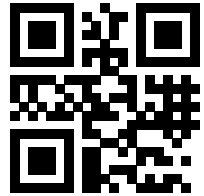


INSTRUCTION MANUAL

P2003557 Rev A



ecocirc[®] 19-16

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1 Introduction and Safety

1.1 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.

1.2 Safety



WARNING:

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



CAUTION:

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




1.2.1 Safety terminology and symbols

About safety messages

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



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

Hazard levels

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

Special symbols

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

Electrical hazard	Magnetic fields hazard
 Electrical Hazard:	 CAUTION:

Hot surface hazard

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



CAUTION:

Qualified personnel



WARNING:

This product is intended to be operated by qualified personnel only.

1.3 User safety

General safety rules

These safety rules apply:

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

Safety equipment

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

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

NOTICE:

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

Electrical connections

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

Precautions before work

Observe these safety precautions before you work with the product or are in connection with the product:

- Provide a suitable barrier around the work area, for example, a guard rail.
- Make sure that all safety guards are in place and secure.
- Make sure that you have a clear path of retreat.
- Make sure that the product cannot roll or fall over and injure people or damage property.

- Make sure that the lifting equipment is in good condition.
- Use a lifting harness, a safety line, and a breathing device as required.
- Allow all system and pump components to cool before you handle them.
- Make sure that the product has been thoroughly cleaned.
- Disconnect and lock out power before you service the pump.
- Check the explosion risk before you weld or use electric hand tools.

Precautions during work

Observe these safety precautions when you work with the product or are in connection with the product:

- Never work alone.
- Always wear protective clothing and hand protection.
- Stay clear of suspended loads.
- Always lift the product by its lifting device.
- Beware of the risk of a sudden start if the product is used with an automatic level control.
- Beware of the starting jerk, which can be powerful.
- Rinse the components in water after you disassemble the pump.
- Do not exceed the maximum working pressure of the pump.
- Do not open any vent or drain valve 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.
- Never operate a pump without a properly installed coupling guard.

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">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	<ol style="list-style-type: none">1. Remove contaminated clothing.2. Wash the skin with soap and water for at least 1 minute.3. Seek medical attention, if necessary.

1.4 Protecting the environment

Emissions and waste disposal

Observe the local regulations and codes regarding:

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

Exceptional sites



CAUTION: Radiation Hazard

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

Recycling guidelines

Always follow local laws and regulations regarding recycling.

2 Transportation and Storage

2.1 Inspect the delivery

2.1.1 Inspect the package

1. Inspect the package for damaged or missing items upon delivery.
2. Note any damaged or missing items on the receipt and freight bill.
3. File a claim with the shipping company if anything is out of order.

If the product has been picked up at a distributor, make a claim directly to the distributor.

2.1.2 Inspect the unit

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

3 Product Description

3.1 General description

The product is a shaft-less spherical motor pump, with energy-efficient, electronically commutated permanent magnet synchronous motor. The following features make it easy to install, operate, and service:

- A leak proof, integrated pump and motor design eliminates the need for conventional mechanical seals or other shaft sealing devices.
- The product is lubricated with system fluid, and thus does not require external lubrication.
- The product requires only a small amount of torque to start even after a long period.



WARNING:

California Proposition 65 warning! This product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

Intended applications

The product is intended for the following applications:

- Hot water heating systems
- Chilled water applications
- Heat pumps
- Solar systems
- Industrial water circulation and potable water

3.2 Nomenclature

ecocirc®	19	16
Series name	Maximum head 19 ft (~6 m)	Maximum flow 16 GPM (~3500 L/H)

Port to port distance = 6 3/8" (162 mm)

The product is capable of satisfying heating systems of about 170,600 BTU/HR (50 KW), which will be equivalent to:

- Radiator heating system for approximately up to 5,000 ft² (465 m²) of living space.
- Under-floor heating systems for approximately up to 2,000 ft² (186 m²) of floor space.

3.3 Operation specifications

Materials of construction

Part	Material
Pump housing	Cast iron (GJL-200) Stainless steel (AISI 304)
O-rings	EPDM
Bearing	PEEK/AI203)
All plastics, except for bearings	PPE
All other wetted parts	AISI 304 / AISI 316 L / AISI 316Ti stainless steel
Check valve	Noryl

Technical specification

Rated voltage	115 V
Frequency	50/60 Hz
Power consumption	4–60 W
IP protection	IP 44
Insulation class	Class 155 (F)
Maximum system pressure	150 PSI (10 bar)
Maximum ambient temperature	104°F (40°C)
Permitted temperature range of pumped fluid ¹	14°F to 203°F (-10°C to +95°C)
Permitted pumping media ²	Water – in potable and domestic water applications Water/glycol mixtures up to 50% – in chilled water applications

¹ For domestic hot water applications, the maximum fluid temperature is 185°F (85°C). For chilled water applications, the fluid must not freeze. To avoid condensation, the fluid temperature must always be higher than the ambient temperature.

² Performance of the pump will noticeably change when pumping water/glycol mixtures with concentrations higher than 20%.

Performance curves

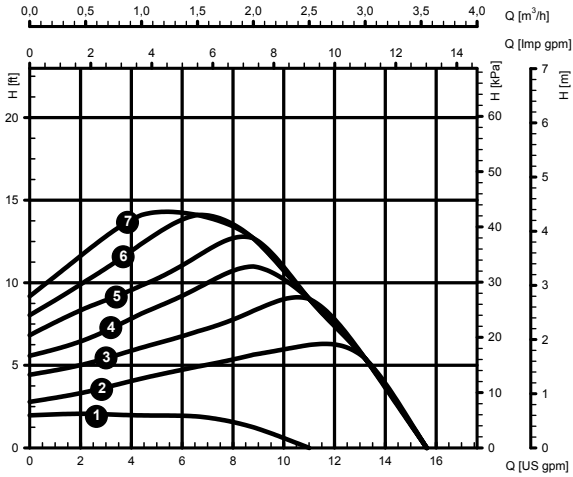


Figure 1: Proportional pressure (factory default)

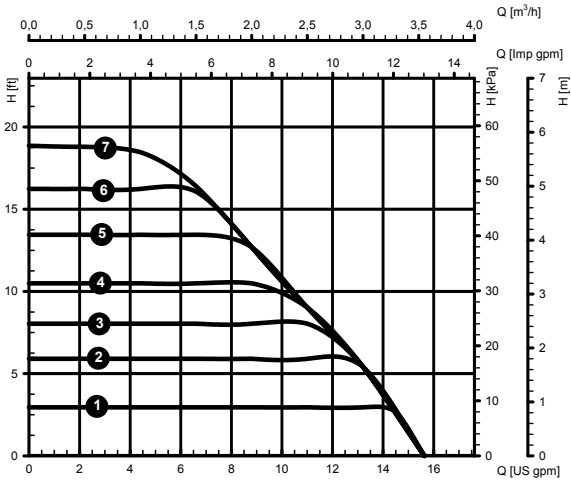


Figure 2: Constant pressure

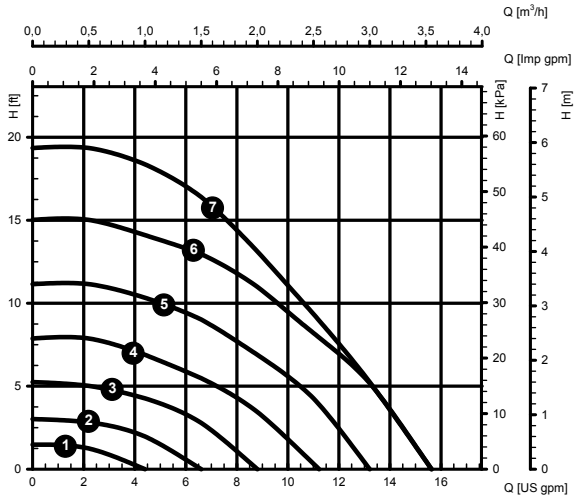


Figure 3: Constant speed

Dimensions and weight

See [Figure 4: Dimensions and weight](#) on page 22.

4 Installation

Precautions



WARNING:

- Observe accident prevention regulations in force.
 - Use suitable equipment and protection.
 - Always refer to the local and/or national regulations, legislation, and codes in force regarding the selection of the installation site, plumbing, and power connections.
-

4.1 Facility requirements

4.1.1 Pump location



DANGER:

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

Guidelines

Observe the following guidelines regarding the location of the product:

- Make sure that the installation area is protected from any fluid leaks, or flooding.
 - If possible, place the pump slightly higher than the floor level.
 - Provide shut-off valves on the suction and discharge sides of the pump.
 - The relative humidity of the ambient air must be less than 95% non-condensing.
 - This pump is suitable for indoor use only.
 - These pumps are electronically thermally overload protected.
-



CAUTION:

CAUTION: PROPERTY DAMAGE HAZARD. It is not advisable to install circulators in an attic or upper floor over finished living space. If the circulator must be installed over head, or over expensive equipment, provide adequate drainage in the event of leakage. Failure to follow these instructions could result in property damage.

4.2 Piping requirements

Precautions



CAUTION:

- Use pipes suited to the maximum working pressure of the pump. Failure to do so can cause the system to rupture, with the risk of injury.
 - Make sure that all connections are performed by qualified installation technicians and in compliance with the regulations in force.
 - Do not use a shut-off valve on the discharge side in the closed position for more than a few seconds. If the pump must operate with the discharge side closed for more than a few seconds, a bypass circuit must be installed to prevent overheating of the water inside the pump.
-

Piping checklist

- Pipes and valves must be correctly sized.
- Pipe work must not transmit any load or torque to pump flanges.
- Be sure to minimize any pipe-strain on the pump:
 - Support suction and discharge piping by the use of pipe hangers near the pump.
 - Line up the vertical and horizontal piping so that the bolt-holes in the pump flanges match the bolt-holes in the pipe flanges.
 - Do not attempt to spring the suction or discharge lines in position. This may result in unwanted stress in the pump body, flange connections and piping.
 - The code for pressure piping (ANSI B31.1) lists many types of supports available for various applications.

Install the check valve

The discharge nozzle is machined to accept a 1" Noryl check valve. If a check valve is required for installation follow these steps:

1. Insert the O-ring end of the check valve into the discharge port of the pump body.
2. Hand press the check valve body into place until it snaps into position.

The check valve will be shipped loose with each pump for field installation. Once it is installed, it cannot be removed without damage.

See [Figure 5: Parts](#) on page 23 for proper installation of the check valve.

4.3 Electrical requirements

- The NEC, CEC and local codes must be followed at all times. If a branch circuit is fitted with ground fault circuit breaker, ensure that the circuit breaker is suitable for use with inverter-driven appliances.

Electrical connection checklist

Check that the following requirements are met:

- The electrical wires are protected from high temperature and vibration.
- The current type and power supply voltage connection must correspond to the specifications on the name plate on the pump.
- Use wires at least 14 AWG to supply power to the pump. Follow all local and NEC wiring codes and practices.
- The branch circuit supplying power to the pump shall be provided with a 15 Amps or less circuit breaker.
- Attach appropriate sized electrical connector to one of the 7/8" diameter holes on the side of the conduit box.
- Connect ground wire to one of the ground screws inside the conduit box.
- Make sure electrical connections are tightly secured before replacing the motor cover.

The electrical control panel checklist

NOTICE:

The electrical supply must match the electrical rating of the pump. Improper combination could fail to guarantee protection of the unit.

Check that the following requirements are met:

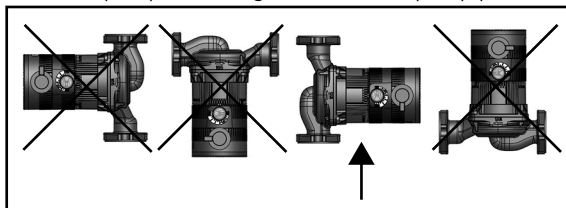
- The control panel circuit breaker is sized properly to protect the pump against short-circuit.
- These pumps are electronically thermally overload protected. No additional overload protection is required.

The motor checklist

Electrical supply and grounding wires must be suitable for at least 194°F (90°C).

4.4 Pump installation requirements

- Install the pump according to the liquid flow direction arrows.
- Install the pump according to the allowed pump positions.



- Make sure that the pump is adequately supported by the piping system and properly aligned to eliminate any stress on the pump or the piping
- Install the pump at a point closest to the highest static pressure point but above the absolute lowest point in the system to avoid dirt and sediment build-up.

- If required by application and code, install a safety relief valve to protect against over temperature and over pressure.
- Do not install with the motor above the impeller. This installation can cause the pump to run dry leading to premature failure of the pump and voids the warranty.

4.5 Electrical installation

4.5.1 Precautions



WARNING:

- Make sure that all connections are performed by a qualified electrician in accordance with all applicable codes, ordinances and good practices. Failure to follow these instructions could result in serious injury, death and/or property damage.
 - 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.
 - Risk of Electrical Shock. To reduce the risk of electric shock, connect only to a properly grounded, grounding type receptacle. This warning applies to pumps fitted with flexible cord connections.
 - Electrical Grounding Hazard. Adequate electrical grounding is required for the safe operation of B&G pumps. The use of grounded metal conduit assures this requirement. If the means of connection to the supply-connection box (wiring compartment) is other than grounded metal conduit, ground the pump back to the service. Use copper wire at least the size of the wires supplying power to the pump. Connect the ground wire to the ground terminal in the wiring compartment. Failure to follow these instructions could result in serious personal injury, death and or property damage.
-

4.5.2 Connect the wires

1. Loosen the screw that secures the motor cover and remove the screw and cover.
See [Figure 6: Electrical connections](#) on page 24 for more information.
2. Attach an appropriately sized electrical connector to one of the 7/8" diameter holes on the side of the conduit box.

3. Connect the ground wire to one of the ground screws inside the conduit box.
4. Make sure that the electrical connections are tightly secured before replacing the motor cover.

5 Operation

5.1 Preparation for startup

Follow these precautions before startup:

- The system must be thoroughly rinsed to prevent the presence of unwanted objects and impurities which could block the pump.
- Fill completely with pumped media (water or water/glycol mixture).
- Purge the entrained air.
 - See [Activate the air purge function](#) on page 19.
 - The air purge function can be activated at any time during operation, when presence of air is suspected in the system.
 - The air purge function can be repeated several times in a sequence if necessary.
 - Audible flow noise indicates presence of air that is entrained in the pump.

5.2 Modes of operation

The product has three standard and two auxiliary modes of operation.

Proportional pressure (PP)	Turn the knob to any position between 1 and 7, with 7 being the highest, to set the speed of the pump. The pump automatically decreases its speed at low flow, thus providing energy savings. This mode is the default setting.
Constant pressure (CP)	Turn the knob to any position between 1 and 7, with 7 being the highest, to set the speed of the pump. The preset pressure remains constant, independent of the flow.
Constant speed (CS)	Turn the knob to any position between 1 and 7, with 7 being the fastest, to set the speed of the pump. The preset speed remains constant, independent of the flow rate.
Automatic air purge	This mode is used to purge air that is trapped in the pump housing. See Activate the air purge function on page 19 for instruction.
Standby	This mode is used to keep power consumption low (<1 W), when pump operation is not required.

5.3 Switch between standard operating modes

1. Turn the knob to the lowest setting.
2. Turn the knob back to the desired setting within 5 seconds.

Pump indicates mode change by color of the knob LED:

Mode	LED color
Proportional pressure (PP)	Blue
Constant pressure (CP)	Green
Constant speed (CS)	White

In any of the standard operating modes, the LED remains permanently lit.

5.4 Standby mode

Turn the knob to the lowest position in order for the pump to enter the standby mode after the air purge function is completed.

Turn the knob to desired setting to return to standard operating mode.

5.5 Activate the air purge function

The air purge function does not start automatically at power-on. To activate the air purge function, do the following:

1. Turn the knob to the highest setting.
2. After 5 seconds, turn the knob to the desired setting.

For air purge indication, see [Display messages](#) on page 21.

After the air purge cycle, which takes approximately 10 minutes, the pump will return to the previous standard operating mode.

To exit the air purge cycle and return to a standard mode before completion, turn the knob to the middle position and then to the highest position in one second.

5.6 Typical speed settings

The typical speed settings are derived from hydraulic calculations of the heating system. If those calculations are not available, then the following speed settings can be used as approximate values:

- Standard single-family home:
 - Approximately 1500 ft² @ 15.85 Btu/hr/ft²
 - 23,775 Btu/hr (approximately 140 m² @ 50 W/m² = 7 KW)
 - Set knob position to 2
- Apartment block:
 - Approximately 4518 ft² @ 15.85 Btu/hr/ft²
 - 71,616 Btu/hr (approximately 420 m² @ 50 W/m² = 21 KW)
 - Set knob position to 3

Note: If the temperature differential between the discharge and suction is too large, increase the speed setting; but if the temperature differential is less than expected, reduce speed setting.

- Guideline values:
 - Underfloor heating: 14.4-18°F (8-10°C)
 - Radiator heating: 27-36°F (15-20°C)

6 Maintenance

6.1 Precautions



Electrical Hazard:

Disconnect and lock out electrical power before installing or servicing the unit.

**WARNING:**

- Always wear protective gloves when handling the pumps and motor. When pumping hot liquids, the pump and its parts may exceed 40°C (104°F).
 - Maintenance and service must be performed by skilled and qualified personnel only.
 - Observe accident prevention regulations in force.
-

6.2 Disassemble the pump

1. Shut off supply and drain lines.
If there are no shut-off valves installed, drain the system so that the fluid level drops below the pump suction level.
2. Loosen and remove the screws with an allen key.
3. Pull the motor out of the pump housing.
Residual water may leak out of the motor cavity. Protect the pump's electrical connections from getting wet.
4. Pull the rotor/impeller upwards by hand and remove it.
The pump body can be left connected to the system.
5. Clean any foreign objects or impurities and reinsert the rotor/impeller.
If the rotor/impeller does not move freely or if there are wear marks visible, that is an indication of bearing failure. Replace the pump.
6. Replace the motor in the pump housing.
7. Replace the screws.
8. Reopen supply and drain lines and fill system.

See [Figure 7: Maintenance](#) on page 25 for more information.

7 Troubleshooting

7.1 Display messages



WARNING:

Maintenance and service must be performed by skilled and qualified personnel only.

Description	LED display	Action
Standby State: Pump is powered and ready to run.	0.75 sec off / 0.1 sec white 0.75 sec off / 0.1 sec blue	–
The pump is running normal.	Continuously lit blue, green, or white, depending on the pump operating mode. See Modes of operation on page 18.	–
Air purge function is active.	0.75 sec off / 0.1 sec on, mode-dependent color	–
Voltage or overtemperature error	1 sec on / 1 sec off, mode-dependent color	Check the power supply. Let the pump cool and restart.
Overcurrent error Start error Position sensing error	0.2 sec on / 0.2 sec off, mode-dependent color	Check for foreign objects blocking the pump rotor. See Disassemble the pump on page 20.
Offset error	0.4 sec off / 0.2 sec on 0.4 sec off / 0.4 sec on mode-dependent color	Electronics board is defective. Non-serviceable.

7.2 The pump is noisy

Description	Reason	Action
The pump is making a loud noise.	The pump is not thoroughly vented.	See Preparation for startup on page 18.
	There are foreign objects in the pump.	See Disassemble the pump on page 20.
	The bearing is worn out.	Replace the pump.

7.3 Excessive ambient temperature

In order to protect the electronics from temperatures that are dangerously high, the electronic control system monitors its own temperature.

- If the temperature is too high, the pump speed is automatically reduced.
- If the temperature rises above safety limit, the pump will shut itself off.
- The pump will automatically restart after cooling down.

8 Appendix

8.1 Appendix

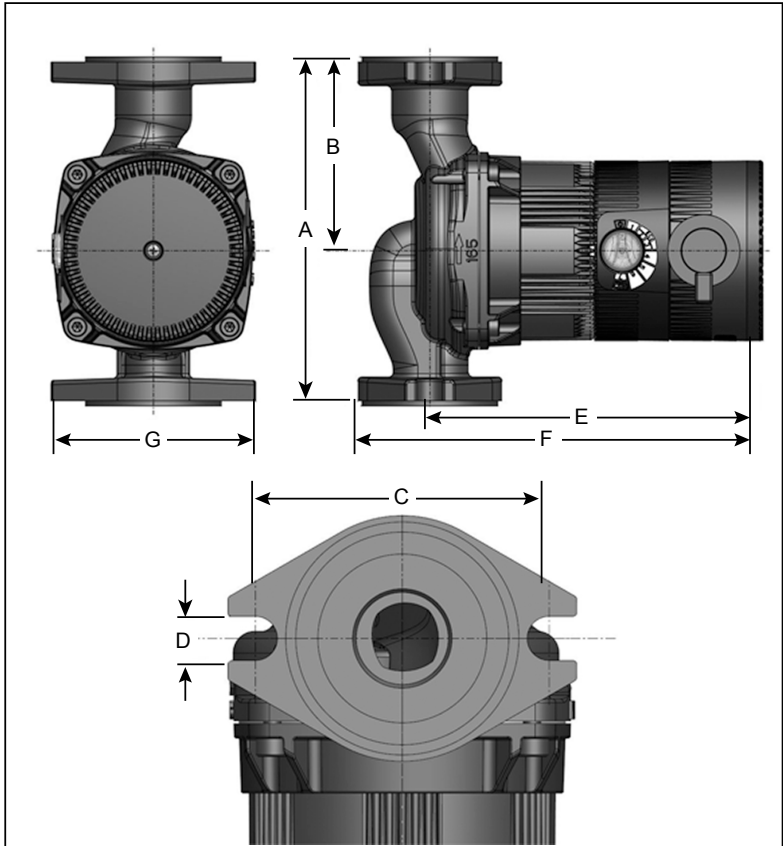


Figure 4: Dimensions and weight

A	6,38" (162 mm)	E	6,09" (154 mm)
B	3,54" (90 mm)	F	7,4" (188 mm)
C	3,15" (80 mm)	G	3,74" (95 mm)
D	0,47" (12 mm)	Weight	5.95 lb. (2.70 kg)

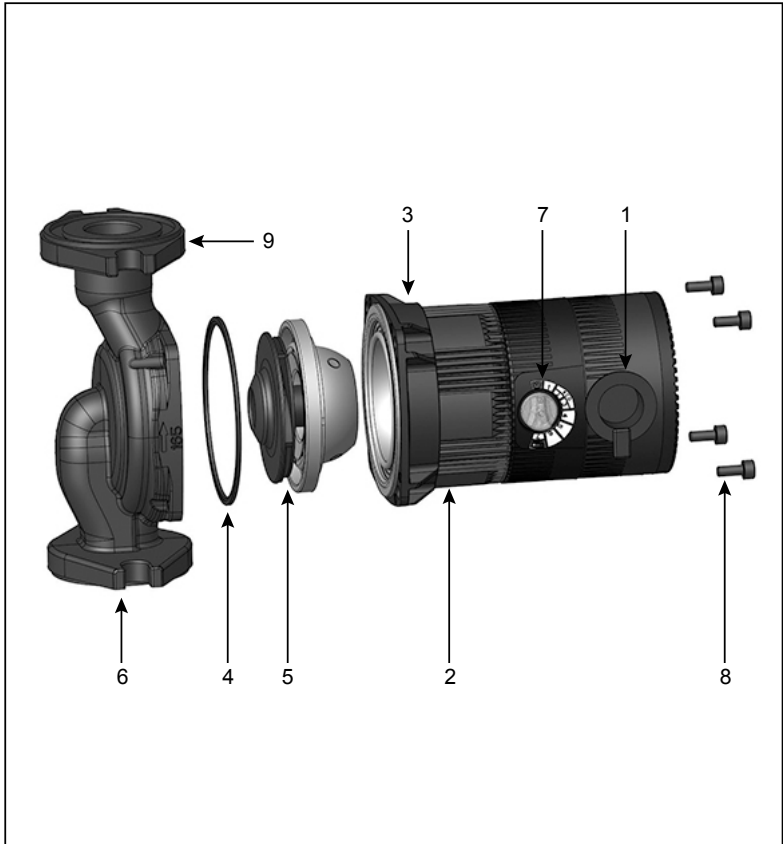


Figure 5: Parts

1. Connection hole for the supply cable
2. Pump motor
3. Union ring
4. O-ring
5. Impeller / rotor
6. Pump housing
7. Adjustable selector knob with built-in LED
8. Fixing screws
9. Check valve

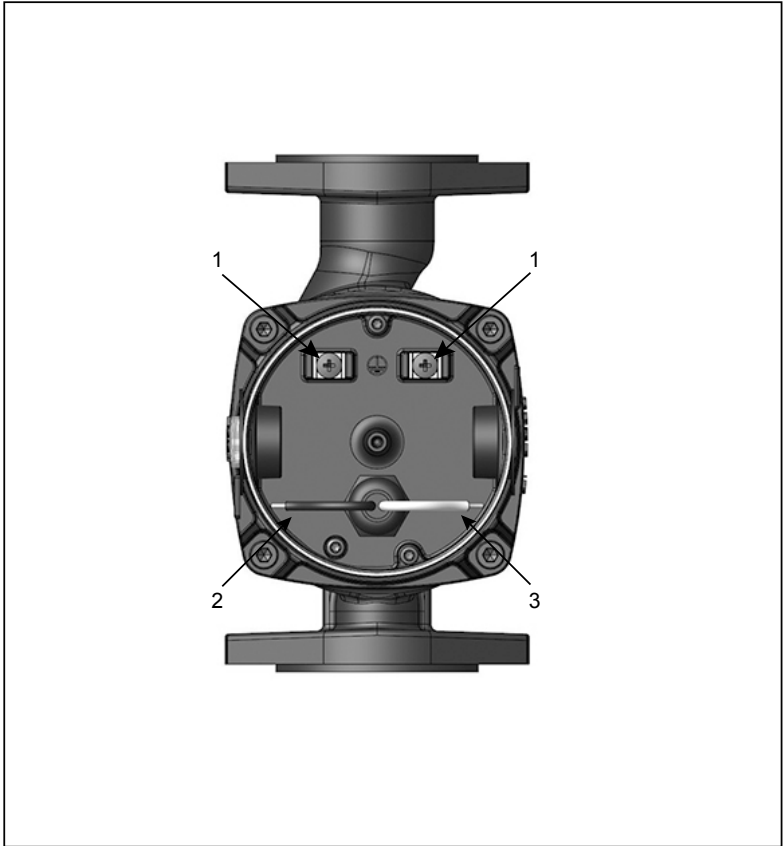


Figure 6: Electrical connections

1. Ground
2. Line
3. Neutral



Figure 7: Maintenance

1. Disconnect power cable
2. Remove screws
3. Disconnect union ring
4. Remove impeller/rotor

9 Product warranty

Commercial warranty

Warranty. For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other "wear parts" or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be (i) be built in accordance with the specifications referred to in the quotation or sales form, if such specifications are expressly made a part of this Agreement, and (ii) free from defects in material and workmanship for a period of twelve (12) from the date of installation or twenty-four (24) months from the date of shipment (which date of shipment shall not be greater than after receipt of notice that the goods are ready to ship), whichever shall occur first, unless a longer period is specified in the product documentation (the "Warranty").

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer's failure to comply with Seller's repair or replacement directions shall terminate Seller's obligations under this Warranty and render the Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller's written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller's instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller's supplier of such products.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO THE GOODS PROVIDED HEREUNDER, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. EXCEPT AS OTHERWISE REQUIRED BY LAW, BUYER'S EXCLUSIVE REMEDY AND SELLER'S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES ARE LIMITED TO REPAIRING OR REPLACING THE PRODUCT

AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE BUYER FOR THE DEFECTIVE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

Limited consumer warranty

Warranty. For goods sold for personal, family or household purposes, Seller warrants the goods purchased hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other "wear parts" or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be free from defects in material and workmanship for a period of twelve (12) from the date of installation or twenty-four (24) months from the product date code, whichever shall occur first, unless a longer period is provided by law or is specified in the product documentation (the "Warranty").

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer's failure to comply with Seller's repair or replacement directions shall terminate Seller's obligations under this Warranty and render this Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. The Warranty is conditioned on Buyer giving written notice to Seller of any defects in material or workmanship of warranted goods within ten (10) days of the date when any defects are first manifest.

Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller's written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller's instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller's supplier of such products.

THE FOREGOING WARRANTY IS PROVIDED IN PLACE OF ALL OTHER EXPRESS WARRANTIES. ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO TWELVE (12) MONTHS FROM THE

DATE OF INSTALLATION OR TWENTY-FOUR (24) MONTHS FROM THE PRODUCT DATE CODE , WHICHEVER SHALL OCCUR FIRST. EXCEPT AS OTHERWISE REQUIRED BY LAW, BUYER'S EXCLUSIVE REMEDY AND SELLER'S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES ARE LIMITED TO REPAIRING OR REPLACING THE PRODUCT AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE BUYER FOR THE DEFECTIVE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

To make a warranty claim, check first with the dealer from whom you purchased the product or visit www.xyleminc.com for the name and location of the nearest dealer providing warranty service.

Xylem |'zīləm|

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

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

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



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