

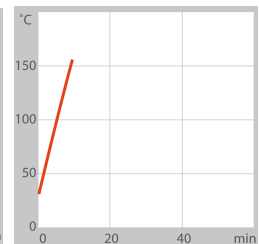
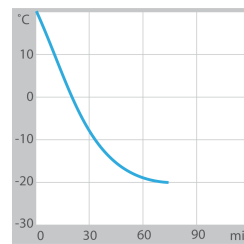
## F12-MA Refrigerated/Heating Circulator

### The general all-rounder for a broad spectrum of requirements

JULABO Refrigerated & Heating Circulators for heating and cooling are suitable for external temperature tasks and for temperature applications directly in the bath. A model from three different series' with different capacities can be selected. Powerful circulating pump systems and high heating and cooling capacities guarantee short heat-up and cool-down times. The inevitable dust accumulation that occurs in refrigeration systems is solved by means of an easily removed venting grid, which allows for easy cleaning. Depending on the model, the units are equipped with handles or castors for an easy transportation. All models have a drain screw on the front allowing the fluid to be drained easily. The compact assembly of each unit enables space to be saved in the laboratory.

### Your advantages

- MULTI-DISPLAY (LED) for actual and setpoint values, warning/safety functions and pump stage
- Keypad for setpoints, warning/safety values and menu functions
- PID2 temperature control with drift compensation
- ATC3 3-Point-Calibration
- Early warning system for low liquid level (DBGM 203 06 059.8)
- Adjustable high temperature cut-out, visible via display
- RS232 interface for online communication
- SMART PUMP electronically adjustable pump stages
- Active Cooling Control



- Cool-down time (Ethanol)
- Heat-up time (thermal)

### Technical Data

Order No.	9153612		
Model series	TopTech		
Category	Refrigerated - Heating Circulators		
Working temperature range (°C)	-20 ... +200		
Temperature control	PID		
Temperature stability (°C)	±0.02		
Setting / display resolution	0.01 (-9.99...99.99) / 0.1 °C		
Temperature Display	LED		
Heating capacity (kW)	2		
Cooling capacity (Medium: JULABO Thermal   Ethanol)	°C	20	0 -20
	kW	0.16	0.1 0.02
Pump capacity flow rate (l/min)	11-16		
Pump capacity flow pressure (bar)	0.23-0.45		
Bath opening / bath depth (W x L / D cm)	13 x 15 /13		

Pump connections	M10x1
Barbed fittings diameter (inner dia. / mm)	8 / 10
Filling volume liters	4.5
Refrigerant	R134a
Digital interface	RS232 Optional: Profibus
Ambient temperature	5...40 °C
Dimensions W x L x H (cm)	20 x 36 x 56
Weight (kg)	23
Classification according to DIN12876-1	Classification III (FL)
Included with each unit	2 barbed fittings suitable for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)
Cooling of compressor	Air
Power requirement V / Hz / A	230/50/11
Available voltage versions	230 V / 50 Hz 115 V / 60 Hz 230 V / 60 Hz 100 V / 50 - 60 Hz

## Characteristics

### Display



#### Several values at a glance

Large Multi-Display (LED), easy to read across the room, for actual value and up to 3 setpoints, warning functions, high temperature cut-off, selected pump stages (resolution 0.01/0.1 °C)

### Operation



#### Comfortable and detailed

Comfortable keypad with additional menu functions for pump stages, calibration, control parameters, programmer, warnings, etc.

### Temperature Control



#### Highly precise

PID Temperature control with drift compensation and adjustable control parameters, temperature stability  $\pm 0.01 \dots \pm 0.02$  °C



#### Highest measuring accuracy

'Absolute Temperature Calibration' for manual compensation of a temperature difference, 3-point calibration

### Refrigeration Technology



#### Consistent cooling capacity

Easily removable venting grid for quick and easy cleaning



#### 100 % Cooling capacity

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

### Technical Features



#### Clever pump system

Reliable and consistent pump capacity, electronically adjustable pump stages



#### Serial connection

RS232 interface for PC connection, e.g. for data communication and recording of measured values

### Warning & Safety Functions



#### Early warning system for low liquid level

Maximum safety for applications, optical and audible alarm, allows user to refill bath fluid before the unit shuts down



#### Early warning system for high/low temperature limits

Maximum safety for applications, optical and audible alarm, convertible to automated cut-off function



#### Enhanced protective functions

Maximum safety, adjustable high temperature cut-off or dry-running protection, additional display of setpoints permits easy and precise adjustments



#### For flammable bath fluids

Classification III (FL) according to DIN 12876-1

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