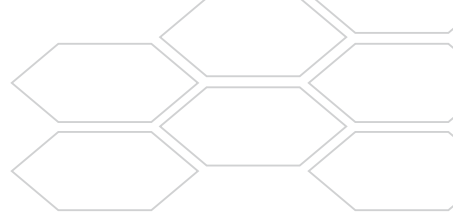


# THE CATALOG

## for Professional Temperature Control

-95 °C ... +400 °C





### JULABO sets the benchmark

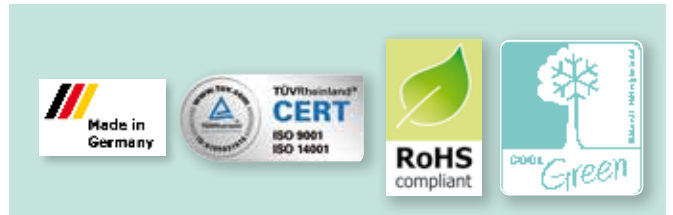
Ever since JULABO was founded in 1967 we develop and produce innovative temperature control instruments with highly precise control technology „Made in Germany“. JULABO instruments are used anywhere where highly precise temperatures or rapid temperature changes are required. More than 400,000 units installed around the world demonstrate the trust JULABO enjoys with users in science, research and industry. We have earned our place as one of the world’s leading firms in the field of temperature control solutions through dedication to quality, German engineering, and rapid, competent support provided by local contacts.



Gerhard Juchheim, Company founder and Managing Director (in the middle) with Markus Juchheim, Managing Director (on the right) and Ralph Juchheim, Managing Director JULABO USA (on the left)

### JULABO acts responsible

We strive relentlessly to reconcile technical innovation and environmental protection. For JULABO the use of environmentally friendly materials and the compliance with international standards are obligatory and implicit at the same time. Our customers profit from our environmental commitment. Under the label Cool Green we offer special refrigerated cooling instruments with natural refrigerants.



### JULABO secures the future

JULABO continues to invest in growth. In the German headquarters new facilities for Research and Development and a fashionable bistro for the employees were built. A modern warehouse and logistics center will increase space for production. The employees of JULABO USA also moved into a new, attractive building.

JULABO is actively committed to its employees and provides a comfortable and innovative working environment.

JULABO promotes skilled trainees and provides ideal conditions for a successful career.



JULABO trainees





## Professional Temperature Control

## Product Characteristics & Functions

### Display



**Easy to read**  
Large LED temperature display for actual value and setpoint (resolution 0.1 °C)



**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)



**A perfect view**  
Ample, easy to read VFD Comfort display for simultaneous display of 3 values, warning functions, high temperature cut-off, pump stages (resolution 0.01 °C)



**Additional plain text information**  
Comfortable LCD dialog display for interactive operation with plain text display



**Pump stage and liquid level**  
Backlit indicator for selected pump stages and filling volume on Presto® PLUS, Magnum 91 & Forte HT

### Operation



**Clear and simple**  
3-key operation for easy setpoint adjustment



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



**Simple and fast**  
Convenient 3-key setpoint adjustment (F models)



**Simple and fast**  
Convenient 3-key setpoint adjustment (FL models)



**Time saving**  
Comfortable and simple operation for setpoint adjustment



**Clearly structured**  
Comfortable, splash-proof keypad for setpoint adjustment, high/low temperatures, timer and shaking frequency (SW models)

### Temperature control



**Precise**  
PID Temperature control with set control parameters, temperature stability  $\pm 0.02 \dots \pm 0.2 \text{ °C}$



**Highly precise**  
PID Temperature control with drift compensation and adjustable control parameters, temperature stability  $\pm 0.01 \dots \pm 0.02 \text{ °C}$



**For higher demands**  
PID Temperature control with drift compensation and adjustable parameters, improved temperature stability for external applications, temperature stability  $\pm 0.01 \text{ °C}$  internal,  $< \pm 0.1 \text{ °C}$  external



**For perfect results**  
'Intelligent Cascade Control', automatic & self optimizing adjustment of PID control parameters, temperature stability  $\pm 0.005 \text{ °C}$  internal,  $< \pm 0.05 \text{ °C}$  external



**Full control**  
'Temperature Control Features' for individual optimization, access to all important control parameters, additional settings for band limit, limits, co-speed-factor etc.



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



**High measuring accuracy**  
'Absolute Temperature Calibration' for manual compensation of a temperature difference, 1-point calibration



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



## The new PRESTO®

### Display



**State-of-the-art display technology**  
TFT Display for comfortable user guidance, colored display of measurement values, graphs and control options, user-defined views

### Operation



**Optimal ease of use**  
Touch screen for direct operation via display



**Instructions inside**  
Help menus and explanations in plain text for all control options, help messages and warning messages



**Multilingual user guidance**  
Language selection for display of control options, notifications and warning messages via touchscreen



**Convenience for several users**  
Administrator level for customizing instrument settings, user levels with limited permissions for fast and safe defined access, password protection, all levels adjustable

### Temperature Control



**For perfect results**  
'Intelligent Cascade Control', automatic & self optimizing adjustment of PID control parameters, temperature stability  $\pm 0.01 \text{ °C} \dots < \pm 0.2 \text{ °C}$



**Full control**  
'Temperature Control Features', for individual optimization, access to all important control parameters, additional settings for band limit, limits, co-speed-factor etc.



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



**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



**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



The icons can be found on the intro pages of each product group

## 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



### 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



### Condensation and ice protection

A heated cover plate prevents condensation or ice build-up in the bath

## 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



### Connection compliant to standard

RS232/RS485 dual-interface for serial data transmission according to EIA-485 industry standard (2-wire bus technology), upgradable with Profibus DP



### Easy program control

Integrated programmer for the execution of time and temperature dependent profiles, 1 temperature profile with 10 steps max., with real time clock



### Optimal program control

For the execution of time and temperature dependent profiles, 6 temperature profiles with 60 steps max., with real time clock



### Automatic control of operating time

Electronic countdown-timer function for timer-programmed unit shut-down, stand-by mode after programmed time expires



### Connection of additional equipment

Stakei connections for solenoid valve, HSP booster pump and HST booster heater

## 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



### Protective functions

Adjustable high temperature cut-off or dry-running protection



### Enhanced protective functions

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



### Only for non-flammable bath fluids

Classification I (NFL) according to DIN 12876-1



### For flammable bath fluids

Classification III (FL) according to DIN 12876-1

## Technical Features



### Intelligent pump system

Reliable and consistent pump capacity, electronically adjustable pump stages or pressure value, automatic adjustment of pump capacity to viscosity



### Communication via networks

For the remote control of instruments via Ethernet networks, full access to all functions of the unit via a network-capable PC



### Intelligent communication

USB connection for data exchange (e.g. service data) or for wireless remote control via *WirelessTEMP*<sup>®</sup>



### Data exchange via SD-Card

For data exchange (e.g. service data) via SD memory card



### Connections according to standard

RS232/RS485 dual-interface for serial data transmission according to EIA-485 industry standard (2-wire bus technology), upgradable with Profibus DP



### Comfortable program control

Integrated programmer for the execution of time and temperature dependent profiles, 8 temperature profiles with 60 steps max., with real time clock



### Quiet as a whisper

Efficient components produce only a minimal sound decibel level



### Space-saving footprint

All connections as well supply and exhaust air are located at the front or rear, no venting grids on the sides, units can be placed close to each other or the application



### Continuous operation up to +40 °C

Robust temperature control instrument, continuous operation even at ambient temperatures of up to +40 °C



### Easy transport by one person

Ergonomic design facilitates moving and positioning by one person



### Filling level at a glance

Backlit indicator for selected pump stages and filling volume

## Warning & Safety Functions



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

Maximum safety for applications, optical and audible signal when limits are exceeded



### Duplicate safety

Adjustable high temperature cut-off for internal tank and for integrated expansion vessel



### For flammable bath fluid

Classification III (FL) according to DIN 12876-1



### Quick support

If an error occurs, the integrated Black-Box function permits fast diagnosis by the JULABO service team



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*Superior Temperature  
Technology for a  
Better Life*



# Cool Refrigeration Technology from **-95 °C** to **+200 °C**





## Refrigerated Circulators

JULABO circulators and their well proven and reliable technology are valued by users around the world and in all industries. They are designed for daily applications in research, material testing or in production. The JULABO circulator program features functional solutions and has set the benchmark for temperature control technology for decades.

The JULABO circulator program has the matching equipment for working temperatures to -50 °C. Choose your temperature control solution from three model series:

- Economy Series
- TopTech Series
- HighTech Series

JULABO ultra-low circulators of the TopTech- and HighTech series are available for working temperatures to -95 °C.

- Circulators for working temperatures from -95 °C to +200 °C
- All products feature user-friendly, intuitive operation
- Extra bright, easy to read displays
- Quick and highly precise results thanks to state-of-the-art control technology
- Many professional functions for adjusting control parameters, temperature calibration, temperature profiles, etc.
- High heating and cooling capacities for demanding applications
- Powerful circulating pumps, electronically adjustable
- Intelligent warning and safety functions
- Unique early warning system for low liquid level
- Digital and analog interface for flexible communication
- Wireless monitoring and operation with *WirelessTEMP*® (accessory)
- Maximum cooling capacity at all temperatures (Active Cooling Control)
- Removable venting grids for quick and easy cleaning
- Energy saving proportional cooling control (FP models)
- Heated bath cover plates to prevent condensation or ice build-up
- All wetted parts are made of stainless steel or high grade plastic







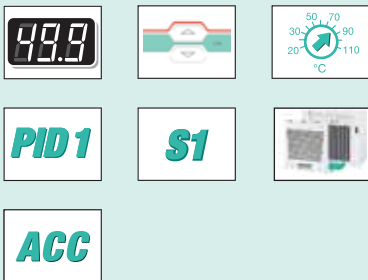
## Economy

## TopTech

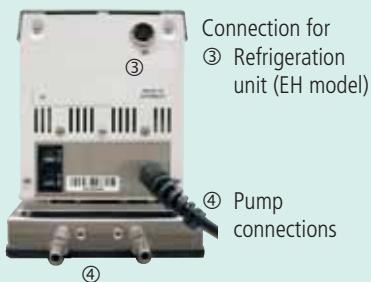


**ED/EH Models**  
-35 °C ... +150 °C

Basic models for routine and standard applications

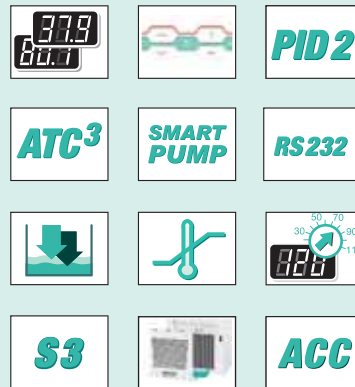


EH Models (in addition)

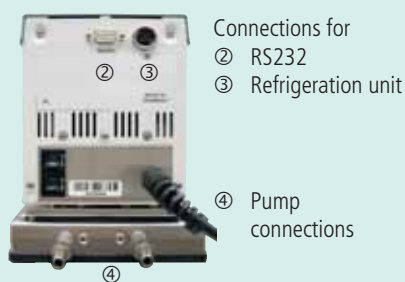


**MA Models**  
-50 °C ... +200 °C

Middle class for a broad range of applications

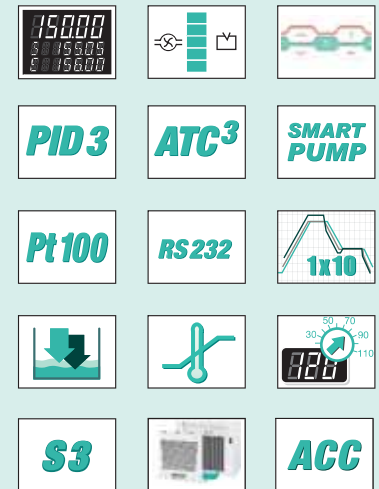


FP Models (in addition)

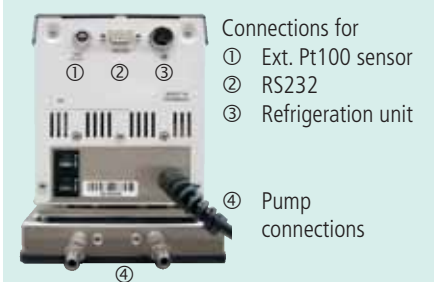


**ME Models**  
-90 °C ... +200 °C

Upper middle class with external Pt100 sensor connection



FP Models (in addition)

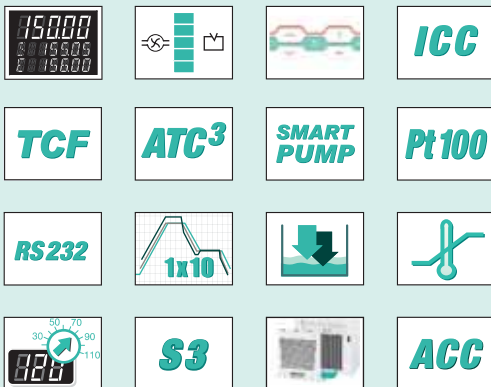


# HighTech



**HE/SE Models**  
-50 °C ... +200 °C

Sophisticated models for demanding applications



FP Models (in addition)

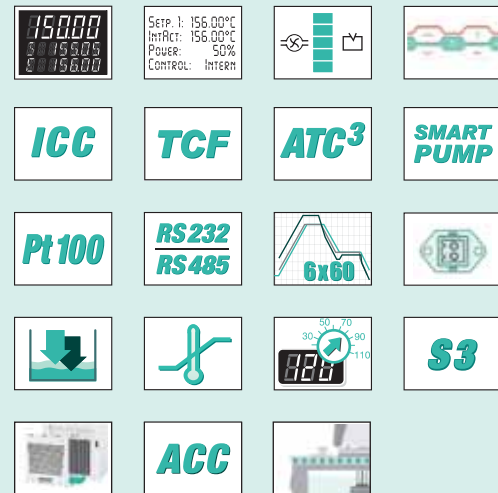


- Connections for
- ① External Pt100 sensor
  - ② RS232 / RS485
  - ③ Refrigeration unit
  - ④ Electronic module (option)
  - ⑤ Stakei connections (HL/SL)
  - ⑥ Pump connections M16x1male



**HL/SL Models**  
-95 °C ... +200 °C

Superior models for most demanding applications



FP Models (in addition)



**Electronic module with analog connections**  
**Order No. 8 900 100**

Optional for HighTech series

- Ⓐ Alarm output
- Ⓑ Standby input
- Ⓒ Analog interface with one input and two outputs for programming, flow sensor, pressure sensor or temperature recorder, scalable (current / voltage)





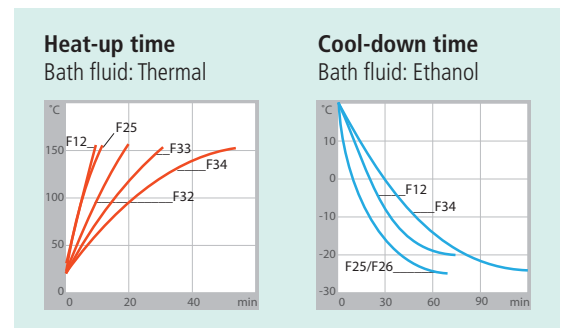
## Economy Series

for working temperatures from -30 °C to +100 °C

Our high-quality refrigerated/heating circulators are designed for the use of non-flammable bath fluids and are economically priced.

### Models with ED circulators

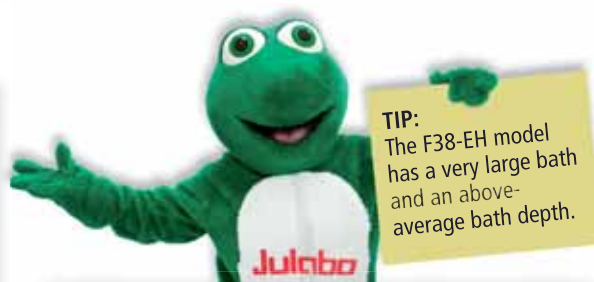
- PID1 temperature control, stability  $\pm 0.03$  °C
- Adjustable high temperature cut-off, low liquid level protection
- Temperature control of external systems
- Bath opening for internal applications
- Low noise level
- No side vents, units can be placed side by side
- Compact design



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)			Pump capacity Flow rate/Pressure l/min. bar	Bath opening/ Bath depth W x L/D cm	Filling volume liters	Dimensions W x L x H cm	
					+20	0	-20 °C					
9 116 612	F12-ED	-20 ... +100	$\pm 0.03$	2	0.16	0.1	0.02	15	0.35	13 x 15 / 13	4.5	20 x 36 x 56
9 116 625	F25-ED	-28 ... +100	$\pm 0.03$	2	0.26	0.2	0.06	15	0.35	12 x 14 / 14	4.5	23 x 42 x 61
9 116 626	F26-ED	-28 ... +100	$\pm 0.03$	2	0.26	0.2	0.06	15	0.35	12 x 14 / 14	4.5	42 x 42 x 42
9 116 634	F34-ED	-30 ... +100	$\pm 0.03$	2	0.45	0.32	0.14	15	0.35	24 x 30 / 15	20	38 x 58 x 62

Included with each unit: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)





### Applications

Routine laboratory applications such as immersing samples for temperature studies in the circulator baths as well as external temperature control applications like measuring cells, refractometers, polarimeters, photometers, viscometers, fermenters, electrophoresis chambers, chromatography columns, rotary evaporators, rheometers

## Economy Series

for working temperatures from -35 °C to +150 °C

Refrigerated/heating circulator EH combinations are based on the technology of the ED series. However, they feature an extended working temperature range and allow the use of flammable bath fluids.

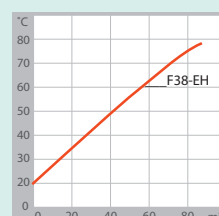
### Models with EH circulators, additional advantages

- Extended working temperature range to +150 °C
- Applications with flammable bath fluids
- Protection class III according to DIN 12876-1
- Refrigeration cut-off safety (except F12-EH)
- ATC 1-point calibration
- Electronic countdown timer

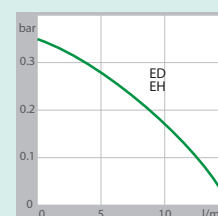


More information on circulators with natural refrigerants on page 22

**Heat-up time**  
Bath fluid: Thermal



**Pump capacity**  
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)			Pump capacity Flow rate/Pressure l/min. bar	Bath opening/ Bath depth W x L/D cm	Filling volume liters	Dimensions W x L x H cm	
					+20	0	-20 °C					
9 118 612	F12-EH	-20 ... +150	±0.03	2	0.16	0.1	0.02	15	0.35	13 x 15 / 13	4.5	20 x 36 x 56
9 118 625	F25-EH	-28 ... +150	±0.03	2	0.26	0.2	0.06	15	0.35	12 x 14 / 14	4.5	23 x 42 x 61
9 118 625N	FN25-EH	-28 ... +150	±0.03	2	0.26	0.2	0.06	15	0.35	12 x 14 / 14	4.5	23 x 50 x 61
9 118 632	F32-EH	-35 ... +150	±0.03	2	0.45	0.39	0.15	15	0.35	18 x 12 / 15	8	31 x 42 x 64
9 118 632N	FN32-EH	-35 ... +150	±0.03	2	0.45	0.39	0.15	15	0.35	18 x 12 / 15	8	31 x 50 x 64
9 118 633	F33-EH	-30 ... +150	±0.03	2	0.5	0.32	0.12	15	0.35	23 x 14 / 20	16	36 x 46 x 69
9 118 634	F34-EH	-30 ... +150	±0.03	2	0.45	0.32	0.14	15	0.35	24 x 30 / 15	20	38 x 58 x 62
9 118 638	F38-EH	-35 ... +80	±0.05	2	0.92	0.66	0.32	15	0.35	35 x 41 / 27	45	46 x 70 x 89

Included with each unit: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

**FP35-MA for external applications with rapid temperature changes**



F12-MA



F25-MA



FP35-MA

## TopTech Series

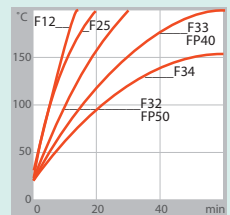
for working temperatures from -50 °C to +200 °C

Refrigerated/heating circulators of the TopTech series are designed for more demanding applications. They feature increased functionality and additional warning and safety functions.

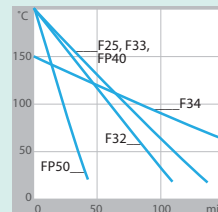
### Models with MA circulators

- PID2 temperature control, stability  $\pm 0.02$  °C
- ATC 3-point calibration
- RS232 interface
- Early warning system for low liquid level and high/low temperature
- Pump capacity electronically adjustable
- Protection class III according to DIN 12876-1

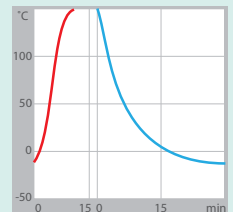
**Heat-up time**  
Bath fluid: Thermal



**Cool-down time**  
Bath fluid: Thermal



**Heat-up/cool-down time**  
Bath fluid: Thermal



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)					Pump capacity Flow rate/Pressure l/min. bar	Bath opening/ Bath depth W x L/D cm	Fill. vol. liters	Dimensions W x L x H cm	
					+20	0	-20	-30	-40 °C					
9 153 612	F12-MA	-20 ... +200	$\pm 0.02$	2	0.16	0.1	0.02	--	--	11-16	0.23-0.45	13 x 15 / 13	4.5	20 x 36 x 56
9 153 625	F25-MA	-28 ... +200	$\pm 0.02$	2	0.26	0.2	0.06	--	--	11-16	0.23-0.45	12 x 14 / 14	4.5	23 x 42 x 61
9 153 625N	FN25-MA	-28 ... +200	$\pm 0.02$	2	0.26	0.2	0.06	--	--	11-16	0.23-0.45	12 x 14 / 14	4.5	23 x 50 x 61
9 153 632	F32-MA	-35 ... +200	$\pm 0.02$	2	0.45	0.39	0.15	0.06	--	11-16	0.23-0.45	18 x 12 / 15	8	31 x 42 x 64
9 153 632N	FN32-MA	-35 ... +200	$\pm 0.02$	2	0.45	0.39	0.15	0.06	--	11-16	0.23-0.45	18 x 12 / 15	8	31 x 50 x 64
9 153 633	F33-MA	-30 ... +200	$\pm 0.02$	2	0.5	0.32	0.12	0.03	--	11-16	0.23-0.45	23 x 14 / 20	16	36 x 46 x 69
9 153 634	F34-MA	-30 ... +150	$\pm 0.02$	2	0.45	0.32	0.14	0.03	--	11-16	0.23-0.45	24 x 30 / 15	20	38 x 58 x 62
9 153 618	FP35-MA	-35 ... +150	$\pm 0.02$	2	0.45	0.39	0.15	0.05	--	11-16	0.23-0.45	18 x 12 / --	2.5	31 x 42 x 64
9 153 640	FP40-MA	-40 ... +200	$\pm 0.02$	2	0.68	0.5	0.32	0.17	0.04	11-16	0.23-0.45	23 x 14 / 20	16	37 x 46 x 69
9 153 650	FP50-MA	-50 ... +200	$\pm 0.02$	2	0.9	0.8	0.5	0.32	0.16	11-16	0.23-0.45	18 x 12 / 15	8	42 x 49 x 70
water-cooled model														
9 153 651	FPW50-MA	-50 ... +200	$\pm 0.02$	2	0.9	0.8	0.5	0.32	0.16	11-16	0.23-0.45	18 x 12 / 15	8	42 x 49 x 70

Included with each unit: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)



F26-ME



FN32-ME



FP50-ME

## TopTech Series

for working temperatures from -50 °C to +200 °C

Models with ME circulators allow for a wide range of applications. The units have a connection for an external Pt100 sensor for direct measuring and control in an external application. The VFD Comfort display features easy operation and shows all temperature values on one display.

### Additional advantages of models with ME circulators

- PID3 temperature control, stability  $\pm 0.01$  °C
- VFD Comfort Display with simultaneous indication of setpoint and internal and external actual value (resolution 0.01 °C)
- Integrated programmer (1 x 10 steps) with real-time clock
- Illuminated display for adjustable pump capacity

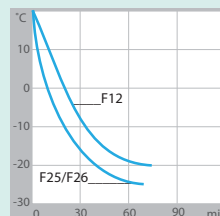
**Note:** FP models feature an energy-saving proportional cooling control.



More information on circulators with natural refrigerants on page 22

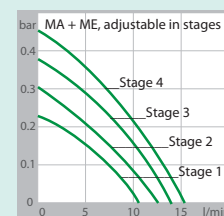
### Cool-down time

Bath fluid: Ethanol



### Pump capacity

Bath fluid: water



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)					Pump capacity		Bath opening/ Bath depth	Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-30	-40 °C	Flow rate/Pressure	bar	W x L / D cm		
9 162 625	F25-ME	-28 ... +200	$\pm 0.01$	2	0.26	0.2	0.06	--	--	11-16	0.23-0.45	12 x 14 / 14	4.5	23 x 42 x 61
9 162 625N	FN25-ME	-28 ... +200	$\pm 0.01$	2	0.26	0.2	0.06	--	--	11-16	0.23-0.45	12 x 14 / 14	4.5	23 x 50 x 61
9 162 626	F26-ME	-28 ... +200	$\pm 0.01$	2	0.26	0.2	0.06	--	--	11-16	0.23-0.45	12 x 14 / 14	4.5	42 x 42 x 42
9 162 632	F32-ME	-35 ... +200	$\pm 0.01$	2	0.45	0.39	0.15	0.06	--	11-16	0.23-0.45	18 x 12 / 15	8	31 x 42 x 64
9 162 632N	FN32-ME	-35 ... +200	$\pm 0.01$	2	0.45	0.39	0.15	0.06	--	11-16	0.23-0.45	18 x 12 / 15	8	31 x 50 x 64
9 162 633	F33-ME	-30 ... +200	$\pm 0.01$	2	0.5	0.32	0.12	0.03	--	11-16	0.23-0.45	23 x 14 / 20	16	36 x 46 x 69
9 162 634	F34-ME	-30 ... +150	$\pm 0.01$	2	0.45	0.32	0.14	0.03	--	11-16	0.23-0.45	24 x 30 / 15	20	38 x 58 x 62
9 162 640	FP40-ME	-40 ... +200	$\pm 0.01$	2	0.68	0.5	0.32	0.17	0.04	11-16	0.23-0.45	23 x 14 / 20	16	37 x 46 x 69
9 162 650	FP50-ME	-50 ... +200	$\pm 0.01$	2	0.9	0.8	0.5	0.32	0.16	11-16	0.23-0.45	18 x 12 / 15	8	42 x 49 x 70
water-cooled model														
9 162 651	FPW50-ME	-50 ... +200	$\pm 0.01$	2	0.9	0.8	0.5	0.32	0.16	11-16	0.23-0.45	18 x 12 / 15	8	42 x 49 x 70

Included with each unit: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)





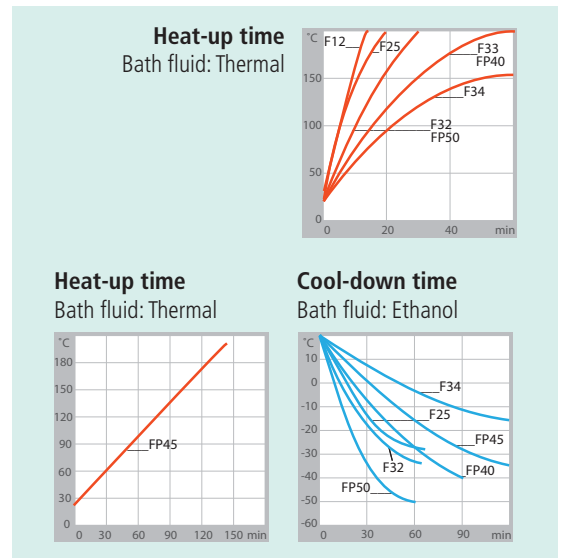
## HighTech Series

for working temperatures from -50 °C to +200 °C

The HighTech series features refrigerated/heating circulators with innovative technology for sophisticated applications. The instruments provide a powerful, electronically adjustable pressure and suction pump. The instruments can be used for internal as well as external (closed/open) temperature control applications.

### Models with HE circulators

- The ICC Cascade control guarantees highest precision, stability  $\pm 0.01$  °C
- The VFD Comfort Display shows internal and external temperatures (resolution 0.01 °C)
- Integrated programmer (1 x 10 steps), real-time clock, RS232
- Powerful pressure and suction pump, electronically adjustable, automatic adjustment of pump capacity to viscosity characteristics



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)					Pump cap./Flow rate			Bath open./ Bath depth W x L/D cm	Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-30	-40 °C	l/min.	Pressure bar	Suction bar			
9 212 625	F25-HE	-28 ... +200	$\pm 0.01$	2	0.26	0.2	0.06	--	--	22-26	0.4-0.7	0.2-0.4	12 x 14 / 14	4.5	23 x 42 x 64
9 212 625N	FN25-HE	-28 ... +200	$\pm 0.01$	2	0.26	0.2	0.06	--	--	22-26	0.4-0.7	0.2-0.4	12 x 14 / 14	4.5	23 x 50 x 64
9 212 632	F32-HE	-35 ... +200	$\pm 0.01$	2	0.45	0.39	0.15	0.06	--	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	31 x 42 x 66
9 212 632N	FN32-HE	-35 ... +200	$\pm 0.01$	2	0.45	0.39	0.15	0.06	--	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	31 x 50 x 66
9 212 634	F34-HE	-30 ... +150	$\pm 0.01$	2	0.45	0.32	0.14	0.03	--	22-26	0.4-0.7	0.2-0.4	24 x 30 / 15	20	38 x 58 x 64
9 212 640	FP40-HE	-40 ... +200	$\pm 0.01$	2	0.68	0.5	0.32	0.17	0.04	22-26	0.4-0.7	0.2-0.4	23 x 14 / 20	16	37 x 46 x 71
9 212 645	FP45-HE	-42 ... +200	$\pm 0.01$	2	0.85	0.7	0.42	0.28	0.08	22-26	0.4-0.7	0.2-0.4	23 x 26 / 20	26	38 x 58 x 69
9 212 650	FP50-HE	-50 ... +200	$\pm 0.01$	2	0.9	0.8	0.5	0.32	0.16	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	42 x 49 x 72

water-cooled model

9 212 651	FPW50-HE	-50 ... +200	$\pm 0.01$	2	0.9	0.8	0.5	0.32	0.16	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	42 x 49 x 72
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Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)



F25-HL

FP50-HL



### Applications

External temperature control applications, particularly for distillation apparatus and mini-plant installations, jacketed reactors, autoclaves, Kilo labs, pilot plants, etc.

## HighTech Series

for working temperatures from -50 °C to +200 °C

The top-of-the-line HL circulators provide sophisticated technology and maximum functionality for the most demanding applications.

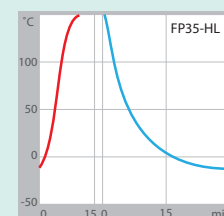
### Additional advantages of models with HL circulators

- VFD Comfort Display and additional LCD Display
- Integrated programmer (6 x 60 steps) with real-time clock
- Combined RS232 / RS485 interface
- Temperature display in °C and °F
- Stakei connection for solenoid valve

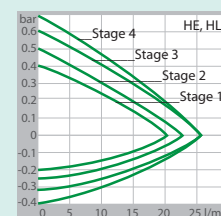
**Note:** FP models feature an energy-saving proportional cooling control.



**Heat-up/Cool-down time**  
Bath fluid: Thermal



**Pump capacity**  
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heating cap. kW	Cooling capacity kW (Bath fluid: Ethanol)					Pump cap./Flow rate			Bath open./ Bath depth W x L/D cm	Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-30	-40 °C	l/min.	bar	Suction bar			
9 312 625	F25-HL	-28 ... +200	±0.01	2	0.26	0.2	0.06	--	--	22-26	0.4-0.7	0.2-0.4	12 x 14 / 14	4.5	23 x 42 x 64
9 312 625N	FN25-HL	-28 ... +200	±0.01	2	0.26	0.2	0.06	--	--	22-26	0.4-0.7	0.2-0.4	12 x 14 / 14	4.5	23 x 50 x 64
9 312 632	F32-HL	-35 ... +200	±0.01	2	0.45	0.39	0.15	0.06	--	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	31 x 42 x 66
9 312 632N	FN32-HL	-35 ... +200	±0.01	2	0.45	0.39	0.15	0.06	--	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	31 x 50 x 66
9 312 633	F33-HL	-30 ... +200	±0.01	2	0.5	0.32	0.12	0.03	--	22-26	0.4-0.7	0.2-0.4	23 x 14 / 20	16	36 x 46 x 71
9 312 618	FP35-HL	-35 ... +150	±0.01	2	0.45	0.39	0.15	0.05	--	22-26	0.4-0.7	0.2-0.4	18 x 12 / --	2.5	31 x 42 x 66
9 312 640	FP40-HL	-40 ... +200	±0.01	2	0.68	0.5	0.32	0.17	0.04	22-26	0.4-0.7	0.2-0.4	23 x 14 / 20	16	37 x 46 x 71
9 312 645	FP45-HL	-42 ... +200	±0.01	2	0.85	0.7	0.42	0.28	0.08	22-26	0.4-0.7	0.2-0.4	23 x 26 / 20	26	38 x 58 x 69
9 312 650	FP50-HL	-50 ... +200	±0.01	2	0.9	0.8	0.5	0.32	0.16	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	42 x 49 x 72
water-cooled model															
9 312 651	FPW50-HL	-50 ... +200	±0.01	2	0.9	0.8	0.5	0.32	0.16	22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	42 x 49 x 72

Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)

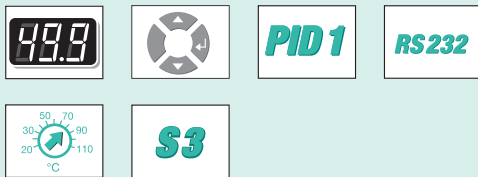
## Cryo-Compact Circulators

### Economy



**CF30 / CF40**  
-40 °C ... +150 °C

Basic models for routine and standard applications



- Working temperatures to +150 °C
- Pressure pump
- LED Display for actual value/setpoint (resolution 0.1 °C)
- RS232 interface
- Intuitive operation



**Rear view**

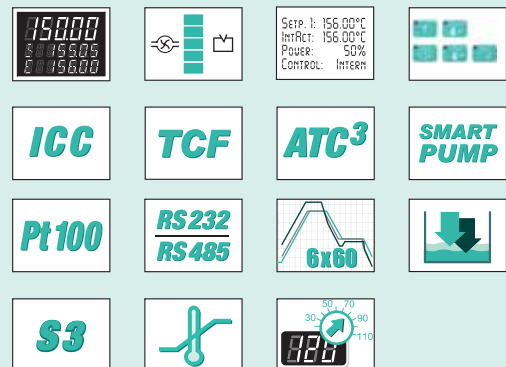
- ① Pump connections
- ② RS232 Interface

### HighTech



**CF31 / CF41**  
-40 °C ... +200 °C

Superior models for most demanding applications



- Working temperatures to +200 °C
- Pressure and suction pump, electronically adjustable
- VFD Comfort Display (resolution 0.01 °C)
- Additional LCD Display for interactive operation
- ICC Cascade Temperature Control
- RS232 / RS485 interface
- Connection for external Pt100 sensor
- Integrated programmer (6 x 60 steps)



**Rear view**

- ① Pump connections
- ② RS232/RS485 Interface
- ③ Connection for external Pt100 sensor
- ④ Electronic module (optional)





### Applications

External temperature control applications, distillation apparatus and miniplant installations, especially installations with limited space, e.g. in fume hoods

## Cryo-Compact Circulators

for working temperatures from -40 °C to +200 °C

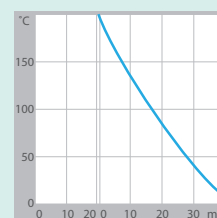
The CF circulator series provides powerful cooling and heating capabilities in a space-saving, compact design. The instruments feature 2 kW heating capacity with classification III according to DIN 12876-1. The Cryo-Compacts have pump connections for external temperature control applications and a small bath tank for temperature control of small objects.

### Cryo-compact circulators, CF series

- Extra compact dimensions for easy installation
- Cooling capacities up to 470 Watt
- Permissible ambient temperature up to +40 °C
- Splash-proof keypad
- Pump connections for external temperature control
- Internal bath to immerse small objects, e.g. temperature sensors

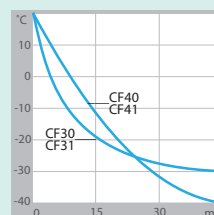
### Heat-up/Cool-down time

Bath fluid: Thermal



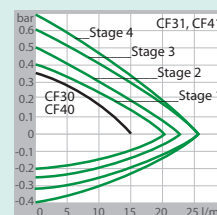
### Cool-down time

Bath fluid: Ethanol



### Pump capacity

Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)				Pump cap./Flow rate			Bath open./Bath depth W x L/D cm	Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-30°C	l/min.	Pressure bar	Suction bar			
9 400 330	CF30	-30 ... +150	±0.03	2	0.32	0.25	0.15	--	15	0.35	--	16 x 3 / 14	3.5	24 x 46 x 40
9 400 340	CF40	-40 ... +150	±0.03	2	0.47	0.4	0.28	0.12	15	0.35	--	19 x 3 / 19	5.5	28 x 46 x 46
9 400 331	CF31	-30 ... +200	±0.02	2	0.32	0.25	0.15	--	22-26	0.4-0.7	0.2-0.4	16 x 3 / 14	3.5	24 x 46 x 40
9 400 341	CF41	-40 ... +200	±0.02	2	0.47	0.4	0.28	0.12	22-26	0.4-0.7	0.2-0.4	19 x 3 / 19	5.5	28 x 46 x 46

Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)



## TopTech Series

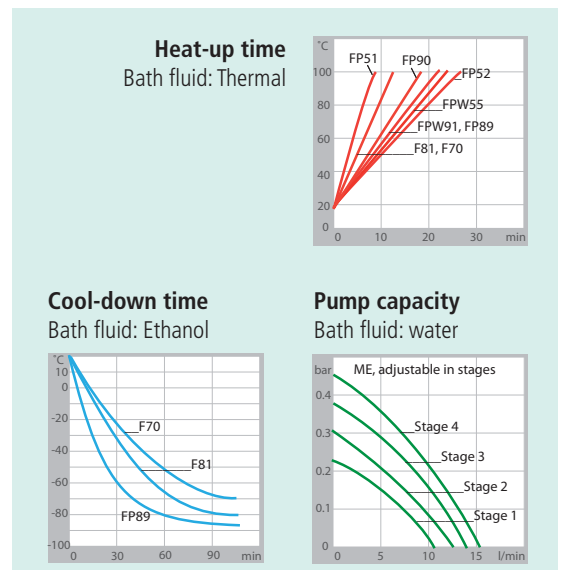
for working temperatures from -90 °C to +100 °C with bath openings for internal/external applications

The TopTech Ultra-Low circulators are equipped with a dual-stage compressor refrigeration system for continuous operation of internal and external applications.

### Models with ME circulators

- Heated bath cover plate to prevent condensation and ice build-up
- Pressure pump up to 0.45 bar, electronically adjustable
- ACC Active Cooling Control across the entire temperature range
- Compact design

**Note:** FP models feature an energy-saving proportional cooling control



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)						Pump cap./Flow rate		Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-40	-60	-80 °C	l/min.	Pressure bar		
9 162 670	F70-ME	-70 ... +100	±0.02	1.3	0.34	0.22	0.17	0.13	0.07	--	11-16	0.23-0.45	4.5	42 x 54 x 71
9 162 681	F81-ME	-81 ... +100	±0.02	1.3	0.45	0.38	0.36	0.32	0.27	0.07	11-16	0.23-0.45	6.5	50 x 58 x 88
9 162 689	FP89-ME	-90 ... +100	±0.02	1.3	1.0	0.92	0.88	0.75	0.58	0.20	11-16	0.23-0.45	8	55 x 60 x 90

Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)





| FP51-SL

| FP89-HL

### Applications

Freezing point determination, calibration at low temperatures, Petroleum testing, ultra-low temperature cell culture storage

## HighTech Series

for working temperatures from -91 °C to +200 °C  
with large bath openings for internal/external applications

The top-of-the-line HighTech ultra-low refrigerated circulators HL, SL feature a powerful pressure and suction pump. The instruments provide sophisticated technology and maximum functionality for the most demanding applications.

### Models with HL, SL circulators

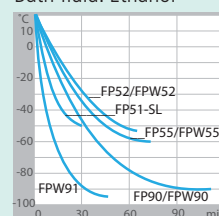
- Energy saving proportional cooling control
- ACC Active Cooling Control for the entire temperature range
- Heated bath cover to prevent condensation and ice build-up
- Pressure and suction pump up to 1.1 bar, electronically adjustable
- SL models with a heating capacity of 3 kW for rapid heat-up

### Bath opening

JULABO Model	Dimensions bath opening W x L / Bath depth
F70	12 x 12 / 13 cm
FP51	18 x 12 / 20 cm
F81, FP89	13 x 15 / 16 cm
FP(W)52/55/90/91	28 x 23 / 22 cm

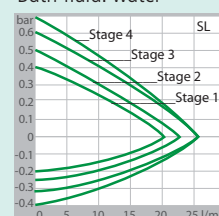
### Cool-down time

Bath fluid: Ethanol



### Pump capacity

Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)						Pump cap./Flow rate			Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-40	-60	-80 °C	Pressure l/min.	Suction bar	bar		
9 352 751	FP51-SL	-51 ... +200	±0.05	3	2.0	1.5	1.0	0.26	--		22-26	0.4-0.7	0.2-0.4	11	46 x 55 x 89
9 352 752	FP52-SL	-60 ... +100	±0.05	3	3.0	2.8	1.6	0.65	0.1		22-26	0.4-0.7	0.2-0.4	24	59 x 76 x 116
9 352 755	FP55-SL	-60 ... +100	±0.05	3	5.2	4.1	2.2	0.70	0.13		22-26	0.4-0.7	0.2-0.4	27	85 x 76 x 116
9 312 681	F81-HL	-81 ... +100	±0.02	1.3	0.45	0.38	0.36	0.32	0.27	0.07	22-26	0.4-0.7	0.2-0.4	6.5	50 x 58 x 89
9 312 689	FP89-HL	-90 ... +100	±0.02	1.3	1.0	0.92	0.88	0.75	0.58	0.20	22-26	0.4-0.7	0.2-0.4	8	55 x 60 x 92
9 352 790	FP90-SL	-90 ... +100	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
water-cooled models															
9 352 753	FPW52-SL	-60 ... +100	±0.05	3	3.0	2.8	1.6	0.65	0.1		22-26	0.4-0.7	0.2-0.4	24	59 x 76 x 116
9 352 756	FPW55-SL	-60 ... +100	±0.05	3	5.5	4.1	2.2	1.0	0.13		22-26	0.4-0.7	0.2-0.4	27	59 x 76 x 116
9 352 791	FPW90-SL	-90 ... +100	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
9 352 793	FPW91-SL	-91 ... +100	±0.2	3	4.5	4.1	3.7	3.1	2.0	0.75	22-26	0.4-0.7	0.2-0.4	22	85 x 76 x 116

Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)



FP55-SL



FP90-SL

## HighTech Series

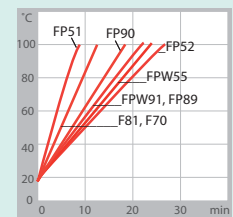
for working temperatures from -95 °C to +150 °C  
upgradable with additional heating and pump capacity  
for external applications

Ultra-low refrigerated circulators with SL impress with their high heating, cooling and pump capacities for external temperature control applications.

- Cooling capacities up to 5.5 kW, heating capacities up to 3 kW
- Insulated filling port (70 mm dia.)
- Heated bath cover plate to prevent condensation/ice build-up
- Upgradable with booster heater and booster pump
- Energy saving proportional cooling control
- Pressure and suction pump up to 1.1 bar, electronically adjustable

**Note:** FP models feature an energy-saving proportional cooling control. FPW models for cooling water connection.

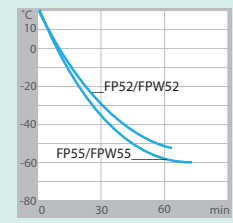
**Heat-up time**  
Bath fluid: Thermal



**Filling port with insulated cover**



**Cool-down time**  
Bath fluid: Ethanol



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heating capacity kW	Cooling capacity kW (Bath fluid: Ethanol)					Pump cap./Flow rate			Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-40	-60 °C	l/min.	Pressure bar	Suction bar		
9 352 752N	FP52-SL	-60 ... +100	±0.05	3	3.0	2.8	1.6	0.65	0.1	22-26	0.4-0.7	0.2-0.4	24	59 x 76 x 116
9 352 755N	FP55-SL	-60 ... +100	±0.05	3	5.2	4.1	2.2	0.7	0.13	22-26	0.4-0.7	0.2-0.4	27	85 x 76 x 116
9 352 752N150	FP52-SL	-60 ... +150	±0.05	3	3.0	2.8	1.6	0.65	0.1	22-26	0.4-0.7	0.2-0.4	24	59 x 76 x 116
9 352 755N150	FP55-SL	-60 ... +150	±0.05	3	5.2	4.1	2.2	0.7	0.13	22-26	0.4-0.7	0.2-0.4	27	85 x 76 x 116
water-cooled models														
9 352 753N	FPW52-SL	-60 ... +100	±0.05	3	3.0	2.8	1.6	0.65	0.1	22-26	0.4-0.7	0.2-0.4	24	59 x 76 x 116
9 352 756N	FPW55-SL	-60 ... +100	±0.05	3	5.5	4.1	2.2	1.0	0.13	22-26	0.4-0.7	0.2-0.4	27	59 x 76 x 116
9 352 753N150	FPW52-SL	-60 ... +150	±0.05	3	3.0	2.8	1.6	0.65	0.1	22-26	0.4-0.7	0.2-0.4	24	59 x 76 x 116
9 352 756N150	FPW55-SL	-60 ... +150	±0.05	3	5.5	4.1	2.2	1.0	0.13	22-26	0.4-0.7	0.2-0.4	27	59 x 76 x 116

Included with each unit: 2 each barbed fitting for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)  
FPW Models: Cooling water connections G 3/4" male with barbed fittings for tubing 1/2" inner dia.





FPW91-SL



**Applications**

Jacketed reactors, miniplant installations, Kilo labs, process development

**Increase heating and/or pump capacities with booster modules**

All models on this double-page are upgradable (except for F95-SL and FW95-SL).

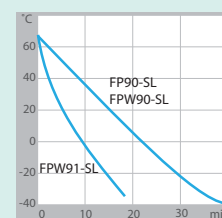
**HST booster heater ①**  
adds 6 kW of heating capacity for a total of 9 kW

**HSP booster pump ②**  
increases pumping capacity to 30 l/min - 3 bar max. (reduces cooling capacity by 0.4 kW)

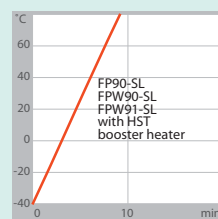
**Upgradable**  
with booster heater and pump



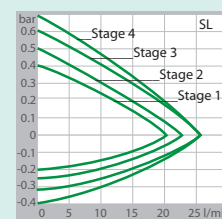
**Cool-down time**  
Bath fluid: Thermal



**Heat-up time**  
Bath fluid: Thermal



**Pump capacity**  
Bath fluid: water



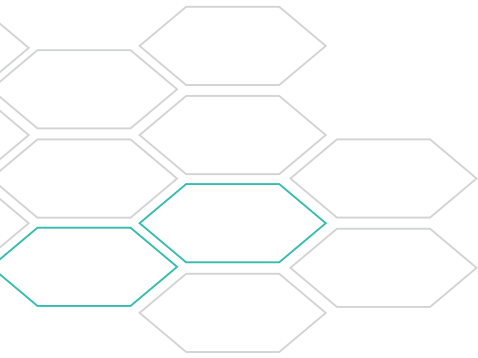
JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)						Pump cap./Flow rate			Fill. vol. liters	Dimensions W x L x H cm
					+20	0	-20	-40	-60	-80 °C	l/min.	Press. bar	Suction bar		
9 352 790N	FP90-SL	-90 ... +100	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
9 352 795N	F95-SL	-95 ... 0	±0.05	3	--	1.7	1.5	1.3	1.1	0.36	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
9 352 790N150	FP90-SL	-90 ... +150	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
water-cooled models															
9 352 791N	FPW90-SL	-90 ... +100	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
9 352 793N	FPW91-SL	-91 ... +100	±0.2	3	4.5	4.1	3.7	3.1	2.0	0.75	22-26	0.4-0.7	0.2-0.4	22	85 x 76 x 116
9 352 796N	FW95-SL	-95 ... 0	±0.05	3	--	1.7	1.5	1.3	1.1	0.36	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
9 352 791N150	FPW90-SL	-90 ... +150	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116

Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (Pump connections M16x1 male)  
FPW Models: Cooling water connection G 3/4" male with barbed fitting for tubing 1/2" inner dia.



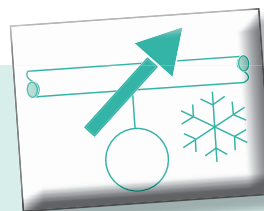
# User Benefits and **Helpful Tips**

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## Advantages of JULABO Cooling Systems

- No side vents for ventilation-air cooling: air intake from the front, air discharge to the rear. Therefore the instruments can be placed right next to other equipment without affecting performance.
- All refrigerated circulators have an ambient operating limit up to +40 °C!
- Automatic shut-down of the refrigeration unit when no cooling is required (exception: F12 refrigeration unit and cooling systems with ED circulators).
- Overload protection for refrigeration unit



## Full Cooling Capacity, while Saving Energy

JULABO refrigerated circulators feature Active Cooling Control technology which provides full cooling capacity at all times and across the entire working temperature range.

All FP models feature proportional cooling control which automatically adjusts the cooling capacity. Compared to refrigeration instruments without proportional control this results in up to 90 % energy savings.



## Detailed Model Designations

The model designations of refrigerated circulators are composed as follows:

- F** = Frigus, Latin for cooling
- FP** = Proportional cooling control, energy saving
- FPW** = Water-cooled, alternative for powerful models  
Advantage: Minimal heat discharge into ambient air, reduced HVAC costs, low noise level
- FP50** = The **Number** following the model designation relates to the approximately lowest achievable temperature, (e.g. -50 °C).
- FP50-HL** = The **complete model designation** is formed in combination with the circulator (e.g. **HL**)



## Heated Bath Cover Plate

Ultra-low refrigerated circulators feature a heated bath cover plate to prevent condensation and ice build-up in the circulator bath. Depending on the model, ultra-low refrigerated circulators are equipped either with an insulated bath cover or an insulated filling port.



## Responsibility for the Environment

The new refrigerated circulator with natural refrigerants (FN models) contribute to the reduction of the greenhouse effect. The use of non-halogenated refrigerants conserves the ozone layer and makes a significant contribution to the protection of the atmosphere. In addition the new FN models have a reduced current consumption resulting in lower CO<sub>2</sub> emissions from the power grid. This protects the environment and saves the user's money.

### Advantages

- High cooling capacities up to 450 W
- Suitable for ambient temperatures up to +40 °C
- ACC Active Cooling Control for maximum cooling capacity
- Powerful recirculating pumps, electronically adjustable
- Innovative

## Maximum Safety

JULABO circulators with natural refrigerant have state-of-the-art technology. When developing the products safety aspects received the utmost attention.

The refrigerant cycle is hermetically sealed and permanently leak-proof. Furthermore, all electrical components are segregated. Even in the case of a highly improbable leakage there is no danger of burning refrigerant. JULABO guarantees maximum safety for units with natural refrigerants - with no practical disadvantages for any application.

- Maximum operational safety
- Refrigeration cycle and electronics are spaced apart
- Virtually no application limitations
- Minimum room size for operation of these units is 5 m<sup>3</sup> (according to DIN EN 378-1:2008)



### FN Models in our Catalog

In the catalog the new refrigerated circulators with natural refrigerants are marked with the **Cool Green Logo**.

**Note:** FN models available in selected countries only



### Refrigerant R290

FN models use the natural refrigerant R290. This refrigerant is a type of hydrocarbon with a very low GW value (Global Warming Potential) of 3. For comparison the popular refrigerant R134a has a value of 1300.

### Only at JULABO!

The electronics of the unit are outside of the refrigeration area



## Always visible and easy to read: Brightest Temperature Displays

JULABO circulators offer large, easy-to-read temperature displays. The displayed values can be viewed easily from a long distance, at an angle and in very bright surroundings. This makes it easy to monitor the display during your daily tasks.

### LED Display

for 1 actual value and up to 3 setpoints, warning functions, high temperature cut-off, pump stages (resolution 0.01/0.1 °C)

### VFD Comfort Display

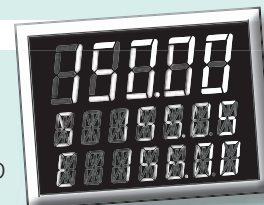
simultaneous display of 3 values, warning functions, high temperature cut-off, pump stages (resolution 0.01 °C)

### LCD Dialog Display

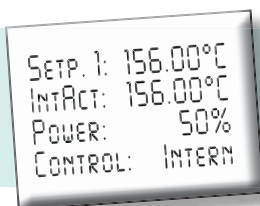
allows for interactive operation with easy-to-read text



LED



VFD



LCD

## Highly precise Temperature Control Technology – professional and simple operation

PID1, PID2 and PID3 temperature controls offer fixed control parameters (Xp, Tn, Tv). For the advanced user the PID2 and PID3 settings can be manually changed to reach an improved temperature stability, especially for external temperature control.

ICC temperature control (Intelligent Cascade Control) provides highly precise temperature control results even for the most demanding applications. With ICC the PID control parameters are self-optimizing and automatically adjust to the respective application.

The TCF function permits full control of the control dynamics. In addition to accessing control parameters, this function also allows for setting band limit, limit setting, co-speed factor, etc.



## Intuitive and Integrated Operation

All JULABO products feature a consistent user interface design affording easy operation via the splash-proof and easy-to-clean keypads. Menus allow users to set additional parameters for process optimization such as control parameters, autostart mode, interface configuration, etc.



## Early Warning System for Low Liquid Level

The JULABO early warning system for low liquid level recognizes fluid losses in the circulator bath and gives an optical and audible signal. Users have the opportunity to refill the bath tank before the built-in low liquid level protection triggers the undesired automatic safety cut-off.

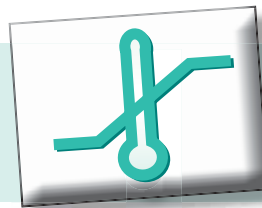




## Early Warning System for High/Low Temperature Limits

If the operator-defined temperature limits are exceeded - e.g. caused by an exothermic reaction - the early warning system will trigger audible and optical warnings.

Low temperature protection with cut-off function: If required, the warning function can be switched to a cut-off function (e.g. as low temperature protection).



## Integrated Additional Protection Functions

JULABO circulators and temperature control systems also feature:

- Standby display and automatic self-test
- Monitoring of sensors and sensor temperature differentials
- *BlackBox* Function with error memory for remote diagnosis
- Overload protection for pump motor and refrigeration unit



## Integrated Programmer

Many applications are time and temperature dependent processes. The ME circulators and all HighTech circulators feature an integrated programmer. Temperature profiles can be easily programmed, executed, and saved. Programming functions include a continuous loop setting and adjustable incremental gradients. The real-time clock allows application start-up at a specified time, e.g. heat-up of application prior to the start of the work day.

ME, HE, SE Models: 1 Temperature profile with up to 10 steps  
HL, SL Models: 6 Temperature profiles with up to 60 steps

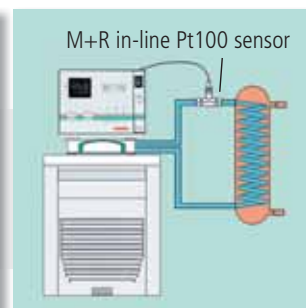
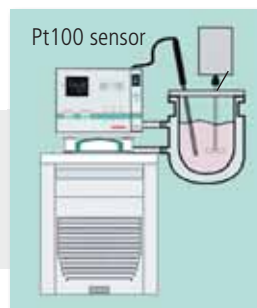


## External Temperature Control and Measurement

The ME circulators and all HighTech circulators include a connection for an external Pt100 temperature sensor. Various external sensors made of stainless steel or PTFE coated stainless steel are available in lengths between 20 and 1200 mm. For highly precise temperature control a M+R in-line Pt100 sensor can be installed directly into the cooling circuit. The externally measured actual value is shown on the circulator's display.

8 981 003 to 017 External Pt100 sensors

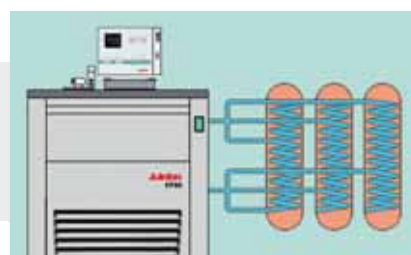
8 981 020 M+R in-line Pt100 sensor



## External Temperature Control of large or several Applications

The powerful ultra-low refrigerated circulators of the HighTech series with a heating capacity of 3 kW and a maximum pump pressure of 1.1 bar can have capacities increased with:

8 810 012 HST Booster heater 6 kW  
8 810 015 HSP Booster pump 30 l/min. - 3 bar max.



## Intelligent Pump Systems

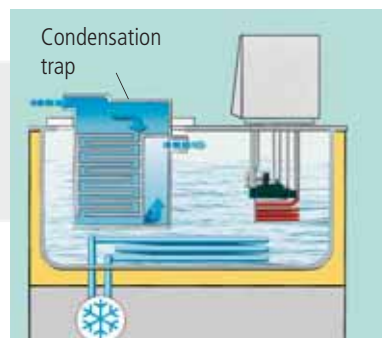
The highly efficient circulating pumps provide high pressures and flow rates. The *SmartPump* electronics have many benefits: The electronically adjustable pump capacity (4 stages) via keypad on one hand. On the other hand an automatic, electronic adjustment of the pump capacity in response to changes in bath fluid viscosity values for reliable and safe operation even when using high viscosity bath fluids.

## Condensation Traps

Ice crystals can form when bath fluids are exposed to humidity at ultra-low temperatures reducing the lowest achievable temperature. To avoid negative impact on the efficiency of the refrigerated unit, condensation traps are the ideal solution. They were designed to integrate exactly into the filling port or bath opening of the respective model. The humidity condenses in the trap and remains separate from the bath fluid. Simply remove the trapped ice from time to time in order to maintain full performance.

## Wireless Instrument Management

For more information on *WirelessTEMP*® products please refer to the catalog section Wireless Communication & Software.



*Comfortable*  
operation and management!



**WirelessTEMP**®  
Wireless Instrument Management!

## Individual Solutions for Your Application



JULABO provides solutions for any customer's individual requirements. JULABO customers have the following options for refrigerated circulators:

### Special inserts

We design and manufacture inserts and racks for sample incubations in the bath. Please contact us for a consultation regarding the insert design and material of construction.



### Special bath covers

We design and manufacture bath covers according to your specific information on the geometry of the samples and baths. We will gladly advise you on the design of the bath covers.



Special bath covers

### Special temperature sensors

We supply external Pt100 sensors according to your specifications. Customer specified sensor length, sensor diameter and connection cable length solutions are available. Ask us about the accuracy class.



### More power

Are the pump and heating capacities of our standard products insufficient? Specify the bath fluid flow requirements of your application and we supply the matching booster pump. Specifying the heating rate needed for your application will allow us to calculate the required heating capacity to manufacture an appropriate booster heater.



## Individual Solutions for Your Application



### Special heat exchangers

We design the liquid heat exchanger according to your performance requirements. Simply specify the transmission capacity, the temperature range of the application and the mechanical interfaces to your application. We calculate the required heat exchanger surface and supply your custom-made heat exchanger.



### Individual connections and adapters

If you need a special adapter to connect our instrument to your application, specify the mechanical interface and we will manufacture the matching adapter.



### Special tubing

Do you have special tubing requirements? Specify your bath fluid, the length, inside diameter and the mechanical interfaces of the tubing. We will choose the compatible material and insulation and supply the required tubing.



# Practical Accessories

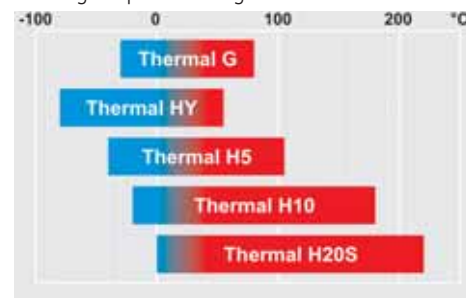




## JULABO Thermal Bath Fluids

JULABO Thermal bath fluids are ideally suited for all of your temperature control applications guaranteeing safe and reliable operation. Choosing the proper bath fluid is critical for the results in temperature control. The viscosity, oxidation and heat transfer characteristics of Thermal fluids are specifically matched with each JULABO temperature control instrument.

Working temperature ranges



### Advantages

- Wide temperature ranges
- Low viscosity
- High stability
- Good heat conductivity
- Minimum odor
- Low corrosion tendency
- Low toxicity
- Long shelf life



Included in delivery:  
drain tap

JULABO Description		Thermal G	Thermal HY	Thermal H5	Thermal H10	Thermal H20S
JULABO Order No.	10 liters 5 liters	8 940 124 8 940 125	8 940 104 8 940 105	8 940 106 8 940 107	8 940 114 8 940 115	8 940 108 8 940 109
<b>Working temperature ranges and specifications</b>						
For refrigerated circulators	°C	-30 ... +80	-80 ... +55	-50 ... +105	-20 ... +180	0 ... +220
Flash point	°C	--	+78	+124	+190	+230
Fire point	°C	--	+80	+142	+216	+274
Viscosity, kinetic at +20 °C	mm <sup>2</sup> /s	3.87	<4	<4	10	<51.5
Density at +20 °C	g/cm <sup>3</sup>	1.084	0.93	0.93	0.93	0.97
Pour point	°C	<-35	-100	-100	-90	-70
Boiling point	°C	+107	>+300	>+300	>+300	>+315
Ignition temperature	°C	--	>+400	>+400	>+400	>+400
Color		light yellow	clear	clear	clear	light brown



*Comfortable*  
operation and management!

**WirelessTEMP<sup>®</sup>**  
Wireless Instrument Management!

## Tubing / Tubing insulation / Tubing accessories

JULABO Order No.	Description	Suitable for
<b>CR® and Viton® Tubing / Tubing insulation / Tube clamps</b>		
8 930 008	1 m CR® Tubing, 8 mm inner dia. (-20 ... +120 °C)	ED, EH, MA, ME, HE, HL, SL, CF models
8 930 010	1 m CR® Tubing, 10 mm inner dia. (-20 ... +120 °C)	ED, EH, MA, ME
8 930 012	1 m CR® Tubing, 12 mm inner dia. (-20 ... +120 °C)	HE, HL, SL, CF models
8 930 108	1 m Viton® Tubing, 8 mm inner dia. (-50 ... +200 °C)	EH, MA, ME, HE, HL, SL, CF models
8 930 110	1 m Viton® Tubing, 10 mm inner dia. (-50 ... +200 °C)	EH, MA, ME
8 930 112	1 m Viton® Tubing, 12 mm inner dia. (-50 ... +200 °C)	HE, HL, SL, CF models
8 930 410	1 m Insulation for tubing 8 mm or 10 mm inner dia.	CR® and Viton® Tubing, temperature range -50 ... +100 °C
8 930 412	1 m Insulation for tubing 12 mm inner dia.	CR® and Viton® Tubing, temperature range -50 ... +100 °C
8 970 480	2 Tube clamps, size 1	Tubing 8 mm inner dia.
8 970 481	2 Tube clamps, size 2	Tubing 10 or 12 mm inner dia.



<b>Metal tubing, flexible, triple insulated -100 ... +350 °C</b>		
8 930 209	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 210	1.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 211	1.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 214	3.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41



<b>Metal tubing, flexible, insulated -50 ... +200 °C</b>		
8 930 220	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 221	1.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 222	1.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 223	3.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41



<b>Accessories for metal tubing connections</b>		
8 970 443	Adapter M16x1 male to M16x1 male	Metal tubing connection
8 970 444	Adapter for metal tubing M10x1 male to M16x1 male	EH, MA, ME
8 970 750	Icing protection sleeve for pump connections	SL, ultra-low circulators
8 970 751	Pump nozzle insulating set	ME, HL, SL, ultra-low circulators



## Prevention of ice build-up at low temperatures

JULABO Order No.	Description	Suitable for
8 970 700	Condensation trap with bath cover	FP50, FPW50, FP51
8 970 702	Condensation trap with bath cover	F81, FP89
8 970 705	Filling port, insulated with humidity absorber	FP(W)52/55/90/91/95



## External Pt100 sensors

JULABO Order No.	Description	Suitable for
8 981 003	200 x 6 mm dia., stainless steel, 1.5 m cable	ME, HE, HL, SL, CF31, CF41
8 981 006	20 x 2 mm dia., stainless steel, 1.5 m cable	ME, HE, HL, SL, CF31, CF41
8 981 010	300 x 6 mm dia., stainless steel, 1.5 m cable	ME, HE, HL, SL, CF31, CF41
8 981 017	200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SL, CF31, CF41
8 981 015	300 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SL, CF31, CF41
8 981 013	600 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SL, CF31, CF41
8 981 016	900 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SL, CF31, CF41
8 981 014	1200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SL, CF31, CF41
8 981 020	M+R in-line Pt100 sensor, 2 fittings M16x1 male	ME, HE, HL, SL, CF31, CF41
8 981 103	Extension cable 3.5 m for Pt100 sensor	ME, HE, HL, SL, CF31, CF41



## Cooling installations / Booster heaters / Particle filter

JULABO Order No.	Description	Suitable for
8 970 240	Bath lid with built-in cooling coil	F12, F25
8 970 243	Bath cover with special cooling coil	F32, FP50, FPW50, FP51
8 810 008	HST booster heater 6 kW	FP40-HL
8 810 009	HST booster heater 6 kW	FP45-HL
8 810 011	HST booster heater 6 kW	FP51-SL
8 810 012	HST booster heater 6 kW	FP(W)52, FP(W)55, FP(W)90, FPW91
8 810 015	HSP booster pump 30 l/min. - 3 bar max.	FP(W)52, FP(W)55, FP(W)90, FPW91
8 920 000	Particle filter for cooling water circuit (for water cooled models)	FW, FPW



## Test tube racks

JULABO Order No.	Description	Immers. depth mm	Suitable for	Maximum insert capacity for test tube racks
<b>Test tube racks made of stainless steel, to +150 °C</b>				
8 970 320	for 28 tubes, 16/17 mm dia.	80	F12, F25, F26	1
8 970 321	for 38 tubes, 12/13 mm dia.	65	F12, F25, F26	1
8 970 307	for 50 tubes, 16/17 mm dia.	80	FP45	3
8 970 308	for 90 tubes, 12/13 mm dia.	65	FP45	3
8 970 309	for 90 microliter tubes, 11/12 mm dia.	30	FP45	3
8 970 310	for 21 tubes, 30 mm dia.	90	FP45	3



## Immersion height adjustable platforms / Castor platform

JULABO Order No.	Description	Suitable for
8 970 502	Immersion-height adjustable platform	F34, FP45
8 910 040	Castor platform	FP40, FP50, FPW50



## Adapters / Valves / Connectors, etc.

JULABO Order No.	Description	Suitable for	
8 970 456	Shut-off valve for loop circuit (-10 °C ... +100 °C), M16x1	HE, HL, SL	
8 970 457	Shut-off valve for loop circuit (-30 °C ... +200 °C), M16x1	HE, HL, SL, CF31, CF41	
8 980 701	Solenoid valve for loop circuit (-10 °C ... +130 °C), M16x1	HL, SL	
8 970 452	Drain tap (-20 °C ... +150 °C)	CF	
8 970 450	Drain tap (-30 °C ... +200 °C)	CF	
8 970 470	Twin distributing adapter with barbed fitting	Tubing 8 mm inner dia.	
8 970 472	Twin distributing adapter with barbed fitting	Tubing 10 mm inner dia.	
8 970 471	Twin distributing adapter with barbed fitting	Tubing 12 mm inner dia.	
8 970 473	Twin distributing adapter M16x1 female to 2 x M16x1 male	HE, HL, SL	
8 970 445	2 Barbed fittings for tubing 12 mm inner dia.	HE, HL, SL, CF	
8 970 447	2 Barbed fittings for tubing 10 mm inner dia.	HE, HL, SL	
8 970 446	2 Barbed fittings for tubing 8 mm inner dia.	HE, HL, SL, CF	
8 970 460	2 Barbed fittings for tubing 8 mm inner dia., M10x1	ED, EH, MA, ME	
8 970 468	2 Barbed fittings for tubing 12 mm inner dia., M10x1	ED, EH, MA, ME	
8 970 490	2 Collar nuts M16x1 male	HE, HL, SL, CF	
8 970 492	1 Collar nut M10x1 male	ED, EH, MA, ME	
8 970 442	2 Elbow fittings 90°, M16x1 female/male	HE, HL, SL, CF	
8 890 004	2 Adapters M16x1 female to NPT 1/4" male	HE, HL, SL, CF	
8 890 005	2 Adapters M16x1 female to NPT 1/4" female	HE, HL, SL, CF	
8 890 006	2 Adapters M16x1 female to NPT 3/8" male	HE, HL, SL, CF	
8 890 007	2 Adapters M16x1 female to NPT 3/8" female	HE, HL, SL, CF	
8 890 008	2 Adapters M16x1 female to NPT 1/2" male	HE, HL, SL, CF	
8 890 009	2 Adapters M16x1 female to NPT 1/2" female	HE, HL, SL, CF	
8 890 010	2 Adapters M16x1 male to NPT 1/4" female	HE, HL, SL, CF	
8 891 008	1 Adapter M16x1 male to BSP 1/2" female	HE, HL, SL, CF	
8 891 009	1 Adapter M16x1 male to BSP 3/4" female	HE, HL, SL, CF	
8 890 011	2 Adapters M16x1 female to tube 1/4" male	HE, HL, SL, CF	
8 890 012	2 Adapters M16x1 female to tube 3/8" male	HE, HL, SL, CF	
8 890 013	2 Adapters M16x1 female to tube 1/2" male	HE, HL, SL, CF	
8 890 024	2 Adapters M16x1 female to M16x1 female	HE, HL, SL, CF	
8 890 034	2 Adapters M30x1.5 female to M16x1 male, stainless steel	HE, HL, SL	
8 890 035	2 Adapters M30x1.5 male to M16x1 male, stainless steel	HE, HL, SL	

## Connection plugs

JULABO Order No.	Description	Suitable for	
8 980 131	External Pt100 connector	ME, HE, SE, HL, SL, CF31, CF41	
8 980 133	Connector 3 pin	HE/SE/HL/SL/CF31/CF41 in combination with electronic module	
8 980 135	Alarm connector 5 pin	HE/SE/HL/SL/CF31/CF41 in combination with electronic module	
8 980 136	REG+EPROG connector 6 pin	HE/SE/HL/SL/CF31/CF41 in combination with electronic module	
8 980 137	Stakei connector	HL, SL	

## Software & Hardware for Instrument Control / Interfaces

JULABO Order No.	Description	Suitable for
<b>Electronic module with analog connectors</b> provides one input and two outputs for external data transfer, temperature recorder (freely scalable, current/voltage) as well as standby input and alarm output.		
8 900 100	Electronic module with analog connectors	HE, HL, SL, CF31, CF41
<b>Automatic Refill Device</b> when connected (Stakei) to the circulator - at low level - liquid is automatically pumped from the reservoir (5 liters) into the circulator bath		
8 980 750	ARD Automatic refill device with 5 liter reservoir	HL, SL
<b>EasyTEMP Software for instrument control, data recording and visualization</b>		
8 901 102	EasyTEMP Software (free of charge at <a href="http://www.julabo.de">www.julabo.de</a> )	Units with RS232
8 901 105	EasyTEMP Professional Software, incl. USB-Dongle	Units with RS232
8 980 073	RS232 interface cable, 2.5 m	Units with RS232
8 980 074	RS232 interface cable, 5 m	Units with RS232
8 900 110	USB interface adapter + RS232 interface cable	Units with RS232
8 980 031	Ethernet / RS232 interface converter	Units with RS232
8 900 005	PB-5 Option: Integrated Profibus DP	HighTech circulator, models HL, SL
8 900 020	Profibus DP Interface	Units with RS232
<b>WirelessTEMP® - Wireless Communication</b>		
8 900 500	WirelessTEMP Remote Control	WirelessTEMP communication
8 900 505	WirelessTEMP Remote Control, ATEX-Version	WirelessTEMP communication
8 900 520	WirelessTEMP Transmitter (Send/Receive unit)	Units with RS232
8 900 540	WirelessTEMP USB Stick	Windows® PC / Notebook
8 900 530	WirelessTEMP Router for extending wireless range	WirelessTEMP communication

## Calibration and manufacturer's certificates

JULABO Order No.	Description	Suitable for
8 902 901	1-Point Manufacturer's calibration certificate	All circulators
8 902 903	3-Point Manufacturer's calibration certificate	All circulators
8 902 905	5-Point Manufacturer's calibration certificate	All circulators
8 903 025	Manufacturer's testing certificate for JULABO cooling units <1 kW cooling power (at +20 °C)	All circulators
8 903 035	Manufacturer's testing certificate for JULABO cooling units >1 kW cooling power (at +20 °C)	All circulators



# Hot Heating Technology to +300 °C





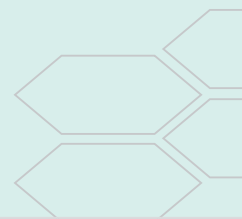
## Heating Circulators

Innovation is our tradition:

The JULABO circulator program features functional solutions for daily applications. Whether in research, material testing or in production – the well proven and reliable technology is valued by users in all industries. With JULABO circulators, rely on innovative temperature control technology that sets standards.

The JULABO circulator program offers the perfect equipment for every application. Choose your temperature control solution from three series:

- Economy series
- TopTech series
- HighTech series
- Complete selection of models for internal and external applications
- Working temperatures from +20 °C to +300 °C
- Bath tanks made of Plexiglas®, Makrolon® or stainless steel
- All products feature user friendly, intuitive operation
- Extra bright displays, easy to read from a distance
- Quick results and high precision thanks to state-of-the-art control technology
- Many professional functions for adjusting control parameters, temperature calibration, temperature profiles, etc. (depending on model)
- Powerful circulating pumps, electronically adjustable
- High heating capacities
- Intelligent warning and safety functions
- Unique early warning system for low liquid level
- Digital and analog interfaces for flexible communication
- Wireless monitoring and operation (*WirelessTEMP*®)
- Complete selection of useful and practical accessories





## Economy

## TopTech



**ED/EH Models**  
+20 °C ... +150 °C

Basic models for routine and standard applications



EH Models (in addition)



③ Connection for Solenoid valve (EH Model)

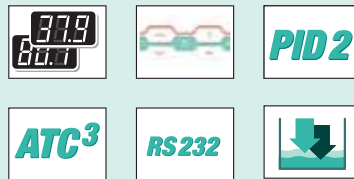
④ Connections for pump and cooling coil

④



**MB/MA Models**  
+20 °C ... +200 °C

Middle class for a broad range of applications



MB Models (in addition)



MA Models (in addition)



② Connections for RS232  
③ Solenoid valve

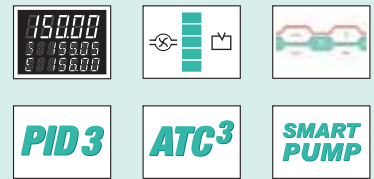
④ Connections for pump and cooling coil

④



**ME Models**  
+20 °C ... +200 °C

Upper middle class with ext. Pt100 sensor connection



Connections for  
① Ext. Pt100 sensor  
② RS232  
③ Solenoid valve

④ Connections for pump and cooling coil

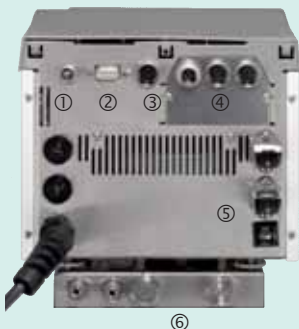
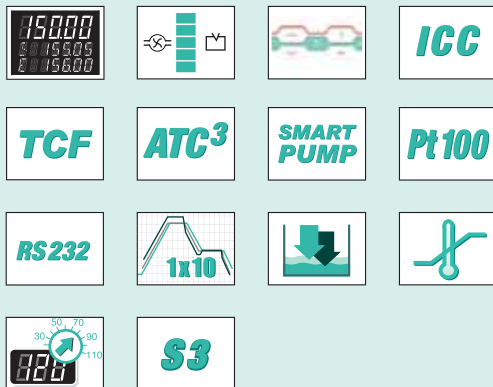
④

# HighTech



**HE/SE Models**  
+20 °C ... +300 °C

Sophisticated models for demanding applications

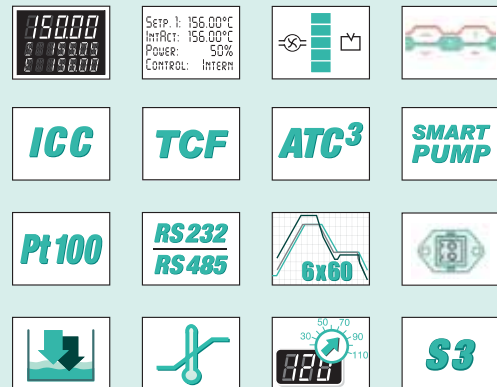


- Connections for
- ① External Pt100 sensor
  - ② RS232 / RS485
  - ③ Solenoid valve
  - ④ Electronic module (optional)
  - ⑤ Stakei connections (HL/SL)
  - ⑥ Connections for pump and cooling coil



**HL/SL Models**  
+20 °C ... +300 °C

Superior models for most demanding applications



**Electronic module with analog connections**  
**Order No. 8 900 100**

Optional for the HighTech series

- Ⓐ Alarm output
- Ⓑ Standby input
- Ⓒ Analog interface with input and two outputs for programming, flow sensor, pressure sensor or temperature recorder scalable (current/voltage)







## Heating Immersion Circulators

with attachment clamp for any bath tank up to 50 liters filling volume

Heating immersion circulators have always been a staple at JULABO. All circulators include a bath attachment clamp allowing for quick and easy mounting to a bath tank up to 50 liters.

### Immersion circulators

- Working temperature range up to +200 °C
- Bath attachment clamp for a wall thickness up to 26 mm
- Immersion depth 16.5 cm, reducible to 14.5 cm
- All wetted parts made of stainless steel or high grade plastic
- Pump set for external control application and cooling coil for applications below ambient temperature available as accessories
- Model MB for whisper-quiet operation

**Note:** Model ME with connection for external Pt100 sensor and integrated programmer

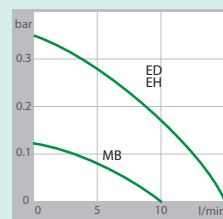
**Bath attachment clamp**  
for any bath tank (included)



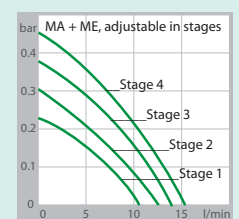
**Pump set** for external applications (accessory)



**Pump capacity**  
Bath fluid: water



**Pump capacity**  
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stability °C	Heating capacity kW	Pump capacity Flow rate l/min	Pressure bar	Cooling coil	Usable immersion depth cm	Dimensions W x L x H cm
9 116 000	ED	+20 ... +100	±0.03	2	15	0.35	Option	8-14.5	13 x 15 x 33
9 118 000	EH	+20 ... +150	±0.03	2	15	0.35	Option	8-14.5	13 x 15 x 33
9 142 000	MB	+20 ... +100	±0.02	2	10	0.12	Option	8-14.5	13 x 15 x 33
9 153 000	MA	+20 ... +200	±0.01	2	11-16	0.23-0.45	Option	8-14.5	13 x 15 x 33
9 162 000	ME	+20 ... +200	±0.01	2	11-16	0.23-0.45	Option	8-14.5	13 x 15 x 33

<sup>1)</sup> For applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler.





### Applications

Very flexible (with bath attachment clamp or telescopic bridge), for a variety of bath tanks, suitable for a wide range of applications, e.g. temperature applications for samples, analytics, material testing, etc.

## Bridge Mounted Circulator

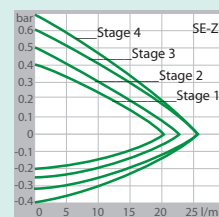
with extendable bridge for bath tanks up to 100 liters filling volume

The bridge mounted circulator features an adjustable stainless steel bridge for any bath tank up to 100 liters. The instrument can be used for internal and external temperature control applications and has a connection for an external Pt100 temperature sensor as well as a cooling coil for applications below or near ambient temperature.

### Bridge mounted circulator

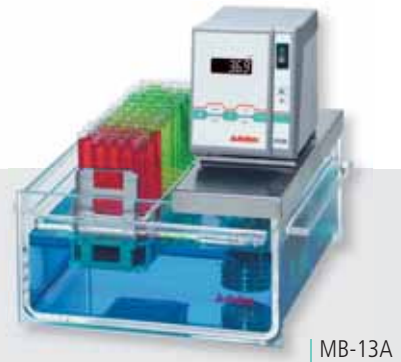
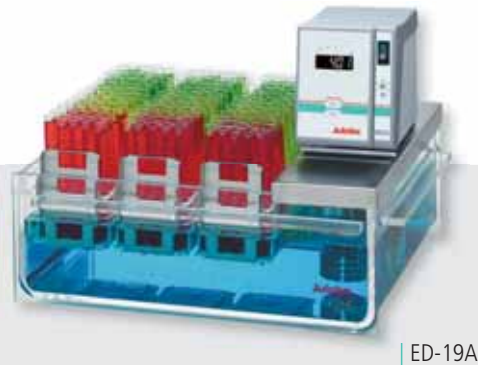
- Working temperature range up to +300 °C
- Expandable stainless steel bridge for bath tanks from 31 to 66 cm wide
- Immersion depth 12 to 19 cm
- Up to 3 kW of heating capacity for applications with large bath tanks
- Powerful pressure/suction pump for turbulent circulation and for the connection of external temperature applications
- Connection for external Pt100 sensor
- Integrated cooling coil

**Pump capacity**  
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stability °C	Heating capacity kW	Pump capacity			Cooling coil	Usable immersion depth cm	Dimensions W x L x H cm
					Flow rate l/min	Pressure bar	Suction bar			
9 252 218	SE-Z	+20 ... +300	±0.01	3	22-26	0.4-0.7	0.2-0.4	Integrated	12-19	32 x 17 x 40

Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)



## Open Heating Bath Circulators – internal

for internal temperature applications with transparent bath tanks

Open heating bath circulators are designed for internal applications in the circulator bath. The models on this page are equipped with bath tanks made of Plexiglas® or Makrolon®. Available accessories include a variety of test tube racks, immersion-height adjustable platforms and cooling coils. The circulator can be removed for easy cleaning of the bath tanks.

### Open heating bath circulators

- Bath tanks made of transparent Plexiglas® or Makrolon®
- Models with a filling volume of 5 to 19 liters
- Bath tanks of 13 and 19 liters with handles

Affix ‚A‘ Plexiglas®, to +60 °C

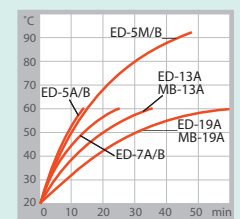
Affix ‚M‘ Makrolon®, to +100 °C

### Test tube insert capacity

Model	No. of test tubes with 13 mm Ø	17 mm Ø
ED-5A/B, ED-5M/B	90	40
ED-7A/B	90	60
ED-13A, ED-13M, MB-13A	90	60
ED-19A, ED-19M, MB-19A	270	180

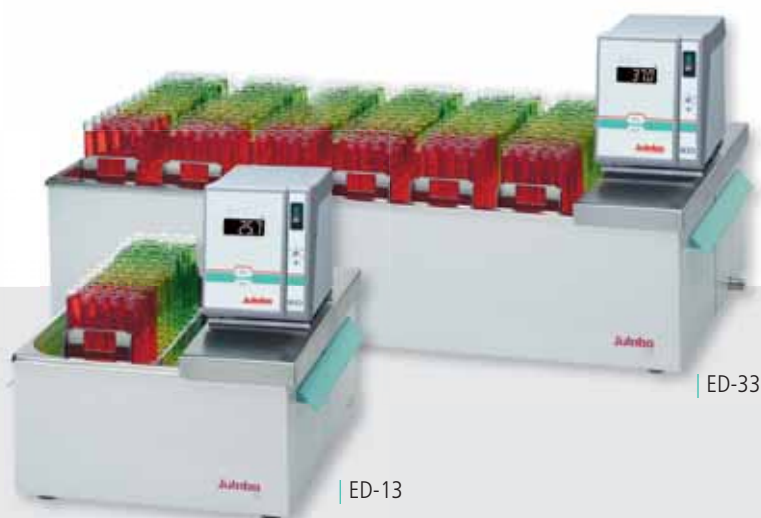
### Heat-up time

Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stab. °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pressure bar	Cooling coil	Bath opening/ Bath depth W x L / D cm	Bath tanks	Filling vol. liters	Dimensions W x L x H cm
9 116 315	ED-5A/B	+20 ... +60	±0.03	2	15	0.35	--	12 x 24 / 15	Plexiglas®	5	14 x 40 x 35
9 116 317	ED-7A/B	+20 ... +60	±0.03	2	15	0.35	--	12 x 34 / 15	Plexiglas®	7	14 x 50 x 35
9 116 515	ED-5M/B	+20 ... +100	±0.03	2	15	0.35	--	12 x 24 / 15	Makrolon®	5	14 x 40 x 35
9 116 313	ED-13A	+20 ... +60	±0.03	2	15	0.35	Option	18 x 30 / 15	Plexiglas®	13	41 x 33 x 36
9 116 319	ED-19A	+20 ... +60	±0.03	2	15	0.35	Option	36 x 30 / 15	Plexiglas®	19	55 x 33 x 36
9 116 513	ED-13M	+20 ... +100	±0.03	2	15	0.35	Option	18 x 30 / 15	Makrolon®	13	41 x 33 x 37
9 116 519	ED-19M	+20 ... +100	±0.03	2	15	0.35	Option	36 x 30 / 15	Makrolon®	19	55 x 33 x 37
9 142 313	MB-13A	+20 ... +60	±0.02	2	10	0.12	Option	18 x 30 / 15	Plexiglas®	13	41 x 33 x 36
9 142 319	MB-19A	+20 ... +60	±0.02	2	10	0.12	Option	36 x 30 / 15	Plexiglas®	19	55 x 33 x 36

<sup>1)</sup> For applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler.



Test tube racks not included in delivery (accessory).

### Applications

Temperature applications for samples, preparation of samples for serology and clinical chemistry, analytics, material testing

## Open Heating Bath Circulators – internal

for internal temperature applications with stainless steel bath tanks

The models on this page are equipped with bath tanks made of high quality stainless steel. Various accessories are available including test tube racks, immersion-height adjustable platforms, cooling coils, lift-up bath covers and flat stainless steel covers.

### Open heating bath circulators

- Bath tanks made of high quality stainless steel
- Models with filling volumes from 13 to 33 liters
- Large bath openings
- All models have handles and are designed for use with test tube racks

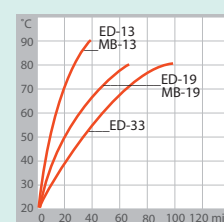
### Test tube insert capacity

Model	No. of test tubes with	
	13 mm Ø	17 mm Ø
ED-13, ED-17, MB-13	90	60
ED-19, ED-27, MB-19	270	180
ED-33	540	360

### Bath covers available accessory



### Heat-up time Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stab. °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pressure bar	Cooling coil	Bath opening/ Bath depth W x L / D cm	Bath tanks	Filling vol. liters	Dimensions W x L x H cm
9 116 413	ED-13	+20 ... +100	±0.03	2	15	0.35	Option	18 x 30 / 15	Option	13	39 x 33 x 37
9 116 417	ED-17	+20 ... +100	±0.03	2	15	0.35	Option	18 x 30 / 20	Option	17	39 x 33 x 42
9 116 419	ED-19	+20 ... +100	±0.03	2	15	0.35	Option	36 x 30 / 15	Option	19	57 x 33 x 37
9 116 427	ED-27	+20 ... +100	±0.03	2	15	0.35	Option	36 x 30 / 20	Option	27	57 x 37 x 42
9 116 433	ED-33	+20 ... +100	±0.03	2	15	0.35	Option	67 x 30 / 15	Option	33	91 x 33 x 38
9 142 413	MB-13	+20 ... +100	±0.02	2	10	0.12	Option	18 x 30 / 15	Option	13	39 x 33 x 37
9 142 419	MB-19	+20 ... +100	±0.02	2	10	0.12	Option	36 x 30 / 15	Option	19	57 x 33 x 37

<sup>1)</sup> For applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler.



Test tube racks not included in delivery (accessory).

## Heating Circulators with Open Bath internal and external

for internal and external temperature applications up to +100 °C with transparent bath tanks and pump connections

Heating circulators with open baths are designed for temperature applications in the circulator bath and are equipped with pump connections for external temperature applications. The models on this page feature bath tanks made of transparent Plexiglas® or Makrolon®.

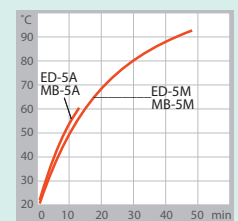
### Heating circulators with open bath

- Additional pump connections for external applications
- Integrated cooling coil
- Bath tanks made of Plexiglas® or Makrolon®
- Models with filling volumes of 5 and 7 liters

Affix ,A' Plexiglas®, to +60 °C

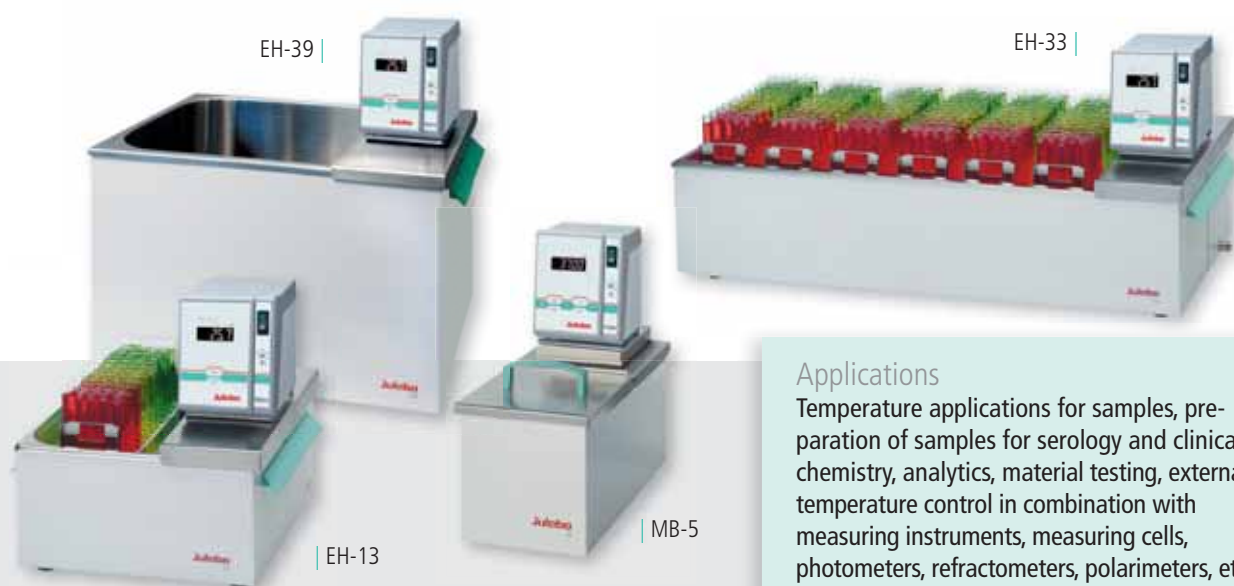
Affix ,M' Makrolon®, to +100 °C

**Heat-up time**  
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stab. °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pressure bar	Cooling coil	Bath opening/ Bath depth W x L / D cm	Bath cover	Filling vol. liters	Dimensions W x L x H cm
9 116 305	ED-5A	+20 ... +60	±0.03	2	15	0.35	Integrated	12 x 24 / 15	--	5	14 x 40 x 35
9 116 505	ED-5M	+20 ... +100	±0.03	2	15	0.35	Integrated	12 x 24 / 15	--	5	14 x 40 x 35
9 142 305	MB-5A	+20 ... +60	±0.02	2	10	0.12	Integrated	12 x 24 / 15	--	5	14 x 40 x 35
9 142 307	MB-7A	+20 ... +60	±0.02	2	10	0.12	Integrated	12 x 34 / 15	--	7	14 x 50 x 35
9 142 505	MB-5M	+20 ... +100	±0.02	2	10	0.12	Integrated	12 x 24 / 15	--	5	14 x 40 x 35

<sup>1)</sup>For applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler  
Included with each unit: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)



### Applications

Temperature applications for samples, preparation of samples for serology and clinical chemistry, analytics, material testing, external temperature control in combination with measuring instruments, measuring cells, photometers, refractometers, polarimeters, etc.

## Heating circulators with Open Bath internal and external

for internal and external temperature applications up to +150 °C with stainless steel bath tanks and pump connections

The models on this page are equipped with bath tanks made of high quality stainless steel. Various accessories are available including test tube racks, immersion-height adjustable platforms, cooling coils, lift-up bath covers and flat stainless steel covers.

### Heating circulators with open bath

- Bath tanks made of high quality stainless steel
- Models with a filling volume of 5 to 39 liters
- Large bath openings

#### Note:

Models EH-27, EH-33 and EH-39 with integrated easy-access drain.

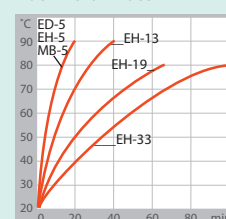
Models ED-5, EH-5 and MB-5 include bath cover and cooling coil.

EH Models with countdown timer.

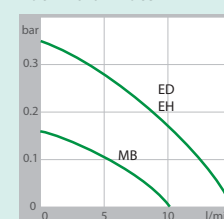
Lift-up and flat **bath covers** available as accessory



**Heat-up time**  
Bath fluid: water



**Pump capacity**  
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stab. °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pressure bar	Cooling coil	Bath opening/ Bath depth W x L / D cm	Bath cover	Filling vol. liters	Dimensions W x L x H cm
9 116 405	ED-5	+20 ... +100	±0.03	2	15	0.35	Integrated	15 x 15 / 15	Integrated	4.5	17 x 33 x 36
9 118 405	EH-5	+20 ... +150	±0.03	2	15	0.35	Integrated	15 x 15 / 15	Integrated	4.5	17 x 33 x 36
9 118 413	EH-13	+20 ... +150	±0.03	2	15	0.35	Option	18 x 30 / 15	Option	13	39 x 33 x 37
9 118 419	EH-19	+20 ... +150	±0.03	2	15	0.35	Option	36 x 30 / 15	Option	19	57 x 33 x 37
9 118 427	EH-27	+20 ... +150	±0.03	2	15	0.35	Option	36 x 30 / 20	Option	27	57 x 37 x 42
9 118 433	EH-33	+20 ... +150	±0.03	2	15	0.35	Option	67 x 30 / 15	Option	33	91 x 33 x 38
9 118 439	EH-39	+20 ... +150	±0.03	2	15	0.35	Option	36 x 30 / 30	Option	39	54 x 34 x 52
9 142 405	MB-5	+20 ... +100	±0.02	2	10	0.12	Integrated	15 x 15 / 15	Integrated	4.5	17 x 33 x 36

<sup>1)</sup> For applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler  
Included with each unit: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)





MA-4



ME-26  
with integrated immersion-height adjustable platform

## Heating Circulators – external and internal

for external and internal temperature applications up to +200 °C  
with stainless steel bath tanks and pump connections

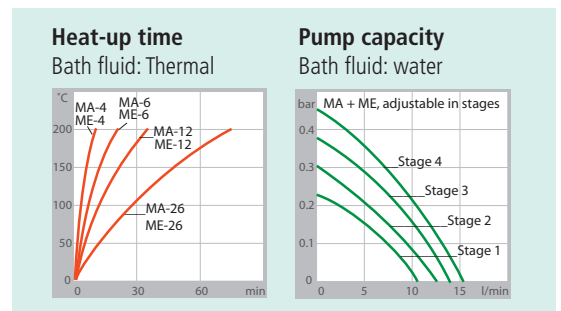
Heating circulators are used primarily for the external temperature control of externally closed systems. Temperature control applications in the internal circulator bath are also possible.

### TopTech heating circulators

- For external temperature applications
- Simultaneously, internal temperature applications
- Electronically adjustable pressure pump
- Early warning system for low liquid level and high/low temperature
- RS232 interface
- Integrated cooling coil

### Models with ME circulator also feature

- Connection for external Pt100 sensor
- Integrated programmer (1 x 10 steps) with real time clock



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stability °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pressure bar	Cooling coil	Bath opening/ Bath depth W x L / D cm	Filling volume liters	Dimensions W x L x H cm
9 153 504	MA-4	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	13 x 15 / 15	4.5	21 x 42 x 38
9 153 506	MA-6	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	13 x 15 / 20	6	21 x 43 x 42
9 153 512	MA-12	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	22 x 15 / 20	12	30 x 43 x 45
9 153 526	MA-26	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	22 x 30 / 20	26	36 x 61 x 45
9 162 504	ME-4	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	13 x 15 / 15	4.5	21 x 42 x 38
9 162 506	ME-6	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	13 x 15 / 20	6	21 x 43 x 42
9 162 512	ME-12	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	22 x 15 / 20	12	30 x 43 x 45
9 162 526	ME-26	+20 ... +200	±0.01	2	11-16	0.23-0.45	Integrated	22 x 30 / 20	26	36 x 61 x 45

<sup>1)</sup> For applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler  
Included with each unit: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)



## Applications

External temperature application in combination with jacketed reactors, distillation apparatus, mini plant applications, photometers, refractometers and temperature applications to small objects

## Heating Circulators – external and internal

for external and internal temperature applications up to +300 °C  
with stainless steel bath tanks and pump connections

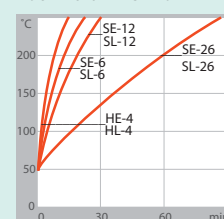
HighTech circulators provide superior technology for the most demanding applications. The instruments feature a powerful, electronically adjustable pressure and suction pump.

### HighTech heating circulators

- External temperature control in closed and open systems
- ICC temperature control for high precision
- VFD Comfort Display with simultaneous display of 3 temperature values
- Integrated programmer with real time clock
- Powerful pressure and suction pump, electronically adjustable
- Automatic adjustment of pump capacity to fluid viscosity
- Integrated cooling coil

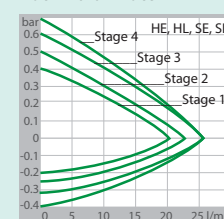
### Heat-up time

Bath fluid: Thermal



### Pump capacity

Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C <sup>1)</sup>	Temp. stability °C	Heat. cap. kW	Pump capacity / Flow rate l/min	Pressure bar	Suction bar	Bath opening/ bath depth W x L / D cm	Filling volume liters	Dimensions W x L x H cm
9 212 504	HE-4	+20 ... +250	±0.01	2	22-26	0.4-0.7	0.2-0.4	13 x 15 / 15	4.5	21 x 42 x 40
9 252 506	SE-6	+20 ... +300	±0.01	3	22-26	0.4-0.7	0.2-0.4	13 x 15 / 20	6	21 x 43 x 44
9 252 512	SE-12	+20 ... +300	±0.01	3	22-26	0.4-0.7	0.2-0.4	22 x 15 / 20	12	30 x 43 x 47
9 252 526	SE-26	+20 ... +300	±0.01	3	22-26	0.4-0.7	0.2-0.4	22 x 30 / 20	26	36 x 61 x 47
9 312 504	HL-4	+20 ... +250	±0.01	2	22-26	0.4-0.7	0.2-0.4	13 x 15 / 15	4.5	21 x 42 x 40
9 352 506	SL-6	+20 ... +300	±0.01	3	22-26	0.4-0.7	0.2-0.4	13 x 15 / 20	6	21 x 43 x 44
9 352 512	SL-12	+20 ... +300	±0.01	3	22-26	0.4-0.7	0.2-0.4	22 x 15 / 20	12	30 x 43 x 47
9 352 526	SL-26	+20 ... +300	±0.01	3	22-26	0.4-0.7	0.2-0.4	22 x 30 / 20	26	36 x 61 x 47

<sup>1)</sup> For applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler  
Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)



# User Benefits and helpful Tips



## Always visible and easy to read: Brightest Temperature Displays

JULABO circulators offer large, easy-to-read temperatures displays. The values can be viewed easily from a long distance, at an angle and in very bright surroundings. This makes it easy to monitor the display during your daily tasks.

### LED Display

for 1 actual value and up to 3 setpoints, warning functions, high temperature cut-off, pump stages (resolution 0.01/0.1 °C)

### VFD Comfort Display

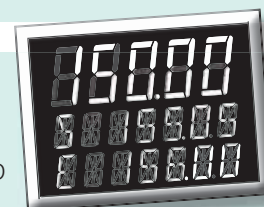
simultaneous display of 3 values, warning functions, high temperature cut-off, pump stages (resolution 0.01 °C)

### LCD Dialog Display

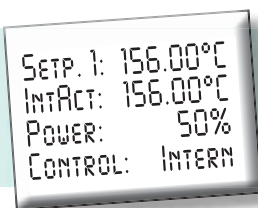
allows for interactive operation with easy-to-read text



LED



VFD



LCD

## Highly precise Temperature Control Technology – professional and simple operation

PID1, PID2 and PID3 temperature controls offer fixed control parameters (Xp, Tn, Tv). For the advanced user the PID2 and PID3 settings can be manually changed to reach an improved temperature stability, especially for external temperature control.

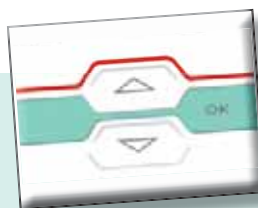
ICC temperature control (Intelligent Cascade Control) provides highly precise temperature control results even for the most demanding applications. With ICC the PID control parameters are self-optimizing and automatically adjust to the respective application.

The TCF function permits full control of the control dynamics. In addition to accessing control parameters, this function also allows for setting band limit, limit setting, co-speed factor, etc.



## Intuitive and Integrated Operation

All JULABO products feature a consistent user interface design allowing for easy operation via the splash-proof and easy-to-clean keypads. Menus enable users to set additional parameters for process optimization such as control parameters, autostart mode, interface configuration, etc.



## Early Warning System for Low Liquid Level

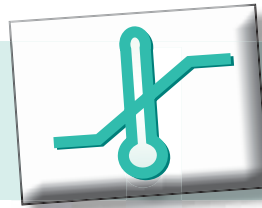
The JULABO early warning system for low liquid level recognizes fluid losses in the circulator bath and gives an optical and audible signal. Users have the opportunity to refill the bath tank before the built-in low liquid level protection triggers the undesired automatic safety cut-off.



## Early warning system for High/Low Temperature Limits

If the operator-defined temperature limits are exceeded - e.g. caused by an exothermic reaction - the early warning system will trigger audible and optical warnings.

Low temperature protection with cut-off function: If required, the warning function can be switched to a cut-off function (e.g. as low temperature protection).



## Integrated Additional Protection Functions

JULABO circulators and temperature control systems also feature:

- Standby display and automatic self-test
- Monitoring of sensors and sensor temperature differentials
- *BlackBox* Function with error memory for remote diagnosis
- Overload protection for pump motor and refrigeration unit



## Wireless Equipment Management

JULABO *WirelessTEMP*® products allow wireless monitoring and operation of JULABO temperature control instruments via PC or a hand-held remote control. For more information on *WirelessTEMP*® products see the chapter Wireless Communication & Software.



## Intelligent Pump Systems

The highly efficient circulating pumps provide high pressures and flow rates. The *SmartPump* electronics has many benefits: The electronically adjustable pump capacity (4 stages) via keypad on one hand. On the other hand an automatic, electronic adjustment of the pump capacity in response to changes in bath fluid viscosity values for reliable and safe operation even when using high viscosity bath fluids.



## Integrated Programmer

Many applications are time and temperature dependent processes. The ME circulators and all HighTech circulators feature an integrated programmer. Temperature profiles can be easily programmed, executed, and saved. Programming functions include a continuous loop setting and adjustable incremental gradients. The real-time clock allows application start-up at a specified time, e.g. heat-up of application prior to the start of the work.

- ME, HE, SE Models: 1 Temperature profile with up to 10 steps  
 HL, SL Models: 6 Temperature profiles with up to 60 steps





## ATC - Temperature Calibration

The ATC function is designed to compensate for temperature differences, due to physics, which may occur between the circulator and a defined measuring point. When using a reference thermometer the actual temperature can be determined at any measuring point (circulator bath or external application). The ATC function calibrates the circulator control to the reference value. The internal temperature sensor as well as the external sensor (if an external sensor connection exists) can be calibrated.

EH Models: 1-Point calibration  
TopTech, HighTech Models: 3-Point calibration

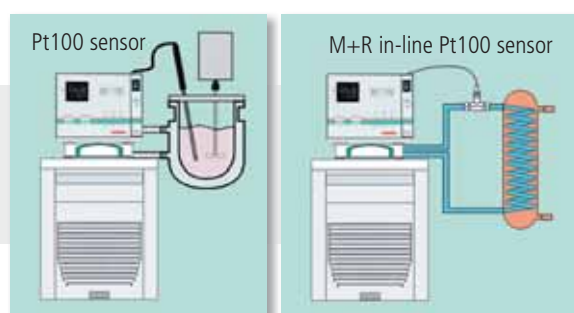


## External Temperature Control and Measurement

The ME circulators and all HighTech circulators include a connection for an external Pt100 temperature sensor. Various external sensors made of stainless steel or PTFE coated stainless steel are available in lengths between 20 and 1200 mm. For highly precise temperature control a M+R in-line Pt100 sensor can be installed directly into the cooling circuit. The externally measured actual value is shown on the circulator's display.

8 981 003 to 017 External Pt100 sensors

8 981 020 M+R in-line Pt100 sensor



## Exothermic Reactions under Control

A bath lid with built-in cooling coil is available in order to compensate for exothermic reactions. In case of a sudden peak in temperature, cooling water is automatically fed into the cooling coil via a solenoid valve. This instantly compensates for exothermic reactions.

HL and SL feature an integrated automatic solenoid valve controller and require the following accessories:

8 981 003 to 017 External Pt100 sensors

8 970 240 to 242 Bath lid with built-in cooling coil

8 980 703 Solenoid valve for cooling water

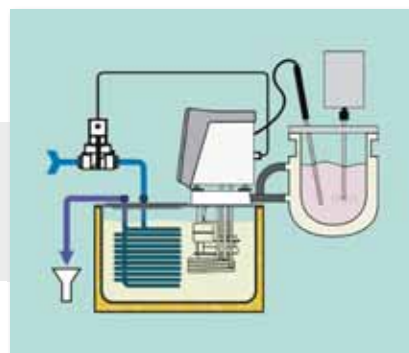
ME, HE and SE circulators can also be equipped with an automatic cooling water supply. As these instruments do not have an integrated solenoid valve controller, they require:

9 790 000 MVS Solenoid valve controller

8 981 003 to 017 External Pt100 sensors

8 970 240 to 242 Bath lid with built-in cooling coil

8 980 700 Solenoid valve for cooling water



## Economic Cooling Water Consumption

Heating circulators provide a built-in cooling coil to perform counter-cooling with tap water facilitating applications near ambient temperature. We recommend using a solenoid valve controller to reduce cooling water consumption.

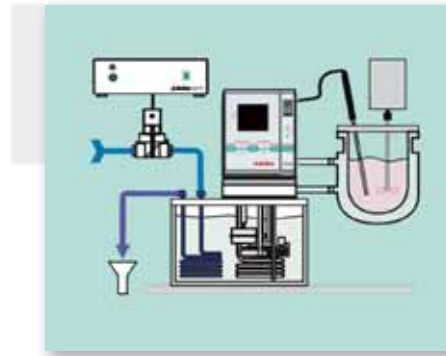
**HL and SL circulators** have an integrated automatic solenoid valve controller and only require the following accessory:

**8 980 703 Solenoid valve for cooling water**

**MB, MA, ME, HE and SE circulators** can also be equipped with an automatic cooling water supply. However, these instruments require an additional external controller:

**9 790 000 MVS Solenoid valve controller**

**8 980 700 Solenoid valve for cooling water**



## Flow-through Coolers and Immersion Coolers

For applications below ambient temperatures JULABO flow-through and immersion coolers can be used for counter-cooling of heating circulators.

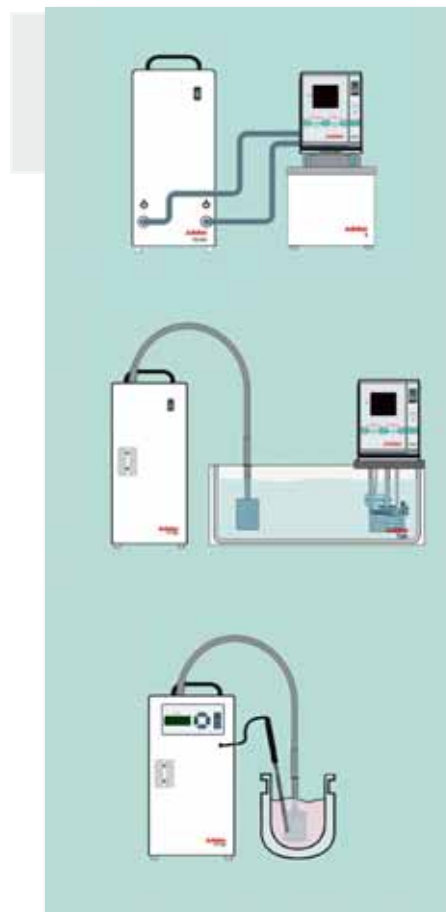
### Advantages:

- Environmentally friendly
- Reduced tap water consumption
- Reduced energy consumption

Immersion coolers are also recommended for rapidly cooling fluids to low temperature e.g. in a Dewar vessel or as a dry ice substitute.

Immersion coolers can be used apart from circulators for controlled cooling of liquid in any vessel.

This requires immersion coolers with a temperature sensor and permits the setting of a setpoint via keypad: FT402 and FT902. For more information see the chapter „Additional Products“.



## THE SMART CONTROLLERS

JULABO heating circulators are available in three performance categories for a variety of laboratory applications.

### The Economy Series

Basic models for routine and standard applications.

Heating circulators of the Economy Series are particularly cost effective. Even the smallest circulators provide temperature control with a stability of  $\pm 0.03$  °C. Operation could not be easier and the bright display permits reading a setpoint or actual value from a distance. All models with an EH circulator comply with protection class III (FL) according to DIN 12876-1 and feature a countdown timer.

### The TopTech Series

Middle class for a broad range of applications.

Heating circulators of the TopTech Series are designed for more demanding applications. They feature increased functionality and additional warning and safety functions. Models with ME circulators provide maximum flexibility. They feature a connection for an external Pt100 sensor e.g. for direct measurement and control within an external application. The VFD Comfort Display is easy to use and shows all temperature values at once.

### The HighTech Series

Sophisticated models for demanding applications.

The HighTech Series offers heating circulators which feature a powerful, electronically adjustable pressure and suction pump. Only the HighTech series features an electronic module (accessory) to add further interfaces. The top-of-the-line HL and SL circulators provide maximum functionality. They are equipped with an integrated programmer to monitor up to 6 programs with 60 working steps each. Unique to the SL and SE models is the increased heating capacity with 3 kW for rapid heat-up. The top-of-the-range in temperature control impresses with smart functional diversity which leaves nothing to be desired.



## Economy

ED/EH



MB/MA



ME

## TopTech



HE/SE



HL/SL

## HighTech

## Individual Solutions for Your Application



JULABO provides solutions for any customer's individual requirements. JULABO customers have the following options for heating circulators:

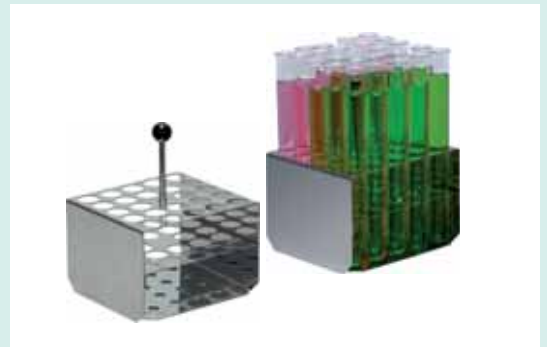
### Special baths made of stainless steel or Makrolon®

JULABO designs and manufactures baths exactly to your specification. You define the geometry and required fittings for the integration into your application. We would be glad to advise you.



### Special inserts

We design and manufacture inserts and racks for sample incubations in the bath. Please contact us for a consultation regarding the insert design and material of construction.



### Special bath covers

We design and manufacture bath covers according to your specific information on the geometry of the samples and baths. We will gladly advise you on the design of the bath covers.



Special bath covers

### Special temperature sensors

We supply external Pt100 sensors according to your specifications. Customer specified sensor length, sensor diameter and connection cable length solutions are available. Ask us about the accuracy class.



## Individual Solutions for Your Application



### More power

Are the pump and heating capacities of our standard products insufficient? Specify the bath fluid flow requirements of your application and we supply the matching booster pump. Specifying the heating rate needed for your application will allow us to calculate the required heating capacity to manufacture an appropriate booster heater.



### Special heat exchangers

We design the liquid heat exchanger according to your performance requirements. Simply specify the transmission capacity, the temperature range of the application and the mechanical interfaces to your application. We calculate the required heat exchanger surface and supply your custom-made heat exchanger.



### Special tubing

Do you have special tubing requirements? Specify your bath fluid, the length, inside diameter and the mechanical interfaces of the tubing. We will choose the compatible material and insulation and supply the required tubing.



### Individual connections and adapters

If you need a special adapter to connect our instrument to your application, specify the mechanical interface and we will manufacture the matching adapter.



### Special bridges

You have a special bath and need the matching bridge to position your JULABO circulator. We will advise you on the material and will manufacture a precisely dimensioned bridge.





# Practical Accessories



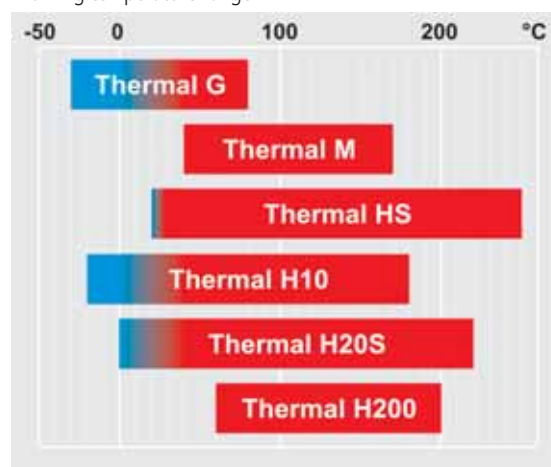
## JULABO *Thermal* Bath Fluids

JULABO *Thermal* bath fluids are ideally suited for all of your temperature control applications guaranteeing safe and reliable operation. Choosing the proper bath fluid is critical for high performance temperature control. The viscosity, oxidation and heat transfer characteristics of *Thermal* fluids are specifically matched with each JULABO temperature control instrument.

### Advantages

- Wide temperature ranges
- Low viscosity
- High stability
- Good heat conductivity
- Minimum odor
- Low corrosion properties
- Low toxicity
- Long shelf life

Working temperature range



Included in delivery:  
drain tap

JULABO Description		Thermal G	Thermal M	Thermal HS	Thermal H10	Thermal H20S	Thermal H200
JULABO Order No.	10 liters 5 liters	8 940 124 8 940 125	8 940 100 8 940 101	8 940 102 8 940 103	8 940 114 8 940 115	8 940 108 8 940 109	8 940 134 8 940 135

Working temperature ranges and specifications							
For heating circulators	°C	-30 ... +80	+40 ... +170	+20 ... +250	-20 ... +180	0 ... +220	+60 ... +200
Flash point	°C	--	+284	+270	+190	+230	+292
Fire point	°C	--	+306	>+360	+216	+274	+334
Viscosity, kinetic at +20 °C	mm <sup>2</sup> /s	3.87	350	<51.5	10	<51.5	84
Density at +20 °C	g/cm <sup>3</sup>	1.084	1.15	0.97	0.93	0.97	1.07
Pour point	°C	<-35	-39	-60	-90	-70	-50
Boiling point	°C	+107	--	>+315	>+300	>+315	>+300
Ignition temperature	°C	--	>+255	>+400	>+400	>+400	>+400
Color		light yellow	light yellow	light brown	clear	light brown	clear

## Water protective media to prevent formation of algae

JULABO Order No.	Description	Suitable for
8 940 006	6 bottles <i>Aqua Stabil</i> 100 ml each	All immersion, bath and
8 940 012	12 bottles <i>Aqua Stabil</i> 100 ml each	heating circulators



## Accessories for heating immersion circulators

JULABO Order No.	Description	Suitable for
8 970 022	Stand attachment with rod 200 x 12 mm for laboratory stands	ED, EH, MB, MA, ME
8 970 421	Bath attachment clamp for wall thickness up to 60 mm	ED, EH, MB, MA, ME
8 970 140	Pump set for external temperature applications	ED, EH, MB, MA, ME
8 970 105	Installation cooling coil for counter-cooling with tap water	ED, EH, MB, MA, ME



## Bath tanks for heating immersion circulators

JULABO Order No.	Description	Fill.vol. liters	Dimensions cm inner (W x L / D)	outer (W x L / H)	Suitable for
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### Stainless steel bath tanks to +150 °C, insulated

9 902 405	Bath tank 5	5	33 x 15 / 15	38 x 19 / 18	ED, EH, MB, MA, ME
9 902 413	Bath tank 13	13	33 x 30 / 15	38 x 33 / 18	ED, EH, MB, MA, ME
9 902 417	Bath tank 17	17	33 x 30 / 20	38 x 33 / 23	ED, EH, MB, MA, ME
9 902 419	Bath tank 19	19	50 x 30 / 15	56 x 33 / 18	ED, EH, MB, MA, ME
9 902 427	Bath tank 27 with drain	27	50 x 30 / 20	56 x 33 / 23	ED, EH, MA, ME
9 902 433	Bath tank 33 with drain	33	83 x 30 / 15	90 x 33 / 20	ED, EH, MA, ME
9 902 439	Bath tank 39 with drain	39	50 x 30 / 30	54 x 33 / 35	ED, EH, MA, ME



### Makrolon® bath tanks to +100 °C

9 900 505	Bath tank 5M	5	39 x 12 / 15	41 x 14 / 18	ED, MB
9 900 513	Bath tank 13M	13	32 x 30 / 15	41 x 33 / 18	ED, MB, MA
9 900 519	Bath tank 19M	19	47 x 30 / 15	55 x 33 / 18	ED, MB, MA

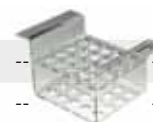
### Plexiglas® bath tanks to +60 °C

9 900 305	Bath tank 5A	5	39 x 12 / 15	41 x 14 / 17	ED, MB
9 900 307	Bath tank 7A	7	49 x 12 / 15	51 x 14 / 17	ED, MB
9 900 313	Bath tank 13A	13	32 x 30 / 15	41 x 33 / 17	ED, MB, MA
9 900 319	Bath tank 19A	19	47 x 30 / 15	55 x 33 / 17	ED, MB, MA



## Test tube racks

JULABO Order No.	Description	Immersion depth mm	Suitable for following bath tanks and maximum insert capacity for test tube racks per bath tank							
			5	5A/5M	7A	13/13A/13M	17	19/19A/19M	27	33
<b>Test tube racks made of Plexiglas®, to +60 °C</b>										
8 960 000	for 20 centrifuge tubes, 100 x 17 mm dia. (Type 030)	55	--	2	3	--	--	--	--	--
8 960 002	for 36 reaction vessels, 40 x 10/11 mm dia. (Type 042)	30	--	2	3	--	--	--	--	--
8 960 003	for 30 quick test tubes, 55 x 12/13 mm dia. (Type 046)	45	--	2	3	--	--	--	--	--
8 960 010	for 20 test tubes, 160 x 17 mm dia. (Type 062)	100	--	2	3	--	--	--	--	--
8 960 013	for 6 Falcon tubes, 50 ml (Type 056)	95	--	2	3	--	--	--	--	--
<b>Test tube racks made of Polypropylene®, to +80 °C</b>										
8 970 304	for 60 tubes, 16/17 mm dia.	80	--	--	--	1	1	3	3	6
8 970 306	for 90 tubes, 12/13 mm dia.	65	--	--	--	1	1	3	3	6
<b>Test tube racks made of stainless steel, to +150 °C</b>										
8 970 307	for 50 tubes, 16/17 mm dia.	80	--	--	--	1	1	3	3	6
8 970 308	for 90 tubes, 12/13 mm dia.	65	--	--	--	1	1	3	3	6
8 970 309	for 90 Microliter tubes, 11/12 mm dia.	30	--	--	--	1	1	3	3	6
8 970 310	for 21 tubes, 30 mm dia.	90	--	--	--	1	1	3	3	6
8 970 320	for 28 tubes, 16/17 mm dia.	80	1	--	--	--	--	--	--	--
8 970 321	for 38 tubes, 12/13 mm dia.	65	1	--	--	--	--	--	--	--



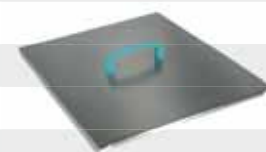
## Immersion-height adjustable platforms

JULABO Order No.	Description	Suitable for
8 970 502	Immersion-height adjustable platform	Bath tank 19, 27
8 970 503	Immersion-height adjustable platform	Bath tank 13, 17



## Bath covers / Hollow balls

JULABO Order No.	Description	Suitable for
8 970 253	Lift-up gable bath cover made of stainless steel	Bath tanks 13, 17
8 970 254	Lift-up gable bath cover made of stainless steel	Bath tanks 19, 27
8 970 257	Lift-up bath cover made of stainless steel	Bath tank 33
8 970 263	Flat stainless steel bath cover	Bath tank 39
8 970 290	Flat stainless steel bath cover	Bath tanks 13, 17
8 970 291	Flat stainless steel bath cover	Bath tanks 19, 27
8 970 292	Flat stainless steel bath cover	Bath tank 33
8 970 010	Hollow balls, Polypropylene®, 20 mm dia. (1000 pcs.)	All bath tanks



## Tubing / Tubing Insulation / Tubing Accessories

JULABO Order No.	Description	Suitable for
<b>CR® and Viton® Tubing / Tubing insulation / Tube clamps</b>		
8 930 008	1 m CR® Tubing, 8 mm inner dia. (-20 ... +120 °C)	ED, EH, MB, MA, ME, HE, HL, SE, SL
8 930 010	1 m CR® Tubing, 10 mm inner dia. (-20 ... +120 °C)	ED, EH, MB, MA, ME
8 930 012	1 m CR® Tubing, 12 mm inner dia. (-20 ... +120 °C)	HE, HL, SE, SL
8 930 108	1 m Viton® Tubing, 8 mm inner dia. (-50 ... +200 °C)	EH, MA, ME, HE, HL, SE, SL
8 930 110	1 m Viton® Tubing, 10 mm inner dia. (-50 ... +200 °C)	EH, MA, ME
8 930 112	1 m Viton® Tubing, 12 mm inner dia. (-50 ... +200 °C)	HE, HL, SE, SL
8 930 410	1 m Insulation for tubing 8 mm or 10 mm inner dia.	CR® and Viton® Tubing, temperature range -50 ... +100 °C
8 930 412	1 m Insulation for tubing 12 mm inner dia.	CR® and Viton® Tubing, temperature range -50 ... +100 °C
8 970 480	2 Tube clamps, size 1	Tubing 8 mm inner dia.
8 970 481	2 Tube clamps, size 2	Tubing 10 or 12 mm inner dia.



<b>Metal tubing, flexible, triple insulated -100 ... +350 °C</b>		
8 930 209	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 210	1.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 211	1.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 214	3.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL



<b>Metal tubing, flexible, insulated -50 ... +200 °C</b>		
8 930 220	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 221	1.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 222	1.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 223	3.0 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL



<b>Accessories for metal tubing connections</b>		
8 970 443	Adapter M16x1 male to M16x1 male	Metal tubing connection
8 970 444	Adapter for metal tubing M10x1 male to M16x1 male	MA, ME














## Cooling accessories / Booster heater

JULABO Order No.	Description	Suitable for
9 790 000	MVS Solenoid valve controller for cooling water	MB, MA, ME, HE, SE
8 980 700	Solenoid valve for cooling water, for tubing 8 mm inner dia.	MB, MA, ME, HE, SE
8 980 703	Solenoid valve for cooling water, for tubing 8 mm inner dia.	HL, SL
8 970 180	Installation cooling coil	ED, EH, MB
8 970 240	Bath lid with built-in cooling coil	MA-4, MA-6, ME-4, ME-6, HE-4, HL-4, SE-6, SL-6
8 970 242	Bath lid with built-in cooling coil	ME-12, SE-12, SL-12
8 810 007	HST Booster heater 6 kW	SL-12





## Adapters / Valves /Connectors, etc.

JULABO Order No.	Description	Suitable for	
8 970 410	D + S level-adapter to maintain constant level (in external bath)	HE, HL, SE, SL	
8 970 456	Shut-off valve for loop circuit (-10 °C ... +100 °C), M16x1	HE, HL, SE, SL	
8 970 457	Shut-off valve for loop circuit (-30 °C ... +200 °C), M16x1	HE, HL, SE, SL	
8 980 701	Solenoid valve for loop circuit (-10 °C ... +130 °C), M16x1	HL, SL	
8 970 452	Drain tap (-20 °C ... +150 °C)	Bath tanks 4, 6, 12, 26	
8 970 450	Drain tap (-30 °C ... +200 °C)	Bath tanks 4, 6, 12, 26	
8 970 470	Twin distributing adapter with barbed fitting	Tubing 8 mm inner dia.	
8 970 472	Twin distributing adapter with barbed fitting	Tubing 10 mm inner dia.	
8 970 471	Twin distributing adapter with barbed fitting	Tubing 12 mm inner dia.	
8 970 473	Twin distributing adapter M16x1 female to 2 x M16x1 male	HE, HL, SE, SL	
8 970 445	2 Barbed fittings for tubing 12 mm inner dia.	HE, HL, SE, SL	
8 970 447	2 Barbed fittings for tubing 10 mm inner dia.	HE, HL, SE, SL	
8 970 446	2 Barbed fittings for tubing 8 mm inner dia.	HE, HL, SE, SL	
8 970 460	2 Barbed fittings for tubing 8 mm inner dia., M10x1	ED, EH, MB, MA, ME	
8 970 468	2 Barbed fittings for tubing 12 mm inner dia., M10x1	ED, EH, MB, MA, ME	
8 970 490	2 Collar nuts M16x1 male	HE, HL, SE, SL	
8 970 492	1 Collar nut M10x1 male	ED, EH, MB, MA, ME	
8 970 442	2 Elbow fittings 90°, M16x1 female/male	HE, HL, SE, SL	
8 890 004	2 Adapters M16x1 female to NPT 1/4" male	HE, HL, SE, SL	
8 890 005	2 Adapters M16x1 female to NPT 1/4" female	HE, HL, SE, SL	
8 890 006	2 Adapters M16x1 female to NPT 3/8" male	HE, HL, SE, SL	
8 890 007	2 Adapters M16x1 female to NPT 3/8" female	HE, HL, SE, SL	
8 890 008	2 Adapters M16x1 female to NPT 1/2" male	HE, HL, SE, SL	
8 890 009	2 Adapters M16x1 female to NPT 1/2" female	HE, HL, SE, SL	
8 890 010	2 Adapters M16x1 male to NPT 1/4" female	HE, HL, SE, SL	
8 891 008	1 Adapter M16x1 male to BSP 1/2" female	HE, HL, SE, SL	
8 891 009	1 Adapter M16x1 male to BSP 3/4" female	HE, HL, SE, SL	
8 890 011	2 Adapters M16x1 female to tube 1/4" male	HE, HL, SE, SL	
8 890 012	2 Adapters M16x1 female to tube 3/8" male	HE, HL, SE, SL	
8 890 013	2 Adapters M16x1 female to tube 1/2" male	HE, HL, SE, SL	
8 890 024	2 Adapters M16x1 female to M16x1 female	HE, HL, SE, SL	
8 890 034	2 Adapters M30x1.5 female to M16x1 male, stainless steel	HE, HL, SE, SL	
8 890 035	2 Adapters M30x1.5 male to M16x1 male, stainless steel	HE, HL, SE, SL	

## Calibration and Manufacturer's Certificates

JULABO Order No.	Description	Suitable for
8 902 901	1-Point Manufacturer's calibration certificate	All circulators
8 902 903	3-Point Manufacturer's calibration certificate	All circulators
8 902 905	5-Point Manufacturer's calibration certificate	All circulators
8 903 015	Manufacturer's testing certificate for units w/o built-in cooling	Heating circulators

## Software & Hardware for Instrument Control / Interfaces

JULABO Order No.	Description	Suitable for
<b>Electronic module with analog connectors</b> provides one input and two outputs for external data transfer, temperature recorder (freely scalable, current/voltage) as well as standby input and alarm output		
8 900 100	Electronic module with analog connectors	HE, HL, SE, SL
<b>Automatic Refill Device</b> when connected (Stakei) to the circulator - at low level - liquid is automatically pumped from the reservoir (5 liters) into the circulator bath.		
8 980 750	ARD Automatic refill device with 5 liter reservoir	HL, SL
<b>EasyTEMP Software for instrument control, data recording and visualization</b>		
8 901 102	EasyTEMP Software (free of charge at www.julabo.de)	Units with RS232
8 901 105	EasyTEMP Professional Software, incl. USB-Dongle	Units with RS232
8 980 073	RS232 interface cable, 2.5 m	Units with RS232
8 980 074	RS232 interface cable, 5 m	Units with RS232
8 900 110	USB interface adapter + RS232 interface cable	Units with RS232
8 980 031	Ethernet / RS232 interface converter	Units with RS232
8 900 005	PB-5 Option: Integrated Profibus DP	HighTech circulators HL, SL
8 900 020	Profibus DP Interface	Unit with RS232
<b>WirelessTEMP® - Wireless Communication</b>		
8 900 500	WirelessTEMP® Remote Control	WirelessTEMP Communication
8 900 505	WirelessTEMP® Remote Control, ATEX certified version	WirelessTEMP Communication
8 900 520	WirelessTEMP® Transmitter (Send/Receive unit)	Units with RS232
8 900 540	WirelessTEMP® USB Stick	Windows® PC / Notebook
8 900 530	WirelessTEMP® Router for extending wireless range	WirelessTEMP Communication



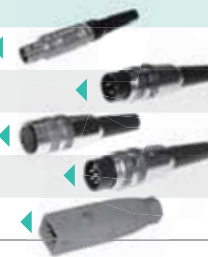
## External Pt100 sensors

JULABO Order No.	Description	Suitable for
8 981 003	200 x 6 mm dia., stainless steel, 1.5 m cable	ME, HE, HL, SE, SL
8 981 006	20 x 2 mm dia., stainless steel, 1.5 m cable	ME, HE, HL, SE, SL
8 981 010	300 x 6 mm dia., stainless steel, 1.5 m cable	ME, HE, HL, SE, SL
8 981 017	200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SE, SL
8 981 015	300 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SE, SL
8 981 013	600 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SE, SL
8 981 016	900 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SE, SL
8 981 014	1200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	ME, HE, HL, SE, SL
8 981 020	M+R in-line Pt100 sensor, 2 fittings M16x1 male	ME, HE, HL, SE, SL
8 981 103	Extension cable 3.5 m for Pt100 sensor	ME, HE, HL, SE, SL



## Connection plugs

JULABO Order No.	Description	Suitable for
8 980 131	External Pt100 connector	ME, HE, SE, HL, SL, CF31, CF41
8 980 133	Standby connector 3 pin	HE/SE/HL/SL/CF31/CF41 in combination with electronic module
8 980 135	Alarm connector 5 pin	HE/SE/HL/SL/CF31/CF41 in combination with electronic module
8 980 136	REG+EPROG connector 6 pin	HE/SE/HL/SL/CF31/CF41 in combination with electronic module
8 980 137	Stakei connector	HL, SL



*Comfortable*  
operation and management!

**WirelessTEMP<sup>®</sup>**  
Wireless Instrument Management!

# The Power of Thermodynamics

PRESTO®







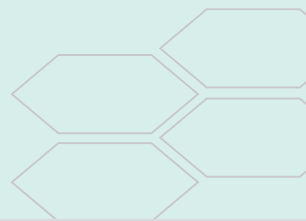
## Highly Dynamic Temperature Control Systems

JULABO Highly Dynamic Temperature Control Systems are designed specifically for extremely fast heat-up and cool-down times in external applications. These units deliver extraordinary power and cover wide temperature ranges without the need to change the bath fluid. These characteristics make Highly Dynamic Temperature Control Systems ideal for controlling the temperature of jacketed reaction vessels.

**The pinnacle of temperature technology:** Advanced control technology and a small bath fluid reservoir enable highly dynamic temperature control systems to achieve rapid heat-up and cool-down. This gives you the ability to handle difficult temperature challenges quickly.

- Ideal for precise control of external temperature applications
- Wide working temperature ranges using one bath fluid
- Designed for temperature control of jacketed reaction vessels or other demanding applications
- Rapid cool-down and heat-up
- Designed to quickly compensate exothermic and endothermic reactions
- Highly dynamic ICC temperature control, stability to  $\pm 0.01$  °C
- Powerful circulating pumps, select a stage or a specific pressure
- Extended shelf life of the bath fluid
- Hydraulically sealed to prevent unpleasant vapors and odors
- No condensation or ice build-up

JULABO has raised the bar for user convenience!





# THE NEW PRESTO®



## PRESTO® Models

-92 °C ... +250 °C

Cutting-edge temperature control technology for demanding applications

TFT DISPLAY		TOUCH	MULTI LINGUAL	
ICC	TCF	ATC <sup>3</sup>	ACCESS LEVELS	BLACK BOX
INTELLI PUMP	Pt100	RS232 RS485	40°	
ETHERNET	USB	SmartCard	SIDE by SIDE	HELP
8x60	ACC		EASY Transport	
		S3		



**PRESTO® takes convenience to a new level**  
The new generation of highly dynamic temperature units are the first instruments of their kind to revolutionize operation and monitoring with an intuitive industrial-grade color touchscreen.



**PRESTO® has new interfaces**  
JULABO is first to introduce highly dynamic temperature control systems equipped with Ethernet and USB interfaces.

# Presto® PLUS / Magnum 91



# Forte HT



## Presto® PLUS Models & Magnum 91 -91 °C ... +250 °C

For temperature control  
of reactors up to 50 liters

		Setp.: 156.00°C InPrct.: 156.00°C Power: 50% Control: Intern
<b>IGC</b>	<b>TCF</b>	
<b>ATC</b>	<b>SMART PUMP</b>	<b>Pt100</b>
<b>RS232</b> <b>RS485</b>	<b>6x60</b>	<b>ACC</b>
<b>S3</b>		

## Forte HT Models +40 °C ... +400 °C

Dual-zone technology for  
extremely high working temperatures

	Setp.: 156.00°C InPrct.: 156.00°C Power: 50% Control: Intern	
	<b>IGC</b>	<b>TCF</b>
<b>ATC</b>	<b>Pt100</b>	<b>RS232</b> <b>RS485</b>
<b>S3</b>		



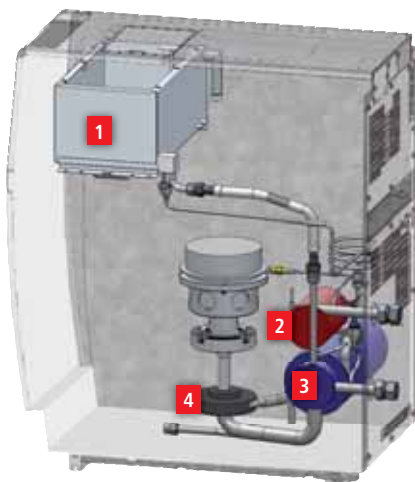
A brand new generation of highly dynamic temperature control systems by JULABO

## PRESTO® Technology

The new PRESTO® systems are designed for precise temperature control as well as rapid temperature changes, making them ideal for reactor vessels, material stress tests, or temperature simulations.

With high cooling and heating capacities, they cover a working temperature range from -92 °C to +250 °C. Highly efficient components enable these instruments to counteract exothermic and endothermic reactions with extraordinary speed.

PRESTO® units are hydraulically sealed. A cooled expansion vessel compensates for temperature-induced volume changes in the heat exchanger.



### The PRESTO® Principle

Expansion vessel (1)

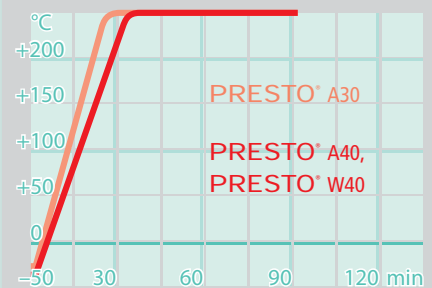
Heat exchanger

Heating section (2)

Refrigeration section (3)

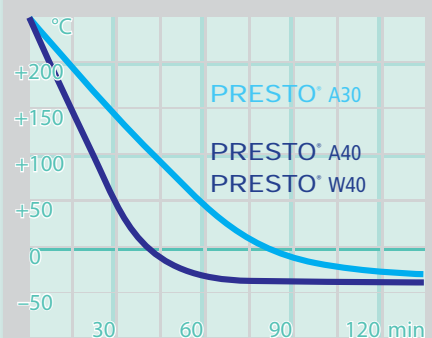
Circulating pump (4)

#### Heat-up time



Maximum pump capacity (Voltage 230 V)  
Bath fluid: JULABO Thermal HL45

#### Cool-down time



Maximum pump capacity (Voltage 230 V)  
Bath fluid: JULABO Thermal HL45



JULABO sets new standards for intuitive operation



## PRESTO® User Convenience

The state-of-the-art 5.7-inch industrial-grade color touchscreen is one of the identifying characteristics of the new PRESTO®. It gives the user a clear and well-organized view of important information with unmatched, intuitive user-friendliness. You can control the new PRESTO® with a simple tap of your finger.

There are three preset screen layouts displaying temperature reading, temperature graph, and other critical information. Users may also customize screen info to their specific needs. PRESTO® can be operated in eight different languages.

Password management enables administrators to configure a total of three user levels. Managers can set the desired parameters for recurring day-to-day tasks. Employees can then operate the PRESTO® with their limited access rights.



Clear and straightforward operation!

**The PRESTO® Operation**

- NEW** 5.7" industrial color touchscreen
- NEW** User defined views
- NEW** 3 user levels with password protection

Clearly structured display  
Intuitive menu navigation (multi-lingual)





Powerful pumps provide high flow rates at constant pressure



## PRESTO® Pump Power

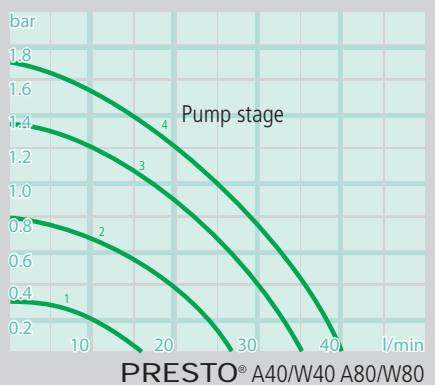
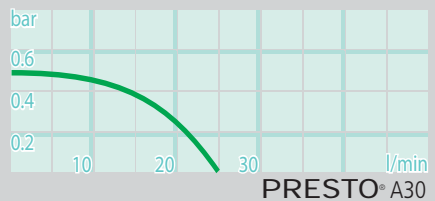
The new PRESTO® units generate the desired pressure at any time – to protect your applications and investments. The pumps even dynamically compensate for viscosity changes in the heat transfer fluid (except A30). Permanent internal monitoring and self-lubricating pumps extend the shelf life of the new PRESTO®.

The new PRESTO® units utilize a closed temperature-control loop. This prevents the heat transfer fluid from coming in contact with the ambient air.

Moisture cannot penetrate the system and oxidation is eliminated. The result: shelf life of the heat transfer fluid is extended significantly.

Here's another major benefit: The closed-loop design of the new PRESTO® eliminates oil vapors in your laboratory.

### Pump Characteristics



### The PRESTO® pump

**NEW** on PRESTO® (except A30): The pump capacity can be adjusted in four stages or via a specified pressure value

Permanently monitored pressure build-up

Dynamic compensation of viscosity changes





Many useful features  
simplify your  
laboratory routine



## PRESTO® Features

The new PRESTO® uses a single bath fluid across a wide range of working temperatures. This saves you the trouble of frequently changing the bath fluid and makes stock keeping much easier.

The filling funnel of the new PRESTO® is easily accessible on the top of the unit.

The new PRESTO® is whisper-quiet. You'll hardly know it's running.

Even elevated ambient temperatures (up to +40 °C) are not enough to make the new PRESTO® sweat.

Maintenance-free pumps and motors are always ready for action. So you can be sure that the new PRESTO® will be available when you need it. JULABO is known for rapid reaction times and global support.



## Air or water cooling

The new PRESTO® units are available with air or water cooling.

Air-cooled units do not require water and can be installed anywhere. If you expect to move the unit frequently, an air-cooled unit will be the best choice. However, it is important to remember that these units draw in air and will slightly elevate the ambient temperature during operation.

Water-cooled units must be connected to an existing cooling water line. These units are even quieter and can be completely enclosed during operation. The new PRESTO® uses robust, maintenance-free heat exchangers for water cooling. Clogging of the heat exchanger by particles or impure water is virtually eliminated.





Extensive interfaces,  
remote control via network and  
integration in master control systems



## PRESTO® Interfaces

The new PRESTO® temperature control systems are designed for connectivity. The Ethernet interface gives you complete access to operating functions.

Or take advantage of the USB interface – another first among dynamic systems. JULABO's proven WirelessTEMP® software allows you to control the new PRESTO® from your computer. You'll never run cables again!



**WirelessTEMP®**

### The PRESTO® Interfaces

- **NEW** USB (host and device)
- **NEW** Ethernet interface
- **NEW** Slot for SD cards
- **NEW** Modbus
- RS232

### Connections for

- Alarm output
- External Pt100 sensor
- Standby input (Accessory)
- Analog inputs and outputs (Accessory)
- **NEW** Flow and pressure sensors (except A30)
- **NEW** Second external Pt100 sensor (Accessory, except A30)

### Optional Interfaces

- Profibus DP
- RS485





State-of-the-art technology  
designed for  
state-of-the-art requirements



### PRESTO® Other exciting Features

The new PRESTO® units are the only highly dynamic temperature systems that eliminate ventilation slits on the side walls. JULABO units are designed specifically for front-to-rear air flow.

This is a major advantage because it enables several PRESTO® units to operate directly next to each other without any loss of performance.

A retractable handle is integrated into the front of the unit, making it easy for one person to move the new PRESTO® from one place to another.

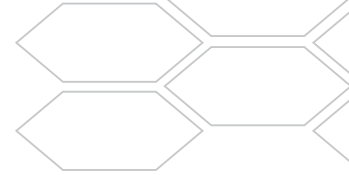


Space saving design  
JULABO units can line-up close to each other.

#### The PRESTO® Benefits

- Sides without venting slots
- Space saving design
- Quiet as a whisper
- Easy to transport





| A30



| A40



## PRESTO® Models

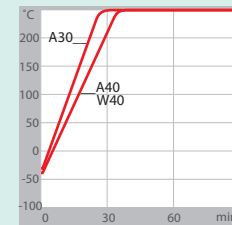
for working temperature range -40 to +250 °C

Highly dynamic systems of the PRESTO® series employ cutting-edge temperature control technology. Numerous new functions make day-to-day tasks easier and deliver the thermodynamic power needed to handle even the most demanding external applications. See for yourself what makes these dynamic temperature control systems so unique and take advantage of their special features.

- Extremely fast cool-down and heat-up times
- Wide working temperature ranges without changing the bath fluid
- Ultra-fast compensation of exothermic and endothermic reactions

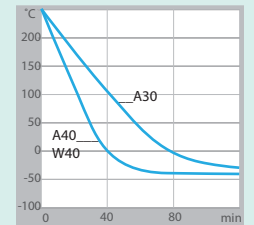
### Heat-up time

Bath fluid: Thermal HL



### Cool-down time

Bath fluid: Thermal HL



JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Temp. display/ Resolution °C	Cooling capacity kW						Heating capacity kW	
					Bath fluid: JULABO Thermal HL   Ethanol							
					+200	+20	0	-10	-20	-30	-40 °C	
9 420 300	A30	-30 ... +250	±0.01...±0.05	5.7" TFT / ±0.01	0.5	0.5	0.4	0.3	0.2	0.05	--	2.7
9 420 401	A40	-40 ... +250	±0.01...±0.05	5.7" TFT / ±0.01	1.2	1.2	0.9	0.8	0.6	0.3	0.1	2.7
water-cooled model												
9 421 401	W40	-40 ... +250	±0.01...±0.05	5.7" TFT / ±0.01	1.2	1.2	1.0	0.8	0.55	0.3	0.06	2.7

All data refers to the nominal voltage of 230 V, nominal frequency of 50 Hz and ambient temperature of +20 °C. Cooling capacity measured at max. pump stage. All pump data refers to a bath fluid with a specific density of 1 kg/dm³.



| W40

### Applications

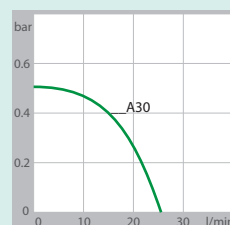
Jacketed reactors, reactor systems and autoclaves for polymerization, polycondensation, etc., combinatorial chemistry, reaction blocks, organic synthesis, reaction calorimeters, distillation, pilot plants, semiconductor industry

### Additional benefits and features:

- Heating capacity of 2.7 kW
- Ambient temperature range +5 °C to +40 °C
- Space optimized design creates more room directly next to the units
- Integrated 5.7" industrial color touchscreen displays the most critical information and enables simple fingertip control
- Extensive warning, protective, and monitoring functions with detailed plain-language displays
- ICC cascade control for extraordinary precision, temperature stability of  $\pm 0.01$  °C
- Integrated programmer with real-time clock
- Filling level indicator and pump capacity displayed electronically
- Powerful circulating pumps, electronically adjustable in stages or by setting the pressure value (except A30)
- Interface for SD memory card
- Connections for USB, Ethernet, RS232, and Alarm output
- Optional analog connections, RS485, Profibus DP, Modbus

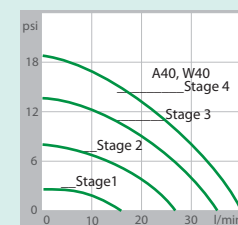
#### Pump capacity

Bath fluid: Thermal HL



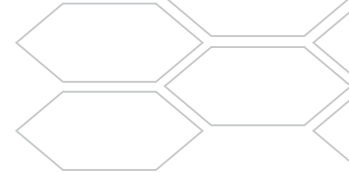
#### Pump capacity

Bath fluid: Thermal HL



Pump capacity	Flow rate	Pressure	Cooling of compressor	Noise level (distance 1 m)	Process volume min. (active heat exchanger volume)	Internal usable expansion vol.	Weight	Dimensions W x L x H
l/min	bar	bar		dbA, max.	liters	liters	kg	cm
25	0.5		single stage, air-cooled	54	2.4 (1.4)	1.5	62	25 x 59 x 62
16 ... 40	0.3 ... 1.7		single stage, air-cooled	55	3.5 (1.7)	2.7	79	33 x 59 x 67
16 ... 40	0.3 ... 1.7		single stage, water-cooled	53	3.5 (1.7)	2.7	78	33 x 59 x 67





A80 / A80t



W80 / W80t



## PRESTO® Models

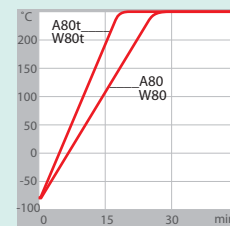
for working temperature range -80 °C to +250 °C

Highly dynamic temperature systems of the PRESTO® series deliver cutting-edge temperature control technology. Numerous new functions make day-to-day tasks easier and deliver the thermodynamic power needed to handle even the most demanding external applications. See for yourself what makes these dynamic temperature control systems so unique and take advantage of their special features.

- Extremely fast cool-down and heat-up times
- Wide working temperature range without changing the bath fluid
- Very fast compensation of exothermic and endothermic reactions

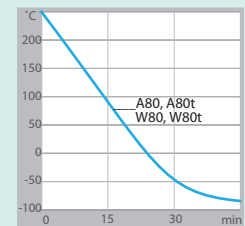
### Heat-up time

Bath fluid: Thermal HL



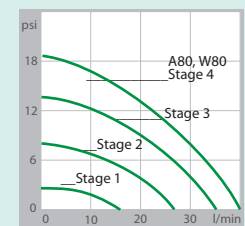
### Cool-down time

Bath fluid: Thermal HL



### Pump capacity

Bath fluid: Thermal HL



JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Temp. display/ Resolution °C	Cooling capacity kW							Heating capacity kW
					Bath fluid: JULABO Thermal HL   Ethanol							
					+200	+20	0	-20	-40	-60	-80 °C	
9 420 801	A80	-80 ... +250	±0.01...±0.05	5.7" TFT / ±0.01	1.2	1.2	1.2	1.1	1.1	0.65	0.1	1.8
9 420 801.T	A80t	-80 ... +250	±0.01...±0.05	5.7" TFT / ±0.01	1.2	1.2	1.2	1.1	1.1	0.65	0.1	3.4
water-cooled models												
9 421 801	W80	-80 ... +250	±0.01...±0.05	5.7" TFT / ±0.01	1.2	1.2	1.2	1.1	1.1	0.65	0.1	1.8
9 421 801.T	W80t	-80 ... +250	±0.01...±0.05	5.7" TFT / ±0.01	1.2	1.2	1.2	1.1	1.1	0.65	0.1	3.4

All data refers to the nominal voltage of 230 V, nominal frequency of 50 Hz (respectively 400 V, 3Ph., 50 Hz) and ambient temperature of +20 °C. Cooling capacity measured at max. pump stage. All pump data refers to a bath fluid with a specific density of 1 kg/dm<sup>3</sup>.

Setting new standards of convenience!

Powerful pumps for high flow rates!

## Applications

Jacketed reactors, reactor systems and autoclaves for polymerization, polycondensation, etc., combinatorial chemistry, reaction blocks, organic synthesis, reaction calorimeters, distillation, pilot plants, semiconductor industry

## Additional benefits and features:

- Heating capacity up to 3.4 kW
- Ambient temperature range +5 °C to +40 °C
- Space optimized design creates more room directly next to the units
- Integrated 5.7" industrial color touchscreen displays the most critical information and enables simple fingertip control
- Extensive warning, protective, and monitoring functions with detailed plain-language displays
- ICC cascade control for extraordinary precision, temperature stability of  $\pm 0.01$  °C
- Integrated programmer with real-time clock
- Filling level indicator and pump capacity displayed electronically
- Powerful circulating pumps, electronically adjustable in stages or by setting the pressure value
- Interface for SD memory card
- Connections for USB, Ethernet, RS232, and Alarm output
- Optional analog connections, RS485, Profibus DP, Modbus

NEW

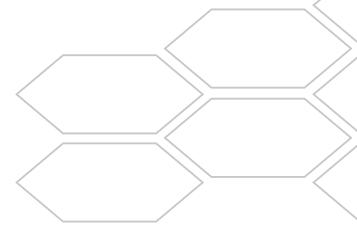
Useful accessory for PRESTO®

### 8 980 762 VFCpro-24 flow control unit

Measure/regulate flow and determine calorimetry  
M24x1.5 male, -100 °C ... +300 °C with stabilization section



Pump capacity		Cooling of compressor	Noise level (distance 1 m) dbA, max.	Process volume min. (active heat exchanger volume) liters	Internal usable expansion vol. liters	Weight kg	Dimensions W x L x H cm
Flow rate l/min	Pressure bar						
16 ... 40	0.3 ... 1.7	2-stage, air-cooled	68	3.9 (1.7)	5.6	164	43 x 65 x 126
16 ... 40	0.3 ... 1.7	2-stage, air-cooled	68	3.9 (1.7)	5.6	167	43 x 65 x 126
16 ... 40	0.3 ... 1.7	2-stage, water-cooled	64	3.9 (1.7)	5.6	159	43 x 65 x 126
16 ... 40	0.3 ... 1.7	2-stage, water-cooled	64	3.9 (1.7)	5.6	162	43 x 65 x 126



| W91 models



## PRESTO® Models

Power packages for demanding temperature tasks for working temperature range -91 °C to +250 °C

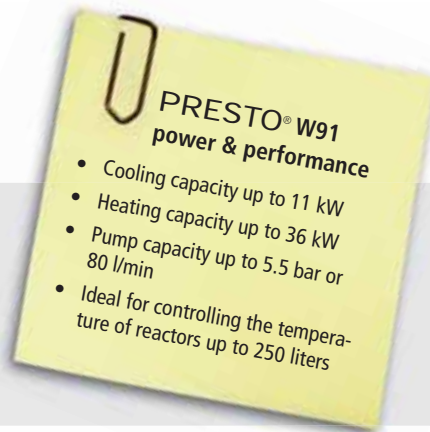
The PRESTO® W91 Highly Dynamic Temperature Control Systems are among the most powerful units available. Their impressive power is harnessed by cutting-edge control technology. The W91 delivers extraordinary heating, cooling, and pumping performance. But it also comes with the functions and features that make the new generation of PRESTO® so unique.

- Extremely fast cool-down and heat-up times
- Wide working temperature range without changing the bath fluid
- Very fast compensation of exothermic and endothermic reactions
- Unsurpassed power and efficiency



JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Cooling capacity kW								Heating capacity kW	
				Bath fluid: JULABO Thermal HL				Ethanol					
				+200	+100	+20	0	-20	-40	-60	-80 °C		
9 421 912	W91	-91 ... +250	±0.05 ... ±0.2	11.0	11.0		11.0	10.0	9.5	9.0	6.5	1.5	12
9 421 912.T	W91t	-91 ... +250	±0.05 ... ±0.2	11.0	11.0		11.0	10.0	9.5	9.0	6.5	1.5	24
9 421 912.TT	W91tt	-91 ... +250	±0.05 ... ±0.2	11.0	11.0		11.0	10.0	9.5	9.0	6.5	1.5	36
9 421 913	W91x	-91 ... +250	±0.05 ... ±0.2	11.0	11.0		11.0	10.0	9.5	9.0	6.5	1.5	12
9 421 913.T	W91tx	-91 ... +250	±0.05 ... ±0.2	11.0	11.0		11.0	10.0	9.5	9.0	6.5	1.5	24
9 421 913.TT	W91ttx	-91 ... +250	±0.05 ... ±0.2	11.0	11.0		11.0	10.0	9.5	9.0	6.5	1.5	36

All data refers to the nominal voltage of 400 V, nominal frequency of 50 Hz and ambient temperature of +20 °C. Cooling capacity measured at max. pump stage. All pump data refers to a bath fluid with a specific density of 1 kg/dm³.



## Applications

Reactor systems, mini plants, pilot plants, Kilo labs, process technology, vacuum chambers

## Additional benefits and features:

- Powerful circulating pumps, electronically adjustable in stages or by setting the pressure value  
Choose between a magnetically coupled centrifugal pump or a magnetically coupled gear pump for pressures up to 5.5 bar and virtually constant flow rate at any pressure
- Integrated 5.7" industrial color touchscreen displays all essential information and enables simple fingertip control
- Extensive warning, protection, and monitoring functions with detailed self-explanatory messages
- ICC cascade control for extraordinary precision, temperature stability  $\pm 0.05$  °C ...  $\pm 0.2$  °C
- Ambient temperature range +5 °C to +40 °C
- Integrated programmer with real-time clock
- Filling level indicator and pump capacity displayed electronically
- Interface for SD memory card
- Connections for USB, Ethernet, RS232, and Alarm output
- Optional analog connections, RS485, Profibus DP, Modbus



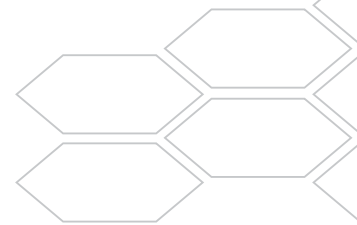
Useful accessory for PRESTO®

### 8 980 764 VFCpro-38 flow control unit

Measure/regulate flow and determine calorimetry M38x1.5 male, -100 °C ... +300 °C with stabilization section



Pump capacity		Viscosity max. cSt.	Cooling of compressor	Process volume min. (active heat exchanger volume) liters	Internal usable expansion vol. liters	Weight kg	Dimensions W x L x H cm
Flow rate l/min	Pressure bar						
26 ... 80	0.5 ... 3.0	50	2-stage, water-cooled	28 (16)	40	770	95 x 127 x 190
26 ... 80	0.5 ... 3.0	50	2-stage, water-cooled	28 (16)	40	780	95 x 127 x 190
26 ... 80	0.5 ... 3.0	50	2-stage, water-cooled	28 (16)	40	790	95 x 127 x 190
18 ... 70	0.8 ... 5.5	70	2-stage, water-cooled	28 (16)	40	785	95 x 127 x 190
18 ... 70	0.8 ... 5.5	70	2-stage, water-cooled	28 (16)	40	795	95 x 127 x 190
18 ... 70	0.8 ... 5.5	70	2-stage, water-cooled	28 (16)	40	805	95 x 127 x 190



| W92 models



## PRESTO® Models

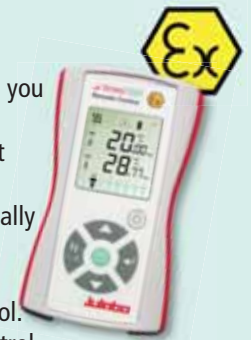
Power packages for demanding temperature tasks for working temperature range -92 °C to +250 °C

The PRESTO® W92 Highly Dynamic Temperature Control Systems are among the most powerful units available. Their impressive power is harnessed by cutting-edge control technology. The W92 delivers extraordinary heating, cooling, and pumping performance. But it also comes with the functions and features that make the new generation of PRESTO® so unique.

- Extremely fast cool-down and heat-up times
- Wide working temperature range without changing the bath fluid
- Very fast compensation of exothermic and endothermic reactions
- Unsurpassed power and efficiency

### Practical tip:

WirelessTEMP® software gives you the convenience of controlling PRESTO® remotely without the hassle of running wires. If you are working in a potentially explosive atmosphere, choose the ATEX version of the handy *WirelessTEMP*® remote control. Then you can monitor and control the JULABO unit without having to leave the EX space.

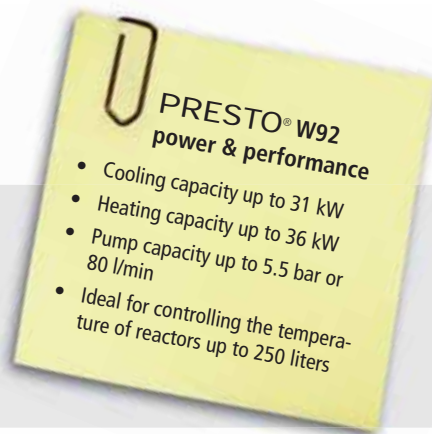


Refer to the chapter on Wireless Communication & Software for more information.

JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Cooling capacity kW											Heating capacity kW
				Bath fluid: JULABO Thermal HL   Ethanol											
				+200	+100	+20	0	-20	-40	-60	-80 °C				
9 421 922	W92	-92 ... +250	±0.05 ... ±0.2	31.0	29.0		19.0	15.5	9.5	9.0	6.5	1.5	12		
9 421 922.T	W92t	-92 ... +250	±0.05 ... ±0.2	31.0	29.0		19.0	15.5	9.5	9.0	6.5	1.5	24		
9 421 922.TT	W92tt	-92 ... +250	±0.05 ... ±0.2	31.0	29.0		19.0	15.5	9.5	9.0	6.5	1.5	36		
9 421 923	W92x	-92 ... +250	±0.05 ... ±0.2	31.0	29.0		19.0	15.5	9.5	9.0	6.5	1.5	12		
9 421 923.T	W92tx	-92 ... +250	±0.05 ... ±0.2	31.0	29.0		19.0	15.5	9.5	9.0	6.5	1.5	24		
9 421 923.TT	W92ttx	-92 ... +250	±0.05 ... ±0.2	31.0	29.0		19.0	15.5	9.5	9.0	6.5	1.5	36		

All data refers to the nominal voltage of 400 V, nominal frequency of 50 Hz and ambient temperature of +20 °C. Cooling capacity measured at max. pump stage. All pump data refers to a bath fluid with a specific density of 1 kg/dm³.





## Applications

Reactor systems, mini plants, pilot plants, Kilo labs, process technology, vacuum chambers

## Additional benefits and features:

- Powerful circulating pumps, electronically adjustable in stages or by setting the pressure value  
Choose between a magnetically coupled centrifugal pump or a magnetically coupled gear pump for pressures up to 5.5 bar and virtually constant flow rate at any pressure
- Integrated 5.7" industrial color touchscreen displays all essential information and enables simple fingertip control
- Extensive warning, protection, and monitoring functions with detailed self-explanatory messages
- ICC cascade control for extraordinary precision, temperature stability  $\pm 0.05\text{ }^{\circ}\text{C}$  ...  $\pm 0.2\text{ }^{\circ}\text{C}$
- Ambient temperature range  $+5\text{ }^{\circ}\text{C}$  to  $+40\text{ }^{\circ}\text{C}$
- Integrated programmer with real-time clock
- Filling level indicator and pump capacity displayed electronically
- Interface for SD memory card
- Connections for USB, Ethernet, RS232, and Alarm output
- Optional analog connections, RS485, Profibus DP, Modbus



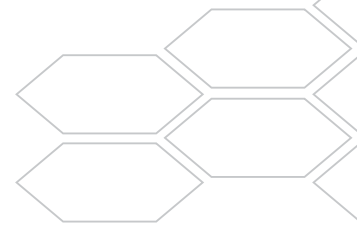
Useful accessory for PRESTO®

### 8 980 764 VFCpro-38 flow control unit

Measure/regulate flow and determine calorimetry M38x1.5 male,  $-100\text{ }^{\circ}\text{C}$  ...  $+300\text{ }^{\circ}\text{C}$  with stabilization section



Pump capacity		Viscosity max. cSt.	Cooling of compressor	Process volume min. (active heat exchanger volume) liters	Internal usable expansion vol. liters	Weight kg	Dimensions W x L x H cm
Flow rate l/min	Pressure bar						
26 ... 80	0.5 ... 3.0	50	2-stage, water-cooled	28 (16)	40	785	95 x 127 x 190
26 ... 80	0.5 ... 3.0	50	2-stage, water-cooled	28 (16)	40	795	95 x 127 x 190
26 ... 80	0.5 ... 3.0	50	2-stage, water-cooled	28 (16)	40	805	95 x 127 x 190
18 ... 70	0.8 ... 5.5	70	2-stage, water-cooled	28 (16)	40	800	95 x 127 x 190
18 ... 70	0.8 ... 5.5	70	2-stage, water-cooled	28 (16)	40	810	95 x 127 x 190
18 ... 70	0.8 ... 5.5	70	2-stage, water-cooled	28 (16)	40	820	95 x 127 x 190



LH46



LH50

## Presto® PLUS Models

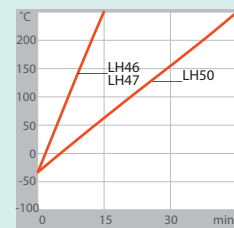
for heating and cooling of external applications

Highly dynamic systems of the Presto® PLUS series deliver high-performance temperature control technology. These units embody proven thermodynamics for high precision. Presto® PLUS is the ideal solution for many demanding external temperature control tasks.

- Small footprint saves space
- Wide working temperature ranges
- High heating and cooling capacity
- Powerful pumps
- Electronic pump stage and filling level indicator (Pump pressure is displayed in bar)
- IP class according to IEC 60529: IP20
- ICC cascade control for extraordinary precision, temperature stability of  $\pm 0.01$  °C
- User guidance on VFD and LCD displays

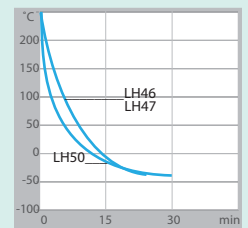
### Heat-up time

Bath fluid: Thermal HL



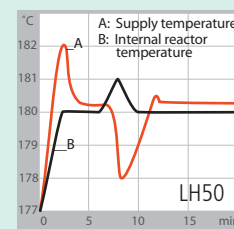
### Cool-down time

Bath fluid: Thermal HL



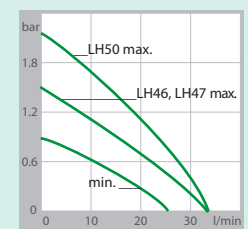
### Reaction compensation

Exothermic, 2 L reactor



### Pump capacity

Bath fluid: Thermal HL



JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Temp. display/ Resolution °C	Cooling capacity kW					
					Bath fluid: JULABO Thermal		Ethanol			
					+200	+20	-20	-40	-60	-80
9 410 246	LH46	-45 ... +250	$\pm 0.01$ ... $\pm 0.05$	VFD LCD / $\pm 0.01$	2.5	2.3	0.7	0.10	--	--
9 410 247	LH47	-47 ... +250	$\pm 0.01$ ... $\pm 0.05$	VFD LCD / $\pm 0.01$	3.7	3.0	0.9	0.20	--	--
9 410 250	LH50	-50 ... +250	$\pm 0.01$ ... $\pm 0.05$	VFD LCD / $\pm 0.01$	5.5	7.0	2.6	0.50	--	--
9 410 191	Magnum 91	-91 ... +250	$\pm 0.05$ ... $\pm 0.2$	VFD LCD / $\pm 0.01$	3.0	4.6	4.5	4.3	2.0	0.5

All data refers to the nominal voltage of 230 V, nominal frequency of 50 Hz (respectively 400 V, 3Ph., 50 Hz) and ambient temperature of +20 °C. Cooling capacity measured at max. pump stage. All pump data refers to a bath fluid with a specific density of 1 kg/dm<sup>3</sup>.



Magnum 91

### Applications

Reactor systems, pilot plant, Kilo labs, polymerization, polycondensation, mini plants, vacuum chambers, space and atmospheric research

## Magnum 91

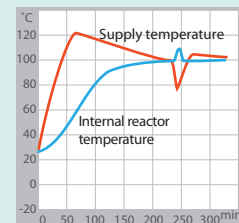
high-performance dynamic temperature control system

Magnum 91 has all the advantages of the Presto® PLUS series, but with additional features for external temperature control applications:

- Extra power for reactors up to 50 liters or similar applications
- Expanded working temperature range from -91 to +250 °C
- High heating and cooling capacity
- Powerful pump
- IP class according to IEC 60529: IP20
- Two-stage, water-cooled refrigeration system

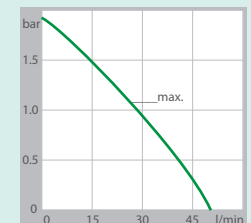
### Reaction compensation

Exothermic, 30 L reactor



### Pump capacity

Bath fluid: Thermal HL



Heating capacity kW	Pump capacity Flow rate l/min.	Pressure bar	Cooling of compressor	Filling volume liters	Filling volume expansion vessel liters	Dimensions W x L x H cm
1.8	16 ... 30	0.5 ... 1.6	1-stage, air-/water-cooled	3.7	2.2	50 x 59 x 64
1.8	16 ... 30	0.5 ... 1.6	1-stage, air-cooled	5.7	5.2	40 x 55 x 127
6.0	16 ... 30	0.7 ... 2.2	1-stage, water-cooled	13.5	4.9	40 x 55 x 127
6.0	30 ... 50	0.8 ... 1.9	2-stage, water-cooled	21.5	13	71 x 88 x 165



Control unit M1 |

| HT30 Circulator

## Forte HT

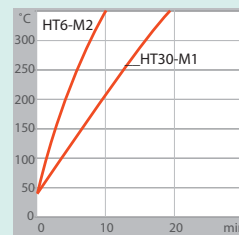
for working temperature range +70 to +400 °C

High temperature circulators of the Forte HT series are designed for temperature control in closed external systems. These compact units have a closed design that prevents the escape of oil vapors even at high temperatures.

- High heating capacity up to 7 kW of power for fast heat-up times
- Strong pump capacity, adjustable (with optional adapter)
- Small filling volume
- Cooling water connection when working at high temperatures
- Wide working temperature range without changing of bath fluids
- Prolonged lifetime of bath fluid
- Integrates easily into mini plant installations

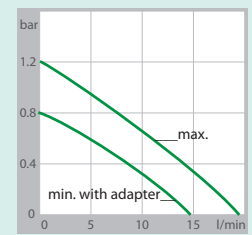
### Heat-up time

Bath fluid: Thermal H350



### Pump capacity

Bath fluid: Thermal H350



JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Temp. display/ Resolution °C	Display filling volume	Heating capacity kW
9 800 031	HT30-M1	+70 ... +400	±0.01 ... ±0.1	LED LCD / ±0.1	VFD Display	3
9 800 062	HT60-M2	+70 ... +400	±0.01 ... ±0.1	LED LCD / ±0.1	VFD Display	7
9 800 063	HT60-M3	+70 ... +400	±0.01 ... ±0.1	LED LCD / ±0.1	VFD Display	6
9 800 035	HT30-M1-C.U.	+40 ... +400	±0.01 ... ±0.1	LED LCD / ±0.1	VFD Display	3
9 800 065	HT60-M2-C.U.	+40 ... +400	±0.01 ... ±0.1	LED LCD / ±0.1	VFD Display	7
9 800 066	HT60-M3-C.U.	+40 ... +400	±0.01 ... ±0.1	LED LCD / ±0.1	VFD Display	6



Control unit M2 |

| HT60 Circulator  
with C.U. cooling unit

## Forte HT with cooling unit

for working temperature range +40 to +400 °C

The Forte HT models with C.U. cooling unit are suitable for temperature control tasks at +40 °C and above. Running tap water through the cooling unit permits rapid cool-down across the entire temperature range. As a result, exothermic reactions can be immediately counteracted, even at high temperatures.

### Additional benefit of models with C.U. cooling unit:

- Controlled cooling water supply for temperature applications from +40 °C
- High cooling capacities up to 15 kW (at +20 °C cooling water)
- Rapid cooling
- Rapid temperature control of exothermic and endothermic reactions

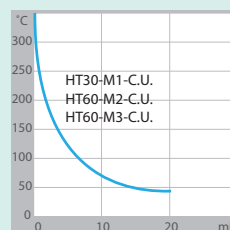
### Connections Control unit

- ① RS232 / RS485
- ② Analog input
- ③ Standby input
- ④ Alarm output
- ⑤ Connector for control cable to HT Circulator



### Cool-down time

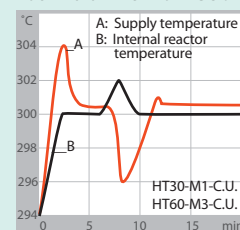
Bath fluid: Thermal H350



### Reaction compensation

5 liter reactor

Bath fluid: Thermal H350



Cooling capacity (Water +20 °C) kW, max.	Pump capacity		Filling volume liters	Power requirement V / Hz	Dimensions Circulator (W x L x H) cm	Dimensions Control unit (W x L x H) cm
	Flow rate l/min.	Pressure bar				
--	14 ... 18	0.8 - 1.2	2	230 / 50 or 230 / 60	23 x 23 x 58	25 x 25 x 18
--	14 ... 18	0.8 - 1.2	2	3 x 400 / 50	23 x 23 x 58	25 x 25 x 18
--	14 ... 18	0.8 - 1.2	2	3 x 208 / 60	23 x 23 x 58	25 x 25 x 18
15	14 ... 18	0.8 - 1.2	2	230 / 50 or 230 / 60	43 x 23 x 58	25 x 25 x 18
15	14 ... 18	0.8 - 1.2	2	3 x 400 / 50	43 x 23 x 58	25 x 25 x 18
15	14 ... 18	0.8 - 1.2	2	3 x 208 / 60	43 x 23 x 58	25 x 25 x 18





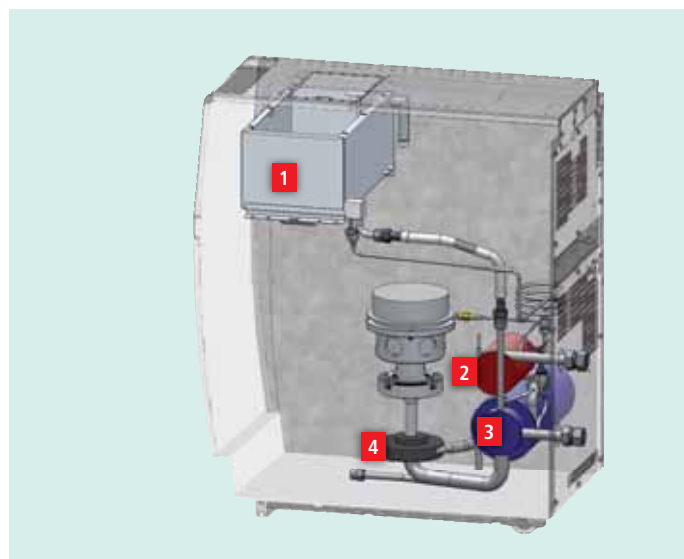
# Practical Benefits and Useful Tips



## The Power of Thermodynamics

Each JULABO Temperature Control System is a unified package of intelligent control electronics, adaptive heating output, refined refrigeration engineering, and optimized fluid dynamics. The end result is maximum efficiency and high temperature stability. Cooling power adjusts to the actual requirements of the application. Stepper-motor expansion valves with cutting-edge control technologies achieve high power density and efficiency. Highly Dynamic Temperature Control Systems are additionally characterized by a closed-loop design.

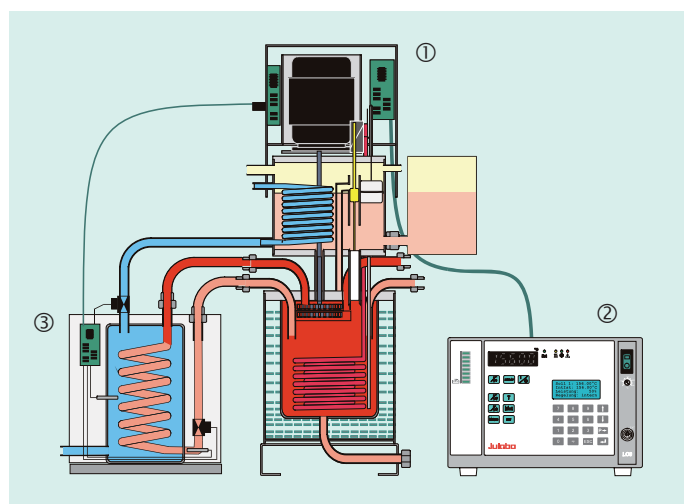
**The PRESTO® Principle:** Expansion vessel ①, Heat exchanger Heating section ②, Heat exchanger Refrigeration section ③, Circulating pump ④



## Forte HT with cooling unit

Forte HT high-temperature circulators are designed for applications that require very high temperatures, as high as +400 °C. Thanks to their closed-loop design, they emit no oil odor, even at high temperatures. These units have automated heat-up, filling, and degassing features.

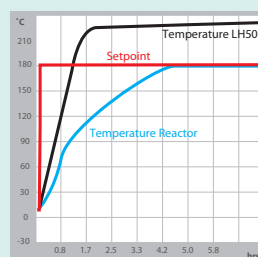
The figure at right shows the major components of high-temperature circulators, with complete separation of circulator ①, control electronics ②, and C.U. cooling unit ③.



## Presto® PLUS LH50 with 30-liter glass reactor

In this case study, a heat-up cycle was completed in the temperature range of +20 to +180 °C. Performance results were recorded using *EasyTEMP Professional* software.

Test results show that the LH50 can heat up the reactor from +20 to +180 °C within 4.2 hours. In order to demonstrate the control capabilities, the LH50's internal temperature was limited to a maximum of +215 °C (TCF).

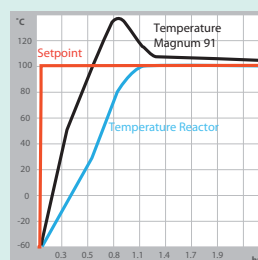


Heat-up time

## Magnum 91 with 20-liter glass reactor

Performance was determined with one heat-up and one cool-down cycle across the temperature range of -60 to +100 °C. Results were recorded using *EasyTEMP Professional* software.

Test results show that the Magnum 91 can heat up the reactor from -60 to +100 °C within 1.1 hours. A band limit ensures that the temperature differential between the reactor and the Magnum 91 will not exceed a pre-set limit.



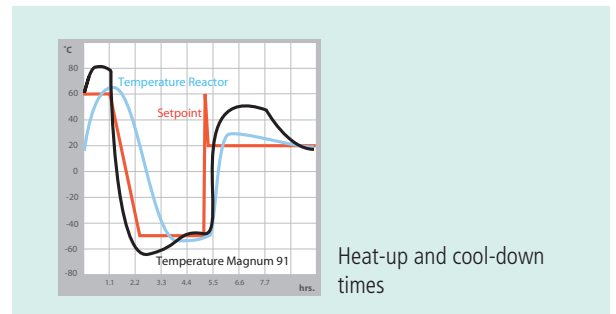
Heat-up time



## Magnum 91 with 35-liter glass reactor

In this case, performance was determined with several heat-up and cool-down cycles across temperature ranges. A separate test determined the lowest achievable temperature. Results were recorded using *EasyTEMP Professional* software.

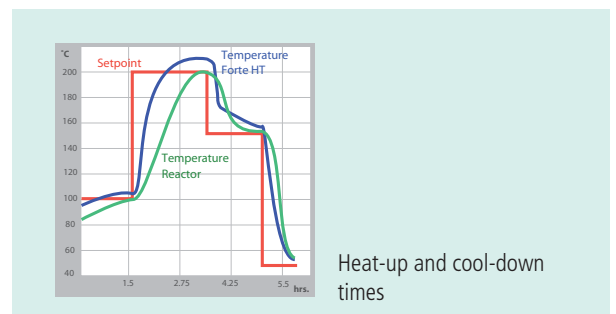
The test showed that the Magnum 91 can cool down the reactor from +60 to -50 °C in a period of 2.05 hours. The lowest temperature achieved in the reactor was -69 °C.



## Forte HT with 30-liter glass reactor

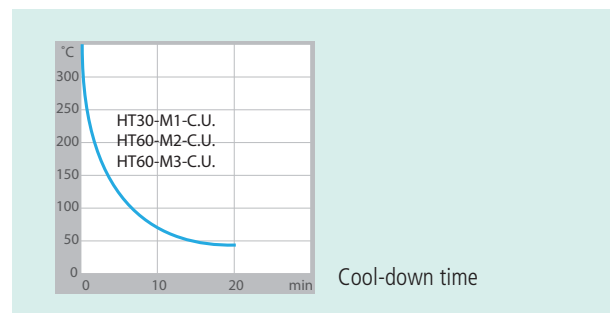
In order to determine the efficiency of the C.U. cooling unit, a cool-down cycle was completed within a temperature range of +200 to +150 °C.

The test results reveal a highly precise, aperiodic stabilization of the application temperature at the selected setpoint. The cooling unit achieves cool-down rates of up to +16 °C/minute.



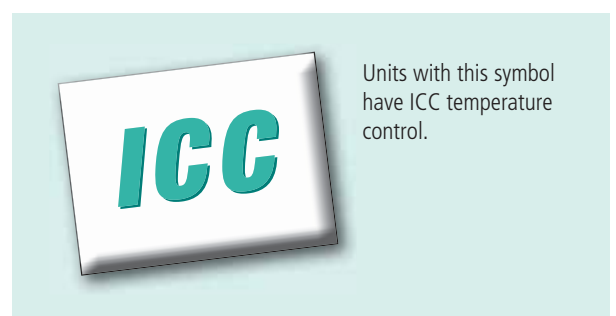
## Rapid cool-down with Forte HT

The C.U. cooling unit can be used for very rapid cool-down times or to quickly counteract exothermic reactions.



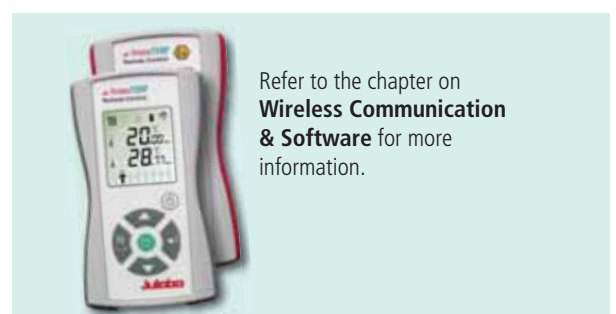
## Professional features, easy to use: Highly precise control technology

Intelligent Cascade Control (ICC) ensures precision control even with the most challenging applications. The electronics automatically optimize and adapt the control parameters to the application at hand.



## Wireless Instruments management

The new *WirelessTEMP*® products enable wireless monitoring and operation of JULABO temperature control instruments via a PC or the remote control unit. The benefits are many, including time savings, greater flexibility in selecting where to put the unit, and less hassle running cables, which ultimately saves money.



## Individual Solutions for Your Application



JULABO is ready to provide customized solutions for unique requirements. PRESTO® units can be customized in the following ways:

### More power

Do you need a bit more pumping or heating power than a standard PRESTO®? No problem. Just tell us the hydraulic operating point of your application and JULABO will install a suitable pump. Or tell us how fast you need to heat up your application. JULABO will calculate the required heating capacity and provide the right heater.

### Higher cooling capacity

Does your application require greater cooling capacity at a specific operating point? Simply define the cooling capacity and the operating point and JULABO will create a custom PRESTO® with precisely the amount of cooling capacity your application requires.

### Special heat exchangers

Do you prefer water-cooled units but only have access to aggressive cooling water? JULABO can install a very robust heat exchanger in your unit.

### Special temperature sensors

We can provide external Pt100 sensors according to your specifications. Tell us the length and diameter of the sensor as well as the length of the connection cable. We will be happy to help you select the right accuracy class.

### Custom connections and adapters

If you need custom adapters in order to connect one of our units to your application, simply give us the specifications and we'll make the right one for you!

### Integration into an automated environment

Do you have data-transmission requirements in order to integrate a PRESTO® into your existing system? JULABO can implement your protocol for seamless integration into your system.

### Special environmental conditions

Do you need to set up your PRESTO® in a difficult environment or even outdoors?

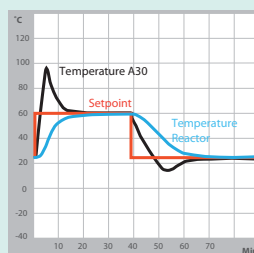
We can advise during the design phase and make a PRESTO® suitable for your environment.



## PRESTO® A30 with 1.3-liter glass reactor

Cooling and heating performance were tested by connecting a PRESTO® A30 to a 1.3-liter glass reactor via two lengths of 1.0 m metal tubing. The A30 was programmed to heat and cool between the setpoints +25 °C and +60 °C. Results were recorded using *EasyTEMP Professional* software.

The test shows that the A30 can heat up the reactor in 30 minutes without overshooting. The cool-down process required 40 minutes, again without overshooting.

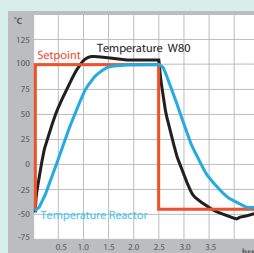


Heat-up and cool-down times

## PRESTO® W80 with 10-liter glass reactor

Cooling and heating performance were tested by connecting a PRESTO® W80 to a 10-liter glass reactor via two lengths of 1.0 m metal tubing. The W80 was programmed to heat and cool between the setpoints -50 °C and +100 °C. Results were recorded using *EasyTEMP Professional* software.

The test shows that the W80 can heat up the reactor in 2 hours without overshooting. The cool-down process required 2.5 hours without overshooting.



Heat-up and cool-down times

## PRESTO® – Your benefits

### Space-saving design optimizes space utilization in your lab

When evaluating a temperature system's space requirement, it is important to consider more than just the footprint. You must also consider all necessary connections and circulation of the ambient air. On the space-optimized PRESTO® systems you will find connections and air slits on the front and rear sides only. This saves a significant amount of space because other laboratory instruments or system components can be placed directly next to the PRESTO® units.



Space saving design  
JULABO units can line up close to each other.

## PRESTO® – Your benefits

### Water-cooled units with durable heat exchangers

Water-cooled units must be connected to an existing cooling water line. In the new PRESTO® units, water cooling is provided by robust, non-wearing heat exchangers. Clogging of the heat exchanger by particles or impure water is virtually eliminated.



Non-wearing, robust heat exchanger





Useful PRESTO® accessories

# VFCpro

Measure and control flow  
Determine calorimetry



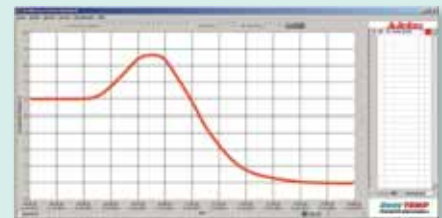
## Flow measurement and control

- For scientific and industrial tests and experiments
- Determine the flow rate through an application (e. g. jacketed reactor).
- Real-time measurement of heating/cooling capacity (kW)
- Real-time measurement of flow rate (l/min)
- Working temperature range -100 °C ...+300 °C
- Real-time measurement of calorimetric work (kWh)
- Flow rate control for maintaining a constant flow while simultaneously controlling temperature



## Practical calorimetry

- Examine the kinetics and dynamics of reactive syntheses and crystallization
- For scientific examination of heating quantities
- For scale-up from laboratory quantities to kilogram quantities or production scale



Real-time measurement of heating and cooling capacity



The flow value measured by VFCpro and the calorimetric values calculated by PRESTO® are shown directly on the PRESTO® display.





## VFCpro measurement accuracy and PRESTO®

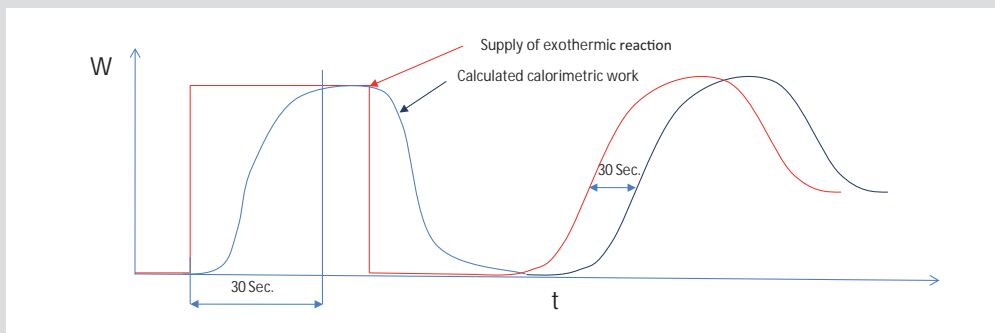
VFCpro and PRESTO® measure flow rate with an accuracy of 0.8 to 1.5 %. This corresponds to a flow of approximately 0.4 to 0.75 l/min.

The accuracy of calorimetric measurements depends on the following factors:

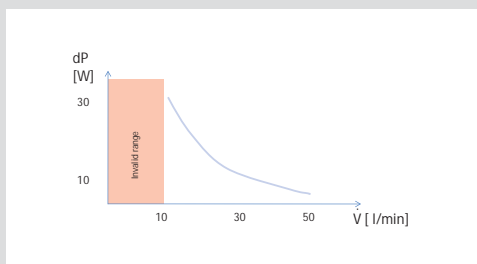
- Correct specification of heat capacities of the chosen bath fluids  
**Please note:** The correct specifications of the bath fluids Thermal HL40, Thermal HL45, and Thermal HL80 are stored in the PRESTO® settings. The user can store specifications of other bath fluids at any time.
- Quality of sensor taring at the beginning of each measurement  
**Please note:** Taring that is inaccurate by 0.1 K can lead to a measurement error of approximately 80 Watts (example measurement with a flow rate of 20 l/min with Thermal HL45 bath fluid).
- Absolute introduced energy  
**Please note:** The higher the value of the introduced energy, the smaller the relative error.
- Mass flow of bath fluid  
**Please note:** For measurements with VFCpro and PRESTO® the flow rate must be at least 10 l/min (VFCpro-24) or 20 l/min (VFCpro-38).



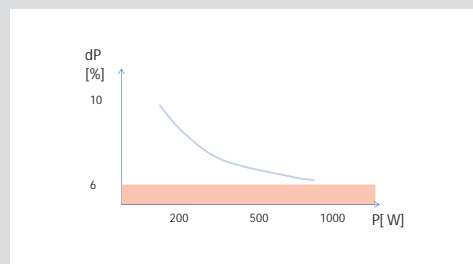
### Measurements with VFCpro-24



Time curve of a measurement with VFCpro-24 and PRESTO®. The dynamic error contribution is caused by the filtering of measured values.



Static error contribution in dependence of the flow rate.



Relative error contribution at static load.

## The JULABO Calorimetric Principle

$$\text{Heating Capacity} = \text{Mass Flow}^{(1)} * \text{Constant}^{(2)} * \text{Temperature Differential}^{(3)}$$

- <sup>(1)</sup> The mass flow is measured directly by the VFCpro.
- <sup>(2)</sup> Heat capacities for certain bath fluids are stored in the PRESTO® settings. Individual values can be entered directly on the PRESTO®.
- <sup>(3)</sup> The differential temperature is tared (set to `0`) at the beginning of the measurement with no load. PRESTO® measures the temperature differential directly during the measurement.



### VFC installation notes

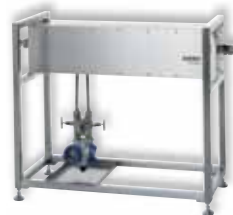
The user must verify compliance with the following criteria in order to ensure maximum accuracy of the VFC:

Observe all included installation requirements

- Piping inner diameter: 24 mm
- Minimum pipe length on inlet side: >1000 mm  
**Please note:** The pipe on the inlet side establishes laminar flow of the bath fluid.
- Minimum pipe length on outlet side: >170 mm
- Flange plates for pipe connections according to IEC 61518



### VFC and VFCpro Overview



Accessories	VFC	VFCpro-24	VFCpro-38
Working temperature range	-100 ... +300 °C	-100 ... +300 °C	-100 ... +300 °C
Flow rate max.	50 l/min	50 l/min	100 l/min
Connection	- -	M24x1.5 male	M38x1.5 male
Power requirement	10.5...45 VDC	10.5...45 VDC	10.5...45 VDC
Output	4...20 mA	4...20 mA	4...20 mA
Electric connection	Circular plug, 4-pin	Circular plug, 4-pin	Circular plug, 4-pin
Weight	10.5 kg	42.7 kg	42.0 kg
Dimensions W x L x H	22 x 24 x 46 cm	102.3 x 42 x 76 cm	95 x 42 x 76 cm
<b>JULABO Order No.</b>	<b>8 980 782</b>	<b>8 980 762</b>	<b>8 980 764</b>



For the new PRESTO® series

# Accessories





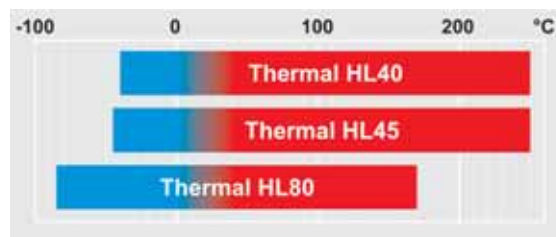


## JULABO Thermal Bath fluids for the new PRESTO®

### Benefits

- Wide temperature ranges
- Low viscosity
- High stability
- Good heat conductivity
- Minimum odor
- Low corrosion tendency
- Low toxicity
- Long shelf life

Working temperature ranges

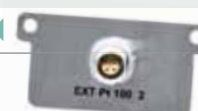
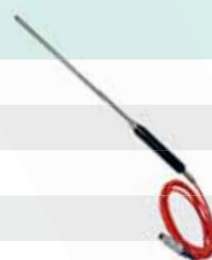


JULABO Description		Thermal HL40	Thermal HL45	Thermal HL80
<b>JULABO Order No.</b>	<b>10 liters</b> <b>5 liters</b>	<b>8 940 136</b> <b>8 940 137</b>	<b>8 940 122</b> <b>8 940 123</b>	<b>8 940 120</b> <b>8 940 121</b>
Working temperature range	°C	-40 ... +250	-45 ... +250	-85 ... +170
Flash point	°C	+124	>+121	>+63
Fire point	°C	+142	>+162	>+112
Viscosity, kinetic	mm <sup>2</sup> /s	<4 at +20 °C	7.5 at 0 °C	5 at 0 °C
Density at +20 °C	g/cm <sup>3</sup>	0.93	0.92	0.9
Pour point	°C	-100	<-96	<-108
Boiling point	°C	>+300	>+275	>+200
Ignition temperature	°C	>+400	>+420	>+420
Color		clear	clear	clear



## External Pt100 sensors

JULABO Order No.	Description	Suitable for
<b>8 981 003</b>	200 x 6 mm dia., stainless steel, 1.5 m cable	PRESTO®
<b>8 981 006</b>	20 x 2 mm dia., stainless steel, 1.5 m cable	PRESTO®
<b>8 981 010</b>	300 x 6 mm dia., stainless steel, 1.5 m cable	PRESTO®
<b>8 981 017</b>	200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	PRESTO®
<b>8 981 015</b>	300 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	PRESTO®
<b>8 981 013</b>	600 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	PRESTO®
<b>8 981 016</b>	900 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	PRESTO®
<b>8 981 014</b>	1200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	PRESTO®
<b>8 981 021</b>	M+R in-line Pt100 sensor, 2 fittings M24x1.5 male, 1.5 m cable	PRESTO®
<b>8 981 022</b>	M+R in-line Pt100 sensor, 2 fittings M30x1.5 male, 1.5 m cable	PRESTO®
<b>8 981 023</b>	M+R in-line Pt100 sensor, 2 fittings M38x1.5 male, 1.5 m cable	PRESTO®
<b>8 981 103</b>	Extension cable 3.5 m for Pt100 sensor	PRESTO®
<b>8 900 106</b>	Module with Pt100 connection socket for second external Pt100 sensor	A40, W40, A80, W80, W91, W92







### Metal tubing flexible, triple insulated, -100 to +350 °C

JULABO Order No.	Description	Suitable for
8 930 261	1.0 m Metal tubing, 2 fittings M24x1.5 female	PRESTO®
8 930 262	1.5 m Metal tubing, 2 fittings M24x1.5 female	PRESTO®
8 930 263	2.0 m Metal tubing, 2 fittings M24x1.5 female	PRESTO®
8 930 264	3.0 m Metal tubing, 2 fittings M24x1.5 female	PRESTO®
8 930 271	1.0 m Metal tubing, 2 fittings M30x1.5 female	PRESTO®
8 930 272	1.5 m Metal tubing, 2 fittings M30x1.5 female	PRESTO®
8 930 273	2.0 m Metal tubing, 2 fittings M30x1.5 female	PRESTO®
8 930 274	3.0 m Metal tubing, 2 fittings M30x1.5 female	PRESTO®
8 930 275	5.0 m Metal tubing, 2 fittings M30x1.5 female	PRESTO®
8 930 282	1.5 m Metal tubing, 2 fittings M38x1.5 female	PRESTO®
8 930 283	2.0 m Metal tubing, 2 fittings M38x1.5 female	PRESTO®
8 930 284	3.0 m Metal tubing, 2 fittings M38x1.5 female	PRESTO®
8 930 285	5.0 m Metal tubing, 2 fittings M38x1.5 female	PRESTO®



### Interfaces / Software & Hardware

JULABO Order No.	Description	Suitable for
8 900 105	Electronic module with analog connectors (Input, Output, Standby-In)	PRESTO®
8 900 020	Profibus DP Interface	PRESTO®
8 900 024	RS485 Interface	PRESTO®
8 980 771	Pressure sensor, 2 fittings M24x1.5 male (-95 ... +250 °C)	PRESTO®
8 980 772	Pressure sensor, 2 fittings M30x1.5 male (-95 ... +250 °C)	PRESTO®
8 980 773	Pressure sensor, 2 fittings M38x1.5 male (-95 ... +250 °C)	PRESTO®
8 970 815	Sight glass, -100...+280 °C, PN16/Class 230, 2 fittings M30x1.5 male	PRESTO®
8 900 500	<i>WirelessTEMP</i> Remote Control	PRESTO®
8 900 505	<i>WirelessTEMP</i> Remote Control, ATEX Version	PRESTO®
8 900 540	<i>WirelessTEMP</i> USB Stick	PRESTO®
8 900 530	<i>WirelessTEMP</i> Router for extending wireless range	PRESTO®
8 901 102	<i>EasyTEMP</i> Software (free of charge at <a href="http://www.julabo.de">www.julabo.de</a> )	PRESTO®
8 901 105	<i>EasyTEMP</i> Professional Software, incl. USB-Dongle	PRESTO®



### VFCpro Measure & control flow, determine calorimetry

JULABO Order No.	Description	Suitable for
8 980 782	VFC	A40, A80, W40, W80, W91, W92
8 980 762	VFCpro-24	A40, A80, W40, W80
8 980 764	VFCpro-38	W91, W92





## Adapters / Valves / Connectors, etc.

JULABO Order No.	Description	Suitable for
8 890 110	Adapter M24x1.5 male to M24x1.5 male	PRESTO® 
8 890 111	Adapter M30x1.5 male to M30x1.5 male	PRESTO®
8 890 112	Adapter M38x1.5 male to M38x1.5 male	PRESTO®
8 890 120	2 Elbow fittings 90°, M24x1.5 female/male	PRESTO® 
8 890 121	2 Elbow fittings 90°, M30x1.5 female/male	PRESTO®
8 890 122	2 Elbow fittings 90°, M38x1.5 female/male	PRESTO®
8 890 034	2 Adapters M30x1.5 female to M16x1 male, stainless steel	PRESTO®
8 890 035	2 Adapters M30x1.5 male to M16x1 male, stainless steel	PRESTO®
8 890 052	2 Adapters M24x1.5 female to M16x1 male	PRESTO® 
8 890 053	2 Adapters M24x1.5 female to NPT 1/4" female	PRESTO®
8 890 054	2 Adapters M24x1.5 female to NPT 3/8" female	PRESTO® 
8 890 055	2 Adapters M24x1.5 female to NPT 1/2" female	PRESTO®
8 890 056	2 Adapters M24x1.5 female to NPT 3/4" female	PRESTO® 
8 890 057	2 Adapters M24x1.5 female to NPT 1" female	PRESTO®
8 890 058	2 Adapters M24x1.5 female to NPT 1/4" male	PRESTO®
8 890 059	2 Adapters M24x1.5 female to NPT 3/8" male	PRESTO®
8 890 060	2 Adapters M24x1.5 female to NPT 1/2" male	PRESTO®
8 890 061	2 Adapters M24x1.5 female to NPT 3/4" male	PRESTO® 
8 890 062	2 Adapters M24x1.5 female to NPT 1" male	PRESTO®
8 890 063	2 Adapters M24x1.5 female to tube 1/4"	PRESTO®
8 890 064	2 Adapters M24x1.5 female to tube 3/8"	PRESTO®
8 890 065	2 Adapters M24x1.5 female to tube 1/2"	PRESTO®
8 890 066	2 Adapters M24x1.5 female to tube 1"	PRESTO®
8 890 067	2 Adapters M24x1.5 female/M24x1.5 female	PRESTO®
8 890 068	2 Adapters M24x1.5 female/M30x1.5 male	PRESTO®
8 890 069	2 Adapters M24x1.5 male/M30x1.5 female	PRESTO®
8 890 070	2 Adapters M24x1.5 female/M30x1.5 female	PRESTO®
8 890 071	2 Adapters M24x1.5 male/M16x1 female	PRESTO® 
8 890 080	2 Adapters M30x1.5 female/M38x1.5 male	PRESTO®
8 890 081	2 Adapters M30x1.5 male/M38x1.5 female	PRESTO®
8 890 082	2 Adapters M30x1.5 female/M38x1.5 female	PRESTO®
8 890 083	2 Adapters M30x1.5 female to NPT 3/4" male	PRESTO®
8 890 084	2 Adapters M30x1.5 female to NPT 3/4" female	PRESTO®
8 890 085	2 Adapters M30x1.5 female to NPT 1" male	PRESTO®
8 890 086	2 Adapters M30x1.5 female to NPT 1" female	PRESTO®
8 890 087	2 Adapters M30x1.5 female to tube 1"	PRESTO®
8 890 088	2 Adapters M30x1.5 female/M30x1.5 female	PRESTO®
8 890 089	2 Adapters M38x1.5 female/M38x1.5 female	PRESTO®
8 890 100	2 Adapters M38x1.5 female to NPT 1" male	PRESTO®
8 890 101	2 Adapters M38x1.5 female to NPT 1" female	PRESTO®
8 890 102	2 Adapters M38x1.5 female to NPT 1 1/4" male	PRESTO®
8 890 103	2 Adapters M38x1.5 female to NPT 1 1/4" female	PRESTO®
8 890 104	2 Adapters M38x1.5 female to tube 1"	PRESTO®
8 890 130	Twin distributing adapter M24x1.5, isolated, 1x M24x1.5 female to 2x M24x1.5 male	PRESTO®
8 890 131	Quad distributing adapter M24x1.5, isolated, 1x M24x1.5 female to 4x M24x1.5 male	PRESTO®

JULABO Order No.	Description	Suitable for
8 890 132	Twin distributing adapter M30x1.5, isolated, 1x M30x1.5 female to 2x M30x1.5 male	PRESTO®
8 890 133	Quad distributing adapter M30x1.5, isolated, 1x M30x1.5 female to 4x M30x1.5 male	PRESTO®
8 890 134	Twin distributing adapter M38x1.5, isolated, 1x M38x1.5 female to 2x M38x1.5 male	PRESTO®
8 890 135	Quad distributing adapter M38x1.5, isolated, 1x M38x1.5 female to 4x M38x1.5 male	PRESTO®
8 890 140	Twin distributing adapter M24x1.5, 1x M24x1.5 female to 2x M24x1.5 male	PRESTO®
8 890 141	Quad distributing adapter M24x1.5, 1x M24x1.5 female to 4x M24x1.5 male	PRESTO®
8 890 142	Twin distributing adapter M30x1.5, 1x M30x1.5 female to 2x M30x1.5 male	PRESTO®
8 890 143	Quad distributing adapter M30x1.5, 1x M30x1.5 female to 4x M30x1.5 male	PRESTO®
8 890 144	Twin distributing adapter M38x1.5, 1x M38x1.5 female to 2x M38x1.5 male	PRESTO®
8 890 145	Quad distributing adapter M38x1.5, 1x M38x1.5 female to 4x M38x1.5 male	PRESTO®
8 970 495	2 Collar nuts M24x1.5	PRESTO®
8 970 496	2 Collar nuts M30x1.5	PRESTO®
8 970 497	2 Collar nuts M38x1.5	PRESTO®
8 970 851	Shut-off valve M24x1.5 female/male, -40 °C ... +200 °C	A30, A40, W40, A80, W80
8 970 852	Shut-off valve M30x1.5 female/male, -40 °C ... +200 °C	PRESTO® A40
8 970 853	Shut-off valve M38x1.5 female/male, -30 °C ... +200 °C	PRESTO® A30



### External expansion vessels

JULABO Order No.	Description	Suitable for
8 970 832	External expansion vessel, 3 liters	A30, A40, W40
8 970 833	External expansion vessel, 3 liters	A80, W80



### Filter mats

JULABO Order No.	Description	Suitable for
8 970 920	Filter mat	A30
8 970 921	Filter mat	A40
8 970 922	Filter mat	A80

### Cooling water connection

JULABO Order No.	Description	Suitable for
8 930 312	1 m Reinforced tubing (pressure proof) ½" inner dia.	W40, W80
8 970 482	2 Tube clamps	W40, W80
8 920 000	Particle filter for cooling water circuit	W40, W80, W91, W92



### Connection plugs

JULABO Order No.	Description	Suitable for
8 980 131	External Pt100 connector	PRESTO®
8 980 133	Standby connector 3 pin	PRESTO® with electronic module 8 900 105
8 980 135	Alarm connector 5 pin	PRESTO®
8 980 136	REG+EPROG connector 6 pin	PRESTO® with electronic module 8 900 105



For Presto® PLUS, Magnum 91, Forte HT

# Accessories



## JULABO Thermal Bath fluids

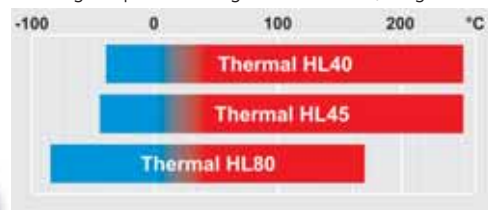
JULABO Thermal bath fluids are carefully selected and subjected to long-term testing. They are ideally suited to temperature control tasks in specialized systems and help ensure safe and reliable operation. Selection of a suitable bath fluid is of critical importance for achieving the best possible results. Viscosity, oxidation properties, and heat conductivity of Thermal bath fluids are specially adapted for use with JULABO temperature control units.

### Benefits

- Wide temperature ranges
- Low viscosity
- High stability
- Good heat conductivity
- Minimum odor
- Low corrosion tendency
- Low toxicity
- Long shelf life



Working temperature ranges Presto® PLUS, Magnum 91



Forte HT working temperature ranges



JULABO Description		Thermal HL40	Thermal HL45	Thermal HL80	Thermal H250S	Thermal H250	Thermal H335 <sup>1)</sup>	Thermal H350
JULABO Order No.	10 liters 5 liters	8 940 136 8 940 137	8 940 122 8 940 123	8 940 120 8 940 121	8 940 132 8 940 133	8 940 116 8 940 117	8 940 130 8 940 131	-- 8 940 111

### Models/Working temperature ranges and specifications

Model	Unit	Thermal HL40	Thermal HL45	Thermal HL80	Thermal H250S	Thermal H250	Thermal H335 <sup>1)</sup>	Thermal H350
Presto® PLUS, Magnum 91	°C	-40 ... +250	-45 ... +250	-85 ... +170	not suitable	not suitable	not suitable	not suitable
Forte HT		not suitable	not suitable	not suitable	+20 ... +250	+80 ... +250	+30 ... +335	+50 ... +350
Flash point	°C	+124	>+121	>+63	+230	+292	+184	+210
Fire point	°C	+142	>+162	>+112	+274	+334	+212	+235
Viscosity, kinetic	mm <sup>2</sup> /s	<4 at 20 °C	7.5 at 0 °C	5 at 0 °C	<51.5 at +20 °C	84 at +20 °C	122.45 at +20 °C	47.1 at +20 °C
Density at +20 °C	g/cm <sup>3</sup>	0.93	0.92	0.9	0.97	1.07	1.013	1.04
Pour point	°C	-100	<-96	<-108	-70	-50	-32	<-34
Boiling point	°C	>+300	>+275	>+200	>+315	>+300	+359	+390
Ignition temperature	°C	>+400	>+420	>+420	>+400	>+400	+373	+450
Color		clear	clear	clear	light brown	clear	light yellow	clear

<sup>1)</sup>Therminol® 66, trademark of Solutia, Inc.



*Conveniently*  
operate and manage  
your instruments!

**WirelessTEMP®**  
Wireless Instrument Management!



## External Pt100 sensors

JULABO Order No.	Description	Suitable for
8 981 003	200 x 6 mm dia., stainless steel, 1.5 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 006	20 x 2 mm dia., stainless steel, 1.5 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 010	300 x 6 mm dia., stainless steel, 1.5 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 017	200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 015	300 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 013	600 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 016	900 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 014	1200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® PLUS, Magnum 91, Forte HT
8 981 020	M+R in-line Pt100 sensor, 2 fittings M16x1 male	Presto® PLUS, Forte HT
8 981 103	Extension cable 3.5 m for Pt100 sensor	Presto® PLUS, Magnum 91, Forte HT



## Accessories for Presto® PLUS and Magnum 91

JULABO Order No.	Description	Suitable for
8 920 000	Particle filter for cooling water cycle (for water-cooled models)	Presto® PLUS LH46/50, Magnum 91
8 910 041	Castor with 2 locks (W x L x H: 56 x 47.5 x 12.5 cm)	Presto® PLUS LH46
8 970 830	Expansion vessel 2 liters	Presto® PLUS LH46
8 970 831	Expansion vessel 5 liters	Presto® PLUS LH47/50
8 980 127	Extension cable 5 m for remote device RD	Presto® PLUS
8 920 054	Earthquake anchors	Presto® PLUS LH47/50
8 920 055	Earthquake anchors	Magnum 91



## Accessories for Forte HT

JULABO Order No.	Description	Suitable for
9 790 100	C.U. cooling unit	Forte HT
8 970 802	Adapter for pump pressure reduction (0.8 bar)	Forte HT
8 970 811	Level indicator (with sight glass)	Forte HT
8 970 435	Handle for stand rod attachment	Forte HT
8 970 801	Expansion vessel	Forte HT
8 980 125	Extension cable 5 m (control electronics for HT circulator)	Forte HT
8 980 704	Solenoid valve for cooling water with 2 m tubing 8 mm inner dia.	Forte HT (without C.U. cooling unit)



## Software & hardware for device control / interfaces

Refer to chapter "Wireless Communication & Software" for software and hardware accessories



## Metal tubing

JULABO Order No.	Description	Suitable for
<b>Metal tubing flexible, triple insulated, -100 to +350 °C</b>		
8 930 209	0.5 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
8 930 210	1.0 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
8 930 211	1.5 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
8 930 214	3.0 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
<b>Metal tubing flexible, insulated, -50 to +200 °C</b>		
8 930 220	0.5 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
8 930 221	1.0 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
8 930 222	1.5 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
8 930 223	3.0 m Metal tubing, 2 fittings M16x1 female	Presto® PLUS, Forte HT
<b>Accessories for connecting metal tubing</b>		
8 970 443	Adapter M16x1 male to M16x1 male	Presto® PLUS, Forte HT
8 970 750	Icing protection sleeve for pump connectors	Presto® PLUS, Magnum 91
<b>Metal tubing for Magnum 91, flexible, triple insulated -100 to +350 °C</b>		
8 930 261	1.0 m Metal tubing, 2 fittings M24x1.5 female	Magnum 91
8 930 262	1.5 m Metal tubing, 2 fittings M24x1.5 female	Magnum 91
8 930 263	2.0 m Metal tubing, 2 fittings M24x1.5 female	Magnum 91
8 930 264	3.0 m Metal tubing, 2 fittings M24x1.5 female	Magnum 91

## Adapters / Valves / Connectors, etc.

JULABO Order No.	Description	Suitable for
8 970 457	Shut-off valve for loop circuit (-30 °C... +200 °C), M16x1	Presto® PLUS, Forte HT
8 970 490	2 Collar nuts M16x1 female	Presto® PLUS, Forte HT
8 970 442	2 Elbow fittings 90°, M16x1 female/male	Presto® PLUS, Forte HT
8 890 004	2 Adapters M16x1 female to NPT 1/4" male	Presto® PLUS, Forte HT
8 890 005	2 Adapters M16x1 female to NPT 1/4" female	Presto® PLUS, Forte HT
8 890 006	2 Adapters M16x1 female to NPT 3/8" male	Presto® PLUS, Forte HT
8 890 007	2 Adapters M16x1 female to NPT 3/8" female	Presto® PLUS, Forte HT
8 890 008	2 Adapters M16x1 female to NPT 1/2" male	Presto® PLUS, Forte HT
8 890 009	2 Adapters M16x1 female to NPT 1/2" female	Presto® PLUS, Forte HT
8 890 010	2 Adapters M16x1 male to NPT 1/4" female	Presto® PLUS, Forte HT
8 891 008	1 Adapter M16x1 male to BSP 1/2" female	Presto® PLUS, Forte HT
8 891 009	1 Adapter M16x1 male to BSP 3/4" female	Presto® PLUS, Forte HT
8 890 011	2 Adapters M16x1 female to tube 1/4" male	Presto® PLUS, Forte HT
8 890 012	2 Adapters M16x1 female to tube 3/8" male	Presto® PLUS, Forte HT
8 890 013	2 Adapters M16x1 female to tube 1/2" male	Presto® PLUS, Forte HT
8 890 024	2 Adapters M16x1 female to M16x1 female	Presto® PLUS, Forte HT
8 890 034	2 Adapters M30x1.5 female to M16x1 male, stainless steel	Presto® PLUS
8 890 035	2 Adapters M30x1.5 male to M16x1 male, stainless steel	Presto® PLUS

## Adapters / Valves / Connectors, etc. for Magnum 91

JULABO Order No.	Description	Suitable for
8 890 110	Adapter M24x1.5 male to M24x1.5 male	Magnum 91
8 890 120	2 Elbow fittings 90°, M24x1.5 female/male	Magnum 91
8 890 052	2 Adapters M24x1.5 female to M16x1 male	Magnum 91
8 890 053	2 Adapters M24x1.5 female to NPT 1/4" female	Magnum 91
8 890 054	2 Adapters M24x1.5 female to NPT 3/8" female	Magnum 91
8 890 055	2 Adapters M24x1.5 female to NPT 1/2" female	Magnum 91
8 890 056	2 Adapters M24x1.5 female to NPT 3/4" female	Magnum 91
8 890 057	2 Adapters M24x1.5 female to NPT 1" female	Magnum 91
8 890 058	2 Adapters M24x1.5 female to NPT 1/4" male	Magnum 91
8 890 059	2 Adapters M24x1.5 female to NPT 3/8" male	Magnum 91
8 890 060	2 Adapters M24x1.5 female to NPT 1/2" male	Magnum 91
8 890 061	2 Adapters M24x1.5 female to NPT 3/4" male	Magnum 91
8 890 062	2 Adapters M24x1.5 female to NPT 1" male	Magnum 91
8 890 065	2 Adapters M24x1.5 female to tube 1/2"	Magnum 91
8 890 066	2 Adapters M24x1.5 female to tube 1"	Magnum 91
8 970 851	Shut-off valve M24x1.5 female/male, -40 °C ... +200 °C	Magnum 91

## Connection plugs

JULABO Order No.	Description	Suitable for
8 980 131	External Pt100 connector	Presto® PLUS, Magnum 91, Forte HT
8 980 133	Standby connector 3 pin	Presto® PLUS, Magnum 91, Forte HT
8 980 135	Alarm connector 5 pin	Presto® PLUS, Magnum 91, Forte HT
8 980 136	REG+EPROG connector 6 pin	Presto® PLUS, Magnum 91, Forte HT
8 980 137	Stakei connector	Presto® PLUS

# Chill Environmentally Friendly and Economical

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## Recirculating Coolers

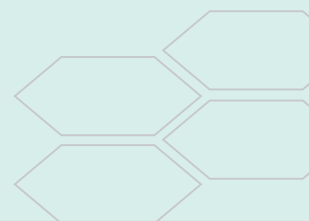
JULABO recirculating coolers can handle virtually any cooling requirements in laboratories or industrial environments. Their efficiency makes them an environmentally-friendly and economical alternative to cooling with tap water. Compact models from JULABO are ideal for placement on or underneath a laboratory bench. JULABO offers several powerful models with up to 20 kW of cooling capacity for applications in industrial environments.

### Exclusive to JULABO instruments

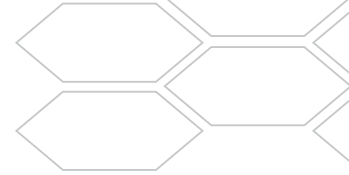
JULABO recirculating coolers have no ventilation slits on the side panels. This means that you can save space by placing several units directly next to each other.

- Environmentally-friendly operation with low energy consumption
- Ergonomic design and easy operation
- Working temperature range from -25 °C to +130 °C
- Cooling capacity of up to 20 kW
- Splash-proof keypad
- Large and bright LED display
- Alarm output (potential free contact) and RS232 interface on virtually all models
- Filling level indicator
- Higher-powered models equipped with a pressure gauge
- Circulating pumps with flow rates up to 80 l/min and pressure up to 6 bar
- Easy filling
- Drain tap easily accessible
- No side vents, instruments can be placed right next to each other
- Air- and water-cooled models available
- All wetted parts made of stainless steel or high grade plastic (except FC-T models)

*Environmentally-friendly savings*  
Cooling a three-liter rotary evaporator with tap water consumes as much water in one year as a four-person household!







## F / AWC models



### F Models

-10 °C ... +40 °C

3 models with 250, 500, and 1000 W of cooling capacity



Recirculating coolers of the F series are low-cost units designed especially for simple cooling tasks where reliability in continuous operation is a high priority.

### AWC100

+20 °C ... +40 °C

#### Air/water recirculating cooler



Ideal for simple cooling tasks: Model AWC100 will save you money and space.

## FL models



### FL Models

-20 °C ... +40 °C

22 models with up to 20 kW of cooling capacity for laboratory and industrial applications



The removable venting grid makes it easy to clean the condenser. As a result, the unit always delivers its full cooling capacity.

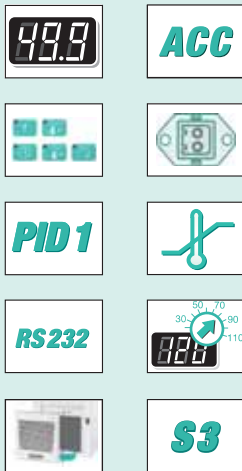
## FC models



### FC Models

-25 °C ... +80 °C

11 models for heating and cooling tasks  
Cooling capacity of up to 2.5 kW



**Pt100** on models FC1200T, FC1600T, FCW2500T

Sophisticated electronics with digital and analog connections for RS232, standby, alarm, external Pt100 sensor, temperature recorder, programming.



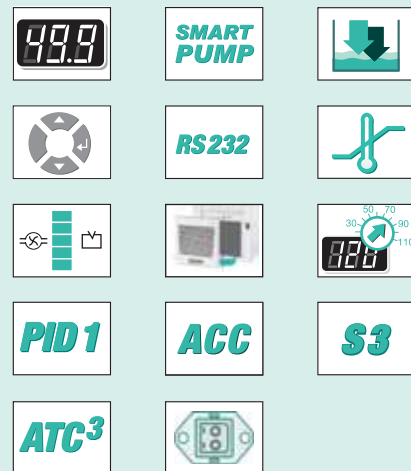
## SemiChill models



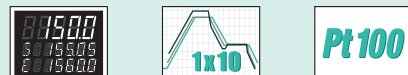
### SC Models

-20 °C ... +130 °C

5 Basic models for industrial applications  
up to 10 kW of cooling capacity, customizable



on models with Professional electronics



Available with optional DI-filter or micro-filter housing.





F250



F500



F1000

## Compact Recirculating Coolers

for simple cooling tasks

JULABO F models require very little space and have very low procurement costs.

Recirculating coolers of the F Series are a great way to replace costly tap water and are ideal for basic cooling tasks.

- Environmentally-friendly operation with low energy consumption
- Compact design
- Splash-proof membrane keypad with LED temperature display
- Straightforward filling and draining
- Filling level indicator
- May be used with water, water/glycol, JULABO Thermal G

Ideal for cooling:

- Rotary evaporators
- Kjeldahl instruments
- Measurement cells
- Automated analysis systems
- CCD cameras
- Polarimeters, refractometers
- Condensers for glass apparatus
- Calorimeters
- Soxhlet apparatus

JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Cooling capacity kW					Pump capacity Flow rate/pressure		Filling volume liters	Dimensions W x L x H cm
				+20	+10	+5	0	-5 °C	l/min	bar		
9 620 025	F250	-10 ... +40	±0.5	0.25	0.22	0.21	0.18	0.09	15	0.35	1.7 ... 2.6	24 x 40 x 52
9 620 050	F500	0 ... +40	±0.5	0.50	0.40	0.30	0.25	--	24	0.5	5 ... 7.5	37.5 x 44 x 59
9 620 100	F1000	0 ... +40	±0.5	1.00	0.70	0.55	0.35	--	23	1.0	7 ... 9.5	37.5 x 49 x 64

Included with F250: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

Included with F500, F1000: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)



| AWC100

### Applications

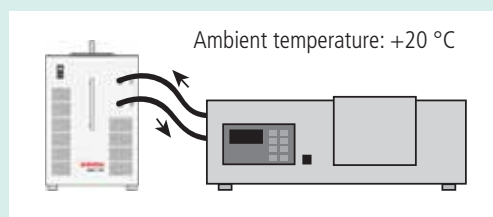
Cooling of Peltier elements, particularly for automated analysis units and CCD cameras, polarimeters, refractometers, electrophoresis chambers, condensers for glass apparatus.

## Air-to-Water Recirculating Cooler AWC100

for working near ambient temperature

The JULABO AWC100 requires very little space and has a very low procurement cost.

- Plug it in, switch it on, and you're ready to go
- Whisper quiet
- Saves energy (compressor-free design)
- Water loop cooled by fan air
- Uniform pump capacity
- Cooling performance adjustable in two stages
- Filling level indicator

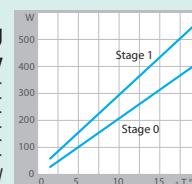


**AWC100 is designed to cool water in closed loops. The unit permanently removes heat from water as it flows through the machine.**

#### Example for determining cooling capacity

Ambient temperature: +20 °C  
Return temperature: +30 °C  
 $\Delta T$ : +10 °C

Cooling capacity (Stage 1): 300 W



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Cooling capacity <sup>1)</sup> W			Pump capacity Flow rate/pressure l/min bar	Filling volume liters	Dimensions W x L x H cm	
				+20	+10	+5 °C				
9 630 100	AWC100	+20 ... +40	--	400	220	120 (stage 0)	2.9	0.2	0.9	20 x 34 x 30
				550	300	180 (stage 1)				

<sup>1)</sup> Cooling capacity depends on the temperature differential between the return flow and the ambient environment. Included: 2 barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)



FL300



FL601



FL1201  
FL1703

## FL Recirculating Coolers

compact models with up to 1.7 kW cooling capacity for installation below a lab bench

The compact FL models are suited for a wide variety of cooling tasks. Installation under a lab bench saves valuable space.

- Easy filling from above
- Feed pressure indicator (FL1201 and above) and filling level indicator (all models)
- Large compensation volume
- Circulating pumps designed for continuous operation
- Permissible return temperature up to +80 °C
- Low liquid level protection with visual and acoustic signals
- May be used with water, water/glycol, and JULABO *Thermal* bath fluids
- Overload protection for pump motor and cooling machine

Practical recessed grip

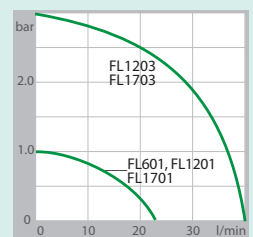


Drain tap located behind removable venting grid.

Rollers add flexibility



**Pump capacity**  
Bath fluid: Water



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Cooling capacity kW					Pump capacity		Filling volume liters	Dimensions W x L x H cm
				+20	+10	0	-10	-20	Flow rate/pressure l/min bar			
9 660 003	FL300	-20 ... +40	±0.5	0.3	0.25	0.2	0.15	0.1	15	0.35	3 ... 4.5	25 x 50 x 60
9 661 006	FL601	-20 ... +40	±0.5	0.6	0.5	0.4	0.33	0.2	23	1.0	5.5 ... 8	32 x 50 x 60
9 661 012	FL1201	-20 ... +40	±0.5	1.2	1.0	0.9	0.6	0.3	23	1.0	12 ... 17	50 x 76 x 64
9 663 012	FL1203	-20 ... +40	±0.5	1.2	0.9	0.8	0.5	0.2	40	0.5 - 3.0	12 ... 17	50 x 76 x 64
9 661 017	FL1701	-20 ... +40	±0.5	1.7	1.5	1.1	0.85	0.4	23	1.0	12 ... 17	50 x 76 x 64
9 663 017	FL1703	-20 ... +40	±0.5	1.7	1.4	1.0	0.75	0.3	40	0.5 - 3.0	12 ... 17	50 x 76 x 64
water-cooled models												
9 671 017	FLW1701	-20 ... +40	±0.5	1.7	1.5	1.1	0.85	0.4	23	1.0	12 ... 17	50 x 76 x 64
9 673 017	FLW1703	-20 ... +40	±0.5	1.7	1.4	1.0	0.75	0.3	40	0.5 - 3.0	12 ... 17	50 x 76 x 64

Included: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)  
2 barbed fittings for tubing 3/4" inner dia. with models FL1203 and FL(W)1703 (pump connections G 3/4" male)





FL4006

### Applications

Rotary evaporators, bio-reactors/fermenters, Soxhlet apparatus, distillation systems, vacuum systems, gas chromatographs, spectrometers, semiconductor applications, metering and adhesive technology, diffusion pumps, mass spectrometers, electron microscopes

## FL Recirculating Coolers

powerful models with up to 4.3 kW cooling capacity, tower version

The FL models shown here have higher cooling capacity, powerful circulating pumps, and internal bath volumes of up to 30 liters.

- Powerful circulating pumps up to 60 l/min; 6 bar
- By-pass valve to adjust pump pressure
- Rollers make it easy to move the units
- Early warning function when condenser is dirty
- Overload protection for pump motor and cooling machine
- Stainless steel bath tank
- *BlackBox* function with error memory for remote diagnosis

**Filling level indicator**  
all models



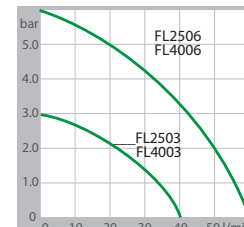
**Pump pressure adjustment**  
models from 3 bar pressure



**Pump pressure indicator**  
on FL1201 and above

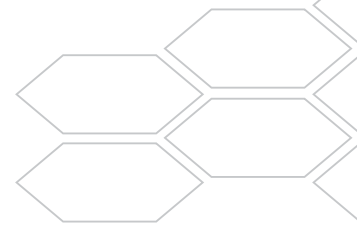


**Pump capacity**  
Bath fluid: Water



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Cooling capacity kW					Pump capacity Flow rate/pressure		Filling volume liters	Dimensions W x L x H cm
				+20	+10	0	-10	-20 °C	l/min	bar		
9 663 025	FL2503	-20 ... +40	±0.5	2.5	2.2	1.5	1.2	0.55	40	0.5 - 3.0	24 ... 30	60 x 76 x 115
9 666 025	FL2506	-15 ... +40	±0.5	2.5	1.9	1.0	0.3	--	60	0.5 - 6.0	24 ... 30	60 x 76 x 115
9 663 040	FL4003	-20 ... +40	±0.5	4.0	3.4	2.4	1.5	0.65	40	0.5 - 3.0	24 ... 30	60 x 76 x 115
9 666 040	FL4006	-20 ... +40	±0.5	4.0	2.9	1.9	0.9	0.05	60	0.5 - 6.0	24 ... 30	60 x 76 x 115
water-cooled models												
9 673 025	FLW2503	-20 ... +40	±0.5	2.7	2.5	1.7	1.0	0.4	40	0.5 - 3.0	24 ... 30	60 x 76 x 115
9 676 025	FLW2506	-15 ... +40	±0.5	2.5	1.9	1.0	0.3	--	60	0.5 - 6.0	24 ... 30	60 x 76 x 115
9 673 040	FLW4003	-20 ... +40	±0.5	4.3	3.0	2.2	1.3	0.45	40	0.5 - 3.0	24 ... 30	60 x 76 x 115
9 676 040	FLW4006	-15 ... +40	±0.5	4.0	3.0	1.7	0.7	--	60	0.5 - 6.0	24 ... 30	60 x 76 x 115

Included: 2 barbed fittings for tubing 3/4" inner dia. with models FL/FLW2503 and FL/FLW4003 (pump connections G 3/4" male)  
2 barbed fittings for tubing 1" inner dia. with models FL/FLW2506 and FL/FLW4006 (pump connections G 1 1/4" male)



FL7006 to FLW11006



### Applications

Electron microscopes, lasers, mills, and kneaders, pilot plants, plastics industry, drying of gases, general industrial applications

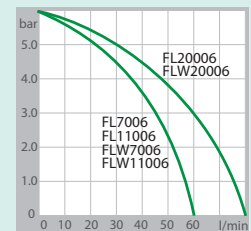
## FL Recirculating Coolers

very powerful units, up to 20 kW cooling capacity

The powerful FL models are suitable for a wide range of cooling tasks in industrial environments, such as removal of large process heat.

- High cooling capacity of up to 20 kW
- Powerful circulating pumps
- Large power reserves with all applications
- Low water consumption on FLW models
- Overload protection for pump motor and cooling machine
- *BlackBox* function with error memory for remote diagnosis

**Pump capacity**  
Bath fluid: Water



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Cooling capacity kW					Pump capacity		Filling volume liters	Dimensions W x L x H cm
				+20	+10	0	-10	-20 °C	Flow rate/pressure l/min bar			
9 666 070	FL7006	-20 ... +40	±0.5	7.0	6.4	5.1	3.0	1.55	60	0.5 - 6.0	39... 47	78 x 85 x 148
9 666 110	FL11006	-20 ... +40	±0.5	11.0	9.0	7.5	5.0	3.0	60	0.5 - 6.0	39... 47	78 x 85 x 148
9 666 200	FL20006	-25 ... +40	±0.5	20.0	15.0	10.0	6.0	2.5	80	0.8 - 6.0	15... 37	95 x 115 x 161
water-cooled models												
9 676 070	FLW7006	-20 ... +40	±0.5	7.4	7.0	5.5	3.1	1.3	60	0.5 - 6.0	39... 47	78 x 85 x 148
9 676 110	FLW11006	-20 ... +40	±0.5	11.5	9.0	7.3	4.8	2.7	60	0.5 - 6.0	39... 47	78 x 85 x 148
9 676 200	FLW20006	-25 ... +40	±0.5	20.0	15.0	12.0	7.0	3.0	80	0.8 - 6.0	15... 37	95 x 115 x 161

Included: 2 barbed fittings for tubing 1" inner dia. (pump connections G 1 1/4" male)



FC600S



FC1600T

## FC Recirculating Coolers

for heating and cooling tasks

The FC models have high temperature stability and are also equipped with integrated heating.

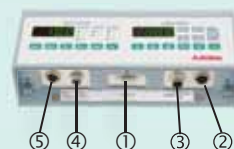
- Expanded working temperatures up to +80 °C
- Two LED displays
- Adjustable feed/return temperature ratio
- Filling level indicator

### Models FC1200T, FC1600T, FCW2500T

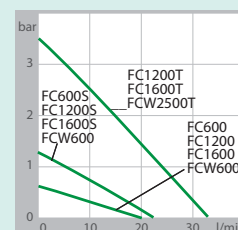
- Connection for external Pt100 sensor
- Analog connections for external setpoint device and temperature recorder

### Digital/analog connections Pump capacity

- ① RS232 interface
- ② Standby input
- ③ Alarm output



Bath fluid: Water



FC1200T, FC1600T, FCW2500T also include:

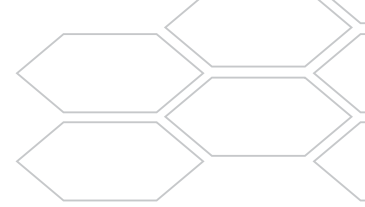
- ④ External Pt100 sensor connection
- ⑤ Connections for external setpoint device, temperature recorder

JULABO Order No.	JULABO model	Working temp. range °C	Temp. stability °C	Heat cap. kW	Cooling capacity kW					Pump capacity		Pressure display bar	Filling volume liters	Dimensions W x L x H cm
					+20	+10	+5	-10	-20 °C	Flow rate/pressure l/min bar				
9 600 060	FC600	-20 ... +80	±0.2	1.2	0.6	0.47	0.4	0.21	--	20	0.5	--	6 ... 8	35 x 54 x 49
9 600 063	FC600S	-10 ... +80	±0.2	1.2	0.5	0.37	0.3	0.1	--	22	1.2	--	6 ... 8	35 x 54 x 49
9 600 120	FC1200	-20 ... +80	±0.2	1.2	1.3	0.95	0.75	0.37	--	20	0.5	0 ... 2.5	8 ... 11	46 x 61 x 49
9 600 123	FC1200S	-15 ... +80	±0.2	1.2	1.2	0.85	0.65	0.26	--	22	1.2	0 ... 2.5	8 ... 11	46 x 61 x 49
9 600 160	FC1600	-20 ... +80	±0.2	1.2	1.65	1.25	1.0	0.47	--	20	0.5	0 ... 2.5	8 ... 11	46 x 61 x 49
9 600 163	FC1600S	-15 ... +80	±0.2	1.2	1.55	1.15	0.9	0.36	--	22	1.2	0 ... 2.5	8 ... 11	46 x 61 x 49
9 600 126	FC1200T	-10 ... +80	±0.2	1.2	1.1	0.75	0.55	0.15	--	28	3.5	0 ... 4.0	8 ... 11	46 x 61 x 49
9 600 166	FC1600T	-15 ... +80	±0.2	1.2	1.45	1.05	0.8	0.25	--	28	3.5	0 ... 4.0	8 ... 11	46 x 61 x 49

water-cooled models

9 601 060	FCW600	-20 ... +80	±0.2	1.2	0.6	0.47	0.4	0.21	--	20	0.5	--	6 ... 8	35 x 54 x 49
9 601 063	FCW600S	-10 ... +80	±0.2	1.2	0.5	0.37	0.3	0.1	--	22	1.2	--	6 ... 8	35 x 54 x 49
9 601 256	FCW2500T	-25 ... +80	±0.2	1.2	2.5	2.0	1.8	0.8	0.25	28	3.5	0 ... 4.0	8 ... 11	46 x 61 x 49

Included: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)



SC2500a  
SC2500w

### Applications

Semiconductor industry (etching process, stainless steel chucks, PVD, sputtering, wet benches), packaging industry, plastics industry, metering and adhesive technology, jacketed reaction vessels, Kilo labs, pilot plants

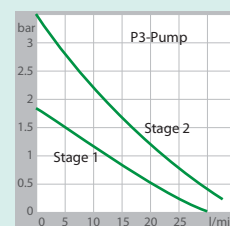
## SemiChill Recirculating Coolers

for extreme requirements in industrial environments

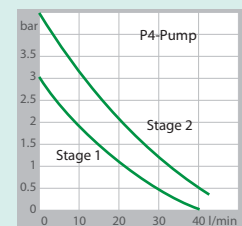
JULABO's SemiChill models are characterized by maximum reliability in continuous operation and under harsh environmental conditions. All parts that contact the bath fluid are made of stainless steel or high-quality plastic. The modular concept permits custom configurations according to your requirements.

- Five basic models, individually configurable
- High cooling capacities and strong pumps
- Optional integrated heater with up to 12 kW of power
- Seal-free immersion pumps, maintenance-free and electronically adjustable
- Pressure and filling level indicator
- Sealed filling port (70 mm dia.)
- Overload protection for pump motor and cooling machine

**Pump capacity P3**  
Bath fluid: Water



**Pump capacity P4**  
Bath fluid: Water



JULABO Order No.	JULABO Model	Working <sup>1)</sup> temp. range °C	Temp. stability °C	Cooling capacity kW			Pump type/ pump capacity	Filling volume liters	Dimensions W x L x H cm
				+20	0	-10 °C			
	<b>SC2500a</b>	-20 ... +80	±0.1	2.5	1.5	0.9		21 ... 33	49 x 62 x 105
see	<b>SC2500w</b>	-20 ... +80	±0.1	2.5	1.5	0.9	see	21 ... 33	49 x 62 x 105
order index	<b>SC5000a</b>	-20 ... +130	±0.1	5.0	2.5	1.2	order index	43 ... 60	59 x 67 x 112
on following	<b>SC5000w</b>	-20 ... +130	±0.1	5.0	2.5	1.2	on following	43 ... 60	59 x 67 x 112
pages	<b>SC10000w</b>	-20 ... +130	±0.1	10.0	5.0	2.5	pages	43 ... 60	59 x 67 x 112

Models with designation "a" = air-cooled; "w" = water-cooled

Pump connections: NPT 3/4" male

<sup>1)</sup> Maximum working temperature range (standard working temperature range +5... +35 °C)

## Operating and control electronics

Optional features

Eco

Professional



Multi-Display (LED) temperature display	•	
VFD Comfort Display with simultaneous display of 3 values		•
Keypad, splash-proof	•	•
PID temperature control	•	•
3-point calibration	•	•
Pump capacity adjustable in stages	•	•
RS232 interface	•	•
'Stakei' connection for power supply (e. g. for shut-off valve)	•	•
Early warning system for low level, high and low temperature limits	•	•
High-temperature cut-off adjustable via display	•	•
Low liquid level protection with cut-off function	•	•
Classification III (DIN 12876-1)	•	•
Remote diagnosis function via integrated <i>BlackBox</i>	•	•
Connector for external Pt100 sensor for measuring and controlling the external system		•
Integrated programmer with real-time clock for 1x10 program steps		•
Quantitative resistivity measurement and display, range 0.5...5 Ω/cm		•
Flow measurement and status display (factory pre-set limit value)*		•
Options for <b>Professional</b> electronics		
Scalable analog interfaces (E-PROG input, standby input, alarm output)	--	Optional
RS485 Interface	--	Optional

\***Professional** electronics with analog interface module required. Flow sensor not included.

## Additional options for working temperature, pump capacity, and heater

Model	Working temperature ranges				Circulating pumps		Heaters			
	Standard +5...+35 °C	Low temp. -20...+35 °C	Low/high temp I -20...+80 °C	Low/high temp II -20...130 °C	P3 33 l/min 3.5 bar	P4 43 l/min 4.3 bar	H0 no Heater	H1 1 kW	H5 5 kW	H12 12 kW
SC2500a SC2500w	✓	Optional	Optional	--	✓	--	✓	Optional	--	--
SC5000a, SC5000w SC10000w	✓	Optional	Optional	Optional	✓	Optional <sup>1)</sup>	✓	--	Optional	Optional

✓ This feature is already included with the basic model

<sup>1)</sup> Cooling capacity reduced by 0.2 kW

## Filter housings

Please specify the desired filter option when ordering. Retrofitting is not possible. Housing is mounted on the right side of the unit.

- D1 DI-filter housing, plastic (up to +35 °C), incl. cartridge
- D2 DI-filter housing, stainless steel (up to +90 °C), incl. cartridge
- M1 Micro-filter housing, plastic (up to +35 °C), w/o cartridge
- M2 Micro-filter housing, stainless steel (up to +130 °C), w/o cartridge

Filter housings for DI-filter and micro-filter (optional)





## Order index

for custom configuration

Select one of five basic models and then the options of your choice. Please use the order index shown below to create the order number for your instrument.

The following example is for model SC5000a:

<b>9</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>050</b>	<b>07</b>	<b>P3</b>	<b>H0</b>	<b>D0</b>	<b>M1</b>
9	5	x	x	xxx	xx	xx	xx	xx	xx
		a	b	c	d	e	f	g	h



### Custom configuration

- > Electronics
- > Pumps
- > Temperature range
- > Interfaces
- > Heating power
- > Filters

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### Keypad and control electronics

- 0 Eco
- 2 Professional
- 3 Professional with analog interface module
- 7 Professional with RS485 interface

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### Circulating pump (pump type, pump capacity)

- P3 33 l/min. - 3.5 bar max.
- P4 43 l/min. - 4.3 bar max.

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### Working temperature range

- 0 Standard (+5 ... +35 °C)
- 1 LowTemp (-20 ... +35 °C)
- 2 Low/HighTemp I (-20 ... +80 °C)
- 3 Low/HighTemp II (-20 ... +130 °C)

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### Integrated Heater

- H0 Without heater
- H1 Heating capacity 1 kW
- H5 Heating capacity 5 kW
- H12 Heating capacity 12kW

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### Basic model

- 025 SC2500a
- 026 SC2500w
- 050 SC5000a
- 051 SC5000w
- 101 SC10000w

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### DI-filter housing

- D0 Without DI-filter housing
- D1 DI-filter housing, plastic (to +35 °C max.)
- D2 DI-filter housing, stainless steel (to +90 °C max.)

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### Voltage version<sup>1)</sup>

- 03 230 V / 50 Hz
- 07 400 V (3 Ph.) / 50 Hz
- 13 208-230 V / 60 Hz
- 16 208-230 V (3 Ph.) / 60 Hz

9	5	x	x	xxx	xx	xx	xx	xx	xx
---	---	---	---	-----	----	----	----	----	----

#### Micro-filter housing

- M0 Without micro-filter housing
- M1 Micro-filter housing, plastic (to +35 °C max.)
- M2 Micro-filter housing, stainless steel (to +130 °C max.)



<sup>1)</sup> Voltage version

<b>SC2500a, SC2500w</b>	<b>SC5000a, SC5000w, SC10000w</b>
230 V / 50 Hz or 208-230 V / 60 Hz	400 V (3 Ph.) / 50 Hz or 208-230 V (3 Ph.) / 60 Hz

# Practical **Benefits** and **Useful Tips**



## Cost savings (example calculation)

Cooling rotary evaporators is a common way to use recirculating coolers. For example, an average size 3-liter rotary evaporator requires approximately 230,000 liters of cooling water per year. This is almost as much as the yearly consumption of a four-person household! The calculation below is for cooling of two rotary evaporators:



### Application parameters

Cooling water inlet: +15 °C  
 Cooling water outlet: +17 °C  
 Water flow rate: 4 liters per minute

### Calculation of cooling capacity

$P = \Delta T * c * m/t$   
 $\Delta T = 2 \text{ °C}$  (temperature difference)  
 $c = 4.18 \text{ kJ/kg} * \text{K}$  (specific heat capacity of water)  
 $m/t = 0.066 \text{ l/sec}$  (water flow rate)

**The required cooling capacity is 560 W.**

### Cooling water costs

4 liters per minute = 240 liters per hour  
 Operating time/year = 240 days x 8 hours  
 Consumption/year = 461 m<sup>3</sup>  
 Cost per m<sup>3</sup> = 4.49 € \*  
 Cost per year = 2069.89 € \*

### Costs for operating a recirculating cooler (FL601)

Power consumption = 1.05 kW  
 Operating time/year = 240 days x 8 hours  
 Consumption/year = 2016 kWh  
 Cost per kWh = 0.25 € \*  
 Cost per year = 504.00 € \*

\*Average prices in Germany in March 2013

**Water is valuable and costly**

The example calculation above indicates **savings of more than €1500 per year!** Therefore, a JULABO recirculating cooler will pay for itself after two years and make a contribution to environmental protection.



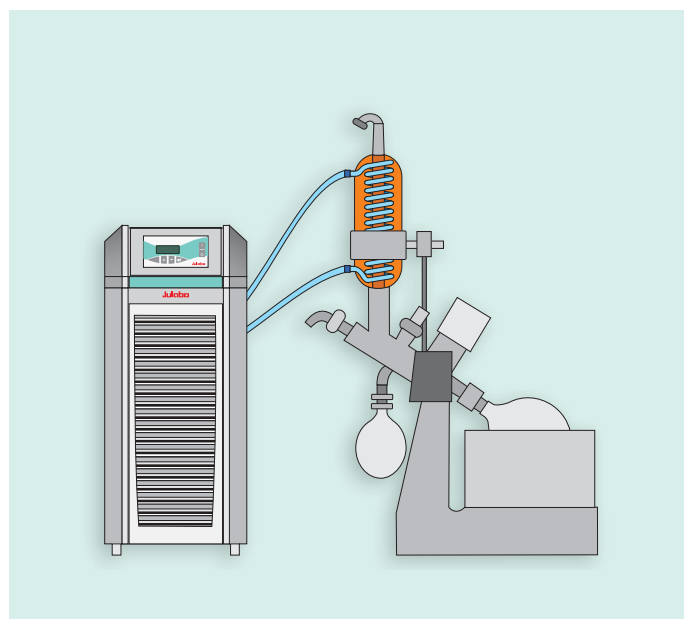
## Evaporation and concentration

Commonly used in laboratories for synthetic chemistry, organic chemistry, scale-ups, or in R&D labs for pharmaceuticals, chemicals, cosmetics, and nutritional chemistry.

Evaporation and concentration without consumption of water, elevated efficiency even at cooling temperatures as low as  $-10\text{ }^{\circ}\text{C}$ . Independent of external conditions.

### Cooling and temperature control of 1 to 4 rotary evaporators

JULABO Model	FL300 F250	FL601 F500	FL1201 FL1203 F1000	FL1201 FL1203 F1000	FL1701 FL1703	FL2503 FL4003
Flask size	0.5 - 1 liters	up to 2 liters		up to 4 liters		up to 20 liters
Number of rotary evaporators	1	2	3-4	1	2	1-2

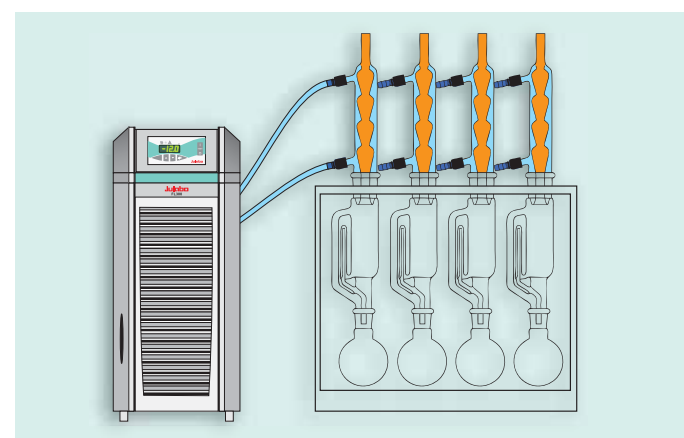


## Extraction

Quality control applications in laboratories for determination of fat content and extractable substances in food, animal feed, etc. used in the feed, animal nutrition, and dairy industries.

Extraction without consumption of cooling water, consistently reproducible condensation temperatures, without influence of ambient or seasonal temperature fluctuations.

JULABO Model	FL300 F250	FL601 F500	FL601 F500	FL1201 F1000	FL1701 FL1201	FL1701	FL2503
Number of condensers	2	4	6	8	12	18	24

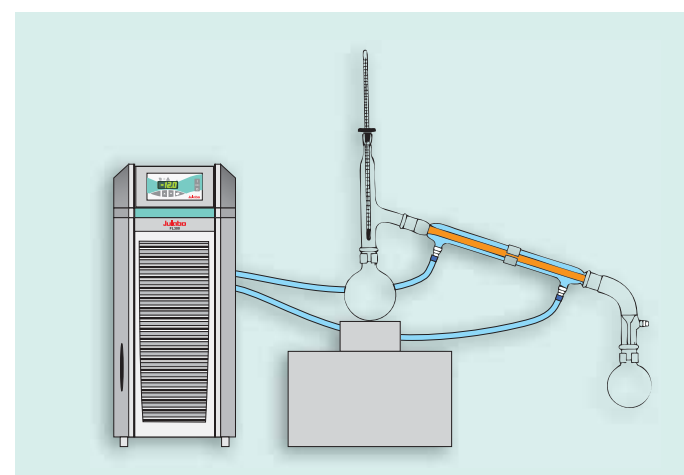


## Distillation

Common applications in QA laboratories for determination of alcohol, ethanol, or carbolic levels. Primarily used in the food, beverage, animal feed, cosmetics, and detergent industries as well as in clarification plants.

Distillation without use of tap water, with more effective and reproducible cooling and consistent analysis conditions.

JULABO Model	FL1201 F1000	FL2503	FL2503	FL4003
Number of distillation units	1	2	3	4





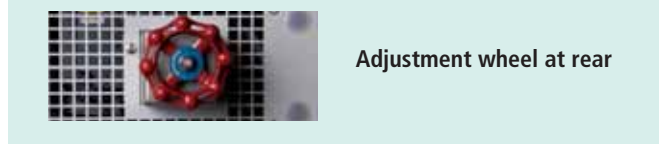
## Adjustable pump capacity!

JULABO customers have several different options for controlling the pressure and flow rate in our recirculating coolers:

1  
The simplest option is a manually controlled, steplessly adjustable valve (e.g. accessory 8 970 454).

2  
Models FL1203 and above have an adjustment wheel on the rear of the unit. The wheel provides for stepless pressure and flow control and diversion through the internal bypass.

3  
SemiChill models include adjustable pumps.



## Pump protection

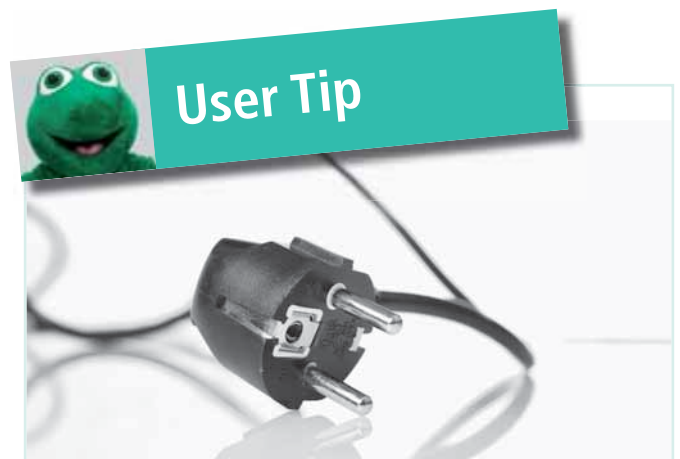
Other units on the market contain pumps (e.g. PD pumps) that may not run up against a closed pump connection without causing damage to the pump. But pumps used in JULABO units are equipped with technology to ensure that they will not be damaged even if the external liquid loop is interrupted by a kink in the tube, for example.



## Autostart function after power failure!

All JULABO recirculating coolers have an autostart function. In order to comply with industrial standards, the factory setting is "Off".

A simple key combination makes it easy for a JULABO user to activate the autostart function. Then the recirculating cooler will restart automatically after a power interruption.





## What cooling capacity does your application need?

JULABO's temperature control specialists can calculate the ideal cooling capacity with just a few pieces of information.

They will need only **three values**, which are easy to determine in most cases:

1  
Temperature of the cooling water before it flows into the application.

2  
Temperature of the cooling water after exiting the application.

3  
Flow rate of the cooling water in liters per minute.

Send these three values to [info@julabo.de](mailto:info@julabo.de) and you will receive a recommendation for the most suitable JULABO recirculating cooler.

We will be  
happy to help!



## Individual Solutions for Your Application



JULABO is ready to help its customers by providing custom solutions for special requirements. JULABO recirculating coolers can be customized in the following ways:

### Electric switch output

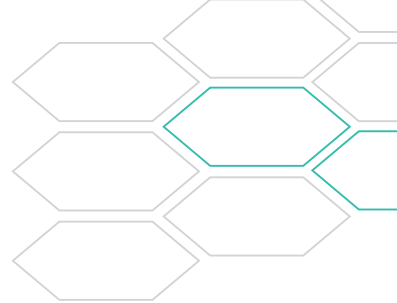
Some applications require an additional switch output in order to connect a solenoid valve or enable evaluation of a status signal, for example. In situations like these, JULABO can integrate the connection of your choice into the recirculating cooler. All we need to know is the signal level and the desired connector type.



### Higher cooling capacity

Does your application require greater cooling capacity at a specific operating point? If so, please speak with a JULABO technician. Simply define the cooling capacity and the operating point and you will receive exactly the unit that you need.





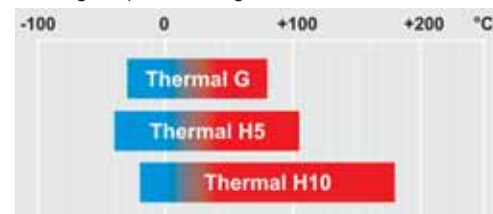
# Useful Accessories



## JULABO Thermal bath fluids

JULABO Thermal bath fluids are carefully selected and subjected to long-term testing. They are ideally suited to temperature-control tasks in specialized systems and help ensure safe and reliable operation. Selection of a suitable bath fluid is of critical importance for achieving the best possible results. Viscosity, oxidation properties, and heat conductivity of Thermal fluids are specially adapted for use with JULABO instruments.

Working temperature ranges



### Benefits

- Wide temperature ranges
- Low viscosity
- High stability
- Good heat conductivity
- Minimum odor
- Low corrosion tendency
- Low toxicity
- Long shelf life



JULABO description		Thermal G	Thermal H5	Thermal H10
JULABO Order No.	10 liters 5 liters	8 940 124 8 940 125	8 940 106 8 940 107	8 940 114 8 940 115
<b>Working temperature ranges and specifications</b>				
For recirculating coolers	°C	-30 ... +80	-50 ... +105	-20 ... +180
Flash point	°C	--	+124	+190
Fire point	°C	--	+142	+216
Viscosity, kinetic (at +20 °C)	mm <sup>2</sup> /s	3.87	<4	10
Density at +20 °C	g/cm <sup>3</sup>	1.084	0.93	0.93
Pour point	°C	<-35	-100	-90
Boiling point	°C	+107	>+300	>+300
Ignition temperature	°C	--	>+400	>+400
Color		light yellow	clear	clear



### Practical Tip

WirelessTEMP® allows you to control JULABO instruments remotely without the hassle of running wires.

**WirelessTEMP®**  
Wireless Instrument Management!



## Tubing

JULABO Order No.	Description	Suitable for
8 930 008	1 m CR® Tubing, 8 mm inner dia. (-20 ... +120 °C)	AWC100, F250, FL300
8 930 010	1 m CR® Tubing, 10 mm inner dia. (-20 ... +120 °C)	AWC100, F250
8 930 012	1 m CR® Tubing, 12 mm inner dia. (-20 ... +120 °C)	FL300
8 930 308	1 m Reinforced tubing, 8 mm inner dia., pressure resistant (-40 ... +120 °C)	F500, F1000, FL601/1201/1701, FC models
8 930 312	1 m Reinforced tubing, 12 mm / 1/2" inner dia., pressure resistant (-40 ... +120 °C)	F500, F1000, FL601/1201/1701, FC models
8 930 319	1 m Reinforced tubing, 3/4" inner dia., pressure resistant (-40 ... +120 °C)	FL(W)1203/1703/2503/4003
8 930 325	1 m Reinforced tubing, 1" inner dia., pressure resistant (-40 ... +120 °C)	FL(W)2506/4006/7006/11006/20006



## Tubing insulation

JULABO Order No.	Description	Suitable for
8 930 410	1 m Insulation, 14 mm inner dia.	CR® tubing 8 to 10 mm ID
8 930 412	1 m Insulation, 18 mm inner dia.	CR® tubing 12 mm ID, Reinforced tubing 8 mm ID
8 930 413	1 m Insulation, 23 mm inner dia.	Reinforced tubing 12 mm / 1/2" ID
8 930 419	1 m Insulation, 29 mm inner dia.	Reinforced tubing 3/4" ID
8 930 425	1 m Insulation, 35 mm inner dia.	Reinforced tubing 1" ID



## Tube clamps

JULABO Order No.	Description	Suitable for
8 970 480	2 Tube clamps, size 1	CR® tubing 8 mm ID
8 970 481	2 Tube clamps, size 2	CR® tubing 10/12 mm ID, Reinforced tubing 8 mm ID
8 970 482	2 Tube clamps, size 3	Reinforced tubing 12 mm / 1/2" ID
8 970 483	2 Tube clamps, size 4	Reinforced tubing 3/4" ID
8 970 484	2 Tube clamps, size 5	Reinforced tubing 1" ID








## Twin distributing adapters / Quad distributing adapters





JULABO Order No.	Description	Suitable for
8 970 470	Twin distributing adapters with barbed fittings for tubing 8 mm ID	F, FL, FC
8 970 472	Twin distributing adapters with barbed fittings for tubing 10 mm ID	F, FL, FC
8 970 471	Twin distributing adapters with barbed fittings for tubing 12 mm ID	F, FL, FC
8 970 476	Twin distributing adapters G 3/4" with barbed fittings for tubing 3/4" ID	FL(W)1203/1703/2503/4003
8 970 477	Twin distributing adapters G 1 1/4" with barbed fittings for tubing 1" ID	FL(W)2506/4006/7006/11006/20006
8 970 474	2 Quad distributing adapters, M16x1, with barbed fittings for tubing 8 mm or 12 mm / 1/2" ID	FC
8 970 520	2 Quad distributing adapters, M16x1, with barbed fittings for tubing 8 mm or 12 mm / 1/2" ID	F500, F1000, FL(W)601/1201/1701
8 970 522	2 Quad distributing adapters, G 3/4" female, with barbed fittings for tubing 3/4" ID	FL(W)1203/1703/2503/4003
8 970 524	2 Quad distributing adapters, G 1 1/4" female, with barbed fittings for tubing 1" ID	FL(W)2506/4006/7006/11006/20006





## Adapters

JULABO Order No.	Description	Suitable for	
8 890 040	2 Adapters G 3/4" female to M16x1 male	FL(W)1203/1703/2503/4003	
8 890 041	2 Adapters G 1 1/4" female to M16x1 male	FL(W)2506/4006/7006/11006/20006	
8 890 042	2 Adapters G 3/4" female to barbed fitting for tubing 1/2" inner dia.	FL(W)1203/1703/2503/4003	
8 890 043	2 Adapters G 3/4" female to barbed fitting for tubing 3/4" inner dia.	FL(W)1203/1703/2503/4003	
8 890 044	2 Adapters G 1 1/4" female to barbed fitting for tubing 1/2" inner dia.	FL(W)2506/4006/7006/11006/20006	
8 890 045	2 Adapters G 1 1/4" female to barbed fitting for tubing 3/4" inner dia.	FL(W)2506/4006/7006/11006/20006	
8 890 046	2 Adapters G 1 1/4" female to barbed fitting for tubing 1" inner dia.	FL(W)2506/4006/7006/11006/20006	
8 890 047	2 Adapters G 3/4" female to NPT 1/2" male	FL(W)1203/1703/2503/4003	
8 890 048	2 Adapters G 3/4" female to NPT 3/4" male	FL(W)1203/1703/2503/4003	
8 890 049	2 Adapters G 1 1/4" female to NPT 1/2" male	FL(W)2506/4006/7006/11006/20006	
8 890 050	2 Adapters G 1 1/4" female to NPT 3/4" male	FL(W)2506/4006/7006/11006/20006	
8 890 051	2 Adapters G 1 1/4" female to NPT 1" male	FL(W)2506/4006/7006/11006/20006	

## Particle filter / Shut-off valves / Solenoid valve / Earthquake anchors / Castor

JULABO Order No.	Description	Suitable for	
8 920 000	Particle filter for cooling water loop (for water-cooled models)	FLW, FCW, SC5000w, SC10000w	
8 970 456	Shut-off valve for temperature control loop M16x1	F500, F1000, FL300/601/1201/1701, FC, FCW	
8 970 454	Shut-off valve G 3/4"	FL(W)1203/1703/2503/4003	
8 970 458	Shut-off valve G 1 1/4"	FL(W)2506/4006/7006/11006/20006	
8 980 701	Solenoid valve set for loop circuit (-10 °C ... +130 °C), M16x1	FC, FCW	
8 920 051	Earthquake anchors	FL(W)2503/2506/4003/4006	
8 920 052	Earthquake anchors	FL(W)7006/11006	
8 920 053	Earthquake anchors	FL(W)20006	
8 910 045	Castor	F250	

## External Pt100 sensors

JULABO Order No.	Description	Suitable for	
8 981 003	200 x 6 mm dia., stainless steel, 1.5 m cable	FC1200T, FC1600T, FCW2500T	
8 981 006	20 x 2 mm dia., stainless steel, 1.5 m cable	FC1200T, FC1600T, FCW2500T	
8 981 010	300 x 6 mm dia., stainless steel, 1.5 m cable	FC1200T, FC1600T, FCW2500T	
8 981 017	200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	FC1200T, FC1600T, FCW2500T	
8 981 015	300 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	FC1200T, FC1600T, FCW2500T	
8 981 013	600 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	FC1200T, FC1600T, FCW2500T	
8 981 016	900 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	FC1200T, FC1600T, FCW2500T	
8 981 014	1200 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	FC1200T, FC1600T, FCW2500T	
8 981 020	M+R in-line Pt100 sensor, 2 fittings M16x1 male	FC1200T, FC1600T, FCW2500T	
8 981 103	Extension cable 3.5 m for Pt100 sensor	FC1200T, FC1600T, FCW2500T	



## Connection plugs

JULABO Order No.	Description	Suitable for
8 980 131	External Pt100 connector	FC-T models
8 980 133	Standby connector 3 pin	FC
8 980 135	Alarm connector 5 pin	FL, FC
8 980 136	REG+EPROG connector 6 pin	FC-T models
8 980 137	Stakei connector	FC



## Accessories for SemiChill recirculating coolers

JULABO Order No.	Description	Suitable for
8 920 016	Micro-filter cartridge 10 micron	Micro-filter housing plastic
8 920 017	Micro-filter cartridge 25 micron	Micro-filter housing plastic
8 920 018	Micro-filter cartridge 40 micron	Micro-filter housing plastic
8 920 019	Micro-filter cartridge 100 micron	Micro-filter housing plastic
8 920 020	Micro-filter cartridge 250 micron	Micro-filter housing plastic
8 920 036	Micro-filter cartridge 10 micron	Micro-filter housing stainless steel
8 920 038	Micro-filter cartridge 40 micron	Micro-filter housing stainless steel
8 920 039	Micro-filter cartridge 100 micron	Micro-filter housing stainless steel
8 920 040	Micro-filter cartridge 250 micron	Micro-filter housing stainless steel
8 920 005	DI-filter cartridge	DI-filter housing, plastic/stainless steel
8 920 030	Touch and condensation cover	DI-filter and micro-filter housing
8 920 060	Air-filter package, washable	SC2500a
8 920 061	Air-filter package, washable	SC5000a
8 920 050	Earthquake anchors	SC2500a, SC2500w
8 920 051	Earthquake anchors	SC5000a, SC5000w, SC10000w
8 920 100	Drain port, stainless steel, to empty the unit	SemiChill
8 980 705	Solenoid valve set, 230V/50-60Hz, -10 ... +130 °C (Including: 1 solenoid valve and 1 back pressure valve)	SemiChill
8 890 036	2 Barbed fittings for tubing 1/2 " inner dia. to NPT 3/4" female	SemiChill
8 890 037	2 Barbed fittings for tubing 5/8 " inner dia. to NPT 3/4" female	SemiChill
8 890 038	2 Adapters NPT 3/4" female to M16x1 male	SemiChill
8 980 073	RS232 Interface cable, 2.5 m	SemiChill
8 980 074	RS232 Interface cable, 5 m	SemiChill
8 900 110	USB Interface adapter cable	SemiChill
8 980 031	Ethernet / RS232 Interface converter	SemiChill
8 980 131	External Pt100 connector	SemiChill with Professional electronics
8 980 133	Standby connector 3 pin	SemiChill with Professional electronics with analog connections
8 980 135	Alarm connector 5 pin	SemiChill with Professional electronics with analog connections
8 980 136	REG+EPROG connector 6 pin	SemiChill with Professional electronics with analog connections
8 980 137	Stakei connector	SemiChill



Superior Temperature Technology for a Better Life



**Quality Never Goes  
Out of *Style***

### **Economical temperature control is our masterpiece**

JULABO recirculating coolers are used in laboratories around the world. Their environmentally-friendly design and low energy consumption make JULABO recirculating coolers an economical alternative.

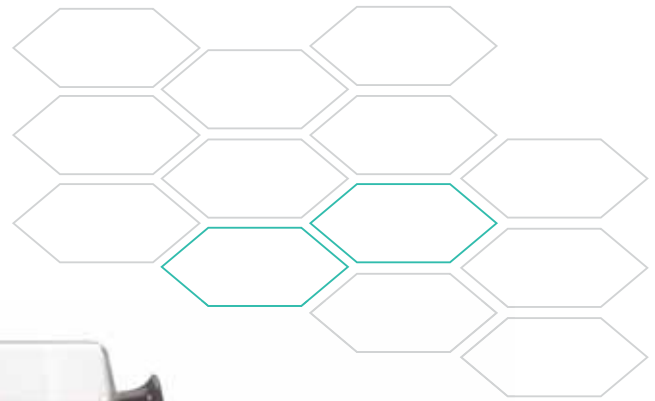
**Julabo**  
THE TEMPERATURE CONTROL COMPANY



[www.julabo.de](http://www.julabo.de)

# High Quality and Durable

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## Water Baths and Shaking Water Baths

The Water Baths of the TW series or Shaking Water Baths of the SW series are ideal for routine applications.

Examples are temperature control of samples, incubations, material testing, corrosion tests, cell cultivation, food and beverage testing. All TW and SW Baths are robust instruments of high quality. Their working temperature ranges from +20 to +99.9 °C qualifying them for a wide variety of applications.

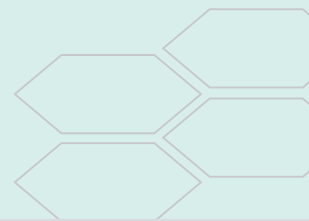
- User-friendly operation
- Splash-proof design
- Integrated Power Switch
- Bright LED display
- Bath volumes from 2 to 26 liters
- Lift-up bath cover (accessory)
- High temperature stability of up to  $\pm 0.02$  °C
- Acoustic and optical low water level alarm
- Convenient bath drain
- Removable bottom plate and shaking insert
- Wide selection of accessories for temperature control of samples
- Highest quality (all wetted parts are made of stainless steel or high grade plastics)

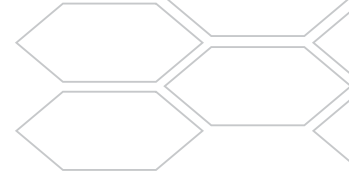
### SW models also offer

- Warning and cut-off protection for high/low temperature
- Adjustable shaking frequencies from 20 to 200 rpm
- Integrated Timer
- RS232 Interface

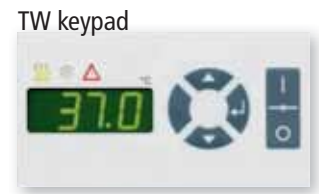
### Practical Tip

The wide selection of accessories presented in this catalog permits specific and individual set-up of all TW and SW models.





# TW Models



TW keypad

## Water Baths

+20 °C ... +99.9 °C

4 different models with bath volumes from 2 to 26 liters



### Advantages and functions at a glance



User-friendly keypad with LED display



Wide selection of test tube racks



Lift-up bath covers available in Makrolon® or stainless steel



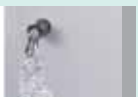
Small footprint  
Large bath volume



Durable handles for easy positioning



Integrated power switch with Auto-Start function



Easy-access drain



Integrated high performance heater



High quality stainless steel bath tank design for minimum fluid loss



# SW Models



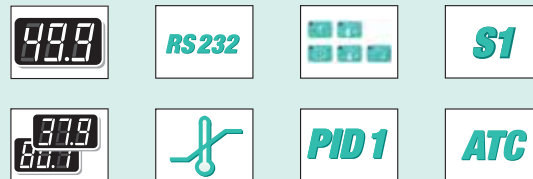
SW keypad



## Shaking Water Baths

+20 °C ... +99.9 °C

2 different models with 20 liters filling volume



## Advantages and functions at a glance



Removable shaking insert



Adjustable shaking frequency (20 ... 200 rpm)



High temperature stability ( $\pm 0.2$  °C or  $\pm 0.02$  °C)



Countdown timer (0...10 operating hours)



RS232 Interface



User-friendly keypad with LED display



Wide selection of test tube racks



Lift-up bath covers available in Makrolon® or stainless steel



Small footprint Large bath volume



Durable handles for easy positioning



Integrated power switch with Auto-Start function



Easy-access drain



Integrated high performance heater



High quality stainless steel bath tank design for minimum fluid loss



Test tube racks and cover not included (optional).

## Water Baths TW Series

for working temperatures from +20 °C to +99.9 °C

JULABO water baths facilitate day-to-day laboratory work with their user-friendly operation. Splash water protection and optimized bath tank design are special advantages.

### Model TW2

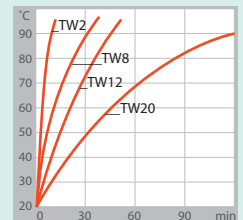
- Space-saving design, suitable for samples and for up to 24 test tubes.

### Models TW8, TW12, TW20

- Convenient bath drain
- Durable handles for easy positioning
- Removable bottom plate for easy cleaning

### Heat-up times

Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stability °C	Heating capacity kW	Bath opening / bath depth W x L / D cm	Insert capacity test tube racks 13 mm dia. 17 mm dia.	Filling volume liters	Dimensions W x L x H cm w/o / with cover
9 550 102	TW2	+20 ... +99.9	±0.2	1	15 x 13 / 11	-- 24	1 ... 2	17 x 16 x 26 / 37
9 550 108	TW8	+20 ... +99.9	±0.2	2	23 x 27 / 14	180 120	3 ... 8	29 x 32 x 28 / 44
9 550 112	TW12	+20 ... +99.9	±0.2	2	35 x 27 / 14	270 180	5 ... 14	40 x 32 x 28 / 44
9 550 120	TW20	+20 ... +99.9	±0.2	2	50 x 30 / 18	360 240	8 ... 26	56 x 35 x 32 / 49

### Applications

Routine laboratory applications, e.g. cell cultivation, temperature control of samples, incubation, material / corrosion tests, temperature test of food and beverages



## Accessories for TW Models

JULABO Order No.	Description / Dimensions	Suitable for
<b>Lift-up Makrolon® covers (to +80 °C), transparent</b>		
8 970 289	Lift-up Makrolon® cover, 17 x 16 x 16 cm	TW2
8 970 286	Lift-up Makrolon® cover, 29 x 32 x 16 cm	TW8
8 970 287	Lift-up Makrolon® cover, 40 x 32 x 16 cm	TW12
8 970 288	Lift-up Makrolon® cover, 56 x 35 x 17 cm	TW20
<b>Lift-up stainless steel bath covers (to +100 °C)</b>		
8 970 259	Lift-up stainless steel cover	TW2
8 970 266	Lift-up stainless steel cover	TW8
8 970 267	Lift-up stainless steel cover	TW12
8 970 268	Lift-up stainless steel cover	TW20
<b>Flat stainless steel bath covers with sets of rings</b>		
8 970 270	with 1 opening 190 mm dia.	TW8
8 970 271	with 4 openings 92 mm dia.	TW8
8 970 278	with 6 openings 92 mm dia.	TW12
8 970 272	with 2 openings 190 mm dia.	TW20
8 970 273	with 6 openings 115 mm dia.	TW20
8 970 277	with 8 openings 92 mm dia.	TW20
<b>Cooling installation / Continuous water supply</b>		
8 970 415	Liquid level / cooling set	TW8, TW12, TW20
<b>Test tube racks to +80 °C, Polypropylene®</b>		
8 970 380	for 60 test tubes 16/17 mm dia.	TW8, TW12, TW20
8 970 381	for 90 test tubes 12/13 mm dia.	TW8, TW12, TW20
8 970 382	for 90 microliter tubes 11/12 mm dia.	TW8, TW12, TW20
8 970 383	for 21 test tubes 30 mm dia.	TW8, TW12, TW20
<b>Test tube racks to +100 °C, stainless steel</b>		
8 970 330	for 24 test tubes 16/17 mm dia.	TW2
8 970 344	for 50 test tubes 16/17 mm dia.	TW8, TW12, TW20
8 970 345	for 90 test tube 12/13 mm dia.	TW8, TW12, TW20
8 970 346	for 90 microliter tubes 11/12 mm dia.	TW8, TW12, TW20
8 970 347	for 21 test tubes 30 mm dia.	TW8, TW12, TW20
<b>Additional accessories</b>		
8 970 331	Stents lifter	TW2
8 970 339	Hygiene insert, stainless steel	TW2
8 970 453	Drain tap with tube 8 mm inner dia.	TW8, TW12, TW20
8 970 010	Hollow balls, Polypropylene®, 20 mm dia. (1000 pcs.)	TW2, TW8, TW12, TW20
<b>Water bath protective media <i>Aqua Stabil</i></b>		
8 940 006	6 bottles, 100 ml each, to prevent formation of algae	
8 940 012	12 bottles, 100 ml each, to prevent formation of algae	

### Lift-up covers

Prevent liquid losses due to evaporation. Protect samples from contamination. Cover made of either Makrolon® or stainless steel.



### Flat bath covers

Place beakers or Erlenmeyer flasks directly onto the perforated stainless steel bottom plate.



### Liquid level/Cooling set

To maintain constant liquid level at high temperatures (with continuous water supply) or for counter-cooling of applications at or near ambient temperature.



### Application Tip

Insert capacity of test tube racks for each water bath:

TW2	1 rack
TW8	2 racks
TW12	3 racks
TW20	4 racks





The removable shaking insert prevents direct contact with the bath fluid. Carrier trays can be assembled comfortably outside the bath.

Test tube racks and cover not included (optional).

## Shaking Water Baths SW Series

for working temperatures from +20 °C to +99.9 °C

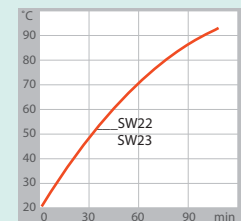
JULABO Shaking Water Baths provide many state-of-the-art features for common day-to-day laboratory tasks. For example: sloped edges keep the water in the stainless steel bath tank even when the lid is open.

- Overall splash water protection
- Low water-level warning and cut-off functions
- Countdown timer (0 ... 10 operating hours)
- User-friendly operation and consistent reproducibility
- 1-point calibration

**Model SW22:** Temperature stability  $\pm 0.2$  °C, for general applications

**Model SW23:** Temperature stability  $\pm 0.02$  °C, with integrated circulating pump for best temperature stability and homogeneity

**Heat-up time**  
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stability °C	Heating capacity kW	Bath opening / bath depth W x L / D cm	Filling volume liters	Shaking frequency rpm	Shaking stroke mm	Dimensions W x L x H cm w/o / with cover
9 550 322	SW22	+20 ... +99.9	$\pm 0.2$	2	50 x 30 / 18	8 ... 20	20 ... 200	15	70 x 35 x 26 / 43
9 550 323	SW23	+20 ... +99.9	$\pm 0.02$	2	50 x 30 / 18	8 ... 20	20 ... 200	15	70 x 35 x 26 / 43

### Applications

Biochemical research, material testing, enzyme and tissue studies, homogenization, routine laboratory tasks, corrosion tests, fermentation, incubation, blood plasma thawing, temperature tests of food and beverages



## Accessories for SW Models

JULABO Order No.	Description	JULABO Order No.	Description
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### Lift-up bath covers / hollow balls

8 970 288	Lift-up Makrolon® cover (to +80 °C), transparent	8 970 010	Hollow balls, Polypropylene® 20 mm dia., (1000 pcs.)
8 970 268	Lift-up stainless steel cover (to +100 °C)		

### Cooling installation / continuous water supply

8 970 415	Liquid level / cooling set	8 970 416	Cooling coil
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### All-purpose spring tray

8 970 630	All-purpose spring tray Pre-assembled for 11 Erlenmeyer flasks 250 ml, incl. set of springs for Erlenmeyer flasks 25 ... 1000 ml	8 970 631	Set of springs consisting of 5 springs 190 mm and 12 springs 135 mm (for tray 8 970 630)
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### Standard carrier tray for Erlenmeyer flasks

8 970 360	for 45 flasks	25 ml	8 970 364	for 11 flasks	250-300 ml
8 970 361	for 32 flasks	50 ml	8 970 365	for 8 flasks	500 ml
8 970 362	for 18 flasks	100 ml	8 970 366	for 5 flasks	1000 ml
8 970 363	for 15 flasks	200 ml			

### Base tray and spring clamps for Erlenmeyer flasks

8 970 620	Base tray for assembling spring clamps on a mix and match basis			
8 970 601	Spring clamp for	10 ml flasks	8 970 606	for 200-250 ml flasks
8 970 602	Spring clamp for	25 ml flasks	8 970 607	for 300 ml flasks
8 970 603	Spring clamp for	50 ml flasks	8 970 608	for 500 ml flasks
8 970 604	Spring clamp for	100 ml flasks	8 970 609	for 1000 ml flasks

### Carrier tray for test tube racks

8 970 369	Base tray for assembling a maximum of 4 test tube racks			
Test tube racks made of Polypropylene® (to +80 °C)		Test tube racks made of stainless steel (to +100 °C)		
8 970 380	for 60 test tubes, 16/17 mm dia.	8 970 344	for 50 test tubes, 16/17 mm dia.	
8 970 381	for 90 test tubes, 12/13 mm dia.	8 970 345	for 90 test tubes, 12/13 mm dia.	
8 970 382	for 90 Microliter tubes, 11/12 mm dia.	8 970 346	for 90 microliter tubes, 11/12 mm dia.	
8 970 383	for 21 test tubes, 30 mm dia.	8 970 347	for 21 test tubes, 30 mm dia.	

### Complete carrier trays with test tube racks (to +80 °C)

8 960 440	for 240 test tubes, 16/17 mm dia.	8 960 442	for 360 microliter tubes, 30 x 11/12 mm dia.
8 960 441	for 360 test tubes, 12/13 mm dia.	8 960 443	for 84 test tubes, 30 mm dia.

### Software

8 901 102	EasyTemp software free of charge at <a href="http://www.julabo.de">www.julabo.de</a>	8 980 075	RS232 interface cable, 3 m, for direct PC connection
8 900 110	USB Interface adapter cable		

### Water bath protective media Aqua Stabil

8 940 006	6 bottles, 100 ml each, to prevent formation of algae
8 940 012	12 bottles, 100 ml each, to prevent formation of algae

### Lift-up covers

Prevent liquid losses due to evaporation. Protect samples from contamination. Cover made of either Makrolon® or stainless steel.

Makrolon®-cover ▶



For applications near ambient temperature use the cooling coil.



### All-purpose spring tray



### Standard carrier tray



### Base tray with spring clamps



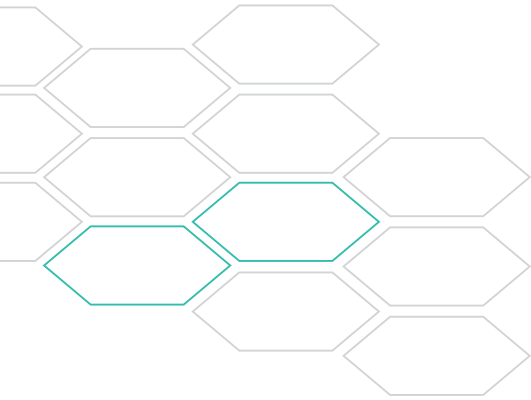
### Tray with test tube racks







# Additional Products for the right **Temperature**





## Additional Products

This section features additional products for various temperature control applications typical for laboratories. Whether you need to calibrate temperature sensors, cool chemicals or determine the ‚best before‘ date of beer - the comprehensive JULABO program provides the specific solution when it comes to temperature control.

*Comprehensive  
Equipment  
Program*  
for almost every application  
when it comes  
to temperature control.

### Calibration Baths

- Calibration of sensors, measuring devices, thermometers, etc.
- Highest temperature stability to  $\pm 0.005$  °C, ISO and DKD certificates

### Visco Baths

- For highly precise measuring applications with viscometers and densimeters
- Transparent bath tanks (Plexiglas® or stainless steel version with insulated windows)

### Beer Forcing Test Refrigerated/Heating Circulating Bath

- Determination of ‚best before‘ date of beer
- Pre-programmed temperature profiles for forcing tests

### Immersion Coolers and Flow-Through Cooler

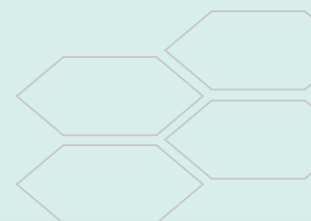
- Rapid cooling, a perfect complement to heating circulators
- Environmentally friendly alternative to tap water cooling and dry ice

### Temperature Controllers

- Measurement, control and monitoring of any electrically heated equipment in laboratories and pilot plants

### Refrigerators for Chemicals

- Storing and cooling of hazardous substances
- Spark free interior





## Calibration Baths

for working temperatures from +50 °C to +300 °C

JULABO calibration baths are ideal for high precision calibration of sensors, measuring devices, thermometers, etc. These instruments are ideal for applications in calibration laboratories and conform to the requirements specified by DIN EN ISO 9001:2000.

### Advantages

- Highest available temperature stability;  $\pm 0.005$  °C
- Precision Pt100 sensor for reference temperature measurements (optional)
- Display resolution 0.01 °C across the entire temperature range
- Homogeneous temperature chamber with constant level
- ISO and DKD calibration certificates are available

### VFD Comfort Display



All temperatures on one screen: The large display shows up to three temperature values simultaneously:

- ① Reference temperature
- ② Setpoint temperature
- ③ Actual temperature

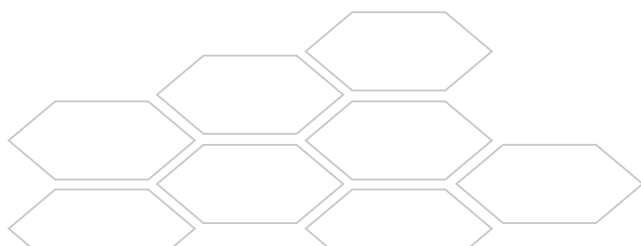
Removable circulator



Temperature chamber with uniform overflow



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stability °C	Heating capacity kW	Pump capacity Flow rate / Pressure l/min bar	Bath opening/ Usable bath depth cm	Filling volume liters	Dimensions W x L x H cm
9 352 508	SL-8K	+50 ... +300	$\pm 0.005$	3	22-26 0.4-0.7	dia. 12 / 17	8	22 x 46 x 47
9 352 514	SL-14K	+50 ... +300	$\pm 0.005$	3	22-26 0.4-0.7	dia. 12 / 31	14	22 x 46 x 61





### Applications

Calibration for the determination of conformity to national and international standards such as temperature sensors, measuring devices or thermometers.

## Calibration Baths

for working temperatures from -30 °C to +200 °C  
with integrated refrigeration unit

The calibration baths on this page feature an integrated refrigeration unit and are suitable for calibration applications to -30 °C.

### Advantages

- Integrated refrigeration unit
- Compact design
- Low noise level
- ACC Active Cooling Control across the entire working temperature range
- Removable venting grid
- ISO and DKD calibration certificates are available

### Included with each unit

8 970 246 Bath cover with openings and Viton® sleeves:  
2 x 3 mm, 2 x 4 mm, 2 x 6 mm inner dia.

### Accessories

8 981 002 **Precision Pt100 reference sensor 180 x 4 mm dia.**

9 660 003 FL300 recirculating cooler for SL-8K & SL-14K

Viton® sleeves (2 pcs.)

8 930 602 for sensor 2 mm dia.

8 930 603 for sensor 3 mm dia.

8 930 604 for sensor 4 mm dia.

8 930 605 for sensor 5 mm dia.

8 930 606 for sensor 6 mm dia.

8 930 608 for sensor 8 mm dia.

JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol)			Pump capacity		Bath opening/ Usable bath depth cm	Filling vol. liters	Dimensions W x L x H cm
					+20	0	-20 °C	Flow rate /	Pressure			
9 352 627	FK30-SL	-30 ... +200	up to ±0.005	2	0.46	0.34	0.15	22-26	0.4-0.7	dia. 12 / 17	14	32 x 45 x 79
9 352 628	FK31-SL	-30 ... +200	up to ±0.005	2	0.46	0.34	0.15	22-26	0.4-0.7	dia. 12 / 31	24	32 x 45 x 91

## Calibration Certificates

Calibration at 3 or 5 selectable measuring points depending on certificate

### For calibration baths

8 902 113	ISO-3-Point Calibration certificate
8 902 115	ISO-5-Point Calibration certificate
8 902 123	DKD-3-Point Calibration certificate
8 902 125	DKD-5-Point Calibration certificate


### For precision reference sensor

8 902 213	ISO-3-Point Calibration certificate
8 902 215	ISO-5-Point Calibration certificate
8 902 223	DKD-3-Point Calibration certificate
8 902 225	DKD-5-Point Calibration certificate







 Custom design ME-18V-TT with special cooling coil for applications to -40 °C available! Just ask!

### Applications

For measurements with capillary viscometers or use of densimeters and other related products. The model ME-18V enables operation conforming to ASTM D445.

## Visco Baths

for highly precise temperature applications in the bath tank

JULABO visco baths for highly precise temperature control of viscometers, densimeters and other related products.

### Advantages

- Temperature setting and display resolution 0.01 °C
- Temperature stability  $\pm 0.01$  °C
- Programmer with real time clock
- Cooling coil for applications below ambient temperature

### Bath tanks

ME-31A: Plexiglas® bath tank

ME-16G: Glass bath tank

ME-18V: Stainless steel bath tank with insulated bath mantle and two windows of 185 x 245 mm made of high quality multiple-layer insulated glass

### Accessories

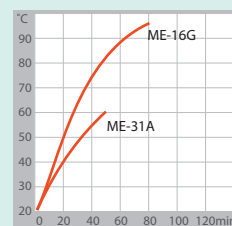
8 970 294 Cover for ME-18V  
4 round openings,  
51 mm dia.

8 970 295 Cover for ME-31A  
5 round openings,  
51 mm dia



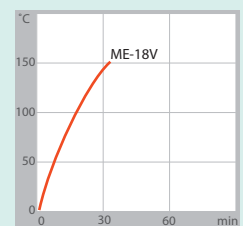
### Heat-up time

Bath fluid: water



### Heat-up time

Bath fluid: Thermal H



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stability °C	Heating cap. kW	Pump capacity Flow rate/ Pressure l/min bar	Cooling coil	Bath opening/ Number/ Bath depth cm	Number of visco-meters	Fill. vol. liters	Dimensions W x L x H cm
9 162 331	ME-31A	+20 ... +60	$\pm 0.01$	2	11-16 0.23-0.45	integrated	9 x 9 / 3 x / 37	3	31	50 x 20 x 56
9 162 616	ME-16G	+20 ... +100	$\pm 0.01$	2	11-16 0.23-0.45	integrated	7.6 x 7.6 / 2 x / 31	2	16	dia. 29 x 48
9 162 518	ME-18V	+20 ... +150	$\pm 0.01$	2	11-16 0.23-0.45	integrated	9 x 9 / 2 x / 37	2	18	36 x 24 x 54

<sup>1)</sup> For temperature applications below ambient temperature: counter-cooling with tap water or recirculating cooler via built-in cooling coil.



| F38-ME

### Applications

Forcing tests, determination of 'best before' date by simulating the beer aging process

## Beer Forcing Test Refrigerated/Heating Circulating Bath

to determine the 'best before' date of beer

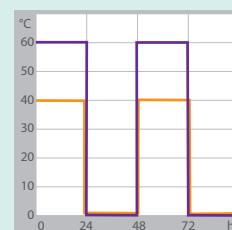
The JULABO forcing test refrigerated/heating circulator in conjunction with a photometer determines the product life of beer before clouding. The simulated aging process is achieved through a programmable temperature profile which is repeated until the first clouding develops.

- Automatic cycles of temperature ramps simulate aging
- Pre-programmed temperature profiles for forcing test
- Program modification possible at any time
- Built-in meter for counting temperature cycles
- Large bath opening with insert for 20 bottles, 0.5 liters each (Racks for other bottle sizes on request)
- Removable Plexiglas® cover

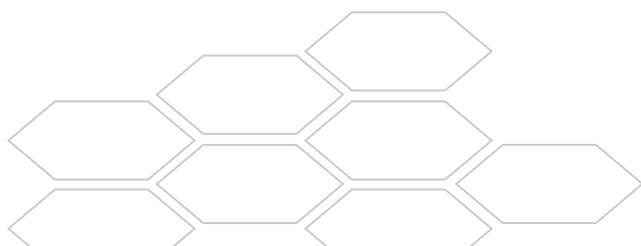


*Convenient!  
Pre-programmed  
temperature cycles!*

**Forcing test**  
All program steps  
for the forcing test  
are pre-programmed



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Heating capacity kW	Cooling capacity kW (Bath fluid: Ethanol)			Pump capacity Flow rate / Pressure l/min bar	Bath opening/ Bath depth W x L / D cm	Filll. vol. liters	Dimensions W x L x H cm	
					+20	0	-20 °C					
9 162 638	F38-ME	-38 ... +80	±0.05	2	0.92	0.66	0.32	11-16	0.23-0.45	35 x 41 / 27	45	46 x 70 x 89





### Applications

Cooling of liquids, dry-ice substitute, counter-cooling for heating circulators, saving of tap water

## Immersion Coolers

with immersion probe for rapid cooling of liquids

JULABO immersion coolers are ideal for counter-cooling in combination with heating circulators and for rapid cooling of liquids down to low temperatures. These units represent a budget-priced alternative to customary cooling with tap water and as a substitute for dry ice.

- User-friendly operation and handling
- Compact design, small footprint
- FT402 and FT902 with integrated temperature control and display as well as external Pt100 sensor (200 x 6 mm dia., stainless steel)
- Environmentally friendly by conserving precious tap water
- Dry ice substitution

### Accessories

- 8 970 400 Clamp for cooler probe for open baths (FT200, FT400, FT402)
- 8 981 017 Pt100 sensor, 200 x 6 mm dia., stainless steel/PTFE coated, 1.5 m cable (FT402, FT902)
- 8 981 010 Pt100 sensor, 300 x 6 mm dia., stainless steel. 1.5 m cable (FT402, FT902)

JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Display resolution °C	Cooling capacity kW					Immersion probe / flexible probe (L x dia. cm)	Connection tube (L) cm	Dimensions W x L x H cm
					+20	+10	-20	-40	-80 °C			
9 650 820	FT200	-20 ... +30	--	--	0.25	0.2	0.04	--	--	9 x 4	120	18 x 27 x 39
9 650 840	FT400	-40 ... +30	--	--	0.45	0.36	0.14	0.03	--	12 x 5	120	20 x 30 x 43
9 650 890	FT900	-90 ... +30	--	--	0.3	0.27	0.24	0.2	0.07	65 x 1.5 flexible	160	38 x 55 x 60
with temperature control, LED display and keypad												
9 650 842	FT402	-40 ... +30	±0.5	0.1	0.45	0.36	0.14	0.03	--	12 x 5	120	20 x 30 x 43
9 650 892	FT902	-90 ... +30	±1	0.1	0.3	0.27	0.24	0.2	0.07	65 x 1.5 flexible	160	38 x 55 x 60



FD200

### Applications

For applications with heating circulators for sub-ambient temperatures, integration into loop circuits

## Flow-through Cooler

for cooling of loop circuits

The JULABO flow-through cooler is designed for applications below ambient temperature. The cooler is connected with tubing into the loop circuit, e.g. in the return line of a circulator. In combination with a heating circulator almost every application can be equipped with cooling capability.

- Allows applications below ambient temperature with heating circulators and circulating pumps
- Liquids flow through tubing into the cooler
- Environmentally friendly by saving precious tap water

### Accessories

- Tubing for liquids
- Tubing insulation

See page 120



JULABO Order No.	JULABO Model	Working temperature range °C	Cooling capacity		Dimensions W x L x H cm
			kW +20	+10 °C	
9 655 825	FD200	+10 ... +30	0.22	0.18	18 x 27 x 39

Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia.



A large selection of accessories at [www.julabo.de](http://www.julabo.de)



### Applications

For precise and reliable temperature control for heating mantles and heating collars, oil baths in combination with distillation/pilot plants, indirect tap water cooling with solenoid valve

## Temperature Controllers

for measuring, control and monitoring

JULABO temperature controllers measure, control and monitor applications in laboratories and pilot plants.

### LC4, LC4-F, LC6

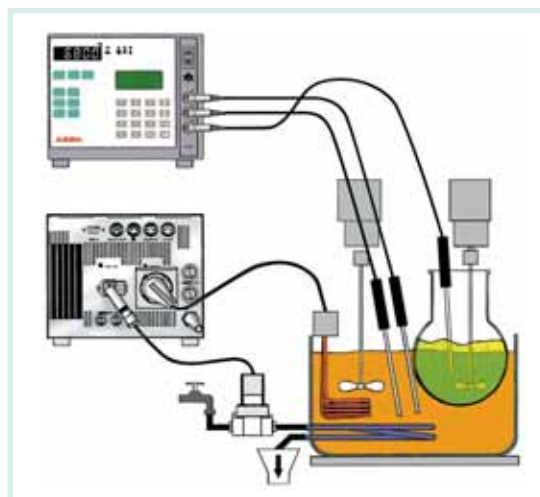
- Multi-Display (LED) with splash-proof keypad
- High/low temperature warning and cut-off
- RS232 Interface

### LC4-F additional features

- Separate operating elements for working and safety circuits
- 4 LED displays for actual values and setpoints (working & safety circuits)
- Analog inputs and outputs

### LC6 additional features

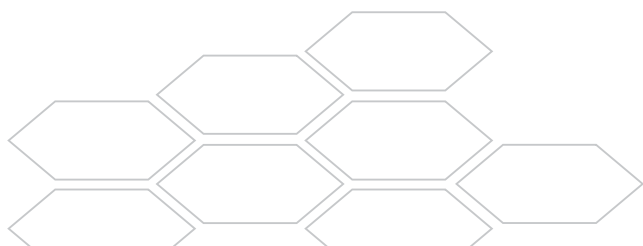
- 2 working sensors for different measurement locations (cascade-controller)
- Stakei connection for tap water cooling via solenoid valve
- Integrated programmer for 6 x 60 program steps



### Practical tip

The external system (e.g. heater) is connected via power socket (Schuko) at the back. Different sensors for working and safety temperatures control the application. Analog and digital interfaces are available for other applications.

JULABO Order No.	JULABO Model	Working temperature range °C	Temperature stability in ext. system °C	LED display/ resolution °C	LCD display/ resolution °C	Working sensor	Safety sensor	Max. connection wattage kW	Dimensions W x L x H cm
9 700 140	LC4	-50 ... +350	> ±0.05	2 / 0.1	--	1 x Pt100	1 x Pt100	2	17 x 17 x 16
9 700 142	LC4-F	-50 ... +350	> ±0.03	4 / 0.1	--	1 x Pt100	1 x Pt100	2	25 x 20 x 10
9 700 160	LC6	-100 ... +400	> ±0.03	1 / 0.01	1 / 0.01	2 x Pt100	1 x Pt100	3	21 x 18 x 18







| KRC50

| KRC180

## Refrigerators for Chemicals

for storing and cooling of chemicals and hazardous substances

JULABO refrigerators for chemicals are designed for storing and cooling hazardous substances. The spark free interior prevents damage caused by spilled or evaporating chemicals.

- With spark free interior
- Storing and cooling of hazardous substances
- Self-protecting control circuit
- Digital temperature display (LED)
- Overload protection for cooling compressor with test button
- Cut-off in case of disturbance with optical alarm signal
- Working and safety sensors are protected against short circuits and disconnection

JULABO Order No.	JULABO Model	Working temperature range °C	Temperature selection / display	Temperature stability °C	Volumetric capacity liters	Inner dimensions W x L x H cm	Outer dimensions W x L x H cm
8 800 705	KRC50	-2 ... +12	Analog / LED	±1	50	42 x 31 x 39	53 x 63 x 54
8 800 718	KRC180	-2 ... +12	Analog / LED	±1	180	52 x 40 x 70	60 x 64 x 86

# Easy Control and **Wireless** Communication





## Instrument Management via PC or Remote Control

JULABO facilitates the automation of applications. With *EasyTEMP Professional* temperature control units are comfortably controlled and monitored via PC. Laboratory instruments are easily connected via RS232, RS485 or Profibus. *WirelessTEMP*<sup>®</sup> permits wireless control and monitoring. Measurement values are easily recorded, documented and visualized on any PC or notebook.

- Increase efficiency by automating applications
- Convenient instrument control and operation directly from your workstation
- Instrument control via PC or easy remote control
- Numerous possibilities to visualize and record measuring values
- Monitoring of instruments without time-consuming inspection rounds
- Economic solutions for small and medium laboratories
- Easy to start and operate
- For virtually all JULABO units with an RS232 interface
- Download JULABO *EasyTEMP* software free of charge

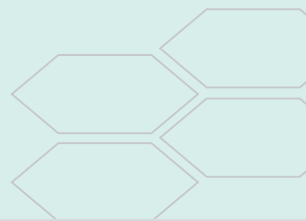


**Easy!**

Remote control  
Monitoring  
Visualization  
Documentation

**EasyTEMP**  
**PROFESSIONAL**

**WirelessTEMP**<sup>®</sup>  
Wireless Instrument Management!





## WirelessTEMP®

Accessories for wireless operation and monitoring of JULABO temperature control instruments

*WirelessTEMP*® products allow wireless monitoring and operation of up to eight JULABO temperature control instruments via PC or remote control.

- Comfortable operation of instruments directly from your workstation
- Reduces time and resources for monitoring the instruments
- Increased freedom in choosing a location for the instrument
- No need for communication cables
- Easy to handle *Remote Control*, also available in ATEX certified version

### Application examples



*Remote Control* to control and monitor up to 8 JULABO instruments



PC and *Wireless USB Stick* to control and monitor up to 8 JULABO instruments

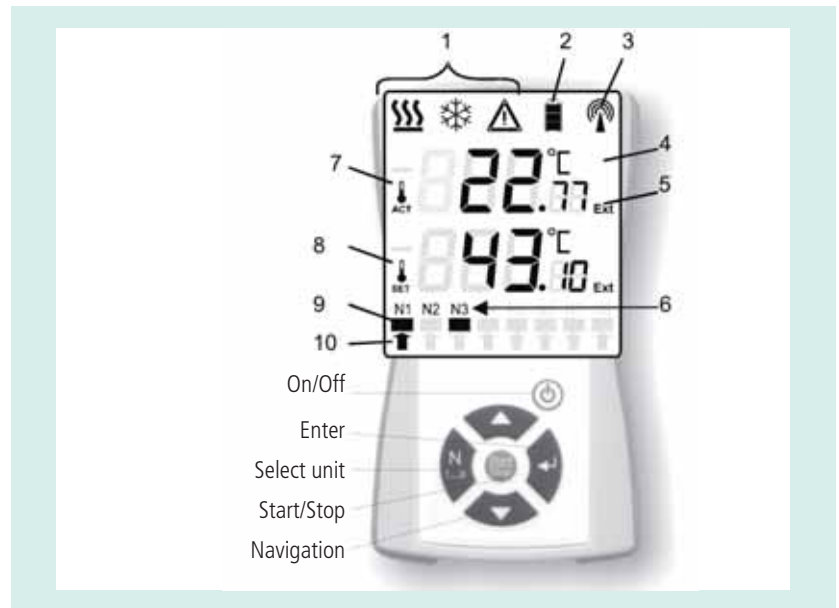
JULABO Order No.	JULABO Model / Description	Power supply	Dimensions W x L x H mm	Weight g
8 900 500	Remote Control	Plug-in power supply 100-240V~/50-60Hz or 3 batteries 1.5 V (AAA)	70 x 32 x 122	170
8 900 505	Remote Control, ATEX certified version	3 batteries 1.5 V (AAA)	70 x 32 x 122	170
8 900 520	Transmitter	Plug-in power supply 100-240V~/50-60Hz	43 x 24 x 88	45
8 900 540	Wireless USB Stick	via USB interface of PC	29 x 12 x 85	21
8 900 530	Router for extending wireless range	Plug-in power supply, available with plugs for EU, USA, UK	67 x 78 x 125	230
8 900 590	3 Spare batteries (ATEX approved)	--	--	--
8 901 105	EasyTEMP Professional Software	--	--	--



## Easy to handle Remote Control

Functions of *Remote Control* in detail

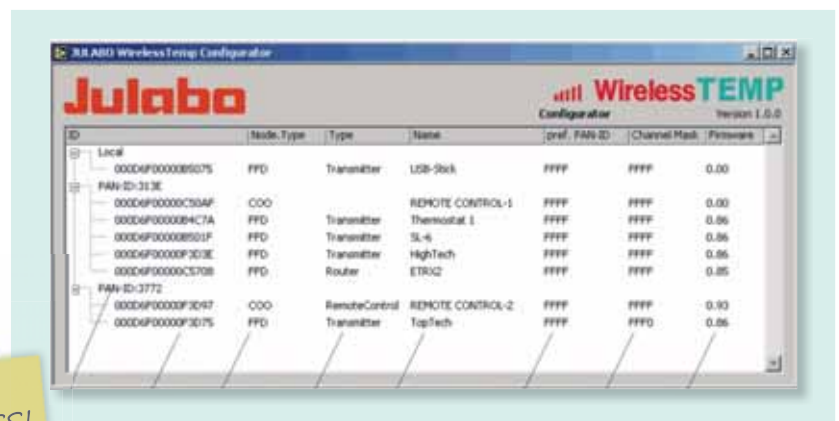
1. Status displays for heater, cooling, alarms
2. Battery status
3. Wireless connection status
4. Temperature in °C / °F or heating output in %
5. Internal/external temperature control
6. Displays all connected units
7. Displays actual temperature
8. Displays setpoint temperature
9. Displays start/stop status
10. Displays selected units







## Convenient Configuration

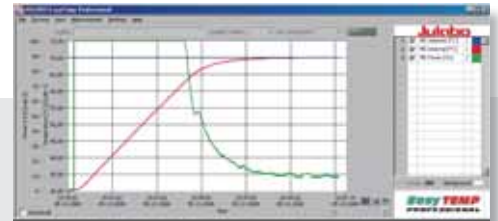
Easy network setup with software  
*WirelessTEMP*® Configurator

*WirelessTEMP*® Configurator software makes it easy to set up extensive networks. All units within a wireless network can be configured directly from a PC. This makes the task of establishing or expanding networks quick and easy. The software is included with the Wireless USB Stick.



JULABO Model	Functions	Included in delivery
	Remote control with display for up to 8 JULABO units <ul style="list-style-type: none"> <li>• Display and modification of setpoints and actual values</li> <li>• Display of output data, warning messages and error messages</li> <li>• Display and selection of units within wireless range</li> </ul>	Remote control, 3 batteries 1.5 V (AAA), supply plug with adapters for EU, USA, UK, CH, AU (100-240V~/50-60Hz, not with ATEX certified version).
	Send/receive module for JULABO instruments with RS232 interface <ul style="list-style-type: none"> <li>• Connects to RS232 interfaces</li> <li>• Receives control commands</li> <li>• Sends instrument data, status messages and measurement values to a PC or <i>Remote Control</i> unit</li> </ul>	Transmitter, adapter (gender changer) for RS232 interface of JULABO instrument, power supply with plug adapters for EU, USA, UK, CH, AU (100-240V~/50-60Hz).
	Send/receive module for PC/JULABO instruments with USB interface <ul style="list-style-type: none"> <li>• Connects to USB interface at PC or USB port</li> <li>• Sends control commands</li> <li>• Receives data, status messages and measurement values from the temperature control instruments</li> </ul>	Wireless USB Stick, Configuration software, driver software, USB extension cable, for Microsoft® Windows®.
	Extends wireless range <ul style="list-style-type: none"> <li>• Plug into any standard electrical socket</li> </ul>	Router, available with choice of AC adapters for EU, USA, UK. Please indicate choice when ordering!





Graphic display of temperatures in main window

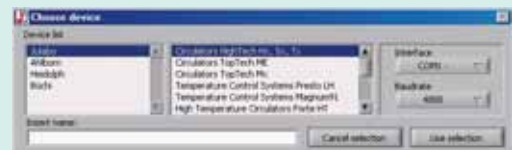
## EasyTEMP Professional Software

PC-Software to control, visualize and record

*EasyTEMP* Software allows control and monitoring of JULABO temperature control instruments using any Windows® based PC. *EasyTEMP* features a variety of functions to visualize and document temperature and time-dependent processes.

- Connect *WirelessTEMP*® via RS232, USB or wirelessly
- Diagram function for graphic display of measurement values
- Storage of measurement values for processing e.g. in Microsoft® Excel®
- Temperature profile programming with one second accuracy
- Display in degrees Celsius (°C) or Fahrenheit (°F)
- *EasyTemp* basic version: free of charge download
- *EasyTemp Professional* version with advanced functions

Easy set-up of laboratory instruments



Each laboratory instrument has its own control window

JULABO Order No.	JULABO Description	Suitable for
8 901 102	EasyTEMP Software (free of charge at <a href="http://www.julabo.de">www.julabo.de</a> )	Instruments with RS232
8 901 105	EasyTEMP Professional Software, incl. USB-Dongle	Instruments with RS232
8 980 073	RS232 interface cable, 2.5 m	Instruments with RS232
8 980 074	RS232 interface cable, 5 m	Instruments with RS232
8 980 075	RS232 interface cable, 3.0 m	Shaking water baths SW22 and SW23
8 900 110	USB interface adapter cable	Instruments with RS232
8 980 031	Ethernet / RS232 interface converter	Instruments with RS232
8 900 002	PB-2 Option: Integrated Profibus DP	Presto® PLUS, Forte HT
8 900 005	PB-5 Option: Integrated Profibus DP	HighTech circulators HL, SL
8 900 020	Profibus DP Interface	Instruments with RS232
8 900 022	Modbus Interface	Instruments with RS232
8 900 024	RS485 Interface	Instruments with RS232

## EasyTEMP Version Comparison

Control, visualize and document temperature and time-dependant processes using JULABO software. The free of charge *EasyTEMP* is perfect for simple control applications with one JULABO instrument (download at [www.julabo.de](http://www.julabo.de)). *EasyTEMP Professional* is available for more complex applications with up to 24 instruments. The software installs easily and offers instrument control via RS232 interface, USB converter or *WirelessTEMP*® accessories.



### Tip

Download the free of charge EasyTemp basic version at [www.julabo.de](http://www.julabo.de) NOW!

### Comparison of the JULABO *EasyTEMP* software versions



Control of one JULABO unit with integrated interface	•	•
Control of up to 24 JULABO units with integrated interface		•
Support of industrial standards like RS485 and Profibus		•
<b>Instrument:</b>		
Recording and display of currently measured values on PC	•	•
Setpoint programming via PC	•	•
Status indication	•	•
Individual control window for each unit		•
Simultaneous start of units with just one button		•
<b>Recording of measured values:</b>		
Graphic zoom data function	•	•
Displays up to 4 curves in one diagram	•	
Displays unlimited curves in one diagram		•
Curves can be assigned to individual scales		•
Insert formulas such as averaging, differences between measured values, etc.		•
Insert text comments with display in the diagram		•
<b>Ramp programming:</b>		
Ramp function up to 100 steps	•	
Ramp function up to 1000 steps (individually for each instrument)		•
Cyclic repetition of stored profiles	•	•
Modify running profiles	•	•
Graphic display of total profiles		•
<b>Data recording:</b>		
Records measured values in ASCII format	•	•
Records measured values in Microsoft® Excel®		•
Saves additional, relevant measuring data		•
Scalable recording pattern		•
Export function of graphs into JPG format		•
Uploads previously created recordings with print function		•
Control and integration of laboratory instruments of different makes e.g. stirrers, balances, dosing pumps, pH meters, etc.		on request

# Chill out at work thanks to our **Services**

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## Services

Competent advice and good service are JULABO customer support principles. We want you to operate your JULABO unit with success and satisfaction for a long time. Therefore we ensure the best support with our worldwide distribution network.

Divisions and service partners in many countries throughout the world inform and advise our customers in all topics of precise liquid temperature control.

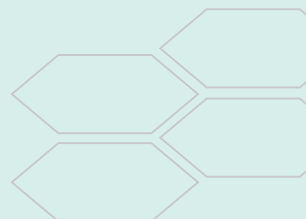
### Our Services

- Technical consultation
- Preventive maintenance contracts
- Equipment qualification
- On-site service
- Installation
- Calibration
- User training

### Your advantages

- Increased product life
- Prevention of down time
- Optimized equipment performance
- Predictable maintenance costs
- Cost reduction due to fewer repairs
- Conservation of investment value

Qualification  
 Maintenance  
 On-site service  
 Training  
 Certificates



## Certificates

Quality and precision is paramount for the production of JULABO units. Calibrations increase measuring accuracy and ensure that your equipment meets all specifications. JULABO provides manufacturer's calibration certificates for virtually all instruments. In addition JULABO offers on-site calibration for a large variety of our instruments and applications.

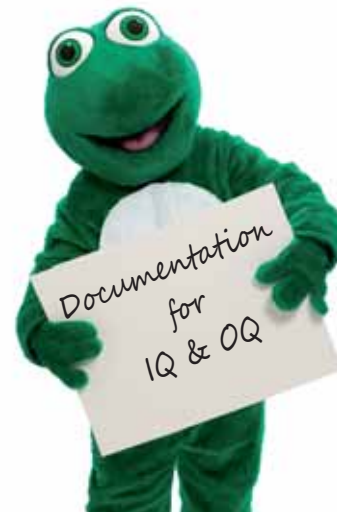


JULABO Order No.	Description
8 902 901	1-Point-Manufacturer's Calibration Certificate for JULABO circulators
8 902 903	3-Point-Manufacturer's Calibration Certificate for JULABO circulators
8 902 905	5-Point-Manufacturer's Calibration Certificate for JULABO circulators
8 903 015	Manufacturer's Testing Certificate for JULABO unit without built-in cooling
8 903 025	Manufacturer's Testing Certificate for JULABO cooling units <1 kW cooling power (at +20 °C)
8 903 035	Manufacturer's Testing Certificate for JULABO cooling units >1 kW cooling power (at +20 °C)

## IQ/OQ Documentation for Equipment Qualification

JULABO provides Installation and Operational Qualifications (IQ/OQ) for our product lines. Our IQ/OQ documentation includes the mandatory test protocols and standard operating procedures. At JULABO we offer a turn-key solution to assist with the qualification tasks associated with operating in a regulated facility.

Documentation is available for IQ (Installation Qualification) and OQ (Operational Qualification). The documents offered below are for new instruments. Documents for used instruments upon request. All documentation is available in German, English and French.



JULABO Order No.	Description	Valid for the following products
2 310 110	<b>IQ/OQ Documentation, Category 1</b>	<ul style="list-style-type: none"> <li>- Heating &amp; refrigerated circulators Economy series</li> <li>- Heating circulators TopTech series</li> <li>- Water baths TW series</li> <li>- Shaking water baths SW series</li> </ul>
2 310 120	<b>IQ/OQ Documentation, Category 2</b>	<ul style="list-style-type: none"> <li>- Refrigerated circulators TopTech series (except F70, F81, FP89)</li> <li>- Heating and refrigerated circulators HighTech series (except ultra-low circulators)</li> <li>- Cryo-compact circulators CF series</li> <li>- Recirculating coolers F &amp; FL series</li> </ul>
2 310 130	<b>IQ/OQ Documentation, Category 3</b>	<ul style="list-style-type: none"> <li>- Ultra-low refrigerated circulators TopTech &amp; HighTech series</li> <li>- High temperature circulators Forte HT series</li> <li>- Highly dynamic temperature control systems PRESTO®, Presto® PLUS &amp; Magnum 91</li> <li>- Recirculating coolers SemiChill series</li> </ul>



## Preventive Maintenance Contract

Scheduled maintenance increases your equipment's life time and ensures reliability, always optimizing the performance of your instrument. JULABO offers Preventive Maintenance and Service Contracts to meet your individual requirements.

### Your advantages

- Increased product life and optimized equipment performance
- Reduced down time
- Conservation of investment value
- Predictable maintenance costs



JULABO Order No.	Description	Available for the following products
2 350 100	<b>Preventive Maintenance Contracts Standard</b> include the following services: Visual inspection, technical diagnostics, read-out of BlackBox, testing of tube connections and bath fluid, thorough cleaning of condenser and other components, testing of temperature stability and sensor calibration, testing/measuring of pump and cooling capacity (depending on model) and Firmware update (if no hardware adjustment is required)	JULABO Program
2 350 110	<b>Preventive Maintenance Contracts Premium</b> include all services listed above as well as spare parts and labor required for installation or replacement	JULABO Program

JULABO service contracts include the maintenance of the units as stated in the contract once per year. Availability is subject to model and country.

## Rental Equipment

If you have a sudden need for additional units or a replacement unit to avoid down time, you can now rent JULABO equipment. Equipment in various performance categories is available. Rental period and product availability is subject to model and country. Contact us for more information or quotations.



## On-Site Service

JULABO offers on-site service by qualified experts. Many problems can be solved directly on-site, avoiding time-consuming and expensive return shipments. Availability of service is subject to country. For further information call our **service hotline +49 (0) 7823 51-66**.

### JULABO Services

- Installation
- Repair & maintenance
- Calibration
- User training

*On our way to you!*



## Training

Extensive training programs are available at the JULABO training center or directly at your location. As training schedules are designed individually to your requirements, beginners as well as 'JULABO experts' will benefit. Make use of our know-how and get further information on our training programs by calling +49 (0) 7823 51-190.



**Telephone**  
**+49 (0) 7823 51-190**

## Online Services

JULABO offers comprehensive services online. Choose the categories 'Support' or 'Downloads' and access catalogs, data sheets, operating manuals, case studies and much more. JULABO online service is available 24 hours a day and 7 days per week at [www.julabo.de](http://www.julabo.de).



## Technical Specifications

### Refrigerated/Heating Circulators | Cryo-Compact Circulators

JULABO Model	JULABO Order No.	Working temperature range	Setting/ display resolution	Temperature control	Temp. stability	Heat. cap.	Cooling of refrigeration unit	Cooling capacity (Bath fluid: Ethanol)			
		°C	°C		°C	kW		+20 °C	0 °C	-20 °C	-40 °C
F12-ED	9 116 612	-20 ... +100	0.1	PID1	±0.03	2	Air	0.16	0.1	0.02	-
F25-ED	9 116 625	-28 ... +100	0.1	PID1	±0.03	2	Air	0.26	0.2	0.06	-
F26-ED	9 116 626	-28 ... +100	0.1	PID1	±0.03	2	Air	0.26	0.2	0.06	-
F34-ED	9 116 634	-30 ... +100	0.1	PID1	±0.03	2	Air	0.45	0.32	0.14	-
F12-EH	9 118 612	-20 ... +150	0.1	PID1	±0.03	2	Air	0.16	0.1	0.02	-
F25-EH	9 118 625	-28 ... +150	0.1	PID1	±0.03	2	Air	0.26	0.2	0.06	-
FN25-EH	9 118 625N	-28 ... +150	0.1	PID1	±0.03	2	Air	0.26	0.2	0.06	-
F32-EH	9 118 632	-35 ... +150	0.1	PID1	±0.03	2	Air	0.45	0.39	0.15	-
FN32-EH	9 118 632N	-35 ... +150	0.1	PID1	±0.03	2	Air	0.45	0.39	0.15	-
F33-EH	9 118 633	-30 ... +150	0.1	PID1	±0.03	2	Air	0.5	0.32	0.12	-
F34-EH	9 118 634	-30 ... +150	0.1	PID1	±0.03	2	Air	0.45	0.32	0.14	-
F38-EH	9 118 638	-35 ... +80	0.1	PID1	±0.05	2	Air	0.92	0.66	0.32	-
F12-MA	9 153 612	-20 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.16	0.1	0.02	-
F25-MA	9 153 625	-28 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.26	0.2	0.06	-
FN25-MA	9 153 625N	-28 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.26	0.2	0.06	-
F32-MA	9 153 632	-35 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.45	0.39	0.15	-
FN32-MA	9 153 632N	-35 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.45	0.39	0.15	-
F33-MA	9 153 633	-30 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.5	0.32	0.12	-
F34-MA	9 153 634	-30 ... +150	0.01/0.1	PID2	±0.02	2	Air	0.45	0.32	0.14	-
FP35-MA	9 153 618	-35 ... +150	0.01/0.1	PID2	±0.02	2	Air	0.45	0.39	0.15	-
FP40-MA	9 153 640	-40 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.68	0.5	0.32	0.04
FP50-MA	9 153 650	-50 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.9	0.8	0.5	0.16
FPW50-MA	9 153 651	-50 ... +200	0.01/0.1	PID2	±0.02	2	Water	0.9	0.8	0.5	0.16
F25-ME	9 162 625	-28 ... +200	0.01	PID3	±0.01	2	Air	0.26	0.2	0.06	-
FN25-ME	9 162 625N	-28 ... +200	0.01	PID2	±0.01	2	Air	0.26	0.2	0.06	-
F26-ME	9 162 626	-28 ... +200	0.01	PID3	±0.01	2	Air	0.26	0.2	0.06	-
F32-ME	9 162 632	-35 ... +200	0.01	PID3	±0.01	2	Air	0.45	0.39	0.15	-
FN32-ME	9 162 632N	-35 ... +200	0.01	PID2	±0.01	2	Air	0.45	0.39	0.15	-
F33-ME	9 162 633	-30 ... +200	0.01	PID3	±0.01	2	Air	0.5	0.32	0.12	-
F34-ME	9 162 634	-30 ... +150	0.01	PID3	±0.01	2	Air	0.45	0.32	0.14	-
FP40-ME	9 162 640	-40 ... +200	0.01	PID3	±0.01	2	Air	0.68	0.5	0.32	0.04
FP50-ME	9 162 650	-50 ... +200	0.01	PID3	±0.01	2	Air	0.9	0.8	0.5	0.16
FPW50-ME	9 162 651	-50 ... +200	0.01	PID3	±0.01	2	Water	0.9	0.8	0.5	0.16
F25-HE	9 212 625	-28 ... +200	0.01	ICC	±0.01	2	Air	0.26	0.2	0.06	-
FN25-HE	9 212 625N	-28 ... +200	0.01	ICC	±0.01	2	Air	0.26	0.2	0.06	-
F32-HE	9 212 632	-35 ... +200	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
FN32-HE	9 212 632N	-35 ... +200	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
F34-HE	9 212 634	-30 ... +150	0.01	ICC	±0.01	2	Air	0.45	0.32	0.14	-
FP40-HE	9 212 640	-40 ... +200	0.01	ICC	±0.01	2	Air	0.68	0.5	0.32	0.04
FP45-HE	9 212 645	-42 ... +200	0.01	ICC	±0.01	2	Air	0.85	0.7	0.42	0.08
FP50-HE	9 212 650	-50 ... +200	0.01	ICC	±0.01	2	Air	0.9	0.8	0.5	0.16
FPW50-HE	9 212 651	-50 ... +200	0.01	ICC	±0.01	2	Water	0.9	0.8	0.5	0.16
F25-HL	9 312 625	-28 ... +200	0.01	ICC	±0.01	2	Air	0.26	0.2	0.06	-

Pump capacity		Flow rate	Pump connections	Barbed fitting diameter	Bath opening/depth W x L / D	Filling volume	Classification acc. to DIN 12876-1	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Suction										
bar	bar	l/min		inner dia.	cm	liters		V / Hz / A	cm	kg	
0.35	-	15	M10x1	8 / 10 mm	13 x 15 / 13	4.5	I (NFL)	230/50/11	20 x 36 x 56	22	F12-ED
0.35	-	15	M10x1	8 / 10 mm	12 x 14 / 14	4.5	I (NFL)	230/50/12	23 x 42 x 61	30	F25-ED
0.35	-	15	M10x1	8 / 10 mm	12 x 14 / 14	4.5	I (NFL)	230/50/12	42 x 42 x 42	30	F26-ED
0.35	-	15	M10x1	8 / 10 mm	24 x 30 / 15	20	I (NFL)	230/50/12	38 x 58 x 62	41	F34-ED
0.35	-	15	M10x1	8 / 10 mm	13 x 15 / 13	4.5	III (FL)	230/50/11	20 x 36 x 56	22	F12-EH
0.35	-	15	M10x1	8 / 10 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 42 x 61	30	F25-EH
0.35	-	15	M10x1	8 / 10 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 50 x 61	31	FN25-EH
0.35	-	15	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50/12	31 x 42 x 64	36	F32-EH
0.35	-	15	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50/12	31 x 50 x 64	37	FN32-EH
0.35	-	15	M10x1	8 / 10 mm	23 x 14 / 20	16	III (FL)	230/50/12	36 x 46 x 69	43	F33-EH
0.35	-	15	M10x1	8 / 10 mm	24 x 30 / 15	20	III (FL)	230/50/12	38 x 58 x 62	41	F34-EH
0.35	-	15	M10x1	8 / 10 mm	35 x 41 / 27	45	III (FL)	230/50/13	46 x 70 x 89	67	F38-EH
0.23-0.45	-	11-16	M10x1	8 / 10 mm	13 x 15 / 13	4.5	III (FL)	230/50/11	20 x 36 x 56	23	F12-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 42 x 61	31	F25-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 50 x 61	32	FN25-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50-60/13	31 x 42 x 64	37	F32-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50/12	31 x 50 x 64	38	FN32-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	23 x 14 / 20	16	III (FL)	230/50/12	36 x 46 x 69	44	F33-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	24 x 30 / 15	20	III (FL)	230/50/12	38 x 58 x 62	42	F34-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 x 12 / -	2.5	III (FL)	230/50/12	31 x 42 x 64	37	FP35-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	23 x 14 / 20	16	III (FL)	230/50/13	37 x 46 x 69	48	FP40-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 X 12 /15	8	III (FL)	230/50/14	42 x 49 x 70	55	FP50-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 X 12 /15	8	III (FL)	230/50/14	42 x 49 x 70	55	FPW50-MA
0.23-0.45	-	11-16	M10x1	8 / 10 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 42 x 61	31	F25-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 50 x 61	32	FN25-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	42 x 42 x 42	31	F26-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50-60/13	31 x 42 x 64	37	F32-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50/12	31 x 50 x 64	38	FN32-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	23 x 14 / 20	16	III (FL)	230/50/12	36 x 46 x 69	44	F33-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	24 x 30 / 15	20	III (FL)	230/50/12	38 x 58 x 62	42	F34-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	23 x 14 / 20	16	III (FL)	230/50/13	37 x 46 x 69	48	FP40-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50/14	42 x 49 x 70	55	FP50-ME
0.23-0.45	-	11-16	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50/14	42 x 49 x 70	55	FPW50-ME
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 42 x 64	32	F25-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 50 x 64	33	FN25-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50-60/12	31 x 42 x 66	38	F32-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50/12	31 x 50 x 66	39	FN32-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	24 x 30 / 15	20	III (FL)	230/50/12	38 x 58 x 64	44	F34-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	23 x14 / 20	16	III (FL)	230/50/13	37 x 46 x 71	49	FP40-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	23 x 26 / 20	26	III (FL)	230/50-60/13	38 x 58 x 69	53	FP45-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50/14	42 x 49 x 72	57	FP50-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50/14	42 x 49 x 72	57	FPW50-HE
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 42 x 64	32	F25-HL

JULABO Model	JULABO Order No.	Working temperature range	Setting/ display resolution	Temperature control	Temp. stability	Heat. cap.	Cooling of refrigeration unit	Cooling capacity (Bath fluid: Ethanol)			
		°C	°C					+20 °C	0 °C	-20 °C	-40 °C
FN25-HL	9 312 625N	-28 ... +200	0.01	ICC	±0.01	2	Air	0.26	0.2	0.06	-
F32-HL	9 312 632	-35 ... +200	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
FN32-HL	9 312 632N	-35 ... +200	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
F33-HL	9 312 633	-30 ... +200	0.01	ICC	±0.01	2	Air	0.5	0.32	0.12	-
FP35-HL	9 312 618	-35 ... +150	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
FP40-HL	9 312 640	-40 ... +200	0.01	ICC	±0.01	2	Air	0.68	0.5	0.32	0.04
FP45-HL	9 312 645	-42 ... +200	0.01	ICC	±0.01	2	Air	0.85	0.7	0.42	0.08
FP50-HL	9 312 650	-50 ... +200	0.01	ICC	±0.01	2	Air	0.9	0.8	0.5	0.16
FPW50-HL	9 312 651	-50 ... +200	0.01	ICC	±0.01	2	Water	0.9	0.8	0.5	0.16
CF30	9 400 330	-30 ... +150	0.1	PID1	±0.03	2	Air	0.32	0.25	0.15	-
CF40	9 400 340	-40 ... +150	0.1	PID1	±0.03	2	Air	0.47	0.4	0.28	-
CF31	9 400 331	-30 ... +200	0.01	ICC	±0.02	2	Air	0.32	0.25	0.15	-
CF41	9 400 341	-40 ... +200	0.01	ICC	±0.02	2	Air	0.47	0.4	0.28	-

### Ultra-low Refrigerated Circulators

JULABO Model	JULABO Order No.	Working temperature range	Setting/ display resolution	Temp. control	Temp. stability	Heat. cap.	Cooling of refrigeration unit	Cooling capacity (Bath fluid: Ethanol)					
		°C	°C					+20 °C	0 °C	-20 °C	-40 °C	-60 °C	-80 °C
F70-ME	9 162 670	-70 ... +100	0.01	PID3	±0.02	1.3	Air	0.34	0.22	0.17	0.13	0.07	-
F81-ME	9 162 681	-81 ... +100	0.01	PID3	±0.02	1.3	Air	0.45	0.38	0.36	0.32	0.27	0.07
FP89-ME	9 162 689	-90 ... +100	0.01	PID3	±0.02	1.3	Air	1.0	0.92	0.88	0.75	0.58	0.2
FP51-SL	9 352 751	-51 ... +200	0.01	ICC	±0.05	3	Air	2.0	1.5	1.0	0.26	-	-
FP52-SL	9 352 752	-60 ... +100	0.01	ICC	±0.05	3	Air	3.0	2.8	1.6	0.65	0.1	-
FP55-SL	9 352 755	-60 ... +100	0.01	ICC	±0.05	3	Air	5.2	4.1	2.2	0.70	0.13	-
F81-HL	9 312 681	-81 ... +100	0.01	ICC	±0.02	1.3	Air	0.45	0.38	0.36	0.32	0.27	0.07
FP89-HL	9 312 689	-90 ... +100	0.01	ICC	±0.02	1.3	Air	1.0	0.92	0.88	0.75	0.58	0.20
FP90-SL	9 352 790	-90 ... +100	0.01	ICC	±0.05	3	Air	1.8	1.7	1.6	1.35	0.75	0.15
FPW52-SL	9 352 753	-60 ... +100	0.01	ICC	±0.05	3	Water	3.0	2.8	1.6	0.65	0.1	-
FPW55-SL	9 352 756	-60 ... +100	0.01	ICC	±0.05	3	Water	5.5	4.1	2.2	1.0	0.13	-
FPW90-SL	9 352 791	-90 ... +100	0.01	ICC	±0.05	3	Water	1.8	1.7	1.6	1.35	0.75	0.15
FPW91-SL	9 352 793	-91 ... +100	0.01	ICC	±0.2	3	Water	4.5	4.1	3.7	3.1	2.0	0.75
FP52-SL	9 352 752N	-60 ... +100	0.01	ICC	±0.05	3	Air	3.0	2.8	1.6	0.65	0.1	-
FP55-SL	9 352 755N	-60 ... +100	0.01	ICC	±0.05	3	Air	5.2	4.1	2.2	0.7	0.13	-
FP52-SL	9 352 752N150	-60 ... +150	0.01	ICC	±0.05	3	Air	3.0	2.8	1.6	0.65	0.1	-
FP55-SL	9 352 755N150	-60 ... +150	0.01	ICC	±0.05	3	Air	5.2	4.1	2.2	0.7	0.13	-
FPW52-SL	9 352 753N	-60 ... +100	0.01	ICC	±0.05	3	Water	3.0	2.8	1.6	0.65	0.1	-
FPW55-SL	9 352 756N	-60 ... +100	0.01	ICC	±0.05	3	Water	5.5	4.1	2.2	1.0	0.13	-
FPW52-SL	9 352 753N150	-60 ... +150	0.01	ICC	±0.05	3	Water	3.0	2.8	1.6	0.65	0.1	-
FPW55-SL	9 352 756N150	-60 ... +150	0.01	ICC	±0.05	3	Water	5.5	4.1	2.2	1.0	0.13	-
FP90-SL	9 352 790N	-90 ... +100	0.01	ICC	±0.05	3	Air	1.8	1.7	1.6	1.35	0.75	0.15
F95-SL	9 352 795N	-95 ... 0	0.01	ICC	±0.05	3	Air	-	1.7	1.5	1.3	1.1	0.36
FP90-SL	9 352 790N150	-90 ... +150	0.01	ICC	±0.05	3	Air	1.8	1.7	1.6	1.35	0.75	0.15
FPW90-SL	9 352 791N	-90 ... +100	0.01	ICC	±0.05	3	Water	1.8	1.7	1.6	1.35	0.75	0.15
FPW91-SL	9 352 793N	-91 ... +100	0.01	ICC	±0.2	3	Water	4.5	4.1	3.7	3.1	2.0	0.75
FW95-SL	9 352 796N	-95 ... 0	0.01	ICC	±0.05	3	Water	-	1.7	1.5	1.3	1.1	0.36
FPW90-SL	9 352 791N150	-90 ... +150	0.01	ICC	±0.05	3	Water	1.8	1.7	1.6	1.35	0.75	0.15

Pump capacity			Pump connections	Barbed fitting diameter	Bath opening/depth W x L / D	Filling volume	Classification acc. to DIN 12876-1	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Suction	Flow rate									
bar	bar	l/min		inner dia.	cm	liters		V / Hz / A	cm	kg	
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	12 x 14 / 14	4.5	III (FL)	230/50/12	23 x 50 x 64	33	FN25-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50-60/12	31 x 42 x 66	38	F32-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50/12	31 x 50 x 66	39	FN32-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	23 x 14 / 20	16	III (FL)	230/50/12	36 x 46 x 71	45	F33-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / -	2.5	III (FL)	230/50/12	31 x 42 x 66	38	FP35-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	23 x 14 / 20	16	III (FL)	230/50/13	37 x 46 x 71	49	FP40-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	23 x 26 / 20	26	III (FL)	230/50-60/13	38 x 58 x 59	53	FP45-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50/14	42 x 49 x 72	57	FP50-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 15	8	III (FL)	230/50/14	42 x 49 x 72	57	FPW50-HL
0.35	-	15	M16x1	8 / 12 mm	16 x 3 / 14	3.5	III (FL)	230/50/10	24 x 46 x 40	35	CF30
0.35	-	15	M16x1	8 / 12 mm	19 x 3 / 19	5.5	III (FL)	230/50/12	28 x 46 x 46	41	CF40
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	16 x 3 / 14	3.5	III (FL)	230/50/11	24 x 46 x 40	36	CF31
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	19 x 3 / 19	5.5	III (FL)	230/50/13	28 x 46 x 46	42	CF41

Pump capacity			Pump connections	Barbed fitting diameter	Bad opening/depth W x L / D	Filling volume	Classification acc. to DIN 12876-1	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Suction	Flow rate									
bar	bar	l/min		inner dia.	cm	liters		V / Hz / A	cm	kg	
0.23-0.45	-	11-16	M16x1	8 / 12 mm	12 x 12 / 13	4.5	III (FL)	230/50/14	42 x 54 x 71	63	F70-ME
0.23-0.45	-	11-16	M16x1	8 / 12 mm	13 x 15 / 16	6.5	III (FL)	230/50-60/16	50 x 58 x 88	86	F81-ME
0.23-0.45	-	11-16	M16x1	8 / 12 mm	13 x 15 / 16	8	III (FL)	230/50/14	55 x 60 x 90	133	FP89-ME
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	18 x 12 / 20	11	III (FL)	3x400/50/14	46 x 55 x 89	90	FP51-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	28 x 23 / 22	24	III (FL)	3x400/50/16	59 x 76 x 116	156	FP52-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	28 x 23 / 22	27	III (FL)	3x400/50/20	85 x 76 x 116	182	FP55-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	13 x 15 / 16	6.5	III (FL)	230/50-60/16	50 x 58 x 89	88	F81-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	13 x 15 / 16	8	III (FL)	230/50/14	55 x 60 x 92	135	FP89-HL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	28 x 23 / 22	22	III (FL)	3x400/50/22	59 x 76 x 116	195	FP90-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	28 x 23 / 22	24	III (FL)	3x400/50/16	59 x 76 x 116	153	FPW52-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	28 x 23 / 22	27	III (FL)	3x400/50/20	59 x 76 x 116	163	FPW55-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	28 x 23 / 22	22	III (FL)	3x400/50/22	59 x 76 x 116	188	FPW90-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	28 x 23 / 22	22	III (FL)	3x400/50/32	85 x 76 x 116	296	FPW91-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	24	III (FL)	3x400/50/16	59 x 76 x 116	156	FP52-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	27	III (FL)	3x400/50/20	85 x 76 x 116	182	FP55-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	24	III (FL)	3x400/50/16	59 x 76 x 116	156	FP52-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	27	III (FL)	3x400/50/20	85 x 76 x 116	182	FP55-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	24	III (FL)	3x400/50/16	59 x 76 x 116	153	FPW52-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	27	III (FL)	3x400/50/20	59 x 76 x 116	163	FPW55-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	24	III (FL)	3x400/50/16	59 x 76 x 116	153	FPW52-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	27	III (FL)	3x400/50/20	59 x 76 x 116	163	FPW55-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	22	III (FL)	3x400/50/22	59 x 76 x 116	195	FP90-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	22	III (FL)	3x400/50/24	59 x 76 x 116	201	F95-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	22	III (FL)	3x400/50/22	59 x 76 x 116	195	FP90-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	22	III (FL)	3x400/50/22	59 x 76 x 116	188	FPW90-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	22	III (FL)	3x400/50/32	85 x 76 x 116	296	FPW91-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	22	III (FL)	3x400/50/24	59 x 76 x 116	198	FW95-SL
0.4-0.7	0.2-0.4	22-26	M16x1	8 / 12 mm	filling port	22	III (FL)	3x400/50/22	59 x 76 x 116	188	FPW90-SL



## Heating Immersion Circulators | Bridge Mounted Circulators

JULABO Model	JULABO Order No.	Working temperature range	Setting / display resolution	Temperature control	Temp. stability	Heating capacity	Pump capacity		
							Pressure	Suction	Flow rate
		°C	°C		°C	kW	bar	bar	l/min.
ED	9 116 000	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
EH	9 118 000	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
MB	9 142 000	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
MA	9 153 000	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
ME	9 162 000	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
SE-Z	9 252 218	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26

## Open Heating Bath Circulators | Heating Circulators with Open Bath

JULABO Model	JULABO Order No.	Working temperature range	Setting / display resolution	Temperature control	Temp. stability	Heating capacity	Pump capacity		
							Pressure	Suction	Flow rate
		°C	°C		°C	kW	bar	bar	l/min.
ED-5A/B	9 116 315	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-7A/B	9 116 317	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-5M/B	9 116 515	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-13A	9 116 313	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-19A	9 116 319	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-13M	9 116 513	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-19M	9 116 519	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
MB-13A	9 142 313	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-19A	9 142 319	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
ED-13	9 116 413	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-17	9 116 417	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-19	9 116 419	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-27	9 116 427	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-33	9 116 433	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
MB-13	9 142 413	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-19	9 142 419	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
ED-5A	9 116 305	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-5M	9 116 505	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
MB-5A	9 142 305	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-7A	9 142 307	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-5M	9 142 505	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
ED-5	9 116 405	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
EH-5	9 118 405	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-13	9 118 413	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-19	9 118 419	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-27	9 118 427	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-33	9 118 433	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-39	9 118 439	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
MB-5	9 142 405	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10

Pump connections	Barbed fitting diameter	Usable immersion depth	Classification according to DIN 12876-1	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
-	-	8 - 14.5	I (NFL)	230/50/9	13 x 15 x 33	3.3	ED
-	-	8 - 14.5	III (FL)	230/50/9	13 x 15 x 33	3.3	EH
-	-	8 - 14.5	I (NFL)	230/50/9	13 x 15 x 33	3.3	MB
-	-	8 - 14.5	III (FL)	230/50-60/9	13 x 15 x 33	4	MA
-	-	8 - 14.5	III (FL)	230/50-60/9	13 x 15 x 33	4	ME
M16x1	8 / 12 mm	12 - 19	III (FL)	230/50-60/13	32 x 17 x 40	8	SE-Z

Pump connections	Barbed fitting diameter	Bath opening/ Bath depth W x L / D	Fill. vol.	Cooling coil	Bath cover	Classification according to DIN 12876-1	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
-	-	12 x 24 / 15	5	-	-	I (NFL)	230/50/9	14 x 40 x 35	5.3	ED-5A/B
-	-	12 x 34 / 15	7	-	-	I (NFL)	230/50/9	14 x 50 x 35	5.6	ED-7A/B
-	-	12 x 24 / 15	5	-	-	I (NFL)	230/50/9	14 x 40 x 35	5.2	ED-5M/B
-	-	18 x 30 / 15	13	Option	-	I (NFL)	230/50/9	41 x 33 x 36	7.5	ED-13A
-	-	36 x 30 / 15	19	Option	-	I (NFL)	230/50/9	55 x 33 x 36	8.5	ED-19A
-	-	18 x 30 / 15	13	Option	-	I (NFL)	230/50/9	41 x 33 x 37	7.5	ED-13M
-	-	36 x 30 / 15	19	Option	-	I (NFL)	230/50/9	55 x 33 x 37	8.5	ED-19M
-	-	18 x 30 / 15	13	Option	-	I (NFL)	230/50/9	41 x 33 x 36	7.5	MB-13A
-	-	36 x 30 / 15	19	Option	-	I (NFL)	230/50/9	55 x 33 x 36	8.5	MB-19A
-	-	18 x 30 / 15	13	Option	Option	I (NFL)	230/50/9	39 x 33 x 37	8	ED-13
-	-	18 x 30 / 20	17	Option	Option	I (NFL)	230/50/9	39 x 33 x 42	10	ED-17
-	-	36 x 30 / 15	19	Option	Option	I (NFL)	230/50/9	57 x 33 x 37	11	ED-19
-	-	36 x 30 / 20	27	Option	Option	I (NFL)	230/50/9	57 x 37 x 42	13	ED-27
-	-	67 x 30 / 15	33	Option	Option	I (NFL)	230/50/9	91 x 33 x 38	20	ED-33
-	-	18 x 30 / 15	13	Option	Option	I (NFL)	230/50/9	39 x 33 x 37	8	MB-13
-	-	36 x 30 / 15	19	Option	Option	I (NFL)	230/50/9	57 x 33 x 37	11	MB-19
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.3	ED-5A
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.2	ED-5M
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.3	MB-5A
M10x1	8 / 10 mm	12 x 34 / 15	7	Integrated	-	I (NFL)	230/50/9	14 x 50 x 35	5.6	MB-7A
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.2	MB-5M
M10x1	8 / 10 mm	15 x 15 / 15	4.5	Integrated	Integrated	I (NFL)	230/50/9	17 x 33 x 36	7	ED-5
M10x1	8 / 10 mm	15 x 15 / 15	4.5	Integrated	Integrated	III (FL)	230/50/9	17 x 33 x 36	7	EH-5
M10x1	8 / 10 mm	18 x 30 / 15	13	Option	Option	III (FL)	230/50/9	39 x 33 x 37	8	EH-13
M10x1	8 / 10 mm	36 x 30 / 15	19	Option	Option	III (FL)	230/50/9	57 x 33 x 37	11	EH-19
M10x1	8 / 10 mm	36 x 30 / 20	27	Option	Option	III (FL)	230/50/9	57 x 37 x 42	13	EH-27
M10x1	8 / 10 mm	67 x 30 / 15	33	Option	Option	III (FL)	230/50/9	91 x 33 x 38	20	EH-33
M10x1	8 / 10 mm	36 x 30 / 30	39	Option	Option	III (FL)	230/50/9	54 x 34 x 52	19	EH-39
M10x1	8 / 10 mm	15 x 15 / 15	4.5	Integrated	Integrated	I (NFL)	230/50/9	17 x 33 x 36	7	MB-5

## Heating Circulators

JULABO Model	JULABO Order No.	Working temperature range	Setting / display resolution	Temperature control	Temp. stability	Heating capacity	Pump capacity		
		°C	°C		°C	kW	Pressure bar	Suction bar	Flow rate l/min.
MA-4	9 153 504	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
MA-6	9 153 506	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
MA-12	9 153 512	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
MA-26	9 153 526	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
ME-4	9 162 504	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
ME-6	9 162 506	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
ME-12	9 162 512	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
ME-26	9 162 526	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
HE-4	9 212 504	+20 ... +250	0.01	ICC	±0.01	2	0.4 - 0.7	0.2 - 0.4	22 - 26
SE-6	9 252 506	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SE-12	9 252 512	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SE-26	9 252 526	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
HL-4	9 312 504	+20 ... +250	0.01	ICC	±0.01	2	0.4 - 0.7	0.2 - 0.4	22 - 26
SL-6	9 352 506	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SL-12	9 352 512	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SL-26	9 352 526	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26

## Presto® Highly Dynamic Temperature Control Systems | Process Circulators

JULABO Model	JULABO Order No.	Working temp. range	User interface / resolution	Temp. contr.	Temperature stability	Heat cap.	Cooling of refrigeration unit	Cooling capacity (Bath fluid: JULABO Thermal   Ethanol)							
								+200	+20	0	-20	-30	-40	-60	-80 °C
		°C	°C		°C	kW		kW	kW	kW	kW	kW	kW	kW	kW
A30	9 420 300	-30 ... +250	5.7" TFT /±0.01°C	ICC	±0.01 ... ±0.05	2.7	1-st. Air	0.5	0.5	0.4	0.2	0.05	-	-	-
A40	9 420 401	-40 ... +250	5.7" TFT /±0.01°C	ICC	±0.01 ... ±0.05	2.7	1-st. Air	1.2	1.2	0.9	0.6	0.3	0.1	-	-
W40	9 421 401	-40 ... +250	5.7" TFT /±0.01°C	ICC	±0.01 ... ±0.05	2.7	1-st. Water	1.2	1.2	1.0	0.55	0.3	0.06	-	-
A80	9 420 801	-80 ... +250	5.7" TFT /±0.01°C	ICC	±0.01 ... ±0.05	1.8	2-st. Air	1.2	1.2	1.2	1.1	1.1	1.1	0.65	0.1
A80t	9 420 801.T	-80 ... +250	5.7" TFT /±0.01°C	ICC	±0.01 ... ±0.05	3.4	2-st. Air	1.2	1.2	1.2	1.1	1.1	1.1	0.65	0.1
W80	9 421 801	-80 ... +250	5.7" TFT /±0.01°C	ICC	±0.01 ... ±0.05	1.8	2-st. Water	1.2	1.2	1.2	1.1	1.1	1.1	0.65	0.1
W80t	9 421 801.T	-80 ... +250	5.7" TFT /±0.01°C	ICC	±0.01 ... ±0.05	3.4	2-st. Water	1.2	1.2	1.2	1.1	1.1	1.1	0.65	0.1
W91	9 421 912	-91 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	12	2-st. Water	11.0	11.0	10.0	9.5		9.0	6.5	1.5
W91t	9 421 912.T	-91 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	24	2-st. Water	11.0	11.0	10.0	9.5		9.0	6.5	1.5
W91tt	9 421 912.TT	-91 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	36	2-st. Water	11.0	11.0	10.0	9.5		9.0	6.5	1.5
W91x	9 421 913	-91 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	12	2-st. Water	11.0	11.0	10.0	9.5		9.0	6.5	1.5
W91tx	9 421 913.T	-91 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	24	2-st. Water	11.0	11.0	10.0	9.5		9.0	6.5	1.5
W91ttx	9 421 913.TT	-91 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	36	2-st. Water	11.0	11.0	10.0	9.5		9.0	6.5	1.5
W92	9 421 922	-92 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	12	2-st. Water	31.0	19.0	15.5	9.5		9.0	6.5	1.5
W92t	9 421 922.T	-92 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	24	2-st. Water	31.0	19.0	15.5	9.5		9.0	6.5	1.5
W92tt	9 421 922.TT	-92 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	36	2-st. Water	31.0	19.0	15.5	9.5		9.0	6.5	1.5
W92x	9 421 923	-92 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	12	2-st. Water	31.0	19.0	15.5	9.5		9.0	6.5	1.5
W92tx	9 421 923.T	-92 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	24	2-st. Water	31.0	19.0	15.5	9.5		9.0	6.5	1.5
W92ttx	9 421 923.TT	-92 ... +250	5.7" TFT /±0.01°C	ICC	±0.05 ... ±0.2	36	2-st. Water	31.0	19.0	15.5	9.5		9.0	6.5	1.5
LH46	9 410 246	-45 ... +250	LCD/VFD/ ±0.01°C	ICC	±0.01... ±0.05	1.8	1-st. Air/Water	2.5	2.3	1.4	0.70		0.10	-	-
LH47	9 410 247	-47 ... +250	LCD/VFD/ ±0.01°C	ICC	±0.01... ±0.05	1.8	1-st. Air	3.7	3.0	2.0	0.90		0.20	-	-
LH50	9 410 250	-50 ... +250	LCD/VFD/ ±0.01°C	ICC	±0.01... ±0.05	6.0	1-st. Water	5.5	7.0	4.6	2.60		0.50	-	-
Magnum 91	9 410 191	-91 ... +250	LCD/VFD/ ±0.01°C	ICC	±0.05... ±0.2	6.0	2-st. Water	3.0	4.6	4.6	4.5		4.3	2	0.5

Pump connections	Barbed fitting diameter	Bath opening/ Bath depth W x L / D	Fill. vol.	Cooling coil	Bath cover	Classification according to DIN 12876-1	Power requirement	Dimensions	Weight net	JULABO Model
	inner dia.	cm	liters	V / Hz / A	W x L x H			cm		
M10x1	8 / 10 mm	13 x 15 / 15	4.5	Integrated	Integrated	III (FL)	230/50-60/9	21 x 42 x 38	9.6	<b>MA-4</b>
M10x1	8 / 10 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/9	21 x 43 x 42	12.5	<b>MA-6</b>
M10x1	8 / 10 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/9	30 x 43 x 45	13	<b>MA-12</b>
M10x1	8 / 10 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/9	36 x 61 x 45	26	<b>MA-26</b>
M10x1	8 / 10 mm	13 x 15 / 15	4.5	Integrated	Integrated	III (FL)	230/50-60/9	21 x 42 x 38	9.6	<b>ME-4</b>
M10x1	8 / 10 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/9	21 x 43 x 42	12.5	<b>ME-6</b>
M10x1	8 / 10 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/9	30 x 43 x 45	13	<b>ME-12</b>
M10x1	8 / 10 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/9	36 x 61 x 45	26	<b>ME-26</b>
M16x1	8 / 12 mm	13 x 15 / 15	4.5	Integrated	Integrated	III (FL)	230/50-60/9	21 x 42 x 40	11	<b>HE-4</b>
M16x1	8 / 12 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/13	21 x 43 x 44	13.5	<b>SE-6</b>
M16x1	8 / 12 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/13	30 x 43 x 47	14	<b>SE-12</b>
M16x1	8 / 12 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/13	36 x 61 x 47	27	<b>SE-26</b>
M16x1	8 / 12 mm	13 x 15 / 15	4.5	Integrated	Integrated	III (FL)	230/50-60/9	21 x 42 x 40	11	<b>HL-4</b>
M16x1	8 / 12 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/13	21 x 43 x 44	13.5	<b>SL-6</b>
M16x1	8 / 12 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/13	30 x 43 x 47	14	<b>SL-12</b>
M16x1	8 / 12 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/13	36 x 61 x 47	27	<b>SL-26</b>

Pump capacity		Viscosity max.	Pump connections	Process volume min. (active heat exchanges volume)	Internal usable expansion volume	Classification acc. to DIN 12876-1	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Flow rate									
bar	l/min.	cSt.		liters	liters	V / Hz / A	cm	kg		
0.5	25	50	M24x1.5	2.4 (1.4)	1.5	III (FL)	230/50/15	25 x 59 x 62	62	<b>A30</b>
0.3 ... 1.7	16 ... 40	50	M24x1.5	3.5 (1.7)	2.7	III (FL)	230/50-60/16	33 x 59 x 67	79	<b>A40</b>
0.3 ... 1.7	16 ... 40	50	M24x1.5	3.5 (1.7)	2.7	III (FL)	230/50-60/16	33 x 59 x 67	78	<b>W40</b>
0.3 ... 1.7	16 ... 40	50	M24x1.5	3.9 (1.7)	5.6	III (FL)	230/50/16	43 x 65 x 126	164	<b>A80</b>
0.3 ... 1.7	16 ... 40	50	M24x1.5	3.9 (1.7)	5.6	III (FL)	3 x 400/50/16	43 x 65 x 126	167	<b>A80t</b>
0.3 ... 1.7	16 ... 40	50	M24x1.5	3.9 (1.7)	5.6	III (FL)	230/50/16	43 x 65 x 126	159	<b>W80</b>
0.3 ... 1.7	16 ... 40	50	M24x1.5	3.9 (1.7)	5.6	III (FL)	3 x 400/50/16	43 x 65 x 126	162	<b>W80t</b>
0.5 ... 3.0	26 ... 80	50	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/31	95 x 127 x 190	770	<b>W91</b>
0.5 ... 3.0	26 ... 80	50	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/43	95 x 127 x 190	780	<b>W91t</b>
0.5 ... 3.0	26 ... 80	50	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/55	95 x 127 x 190	790	<b>W91tt</b>
0.8 ... 5.5	18 ... 70	70	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/31	95 x 127 x 190	785	<b>W91x</b>
0.8 ... 5.5	18 ... 70	70	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/43	95 x 127 x 190	795	<b>W91tx</b>
0.8 ... 5.5	18 ... 70	70	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/55	95 x 127 x 190	805	<b>W91ttx</b>
0.5 ... 3.0	26 ... 80	50	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/31	95 x 127 x 190	785	<b>W92</b>
0.5 ... 3.0	26 ... 80	50	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/43	95 x 127 x 190	795	<b>W92t</b>
0.5 ... 3.0	26 ... 80	50	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/55	95 x 127 x 190	805	<b>W92tt</b>
0.8 ... 5.5	18 ... 70	70	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/31	95 x 127 x 190	800	<b>W92x</b>
0.8 ... 5.5	18 ... 70	70	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/43	95 x 127 x 190	810	<b>W92tx</b>
0.8 ... 5.5	18 ... 70	70	M38x1.5	28 (16)	40	III (FL)	3 x 400/50/55	95 x 127 x 190	820	<b>W92ttx</b>
0.5 ... 1.6	16 ... 30	50	M16x1	3.7	2.2	III (FL)	230/50/12	50 x 59 x 64	103	<b>LH46</b>
0.5 ... 1.6	16 ... 30	50	M16x1	5.7	5.2	III (FL)	3 x 400/50/12	40 x 55 x 127	150	<b>LH47</b>
0.7 ... 2.2	16 ... 30	50	M16x1	13.5	4.9	III (FL)	3 x 400/50/17	40 x 55 x 127	182	<b>LH50</b>
0.8 ... 1.9	30 ... 50	50	M24x1.5	21.5	13	III (FL)	3 x 400/50/20	71 x 88 x 165	442	<b>Magnum 91</b>

## Forte HT Highly Dynamic Temperature Control Systems / Process Circulators

JULABO Model	JULABO Order No.	Working temperature range	Setting/display resolution	Temperature control	Temperature stability external	Heating capacity	Integrated Cooling unit C.U.	Pump capacity	
								Pressure	Flow rate
		°C	°C		°C	kW	kW	bar	l/min.
HT30-M1	9 800 031	+70 ... +400	0.01	ICC	±0.01 ... ±0.1	3	-	0.8 - 1.2	14 - 18
HT60-M2	9 800 062	+70 ... +400	0.01	ICC	±0.01 ... ±0.1	7	-	0.8 - 1.2	14 - 18
HT60-M3	9 800 063	+70 ... +400	0.01	ICC	±0.01 ... ±0.1	6	-	0.8 - 1.2	14 - 18
HT30-M1-C.U.	9 800 035	+40 ... +400	0.01	ICC	±0.01 ... ±0.1	3	Ja	0.8 - 1.2	14 - 18
HT60-M2-C.U.	9 800 065	+40 ... +400	0.01	ICC	±0.01 ... ±0.1	7	Ja	0.8 - 1.2	14 - 18
HT60-M3-C.U.	9 800 066	+40 ... +400	0.01	ICC	±0.01 ... ±0.1	6	Ja	0.8 - 1.2	14 - 18

## Recirculating Coolers (F/AWC100)

JULABO Model	JULABO Order No.	Working temperature range	Setting/display resolution	Temperature control	Temp. stability	Cooling of the refrigeration unit	Cooling capacity				
							+20	+10	+5	0	-5 °C
		°C	°C		°C		kW	kW	kW	kW	kW
F250	9 620 025	-10 ... +40	0.1	PID	±0.5	Air	0.25	0.22	0.21	0.18	0.09
F500	9 620 050	0 ... +40	0.1	PID	±0.5	Air	0.5	0.4	0.3	0.25	-
F1000	9 620 100	0 ... +40	0.1	PID	±0.5	Air	1.0	0.7	0.55	0.35	-
AWC100	9 630 100	+20 ... +40	-	-	-	Air	0.55	0.3	0.18	-	-

## Recirculating Coolers (FL)

JULABO Model	JULABO Order No.	Working temp. range	Setting/display resolution	Temp. control	Temp. stability	Heating capacity	Cooling of refrigeration unit	Cooling capacity			
								+20	0	-10	-20 °C
		°C	°C		°C	kW		kW	kW	kW	kW
FL300	9 660 003	-20 ... +40	0.1	PID1	±0.5	-	Air	0.3	0.2	0.15	0.1
FL601	9 661 006	-20 ... +40	0.1	PID1	±0.5	-	Air	0.6	0.4	0.33	0.2
FL1201	9 661 012	-20 ... +40	0.1	PID1	±0.5	-	Air	1.2	0.9	0.6	0.3
FL1203	9 663 012	-20 ... +40	0.1	PID1	±0.5	-	Air	1.2	0.8	0.5	0.2
FL1701	9 661 017	-20 ... +40	0.1	PID1	±0.5	-	Air	1.7	1.1	0.85	0.4
FL1703	9 663 017	-20 ... +40	0.1	PID1	±0.5	-	Air	1.7	1.0	0.75	0.3
FLW1701	9 671 017	-20 ... +40	0.1	PID1	±0.5	-	Water	1.7	1.1	0.85	0.4
FLW1703	9 673 017	-20 ... +40	0.1	PID1	±0.5	-	Water	1.7	1.0	0.75	0.3
FL2503	9 663 025	-20 ... +40	0.1	PID1	±0.5	-	Air	2.5	1.5	1.2	0.55
FL2506	9 666 025	-15 ... +40	0.1	PID1	±0.5	-	Air	2.5	1.0	0.3	-
FL4003	9 663 040	-20 ... +40	0.1	PID1	±0.5	-	Air	4.0	2.4	1.5	0.65
FL4006	9 666 040	-20 ... +40	0.1	PID1	±0.5	-	Air	4.0	1.9	0.9	0.05
FLW2503	9 673 025	-20 ... +40	0.1	PID1	±0.5	-	Water	2.7	1.7	1.0	0.4
FLW2506	9 676 025	-15 ... +40	0.1	PID1	±0.5	-	Water	2.5	1.0	0.3	-
FLW4003	9 673 040	-20 ... +40	0.1	PID1	±0.5	-	Water	4.3	2.2	1.3	0.45
FLW4006	9 676 040	-20 ... +40	0.1	PID1	±0.5	-	Water	4.0	1.7	0.7	-
FL7006	9 666 070	-20 ... +40	0.1	PID1	±0.5	-	Air	7.0	5.1	3.0	1.55
FL11006	9 666 110	-20 ... +40	0.1	PID1	±0.5	-	Air	11.0	7.5	5.0	3.0
FL20006	9 666 200	-25 ... +40	0.1	PID1	±0.5	-	Air	20.0	10	6.0	2.5
FLW7006	9 676 070	-20 ... +40	0.1	PID1	±0.5	-	Water	7.4	7.0	3.1	1.3
FLW11006	9 676 110	-20 ... +40	0.1	PID1	±0.5	-	Water	11.5	7.3	4.8	2.7
FLW20006	9 676 200	-25 ... +40	0.1	PID1	±0.5	-	Water	20.0	12.0	7.0	3.0



Pump connections	Filling volume	Fill. volume expansion vessel	Classification acc. to DIN 12876-1	IP Class acc. to IEC 60529	Power requirement	Dimensions W x L x H	Control unit dimensions W x L x H	Weight net	JULABO Model
	liters								
M16x1	2	1.6+0.9	III (FL)	IP31	230/50/15	23 x 23 x 58	25 x 25 x 18	27	HT30-M1
M16x1	2	1.6+0.9	III (FL)	IP31	3 x 400/50/11	23 x 23 x 58	25 x 25 x 18	29	HT60-M2
M16x1	2	1.6+0.9	III (FL)	IP31	3 x 208/60/18	23 x 23 x 58	25 x 25 x 18	29	HT60-M3
M16x1	2	1.6+0.9	III (FL)	IP31	230/50/15	43 x 23 x 58	25 x 25 x 18	35	HT30-M1-C.U.
M16x1	2	1.6+0.9	III (FL)	IP31	3 x 400/50/11	43 x 23 x 58	25 x 25 x 18	37	HT60-M2-C.U.
M16x1	2	1.6+0.9	III (FL)	IP31	3 x 208/60/18	43 x 23 x 58	25 x 25 x 18	37	HT60-M3-C.U.

Pump capacity		Pump connections	Barbed fitting diameter	Filling volume	Power requirement	Noise level	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Flow rate								
bar	l/min		inner dia.	liters	V / Hz / A	dBa	cm	kg	
0.35	15	M10x1	8 / 10 mm	1.7...2.6	230/50/2	59	24 x 40 x 52	27	F250
0.5	24	M16x1	8 / 12 mm	5 ... 7.5	230/50/3	62	37.5 x 44 x 59	34	F500
1.0	23	M16x1	8 / 12 mm	7 ... 9.5	230/50/3	62	37.5 x 49 x 64	45	F1000
0.2	2.9	M10x1	8 / 10 mm	0.9	230/50-60/1	55	20 x 34 x 30	11	AWC100

Pump capacity		Pump connections	Barbed fitting diameter	Filling volume	IP Class acc. to IEC 60529	Power requirement	Noise level	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Flow rate									
bar	l/min.		inner dia.	liters		V / Hz / A	dBa	cm	kg	
0.35	15	M16x1	8 / 12 mm	3...4.5	IP21	230/50/3	55	25 x 50 x 60	39	FL300
1.0	23	M16x1	8 / 12 mm	5.5...8	IP21	230/50/5	55	32 x 50 x 60	48	FL601
1.0	23	M16x1	8 / 12 mm	12...17	IP21	230/50/7	61	50 x 76 x 64	76	FL1201
0.5 - 3.0	40	G ¾"	¾"	12...17	IP21	230/50/12	61	50 x 76 x 64	91	FL1203
1.0	23	M16x1	8 / 12 mm	12...17	IP21	230/50/10	62	50 x 76 x 64	85	FL1701
0.5 - 3.0	40	G ¾"	¾"	12...17	IP21	230/50/12	63	50 x 76 x 64	91	FL1703
1.0	23	M16x1	8 / 12 mm	12...17	IP21	230/50/10	59	50 x 76 x 64	82	FLW1701
0.5 - 3.0	40	G ¾"	¾"	12...17	IP21	230/50/12	60	50 x 76 x 64	88	FLW1703
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	230/50/11	64	60 x 76 x 115	146	FL2503
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	230/50/14	64	60 x 76 x 115	158	FL2506
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	3 x 400/50/8	67	60 x 76 x 115	148	FL4003
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	3 x 400/50/12	67	60 x 76 x 115	157	FL4006
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	230/50/11	61	60 x 76 x 115	143	FLW2503
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	230/50/14	61	60 x 76 x 115	160	FLW2506
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	3 x 400/50/8	65	60 x 76 x 115	143	FLW4003
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	3 x 400/50/13	65	60 x 76 x 115	160	FLW4006
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/14	74	78 x 85 x 148	252	FL7006
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/17	74	78 x 85 x 148	248	FL11006
0.8 - 6.0	80	G1 ¼"	1"	15...37	IP21	3 x 400/50/18	73	95 x 115 x 161	360	FL20006
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/14	74	78 x 85 x 148	220	FLW7006
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/17	74	78 x 85 x 148	250	FLW11006
0.8 - 6.0	80	G1 ¼"	1"	15...37	IP21	3 x 400/50	69	95 x 115 x 161	360	FLW20006

## Recirculating Coolers (FC/SemiChill)

JULABO Model	JULABO Order No.	Working temp. range	Setting/ display resolution	Temp. control	Temp. stability	Heating capacity	Cooling of refrigeration unit	Cooling capacity			
								+20	0	-10	-20 °C
		°C	°C			°C	kW	kW	kW	kW	
FC600	9 600 060	-20 ... +80	0.1	PID1	±0.2	1.2	Air	0.6	0.33	0.21	-
FC600S	9 600 063	-10 ... +80	0.1	PID1	±0.2	1.2	Air	0.5	0.22	0.1	-
FC1200	9 600 120	-20 ... +80	0.1	PID1	±0.2	1.2	Air	1.3	0.6	0.37	-
FC1200S	9 600 123	-15 ... +80	0.1	PID1	±0.2	1.2	Air	1.2	0.5	0.26	-
FC1600	9 600 160	-20 ... +80	0.1	PID1	±0.2	1.2	Air	1.65	0.8	0.47	-
FC1600S	9 600 163	-15 ... +80	0.1	PID1	±0.2	1.2	Air	1.55	0.65	0.36	-
FC1200T	9 600 126	-10 ... +80	0.1	PID1	±0.2	1.2	Air	1.1	0.4	0.15	-
FC1600T	9 600 166	-15 ... +80	0.1	PID1	±0.2	1.2	Air	1.45	0.5	0.25	-
FCW600	9 601 060	-20 ... +80	0.1	PID1	±0.2	1.2	Water	0.6	0.33	0.21	-
FCW600S	9 601 063	-10 ... +80	0.1	PID1	±0.2	1.2	Water	0.5	0.22	0.1	-
FCW2500T	9 601 256	-25 ... +80	0.1	PID1	±0.2	1.2	Water	2.5	2.0	0.8	0.25
SC2500a *1	9500025XXP3H0D0M0	+5 ... +35	0.1	PID1	±0.1	-	Air	2.5	1.5	0.9	-
SC2500w *1	9500026XXP3H0D0M0	+5 ... +35	0.1	PID1	±0.1	-	Water	2.5	1.5	0.9	-
SC5000a *2,3	9500050XXP3H0D0M0	+5 ... +35	0.1	PID1	±0.1	-	Air	5.0	2.5	1.2	-
SC5000w *2,3	9500051XXP3H0D0M0	+5 ... +35	0.1	PID1	±0.1	-	Water	5.0	2.5	1.2	-
SC10000w *2,3	9500101XXP3H0D0M0	+5 ... +35	0.1	PID1	±0.1	-	Water	10.0	5.0	2.5	-

\*1) with Option H1: Current consumption = plus 5A \*2) with Option H5: Current consumption = plus 7A \*3) with Option H12: current consumption = plus 11A

## Water Baths | Shaking Water Baths

JULABO Model	JULABO Order No.	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Bath opening/ Bath depth W x L / D
TW2	9 550 102	+20 ... +99.9	0.1	PID1	±0.2	1	15 x 13 / 11
TW8	9 550 108	+20 ... +99.9	0.1	PID1	±0.2	2	23 x 27 / 14
TW12	9 550 112	+20 ... +99.9	0.1	PID1	±0.2	2	35 x 27 / 14
TW20	9 550 120	+20 ... +99.9	0.1	PID1	±0.2	2	50 x 30 / 18
SW22	9 550 322	+20 ... +99.9	0.1	PID1	±0.2	2	50 x 30 / 18
SW23	9 550 323	+20 ... +99.9	0.1	PID1	±0.02	2	50 x 30 / 18

Pump capacity		Pump connections	Barbed fitting diameter	Filling volume	IP Class acc. to IEC 60529	Power requirement	Noise level	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Flow rate									
bar	l/min.		inner dia.	liters		V / Hz / A	dBA	cm	kg	
0.5	20	M16x1	8 / 12 mm	6 ... 8	IP21	230/50/8	51	35 x 54 x 49	48	<b>FC600</b>
1.2	22	M16x1	8 / 12 mm	6 ... 8	IP21	230/50/10	54	35 x 54 x 49	52	<b>FC600S</b>
0.5	20	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/10	53	46 x 61 x 49	60	<b>FC1200</b>
1.2	22	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/12	57	46 x 61 x 49	66	<b>FC1200S</b>
0.5	20	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/11	53	46 x 61 x 49	65	<b>FC1600</b>
1.2	22	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/13	57	46 x 61 x 49	66	<b>FC1600S</b>
3.5	28	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/12	58	46 x 61 x 49	67	<b>FC1200T</b>
3.5	28	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/13	58	46 x 61 x 49	67	<b>FC1600T</b>
0.5	20	M16x1	8 / 12 mm	6 ... 8	IP21	230/50/8	51	35 x 54 x 49	48	<b>FCW600</b>
1.2	22	M16x1	8 / 12 mm	6 ... 8	IP21	230/50/10	54	35 x 54 x 49	52	<b>FCW600S</b>
3.5	28	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/12	53	46 x 61 x 49	74	<b>FCW2500T</b>
3.5	33	NPT 3/4"	3/4"	21...33	IP21	230/50/10	65	49 x 62 x 105	123	<b>SC2500a</b> *1
3.5	33	NPT 3/4"	3/4"	21...33	IP21	230/50/10	63	49 x 62 x 105	123	<b>SC2500w</b> *1
3.5	33	NPT 3/4"	3/4"	43...60	IP21	3 x 400/50/11	71	59 x 67 x 112	153	<b>SC5000a</b> *2,3
3.5	33	NPT 3/4"	3/4"	43...60	IP21	3 x 400/50/11	69	59 x 67 x 112	153	<b>SC5000w</b> *2,3
3.5	33	NPT 3/4"	3/4"	43...60	IP21	3 x 400/50/18	69	59 x 67 x 112	159	<b>SC10000w</b> *2,3

Filling volume from ... to	Shaking frequency	Shaking stroke	Classification acc. to DIN 12876-1	IP Class acc. to IEC 60529	Power requirement	Dimensions W x L x H without cover	Dimensions W x L x H with cover	Weight net	JULABO Model
liters	rpm	mm			V / Hz / A	cm	cm	kg	
1 ... 2	-	-	I (NFL)	IP43	230/50-60/5	17 x 16 x 26	17 x 16 x 37	3.5	<b>TW2</b>
3 ... 8	-	-	I (NFL)	IP43	230/50-60/9	29 x 32 x 28	29 x 32 x 44	8.5	<b>TW8</b>
5 ... 14	-	-	I (NFL)	IP43	230/50-60/9	40 x 32 x 28	40 x 32 x 44	9.8	<b>TW12</b>
8 ... 26	-	-	I (NFL)	IP43	230/50-60/9	56 x 35 x 32	56 x 35 x 49	14.2	<b>TW20</b>
8 ... 20	20 ... 200	15	I (NFL)	IP21	230/50-60/10	70 x 35 x 26	70 x 35 x 43	19.4	<b>SW22</b>
8 ... 20	20 ... 200	15	I (NFL)	IP21	230/50-60/10	70 x 35 x 26	70 x 35 x 43	21.4	<b>SW23</b>

## Calibration Baths | Visco Baths | Beer Forcing Test Refrigerated/Heating Circulating Bath

JULABO Model	JULABO Order No.	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Cooling capacity		
							+20	0	-20°C
		°C	°C			kW	kW	kW	kW
SL-8K	9 352 508	+50 ... +300	0.01	ICC	±0.005	3	-	-	-
SL-14K	9 352 514	+50 ... +300	0.01	ICC	±0.005	3	-	-	-
FK30-SL	9 352 627	-30 ... +200	0.01	ICC	±0.005	2	0.46	0.34	0.15
FK31-SL	9 352 628	-30 ... +200	0.01	ICC	±0.005	2	0.46	0.34	0.15
ME-31A	9 162 331	+20 ... +60	0.01	PID3	±0.01	2	-	-	-
ME-16G	9 162 616	+20 ... +100	0.01	PID3	±0.01	2	-	-	-
ME-18V	9 162 518	+20 ... +150	0.01	PID3	±0.01	2	-	-	-
F38-ME	9 162 638	-38 ... +80	0.01	PID3	±0.05	2	0.92	0.66	0.32

## Immersion Coolers | Flow-Through Cooler

JULABO Model	JULABO Order No.	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Cooling capacity				
						+20	+10	-20	-40	-80 °C
		°C	°C			kW	kW	kW	kW	kW
FT200	9 650 820	-20 ... +30	-	-	-	0.25	0.2	0.04	-	-
FT400	9 650 840	-40 ... +30	-	-	-	0.45	0.36	0.14	0.03	-
FT900	9 650 890	-90 ... +30	-	-	-	0.3	0.27	0.24	0.2	0.07
FT402	9 650 842	-40 ... +30	0.1	Analog 2-point	±0.5	0.45	0.36	0.14	0.03	-
FT902	9 650 892	-90 ... +30	0.1	Analog 2-point	±1	0.3	0.27	0.24	0.2	0.07
FD200	9 655 825	+10 ... +30	-	-	-	0.22	0.18	-	-	-

## Temperature Controllers

JULABO Model	JULABO Order No.	Adjustable Temperature range	LED Temperature display / resolution	LCD display / resolution	Temperature control	Temperature stability
		°C	°C	°C	°C	
LC4	9 700 140	-50 ... +350	2 / 0.1 °C	-	PID2	> ±0.05
LC4-F	9 700 142	-50 ... +350	4 / 0.1 °C	-	PID3	> ±0.03
LC6	9 700 160	-100 ... +400	1 / 0.01 °C	1 / 0.01 °C	ICC	> ±0.03

## Refrigerators for Chemicals

JULABO Model	JULABO Order No.	Working temperature range	Temperature selection	Temperature display	Alarm signal	Temperature stability	Compressor overheating protection
		°C				°C	°C
KRC50	8 800 705	-2 ... +12	Analog	LED	optical	±1	105
KRC180	8 800 718	-2 ... +12	Analog	LED	optical	±1	105

Pump capacity		Bath opening/ Usable bath depth	Fill. vol.	Bath cover	Classification according to DIN 12876-1	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
Pressure	Flow rate								
bar	l/min.	cm	liters			V / Hz / A	cm	kg	
0.4 - 0.7	22 - 26	dia. 12 / 17	8	Integrated	III (FL)	230/50-60/13	22 x 46 x 47	16	SL-8K
0.4 - 0.7	22 - 26	dia. 12 / 31	14	Integrated	III (FL)	230/50-60/13	22 x 46 x 61	20	SL-14K
0.4 - 0.7	22 - 26	dia. 12 / 17	14	Integrated	III (FL)	230/50/16	32 x 45 x 79	48	FK30-SL
0.4 - 0.7	22 - 26	dia. 12 / 31	24	Integrated	III (FL)	230/50/16	32 x 45 x 91	51	FK31-SL
0.23 - 0.45	11 - 16	9 x 9 / 3x / 37	31	Integrated	III (FL)	230/50-60/9	50 x 20 x 56	11	ME-31A
0.23 - 0.45	11 - 16	7.6 x 7.6 / 2x / 31	16	Integrated	III (FL)	230/50-60/9	Ø 29 x 48	9	ME-16G
0.23 - 0.45	11 - 16	9 x 9 / 2x / 37	18	Integrated	III (FL)	230/50-60/9	36 x 24 x 54	17	ME-18V
0.23 - 0.45	11 - 16	35 x 41 / 27	45	Integrated	III (FL)	230/50/13	46 x 70 x 89	72	F38-ME

Barbed fittings diameter	Immersion probe/ flexible probe (L x dia.)	Connection tube (L)	IP Class acc. to IEC 60529	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
inner dia.	cm	cm		V / Hz / A	cm	kg	
-	9 x 4	120	IP21	230/50/2	18 x 27 x 39	18	FT200
-	12 x 5	120	IP21	230/50/4	20 x 30 x 43	24	FT400
-	65 x 1.5 flexible	160	IP21	230/50-60/5	38 x 55 x 60	50	FT900
-	12 x 5	120	IP21	230/50/4	20 x 30 x 43	24	FT402
-	65 x 1.5 flexible	160	IP21	230/50-60/5	38 x 55 x 60	50	FT902
8 / 12 mm	-	-	IP21	230/50/2	18 x 27 x 39	16	FD200

Working sensor	Safety sensor	Maximum connection wattage	IP Classe acc. to IEC 60529	Power requirement	Dimensions W x L x H	Weight net	JULABO Model
		kW		V / Hz / A	cm	kg	
1 Pt100	1 Pt100	2	IP31	230/50-60/10	17 x 17 x 16	3	LC4
1 Pt100	1 Pt100	2	IP31	230/50-60/10	25 x 20 x 10	3	LC4-F
2 Pt100	1 Pt100	3	IP31	230/50-60/14	21 x 18 x 18	4	LC6

Working sensor	Safety sensor	Volumetric capacity	Power requirement	Inner dimensions W x L x H	Outer dimensions W x L x H	Weight net	JULABO Model
		liters	V / Hz / A	cm	cm	kg	
PTC	PTC	50	230/50/0.5	42 x 31 x 39	53 x 63 x 54	23	KRC50
PTC	PTC	180	230/50/0.5	52 x 40 x 70	60 x 64 x 86	35	KRC180



## Voltage Options / Heating Capacity

### Refrigerated/Heating Circulators

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW				
		230 V 50 Hz	230 V 60 Hz	230 V 50-60 Hz	115 V 60 Hz	100 V 50-60 Hz
F12-ED	9 116 612	2.0	2.0		1.0	0.8
F25-ED	9 116 625	2.0	2.0		1.0	0.8
F26-ED	9 116 626	2.0			1.0	0.8
F34-ED	9 116 634	2.0	2.0		1.0	
F12-EH	9 118 612	2.0	2.0		1.0	0.8
F25-EH	9 118 625	2.0	2.0		1.0	0.8
FN25-EH	9 118 625N	2.0				
F32-EH	9 118 632	2.0	2.0		1.0	0.8
FN32-EH	9 118 632N	2.0				
F33-EH	9 118 633	2.0	2.0		1.0	0.8
F34-EH	9 118 634	2.0	2.0		1.0	
F38-EH	9 118 638	2.0	2.0			
F12-MA	9 153 612	2.0	2.0		1.0	0.8
F25-MA	9 153 625	2.0		2.0	1.0	0.8
FN25-MA	9 153 625N	2.0				
F32-MA	9 153 632			2.0	1.0	0.8
FN32-MA	9 153 632N	2.0				
F33-MA	9 153 633	2.0	2.0		1.0	0.8
F34-MA	9 153 634	2.0	2.0		1.0	
FP35-MA	9 153 618	2.0			1.0	0.8
FP40-MA	9 153 640	2.0	2.0			
FP50-MA	9 153 650	2.0	2.0			
FPW50-MA	9 153 651	2.0	2.0			
F25-ME	9 162 625	2.0		2.0	1.0	0.8
FN25-ME	9 162 625N	2.0				
F26-ME	9 162 626	2.0			1.0	0.8
F32-ME	9 162 632			2.0	1.0	0.8
FN32-ME	9 162 632N	2.0				
F33-ME	9 162 633	2.0	2.0		1.0	0.8
F34-ME	9 162 634	2.0	2.0		1.0	
F38-ME	9 162 638	2.0	2.0			
FP40-ME	9 162 640	2.0	2.0			
FP50-ME	9 162 650	2.0	2.0			
FPW50-ME	9 162 651	2.0	2.0			
F25-HE	9 212 625	2.0		2.0	1.0	0.8
FN25-HE	9 212 625N	2.0				
F32-HE	9 212 632			2.0	1.0	0.8
FN32-HE	9 212 632N	2.0				
F34-HE	9 212 634	2.0	2.0		1.0	
FP40-HE	9 212 640	2.0	2.0			
FP45-HE	9 212 645			2.0		
FP50-HE	9 212 650	2.0	2.0			
FPW50-HE	9 212 651	2.0	2.0			
F25-HL	9 312 625	2.0		2.0	1.0	0.8
FN25-HL	9 312 625N	2.0				
F32-HL	9 312 632			2.0	1.0	0.8
FN32-HL	9 312 625N	2.0				
F33-HL	9 312 633	2.0	2.0		1.0	0.8
FP35-HL	9 312 618	2.0			1.0	0.8
FP40-HL	9 312 640	2.0	2.0			
FP45-HL	9 312 645			2.0		
FP50-HL	9 312 650	2.0	2.0			
FPW50-HL	9 312 651	2.0	2.0			

## Cryo-Compact Circulators

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW		
		230 V 50 Hz	230 V 60 Hz	115 V 60 Hz
CF30	9 400 330	2.0	2.0	1.0
CF31	9 400 331	2.0	2.0	1.0
CF40	9 400 340	2.0	2.0	1.0
CF41	9 400 341	2.0	2.0	1.0

## Ultra-low Refrigerated Circulators

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW					
		230 V 50 Hz	230 V 60 Hz	230 V 50-60 Hz	3 x 230 V 50 Hz	3 x 400 V 50 Hz	3 x 230 V 60 Hz
F70-ME	9 162 670	1.3					
F81-ME	9 162 681			1.3			
FP89-ME	9 162 689	1.3	1.3				
FP51-SL	9 352 751				3.0	3.0	3.0
FP52-SL	9 352 752					3.0	3.0
FP55-SL	9 352 755					3.0	3.0
F81-HL	9 312 681			1.3			
FP89-HL	9 312 689	1.3	1.3				
FP90-SL	9 352 790					3.0	3.0
FPW52-SL	9 352 753					3.0	3.0
FPW55-SL	9 352 756					3.0	3.0
FPW90-SL	9 352 791					3.0	3.0
FPW91-SL	9 352 793					3.0	3.0
FP52-SL	9 352 752N					3.0	3.0
FP55-SL	9 352 755N					3.0	3.0
FP52-SL	9 352 752N150					3.0	3.0
FP55-SL	9 352 755N150					3.0	3.0
FPW52-SL	9 352 753N					3.0	3.0
FPW55-SL	9 352 756N					3.0	3.0
FPW52-SL	9 352 753N150					3.0	3.0
FPW55-SL	9 352 756N150					3.0	3.0
FP90-SL	9 352 790N					3.0	3.0
F95-SL	9 352 795N					3.0	3.0
FP90-SL	9 352 790N150					3.0	3.0
FPW90-SL	9 352 791N					3.0	3.0
FPW91-SL	9 352 793N					3.0	3.0
FW95-SL	9 352 796N					3.0	3.0
FPW90-SL	9 352 791N150					3.0	3.0

### Heating Immersion Circulators | Bridge Mounted Circulators

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW					
		230 V 50 Hz	230 V 60 Hz	230 V 50-60 Hz	115 V 60 Hz	100-115 V 50-60 Hz	100 V 50-60 Hz
ED	9 116 000	2.0	2.0		1.0		0.8
EH	9 118 000	2.0	2.0		1.0		0.8
MB	9 142 000			2.0		0.8 - 1.0	
MA	9 153 000			2.0		0.8 - 1.0	
ME	9 162 000			2.0		0.8 - 1.0	
SE-Z	9 252 218			3.0			

### Open Heating Bath Circulators | Heating Circulators with Open Baths | Heating Circulators

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW					
		230 V 50 Hz	230 V 60 Hz	230 V 50-60 Hz	115 V 60 Hz	100-115 V 50-60 Hz	100 V 50-60 Hz
ED-5A/B	9 116 315	2.0	2.0		1.0		0.8
ED-7A/B	9 116 317	2.0	2.0		1.0		0.8
ED-5M/B	9 116 515	2.0	2.0		1.0		0.8
ED-13A	9 116 313	2.0	2.0		1.0		0.8
ED-19A	9 116 319	2.0	2.0		1.0		0.8
ED-13M	9 116 513	2.0	2.0		1.0		0.8
ED-19M	9 116 519	2.0	2.0		1.0		0.8
MB-13A	9 142 313			2.0		0.8 - 1.0	
MB-19A	9 142 319			2.0		0.8 - 1.0	
ED-13	9 116 413	2.0	2.0		1.0		0.8
ED-17	9 116 417	2.0	2.0		1.0		0.8
ED-19	9 116 419	2.0	2.0		1.0		0.8
ED-27	9 116 427	2.0	2.0		1.0		0.8
ED-33	9 116 433	2.0	2.0		1.0		0.8
MB-13	9 142 413			2.0		0.8 - 1.0	
MB-19	9 142 419			2.0		0.8 - 1.0	
ED-5A	9 116 305	2.0	2.0		1.0		0.8
ED-5M	9 116 505	2.0	2.0		1.0		0.8
MB-5A	9 142 305			2.0		0.8 - 1.0	
MB-7A	9 142 307			2.0		0.8 - 1.0	
MB-5M	9 142 505			2.0		0.8 - 1.0	
ED-5	9 116 405	2.0	2.0		1.0		0.8
EH-5	9 118 405	2.0	2.0		1.0		0.8
EH-13	9 118 413	2.0	2.0		1.0		0.8
EH-19	9 118 419	2.0	2.0		1.0		0.8
EH-27	9 118 427	2.0	2.0		1.0		0.8
EH-33	9 118 433	2.0	2.0		1.0		0.8
EH-39	9 118 439	2.0	2.0		1.0		0.8
MB-5	9 142 405			2.0		0.8 - 1.0	
MA-4	9 153 504			2.0		0.8 - 1.0	
MA-6	9 153 506			2.0		0.8 - 1.0	
MA-12	9 153 512			2.0		0.8 - 1.0	
MA-26	9 153 526			2.0		0.8 - 1.0	
ME-4	9 162 504			2.0		0.8 - 1.0	
ME-6	9 162 506			2.0		0.8 - 1.0	
ME-12	9 162 512			2.0		0.8 - 1.0	
ME-26	9 162 526			2.0		0.8 - 1.0	
HE-4	9 212 504			2.0		0.8 - 1.0	
SE-6	9 252 506			3.0			
SE-12	9 252 512			3.0			
SE-26	9 252 526			3.0			
HL-4	9 312 504			2.0		0.8 - 1.0	
SL-6	9 352 506			3.0			
SL-12	9 352 512			3.0			
SL-26	9 352 526			3.0			

## Highly Dynamic Temperature Control Systems | Process Circulators

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW							
		230 V 50 Hz	230 V 60 Hz	230 V 50-60 Hz	208 V 60 Hz	3 x 400 V 50 Hz	3 x 230 V 50 Hz	3 x 230 V 60 Hz	3 x 480V 60 Hz
A30	9 420 300	2.7 @ 230 V 2.1 @ 200 V	2.7 @ 230 V 2.1 @ 200 V		2.3				
A40	9 420 401			2.7 @ 230 V 2.1 @ 200 V	2.3				
W40	9 421 401			2.7 @ 230 V 2.1 @ 200 V	2.3				
A80	9 420 801	1.8 @ 230 V 1.3 @ 200 V	1.8 @ 230 V 1.3 @ 200 V		1.5				
A80t	9 420 801.T					3.4	3.4	3.4	
W80	9 421 801	1.8 @ 230 V 1.3 @ 200 V	1.8 @ 230 V 1.3 @ 200 V		1.5				
W80t	9 421 801.T					3.4	3.4	3.4	
W91	9 421 912					12			12
W91t	9 421 912.T					24			24
W91tt	9 421 912.TT					36			36
W91x	9 421 913					12			12
W91tx	9 421 913.T					24			24
W91ttx	9 421 913.TT					36			36
W92	9 421 922					12			12
W92t	9 421 922.T					24			24
W92tt	9 421 922.TT					36			36
W92x	9 421 923					12			12
W92tx	9 421 923.T					24			24
W92ttx	9 421 923.TT					36			36
LH46	9 410 246	1.8	1.8						
LH47	9 410 247					1.8		1.8	
LH50	9 410 250					6.0		6.0	
Magnum 91	9 410 191					6.0		6.0	
HT30-M1	9 800 031	3.0	3.0						
HT30-M1-C.U.	9 800 035	3.0	3.0						
HT60-M2	9 800 062					7.0			
HT60-M2-C.U.	9 800 065					7.0			
HT60-M3	9 800 063							6.0	
HT60-M3-C.U.	9 800 066							6.0	

### Recirculating Coolers (F/AWC100)

JULABO Model	JULABO Order No.	Available voltage option					
		230 V 50 Hz	230 V 60 Hz	230 V 50-60 Hz	115 V 60 Hz	100 V 50-60 Hz	200 V 50-60 Hz
F250	9 620 025	•	•		•	•	•
F500	9 620 050	•	•		•	•	
F1000	9 620 100	•	•		•		
AWC100	9 630 100			•	•		

### Recirculating Coolers (FL)

JULABO Model	JULABO Order No.	Available voltage option							
		230 V 50 Hz	230 V 60 Hz	115 V 60 Hz	100 V 50-60 Hz	200 V 50-60 Hz	3 x 400 V 50 Hz	3 x 230 V 50 Hz	3 x 230 V 60 Hz
FL300	9 660 003	•	•	•	•				
FL601	9 661 006	•	•	•					
FL1201	9 661 012	•	•	•					
FL1203	9 663 012	•	•						
FL1701	9 661 017	•	•	•					
FL1703	9 663 017	•	•						
FL2503	9 663 025	•	•						
FL2506	9 666 025	•	•						
FL4003	9 663 040						•		•
FL4006	9 666 040						•		•
FLW1701	9 671 017	•	•	•					
FLW1703	9 673 017	•	•						
FLW2503	9 673 025	•	•						
FLW2506	9 676 025	•	•						
FLW4003	9 673 040						•		•
FLW4006	9 676 040						•		•
FL7006	9 666 070						•		•
FL11006	9 666 110						•		•
FL20006	9 666 200						•		•
FLW7006	9 676 070						•		•
FLW11006	9 676 110						•		•
FLW20006	9 676 200						•		•

### Recirculating Coolers (FC)

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW	
		230 V 50 Hz	230 V 60 Hz
FC600	9 600 060	1.2	1.2
FCW600	9 601 060	1.2	1.2
FC600S	9 600 063	1.2	1.2
FCW600S	9 601 063	1.2	1.2
FC1200	9 600 120	1.2	
FC1200S	9 600 123	1.2	
FC1600	9 600 160	1.2	1.2
FC1600S	9 600 163	1.2	1.2
FC1200T	9 600 126	1.2	
FC1600T	9 600 166	1.2	1.2
FCW2500T	9 601 256	1.2	1.2

### Recirculating Coolers (SemiChill)

JULABO Model	Available voltage option / Heating capacity kW			
	230 V 50 Hz	230 V 60 Hz	3 x 400 V 50 Hz	3 x 230 V 60 Hz
SC2500a	• / 1.0	• / 1.0		
SC2500w	• / 1.0	• / 1.0		
SC5000a			• / 5.0 / 12.0	• / 5.0 / 12.0
SC5000w			• / 5.0 / 12.0	• / 5.0 / 12.0
SC10000w			• / 5.0 / 12.0	• / 5.0 / 12.0



## Water Baths | Shaking Water Baths

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW		
		230 V 50-60 Hz	115 V 60 Hz	115 V 50-60 Hz
TW2	9 550 102	1.0		1.0
TW8	9 550 108	2.0		1.0
TW12	9 550 112	2.0		1.0
TW20	9 550 120	2.0		1.0
SW22	9 550 322	2.0	1.0	
SW23	9 550 323	2.0	1.0	

## Calibration Baths | Visco Baths

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW			
		230 V 50 Hz	230 V 50-60 Hz	115 V 60 Hz	100-115 V 50-60 Hz
SL-8K	9 352 508		3.0		
SL-14K	9 352 514		3.0		
FK30-SL	9 352 627	2.0		1.0	
FK31-SL	9 352 628	2.0		1.0	
ME-31A	9 162 331		2.0		0.8 - 1.0
ME-16G	9 162 616		2.0		0.8 - 1.0
ME-18V	9 162 518		2.0		0.8 - 1.0

## Immersion Coolers | Flow-Through Cooler | Beer Forcing Test Refrigerated/Heating Circulating Bath

JULABO Model	JULABO Order No.	Available voltage option / Heating capacity kW			
		230 V 50 Hz	230 V 60 Hz	230 V 50-60 Hz	115 V 60 Hz
FT200	9 650 820	•			•
FT400	9 650 840	•			•
FT900	9 650 890			•	•
FT402	9 650 842	•			•
FT902	9 650 892			•	•
FD200	9 655 825	•			•
F38-EH	9 118 638	2.0	2.0		

## Temperature Controllers

JULABO Model	JULABO Order No.	Available voltage option / max. connection wattage kW	
		230 V 50-60 Hz	115 V 60 Hz
LC4	9 700 140	2.0	1.0
LC4-F	9 700 142	2.0	1.0
LC6	9 700 160	3.0	1.0

## Refrigerators for Chemicals

JULABO Model	JULABO Order No.	Available voltage option
		230 V 50 Hz
KRC50	8 800 705	•
KRC180	8 800 718	•

## Glossary

### | A

#### ACC, Active Cooling Control

ACC is the working temperature range in which the refrigeration system remains active as long as refrigeration is desired or required. For all JULABO units the working temperature ranges are equivalent to the ACC range. Thus the refrigeration system can also be used at high temperatures (e.g. +200 °C) for a fast cool-down.

#### Access Rights

are the regulations deciding user access rights to functions and features of a JULABO temperature control unit. The new PRESTO® series is the line with the most extensive access possibilities: they feature three user levels with password protection.

#### Air Cooling

If temperature control systems have a refrigeration unit, the heat created by refrigeration must be dissipated. In the case of air-cooled units the heat is dissipated via the condenser of the cooling machine into the ambient air. The air inlet of JULABO units is always at the front. Heated air is dissipated at the back. Other equipment placed on the sides of JULABO units will not be affected.

#### Ambient Conditions

All JULABO units can be operated at ambient temperatures between +5 °C and +40 °C. The performance data as stated by JULABO is based on ideal ambient conditions of +20 °C and approximately 50 % relative humidity.

### | B

#### Bath Fluids

are mainly selected for their temperature range. The limiting factors of the temperature range are viscosity, fire point, and flash point.

Water: JULABO recommends the use of soft and decalcified water for working temperature ranges from +5 °C to +90 °C.

Distilled and deionized water tends to absorb composites from components, thus causing corrosion.

Alcohols (e.g. Ethanol): Due to their very low fire point these are only partly suitable. For working temperature ranges to -25 °C a water-glycol-mixture (1:1) can be used.

JULABO Thermal bath fluids: are ideal for extended working temperature ranges and have the advantage of much lower specific heat capacities than water and alcohols.

#### Bath Opening/Bath Depth

is the size of opening which is available for immersing objects or samples into the bath. Usually bath depth is mentioned along with the bath opening.

#### BlackBox Function, Remote Diagnosis

JULABO circulators with RS232 interface feature a black box which is integrated in the unit and is activated unnoticed in the background recording all relevant data during operation. In the event of a problem the data can be downloaded and sent to JULABO by e-mail. This allows for fast and efficient support. The software Easy BlackBox is available as a free download from [www.julabo.de](http://www.julabo.de).

### | C

#### Calibration Bath

is a bath circulator with extremely high temperature stability and uniformity (homogeneity). Typical applications are calibration tasks, gauging, and testing of temperature sensors, thermometers, etc.

#### Capacity Calculation, cooling/heating

The following formula can be used for a time-dependent calculation of the cooling/heating capacity:

$$Q = (m \cdot c \cdot dT) / t$$

Q = required cooling/heating capacity in kW

m = mass of material in kg

c = specific heat capacity

(water = 4.2 / Ethanol = 2.5 / silicone oil = 1.8)

dT = required temperature difference in °C

t = desired cool-down/heat-up times in seconds

One has to take into consideration that the total mass (m) is the sum of volumes of different sources: e.g. the mass of the circulator, the volume of the tubing, the volume of the reactor's jacket, and the volume of the reactor.

The simple calculation of required cooling/heating capacity as seen above does not take into account differences in weight of the bath fluid or other factors reducing performance. Loss of performance is caused e.g. by: tubing (length, insulation), jacketed reactors (material, thickness, surface), high ambient temperatures, open applications (surface). To supply sufficient cooling/heating capacity a safety factor of 20-30 % should be added.

#### Classification according to DIN 12876-1

In temperature control instruments, flammable or non-flammable bath fluids may be used. Terms and classifications are specified in DIN 12876-1. JULABO units are part of the following classification: S1: class I: NFL, for non-flammable bath fluids. Units of this class feature a temperature limiting function called 'overheating' protection.

S3: class III: FL, for flammable bath fluids. Units of this class feature an adjustable high temperature cut-off and an additional low liquid level protection.

For many models JULABO offers additional protection which clearly exceeds standard requirements.

**Circulator**

is a laboratory circulator. Its bath fluid is circulated through a closed- or an open-loop.

**Cool-down/heat-up times**

are the times to reach a defined setpoint. When using JULABO Thermal bath fluids these times are shorter than when using water or alcohol. The reason is their significantly lower and better specific heat capacities.

**Cooling Control, proportional**

Refrigerated units without proportional cooling have refrigeration systems which are either switched on or off. Systems with proportional cooling have a special electronic valve which automatically controls the cooling capacity. This allows for accurate control of the required cooling power and at the same time saves energy (up to 90 %) and waste heat.

**| D****Data Recording, Data logging**

JULABO circulators with the appropriate interface can be connected to a PC or a PLC. The JULABO software EasyTemp or a software programmed by the user permits data logging.

**DIN 12876**

is the German Industry Standard for laboratory circulators and baths. It defines product categories and technical specifications.

**Display**

Depending on the model JULABO units are equipped with different displays:

- LED display to indicate actual and setpoint value.
- Multi-Display (LED) to indicate actual and setpoint value as well as values high/low temperature warnings and high temperature cut-off. Depending on the model it is possible to display additional values (e.g. pump capacity stages, shaking frequency, etc.)
- LCD display for easy, interactive user guidance with continuous text display
- VFD Comfort Display for permanent, simultaneous indication of three temperature values (internal actual temperature, setpoint temperature and external actual value) and the pump stage.
- TFT Touchscreen: The new PRESTO® series is equipped with 5.7" color industry touchscreens. The intuitive operation provides a fast learning curve.

**| E****Early Warning Systems**

1. The early warning system for low liquid level: the lack of bath fluid is often the reason for a premature, undesired cut-off caused by the low liquid level protection. Depending on the application, such a cut-off might lead to damage to the objects or samples. The JULABO Early Warning System was de-

signed to avoid this situation by indicating to the user that bath fluid needs to be refilled.

2. The early warning system for high/low temperature detects and signals undesired temperature deviations (e.g. due to exothermic reactions in time).

**EasyTEMP** => see Software, control

**Ethernet** => see Interfaces

**External Sensor**

is a Pt100 sensor which can be applied inside or outside the object being controlled. The sensor is connected to the temperature control unit via a cable. This permits direct measurement and control of an external system.

**| F**

**Fluid** => see Bath Fluids

**Feed Pressure**

is the pressure applied to the pump connection of the circulating pump. If there is only one value indicated in the technical specifications, it is the maximum feed pressure at flow rate zero. The diagrams show the suction in relation to the flow rate.

**Feed Suction**

is the suction applied to the intake of the circulating pump (pressure/suction pump). If there is only one value indicated in the technical specifications it is the maximum suction at feed pressure zero. The diagrams show the suction in relation to the flow rate.

**Filling Volume**

is the amount of bath fluid needed for proper operation. The value does not include the amount of fluid which is possibly needed in an external loop. If there are two values stated for the bath volume the smaller value stands for the required minimum amount and the higher value stands for the maximum amount.

**Flow Rate**

is the volume of liquid per time unit which is moved by the circulating pump. If there is only one value indicated in the technical specifications, it is the maximum flow rate at counter pressure zero. The diagrams show the flow rate in relation to the pressure.

**Flow-Through Cooler**

is often used as a substitute for cooling with tap water. A flow-through cooler is an uncontrolled cooling unit without a circulating pump. The unit is installed into the external temperature loop in order to cool down the bath fluid. For applications using heating circulators, lower temperatures and/or faster cool-down times can be achieved.

## | H

### Heating Capacity

is the maximum electrical capacity of the heater which is installed in the unit. The heating capacity is controlled continuously and reduced when getting closer to the pre-set setpoint.

### Heating Circulator

is a circulator with a working temperature range that is mainly above ambient temperature and provides heat for the bath fluid.

### Heating Immersion Circulator

is fixed with a bath attachment clamp to any bath tank. The bath tank is not included in delivery.

### Highly Dynamic Temperature Control Systems

This product group contains model series which have been designed for external temperature control application only (PRESTO®, Magnum91 and Forte HT). Unique features are the extremely rapid heat-up and cool-down times and the unusually wide temperature ranges while using only one type of bath fluid, e.g. Thermal HL40 from -40 °C to +250 °C.

## | I

### ICC, Intelligent Cascade Control

This is a highly precise PID Cascade Control which was designed for perfect results. The ICC Temperature Control is self-optimizing, i.e. the control parameters automatically adjust to the application.

### Immersion Coolers

Immersion coolers are cooling devices with an immersion probe. This is fixed to a flexible tubing and can be used to cool down fluids in any bath tank.

JULABO immersion coolers are optionally available with temperature control and display.

### Interfaces, analog, digital

Analog interfaces allow input of the temperature setpoint and output of the actual temperature value analogous as a power or voltage signal. In addition, analog interfaces serve as potential-free alarm output.

Digital interfaces allow a serial data communication between two or more connected units and PCs in digital form. Temperature values, status messages, and application data can be transmitted and recorded. Depending on the model the interfaces RS232, RS485, USB, Ethernet, Profibus, and Modbus are available.

## | L

**LCD Display** => see Display

**LED Display** => see Display

## | M

### Main Fuse Protection

The required fuse protection depends on the respective unit. In general the fuse protection has to be higher than the current consumption of the unit which is stated on the type label. When using a cooling machine, one must keep in mind that upon compressor start up the current draw might be three to five times the nominal current draw.

### Mains Voltage

Information on mains voltages and net frequencies required for safe operation can be found on the type label of each unit.

**Metal Tubing** => see Tubing

**Modbus** => see Interface

**Multi-Display** => see Display

## | N

### Noise Level, Sound Pressure Level

is the acoustic emission of a unit. Sources of noise within the unit are, e.g. the type of counter cooling as well as the ventilation of electronic components. The sound pressure level of JULABO units is determined according to standards, i.e. measurements are made with highly sensitive measuring sensors in the distance prescribed by the standards. The measured values are listed in the chapter 'Technical Specifications' or you can contact JULABO directly.

## | O

### Open Bath Circulator

are circulators with a bath opening for the insertion of objects for direct temperature control in the bath. A circulating pump with pump connection for an external loop is included.

### Open Heating Bath Circulators

are circulators with a circulating pump and an open bath tank. The objects or samples are placed directly into the bath. The circulating pump is used to circulate the bath fluid. Pump connections for an external loop are typically not included.

### Operating Temperature Range

is the temperature range limited by the permitted minimum and maximum operating temperature. The adjustable operating temperature range corresponds to the temperature range determined by the control electronics.

## | P

**Password Management** => see Access Rights

### PID Temperature Control

JULABO PID1, PID2, and PID3 controls offer fixed control parameters (Xp, Tn, Tv). These can be changed manually with PID2 and

PID3 controls to reach an improved temperature stability especially for external temperature control.

### Pressure Pump

is used for the internal circulation of the bath fluid in the bath tank and may additionally be used for fluid circulation in an external temperature loop. Pressure pumps are most frequently used in JULABO units.

### Pressure/Suction Pump

Units equipped with a pressure/suction pump (e.g. circulators of the HighTech series) are equipped with two pumps that complement one another. While the pressure pump pumps the fluid from the internal bath tank into the external system, the second pump sucks the fluid through a return line into the bath. Each pump has its own capacity. Therefore, there are two separate values for the pressure and suction capacities stated in the technical specifications. Advantage: an especially high flow rate.

**PRESTO®** => see Highly Dynamic Temperature Control Systems

**Profibus** => see Interfaces

### Pump Systems

JULABO uses immersion pumps which are designed to work virtually free from mechanical and thermal wear over extended time periods. The main task, beside the internal circulation of the bath fluid, is to constantly supply objects or systems with bath fluid in a loop. The units of the Economy and TopTech series as well as JULABO recirculating coolers, feature pressure pumps of different capacities for closed, external systems.

MA and ME feature electronically adjustable pump capacities in stages. All HighTech circulators feature pressure and suction pumps which can also be adjusted electronically in stages. These pump systems can achieve remarkable pressure, suction and flow rate capacities in closed or open external systems. When working with a connected external glass apparatus the advantage is that by adjusting maximum pressure, damage to the glass vessel can be avoided.

The new PRESTO® (except A30) feature pumps which can be adjusted in four stages via a pressure setpoint. In connection with the VCFpro the flow rate in liters per minute can be controlled.

## | R

### Recirculating Coolers

are cooling units which are often used as substitutes to cooling solutions with tap water. They usually do not have an accessible bath. The units are equipped with a strong circulating pump with connections for an external application.

### Refrigerant

The refrigerant is pumped through a hermetically closed cooling cycle of a cooling machine and withdraws the heat from the bath fluid. For years JULABO has been using environmentally-friendly refrigerants which are CFC-free. Alternatively, JULABO offers units with natural refrigerants.

### Refrigerated and Heating Circulator

is a circulator with a working temperature range above and below ambient temperature. The circulator can either heat up the bath fluid or cool it down.

**RS232/RS485** => see Interfaces

**Remote Diagnosis** => see BlackBox Function

## | S

### Software, Control

The JULABO software solutions offer the possibility to easily control, display, and record temperature and time related processes. *EasyTEMP*, which is available free of charge, is ideal for simple control tasks of just one JULABO unit. For complex tasks JULABO offers the *EasyTEMP Professional* software.

### Systems, external

When connecting an external system, the following points have to be considered for optimal temperature control:

1. Tubing between the circulator and the external system has to be kept as short as possible and has to be secured.
2. Tubing, connections, and the external system have to be well insulated.
3. Use suitable JULABO bath fluid.
4. The exchange of energy between the circulator and the external system has to be optimized (e.g. by avoiding constrictions in the tubing).
5. When using an external temperature sensor, it has to be integrated into the system.
6. The viscosity of the heat transfer liquid has to be kept to a minimum.

## | T

### TCF (Temperature Control Features)

The TCF Temperature Control Features allow access to all important control parameters. Thus, the user has full control over the control dynamics and can execute manual optimization.

The following functions are available:

1. Band limit: When working in external control mode, this function allows the user to limit the difference between internal and external temperature to freely selectable values. Advantages: Protection of the objects or samples through careful temperature application, e.g. protection of glass reactors from thermal shock.
2. Control dynamics: Option to choose between aperiodic and normal PID behavior when using internal control mode. Aperiodic (factor setting): Perfect, but takes slightly longer to reach the setpoint without overshooting. Normal: reaches the setpoint fast but with minimal overshooting.
3. Limit settings. The limits „IntMax“ and „IntMin“ are applicable only when operating in external control mode. Fixed temperature limits (maximum and minimum values) can be set for the internal bath temperature. These limits cannot be exceeded by the controller. Advantages: Protection against overheating; Freezing pro-



- tection when water is used in refrigerated circulators; Protection against unintended high temperature cut-off
4. Co-speed factor: This parameter influences the time for reaching the setpoint temperature when working in external control mode. Increasing the co-speed factor reduces the time to reach the setpoint but the possibility of overshooting increases.

**Temperature control tubing** => see Tubing

#### Temperature Uniformity

is the maximum difference in temperature at different measuring points in the circulator bath. This is especially important for calibration tasks. In JULABO circulators the temperature uniformity differs only slightly from temperature stability. Calibration baths offer the best temperature uniformity.

#### Temperature Stability

is the maximum difference in temperature at one specific measuring point in the circulator bath. The temperature stability is the maximum deviation of a temperature nominal value measured during a certain period of time and is listed in the catalog for every JULABO unit.

**Temperature Control** => see PID, ICC, TCF

**TFT Touchscreen** => see Display

#### Transparent Bath Circulator

is a circulator with transparent walls which allows direct monitoring of the objects and samples placed into the bath.

#### Tubing

When used in the proper temperature range JULABO tubing is dependable, extensively chemically resistant and long lasting when used with the recommended JULABO bath fluids. Available tubing:

1. CR Tubing: for working temperatures from -20 °C to +120 °C
2. Viton tubing: for working temperatures from -50 °C to +200 °C
3. Metal tubing, flexible, single insulated: for working temperatures from -50 °C to +200 °C
4. Metal tubing, flexible, triple insulated: for working temperatures from -100 °C to +350 °C

Metal tubing is tightly screwed onto the circulator or external system to avoid displacement.

## | U

#### Usable Bath Depth

is the depth which is available in the bath circulator for temperature control applications.

#### User Guidance, interactive

JULABO Circulators of the HighTech series (except for HE, SE) as well as the highly dynamic temperature control system Presto PLUS®, Magnum 91 and Forte HT feature an additional 4-line LCD Display in addition to the standard temperature display. All displays, messages and menus are shown as an easy-to-read text. The new generation of the highly dynamic temperature control

systems PRESTO® guides the user via a comfortable TFT Touchscreen.

**USB** => see Interfaces

## | V

**VFD Comfort Display** => see Display

#### Viscosity

describes the fluid thickness. High viscosity means low flowability and low viscosity means high flowability.

## | W

#### Warranty, Warranty Period

Standard warranty for all JULABO units is 12 months. The 1PLUS-Warranty gives users the opportunity to extend the warranty up to 24 months, limited to a maximum of 10,000 operating hours. Registration for 1PLUS-Warranty is available at: [www.julabo.de](http://www.julabo.de).

#### Water Cooling

When temperature control systems have a cooling machine the heat created by refrigeration must be dissipated. In case of water-cooled units the heat is dissipated to the cooling water (tap water or industrial cooling water) via the condenser of the refrigeration unit. The advantages of water cooling are low noise level and almost zero emission of heat.

#### WirelessTEMP®

The *WirelessTEMP*® product range allows wireless monitoring and control of JULABO temperature control instruments from a large distance, thus allowing a great variety of operation possibilities. Typical scenarios are e.g. operation of a temperature control unit underneath a fume hood, in a shielded hazard zone, or at locations that are hard to access.

#### Working Temperature Range

is the temperature range within the operating temperature range which can be reached by the circulator without external cooling at an ambient temperature of +20 °C. The working temperature range for heating circulators starts between +5 °C to +25 °C above ambient temperature. By using a cooling coil (cooling water) or a cooling device the temperature range can be extended towards ambient temperature.

Superior Temperature Technology for a Better Life

**Precision & Quality**  
**Never Go Out of *Style***

Temperature control solutions from -95 °C to +400 °C for science, research, and industry



The precision, accuracy, and performance of JULABO temperature control solutions have made them fixtures in laboratories around the world. JULABO instruments cover every application from -95 °C to +400 °C in science, research, and industry.

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