ECO FRIENDLY
NATURAL REFRIGERANT

ModbusRTU

Sample gas cooler RC 3.1

Sample gas coolers are used in extractive gas analysis. The sample gas is taken from the process and may contain impurities such as particles or moisture that can damage the measuring cells or influence the measurement results. For this reason, the moist gas is cooled below the dew point in the sample gas cooler, causing the moisture to condense so it can be removed from the system.

The RC 3.1 is a compressor high performance cooler with a special heat exchanger. Suitable for wall-mounting or desktop operation.

The natural refrigerant R600a meets the requirements of Regulation (EU) 2024/573 and is a very environmentally friendly solution thanks to the reduction in CO_2 emissions. At the same time, it ensures the future-proof operation of your systems that comply with legal requirements in the long term.

- High-performance cooler with a rated output of 1280 Btu/h
- Accurate setting of the gas outlet dew point in a range from 37 °F to 59 °F with a constant dew point stability of ± 0.2 K
- Adjustable tolerance ranges (alarm thresholds) for the setpoint temperature of the measuring gas cooler
- Special stainless steel heat exchangers, also available with glass coating for corrosive gases
- Ambient temperature from 41 °F to 122 °F
- Future-proof and climate-friendly: Use of natural refrigerants instead of HFC refrigerants
- Option: Signal output 4 - 20 mA for function and temperature monitoring
- Option: Digital output (Modbus RTU) for device configuration and access to process and diagnostic data

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Overview

The RC 3.1 is a high performance compressor cooler with a special heat exchanger. Suitable for wall-mounting or desktop operation.

This unit is available in various versions. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Application	Cooler model	Heat exchanger
Standard	RC 3.1	1 heat exchanger

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Moisture detector.

In addition, we offer a range of signal outputs:

- Status output,
- Analogue output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output.

This allows for various configurations of the cooler and its options. Here the approach is to simplify the creation of a complete system in a cost-efficient way using pre-installed components with hoses connected. We also prioritised easy access to wear parts and consumables.

Technical Data

Gas Cooler Technical Data		
Rated cooling capacity (at 77 °F):	1280 Btu/h	
Ambient temperature:	41 °F to 122 °F	
Ready for operation:	after max. 15 minutes	
Gas outlet dew point preset: adjustable:	 41 °F 37 °F to 59 °F	
Dew point fluctuations static: in the entire specification range:	 ± 0.2 K ± 2 K	
IP rating:	IP 20	
Installation:	Table-top or wall mounting	
Housing:	Stainless steel	
Packaging dimensions:	approx. 20.1 x 17.7 x 13.8 in	
Weight:	approx. 53 lb	
max. altitude:	Altitudes up to 3281 ft	
Refrigerant quantity [oz]:	R600a (2.65 oz)	
Electrical connection:	Plug per DIN EN 175301-803	
Contamination level:	2	
Overvoltage category:	II	
Electrical data: *Available options may result in details that differ from these*	Supply voltage:	230 V
	Tolerance:	+/-5%
	Frequency:	50 Hz
	Typical power input:	722 VA
	max. operating current:	3.1 A
	Starting current:	5.5 A
	Protection:	6 A (delayed action)
Status output switching capacity:	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free	
Gas connections and condensate outlet:	For heat exchanger, see table ”Heat exchanger overview” For condensate pump, see ”Technical Data - Options”	
Parts in contact with media Filter:Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 See ”Technical Data - Options” See table ”Heat exchanger overview” see ”Technical Data - Options” PTFE/FKM (Viton)	

Technical Data - Options

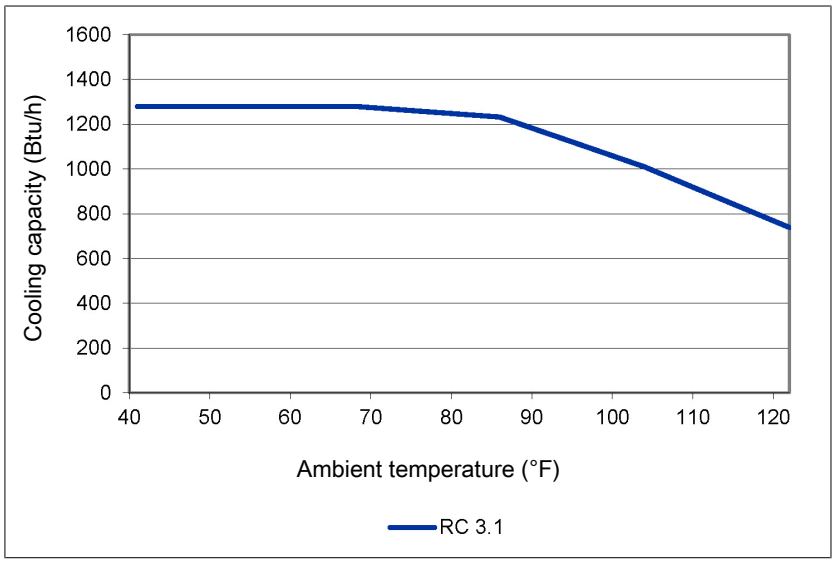
Analogue Output Technical Data	
Signal:	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooling block temperature
Connection:	M12x1 connector, DIN EN 61076-2-101

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

Technical Data Cpsingle 1L Condensate Pump	
Ambient temperature:	32 °F to 140 °F
Flow rate:	1 l/h (50 Hz) / 1.21 l/h (60 Hz)
Inlet vacuum:	max. 11.6 psi
Inlet pressure:	max. 14.5 psi
Outlet pressure:	14.5 psi
Weight:	1.03 lb
Hose:	4 x 1.6 mm
Condensate outlet:	Hose nipple Ø5 mm (straight) or Ø6 mm (angled) Screw connection 4/6 (metric), 1/6”–1/4” (US)
IP rating:	IP 40
Materials Hose: Connections:	 Tygon (Norprene) PVDF

Technical Data FF-3-N Moisture Detector	
Ambient temperature:	37 °F to 122 °F
max. operating pressure with FF-3-N:	29 psi
Weight:	0.09 lb (incl. cable)
Material:	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Performance Data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

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, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

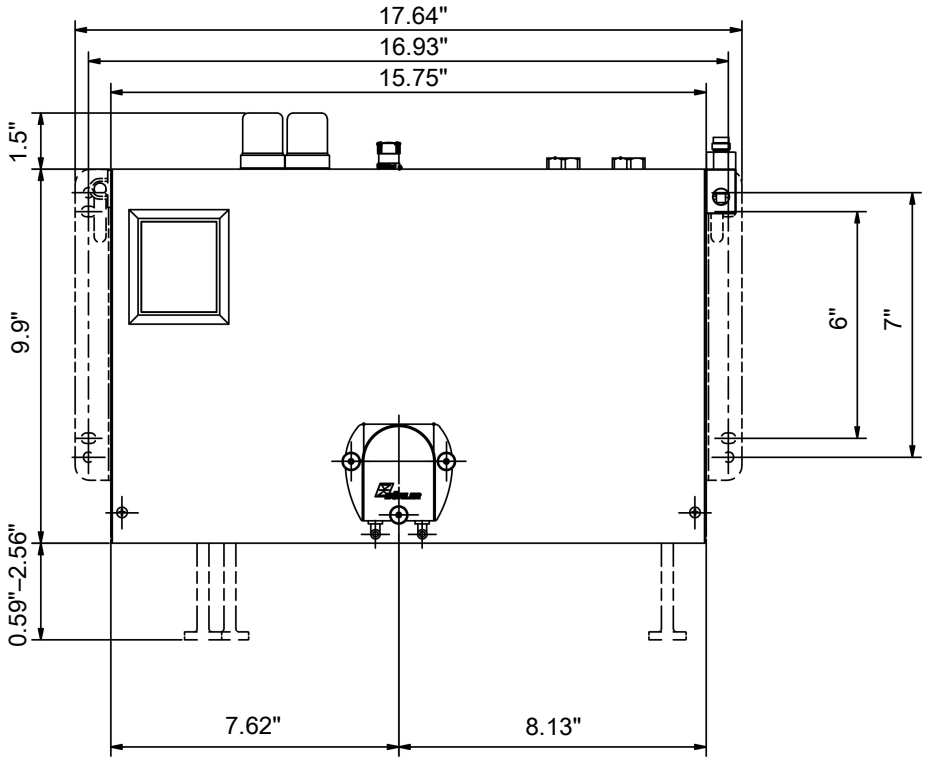
Heat exchanger overview

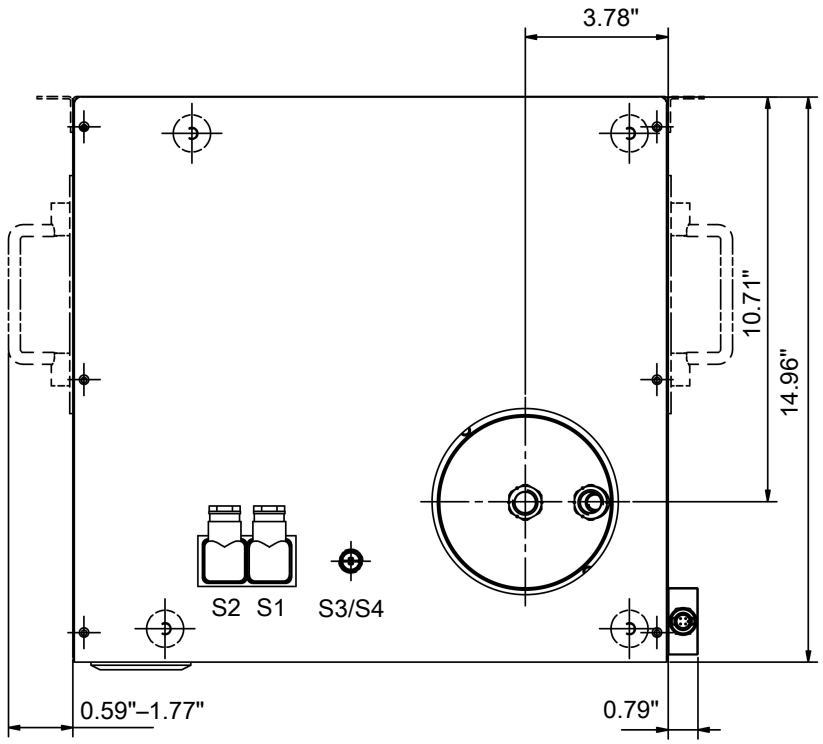
Heat exchanger	TS10 TS10-I [2]	TS10-GB TS10-GB-I [2]
Materials in contact with media	Stainless steel	Stainless steel, parts in contact with media are glass-coated
Weight	10 lb	10 lb
Flow rate v_{max} [1]	65 lpm	65 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	356 °F
Max. cooling capacity Q_{max}	2037 Btu/h	2037 Btu/h
Gas pressure p_{max}	73 psi	73 psi
Pressure drop Δp (v=1500 l/h)	0.35 psi	0.35 psi
Dead volume V_{tot}	47 cu. in.	47 cu. in.
Gas connections and condensate-out connections (metric)	G3/8	G3/8
Gas connections and condensate out connections (US)	NPT 3/8”	NPT 3/8”

[1] Max. cooling capacity of the cooler must be considered.

[2] Types with I are equipped with NPT threads or imperial pipes.

Dimensions





S1 = Electric supply
S2 = Status output
S3/S4 = Analog/digital output (optional)

Ordering instructions

Gas cooler with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model key:

4596	7	1	1	0	X	X	X	X	X	0	0	X	X	0	0	0	0	0	Product characteristic
																			Power supply
					2														230 V AC, 50 Hz
																			Heat exchanger
						1	1	0											Stainless steel, TS10 G3/8”
						1	1	5											Stainless steel, TS10 NPT 3/8”
						1	2	5											Stainless steel, parts in contact with media are glass-coated, TS10-GB, NPT 3/8"
																			Condensate drain
									0										without condensate drain
									8										CPsingle with hose nipple, angled
									9										CPsingle with screw connection, metric/US
																			Moisture detectors
												0							without moisture detector
												1							with moisture detector in PVDF adapter
												3							with moisture detector in stainless steel adapter
																			Signal outputs
													0						status output only
													1						Analogue output, 4..20 mA, incl. status output
													2						Modbus RTU digital output, incl. status output

Spare Parts and Accessories

Item no.	Description
9144050143	Modbus RTU connection cable 2 m (6.6 ft)
9144050144	Modbus RTU connection cable 5 m (16.4 ft)
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 l
4410019	Condensate trap GL 2; glass, 1 l
44920035112	Replacement hose, angled hose nipple
44920035114	Replacement hose metric screw-in connection
44920035115	Replacement hose US screw-in connection