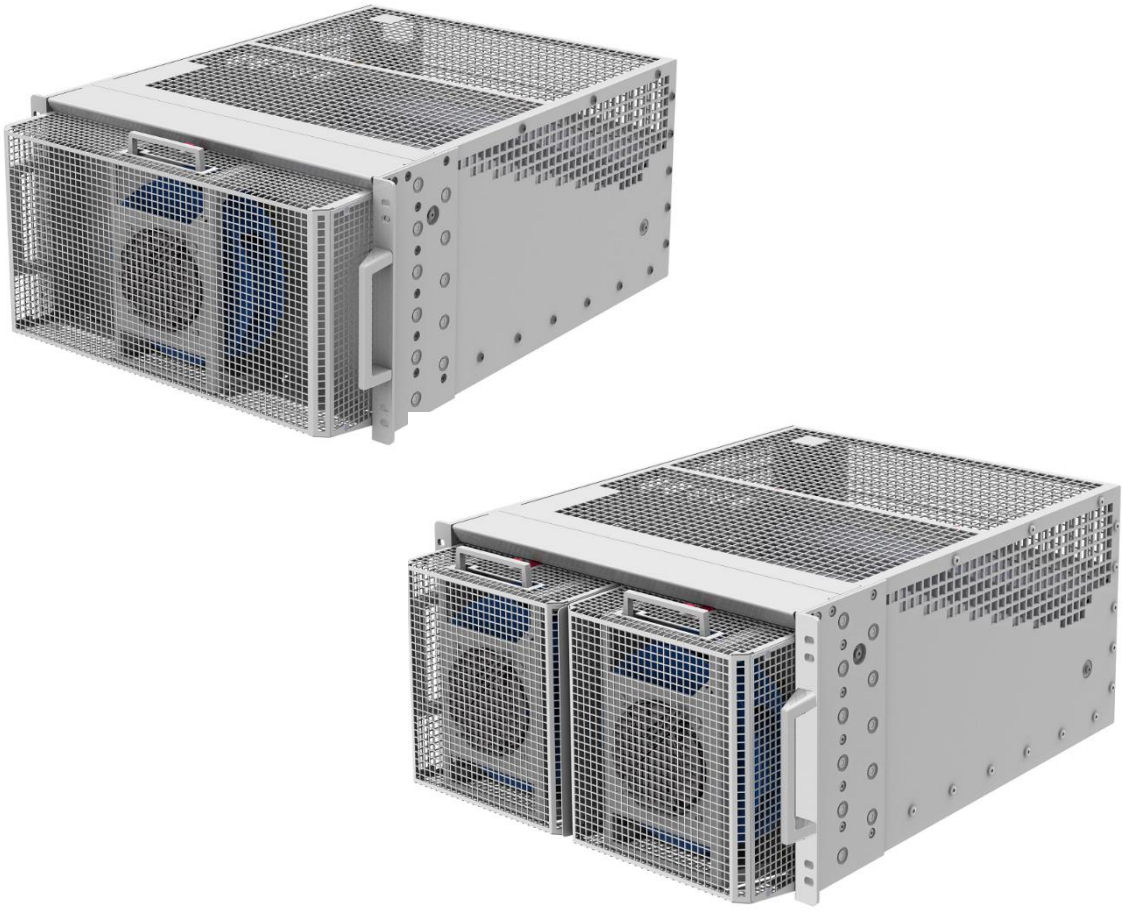
Draft!

nVent SCHROFF
Cooling Modules 29714-016/-017/-022/027

User Manual



Doc-No.: 63972-403

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Hier Text eingeben

Manual für 29714-036 ergänzen:
Ausführung wie 29714-027

1 Safety

1.1 Intended Use

The nVent SCHROFF cooling modules described in this manual are intended to be installed into the 19" plane of electronics cabinets to provide heat dissipation. The cabinet with the cooling module forms a closed system and allows the cooling of electronic components mounted in its 19" plane independently of the ambient or room temperature.
Before commencing operation the modules must be connected to an external recirculation cooling system (chiller).
Intended use includes compliance with the terms and conditions for assembly, disassembly, commissioning, operation and maintenance specified by the manufacturer.

1.2 Safety instructions of the manufacturer

1.2.1 Disclaimer

Schroff accepts no liability for any errors in this documentation. To the maximum extent permissible by law, any liability for damage, direct or indirect, arising from the supply or use of this documentation is excluded.

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1.3 Safety symbols used in this manual

In these original operating instructions, warning notices point out residual risks that cannot be avoided by constructive means when installing or operating the cooling module. The warning notices are classified according to the severity of the damage occurring and the probability of its occurrence.

⚠ DANGER	
Symbol	**Short description of the danger** The signal word DANGER indicates an immediate danger. Non-observance will result in severe injuries or death.

⚠ WARNING	
Symbol	**Short description of the danger** The signal word WARNING indicates a possible danger. Non-observance can lead to serious injury or death.

⚠ CAUTION	
Symbol	**Short description of the danger** The signal word CAUTION indicates a possible danger. Non-observance can lead to injuries.

ATTENTION
Short description The signal word ATTENTION indicates possible damages to equipment. Non-observance can lead to damage to the device.

	**Important information**

1.4 Safety Information for the Operator

1.4.1 General notes

The operator must comply with all relevant safety regulations for setting up and operating the nVent SCHROFF LHX+ cooling modules, e.g. accident prevention regulations for the operation of cooling equipment. Furthermore, the installation and connection conditions and the corresponding instructions in Chapter 3 Transport and installation must be observed.

1.4.2 Qualification of the personnel

Only trained specialists are authorized to carry out assembly, commissioning, completion, maintenance and service of the LHX+ cabinets or the integrated cooling modules. The nationally applicable health and safety regulations must also be adhered to.

1.4.3 Personal protective equipment

⚠ WARNING	
	**Risk of injury due to insufficient personal protective equipment** If you use the wrong protective equipment or no protective equipment at all, you could be seriously injured. - Wear protective equipment adapted to the work processes. - Check the protective equipment before each use to ensure that it is intact! - Use only approved protective equipment.

The personnel responsible for installation, maintenance and operation must wear protective equipment appropriate to the work processes.
The following personal protective equipment is required:
- Safety glasses
- Protective gloves
- Protective boots

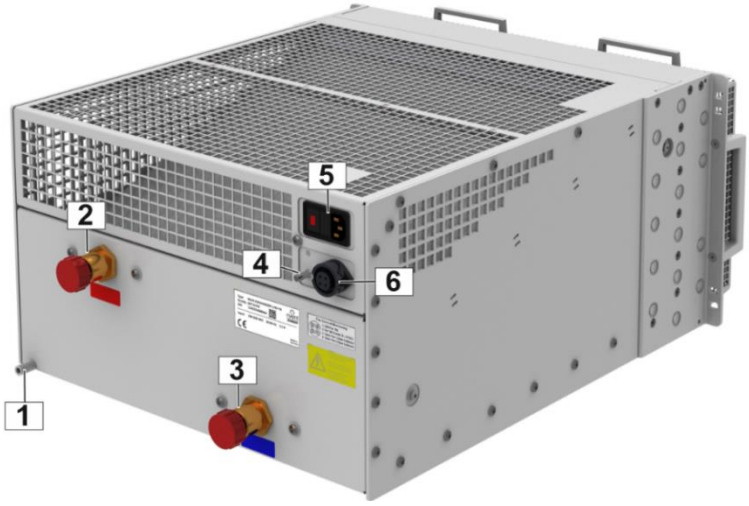
2 Cooling modules overview

The nVent SCHROFF cooling modules 29714-0xx are intended to be installed at the bottom of the 19" plane in closed electronics cabinets.
The following variants are available at the time of the compilation of this manual:

Part-No.	Cooling capacity	Mains voltage	Fan Trays
29714-016	10 kW	200-240 VAC	2
29714-017	5 kW	200-240 VAC	1
29714-022	5 kW	100-130 VAC	2
29714-027	5 kW	100-130 VAC	1

29714-017/027

29714-016/022



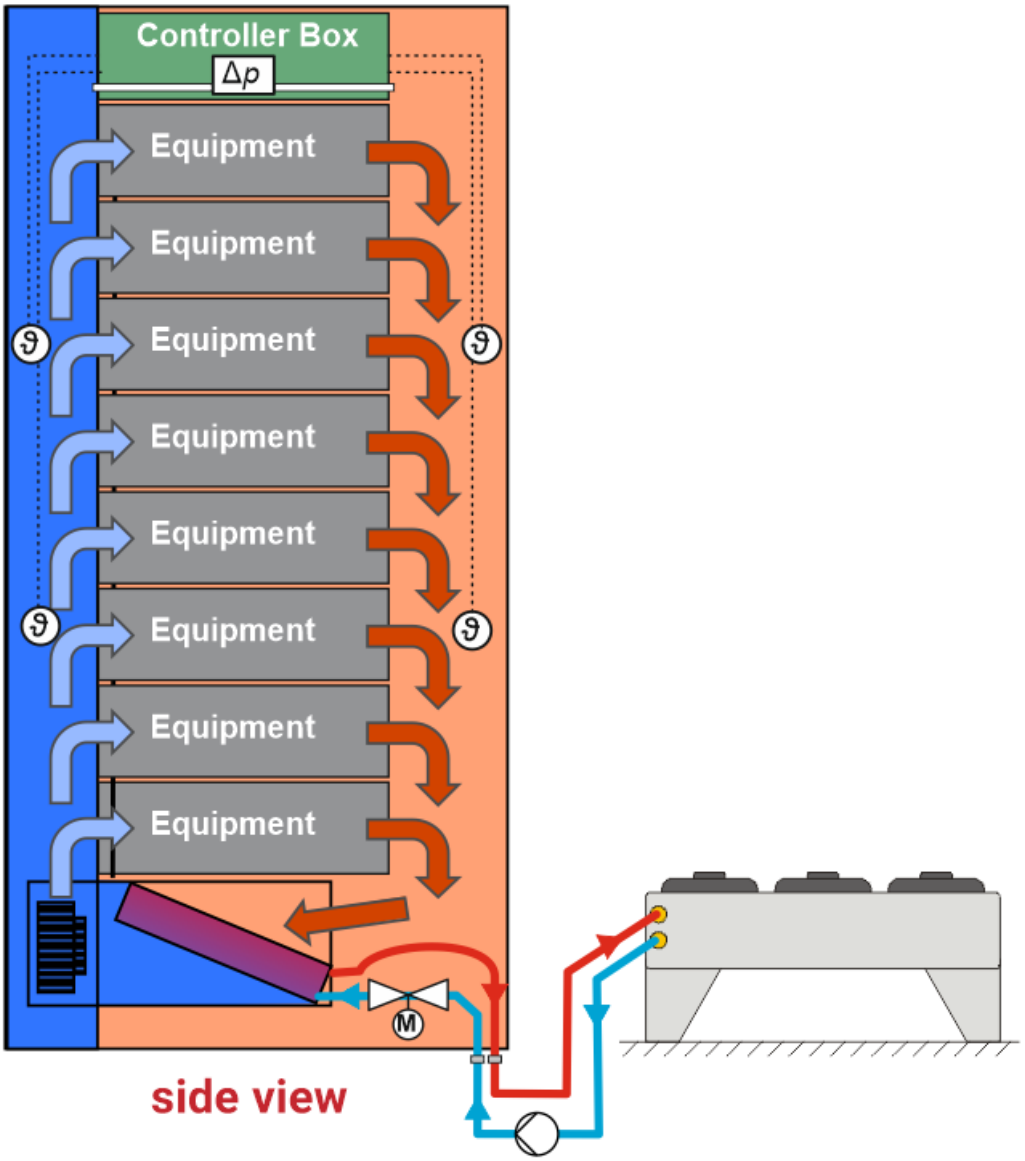
1 Condensate drain (10 mm)	4 Ground stud (M6)
2 Water outlet	5 Fused mains input IEC60320-C14
3 Water inlet	6 Connector for fan control and monitoring

	The cooling modules contain no user serviceable parts inside; the fan trays are hot swappable.

2.1 Functional description

The cooling system consists of an air loop and a water loop.
The fans of the cooling unit draw warm air from the rear section of the cabinet and into an air/water heat exchanger. The air is cooled down and then blown into the front area of the cabinet.
Inside the air/water heat exchanger the heat energy of the warm air is transferred to the medium of water. The air/water heat exchanger is connected to an external reciprocal chiller unit (not supplied with the module), where the water is cooled down again.

Example for an installation inside a cabinet



The water inlet temperature and the cooling water flow and the air flow determine the cooling capacity of the cooling module.

3 Transport and assembly

3.1 Safety rules for transport and assembly

⚠ WARNING	
	**Risk of accidents due to insufficiently qualified personnel!** • The installation may only be carried out by qualified personnel who are authorized to do so according to the valid safety regulations, e.g. by authorized specialized companies or authorized departments of the company. • When installing the system, the corresponding personal protective equipment must be worn. • Only use approved equipment and slings to lift the cooling module.


Use eye protection!


Use hand protection!


Use foot protection!

The specified personal protective equipment must be used during all assembly and transport work.

3.2 Unpacking

- Remove any transport material and packaging.
- Dispose of the transport and packaging material in an environmentally compliant manner and in accordance with the applicable local rules and regulations.

	After unpacking, check the cooling module for signs of transport damage or other damage. In order to avoid transport damage if the unit needs to be returned to the manufacturer, return the cooling module solely in its original packaging.

3.3 Installation

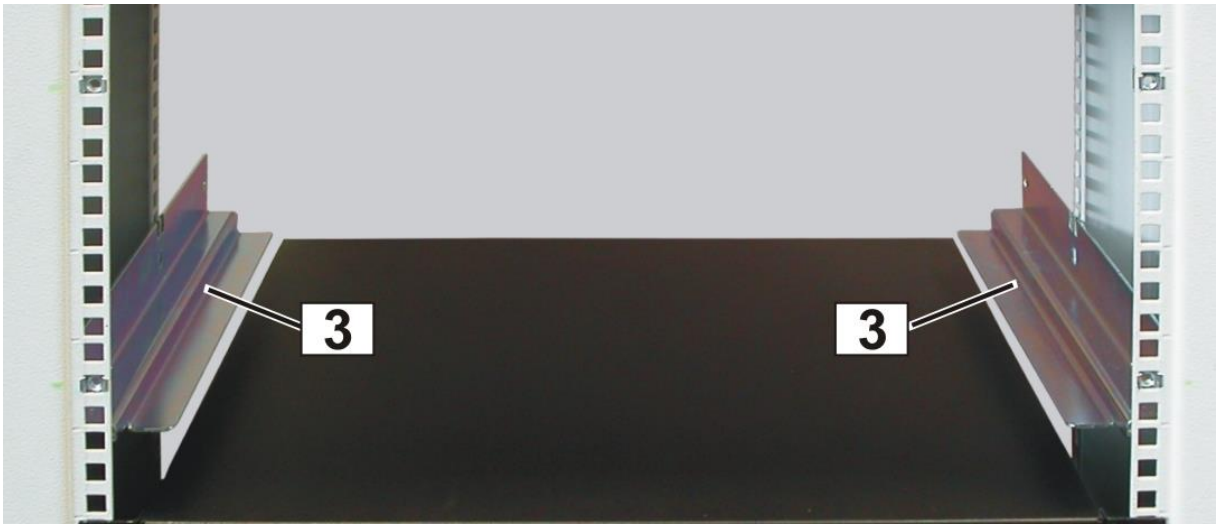
ATTENTION
Use heavy-duty slide rails! The cooling unit must only be mounted on heavy-duty slide rails with a load capacity of 25 kg. If the cooling module is mounted only on the 19" rack mounting brackets, the cooling module will be damaged; water may leak out and damage the electronic components in the cabinet.

ATTENTION
Operate only in closed cabinets! The cooling module must be operated in a closed cabinet. If the cooling module is operated in an open cabinet, condensation water will be produced around the heat exchanger, which is distributed by the fans in the enclosure and can damage the electronics components. The installation of a door contact switch which will turn off the cooling module when the door is opened is mandatory.

	To ensure proper function and cooling performance, the front 19" plane must be sealed off from the rear part of the cabinet by suitable air baffle plates and seals.

3.3.1 Mechanical installation

Install heavy-duty slide rails (3) at the bottom of the cabinet.



Slide in the cooling module and attach it to the 19" posts.

3.3.2 Connection to the cooling water supply

ATTENTION
Outflow of cooling water can cause damage! • Connection to the cooling water supply should be carried out by a refrigeration engineer or suitably trained plumber. • It must be ensured that suitable structural measures (leak sensor, automatic shut-off valves) prevent damage to surrounding components in the event of a leak or defect. These measures depend on the installation location or the structural conditions and are the responsibility of the installer or system designer. • Ensure that the water supply pressure does not exceed the unit rating.

	**Notes on the water connection:** • The cooling infrastructure to which the unit is connected (the external water loop) must be appropriately dimensioned by the system designer, taking into consideration the available pump pressure and type, the nominal pipe diameters and the pressure loss expected in the load circuit (the cooling module). • To avoid a pressure drop in the system, the water pipes should be kept as short as possible. • The behavior of the materials used in the cooling module with the materials of the external water circuit must be observed in order to avoid corrosion damage! • When creating the on-site piping, contamination in the line system must be avoided, or the lines must be flushed before connecting the cooling module. • Shut-off and drain valves on each cabinet as well as a central water filter and air separator are mandatory.

3.3.3 Requirements for the water quality

ATTENTION
Risk of corrosion! • If aluminum is used in the external water circuit, there is a risk of corrosion. • To avoid electrochemical corrosion, the compatibility of the materials used in the cooling module with those of the external cooling circuit must be observed. • The type and dosage of a suitable anticorrosive or antifreeze agent depends on the structural environment and the external recooling system and must be determined individually by the plant planner.

	The following materials are used in the cooling module: • Aluminum • Brass • Copper • Stainless steel

To ensure trouble-free operation of the cooling module, the following water quality requirements must be met.
(see also VDI 3803 / ASHRAE: Liquid cooling guidelines for datacom equipment centers, second edition).

Electrical conductivity:	25 mS/m - 100 mS/m at 25 °C /77 °F
Hydrogen concentration:	7,5 - 8,5 (ph-value) at 20 °C /68 °F
Chloride:	< 50 mg/l / 50 ppm
Total Hardness:	> 3 °dH < 8 °dH
Colony-forming units:	< 1000 CFU/ml
Appearance:	clear
Colour:	colourless

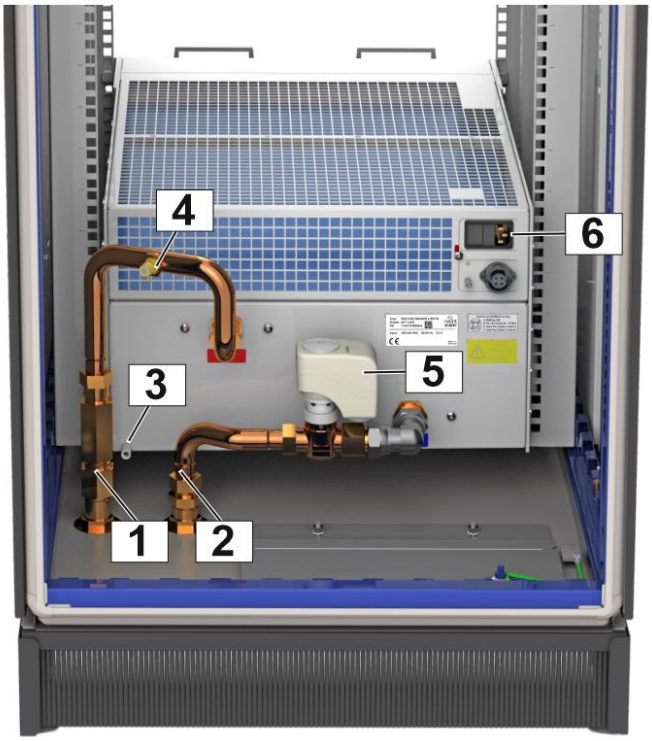
3.3.4 Water connection

ATTENTION
Damage due to condensation and spraying water! The cabinet doors must be closed for operation. If the cooling module is operated in an open cabinet, condensation water will be produced around the heat exchanger, which is distributed by the fans in the enclosure and can damage the electronics components.

	The cabinet must be equipped with door contact switches. When the doors are open, the cooling module is shut off, the fans are disabled. To ensure proper function and cooling performance, the front 19" plane must be sealed off from the rear part of the cabinet by suitable air baffles and seals.

	• For the operation of the cooling module, an electromechanical control valve, temperature sensors and an appropriate controller to drive the control valve and the fans are required. • Suitable control and connection sets are available from SCHROFF as accessories. • Corresponding part numbers can be found in the appendix.

Example for the integration inside a cabinet



1	Water outlet	4	Bleeding valve
2	Water inlet	5	Actuator water valve
3	Condensate drain (10 mm)	6	Fused mains input IEC60320-C14

Installation must be carried out by a qualified plumber.

Corresponding connection kits are available as accessories.
The bottom of the cooling module is designed as a condensate tray with a 10 mm hose connection at the rear side. Especially at low water inlet temperatures it is recommended to realize the condensate drain on site via the hose connection.

	The required connection nominal widths and the position of the connections at the cooling module rear side can be found in the drawings in the appendix to this manual.

Connect the water supply, water return and condensate drain according to the drawings in the appendix to this operating manual.

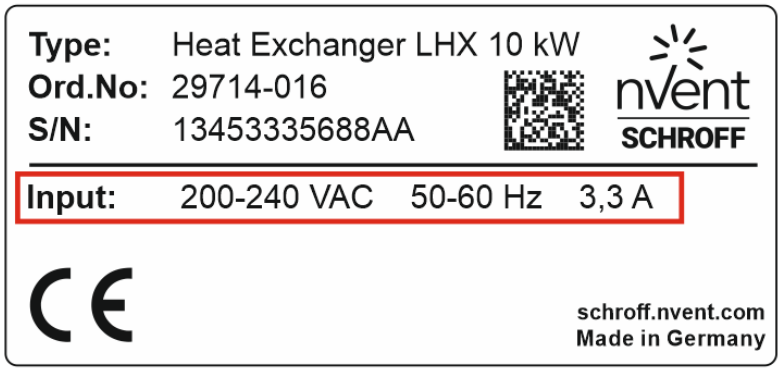
Before commissioning, the device must be vented. Appropriate venting points must be arranged by the plumber in the return pipe.

3.3.5 Mains connection

⚠ WARNING	
	**Power cable rating** If your cooling module was not supplied with an AC power cable, purchase an AC power cable approved for use in your country. The AC power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product. The cooling module must be operated with protective earth/GND connection. Use only a three conductor AC power cable with a protective earth conductor that meets the IEC safety standards!

ATTENTION
Incorrect mains voltage can lead to component damage! Verify that your mains voltage corresponds with the product's electrical ratings label.

Electrical rating (Example)



Verify that your mains voltage corresponds with the product's electrical ratings label.
Currently available are the following cooling modules:

29714-016 - Mains Voltage 200 – 240 VAC
29714-017 - Mains Voltage 200 – 240 VAC

3.3.6 Mains input

The cooling unit provides a fused mains/line input with IEC60320-C14 connector at the rear side.

1 Fuse
2 Ground Stud (M6)
3 IEC60320-C14 connector
4 Fuse rating (Example)
5 Connector for fan control and monitoring

3.3.7 Fan control and monitoring

	The cooling module has no internal fan controller. For fan control and monitoring, an external controller is needed to set the fan speed on a fixed level or to adjust it depending on the differential pressure.

On the rear side is an interface socket which allows to adjust the fan speed by a control voltage (0 – 10 VDC) and to read the tacho signal of the fans.

Pinout:

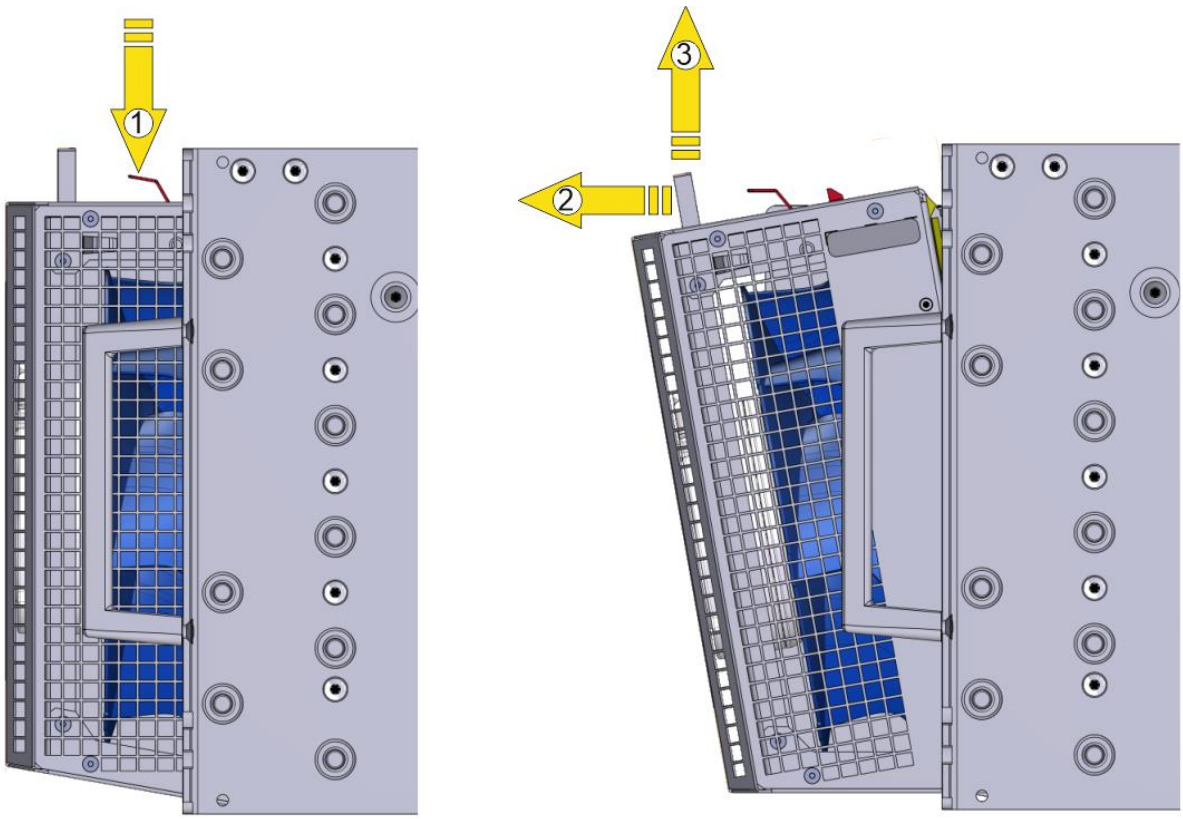
The corresponding connector is: **Hirschmann CA 3 LS**

3.4 Fan replacement

Fehler! Verweisquelle konnte nicht gefunden werden.
The cooling module must be switched off before removing the fan. If this is not done automatically, e.g. by the door contact switch, please unplug the power plug.

Steps

- Press down the lever (1)
- Pull the Fan Tray to the front by the handle (2)
- Remove the fan tray upwards (3)
- Installation in reverse order



4 Dismantling, storage and disposal

4.1 Safety rules for dismantling, storage and disposal

⚠ WARNING	
	**Risk of injury and/or material damage from falling or tipping loads!** • When transporting the cooling module with a pallet truck, forklift or crane, do not step under the suspended load. • Only use approved equipment and slings to lift the cooling module. • During transport and dismantling, the corresponding personal protective equipment must be worn. • At least 2 people are required when moving and unpacking the cooling module

⚠ WARNING	
	**Risk of accidents due to insufficiently qualified personnel!** • The dismantling may only be carried out by qualified personnel who are authorized to do so according to the valid safety regulations, e.g. by authorized specialized companies or authorized departments of the company. • When dismantling the system, the corresponding personal protective equipment must be worn.


Use eye protection!


Use hand protection!


Use foot protection!


Use head protection!

The specified personal protective equipment must be used during all assembly, dismantling and transport work.

ATTENTION
Freezing hazard! The cooling unit may be damaged if the cooling medium freezes inside the unit. Drain the cooling unit completely prior to transporting or.storage at temperatures below 0 °C.

4.2 Dismantling

ATTENTION
Outflow of cooling water can cause damage! • Works on the cooling water supply should be carried out by a refrigeration engineer or suitably trained plumber.

Before any dismantling work can be started, the controller and cooling module must be disconnected from the mains.
The cooling water supply and return must be closed and the cooling module must be drained.
Procedure:

- Disconnect the cooling module from the mains
- Close the shut-off valves for the water supply and return.
- Disconnect the screw connections for the water supply and return, collect the leaking water.
- Close the water supply and return lines on the cooling module to prevent the water remaining in the heat exchanger from leaking out.

4.3 Storage

- The cooling unit must be completely drained before storage.
- If complete draining is not possible, flush the cooling unit with a suitable antifreeze agent.
- Ensure that the ambient conditions for storage comply with the specifications in the "Technical data" chapter.
- Protect the cooling module from dirt and moisture by using suitable packaging material.

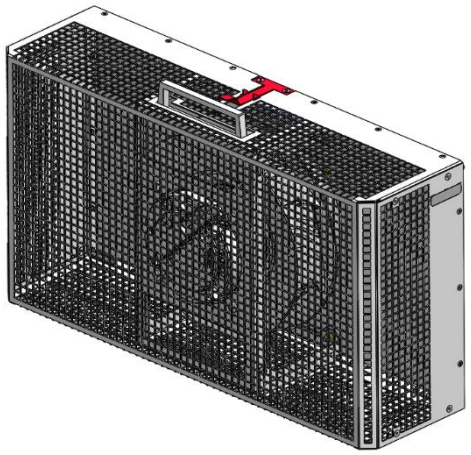
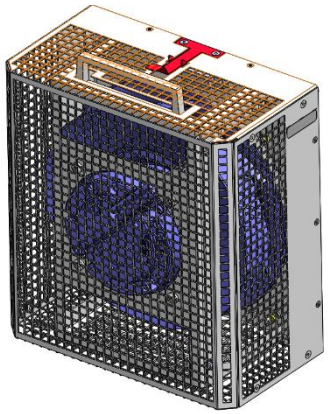
4.4 Disposal

The cooling module must be recycled in an environmentally friendly manner and disposed of properly.
A specialized company can take over this task.
All regulations of the national legislation applicable in your country must be adhered to

5 Technical data

Type	LHX+ 5 kW	LHX+ 10 kW	LHX+ 10 kW
Part No. Heat Exchanger	**29714-017**	**29714-022/02**	**29714-016**
Cooling capacity			
Usable cooling capacity (cooling water inlet temperature 10 °C, air exit temperature 20 °C)	5 kW	10 kW	10 kW
Water circuit			
Cooling medium [1)]	Water	Water	Water
Water inlet temperature [2)]	6…25 °C	6…25 °C	6…25 °C
Water flow	Up to 2.0 m³/h	Up to 2.0 m³/h	Up to 2.0 m³/h
Max. water pressure	typical: 6 bar peak: 10 bar	typical: 6 bar peak: 10 bar	typical: 6 bar peak: 10 bar
Static pressure loss in device at 0.5 m3/h	0,2 bar	0,2 bar	0,2 bar
Water conduit	Copper	Copper	Copper
Water connection inlet/outlet	G3/4" (inside conic)	G3/4" (inside conic)	G3/4" (inside conic)
Connection condensate drain	Ø10 mm (outside)	Ø10 mm (outside)	Ø10 mm (outside)
Air circuit			
Air flow	990 m³/h	1500 m³/h	1790 m³/h
Electrical data			
Supply voltage, single phase	230 V AC, 50/60 Hz	115 V AC, 50/60 Hz	230 V AC, 50/60 Hz
Power consumption	170 W	240 W	340 W
Protection fuse	2 AT	4 AT	4 AT
General Data			
Ambient temperature during transport	-25….70 °C	-25….70 °C	-25….70 °C
Ambient temperature outside of cabinet (during operation)	5…50 °C	5…50 °C	5…50 °C
Relative humidity level	5…95 %	5…95 %	5…95 %
Sound Power LWA (100 % Fan Speed)	72,6 dB (A)	76,3 dB(A)	76,3 dB(A)
Sound Pressure LPA (100 % Fan Speed)	65,8 dB (A)	69,6 dB (A)	69,6 dB (A)
Heat exchanger dry/filled with water	17/18 kg	20/21 kg	20/21 kg
Dimensions of air/water heat exchanger			
Height	266 mm = 6 U	266 mm = 6 U	266 mm = 6 U
Width	483/448 mm (19")	483/448 mm (19")	483/448 mm (19")
Depth	653 mm	653 mm	653 mm

5.1 Spare parts

Spare parts		
Part No.	Item	
29714-026	Fan Tray 230 V AC for cooling module **29714-017**	
29714-025	Fan Tray 230 V AC for cooling module **29714-016**	

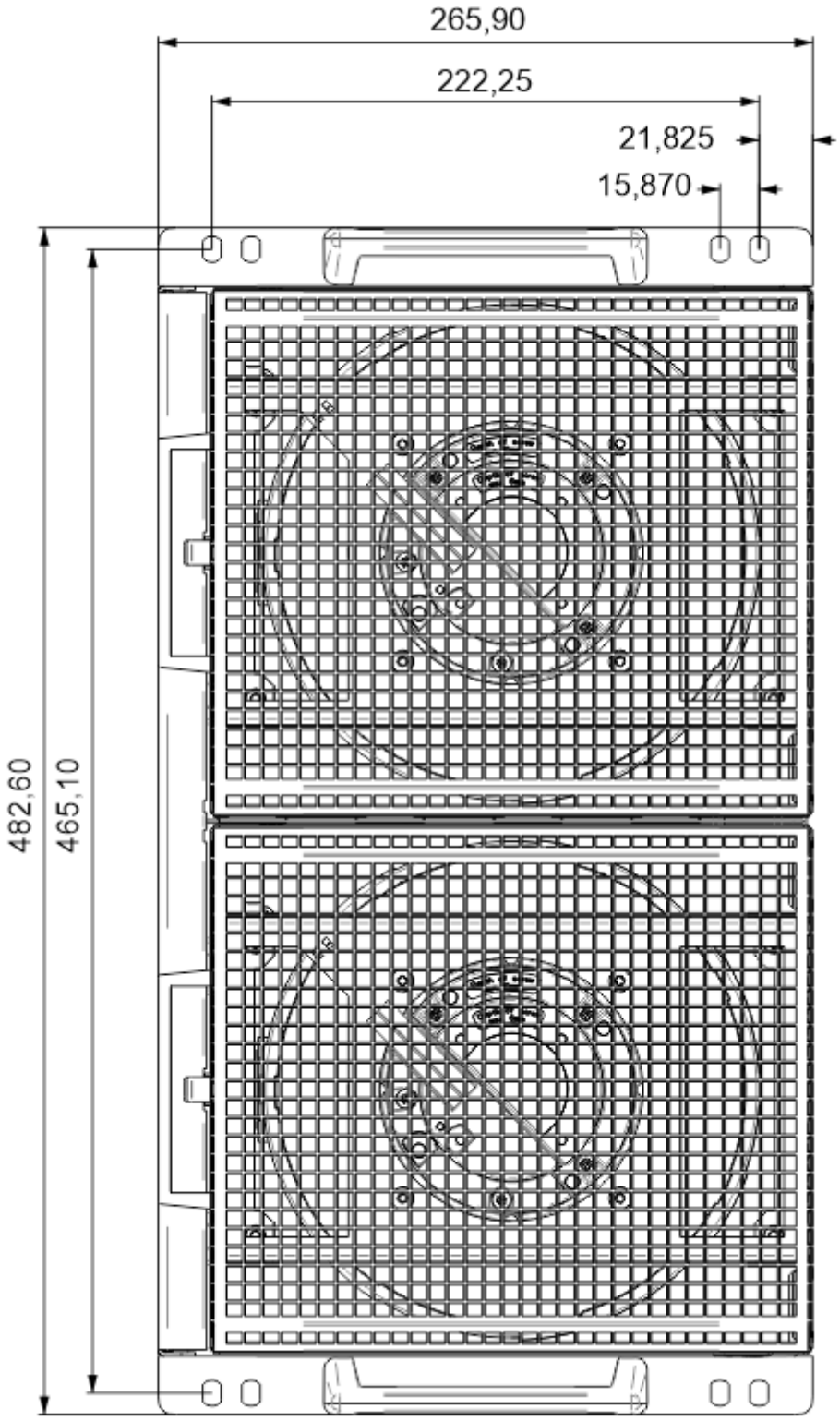
5.2 Accessoires

Accessoires		
Part No.	Item	
23130-664	Controller Kit including: • Controller Box • Temperatur sensors • Actuator and ball valve • Connection cable controller box to cooling module	
23130-667	Door Switch Kit	
23130-666	Display	
23130-660	LHX+ water hoses connection kit 1.5 m	

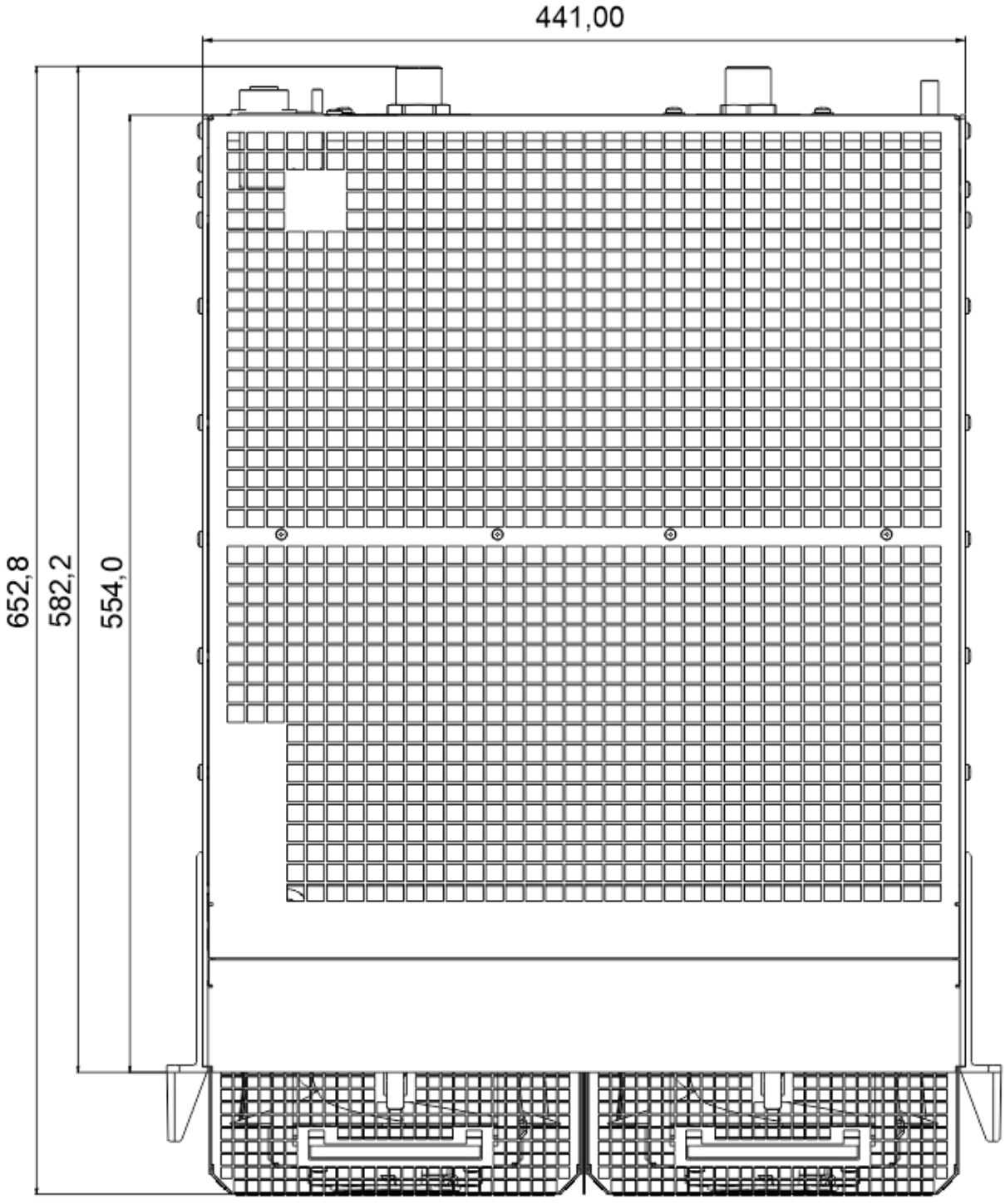
23130-661	LHX+ water hoses connection kit 4 m	
23130-663	Water flow and temperature sensor kit	

5.3 Dimensions

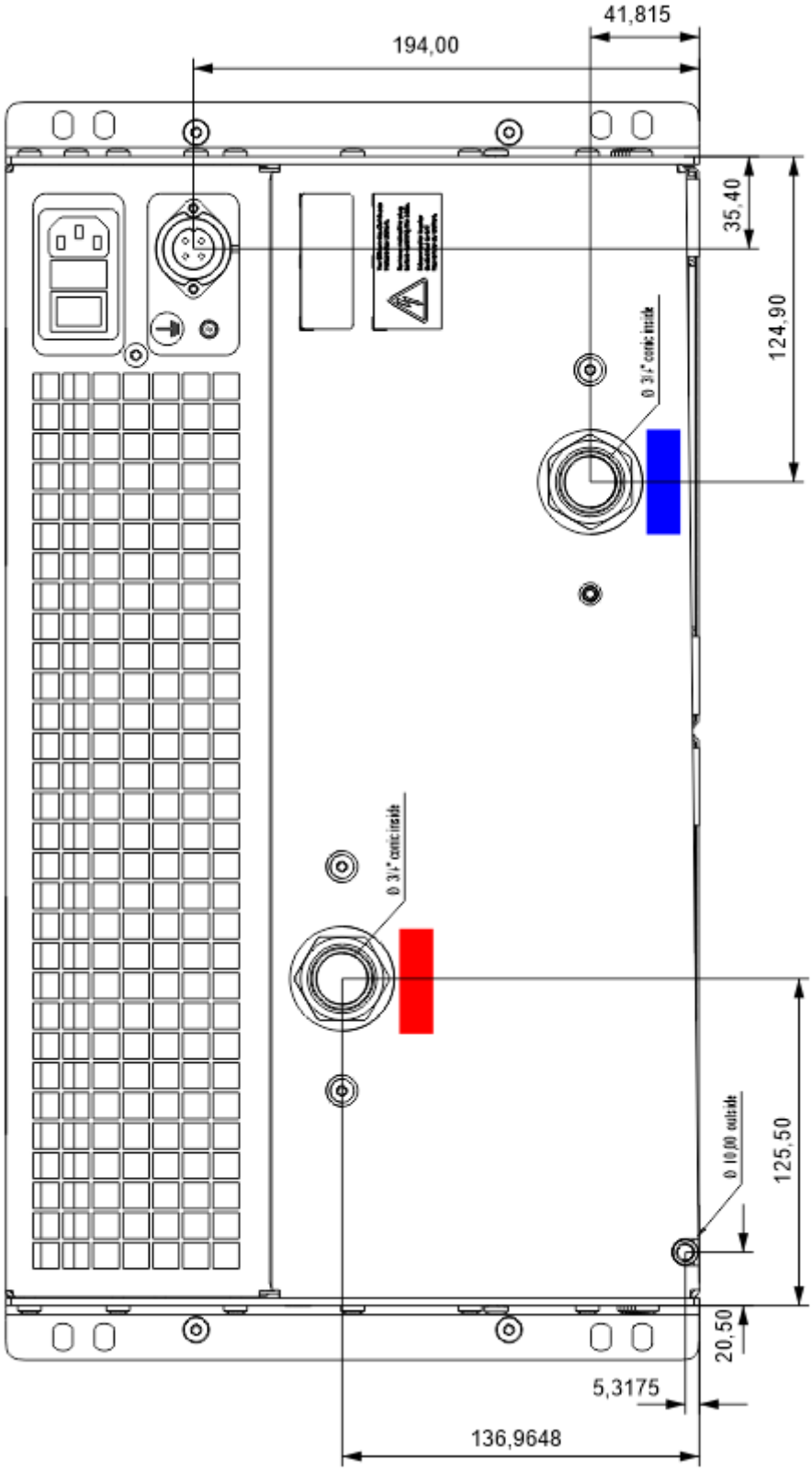
Front view



Top view

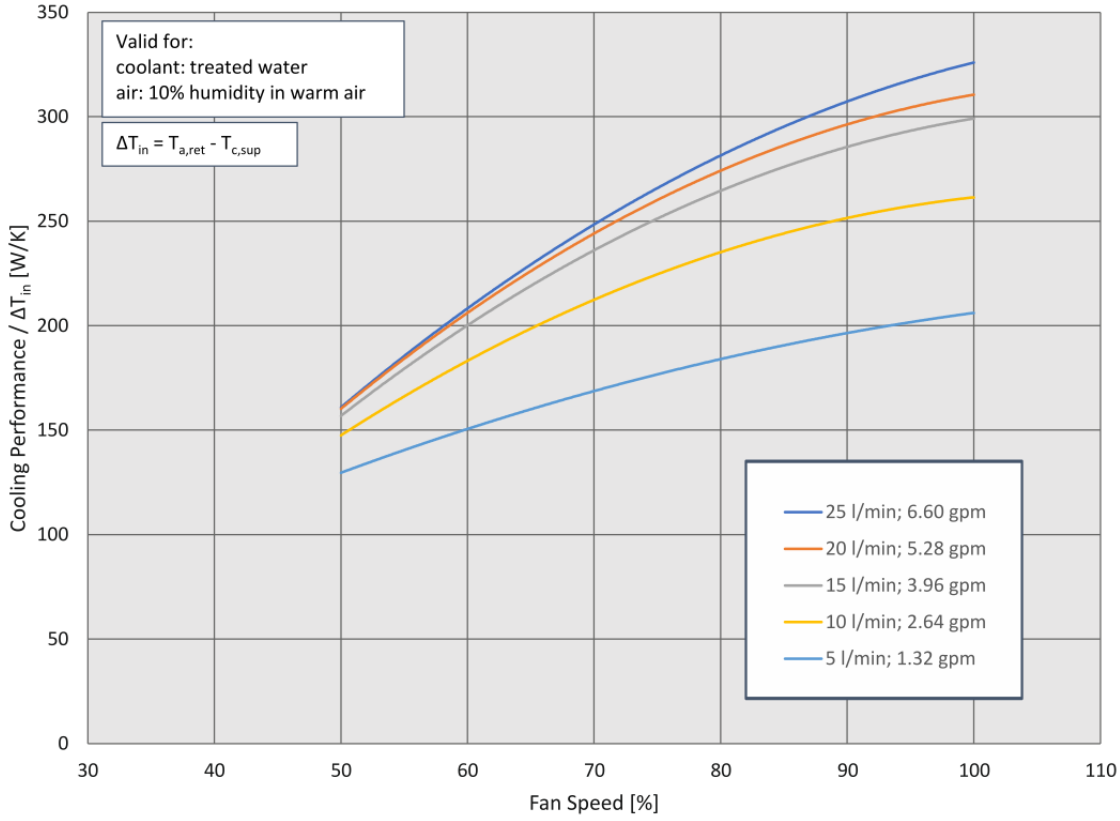


Rear view

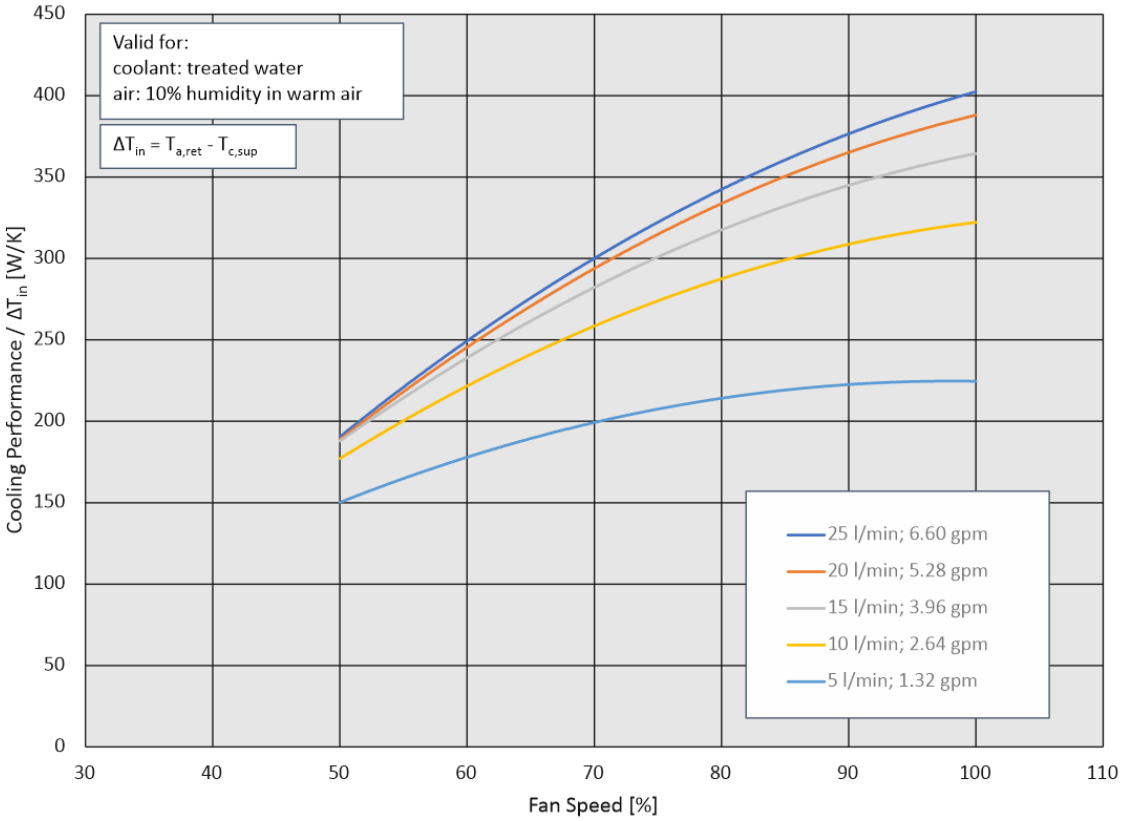

41,815
194,00
35,40
124,90
Ø 3/4" conic inside
Ø 3/4" conic inside
Ø 10,00 outside
125,50
20,50
5,3175
136,9648

5.4 Cooling performance

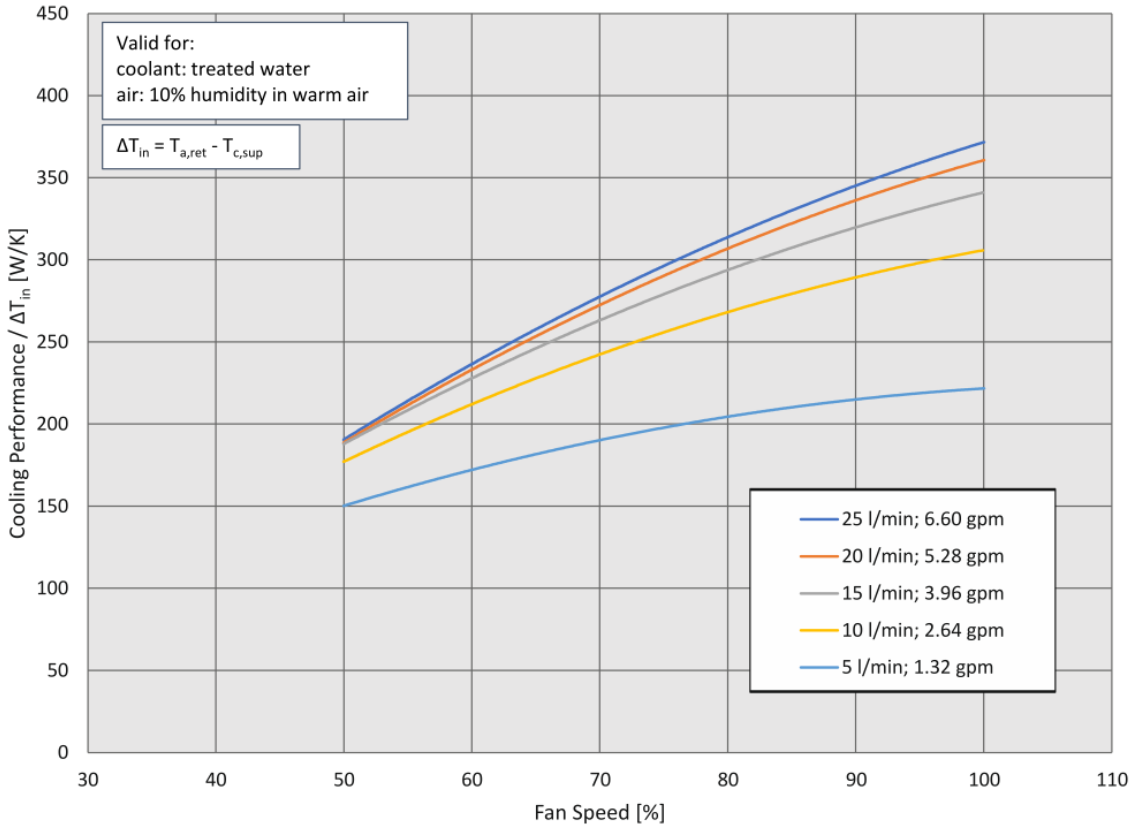
Cooling performance 29714-017



Cooling performance LHX 29714-016



Cooling performance LHX 29714-022



5.5 Air flow

Air flow 29714-017

Control voltage [VDC]	Fan Speed [1/min]	Total air flow	
		[m³/h]	[CFM]
10	4354	987	581,2
9	4290	975	574,2
8	3788	864	508,8
7	3267	741	436,4
6	2765	624	367,5
5	2228	496	292,1
4	1726	380	223,8
3	1208	253	149,1

Air flow 29714-016

Control voltage [VDC]	Fan Speed [1/min]	Total air flow	
		[m³/h]	[CFM]
10	4214	1790	1053,5
9	4204	1785	1050,6
8	3753	1598	940,5
7	3254	1377	810,4
6	2737	1155	679,8
5	2222	926	545,0
4	1712	707	416,1
3	1193	478	281

5.6 Noise Level

To measure the noise levels, the cooling module was mounted in a cabinet type SCHROFF LHX. The measurement was performed with closed doors.

Noise level 29714-017

Fan Speed (%)	Closed doors	
	Sound Power L_{WA} [dB(A)]	Sound Pressure L_{PA} [dB(A)] 0,2m distance
100	72,6	65,8
90	71,2	64,6
80	68,3	61,5
70	64,8	58,1
60	60,7	54,4
50	55,7	50,4
40	-	-

Noise level 29714-016

Fan Speed (%)	Closed doors	
	Sound Power L_{WA} [dB(A)]	Sound Pressure L_{PA} [dB(A)] 0,2m distance
100	76,3	69,6
90	72,2	66,2
80	68,3	62,3
70	67,4	60,6
60	62,7	56,2
50	57,4	52,0
40	-	-