Julabo

THE TEMPERATURE CONTROL COMPANY

# TopTech | HighTech Circulators


ENGLISH

# Product Characteristics | Functions

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

## Display

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

**Several values at a glance**
Large Multi-Display (LED), easy to read across the room, for actual value and up to 3 setpoints: warning functions, high temperature cut-off, pump stages (display resolution 0.01/0.1 °C)

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

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

**Pump stage**
Illuminated bar display for pump stages

## Operation

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

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

## Temperature Control

**Precise**
PID Temperature control with set control parameters, temperature stability ±0.02...±0.2 °C

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

**For higher demands**
PID Temperature control with drift compensation and adjustable parameters, improved temperature stability for external applications, temperature stability ±0.01 °C internal, <±0.1 °C external

**For perfect results**
'**I**ntelligent **C**ascade **C**ontrol', automatic & self optimizing adjustment of PID control parameters, temperature stability ±0.005 °C internal, <±0.05 °C external

**Full control**
'**T**emperature **C**ontrol **F**eatures' for individual optimization, access to all important control parameters, additional settings for band limit, limits, co-speed- factor etc.

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

**Highest measuring accuracy**
'**A**bsolute **T**emperature **C**alibration' for compensation of a temperature difference, **3**-point calibration

## Refrigeration Technology

**Consistent cooling capacity**
Easily removable venting grid for quick and easy dust removal

**100 % cooling capacity**
'**A**ctive **C**ooling **C**ontrol' for full utilization of the cooling capacity available throughout the entire working temperature range, fast cool-down even at higher temperatures

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

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

## Technical Features

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

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

**Connection compliant to standard**
Combined RS232/RS485 interface for serial data transmission according to EIA-485 industry standard (2-wire bus technology), upgradeable with Profibus DP

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

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

**Optimal program control**
For the execution of time and temperature dependent profiles, 6 temperature profiles with 60 steps max., with real-time clock

## Warning & Safety Functions

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

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

**Protective function**
Adjustable high temperature cut-off or dry-running protection

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

**For flammable bath fluids**
Class III (FL) according to DIN 12876-1

## TopTech | HighTech Circulators

# Refrigerated Circulators

JULABO circulators and their well proven and reliable technology are valued by users around the world and in all industries. They are designed for day-to-day work in research, material testing or in production.
The JULABO range of circulators features functional solutions and has set the benchmark for temperature control technology for decades.

The JULABO range of circulators has the matching equipment for working temperatures to -95 °C. Choose your temperature control solution from two model series: TopTech Series & HighTech Series.

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

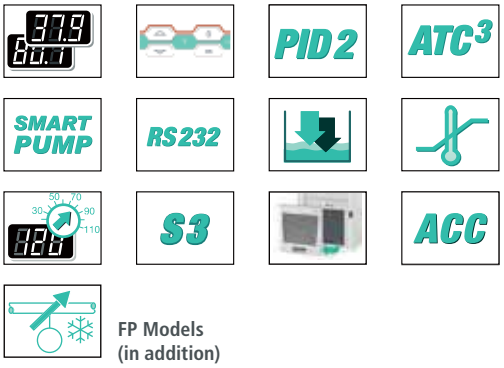
# TopTech | HighTech Circulators at a Glance

## TopTech

### MA Models

-50 °C ... +200 °C

**Middle class for a broad range of applications**



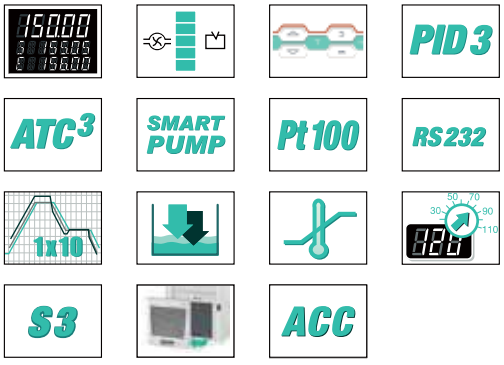

FP Models (in addition)

Connections for
② RS232
③ Refrigeration unit
④ Pump


### ME Models

-90 °C ... +200 °C

**Upper middle class with external Pt100 sensor connection**




FP Models (in addition)

Connections for
① External Pt100 sensor
② RS232
③ Refrigeration unit
④ Pump

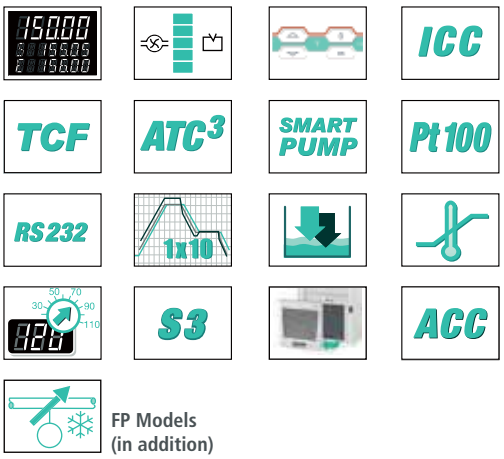

Please refer to the beginning of the brochure for a description of the icons shown above.

# HighTech

## HE/SE Models

-50 °C ... +200 °C

### Powerful sophisticated models for demanding applications



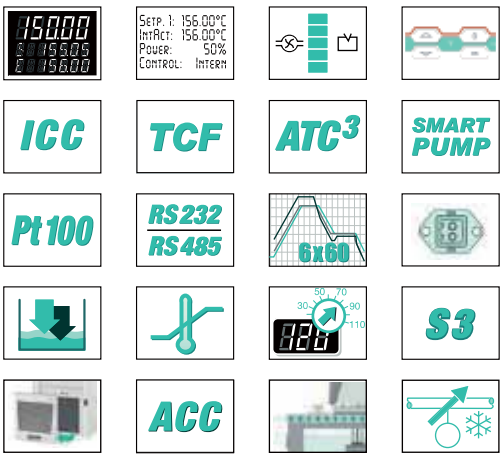

FP Models (in addition)

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


## HL/SL Models

-95 °C ... +200 °C

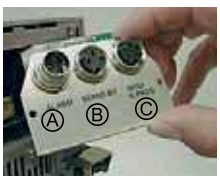
### Top class for demanding applications in any environment




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

Optional for HighTech Series

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



| F12-MA

| F25-MA

| FP35-MA

## TopTech Series

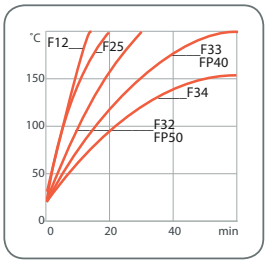
for working temperatures from -50 °C to +200 °C

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

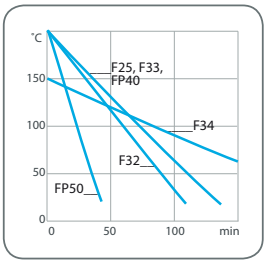
### Models with MA circulator

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

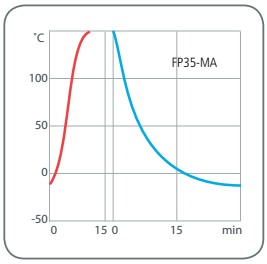
**Heat-up time**
Bath fluid: thermal




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




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




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

Included in delivery: 2 barbed fittings each for tubing 8 and 10 mm ID (pump connections M10x1 female)

| F26-ME

| FN32-ME

| FP50-ME

## TopTech Series

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

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

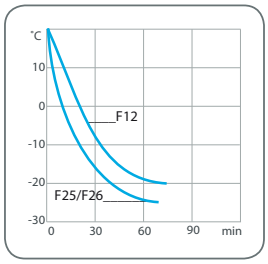
### Additional advantages of models with ME circulator

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

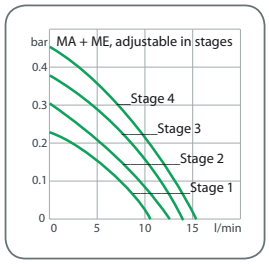
**Note:** FP models feature an energy-saving proportional cooling control.

More information on circulators with natural refrigerants at www.julabo.com

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




**Pump capacity**
Bath fluid: water




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

Included in delivery: 2 barbed fittings each for tubing 8 and 10 mm ID (pump connections M10x1 female)

| F25-HE

| FN32-HE

| FP50-HE

## HighTech Series

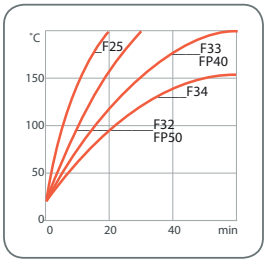
for working temperatures from -50 °C to +200 °C

The HighTech Series features refrigerated heating circulators with innovative technology for sophisticated applications. The instruments provide powerful, electronically adjustable pressure and suction pumps.
The instruments can be used for internal as well as external temperature control applications of closed and open systems.

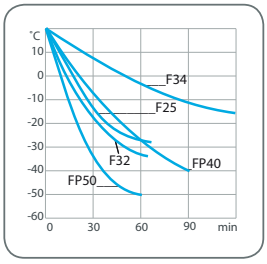
### Models with HE circulator

- The ICC Cascade Control guarantees highest precision, stability ±0.01 °C
- VFD Comfort display, simultaneous indication of setpoint and internal and external actual value (resolution 0.01 °C)
- Integrated programmer (1 x 10 steps), real-time clock, RS232
- Powerful pressure and suction pump, electronically adjustable in steps, automatic adjustment of pump capacity to viscosity characteristics

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




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




| Order No. | Model | Working temperature range °C | Temp. stab. °C | Heat. cap. kW | Cooling capacity kW (Bath fluid: ethanol) +20 | 0 | -20 | -30 | -40 °C | Pump capacity Flow rate / Pressure / Suction l/min. | bar | bar | Bath open./ Bath depth W × L / D cm | Fill. vol. liters | Dimensions W × L × H cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **9 212 625** | **F25-HE** | -28 ... +200 | ±0.01 | 2 | 0.26 | 0.2 | 0.06 | -- | -- | 22-26 | 0.4-0.7 | 0.2-0.4 | 12 x 14 / 14 | 4.5 | 23 x 42 x 64 |
| **9 212 625N** | **FN25-HE** | -28 ... +200 | ±0.01 | 2 | 0.26 | 0.2 | 0.06 | -- | -- | 22-26 | 0.4-0.7 | 0.2-0.4 | 12 x 14 / 14 | 4.5 | 23 x 50 x 64 |
| **9 212 632** | **F32-HE** | -35 ... +200 | ±0.01 | 2 | 0.45 | 0.39 | 0.15 | 0.06 | -- | 22-26 | 0.4-0.7 | 0.2-0.4 | 18 x 12 / 15 | 8 | 31 x 42 x 66 |
| **9 212 632N** | **FN32-HE** | -35 ... +200 | ±0.01 | 2 | 0.45 | 0.39 | 0.15 | 0.06 | -- | 22-26 | 0.4-0.7 | 0.2-0.4 | 18 x 12 / 15 | 8 | 31 x 50 x 66 |
| **9 212 634** | **F34-HE** | -30 ... +150 | ±0.01 | 2 | 0.45 | 0.32 | 0.14 | 0.03 | -- | 22-26 | 0.4-0.7 | 0.2-0.4 | 24 x 30 / 15 | 20 | 38 x 58 x 64 |
| **9 212 640** | **FP40-HE** | -40 ... +200 | ±0.01 | 2 | 0.68 | 0.5 | 0.32 | 0.17 | 0.04 | 22-26 | 0.4-0.7 | 0.2-0.4 | 23 x 14 / 20 | 16 | 37 x 46 x 71 |
| **9 212 650** | **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 |
| water-cooled model | | | | | | | | | | | | | | | |
| **9 212 651** | **FPW50-HE** | -50 ... +200 | ±0.01 | 2 | 0.9 | 0.8 | 0.5 | 0.32 | 0.16 | 22-26 | 0.4-0.7 | 0.2-0.4 | 18 x 12 / 15 | 8 | 42 x 49 x 72 |

Included in delivery: 2 barbed fittings each for tubing 8 and 12 mm ID (pump connections M16x1 male)

| FN25-HL

| FP50-HL

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

## HighTech Series

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

The top models with HL circulators offer professional technology and maximum functionality.

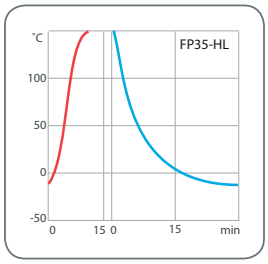
**Additional advantages of models with HL circulator**

- Comfortable user guidance via additional LCD display
- Integrated programmer (6 x 60 steps) with real-time clock
- Combined RS232 / RS485 interface
- Temperature display in °C or °F, adjustable
- Stakei connections for connecting a solenoid valve

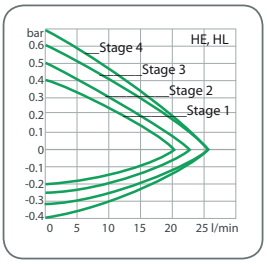
**Note:** FP models feature an energy-saving proportional cooling control.

**Applications**
External temperature control applications, particularly for distillation apparatus and miniplant installations, jacketed reactors, autoclaves, kilo labs, pilot plants etc.

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




**Pump capacity**
Bath fluid: water




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

Included in delivery: 2 barbed fittings each for tubing 8 and 12 mm ID (pump connections M16x1 male)

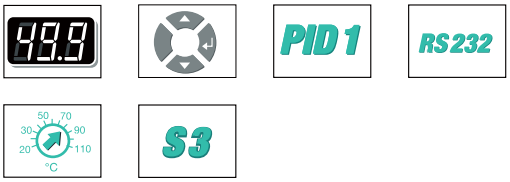
# Cryo-Compact Circulators at a Glance

## Economy

**CF30 / CF40**

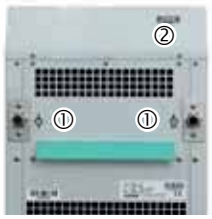
-40 °C ... +150 °C

**Basic models for routine and standard applications in the lab**




**Rear view**

① Pump connections
② RS232 interface

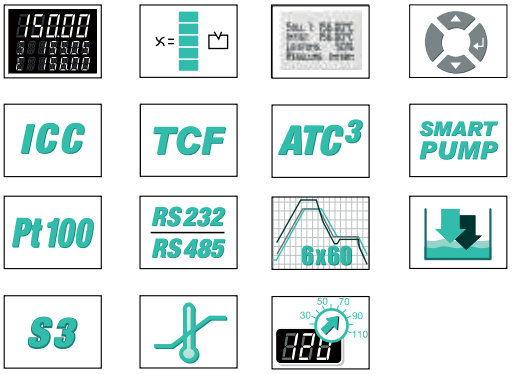



## HighTech

**CF31 / CF41**

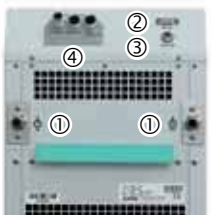
-40 °C ... +200 °C

**Superior models for most demanding applications in any environment**




**Rear view**

① Pump connections
② RS232 / RS485 interface
③ Connection for external Pt100 sensor
④ Electronic module (Optional)




Please refer to the beginning of the brochure for a description of the icons shown above.

| CF30

| CF41

**Applications**
External temperature control applications, distillation apparatuses and miniplant installations, especially for installations with limited space, e.g. in fume hoods

## Cryo-Compact Circulators

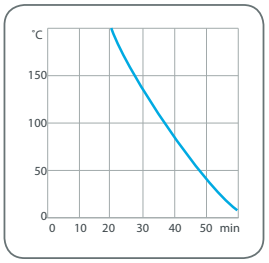
for working temperatures from -40 °C to +200 °C

The Cryo-Compact Circulators of the CF Series provide powerful cooling and heating capabilities in a space-saving, compact design. The instruments feature 2 kW heating capacity and classification III according to DIN 12876-1. The Cryo-Compact Circulators have pump connections for external temperature control applications and a bath opening for temperature control of small objects.

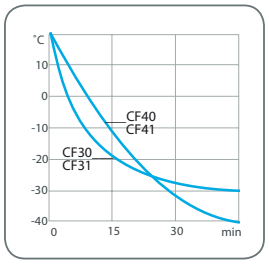
### Cryo-Compact Circulators, CF Series

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

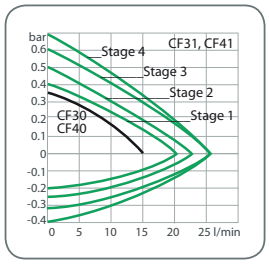
**Heat-up/cool-down time**
Bath fluid: thermal




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




**Pump capacity**
Bath fluid: water




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

Included in delivery: 2 barbed fittings each for tubing 8 and 12 mm ID (pump connections M16x1 male)

| F70-ME

| F81-ME

**Applications**
Freezing point determination, calibration at low temperatures, petroleum testing, ultra-low temperature control for cell cultivation

## TopTech Series

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

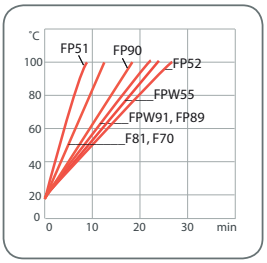
The Ultra-Low Refrigerated Circulators of the TopTech Series are equipped with a dual-stage cascade refrigeration system for continuous operation of internal and external temperature applications.

### Models with ME circulator

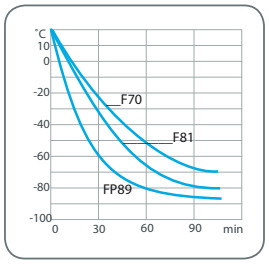
- Heated bath cover plate to prevent condensation or ice build-up
- Pressure pump up to 0.45 bar, electronically adjustable in steps
- ACC Active Cooling Control across the entire temperature range
- Compact design

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

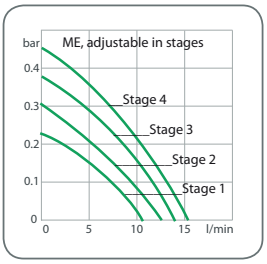
**Heat-up time**
Bath fluid: thermal




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




**Pump capacity**
Bath fluid: water




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

Included in delivery: 2 barbed fittings each for tubing 8 mm and 12 mm ID (pump connections M16x1 male)

| FP51-SL

| FP89-HL

| FPW90-SL

## HighTech Series

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

The Ultra-Low Refrigerated Circulators of the HighTech Series with HL or SL circulator feature powerful pressure and suction pumps. The instruments provide the entire variety of functions of the professional HighTech Series of circulators.

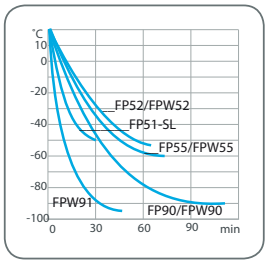
### Models with HL, SL circulator

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

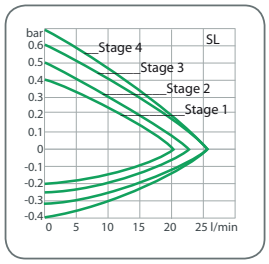
**Bath opening**

| Model | Bath opening / Bath depth W × L / D cm |
|---|---|
| **F70** | 12 x 12 / 13 |
| **FP51** | 18 x 12 / 20 |
| **F81, FP89** | 13 x 15 / 16 |
| **FP(W)52/55/90/91** | 28 x 23 / 22 |

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




**Pump capacity**
Bath fluid: water




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

Included in delivery: 2 barbed fittings each for tubing 8 mm and 12 mm ID (pump connections M16x1 male)

| FP55-SL

| FP90-SL

## HighTech Series

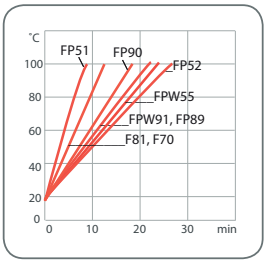
for working temperatures from -95 °C to +150 °C with filling port upgradeable with additional heating and pump capacity for external control only

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

- Cooling capacities up to 5.5 kW, heating capacity of 3 kW
- Insulated filling port (70 mm Ø)
- Heated bath cover plate to prevent condensation or ice build-up
- Upgradeable with booster heater and booster pump
- FPW Series provide cooling water connections
- Pressure and suction pump up to 1.1 bar pressure difference, electronically adjustable in steps

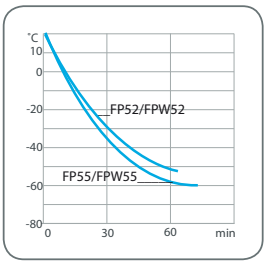
**Note:** FP models feature an energy-saving proportional cooling control.

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




**Filling port with insulated cover**

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




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

Included in delivery: 2 barbed fittings each for tubing 8 and 12 mm ID (pump connections M16x1 male)
FPW models: Cooling water connections G ¾" male with barbed fittings for tubing ½" ID

FPW91-SL

For external applications only

**Applications**
Jacketed, reactors, miniplant installations, kilo labs, process development

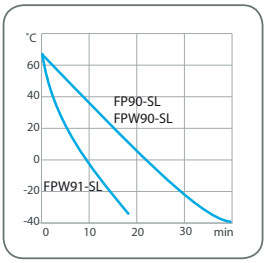
**Upgradeable for even more heating and pump capacity**
All models on this double-page are upgradeable (except for F95-SL and FW95-SL).

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

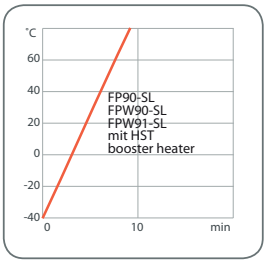
**HSP booster pump** ②
increases pump capacity to 30 l/min or 3 bar max.
(reduces cooling capacity by 0.4 kW)

**Upgradeable**
① with booster heater and
② booster pump

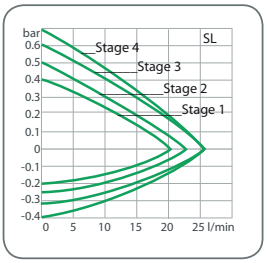

**Cool-down time**
Bath fluid: thermal




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



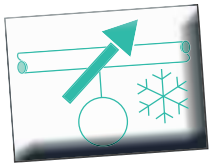

**Pump capacity**
Bath fluid: water




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

Included in delivery: 2 barbed fittings each for tubing 8 and 12 mm ID (pump connections M16x1 male)
FPW models: Cooling water connections G ¾" male with barbed fittings for tubing ½" ID

# User Benefits and Helpful Tips



## Advantages of JULABO Cooling Systems

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


## Full Cooling Capacity while Saving Energy

JULABO refrigerated circulators feature Active Cooling Control technology, which provides full cooling capacity at all times and across the entire working temperature range.
All FP models feature proportional cooling power control, which automatically adjusts the cooling capacity. Compared to refrigeration units without proportional control, this results in up to 90 % energy savings.


## Detailed Model Designations

The model designations of refrigerated circulators are composed as follows:

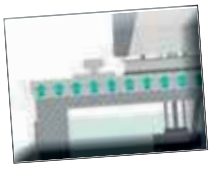
**F** = **F**rigus, Latin for cooling

**FP** = **P**roportional cooling control, energy-saving

**FPW** = **W**ater-cooled, alternative for powerful models
Advantage: Minimal heat discharge into ambient air and low noise level.

FP**50** = The **number** following the model designation relates to the approximately lowest achievable temperature (e.g. -**50** °C).

**FP50-HL** = The **complete model designation** is formed in combination with the circulator (e.g. **HL**).



## Heated Bath Cover Plate

Ultra-Low Refrigerated Circulators feature a heated bath cover plate to prevent condensation and ice build-up in the circulator bath. Depending on the model, the instruments are equipped in addition either with an insulated bath cover or an insulated filling port.

## Responsibility for the Environment

The refrigerated circulators with natural refrigerants (FN models) contribute to the reduction of the greenhouse effect. The omission of refrigerants containing fluoride conserves the ozone layer and makes a significant contribution to the protection of the atmosphere.
In addition, the new FN models have a reduced power consumption resulting in lower $CO_2$ emissions. This protects the environment and saves the user's money.

**Advantages**

- High cooling capacities up to 450 W
- Suitable for ambient temperatures up to +40 °C
- ACC Active Cooling Control for maximum cooling capacity
- Powerful recirculating pumps, electronically adjustable
- State-of-the-art control technology for precise results

## Maximum Safety

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

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

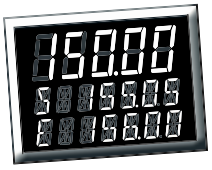
- Maximum operational safety
- Refrigeration cycle and electronics are spaced apart
- Virtually no application limitations
- Minimum room size for operation of theses instruments is 5 m³ (according to DIN EN 378-1:2008)

**Only at JULABO!**
The electronics of the instrument are outside of the refrigeration area

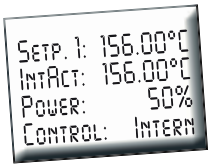
**FN models in our brochure**
The refrigerated circulators with natural refrigerants are marked in the brochure with the Cool Green Logo.
Note: FN Series are available in selected countries only.

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


LED




VFD




LCD

## Always Easy to Read: Brightest Temperature Displays

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

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

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

**LCD Dialog Display**
allows for interactive operation with plain text display


## Highly Precise Temperature Control Technology Professional and Simple Operation

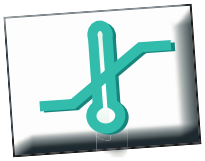
PID1, PID2 and PID3 temperature controls offer fixed control parameters (Xp, Tn, Tv). The PID2 and PID3 settings can be manually changed to reach an improved temperature stability, especially for external temperature control.
ICC temperature control (Intelligent Cascade Control) provides highly precise temperature control results even for the most demanding applications. With ICC, the PID control parameters are self-optimizing and automatically adjust to the respective application.
The TCF function permits full control of the control dynamics. In addition to accessing the standard control parameters, this function also allows for setting band limit, limit setting, co-speed factor etc.

## Intuitive and Integrated Operation

All JULABO products feature a consistent interface design ensuring easy and intuitive instrument operation. As another advantage, keypads are generally splash-proof and easy to clean. Menus allow users to set additional parameters for process optimization such as control parameters, auto-start mode, interface configuration etc.

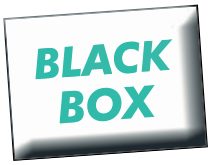
## Early Warning System for Low Liquid Level

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



## Early Warning System for High/Low Temperature Limits

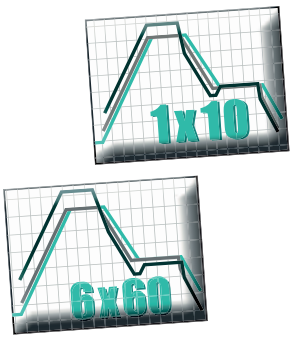
If the set temperature limits are exceeded or undercut – e.g. caused by an exothermic reaction – the early warning system will trigger audible and optical warnings.
High / Low temperature protection with cut-off function: If required, the warning function can be switched to a cut-off function.




## Integrated Additional Features and Protection Functions

JULABO circulators and temperature control systems also offer:

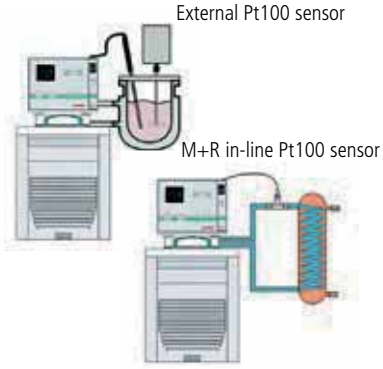
- Standby display with automatic self-test
- Monitoring of sensors and sensor temperature differentials
- BlackBox function with error memory for remote diagnosis
- Overload protection for pump motor and refrigeration unit




## Integrated Programmer

Many applications require the execution of time and temperature dependent processes. The ME Series and all HighTech circulators feature an integrated programmer. Temperature profiles can be easily programmed, saved, and executed. Continuous loops can be started as needed.
In addition, pre-set increases (gradients) can be defined. The real-time clock allows application start-up at a specified time, e.g. heat-up of application prior to the start of the work day.

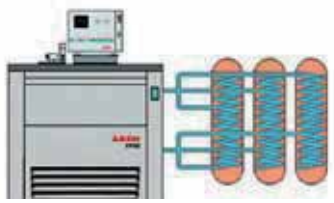
| | |
|---|---|
| ME, HE, SE Models: | 1 temperature profile with up to 10 steps |
| HL, SL Models: | 6 temperature profiles with up to 60 steps |




## External Temperature Control and Measurement

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

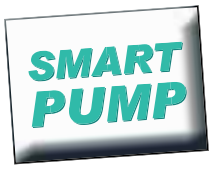
| | |
|---|---|
| **8 981 003 to 017** | **External Pt100 sensors** |
| **8 981 020** | **M+R in-line Pt100 sensor** |



## External Temperature Control of Large or several Applications

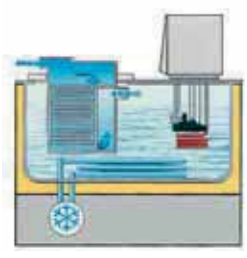
The powerful Ultra-Low Refrigerated Circulators of the HighTech Series with a heating capacity of 3 kW and a maximum pump pressure of 1.1 bar can have capacities increased with:

| | |
|---|---|
| **8 810 012** | **HST booster heater 6 kW** |
| **8 810 015** | **HSP booster pump 30 l/min or 3 bar max.** |




## Intelligent Pump Systems

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



## Condensation Traps

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

# Individual Solutions for Your Application

JULABO provides solutions for individual requirements. JULABO customers have the following options for refrigerated circualtors:

## Special inserts

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

## Special bath covers

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

## Special temperature sensors

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

## More power

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

## Special heat exchangers

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

## Individual connections and adapters

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

## Special tubing

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

## JULABO Thermal Bath Fluids

JULABO Thermal bath fluids have been carefully chosen after long-term testing.
They are ideally suited for all of your temperature control applications guaranteeing safe and reliable operation.

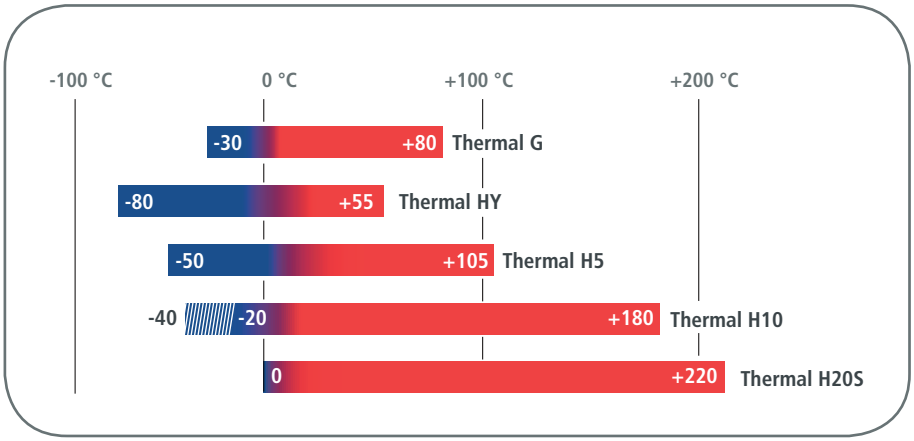
Choosing the proper bath fluid is critical for high performance temperature control. The viscosity, oxidation and heat transfer characteristics of the Thermal fluids are specifically selected for use with JULABO temperature control instruments.

### Advantages

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

Working temperature range
Extended temperature range Thermal H10

### Working temperature ranges




### Thermal G

| | |
|---|---|
| **Order No. 5 liters** | **8 940 125** |
| **Order No. 10 liters** | **8 940 124** |
| Working temperature range °C | -30 … +80 |
| Flash point °C | not applicable |
| Fire point °C | not applicable |
| Viscosity, (kinematic at +20 °C) mm²/s | 4.07 |
| Density (at +20 °C) g/cm³ | 1.08 |
| Pour point °C | -70 |
| Boiling point °C | +108 |
| Ignition temperature °C | +430 |
| Color | light yellow |

### Thermal HY

| | |
|---|---|
| **Order No. 5 liters** | **8 940 105** |
| **Order No. 10 liters** | **8 940 104** |
| Working temperature range °C | -80 … +55 |
| Flash point °C | +62 |
| Fire point °C | +80 |
| Viscosity, (kinematic at +20 °C) mm²/s | <4 |
| Density (at +20 °C) g/cm³ | 0.9 |
| Pour point °C | -100 |
| Boiling point °C | +228.5 |
| Ignition temperature °C | +335 |
| Color | clear |

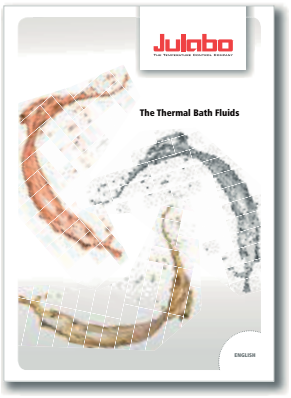
### Makes routine laboratory work easier

JULABO Thermal bath fluids are delivered in containers with a handy drain tap.

**JULABO Thermal bath fluids based on silicon …**
… are chemically inert substances which do not affect metals like iron, copper, zinc, aluminum, chrome or nickel. Compared to other fluids, JULABO Thermal fluids have an extraordinarily high dielectric strength. When properly stored, the fluids will last for 12 months and longer as they are not susceptible to climatic influences.

**JULABO Thermal bath fluids based on water-glycol …**
… (monoethyleneglycol with anti-corrosion additives) have excellent thermal characteristics and a low viscosity. In addition they provide anti-freeze protection, i.e. they can be applied at temperatures below the freezing point of water.

**More information on JULABO Thermal bath fluids …**
… in our brochure 'The Thermal Bath Fluids' at www.julabo.com.




## Thermal H5

| | |
|---|---|
| **Order No. 5 liters** | **8 940 107** |
| **Order No. 10 liters** | **8 940 106** |
| Working temperature range °C | -50 … +105 |
| Flash point °C | +124 |
| Fire point °C | +142 |
| Viscosity, (kinematic at +20 °C) mm²/s | 5.66 |
| Density (at +20 °C) g/cm³ | 0.92 |
| Pour point °C | -100 |
| Boiling point °C | +288 |
| Ignition temperature °C | +350 |
| Color | clear |

## Thermal H10

| | |
|---|---|
| **Order No. 5 liters** | **8 940 115** |
| **Order No. 10 liters** | **8 940 114** |
| Working temperature range °C | (-40) -20 … +180 |
| Flash point °C | >+170 |
| Fire point °C | +220 |
| Viscosity, (kinematic at +20 °C) mm²/s | 10.8 |
| Density (at +20 °C) g/cm³ | 0.94 |
| Pour point °C | <-60 |
| Boiling point °C | +288 |
| Ignition temperature °C | +370 |
| Color | clear |

## Thermal H20S

| | |
|---|---|
| **Order No. 5 liters** | **8 940 109** |
| **Order No. 10 liters** | **8 940 108** |
| Working temperature range °C | 0 … +220 |
| Flash point °C | +230 |
| Fire point °C | +264 |
| Viscosity, (kinematic at +20 °C) mm²/s | 22.3 |
| Density (at +20 °C) g/cm³ | 0.95 |
| Pour point °C | -70 |
| Boiling point °C | +424 |
| Ignition temperature °C | +385 |
| Color | light brown |

Extended temperature range: Thermal H10 can be used within the temperature range from -40 °C to +180 °C with circulators of the TopTech and HighTech Series as well as CF31 and CF41.

## CR® and Viton® tubing / Tubing insulations

| Order No. | Description | Suitable for |
|---|---|---|
| **8 930 008** | 1 m CR® tubing, 8 mm ID (-30 °C ... +120 °C) | MA, ME, HE, HL, SL, CF |
| **8 930 010** | 1 m CR® tubing, 10 mm ID (-30 °C ... +120 °C) | MA, ME |
| **8 930 012** | 1 m CR® tubing, 12 mm ID (-30 °C ... +120 °C) | HE, HL, SL, CF |
| **8 930 108** | 1 m Viton® tubing, 8 mm ID (-35 °C ... +200 °C) | MA, ME, HE, HL, SL, CF |
| **8 930 110** | 1 m Viton® tubing, 10 mm ID (-35 °C ... +200 °C) | MA, ME |
| **8 930 112** | 1 m Viton® tubing, 12 mm ID (-35 °C ... +200 °C) | HE, HL, SL, CF |
| **8 930 410** | 1 m insulation for tubing 8 mm or 10 mm ID | CR® and Viton® tubing |
| **8 930 412** | 1 m insulation for tubing 12 mm ID | CR® and Viton® tubing |

## Tube clamps

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 480** | 2 Tube clamps, size 1 | Tubing 8 mm ID |
| **8 970 481** | 2 Tube clamps, size 2 | Tubing 10 to 12 mm ID |

## Silicone, PTFE and flexible braided tubing

| Order No. | Description | Suitable for |
|---|---|---|
| **8 930 120** | 1 m silicon tubing, 8 mm ID (-50 °C ... +180 °C)<br>Not to be used with silicone bath fluid | MA, ME, HE, HL, SL, CF |
| **8 930 122** | 1 m silicon tubing, 12 mm ID (-60 °C ... +180 °C)<br>Not to be used with silicone bath fluid | MA, ME, HE, HL, SL, CF |
| **8 930 140** | 1 m PTFE tubing, 8 mm ID (-60 °C ... +180 °C) | MA, ME, HE, HL, SL, CF |
| **8 930 142** | 1 m PTFE tubing, 12 mm ID (-60 °C ... +180 °C) | MA, ME, HE, HL, SL, CF |
| **8 930 331** | 1.5 m flexible braided tubing G 3/4" (-30 °C ... +100 °C)<br>with 2 straight fittings with cap nut for cooling water connection | Water-cooled |
| **8 930 332** | 2 m flexible braided tubing G 3/4" (-30 °C ... +100 °C)<br>with 2 straight fittings with cap nut for cooling water connection | Water-cooled |
| **8 930 341** | 1.5 m flexible braided tubing G 3/4" (-30 °C ... +100 °C) with 1 straight fitting, 1 elbow fitting 90°, both with cap nut for cooling water connection | Water-cooled |
| **8 930 342** | 2 m flexible braided tubing G 3/4" (-30 °C ... +100 °C) with 1 straight fitting, 1 elbow fitting 90°, both with cap nut for cooling water connection | Water-cooled |

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

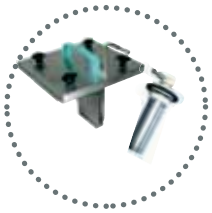
| Order No. | Description | Suitable for |
|---|---|---|
| **8 930 209** | 0.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |
| **8 930 210** | 1.0 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |
| **8 930 211** | 1.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |
| **8 930 214** | 3.0 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |

## Metal tubing, flexible, insulated, -50 °C … +200 °C

| Order No. | Description | Suitable for |
|---|---|---|
| **8 930 220** | 0.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |
| **8 930 221** | 1.0 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |
| **8 930 222** | 1.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |
| **8 930 223** | 3.0 m Metal tubing, 2 fittings M16x1 female | HE, HL, SL, CF31, CF41 |

## Accessories for metal tubing connections

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 443** | Adapter M16x1 male to M16x1 male | Metal tubing connection |
| **8 970 444** | Adapter for metal tubing M10x1 male to M16x1 male | MA, ME |
| **8 970 750** | Icing protection sleeve for pump connections | SL, Ultra-Low Refrigerated Circulators |
| **8 970 751** | Pump nozzle insulation set | ME, HL, SL,<br>Ultra-Low Refrigerated Circulators |



## Prevention of ice build-up at low temperatures

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 700** | Condensation trap with bath cover | FP50, FPW50, FP51 |
| **8 970 702** | Condensation trap with bath cover | F81, FP89 |
| **8 970 705** | Insulated fitting nozzle with condensation trap | FP(W)52/55/90/91/95 |

## External Pt100 sensors

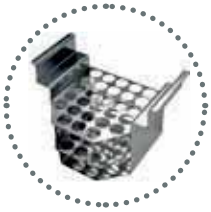
| Order No. | Description | Suitable for |
|---|---|---|
| **8 981 003** | 200 x 6 mm Ø, stainless steel, 1.5 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 006** | 20 x 2 mm Ø, stainless steel, 1.5 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 010** | 300 x 6 mm Ø, stainless steel, 1.5 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 017** | 200 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 015** | 300 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 013** | 600 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 016** | 900 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 014** | 1200 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SL, CF31, CF41 |
| **8 981 020** | M+R in-line Pt100 sensor, 2 connections M16x1 male | ME, HE, HL, SL, CF31, CF41 |
| **8 981 103** | Extension cable 3.5 m for Pt100 sensor | ME, HE, HL, SL, CF31, CF41 |

## Cooling installations

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 240** | Bath cover with special cooling coil | F12, F25 |
| **8 970 243** | Bath cover with special cooling coil | F32, FP50, FPW50, FP51 |

## Booster heaters / Particle filters

| Order No. | Description | Suitable for |
|---|---|---|
| **8 810 008** | HST booster heater 6 kW | FP40-HL |
| **8 810 011** | HST booster heater 6 kW | FP51-SL |
| **8 810 012** | HST booster heater 6 kW | FP(W)52, FP(W)55, FP(W)90, FPW91 |
| **8 810 015** | HSP booster pump 30 l/min. - 3 bar max. | FP(W)52, FP(W)55, FP(W)90, FPW91 |
| **8 920 000** | Particle filter for cooling water circuit (for water-cooled models) | FW, FPW |



## Test tube racks, stainless steel, up to +150 °C

| Order No. | Description | Immersion depth mm | Suitable for | Maximum insert capacity for test tube racks |
|---|---|---|---|---|
| **8 970 320** | for 28 tubes, 16/17 mm Ø | 80 | F12, F25, F26 | 1 |
| **8 970 321** | for 38 tubes, 12/13 mm Ø | 65 | F12, F25, F26 | 1 |

## Immersion-height adjustable platform / Castor platform

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

## Connectors / Valves / Adapters etc.

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 456** | Shut-off valve for loop circuit (-10 °C ... +100 °C), M16x1 | HE, HL, SL |
| **8 970 457** | Shut-off valve for loop circuit (-30 °C ... +200 °C), M16x1 | HE, HL, SL, CF31, CF41 |
| **8 970 850** | Shut-off valve, M16x1 female/male, -60 °C ... +200 °C | HE, HL, SL, CF31, CF41 |
| **8 980 701** | Solenoid valve set for loop circuit (-10 °C ... +130 °C), M16x1 | HL, SL |
| **8 970 452** | Drain tap (-20 °C ... +150 °C) | CF |
| **8 970 450** | Drain tap (-30 °C ... +200 °C) | CF |
| **8 970 470** | Twin distributing adapter with barbed fittings | Tubing 8 mm ID |
| **8 970 472** | Twin distributing adapter with barbed fittings | Tubing 10 mm ID |
| **8 970 471** | Twin distributing adapter with barbed fittings | Tubing 12 mm ID |
| **8 970 473** | Twin distributing adapter M16x1 female to 2 x M16x1 male | HE, HL, SL |
| **8 970 445** | 2 Barbed fittings for tubing 12 mm ID | HE, HL, SL, CF |
| **8 970 447** | 2 Barbed fittings for tubing 10 mm ID | HE, HL, SL |
| **8 970 446** | 2 Barbed fittings for tubing 8 mm ID | HE, HL, SL, CF |
| **8 970 460** | 2 Barbed fittings for tubing 8 mm ID, M10x1 | MA, ME |
| **8 970 468** | 2 Barbed fittings for tubing 12 mm ID, M10x1 | MA, ME |

## Connectors / Valves / Adapters etc.

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 490** | 2 Collar nuts M16x1 female | HE, HL, SL, CF |
| **8 970 492** | 1 Collar nut M10x1 male | MA, ME |
| **8 970 442** | 2 Elbow fittings 90°, M16x1 female/male side length 2 x 54 mm | HE, HL, SL, CF |
| **8 970 448** | 2 Elbow fittings 90°, M16x1 female/male side length 2 x 54 mm / 2 x 120 mm | HE, HL, SL, CF |
| **8 890 004** | 2 Adapters M16x1 female to NPT ¼" male | HE, HL, SL, CF |
| **8 890 005** | 2 Adapters M16x1 female to NPT ¼" female | HE, HL, SL, CF |
| **8 890 006** | 2 Adapters M16x1 female to NPT 3/8" male | HE, HL, SL, CF |
| **8 890 007** | 2 Adapters M16x1 female to NPT 3/8" female | HE, HL, SL, CF |
| **8 890 008** | 2 Adapters M16x1 female to NPT ½" male | HE, HL, SL, CF |
| **8 890 009** | 2 Adapters M16x1 female to NPT ½" female | HE, HL, SL, CF |
| **8 890 010** | 2 Adapters M16x1 male to NPT ¼" female | HE, HL, SL, CF |
| **8 891 008** | 1 Adapter M16x1 male to BSP ½" female | HE, HL, SL, CF |
| **8 891 009** | 1 Adapter M16x1 male to BSP 3/4" female | HE, HL, SL, CF |
| **8 890 011** | 2 Adapters M16x1 female to tube ¼" male | HE, HL, SL, CF |
| **8 890 012** | 2 Adapters M16x1 female to tube 3/8" male | HE, HL, SL, CF |
| **8 890 013** | 2 Adapters M16x1 female to tube ½" male | HE, HL, SL, CF |
| **8 890 024** | 2 Adapters M16x1 female to M16x1 female | HE, HL, SL, CF |
| **8 890 034** | 2 Adapters M30x1.5 female to M16x1 male, stainless steel | HE, HL, SL, CF |
| **8 890 035** | 2 Adapters M30x1.5 male to M16x1 male, stainless steel | HE, HL, SL, CF |

## Connection plugs

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

## Booster Pump & SCB Converter Box

| Order No. | Description | Suitable for |
|---|---|---|
| **8 810 020** | Booster Pump (magnetically coupled), 2.1 bar | HL, SL |
| **8 980 024** | SCB Converter Box | HL, SL |

## Fluid-Gas Heat Exchanger

| Order No. | Description | Suitable for |
|---|---|---|
| **8 810 100** | Fluid-Gas Heat Exchanger | HE, HL, SL, CF31/41 |

## Software & hardware for instrument control / Interfaces

| Order No. | Description | Suitable for |
|---|---|---|
| **Electronic module with analog connectors**<br>With one input and two outputs for external data transfer, flow sensor, or temperature recorder (freely scalable, current/voltage) as well as standby input and alarm output. | | |
| **8 900 100** | Electronic module with analog connectors | HE, HL, SL, CF31, CF41 |
| **Refill device**<br>For connection to circulators (Stakei connection). At low level, liquid is automatically pumped from the reservoir (5 liters) into the circulator bath. | | |
| **8 980 750** | ARD Automatic refill device with 5 l reservoir | HL, SL |
| **Wireless Communication & Software** | | |
| **8 901 102** | EasyTEMP Software (free of charge at www.julabo.com) | Instruments with RS232 |
| **8 901 105** | EasyTEMP Professional Software, incl. USB Dongle | Instruments with RS232 |
| **8 980 073** | RS232 interface cable, 2.5 m | Instruments with RS232 |
| **8 980 074** | RS232 interface cable, 5 m | Instruments with RS232 |
| **8 900 110** | USB interface adapter cable + RS232 interface cable, 2.5 m | Instruments with RS232 |
| **8 980 031** | Ethernet / RS232 interface converter | Instruments with RS232 |
| **8 900 005** | PB-5 option: integrated Profibus DP | HighTech circulators, HL, SL |
| **8 900 020** | Profibus DP interface | Instruments with RS232 |
| **8 900 024** | RS485 interface | Instruments with RS232 |
| **8 980 032** | 4-EtherNet / RS232 converter | Instruments with RS232 |
| **8 980 033** | 8-EtherNet / RS232 converter | Instruments with RS232 |
| **8 980 034** | WLAN / RS232 converter | Instruments with RS232 |
| **8 980 035** | 2 Channel WLAN / RS232 converter | Instruments with RS232 |
| **8 980 036** | ATEX Tablet Agile X | Instruments with RS232 |

## Calibration and testing certificates

| Order No. | Description | Suitable for |
|---|---|---|
| **8 902 901** | 1-Point Manufacturer's calibration certificate | All circulators |
| **8 902 903** | 3-Point Manufacturer's calibration certificate | All circulators |
| **8 902 905** | 5-Point Manufacturer's calibration certificate | All circulators |
| **8 903 025** | testing certificate for JULABO refrigeration units up to 1 kW cooling capacity (at +20 °C) | All refrigerated circulators |
| **8 903 035** | testing certificate for JULABO refrigeration units from 1 kW cooling capacity (at +20 °C) | All refrigerated circulators |

Julabo
THE TEMPERATURE CONTROL COMPANY

# CORIO™

## CORIO the entry level into the world of temperature control

Professional temperature control in the lab does not have to be expensive: the entry level line JULABO CORIO demonstrates this. Whether as Heating Immersion Circulator, Heating Bath Circulator or Refrigerated Circulator – CORIO stands for quality and reliability.

Convince yourself of the, better entry level into the world of temperature control and ask us about CORIO.


Information on all CORIO™ models in the brochure or:
**www. julabo.com**

# Heating Circulators

Innovation is our tradition: The JULABO range of heating circulators features functional solutions for day-to-day work. Whether in research, material testing or in technical systems (production) – the well proven and reliable technology is valued by users in all industries worldwide. With JULABO circulators, you rely on innovative temperature control technology that sets standards.

The JULABO range of circulators offers the perfect equipment for every application. Choose your temperature control solution from two series: TopTech Series & HighTech Series.

- Large selection of models for internal and external applications
- Models for working temperatures from +20 °C to +300 °C
- Optionally with bath tanks made of stainless steel
- All models feature user friendly, intuitive operation
- Extra bright, easy to read displays
- Quick and highly precise results thanks to state-of-the-art control technology
- Many professional functions for adjusting control parameters, temperature calibration, temperature profiles etc. (depending on model)
- Powerful circulating pumps, electronically adjustable in steps
- High heating capacities for rapid heat-up
- Intelligent warning and safety functions
- Unique early warning system for low liquid level
- Digital and analog interfaces for flexible communication
- Comprehensive range of accessories faciliates your day-to-day work

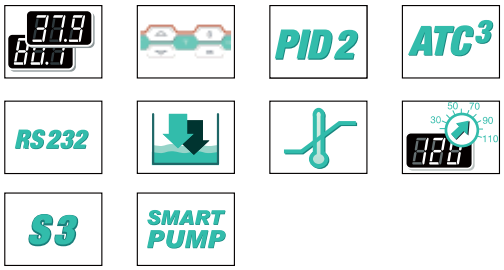
# TopTech | HighTech Circulators at a Glance

## TopTech

### MA Models

+20 °C ... +200 °C

**Middle class for a broad range of applications**

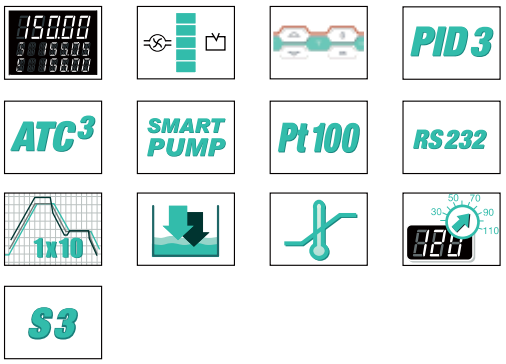



Connections for
② RS232
③ Solenoid valve
④ Pump and cooling coil


### ME Models

+20 °C ... +200 °C

**Upper middle class with external Pt100 sensor connection**




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

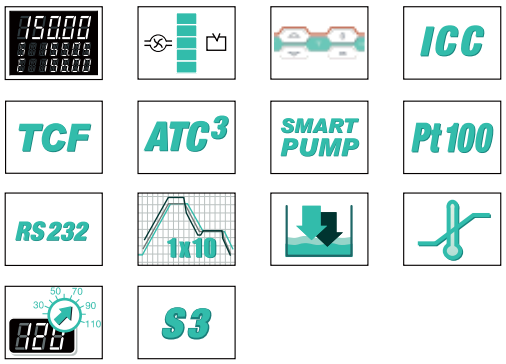

Please refer to the beginning of the brochure for a description of the icons shown above.

# HighTech

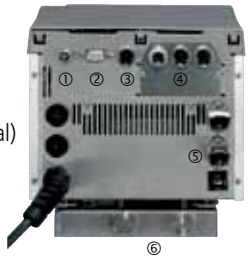
## HE/SE Models

+20 °C ... +300 °C

**Powerful sophisticated models for demanding applications**



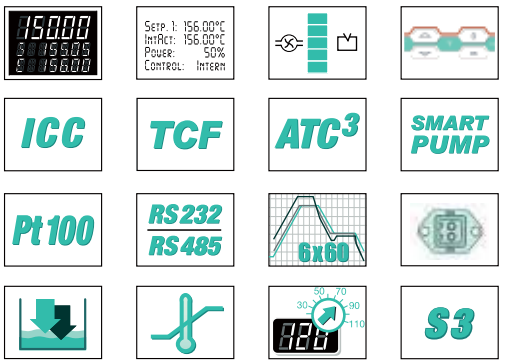

Connections for
① External Pt100 sensor
② RS232 / RS485
③ Solenoid valve
④ Electronic module (Optional)
⑤ Stakei connections (HL/SL)
⑥ Pump and cooling coil




## HL/SL Models

+20 °C ... +300 °C

**Top class for demanding applications in any environment**




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


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

| MA

| ME

| External Pt100 sensor (accessory)

## Heating Immersion Circulators

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

Heating immersion circulators have always been a staple at JULABO. The bath attachment clamp is included in delivery and facilitates mounting of the circulator on any bath tank up to 50 liters.

**Heating Immersion Circulators**

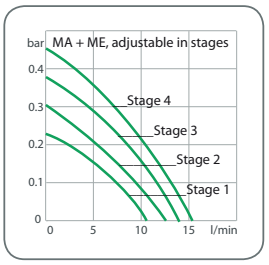
- Working temperature range up to +200 °C
- Bath attachment clamp for wall thickness up to 26 mm
- Immersion depth 16.5 cm, reducible to 14.5 cm
- All immersed parts made of stainless steel or high grade plastic
- Pump set for external control application and add-on cooling coil for applications below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

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

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

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

**Pump capacity**
Bath fluid: water




| Order No. | Model | Working temperature range °C[1] | Temp. stability °C | Heating capacity kW | Pump capacity Flow rate l/min | Pressure bar | Cooling coil | Usable immersion depth cm | Dimensions W × L × H cm |
|---|---|---|---|---|---|---|---|---|---|
| **9 153 000** | **MA** | +20 ... +200 | ±0.01 | 2 | 11-16 | 0.23-0.45 | Optional | 8-14.5 | 13 x 15 x 33 |
| **9 162 000** | **ME** | +20 ... +200 | ±0.01 | 2 | 11-16 | 0.23-0.45 | Optional | 8-14.5 | 13 x 15 x 33 |

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

| SE-Z

**Applications**

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

# Bridge Mounted Circulator

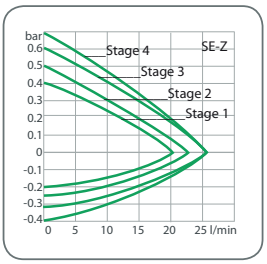
with extendable bridge for bath tanks up to 100 liters filling volume

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

**Bridge Mounted Circulator**

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

**Pump capacity**
Bath fluid: water




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

Included in delivery: 2 barbed fittings each for tubing 8 mm and 12 mm ID (pump connections with M16x1 male)

MA-4

ME-26
with integrated immersion-height adjustable platform

# Heating Circulators

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

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

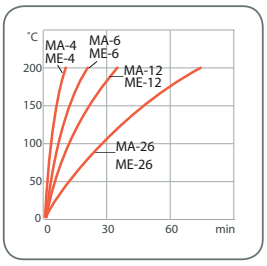
**TopTech heating circulators**

- For external temperature control applications
- Simultaneously, internal temperature control applications possible
- Pressure pump electronically adjustable in steps
- Early warning system for low liquid level and high/low temperature
- RS232 interface
- Integrated cooling coil

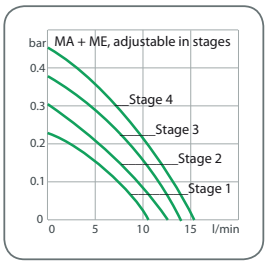
**Models with ME circulator also feature**

- External Pt100 sensor connection
- Integrated programmer (1 x 10 steps) with real-time clock

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




**Pump capacity**
Bath fluid: water




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

[1] For applications near or below ambient temperature: counter-cooling with tap water via integrated cooling coil.
Included in delivery: 2 barbed fittings each for tubing 8 and 10 mm ID (pump connections with M10x1 female)

| SL-6

| HE-4

**Applications**
External temperature applications, e.g. in combination with jacketed reactors, distillation apparatuses, mini-plant applications, photometers, refractometers, and internal temperature control applications to small objects

# Heating Circulators

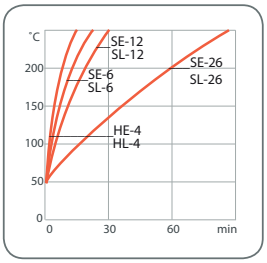
for external and internal temperature applications up to +300 °C
with stainless steel bath tanks and pump connections

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

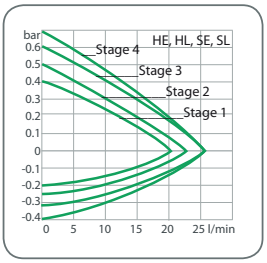
### HighTech heating circulators

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

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




**Pump capacity**
Bath fluid: water

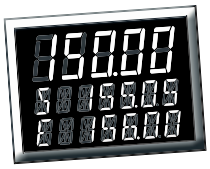


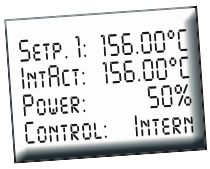

| Order No. | Model | Working temperature range °C[1] | Temperature stability °C | Heating capacity kW | Pump capacity Flow rate l/min | Pressure bar | Suction bar | Bath opening/ Bath depth W × L / D cm | Filling volume liters | Dimensions W × L × H cm |
|---|---|---|---|---|---|---|---|---|---|---|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

[1] For applications near or below ambient temperature: counter-cooling with tap water via integrated cooling coil.
Included in delivery: 2 barbed fittings each for tubing 8 and 12 mm ID (pump connections with M16x1 male)

# User Benefits and Helpful Tips


LED




LCD

## Always Easy to Read: Brightest Temperature Displays

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

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

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

**LCD Dialog Display**
allows for interactive operation with plain text display


## Highly Precise Temperature Control Technology Professional and Simple Operation

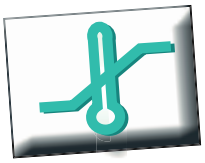
PID1, PID2 and PID3 temperature controls offer fixed control parameters (Xp, Tn, Tv). The PID2 and PID3 settings can be manually changed to reach an improved temperature stability, especially for external temperature control.
ICC temperature control (Intelligent Cascade Control) provides highly precise temperature control results even for the most demanding applications. With ICC, the PID control parameters are self-optimizing and automatically adjust to the respective application.
The TCF function permits full control of the control dynamics. In addition to accessing the standard control parameters, this function also allows for setting band limit, limit setting, co-speed factor, etc.

## Intuitive and Integrated Operation

All JULABO products feature a consistent interface design ensuring easy and intuitive instrument operation. As another advantage, keypads are generally splash-proof and easy to clean. Menus allow users to set additional parameters for process optimization such as control parameters, autostart mode, interface configuration, etc.

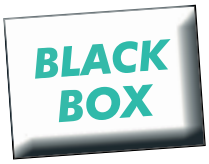
## Early Warning System for Low Liquid Level

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



## Early Warning System for High/Low Temperature Limits

If the set temperature limits are exceeded or undercut – e.g., caused by an exothermic reaction – the early warning system will trigger audible and optical warnings. High / Low temperature protection with cut-off function: If required, the warning function can be switched to a cut-off function.



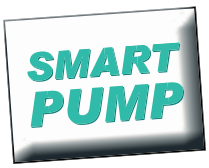

## Integrated Additional Features and Protection Functions

JULABO circulators and temperature control systems also feature:

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

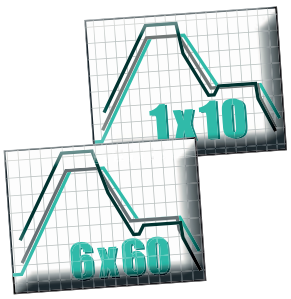
## Wireless Instrument Management

JULABO WirelessTEMP products enable wireless monitoring and operation of JULABO temperature control instruments via PC or remote control directly from your workstation. For more information regarding products, refer to chapter Wireless Communication & Software.




## Intelligent Pump Systems

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




## Integrated Programmer

Many applications require the execution of time and temperature dependent processes. The ME Series and all HighTech circulators feature an integrated programmer. Temperature profiles can be easily programmed, saved, and executed. Continuous loops can be started as needed.
In addition, pre-set increases (gradients) can be defined. The real-time clock allows application start-up at a specified time, e.g. heat-up of application prior to the start of the work day.

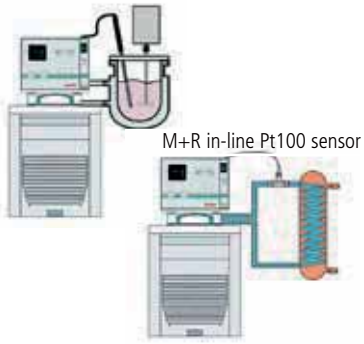
| | |
|---|---|
| ME, HE, SE Series: | 1 temperature profile with up to 10 steps |
| HL, SL Series: | 6 temperature profiles with up to 60 steps |


## ATC - Temperature Calibration

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

| | |
|---|---|
| TopTech, HighTech Series: | 3-point calibration |

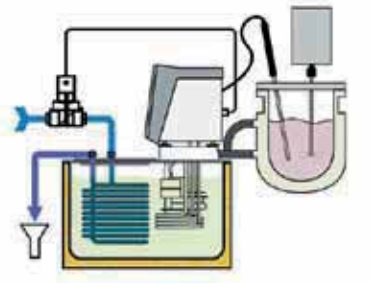
External Pt100 sensor




## External Temperature Control and Measurement

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

**8 981 003 to 017** **External Pt100 sensors**
**8 981 020** **M+R in-line Pt100 sensor with external Pt100 sensor**



## Exothermic Reactions under Control

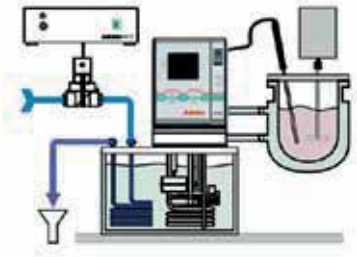
A special cooling coil is available in order to compensate for exothermic reactions. In case of a sudden peak in temperature, cooling water is automatically fed into the cooling coil via a solenoid valve (figure). This instantly and simply compensates for exothermic reactions.

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

**8 981 003 to 017** **External Pt100 sensors**
**8 970 240, 242** **Bath cover with special cooling coil**
**8 980 703** **Solenoid valve for cooling water**

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

**9 790 000** **MVS solenoid valve controller**
**8 981 003 to 017** **External Pt100 sensors**
**8 970 240, 242** **Bath cover with special cooling coil**
**8 980 700** **Solenoid valve for cooling water**



## Economic Cooling Water Consumption

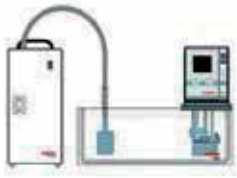
Heating circulators provide a built-in cooling coil to perform counter-cooling with tap water facilitating applications near ambient temperature. We recommend using a solenoid valve controller for metered cooling water supply to reduce cooling water consumption to a minimum.

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

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

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

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



## Flow-through and Immersion Coolers

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

**Advantages:**

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

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

Immersion coolers can be used apart from circulators for controlled cooling of liquid in any vessel. This requires immersion coolers with a temperature sensor and permits the setting of a setpoint via keypad: FT402, FT902, and FT903.

## THE SMART CONTROLLERS

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


## The TopTech Series

Middle class for a broad range of applications.

Heating circulators of the TopTech Series are designed for demanding applications. They feature increased functionality and additional warning and safety functions. Models with ME circulators allow for a wide range of applications. The units have a connection for an external Pt100 sensor for direct measuring and control in an external application. The VFD Comfort display with outstanding functionality shows all temperature values on one display.


## HighTech Series

Powerful sophisticated models for demanding applications.

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

# Individual Solutions for Your Application

JULABO provides solutions for individual requirements. JULABO customers have the followingoptions for heating circulators:

## Special baths made of stainless steel or Makrolon®

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

## Special inserts

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

## Special bath covers

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

## Special temperature sensors

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

## More power

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

## Special heat exchangers

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

## Individual connections and adapters

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

## Special tubing

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

## Special bridges

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

## JULABO Thermal Bath Fluids

JULABO Thermal bath fluids have been carefully chosen after long-term testing. They are ideally suited for all of your temperature control applications guaranteeing safe and reliable operation.

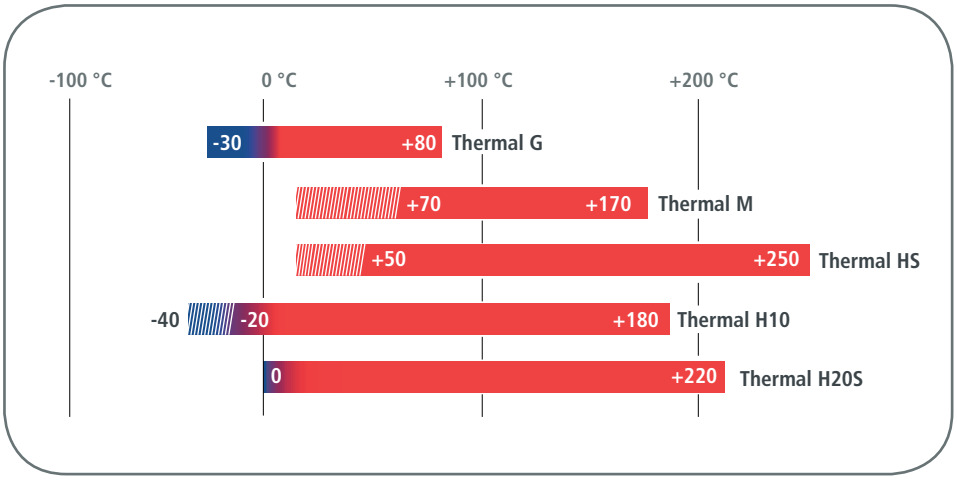
Choosing the proper bath fluid is critical for high performance temperature control. The viscosity, oxidation behavior and thermal conductivity of our Thermal bath fluids are designed specially for use with JULABO temperature control instruments.

### Advantages

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

Working temperature range
Heating phase
Extended temperature range Thermal H10

### Working temperature ranges




### Thermal G

| | |
|---|---|
| **Order No. 5 liters** | **8 940 125** |
| **Order No. 10 liters** | **8 940 124** |
| Working temperature range °C | -30 … +80 |
| Flash point °C | not applicable |
| Fire point °C | not applicable |
| Viscosity, (kinematic at +20 °C) mm²/s | 4.07 |
| Density (at +20 °C) g/cm³ | 1.08 |
| Pour point °C | -70 |
| Boiling point °C | +108 |
| Ignition temperature °C | +430 |
| Color | light yellow |

### Thermal M

| | |
|---|---|
| **Order No. 5 liters** | **8 940 101** |
| **Order No. 10 liters** | **8 940 100** |
| Working temperature range °C | +70 … +170 |
| Flash point °C | +284 |
| Fire point °C | +306 |
| Viscosity, (kinematic at +20 °C) mm²/s | 293 |
| Density (at +20 °C) g/cm³ | 1.15 |
| Pour point °C | -39 |
| Boiling point °C | >+170 |
| Ignition temperature °C | >+255 |
| Color | clear |

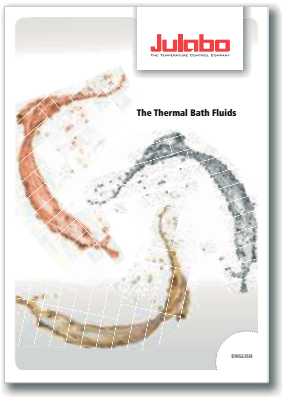
## Makes routine laboratory work easier

JULABO Thermal bath fluids are delivered in containers with a handy drain tap.

**JULABO Thermal bath fluids based on silicon …**
… are chemically inert substances which do not affect metals like iron, copper, zinc, aluminum, chrome or nickel. Compared to other fluids, JULABO Thermal fluids have an extraordinarily high dielectric strength. When properly stored, the fluids will last for 12 months and longer as they are not susceptible to climatic influences.

**JULABO Thermal bath fluids based on water-glycol …**
… (monoethyleneglycol with anti-corrosion additives) have excellent thermal characteristics and a low viscosity. In addition they provide anti-freeze protection, i.e. they can be applied at temperatures below the freezing point of water.

**More information on JULABO Thermal bath fluids …**
… in our brochure 'The Thermal Bath Fluids' at www.julabo.com.




## Thermal HS

| | |
|---|---|
| **Order No. 5 liters** | **8 940 103** |
| **Order No. 10 liters** | **8 940 102** |
| Working temperature range °C | +20 … +250 |
| Flash point °C | +270 |
| Fire point °C | +360 |
| Viscosity, (kinematic at +20 °C) $mm^2/s$ | 55 |
| Density (at +20 °C) $g/cm^3$ | 0.96 |
| Pour point °C | <-60 |
| Boiling point °C | >300 |
| Ignition temperature °C | >+400 |
| Color | light brown |

## Thermal H10

| | |
|---|---|
| **Order No. 5 liters** | **8 940 115** |
| **Order No. 10 liters** | **8 940 114** |
| Working temperature range °C | (-40) -20 … +180 |
| Flash point °C | >+170 |
| Fire point °C | +220 |
| Viscosity, (kinematic at +20 °C) $mm^2/s$ | 10.8 |
| Density (at +20 °C) $g/cm^3$ | 0.94 |
| Pour point °C | <-60 |
| Boiling point °C | +288 |
| Ignition temperature °C | +370 |
| Color | clear |

## Thermal H20S

| | |
|---|---|
| **Order No. 5 liters** | **8 940 109** |
| **Order No. 10 liters** | **8 940 108** |
| Working temperature range °C | 0 … +220 |
| Flash point °C | +230 |
| Fire point °C | +264 |
| Viscosity, (kinematic at +20 °C) $mm^2/s$ | 22.3 |
| Density (at +20 °C) $g/cm^3$ | 0.95 |
| Pour point °C | -70 |
| Boiling point °C | +424 |
| Ignition temperature °C | +385 |
| Color | light brown |

Extended temperature range: Thermal H10 can be used within the temperature range from -40 °C to +180 °C with circulators of the TopTech and HighTech Series.


## Aqua Stabil Water protective media to prevent formation of algae and bacteria Descaling Agent

| Order No. | Description | Suitable for |
|---|---|---|
| **8 940 006** | Aqua Stabil, 6 bottles, 100 ml each | All immersion, bath and heating circulators |
| **8 940 012** | Aqua Stabil, 12 bottles, 100 ml each | All immersion, bath and heating circulators |
| **9 940 200** | Descaling Agent, 1 liter | All immersion, bath and heating circulators |

## Accessories for heating immersion circulators

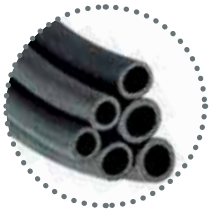
| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 022** | Stand attachment with rod 200 x 12 mm for laboratory stands | MA, ME |
| **8 970 421** | Bath attachment clamp for wall thickness up to 60 mm | MA, ME |
| **8 970 140** | Pump set for external temperature applications | MA, ME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

## External Pt100 sensors

| Order No. | Description | Suitable for |
|---|---|---|
| **8 981 003** | 200 x 6 mm Ø, stainless steel, 1.5 m cable | ME, HE, HL, SE, SL |
| **8 981 006** | 20 x 2 mm Ø, stainless steel, 1.5 m cable | ME, HE, HL, SE, SL |
| **8 981 010** | 300 x 6 mm Ø, stainless steel, 1.5 m cable | ME, HE, HL, SE, SL |
| **8 981 017** | 200 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SE, SL |
| **8 981 015** | 300 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SE, SL |
| **8 981 013** | 600 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SE, SL |
| **8 981 016** | 900 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SE, SL |
| **8 981 014** | 1200 x 6 mm Ø, stainless steel/PTFE coated, 3 m cable | ME, HE, HL, SE, SL |
| **8 981 020** | M+R in-line Pt100 sensor, 2 connections M16x1 male | ME, HE, HL, SE, SL |
| **8 981 103** | Extension cable 3.5 m for Pt100 sensor | ME, HE, HL, SE, SL |

## Hollow balls

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 010** | Hollow balls, Polypropylene®, 20 mm Ø (1000 pcs) | All bath tanks |



## Tubing / Tubing insulation / Tubing accessories

| Order No. | Description | Suitable for |
|---|---|---|
| **CR® and Viton® Tubing / Tubing insulation / Tubing clamps** | | |
| **8 930 008** | 1 m CR® tubing, 8 mm ID (-30 °C ... +120 °C) | MA, ME, HE, HL, SE, SL |
| **8 930 010** | 1 m CR® tubing, 10 mm ID (-30 °C ... +120 °C) | MA, ME |
| **8 930 012** | 1 m CR® tubing, 12 mm ID (-30 °C ... +120 °C) | HE, HL, SE, SL |
| **8 930 108** | 1 m Viton® tubing, 8 mm ID (-35 °C ... +200 °C) | MA, ME, HE, HL, SE, SL |
| **8 930 110** | 1 m Viton® tubing, 10 mm ID (-35 °C ... +200 °C) | MA, ME |
| **8 930 112** | 1 m Viton® tubing, 12 mm ID (-35 °C ... +200 °C) | HE, HL, SE, SL |
| **8 930 410** | 1 m insulation for tubing 8 mm or 10 mm ID | CR® and Viton® tubing, temperature range -50 °C ... +100 °C |
| **8 930 412** | 1 m insulation for tubing 12 mm ID | CR® and Viton® tubing, temperature range -50 °C ... +100 °C |
| **8 970 480** | 2 Tube clamps, size 1 | Tubing 8 mm ID |
| **8 970 481** | 2 Tube clamps, size 2 | Tubing 10 to 12 mm ID |
| **Silicon and PTFE tubing** | | |
| **8 930 120** | 1 m silicon tubing, 8 mm ID (-50...+180 °C) Not to be used with silicon bath fluid | MA, ME, HE, HL, SL |
| **8 930 122** | 1 m silicon tubing, 12 mm ID (-60...+180 °C) Not to be used with silicon bath fluid | MA, ME, HE, HL, SL |
| **8 930 140** | 1 m PTFE tubing, 8 mm ID (-60...+180 °C) | MA, ME, HE, HL, SL |
| **8 930 142** | 1 m PTFE tubing, 12 mm ID (-60...+180 °C) | MA, ME, HE, HL, SL |
| **Metal tubing, flexible, triple insulated, -100 °C … +350 °C** | | |
| **8 930 209** | 0.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |
| **8 930 210** | 1 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |
| **8 930 211** | 1.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |
| **8 930 214** | 3 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |
| **Metal tubing, flexible, insulated, -50 °C … +200 °C** | | |
| **8 930 220** | 0.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |
| **8 930 221** | 1 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |
| **8 930 222** | 1.5 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |
| **8 930 223** | 3 m Metal tubing, 2 fittings M16x1 female | HE, HL, SE, SL |

## Accessories for metal tubing connections

| | | |
|---|---|---|
| **8 970 443** | Adapter M16x1 male to M16x1 male | Metal tubing connection |
| **8 970 444** | Adapter for metal tubing M10x1 male to M16x1 male | MA, ME |

## Cooling installations / Booster heater

| Order No. | Description | Suitable for |
|---|---|---|
| **9 790 000** | MVS solenoid valve controller for cooling water | MA, ME, HE, SE |
| **8 980 700** | Solenoid valve for cooling water, for tubing 8 mm ID | MA, ME, HE, SE |
| **8 980 703** | Solenoid valve for cooling water, for tubing 8 mm ID | HL, SL |
| **8 970 240** | Bath cover with special cooling coil | MA-4, MA-6, ME-4, ME-6, HE-4, HL-4, SE-6, SL-6 |
| **8 970 242** | Bath cover with special cooling coil | ME-12, SE-12, SL-12 |
| **8 810 007** | HST booster heater 6 kW | SL-12 |

## Connectors / Valves / Adapters etc.

| Order No. | Description | Suitable for |
|---|---|---|
| **8 970 410** | D + S level- adapter to maintain constant fluid level (for external open bath) | HE, HL, SE, SL |
| **8 970 456** | Shut-off valve for loop circuit (-10 °C ... +100 °C), M16x1 | HE, HL, SE, SL |
| **8 970 457** | Shut-off valve for loop circuit (-30 °C ... +200 °C), M16x1 | HE, HL, SE, SL |
| **8 980 701** | Solenoid valve set for loop circuit (-10 °C ... +130 °C), M16x1 | HL, SL |
| **8 970 452** | Drain tap (-20 °C ... +150 °C) | Bath tanks 4, 6, 12, 26, 39 |
| **8 970 450** | Drain tap (-30 °C ... +200 °C) | Bath tanks 4, 6, 12, 26, 39 |
| **8 970 470** | Twin distributing adapter with barbed fittings | Tubing 8 mm ID |
| **8 970 472** | Twin distributing adapter with barbed fittings | Tubing 10 mm ID |
| **8 970 471** | Twin distributing adapter with barbed fittings | Tubing 12 mm ID |
| **8 970 473** | Twin distributing adapter M16x1 female to 2 x M16x1 male | HE, HL, SE, SL |
| **8 970 445** | 2 Barbed fittings for tubing 12 mm ID | HE, HL, SE, SL |
| **8 970 447** | 2 Barbed fittings for tubing 10 mm ID | HE, HL, SE, SL |
| **8 970 446** | 2 Barbed fittings for tubing 8 mm ID | HE, HL, SE, SL |
| **8 970 460** | 2 Barbed fittings for tubing 8 mm ID, M10x1 | MA, ME |
| **8 970 468** | 2 Barbed fittings for tubing 12 mm ID, M10x1 | MA, ME |
| **8 970 490** | 2 Collar nuts M16x1 female | HE, HL, SE, SL |
| **8 970 492** | 1 Collar nut M10x1 male | MA, ME |
| **8 970 442** | 2 Elbow fittings 90°, M16x1 female/male side length 2 x 54 mm | HE, HL, SE, SL |
| **8 970 448** | 2 Elbow fittings 90°, M16x1 female/male side length 2 x 54 mm / 2 x 120 mm | HE, HL, SL, CF |
| **8 890 004** | 2 Adapters M16x1 female to NPT ¼" male | HE, HL, SE, SL |
| **8 890 005** | 2 Adapters M16x1 female to NPT ¼" female | HE, HL, SE, SL |
| **8 890 006** | 2 Adapters M16x1 female to NPT 3/8" male | HE, HL, SE, SL |
| **8 890 007** | 2 Adapters M16x1 female to NPT 3/8" female | HE, HL, SE, SL |
| **8 890 008** | 2 Adapters M16x1 female to NPT ½" male | HE, HL, SE, SL |
| **8 890 009** | 2 Adapters M16x1 female to NPT ½" female | HE, HL, SE, SL |
| **8 890 010** | 2 Adapters M16x1 male to NPT ¼" female | HE, HL, SE, SL |
| **8 891 008** | 1 Adapter M16x1 male to BSP ½" female | HE, HL, SE, SL |
| **8 891 009** | 1 Adapter M16x1 male to BSP 3/4" female | HE, HL, SE, SL |
| **8 890 011** | 2 Adapters M16x1 female to tube ¼" male | HE, HL, SE, SL |
| **8 890 012** | 2 Adapters M16x1 female to tube 3/8" male | HE, HL, SE, SL |
| **8 890 013** | 2 Adapters M16x1 female to tube ½" male | HE, HL, SE, SL |

| Order No. | Description | Suitable for |
|---|---|---|
| **8 890 024** | 2 Adapters M16x1 female to M16x1 female | HE, HL, SE, SL |
| **8 890 034** | 2 Adapters M30x1.5 female to M16x1 male, stainless steel | HE, HL, SE, SL |
| **8 890 035** | 2 Adapters M30x1.5 male to M16x1 male, stainless steel | HE, HL, SE, SL |

## Calibration and testing certificates

| Order No. | Description | Suitable for |
|---|---|---|
| **8 902 901** | 1-Point Manufacturer's calibration certificate | All circulators |
| **8 902 903** | 3-Point Manufacturer's calibration certificate | All circulators |
| **8 902 905** | 5-Point Manufacturer's calibration certificate | All circulators |
| **8 903 015** | Manufacturer's Certificate for JULABO unit without built-in cooling | Heating Circulators |

## Software & hardware for instrument control / Interfaces

| Order No. | Description | Suitable for |
|---|---|---|
| **Electronic module with analog connectors**<br>With one input and two outputs for external programming, flow sensor, or temperature recorder (freely scalable, current/voltage) as well as standby input and alarm output. | | |
| **8 900 100** | Electronic module with analog connectors | HE, HL, SL, CF31, CF41 |
| **Refill device**<br>For connection to circulators (Stakei connection). At low level, liquid is automatically pumped from the reservoir (5 liters) into the circulator bath. | | |
| **8 980 750** | ARD Automatic refill device with 5 l reservoir | HL, SL |
| **Wireless Communication & Software** | | |
| **8 901 102** | EasyTEMP Software (free of charge at www.julabo.com) | Instruments with RS232 |
| **8 901 105** | EasyTEMP Professional Software, incl. USB Dongle | Instruments with RS232 |
| **8 980 073** | RS232 interface cable, 2.5 m | Instruments with RS232 |
| **8 980 074** | RS232 interface cable, 5 m | Instruments with RS232 |
| **8 900 110** | USB interface adapter cable + RS232 interface cable, 2.5 m | Instruments with RS232 |
| **8 980 031** | Ethernet / RS232 interface converter | Instruments with RS232 |
| **8 900 005** | PB-5 option: integrated Profibus DP | HighTech circulators, HL, SL |
| **8 900 020** | Profibus DP interface | Instruments with RS232 |
| **8 900 024** | RS485 interface | Instruments with RS232 |
| **8 980 032** | 4-EtherNet / RS232 converter | Instruments with RS232 |
| **8 980 033** | 8-EtherNet / RS232 converter | Instruments with RS232 |
| **8 980 034** | WLAN / RS232 converter | Instruments with RS232 |
| **8 980 035** | 2 Channel WLAN / RS232 converter | Instruments with RS232 |
| **8 980 036** | ATEX Tablet Agile X | Instruments with RS232 |

## Connection plugs

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

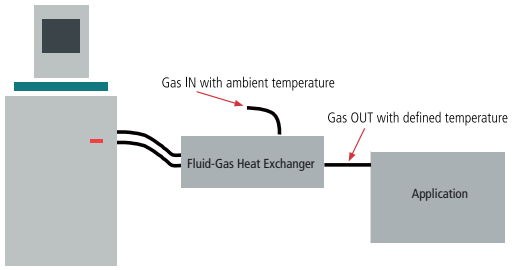
## Booster Pump & SCB Converter Box

| Order No. | Description | Suitable for |
|---|---|---|
| **8 810 020** | Booster Pump (magnetically coupled), 2.1 bar | HL, SL |
| **8 980 024** | SCB Converter Box | HL, SL |

# Fluid-Gas Heat Exchanger Specifications

The stainless steel design of the Fluid-Gas Heat Exchanger provides excellent resistivity against chemical impacts. The specially developed insulation and the extraordinary design of the Fluid-Gas Heat Exchanger provide high efficiency at extremely small overall dimensions.

**Application example:**





| Application | Fluid-based gas temperature control |
|---|---|
| **JULABO Order No.** | **8 810 100** |
| **Working temperature range** | - 95 … +210 °C |
| **Working temperature range gas OUT** | - 90 … +200 °C |
| **Working temperature range gas IN** | - 40 … +60 °C |
| **Suitable fluids** | JULABO Thermal, water, ethanol, water-glycol, silicon oil |
| **Maximum viscosity** | 30 cSt |
| **Housing material** | Stainless steel (1.4404 / AISI 316L) |
| **Gas properties** | nonflammable, non condensing, non corrosive |
| **Gas flow rate** | 0 ... 100 l / min |
| **Pressure stability** | 6 bar |
| **Gas connections** | Input: 1/4" NPT quick connector<br>Output: 1/4" NPT female |
| **Fluid connectors** | M16 x 1 male |
| **Dimensions (W x L x H) cm** | 25.5 x 7 x 7.2 |
| **Attachment** | Flange with holes dia. = 6mm |
| **Weight** | 1,3 kg |
| **Suitable for** | HE, HL, SL, CF31/41 |

# The Solution

The JULABO Fluid-Gas Heat Exchanger merges the advantages of fluid based temperature control and your gas process requirements. Wide temperature ranges, high temperature stability, high stability against environmental effects.

# Technical Specifications

## Refrigerated / Heating Circulators | Cryo-Compact Circulators

| Model | Order No. | Working temp. range | Setting/ display resolution | Temperature control | Temp. stability | Heat. cap. | Cooling of refrigeration unit | Cooling capacity (kW) at bath temperature (°C) (Medium: JULABO Thermal \| Ethanol) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | °C | °C | | °C | kW | | +20 | 0 | -20 | -40 |
| **F12-MA** | 9 153 612 | -20 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.16 | 0.1 | 0.02 | - |
| **F25-MA** | 9 153 625 | -28 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **FN25-MA** | 9 153 625N | -28 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **F32-MA** | 9 153 632 | -35 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **FN32-MA** | 9 153 632N | -35 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **F33-MA** | 9 153 633 | -30 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.5 | 0.32 | 0.12 | - |
| **F34-MA** | 9 153 634 | -30 ... +150 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.45 | 0.32 | 0.14 | - |
| **FP35-MA** | 9 153 618 | -35 ... +150 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **FP40-MA** | 9 153 640 | -40 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.68 | 0.5 | 0.32 | 0.04 |
| **FP50-MA** | 9 153 650 | -50 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Air | 0.9 | 0.8 | 0.5 | 0.16 |
| **FPW50-MA** | 9 153 651 | -50 ... +200 | 0.01/0.1 | PID2 | ±0.02 | 2 | Water | 0.9 | 0.8 | 0.5 | 0.16 |
| **F25-ME** | 9 162 625 | -28 ... +200 | 0.01 | PID3 | ±0.01 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **FN25-ME** | 9 162 625N | -28 ... +200 | 0.01 | PID2 | ±0.01 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **F26-ME** | 9 162 626 | -28 ... +200 | 0.01 | PID3 | ±0.01 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **F32-ME** | 9 162 632 | -35 ... +200 | 0.01 | PID3 | ±0.01 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **FN32-ME** | 9 162 632N | -35 ... +200 | 0.01 | PID2 | ±0.01 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **F33-ME** | 9 162 633 | -30 ... +200 | 0.01 | PID3 | ±0.01 | 2 | Air | 0.5 | 0.32 | 0.12 | - |
| **F34-ME** | 9 162 634 | -30 ... +150 | 0.01 | PID3 | ±0.01 | 2 | Air | 0.45 | 0.32 | 0.14 | - |
| **FP40-ME** | 9 162 640 | -40 ... +200 | 0.01 | PID3 | ±0.01 | 2 | Air | 0.68 | 0.5 | 0.32 | 0.04 |
| **FP50-ME** | 9 162 650 | -50 ... +200 | 0.01 | PID3 | ±0.01 | 2 | Air | 0.9 | 0.8 | 0.5 | 0.16 |
| **FPW50-ME** | 9 162 651 | -50 ... +200 | 0.01 | PID3 | ±0.01 | 2 | Water | 0.9 | 0.8 | 0.5 | 0.16 |
| **F25-HE** | 9 212 625 | -28 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **FN25-HE** | 9 212 625N | -28 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **F32-HE** | 9 212 632 | -35 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **FN32-HE** | 9 212 632N | -35 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **F34-HE** | 9 212 634 | -30 ... +150 | 0.01 | ICC | ±0.01 | 2 | Air | 0.45 | 0.32 | 0.14 | - |
| **FP40-HE** | 9 212 640 | -40 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.68 | 0.5 | 0.32 | 0.04 |
| **FP50-HE** | 9 212 650 | -50 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.9 | 0.8 | 0.5 | 0.16 |
| **FPW50-HE** | 9 212 651 | -50 ... +200 | 0.01 | ICC | ±0.01 | 2 | Water | 0.9 | 0.8 | 0.5 | 0.16 |
| **F25-HL** | 9 312 625 | -28 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **FN25-HL** | 9 312 625N | -28 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.26 | 0.2 | 0.06 | - |
| **F32-HL** | 9 312 632 | -35 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **FN32-HL** | 9 312 632N | -35 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **F33-HL** | 9 312 633 | -30 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.5 | 0.32 | 0.12 | - |
| **FP35-HL** | 9 312 618 | -35 ... +150 | 0.01 | ICC | ±0.01 | 2 | Air | 0.45 | 0.39 | 0.15 | - |
| **FP40-HL** | 9 312 640 | -40 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.68 | 0.5 | 0.32 | 0.04 |
| **FP50-HL** | 9 312 650 | -50 ... +200 | 0.01 | ICC | ±0.01 | 2 | Air | 0.9 | 0.8 | 0.5 | 0.16 |
| **FPW50-HL** | 9 312 651 | -50 ... +200 | 0.01 | ICC | ±0.01 | 2 | Water | 0.9 | 0.8 | 0.5 | 0.16 |
| **CF30** | 9 400 330 | -30 ... +150 | 0.1 | PID1 | ±0.03 | 2 | Air | 0.32 | 0.25 | 0.15 | - |
| **CF40** | 9 400 340 | -40 ... +150 | 0.1 | PID1 | ±0.03 | 2 | Air | 0.47 | 0.4 | 0.28 | - |
| **CF31** | 9 400 331 | -30 ... +200 | 0.01 | ICC | ±0.02 | 2 | Air | 0.32 | 0.25 | 0.15 | - |
| **CF41** | 9 400 341 | -40 ... +200 | 0.01 | ICC | ±0.02 | 2 | Air | 0.47 | 0.4 | 0.28 | - |

Information regarding used refrigerants can be found at www.julabo.com

| Pump capacity | | | Pump connection thread (male) | Barbed fittings ø | Bath opening/ Bath depth W x L / D | Filling volume | Classification acc. to DIN 12876-1 | Power requirement | Dimensions W × L × H cm | Weight net | Model |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pressure | Suction | Flow rate | | | | | | | | | |
| bar | bar | l/min | | ID | cm | liters | | V / Hz / A | cm | kg | |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 13 × 15 / 13 | 4.5 | III (FL) | 230 / 50 / 11 | 20 × 36 × 56 | 23 | **F12-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 42 × 61 | 31 | **F25-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 50 × 61 | 32 | **FN25-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50-60 / 13 | 31 × 42 × 64 | 37 | **F32-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 12 | 31 × 50 × 64 | 38 | **FN32-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 23 × 14 / 20 | 16 | III (FL) | 230 / 50 / 12 | 36 × 46 × 69 | 44 | **F33-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 24 × 30 / 15 | 20 | III (FL) | 230 / 50 / 12 | 38 × 58 × 62 | 42 | **F34-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / - | 2.5 | III (FL) | 230 / 50 / 12 | 31 × 42 × 64 | 37 | **FP35-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 23 × 14 / 20 | 16 | III (FL) | 230 / 50 / 13 | 37 × 46 × 69 | 48 | **FP40-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 70 | 55 | **FP50-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 70 | 55 | **FPW50-MA** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 42 × 61 | 31 | **F25-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 50 × 61 | 32 | **FN25-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 42 × 42 × 42 | 31 | **F26-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50-60 / 13 | 31 × 42 × 64 | 37 | **F32-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 12 | 31 × 50 × 64 | 38 | **FN32-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 23 × 14 / 20 | 16 | III (FL) | 230 / 50 / 12 | 36 × 46 × 69 | 44 | **F33-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 24 × 30 / 15 | 20 | III (FL) | 230 / 50 / 12 | 38 × 58 × 62 | 42 | **F34-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 23 × 14 / 20 | 16 | III (FL) | 230 / 50 / 13 | 37 × 46 × 69 | 48 | **FP40-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 70 | 55 | **FP50-ME** |
| 0.23-0.45 | - | 11-16 | M10 × 1 | 8 / 10 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 70 | 55 | **FPW50-ME** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 42 × 64 | 32 | **F25-HE** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 50 × 64 | 33 | **FN25-HE** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50-60 / 12 | 31 × 42 × 66 | 38 | **F32-HE** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 12 | 31 × 50 × 66 | 39 | **FN32-HE** |
| 0.4 -0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 24 × 30 / 15 | 20 | III (FL) | 230 / 50 / 12 | 38 × 58 × 64 | 44 | **F34-HE** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 23 × 14 / 20 | 16 | III (FL) | 230 / 50 / 13 | 37 × 46 × 71 | 49 | **FP40-HE** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 72 | 57 | **FP50-HE** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 72 | 57 | **FPW50-HE** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 42 × 64 | 32 | **F25-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 12 × 14 / 14 | 4.5 | III (FL) | 230 / 50 / 12 | 23 × 50 × 64 | 33 | **FN25-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50-60 / 12 | 31 × 42 × 66 | 38 | **F32-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 12 | 31 × 50 × 66 | 39 | **FN32-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 23 × 14 / 20 | 16 | III (FL) | 230 / 50 / 12 | 36 × 46 × 71 | 45 | **F33-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / - | 2.5 | III (FL) | 230 / 50 / 12 | 31 × 42 × 66 | 38 | **FP35-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 23 × 14 / 20 | 16 | III (FL) | 230 / 50 / 13 | 37 × 46 × 71 | 49 | **FP40-HL** |
| 0.4 -0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 72 | 57 | **FP50-HL** |
| 0.4 -0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 15 | 8 | III (FL) | 230 / 50 / 14 | 42 × 49 × 72 | 57 | **FPW50-HL** |
| 0.35 | - | 15 | M16 × 1 | 8 / 12 mm | 16 × 3 / 14 | 3.5 | III (FL) | 230 / 50 / 10 | 24 × 46 × 40 | 35 | **CF30** |
| 0.35 | - | 15 | M16 × 1 | 8 / 12 mm | 19 × 3 / 19 | 5.5 | III (FL) | 230 / 50 / 12 | 28 × 46 × 46 | 41 | **CF40** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 16 × 3 / 14 | 3.5 | III (FL) | 230 / 50 / 11 | 24 × 46 × 40 | 36 | **CF31** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 19 × 3 / 19 | 5.5 | III (FL) | 230 / 50 / 13 | 28 × 46 × 46 | 42 | **CF41** |

# Technical Specifications

## Ultra-Low Refrigerated Circulators

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

Information regarding used refrigerants can be found at www.julabo.com

| Pump capacity | | | Pump connection thread (male) | Barbed fittings Ø | Bath opening/ Bath depth W × L / D | Filling volume | Classification acc. to DIN 12876-1 | Power requirement | Dimensions W × L × H cm | Weight net | Model |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pressure | Suction | Flow rate | | | | | | | | | |
| bar | bar | l/min | | ID | cm | liters | | V / Hz / A | cm | kg | |
| 0.23-0.45 | - | 11-16 | M16 × 1 | 8 12 mm | 12 × 12 / 13 | 4.5 | III (FL) | 230 / 50 / 14 | 42 × 54 × 71 | 63 | **F70-ME** |
| 0.23-0.45 | - | 11-16 | M16 × 1 | 8 / 12 mm | 13 × 15 / 16 | 6.5 | III (FL) | 230 / 50-60 / 16 | 50 × 58 × 88 | 86 | **F81-ME** |
| 0.23-0.45 | - | 11-16 | M16 × 1 | 8 / 12 mm | 13 × 15 / 16 | 8 | III (FL) | 230 / 50 / 14 | 55 × 60 × 90 | 133 | **FP89-ME** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 18 × 12 / 20 | 11 | III (FL) | 3 × 400 / 50 / 14 | 46 × 55 × 89 | 90 | **FP51-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 28 × 23 / 22 | 24 | III (FL) | 3 × 400 / 50 / 19 | 59 × 76 × 116 | 156 | **FP52-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 28 × 23 / 22 | 27 | III (FL) | 3 × 400 / 50 / 20 | 85 × 76 × 116 | 182 | **FP55-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 13 × 15 / 16 | 6.5 | III (FL) | 230 / 50-60 / 16 | 50 × 58 × 89 | 88 | **F81-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 13 × 15 / 16 | 8 | III (FL) | 230 / 50 / 14 | 55 × 60 × 92 | 135 | **FP89-HL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 28 × 23 / 22 | 22 | III (FL) | 3 × 400 / 50 / 22 | 59 × 76 × 116 | 195 | **FP90-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 28 × 23 / 22 | 24 | III (FL) | 3 × 400 / 50 / 21 | 59 × 76 × 116 | 153 | **FPW52-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 28 × 23 / 22 | 27 | III (FL) | 3 × 400 / 50 / 20 | 59 × 76 × 116 | 146 | **FPW55-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 28 × 23 / 22 | 22 | III (FL) | 3 × 400 / 50 / 22 | 59 × 76 × 116 | 188 | **FPW90-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | 28 × 23 / 22 | 22 | III (FL) | 3 × 400 / 50 / 32 | 85 × 76 × 116 | 296 | **FPW91-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 24 | III (FL) | 3 × 400 / 50 / 19 | 59 × 76 × 116 | 156 | **FP52-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 27 | III (FL) | 3 × 400 / 50 / 20 | 85 × 76 × 116 | 182 | **FP55-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 24 | III (FL) | 3 × 400 / 50 / 19 | 59 × 76 × 116 | 156 | **FP52-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 27 | III (FL) | 3 × 400 / 50 / 20 | 85 × 76 × 116 | 182 | **FP55-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 24 | III (FL) | 3 × 400 / 50 / 21 | 59 × 76 × 116 | 153 | **FPW52-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 27 | III (FL) | 3 × 400 / 50 / 20 | 59 × 76 × 116 | 146 | **FPW55-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 24 | III (FL) | 3 × 400 / 50 / 21 | 59 × 76 × 116 | 153 | **FPW52-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 27 | III (FL) | 3 × 400 / 50 / 20 | 59 × 76 × 116 | 146 | **FPW55-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 22 | III (FL) | 3 × 400 / 50 / 22 | 59 × 76 × 116 | 195 | **FP90-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 22 | III (FL) | 3 × 400 / 50 / 24 | 59 × 76 × 116 | 201 | **F95-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 22 | III (FL) | 3 × 400 / 50 / 22 | 59 × 76 × 116 | 195 | **FP90-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 22 | III (FL) | 3 × 400 / 50 / 22 | 59 × 76 × 116 | 188 | **FPW90-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 22 | III (FL) | 3 × 400 / 50 / 32 | 85 × 76 × 116 | 296 | **FPW91-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 22 | III (FL) | 3 × 400 / 50 / 24 | 59 × 76 × 116 | 198 | **FW95-SL** |
| 0.4-0.7 | 0.2-0.4 | 22-26 | M16 × 1 | 8 / 12 mm | Filling port | 22 | III (FL) | 3 × 400 / 50 / 22 | 59 × 76 × 116 | 188 | **FPW90-SL** |

# Technical Specifications

## Heating Immersion Circulators | Bridge Mounted Circulator

| Model | Order No. | Working temperature range | Setting/ display resolution | Temperature control | Temperature stability | Heating capacity | Pump capacity | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Pressure | Suction | Flow rate |
| | | °C | °C | | °C | kW | bar | bar | l/min. |
| **MA** | 9 153 000 | +20 ... +200 | 0.01/0.1 | PID2 | ±0.01 | 2 | 0.23 - 0.45 | - | 11 - 16 |
| **ME** | 9 162 000 | +20 ... +200 | 0.01 | PID3 | ±0.01 | 2 | 0.23 - 0.45 | - | 11 - 16 |
| **SE-Z** | 9 252 218 | +20 ... +300 | 0.01 | ICC | ±0.01 | 3 | 0.4 - 0.7 | 0.2 - 0.4 | 22 - 26 |

## Heating Circulators

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

| Pump connection thread (male) | Barbed fittings | Immersion depth | Classification according to DIN 12876-1 | Power requirement | Dimensions W × L × H cm | Weight net | Model |
|---|---|---|---|---|---|---|---|
| | Ø | cm | | V / Hz / A | cm | kg | |
| - | - | 8 - 14.5 | III (FL) | 230 / 50-60 / 9 | 13 × 15 × 33 | 4 | **MA** |
| - | - | 8 - 14.5 | III (FL) | 230 / 50-60 / 9 | 13 × 15 × 33 | 4 | **ME** |
| M16x1 | 8 / 12 mm | 12 - 19 | III (FL) | 230 / 50-60 / 13 | 32 × 17 × 40 | 8 | **SE-Z** |

| Pump connection thread (male) | Barbed fittings | Bath opening/ Bath depth W × L / D | Filling volume | Cooling coil | Bath cover | Classification according to DIN 12876-1 | Power requirement | Dimen-sions W × L × H cm | Weight net | Model |
|---|---|---|---|---|---|---|---|---|---|---|
| | Ø | cm | liters | | | | V / Hz / A | cm | kg | |
| M10 × 1 | 8 / 10 mm | 13 × 15 / 15 | 4.5 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 21 × 42 × 38 | 9.6 | **MA-4** |
| M10 × 1 | 8 / 10 mm | 13 × 15 / 20 | 6 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 21 × 43 × 42 | 12.5 | **MA-6** |
| M10 × 1 | 8 / 10 mm | 22 × 15 / 20 | 12 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 30 × 43 × 45 | 13 | **MA-12** |
| M10 × 1 | 8 / 10 mm | 22 × 30 / 20 | 26 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 36 × 61 × 45 | 26 | **MA-26** |
| M10 × 1 | 8 / 10 mm | 13 × 15 / 15 | 4.5 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 21 × 42 × 38 | 9.6 | **ME-4** |
| M10 × 1 | 8 / 10 mm | 13 × 15 / 20 | 6 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 21 × 43 × 42 | 12.5 | **ME-6** |
| M10 × 1 | 8 / 10 mm | 22 × 15 / 20 | 12 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 30 × 43 × 45 | 13 | **ME-12** |
| M10 × 1 | 8 / 10 mm | 22 × 30 / 20 | 26 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 36 × 61 × 45 | 26 | **ME-26** |
| M16 × 1 | 8 / 12 mm | 13 × 15 / 15 | 4.5 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 21 × 42 × 40 | 11 | **HE-4** |
| M16 × 1 | 8 / 12 mm | 13 × 15 / 20 | 6 | Integrated | Integrated | III (FL) | 230 / 50-60 / 13 | 21 × 43 × 44 | 13.5 | **SE-6** |
| M16 × 1 | 8 / 12 mm | 22 × 15 / 20 | 12 | Integrated | Integrated | III (FL) | 230 / 50-60 / 13 | 30 × 43 × 47 | 14 | **SE-12** |
| M16 × 1 | 8 / 12 mm | 22 × 30 / 20 | 26 | Integrated | Integrated | III (FL) | 230 / 50-60 / 13 | 36 × 61 × 47 | 27 | **SE-26** |
| M16 × 1 | 8 / 12 mm | 13 × 15 / 15 | 4.5 | Integrated | Integrated | III (FL) | 230 / 50-60 / 9 | 21 × 42 × 40 | 11 | **HL-4** |
| M16 × 1 | 8 / 12 mm | 13 × 15 / 20 | 6 | Integrated | Integrated | III (FL) | 230 / 50-60 / 13 | 21 × 43 × 44 | 13.5 | **SL-6** |
| M16 × 1 | 8 / 12 mm | 22 × 15 / 20 | 12 | Integrated | Integrated | III (FL) | 230 / 50-60 / 13 | 30 × 43 × 47 | 14 | **SL-12** |
| M16 × 1 | 8 / 12 mm | 22 × 30 / 20 | 26 | Integrated | Integrated | III (FL) | 230 / 50-60 / 13 | 36 × 61 × 47 | 27 | **SL-26** |

# Voltage Options / Heating Capacity

## Refrigerated Heating Circulators

| Model | Order No. | Available voltage options / heating capacity kW | | | | |
|---|---|---|---|---|---|---|
| | | 230 V 50 Hz | 230 V 60 Hz | 230 V 50-60 Hz | 115 V 60 Hz | 100 V 50-60 Hz |
| **F12-MA** | 9 153 612 | 2.0 | 2.0 | | 1.0 | 0.8 |
| **F25-MA** | 9 153 625 | 2.0 | | 2.0 | 1.0 | 0.8 |
| **FN25-MA** | 9 153 625N | 2.0 | | | | |
| **F32-MA** | 9 153 632 | | | 2.0 | 1.0 | 0.8 |
| **FN32-MA** | 9 153 632N | 2.0 | | | | |
| **F33-MA** | 9 153 633 | 2.0 | 2.0 | | 1.0 | 0.8 |
| **F34-MA** | 9 153 634 | 2.0 | 2.0 | | 1.0 | |
| **FP35-MA** | 9 153 618 | 2.0 | | | 1.0 | 0.8 |
| **FP40-MA** | 9 153 640 | 2.0 | 2.0 | | | |
| **FP50-MA** | 9 153 650 | 2.0 | 2.0 | | | |
| **FPW50-MA** | 9 153 651 | 2.0 | 2.0 | | | |
| **F25-ME** | 9 162 625 | 2.0 | | 2.0 | 1.0 | 0.8 |
| **FN25-ME** | 9 162 625N | 2.0 | | | | |
| **F26-ME** | 9 162 626 | 2.0 | | | 1.0 | 0.8 |
| **F32-ME** | 9 162 632 | | | 2.0 | 1.0 | 0.8 |
| **FN32-ME** | 9 162 632N | 2.0 | | | | |
| **F33-ME** | 9 162 633 | 2.0 | 2.0 | | 1.0 | 0.8 |
| **F34-ME** | 9 162 634 | 2.0 | 2.0 | | 1.0 | |
| **FP40-ME** | 9 162 640 | 2.0 | 2.0 | | | |
| **FP50-ME** | 9 162 650 | 2.0 | 2.0 | | | |
| **FPW50-ME** | 9 162 651 | 2.0 | 2.0 | | | |
| **F25-HE** | 9 212 625 | 2.0 | | 2.0 | 1.0 | 0.8 |
| **FN25-HE** | 9 212 625N | 2.0 | | | | |
| **F32-HE** | 9 212 632 | | | 2.0 | 1.0 | 0.8 |
| **FN32-HE** | 9 212 632N | 2.0 | | | | |
| **F34-HE** | 9 212 634 | 2.0 | 2.0 | | 1.0 | |
| **FP40-HE** | 9 212 640 | 2.0 | 2.0 | | | |
| **FP50-HE** | 9 212 650 | 2.0 | 2.0 | | | |
| **FPW50-HE** | 9 212 651 | 2.0 | 2.0 | | | |
| **F25-HL** | 9 312 625 | 2.0 | | 2.0 | 1.0 | 0.8 |
| **FN25-HL** | 9 312 625N | 2.0 | | | | |
| **F32-HL** | 9 312 632 | | | 2.0 | 1.0 | 0.8 |
| **FN32-HL** | 9 312 625N | 2.0 | | | | |
| **F33-HL** | 9 312 633 | 2.0 | 2.0 | | 1.0 | 0.8 |
| **FP35-HL** | 9 312 618 | 2.0 | | | 1.0 | 0.8 |
| **FP40-HL** | 9 312 640 | 2.0 | 2.0 | | | |
| **FP50-HL** | 9 312 650 | 2.0 | 2.0 | | | |
| **FPW50-HL** | 9 312 651 | 2.0 | 2.0 | | | |

## Cryo-Compact Circulators

| Model | Order No. | Available voltage options / heating capacity kW | | |
|---|---|---|---|---|
| | | 230 V 50 Hz | 230 V 60 Hz | 115 V 60 Hz |
| **CF30** | 9 400 330 | 2.0 | 2.0 | 1.0 |
| **CF31** | 9 400 331 | 2.0 | 2.0 | 1.0 |
| **CF40** | 9 400 340 | 2.0 | 2.0 | 1.0 |
| **CF41** | 9 400 341 | 2.0 | 2.0 | 1.0 |

## Ultra-Low Refrigerated Circulators

| Model | Order No. | Available voltage options / heating capacity kW | | | | | |
|---|---|---|---|---|---|---|---|
| | | 230 V 50 Hz | 230 V 60 Hz | 230 V 50-60 Hz | 3 x 230 V 50 Hz | 3 x 400 V 50 Hz | 3 x 230 V 60 Hz |
| **F70-ME** | 9 162 670 | 1.3 | | | | | |
| **F81-ME** | 9 162 681 | | | 1.3 | | | |
| **FP89-ME** | 9 162 689 | 1.3 | 1.3 | | | | |
| **FP51-SL** | 9 352 751 | | | | 3.0 | 3.0 | 3.0 |
| **FP52-SL** | 9 352 752 | | | | 3.0 | 3.0 | 3.0 |
| **FP55-SL** | 9 352 755 | | | | | 3.0 | 3.0 |
| **F81-HL** | 9 312 681 | | | 1.3 | | | |
| **FP89-HL** | 9 312 689 | 1.3 | 1.3 | | | | |
| **FP90-SL** | 9 352 790 | | | | 3.0 | 3.0 | 3.0 |
| **FPW52-SL** | 9 352 753 | | | | 3.0 | 3.0 | 3.0 |
| **FPW55-SL** | 9 352 756 | | | | | 3.0 | 3.0 |
| **FPW90-SL** | 9 352 791 | | | | 3.0 | 3.0 | 3.0 |
| **FPW91-SL** | 9 352 793 | | | | | 3.0 | 3.0 |
| **FP52-SL** | 9 352 752N | | | | 3.0 | 3.0 | 3.0 |
| **FP55-SL** | 9 352 755N | | | | | 3.0 | 3.0 |
| **FP52-SL** | 9 352 752N150 | | | | 3.0 | 3.0 | 3.0 |
| **FP55-SL** | 9 352 755N150 | | | | | 3.0 | 3.0 |
| **FPW52-SL** | 9 352 753N | | | | 3.0 | 3.0 | 3.0 |
| **FPW55-SL** | 9 352 756N | | | | | 3.0 | 3.0 |
| **FPW52-SL** | 9 352 753N150 | | | | 3.0 | 3.0 | 3.0 |
| **FPW55-SL** | 9 352 756N150 | | | | | 3.0 | 3.0 |
| **FP90-SL** | 9 352 790N | | | | 3.0 | 3.0 | 3.0 |
| **F95-SL** | 9 352 795N | | | | | 3.0 | 3.0 |
| **FP90-SL** | 9 352 790N150 | | | | 3.0 | 3.0 | 3.0 |
| **FPW90-SL** | 9 352 791N | | | | 3.0 | 3.0 | 3.0 |
| **FPW91-SL** | 9 352 793N | | | | | 3.0 | 3.0 |
| **FW95-SL** | 9 352 796N | | | | | 3.0 | 3.0 |
| **FPW90-SL** | 9 352 791N150 | | | | 3.0 | 3.0 | 3.0 |

## Heating Immersion Circulators | Bridge Mounted Circulator

| Model | Order No. | Available voltage options / heating capacity kW | | | | | |
|---|---|---|---|---|---|---|---|
| | | 230 V 50 Hz | 230 V 60 Hz | 230 V 50-60 Hz | 115 V 60 Hz | 100-115 V 50-60 Hz | 100 V 50-60 Hz |
| **MA** | 9 153 000 | | | 2.0 | | 0.8 - 1.0 | |
| **ME** | 9 162 000 | | | 2.0 | | 0.8 - 1.0 | |
| **SE-Z** | 9 252 218 | | | 3.0 | | | |

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

| Model | Order No. | Available voltage options / heating capacity kW | | | | | |
|---|---|---|---|---|---|---|---|
| | | 230 V 50 Hz | 230 V 60 Hz | 230 V 50-60 Hz | 115 V 60 Hz | 100-115 V 50-60 Hz | 100 V 50-60 Hz |
| **MA-4** | 9 153 504 | | | 2.0 | | 0.8 - 1.0 | |
| **MA-6** | 9 153 506 | | | 2.0 | | 0.8 - 1.0 | |
| **MA-12** | 9 153 512 | | | 2.0 | | 0.8 - 1.0 | |
| **MA-26** | 9 153 526 | | | 2.0 | | 0.8 - 1.0 | |
| **ME-4** | 9 162 504 | | | 2.0 | | 0.8 - 1.0 | |
| **ME-6** | 9 162 506 | | | 2.0 | | 0.8 - 1.0 | |
| **ME-12** | 9 162 512 | | | 2.0 | | 0.8 - 1.0 | |
| **ME-26** | 9 162 526 | | | 2.0 | | 0.8 - 1.0 | |
| **HE-4** | 9 212 504 | | | 2.0 | | 0.8 - 1.0 | |
| **SE-6** | 9 252 506 | | | 3.0 | | | |
| **SE-12** | 9 252 512 | | | 3.0 | | | |
| **SE-26** | 9 252 526 | | | 3.0 | | | |
| **HL-4** | 9 312 504 | | | 2.0 | | 0.8 - 1.0 | |
| **SL-6** | 9 352 506 | | | 3.0 | | | |
| **SL-12** | 9 352 512 | | | 3.0 | | | |
| **SL-26** | 9 352 526 | | | 3.0 | | | |

# The Julabo advantages at a glance.

## JULABO temperature control – high-precision and speed

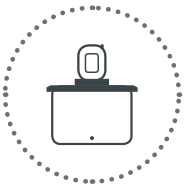
JULABO products include high-quality temperature control solutions to cover the temperature range from -95 °C to +400 °C.

### Refrigerated Circulators

The JULABO refrigerated circulators are suitable for internal and external applications and can be used within the temperature range of -95 °C to +200 °C.

### Water Baths and Shaking Water Baths

Water baths and shaking water baths from JULABO can be used for a variety of applications in the temperature range from +18 °C to +99.9 °C.

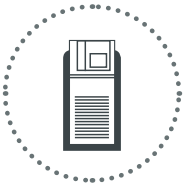


### Heating Circulators

Heating circulators are available in various designs including Heating Immersion Circulators, Open Heating Bath Circulators, or Heating Circulators and cover the temperature range from +20 °C to +300 °C.

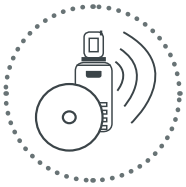
### Additional Products

In addition, the JULABO product portfolio has equipment for special applications such as Calibration Baths, Visco Baths, Beer Forcing Test Bath, Immersion / Flow-Through Coolers, Temperature Controllers and Refrigerators for Chemicals.



### Highly Dynamic Temperature Control Systems

The highly dynamic temperature control systems from JULABO can be used for demanding temperature applications ranging from -92 °C to +400 °C. The new PRESTO® line offers unique high performance specifications to meet these requirements.



### Wireless Communication & Software Solutions

JULABO facilitates the automation of applications. The temperature control units can be comfortably controlled and monitored via PC.

### Recirculating Coolers

JULABO recirculating coolers are highly efficient and therefore offer an environmentally friendly and economic alternative to tap water cooling in the range of -25 °C to +130 °C.

### Accessories

The extensive range of accessories for all our instruments allows the flexible use of JULABO products in research and industry.

### Comprehensive service and on-site support

JULABO takes pride in offering customers expert advice for pairing the proper JULABO temperature control solution to their specific application. JULABO service and support options include installation and calibration, equipment qualification documentation and application training. These invaluable services ensure customer confidence in the operation and maintenance of their JULABO unit.

### Individual requirements – individual products

The wide range of JULABO offers a solution for almost any application. However, if a specific application needs more than a standard product is able to offer, the JULABO specialists will work out an individual solution with you.


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

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Deliberately engineered with environmentally friendly materials and technologies.

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


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