-95 °C ... +400 °C

Temperature Control Solutions

for Science, Research and Industry

Julabo

THE TEMPERATURE CONTROL COMPANY

Nature & Environment

Innovation in line with nature

As a medium-sized company located in the Black Forest, a scenic region surrounded by woods, rivers and lakes, it is our aim to link technical innovation with environmental protection.

For our technology-minded company, along with innovation and efficiency, environmental aspects are most essential. Although our products presently do not fall under the scope of the EC Directive 'RoHS', we decided to use materials conforming to 'RoHS' requirements. We consistently focus on considering environmental aspects when implementing new production procedures and processes as well as when planning future investments.

EMAS certified Eco management

JULABO introduced an environmental management system in 2006. The successful validation, in line with EC Directive No. 761/2001, was confirmed to JULABO by being awarded EMAS certification in spring of 2008. EMAS (Eco Management and Audit Scheme) certification represents the highest European award for a structured company-wide environmental management system. By applying for EMAS validation, JULABO chose the most demanding solution in the field of environment management systems and therefore automatically conforms to the requirements of the international standard EN ISO 14001.

Natural refrigerants

JULABO is taking its dedication to the environment to a higher level by introducing instruments designed for the use with 100 % natural refrigerants. Available upon request.

Icon feature description

Temperature Displays

LED temperature display
for actual value and setpoint (resolution 0.1 °C)

Multi-Display (LED) for actual value & 3 setpoints, warning functions, high temperature cut-off, selected pump stage (resolution 0.01/0.1 °C)

VFD Comfort Display with simultaneous indication of 3 values, warning functions, high temperature cut-off, pump stages (resolution 0.01 °C)

LCD Dialog Display
offers interactive operation via backlit, easy-to-read text

Backlit indicator
for selected pump stage and filling volume on Presto® *PLUS*, Magnum 91 and Forte HT

Operation and setpoint adjustment
and automatic display of actual value

Keypad 1 for convenient 3-key setpoint adjustment

Keypad 2 with additional menu functions for pump stages, calibration, control parameters, programmer, warnings etc.

Keypad 3 for convenient 3-key setpoint adjustment (FL models)

Keypad 4
for setpoint adjustment

Keypad 5 for setpoint adjustment, high/low temperatures, timer, shaking frequency (SW models)

Temperature Control / Control Dynamics

PID temperature control
temperature stability ±0.02...±0.2 °C

PID temperature control with drift compensation and adjustable control parameters, temperature stability ±0.01...±0.02 °C

PID cascade temperature control with drift compensation and adjustable parameters, temp. stability ±0.01 °C internally, <±0.1 °C externally

ICC Intelligent Cascade Control for best results, self-optimizing and precise, temperature stability ±0.005 °C internally, <±0.05 °C externally

TCF Temperature Control Features for supervising the control dynamics, access to all important control parameters for optimized operation

External Pt100 sensor connection
for precise measurement and control directly in the external system

Absolute Temperature Calibration
1-point calibration

Absolute Temperature Calibration
3-point calibration

Technical Features

Intelligent pump system
Electronically adjustable pump stages

RS232 interface for PC control, data communication and recording of measured values

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

Integrated programmer for 1 temperature profile with 10 steps max., with real time clock

Integrated programmer for 6 temperature profiles with up to 60 steps each, with real time clock

Electronic timer
Unit stops operation after a preset time and turns on standby (max. 33 hrs)

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

Warning & Safety Functions

Early warning system for low liquid level
with optical and audible alarm, allows user to refill bath fluid before the unit shuts down

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

Adjustable high temperature cut-off
or dry-running protection for maximum safety

High temperature cut-off adjustable and indicated on display, allowing for the most accurate setting

Classification I (NFL) according to DIN 12876-1
Unit provides high temperature cut-off or dry-running protection for use with non-flammable bath fluids

Classification III (FL) according to DIN 12876-1
Unit provides high temperature cut-off and low liquid level protection for use with flammable bath fluids

Refrigeration Technology

Removable venting grid for quick and easy cleaning, to maintain cooling performance

ACC Active Cooling Control:
Cooling available throughout the entire temperature range

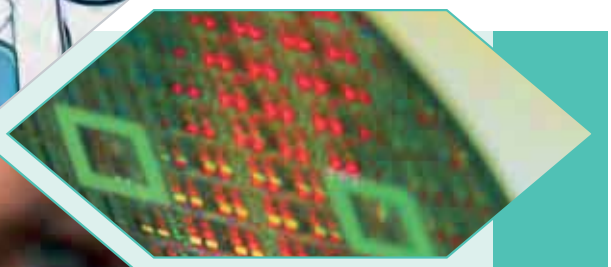
Proportional cooling control: Automatic adjustment of cooling power or temporary switch-off of compressor as needed to save energy (FP models)

Heated cover plate prevents condensation or ice build-up

The icons can be found on the introductory pages for each product group.

Julabo

Liquid Temperature Control for Science, Research and Industry



Highly precise temperature control

-95...+400 °C

JULABO sets the benchmark

JULABO takes pride in its core values of innovation and high quality. This has established JULABO as a worldwide leader in the development and manufacturing of temperature control technology.
Since JULABO's inception in 1967 the company has contributed globally to the advancement of liquid temperature control technology. The company has established many benchmarks through innovative product design. JULABO continues to push the envelope in temperature control technology drawing on its vast technical know-how and experience. We thrive on meeting and exceeding customer expectations.

Customer proximity – around the globe

We have a global presence with worldwide subsidiaries and partners. More than 300 motivated employees are dedicated to one common goal: Total customer satisfaction!

Superior technology – at your fingertips

JULABO temperature control instruments are routinely exposed to the toughest application conditions. We design our instruments to withstand the most extreme conditions defined by our customers. JULABO's highly qualified refrigeration, electronics, and mechanical engineers use state-of-the-art R&D technology and methods to develop the temperature control solutions of the future.

Internationally certified quality

Since 1994 JULABO products conform to the highest national, European and international standards under the DIN EN ISO 9001 certification. Each instrument must pass numerous tests in every production phase. A sophisticated Quality Management system guarantees that only technologically superior products of the highest quality are shipped from our facility.

Made in Germany

CERT ISO 9001

CE

IEC/EN 61010-1
IEC/EN 61010-2-010
EN 61326-1
DIN 12876

Contents

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

Refrigerated circulators

JULABO circulators are used successfully around the world. Whether in research, material testing or in production – the well proven and reliable technology is valued by users in all industries. The JULABO circulator program features functional solutions for daily applications. Innovation is our tradition: by focusing on user requirements JULABO has set the benchmark for temperature control technology for over 4 decades.

- Circulators for working temperatures from -95 °C to +200 °C
- All products feature user-friendly, intuitive operation
- Extra bright displays, easy to read across the room
- State-of-the-art control technology for quick and highly precise results
- 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 interfaces
- Wireless monitoring and operation (*WirelessTEMP*)
- Removable venting grid for quick and easy cleaning
- Active Cooling Control, maximum cooling capacity at all temperatures
- 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

Natural refrigerants

Refrigerated circulators are available with natural refrigerants upon request.

Three series of circulators offer solutions for all requirements and every budget. From routine to highly demanding applications: the JULABO circulator program has the matching equipment for every application.

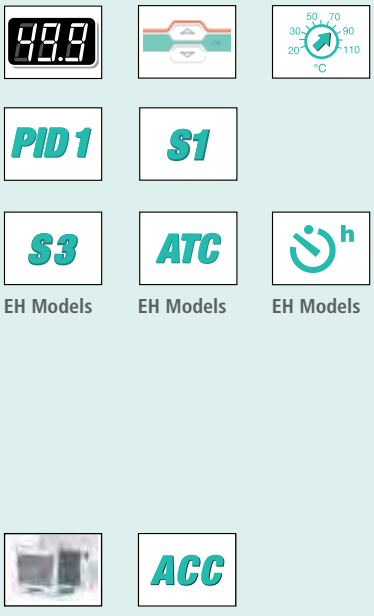
Julabo Refrigerated Circulators at a Glance

Economy Series

ED/EH Models

-35 °C ... +150 °C

Basic models for routine and standard applications

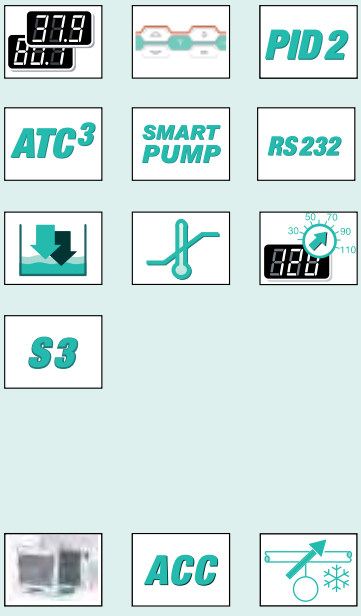


TopTech Series

MA Models

-50 °C ... +200 °C

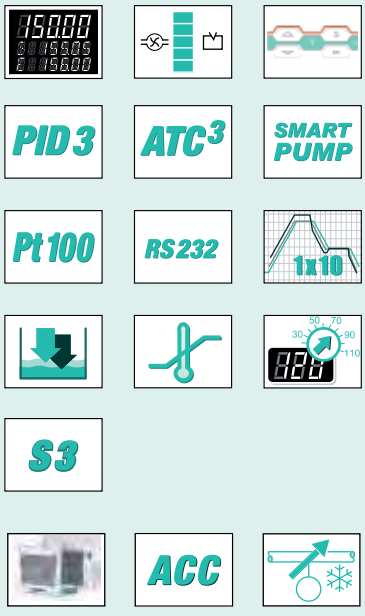
Middle class for a broad range of applications



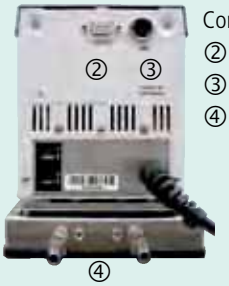
ME Models

-90 °C ... +200 °C

Upper middle class with ext. Pt100 sensor connection



Connections for
③ Refrigeration unit (EH model)
④ Pump connections



Connections for
② RS232
③ Refrigeration unit
④ Pump connections

Connections for
① Ext. Pt100 sensor
② RS232
③ Refrigeration unit
④ Pump connections

Please refer to the fold-out page for description of icons above.

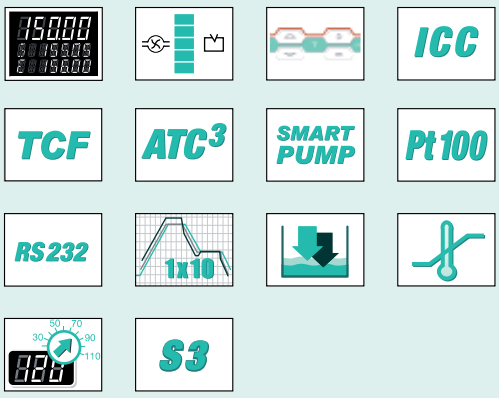
Improved Intuitive Operation and Extra Bright Displays for ALL MODELS!

HighTech Series

HE Models

-50 °C ... +200 °C

Sophisticated models for demanding applications

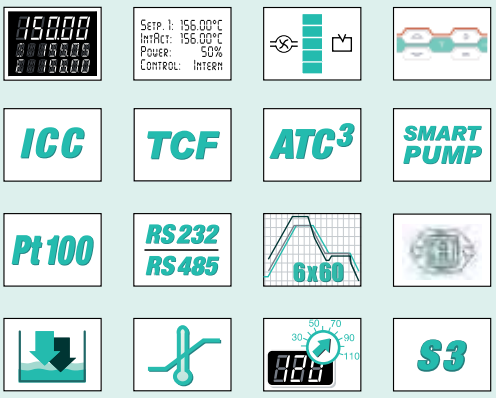


FP Models

HL/SL Models

-95 °C ... +200 °C

Superior models for most demanding applications



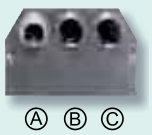
FP Models

Connections for

① External Pt100 sensor
② RS232 / RS485
③ Refrigeration unit
④ Electronic module (option)
⑤ Stakei connections (HL/SL)
⑥ Pump connections M16x1 male

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)

Please refer to the fold-out page for description of icons above.

Julabo Refrigerated/Heating Circulators


F12-ED


F25-ED


F34-ED

Economy - ED Series

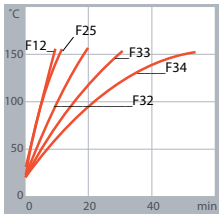
for working temperatures from -30 °C to +100 °C

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

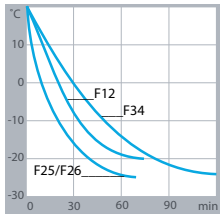
Models with ED circulators

- PID1 temperature control, stability ±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
- Front drain
- Compact design

Heat-up times
Bath fluid: Thermal



Cool-down times
Bath fluid: Ethanol



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20 °C	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
9 116 612	**F12-ED**	-20 ... +100	±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	±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	±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	±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 each barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

F32-EH

F38-EH

Applications

- Routine laboratory applications such as immersing samples for temperature studies in the circulator bath
- External temperature control applications:
  - Measuring cells
  - Refractometers
  - Polarimeters
  - Photometers
  - Viscometers
  - Fermenters
  - Electrophoresis chambers
  - Chromatography columns
  - Rotary evaporators
  - Rheometers

Economy - EH Series

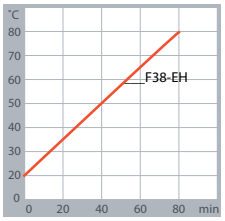
for working temperatures from -35 °C to +150 °C

Refrigerated/heating circulator EH combinations feature an extended working temperature range and allow the use of flammable bath fluids.

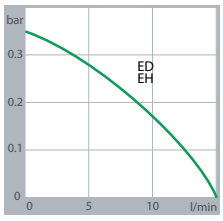
Models with EH circulator, additional benefits

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

Heat-up time
Bath fluid: Thermal



Pump capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stability °C	Heating cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20 °C	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
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
9 118 632	**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
9 118 633	**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 each barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

Julabo Refrigerated/Heating Circulators

F12-MA

F25-MA

FP35-MA

TopTech - MA Series

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

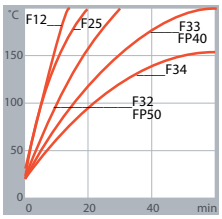
Refrigerated/heating circulators of the *TopTech* Series are designed for more demanding applications. They feature increased functionality and additional warning and safety functions.

Models with MA circulator

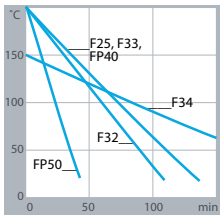
- PID2 temperature control, stability ±0.02 °C
- Electronically adjustable pump capacity
- RS232 interface
- 3-point calibration
- Early warning system for low liquid level and high/low temperature

The FP35-MA model is designed for external temperature control applications requiring fast temperature changes due to its small bath volume.

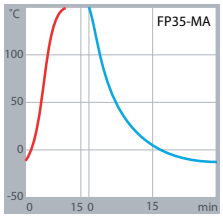
Heat-up times
Bath fluid: Thermal



Cool-down times
Bath fluid: Thermal



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



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20	-30	-40 °C	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
9 153 612	**F12-MA**	-20 ... +200	±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	±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
9 153 632	**F32-MA**	-35 ... +200	±0.02	2	0.45	0.39	0.15	0.05	--	11-16	0.23-0.45	18 x 12 / 15	8	31 x 42 x 64
9 153 633	**F33-MA**	-30 ... +200	±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	±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	±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	±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	±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 each barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

| F26-ME

| F32-ME

| FP50-ME

TopTech - ME Series

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

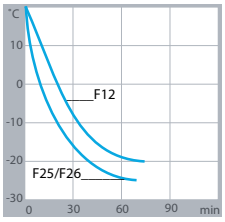
Models with ME circulators and their additional features allow for a wide range of applications. The units have a connection for an external Pt100 sensor for direct measuring and control in an external application. The VFD display features easy operation and shows all temperature values on one display.

Additional benefits of models with ME circulators

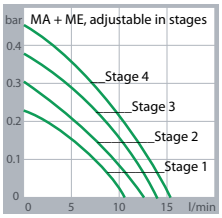
- PID3 temperature control, stability ±0.01 °C
- VFD Comfort Display with simultaneous indication of setpoint and internal and external actual value (resolution 0.01 °C)
- Integrated programmer (1 x 10 steps) with real-time clock
- Illuminated display for adjustable pump capacity
- RS232 interface

FP models: energy-saving proportional cooling control

Cool-down times
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) +20	0	-20	-30	-40°C	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
9 162 625	**F25-ME**	-28 ... +200	±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
9 162 626	**F26-ME**	-28 ... +200	±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	±0.01	2	0.45	0.39	0.15	0.05	--	11-16	0.23-0.45	18 x 12 / 15	8	31 x 42 x 64
9 162 633	**F33-ME**	-30 ... +200	±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	±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	±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	±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 each barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

Julabo Refrigerated/Heating Circulators

F25-HE

F32-HE

FP50-HE

HighTech - HE Series

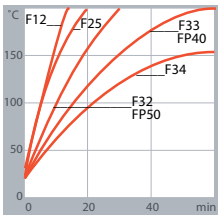
for working temperatures from -50 °C to +200 °C

The instruments provide a powerful, electronically adjustable pressure and suction pump. The intelligent cascade control (ICC) optimizes the temperature control parameters, achieving maximal temperature control accuracy.

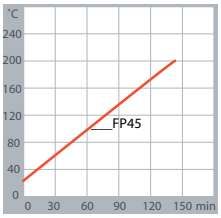
Models with HE circulator

- Intelligent Cascade Control (ICC), stability ±0.01 °C
- VFD Comfort Display shows internal and external temperatures
- Integrated programmer (1 x 10 steps) with real-time clock
- RS232 interface
- Powerful pressure and suction pump, electronically adjustable
- Automatic adjustment of pump capacity to viscosity characteristics

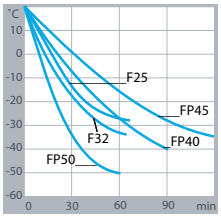
Heat-up times
Bath fluid: Thermal



Heat-up time
Bath fluid: Thermal



Cool-down times
Bath fluid: Ethanol



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20	-30	-40 °C	Pump cap./Flow rate l/min.	Press. bar	Suction bar	Bath open./ Bath depth W x L/D cm	Fill. vol. liters	Dimension W x L x H cm
9 212 625	**F25-HE**	-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
9 212 632	**F32-HE**	-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
9 212 634	**F34-HE**	-30 ... +150	±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	±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	±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	±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)

F25-HL

FP50-HL

Applications

- External temperature control applications, particularly for distillation apparatus and miniplant installations
- Reactors
- Autoclaves
- Kilo labs

HighTech - HL 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.

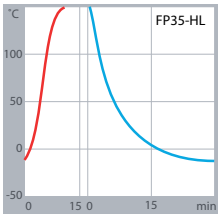
Additional benefits of models with HL circulator

- Intuitive operation
- VFD Comfort Display & 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

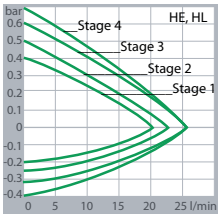
The model FP35-HL is designed for external temperature control applications requiring fast temperature changes due to its small bath volume.

FP models: energy-saving proportional cooling control

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



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) +20	0	-20	-30	-40°C	Pump cap./Flow rate l/min.	Press. bar	Suct. bar	Bath open./ Bath depth W x L / D cm	Fill. vol. liters	Dimensions W x L x H cm
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
9 312 632	**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
9 312 633	**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

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

Julabo Cryo-Compact Circulators

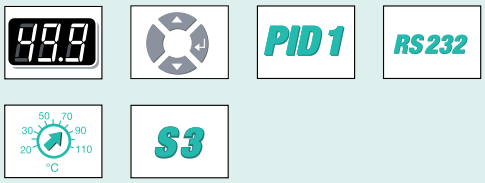
The compact design and footprint of the CF refrigerated/heating circulators allows for installation in tight spaces. The specially designed ventilation-air-cooling unit permits ambient operation up to +40 °C and installation directly next to other equipment.

Economy Series

CF30 / CF40

-40 °C ... +150 °C

Basic models for routine and standard applications



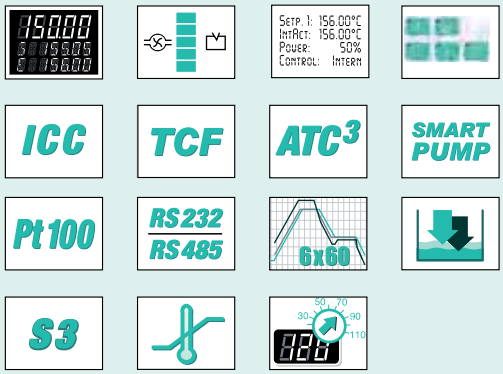
- Working temperatures up to +150 °C
- Pressure pump
- LED Display for actual value/setpoint (resolution 0.1 °C)
- RS232 interface
- Intuitive operation

HighTech Series

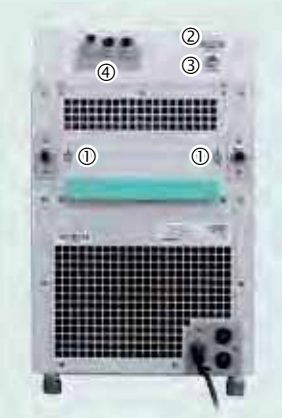
CF31 / CF41

-40 °C ... +200 °C

Superior models for most demanding applications



- Working temperatures up 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 interface

CF31 and CF41 additional features:
③ Connection for external Pt100 sensor
④ Electronic module (optional)

Please refer to the fold-out page for description of icons above.

CF30

CF41

Applications

- External temperature control applications
- Applications with limited space, e.g. in fume hoods

Extra Compact!

Cryo-Compact Circulators - CF Series

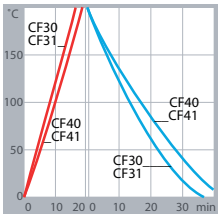
for working temperatures from -40 °C to +200 °C

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 rapid temperature changes.

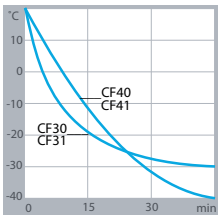
Cryo-compact circulators

- Extra compact dimensions for easy installation
- Splash-proof keypad
- Pump connections for external temperature control
- Cooling capacities up to 470 W
- Bath opening to immerse small objects
- Permissible ambient temperature up to +40 °C

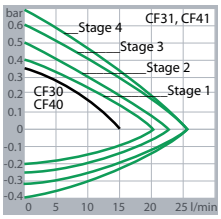
Heat-up/cool-down times
Bath fluid: Thermal



Cool-down times
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) +20	0	-20	-30 °C	Pump cap./Flow rate l/min.	Press. bar	Suct. bar	Bath open./ Bath depth W x L / D cm	Fill. vol. liters	Dimensions W x L x H cm
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)

Julabo Ultra-Low Refrigerated Circulators

F70-ME

F81-ME

TopTech - ME Series

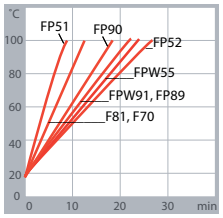
for working temperatures from -90 °C to +100 °C

The *TopTech* Ultra-Low circulator FP89-ME features a dual-stage compressor refrigeration system with 1.3 kW heating capacity. This instrument offers a wide operating temperature range for many different internal or external uses.

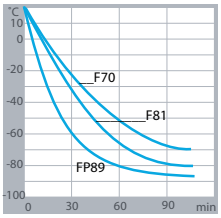
- Active Cooling Control across the entire temperature range
- Heated bath cover plate to prevent condensation and ice build-up
- Pressure pump up to 0.45 bar, electronically adjustable
- Compact design

FP models: energy saving proportional cooling control

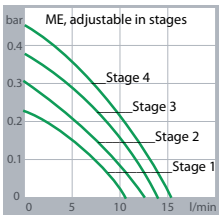
Heat-up times
Bath fluid: Thermal



Cool-down times
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) +20	0	-20	-40	-60	-80 °C	Pump cap./Flow rate l/min.	Press. bar	Fill. vol. liters	Dimensions W x L x H cm
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
- Reactors

HighTech - HL/SL Series

for working temperatures from -91 °C to +200 °C

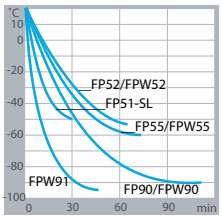
The top-of-the-line *HighTech* ultra-low refrigerated circulators provide sophisticated technology and maximum functionality for the most demanding applications.

- Intuitive operation
- Heated bath cover plate to prevent condensation and ice build-up
- VFD Comfort Display & additional LCD Display
- Integrated programmer (6 x 60 steps) with real-time clock
- Combined RS232/RS485 interface
- Electronically adjustable pump
- Up to 3 kW of heating capacity
- Temperature display in °C and °F
- Stakei connection for solenoid valve

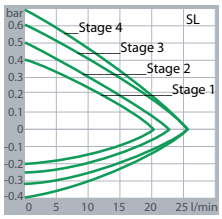
Bath opening for internal temperature applications

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 times
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) +20	0	-20	-40	-60	-80 °C	Pump cap./Flow rate l/min.	Press. bar	Suct. bar	Fill. vol. liters	Dimensions W x L x H cm
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
9 352 753	**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
9 352 755	**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
9 352 756	**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
9 312 681	**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
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	5.2	4.7	4.0	3.5	2.3	0.8	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)

Julabo Ultra-Low Refrigerated Circulators

FP55-SL

FP90-SL

HighTech - SL Series

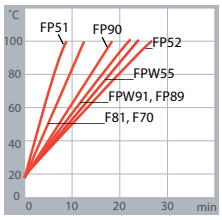
for working temperatures from -95 °C to +150 °C
upgradable with additional heating and pump capacity

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

- Cooling capacities up to 5.5 kW, heating capacities up to 9 kW
- Insulated filling port (70 mm dia.) to prevent condensation/ice build-up
- Heated bath cover plate
- Upgradable with booster heater and booster pump
- Energy-saving proportional cooling control
- Pressure and suction up to 1.1 bar, electronically adjustable

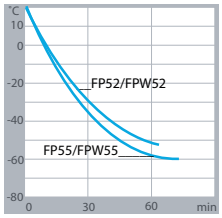
FP: Energy-saving proportional cooling control
FPW: For cooling water connection

Heat-up times
Bath fluid: Thermal



Filling port with insulated cover

Cool-down times
Bath fluid: Ethanol



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20	-40	-60 °C	Pump cap./Flow rate l/min.	Press. bar	Suct. bar	Fill. vol. liters	Dimensions W x L x H cm
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 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 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 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 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 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 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
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 fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)
FPW models: Cooling water connection G ¾" male with barbed fittings for tubing ½" inner dia.

FPW91-SL

Applications

- Reactors
- Autoclaves, Mini plants
- Kilo labs
- Process development

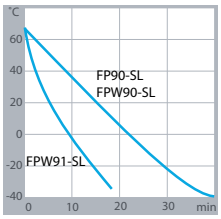
External Temperature Control Applications only

Increase heating and/or pump capacity with booster modules
All models on this double-page are upgradable
(exceptions: F95-SL and FW95-SL).

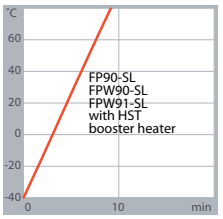
- HST booster heater ①
  adds 6 kW of heating capacity for a total of 9 kW
- HSP booster pump ②
  increase pumping capacity 30 l/min. - 3 bar max.
  (reduces cooling capacity by 0.4 kW)

Upgradable
with booster heater and pump

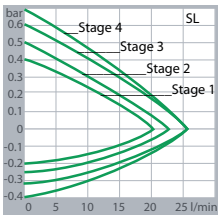
Cool-down times
Bath fluid: Thermal



Heat-up time
Bath fluid: Thermal



Pump capacity
Bath fluid: water

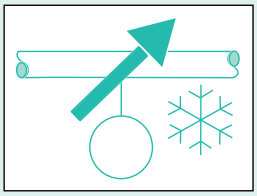


JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20	-40	-60	-80 °C	Pump cap./Flow rate l/min.	Press bar	Suct. bar	Fill. vol. liters	Dimensions W x L x H cm
9 352 790N	**FP90-SL**	-90 ... +100	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22-26	0.4-0.7	0.2-0.4	22	59 x 76 x 116
9 352 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	5.2	4.7	4.0	3.5	2.3	0.8	22-26	0.4-0.7	0.2-0.4	22	85 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 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 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
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 ¾" male with barbed fittings for tubing ½" inner dia.

User Benefits
and helpful Tips

Benefits of JULABO Cooling systems



- Ventilation-air cooling of compressor and condenser directs discharged air from front to rear.
- All refrigerated circulators have an ambient operating limit up to +40 °C!
- No side vents, instruments can be placed right next to other equipment without affecting performance.
- Automatic shut-down of the refrigeration unit when no cooling is required (exception: F12 refrigeration unit and 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 saving.

Detailed Model Designations

The model designations of refrigerated circulators are composed as follows:

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

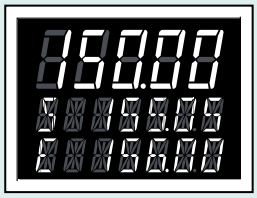
User Benefits and helpful Tips

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 Temperature Display**
  for actual value and up to 3 setpoints, warning functions, high temperature cut-off, pump stages (resolution 0.01/0.1 °C, fig. 1)
- **VFD Comfort Display**
  simultaneous display of 3 values, warning functions, high temperature cut-off, pump stages (resolution 0.01 °C, fig. 2)
- **LCD Dialog Display**
  allows for interactive operation with easy-to-read text (fig. 3)

1



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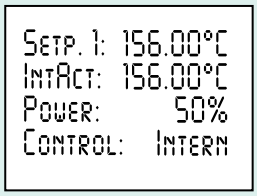


3

Highly precise Temperature Control Technology professional and user-friendly

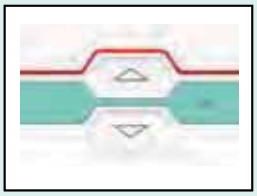
PID1, PID2 and PID3 temperature controls offer fixed control parameters (Xp, Tn, Tv). For the advanced user the PID2 and PID3 settings can be manually changed to reach an improved temperature stability, especially for external temperature control.

ICC Temperature Control (Intelligent Cascade Control) provides highly precise temperature control results even for the most demanding applications. ICC offers perfected temperature control: 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.

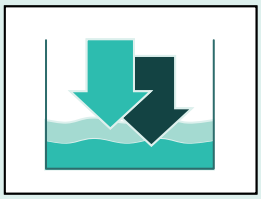
Intuitive and Integrated Operation

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.



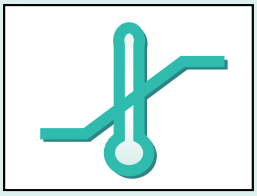
Early Warning System for Low Liquid Level

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



Early Warning System for High/Low Temperature Limits

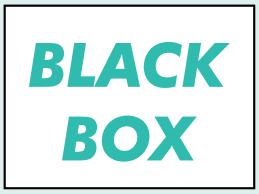
If the operator defined temperature limits are exceeded - e.g. caused by an exothermic reaction - the early warning system will trigger audible and optical warnings. **Low temperature protection with cut-off function: If required, the warning function can be switched to cut-off establishing an additional low temperature protection.**



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 for remote diagnosis
- Overload protection for pump motor and refrigeration unit

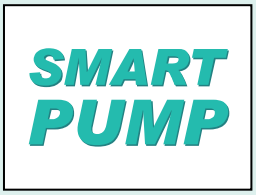


User Benefits and helpful Tips

Intelligent Pump Systems

The highly efficient circulating pumps provide high pressures and flow rates. The *SmartPump* electronics have many benefits:

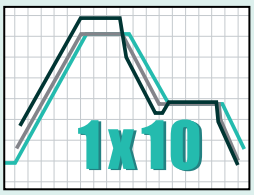
- Electronically adjustable pump capacity (4 stages) via keypad
- The HighTech electronics automatically adjust the pump capacity in response to changes in bath fluid viscosity values. This ensures hassle-free, safe operation even when using high viscosity bath fluids.

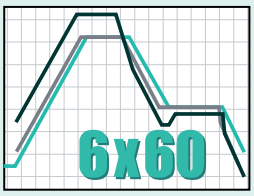


Integrated Programmer

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 startup at a specified time.

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





Wireless Equipment Management

The new *WirelessTEMP* products allow wireless monitoring and operation of JULABO temperature control instruments via PC or a handheld remote control. Using *WirelessTEMP* saves time when monitoring instrument parameters, improves instrument installation options and eliminates expensive wiring or cabling. For more information see the chapter **Wireless Communication & Software**.

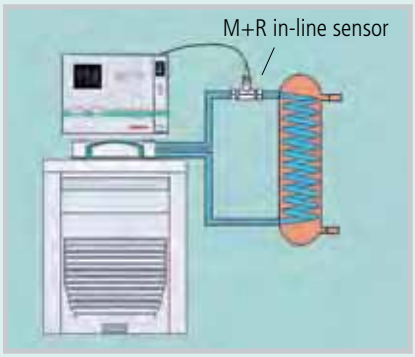
Heated Bath Cover Plate

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.

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, glass or PTFE coated stainless steel are available in lengths between 20 and 1200 mm. For highly precise temperature control an M+R in-line Pt100 sensor (see illustration) can be installed directly into the cooling circuit. The externally measured value is shown on the circulator's display.

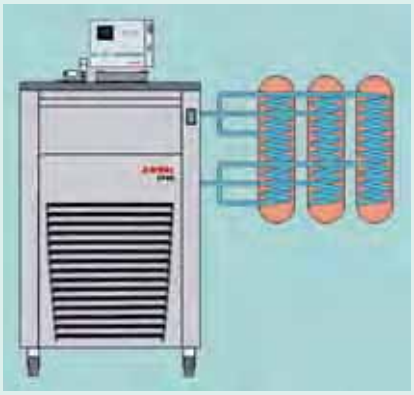
8 981 020 M+R in-line Pt100 sensor



Upgrades with Booster Heaters and Pumps

Some external applications with the ultra-low *HighTech* refrigerated circulators might require a stronger pump and/or additional heating capacity. These capacities can be increased with:

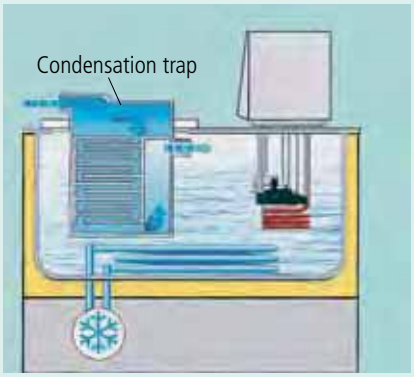
8 810 011, 012 HST Booster heater 6 kW
8 810 015 HSP Booster pump 30 l/min. - 3 bar max.



Condensation Traps

Ice crystals can form when bath fluids are exposed to humidity at ultra-low temperatures. This has a negative impact on the efficiency of the refrigerated unit, the lifetime of the bath fluid and also on the lowest achievable temperature.

Condensation traps are the ideal solution: they integrate into the filling port or bath opening of the instrument. 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.



Accessories

Bath Fluids

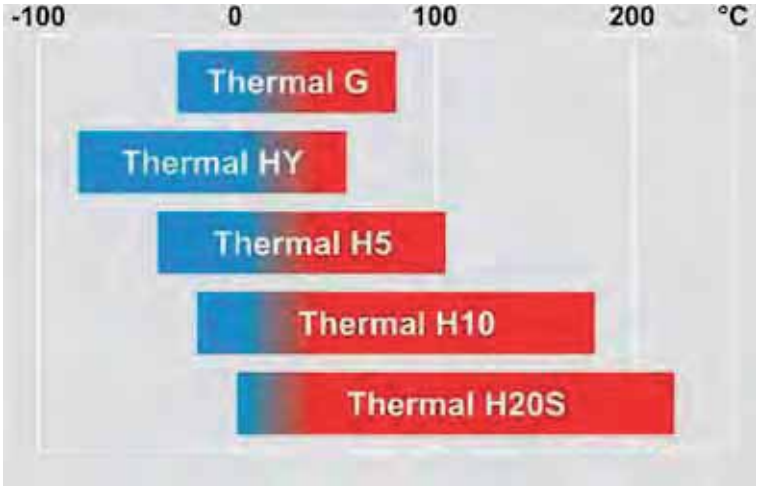
JULABO *Thermal* bath fluids are ideally suited for all of your temperature control applications guaranteeing safe and reliable operation. Choosing the proper bath fluid is critical for the best results in temperature control. The viscosity, oxidation and heat transfer characteristics of *Thermal* fluids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

JULABO *Thermal* bath fluids have been carefully selected for maximum performance with JULABO instruments.

Benefits

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

Working temperature ranges



JULABO *Thermal* Bath Fluids

JULABO Description		Thermal G	Thermal HY	Thermal H5	Thermal H10	Thermal H20S
JULABO Order Number	**10 liters**	**8 940 124**	**8 940 104**	**8 940 106**	**8 940 114**	**8 940 108**
	5 liters	**8 940 125**	**8 940 105**	**8 940 107**	**8 940 115**	**8 940 109**
Working temperature ranges and specifications						
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)	mm²/s	3.87	<4	<4	10	<51.5
Density at +20 °C	g/cm³	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

Tubing / Tubing insulation / Tubing accessories

JULABO Order No.	Description	Suitable for
CR® and Viton® Tubing / Tubing insulation / Tube clamps		
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.

Metal tubing, flexible, triple insulated -100 ... +350 °C		
8 930 209	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 210	1 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 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41

Metal tubing, flexible, insulated -50 ... +200 °C		
8 930 220	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41
8 930 221	1 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 m Metal tubing, 2 fittings M16x1 female	HE, HL, SL, CF31, CF41

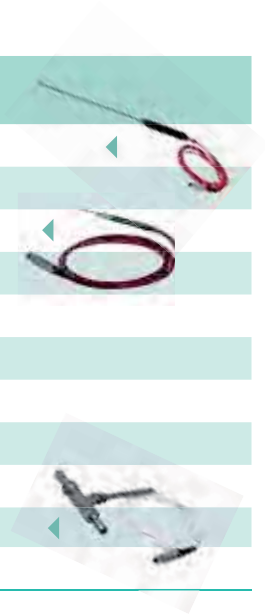
Accessories for metal tubing connections		
8 970 443	Adapter M16x1 male to M16x1 male	Metal tubing connection
8 970 444	Adapter for metal tubing M10x1 male to M16x1male	EH, MA, ME
8 970 750	Icing protection sleeve for pump connectors	SL, ultra-low circulators
8 970 751	Pump nozzle insulating set	ME, 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, 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
8 981 005	200 x 6 mm dia., glass, 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
8 981 011	300 x 6 mm dia., glass, 1.5 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
8 970 243	Bath cover with special cooling coil	F32, FP50, 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)	FPW

Test tube racks

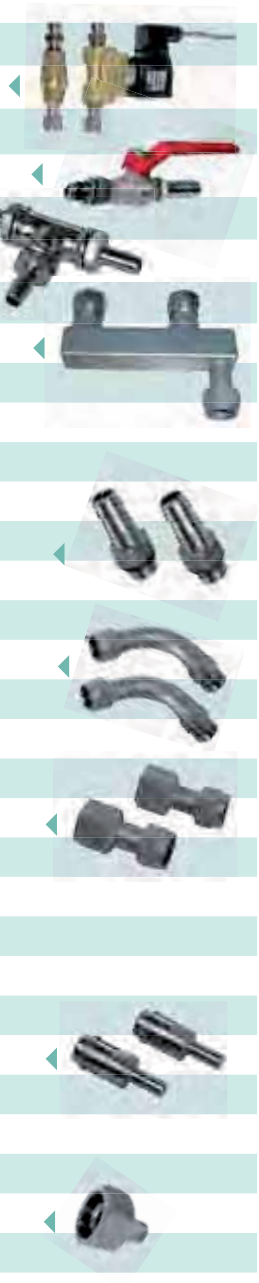
JULABO Order No.	Description	Immers. depth mm	Suitable for	Maximum insert capacity for test tube racks
Test tube racks made of stainless steel, to 150 °C				
8 970 320	for 28 tubes, 16/17 mm dia.	80	F12, F25, F26	1
8 970 321	for 38 tubes, 12/13 mm dia.	65	F12, F25, F26	1
8 970 307	for 50 tubes, 16/17 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

Connectors / Valves / Adapters, 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 models
8 970 450	Drain tap (-30 °C ... +200 °C)	CF models
8 970 470	Twin distributing adapter with barbed fittings	Tubing 8 mm inner dia.
8 970 472	Twin distributing adapter with barbed fittings	Tubing 10 mm inner dia.
8 970 471	Twin distributing adapter with barbed fittings	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 models
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 models
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 female	HE, HL, SL, CF models
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 models
8 890 004	2 Adapters M16x1 female to NPT ¼" male	HE, HL, SL, CF models
8 890 005	2 Adapters M16x1 female to NPT ¼" female	HE, HL, SL, CF models
8 890 006	2 Adapters M16x1 female to NPT ⅜" male	HE, HL, SL, CF models
8 890 007	2 Adapters M16x1 female to NPT ⅜" female	HE, HL, SL, CF models
8 890 008	2 Adapters M16x1 female to NPT ½" male	HE, HL, SL, CF models
8 890 009	2 Adapters M16x1 female to NPT ½" female	HE, HL, SL, CF models
8 890 010	2 Adapters M16x1 male to NPT ¼" female	HE, HL, SL, CF models
8 891 008	1 Adapter M16x1 male to BSP ½" female	HE, HL, SL, CF models
8 891 009	1 Adapter M16x1 male to BSP ¾" female	HE, HL, SL, CF models
8 890 011	2 Adapters M16x1 female to tube ¼" male	HE, HL, SL, CF models
8 890 012	2 Adapters M16x1 female to tube ⅜" male	HE, HL, SL, CF models
8 890 013	2 Adapters M16x1 female to tube ½" male	HE, HL, SL, CF models
8 890 024	2 Adapters M16x1 female to M16x1 female	HE, HL, SL, CF models
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



Software & Hardware for Instrument Control / Interfaces

JULABO Order No.	Description	Suitable for
	Electronic module with analog connectors 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
	Automatic Refill Device 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	Automatic refill device with 5 liter reservoir	HL, SL

***EasyTEMP* Software** (refer to chapter Wireless Communication & Software for details)

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
8 900 110	USB interface adapter 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

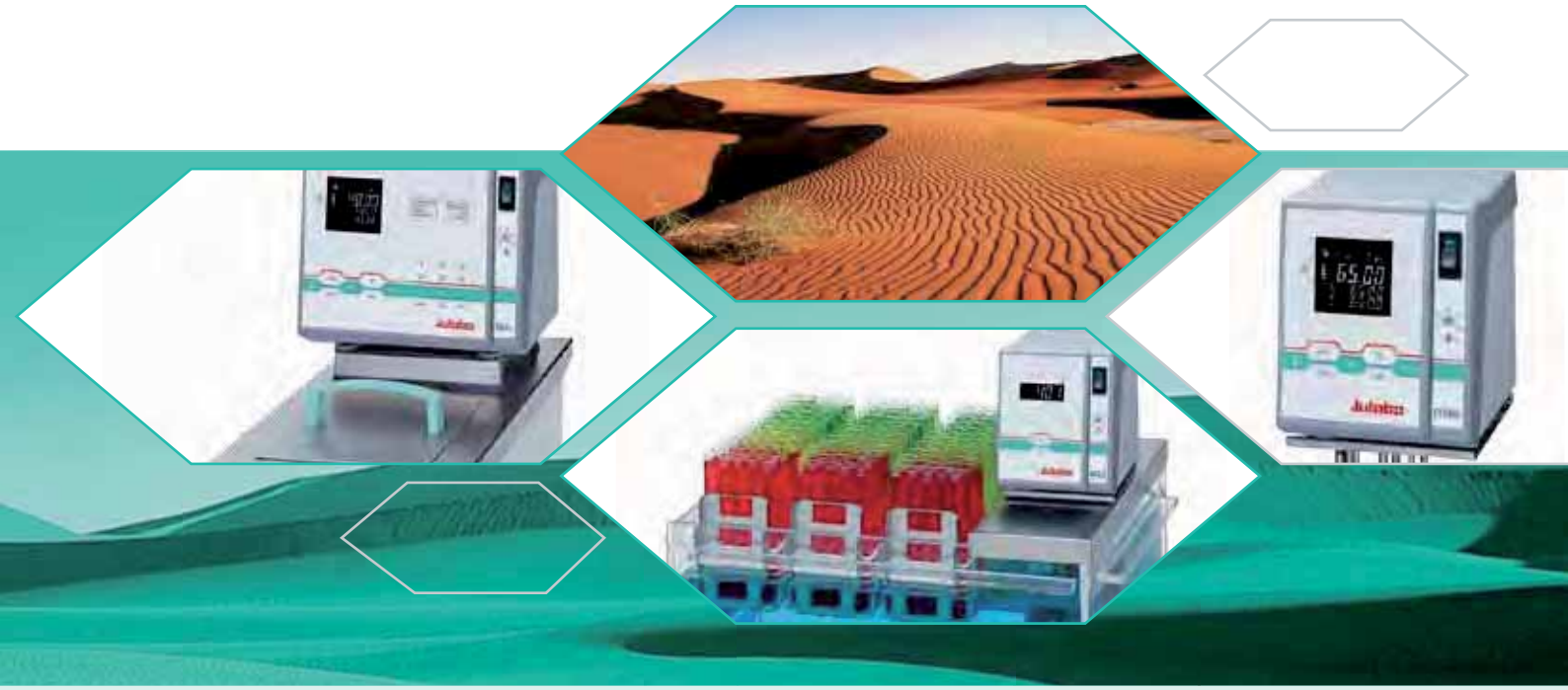
***WirelessTEMP* - Wireless Communication** (refer to chapter Wireless Communication & Software for details)

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* PC 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 cooling units <1 kW cooling power (at +20 °C)	All refrigerated circulators
8 903 035	Manufacturer's testing certificate for cooling units >1 kW cooling power (at +20 °C)	All refrigerated circulators

Hot Heating Technology to +300 °C



Heating Circulators

JULABO circulators are used successfully around the world. Whether in research, material testing or in production – the well proven and reliable technology is valued by users in all industries. The JULABO circulator program features functional solutions for daily applications. Innovation is our tradition: by focusing on user requirements JULABO has set the benchmark for temperature control technology for over 4 decades.

- 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 userfriendly, intuitive operation
- Extra bright displays, easy to read from a distance
- State-of-the-art control technology for quick and highly precise results
- Many professional functions for adjusting control parameters, temperature calibration, temperature profiles, etc.
- 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
- Wireless monitoring and operation (*WirelessTEMP)*
- Complete selection of useful and practical accessories

Three series of circulators offer solutions for all requirements and every budget. From routine to highly demanding applications: the JULABO circulator program has the matching equipment for every application.

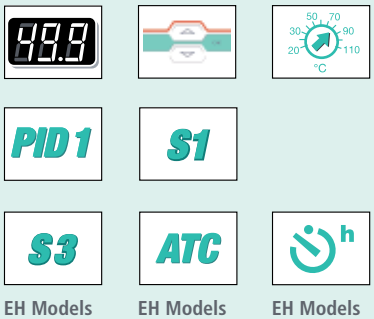
Julabo Heating Circulators at a Glance

Economy Series

ED/EH Models

+20 °C ... +150 °C

Basic models for routine and standard applications



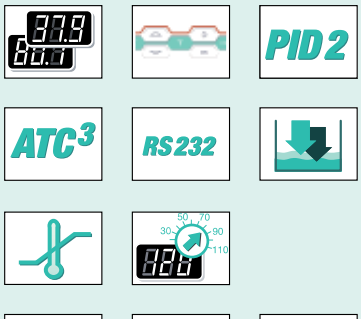
EH Models | EH Models | EH Models

TopTech Series

MB/MA Models

+20 °C ... +200 °C

Middle class for a broad range of applications

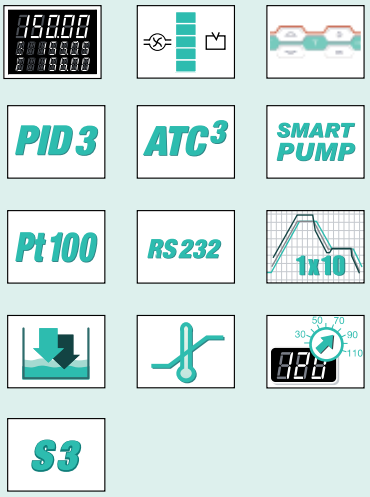


MB Models | MA Models | MA Models

ME Models

+20 °C ... +200 °C

Upper middle class with ext. Pt100 sensor connection



Connections for
③ Solenoid valve (EH Model)
④ Connections for pump and cooling coil

Connections for
② RS232
③ Solenoid valve
④ Connections for pump and cooling coil

Connections for
① External Pt100 sensor
② RS232
③ Solenoid valve
④ Connections for pump and cooling coil

Please refer to the fold-out page for description of icons above.

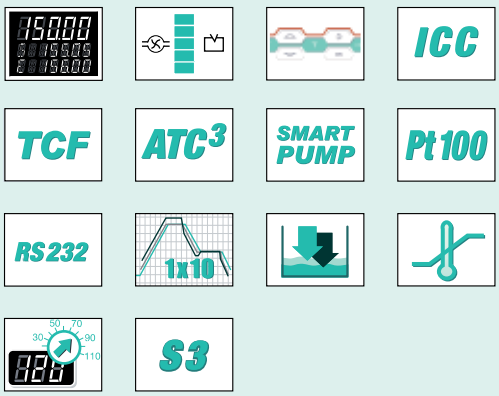
Intuitive Operation and Extra Bright Displays for ALL MODELS!

HighTech Series

HE/SE Models

+20 °C ... +300 °C

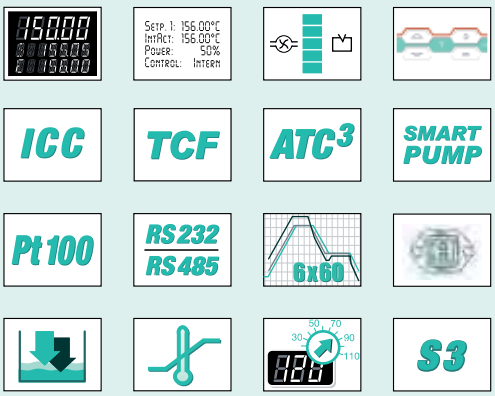
Sophisticated models for demanding applications

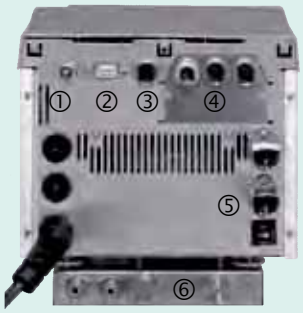


HL/SL Models

+20 °C ... +300 °C

Superior models for most demanding applications





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

Electronic module
with analog connections
Order No. 8 900 100
Optional for the HighTech series

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

Please refer to the fold-out page for description of icons above.

Julabo Heating Immersion Circulators

ED / EH

MB / MA

ME

External Pt100 sensor (accessory)

Heating Immersion Circulators

with attachment clamp for any bath tank up to 50 liters

Heating immersion circulators have been a staple at JULABO since the company was established in the late 1960s. These circulators control the temperature of baths up to 50 liters. All circulators include a bath attachment clamp allowing for quick and easy mounting to a bath tank.

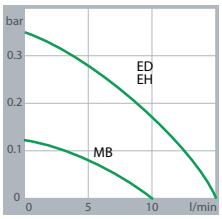
Immersion circulators

- Working temperature ranges 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
- Wetted parts made of stainless steel or high grade plastic
- Pump set accessory for external control applications
- Cooling coil accessory for applications below ambient temperature
- ME model features connection for external Pt100 temperature sensor and integrated programmer

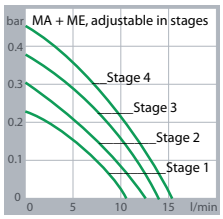
Bath attachment clamp for any bath tank (included)

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[1)]	Temp. stability °C	Heating capacity kW	Pump capacity Flow rate l/min	Pump capacity 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

[1)] For temperature applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler.

Bridge Mounted Circulator

SE-Z

Applications

- Quick and easy attachment with the bath attachment clamp or stainless steel telescopic bridge.
- Temperature control of any bath tank

Suitable for a wide range of applications, e. g. for:

- Temperature applications for samples
- Analytics
- Material testing

Bridge Mounted Circulator

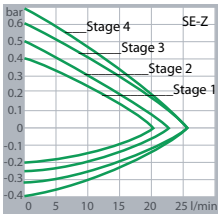
with expandable bridge for bath tanks up to 100 liters

The bridge mounted circulator features an adjustable stainless steel bridge for any bath tank up to 100 liters. The instrument 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 turbulant circulation
- Connection for external Pt100 sensor
- Integrated cooling coil

Pump capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C[1)]	Temp. stability °C	Heat. capacity kW	Pump capacity Flow rate l/min	Press. bar	Suction bar	Cooling coil	Usable immersion depth cm	Dimensions W x L x H cm
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)

Julabo Open Heating Bath Circulators

ED-5A/B

ED-19A

MB-13A

Open Heating Bath Circulators

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 tank.

Open heating bath circulator

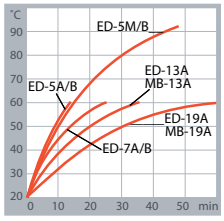
- Bath tanks made of transparent Plexiglas® or Makrolon®
- Models with a filling volume of 5 to 19 liters
- Bath tanks of 13 and 19 liters with handles

Plexiglas®: to +60 °C (designated 'A')
Makrolon®: to +100 °C (designated 'M')

Test tube insert capacity

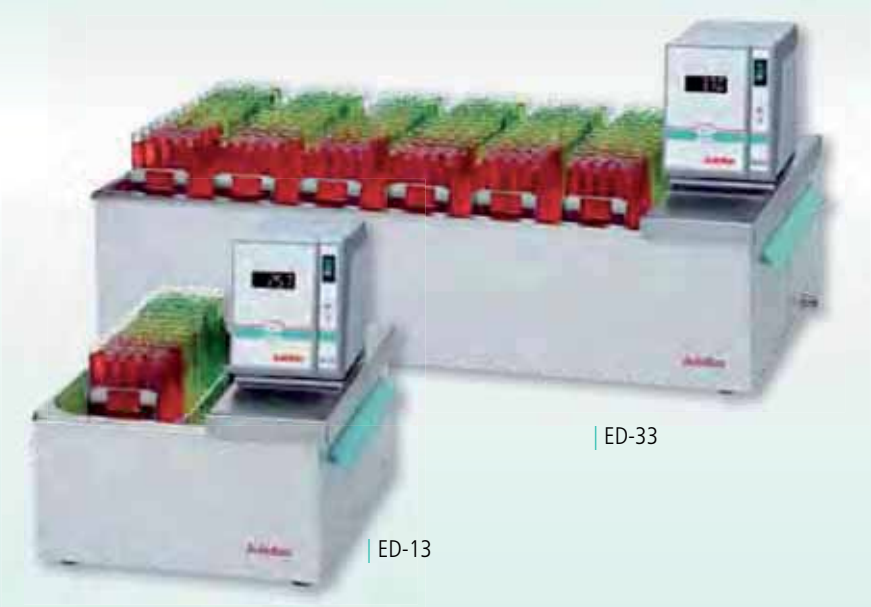
Model	Number of test tubes with 13 mm dia.	17 mm dia.
ED-5A/B, ED-5M/B	90	40
ED-7A/B	90	60
ED-13A, ED-13M, MB-13A	90	60
ED-19A, ED-19M, MB-19A	270	180

Heat-up times
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C[1]	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 tank	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

[1] For temperature applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler.



ED-33

ED-13

Applications

- Temperature applications for samples
- Preparation of samples for serology and clinical chemistry
- Analytics
- Material testing

Test tubes racks not included (accessory).

Open Heating Bath Circulators

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. A variety of accessories is available including test tube racks, immersion-height adjustable platforms, cooling coils, lift-up bath covers and flat stainless steel covers.

Open heating bath circulators

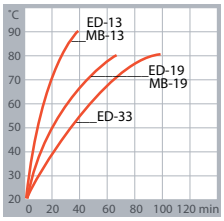
- Bath tanks made of high quality stainless steel
- Models with a filling volume from 13 to 33 liters
- Large bath openings for samples of any kind
- All models include handles and are designed for use with test tube racks

Test tube insert capacity

Model	Number of test tubes with 13 mm dia	17 mm dia
ED-13, ED-17, MB-13	90	60
ED-19, ED-27, MB-19	270	180
ED-33	540	360

Bath cover
available accessory

Heat-up times
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C[1)]	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 volume 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

[1)] For temperature applications near or below ambient temperature: use a cooling coil or JULABO immersion cooler.

Julabo Heating Circulators with Open Bath

ED-5A

MB-7A

ED-5M

Heating Circulators with Open Bath

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

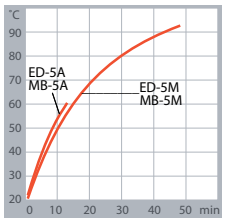
Heating circulators with open baths are designed for temperature applications in the circulator bath and are equipped with pump connections for external temperature applications. The models on this page feature bath tanks made of transparent Plexiglas® or Makrolon®.

Heating circulators with open bath

- Additional pump connections for external applications
- Bath tanks made of Plexiglas® or Makrolon®
- Models with a filling volume of 5 and 7 liters

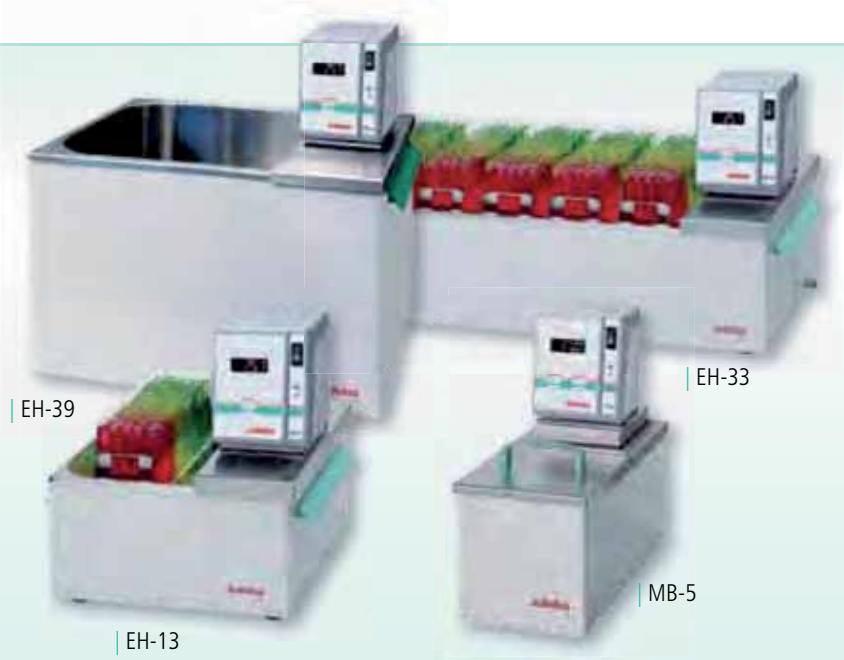
Plexiglas®: to +60 °C (designated 'A')
Makrolon®: to +100 °C (designated 'M')

Heat-up times
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C[1)]	Temp. stability °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pump capacity Pressure bar	Cooling coil	Bath opening/ bath depth W x L / D cm	Bath cover	Filling volume 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

[1)] For temperature 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 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.

Test tubes racks not included in delivery (accessory).

Heating Circulators with Open Bath

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

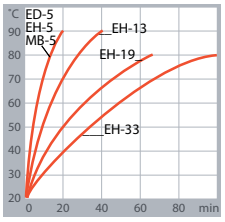
The models on this page are equipped with bath tanks made of high quality stainless steel. A variety of accessories is available including test tube racks, immersion-height adjustable platforms, cooling coils, lift-up bath covers and flat stainless steel covers.

Bath cover
available as accessory

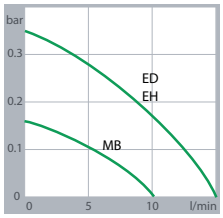
Heating circulators with open bath

- Bath tanks made of high quality stainless steel
- Working temperature range to +150 °C
- Models with a filling volume of 5 to 39 liters
- Models ED-5, EH-5 and MB-5 include bath cover and cooling coil
- Large bath openings for samples of any kind
- Models with 27, 33 or 39 liter bath tanks include drain
- EH models with electronic timer

Heat-up times
Bath fluid: water



Pump capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temp. range °C[1)]	Temp. stab. °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pump capacity 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

[1)] For temperature 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 10 mm inner dia. (pump connections M10x1 female)

Julabo Heating Circulators

MA-4

ME-26
with integrated immersion-height adjustable platform

Heating Circulators

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 closed systems. Temperature control applications in the bath are also possible. JULABO offers models with various bath tank sizes and features.

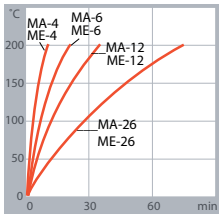
TopTech heating circulators

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

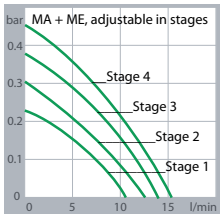
ME circulators additional features

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

Heat-up times
Bath fluid: Thermal



Pump capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C[1)]	Temp. stability °C	Heat. cap. kW	Pump capacity Flow rate l/min	Press. 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

[1)] For temperature 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 10 mm inner dia. (pump connections M10x1 female)

SL-6

HE-4

Applications

External temperature applications in combination with

- Reactors
- Autoclaves
- Distillation apparatus
- Mini plant applications
- Photometers
- Refractometers
- Temperature applications to small objects

Heating Circulators

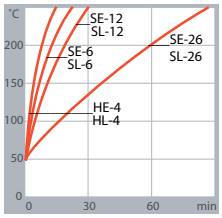
for external and internal temperature applications up to +300 °C with stainless steel bath tanks and pump connections

HighTech heating circulators provide superior technology for the most demanding applications. The instruments feature a powerful, electronically adjustable pressure and suction pump. The intelligent ICC Cascade temperature control automatically adjusts to the application conditions to achieve optimal control accuracy; especially useful with difficult, external applications.

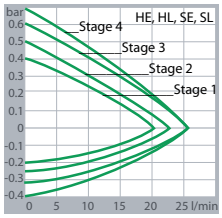
HighTech heating circulators

- External temperature control in closed and open systems
- ICC cascade 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 times
Bath fluid: Thermal



Pump capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C[1)]	Temp. stab. °C	Heat. cap. kW	Pump capacity / Flow rate l/min	Press. 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

[1)] For temperature 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 M16 x1 male)

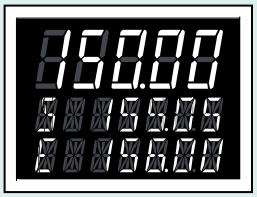
User Benefits
and helpful Tips

Always visible and easy to read: Brightest Temperature Displays

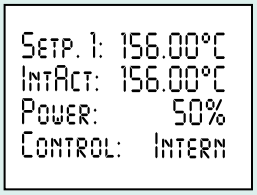
JULABO circulators offer large, easy-to-read temperature displays. The displayed values can be viewed easily from a long distance, at an angle and in very bright surroundings. This makes it easy to monitor the display during your daily tasks.

- **LED Temperature Display**
  for actual value and up to 3 setpoints, warning functions, high temperature cut-off, pump stages (resolution 0.01/0.1 °C, fig. 1)
- **VFD Comfort Display**
  simultaneous display of 3 values, warning functions, high temperature cut-off, pump stages (resolution 0.01/0.1 °C, fig. 2)
- **LCD Dialog Display**
  allows for interactive operation with easy-to-read text (fig. 3)

1



2



3

Highly precise Temperature Control Technology professional and user-friendly

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.

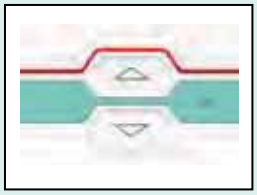
ICC Temperature Control (Intelligent Cascade Control) provides highly precise temperature control results even for the most demanding applications. ICC offers perfected temperature control: the PID control parameters are self-optimizing and automatically adjust to the respective application.

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.

User Benefits and helpful Tips

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.

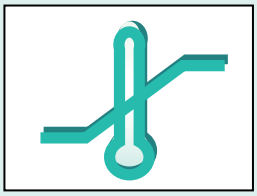


Early Warning System for Low Liquid Level

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

Early Warning System for High/Low Temperature Limits

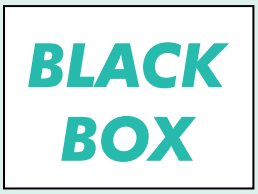
If the operator defined temperature limits are exceeded - e. g. caused by an exothermic reaction - the early warning system will trigger audible and optical warnings.
Low temperature protection with cut-off function: If required, the warning function can be switched to cut-off establishing an additional low temperature protection.



Additional Protection Functions

JULABO circulators and temperature control systems also feature:

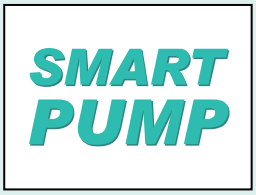
- Standby display and automatic self-test
- Monitoring of sensors and sensor temperature differentials
- *BlackBox*-function for remote diagnosis
- Overload protection for pump motor and refrigeration unit



Wireless Equipment Management

The new *WirelessTEMP* products allow wireless monitoring and operation of JULABO temperature control instruments via PC or a handheld remote control. Using *WirelessTEMP* saves time when monitoring instrument parameters, improves instrument installation options and eliminates expensive wiring or cabling. For more information see the chapter **Wireless Communication & Software**.

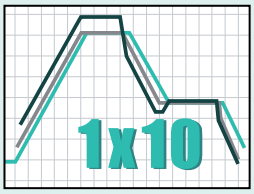
Intelligent Pump Systems

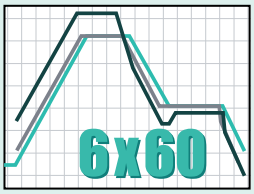


The highly efficient circulating pumps provide high pressures and flow rates. The *SmartPump* electronics have many benefits:

- Electronically adjustable pump capacity (4 stages) via keypad
- The HighTech electronics automatically adjust the pump capacity in response to changes in bath fluid viscosity values. This ensures hassle-free, 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 startup at a specified time.

- ME, HE, SE: 1 Temperature profile with up to 10 steps
- HL, SL: 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.

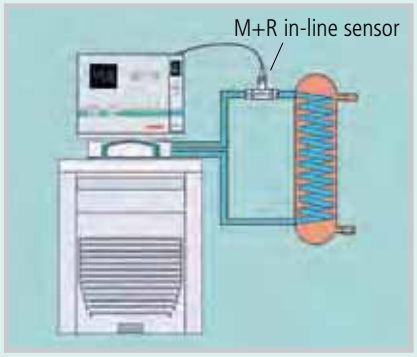
- EH: 1-Point calibration
- TopTech, HighTech: 3-Point calibration

User Benefits and helpful Tips

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, glass or PTFE coated stainless steel are available in lengths between 20 and 1200 mm. For highly precise temperature control an M+R in-line Pt100 sensor (see illustration) can be installed directly into the cooling circuit. The externally measured value is shown on the circulator's display.

8 981 020 **M+R in-line Pt100 sensor**



Exothermic Reactions under Control

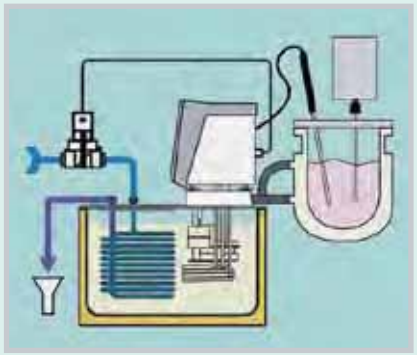
A bath lid with a built-in cooling coil is available in order to compensate for exothermic reactions. In case of a sudden peak in temperature cooling water is automatically fed into the cooling coil via a solenoid valve. This can instantly compensate for exothermic reactions.

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

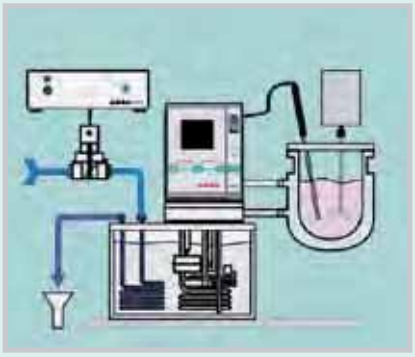
8 981 003 to 014 **External Pt100 sensor** (see accessories)
8 970 240 to 242 **Bath cover with special cooling coil** (see accessories)
8 980 703 **Solenoid valve for cooling water**

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:

8 981 003 to 014 **External Pt100 sensor** (see accessories)
8 970 240 to 242 **Bath cover with special cooling coil** (see accessories)
8 980 700 **Solenoid valve for cooling water**
9 790 000 **MVS Solenoid valve controller**



Economic Cooling Water Consumption



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

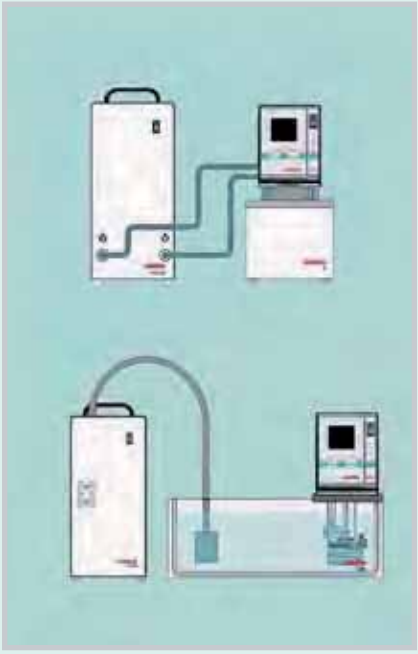
HL and SL circulators have an integrated automatic solenoid valve controller and require:

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

Flow-Through Coolers and Immersion Coolers



Flow-through coolers and immersion coolers used in combination with heating circulators allow users to work below ambient temperature.

Benefits:

- 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.

Accessories

Bath Fluids

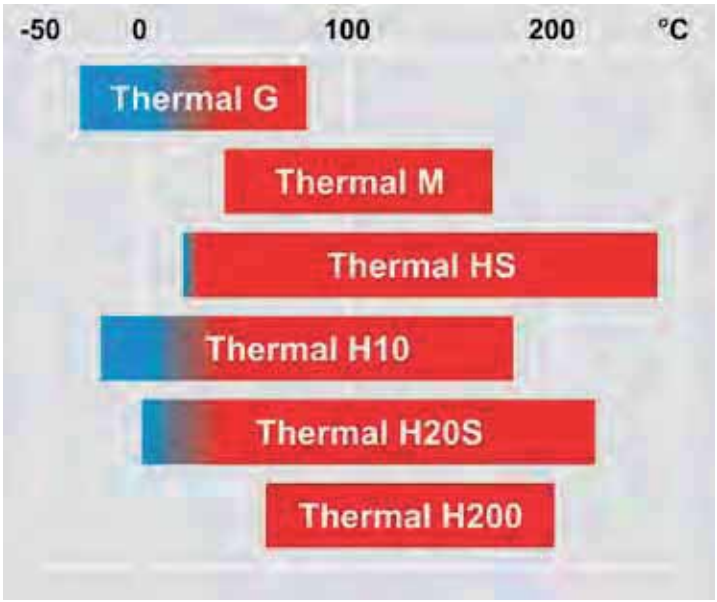
JULABO *Thermal* bath fluids are ideally suited for all of your temperature control applications guaranteeing safe and reliable operation. Choosing the proper bath fluid is critical for the best results in temperature control. The viscosity, oxidation and heat transfer characteristics of *Thermal* fluids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

JULABO *Thermal* bath fluids have been carefully selected for maximum performance with JULABO instruments.

Benefits

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

Working temperature ranges



JULABO *Thermal* Bath Fluid

JULABO Description		Thermal G	Thermal M	Thermal HS	Thermal H10	Thermal H20S	Thermal H200
JULABO Order Number	10 liters	8 940 124	8 940 100	8 940 102	8 940 114	8 940 108	8 940 134
	5 liters	8 940 125	8 940 101	8 940 103	8 940 115	8 940 109	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)	mm²/s	3.87	350	<51.5	10	<51.5	84
Density at +20 °C	g/cm³	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	clear	light brown	clear	light brown	clear

Julabo Heating Circulators

Water bath protective media to prevent formation of algae

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

Accessories for heating immersion circulators

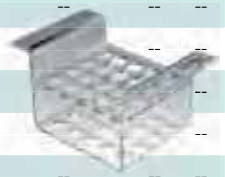
JULABO Order No.	Description	Suitable for
8 970 022	Stand attachment with rod 200 x 12 mm for laboratory stands	ED, EH, MB, MA, ME
8 970 421	Bath attachment clamp for wall thickness up to 60 mm	ED, EH, MB, MA, ME
8 970 140	Pump set for external temperature applications	ED, EH, MB, MA, ME
8 970 105	Installation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

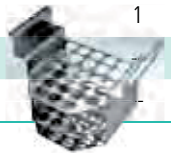
Bath tanks for heating immersion circulators

JULABO Order No.	Description	Fill. vol. liters	Dimensions cm inner (W x L / D)	outer (W x L / H)	Suitable for
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
Test tube racks made of Plexiglas®, to +60 °C										
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	--	--	--	--	--
Test tube racks made of Polypropylene®, to +80 °C										
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
Test tube racks made of stainless steel, to +150 °C										
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

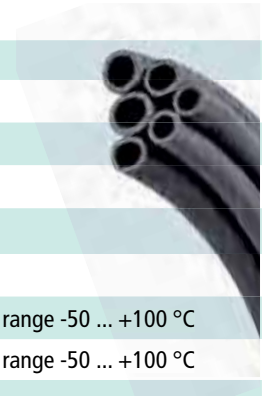
JULABO Order No.	Description	Suitable for
8 970 502	Immersion-height adjustable platform	Bath tank 19, 27
8 970 503	Immersion-height adjustable platform	Bath tank 13, 17

Bath Covers / Hollow Balls

JULABO Order No.	Description	Suitable for
8 970 253	Lift-up gable bath cover made of stainless steel	Bath tank 13, 17
8 970 254	Lift-up gable bath cover made of stainless steel	Bath tank 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 tank 13, 17
8 970 291	Flat stainless steel bath cover	Bath tank 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
CR® and Viton® Tubing / Tubing insulation / Tube clamps		
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.



Metal tubing flexible, triple insulated -100 ... +350 °C		
8 930 209	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 210	1 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 m Metal tubing, 2 fittings M16x1female	HE, HL, SE, SL

Metal tubing, flexible, insulated -50 ... +200 °C		
8 930 220	0.5 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL
8 930 221	1 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 m Metal tubing, 2 fittings M16x1 female	HE, HL, SE, SL

Accessories for metal tubing connections		
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 cover with special cooling coil	MA-4, MA-6, ME-4, ME-6, HE-4, HL-4, SE-6, SL-6
8 970 242	Bath cover with special cooling coil	ME-12, SE-12, SL-12
8 810 007	HST Booster heater 6 kW	SL-12

Connectors / Valves / Adapters, 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 female	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 ¼" male	HE, HL, SE, SL
8 890 005	2 Adapters M16x1 female to NPT ¼" female	HE, HL, SE, SL
8 890 006	2 Adapters M16x1 female to NPT ⅜" male	HE, HL, SE, SL
8 890 007	2 Adapters M16x1 female to NPT ⅜" female	HE, HL, SE, SL
8 890 008	2 Adapters M16x1 female to NPT ½" male	HE, HL, SE, SL
8 890 009	2 Adapters M16x1 female to NPT ½" female	HE, HL, SE, SL
8 890 010	2 Adapters M16x1 male to NPT ¼" female	HE, HL, SE, SL
8 891 008	1 Adapter M16x1 male to BSP ½" female	HE, HL, SE, SL
8 891 009	1 Adapter M16x1 male to BSP ¾" female	HE, HL, SE, SL
8 890 011	2 Adapters M16x1 female to tube ¼" male	HE, HL, SE, SL
8 890 012	2 Adapters M16x1 female to tube ⅜" male	HE, HL, SE, SL
8 890 013	2 Adapters M16x1 female to tube ½" 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

Julabo Heating Circulators

Software & Hardware for Instrument Control / Interfaces

JULABO Order No.	Description	Suitable for
	Electronic module with analog connectors 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
	Automatic Refill Device 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	Automatic refill device with 5 liter reservoir	HL, SL

	***EasyTEMP* Software** (refer to chapter Wireless Communication & Software for details)	
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
8 900 110	USB interface adapter 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

	***WirelessTEMP* - Wireless Communication** (refer to chapter Wireless Communication & Software for details)	
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* PC 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
8 981 005	200 x 6 mm dia., glass, 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
8 981 011	300 x 6 mm dia., glass, 1.5 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

NEW!

The new *WirelessTEMP* products enable you to simplify and automate your applications. JULABO temperature control instruments can be wirelessly operated and monitored - via PC or JULABO's convenient *Remote Control*.

For more information please refer to the catalog section:
Wireless Communication & Software

The Ultimate of Temperature Control

Temperature Control Systems

Highly dynamic temperature control systems are ideal for external temperature applications. These instruments feature high performance capabilities combining extremely rapid heat-up and cool-down times with wide working temperature ranges. The closed-system technology enables bath fluids to be used with an extended temperature range and a longer lifetime compared to conventional circulators. These instruments are used primarily for temperature control of jacketed reaction vessels.

- Ideal for precise control of external temperature applications
- Designed for temperature control of jacketed reaction vessels
- Rapid heat-up and cool-down
- Wide working temperature ranges using one bath fluid
- Designed to quickly compensate exothermic and endothermic reactions
- Highly dynamic ICC temperature control, stability to ±0.01 °C
- Powerful circulating pumps, electronically adjustable pump stages
- Prolonged bath fluid lifetime due to protection against oxidation and cracking
- Hydraulically sealed to prevent unpleasant vapors and odors
- No condensation or ice build-up
- Removable control for remote operation
- Automatic filling and de-gas mode
- Various models to select from
- Integrated warning and safety functions
- Digital and analog connections

The ultimate of temperature control:
The state-of-the-art temperature control technology and small filling volume of highly dynamic temperature control systems facilitates rapid heat-up & cool-down times. Difficult temperature applications can be controlled precisely and quickly.

JULABO's new *Presto*® *PLUS* Series represents the next generation of technology.

Julabo Highly Dynamic Temperature Control Systems at a Glance

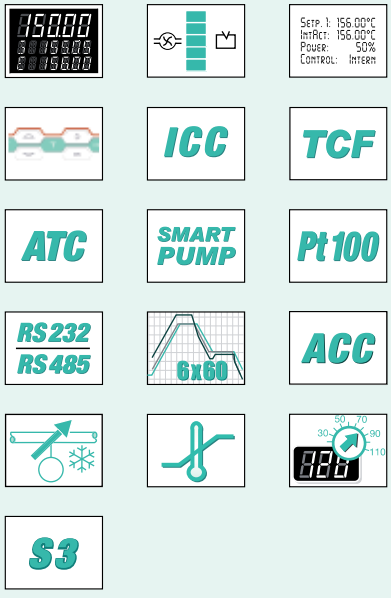
Presto® *PLUS*

Magnum 91

Presto® *PLUS* Models

-80 °C ... +250 °C

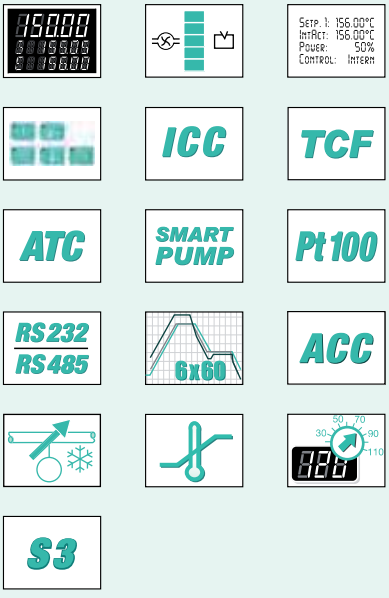
Innovative technology for
wide temperature ranges

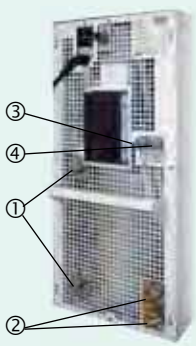


Magnum 91

-91 °C ... +250 °C

Maximum power for temperature control
of reactors up to 50 liters





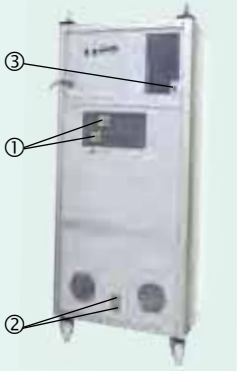
Rear view

① Pump connections M16x1

② Cooling water connections G ¾" with barbed fittings for tubing ½" inner dia.

③ Overflow connector

④ Expansion vessel connection M16x1



Rear view

① Pump connections M16x1

② Cooling water connections G ¾" with barbed fittings for tubing ½" inner dia.

③ Overflow connector

Please refer to the fold-out page for description of icons above.

W92

W92

-92 °C ... +250 °C

The next technology generation

W92 enters a new technological era of unsurpassed power and efficiency.

The W92 is the first of its class and features

- Extra-large heating & cooling capacity
- High pump capacity with adjustable pressure
- User-friendly operation via large, interactive TFT color display.

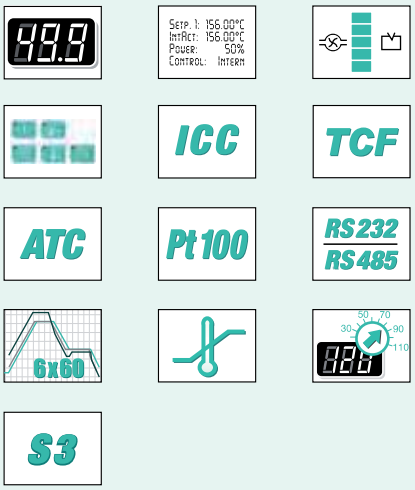
Interested? Contact us!

Forte HT

Forte HT Models

+40 °C ... +400 °C

Dual-zone technology for extremely high working temperatures



- Strong heating capacity
- Optional Cooling Unit (CU)
- Sealed heat-exchanger technology
- Virtually no fumes

Please refer to the fold-out page for description of icons above.

Julabo Presto® *PLUS*

LH40

LH85

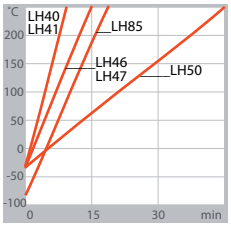
Presto® *PLUS*

the new generation of highly dynamic temperature control systems for perfectly accurate temperatures in the shortest amount of time

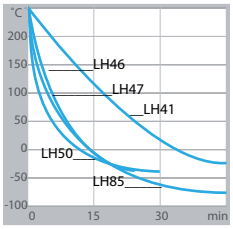
The *Presto® PLUS* Series of highly dynamic temperature control systems are the ultimate of temperature control technology. This series features numerous improvements based on proven and reliable technology. The temperature technology provides precise control utilizing well-engineered thermodynamic principles. *Presto® PLUS* is the ideal solution for all highly demanding external temperature applications.

- Highly dynamic control
- Rapid heat-up and cool-down
- Wide working temperature ranges without changing bath fluid
- Quick compensation of exothermic and endothermic reactions
- Prolonged lifetime of bath fluid due to sealed system

Heat-up times
Bath fluid: Thermal HL



Cool-down times
Bath fluid: Thermal HL



JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Temperature display / resolution °C	Display for pump pressure and filling volume	Heating capacity kW
9 410 240	**LH40**	-40 ... +250	±0.01 ... ±0.05	VFD & LCD / ±0.01	on VFD display	2.6
9 410 241	**LH41**	-40 ... +250	±0.01 ... ±0.05	VFD & LCD / ±0.01	on VFD display	2.6
9 410 246	**LH46**	-45 ... +250	±0.01 ... ±0.05	VFD & LCD / ±0.01	on VFD display	1.8
9 410 247	**LH47**	-47 ... +250	±0.01 ... ±0.05	VFD & LCD / ±0.01	on VFD display	1.8
9 410 250	**LH50**	-50 ... +250	±0.01 ... ±0.05	VFD & LCD / ±0.01	on VFD display	6.0
9 410 285	**LH85**	-80 ... +250	±0.01 ... ±0.05	VFD & LCD / ±0.01	on VFD display	1.8

LH50

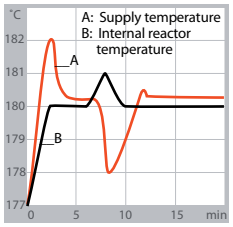
Applications

- Jacketed reactors, reactor systems and autoclaves
- Combinatorial chemistry
- Reaction blocks
- Organic synthesis
- Reaction calorimeters
- Distillation, pilot plants
- Semiconductor industry

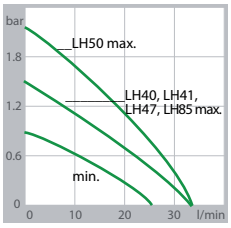
Additional benefits and features:

- Minimal space requirement due to small footprint
- Models can be located under the lab bench
- State of the art warning, safety, and monitoring functions
- Automatic filling and de-gas modes
- Small internal filling volume for rapid temperature response times
- IP class according to IEC 60529: IP31
- Pull out handle and castors for easy placement
- ICC cascade control for highest precision, stability ±0.01 °C
- VFD Comfort Display (resolution 0.01 °C/°F)
- Convenient operator navigation with an additional LCD display
- Integrated programmer (for 6 x 60 steps) with real time clock
- Indicators for pump stages and filling volume
- Powerful circulating pumps, electronically adjustable
- Combined RS232 / RS485 interface, Profibus optional

Reaction compensation
Exothermic, 2 liter reactor



Pump capacity
Bath fluid: Thermal HL



Cooling capacity kW [1] Bath fluid: JULABO Thermal | Ethanol 200 | +20	-20	-40	-60	-80 °C	Cooling of compressor	Pump capacity Flow rate l/min.	Press. bar	Filling volume liters	Filling volume expansion vessel liters	Dimensions W x L x H cm
1.6 | 0.9	0.35	0.01	--	--	Air	16-30	0.5 - 1.6	3.1	0.8	30 x 49 x 64
1.6 | 1.0	0.40	0.05	--	--	Water	16-30	0.5 - 1.6	3.1	0.8	30 x 49 x 64
2.5 | 2.3	0.70	0.10	--	--	Air/water	16-30	0.5 - 1.6	3.7	2.2	50 x 59 x 64
3.7 | 3.0	0.90	0.20	--	--	Air	16-30	0.5 - 1.6	5.7	5.2	40 x 55 x 127
5.5 | 7.0	2.60	0.50	--	--	Water	16-30	0.7 - 2.2	13.5	4.9	40 x 55 x 127
1.4 | 0.9	0.80	0.70	0.5	0.01	Air/water	16-30	0.5 - 1.6	3.7	2.2	50 x 59 x 64

[1] Cooling capacity at pump stage 1

Julabo Magnum

Magnum 91

Applications

- Reactor systems
- Pilot plant, Kilo labs
- Polymerization, Polycondensation
- Miniplants
- Vacuum chambers
- Space and atmospheric research

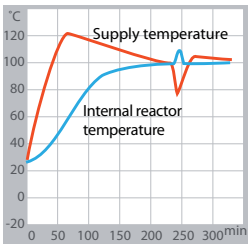
Magnum 91

an exceptionally powerful highly dynamic temperature control system

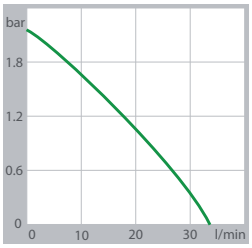
Magnum 91 offers all the benefits of the *Presto® PLUS* series.
In addition, the instrument is ideally suited for large-volume applications due to its powerful specifications:

- High heating and cooling capacity
- Wide working temperature range from -91 °C to +250 °C
- Increased pump capacity
- IP class according to IEC 60529: IP20
- Two-stage water-cooled refrigeration system

Reaction compensation
Exotherm, 30 liter reactor



Pump capacity
Bath fluid: Thermal HL



JULABO Order No.	JULABO Model	Working temperature range °C	Temperature stability °C	Temperature display resolution °C	Indication of pump pressure and filling volume	Heating capacity kW
9 410 191	**Magnum 91**	-91 ... +250	±0.05 ... ±0.2	VFD LCD / ±0.01	on indicator	6.0

Cooling capacity kW Bath fluid: JULABO Thermal | Ethanol 200 | +20	-20	-40	-60	-80 °C	Cooling of compressor	Pump capacity Flow rate l/min.	Press. bar	Filling volume liters	Filling volume expansion vessel liters	Dimensions W x L x H cm
3.5 | 5.0	4.5	4.0	2.5	0.6	Water	24-35	0.8-2.2	21.6	11.4	71 x 88 x 165

W92

Applications

- Reactor systems
- Miniplants
- Pilot plants
- Kilo labs
- Process technology
- Vacuum chambers

NEW!

W92

the next technology generation

The highly dynamic temperature control system W92 is the first instrument of a new high performance generation. This highly dynamic temperature control instrument features the latest cutting-edge technology available in the market today. Some of the features include:

- Temperature range -92 °C ... +250 °C
- Cooling capacity at +100 °C: 30 kW
  at +20 °C: 17 kW
  at -40 °C: 10 kW
  at -60 °C: 5.5 kW
- Heating capacity 12 kW (upgradable to 24 or 36 kW)
- Pump capacity, max. 6 bar, 60 l/min (adjustable)
- Easy and intuitive operation via large interactive TFT color display

Cooling capacity up to 30 kW !

Heating capacity up to 36 kW !

Pump capacity 6 bar, 60 l/min !

Interested? Contact us.

Julabo Forte HT

HT30 Circulator

Control unit M1

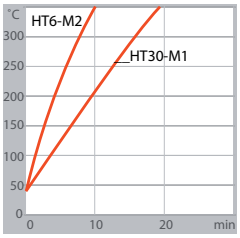
Forte HT

high temperature circulators
for working temperatures from +70 °C to +400 °C

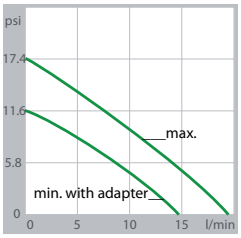
The Forte HT high temperature circulators are suitable for temperature control of external, closed-system applications. The compact, closed-system design prevents oil evaporation and fumes even at very high temperatures.

- High heating capacity up to 7 kW for fast heat-up times
- Strong pump capacity, adjustable (with optional adapter)
- Small filling volume
- Optional Cooling Unit (C.U.) for counter-cooling (refer to next page)
- Wide working temperature range without changing of bath fluids
- Prolonged lifetime of bath fluid
- Integrates easily into miniplant installations

Heat-up times
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	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

HT60 Circulator with C.U. cooling unit

Control unit M2

Forte HT with Cooling Unit

high temperature circulators with C.U. cooling unit for working temperatures from +40 °C to +400 °C

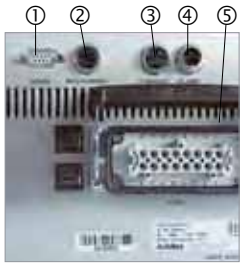
The Forte HT models on this page include the C.U. cooling unit for temperature applications starting at +40 °C. The Cooling Unit (C.U.) uses facility water and permits rapid cooling across the entire temperature range. Exothermic reactions are immediately compensated even at high temperatures.

Additional benefits of models with C.U. cooling unit:

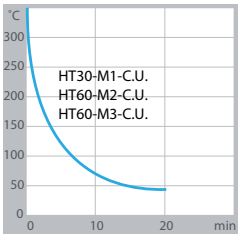
- Controlled cooling water supply for temperature applications from +40 °C
- High cooling capacities up to 15 kW (at +20 °C cooling water)
- Rapid cooling
- Rapid temperature control of exothermic and endothermic reactions

Connections Control unit

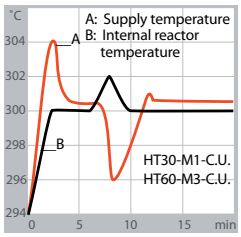
① RS232 / RS485
② Analog input
③ Standby input
④ Alarm output
⑤ Connector for control cable to HT Circulator



Cool-down times
Bath fluid: Thermal H350



Reaction compensation
5 liter reactor
Bath fluid: Thermal H350



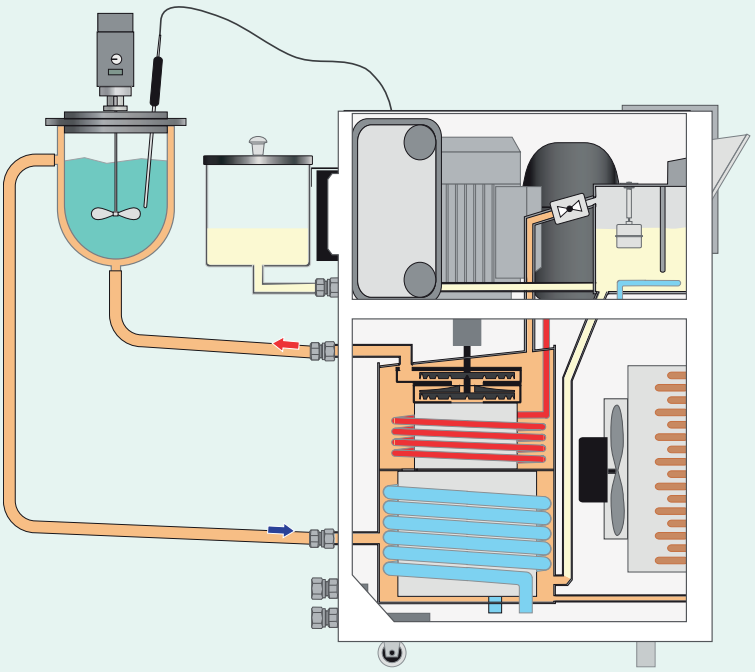
Cooling capacity (Water 20 °C) kW, max.	Pump capacity Flow rate l/min.	Press. bar	Filling volume liters	Power requirement V / Hz	Dimensions Circulator (W x L x H) cm	Dimensions Control unit (W x L x H) cm
--	14 - 18	0.8 - 1.2	2	230 / 50 or 230 / 60	23 x 23 x 58	25 x 25 x 18
--	14 - 18	0.8 - 1.2	2	3 x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

User Benefits
and helpful Tips

Thermodynamics and processor technology

JULABO Highly Dynamic Temperature Control Systems combine intelligent control electronics with proportionate heating capacity adjustment, robust cooling technology and optimized fluid dynamics. These integrated systems produce excellent performance with high temperature stability.

The cooling capacity output automatically adjusts to the application requirements. A state-of-the-art multi-phase motor controls refrigeration with high performance and efficiency. These instruments also feature closed-system heat exchanger design which eliminates vapors and/or condensation and the need for changing bath fluids when operating across wide temperature ranges.

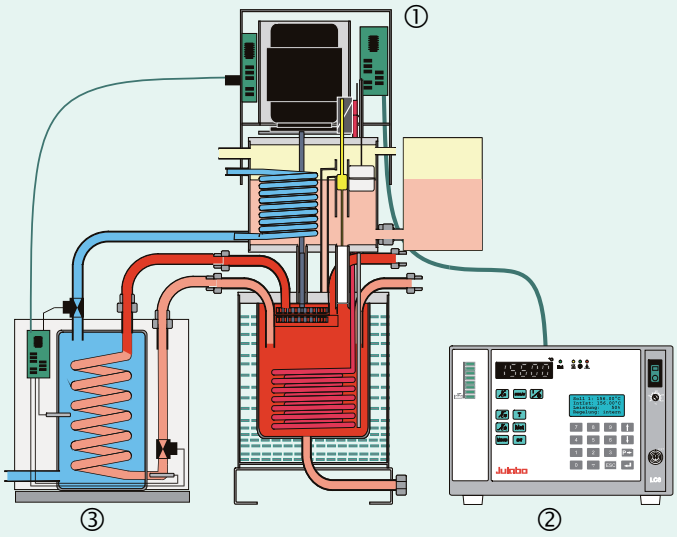


Forte HT with Cooling Unit

Forte HT high temperature circulators are designed for temperature control applications at very high temperatures. The closed-system design prevents oil fumes even at high temperatures. The circulators feature automatic heat-up, filling and de-gas functions.

The illustration shows a complete separation of modular design of the *Forte HT*:

① Circulator
② Control electronics
③ C.U. Cooling unit

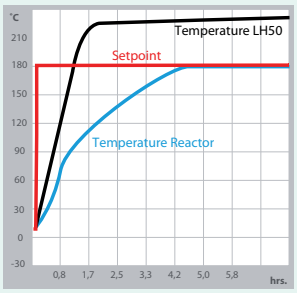


User Benefits and helpful Tips

Presto® LH50 with a 30 liter Glass Reactor

The graph on the right shows a heat-up sequence from +20 °C to +180 °C. Results were recorded using *EasyTEMP Professional* Software.

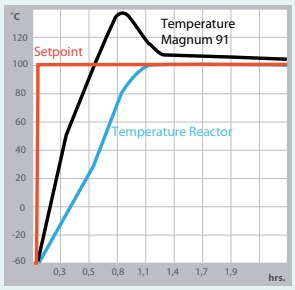
Test results show that a 30 liter glass reactor can be heated up from +20 °C to +180 °C within 4.2 hours using a *Presto*® LH50.



Magnum 91 with a 20 liter Glass Reactor

The graph on the right shows a heat-up sequence from -60 °C to +100 °C. Results were recorded using *EasyTEMP Professional* Software.

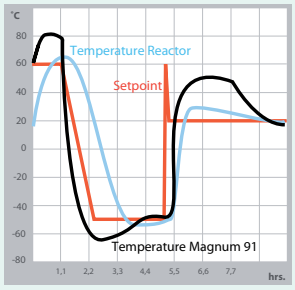
Test results show that a 20 liter glass reactor can be heated up from -60 °C to +100 °C within 1.1 hours using a *Magnum 91*. Cool-down from +100 °C to -60 °C was achieved within 2.2 hours.



Magnum 91 with a 35 liter Glass Reactor

The graph on the right shows several heat-up and cool-down sequences conducted within different temperature ranges, as well as a test to determine the lowest possible reactor temperature. Results were recorded using *EasyTEMP Professional* Software.

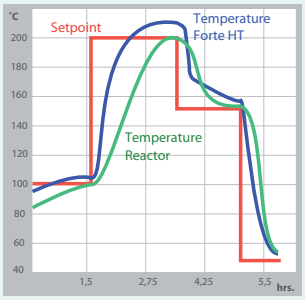
Test results show that a 35 liter glass reactor can be cooled down from +60 °C to -50 °C within 2.05 hours using a *Magnum 91*. The lowest possible reactor temperature was -69 °C.



Forte HT with 30 liter Glass Reactor

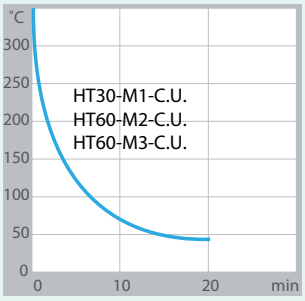
The graph on the right shows a cool-down sequence from +200 °C to +150 °C using the C.U. cooling unit.

Test results show a precise and fast response of the application temperature to the setpoint. Using the highly efficient C.U. cooling unit, a cool-down rate of up to 16 °C/min was achieved.



Rapid Cool-down with Forte HT

The optional C.U. cooling unit accessory achieves very rapid cool-down times and instantly compensates for exothermic reactions.



Professional & Easy Operation: Highly Precise Temperature Control Technology

The ICC temperature control (Intelligent Cascade Control) enables highly precise temperature control even for very demanding applications. The control parameters automatically adjust to the application.

ICC

Wireless Instrument Management

The new *WirelessTEMP* products allow wireless monitoring and operation of JULABO temperature control instruments via PC or a handheld remote control. Using WirelessTEMP saves time when monitoring instrument parameters, improves instrument installation options and eliminates expensive wiring or cabling.
For more information refer to the chapter **Wireless Communication & Software.**

Accessories

Bath Fluids

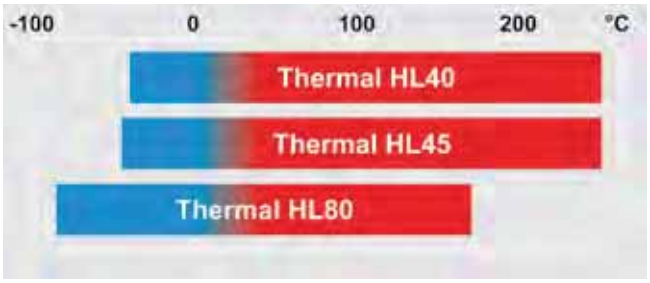
JULABO *Thermal* bath fluids are ideally suited for all of your temperature control applications guaranteeing safe and reliable operation. Choosing the proper bath fluid is critical for the best results in temperature control. The viscosity, oxidation and heat transfer characteristics of *Thermal* fluids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

JULABO *Thermal* bath fluids have been carefully selected for maximum performance with JULABO instruments.

Benefits

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

Working temperature range *Presto*, *Magnum*, *W92*



Working temperature range *Forte HT*

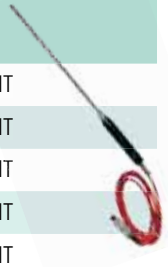
JULABO *Thermal* Bath fluids

JULABO Description		Thermal HL40	Thermal HL45	Thermal HL80	Thermal H250S	Thermal H250	Thermal H335 [1]	Thermal H350
JULABO Order Number	**10 liters**	**8 940 136**	**8 940 122**	**8 940 120**	**8 940 132**	**8 940 116**	**8 940 130**	**--**
	5 liters	**8 940 137**	**8 940 123**	**8 940 121**	**8 940 133**	**8 940 117**	**8 940 131**	**8 940 111**
Working temperature range and specifications								
Presto, Magnum, W92	°C	-40 ... +250 not suitable	-45 ... +250 not suitable	-85 ... +170 not suitable	not suitable +20 ... +250	not suitable +80 ... +250	not suitable +30 ... +335	not suitable +50 ... +350
Forte HT								
Flash point	°C	+124	>+121	>+63	+230	+292	+184	+210
Fire point	°C	+142	>+162	>+112	+274	+334	+212	+235
Viscosity, kinetic	mm²/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/cm³	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

[1] Therminol® 66, trademark of Solutia, Inc.

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, W92, Forte HT
8 981 005	200 x 6 mm dia., glass, 1.5 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 006	20 x 2 mm dia., stainless steel, 1.5 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 010	300 x 6 mm dia., stainless steel, 1.5 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 011	300 x 6 mm dia., glass, 1.5 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 015	300 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 013	600 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 016	900 x 6 mm dia., stainless steel/PTFE coated, 3.0 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 014	1200 x 6 mm dia. stainless steel/PTFE coated, 3.0 m cable	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 020	M+R in-line Pt100 sensor, 2 fittings M16x1 male	Presto® *PLUS*, Magnum 91, W92, Forte HT
8 981 103	Extension cable 3.5 m for Pt100 sensor	Presto® *PLUS*, Magnum 91, W92, 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 LH41/46/50/85*, Magnum 91, W92
8 910 041	Castors with 2 locks (W x L x H: 56 x 47.5 x 12.5 cm)	Presto® *PLUS LH40/41/46/85*
8 970 830	Expansion vessel 2 liters	Presto® *PLUS LH40/41/46/85*
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 indication (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

Software & Hardware for Instrument Control / Interfaces

For software and hardware accessories please refer to 'Wireless Communication & Software', page 112 ff

Metal tubing

JULABO Order No.	Description	Suitable for
Metal tubing, flexible, triple insulated -100 ... +350 °C		
8 930 209	0.5 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 930 210	1 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 930 211	1.5 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 930 214	3 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
Metal tubing, flexible, insulated -50 ... +200 °C		
8 930 220	0.5 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 930 221	1 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 930 222	1.5 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 930 223	3 m Metal tubing, 2 fittings M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
Accessories for connecting metal tubing		
8 970 443	Adapter M16x1 male to M16x1 male	Presto® *PLUS*, Magnum 91, Forte HT
8 970 750	Icing protection sleeve for pump connectors	Presto® *PLUS*, Magnum 91

Connectors / Valves / Adapters, etc.

JULABO Order No.	Description	Suitable for
8 970 457	Shut-off valve for loop circuit (-30 °C ... +200 °C), M16x1	Presto® *PLUS*, Magnum 91, Forte HT
8 970 490	2 Collar nuts M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 970 442	2 Elbow fittings 90°, M16x1 female/male	Presto® *PLUS*, Magnum 91, Forte HT
8 890 004	2 Adapters M16x1 female to NPT ¼" male	Presto® *PLUS*, Magnum 91, Forte HT
8 890 005	2 Adapters M16x1 female to NPT ¼" female	Presto® *PLUS*, Magnum 91, Forte HT
8 890 006	2 Adapters M16x1 female to NPT ⅜" male	Presto® *PLUS*, Magnum 91, Forte HT
8 890 007	2 Adapters M16x1 female to NPT ⅜" female	Presto® *PLUS*, Magnum 91, Forte HT
8 890 008	2 Adapters M16x1 female to NPT ½" male	Presto® *PLUS*, Magnum 91, Forte HT
8 890 009	2 Adapters M16x1 female to NPT ½" female	Presto® *PLUS*, Magnum 91, Forte HT
8 890 010	2 Adapters M16x1 male to NPT ¼" female	Presto® *PLUS*, Magnum 91, Forte HT
8 891 008	1 Adapter M16x1 male to BSP ½" female	Presto® *PLUS*, Magnum 91, Forte HT
8 891 009	1 Adapter M16x1 male to BSP ¾" female	Presto® *PLUS*, Magnum 91, Forte HT
8 890 011	2 Adapters M16x1 female to tube ¼" male	Presto® *PLUS*, Magnum 91, Forte HT
8 890 012	2 Adapters M16x1 female to tube ⅜" male	Presto® *PLUS*, Magnum 91, Forte HT
8 890 013	2 Adapters M16x1 female to tube ½" male	Presto® *PLUS*, Magnum 91, Forte HT
8 890 024	2 Adapters M16x1 female to M16x1 female	Presto® *PLUS*, Magnum 91, Forte HT
8 890 034	2 Adapters M30x1.5 female to M16x1 male, stainless steel	Presto® *PLUS*, Magnum 91
8 890 035	2 Adapters M30x1.5 male to M16x1 male, stainless steel	Presto® *PLUS*, Magnum 91

Eco-Friendly and Powerful Cooling

Recirculating Coolers

JULABO recirculating coolers are specifically designed for laboratory and industrial applications. Due to their high efficiency these chillers are an economic and environmentally friendly alternative to conventional tap water cooling. Compact models for laboratory applications can be placed on top of or under the lab bench. High-performance models with a cooling capacity of up to 20 kW are available for industrial applications.

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

JULABO recirculating coolers have no side vents and therefore can be placed right next to other equipment saving valuable space.

Example calculation
Cooling of rotary evaporators is a typical application of recirculating coolers. In one year an average 3 liter rotary evaporator uses the same amount of water as a family of four! The recirculating cooler purchase is amortized quickly while saving our precious drinking water resources.

Julabo Recirculating Coolers at a Glance

Up to 20 kW cooling capacity !

FL Series

FC Series

FL Models

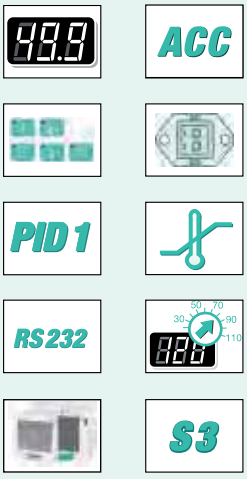
-20 °C ... +40 °C

Over 20 models for laboratories and industry

FC Models

-25 °C ... +80 °C

9 models for heating and cooling applications, up to 2.5 kW cooling capacity



Pt100 FC1200T, FC1600T, FCW2500T

Removable venting grid for quick and easy cleaning of condenser.

Benefit:
No loss of cooling capacity.

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

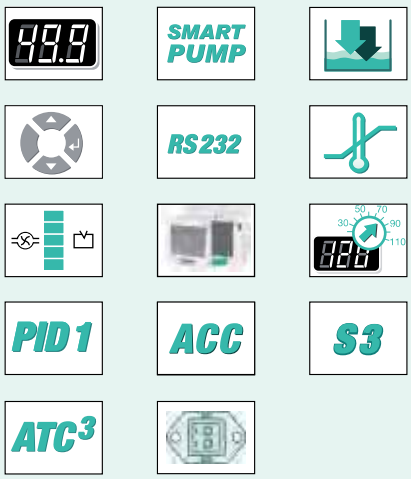
Please refer to the fold-out page for description of icons above.

SemiChill Series

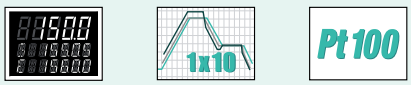
SC Models

-20 °C ... +130 °C

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



models with *Professional* Electronics



Optional DI-filter or micro-filter mounted directly on housing

F / AWC

F250 / AWC100 Models

+5 °C ... +40 °C

Compact models for applications requiring little cooling performance

AWC100 and F250 are economically designed featuring a small footprint and budget pricing.

Both models feature a filling port with lid and level indicator.

Ideal for simple cooling applications: Low purchase cost and small footprint are the key benefits of the AWC100 with air-to-water-cooling.

Please refer to the fold-out page for description of icons above.

Julabo Recirculating Coolers FL Series

FL300

FL601

FL1201
FL1703

Recirculating Coolers - FL Series

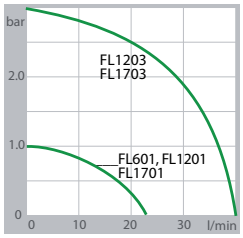
compact models, up to 1.7 kW cooling capacity
flexible installation – even under lab benches

The FL models featured on this page are equipped for a wide range of cooling applications.

- Easy access filling
- Level indicator (all models), pressure indicator (from FL1201 and up)
- Large expansion volume
- Immersion pumps, suitable for continuous operation
- Return line maximum temperature of +80 °C
- Recessed grips and wheels for easy transport
- Low liquid level protection with optical and audible alarm
- Suitable for water, water-glycol mixture, *Thermal* bath fluids
- Overload protection (pump motor, compressor)

Removable venting grid
with drain port at front bottom

Pump Capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Cooling capacity kW +20	+10	0	-10	-20 °C	Pump capacity Flow rate / Pressure l/min	bar	Filling volume liters	Dimensions W x L x H cm
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 with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)
FL1203 and FL(W)1703: 2 barbed fittings for tubing ¾" inner dia. (pump connections G ¾" male)

FL4006

Applications

- Rotary evaporators
- Condensers
- Reaction vessels
- Soxhlet installations
- Distillation apparatus
- Vacuum systems
- Gas chromatographs
- Spectrometers
- Semiconductor industry
- Dosing and gluing techniques
- Diffusion pumps
- Mass spectrometers
- SEM

Recirculating Coolers - FL Series

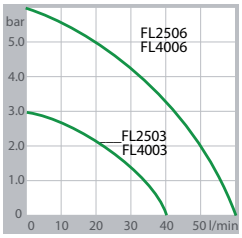
tower versions, up to 4.3 kW cooling capacity

The FL models shown on this page feature cooling capacities up to 4.3 kW, powerful circulating pumps and integrated bath tanks with filling volumes up to 30 liters.

- Powerful circulating pumps up to 60 l/min; 6 bar
- By-pass valve to adjust pump pressure
- Early warning function for maintenance procedures
- Overload protection (pump motor, compressor)
- Stainless steel bath tank and heat exchanger
- *BlackBox* function for online diagnosis
- Castors

Pressure indicator
from model FL1201 upwards

Pump capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Cooling capacity kW +20	+10	0	-10	-20 °C	Pump capacity Flow rate l/min	Pump capacity Pressure bar	Filling volume liters	Dimensions W x L x H cm
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 with each unit: 2 barbed fittings for tubing ¾" inner dia. on models FL/FLW2503 and FL/FLW4003 (pump connections G ¾" male)
2 barbed fittings for tubing 1" inner dia. on models FL/FLW2506 and FL/FLW4006 (pump connections G 1 ¼")

Julabo Recirculating Coolers FL Series

FL7006 to FLW11006

Applications

- Electron microscopes
- Lasers
- Mills and kneaders
- Pilot plants
- Miniplants
- Plastic industry
- Drying of gases
- General industry

Up to 20 kW!

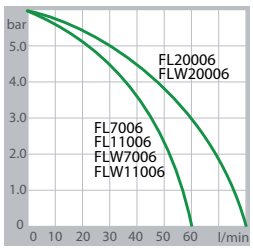
Recirculating Coolers - FL Series

powerful models, up to 20 kW cooling capacity

The FL models on this page are designed to remove process heat from large systems and applications. They feature strong fluid pumps and high-performance compressors.

- Cooling capacities up to 20 kW
- For demanding applications in the process industry
- Low water consumption for all water-cooled FLW models
- Overload protection for pump motor and compressor

Pump capacity
Bath fluid: water



JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Cooling capacity kW +20	+10	0	-10	-20 °C	Pump capacity Flow rate / Pressure l/min	bar	Filling volume liters	Dimensions W x L x H cm
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	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	11.0	6.0	2.5	80	0.8 - 6.0	15... 37	95 x 115 x 161

Included with each unit: 2 barbed fittings for tubing 1" inner dia. (pump connections G 1 ¼")

Recirculating Coolers FC Series

| FC600S

| FC1600T

Recirculating Coolers - FC Series

compact size, up to 2.5 kW cooling capacity
and 1.2 kW heating capacity

The FC models on this page feature integrated heaters with high temperature stability across the operating range.

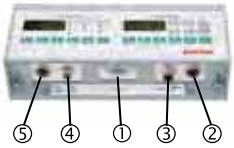
- Temperature stability ±0.2 °C
- Integrated heater
- Expanded working temperature range to +80 °C
- Two LED temperature displays
- Adjustable inlet/outlet temperature differential
- Fluid level indicator (sight glass)
- Connections for RS232, standby and alarm

FC1200T, FC1600T, FCW2500T

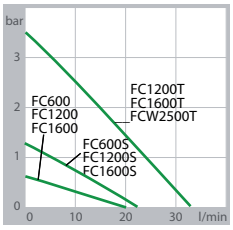
- Connection for external Pt100 sensor
- Analog connections for programming and temperature recorder

Digital/analog connections

① RS232 Interface
② Standby input
③ Alarm output



Pump capacity
Bath fluid: water



FC1200T, FC1600T, FCW2500T provide additionally:

④ External Pt100 sensor
⑤ External programming, temperature recorder

JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Heat cap. kW	Cooling capacity kW +20	+10	+5	-10	-20 °C	Pump capacity Flow rate / Press. l/min	bar	Pressure indicator bar	Filling volume liters	Dimensions W x L x H cm
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														
9 601 256	**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

Julabo Recirculating Coolers SemiChill Series

SC2500a
SC2500w

Applications

- Semiconductor industry:
  - Etching tools
  - Stainless steel chucks
  - PVD
  - Sputtering
  - Wet benches
- Packaging industry
- Plastic industry
- Dosing and gluing techniques
- Jacketed reaction vessels
- Kilo labs, pilot plants

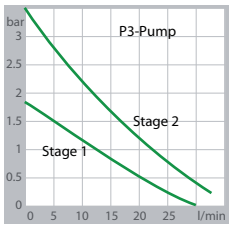
Recirculating Coolers - SemiChill Series

modular concept, pick & choose components to meet your requirements, up to 10 kW cooling capacity

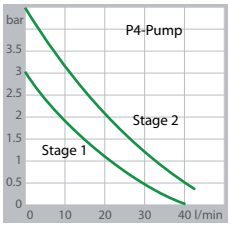
Field-proven SemiChill recirculating coolers provide reliable, continuous operation under rough environmental conditions. All wetted parts are made of stainless steel or high grade plastic.

- Selection of 5 different models
- Modular component concept
- Optional heating capacity up to 12 kW
- All wetted parts stainless steel or high-grade plastic
- Pressure gauge & fluid level indicator
- Overload protection (pump motor, compressor)
- Gasket-free immersion pumps, maintenance free and electronically adjustable

Pump capacity P3
Bath fluid: water



Pump capacity P4
Bath fluid: water



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

Models designated 'a' = ventilation air cooling; 'w' = water cooling Pump connections: NPT ¾" male

[1] Maximum working temperature range (Working temperature range, Standard: +5 ... +35 °C)

Configuration Options

Keypad and control electronics **Optional features**	Eco	Professional
		
MULTI-DISPLAY (LED) temperature indication	●	
VFD Comfort Display with simultaneous indication of 3 values		●
Keypad, splash-proof	●	●
PID temperature control	●	●
3-point calibration	●	●
Pump capacity adjustable in stages	●	●
RS232 interface	●	●
´Stakei´ connections 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)	●	●
Online diagnosis via integrated Black Box	●	●
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 MΩ/cm		●
Flow measurement and status display (factory pre-set limit value)		●
Options for *Professional* electronics		
Scalable analog interfaces (standby input, 2 x alarm output)	--	Option
RS485 Interface	--	Option

Further options for working temperature, pump capacity and heaters

Type	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	✓	Option	Option	--	✓	--	✓	Option	--	--
SC5000a, SC5000w SC10000w	✓	Option	Option	Option	✓	Option[1)]	✓	--	Option	Option

✓ This feature is included in base model

1) Cooling capacity reduces by 0.2 kW

Filter housings

Please specify filter option when placing an order. Filter housings cannot be retrofitted. Housings are mounted on the right side.

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

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

Julabo Recirculating Coolers SemiChill Series

Order Information

Combine one of the five base models with the options of your choice. Please use the following order information to create your order number. Example for model SC5000a: 9 5 2 1 050 07 P3 H0 D0 M1

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.)

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.)

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

Circulating pump (pump type, pump capacity)
P3 33 l/min. - 3.5 bar max.
P4 43 l/min. - 4.3 bar max.

Voltage version[1)]
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

Basic model
025 SC2500a
026 SC2500w
050 SC5000a
051 SC5000w
101 SC10000w

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)

Keypad and control electronics
0 Eco
2 Professional
3 Professional with analog interface module
7 Professional with RS485 interface

[1)] **Voltage version**
SC2500a, SC2500w
230 V / 50 Hz or
208-230 V / 60 Hz

SC5000a, SC5000w, SC10000w
400 V (3 Ph.) / 50 Hz or
208-230 V (3 Ph.) / 60 Hz

Compact Recirculating Coolers

AWC100

F250

Applications

- Rotary evaporators
- Cooling of Peltier elements, for analytical devices and CCD cameras
- Polarimeters, refractometers
- Electrophoresis chambers
- Condensers for glass installations
- Calorimeters

Compact Recirculating Coolers

small sizes, low cost, up to 0.55 kW cooling capacity

The models AWC100 and F250 are environmentally friendly reducing electricity and facility water consumption.

Air-to-Water Recirculating Cooler AWC100 for applications near ambient temperature

- Circulating water is cooled by air ventilation
- Constant pump performance
- Energy saving without compressor
- Cooling performance adjustable in 2 stages
- Level indicator

The F250 EcoChiller is the ideal choice for replacing tap water in cooling applications

- Environmentally friendly operation with low energy consumption
- Compact design and small footprint
- Splash-proof keypad with LED display
- Easy filling, drain tap and level indicator

JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C	Cooling capacity[1] W +20	+10	+5 °C	Pump capacity Flow rate l/min	Pump capacity Pressure bar	Filling volume liters	Dimensions W x L x H cm
9 630 100	**AWC100**	+20 ... +40	--	400 550	220 300	120 (Stage 1) 180 (Stage 2)	2.9	0.2	0.9	20 x 34 x 30
9 620 025	**F250**	+5 ... +40	±0.5	250	220	210	15	0.35	1.7 ... 2.6	24 x 40 x 52

[1] AWC100: cooling capacity varies with the temperature difference between return line temperature and ambient temperature.

Included with each unit:
AWC100 / F250: 2 each barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

User Benefits
and helpful Tips

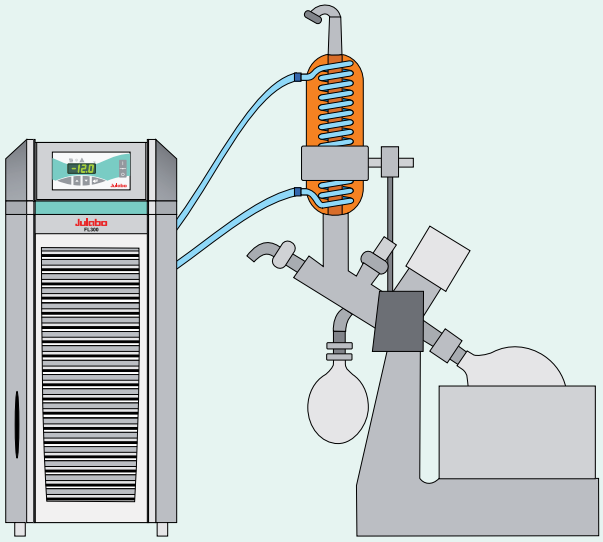
Cooling with Recirculating Coolers

The use of tap water as a cooling source has environmental and performance issues:

- Unreliable performance due to fluctuations in tap water temperature
- Operating costs: fresh water and sewer charges
- Inability to precisely control the temperature

Benefits of JULABO Recirculating Coolers:

- Reliable performance due to precise temperature control
- Reduction in operating costs
- No waste water generation
- Consistent flow rate
- Connection to multiple systems



Cost Saving (sample calculation)

The cooling of rotary evaporators is a common application for recirculating coolers. An average 3 liter rotary evaporator uses approximately 230,000 liters of cooling water per year. This corresponds to an annual water consumption of a family of four! The following example calculates the 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	=	ΔT * c * m/t
ΔT	=	2 °C (temperature difference)
c	=	4.18 kJ/kg*K (specific heat capacity for water)
m/t	=	0.066 l/sec (water flow rate)

Required cooling capacity: 560 watts.

Cooling water costs

4 liters per minute	= 240 liters per hour
Operating time per year	= 240 days x 8 hours
Consumption per year	= 461 m³
Cost per m³	= 4.80 € *
Cost per year	= 2212.80 €

Costs for operating a recirculating cooler (FL601)

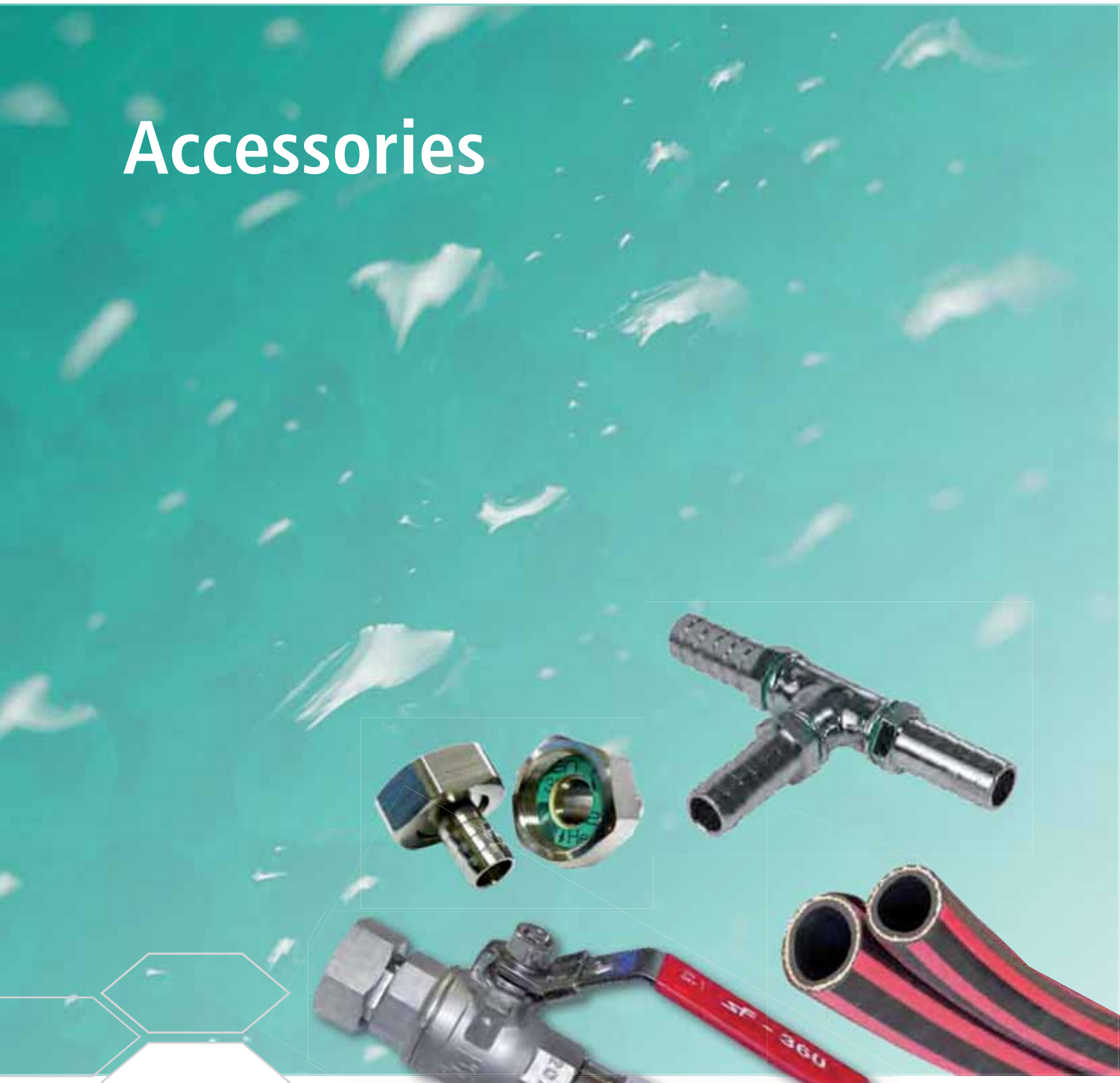
Power consumption	= 1.05 kW
Operating time per year	= 240 days x 8 hours
Consumption per year	= 2016 kW
Cost per kWh	= 0.20 € *
Cost per year	= 403.20 €

* Average prices in Germany, March 2009

This adds up to **cost savings of € 1809.60 per year**.

Amortization period: 2 years!
Reduce your cost while contributing to our environment.

Accessories



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., (-40 ... +120 °C)	FL601/1201/1701, FC Series
8 930 312	1 m Reinforced tubing, 12 mm / ½" inner dia., (-40 ... +120 °C)	FL601/1201/1701, FC Series
8 930 319	1 m Reinforced tubing, ¾" inner dia., (-40 ... +120 °C)	FL(W)1203/1703/2503/4003
8 930 325	1 m Reinforced tubing, 1" inner dia., (-40 ... +120 °C)	FL(W)2506/4006/7006/11006/20006

Tubing insulation

JULABO Oder 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 inner dia, Reinforced tubing 8 mm ID
8 930 413	1 m Insulation, 23 mm inner dia.	Reinforced tubing 12 mm / ½" ID
8 930 419	1 m Insulation, 29 mm inner dia.	Reinforced tubing, ¾" 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 / ½" ID
8 970 483	2 Tube clamps, size 4	Reinforced tubing, ¾" 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 adapter with barbed fittings for tubing 8 mm ID	FL, FC, F250
8 970 472	Twin distributing adapter with barbed fittings for tubing 10 mm ID	FL, FC, F250
8 970 471	Twin distributing adapter with barbed fittings for tubing 12 mm ID	FL, FC
8 970 476	Twin distributing adapter G ¾" with barbed fittings for tubing ¾" ID	FL(W)1203/1703/2503/4003
8 970 477	Twin distributing adapter G 1¼" 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 / ½" ID	FC
8 970 520	2 Quad distributing adapters, M16x1, with barbed fittings for tubing 8 mm or 12 mm / ½" ID	FL(W)601/1201/1701
8 970 522	2 Quad distributing adapters, G ¾" female, with barbed fittings for tubing ¾" ID	FL(W)1203/1703/2503/4003
8 970 524	2 Quad distributing adapters, G 1¼" female, with barbed fittings for tubing 1" ID	FL(W)2506/4006/7006/11006/20006

Connectors / Adapters

JULABO Order No.	Description	Suitable for
8 890 040	2 Adapters G ¾" female to M16x1 male	FL(W)1203/1703/2503/4003
8 890 041	2 Adapters G 1¼" female to M16x1 male	FL(W)2506/4006/7006/11006/20006
8 890 042	2 Adapters G ¾" female to barbed fitting for tubing ½" inner dia.	FL(W)1203/1703/2503/4003
8 890 043	2 Adapters G ¾" female to barbed fitting for tubing ¾" inner dia.	FL(W)1203/1703/2503/4003
8 890 044	2 Adapters G 1¼" female to barbed fitting for tubing ½" inner dia.	FL(W)2506/4006/7006/11006/20006
8 890 045	2 Adapters G 1¼" female to barbed fitting for tubing ¾" inner dia.	FL(W)2506/4006/7006/11006/20006
8 890 046	2 Adapters G 1¼" female to barbed fitting for tubing 1" inner dia.	FL(W)2506/4006/7006/11006/20006
8 890 047	2 Adapters G ¾" female to NPT ½" male	FL(W)1203/1703/2503/4003
8 890 048	2 Adapters G ¾" female to NPT ¾" male	FL(W)1203/1703/2503/4003
8 890 049	2 Adapters G 1¼" female to NPT ½" male	FL(W)2506/4006/7006/11006/20006
8 890 050	2 Adapters G 1¼" female to NPT ¾" male	FL(W)2506/4006/7006/11006/20006
8 890 051	2 Adapters G 1¼" female to NPT 1" male	FL(W)2506/4006/7006/11006/20006

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

JULABO Order No.	Description	Suitable for
8 920 000	Particle filter for cooling water circuit (for water-cooled models)	FLW, FCW, SC5000w, SC10000w
8 970 456	Shut-off valve for loop circuit M16x1	FL300/601/1201/1701, FC
8 970 454	Shut-off valve G ¾"	FL(W)1203/1703/2503/4003
8 970 458	Shut-off valve G 1¼"	FL(W)2506/4006/7006/11006/20006
8 980 701	Solenoid valve set for loop circuit (-10 °C ... +130 °C), M16x1	FC
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

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
8 981 005	200 x 6 mm dia., glass, 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
8 981 011	300 x 6 mm dia., glass, 1.5 m connecting 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, including 2 fittings M16x1 male	FC1200T, FC1600T, FCW2500T
8 981 103	Extension cable 3.5 m for Pt100 sensor	FC1200T, FC1600T, FCW2500T

Software & Hardware for Instrument Control / Interfaces

For software and hardware accessories please refer to 'Wireless Communication & Software', page 112 ff

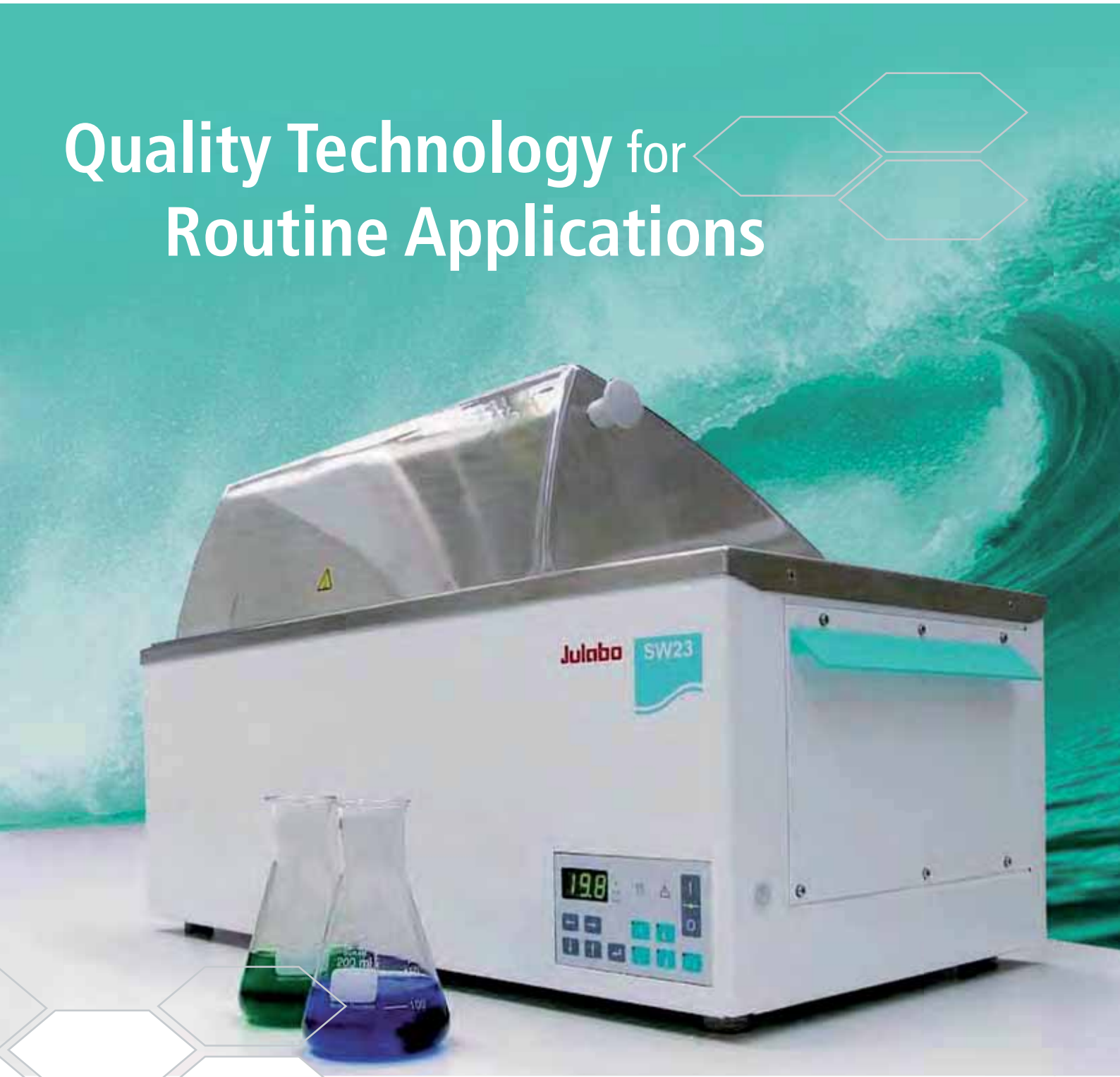
Accessories for *SemiChill* Recirculating Coolers

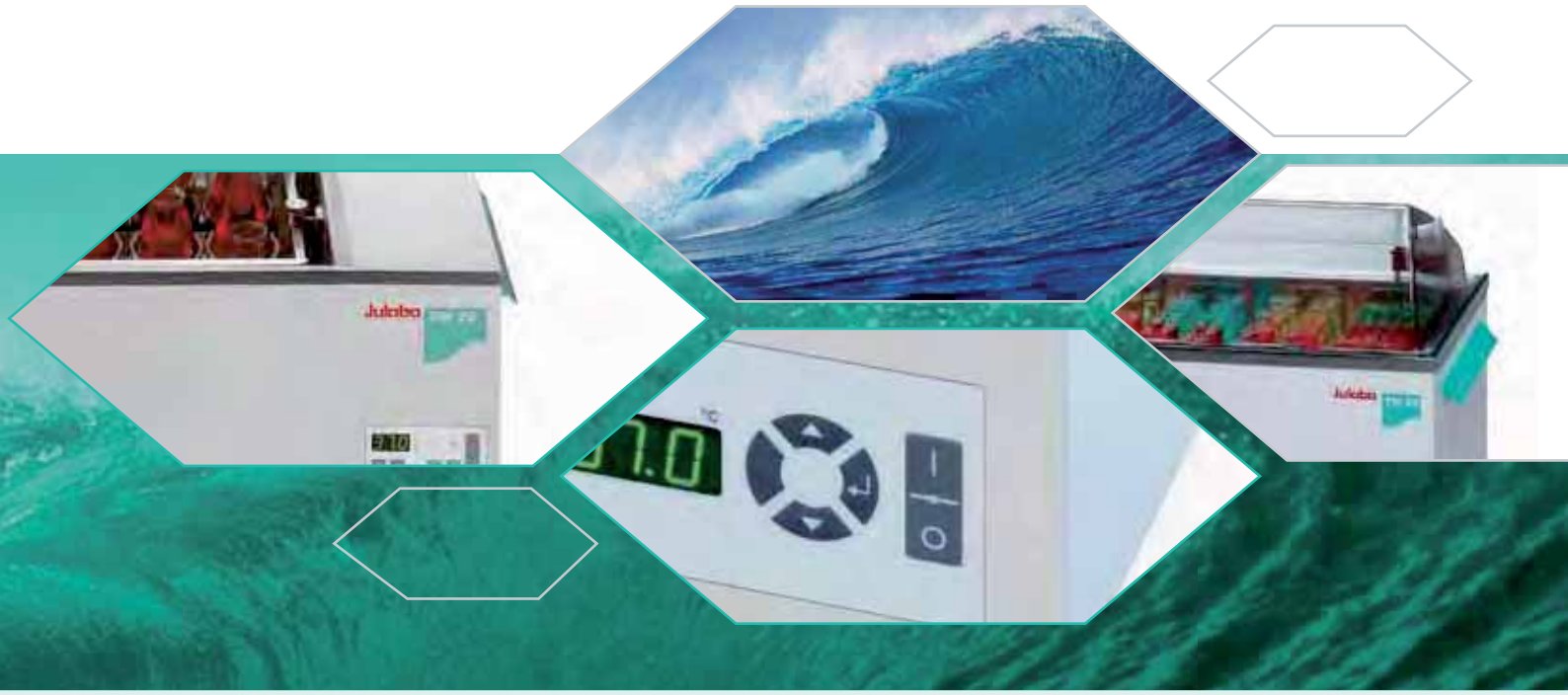
JULABO Order No.	Description	Suitable for
8 920 016	Micro-filter cartridge 10 micron	Micro-filter housing plastic
8 920 017	Micro-filter cartridge 25 micron	Micro-filter housing plastic
8 920 018	Micro-filter cartridge 40 micron	Micro-filter housing plastic
8 920 019	Micro-filter cartridge 100 micron	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 housings
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 ½" inner dia. to NPT ¾" female	SemiChill
8 890 037	2 Barbed fittings for tubing 5/8" inner dia. to NPT ¾" female	SemiChill
8 890 038	2 Adapters NPT ¾" female to M16x1 male	SemiChill
8 980 073	RS232 Interface cable, 2.5 m	SemiChill
8 900 110	USB Interface adapter cable	SemiChill
8 980 031	Ethernet / RS232 Interface converter	SemiChill

JULABO *Thermal* Bath Fluids

JULABO Description		Thermal G	Thermal H5	Thermal H10
JULABO Order Number	**10 liters**	**8 940 124**	**8 940 106**	**8 940 114**
	5 liters	**8 940 125**	**8 940 107**	**8 940 115**
Working temperature ranges and specifications				
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^2/s	3.87	<4	10
Density at +20 °C	g/cm^3	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

Quality Technology for Routine Applications





Water Baths and Shaking Water Baths

The TW and SW Water Bath Series are microprocessor-controlled, durable, and long-lasting high quality products that accommodate any common temperature application from +20 °C to +99.9 °C. Examples include temperature control of samples, incubations, material testing, corrosion tests, and cell cultivation.

- User-friendly operation via keypad
- Bright LED-Display
- Bath volumes from 2 to 26 liters
- Lift-up bath cover (optional)
- Splash-proof design
- Power switch integrated in keypad (patented)
- High temperature stability of ±0.2 °C or ±0.02 °C
- Dry-running protection with audible and optical alarm
- Warning and cut-off protection for high/low temperature
- Adjustable shaking frequencies from 20 to 200 RPM's in SW models
- Convenient bath drains
- Removable bottom plate and shaking insert
- Wide selection of accessories for temperature control of samples
- All wetted parts are made of stainless steel or high grade plastics

Large selection of accessories for all routine laboratory applications:
For example: the all-purpose tray accommodates Erlenmeyer flasks in all common sizes. Various racks for test tubes and microliter tubes are also available.

Julabo Water Baths Overview

TW Series

Water Baths
+20 °C ... +99.9 °C

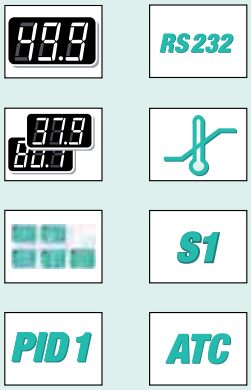
4 different models
from 2 to 26 liters

User-friendly operation via splash water protected keypad with integrated power switch and bright LED temperature display.

SW Series

Shaking Water Baths
+20 °C ... +99.9 °C

2 different models
with 20 liters filling volume



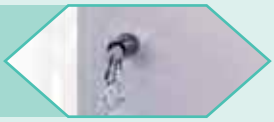
Keypad with Multi-Display (LED) for adjusting setpoint, high/low temperature early warning function, and shaking frequency.

Please refer to the fold-out page for description of icons above.

Features & Benefits

TW Models

User-Friendly Keypad with LED Display



Easy-Access Drain

Small Footprint – Large Bath Volume

Wide Selection of Test Tube Racks

Durable Handles

Integrated High Performance Heater

Lift-up Bath Covers available in Makrolon® or Stainless Steel

Integrated Power Switch with Auto-Start Feature

High Quality Stainless Steel Bath Tank Design for Minimum Fluid Loss

SW Models
also offer:

Temperature Stability up to ±0.02 °C

Adjustable Shaking Frequency (20 ... 200 rpm)

Removable Shaking Insert

Integrated Timer (0...10 Operating Hours)

RS232 Interface

Julabo Water Baths

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 provide many benefits for your common day-to-day laboratory tasks. Features like easy operation, splash water protection, and an optimized bath tank design maximize user-friendliness.

TW2

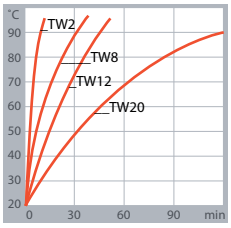
- Space-saving design, suitable for samples and for up to 24 test tubes

TW8, TW12, TW20

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

Applications

- Routine laboratory applications
- Cell cultivation
- Food & cosmetics
- Temperature control of samples
- Incubations
- Material / corrosion tests



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

Accessories

JULABO Order No.	Description / Dimensions		Suitable for
Lift-up Makrolon® covers (to +80 °C), transparent			
8 970 289	Lift-up Makrolon® cover		TW2
8 970 286	Lift-up Makrolon® cover		TW8
8 970 287	Lift-up Makrolon® cover		TW12
8 970 288	Lift-up Makrolon® cover		TW20
Lift-up stainless steel bath covers (to +100 °C)			
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
Flat stainless steel bath covers with sets of rings			
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
Cooling installation / continuous water supply			
8 970 415	Liquid level/cooling set		TW8, TW12,TW20
Test tube racks to +80 °C, Polypropylene			
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
Test tube racks to +100 °C, stainless steel			
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 tubes	12/13 mm dia.	TW8, TW12,TW20
8 970 346	for 90 test tubes	11/12 mm dia.	TW8, TW12,TW20
8 970 347	for 21 test tubes	30 mm dia.	TW8, TW12,TW20
Additional accessories			
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
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 and protect samples from contamination. Made of either Makrolon® or stainless steel.

Flat Bath Covers

Beakers or Erlenmeyer flasks can be placed directly onto the perforated stainless steel bottom plate.

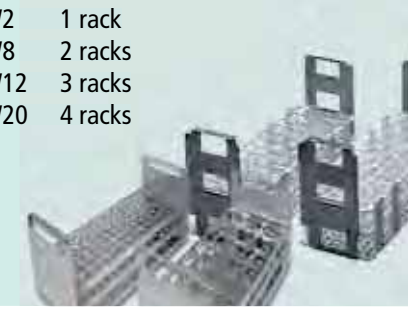
Liquid Level/Cooling Set

With continuous water supply to maintain constant liquid level at high temperatures and for counter-cooling of applications at or near ambient temperature.

Insert Capacity

of test tube racks for water baths:

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



Julabo Shaking Water Baths

| SW23

| SW22

Applications

- Biochemical research
- Material testing
- Enzyme and tissue studies
- Homogenization
- Corrosion tests
- Fermentation
- Incubations
- Blood plasma thawing
- Food & cosmetics

Test tube racks and cover not included (optional).

Shaking Water Baths SW Series

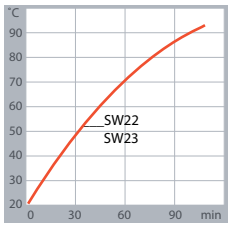
for working temperatures from +20 °C to +99.9 °C

JULABO Shaking Water Baths provide state-of-the-art features for your 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
- Dry-running protection and audible warning / cut-off functions
- Integrated timer (0 ... 10 operating hours)
- Side drain
- User-friendly operation and consistent reproducibility
- 1-point calibration

Model SW22 is the basic model featuring a temperature stability of ±0.2 °C.
Model SW23 is the advanced model featuring a temperature stability of ±0.02 °C with integrated circulation pump.

The shaking insert is removable: No direct contact with the bath fluid, carrier trays can be assembled outside the bath.



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	±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	±0.02	2	50 x 30 / 18	8 ... 20	20 ... 200	15	70 x 35 x 26 / 43

Accessories

JULABO Order No.	Description

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

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)

Standard carrier trays for Erlenmeyer flaks

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 flaks

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 with 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 *www.julabo.de*	**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*

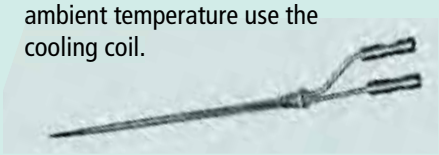
8 940 006	**6 bottles, 100 ml each, to prevent formation of algae**
8 940 012	**12 bottles, 100 ml each, to prevent formation of algae**

Lift-up Covers

prevent liquid losses due to evaporation and protect samples from contamination.

Makrolon® cover

For counter-cooling near ambient temperature use the cooling coil.



All-purpose spring tray

Standard carrier tray

Base tray with spring clamps

Carrier tray with test tube racks

Additional

Temperature Control Products

Additional Products

This section features additional equipment for various temperature control applications. 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 for nearly every application.

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

Visco Baths
- For highly precise measuring applications with viscometers and densimeters
- Clear bath tanks and stainless steel version with 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

Julabo Calibration Baths

SL-8K

SL-14K

Calibration Baths

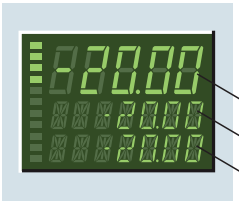
for working temperatures from +50 °C to +300 °C

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

Benefits:

- Highest available temperature stability; ±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
- Storage of up to 3 temperature setpoints
- ISO and DKD calibration certificates are available
- VFD Comfort Display

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/ l/min	Pressure bar	Bath opening Usable bath depth cm	Filling volume liters	Dimensions W x L x H cm
9 352 508	**SL-8K**	+50 ... +300	±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	±0.005	3	22-26	0.4-0.7	dia. 12 / 31	14	22 x 46 x 61

| FK30-SL

| FK31-SL

Applications

Calibration for the determination of conformity to national and international standards, such as:

- Temperature sensors
- Measuring devices
- Thermometers

Calibration certificates available (ISO/DKD)!

Calibration Baths

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

The calibration baths on this page feature a refrigeration unit for calibration applications to -30 °C.

Benefits

- Integrated refrigeration unit
- Compact design
- Low noise level
- Active Cooling Control across the entire working temperature range
- Removable venting grid

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 and 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 temperature range °C	Temp. stability °C	Heating cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20 °C	Pump capacity Flow rate / Pressure l/min	bar	Bath opening Usable bath depth cm	Filling vol. liters	Dimensions W x L x H cm
9 352 627	**FK30-SL**	-30 ... +200	±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	±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

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

Calibration at 3 or 5 selectable measuring points depending on certificate.

Julabo Visco Baths

| ME-31A

| ME-16G

| ME-18V

Applications

- Measurements with capillary viscometers
- Use of densimeters and other related products
- ME-18V enables operation conforming to ASTM D445

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

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.

Benefits

- Temperature setting and display resolution 0.01 °C
- Temperature stability ±0.01 °C
- Programmer with real time clock
- Cooling coil for applications below ambient temperature
- ME-18V can be used according to standard ASTM D445

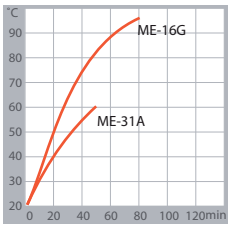
Bath tanks

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

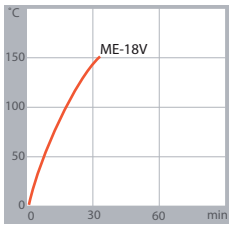
Cover for ME-18V
4 round openings, 51 mm dia.
Order No. 8 970 294

Cover for ME-31A
5 round openings, 51 mm dia.
Order No. 8 970 295

Heat-up times
Bath fluid: water



Heat-up time
Bath fluid: Thermal H



JULABO Order No.	JULABO Model	Working temperature range °C[1]	Temp. stab. °C	Heat. cap. kW	Pump capacity Flow rate l/min	Pump capacity Pressure bar	Cooling coil	Bath opening/ Number/ Bath depth cm	Number of visco-meters	Filling volume liters	Dimensions W x L x H cm
9 162 331	**ME-31A**	+20 ... +60	±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	±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	±0.01	2	11-16	0.23-0.45	integrated	9 x 9 / 2 x / 37	2	18	36 x 24 x 56

[1] For temperature applications below ambient temperature: counter-cooling with tap water or recirculating cooler via built-in cooling coil.

Beer Forcing Test Refrigerated/Heating Circulating Bath

F38-ME

Applications

- Forcing tests
- Determination of 'best before' date by simulating the beer aging process

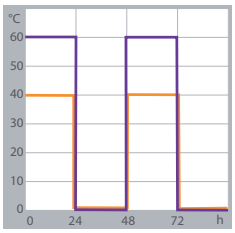
Beer Forcing Test Refrigerated/Heating Circulating Bath

to determine the 'best before' date of beer

The JULABO forcing test refrigerated/heating circulating bath in connection with a photometer determines the product life of beer without clouding. The simulated aging process is achieved through a repetitive programmable temperature profile.

- Automatic cycle of temperature ramps to simulate aging
- Pre-programmed temperature profile for forcing tests
- 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

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 cap. kW	Cooling capacity kW (Bath fluid: Ethanol) +20	0	-20 °C	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
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

Julabo Immersion Coolers

| FT200

| FT402

| FT902

Immersion Coolers

with immersion probe for rapid cooling of liquids

JULABO immersion coolers are mainly used 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.

- Rapid cooling of liquids down to low temperatures
- Counter-cooling of liquids in combination with heating circulators
- Environmentally friendly by saving precious tap water
- FT402 and FT902 with temperature control and display as well as external Pt100 sensor (200 x 6 mm dia., stainless steel)
- User-friendly operation and handling
- Compact design, small footprint
- Dry ice substitution

Accessories

8 970 400	Clamp for cooler probe for open baths (FT200, FT400, FT402)
8 981 005	Pt100 sensor, 200 x 6 mm dia., glass, 1.5 m cable
8 981 010	Pt100 sensor, 300 x 6 mm dia., stainless steel, 1.5 m cable

JULABO Order No.	JULABO Model	Working temperature range °C	Temp. stab. °C	Display resolution °C	Cooling capacity kW +20	+10	-20	-40	-80 °C	Immersion probe/ flexible probe (L x dia.) cm	Connection tube (L) cm	Dimensions W x L x H cm
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

Flow-Through Cooler

FD200

Applications

Immersion Coolers

- Cooling of liquids
- Dry-ice substitute
- Counter-cooling for heating circulators
- Tap water replacement

Flow-Through Cooler

- 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

JULABO Order No.	JULABO Model	Working temperature range °C	Cooling capacity kW +20	Cooling capacity kW +10 °C	Dimensions W x L x H cm
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.

Julabo Temperature Controllers

| LC4

| LC4-F

| LC6

Applications

Precise and reliable temperature control for:

- Heating mantles, heating collars
- Oil baths in combination with distillation/pilot plants
- Control for indirect tap water cooling with solenoid valve

A large selection of accessories can be found at www.julabo.de

Temperature Controllers

for measuring, controlling and monitoring

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

LC4, LC4-F, LC6

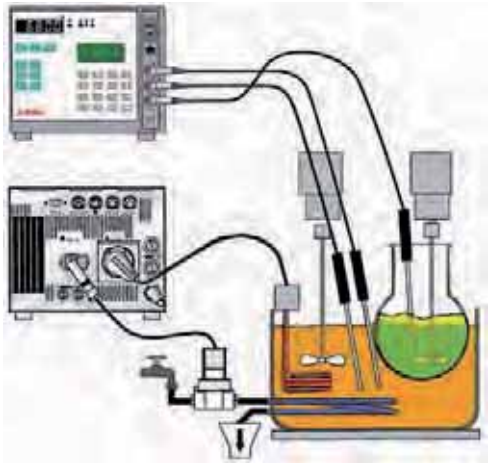
- Multi-Display (LED) with splash-proof keypad
- High/low temperature warning and cut-off
- RS232 Interface

LC4-F additional features:

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

LC6 additional features:

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



Flexible control for many applications
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	Temp. stab. in external 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

Refrigerators for Chemicals

| KRC50

| KRC180

Refrigerators for Chemicals

with spark free interior for storing and cooling of chemicals and hazardous substances

JULABO refrigerators for chemicals are designed for storing and cooling of hazardous substances. Spilled or evaporating chemicals cannot cause any damage when stored in the spark-free interior.

- Storing and cooling of hazardous substances
- Self-protecting control circuit
- Digital temperature indication (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
- Spark-free control electronics

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

Everything Easy and always under Control

Remote controlling, monitoring, viewing and recording

EasyTEMP and *WirelessTEMP* provide many options to simplify and automate applications. JULABO temperature control units are comfortably controlled and monitored via PC or remote control. Measurement values are easily recorded and visualized on any PC or notebook. Connections to laboratory instruments are established via RS232, RS485, Profibus or wirelessly.

- 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
- Save time when monitoring instruments, fewer inspection rounds
- Economic and ideal for small and medium laboratories
- Easy to start and operate
- Works with virtually all JULABO units with an RS232 interface
- Supports industrial standards like RS485 and Profibus
- Download JULABO *EasyTemp* software free of charge

WirelessTEMP®

NEW: Wireless Instrument Management!

Julabo WirelessTEMP - Wireless Communication

| Remote Control

| Transmitter

| Router

| Wireless PC USB Stick

Applications

- Control and monitor instruments remotely
- Operate instruments in explosion-proof areas and clean rooms
- Fewer inspection rounds
- Remote display for difficult to reach instruments, e. g. below exhaust hoods or when integrated in applications

WirelessTEMP

accessories for wireless operation and monitoring of JULABO temperature control instruments

The new *WirelessTEMP* products allow wireless monitoring and operation of up to 8 JULABO temperature control instruments via PC or remote control.

- A convenient way to operate instruments directly from your workstation
- Spend less time and resources monitoring the instruments
- Greater flexibility in choosing a location for the instrument
- Reduce costs by eliminating the need for communication cables
- Functions as 'Remote Display' for your application
- Works with virtually all RS232 equipped JULABO instruments
- *Wireless PC USB Stick* for PC or Notebook
- Easy to handle *Remote Control*, also available as ATEX certified version

Application Examples

Remote Control to control and monitor up to 8 JULABO instruments

PC and *Wireless PC 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 PC USB Stick**	via USB interface of PC	29 x 12 x 85	21
8 900 530	**Router for extending wireless range**	via power plug, 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**	--	--	--

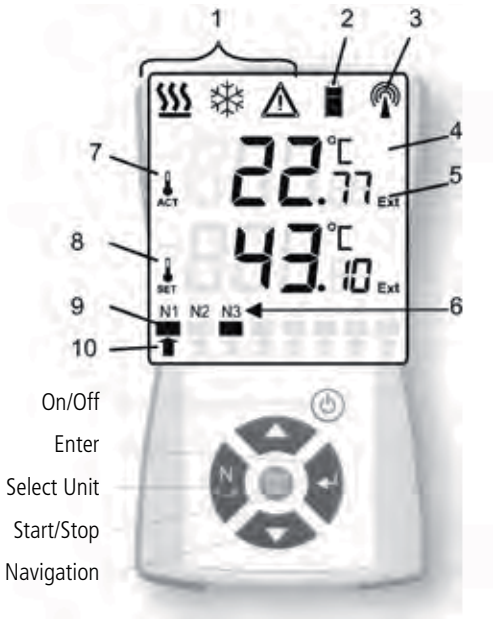
WirelessTEMP®

JULABO Model	Functions	Included in delivery
	Remote control with display for up to 8 JULABO units • Display and modification of setpoints and actual values • Display of output data, warning messages and error messages • Display and selection of units within wireless range	Remote control, 3 batteries 1.5 V (AAA), power supply with plug 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 • Connects to RS232 interface • Receives control commands • Sends instrument data, status messages and measurement values to a PC or *Remote Control* unit	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 PCs with USB interface • Connects to USB interface at PC • Sends control commands • Receives data, status messages and measurement values from the temperature control instruments	Wireless PC USB Stick, configuration software, driver software, USB extension cable, for Microsoft® Windows®.
	Extends wireless range • Plug into any standard electrical socket	Router, available with choice of AC adapter for EU, USA, UK. Please indicate choice when ordering!

Easy to handle Remote Control

functions of *Remote Control* in detail

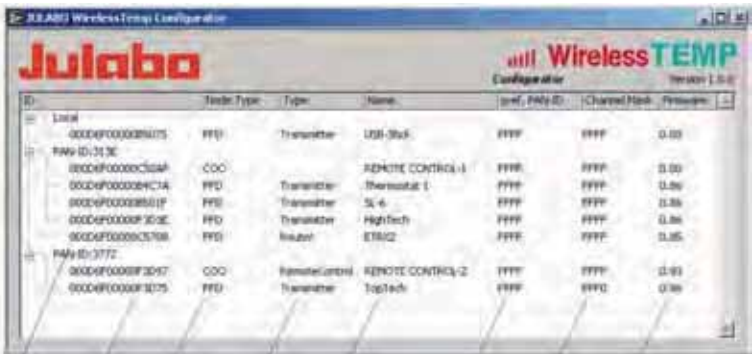
1. Status displays for heater, cooling, alarms
2. Battery charge status
3. Wireless connection status
4. Temperature in °C / °F or heater output in %
5. Internal/external temperature control
6. Displays all located units
7. Displays actual temperature
8. Displays setpoint temperature
9. Displays start/stop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



Convenient Configuration

easy network set-up with the 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 the PC. This makes the task of establishing or expanding networks quick and easy. The software is included with the *Wireless PC USB Stick*.



Julabo EasyTEMP Software

Applications

- Instrument control via PC
- Record measurement values
- Test documentation
- Specify temperature ramps
- Automate applications

NEW VERSION!

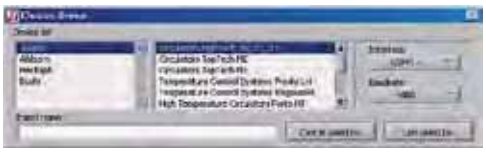
EasyTEMP Software

PC Software to control, visualize and record

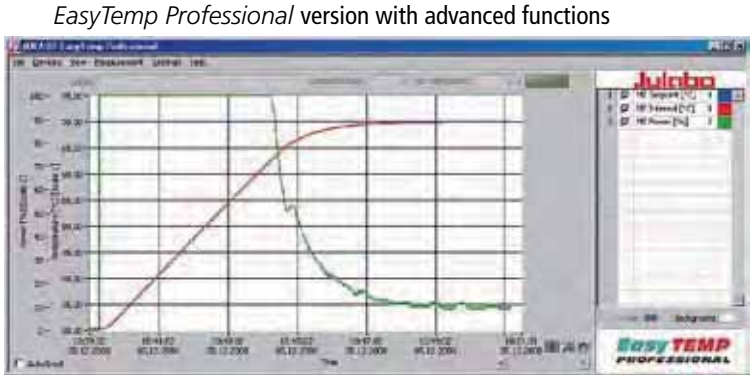
EasyTEMP Software allows control and monitoring of JULABO temperature control instruments using any Windows® based PC. The software features a variety of functions to visualize and document temperature and time-dependent processes.

- Version 3 with new functions and revised operating interface
- Connections via RS232, USB or wirelessly via *WirelessTEMP*
- 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
- Unit of measurement adjustable from degrees Celsius (°C) to degrees Fahrenheit (°F)
- Two versions are available: *EasyTemp* free of charge version and *EasyTemp Professional* version with advanced functions

New version 3 with additional functions and improved program interface!



Set-up of instruments
Easy set-up of laboratory instruments



Visualization of temperature application
Graphic display of temperatures in main window

Every instrument on one screen
Each laboratory instrument has its own control window

EasyTEMP Version Comparison

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

Comparison of the JULABO *EasyTEMP* Software versions	EasyTEMP	EasyTEMP PROFESSIONAL
Control of one JULABO unit with integrated interface	●	●
Control of up to 24 JULABO units with integrated interface		●
Instrument:		
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		●
Recording of measured values:		
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		●
Ramp programming:		
Ramp function of up to 100 steps	●	
Ramp function of up to 1000 steps (individually for each instrument)		●
Repeat memorized profiles	●	●
Modify running profiles	●	●
Graphic display of total profiles		●
Data recording:		
Records measured values in ASCII format	●	●
Records measured values in Excel		●
Saves additional relevant measuring data		●
Scalable monitoring pattern		●
Export function of graphs into JPG format		●
Uploads previously created recordings with print function		●
Control and integrate laboratory instruments of different makes, e. g. stirrers, balances, dosing pumps, pH meters etc.		on request

JULABO Order No.	JULABO Description	Suitable for
8 901 102	**EasyTEMP Software (free of charge at *www.julabo.de*)**	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
8 980 075	**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
8 900 003	**PB-3 Option: Integrated Profibus DP**	LC6
8 900 005	**PB-5 Option: Integrated Profibus DP**	*HighTech* circulators HL, SL

Technical specifications

Refrigerated/Heating Circulators | Cryo-Compact Circulators

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Cooling of the refrigeration unit	Cooling capacity (Bath fluid: Ethanol)			
								+20 °C	0 °C	-20 °C	-40 °C
		°C	°C		°C	kW		kW	kW	kW	kW
F12-ED	**8**	-20 ... +100	0.1	PID1	±0.03	2	Air	0.16	0.1	0.02	-
F25-ED	**8**	-28 ... +100	0.1	PID1	±0.03	2	Air	0.26	0.2	0.06	-
F26-ED	**8**	-28 ... +100	0.1	PID1	±0.03	2	Air	0.26	0.2	0.06	-
F34-ED	**8**	-30 ... +100	0.1	PID1	±0.03	2	Air	0.45	0.32	0.14	-
F12-EH	**9**	-20 ... +150	0.1	PID1	±0.03	2	Air	0.16	0.1	0.02	-
F25-EH	**9**	-28 ... +150	0.1	PID1	±0.03	2	Air	0.26	0.2	0.06	-
F32-EH	**9**	-35 ... +150	0.1	PID1	±0.03	2	Air	0.45	0.39	0.15	-
F33-EH	**9**	-30 ... +150	0.1	PID1	±0.03	2	Air	0.5	0.32	0.12	-
F34-EH	**9**	-30 ... +150	0.1	PID1	±0.03	2	Air	0.45	0.32	0.14	-
F38-EH	**9**	-35 ... +80	0.1	PID1	±0.05	2	Air	0.92	0.66	0.32	-
F12-MA	**10**	-20 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.16	0.1	0.02	-
F25-MA	**10**	-28 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.26	0.2	0.06	-
F32-MA	**10**	-35 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.45	0.39	0.15	-
F33-MA	**10**	-30 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.5	0.32	0.12	-
F34-MA	**10**	-30 ... +150	0.01/0.1	PID2	±0.02	2	Air	0.45	0.32	0.14	-
FP35-MA	**10**	-35 ... +150	0.01/0.1	PID2	±0.02	2	Air	0.45	0.39	0.15	-
FP40-MA	**10**	-40 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.68	0.5	0.32	0.04
FP50-MA	**10**	-50 ... +200	0.01/0.1	PID2	±0.02	2	Air	0.9	0.8	0.5	0.16
F25-ME	**11**	-28 ... +200	0.01	PID3	±0.01	2	Air	0.26	0.2	0.06	-
F26-ME	**11**	-28 ... +200	0.01	PID3	±0.01	2	Air	0.26	0.2	0.06	-
F32-ME	**11**	-35 ... +200	0.01	PID3	±0.01	2	Air	0.45	0.39	0.15	-
F33-ME	**11**	-30 ... +200	0.01	PID3	±0.01	2	Air	0.5	0.32	0.12	-
F34-ME	**11**	-30 ... +150	0.01	PID3	±0.01	2	Air	0.45	0.32	0.14	-
FP40-ME	**11**	-40 ... +200	0.01	PID3	±0.01	2	Air	0.68	0.5	0.32	0.04
FP50-ME	**11**	-50 ... +200	0.01	PID3	±0.01	2	Air	0.9	0.8	0.5	0.1
F25-HE	**12**	-28 ... +200	0.01	ICC	±0.01	2	Air	0.26	0.2	0.06	-
F32-HE	**12**	-35 ... +200	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
F34-HE	**12**	-30 ... +150	0.01	ICC	±0.01	2	Air	0.45	0.32	0.14	-
FP40-HE	**12**	-40 ... +200	0.01	ICC	±0.01	2	Air	0.68	0.5	0.32	0.04
FP45-HE	**12**	-42 ... +200	0.01	ICC	±0.01	2	Air	0.85	0.7	0.42	0.08
FP50-HE	**12**	-50 ... +200	0.01	ICC	±0.01	2	Air	0.9	0.8	0.5	0.16
F25-HL	**13**	-28 ... +200	0.01	ICC	±0.01	2	Air	0.26	0.2	0.06	-
F32-HL	**13**	-35 ... +200	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
F33-HL	**13**	-30 ... +200	0.01	ICC	±0.01	2	Air	0.5	0.32	0.12	-
FP35-HL	**13**	-35 ... +150	0.01	ICC	±0.01	2	Air	0.45	0.39	0.15	-
FP40-HL	**13**	-40 ... +200	0.01	ICC	±0.01	2	Air	0.68	0.5	0.32	0.04
FP45-HL	**13**	-42 ... +200	0.01	ICC	±0.01	2	Air	0.85	0.7	0.42	0.08
FP50-HL	**13**	-50 ... +200	0.01	ICC	±0.01	2	Air	0.9	0.8	0.5	0.16
CF30	**15**	-30 ... +150	0.1	PID1	±0.03	2	Air	0.32	0.25	0.15	-
CF40	**15**	-40 ... +150	0.1	PID1	±0.03	2	Air	0.47	0.4	0.28	-
CF31	**15**	-30 ... +200	0.01	ICC	±0.02	2	Air	0.32	0.25	0.15	-
CF41	**15**	-40 ... +200	0.01	ICC	±0.02	2	Air	0.47	0.4	0.28	-

* Additional voltages available - please contact us!

Pump capacity												
Pressure	Suction	Flow rate	Pump connections	Barbed fitting diameter	Bath opening/ bath depth W x L / D	Filling volume	Classification acc. to DIN 12876-1	Power requirement*	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
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	9 116 612	**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	9 116 625	**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	9 116 626	**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	9 116 634	**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	9 118 612	**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	9 118 625	**F25-EH**
0.35	-	15	M10x1	8 / 10 mm	18 x 12 / 15	8	III (FL)	230/50/12	31 x 42 x 64	36	9 118 632	**F32-EH**
0.35	-	15	M10x1	8 / 10 mm	23 x 14 / 20	16	III (FL)	230/50/12	36 x 46 x 69	43	9 118 633	**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	9 118 634	**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	9 118 638	**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	9 153 612	**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	9 153 625	**F25-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	9 153 632	**F32-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	9 153 633	**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	9 153 634	**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	9 153 618	**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	9 153 640	**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	9 153 650	**FP50-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	9 162 625	**F25-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	9 162 626	**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	9 162 632	**F32-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	9 162 633	**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	9 162 634	**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	9 162 640	**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	9 162 650	**FP50-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	9 212 625	**F25-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	9 212 632	**F32-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	9 212 634	**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	9 212 640	**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	9 212 645	**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	9 212 650	**FP50-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	9 312 625	**F25-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	9 312 632	**F32-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	9 312 633	**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	9 312 618	**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	9 312 640	**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	9 312 645	**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	9 312 650	**FP50-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	9 400 330	**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	9 400 340	**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	9 400 331	**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	9 400 341	**CF41**

Technical specifications

Ultra-Low Refrigerated Circulators

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Cooling of the refrigeration unit	Cooling capacity (Bath fluid: Ethanol)					
								+20 °C	0 °C	-20 °C	-40 °C	-60 °C	-80 °C
		°C	°C		°C	kW		kW	kW	kW	kW	kW	kW
F70-ME	**16**	-70 ... +100	0.01	PID3	±0.02	1.3	Air	0.34	0.22	0.17	0.13	0.07	-
F81-ME	**16**	-81 ... +100	0.01	PID3	±0.02	1.3	Air	0.45	0.38	0.36	0.32	0.27	0.07
FP89-ME	**16**	-90 ... +100	0.01	PID3	±0.02	1.3	Air	1.0	0.92	0.88	0.75	0.58	0.2
FP51-SL	**17**	-51 ... +200	0.01	ICC	±0.05	3	Air	2.0	1.5	1.0	0.26	-	-
FP52-SL	**17**	-60 ... +100	0.01	ICC	±0.05	3	Air	3.0	2.8	1.6	0.65	0.1	-
FPW52-SL	**17**	-60 ... +100	0.01	ICC	±0.05	3	Water	3.0	2.8	1.6	0.65	0.1	-
FP55-SL	**17**	-60 ... +100	0.01	ICC	±0.05	3	Air	5.2	4.1	2.2	0.70	0.13	-
FPW55-SL	**17**	-60 ... +100	0.01	ICC	±0.05	3	Water	5.5	4.1	2.2	1.0	0.13	-
F81-HL	**17**	-81 ... +100	0.01	ICC	±0.02	1.3	Air	0.45	0.38	0.36	0.32	0.27	0.07
FP89-HL	**17**	-90 ... +100	0.01	ICC	±0.02	1.3	Air	1.0	0.92	0.88	0.75	0.58	0.20
FP90-SL	**17**	-90 ... +100	0.01	ICC	±0.05	3	Air	1.8	1.7	1.6	1.35	0.75	0.15
FPW90-SL	**17**	-90 ... +100	0.01	ICC	±0.05	3	Water	1.8	1.7	1.6	1.35	0.75	0.15
FPW91-SL	**17**	-90 ... +100	0.01	ICC	±0.2	3	Water	5.2	4.7	4.0	3.5	2.3	0.8
FP52-SL	**18**	-60 ... +100	0.01	ICC	±0.05	3	Air	3.0	2.8	1.6	0.65	0.1	-
FPW52-SL	**18**	-60 ... +100	0.01	ICC	±0.05	3	Water	3.0	2.8	1.6	0.65	0.1	-
FP55-SL	**18**	-60 ... +100	0.01	ICC	±0.05	3	Air	5.2	4.1	2.2	0.7	0.13	-
FPW55-SL	**18**	-60 ... +100	0.01	ICC	±0.05	3	Water	5.5	4.1	2.2	1.0	0.13	-
FP52-SL	**18**	-60 ... +150	0.01	ICC	±0.05	3	Air	3.0	2.8	1.6	0.65	0.1	-
FPW52-SL	**18**	-60 ... +150	0.01	ICC	±0.05	3	Water	3.0	2.8	1.6	0.65	0.1	-
FP55-SL	**18**	-60 ... +150	0.01	ICC	±0.05	3	Air	5.2	4.1	2.2	0.7	0.13	-
FPW55-SL	**18**	-60 ... +150	0.01	ICC	±0.05	3	Water	5.5	4.1	2.2	1.0	0.13	
FP90-SL	**19**	-90 ... +100	0.01	ICC	±0.05	3	Air	1.8	1.7	1.6	1.35	0.75	0.15
FPW90-SL	**19**	-90 ... +100	0.01	ICC	±0.05	3	Water	1.8	1.7	1.6	1.35	0.75	0.15
FPW91-SL	**19**	-91 ... +100	0.01	ICC	±0.2	3	Water	5.2	4.7	4.0	3.5	2.3	0.8
F95-SL	**19**	-95 ... 0	0.01	ICC	±0.05	3	Air	-	1.7	1.5	1.3	1.1	0.36
FW95-SL	**19**	-95 ... 0	0.01	ICC	±0.05	3	Water	-	1.7	1.5	1.3	1.1	0.36
FP90-SL	**19**	-90 ... +150	0.01	ICC	±0.05	3	Air	1.8	1.7	1.6	1.35	0.75	0.15
FPW90-SL	**19**	-90 ... +150	0.01	ICC	±0.05	3	Water	1.8	1.7	1.6	1.35	0.75	0.15

Heating Immersion Circulators | Bridge Mounted Circulator

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Pump capacity		
							Pressure	Suction	Flow rate
		°C	°C		°C	kW	bar	bar	l/min.
ED	**36**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
EH	**36**	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
MB	**36**	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
MA	**36**	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
ME	**36**	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
SE-Z	**37**	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26

* Additional voltages available - please contact us!

Pump capacity												
Pressure	Suction	Flow rate	Pump connections	Barbed fitting diameter	Bath opening/ bath depth W x L / D	Filling volume	Classification acc. to DIN 12876-1	Power requirement*	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
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	9 162 670	**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	9 162 681	**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	9 162 689	**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	9 352 751	**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	9 352 752	**FP52-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	9 352 753	**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	85 x 76 x 116	182	9 352 755	**FP55-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	9 352 756	**FPW55-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	9 312 681	**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	9 312 689	**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	9 352 790	**FP90-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	9 352 791	**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	9 352 793	**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	9 352 752N	**FP52-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	9 352 753N	**FPW52-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	9 352 755N	**FP55-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	9 352 756N	**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	156	9 352 752N150	**FP52-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	9 352 753N150	**FPW52-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	9 352 755N150	**FP55-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	9 352 756N150	**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	9 352 790N	**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	9 352 791N	**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	9 352 793N	**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	201	9 352 795N	**F95-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	9 352 796N	**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	195	9 352 790N150	**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	9 352 791N150	**FPW90-SL**

Pump connections	Barbed fitting diameter	Usable immersion depth	Classification acc. to DIN 12876-1	Power requirement*	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
	inner dia.	cm		V / Hz / A	cm	kg		
-	-	8 - 14.5	I (NFL)	230/50/9	13 x 15 x 33	3.3	9 116 000	**ED**
-	-	8 - 14.5	III (FL)	230/50/9	13 x 15 x 33	3.3	9 118 000	**EH**
-	-	8 - 14.5	I (NFL)	230/50/9	13 x 15 x 33	3.3	9 142 000	**MB**
-	-	8 - 14.5	III (FL)	230/50-60/9	13 x 15 x 33	4	9 153 000	**MA**
-	-	8 - 14.5	III (FL)	230/50-60/9	13 x 15 x 33	4	9 162 000	**ME**
M16x1	8 / 12 mm	12 - 19	III (FL)	230/50-60/13	32 x 17 x 40	8	9 252 218	**SE-Z**

Technical specifications

Open Heating Bath Circulators | Heating Circulators with Open Bath

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Pump capacity		
							Pressure	Suction	Flow rate
		°C	°C		°C	kW	bar	bar	l/min.
ED-5A/B	**38**	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-7A/B	**38**	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-5M/B	**38**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-13A	**38**	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-19A	**38**	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-13M	**38**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-19M	**38**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
MB-13A	**38**	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-19A	**38**	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
ED-13	**39**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-17	**39**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-19	**39**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-27	**39**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
ED-33	**39**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
MB-13	**39**	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-19	**39**	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
ED-5A	**40**	+20 ... +60	0.1	PID1	±0.03	2	0.35	-	15
ED-5M	**40**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
MB-5A	**40**	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-7A	**40**	+20 ... +60	0.01/0.1	PID2	±0.02	2	0.12	-	10
MB-5M	**40**	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
ED-5	**41**	+20 ... +100	0.1	PID1	±0.03	2	0.35	-	15
EH-5	**41**	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-13	**41**	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-19	**41**	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-27	**41**	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-33	**41**	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
EH-39	**41**	+20 ... +150	0.1	PID1	±0.03	2	0.35	-	15
MB-5	**41**	+20 ... +100	0.01/0.1	PID2	±0.02	2	0.12	-	10
MA-4	**42**	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
MA-6	**42**	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
MA-12	**42**	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
MA-26	**42**	+20 ... +200	0.01/0.1	PID2	±0.01	2	0.23 - 0.45	-	11 - 16
ME-4	**42**	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
ME-6	**42**	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
ME-12	**42**	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
ME-26	**42**	+20 ... +200	0.01	PID3	±0.01	2	0.23 - 0.45	-	11 - 16
HE-4	**43**	+20 ... +250	0.01	ICC	±0.01	2	0.4 - 0.7	0.2 - 0.4	22 - 26
SE-6	**43**	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SE-12	**43**	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SE-26	**43**	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
HL-4	**43**	+20 ... +250	0.01	ICC	±0.01	2	0.4 - 0.7	0.2 - 0.4	22 - 26
SL-6	**43**	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SL-12	**43**	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26
SL-26	**43**	+20 ... +300	0.01	ICC	±0.01	3	0.4 - 0.7	0.2 - 0.4	22 - 26

* Additional voltages available - please contact us!

Pump connections	Barbed fitting diameter	Bath opening/ bath depth W x L / D	Filling volume	Cooling coil	Bath cover	Classification acc. to DIN 12876-1	Power requirement*	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
	inner dia.	cm	liters				V / Hz / A	cm	kg		
-	-	12 x 24 / 15	5	-	-	I (NFL)	230/50/9	14 x 40 x 35	5.3	9 116 315	**ED-5A/B**
-	-	12 x 34 / 15	7	-	-	I (NFL)	230/50/9	14 x 50 x 35	5.6	9 116 317	**ED-7A/B**
-	-	12 x 24 / 15	5	-	-	I (NFL)	230/50/9	14 x 40 x 35	5.2	9 116 515	**ED-5M/B**
-	-	18 x 30 / 15	13	Option	-	I (NFL)	230/50/9	41 x 33 x 36	7.5	9 116 313	**ED-13A**
-	-	36 x 30 / 15	19	Option	-	I (NFL)	230/50/9	55 x 33 x 36	8.5	9 116 319	**ED-19A**
-	-	18 x 30 / 15	13	Option	-	I (NFL)	230/50/9	41 x 33 x 37	7.5	9 116 513	**ED-13M**
-	-	36 x 30 / 15	19	Option	-	I (NFL)	230/50/9	55 x 33 x 37	8.5	9 116 519	**ED-19M**
-	-	18 x 30 / 15	13	Option	-	I (NFL)	230/50/9	41 x 33 x 36	7.5	9 142 313	**MB-13A**
-	-	36 x 30 / 15	19	Option	-	I (NFL)	230/50/9	55 x 33 x 36	8.5	9 142 319	**MB-19A**
-	-	18 x 30 / 15	13	Option	Option	I (NFL)	230/50/9	39 x 33 x 37	8	9 116 413	**ED-13**
-	-	18 x 30 / 20	17	Option	Option	I (NFL)	230/50/9	39 x 33 x 42	10	9 116 417	**ED-17**
-	-	36 x 30 / 15	19	Option	Option	I (NFL)	230/50/9	57 x 33 x 37	11	9 116 419	**ED-19**
-	-	36 x 30 / 20	27	Option	Option	I (NFL)	230/50/9	57 x 37 x 42	13	9 116 427	**ED-27**
-	-	67 x 30 / 15	33	Option	Option	I (NFL)	230/50/9	91 x 33 x 38	20	9 116 433	**ED-33**
-	-	18 x 30 / 15	13	Option	Option	I (NFL)	230/50/9	39 x 33 x 37	8	9 142 413	**MB-13**
-	-	36 x 30 / 15	19	Option	Option	I (NFL)	230/50/9	57 x 33 x 37	11	9 142 419	**MB-19**
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.3	9 116 305	**ED-5A**
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.2	9 116 505	**ED-5M**
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.3	9 142 305	**MB-5A**
M10x1	8 / 10 mm	12 x 34 / 15	7	Integrated	-	I (NFL)	230/50/9	14 x 50 x 35	5.6	9 142 307	**MB-7A**
M10x1	8 / 10 mm	12 x 24 / 15	5	Integrated	-	I (NFL)	230/50/9	14 x 40 x 35	5.2	9 142 505	**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	9 116 405	**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	9 118 405	**EH-5**
M10x1	8 / 10 mm	18 x 30 / 15	13	Option	Option	III (FL)	230/50/9	39 x 33 x 37	8	9 118 413	**EH-13**
M10x1	8 / 10 mm	36 x 30 / 15	19	Option	Option	III (FL)	230/50/9	57 x 33 x 37	11	9 118 419	**EH-19**
M10x1	8 / 10 mm	36 x 30 / 20	27	Option	Option	III (FL)	230/50/9	57 x 37 x 42	13	9 118 427	**EH-27**
M10x1	8 / 10 mm	67 x 30 / 15	33	Option	Option	III (FL)	230/50/9	91 x 33 x 38	20	9 118 433	**EH-33**
M10x1	8 / 10 mm	36 x 30 / 30	39	Option	Option	III (FL)	230/50/9	54 x 34 x 52	19	9 118 439	**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	9 142 405	**MB-5**
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	9 153 504	**MA-4**
M10x1	8 / 10 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/9	21 x 43 x 42	12.5	9 153 506	**MA-6**
M10x1	8 / 10 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/9	30 x 43 x 45	13	9 153 512	**MA-12**
M10x1	8 / 10 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/9	36 x 61 x 45	26	9 153 526	**MA-26**
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	9 162 504	**ME-4**
M10x1	8 / 10 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/9	21 x 43 x 42	12.5	9 162 506	**ME-6**
M10x1	8 / 10 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/9	30 x 43 x 45	13	9 162 512	**ME-12**
M10x1	8 / 10 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/9	36 x 61 x 45	26	9 162 526	**ME-26**
M16x1	8 / 12 mm	13 x 15 / 15	4.5	Integrated	Integrated	III (FL)	230/50-60/9	21 x 42 x 40	11	9 212 504	**HE-4**
M16x1	8 / 12 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/13	21 x 43 x 44	13.5	9 252 506	**SE-6**
M16x1	8 / 12 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/13	30 x 43 x 47	14	9 252 512	**SE-12**
M16x1	8 / 12 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/13	36 x 61 x 47	27	9 252 526	**SE-26**
M16x1	8 / 12 mm	13 x 15 / 15	4.5	Integrated	Integrated	III (FL)	230/50-60/9	21 x 42 x 40	11	9 312 504	**HL-4**
M16x1	8 / 12 mm	13 x 15 / 20	6	Integrated	Integrated	III (FL)	230/50-60/13	21 x 43 x 44	13.5	9 352 506	**SL-6**
M16x1	8 / 12 mm	22 x 15 / 20	12	Integrated	Integrated	III (FL)	230/50-60/13	30 x 43 x 47	14	9 352 512	**SL-12**
M16x1	8 / 12 mm	22 x 30 / 20	26	Integrated	Integrated	III (FL)	230/50-60/13	36 x 61 x 47	27	9 352 526	**SL-26**

Technical specifications

Highly Dynamic Temperature Control Systems / Process Circulators

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Cooling of the refrigeration unit	Cooling capacity (Bath fluid: JULABO Thermal | Ethanol) 200 °C	20 °C	0 °C	-20 °C	-40 °C	-60 °C	-80 °C
		°C	°C		°C	kW		kW |	kW	kW	kW	kW	kW	kW
LH40	**62**	-40 ... +250	0.01	ICC	±0.01... ±0.05	2.6	Air	1.6 |	0.9	0.8	0.35	0.01	-	-
LH41	**62**	-40 ... +250	0.01	ICC	±0.01... ±0.05	2.6	Water	1.6 |	1.0	0.9	0.40	0.05	-	-
LH46	**62**	-45 ... +250	0.01	ICC	±0.01... ±0.05	1.8	Air/Water	2.5 |	2.3	1.4	0.70	0.10	-	-
LH47	**62**	-47 ... +250	0.01	ICC	±0.01... ±0.05	1.8	Air	3.7 |	3.0	2.0	0.90	0.20	-	-
LH50	**62**	-50 ... +250	0.01	ICC	±0.01... ±0.05	6.0	Water	5.5 |	7.0	4.6	2.60	0.50	-	-
LH85	**62**	-80 ... +250	0.01	ICC	±0.01... ±0.05	1.8	Air/Water	1.4 |	0.9	0.92	0.80	0.70	0.5	0.01
Magnum 91	**64**	-91 ... +250	0.01	ICC	±0.05... ±0.2	6.0	Water	3.5 |	5.0	4.8	4.5	4.0	2.5	0.6

Highly Dynamic Temperature Control Systems / Process Circulators

JULABO Model	Catalog page	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	**66**	+70 ... +400	0.01	ICC	±0.01 ... ±0.1	3	-	0.8 - 1.2	14 - 18
HT60-M2	**66**	+70 ... +400	0.01	ICC	±0.01 ... ±0.1	7	-	0.8 - 1.2	14 - 18
HT60-M3	**66**	+70 ... +400	0.01	ICC	±0.01 ... ±0.1	6	-	0.8 - 1.2	14 - 18
HT30-M1-C.U.	**66**	+40 ... +400	0.01	ICC	±0.01 ... ±0.1	3	Yes	0.8 - 1.2	14 - 18
HT60-M2-C.U.	**66**	+40 ... +400	0.01	ICC	±0.01 ... ±0.1	7	Yes	0.8 - 1.2	14 - 18
HT60-M3-C.U.	**66**	+40 ... +400	0.01	ICC	±0.01 ... ±0.1	6	Yes	0.8 - 1.2	14 - 18

Water Baths | Shaking Water Baths

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity
		°C	°C		°C	kW
TW2	**98**	+20 ... +99.9	0.1	PID1	±0.2	1
TW8	**98**	+20 ... +99.9	0.1	PID1	±0.2	2
TW12	**98**	+20 ... +99.9	0.1	PID1	±0.2	2
TW20	**98**	+20 ... +99.9	0.1	PID1	±0.2	2
SW22	**100**	+20 ... +99.9	0.1	PID1	±0.2	2
SW23	**100**	+20 ... +99.9	0.1	PID1	±0.02	2

* Additional voltages available - please contact us!

Pump capacity Pressure	Flow rate	Pump connections	Filling volume	Filling volume expansion tank	Classification acc. to DIN 12876-1	IP class acc. to IEC 60529	Power requirement*	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
bar	l/min.		liters	liters			V / Hz / A	cm	kg		
0.5 - 1.6	16 - 30	M16x1	3.1	0.8	III (FL)	IP31	230/50/15	30 x 49 x 64	72	9 410 240	**LH40**
0.5 - 1.6	16 - 30	M16x1	3.1	0.8	III (FL)	IP31	230/50/14	30 x 49 x 64	71	9 410 241	**LH41**
0.5 - 1.6	16 - 30	M16x1	3.7	2.2	III (FL)	IP31	230/50/12	50 x 59 x 64	103	9 410 246	**LH46**
0.5 - 1.6	16 - 30	M16x1	5.7	5.2	III (FL)	IP31	3 x 400/50/12	40 x 55 x 127	150	9 410 247	**LH47**
0.7 - 2.2	16 - 30	M16x1	13.5	4.9	III (FL)	IP31	3 x 400/50/17	40 x 55 x 127	182	9 410 250	**LH50**
0.5 - 1.6	16 - 30	M16x1	3.7	2.2	III (FL)	IP31	230/50/15	50 x 59 x 64	130	9 410 285	**LH85**
0.8 - 2.2	24 - 35	M16x1	21.6	11.4	III (FL)	IP20	3 x 400/50/20	71 x 88 x 165	442	9 410 191	**Magnum 91**

Pump connections	Filling volume	Filling volume expansion tank	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 Order No.	JULABO Model
	liters	liters			V / Hz / A	cm	cm	kg		
M16x1	2	1.6+0.9	III (FL)	IP31	230/50/15	23 x 23 x 58	25 x 25 x 18	27	9 800 031	**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	9 800 062	**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	9 800 063	**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	9 800 035	**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	9 800 065	**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	9 800 066	**HT60-M3-C.U.**

Bath opening/ bath depth W x L / D	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 Order No.	JULABO Model
cm	liters	rpm	mm			V / Hz / A	cm	cm	kg		
15 x 13 / 11	1 ... 2	-	-	I (NFL)	IP43	230/50-60/5	17 x 16 x 26	17 x 16 x 37	3.5	9 550 102	**TW2**
23 x 27 / 14	3 ... 8	-	-	I (NFL)	IP43	230/50-60/9	29 x 32 x 28	29 x 32 x 44	8.5	9 550 108	**TW8**
35 x 27 / 14	5 ... 14	-	-	I (NFL)	IP43	230/50-60/9	40 x 32 x 28	40 x 32 x 44	9.8	9 550 112	**TW12**
50 x 30 / 18	8 ... 26	-	-	I (NFL)	IP43	230/50-60/9	56 x 35 x 32	56 x 35 x 49	14.2	9 550 120	**TW20**
50 x 30 / 18	8 ... 20	20 ... 200	15	I (NFL)	IP21	230/50-60/10	70 x 35 x 26	70 x 35 x 43	19.4	9 550 322	**SW22**
50 x 30 / 18	8 ... 20	20 ... 200	15	I (NFL)	IP21	230/50-60/10	70 x 35 x 26	70 x 35 x 43	21.4	9 550 323	**SW23**

Technical specifications

Recirculating Coolers

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Cooling of the refrigeration unit	Cooling capacity			
								+20 °C	0 °C	-10 °C	-20 °C
		°C	°C		°C	kW		kW	kW	kW	kW
FL300	**80**	-20 ... +40	0.1	PID1	±0.5	-	Air	0.3	0.2	0.15	0.1
FL601	**80**	-20 ... +40	0.1	PID1	±0.5	-	Air	0.6	0.4	0.33	0.2
FL1201	**80**	-20 ... +40	0.1	PID1	±0.5	-	Air	1.2	0.9	0.6	0.3
FL1203	**80**	-20 ... +40	0.1	PID1	±0.5	-	Air	1.2	0.8	0.5	0.2
FL1701	**80**	-20 ... +40	0.1	PID1	±0.5	-	Air	1.7	1.1	0.85	0.4
FL1703	**80**	-20 ... +40	0.1	PID1	±0.5	-	Air	1.7	1.0	0.75	0.3
FLW1701	**80**	-20 ... +40	0.1	PID1	±0.5	-	Water	1.7	1.1	0.85	0.4
FLW1703	**80**	-20 ... +40	0.1	PID1	±0.5	-	Water	1.7	1.0	0.75	0.3
FL2503	**81**	-20 ... +40	0.1	PID1	±0.5	-	Air	2.5	1.5	1.2	0.55
FL2506	**81**	-15 ... +40	0.1	PID1	±0.5	-	Air	2.5	1.0	0.3	-
FL4003	**81**	-20 ... +40	0.1	PID1	±0.5	-	Air	4.0	2.4	1.5	0.65
FL4006	**81**	-20 ... +40	0.1	PID1	±0.5	-	Air	4.0	1.9	0.9	0.05
FLW2503	**81**	-20 ... +40	0.1	PID1	±0.5	-	Water	2.7	1.7	1.0	0.4
FLW2506	**81**	-15 ... +40	0.1	PID1	±0.5	-	Water	2.5	1.0	0.3	-
FLW4003	**81**	-20 ... +40	0.1	PID1	±0.5	-	Water	4.3	2.2	1.3	0.45
FLW4006	**81**	-20 ... +40	0.1	PID1	±0.5	-	Water	4.0	1.7	0.7	-
FL7006	**82**	-20 ... +40	0.1	PID1	±0.5	-	Air	7.0	5.1	3.0	1.55
FL11006	**82**	-20 ... +40	0.1	PID1	±0.5	-	Air	11.0	7.5	5.0	3.0
FL20006	**82**	-25 ... +40	0.1	PID1	±0.5	-	Air	20.0	10	6.0	2.5
FLW7006	**82**	-20 ... +40	0.1	PID1	±0.5	-	Water	7.4	7.0	3.1	1.3
FLW11006	**82**	-20 ... +40	0.1	PID1	±0.5	-	Water	11.5	9.0	4.8	2.7
FLW20006	**82**	-25 ... +40	0.1	PID1	±0.5	-	Water	20.0	11	6.0	2.5
FC600	**83**	-20 ... +80	0.1	PID1	±0.2	1.2	Air	0.6	0.33	0.21	-
FC600S	**83**	-10 ... +80	0.1	PID1	±0.2	1.2	Air	0.5	0.22	0.1	-
FC1200	**83**	-20 ... +80	0.1	PID1	±0.2	1.2	Air	1.3	0.6	0.37	-
FC1200S	**83**	-15 ... +80	0.1	PID1	±0.2	1.2	Air	1.2	0.5	0.26	-
FC1600	**83**	-20 ... +80	0.1	PID1	±0.2	1.2	Air	1.65	0.8	0.47	-
FC1600S	**83**	-15 ... +80	0.1	PID1	±0.2	1.2	Air	1.55	0.65	0.36	-
FC1200T	**83**	-10 ... +80	0.1	PID1	±0.2	1.2	Air	1.1	0.4	0.15	-
FC1600T	**83**	-15 ... +80	0.1	PID1	±0.2	1.2	Air	1.45	0.5	0.25	-
FCW2500T	**83**	-25 ... +80	0.1	PID1	±0.2	1.2	Water	2.5	2.0	0.8	0.25
SC2500a *1	**84**	+5 ... +35	0.1	PID1	±0.1	-	Air	2.5	1.5	0.9	-
SC2500w *1	**84**	+5 ... +35	0.1	PID1	±0.1	-	Water	2.5	1.5	0.9	-
SC5000a *2,3	**84**	+5 ... +35	0.1	PID1	±0.1	-	Air	5.0	2.5	1.2	-
SC5000w *2,3	**84**	+5 ... +35	0.1	PID1	±0.1	-	Water	5.0	2.5	1.2	-
SC10000w *2,3	**84**	+5 ... +35	0.1	PID1	±0.1	-	Water	10.0	5.0	2.5	-
AWC100	**87**	+20 ... +40	-	-		-	Air	0.55	-	-	-
F250	**87**	+5 ... +40	0.1	PID	±0.5	-	Air	0.25	-	-	-

* Additional voltages available - please contact us!

Pump capacity											
Pressure	Flow rate	Pump connections	Barbed fittings diameter	Filling volume	IP class acc. to IEC 60529	Power requirement*	Noise level	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
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	9 660 003	**FL300**
1.0	23	M16x1	8 / 12 mm	5.5...8	IP21	230/50/5	55	32 x 50 x 60	48	9 661 006	**FL601**
1.0	23	M16x1	8 / 12 mm	12...17	IP21	230/50/7	61	50 x 76 x 64	76	9 661 012	**FL1201**
0.5 - 3.0	40	G ¾"	¾"	12...17	IP21	230/50/12	61	50 x 76 x 64	91	9 663 012	**FL1203**
1.0	23	M16x1	8 / 12 mm	12...17	IP21	230/50/10	62	50 x 76 x 64	85	9 661 017	**FL1701**
0.5 - 3.0	40	G ¾"	¾"	12...17	IP21	230/50/12	63	50 x 76 x 64	91	9 663 017	**FL1703**
1.0	23	M16x1	8 / 12 mm	12...17	IP21	230/50/10	59	50 x 76 x 64	82	9 671 017	**FLW1701**
0.5 - 3.0	40	G ¾"	¾"	12...17	IP21	230/50/12	60	50 x 76 x 64	88	9 673 017	**FLW1703**
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	230/50/11	64	60 x 76 x 115	146	9 663 025	**FL2503**
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	230/50/14	64	60 x 76 x 115	158	9 666 025	**FL2506**
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	3 x 400/50/8	67	60 x 76 x 115	148	9 663 040	**FL4003**
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	3 x 400/50/12	67	60 x 76 x 115	157	9 666 040	**FL4006**
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	230/50/11	61	60 x 76 x 115	143	9 673 025	**FLW2503**
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	230/50/14	61	60 x 76 x 115	160	9 676 025	**FLW2506**
0.5 - 3.0	40	G ¾"	¾"	24...30	IP21	3 x 400/50/8	65	60 x 76 x 115	143	9 673 040	**FLW4003**
0.5 - 6.0	60	G1 ¼"	1"	24...30	IP21	3 x 400/50/13	65	60 x 76 x 115	160	9 676 040	**FLW4006**
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/14	74	78 x 85 x 148	252	9 666 070	**FL7006**
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/17	74	78 x 85 x 148	248	9 666 110	**FL11006**
0.8 - 6.0	80	G1 ¼"	1"	15...37	IP21	3 x 400/50/18	74	95 x 115 x 161	360	9 666 200	**FL20006**
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/14	74	78 x 85 x 148	220	9 676 070	**FLW7006**
0.5 - 6.0	60	G1 ¼"	1"	39...47	IP21	3 x 400/50/17	74	78 x 85 x 148	250	9 676 110	**FLW11006**
0.8 - 6.0	80	G1 ¼"	1"	15...37	IP21	3 x 400/50	74	95 x 115 x 161	360	9 676 200	**FLW20006**
0.5	20	M16x1	8 / 12 mm	6 ... 8	IP21	230/50/8	51	35 x 54 x 49	48	9 600 060	**FC600**
1.2	22	M16x1	8 / 12 mm	6 ... 8	IP21	230/50/10	54	35 x 54 x 49	52	9 600 063	**FC600S**
0.5	20	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/10	53	46 x 61 x 49	60	9 600 120	**FC1200**
1.2	22	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/12	57	46 x 61 x 49	66	9 600 123	**FC1200S**
0.5	20	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/11	53	46 x 61 x 49	65	9 600 160	**FC1600**
1.2	22	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/13	57	46 x 61 x 49	66	9 600 163	**FC1600S**
3.5	28	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/12	58	46 x 61 x 49	67	9 600 126	**FC1200T**
3.5	28	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/13	58	46 x 61 x 49	67	9 600 166	**FC1600T**
3.5	28	M16x1	8 / 12 mm	8 ... 11	IP21	230/50/12	53	46 x 61 x 49	74	9 601 256	**FCW2500T**
3.5	33	NPT ¾"	¾"	21...33	IP21	230/50/10	65	49 x 62 x 105	123	9500025XXP3H0D0M0	**SC2500a** *1
3.5	33	NPT ¾"	¾"	21...33	IP21	230/50/10	63	49 x 62 x 105	123	9500026XXP3H0D0M0	**SC2500w** *1
3.5	33	NPT ¾"	¾"	43...60	IP21	3 x 400/50/11	71	59 x 67 x 112	153	9500050XXP3H0D0M0	**SC5000a** *2,3
3.5	33	NPT ¾"	¾"	43...60	IP21	3 x 400/50/11	69	59 x 67 x 112	153	9500051XXP3H0D0M0	**SC5000w** *2,3
3.5	33	NPT ¾"	¾"	43...60	IP21	3 x 400/50/18	69	59 x 67 x 112	159	9500101XXP3H0D0M0	**SC10000w** *2,3
0.2	2.9	M10x1	8 / 10 mm	0.9	IP21	230/50-60/1	55	20 x 34 x 30	11	9 630 100	**AWC100**
0.35	15	M10x1	8 / 10 mm	1.7...2.6	-	230/50/2	59	24 x 40 x 52	27	9 620 025	**F250**

*1) with Option H_1 : Current consumption = plus 5A

*2) with Option H_5 : Current consumption = plus 7A

*3) with Option H_{12} : Current consumption = plus 11A

Julabo Technical specifications

Immersion Coolers | Flow-Through Cooler

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Cooling capacity +20 °C	Cooling capacity +10 °C	Cooling capacity -20 °C	Cooling capacity -40 °C	Cooling capacity -80 °C
		°C	°C		°C	kW	kW	kW	kW	kW
FT200	**108**	-20 ... +30	-	-	-	0.25	0.2	0.04	-	-
FT400	**108**	-40 ... +30	-	-	-	0.45	0.36	0.14	0.03	-
FT900	**108**	-90 ... +30	-	-	-	0.3	0.27	0.24	0.2	0.07
FT402	**108**	-40 ... +30	0.1	Analog 2-point	±0.5	0.45	0.36	0.14	0.03	-
FT902	**108**	-90 ... +30	0.1	Analog 2-point	±1	0.3	0.27	0.24	0.2	0.07
FD200	**109**	+10 ... +30	-	-	-	0.22	0.18	-	-	-

Calibration Baths | Visco Baths | Beer Forcing Test Refrigerated/Heating Circulating Bath

JULABO Model	Catalog page	Working temperature range	Setting/ display resolution	Temperature control	Temperature stability	Heating capacity	Cooling capacity (Bath fluid: Ethanol) +20 °C	Cooling capacity (Bath fluid: Ethanol) 0 °C	Cooling capacity (Bath fluid: Ethanol) -20 °C
		°C	°C		°C	kW	kW	kW	kW
SL-8K	**104**	+50 ... +300	0.01	ICC	±0.005	3	-	-	-
SL-14K	**104**	+50 ... +300	0.01	ICC	±0.005	3	-	-	-
FK30-SL	**105**	-30 ... +200	0.01	ICC	±0.005	2	0.46	0.34	0.15
FK31-SL	**105**	-30 ... +200	0.01	ICC	±0.005	2	0.46	0.34	0.15
ME-31A	**106**	+20 ... +60	0.01	PID3	±0.01	2	-	-	-
ME-16G	**106**	+20 ... +100	0.01	PID3	±0.01	2	-	-	-
ME-18V	**106**	+20 ... +150	0.01	PID3	±0.01	2	-	-	-
F38-ME	**107**	-38 ... +80	0.01	PID3	±0.05	2	0.92	0.66	0.32

Temperature Controllers

JULABO Model	Catalog page	Adjustable temperature range	LED display/ resolution	LCD display/ resolution	Temperature control	Temperature stability in external system
		°C	°C	°C	°C	°C
LC4	**110**	-50 ... +350	2 / 0.1 °C	-	PID2	> ±0.05
LC4-F	**110**	-50 ... +350	4 / 0.1 °C	-	PID3	> ±0.03
LC6	**110**	-100 ... +400	1 / 0.01 °C	1 / 0.01 °C	ICC	> ±0.03

Refrigerators for Chemicals

JULABO Model	Catalog page	Working temperature range	Temperature selection	Temperature display	Alarm signal	Temperature stability	Compressor overheating protection
		°C				°C	°C
KRC50	**111**	-2 ... +12	Analog	LED	Optical	±1	105
KRC180	**111**	-2 ... +12	Analog	LED	Optical	±1	105

* Additional voltages available - please contact us!

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 Order No.	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	9 650 820	**FT200**
-	12 x 5	120	IP21	230/50/4	20 x 30 x 43	24	9 650 840	**FT400**
-	65 x 1.5 flexible	160	IP21	230/50-60/5	38 x 55 x 60	50	9 650 890	**FT900**
-	12 x 5	120	IP21	230/50/4	20 x 30 x 43	24	9 650 842	**FT402**
-	65 x 1.5 flexible	160	IP21	230/50-60/5	38 x 55 x 60	50	9 650 892	**FT902**
8 / 12 mm	-	-	IP21	230/50/2	18 x 27 x 39	16	9 655 825	**FD200**

Pump capacity: Pressure	Pump capacity: Flow rate	Bath opening/ Usable bath depth	Filling volume	Bath cover	Classification acc. to DIN 12876-1	Power requirement*	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
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	9 352 508	**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	9 352 514	**SL-14K**
0.4 - 0.7	22 - 26	dia. 12 / 17	14	Integrated	III (FL)	230/50/16	32 x 45 x 79	48	9 352 627	**FK30-SL**
0.4 - 0.7	22 - 26	dia. 12 / 31	24	Integrated	III (FL)	230/50/16	32 x 45 x 91	51	9 352 628	**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	9 162 331	**ME-31A**
0.23 - 0.45	11 - 16	7.6 x 7.6 / 2x / 31	16	Integrated	III (FL)	230/50-60/9	dia. 29 x 48	9	9 162 616	**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	9 162 518	**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	9 162 638	**F38-ME**

Working sensor	Safety sensor	Maximum connection wattage	IP class acc. to IEC 60529	Power requirement*	Dimensions W x L x H	Weight (net)	JULABO Order No.	JULABO Model
		kW		V / Hz / A	cm	kg		
1 Pt100	1 Pt100	2	IP31	230/50-60/10	17 x 17 x 16	3	9 700 140	**LC4**
1 Pt100	1 Pt100	2	IP31	230/50-60/10	25 x 20 x 10	3	9 700 142	**LC4-F**
2 Pt100	1 Pt100	3	IP31	230/50-60/14	21 x 18 x 18	4	9 700 160	**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 Order No.	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	8 800 705	**KRC50**
PTC	PTC	180	230/50/0.5	52 x 40 x 70	60 x 64 x 86	35	8 800 718	**KRC180**

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 fast cool-down.

Ambient Conditions

All JULABO units can be operated at ambient temperatures between 5 °C and 40 °C. Optimal ambient conditions are ambient temperature of 20 °C and approximately 50 % relative humidity.

| B

Bath Fluid

For working temperature ranges from 5 °C to 90 °C JULABO recommends the use of soft and decalcified water. Distilled and deionised water tends to absorb composites from components, thus causing corrosion. Alcohols (e.g. ethanol) only have a limited range due to their extremely low flash point and fire point. For working temperatures down to -20 °C a water-glycol-mixture (1:1) may be used. JULABO *Thermal* bath fluids offer extended temperature ranges. They have the advantage of much lower specific heat capacities. When selecting bath fluids special attention has to be paid to the flash point and fire point. Especially when it comes to low temperatures the permissible viscosity, as stated in the operating manuals, may not be exceeded. The maximum working temperature has to be at least 30 °C below the fire point of the bath fluid.

Bath Opening

is the size of opening which is available for immersing objects or samples into the bath. Usually bath depth is also 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 works 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.

| C

Calibration Bath

is a bath circulator with extremely high temperature stability and uniformity. 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 * c* 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 / silicon oil = 1.8)
dT = required temperature difference in °C
t = desired cool-down / heat-up time in seconds

One has to take into consideration that the total mass (m) is the sum of volumes of different sources: e.g. the volume of the circulator, in the tubing, in the reactor's jacket, in the reactor.

The simple calculation of required cooling/heating capacity as seen above does not take into account differences in weight of the bath fluids 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. You may distinguish between two different classes: NFL (non-flammable) and FL (flammable).

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`. These units are only suitable for operation with non-flammable bath fluids.

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. These units are only suitable for operation with flammable bath fluids.

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 required cooling power and at the same time saves energy (up to 90 %) and waste heat.

Cool-down/heat-up times

When using JULABO *Thermal* bath fluids cool-down and heat-up times are shorter than when using water or alcohol. The required cooling/heating capacity is significantly lower when using *Thermal* bath fluids, thus resulting in shorter cool-down and heat-up times. The reason is that *Thermal* bath fluids have better specific heat capacities.

| D

DIN 12876-1

Describes and classifies electrical lab equipment such as e.g. laboratory circulators. The norm also describes functionality of warning and safety features. Beyond the DIN definition JULABO offers the following warning and safety features:

1.) High temperature cut-off is adjustable on all circulators. For most models the adjusted value can be shown on the display.

2.) There are optical and audible alarms if the set over temperature value or an impermissibly low liquid level is detected.

3.) All JULABO units feature constant monitoring of the difference between safety and working temperature sensors. The unit is shut down if the difference between these two sensors exceeds a defined value. Cut-off also occurs when one of the two sensors is defective. The safety sensor has the additional function of a dry-running protection.

4.) Furthermore function checks of both sensors are always active.

Display

Multi-Display (LED) means that not only actual and set-point values but also values for high-/low temperature warnings and high temperature cut-off are displayed. Depending on the model it is possible to display additional values such as e.g. pump capacity stages, shaking frequency, etc.

The VFD Comfort-Display allows permanent, simultaneous indication of three temperature values: the internal actual temperature, the setpoint temperature and the external actual value. Furthermore the selected pump stage is visible at all times on the integrated illuminated pump stage display.

| E

Early Warning System (patented)

The reason for a premature/undesired cut-off caused by the low liquid level protection is often the lack of bath fluid. Depending on the application such a cut-off might lead to damage to the objects or samples. The JULABO Early Warning System was designed to avoid such situations by indicating to the user (by means of an intermittent alarm) that bath fluid needs to be refilled. Furthermore it enables users to notice an undesired temperature deviation (e.g. due to exothermic reactions).

EasyTEMP

=> see Software, Control

| F

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 pressure 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.

Glossary

Flow-Through Cooler
is often used as a substitute for cooling with tap water. A flow-through cooler is an uncontrolled cooling unit without circulating pump. The unit is installed into the external temperature loop in order to cool down the bath fluid. For applications with heating circulators lower temperatures or faster cool-down times can be achieved.

Fluid
=> see Bath Fluid

| 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. A heating circulator is a circulator with an open bath to insert objects into the bath. Additionally the instrument is equipped with a circulating pump and pump connections for an external system.

Heating Immersion Circulator
is equipped with a bath attachment clamp to fix it to any bath tank. The bath tank is not included in delivery. Alternatively it is possible to attach heating immersion circulators to a laboratory stand by means of an attachment clamp with rod.

| I

ICC, Intelligent Cascade Control
Highly precise PID Cascade Control was designed for perfect results. The ICC Temperature Control is self-optimizing, i.e. the control parameters automatically adjust to the application.

Immersion Cooler
is a cooling device with immersion probe which is fixed to a flexible hose. Immersion coolers are used to cool down fluids in any bath tank.

Interface, analog
allows input of the temperature setpoint and output of the actual temperature value analogous as a power or voltage signal.

Interface, digital
allows a serial data communication between two or more connected units in digital form via cable to transmit and record temperature values, status messages and application data. In addition, it is possible to control the temperature control unit via PC with the suitable software. Depending on the model RS232, RS485, USB and profibus interfaces are available.

| M

Mains 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 cooling machines one has to keep in mind that when starting the compressor it might require three to five times the nominal current.

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

| O

Open Heating Bath Circulator
is a circulator 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 control electronics. E.g. working temperature range of heating circulators can be extended by auxiliary means (cooling) down to the maximum of the lower operating temperature range.

| P

PID, Temperature Control
JULABO PID1, PID2 and PID3 control offer fixed control parameters (Xp, Tn, Tv). These can be changed manually with PID2 and PID3 controlls 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/Suction Pump

Units equipped with a pressure/suction pump (e.g. circulators of the *HighTech* series) are also equipped with two pumps that complement one another. While one pump is pumping the fluid from the internal bath tank into the external system, the second pump sucks the fluid through a run back line into the bath. Each pump has its own capacity. Therefore there are two separate values for the pressure and suction capacity stated in the technical specifications. By using both pumps simultaneously an especially high flow rate can be reached.

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, *ME* and *Presto* 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.

| R

Recirculating Cooler

is a cooling unit which is often used as a substitute to cooling solutions with tap water. It usually does not have an accessible bath. The unit is equipped with a strong circulating pump with connections for an external application.

Refrigerant

For years JULABO has been using environmentally-friendly refrigerants which are CFC-free.

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.

Remote Diagnosis

=> see BlackBox-Function

RS232/RS485 Interface

=> see Interface, Digital

| 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 which can communicate with up to 24 units simultaneously.

Systems, external

When connecting an external system, several points have to be considered in order to achieve the best heat transfer between the temperature control unit and the connected system:

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 external system have to be well insulated.

3.) Use of a 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 well integrated into the system.

6.) The viscosity of the heat transfer liquid has to be kept to a minimum.

Glossary

| 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 dynamic 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. Advantage: Protection of the objects or samples or through careful temperature application; protection of e.g. glass reactors from thermal shock.

2.) Control dynamics: Option to choose between aperiodic and normal PID behavior when using internal control mode. Aperiodic (factory setting): Perfect, but takes slightly longer to reach the setpoint without overshoots. Normal: Reaches the setpoint fast, but with small overshoots.

3.) Limit settings: The limits `IntMax´ and `IntMin´ are applicable 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.

Advantage: Bath fluid is protected against overheating; Freezing protection 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 overshoots increases.

Temperature Control

=> see PID, ICC, *TCF*

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.

Temperature Control System

Temperature control systems are circulators with strong cooling, heating and pump capacities. Due to a small liquid volume fast cool-down and heat-up times can be achieved which is ideal for applications in the field of process development.

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.

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 tubings are dependable, extensively chemically resistant and when used with the respective bath fluid recommended by JULABO. The following sorts of tubings are available:

1.) CR-Tubing, proven tubing material for working temperatures from -20 °C to 120 °C.

2.) Viton tubing, high quality tubing material for working temperatures from -50 °C to 200 °C.

3.) Metal tubing, for a tight screw connection between the circulator and the external system. The insulation reduces loss of capacity. Displacement of the tubing is avoided. The flexible metal tubings are available with single or triple insulation and are suitable for working temperatures from -50 °C to 200 °C respectively from -100 °C to 350 °C. The triple insulated metal tubings are permitted for pressure capacities up to a maximum of 3.8 bar.

| 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 as well as the highly dynamic temperature control systems *Presto®*, *Magnum* 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.

| V

Viscosity

describes the thickness of fluids. It is a measurement for the internal liquid resistance against flowing. The higher the viscosity, the thicker the liquid; The lower the viscosity, the thinner the liquid.

| W

Warranty

Standard warranty for all JULABO units is 12 months. The *1PLUS-Warranty* gives users the opportunity to extend the warranty to 24 months, limited to a maximum of 10,000 operating hours. Registration for *1PLUS-Warranty* is available at: *www.julabo.de*.

WirelessTEMP

The *WirelessTEMP* product range allows wireless monitoring and control of JULABO temperature control instruments from 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 (e.g. underneath lab benches). For such situations *WirelessTEMP* makes work significantly easier as it is not necessary to directly access the temperature control unit.

WirelessTEMP allows you to spend less time and resources monitoring the temperature or to change settings at the unit. All important parameters can be displayed and changed directly at your workstation, optionally via PC/notebook.

WirelessTEMP can be used with virtually all JULABO temperature control units with RS232 interface. Most older, already existing JULABO laboratory circulators, recirculating coolers, temperature systems, etc. can be upgraded.

Another advantage: The hassle of running cables is eliminated. The measuring data collection or data transmission can now be achieved wirelessly. There are virtually no costs for shielded data lines, power sockets, etc. In addition, *WirelessTEMP* offers higher flexibility when setting up the lab or choosing the location of the unit.

Working Temperature Range

is the temperature range within the operating temperature range which can be reached by the circulator itself and 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 downward.

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