

9 Appendices

9.1 Gas Cooler Technical Data

RC 1.2 Rack

Gas Cooler Technical Data			
Rated cooling capacity (at 25 °C):	320 kJ/h		
Ambient temperature:	5 °C to 50 °C		
Ready for operation:	after max. 15 minutes		
Gas outlet dew point preset:	5 °C		
adjustable:	3 °C to 20 °C		
Dew point fluctuations static:	± 0.1 K		
in the entire specification range:	± 1.5 K		
Temperature difference between heat exchangers:	< 0.5 K		
IP rating:	IP 20		
Installation:	19" rack mounting housing or wall mounting		
Housing:	Stainless steel		
Packaging dimensions:	approx. 550 x 420 x 340 mm		
Weight:	approx. 16 kg		
max. altitude:	Altitudes up to 2000 m		
Refrigerant:	R600a (26 g)		
Recommended minimum room: <i>Refrigerant quantity [g] / 8 g/m²</i>	3,2 m²		
Electrical connection:	Plug per DIN EN 175301-803 + 12-pin terminal block		
Contamination level:	2		
Overvoltage category:	II		
Electrical data: <i>Available options may result in details that differ from these</i>	Voltage:	230 V	115 V
	Tolerance:	+/-10% at 50 Hz +/-10% at 60 Hz	- +/-10% at 60 Hz
	Typical power input:	322 VA	288 VA
	max. operating current:	1.4 A	2.5 A
	Starting current:	2.3 A	3.6 A
	Protection:	4 A (delayed action)	4 A (delayed action)
	Status output switching capacity:	30 V AC/60 V DC 1A, potential-free	
Condensate outlet:	Hose nipple Ø5 mm or with screw connection (metric/US)		
Parts in contact with media			
Filter:	see "Technical Data - Options"		
Moisture detector:	see "Technical Data - Options"		
Heat exchanger:	see table "Heat Exchanger Overview"		
Peristaltic pump:	see "Technical Data - Options"		
Tubing:	PTFE/FKM (Viton)		

RC 1.2+ Rack

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Parts in contact with media			
Filter:	see "Technical Data - Options"		
Moisture detector:	see "Technical Data - Options"		
Heat exchanger:	see table "Heat Exchanger Overview"		
Peristaltic pump:	see "Technical Data - Options"		
Tubing:	PTFE/FKM (Viton)		

9.2 Technical Data - Options

Analogue Output Technical Data

Signal:	4-20 mA or 2-10 V corresponds to -20 °C to +60 °C cooling block temperature
Connection:	M12x1 connector, DIN EN 61076-2-101

Technical Data, digital output

Signal:	Modbus RTU (RS-485)
Connection:	M12x1 connector, DIN EN 61076-2-101

Technical Data Cpsingle Condensate Pumps

Ambient temperature:	0 °C to 60 °C
Voltage tolerance:	± 5%
Flow rate:	0.3 L/h (50 Hz)/0.36 L/h (60 Hz) with standard hose
Inlet vacuum:	max. 0.8 bar
Inlet pressure:	max. 1 bar
Outlet pressure:	1 bar
Weight:	0.47 kg
Hose:	4 x 1.6 mm
Condensate outlet:	Hose nipple Ø5 mm Screw connection 4/6 (metric), 1/6"-1/4" (US)
IP rating:	IP 40
Materials	
Hose:	Tygon (Norprene)
Connections:	PVDF

Technical Data FF-3-N Moisture Detector

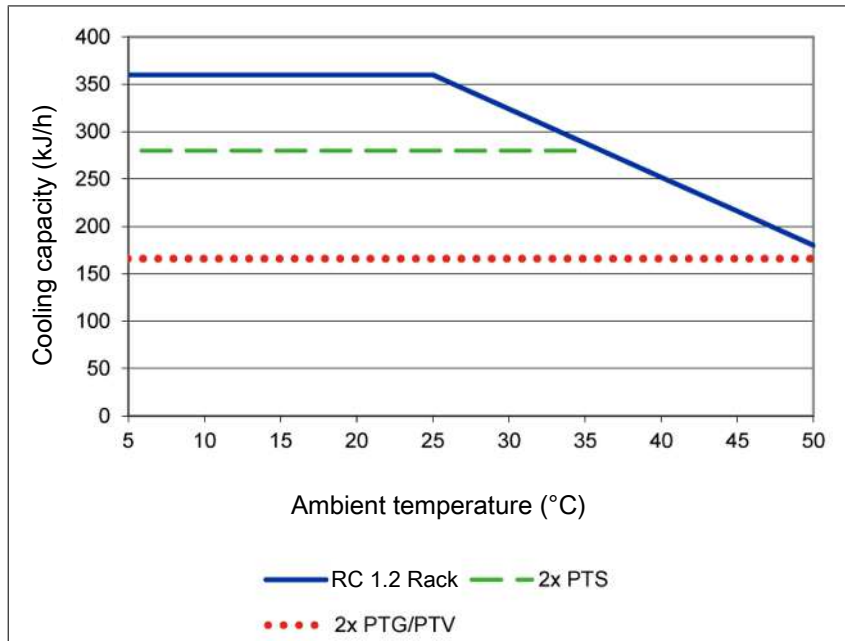
Ambient temperature:	3 °C to 50 °C
max. operating pressure with FF-3-N:	2 bar
Weight:	0.04 kg (incl. cable)
Material:	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data Filter AGF-FA-5

max. operating pressure with filter:	2 bar
Filter surface:	42 cm ²
Weight:	0.30 kg
Filter fineness:	2 µm
Dead volume:	28.5 ml
Materials	
Filter:	PTFE, PVDF, DURAN glass (parts in contact with media)
Seal:	FKM (Viton)
Filter element:	PTFE sintered

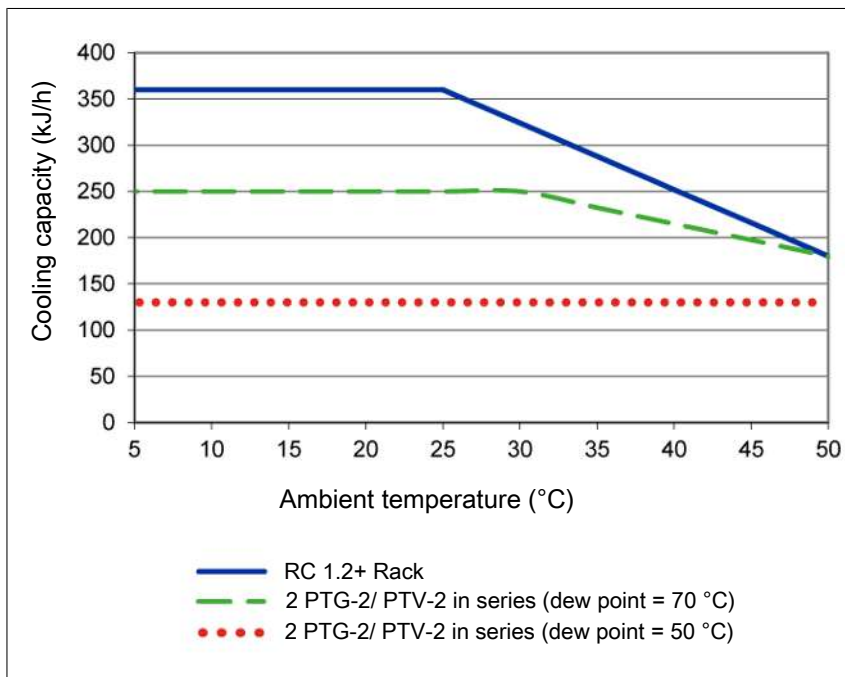
9.3 Performance curves

RC 1.2 Rack



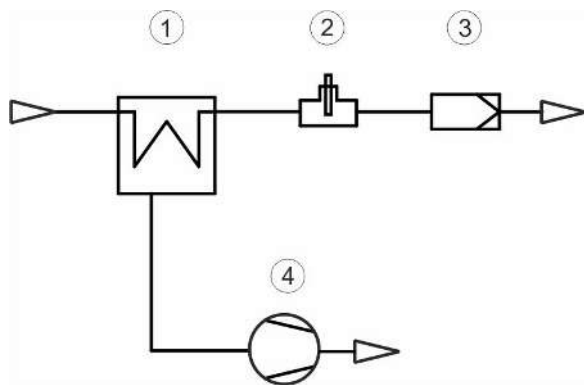
Note: The limit curves for the heat exchangers exchanger apply to a dew point of 40 °C.

RC 1.2+ Rack



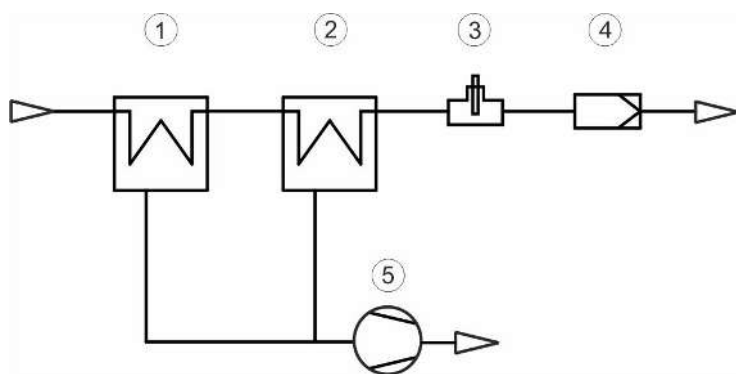
Remark: The limit curves for the heat exchanger apply to a dew point of 70 °C under standard conditions per DIN EN 15267-3:2008-03 and to a dew point of 50 °C under operating conditions.

9.4 Typical installation arrangement (1 gas path)



1 Cooler/cooling nest 1	3 Filter (optional)
2 Moisture detector (optional)	4 Condensate Pump

9.5 Typical installation arrangement (2 gas paths)



1 Cooler/cooling nest 1	4 Filter (optional)
2 Cooler/cooling nest 2	5 Condensate Pump
3 Moisture detector (optional)	

9.6 Heat exchanger

9.6.1 Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G , dew point τ_e (moisture content) and volume flow v . The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of $\tau_e = 40^\circ\text{C}$ and $\vartheta_G = 70^\circ\text{C}$. The maximum flow $v_{\max}$ in NI/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation programme.

9.6.2 Heat exchanger overview

RC 1.2 Rack

Heat exchanger	PTS PTS-I ²⁾	PTG	PTV PTV-I ²⁾
Materials in contact with media	Stainless steel	DURAN Glas PTFE	PVDF
Weight	0.5 kg	0.2 kg	0.125 kg
Flow rate $v_{\max}$ ¹⁾	500 NI/h	280 NI/h	280 NI/h
Inlet dew point $\tau_{e,\max}$ ¹⁾	65 °C	65 °C	65 °C
Gas inlet temperature $\vartheta_{G,\max}$ ¹⁾	180 °C	140 °C	140 °C
Max. Cooling capacity $Q_{\max}$	150 kJ/h	90 kJ/h	90 kJ/h
Gas pressure $p_{\max}$	160 bar	3 bar	2 bar
Pressure drop Δp ($v=150$ L/h)	10 mbar	10 mbar	10 mbar
Dead volume V_{dead}	29 ml	29 ml	57 ml
Gas connections (metric)	6 mm	GL 14 (6 mm) ³⁾	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") ³⁾	1/4"-1/6"
Condensate out connection (metric)	G3/8	GL 25 (12 mm) ³⁾	G3/8
Condensate out connection (US)	NPT 3/8"	GL 25 (1/2") ³⁾	NPT 3/8"

¹⁾ Max. cooling capacity of the cooler must be considered.

²⁾ Models marked I have NPT threads or US tubes, respectively.

³⁾ Gasket inside diameter.

RC 1.2+ Rack

Heat exchanger	2 x PTG-2 2 x PTG-2-I ²⁾	2 x PTV-2 2 x PTV-2-I ²⁾
Materials in contact with media	DURAN Glas PTFE	PVDF
Weight	2 x 0.15 kg	2 x 0.15 kg
Flow rate $v_{\max}$ ¹⁾	250 NI/h	250 NI/h
Inlet dew point $\tau_{e,\max}$ ¹⁾	70 °C	70 °C
Gas inlet temperature $\vartheta_{G,\max}$ ¹⁾	140 °C	140 °C
Max. Cooling capacity $Q_{\max}$	230 kJ/h	215 kJ/h
Gas pressure $p_{\max}$	3 bar	2 bar
Pressure drop Δp ($v=150$ L/h) total	20 mbar	20 mbar
Dead volume V_{dead} total	59 ml	115 ml
Gas connections (metric)	GL 14 (6 mm) ³⁾	DN 4/6
Gas connections (US)	GL 14 (1/4") ³⁾	1/4"-1/6"
Condensate out connection (metric)	GL 25 (12 mm) ³⁾	G3/8
Condensate out connection (US)	GL 25 (1/2") ³⁾	NPT 3/8"

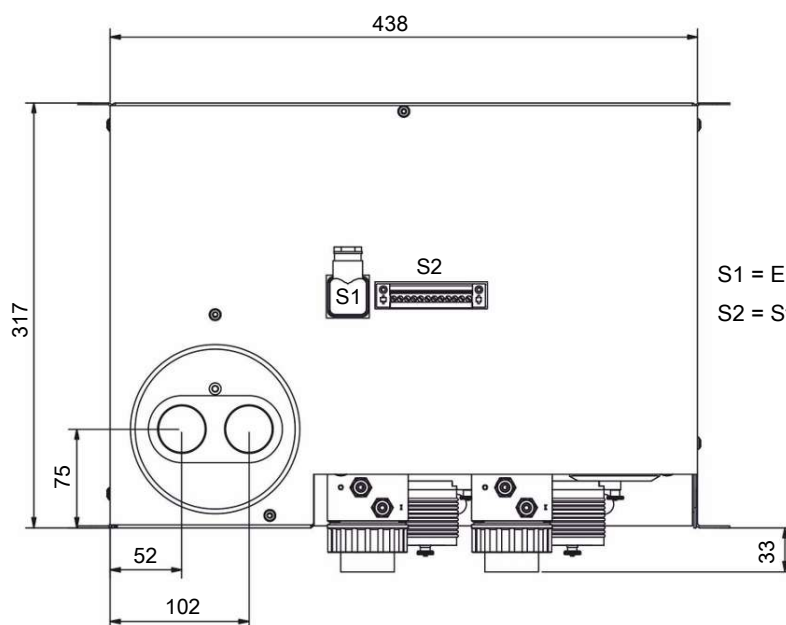
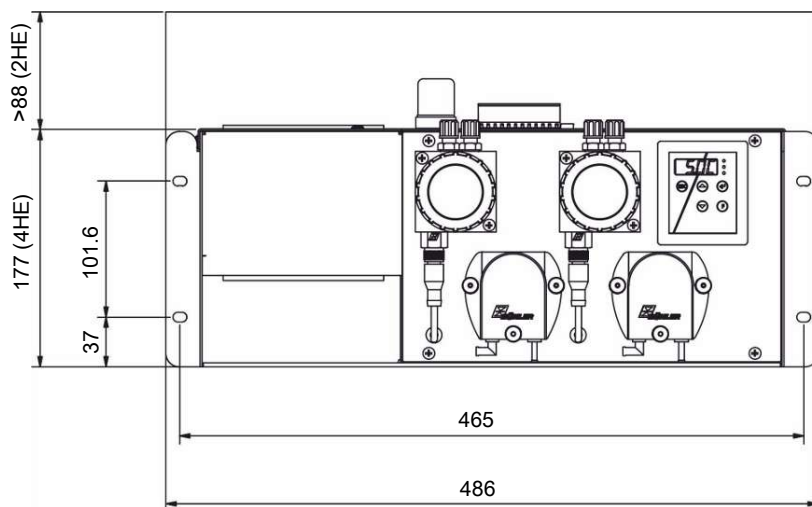
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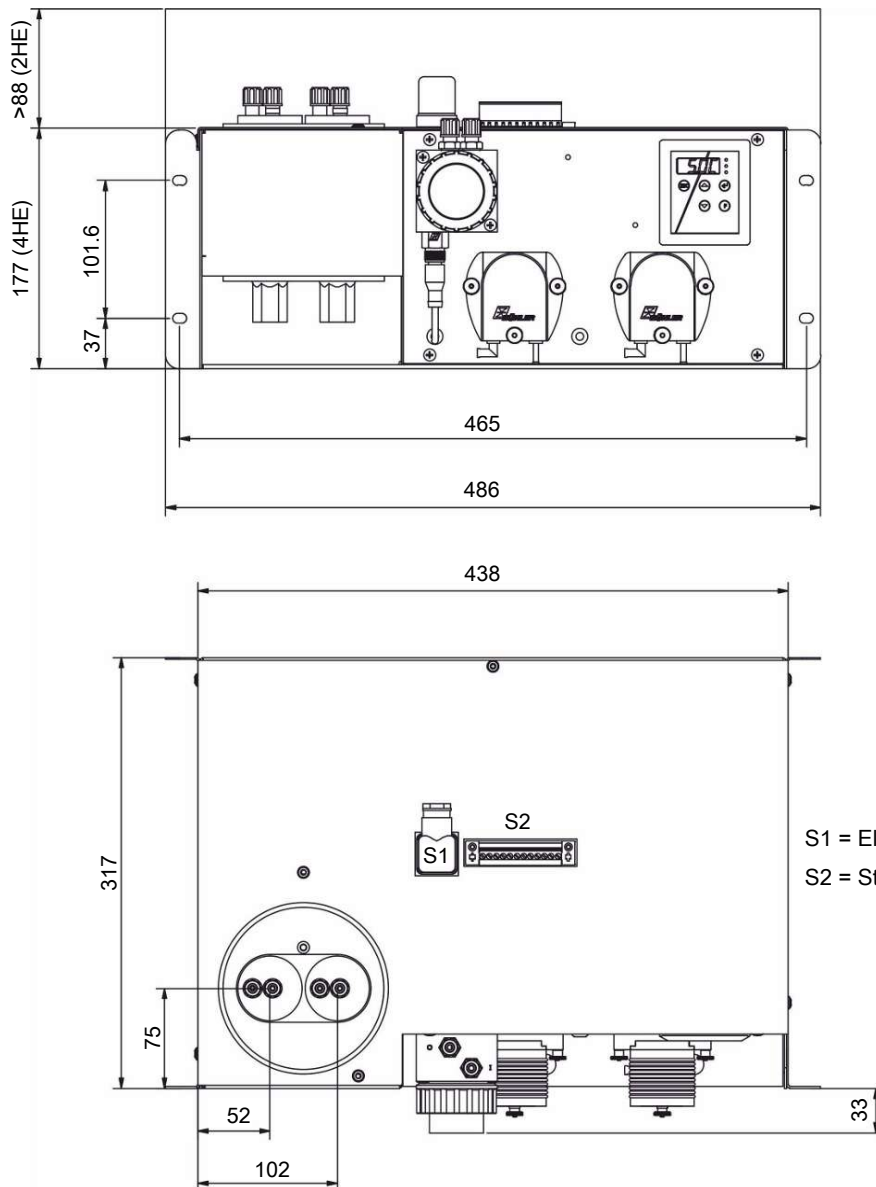
³⁾ Gasket inside diameter.

9.7 Dimensions

RC 1.2 Rack



RC 1.2+ Rack



S1 = Electric supply

S2 = Status output, Analogue/digital output (optional)