

## FP90-SL Ultra-Low Refrigerated / Heating Circulator

Ultra-Low Refrigerated Circulators with SL circulator impress with their high heating, cooling and pump capacities for external temperature control applications.

### Product features

- VFD COMFORT DISPLAY
- LCD DIALOG DISPLAY backlit for convenient interactive operation
- Keypad for setpoints, warning/safety values and menu functions
- ICC (Intelligent Cascade Control), self-optimizing temperature control
- TCF Temperature Control Features to optimize the control behavior
- ATC3 3-Point-Calibration
- Pt100 External sensor connection for measurement and control
- SMART PUMP, electronically adjustable pump stages
- Unique early warning system for low liquid level
- Adjustable high temperature cut-out, visible via display
- RS232/RS485 interface for online communication
- Integrated programmer for 6 x 60 program steps
- Connections for solenoid valve and HSP booster pump
- Proportional cooling control
- Active Cooling Control



### Performance values

400V/3PNPE/50Hz (Plug 32A CEE)	
Heating capacity kW	3
Viscosity max. cSt	70
Pump capacity flow rate l/min	22 ... 26
Pump capacity flow pressure bar	0.4 ... 0.7
Maximum suction bar	0.2 ... 0.4
Power consumption A	22

Order No.	9352790N.07					
Cooling capacity (Ethanol)						
°C	20	0	-20	-40	-60	-80
kW <sup>1</sup>	1.8	1.7	1.6	1.35	0.75	0.15
Refrigerant stage 1			Refrigerant stage 2			
Refrigerant	R404A		Refrigerant	R23		
Filling weight g	850		Filling weight g	380		
Global Warming Potential for R404A	3922		Global Warming Potential for R23	14800		
Carbon dioxide equivalent t	3.3337		Carbon dioxide equivalent t	5.624		

<sup>1</sup> Performance specifications measured in accordance with DIN 12876. Cooling capacities up to 20 °C measured with ethanol; over 20 °C with thermal oil unless otherwise specified. Performance specifications apply at an ambient temperature of 20 °C. Performance values may differ with other bath fluids.

## Technical data

Available voltage versions		Cooling	
Order No.	9 352 790N	Cooling of compressor	2-stage Air
Available voltage versions:			
9352790N.06	230V/3PPE/50Hz (Without Plug) (R404A)		
9352790N.07	400V/3PNPE/50Hz (Plug 32A CEE) (R404A)		
9352790N.16	208V/3PPE/60Hz (Without Plug) (R404A)		
Bath		Other	
Bath cover	integrated	Classification	Classification III (FL)
		IP Code	IP 21
Electronics		Dimensions and volumes	
Interfaces	Profibus optional	Weight kg	201
External pt100 sensor connection	integrated	Dimensions cm (W x L x H)	59 x 76 x 116
Integrated programmer	6x60 steps	Filling volume l	22
Temperature control	ICC	Pump connections	M16x1 male
Absolute temperature calibration	3 Point Calibration		
Temperature display	VFD		
Temperature setting	Keypad		
Temperature values		Included in delivery	
Setting the resolution of the temperature display °C	0.01	2 Barbed fittings for tubing 8 and 12 mm ID. (Pump connections M16x1 male)	
Working temperature range °C	-90 ... +100	2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 female).	
Temperature stability °C	±0.05		
Ambient temperature °C	+5 ... +40		
Setting the resolution of the temperature display °C	0.01		

## All Benefits



**For flammable bath fluid**  
Classification III (FL) according to DIN 12876-1



**ATC3. Calibration.**  
'Absolute Temperature Calibration' for compensating a physically caused temperature difference, 3-point calibration.



**Process. Under control.**  
Full regulation of the dynamics control, access to all important control parameters for individual process optimization.



**100 % Cooling capacity**  
'Active Cooling Control' for cooling available throughout the entire working temperature range, fast cool-down even at higher temperatures



**Early warning system for high/low temperature limits**  
Maximum safety for applications, optical and audible alarm, convertible to automated cut-off function



**Energy saving cooling**  
Proportional cooling control for automatic adjustment of cooling power or temporary switch-off of compressor as needed to save up to 90 % energy in comparison to unregulated cooling machines



**Connection of additional equipment**  
Stakei connections for solenoid valve, HSP booster pump and HST booster heater



**Clever pump system**  
Reliable and consistent pump capacity, electronically adjustable pump stages



**Control of the external application**  
External Pt100 sensor connection for precise measurement and control directly in the external application



**Condensation and ice protection**  
A heated cover plate prevents condensation or ice build-up in the bath



**100% Checked.**  
100% testing. 100% quality. Each JULABO Circulator undergoes thorough quality testing before leaving the factory.



**Green technology.**  
Development consistently applied environmentally friendly materials and technologies.



**JULABO. Quality.**  
Highest standards of quality for a long product life.



**Quick start.**  
Individual JULABO consultation and comprehensive manuals at your disposal.



**Satisfied customers.**  
11 subsidiaries and more than 100 partners worldwide guarantee fast and qualified JULABO support.



**Services 24/7.**  
Around the clock availability. You can find suitable accessories, data sheets, manuals, case studies, and more at [www.julabo.com](http://www.julabo.com).



**Intelligent temperature control.**  
Intelligent cascade control - automatic and self-optimizing adaptation of the PID control parameters with external stability of +/- 0.05 °C.