



The 2006/2007 Program

with NEW product groups



Innovative Temperature Technology

highly precise temperature control from -95 to +400°C





Julpho Innovative Temperature Technology

On 1 January 1967, JULABO was established by Mr. Gerhard Juchheim in the village of Seelbach/Germany. recognized to be one of the leading manufacturers of temperature control instruments. This tradition is constantly continued.

With the corporate headquarters in Germany, seven JULABO divisions and many distributors worldwide. Already in the eighties, JULABO was JULABO offers customer proximity and reliable service. With JULABO YOU always are and will be at the forefront of technology!



Welcome at JULABO!

JULABO has more than 220 motivated employees worldwide, 180 of them based at the corporate headquarters in Germany. A highly integrated team of engineers focuses on speciality areas including electrical, mechanical, thermo-dynamics and refrigeration technology within the R&D department.

JULABO Labortechnik GmbH is located in the scenic village of Seelbach (Black Forest)

State-of-the-art manufacturing facilities include mechanical, electronics and refrigeration techniques.

A high level of automation that allows to test and QC every production unit is also incorporated. The dedication to quality can be seen in every part of JULABO.



Icon feature description of technical benefits





Intelligent pump system Electronically adjustable PUMP pump stages External Pt100 sensor connection Pt100 for precise measurement and control directly in the external system Interface -RS 232 Online communication Interface - Online communication RS 232 for highest demands, upgradeable **RS485** with Profibus DP JULABO early warning systems (patented) with intermittent tone and optical signal for low liquid level, ability to refill bath fluid before unit shuts down! for high temperature and low temperature limits, adjustable to automated cut-off Integrated programmer with real time clock and keypad operation 1 x 10 for 1 x 10 program steps

> Integrated programmer with real time clock and convenient keypad operation for 6 x 60 program steps



pump/HST booster heater



¹⁾ VFD: Vacuum Fluorescence Display

Please keep this page open!





6 x 60

'Stakei' connections for solenoid valve or HSP booster



flammable bath fluids (FL)



PID 3



TCF

ATC

ATC³



Jurbo Innovative Temperature Technology since 1967

Always first – Decades of incorporating the latest technologies

Back in the seventies **JULABO** is the first to implement

 fully electronic temperature control for laboratory circulators and baths, while other manufacturers continue to rely on glass/mercury thermometers.



The eighties: **JULABO is the first** to offer a range of benefits using the latest electronic components:

- Illuminated displays for actual and setpoint values, whilst fragile mercury-thermoregulators are still used by other manufacturers.
- External measuring and control via Pt100 sensor, to ensure high temperature stability directly in the external system.
- Adjustable warning and safety functions for high and low temperatures, exceeding the DIN recommendations.



In the nineties, the transition from analog to digital technology is successfuly completed. JULABO products get a new design. Operation by keypad setting and reproducibility are significantly enhanced. Digital interfaces allow for direct connection of PCs for automation and documentation of processes.

The beginning of a new millenium is characterized by the introduction of

- 'Presto' Highly Dynamic Temperature Control Systems
- 'Forte HT' High Temperature Circulators



The perfect solution for every requirement and budget!

The totally NEW line, introduced in fall 2003, features three main product groups: 'Economy', 'TopTech' and 'HighTech'. The appealing and registered design includes a number of unique technical advantages, as well as a range of new patented warning functions.



Further new products such as calibration baths and 'SemiChill' recirculating coolers for industrial applications expand the product range. Immersion coolers and water baths are equipped with the latest digital technology and offer great price/performance ratio.

During Achema 2006 in Frankfurt/Main, JULABO presents • Recirculating Coolers: The Covice



See for yourself the benefits of the JULABO product portfolio. For temperature control, cooling and automation tasks – contact JULABO.

Contents Julaba JULABO Innovative Temperature Technology since 1967 2 **Circulators & Temperature Control Systems** 4 **Refrigeration Technology & Thermo-Dynamics** 5 Environmentally friendly cooling and more ... 6 7 Selection criteria - Choose the appropriate JULABO unit for your application JULABO The Circulator Program - The tradition of innovation continues with 9 basic models 8-9 Internal temperature applications Heating Immersion Circulators, Bridge Mounted Circulator 10-11 Open Heating Bath Circulators 12-13 External & internal temperature applications Heating Circulators with Open Bath 14-15 Heating Circulators 16-17 **External temperature applications** 'Forte HT' High Temperature Circulators 18-19 External & internal temperature applications Refrigerated/Heating Circulators 20-25 Cryo-Compact Circulators – 4 miniature design models 26-27 28-30 Ultra-Low Refrigerated Circulators Bath Fluids • Accessories • Applications • Peripherals 31-35 Immersion Coolers, Flow-Through Coolers 36 Internal temperature applications 37 Visco Baths Calibration Baths 38-40 Temperature Control Systems – external temperature applications in wide temperature ranges 'Presto®' Highly Dynamic Temperature Control Systems 41-43 'Magnum 91' - The Powerful Temperature Control System 44 Pump connections, etc. • Accessories 45-46 **Recirculating Coolers COMPACT Recirculating Coolers** 47 48-51 MEW The 'FL' series 52 The 'FC' series 53-55 The 'SemiChill' series Accessories 56 Lab Automation & Software 57 Water Baths & Accessories 58-59 Shaking Water Baths & Accessories 60-61 Temperature Controllers, Programmable Controller, Programmer 62-63 **Circulators & Units for special applications** for combinatorial chemistry, reaction systems and petro analysis 64 • for the beer forcing test 64 65

for MOCVD applications
 for Applications
 Refrigerators for chemicals
 FAQs
 66-67

∃ info@julabo.de

3



Circulators & Temperature Control Systems

The 'Economy', 'TopTech' and 'HighTech' circulators series include user-friendly design and incorporate the latest state-ofthe-art technology to give YOU the highest performance standards in the industry, as well as enhanced warning and safety functions!

JULABO sets bright standards



JULABO circulators and temperature control systems offer large. easy-to-read displays (LED) (fig. 1).

The VFD COMFORT-DISPLAY (fig.2) allows simultaneous indication of 3 temperature values. The Temperature Control Systems additionally indicate the selected pump stage and filling volume. The backlit LCD Dialog-Display (fig.3) offers interactive operation with easy-to-read text.

JULABO early warning system (patented) for observation of the filling level



Fluid losses in the circulator bath are recognized before shutdown is necessary. An intermittent signal sounds and an optical signal is displayed. Refill the bath tank in time before the built-in low liquid level protection is triggered and the process is unnecessarily interrupted.

Outstanding: The professional JULABO control electronics



PID1, PID2 and PID3 control offer fixed control parameters (Xp, Tn, Tv). These can be manually changed with PID2 and PID3 to reach an improved temperature stability, especially for external temperature control.



ICC (Intelligent Cascade Control) represents the supreme solution temperature control. ICC offers perfect temperature control with self-optimizing PID control parameters.



TCF offers additional functions such as band limit, limit setting, co-speed factor and control dynamics. For more details, please see page 66.

ICC temperature control is implemented in the JULABO circulators of the 'HighTech' series, Highly Dynamic Temperature Control Systems and LC6 Programmable Controller.

Highly Dynamic Temperature Control Systems 'Presto®' and 'Magnum 91' are the top of liquid temperature control technology. They are suitable for highly demanding external temperature applications without the requirement to changing bath fluids (e.g. in wide temperature ranges from -40 to +250 °C).

Integrated and easy operation



The key arrangement is very similar for all JULABO products. The systems are simple to operate using the splash-proof and easy-to-clean keypads. The menu allows setting of additional functions for process optimization, such as for example autostart mode, interface configuration, etc.

JULABO early warning system (patented) for high and low temperature limits



If the selected limits are exceeded - caused by e.g. exothermic reactions - optical and audible alarms are triggered.

Low temperature protection with cut-off function

If a low temperature protection with cut-off function, instead of a warning function is preferred, it can be programmed

The new circulating pumps feature high performance data and high efficiency. The pump motor allows:

- Electronical adjustment of the pump capacity SMART in 4 stages via the keypad.
- PUMP Automatic adjustment of the pump capacity for changing viscosity levels.
- · The 'HighTech' electronics ensure problem-free and safe operation - even using bath fluids with a high viscosity.

Integrated supplementary and protection functions

JULABO circulators and temperature control systems incorporate additionally

- Standby display and automatic self-test
- Monitoring of sensors and sensor temperature differentials
- Online diagnosis with 'BlackBox' function
- · Overload protection for pump motor

Refrigeration Technology & Thermo-dynamics

Instruments with integrated refrigeration are suitable for wide working temperature ranges. For applications around ambient temperature a unit with refrigeration is recommended.

Additional benefits of JULABO refrigeration systems

- · Ventilation-air-cooling of condenser and compressor, air flow is typically from the front: directs discharged air to the rear.
- Permissible ambient temperature up to +40 °C for all single-stage models - only offered by JULABO! Ultra-low models with two-stage cascaded technology are suitable for ambient temperatures of up to 35 °C.
- · No side vents units can be located closely next to each other.
- No negative thermal impact to the left or right of the unit.



· FP models: proportional cooling control cooling capacity is automatically adjusted (saves energy).

· Active Cooling Control: Cooling available throughout the entire temperature range.

- · Automatic shutdown of the refrigeration unit when no cooling is required (except F12 refrigeration unit and ED circulators).
- · Heated top cover plates on all JULABO ultra-low units prevent ice build-up and condensation at low temperatures.
- Overload protection for refrigeration unit.

Equipped alternatively with fan-air-cooling or water-cooling, these systems ensure maximum performance across the entire working temperature range.

Removable venting grid



JULABO Refrigerated Circulators, Temperature Control Systems and Recirculating Coolers have a removable venting grid.

Inevitable dust accumulation can easily be removed from the condenser. The drain port is easily accessible from the front if the venting grid is removed.

JULABO Model designations for Refrigeration Units

- = Frigus, Froid, Frio (stands for 'cooling' F in Latin, French and Spanish).
- = Proportional cooling control FP energy-saving especially implemented in high performance units.
- Water-cooled, powerful models. FPW = Benefit: Virtually no heat generation into ambient air, low noise level.

For cooling of FPW models a cooling water system (industrial water) is recommended instead of tap water cooling - in recognition of environmental concerns.

The number after the model designation relates to the lowest achievable temperature inside the bath tank. Example: $FP50 = -50 \ ^{\circ}C$.

In combination with the basic circulator (pages 8 to 9) the complete model designation is formed (e.g. FP50-HL).

Thermo-dynamics and processor technology

By combining highly intelligent control electronics, the latest refrigeration technology and optimized fluid dynamics, JULABO products achieve the market leading temperature stability and efficiency. Cooling is produced by a built-in cooling coil (9) in the bath tank. In the powerful units, cooling is adapted to the actual requirements of the application via a solenoid valve control system or a stepper motor controlled expansion valve to ensure high efficiency.

Highly Dynamic Temperature Control Systems (pages 41 to 44) provide a closed construction design (see illustration).



∃ info@julabo.de

5

using the keypad. Intelligent pump systems



All natural resources deserve careful consideration, and especially precious potable water. Using tap water for cooling purposes in the laboratory is perhaps one of the most wasteful and easily resolved consumption problems!

JULABO Recirculating Coolers

The units have a keypad and LED display. They include a refrigerated unit with fan-air-cooling; more powerful units are alternatively available with water-cooling.

For simple cooling tasks of small objects, the AWC100 air-towater recirculating cooler (illustrated on page 47) is sufficient.

The NEW 'FL' series



The new product line (details on pages 48 to 51) include recirculating coolers for applications requiring cooling capacities from 0.3 to 11 kW.

The 'FC' series is suitable for heating and cooling tasks from -20 to +80 °C with a high temperature stability.

What the JULABO product line features additionally ...

Lab Automation & Software



Water Baths





Combinatorial chemistry

- Beer forcing test
- MOCVD
- Cooling of chemicals

The table on the next page allows you to choose the appropriate JULABO unit.

For constant cooling via a cooling loop, JULABO offers a wide range of recirculating coolers (for details please refer to page 47 to 56). This product group is designed to remove heat and control temperature economically and with minimal impact on the environment.

Benefits of JULABO recirculating coolers:

- Operation in ambient temperatures up to +40 °C
- · No side vents units can be located closely next to each other.
- · No negative thermal impact to the left or right of the unit.



• Removable venting grid: Hassle-free cleaning of the condenser

Drain port easily accessible

'SemiChill' Recirculating Coolers for most demanding requirements

These powerful units, up to 10 kW cooling capacity, are designed for special demands such as those required in semiconductor industries or common industrial fields. The modular concept allows YOU to customize your 'SemiChill' unit to your requirements.



Temperature Controllers, Programmable Controller and Programmer

for measuring, controlling and monitoring of any electrically heated equipment are described on pages 62 and 63.

JULABO units for special applications are illustrated on pages 64 and 65. FAQs are on pages 66 and 67!



Selection criteria – Choose the appropriate JULABO unit for YOUR application

JULABO Circulators	Catalog pages:	10 to 13	14 to 17	18 to 19	20 to 21	22 to 23	24 to 25	26 to 27	28 to 30	37 to 39	41 to 44	47 to 51	52	53 to 55	58 to 61
Ilecting Immercian	00														
Giraulatara	+20 to +100/+150 °C	•													
Circulators	+20 to +200 °C														
Bridge Wounted Circulator	+20 to +300 °C														
Upen Heating Bath Circula	tors +20 to +60/+100 °C	•													
Heating Lirculators	+20 to +60/+100 °C		•												
with Upen Bath	+20 to +100/+150 °C		•												
Heating Circulators	+20 to +200 °C		•												
10 1 2 .	+20 to +250/+300 °C														
High lemperature	+40/+70 to +400 °C			•											
Circulators															
Refrigerated/Heating	-20/-30 to +100 °C														
Circulators	-20/-35 to +150 °C				•		•								
	-20/-28 to +200 °C					•	•								
	-30/-35 to +200 °C					•	•								
	-40/-50 to +200 °C					•	•								
Crvo-Compact	-30/-40 to +150 °C							•							
Circulators	-30/-40 to +200 °C							•							
Ultra-Low	-60/-95 to +100 °C								•						
Refrigerated Circulators	-60/-91 to +150 °C								•						
Visco Datha	20 to														
VISCO Baths	+20 to +60/+100 °C									•					
Caliburation Daths	+20 to +150 °C									•					
Calibration Baths	-30 to +200 °C									•					
	+50 to +300 °C														
Temperature Control	Systems														
'Presto [®] '	-40/-50 to +250 °C										•				
	-85 to +250 °C										٠				
'Magnum 91'	-91 to +250 °C										٠				
Recirculating Coolers	3														
COMPACT Recirculating Co	olers +5/+20 to +40 °C														
The 'FL' series	-20 to +40/+80 °C											•			
The 'FC' series	-10/-20 to +80 °C											-	•		
'SemiChill' -2	20/+5 to +35/+80/+130 °C												-	•	
	00 / 100 00														
water Baths	+20 to +100 °C														

Selection according to effective cooling capacity

Circulators, Temperature Control Systems and Recirculating Coolers

+20 to +100 °C

Cooling capacity at	0.15 to 0.26 kW		•	•	•			•			
+20 °C working temperature	0.38 to 0.6 kW										
	0.68 to 0.96 kW		•		•	•		•	•		
	1.2 to 5.5 kW					•	•		•	•	
	7.0 to 11.0 kW										

∃ info@julabo.de

Shaking Water Baths

The Circulator Program

The 'TopTech' Series





ED & EH Circulators

• For ro applie	outine laboratory cations
88.8	LED temperature display, resolution 0.1 °C
	Keypad 1
PID 1	PID temperature control
۲	Adjustable high temperature cut-off or dry-running protection
ED circu	lator:
S1	Classification I (DIN 12876-1) with adjustable high temperature cut-off
EH circu	lator:
S 3	with adjustable high temperature cut-off and low liquid level protection
[=	EH model
	(rear view) with connection for



888

ATC

RS232

-1

888

S1

SMART PUMP

S3

MB circulator:

MC circulator:

Intelliaent

2 3

solenoid valve

111_111_111_11

Calibration





(3) Refrigeration unit/ solenoid valve

The tradition of innovation continues with 9 basic models





HE & SE Circulators

HL & SL Circulators

upgradeable with HSP booster pump + HST booster heater

Top-of-the-line-models: even EASIER to use and

Julaba

Supreme temperature control solutions for the most demanding applications with powerful pressure/suction pump systems

165.00 165.00

800888 8000888 8000888	VFD ¹⁾ COMFORT-DISPLAY, resolution 0.01 °C	RS 232	Online communication	888	188 1888 1853	VFD ¹¹ COMFORT-DISPLAY, resolution 0.01 °C	Pt100	External sensor connection
	Illuminated display for pump stages 1 to 4	1x10	Integrated programmer			Illuminated display for pump stages 1 to 4	<u>RS232</u> RS485	Online communication
	Keypad 3 with menu functions ICC, TCF, ATC3, Smart Pump		Early warning system for low liquid level	Sarp. 1: 1 Josefice: 1 Controls:		lcd Dialog-display	6 x 60	Integrated programmer
ICC	Intelligent Cascade Control	-}-	Early warning system for high/low temperature limits			Keypad 3 with menu functions ICC, TCF, ATC3, Smart Pump		'Stakei' connections for solenoid valve or booster heater/pump
TCF	Temperature Control Features	HA	Adjustable high temperature cut-off visible via VFD	IC	C	Intelligent Cascade Control		Early warning system for low liquid level
ATC ³	Absolute Temperature Calibration	S 3	Classification III (DIN 12876-1)	70	F	Temperature Control Features	- }	Early warning system for high/low temperature limits
SMART PUMP	Intelligent pump system			AT	C ³	Absolute Temperature Calibration	Ħ	Adjustable high temperature cut-off visible via VFD
Pt100	External sensor connection			SMA PUI	RT VIP	Intelligent pump system	S 3	Classification III (DIN 12876-1)
The 'Hig	hTech' series (rear view):			Option	for	the 'HighTech' series:		
	with connections (1) External Pt100 (2) RS232 / RS48 (3) Refrigeration u (4) Electronic mo (5) Stakei' connections for (6) Connections for	for sensor 5 interface unit / solenc udule (option ctions (HL, or pump an	oid valve on) SL models) d cooling coil	 A 	B	Electronic modul with analog com (order no. 8 900 1 (Alarm output (C) Analog interfar for external pm temperature re	le nections 00) ce with one ogramming ecorder (cu	input and two outputs , flow sensor or rrent/voltage), scalable

1) VFD: Vacuum Fluorescence Display

Heating Immersion Circulators

370

1

JULABO Heating Immersion Circulators form the basis for the program of the 'Economy' and 'TopTech' series featuring mechanically adjustable pressure pump (patented).

JULABO Heating Immersion Circulators are suitable for a wide range of applications and feature the following:

- · For bath tanks up to 50 liters
- With bath attachment clamp for wall thickness to 26 mm
- Immersion depth 16.5 cm, reducible to 14.5 cm · Wetted parts and housing made of



The 'Economy' Series

The 'ED' circulator is suitable for working temperatures to +100 °C when non-flammable bath fluids are used. Highly competitive model in respect of price/performance. The 'EH' model covers an expanded working temperature range to +150 °C and is suitable for flammable bath fluids. The performance data is the same as for the 'ED' model.

0

The 'TopTech' Series

These units are designed for more demanding applications and provide an improved operating comfort with menu functions, warning and safety installations, such as an early detection system with audible signal in case of fluid losses or if the setpoint temperature is exceeded. All models have a RS232 interface.





the features of the 'MC' model. Additional technical high-

VFD COMFORT-DISPLAY for the SIMULTANEOUS

Integrated programmer (1 x 10 program steps)

display for selected pump stage

External Pt100 sensor

indication of 3 temperature values and illuminated

lights are:

The 'MB' model is suitable for working temperatures to The 'ME' model - 'STAR' of the 'TopTech' series - includes +100 °C and for small bath volumes up to 20 liters. It also features a low noise level.

The 'MC' model provides

- High pump capacity
- · Pump pressure control and an expanded working temperature range to +200 °C.

Accessories (pages 31 + 32)

- Pump set for external temperature applications
- · Installation cooling coil
- · External Pt100 sensors (for ME model)



The 'HighTech' Series

The 'SE-Z' bridge mounted circulator is suitable for bath tanks to 100 liters.

- With the stainless steel bridge (extendable from 31 cm to 66 cm) it can easily be placed on the bath tank.
- Immersion depth 12 to 19 cm
- · Built-in cooling coil

Additional features

- Working temperature range up to +300 °C
- VFD COMFORT-DISPLAY for the SIMULTANEOUS indication of 3 temperature values and illuminated display for selected pump stage
- · Early detection system with audible signal (e.g. in case of fluid losses, etc.)
- External Pt100 sensor (accessory)
- · Integrated programmer (1 x 10 program steps)

The powerful pressure and suction pump allows an optimum bath circulation and connection of external systems requiring temperature application.







JULABO Order No.	JULABO Model	Working temp.	Temp. stab.	Heat. cap.	Pump cap Flow rate	oacity Pressure	Suction	Cooling coil	Usable immersion depth	Dimensions W x L x H	Weight
Heating I – The 'Econ	nmersion (omy' Series	Circulators		KVV ~	1/11111.		Fechnica see fold-	l features out page)		PID 1	s1
9 115 000	ED	20 100	±0.03	2/1	15	0.35		Option	8-14.5	13 x 15 x 33	3.3
										PID 1 (1)	S 3
9 117 000	EH	20 150	±0.03	2/1	15	0.35		Option	8-14.5	13 x 15 x 33	3.3
Heating li – The 'TopT	nmersion (ech' Series –	Circulators	;				PID 2	ATC ³	RS232		S1
9 140 000	MB	20 100	±0.02	2/1	10	0.12		Option	8-14.5	13 x 15 x 33	3.3
				6 888 6 000		<i>PID 2</i>	ATC ³	SMART PUMP	RS 232		S3
9 150 000	MC	20 200	±0.01	2/1	11-16	0.23-0.45		Option	8-14.5	13 x 15 x 33	4.0
	8988 3			PID 3	ATC ³	SMART PUMP	Pt100	RS 232			S 3
9 160 000	ME	20 200	±0.01	2/1	11-16	0.23-0.45		Option	8-14.5	13 x 15 x 33	4.0
Bridge Mou Circulator	nted			C 1	CF A1	C ³ SMA	RT NP Pt1	100 RS2 3] 🔀 📷	\$3
9 250 218	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	8
¹⁾ For temperat	ure applications	at or near amb	ient: use a	cooling c	oil or JULAE	30 immersio	on cooler.	²⁾ EI M), EH: At voltage 230 IB, MC, ME, SE-Z: At	V/50Hz / 115V/60Hz t voltage 230V/50-60Hz /	/ 115V/60Hz

🖅 info@julabo.de

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

Julabo

Open Heating Bath Circulators

More benefit for

YOUR budget.

ED-7A/B

Open Heating Bath Circulators are used for accurate temperature control of samples placed in the circulator bath. The circulator - mounted on a bridge - can easily be removed from the bath.

Open bath tanks made of high quality stainless steel with insulated bath mantle, or bath tanks made of either Plexiglas® or Makrolon[®] are also available.

Open Heating Bath Circulators with transparent bath tank

- Plexiglas[®] (designation 'A') to +60 °C
- Makrolon[®] (designation 'M') to +100 °C
- Available are:
- Space-saving units with a compact design (bath volume of 5 or 7 liters)
- · Units with large bath tanks, fitted with supports for test tube racks and handles

Accessories (see page 32)

- Test tube racks
- · Immersion-height adjustable platforms
- Cooling coils

Heat-up times (230 V) Bath fluid: Water

°C							
				E	D-5M	/B	
50				/			
20			/		FD	13A	
	ED-	DAVB	ED-7	A/B	ME	-13A	
50		1/	/		-		
50		1/	\sim		ED-19	A	
40		\sim			MB-1	9A	
30	V						
20	1	0 2	0 3	0 4	0 50	60 m	in.





ED-5M/B

MB-13A

JULABO	JULABO	Working	Temp.	Heat.	Pump capacity	Cooling	Bath opening/	Bath	Filling	Dimensions	Weight
Order No.	Model	temp.	stab.	cap.	Flow rate / Pres	ssure coil	bath depth	cover	volume	W x L x H	
		range °C 1)	°C	kW 2)	l/min. bar		WxL/Dcm		liters	cm	kg

ED-5A/B

Open Heat – The 'Econ	ing Bath Cir omy' Series				(see fold-out page)							
9 115 315	ED-5A/B	20 60	±0.03	2/1	15	0.35		12 x 24 / 15		5	14 x 40 x 35	5.3
9 115 317	ED-7A/B	20 60	±0.03	2/1	15	0.35		12 x 34 / 15		7	14 x 50 x 35	5.6
9 115 515	ED-5M/B	20 100	±0.03	2/1	15	0.35		12 x 24 / 15		5	14 x 40 x 35	5.2
9 115 313	ED-13A	20 60	±0.03	2/1	15	0.35	Option	18 x 30 / 15		13	41 x 33 x 36	7.5
9 115 319	ED-19A	20 60	±0.03	2/1	15	0.35	Option	36 x 30 / 15		19	55 x 33 x 36	8.5
9 115 513	ED-13M	20 100	±0.03	2/1	15	0.35	Option	18 x 30 / 15		13	41 x 33 x 37	7.5
9 115 519	ED-19M	20 100	±0.03	2/1	15	0.35	Option	36 x 30 / 15		19	55 x 33 x 37	8.5
Upen Heat	ing Bath Cir	culators			F		PID 2	ATC ³ R	\$232			S1

- The 'TopTe	ech' Series –				80		PID 2	AIC*	232	<u> </u>		3
9 140 313	MB-13A	20 60	±0.02	2/1	10	0.12	Option	18 x 30 / 15		13	41 x 33 x 36	7.5
9 140 319	MB-19A	20 60	±0.02	2/1	10	0.12	Option	36 x 30 / 15		19	55 x 33 x 36	8.5

¹⁾ For temperature applications at or near ambient: use a cooling coil or JULABO immersion cooler

²⁾ ED combinations: At voltage 230V/50Hz / 115V/60Hz MB combinations: At voltage 230V/50-60Hz / 115V/60Hz

Open Heating Bath Circulators with stainless steel bath tank

- · Large bath opening for samples of any kind or JULABO test tube racks
- Fitted with supports and handles

Insert canacity for test tubes 13 mm / 17 mm dia

	-13 / MB-1	17 FD-19	/ FD-27	/ MB-	19 FD-33						
90 or	60	2	70 or 18	0	540 or 360					Julabo	
Accesso Lift-up an bath cove Immersio	ries (se d flat ers n-height a	e pages 31 • Test t • Cooli adjustable p	and 32) tube rac ng coil Ilatform	ks s			14	6		MB-13	
Applica for circula Preparatior • for serolo • clinical c	tions tors on p of sample ogy and hemistry	es Temp. a • Analy • Mate	13 pplicatio rtics rial testi	ons			ED-19	Julata			
	and the second			n and	Statistics						
		242	ED-33	11						Heat-up times Bath fluid: Wat	(230 V) er ED-33
JULABO Order No.	JULABO Model	Working temp. range °C 1)	ED-33 Temp. stab. °C	Heat. cap. kW ²⁾	Pump capacity Flow rate/Pressure Vmin. bar	Cooling coil	Bath opening/ bath depth W x L / D cm	Bath	Filling volume liters	Heat-up times Bath fluid: Wat	(230 V) er ED-33 100 120 100 Weight kg
JULABO Order No.)pen Heati The 'Econ	JULABO Model ing Bath (Working temp. range °C 1 ¹ Circulators	ED-33 Temp. stab. °C	Heat. cap. kW ²⁾	Pump capacity Flow rate/Pressure I/min. bar	Cooling coil Technica (see fold-	Bath opening/ bath depth W x L / D cm I features out page)	Bath cover	Filling volume liters	Heat-up times Bath fluid: Wat	(230 V) er ED-33 100 120 140 Weight kg
JULABO Order No. Dpen Heati 9115413	JULABO Model ing Bath l omy' Serie ED-13	Working temp. range °C 1) Circulators 25 – 20 100	ED-33 Temp. stab. °C ±0.03	Heat. cap. kW ²⁾	Pump capacity Flow rate/Pressure Imin. bar	Cooling coil Technica (see fold- Option	Bath opening/ bath depth W x L / D cm I features out page)	Bath cover	Filling volume liters	Heat-up times Bath fluid: Wat	(230 V) er ED-33 100 120 140 kg S1 8.0
JULABO Order No. Dpen Heati The 'Econ 9 115 413 9 115 419	JULABO Model ing Bath (omy' Serie ED-13 ED-19 ED-19	Working temp. range °C 1) Circulators 25 – 20 100 20 100	ED-33 Temp. stab. °C ±0.03 ±0.03	Heat. cap. kW ²⁾ 2/1 2/1	Pump capacity Flow rate/Pressure /min. bar	Cooling coil Technica (see fold- Option Option	Bath opening/ bath depth W x L / D cm I features out page) 18 x 30 / 15 36 x 30 / 15	Bath cover	Filling volume liters 13 19	Heat-up times Bath fluid: Wat	(230 V) er ED-33 100 120 120 100 120 120 kg S1 8.0 11.0

Open	Heating	Bath	Circulators	
_ The	'TonTech	' Soria	- 20	

The 'TopTo	ech' Series	s —					PIDZ	AIL ^o RS	232	* -		31
9 140 413	MB-13	20 100	±0.02	2/1	10	0.12	Option	18 x 30 / 15	Option	13	39 x 33 x 37	8
9 140 417	MB-17	20 100	±0.02	2/1	10	0.12	Option	18 x 30 / 20	Option	17	39 x 33 x 42	10
9 140 419	MB-19	20 100	±0.02	2/1	10	0.12	Option	36 x 30 / 15	Option	19	57 x 33 x 37	11

🖅 info@julabo.de

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

2) ED combinations: At voltage 230V/50Hz / 115V/60Hz MB combinations: At voltage 230V/50-60Hz / 115V/60Hz

Julaba

Heating Circulators with Open Bath

Heating Circulators with Open Bath with transparent bath tank

These units are designed for

- · Temperature applications in the circulator bath · as well as for temperature control of smaller external
- devices, such as measuring cells.
- Bath tanks made of:
- Plexiglas[®] (designation 'A') to +60 °C
- Makrolon[®] (designation 'M') to +100 °C

The 'Economy' Series

ED-5A and ED-5M both offer the latest digital technology at highly competitive prices.

The 'TopTech' Series

These units are designed for more demanding applications and provide improved functionality with warning functions, such as · early detection system in case

of liquid losses

Accessories

14

· Large selection of test tube racks (see page 32)





MB-7A

A	pplications
fc	or circulators on pages 14 & 15
0	Clinical chemistry, analytics
0	External temperature control, e.g. for measuring cells, photometers, refractometers, polarimeters

JULABO Order No.	JULABO Model	Working temp. range °C ¹⁾	Temp. stab. °C	Heat. cap. kW ²⁾	Pump ca Flow rate I/min.	apacity e/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	Weig kg
Heating Ci – The 'Ecor	rculators iomy' Serie	with Open es –	Bath				Technic (see fold	al features d-out page)	<u>888</u>)		PID 1	S1
9 115 305	ED-5A	20 60	±0.03	2/1	15	0.35	Integr.	12 x 24 / 15		5	14 x 40 x 35	5.3
9 115 505	ED-5M	20 100	±0.03	2/1	15	0.35	Integr.	12 x 24 / 15		5	14 x 40 x 35	5.2
Heating Ci – The 'TopT	rculators ech' Serie	with Open s –	Bath		B)	2 ATC ³	RS 232			S1
9 140 305	MB-5A	20 60	±0.02	2/1	10	0.12	Intear.	12 x 24 / 15		5	14 x 40 x 35	5.3

9 140 305	MB-5A	20 60	±0.02	2/1	10	0.12	Integr.	12 x 24 / 15	 5	14 x 40 x 35	5.3
9 140 307	MB-7A	20 60	±0.02	2/1	10	0.12	Integr.	12 x 34 / 15	 7	14 x 50 x 35	5.6
9 140 505	MB-5M	20 100	±0.02	2/1	10	0.12	Integr.	12 x 24 / 15	 5	14 x 40 x 35	5.2

MB-5A

¹⁾ For temperature applications at or near ambient: counter-cooling with tap water via built-in cooling coil. ²⁾ ED combinations: At voltage 230V/50Hz / 115V/60Hz

MB combinations: At voltage 230V/50-60Hz / 115V/60Hz

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

internal & external temperature applications

Heating Circulators with Open Bath

with high quality stainless steel bath tank

- Internal and external temperature applications to +150 °C
- EH-5 (to +150 °C) as well as ED-5 and MB-5 (to +100 °C) include a lift-up bath cover. The units - like the ones on page 14 have a built-in cooling coil.
- · Large bath opening on the models with a filling volume of 13, 19, 27, 33 or 39 liters

Accessories

(see pages 31 & 32)

- · Lift-up and flat bath covers
- · Immersion-height adj. platforms
- · Test tube racks EH-13
- · Cooling coil

Heat-up times similar to the models on page 13

EH-33

MB-5

EH-5

Julabo

JULABO Order No.	JULABO Model	Working temp. range °C ¹⁾	Temp. stab. °C	Heat. cap. kW ²⁾	Pump ca Flow rate I/min.	apacity e/Pressure bar	Cooling coil	Bath opening/ bath depth WxL/D cm	Bath cover	Filling volume liters	Dimensions W x L x H cm	Weight kg
Heating Ci – The 'Econ	rculators v nomy' Serie	with Open I s –	Bath				Technical (see fold-o	features ut page)	B		ID 1 💿	S1
9 115 405	ED-5	20 100	±0.03	2	15	0.35	Integr.	15 x 15 / 15	Integr.	4.5	17 x 33 x 36	7.0
								features				
							(see fold-o	ut page) 🛛 🚾			0	S3
9 117 405	EH-5	20 150	±0.03	2/1	15	0.35	(see fold-o Integr.	ut page) 🛛 🚾 15 x 15 / 15	Integr.	4.5	17 x 33 x 36	\$3 7.0
9 117 405 9 117 413	EH-5 EH-13	20 150 20 150	±0.03 ±0.03	2/1 2/1	15 15	0.35 0.35	(see fold-o Integr. Option	ut page) 15 x 15 / 15 18 x 30 / 15	Integr. Option	4.5 13	17 x 33 x 36 39 x 33 x 37	\$3 7.0 8.0
9 117 405 9 117 413 9 117 419	EH-5 EH-13 EH-19	20 150 20 150 20 150	±0.03 ±0.03 ±0.03	2/1 2/1 2/1	15 15 15	0.35 0.35 0.35	(see fold-o Integr. Option Option	ut page) 15 x 15 / 15 18 x 30 / 15 36 x 30 / 15	Integr. Option Option	4.5 13 19	D 1 17 x 33 x 36 39 x 33 x 37 57 x 33 x 37	S3 7.0 8.0 11.0
9 117 405 9 117 413 9 117 419 9 117 427	EH-5 EH-13 EH-19 EH-27	20 150 20 150 20 150 20 150	±0.03 ±0.03 ±0.03 ±0.03	2/1 2/1 2/1 2/1	15 15 15 15	0.35 0.35 0.35 0.35	(see fold-o Integr. Option Option Option	ut page) 15 x 15 / 15 18 x 30 / 15 36 x 30 / 15 36 x 30 / 20	Integr. Option Option Option	4.5 13 19 27	17 x 33 x 36 39 x 33 x 37 57 x 33 x 37 57 x 37 x 42	\$3 7.0 8.0 11.0 13.0

Julph

Heating Circulators with Open Bath - The 'TopTech' Series

EH-39

9 117 439

EH-39

9 140 405 MB-5 20...100 ±0.02 2/1 10

20 ... 150

¹⁾ For temperature applications at or near ambient: 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)

±0.03

2/1

15

0.35

0.12

🖅 info@julabo.de

Option

Integr.

²⁾ ED, EH combinations: At voltage 230V/50Hz / 115V/60Hz MB combination: At voltage 230V/50-60Hz / 115V/60Hz

39

4.5

54 x 34 x 52

17 x 33 x 36

🏠 Hotline +49 7823 51190

36 x 30 / 30

ATC³

Option

RS 232

15 x 15 / 15 Integr.

19.0

S1

7.0

The 'TopTech' Series for working temperatures to +200 °C

- · External temperature control application to closed systems
- · Simultaneous operation in the circulator bath
- · Electronically adjustable pump capacity 'Smart Pump'
- · Built-in cooling coil
- Optional use of the MVS controller and solenoid valve (see pages 33 & 34) requires only low tap water consumption
- · Warning and safety installations such as early detection system in case of fluid losses or if the setpoint temperature is exceeded
- RS232 interface

There are 4 'MC' model combinations with differing filling volumes, bath openings and bath depths.

Additional benefits of the 'ME' circulators:

- · External measurement and control with ext. Pt100 sensor
- VFD COMFORT-DISPLAY
- Temperature and time-dependent processes with integrated programmer
- Automatic control of exothermic reactions using tap water cooling (see pages 33 & 34 for details)

Accessories (see pages 32 & 33)

- External Pt100 sensor
- · Bath lid with special cooling coil
- MVS controller and solenoid valve

Applications

for circulators on pages 16 to 19

External temperature control applications for Refractometers
 Polarimeters

Photometers
 Rotary viscometers



Heating Circulators

at low liquid level

With early warning system

Thermal H	Bath fluid: Water
AC-6 AC-6 MC-12 ME-12 MC-26 ME-26	br 05 04 04 04 05 05 05 05 05 05 05 05 05 05
60 90 min.	0 5 10 15 201/min. Flow rate

JULABO Order No.	JULABO Model	Working temp. range °C ¹⁾	Temp. stab. °C	Heat. cap. kW ²⁾	Pump ca Flow rat I/min.	apacity e/Pressure bar	Cooling coil	Bath opening/ bath depth W x L / D cm	Filling volume liters	Dimensions W x L x H cm	Weight kg
Technical fe a (see fold-out	atures page)			BE		PID 2	ATC ³	SMART PUMP			S 3
9 150 504	MC-4	20 200	±0.01	2/1	11-16	0.23-0.45	Integrated	13 x 15 / 15	4.5	21 x 42 x 38	9.6
9 150 506	MC-6	20 200	±0.01	2/1	11-16	0.23-0.45	Integrated	13 x 15 / 20	6	21 x 43 x 42	12.5
9 150 512	MC-12	20 200	±0.01	2/1	11-16	0.23-0.45	Integrated	22 x 15 / 20	12	30 x 43 x 45	13.0

0.23-0.45 Integrated

22 x 30 / 20

MC-6

0

ME-4

Julaba

Technical features: The red framed icons signify the differences to the 'MC' model

20 ... 200

	88			PI.	D 3	TC ³ SMART	Pt100	R5232			S 3
9 160 504	ME-4	20 200	±0.01	2/1	11-16	0.23-0.45	Integrated	13 x 15 / 15	4.5	21 x 42 x 38	9.6
9 160 506	ME-6	20 200	±0.01	2/1	11-16	0.23-0.45	Integrated	13 x 15 / 20	6	21 x 43 x 42	12.5
9 160 512	ME-12	20 200	±0.01	2/1	11-16	0.23-0.45	Integrated	22 x 15 / 20	12	30 x 43 x 45	13.0
9 160 526	ME-26	20 200	±0.01	2/1	11-16	0.23-0.45	Integrated	22 x 30 / 20	26	36 x 61 x 45	26.0

¹⁾ For temperature applications at or near ambient: counter-cooling with tap water via built-in cooling coil. Included with each unit: 2 each barbed fittings for tubing 8 and 10 mm inner dia. (pump connections M10x1 female)

±0.01 2/1 11-16

2) At voltage 230V/50-60Hz / 115V/60Hz

36 x 61 x 45

26.0

26

Julabo

MORE SPACE:

Pump connections on the rear

Pt100 sensor

(accessory)

External

with immersion-height adjustable platform

Pump capacities

Bath fluid: Water

The 'HighTech' Series

for working temperatures to +300 °C

- External temperature control application to closed or open systems
- · Highest precision and display resolution
- VFD COMFORT-DISPLAY for SIMULTANEOUS indication of 3 temperature values
- · Powerful pressure and suction pump with electronically adjustable pump capacity 'Smart Pump'
- · Adjustment of pump capacity for varying viscosity levels of bath fluids
- Built-in cooling coil
- Programmer (1 x 10 program steps)
- · Automatic control of exothermic reactions using tap water
- Professional PC connection bus capability

Additional features of the top-of-the-line 'HL' circulators:

- Backlit LCD DIALOG-DISPLAY offers interactive operation in easy-to-read text
- Integrated programmer (6 x 60 steps)
- RS232 / RS485 interface
- Switchable between °C / °F

Accessories (see pages 32 & 33)

- · Electronic module
- External Pt100 sensor
- · Bath lid with special cooling coil
- Solenoid valve

Applications

 External temperature application processes, particularly e.g. a distillation apparatus or a miniplant installation

JULABO	JULABO	Working	Temp.	Heat.	Pump capa	acity		Bath opening/	Filling	Dimensions	Weight
Order No.	Model	temp.	stab.	cap.	Flow rate	Pressure	Suction	Bath depth	volume	WxLxH	
		range °C 1)	°C	kW 2)	l/min.	bar	bar	W x L / D cm	liters	cm	kg

Julaba

3

SI -6

0

SL-26

Heat-up times (230 V)

Bath fluid: Thermal H

HE-4

Technical features: The red framed icons signify the differences to the 'ME' model (page 16)

	838 88 3000500 2000453			CC i	TCF A	ITC ³ SMAF	Pt100	RS232			S3
9 210 504	HE-4	20 250	±0.01	2/1	22-26	0.4-0.7	0.2-0.4	13 x 15 / 15	4.5	21 x 42 x 40	11
9 250 506	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	13.5
9 250 512	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	14
9 250 526	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	27

Technical features: The red framed icons signify the differences to the 'HE'/'SE' models

858888 8888888 8888888	Sarr, 1 Staturt Britter Hallor Ramma: Britter		CC 1	CF 4	ATC ³	IART IMP Pt1	00				S 3
9 310 504	HL-4	20 250	±0.01	2/1	22-26	0.4-0.7	0.2-0.4	13 x 15 / 15	4.5	21 x 42 x 40	11
9 350 506	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	13.5
9 350 512	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	14
9 350 526	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	27

¹⁾ For temperature applications at or near ambient: counter-cooling with tap water via built-in cooling coil. Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male)

🐑 www.julabo.de

9 150 526

MC-26



High Temperature Circulators

Working temperature

range:

Forte HT30-M1 Forte HT60-M2 HT60-M3

JULABO High Temperature Circulators have a compact, closed design and are ideally suited for wide working temperature ranges.

Benefits:

- Rapid heating according to diagram (A)
- High pump capacity, reducible via adapter (B)
- Small footprint
- Small filling volume
- · Cooling water connection for applications at particularly high temperatures (cooling zone in unit)
- Wide working temperature range without the requirement to changing bath fluids
- · Avoids oxidation and cracking of the bath fluid. This ensures a prolonged lifetime of the bath fluids recommended by JULABO (e.g. Thermal H350).
- · Can be easily integrated into a miniplant installation, for example



- · Time-saving filling process for the entire system
- with permanent air purge Expansion vessel (included as standard accessory)
- is used for filling process and serves as additional reservoir
- Automatic de-gas mode
- Integrated warning, safety and supervision functions via 7 sensors



'HT30' circulator

+70 °C ... +400 °C

No unpleasant

· Separate control unit: with MULTI-DISPLAY (LED), LCD DIALOG-DISPLAY, illuminated display for filling level. Keypad is splash-proof.

Accessories (see page 34)

Separate control unit 'M1'

222

Technical specifications (see fold-out page)

6 000	Sirp. 1: 75500°C Invite: 1: 1550 Invite: 1: 1576 Cartos: Inten		TCF ATC	Pt100 RS232 RS485	6 x 60	S3
JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability external °C	Temperature display/ resolution °C	Display for filling level	Heating capacity kW
9 800 031	HT30-M1	+70 +400	±0.01 ±0.1	LED + LCD / ±0.1	illuminated display	3
9 800 062	HT60-M2	+70 +400	±0.01 ±0.1	LED + LCD / ±0.1	illuminated display	7
9 800 063	HT60-M3	+70 +400	±0.01 ±0.1	LED + LCD / ±0.1	illuminated display	6
9 800 035	HT30-M1-C.U.	+40 +400	±0.01 ±0.1	LED + LCD / ±0.1	illuminated display	3
9 800 065	HT60-M2-C.U.	+40 +400	±0.01 ±0.1	LED + LCD / ±0.1	illuminated display	7
9 800 066	HT60-M3-C.U.	+40 +400	±0.01 ±0.1	LED + LCD / ±0.1	illuminated display	6

Tough • Powerful • Fast

Forte HT30-M1, HT60-M2, HT60-M3 with C.U. cooling unit

Using the optional C.U. cooling unit, the working temperature range can be further expanded downwards. Additionally a high cooling capacity is available if constant tap water cooling is carried out.

Benefits:

350 HT60-M2

- Temperature application from +40 °C with controlled tap water cooling
- · Rapid cooling to a low temperature value – see diagram ©
- Dynamic control characteristics: Automatic control of exothermic reactions in the connected system (D)

Heat-up times Pump capacities



Bath fluid: JULABO Thermal H350

Cooling cap. Pump capacity Filling IP class Weight incl. Power requirement Dimensions (water 20 °C) Flow rate Pressure vol. acc. to Circulator / Control unit control unit (WxLxH) cm V/Hz kW, max. l/min bar liters IEC529 kg 0.8 - 1.2 14 - 18 2 IP31 23 x 23 x 58 25 x 25 x 18 27 230~/50 or 230~/60 -14 - 18 0.8 - 1.2 2 IP31 23 x 23 x 58 25 x 25 x 18 29 3 x 400~/50 14 - 18 0.8 - 1.2 2 IP31 23 x 23 x 58 25 x 25 x 18 29 3 x 208~/60 -14 - 18 0.8 - 1.2 43 x 23 x 58 25 x 25 x 18 230~/50 or 230~/60 15 2 IP31 35 15 14 - 18 0.8 - 1.2 2 IP31 43 x 23 x 58 25 x 25 x 18 37 3 x 400~/50 15 14 - 18 0.8 - 1.2 2 IP31 43 x 23 x 58 25 x 25 x 18 37 3 x 208~/60

🖅 info@julabo.de

12 34 (5

D

HT30-M1-C U

10 15 20 min

Working temperature +40 °C ... +400 °C range:

Ambient temperatures up to +40 °C for all models!



Separate control unit 'M2'

'HT60' circulator with C.U. cooling unit

Separate control unit (rear view)

- ① Serial interface RS232 / RS485
- ② Analog input for external programming
- ③ Standby input for ext. emergency cut-off
- (4) Connector for external alarm device
- ⑤ Connector for control cable to HT circulator

Refrigerated/Heating Circulators

The 'Economy' Series

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

- · Temperature control applications to external systems
- Simultaneous operation in the circulator bath
- Low noise level



luid: Et 0	hanol) -20°C	Flow rate I/min.	e/Pressure bar	bath depth Wx L/ D cm	volume liters	W x L x H cm		
		Technica (see fold	al features -out page)		PI	D 1		
0.1	0.02	15	0.35	13 x 15 / 13	4.5	20 x 36 x 56	Γ	
0.2	0.06	15	0.35	12 x 14 / 14	4.5	23 x 42 x 61		
0.2	0.06	15	0.35	12 x 14 / 14	4.5	42 x 42 x 42	Τ	
0.32	0 14	15	0.35	24 x 30 / 15	20	38 x 58 x 62	T	

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

±0.03 2/1 0.26

±0.03

2/1 0.26

±0.03 2/1 0.45

-28 ... 100

-28 ... 100

-30 ... 100

Harmony of Ecology + Economy

F25-ED

F34-ED

Bath opening/ Filling Dimensions

Weight

kg

S1

22

30

30

41

1) At voltage 230V/50Hz / 115V/60Hz

F12/F25-ED: At voltage 230V/50Hz or 230V/60Hz / 115V/60Hz



Julabo

The 'Economy' Series

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

Benefits of the 'EH' model combinations: · Extended working temperature ranges · Suitable for use with flammable bath fluids · Classification III according to DIN 12876-1 · Refrigeration unit cut-off in case of a disturbance • Large model selection The F38-EH provides an extra large bath tank with large bath depth and is particularly suitable for temperature control applications for large volume objects which require temperature application in the bath. F12-EH F25-EH C1 Pump capacity Bath fluid: Water F32-EH F33-EH F38-EH Heat. Cooling capacity kW Pump capacity JULABO JULABO Working Temp. Bath opening/ Filling Dimensions Order No. Model temp. stab. cap. (Bath fluid: Ethanol) Flow rate/Pressure bath depth volume WxLxH °C kW 1) 20 0 -20°C I/min. bar WxL/Dcm liters range °C cm **Refrigerated/Heating Circulators Technical features** -(see fold-out page) 9 117 612 F12-EH 0.02 15 0.35 13 x 15 / 13 4.5 20 x 36 x 56 -20 ... 150 ±0.03 2/1 0.16 0.1 4.5 9 117 625 F25-EH -28 ... 150 ±0.03 2/1 0.26 0.2 0.06 15 0.35 12 x 14 / 14 23 x 42 x 61 9 117 632 F32-EH -35 ... 150 ±0.03 2/1 0.45 0.38 0.15 15 0.35 18 x 12 / 15 8 31 x 42 x 64 9 117 633 F33-EH -30 ... 150 ±0.03 2/1 0.5 0.32 0.12 15 0.35 23 x 14 / 20 16 36 x 46 x 69 24 x 30 / 15 9 117 634 F34-EH -30 ... 150 ±0.03 2/1 0.45 0.32 0.14 15 0.35 20 38 x 58 x 62 9 117 638 F38-EH -35... 80 ±0.05 2/1 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

1) At voltage 230V/50Hz / 115V/60Hz F12/F25-EH: At voltage 230V/50Hz or 230V/60Hz / 115V/60Hz

Weight

S3

22

30

36

43

41

67

21

kg

🖅 info@julabo.de

9 115 625

9 115 626

9 115 634

F25-ED

F26-ED

F34-ED

Refrigerated/Heating Circulators

Rapid cool-down time

even at +200 °C

The 'TopTech' Series

for working temperatures from -28 °C to +200 °C

The units of the 'TopTech' series are designed for more demanding applications. They provide increased functionality with menu functions, warning and safety functions, such as

• early detection system with audible signal

in case of fluid losses or if the setpoint temperature is exceeded.

All models with RS232 interface.



Hassle-free cleaning of condenser

- · Drain port easily accessible on the front
- Energy-saving proportional cooling control on 'FP' models (page 23)

Please note the technical benefits and differences for the 3 basic models MB. MC and ME.

Cool-down times (p.22+23) Pump capacities Bath fluid: Ethanol Bath fluid: Water ME, adjustable in stage



F26-ME

	JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW ¹⁾	Cooling (Bath 1 20	g capao fluid: Et 0	city kW hanol) -20°C	Pump ca Flow rate I/min.	ipacity e/Pressure bar	Bath opening/ bath depth W x L / D cm	Filling volume liters	Dimensions W x L x H cm	Weight kg
1	Refrigerat Circulator	ted/Heat rs	ing	Technica (see fold-	il featur •out paç	r es je) B	888) 		PID	2 ATC ³	³ RS232			S1
	9 140 612	F12-MB	-20 100	±0.02	2/1	0.16	0.1	0.02	10	0.12	13 x 15 / 13	4.5	20 x 36 x 56	22
	9 140 625	F25-MB	-28 100	±0.02	2/1	0.26	0.2	0.06	10	0.12	12 x 14 / 14	4.5	23 x 42 x 61	30
1 (Fechnical fea see fold-out 9 150 612 9 150 625	atures page) F12-MC F25-MC	-20 200 -28 200	±0.02 ±0.02	2/1 2/1	0.16 0.26	0.1	PID 0.02 0.06	2 ATC 11-16 11-16	3 SMART PUMP 0.23-0.45 0.23-0.45	RS 232 13 x 15 / 13 12 x 14 / 14	4.5	20 x 36 x 56 23 x 42 x 61	\$3 23 31
1	lechnical fea	atures: The r	red framed ic	ons signif	y the dif	ference	s to the	e 'MC' r	nodel					
				2030	PI	D3 /	ATC ³	PUM	P Pt10	0 RS 232	1×10			S 3
	9 160 625	F25-ME	-28 200	±0.01	2/1	0.26	0.2	0.06	11-16	0.23-0.45	12 x 14 / 14	4.5	23 x 42 x 61	31
	9 160 626	F26-ME	-28 200	±0.01	2/1	0.26	0.2	0.06	11-16	0.23-0.45	12 x 14 / 14	4.5	42 x 42 x 42	31

F25-ME

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

1) At voltage 230V/50Hz / 115V/60Hz F12/F25 combinations: At voltage 230V/50Hz or 230V/60Hz / 115V/60Hz external & internal temperature applications

Julabo

The 'TopTech' Series

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

The major benefit of these models is the increased cooling performance. Optionally available with the MC or ME basic circulator:

FP35-MC

This refrigerated/heating circulator is designed for

· external temperature applications requiring fast temperature changes (in combination with rheometers for example).

> Heat-up/Cool-down times Bath fluid: Thermal H

Benefits

· Small bath volume Rapid heating and cooling Also available as 'HighTech' circulator (page 25)

Heat-up times (p. 22-24) Cool-down times (p. 21-24) Pump capacities Bath fluid: Thermal H Bath fluid: Thermal H Bath fluid: Water





JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW ¹⁾	C (E 20	ooling Bath flu 0	i capa uid: E -20	acity k thanol -30 -4	W) 0°C	Pump Flow ra I/min.	capacity ate / Pressure bar	Bath opening/ bath depth WxL/D cm	Filling vol. liters	Dimensions W x L x H cm	Weight kg
Technical fe (see fold-out	atures page)			E	### 101		02	PID	2	4 TC ³	SMART PUMP	232	ł		S 3
9 150 632	F32-MC	-35 200	±0.02	2/1	0.45	0.39	0.15	0.05		11-16	0.23-0.45	18 x 12 / 15	8	31 x 42 x 64	37
9 150 633	F33-MC	-30 200	±0.02	2/1	0.5	0.32	0.12	0.03		11-16	0.23-0.45	23 x 14 / 20	16	36 x 46 x 69	44
9 150 634	F34-MC	-30 150	±0.02	2/1	0.45	0.32	0.14	0.03		11-16	0.23-0.45	24 x 30 / 15	20	38 x 58 x 62	42
9 150 618	FP35-MC	-35 150	±0.02	2/1	0.45	0.39	0.15	0.05		11-16	0.23-0.45	18 x 12/ 5	2.5	31 x 42 x 64	37
9 150 640	FP40-MC	-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	48
9 150 650	FP50-MC	-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	55
					ID 3	AT	C ³	SMAR PUM	7 P	Pt100	RS232		ł		S 3
9 160 632	F32-ME	-35 200	±0.01	2/1	0.45	0.39	0.15	0.05		11-16	0.23-0.45	18 x 12 / 15	8	31 x 42 x 64	37
9 160 633	F33-ME	-30 200	±0.01	2/1	0.5	0.32	0.12	0.03		11-16	0.23-0.45	23 x 14 / 20	16	36 x 46 x 69	44
9 160 634	F34-ME	-30 150	±0.01	2/1	0.45	0.32	0.14	0.03		11-16	0.23-0.45	24 x 30 / 15	20	38 x 58 x 62	42

±0.01 2/-- 0.68 0.5 0.32 0.17 0.04 11-16

-50 ... 200 ±0.01 2/-- 0.9 0.8 0.5 0.32 0.16 11-16

FP35-MC

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

-40 ... 200

1) At voltage 230V/50Hz / 115V/60Hz FP40, FP50 combinations: At voltage 230V/50Hz or 230V/60Hz

16

37 x 46 x 69

8 42 x 49 x 70

FP40-MF

FP50-ME

9 160 640

9 160 650

0.23-0.45 23 x 14 / 20

0.23-0.45 18 x 12 / 15

48

55

Refrigerated/Heating Circulators

With new pump

technology

The 'HighTech' Series

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

Benefits of the 'HE' refrigerated circulators:

- · Highest precision and display resolution VFD COMFORT-DISPLAY for SIMULTANEOUS indication of 3 temperature values
- 'ICC' self-optimizing control electronics
- RS232 interface
- Professional PC connection bus capability
- Integrated programmer (1 x 10 steps) with real time clock
- Powerful pressure and suction pump with electronically adjustable pump capacity
- · Adjustment of pump capacity for varying viscosity levels of bath fluids
- · Early detection system with audible signal in case of fluid losses or if the setpoint is exceeded

 Active Cooling Control throughout the entire temperature range

• Removable venting grid: Hassle-free cleaning of the condenser

- · Drain port easily accessible on the front
- · Energy-saving proportional cooling control on 'FP' models



Electronic module with analog connections for all models on pages 24 and 25 (accessory).

Cool-down times (p. 24-25) Pump capacities Bath fluid: Ethanol Bath fluid: Water





Heat-up and cool-down curves with bath fluid Thermal H - page 23!

JULABO	JULABO	Working	Temp.	Heat.	Cool	ing o	capad	city kW		Pump c	apacity		Bath opening/	Fill.	Dimensions	Weight
Order No.	Model	temp.	stab.	cap.	(Bat	h flui	id: Etł	nanol)		Flow rate	Press.	Suction	bath depth	vol.	WxLxH	
		range °C	°C	kW 1)	20	0	-20	-30 -40	D°C	l/min.	bar	bar	WxL/D cm	liters	cm	kg

Technical features: The red framed icons signify the differences to the 'ME' model

				ICC	7	CF	AT	;3 p	MAR PUM	F Pt1	00 RS	232	1x 10			S 3
9 210 625	F25-HE	-28 200	±0.01	2/1	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	32
9 210 632	F32-HE	-35 200	±0.01	2/1	0.45	0.38	0.15	0.06		22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	31 x 42 x 66	38
9 210 634	F34-HE	-30 150	±0.01	2/1	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	44
9 210 640	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	49
9 210 645	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	53
9 210 650	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	57

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

1) F25-HE: At voltage 230V/50Hz or 230V/60Hz / 115V/60Hz F32/F34-HE: At voltage 230V/50Hz / 115V/60Hz FP40/FP45/FP50-HE: At voltage 230V/50Hz or 230V/60Hz

The 'HighTech' Series

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

Additional features of the top-of-the-line 'HL' circulators compared to the 'HE' combinations are:

- Backlit LCD DIALOG-DISPLAY offers interactive operation in easy-to-read text
- Integrated programmer (6 x 60 program steps) with real time clock
- RS232 / RS485 interface
- Switchable between °C / °F

Applications

for the models on pages 24 & 25

- External temperature application processes particularly e.g. a distillation apparatus or a miniplant installation
- Jacketed reaction vessels
- Autoclaves
- Kilo labs

FP35-HL

Benefits

This refrigerated/heating circulator is designed for

· external temperature applications requiring fast temperature changes (in combination with rheometers for example).

· Small bath volume Rapid heating and cooling External Pt100 sensor (accessorv) Also available as 'TopTech' circulator (page 23)



F25-HL



Julabo

JULABO	JULABO	Working	Temp.	Heat.	Coo	ling (capad	city k\	N	Pump c	apacity		Bath opening/	Fill.	Dimensions	Weight
Order No.	Model	temp.	stab.	cap.	(Bat	h flu	id: Eth	nanol)	Flow rate	e Press.	Suction	bath depth	vol.	WxLxH	
		range °C	°C	kW 1)	20	0	-20	-30	-40°C	l/min.	bar	bar	WxL/D cm	liters	cm	kg

Technical features: The red framed icons signify the differences to the 'HE' model

FP35-

88888 seesson seesson	Sep. 1: 25.00 Jack to 25.00 Lowers: Low		ICC	TCF	A	TC ³	SMA PUN	RT IP	Pt10	D RS2 RS4	232 185	x 60\				S3
9 310 625	F25-HL	-28 200	±0.01	2/1	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	32
9 310 632	F32-HL	-35 200	±0.01	2/1	0.45	0.39	0.15	0.05		22-26	0.4-0.7	0.2-0.4	18 x 12 / 15	8	31 x 42 x 66	38
9 310 633	F33-HL	-30 200	±0.01	2/1	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	45
9 310 634	F34-HL	-30 150	±0.01	2/1	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	44
9 310 618	FP35-HL	-35 150	±0.01	2/1	0.45	0.39	0.15	0.05		22-26	0.4-0.7	0.2-0.4	18 x 12 / 5	2.5	31 x 42 x 66	38
9 310 640	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	49
9 310 645	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	53
9 310 650	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	57

∃ info@julabo.de

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

¹⁾ F25-HL: At voltage 230V/50Hz or 230V/60Hz / 115V/60Hz F32/F33/F34/FP35-HL: At voltage 230V/50Hz / 115V/60Hz FP40/FP45/FP50-HL: At voltage 230V/50Hz or 230V/60Hz

Cryo-Compact Circulators

Working temperatures from ...

The NEW 'CF' series offers YOU powerful performance with small overall dimensions to increase bench space for technical systems, or to free up valuable fume hood space.

The 'Economy' Series

Julob

- for routine applications -
- Working temperatures up to +150 °C with pressure pump
- Ergonomic design and convenient operation · Keypad with LED display,
- splash-proof and easy to clean
- RS232 interface



Rear view

① Pump connections ② RS232 interface

CF31 and CF41 additionally provide:

- ③ Connection for
- external Pt100 sensor ④ Option: Electronic module
 - (Order no. 8 900 100)

The 'HighTech' Series - the perfect solution for high demands -

Julaha

- Working temperatures up to +200 °C
- with pressure and suction pump and electronically adjustable pump capacity
- VFD COMFORT-DISPLAY, LCD DIALOG-DISPLAY Self-optimizing ICC temperature control
- RS232/RS485 interface
- Connection for external Pt100 sensor
- Integrated programmer and many other features
- (see icons) · Electronic module with analog connections
- (accessory)

Cryo-Compact Circulators include the latest technology from the JULABO

MICROPROCESSOR electronics with high

· Integration of the latest components for highly reliable refrigeration and pump

· Wetted parts made of high quality stainless steel or plastic

temperature stability, warning and safety

 External temperature application processes particularly e.g. a distillation apparatus or a

Temperature application to small objects,

Cool-down times

Bath fluid: Ethanol

Working

range °C

temp.

Temp.

stab. cap.

°C

sensors, etc. in the circulator bath

Accessories (see pages 31 to 33)

JULABO

Model

circulator program.

Benefits:

functions

performance

Applications

miniplant installation

Heat-up/Cool-down times

Bath fluid: Thermal H

JULABO

Order No.

Miniature design models

Ambient temperatures up to +40 °C

Julabo



The 'Economy' Series (see fold-out page)	PID 1 RS232 ①	S 3
9400330 CF30 -30150 ±0.03 2/1 0.32 0.25 0.15 15 0.35 16	6 x 3 / 14 3.5 24 x 46 x 40	32
9400340 CF40 -40150 ±0.03 2/1 0.47 0.4 0.28 0.12 15 0.35 19	9 x 3 / 19 5.5 28 x 46 x 46	41

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

kW¹⁾ 20

The 'HighTech' Series

	588 5568 1953	Serv. 1: 165,000 Inficie Martin Canter, Infilm		ICC	TC.	7	4 TC ³	SMAR PUM	P Pti	IOO RS	232 485	↓ x 60			S3
9 400 331	CF31	- 30 200	±0.02	2/1	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	33
9 400 341	CF41	- 40 200	±0.02	2/1	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	42

🖅 info@julabo.de

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

1) At voltage 230V/50Hz or 230V/60Hz / 115V/60Hz

Ultra-Low Refrigerated Circulators

FP51-SL

The 'HighTech' Series

for working temperatures from -60 °C to +150 °C

Benefits

- of the powerful ultra-low refrigerated circulators on pages 28 to 30:
- · Cooling capacities to 5.5 kW, heating capacity 3 kW and the electronically controlled pressure and suction pump with 1.1 bar pressure capacity



- Active Cooling Control throughout **4***C*(the entire temperature range
 - Removable venting grid: Hassle-free cleaning of the condenser Drain port easily accessible on the front

· Heated bath cover plate: Prevents ice build-up or condensation (except FP51-SL)

FP models: fan-air-cooling FPW models: for cooling water connection

The COMPACT FP51-SL has a bath opening of 18 x 12 cm (depth: 20 cm).

All other ultra-low models

- have an insulated filling port (70 mm dia.)
- are upgradable with supplementary heater and pump (page 30)
- also available with bath opening (page 30)

Pump capacities Cool-down times Bath fluid: Ethanol Bath fluid: Water EP80/EP\//80

Applications for models on pages 28 & 30 · Jacketed reaction vessels Autoclaves, miniplant installations Kilo labs Process development

JULAB0	JULAB0	Working	Temp.	Heat.	Pump	Cooling capacity kW	Fill.	Dimensions	Weight	Power
Order No.	Model	temp.	stab.	cap.	cap.	(Bath fluid: Ethanol)	vol.	WxLxH		requirement
		range °C	°C	kW		20 0 -20 -40 -60°C	liters	cm	kg	V / Hz

Ultra-Low Refrigerated Circulators

	8888 9019500 0019463	Sep. 1 SALETY BRACE SEARCY Paule Contract Intern		ICC	TCF	A	rC 3	SM PU	art MP	Pt1	00	RS 232 RS 485	6 x 60		🛃 🔀 📷 🛛 S3
NEW	9 350 751	FP51-SL	-47 200	±0.05	3		2.0	1.5	1.0	0.26		11	46 x 55 x 89	90	3 x 400~/50 or 3 x 230~/60
~~~	9 350 752N	FP52-SL	-60 100	±0.05	3	see	3.0	2.8	1.6	0.65	0.1	24	59 x 76 x 116	156	3 x 400~/50 or 3 x 230~/60
	9 350 753N	FPW52-SL	-60 100	±0.05	3	dia-	3.0	2.8	1.6	0.65	0.1	24	59 x 76 x 116	153	3 x 400~/50 or 3 x 230~/60
	9 350 755N	FP55-SL	-55 100	±0.05	3	gram	5.2	4.1	2.2	0.7	0.13	27	85 x 76 x 116	182	3 x 400~/50 or 3 x 230~/60
	9 350 756N	FPW55-SL	-60 100	±0.05	3		5.5	4.1	2.2	1.0	0.13	27	59 x 76 x 116	163	3 x 400~/50 or 3 x 230~/60

## Ultra-Low Refrigerated Circulators, with expanded working temperature ranges

					-						-			
9 350 752N150	FP52-SL	-60 150	±0.05	3	600	3.0	2.8	1.6	0.65	0.1	24	59 x 76 x 116	156	3 x 400~/50 or 3 x 230~/60
9 350 753N150	FPW52-SL	-60 150	±0.05	3	dia-	3.0	2.8	1.6	0.65	0.1	24	59 x 76 x 116	153	3 x 400~/50 or 3 x 230~/60
9 350 755N150	FP55-SL	-55 150	±0.05	3	gram	5.2	4.1	2.2	0.7	0.13	27	85 x 76 x 116	182	3 x 400~/50 or 3 x 230~/60
9 350 756N150	FPW55-SL	-60 150	±0.05	3	-	5.5	4.1	2.2	1.0	0.13	27	59 x 76 x 116	163	3 x 400~/50 or 3 x 230~/60

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 G³/4" male with barbed fittings for tubing 1/2" inner dia.

FPW55-SL

# COMPACT Ultra-Low Refrigerated Circulators

## The 'TopTech' Series/ The 'HighTech' Series

for working temperatures from -88 °C to +100 °C

## Benefits

ACC

 Small dimensions Two-stage cascaded technology • Bath opening: 13 x 15 cm (depth: 16 cm) except F70-ME (12 x 12 cm / depth: 13 cm) · Active Cooling Control throughout the entire temperature range · Removable venting grid: Hassle-free cleaning of the condenser Drain port easily accessible on the front · Heated bath cover plate: Prevents ice build-up or condensation F81-ME The units are suitable for various internal and external temperature applications: FP88-HL • with pressure pump to 0.45 bar ('TopTech' Series) with pressure and suction pump to 1.1 bar ('HighTech' Series) The pump pressure is electronically adjustable in stages. **Cool-down times Pump capacities** Bath fluid: Ethanol Bath fluid: Water



- Freezing point determination
- Calibration at low temperatures
- Petroleum testing Cell cultivation at low temperatures
- Working **JULABO JULABO** Temp. Heat. Pump Cooling capacity kW Fill. Dimensions Weight Power vol. WxLxH Order No. Model stab. cap. capacity (Bath fluid: Ethanol) requirement temp °C kŴ 20 0 -20 -40 -60 -80°C liters cm

### The 'TopTech' Series

Te fe	chnical atures		8		PI	<b>D</b> 3	TC ³ SMART PUMP	Pt100	RS 232			<b>53</b>
1	9 160 670	F70-ME	-70 100	±0.02	1.3		0.34 0.22 0.17 0	).13 0.07	4.5	42 x 54 x 71	63	230/50 or 230/60
1	9 160 681	F81-ME	-81 100	±0.02	1.3	See diagram	0.45 0.38 0.36 0	).32 0.27	0.07 6.5	50 x 58 x 88	86	230/50 or 230/60
1	9 160 683	F83-ME	-83 50	±0.02	1.3	ulagrafii	0.9 0.78 0.72	0.6 0.38	0.12 8	55 x 61 x 90	116	230/50 or 230/60
1	9 160 688	FP88-ME	-88 100	±0.02	1.3		1.1 0.96 0.92 0	0.73 0.59	0.15 8	55 x 61 x 90	119	230/50 or 230/60

#### The 'HighTech' Series

	See. & SLADY Befer: SELARY Plane: SAS Covers: System		ICC	TCF	ATC ³	SMART PUMP	Pt100	<b>RS23</b> <b>RS48</b>	5	6 x 60\				*	<b>S</b> 3
9 310 681	F81-HL	-81 100	±0.02	1.3	see	0.45 0.38	0.36 0.3	2 0.27	0.07	6.5	50 x 58 x	89	88	230/50 or 230/60	
9 310 683	F83-HL	-83 50	±0.02	1.3	diagram	0.9 0.78	0.72 0.	6 0.38	0.12	8	55 x 60 x	92	118	230/50 or 230/60	
9 310 688	FP88-HL	-88 100	±0.02	1.3		1.1 0.96	0.92 0.7	3 0.59	0.15	8	55 x 60 x	92	121	230/50 or 230/60	

∃ info@julabo.de

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

range °C

A real PLUS:

ME, adjustable in stages

V/Hz

heated bath cover plates

## **Ultra-Low Refrigerated Circulators**

## The 'HighTech' Series

for working temperatures from -95 °C to +150 °C

The powerful two-stage ultra-low refrigerated circulators additionally provide:

 High cooling capacities at low temperatures · Wide working temperature ranges (benefits and pump capacities: page 28).

#### Upgradable:

Ultra-low units on pages 28 and 30 are upgradable (except F95-SL and FW95-SL):

> () HST booster heater (6 kW) (order no. 8 810 011 or 8 810 012) = Total: 9 kW

The electronic module (page 32) (order no. 8 900 100) is required for control of the HST booster heater!

③ HSP booster pump max. 3 bar- 30 l/min. (except for FP51-SL) (reduces cooling capacity by 0.4 kW) (order no. 8 810 015)

#### **Option: Bath opening**



All models to +100 °C on pages 28 and 30 (except FP51-SL/F(W)95-SL) are available with a bath opening of 28 x 23 cm (depth: 22 cm) (order no. without 'N')

Cool-down times Bath fluid: Thermal H5S

FPW91-SL

-40 10







**ULTRA-LOW** 

and powerful!

JULABO JULABO Working Temp. Cooling capacity kW Fill. Dimensions Weight Power Heat. Order No. vol. WxLxH Model stab. cap. (Bath fluid: Ethanol) requirement temp range °C °C kW 20 0 -20 -40 -60 -80°C liters cm V/Hz ka

### Ultra-Low Refrigerated Circulators

9 350 790 N	FP90-SL	-90 100	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22	59 x 76 x 116	191	3 x 400~/50 or 3 x 230~/60
9 350 791 N	FPW90-SL	-90 100	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22	59 x 76 x 116	188	3 x 400~/50 or 3 x 230~/60
9 350 793 N	FPW91-SL	-91 100	±0.2	3	5.2	4.7	4.0	3.5	2.3	0.8	22	85 x 76 x 116	296	3 x 400~/50 or 3 x 230~/60
9 350 795 N	F95-SL	-95 0	±0.05	3		2.0	1.9	1.65	1.2	0.36	22	59 x 76 x 116	201	3 x 400~/50 or 3 x 230~/60
9 350 796 N	FW95-SL	-95 0	±0.05	3		2.0	1.9	1.65	1.2	0.36	22	59 x 76 x 116	198	3 x 400~/50 or 3 x 230~/60

## Ultra-Low Refrigerated Circulators, with expanded working temperature ranges

9 350 790N150	FP90-SL	-90 150	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22	59 x 76 x 116	191	3 x 400~/50 or 3 x 230~/60
9 350 791N150	FPW90-SL	-90 150	±0.05	3	1.8	1.7	1.6	1.35	0.75	0.15	22	59 x 76 x 116	188	3 x 400~/50 or 3 x 230~/60

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 G3/4" male with barbed fittings for tubing 1/2" inner dia.

# Accessories • Applications • Peripherals Julaba

Order No.	Description	Qty.	Suitable for working temperature range	Flash point	Fire point	Color
Bath flui	ds					
8 940 124	Thermal G	10	-30 + 80°C			light yellow
8 940 125	Thermal G	51	-30 + 80°C			light yellow
8 940 100	Thermal M	10	+40 +170°C	>+280°C	>+305°C	clear
8 940 101	Thermal M	51	+40 +170°C	>+280°C	>+305°C	clear
8 940 102	Thermal H	10	+20 +250°C	>+270°C	>+360°C	light brown
8 940 103	Thermal H	51	+20 +250°C	>+270°C	>+360°C	light brown
8 940 104	Thermal HY	10	-80 + 55°C	> +75°C	> +80°C	clear
8 940 105	Thermal HY	51	-80 + 55°C	> +75°C	> +80°C	clear
8 940 106	Thermal H5S	10	-50 +105°C	>+110°C	>+130°C	light brown
8 940 107	Thermal H5S	51	-50 +105°C	>+110°C	>+130°C	light brown
8 940 114	Thermal H10S	10	-20 +180°C	>+175°C	>+210°C	light brown
8 940 115	Thermal H10S	51	-20 +180°C	>+175°C	>+210°C	light brown
8 940 108	Thermal H20S	10	0 +220°C	>+230°C	>+270°C	light brown
8 940 109	Thermal H20S	51	0 +220°C	>+230°C	>+270°C	light brown
8 940 116	Thermal H250	10	+60 +200°C	>+225°C	>+250°C	clear
8 940 117	Thermal H250	51	+60 +200°C	>+225°C	>+250°C	clear



8 940 110	Thermal H350	10 I	+50 +350°C	>+200°C	>+230°C	light brown
8 940 111	Thermal H350	5 I	+50 +350°C	>+200°C	>+230°C	light brown

Order No.	Description	Suitable for
<b>Water ba</b> To prevent c	ath protective media ontamination and formation of algae.	

8 940 006	6 bottles 'Aqua Stabil', 100 ml each	Open heating bath/heating circulators,
8 940 012	12 bottles 'Aqua Stabil', 100 ml each	water baths, shaking water baths

## Heating Immersion Circulators (pages 10 and 11)

	External temperature application						
8 970 020	Stand rod (for attachment to a laboratory stand)	ED, EH, MB, MC, ME					
or combination with any bath tank. For attachment either use a bath clamp or a stand rod.							

8 970 140	Pump set		ED, EH, MB, MG, ME
	Counter-cooling with tap water		
8 970 105	Installation cooling coil (for tap water co	oling)	ED, EH, MB, MC, ME
	Tubing	see	ED, EH, MB, MC, ME
	External Pt100 sensors	nage 32	MF

#### Large selection of bath tanks

Stainless s to +150 °C	steel bath tanks	Inner / Outero WxL/Dcm	limensions W x L / H cm			
9 902 405	Bath tank 5	33 x 15 / 15	38 x 19 / 18	I		
9 902 413	Bath tank 13	33 x 30 / 15	38 x 33 / 18			
9 902 417	Bath tank 17	33 x 30 / 20	38 x 33 / 23	ED, EH, MB, MC, ME		
9 902 419	Bath tank 19	50 x 30 / 15	56 x 33 / 18			
9 902 427	Bath tank 27	50 x 30 / 20	56 x 33 / 23	ED, EH, MC, ME		
9 902 433	Bath tank 33	83 x 30 / 15	90 x 33 / 20	ED, EH, MC, ME		
9 902 439	Bath tank 39	50 x 30 / 30	54 x 33 / 35	ED, EH, MC, ME		
<b>Plexiglas</b> ®	bath tanks to +60 °C	Inner / Outer dimensions				
9 900 305	Bath tank 5A	39 x 12 / 15	41 x 15 / 17	ED, MB		
9 900 307	Bath tank 7A	49 x 12 / 15	51 x 14 / 17	ED, MB		
9 900 313	Bath tank 13A	32 x 30 / 15	41 x 33 / 17	ED, MB, MC		
9 900 319	Bath tank 19A	47 x 30 / 15	55 x 33 / 17	ED, MB, MC		
Makrolon	° bath tanks to +100 °C	Inner / Outer o	limensions			
9 900 505	Bath tank 5M	39 x 12 / 15	41 x 15 / 18	ED, MB		
9 900 513	Bath tank 13M	32 x 30 / 15	41 x 33 / 18	ED		
9 900 519	Bath tank 19M	47 x 30 / 15	55 x 33 / 18	ED		



Bath fluid



Water bath protective media



Pump set, with the bath attachment clamp removed



Stainless steel bath tanks



Plexiglas[®]/Makrolon[®] bath tanks

n www.julabo.de

JULABO offers the perfect accessory for the unit YOU selected:

Installation cooling coil / Water bath protective media

for 90 microliter tubes 11/12 mm dia. steel to 150 °C

042 for 36 test tubes, 40 x 10/11 mm dia.

046 for 30 test tubes, 50 x 12/13 mm dia.

062 for 20 test tubes, 160 x 17 mm dia.

056 for 6 Falcon tubes, 50 ml

for 60 tubes, 16/17 mm dia.

for 90 tubes, 12/13 mm dia.

for 50 tubes, 16/17 mm dia.

for 90 tubes, 12/13 mm dia.

for 28 tubes, 16/17 mm dia.

for 38 tubes, 12/13 mm dia.

Immersion-height adjustable platform

Immersion-height adjustable platform

for 21 tubes, 30 mm dia.

Castor platform

8 970 255 Lift-up bath cover

8 970 256 Lift-up bath cover

8 970 257 Lift-up bath cover

Installation cooling coil

Flat stainless steel bath cover

Flat stainless steel bath cover

8 970 290 Flat stainless steel bath cover

8 970 292 Flat stainless steel bath cover

Open Heating Bath, Heating, Refrigerated/Heating Circulators (pages 12 to 30)

Test tube racks / Immersion-height adjustable platforms / Castor platform /

made of Poly-

made of stainless

steel to 150 °C

Suitable for

Bath tanks: 5A / 5M

Max. qty.: 1

Bath tanks: 13, 17

Bath tanks 13, 17

Bath tanks 19, 27 Bath tank 33

Bath tanks 19, 27

Bath tank 39 Bath tanks 13, 17

Bath tank 33

FP40, FP50

ED, EH, MB

Max. qty.: 2

7A

3

3 6

Bath tanks: 13/13A/13M/17 19/19A/19M/27 33

Bath tanks: 13/13A/13M/17 19/19A/19M/27 33

Max. qty.: 1 3

Bath tank: 5 and F12, F25, F26

Bath tanks: 19, 27, F34, FP45

Immers. depth Insert capacity

55 mm

30 mm

100 mm

95 mm

80 mm

80 mm

65 mm

30 mm

90 mm

65 mm Max. qty.: 1

60 °C 45 mm

to

propylene® to 80 °C 65 mm

made of stainless 80 mm

Order No. Description

8 960 002

8 960 003

8 960 010

8 970 503

8 910 040

8 970 180

8 970 263

8 970 291

Test tube racks, made of Plexiglas®

8 960 000 030 for 20 test tubes, 100 x 17 mm dia.



Polypropylene® test tube rack with stainless steel frame



Immersion-height adjustable platform



Lift-up bath cover



External Pt100 sensor/

M+R inline Pt100 sensor

External Pt100 sensors								
8 981 003	200 x 6 mm dia., stainless steel, 1.5 m cable							
8 981 005	200 x 6 mm dia., glass, 1.5 m cable							
8 981 006	20 x 2 mm dia., stainless steel, 1.5 m cable							
8 981 010	300 x 6 mm dia., stainless steel, 1.5 m cable							
8 981 013	600 x 6 mm dia., stainless steel/Teflon coated, 3 m cable	ME HE HI SE SI						
8 981 014	1200 x 6 mm dia., stainless steel/Teflon coated, 3 m cable	ME, ME, ME, 0E, 0E						
8 981 020	M + R in-line Pt100 sensor (including 2 fittings M16x1 male)							
8 981 103	3.5 m Extension cable for Pt100 sensor							
8 981 030	TCCB Thermo-Couple Converter Box							

#### Automation

In addition to the digital interfaces, an electronic module with analog connections can be retrofitted to all circulators of the 'HighTech' series. This module provides one input and two outputs for external programming, flow sensor or temperature recorder. Inputs/outputs are scalable (current or voltage). A standby input and an alarm output are also implemented.

8 900 100	Electronic module with analog connections	HE, HL, SE, SL, CF31, CF41
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, MC, ME, HE, HL, SE, SL
8 930 010	1 m CR® tubing, 10 mm inner dia. (-20 +120 °C)	ED, EH, MB, MC, 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)	MC, ME, HE, HL, SE, SL,
8 930 110	1 m Viton® tubing, 10 mm inner dia. (-50 +200 °C)	EH, MC, 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
8 930 412	1 m Insulation for tubing 12 mm inner dia.	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

# Accessories • Applications • Peripherals Julabo

0 I N	B 14		0 % 11 7	
Urder No.	Description		Suitable for	
Metal tu	bing, flexible, triple i	nsulated, -100 +350 °C		
8 930 209 8 930 210	0.5 m Metal tubing			
3 930 211	1.5 m Metal tubing	2 fittings M16x1 female	HE, HL, SE, SL	NO STATE
8 930 214	3 m Metal tubing			
Metal tu	bing, flexible, insulat	ed, -50 +200 °C		
8 930 220	0.5 m Metal tubing			Metal tubing triple insulated
8 930 221 8 930 222	1 m Metal tubing 1.5 m Metal tubing	2 fittings M16x1 female	HE, HL, SE, SL	motal tability, triple motalated
930 223	3 m Metal tubing			
970 443	Adapter M16v1 male to M1	l6v1 male	Connecting metal tubing	
3 970 444 3 970 444	Adapter for metal tubing N	110x1 male to M16x1 male	EH, MC, ME	
8 970 750 970 751	Icing protection sleeve for	pump connectors	SL, ultra-low circulators	
5 5/0 / 51				
Prevent	ice formation at low	temperatures (see page 35):		
8 970 700 8 970 702	Condensation trap with bat	h lid h lid	FP50, FP51 F81 F83 FP88	
8 970 705	Insulated filling nozzle with	condensation trap	FP(W)52/55/90/91/95	
i nniloo	installations / Rooste	er heaters / Rooster numn	,	Insulated filling nozzle
9 790 000	MVS solenoid valve contro	oller for tan water cooling	MR MC ME HE SE	with contrensation trap
8 980 700	Solenoid valve for tap wat	ter cooling (for tubing 8 mm inner dia.)	MB, MC, ME, HE, SE	
8 980 703	Solenoid valve for tap wat	ter cooling (for tubing 8 mm inner dia.)		
8 970 240 8 970 242	Bath lid with special coolir	ig coil	ME-12, SE-12, SL-12	
8 970 243	Bath lid with special coolir	ng coil	F32, FP50	
8 810 010 8 810 011	HST booster heater 4 kW		SL-12, FP40-HL, FP45-HL, FP50-HL FP51-SL	
8 810 012	HST booster heater 6 kW		FP52, FPW52, FP55, FPW55	
8 810 015	HSP booster pump 30 l/mi	n 3 bar max.	FP90, FPW90, FPW91	
Connect	ors / Valves / Adapters	s, etc.		MVS controller.
970 410	D + S level-adapter (to main	tain constant fluid level in ext. bath)	HE, HL, SE, SL	solenoid valve
8 970 456 8 970 457	Shut-off valve for loop circl	uit (max. +90 °C), M16x1 uit (max. +200 °C), M16x1	HE, HL, SE, SL HE, HL, SE, SL	
8 980 701	Solenoid valve set for loop	circuit (max. +100 °C), M16x1	HL, SL	
8 970 452 8 970 450	Drain tap (max. +150 °C) Drain tap (max. +200 °C)		Bath tanks 4, 6, 12, 26, F30-C, F31-C Bath tanks 4, 6, 12, 26, F30-C, F31-C	
8 970 470	T-connection with barbed f	fittings	Tubing 8 mm inner dia.	
8 970 472	T-connection with barbed f	fittings	Tubing 10 mm inner dia.	
8 970 471 8 970 473	T-connection M16x1 female	e to 2 x M16x1 male	HE, HL, SE, SL	
8 970 445	2 Barbed fittings for tubing	12 mm inner dia.	HE, HL, SE, SL	
8 970 447 8 970 446	2 Barbed fittings for tubing 2 Barbed fittings for tubing	10 mm inner dia. 8 mm inner dia	HE, HL, SE, SL HE HI SE SI	
8 970 460	2 Barbed fittings for tubing	8 mm inner dia., M10x1	ED, EH, MB, MC, ME	Bath lid with
8 970 468 9 970 400	2 Barbed fittings for tubing	12 mm inner dia., M10x1	ED, EH, MB, MC, ME	special cooling coll
8 970 490 8 970 492	1 Collar nut M10x1 male		ED, EH, MB, MC, ME	<u>d</u> a
8 970 442	2 Elbow fittings 90°, M16x1	female/male		de
8 890 004 8 890 005	2 Adapters M16x1 female t 2 Adapters M16x1 female t	o NPT 1/4" male o NPT 1/4" female		
8 890 006	2 Adapters M16x1 female t	o NPT ³ /8" male		
8 890 007 8 890 008	2 Adapters M16x1 female t 2 Adapters M16x1 female t	o NPT 3/8" female o NPT 1/2" male		
8 890 009	2 Adapters M16x1 female t	o NPT 1/2" female		
8 890 010	2 Adapters M16x1 male to	NPT 1/4" female	HE, HL, SE, SL	
8 891 008	1 Adapter M16x1 male to B	SP 3/4" female		D+S level-adapter
8 890 011	2 Adapters M16x1 female t	o tube 1/4" male		Sie leter adaptor
8 890 012 8 890 013	2 Adapters M16x1 female t 2 Adapters M16x1 female t	o tube ³ /8" male o tube ¹ /2" male		
8 890 024	2 Adapters M16x1 female t	o M16x1 female		
<b>7</b> 40	otline ±49 7823 51190	≢⊒ info@iula	uho de 🖉 wu	ww.iulaho.de

32

Electronic module

# Accessories • Applications • Peripherals



Manufacturer's **Calibration** Certificate

8



C.U. cooling unit



M+R in-line Pt100 sensor



Circulator, ext. sensor, special
cooling coil, solenoid valve



ME circulator, MVS controller and solenoid valve

Order No.	Description	Suitable for
Manufactu 8 902 901 8 902 903 8 902 905	rer's Calibration Certificates 1-point calibration certificate 3-point calibration certificate 5-point calibration certificate	JULABO circulators

## High Temperature Circulators (pages 18 & 19)

790 100 970 802 970 811 970 435 980 125 980 704	C.U. cooling unit Adapter for pressure reduction (0.8 bar) Level indicator (with sight glass) Handle 5 m Extension cable (for separate control unit to HT circulator) Solenoid valve for controlled tap water cooling	HT30-M1 HT60-M2 HT60-M3
	with 2 m tubing 8 mm inner dia.	



are suitable for a variety of applications.

A selection of application examples are listed here.

The ME circulators and all models of the 'HighTech' series provide a connection for an external Pt100 sensor (available in lengths of 20 to 1200 mm, made of stainless steel, glass or Teflon-coated stainless steel). The illustration shows an M+R in-line Pt100 sensor (order no. 8 981 020) installed in the return line of the loop circuit to ensure precise constant temperature control. The circulator

Controlled exothermic reactions

The illustration shows the temperature application to an external jacketed glass vessel in combination with an HL-4. The automatic solenoid valve controller implemented in the HL and SL models instantly compensates a sudden increase of the actual temperature in combination with 8 981 003 External Pt100 sensor

- 8 970 240 Bath lid with special cooling coil
- 8 980 703 Solenoid valve for tap water cooling

For use with the models ME, HE and SE are additionally required: 9 790 000 MVS solenoid valve controller

External temperature application, measurement and control

permanently indicates the actual external temperature on the display.

8 980 700 Solenoid valve for tap water cooling (instead of 8 980 703)

## Economic cooling water consumption

Heating circulators provide a built-in cooling coil to perform counter-cooling with tap water for applications at or near ambient temperature.

To ensure controlled tap water usage for use with the models MB, MC, ME, HE and SE, we recommend the following:

9 790 000 MVS solenoid valve controller 8 980 700 Solenoid valve for tap water cooling

The heating circulators HL and SL of the 'HighTech' series already provide an automatic solenoid valve controller. So only the

8 980 703 Solenoid valve for tap water cooling

is required for direct plug-in to the 'Stakei' connection.

Accessories • Applications • Peripherals

## External temperature application to large or various other objects

To accomplish these tasks, the use of the powerful ultra-low circulators of the 'HighTech' series with a heater capacity of 3 kW and a maximum pump pressure of 1.1 bar is recommended. The capacity can be increased with the following:

8 810 012 HST booster heater 6 kW

8810015 HSP booster pump 30 l/min. – 3 bar max.

When using the HST booster heater, the electronic module with analog connections (order no. 8 900 100) is required.



FP90-SL with 3 objets requiring temp. application

## **Condensation traps**

When humidity comes into contact with the bath fluid at ultra-low temperatures, ice crystals may occur. This has a negative impact on the efficiency of the refrigerated unit and therefore the lowest achievable temperature.

Condensation traps are the perfect solution: They are especially integrated into the filling port or bath opening of the relevant models. Humidity is trapped in the immersed cube and separated from the bath fluid. Remove the trapped ice from time to time in order to maintain full performance.



Condensation trap immersed in the filling port

## **Recirculating coolers** (pages 47 to 52) Professional cooling of rotary evaporators

Today precious tap water is still often used for cooling purposes. Negative environmental and other aspects are:

- · Low efficiency no control of characteristic temperature
- High cost for water and waste water
- · Danger to personnel and environment caused by solvents

#### Benefits of using JULABO recirculating coolers:

- High condensation efficiency
- Adjustable working temperature, e.g. +10 °C or -10 °C
- Constant pump performance
- · Waste water does not contain hazardous substances
- If a powerful recirculating cooler is used, multiple external systems (e.g. rotary evaporators) can be connected.

## Flow-through cooler and immersion coolers (page 36)

These units are employed for counter-cooling in combination with heating circulators. This allows for sub ambient temperature applications.

#### Advantages:

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

Immersion coolers are also recommended for rapidly cooling fluids to low temperatures or as a dry-ice substitute.



FL300 recirculating cooler with rotary evaporator

FD200 flow-through cooler and circulator

∃ info@julabo.de

FT200 immersion cooler e.g. used to cool an MB-13

## Immersion / Flow-Through Coolers Julabo

## Immersion Coolers

#### Benefits and applications:

- Save precious tap water!
- MORE efficient cooling
- REDUCED energy consumption
- · Rapid cooling of liquids down to low temperatures, e.g. in a Dewar vessel Dry-ice substitution
- For counter-cooling in combination with heating circulators
- · Immersion probe made of high quality stainless steel

#### **Immersion Coolers** with temperature control and display FT402 and FT902 provide a keypad and water-protected mains switch (patented). They are supplied with a Pt100 sensor, stainless steel, 200 x 6 mm dia.

Optional sensors available:

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

## Flow-Through Cooler

The FD200 is used for example, for cooling a loop circuit of a closed system. The cooler needs to be connected in the return line of a heating circulator. ED 200

FT200 FT400 **Bright LED temperature** display & keypad Juintoo FT902 FT402

		JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Temp.display/ resolution °C	+20	Cooli +10	ng cap kW -20	acity -40	-80°C	Immersion probe/ flexible probe (L x dia.) cm	Connection tube (L) cm	Dimensions W x L x H cm	Weight kg
--	--	---------------------	-----------------	------------------------------	----------------------	-----------------------------------	-----	--------------	---------------------	--------------	-------	-----------------------------------------------------	------------------------------	-------------------------------	--------------

## **Immersion Coolers**

9 650 820	FT200	-2030	 	0.25	0.2	0.04			9 x 4	120	18 x 27 x 39	18
9 650 840	FT400	-4030	 	0.45 0	).36	0.14	0.03		12 x 5	120	20 x 30 x 43	24
9 650 890	FT900	-9030	 	0.27 0	).27	0.24	0.2	0.07	65 x 1.5 flexible	160	38 x 55 x 60	50

9 650 842	FT402	-4030	±0.5	LED/0.1	0.45 0.36	0.14	0.03	12 x 5	120	20 x 30 x 43	24
9 650 892	FT902	-9030	±1	LED/0.1	0.27 0.27	0.24	0.2 0.07	65 x 1.5 flexible	160	38 x 55 x 60	50

Included with each unit: Pt100 sensor 200 x 6 mm dia.

## Accessories

8 970 400 Clamp for cooler probe for open baths (FT200, FT400, FT402)

## Flow-Through Cooler

9 655 825	FD200	1030	 	0.22 0.18	 	 	 18 x 27 x 39	16

Included with FD200: 2 each barbed fittings for tubing 8 and 12 mm inner dia. For details on tubing/tubing insulation please refer to page 32.

Voltage: All models available in 230V/50Hz or 115V/60Hz

# Visco Baths

## Visco Baths

## for highly precise temperature applications in the bath tank

- Temperature setting to 0.01 °C
- Display resolution 0.01 °C
- Temperature stability ±0.01 °C Programmer with real time clock
- · Built-in cooling coil for applications at or near ambient using tap water cooling

#### ME-31A is supplied with a Plexiglas® bath tank, ME-16G includes a glass bath tank.

The top-of-the-line model ME-18V is supplied with a stainless steel bath tank having an insulated bath mantle and two transparent windows of 185 x 245 mm made of high quality multiple-layer insulation glass.

Using JULABO refrigeration units in combination with a special cooling coil, temperatures of 0 °C, -20 °C or -40 °C can be reached. Please contact JULABO!





**ME-16G** 

## Applications

- Measuring tasks with capillary viscometers
- · Use of densimeters and other related products
- ME-18V can be used according to standard ASTM D445

Heat-up times (230 V)	Heat-up times (230 V)
Bath fluid: Water	Bath fluid: Thermal H
5 6 7 7 7 7 7 7 7 7 7 7 7 7 7	*C 200 150 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0





**ME-18V** 

For more viscometers! Available as option:

Cover with 4 round openings 51 mm dia. for ME-18V (order no. 8 970 294)



Cover with 5 round openings 51 mm dia. for ME-31A (order no. 8 970 295)

JULABO Order No.	JULABO Model	Working temp. range °C ¹⁾	Temp. stab. °C	Heat. cap. kW ²⁾	Pump capa Flow rate/ I/min.	acity Pressure bar	Cooling coil	Bath opening/ number/ bath depth cm	For x visco- meters	Fill. vol. liters	Dimensions W x L x H cm	Weight kg
Visco Bat	hs											
Technical features				PID	3 ATC ³	SMART PUMP	Pt100	RS 232	N .			<b>S</b> 3
9 160 331	ME-31A	20 60	±0.01	2/1	11-16 0	0.23-0.45	Integrated	9 x 9 / 3 x / 37	3	31	50 x 20 x 56	11
9 160 616	ME-16G	20 100	±0.01	2/1	11-16 0	0.23-0.45	Integrated	7.6 x 7.6 / 2 x / 31	2	16	dia. 29 x 48	9
9 160 518	ME-18V	20 150	±0.01	2/1	11-16 0	).23-0.45	Integrated	9 x 9 / 2 x / 37	2	18	36 x 24 x 54	17

∃ info@julabo.de

¹⁾ For temperature applications at or near ambient; counter-cooling with tap water via built-in cooling coil

37



Stability 0.01 °C

Julaba

# **Calibration Baths**

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

VFD COMFORT-DISPLAY.

can be issued.

**Applications** 

international standards.

stored and recalled any time.

Temperature values (reproducible to 0.01°C) are set via the

Up to 3 frequently required setpoint temperatures can be

Using the precision Pt100 reference sensor it is possible to

have the reference temperature displayed. Based on this,

additional calibration certificates according to ISO and DKD

Display resolution 0.01 °C across the temperature range!

Calibration of temperature sensors, measuring

out in regular intervals according to national and

devices and thermometers, that needs to be carried

splash-proof keypad and are clearly visible on the bright

Simultaneous indication of 3 temperature values!

These units are designed specifically for applications in calibration laboratories and conform to the requirements specified by DIN ISO 9001:2000.

Calibration baths include a constant level temperature chamber. The circulating pump transports the bath fluid through the overflowing temperature chamber to the circulator bath. The following values are achieved while a constant liquid level is maintained:

Highest temperature stability to ±0.005 °C

## Additional benefits

- · Ease of operation
- · Low noise level
- Compact design
- · Removable circulator with temperature chamber



· Temperature chamber

with uniform overflow





SE-14K

JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	HeatingPump capacitycapacityFlow ratekW 1)I/min.		ity Pressure bar	y Bath opening/ I Pressure Usable bath bar depth cm I		Dimensions W x L x H cm	Weight kg
Calibratio	on Baths									
Technical fea (see fold-out	<b>atures</b> page)	8 <b>39888</b> 3828509 6828869			C ATC ³	PUMP Pt	100 <b>RS 232</b>	1x10		<b>S</b> 3
9 250 508	SE-8K	+50 +300	±0.005	3	22-26	0.4-0.7	dia. 12 / 17	8	22 x 46 x 47	16
9 250 514	SE-14K	+50 +300	±0.005	3	22-26	0.4-0.7	dia. 12/31	14	22 x 46 x 61	20
									¹⁾ At voltage 2	30V/50-60Hz

**Calibration Baths** 

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

Reference temperature can be measured and permanently displayed via an adapted highly accurate digital sensor (patented).

#### VFD COMFORT-DISPLAY



FK30-SE

Using the reference sensor, the large display can be set via keypad to display the reference

Reference temperature ⁽²⁾ Setpoint temperature 3 Actual temperature



**Outstanding and new!** Only offered by JULABO.

Save the extra costs of purchasing a highly accurate digital thermometer! (details see page 40)

Julabo

## Accessory included with all models:

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

## Accessories

8

8 981 002	Precision Pt100 reference senso 180 x 4 mm dia.
9 660 003	FL300 recirculating cooler for models SE-8K and SE-14K

### Viton[®] sleeves

Order No.	for sensor
8 930 602	2 mm dia.
8 930 603	3 mm dia.
8 930 604	4 mm dia.
8 930 605	5 mm dia.
8 930 606	6 mm dia.
8 930 608	8 mm dia.

JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability °C	Heating capacity kW ¹⁾	Coolin (Bath t 20	g cap. kV fluid: Etha 0 -20	V anol) °C	Pump ca Flow rat I/min.	apacity te / Pressure bar	Bath opening/ Usable bath depth cm	Filling vol. liters	Dimensions W x L x H cm	Weight kg
<b>Calibratio</b> <b>Technical feat</b> see fold-out p	n Baths tures bage)	with integ	rated refrig	eration u	nit <i>ICC</i>	ATC ³	3 S F	SMART PUMP	Pt100 RS	232			<b>S</b> 3
9 250 627	FK30-SE	-30 +200	±0.005	2/1	0.46	0.34 0	.15	22-26	0.4-0.7	Ø 12/17	14	32 x 45 x 79	33

1) At voltage 230V/50Hz / 115V/60Hz

## Accessories

(-40.00 ... 0.00 °C)

(+0.01 ... +100.00 °C)

(+100.01 ... +300.00 °C)

## Precision Pt100 reference sensor (Order No. 8 981 002)

This special sensor for calibration technology provides integrated measuring electronics and RS232 connection The sensor is inside a high quality stainless steel tube and is suitable for use with the JULABO calibration baths.



	Measuring range	-40.00 +300.00 °C
	Measuring accuracy	±0.05 °C (-40.00 0.00
		±0.01 °C (+0.01 +100
		±0.05 °C (+100.01 +3
	Dimensions	180 x 4 mm, 1 m cable
	Immersion depth	90 mm min., 140 mm max.

## **DKD and ISO Calibration Certificates**

When purchasing a JULABO calibration bath YOU decide which certificates you require. We take care of the rest!

YOU obtain the calibration solution including the requested certificate ready for immediate use for calibration services, production, quality assurance, etc.

JULABO Description Order No.

## Certificates for the calibration of the circulator

8 902 113	ISO-3-point calibration certificate	Calibration at 3 selectable measuring points
8 902 115	ISO-5-point calibration certificate	Calibration at 5 selectable measuring points
8 902 123	DKD-3-point calibration certificate	Calibration at 3 selectable measuring points
8 902 125	DKD-5-point calibration certificate	Calibration at 5 selectable measuring points

#### Certificates for the calibration of the precision reference sensor

8 902 213	ISO-3-point calibration certificate	Calibration at 3 selectable measuring points
8 902 215	ISO-5-point calibration certificate	Calibration at 5 selectable measuring points
8 902 223	DKD-3-point calibration certificate	Calibration at 3 selectable measuring points
8 902 225	DKD-5-point calibration certificate	Calibration at 5 selectable measuring points

#### **Example: DKD calibration certificate**



#### Example: ISO calibration certificate

	Kalibr	ier-Zertifik
	Railbi	ler-Zerunn
	Calibrat	ion Certifica
Junitaria.	Common m	anne i
Reasoning Tank	Description of mathematic	Aug. 202
Cardin Arthur II.	Probation includes an	1000 0001
Taritte Sarian PE	Published Spin Inc.	35735a0a
Kunden Imamia Nr. Gardi	Gatime Averaging in Induced	
Series Taylories in	Performent supplyinged bit.	
Beautifung Midnerfastrations'	(Description of proba-	Temperaturkites
Helperia helina kita le	Probe Problems	0008-0118
Bulanta, hatma Galan Iti	Profection est.	1006000
Russies Institute In Paller	California di anticipi nu grabei	
Without Statistics To portant St.	Profession and a second second	
Automation .	Contribut	Nume will
Automphan Ce	Culture Pace	0.79033 Mutheland
Rymphen-Ne.	Continent's ID-ray	100000
On für die Reflectung	ny warmen Referentinger series o	the bet heritari gittering
Die So des Highlenes estellichten auf die regisnesse auf antere nationale been	ng senantena Baharan Danjar kariar I Schedu be Majakata Tachmalar Da Mili Sata salamata Samata anatar Mini Jama salamata Samata anatar	spatiality indication and and elemented (1995) (independent of a compaction are believed about the effects
De for international control to the national and actions national them the for the second trace the observations into the	ng severences Billerenchappel renter in Schröde Ber Physiolaite Trackoscher Bu- ber Billeren stationaler termati considere Bernet geltigte Schrödenstater Lans tot is gest angefreigte Schrödenstater Lans tot is an and ad delts; nachlagenter Schercht	epartetti pi vattimati and and elevandel (1731) (autoritaria citi vengeletti par Methodologi dar elevani lettati atipinatiari europei par fullorio-Certificas autoritaria
Un for the Inglishow contribution of the indicates and protein endowed them the Advantage of the the Advantage of the the Advantage of the protein	e) a service de la construcción de la constru- tionnel de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la constr	spectrality instituted and and ensemble (1970). Development con- compaction pair backworkshows nor- strates. Intel [®] alternative and the near further Cardinals adjustmen- men unlikented according to any processing agents.
Con Sor the statistical end of the statistical and a statistical Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social Social	The second secon	spectrality instituted and and escenarial (2016) Endeprices in endeprict the Mohenheime inte- ential Mark disputation methods, user failures Conflicting adjustest, and philosophic accuracy to any instituted accuracy to any instituted accuracy to any instituted accuracy to applications and the initial method instituted accuracy to a set failures of the initial method instituted accuracy to the applications and the trace of the to applications and the trace of the to applications and the trace of the top
De Vorde Heldens and antere estavalit De Vordes estavalit De Vordestavalit De Vordestavalit De Vordestavalit De Vordestavalit	In several and the several sequences and the several s	spatiality instituti and and inservable (PTI) (Index Internet on origination to Mathematicum on origination and automaticum origination (Indihata antipatian), and (Indiana) (Indihata antipatian), and (Indiana) (Indihata antipatian), and (Indiana) (Indihata antipatian) antipatiano antipatian), antipatiano antipatiano antipatiano applications and materia
De la la celativa mitichana de la cultaria de la trans salavait terri De la censo salavait terri De la censo de la cultaria de la celativa de la cultaria de la cultaria de la cultaria de	The properties of the second	spatiality instruct and and encounted (2015) Endothermon on a compariso the Schedenberger man. Market Schedenberger and Schedenberger and Schedenberger and Schedenberg and Schedenberg absorb for some some some spatiality for some some statistics for some of spatiality of the same some some profiles.
The to an entitive solutions of the salescent of artises salescent teer to a selection of the to and the to an entities of the salescent of the salescent of the Samer and Heat Salescent Salescent on Salescent Salescent Salescent on Salescent Salescent Salescent on Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent Salescent	c) constraints the Maximum Comparementation to extrain the Section Technologies of the Maximum Comparementation Technologies of the Maximum Comparementation of the Maximum Section 2 and Antilia Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Section Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the Maximum Comparementation of the M	specific particular of and encoded if the base-home or encode the base-home or encode the base-home or the second second second of a second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se
Un to una software software of the same of the same same taken to the Unit of the same taken in the same same taken in the same same same same same same same in the same same same same same same same	or province the Machine Service Service to constrain the Physical Service Service Service and party instruments. The service service service and an end of the service service service and and an end of the service service service service service services of the service service service service services of the service service service service services of the service service of the service service service service services of the service service service service services service service service service service services service service service service services service service service services service service services and services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services services se	предната натали на нат напрата на Малантана на напрата на Малантана на ната на малантана на базета селита на на на селита селита на на на на на на на на на на на на на на на на на на на на на ната на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на на н
In the sec estimates of a stateway and areas when the sec estimate the stateway of the sec estimates of the sec es	on provinces the Management applies and the set of the strength and the strength and the strength and the strength and the strength and the strength and and the strength and the strength and the strength and the strength and the strength and the strength and the strength and the strength and the strength and the	spectral particular out and ensight of the base nones on ensight on balanchine base metric and the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the s
De to un estémic métrico estémica de suburse in enconservantes De source l'esté De source l'e	ng waxaman Robustano Japan Santano Marina Karakana Kanada Jabatano Karakana Karakana Jabatano Karakana Karakana Jabatano Karakana Jabatano Jabatano Jabatano Karakana Jabatano Karakana Jabatano Karakana Jabatano Karakana Jabatano Karakanana Jabatano Karakana Jabata	spectral particular out and second of 21% Decembers on the communication of 21% Decembers of 21% and 21% December of 21% Decembers of 21% and 21% December of 21% December of 21% December of 21% and 21% December of 21% December of 21% December of 21% and 21% December of 21% December of 21% December of 21% and 21% December of 21% December of 21% December of 21% and 21% December of 21% December of 21% December of 21% and 21% December of 21% December of 21% December of 21% and 21% December of
On to an entering the universe and an entering of a universe and and an entering of a universe and an entering of the universe and an entering of the universe and an entering of the entering	ng nerena serie balance de la conserie de la conser	operating outputs of a part of the operations of a part of the operation o

## Presto[®] and Magnum 91

## - External temperature applications in wide temperature ranges

JULABO offers a sophisticated range of Highly Dynamic Temperature Control Systems on pages 41 to 46.

- ▶ Presto® is suitable for extended temperature ranges, for example from -40 to +250 °C or from -85 to +170 °C without the requirement to changing bath fluids.
- Presto[®] avoids oxidation and ensures prolonged lifetime of the bath fluid.
- ▶ Presto® is time-saving: rapid heat-up and cool-down times throughout the entire temperature range, control for unsupervised continuous operation.

Briaht

**VFD COMFORT-DISPLAY** 

For actual value, setpoint

Illuminated displays for

A: selected pump stage B: filling volume

Resolution 0.01 °C

The systems provide many unique features compared to conventional heating and cooling circulators.

- ▶ **Presto**[®] compensates exothermic and endothermic reactions quickly and with exceptional temperature accuracy.
- Presto[®] is hydraulically sealed to prevent unpleasant steam and odors.
- Presto[®] does not allow absorption of air humidity into the bath fluid. This prevents condensation and ice build-up.

## Remote device 'RD' user-friendly operation

· Splash-proof keypad for stepoint,

actual temperature, pump

presssure control

· Backlit, 4-line LCD-DISPLAY for · System status, high/low temperature warning functions with intermittent tone

- Integrated programmer with real time clock for 6 x 60 program steps
- · Best reproducibility of all set values



## Keypad, splash-proof

Presto

- (1) Start key for filling process
- (2) Key to toggle display from setpoint / actual value
- (3) High temperature cut-off according to DIN 12876-1
- (3a) High temperature cut-off for cooled fluid in reservoir

# Analog/

## digital connections

- External Pt100 sensor
- Serial interface RS232 / RS485
- Analog input for external programming
- Standby input for external emergency cut-off Connector for external alarm device
- Control cable for remote device 'RD' or 5 m extension cable (accessory)

41

# Juicho Highly Dynamic Temperature Control Systems

Automatic control

with a 2 liter reactor

of an exothermic reaction

A: Supply tem

## Presto® benefits:

- Small space required – LH40, LH45, LH46 and LH85 can be placed under lab bench
- LH45, LH46 and LH85: Combination of air and water cooling, i.e. automatic changeover at high ambient temperatures or interruption of cooling water
- · Handles and castors allow easy relocation
- Time-saving filling process for the entire system with permanent air purge
  - inent air purge

- Reservoir with cooling device and integrated high temperature cut-off
- Integrated warning, safety and supervision functions via 9 sensors
- Optional expansion vessels (accessories)
- Automatic de-gas mode
- Small filling volume enhances instrument performance
- IP class according to IEC 529: IP31

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

- Proportional cooling control:
- energy-saving performanceRemovable venting grid:
- Hassle-free cleaning of the condenser
- Drain port easily accessible on the front

## Highly dynamic control

∕*

The diagram on the right shows how the LH45 automatically compensates an exothermic reaction in order to keep the setpoint temperature in the connected 2 liter reactor.

Heat-up times Bath fluid: Thermal HL

 Presto®

 Cool-down times
 Pump capacities

 Bath fluid: Thermal HL
 Bath fluid: Thermal HL









LH40 / LH45

JULABO Order No.	JULABO Model	Working temp. range °C	Temperature stability in external system °C	Temperature display / Resolution °C	Indication of pump pressure and filling volume	Heating capacity kW						
Fechnical features (see fold-out page)												
Image: state     Icc     TCF     ATC     SMART     Pt100     RS232 RS485     Image: state     S3												
9 410 140	LH40	-40 +250	±0.01 ±0.05	VFD + LCD / ±0.01	on VFD display	1.8						
9 410 145	LH45	-40 +250	±0.01 ±0.05	VFD + LCD / ±0.01	on VFD display	1.8						
9 410 146	LH46	-45 +250	±0.01 ±0.05	VFD + LCD / ±0.01	on VFD display	1.8						
9 410 147	LH47	-45 +250	±0.01 ±0.05	VFD + LCD / ±0.01	on VFD display	1.8						
9 410 150	LH50	-50 +250	±0.01 ±0.1	VFD + LCD / ±0.01	on VFD display	6.0						
9 410 185	LH85	-85 +250	±0.01 ±0.05	VFD + LCD / ±0.01	on VFD display	1.8						

Included with each unit: 1.5 m CR® tubing for overflow

## Applications

- Jacketed reactors, autoclaves,
- e.g. for polymerization, polycondensation
- Combinatorial chemistry, reaction blocks,
- organic synthesis
- Reaction calorimeters
- Distillation, pilot plants
- Calibration
- Semiconductor industry
- External open systems (except LH40)

## Can be placed under the bench!





Cooling capacity kW ¹ ) Cooling of						Cooling of	Pump ca	pacity	Filling	Dimensions	Weight	Power
(Bath	fluid: J	0LAB	U I hern	nal Et	hanol)	compressor	How rate	/ Pressure	VOI. litoro	WXLXH	kg	requirement
+200	+20	-20 -	40 -0	0 -0	50 0		1/11111.	Udi	liters	CIII		V / HZ
Sechnical features (see fold-out page)												
		i BLORT III BLORT III BRONT III BRONT					TCF	ATC	SMA PUN	Pt100	RS232 RS485	6x60 53
1.5	1.0	0.4	0.05			air	24-33	0.8 - 1.6	2.5	30 x 49 x 64	71	230~ / 50 or 230~ / 60
1.5	1.2	0.5	0.1			air/water	24-33	0.8 - 1.6	2.5	30 x 49 x 64	77	230~ / 50 or 230~ / 60
2.5	2.1	0.9	0.1			air/water	24-33	0.8 - 1.6	2.5	50 x 59 x 64	103	230~ / 50 or 230~ / 60
2.5	3.0	1.3	0.3			air	24-33	0.8 - 1.6	2.5	40 x 55 x 127	150	3x400~/50 ²⁾ or 3x230~/60
5.5	7.0	2.8	0.9			water	24-35	0.8 - 2.2	10.0	40 x 55 x 127	182	3x400~/50 ²⁾ or 3x230~/60
1.5	1.0	0.9	0.7	0.5	0.1	air/water	24-33	0.8 - 1.6	2.5	50 x 59 x 64	130	230~ / 50 or 230~ / 60

🖅 info@julabo.de

¹⁾ Cooling capacity measured at pump stage 1 = 24 l/min. – 0.8 bar (and water-cooling on models LH45, LH85, LH50)

²⁾ 32A CEE power supply line necessary for LH47 and LH50



capacity.

## More space in your lab:

## Magnum 91

## - The Powerful Temperature Control System -

Magnum 91 offers the same benefits as the Presto® models. This system is particularly suitable for temperature control of external systems because it provides:

- Working temperature range from -91 to +250 °C
- · High heating and cooling capacities
- Strong pump performance
- IP class according to IEC 529: IP20

Cooling of the two-stage refrigeration unit can be performed via the built-in cooling water connections G 3/4" using industrial water.

#### Additional benefits

- · Convenient arrangement of operating elements
- Keypad control
- Large VFD COMFORT-DISPLAY
- · Backlit LCD display for user-friendly operation
- Connections for external Pt100 sensor as well as other analog and digital connectors

### Applications

- Reactor systems up to 50 liters
- Pilot plants, Kilo labs
- Polymerization, polycondensation, etc.

#### Automatic control

of an exothermic reaction Pump capacity with a 30 liter reactor Bath fluid: Thermal HL





JULABO Order No.	JULABO Working temp. p. Model range °C		Temp. stability in external system °C	Temperature display / resolution °C	Indication of pump pressure and filling volume	Heating capacity kW				
Technical features (see fold-out page)										
28888 2008888 2018888	Serp. 1: 56.00°C Inner: 156.00°C Carres: Inner	ICC TCF	ATC SMART PUMP	100 RS 232 RS 485 6 × 60		<b>S3</b>				
9 410 191	Magnum 91	-91 +250	±0.05 ±0.2	VFD + LCD / ±0.01	on illuminated display	6.0				

Cooling (Bath fl +200	g cap luid: J +20	acity l ULAB -20	kW 10 The -40	rmal E -60	Ethanol) -80°C	Cooling of compressor	Pump capac Flow rate / I / min.	ity Press. bar	Filling volume liters	Dimensions W x L x H cm	Weight kg	Power requirement V / Hz	Amp. at 50 / 60 Hz
												7.	
3.5	5.0	4.5	4.0	2.5	0.6	water	24-35	0.8-2.2	21.5	71 x 88 x 165	420	3 x 400 ~/50 or 3 x 230 ~/60	20 / 35



## Pump connections, etc. • Accessories

# Julabo



Suitable for

## **Bath Fluids**

Order N	No. Description	Quantity	Suitable for working temperatur ranges	Flash re point	Fire point	Color
8 940 1	06 Thermal H5S	101	-40+250 °C	110.00	100.00	light
8 940 1	07 Thermal H5S	51	-40+250 °C	>+110 °C	>+130 °C	brown
8 940 1	22 Thermal HL45	101	-45+250 °C			clear
8 940 1	23 Thermal HL45	51	-45+250 °C	>+121 °C	>+162 °C	
8 940 1	20 Thermal HL80	101	-85+170 °C	_	_	clear
8 940 1	21 Thermal HL80	51	-85+170 °C	>+63 °C	>+112 °C	

These temperature ranges are only valid for use with Presto® and Magnum 91! Bath fluids for use with circulators, please refer to page 31.

## Accessories

## Order No. Description

#### External Pt100 sensors

8 981 003 8 981 005	200 x 6 mm dia., stainless steel, 1.5 m cable	
8 981 006	20 x 2 mm dia., stainless steel, 1.5 m cable	
8 981 010	300 x 6 mm dia., stainless steel, 1.5 m cable	Presto®
8 981 013	600 x 6 mm dia., stainless steel/Teflon coated, 3 m cable	+ Magnum 91
8 981 014	1200 x 6 mm dia., stainless steel/Teflon coated, 3 m cable	-
8 981 020	M + R in-line Pt100 sensor (including 2 fittings M16x1 male)	
8 981 103	3.5 m Extension cable for Pt100 sensor	
8 981 030	TCCB Thermo-Couple Converter Box	

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

notarta	billig, noxibio, dipi										
8 930 209 8 930 210 8 930 211 8 930 214	0.5 m Metal tubing 1 m Metal tubing 1.5 m Metal tubing 3 m Metal tubing	2 fittings M16x1 female	Presto® + Magnum 91								
Metal tu	Aetal tubing, flexible, insulated, -50 +200 °C										

8 930 220 8 930 221 8 930 222 8 930 223	1 m Metal tubing 1 m Metal tubing 1.5 m Metal tubing 3 m Metal tubing	2 fittings M16x1 female	Presto® + Magnum 91							
8 030 220	0.5 m Motal tubing	1								

#### Additional accessories

8 970 443	Adapter M16x1 male to M16x1 male	Connecting metal tubing	
8 970 750	Icing protection sleeve for pump connectors	Presto® + Magnum 91	Motal tubing

🖅 info@julabo.de

tubing, triple insulated

External Pt100 sensor/ M+R in-line Pt100 sensor

Bath fluid



## Accessories

Suitable for

Presto® LH40, 45, 46, 85

Presto® LH40, 45, 46, 85

Presto® LH47, LH50

Presto®

Presto® + Magnum 91

Presto[®] + Magnum 91

Order No. Description
 Additional accessories
8 910 041         Castor platform           8 970 830         Expansion vessel           8 970 831         Expansion vessel           8 980 127         5 m Extension cat

Castor platform

(rear view)



8 970 457	Shut-off valve for loop circuit (max. +250 °C), M16x1
8 970 490	2 Collar nuts M16x1 female
8 890 004	2 Adapters M16x1 female to NPT 1/4" male
8 890 005	2 Adapters M16x1 female to NPT 1/4" female
8 890 006	2 Adapters M16x1 female to NPT 3/8" male
8 890 007	2 Adapters M16x1 female to NPT 3/8" female
8 890 008	2 Adapters M16x1 female to NPT 1/2" male
8 890 009	2 Adapters M16x1 female to NPT 1/2" female
8 890 010	2 Adapters M16x1 male to NPT 1/4" female
8 891 008	1 Adapter M16x1 male to BSP 1/2" female
8 891 009	1 Adapter M16x1 male to BSP 3/4" female
8 890 011	2 Adapters M16x1 female to tube 1/4" male
8 890 012	2 Adapters M16x1 female to tube 3/8" male
8 890 013	2 Adapters M16x1 female to tube 1/2" male
8 890 024	2 Adapters M16x1 female to M16x1 female

5 m Extension cable for remote device RD

## Software / Lab automation

Expansion vessel 2 liters

Expansion vessel 5 liters

8 901 102 8 901 105 8 980 073 8 900 110 8 900 015	'EasyTemp' control software (free download www.julabo.de) 'EasyTemp Professional' control software, incl. USB dongle RS232 interface cable, 2.5 m USB Interface adapter cable PBM Profibus DP Master	Presto® + Magnum 91
8 900 002	PB-2 Option: integrated Profibus DP	

Perfect:

your requirements.



Easy TEMP

Easy TEMP

**FREE of charge** 

glass reactor



#### For YOUR convenience!

Presto® and Magnum 91 are the perfect solution for temperature control of reactors. Please contact JULABO and ask for the most suitable unit for

> Get detailed information about functioning, operation and setup from the interactive Presto® CD-ROM, which you can order free of charge at www.julabo.de!

## **COMPACT** Recirculating Coolers

## Environmentally friendly solutions for cooling applications

JULABO Recirculating Coolers are designed to economically dissipate process heat from external systems via a

cooling loop. This has the benefit of saving precious tap water, reducing costs and increasing efficiency.

Julabo

## Benefits of JULABO recirculating coolers (pages 47 to 56)

- · Environmentally friendly operation with reduced energy consumption
- Prevents contamination in the cooling loop
- Waste water does not contain hazardous substances
- High condensation efficiency Constant working temperature

## • Constant pump performance

- · Temperature adjustable to sub ambient temperatures, if required down to -20 °C
- Suitable for heating and cooling applications (pages 52 to 55)
- Rapid amortization period

## **COMPACT Recirculating Coolers**

These models with a small footprint are designed for applications requiring no strong cooling performance.

## AWC100 Air-to-Water Recirculating Cooler:



This unit does not include a refrigeration unit. The cooling principle: Warm bath fluid is pumped through the heat exchanger. The heat exchanger is cooled by a ventilator motor and thus withdraws the produced heat. The ventilator motor is adjustable in 2 stages.

## F200 Recirculating Cooler



With the integrated refrigeration unit and the cooling coil in the bath tank a constant cooling performance is achieved. The setpoint is adjustable.

### AWC100 and F200 offer: Filling opening with cover and filling level indicator

A	Applications	
0	Cooling of Peltier elements, particularly for analytical devices and CCD cameras	
o	Polarimeters, refractometers	

## Electrophoresis chambers

Applications

F200

- Condensers for glass installations
- · Calorimeters, lasers with low heat generation

JULABO Order No.	JULABO Model	Working temp. range °C	Cooling capa between ret	acity varyin urn line tem 20	g with the ip. and am 15	temp. diff bient tem 10	erence p., Watt 5 °	s C	Pump capa Flow rate /	city Press. Dar	Filling volume liters	Dimensions W x L x H cm	Weight
Air-to-Wa	Air-to-Water Recirculating Cooler												
9 630 100	AWC100	+20 +40	Stage 1: Stage 2:	400 550	320 440	220 300	12 18	20 30	2.9	).2	0.9	20 x 34 x 30	11
JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stability °C		Cooling Wat +20	capacity ts +10 +	-5 °C	Pu Flo I/m	mp capacity w rate/Press iin. ba	Fi s. vo ır lit	lling olume ers	Dimensions W x L x H cm	Weight kg
Recircula	Recirculating Cooler												
9 620 020	F200	+5 +40	±3		200	180	130	8	B 0.1	2	3.0	19 x 35 x 41	19
Included with:	AWC100: 2 F200: F	each barbed fi Pump connectio	ttings for tubing ns for tubing 10	g 8 and 10 mr ) mm inner d	n inner dia. a.	(pump cor	nections	s M1	0x1 female)		Volta	ge: Available in 230V/50Hz or	r 115V/60Hz

∃ info@julabo.de

🎓 Hotline +49 7823 51190

# Recirculating Coolers ...

## The NEW 'FL' Series

## Recirculating coolers from the new FL generation offer YOU:

- Ergonomic design and easy operation
- Splash-proof keypad with large, bright LED display and integrated mains switch
- Industrial grade mains power switch (models > 2.5 kW cooling capacity)
- Reliable MICROPROCESSOR PID temperature control
- Filling level indicator
- Pressure indicator from model FL1201 upwards
- Powerful immersion pumps, suitable for continuous operation
- Pump capacities from 0.35 to 6 bar
- Adjustable bypass for pump pressure from model FL1203 upwards
- Suitable fluids: water, water-glycol mixture and JULABO Thermal bath fluids
- Permissible temperature in return line +80 °C
- Filling from the top; with hinged protective lid
- B Splash-proof keypad
- © Integrated mains switch
- Bright LED temperature display
- Alarm output
- (potential-free contact)
- Pressure indicator
- In Filling level indicator
- ① Drain port
- Removable venting grid

The generation of the required cooling capacity occurs through the cooling coil ⁽²⁾ integrated in the bath tank ⁽¹⁾. Control electronics and temperature sensor ⁽³⁾ control the solenoid valve ⁽⁴⁾. The immersing circulating pump ⁽⁵⁾ delivers the cooled fluid with a high degree of efficiency through a circuit to an externally connected system ⁽⁶⁾.

## Model designation and comments

FL = with fan-air-cooling FLW = with water-cooling, powerful models (alternatively)



D

(B ---- (F)

B

G

- Easy filling
   Cooling consolition from 0.2
- Cooling capacities from 0.3 to 11 kW
- Low liquid level protection with optical and audible alarm signal
   Integrated stainless steel bath tanks with large volumes
- Meter parts are made of
- high quality stainless steel or plastic
- Removable venting grid for hassle-free cleaning of condenser, front drain accessibility
- No side vents. Benefit: Recirculating coolers can be placed right next to other equipment.
- Recessed grips for easy relocation integrated in the housing
- IP class according to IEC 529: IP21
- Operation in ambient temperatures up to +40 °C for all models

The Recirculating Coolers of the FL series will make YOUR work easier and save YOU time.

The pump inlet and outlet with connection thread and barbed fittings as well as the lockable overflow are located on the back of the unit. Furthermore: manually adjustable bypass (handwheel), especially to reduce the pump capacity from model FL1203 upwards (e.g. for applications involving glass devices)

- Bath tank
   Cooling coil
   Temperature sensor
   Solenoid valve
  - 6 Circulating pump
  - Compressor
  - ⑦ Condenser
  - Pump connections
  - Bypass for pump pressure
  - ① Externally connected
  - system

... the 'FL' Series



# Can be placed under lab bench!

### Applications for models on pages 49 to 51 • Rotary evaporators

- Autoclaves
- Reaction vessels
- Soxhlet installations
- Distillation apparatus
- Vacuum systems
- Gas chromatographs
- Spectrometers
- Semiconductor industry
- Dosing & glueing tech
- Diffusion pumps
- Mass spectrometers



## **Recirculating Coolers**

Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	C 20	ooling 10	g capa kW 0 -10	city -20°C	Pump Flow r I/min.	capacity ate/Press. bar	Filling volume liters	Dimensions W x L x H cm	Weight kg	Power requirement V/Hz
Fechnical features (see fold-out page)     PID 1     RS232													
9 660 003	FL300	-20 +40	±0.5	0.3	0.25	0.2 0.1	15 0.1	15	0.35	3 4.5	25 x 50 x 60	41	230~/50 or 115~/60 or 230~/60
9 661 006	FL601	-20 +40	±0.5	0.6	0.5	0.4 0.3	33 0.2	40	1.0	5.5 8	32 x 50 x 60	45	230~/50 or 115~/60 or 230~/60
0 001 000													
9 661 012	FL1201	-20 +40	±0.5	1.2	1.0	0.9 0	.6 0.3	40	1.0	12 17	50 x 76 x 64	69	230~/50 or 115~/60 or 230~/60
9 661 012 9 663 012	FL1201 FL1203	-20 +40 -20 +40	±0.5 ±0.5	1.2 1.2	1.0 0.9	0.9 0 0.8 0	.6 0.3 .5 0.2	40 60	1.0 0.5 3.0	12 17 12 17	50 x 76 x 64 50 x 76 x 64	69 73	230~/50 or 115~/60 or 230~/60 230~/50 or 115~/60 or 230~/60
9 661 012 9 663 012 9 661 017	FL1201 FL1203 FL1701	-20 +40 -20 +40 -20 +40	±0.5 ±0.5 ±0.5	1.2 1.2 1.7	1.0 0.9 1.5	0.9 0 0.8 0 1.1 1	.6 0.3 .5 0.2 .0 0.4	40 60 40	1.0 0.5 3.0 1.0	12 17 12 17 12 17	50 x 76 x 64 50 x 76 x 64 50 x 76 x 64	69 73 71	230~/50 or 115~/60 or 230~/60 230~/50 or 115~/60 or 230~/60 230~/50 or 115~/60 or 230~/60

9 671 017	FLW1701	-20 +40	±0.5	1.7	1.5 1.1	1.0 0.4	40	1.0	12 17	50 x 76 x 64	72	230~/50 or 115~/60 or 230~/60
9 673 017	FLW1703	-20 +40	±0.5	1.7	1.4 1.0	0.9 0.3	60	0.5 3.0	12 17	50 x 76 x 64	77	230~/50 or 115~/60 or 230~/60

∃ info@julabo.de

Included with each unit 2 each barbed fittings for tubing 8 and 12 mm inner dia. (pump connections M16x1 male) FL1203, FL1703 and FLW1703: 2 barbed fittings for tubing ³/₄" inner dia. (pump connections G³/₄" male)

0	
I	[[[[[[[[[]]
	0





FL1201, FL1703

# Recirculating Coolers ...

FLW2503 through FLW4006



## Models FL2503 through FLW4006

These powerful recirculating coolers provide high cooling capacities, a strong pump performance and a bath volume of up to 27 liters so that high power reserves are available for constant cooling of the external system.

#### Benefits of models FL2503 through FLW11006:

- Early warning function with sensor monitoring to signal a dirty condenser
- Pump motor and compressor overload protection (on all models)
- · Online diagnosis with 'BlackBox' function
- Low water consumption on all FLW models

Pump capacities Bath fluid: Water

7 0	ar								
6.0						0.2	303		
2 ^{5.0}						FL4	006		
8 ^{4.0}									
±3.0	_		-				-		
2.0					_	_	$\mathbf{\lambda}$		
10			FL2	2503					
			FL/	003		$\sim$		$\mathbf{N}$	
0 10 20 30 40 50 60 70 80									



## **Recirculating Coolers**

	JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Cooli   +20	ing ca kW ±0 -	ар. 10°С	Pum Flow I/min	p capacity rate/Press. . bar	Filling volume liters	Dimensions W x L x H cm	Weight kg	Power requirement V / Hz
T (s	echnical fea ee fold-out	<b>atures</b> page)	<b>888</b>		PI	D 1	RS	232					
	9 663 025	FL2503	-20 40	±0.5	2.5	1.5	1.2	60	0.5 3.0	19 27	60 x 76 x 115	123	230~/50 or 230~/60
	9 666 025	FL2506	-20 40	±0.5	2.5	1.4	1.1	80	0.5 6.0	19 27	60 x 76 x 115	130	230~/50 or 230~/60
	9 663 040	FL4003	-20 40	±0.5	4.0	2.4	1.5	60	0.5 3.0	19 27	60 x 76 x 115	123	3x400~/50 or 3x230~/60
	9 666 040	FL4006	-20 40	±0.5	4.0	2.3	1.4	80	0.5 6.0	19 27	60 x 76 x 115	130	3x400~/50 or 3x230~/60

## Recirculating Coolers (water-cooled)

9 673 025	FLW 2503	-20 40	±0.5	2.7	1.7	1.3	60	0.5 3.0	19 27	60 x 76 x 115	127	230~/50 or 230~/60
9 676 025	FLW 2506	-20 40	±0.5	2.7	1.6	1.2	80	0.5 6.0	19 27	60 x 76 x 115	135	230~/50 or 230~/60
9 673 040	FLW 4003	-20 40	±0.5	4.3	2.5	1.6	60	0.5 3.0	19 27	60 x 76 x 115	127	3x400~/50 or 3x230~/60
9 676 040	FLW 4006	-20 40	±0.5	4.3	2.4	1.5	80	0.5 6.0	19 27	60 x 76 x 115	135	3x400~/50 or 3x230~/60

Included with each unit: 2 barbed fittings for tubing 3/4" inner dia. on models FL/FLW2503 and FL/FLW4003 (pump connections G 3/4" male) 2 barbed fittings for tubing 1" inner dia. on models FL/FLW2506 and FL/FLW4006 (pump connections G11/4")

## Models FL7006 through FLW11006

Recirculating coolers from this performance category are designed to dissipate process heat from large and demanding external systems.

## Further Applications

- Electron microscopes
- Lasers
- Mills or kneaders
- Pilot plants
- Miniplants
- · Plastic industry
- Drying of gases
- General industries

#### Pump capacity Bath fluid: Water





## **Recirculating Coolers**

JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Cooling c kW +20 ±0	ap. -10°C	Pump capaci Flow rate/Pre I/min. bar	ty Filling ess. volume liters	Dimensions W x L x H cm	Weight kg	Power requirement V / Hz
<b>Technical fea</b> (see fold-out	chnical features ee fold-out page)									
9 666 070	FL7006	-20 40	±0.5	7.0 5.5	3.0	80 0.5 6	.0 25 35	78 x 85 x 148	160	3x400~/50 or 3x230~/60
9 666 110	FL11006	-20 40	±0.5	11.0 7.5	5.0	80 0.5 6	.0 25 35	78 x 85 x 148	180	3x400~/50 or 3x230~/60
Recircula	Recirculating Coolers (water-cooled)									
9 676 070	FLW 7006	-20 40	±0.5	7.4 6.0	3.1	80 0.5 6	.0 25 35	78 x 85 x 148	165	3x400~/50 or 3x230~/60
9 676 110	FLW11006	-20 40	±0.5	11.5 8.0	5.1	80 0.5 6	.0 25 35	78 x 85 x 148	180	3x400~/50 or 3x230~/60

🖅 info@julabo.de

Included with each unit: 2 barbed fittings for tubing 1" inner dia. (pump connections G11/4")

# Recirculating Coolers ...

## Recirculating Coolers of the FC Series with 0.6 to 2.5 kW cooling capacity

## for heating and cooling

- High temperature stability
- Expanded working temperature ranges to +80 °C
- Integrated heater
- Keypad with 2 LED displays
- Adjustable inlet/outlet temperature ratio
- Energy-saving cooling control
- Liquid level indicator: sight glass
- Operation in ambient temperatures up to +40 °C







- RS232 interface
   Standby input
- ③ Alarm output
- FC1200T, FC1600T, FCW2500T provide additionally:
- ④ External Pt100 sensor
- External programming,
- temperature recorder

Pump capacities Bath fluid: Water



FC600S

,0000



FC1600T

JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW	C 20	ooling 10	capa kW 5 -	city 10 -2	0°C	Pump ca Flow rat I/min.	apacity æ/Press. bar	Pressure indicator bar	Filling volume liters	Dimensions W x L x H cm	Weight kg
FC Recirc Coolers	ulating	<b>Techni</b> (see fo	<b>cal featu</b> ld-out pa	res ge)	<u>88.8</u>	B	<del>9.9</del> )	• 4 6 4	Q	PID 1	RS 232		ACC		<b>S3</b>
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	48
9 600 063	FC600S	-10 80	±0.2	1.2	0.5	0.37	0.3	0.1		22	1.2		68	35 x 54 x 49	52
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	60
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	66
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	65
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	66
with conne external Pt	ction for 100 sensor		6	<u>88</u> )	<u>88.8</u>		. 0	PID	1	Pt100	RS 232		ACC		<b>S</b> 3
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	67
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	67
water-cool	ed model														
9 601 256	FCW2500T	-25 80	±0.2	1.2	2.5	2.0	1.8	0.8 (	).25	28	3.5	0 4.0	8 11	46 x 61 x 49	74
Included with each unit: 2 each barbed fittings for tubing 8 and 12 mm inner dia. (numo connections M16x1 male) Voltage: Available in 230V/50Hz EC600. EC600. EC600.S. EC1600/S/T. ECW2500T also available in 230V/60Hz															

# 'SemiChill' Recirculating Coolers

## **Recirculating Coolers** for more demanding industrial applications Also ideal for use in semiconductor applications

## Top quality and reliability

Maximum reliability during continuous operation in rough environmental conditions is achieved by using components and materials of the highest quality only. All wetted parts are made of stainless steel or high grade plastic.

## Benefits

 Convenient keypad operation and bright temperature display (see page 54)

- Industrial grade mains switch and emergency cut-off switch
- High cooling and pump capacities
- Highly efficient gasket-free immersing pumps ensuring maintenance-free continuous operation
- Electronically adjustable pump pressure in stages

# NEW and OUTSTANDING:

## The modular concept

Customize your recirculating cooler according to YOUR requirements and select from 5 basic models:

- Keypad and control electronics
- Working temperature range, e.g. -20 to +35 °C, or up to +130 °C
- Adjustable pump type / pump capacity
- Integrated heater
- Process integration (e.g. devicenet)
- Micro-filters and DI-filters

## Model descriptions:

Designation 'a' = ventilation-air-cooling Designation 'w' = water-cooled models

#### Suitable bath fluids:

- Water, water-glycol
- Silicon oils
- 3M-Fluorinert[®]
- ∘ Galden®

- Pressure indicator
  - Filling level indicator
  - Overload protection for pump motor and compressor

Julaba

- Filling port (70 mm dia.), sealed
- Handles and castors
- IP class according to IEC529 : IP21
- Operation in ambient temperatures up to +40 °C!



'SemiChill' Recirculating Coolers (Order numbers: see pages 54 & 55)

JULABO Basic model	Working temp. range ¹⁾ °C	Temp. stab. °C	Cooling +20	g capa O	acity kW -10 °C	Pump type/pump capacity	Filling volume liters	Dimensions W x L x H cm	Weight kg	Power requirement V / Hz
SC2500a	-20 +80	±0.1	2.5	1.5	0.9		2133	49 x 62 x 105	135	230~/50 or 208-230/60
SC2500w	-20 +80	±0.1	2.5	1.5	0.9	see	2133	49 x 62 x 105	135	230~/50 or 208-230/60
SC5000a	-20 +130	±0.1	5.0	2.5	1.2	page	4360	59 x 67 x 112	153	3 x 400~/50 or 3 x 208-230/60
SC5000w	-20 +130	±0.1	5.0	2.5	1.2	54	4360	59 x 67 x 112	153	3 x 400~/50 or 3 x 208-230/60
SC10000w	-20 +130	±0.1	10.0	5.0	2.5		4360	59 x 67 x 112	155	3 x 400~/50 or 3 x 208-230/60

¹⁾ Different working temperature ranges: see page 54 (standard working temperature range: +5 ... +35 °C)

🐑 www.julabo.de

# The modular concept

Customize YOUR unit with the following options:

····· · · · · · · · · · · · · · · · ·			
Keypad and control electronics	'Eco'	'EcoPlus'	'Professional'
Technical features			
MULTI-DISPLAY (LED) temperature indication	•	•	
VFD COMFORT-DISPLAY with simultaneous indication of 3 values			•
Keypad, splash-proof	•	۲	•
PID temperature control	•	۲	•
3-point calibration	•	۲	٠
Pump capacity adjustable in stages	•	۲	٠
RS232 interface	٠	۲	۲
'Stakei' connections for power supply (e.g. for a shut-off solenoid valve)	٠	۲	۲
Early warning system for low level, high and low temperature limits	٠	۲	٠
High temperature cut-off adjustable via display	•	•	•
Low liquid level protection with cut-off function	•	•	•
Classification III (DIN 12876-1)	•	•	•
Online diagnosis with 'Black Box' function	•	•	•
Connector for ext. Pt100 sensor for measuring and controlling the external system			•
Integrated programmer with real time clock for 1x10 program steps			•
Resistivity measurement/status display via LED: adjustable between 1 5 M $\Omega$ /cm		•	
Resistivity measurement & actual value display (range: 0.5 5 MQ/cm			•
Flow measurement and status display (factory-preset limit value)		•	•
Quantitative flow measurement and display on VFD			Option
Scalable analog interfaces (1 input, 2 outputs),			Ontion
standby input and alarm output			Uption
Devicenet interface			Option
Ethernet interface			Option
RS485 interface			Option

See fold-out page for icon feature description

## Working temperature range

Type: Working temperature range:	Standard +5+35°C	LowTemp -20+35°C	Low/HighTemp I -20+80°C	Low/HighTemp II -20+130°C
SC2500a, SC2500w	In basic model	Option	Option	
SC5000a, SC5000w, SC10000w	In basic model	Option	Option	Option

Circu	lating	pumps	

Pump type:	PO	P3	P4
Flow rate/pressure:	48 l/min1.8 bar	33 I/min3.5 bar	43 l/min4.3 bar
SC2500a, SC2500w	In basic model	Option 1)	
SC5000a, SC5000w SC10000w		In basic model	Option ¹⁾

## **Heaters**

Type: Heating capacity:	H1 1 kW	H5 5 kW
SC2500a, SC2500w	Option	
SC5000a, SC5000w, SC10000w		Option

1) Reduces cooling capacity by 0.2 kW · Pump connections: NPT 3/4" male

YOUR recirculating cooler can be equipped with one of the available heaters to provide an expanded working temperature range.

Pump capacities (Bath fluid: Water)

## DI-filter housings and micro-filter housings

All models can be fitted with filter housings (right side mounting). Please specify when placing an order. Filter housings cannot be retrofitted

- D1 DI-filter housing, plastic (to +35 °C max.), with cartridge D2
  - M1 DI-filter housing, stainless steel (bis +90 °C max.), with cartridge M2
- Micro-filter housing, plastic (to +35 °C max.), without cartridge Micro-filter housing, stainless steel (to +130 °C max.), without cartridge

'SemiChill' Recirculating Coolers

# Julabo

## **Order Information**

Compose the order number of YOUR recirculating cooler (Example: for model SC5000a):

07 P3 H0 D0 M1 9521 050



1) Voltage versions: SC2500a, SC2500w: 230V/50Hz or 208-230V/60Hz SC5000a, SC5000w, SC10000w: 400V(3ph.)/50Hz or 208-230V(3ph.)/60Hz

∃ info@julabo.de

## Accessories 'SemiChill'

Order No.	Description	Suitable for
8 920 016	Micro-filter cartridge 10 micron	Micro-filter housings plastic
8 920 017	Micro-filter cartridge 25 micron	Micro-filter housings plastic
8 920 018	Micro-filter cartridge 40 micron	Micro-filter housings plastic
8 920 019	Micro-filter cartridge 100 micron	Micro-filter housings plastic
8 920 020	Micro-filter cartridge 250 micron	Micro-filter housings plastic
8 920 036	Micro-filter cartridge 10 micron	Micro-filter housings stainless steel
8 920 037	Micro-filter cartridge 25 micron	Micro-filter housings stainless steel
8 920 038	Micro-filter cartridge 40 micron	Micro-filter housings stainless steel
8 920 039	Micro-filter cartridge 100 micron	Micro-filter housings stainless steel
8 920 040	Micro-filter cartridge 250 micron	Micro-filter housings stainless steel
8 920 005	DI-filter cartridge	DI-filter housings, plastic/stainl. stee
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	All models
8 890 036	2 Barbed fittings for tubing 1/2" inner dia. to NPT 3/4" female	All models
8 890 037	2 Barbed fittings for tubing 5/8" inner dia. to NPT 3/4" female	All models
8 890 038	2 Adapters NPT 3/4" female to M16x1 male	All models
8 980 073	RS232 interface cable, 2.5 m	All models
8 900 110	USB Interface adapter cable	All models
8 980 030	PBI Profibus Interface Box	All models





Options: DI-filter housings and micro-filter housings mounted on the unit

Order No. Description

## **Accessories Recirculating Coolers**

Suitable for

control



Reinforced tubing CR® tubing



Tubing insulation Tube clamps



Twin distributing adapter Quad distributing adapter



Solenoid valve for return flow safety device



External Pt100 sensor / M+R in-line Pt100 sensor

Tubing		
8 930 008	1 m CR® tubing, 8 mm inner dia. (-20 +120 °C)	AWC100, F200, FL300
8 930 010	1 m CR [®] tubing, 10 mm inner dia. (-20 +120 °C)	AWC100, F200
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 / 1/2" inner dia. (-40 + 120 °C)	FL601/1201/1701 + FC series
8 930 319	1 m Reinforced tubing, 3/4" 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
<b>T</b> 1 · · · ·	· · · · · · · · · · · · · · · · · · ·	
Tubing I	nsulations	
8 930 410	1 m Insulation, 14 mm inner dia.	CR [®] tubing 8 to 10 mm inner dia.
8 930 412	I m Insulation, 18 mm inner dia.	Reinforced tubing 8 mm ID
8 930 413	I m Insulation, 23 mm inner dia.	Reinforced tubing 12 mm/ 1/2" ID
0 330 413	1 m Insulation, 25 mm inner die	Reinforced tubing 14 ID
0 330 423		Reinforced tubling 1 TD
Tube cla	amps	
8 970 480	2 Tube clamps, size 1	CR® tubing 8 inner dia.
8 970 481	2 Tube clamps_size 2	CR® tubing 10 mm inner dia.
0 070 401		Reinforced tubing 8 mm ID
8 970 482	2 lube clamps, size 3	Reinforced tubing 12 mm/ 1/2" ID
8 970 483	2 lube clamps, size 4	Reinforced tubing 3/4" ID
8 970 484	2 Tube clamps, size 5	Reinforced tubing 1" ID
Twin di	stributing adapters / Quad distributing adapters	
8 970 470	Twin distributing adapter with barbed fittings for tubing 8 mm ID	FL + FC series
8 970 472	Twin distributing adapter with barbed fittings for tubing 10 mm ID	FL + FC series
8 970 471	Twin distributing adapter with barbed fittings for tubing 12 mm ID	FL + FC series
8 970 476	Twin distribut adapter $G^{3}/4^{\circ}$ with barbed fittings for tubing $3/4^{\circ}$ ID	FI (\V/)1203/1703/2503/4003
8 970 477	Twin distribut, adapter G $1^{1/4}$ " with barbed fittings for tubing 1" ID	FL(W)2506/4006/7006/11006
8 970 474	2 Quad distributing adapters M16x1	FC series
	with barbed fittings for tubing 8 mm or 12 mm/ $^{1}/_{2}$ inner dia.	
8 970 520 ¹	¹ 2 Quad distributing adapters, M16x1.	FL(W)601/1201/1701
	with barbed fittings for tubing 8 mm or 12 mm/ $^{1}/_{2}$ inner dia.	
8 970 522 ¹	¹ 2 Quad distributing adapters, G ³ / ₄ " female,	FL(W)1203/1703/2503/4003
	with barbed fittings for tubing 3/4" inner dia.	
8 970 524 ¹	⁾ 2 Quad distributing adapters, G 1 ¹ /4" female,	FL(W)2506/4006/7006/11006
	with barbed fittings for tubing 1" inner dia.	
	1) Recommendation: Use shut-off valves additionally.	
Connec	tors / Stainless steel adapters	
8 890 040	2 Adapters $G^{3}/4^{\prime\prime}$ female to M16x1 male	FL (\V/)1203/1703/2503/4003
8 890 041	2 Adapters G $1^{1/4}$ " female to M16x1 male	FL(W)2506/4006/7006/11006
8 890 042	2 Adapters $G^{3}/4^{*}$ female to harbed fitting for tubing $1/2^{*}$ inner dia	EL (\\/)1203/1703/2503/4003
8 890 043	2 Adapters G $\frac{3}{4}$ female to barbed fitting for tubing $\frac{3}{4}$ inner dia	FL(W/)1203/1703/2503/4003
8 890 044	2 Adapters G $1^{1/4}$ " female to barbed fitting for tubing $1/2$ " inner dia	EL (\V/)2506/4006/7006/11006
8 890 045	2 Adapters G $1^{1/4}$ female to barbed fitting for tubing $3/4$ inner dia.	EL(W/)2506/4006/7006/11006
8 890 046	2 Adapters G 1 ¹ / ₄ " female to barbed fitting for tubing 1" inper dia	EL (W)2506/4006/7006/11006
8 890 047	2 Adapters G $^{3}/_{4}$ " female to NPT $^{1}/_{2}$ " male	FL (W)1203/1703/2503/4003
8 890 048	2 Adapters G $^{3}/_{4}$ " female to NPT $^{3}/_{4}$ " male	FL (W/)1203/1703/2503/4003
8 890 049	2 Adapters G $1^{1}/4^{*}$ female to NPT $1/2^{*}$ male	EL(W)2506/4006/7006/11006
8 890 050	2 Adapters G $1^{1}/4^{*}$ female to NPT $3/4^{*}$ male	FL (VV)2506/4006/7006/11006
8 890 051	2 Adapters G 1 ¹ / ₄ " female to NPT 1" male	FL(W)2506/4006/7006/11006
000001		(,
Shut-of	valves / Solenoid valve	
8 970 456	Shut-off valve for loop circuit, M16x1	FL300/601/1201,1701, FC series
8 970 454	Shut-off valve G ³ /4"	FL1203/1703/2503/4003
8 970 458	Shut-off valve G 1 ¹ /4"	FL(W)2506/4006/7006/11006
8 980 701	Solenoid valve set for loop circuit (max. +100 °C), M16x1	FC series (return flow safety device)
Externa	l Pt100 sensors	
8 981 003	External Pt100 sensor 200 x 6 mm dia stainless steel	EC1200T EC1600T ECW2500T
8 981 020	M+R in-line Pt100 sensor, including 2 fittings M16x1 male	external measurement &
001020	the second of th	oncontantinououronionic or

# Bath fluids / Lab automation see pages 31/57

(for installation in the loop circuit)

Lab Automation

## Controlling • Programming • Viewing • Recording

JULABO offers YOU the most suitable software for YOUR application. YOU save time, make YOUR work easier – control, optimize, visualize and record temperature and time-dependent processes without any hassle.

For routine control tasks of only one JULABO instrument, the FREE 'EasyTemp' is ideal (download at www.julabo.de). For more demanding applications JULABO offers 'EasyTemp Professional' for controlling up to 8 instruments. The connection is carried out inexpensively and simply via digital RS232 interface or USB converter. Ask JULABO!

JULABO Software Solutions offer:	Easy TEMP	
Control of one JULABO unit with integrated interface	•	•
Control of up to 8 JULABO units with integrated interface		
Instrument window:		
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	•	
Display of up to 4 curves in one diagram	•	
Display of up to 16 curves in one diagram		•
Up to 4 definable scales		•
Curves can be assigned to individual scales		•
Entry of formulas such as averaging, differences between measured values, etc.		•
Entry of 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	•	•
Modifications to running profiles	•	
Graphic display of total profiles		
Data recording:		
Recording of measured values in ASCII format	•	
Recording of measured values in Excel		
Saving of further relevant measuring data		
Scalable monitoring pattern		
Trigger function for recording		
Export function of graphs into JPG format		
Loading of previously created recordings with print function		
Ontions:		
Control and integration of laboratory instruments of different makes, e.g. labora-		
tory stirrers, magnetic stirrers, analyzing balances, dosing pumps, nH meters, etc.		on request
Drivers for interfaces such as Profibus, Devicenet, Ethernet, RS485		on request
21 CFR 11 conformity		on request

Order No.	Description	Suitable for
8 901 102	'EasyTemn' control software (free download at www.iulabo.de)	Units with BS232
8 901 105	'EasyTemp Professional' control software, with USB dongle	Units with RS232
8 980 073	RS232 interface cable, 2.5 m	Units with RS232
8 980 075	RS232 interface cable, 3.0 m	SW22 + SW23 shaking water baths
8 900 110	USB interface adapter cable	Units with RS232
8 900 015	PBM Profibus DP Master	Connection via USB port on PC
8 900 005	PB-5 Option: integrated Profibus DP	'HighTech' circulators HL, SL
8 900 002	PB-2 Option: integrated Profibus DP	Presto®, Magnum 91, Forte HT
8 900 003	PB-3 Option: integrated Profibus DP	LC6 programmable controller
8 980 030	PBI Profibus DP Interface Box	Units with RS232

## **Customized solutions**

JULABO offers a turnkey automation solution including custom software and hardware solutions for specific appliations. JULABO offers YOU a turnkey dedicated solution to your automation requirements.

57

Julabo

# Water Baths

JULABO Water Baths are clearly superior to other water baths. They provide numerous features and significant benefits for YOU and YOUR work:

The sloped tank rim keeps the water in the stainless steel bath tank where it belongs. No dripping, no condensation even when the lid is opened.

## Features of TW2

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

## TW8, TW12, TW20 provide

- Drain screw
- Handles for easy relocation



#### Makrolon® covers are optionally available for all models. Details see page 59.

TW2		TW8			June 1		TA	2000 CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR CONTRACT	
JULABO Order No.	JULABO Model	Working temp. range °C ¹⁾	Temperature stability °C	Heat. cap. kW ²⁾	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	Weight kg
Water Ba	ths					Technical features	898	PID 1	<b>S1</b>

vvater Ba	itiis					(see fold	-out page)		<b>FID</b>	31
9 550 102	TW2	20 99.9	±0.2	1/1	15 x 13 / 11		24	12	17 x 16 x 26/37	3.5
9 550 108	TW8	20 99.9	±0.2	2/1	23 x 27 / 14	180	120	38	29 x 32 x 28/44	8.1
9 550 112	TW12	20 99.9	±0.2	2/1	35 x 27 / 14	270	180	512	40 x 32 x 28/44	9.8
9 550 120	TW20	20 99.9	±0.2	2/1	50 x 30 / 18	360	240	822	56 x 35 x 32/49	14.2

¹⁾ For applications at or near ambient temperature: Counter-cooling with tap water and liquid level/cooling set (accessory) 2) At voltage 230V/50-60Hz / 115V/50-60Hz

## Benefits:

- Overall splash-water protection
- Keypad with water-protected mains switch
- · User-friendly operation, best reproducibility of the set values
- Bright temperature indication (LED) for actual and setpoint values
- Display resolution: 0.1 °C
- Dry-running protection
- Audible warning signal with optical indication for the cut-off function
- Removable bottom plate

## Applications

	••		
0	Routine laboratory	0	Temperature control
	applications		of samples
0	Cell cultivation	0	Incubations

- Temperature testing of Material testing
- food and luxury articles Corrosion tests

## Accessories

## Makrolon[®] covers

The lift-up Makrolon[®] cover is recommended for use at working temperatures above +60 °C, particularly to protect samples from contamination.

## TW8, TW12, TW20;

JULABO

Order No.

8 970 289

8 970 286

8 970 287

8 970 288

8 970 270

8 970 271

8 970 278

8 970 272

8 970 273

8 970 415

8 970 380

8 970 381

8 970 382

8 970 383

- Flat bath covers are also available
- · For counter-cooling of applications at or near ambient temperature to ensure continuous water supply: Liquid/level cooling set (illustration on the right)
- Test tube racks made of Polypropylene[®] or stainless steel

Description

Dimensions

17 x 16 x 16 cm

29 x 32 x 16 cm

40 x 32 x 16 cm

56 x 35 x 17 cm

with 1 opening

with 4 openings

with 6 openings

Flat stainless steel bath covers with sets of rings

with 2 openings 190 mm dia.

with 6 openings 115 mm dia.

Cooling installation/continuous water supply

Liquid level/cooling set

(see illustration above)

Test tube racks to +80 °C, Polypropylene®

for 60 test tubes

for 90 test tubes

for 21 test tubes

190 mm dia.

92 mm dia.

92 mm dia.

16/17 mm dia.

12/13 mm dia.

30 mm dia.

Lift-up Makrolon[®] covers

• The water bath protective media 'AquaStabil' is particularly recommended for long-term usage

## Liquid level/cooling set

- for continuous water supply · to maintain a constant liquid level at high
- temperatures · for counter-cooling of applications at or near

ambient temperature

Prevents liquid losses

protects samples from

Beakers or Erlenmeyer flasks

the perforated stainless steel

To maintain a constant liquid level.

TW12

3

TW20

4

can be placed directly onto

due to evaporation.

contamination

bottom plate.

for counter-cooling

Insert capacity

test tube racks

TW8

2

Remarks

Liquid level/cooling set



Makrolon® cover



Polypropylene® test tube racks

#### Test tube racks to +100 °C, stainless steel

for 90 microliter tubes 11/12 mm dia.

8 970 330	for 24 test tubes	16/17 mm dia.	TW2	Incort	oonooity		
8 970 344 8 970 345	for 50 test tubes for 90 test tubes	16/17 mm dia. 12/13 mm dia.	TW8, TW12, TW20	test tu TW2	be racks TW8	TW12	TW20
8 970 346 8 970 347	for 21 test tubes	30 mm dia.		1	2	3	4
Water bath protective media 'Aqua-Stabil'							
8 940 006 8 940 012	6 bottles, 100 ml ea	ch ch		To pre	vent conta	amination f algae	ı

for

model

TW2

TW8

TW12

TW20

TW8

TW8

TW12

TW20

TW20

TW8, TW12, TW20

TW8, TW12, TW20

∃ info@julabo.de

Stainless steel test tube racks



58



JULABO Shaking Water Baths provide features that you will always find useful. The sloped tank rim keeps the water in the

## **Benefits:**

- Overall splash-water protection
- · Keypad for adjustment of setpoint temperature, shaking frequency and early warning functions
- · User-friendly operation, best reproducibility



- MULTI-DISPLAY (LED) for ac setpoint, high/low temperatu functions and shaking freque
- Display resolution: 0.1 °C or
- Dry-running protection
- Audible signal for warning a
- Electronic timer (0... 10 operation)



· Shaking carriage is removable: No direct contact with the bath fluid, carrier trays can be assembled outside the bath.

All units have a handle for easy relocation. Upon removing the drain screw, a cooling coil can be fitted to provide counter-cooling with tap water.

For details on accessories, please refer to page 61.



condensation - even when the lid is opened.

Applications	
<ul> <li>Biochemical research</li> </ul>	<ul> <li>Routine laboratory</li> </ul>
<ul> <li>Material testing</li> </ul>	applications

- Enzyme and tissue studies Corrosion tests
- Fermentation Homogenization
- Temperature testing of Incubations
- food and luxury articles Thawing of blood plasma

**Shaking Water Baths** 

stainless steel bath tank where it belongs. No dripping, no

# Accessories

- The lift-up Makrolon[®] cover is recommended for use at working temperatures above +60 °C for both models.
- · Large selection of carrier trays for Erlenmeyer flasks and test tubes is available
- · For counter-cooling at or near ambient temperature, use the cooling coil (order no. 8 970 416).
- To maintain a constant liquid level: use the liquid level/cooling set (order no. 8 970 415)

JULABO Order No.	Description	JULABO Order No.	Description	_
Bath cove	er			
8 970 288	Lift-up Makrolon® cover			- AN
Cooling i	nstallation/continuous water sup	ply		
8 970 415	Liquid level/cooling set (ill. page 59)	8 970 416	Cooling coil (fig. 1)	1
All-purpo	se spring tray (fig. 2)			Cooling coil
8 970 630				
Standard	ALLER.			

#### 8 970 360 for 45 flasks 8 970 364 for 11 flasks 250-300 ml 25 ml 8 970 361 for 32 flasks 50 ml 0 ml 8 970 362 for 18 flasks 100 ml 0 ml for 15 flasks 8 970 363 200 ml

8 970 365	for	8 flasks	500
8 970 366	for	5 flasks	1000

## Carrier tray and spring clamps (fig. 4)

8 970 620 Basic tray for assembling spring clamps on a mix and match basis

#### Spring clamps

Option 8 810 050

8 970 601 8 970 602 8 970 603 8 970 603	for for for for	10 ml flasks 25 ml flasks 50 ml flasks 100 ml flasks		8 970 606 8 970 607 8 970 608 8 970 608 8 970 609	for for for for	200-250 ml flasks 300 ml flasks 500 ml flasks 1000 ml flasks	

Fig. 4 shows the basic tray assembled with different spring clamps.

## Carrier tray with test tube racks (fig. 5)

8 970 369 Basic tray for assembling a maximum of 4 test tube racks

<b>Fest tube racks</b>	<b>Test tube racks</b>			
nade of Polypropylene® (to +80 °C)	made of stainless steel (to +100 °C)			
8 970 380         for 60 test tubes, 16/17 mm dia.           8 970 381         for 90 test tubes, 12/13 mm dia.           8 970 382         for 90 microliter tubes, 11/12 mm dia.           8 970 383         for 21 test tubes, 30 mm dia.	8 970 344         for 50 test tubes, 16/17 mm dia.           8 970 345         for 90 test tubes, 12/13 mm dia.           8 970 346         for 90 microliter tubes, 11/12 mm dia.           8 970 347         for 21 test tubes, 30 mm dia.			

Fig. 5 shows the basic tray assembled with different test tube racks.

Carrier tr (to +80 °C)	<b>ays</b> with test tube racks (complete)	Lab auto	mation
8 960 440 8 960 441 8 960 442 8 960 443	for 240 test tubes, 16/17 mm dia. for 360 test tubes, 12/13 mm dia. for 360 microliter tubes, 30 x 11/12 mm dia. for 84 test tubes, 30 mm dia.	8 901 102 8 980 075 8 900 110	'EasyTemp (free down RS232 inte for direct F USB Interf

## control software load www.julabo.de) rface cable, 3 m C connection ace adapter cable



Carrier tray with test tube racks

The shaking water bath must be factory-prefitted with the shaking tray positioner. Please specify when placing an order. It cannot be retrofitted.



Standard carrier tray



Basic tray with spring clamps

Shaking tray positioner







JULABO Order No.	JULABO Model	Working temp. range °C ¹⁾	Temperature stability °C	Heat. cap. kW ²⁾	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	Weight kg
Shaking	Water Bat	hs		Technical (see fold-o	features out page)	B		<b>PID 1</b>	R\$232	<b>S1</b>
9 550 322	SW22	20 99.9	±0.2	2/1	50 x 30 / 18	8 20	20 200	15	70 x 35 x 26/43	19.4
9 550 323	SW23	20 99.9	±0.02	2/1	50 x 30 / 18	8 20	20 200	15	70 x 35 x 26/43	21.4

¹⁾ For applications at or near ambient temperature: Counter-cooling with tap water and liquid level/cooling set (accessory) 2) At voltage 230V/50-60Hz / 115V/60Hz

SW22 with optional lift-up Makrolon® cover and carrier trav (accessories)

SW23

3.10

60



Julabo

# **Temperature Controllers**

1 Schuko socket for the external device
digital and analog interfaces

• LCD-Display, backlit: offers interactive and

High/low temperature warning functions

· Adjustable high temperature cut-off,

visible via MULTI-DISPLAY

user-friendly operation on LC6 and PG6 programmer

· Audible and optical alarms in case of a disturbance

Applications

Precise and reliable

temperature control for

• Heating mantles, heating collars

• Oil baths in combination with

· Control for indirect tap water

cooling with solenoid valve

distillation/pilot plants

(see illustration above)

They provide connections for:

1 or 2 working sensors

1 safety sensor

Temperature Controllers are designed for measuring, controlling and monitoring of any electrically heated equipment in laboratories and pilot plant stations.

Benefits:

1468

- Simple to operate
- Splash-proof keypad
- High temperature stability
- Bright MULTI-DISPLAY (LED)
- Display resolution 0.1 °C or 0.01 °C, resp.



INCO : 11

-----

with 2 LED displays 1. MULTI-DISPLAY for actual value and adjustment of setpoint, warning and safety values 2. Constant indication of setpoint

## LC4-F

LC4

with separate operating elements for working and safety circuits and 4 LED displays for • Actual value and adjustment of setpoint

- Actual value and adjustment of setpoint and warning values (MULTI-DISPLAY)
   Constant indication of setpoint
- Constant indication of actual safety value
- and adjustment of safety setpoint
  Constant indication of safety setpoint
- Analog inputs and outputs



## LC6 programmable controller with 1 LED and 1 LCD display

- th 1 LED and 1 LCD display
- 2 working sensors for different measurement locations (cascade-controller)
- Analog inputs and outputs for 0...10 V or 0...20 mA/4...20 mA
- 'Stakei' connection for direct
- tap water cooling control • Integrated programmer for 6 x 60 program steps



¹⁾ At voltage 230V/50-60Hz / 115V/50-60Hz

# Programmable Controller, Programmer Julabo

## Accessories

			the second se
Order No.	Description	Suitable for	0
t100 sei	nsors with high quality Lemosa plug		2
8 981 003 8 981 005 8 981 006 8 981 010 8 981 013 8 981 014 8 981 103 8 981 030	200 x 6 mm dia., stainless steel, 1.5 m cable 200 x 6 mm dia., glass, 1.5 m cable 20 x 2 mm dia., stainless steel, 1.5 m cable 300 x 6 mm dia., stainless steel, 1.5 m cable 600 x 6 mm dia., stainless steel/Teflon coated, 3 m cable 1200 x 6 mm dia., stainless steel/Teflon coated, 3 m cable 3.5 m Extension cable for Pt100 sensor TCCB Thermo-Couple Converter Box	LC4, LC4-F, LC6	Pt100 sensors
9 790 000 8 980 700	MVS solenoid valve controller for tap water cooling Solenoid valve for tap water cooling	LC4, LC4-F LC4, LC4-F, LC6	
Addition	al accessories		00 00 000

8 970 020	Stand rod, 200 x 12 mm	LC4
8 970 021	Stand rod system, 200 x 12 mm	LC6
8 980 142	Y-adapter cable for connecting 1 dual Pt100 sensor to 2 Lemosa sockets (conforming to NAMUR)	

## Software / Lab automation

8 901 102 8 901 105 8 980 073 8 900 110 8 900 015	'EasyTemp' control software (free download www.julabo.de) 'EasyTemp Professional' control software, incl. USB dongle RS232 interface cable, 2.5 m USB Interface adapter cable PBM Profibus DP Master	LC4, LC4-F, LC6
8 900 003	PB-3 Option: integrated Profibus DP	LC6
8 980 030	PBI Profibus DP Interface Box	LC4, LC4-F

For MORE information on lab automation and software solutions, please see page 57.

## PG6 programmer, remote controller

This model is suitable for analog and digital control of circulators and recirculating coolers.

#### Benefits:

- Programming of temperature and time-dependent processes
- 6 x 60 program steps
- RS232 interface

The PG6 can also be used as remote controller, particularly for JULABO circulators located in a fume cabinet, where it is quite difficult for the user to get easy access.

15555 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		A 8 8	LCCESSOFI 980 090 Dig 980 092 An	<b>ES</b> jital control c alog control d	able, 2.5 m cable, 2.5 m		<b>A</b> • •	<b>pplicatio</b> JULABO 'Hig refrigerated Recirculatin Heating and of different r	ns ghTech' heatin circulators g coolers 'Sen cooling devic nakes	g and niChill' es	
JULABO Order No	JULAB0 Model	Adjustable	Adjustment	LED display /	LCD display /	Analog outputs	nnt	Total power	Dimensions	Weight	l

P	rogramm	ier					<b>Technical features</b> (see fold-out page)	888	Sero. 1: 556.00°C Infice: 556.00°C Power: 5276 Carrons: Infice		RS 232	6×60
!	750 060	PG6	-99.9+400	digital	1/0.1	1/0.1	010 V or 020/4	20 mA	100	21 x 18	3 x 18	4

∃ info@julabo.de

V/mA

°C

°C

Voltage: Available in 230V/50-60Hz or 115V/50-60Hz

cm

range °C

W

kq

8

LC4-F, MVS controller, solenoid valve

# Circulators & Units ...

## • Combinatorial chemistry, reaction systems, petro-analysis



Voltage: Available in 230V/50Hz or 230V/60Hz

## ... for special applications

# Julabo

## • For MOCVD applications

for temperature control of bubblers in the circulator bath

## **Benefits:**

- Ventilation-air-cooling, instead of water-cooling
- Bath openings for one or two bubblers

•	Active Cooling Control throughout the entire temperature range
	•

- Removable venting grid
- Front drain accessibility



Model	Usable
selection:	bath depth:
FS20-MC / FW20-MC:	180 mm
FS30-MC / FW30-MC:	230 mm

JULABO Order No.	JULABO Model	Working temp. range °C	Temp. stab. °C	Heat. cap. kW ¹⁾	Coolir (Bath 20	ig capaci fluid: Eth O	ity kW anol) -20°C	Pump cap Flow rate/ I/min.	bacity Pressure bar	Bath opening/ bath depth W x L / D cm	Fill. vol. liters	Dimensions W x D x H cm	Weight kg
Refrigera Heating C	ted/ Circulator	Tech S (see	<b>inical fea</b> fold-out j	tures bage)	888) 10		PID	2 <b>ATC</b> ³	SMAR PUM	<b>RS232</b>			<b>S</b> 3
9 150 622	FS20-MC	-25 +80	±0.02	2/1	0.26	0.2	0.06	11-16	0.45	11 x 11 / 20	5 7	23 x 42 x 66	34
9 150 636	FS30-MC	-30 +80	±0.02	2/1	0.46	0.34	0.15	11-16	0.45	22 x 14 / 25	12 15	31 x 42 x 75	42

## water-cooled models

9 150 623	FW20-MC	-25 +80	±0.02	2/1	0.26	0.2	0.06	11-16	0.45	11 x 11 / 20	57	23 x 42 x 66	34
9 150 635	FW30-MC	-30 +80	±0.02	2/1	0.46	0.34	0.15	11-16	0.45	22 x 14 / 25	12 15	31 x 42 x 75	42

1) At voltage: 230V/50Hz / 115V/60Hz

## • Refrigerators for Chemicals with explosion-proof interior

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



JULABO Order No.	JULABO Model	Working temp. range °C	Temperature selection / Temp. display	Temp. stability °C	Volumetric capacity liters	Inner dimensions W x L x H cm	Outer dimensions W x L x H cm	Weight kg
8 800 705	KRC50	-2 +12	Analog / LED	±1	50	42 x 31 x 39	53 x 63 x 54	23
8 800 718	KRC180	-2 +12	Analog / LED	±1	180	52 x 40 x 70	60 x 64 x 86	35

Voltage: Available in 230V/50Hz

🐑 www.julabo.de

# ... Frequently Asked Questions (FAQs)

## ... the Answers

#### What is working temperature range?

Working temperature range is the range within the operating temperature range which can be reached by the circulator itself and without external cooling, based on an ambient temperature of +20 °C.

#### What is operating temperature range?

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 down to the maximum of the lower operating temperature range

#### What is temperature stability?

Temperature stability is the maximum temperature difference at one specific measuring point in the circulator bath.

#### What is temperature uniformity?

Temperature uniformity is the maximum temperature difference at different measuring points in the circulator bath. This is especially important for calibration tasks (pages 38-40). In JULABO circulators temperature uniformity differs only slightly from temperature stability. Visco baths and Calibration baths offer the best temperature uniformity.

#### What advantages are featured by JULABO displays?

JULABO LED displays are visible at large distances and from every angle. MULTI-DISPLAY (LED) refers to the possibility of not only displaying actual and setpoint values, but also values for high / low temperature warning and high temperature cut-off

Additionally the MULTI-DISPLAY (LED) enables the indication of the desired pump stage in circulators with electronically adjustable pumps and the display of the shaking frequency in shaking water baths.

#### JULABO high end products feature the VFD COMFORT-DISPLAY.

This display aims at providing even more illuminating power, clearness and brilliance as well as an even easier operator assistance

It features the unique simultaneous indication of three temperature values: Internal actual temperature, setpoint temperature and external actual temperature are permanently displayed. Furthermore the selected pump stage is visible at all times on the integrated illuminated pump stage display.

#### Which JULABO units feature interactive operator assistance?

JULABO circulators of the 'HighTech' Series, the high dynamic temperature systems 'Presto' and 'Forte HT', as well as LC6 programmable controller feature additionally a 4-line backlit and interactive LCD DIALOG-DISPLAY for user-friendly operation. As well as actual and setpoint values, it is possible to indicate, for example, the control mode (internal/external), heating or cooling canacity as well as external setuoint values

#### What is the difference between PID and ICC temperature control?

JULABO PID1, PID2 and PID3 controllers have fixed control parameters (Xp, Tn, Tv). These can be changed manually in PID2 and PID3 controllers in order to get an improved temperature stability especially in external operating mode

ICC (Intelligent Cascade Control) currently represents the world's most advanced and absolutely unique temperature control system. ICC features perfect temperature control through automatic and self-optimizing adjustment of PID control parameters according to the application.

ICC temperature control is featured in JULABO circulators of the 'HighTech' series, high dynamic temperature control systems and the LC6 programmable controller.

#### What benefits do the 'TCF' Temperature Control Features offer? a) 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 temperature controlled equipment through careful temperature application, protection of e.g. glass reactors from thermal shock

#### b) Dynamics:

Option to choose between aperiodic and normal PID behavior when using internal control mode Aperiodic (default value): Perfect, but takes slightly longer to reach the

setpoint without overshoots.

Normal: Reaches the setpoint fast, but with small overshoots. The same applies to refrigerated circulators (undershoots). c) 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.

#### d) Co-sneed 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 for reaching the setpoint, but the possibility of overshoots increases

#### What tasks are done by JULABO pumps?

JULABO uses immersion pumps which are designed to work 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 closed or open 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 (loon circuits)

The models MC, ME, 'Presto', Magnum 91 and 'Semichill' feature electronically adjustable pump capacities in stages.

All circulators of the 'HighTech' series 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 connected external glass equipment (autoclaves, reactors) the advantage is that by adjusting maximum pressure, damage to the glass vessel can be avoided.

#### What has to be considered when using RS232 interfaces?

It is important to use a null-modem cable to enable communication between the PC and the JULABO unit. RS232 interface cable and USB interface adapter cable are available as accessories.

#### Which refrigerants are used by JULABO?

For many years JULABO refrigerating systems have been filled exclusively with CFC-free refrigerants.

#### What is the meaning of 'ACC' Active Cooling Control?

The 'ACC' range is the working temperature range in which the refrigeration system remains active as long as refrigeration is desired or required. All JULABO units feature working temperature ranges which correspond to the 'ACC' ranges. Thus the refrigeration system can also be used at high temperatures (e.g. +200 °C) for fast cool-down.

#### What does proportional cooling control mean?

Refrigerated units without proportional cooling have refrigeration systems which are either switched on or off. This means they are either working with 100 % or 0 % cooling power. Systems with proportional cooling have a special electronic valve which can automatically control cooling capacity between 0 % and 100 %. This allows for accurate control of required cooling power at any temperature and at the same time saves energy.

#### What advantages are featured by JULABO early warning systems (patented)?

The reason for an untimely cut-off caused by the low liquid level protection is a lack of bath fluid. Usually processes involving temperature application should not be interrupted in order to avoid major damages (e.g. when incubating in the circulator bath or when applying temperature control externally to a reactor)

# ... Frequently Asked Questions (FAQs)

The early warning system for low liquid level indicates through an

Furthermore an undesired change of the set actual value, e.g. through an

exothermic reaction, can be detected and indicated acoustically. For this

purpose limit settings, e.g. 2 °C above and below the actual temperature are

set via the display. When there is a warning counter-active measures can be

This is required for special applications, but can be switched back to the

Changing to cut-off is especially popular in low temperature ranges in order

to use this function as a low temperature cut-off with permanent signal tone.

Of course all JULABO units conform with the requirements of the CE label

guidelines, and comply with safety requirements. The following harmonized

What does the classification according to DIN 12876-1 indicated on the type

Terms and classifications are specified in DIN 12876 and provide information

Units of this class feature a fixed high temperature or dry-running protection.

Units of this class feature adjustable high temperature cut-off and additional

low liquid level protection. The units are suitable for operation with

High temperature cut-off is adjustable in all circulators. It is indicated on

a display (MULTI-DISPLAY LED / VFD COMFORT-DISPLAY) and can be

• If the set high temperature value or an impermissible low liquid level is

detected an optical indication appears and an audible signal sounds

All JULABO units include a constant monitoring of the difference between

safety and working temperature sensor which cuts-off the unit if the

difference between these two sensors exceeds 25 K. The cut-off is also

effected in case one of the two sensors is defective and has to be

replaced. The safety sensor has an additional function as a dry-running

Furthermore a plausibility control of both sensors through software is

All JULABO units can be operated failure-free at ambient temperatures

between +5 and +40 °C (or +35 °C for ultra-low units with two-stage

cascaded technology). Optimal ambient conditions are ambient temperature

Information on mains voltages and net frequencies required for safe

Warranty time for proper operation of all units is 12 months. The 1PLUS-

Warranty provides the user with a free extension of warranty time to

24 months, limited to a maximum of 10,000 operating hours. The registration

What are permissible ambient conditions for JULABO units?

of +20 °C and approximately 50 % relative humidity.

Which mains voltages and frequences are permissible?

for the 1PLUS-Warranty can be carried out at www.julabo.de!

operation can be found on the type label of each unit.

What is the warranty time given by JULABO?

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

Why can temperature alarm indications be set to automated cut-off?

Which norms and standards do JULABO units comply with?

JULABO units belong to the following classification:

Class I: (JULABO abbreviation 'S1')

Class III: (JULABO abbreviation 'S3')

What does JULABO offer beyond DIN?

norms and standards are applied: EN 61010, EN 61326, WEEE/RoHS.

intermittent signal tone that bath fluid has to be refilled.

normal warning function at any time.

taken

lahel mean?

on the application.

flammable bath fluids.

accessed at any time.

nermanently

protection.

always active.

#### What has to be taken into account when connecting an external system?

- 1. Tubing between the circulator and the external system has to be kept as short as possible and has to be secured to prevent displacement.
- 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 strictures in the tubing).
- 5. When using an external temperature sensor it has to be well integrated into the system.

#### What advantages does metal tubing offer?

Flexible JULABO metal tubing can be connected with the circulator and the external system thus avoiding displacement. The integrated insulation prevents loss of performance.

#### Which bath fluids should be used?

For working temperature ranges up to +80 °C JULABO recommends the use of de-ionized water. Distilled water tends to absorb composites from components, thus causing corrosion.

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 (page 31 and 45).

Especially when it comes to low temperatures the permissible viscosity, as stated in the operating manuals, must not be exceeded.

Alcohols, e.g. ethanol, only have a limited range of applications due to their extremely low fire point.

#### Are cool-down and heat-up times shorter when using JULABO THERMAL hath fluids instead of water and alcohol?

The required cooling/heating capacity in Watts or Kilowatts is less when using silicon oils (THERMAL). Therefore heat-up and cool-down times are shorter. The reason is that THERMAL bath fluids have lower specific heat capacities than water and alcohol.

#### How do you calculate the required cooling or heating capacity?

The following formula can be used for a time-dependent calculation: P = (m * c* dT) / t

- P = required cooling/heating capacity in kW
- m = mass of material in kg

∃ info@julabo.de

- 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 the 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 baths/reactors (material, thickness, surface), high ambient temperatures, open applications (surface). To allocate sufficient cooling / heating capacity a safety factor of 20-30 % should be integrated into the calculation.

### What about the JULABO online remote diagnosis with 'black box' function?

The new circulators, and recirculating coolers with at least 2.5 kW cooling capacity (both with RS232 interface), feature a special function to support the enduser. During operation a black box which is integrated in the unit works unnoticed and invisible in the background recording all relevant data from the last 30 minutes. In event of a problem this data can be downloaded via software from the circulator to a PC and sent to JULABO by e-mail. Based on this data fast and efficient support can be provided. The software 'EasyBlack Box' is available as a free download from www.julabo.de.

## JULABO Worldwide





JULABO Labortechnik GmbH Eisenbahnstrasse 45 77960 Seelbach / Germany +49 7823 51 0
+49 7823 2491

- T45 /025 2451
- 🖅 info@julabo.de
- 🕐 www.julabo.de