Installation,
Operation, and
Maintenance Manual

SR 4460

FLYGT
a xylem brand

Table of Contents

Introduction and Safety

Introduction

Purpose of this manual

The purpose of this manual is to provide necessary information for:

- Installation
- Operation
- Maintenance

CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.

NOTICE:

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

Safety

WARNING:

- The operator must be aware of safety precautions to prevent physical injury.
- 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.

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
 DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
 WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
 CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	• A potential situation which, if not avoided, could result in undesirable conditions • A practice not related to personal injury

Hazard categories

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

Electrical hazards are indicated by the following specific symbol:

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.

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.

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.

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:

- 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.

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	1. Hold your eyelids apart forcibly with your fingers. 2. Rinse the eyes with eyewash or running water for at least 15 minutes. 3. Seek medical attention.
Chemicals or hazardous fluids on skin	1. Remove contaminated clothing. 2. Wash the skin with soap and water for at least 1 minute. 3. Seek medical attention, if necessary.

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.
- You must fully submerge the Ex-approved product 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.

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 pump or mixer 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 to +60°C.

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.

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

General description

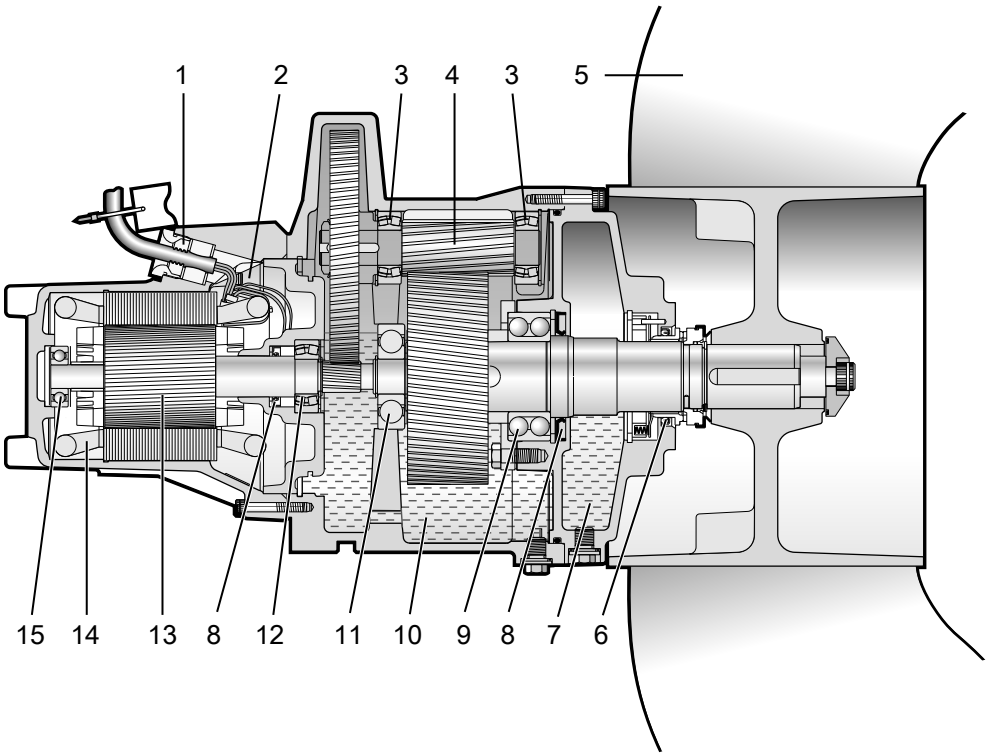
Mixer design

The mixer is submersible and driven by an electric motor.

Intended use

The product is intended for moving waste water, sludge, raw and clean water. Always follow the limits given in *Application limits* (page 44). If there is a question regarding the intended use of the equipment, please contact an Xylem representative before proceeding.

Illustration



Parts

Position	Part	Description
1	Cable entry	Bushing and strain relief on the cable prevent leakage into the motor
2	Junction box	Completely sealed off from the surrounding liquid
3	Bearing	Spherical roller bearings with cylindrical bore
4	Gear box	Two-stage cylindrical helical gear box
5	Propeller	Thin-sectioned, non-clogging propeller with double-curved blades

Position	Part	Description
6	Mechanical face seal	One stationary and one rotating seal ring
7	Oil housing	A housing with oil that lubricates and cools the seals, and acts as a buffer against penetrating liquid
8	Lip seal	-
9	Outer bearing	Spherical roller bearing with cylindrical bore
10	Gear housing	A housing with oil that lubricates the gear wheels
11	Inner bearing	Single-row cylindrical roller bearing
12	Main bearing	Spherical roller bearing
13	Electric motor	For information about the motor, see *Motor data* (page 44)
14	Thermal contacts	For information about the thermal contacts, see Monitoring equipment
15	Support bearing	Deep-groove ball bearing

Monitoring equipment

The following applies to the monitoring equipment of the mixer:

- The stator incorporates thermal contacts connected in series that activates the alarm at overtemperature.
- The thermal contacts open at 125°C (257°F).
- The sensors must be connected to either the MiniCAS II monitoring unit or an equivalent unit.
- The monitoring equipment must be of a design that makes automatic restart impossible.
- The mixer can be equipped with an inspection sensor FLS for sensing the presence of any liquid in the stator housing.
- The mixer can be equipped with a water leakage sensor CLS for sensing the presence of any water in the oil housing.
- The mixer can be equipped with a Variable Frequency Drive (VFD).

Spare parts

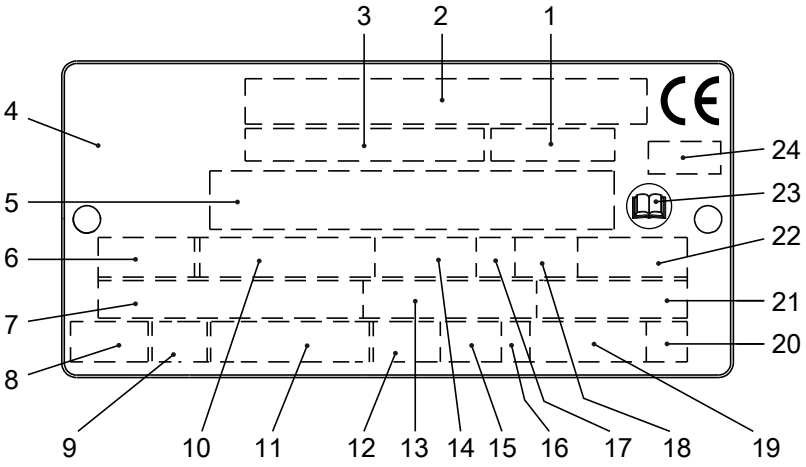
Modifications to the unit/installation should only be carried out after consulting with Xylem. Original spare parts and accessories authorized by the manufacturer are essential for compliance. The use of other parts can invalidate any claims for warranty or compensation. For more information contact your Xylem representative.

Mixer versions

- Standard version
- Ex-approved version
- Optional configuration up to 60°C (140°F)

The data plate

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



1. Curve code/Propeller code
2. Serial number, see *Product denomination* (page 15)
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

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 an FM approval plate.

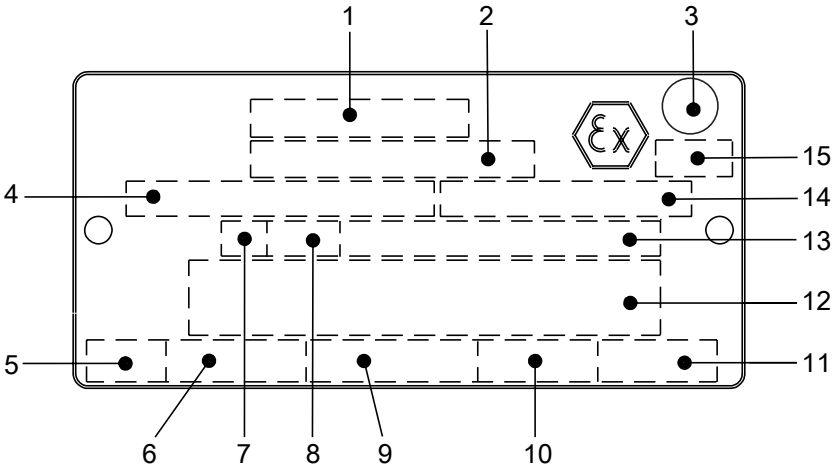
EN

European Norm

- ATEX Directive
- EN 60079–0, EN 60079–1, EN 1127–1

The EN approval plate shows the following approval:

II2G Ex d IIB T4



1. Approval
2. Approval authority and 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

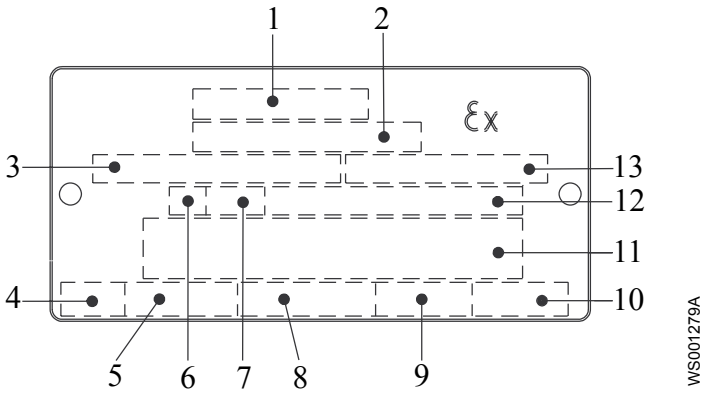
EN approval for cable entry:

- Certificate number: INERIS 02ATEX 9008 U
- 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

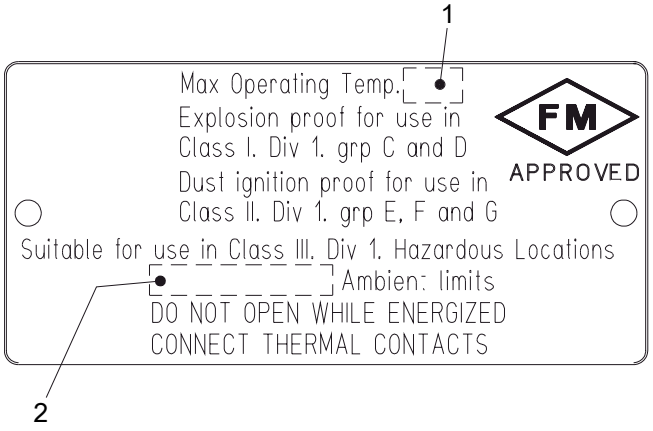


1. Approval
2. Approval authority + approval number
3. Approved for drive unit
4. Stall time

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



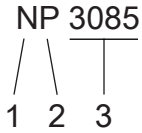
1. Temperature class
2. Maximum ambient temperature

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.

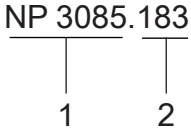


1. Hydraulic part
2. Installation type
3. Sales code

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.

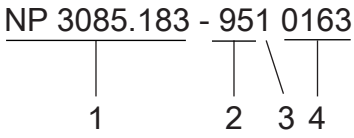


1. Sales denomination
2. Version

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.



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

Installation

Install the mixer

WARNING:

- Do not install CSA-approved products in locations that are classified as hazardous in the national electric code, ANSI/NFPA 70-2005.
- Vent the tank of a sewage station in accordance with local plumbing codes.

NOTICE:

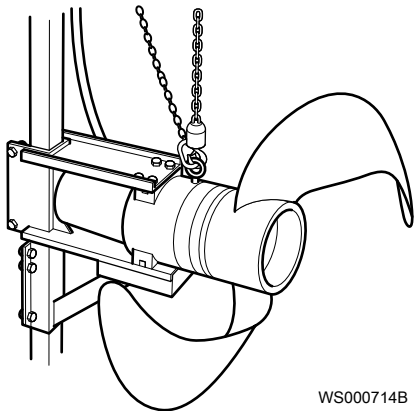
All mounting to the floor should be made with chemical anchor bolts from Xylem.

For information about measurements, see the dimensional drawings of the product.

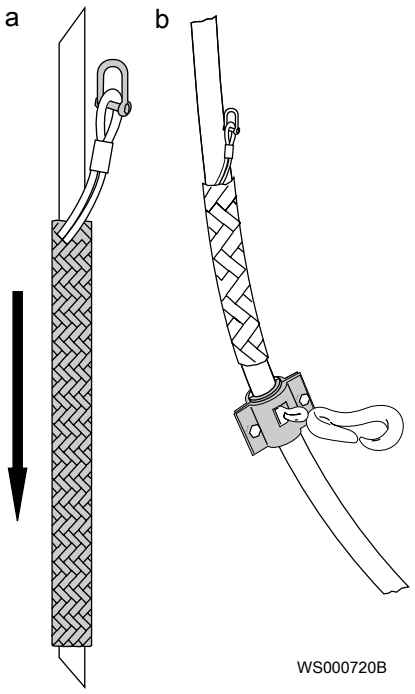
Before installing the mixer, assemble the propeller blades according to the instruction in *Assemble the propeller blades* (page 39).

Install on a tripod

1. Attach chains or wires:
   a) Attach the lifting chain or wire to the mixer with a shackle, and make sure that the shackle is securely locked.
   b) Attach the support chain or wire for the power cable to the mixer.



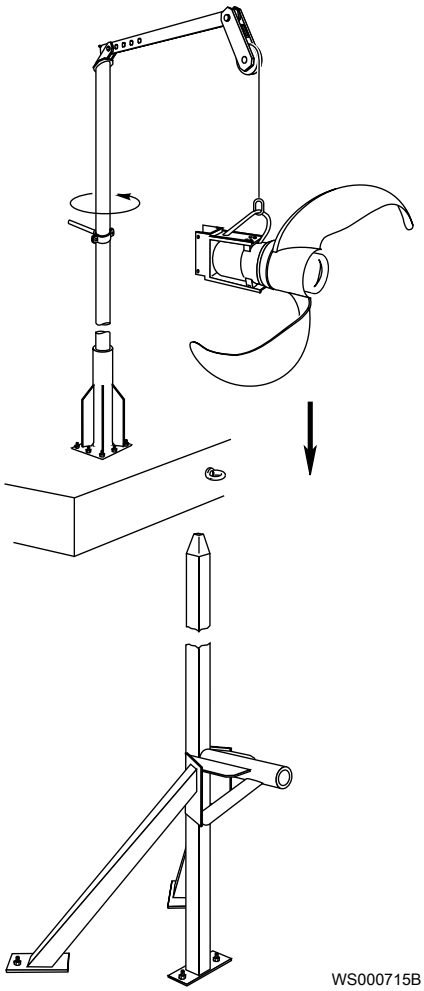
2. Prepare the power cable:
   a) Place the support grip in position on the power cable, and attach a shackle to the grip.
   b) Place cable holders on the power cables every 1.5 m (4.9 ft).



3. Mount the mixer:
   a) Raise the mixer.
   b) Pivot the mixer with the operating bar on the davit.

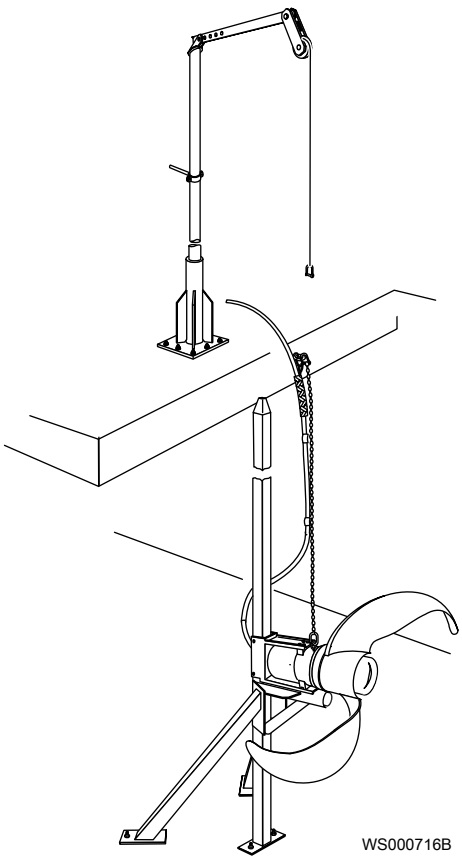
   NOTICE: The lifting chain or wire must be vertically aligned with the guide bar.

   c) Lower the mixer onto the guide bars until it rests on the support unit.



4. Attach the support chain or wire to the bracket unit or eye bolt with a shackle.

NOTICE: Make sure that the chains or wire are taut to prevent them from being sucked into the propeller.

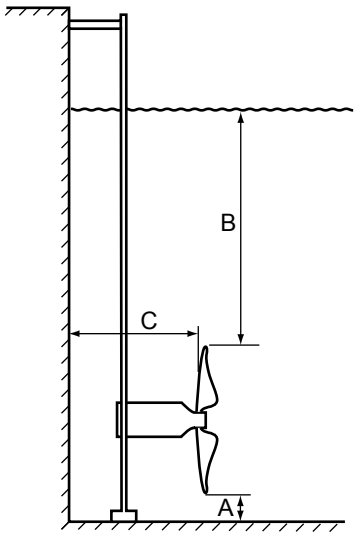


Position the mixer

For more information contact your Xylem representative.

Propeller clearance

This figure shows the propeller clearance. It is the minimum distance between the propeller blade and the surrounding environment.



Minimum propeller clearance

Beginning of the distance	End of the distance	Minimum value	Distance in the figure
Peak position of the propeller blade	• Side wall • Bottom of the tank	300 mm (12 in.)	A
Peak position of the propeller blade	Liquid level	750 mm (30 in.) Exception: In thick media and very good flow condition or with lower motor load, the distance can be 300 mm (12 in.).	B
Propeller blade	Background wall	The dimension of the propeller diameter	C

Obstacles and walls downstream of the mixer

The clear distance downstream of the mixer must be at least 10 times the propeller diameter.

Electrical installation

Requirements

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.
- 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.
- Make sure that all unused conductors are insulated.

Requirements

Check that the following requirements are met:

- The supply authority must be notified before installing the unit if it will be connected to the public mains. When the unit is connected to the public power supply, it may cause flickering of incandescent lamps when started.
- The mains voltage and frequency must agree with the specifications on the data plate.
- The fuses and circuit breakers must have the proper rating, and the unit must be connected to an overload protection (motor protection breaker) that is set to the rated power. See the specifications on the data plate. The starting current in direct-on-line starting 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, the unit must be provided with monitoring equipment supporting such operation.

Cables

When choosing cables:

- The cables must be in good condition, not have any sharp bends, and not be pinched.
- If a cable 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 cable covering is damaged, replace the cable (contact an Xylem service shop).
- The cable entry seal sleeve and washers must conform to the outside diameter of the cable.
- A 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).
- The voltage drop in long cables must be taken into account. The drive unit's rated voltage is the voltage measured at the terminal board in the upper part of the product.

Earthing (Grounding)

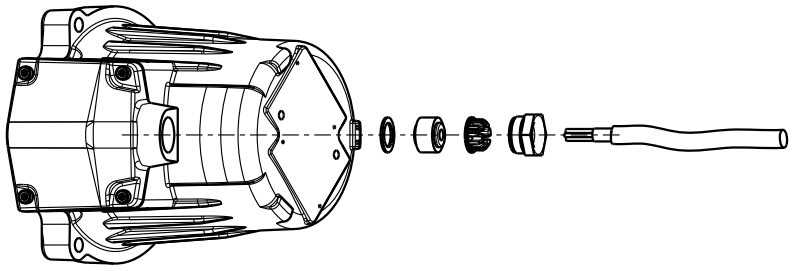
Electrical Hazard:

- All electrical equipment must be earthed (grounded). Make sure that the earth (ground) lead is correctly connected by testing it.
- 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.
- 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.

Connect the motor cable to the mixer

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.



WS000647A

Figure 1: Cable insertion assembly, alternative

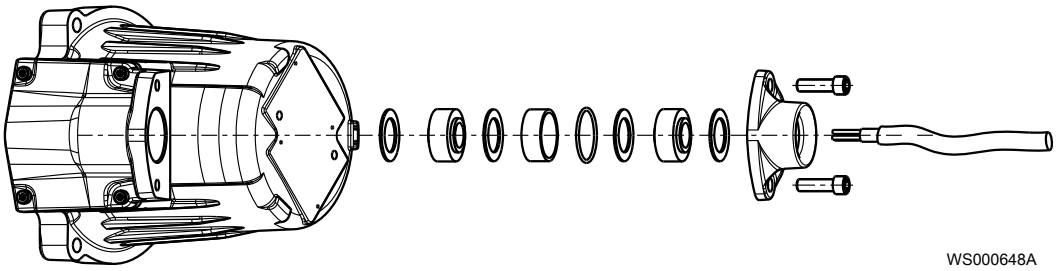


Figure 2: Cable insertion assembly, alternative

The mixer is normally delivered with the cable connected. If not, you need to connect it. For more information about the cable entry, see Parts list.

The earth (ground) conductor must be 90 mm (3.5 in.) longer than the phase conductors in the junction box of the unit.

1. Remove the entrance cover, fixing plate, and O-ring from the mixer housing.
   You will have access to the terminal board.
2. Check the data plate to see which connections are required for the power supply:
   - Y
   - D
   - Y serial
   - Y parallel
3. Arrange the connections on the terminal board in accordance with the required power supply.
4. Connect the motor conductors (U1, V1, W1, and earth (ground)) to the terminal board.
5. Connect the control conductors (T1 and T2) to the terminal board.
6. Make sure that the mixer is correctly connected to earth (ground).
7. Make sure that any thermal contacts are properly connected to the terminal board.
8. Install the O-ring, fixing plate, and entrance cover on the mixer housing.
9. Fasten the screws on the entrance flange so that the cable insertion assembly bottoms out.

Connect the motor cable to the starter and monitoring equipment

WARNING:

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

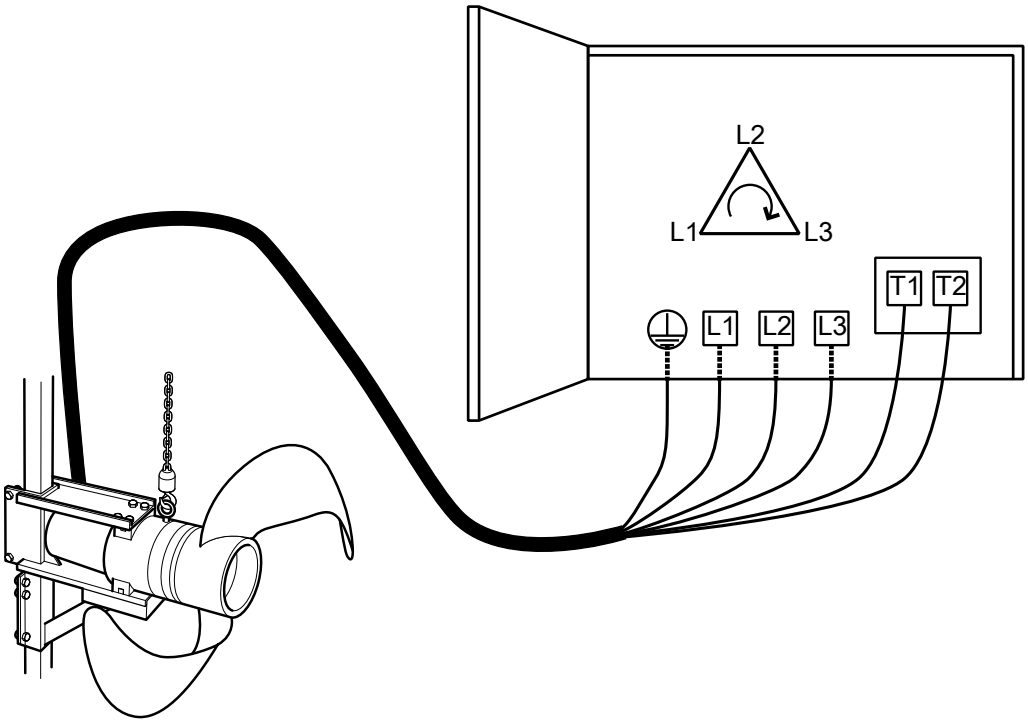


Figure 3: Connection of the motor cable.

1. Connect the T1 and T2 control conductors to the MiniCAS II monitoring equipment.

   NOTICE:

   The thermal contacts are incorporated in the stator. Connect them to 24 V over separate fuses to protect other automatic equipment.

2. If thermistors are included in the mixer installation, connect the T3 and T4 control conductors to the thermistor relay, for example MAS 711.
3. Connect the mains conductors (L1, L2, L3, and earth (ground)) to the starter equipment.

   See the applicable cable charts for the color codes of the conductors.

Sensor-connection alternatives

Sensor alternatives

The mixer is always equipped with thermal contacts incorporated in the stator.

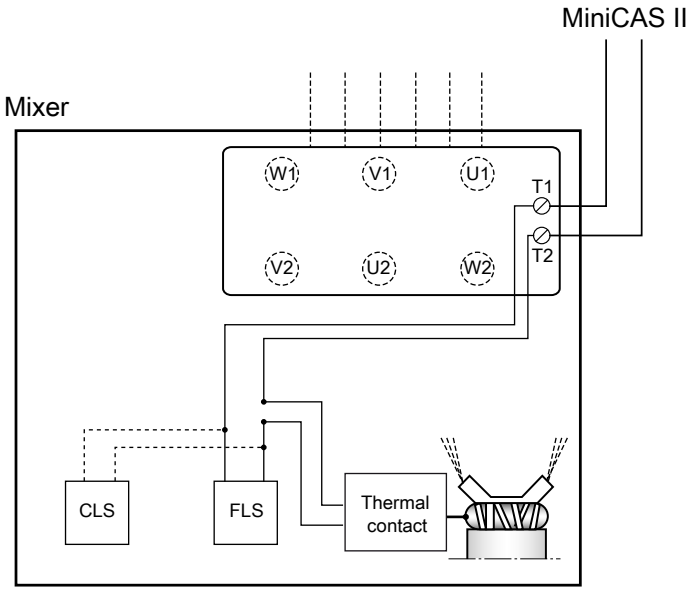
The mixer can also have an optional water leakage sensor (FLS) and/or an oil leakage sensor (CLS).

Connection alternatives

The connection alternatives are the following:

- Thermal contact and FLS
- Thermal contact and CLS
- Thermal contact, FLS, and CLS

Connection diagram



Thermal contact and FLS

This table shows the connection of the thermal contact and the FLS to the MiniCAS II.

Sensor conductor	Terminal board	Cable
White/Grey/Yellow	T1	T1/1 (SUBCAB) Orange (SUBCAB AWG)
Blue	T2	T2/2 (SUBCAB) Blue (SUBCAB AWG)

Thermal contact and FLS/CLS

This table shows the connection of the thermal contact and the FLS/CLS to the MiniCAS II.

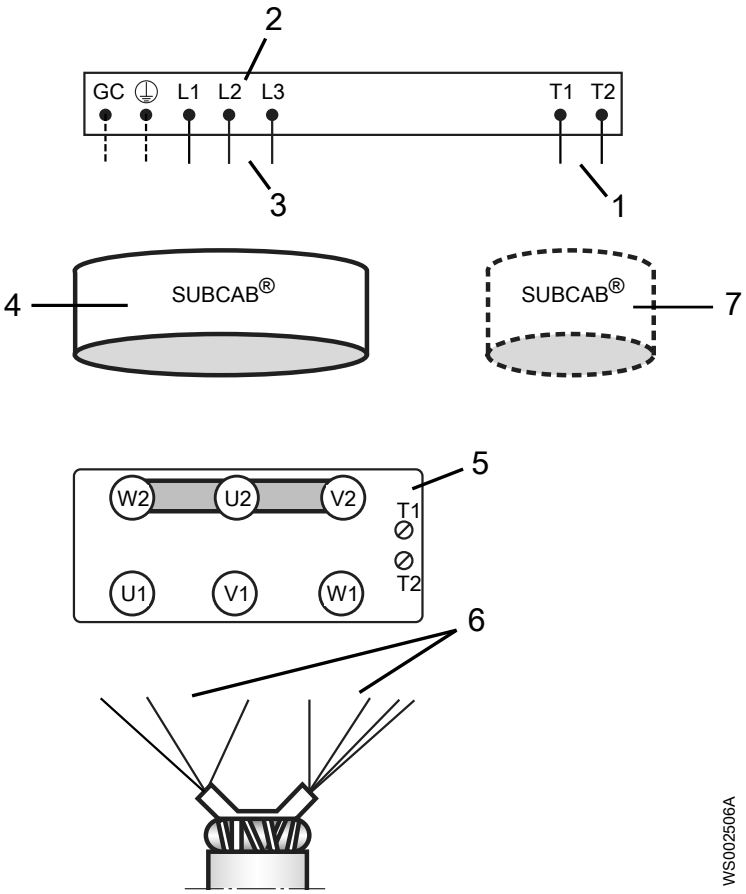
Sensor conductor	Terminal board	Cable
White/Grey/Yellow	T1	T1/1 (SUBCAB) Orange (SUBCAB AWG)
Black	T2	T2/2 (SUBCAB) Blue (SUBCAB AWG)

MiniCAS II

For information about the connection to MiniCAS II, see its separate manual.

Cable charts

Connection locations



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

Colors and marking of the mains leads

Mains	SUBCAB 7GX+2x1.5	SUBCAB 4GX	SUBCAB AWG
L1	1	Brown	Red
L2	2	Black	Black
L3	3	Gray	White
L1	4	-	-
L2	5	-	-
L3	6	-	-
⏚	Yellow/Green	Yellow/Green	Yellow/Green
Ground check (GC)	-	-	Yellow

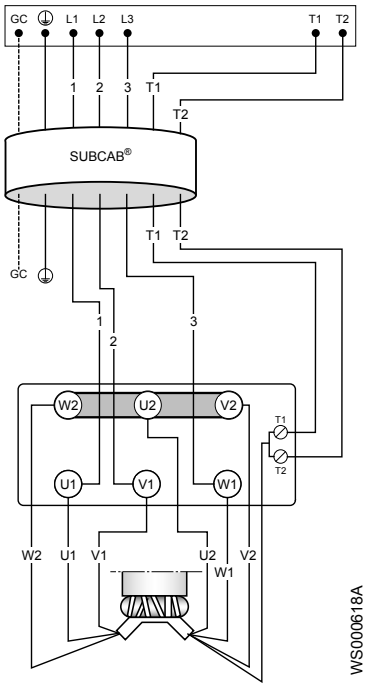
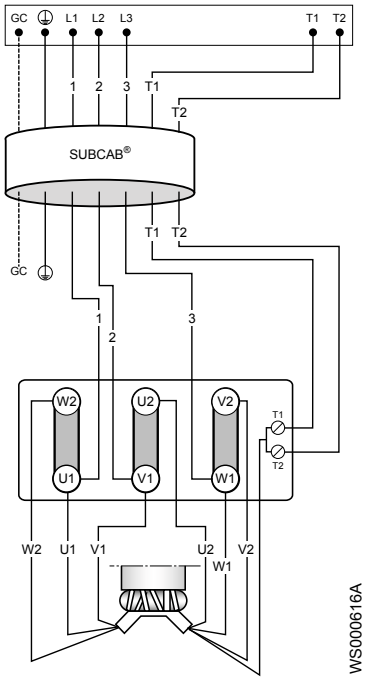
Colors and marking of the control leads

Control	SUBCAB 7GX+2x1,5 and SUBCAB 4GX	SUBCAB AWG
T1	T1	Orange
T2	T2	Blue

Colors of the stator leads

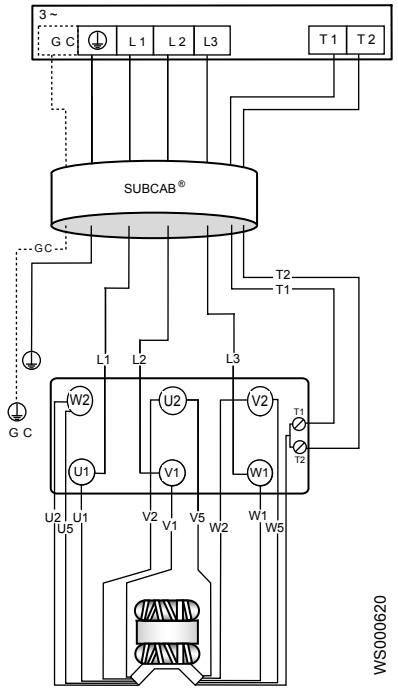
Stator connection	Lead color
U1	Red
U2	Green
U5	Red
V1	Brown
V2	Blue
V5	Brown
W1	Yellow
W2	Black
W5	Yellow

SUBCAB / SUBCAB AWG, 6 stator leads, Y and D connections

Y connection	D connection
	

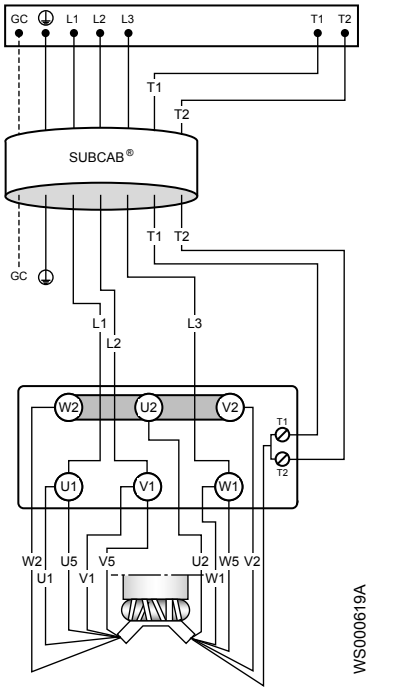
SUBCAB / SUBCAB AWG, 9 stator leads, 460V, 60 Hz

Y serial connection



SUBCAB, 9 stator leads, 230V, 60 Hz

Y parallel connection



Operation

Noise level

The noise level of the unit is normally lower then 70 dB, but in some installations at certain operation points on the performance curve the noise level of 70 dB can be exceeded.

Distance to wet areas

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.

Electrical Hazard:

Risk of electrical shock. This unit has not been investigated for use in swimming pools. If used in connection with swimming pools special safety regulations apply.

Start the mixer

WARNING:

- Make sure nobody is close to the unit when it is started. The unit will jerk in the opposite direction of the propeller rotation.

NOTICE:

The maximum number of starts allowed per hour is 30.

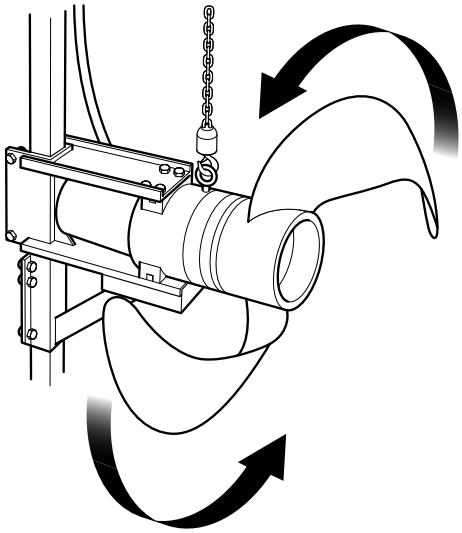
Before you start the mixer, the following requirements must be met:

- There is oil in the oil casing.
- There is oil in the gear box housing.
- The motor cable entry is securely tightened.
- The machine is fixed to the guide bar.
- The monitoring equipment incorporated in the product is correctly connected.

1. Start the motor briefly to check the direction of rotation.

   The correct direction of propeller rotation is counterclockwise when you look at the mixer from the propeller side. See the illustration.

   The illustration shows the correct direction of rotation.



2. If the direction of rotation is incorrect, do as follows:
   a) Stop the motor.
   b) Disconnect the power supply.
   c) Change positions of two of the three mains leads to the power supply.
      For instructions on how to connect the power supply, see *Electrical installation* (page 21).

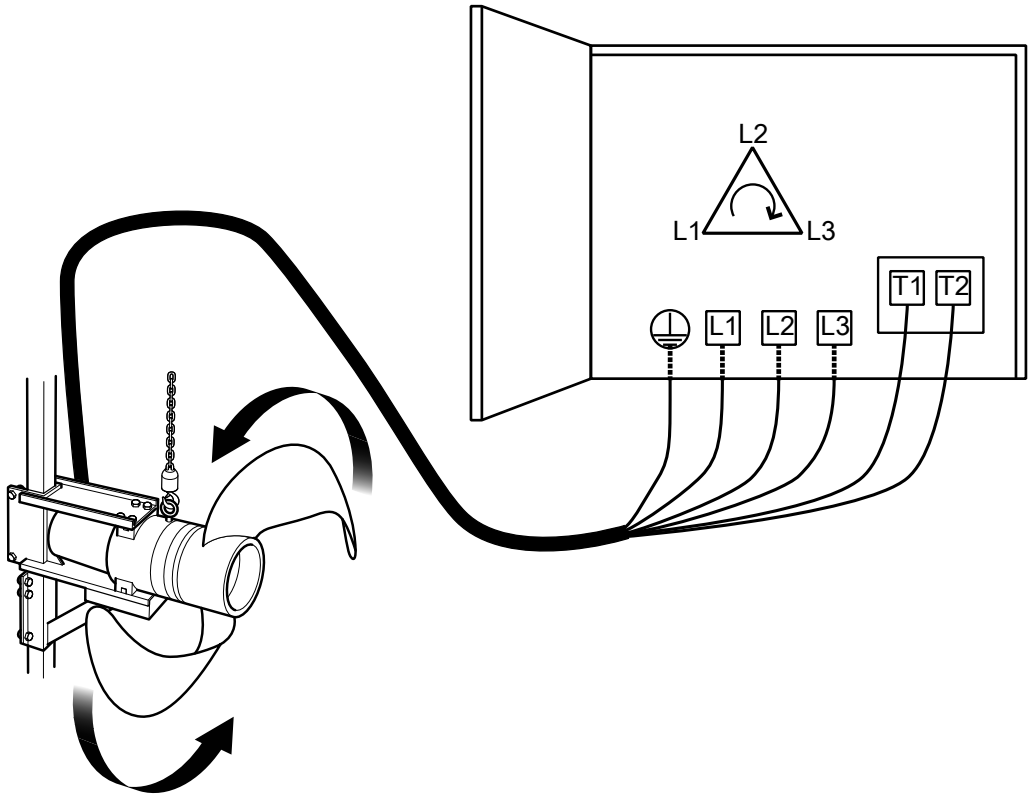


Figure 4: Correct motor cable connection

   d) Start the motor briefly to check that the direction of rotation is correct.

Maintenance

Requirements

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:

When a unit is used for a long period of time, the unit acquires a “patina”. Other working methods besides those recommended here will sometimes have to be used.

Requirements

Check that the following requirements are met:

- The mixer must be isolated from the power supply.
- All tools must be on hand.
- O-rings and other parts that are to be replaced must be set out.
- All parts that have been removed must be cleaned carefully, especially the O-ring seats.
- All screws that have been removed must be lubricated before they are refitted.

Reference

See Parts lists for more details and exploded views of the product, including special tools and parts for service.

Maintenance intervals

Type of service	Purpose	Inspection interval
Initial inspection	To make a check up by an authorized Xylem service representative and, based on the result and findings from these measures, 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 efficiency are defined and decided for each individual application. It can include such things as general inspection, wear part control and replacement, control of zinc-anodes and control of the stator.	Up to 16,000 hours or 2 years, whichever comes first. Applies to normal applications and operating conditions at media (liquid) temperatures <40°C (104°F).
Major overhaul	To secure a long operating lifetime for the product. It includes replacement of key components and the measures taken during an inspection.	Minimum 20,000 hours. Applies to normal applications and operating conditions at media (liquid) temperatures <40°C (104°F).

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	1. If the outer jacket is damaged, replace the cable. 2. Check that the cables do not have any sharp bends and are not pinched.
Connection to power	Check that the connections are properly tightened.
Electrical cabinets	Check that they are clean and dry.
Gear housing	Change the oil.
Insulation	Use a megger maximum 1000 V. 1. Check that the resistance between the earth (ground) and phase lead is more than 5 megohms. 2. Conduct a phase-to-phase resistance check.
Junction box	Check that it is clean and dry.
Lifting device	Check that local safety regulations are followed.
Lifting handle	1. Check the screws. 2. Check the condition of the lifting handle. 3. Replace if necessary. Check the screws and the condition of the lifting handle. Replace if necessary.
Oil housing	Check, and if necessary change the oil.
O-rings	1. Replace the O-rings of the filling plugs and at the junction cover. 2. Grease the new O-rings.
Overload protection and other protections	Check the correct settings.
Personnel safety devices	Check the guard rails, covers, and other protections.
Rotation direction	Check the propeller rotation.
Terminal board	Check that the connections are properly tightened.
Thermal contacts	Normally closed circuit; interval 0–1 ohm.
Thermistor	Check the resistance, which should be 20–250 ohms. Measuring voltage: max 2 VDC.
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

Alarm source	Action
FLS	1. Check the stator housing for any leakage, and drain if necessary. 2. Check mechanical seals and O-rings and replace any damaged seals with new ones.
CLS (not for Ex-approved mixers)	1. Check the oil housing for any leakage. 2. Check mechanical seals and O-rings and replace any damaged seals with new ones.
Thermal contact	1. Check the connections and the electrical motor. 2. Check the start and stop levels. 3. Check that the position is according to the installation requirements.
Overload protection	Check that the propeller can rotate freely.

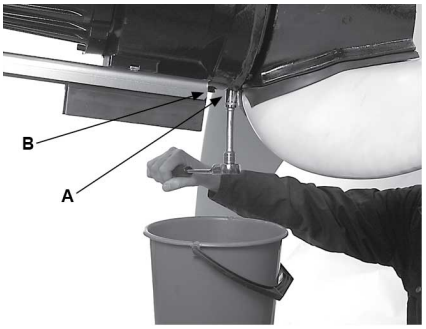
Change the oil

NOTICE:
Mixing lubricating oils can result in equipment damage. Always use the same type of oil when replacing the oil in the gear box.

Drain the oil

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

1. Suspend the mixer horizontally from an overhead crane.
2. Position a suitable vessel underneath the mixer.
   The container must be large enough to hold 7 litres (7.4 US quarts) of used oil.
3. Remove the drain plugs: A for oil housing and B for gear housing.
   It is easier to drain the oil if you also remove the filling plugs.



4. Let the oil drain out.
5. Remove any metal particle caught by the magnetic plug.
6. Replace the O-rings and put the drain plugs back. Tighten the drain plugs.
   Tightening torque: 10–20 Nm (7.4–14.8 ft-lbs).

NOTICE:
The magnetic plug sits in the gear housing (B).

Fill the oil

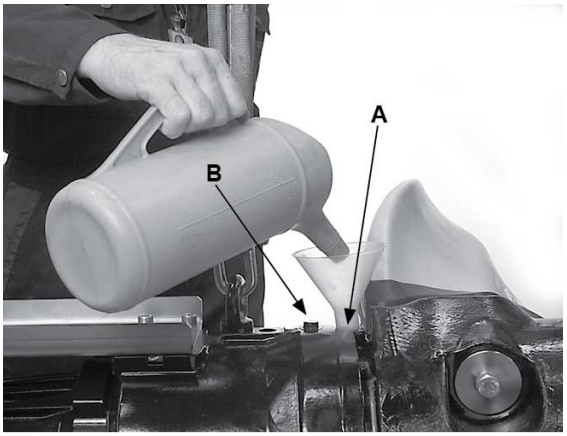
NOTICE:
The oil quality is not the same for oil housing and gear housing.

Table 1: Oil preferences

Housing type	Original oil	Recommended oil	Recommended quantity
Oil housing	Paraffin oil, viscosity close to ISO VG32	90 17 52	1.5 L (1.6 qt)
Gear housing, up to 40°C (104°F)	Mineral oil with additives, viscosity close to ISO VG 220	90 17 58	5 L (5.3 qt)
Gear housing, optional configuration, up to 60°C (140°F)	Mineral oil with additives, viscosity close to ISO VG 680	90 17 64	5 L (5.3 qt)

1. Fill the oil housing (A):
   a) Fill according to the table.
   b) Replace the O-ring of the filling plug.
   c) Put the filling plug back and tighten it.
   Tightening torque: 10–20 Nm (7.4–14.8 ft-lbs).

NOTICE:
The magnetic plug sits in the gear housing (B).



2. Fill the gear housing (B):
   a) Fill according to the table.
   b) Replace the O-ring of the filling plug.
   c) Put the filling plug back and tighten it.
      Tightening torque: 10–20 Nm (7.4–14.8 ft-lbs).

If you replaced the seals, then inspect the oil after one week of operation.

Change the propeller

WARNING:
Wear protective clothing. The edges of the parts can be sharp.

You need the following tools for this procedure:

- Hexagon socket wrench
- Mandrel
- Mallet
- Puller 84 20 49
- Jaws 84 14 45
- M16x170 stud bolt
- M16 nut from the assembly tool 587 61 00
- Mounting tool 580 85 00

Remove the propeller blades

The following procedure must be performed for each propeller blade.

1. Loosen and remove the screw, washers, and O-ring.

2. Carefully tap a mandrel with a mallet until the blade comes out of its slot.

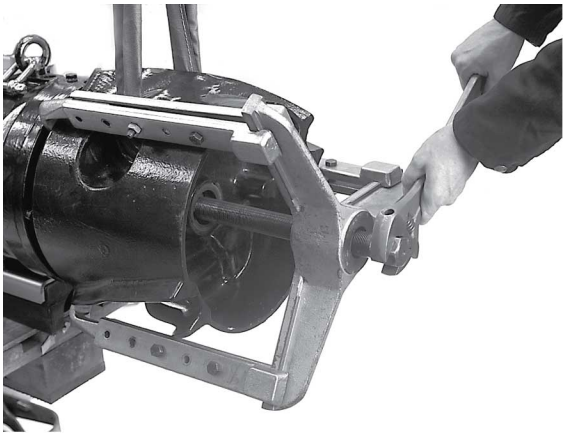
3. Carefully twist the blade back and forth to loosen it from the hub. Pull out the blade without dropping it.

Remove the propeller hub

You must remove the propeller blades before removing the propeller hub.

1. Place and secure the mixer on a workbench.
2. Fit loosely a supporting sling to the hub.
   Use the hole of the blade shaft.
3. Remove the hub screw, washer, O-ring, and sleeve.

4. Pull the hub out using a puller combined with three jaws.
   Use the puller 84 20 49 and the jaws 84 14 45.



Assemble the propeller hub

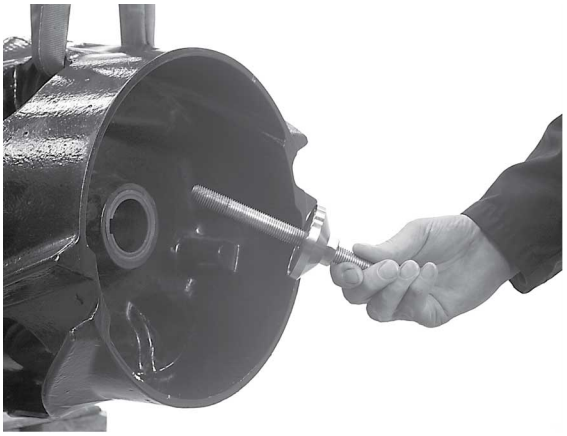
You must support the propeller hub with a sling.

1. Place the mixer on a workbench and secure it.
2. Prepare the shaft:
   a) Make sure that the end of the shaft is clean and free from burrs.
   b) Polish off any flaws with a fine emery cloth.
   c) Fit the key in the keyway on the shaft.
   d) Grease the end of the shaft.

3. Turn the shaft so the shaft key corresponds with the groove in the hub.

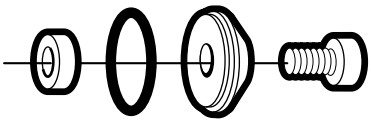
4. Press the sling-supported hub onto the shaft with a stud bolt, a nut, and the washer.

Use an M16x170 stud bolt and an M16 nut from the assembly tool 587 61 00 as a mounting screw.



5. Continue to press the hub onto the shaft.
6. Remove the mounting screw.

7. Place the sleeve, O-ring, and washer on the hub screw.



8. Mount the hub screw.
   Tighten it to 187 Nm (138 ft-lbs).

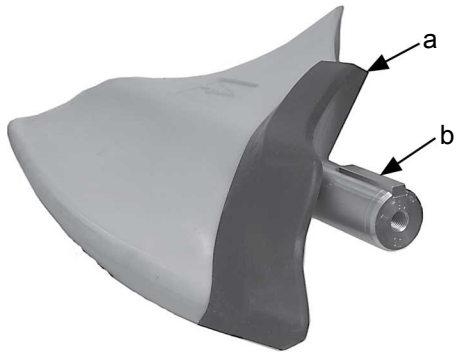
9. Check that the hub can be rotated by hand.

Assemble the propeller blades

You must assemble the propeller hub before assembling the propeller blades.

Perform the following procedure for each propeller blade.

1. Mount the damper (a) and the key (b) on the blade shaft.

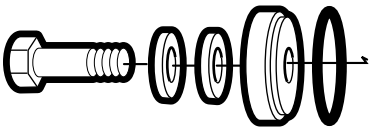


2. Mount the mounting tool 580 85 00 onto the blade shaft.

3. Mount the blade on the hub.

4. When the blade is assembled, remove the mounting tool.

5. Place the two small washers, the larger washer, and the O-ring on the screw.



6. Fasten the screw by hand.

7. Tighten the screw to 150 Nm (111 ft-lbs).

Troubleshooting

Troubleshooting

Before you begin

Follow these guidelines when troubleshooting the mixer:

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

The mixer 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.

Cause	Remedy
An alarm signal has been triggered on the control panel.	Check the thermal contacts, and that the overload protection has not tripped.
The mixer does not start automatically, but can be started manually.	Check the following: • All connections are intact. • The relay and contactor coils are intact. • The control switch (Man/Auto) makes contact in both positions.
The installation is not receiving voltage.	Check the following: • The main power switch is on. • There is control voltage to the start equipment. • The fuses are intact. • There is voltage in all phases of the supply line. • All fuses have power and that they are securely fastened to the fuse holders. • The overload protection is not tripped. • The motor cable is not damaged.
The propeller is stuck.	Clean the following: • The propeller • The inside of the propeller hub Check that the propeller can be rotated.

If the problem still persists, contact the local Xylem service shop. Always state the serial number of your mixer when contacting Xylem, see *The data plate* (page 13).

The mixer starts-stops-starts in rapid sequence

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

Cause	Remedy
The self-holding function of the contactor malfunctions.	Check the voltage in the control circuit in relation to the rated voltages on the coil, and that the contactor connections are intact.

If the problem still persists, contact the local Xylem service shop. Always state the serial number of your mixer when contacting Xylem, see *The data plate* (page 13).

The mixer 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.

Cause	Remedy
The motor protection is set too low.	Set the motor protection according to specifications on the data plate.
There is a malfunction in the overload protection.	Replace the overload protection.
The propeller is difficult to rotate by hand.	Do the following: • Clean the propeller and inside the propeller hub. • Check that the propeller size is correct. • Check if the shaft has too much play due to worn out bearing.
The installation is not receiving full voltage on all three phases.	Do the following: • Check the motor fuses. Replace fuses that have tripped. • If the fuses are intact, notify a certified electrician.
The phase currents vary, or are too high.	Contact the local Xylem service shop.
The rated speed differs from what is stated on the data plate.	Contact the local Xylem service shop.
The density of the liquid is too high.	Do the following: • Dilute the liquid. • Change the propeller blades or to a more suitable mixer. • Contact the local Xylem service shop. • Change the gear ratio.

If the problem still persists, contact the local Xylem service shop. Always state the serial number of your mixer when contacting Xylem, see *The data plate* (page 13).

Technical Reference

Motor data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	50 or 60 Hz
Supply	3-phase
Starting methods	• Direct On-Line • Star-delta
Maximum starts per hour	30 evenly-spaced starts per hour
Design in applicable parts	According to IEC 60034-1
Rated output	Variation of ±10%
Accepted variation from the rated voltage without overheating	Variation of ±10% provided that the motor does not run continuously at full load
Voltage imbalance between the phases	Maximum of 2%
Insulated stator	In accordance with class H (180°C, 356°F)

Application limits

Data	Description
Liquid temperature	Maximum 40°C, (104°F) Optional configuration up to 60°C, (140°F)
Liquid viscosity	Maximum 5000 cp
pH of the mixed liquid	6–11
Depth of immersion	Maximum 20 m (65 ft)

Xylem |ˈzīləm|

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

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