ARMSTRONG

COMPASS | HIGH-EFFICIENCY WET-ROTOR CIRCULATORS |
INSTALLATION AND OPERATING INSTRUCTIONS

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WARNING

- Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.
- The use of this product requires experience with and knowledge of the product. Only licensed or trained installers should install this product.
- For supply Connection, use wires acceptable for at least 90°C (194°F).
- **Risk of shock:** this pump has not been tested for use in swimming pools or marine areas.
- To reduce risk of electric shock: Unplug before servicing, see instructions for proper installation, connect to a properly grounded, grounding type receptacle only.
- For indoor use only.
- Use copper conductors only.
- Do not install with motor above or below pump body.
- Do not submerge.
- Do not run pump dry.

1.0 SYMBOLS USED IN THIS DOCUMENT

WARNING

The safety instructions must be followed to prevent potential personal injury.

CAUTION

The safety instructions must be followed to prevent potential malfunction or damage to the equipment.

HINT

Hints or instructions that make the setup easier and ensure safe operation

2.0 GENERAL INSTALLATION

2.1 THE ARMSTRONG COMPASS CIRCULATOR

The Armstrong Compass circulator is designed for circulating water in closed hydronic heating systems or potable water systems.

Model

- Compass 20-20 CI
- Compass 20-20 SS**

The Armstrong Compass includes operating modes suitable for systems with constant or variable flows, such as:

- Underfloor heating systems
- One-pipe (series) systems
- Two-pipe (parallel) systems

Armstrong Compass circulators incorporate Armstrong patented Design Envelope variable speed control technology with an ECM motor, enabling optimum energy efficiency and occupant comfort, with built-in control algorithms that can adapt to continuously changing system requirements.

The Armstrong Compass features a user-friendly front-mounted control panel (see section 6) and wiring box for ease of installation.

2.2 BENEFITS OF INSTALLING AN ARMSTRONG COMPASS CIRCULATOR

Eight different modes of operation to suit different system requirements:

- Easily selectable from the front mounted display.
- Modes include Sensorless demand-based control – Auto.
- Power consumption and flow rate clearly displayed.

Broad operating range, producing up to 20 feet of head and 20 US GPM of flow, provide versatility to cover the performance of a wide range of fixed speed or variable speed circulators.

- Flange to flange compatibility with existing Armstrong circulators and many competing models.

Front mounted wiring box for ease of installation and service.

3.0 INSTALLATION

3.1 MOUNTING

Note:
For convenience in future servicing, isolation flanges can be used in place of standard flanges.

CORRECT INSTALLATIONS **INCORRECT INSTALLATIONS**

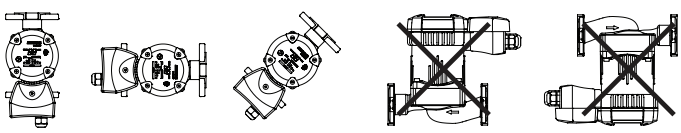

FIG. 2 Mounting the Armstrong compass

Arrows on the pump housing indicate the liquid flow direction through the pump.

1. Fit the two gaskets supplied when the pump is mounted in the pipe.
2. Install the pump with the motor shaft horizontal (see **FIG. 2**).

3.2 CONTROL BOX POSITIONS

The orientation of the display can be adjusted by removing four screws that attach the motor to the pump housing. Pump must be isolated from the system as this will open the system to the atmosphere.

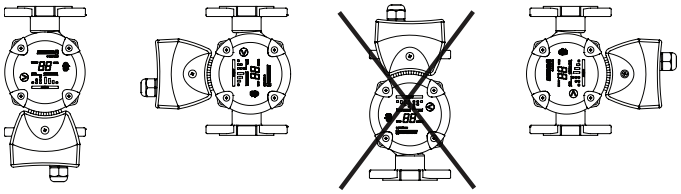

FIG. 3 Control box positions

WARNING

The pumped liquid may be scalding hot and under high pressure. Drain the system or close the isolating valves on either side of the pump before the screws are removed.

CAUTION

After the position of the control box has been rotated, refill the pump with system liquid before startup.

3.3 CHANGING THE WIRING BOX POSITION

Always install the circulator with the wiring box below or beside the motor. To change the wiring box position, remove the motor mounting screws and rotate the motor (see **FIG. 3**).

Ensure the gasket is intact and seated before evenly retightening the mounting screw to 4.5 - 5.5 lb/ft (6 - 7.5 Nm).

4.0 ELECTRICAL CONNECTION

The electrical wiring must be installed strictly in accordance with national electrical codes, local codes and regulations.

1. Electrical installation should be conducted by a qualified electrician.
2. Always make sure electric power is disconnected before wiring the circulator.

The motor is designed for 60 Hz, 1 phase, 115 volt power.

Wire shall be 14 to 16 gauge solid wire or 16 to 18 gauge stranded wire.

To wire, loosen the screw from the wiring box cover and remove the screw and cover.

Insert wires through supplied liquid-seal connector (installed) or other strain relief connector (not provided).

Select to use the installed liquid-seal connector or included ½" NPT connector. To install the NPT connector, loosen the existing connector and screw on the NPT connector using the existing lock nut.

(Connect other strain relief connector (not provided)to the NPT connector.)

Insert wires through the connector(s).

Strip 3⁄16" of insulation from the ends of the three wires to be connected.

To insert the wires into the terminal strip, press the terminal lever downward firmly. Insert the stripped wire into the opening and release the lever (see **FIG. 4**). Tug on the wire gently to ensure it is secured.

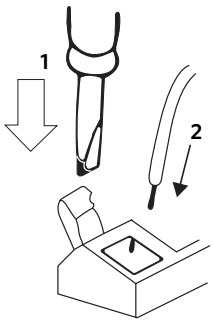

FIG. 4 Terminal strip

Connect the hot wire to terminal 'L', the neutral wire to terminal 'N', and the ground wire to terminal ⏚ (see **FIG. 5**).

Place the terminal box cover and tighten screw.

The motor is thermally protected 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 side of the terminal box.

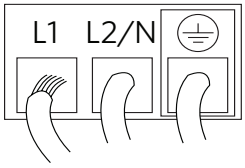

FIG. 5 Electrical connection

The electrical connections and protection must be carried out in accordance with local regulations.

WARNING

The pump must be connected to ground.

5.0 CONTROL PANEL

5.1 ELEMENTS ON THE CONTROL PANEL

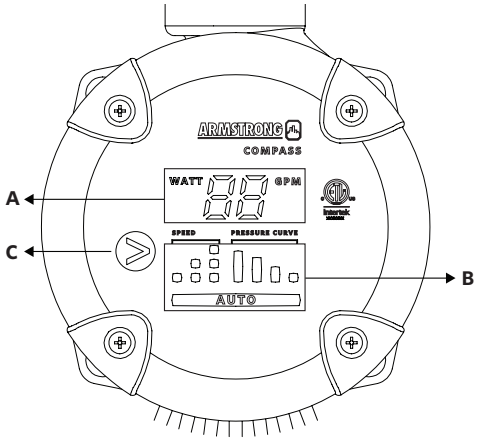

FIG. 6 Armstrong compass control panel

The control panel on the Armstrong compass includes:

POSITION	DESCRIPTION
A	Display showing the actual pump power consumption in Watt and reference flow in USgpm. Display alternates between Watt and GPM every 5 seconds.
B	Eight light fields indicating the pump setting
C	**Mode Select** button for changing pump setting

Note

GPM value is a flow indicator only, not calibrated.

5.2 FIRST POWER-UP

The display is on and in Auto mode (position 0 in **FIG. 7**) when the electricity has been switched on.

The display shows the actual pump power consumption in Watts and reference flow in USgpm during operation.

Note

Display shows "E#" when the pump is not operating properly (see section 10). (# is between 0 to 4)

5.3 DISPLAY

The Armstrong Compass has eight pump settings which can be selected with the press button.

Every time the Mode button is pressed (see **FIG. 6**, **C**) the pump setting is changed to the next option.

A full cycle is eight button presses.

The selected pump setting is indicated by one of eight different light fields (see **FIG. 7**).

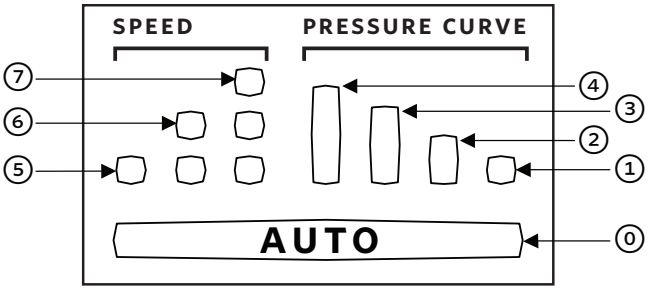

FIG. 7 Eight light fields

See section 9, Pump settings and pump performance, for information about the function of each setting.

POSITION	DESCRIPTION
⓪	AUTO (factory setting)
①	PC1 Lowest proportional-pressure curve
②	PC2 Highest proportional-pressure curve
③	PC3 Lowest constant-pressure curve
④	PC4 Highest constant-pressure curve
⑤	Constant curve, speed I
⑥	Constant curve, speed II
⑦	Constant curve, speed III

6.0 SETTING THE PUMP

6.1 PUMP SETTING FOR SYSTEM TYPE

Note
Optimum energy savings & comfort can be achieved by careful selection of the correct operation mode.

Recommended and alternative pump settings according to **FIG. 8**:

IMAGE	SYSTEM TYPE	RECOMMENDED SETTING	ALTERNATIVE SETTING
A	Underfloor heating	**AUTO**	Highest constant-pressure curve (PC4)* OR Lowest constant-pressure curve (PC3)*
B	Two-pipe (parallel) systems	**AUTO**	Highest proportional-pressure (PC2)*
C	One-pipe (series) systems	Lowest proportional-pressure curve (PC1)*	Highest proportional-pressure (PC2)*

* See pump settings and pump performance (section 9).

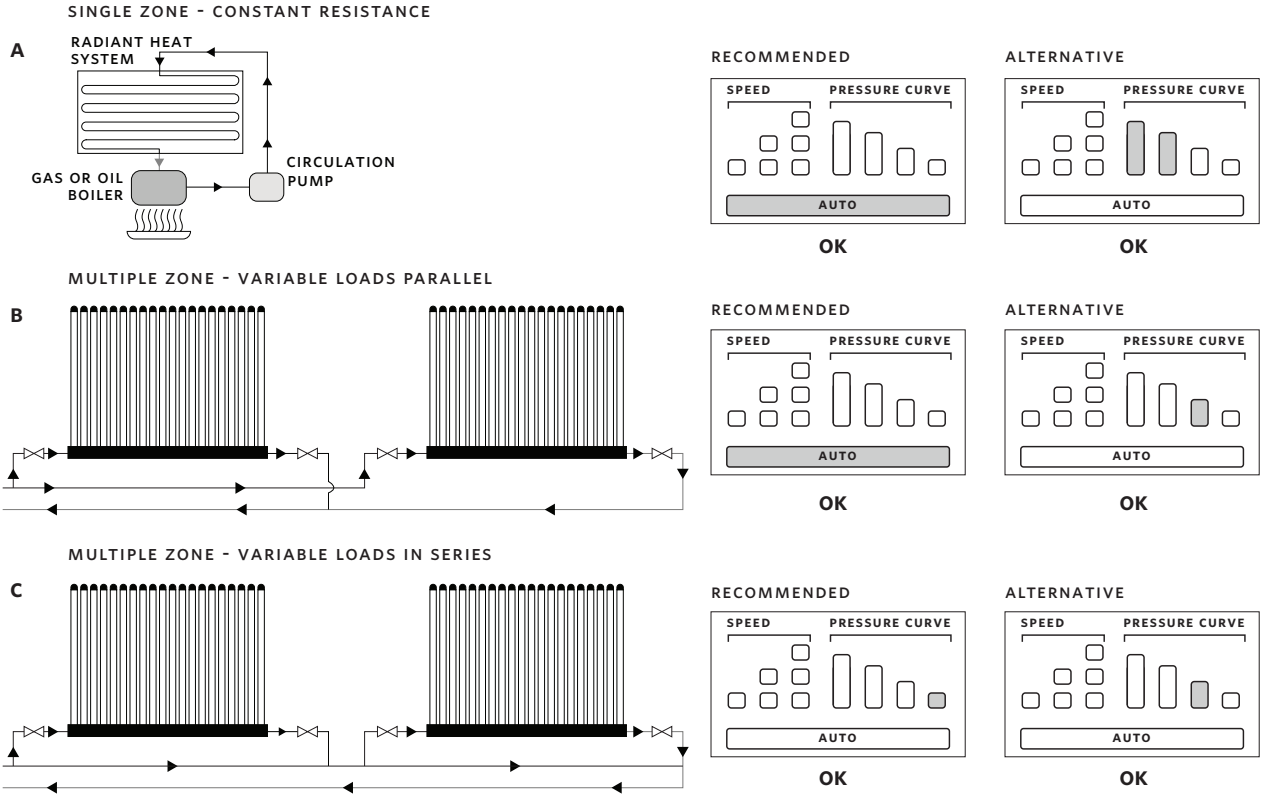

FIG. 8 Selection of pump setting for system type

AUTO (underfloor heating and two-pipe (parallel) systems)
AUTO function observes and adjusts the pump performance to satisfy the system requirement. The pump adapts to the system over time, it is recommended to leave the pump in the **AUTO** position at least one week before selecting other pump settings.

Changing from recommended (AUTO) to alternative pump setting:
Heating systems are 'slow' systems that cannot be set to the optimum operation within minutes or hours.

If the recommended pump setting does not give the desired comfort in some areas of the building, change the pump setting to the shown alternative.

See pump settings and pump performance (section 9) for more details.

7.0 SYSTEMS WITH BYPASS VALVE BETWEEN FLOW AND RETURN PIPES

7.1 PURPOSE OF BYPASS VALVE

The purpose of a differential pressure bypass valve is to ensure that the heat from the boiler can be distributed when all valves in the underfloor-heating circuits and/or thermostatic radiator valves are closed. These valves were commonly applied in multi zone systems with traditional fixed speed pumps.

A Compass circulator can eliminate the need for a differential bypass valve when used in Auto or proportional pressure modes, because the circulator will reduce speed when the valves in the system close and the heat demand is reduced.

If you are servicing an existing system with a bypass valve and you are replacing a fixed speed circulator with a Compass circulator, there is no need to remove the bypass valve.

8.0 START-UP

8.1 BEFORE START-UP

Fill the system with liquid and properly vent the system before starting the pump. The required minimum inlet pressure in relation to liquid temperature must be available at the pump inlet (see section 11).

8.2 VENTING THE PUMP

Even with system vented, air may be still be present in the pump. The air in the pump may cause noise but the noise should cease after a few minutes running.

The venting process can be shortened by setting the pump to run at speed III for a short period of time (20 seconds).

Once the pump is vented (the noise has ceased), set the pump mode according to the recommendations (see section 6).

CAUTION

The pump must not run dry.

9.0 PUMP SETTINGS AND PUMP PERFORMANCE

9.1 RELATION BETWEEN PUMP SETTING AND PUMP PERFORMANCE

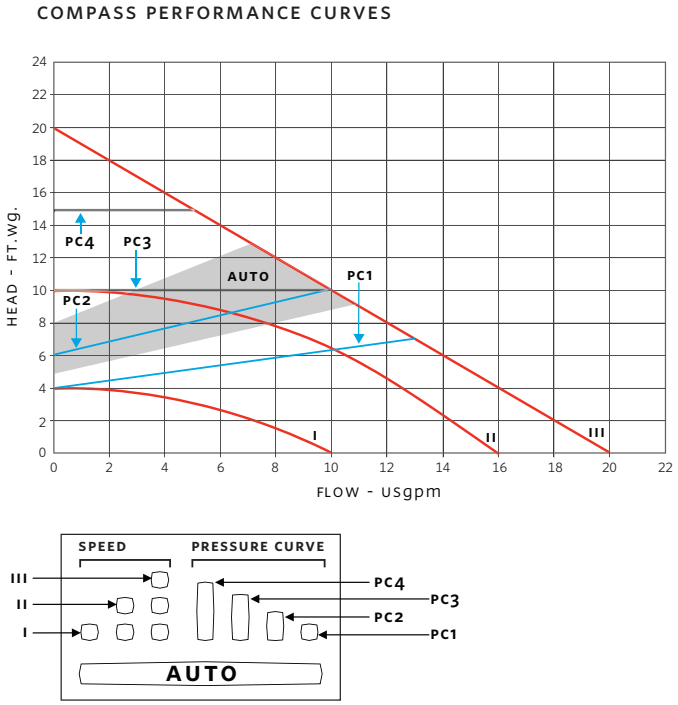

FIG. 10 Pump setting in relation to pump performance

Select the optimum setting:

The Compass circulator comes with 8 modes of operation.

There are three fixed speed curve options which will operate just like traditional fixed speed circulators, except that compass motor technology is far more energy efficient than traditional fixed speed circulators.

The proportional pressure curves operate as Sensorless differential pressure circulators. These curves follow pre-selected performance curves and will reduce flow and energy consumption when the valves in the system close and the flow requirements are reduced.

The constant pressure curves maintain pre-selected pressure ratings at the circulator.

AUTO mode operates on the sensorless differential pressure principle, but will **Learn** usage patterns and adjust circulator performance over time to optimize energy efficiency.

SETTING	PUMP CURVE	FUNCTION
AUTO (factory setting)	Operating within the defined range	The **AUTO** function controls the pump performance automatically within a defined performance range (see **FIG. 10**). • Adapt to the size of the system. • Adapt to system demand over time. In **AUTO**, Compass is set to proportional-pressure curve control.
PC1	Lowest proportional pressure curve	The operation point of the pump will follow the lowest proportional-pressure curve (see **FIG. 10**) depending on the load demand. The head (pressure) is reduced during low demand and increased during high demand until the maximum wattage is reached, then the pump will run on the speed III curve.
PC2	Highest proportional pressure curve	The operation point of the pump will follow the highest proportional-pressure curve (see **FIG. 10**) depending on the load demand. The head (pressure) is reduced during low demand and increased during high demand until the maximum wattage is reached, then the pump will run on the speed III curve.
PC3	Lowest constant pressure curve	The operation point of the pump will follow the lowest constant-pressure curve (see **FIG. 10**) depending on the load demand. The head (pressure) is kept constant, regardless of the load demand until the maximum wattage is reached, then the pump will run on the speed III curve.
PC4	Highest constant pressure curve	The operation point of the pump will follow the highest constant-pressure curve (see **FIG. 10**) depending on the load demand. The head (pressure) is kept constant, regardless of the load demand until the maximum wattage is reached, then the pump will run on the speed III curve.
III	Speed III	Speed III is the highest constant speed performance curve of Compass and it also presents the max performance capability of the pump (see **FIG. 10**). Speed III can also be used to vent the pump (see section 8.2).
II	Speed II	Speed II is the medium constant speed performance curve of Compass (see **FIG. 10**).
I	Speed I	Speed I is the lowest constant speed performance curve of Compass (see **FIG. 10**).

10.0 TROUBLESHOOTING

WARNING

Before starting any work on the pump, make sure that the electricity supply has been switched off and that it cannot be accidentally switched on.

FAULT	CONTROL PANEL	CAUSE	REMEDY
The pump does not run	Light off	A fuse in the installation is blown.	Replace the fuse.
		The circuit breaker has tripped out.	Switch the circuit breaker on.
		The pump is defective.	Replace the pump.
	Shows "E0" or "E1"	Electricity supply failure. Voltage may be too low or too high.	Check voltage level of the electricity supply.
	Shows "E2"	The impeller is locked.	Unlock the impeller/rotor.
	Shows "E3"	No liquid in system	Fill up the system
	Shows "E4"	Voltage may be too low	Check voltage level of the electricity supply.
		Control (internal circuit) is broken	Replace the pump.
Noise in the system	Shows wattage and gpm	Air in the system.	See section 8.2 Venting of the pump system.
		The flow is too high.	Select a lower speed or pressure curve (see section 9). Pump settings and pump performance.
		Pump may be running dry. No liquid in system	Fill up the system
Noise in the pump	Shows wattage and gpm	Air in the pump.	Let the pump run. It vents itself over time (see section 8.2) venting the pump.
		The inlet pressure is too low.	Increase the inlet pressure or check the air volume in the expansion tank, if installed.
Insufficient heat in space	Shows wattage and gpm	The pump performance setting may be too low.	Select a higher speed or pressure curve setting (see section 9). Pump settings and pump performance.
			Confirm that the system requirement can be met by this pump capacity or larger pump may be required.

11.0 TECHNICAL DATA AND INSTALLATION DIMENSIONS

11.1 TECHNICAL DATA

Supply voltage: 1 × 115 V – 10%/+ 6%, 60 Hz

	MINIMUM	MAXIMUM
Amp	0.05	0.65
Watt	5	45

Motor protection: The pump requires no external motor protection.

Maximum working temperature: 230°F (110°C) maximum

Maximum working pressure: 150 psi (10 bar).

Maximum relative air humidity (rh): 95%.

Enclosure class: Type 2

Insulation class: H

Certification: ETL listed for US and Canada (conforms to ULSTD.778 certified to CSA STD. C22.2 NO.108-01)

** NSF 372 (for stainless steel models)

INLET PRESSURE

Minimum inlet pressure in relation to liquid temperature:

LIQUID TEMPERATURE	MINIMUM INLET PRESSURE
150°F (65°C)	3.0 ft (0.91 m)
167°F (75°C)	4.4 ft (1.34 m)
194°F (90°C)	9.2 ft (2.8 m)
230°F (110°C)	36.1 ft (11.0 m)

Sound pressure level: The sound pressure level of the pump is lower than 43 dB(A).

Ambient temperature: 32°F (0°C) – 104°F (40°C)

Pumped liquids: Water or water Glycol mix.

WARNING

No flammable liquids such as diesel oil, petrol or similar liquids

Liquid temperature: 36°F (2°C) – 230°F (110°C)

To avoid condensation in the control box and stator, the liquid temperature must always be higher than the ambient temperature.

AMBIENT TEMPERATURE	LIQUID TEMPERATURE	
	MIN.	MAX.
32°F (0°C)	35.6°F (2°C)	230°F (110°C)
50°F (10°C)	50°F (10°C)	230°F (110°C)
68°F (20°C)	68°F (20°C)	230°F (110°C)
86°F (30°C)	86°F (30°C)	230°F (110°C)
95°F (35°C)	95°F (35°C)	194°F (90°C)
104°F (40°C)	104°F (40°C)	158°F (70°C)

CAUTION

Since water conditions can vary with geographical location (i.e. amount and type of dissolved solids) it is recommended that the operating temperature of the liquid for open (potable) systems be kept as low as possible (i.e. below 150°F or 65°C) to avoid precipitation of calcium.

VOLUTE MATERIAL

Cast iron: For closed systems (boiler loops)

Stainless steel:** Open or closed systems (potable hot water or boiler loops)

** Certified <0.25 weighted average percent lead (NSF 372) and complies with California Health and Safety code section 116875 (commonly known as AB1953).

SPARE PARTS

SPARE PART	ITEM NO.
Check valve 1"	810223–104