

### Inexpensive circulators with a high power capacity

The HAAKE C/DC circulators are inexpensive units with a high power capacity. These circulators are small, slimline units which can be used for a wide range of standard applications. A powerful pump and a heating capacity of up to 2000 watts enable the safe temperature control of applications up to 200°C. Digital displays with user-preset temperatures are available for simple operation.

There are five different models:

**HAAKE C10:** Analog unit up to 100°C, 1.5 kW heating capacity

**HAAKE DC10:** Inexpensive digital unit up to 100°C, 2 kW heating capacity

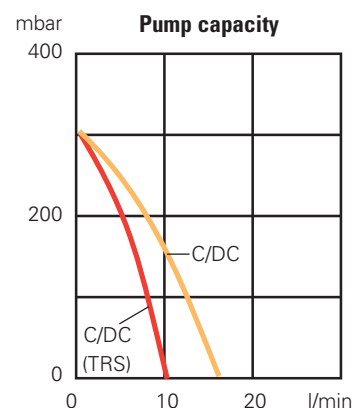
**HAAKE DC30:** Digital unit with RS232C up to 200°C, 2 kW heating capacity

**HAAKE DL30:** Same as DC30, however with 200 mm immersion depth

**HAAKE DC50:** Same as DC30, however with connection for Pt100 sensor and external control

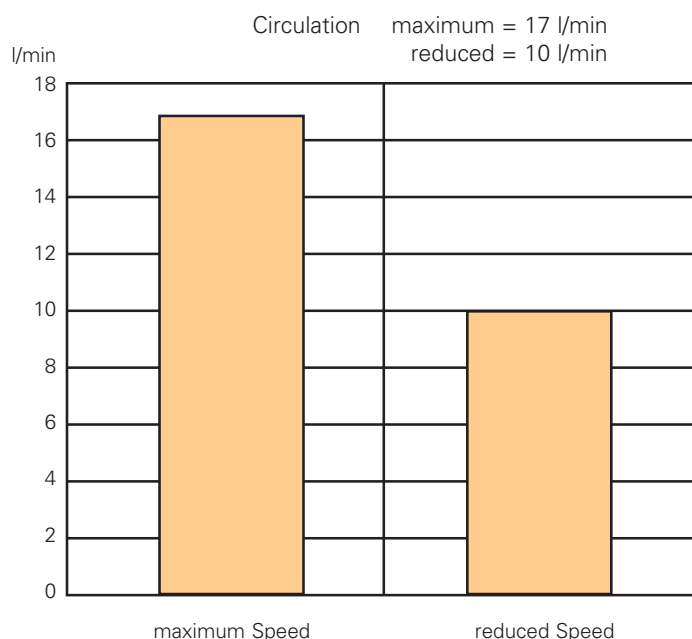
### Highlights

- Powerful pumps with Turbulence Reduction System (TRS)
- Simple operation due to separate display panels for menu selection and temperature (except for C10)
- Microprocessor with PID control (except for C10)
- Resolution of the digital display for the set and actual temperature optionally 0.1 or 0.01°C
- Real Temperature Adjustment (RTA)
- Saving of 3 user-defined fixed temperatures with their respective RTA values
- The reason for a unit fault is shown on the display via the Fault Identification System (FIS)
- RS232C interface (except for C10, DC10), optional RS485 interface with the DC50
- External Temperature Control (ETC) for external systems (for DC50 only)
- Connection for an external Pt100 sensor (for DC50 only)



### TRS (Turbulence Reduction System)

2-level-switching to avoid turbulence in open baths or to enable careful filling of external systems.



The HAAKE C/DC immersion circulators are used for the temperature control of baths up to 50 liters. They can be attached to bath walls with a thickness of up to 25 mm using a bracket clamp. A pivotal nozzle ensures even mixing and a good temperature distribution within the entire bath. The minimum depth of the bath must be 150 or 200 mm. The TRS feature can be used to avoid turbulence in the open bath.

#### Comes with

**Screw clamp** for bath wall thickness up to 25 mm and **pivotal**.

C10: plus **checking thermometer** 0 to 100°C, division 0.5°C

#### Optional accessories

#### Order-No.

**Tap water cooling coil** (C10, DC10, DC30 and DC50) **333-0590**

**Tap water cooling coil** (DL30) **333-0593**

**Software ThermStar95plus** (s. p. 32)

**Bath liquids** (s. p. 30-31)



Technical specifications acc. to DIN 12876		C10	DC10	DC30	DC50	DL30
Working temperature	°C	25..100	25..100	25..200	25..200	25..200
with tap water cooling	°C	20..100	20..100	20..200	20..200	20..200
with other cooling	°C	-30..100	-30..100	-50..200	-50..200	-50..200
Temperature accuracy	+/- K	0.04	0.02	0.01	0.01	0.01
Heater capacity 230V/115V	kW	1.5/1.0	2.0/1.2	2.0/1.2	2.0/1.2	2.0/1.2
Pump: Pressure/Flow rate max.	mbar/l/min	300/17	300/17	300/17	300/17	300/17
Immersion depth from..to	mm	75..145	75..145	85..145	85..145	85..190
Overall dimensions: WxLxH	cm	9.5 x 15 x 32	10 x 16.5 x 32	10 x 16.5 x 32	10 x 16.5 x 32	10 x 16.5 x 37
Net weight	kg	3	3	3.2	3.2	3.6
Total wattage 230V/115V	VA	1550/1050	2050/1250	2050/1250	2050/1250	2050/1550
Order-No. for 230V/50..60Hz		425-1001	426-1001	426-3001	426-5001	427-3001
for 115V/60Hz		425-1002	426-1002	426-3002	426-5002	427-3002
<b>ExtraPlus-Rating (see page 35)</b>		<b>+</b>	<b>++</b>	<b>+++</b>	<b>++++</b>	<b>+++</b>





DC30-K15	C10-K20	DC10-K20	DC30-K20	DC50-K35	DC50-K40	DC50-K41	DC50-K50
-28..150	-28..100	-28..100	-28..150	-35..200	-40..150	-40..150	-47..200
0.01	0.04	0.02	0.01	0.01	0.01	0.01	0.01
2.0/1.2	1.5/1.0	2.0/1.2	2.0/1.2	2.0/1.2	2.0/1.2	2.0/1.2	2.0/1.2
300 200 70	320 205 75	320 205 75	320 205 75	400 300 150	700 550 300	1000 750 400	850 700 500
300/12.5	300/12.5	300/12.5	300/12.5	300/12.5	300/12.5	300/12.5	300/12.5
13 x 10 x 15	13 x 10 x 15	13 x 10 x 15	13 x 10 x 15	22 x 14 x 15	29 x 15 x 15	29 x 15 x 20	22 x 14 x 15
4.5	4.5	4.5	4.5	8	12	15	8
39 x 46 x 41	23 x 46 x 58	23 x 46 x 58	23 x 46 x 58	38 x 46 x 68	38 x 46 x 74	38 x 46 x 74	38 x 46 x 74
31.1	29.8	29.8	30.1	37	43	50	46
2400/1600	1900/1400	2400/1600	2400/1600	2500/1700	2550/ -	2600/ -	2650/ -
426-3501 426-3501 426-3502	425-1601 425-1601 425-1602	426-1601 426-1601 426-1602	426-3601 426-3601 426-3602	426-5351 426-5351 426-5352	426-5401 426-5409 -	426-5411 426-5419 -	426-5491 426-5499 -
+++	+	++	+++	++++	++++	++++	++++

### Hoses

All circulators and cryostats are always delivered with nozzles for tubings with an inner Ø of 8 and 12 mm. The tubings and insulation (if applicable) have to be ordered separately and should be selected according to the application.

Description	Order-No.
<b>Insulated metal tubing made from stainless steel</b> with M 16 x 1 unions on both ends. To be used from -50 to +300°C.	
50 cm long	333-0292
100 cm long	333-0293
150 cm long	333-0294
coupling to connect 2 tubings to each other	001-2560
coupling for circulation set C-/DC-line	333-0302
<b>Insulated metal tubing made from stainless steel</b> with M 16 x 1 unions on both ends. Especially for the low temperature range -90..105°C	
100 cm long	333-0578
150 cm long	333-0579
coupling to connect 2 tubings to each other	001-2560
coupling for circulation set C-/DC-line	333-0302
<b>PVC tubing</b> to be used only with water	
8 mm i. Ø; per meter	082-0745
12 mm i. Ø; per meter	082-0304
<b>Viton tubing</b> for a temperature range of -60 to + 200°C	
8 mm i. Ø; per meter	082-1214
12 mm i. Ø; per meter	082-1215
<b>Silicone tubing</b> for a temperature range of -30 to + 220°C (not to be used with any silicone oil)	
8 mm i. Ø; per meter	082-0663
12 mm i. Ø; per meter	082-0664
<b>Perbunan tubing</b> for a temperature range of -40 to + 100°C	
8 mm i. Ø; per meter	082-0172
12 mm i. Ø; per meter	082-0173
<b>Foam rubber insulation</b> for PVC, Viton, silicone and Perbunan tubings	
for tubings with 8 mm i. Ø; per meter	806-0373
for tubings with 12 mm i. Ø; per meter	806-0374

### Bath Liquids

The carefully selected and proven heat transfer liquids offer the following advantages:

- Eliminates health hazards and minimizes unpleasant odors.
- High resistance against aging while retaining a low viscosity with a low corrosive tendency.

**Note:** Good ventilation is recommended when working at temperatures > 200°C.

#### 1. Viscosity

For optimum temperature accuracy it is very important that the heat transfer liquid be of low viscosity.

#### 2. Fire Point

Flammable thermal liquids can ignite when a specified temperature is surpassed. The usage of bath liquids is limited to a temperature level 25°C below the fire point as defined by the EN 61010.

#### 3. Selection

##### Silicone oils (Sil):

Carry a low risk of inflammation, do not give off unpleasant odors and have a long service life.

##### Synthetic thermal liquids (Synth):

Are mainly produced on a hydrocarbon basis and exhibit a low viscosity within the recommended working temperature range.

#### 4. Application Range

##### Working temperature range:

This is the range within which the circulator can be operated optimally over a longer period of time. The maximum viscosity is approx. 5 mPas.

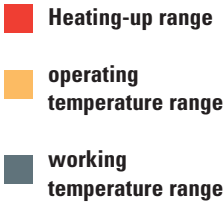
##### Operating temperature range:

The circulator may be operated only within this range over a longer period of time under certain conditions. Viscosity may rise to a maximum of 30 mPas. The pump capacity no longer matches the specifications made in the brochure.

##### Heating range:

Long-term temperature control in this range is not permissible as the pump motor's excess temperature protection may switch off the pump.



Application range		Sil 100	Sil 180	Sil 300	Synth 20*)	Synth 60	Synth 200	Synth 260
<b>Fire point</b>	°C	>100	> 225	>325	n.a.	70	>235	275
<b>Viscosity</b>	at 20°C [mPas]	3	11	200	<1	2	100	140
<b>Density</b>	at 20°C [kg/dm <sup>3</sup> ]	0.89	0.93	1.08	0.77	0.76	0.86	1.03
<b>Spec. heat capacity</b>	[kJ/kg x K]	1.67	1.51	1.56	n.a.	2.1	1.96	2
<b>Temperature ranges</b> 	300°C			<b>300</b>				
	250°C							<b>250</b>
	200°C		<b>200</b>				<b>210</b>	
	150°C							
	100°C							
	50°C	<b>75</b>					<b>45</b>	
	0°C							
	-50°C				<b>-28</b>			
	-100°C							
	<b>Color</b>		transparent colorless	transparent colorless	transparent colorless	transparent colorless	transparent colorless	transparent light brown
<b>Reacts with</b>		Silicone	Silicone	Silicone	Light-metal Zinc	Rubber Silicone	Copper Light-metal Bronze	Copper Light-metal Bronze
<b>Order-No. for 10 l Container</b>		<b>999-0202</b>	<b>999-0204</b>	<b>999-0206</b>	<b>999-0208</b>	<b>999-0210</b>	<b>999-0226</b>	<b>999-0214</b>
<b>Order-No. for 5 l Container</b>		<b>999-0201</b>	<b>999-0203</b>	<b>999-0205</b>	<b>999-0207</b>	<b>999-0209</b>	<b>999-0225</b>	<b>999-0213</b>

EC-Safety Data Sheets will be delivered together with each container of liquid.

\*) Cannot be exported; use methylecyclohexane as bath liquid

n.a. not applicable

## HAAKE ThermStar® 95plus – Application Software for all HAAKE Phoenix II and HAAKE DC Line Circulators

HAAKE Phoenix II line or a HAAKE DC30, DL30 or DC50 circulators can be connected to a PC and controlled with Windows 95, 98 or NT.

### Highlights of HAAKE ThermStar95plus:

- Simple operation due to the clear alignment of program options via a register card system.
- Selection between ramp function, just data recording and an online mode with set value setting.
- Simultaneous control of up to eight circulators.
- Online-graph with zoom function and display of internal, external and set temperature- and time values.
- Temperature ramp programs with up to 99 segments and 99 repetitions.
- Time setting down to the last second with a maximum of 23h:59min:59s per segment.
- Long distance diagnosis possible with recorded service data.
- Export of measured values as ASCII-file.
- 5 operating languages possible
- Automatic identification of connected circulator.
- Circulator connection to Intranet/Internet available (remote control).
- Monitoring of various circulators via Intranet from one location.

### Hard- und Software requirements:

- A HAAKE Phoenix II line circulator or a HAAKE DC30, DL30 or DC50 model.
- A PC with the operating system Windows 95, 98 or NT and a CD-ROM drive.
- At least one available RS232C interface port with a suitable connecting cable (9-pole SUB-D at both ends).

### Contents of delivery:

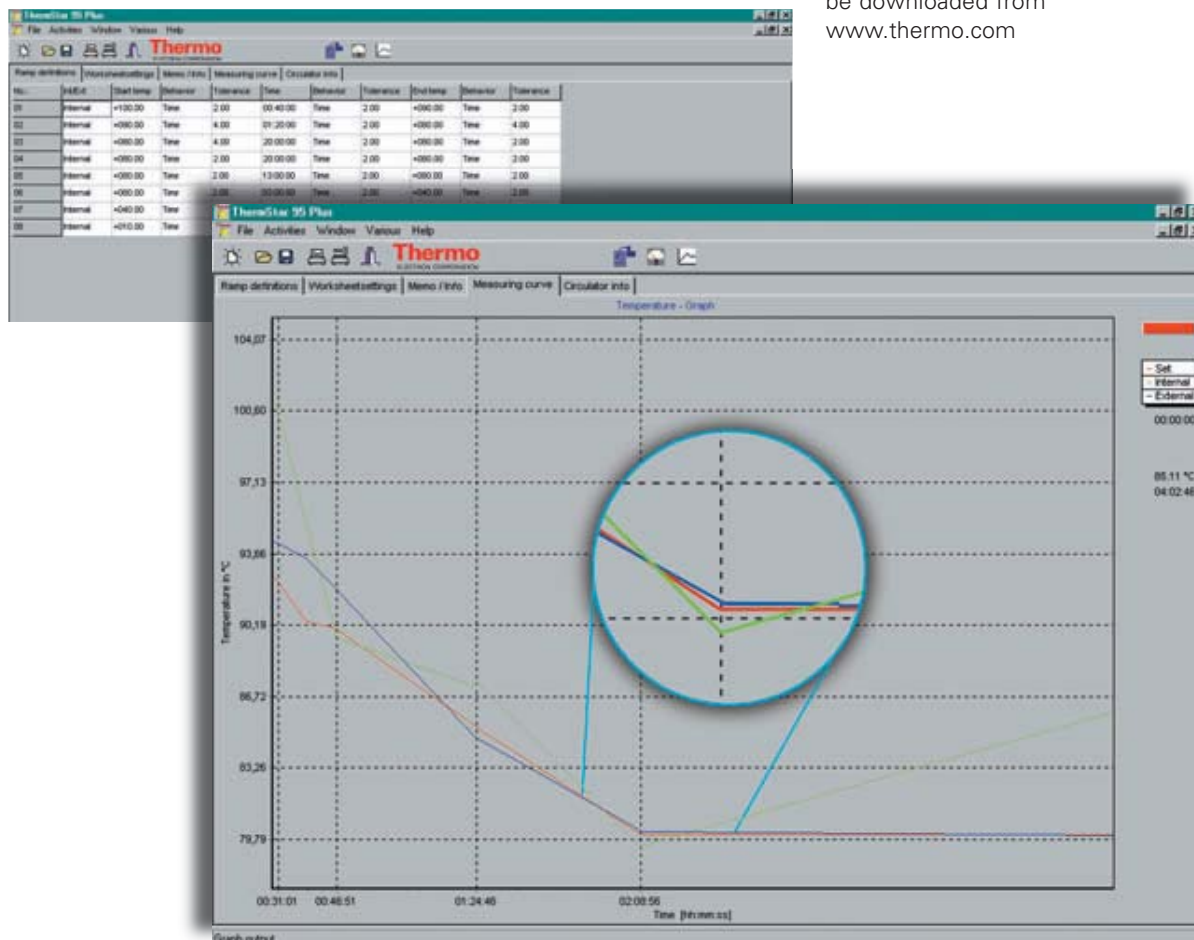
- Software package HAAKE ThermStar95plus on CD-ROM with hardware protection device (dongle) and additional program
- operating instructions

**Order-No. 091-2950**

### Note:

HAAKE ThermStar95plus can also be used with older HAAKE F/N line circulators (F6, F8, N6, N8).

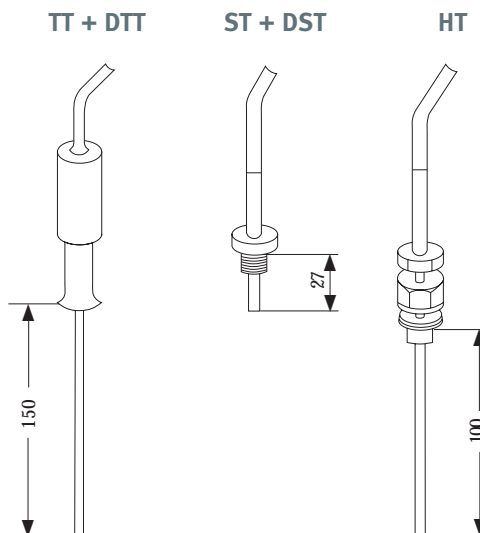
A free demo version of ThermPlot95plus can be downloaded from [www.thermo.com](http://www.thermo.com)



### Pt100 Sensor

The following sensors are available for external temperature control applications (ETC-System) with circulators and cryostats.

Description	Order-No.
<b>Sensor TT for Phoenix II-units</b> Pt100 sensor in closed protection tube made from stainless steel 18/8, 150 mm long, Ø 3 mm, cable length 3 m, up to 600°C	<b>333-0429</b>
<b>Sensor DTT for DC50-units</b> Pt100 sensor in closed protection tube made from stainless steel 18/8, 150 mm long, Ø 3 mm, cable length 3 m, up to 600°C	<b>333-0613</b>
<b>Sensor ST for Phoenix II-units</b> as Sensor TT, 27 mm long, Ø 3 mm, with thread M 10 x 1, cable length 3 m, up to 600°C	<b>333-0428</b>
<b>Sensor DST for DC50-units</b> as Sensor DTT, 27 mm long, Ø 3 mm, with thread M 10 x 1, cable length 3 m, up to 600°C	<b>333-0612</b>
<b>Sensor HT for Phoenix II-units</b> as Sensor TT, only to be used with the T-piece 001-1766, cable length 3 m, up to 600°C	<b>333-0423</b>
<b>T-Piece for the sensor HT</b> to be mounted into HAAKE metal tubing connections	<b>001-1766</b>



### Level Control

All circulators and cryostats equipped with a combined pressure and suction pump can be used for the temperature control of external open baths. Tubing mounts with integrated level control are fitted for this purpose to make sure that the external bath will not overflow.

### Replenishing Device

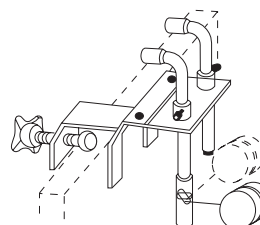
This device enables the user to transfer evaporated water into a bath circulator automatically. The water loss will be compensated in small amounts to avoid temperature shocks and drifts.

The device comprises a controller and a float switch. The float switch has to be mounted into the bath cover of the circulator.

Description	Order-No.
Automatic replenishing device AN2 for 230 V/50..60 Hz/60 VA	<b>333-0752</b>
Holder for AN2 in bath bridge H62 and H73	<b>333-0762</b>
Holder for AN2 in bath cover B3, B7, K10, K15, K20, C25P	<b>333-0764</b>
Holder for AN2 in bath cover B5	<b>333-0765</b>
Holder for AN2 in bath cover B12, K35, K50, C30P, C35P, C50P	<b>333-0757</b>
Holder for AN2 in bath cover K40, K41, C40P, C41P	<b>333-0759</b>

Description	Order-No.
-------------	-----------

**Tubing mount** for the level control in the external bath with screw clamp:

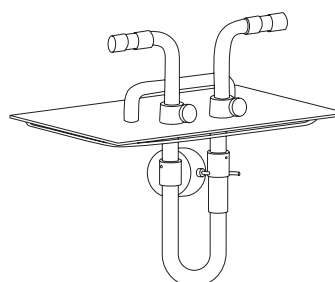


**333-0587**

Description	Order-No.
-------------	-----------

Tubing mount built into bath cover for level control in the circulator bath when temperature controlling external open vessels. For units with bath:

B7, C25P	<b>333-0609</b>
B5	<b>333-0610</b>
B12	<b>333-0603</b>
C30P, C35P, C50P	<b>333-0591</b>
C40P, C41P	<b>333-0608</b>



This glossary contains the most important terms used to describe the features of HAAKE circulators.

### 1 PID<sup>++</sup>-control

This robust control system is specially developed for HAAKE DC circulators and adapted to each respective unit. No customer adjustments are necessary.

### 2 FuzzyStar-control system with neural adaptation

This intelligent control system is included in all Phoenix II circulators designed for the special demands of temperature control. This range incorporates a Fuzzy Logic control system combined with a system identification feature via neural networks.

#### Advantages:

- Quick heating and cooling
- Exact control without fluctuations
- Extremely robust control compensation in case of system changes
- High level of adaptability to suit a variety of applications
- Energy saving due to integrated cooling management
- Phoenix II units sense your application needs and automatically adapt for optimal results

### 3 TRS system

The pump capacity can be reduced with the Turbulence Reduction System (TRS) to avoid heavy turbulence in open baths.

### 4 ESK system with external sensor connection

The External Temperature Control (ETC) handles the temperature control of external systems when an external Pt100 is connected. The inlet temperature in the circulator is adapted so that the set temperature in the external system is maintained precisely. A Pt100 sensor is used for this purpose.

### 5 Direct dialog via LCD graphic display

Phoenix II circulators are equipped with a large LCD graphic display that shows the necessary operating steps in plain text. The selection of menu options is carried out via the direct assignment of the functions to keys.

### 6 HAAKE RTA system

The Real Temperature Adjustment (RTA) enables the difference between the actual temperature displayed and the real temperature in the bath or external system to be compensated for. To do this, the temperature difference must be measured once and entered into the circulator as a correction value. The correction of the display is then carried out automatically.

### 7 Safety classes NFL and FL

Units with safety elements classified according to NFL (Non Flammable Liquids) can be used only with water or water and antifreeze. Units with elements classified according to FL (Flammable Liquids) can be used with the recommended bath liquids.

### 8 HAAKE FIS system

The Fault Identification System (FIS) ensures that the cause for an alarm is clearly shown on the display. All safety-relevant parts are switched off.



## ExtraPlus Rating System

Each circulator has been given an individual ExtraPlus rating. This rating can be found at the bottom of the specification table in the product description.

### Have you already chosen your circulator?

You can now cross-reference the ExtraPlus rating with the specifications in the corresponding column of the table on this page and see which features your circulator has.

### Are you looking for a circulator with special features?

Select the desired features in the first column of the table on this page, and you can then determine which ExtraPlus rating your circulator should have. Phoenix II line circulators with a rating of 5 and 6 Pluses can be found on pages with HAAKE Phoenix II circulators. Circulators with a rating of 1 and 4 stars can be found on pages with HAAKE C/DC-line circulators.

Rating	+	++	+++	++++	+++++	++++++
<b>Control and Technology</b>						
Stable On/Off-Control	✓					
<b>1</b> Advanced PID+-Control		✓	✓	✓		
<b>2</b> FuzzyStar®-Control with neural adaption					✓	✓
Energy management of cooling					✓	✓
<b>3</b> TRS-system/flow rate reduction	✓	✓	✓	✓	✓	✓
Self-adapting pump					✓	✓
<b>4</b> External sensor connection with ETC-system				✓	✓	✓
Microprocessor and digital electronics		✓	✓	✓	✓	✓
<b>Operation</b>						
Analog setting and fine adjustment	✓					
Touch pad front panel with double display		✓	✓	✓		
<b>5</b> Direct dialog on LCD-graphic display					✓	✓
Display selection (°C, °F, K)					✓	✓
Digital Display resolution (0.1 / 0.01 °C)		✓	✓	✓	✓	✓
Simultaneous SET/ACTUAL display				✓	✓	✓
Green 7-segment LED-display		✓	✓	✓		
Language Selection				✓	✓	✓
User-defined fixed temperatures (storable)		✓	✓	✓	✓	✓
<b>6</b> RTA-system for internal temperature		✓	✓	✓	✓	✓
<b>6</b> RTA-system for external temperature				✓	✓	✓
High temperature limitation		✓	✓	✓	✓	✓
Low temperature limitation		✓	✓	✓	✓	✓
Continous display of date and time					✓	✓
Time for Start/Stop						✓
Number of saveable programs					1	10
3-point calibration						✓
<b>Safety</b>						
<b>7</b> Safety elements acc. to NFL	✓	✓				
<b>7</b> Safety elements acc. to FL			✓	✓	✓	✓
Variable overtemperature protection	✓	✓	✓	✓	✓	✓
Fixed low liquid level protection			✓	✓	✓	✓
Pump and motor overload protection	✓	✓	✓	✓	✓	✓
Control sensor monitoring		✓	✓	✓	✓	✓
Measuring and external sensor monitoring				✓	✓	✓
Cooling circuit overload protection					✓	✓
Optical alarm	✓	✓	✓	✓	✓	✓
Acoustical alarm			✓	✓	✓	✓
<b>8</b> FIS		✓	✓	✓	✓	✓
<b>Communication</b>						
RS 232C interface			✓	✓	✓	✓
RS 485 interface				optional		✓
Profibus interface						optional
LIMS-compatible				optional		✓
Remote alarm connection						✓
External Start/Stop/Alarm						✓
Rating	+	++	+++	++++	+++++	++++++