ModbusRTU

H_2/O_2 ready

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

When powerful cooling is required, the RC 1.1 compressor sample gas cooler with -H2/-O2 heat exchanger is the ideal solution for reliable cooling of hydrogen (H_2) and oxygen (O_2) in extractive gas analysis. Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry.

The safe, reliable cooling of the sample gas is decisive for gas analytics in the electrolyser (e.g. for LEL monitoring), as a higher moisture content is to be expected with some processes. The moisture in the process gas can damage the sensitive measuring cells in the analyser, so the gas temperature is kept below gas dew point at all times, thus causing the moisture to be emitted. The condensate is discharged via an automatic condensate drain.

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”.

- 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
- Nominal cooling capacity 360 kJ/h
- Constant dew point stability ± 0.1 °C
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display
- Optional 4 - 20 mA or Modbus RTU signal output

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Overview

The RC 1.1 with -H2/-O2 heat exchanger series was specially developed for use with high-purity hydrogen and oxygen.

We also offer different signal outputs:

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

Gas cooler technical data

Gas cooler technical data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 25 °C)	360 kJ/h		
ambient temperature	5 °C to 50 °C		
Gas outlet dew point preset: adjustable:	 5 °C 3 °C to 20 °C		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 420 x 440 x 350 mm		
Weight incl. heat exchanger	approx. 16.0 kg		
Electric supply	115 V, 60 Hz or 230 V, 50/60 Hz ± 5% Plug per DIN EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	396 VA	402 VA
	max. operating current:	2.5 A	5 A
Alarm output switching connection	max. 250 V, 2 A, 50 VA Connector per DIN EN 175301-803		
Installation	stand-alone or wall-mounted		

Technical Data - Options

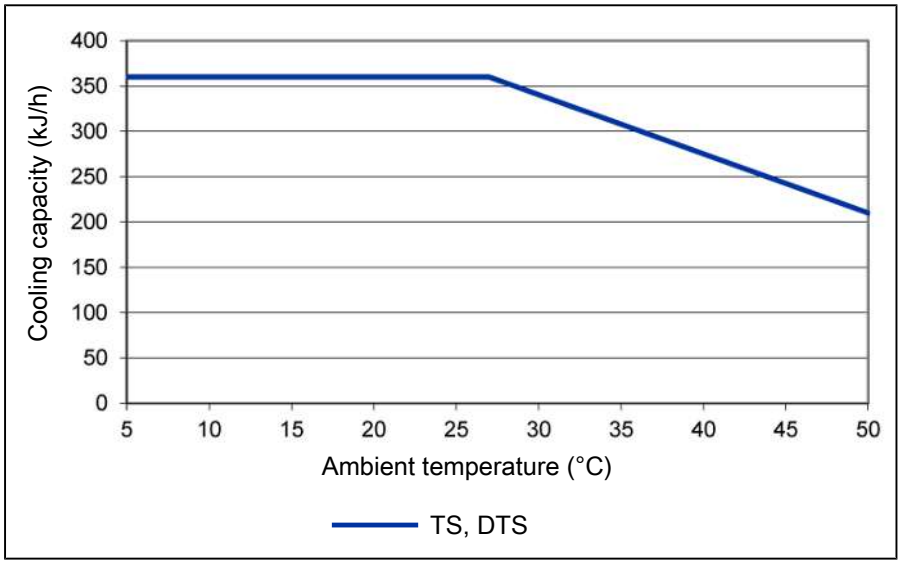
Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -20 °C to +60 °C cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data

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 65 °C.

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 = 65 °C and ϑ_G = 90 °C. 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 = 65 °C, ϑ_G = 90 °C and v = 280 Nl/h may also be used in place of τ_e = 50 °C, ϑ_G = 80 °C and v = 380 Nl/h

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

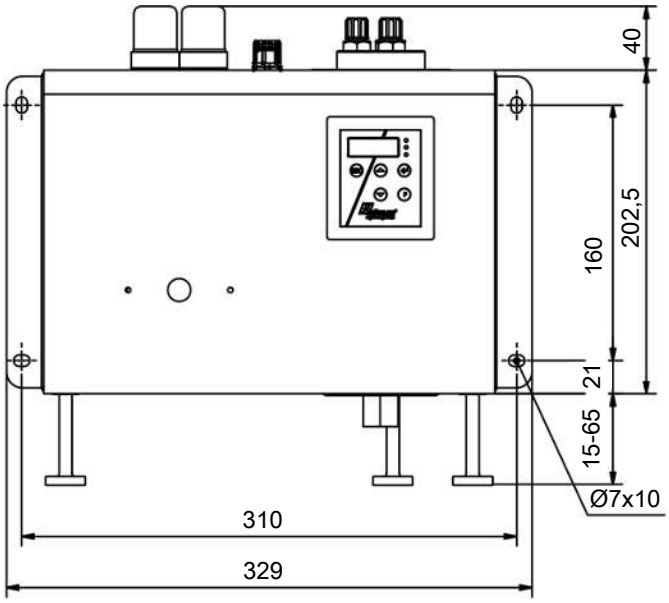
Heat exchanger overview

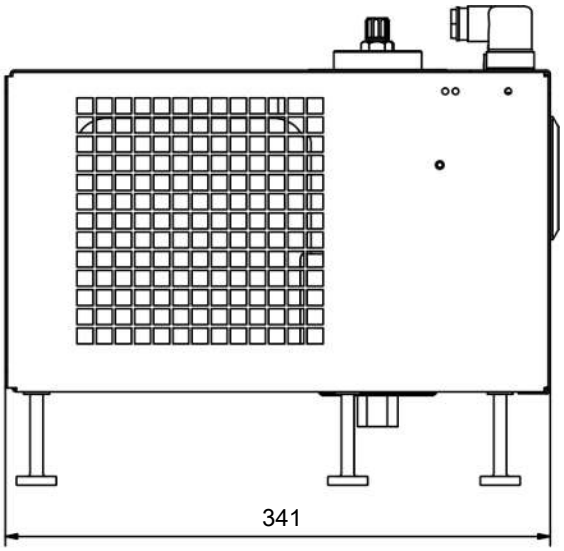
Heat exchanger	TS-H2/-O2 TS-I-H2/-O2 [2]	DTS-H2/-O2 DTS-I-H2/-O2 [2]
Materials in contact with media	Stainless steel	Stainless steel
Flow rate v_{max} [1]	530 l/h	2x 250 l/h
Inlet dew point $\tau_{e,max}$ [1]	80 °C	80 °C
Gas inlet temperature $\vartheta_{G,max}$ [1]	180 °C	180 °C
Max. cooling capacity Q_{max}	450 kJ/h	450 kJ/h
Gas pressure p_{max}	1.5 bar	1.5 bar
Pressure drop Δp (v=150 l/h)	8 mbar	5 mbar each
Dead volume V_{dead}	69 ml	28/25 ml
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

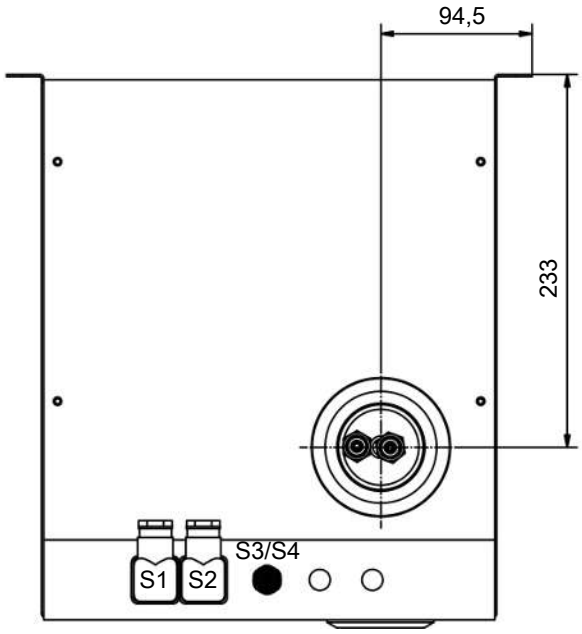
[1] Max. cooling capacity of the cooler must be considered.

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

Dimensions







S1 = Electric supply

S2 = Alarm contact

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	2	1	1	0	X	X	X	X	0	0	0	X	0	0	0	0	0	X	Product Characteristics
																			Supply voltage
					1														115 V, 60 Hz
					2														230 V, 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	0									status output only
									1	0									Analog output, 4..20 mA, incl. status output
									2	0									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. 1.5 bar overpressure.