

Heating and cooling thermostats for specific use
in process engineering and measuring technology at temperatures
from **-90 up to 400 °C**

The image shows a scientist in a white lab coat smiling and gesturing towards a LAUDA KRYOMAT RUL 90 control unit. The control unit features a digital display showing 'Ti=-90.01 °C K' and 'Ts=-90.00 °C TiI', a keypad with various function buttons, and the LAUDA logo. Below the control unit, several LAUDA Ultra thermostats of different sizes are displayed.

Heating and cooling thermostats

for specific use in process engineering and measuring technology at temperatures from -90 up to 400 °C

Top performance and optimum safety



High temperatures
in a mini-plant



Ageing tests on raw
materials for the
production of plastics



Material testing at
low temperatures

The special feature about the Ultra heating devices is that the control head is functionally separated from the thermostat. This offers the advantage of being able to control it remotely and guarantees maximum process safety. Alternatively, Ultra devices can come equipped with a duplex pump – a pressure/suction pump with constant level device for the thermostating of external open baths without the need for any additional equipment. The low-level and adjustable overtemperature protection features which come as standard further enable operation with flammable liquids (safety class III, FL). A cooling coil is fitted as standard. The USH 400 high-temperature thermostats are excellent for use in mini plants, reactors and applications in closed vents.

Fields of application: process engineering, industrial materials testing, quality control

External control

The connection of up to two temperature probes enables external control and temperature measurement directly on the object.

Highly-efficient automatic chillers and proportional cooling

An energy-saving refrigeration technology is particularly important to process integration. Ultra-Kryomats automatically recognise when no cooling is necessary, and automatically switch the compressor off. The proportional cooling just cools as much as is necessary. This saves you up to 75 per cent energy. The temperature stability is excellent, room heating caused by waste heat is low. Even at the highest temperatures, you can rely on the cooling properties throughout the entire working range – identical to the ACC range with LAUDA devices. Water-cooled refrigeration units have an economical through-flow control.

The power packs for demanding applications

The powerful cooling unit extracts sufficient heat even at cryogenic temperatures of the bath liquid. Ultra-Kryomats are excellent for the materials testing of large-volume samples and for simulating space conditions in vacuum chambers.

The LAUDA Ultra range includes heating and cooling thermostats for the high-performance area in process engineering and measuring technology. Various bath sizes and temperatures up to 400 °C also fulfil special requirements. The Ultra-Kryomat

series is the classic amongst the sophisticated chillers in the field of process engineering. Their compact design enables the flexible lining-up of several test baths with various temperatures.

LAUDA Ultra control unit P: flexible programming for process engineering

LAUDA Ultra thermostats are equipped with a powerful control unit which provides numerous additional functions for ambitious applications in the process industry. In the Ultra heating thermostats the control unit is separated from the thermostat itself.

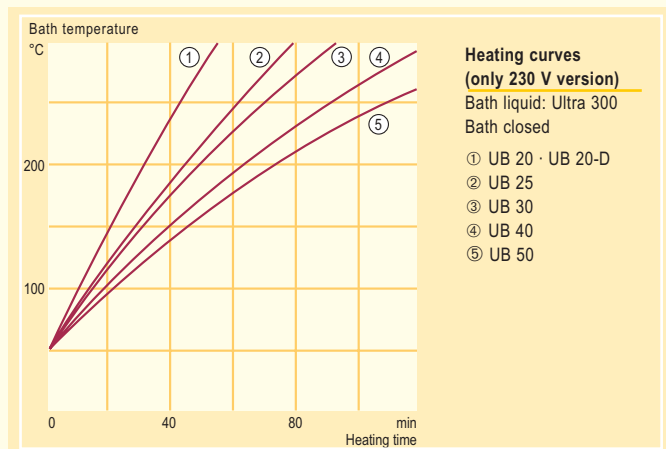
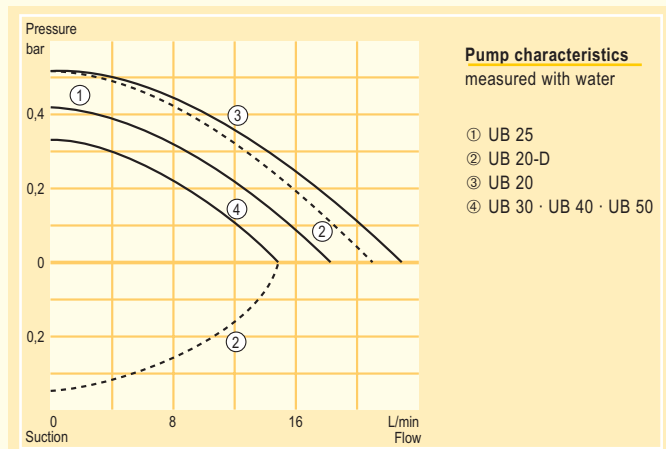


- ❖ Programmer function with 99 temperature/time segments, repeat and tolerance band function
- ❖ Parallel display of two temperature values with 0.01/0.001 °C resolution
- ❖ Selectable limitation for heating and cooling capacity
- ❖ Facility for individual parameter input or self-adaption
- ❖ Heating thermostats equipped with output for solenoid valve for accurate controlled cooling
- ❖ Programmable analogue setpoint input and temperature output, 0...10 V or 0/4...20 mA, second analogue temperature output (0...10 V), input and output scalable
- ❖ Fault signal input and output
- ❖ Output for reverse flow protection
- ❖ Easy user calibration
- ❖ RS 232 interface for PC and LAUDA Wintherm Plus control software
- ❖ Menu guidance in: German, English, French

Additional functions for external control:

- ❖ External controller in cascade circuit
- ❖ Two independent measuring circuits for external Pt 100 temperature probes, connector according to Namur (LEMOSA)
- ❖ Independent limitation of bath temperature
- ❖ Limiting of the difference between inlet and external temperatures for the gentle thermostating of sensitive samples

Heating thermostats



**The direct ones for high temperatures:
Ultra thermostats up to 300 °C**

LAUDA Ultra bath/circulation thermostats have a large bath opening for direct thermostating at high temperatures. They are also available as variants with greater usable depths and bath openings. The UB 25 and the UB 50 have particularly large baths and, as series bath thermostats, can be expanded.



Heating thermostat UB 20

Technical features	UB 20	UB 20-D	UB 30
Working temperature range	°C 45...300	50...300	40...300
Temperature stability	±K 0.01	0.01	0.01
Heater power	kW 3.0	3.0	3.0
Pump pressure max.	bar 0.50	0.50	0.30
Pump suction max.	bar -	0.33	-
Pump flow (pressure) max.	L/min 22	20	15
Pump flow (suction) max.	L/min -	15	-
Bath volume	L 13...18	13...18	17.5...30
Bath opening/depth	mm 250x265/195	250x265/195	250x265/320
Cat. No. 230 V; 50 Hz	LTB 130	LTB 131	LTB 134
Cat. No. 230 V; 60 Hz	LTB 230	LTB 231	LTB 234

Technical features	UB 40	UB 25	UB 50
Working temperature range	°C 35...300	40...200 (300*)	35...200 (300*)
Temperature stability	±K 0.01	0.02	0.02
Heater power	kW 3.0	3.0	3.0
Pump pressure max.	bar 0.30	0.40	0.30
Pump suction max.	bar -	-	-
Pump flow (pressure) max	L/min 15	18	15
Pump flow (suction) max.	L/min -	-	-
Bath volume	L 27...40	19...26	33...46
Bath opening/depth	mm 250x265/450	250x455/195	250x905/195
Cat. No. 230 V; 50 Hz	LTB 135	LTB 132	LTB 133
Cat. No. 230 V; 60 Hz	LTB 235	LTB 232	LTB 233

* With bath cover

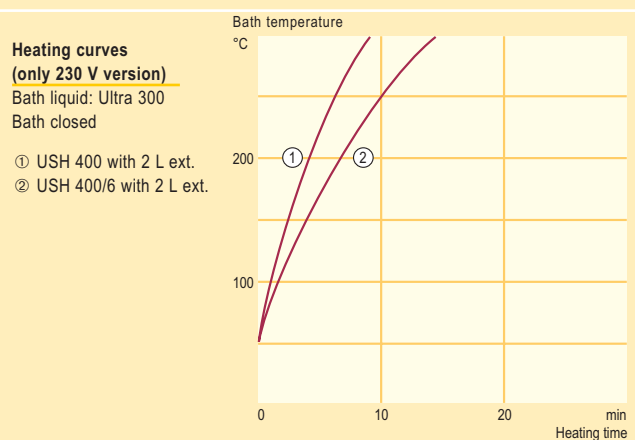
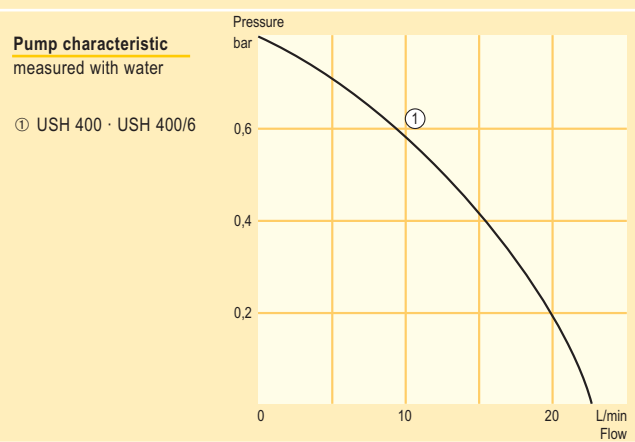
High-temperature thermostats USH 400 from 20 up to 400 °C

Controlled power in the high-temperature range: USH 400

The high-temperature thermostats of the USH 400 range with the controlled high-temperature chiller MVH (available as an optional extra) have been designed especially for the thermostating of external consumers at high temperatures up to 400 °C. The controlled high-temperature chiller MVH guarantees controlled cooling at any temperature. The highly efficient pump of the USH 400 enables trouble-free working with distant consumers. The special construction avoids direct contact of the heat-transfer oil with atmospheric oxygen. Thanks to the optimised thermal separation of the cooling chamber for the cold oil blanket, there is no need for additional cooling up to an operating temperature of 250 °C. The heating capacity restriction and the low surface load of the heater ensure long service lives of the heat transfer medium.



USH 400 with MVH



Standard accessories

Nipples · screw caps · filler funnel · control unit

Technical features		USH 400	USH 400/6
Working temperature range	°C	80...400*	80...400*
Temperature range with MVH	°C	20...400*	20...400*
Display resolution	°C	0.01	0.01
Temperature stability	±K	0.02...0.1	0.02...0.2
Heating capacity	°C	3.0	5.6
Surface loading of the heater	W/cm ²	approx. 3	approx. 5.6
Cooling capacity with MHV (cooling water temperature 10 °C)	kW	6 at 300 °C, 2 at 100 °C	6 at 300 °C, 2 at 100 °C
Cooling water flow/pressure for MVH	L/min / bar	approx. 10/0.5...6	approx. 10/0.5...6
Pump pressure max.	bar	0.80	0.80
Pump flow (pressure) max.	L/min	22	22
Bath volume/with additional expansion vessel (1.2 L)	L	1.9/2.1	1.9/2.1
Expansion volume/with additional expansion vessel (1.2 L)	L	0.9/2.2	0.9/2.2
Loading	kW	3.2	5.8
Cat. No.		LTH 109 (230 V; 50 Hz)	LTH 211 (400 V; 3~/N/PE; 50 Hz)
Cat. No.		LTH 209 (230 V; 60 Hz)	LTH 611 (440...480 V; 3~/N/PE; 60 Hz)

* Bath liquids only available up to 350 °C.

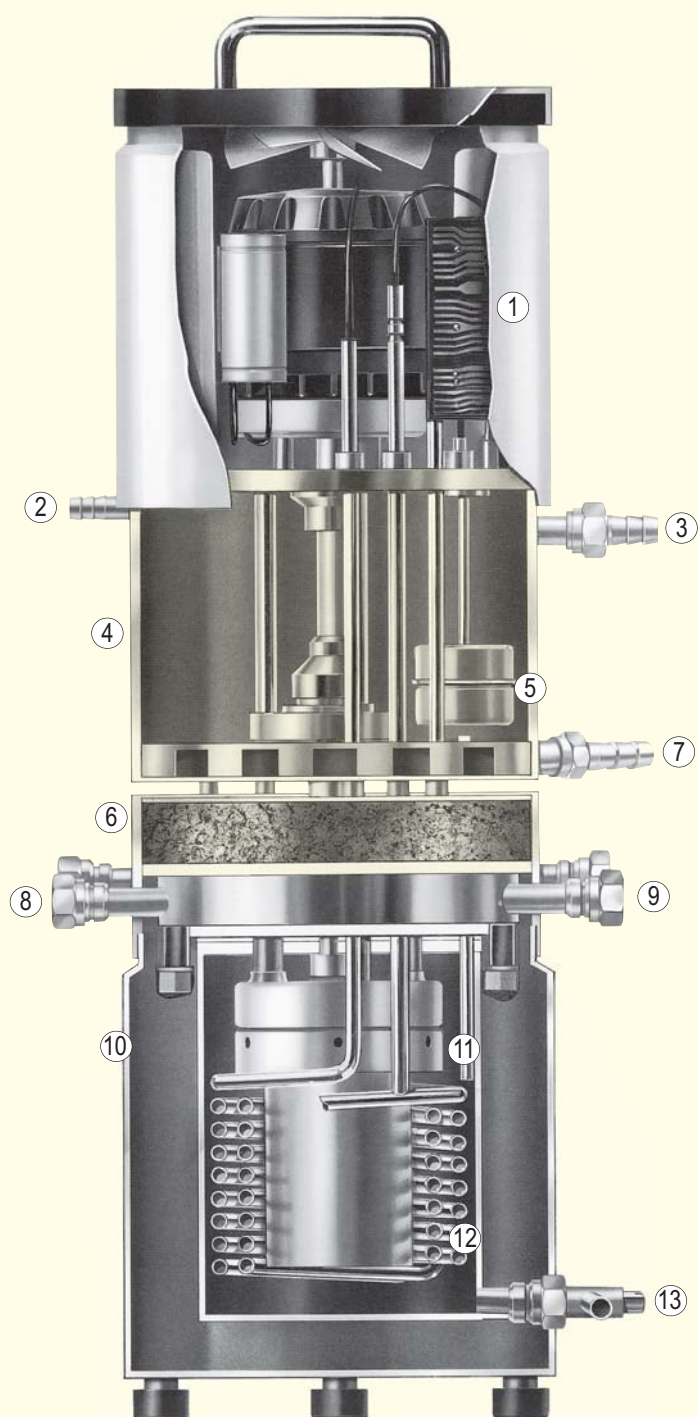
 High-temperature thermostats USH 400 from 20 up to 400 °C

There is nothing comparable up to 400 °C: LAUDA USH 400 high-temperature thermostats

Ultra high-temperature thermostats offer the maximum capacity in the minimum amount of space. Thanks to the small footprint they were almost made to be integrated into mini-plants. As in many cases the actual thermostat is often installed directly next to the reactor. The separate control unit has a decisive advantage here, since it allows control and visual inspection of all important unit functions such as level monitoring and temperature setting from an easily accessible point.

Two-chamber construction

- ① Pump motor
- ② Inert gas blanket
- ③ Overflow
- ④ Cold oil blanket
- ⑤ Float
- ⑥ Cooling chamber for cold oil blanket
- ⑦ Connections for cooling chamber
- ⑧ Connection MVH
- ⑨ Pump outflow/return
- ⑩ Pump chamber
- ⑪ Heating chamber
- ⑫ Heater
- ⑬ Drain tap



If you need to provide thermostating up to 400 °C in closed external circuits in the chemical industry, you will find technical perfection in the LAUDA USH 400 high-temperature thermostats.

The specific characteristic is the “two-chamber construction principle”. In this case the thermostating chamber and the expansion vessel are thermally separated from each other.

Two-chamber construction

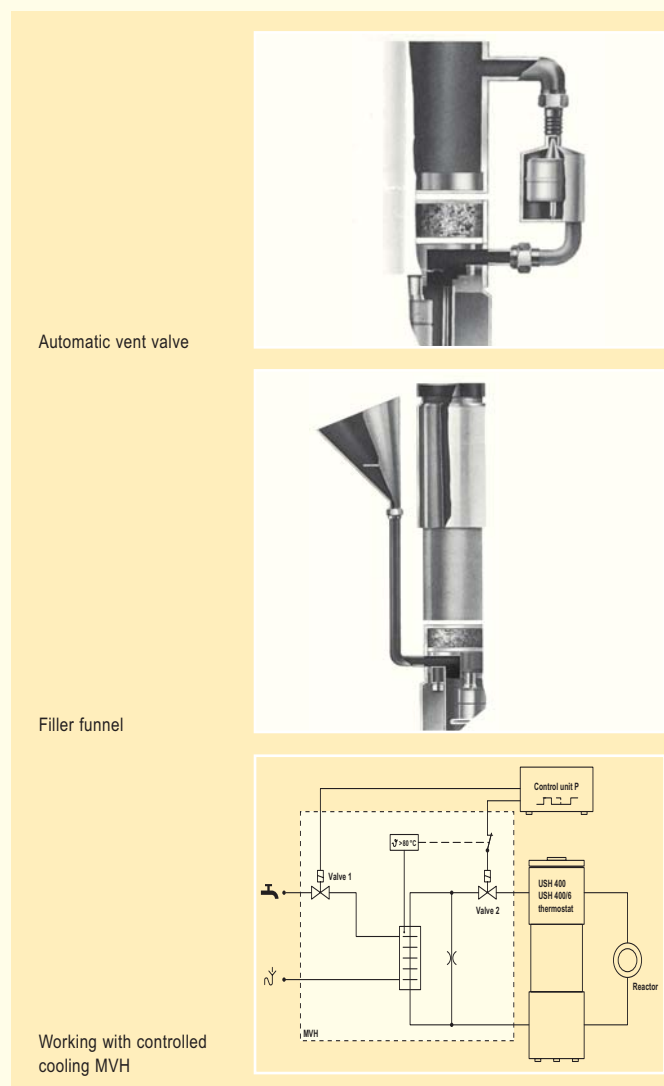
When heat-transfer liquids are operated at temperatures above 200 °C, a noticeable oxidation of the liquid by the oxygen in the atmosphere takes place on the hot surface of the liquid. This damages the liquid and reduces its service life. Thanks to the USH's special two-chamber construction, the actual bath is divided into a heating chamber and a cold oil blanket which are extensively thermally decoupled. The cold oil blanket is located above the actual heating chamber, which contains the heater and the pump chamber. The two chambers are connected via tubes with small diameters. This enables the liquid from the heating chamber to expand into the cold oil blanket, yet no active heat exchange between the chambers occurs. Even at maximum temperature, the surface temperature of the cold oil blanket thus always remains below 200 °C. This effect can be considerably improved by means of additional cooling with air or water. In order to further extend the service life of the heat-transfer liquid, an inert gas blanket can be superimposed on the cold oil blanket.

Fast reaction time

The two-chamber construction reduces the active heat-transfer volume in thermostats to a minimum of approx. 1.9 litres. Thus the possible heat energy of 3 kW/5.6 kW is widely available for the thermostating of the external consumer. This enables very fast heating processes. In connection with the MVH (controlled cooling), faster cooling processes can also be achieved. The combination of USH and MVH therefore provides a compact, highly-dynamic thermostating system.

Everything safely under control

LAUDA high-temperature thermostats come equipped with several sensors to ensure safe operation at high temperatures with flammable liquids. The liquid level of the cold oil blanket is monitored with the aid of a float and, should a minimum value not be reached, an all-pole cut-off of the device is activated. An all-pole cut-off of the device is also activated should the set maximum temperature be exceeded – this is registered by means of a separate electronic measuring circuit with an independent probe. A further temperature probe is located in the



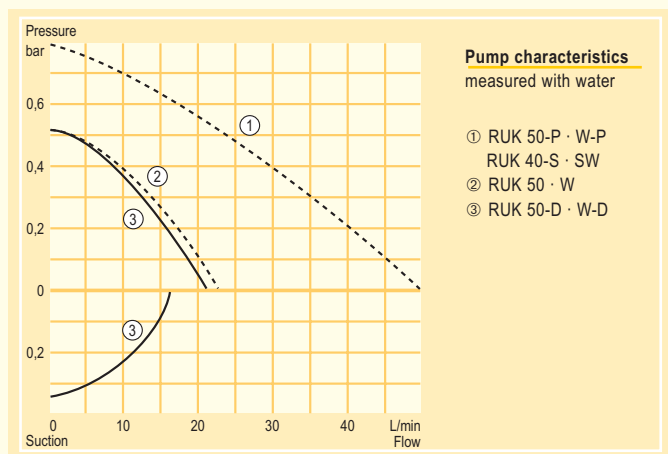
motor space to avoid a thermal overload of the pump motor. Since heat transfer liquids used at high temperatures have a high viscosity at ambient temperature, there is always the possibility of a selective thermal decomposition of the liquid on the surface of the heater when starting up the system. In order to prevent this, the surface temperature of the heater is monitored by means of a temperature probe and the heating capacity is adapted accordingly. An optional automatic vent valve is available for achieving complete ventilation during filling.

❄️ Cooling thermostats down to -50 °C

Ice-cold when it comes to power: Ultra-Kryomats go down to -50 °C

The Ultra-Kryomats from the RUK series excel; primarily because of their high cooling capacity and versatility. They are available with a Duplex pump (D), a pressure/suction pump with built-in constant level device, or a high-power pressure pump (P), with

increased cooling capacity (S) in the RUK 40 S and RUK 90, and also in a water-cooled version (W), with automatic control of the cooling water flow.



Cooling thermostat RUK 50

Standard accessories

Cover plate · 2 nipples 11 mm Ø · 2 nipples 13 mm Ø · 2 screw caps · 1 m insulated silicone tube · 2x 4 m water tube 1/2" (only for RUK 50 W, RUK 50 W-D)

For further accessories please request the comprehensive LAUDA accessories brochure.

Technical features		RUK 50	RUK 50-D	RUK 50 W	RUK 50 W-D
Working temperature range*	°C	-50...100	-50...100	-50...100	-50...100
Temperature stability	±K	0.02...0.05	0.02...0.05	0.02...0.05	0.02...0.05
Heater power	kW	2.0	2.0	2.0	2.0
Cooling output at 20 °C	kW	2.5	2.5	3.0	3.0
Pump pressure max.	bar	0.50	0.50	0.50	0.50
Pump suction max.	bar	–	0.33	–	0.33
Pump flow (pressure) max.	L/min	22	20	22	20
Pump flow (suction) max.	L/min	–	15	–	15
Bath volume	L	19...27	19...27	19...27	19...27
Bath opening/depth	mm	282x257/220	282x257/220	282x257/220	282x257/220
Cat. No. 400 V; 3~ /N/PE; 50 Hz		LUK 201	LUK 202	LUK 203	LUK 204
Cat. No. 440...480 V; 3~/PE; 60 Hz		LUK 601	LUK 602	LUK 603	LUK 604

* Working temperature range is equal to ACC range.

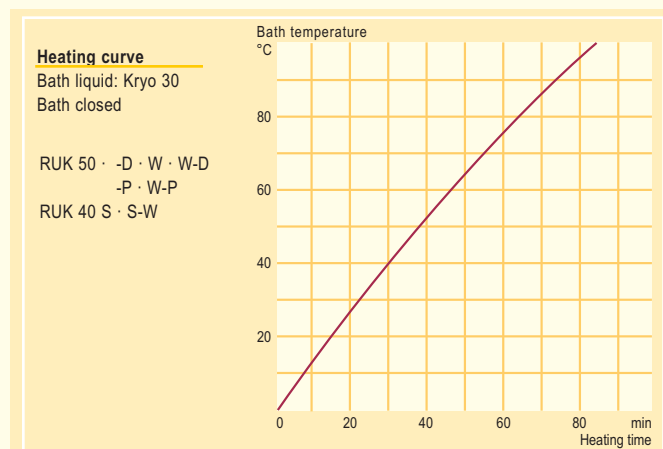
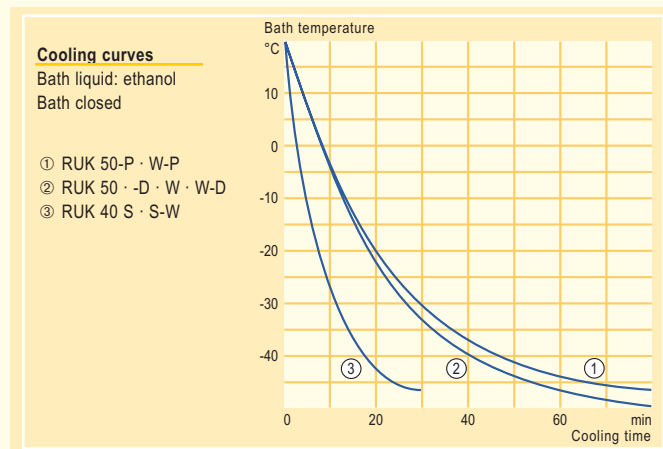
Other power supply versions on request.

LAUDA Ultra-Kryomats of the RUK series that work down to -50 °C are compact, floor-standing cooling thermostats. They are characterised primarily by high cooling capacities and large

baths. Multiple units can be arranged one after another for test baths with various temperatures.



Cooling thermostat RUK 40 S



Standard accessories

Cover plate · 2 nipples 15 mm Ø · 2 screw caps · 1 m insulated silicone tube · 2x 4 m water tube 1/2" (only for RUK 50 W-P, RUK 40 SW)

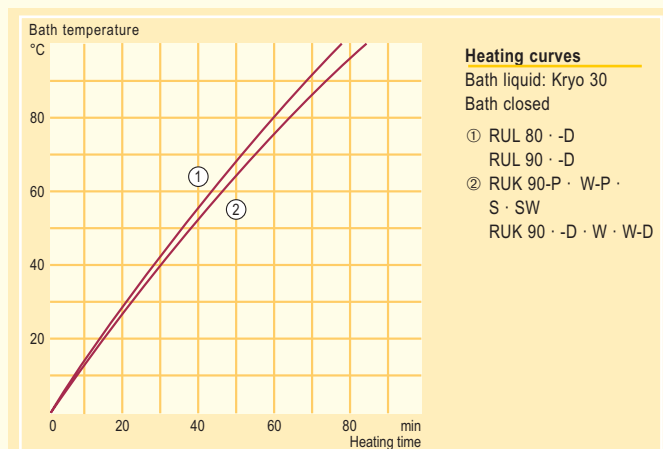
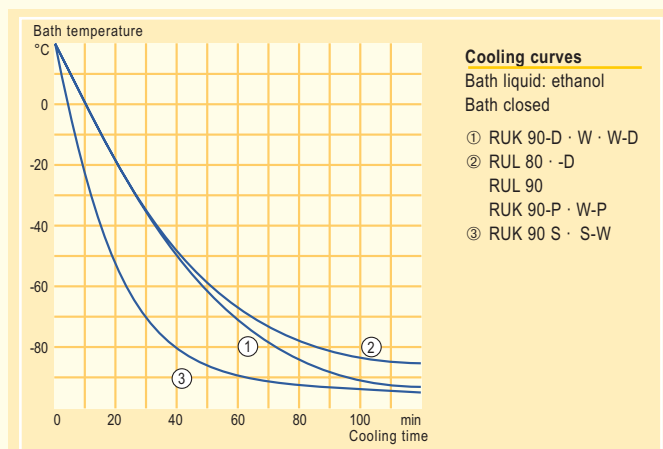
For further accessories please request the comprehensive LAUDA accessories brochure.

Technical features		RUK 50-P	RUK 50 W-P	RUK 40 S	RUK 40 SW
Working temperature range*	°C	-40...100	-40...100	-40...100	-40...100
Temperature stability	±K	0.02...0.05	0.02...0.05	0.1...0.5	0.1...0.5
Heater power	kW	2.0	2.0	2.0	2.0
Cooling output at 20 °C	kW	2.3	2.8	4.8	6.0
Pump pressure max.	bar	0.80	0.80	0.80	0.80
Pump suction max.	bar	-	-	-	-
Pump flow (pressure) max.	L/min	50	50	50	50
Pump flow (suction) max.	L/min	-	-	-	-
Bath volume	L	19...27	19...27	19...27	19...27
Bath opening/depth	mm	282x257/220	282x257/220	282x257/220	282x257/220
Cat. No. 400 V; 3~/PE; 50 Hz		LUK 231	LUK 227	LUK 209	LUK 210
Cat. No. 440...480 V; 3~/PE; 60 Hz		LUK 631	LUK 627	LUK 609	LUK 610

* Working temperature range is equal to ACC range.

Other power supply versions on request.

 Cooling thermostats down to -90 °C



Standard accessories

Cover plate · 2 nipples 11 mm Ø · 2 nipples 13 mm Ø · 2 screw caps · 1 m insulated silicone tube

For further accessories please request the comprehensive LAUDA accessories brochure.

RUL 80 and RUL 90 Ultra-Kryomats are true all-rounders

The air-cooled RUL 80 and RUL 90 Ultra-Kryomats are equally suitable for bath and external thermostating down to -80 or -90 °C. The units offer a very wide application spectrum, such as the mass calibration of thermometers and temperature controllers, temperature change testing of electronic components, cloud testing and pour point testing, viscosity measuring at low temperatures, low-temperature notch bending testing, and tests for the resistance to cold of biological materials. The units are also available with a Duplex pump (D) instead of the pressure pump.



Cooling thermostat RUL 80

Technical features		RUL 80	RUL 80-D	RUL 90	RUL 90-D
Working temperature range*	°C	-80...100	-80...100	-90...100	-90...100
Temperature stability	±K	0.02...0.05	0.02...0.05	0.02...0.05	0.02...0.05
Heater power	kW	1.2	1.2	1.2	1.2
Cooling output at 20 °C	kW	1.0	1.0	1.2	1.2
Pump pressure max.	bar	0.5	0.5	0.5	0.5
Pump suction max.	bar	–	0.33	–	0.33
Pump flow (pressure) max.	L/min	22	20	22	20
Pump flow (suction) max.	L/min	–	15	–	15
Bath volume	L	9...14	9...14	13...18	13...18
Bath opening/depth	mm	250x175/180	250x175/180	250x175/180	250x175/180
Cat. No. 230 V; 50 Hz		LUK 117	LUK 118	LUK 137	LUK 138
Cat. No. 230 V; 60 Hz		LUK 217	LUK 218	LUK 837	LUK 838

* Working temperature range is equal to ACC range.

Other power supply versions on request.

The LAUDA Ultra-Kryomats of the RUL and RUK series are powerful all-rounders. In research and application technology they provide for low temperatures down to -80 or -90 °C, with

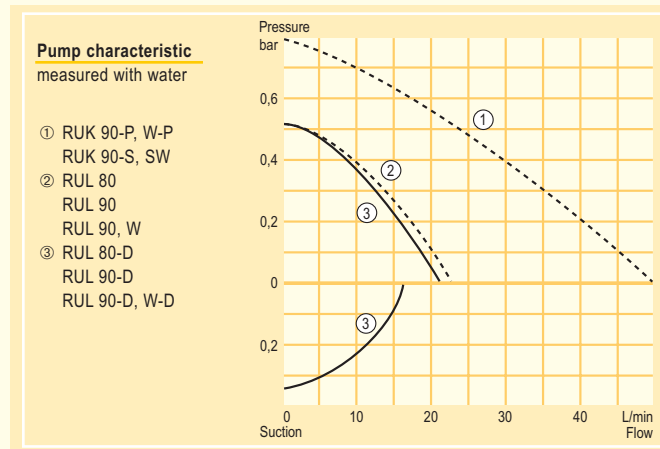
cooling capacities of 1 and 4 kW at 20 °C, and thus give you an enormously wide application spectrum.

The powerful variant: RUK 90 Ultra-Kryomats

The air-cooled RUK 90 Ultra-Kryomats provide temperatures down to -90 °C with a refrigeration unit connected in cascade. They are available also with Duplex (D) and high-power pressure pumps (P), with especially high cooling capacity (S), and also in water-cooled version (W).



Cooling thermostat RUK 90



Standard accessories RUK 90...RUK 90 W-D

Cover plate · 2 nipples 11 mm Ø · 2 nipples 13 mm Ø · 2 screw caps · 1 m insulated silicone tube · 2 x 4 m water tube 1/2" (only for RUK 90 W, RUK 90 W-D)

Standard accessories RUK 90 P...RUK 90 SW

Cover plate · 2 nipples 15 mm Ø · 2 screw caps · 1 m insulated silicone tube · 2 x 4 m water tube 1/2" (only for RUK 90 W-P, RUK 90 SW)

For further accessories please request the comprehensive LAUDA accessories brochure.

Technical features		RUK 90	RUK 90-D	RUK 90 W	RUK 90 W-D
Working temperature range*	°C	-90...100	-90...100	-90...100	-90...100
Temperature stability	±K	0.02...0.05	0.02...0.05	0.02...0.05	0.02...0.05
Heater power	kW	2.0	2.0	2.0	2.0
Cooling output at 20 °C	kW	1.7	1.7	2.0	2.0
Pump pressure max.	bar	0.5	0.5	0.5	0.5
Pump suction max.	bar	–	0.33	–	0.33
Pump flow (pressure) max.	L/min	22	20	22	20
Pump flow (suction) max.	L/min	–	15	–	15
Bath volume	L	19...27	19...27	19...27	19...27
Bath opening/depth	mm	282x257/220	282x257/220	282x257/220	282x257/220
Cat. No. 400 V; 3~/N/PE; 50 Hz		LUK 205	LUK 206	LUK 207	LUK 208
Cat. No. 440...480 V; 3~/PE; 60 Hz		LUK 605	LUK 606	LUK 607	LUK 608

Technical features		RUK 90-P	RUK 90 W-P	RUK 90 S	RUK 90 SW
Working temperature range*	°C	-80...100	-80...100	-90...100	-90...100
Temperature stability	±k	0.02...0.05	0.02...0.05	0.1...0.5	0.1...0.5
Heater power	kW	2.0	2.0	2.0	2.0
Cooling output at 20 °C	kW	1.5	1.8	4.0	4.0
Pump pressure max.	bar	0.8	0.8	0.8	0.8
Pump suction max.	bar	–	–	–	–
Pump flow (pressure) max.	L/min	50	50	50	50
Pump flow (suction) max.	L/min	–	–	–	–
Bath volume	L	19...27	19...27	19...27	19...27
Bath opening/depth	mm	282x257/220	282x257/220	282x257/220	282x257/220
Cat. No. 400 V; 3~/N/PE; 50 Hz		LUK 229	LUK 230	LUK 211	LUK 212
Cat. No. 440...480 V; 3~/PE; 60 Hz		LUK 629	LUK 630	LUK 611	LUK 612

* Working temperature range is equal to ACC range.

Other power supply versions on request.

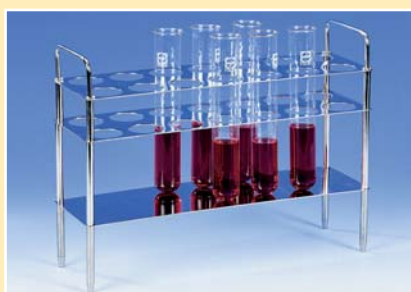
This page offers you a selection of important accessories for the thermostats of the **LAUDA Ultra** range. Please see the LAUDA accessories brochure for further accessories.



Cover plates

With openings, water bath rings, adjustable platforms and stand rods

Cat.-No.:	Designation	Openings Ø mm	Waterbath rings	Plat-forms	Support rods	suitable for
LTZ 011	DP UB 20	1/195	1	1	2	UB 20
LTZ 013	DP UB 25/2	2 /195	2	2	2	UB 25
LTZ 014	DP UB 25/4	4/100	4	4	4	UB 25
LTZ 015	DP UB 50/4	4/195	4	4	4	UB 50
LTZ 016	DP UB 50/8	8/100	8	8	8	UB 50



Racks

Stainless steel up to 300 °C

Completely made of stainless steel with handles, suitable for all LAUDA bath liquids

Cat.-No.:	Designation	Qty. tubes	Ø mm	Immersion/mm
UG 070	RE 13	56	10...13	80
UG 071	RE 18/1	33	14...18	80
UG 072	RE 18/2	33	14...18	110
UG 073	RE 30	14	24...30	110
suitable for	3 x RUK 50 · 90 · RUK-P · RUK-S			
UG 074	RF 18/1	20	14...18	80
UG 075	RF 18/2	20	14...18	110
suitable for	1 x RUL 80 · RUL 90			



High temperature chiller

For controlled cooling of thermostats in the operating temperature range above 100 °C without vapour formation, to be connected to external water cooling

Cat.-No.:	Designation	suitable for
LTZ 034	Controlled high-temperature chiller MVH	USH 400, USH 400/6



Accessories for pour point determination

To take metal beakers EU 034 for pour point determination acc. to DIN 51597/ISO 3016

Cat.-No.:	Designation	Description	suitable for
UP 052	Bath cover	for 6 metal beakers	RUL 80
UP 053	Bath cover	for 9 metal beakers	RUK 50,90 RUK-P, RUK-S
EGG 009	Glass vessel		EU 034
EU 034	Metal beaker	to take glass vessel EGG 009	UP 052, 053

Ultra Kryomate	Cat.-No.	RUK 50-P	RUK 50 W-P	RUK 40 S	RUK 40 SW	RUK 90-P	RUK 90 W-P	RUK 90 S	RUK 90 SW
Options	LUZ 205	●	●	●	●	●	●	●	●
High-power pump 1.2 bar, 50 L/min.	LUZ 205	●	●	●	●	●	●	●	●

Request your free copy of the comprehensive LAUDA accessories brochure.