ECO FRIENDLY
NATURAL REFRIGERANT

H_2/O_2 ready

ModbusRTU

Sample gas cooler RC 1.1 with -H2/-O2 heat exchanger

When powerful cooling is required, the RC 1.1 with the heat exchanger -H2/-O2 is the ideal solution for reliable cooling of hydrogen (H_2) and oxygen (O_2) in extractive gas analysis. For this reason, the moist sample 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.

As well as material-refining measures to prevent hydrogen-induced component damage, the heat exchangers for the H_2 series are subjected to a leak test using helium. For the O_2 version, special cleaning processes are used to remove particles, oils and fats from parts coming into contact with media. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 ”Cleaning of Equipment for Oxygen Service”.

The natural refrigerant R600a meets the requirements of EU 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.

- For applications with high-purity hydrogen or oxygen.
- Cleaning standard is based on EIGA Doc 33/18 as regards the absence of particles, oils and fats for heat exchangers with the O_2 version.
- Materials in contact with media are suitability-tested for high H_2 and O_2 concentrations
- Heat exchanger leak tests using helium are performed on the H_2 series as standard
- Efficient cooling with a nominal output of 341 Btu/h
- Ambient temperature from 41 °F to 122 °F
- Adjustable outlet dew point and alarm thresholds
- 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 1.1 series with the heat exchanger -H2/-O2 was specially developed for use with high-purity hydrogen and oxygen.

Application	Cooler model	Heat exchanger
H_2/O_2	RC 1.1	1 heat exchanger (single or double)

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.

Gas cooler technical data

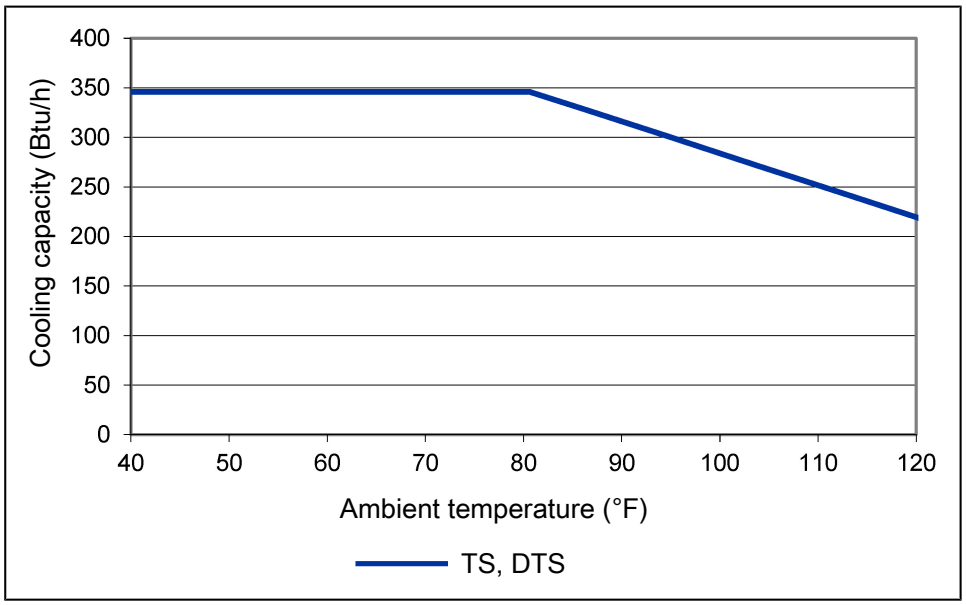
Gas Cooler Technical Data			
Rated cooling capacity (at 77 °F):	341 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Ready for operation:	after max. 15 minutes		
Gas outlet dew point preset: adjustable:	 41 °F 37 °F to 68 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating:	IP 20		
Installation:	Table-top or wall mounting		
Housing:	Stainless steel		
Packaging dimensions:	approx. 20.87 x 15.75 x 15.75 in		
Weight:	approx. 33 lb		
max. altitude:	Altitudes up to 3281 ft		
Refrigerant:	R600a (0.98 oz)		
Recommended minimum room: *Refrigerant quantity [oz] / 0.28 oz/ft²*	38 ft²		
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*	Voltage:	230 V	115 V
	Tolerance:	+/-10% at 50 Hz +/-10% at 60 Hz	- +/-10% at 60 Hz
	Typical power input:	414 VA	345 VA
	max. operating current:	1.8 A	3.0 A
	Starting current:	2.3 A	3.6 A
	Protection:	4 A (delayed action)	4 A (delayed action)
Status output switching capacity:	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Condensate outlet:	For heat exchanger, see table "Heat exchanger overview"		
Parts in contact with media Heat exchanger:	 see table "Heat Exchanger Overview"		

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

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.

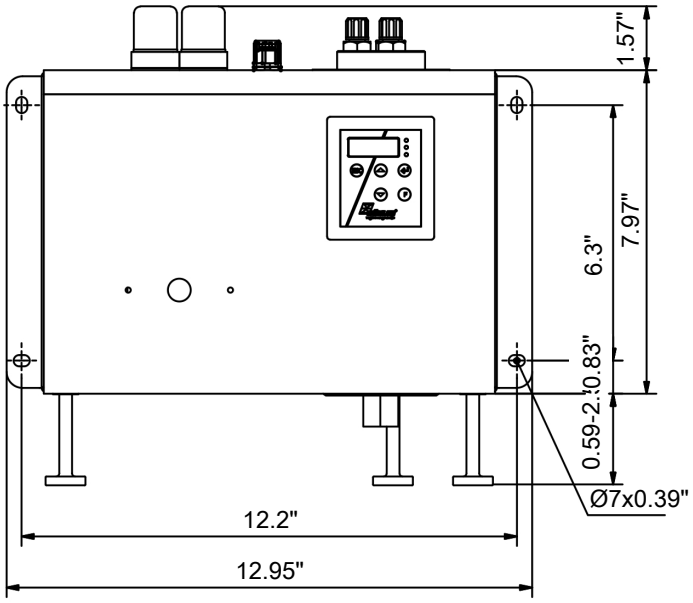
Heat exchanger overview

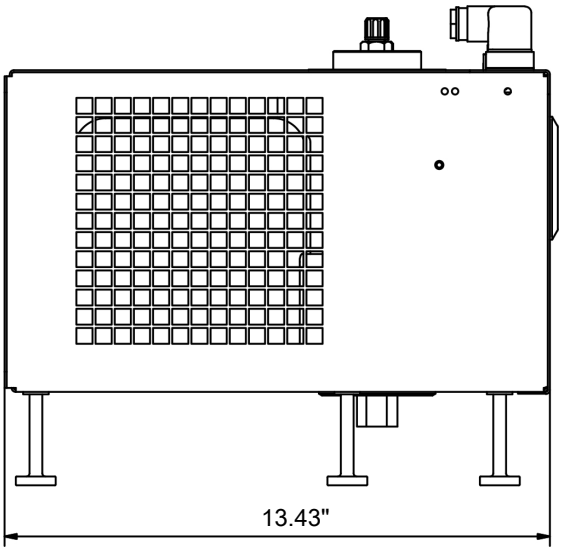
Heat exchanger	TS-H2/-O2 TS-I-H2/-O2 [2]	DTS-H2/-O2 DTS-I-H2/-O2 [2]
Materials in contact with media	Stainless steel	Stainless steel
Weight	2 lb	2 lb
Flow rate v_{max} [1]	8.9 lpm	2 x 4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	356 °F
Max. cooling capacity Q_{max}	427 Btu/h	427 Btu/h
Gas pressure p_{max}	22 psig (H2) / 218 psig (O2)	22 psig (H2) / 218 psig (O2)
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.1 psi each
Dead volume V_{dead}	4.2 cu. in.	1.7/1.5 cu. in.
Gas connections (metric)	G1/4	6 mm tube
Gas connections (US)	NPT 1/4"	1/4" tube
Condensate out connection (metric)	G3/8	Tube 10 mm (6 mm)
Condensate out connection (US)	NPT 3/8"	3/8" tube

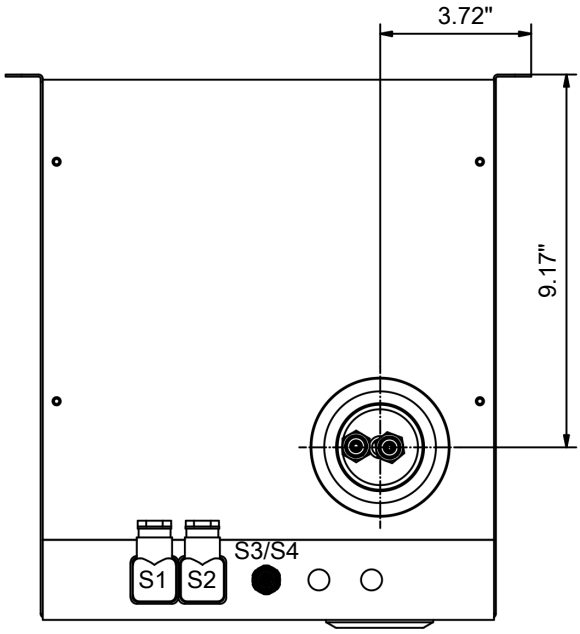
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes.

Dimensions







S1 = Electric supply

S2 = Status output

S3 = Analog/digital output (optional)

Ordering instructions

Gas cooler for H2/O2 applications

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

4596 3 1 1 0 X X X X 0 0 0 0 X 0 0 0 0 X	Product Characteristics
	Power supply
1	115 V AC, 60 Hz
2	230 V AC, 50/60 Hz
	Heat exchanger
1 1 0 -O2	Stainless steel, TS-O2, metric
1 1 5 -O2	Stainless steel, TS-I-O2, US
1 1 0 -H2	Stainless steel, TS-H2, metric
1 1 5 -H2	Stainless steel, TS-I-H2, US
2 6 0 -O2	Stainless steel, DTS-O2, metric
2 6 5 -O2	Stainless steel, DTS-I-O2, US
2 6 0 -H2	Stainless steel, DTS-H2, metric
2 6 5 -H2	Stainless steel, DTS-I-H2, US
	Signal outputs
0	status output only
1	Analog output, 4..20 mA, incl. status output
2	Modbus RTU digital output, incl. status output

Spare parts and accessories for cooler with -H2/-O2 heat exchanger

Item no.	Description
4410001 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 [1]
4410001-O2 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 optimised for oxygen
see data sheet 400016	Stainless steel pipe fittings for high-purity oxygen applications

[1] For use with high hydrogen concentrations max. 22 psi overpressure.