

Technical Information

Performance Specifications

Operating Temperature Range:	Model dependent; see table below	
Temperature Stability:	±0.005°C (±0.01°F)	
Pump Type:	Variable speed pressure/suction	
	<u>60Hz models</u>	<u>50Hz models</u>
Maximum Pressure:	4.3 psi (0.30 bar)	3.6 psi (0.25 bar)
Maximum Pressure Flow Rate:	5.3 gpm (20.1 lpm)	4.4 gpm (16.7 lpm)
Maximum Suction Flow Rate:	3.9 gpm (14.7 lpm)	3.2 gpm (12.2 lpm)
Heater Wattage:	1100 watts	2200 watts

Model Type	Reservoir Capacity	Temperature Range	Electrical Requirements	
			60Hz	50Hz
AP07R-20 Refrigerating / Heating Bath	7 liters	-20° to 200°C -4° to 392°F	120V, 60Hz, 12A	240V, 50Hz, 12A
AP07R-40 Refrigerating / Heating Bath	7 liters	-40° to 200°C -40° to 392°F	120V, 60Hz, 12A	240V, 50Hz, 12A
AP7LR-20 Refrigerating / Heating Bath	7 liters	-20° to 200°C -4° to 392°F	120V, 60Hz, 12A	240V, 50Hz, 12A
AP15R-30 Refrigerating / Heating Bath	15 liters	-30° to 200°C -22 to 392°F	120V, 60Hz, 13A	240V, 50Hz, 13A
AP15R-40 Refrigerating / Heating Bath	15 liters	-40° to 200°C -40° to 392°F	120V, 60Hz, 13A	240V, 50Hz, 13A
AP20R-30 Refrigerating / Heating Bath	20 liters	-30° to 200°C -22° to 392°F	120V, 60Hz, 13A	240V, 50Hz, 13A
AP28R-30 Refrigerating / Heating Bath	28 liters	-30° to 200°C -22° to 392°F	120V, 60Hz, 13A	240V, 50Hz, 13A
AP45R-20 Refrigerating / Heating Bath	45 liters	-25° to 135°C -13° to 275°F ⁽¹⁾	208-240V, 50/60Hz, 13A	208-240V, 50/60Hz, 13A
AP75R-20 Refrigerating / Heating Bath	75 liters	-20° to 100°C -4° to 212°F ⁽¹⁾	208-240V, 50/60Hz, 13A	208-240V, 50/60Hz, 13A
AP07H200 Heating Only Bath	7 liters	Ambient +10° to 200°C Ambient +20° to 392°C	120V, 60Hz, 10A	240V, 50Hz, 10A
AP15H200 Heating Only Bath	15 liters	Ambient +10° to 200°C Ambient +20° to 392°F	120V, 60Hz, 10A	240V, 50Hz, 10A
AP20H200 Heating Only Bath	20 liters	Ambient +10° to 200°C Ambient +20° to 392°F	120V, 60Hz, 10A	240V, 50Hz, 10A
AP28H200 Heating Only Bath	28 liters	Ambient +10° to 200°C Ambient +20° to 392°F	120V, 60Hz, 10A	240V, 50Hz, 10A
AP06S150 Stainless Steel Open Tank	6 liter	Ambient +10° to 150°C Ambient +20° to 302°F	120V, 60Hz, 10A	240V, 50Hz, 10A
AP10S150 Stainless Steel Open Tank	10 liter	Ambient +10° to 150°C Ambient +20° to 302°F ⁽²⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP20S150 Stainless Steel Open Tank	20 liter	Ambient +10° to 150°C Ambient +20° to 302°F ⁽²⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP28S150 Stainless Steel Open Tank	28 liter	Ambient +10° to 150°C Ambient +20° to 302°F ⁽²⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP08P100 Polycarbonate Open Tank	8 liter	Ambient +10° to 85°C Ambient +20° to 185°F ⁽³⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP11P100 Polycarbonate Open Tank	11 liter	Ambient +10° to 85°C Ambient +20° to 185°F ⁽³⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP14P100 Polycarbonate Open Tank	14 liter	Ambient +10° to 85°C	120V, 60Hz,	240V, 50Hz,

		Ambient +20° to 185°F ⁽³⁾	10A	10A
AP17P100 Polycarbonate Open Tank	17 liter	Ambient +10° to 85°C Ambient +20° to 185°F ⁽³⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP23P100 Polycarbonate Open Tank	23 liter	Ambient +10° to 85°C Ambient +20° to 185°F ⁽³⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP28P100 Polycarbonate Open Tank	28 liter	Ambient +10° to 85°C Ambient +20° to 185°F ⁽³⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP29VB5R Polycarbonate Viscosity	29 liter	Ambient +10° to 85°C Ambient +20° to 185°F ⁽³⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
AP29VB3S Polycarbonate Viscosity	29 liter	Ambient +10° to 85°C Ambient +20° to 185°F ⁽³⁾	120V, 60Hz, 10A	240V, 50Hz, 10A
PP15RCAL Refrigerating Calibration Bath	15 liters	-30° to 200°C -22° to 392°F	120V, 60Hz, 13A	240V, 50Hz, 13A

1. Maximum operating temperature at which $\pm 0.005^\circ\text{C}$ temperature stability can be maintained; Advanced Programmable Controller is capable of higher temperatures.
2. Maximum operating temperature for stainless steel tank; Advanced Programmable Controller is capable of higher temperatures.
3. Maximum operating temperature for polycarbonate tank; Advanced Programmable Controller is capable of higher temperatures.





Environmental Conditions Indoor use only


Maximum Altitude:	2000 meter
Operating Ambient:	5° to 35°C (41° to 95°F)
Relative Humidity:	80%, non-condensing
Installation Category:	II
Pollution Degree:	2
Ingress Protection:	IP 31
Climate Class:	SN
Software Class:	B
Output Waveform:	Sinusoidal

Specifications subject to change without notice.

Reservoir Fluids

Depending on your needs, a variety of fluids can be used with your Circulator. No matter what bath fluid is selected, it must be chemically compatible with the reservoir and the materials in your Circulator. It must also be suitable for the desired temperature range.

	<p>WARNING: When using Class III flammable fluids per DIN 12876-1, the user must attach the following warning labels to the front of the unit so that they are well visible:</p>		
	<p>Warning Label W09 Colors: Yellow/black</p>		<p>Danger Area. Attention! Observe instructions (operating manual, safety data sheet)</p>
<p>Mandatory Label M018 Colors: Blue/white</p> <p>Or</p> <p>Semi S1-0701 Table A1-2 #9 Colors: Blue/white</p>		<p>Carefully read the user information prior to beginning operation. Scope: EU</p>	
		<p>Carefully read the user information prior to beginning operation. Scope: NAFTA</p>	

	<p>WARNING: Always use fluids that satisfy safety, health, and equipment compatibility requirements. Be aware of the chemical hazards that may be associated with the bath fluid used. Observe all safety warnings for the fluids used as well as those contained in the material safety data sheet.</p>
---	---

For optimum temperature stability, the fluid's viscosity should be 50 centistokes or less at its lowest operating temperature. This permits good fluid circulation and minimizes heating from the pump.

For temperatures from 10°C to 90°C, distilled water is recommended. For temperatures below 10°C, a mixture of laboratory grade ethylene glycol and water should be used. Do not use deionized water.

The following chart is intended to serve as a guide in selecting a bath fluid for your application. For optimum temperature stability and low vaporization, be sure to stay within the fluid's normal temperature range.

You are responsible for proper selection and use of the fluids. Avoid extreme range operation.

Fluid Description	Viscosity (cSt) @ 25°C	Specific Heat			Normal Temperature Range	Extreme Temperature Range
		@ Fluid Temperature	BTU/lb°F	KJ/Kg°C		
distilled water	1	50°C	1.00	4.18	10° to 90°C	2° to 100°C
polyclear MIX 30	1	50°C	1.00	4.18	15° to 90°C	2° to 100°C
polytherm S150	50	100°C	0.41	1.71	50° to 150°C	5° to 270°C*
polytherm S200	125	150°C	0.40	1.67	100° to 200°C	80° to 232°C*
polytherm S250	500	200°C	0.39	1.63	150° to 250°C	125° to 260°C*
polytherm M170	40	85°C	0.40	1.67	50° to 170°C	25° to 190°C
polyclear HC -50	3	-30°C	0.62	2.59	-50° to 100°C	-62° to 118°C
polyclear EG -25 (50/50 mix with distilled H ₂ O)	20	-20°C	0.78	3.26	-25° to 100°C	-30° to 115°C
polyclear EG -25 (30/70 mix with distilled H ₂ O)	12	0°C	0.89	3.72	0° to 95°C	-15° to 107°C
polyclear PG -20 (50/50 mix with distilled H ₂ O)	20	-10°C	0.83	3.47	-20° to 100°C	-30° to 115°C
polyclear PG -20 (30/70 mix with distilled H ₂ O)	12	5°C	0.92	3.85	5° to 90°C	-10° to 107°C
polyclear MIX -25 (50/50 mix with distilled H ₂ O)	20	-20°C	0.78	3.26	-25° to 100°C	-30° to 115°C
polyclear MIX -25 (30/70 mix with distilled H ₂ O)	12	0°C	0.89	3.72	0° to 95°C	-15° to 107°C



***WARNING:** This is the fluid's flash point temperature.



WARNING: DO NOT USE THE FOLLOWING LIQUIDS

- Automotive antifreeze with additives**
- Hard tap water**
- Deionized water with a specific resistance > 1 meg ohm
- Concentrations of acids or bases
- Solutions with halides: chlorides, fluorides, bromides, iodides or sulfur
- Bleach (Sodium Hypochlorite)
- Solutions with chromates or chromium salts
- Glycerine
- Syltherm fluids

** At temperatures above 40°C, additives or mineral deposits can adhere to the heater. If deposits are allowed to build up, the heater may overheat and fail. Higher temperatures and higher concentrations of additives will hasten deposit build up.

Application Notes

At a fluid's low temperature extreme:

- The presence of ice or slush adversely affects temperature stability.
- A viscosity above 10 centistokes adversely affects temperature uniformity.
- A high fluid viscosity and high pump speed adds heat to the fluid being pumped.

At a fluid's temperature above ambient without refrigeration:

- If your set point temperature is less than 15°C above the ambient temperature, the viscosity of the fluid should be 10 centistokes or less to minimize friction heating of the fluid.
- Heat loss should be encouraged by uncovering the fluid and lowering the pump speed.

At fluid's high temperature extreme:

- Heat loss from vapor adversely affects temperature stability.
- To prevent the accumulation of vapors inside the room, the reservoir may need to be placed in a fume hood.
- Use a cover and/or floating hollow balls to help prevent heat and vapor loss.
- Replenish fluid lost from vapor frequently.

Tubing and Fitting Temperature Ranges

Material	Temperature Range
Buna N tubing	-40° to 120°C
Viton® tubing	-32° to 200°C
Braided Teflon® lined tubing	-50° to 225°C
Stainless steel fittings	-45° to 225°C
Nylon fittings	-40° to 90°C
Brass fittings	-40° to 80°C

Fluid Compatibility

	Buna N Tubing	Viton Tubing	Braided Teflon Tubing	Stainless Steel Fittings	Nylon Fittings	Brass Fittings
polycool EG -25	A	A	A	B	A	B
polycool PG -20	A	A	A	B		B
polycool HC -50	B	B	A	B	B	B
polytherm S150	B	B	A	B		B
polytherm S200	B	B	A	B		B
polytherm S250	B	B	A	B		B
polytherm M170)	A	A	A	A		B
polycool MIX -25	A	A	A	B	A	B
polyclear MIX 30	A	A	A	A	A	A

A = Excellent B = Good