

# LUGGAGE POINT INLET STRUCTURE UPGRADE PROJECT

## 1.1 Background

Luggage Point Sewage Treatment Plant (STP) serves the S1 catchment that encompasses approximately half of the population of the City of Brisbane. The plant is located at 200 Main Beach Rd, Pinkenba. The plant receives flow from a combination of domestic and industrial sources but is principally treating domestic sewage.

Prior to the inlet structure upgrade project, the inlet works operated on mechanically raked bar screens. Their primary purpose was to remove coarse solids and rags from the influent stream to protect downstream equipment. The inlet screens and associated mechanical/civil structure consisted of;

- Main stilling chamber
- Four inlet channels
- Eight coarse screens (15mm aperture) with mechanically raked drives, two per inlet channel
- Four outlet penstocks
- Screenings conveyor and screenings press

A feasibility study was undertaken to assess options to address the need for better screening removal at the inlet works to prevent blockages at downstream pumps and valves and to avoid the impacts of ragging on downstream processes within the STP.

The feasibility report recommended the installation of new fine screen units to the existing inlet works structure and upgrade the inlet works for an ultimate hydraulic load of 11,600 L/s, with provision to bypass the new fine screens in the event of screen failure.

Other objectives included;

- Eliminate current WH&S issues
- Maximise the hydraulic capacity of the inlet structure, while satisfying the design criteria, for both screen flows and bypass flows.
- Improve screenings removal efficiency (for downstream operation)
- Meet fine screening requirements as per Development Approval Permit, and
- Be able to retrofit odour control (at a later date).

The inlet screen upgrade project was carried out by Stirloch Constructions Pty Ltd between December 2013 and early 2015.

## 1.2 OVERVIEW OF THE UPGRADED SYSTEM

The Luggage Point STP inlet screens process removes gross solids from the incoming sewage and handles the screening until it is loaded into transportable storage bins.

The inlet works consists of following main process sections:

- 8 x Inlet Screens with 8 associated Inlet and 4 associated outlet penstocks.
- 2 x transfer water sluices.
- 2 x splitter boxes.
- 3 x wash presses for de-watering of the screenings.
- 3 x storage bins for screenings storage and off-site disposal.
- 2 x drainage pumps.
- 1 x wash water pressure system.

Luggage Point STP Inlet Works is designed with a common deep receiving bay where the three pipelines from Eagle Farm Pumping Station discharge Raw Sewage. From this compartment, influent enters the fore bay or stilling area, which comprises four wide individual channels.

These four channels are then split by divider walls to make eight individual 1980mm wide channels where eight band screens are located. Each of the eight inlet channels is isolated, upstream of the screen, by a double isolation package comprising an electrically actuated penstock and a manually inserted stop board.

Each channel has an ANDRITZ AQUA SCREEN which captures and removes the rubbish and debris from the raw sewage in the inlet works. The eight screens are labelled SC-0210-001 to SC-0210-008 and are staggered to form two banks, (Bank A and Bank B). Screenings are automatically removed from the continuous perforated plates of the screens by spraying service water, which is initiated by the backwash cycle of the screens.

Channels 1 and 2, 3 and 4, 5 and 6, 7 and 8 merge downstream of the screens to make four wider channels followed by a penstock in each of these four wider channels.

There are bypass weirs downstream of the screens SC-0210-001, SC-0210-003, SC-0210-005 and SC-0210-007 cut into the divider walls. In the event of the screens become blinded or flow exceeds the screen capacity, the incoming flows overtop the bypass weirs and flow passes to the adjacent inlet channel upstream of SC-0210-002, SC-0210-004, SC-0210-006 and SC-0210-008 respectively.

The screens 1, 3, 5 and 7 (Bank A) drop their screenings onto Screenings Sluice No.1 (SL-0210-001). The spray water provided during the screen backwashing cycle transports the screenings along the sluice launder to discharge into Splitter Box No.1 (DG0210-001). The Splitter Box can direct the screenings to either Wash Press No.1 (WPR-0220-001) or alternatively to Wash Press No.3 (WPR-0220-003).

The screens 2, 4, 6 and 8 (Bank B) drop their screenings onto Screenings Sluice No.2 (SL-0210-002). The spray water provided during the screen backwashing cycle transports the screenings along the sluice launder to discharge into Splitter Box No.2 (DG0210-002). The Splitter Box can direct the screenings to either Wash Press No.2 (WPR-0220-002) or alternatively to Wash Press No.3 (WPR-0220-003).



The Wash Presses wash and compress the screenings and discharge them into an associated Storage Bin. The de-watered screenings from Wash Press 1 is transferred to Storage Bin 1 (BN-0220-001) and from Wash Press 2 to the Storage Bin 2 (BN-0220-002).

Normal operation is for the screenings from Bank A to be delivered to Wash Press 1 and for the screenings from Bank B to be delivered to Wash Press 2. Wash Press 3 and Storage Bin 3 are used as a standby storage destination for both Bank A and Bank B, while the full Storage Bins 1 or 2 are removed and replaced by empty bins.

The Splitter Boxes are arranged so that screenings from both Bank A and Bank B can be diverted to Wash Press 3 at the same time.

A pressure booster pump station is provided for effluent wash water supply to the inlet screening equipment. These pumps are controlled by VSD to maintain constant pressure in the spray and wash water line. This equipment is located remotely from the Inlet Works at the north side of Stage 1A between PST1 and Bioreactor 1.

A drain water sump with two level-controlled submersible pumps return the drain water from the wash presses and floor drains to the inlet collection chamber.

### **1.3 Format of the O&M Manual(s):**

The O&M Manual has been split up into 6 folders/sections. Folder 1 acts as a directory for the O&M utilizing an overall index of what is contained in each section/folder.

Folder 1 provides an overall picture of the project and includes the functional specification which describes the operation of the plant.

Folders 2, 3, 4 & 5 provide specific installation, operation & maintenance documentation from specific vendors and suppliers and also include factory testing, test certificates and commissioning checksheets and procedures.

Folder 6 contains IOM documentation on free issue materials provided by QUU. This information has been included in the Stirloch manuals for the convenience of the QUU operators.



## **1.4 INDEX:**

### **FOLDER 1 : OVERVIEW FOLDER (TMS830)**

**Section 1: Background, Overview, Format, Index**

**Section 2: Functional Specification**

**Section 3: As Constructed Drawings**

**Section 4: Commissioning Plan/Program**

**Section 5: Equipment List & Asset Register**

**Section 6: Electrical Installation - O&M (Draft)**

### **FOLDER 2: DRAINAGE PUMP STATION O&M MANUAL (TMS831)**

**Section 1 – Drainage Pump Station Drawings**

**Section 2 – 3127 Submersible Pump IOM**

**Section 3 – 3127 Submersible Pump Technical Specifications**

**Section 4 – 3127 Submersible Pump Service & Repair Instructions**

**Section 5 – 3127 Submersible Pump Parts List**

**Section 6 – 3127 Submersible Pump Test Reports**

**Section 7 – Multitrode Level Sensor IOM**

**Section 8 – Multitrode Level Sensor Install & Troubleshooting**

**Section 9 – Multitrode Level Sensor Brochure**

**Section 10 – Multitrode Level Sensor Chemical Information**

**Section 11 – Drainage Pump Station Control Cabinet & Wiring Drawings**



## **FOLDER 3: BOOSTER PUMP STATION O&M MANUAL (TMS832)**

### **Section 1 – Grundfos**

- 1.1 MPC I&O Manual Cover Page**
- 1.2 Pre-commissioning Checksheet**
- 1.3 Table of Contents**

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### **Section 3 – Grundfos System Operation Description**

- 3.1 Hydro MPC I&O**
- 3.2 CU3X2 I&O + IO 351 I&O**

### **Section 4 – Grundfos Pumps**

- 4.1 Installation and Operation**
- 4.2 Curves**

### **Section 5 – Grundfos Hydro MPC Quick Guide**

### **Section 6 – Grundfos Electrical Details and Wiring Diagrams**

### **Section 7 – Grundfos Mechanical System Drawings**

### **Section 8 – Grundfos Test Details and Settings**

### **Section 9 – Amiad SAF 6000 Filter**

- 9.1 IOM SAF 6000 Filter**
- 9.2 IOM Manual Strainer**

### **Section 10 – Amiad SAF 6000 Filter**

- 10.1 Drawings**
- 10.2 Test Documents and Reports**



## **FOLDER 4: WASH PRESS AND SLUICE LAUNDER O&M MANUAL (TMS833)**

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**Section 2: Wash Press Operating Instructions**

**Section 3: Wash Press Control Concept**

**Section 4: Motox Gearbox Operating Instructions**

**Section 5: Siemens Low Voltage Motors Operating Instructions**

**Section 6: Wash Press Solenoid Valves Operating Instructions**

**Section 7: Sluicing Launder**

**Section 8: Distribution Box - Festo Cylinder Information**

**Section 9: Installation and Acceptance ITP's, FAT Documents**

**Section 10: Drawings**

## **FOLDER 5: MISCELLANEOUS ITEMS – VALVES, FLOWMETER, PENSTOCKS (TMS834)**

**Section 1: AWE Double Isolation Module O&M**

**Section 2: AWE Double Isolation Module Drawings**

**Section 3 : ABB Flowmeter Data Sheet + Calibration Certificates**

**Section 4: ABB Flowmeter User Guide**

**Section 5: ABB Flowmeter Transmitter Guide**

**Section 6: Swingflex Check Valve Data Sheet + IOM**

**Section 7: Resilient Seat Gate Valve Data Sheet + IOM**

**Section 8: Heavy Duty Knifegate Valve Data Sheet + IOM**

**Section 9: SS316 Ball Valve Data Sheet + IOM**

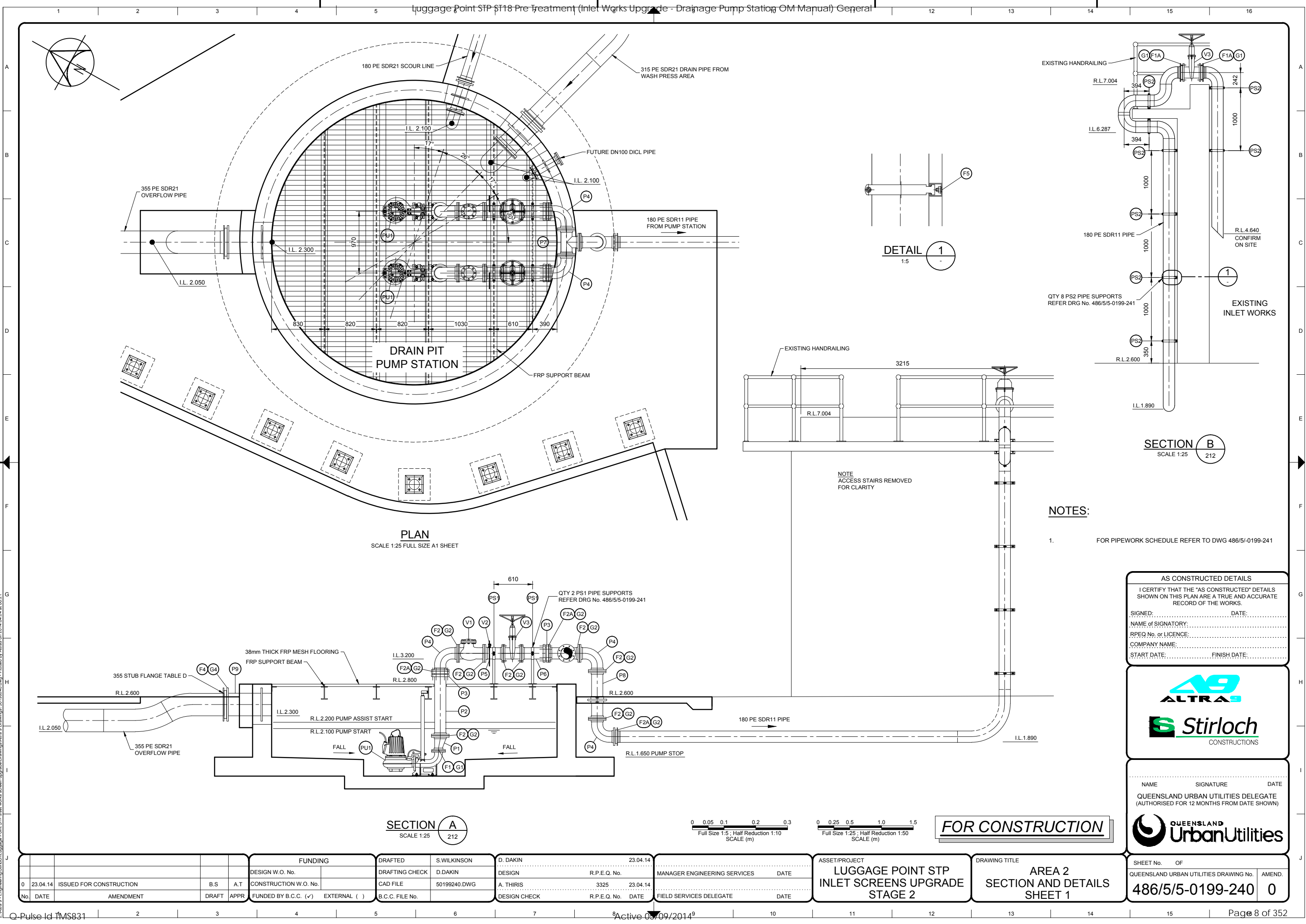
**Section 10: ARI Combination Air Valve Data Sheet + IOM**

## **FOLDER 6: QUU SUPPLIED INFORMATION (TMS835)**

**Section 1-9: ANDRITZ Screens O&M Manual**

**Section 12-15: Spirac Bin and Retractable Chute IOM + Miscellaneous Info**

# Section 1 – Drainage Pump Station Drawings



NOTES:

1. FOR PIPEWORK SCHEDULE REFER TO DWG 486/5-0199-241

AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: \_\_\_\_\_ DATE: \_\_\_\_\_

NAME of SIGNATORY: \_\_\_\_\_

RPEQ No. or LICENCE: \_\_\_\_\_

COMPANY NAME: \_\_\_\_\_

START DATE: \_\_\_\_\_ FINISH DATE: \_\_\_\_\_



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QUEENSLAND URBAN UTILITIES DELEGATE (AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

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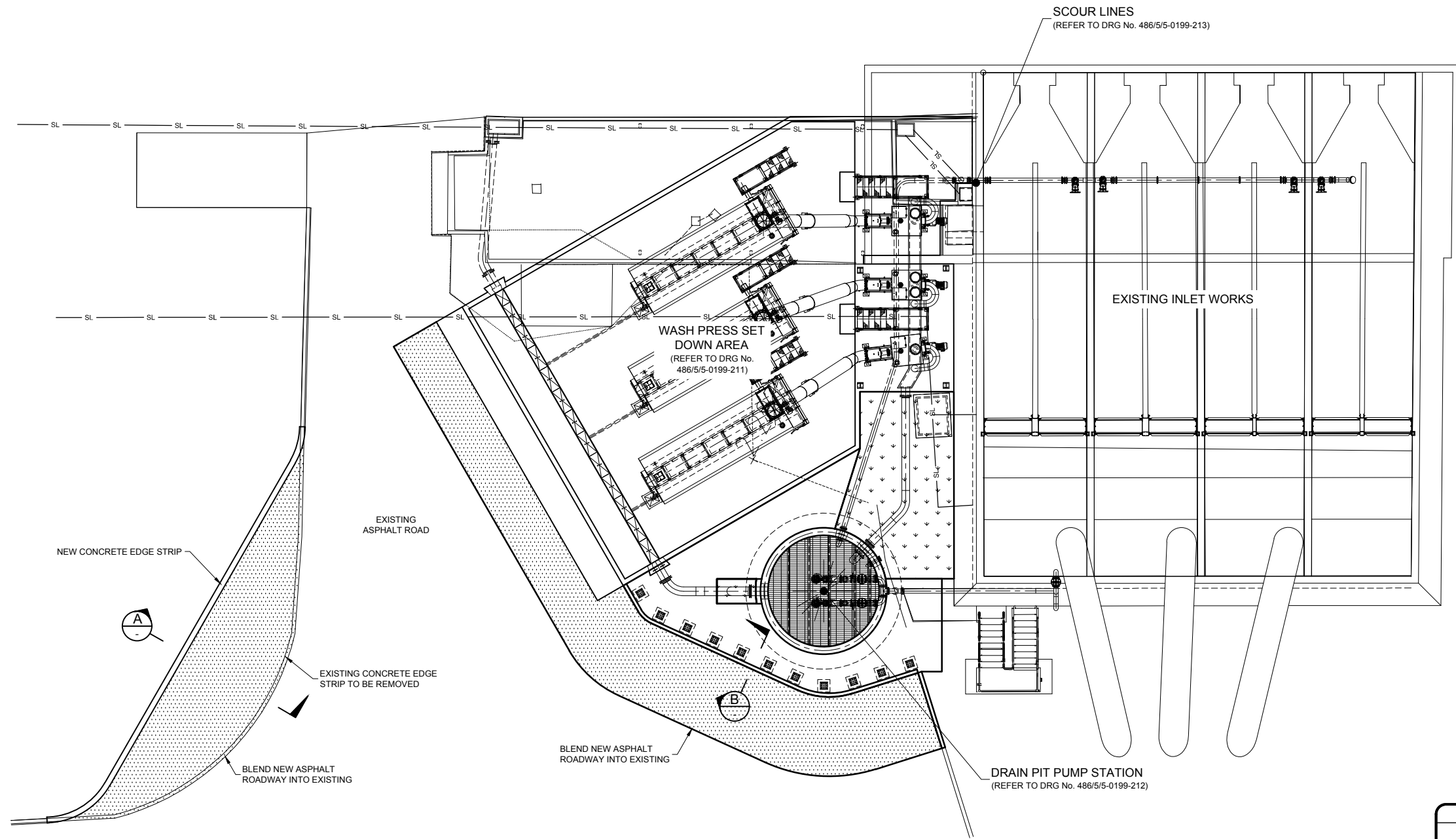
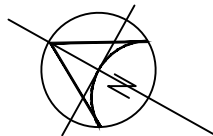
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ASSET/PROJECT

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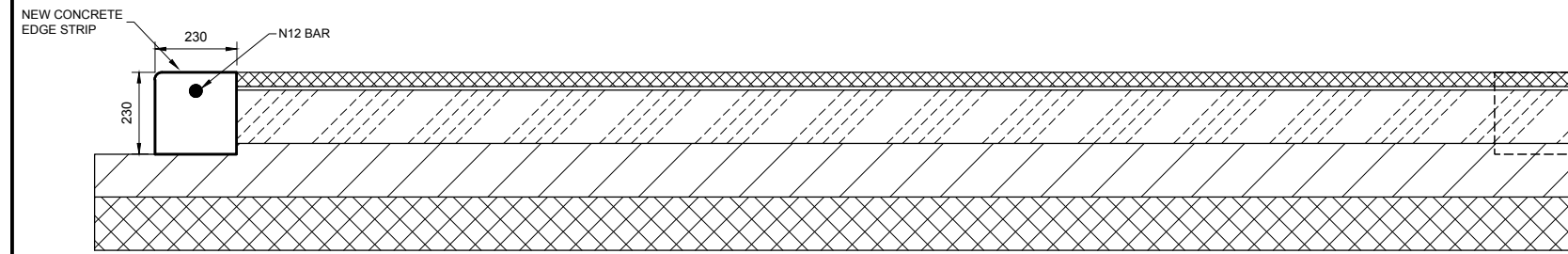
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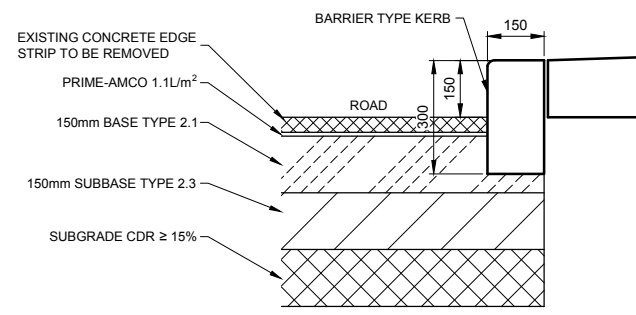


- LEGEND**
- NEW GRAVEL AREA
  - NEW ASPHALT

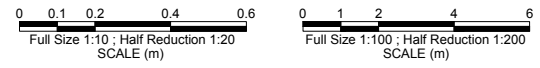
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**SECTION A**  
1:10  
TYPICAL FLEXIBLE UNBOUND GRANULAR



**SECTION B**  
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BARRIER KERB DETAIL  
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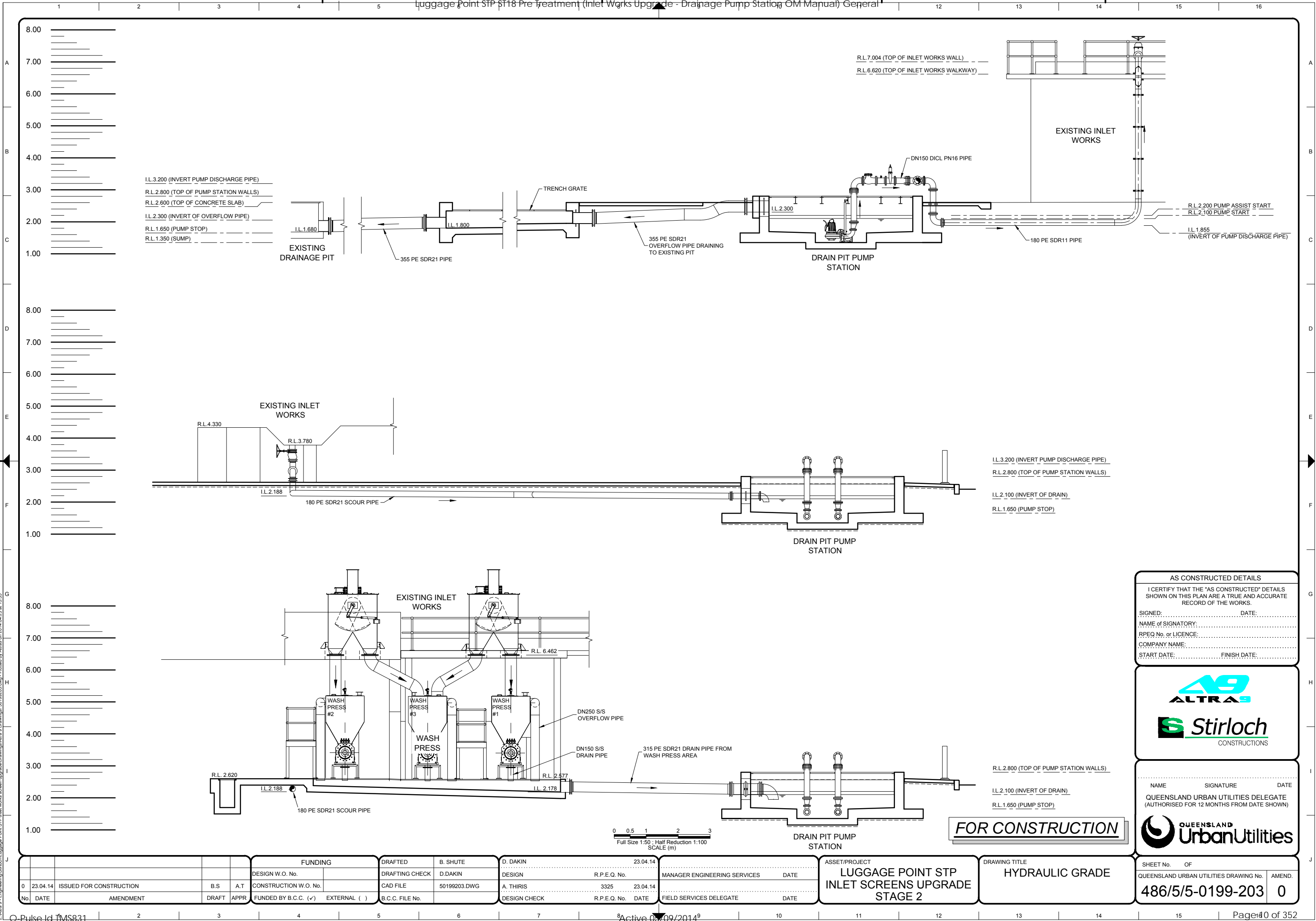
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COMPANY NAME: \_\_\_\_\_  
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COMPANY NAME: \_\_\_\_\_

START DATE: \_\_\_\_\_ FINISH DATE: \_\_\_\_\_



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**FOR CONSTRUCTION**

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Full Size 1:50 : Half Reduction 1:100  
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# Section 2 – 3127 Submersible Pump IOM

# Installation, Operation, and Maintenance Manual



3127





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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



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**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.

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**NOTICE:**

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

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## Safety



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**WARNING:**

- The operator must be aware of safety precautions to prevent physical injury.
  - Any pressure-containing device can explode, rupture, or discharge its contents if it is over-pressurized. Take all necessary measures to avoid over-pressurization.
  - 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 an Xylem representative before proceeding.
  - This manual clearly identifies accepted methods for disassembling units. These methods must be adhered to. Trapped liquid can rapidly expand and result in a violent explosion and injury. Never apply heat to impellers, propellers, or their retaining devices to aid in their removal.
  - Do not change the service application without the approval of an authorized Xylem representative.
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**CAUTION:**

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

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## Safety terminology and symbols

### About safety messages

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

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

## Hazard levels

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

## Hazard categories

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

Electrical hazards are indicated by the following specific symbol:



**Electrical Hazard:**

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

- Crush hazard
- Cutting hazard
- Arc flash hazard

## Magnetic hazard

Magnetic hazards are indicated by a specific symbol that replaces the typical hazard level symbols:



**CAUTION:**

## The Ex symbol

The Ex symbol indicates safety regulations for Ex-approved products when used in atmospheres that are potentially explosive or flammable.



## Environmental safety

### The work area

Always keep the station clean to avoid and/or discover emissions.

### 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.



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**WARNING:**

Do NOT send the product to the Xylem manufacturer if it has been contaminated by any nuclear radiation. Inform Xylem so that accurate actions can take place.

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### Electrical installation

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

### Recycling guidelines

Always recycle according to these guidelines:

1. Follow local laws and regulations regarding recycling if the unit or parts are accepted by an authorized recycling company.
2. If the first guideline is not applicable, then return the unit or parts to your Xylem representative.

## 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

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**NOTICE:**

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

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## 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:

Condition	Action
Chemicals or hazardous fluids in eyes	<ol style="list-style-type: none"> <li>1. Hold your eyelids apart forcibly with your fingers.</li> <li>2. Rinse the eyes with eyewash or running water for at least 15 minutes.</li> <li>3. Seek medical attention.</li> </ol>
Chemicals or hazardous fluids on skin	<ol style="list-style-type: none"> <li>1. Remove contaminated clothing.</li> <li>2. Wash the skin with soap and water for at least 1 minute.</li> <li>3. Seek medical attention, if necessary.</li> </ol>

## 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 authorized Xylem representative.
- Only use parts that are provided by an authorized Xylem representative.

### 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 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 faults in products from Xylem under these conditions:

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

### Limitations

The warranty does not cover faults caused by these situations:

- Deficient maintenance
- Improper installation
- Modifications or changes to the product and installation made without consulting Xylem
- 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 arise for a warranty claim, then contact your Xylem representative.

### **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 your sales representative if anything is out of order.

## Transportation guidelines

### Precautions



---

**WARNING:**

- Stay clear of suspended loads.
  - Observe accident prevention regulations in force.
- 

### 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



---

**WARNING:**

- Crush hazard. The unit and the components can be heavy. Use proper lifting methods and wear steel-toed shoes at all times.
  - Lift and handle the product carefully, using suitable lifting equipment.
  - The product must be securely harnessed for lifting and handling. Use eyebolts or lifting lugs if available.
  - Always lift the unit by its lifting handle. Never lift the unit by the motor cable or by the hose.
  - Do not attach sling ropes to shaft ends.
-

### Lifting equipment

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

- The minimum height (contact Xylem 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 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.

---

**NOTICE:**

Oversized lifting equipment could cause damage if the unit should stick when being lifted.

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## 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 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 6 months, 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.

For a list of pump version and corresponding motor type, see [Motor data](#) (page 67).

## Intended use

The product is intended for moving waste water, sludge, raw and clean water. Always follow the limits given in [Application limits](#) (page 67). If there is a question regarding the intended use of the equipment, please contact an Xylem representative before proceeding.



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**WARNING:**

In explosive or flammable environments, only use Ex- or MSHA-approved pumps.

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**NOTICE:**

Do NOT use the pump in highly corrosive liquids.

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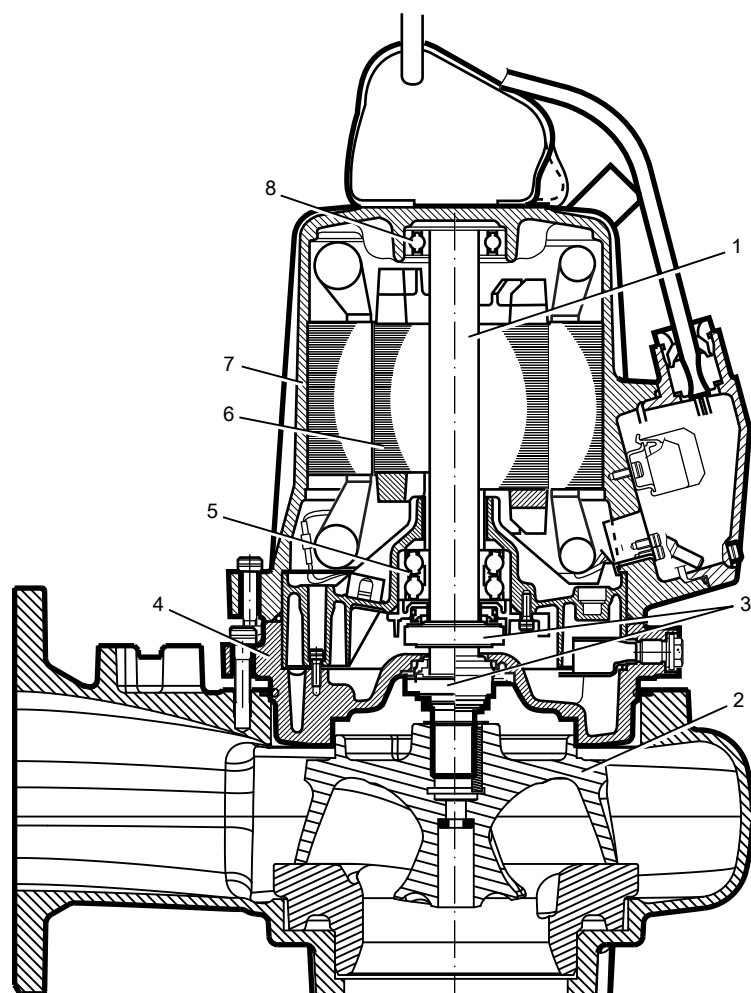
## Spare parts

- Modifications to the unit or installation should only be carried out after consulting with Xylem.
- Original spare parts and accessories 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.

## Pressure class

LT	Low head
MT	Medium head
HT	High head
SH	Super high head

## Parts



Position	Part	Description
1	Shaft	The shaft is made of stainless steel, with an integrated rotor.
2	Impeller	There are multiple types of impellers. For information about the pumps impellers, see Parts List.
3	Mechanical seals	One inner and one outer seal in a combination of materials: <ul style="list-style-type: none"> <li>Aluminium oxide <math>Al_2O_3</math></li> <li>Corrosion-resistant cemented carbide WCCR</li> </ul> For information about the pumps mechanical seals, see Parts List.
4	Oil housing	The oil housing includes a coolant that lubricates and cools the seals; the housing acts as a buffer between the pumped fluid and the drive unit.
5	Main bearing	The bearing consisting of a two-row angular contact ball bearing.
6	Motor	For information about the motor, see <a href="#">Motor data</a> (page 67).
7	Stator housing	The pump is cooled by the ambient liquid/air.
8	Support bearing	The bearing consisting of a single-row ball bearing.

## Monitoring equipment

The following applies to the monitoring equipment of the pump:

- The stator incorporates three thermal contacts connected in series that activate the alarm and stops the pump at overtemperature
- The thermal contacts open at 125°C (257°F).
- Ex-approved pumps must have thermal contacts connected to the control panel.
- The sensors must be connected to either the MiniCAS II 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

**FLS** FLS 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 FLS sensor is installed in the bottom of the stator housing.

**CLS** CLS is a sensor for detection of water in the oil housing. The sensor initiates an alarm when the oil contains approximately 35% water. The sensor is installed in the bearing housing/bearing holder with its sensing part in the oil housing. The CLS sensor is not applicable to Ex-approved pumps.

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#### NOTICE:

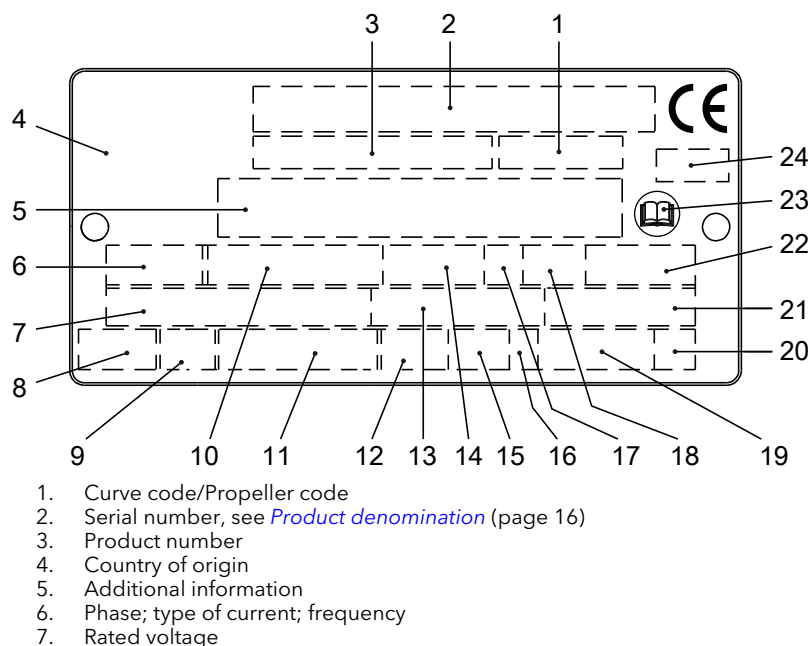
The CLS sensor body is made of glass. Handle the sensor with care.

---

One CLS and one FLS sensor can be used in the same pump, if they are connected in parallel.

## The data plate

The data plate is a metal label located on the main body of the products. The data plate lists key product specifications. Specially approved products also have an approval plate.






8. Thermal protection
9. Thermal class
10. Rated shaft power
11. International standard
12. Degree of protection
13. Rated current
14. Rated speed
15. Maximum submergence
16. Direction of rotation: L=left, R=right
17. Duty class
18. Duty factor
19. Product weight
20. Locked rotor code letter
21. Power factor
22. Maximum ambient temperature
23. Read installation manual
24. Notified body. Only for EN-approved Ex-products

Figure 1: The data plate

## Approvals

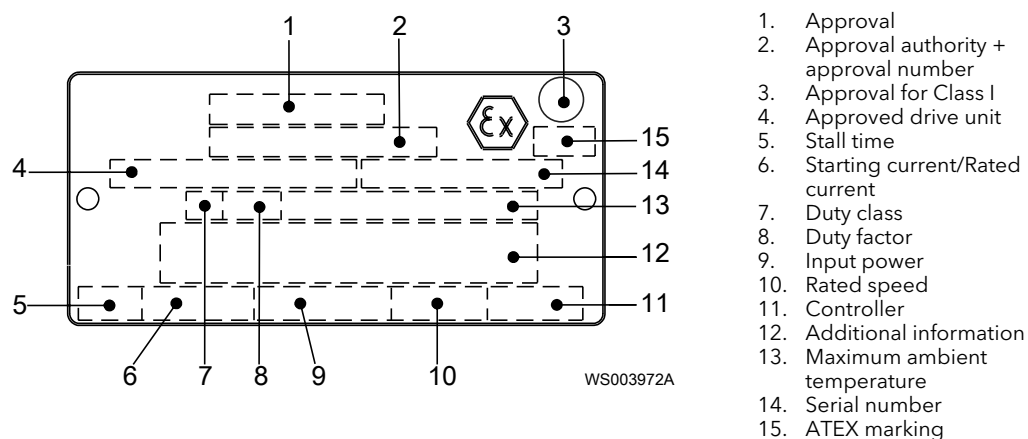
Product approvals for hazardous locations

Pump	Approval
<ul style="list-style-type: none"> <li>• 3127.090</li> <li>• 3127.095</li> <li>• 3127.190</li> <li>• 3127.390</li> <li>• 3127.810</li> <li>• 3127.830</li> <li>• 3127.850</li> <li>• 3127.910</li> </ul>	European Norm (EN) <ul style="list-style-type: none"> <li>• ATEX Directive</li> <li>• EN 60079-0, EN 60079-1, EN 1127-1</li> <li>•  I M2 Ex d I</li> <li>•  II 2 G Ex d IIB T4</li> </ul>
	EN approval for cable entry: <ul style="list-style-type: none"> <li>• Certificate number: INERIS 02ATEX9008 U</li> <li>•  II 2 G Ex d IIC or I M2 Ex d I</li> </ul>
	IEC <ul style="list-style-type: none"> <li>• IECEx scheme</li> <li>• IEC 60079-0, IEC 60079-1</li> <li>• Ex d I</li> <li>• Ex d IIB T4</li> </ul>
	Factory Mutual (FM) <ul style="list-style-type: none"> <li>• Class I. Div 1. Group C and D</li> <li>• Dust ignition proof for use in Class II. Div 1. Group E, F and G</li> <li>• Suitable for use in Class III. Div 1. Hazardous Locations</li> </ul>

### EN approval plate

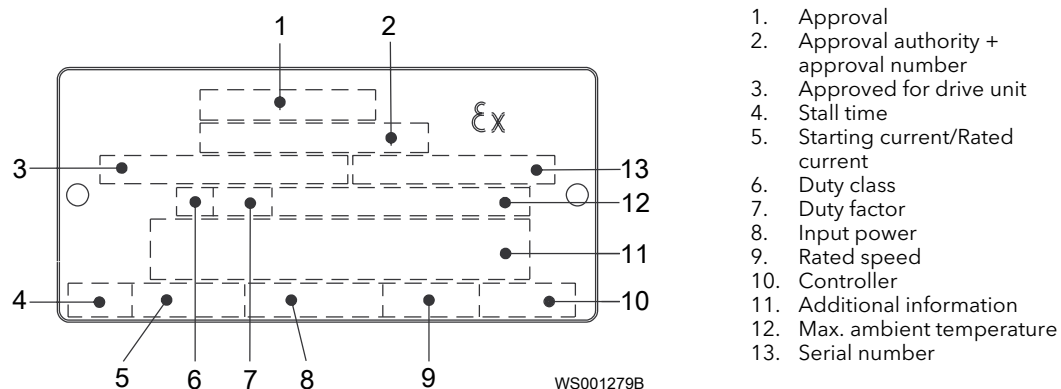
This illustration describes the EN approval plate and the information contained in its fields.

## Product Description



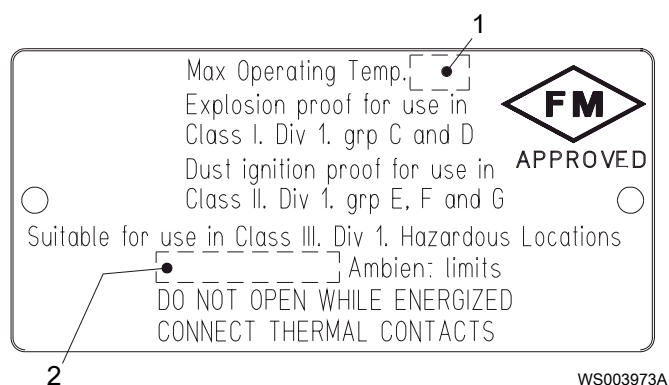
## IEC approval plate

This illustration describes the IEC approval plate and the information contained in its fields. International Norm; not for EU member countries.



## FM approval plate

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

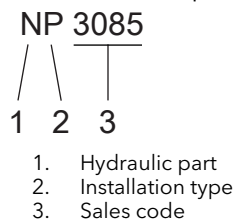


## Product denomination

## Sales denomination

The sales denomination consists of the four-digit sales code and two letters that indicate the hydraulic end and type of installation.

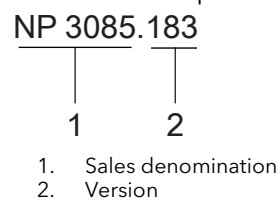
This is an example of a sales denomination, and an explanation of its parts.



## Product code

The product code consists of nine characters divided into two parts.

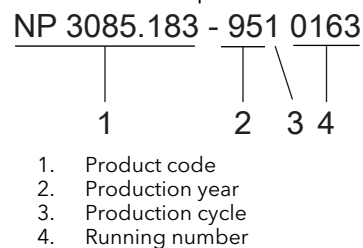
This is an example of a product code, and an explanation of its parts.



## Serial number

The serial number is used for identification of an individual product, and is divided into four parts.

This is an example of a serial number, and an explanation of its parts.



# Installation

## Install the pump



---

**WARNING:**

- Before installing the pump, check that the cable and cable entry have not been damaged during transportation.
  - Note that special rules apply to installation in explosive atmospheres.
  - Make sure that the unit cannot roll or fall over and injure people or damage property.
  - Do not install CSA-approved products in locations that are classified as hazardous in the national electric code, ANSI/NFPA 70-2005.
  - Do not install the starter equipment in an explosive zone unless it is explosion-proof rated.
- 



---

**WARNING:**

A permanent-magnet motor generates voltage when the shaft is rotating. Ensure that the shaft can not rotate before performing any electrical installation.

---

---

**NOTICE:**

- Do not run the pump dry.
  - Never force piping to make a connection with a pump.
  - Always remove all debris and waste material from the sump, inlet piping, and discharge connection, before you install the pump.
- 

These requirements apply:

- Use the pump dimensional drawing in order to ensure proper installation.
- Provide a suitable barrier around the work area, for example, a guard rail.
- Check the explosion risk before you weld or use electric hand tools.
- If the unit has a permanent magnet motor, ensure that you have read and understood all safety instructions regarding permanent magnet motors.

### Authority regulation

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

### Fasteners



---

**WARNING:**

- 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 P-installation

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.

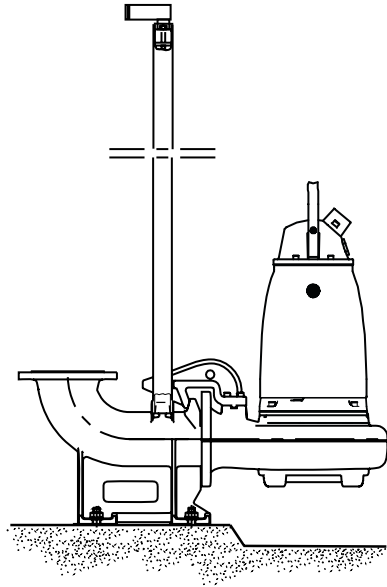


Figure 2: P-installation

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
- Cable holder for holding the cable
- 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. Install the access frame:
  - a) Place the access frame in position and align it horizontally.
  - b) Grout the frame in place.
2. Grout the anchor bolts in place.  
Be careful when you align and position the discharge connection in relation to the access frame.
3. Place the discharge connection in position, and tighten the nuts.
4. 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.
5. Connect the discharge pipe to the discharge connection.
6. Lower the pump along the guide bars.  
When it reaches the bottom position, the pump automatically connects to the discharge connection.

7. 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 34).

Clean all debris from the sump before starting the pump.

## Install with S-installation

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.

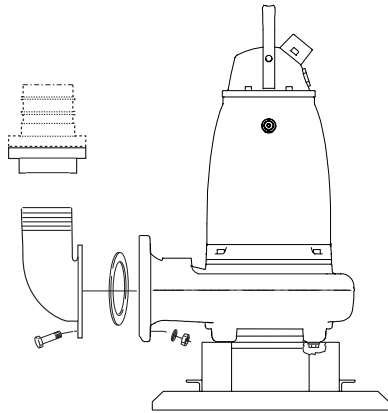


Figure 3: S-installation

1. Run the cable so that it has no sharp bends. Make sure that it 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 34).

## Install with T/Z-installation

This installation is not applicable for these versions:

- 170
- 890

In the T-installation, the pump is installed in a vertical position in a dry well next to the wet sump. These requirements and instructions only apply when the installation is made according to the dimensional drawing.

In the Z-installation, the pump is installed in a horizontal position on a support stand in a dry well next to the wet sump. The following requirements and instructions are for Z-installations that comply to the dimensional drawing.

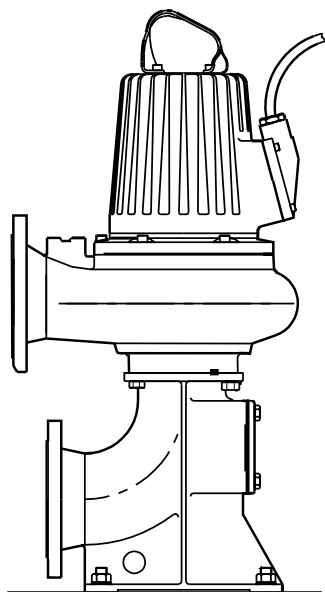


Figure 4: T-installation

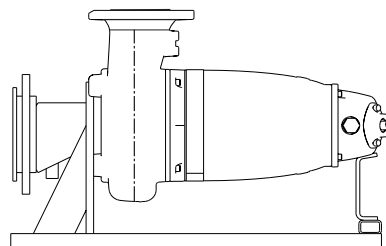


Figure 5: Z-installation

These items are required:

- Anchor bolts for anchoring the pump to a base.
- Shut-off valves that allow you to remove the pump from service

---

#### NOTICE:

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

---

1. Fasten the pump:
  - a) Bolt the stationary suction connection to the concrete base.
  - b) Bolt the pump to the suction connection.
2. Make sure that the pump is vertical for the T-installation or horizontal for the Z-installation.
3. Connect the suction line and discharge line.
4. 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 34).
5. Make sure that the weight of the pump does not put strain on the piping.

### Install with F-installation

In the F-installation, the pump is free standing and installed primarily in a small sump on a firm surface. The pump is intended to operate completely or partially submerged in the pumped liquid. The pump is equipped with a connection for hose or pipe and with supporting legs and/or a strainer. These requirements and instructions are for F-installations that comply to the dimensional drawing.

## Installation

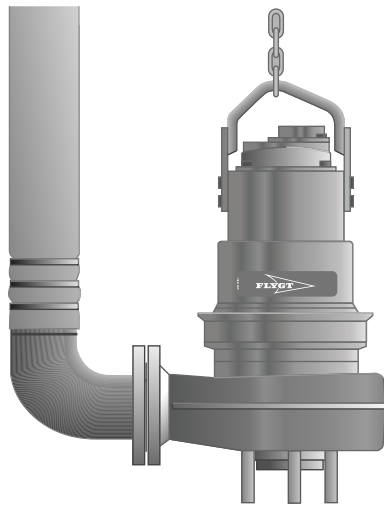


Figure 6: F-installation

These items are required:

- Nipple pipe/Flange/Coupling
  - Pipe or hose
1. Run the cable so that it has no sharp bends, is not pinched, and cannot be sucked into the pump inlet.
  2. Fit the nipple pipe/flange/coupling.
  3. Lower the pump into the sump.
  4. Place the pump on the sump bottom and make sure it cannot fall over.
  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 34).

## Install with X-installation

In the X-installation, the pump has no pre-determined mechanical connection. The flange is drilled.

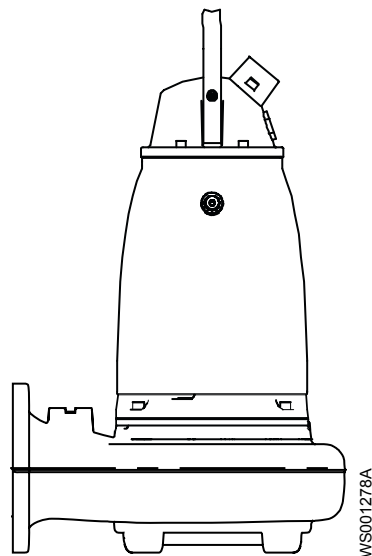


Figure 7: X-installation

---

**NOTICE:**

A pump prepared for X-installation is only approved to be used in P- or S-installation. Never use it in T- or Z-installation

---

For installation instructions, see appropriate mechanical accessories.

## Make the electrical connections

### General precautions



---

**Electrical Hazard:**

- A certified electrician must supervise all electrical work. Comply with all local codes and regulations.
  - 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.
  - Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable above the liquid level.
  - Make sure that all unused conductors are insulated.
  - 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.
  - A permanent-magnet motor generates voltage when the shaft is rotating. Ensure that the shaft can not rotate before performing any electrical installation.
- 



---

**WARNING:**

Do not install the starter equipment in an explosive zone unless it is explosion-proof rated.

---



---

**CAUTION:**

If the pump is equipped with automatic level control and/or internal contactor, there is a risk of sudden restart.

---

### 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.

---

Installation

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- The thermal contacts/thermistors must be in use.
- For FM-approved pumps, FLS 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 an Xylem service shop.
- 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.
- The screened cable must be used according to the European CE requirements if a Variable Frequency Drive (VFD) is used. For more information, contact your Xylem representative (VFD-supplier).

## Earthing (Grounding)



---

### Electrical Hazard:

- You must earth (ground) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the earth (ground) lead to verify that it is connected correctly.
  - If the motor cable is jerked loose by mistake, the earth (ground) conductor should be the last conductor to come loose from its terminal. Make sure that the earth (ground) conductor is longer than the phase conductors. This applies to both ends of the motor cable.
  - Risk of electrical shock or burn. You must connect an additional earth- (ground-) fault protection device to the earthed (grounded) connectors if persons are likely to come into physical contact with the pump or pumped liquids.
- 

## Connect the motor cable to the pump

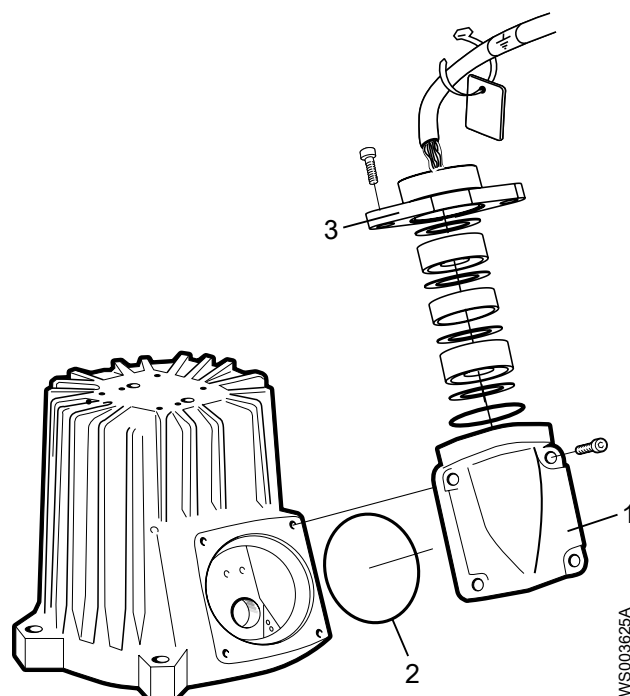


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### CAUTION:

Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable above the liquid level.

---



1. Entrance cover
2. O-ring
3. Entrance flange

1. Remove the entrance cover and the O-ring from the stator housing.  
This provide access to the terminal board/closed end splices.
2. Check the data plate to see which connections are required for the power supply.
3. Arrange the connections on the terminal board/closed end splices in accordance with the required power supply.
4. Connect the mains leads (L1, L2, L3, and earth (ground)) according to applicable cable chart.  
The earth (ground) lead must be 50 mm ( 2.0 in.) longer than the phase leads in the junction box of the unit.
5. Make sure that the pump is correctly connected to earth (ground).
6. Make sure that any thermal contacts incorporated in the pump are properly connected to the terminal block/closed end splices.
7. Install the entrance cover and the O-ring on the stator housing.
8. 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



### **WARNING:**

Do not install the starter equipment in an explosive zone unless it is explosion-proof rated.

**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.

The single phase pumps must be equipped with a starter which has start and run capacitors.

A specially Flygt designed starter is required for the operation of single phase pumps. The connection of the motor cable to the starter is shown in the wiring diagram.

1. If thermal contacts are included in the pump installation, connect the T1 and T2 control conductors to the monitoring equipment.

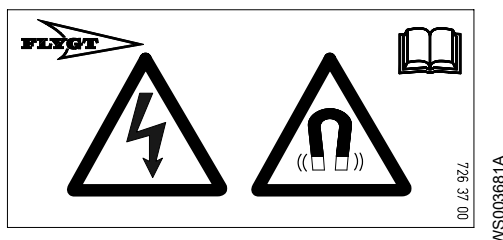
Do not connect the T1 and T2 leads to thermal contacts if the temperature of the pumped liquid is above 40°C (104°F).

**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 earth [ground]) to the starter equipment.  
For information about the phase sequence and the color codes of the leads, see [Cable charts](#).
3. Ensure that the warning label is attached to the cable end. In case the label is missing, attach the spare label to the cable end.

The label is delivered with the pump.

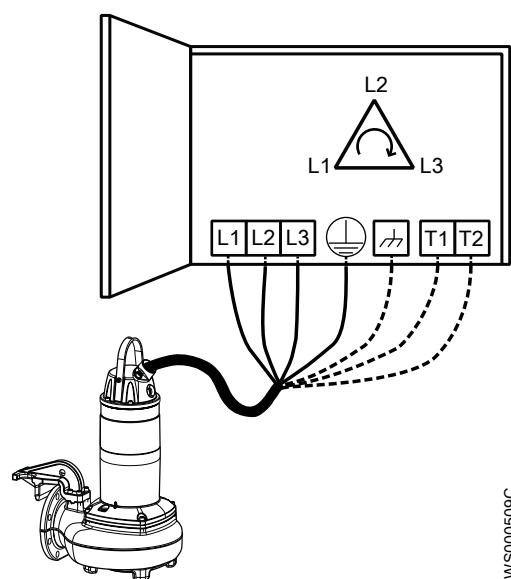


4. Check the functionality of the monitoring equipment:
  - a) Check that the signals and the tripping function work properly.
  - b) Check that the relays, lamps, fuses, and connections are intact.
 Replace any defective equipment.

## Cable charts

### Description

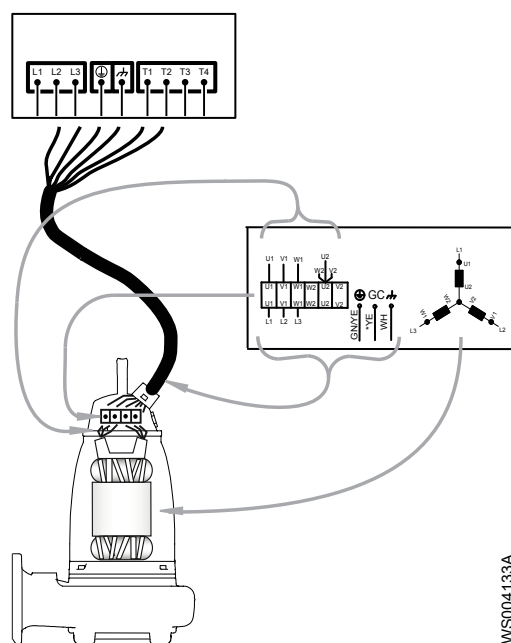
This topic contains general connection information. It also provides cable charts that show connection alternatives for use with different cables and power supply.



WS000509C

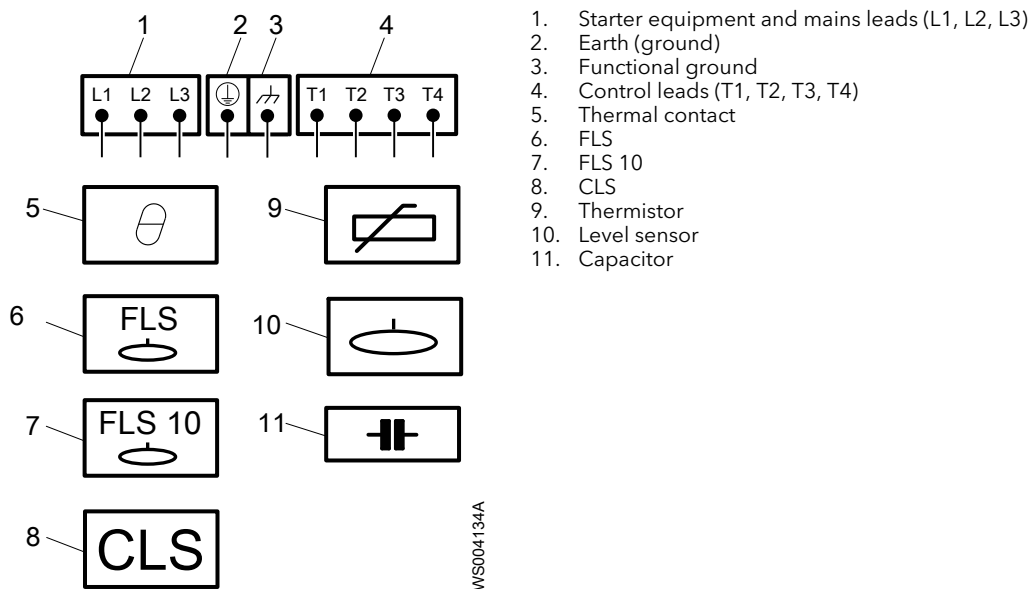
Figure 8: Phase sequence

### Connection locations



WS004133A

## Installation



## 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

## Colors and markings of leads

Motor connection		Mains		SUBCAB 7GX Screenflex 7GX	SUBCAB 4GX Screenflex 4GX	SUBCAB AWG	SUBCAB Screened
Colours and marking of main leads		1~	3~				
<b>COLOUR STANDARD</b> BN=Brown BK=Black WH=White OG=Orange GN=Green GN/YE=Green-Yellow RD=Red GY=Grey BU=Blue YE=Yellow *SUBCAB AWG ** Ground Conductor is stranded around cores GC=Ground Check	<b>STATOR LEADS</b> U1,U5 RD U2,U6 GN V1,V5 BN V2,V6 BU W1,W5 YE W2,W6 BK T1,T2 WH/YE	1	L1	BK 1	BN	RD	BN
		2	L2	BK 2	BK	BK	BK
		3	L3	BK 3	GY	WH	GY
			L1	BK 4	-	-	-
			L2	BK 5	-	-	-
			L3	BK 6	-	-	-
				GN/YE	GN/YE	GN/YE	**Screen/PE from cores
				Screen (WH)	Screen (WH)	-	Screen (WH)
				-	-	YE	-
				-	-	-	-

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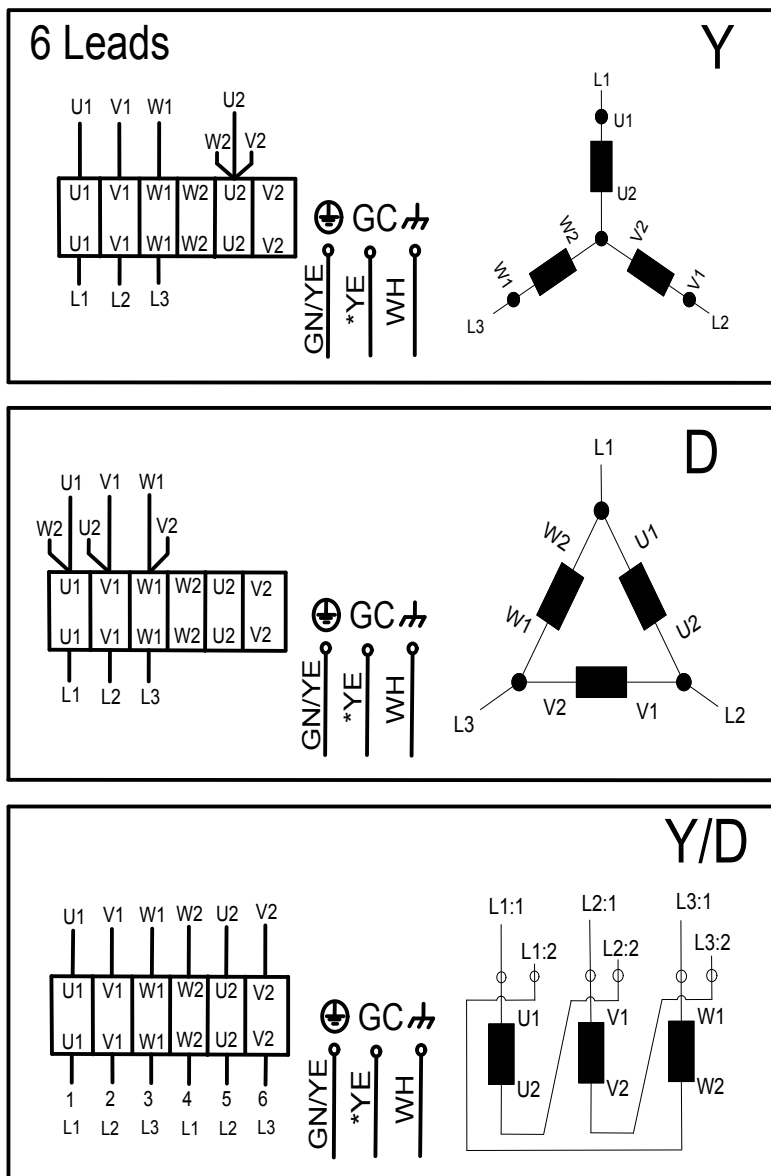
For markings on sensor leads, see [Sensors connection](#) (page 33).

## Connections included

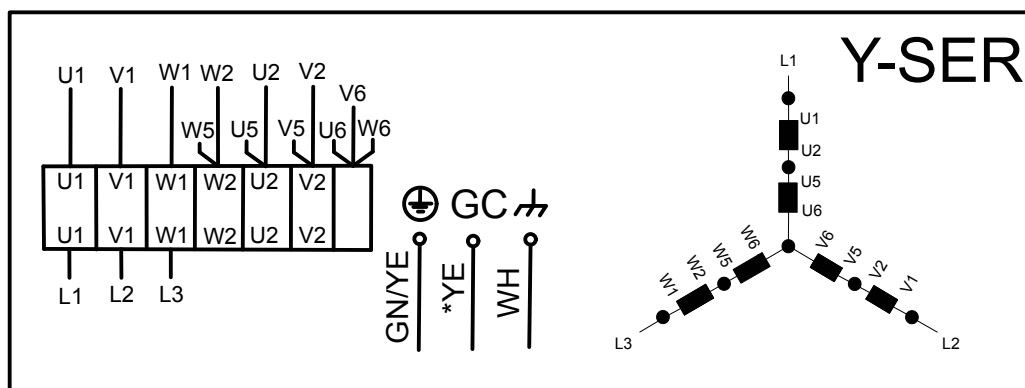
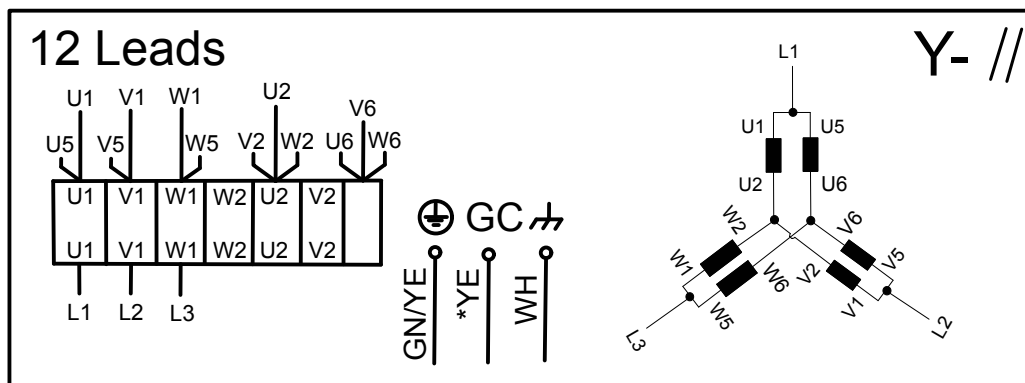
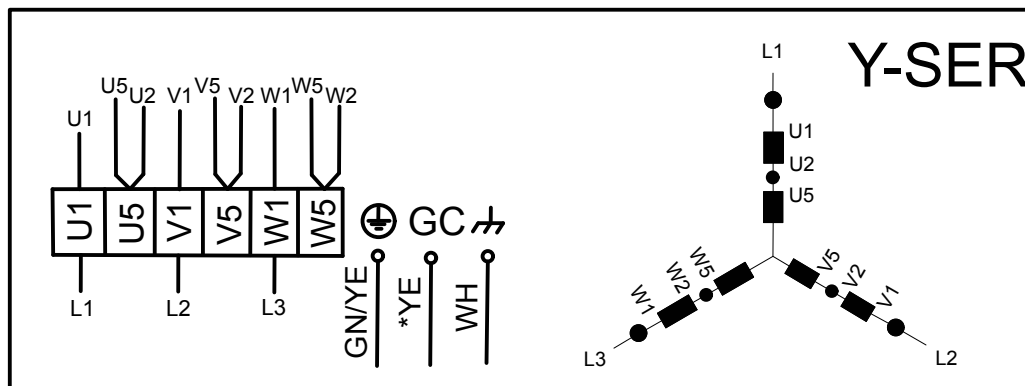
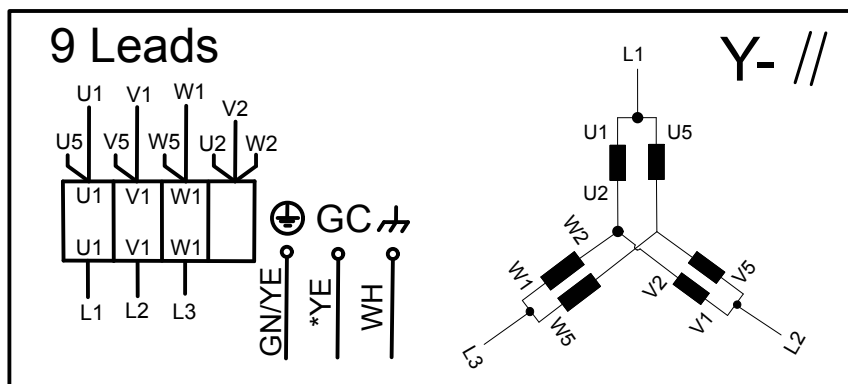
- [3-phase connection](#) (page 29)
- [1-phase connection](#) (page 31)

- [Sensors connection](#) (page 33)
- [Screened cable connection](#) (page 32)

### 3-phase connection

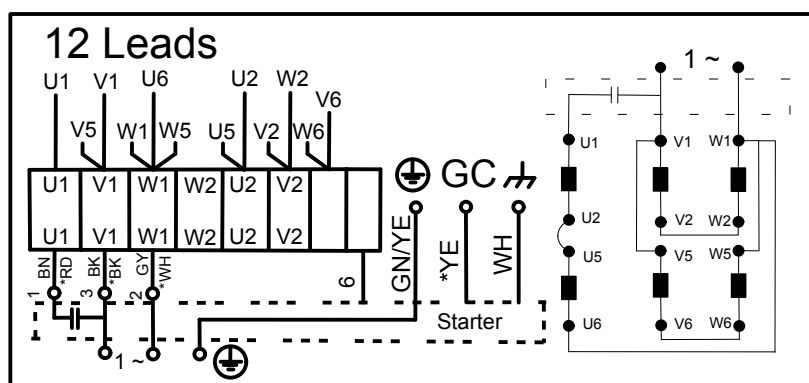
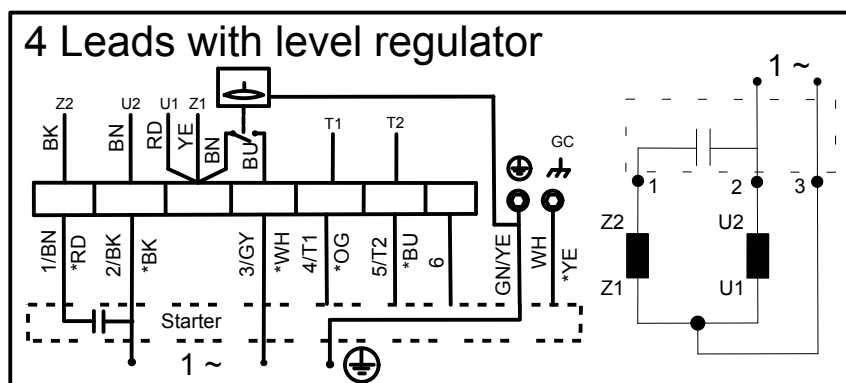
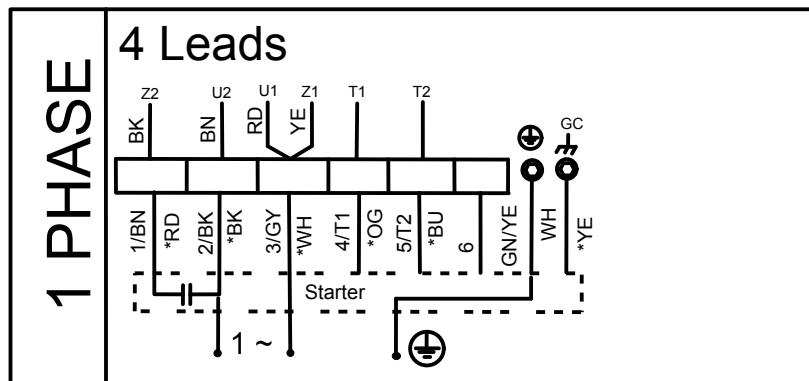


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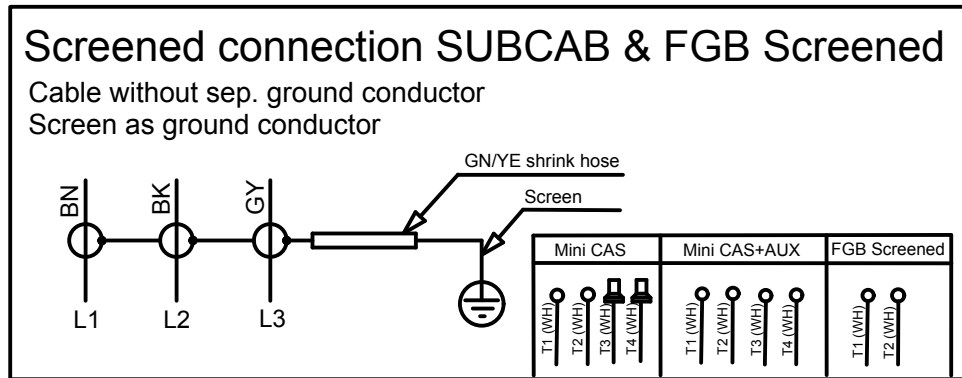
## 1-phase connection



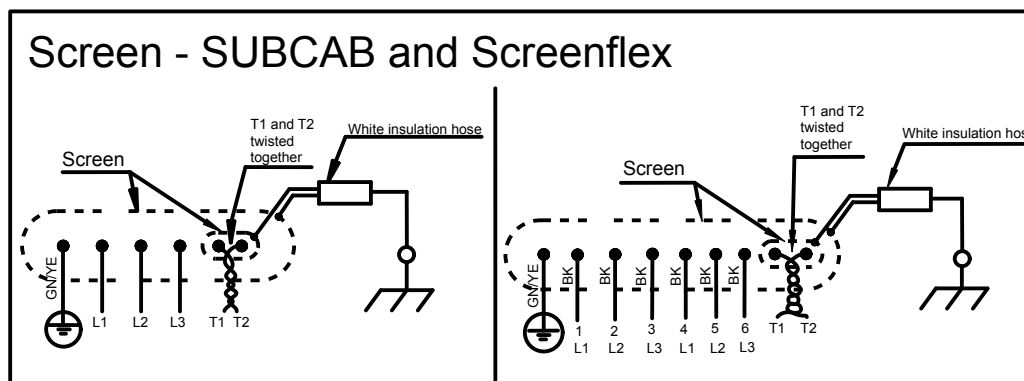
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## Installation

### Screened cable connection

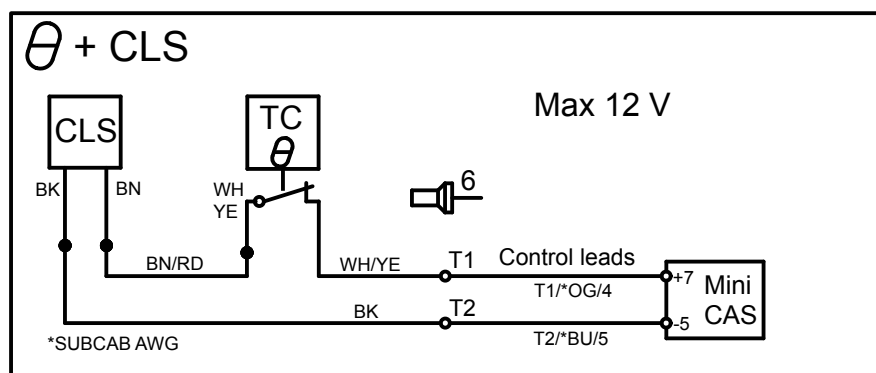
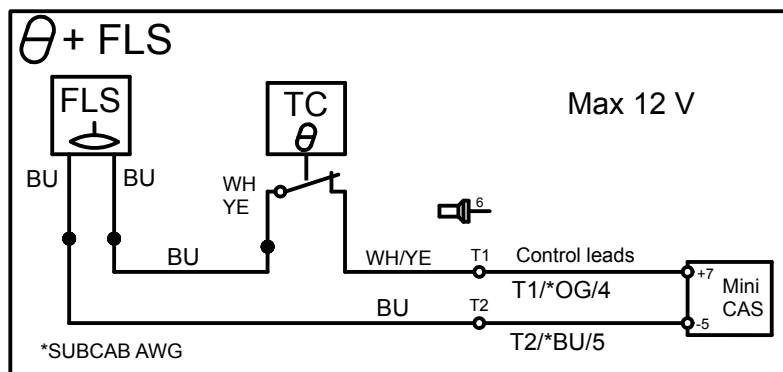
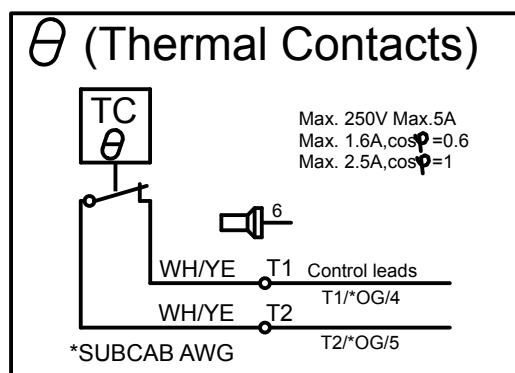


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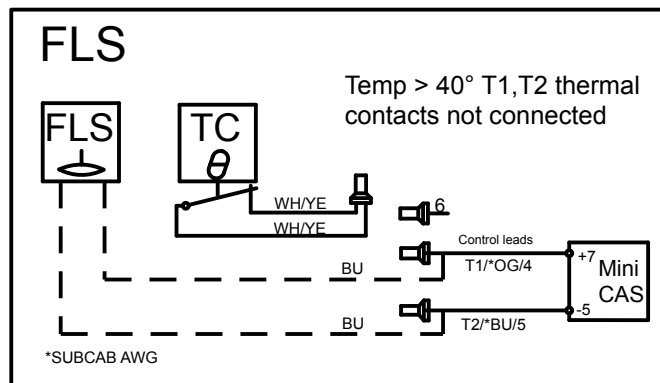
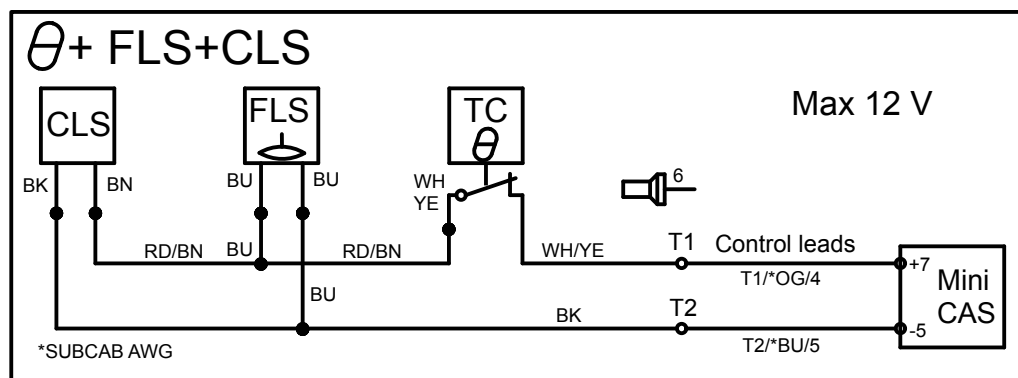


## Sensors connection

SENSORS	Control	SUBCAB 7GX & 4GX Screenflex	SUBCAB AWG	SUBCAB screened
	T1	WH T1	OG	WH T1
	T2	WH T2	BU	WH T2
	T3	-	-	WH T3
	T4	-	-	WH T4



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### Sensor connection characteristics

The values have a 10 % tolerance.

Sensors	Value (mA)	Definition
FLS and thermal contact	0	Overtemperature
	7.8	OK
	36	Leakage
CLS and thermal contact	0	Overtemperature
	5.5	OK
	29	Leakage (5 seconds delay)
CLS, FLS and thermal contact	0	Overtemperature
	13.3	OK
	36-42	Leakage (0/5 seconds delay)

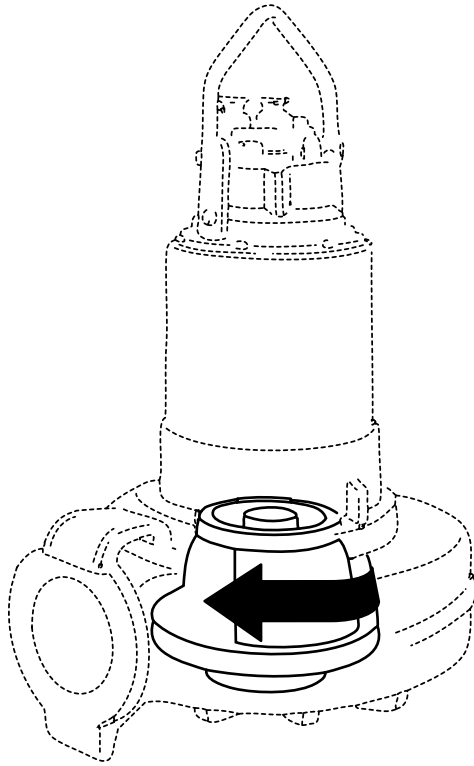
## Check the impeller rotation



### WARNING:

The starting jerk can be powerful.

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, do one of these steps:
  - If the motor has a 1-phase connection, contact the local Xylem shop.
  - If the motor has a 3-phase connection, transpose two phase leads and do this procedure again.

# Operation

## Precautions



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**WARNING:**

- Never operate the pump without safety devices installed.
  - Never operate the pump with the discharge valve closed.
  - Make sure you have a clear path of retreat.
  - Never work alone.
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**CAUTION:**

If the pump is equipped with automatic level control and/or internal contactor, there is a risk of sudden restart.

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## Distance to wet areas



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**Electrical Hazard:**

Risk of electrical shock. Make sure no one gets closer than 20 m (65 ft.) to the unit when being in contact with the pumped or mixed liquid.

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## Noise level

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**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 pump is installed. Failure to do so may result in hearing loss or violation of local laws.

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## Start the pump



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**Electrical Hazard:**

A permanent-magnet motor generates voltage when the shaft is rotating. Ensure that the shaft can not rotate before performing any electrical installation.

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**WARNING:**

- If you need to work on the pump, make sure that it is isolated from the power supply and cannot be energized.
  - Make sure that the unit cannot roll or fall over and injure people or damage property.
  - In some installations, the pump and the surrounding liquid may be hot. Bear in mind the risk of burn injuries.
  - Make sure nobody is close to the unit when it is started. The unit will jerk in the opposite direction of the impeller rotation.
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**NOTICE:**

Make sure that the rotation of the impeller is correct. For more information, see Check the impeller rotation.

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1. Check the oil level in the oil housing.
2. Remove the fuses or open the circuit breaker, and check that the impeller can be rotated freely.
3. Conduct insulation test phase to ground. To pass, the value must exceed 5 megohms.
4. Check that the monitoring equipment works.
5. Start the pump.

# Maintenance

## Precautions



### WARNING:

- Always follow safety guidelines when working on the product. See [Introduction and Safety](#) (page 3).
- Disconnect and lock out electrical power before installing or servicing the pump.
- Make sure that the unit cannot roll or fall over and injure people or damage property.
- Rinse the unit thoroughly with clean water before working on the unit.
- Rinse the components in water after dismantling.



### WARNING:

Electrical hazard. A permanent magnet motor produces voltage when the shaft is rotating. The conductors must be insulated.



### CAUTION:

- Magnetic stray fields may damage cardiac pacemaker and other medical implants. Stay clear of any magnetic stray fields that can occur near an open or disassembled permanent-magnet synchronous motor, or near a separate rotor of such a motor. Keep magnetic media away, including credit cards and watches.
- Crush hazard during disassembly or assembly of a permanent-magnet synchronous motor. Fingers or other body parts can be trapped and injured. Magnetic items such as tools attracted to the rotor can also cause personal injury.
- Assembly and disassembly of permanent-magnet synchronous motors must be performed by qualified personnel and according to relevant instructions.

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.
- If the unit has a permanent magnet motor, ensure that you have read and understood all safety instructions regarding permanent magnet motors.

## Maintenance guidelines

During 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, and O-rings with grease.

During 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 a sales 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)**

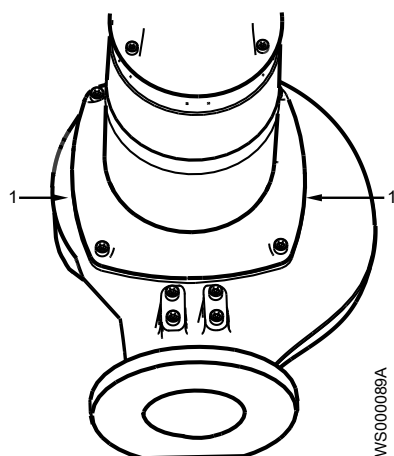
Property class	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30
8.8	2.9 (2.1)	5.7 (4.2)	9.8 (7.2)	24 (18)	47 (35)	81(60)	194 (143)	385 (285)	665 (490)	1310 (966.2)
10.9	4.0 (2.9)	8.1 (6)	14 (10)	33 (24)	65 (48)	114 (84)	277 (204)	541 (399)	935 (689)	1840 (1357)
12.9	4.9 (3.6)	9.7 (7.2)	17 (13)	40 (30)	79 (58)	136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

## Change the oil

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



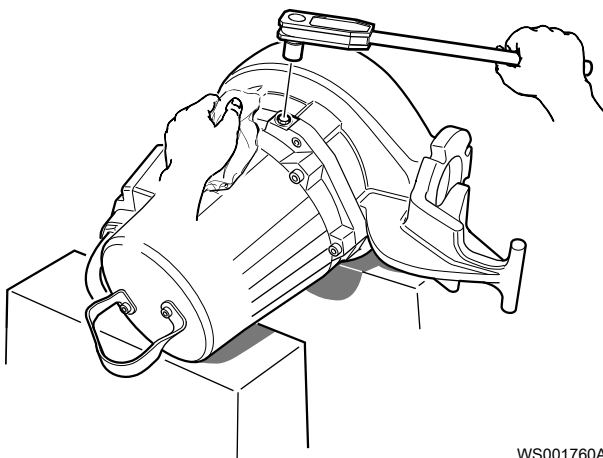
1. Oil plug

## Empty the oil

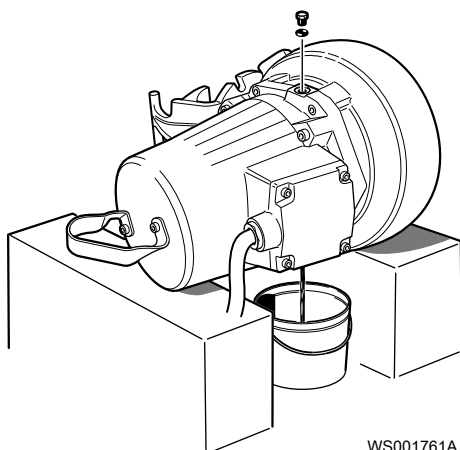
**WARNING:**

The oil housing may be pressurized. Hold a rag over the oil plug to prevent oil from spraying out.

1. Place the pump in a horizontal position and unscrew the oil plug.  
If the pump has a hole with the markings "oil out" it is important that this hole is used for drainage.



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.



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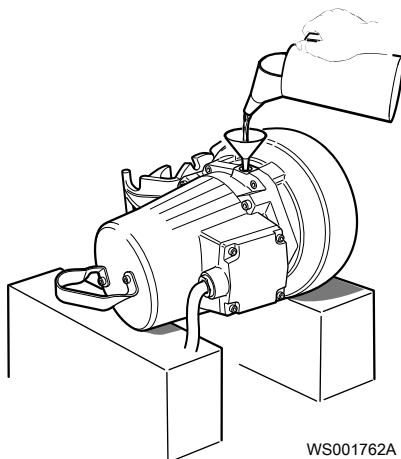
## Fill with oil

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: 10-40 Nm (7.5-29.5 ft-lbs)
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.)



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4. Refit the oil plug and tighten.  
Tightening torque: 10-40 Nm (7.5-29.5 ft-lbs)

## Service the pump

Type of service	Purpose	Inspection interval
Initial inspection	To make a check up of the pump condition by an authorized Xylem 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.	Within the first year of operation.

## Maintenance

Type of service	Purpose	Inspection interval
Periodical inspection	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.	Up to every year Applies to normal applications and operating conditions at media (liquid) temperatures <40°C.
Major overhaul	To secure a long operating lifetime for the product. It includes replacement of key components and the measures taken during an inspection.	Up to every 3 year Applies to normal applications and operating conditions at media (liquid) temperatures <40°C.

**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

Service item	Action
Cable	<ol style="list-style-type: none"> <li>1. If the outer jacket is damaged, replace the cable.</li> <li>2. Check that the cables do not have any sharp bends and are not pinched.</li> </ol>
Connection to power	Check that the connections are properly tightened.
Electrical cabinets	Check that they are clean and dry.
Impeller	<ol style="list-style-type: none"> <li>1. Check the impeller clearance.</li> <li>2. Adjust the impeller, if necessary.</li> </ol>
Stator housing	<ol style="list-style-type: none"> <li>1. Drain all liquid, if any.</li> <li>2. Check the resistance of the leakage sensor. Normal value approx. 1500 ohms, alarm approx. 430 ohms.</li> </ol>
Insulation	Use a megger maximum 1000 V. <ol style="list-style-type: none"> <li>1. Check that the resistance between the earth (ground) and phase lead is more than 5 megohms.</li> <li>2. Conduct a phase-to-phase resistance check.</li> </ol>
Junction box	Check that it is clean and dry.
Lifting device	Check that local safety regulations are followed.
Lifting handle	<ol style="list-style-type: none"> <li>1. Check the screws.</li> <li>2. Check the condition of the lifting handle.</li> <li>3. Replace if necessary.</li> </ol>

Service item	Action
O-rings	<ol style="list-style-type: none"> <li>1. Replace the oil plug O-rings.</li> <li>2. Replace the O-rings at the entrance or junction cover.</li> <li>3. Grease the new O-rings.</li> </ol>
Overload protection and other protections	Check the correct settings.
Personnel safety devices	Check the guard rails, covers, and other protections.
Rotation direction	Check the impeller rotation.
Oil housing	Fill with new oil, if necessary.
Terminal block/closed end splice	Check that the connections are properly tightened.
Thermal contacts	Normally closed circuit; interval 0–1 ohm.
Voltage and amperage	Check the running values.

## Major overhaul

For a major overhaul, take this action 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.

## Service in case of alarm

For information about indication values for sensors, see [Sensor-connection](#).

Alarm source	Action
CLS	Check for water in the oil housing. If the oil contains too much water: <ol style="list-style-type: none"> <li>1. Drain the oil and water.</li> <li>2. Replace with new oil.</li> </ol>
FLS	<ol style="list-style-type: none"> <li>1. Check for liquid in the stator housing.</li> <li>2. Drain all liquid, if any.</li> <li>3. Check the mechanical seal unit, the O-rings, and the cable entry, if liquid was found.</li> </ol>
Thermal contact	Check the start and stop levels.
The overload protection	Check that the impeller can rotate freely.

## 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 Xylem representative for correct type and size.
- Rod (wood 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.
- A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.
- 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.

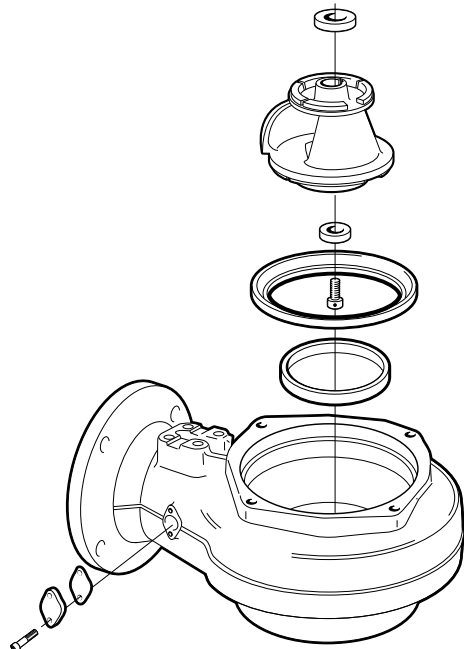
**Replace the C- or D-impeller**

Figure 9: C-Impeller

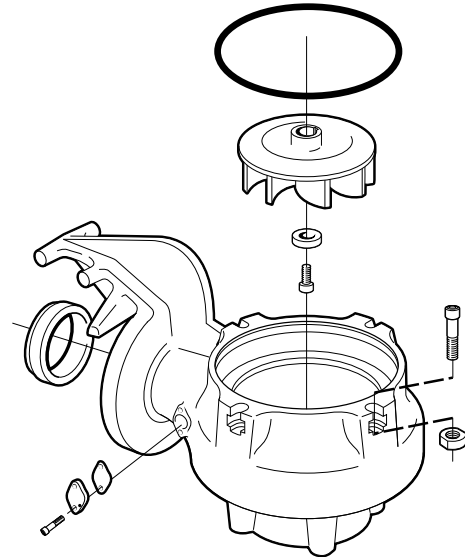


Figure 10: D-Impeller

**Remove the impeller: C , D****CAUTION:**

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the pump housing or the suction cover.



2. Remove the impeller screw.  
If applicable, use the rod.



Figure 11: C-impeller



Figure 12: D-impeller

3. Remove the washer.
4. Remove the impeller.  
Use the impeller puller or the crowbars.



Figure 13: D-impeller

### Install the impeller: C , D

1. 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) Fit the spacer ring to the shaft (applicable for seal type O).
  - c) Make sure that the parallel key is seated in the keyway on the shaft.
  - d) Lubricate the end of the shaft.
2. Mount the impeller:
- a) Lubricate the impeller screw threads and contact surface.  
Ensure that all parts are clean.
  - b) Fit the washer on the lubricated impeller screw.
  - c) Press the impeller onto the shaft with the impeller screw.
3. Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)



Check that the impeller can rotate freely.

4. Mount the suction cover (if applicable):
- a) Fit a new lubricated O-ring to the suction cover.

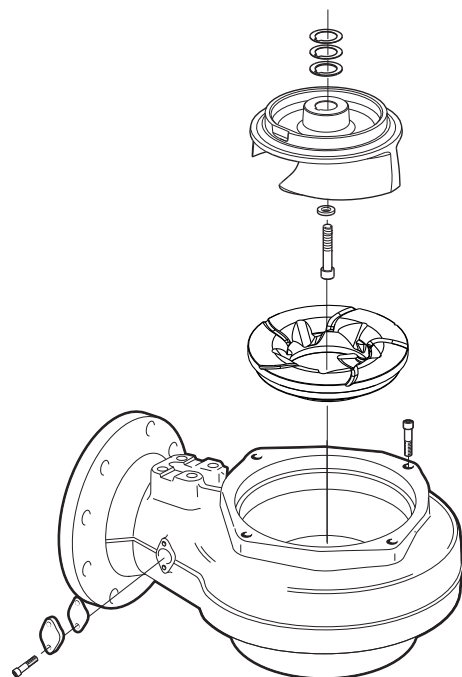


- b) Fit the suction cover.
  - c) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
5. Mount the pump housing:

- a) D-impeller: Fit a new lubricated O-ring to the pump housing.
  - b) Fit the pump housing.
  - c) Fit and tighten the lubricated screws.
- Tightening torque: 57 Nm (42 ft-lbs).



## Replace the F-impeller



## Remove the F-impeller



### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the suction cover.
2. Remove the impeller screw, the ring, and the washers.  
If applicable, use the rod.



3. Remove the impeller.  
Use the impeller puller or the crowbars.

### Install the F-impeller

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
2. Mount the impeller:
  - a) Fit the ring and a new lubricated O-ring onto the lubricated impeller screw.
  - b) Fit one or two plain washers with a thickness of 0.3 mm (0.01 in.), or one plain washer with a thickness of 0.5 mm (0.02 in.) onto the impeller.



- c) Lubricate the impeller screw threads and contact surface.  
Ensure that all parts are clean.
    - d) Press the impeller onto the shaft with the impeller screw.
3. Fasten the impeller:
  - a) Prevent the impeller from rotating by inserting the rod through the pump housing outlet.
  - b) Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)

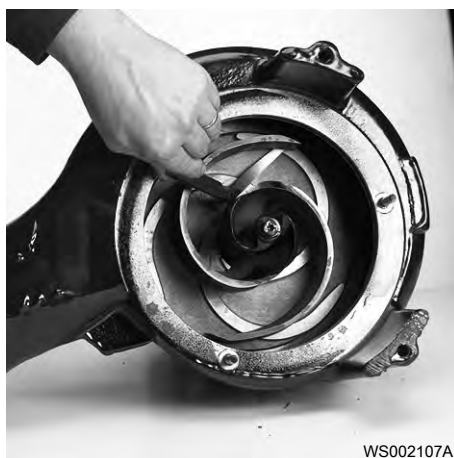


Check that the impeller can rotate freely.

4. Adjust the impeller:

- a) Measure the distance between the edge of the impeller and the pump housing cover.

The correct distance should be 0.5-1.5 mm (0.02-0.06 in.). Add or remove the appropriate number of adjusting washers in order to achieve correct distance.



- b) Tighten the impeller screw.

If applicable, use the rod.

Tightening torque: 80 Nm (59 ft-lbs)

Check that the impeller can rotate freely.

5. Mount the suction cover:

- a) Fit the studs on the pump housing.

Use Loctite 603 locking liquid in order to secure the studs.

- b) Fit one adjustment washer with a thickness of 1.5 mm (0.06 in.) and 7-8 adjustment washers with a thickness of 0.3 mm (0.01 in.) onto each stud.



- c) Fit the suction cover to the studs.
  - d) Fit the lock nuts onto the studs.
  - e) Tighten the nuts.
- Tightening torque: 57 Nm (42 ft-lbs).



6. Adjust the suction cover:
- a) Measure the distance between the impeller and the suction cover.  
The correct distance should be 0.5-1 mm (0.02-0.04 in.). Add or remove the appropriate number of adjusting washers in order to achieve the correct distance. Use adjustment washers with a thickness of 1.5 mm (0.06 in.) and 0.3 mm (0.01 in.) in order to achieve the correct distance.



- b) Tighten the nuts.

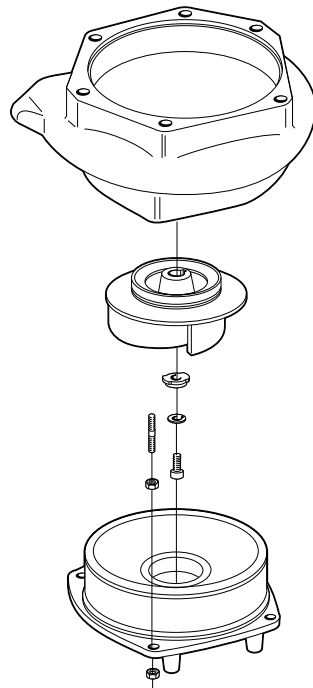
Tightening torque: 57 Nm (42 ft-lbs).



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7. Raise the pump to a vertical position.  
Check that the impeller can rotate freely.

## Replace the H-impeller



## Remove the H-impeller



### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the suction cover.
2. Remove the impeller screw and washer.  
If applicable, use the rod.
3. Remove the impeller from the shaft:

- a) Insert a M16 screw into the square nut.
- b) Turn the screw to push off the impeller.
4. Remove the screw and the square nut.

### Install the H-impeller

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
2. Mount the impeller:
  - a) Fit the washer and square nut to the lubricated impeller screw.
  - b) Press the impeller onto the shaft with the impeller screw.
3. Tighten the impeller screw.  
Tightening torque: 80 Nm (59 ft-lbs)  
If applicable, use the rod.  
Check that the impeller can rotate freely.
4. Mount the suction cover:
  - a) Fit the studs on the pump housing.
  - b) Fit the first hexagon nut onto the studs.
  - c) Fit the suction cover to the studs.  
Make sure that the impeller rotates freely from the suction cover before tightening the hexagon nuts. The clearance between the impeller and the suction cover should be as small as possible.
  - d) Fit the second hexagon nuts onto the studs.
  - e) Tighten the nuts.  
Tightening torque: 57 Nm (42 ft-lbs).
5. Raise the pump to a vertical position.  
Check that the impeller can rotate freely.

### Replace the M-impeller

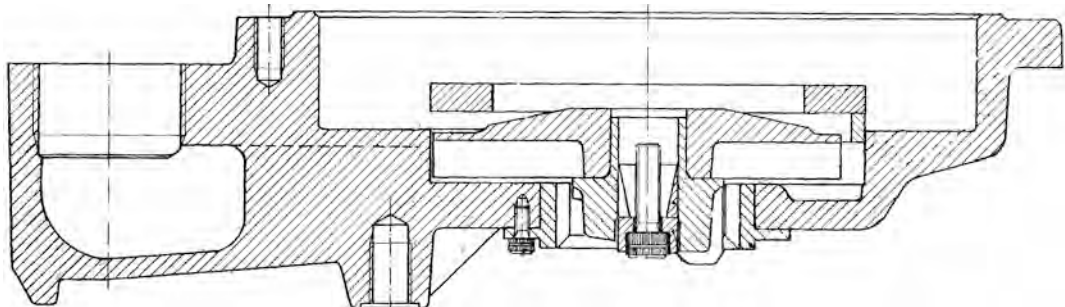


Figure 14: M-impeller

### Remove the M-impeller



#### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the pump housing.
2. Remove the impeller screw and outer sleeve.  
If applicable, use the rod.



3. Refit the impeller screw.



4. Fit the impeller puller and pull off the impeller and cutter wheel.
  - If used, remove the washer between the impeller and cutter wheel.Place a protector between the screw head and the impeller puller.



5. Remove the conical sleeve.



WS001987A

### Install the M-impeller

1. Make sure that the end of the shaft is clean and free from burrs.  
Polish off any flaws with a fine emery cloth.
2. Mount the impeller:
  - a) Fit the conical sleeve onto the shaft.

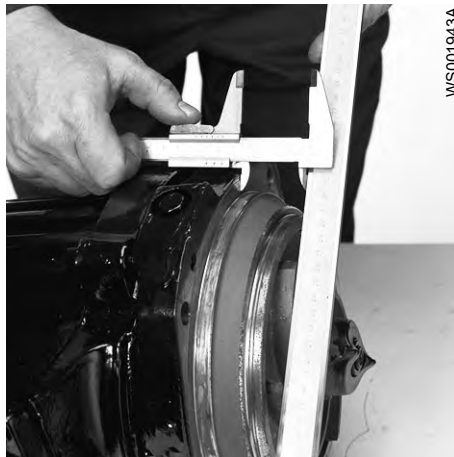


WS002081A

- b) Fit the cutter wheel into the impeller.
  - c) Fit the outer sleeve onto the lubricated impeller screw.
  - d) Fit the impeller with the cutter wheel onto the shaft with the impeller screw.  
Do not tighten the impeller screw.
3. Adjust the impeller:
  - a) Use a straightedge and a vernier to measure the distance between the vanes of the impeller and the shoulder for the pump housing on the oil housing bottom.

Pressure class	Phase	Hz	Distance
LT, HT	3	50	65.0±0.3 mm (2.56±0.01 in.)
LT, HT	3	60	65.0±0.3 mm (2.56±0.01 in.)
LT	1	60	63.0±0.3 mm (2.48±0.01 in.)
HT	1	60	65.0±0.3 mm (2.56±0.01 in.)

- b) Slide the impeller on to the shaft until you reach the correct distance.



4. Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)

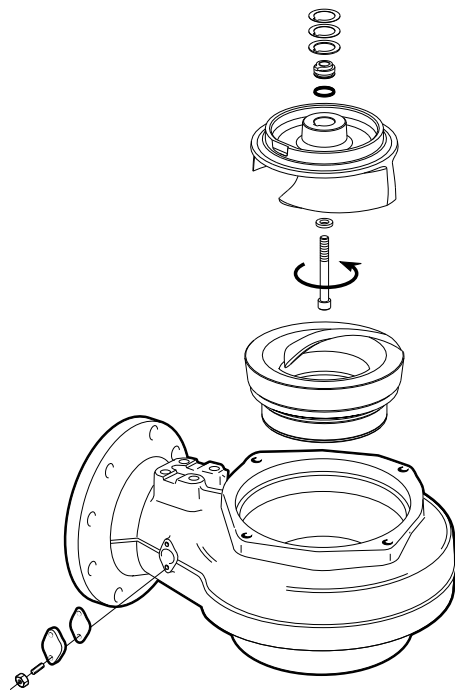


Check that the impeller can rotate freely.

5. Mount the pump housing:
  - a) Fit the pump housing.
  - b) Fit and tighten the lubricated screws.Tightening torque: 57 Nm (42 ft-lbs).



## Replace the N-impeller



### Remove the N-impeller



#### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the pump housing.
2. For the version .160 and .190, remove the plug.
3. Remove the impeller screw.  
Use the impeller puller or the crowbars.
4. Remove the impeller.
5. Remove the plain washers and the adjustment washers.

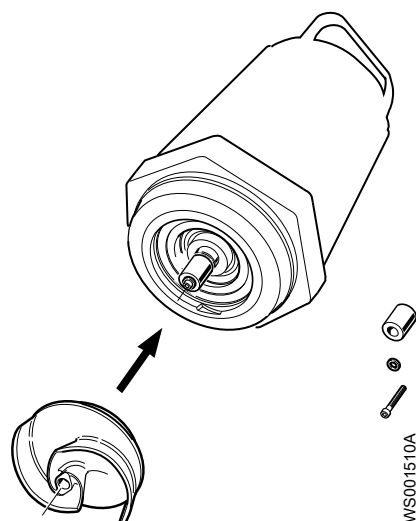
### Install the N-impeller with P/S/L-installation

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
  - c) Grease the shaft end.
  - d) Fit the adjustment washers.

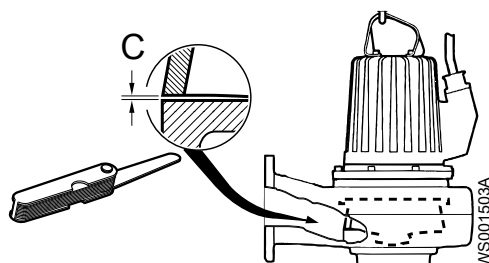
Number of washers	Thickness mm (in.)
3	0.3 (0.012)
2	0.5 (0.02)
1	1.5 (0.06)

2. Mount the impeller:

- a) Fit the impeller to the shaft.
- b) Fit the washer on the lubricated impeller screw.
- c) Hand-tighten the impeller screw enough to prevent it from falling off.

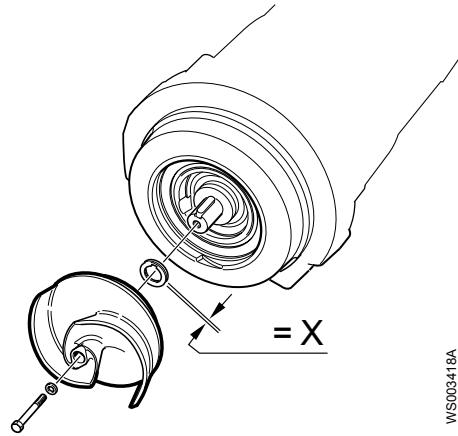


3. Mount the pump housing:
  - a) Fit the pump housing.
  - b) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
4. Adjust the impeller:
  - a) Measure the distance (C).



The correct distance is 0.2-0.8 mm (0.0079-0.032 in.) If the distance is correct, then fasten the impeller, otherwise proceed to next step.

- b) Remove the pump housing.
- c) Remove the impeller.  
If applicable, use the rod.
- d) Combine the adjustment washers so the total thickness X corresponds to  $X = 3.4 \text{ mm (0.134 in.)} - (C)$ .



5. Fasten the impeller:
  - a) Fit the impeller.
  - b) Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque:
    - LT, MT, HT: 80 Nm (59 ft-lbs)
    - SH: 57 Nm (47 ft-lbs)
 Check that the impeller can rotate freely.

**CAUTION:**

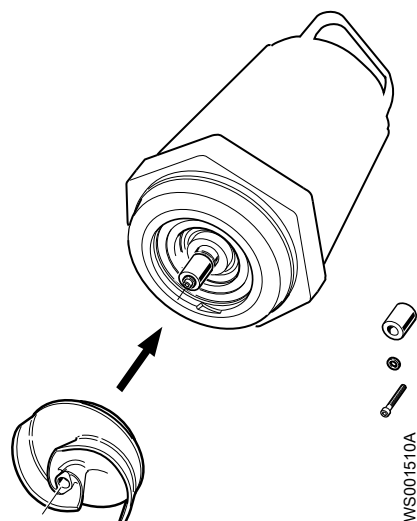
Beware of the pinch point hazard between the rotating impeller and the guide pin.

- c) Fit the pump housing.
  - d) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
6. For versions .160 and .190 fit the lubricated plug and tighten it.  
Tightening torque: 25 Nm (19 ft-lbs)

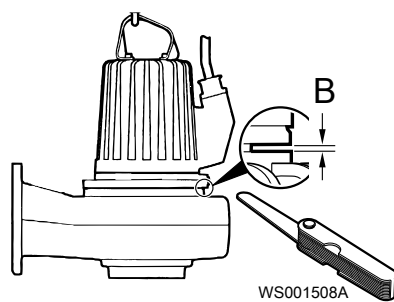
**Install the N-impeller with T/Z-installation**

For versions .160 and .190, use the instructions in [Install the N-impeller with P/S/L-installation](#) (page 56).

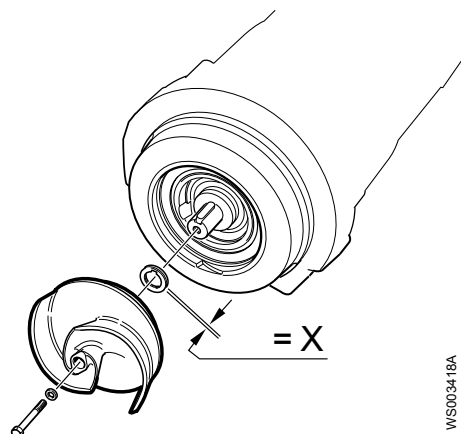
1. Prepare the shaft:
  - a) Make sure that the end of the shaft is clean and free from burrs.  
Polish off any flaws with a fine emery cloth.
  - b) Make sure that the parallel key is seated in the keyway on the shaft.
  - c) Grease the shaft end.
  - d) Fit three adjustment washers with the thickness 1.5 mm (0.06 in.)
2. Mount the impeller:
  - a) Fit the impeller to the shaft.
  - b) Fit the washer on the lubricated impeller screw.
  - c) Hand-tighten the impeller screw enough to prevent it from falling off.



3. Adjust the impeller:
  - a) Lift the drive unit into the pump housing.
  - b) Measure the distance (B):



- c) Lift off the drive unit.
  - d) Remove the impeller.
  - e) Combine the adjustment washers so the total thickness X corresponds to  $X = 4.5 \text{ mm (0.18 in.)} - B - 0.25 \text{ mm (0.01 in.)}$ .



4. Mount the impeller:
  - a) Fit the impeller.
  - b) Tighten the impeller screw.  
If applicable, use the rod.

Tightening torque:

- LT, MT, HT: 80 Nm (59 ft-lbs)
- SH: 57 Nm (47 ft-lbs)

Check that the impeller can rotate freely.



---

**CAUTION:**

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

---

## Replace the propeller

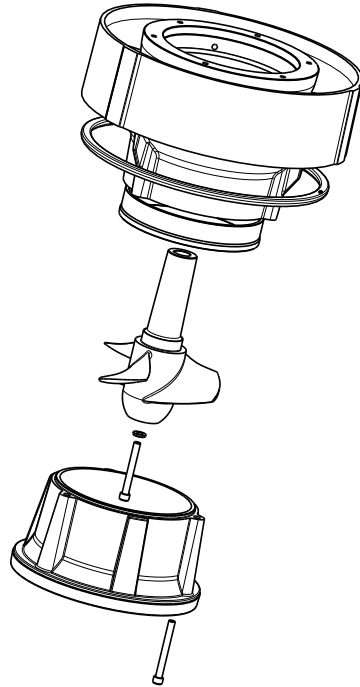


Figure 15: Propeller

Required tools:

- 10 mm hexagon bit adapter with an extension of at least 125 mm (4.92 in.)
  - Rod (wooden or copper) for locking the propeller in place, if applicable
  - Propeller puller
- If applicable, contact your local Xylem representative for correct type and size.
- Two crowbars, if applicable

**WARNING:**

- If you fail with the propeller installation, you must redo the installation procedure from the beginning.
- A worn propeller and/or pump housing can have very sharp edges. Wear protective gloves.
- When laying the pump on its side, do not allow the weight of the pump to rest on any portion of the propeller. The propeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.

**Remove the propeller****CAUTION:**

A worn propeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Lay the pump on its side.
2. Remove the bell mouth.
3. Remove the propeller screw.  
If applicable, use the rod.
4. Remove the washer.
5. Remove the propeller.  
Use the impeller puller or the crowbars.
6. Remove the diffuser.

**Install the propeller**

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
2. Mount the diffuser:
  - a) Fit the diffuser.
  - b) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
3. Mount the propeller:
  - a) Fit the washer to the lubricated propeller screw.
  - b) Fit the propeller to the shaft.
  - c) Tighten the propeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)
4. Mount the bell mouth:
  - a) Fit the bell mouth:
  - b) Fit and tighten the lubricated screws.  
For tightening torque, see [Torque values](#) (page 39).
  - c) Raise the pump to a vertical position.  
Check that the propeller can rotate freely.

# Troubleshooting

## Introduction

Follow these guidelines when troubleshooting the pump:

- Disconnect and lock out the power supply except when conducting checks that require voltage.
- Make sure that no one is near the pump 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



### WARNING:

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. A permanent magnet motor produces voltage when the shaft is rotating. The conductors must be insulated.

### NOTICE:

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

Cause	Remedy
An alarm signal has been triggered on the control panel.	Check that: <ul style="list-style-type: none"> <li>• The impeller rotates freely.</li> <li>• The sensor indicators do not indicate an alarm.</li> <li>• The overload protection is not tripped.</li> </ul> If the problem still persists: Contact the local Xylem service shop.
The pump does not start automatically, but can be started manually.	Check that: <ul style="list-style-type: none"> <li>• The start level regulator is functioning. Clean or replace if necessary.</li> <li>• All connections are intact.</li> <li>• The relay and contactor coils are intact.</li> <li>• The control switch (Man/Auto) makes contact in both positions.</li> </ul> Check the control circuit and functions.
The installation is not receiving voltage.	Check that: <ul style="list-style-type: none"> <li>• The main power switch is on.</li> <li>• There is control voltage to the start equipment.</li> <li>• The fuses are intact.</li> <li>• There is voltage in all phases of the supply line.</li> </ul>

Cause	Remedy
	<ul style="list-style-type: none"> <li>• All fuses have power and that they are securely fastened to the fuse holders.</li> <li>• The overload protection is not tripped.</li> <li>• The motor cable is not damaged.</li> </ul>
The impeller is stuck.	Clean: <ul style="list-style-type: none"> <li>• The impeller</li> <li>• The sump in order to prevent the impeller from clogging again.</li> </ul>

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 12).

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



### WARNING:

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. A permanent magnet motor produces voltage when the shaft is rotating. The conductors must be insulated.

Cause	Remedy
The pump is unable to empty the sump to the stop level.	Check that: <ul style="list-style-type: none"> <li>• There are no leaks from the piping and/or discharge connection.</li> <li>• The impeller is not clogged.</li> <li>• The non-return valve(s) are functioning properly.</li> <li>• The pump has adequate capacity. For information: Contact the local Xylem service shop.</li> </ul>
There is a malfunction in the level-sensing equipment.	<ul style="list-style-type: none"> <li>• Clean the level regulators.</li> <li>• Check the functioning of the level regulators.</li> <li>• Check the contactor and the control circuit.</li> <li>• Replace all defective items.</li> </ul>
The stop level is set too low.	Raise the stop level.

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 12).

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

Cause	Remedy
The pump starts due to back-flow which fills the sump to the start level again.	Check that:

## Troubleshooting

Cause	Remedy
	<ul style="list-style-type: none"> <li>• The distance between the start and stop levels is sufficient.</li> <li>• The non-return valve(s) work(s) properly.</li> <li>• The length of the discharge pipe between the pump and the first non-return valve is sufficiently short.</li> </ul>
The self-holding function of the contactor malfunctions.	Check: <ul style="list-style-type: none"> <li>• The contactor connections.</li> <li>• The voltage in the control circuit in relation to the rated voltages on the coil.</li> <li>• The functioning of the stop-level regulator.</li> <li>• Whether the voltage drop in the line at the starting surge causes the contactor's self-holding malfunction.</li> </ul>

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 12).

## The pump runs but the motor protection trips

**WARNING:**

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. A permanent magnet motor produces voltage when the shaft is rotating. The conductors must be insulated.

**NOTICE:**

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

Cause	Remedy
The motor protection is set too low.	Set the motor protection according to the data plate and if applicable the cable chart.
The impeller is difficult to rotate by hand.	<ul style="list-style-type: none"> <li>• Clean the impeller.</li> <li>• Clean out the sump.</li> <li>• Check that the impeller is properly trimmed.</li> </ul>
The drive unit is not receiving full voltage on all three phases.	<ul style="list-style-type: none"> <li>• Check the fuses. Replace fuses that have tripped.</li> <li>• If the fuses are intact, notify a certified electrician.</li> </ul>
The phase currents vary, or they are too high.	Contact the local Xylem service shop.

Cause	Remedy
The insulation between the phases and ground in the stator is defective.	<ol style="list-style-type: none"> <li>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 megohms.</li> <li>2. If the insulation is less: Contact the local Xylem service shop.</li> </ol>
The density of the pumped fluid is too high.	<p>Make sure that the maximum density is 1100 kg/m<sup>3</sup> (9.2 lb/US gal)</p> <ul style="list-style-type: none"> <li>• Change the impeller, or</li> <li>• Change to a more suitable pump.</li> <li>• Contact the local Xylem service shop.</li> </ul>
There is a malfunction in the overload protection.	Replace the overload protection.

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 12).

## The pump delivers too little or no water



### WARNING:

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. A permanent magnet motor produces voltage when the shaft is rotating. The conductors must be insulated.

### NOTICE:

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

Cause	Remedy
The impeller rotates in the wrong direction.	<ul style="list-style-type: none"> <li>• If it is a 3-phase pump, transpose two phase leads.</li> <li>• If it is a 1-phase pump: Contact the local Xylem service shop.</li> </ul>
One or more of the valves are set in the wrong positions.	<ul style="list-style-type: none"> <li>• Reset the valves that are set in the wrong position.</li> <li>• Replace the valves, if necessary.</li> <li>• Check that all valves are correctly installed according to media flow.</li> <li>• Check that all valves open correctly.</li> </ul>
The impeller is difficult to rotate by hand.	<ul style="list-style-type: none"> <li>• Clean the impeller.</li> <li>• Clean out the sump.</li> <li>• Check that the impeller is properly trimmed.</li> </ul>
The pipes are obstructed.	Clean out the pipes to ensure a free flow.
The pipes and joints leak.	Find the leaks and seal them.

## Troubleshooting

Cause	Remedy
There are signs of wear on the impeller, pump, and casing.	Replace the worn parts.
The liquid level is too low.	<ul style="list-style-type: none"><li>• Check that the level sensor is set correctly.</li><li>• Depending on the installation type, add a means for priming the pump, such as a foot valve.</li></ul>

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 12).

# Technical Reference

## Motor data

Feature	Description
Motor type	<ul style="list-style-type: none"> <li>3127.090/.095/.160/.170/.181/.185/.190/.350/.390/.890: Squirrel-cage induction motor</li> <li>3127.800/.810/.820/.830/.840/.850/.900/.920: Line-started, permanent-magnet synchronous motor</li> </ul>
Frequency	50 or 60 Hz
Supply	1-phase or 3-phase
Starting method	<ul style="list-style-type: none"> <li>Direct on-line</li> <li>Star-delta</li> <li>Soft starter</li> </ul>
Maximum starts per hour	30 evenly spaced starts per hour
Code compliance	IEC 60034-1
Rated output variation	±5%
Voltage variation without overheating	±10%, provided that it does not run continuously at full load
Voltage imbalance tolerance	2%
Stator insulation class	H (180°C [360°F])

## Application limits

Data	Description
Liquid temperature	40°C (104°F) maximum The pump can be operated at full load only if at least half the stator housing is submerged. Warm-liquid version: 70°C (158°F) maximum (3127.160, 3127.181, 3127.350 ) Ex-approved pumps: 40°C (104°F) maximum
Liquid density	1100 kg/m <sup>3</sup> (9.2 lb per US gal) maximum
pH of the pumped media (liquid)	5.5–14
Depth of immersion	20 m (65 ft) maximum
Other	For the specific weight, current, voltage, power ratings, and speed of the pump, see the data plate of the pump.





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- 2) A leading global water technology company

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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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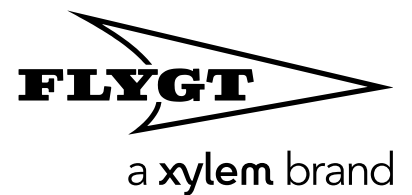
3127.090/.095/.160/.170/.181/.185/.190/.350/.390/.800/.810/.820/.830/.840/.850/.890/.900/.910

## **Section 3 – 3127 Submersible Pump Technical Specifications**

## Technical Specification



### Flygt 3127, 50Hz





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# C-pump, Standard Motor

## Product description

### Usage

Submersible pump for pumping clean water, surface water and waste water containing solids or fibred material.

### Denomination

Type	Non explosion proof version	Explosion proof version	Pressure class	Installation types
Standard	3127.181	3127.090	<ul style="list-style-type: none"> <li>LT – Low head</li> <li>MT – Medium head</li> <li>HT – High head</li> </ul>	P, S, T, Z

The pump can be used in the following installations:

- P** Semi permanent, wet well arrangement with pump installed on two guide bars with automatic connection to discharge.
- S** Portable semi permanent, wet well arrangement with hose coupling or flange for connection to discharge pipeline.
- T** Vertical permanent, dry well arrangement with flange connection to suction and discharge piping.
- Z** Horizontal permanent, dry well arrangement with flange connection to suction and discharge piping.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 – 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>Direct on-line</li> <li>Star-delta</li> </ul>
Number of starts per hour	Maximum 30
Code compliance	IEC 60034-1

Feature	Description
Rated output variation	±10%
Voltage variation	<ul style="list-style-type: none"> <li>Continuously running: Maximum ±5%</li> <li>Intermittent running: Maximum ±10%</li> </ul>
Voltage imbalance between phases	Maximum 2%
Insulation class	H (180°C, 356°F)

## Cables

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G2.5+2×1.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>
	NSSHÖU../3E+St	3x2.5+3x2.5/3E+3x1.5 St

## Monitoring Equipment

Thermal contacts opening temperature 125° C (257° F)

## Materials

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing	Cast iron, gray	35B	GJL-250
Impeller, alternative 1	Cast iron, gray	35B	GJL-250
Impeller, alternative 2	Cast iron, gray	30B	GJL-200
Impeller, alternative 3	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Suction cover, alternative 1	Cast iron, gray	30B	GJL-200
Suction cover, alternative 2	Nitrile rubber (NBR)	–	–
Wear ring, alternative 1	Nitrile rubber (NBR)	–	–
Wear ring, alternative 2	Bronze	C924	CC491K, CC492K
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings, alternative 1	Nitrile rubber (NBR) 70° IRH	–	–
O-rings, alternative 2	Fluorinated rubber (FPM) 70° IRH	–	–

## C-pump, Standard Motor

Denomination	Material	ASTM	EN
Oil, part no 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)	-	-

**Table 1: Mechanical face seals**

Alternative	Inner seal	Outer seal
1	Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
2	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
3	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Silicon carbide/ Silicon carbide

## Surface Treatment

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

## Options

- Warm liquid version (non-explosion proof versions)
- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)
- Surface treatment (Epoxy)
- Zinc anodes
- Other cables

## Accessories

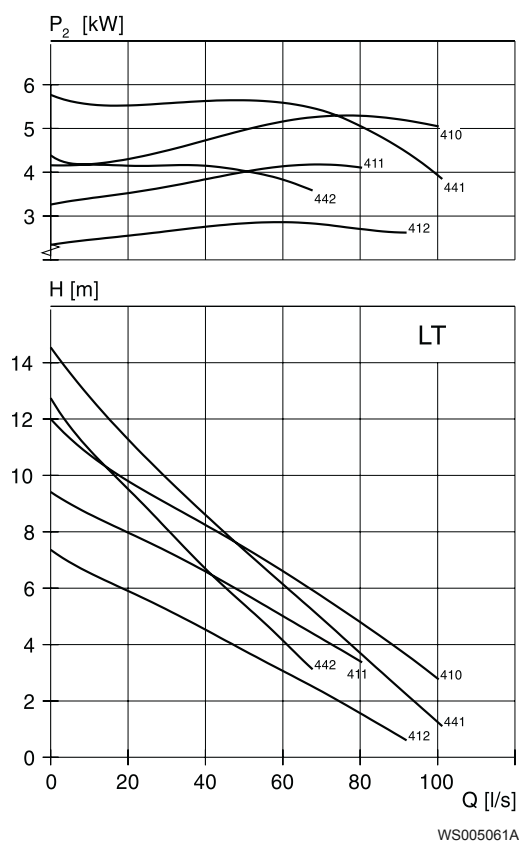
Discharge connections, adapters, hose connections, and other mechanical accessories.

Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

## Motor rating and performance curves

Star-delta starting current is 1/3 of Direct on-line starting current.

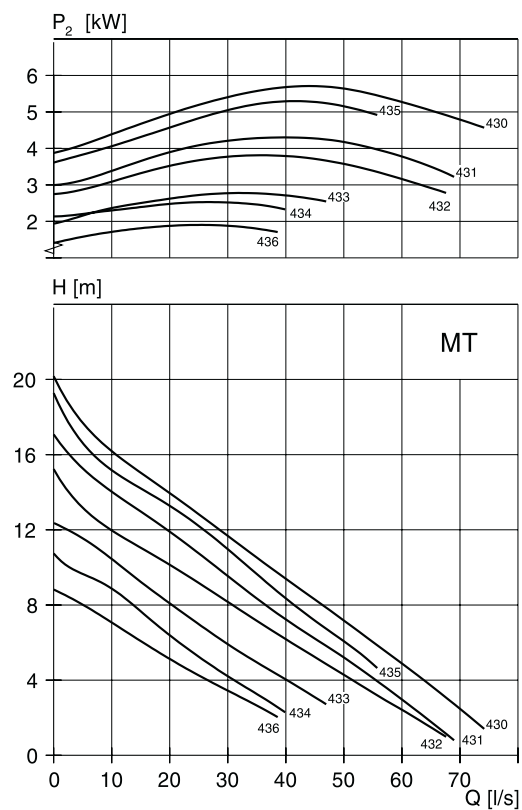
LT

**Table 2: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Impeller throughlet, mm	Installation
4	5.4	412	1465	9.4	73	.74	76	T,Z
4	5.4	442	1465	9.4	73	.74	100	T,Z
4.7	6.3	411	1445	9.6	56	.86	76	P,S
4.7	6.3	412	1445	9.6	56	.86	76	P,S
4.7	6.3	442	1445	9.6	56	.86	100	P,S
4.7	6.3	411	1460	10	73	.78	76	P,S
4.7	6.3	412	1460	10	73	.78	76	P,S
4.7	6.3	442	1460	10	73	.78	100	P,S
4.7	6.3	411	1460	11	76	.76	76	T,Z
4.7	6.3	412	1460	11	76	.76	76	T,Z
4.7	6.3	442	1460	11	76	.76	100	T,Z
5.9	7.9	410	1450	12	77	.84	76	P,S
5.9	7.9	411	1450	12	77	.84	76	P,S
5.9	7.9	412	1450	12	77	.84	76	P,S
5.9	7.9	441	1450	12	77	.84	107	P,S
5.9	7.9	442	1450	12	77	.84	100	P,S

## C-pump, Standard Motor

MT

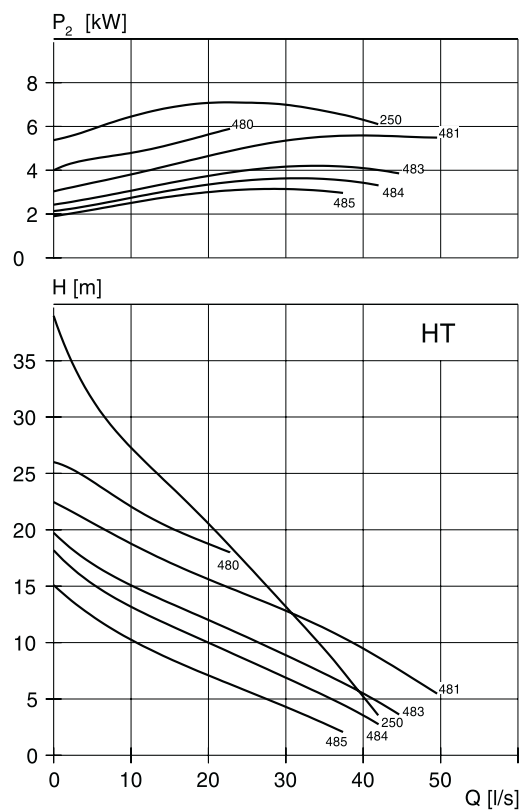


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**Table 3: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Impeller throughlet, mm	Installation
4	5.4	432	1455	8.3	56	.84	87	T,Z
4	5.4	433	1455	8.3	56	.84	82	T,Z
4	5.4	434	1455	8.3	56	.84	87	T,Z
4.7	6.3	431	1445	9.6	56	.86	90	P,S
4.7	6.3	432	1445	9.6	56	.86	87	P,S
4.7	6.3	433	1445	9.6	56	.86	82	P,S
4.7	6.3	434	1445	9.6	56	.86	87	P,S
4.7	6.3	431	1460	11	76	.76	90	T,Z
4.7	6.3	432	1460	11	76	.76	87	T,Z
4.7	6.3	433	1460	11	76	.76	82	T,Z
4.7	6.3	434	1460	11	76	.76	87	T,Z
5.9	7.9	430	1450	12	77	.84	100	P,S
5.9	7.9	431	1450	12	77	.84	90	P,S
5.9	7.9	432	1450	12	77	.84	87	P,S
5.9	7.9	433	1450	12	77	.84	82	P,S
5.9	7.9	434	1450	12	77	.84	87	P,S

HT



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**Table 4: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Impeller throughlet, mm	Installation
4	5.4	483	1465	9.4	73	.74	76	T,Z
4	5.4	484	1465	9.4	73	.74	76	T,Z
4	5.4	485	1465	9.4	73	.74	76	T,Z
4.7	6.3	483	1445	9.6	56	.86	76	P,S
4.7	6.3	484	1445	9.6	56	.86	76	P,S
4.7	6.3	485	1445	9.6	56	.86	76	P,S
4.7	6.3	483	1460	11	76	.76	76	T,Z
4.7	6.3	484	1460	11	76	.76	76	T,Z
4.7	6.3	485	1460	11	76	.76	76	T,Z
5.9	7.9	480	1450	12	77	.84	76	P,S
5.9	7.9	481	1450	12	77	.84	76	P,S
5.9	7.9	483	1450	12	77	.84	76	P,S
5.9	7.9	484	1450	12	77	.84	76	P,S
5.9	7.9	485	1450	12	77	.84	76	P,S
7.4	9.9	250	2900	14	114	.91	-	P,S

# D-pump

## Product description

### Usage

Submersible pump for pumping liquids containing solids, abrasive media or low volumes at high heads.

### Denomination

Type	Non explosion proof version	Explosion proof version	Pressure class	Installation types
Standard	3127.181	3127.090	<ul style="list-style-type: none"> <li>MT – Medium head</li> <li>HT – High head</li> </ul>	P

The pump can be used in the following installations:

- P Semi permanent, wet well arrangement with pump installed on two guide bars with automatic connection to discharge.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 – 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>Direct on-line</li> <li>Star-delta</li> </ul>
Number of starts per hour	Maximum 30
Code compliance	IEC 60034-1
Rated output variation	±10%
Voltage variation	<ul style="list-style-type: none"> <li>Continuously running: Maximum ±5%</li> <li>Intermittent running: Maximum ±10%</li> </ul>
Voltage imbalance between phases	Maximum 2%
Insulation class	H (180°C, 356°F)

## Cables

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G2.5+2×1.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>
	NSSHÖU../3E+St	3x2.5+3x2.5/3E+3x1.5 St

## Monitoring Equipment

Thermal contacts opening temperature 125° C (257° F)

## Materials

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing, alternative 1	Cast iron, gray	35B	GJL-250
Pump housing, alternative 2	Cast iron, gray	35B	GJL-250
Impeller, alternative 1	Cast iron, gray	35B	GJL-250
Impeller, alternative 2	Cast iron, gray	35B	GJL-250
Impeller, alternative 3	Cast iron, gray	30B	GJL-200
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings, alternative 1	Nitrile rubber (NBR) 70° IRH		
O-rings, alternative 2	Fluorinated rubber (FPM) 70° IRH		
Oil, part no 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)		

**Table 5: Mechanical face seals**

Alternative	Inner seal	Outer seal
1	Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
2	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
3	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Silicon carbide/ Silicon carbide

D-pump

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**Surface Treatment**

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

**Options**

- Warm liquid version (non-explosion proof versions)
- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)
- Surface treatment (Epoxy)
- Zinc anodes
- Other cables

**Accessories**

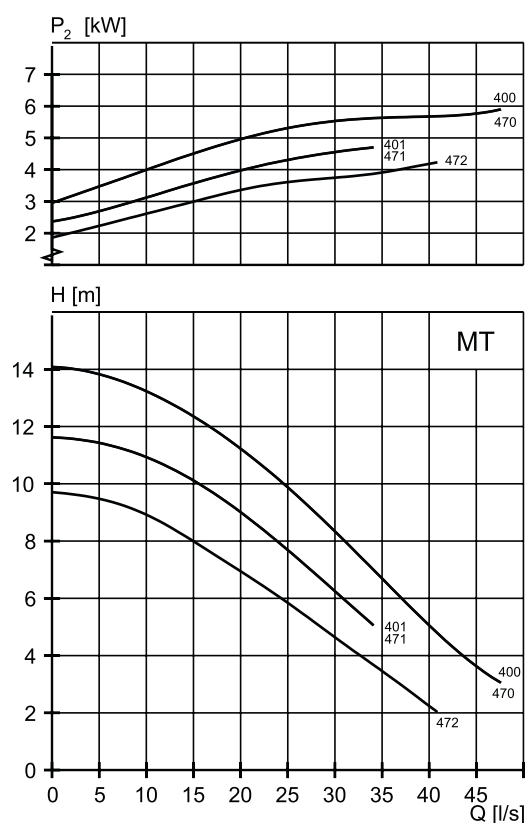
Discharge connections, adapters, hose connections, and other mechanical accessories.

Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

## Motor rating and performance curves

Star-delta starting current is 1/3 of Direct on-line starting current.

MT



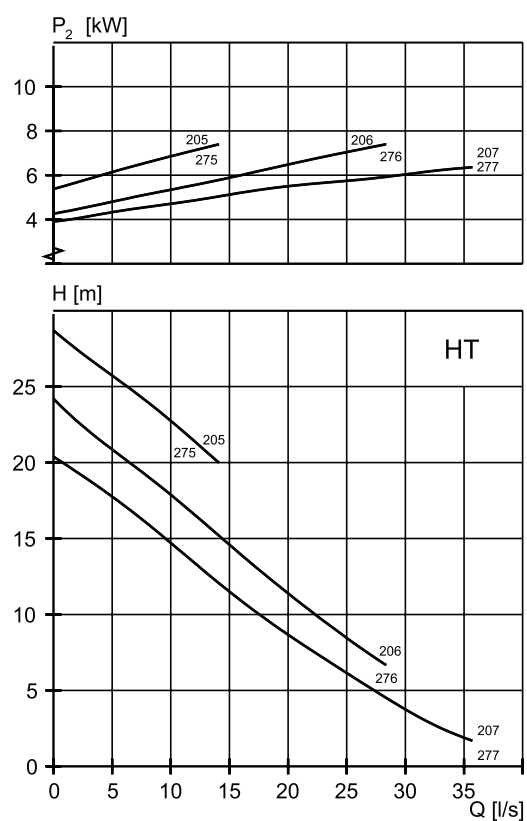
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**Table 6: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Impeller throughlet, mm	Installation
4.7	6.3	401	1460	10	73	.78	100	P
4.7	6.3	471	1460	10	73	.78	100	P
4.7	6.3	472	1460	10	73	.78	100	P
5.9	7.9	400	1450	12	77	.84	100	P
5.9	7.9	401	1450	12	77	.84	100	P
5.9	7.9	470	1450	12	77	.84	100	P
5.9	7.9	471	1450	12	77	.84	100	P
5.9	7.9	472	1450	12	77	.84	100	P

D-pump

HT



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**Table 7: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Impeller throughlet, mm	Installation
7.4	9.9	205	2920	15	137	.84	76	P
7.4	9.9	206	2920	15	137	.84	76	P
7.4	9.9	207	2920	15	137	.84	76	P
7.4	9.9	275	2920	15	137	.84	76	P
7.4	9.9	276	2920	15	137	.84	76	P
7.4	9.9	277	2920	15	137	.84	76	P

# F-pump, Standard Motor

## Product description

### Usage 3127.181/.090

Submersible pump for pumping liquid manure, or heavily contaminated sewage and sludge. The impeller is S-shaped and fitted with a cutting device and a break pin to protect the pump.

### Usage 3127.350/.390

Submersible chopper pump for pumping liquid manure, or heavily contaminated sewage and sludge. The hydraulic end has a cutting function.

### Denomination

Type	Non explosion proof version	Explosion proof version	Installation types	Installation types
Cast iron	3127.181	3127.090	• LT – Low head	J, P, S
Hard-Iron™	3127.350	3127.390	• MT – Medium head • HT – High head • SH – Super head	P, S, T, Z

The pump can be used in the following installations:

- J** Semi permanent, wet well arrangement with guide bars or wire for a pump with a jet nozzle intended for mixing. For connection to a discharge stool. Jet nozzle can also be used as a hose connection.
- P** Semi permanent, wet well arrangement with pump installed on two guide bars with automatic connection to discharge.
- S** Portable semi permanent, wet well arrangement with hose coupling or flange for connection to discharge pipeline.
- T** Vertical permanent, dry well arrangement with flange connection to suction and discharge piping.
- Z** Horizontal permanent, dry well arrangement with flange connection to suction and discharge piping.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 - 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor

## F-pump, Standard Motor

Feature	Description
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>• Direct on-line</li> <li>• Star-delta</li> </ul>
Number of starts per hour	Maximum 30
Code compliance	IEC 60034-1
Rated output variation	$\pm 10\%$
Voltage variation	<ul style="list-style-type: none"> <li>• Continuously running: Maximum <math>\pm 5\%</math></li> <li>• Intermittent running: Maximum <math>\pm 10\%</math></li> </ul>
Voltage imbalance between phases	Maximum 2%
Insulation class	H (180°C, 356°F)

## Cables 3127.181/.090

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G2.5+2×1.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>
	NSSHÖU../3E+St	3x2.5+3x2.5/3E+3x1.5 St

## Cables 3127.350/.390

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup> 4G6+2×1.5 mm <sup>2</sup> 4G10+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>
	Screened SUBCAB® heavy-duty submersible cable	S3×2.5 mm <sup>2</sup> S3×2.5+3×2.5/3+4×1.5 mm <sup>2</sup> S6×2.5+2×1.5 mm <sup>2</sup>

## Monitoring Equipment

Thermal contacts opening temperature 125° C (257° F)

**Materials**

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing	Cast iron, gray	35B	GJL-250
Impeller, alternative 1	Cast iron, nodular		GJS-400-18-LT
Impeller, alternative 2	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Suction cover, alternative 1	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Suction cover, alternative 2	Steel	A 572 GR50	S355
Suction cover, alternative 3	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings, alternative 1	Nitrile rubber (NBR) 70° IRH		
O-rings, alternative 2	Fluorinated rubber (FPM) 70° IRH		
Oil, part no 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)		

**Table 8: Mechanical face seals**

Alternative	Inner seal	Outer seal
1	Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
2	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
3	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Silicon carbide/ Silicon carbide

**Surface Treatment**

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

**Options**

- Warm liquid version (non-explosion proof versions)
- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)
- Surface treatment (Epoxy)
- Zinc anodes
- Other cables

**Accessories**

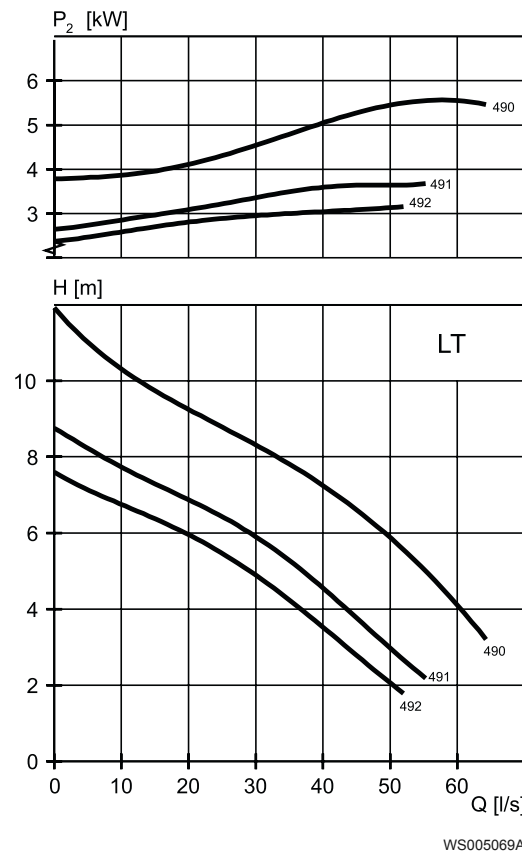
Discharge connections, adapters, hose connections, and other mechanical accessories.

Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

**Motor rating and performance curves 3127.181/.090**

Star-delta starting current is 1/3 of Direct on-line starting current.

LT



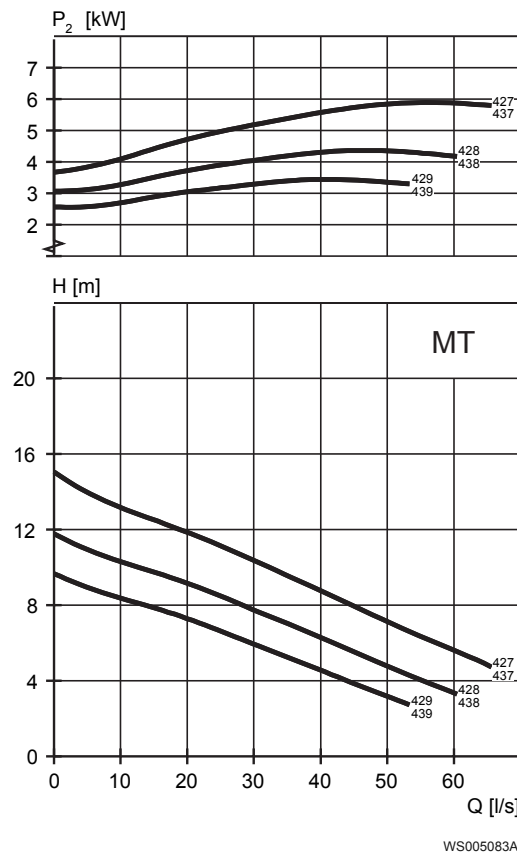
**Table 9: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, cos φ	Installation
4.7	6.3	491	1460	10	73	.78	P,S
4.7	6.3	492	1460	10	73	.78	P,S
5.9	7.9	490	1450	12	77	.84	J,P,S
5.9	7.9	491	1450	12	77	.84	P,S
5.9	7.9	492	1450	12	77	.84	P,S
5.9	7.9	493	1450	12	77	.84	P,S

**Motor rating and performance curves 3127.350/.390**

Star-delta starting current is 1/3 of Direct on-line starting current.

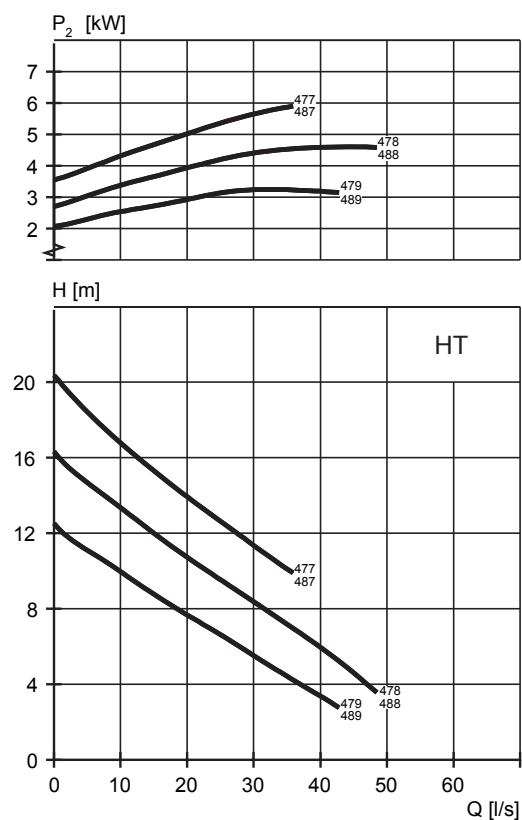
MT

**Table 10: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
4	5.4	429	1455	8.3	56	.84	T,Z
4	5.4	439	1455	8.3	56	.84	T,Z
4.7	6.3	428	1445	9.6	56	.86	P,S
4.7	6.3	429	1445	9.6	56	.86	P,S
4.7	6.3	438	1445	9.6	56	.86	P,S
4.7	6.3	439	1445	9.6	56	.86	P,S
5.9	7.9	427	1440	12	62	.88	P,S
5.9	7.9	427	1450	13	76	.81	P,S
5.9	7.9	437	1440	12	62	.88	P,S
5.9	7.9	437	1450	13	76	.81	P,S

## F-pump, Standard Motor

HT

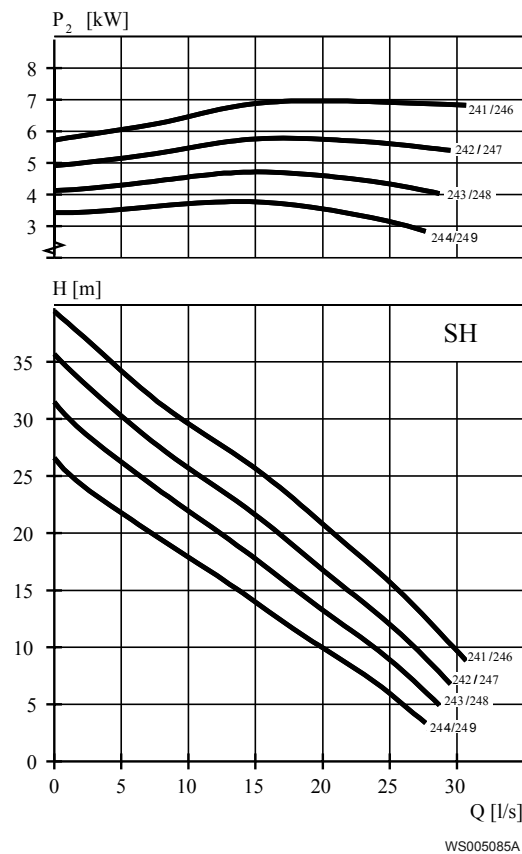


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**Table 11: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Installation
4	5.4	479	1455	8.3	56	.84	T,Z
4	5.4	489	1455	8.3	56	.84	T,Z
4.7	6.3	478	1445	9.6	56	.86	P,S
4.7	6.3	479	1445	9.6	56	.86	P,S
4.7	6.3	488	1445	9.6	56	.86	P,S
4.7	6.3	489	1445	9.6	56	.86	P,S
5.9	7.9	477	1440	12	62	.88	P,S
5.9	7.9	477	1450	13	76	.81	P,S
5.9	7.9	486	1440	12	62	.88	P,S
5.9	7.9	486	1450	13	76	.81	P,S
5.9	7.9	487	1440	12	62	.88	P,S
5.9	7.9	487	1450	13	76	.81	P,S

SH

**Table 12: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
7.4	9.9	241	2900	14	114	.91	P,S
7.4	9.9	242	2900	14	114	.91	P,S
7.4	9.9	243	2900	14	114	.91	P,S
7.4	9.9	244	2900	14	114	.91	P,S
7.4	9.9	246	2900	14	114	.91	P,S
7.4	9.9	247	2900	14	114	.91	P,S
7.4	9.9	248	2900	14	114	.91	P,S
7.4	9.9	249	2900	14	114	.91	P,S

# H-pump

## Product description

### Usage

Submersible pump for pumping water containing abrasive particles, sludge, ground water, slurries.

### Denomination

Type	Non explosion proof version	Explosion proof version	Pressure class	Installation types
Cast iron	3127.181	3127.090	HT – High head	S

The pump can be used in the following installations:

- S** Portable semi permanent, wet well arrangement with hose coupling or flange for connection to discharge pipeline.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 – 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>• Direct on-line</li> <li>• Star-delta</li> </ul>
Number of starts per hour	Maximum 30
Code compliance	IEC 60034-1
Rated output variation	±10%
Voltage variation	<ul style="list-style-type: none"> <li>• Continuously running: Maximum ±5%</li> <li>• Intermittent running: Maximum ±10%</li> </ul>
Voltage imbalance between phases	Maximum 2%
Insulation class	H (180°C, 356°F)

## Cables

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G2.5+2×1.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>

## Monitoring Equipment

- Thermal contacts opening temperature 125° C (257° F)

## Materials

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing	Cast iron, gray	35B	GJL-250
Impeller	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Suction cover	Nitrile rubber (NBR)	–	–
Wear ring	Nitrile rubber (NBR)	–	–
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings, alternative 1	Nitrile rubber (NBR) 70° IRH	–	–
O-rings, alternative 2	Fluorinated rubber (FPM) 70° IRH	–	–
Oil Part No 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)	–	–

**Table 13: Mechanical face seals**

Alternative	Inner seal	Outer seal
1	Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
2	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
3	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Silicon carbide/ Silicon carbide

H-pump

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**Surface Treatment**

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

**Options**

- Warm liquid version (non-explosion proof versions)
- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)
- Surface treatment (Epoxy)
- Zinc anodes
- Other cables

**Accessories**

Discharge connections, adapters, hose connections, and other mechanical accessories.

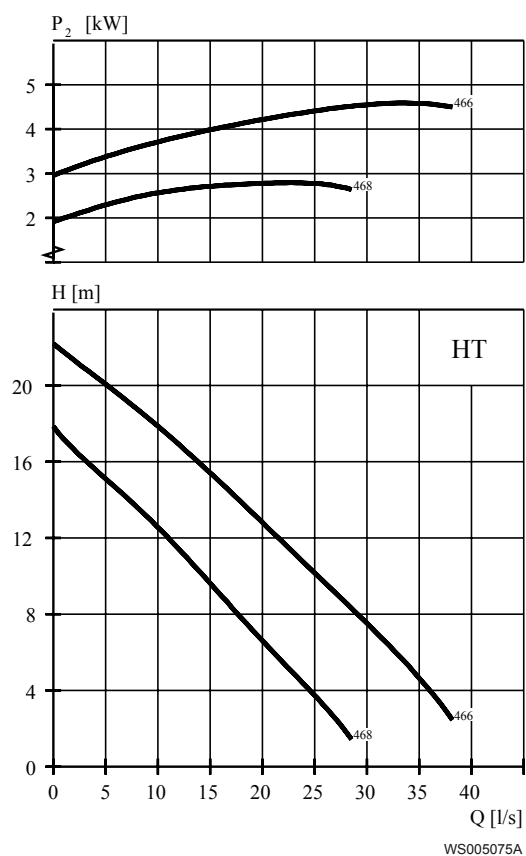
Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

For more information, see separate booklet or our website.

## Motor rating and performance curves

Star-delta starting current is 1/3 of Direct on-line starting current.

HT

**Table 14: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Impeller throughlet, mm	Installation
4.7	6.3	466	1460	10	73	.78	51	S
4.7	6.3	468	1460	10	73	.78	50	S
5.9	7.9	466	1450	12	77	.84	51	S
5.9	7.9	468	1450	12	77	.84	50	S

# L-pump

## Product description

### Usage

Submersible pump for pumping clean, surface or waste water containing fibre-free solids.

### Denomination

Type	Non explosion proof version	Explosion proof version	Pressure class	Installation types
Cast iron	3127.181	–	LT – Low head	L

The pump can be used in the following installations:

- L Semi permanent, wet well column pipe arrangement where the well is divided into a suction part and a discharge part. Pump end equipped with guide vanes.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 – 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>• Direct on-line</li> <li>• Star-delta</li> </ul>
Number of starts per hour	Maximum 30
Code compliance	IEC 60034-1
Rated output variation	±10%
Voltage variation	<ul style="list-style-type: none"> <li>• Continuously running: Maximum ±5%</li> <li>• Intermittent running: Maximum ±10%</li> </ul>
Voltage imbalance between phases	Maximum 2%
Insulation class	H (180°C, 356°F)

## Cables

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G2.5+2×1.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>

## Monitoring Equipment

- Thermal contacts opening temperature 125° C (257° F)

## Materials

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing	Cast iron, gray	35B	GJL-250
Impeller	Cast iron, gray	35B	GJL-250
Insert ring	Cast iron, gray	35B	GJL-250
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings, alternative 1	Nitrile rubber (NBR) 70° IRH		
O-rings, alternative 2	Fluorinated rubber (FPM) 70° IRH		
Oil Part No 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)		

**Table 15: Mechanical face seals**

Alternative	Inner seal	Outer seal
1	Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
2	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
3	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Silicon carbide/ Silicon carbide

L-pump

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**Surface Treatment**

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

**Options**

- Warm liquid version (non-explosion proof versions)
- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)
- Surface treatment (Epoxy)
- Zinc anodes
- Other cables

**Accessories**

Discharge connections, adapters, hose connections, and other mechanical accessories.

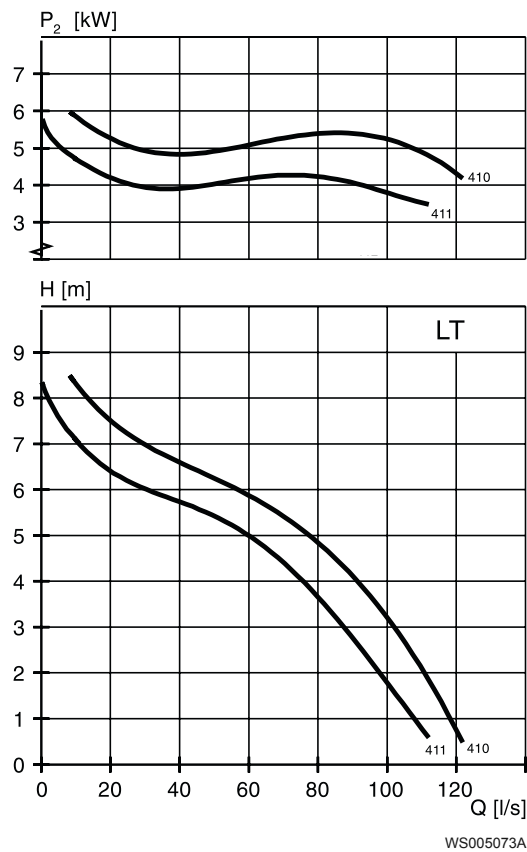
Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

For more information, see separate booklet or our website.

## Motor rating and performance curves

Star-delta starting current is 1/3 of Direct on-line starting current.

LT

**Table 16: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Impeller throughlet, mm	Installation
4.7	6.3	411	1445	9.6	56	.86	76	L
5.9	7.9	410	1450	12	77	.84	76	L
5.9	7.9	411	1450	12	77	.84	76	L
7.5	10.1	410	1435	15	77	.86	76	L
7.5	10.1	411	1435	15	77	.86	76	L

# M-pump

## Product description

### Usage

Submersible pump for pumping waste water containing solids that need to be macerated. The impeller is equipped with a grinder device.

### Denomination

Type	Non explosion proof version	Explosion proof version	Pressure class	Installation types
Grinder	3127.170	3127.890	LT – Low head HT – High head	F, P

The pump can be used in the following installations:

- F** Free standing semi permanent, wet well arrangement where the pump is placed on a firm surface.
- P** Semi permanent, wet well arrangement with pump installed on two guide bars with automatic connection to discharge.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 – 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>• Direct on-line</li> <li>• Star-delta</li> </ul>
Number of starts per hour	Maximum 30
Code compliance	IEC 60034-1
Rated output variation	±10%
Voltage variation	<ul style="list-style-type: none"> <li>• Continuously running: Maximum ±5%</li> <li>• Intermittent running: Maximum ±10%</li> </ul>
Voltage imbalance between phases	Maximum 2%

Feature	Description
Insulation class	H (180°C, 356°F)

### Cables

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G2.5+2×1.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>

### Monitoring Equipment

Thermal contacts opening temperature 125° C (257° F)

### Materials

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing	Cast iron, gray	35B	GJL-250
Impeller, alternative 1	Cast iron, gray	30B	GJL-200
Impeller, alternative 2	Cast iron, gray	35B	GJL-250
Cutter wheel	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Cutter plate	Stainless steel		
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings	Nitrile rubber (NBR) 70° IRH		
Oil, part no 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)		

**Table 17: Mechanical face seals**

Inner seal	Outer seal
Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide

### Surface Treatment

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

### Options

- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)

## M-pump

- Surface treatment (Epoxy)
- Zinc anodes
- Other cables

## Accessories

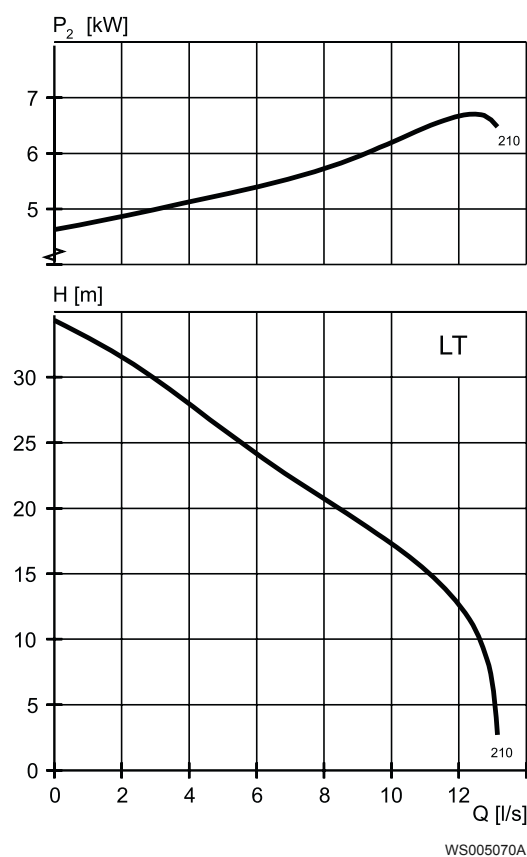
Discharge connections, adapters, hose connections, and other mechanical accessories.

Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

## Motor rating and performance curves

Star-delta starting current is 1/3 of Direct on-line starting current.

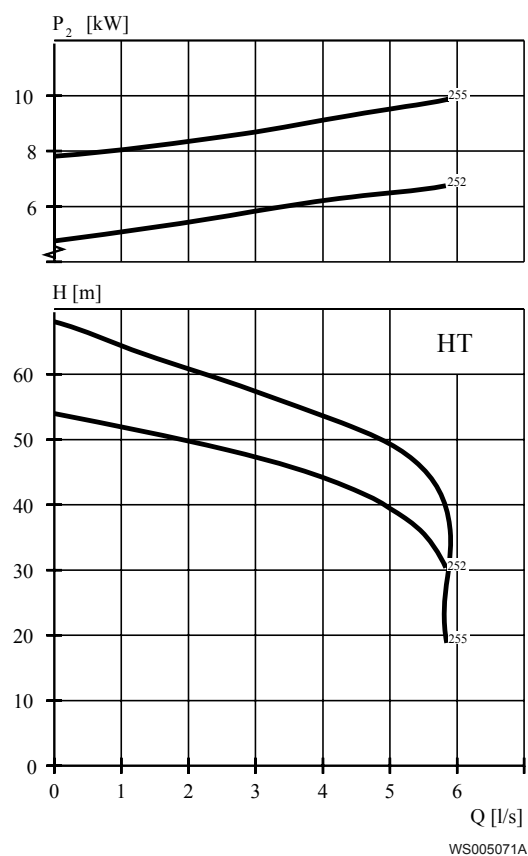
LT



**Table 18: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
7.4	9.9	210	2900	14	114	.91	F,P

HT

**Table 19: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
7.4	9.9	252	2900	14	114	.91	F,P
10.9	14.6	255	2875	21	137	.88	F,P

# N-pump, Standard Motor

## Product description

### Usage

The submersible pump is designed for pumping clean water, surface water, and wastewater containing solids or long-fibred material.

### Denomination

Type	Non explosion proof version	Explosion proof version	Pressure class	Installation types
Adaptive	3127.160	3127.190	LT – Low head	P, S, T, Z
Cast iron	3127.181	3127.090	MT – Medium head	L, P, S, T, Z
Hard-Iron™	3127.185	3127.095	HT – High head SH – Super head	P, S, T, Z

The pump can be used in the following installations:

- L** Semi permanent, wet well column pipe arrangement where the well is divided into a suction part and a discharge part. Pump end equipped with guide vanes.
- P** Semi permanent, wet well arrangement with pump installed on two guide bars with automatic connection to discharge.
- S** Portable semi permanent, wet well arrangement with hose coupling or flange for connection to discharge pipeline.
- T** Vertical permanent, dry well arrangement with flange connection to suction and discharge piping.
- Z** Horizontal permanent, dry well arrangement with flange connection to suction and discharge piping.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 – 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>• Direct on-line</li> <li>• Star-delta</li> </ul>
Number of starts per hour	Maximum 30

Feature	Description
Code compliance	IEC 60034-1
Rated output variation	±10%
Voltage variation	<ul style="list-style-type: none"> <li>Continuously running: Maximum ±5%</li> <li>Intermittent running: Maximum ±10%</li> </ul>
Voltage imbalance between phases	Maximum 2%
Insulation class	H (180°C, 356°F)

## Cables

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	4G2.5 mm <sup>2</sup> 4G2.5+2×1.5 mm <sup>2</sup> 4G4 mm <sup>2</sup> 4G4+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5 mm <sup>2</sup> 7G2.5+2×1.5 mm <sup>2</sup> 7G4+2×1.5 mm <sup>2</sup>
	Screened SUBCAB® heavy-duty submersible cable	S3×2.5+3×2.5/3+4×1.5 mm <sup>2</sup>

## Monitoring Equipment

Thermal contacts opening temperature 125° C (257° F)

## Materials

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing	Cast iron, gray	35B	GJL-250
Impeller, alternative 1	Cast iron, gray	35B	GJL-250
Impeller, alternative 2	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Insert ring, alternative 1	Cast iron, gray	35B	GJL-250
Insert ring, alternative 2	Cast iron, Hard-Iron™	A 532 IIIA	GJN-HB555(XCR23)
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings, alternative 1	Nitrile rubber (NBR) 70° IRH	-	-
O-rings, alternative 2	Fluorinated rubber (FPM) 70° IRH	-	-

## N-pump, Standard Motor

Denomination	Material	ASTM	EN
Oil, part no 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)	-	-

**Table 20: Mechanical face seals**

Alternative	Inner seal	Outer seal
1	Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
2	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
3	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Silicon carbide/ Silicon carbide

## Surface Treatment

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

## Options

- Warm liquid version (non-explosion proof versions)
- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)
- Surface treatment (Epoxy)
- Zinc anodes
- Other cables

## Accessories

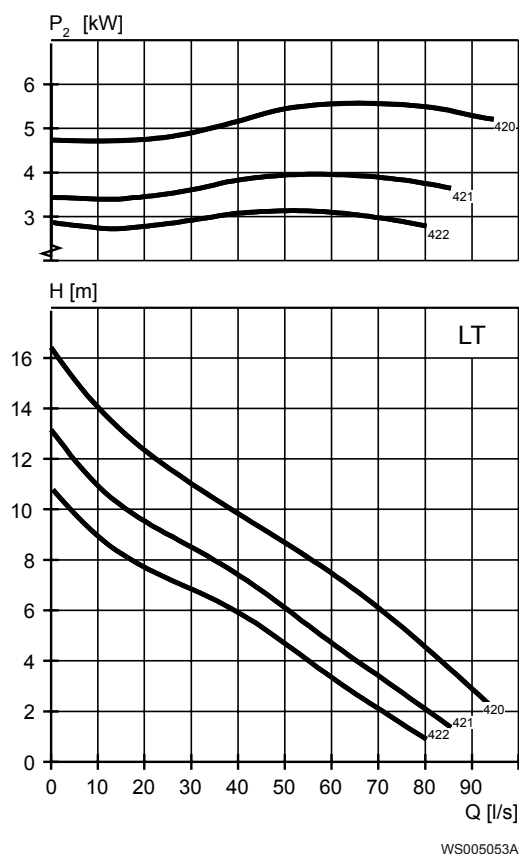
Discharge connections, adapters, hose connections, and other mechanical accessories.

Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

## Motor rating and performance curves

Star-delta starting current is 1/3 of Direct on-line starting current.

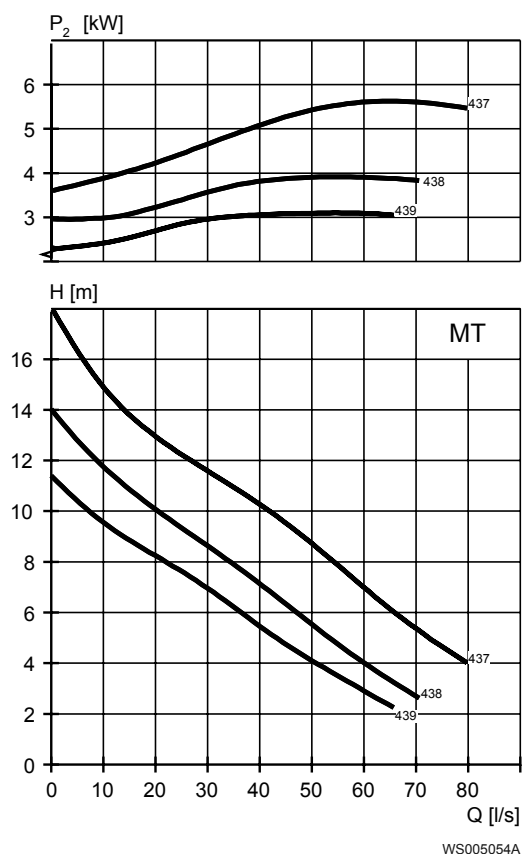
LT

**Table 21: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
4	5.4	421	1455	8.3	56	.84	T,Z
4	5.4	422	1455	8.3	56	.84	T,Z
4.7	6.3	421	1445	9.6	56	.86	P,S
4.7	6.3	422	1445	9.6	56	.86	P,S
4.7	6.3	421	1460	11	76	.76	T,Z
4.7	6.3	422	1460	11	76	.76	T,Z
5.9	7.9	420	1450	12	77	.84	P,S
5.9	7.9	421	1450	12	77	.84	P,S
5.9	7.9	422	1450	12	77	.84	P,S

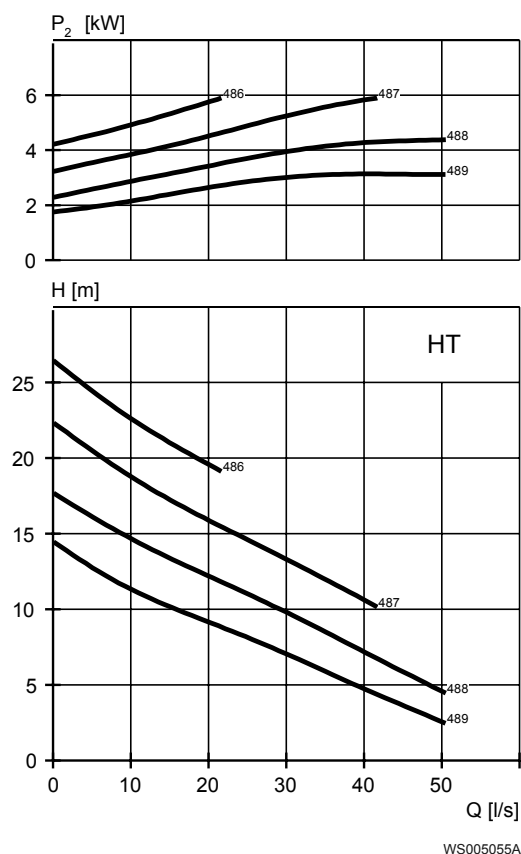
## N-pump, Standard Motor

MT

**Table 22: 400 V, 50 Hz, 3-phase**

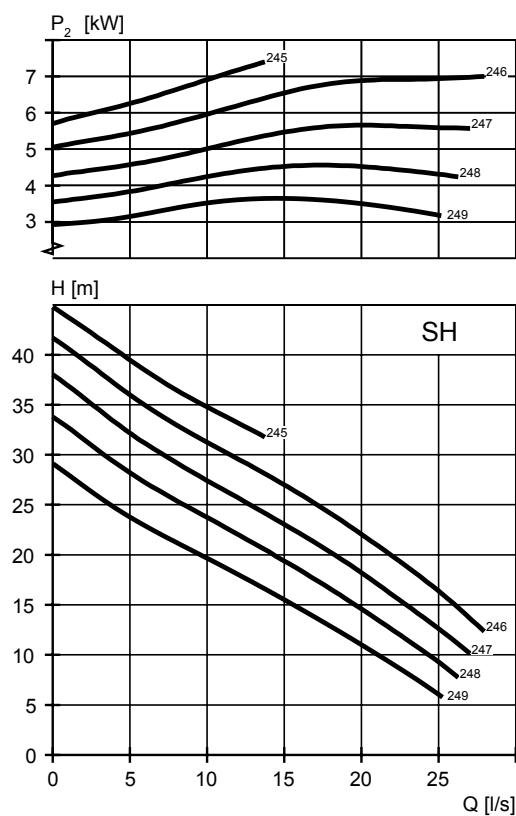
Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
4	5.4	438	1455	8.3	56	.84	T,Z
4	5.4	439	1455	8.3	56	.84	T,Z
4.7	6.3	438	1445	9.6	56	.86	P,S
4.7	6.3	439	1445	9.6	56	.86	P,S
4.7	6.3	438	1460	11	76	.76	T,Z
4.7	6.3	439	1460	11	76	.76	T,Z
5.9	7.9	437	1450	13	76	.81	P,S
5.9	7.9	438	1450	13	76	.81	P,S
5.9	7.9	439	1450	13	76	.81	P,S

HT

**Table 23: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
4	5.4	489	1455	8.3	56	.84	T,Z
4.7	6.3	487	1445	9.6	56	.86	P,S
4.7	6.3	488	1445	9.6	56	.86	P,S
4.7	6.3	489	1445	9.6	56	.86	P,S
4.7	6.3	487	1460	11	76	.76	T,Z
4.7	6.3	488	1460	11	76	.76	T,Z
4.7	6.3	489	1460	11	76	.76	T,Z
5.9	7.9	486	1450	12	77	.84	P,S
5.9	7.9	487	1450	12	77	.84	P,S
5.9	7.9	488	1450	12	77	.84	P,S
5.9	7.9	489	1450	12	77	.84	P,S

SH



WS005056A

**Table 24: 400 V, 50 Hz, 3-phase**

Rated power kW	Rated power hp	Curve/ Impeller No	Revolutions per minute, rpm	Rated current, A	Starting current, A	Power factor, $\cos \varphi$	Installation
7.4	9.9	245	2900	14	114	.91	P,S
7.4	9.9	246	2900	14	114	.91	P,S
7.4	9.9	247	2900	14	114	.91	P,S
7.4	9.9	248	2900	14	114	.91	P,S
7.4	9.9	249	2900	14	114	.91	P,S

# P-pump

## Product description

### Usage

Submersible pump intended for pumping clean and slightly contaminated water.

### Denomination

Type	Non explosion proof version	Explosion proof version	Pressure class	Installation types
Cast iron	3127.181	3127.090	LT – Low head	L

The pump can be used in the following installations:

- L Semi permanent, wet well column pipe arrangement where the well is divided into a suction part and a discharge part. Pump end equipped with guide vanes.

### Application Limits

Feature	Description
Liquid temperature	Maximum 40°C, (104°F)
Liquid temperature, warm water version	Maximum 70°C, (158°F)
Depth of immersion	Maximum 20 m (65 ft)
pH of the pumped liquid	5.5 – 14
Liquid density	Maximum 1100 kg/m <sup>3</sup>

### Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 Hz
Power supply	3-phase
Starting method	<ul style="list-style-type: none"> <li>• Direct on-line</li> <li>• Star-delta</li> </ul>
Number of starts per hour	Maximum 30
Code compliance	IEC 60034-1
Rated output variation	±10%
Voltage variation	<ul style="list-style-type: none"> <li>• Continuously running: Maximum ±5%</li> <li>• Intermittent running: Maximum ±10%</li> </ul>
Voltage imbalance between phases	Maximum 2%
Insulation class	H (180°C, 356°F)

## P-pump

## Cables

Application	Type	Denomination
Direct-on-line start	SUBCAB® heavy-duty submersible cable	7G2.5+2×1.5 mm <sup>2</sup>
Y/D start	SUBCAB® heavy-duty submersible cable	7G2.5+2×1.5 mm <sup>2</sup>

## Monitoring Equipment

- Thermal contacts opening temperature 125° C (257° F)

## Materials

Denomination	Material	ASTM	EN
Major castings	Cast iron, gray	35B	GJL-250
Pump housing	Cast iron, gray	35B	GJL-250
Propeller	Alumimum bronze	C 95 500	CC333G
Lifting handle	Stainless steel	AISI 316L	1.4404, 1.4432, ...
Shaft	Stainless steel	AISI 431	1.4057+QT800
Screws and nuts	Stainless steel, A4	AISI 316L, 316, 316Ti	1.4401, 1.4404, ...
O-rings, alternative 1	Nitrile rubber (NBR) 70° IRH		
O-rings, alternative 2	Fluorinated rubber (FPM) 70° IRH		
Oil Part No 901752	Medical white oil of paraffin type. Fulfills FDA 172.878 (a)		

**Table 25: Mechanical face seals**

Alternative	Inner seal	Outer seal
1	Aluminum oxide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
2	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide
3	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbide	Silicon carbide/ Silicon carbide

## Surface Treatment

Priming	Finish
Painted with a primer, see internal standard M0700.00.0002	Navy gray color NCS 5804-B07G. Two-component high-solid top coating, see internal standard M0700.00.0004 for standard painting and M0700.00.0008 for special painting.

## Options

- Leakage sensor in the stator housing (FLS)
- Leakage sensor in the oil housing (CLS)
- Surface treatment (Epoxy)

- Zinc anodes
- Other cables

### Accessories

Discharge connections, adapters, hose connections, and other mechanical accessories.

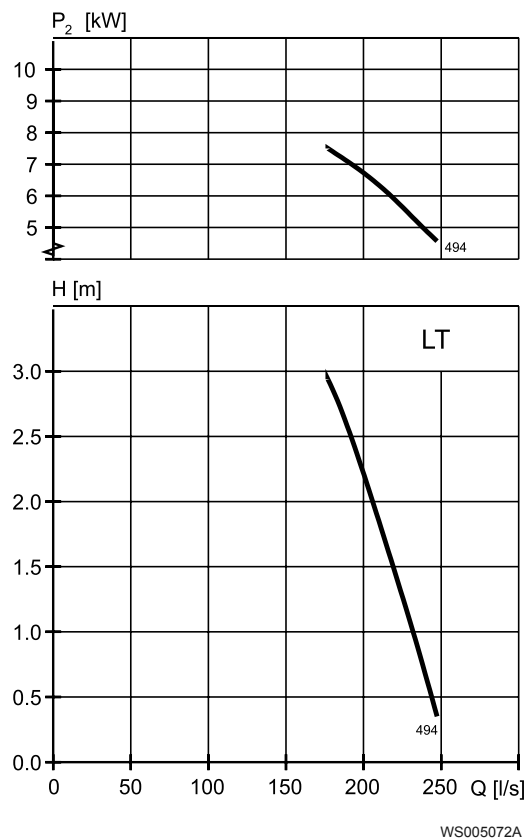
Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

For more information, see separate booklet or our website.

## Motor rating and performance curves

Star-delta starting current is 1/3 of Direct on-line starting current.

LT



**Table 26: 400 V, 50 Hz, 3-phase**

Rated power, kW	Rated power, hp	Curve/ Impeller No	Blade angle, °	Revolution s per minute, rpm	Rated current, A	Starting current, A	Power factor, cos $\varphi$	Installation
7.5	10.1	494	16	1435	15	77	.86	L

# Dimensions and Weight

## Drawings, C-pump

All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg).  
Contact your sales representative for more information.

All dimensions are in mm.

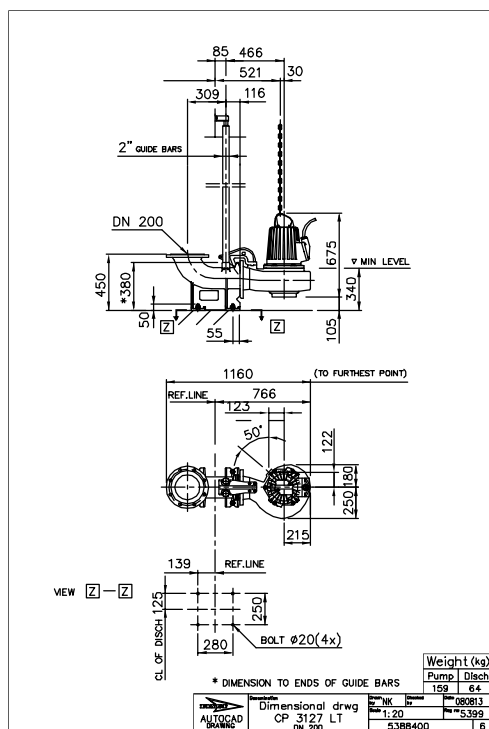


Figure 1: LT, P-installation

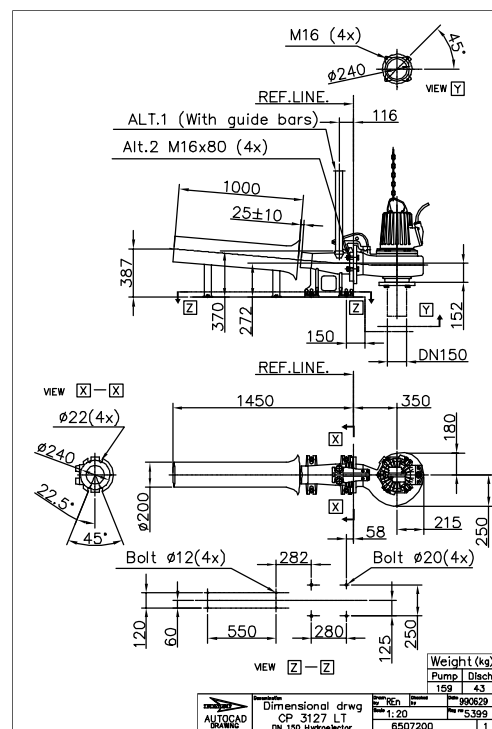


Figure 2: LT, P-installation

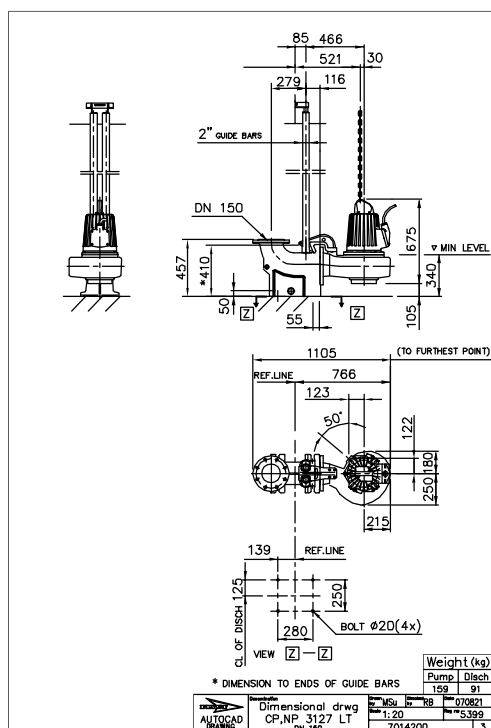


Figure 3: LT, P-installation

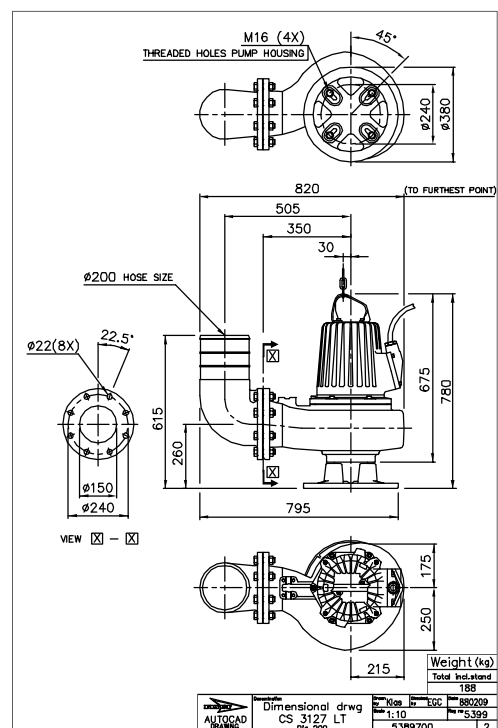


Figure 4: LT, S-installation

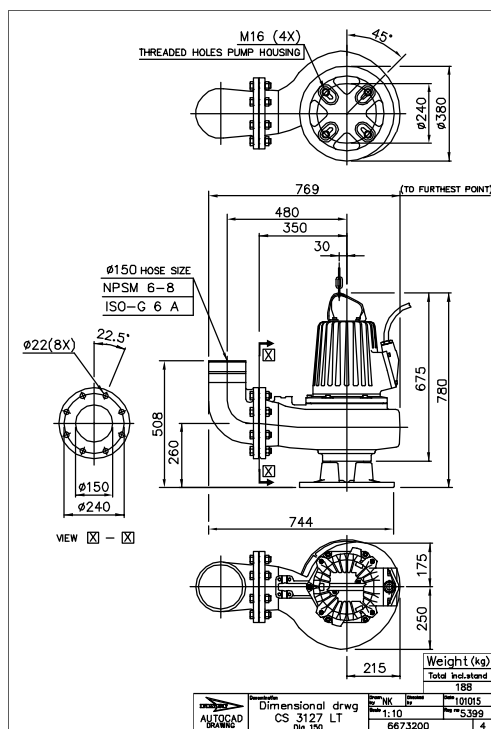


Figure 5: LT, S-installation

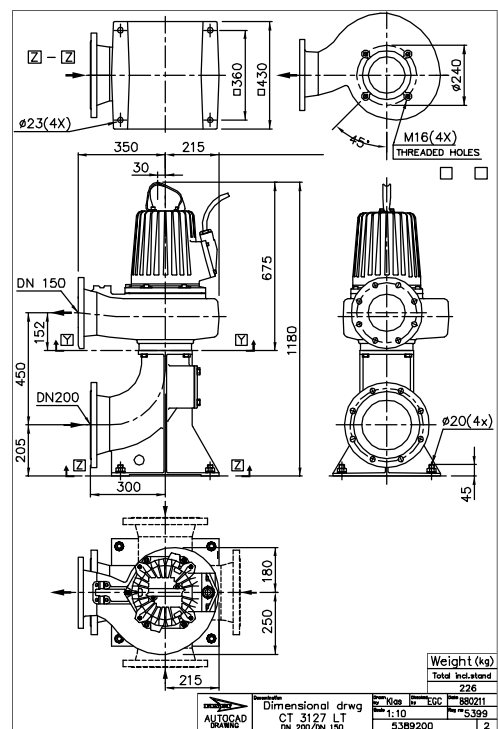


Figure 6: LT, T-installation

## Dimensions and Weight

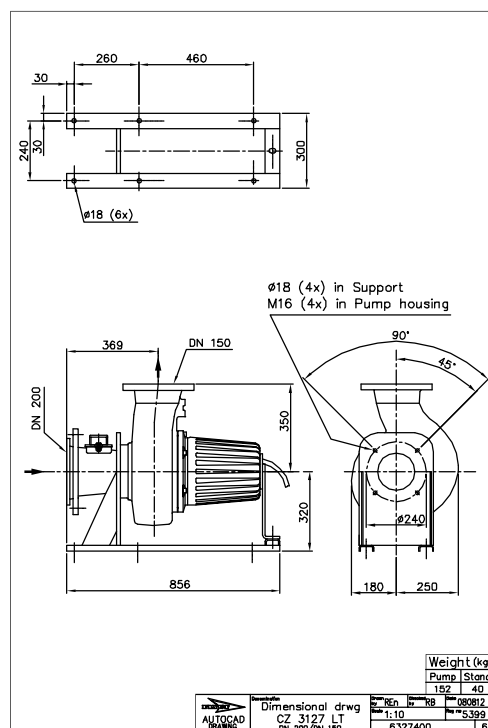


Figure 7: LT, Z-installation

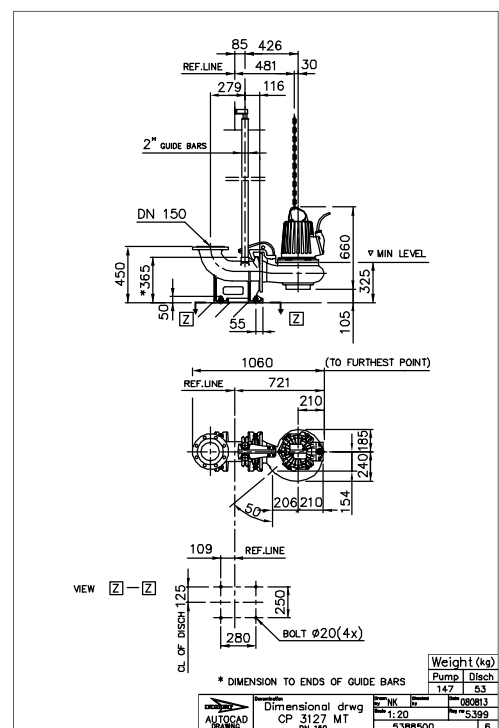


Figure 8: MT, P-installation

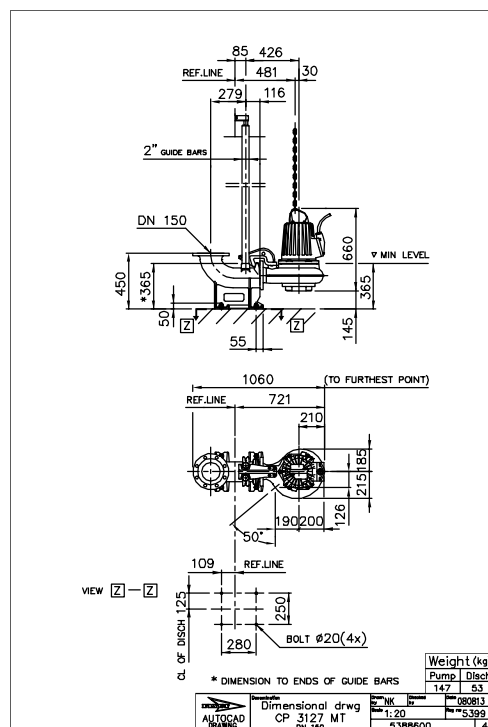


Figure 9: MT, P-installation

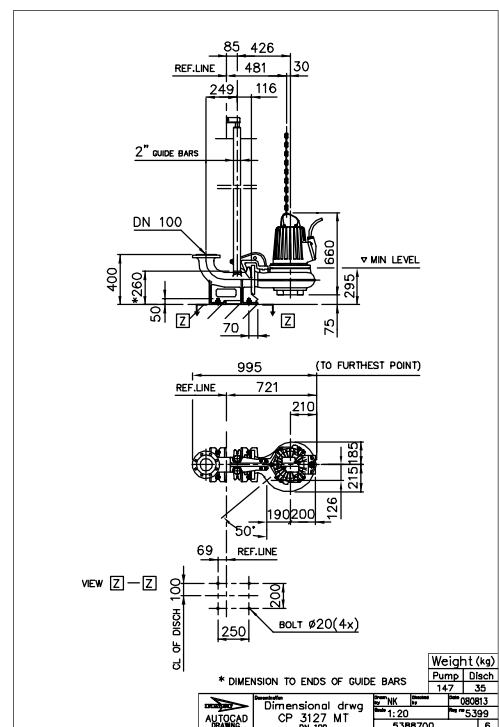


Figure 10: MT, P-installation

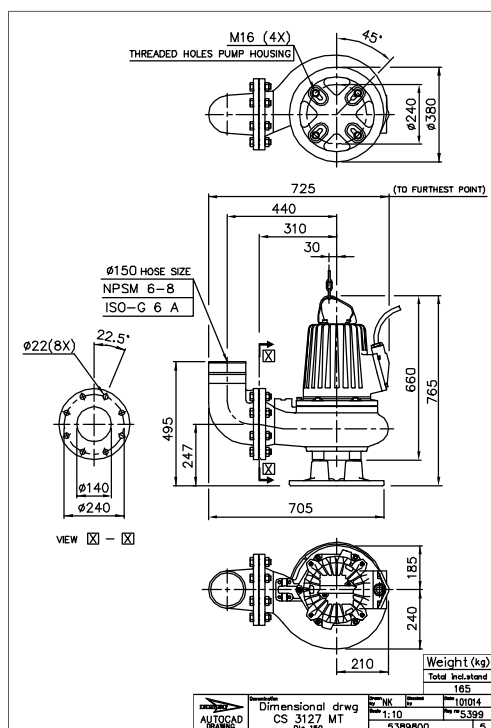


Figure 11: MT, S-installation

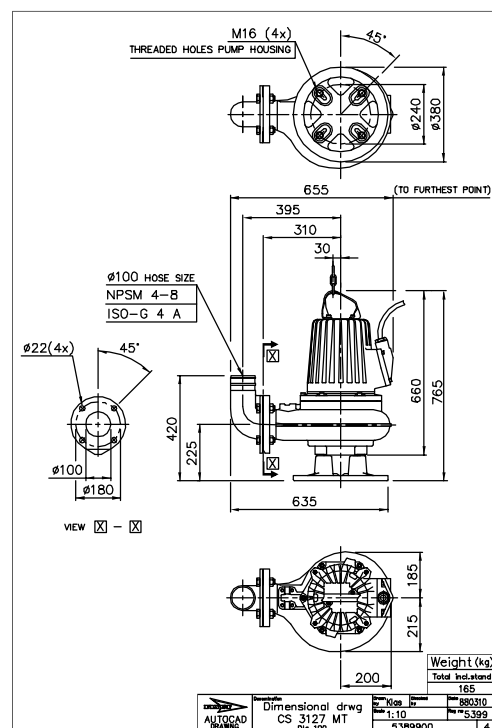


Figure 12: MT, S-installation

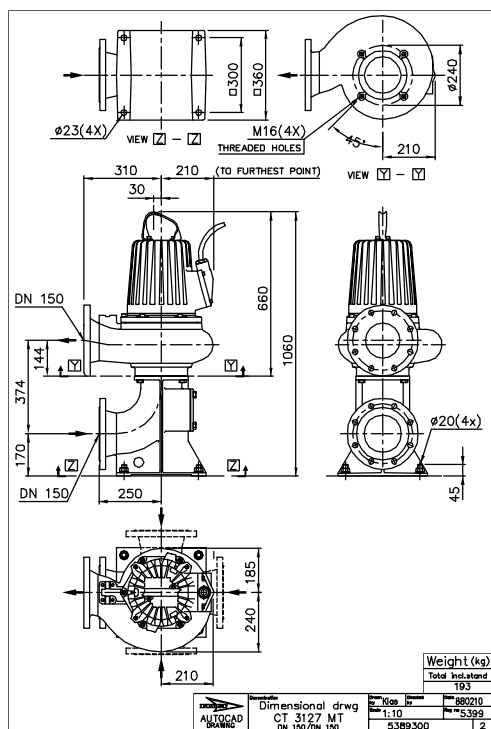


Figure 13: MT, T-installation

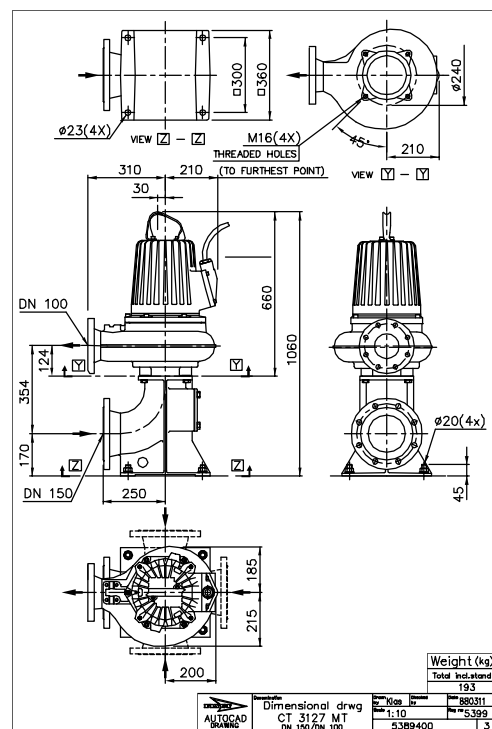


Figure 14: MT, T-installation

## Dimensions and Weight

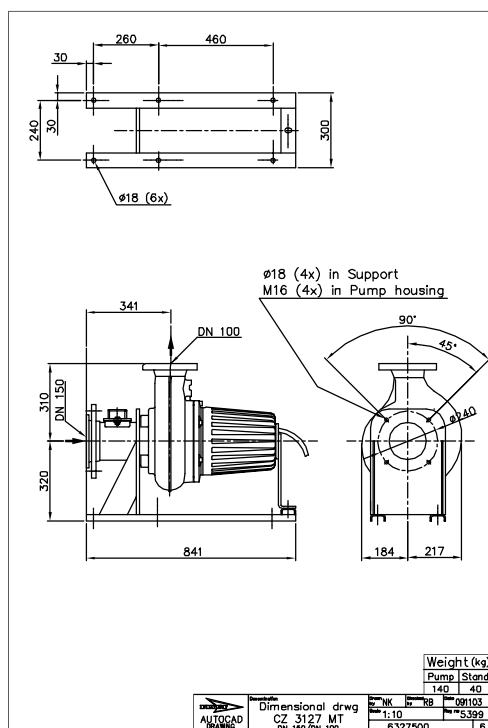


Figure 15: MT, Z-installation

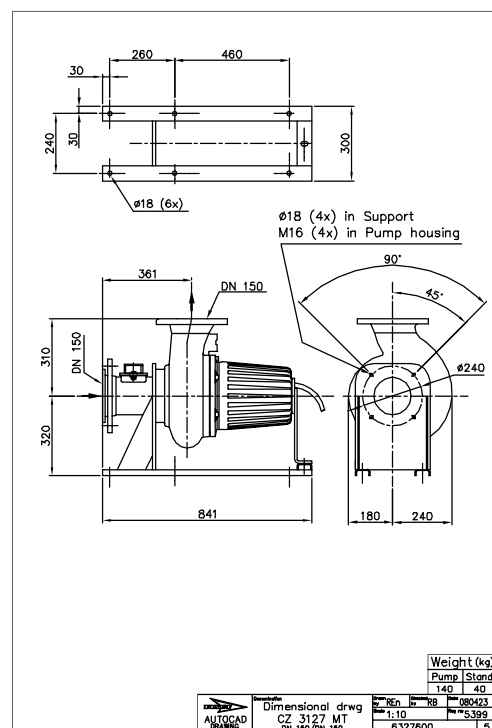


Figure 16: MT, Z-installation

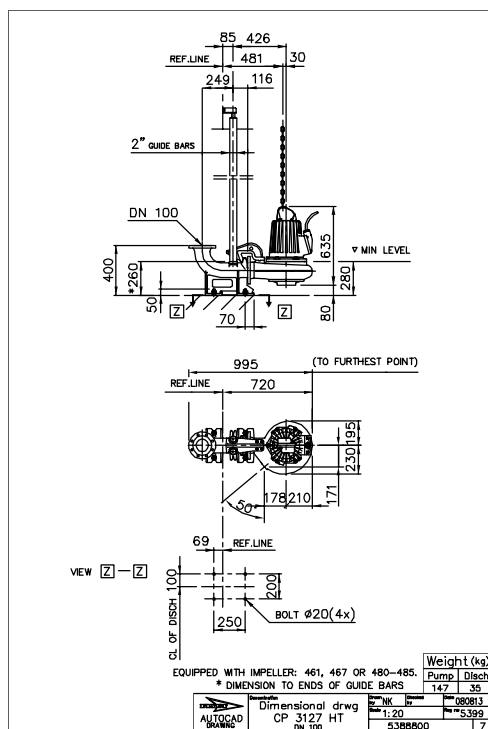


Figure 17: HT, P-installation

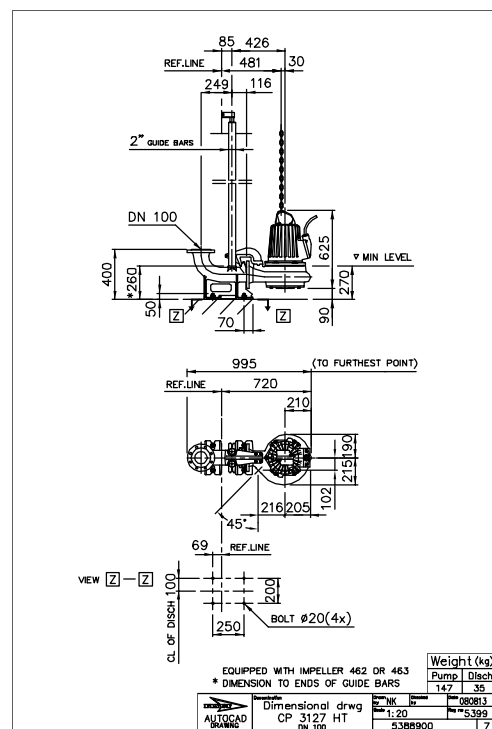


Figure 18: HT, P-installation

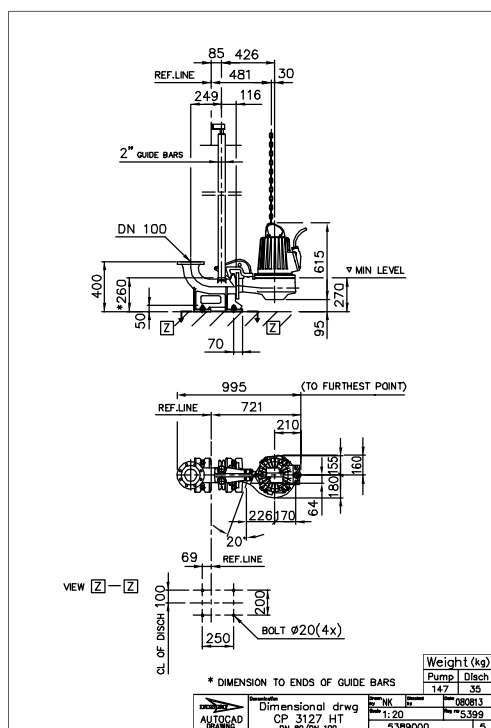


Figure 19: HT, P-installation

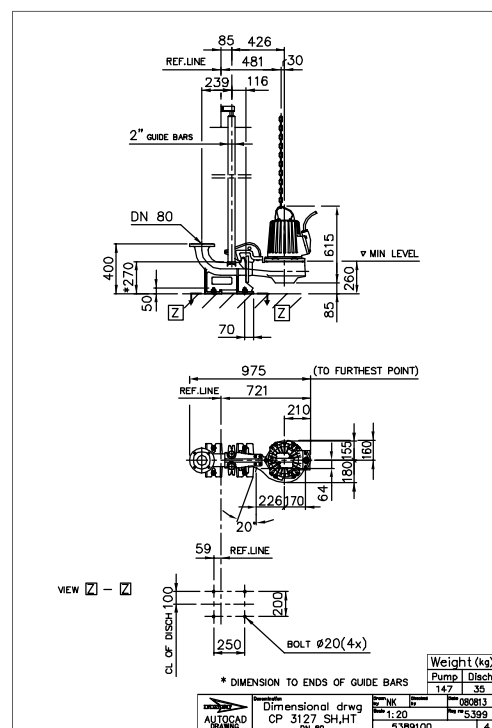


Figure 20: HT/SH, P-installation

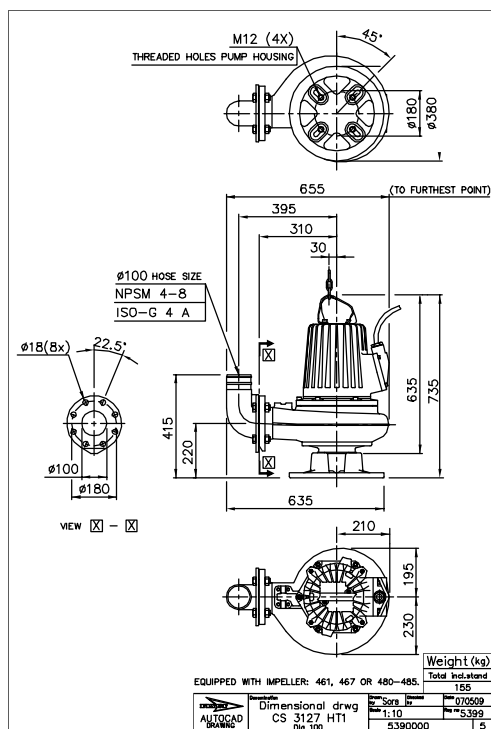


Figure 21: HT, S-installation

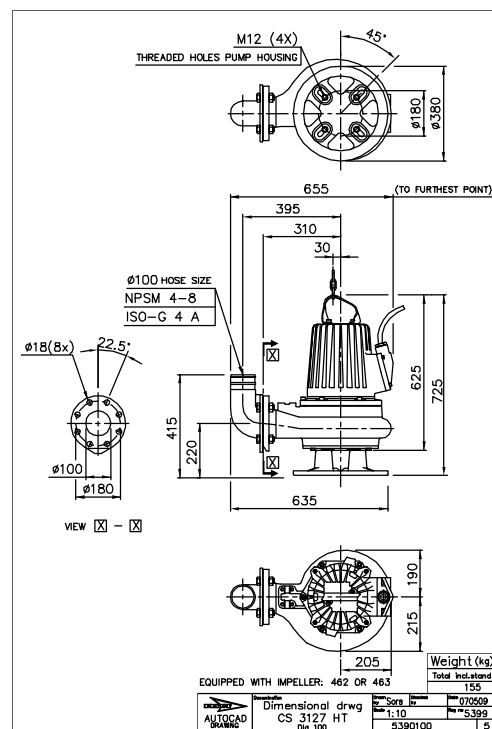


Figure 22: HT, S-installation

## Dimensions and Weight

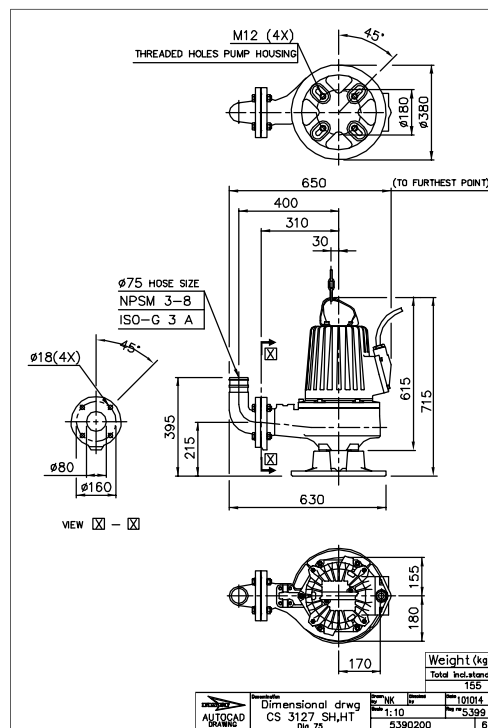


Figure 23: HT/SH, S-installation

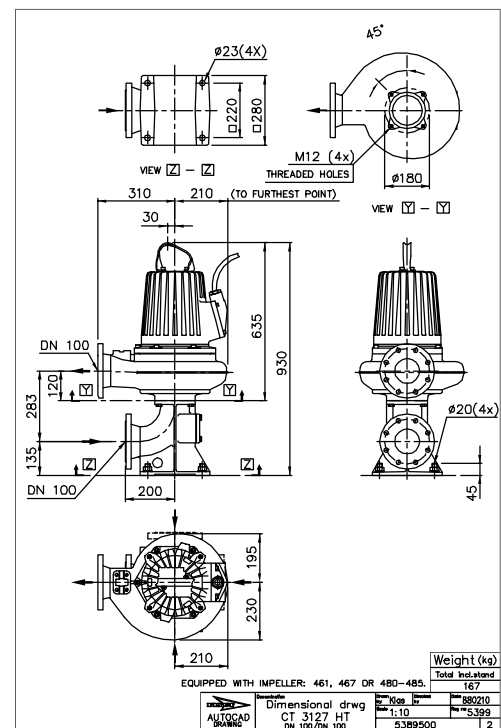


Figure 24: HT, T-installation

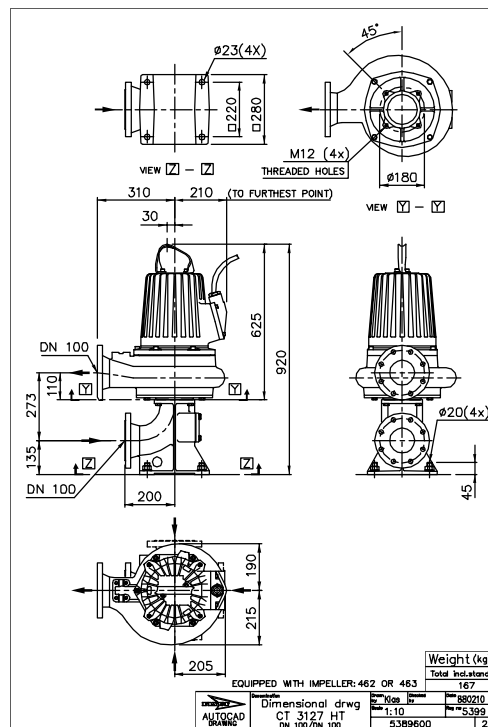


Figure 25: HT, T-installation

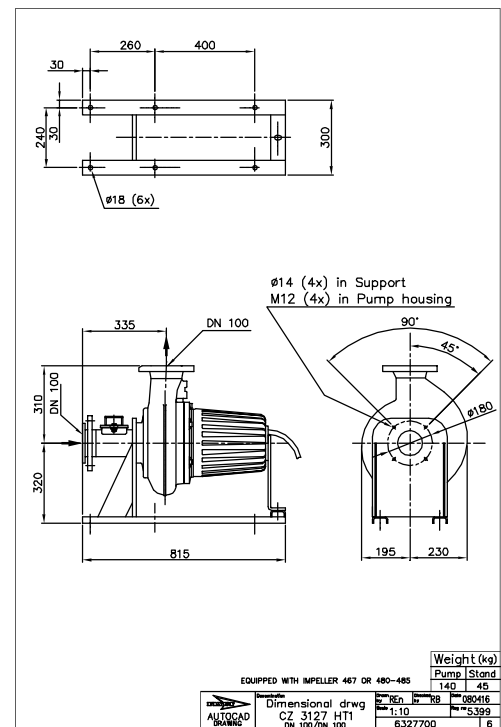
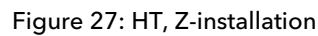


Figure 26: HT, Z-installation



All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg).  
Contact your sales representative for more information.  
All dimensions are in mm.



## Dimensions and Weight

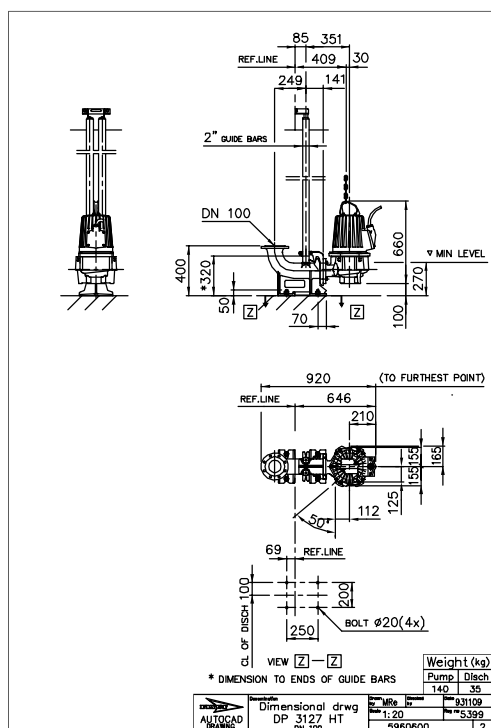


Figure 30: HT, P-installation

## Drawings, F-pump

All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg).  
Contact your sales representative for more information.

All dimensions are in mm.

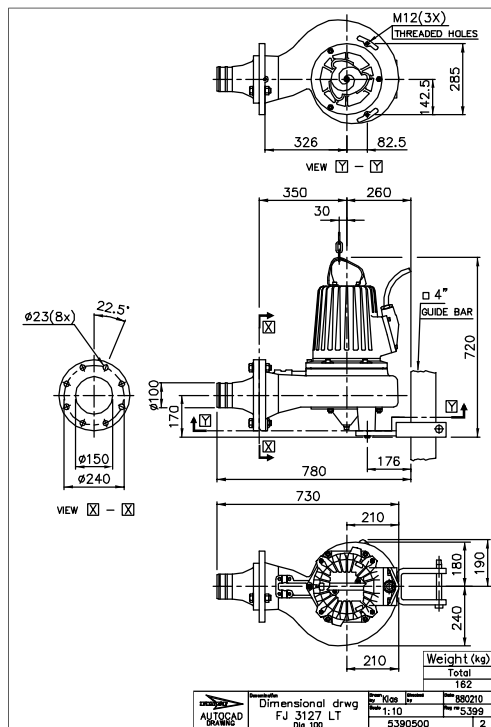


Figure 31: LT, J-installation

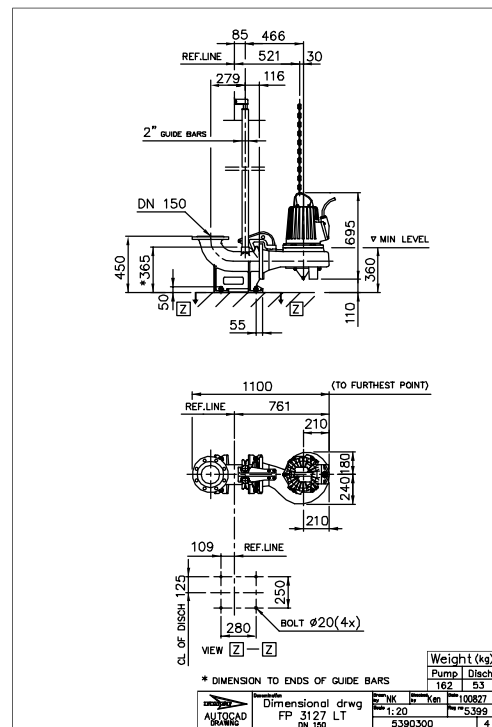
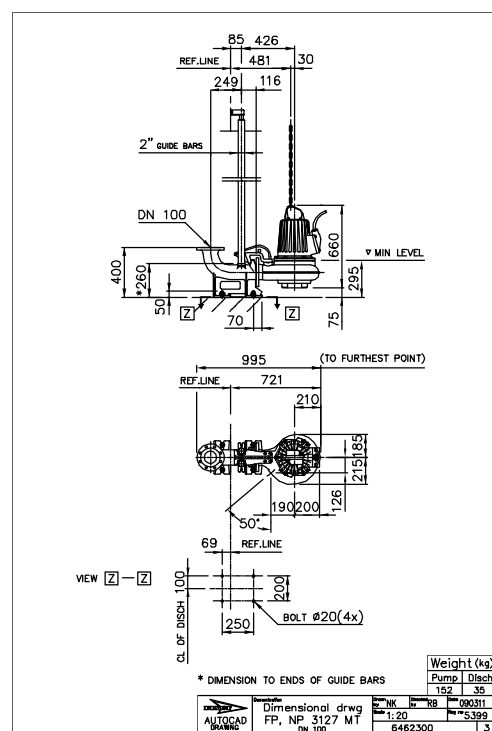
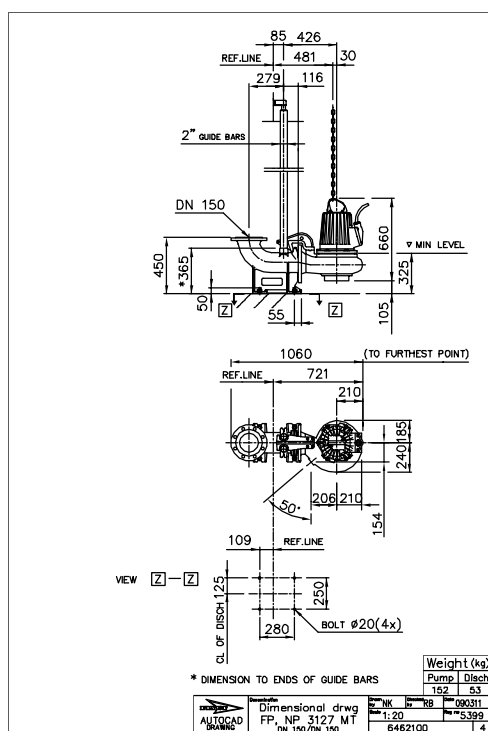
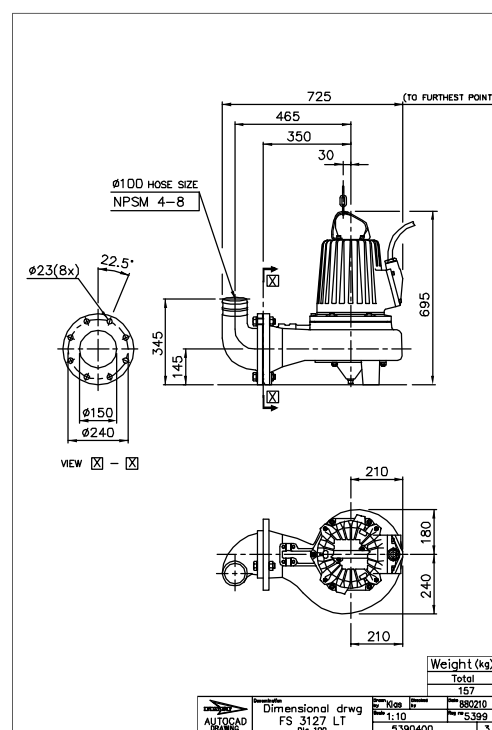
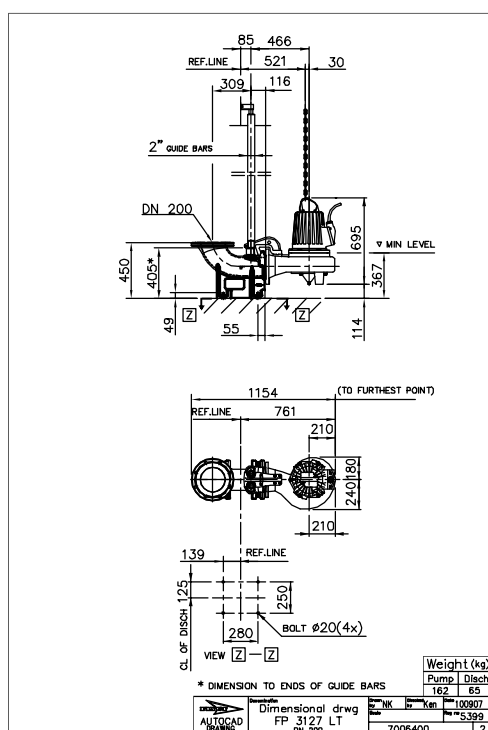


Figure 32: LT, P-installation



## Dimensions and Weight

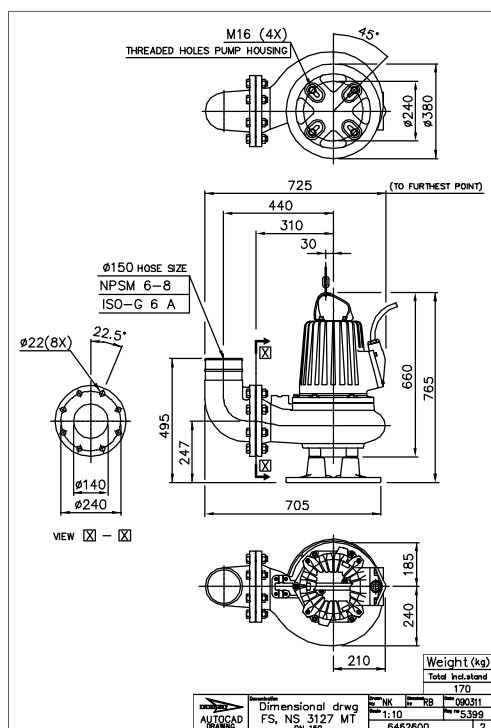


Figure 37: MT, S-installation

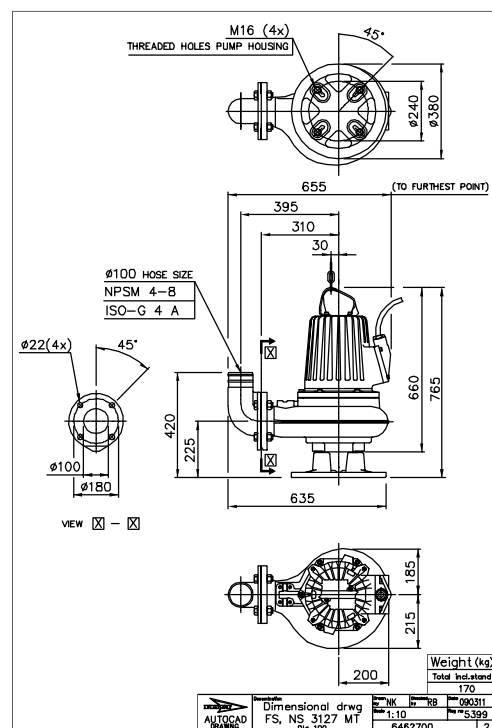


Figure 38: MT, S-installation

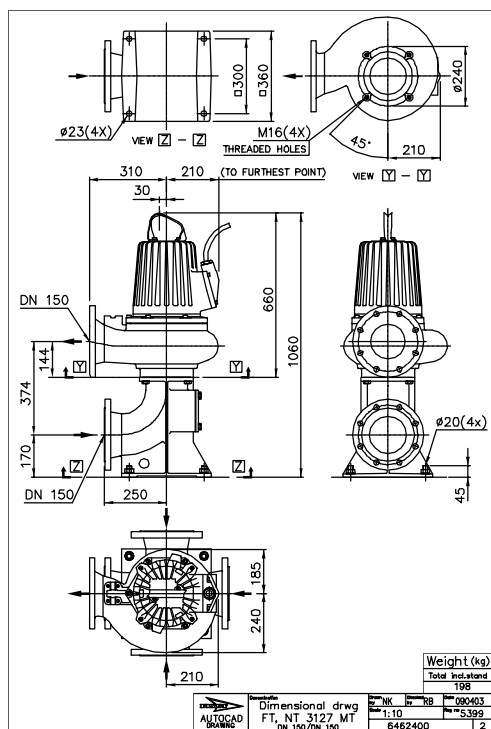


Figure 39: MT, T-installation

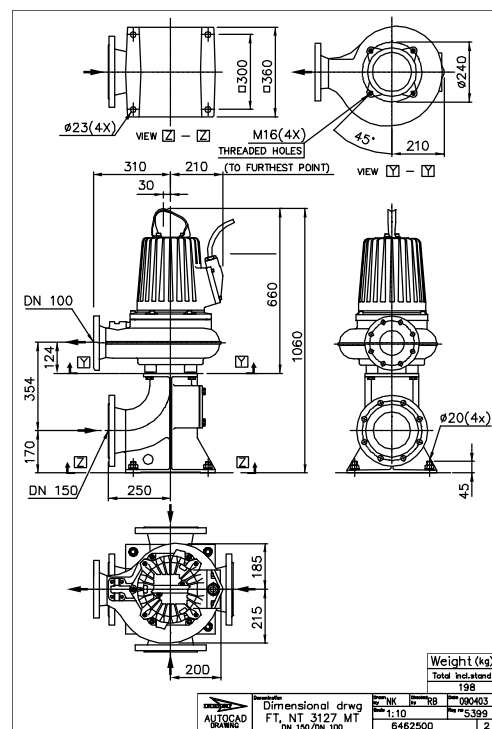
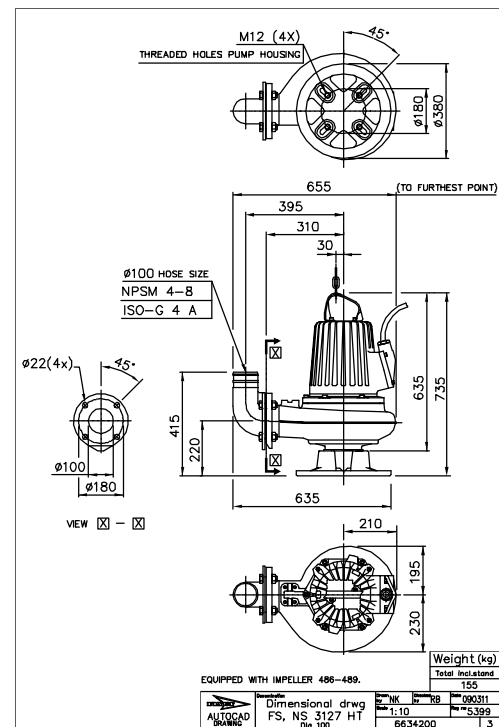
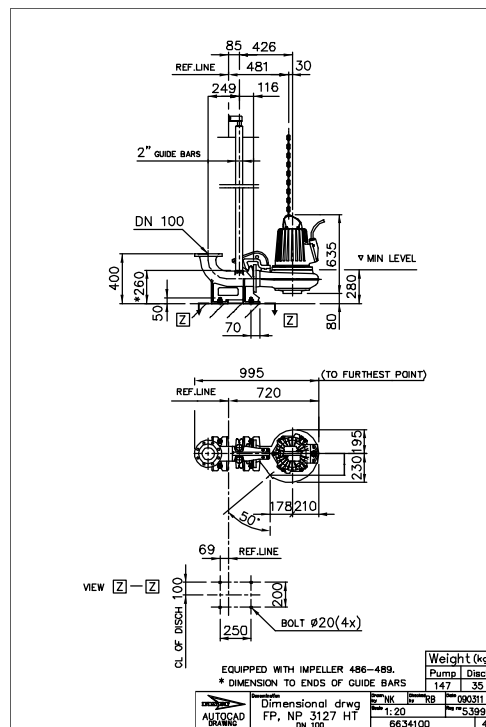
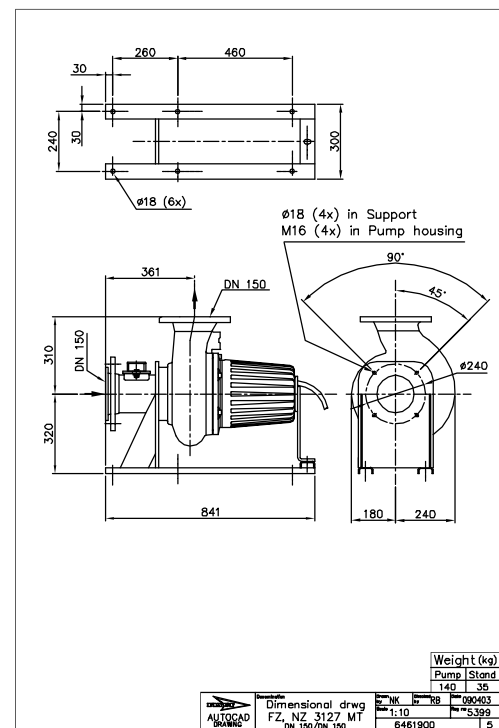
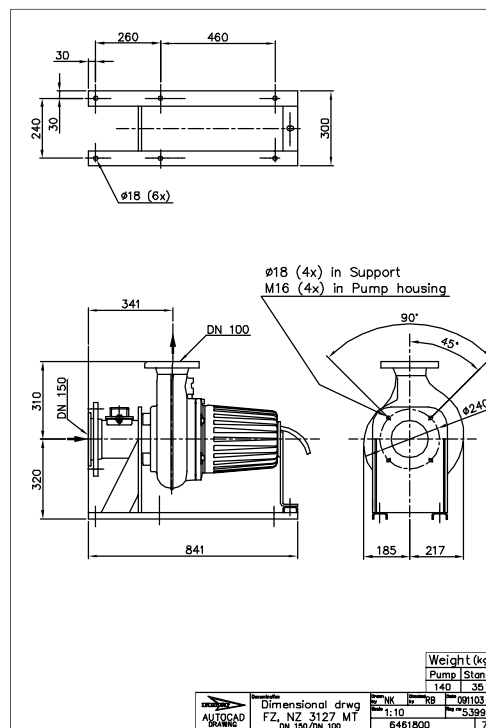


Figure 40: MT, T-installation



## Dimensions and Weight

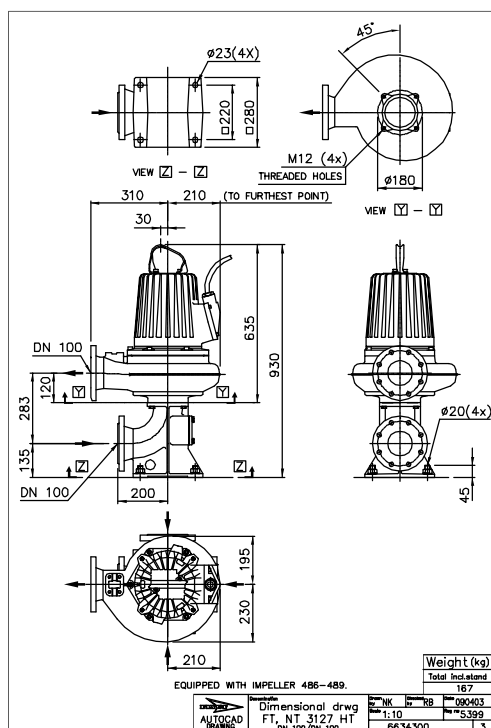


Figure 45: HT, T-installation

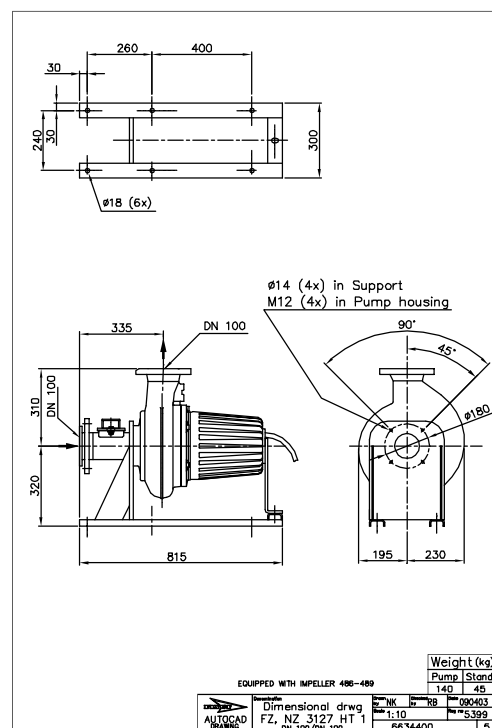


Figure 46: HT, Z-installation

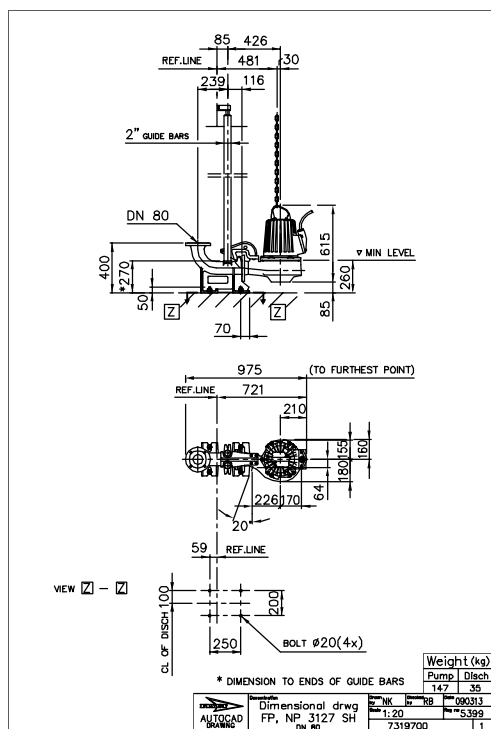


Figure 47: SH, P-installation

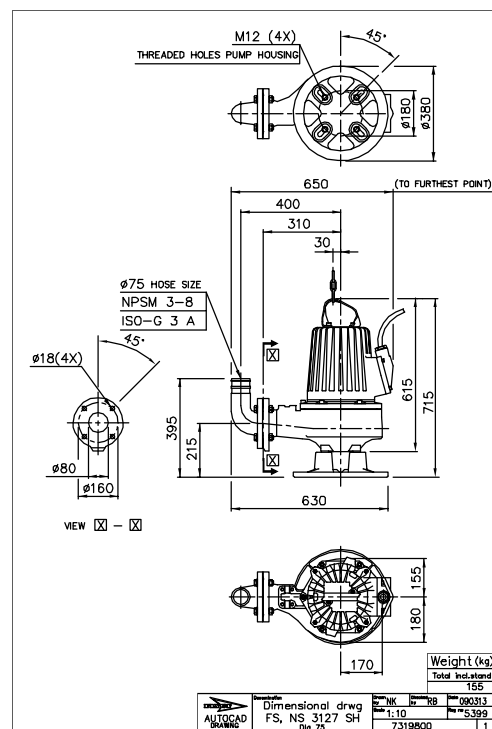


Figure 48: SH, S-installation

## Drawings, H-pump

All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg). Contact your sales representative for more information.

All dimensions are in mm.

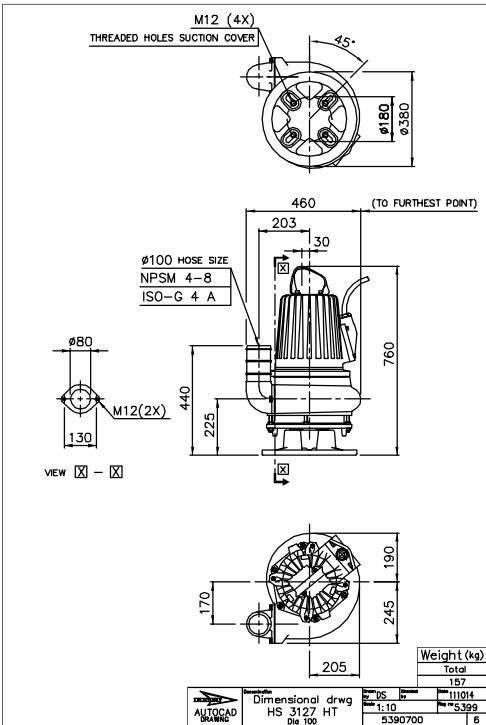


Figure 49: HT, S-installation

Drawings, L-pump

All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg).  
Contact your sales representative for more information.  
All dimensions are in mm.

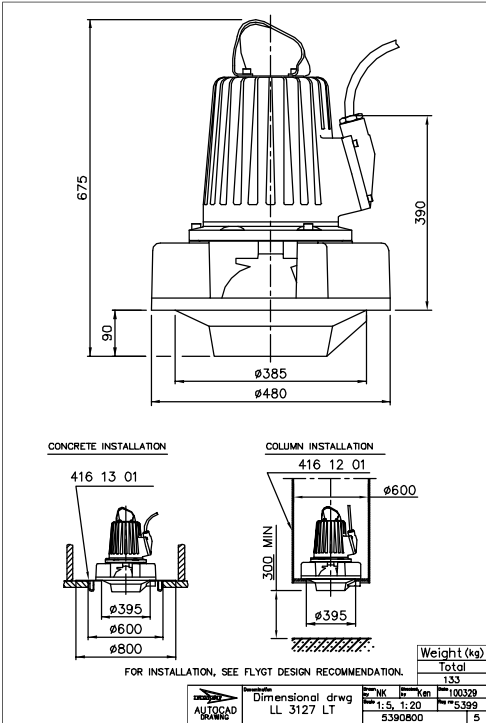


Figure 50: LT, L-installation

Drawings, M-pump

All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg).  
Contact your sales representative for more information.  
All dimensions are in mm.

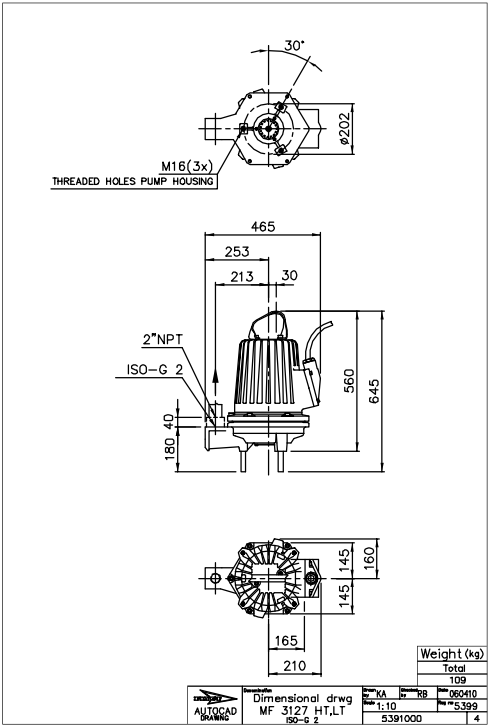


Figure 51: LT/HT, F-installation

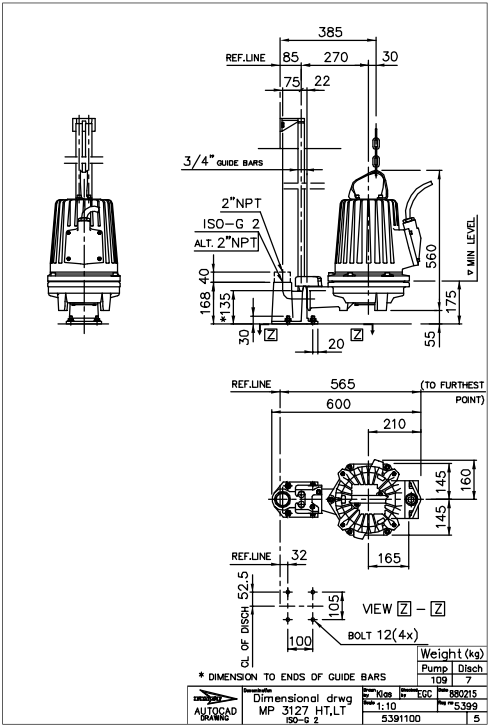


Figure 52: LT/HT, P-installation

Drawings, N-pump

All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg).  
Contact your sales representative for more information.  
All dimensions are in mm.

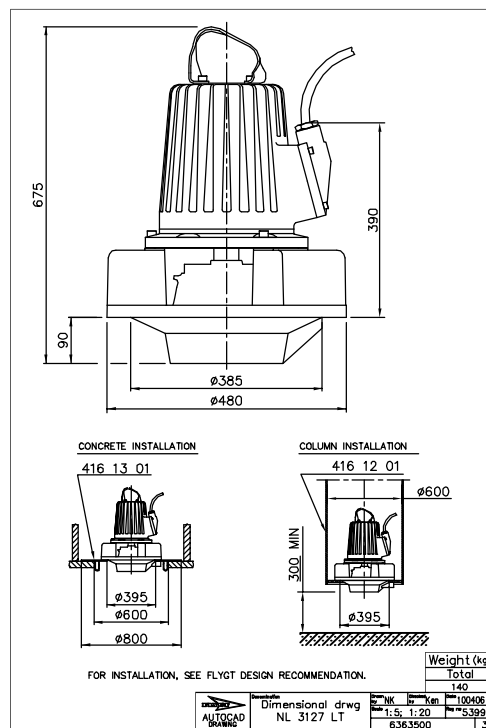


Figure 53: LT, L-installation

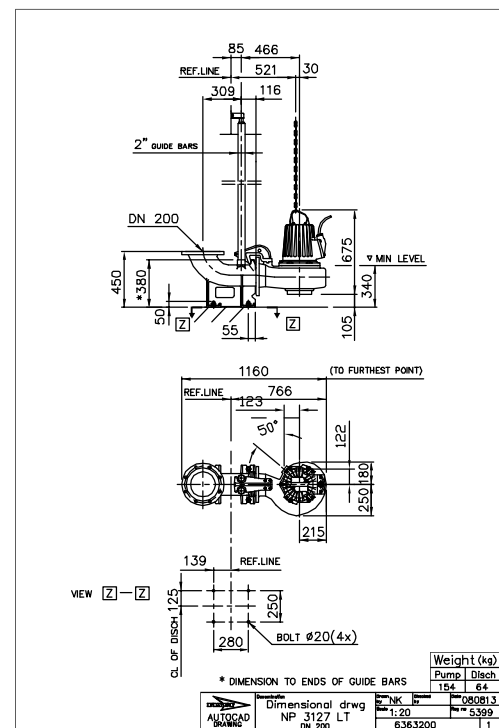


Figure 54: LT, P-installation

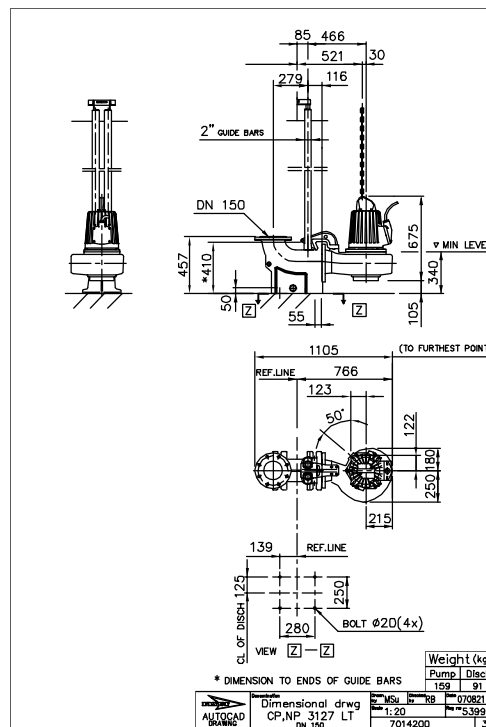


Figure 55: LT, P-installation

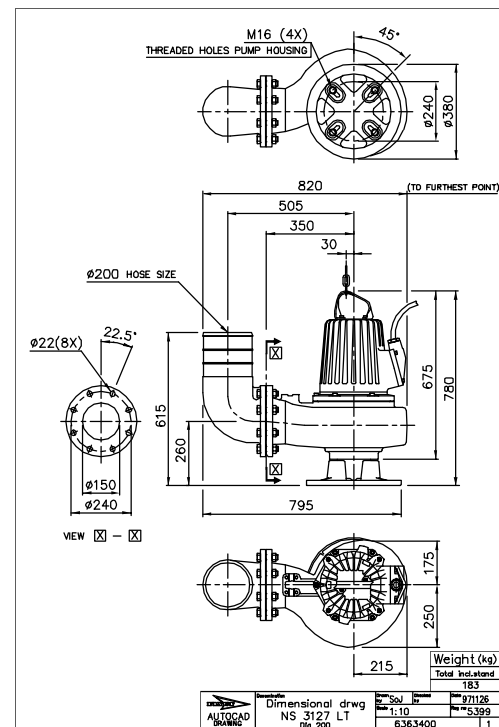


Figure 56: LT, S-installation

## Dimensions and Weight

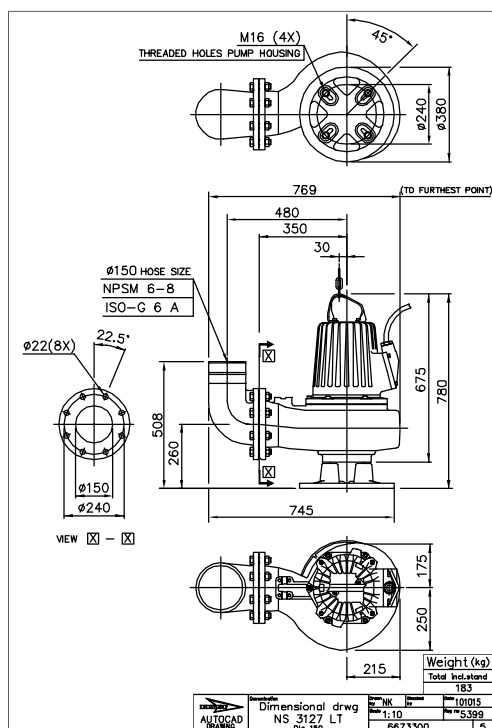


Figure 57: LT, S-installation

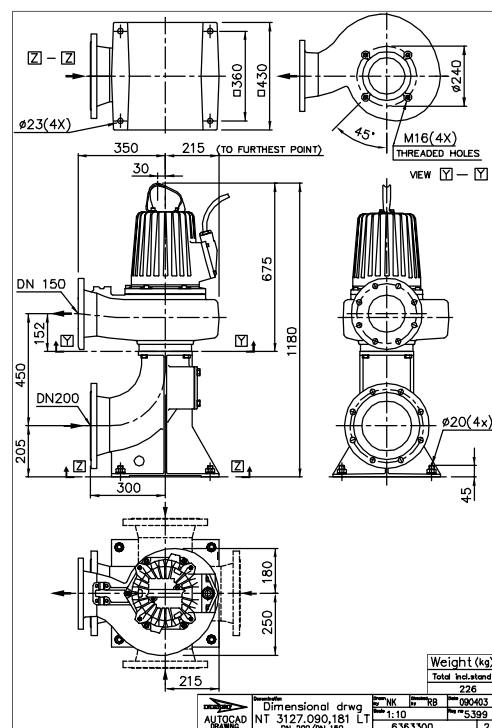


Figure 58: LT, T-installation

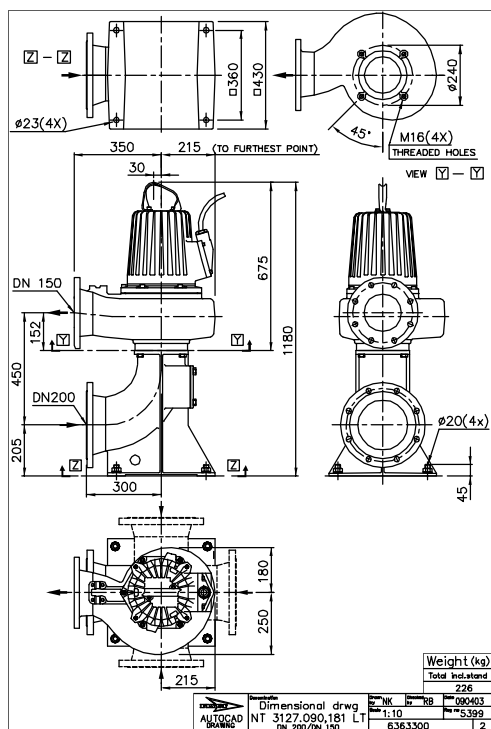


Figure 59: LT, T-installation

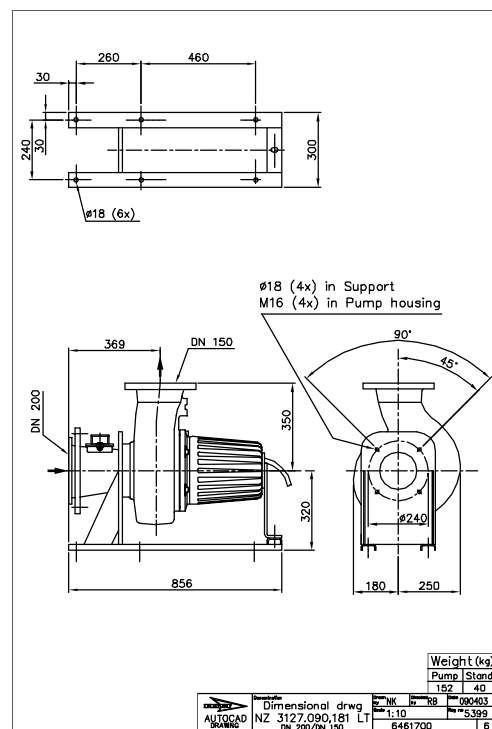


Figure 60: LT, Z-installation

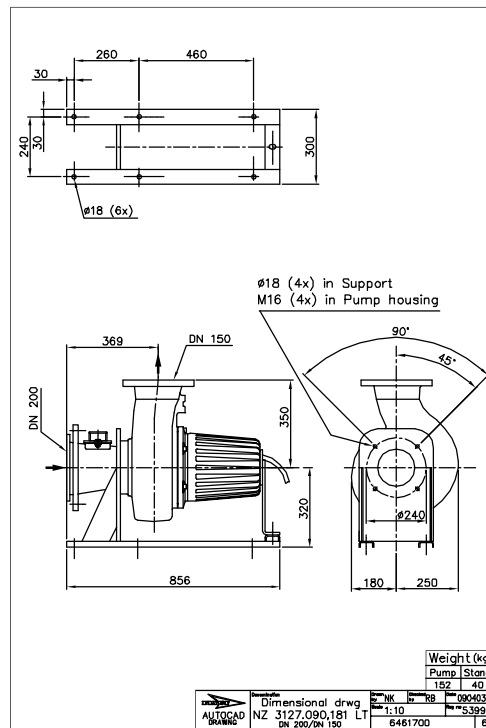


Figure 61: LT, Z-installation

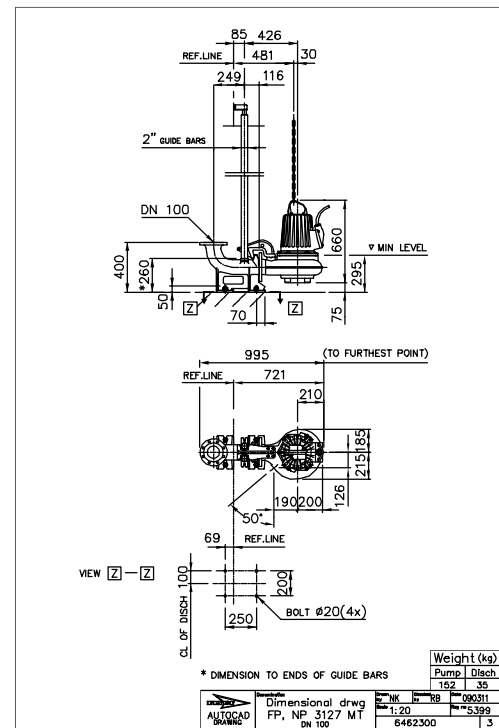


Figure 62: MT, P-installation

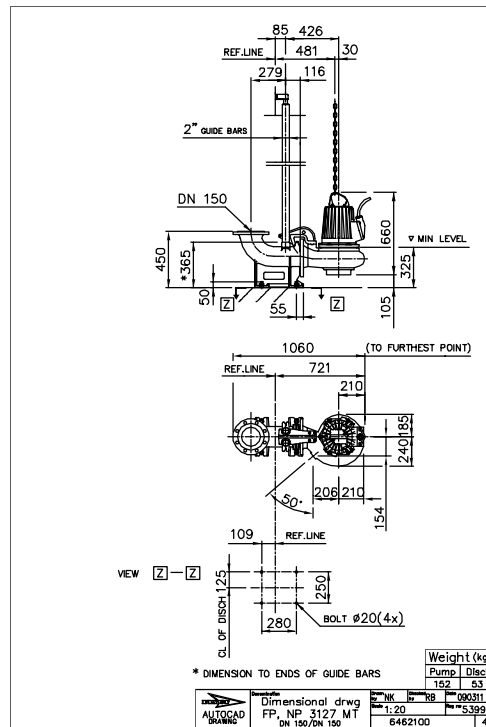


Figure 63: MT, P-installation

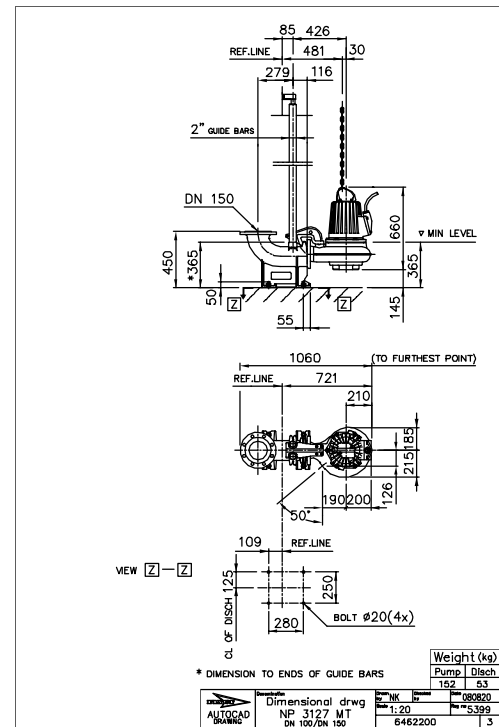


Figure 64: MT, P-installation

Dimensions and Weight

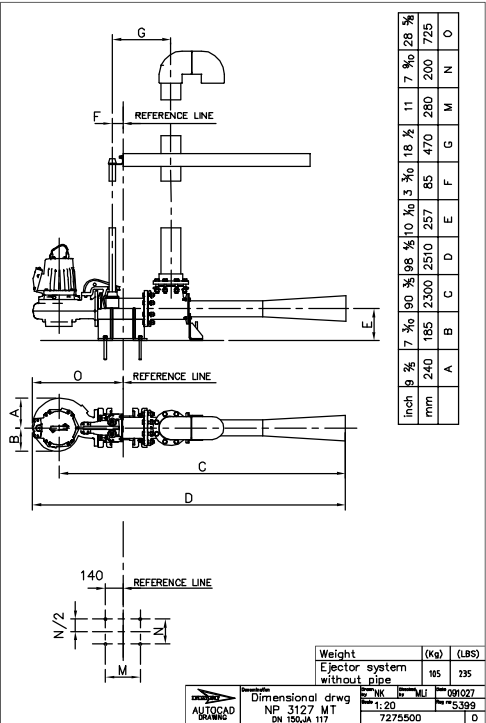


Figure 65: MT, P-installation

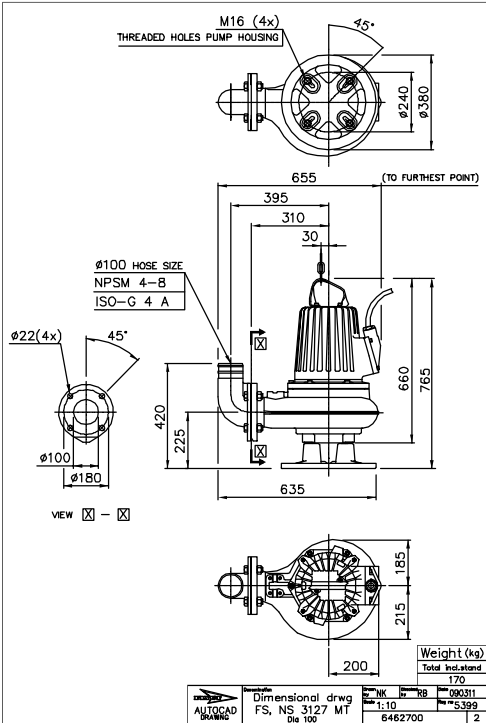


Figure 66: MT, S-installation

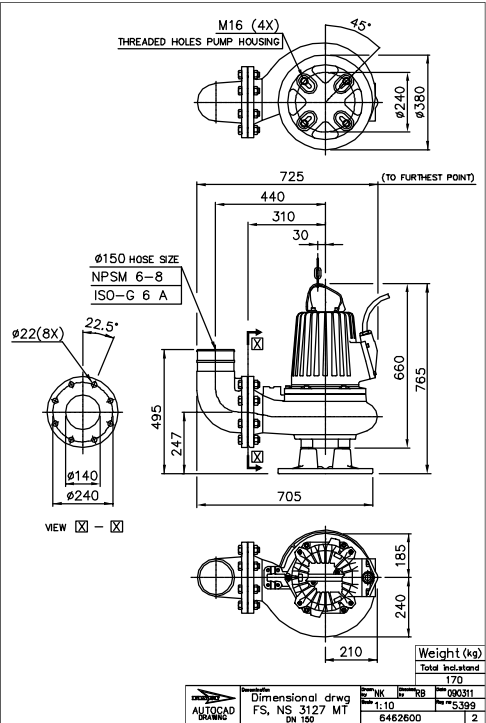


Figure 67: MT, S-installation

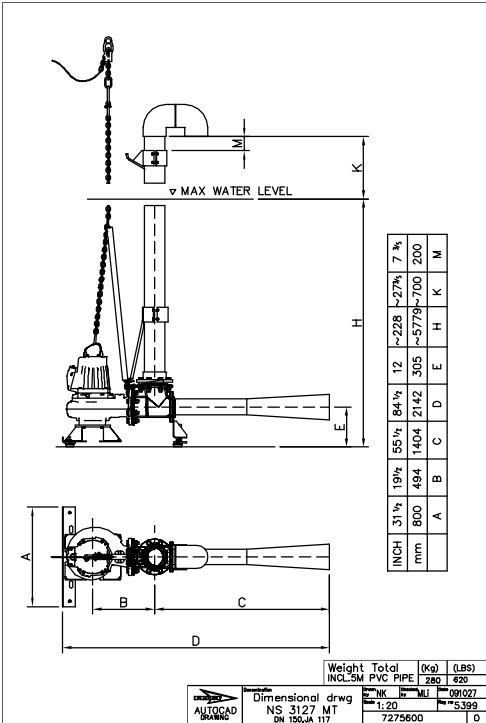


Figure 68: MT, S-installation

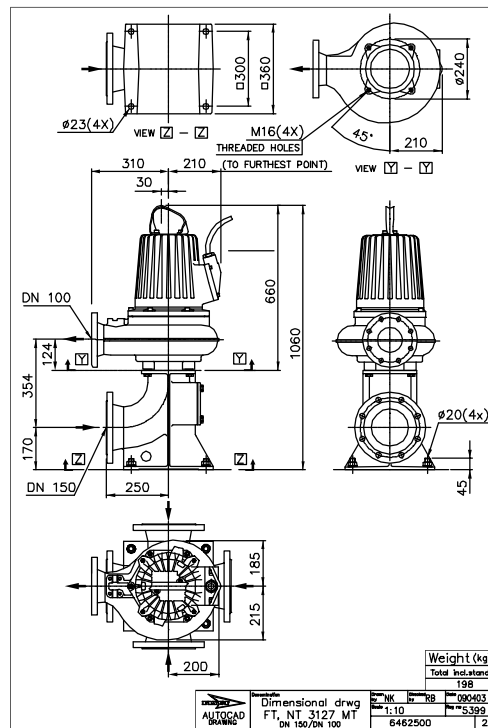


Figure 69: MT, T-installation

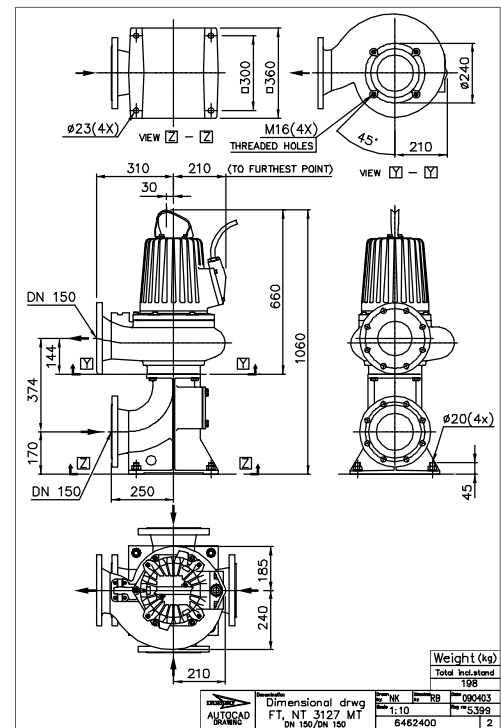


Figure 70: MT, T-installation

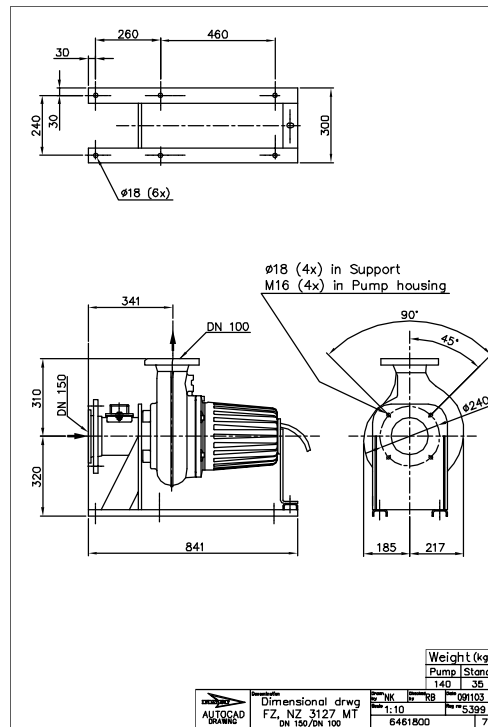


Figure 71: MT, Z-installation

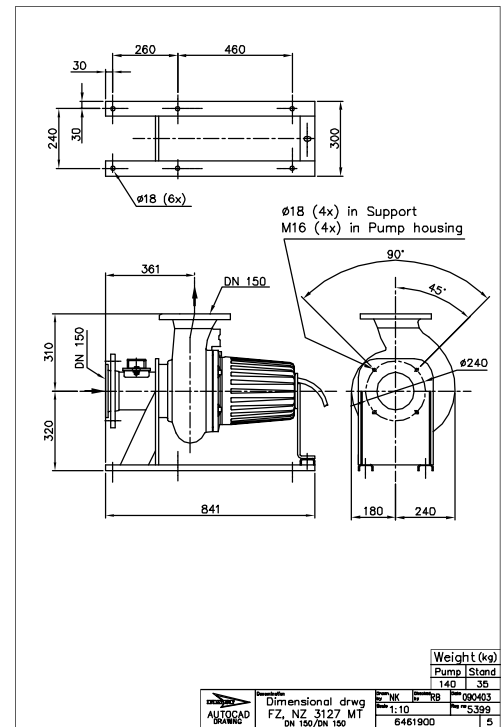


Figure 72: MT, Z-installation

## Dimensions and Weight

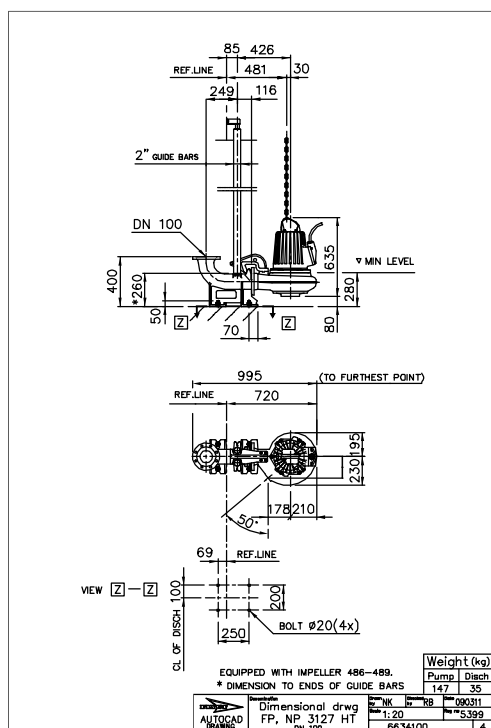


Figure 73: HT, P-installation

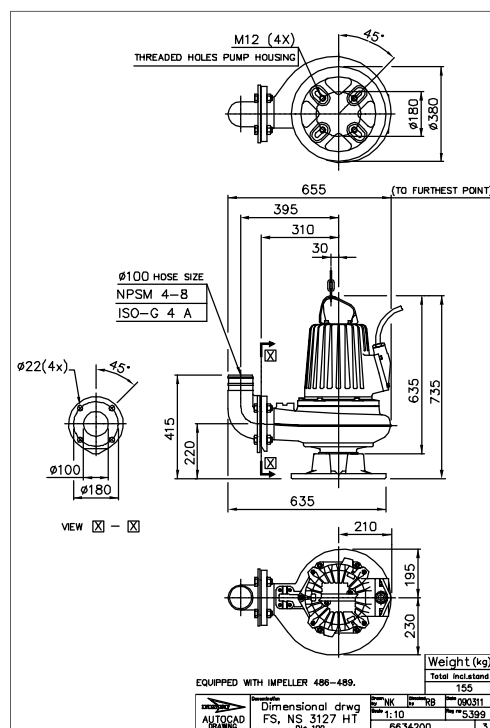


Figure 74: HT, S-installation

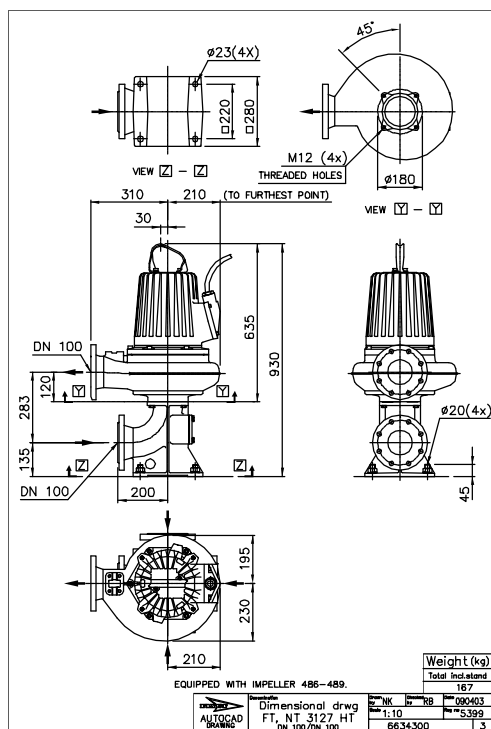


Figure 75: HT, T-installation

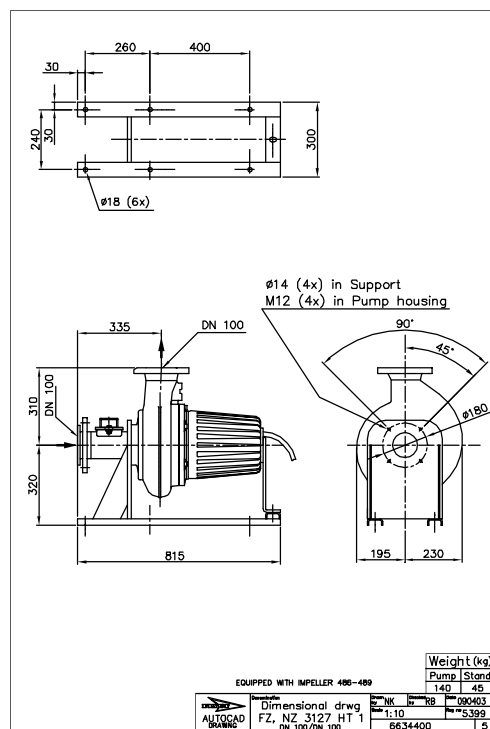


Figure 76: HT, Z-installation

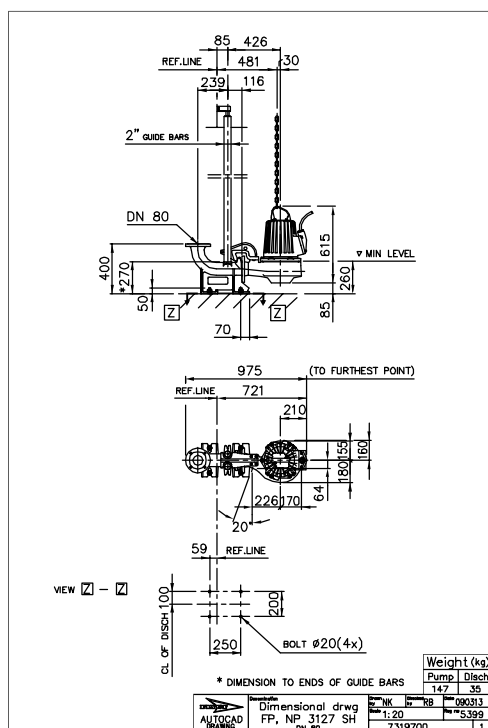


Figure 77: SH, P-installation

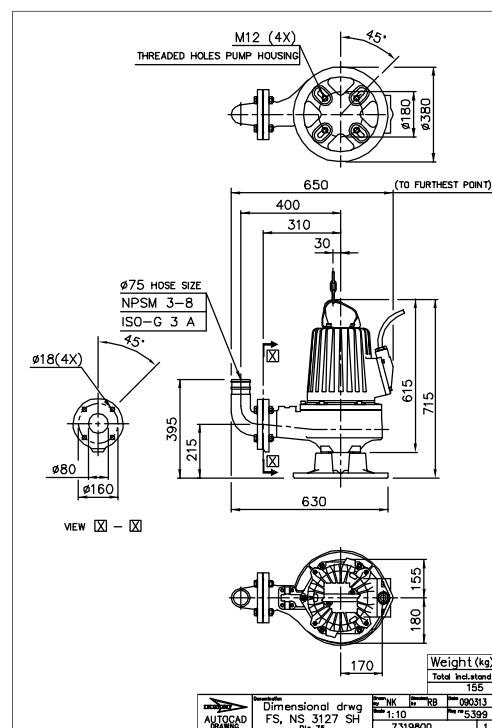


Figure 78: SH, S-installation

## Drawings, P-pump

All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg).  
Contact your sales representative for more information.

All dimensions are in mm.

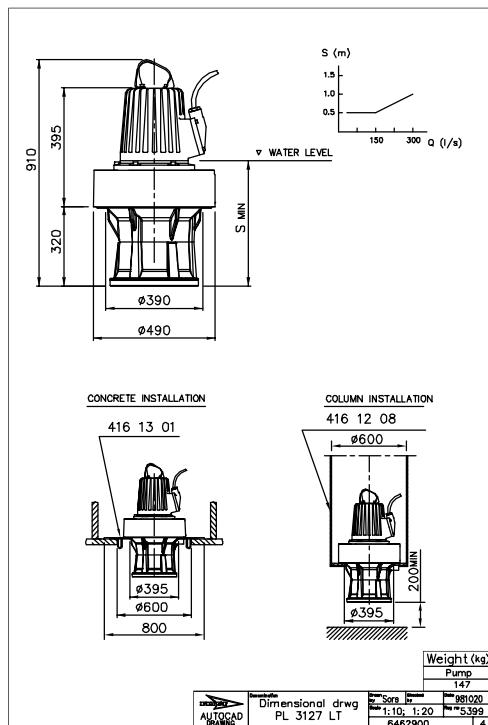


Figure 79: LT, L-installation





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- 2) A leading global water technology company

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For more information on how Xylem can help you, go to [xyleminc.com](http://xyleminc.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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883452\_1.0\_en.US\_2012-04\_TS\_3127\_50Hz

## **Section 4 – 3127 Submersible Pump Service & Repair Instructions**

## Service and Repair Instructions



# Flygt 3127





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# Introduction and Safety

## Introduction

### Purpose of this manual

The purpose of this manual is to provide necessary information for Service and Repair.



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**CAUTION:**

Read this manual carefully before performing any service or repair on the product. Improper service or repair can cause personal injury and damage to property, and may void the warranty.

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**NOTICE:**

Save this manual for future reference.

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### Transportation and Storage

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**NOTICE:**

For information about how to transport and store the pump, see Transportation and Storage in the Installation, Operation and Maintenance manual.

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## 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 your sales representative if anything is out of order.

### Product warranty

For information about the conditions for the products warranty, see Introduction and Safety in the Installation, Operation, and Maintenance manual.

### Spare parts

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

## Safety



### WARNING:

- The operator must be aware of safety precautions to prevent physical injury.
- Any pressure-containing device can explode, rupture, or discharge its contents if it is over-pressurized. Take all necessary measures to avoid over-pressurization.
- Servicing 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 an Xylem representative before proceeding.
- This manual clearly identifies accepted methods for disassembling units. These methods must be adhered to. Trapped liquid can rapidly expand and result in a violent explosion and injury. Never apply heat to impellers, propellers, or their retaining devices to aid in their removal.
- 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

Hazard level	Indication
 <b>DANGER:</b>	A hazardous situation which, if not avoided, will result in death or serious injury
 <b>WARNING:</b>	A hazardous situation which, if not avoided, could result in death or serious injury
 <b>CAUTION:</b>	A hazardous situation which, if not avoided, could result in minor or moderate injury

Hazard level	Indication
NOTICE:	<ul style="list-style-type: none"> <li>• A potential situation which, if not avoided, could result in undesirable conditions</li> <li>• A practice not related to personal injury</li> </ul>

### Hazard categories

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

Electrical hazards are indicated by the following specific symbol:



Electrical Hazard:

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

- Crush hazard
- Cutting hazard
- Arc flash hazard

### The Ex symbol

The Ex symbol indicates safety regulations for Ex-approved products when used in atmospheres that are potentially explosive or flammable.



## 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:

- Helmet
- 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.

## Introduction and Safety

**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:

Condition	Action
Chemicals or hazardous fluids in eyes	<ol style="list-style-type: none"> <li>1. Hold your eyelids apart forcibly with your fingers.</li> <li>2. Rinse the eyes with eyewash or running water for at least 15 minutes.</li> <li>3. Seek medical attention.</li> </ol>
Chemicals or hazardous fluids on skin	<ol style="list-style-type: none"> <li>1. Remove contaminated clothing.</li> <li>2. Wash the skin with soap and water for at least 1 minute.</li> <li>3. Seek medical attention, if necessary.</li> </ol>

**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 authorized Xylem representative.
- Only use parts that are provided by an authorized Xylem representative.

### 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 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

## Environmental safety

### The work area

Always keep the station clean to avoid and/or discover emissions.

### 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.



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**WARNING:**

Do NOT send the product to the Xylem manufacturer if it has been contaminated by any nuclear radiation. Inform Xylem so that accurate actions can take place.

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### Electrical installation

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

### Recycling guidelines





Always recycle according to these guidelines:

1. Follow local laws and regulations regarding recycling if the unit or parts are accepted by an authorized recycling company.
2. If the first guideline is not applicable, then return the unit or parts to your Xylem representative.

## Product Description

# Product Description

## Products included

Pump model	Feature
3127.090 3127.190	EN <ul style="list-style-type: none"> <li>•  II 2 G EEx d IIB T4</li> </ul> FM <ul style="list-style-type: none"> <li>• FM: Class I Div. 1 groups C and D</li> <li>• Class II Div. 1 groups E, F and G</li> <li>• Suitable for use in Class III Div. 1</li> </ul>
3127.095	Hard Iron™ EN <ul style="list-style-type: none"> <li>•  II 2 G EEx d IIB T4</li> </ul> FM <ul style="list-style-type: none"> <li>• FM: Class I Div. 1 groups C and D</li> <li>• Class II Div. 1 groups E, F and G</li> <li>• Suitable for use in Class III Div. 1</li> </ul>
3127.170	Grinder
3127.160 3127.181	Standard
3127.185	Hard Iron™
3127.350	Chopper
3127.390	Chopper EN <ul style="list-style-type: none"> <li>•  II 2 G EEx d IIB T4</li> </ul> FM <ul style="list-style-type: none"> <li>• FM: Class I Div. 1 groups C and D</li> <li>• Class II Div. 1 groups E, F and G</li> <li>• Suitable for use in Class III Div. 1</li> </ul>
3127.890	Grinder EN <ul style="list-style-type: none"> <li>•  II 2 G EEx d IIB T4</li> </ul> FM <ul style="list-style-type: none"> <li>• FM: Class I Div. 1 groups C and D</li> <li>• Class II Div. 1 groups E, F and G</li> <li>• Suitable for use in Class III Div. 1</li> </ul>

## Pump-specific information

For the specific weight, current, voltage, power ratings, and speed of the pump, see the data plate of the pump.

## 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.

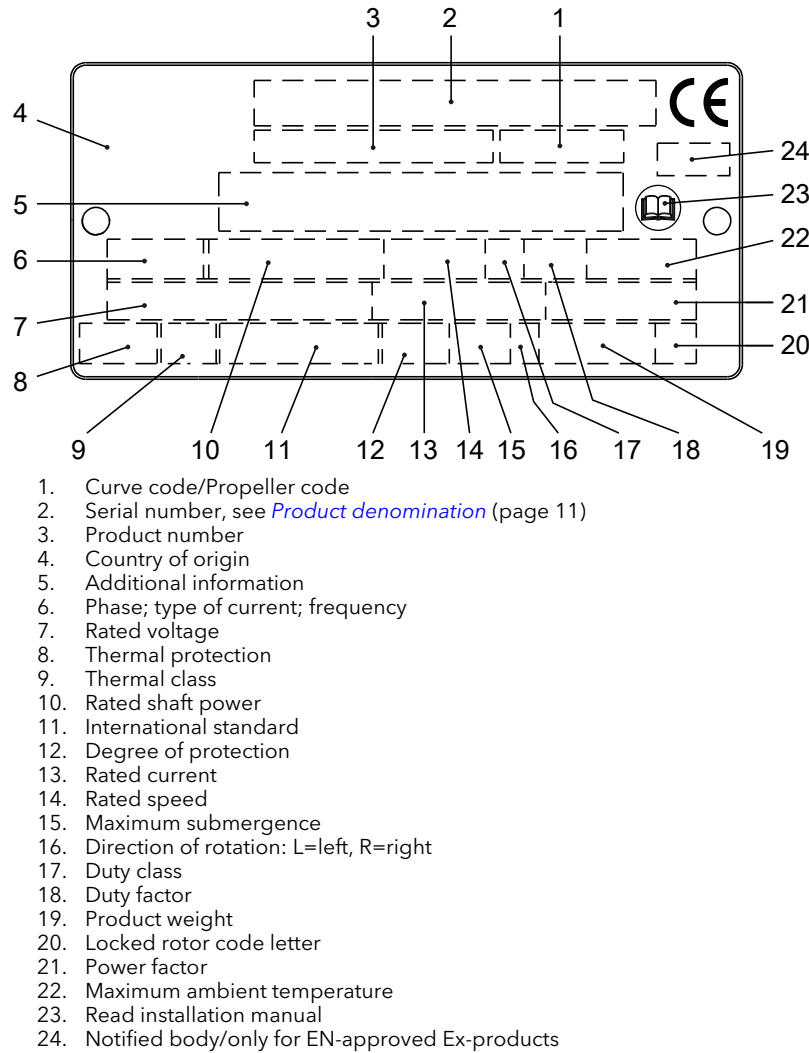


Figure 1: The data plate

## Approvals

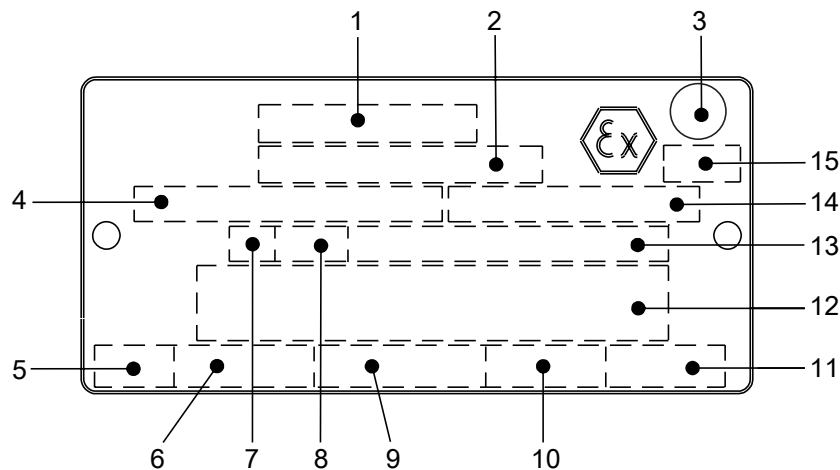
This section describes the EN, IEC and FM approvals that explosion-proof products have. For more information, please contact your Xylem representative. In addition to the data plate, explosion-proof products also have an EN, an IEC or a FM approval plate.

## Product Description

## EN

## European Norm

- ATEX Directive
- EN 60079-0, EN 60079-1, EN 1127-1
- $\text{Ex}$  II 2 G Ex d IIB T4



1. Approval
2. Approval authority + approval number
3. Approval for Class I
4. Approved drive unit
5. Stall time
6. Starting current/Rated current
7. Duty class
8. Duty factor
9. Input power
10. Rated speed
11. Controller
12. Additional information
13. Maximum ambient temperature
14. Serial number
15. ATEX marking

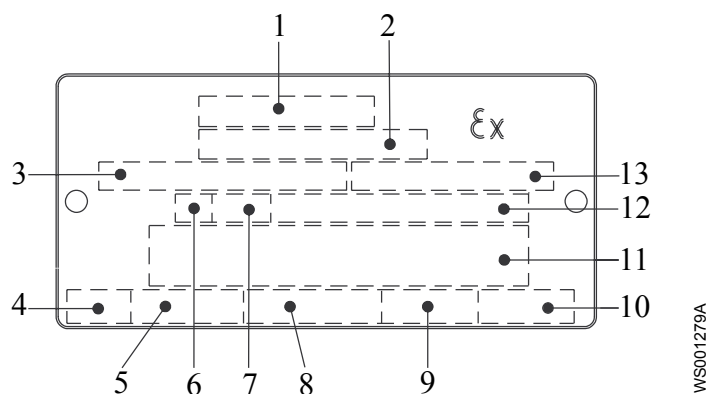
## EN approval for cable entry:

- Certificate number: INERIS 02ATEX9008 U
- $\text{Ex}$  II 2 G or IM2 EEx d IIC or EEx dI

## IEC

## International Norm; not for EU member countries

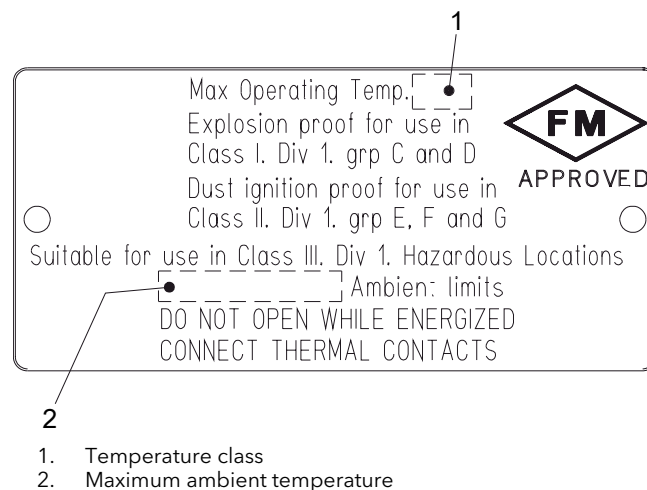
- IECEx scheme
- IEC 60079-0, IEC 60079-1
- Ex dI, Ex dII B



1. Approval
2. Approval authority + approval number
3. Approved for drive unit
4. Stall time
5. Starting current/Rated current
6. Duty class
7. Duty factor
8. Input power
9. Rated speed
10. Controller
11. Additional information
12. Max. ambient temperature
13. Serial number

## FM

This illustration describes the approval plate for Factory Mutual (FM) and the information contained in its fields.

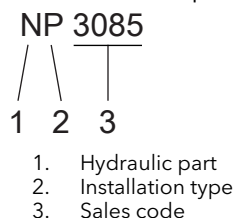


## Product denomination

### Sales denomination

The sales denomination consists of the four-digit sales code and two letters that indicate the hydraulic end and type of installation.

This is an example of a sales denomination, and an explanation of its parts.



### Product code

The product code consists of nine characters divided into two parts.

This is an example of a product code, and an explanation of its parts.

---

Product Description

---

NP 3085.183

1

2

1. Sales denomination
2. Version

### Serial number

The serial number is used for identification of an individual product, and is divided into four parts.

This is an example of a serial number, and an explanation of its parts.

NP 3085.183 - 951 0163

1

2

3

4

1. Product code
2. Production year
3. Production cycle
4. Running number

# Installation

## General precautions



### Electrical Hazard:

- A certified electrician must supervise all electrical work. Comply with all local codes and regulations.
- 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.
- Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable above the liquid level.
- Make sure that all unused conductors are insulated.
- 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.



### WARNING:

Do not install the starter equipment in an explosive zone unless it is explosion-proof rated.



### CAUTION:

If the pump is equipped with automatic level control and/or internal contactor, there is a risk of sudden restart.

## 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, FLS 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 an Xylem service shop.
- 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.
- The screened cable must be used according to the European CE requirements if a Variable Frequency Drive (VFD) is used. For more information, contact your Xylem representative (VFD-supplier).

## Earthing (Grounding)



---

### Electrical Hazard:

- You must earth (ground) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the earth (ground) lead to verify that it is connected correctly.
  - If the motor cable is jerked loose by mistake, the earth (ground) conductor should be the last conductor to come loose from its terminal. Make sure that the earth (ground) conductor is longer than the phase conductors. This applies to both ends of the motor cable.
  - Risk of electrical shock or burn. You must connect an additional earth- (ground-) fault protection device to the earthed (grounded) connectors if persons are likely to come into physical contact with the pump or pumped liquids.
- 

## Connect the motor cable to the pump

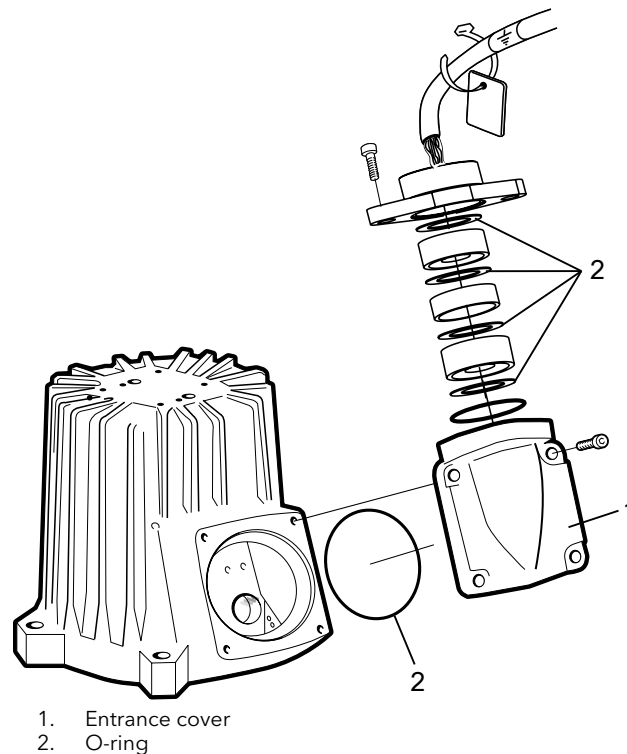


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### CAUTION:

Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable above the liquid level.

---



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 provide access to the terminal board/closed end splices.
2. Check the data plate to see which connections are required for the power supply.
3. Arrange the connections on the terminal board/closed end splices in accordance with the required power supply.
4. Connect the mains leads (L1, L2, L3, and earth (ground)) according to applicable cable chart.  
The earth (ground) lead must be 50 mm ( 2.0 in.) longer than the phase leads in the junction box of the unit.
5. Make sure that the pump is correctly connected to earth (ground).
6. Make sure that any thermal contacts incorporated in the pump are properly connected to the terminal block/closed end splices.
7. Install the entrance cover and the O-ring on the stator housing.
8. 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



### **WARNING:**

Do not install the starter equipment in an explosive zone unless it is explosion-proof rated.

**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.
- 

The single phase pumps must be equipped with a starter which has start and run capacitors.

A specially Flygt designed starter is required for the operation of single phase pumps. The connection of the motor cable to the starter is shown in the wiring diagram.

1. If thermal contacts are included in the pump installation, connect the T1 and T2 control conductors to the monitoring equipment.

Do not connect the T1 and T2 leads to thermal contacts if the temperature of the pumped liquid is above 40°C (104°F).

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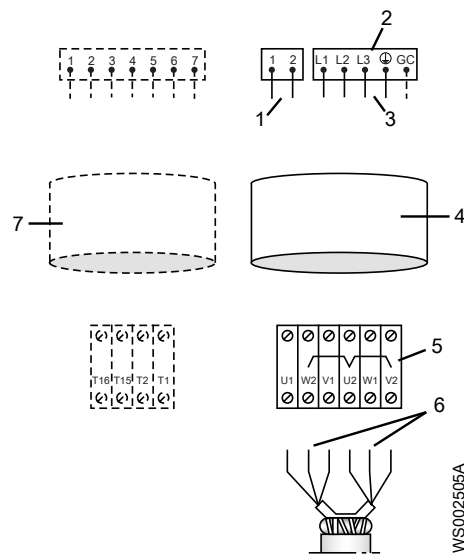
**NOTICE:**

Ex-approved products must always have the thermal contacts connected irrespective of the ambient temperature.

---

2. Connect the mains leads (L1, L2, L3, and earth [ground]) to the starter equipment. For information about the phase sequence and the color codes of the leads, see [Cable charts](#) (page 17).
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



1. Control leads
2. Starter equipment
3. Mains leads
4. Motor cable
5. Terminal blocks on pump
6. Stator leads
7. Control cable

Figure 2: Connection locations

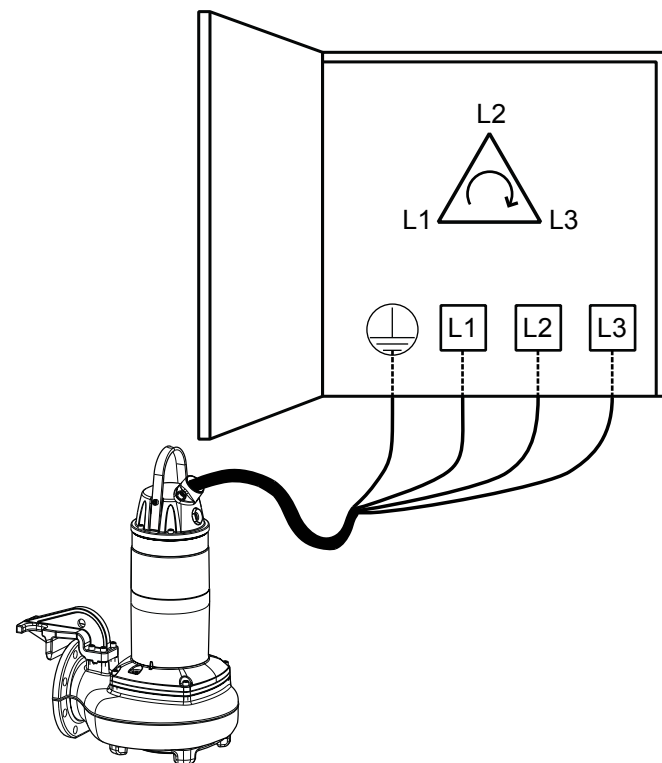



Figure 3: Phase sequence

### Colors and marking of the mains leads

Mains	SUBCAB 7GX	SUBCAB 4GX	SUBCAB AWG	SUBCAB Screened	SI-SL-BIHFSIH-J
L1	Black 1	Brown	Red	Brown	Brown
L2	Black 2	Black	Black	Black	Black
L3	Black 3	Grey	White	Grey	Grey
L1	Black 4	-	-	-	-
L2	Black 5	-	-	-	-
L3	Black 6	-	-	-	-
	Yellow/Green	Yellow/Green	Yellow/Green	Screen from leads	Yellow/Green
Groundcheck (GC)	-	-	Yellow	-	-

### Color and marking of the control leads

Control	SUBCAB 7GX and SUBCAB 4GX	SUBCAB AWG	SUBCAB screened
T1	White T1	Orange	White T1
T2	White T2	Blue	White T2
T3	-	-	White T3
T4	-	-	White T4

## Installation

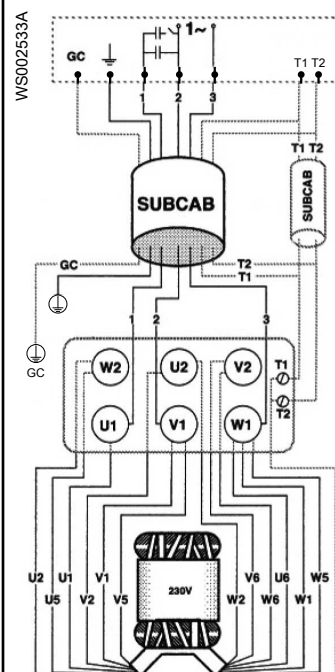
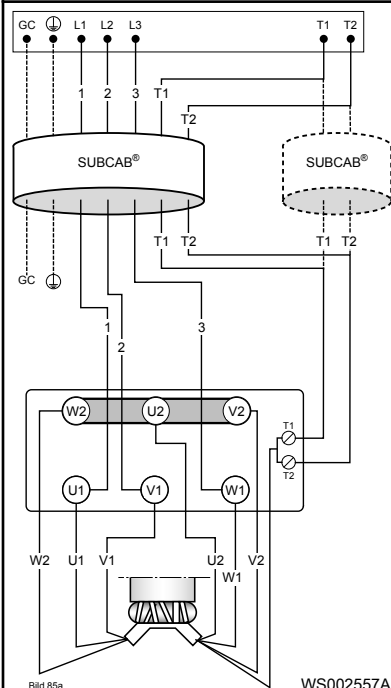
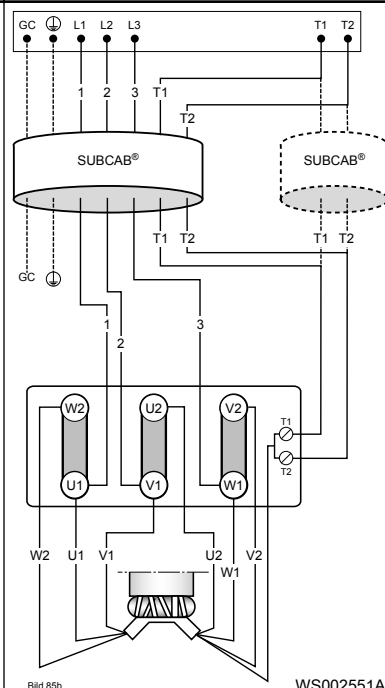
## Colors of the stator leads

Stator connection	Lead color
U1	Red
U2	Green (Brown if 1 phase stator 4 leads is used)
U5	Red
U6	Green
V1	Brown
V2	Blue
V5	Brown
V6	Blue
W1	Yellow
W2	Black
W5	Yellow
W6	Black
Z1	Yellow
Z2	Black

## Cable charts

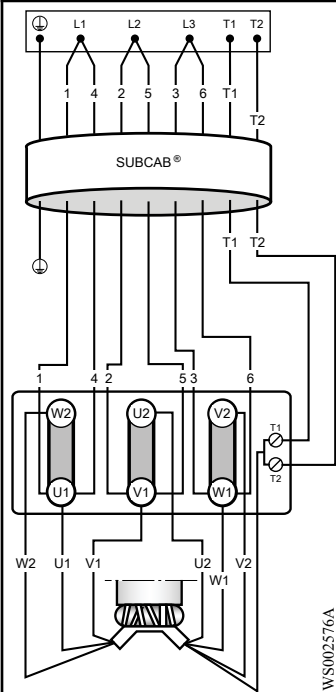
The figures in this section show all applicable cable charts.

<b>SUBCAB 4GX/SUBCAB AWG/SI-SL-BIHF, 4 stator leads, 1-phase</b>	-
<p>WS002534A</p>	-

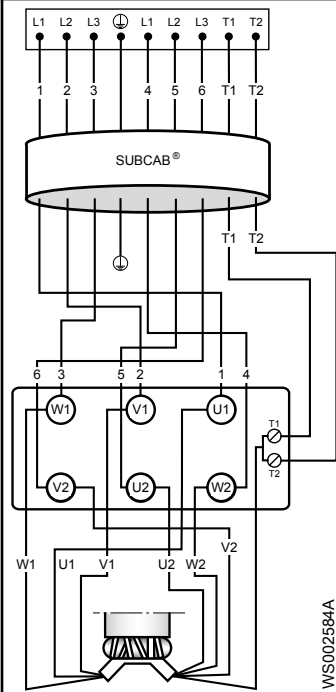
**SUBCAB 4GX/SUBCAB AWG/SI-SL-BIHF, 12 stator leads, 230V, 1-phase****SUBCAB 4GX/SUBCAB AWG, 6 stator leads, Y connection, 3-phase****SUBCAB 4GX/SUBCAB AWG, 6 stator leads, D connection, 3-phase**

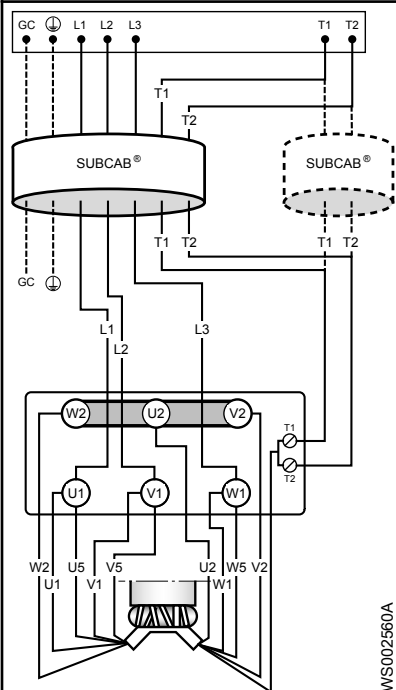
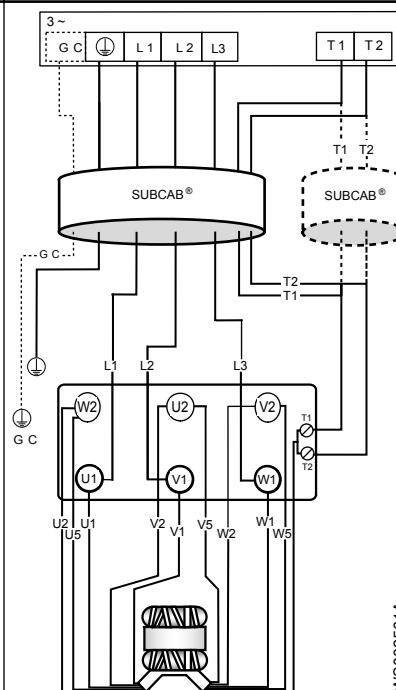
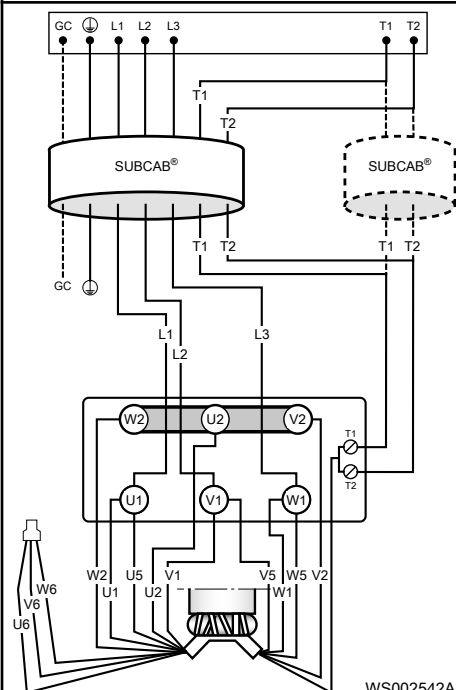
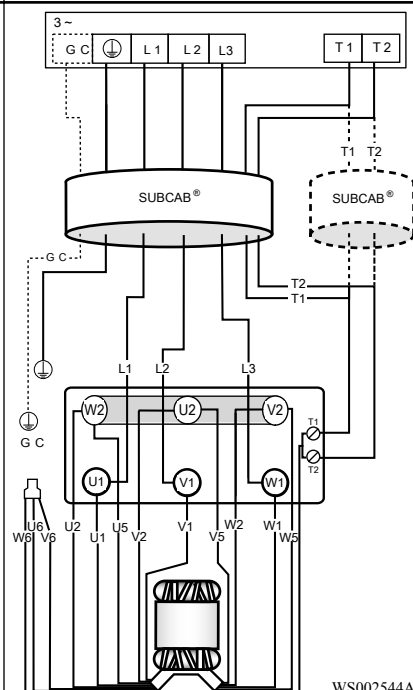
Installation

SUBCAB 7GX, 6 stator leads, D connection, 3-phase

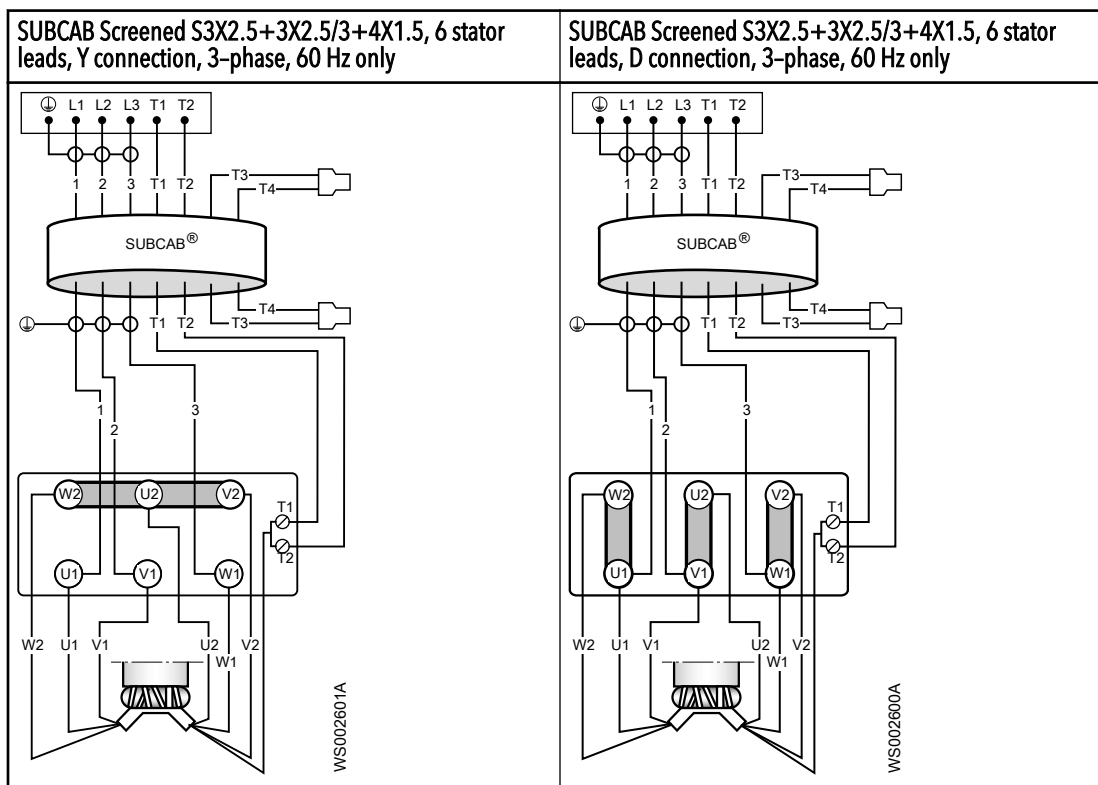


SUBCAB 7GX, 6 stator leads, Y/D connection, 3-phase



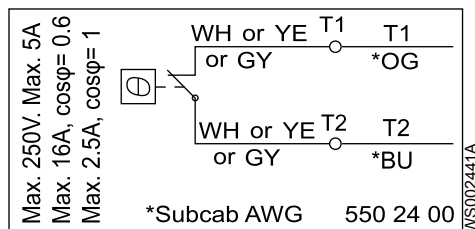
**SUBCAB 4GX/SUBCAB AWG, 9-leads, 230 V, Y parallel connection, 3-phase, 60 Hz only****SUBCAB 4GX/SUBCAB AWG, 9-leads, 460 V, Y serial connection, 3-phase, 60 Hz only****SUBCAB 4GX/SUBCAB AWG, 12 stator leads, 220/230 V, Y parallel connection, 3-phase, 60 Hz only****SUBCAB 4GX/SUBCAB AWG, 12 stator leads, 440/460 V, Y serial connection, 3-phase, 60 Hz only**

## Installation

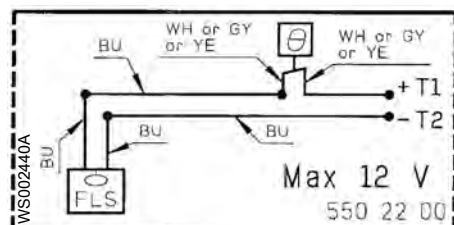


## Sensor-connection

## Thermal contact



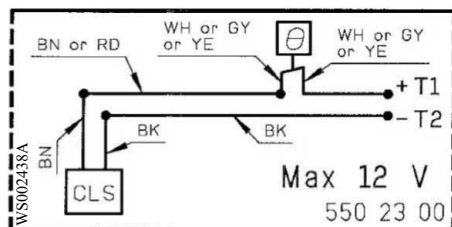
## FLS and Thermal contact



## Value

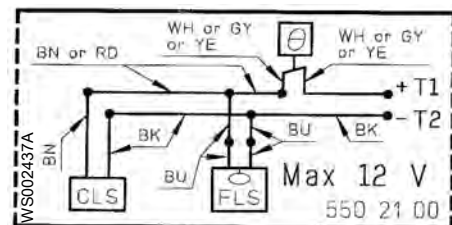
0 mA	Overtemperature
7.8 mA	OK
36 mA	Leakage

The values have a 10 % tolerance

**CLS and Thermal contact (only standard version)****Value**

<b>0 mA</b>	Overtemperature
<b>5.5mA</b>	OK
<b>29mA</b>	Leakage (5 second delay)

The values have a 10 % tolerance

**CLS, FLS, and Thermal contact (only standard version)****Value**

<b>0 mA</b>	Overtemperature
<b>13.3 mA</b>	OK
<b>36-42mA</b>	Leakage (0/5 seconds delay)

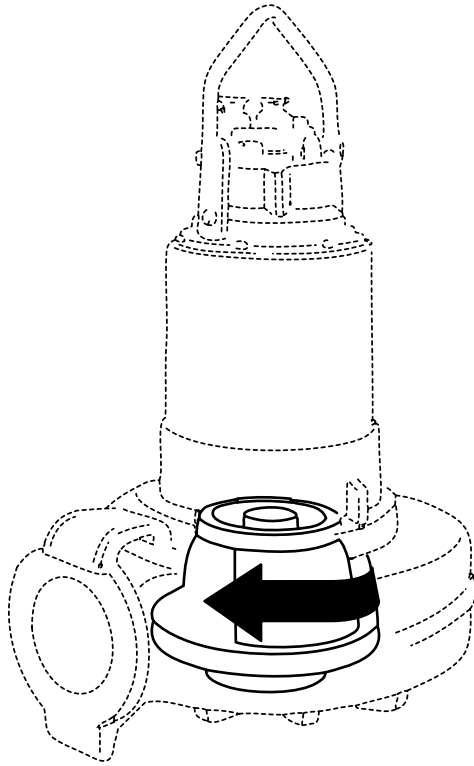
The values have a 10 % tolerance

## Check the impeller rotation

**WARNING:**

The starting jerk can be powerful.

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, do one of these steps:
  - If the motor has a 1-phase connection, contact the local Xylem shop.
  - If the motor has a 3-phase connection, transpose two phase leads and do this procedure again.

# Maintenance

## Precautions



### WARNING:

- Always follow safety guidelines when working on the product. See [Introduction and Safety](#) (page 3).
- Disconnect and lock out electrical power before installing or servicing the pump.
- Make sure that the unit cannot roll or fall over and injure people or damage property.
- Rinse the unit thoroughly with clean water before working on the unit.
- Rinse the components in water after dismantling.

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.

## Maintenance guidelines

During 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, and O-rings with grease.

During 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 a sales 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 (94)	220 (162)	434 (320)

## Maintenance

Property class	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30
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)

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

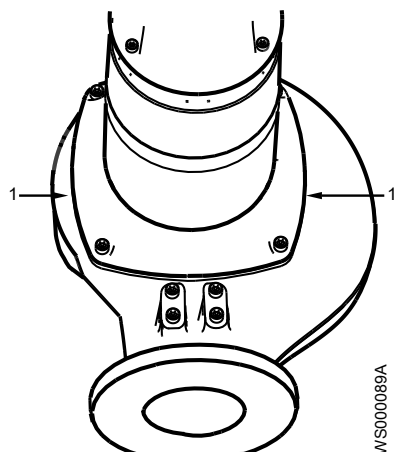
Property class	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30
8.8	2.9 (2.1)	5.7 (4.2)	9.8 (7.2)	24 (18)	47 (35)	81(60)	194 (143)	385 (285)	665 (490)	1310 (966)
10.9	4.0 (2.9)	8.1 (6)	14 (10.3)	33 (24.3)	65 (48)	114 (84)	277 (204)	541 (399)	935 (689)	1840 (1357)
12.9	4.9 (3.6)	9.7 (7.2)	17 (12.5)	40 (30)	79 (58)	136 (100)	333 (245)	649 (480)	1120 (825)	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.

## Change the oil

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

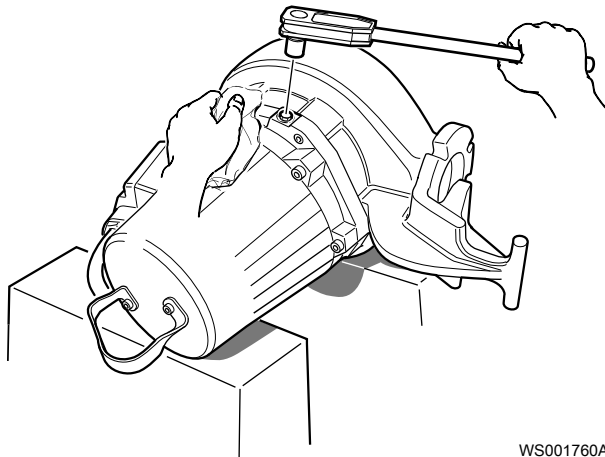


1. Oil plug

**Empty the oil****WARNING:**

The oil housing may be pressurized. Hold a rag over the oil plug to prevent oil from spraying out.

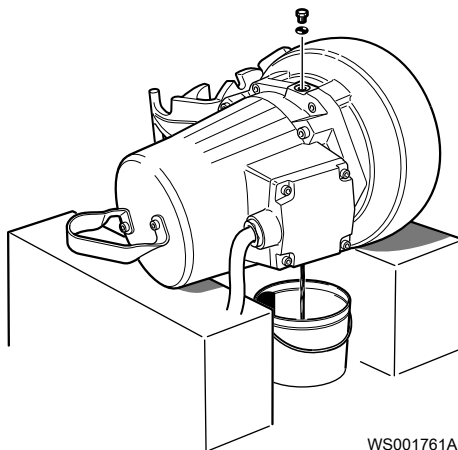
1. Place the pump in a horizontal position and unscrew the oil plug.  
If the pump has a hole with the markings "oil out" it is important that this hole is used for drainage.



WS001760A

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.



WS001761A

### 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.

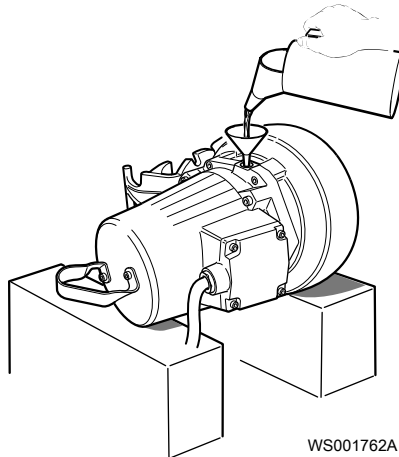
1. Replace the O-rings of the oil plugs.
2. Refit an oil plug in the hole that faces downwards or is marked "oil out", and tighten.

Tightening torque: 10-40 Nm (7.5-29.5 ft-lbs)

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: 10-40 Nm (7.5-29.5 ft-lbs)

## Disassemble the pump

Before the pump is disassembled the pump has to be drained of all coolant. For information, see [Empty the oil](#) (page 26).

For specially approved drive units, follow the instructions in [Requirements for Ex-approved products](#) (page 72) during the disassembly.

Follow the applicable instructions when removing the mechanical seal.

- Griploc seals: [Remove the inner mechanical seal: Griploc](#) (page 33)
  - For seals type T, see information included in the spare part.
  - Other seals: [Remove the mechanical seal](#) (page 30)
1. [Remove the motor cable and the stator housing](#) (page 28)
  2. [Remove the pump housing](#) (page 29)
  3. [Remove the mechanical seal](#) (page 30)
    - a) [Remove the outer mechanical seal: Griploc](#) (page 30)
    - b) [Remove the outer mechanical seal](#) (page 30)
    - c) [Remove the oil housing bottom](#) (page 32)
    - d) [Remove the inner mechanical seal: Griploc](#) (page 33)
    - e) [Remove the inner mechanical seal](#) (page 33)
  4. [Remove the bearings](#) (page 34)
  5. [Remove the stator from the stator housing](#) (page 37)

## Remove the motor cable and the stator housing

1. Remove the stator housing:
  - a) Remove the stator housing screws.
  - b) Lift of the stator housing from the oil housing.
2. Open the entrance cover.



WS002009A

3. Disconnect the motor cable and the stator leads from the terminal board.



WS0020091A

4. Pull out the stator leads through the cable lead trough in the stator housing.
5. Undo the cable entry and pull the motor cable out of the entrance cover.  
Inspect the cable for damage, especially close to the cable entry.

## Remove the pump housing

1. Remove the pump housing screws.



2. Fasten lifting eye bolts in the oil housing screw holes.  
Use M10 eye bolts.
3. Lift off the rotor assembly with the oil housing and impeller from the pump housing.



For instructions about how to remove the impeller, see [Replace the impeller](#) (page 53).

For instructions about how to remove the propeller, see [Replace the propeller](#) (page 70).

## Remove the mechanical seal

### Remove the outer mechanical seal: Griploc

1. Loosen the seal locking screw.  
Use a 8 mm flat bladed screwdriver
2. Remove the rotating seal unit.
3. Remove the stationary seal ring including its O-ring.

### Remove the outer mechanical seal

1. Remove the key with a hammer and chisel.



2. Remove the spacer ring (applicable for seal type O).



WS001961A

3. Remove the grip ring:
  - a) Fit the mounting tool and turn the allen key to release the grip ring. Use the mounting tool.



WS001991A

- b) Remove the grip ring.



WS001979A

4. Remove the outer rotating seal ring. Use special pliers.



WS001971A



WS001970A

5. Remove the outer stationary seal ring.



WS001969A



WS001954A

### Remove the oil housing bottom

1. Undo the socket hexagon screws which hold the oil housing together.



WS001948A

2. Lift off the rotor unit together with the bearing holder.



WS002036A

### Remove the inner mechanical seal: Griploc

Use the instructions in [Remove the outer mechanical seal: Griploc](#) (page 30) to remove the inner mechanical seal.

#### Remove the inner mechanical seal

1. Remove the grip ring:
  - a) Fit the mounting tool and turn the allen key to release the grip ring.  
Use the mounting tool.



WS001992A

- b) Remove the grip ring.



WS001980A

2. Remove the rotating seal ring.

Use two screwdrivers.



WS001963A

3. Remove the O-ring.



WS001972A

## Remove the bearings

1. Remove the bearing cover:
  - a) Remove the four inner hexagon screws.



WS001975A

- b) Remove the bearing cover.



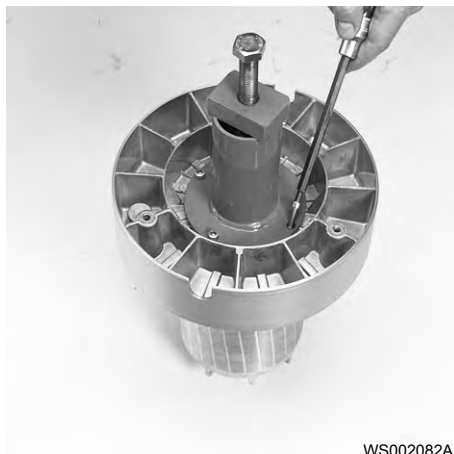
WS001990A

2. Insert a protection pin/tap in the hole in the end of the shaft in order to protect the thread.



WS002044A

3. Remove the bearing holder:
  - a) Fit the bearing puller tool with the screws for the bearing cover.



WS002082A

- b) Pull off the bearing holder with a 24 mm combination wrench and an adjustable wrench.



c) Lift off the bearing holder.



4. Remove the bearing:

a) Remove the distance sleeve from the hydraulic end of the shaft.



b) Knock out the main bearing from the bearing holder with a suitable mandril.



WS002039A

c) Pull off the support bearing with the puller.



WS001995A

## Remove the stator from the stator housing

### NOTICE:

Make sure that the lifting device is suitable for use near heat and open flames.

1. Lift the stator.
2. Place a suitable protecting device under the stator.



WS002029A

Use a protective material that will protect the stator from breaking when released.

3. Quickly heat the stator housing in order to loosen the stator.  
Use an LP gas set. When the stator has released and dropped down, extinguish the burners and allow the stator housing and the stator to cool.

## Assemble the pump

For specially approved drive units, follow the instructions in [Empty the oil](#) (page 26) during the assembly.

1. [Install the stator in the stator housing](#) (page 38)
2. [Install the bearings](#) (page 39)
3. [Install the mechanical seal](#) (page 43)
  - a) [Install the inner mechanical seal: Griploc](#) (page 43)
  - b) [Install the oil housing bottom](#) (page 45)
  - c) [Install the outer mechanical seal: Griploc](#) (page 46)
4. [Install the motor cable in the stator housing](#) (page 46)
5. [Replace wear parts and cutting parts](#) (page 48)
  - a) [Replace the wear ring: C-impeller](#) (page 48)
  - b) [Replace the wear protection: H-impeller](#) (page 50)
  - c) [Replace the insert ring](#) (page 50)
  - d) [Replace and adjust the removable guide pin](#)
  - e) [Replace the cutting ring](#) (page 50)
  - f) [Replace the pump housing cover](#) (page 51)

After the pump is assembled it has to be filled with coolant. For more information, see [Fill with oil](#).

## Install the stator in the stator housing

1. Heat the stator housing to about 150°C (302°F).



2. Then quickly lower the stator into the stator housing until it bottoms.  
Use a lifting device.

---

### NOTICE:

The stator must be oriented in the stator housing so that the stator leads reach the motor cable connection.

---



WS002025A



WS001942A

3. Connect the leads according to applicable cable chart.

## Install the bearings

1. Mount the support bearing:
  - a) Heat the support bearing to about 100°C (212°F) (max 120°C, 248°F) in an oven, in oil, or with a heating dowel.
  - b) Place the heated bearing on a smooth surface and insert the end of the shaft into the bearing.



WS002012A

- c) Allow the bearing to cool.
2. Fit the distance sleeve onto the shaft.



WS001981A

3. Install the main bearing in the bearing holder.
  - a) Lubricate the shaft with oil in order to allow the bearing to slide more easily into place.



- b) Fit the main bearing into its holder.



- c) Press the main bearing into place.  
Use the bearing puller tool plus a rubber mallet. Alternatives:
    - Heat the bearing holder
    - Use a press



4. Install the bearing holder on the shaft:
  - a) Fit the bearing holder onto the shaft unit.



WS002083A

b) Fit the bearing puller.



WS002001A

c) Mount the screw and the washer that fits the threaded hole for the impeller.



WS002017A

d) Press the bearing holder onto the shaft.

Use a combination wrench (18 mm across flats) and an adjustable wrench.  
Make sure that the bearing is pressed all the way to the bottom.

---

**NOTICE:**

If the pump is specially approved, the gap between the bearing holder and the distance sleeve should be measured as described in the section "Specially approved pumps".

---



5. Install the bearing cover:
- Grease the O-ring.



- Assemble the bearing cover with the bearing holder.



c) Tighten the screws.

Tightening torque: see [Torque values](#) (page 25)



## Install the mechanical seal

### Install the inner mechanical seal: Griploc

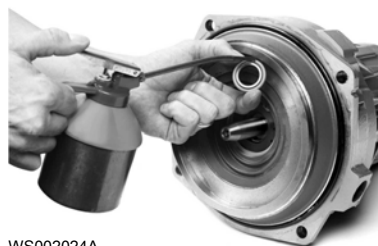
The following items are needed for these procedures:

- Oil
- Grease
- 8 mm flat bladed screwdriver
- Mounting tool (included)

1. Mount the stationary seal ring:

a) Lubricate the O-ring.

If the stationary seal ring has a mechanical torque lock the O-ring can be lubricated with oil or grease.



b) Press the stationary seal ring into its seat.

Make sure that the highly polished surface is facing out.



2. Clean the seal face on the shaft.



3. Fit the mechanical seal:
  - a) Apply oil to the seal surface.



- b) Lubricate the shaft with grease.
  - c) Fit the rotating seal unit to the shaft using the mounting tool.



- d) Compress the seal unit with the mounting tool.

Press the seal as far as it will go without forcing it.

4. Fasten the seal using a screwdriver.

Do not put pressure on the screwdriver while fastening the screw. Tightening torque:  
5.4 Nm (4.0 ft-lbs.)



WS002085A

5. Remove the mounting tool.



WS001973A

### Install the oil housing bottom

1. Install the oil housing.

Check that the sleeve for the oil refill can pass unobstructed from the cutouts in the bearing holder.



WS002043A

2. Replace the old sealing washers with new ones.



3. Fit the 3 self-tapping screws.

Tightening torque: 7 Nm (5 ft-lbs.)

If you have bought an oil housing as a spare part, there will not be any threads in the 3 holes for the screws (self-tapping screws).



### Install the outer mechanical seal: Griploc

Use the instructions in [Install the inner mechanical seal: Griploc](#) (page 43) to install the outer mechanical seal.

### Install the motor cable in the stator housing

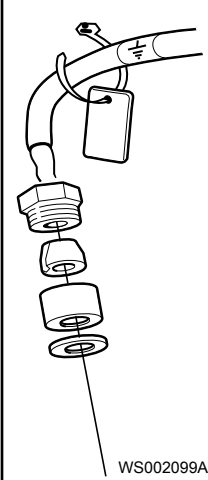
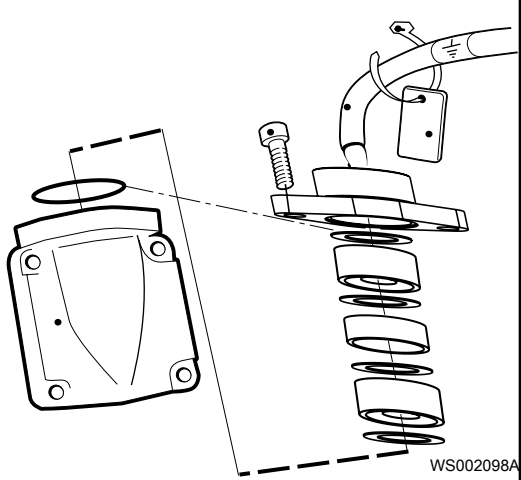
1. Pull the cable into the junction box.
2. Pull the stator leads into the junction box through the cable-lead-trough in the stator housing.
3. Connect the leads to the terminal board as shown in appropriate cable chart.

Check the insulation for the connections with a Megger. The insulation between the phases and between any phase and earth must be  $> 5 \text{ M}\Omega$ .



WS002091A

4. Assemble and fasten the cable entry.  
Make sure that the gland screw bottoms out when fasten.

Cable entry for cables with the outside diameter of 12-20 mm (0.47-0.79 in.)	Cable entry for cables with the outside diameter of (20)-32 mm ((0.79)-1.26 in.)
 <p>WS002099A</p>	 <p>WS002098A</p>

5. Lubricate and fit the O-ring on the bearing holder.  
Push it down to the oil housing bottom.



WS002071A

6. Install the stator housing.

In order to get the stator housing in the correct position, the junction box must be positioned just above the flange where there is no hole for the screws connecting the hydraulic part.



7. Fit and tighten the lubricated screws.  
Tightening torque: [Torque values](#) (page 25)



## Replace wear parts and cutting parts

### Replace the wear ring: C-impeller

This procedure only applies to the following pumps:

- 3127.090
- 3127.181

1. Bend out the wear ring at a suitable point.  
Use a crowbar.



2. Knock out the wear ring.  
Use a chisel and a hammer.



3. Check that the surface intended for the wear ring is clean and undamaged.
4. Drive in the new wear ring.  
To prevent deformation use either a rubber mallet or a wooden block and a hammer.



**Replace the wear protection: H-impeller**

This procedure only applies to the following pumps:

- 3127.090
- 3127.181

1. Remove the wear protection from the oil housing bottom.
2. Check that the surface intended for the wear protection is clean and undamaged.
3. Fit the new wear protection.

To prevent deformation use either a rubber mallet or a wooden block and a hammer.

**Replace the insert ring**

This procedure does not apply to the following pumps:

- 3127.170
- 3127.890

1. Turn the pump housing upside down.
2. Press out the insert.
3. Turn back the pump housing.
4. Check the surface intended for the insert ring is clean and undamaged.
5. Press in a new insert ring until it bottoms out.

**Replace the cutting ring**

This procedure only applies to the following pumps:

- 3127.170
- 3127.890

When the impeller and cutter wheel are replaced, also replace the cutting ring.

1. Remove the cutter wheel from the pump housing.



WS001985A

2. Knock out the cutting ring from the inside of the pump housing.



WS002040A

3. Turn the pump housing.
4. Check that the surface intended for the cutting ring is clean and undamaged.
5. Knock the new cutting ring in position.
6. Fit the cutter wheel on the outside of the pump housing.
7. Fit and tighten the lubricated screw.

Tightening torque: see [Torque values](#) (page 25)



WS002061A

### Replace the pump housing cover

This procedure only applies to the following pumps:

- 3127.090
- 3127.181

To be able to replace the pump housing cover, the pump housing and impeller must have been removed.

1. Remove the pump housing cover and its O-ring.



2. Fit the new pump housing cover into the pump housing.  
Check that the guide boss fits into the corresponding recess of the pump housing.



3. Fit the new O-ring into its groove.



### Install the pump housing

1. If used, fit the new lubricated O-ring between the oil housing bottom and the pump housing.
2. Install the pump housing.
3. Fit and tighten the lubricated screws.

Tightening torque: [Torque values](#) (page 25)



4. If applicable, fit the sliding bracket.



## 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 Xylem representative for correct type and size.
- Rod (wood 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.
- A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.
- 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.

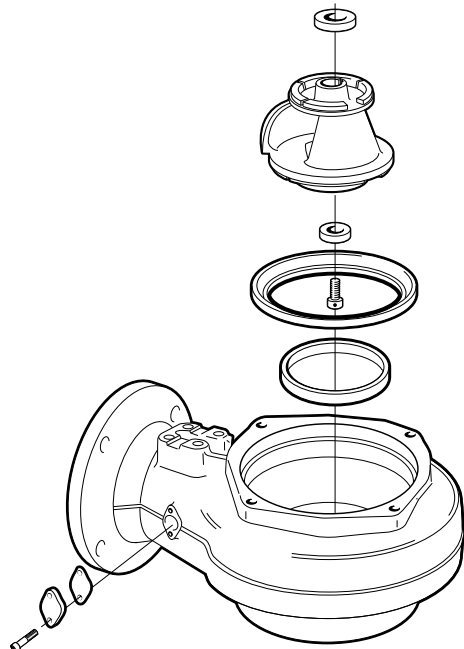
**Replace the C- or D-impeller**

Figure 4: C-Impeller

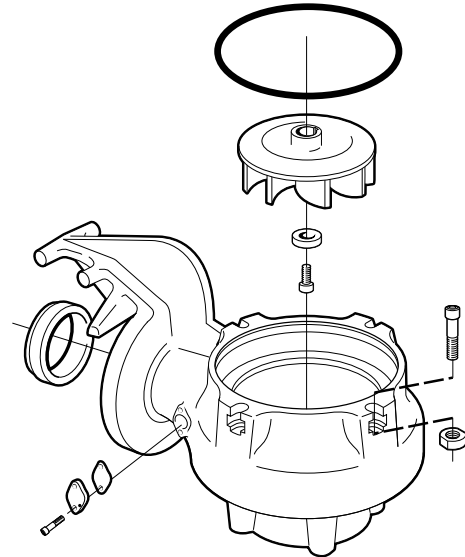


Figure 5: D-Impeller

**Remove the impeller: C , D****CAUTION:**

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the pump housing or the suction cover.



2. Remove the impeller screw.  
If applicable, use the rod.



Figure 6: C-impeller



Figure 7: D-impeller

3. Remove the washer.
4. Remove the impeller.  
Use the impeller puller or the crowbars.



Figure 8: D-impeller

#### Install the impeller: C , D

1. 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) Fit the spacer ring to the shaft (applicable for seal type O).
- c) Make sure that the parallel key is seated in the keyway on the shaft.
- d) Lubricate the shaft.  
Only: 3127.170, 3127.890

---

**NOTICE:**

Do not grease the conical part of the shaft.

---

2. Mount the impeller:
  - a) Fit the washer on the lubricated impeller screw.
  - b) Press the impeller onto the shaft with the impeller screw.
3. Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)



Check that the impeller can rotate freely.

4. Mount the suction cover (if applicable):
  - a) Fit a new lubricated O-ring to the suction cover.

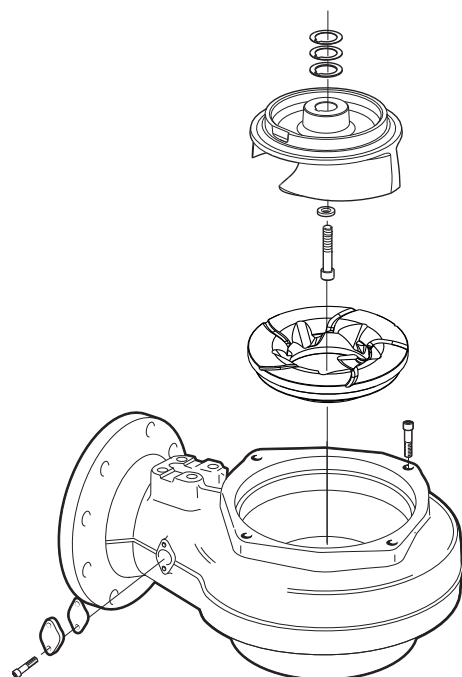


- b) Fit the suction cover.
  - c) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
5. Mount the pump housing:

- a) D-impeller (only 3127.170, 3127.890): Fit a new lubricated O-ring to the pump housing.
  - b) Fit the pump housing.
  - c) Fit and tighten the lubricated screws.
- Tightening torque: 57 Nm (42 ft-lbs).



## Replace the F-impeller



## Remove the F-impeller



### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the suction cover.
2. Remove the impeller screw, the ring, and the washers.  
If applicable, use the rod.



3. Remove the impeller.  
Use the impeller puller or the crowbars.

### Install the F-impeller

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
2. Mount the impeller:
  - a) Fit the ring and a new lubricated O-ring onto the lubricated impeller screw.
  - b) Fit one or two plain washers with a thickness of 0.3 mm (0.01 in.), or one plain washer with a thickness of 0.5 mm (0.02 in.) onto the impeller.



- c) Press the impeller onto the shaft with the impeller screw.
3. Fasten the impeller:
  - a) Prevent the impeller from rotating by inserting the rod through the pump housing outlet.
  - b) Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)

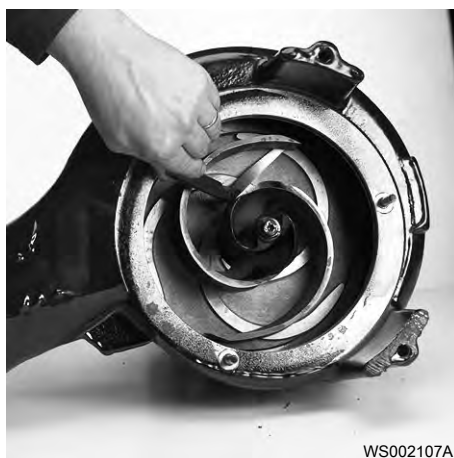


Check that the impeller can rotate freely.

4. Adjust the impeller:

- a) Measure the distance between the edge of the impeller and the pump housing cover.

The correct distance should be 0.5-1.5 mm (0.02-0.06 in.). Add or remove the appropriate number of adjusting washers in order to achieve correct distance.



- b) Tighten the impeller screw.

If applicable, use the rod.

Tightening torque: 80 Nm (59 ft-lbs)

Check that the impeller can rotate freely.

5. Mount the suction cover:

- a) Fit the studs on the pump housing.

Use Loctite 603 locking liquid in order to secure the studs.

- b) Fit one adjustment washer with a thickness of 1.5 mm (0.06 in.) and 7-8 adjustment washers with a thickness of 0.3 mm (0.01 in.) onto each stud.



- c) Fit the suction cover to the studs.
  - d) Fit the lock nuts onto the studs.
  - e) Tighten the nuts.
- Tightening torque: 57 Nm (42 ft-lbs).



6. Adjust the suction cover:
- a) Measure the distance between the impeller and the suction cover.  
The correct distance should be 0.5-1 mm (0.02-0.04 in.). Add or remove the appropriate number of adjusting washers in order to achieve the correct distance. Use adjustment washers with a thickness of 1.5 mm (0.06 in.) and 0.3 mm (0.01 in.) in order to achieve the correct distance.



- b) Tighten the nuts.

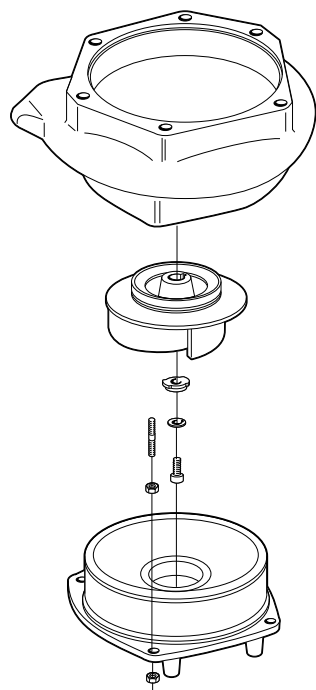
Tightening torque: 57 Nm (42 ft-lbs).



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7. Raise the pump to a vertical position.  
Check that the impeller can rotate freely.

## Replace the H-impeller



## Remove the H-impeller



### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the suction cover.
2. Remove the impeller screw and washer.  
If applicable, use the rod.
3. Remove the impeller from the shaft:

- a) Insert a M16 screw into the square nut.
- b) Turn the screw to push off the impeller.
4. Remove the screw and the square nut.

### Install the H-impeller

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
2. Mount the impeller:
  - a) Fit the washer and square nut to the lubricated impeller screw.
  - b) Press the impeller onto the shaft with the impeller screw.
3. Tighten the impeller screw.  
Tightening torque: 80 Nm (59 ft-lbs)  
If applicable, use the rod.  
Check that the impeller can rotate freely.
4. Mount the suction cover:
  - a) Fit the studs on the pump housing.
  - b) Fit the first hexagon nut onto the studs.
  - c) Fit the suction cover to the studs.  
Make sure that the impeller rotates freely from the suction cover before tightening the hexagon nuts. The clearance between the impeller and the suction cover should be as small as possible.
  - d) Fit the second hexagon nuts onto the studs.
  - e) Tighten the nuts.  
Tightening torque: 57 Nm (42 ft-lbs).
5. Raise the pump to a vertical position.  
Check that the impeller can rotate freely.

### Replace the M-impeller

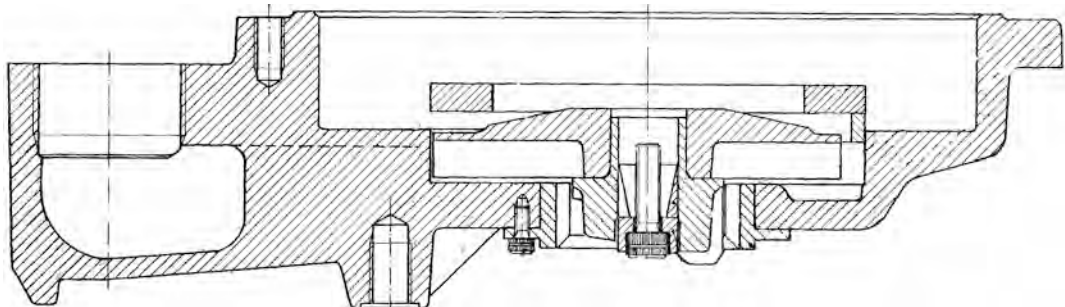


Figure 9: M-impeller

### Remove the M-impeller



#### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

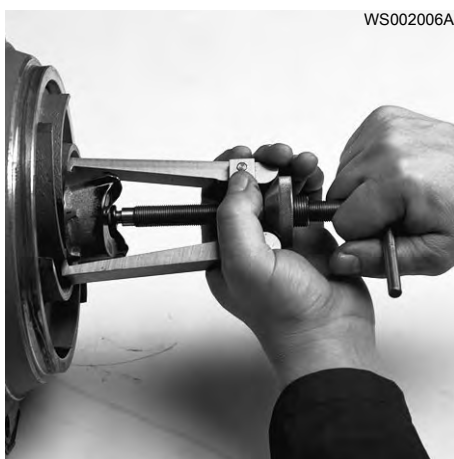
1. Remove the pump housing.
2. Remove the impeller screw and outer sleeve.  
If applicable, use the rod.



3. Refit the impeller screw.



4. Fit the impeller puller and pull off the impeller and cutter wheel.
  - If used, remove the washer between the impeller and cutter wheel.Place a protector between the screw head and the impeller puller.



5. Remove the conical sleeve.



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### Install the M-impeller

1. Make sure that the end of the shaft is clean and free from burrs.  
Polish off any flaws with a fine emery cloth.
2. Mount the impeller:
  - a) Fit the conical sleeve onto the shaft.

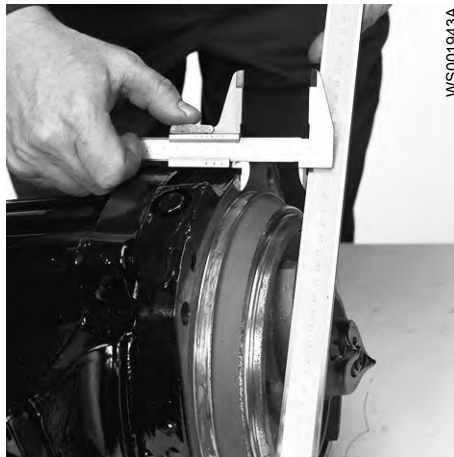


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- b) Fit the cutter wheel into the impeller.
  - c) Fit the outer sleeve onto the lubricated impeller screw.
  - d) Fit the impeller with the cutter wheel onto the shaft with the impeller screw.  
Do not tighten the impeller screw.
3. Adjust the impeller:
  - a) Use a straightedge and a vernier to measure the distance between the vanes of the impeller and the shoulder for the pump housing on the oil housing bottom.

Pressure class	Phase	Hz	Distance
LT, HT	3	50	65.0±0.3 mm (2.56±0.01 in.)
LT, HT	3	60	65.0±0.3 mm (2.56±0.01 in.)
LT	1	60	63.0±0.3 mm (2.48±0.01 in.)
HT	1	60	65.0±0.3 mm (2.56±0.01 in.)

- b) Slide the impeller on to the shaft until you reach the correct distance.



4. Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)

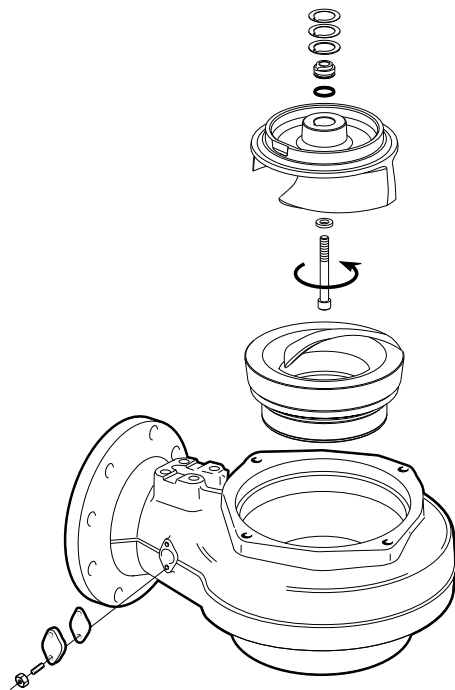


Check that the impeller can rotate freely.

5. Mount the pump housing:
  - a) Fit the pump housing.
  - b) Fit and tighten the lubricated screws.Tightening torque: 57 Nm (42 ft-lbs).



## Replace the N-impeller



### Remove the N-impeller



#### CAUTION:

A worn impeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Remove the pump housing.
2. For the version .160 and .190, remove the plug.
3. Remove the impeller screw.  
Use the impeller puller or the crowbars.
4. Remove the impeller.
5. Remove the plain washers and the adjustment washers.

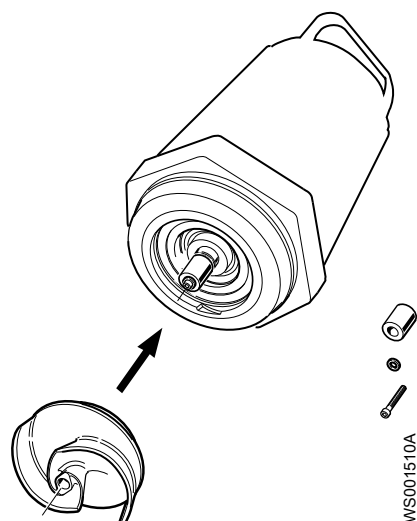
### Install the N-impeller with P/S/L-installation

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
  - c) Grease the shaft end.
  - d) Fit the adjustment washers.

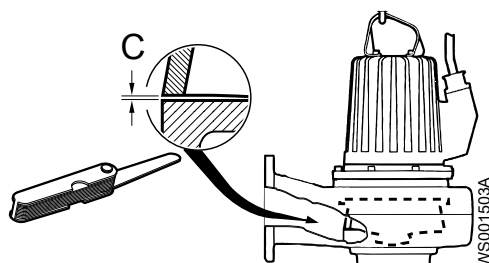
Number of washers	Thickness mm (in.)
3	0.3 (0.012)
2	0.5 (0.02)
1	1.5 (0.06)

2. Mount the impeller:

- a) Fit the impeller to the shaft.
- b) Fit the washer on the lubricated impeller screw.
- c) Hand-tighten the impeller screw enough to prevent it from falling off.

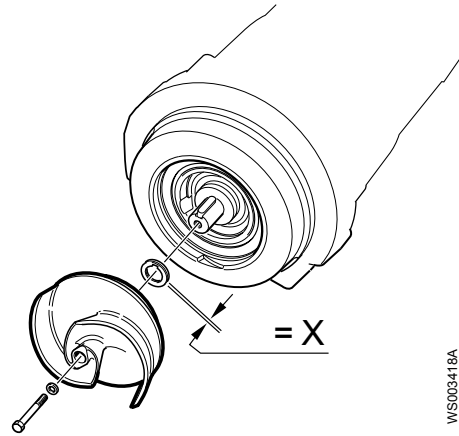


3. Mount the pump housing:
  - a) Fit the pump housing.
  - b) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
4. Adjust the impeller:
  - a) Measure the distance (C).



The correct distance is 0.2-0.8 mm (0.0079-0.032 in.) If the distance is correct, then fasten the impeller, otherwise proceed to next step.

- b) Remove the pump housing.
- c) Remove the impeller.  
If applicable, use the rod.
- d) Combine the adjustment washers so the total thickness X corresponds to  $X = 3.4 \text{ mm (0.134 in.)} - (C)$ .



5. Fasten the impeller:
    - a) Fit the impeller.
    - b) Tighten the impeller screw.  
If applicable, use the rod.  
Tightening torque:
      - LT, MT, HT: 80 Nm (59 ft-lbs)
      - SH: 57 Nm (47 ft-lbs)
- Check that the impeller can rotate freely.

**CAUTION:**

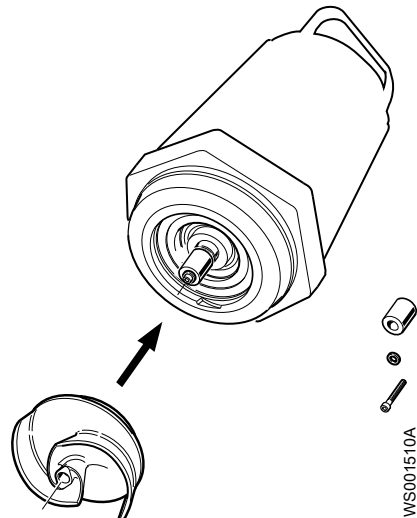
Beware of the pinch point hazard between the rotating impeller and the guide pin.

- c) Fit the pump housing.
  - d) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
6. For versions .160 and .190 fit the lubricated plug and tighten it.  
Tightening torque: 25 Nm (19 ft-lbs)

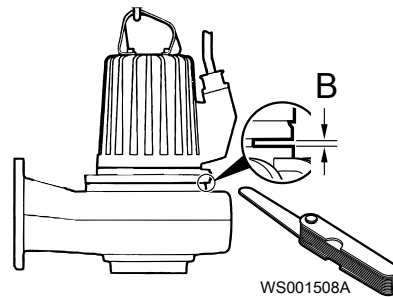
**Install the N-impeller with T/Z-installation**

For versions .160 and .190, use the instructions in [Install the N-impeller with P/S/L-installation](#) (page 66).

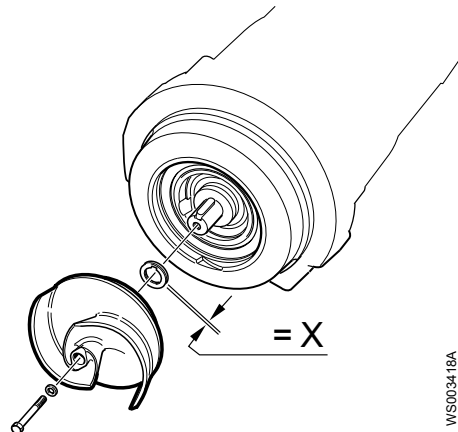
1. Prepare the shaft:
  - a) Make sure that the end of the shaft is clean and free from burrs.  
Polish off any flaws with a fine emery cloth.
  - b) Make sure that the parallel key is seated in the keyway on the shaft.
  - c) Grease the shaft end.
  - d) Fit three adjustment washers with the thickness 1.5 mm (0.06 in.)
2. Mount the impeller:
  - a) Fit the impeller to the shaft.
  - b) Fit the washer on the lubricated impeller screw.
  - c) Hand-tighten the impeller screw enough to prevent it from falling off.



3. Adjust the impeller:
  - a) Lift the drive unit into the pump housing.
  - b) Measure the distance (B):



- c) Lift off the drive unit.
  - d) Remove the impeller.
  - e) Combine the adjustment washers so the total thickness X corresponds to  $X = 4.5 \text{ mm (0.18 in.)} - B - 0.25 \text{ mm (0.01 in.)}$ .



4. Mount the impeller:
  - a) Fit the impeller.
  - b) Tighten the impeller screw.  
If applicable, use the rod.

Tightening torque:

- LT, MT, HT: 80 Nm (59 ft-lbs)
- SH: 57 Nm (47 ft-lbs)

Check that the impeller can rotate freely.



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**CAUTION:**

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

---

## Replace the propeller

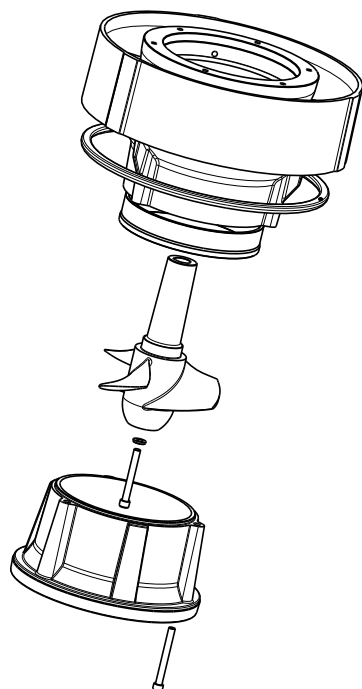


Figure 10: Propeller

Required tools:

- 10 mm hexagon bit adapter with an extension of at least 125 mm (4.92 in.)
  - Rod (wooden or copper) for locking the propeller in place, if applicable
  - Propeller puller
- If applicable, contact your local Xylem representative for correct type and size.
- Two crowbars, if applicable

**WARNING:**

- If you fail with the propeller installation, you must redo the installation procedure from the beginning.
- A worn propeller and/or pump housing can have very sharp edges. Wear protective gloves.
- When laying the pump on its side, do not allow the weight of the pump to rest on any portion of the propeller. The propeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.

**Remove the propeller****CAUTION:**

A worn propeller and/or pump housing can have very sharp edges. Wear protective gloves.

1. Lay the pump on its side.
2. Remove the bell mouth.
3. Remove the propeller screw.  
If applicable, use the rod.
4. Remove the washer.
5. Remove the propeller.  
Use the impeller puller or the crowbars.
6. Remove the diffuser.

**Install the propeller**

1. 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) Make sure that the parallel key is seated in the keyway on the shaft.
2. Mount the diffuser:
  - a) Fit the diffuser.
  - b) Fit and tighten the lubricated screws.  
Tightening torque: 57 Nm (42 ft-lbs).
3. Mount the propeller:
  - a) Fit the washer to the lubricated propeller screw.
  - b) Fit the propeller to the shaft.
  - c) Tighten the propeller screw.  
If applicable, use the rod.  
Tightening torque: 80 Nm (59 ft-lbs)
4. Mount the bell mouth:
  - a) Fit the bell mouth:
  - b) Fit and tighten the lubricated screws.  
For tightening torque, see [Torque values](#) (page 25).
  - c) Raise the pump to a vertical position.  
Check that the propeller can rotate freely.

## Requirements for Ex-approved products

### Basic requirements

- Only personnel authorized by the manufacturer are allowed to repair, maintain and service Ex-approved products.
- Always follow the information about repair, maintenance and service in the Ex manual while working on an Ex-approved product. For the Ex manual, see the W&WW Intranet or contact your local Ex-coordinator.
- To ensure that the product complies with the regulations and approval of the authorities, use only original spare parts.
- Always check the dimensions of vital parts before assembly, this applies to spare parts as well.

Failure to meet the above requirements may render the Ex-approval invalid.

### Background

In an Ex-approved product the gaps between different parts, for example between the stator housing and the junction box, must be tight enough and long enough to prevent any sparks from the interior of the product from escaping out and igniting surrounding gases. To be able to measure these flameproof gaps accurately all surfaces included in a gap must be clean and free from damages.

The approval drawings show the gaps, in these drawings also called joints, that must be measured and the surfaces that must be inspected for damages. For approval drawings of the product, see the W&WW Intranet or contact your local Ex-coordinator.

### Documents required

- Approval drawing
- Ex manual
- Report of findings, measurements, tests, and similar, see examples in the Ex manual

### Temporary storage guidelines

If a disassembled product has to await ordered spare parts, all parts have to be carefully lubricated and covered. Store all parts separately to ensure that no damages will occur.

## Service the pump

Type of service	Purpose	Inspection interval
Initial inspection	To make a check up of the pump condition by an authorized Xylem 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.	Within the first year of operation.
Periodical inspection	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.	Up to every year Applies to normal applications and operating conditions at media (liquid) temperatures <40°C.

Type of service	Purpose	Inspection interval
Major overhaul	To secure a long operating lifetime for the product. It includes replacement of key components and the measures taken during an inspection.	Up to every 3 year Applies to normal applications and operating conditions at media (liquid) temperatures <40°C.

**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

Service item	Action
Cable	<ol style="list-style-type: none"> <li>1. If the outer jacket is damaged, replace the cable.</li> <li>2. Check that the cables do not have any sharp bends and are not pinched.</li> </ol>
Connection to power	Check that the connections are properly tightened.
Electrical cabinets	Check that they are clean and dry.
Impeller	<ol style="list-style-type: none"> <li>1. Check the impeller clearance.</li> <li>2. Adjust the impeller, if necessary.</li> </ol>
Stator housing Inspection chamber	<p>Drain all liquid, if any.</p> <ol style="list-style-type: none"> <li>1. Drain all liquid, if any.</li> <li>2. Check the resistance of the leakage sensor. Applicable for Ex-version. Normal value approx. 1200 1500 ohms, alarm approx. 430 ohms.</li> <li>3. Check the resistance of the leakage sensor. If the pump is connected to the MAS 711 then it is recommended that the sensors be checked in the MAS 711 unit. Otherwise, use a multimeter. For values, see <a href="#">Sensor-connection</a> (page 22). Make sure to select values for the appropriate monitoring equipment and sensor combination. For values, see <a href="#">Connection to the pump</a>. Make sure to select values for the appropriate monitoring equipment and sensor combination.</li> </ol>
Insulation	<p>Use a megger maximum 1000 V.</p> <ol style="list-style-type: none"> <li>1. Check that the resistance between the earth (ground) and phase lead is more than 5 megohms.</li> <li>2. Conduct a phase-to-phase resistance check.</li> </ol>
Junction box	Check that it is clean and dry.
Lifting device	Check that local safety regulations are followed.

## Maintenance

Service item	Action
Lifting handle : Ex-version	<ol style="list-style-type: none"> <li>1. Check the screws.</li> <li>2. Check the condition of the lifting handle.</li> <li>3. Replace if necessary.</li> </ol>
O-rings	<ol style="list-style-type: none"> <li>1. Replace the oil plug O-rings.</li> <li>2. Replace the O-rings at the entrance or junction cover.</li> <li>3. Grease the new O-rings.</li> </ol>
Overload protection and other protections	Check the correct settings.
Personnel safety devices	Check the guard rails, covers, and other protections.
Rotation direction	Check the impeller rotation.
Oil housing	Fill with new oil, if necessary.
Terminal block/closed end splice	Check that the connections are properly tightened.
Thermal contacts	Normally closed circuit; interval 0–1 ohm.
Voltage and amperage	Check the running values.

## Major overhaul

For a major overhaul, take this action 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.

## Service in case of alarm

For information about indication values for sensors, see [Sensor-connection](#) (page 22).

Alarm source	Action
CLS	Check for water in the oil housing. If the oil contains too much water: <ol style="list-style-type: none"> <li>1. Drain the oil and water.</li> <li>2. Replace with new oil.</li> </ol>
FLS: Ex-version	<ol style="list-style-type: none"> <li>1. Check for liquid in the stator housing.</li> <li>2. Drain all liquid, if any.</li> <li>3. Check the mechanical seal unit, the O-rings, and the cable entry, if liquid was found.</li> <li>1. Check for liquid in the connection housing.</li> <li>2. Drain all liquid, if any.</li> <li>3. Check the O-rings and the cable entry, if liquid was found.</li> </ol>
The thermistor/Thermal contact	Check the start and stop levels. Check that the cooling jacket is not clogged. Clean if necessary. <ol style="list-style-type: none"> <li>1. Check the coolant level (pump with cooling jacket).</li> <li>2. Check the start and stop levels.</li> </ol>

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Alarm source	Action
The overload protection	Check that the impeller can rotate freely.

# Troubleshooting

## Introduction

Follow these guidelines when troubleshooting the pump:

- Disconnect and lock out the power supply except when conducting checks that require voltage.
- Make sure that no one is near the pump 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



### WARNING:

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.

Cause	Remedy
An alarm signal has been triggered on the control panel.	Check that: <ul style="list-style-type: none"> <li>• The impeller rotates freely.</li> <li>• The sensor indicators do not indicate an alarm.</li> <li>• The overload protection is not tripped.</li> </ul> If the problem still persists: Contact the local Xylem service shop.
The pump does not start automatically, but can be started manually.	Check that: <ul style="list-style-type: none"> <li>• The start level regulator is functioning. Clean or replace if necessary.</li> <li>• All connections are intact.</li> <li>• The relay and contactor coils are intact.</li> <li>• The control switch (Man/Auto) makes contact in both positions.</li> </ul> Check the control circuit and functions.
The installation is not receiving voltage.	Check that: <ul style="list-style-type: none"> <li>• The main power switch is on.</li> <li>• There is control voltage to the start equipment.</li> <li>• The fuses are intact.</li> <li>• There is voltage in all phases of the supply line.</li> <li>• All fuses have power and that they are securely fastened to the fuse holders.</li> <li>• The overload protection is not tripped.</li> <li>• The motor cable is not damaged.</li> </ul>
The impeller is stuck.	Clean:

Cause	Remedy
	<ul style="list-style-type: none"> <li>• The impeller</li> <li>• The sump in order to prevent the impeller from clogging again.</li> </ul>

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 8).

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



### WARNING:

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

Cause	Remedy
The pump is unable to empty the sump to the stop level.	Check that: <ul style="list-style-type: none"> <li>• There are no leaks from the piping and/or discharge connection.</li> <li>• The impeller is not clogged.</li> <li>• The non-return valve(s) are functioning properly.</li> <li>• The pump has adequate capacity. For information: Contact the local Xylem service shop.</li> </ul>
There is a malfunction in the level-sensing equipment.	<ul style="list-style-type: none"> <li>• Clean the level regulators.</li> <li>• Check the functioning of the level regulators.</li> <li>• Check the contactor and the control circuit.</li> <li>• Replace all defective items.</li> </ul>
The stop level is set too low.	Raise the stop level.

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 8).

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

Cause	Remedy
The pump starts due to back-flow which fills the sump to the start level again.	Check that: <ul style="list-style-type: none"> <li>• The distance between the start and stop levels is sufficient.</li> <li>• The non-return valve(s) work(s) properly.</li> <li>• The length of the discharge pipe between the pump and the first non-return valve is sufficiently short.</li> </ul>
The self-holding function of the contactor malfunctions.	Check: <ul style="list-style-type: none"> <li>• The contactor connections.</li> <li>• The voltage in the control circuit in relation to the rated voltages on the coil.</li> <li>• The functioning of the stop-level regulator.</li> <li>• Whether the voltage drop in the line at the starting surge causes the contactor's self-holding malfunction.</li> </ul>

## Troubleshooting

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 8).

## The pump runs but the motor protection trips

**WARNING:**

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.

Cause	Remedy
The motor protection is set too low.	Set the motor protection according to the data plate and if applicable the cable chart.
The impeller is difficult to rotate by hand.	<ul style="list-style-type: none"> <li>• Clean the impeller.</li> <li>• Clean out the sump.</li> <li>• Check that the impeller is properly trimmed.</li> </ul>
The drive unit is not receiving full voltage on all three phases.	<ul style="list-style-type: none"> <li>• Check the fuses. Replace fuses that have tripped.</li> <li>• If the fuses are intact, notify a certified electrician.</li> </ul>
The phase currents vary, or they are too high.	Contact the local Xylem service shop.
The insulation between the phases and ground in the stator is defective.	<ol style="list-style-type: none"> <li>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 megohms.</li> <li>2. If the insulation is less: Contact the local Xylem service shop.</li> </ol>
The density of the pumped fluid is too high.	<p>Make sure that the maximum density is 1100 kg/m<sup>3</sup> (9.2 lb/US gal)</p> <ul style="list-style-type: none"> <li>• Change the impeller, or</li> <li>• Change to a more suitable pump.</li> <li>• Contact the local Xylem service shop.</li> </ul>
There is a malfunction in the overload protection.	Replace the overload protection.

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 8).

## The pump delivers too little or no water

**WARNING:**

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.

Cause	Remedy
The impeller rotates in the wrong direction.	<ul style="list-style-type: none"> <li>• If it is a 3-phase pump, transpose two phase leads.</li> <li>• If it is a 1-phase pump: Contact the local Xylem service shop.</li> </ul>
One or more of the valves are set in the wrong positions.	<ul style="list-style-type: none"> <li>• Reset the valves that are set in the wrong position.</li> <li>• Replace the valves, if necessary.</li> <li>• Check that all valves are correctly installed according to media flow.</li> <li>• Check that all valves open correctly.</li> </ul>
The impeller is difficult to rotate by hand.	<ul style="list-style-type: none"> <li>• Clean the impeller.</li> <li>• Clean out the sump.</li> <li>• Check that the impeller is properly trimmed.</li> </ul>
The pipes are obstructed.	Clean out the pipes to ensure a free flow.
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.	<ul style="list-style-type: none"> <li>• Check that the level sensor is set correctly.</li> <li>• Depending on the installation type, add a means for priming the pump, such as a foot valve.</li> </ul>

If the problem persists, refer to the Flygt Service Guide on the web or contact the local Xylem service shop. Always state the serial number of your pump when you contact Xylem, see [Product Description](#) (page 8).

# Technical Reference

## Exploded view

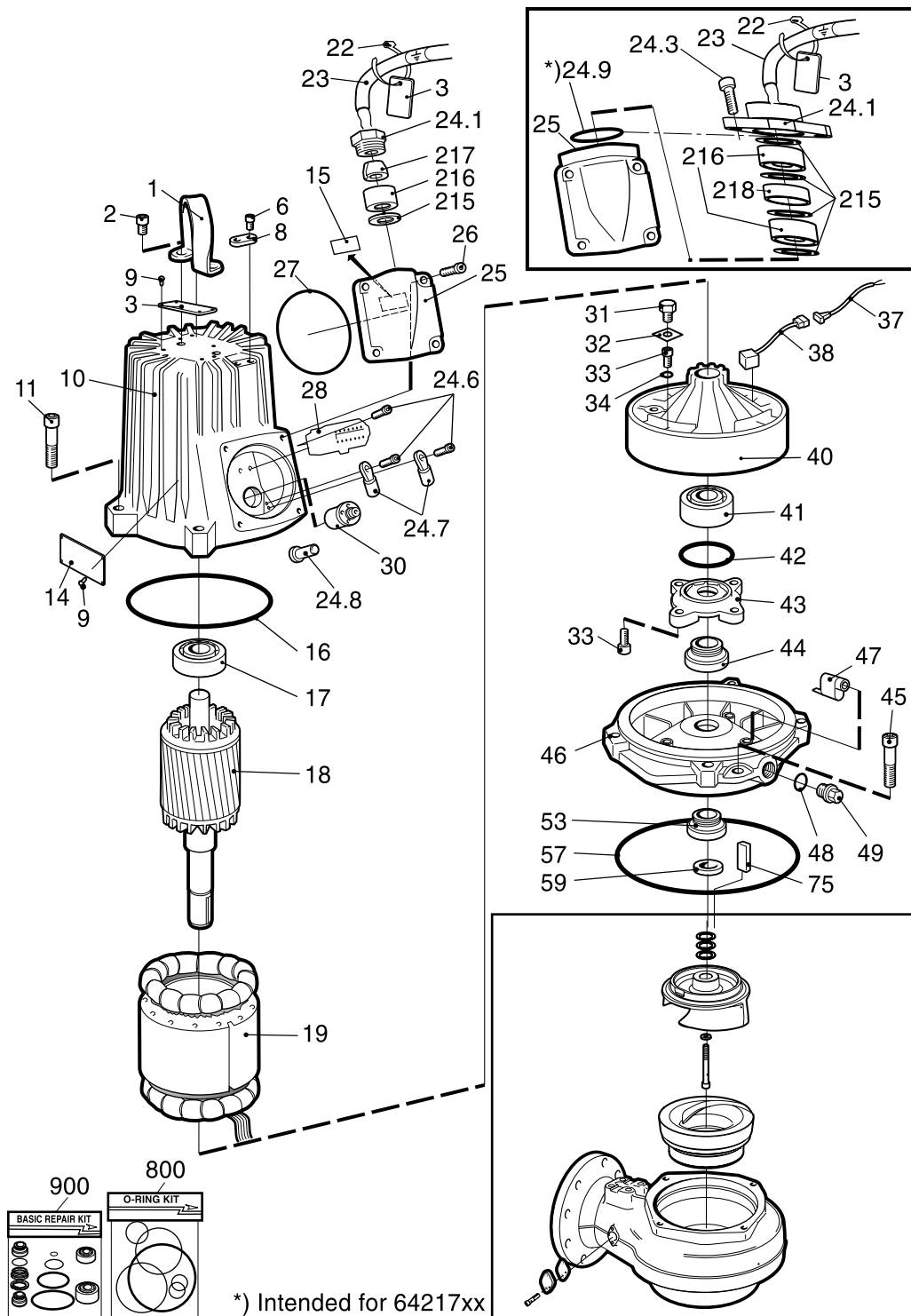


Figure 11: 3127.090/3127.095/3127.190

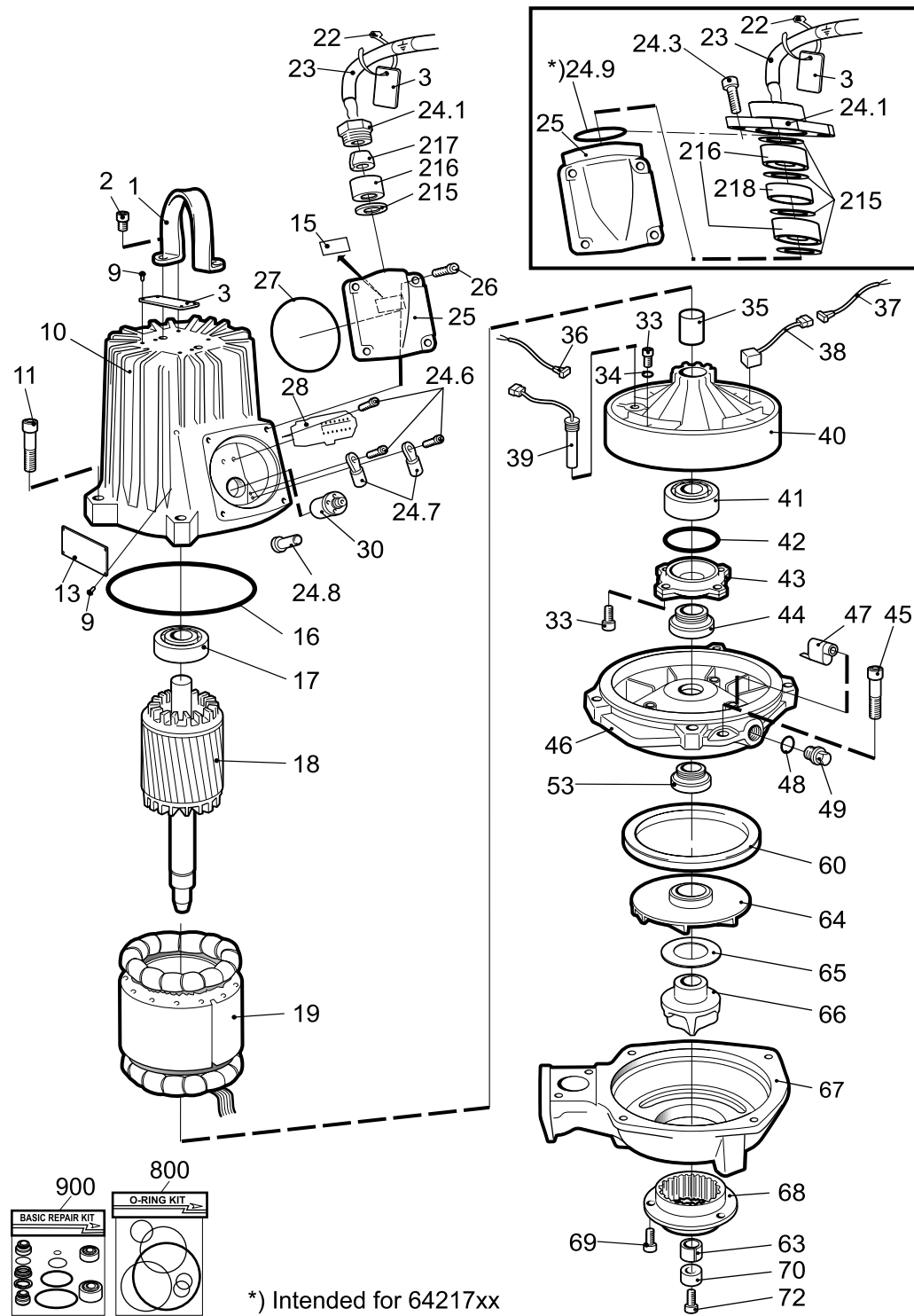


Figure 12: 3127.170

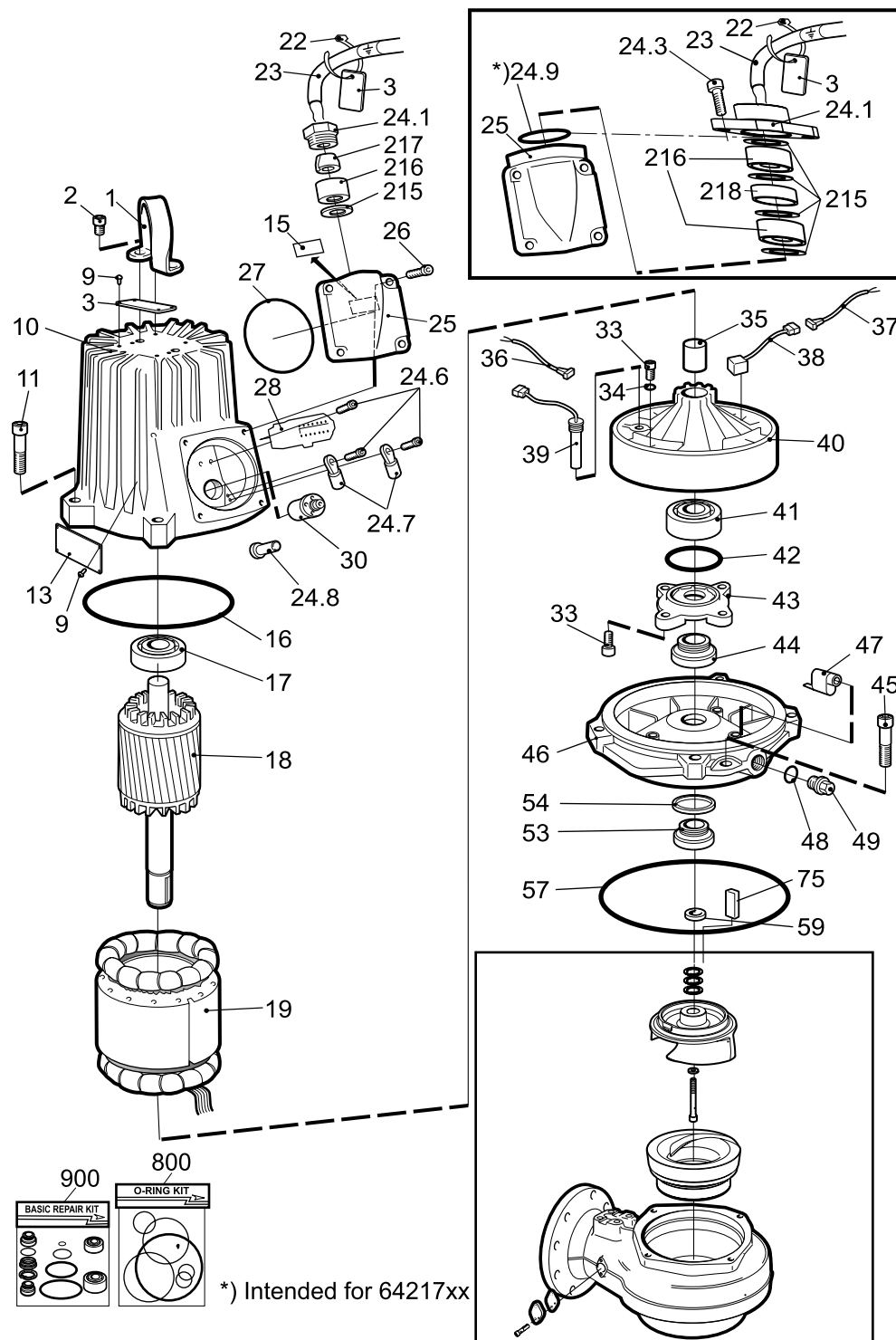


Figure 13: 3127.160/3127.181/3127.185

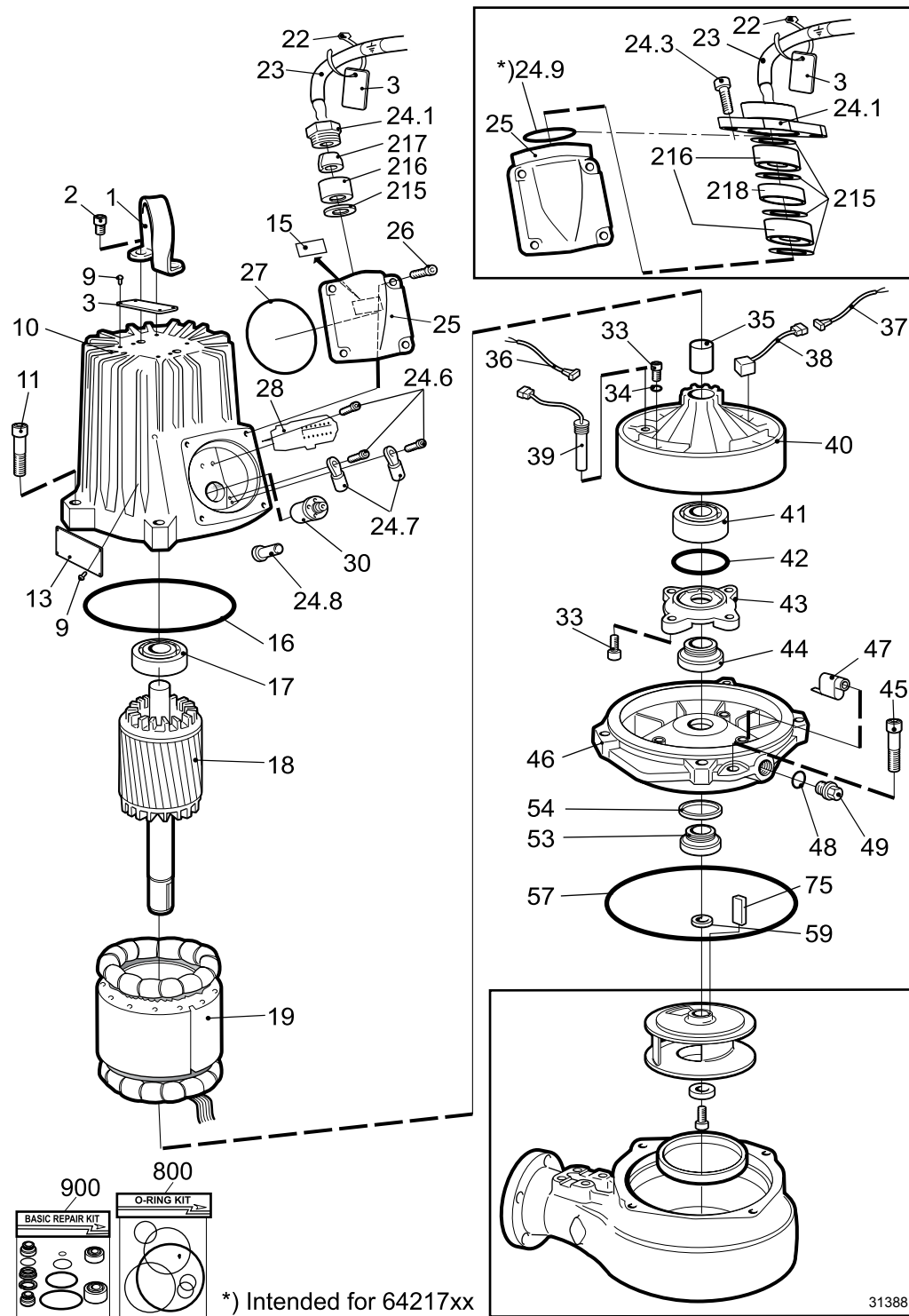


Figure 14: 3127.350

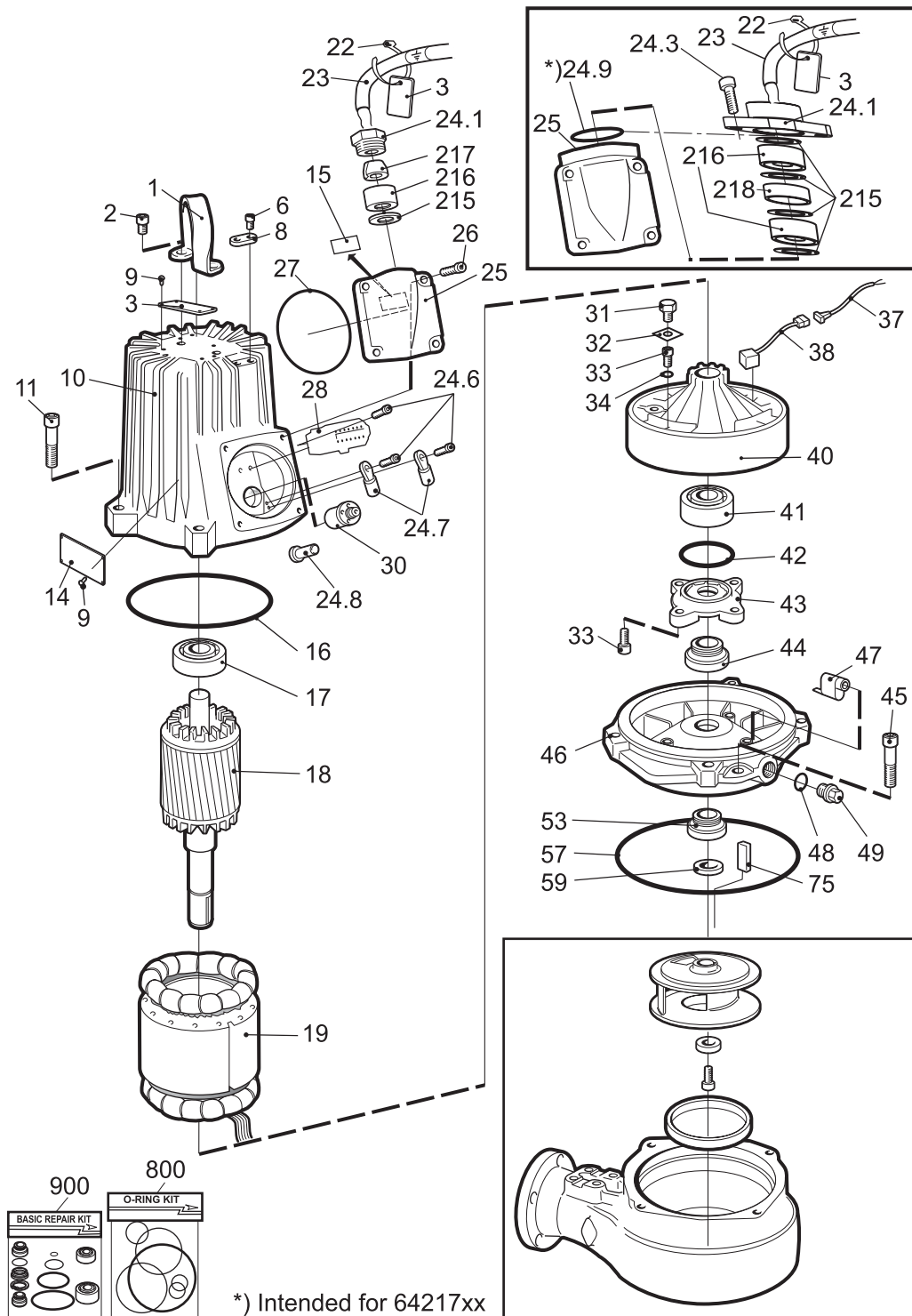


Figure 15: 3127.390

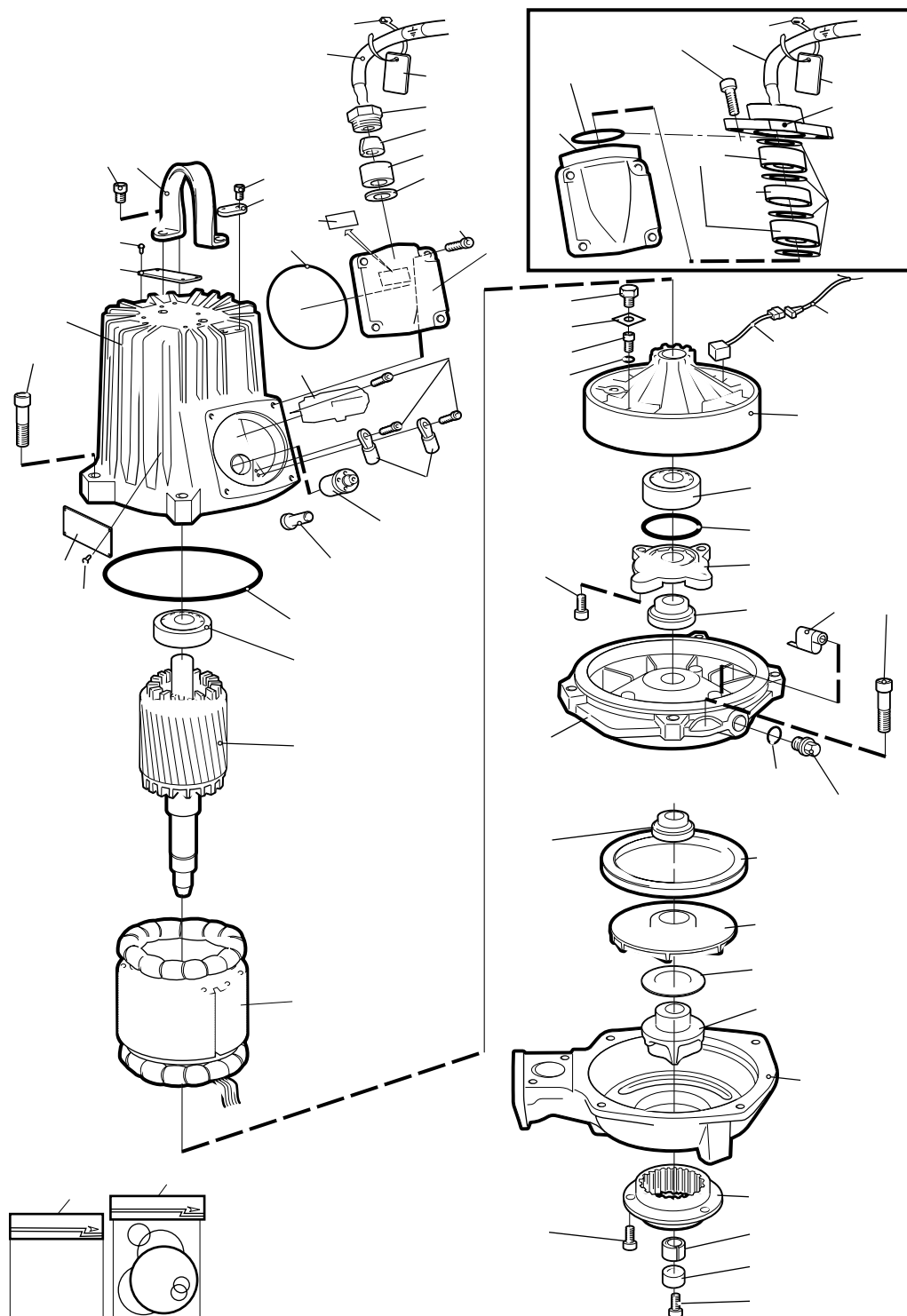


Figure 16: 3127.890

For information about the different hydraulic ends and part names, see Parts List.

# Tools

## Service guide

The Flygt Service Guide (FSG) is a search engine for pump part numbers and spare parts. The service guide is available at [www.ittwww.com](http://www.ittwww.com). For a valid password, contact [flygtpumpar@flygt.com](mailto:flygtpumpar@flygt.com).

## List of tools

Part number	Denomination	Range of use
820660	Socket head screw	Together with 841362 for NEVACLOG
841016	Ratchet handle	Sockets
841135	Combination wrench (8 mm)	Cable entry (cable OD 20-26 mm)
841137	Combination wrench (18 mm)	Suction cover HD, Inlet PL
841156	Combination wrench (41 mm)	Cable entry (cable OD 10-20 mm)
841304	Hexagon bit adapter (6 mm)	Junction box cover
841305	Hexagon bit adapter (8 mm)	Stator housing, lifting handle
841306	Hexagon bit adapter (10 mm)	Impeller screw, pump housing
841362	Puller spread 250 mm/reach 200 mm	D-impeller, HT-impeller 254-259 and NEVACLOG 480-485
841395	Socket wrench (16 mm)	Oil plug, protective plug (only 3127.090)
841476	Hexagon bit adapter (5 mm, long)	Bearing cover, bearing housing, earth screw
841555	Extension bar	Sockets
841566	Torque wrench 0-137 Nm	Torque tightening
841650	Screw driver	Cable entry (cable OD 20-26 mm)
841658	Screw driver	Terminal
841673	Screw driver	CLS-sensor
842048	Puller complete	100 spread/reach inner bearing
2166800	Special pliers	Rotating seal unit
2499204	Impeller puller unit	LL-, LT-, MT-impellers, 410-412, 441-442, 430-436
3035800	Hexagon head screw	HD-impellers
3093900	Impeller puller unit	HT-impellers, curves 250, 461-467
3967000	Puller screw complete	N-impellers, LT, MT, HT curves X20-X22
4003900	Mounting socket	Stationary seal ring
4369700	Mounting tool	Grip ring seals
4385800	Hexagon head screw	F-impeller
4669801	Bearing puller	Outer bearing
6572200	Mounting/dismounting tool	Insert rings for N-impellers
6895402	Mounting/dismounting tool	Stator



# Xylem |'zīləm|

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

We're 12,000 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.

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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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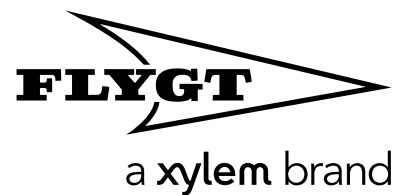
898235\_3.0\_en.US\_2011-09\_SR.3127.090/.095/.160/.170/.181/.185/.190/.350/.390/\_XR

## **Section 5 – 3127 Submersible Pump Parts List**

## Parts List



# Flygt 3127.160/190





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# Introduction

## Purpose of this manual

The purpose of this manual is to provide necessary information on spare parts and accessories order.

## Disclaimer

Always use genuine Flygt parts. The use of other spare parts or accessories can invalidate any claims for warranty or compensation. Xylem does not take any responsibility for damages caused by the use of non-original parts. For more information, contact your Xylem representative.

## Data for ordering spare parts

The following information is needed for spare part orders:

- Serial number of the product
- Part number
- Quantity (\* specify piece goods)

## Specially approved products

### Qualification of personnel

Only Xylem or Xylem-authorized service personnel may undertake repair work on Ex-approved products.

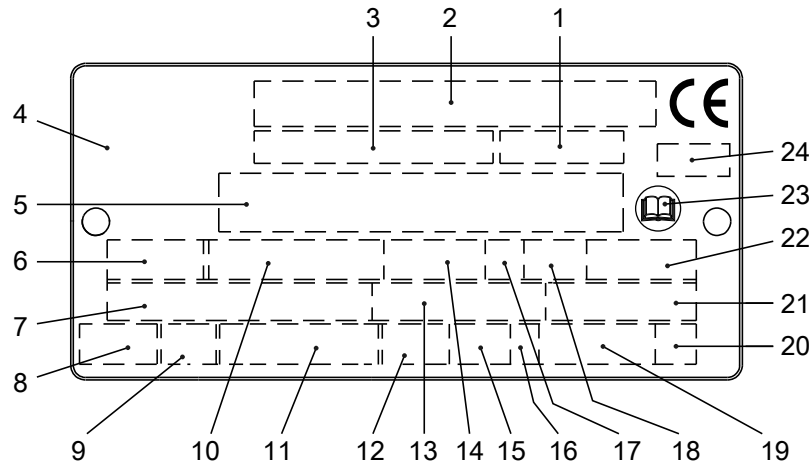
### Dimensional accuracy inspection

Spare parts marked with (EX) after the part number are subject to dimensional accuracy inspection.

# Product Description

## The data plate

The data plate is a metal label located on the main body of the products. The data plate lists key product specifications. Specially approved products also have an approval plate.






1. Curve code/Propeller code
2. Serial number, see [Product denomination](#) (page 5)
3. Product number
4. Country of origin
5. Additional information
6. Phase; type of current; frequency
7. Rated voltage
8. Thermal protection
9. Thermal class
10. Rated shaft power
11. International standard
12. Degree of protection
13. Rated current
14. Rated speed
15. Maximum submergence
16. Direction of rotation: L=left, R=right
17. Duty class
18. Duty factor
19. Product weight
20. Locked rotor code letter
21. Power factor
22. Maximum ambient temperature
23. Read installation manual
24. Notified body. Only for EN-approved Ex-products

Figure 1: The data plate

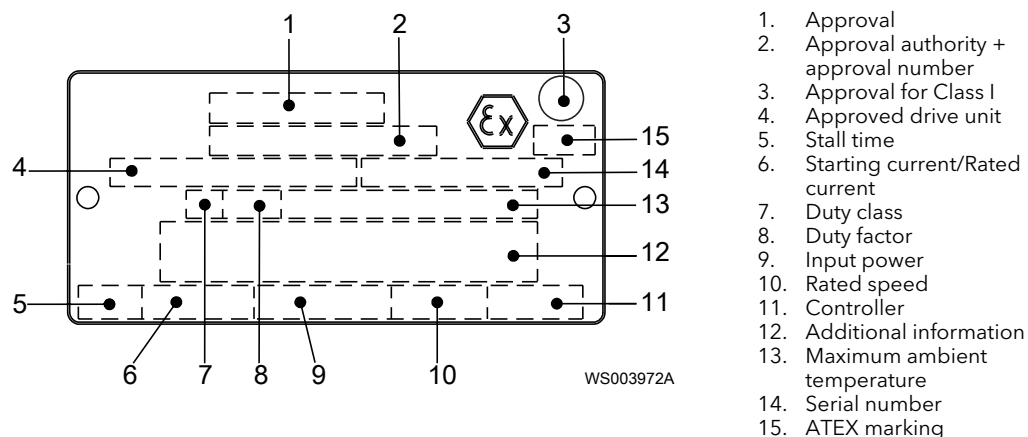
## Approvals

### Product approvals for hazardous locations

Pump	Approval
<ul style="list-style-type: none"> <li>• 3127.090</li> <li>• 3127.095</li> <li>• 3127.190</li> <li>• 3127.390</li> <li>• 3127.810</li> <li>• 3127.830</li> <li>• 3127.850</li> <li>• 3127.910</li> </ul>	European Norm (EN) <ul style="list-style-type: none"> <li>• ATEX Directive</li> <li>• EN 60079-0, EN 60079-1, EN 1127-1</li> <li>•  I M2 Ex d I</li> <li>•  II 2 G Ex d IIB T4</li> </ul>
	EN approval for cable entry: <ul style="list-style-type: none"> <li>• Certificate number: INERIS 02ATEX9008 U</li> <li>•  II 2 G Ex d IIC or I M2 Ex d I</li> </ul>
	IEC <ul style="list-style-type: none"> <li>• IECEx scheme</li> <li>• IEC 60079-0, IEC 60079-1</li> <li>• Ex d I</li> <li>• Ex d IIB T4</li> </ul>
	Factory Mutual (FM) <ul style="list-style-type: none"> <li>• Class I. Div 1. Group C and D</li> <li>• Dust ignition proof for use in Class II. Div 1. Group E, F and G</li> <li>• Suitable for use in Class III. Div 1. Hazardous Locations</li> </ul>

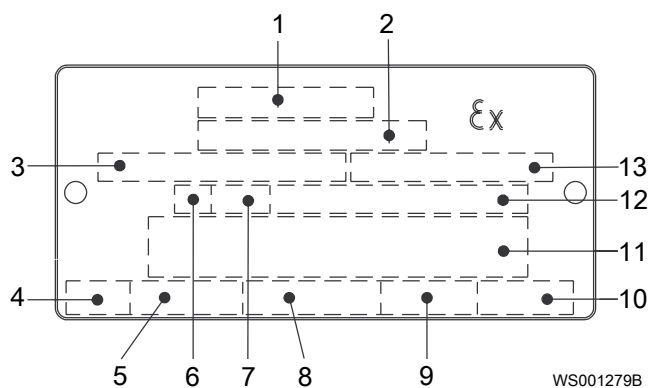
### EN approval plate

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



### IEC approval plate

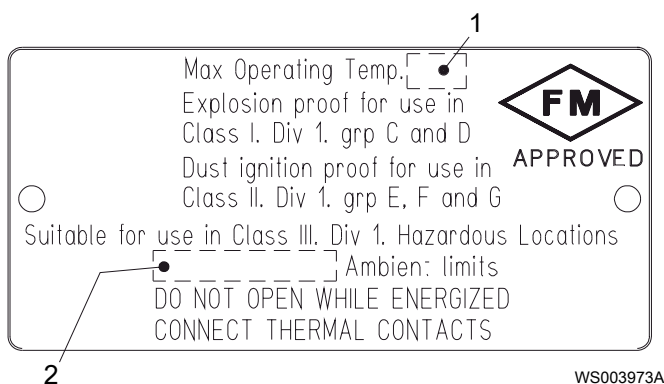
This illustration describes the IEC approval plate and the information contained in its fields. International Norm; not for EU member countries.



1. Approval
2. Approval authority + approval number
3. Approved for drive unit
4. Stall time
5. Starting current/Rated current
6. Duty class
7. Duty factor
8. Input power
9. Rated speed
10. Controller
11. Additional information
12. Max. ambient temperature
13. Serial number

### FM approval plate

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



1. Temperature class
2. Maximum ambient temperature

## Product denomination

### Sales denomination

The sales denomination consists of the four-digit sales code and two letters that indicate the hydraulic end and type of installation.

This is an example of a sales denomination, and an explanation of its parts.

**NP 3085**

1 2 3

1. Hydraulic part
2. Installation type
3. Sales code

### Product code

The product code consists of nine characters divided into two parts.

This is an example of a product code, and an explanation of its parts.

**NP 3085.183**

1 2

1. Sales denomination
2. Version

Product Description

---

**Serial number**

The serial number is used for identification of an individual product, and is divided into four parts.

This is an example of a serial number, and an explanation of its parts.

**NP 3085.183 - 951 0163**

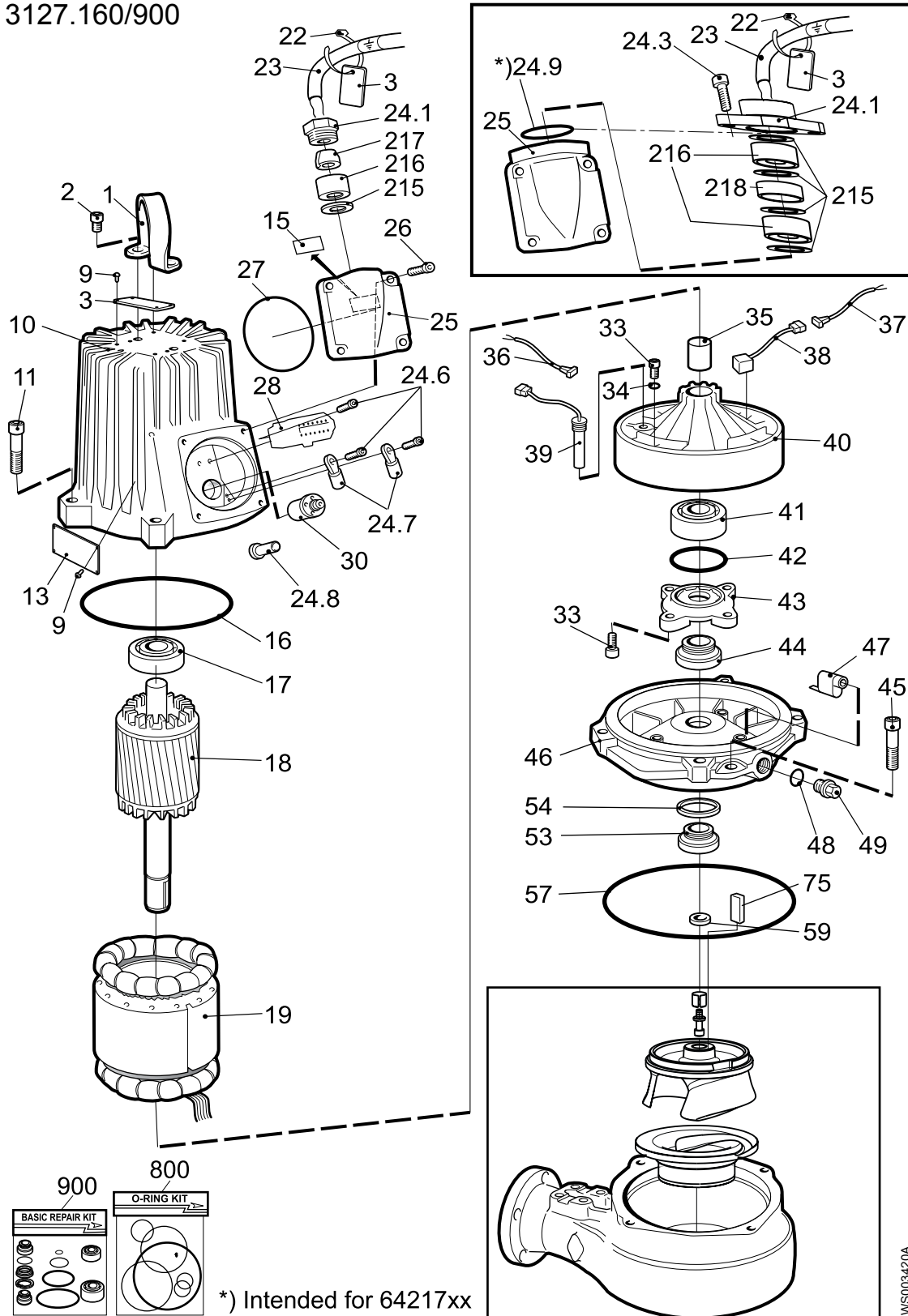
1 2 3 4

1. Product code
2. Production year
3. Production cycle
4. Running number

# Drive Unit

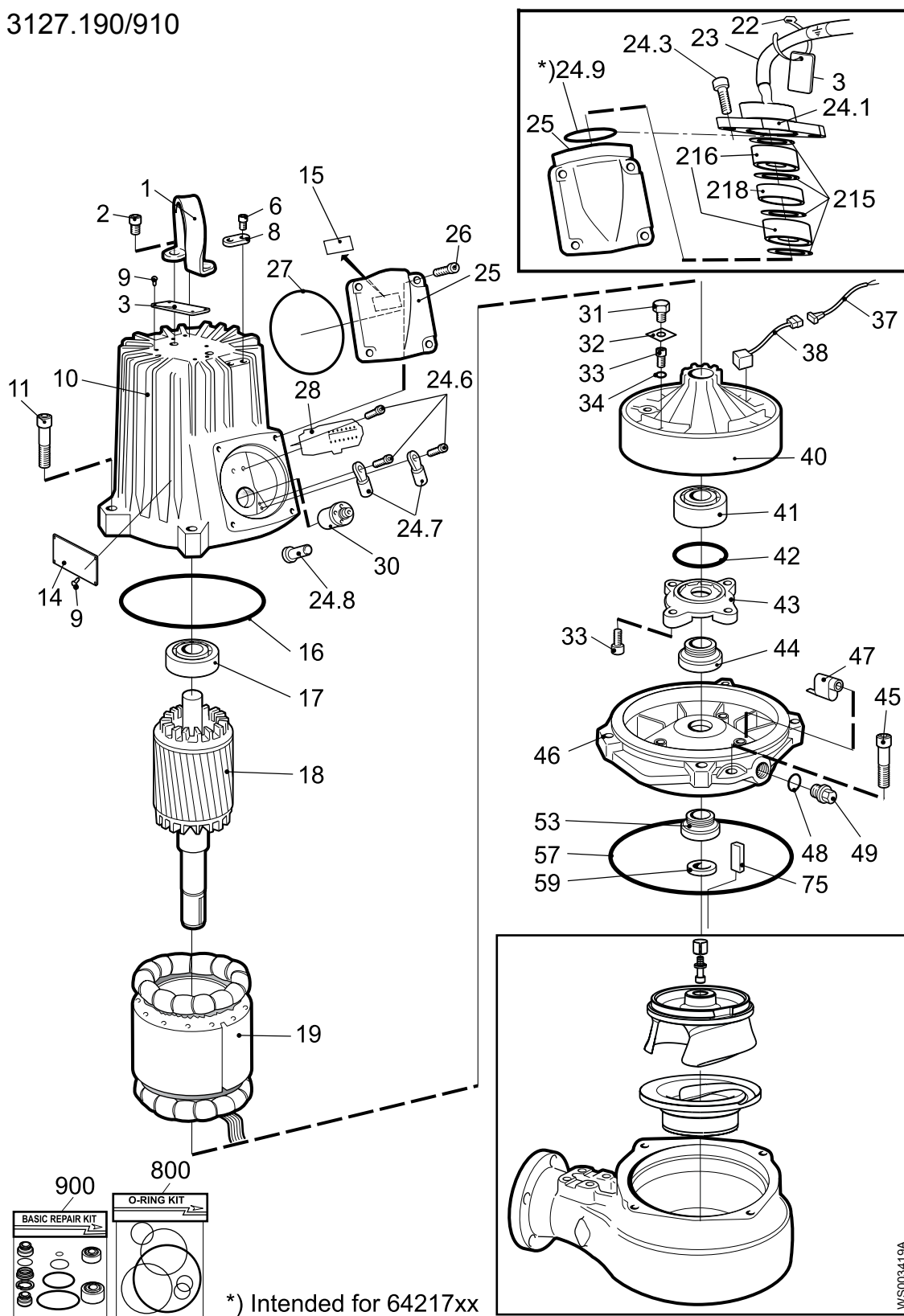
## Standard

3127.160/900



## Explosion-proof

3127.190/910



## List of parts

Pos. No	Part. No	Denomination	Qty/Version	
			160	190
1	477 11 01	Lifting handle	1	1
2	83 03 23	Hex.socket hd screw M10X25-A4-70	2	2
3	630 68 00	Data plate USE 6306801 AS SPARE PART	2	2
6	83 02 58	Hex.socket hd screw M5X12-A4-70		2
8	279 29 00	Earthing plate		1
9	82 20 88	Drive screw 4X5-A2-70	6	10
10	443 53 00	Stator housing	1	
10	443 53 05 (EX)	Stator housing		1
11	83 03 30	Hex.socket hd screw M10X60-A4-70	4	4
13	630 76 00	Plate HOT WATER PRODUCT	1	
14	630 69 00	Certificate plate EX		2
14	630 69 01	Certificate plate IECEX PLATE		2
14	630 70 00 (EX)	Certificate plate FM		2
15	550 21 00	Connection plate (FLS+CLS)	1	
15	550 22 00	Connection plate (FLS)	1	1
15	550 23 00	Connection plate (CLS)	1	
15	550 24 00	Connection plate	1	1
15	657 79 00	Connection plate SCREENED CABLE	1	1
15	698 82 00	Connection plate	1	1
15	698 84 00	Connection plate	12-lead	1
15	727 03 00	Connection plate T1T2	1	
16	82 74 97	O-ring 239.5X5.7 NBR	1	1
16	82 80 86	O-ring 239.3X5.7 FPM	1	
17	83 32 36	Ball bearing 6207,35X72X17	1	1
18	443 59 05	Shaft unit	Intended for motor 21-12-4	1
18	443 59 06	Shaft unit	Intended for motor 21-10-4	1
18	443 60 02	Shaft unit	For motor 21-11-2	1
18	443 66 04 (EX)	Shaft unit	Intended for motor 21-12-4	1
18	443 66 05 (EX)	Shaft unit	Intended for motor 21-10-4	1
18	443 67 02 (EX)	Shaft unit	For motor 21-11-2	1
19	309 44 12 (EX)	Stator 21-12-4a	1-phase, 60 Hz, 220 - 240 V. 3-phase, 60 Hz, 440 - 460 VYSER/220 - 230 VY//.	1
19	309 44 28 (EX)	Stator 21-12-4a	3-phase, 50 Hz, 190 - 200 VD. 3-phase, 60 Hz, 200 - 220 VD.	1
19	309 44 29 (EX)	Stator 21-12-4a	3-phase, 60 Hz, 380 VY/220 - 230 VD.	1
19	309 44 30 (EX)	Stator 21-12-4a	3-phase, 60 Hz, 380 VD.	1

## Drive Unit

Pos. No	Part. No	Denomination		Qty/Version	
				160	190
19	309 44 32 (EX)	Stator 21-12-4a	3-phase, 50 Hz, 346 - 350 VY/200 - 208 VD. 3-phase, 60 Hz, 400 VY/230 - 240 VD.	1	1
19	309 44 34 (EX)	Stator 21-12-4a	3-phase, 50 Hz, 380 - 400 VY/220 - 230 VD. 3-phase, 60 Hz, 440 - 460 VY/260 VD.	1	1
19	309 44 38 (EX)	Stator 21-12-4a	3-phase, 50 Hz, 660 - 690 VY/380 - 400VD. 3-phase, 60 Hz, 440 - 460 VD.	1	1
19	309 44 40 (EX)	Stator 21-12-4a	3-phase, 50 Hz, 400 VD. 3-phase, 60 Hz, 400 VD.	1	1
19	309 44 44 (EX)	Stator 21-12-4a	3-phase, 50 Hz, 400 - 440 VD.	1	1
19	309 44 50 (EX)	Stator 21-12-4a	3-phase, 50 Hz, 500 VD. 3-phase, 60 Hz, 575 VD.	1	1
19	309 44 52 (EX)	Stator 21-12-4a	3-phase, 60 Hz, 575 - 600 VD.	1	1
19	309 49 01	Stator 21-11-2a	3- phase, 50Hz, 400VY.	1	1
19	309 49 02	Stator 21-11-2a	3- phase, 50Hz, 690VY/400VD.	1	1
19	309 49 12 (EX)	Stator 21-11-2a	3- phase, 60Hz, 400 - 460V YSER/220 - 230V Y//.	1	1
19	309 49 28 (EX)	Stator 21-11-2a	3- phase, 50Hz, 190 - 200VD. 3- phase, 60Hz, 200 - 220VD.	1	1
19	309 49 29 (EX)	Stator 21-11-2a	3- phase, 60Hz, 380V Y / 220 - 230V D.	1	1
19	309 49 30 (EX)	Stator 21-11-2a	3- phase, 60Hz, 380V D.	1	1
19	309 49 34 (EX)	Stator 21-11-2a	3- phase, 50Hz, 380VY/200VD. 3-phase, 60Hz, 440 - 460VY/260VD.	1	1
19	309 49 38 (EX)	Stator 21-11-2a	3- phase, 50Hz, 380VD/660VY. 3-phase, 60Hz, 440 - 460VD.	1	1
19	309 49 40 (EX)	Stator 21-11-2a	3- phase, 50Hz, 400V D. 3- phase, 60Hz, 400V D	1	1
19	309 49 44 (EX)	Stator 21-11-2a	3-phase, 50Hz, 415 - 440VD.	1	1
19	309 49 50 (EX)	Stator 21-11-2a	3- phase, 50Hz, 500V D. 3- phase, 60Hz, 575V D.	1	1
19	309 49 52 (EX)	Stator 21-11-2a	3- phase, 60Hz, 575 - 600VD.	1	1
19	426 63 01	Stator 21-10-4a	3-phase, 50 Hz, 690 VY/400 VD.	1	1
19	426 63 02	Stator 21-10-4a	3-phase, 50 Hz, 400 VY/230VD.	1	1
19	426 63 12 (EX)	Stator 21-10-4a	3-phase, 60 Hz, 440 - 460 VYSER/220 - 230 VY//	1	1
19	426 63 28 (EX)	Stator 21-10-4a	3-phase, 50 Hz, 190 - 200 VD. 3-phase, 60 Hz, 200 - 220 VD.	1	1
19	426 63 34 (EX)	Stator 21-10-4a	3-phase, 50 Hz, 380 VY/220 VD. 3-phase, 60 Hz, 440 - 460 VY/260 VD.	1	1
19	426 63 38 (EX)	Stator 21-10-4a	3-phase, 50 Hz, 660 VY/380 VD. 3-phase, 60 Hz, 440 - 460 VD.	1	1
19	426 63 40 (EX)	Stator 21-10-4a	3-phase, 50 Hz, 400 VD. 3-phase, 60 Hz, 400 VD.	1	
19	426 63 44 (EX)	Stator 21-10-4a	3-phase, 50 Hz, 400 - 440 VD. 3-phase, 60 Hz, 480 VD.	1	1

Pos. No	Part. No	Denomination		Qty/Version	
				160	190
19	426 63 50 (EX)	Stator 21-10-4a	3-phase, 50 Hz, 500 VD. 3-phase, 60 Hz, 575 VD.	1	1
19	426 63 52 (EX)	Stator 21-10-4a	3-phase, 60 Hz, 575 - 600 VD.	1	1
19	426 63 55 (EX)	Stator 21-10-4a	3-phase, 50 Hz, 550 VD.	1	1
22	83 45 59	Cable tie 200X2.4 PA 6/6 -55+105		1	1
23	94 17 23	Motor cable SCREEN3X2.5MM2 OD=13.5-15		*	
23	94 17 24	Motor cable SCREEN 6X2.5 MM2 OD=18-20		*	
23	94 19 90	Motor cable subcab S3X2,5+3X2,5/3+S(4X0.5)		*	*
23	94 20 42	Motor cable subcab 4G2.5 OD=12.5-13.5 MM		*	
23	94 20 43	Motor cable subcab 4G4 OD=16-17 MM		*	
23	94 20 59	Motor cable subcab 4G2.5+2X1.5 OD = 17-18 MM		*	*
23	94 20 60	Motor cable subcab 4G4+2X1.5 OD=20-22 MM		*	*
23	94 20 80	Motor cable subcab 7G4+2X1.5 MM2 OD=22-26 MM		*	*
23	94 20 82	Motor cable subcab 7G2.5+2X1.5 MM2 OD=20-23		*	*
23	94 21 02	Motor cable subcab 14AWG/7 OD=18-20 MM		*	
23	94 21 04	Motor cable subcab 12AWG/7 OD=20-22 MM		*	
23	94 21 06	Motor cable 10AWG/3-2-1-GC OD=20-22MM		*	*
23	94 21 08	Motor cable 8AWG/3-2-1-GC OD=27-29 MM		*	*
24.1	397 81 00 (EX)	Gland screw FOR CABLE ENTRY		1	
24.1	642 17 01 (EX)	Entrance flange		1	1
24.3	83 03 48	Hex.socket hd screw M12X40-A4-70		2	2
24.6	82 17 61	Cutting screw TAPTITE-M6X12		3	3
24.7	83 42 96	Cable lug 2.5-6 MM2;M6		2	2
24.7	83 43 36	Cable lug 6.1-10 MM2;M6		1	1
24.7	83 43 48	Cable lug	10 mm2; M6	2	
24.7	83 43 58	Cable lug INSUL.UL/CSA 1.04-2.6 MM2		2	1
24.8	83 44 23	Closed end splice 5.1-10.6;(AWG 18-8) L=38		2	2
24.8	83 44 24	Closed end splice 3-6(AWG 12-10) L=18		1	1
24.9	82 74 63	O-ring 49.5X3 NBR		1	1

## Drive Unit

Pos. No	Part. No	Denomination		Qty/Version	
				160	190
25	443 50 00	Entrance cover	20 mm - 32 mm	1	
25	443 50 03 (EX)	Entrance cover			1
25	443 51 00	Entrance cover	10 mm - 20 mm	1	
26	83 04 45	Hex.socket hd screw M8X35-A4-80		4	4
27	82 74 79	O-ring 129.5X3 NBR		1	1
27	82 80 98	O-ring 129.5X3 FPM		1	
28.1	83 53 21	Terminal clamp		6	6
28.2	83 53 30	Terminal clamp		6	6
28.3	83 53 22	End plate APPA - 11796		1	1
28.4	83 53 22	End plate APPA - 11796		1	1
28.6	83 53 31	End support 35X15		2	2
28.7	443 68 00	Rail 35X15		1	1
28.8	722 00 00	Marking plate		2	2
28.9	427 13 00	Marking tape 8129 HIGH TACK/---		1	1
28.9	471 77 01	Marking strip		2	2
30	734 59 00	El.lead through unit		1	1
31	439 44 01 (EX)	Screw M14X1.25			3
32	596 07 00	Square washer			3
33	82 17 64	Cutting screw TAPTITE-M6X20		7	7
34	82 50 60	Sealing washer DUBO NR 301		3	3
35	443 57 00	Sleeve	43.5 mm	1	
35	443 57 01	Sleeve	53.5mm	1	
35	443 57 02	Sleeve	63.5 mm	1	
36	504 78 06	Cable unit		1	
37	504 78 07	Cable unit		1	1
38	518 89 02	Leakage detect.unit (FLS)		1	1
39	505 12 00	Leakage detect.unit (CLS30)		1	
40	443 55 10	Bearing holder		1	
40	443 55 11 (EX)	Bearing holder EX.VERSION			1
40	443 55 12	Bearing holder STANDARD VERSION		1	
41	83 30 17	Ball bearing 35X80X34.9		1	1
42	82 78 15	O-ring 78X4 NBR		1	1
42	82 79 18	O-ring 78X4 FPM		1	
43	614 49 00	Bearing cover		1	1
44	593 70 03	Mechanical seal WCCR/WCCR-TYPE O		1	1
44	593 70 06	Mechanical seal WCCR/AL203		1	1
45	83 03 48	Hex.socket hd screw M12X40-A4-70		5	5
46	761 16 00	Oil housing bottom		1	1

Pos. No	Part. No	Denomination	Qty/Version	
			160	190
46	761 16 01	Oil housing bottom	1	
47	443 49 00	Sleeve	1	1
48	82 72 95	O-ring 19.2X3 FPM	2	
48	82 73 90	O-ring 19.2X3 NBR	2	2
49	428 22 17	Inspection screw	2	2
53	429 21 04	Mechanical seal RSIC/RSIC-TYPE I	1	1
53	549 07 01	Mechanical seal WCCR/WCCR-TYPE T	1	
53	593 70 03	Mechanical seal WCCR/WCCR-TYPE O	1	1
54	591 79 00	Insert ring	1	
57	82 74 98	O-ring 249.3X5.7 NBR	1	1
59	436 10 00	Ring	1	1
75	80 70 63	Parallel key SMS 2306-8H9X7H11X45	1	1
134	554 30 15	Starter START 351-400-B-532-14		1
134	554 30 16	Starter START 351-400-B-532-18		1
162	93 00 77	Shrink hose ID 6.4	*	*
166	663 85 00	Connection plate	7-lead cable end	1
166	667 14 00	Connection plate	6-lead screened	1
169	667 40 00	Sticker	2	2
215	82 40 61	Plain washer (10)-22 MM	1	
215	82 40 81	Plain washer (14)-20 MM		4
215	82 40 82	Plain washer (20)-32 MM	4	4
216	84 17 90	Seal sleeve (10)-12 MM	1	
216	84 17 91	Seal sleeve (12)-14 MM	1	
216	84 17 92	Seal sleeve (14)-16 MM	1	
216	84 17 93	Seal sleeve (16)-18 MM	1	
216	84 17 94	Seal sleeve (18)-20 MM	1	
216	84 18 00	Seal sleeve (14)-17 MM		2
216	84 18 01	Seal sleeve (17)-20 MM		2
216	84 18 02	Seal sleeve (20)-23 MM	2	2
216	84 18 03	Seal sleeve (23)-26 MM	2	2
216	84 18 04	Seal sleeve (26)-29 MM	2	2
216	84 18 05	Seal sleeve (29)-32 MM	2	2
217	678 58 12 (EX)	Cable clip (10)-12 MM	1	
217	678 58 14 (EX)	Cable clip (12)-14 MM	1	
217	678 58 16 (EX)	Cable clip (14)-16 MM	1	
217	678 58 18 (EX)	Cable clip (16)-18 MM	1	
217	678 58 20 (EX)	Cable clip (18)-20 MM	1	
218	597 98 02	Ring	1	1

## Drive Unit

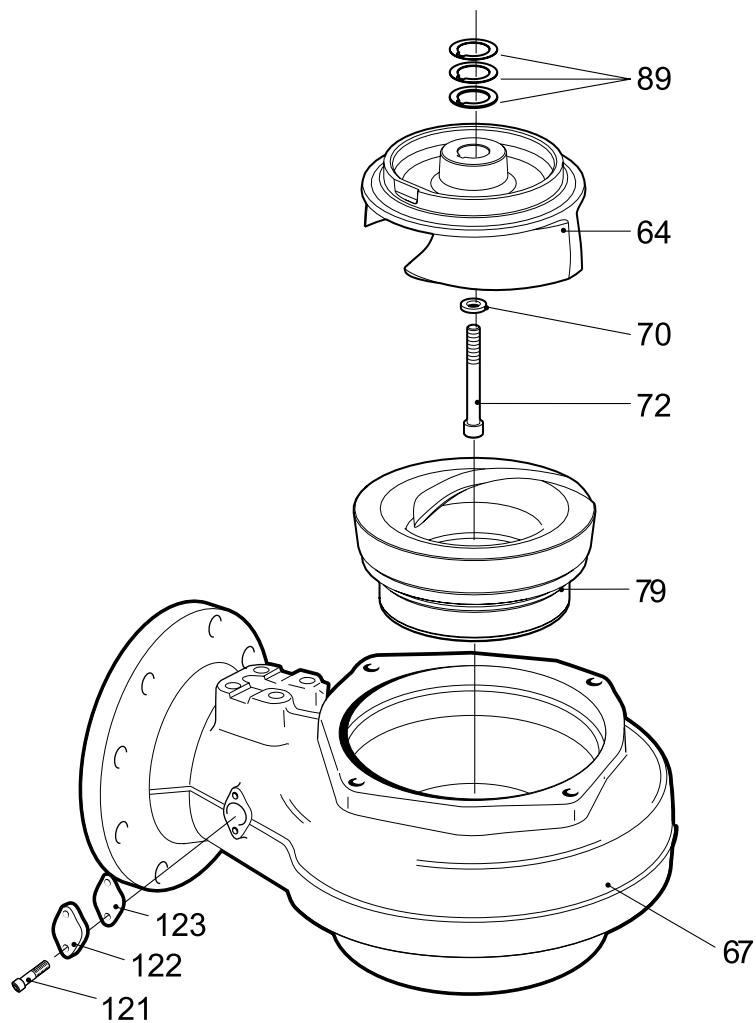
Pos. No	Part. No	Denomination	Qty/Version	
			160	190
912	82 72 95	O-ring 19.2X3 FPM	4	
912	82 73 90	O-ring 19.2X3 NBR	4	4
912	82 74 79	O-ring 129.5X3 NBR	1	1
912	82 80 98	O-ring 129.5X3 FPM	1	

# Hydraulic Unit

N\_LT

Curve: 420 – 422

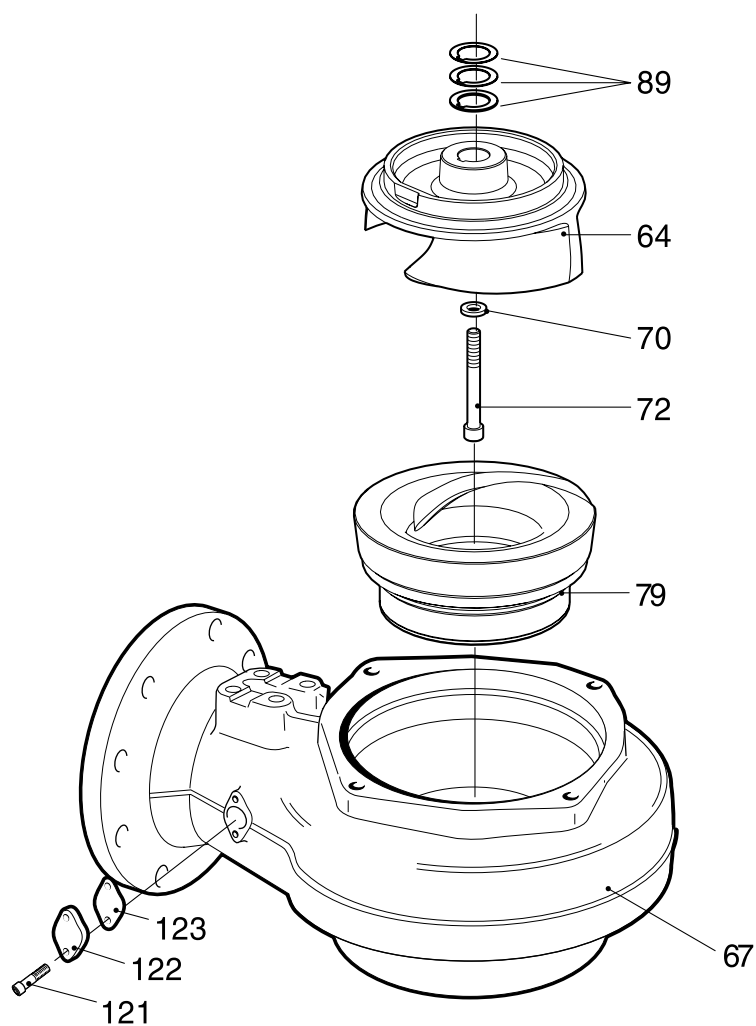
N\_3127 LT



30491

**N\_ MT**

Curve: 437 – 439

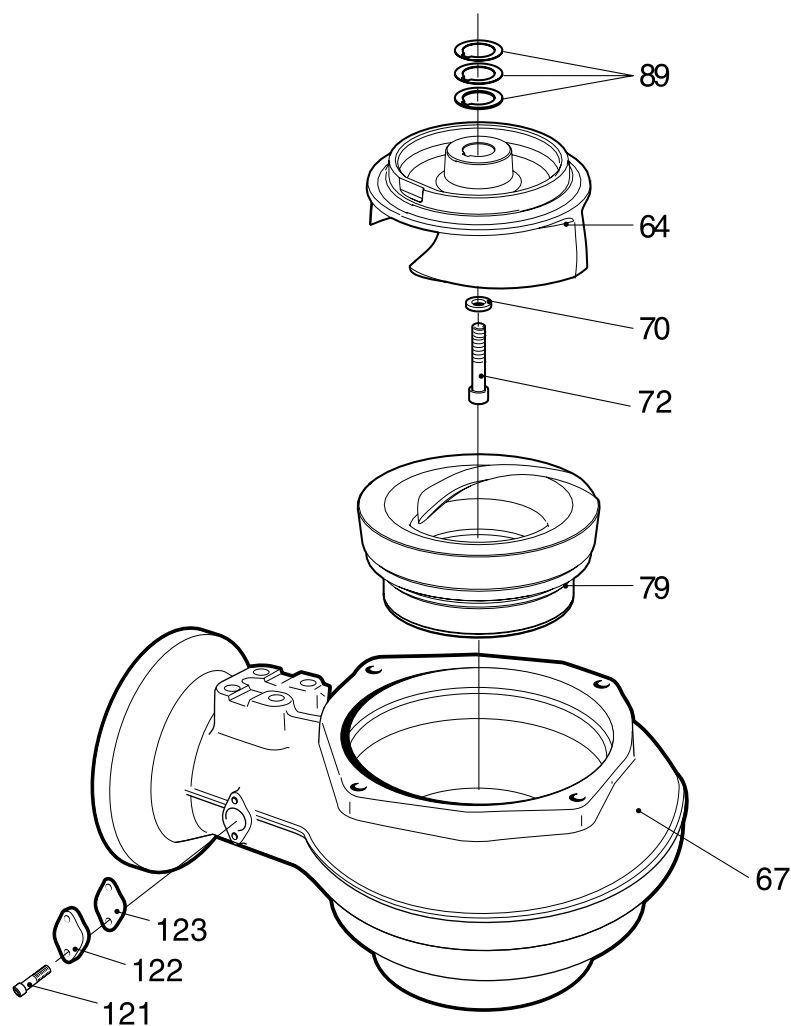
**N\_ 3127 MT**

30564

## N\_HT

Curve: 486 – 489

## N\_3127 HT

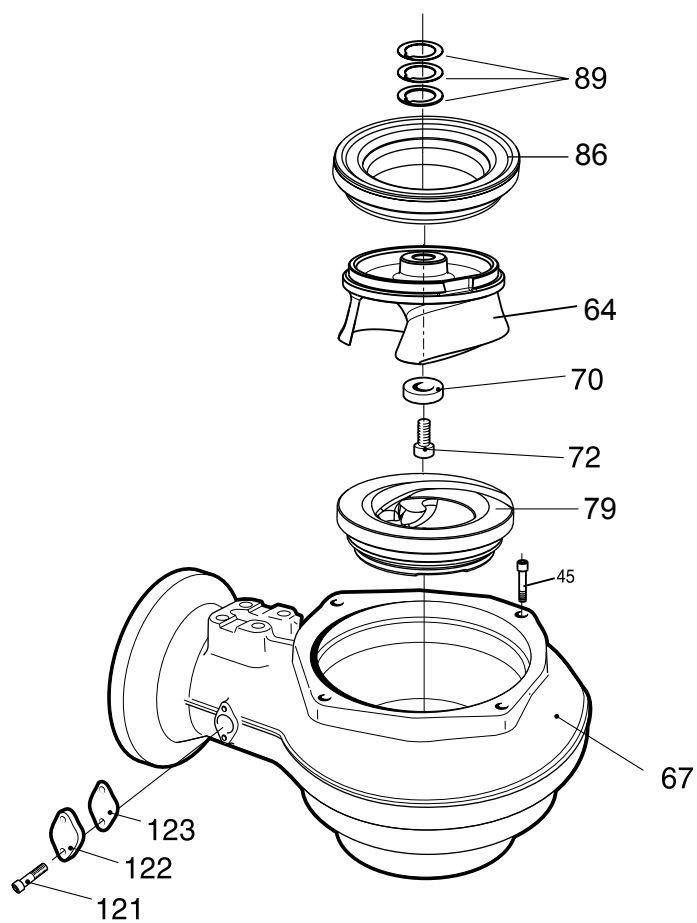


30931

## N\_SH

Curve: 245 – 249

### N\_3127 SH



31400

## List of parts

Pos. No	Part. No	Denomination	Qty/Version		
			160	190	
64	761 20 00	Impeller unit	"N-LT" Low head, curve 420, 50 Hz, 3-phase. "N-MT" Medium head, curve 437, 50 Hz, 3-phase.	1	1
64	761 20 18	Impeller unit	"N-LT" Low head, curve 421. 50/60 Hz, 3-phase. "N-MT" Medium head, curve 438, 50/60 Hz, 3-phase.	1	1
64	761 20 32	Impeller unit	"N-LT" Low head, curve 422, 50/60 Hz, 1-/3-phase. "N-MT" Medium head, curve 439, 50/60 Hz, 1-/3-phase.	1	1
64	766 51 00	Impeller unit	"N-SH" Super high head, curve 245, 50 Hz, 3-phase.	1	1
64	766 51 07	Impeller unit	"N-SH" Super high head, curve 246, 50 Hz, 3-phase.	1	1
64	766 51 16	Impeller unit	"N-SH" Super high head, curve 247, 50/60 Hz, 3-phase.	1	1
64	766 51 25	Impeller unit	"N-SH" Super high head, curve 248, 50/60 Hz, 3-phase.	1	1
64	766 51 34	Impeller unit	"N-SH" Super high head, curve 249, 50/60 Hz, 3-phase.	1	1
64	766 52 03	Impeller unit	"N-HT" High head, curve 486, 50 Hz, 3-phase.	1	1
64	766 52 23	Impeller unit	"N-HT" High head, curve 487, 50/60 Hz, 3-phase.	1	1
64	766 52 43	Impeller unit	"N-HT" High head, curve 488, 50/60 Hz, 3-phase.	1	1
64	766 52 63	Impeller unit	"N-HT" High head, curve 489, 50/60 Hz, 1-/3-phase.	1	1
64	766 53 03	Impeller unit	"N-LT" Low head, curve 420, 50 Hz, 3-phase.	1	1
64	766 53 23	Impeller unit	"N-LT" Low head, curve 421, 50/60 Hz, 3-phase.	1	1
64	766 53 41	Impeller unit	"N-LT" Low head, curve 422, 50/60 Hz, 1-/3-phase.	1	1
67	309 25 20	Pump housing	"MT" Medium head DN 150. For flush valve.	1	1
67	309 25 26	Pump housing	"MT" Medium head DN 150, drilled to EN 1092-2 tab.9 ; ANSI B16.1-89; tab.5. For flush valve.	1	1
67	309 26 30	Pump housing	Super high head "SH" DN 80. For flush valve.	1	1
67	309 26 61	Pump housing	Super high head "SH"/Hight head "HT" DN 80, drilled to EN 1092-2 tab.9. For flush valve.	1	1
67	309 27 22	Pump housing	"LT" Low head DN 150. For flush valve.	1	1

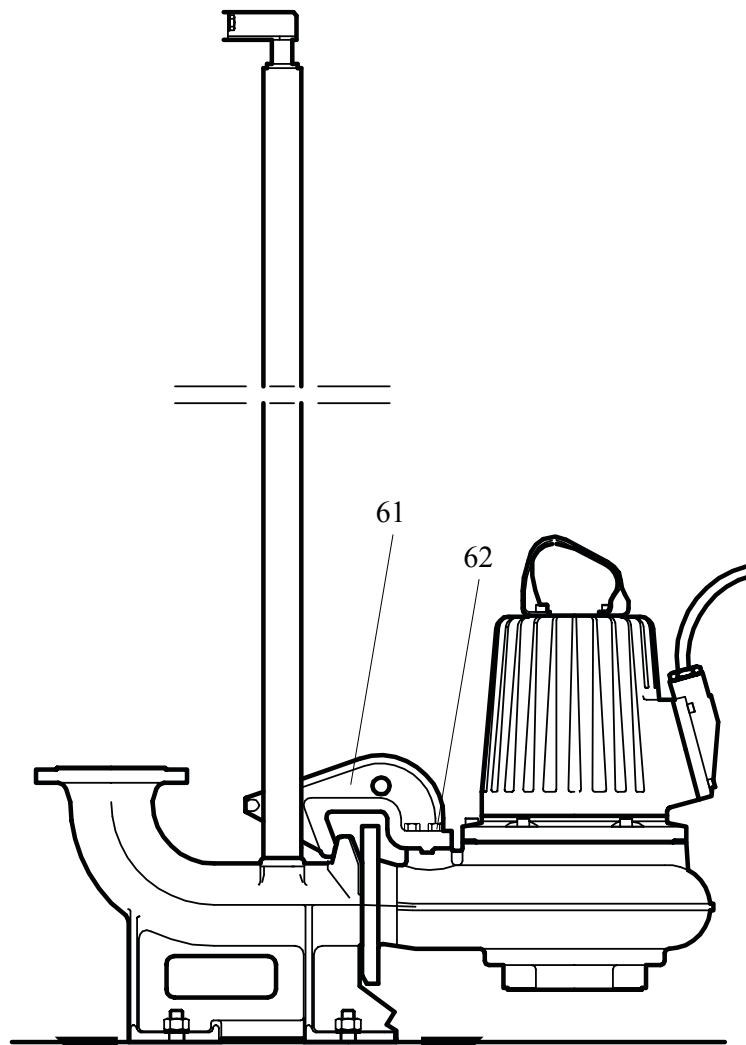
## Hydraulic Unit

Pos. No	Part. No	Denomination		Qty/Version	
				160	190
67	309 27 26	Pump housing	"LT" Low head DN 150, drilled to EN 1092-2 tab.9; ANSI B16.1-89; tab.5. For flush valve.	1	1
67	426 44 20	Pump housing	"MT" Medium head DN 100. For flush valve.	1	1
67	426 44 21	Pump housing	Medium head "MT" DN 100, drilled to ANSI B16.1-89; tab.5.	1	1
67	426 44 22	Pump housing	"MT" Medium head DN 100, drilled to EN 1092-2 tab.9. For flush valve.	1	1
67	465 14 05	Pump housing	High head "HT" DN 100, drilled to ANSI B16.1-89; tab.5.	1	1
67	465 14 22	Pump housing	High head "HT" DN 100. For flush valve.	1	1
67	465 14 24	Pump housing	High head "HT" DN 100, drilled to EN 1092-2 tab.9. For flush valve.	1	1
72	83 03 50	Hex.socket hd screw M12X50-A4-70		1	1
72	83 03 51	Hex.socket hd screw M12X55-A4-70		1	1
79	680 34 00	Insert ring	Curve 437 - 439	1	1
79	682 49 00	Insert ring	Curve 486 - 489	1	1
79	725 40 00	Insert ring	Curve 245 - 249	1	1
79	766 54 00	Insert ring	Curve 420 - 422	1	1
86	769 79 00	Insert ring		1	1
87	80 97 40	Stud 12X35-A4-70		2	2
89	298 62 00	Washer 0.3 MM		3	3
89	298 62 01	Washer 1.5 MM		1	1
89	298 62 02	Washer	0.5 mm	2	2
121	83 03 23	Hex.socket hd screw M10X25-A4-70		2	2
122	433 56 00	Cover		1	1
123	647 99 00	Gasket	Rubber-bonded aramid fibre	1	1
123	647 99 01	Gasket	FPM	1	1

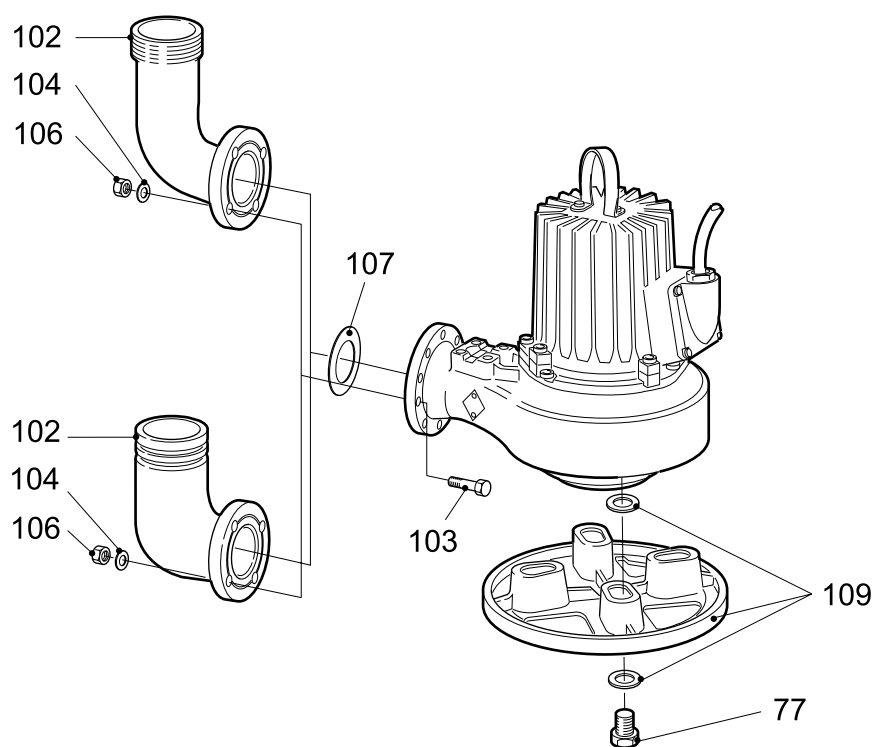
# Installation Components

NP

CP, FP, NP 3127



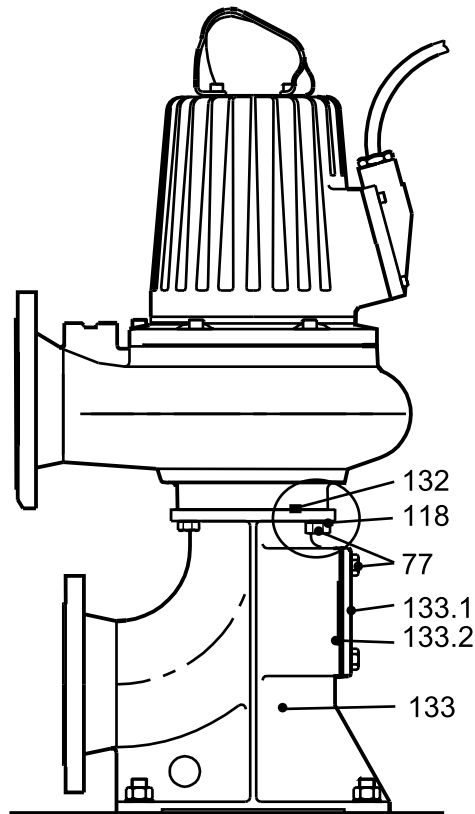
30741

**NS****CS, FS, NS 3127**

30253

NT

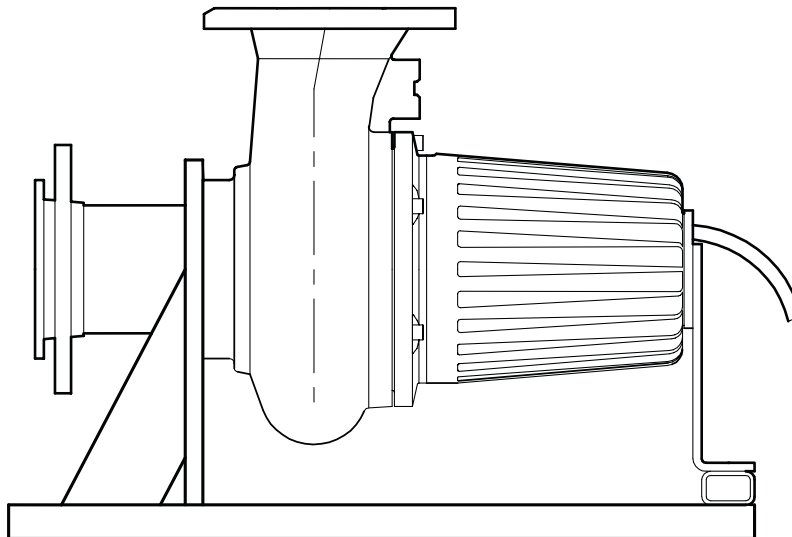
CT, FT, NT 3127



30742

NZ

CZ, FZ, NZ 3127



30570

## List of parts

Pos. No	Part. No	Denomination	Qty/Version		
			160	190	
61	380 91 00	Sliding bracket	1	1	
62	81 49 32	Hexagon head screw M16X45-A4-70	4	4	
62	83 04 53	Hex.socket hd screw M12X45-A4-80	4	4	
77	81 41 81	Hexagon head screw M16X40-A4-70	4	4	
77	81 49 12	Hexagon head screw M12X35-A4-70	4	4	
96	404 91 00	Discharge con.stat.	1		
97	84 34 38	Hexagon head screw M20X120-A2-70	4	4	
98	82 35 26	Plain washer 20-A2-A-170	4	4	
99	82 23 62	Hexagon nut M20-A2-70	4	4	
102	259 82 04	Discharge connection	"MT" Medium head DN 100	1	1
102	259 84 05	Discharge connection	"MT" Medium head DN 100. Thread: 4 - 8 NPSM outer.	1	1
102	259 84 06	Discharge connection	"MT" Medium head DN 100. Thread: ISO G4A outer.	1	1
102	295 57 00	Discharge connection	"LT-MT" Low/Medium head DN 150.	1	1
102	309 31 00	Discharge connection	"LT-MT" Low/Medium head DN 150. Thread: 6 - 8 NPSM outer.	1	1
102	309 31 01	Discharge connection	"MT" Medium head DN 150. Thread: ISO G6A outer.	1	
102	309 80 00	Discharge connection 8"	Low head "LT" DN 200	1	1
102	310 03 01	Discharge connection	High head "HT" DN 75	1	1
102	340 88 00	Discharge connection	High head "HT" DN 100	1	1
102	340 89 00	Discharge connection	High head "HT" DN 100, Thread : 4-8 NPSM Outer	1	1
102	340 89 01	Discharge connection	High head "HT" DN 100, Thread : ISO G4A Outer	1	1
102	385 52 03	Discharge connection 3-8 NPSM	High head "HT" DN 75. Thread: 3 - 8 NPSM Outer	1	1
102	385 52 04	Discharge connection ISO G3	High/Super High head "HT-SH" DN 75, Thread : ISO G3 Outer. Quick Coupling.	1	1
103	81 49 35	Hexagon head screw M16X60-A4-70	4	4	
103	81 49 36	Hexagon head screw M16X65-A4-70	4	4	
103	81 49 60	Hexagon head screw M20X70-A4-70	8	8	
103	84 34 32	Hexagon head screw M20X70-A2-70	8		
104	82 35 78	Plain washer 16-A4-A-170	4	4	
106	82 23 35	Hexagon nut M12-A4-70	2	2	
106	82 23 37	Hexagon nut M16-A4-70	4	4	
106	82 23 38	Hexagon nut M20-A4-70	8	8	
107	259 83 00	Gasket 4"	1	1	

## Installation Components

Pos. No	Part. No	Denomination	Qty/Version	
			160	190
107	295 64 00	Gasket 6"	1	1
107	310 05 00	Gasket	Outer dia = 144 mm, inner dia = 95 mm	1
107	339 87 00	Gasket	4", HD	1
109	436 94 00	Stand unit	1	1
109	436 94 01	Stand unit	1	1
111	83 18 28	Coupling part 6"	1	
111	83 18 46	Coupling part DN 75 G3" INNER STORZ	1	1
111	83 19 34	Coupling part DN 110 G4" INNER STORZ	1	
111	83 19 36	Coupling part DN 150 G6" INNER STORZ	1	
116	416 13 01	Plate	1	1
118	82 35 77	Plain washer A4-A170	4	4
118	82 35 78	Plain washer 16-A4-A-170	4	4
125	396 70 00	Puller screw compl. M16X265 10.9	1	1
125	438 58 00	Hexagon head screw M16X218 10.9	1	1
132	82 74 17	O-ring 124.3X5.7-NBR	1	1
132	82 74 86	O-ring 164.3X5.7 NBR	1	1
132	82 74 88	O-ring 174.3X5.7 NBR	1	1
133	303 72 00	Suction connection STATIONARY	1	1
133	303 72 01	Suction connection STATIONARY	1	1
133	303 72 05	Suction connection	1	1
133	303 85 00	Suction connection STATIONARY	"MT" Medium head DN 150.	1
133	303 85 06	Suction connection STATIONARY	"MT" Medium head DN 150, drilled to EN 1092-2 tab.9; ANSI B16.1-89; tab.5.	1
133	309 46 00	Suction connection	Low head "LT" DN 200, undrilled	1
133	309 46 06	Suction connection	Low head "LT" DN 200, drilled to EN 1092-2 tab. 8 and ANSI B16.1; tab.5	1
133	309 46 07	Suction connection	Low head "LT" DN 200, drilled to EN 1092-2 tab.9	1
133.1	81 49 06	Hexagon head screw M12X30-A4-70	4	4
133.1	303 87 00	Cleaning door	Intended for MT	1
133.1	309 48 00	Cleaning door	Intended for LT	1
133.2	303 76 00	Cleaning door	Intended for HT	1
133.2	303 88 00	Gasket	1	1
133.3	81 41 81	Hexagon head screw M16X40-A4-70	4	4
133.3	303 77 00	Gasket	1	1
134	554 30 15	Starter START 351-400-B-532-14	1	

# Service Parts

## List of parts

Pos. No	Part. No	Denomination	Qty/Version	
			160	190
800	80 32 33	O-ring kits 3127.090,170,180,890	1	1
800	80 32 74	O-ring kits 3127.090/180F,D,SUP.HT	1	1
900	601 89 09	Basic repair kit 3127.090,180	1	1
900	601 89 10	Basic repair kit 3127.090,180	1	1
900	693 19 00	Basic repair kit	1	1
900	693 19 01	Basic repair kit	1	1
900	693 19 02	Basic repair kit	1	
900	693 19 03	Basic repair kit	1	
900.1	80 32 33	O-ring kits 3127.090,170,180,890	1	1
900.1	80 32 74	O-ring kits 3127.090/180F,D,SUP.HT	1	1
900.2	83 32 36	Ball bearing 6207,35X72X17	1	1
900.3	83 30 17	Ball bearing 35X80X34.9	1	1
900.4	429 21 04	Mechanical seal RSIC/RSIC-TYPE I	1	
900.4	593 70 03	Mechanical seal WCCR/WCCR-TYPE O	1	1
900.5	593 70 03	Mechanical seal WCCR/WCCR-TYPE O	1	1
900.5	593 70 06	Mechanical seal WCCR/AL203	1	1
900.6	593 70 03	Mechanical seal WCCR/WCCR-TYPE O	1	1
901	90 17 52	Oil	2	2
904	436 97 00	Mounting tool	1	1





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- 2) A leading global water technology company

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

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# Section 6 – 3127 Submersible Pump Test Reports



# TEST REPORT

## PRODUCT

Serial No.	1346155	Performance curve No.	Motor module/type	Voltage (V)
3127.160		53-437-00-3704	140	415
Base module	Impeller No.		Imp diam/Blade angle	Water temp °C
004	761 20 00			20

## TEST RESULTS

Pump total head H (m)	Volume rate of flow Q (l/s)	Motor input power P (kW)	Voltage U (V)	Current I (A)	Overall efficiency $\eta$ (%)
16.21	7.33	3.91	411	7.6	
12.13	27.26	5.12	410	9.2	
8.05	49.20	6.36	410	11.0	

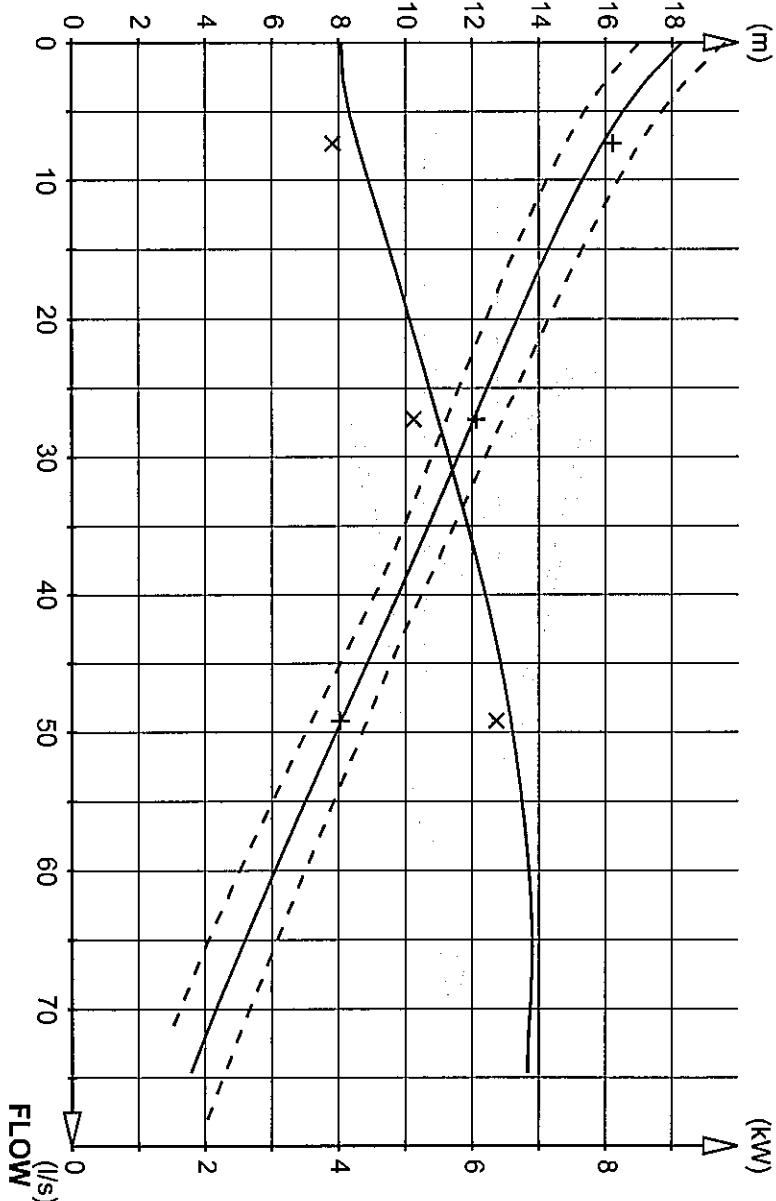
Accepted after	Test facility	Test date	Time	Chief tester
ISO Grade 3B	CH1	13-07-06	17:13	09

## PLOTTED TEST RESULTS

Measured point : + = Q/H      Duty point :  $\diamond$  = Q/H  
X = Q/P       $\square$  = Q/P      Calculated point :  $\Delta$  = Q/ETA overall  
 $\Delta$  = Q/ETA overall      1

### TOTAL HEAD

### INPUT POWER





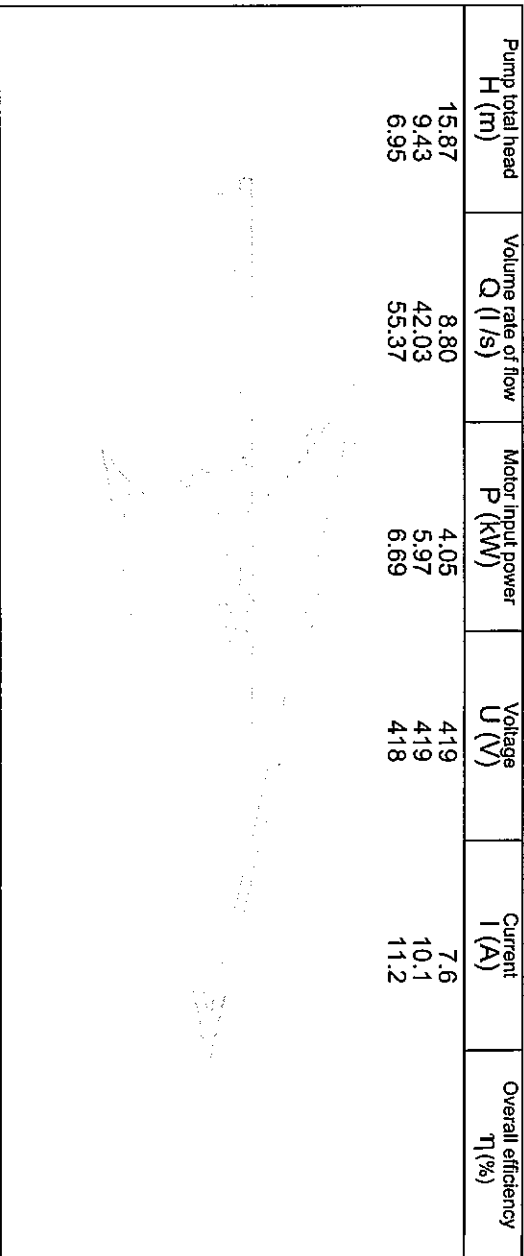
# TEST REPORT

## PRODUCT

Serial No.	1346105	Performance curve No.	53-437-00-3704	Motor module/type	140	Voltage (V)	415
3127.160							
Base module	Impeller No.				Imp.diam/Blade angle		Water temp °C
004	761 20 00						20

## TEST RESULTS

Pump total head H (m)	Volume rate of flow Q (l/s)	Motor input power P (kW)	Voltage U (V)	Current I (A)	Overall efficiency $\eta$ (%)
15.87	8.80	4.05	419	7.6	
9.43	42.03	5.97	419	10.1	
6.95	55.37	6.69	418	11.2	



Accepted after	Test facility	Test date	Time	Chief tester
ISO Grade 3B	CH1	13-07-03	09:33	07

## PLOTTED TEST RESULTS

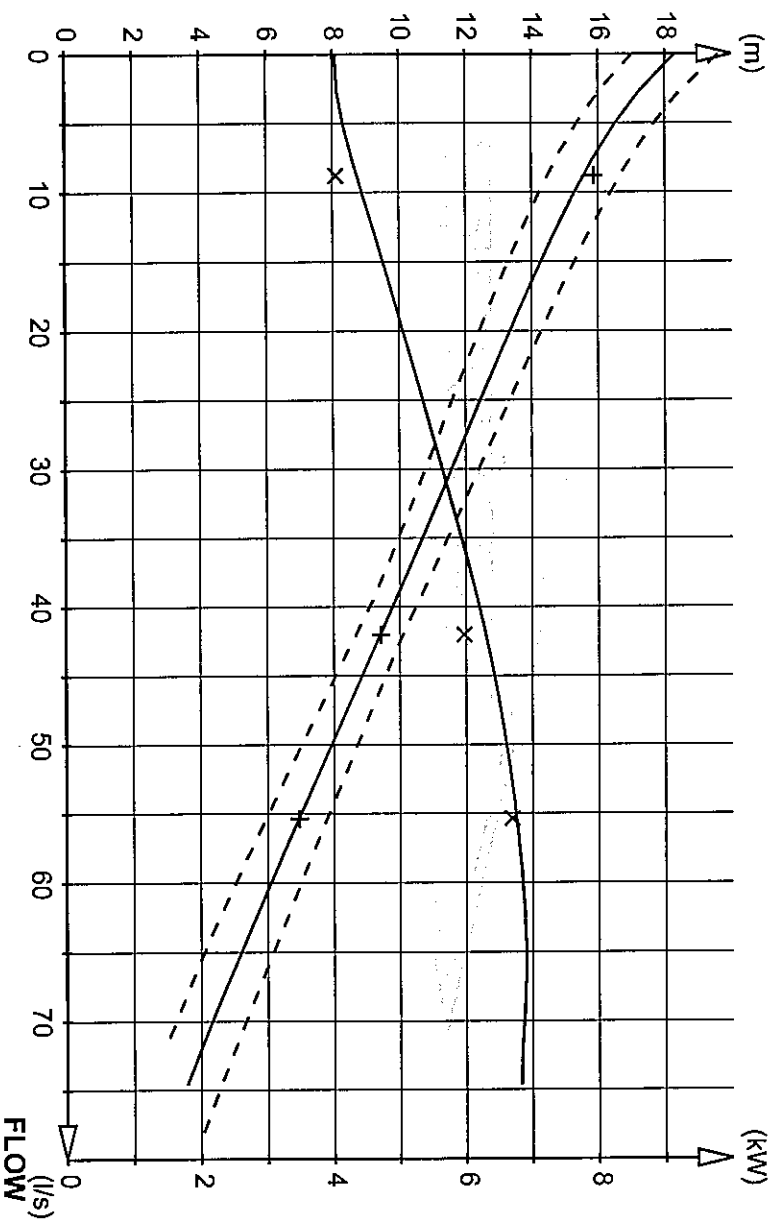
Measured point :  $\pm$  = Q/H  
 $\times$  = Q/P

Duty point :  $\diamond$  = Q/H  
 $\square$  = Q/P  
 $\Delta$  = Q/ETA overall


Calculated point :  $\wedge$  = Q/ETA overall  
1

## TOTAL HEAD

## INPUT POWER



Stirloch Constructions Luggage Pt Wash Water Pump Station Pump ITP.xls

		<b>INSPECTION AND TEST PLAN :</b>		<b>Type of product:</b>		Order No. (Xylem)	6043173
				Pump <input checked="" type="checkbox"/>	Mixer <input type="checkbox"/>	ITP No.	1
						Rev. No.	1
<b>CLIENT</b>							
<b>PROJECT</b>							
Stirloch Constructions							
Luggage Pt Wash Water Pump Station							
<b>PRODUCT Number(s)</b>							
Flygt NP3127.160 MT437 5.9kW Pumps							
<b>TAG Number(s)</b>							
S/Nos. 1346105, 1346155							
<b>Order No, Xylem Water Solutions</b>							
6043173							
5							
4							
3							
2							
1							
Client has requested an ITP							
REVISION DETAILS							
Mark Pearce							
Prepared and approved by (Vendor)							
Accepted by (Client)							
<b>Explanation</b>							
Self inspection/Test by performer of work (Checking specific process data/documentation to determine conformity or personal monitoring of process step without gaining of certificates).							
Provides the customer, service provider or authority the opportunity to review a certain process.							
Provides the customer, service provider or authority the opportunity to monitoring a certain process step .							
Provides the customer, service provider or authority the opportunity to witness test and gain certificate.							
Work may not proceed without customer authorisation. Other fabrication activities, not related to the Hold Point, may proceed.							
Set of test reports and/or certificates agreed upon in the order.							
Only the passed product is allowed to continue in the process.							
Internal instructions.							

ITP Cover page

**INSPECTION AND TEST PLAN:**

Product nr: 31271600131							Order No. (Xylem).	6043173
Flygt NP3127.160 MT437 5.9kW Pumps							ITP No. 1	
							Rev. No. 1	
Item	Activity Description	Procedure / Spec / Drawing	Performed by	Acceptance Criteria	Vendor Internal	Client/Inspector R/S/W/H	Place of production and testing.	Comments
<b>1</b>	<b>PURCHASED OF GOODS</b>							
1.1	Vendor assesment	Purchasing Handbook	Purchaser	Xylem Rating system	P	N/A	SWE - Emmaboda	
1.2	Vendor evaluation	Purchasing Handbook	Purchaser	Xylem Rating system	P	N/A	SWE - Emmaboda	
1.2	Incoming inspection	Drawing operator Instruction	Operator	As per drawing, Pass/Fail	P	P	SWE - Emmaboda	
<b>2</b>	<b>FOUNDRY</b>							
2.1	Material analysis	Control Document	Operator	Pass/Fail	P	P	SWE-Emmaboda/ External Vendors	
2.2	Dimensional check	Drawing operator Instruction	Operator	As per documentation, Pass/Fail	P	P	SWE - Emmaboda	
<b>3</b>	<b>ELECTRIC WINDING SHOP</b>							
3.1	Winding resistance test	Internal control document	Operator	Pass/Fail	P	P	SWE - Emmaboda	
3.2	Insulation test	CD03373	Operator	Pass/Fail	P	P	SWE - Emmaboda	
3.3	Surge test	CD03373	Operator	Pass/Fail	P	P	SWE - Emmaboda	
<b>4</b>	<b>MACHINING</b>							
4.1	Dimensional and visual check	Operational directive	Operator	As per drawing, Pass/Fail	P	P	SWE - Emmaboda	
4.2	Dimensional and visual check of Ex-parts	Operational directive	Operator	As per drawing, Pass/Fail	P	N/A	SWE - Emmaboda	Only for EX-products.
4.3	Balancing of motor shaft and impeller	Operational directive	Operator	ISO 1940 G 6.3. Pass/Fail	P	P	SWE - Emmaboda	
4.4	Tightness test	Xylem Standard A3284.00	Operator	49 mm³/s at 0.07 MPa	P	P	SWE - Emmaboda	
<b>5</b>	<b>ASSEMBLY</b>							
5.1	Assembly check	As per assemblycard	Operator	CD03303 1. Pass/Fail	P	P	SWE - Emmaboda	
5.2	Tightness test	Test instrument	Operator	CD03303 2. Pass/Fail	P	P	SWE - Emmaboda	
5.3	Oil and/or glyckol filled	CD03303 3	Operator	CD03303 3. Pass/Fail	P	P	SWE - Emmaboda	
5.4	High voltage withstand (dielectric test)	IEC 60034-1	Operator	CD03303 4. Pass/Fail	P	P	SWE - Emmaboda	
5.5	Earth continuity test	EN 50106	Operator	CD03303 4. Pass/Fail	P	P	SWE - Emmaboda	
5.6	Surface treatment	Visual check	Operator	CD03303 5. Pass/Fail	P	P	SWE - Emmaboda	
5.7	Performance test	CD03303 6/ ISO 9906	Operator	Pass/Fail ISO 9906 Grade 2	P	P	SWE - Emmaboda	
<b>6</b>	<b>PACKING</b>							
6.1	Visual inspection of finish.	Visual check	Operator	CD03303 7.	P	P	SWE - Emmaboda	
6.2	Control of accessories, tools and documentation.Control of numbers.	Visual check	Operator	CD03303 7.	P	P	SWE - Emmaboda	
6.3	Control of packing according to packing instructions.	Visual check	Operator	CD03303 7.	P	P	SWE - Emmaboda	
6.4	Release of product .	(ref ISO 9001:2000, 8.2.4)	Operator	CD03303 7.	P	P	SWE - Emmaboda	

**INSPECTION AND TEST PLAN:**

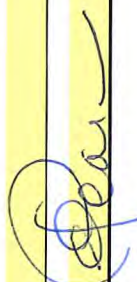
INSPECTION AND TEST PLAN:				Product nr: 31271600131				Order No. (Xylem): 6043173
				Flygt NP3127.160 MT437 5.9kW Pumps				ITP No. 1
								Rev. No. 1
Item	Activity Description	Procedure / Spec / Drawing	Performed by	Acceptance Criteria	Vendor Internal	Client/ Inspector R/S/W/H	Place of production and testing.	Comments
7	OPTIONAL TEST/CERTIFICATES							
7.1	Performance test with certificate	CD03303 6/ ISO 9906	Operator	Pass/Fail ISO 9906 Grade 2	H	P	Sydney Australia	
7.2	Hydrostatic test	EN 12162	Operator	1.5 x Max working pressure	If in order spec.	N/A	SWE - Emmaboda	
7.3	Insulation test	Control Document	Operator	10 MΩ or higher	If in order spec.	N/A	SWE - Emmaboda	
7.4	No load test	Control Document	Operator	Pass/Fail	If in order spec.	N/A	SWE - Emmaboda	
7.5	Noise test	ISO 9614-2	Operator	Record	If in order spec.	N/A	SWE - Emmaboda	
7.6	Vibration test	ISO 9908 Class 3	Operator	Pass/Fail Limit 7,1 mm/s	If in order spec.	N/A	SWE - Emmaboda	
7.7	High voltage withstand (dielectric test) (repeated)	IEC 60034-1	Operator	IEC 60034-1(no short-circuit) Pass/Fail	If in order spec.	N/A	SWE - Emmaboda	
7.8	Test and measurement on piece parts	Control Document	Operator	As per drawing	If in order spec.	N/A	SWE - Emmaboda	
7.9	Material certificates and tests	EN 10204-2.1/-2.2/-3.1	Purchaser/ Foundry		If in order spec.	N/A	SWE - Emmaboda	
7.10	Paint certificate	Surface treatment thickness	Operator	Mean value 150µm	If in order spec.	N/A	SWE - Emmaboda	
8	RELEASE							
8.1	Final inspection (Witness)	Witness test	Client/ Inspector		If in order spec.	N/A	SWE - Emmaboda	
8.2	Manufacturing Record Book (MRB) review	Certificate XXXX Test report XXXX	Client/ Inspector		P	N/A	SWE - Emmaboda	
8.3	Inspection release	Approving all points above. Release of product.	Client/ Inspector		P	P	SWE - Emmaboda	

Approved and released by (Client/Inspector):

Name:

Mark Pearce

Signature:



# Section 7 – Multitrode Level Sensor IOM

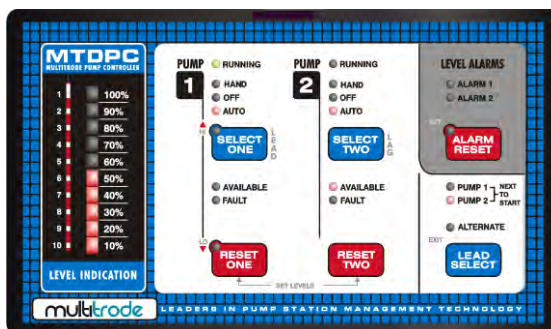


# MTDPC

(also known as MTPC)

## INSTALLATION AND OPERATION MANUAL

### MultiTrobe Dual Pump Controller



This Manual is the support documentation for the installation, commissioning and operation of the MultiTrobe MTDPC.

*Document R4*

(Last updated 7 August 2013)

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## WARNINGS AND CAUTIONS

### IMPORTANT



TO REDUCE THE RISK OF ELECTRIC SHOCK, LEAVE ALL SERVICING TO QUALIFIED AND AUTHORISED TECHNICAL STAFF. THERE ARE NO USER SERVICEABLE PARTS INSIDE.

### Information to User

Please read through the manual so you will know how to operate and obtain maximum performance from your product. After you have finished reading the manual, put it away in a safe place for future reference.



#### WARNING:

Do not use this unit in environments that may contain flammable/explosive or chemically aggressive gases or powders.

### Terms Used in this Manual



This symbol is intended to alert the user to the presence of uninsulated “dangerous voltages” within the product’s enclosure.

#### WARNING

THIS SYMBOL IS USED WHERE NON-COMPLIANCE COULD RESULT IN INJURY OR DEATH.

#### CAUTION

This symbol is used where non-compliance could result in incorrect operation, damage to, or failure of, the equipment.



This symbol is used to highlight an issue or special case within the body of the manual.

#### WARNING

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.

#### WARNING

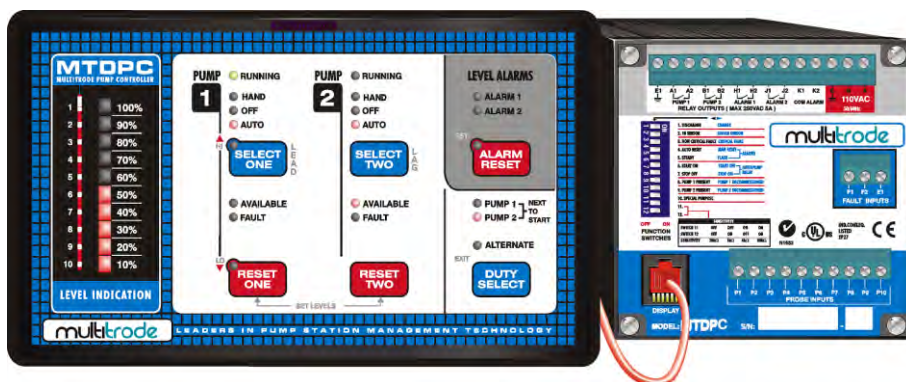
FOR OPERATION IN AN ATMOSPHERE OF EXPLOSIVE GASES CONTACT MULTITRODE FOR INFORMATION ON INTRINSICALLY SAFE BARRIERS.

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## Introduction – MultiTrobe MTDPC Pump Controller



The MTDPC is a cost effective self-contained dual pump controller, designed for simplicity in both installation and operation. Through soft-touch selector buttons and high intensity Light Emitting Diodes (LEDs), the operator is provided with clear, precise indications of liquid level and pump status.

When installed with a MultiTrobe probe, the MTDPC offers a variety of high-performance features:

- ☐ Two pump, two alarm controller
- ☐ Level indication
- ☐ Charge or discharge operation
- ☐ Pump mode selection
- ☐ Alarm mode selection
- ☐ Delayed or instantaneous pump operation
- ☐ Duty pump selection or alternation
- ☐ Next pump to start indication
- ☐ Hi or Lo level alarm activation
- ☐ Auto or Manual level alarm reset
- ☐ Flashing alarm and fault indicators
- ☐ Sensitivities for a wide range of liquids
- ☐ Fault inputs critical/non-critical
- ☐ Perfect for intrinsically safe application when used with MTISB (USA only)

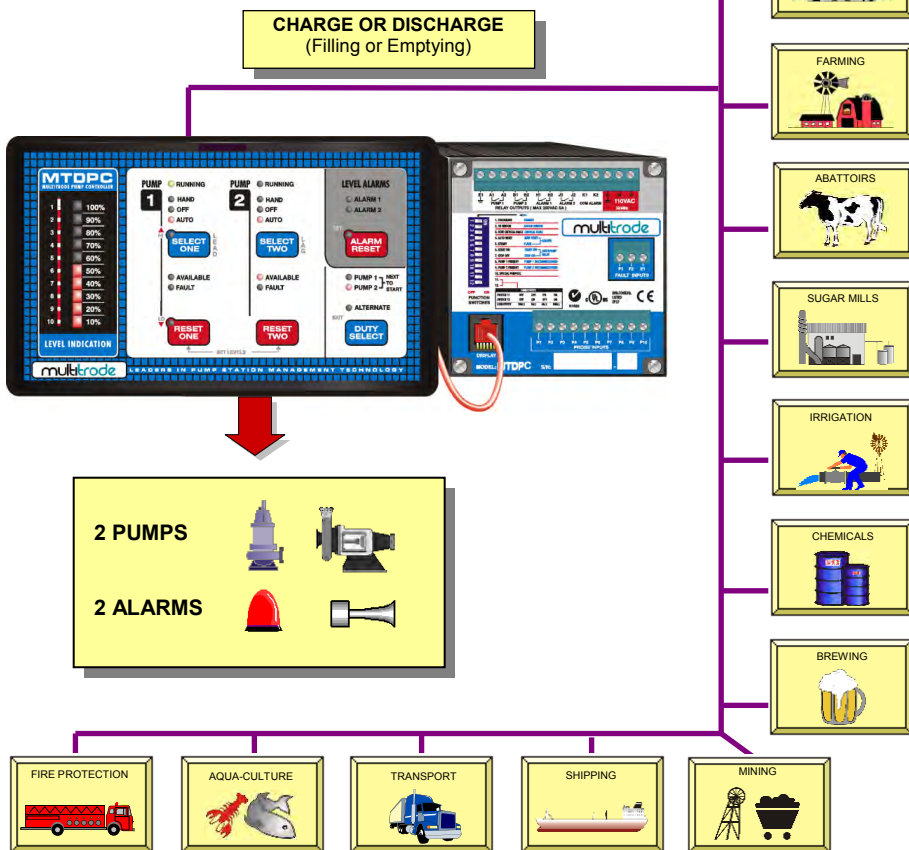
The unit has DIN rail mounting, plug-in terminals and a detached keypad, enabling simple installation, especially where available space is limited.

We are sure you will be fully satisfied with our product.

# 1 Typical Applications

**The MultiTrobe Pump Controller is suitable for a multitude of applications**

- ❑ The ideal solution for reservoirs, water towers and lift stations.
- ❑ Enables water tanks, sullage pits and storm water control to be fully integrated into building management.
- ❑ MultiTrobe conductive probes are resistant to a wide range of aggressive liquids.
- ❑ Perfect for a wide range of liquids and thick slurries encountered in many applications.
- ❑ Water, ballast and sullage can be reliably controlled by the MultiTrobe Pump Controller.



## 2 Installation

### 2.1 Installation Instructions for the MTDPC




---

**WARNING:**

Do not use this unit in environments that may contain flammable/explosive or chemically aggressive gases or powders.

---

The following describes the mounting of the MTDPC.

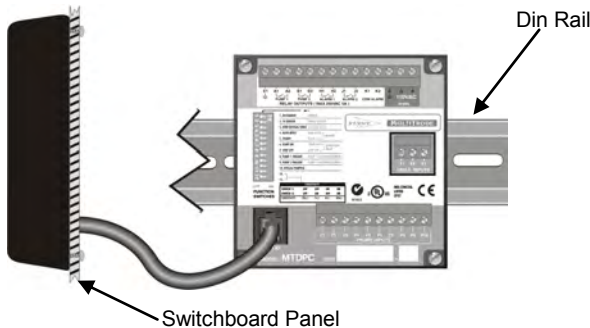
The pump controller housing is mounted on an industry standard (Asymmetric 35 x 7.5mm) DIN Rail. The keypad unit is mounted separately (typically on the switchboard's inner door - escutcheon). The keypad cable is then plugged into the display socket on the controller. This simplifies wiring by eliminating large looms to the door. The following figures illustrate installation suggestions.



To minimise interference it is important that the cable to the MTDPC keypad is not routed with mains cabling.

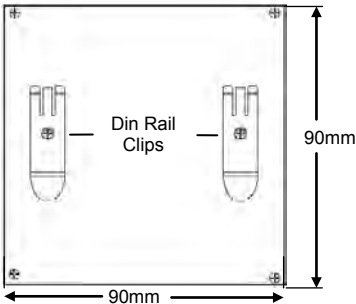
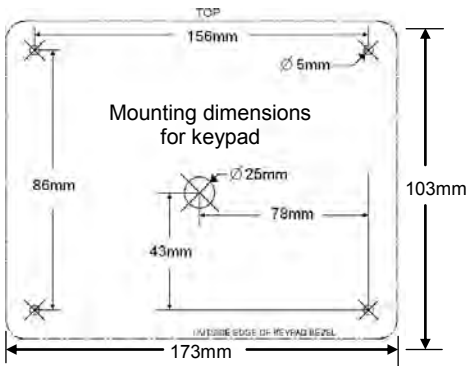
CAUTION

Cables greater than 3 meters in length do not comply with EMC requirements. Any standard RJ45 cable can be used. However, it is recommended the cable supplied be used where possible.



WARNING

For operation in an atmosphere of explosive gases, contact MultiTrove on Intrinsically Safe Barriers (USA only).



## 2.2 Wiring Instructions for the MTDPC

### General precautions



#### Electrical Hazard:

- A certified electrician must supervise all electrical work. Comply with all local codes and regulations.
- Before starting work on the unit, make sure that the unit is isolated from the power supply and cannot be energized.
- Make sure that all unused conductors are insulated.
- 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.



#### WARNING:

Do not use this unit in environments that may contain flammable/explosive or chemically aggressive gases or powders.

### Requirements

These general requirements apply for electrical installation:

- The mains voltage and frequency must agree with the specifications for the product.
- Circuit breakers must be installed between the main voltage line and this unit.
- All fuses and circuit breakers must have the proper rating, and comply with local regulations.
- The cables must be in accordance with the local rules and regulations.

## 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 minimum bending radius must not be below the accepted value.

## Earthing (Grounding)

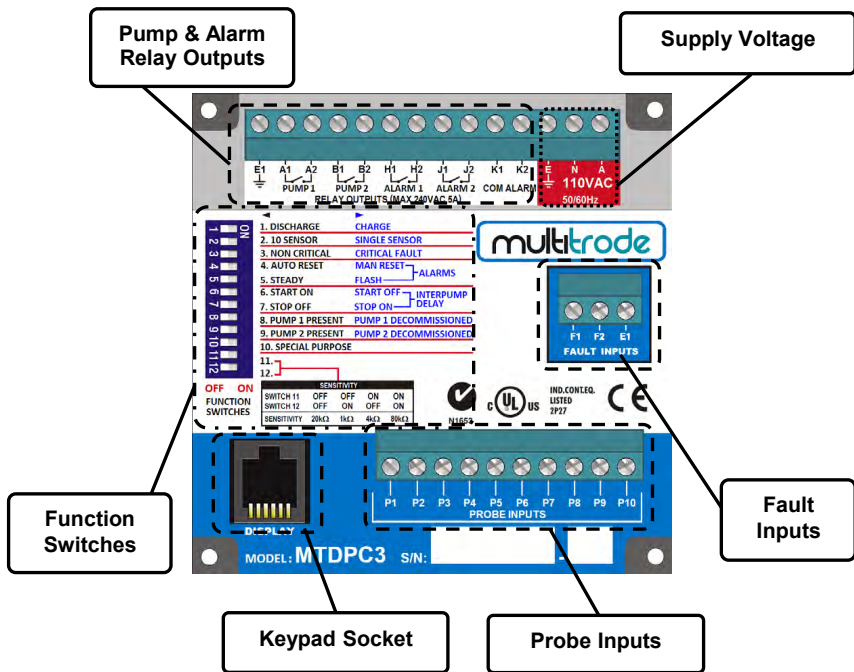



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### Electrical Hazard:

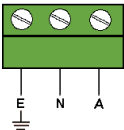
- You must earth (ground) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the earth (ground) lead to verify that it is connected correctly.
  - If the power cable is jerked loose by mistake, the earth (ground) conductor should be the last conductor to come loose from its terminal. Make sure that the earth (ground) conductor is longer than the phase conductors. This applies to both ends of the power cable.
-

The following section provides a detailed description of how to wire the MTDPC.



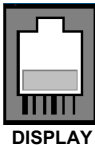
### 2.2.1 Supply Voltage

The MTDPC is mains powered by either 240VAC (50/60Hz) or 110VAC (50/60Hz) as indicated.



### 2.2.2 Keypad

A cable is supplied to connect the controller to the keypad.



CAUTION

Cables greater than 3 meters in length do not comply with EMC requirements. Any standard RJ45 cable can be used. However, it is recommended the cable supplied be used where possible.

## 2.2.3 Level Devices

There are many types of level sensing devices compatible with the MTDPC. The most common types are listed below.

When using 10-sensor probe devices ensure that 'Function Switch 2' is set to OFF. For **ALL** single sensor devices ensure 'Function Switch 2' is set to ON.

### 2.2.3.1 10 Sensor Probe

When using 10-sensor probes, you must configure the MTDPC to operate in 10-sensor mode (Set function switch 2 to OFF).

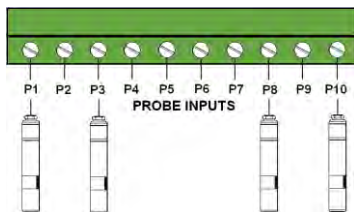
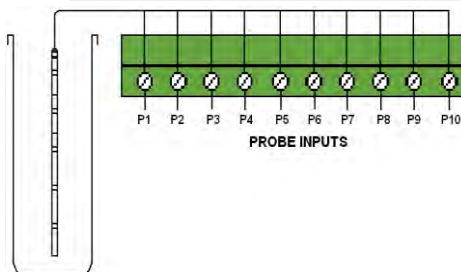
Wire each cable of the multi-sensor probe into its corresponding probe input terminal. Each wire from the probe is numbered from 1-10. Number one connects to input P1. Number ten connects to P10. When the multi-sensor probe is suspended from its cable, number one is at the top of the probe, number ten is at the bottom of the probe.

1	DISCHARGE	CHARGE
2	10 SENSOR	SINGLE SENSOR
3	NON CRITICAL	CRITICAL FAULT
4	AUTO RESET	MAN RESET
5	STEADY	FLASH
6	START ON	START OFF
7	STOP OFF	STOP ON
8	PUMP 1 PRESENT	PUMP 1 DECOMMISSIONED
9	PUMP 2 PRESENT	PUMP 2 DECOMMISSIONED
10	SPECIAL PURPOSE	
11.		
12.		

OFF ON

FUNCTION SWITCHES

SENSITIVITY				
SWITCH 11	OFF	OFF	ON	ON
SWITCH 12	OFF	ON	OFF	ON
SENSITIVITY	20kΩ	1kΩ	4kΩ	80kΩ



### 2.2.3.2 Single Sensor Probes

Connect the single sensor probes to the appropriate probe terminals on the MTDPC.

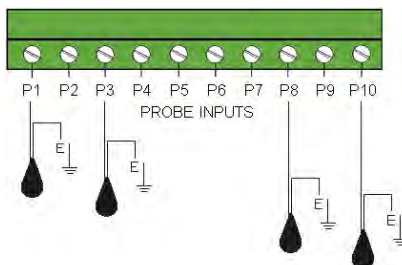
When used with single sensor probes, you must configure the MTDPC to operate in single sensor mode (set function switch 2 to ON). A probe sensor must be connected to each level input where an activation or deactivation point has been set.

### 2.2.3.3 Ball Float

Wire each ball float into the desired input terminal on the rear of the MTDPC.

When using ball floats, the MTDPC must be set to operate in single sensor mode (Set function switch 2 to ON). A ball float must be connected to each level input that has an activation/deactivation level assigned to it.

Each ball float needs to have the N/O relay contact connected to earth.



## 2.2.4 Outputs

This section shows the wiring for the Pump Controller outputs.

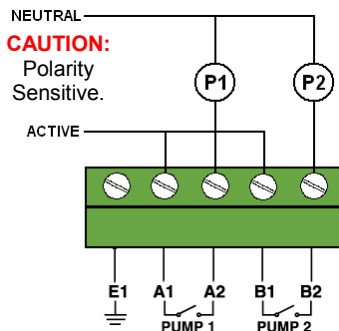
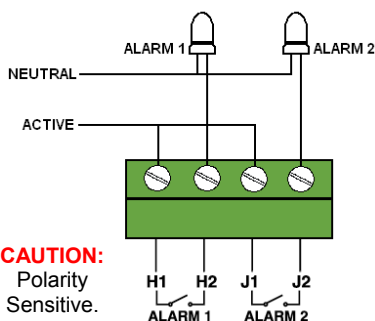
### CAUTION

To improve product reliability, spark-suppressing circuitry had been included internally across each relay output. It is therefore, important to wire each output as shown.

### 2.2.4.1 Pump Relays

Connect the Active Line to A1 & B1 contactor coils or start relays (Load line) to outputs A2 & B2

Relays are rated at 250V, 5amp resistive or 2 amp inductive.



### 2.2.4.2 Level Alarm Relays

Connect the Alarm Active Line to H1 & J1. Wire the Alarm Load Line to outputs H2 & J2.

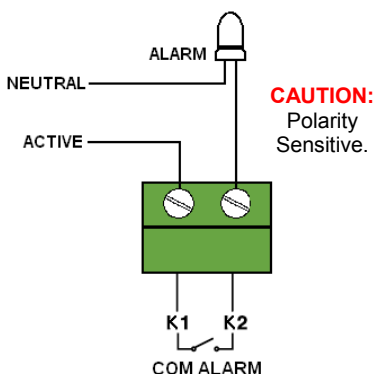
### 2.2.4.3 Common Alarm Relay

The common alarm relay default is set to activate when **ANY** pump fault is unacknowledged.

When an additional alarm is needed, the common alarm relay can be used.

Connect the Alarm Active Line to K1.

Wire the Alarm Load Line to outputs K2.



## 2.2.5 Inputs

To protect a customer's valuable resource, the MultiTrode Dual Pump Controller can be configured to detect:

- Thermal overload conditions
- Seal failures
- Low flow condition

Other fault conditions can be detected where an appropriate switch or relay is incorporated.

Most motors have inbuilt thermal protection. When a motor starts, a lot of heat is generated and if this heat is excessive it may damage the motor windings. Many reasons can be attributed to the excess generation of heat, i.e. aged windings, motor overload, locked rotor, repetitive starts, supply faults and many others.

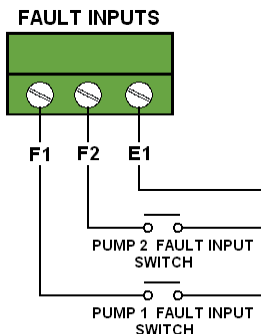
Pump manufacturers usually provide sensors within the motor housing. If a sensor is connected to an appropriate detection relay, then the MTDPC will be able to switch off the pump in the event of a pump fluid seal failure.

When monitoring flow rate is important, flow rate detector relay outputs can be integrated into the Pump Controller fault detection system. This relay is shown as the fault input switch, illustrated in the diagram below.

Wire the pump fault inputs as per diagram.

The fault circuit activates when the contact closes between the fault-input terminal and the E1 terminal.

You can configure the fault inputs to activate a critical or non-critical fault via 'Function Switch 3'.



**BOTH** pump fault inputs (F1 & F2) are set to either non-critical or critical, via 'Function Switch 3'.

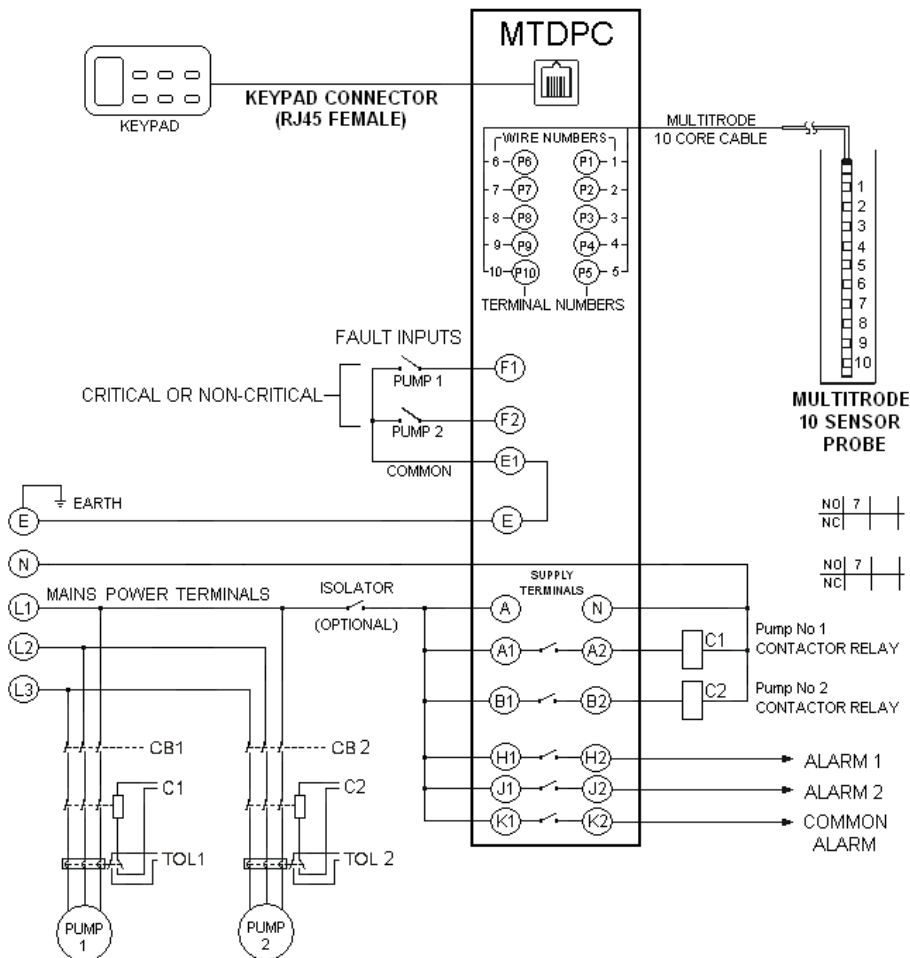
1	ON	1. DISCHARGE	CHARGE
2		2. 10 SENSOR	SINGLE SENSOR
3		3. NON CRITICAL	CRITICAL FAULT
4		4. AUTO RESET	MAN RESET
5		5. STEADY	FLASH
6		6. START ON	START OFF
7		7. STOP OFF	STOP ON
8		8. PUMP 1 PRESENT	PUMP 1 DECOMMISSIONED
9		9. PUMP 2 PRESENT	PUMP 2 DECOMMISSIONED
10		10. SPECIAL PURPOSE	
11		11.	
12		12.	

FUNCTION SWITCHES	OFF	ON	SENSITIVITY	OFF	ON	OFF	ON
SWITCH 11	OFF	OFF	ON	ON	ON	ON	ON
SWITCH 12	OFF	ON	OFF	OFF	ON	ON	ON
SENSITIVITY	20kΩ	1kΩ	4kΩ	80kΩ			

## 2.3 Wiring Diagram

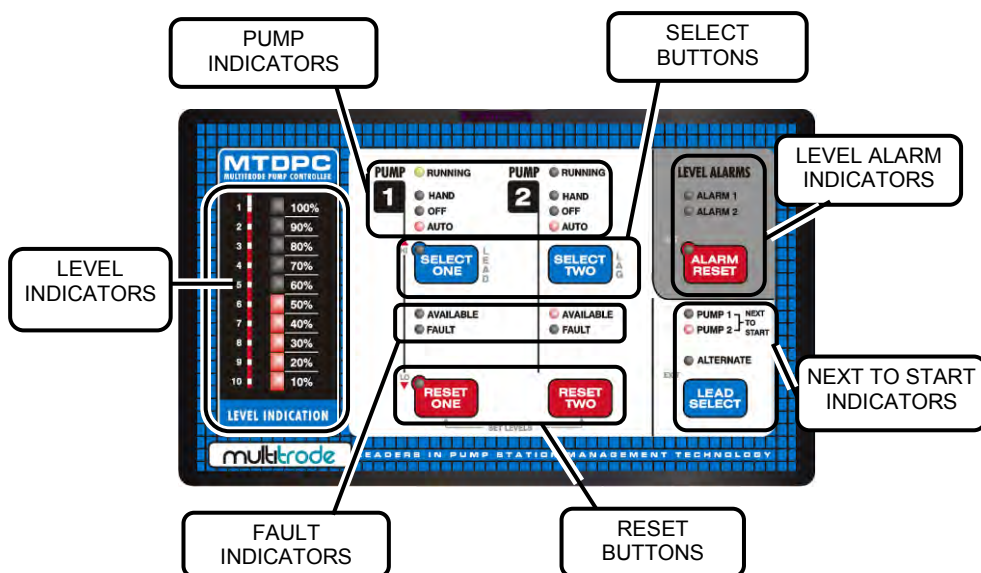
### MultiTrode Dual Pump Controller (MTDPC) Schematic



### 3 Overview

The MultiTrove Dual Pump Controller is an advanced pump control device, which provides control for two pumps and two liquid level alarms. Indication of liquid level, system status, fault conditions and alarms are via high intensity LEDs that remain visible in all light conditions.

This section familiarises you with the look and feel of the pump controller and provides general information on the system components and their functions.



#### 3.1 Level Indicators

The level indicators on the left of the front panel have two basic functions. The first function is to indicate the present level of the liquid. The second function is used for setting level set points during configuration of the controller.

The percentages to the right of the Level Indicators are used to signify the level of the pit or tank in 10% steps. If a particular indicator is flashing, this indicates that the controller has detected a fault with that particular sensor. Although the controller will continue to function, it is recommended that the cause of the fault be identified and the problem rectified.

During configuration of the controller, the level indicators are used to indicate various parameters such as pump and alarm activation/deactivation settings.

#### 3.2 Pump Indicators

The pump indicators are used to denote each pump's operating mode at an installation. When a pump is activated, the corresponding **Running** LED is ON. Each of the two pumps can be set to run in Auto, Off, Manual (Hand) or Manual/Hand Override mode by using the 'Select' button for that pump.

### 3.3 Select Buttons

A 'Select' button is provided for each pump and is used to cycle a pump through Auto, Off and Manual modes (Pump indicator LEDs indicate the current mode). The 'Select' buttons are also used as function buttons.

When entering a function setting, the **Select One** button corresponds to the duty pump. The **Select Two** button corresponds to the standby pump.

The **Select One** button has the extra function of being used to increase a configuration value. The (HI) LED, which forms part of this button, is used to indicate when the button has assumed this extra function.

### 3.4 Level Alarm Indicators

The level alarm indicators, **Alarm 1** and **Alarm 2**, activate when an abnormal liquid level condition has been detected. Usually set when liquid levels are either too high or too low.

The **Alarm Reset** button is used to reset unacknowledged alarm faults, select alarms, mute present alarms as well as being used as a set function button. The set function is used to save any changes made while in configuration mode.

### 3.5 Next to Start Indicators

The **Next to Start** indicators show which pump will start next. If no pump indicators are ON, then all pumps must be either running, decommissioned or unavailable.

When the alternate indicator is ON, the controller is automatically alternating between the two pumps.

The **Duty Select** button is used to scroll through pump 1, pump 2 and alternate pump selection modes as well as an exit button (used to discard any changes made while programming the controller).

### 3.6 Fault Indicators

The pump fault indicators are used to denote pump availability and current fault conditions. Faults have three states; present, unacknowledged and cleared.

### 3.7 Reset Buttons

These buttons are used to reset unacknowledged pump faults as well as being used for function buttons.

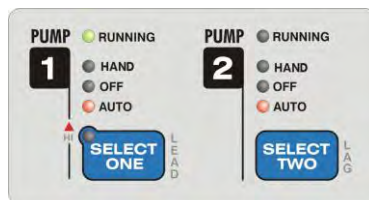
The **Reset One** button has the extra function of being used to decrease a configuration value. The (LO) LED, which forms part of this button, is used to indicate when the button has assumed this extra function.

## 4 Operation

The MultiTrobe pump controller's main function is to automatically provide liquid level control by activating and deactivating pumps.

### 4.1 Pump Operation Modes

Each pump at an installation can be set to run in Auto, Off, Manual (Hand) and Manual /Hand Override modes. Auto, Off and Manual (Hand) are cycled through by using the corresponding select button for that pump.



#### 4.1.1 Auto

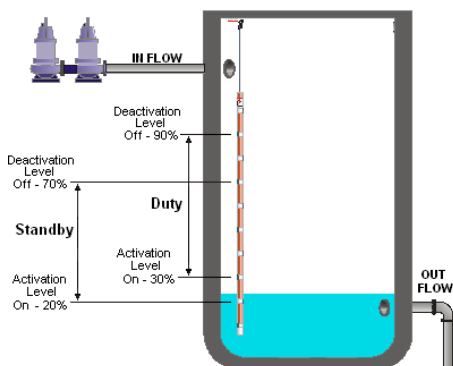
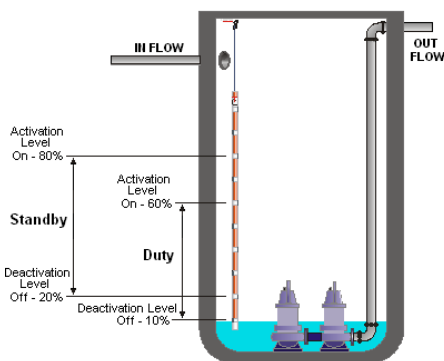
The default configuration sets the MTDPC to auto mode.

In this mode the pump controller automatically controls pump operation. Pump operation is dependent upon the activation and deactivation level sensors, which are situated in the pit or reservoir.

There are two major modes of operation that allow the pump controller to be used for a wide variety of applications; discharge mode and charge mode.

##### 4.1.1.1 Discharge Mode

In Discharge (Empty) mode, the duty pump will turn ON when liquid level rises above the duty pump activation level sensor. If the liquid level continues to rise to the standby pump activation sensor, then the Standby pump will also turn ON. Both pumps will remain ON until the liquid level falls below the deactivation level sensor/s. At this point the pump/s will switch OFF.



##### 4.1.1.2 Charge Mode

In Charge (Fill) mode the opposite occurs, i.e. the pumps will switch ON when the liquid level falls below the activation level sensor, and will switch OFF when the liquid level rises above the deactivation level sensor.



For setting Charge and Discharge modes see Section 5.2.1.

#### 4.1.2 OFF

Press the appropriate pump 'Select' button until the **OFF** LED is illuminated (flashing). The pump is now switched off.

#### 4.1.3 Manual (Dual Function)

##### 4.1.3.1 Manual (Hand) Mode

Press the appropriate pump 'Select' button until the **Manual (Hand)** LED illuminates.

**Manual (Hand)** mode allows an operator to start a pump prior to its activation level, provided the liquid level is within its working range. In this mode the pump will remain ON until the liquid level reaches the pump's deactivation level sensor. The pump will then be switched OFF and the controller will return to auto mode.

**Example:** (Discharge mode). The liquid level is above the pump deactivation sensor but has not yet reached the activation sensor. Press and release the pump 'Select' button until the **Manual (Hand)** LED is illuminated. The pump will start and continue to run until the liquid level reaches the deactivation point. At this point the pump will stop and the controller will revert to auto mode.



##### 4.1.3.2 Manual Override Mode

Manual/Hand override allows a pump to operate outside its normal operating range. (This mode is useful for pumping a well dry.) Illuminate the **Manual (Hand)** LED using the appropriate 'Select' button, and then keep the button held in continuously. When the 'Select' button is released, the pump will return to either:

- A - Manual mode (if the liquid level is within its operating range), or
- B - Auto mode (if the liquid level is outside its operating range).

**Example:** (Discharge mode). You wish to empty a tank to perform maintenance and the liquid level is above the pump deactivation sensor but has not yet reached the activation sensor. Select **Manual (Hand)** using the appropriate pump 'Select' button, ensuring that the button remains held on. The controller is now in Manual/Hand Override mode. The pump will continue to run, regardless of the liquid level, provided the 'Select' button remains held on. When the tank is empty, release the 'Select' button and the pump will stop.

#### 4.1.4 Running Indicator

The **Running** LED is used to indicate the pump's status. When the LED is on continuously, the pump is running.

If the **Running** indicator is flashing quickly (2Hz) the pump is about to start.

If the **Running** indicator is flashing slowly (1Hz) the pump is about to stop.



## 4.2 Analysing Pump Status

### 4.2.1 Pump Fault Indication

The pump controller continually evaluates pump fault information and displays the current pump fault status on the front panel. The pump controller displays a fault in three ways: present unacknowledged or cleared.



- **Present:** A fault condition exists.  
(Indicator Flashing Quickly – 2Hz)
- **Unacknowledged:** A fault has occurred but no longer exists. If the fault was a critical fault the pump will remain unavailable until reset by the operator  
(Indicator Flashing Slowly – 1Hz).
- **Cleared:** A fault, which has occurred, is no longer present and has been reset by the operator (Indicator OFF).

The pump controller has two primary fault types:

- Non-critical
- Critical

**A non-critical fault** makes a pump unavailable when the condition is present and returns the pump back to available when the condition clears. This type of fault is known as an auto reset fault, as operator intervention is not required.

**A critical fault** makes a pump unavailable in both present and unacknowledged fault conditions. This is known as a manual reset fault, as it requires operator intervention by pressing the appropriate 'Reset' button, to make the pump available again.



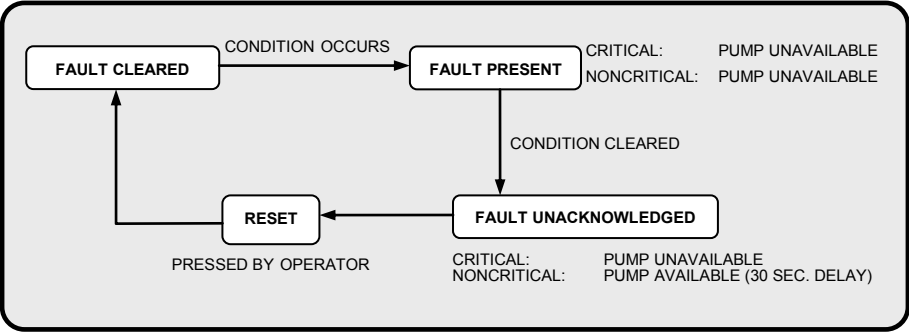
To configure the fault inputs to accept critical and non-critical fault detection see Section 5.4.

Pressing the appropriate pump 'Reset' button clears unacknowledged faults. However, after non-critical faults have been rectified, there is a factory default delay of 30 seconds before the pump is made available.



A pump can only be 'Reset' if the fault condition no longer exists.

The diagram below summarises how pump faults are processed.



The table below summarises how faults are indicated on the control panel.

FAULT LED	FLASHING QUICKLY (2Hz)	FLASHING SLOWLY (1Hz)	OFF
MTDPC IN Non-critical mode	Fault Present	Unacknowledged Fault. There is a factory default delay of 30 seconds before the pump is made available. Press reset button to clear.	No Fault Exists
MTDPC IN Critical mode	Fault Present	Unacknowledged Fault, press reset button to clear.	No Fault Exists



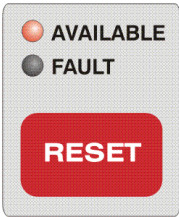
A pump can only be ‘Reset’ if the fault condition no longer exists.

#### 4.2.2 Pump Availability

The **Available** LED shows the available status for that pump. If the LED is Off, the pump is unavailable. If the LED is On, the pump is available for use.

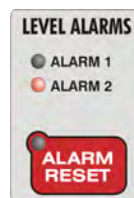
Any of the following items can make a pump unavailable:

- Critical or non-critical fault is present
- A critical fault is unacknowledged
- The pump is decommissioned (see Section 5.5).

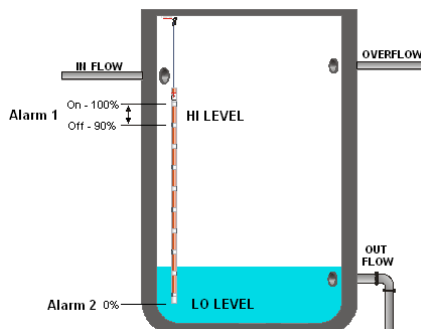


### 4.3 Level Alarm Indicators

An important feature of the level control process is the ability to report abnormal level conditions. The MultiTrobe pump controller provides two different level alarms. These can be configured as high level or low-level alarms, in either charge or discharge modes.



The Level Alarms will operate as high level alarms if their activation levels are set higher than the duty pump activation level or they can be set as low level alarms if their activation levels are set lower than the duty pump activation level.



To configure the Level Alarm settings see Section 5.3.

When a level alarm is present, the appropriate alarm indicator will flash quickly (2Hz). When the alarm condition no longer exists and is unacknowledged, the indicator will flash slowly (1Hz).

To reset an unacknowledged alarm, press the **Alarm Reset** button.



Only unacknowledged alarms may be reset. Present alarms may not be reset as the alarm condition still exists.

#### 4.3.1.1 Muting Level Alarms

To mute a present level alarm, press and hold the **Alarm Reset** button for 5 seconds. This turns OFF the alarm until the level alarm condition no longer exists. A steady 'Alarm' LED indicates this mode has been activated.



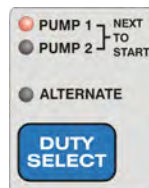
Muting of alarms allows service personnel to perform maintenance without having to endure loud alarms and flashing lights.

## 4.4 Duty Pump Alternation (Next To Start)

For installations with dual pump capability, pumps can be alternated so they share the workload thus protecting pumps from over temperature and excessive wear problems. This is the **default** setting.

Each pump at an installation takes a turn at running. This means that after each successive pump run a new pump is designated as the next to start.

**Example** (For a two-pump installation): When the unit is initialised the next to start pump is designated to physical pump 1. Since this is the first pump to start it is called the duty pump. The other pump is known as the standby pump.



Rising liquid levels start this pump at the duty pump's activation level and the pump stops when the duty pump's deactivation level is reached. The controller's alternation program determines that the 'next to start' pump is now physical pump 2. As this is now the next pump to start, it takes over the duty pump role.

This example has shown that two separate physical pumps have operated as the duty pump and maintained their separate physical identities.



The 'Next to Start' LEDs show which pump will start next. If no pump lights are on, then all pumps must be either running, decommissioned or unavailable.

For most applications, the default pump alternation setting, as described above, will be sufficient and will require no adjustment. Alternatively, the pumps can be set to operate in a fixed sequence.

A fixed sequence is used when alternating pumps is undesirable. See Section 5.6 to establish alternation and fixed sequence settings.

## 5 Configuration

This section will take you through a series of logical steps that will enable you to configure the pump controller to your specific requirements.

### 5.1 Configuring Level Devices

The pump controller has been designed to be connected directly to MultiTrobe probes, either with a number of discrete level probes or the standard 10-sensor probe.

It is possible to use ball float switches, if preferred.

#### 5.1.1 Adjusting for Single/Multi Sensor Input (Function Switch 2)

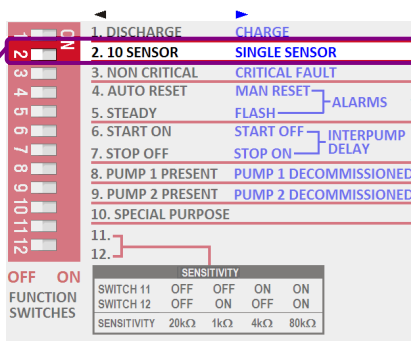
Use function switch 2, on the pump controller, to adjust for either single or multi level sensing devices.

For correct wiring configuration, see Section 2.2.3.

The table below summarises the sensor settings.

SWITCH 2	DESCRIPTION
OFF	Multiple sensor probe with failed sensor detection (default)
ON	Single sensor probe. (Refer Note below)

Function Switch 2 (Located on the controller) is used to adjust for level sensing types, 10 or single sensor.



When in single sensor mode, a sensor must be placed at every point where an activation or deactivation point has been set.

### 5.1.2 Adjusting Probe Sensitivity (Function Switch's 11 & 12)

MultiTrobe probes are conductive sensing devices. As each sensor is submerged in liquid, a current path is created from the controller to the earth and is displayed on the level indicator.

As different liquid types have varying conductive properties it may be necessary, in some cases, to adjust the sensitivity of the probe to allow the controller to accurately display the liquid level.

The pump controller's probe sensitivity can be set to 1k $\Omega$ , 4k $\Omega$ , 20k $\Omega$  (Default Setting) or 80k $\Omega$ .

The table below summarises the sensitivity settings and the liquid environments in which they relate.

SWITCH 11	SWITCH 12	SENSITIVITY
OFF	OFF	20k $\Omega$ Plain Water (Default Setting)
OFF	ON	1k $\Omega$ Highly Conductive Liquids
ON	OFF	4k $\Omega$ Brine and Salt Water
ON	ON	80k $\Omega$ Oil and Fatty Liquids

Function Switches 11 and 12 are used to adjust the sensitivity of the probes.

The diagram shows a vertical row of 12 function switches, numbered 1 to 12. Switches 1 through 10 are currently in the 'OFF' position, while switches 11 and 12 are in the 'ON' position. To the right of the switches is a list of functions for each switch:

- 1. DISCHARGE
- 2. 10 SENSOR
- 3. NON CRITICAL
- 4. AUTO RESET
- 5. STEADY
- 6. START ON
- 7. STOP OFF
- 8. PUMP 1 PRESENT
- 9. PUMP 2 PRESENT
- 10. SPECIAL PURPOSE
- 11. CHARGE
- 12. SINGLE SENSOR

Below this list, a table shows the sensitivity settings for switches 11 and 12:

	SENSITIVITY			
SWITCH 11	OFF	OFF	ON	ON
SWITCH 12	OFF	ON	OFF	ON
SENSITIVITY	20k $\Omega$	1k $\Omega$	4k $\Omega$	80k $\Omega$

Arrows indicate that switches 11 and 12 are used to adjust the sensitivity of the probes.



As MultiTrobe probes are conductive sensing devices, the higher the conductivity of the liquid, the lower the sensitivity setting required and inversely, the lower the liquid conductivity, the higher the sensitivity setting required.

5.2 Setting Pump Levels

This section describes the procedures and function switches used when setting the activation and deactivation level sensing parameters for the pump controller.

5.2.1 Charge/Discharge Mode (Function Switch 1)

The MultiTrode Dual Pump Controller can be used in either charge (Fill) or discharge (Empty) mode.

The table below summarises the mode settings.

SWITCH 1	DESCRIPTION
OFF	Discharge mode (Empty) - Default Setting.
ON	Charge mode (Fill)

Function Switch 1 is used to switch between charge and discharge modes.

1

2

3

4

5

6

7

8

9

10

11

12

OFF

ON

FUNCTION SWITCHES

1. DISCHARGE

2. 10 SENSOR

3. NON CRITICAL

4. AUTO RESET

5. STEADY

6. START ON

7. STOP OFF

8. PUMP 1 PRESENT

9. PUMP 2 PRESENT

10. SPECIAL PURPOSE

11.

12.

CHARGE

SINGLE SENSOR

CRITICAL FAULT

MAN RESET

FLASH

START OFF

STOP ON

PUMP 1 DECOMMISSIONED

PUMP 2 DECOMMISSIONED

ALARMS

INTERPUMP DELAY

SENSITIVITY

SWITCH 11

SWITCH 12

SENSITIVITY

20kΩ

1kΩ

4kΩ

80kΩ

OFF

ON

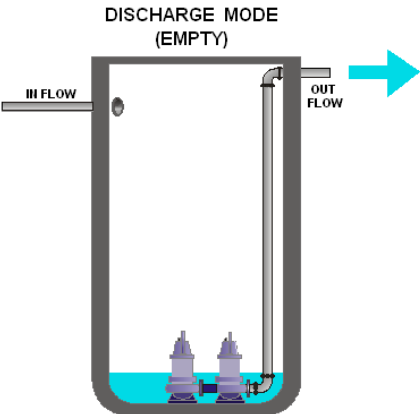
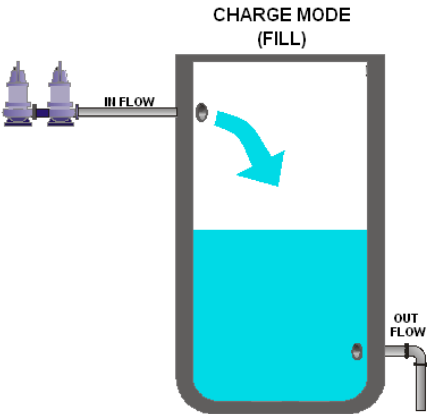
OFF

ON

ON

OFF

ON




### 5.2.2 Activation / Deactivation Level Settings


Use the procedure below to electronically position the activation or deactivation sensor levels that are to be used within your pit, tank or reservoir.

1. Press  &  buttons simultaneously.

The Pump and Alarm LEDs are now flashing.


2. Press one of the following buttons to select which pump level to adjust.


 LEAD = Duty pump 1


 LAG = Standby pump 2

The Running LED for the selected pump will now be lit and the level indicator alternates between the current activation and deactivation points.

3. Press one of the following buttons to select which point to adjust.


 = (HI point) This is the 'ON' point in discharge and 'OFF' for charge mode.

 = (LO point) This is the 'OFF' point in discharge and 'ON' for charge mode.

 = Exits and returns to normal operation without altering levels. Useful if operator is checking current activation and deactivation points.

4. Raise or lower the level using the following keys.

 = Raise level

 = Lower level



The 'Duty Select' button can be used to discard the changes and return to normal operation.

5. Save the new settings by pressing the  button or to discard the changes and return to normal operation, press the  button.

6. Repeat steps 1 through 5 to set each setpoint.

### 5.3 Setting Level Alarms


Use the procedure below to set level alarms for each pump connected to the controller.

1. Press  &  buttons simultaneously.


The Pump and Alarm LEDs are now flashing.

2. Press  to set alarm levels.

3. Press one of the following buttons to select which alarm to adjust.

 = Alarm 1.


 = Alarm 2.


 = Exits and returns to normal operation without altering levels.

The level indicator alternates between the current activation and deactivation points.

4. Press one of the following buttons to select which setpoint to adjust.

 Activation point (HI level alarm) or deactivation point (LO level alarm)

 Deactivation point (HI level alarm) or activation point (LO level alarm).

 Exits and returns to normal operation without altering levels. Useful if operator is checking current activation and deactivation points.

5. Raise or lower the level using the following keys.

 Raise level

 Lower level



The 'Duty Select' button can be used to discard the changes and return to normal operation.

6. Save the new settings by press the  button or to discard the changes and return to normal operation, press the  button.

7. Repeat steps 1 through 6 to set each setpoint.

### 5.3.1 Level Alarm Auto / Manual Reset (Function Switch 4)

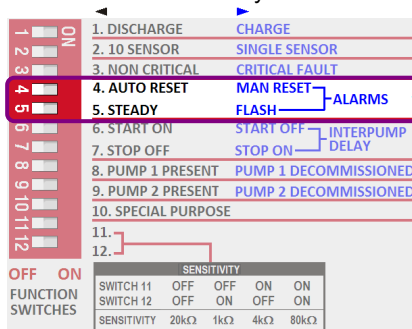
The level alarm relays can be set to one of two modes of operation.

SWITCH 4	DESCRIPTION
OFF	<b>AUTO RESET</b> - When alarm condition is no longer present, alarm relay will be deactivated (Default Value).
ON	<b>MAN RESET</b> - When alarm condition is no longer present, alarm relay will remain activated until manually reset by the operator.

### 5.3.2 Level Alarm Flash/Steady (Function Switch 5)

The level alarm relay can be made to hold a steady state or to flash when activated. This removes the need for additional timers within the system.

SWITCH 5	DESCRIPTION
OFF	Steady (default)
ON	Flashes once every two seconds.

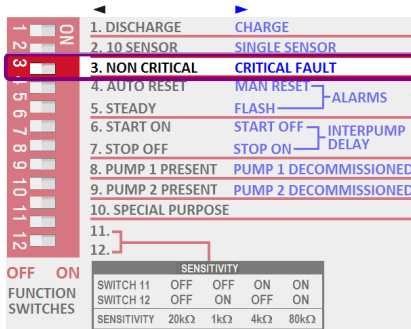


## 5.4 Critical & Non Critical Fault Selection (Function Switch 3)

A critical fault makes a pump unavailable when a fault is present or unacknowledged. This type of fault requires operator intervention to make the pump available again.

A non-critical fault makes a pump unavailable when the condition is present and available again (after a 30-second delay) when the condition clears without having to be reset manually. This type of fault is known as an auto reset fault, as operator intervention is not required.

SWITCH 3	DESCRIPTION
OFF	Non Critical Fault (default)
ON	Critical Fault



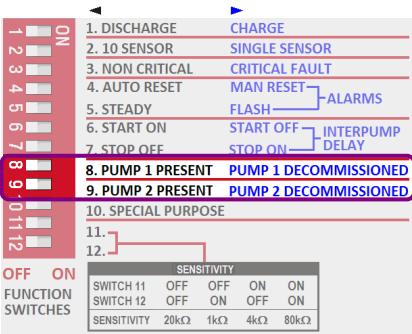
See Section 4.2 (Analysing a pump's status) for a description on how faults are indicated on the panel.

5.5 Decommissioning Pumps (Function Switches 8 & 9)

This function makes the pump unavailable to the pump controller, particularly for single pump installations or to decommission a pump for maintenance purposes.

SWITCH 8	DESCRIPTION
OFF	Pump 1 is present (default).
ON	Pump 1 is decommissioned.

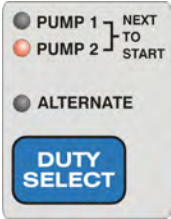
SWITCH 9	DESCRIPTION
OFF	Pump 2 is present (default).
ON	Pump 2 is decommissioned.



If a pump is recommissioned or an additional pump is added to the system, the appropriate function switch will have to be set to ‘Present’.

5.6 Setting the Alternate/Fixed Pump Sequence

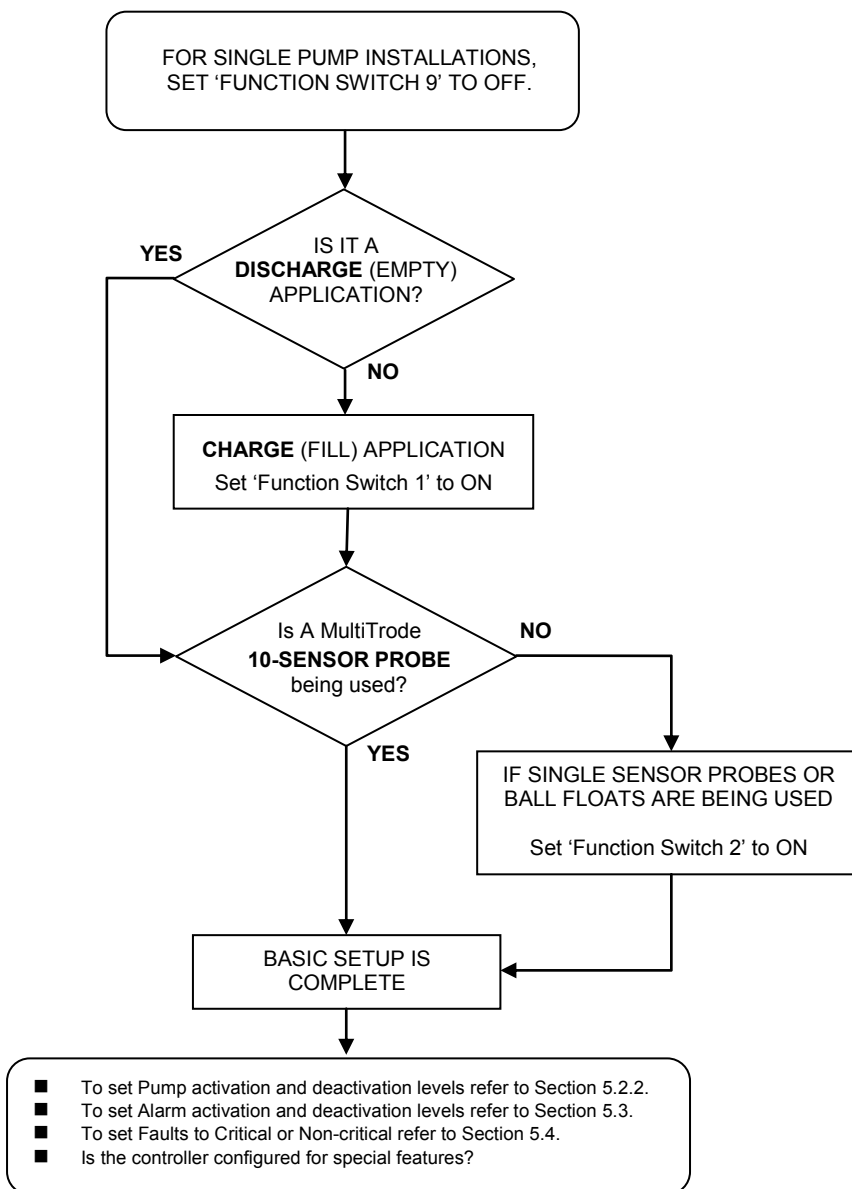
To cycle through alternate and fixed pump sequence, press and hold the **DUTY SELECT** button for 3 second intervals until the desired mode is selected.



Alternate LED is ON:	Controller is alternating between the pumps
Pump 1 LED is ON:	Physical pump 1 fixed as Duty pump
Pump 2 LED is ON:	Physical pump 2 fixed as Duty pump

## 6 Configuration Quick Start

MultiTrobe has pre-programmed the controller with **FACTORY DEFAULT** settings to suit most applications. Little or no adjustment should be necessary in the majority of cases. Prior to installation, check the following.



## 7 Special Features

### 7.1 Simulating Levels for Commissioning Purposes

**Ideal for operators to test all pumps and alarms without waiting for levels to change and eliminates the dangerous process of entering a pit to manually adjust sensor positions.**



The pump controller can simulate levels for commissioning purposes. This function allows the operator to increase or decrease the level in 10% steps via the keypad. This enables the total system to be tested before it is installed at the pump site.

Level commissioning mode is entered by

1. Simultaneously press  &  buttons.

In this mode the HI and LO LEDs flash alternately.

2. Raise or lower the simulated level in 10% steps.

  = Raise level

  = Lower level



This function will automatically time out after 30 seconds of inactivity.

The level indicator will show a simulated level, which activates pumps and alarms at their appropriate activation and deactivation levels.

3. Press  to exit this mode and return to normal operation.

### 7.2 Automatic Sensor Fault Detection

As a special feature, when using any MultiTrobe probe for level sensing, the pump controller automatically detects if a probe sensor not working correctly.

**For example:** If a standard ten-sensor probe is being used, and a sensor becomes defective, it will be displayed on the Level indicator as a flashing LED.

This function indicates that the probe requires inspection.



For installations where single sensor probes or ball floats are being used, the pump controller automatically determines whether or not a sensor has a pump or alarm activation or deactivation level connected to it. Only those level positions connected to a sensing device will flash if a malfunction occurs.

7.3 Interpump Delays


This helps to protect the system from turbulence and power surges.

The Interpump delay sets a time delay between any two pumps starting or stopping. This reduces liquid turbulence and excessive loading on the electricity supply caused by multiple pumps starting or stopping simultaneously.

7.3.1 Interpump Start Delay (Function Switch 6)

The interpump start delay sets a 15 second delay between any two pumps starting.

SWITCH 6	DESCRIPTION
OFF	15 second delay (default)
ON	No Delay



The pump controller will override this constraint when a pump is moved to 'Manual' mode.

123456789101112

ON

OFF ON

FUNCTION SWITCHES

1. DISCHARGE

2. 10 SENSOR

3. NON CRITICAL

4. AUTO RESET

5. STEADY

6. START ON

7. STOP OFF

8. PUMP 1 PRESENT

9. PUMP 2 PRESENT

10. SPECIAL PURPOSE

11.

12.

CHARGE

SINGLE SENSOR

CRITICAL FAULT

MAN RESET

FLASH

START OFF

STOP ON

PUMP 1 DECOMMISSIONED

PUMP 2 DECOMMISSIONED

SENSITIVITY

SWITCH 11	OFF	OFF	ON	ON
SWITCH 12	OFF	OFF	ON	ON
SENSITIVITY	20kΩ	1kΩ	4kΩ	80kΩ


ALARMS

INTERPUMP DELAY

7.3.2 Interpump Stop Delay (Function Switch 7)

The interpump stop delay sets a 15 second delay between any two pumps stopping.

SWITCH 7	DESCRIPTION
OFF	No Delay (default)
ON	15 second delay



The pump controller will override this constraint in the event of pump faults occurring or the pumps are turned 'OFF'.

7.4 LED Test

The LED test may be performed at any time to check that the LEDs are working.

Simultaneously press 'Reset One', 'Reset Two' and 'Alarm Reset'.

The test will cycle through the LEDs, column by column. The test does not affect the controller's operation.

PUMP 1

● RUNNING

● HAND

● OFF

● AUTO

SELECT ONE

● AVAILABLE

● FAULT

RESET ONE

PUMP 2

● RUNNING

● HAND

● OFF

● AUTO

SELECT TWO

● AVAILABLE

● FAULT

RESET TWO

LEVEL ALARMS

● ALARM 1

● ALARM 2

ALARM RESET

● PUMP 1 → NEXT TO START

● PUMP 2 →

ALTERNATE

LEAD SELECT

## 8 Default Settings

The pump controller is supplied with “plug’n’play” default settings in both activation/deactivation levels and manually controlled function switches.

### 8.1 Activation / Deactivation Default Levels

#### 8.1.1 Default Level Settings

For most applications the default activation and deactivation liquid level settings should be appropriate for correct operation and should need no adjustment after installation. These levels are shown in the table below and may be changed as required.

Pump	DISCHARGE DEFAULT LEVEL %		CHARGE DEFAULT LEVEL %	
	Activation	Deactivation	Activation	Deactivation
Duty	50	10	50	90
Standby	60	20	40	80

To change default setting see Section 5.2.2.

#### 8.1.2 Default Level Alarm Settings

The pump controller is pre-programmed with a set of alarm activation and deactivation levels. The common alarm relay default is set to activate when **ANY** pump fault is unacknowledged. These are shown in the table below and may be changed as required.

Alarm	DEFAULT LEVELS	
	Activation	Deactivation
Alarm 1	100	90
Alarm 2	Disabled	Disabled
Common	Set to activate when <b>ANY</b> pump fault is present	

To change default setting, see Section 5.3

#### 8.1.3 Default Pump Alternation Setting

For most dual pump applications the default pump alternation setting will work correctly. The default pump alternation setting gives each pump in an installation a turn at being the duty pump. To change this default setting, see Section 5.6.

## 8.2 Function Switch Default Settings

The function switches (located on the controller) are used to manually change function settings.

DIP SWITCH	DEFAULT POSITION	DESCRIPTION	DIP SWITCH	DEFAULT POSITION	DESCRIPTION
1	Off	Discharge	7	Off	Stop Off - No Interpump stop delay
2	Off	10 Sensor	8	Off	Pump 1 Present
3	Off	Non Critical Fault	9	Off	Pump 2 Present
4	Off	Auto Reset Alarm	10	Off	Special Purpose
5	Off	Steady Alarm	11	Off	Sensitivity Set to 20k $\Omega$
6	Off	Start On - 15 sec Interpump start delay	12	Off	


## 8.3 Resetting Controller Defaults

All keypad configurable settings within the MultiTrove Dual Pump Controller can be returned to their default state by performing a full reset. This function may be helpful if the pump controller is transferred from one site to another. The full default reset returns all Levels, Alarms and Alternation information to their default values.


To perform a full default reset:

1. Simultaneously press   and  buttons.

A LED test commences.

2. During the lamp test press  once.

3. When the LED test finishes, the 'LO' LED will flash.

Whilst the 'LO' LED is flashing press  once.

A buzzer will sound for two seconds and the LED test will recommence.

This completes the full reset.

### CAUTION

Resetting a unit will stop all running pumps without interpump delays and reset all faults and alarms.

## 9 Specifications

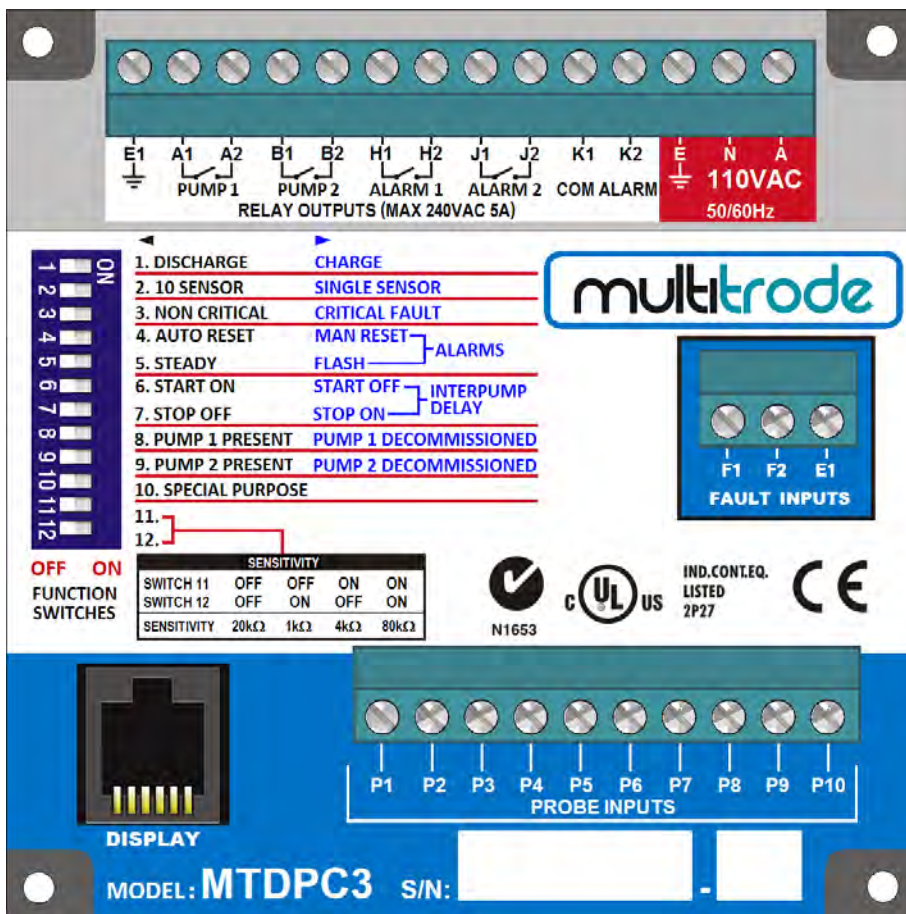
<b>Mode of Operation</b> Charge or Discharge (Fill or Empty) Pump Alternation	Selectable via Function Switch Auto or Fixed: Selectable from Keypad
<b>Level Sensing Probe Inputs</b> Number of inputs Output voltage Output current Sensitivity settings Maximum cable length	10 2.5VAC Nominal (open circuit) 0.8mA max (per sensor) 1k, 4k, 20k and 80kΩ. Selectable via Function Switch Probe cable capacitance is compensated up to 1km ( Recommended maximum cable length 50m, contact MultiTrobe if longer lengths required)
<b>Fault Input</b> Critical or Non Critical	Selectable for each pump via Function Switch (Operated by voltage free contact)
<b>Relay outputs</b> No. of relay outputs Relay contact rating Relay contact life	2 pump, 2 alarm (Steady or Flashing), 1 common alarm 250VAC 5A Resistive, 2A Inductive 300000 Operations at 2A
<b>Displays</b> LEDs	Hi intensity LEDs (Red & Green)
<b>Physical Product</b> <b>Controller</b> Dimensions mm Material Mounting Terminal size IP rating  <b>Keypad</b> Dimensions (mm) Material Mounting	H 95 x W 95 x D 145 Aluminium & Polycarbonate DIN rail mounted 2.5 mm <sup>2</sup> , # 13 IP20  H 105 x W 175 x D 24 Polycarbonate Panel mounted
<b>Power Supply</b> Supply voltage AC MTDPC 2 Supply voltage AC MTDPC 3 Power consumption	240VAC nominal 50/60Hz 110VAC nominal 50/60Hz 6VA max.
<b>Environmental Range</b> Operating temperature Humidity	-10° to +60° C (+14° to +140° F) 90% non condensing

## 10 MTDPC Connectors & Dip Switch

### Models available:

MTDPC2 240VAC

MTDPC3 110VAC



## 11 Glossary of Terms

<b>Activation Level</b>	The point at which a pump or alarm is switched On.
<b>Alternate Mode</b>	The pump controller is automatically alternating (switching or changing) between the two pumps.
<b>Charge Mode</b>	When the pump controller is set to fill a tank or pit.
<b>Cleared Fault</b>	A fault that has occurred, is no longer present, and has been reset by the operator.
<b>Deactivation Level</b>	The point at which a pump or alarm is switched "Off".
<b>Decommissioned Pump</b>	A pump that has been removed from duty or an installation, e.g. for maintenance purposes.
<b>Discharge Mode</b>	When the pump controller is set to empty a tank or pit.
<b>Duty Pump</b>	The main pump or the first pump to start within a pumping cycle.
<b>Fixed Sequence</b>	Pump 1 or pump 2 is fixed as the duty pump.
<b>Interpump Start Delay</b>	The delay between any two pumps starting.
<b>Interpump Stop Delay</b>	The delay between any two pumps stopping.
<b>Present Fault</b>	A current fault condition exists.
<b>Standby Pump</b>	The secondary pump or the next pump to start within a pumping cycle.
<b>Probe</b>	MultiTrobe manufactures a range of conductive level sensors. They have many advantages over traditional devices such as ball floats. Advantages include: resistance to fatty deposit build-up, tangle-free and an adjustable sensitivity to liquid to prevent false readings.
<b>Unacknowledged Fault</b>	A fault has occurred but no longer exists and has not been acknowledged.

## 12 List of Abbreviations Used

<b><math>\Omega</math></b>	Resistance Value (Ohm)
<b>EMC</b>	Electromagnetic Compatibility
<b>Hz</b>	Frequency (Hertz)
<b>LED</b>	Light Emitting Diode
<b>MTDPC</b>	MultiTrode Dual Pump Controller
<b>N/O</b>	Normally Open
<b>VAC</b>	Alternating Current Voltage
<b>VDC</b>	Direct Current Voltage

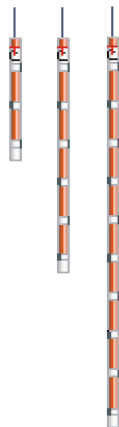
## ACCESSORIES

### PROBES

- Little maintenance required
- Cost-savings, short and long term
- Resistant to fat, grease, debris and foam

MultiTrode probes are specifically designed for the arduous, turbulent conditions encountered in water, sewage and industrial tanks & sumps.

MultiTrode offers a large variety of off-the-shelf probes or we can manufacture them to your exact requirements.



#### Probe Parameters

##### No. of Sensors

25 max

##### Sensor spacing

100mm (4") min

##### Section length

3m (9ft) max

##### Cable Length

50m (164ft)

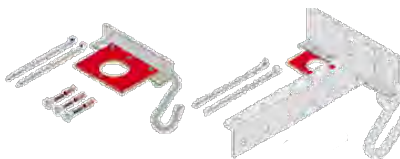
(recommended max.)

### MTAK-1 & MTAK-2

#### Standard mounting Bracket

The MTAK-1 standard mounting bracket kit is supplied with all multi-sensor probes and is made from 2.5mm 316 stainless steel. The kit also includes a stainless steel hook and cable ties.

The MTAK-2 is an optional extra available where longer reach is required and is only supplied on order.



### MTTS

#### Transient Suppressors

The MTTS helps protect MultiTrode equipment from transients such as the secondary effects of lightning entering through inputs.



## Further Information

[www.multitrode.com](http://www.multitrode.com)



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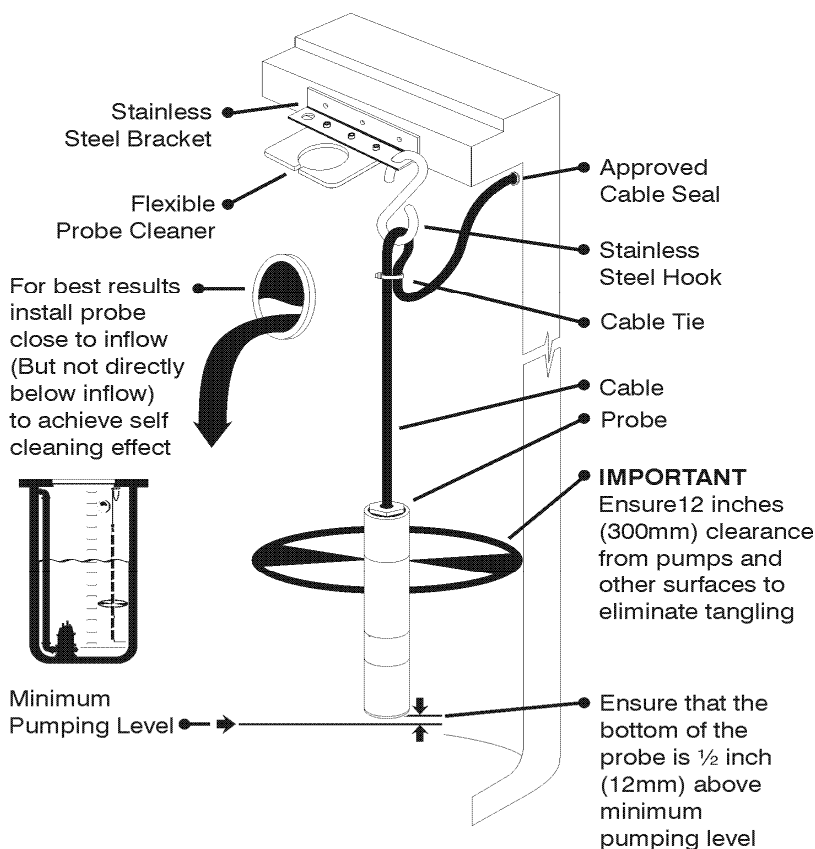
## **Section 8 – Multitrode Level Sensor Install & Troubleshooting**

## 1 Correct Probe Installation

### 1.1 Important Notes

- Hang probe in turbulent area of wet well
- Do not install the probe in a stagnant area or corner where grease and debris may collect. Stilling wells are not suggested.
- Ensure a minimum of 300 mm (12 inches) clearance from any surface
- Ensure bottom of probe is 12.5 mm (½ inch) above minimum pumping level
- Do not use the bottom sensor as earth or ground
- The Probe cable must be buried (outside the well) in a separate metal conduit and shielded for correct operation of the level-sensing device
- Most pits are adequately earthed or grounded and do not require any reference rods, however PVC or Fibre Glass Tanks without pumps or metallic grounded pipe require reference rods

## 2 Probe Location



The MultiTrobe probe is designed to be supported on its control cable (see Fig.1) from the Suspension/ Cleaning bracket supplied with the probe. It is desirable for the probe to be located near the inflow in a reasonably turbulent area of the wet well.

The inflow should not be allowed to run directly on to the probe, but the surface agitation of the inflow area is beneficial in keeping the probe clean. Before deciding on the probe location, the wet well should be pumped down as far as possible and the probe suspended from its approximate position to ensure that adequate clearance exists from objects in the pit.

A minimum of 300 mm (12 inches) clearance should be maintained from any conductive surfaces.

Probe sensor points are numbered from 1 to x with 1 being the sensor closest to the cabled end of the probe, and where x is the total number of sensor points.

Figure 1 - Locating the probe in the vessel

## 3 Mounting

Fix the Suspension/Cleaning Bracket MTA1 in Fig.1, (not supplied with single-sensor probes) on to the inside of the wet well, ensuring the clearance form covers and the ladder access. To mount the probe, first thread the cable through the stainless steel hook provided. Place the hook onto the mounting bracket or eyeball and adjust the cable length until the bottom of the probe is 12.5 mm (½") above the minimum liquid level. Fasten the cable to the hook using cable ties. Draw the loose end through the conduit to the control panel.

## 4 Cleaning

Provide sufficient slack in the cable to allow the probe to be drawn through the cleaning bracket (Fig.1), or taken out of the well for cleaning. MultiTrobe systems are designed so that the need for probe cleaning is greatly reduced or eliminated. This is achieved by correctly, positioning the probe and selecting sensitivity on the level controller.

## 5 Accessories

### 5.1 MTAK 2 Extended Mounting Bracket

The MTAK-2 (Fig.2) is an optional extra. It is made from 2.5mm (1/8") 316 stainless steel and can be used with all multi-sensored probes to give a greater, free-swinging area. It has an in-built squeegee blade style probe cleaner and includes stainless steel hook and cable ties.

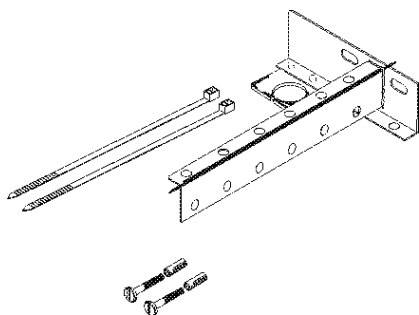


Figure 2 - MTAK 2 Extended Mounting Bracket Kit

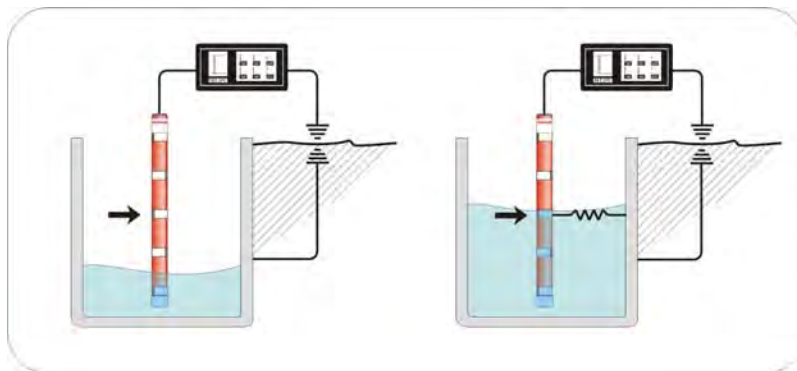


Figure 3 - How the probe works

## 6 How the MultiTrode Probe Works

As the level rises and contacts the probes sensor/s a circuit is completed. See Figure 3.

## 7 Probe Theory

The probe is manufactured from uPVX moulded Housing incorporating 2 sensor points of Avesta 254 SMO high-grade stainless alloy.

The probe has no moving parts and no electronic components inside; the probe utilizes the conductive state of the liquid to complete a circuit.

If tank is PVC or fibreglass and has no metal grounded objects such as pumps, then the system will need a ground reference rod. Suggest 6mm stainless steel rod suspended in liquid, then grounded.

## 8 Trouble Shooting

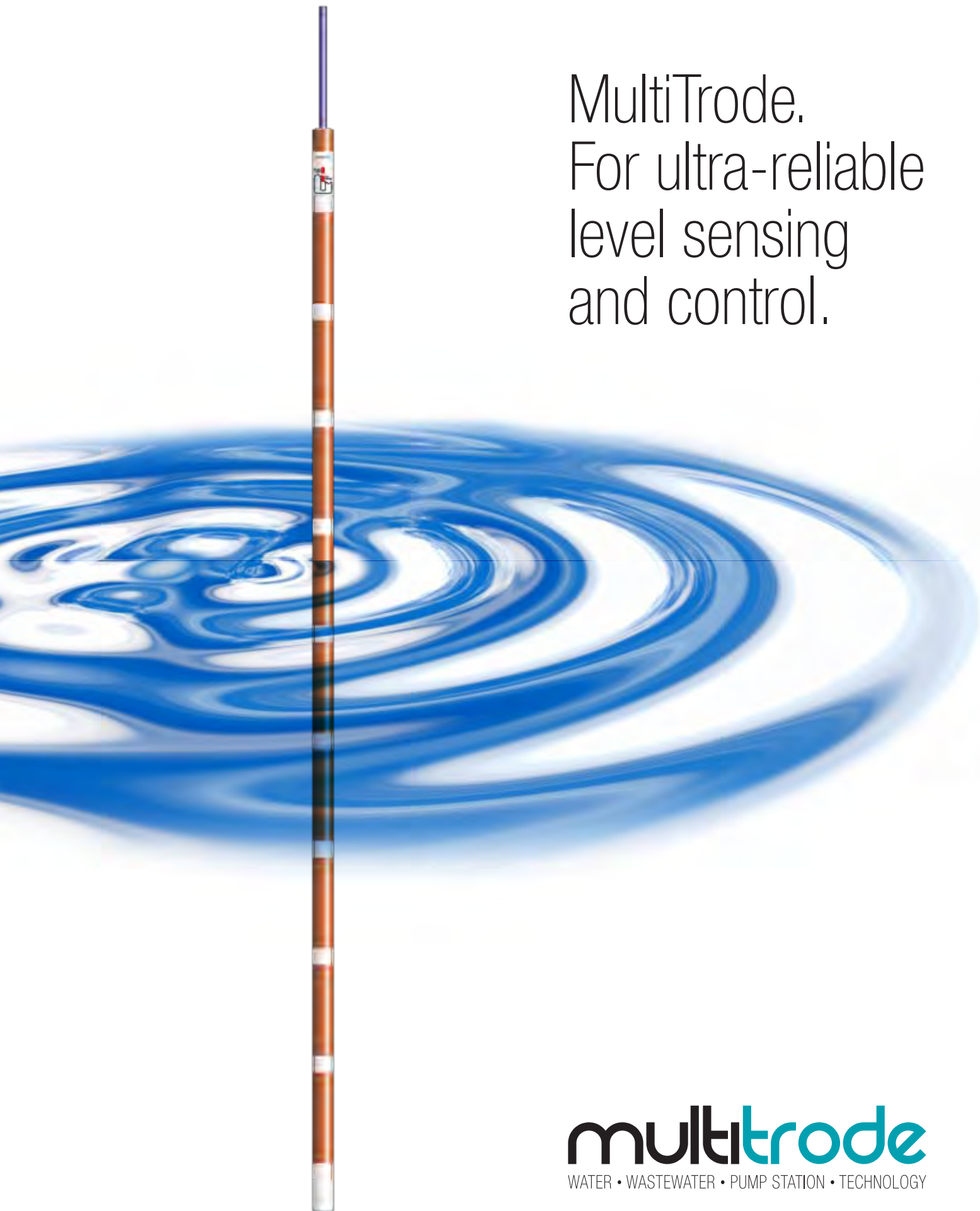
<b>Controller fails to activate (when expected)</b>	<ul style="list-style-type: none"> <li>Remove probe connection from controller</li> <li>Short circuit the probe inputs on the controller to ground, start with p10 working your way down to p1</li> </ul>
<b>Does the controller activate?</b>	<ul style="list-style-type: none"> <li>No, Setup problem or actual faults on controller - go to trouble shooting guide or the product manual</li> <li>Yes, This means controller functional - while the probe (or probe segment) is immersed measure the resistance to ground of that sensor with a high <math>\Omega</math> resistance meter.</li> <li>Is it-opened circuit?</li> <li>Yes - end of issue – wires faulty – check for damages cables</li> <li>No – Check grounding on earth rod in pit, and grounding on Controller, check for earth continuity across installation</li> </ul> <p><i>Note: External contamination such as excess oil can insulate probe in areas such as wash down plants and workshops for diesel motors.</i></p>
<b>Pumps activate prematurely</b>	<ul style="list-style-type: none"> <li>Check sensitivity setting on controller. Set to next lowest setting.</li> </ul> <p><i>Note: This is caused by external contaminates of sticky composition, and also very conductive – can cause premature activation in some industrial applications.</i></p>
<b>Excessive fat build-up on probes</b>	<ul style="list-style-type: none"> <li>Move probe to a more turbulent area of pit, preferably close to inflow</li> </ul>
<b>Probe works erratically</b>	<ul style="list-style-type: none"> <li>Check any junctions in probe cable, especially where moisture can penetrate.</li> </ul> <p><i>Note: Running the probe cable in the same conduit as pump power cables can cause inductance into probe cable and give false readings.</i></p>
<b>High alarm activates after some delay when sensor is immersed</b>	<ul style="list-style-type: none"> <li>Check build-up on sensor – clean</li> </ul> <p><i>Note: This may be caused by some areas containing heavy sludge such as finals of treatment plants, the sludge can, over extended time, dry out over sensor. A delay of 20 to 60 seconds can be experienced due to moisture slowly penetrating build-up. Increasing sensitivity will also remedy the problem.</i></p>

## Probe Installation and Troubleshooting

---

## **Section 9 – Multitrode Level Sensor Brochure**

MultiTrode.  
For ultra-reliable  
level sensing  
and control.



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# The Liquid Level Sensor you don't need to clean.

The most reliable and cost-effective level sensor for wastewater.

Lasts for over 20 years!

- Reduces maintenance costs.
- No more false readings or burnt-out pumps.
- Simple to install and guaranteed for 10 years.
- Cuts the risk of spills.

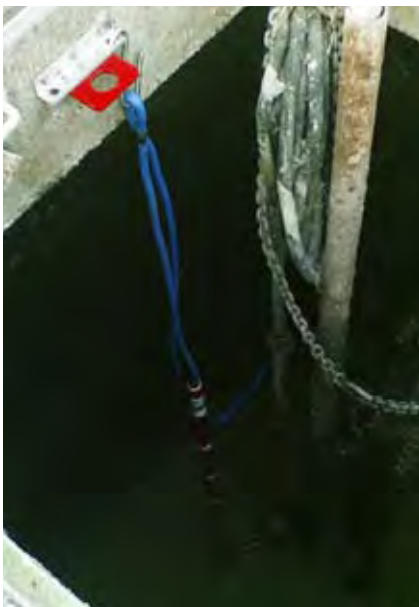
## Why is it so reliable?

No electronics and no moving parts means there is nothing to fail – that's why it gets a 10-year warranty.

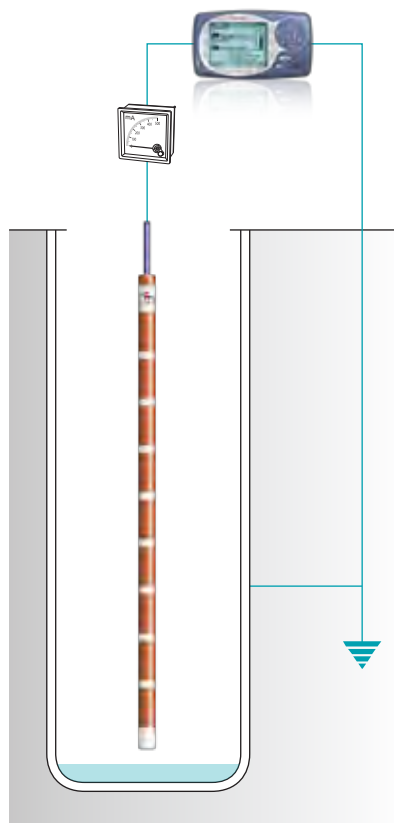
## How does it work?

The Probe works by using the conductive properties of the water itself to complete a circuit with a controller. It's mounted near the inflow, allowing the turbulence to keep it clean. Even if a build-up does occur it's usually conductive (in wastewater) and so the Probe keeps right on working.

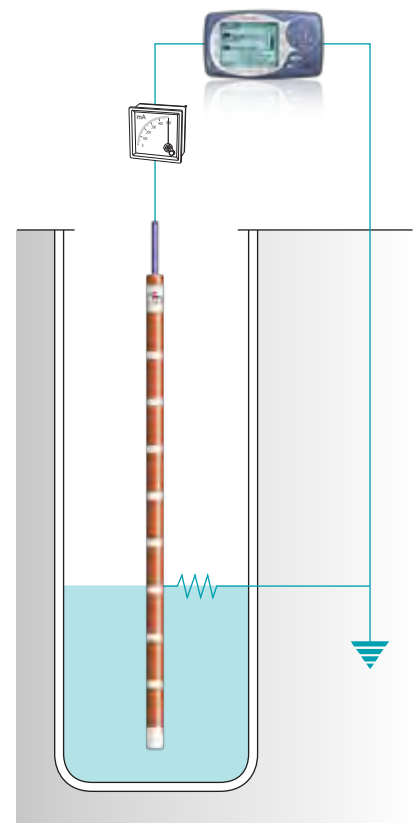
When cleaning is required, the probe is installed off a mounting bracket that includes a cleaning device.



Typical installation in the UK.



When a sensor is not covered with liquid there is no circuit to ground/earth.



Each sensor completes a separate circuit to ground/earth through the liquid.

# Primary Level in Wastewater.

Connects to:



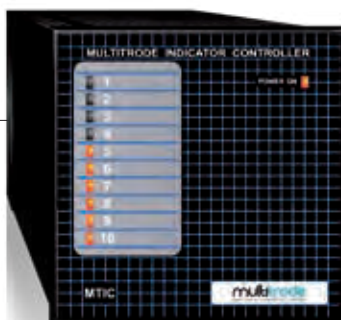
## MultiSmart Pump Station Manager

Full control and monitoring with SCADA connectivity – see MultiSmart brochure for details.



## MTDPC Pump Controller

Simple lead/lag control with level display, typically non-utility.



## MTIC Indicator Controller

4-20mA output to connect to PLC control and 10 Digital Outputs (for each level sensor) for simple control.



## MTISB Intrinsically Safe Barrier

The MTISB is used between the MultiTrove probes and control equipment. It eliminates the risk of dangerous energy entering the potentially explosive environment where the probe is located. 5-channel (MTISB5) and 10-channel (MTISB10) barriers available.

MultiTrove. For ultra-reliable level sensing and control. 3.

# Primary Level in Industrial Applications.

## Single Pump Control.

Works well in confined spaces and with a wide variety of effluents.



MTR with  
2 single sensor probes

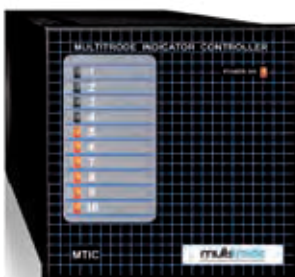


MTRA with  
3 single sensor probes



SafeSmart-TL version with  
3-sensor probe

## 2 Pump Control.



MTIC with 10-sensor probe



MTDPC with 10-sensor probe



Two single sensor probes (e.g. from a sump pack),  
with optional extender bracket.

## How accurate is the Probe?

The probe gives 10% resolution, more than enough for most pump stations.

## Why is it easier to install than other level devices?

All you do is hang the Probe on its own cable into your wet well, using the bracket we supply. Installation is simple – any one of your technicians could do it in an hour or so. What's more, you install the Probe relatively low down in the wet well, so compared to ball floats it allows the well to be cleaned out more thoroughly. That means less debris build-up, odors and pump clogs.

Why do we like the Probe? It's simple, safe, cuts  
maintenance time and makes life so much easier!

Gray Walls, Public Works Director, Town of Troy, NC

## Backup Control - Simple Spill Preventer.

The sump pack (MTR or MTRA with 2-single sensor probes) is ideal as a spill preventer. Instead of having a high level float wired as a high level alarm, the sump pack provides simple but effective backup control for those times when the primary control system has failed.

It keeps the well emptied, giving you more time to deal with the problem.

## Better Backup Control - Advanced Spill Preventer.

The SafeSmart family provides better backup control by reading the thermal state of the pump (via thermistors and thermal switches) to ensure the pump doesn't run while too hot, even under backup conditions.

## Specifications for ordering the Probe.

The mounting bracket is a standard accessory supplied with the multi-sensor probes (3-sensor and 10-sensor probes) and is available as an optional extra on the single sensor probe.

### ORDERING EXAMPLES AND INFORMATION

Model Code	Probe Length	Number of Sensors	Sensor Separation
0.2/1-xx	0.2m / 8in	1	N/A
0.5/3-xx	0.5m / 16in	3	150mm / 6in
1.0/10-xx	1.0m / 40in	10	100mm / 4in
1.5/10-xx	1.5m / 60in	10	150mm / 6in
2.0/10-xx	2.0m / 80in	10	200mm / 8in
2.5/10-xx	2.5m / 96in	10	250mm / 10in
3.0/10-xx	3.0m / 115in	10	300mm / 12in
6.0/10-xx	6.0m / 224in	10	600mm / 24in
9.0/10-xx	9.0m / 368in	10	900mm / 40in

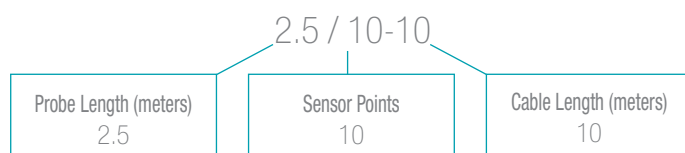
xx = 10 (for 10m or 33ft of cable); or 30 (for 30m or 100ft of cable)

Probes are supplied with a standard length of cable in either 10m / 33ft or in 30m / 100ft lengths.

### SPECIAL PROBES

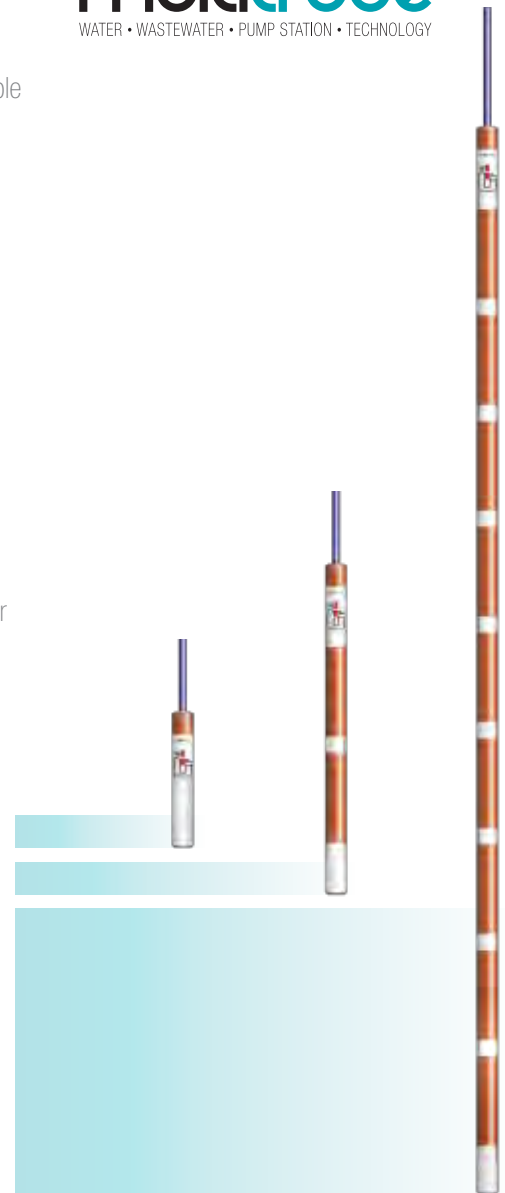
Special Probes with custom sensor spacing are available to suit your every application (18 sensors maximum).

Please call our office and speak with our design team for your customized drawing.



Add "FSP" to the end of the part number to order the failsafe probe (for use with MultiSmart and the SafeSmart range).

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*The sump pack is also ideal for primary pump control in industrial applications.*

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# MTDPC

Simple 2-pump control, with operator interface. Suitable for empty (pump down) and fill (pump up) applications and for use with the MultiTrode probe.

The MTDPC integrates all basic control functions into one panel – with setpoints for two pumps with alternation, a fault input for each pump and an operator interface showing pump status at a glance.

- Level display, pump and fault status indication.
- Alternation or fixed sequence.
- Adjustable setpoints via the keypad.
- Adjustable sensitivities for a wide range of liquids.
- Cost-effective and simple to use.
- Pump auto / off / manual selection.
- Level simulator via keypad to test the control panel.

## Applications:

- Effluent and stormwater pits.
- Sullage pits.
- Water tanks.
- Car park pits.
- Wash down pits.
- Basement sumps.

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## MTDPC SPECIFICATIONS

### MODE OF OPERATION:

Mode	Fill or Empty (Charge or Discharge) Selectable via function switch
Pump Alternation	Alternation or Fixed: Selectable via Keypad

### LEVEL SENSING PROBE INPUTS:

Number of inputs	10
Output voltage	10VAC Nominal (open circuit)
Output current	0.8mA max. (per sensor)
Sensitivity settings	1k, 4k, 20k and 80k Ohm Via function switch
Max cable length	50m

### BUTTONS:

Pump Mode:	Auto / Off / Manual
Fault Resets:	Pump 1, 2 and Level Alarms.
Configuration:	Alternation / fixed sequence Level and alarm setpoints Level simulation

### FAULT INPUTS

Fault Input:	Critical (Lockout) or Non-Critical (Auto Reset); Selectable via function switch, one fault input per pump
--------------	--

### RELAY OUTPUTS:

No. of relay outputs	2 pump N/O, 2 alarm (steady or flash) N/O 1 common alarm N/O
Relay contact rating	250VAC 5A Resistive, 2A Inductive
Relay contact life	10 <sup>5</sup> @ 2A Operations

### DISPLAY:

LEDs	Hi intensity (Red & Green)
------	----------------------------

### PHYSICAL PRODUCT:

Controller Dimensions	3 3/4"H x 3 3/4"W x 5 11/16"D (inches) 95H x 95W x 145D (mm)
Material	Aluminium and Polycarb
Mounting	DIN Rail Mounted
Terminal size	2 x 13 AWG / 2.5mm <sup>2</sup>
Keypad Dimensions	4 1/8"H x 6 7/8"W x 1"D / 105H x 175W x 24D (mm)
Material	Polycarbonate
Mounting	Panel Mounted

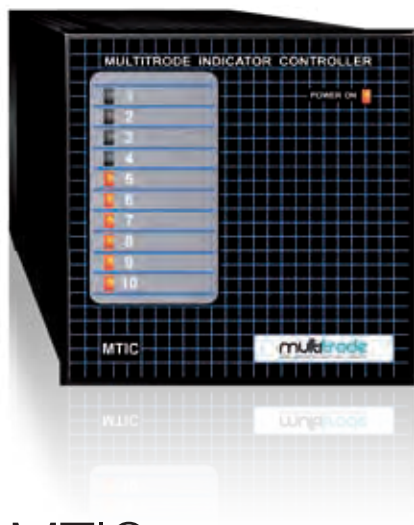
### POWER SUPPLY:

Supply voltage AC	MTDPC 3 110VAC nom. 50/60Hz MTDPC 2 240VAC nom. 50/60Hz
Power Consumption	6VA max.

### ENVIRONMENTAL RANGE:

Operating Temp.	-10°C to +60°C (+14°F to 140°F)
Humidity	90% non condensing

### RECOMMENDED PROBE 10-SENSOR PROBE



## MTIC

Connect the MultiTrobe probe to a PLC/RTU – or provide independent control.

The MTIC Indicator Controller provides continuous level indication and pump control from the MultiTrobe probe.

The 4-20mA output allows the probe to be connected to a PLC or dedicated pump controller system. The 10 Digital Outputs (one for each probe input) provide a mechanism for simple pump control without any other control device.

- 4-20mA output.
- 10 digital outputs.
- Bargraph for level indication.
- Control up to 3 pumps.

## MTIC SPECIFICATIONS

### MODE OF OPERATION:

Mode	Fill or Empty (Charge or Discharge)
------	-------------------------------------

### PROBE INPUTS:

Sensor Inputs	10
Sensor Voltage	10VAC Nominal
Sensor Current	0.8mA max (per sensor)
Sensitivity	1k, 4k, 20k, 80k Ohms

### RELAY OUTPUTS:

Selectable Delays	0, 5, 10, 15 sec
Relay contact rating	250VAC 5A Resistive, 2A Inductive
Relay contact life	10 <sup>5</sup> Operations
Terminal size	2 x 2 x 13 AWG / 2.5mm <sup>2</sup>

### ANALOG OUTPUT:

Analog	4-20mA RLoad < 940 Ohms
--------	-------------------------

### DISPLAY:

LEDs	10 LED bargraph & Power On
------	----------------------------

### PHYSICAL PRODUCT:

Dimensions	3.78"H x 3.78"W x 5.12"D (inches) 96H x 96W x 130D (mm)
Mounting	Panel mounted through cut-out (brackets supplied)
Enclosure	Extruded aluminium

### POWER SUPPLY:

Supply Voltage AC	MTIC2 240V, 50/60Hz MTIC3 110V, 50/60Hz
Power Consumption	16VA max.
Supply Voltage DC	MTIC5 24V MTIC6 12V
Power Consumption	10W max.

### ENVIRONMENTAL RANGE:

Operating Temp.	-10°C to +60°C (+14°F to 140°F)
Humidity	90% non condensing

### RECOMMENDED PROBE 10-SENSOR PROBE



# NEW

## SAFE-FSP & SAFE-TL SafeSmart Backup Controllers.

For the rare times when the primary control or primary level device fails, an independent backup control system reduces the risk of spills.

SafeSmart Backup Controllers, used with a 3-sensor probe (or 3 single-sensor probes), are the next generation of backup systems for wastewater lift stations.

Most utilities have been using a high level sensor into their primary control device, so if the primary control device fails the operations staff find out through a 'Comms Fail' alarm from the SCADA system. This puts time pressure on every aspect of the organization. A SafeSmart Backup Controller helps avoid this risk.

Complete back up controller including pump control, level alarms and pump sensor inputs:

- Perfect pump control for one pump (either primary or redundant control).
- One level alarm - either high or low.
- Manual (hand) operation from an external selector switch or (SAFE-TL only) keypad.
- Pump thermal protection (thermistor, thermal switch or Flygt FLS).
- Adjustable delays for pump start / stop and alarms.
- Failed Probe detection (requires new failsafe probe).
- Adjustable sensitivity for MultiTrod probe.
- Parallel operation with MultiSmart.

SAFE-TL also has:

- Seal and thermal protection from Flygt FLS input.
- Remote mount keypad.

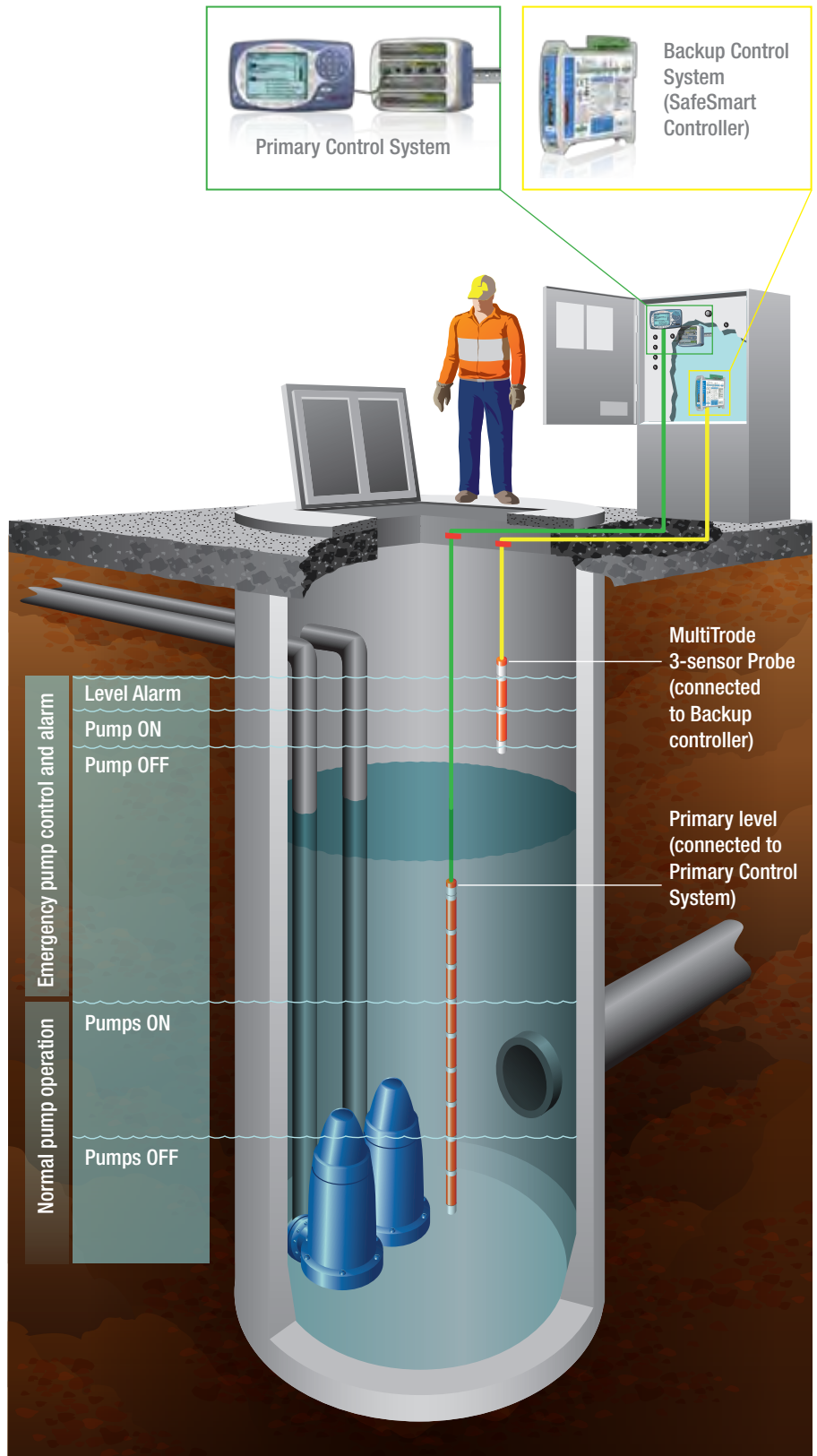
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### SAFE-FSP SPECIFICATIONS

<b>MODE</b>	Fill or Empty (Charge or Discharge) Start / Stop / High level or Low Level Alarm
<b>RELAY OUTPUTS</b>	Pump, Alarm, Probe Fail
<b>RELAY RATINGS</b>	5A Resistive, 2A Inductive, 30VDC or 250VA Contact Life 10 <sup>5</sup> operations
<b>PROBE INPUTS</b>	Low / High / Alarm / Alarm failsafe
<b>PUMP INPUT</b>	PTC thermistor or Thermal N/C or Flygt FLS [note] Can work in parallel with MultiSmart pump controller
<b>DIGITAL INPUTS</b>	- Manual (hand) mode - Off mode
<b>DIP SWITCHES</b>	- Empty or Fill mode - High or Low level alarm - Pump Activation Delay 0.5 or 30s - Pump Deactivation Delay 0.5 or 30s - Alarm Activation & Deactivation Delay 0.5 or 30s - Level Alarm & Probe Alarm Outputs N/C or N/O - Probe Sensitivity 1k, 4k, 20k or 80k
<b>DISPLAY LEDS</b>	- Power - Level Alarm - Pump Relay - Thermal Fault - Probe Fault
<b>POWER SUPPLY</b>	11-30v DC @ 0.15A 85-265V 50/60Hz, 3VA
<b>PHYSICAL PRODUCT</b>	DIN rail mounted (4.2"H x 3.0"W x 0.7"D (inches) 106H x 75W x 17D (mm)
<b>ENVIRONMENTAL RANGE</b>	-10°C to +60°C (+14°F to 140°F) Relative Humidity 5 to 90%, non-condensing
<b>ORDERING INFORMATION</b>	SAFE-FSP
<b>RECOMMENDED PROBE ONE FAILSAFE 3-SENSOR PROBE</b>	

## SAFE-TL SPECIFICATIONS

<b>MODE</b>	Start / Stop / High level or Low Level Alarm
<b>RELAY OUTPUTS</b>	Pump, Alarm, Thermal / FLS
<b>RELAY RATINGS</b>	5A Resistive, 2A Inductive, 30VDC or 250VA Contact Life 10 <sup>5</sup> operations
<b>PROBE INPUTS</b>	Low / High / Alarm / Alarm failsafe
<b>PUMP INPUT</b>	PTC thermistor or Thermal N/C or Flygt FLS [note] Can work in parallel with MultiSmart pump controller - Seal
<b>DIGITAL INPUTS</b>	- Manual (hand) mode
<b>DIP SWITCHES</b>	- Empty or Fill mode - High or Low level alarm - Pump Activation Delay 0.5 or 10s - Seal Fault Operates DO3 or Indicates LED only - Thermal Input to be Thermal Only or Thermal & Seal (miniCAS) - Thermal Reset is Manual or Auto - Probe Sensitivity 1k, 4k, 20k or 80k
<b>DISPLAY LEDS</b>	- Power - Level Alarm - Pump Relay - Thermal Fault - Seal Fault
<b>POWER SUPPLY</b>	11-30v DC @ 0.15A 85-265V 50/60Hz, 3VA
<b>PHYSICAL PRODUCT</b>	DIN rail mounted (4.2"H x 3.0"W x 0.7"D (inches) 106H x 75W x 17D (mm)
<b>ENVIRONMENTAL RANGE</b>	-10°C to +60°C (+14°F to 140°F) Relative Humidity 5 to 90%, non-condensing
<b>ORDERING INFORMATION</b>	SAFE-TL
<b>RECOMMENDED PROBE ONE FAILSAFE 3-SENSOR PROBE</b>	





## SAFE-FS

### SafeSmart Failsafe Level Alarm Relay.

The Safe-FS is the next generation of ultra-reliable high level alarming for lift stations and pump stations. It adds failsafe probe functionality, for example, for a situation where rats have been eating through cables. The -FS verifies that the high level alarm is always functioning.

Level Alarm Relay for use with the new failsafe probe.

- Separate relays for level alarm & loss of probe.
- N/O or N/C outputs.
- Adjustable delays.
- LED indication for power, level alarm, loss of probe alarm.

#### SAFE-FS SPECIFICATIONS

<b>MODE</b>	High Level or Low Level Alarm
<b>RELAY OUTPUTS</b>	- Level alarm N/O or N/C, 0.5s or 10s delay - Probe fail N/O or N/C, 0.5s or 10s delay [note] requires failsafe probe
<b>RELAY RATINGS</b>	- 5A Resistive, 2A Inductive, 30VDC or 250VA - Contact Life 10 <sup>6</sup> operations
<b>PROBE INPUTS</b>	- Alarm sensor - Failsafe for alarm sensor
<b>DISPLAY LEDS</b>	- Power On Green, flashes when low - Level Alarm Red, flashes when alarm active - Probe Alarm Red, flashes when alarm active
<b>POWER SUPPLY</b>	11-30v DC @ 0.15A max
<b>PHYSICAL PRODUCT</b>	(4.2"H x 3.0"W x 0.7"D (inches) DIN rail mounted 106H x 75W x 17D (mm)
<b>ENVIRONMENTAL RANGE</b>	-10°C to +60°C (+14°F to 140°F) Relative Humidity 5 to 90%, non-condensing
<b>ORDERING INFORMATION</b>	SAFE-FS
<b>RECOMMENDED PROBE ONE FAILSAFE SINGLE SENSOR PROBE</b>	



## MTR family

Simple, reliable and effective – for use with MultiTrobe probes or in any control application.

The MTR family gives an ultra-reliable, maintenance free level control system. Use it with the MultiTrobe conductive probes and it works in the worst kind of liquids:

- Wastewater.
- Stormwater.
- Industrial effluent.
- Sullage pits.

The adjustable conductivity settings and adjustable delays give it the flexibility that other systems lack.

The MTR controls one pump in fill (pump up) and empty (pump down) applications. The MTRA controls one pump and one alarm in empty only mode.

The MTR family is also available with single sensor probes as a package: MT-SSP

To order the Sump Pack, use the order code MTSSP - relay part number - probe cable length in m.

E.g. MTSSP-MTR3-10 is the ordering code for the sump pack with MTR3 and 2-single sensor probes each with 10m / 33ft of cable.

## MTR SPECIFICATIONS

### MODE OF OPERATION:

MTR Mode	Fill or Empty (Charge or Discharge)
MTRA Mode	Empty ONLY

### PROBE INPUTS:

Sensor inputs	MTR : 2 / MTRA : 3
Sensor voltage	10 / 12VAC Nominal
Sensor current	0.8mA max. (per sensor)
Sensitivity	1k, 4k, 20k, 80k

### RELAY OUTPUTS:

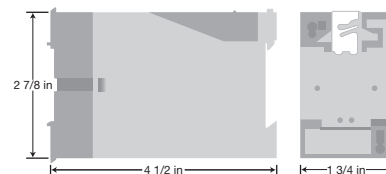
MTR relay output	2 contact sets : 1 N/O & 1 C/O
MTR output delay	0, 2.5, 5, 10, 20, 40, 80, 160 sec
MTRA relay output	2 relays : both N/O
MTRA output delay	Pump: 0.5, 10; Alarm: 0.5, 15 sec
Relay contact rating	250 VAC 5A Resistive, 2A Inductive
Relay contact life	10 <sup>5</sup> Operations
Terminal size	2 x 13 AWG / 2.5mm <sup>2</sup>

### DISPLAY

LEDs:	Power On	Pump	Alarm
MTR	Green	Red	
MTRA	Green	Yellow	Red

### PHYSICAL PRODUCT:

Dimensions	2.7/8"H x 1.3/4"W x 4.1/2"D (Inches) 72H x 45W x 114D (mm)
Mounting	DIN Rail or 2 x #6 Screws / 2 x M4 Screws
Enclosure	Makrolon (self-extinguishing)



### POWER SUPPLY:

Supply Voltage AC	MTR-2 / MTRA-2 240V 50/60Hz MTR-3 / MTRA-3 110V 50/60Hz MTR-4 / MTRA-4 24V 50/60Hz
Power Consumption	3.5W max.
Supply Voltage DC	MTR-5 / MTRA-5 24V MTR-6 / MTRA-6 12V
Power Consumption	3W max.

### ENVIRONMENTAL RANGE:

Operating Temp.	-10°C to +60°C (+14°F to 140°F)
Humidity	90% non condensing

### RECOMMENDED PROBE

MTR	2 single-sensor probes
MTRA	3 single-sensor probes, or a 3-sensor probe

A 10-sensor probe can also be connected to the sensors, when you need to have the versatility to change setpoints without going back into the pit.

All specifications subject to change without notice.

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# **Section 10 – Multitrode Level Sensor Chemical Information**



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The major exposed surfaces of the MultiTrobe Probe are PVC and AVESTA 254 SMO. Both have been tested and will operate with all the chemicals listed below. All aqueous solutions, unless stated, are at 100%.

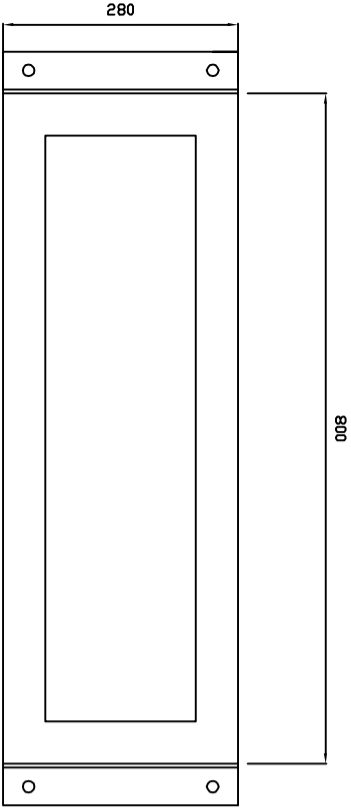
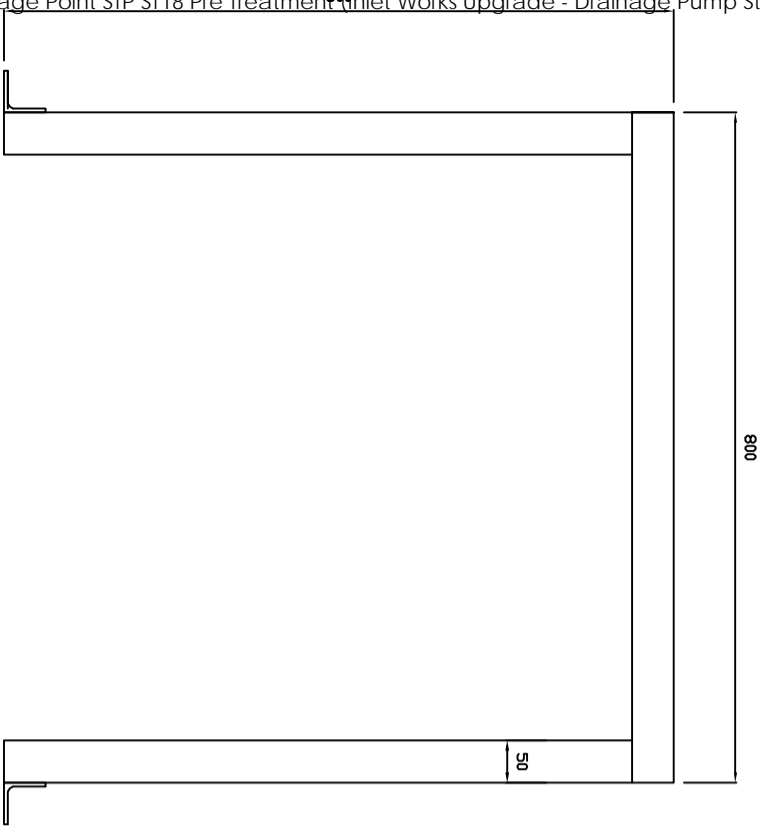
1	Chemical	2	Notes
	ACETIC ACID		50% AQUEOUS
	ADIPIC ACID		SATURATED AQUEOUS
	ALUMINIUM SULPHATE		27%
	AMMONIUM CARBONATE		50% AQUEOUS
	AMMONIUM HYDROXIDE		ALL Concentrations
	AMMONIUM PHOSPHATE		ALL Concentrations
	AMMONIUM SULPHATE		ALL Concentrations
	AMMONIUM SULPHIDE		ALL Concentrations
	AMYL ALCOHOL		
	ANILINE HYDROCHLORIDE		ALL Concentrations
	BARIUM HYDROXIDE		ALL Concentrations
	BEER		
	BORAX		ALL AQUEOUS
	BORIC ACID		AQUEOUS ALL
	CALCIUM NITRATE		50% AQUEOUS
	CHLORIC ACID		10%
	CHROMIC ACID		5%
	FORMIC ACID		UP TO 50% AQUEOUS
	GELATINE		ALL Concentrations
	GLUCOSE		ALL Concentrations
	GLYCERINE		ALL Concentrations
	HYDROBROMIC ACID		50% AQUEOUS
	HYDROCYANIC ACID		100%
	HYDROFLUORIC ACID		1%
	HYDROGEN PEROXIDE		30% AQUEOUS
	HYDROGEN SULPHIDE		MOIST GAS OR SATUR. AQUEOUS SOLUTION
	LACTIC ACID		18% AQUEOUS
	LEAD ACETATE		ALL CONC
	MERCURY		100%
	MILK		SOUR
	NITRIC ACID		UP TO 40% AQUEOUS



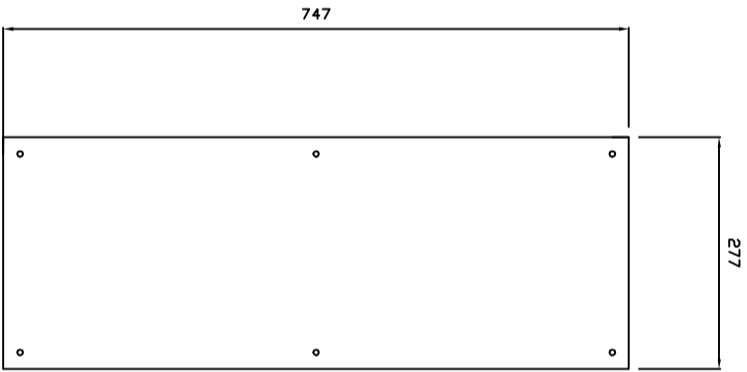
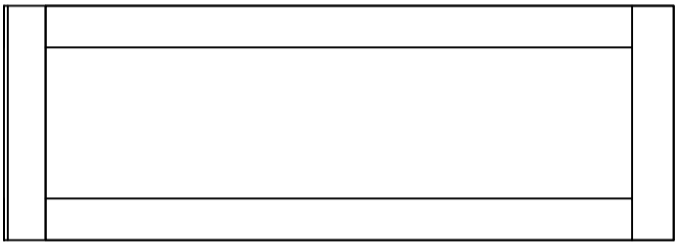
OXALIC ACID	5%
PHOSPHORIC ACID	UP TO 30% AQUEOUS
POTASSIUM BICHROMATE	25%
POTASSIUM CHLORATE	36%
POTASSIUM CHROMATE	ALL Concentrations
POTASSIUM CYANIDE	ALL Concentrations
POTASSIUM PERMANGANATE	5-10%
POTASSIUM PERSULPHATE	SATURATED
POTASSIUM SULPHATE	ALL Concentrations
SODIUM ACETATE	ALL Concentrations
SODIUM BICARBONATE	ALL Concentrations
SODIUM BISULPHATE	5%
SODIUM BISULPHITE	10%
SODIUM CHLORATE	30%
SODIUM FLUORIDE	5-10%
SODIUM NITRATE	ALL Concentrations
SODIUM PHOSPHATE	ALL Concentrations
SODIUM SILICATE	ALL AQUEOUS
SODIUM SULPHATE	ALL Concentrations
SODIUM SULPHIDE	5%
SODIUM SULPHITE	50%
SODIUM THIOSULPHATE	16-25%
SULPHUR DIOXIDE	TECHNICALLY PURE ANHYDROUS
SULPHURIC ACID	98%
SULPHUROUS ACID	SATURATED AQUEOUS
TANNIC ACID	ALL AQUEOUS
TARTARIC ACID	ALL AQUEOUS
TURPENTINE OIL	TECHNICALLY PURE
VINEGAR	4-5%
YEAST	ALL AQUEOUS

MultiTrode Probes can be used in numerous aggressive applications. The information contained above is a representative sample. For other solutions, Contact Us.

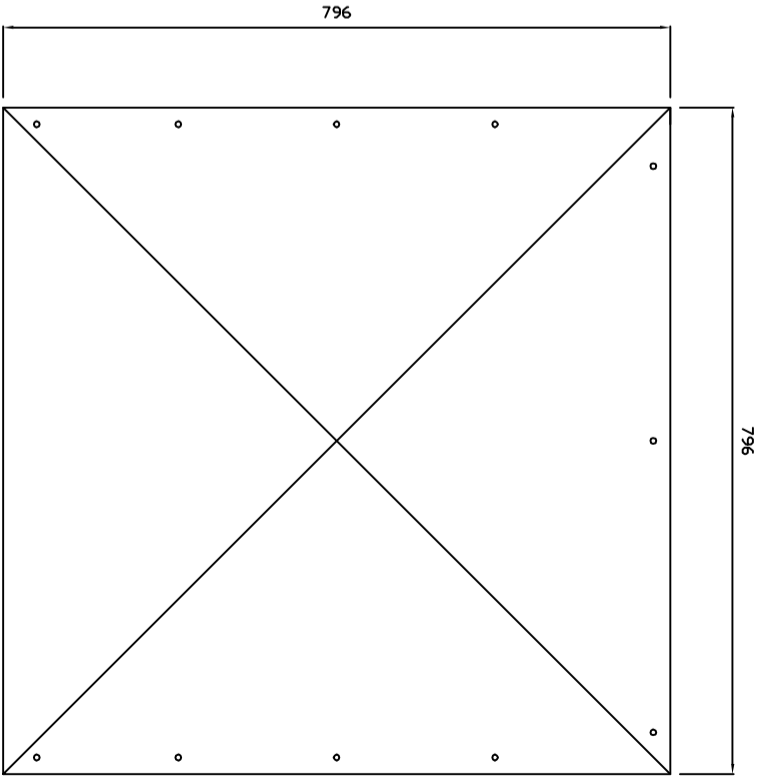
# **Section 11 – Drainage Pump Station Control Cabinet & Wiring Drawings**



50 x 5 grade 316 equal angle  
2 off - 800 long  
4 off - 750 long  
4 off - 280 long  
5720 long



1.6mm grade 316 sheet - 2 reqd



1.6mm grade 316 sheet with cross break - 1 reqd





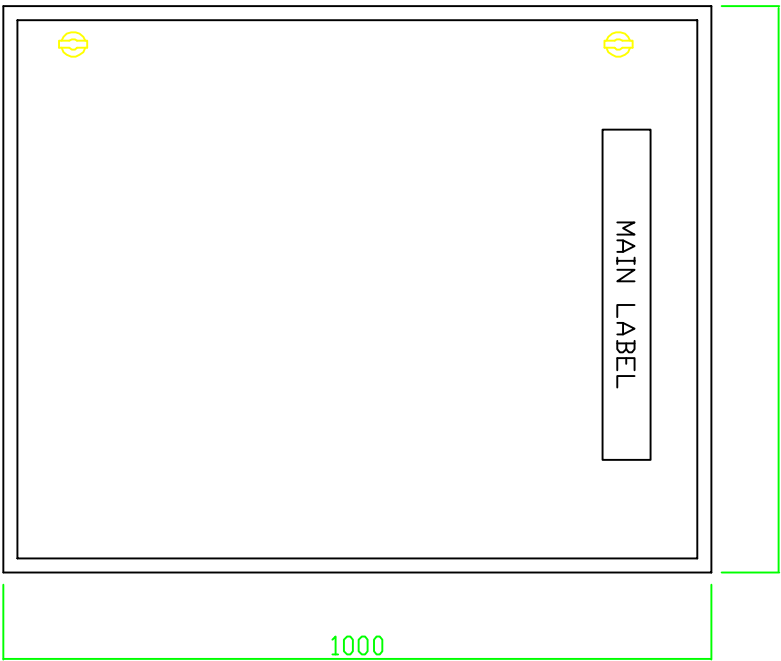
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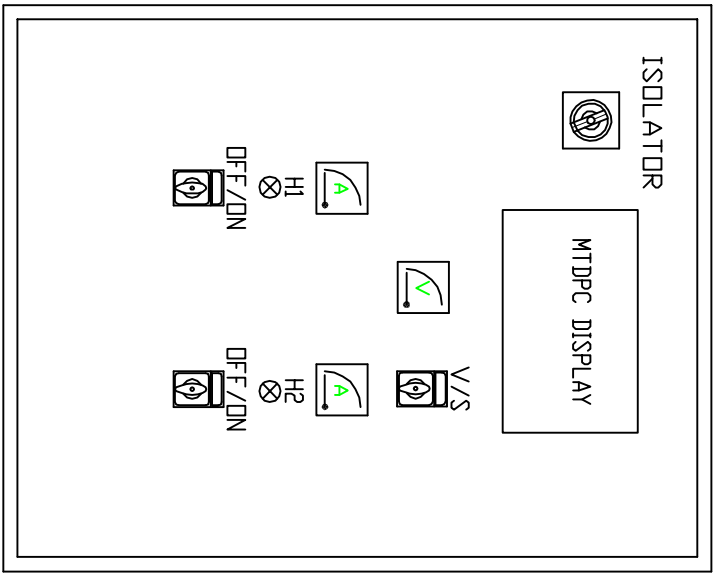
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TITLE	
SIZE	
SCALE	

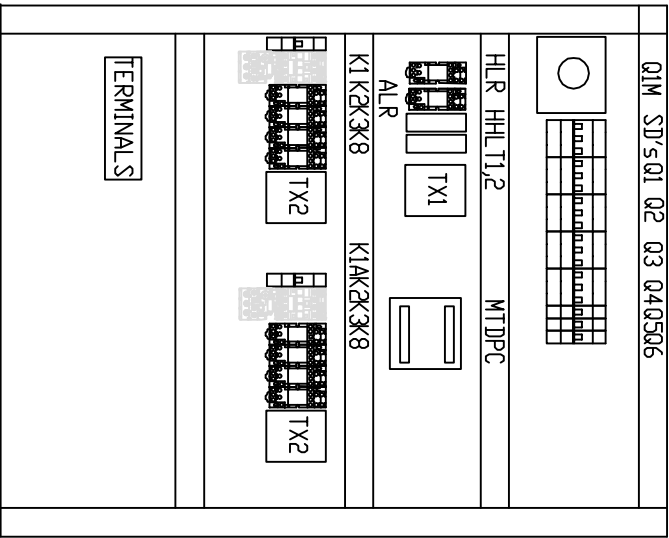


ELEVATION



INTERNAL DOOR LAYOUT



MTG PANEL LAYOUT

CONSTRUCTION NOTES:

- 1. SCA SHALL BE CONSTRUCTED FROM 316 STAINLESS STEEL
- 2. CABINET TO BE PROPRIETARY NHP ZANARDO D1008030 + INNER DOOR
- 3. CABINET TO BE OUTDOOR TO IP66
- 3. FORM OF SEGREGATION OF ASSEMBLY IS FORM 1 TO AS3439.1-2002.



A		ISSUED FOR CLIENT APPROVAL	KF	28/7/16	
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7/5 Daintree Place  
West Gosford NSW 2250  
PH. 4321 1000 FAX. 4321 1033

CLIENT		Xylem Water Solutions Australia Ltd		TITLE	
ADDRESS		7/5 Daintree Place		LUGGAGE POINT STP DRAINAGE P/S	
		EASTERN CREEK		CONTROL CABINET GENERAL ARRANGEMENT	
NSW					
AUSTRALIA					
DIMENSIONS IN MILLIMETERS		DRAWN		SIZE	
		K.F.		A1	
		CHECKED (SIGN & DATE)		SCALE	
		APPROVED (SIGN & DATE)		DO NOT	
		CAD FILE No.		DRAWING NO.	
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