LAUDA

CONSTANT TEMPERATURE EQUIPMENT FOR TEST BENCHES IN THE AUTOMOTIVE INDUSTRY

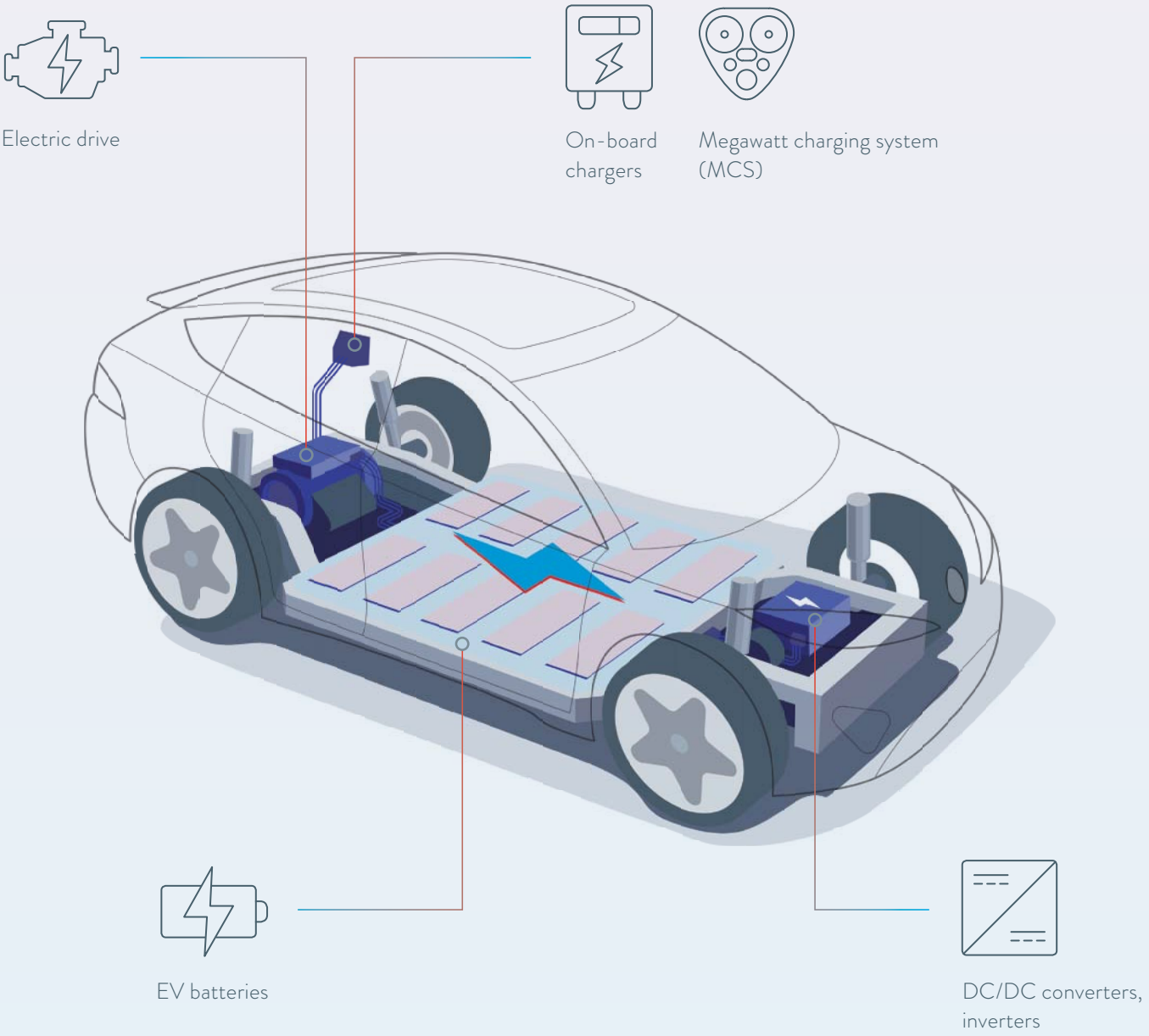
°FAHRENHEIT. °CELSIUS. °LAUDA.

CONSTANT TEMPERATURE EQUIPMENT FOR TEST BENCHES IN THE AUTOMOTIVE INDUSTRY

In the automotive industry, temperature control is mainly found in test and inspection rigs, as well as material tests. All the components of an automobile are exposed to extremely high temperature fluctuations to ensure that they function correctly and reliably during subsequent use. This process of testing many different components in special test rigs makes an important contribution to increasing quality and reliability.

The simulation of extreme environmental conditions across a wide range of different temperatures is an important part of the material tests. Climatic chambers are used to simulate ambient temperatures, while process thermostats control the temperature of the coolant to simulate cooling circuits in the vehicle. The heat flow in the test specimen can be controlled via temperature gradients as a result.

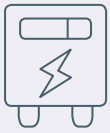
APPLICATION EXAMPLES



DC/DC CONVERTERS, INVERTERS

Devices such as DC/DC converters and inverters are key components of the drives used in electric mobility. To test their reliability and efficiency, these components are exposed to different climatic influences. LAUDA Constant temperature equipment and systems run through the required temperature profiles within a test temperature range of −40 to 90 °C and reliably adjust the load conditions.

ON-BOARD CHARGERS



On-board chargers (OBC) in electric vehicles must undergo thermal testing as they are critical to safety and performance. These chargers convert alternating current into direct current, generating heat in the process. Excessive temperatures can damage components, reduce efficiency and shorten the life of the system. Thermal tests simulate extreme operating conditions to ensure that the OBC has sufficient cooling and functions reliably, even in high outside temperatures or intensive use. This ensures compliance with safety standards.

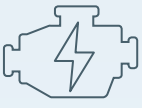
EV BATTERIES

Battery performance is a key element of electric mobility. Charge levels, charging cycles and performance are tested in climatic chambers at varying ambient temperatures. LAUDA Constant temperature equipment and systems control and monitor the temperature to simulate varying operating conditions and determine if this has any impact on battery performance.

MEGAWATT CHARGING SYSTEM (MCS)

The use of liquid cooling technology in high-power DC charging cables helps maintain a constant low temperature during charging, preventing thermal damage to the cable and connector caused by overheating. To ensure safe and efficient operation of liquid-cooled charging cables, rigorous thermal and electrical performance testing must be conducted.

ELECTRIC DRIVE



The engine and its cooling system must work reliably and efficiently under different operating conditions. Our Integral process thermostat plays a key role in this by providing the precise temperatures required for reproducible and controllable test conditions.

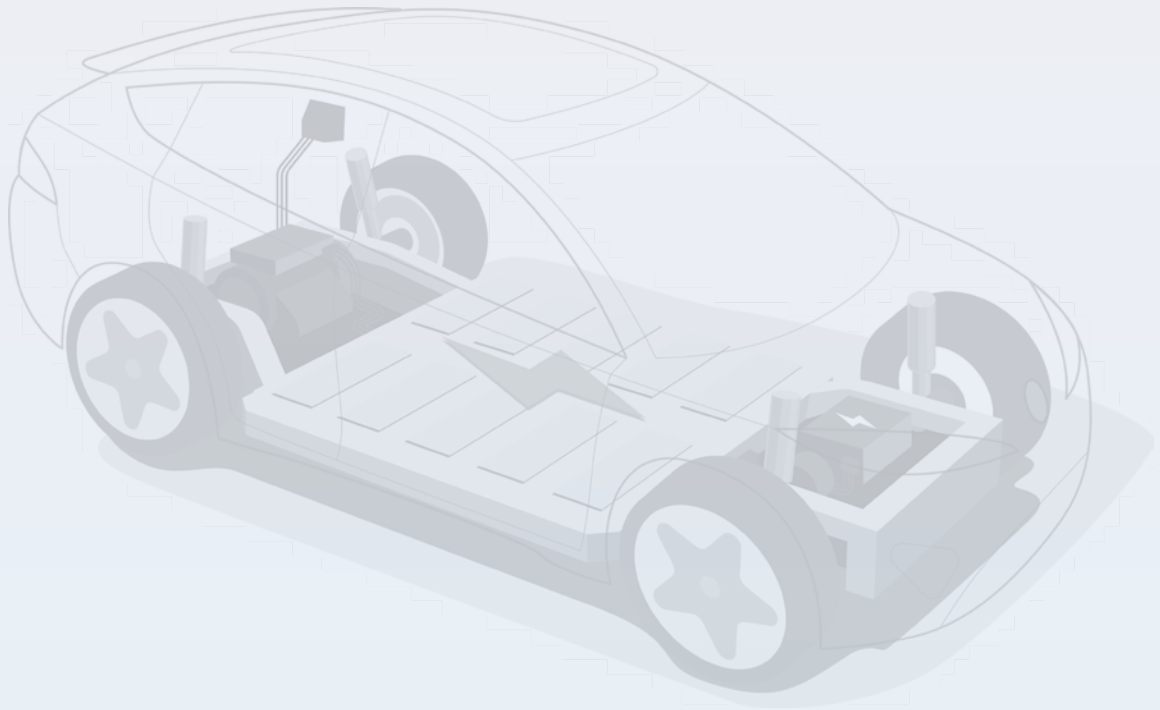
COMPONENT AND MATERIAL TESTS

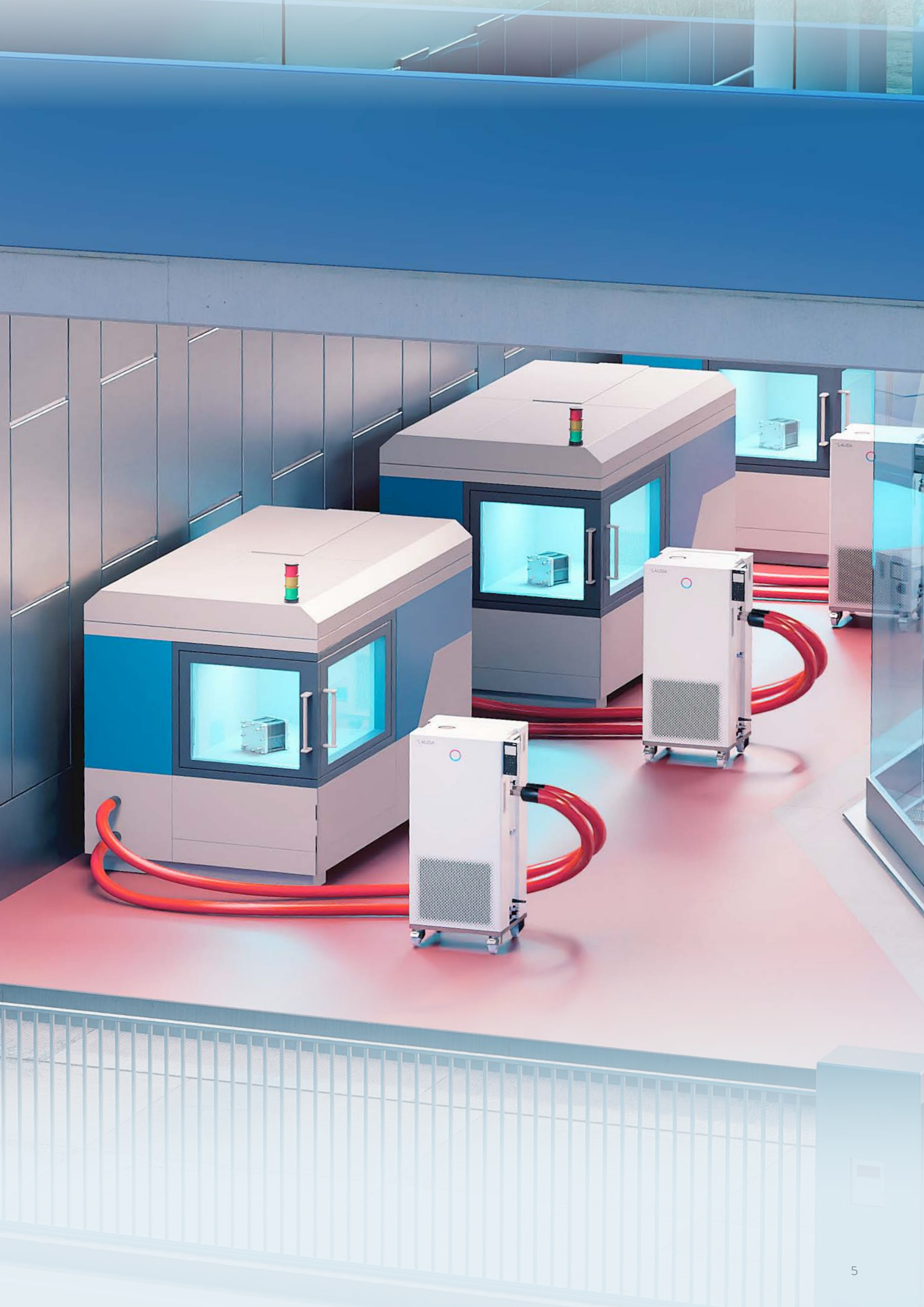
Parts and components for vehicles are tested for their resilience under extreme conditions using climate and temperature tests. With powerful, variable pressure pumps and direct use of automotive coolant, LAUDA Constant temperature equipment and systems pass these stress tests with flying colors. Thanks to the integration of a LAUDA flow control unit, these tests are more precise and can be reproduced more accurately. This ensures the high quality of the components.

The most popular constant temperature equipment of our customers in the automotive sector include circulation chillers and thermostats. These are ideally suited to carry out the following activities reliably and precisely:

- Accelerated life tests in the development of batteries and electronic components
- End-of-line testing of components in e-mobility
- Test benches for electric motors
- Endurance tests in fuel cell testing

On request, you can adapt our temperature control solutions for the automotive sector both to the prevailing requirements and to your own wishes. The individual temperature control systems offered by LAUDA can be flexibly extended and modified and are developed individually according to customer requirements.





THE RIGHT CONSTANT TEMPERATURE EQUIPMENT FOR EVERY APPLICATION

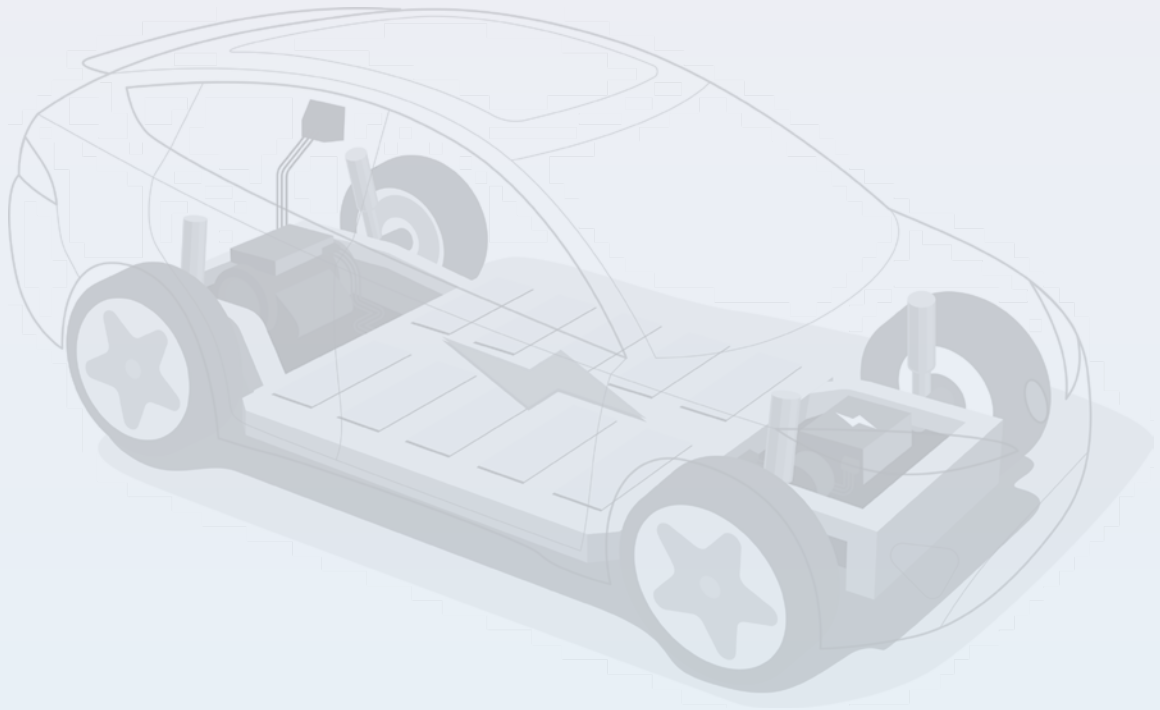
In the automotive industry, test benches, aging tests, quality control and the examination of various engine components are part of daily business. Therefore, for example, you must always be able to rely on correct temperatures during testing, enabling accurate assessment and validation of the device under test. With the temperature control units for the automotive industry from our portfolio, you can achieve this.

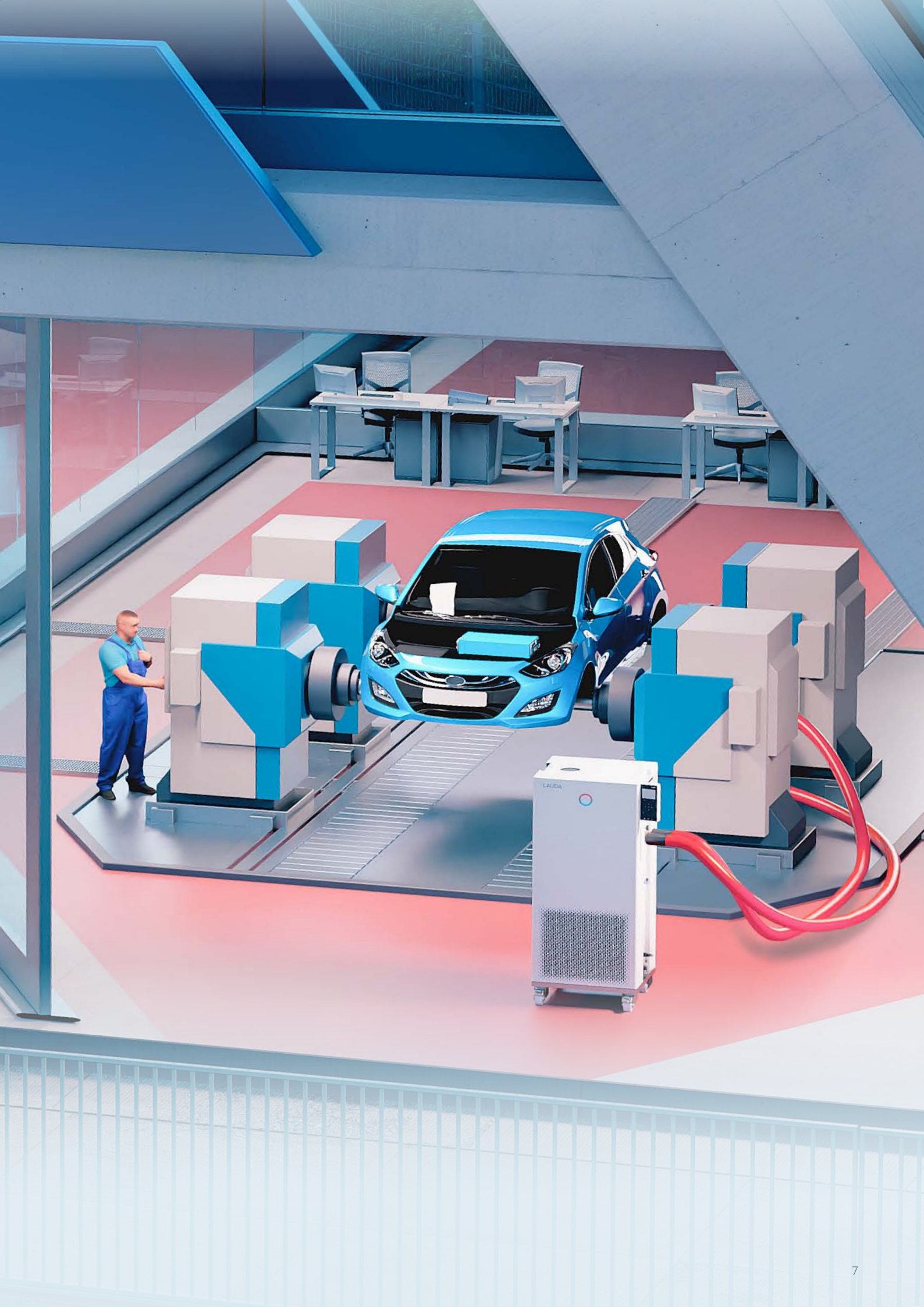
Our product range includes a large number of units to keep your temperature control processes in the automotive industry up to date.

Examples
Integral process thermostats are used by a large number of testing service providers in the automotive industry to test batteries, power electronics and eDrives, often in combination with LAUDA flow control or LAUDA filling and drain unit.

Our Ultracool circulation coolers are perfect for providing central cooling water for Integral process thermostats and ensure a high cooling capacity – even in continuous operation. They are suitable for outdoor installation and also have a temperature monitor that reliably protects the heat exchanger.

LAUDA plans and builds systems precisely in accordance with the customer's wishes: process-oriented, made-to-measure and precisely in accordance with the regulations, and in compliance with the strict safety standards. Since the requirements for constant temperature equipment are continuously growing, the modern LAUDA heating and cooling modules are also flexible as far as expansion and modification are concerned.





LAUDA INTEGRAL PROCESS THERMOSTATS

1.5 to 35 kW cooling capacity, 3.5 to 24 kW heating capacity

LAUDA INTEGRAL

−90 °C 320 °C

Renowned quality
The Integral product line has proven itself in a wide variety of industries and applications for more than 20 years. Thousands of installations ensure the extensive testing and development of innovative components and systems on test benches in the automotive, electronics and aviation industries.

With a modular interface concept, fast temperature changes and a flow rate up to 120 L/min as well as maximum delivery pressures up to 6 bar, LAUDA Integral process thermostats are the perfect choice for demanding temperature control tasks in the automotive industry.

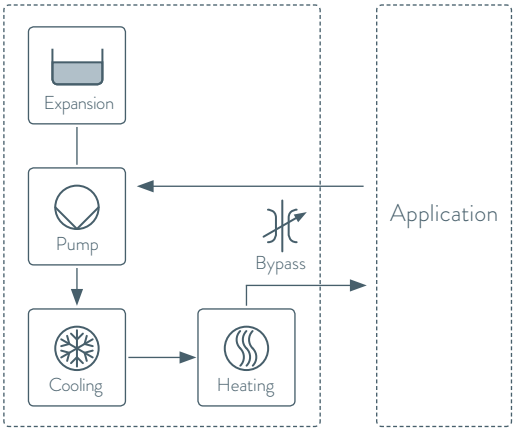
More information:

LAUDA INTEGRAL XT
(closed system with cold oil overlay)

LAUDA Integral XT process thermostats operate according to the flow principle with a cold oil overlay which enables the utilization of heat transfer liquids over a significantly larger temperature range – optimal for dynamic temperature control tasks.

−40 °C Water/glycol mixtures 90 °C

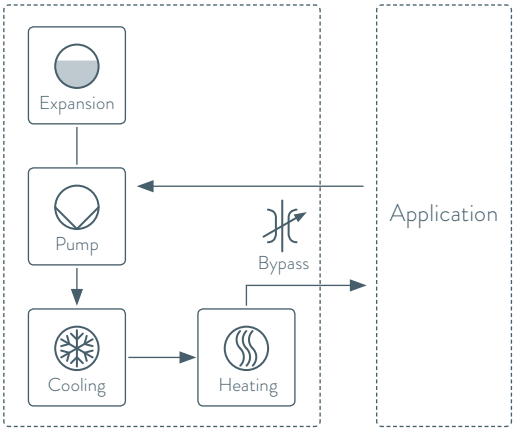
−90 °C Oils 320 °C



LAUDA INTEGRAL P
(closed system with pressure overlay)

The **LAUDA Integral P** process thermostats function according to the flow principle, with a pressure overlay of up to 4 bar. This allows non-flammable water/glycol mixtures to be used in a temperature range of −40 to 140 °C.

−40 °C Water/glycol mixtures 140 °C



Safe, continuous operation

Integrated safety technology makes the difference

Simple installation and commissioning
LAUDA units using A3 and A2L refrigerants can be installed and used immediately without the need for additional retrofitting – provided the minimum room size is observed – thanks to their integrated safety sensors.

Equipment using CO_2 refrigerant requires particular attention to be paid to the installation conditions and the ventilation system, especially in the case of both underground and above-ground installations in rooms without emergency exits, in order to prevent oxygen depletion in the installation room.

Note: To determine the minimum room size, only the temperature control unit with the highest room size requirement needs to be taken into account. Values are not cumulative.

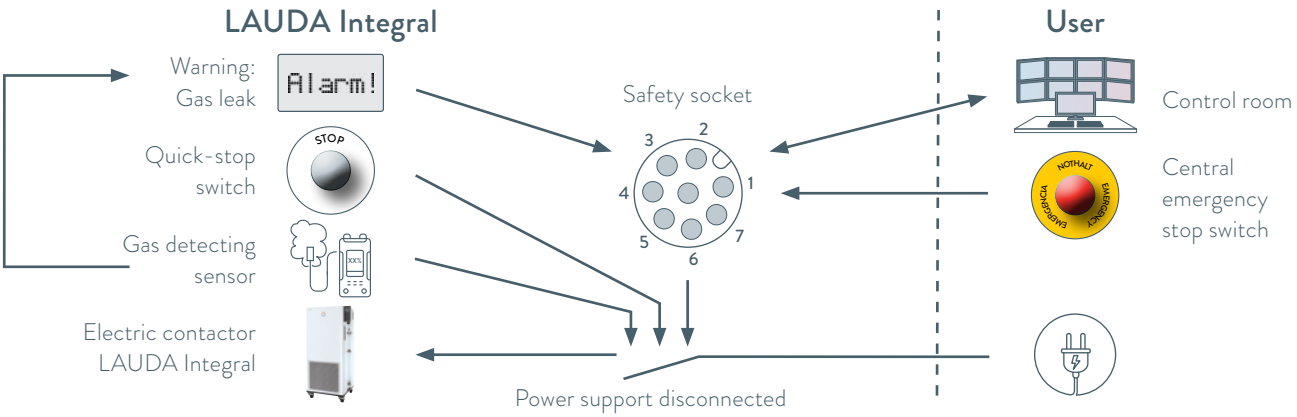
SPECIAL HIGHLIGHTS

Safe, continuous operation
This is the guiding principle behind the integrated safety concept for all LAUDA units containing more than 150 g of A3 (such as propane) and A2L refrigerants. A gas detection sensor, fitted as standard, continuously monitors the surrounding area of the refrigeration system for gas leaks once the unit is connected to the mains supply. The unit can only be switched on if the test is successful. If the leak detection system detects refrigerant during operation, a warning is initially issued depending on the concentration. If the concentration of the refrigerant continues to rise, all components are safely disconnected from the mains.
Special feature of LAUDA Ultracool circulation chillers: Due to the radial ventilation concept, the fan continues to operate even in the event of a gas leak to prevent a critical build-up of concentration.

Up to 15 years without the need for calibration
We support the safe operation of your system through a fully integrated safety concept, saving you the hassle of searching for suitable accessories, selecting the right options and dealing with gas detection sensors that require annual calibration. The devices can be used immediately without any additional retrofitting – provided the minimum room size is observed.

Quick-stop switch and emergency stop
All Integral units containing more than 150 g of CO_2 and A3 refrigerants (e.g. propane) are equipped with a quick-stop switch and an interface for integration into a central emergency stop system.

EXAMPLE SAFETY CONCEPT FOR LAUDA PORTFOLIO UNITS: LAUDA INTEGRAL



LAUDA solutions at a glance
Natural and synthetic refrigerants

Natural refrigerant
CO_2 powered

R744 is the official designation for carbon dioxide (CO_2) as a refrigerant. R744 is a naturally occurring refrigerant that has no harmful effects on the ozone layer.

It has a very low global warming potential compared to conventional, fluorinated refrigerants, known as HFCs / F-gases. CO_2 or R744 is a non-flammable (A1) refrigerant; however, due to higher operating pressures, it requires adapted components and safety measures.

The natural refrigerant R744 (CO_2) is particularly effective in applications requiring high cooling capacity, indoor installation, flow temperatures below 0 °C and the use of a central cooling water supply.

Natural refrigerant
Propane-powered

R290 is the official designation for propane as a refrigerant. For LAUDA, R290 is a very important refrigerant due to its low GWP value, its versatility, and its high performance.

Like R744 (CO_2), R290 is a naturally occurring refrigerant. It has no ozone depletion potential (ODP) and a very low global warming potential (GWP of 3). R290 is considered the ideal solution, particularly in refrigeration and domestic appliances such as fridges, air conditioning systems and dryers, but also in industrial refrigeration systems, especially in chemical and pharmaceutical companies, due to its robustness and versatility.

These properties are representative of many other natural hydrocarbon refrigerants, such as R170 (ethane) or R1270 (propene).

The natural refrigerant R290 (and other A3 refrigerants) is characterised by its near 1:1 replacement ratio for fluorinated refrigerants. Indoor and outdoor installation, air- or water-cooled, and high energy efficiency even at flow temperatures > 0 °C make R290 an ideal and more cost-effective solution than R744. Proven and integrated safety features ensure easy use and installation.

Synthetic refrigerant
R513A powered

R513A is a non-flammable HFO/HFC refrigerant blend. It was developed as an alternative to R134A and, with a GWP (Global Warming Potential) of 631, has a significantly lower greenhouse effect than its predecessor (GWP 1,430). As it is designed as a ›drop-in‹ replacement, it can be used in many existing systems without major modifications. Key benefits include lower environmental impact, good energy efficiency and an A1 safety classification (non-flammable, non-toxic).

Synthetic HFO refrigerants such as R513A, which have a lower GWP, represent a good compromise between conventional F-gases (HFCs) and natural refrigerants, and are rightly regarded as transitional refrigerants. A1/HFO refrigerants offer more limited temperature ranges and have lower cooling capacities, but score highly for ease of use. R513A also meets the requirements of the EU F-Gas Regulation (from 12 kW and for export).

Technical comparison
Refrigerants used by LAUDA

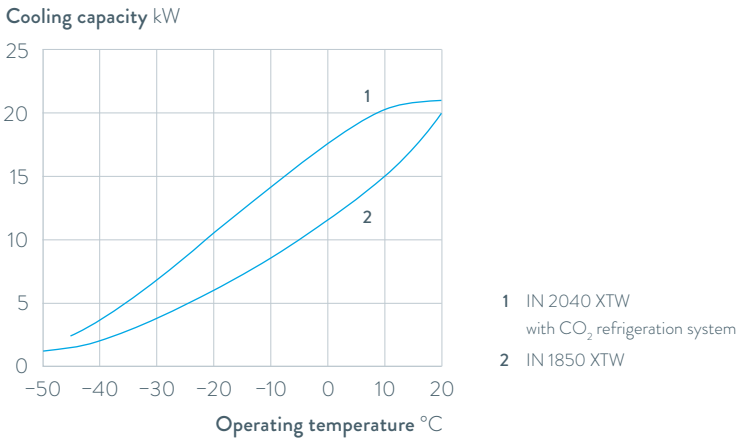
	Device with natural refrigerant R744 = CO_2	Device using natural refrigerants / hydrocarbons (e.g. R290 = propane)	Device with HFO refrigerants / synthetic F-gases (e.g. R513A)	Device with HFO refrigerants / synthetic F-gases (e.g. R455A)	Reference: HFC refrigerants / classic F-gases (e.g. R449A)
Safety class	A1	A3	A1	A2L	A1
Toxicity	No	No	No	No	No
Flammability	No	Yes	No	Low	No
Danger of asphyxia	Yes	Low	Low	Low	Low
Specific safety requirements	For installation in cellars or above ground without emergency exits: Minimum room volumes of the installation site and ventilation if necessary (risk of suffocation in the event of leakage).	None up to 150 g refrigerant load. From 150 g refrigerant load: Minimum volumes of the installation location, gas detection sensor and ventilation if necessary.	None	None up to 150 g refrigerant load. From 150 g refrigerant load: Minimum volumes of the installation location, gas detection sensor and ventilation if necessary.	None
GWP (Global Warming Potential = CO_2 equivalent)	1	<10	<1 to <700	<1 to <700	Normally >1,000
COP (Coefficient Of Performance = Ratio of cooling capacity to the electrical power used at full load and tb = 20 °C)	Approx. 3 (single-stage compressor, long-term stability at lower temperatures)	Approx. 3.6 (decreases steadily at lower temperatures)	Approx. 3 (decreases steadily at lower temperatures)	Approx. 3.3 (decreases steadily at lower temperatures)	Approx. 3.3 (decreases steadily at lower temperatures)
Temperature range	Down to −45 °C (single-stage)	Down to −100 °C	Down to −30 °C	Down to −50 °C	Down to −100 °C
Heat discharge	Water-cooled is preferred, air-cooled units show reduced efficiency	Air and water cooling possible	Air and water cooling possible	Air and water cooling possible	Air and water cooling possible
Conclusion	Limited minimum temperature. High energy efficiency and cooling capacity under ideal working conditions (water-cooled, indoor installation). Additional costs due to higher system pressures. Low safety requirements.	Technically ideal replacement for classic F-gases with high energy efficiency. Air and water-cooled design, all temperature ranges can be realized. Established safety technology.	Alternative to conventional F-gases. Advantage in terms of low safety requirements (like HFC refrigerants) and can be designed for air and water cooling, but as a fluorinated refrigerant, its use is restricted in the EU. Limited minimum temperature and lower cooling capacity density require larger systems.	Slightly reduced, but similar safety requirements to natural A3 refrigerants, lower cooling capacity density requires larger systems for comparable cooling capacity.	State-of-the-art technology, high energy efficiency and low safety requirements.

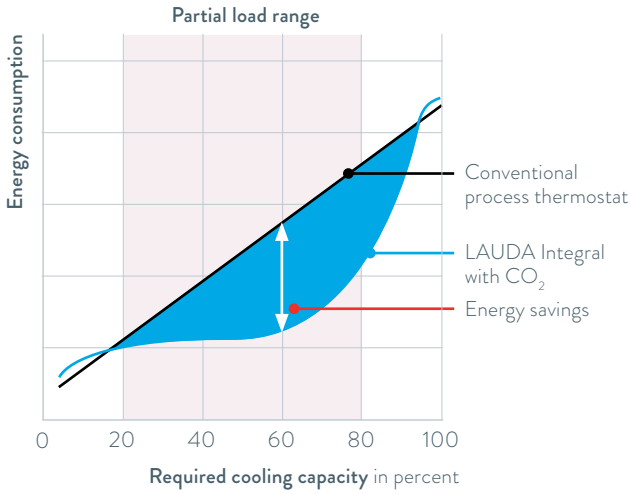
LAUDA INTEGRAL WITH CO_2 REFRIGERATION SYSTEM

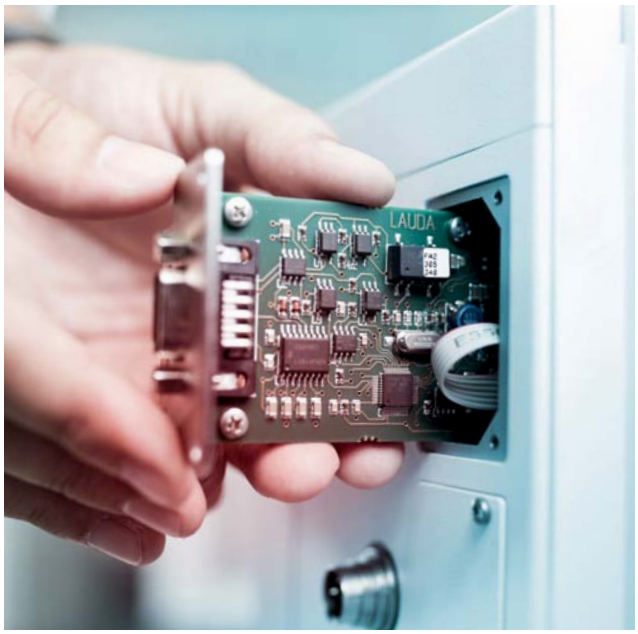
Powerful and energy-efficient

More information:

LAUDA INTEGRAL XT







CONNECTIVITY

Thanks to their future-proof modular interface concept, Integral process thermostats enable networking in a wide range of control systems.
Alongside the standard implementation of the Ethernet interface, many fieldbus and Ethernet-based interfaces can be easily retrofitted via Plug & Play.

- LRZ 926 RS-232/485 module Advanced, D-Sub 9-pin
- LRZ 927 Contact module NAMUR Advanced, 1 input, 1 output
- LRZ 928 Contact module D-Sub Advanced, 3 inputs, 3 outputs
- LRZ 929 Profibus module Advanced, D-Sub 9-pin
- LRZ 930 Ethernet module Advanced, RJ45
- LRZ 931 EtherCAT module Advanced, 2 x M8
- LRZ 932 Profinet module Advanced, RJ45
- LRZ 933 CAN module Advanced, D-Sub 9-pin
- LRZ 934: OPC UA module Advanced, RJ45
  LRZ 935: Modbus TCP module Advanced, RJ45
  LRZ 936: Ethernet/IP module Advanced

ADDITIONAL PRODUCTS FOR FUNCTIONAL UPGRADES

LAUDA FLOW CONTROL

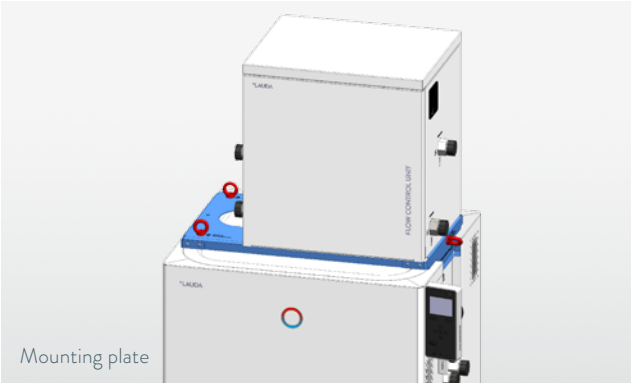
FC 80 C

- Flow control system with Coriolis measuring method
- Ideal for dielectric cooling media with immersion cooling
- Suitable for all temperature control media
- Available as a floor-standing or surface-mounted solution

FC 80 MID

- Flow control system with magnetic inductive measurement principle
- Ideal for water/glycol and conductive temperature control media
- Available as a floor-standing or surface-mounted solution

More at **www.lauda.de/de/1825**



Mounting plate

- For flow control on Integral (shown in blue)
- Depending on the housing size of the Integral

More at **www.lauda.de/de/1827**

LAUDA FILLING AND DRAINING UNIT

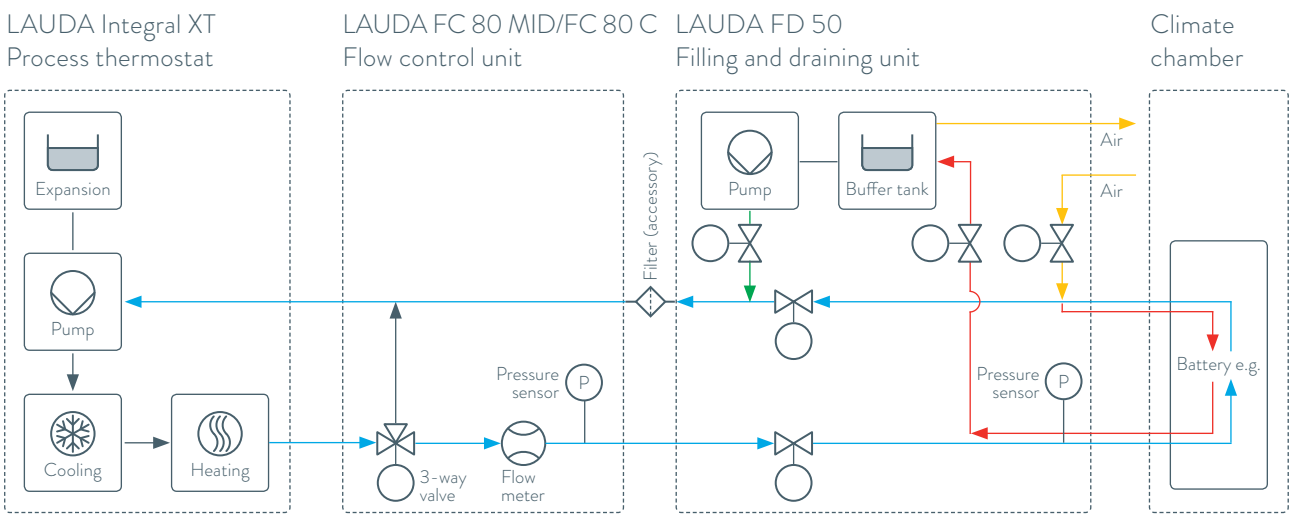
FD 50

- For non-flammable liquids
- Buffer volume up to 50 L
- Safe temperature before emptying
- Leak test via compressed air
- Rapid venting

More at **www.lauda.de/de/1826**

FD 50 F

- For flammable liquids



LAUDA ULTRACOOL CIRCULATION CHILLERS

COOLING WATER SYSTEM WITH LAUDA ULTRACOOL CIRCULATION CHILLERS

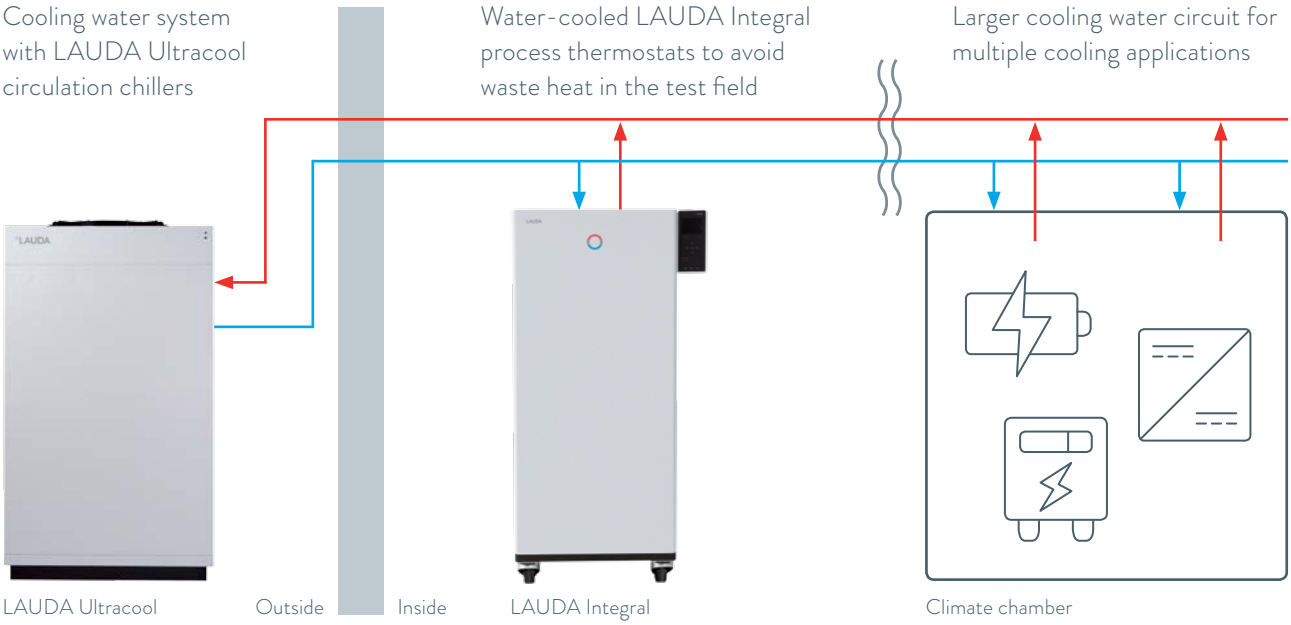
−10 °C 35 °C

LAUDA Ultracool circulation coolers provide precise temperature control in an extended operating temperature range from −10 to 35 °C and a temperature stability of ±0.5 K. The protection class IP 54 enables outdoor installation, a standard fan control allows operation at ambient temperatures down to −15 °C and reduces the noise pollution.

The recirculating chillers come equipped with a standard Ethernet interface and, thanks to numerous options such as speed-controlled pumps or flow meters, can be customized to customer specific requirements.

More information:

Energy-efficient with cost-savings of up to 50 percent
Developed with a focus on energy efficiency, the LAUDA Ultracool circulation chillers make a pivotal contribution to reducing your operating costs. The devices allow energy costs to be reduced by up to 50 percent, depending on the operating conditions.



INDIVIDUAL HEATING AND COOLING SYSTEMS

LAUDA Process cooling units

LAUDA PROCESS COOLING UNIT

−40 °C 120 °C

Efficiency, precision and flexibility characterize the heating and cooling systems from LAUDA, specialized for the temperature control of components in the automotive industry from typically −40 to 120 °C. The flexible connectivity options of our systems allows for the operation of a large number of test specimens simultaneously at an identical temperature profile, while the volume flow rate remains individually adjustable for each test specimen. Our systems are designed for maximum integration and user-friendliness and effortlessly fulfill the high control accuracy requirements.

General performance features

- Ambient temperature range: 5 to 40 °C
- Working temperature: −40 to 120 °C
- Heat transfer medium: water/ethylene glycol
- Max. pump pressure: 6 bar
- Available cooling output:
  8 to 35 kW at −40 °C flow temperature,
  15 to 60 kW at −30 °C flow temperature
- Temperature control accuracy: ±0.5 °C
- Cooling water: max. 20 °C, min. 2 bar pressure difference
- Profinet interface

Optional

- Volume flow control up to 10 circuits possible (control accuracy: ±0.2 L/min)
- Automatic filling and emptying of test specimens
- Pressure monitoring/pressure control
- Pressure test for test item
- Non-ferrous metal-free
- Other interfaces (Ethernet, Modbus, ...)
- Quick couplings
- Natural refrigerants
- Oil as heat transfer medium
- Low-temperature version down to −50 °C brine

More information:

LAUDA Integral

Technical data acc. to DIN 12876

Device type	Working temperature range °C	Temperature stability ±K	Cooling of the refrigerating machine	Heater power max. kW	Cooling output kW													
					200 °C	100 °C	20 °C	10 °C	0 °C	-10 °C	-20 °C	-30 °C	-40 °C	-50 °C	-60 °C	-70 °C	-80 °C	-90 °C
LAUDA Integral XT																		
IN 150 XT	−45 ... 220	0.05	Air	3.5	1.50[3]	1.50[3]	1.50[3]	1.50[3]	1.30[3]	1.00[3]	0.70[2]	0.30[2]	0.06[2]	-	-	-	-	-
IN 250 XTW	−45 ... 220	0.05	Water	3.5	2.20[3]	2.20[3]	2.10[3]	2.00[3]	1.80[3]	1.40[3]	1.00[2]	0.55[2]	0.20[2]	-	-	-	-	-
IN 550 XT	−50 ... 220	0.05	Air	8.0	5.00[3]	5.00[3]	5.00[3]	4.80[3]	4.60[3]	3.30[3]	2.30[2]	1.20[2]	0.50[2]	0.10[1]	-	-	-	-
IN 550 XTW	−50 ... 220	0.05	Water	8.0	5.80[3]	5.80[3]	5.80[3]	5.80[3]	5.40[3]	4.00[3]	2.60[2]	1.45[2]	0.55[2]	0.12[1]	-	-	-	-
IN 750 XT	−45 ... 220	0.05	Air	8.0	7.00[3]	7.00[3]	7.00[3]	7.00[3]	5.40[3]	3.60[3]	2.60[2]	1.60[2]	0.80[2]	-	-	-	-	-
IN 950 XTW	−50 ... 220	0.05	Water	8.0	9.50[3]	9.50[3]	9.50[3]	8.50[3]	6.20[3]	4.30[3]	3.00[2]	1.70[2]	0.90[2]	0.35[1]	-	-	-	-
IN 1850 XTW	−50 ... 220	0.05	Water	16.0	20.00[3]	20.00[3]	20.00[3]	15.00[3]	11.50[3]	8.50[3]	6.10[2]	3.60[2]	1.90[2]	1.10[1]	-	-	-	-
IN 2560 XTW	−60 ... 220	0.10	Water	24.0	25.00[3]	25.00[3]	25.00[3]	24.50[3]	22.50[3]	22.00[3]	18.50[2]	12.50[2]	8.70[2]	5.00[1]	3.00[2]	-	-	-
IN 280 XT	−80 ... 220	0.05	Air	4.0	1.60[3]	1.60[3]	1.60[3]	1.55[3]	1.50[3]	1.50[3]	1.70[2]	1.70[2]	1.65[2]	1.40[2]	0.85[2]	0.35[2]	0.15[2]	-
IN 280 XTW	−80 ... 220	0.05	Water	4.0	1.70[3]	1.70[3]	1.70[3]	1.65[3]	1.60[3]	1.60[3]	1.80[2]	1.80[2]	1.80[2]	1.50[2]	0.90[2]	0.45[2]	0.18[2]	-
IN 590 XTW	−90 ... 220	0.05	Water	8.0	4.50[3]	4.50[3]	4.50[3]	4.45[3]	4.40[3]	4.40[3]	4.60[2]	4.60[2]	4.50[2]	4.20[2]	2.70[2]	1.40[2]	0.60[2]	0.20[1]
IN 1590 XTW	−90 ... 220	0.05	Water	12.0	18.50[3]	18.50[3]	18.50[3]	15.00[3]	11.50[3]	8.70[3]	8.50[2]	8.50[2]	7.50[2]	6.00[2]	4.00[2]	2.20[2]	0.90[2]	0.35[1]
LAUDA Integral XT with natural refrigerant																		
IN 550 XT	−50 ... 220	0.05	Air	8.0	5.00[3]	5.00[3]	5.00[3]	4.80[3]	4.60[3]	3.30[3]	2.40[2]	1.50[2]	0.70[2]	0.30[1]	-	-	-	-
IN 550 XTW	−50 ... 220	0.05	Water	8.0	5.80[3]	5.80[3]	5.80[3]	5.80[3]	5.40[3]	4.00[3]	2.80[2]	1.70[2]	0.75[2]	0.35[1]	-	-	-	-
IN 750 XT	−50 ... 220	0.05	Air	8.0	7.00[3]	7.00[3]	7.00[3]	6.30[3]	4.80[3]	3.60[3]	2.60[2]	1.70[2]	0.85[2]	0.40[1]	-	-	-	-
IN 950 XTW	−50 ... 220	0.05	Water	8.0	9.00[3]	9.00[3]	9.00[3]	7.80[3]	5.80[3]	4.20[3]	3.00[2]	1.90[2]	0.95[2]	0.50[1]	-	-	-	-
IN 1850 XTW	−50 ... 220	0.05	Water	16.0	20.00[3]	20.00[3]	20.00[3]	17.80[3]	13.20[3]	9.40[3]	6.80[2]	4.20[2]	2.20[2]	1.35[1]	-	-	-	-
LAUDA Integral XT with CO_2 refrigerant																		
IN 2040 XTW	−45 ... 200	0.05	Water	16.0	20.80[3]	20.80[3]	20.80[3]	20.50[3]	17.80[3]	14.00[3]	10.50[2]	6.60[2]	3.50[2]	-	-	-	-	-
IN 3540 XTW	−45 ... 200	0.10	Water	24.0	35.00[3]	35.00[3]	35.00[3]	34.00[3]	31.00[3]	25.00[3]	19.00[2]	12.50[2]	9.00[2]	-	-	-	-	-

* Cooling water supply must be provided for operation

[1] Pump output step 2 [2] Pump output step 4 [3] Pump output step 8

Pump pressure max. bar	**Pump flow max. pressure** L/min	**Pump connection thread**	**Bath volume min.** L	**Bath volume max.** L	**Dimensions (W × D × H)** mm	**Protection Rating**	**Noise level** dB (A)	**Weight** kg	**Loading max.** kW	**Power supply** V; Hz	**Part Number**	**Device type**
3.1	65	M30 × 1.5	2.5	8.7	430 × 550 × 760	IP 21	60	106	3.7	230 V; 50 Hz	L002673**	IN 150 XT
3.1	65	M30 × 1.5	2.5	8.7	430 × 550 × 760	IP 21	57	106	3.7	230 V; 50 Hz	L002674**	IN 250 XTW
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	66	177	10.5	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002675**	IN 550 XT
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	66	177	10.5	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002676**	IN 550 XTW
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	68	176	11.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002677**	IN 750 XT
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	69	176	11.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002678**	IN 950 XTW
6.0	120	M38 × 1.5	8.0	28.6	760 × 650 × 1,605	IP 21	62	288	18.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002680**	IN 1850 XTW
6.0	100	M38 × 1.5	12.6	34.4	1,100 × 895 × 1,865	IP 21	74	613	37.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002681**	IN 2560 XTW
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	63	198	9.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002684**	IN 280 XT
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	62	195	9.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002685**	IN 280 XTW
3.1	65	M30 × 1.5	8.0	28.6	760 × 650 × 1,605	IP 21	64	279	11.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002687**	IN 590 XTW
3.1	65	M38 × 1.5	10.0	30.6	760 × 650 × 1,605	IP 21	65	356	19.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002689**	IN 1590 XTW
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	65	176	10.5	400 V; 3/PE; 50 Hz	L004069	IN 550 XT
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	60	181	10.5	400 V; 3/PE; 50 Hz	L004070	IN 550 XTW
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	65	176	11.0	400 V; 3/PE; 50 Hz	L004063	IN 750 XT
3.1	65	M30 × 1.5	4.8	17.2	560 × 550 × 1,325	IP 21	60	181	11.0	400 V; 3/PE; 50 Hz	L003681	IN 950 XTW
6.0	120	M30 × 1.5	8.0	28.6	760 × 650 × 1,605	IP 21	60	310	18.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L004064	IN 1850 XTW
6.0	120	M38 × 1.5	10.5	30.0	760 × 650 × 1,605	IP 21	61	454	18.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L004065	IN 2040 XTW
6.0	100	M38 × 1.5	15.6	37.4	1,100 × 895 × 1,865	IP 21	75	600	-	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L004071	IN 3540 XTW

** Utilises traditional refrigerants (HFCs) in accordance with European legislation to control F-gases (EU) 573/2024.
Detailed information can be found on the respective product detail page of the part number at www.lauda.de

LAUDA Integral

Technical data acc. to DIN 12876

Device type	Working temperature range °C	Temperature stability ±K	Cooling of the refrigerating machine	Heater power max. kW	Cooling output kW													
					200 °C	100 °C	20 °C	10 °C	0 °C	-10 °C	-20 °C	-30 °C	-40 °C	-50 °C	-60 °C	-70 °C	-80 °C	-90 °C
LAUDA Integral XT High-temperature thermostats																		
IN 4 XTW*	25 ... 320	0.10	Water	3.5	17.00[3]	10.00[2]	-	-	-	-	-	-	-	-	-	-	-	-
IN 8 XTW*	25 ... 320	0.10	Water	8.0	17.00[3]	10.00[2]	-	-	-	-	-	-	-	-	-	-	-	-
LAUDA Integral P																		
IN 2050 PW	−40 ... 140	0.05	Water	16.0	-	20.00[3]	20.00[3]	15.00[3]	10.80[3]	7.80[3]	4.80[2]	3.00[2]	1.60[2]	-	-	-	-	-
IN 2560 PW	−40 ... 140	0.10	Water	24.0	-	25.00[3]	25.00[3]	25.00[3]	24.50[3]	24.00[3]	17.70[3]	11.00[3]	7.50[3]	-	-	-	-	-
LAUDA Integral P with CO_2 refrigerant																		
IN 2040 PW	−40 ... 140	0.05	Water	16.0		20.80[3]	20.80[3]	20.00[3]	17.00[3]	13.00[3]	9.20[2]	5.30[2]	3.00[2]	-	-	-	-	-
IN 3540 PW	−40 ... 140	0.10	Water	24.0		35.00[3]	35.00[3]	34.00[3]	33.00[3]	26.00[3]	18.50[2]	9.00[2]	5.40[2]	-	-	-	-	-

* Cooling water supply must be provided for operation

[1] Pump output step 2 [2] Pump output step 4 [3] Pump output step 8

Pump pressure max. bar	**Pump flow max. pressure** L/min	**Pump connection thread**	**Bath volume min.** L	**Bath volume max.** L	**Dimensions (W × D × H)** mm	**Protection Rating**	**Noise level** dB (A)	**Weight** kg	**Loading max.** kW	**Power supply** V; Hz	**Part Number**	**Device type**
3.1	60	M30 × 1.5	3.3	9.5	430 × 550 × 760	IP 21	52	52	3.7	230 V; 50 Hz	L002682	IN 4 XTW
3.1	60	M30 × 1.5	3.6	9.8	430 × 550 × 760	IP 21	52	86	9.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002683	IN 8 XTW
6.0	120	M38 × 1.5	11.1	36.3	1,100 × 895 × 1,865	IP 21	58	382	18.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L003214**	IN 2050 PW
6.0	100	M38 × 1.5	12.1	48.1	1,100 × 895 × 1,865	IP 21	74	625	37.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L003308**	IN 2560 PW
6.0	120	M38 × 1.5	11.5	41.0	1,100 × 895 × 1,865	IP 21	61	508	18.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L004350	IN 2040 PW
6.0	100	M38 × 1.5	15.6	37.4	1,100 × 895 × 1,865	IP 21	75	612	-	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L004351	IN 3540 PW

** Utilises traditional refrigerants (HFCs) in accordance with European legislation to control F-gases (EU) 573/2024.
Detailed information can be found on the respective product detail page of the part number at www.lauda.de

LAUDA Ultracool

Technical data acc. to DIN 12876

Device type	Working temperature range °C	Temperature stability ±K	Ambient temperature range °C	Cooling output at water outlet temperature[1] kW								Number of refrigerant circuits	Motor fan			Max. discharge pressure bar
				35 - 25 °C	20 °C	15 °C	10 °C	5 °C	0 °C	–5 °C	–10 °C		No.	kW	m³/h	
LAUDA Ultracool with natural refrigerant																
UC 2	–10 … 35	0.5	–15…50	3.1	3.1	2.8	2.6	2.0	1.7	1.4	1.2	1	1	0.2	3,050	3.4
UC 4	–10 … 35	0.5	–15…50	6.1	6.1	5.5	4.7	3.9	3.3	2.8	2.4	1	1	0.2	3,050	5.5
UC 4	–10 … 35	0.5	–15…50	6.1	6.1	5.5	4.7	3.9	3.3	2.8	2.4	1	1	0.2	3,050	3.4
UC 8	–10 … 35	0.5	–20…50	14.1	12.7	11.3	10.1	8.7	7.4	6.1	5.0	1	1	0.2	4,500	3.9
UC 8	–10 … 35	0.5	–20…50	14.1	12.7	11.3	10.1	8.7	7.4	6.1	5.0	1	1	0.5	4,500	6.8
UC 14	–10 … 35	0.5	–20…50	21.8	19.7	17.7	15.4	13.2	11.3	9.5	7.9	1	1	0.5	7,500	4.7
UC 14	–10 … 35	0.5	–20…50	21.8	19.7	17.7	15.4	13.2	11.3	9.5	7.9	1	1	1.0	7,500	6.8
UC 24	–10 … 35	0.5	–20…50	37.1	33.2	29.6	25.9	21.9	18.8	16.1	13.8	1	1	1.0	7,500	4.7
UC 24	–10 … 35	0.5	–20…50	37.1	33.2	29.6	25.9	21.9	18.8	16.1	13.8	1	1	1.0	7,500	5.8
UC 50	–10 … 35	0.5	–20…50	74.5	67.0	60.0	51.2	45.3	37.9	31.9	26.7	1	1	1.0	19,000	5.0
UC 50	–10 … 35	0.5	–20…50	74.5	67.0	60.0	51.2	45.3	37.9	31.9	26.7	1	1	2.6	19,000	6.5
UC 65	–10 … 35	0.5	–20…50	95.5	86.0	77.2	67.9	58.5	49.1	41.5	34.7	1	1	2.6	19,000	5.0
UC 65	–10 … 35	0.5	–20…50	95.5	86.0	77.2	67.9	58.5	49.1	41.5	34.7	1	1	2.6	19,000	7.2
UC 80	–10 … 35	1.0	–20…50	106.5	103.6	92.5	79.8	68.2	57.9	48.7	40.6	1	1	2.6	24,000	5.3

[1] at 25 °C ambient temperature

[2] Rp = G = BSP (internal screw thread acc. to British Standard Pipe)

Pump flow max. L/min	**Nominal discharge pressure** bar	**Pump flow nominal** L/min	**Pump connection thread**[2]	**Volume water tank** L	**Dimensions (W × D × H)** mm	**Protection Rating**	**Noise level** dB (A)	**Weight** kg	**Loading nominal** kW	**Max. fuse** A	**Power supply** V; Hz	**SEPR**	**Part Number**	**Device type**
42	3.3	5.6	Rp ½	12	510×680×1,042	IP 32	53.5	101	0.9	16	230 V; 50 Hz	8.70	L004586	UC 2
68.3	5.0	13.8	Rp ½	12	510×680×1,042	IP 32	57.9	103	1.8	16	230 V; 50 Hz	6.40	L004671	UC 4
42	2.8	13.8	Rp ½	12	510×680×1,042	IP 32	57.9	103	1.8	16	230 V; 50 Hz	6.40	L004588	UC 4
105	3.5	26.6	Rp 1	35	720×910×1,280	IP 54	61.0	150	3.2	25	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	5.80	L004662	UC 8
106	6.1	26.6	Rp 1	35	720×910×1,280	IP 54	61.0	150	3.8	25	400 V; 3/PE; 50 Hz	5.80	L004672	UC 8
166	3.2	43.8	Rp 1	35	720×910×1,250	IP 54	64.7	175	5.5	25	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	5.92	L004663	UC 14
106	5.5	43.8	Rp 1	35	720×910×1,250	IP 54	64.7	175	5.4	25	400 V; 3/PE; 50 Hz	5.92	L004673	UC 14
166	3.8	84.1	Rp 1	35	720×910×1,250	IP 54	64.7	180	9.7	32	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	5.30	L004590	UC 24
166	4.7	84.1	Rp 1	35	720×910×1,250	IP 54	64.7	180	9.7	32	400 V; 3/PE; 50 Hz	5.30	L004674	UC 24
250	3.1	150.0	Rp 1 ½	125	1,040×1,435×1,890	IP 54	68.7	410	16.4	50	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	5.72	L004664	UC 50
250	5.5	150.0	Rp 1 ½	125	1,040×1,435×1,890	IP 54	68.7	410	16.4	50	400 V; 3/PE; 50 Hz	5.72	L004675	UC 50
250	3.3	196.0	Rp 1 ½	125	1,040×1,435×1,890	IP 54	69.5	440	22.0	63	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	5.51	L004591	UC 65
367	6.6	196.0	Rp 1 ½	125	1,040×1,435×1,890	IP 54	69.5	440	23.7	63	400 V; 3/PE; 50 Hz	5.51	L004676	UC 65
367	4.6	250.0	Rp 2 ½	125	1,256×1,706×1,905	IP 54	67.5	700	26.0	63	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	5.47	L004665	UC 80

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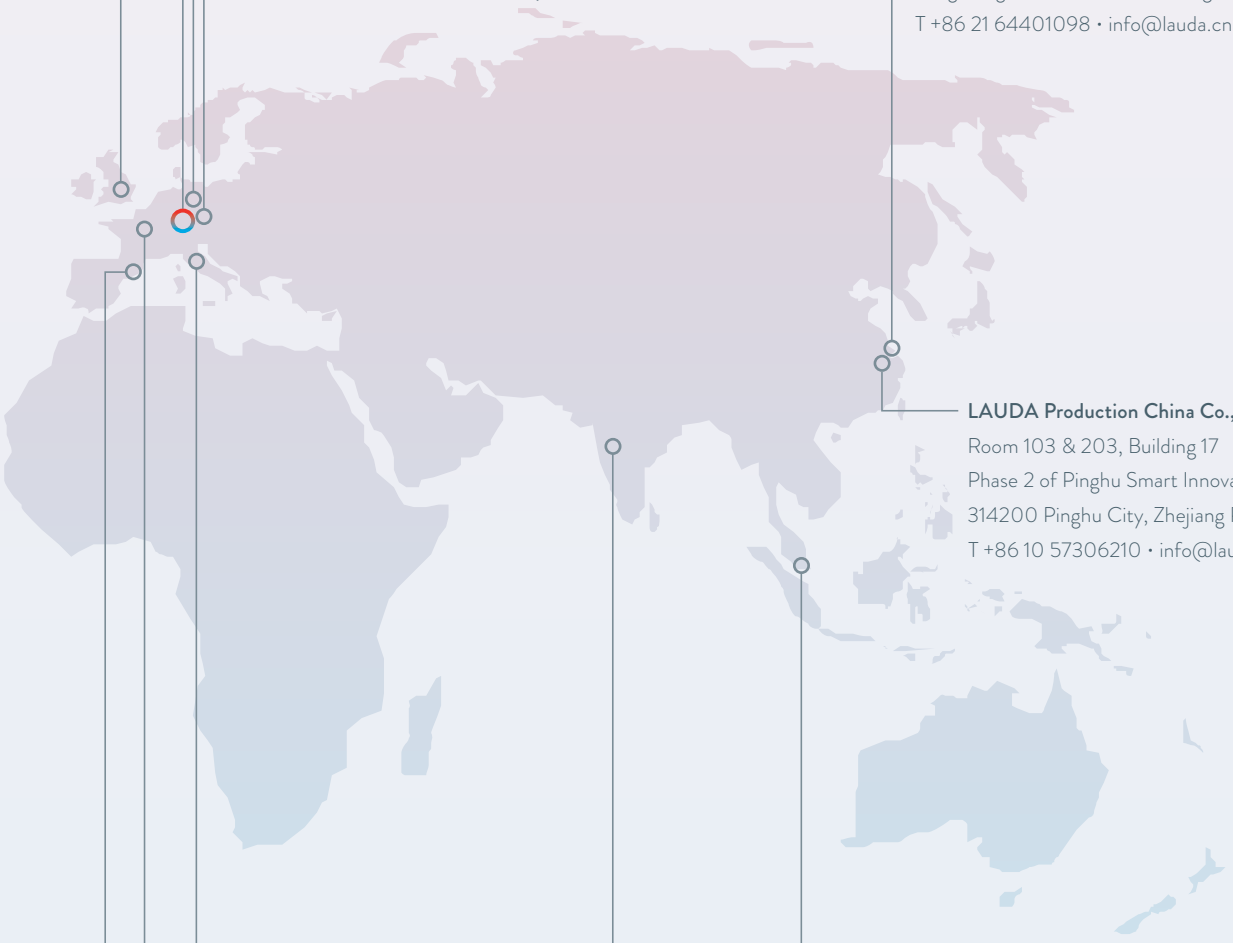

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