LAUDA

CONSTANT TEMPERATURE EQUIPMENT FOR TEST BENCHES IN THE AUTOMOTIVE INDUSTRY

°FAHRENHEIT. °CELSIUS. °LAUDA.

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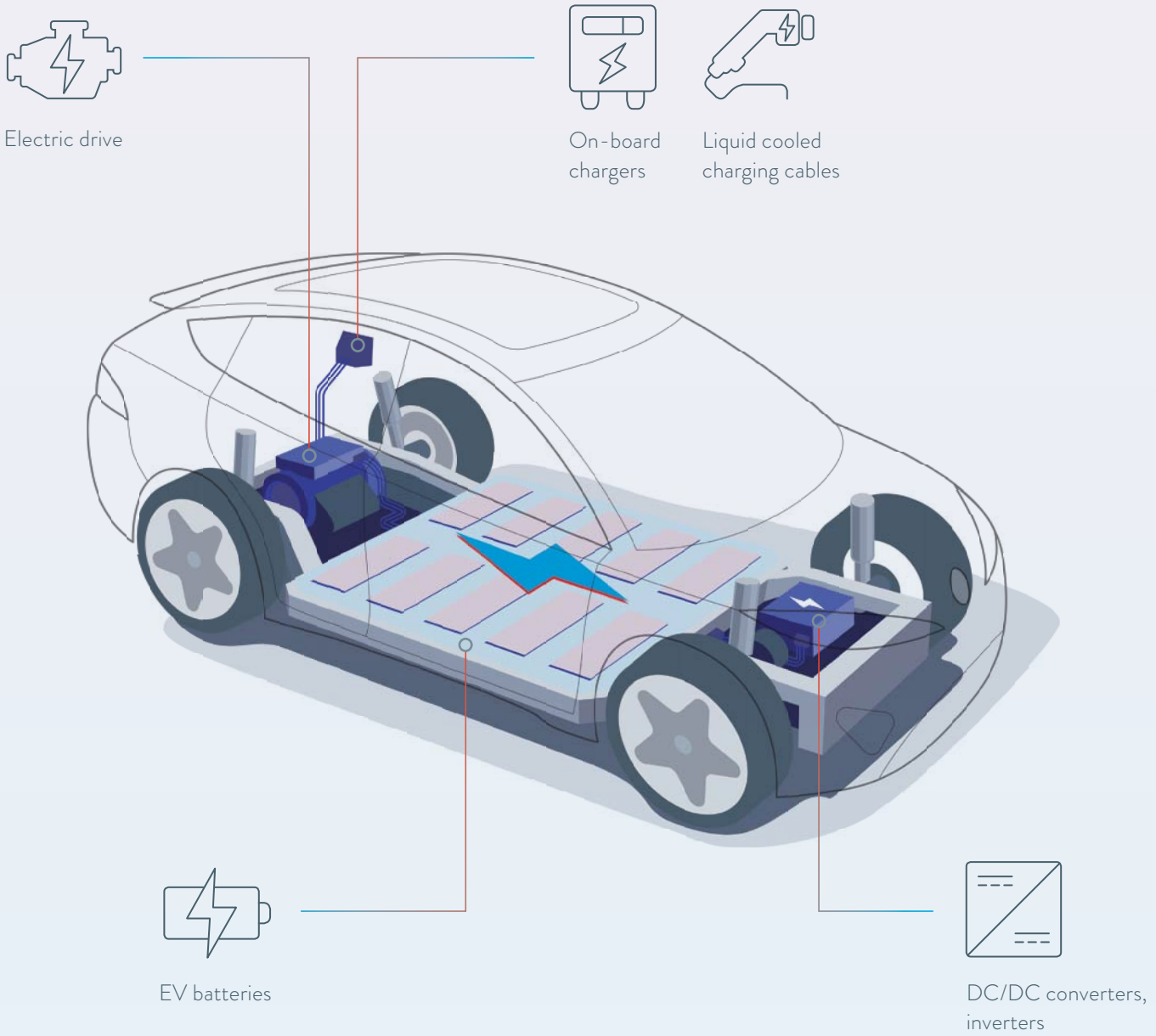
In the automotive industry, temperature control is mainly found in test and inspection rigs, as well as material tests. All the components of an automobile are exposed to extremely high temperature fluctuations to ensure that they function correctly and reliably during subsequent use. This process of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

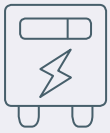
APPLICATION EXAMPLES



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

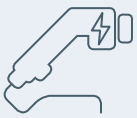


On-board chargers (OBC) in electric vehicles must undergo thermal testing as they are critical to safety and performance. These chargers convert alternating current into direct current, generating heat in the process. Excessive temperatures can damage components, reduce efficiency and shorten the life 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

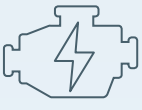
Battery performance is a key element of electric mobility. Charge levels, charging cycles and performance are tested in climatic chambers at varying ambient temperatures. LAUDA Constant temperature equipment and systems control and monitor the temperature to simulate varying operating conditions and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

LIQUID COOLED CHARGING CABLES



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.

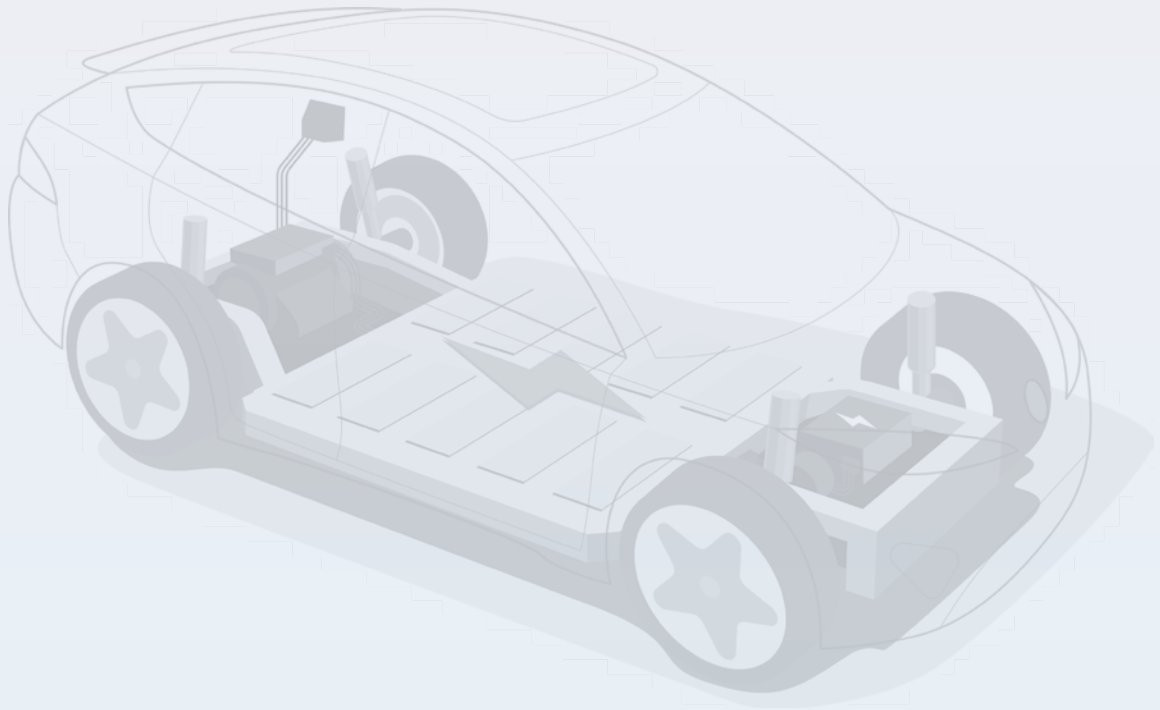
COMPONENT AND MATERIAL TESTS

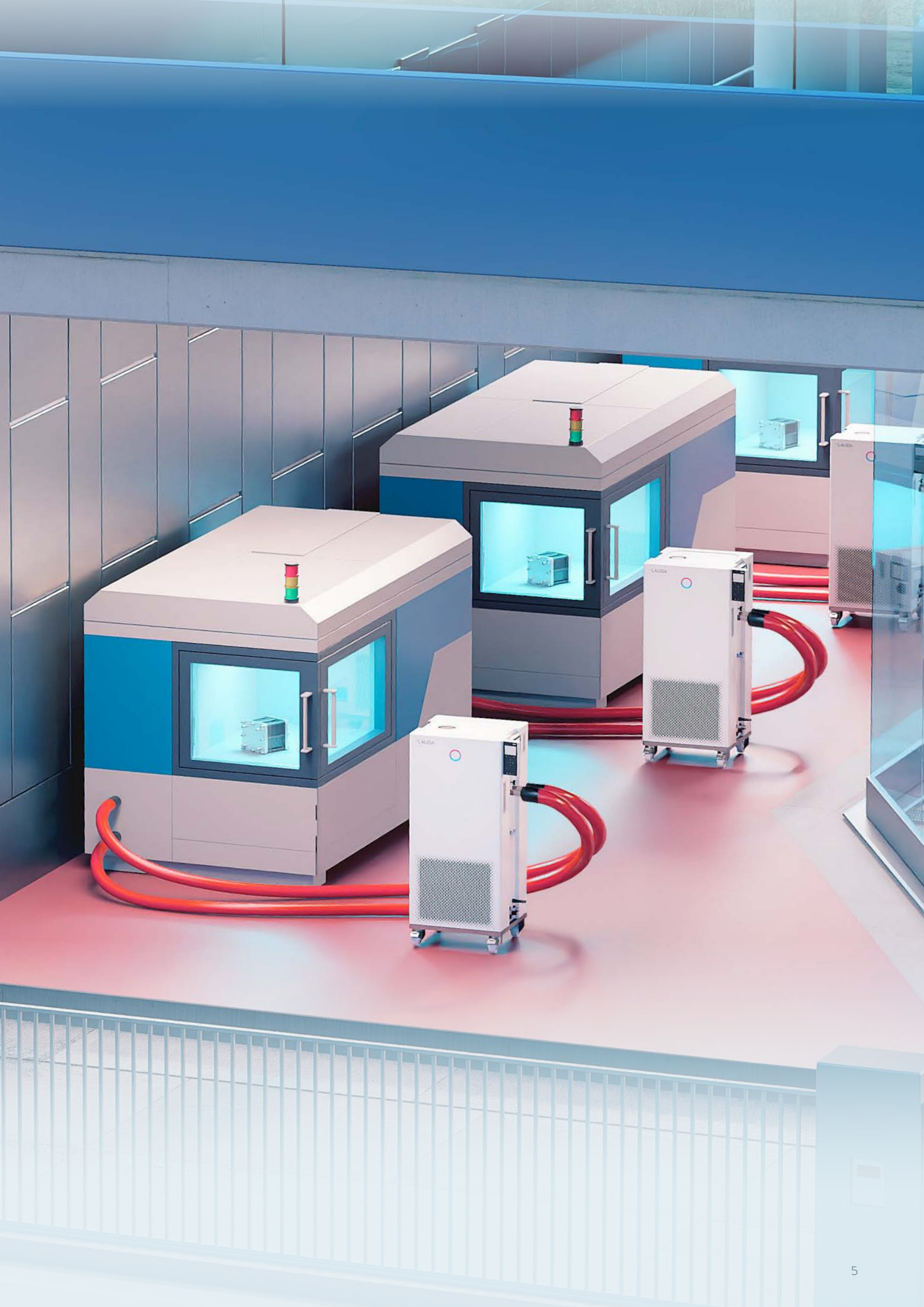
Parts and components for vehicles are tested for their resilience under extreme conditions using climate and temperature tests. With powerful, variable pressure pumps and direct use of automotive coolant, LAUDA Constant temperature equipment and systems pass these stress tests with flying colors. Thanks 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

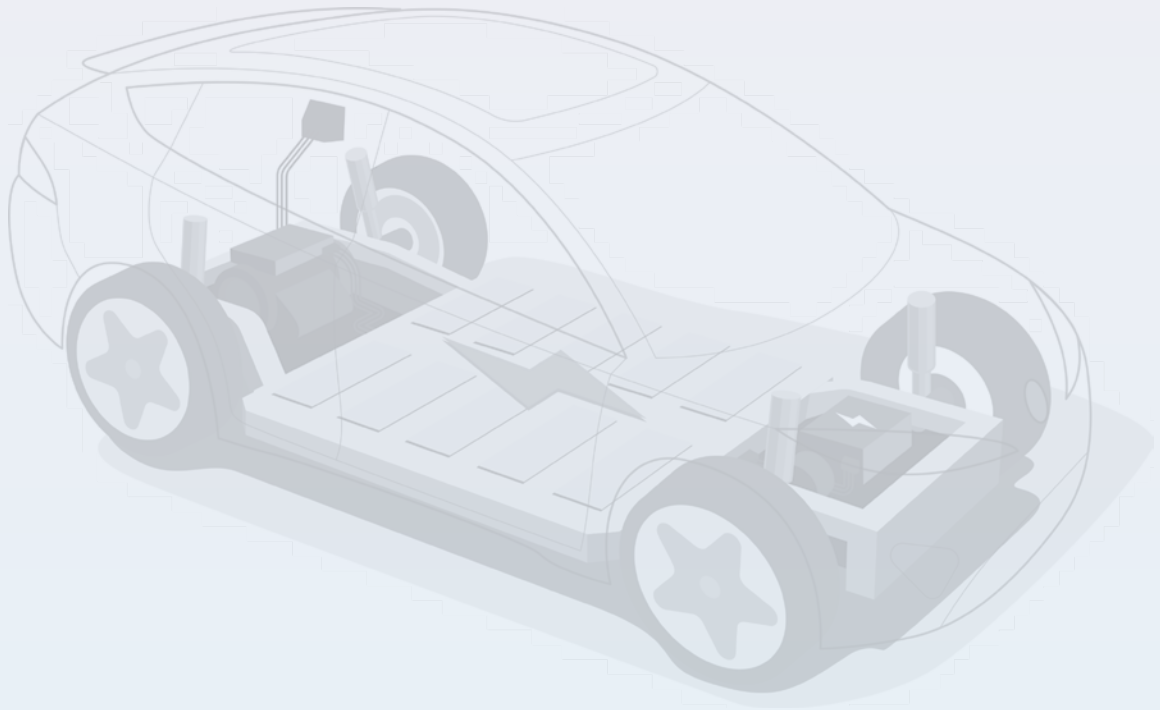
In the automotive industry, test benches, aging tests, quality control and the examination of various engine components are part of daily business. Therefore, for example, you must always be able to rely on correct temperatures during testing, enabling accurate assessment and validation of the device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

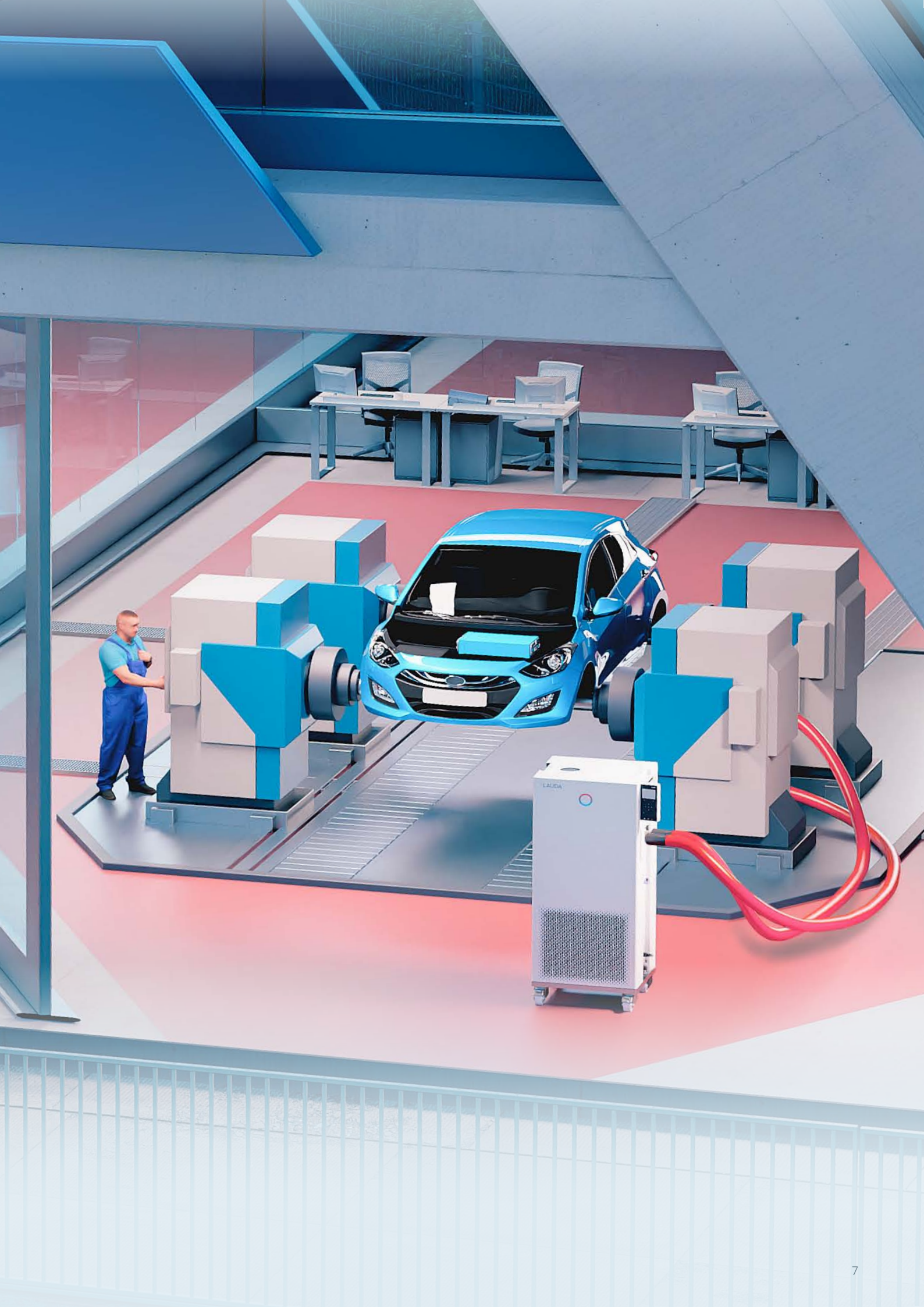
Our product range includes a large number of units to keep your temperature control processes in the automotive industry up to date.

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 25 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:

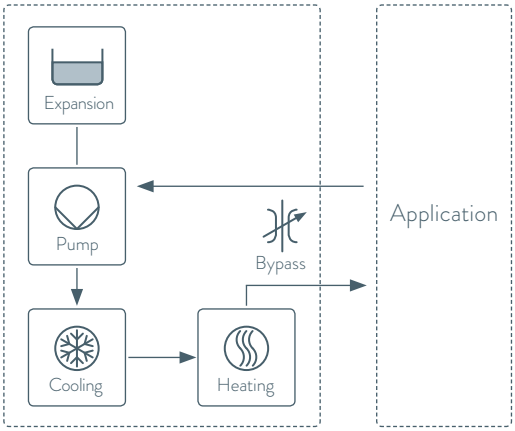
LAUDA INTEGRAL XT

(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

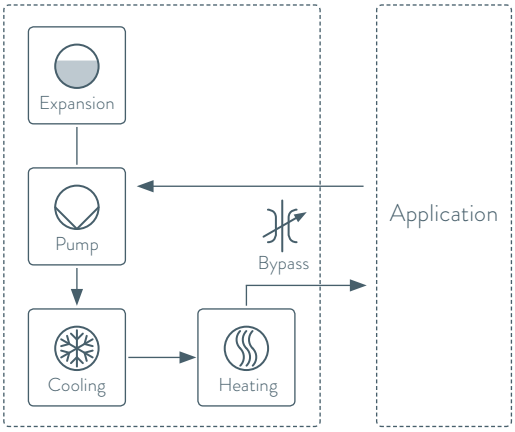


LAUDA INTEGRAL P

(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



WHETHER CO_2 OR HYDROCARBONS – ALWAYS THE BEST SOLUTION

COMPARISON OF TECHNOLOGICAL SOLUTIONS AT LAUDA

	Device with natural refrigerant R744 = CO_2	Device using natural refrigerants / hydrocarbons (e.g. R290 = propane)	Reference: HFC refrigerants / classic F-gases (e.g. R134a)
Safety class	A1	A3	A1
Toxicity	No	No	No
Flammability	No	Yes	No
Danger of asphyxia	Yes	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, leakage sensor and ventilation if necessary.	None
GWP (Global Warming Potential = CO_2 equivalent)	1	<10	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. 3.3 (decreases steadily at lower temperatures)
Temperature range	Down to −45 °C (single-stage)	Down to −100 °C	Down to −100 °C
Heat discharge	Water-cooled only	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.	State-of-the-art technology, high energy efficiency and low safety requirements.

SECURITY TECHNOLOGY

- Quick shutdown by black push-button and integration into external emergency stop circuit via connection contacts is possible

Additionally for A3 refrigerant

- Gas warning sensor with warning and switch-off function and an external status interface for higher-level safety systems

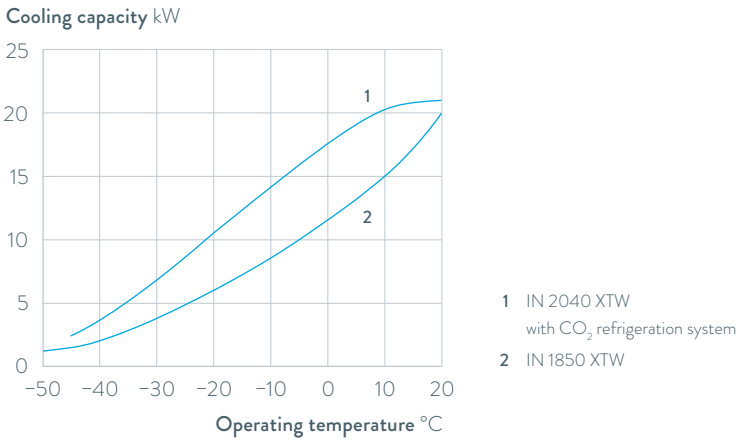
More information:

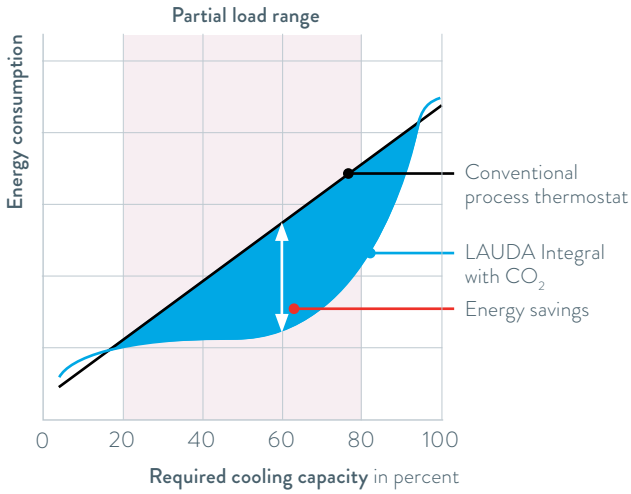
LAUDA INTEGRAL WITH CO_2 REFRIGERATION SYSTEM

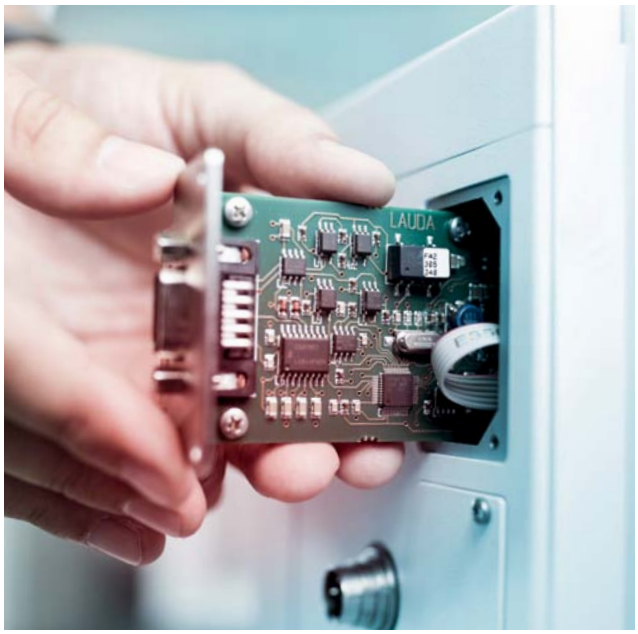
Powerful and energy-efficient

More information:

LAUDA INTEGRAL XT







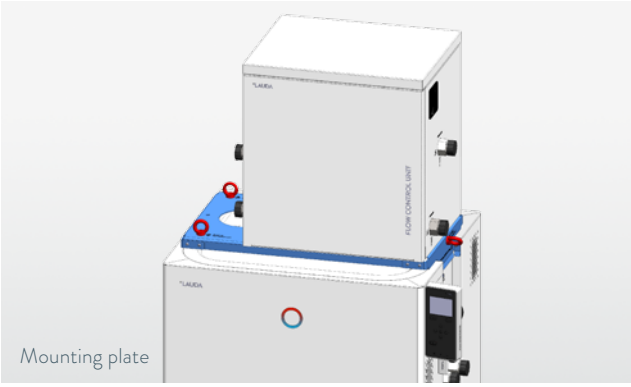
CONNECTIVITY

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 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 931 EtherCAT module Advanced, 2 x M8

ADDITIONAL PRODUCTS FOR FUNCTIONAL UPGRADES


MID 80


Mounting plate


FD 50

LAUDA FLOW CONTROL

FC 80 C (on request)
- 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

MID 80
- 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 information:

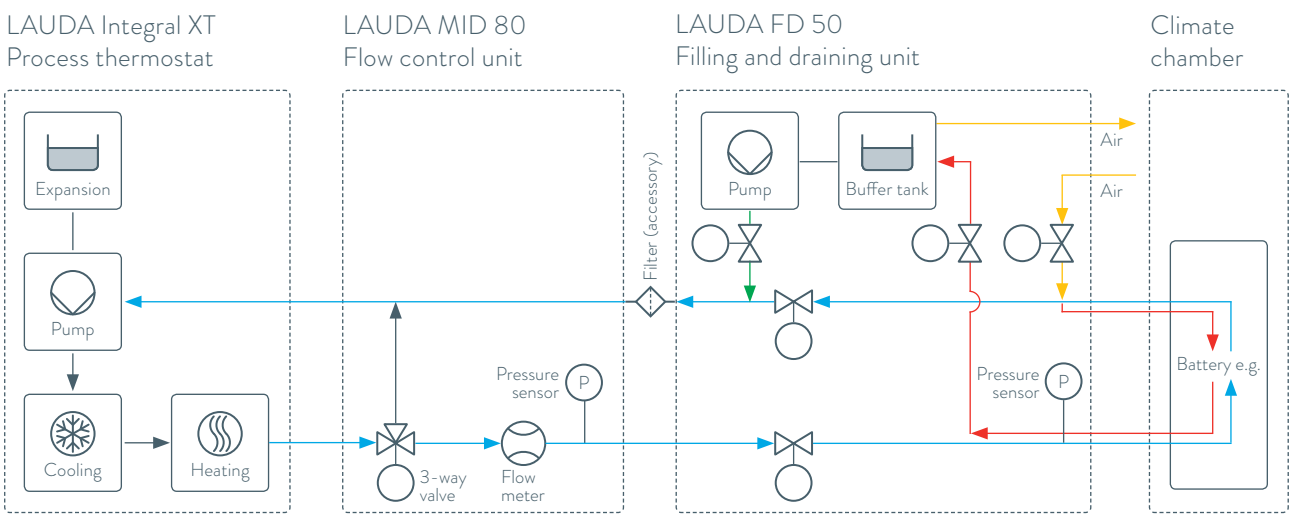
Mounting plate
- For flow control on Integral (shown in blue)

More information:

LAUDA FILLING AND DRAINING UNIT

FD 50
- Buffer volume up to 50 L
- Safe temperature before emptying
- Leak test via compressed air
- Rapid venting

More information:



LAUDA ULTRACOOL CIRCULATION CHILLERS

COOLING WATER SYSTEM WITH LAUDA ULTRACOOL CIRCULATION CHILLERS

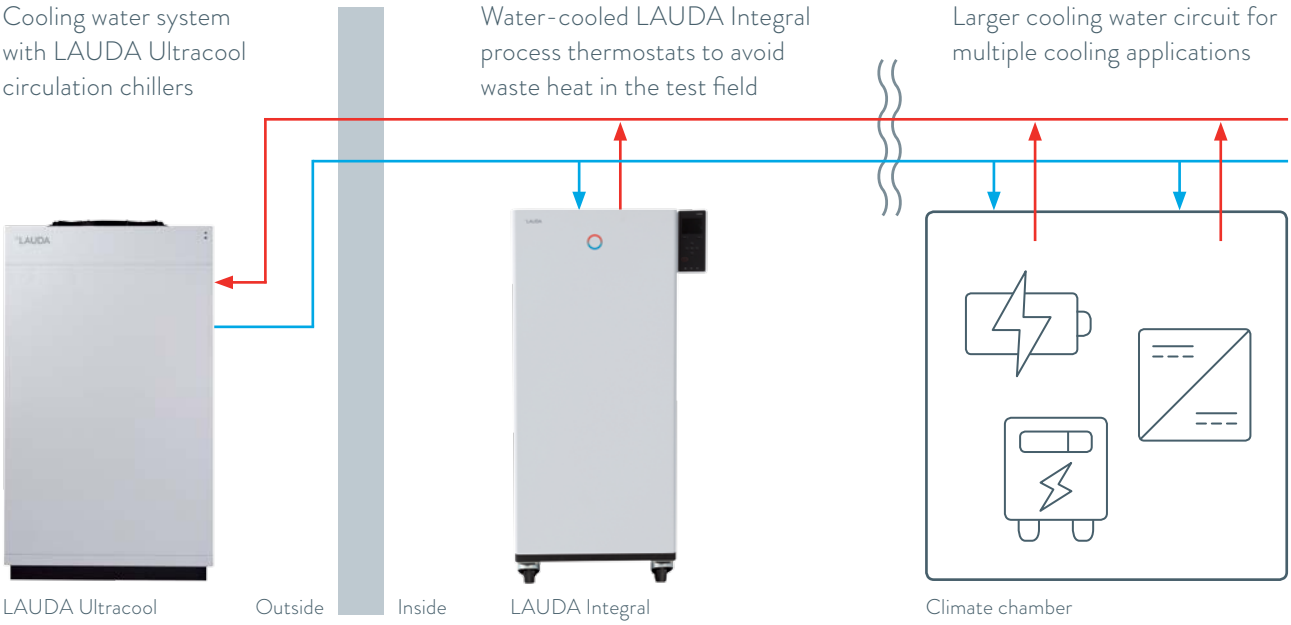
−10 °C 35 °C

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 any customer specific requirements.

More information:

With the current generation of the Ultracool series, LAUDA offers state-of-the-art circulation chillers with high energy savings and a short payback time for the supply of cooling water.



INDIVIDUAL HEATING AND COOLING SYSTEMS

LAUDA Process cooling units

LAUDA PROCESS COOLING UNIT

−40 °C 120 °C

Efficiency, precision and flexibility characterize the advanced 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.

More information:

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 - 35 kW at −40 °C flow temperature,
  15 - 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

LAUDA Integral and Ultracool

Technical data acc. to DIN 12876

Device type	Working temperature range °C	Temperature stability ±K	Cooling of the refrigerating machine	Max. heating output kW	Cooling capacity 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 with HFC refrigerants																		
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	20.0[3]	20.0[3]	20.0[3]	15.0[3]	11.5[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	25.0[3]	25.0[3]	25.0[3]	24.5[3]	22.5[3]	22.0[3]	18.5[2]	12.5[3]	8.70[2]	5.00[2]	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[1]	-
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[1]	-
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	18.5[3]	18.5[3]	18.5[3]	15.0[3]	11.5[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 refrigerants																		
IN 2040 XTW	−45 ... 200	0.05	Water	16.0	20.8[3]	20.8[3]	20.8[3]	20.5[3]	17.8[3]	14.0[3]	10.5[2]	6.60[2]	3.50[2]	-	-	-	-	-
LAUDA Integral P with HFC refrigerants																		
IN 2050 PW	−40 ... 140	0.05	Water	16.0	-	20.0[3]	20.0[3]	15.0[3]	10.8[3]	7.80[3]	4.80[2]	3.00[2]	1.60[2]	-	-	-	-	-
IN 2560 PW	−40 ... 140	0.10	Water	24.0	-	25.0[3]	25.0[3]	25.0[3]	24.5[3]	24.0[3]	17.7[3]	11.0[3]	7.50[3]	-	-	-	-	-
LAUDA Ultracool																		
UC 4	−10 ... 35	0.5	-	-	-	-	6.1	4.8	3.3	2.4	-	-	-	-	-	-	-	-
UC 8	−10 ... 35	0.5	-	-	-	-	13.3	10.2	7.0	4.4	-	-	-	-	-	-	-	-
UC 14	−10 ... 35	0.5	-	-	-	-	20.3	15.8	11.1	7.6	-	-	-	-	-	-	-	-
UC 24	−10 ... 35	0.5	-	-	-	-	30.9	24.3	17.3	12.0	-	-	-	-	-	-	-	-
UC 50	−10 ... 35	0.5	-	-	-	-	65.6	51.2	36.4	25.2	-	-	-	-	-	-	-	-
UC 65	−10 ... 35	0.5	-	-	-	-	85.2	66.9	47.8	33.3	-	-	-	-	-	-	-	-
UC 80	−10 ... 35	0.5	-	-	-	-	101.4	79.0	56.2	39.0	-	-	-	-	-	-	-	-
UC 100	−10 ... 35	0.5	-	-	-	-	121.4	95.3	68.3	47.8	-	-	-	-	-	-	-	-

IN 550 XT, IN 550 XTW, IN 750 XT, IN 950 XTW and IN 1850 XTW are also available with A3 refrigerants.

[1] Pump level 2 [2] Pump level 4 [3] Pump level 8

Max. discharge pressure bar	Max. flow rate Pressure L/min	Pump connection thread mm	Min. filling volume L	Filling volume L	Dimensions (W × D × H) mm	Protection level	Noise level dB(A)	Weight kg	Max. power consumption kW	Mains voltage V; Hz	Part number	Device type
3.1	65	M30 × 1.5	2.5	8.7	430 × 550 × 760	IP 21	60	103	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	65	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	64	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
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	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	647	37.0	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L003308	IN 2560 PW
5.0	68	Rp ½	-	12	510 × 680 × 1,042	IP 32	57.9	115	2.0	230 V; 50 Hz	L003512	UC 4
3.5	130	Rp 1	-	35	720 × 910 × 1,280	IP 54	61.0	150	3.8	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002853	UC 8
3.2	130	Rp 1	-	35	720 × 910 × 1,250	IP 54	64.7	175	5.4	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002854	UC 14
3.8	130	Rp 1	-	35	720 × 910 × 1,250	IP 54	64.7	180	9.8	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002855	UC 24
3.1	230	Rp 1 ½	-	210	1,040 × 1,435 × 1,890	IP 54	68.7	410	15.8	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002856	UC 50
3.3	250	Rp 1 ½	-	210	1,040 × 1,435 × 1,890	IP 54	69.5	440	20.4	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L002857	UC 65
5.1	500	Rp 2 ½	-	125	1,256 × 1,706 × 1,905	IP 54	67.5	700	23.3	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L003684	UC 80
5.1	500	Rp 2 ½	-	125	1,256 × 1,706 × 1,905	IP 54	69.3	700	30.2	400 V; 3/PE; 50 Hz & 460 V; 3/PE; 60 Hz	L003685	UC 100

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