

Series e³ SC Solar Circulators



Installation, Operation and Service Instructions

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

NOTE: Bell & Gossett recommends Bronze or Stainless Steel Booster Pumps be used for pumping potable water.



WARNING: Before Installing, using or servicing this product, read the instructions. To reduce risk of electrical shock see instructions for proper installation.



CAUTION: For supply connections use wire suitable for at least 221°F (105°C). Use copper conductors only.



WARNING: Risk of electric shock; this pump has not been investigated for use in swimming pool and marine areas. - **Non submersible Pump** -

Description

The B&G ecocirc e³ solar circulator can be used for solar circulation pump applications without connection to the power grid. Highly efficient, the ecocirc solar pump can be connected directly to a photovoltaic panel and is characterized by its small size, high efficiency, extreme low power consumption and its Maximum Power Point (MPP) tracking.

Pump Application

The model ecocirc e³ solar circulator may be used for water circulating applications in solar thermal systems.

Note: This pump is non submersible, for indoor use only. It has not been tested for use in swimming pools and marine applications. System must be a closed loop system for pump to operate properly.

Operational Limits

These pumps are designed to pump liquids compatible with its brass body construction.

Maximum operating pressure: 150 PSI (10 bar)


Maximum operating temperature: 203F (95C)

Electrical rating: 12-24 V DC (.025-0.46 A current draw)

If your pump is equipped with a sweat connection body, the maximum operating pressure is limited to 150 PSI (10 bar) or a lower value determined by the type of solder used and pressure/temperature limitations listed below:


Do not exceed these valves. (Solder type limits per ASTM STD. B16. 18-1978)


Pump Body	Type of Solder	Maximum Limitations	
		Pressure PSI	Temperature F
Sweat	95-5 Tin-Antimony	300	200
		250	225
		200	250

 **WARNING:** Damage to the pump or failure of solder sealing joints may occur if these operational limits are exceeded. This can result in water leakage. Failure to follow this instruction could cause serious personal injury and/or property damage. Damage to the pump or failure of solder sealing joints may occur if these operational limits are exceeded. This can result in water leakage. Failure to follow this instruction could cause serious personal injury and/or property damage.


Safety Requirements

Mechanical Safety


 **WARNING: - Excessive System Pressure Hazard** - The maximum working pressure of the pump is listed on the nameplate - **Do Not Exceed This Pressure.** Failure to follow these instructions could result in serious personal injury, death and/or property damage.


 **WARNING: - Excessive Pressure Hazard Volumetric Expansion** - The heating of water and other fluids causes volumetric expansion. The associated forces may cause failure of system components and the release of high temperature fluids. This can be prevented by installing properly sized and located compression tanks and pressure relief valves. Failure to follow these instructions could result in serious personal injury, death and/or property damage.


Thermal Safety

 **WARNING: - Extreme Temperature Hazard** - If the pump, motor or piping are operating at extremely high or low temperature, guarding or insulation is required. Failure to follow these instructions could result in serious personal injury, death and/or property damage.


Electrical Safety

 **WARNING: - Electrical Shock Hazard** - Electrical connections are to be made by a qualified electrician in accordance with all applicable codes, ordinances and good practices. Failure to follow these instructions could result in serious personal injury, death and/or property damage.


 **WARNING: - Electrical Grounding Hazard** - Adequate electrical grounding is required for the safe operation of B&G Pumps. 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.


 **WARNING: - Risk of Electric Shock** - Do not install this pump in swimming pool or marine areas. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

Removal of Pump From Existing System For Replacement

 **WARNING: - Electrical Shock Hazard** - Disconnect and lockout the power before servicing. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

1. Close the valves on the suction and discharge sides of the pump. (If no valves have been installed, it may be necessary to drain the system.)

 **WARNING: - Hot Water Hazard** - Before draining the system, allow water to cool to at least 100°F (38°C), open the drain valve (take precautions against water damage) and leave the drain valve open until servicing is complete. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

 **WARNING: - Electrical Shock Hazard** - Be certain the electrical power is not present at the motor leads before continuing. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

2. Loosen the conduit box cover screw and remove the cover.

3. Disconnect the electrical supply lines to the pump.



WARNING: - High Pressure Hazard - Pressure may be present in the pump body. This pressure can be relieved by loosening the flange bolts and shifting the pump assembly slightly to allow the pressurized water to escape. Failure to follow these instructions could result in serious personal injury and death.

Pump Installation

Locate the pump so there is sufficient room for inspection, maintenance and service. Bell & Gossett recommends the installation of service valves on the suction and discharge of all circulators to facilitate servicing or replacement of the circulator without draining the system.



CAUTION: The use of fluoropolymer impregnated pipe compound and fluoropolymer tape on pipe threads provides lubricity which can lead to over tightening and break-age. Do not over tighten. Failure to follow this instruction can result in moderate personal injury from hot water and/or property damage.

Install suction and discharge flanges or union connectors on the pipe ends. The use of fluoropolymer tape sealer or a high quality thread sealant is recommended.

Be sure to minimize any pipe-strain on the pump. Support the suction and discharge piping by the use of pipe hangers near the pump. If union connections are used, line up the pump threads with union tail pieces. **DO NOT ATTEMPT TO SPRING THE SUCTION OR DISCHARGE LINES IN POSITION. THIS MAY RESULT IN UNWANTED STRESS IN THE PUMP BODY AND PIPING.** The code for Pressure Piping (ANSI B31.1) lists many types of supports available for various applications.

Installation Procedures

- Do not connect the pump to the electric supply unless fluid is in the plumbing lines. Running the pump dry may cause premature failure and will void the warranty.
- For hot water systems, fluid temperatures above those rated for the pump may reduce pump life. The creation of steam in the plumbing lines may result in the pump running dry.
- Prevent back flow. The direction of flow is indicated by the arrow on the pump housing. Reverse flow will adversely affect the life of the pump. You may wish to install a check valve on the discharge side of the pump to prevent back flow.

NOTE: A swing type check valve is preferred. If a spring loaded check valve is used, it is important that the opening pressure be 1/2 PSI or less (3/4" or larger).

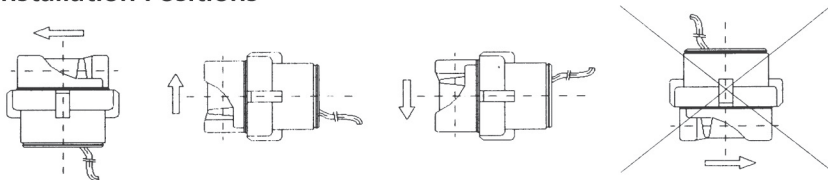
Mounting The Pump

Observe the permitted installation positions. With brass models, do not sweat the housing into the plumbing line with the motor drive unit or o-ring attached. Always remove the motor drive unit and o-ring from the pump housing before installing the brass housing into the plumbing line.

*Solar: The Pump should be mounted on the supply line to the collectors pumping in an upward position.

NOTE: Pump is shipped with pump housing screw ring loosened to ease removal of pump from motor housing during installation. Before pressurizing system, be sure to tighten screw ring. Hand tightening is sufficient. DO NOT OVER TIGHTEN THE SCREW RING.

Installation Positions



If your ecocirc pump is equipped with a sweat connected pump body, see the following instructions:

1. Use a torch with a sharp pointed flame.
2. Clean tube ends and pump connections thoroughly.
3. Use 95-5 (Tin-Antimony); and a good grade of flux.



CAUTION: Heat associated with the use of silver solder may damage a pump voiding the warranty. Do not use silver solder. Failure to follow these instructions could result in property damage and/or moderate personal injury.



CAUTION: Excessive use of solder in a vertical installation may result in damage to the pump impeller. Do not use excessive flux. Failure to follow these instructions could result in property damage and/or moderate personal injury.

4. When sweating the joints, first wrap the pump body with a cool wet rag, then direct the flame with care to avoid subjecting the pump to excessive heat.
5. Check soldered connections for leaks. If re soldering is required, take care to avoid subjecting the pump to excessive heat.

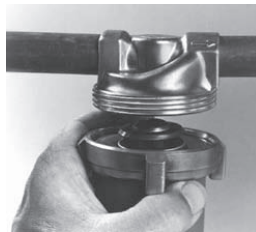


WARNING: - WATER LEAKAGE HAZARD - To prevent leakage, make certain that the flange bolts or ring nuts have been adequately tightened and that the solder connections do not leak. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

6. Drain the plumbing lines by opening the faucet/tap in the house. Drain the water heater if you plan to make the connection at the bottom of the water heater, which requires removal of the drain valve.
7. Connect the return line at the last faucet/taps riser and run to the water heater. Tee the return line as close to the end of the hot water supply line as possible and run the return line back to the water heater.
8. Close the shut-off valve on the inlet side of the pump and turn the water supply to the house back on.
9. Flush system of debris. Before reattaching the pump motor, open the shut-off valve on the inlet side of the pump housing and let water flow through the housing. Use a bucket to catch the water. Let the water run long enough to clear all sand, solder pellets, plumbers tape flakes, etc. from the lines. Close the inlet shut-off valve when finished.
10. Connect the pump motor to the housing. Make sure the rubber o-ring is in place in the housing and the screw ring is securely hand tightened. Reopen the shut-off valve or valves and let the water flood the pump housing.

fig. 1

Remove the motor unit and o-ring from the pump housing into the plumbing line. Do not sweat the housing into the plumbing line with the motor or o-ring attached. Arrows on the pump housing indicate the direction of water flow.



Caution: Only hand tighten the screw ring. Do not over tighten! Do not use plumbers putty on the screw ring.

Do's and Do Not's

Do:

- Install an air vent mounted in a vertical position (if provided).
- Be sure the check valve is installed in the proper direction of the flow.
- Be sure all air is purged from the system prior to starting the pump.
- Use a water conditioner if you have hard water.
- Be sure the gate valves are open before turning on the pump.
- Install the pump pumping in upward direction only.

Do Not

- Use grease or oil to lubricate the pump (it is self-lubricating).
- Over tighten the screw ring.
- Install the pump with the motor above the pump housing.
- Install the pump pumping away from the water heater nor pumping downward.
- Start the pump before the system is full of water and purged of air.
- Use any pipe size other than 1/2"(5/8") for all models.

Hard Water Conditions

Use a water conditioner. Hard water can cause scale build-up and eventually reduce the life of the pump and other system components. Protected by one or more of the following Patents: 4580335, 4615662, 4822256, 4834628, 5094593, 5143049, 5749715, 6149407, 6227235

Available Pump Housings



Brass 1/2" Female
Thread/Sweat



Brass Union
Coupled

Power Source Requirements

In order to ensure full service life of the D Series pump, it is important to provide a stable and non-degrading power source at the required voltage. Operating the pump out of the specified voltage range may reduce the life of the motor and will void the warranty.

Electrical Connection

- The pump is provided with 6" pigtails for field hard wiring. The red lead is positive.
- Be certain that correct polarity is observed.
- Ensure that the electrical supply is correct and that the supply cable is suitable for the rated load indicated on the pump label.
- Wire the pump in accordance with your system application.
- A quick function test without liquid is acceptable at this time. However, if the system is not filled with liquid, reduce the time of this function test to an absolute minimum. The pump is liquid cooled and will build heat rapidly. Excessive heat generated by dry run operation for extended periods will damage the pump.
- After ensuring that the unit is functioning properly, fill the system and purge any air that may be trapped in the system loop.

System Preparation

Prior to pump start-up, closed heating and cooling systems should be cleaned, drained, and refilled with clean water. The system fluid pH must be maintained between 7 and 9.

Start-Up

Do not start pump until the system has been filled and vented. Air should be vented from the system by means of an air vent located at a high point in the system. The system must be completely vented prior to pump operation. Do not run ecocirc circulators dry. Pump operation without water circulation could result in pump and motor damage.

- Open the isolation valves and any other valves that may have been closed during the pump installation.
- Switch the pump on.
- If you hear noise initially, this should abate after a short while as air is purged from around the impeller.
- Power cycling the pump several times accelerates the air removal.
- If the noise does not disappear or decrease substantially, purge the system once again.

***Solar:** It is recommended that the pump be left in the auto position for best results.

Periodic Inspection

Bell & Gossett ecocirc solar circulators are designed to provide years of trouble free service. It is recommended that periodic inspections be made to check for potential problems with the pump. If any leakage or evidence of leakage is present, repair or replace the unit.



WARNING: - HOT WATER LEAKAGE HAZARD - Pressurize the body slowly while checking for leaks at all joints with gaskets or solder connections. Failure to follow these instructions could result in serious personal injury and/or property damage.

U.L. Caution

This pump has been tested using water only.
Its suitability for use with liquids other than water is the end user's responsibility.

Australia

This pump must be installed in accordance with AS3500

Automatic Performance Optimization - Maximum Power Point (MPP) Tracking

The ecocirc solar circulators are the first and only spherical motor pumps with self optimizing performance to maximize use of available power of a solar PV panel. Every three seconds the processor will modify its operating point on the voltage current curve of the PV panel to find the point of maximum performance. This is called the "Maximum Power Point" (MPP). At this point, the pump achieves the maximum rpm and therefore the maximum performance. There is no need for a separate performance device. The Ecocirc Solar pump will always find its best operating point under any given light and temperature conditions.

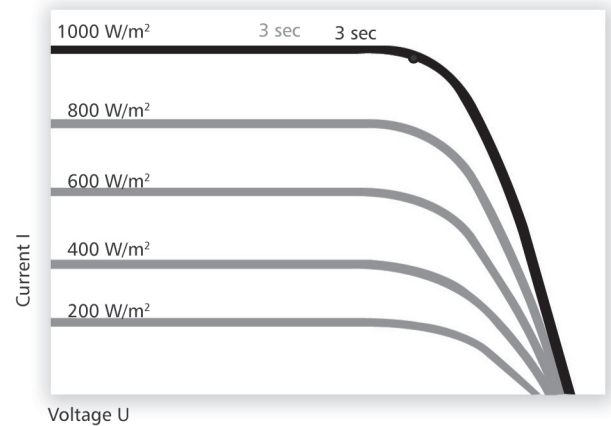
System Maintenance

- Do not attempt to lubricate the pump. The pump is self lubricating.
- Prevent the pump from running dry.
- Flush the system of any debris and re-purge all air from the system in the event of any water supply interruptions in plumbing line.
- Prevent heavy scale build-up by keeping the hot water temperature 140°F (60°C) or less. (only in US)
- Don't over salt your water conditioner.

Trouble Shooting

- Check the electrical supply. Check electrical connections to the motor leads. Ensure the polarity is correct and the connections are secure.
- If the pump still does not operate, shut off the isolation valves and disconnect the electrical supply. Turn the screw ring and carefully remove the motor unit.
- Lift the rotor/impeller unit to ensure it is free of foreign matter. Be sure to lift the rotor/impeller unit straight out of the motor cavity to prevent damage to the bearing support. There will be a magnetic force resisting removal of the rotor/impeller. Use gentle, but steady lifting forces. Use fingers only. **DO NOT PRY UP ROTOR/IMPELLER UNIT WITH SCREW DRIVER.**
- If the rotor shows scratches or discoloration around its base, check for the following conditions:
 - The bearing may be worn and replacement of the rotor/impeller assembly may be necessary. Replace the worn rotor/impeller assembly into the bearing with a new assembly and ensure that it spins freely.
 - Air may not be completely purged from the system causing cavitation and heat build-up as indicated by discoloration of the rotor or motor housing. Purge the system of air once again and replace the rotor if necessary.
 - After repair or replacement of the unit is complete, and after connecting the pump to the electrical supply, run the pump for a short while, during which the rotor/impeller unit should rotate freely.
 - If operating properly, refit the motor, open the isolation valves and the unit will operate normally.

MPP - Maximum Power Point



Typical Current-Voltage-curve of a photovoltaic panel. By employing MPP tracking every three seconds, the ecocirc DC pumps always automatically achieve maximum performance at any given insolation.

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Let's Solve Water

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