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# Installation and operating instructions

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## E.2 Series high efficiency circulator

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# CONTENTS

<b>1.0</b>	Operating limits	4
<b>2.0</b>	Electrical wiring	4
<b>3.0</b>	Start up	5
<b>4.0</b>	Preventive maintenance - inspection	5
<b>5.0</b>	Pump replacement in an existing installation	5
<b>5.1</b>	Complete pump	5
<b>5.2</b>	Motor end only	6
<b>6.0</b>	Mechanical seal replacement	6

## READ CAREFULLY BEFORE INSTALLING & OPERATING THE CIRCULATOR

**INSTALLER:** PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE

You are about to install an E.2 Series circulator – a high-efficiency pump from Armstrong. E.2 Series circulators are designed for heating and cooling in hydronic, geothermal or solar systems and circulating water, ethylene or propylene glycol/water solutions. For pumping domestic (potable) water, Armstrong recommends the use of circulators with bronze body construction.

The E.2 Series circulators are extremely efficient and quiet. They utilize a state of the art permanently lubricated bearing system designed for many years of trouble-free operation. They feature a permanent-split capacitor motor with thermal protection.

### 1.0 OPERATING LIMITS

**Maximum operating pressure:**  
150 psi (1034 kPa)

**Maximum operating temperature:**  
All standard models 230°F (110°C)

**Minimum operating temperature:**  
All standard models 32°F (0°C)

**Electrical rating:**  
For models with 1/4 hp motors: 120 v, 1 phase, 60 Hz or 208/240 v, 1 phase, 60 Hz

For models with 3/8 hp motors: 120 v, 1 phase, 60 Hz or 208/240/277 v, 1 phase, 60 Hz

When unpacking the circulator, inspect for any damage that may have occurred during transit. Check for loose, missing or damaged parts.

### THIS PUMP IS FOR INDOOR USE ONLY

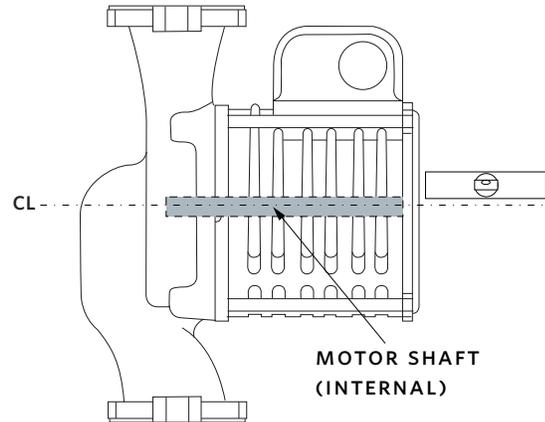
Before installing the circulator, proper installation practice recommends a thorough flush of the hydronic system, ensuring removal of all foreign materials.

### WARNING



Mount with motor shaft horizontal and terminal box above centerline (CL) only!

The circulator is supplied for up-discharge.



For alternate discharge orientation:

- 1 Loosen the four motor mounting bolts
- 2 Rotate the volute to match piping orientation
- 3 Observe flow direction arrow on volute
- 4 Ensure volute gasket is properly seated
- 5 Retighten mounting bolts evenly to 5 lb/ft (6.7 N/m)
- 6 Ensure the impeller spins freely

### 2.0 ELECTRICAL WIRING

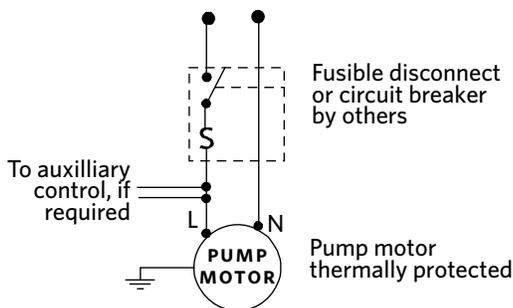
The electrical wiring must be installed in strict accordance with the Canadian Electrical Code or the U.S. National Electrical Code, as well as local codes and regulations.

- 1 Electrical installation should be conducted by a qualified electrician.
- 2 The motors of E.2 Series circulators are designed for 60 Hz, 1 phase, 120 v or 240 v service only. (Please refer to the rating label on the circulator's terminal box to determine the correct voltage.)
- 3 Always make sure the electric power is disconnected and locked out before wiring the circulator.
- 4 To wire, loosen the screw from the terminal box cover and remove the screw and cover.
- 5 Install the appropriate size conduit end to one of the holes on either side of the terminal box.
- 6 **For 120 v models:** Referring to **DIAGRAM 1** below, connect the black, hot, (L) and white, neutral, (N) leads of the supply wire to the black and white motor leads respectively inside the terminal box. Connect the ground wire to any one of the

four green ground screws inside of the terminal box (use a minimum 18 AWG wire size).

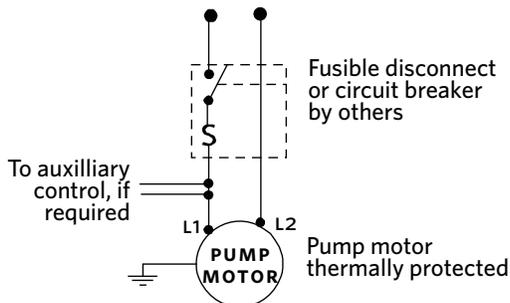
**For 208/240/277 v models:** Referring to **DIAGRAM 2** below, connect the black (L1) and blue (L2) leads of the supply wire to the black and white motor leads respectively inside the terminal box. Connect the ground wire to any one of the four green ground screws inside of the terminal box (use a minimum 18 AWG wire size).

**DIAGRAM 1** 120 v installations



Typical wiring diagram for  
single phase, 120 v, 60 Hz power source

**DIAGRAM 2** 208/240/277 v installations



Typical wiring diagram for  
**A** single phase, 240 v, 60 HZ power source  
**B** three phase, 208/277 v, 60 HZ power source

## 7 Replace the terminal box cover.

The motor is thermally protected for your safety so overload protection is not necessary. All that is required is a fused plug or circuit breaker in the power line.

Electrical information can be found on the nameplate of the motor.

## 3.0 START UP

- 1 Before starting up the circulator, proper installation practice recommends a thorough flush and draining of the hydronic system, ensuring removal of all foreign materials. Fill the system with clean water or glycol solution before starting.
- 2 Air must be completely vented from the system before starting up the circulator. **If the system is not completely vented of air and the circulator is allowed to run dry, the mechanical seal will be damaged.**
- 3 When the system has been completely filled and vented, only then can the pump be started.

## 4.0 PREVENTIVE MAINTENANCE - INSPECTION

E.2 Series circulators are fitted with permanently lubricated ball bearings and **do not** require lubrication.

Although Armstrong long-life circulators are designed to provide years of worry-free service, it is good maintenance practice to inspect the entire hydronic system periodically – including the E.2 Series circulator – for potential problems. If there is any evidence of leakage or damage, repair or replace the pump.

Disconnect and lockout the power before servicing.

## 5.0 PUMP REPLACEMENT IN AN EXISTING INSTALLATION

### 5.1 COMPLETE PUMP

- 1 Ensure that electric power is disconnected and locked out. Loosen the screw from the terminal box cover and remove the cover. Disconnect the supply wires from the circulator only, leaving the capacitor wires connected.
- 2 If valves have been installed, on the suction and discharge sides of the pump, close them before attempting to remove the circulator from the volute. If no valves have been installed it may be necessary to drain the system.



Allow water to cool to 100°F (40°C) before draining the system. It is best to leave the drain valve open while working on the system.

- 3 To relieve any residual pressure which may be present in the pump body, loosen the flange bolts and gently move the pump body back and forth to allow the pressurized water to escape.

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**NOTE:** Place a pan under the pump to collect the drain water.

- 4 If the entire volute is needed to be removed, then remove the flange bolts and nuts. The entire circulator can then be removed from the piping system.
- 5 Install the E.2 Series circulator where there will be sufficient room for inspection and service. It is recommended that isolation valves be installed on both the suction and discharge sides of the circulator for future servicing. This eliminates the need for draining the system when working on the circulator (for example, when replacing the mechanical seal).
- 6 Install suction and discharge flanges on the pipe ends. The use of Teflon tape sealer or a high quality thread sealant is recommended.
- 7 Pipe strain can be minimized by the use of pipe hangers near the pump, positioned to support the suction and discharge piping.

To wire the E.2 Series circulator, follow steps C through G in the Electrical Wiring section above, noting that electrical supply and grounding wires must be rated for at least 194°F (90°C).

### 5.2 MOTOR END ONLY

- 1 Turn off the pump leaving it installed in the line .
- 2 Ensure electrical power is disconnected and locked out .
- 3 Close the water supply at the points closest to the pump's inlet and outlet .
- 4 For safety, allow water to cool to 100°F (40°C) before draining the system. It is best to leave the drain valve open while working on the system.
- 5 Bleed the water pressure from the pump.
- 6 Place a pan under the pump to collect the drain water.
- 7 While holding the motor body, loosen the four bolts that attach the motor to the pump casing (volute). Start with the two bottom bolts first and remove them, then slowly loosen the top two bolts. Allow the water to drain from the bottom of the pump. When the water has finished draining, remove the two top bolts. Remove the motor straight out from the volute being careful of its attached impeller. The motor is heavy, do not drop it.
- 8 Install new casing gasket .
- 9 Install new motor end (with impeller and seal kit).
- 10 Tighten four motor end bolts in a crisscross pattern and tighten evenly to 70 in/lbs.

- 11 Open isolation flanges or fill the system with water before starting circulator.
- 12 To wire the E.2 Series circulator, follow steps C through G in the Electrical Wiring section above, noting that electrical supply and grounding wires must be rated for at least 194°F (90°C).

### 6.0 MECHANICAL SEAL REPLACEMENT

- 1 Follow steps 1 through 4 in section **Existing pump removal from system piping.**
- 2 While holding the motor body, remove the bottom two bolts that attach the motor to the pump casing (volute), then slowly loosen the top two bolts. Allow the water to drain from the bottom of the pump. When the water has finished draining, remove the two top bolts. Remove the motor straight out from the volute being careful of the attached impeller.



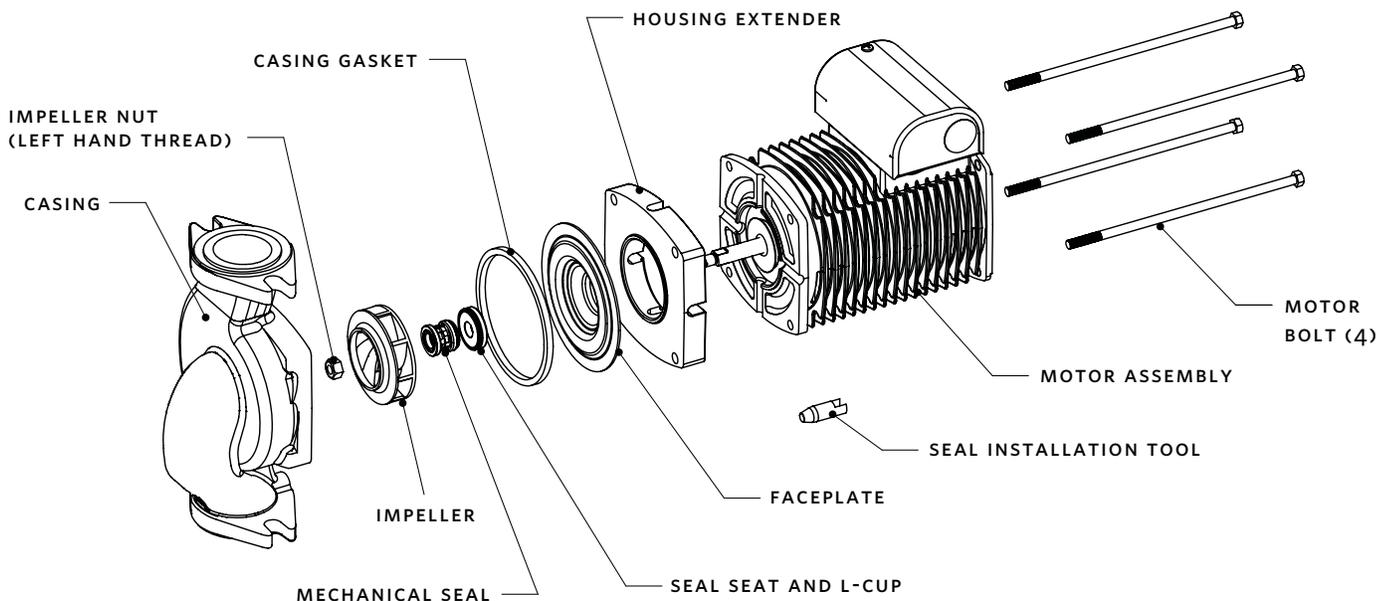
**Handle with care**

The motor is heavy, and possibly hot,

**DO NOT** drop it!

- 3 While holding the rotor very tightly by hand or a gloved hand only, unscrew the impeller nut off the motor shaft by turning it clockwise (i.e. opposite to most bolts and nuts). Place the motor on its back, with the shaft up.
- 4 Remove the rotary part of the mechanical seal by gently pulling it off the shaft. If it is too tight use two small flat bladed screwdrivers to gently pry it off the shaft by placing the flat side of the blades onto opposite sides of the mechanical seal.
- 5 Remove the face plate from the motor by gently prying it off of the motor housing extension, and carefully pulling it straight up, avoiding any shaft contact.
- 6 Remove the stationary part of the seal by gently prying it off the steel faceplate.
- 7 Remove any corrosion present on the stainless steel motor shaft and face plate (especially the seal seat area) with a non-metallic brush or scrub pad. Do not use a wire brush or steel wool.
- 8 Remove any dust created during step #7 above and put a few drops of non-petroleum lubricant around the face plate where the stationary seat is to be installed.

- 9 Install the new stationary seal seat into the faceplate by firmly pressing it down until it bottoms. The disk should be clean. If needed, wipe it with alcohol and a soft lint free cloth.
- 10 Replace the faceplate on the motor housing extension, being careful to avoid shaft contact. This may need to be gently tapped down until tight to the housing. Be sure to check that the stainless steel plate is flush to the extender plate face.
- 11 Install the special **installation tool** (item #180212-095) on the top of the shaft making sure it is tight to the flat base of the impeller to protect the seal from sharp edges during seal installation.
- 12 Apply a liberal amount of non-petroleum based lubricant on the outside of the special plastic **installation tool**.
- 13 Wipe any excess lubricant off of the stationary silicon carbide seal face with a lint free cloth and alcohol to ensure the surface is clean.
- 14 Install the new rotating seal element and spring assembly by gently pushing it (graphite ring first) over the **installation tool** and onto the shaft until the graphite ring presses tightly against the stationary seal seat. The seal spring may be compressed slightly.
- 15 Remove the **installation tool** from the shaft.
- 16 Install the impeller keeping the inlet end up. Make sure to align the flats to the shaft flats and push the impeller down tightly to the seal.
- 17 Place 2-3 drops of medium strength thread locker liquid on the nut threads.
- 18 Install the special left hand thread nut on the motor shaft. While holding the motor rotor in place as in step 3, thread the impeller nut on to the shaft in a counter-clockwise direction and tighten the nut to approximately 6ft-lbs.
- 19 If the impeller will not spin freely contact Armstrong Technical Support at 1-416-755-2291 or email [techsupport@armlink.com](mailto:techsupport@armlink.com).
- 20 Ensure the gasket is properly seated in the pump casing (volute) gasket groove. Holding the motor body, insert the impeller straight into the volute. Verify the gasket was not dislodged during insertion, and is still seated properly. Hold the motor body steady while fastening the four bolts that attach the motor to the pump casing (volute). Tighten evenly and diagonally. There should be a small, even gap of about 0.02" (0.5 mm) between the motor flange and the pump casing (volute).
- 21 Follow the **START UP** instructions (File no. 10.84) and check for leaks.



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