

# LAUDA Integral

Process thermostats for professional external thermostating across a wide temperature range from -90 up to 300 °C



## Application examples

- Process technology
- Process engineering
- Production
- Research
- Thermostating of stirrer tanks
- Temperature control of reactors in chemistry, pharmacy or biotechnology
- Thermal tests on test stands
- Use in material tests

## Extremely flexible and rapid temperature change

**Integral T and XT** process thermostats are particularly suited for external temperature control of reactors, mini plants and calorimeters. They provide broad temperature ranges and rapid temperature changes. The temperature of external applications can be controlled precisely with defined heating and cooling speeds. With

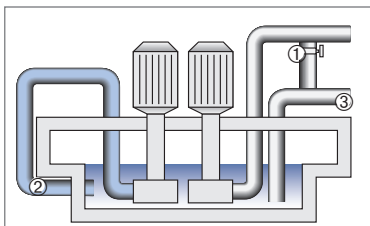
the Integral T, internal circulation allows temperature control independently of external current resistances. The Integral XT units work on the basis of the flow principle with a cold oil blanket. As a result, significantly greater temperature ranges and quicker temperature changes are possible.

# Your advantages at a glance



## The Integral T advantages

## Your benefits



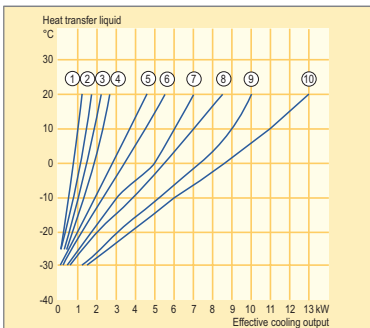
- Small active internal volume
- Bypass valve between inlet and outlet as a standard feature

- Rapid temperature change and effective control of exothermic reactions
- Pressure reducer to protect pressure-sensitive applications and glass



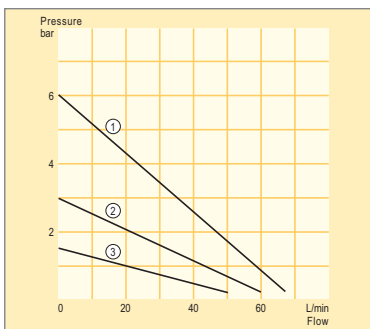
- Pivoting control unit with clear keypad and large display

- Easily accessible yet splash-water protected interfaces
- Easy and intuitive to operate



- Specific equipment range with heating capacities up to 9 kW and cooling capacities up to 13 kW
- Limited target temperature range from -25 to 150 °C

- Application-specific temperature control with high heating and cooling speeds
- Economical temperature control while eliminating unnecessary components and functions



- Strong submersible pump, large expansion volume with overflow connection
- Additional pump as a standard feature with T 4600 units and larger
- Enhanced pump and low-pressure pump available as options

- Suitable for large external circuits
- Full cooling capacity independent from external flow
- May be adapted to various applications



- Compact design, all devices fitted with castors
- Remote control options available with use of accessory

- Saves valuable laboratory space
- Flexible applications
- Mounting and sub-assembly option

# LAUDA Integral T

## Integral T Process thermostats up to 2.7 kW



Integral T process thermostats make rapid thermostating with powerful heating and cooling capacities combined with a small active internal volume possible. This minimises thermal drift and exothermic reactions are effectively controlled. Its compact construction is space-saving and makes the Integral T mobile.

The T control unit can simply be flipped open. The following interfaces are then accessible from below: connector for standby contact input, malfunction (alarm) contact output, analogue inputs and outputs, external Pt 100 and serial RS 232/RS 485 interface.

From the T 4600 units and larger, the Integral T is equipped with an additional pump allowing for more powerful circulation in the internal circuit. An adjustable bypass valve between the supply pipe and the bath of the external circuit allows for pressure reduction (e.g. in order to protect pressure-sensitive applications).

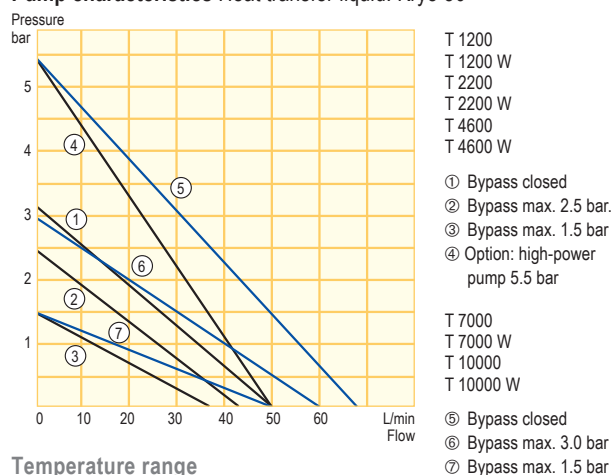


Process thermostat T 2200



- Programmer with max. 150 temperature/time segments, for up to 5 programs
- Parallel display of 2 temperature values and discharge pressure
- External control via Pt100 temperature probe or standard signal
- Analogue inputs (3) and outputs (2), can be configured to 0...10 V or 0/4...20 mA
- Error message for low level, overtemperature, pumps and cooling compressor
- Remote "malfunction" display and stand-by switch via neutral contact
- RS 232/485 interface for PC and LAUDA Wintherm Plus control software

### Pump characteristics Heat transfer liquid: Kryo 30



### Temperature range

-25...120 °C (optional up to 150 °C)

### Options T 1200...T 2200 W

Enlarged temperature range up to 150 °C · flow control instrument · low-pressure pump 1 bar, 30 L/min · high-power pump 5.5 bar

### Recommended accessories T 1200...T 2200 W

Fiber-reinforced rubber tubing · insulation for rubber tubing · 4-port manifold · metal tube · remote control



All technical data from page 94  
Other power supply variants on page 100

Technical features		T 1200	T 1200 W	T 2200	T 2200 W
Working temperature range*	°C	-25...120 **	-25...120 **	-25...120 **	-25...120 **
Temperature stability	±K	0.2	0.2	0.2	0.2
Heater power	kW	2.25	2.25	2.25	2.25
Cooling output at 20 °C	kW	1.2	1.6	2.2	2.7
Pump pressure max.	bar	3.2	3.2	3.2	3.2
Pump flow max.	L/min	40	40	40	40
Internal volume	L	3...7	3...7	3...7	3...7
Cat. No. 230 V; 50 Hz		LWP 101	LWP 102	LWP 103	LWP 104

\* Working temperature range is equal to ACC range

\*\* Available from -25 up to 150 °C upon request

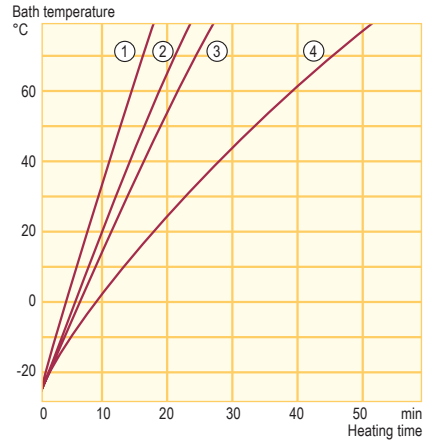
# Integral T Process thermostats up to 13 kW

The more powerful T 4600 to T 10000 W Integral process thermostats have a second pump for circulation in addition to the powerful circulating pump via an internal plate-type heat exchanger and therefore provide efficient and space-saving cooling. This enables a cooling capacity of 4.6 to 13 kW at 20 °C with the smallest internal bath volume.



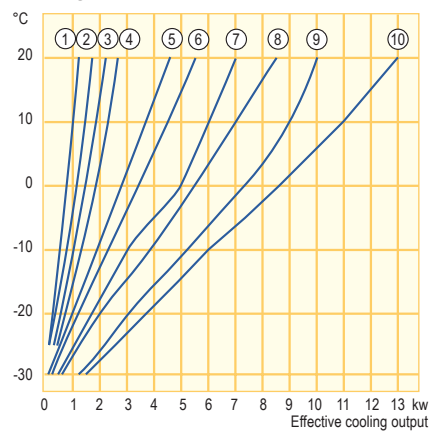
Process thermostat T 7000

### Heating curves Heat transfer liquid: Kryo 30 External volume: 10 L



- ① T 10000 · T 10000 W
- ② T 4600 · T 4600 W
- ③ T 7000 · T 7000 W
- ④ T 1200 · T 1200 W  
T 2200 · T 2200 W

### Cooling output Heat transfer liquid: Ethanol



- ① T 1200
- ② T 1200 W
- ③ T 2200
- ④ T 2200 W
- ⑤ T 4600
- ⑥ T 4600 W
- ⑦ T 7000
- ⑧ T 7000 W
- ⑨ T 10000
- ⑩ T 10000 W

### Temperature range

-30...120 °C (optional up to 150 °C)

### Options T 4600...T 10000 W:

Enlarged temperature range up to 150 °C · flow control instrument · high-power pump 5.5 bar (only T 4600, T 4600 W)

### Recommended accessories T 4600...T 10000 W:

Fiber-reinforced rubber tubing · insulation for rubber tubing · 4-port manifold · metal tube



All technical data from page 94  
Other power supply variants on page 100

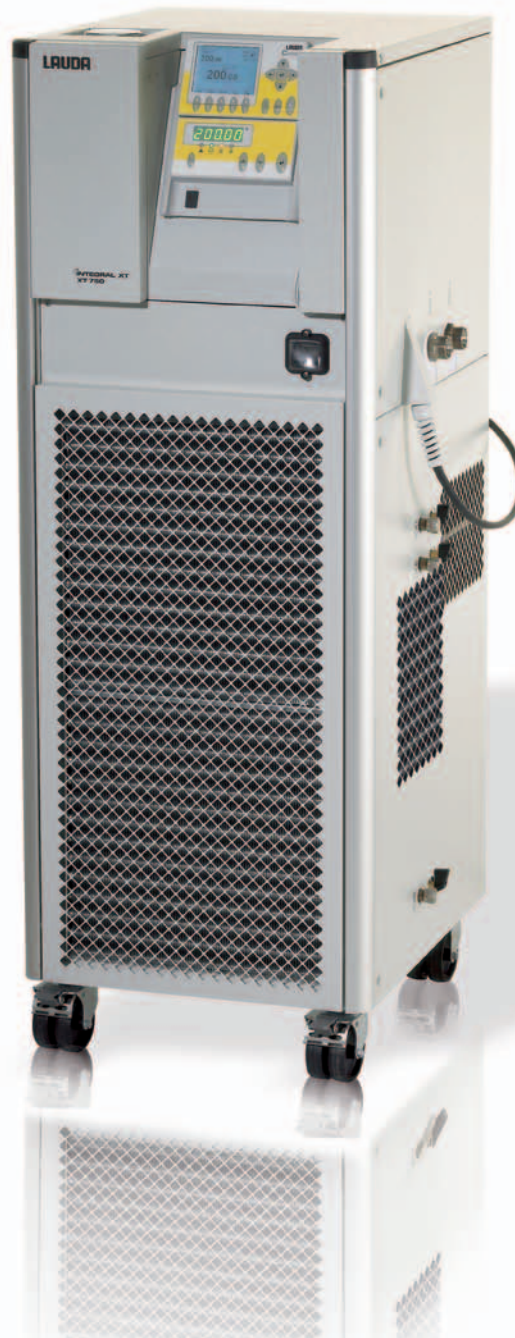
Technical features		T 4600	T 4600 W	T 7000	T 7000 W	T 10000	T 10000 W
Working temperature range*	°C	-30...120 **	-30...120 **	-30...120 **	-30...120 **	-30...120 **	-30...120 **
Temperature stability	±K	0.2	0.2	0.3	0.3	0.3	0.3
Heater power	kW	6.0	6.0	6.0	6.0	9.0	9.0
Cooling output at 20 °C	kW	4.6	5.5	7.0	8.5	10.0	13.0
Pump pressure max.	bar	3.2	3.2	6.0	6.0	6.0	6.0
Pump flow max.	L/min	40	40	60	60	60	60
Internal volume	L	6...18	6...18	8...20	8...20	8...20	8...20
Cat. No. 400 V; 3/N/PE; 50 Hz		LWP 205	LWP 206	LWP 207	LWP 208	LWP 209	LWP 210

\* Working temperature range is equal to ACC range

\*\* Available from -30 up to 150 °C upon request

# LAUDA Integral XT

Extremely broad temperature range and rapid temperature changes:  
**LAUDA Integral XT**



## Application examples

- Temperature control of stirrer tanks
- Temperature control of reactors in chemistry, pharmacy or biotechnology
- Thermal tests on test stands
- Use in material tests

**LAUDA Integral XT** process thermostats allow extremely rapid temperature changes, resulting from the small, internal, thermally active heat transfer medium. The instruments work according to the highly

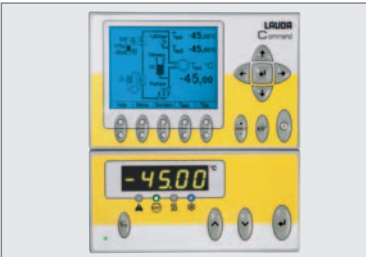
efficient flow principle with a broad working temperature range. The process thermostats are used where rapid temperature changes or high refrigeration and heating performance are required.

# Your advantages at a glance



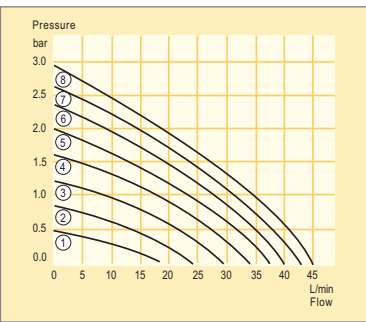
## The Integral XT advantages

## Your benefits



- Removable Command control unit with graphic LCD
- Automatic adjustment of the control parameters via integrated software for adaptive control

- Easy and intuitive operation, quick setting changes
- Saves time-consuming calculation of control parameters



- Eight-level Vario pump adjustment
- Infinitely variable control of pump pressure
- Magnetically coupled pump

- Application-specific adaptation of flow and pressure to the application
- Pressure reduction to protect pressure-sensitive applications
- No sealing problems at the pump shaft across the entire temperature range



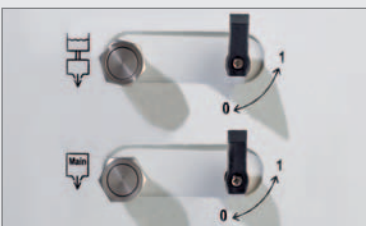
- Two slots for interface modules available
- RS 232/485 interface included

- High flexibility for the user for the broadest range of system integrations



- Recessed filler nozzle on the top of the equipment
- Practical drain taps on the sides of the equipment

- Simple filling with heat transfer liquid from the top of the unit
- Quick and complete drainage of the heat transfer liquid from the system



- Software-based/controlled filling and draining
- Automatic degassing after filling process

- Professional and safe start-up
- Temperature control of external application without gas introduction



- SelfCheck assistant shows equipment status clearly on the display

- High level of operating safety and constant monitoring of all equipment functions

# LAUDA Integral XT

## Integral XT Air-cooled process thermostats down to -80 °C

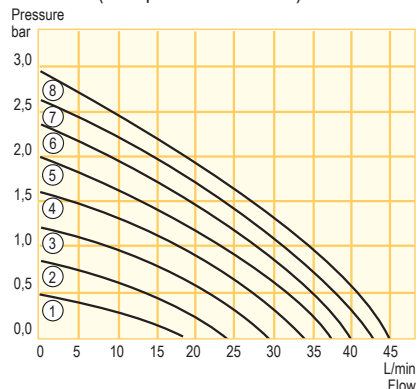
The LAUDA Integral XT process thermostats are ideally designed for the requirements of rapid and precise temperature control of an external application in process plant and pilot plant environments. The air-cooled process thermostats offer high performance in a small space while still providing functionality across a wide temperature range. Using the LAUDA Kryo 55 heat transfer liquid, temperatures from -50 up to 200 °C can be achieved without changing the heat transfer liquid. The special high-temperature version enables process temperatures up to 300 °C. This makes it ideal for reactor thermostating in chemical or pharmaceutical processes. The large expansion vessel in the LAUDA Integral XT absorbs temperature-induced changes in volume, thereby ensuring smooth operation even in large connected external systems.



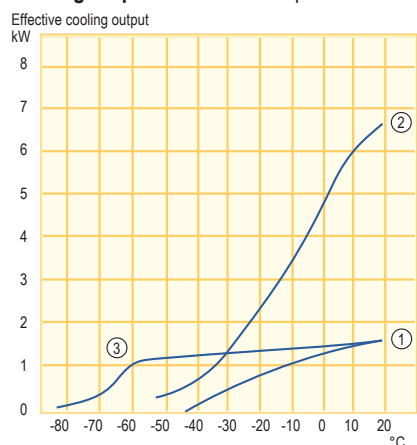
Integral XT 750



**Pump characteristics** Heat transfer liquid: Water  
for all XT (except for XT 1850 W)



**Cooling output** Heat transfer liquid: Ethanol



**Temperature range**  
-80...300 °C

**All Integral XT include**  
Command remote control with RS 232/485 interface



All technical data from page 94  
Other power supply variants  
on page 100



660 mm



1285 mm



1285 mm



1285 mm

Technical features		XT 150	XT 280	XT 750	XT 750 H
Working temperature range*	°C	-45...200	-80...200	-50...200	-50...300
Temperature stability at -10 °C	±K	0.05	0.1	0.05	0.05
Heater power	kW	3.5	4.0	5.3	5.3
Cooling output at 20 °C	kW	1.5	1.5	6.7	6.7
Pump pressure max.	bar	2.9	2.9	2.9	2.9
Pump flow max.	L/min	45	45	45	45
Filling volume min.	L	2.6	5.3	5.0	5.3
Filling volume of expansion vessel	L	5.5	6.7	6.7	6.7
<b>Cat. No.</b> 400 V; 3/PE; 50 Hz		LWP 112 (230 V; 50 Hz)	LWP 534	LWP 520	LWP 522

\* Working temperature range is equal to ACC range

# Integral XT

## Water-cooled process thermostats down to -50 °C

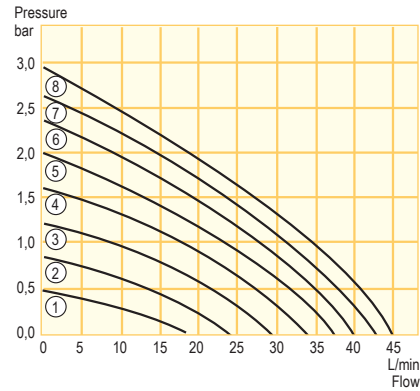
Independent of variations in ambient temperature, Integral XT water-cooled process thermostats achieve constantly high cooling performance. The temperature of the ambient air remains virtually unchanged thanks to the dissipation of the process heat through the cooling water. This is a particular advantage in setups similar to production as in process plants or in the mini-plant, where work is conducted under the most strained conditions. Water-cooled Integral XT systems are also the perfect choice for air-conditioned spaces, since they do not tax or place an unnecessary burden on air-conditioning systems.



Integral XT 350 HW

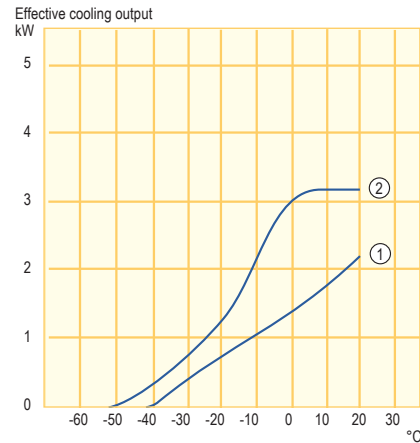


**Pump characteristics** Heat transfer liquid: Water for all XT (except for XT 1850 W)



- ① Step 1
- ② Step 2
- ③ Step 3
- ④ Step 4
- ⑤ Step 5
- ⑥ Step 6
- ⑦ Step 7
- ⑧ Step 8

**Cooling output** Heat transfer liquid: Ethanol



- ① XT 250 W
- ② XT 350 W - XT 350 HW

**Temperature range**  
-50...300 °C

**All Integral XT include**  
Command remote control with RS 232/485 interface



All technical data from page 94  
Other power supply variants on page 100



660 mm



1285 mm



1285 mm

Technical features		XT 250 W	XT 350 W	XT 350 HW
Working temperature range*	°C	-45...200	-50...200	-50...300
Temperature stability at -10 °C	±K	0.05	0.1	0.1
Heater power	kW	3.5	3.5	3.5
Cooling output at 20 °C	kW	2.1	3.1	3.1
Pump pressure max.	bar	2.9	2.9	2.9
Pump flow max.	L/min	45	45	45
Filling volume min.	L	2.6	5.0	5.3
Filling volume of expansion vessel	L	5.5	6.7	6.7
Cat. No. 230 V; 50 Hz		LWP 113	LWP 117	LWP 119

\* Working temperature range is equal to ACC range



# LAUDA Integral XT

## Integral XT Water-cooled process thermostats down to -90 °C

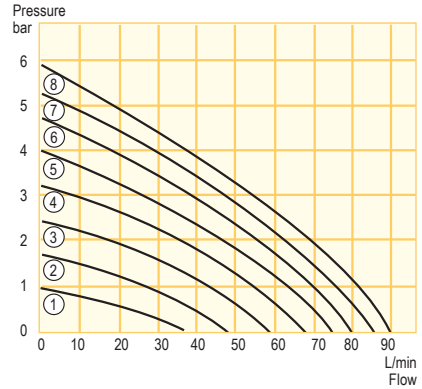
The new LAUDA Integral XT 1590 W and XT 490 W process thermostats stand out for their high cooling capacities at very low temperatures. Thanks to the two-stage cascade system, the thermostats are particularly suited for applications in the ultra-low range down to -90 °C. The water-cooled devices achieve cooling capacities of up to 18.5 kW and maximum heating capacities of 10.4 kW. The Integral XT 1850 W is also available with a heating capacity of 16.0 kW.



Integral XT 1590 W

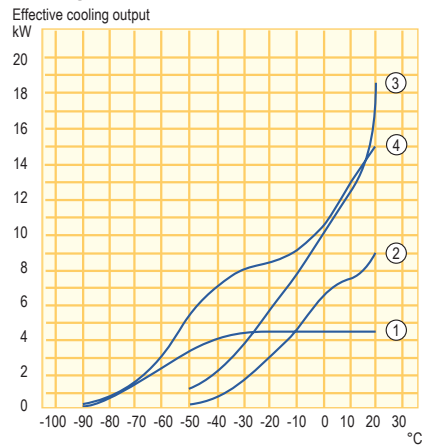


### Pump characteristics Heat transfer liquid: Water for XT 1850 W



- ① Step 1
- ② Step 2
- ③ Step 3
- ④ Step 4
- ⑤ Step 5
- ⑥ Step 6
- ⑦ Step 7
- ⑧ Step 8

### Cooling output Heat transfer liquid: Ethanol



- ① XT 490 W
- ② XT 950 W
- ③ XT 1850 W (XT 1850 WS)
- ④ XT 1590 W

### Temperature range

-90...200 °C

### All Integral XT include

Command remote control with RS 232/485 interface



All technical data from page 94  
Other power supply variants on page 100



Technical features		XT 950 W	XT 1850 W (XT 1850 WS)	XT 490 W	XT 1590 W
Working temperature range*	°C	-50...200	-50...200	-90...200	-90...200
Temperature stability at -10 °C	±K	0.1	0.3	0.1	0.3
Heater power	kW	5.3	10.6 (16.0)	5.3	5.3
Cooling output at 20 °C	kW	9.0	18.5	4.4	15.0
Pump pressure max.	bar	2.9**	5.8	2.9**	2.9**
Pump flow max.	L/min	45	90	45	45
Filling volume min.	L	5.0	9.0	9.5	10.5
Filling volume of expansion vessel	L	6.7	17.4	17.4	17.4
Cat. No. 400 V; 3/PE; 50 Hz		LWP 521	LWP 532 (LWP 533)	LWP 539	LWP 542

\* Working temperature range is equal to ACC range

\*\* Pump characteristics p. 63

## Integral T accessories

### Reinforced polymer tubings

Special polymer tubings for high pressures

Cat.-No.:	Description	Temp.-Range °C	max. pressure in bar
RKJ 031	Polymer tube 1/2", fiber-reinforced	-40...100	20
RKJ 032	Polymer tube 3/4", fiber-reinforced	-40...100	20
RKJ 033	Polymer tube 1", fiber-reinforced	-40...100	20
RKJ 103	Polymer tube 1/2", with textile insert	-40...120	9
RKJ 104	Polymer tube 3/4", with textile insert	-40...120	9
RKJ 105	Polymer tube 1", with textile insert	-40...120	3

### Insulated metal hoses

For T 1200...T 4600 Cat.-No.:	Description	Length/ cm	Thread	d <sub>i</sub> (mm)	d <sub>e</sub> (mm)	Temp.- Range °C
LZM 075	MTK 100	100	G 3/4"	20	47	-60...150
LZM 076	MTK 200	200	G 3/4"	20	47	-60...150

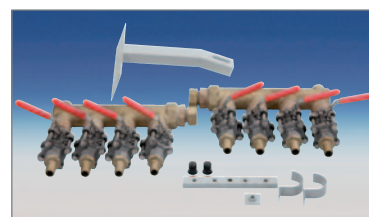
For T 7000...T 10000 Cat.-No.:	Description	Length/ cm	Thread	d <sub>i</sub> (mm)	d <sub>e</sub> (mm)	Temp.- Range °C
LZM 078	MTK 101	100	G 1 1/4-G 1	25	50	-60...150
LZM 079	MTK 201	200	G 1 1/4-G 1	25	50	-60...150

d<sub>i</sub> = internal diameter, d<sub>e</sub> = external diameter

### Manifold connectors

For joining multiple external systems (suitable for water/glycol and silicone oil)

Cat.-No.:	Description	Connection	Male thread	Temp.-Range °C
LWZ 084	Four-port manifold	G 3/4"	4 x 3/4"	-30...150
LWZ 075	Four-port manifold	G 3/4"	4 x 1/2"	-30...150
LWZ 085	Four-port manifold	G 3/4"	4 x 10 mm	-30...150
LWZ 082	Four-port manifold	G 1 1/4"	4 x 3/4"	-30...150



Options	Cat.-No.:	T 1200	T 1200 W*	T 2200	T 2200 W*	T 4600	T 4600 W*	T 7000	T 7000 W*	T 10000 W*	T 10000 W*
Enlarged temperature range up to 150 °C	LWZ 029	●	●	●	●	●	●	●	●	●	●
Flow control instrument	LWZ 035 LWZ 036	● -	● -	● -	● -	● -	● -	- ●	- ●	- ●	- ●
Low-pressure pump 1 bar, 30 L/min, 50-Hz version (see pump characteristics at the top of page 70)	LWZ 041-1	●	●	●	●	-	-	-	-	-	-
High-power pump 5.5 bar, 40 L/min 50-Hz version (see pump characteristics at the top of page 58)	LWZ 031-1 LWZ 032-1	● -	● -	● -	● -	- ●	- ●	- -	- -	- -	- -

\* W = water-cooled version

# LAUDA Integral XT

## Integral XT accessories (excerpt)

### Slot-in and interface modules

Cat. No.:	Description	Description
LRZ 912	Analogue module	2 x In, 2 x Out, 0(4)...20 mA or 0...10 V
LRZ 913	RS 232/485 interface	electrically isolated, 9-pin SUB-D
LRZ 914	Contact module NAMUR	1 x In, 1 x Out, NE 28, 2 DIN sockets
LRZ 915	Contact module SUB-D	3 x In, 3 x Out, 15-pin SUB-D
LRZ 917	Profibus interface	electrically isolated, 9-pin SUB-D



LRZ 912 LRZ 913 LRZ 914 LRZ 915 LRZ 917

### High-pressure pump

Cat. No.:	Description	Description
LZW 077-1	High-pressure pump	Suitable for XT 150 to XT 950 W (230 V; 50 Hz), resulting max. pump pressure 5.8 bar



### Metal hoses M30 x 1.5 I

Cat. No.:	Description	Length/cm	Temp. Range °C
LZM 081	MXC 100S	100	-50...300
LZM 082	MXC 200S	200	-50...300
LZM 083	MXC 300S	300	-50...300
<b>Field of application</b>	with special insulation for cooling and heating thermostats, for all heat transfer liquids		

(I = inner thread)



LZM 081

### Metal hose M38 x 1.5 I

Cat. No.:	Description	Length/cm	Temp. Range °C
LZM 084	MX2C 100S	100	-50...300
LZM 085	MX2C 200S	200	-50...300
LZM 086	MX2C 300S	300	-50...300

(I = inner thread)



LZM 084

## Integral XT accessories (excerpt)

### Additional adapters and connectors

Cat. No.:	Description	Description
HKA 152	Reducer	M30 x 1.5 O on M16 x 1 I
UD 660	Reducer	M30 x 1.5 I on M16 x 1 O
HKA 164	Reducer	M38 x 1.5 O on M30 x 1.5 I
EOV 194	Screw-in stud	M30 x 1.5 O on G 3/4" A
EOV 207	Screw-in stud	M30 x 1.5 O on NPT 3/4" A
EOV 208	Double connectors	M30 x 1.5 O
EOV 206	Screw-in stud	M30 x 1.5 O on G 1" O
HKA 160	Adapter	M30 x 1.5 O on spherical line RD = 28
HKA 163	Flange adapter	M38 x 1.5 O on DIN 2633/DN40
HKA 165	Angle connector	M38 x 1.5 I on M38 x 1.5 A
HKA 153	Angle connector	M30 x 1.5 I on M30 x 1.5 A

(O = outer thread, I = inner thread)

### Nipples

Best.-Nr.:	Description	Description
HKA 161	Nipple	1/2" Nipples on spherical line for M30 x 1.5
HKA 162	Nipple	3/4" Nipples on spherical line for M30 x 1.5
HKA 196	Screw cap	M30 x 1.5

### Miscellaneous

Cat. No.:	Description	Description
LWZ 046	Bypass	M30 x 1.5 I/O Temperature range: -40...350 °C
LWZ 073	Ball valve	M30 x 1.5 I on M30 x 1.5 O Temperature range: -30 to 180°C
LWZ 074	Ball valve	M38 x 1.5 I on M38 x 1.5 O Temperature range: -30...180 °C

(O = outer thread, I = inner thread)



Detailed LAUDA Integral XT accessories information can also be found at [www.lauda.de](http://www.lauda.de)



Order the detailed LAUDA accessories brochure and the heat transfer liquids brochure free of charge. This and additional product information can also be found at [www.lauda.de](http://www.lauda.de)



EOV 206

HKA 152

UD 660



HKA 160

HKA 164

HKA 163



EOV 194

EOV 207

EOV 208



HKA 165

HKA 153



HKA 161

HKA 162

HKA 196



LWZ 046

LWZ 073

LWZ 074