
ECO FRIENDLY
NATURAL REFRIGERANT

ModbusRTU

# Sample gas cooler RC 1.2+

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 1.2+ features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Most notably, the washout of $SO_2$ is low. RC 1.2+ coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

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.

- Optimised for gases with water-soluble substances (e.g. $SO_2$)
- Can be used for systems for continuous emission monitoring pursuant to EN 15267-3 due to low wash-out effects
- Efficient cooling with a nominal output of 370 Btu/h
- Accurate setting of the gas outlet dew point in a range from 37 °F to 68 °F with a constant dew point stability of ± 0.1 K
- Corrosion-resistant heat exchanger made of DURAN glass or PVDF
- 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 1.2+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash-out effects.

The compressor coolers are distinguished by two types based on the cooling nests. This classification is reflected in the type designation. 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 |
|---|---|---|
| Washout-optimised gas cooling | RC 1.2+ | 2 heat exchangers in series |

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

- Peristaltic pump for condensate separation
- Filter,
- 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): | 370 Btu/h | | |
| Ambient temperature: | 41 °F to 122 °F | | |
| Ready for operation: | after max. 15 minutes | | |
| Gas outlet dew point<br>preset:<br>adjustable: | <br>41 °F<br>37 °F to 68 °F | | |
| Dew point fluctuations<br>static:<br>in the entire specification range: | <br>± 0.1 K<br>± 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:<br>*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:<br>*Available options may result in details that differ from these* | Voltage: | 230 V | 115 V |
| | Tolerance: | +/-10% at 50 Hz<br>+/-10% at 60 Hz | -<br>+/-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<br>2 A, 50 VA, potential-free | | |
| Condensate outlet: | Hose nipple Ø5 mm (0.24 in) or with screw connection (metric/US) | | |
| Parts in contact with media<br>Filter:<br>Moisture detector:<br>Heat exchanger:<br>Peristaltic pump:<br>Tubing: | <br>see "Technical Data - Options"<br>see "Technical Data - Options"<br>see table "Heat Exchanger Overview"<br>see "Technical Data - Options"<br>PTFE/FKM (Viton) | | |

## Technical Data - Options

### Analogue Output Technical Data

| | |
|---|---|
| Signal: | 4-20 mA or 2-10 V<br>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 CPdouble Condensate Pumps

| | |
|---|---|
| Ambient temperature: | 32 °F to 140 °F |
| Flow rate: | 0.3 L/h (50 Hz)/0.36 L/h (60 Hz) with standard hose |
| Inlet vacuum: | max. 11.6 psi |
| Inlet pressure: | max. 14.5 psi |
| Outlet pressure: | 14.5 psi |
| Weight: | 1.1 lb |
| Hose: | 4 x 1.6 mm (0.06 in) |
| Condensate outlet: | Hose nipple Ø5 mm (0.24 in)<br>Screw connection 4/6 (metric), 1/6”-1/4” (US) |
| IP rating: | IP 40 |
| Materials | |
| Hose: | Tygon (Norprene) |
| Connections: | PVDF |

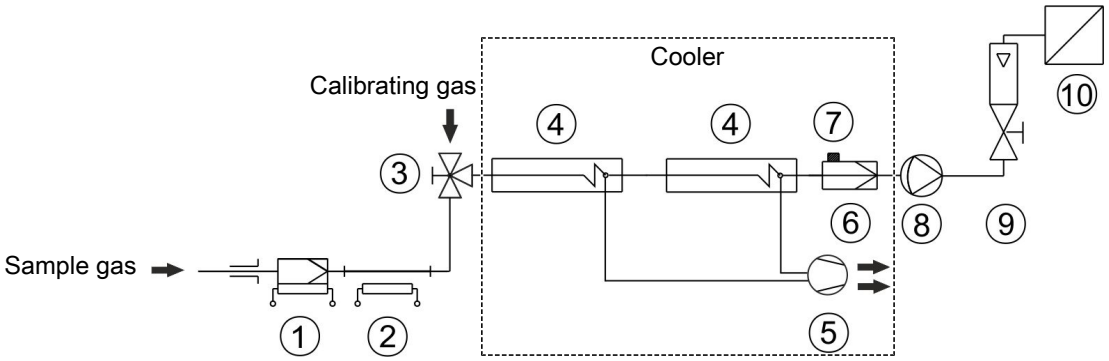
### Technical Data FF-3-N Moisture Detector

| | |
|---|---|
| Ambient temperature: | 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 |

### AGF-PV-30-F2 Filter Technical Data

| | |
|---|---|
| Ambient temperature: | 37 °F to 212 °F |
| max. operating pressure with filter: | 58 psi |
| Weight: | 0.5 lb |
| Filter surface: | 9.3 $in^2$ |
| Filter fineness: | 2 µm |
| Dead volume: | 3.47 cu. in. |
| Materials | |
| Filter: | PVDF, DURAN glass (parts in contact with media) |
| Seal: | FKM (Viton) |
| Filter element: | sintered PTFE |

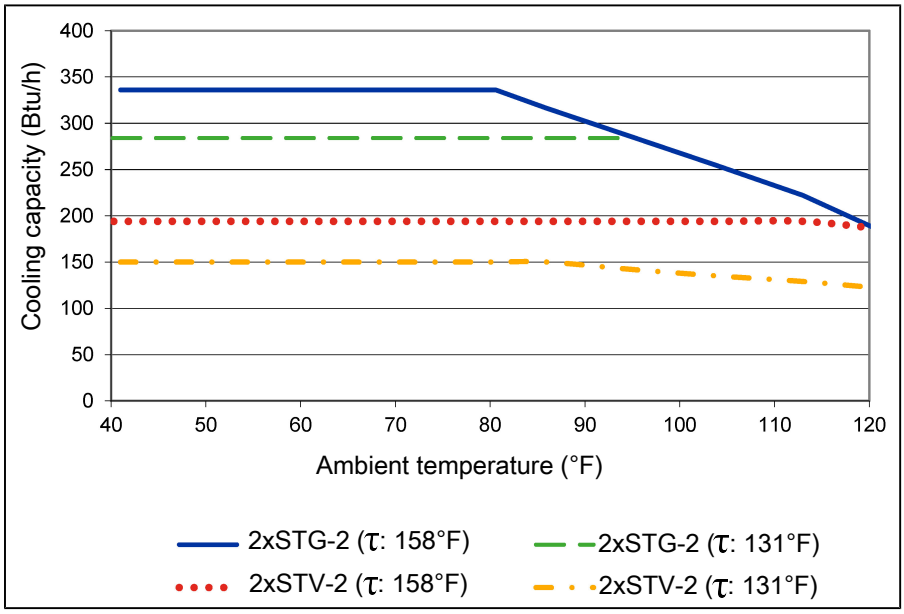
## Diagram typical installation




| | | | |
|---|---|---|---|
| 1 | Sample gas probe | 6 | Fine filter |
| 2 | Sample gas line | 7 | Moisture detector |
| 3 | Reversing tap | 8 | Sample gas pump |
| 4 | Heat exchanger | 9 | Flow meter |
| 5 | Condensate Pump | 10 | Analyser |

See data sheets for individual component models and data.

## Performance data




Note: The limit curves of the heat exchangers apply to different dew points (τ), see legend.

## 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 $\vartheta_G$, dew point $\tau_e$ (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 standard operating point of $\tau_e$ = 158 °F and $\vartheta_G$ = 230 °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 $\tau_e$ and $\vartheta_G$, the flow $v_{max}$ may be increased. For example, with the STG heat exchanger in place of $\tau_e$ = 158 °F, $\vartheta_G$ = 230 °F and v = 5.3 lpm the parameter triple $\tau_e$ = 122 °F, $\vartheta_G$ = 221 °F and v = 7 lpm may also be used.

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

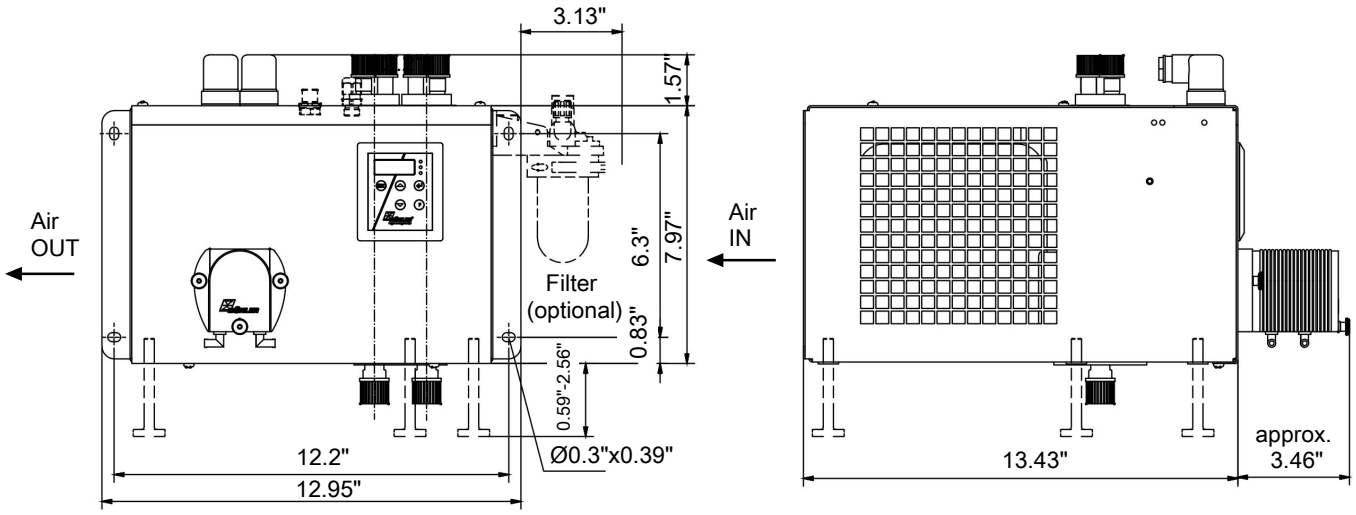
## Heat exchanger overview

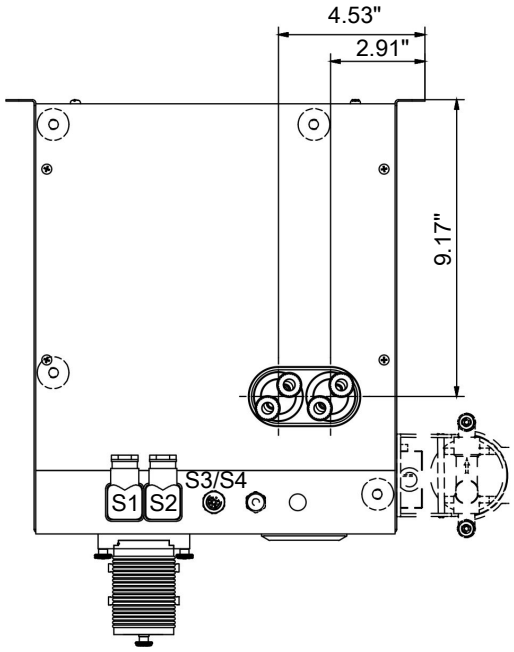
| Heat exchanger | 2 x STG-2 | 2 x STV-2 |
|---|---|---|
| Materials in contact with media | DURAN Glas<br>PTFE | PVDF |
| Weight | 2 x 0.3 lb | 2 x 0.2 lb |
| Flow rate $v_{max}$ [1] | 5.3 lpm | 5 lpm |
| Inlet dew point $\tau_{e,max}$ [1] | 158 °F | 158 °F |
| Gas inlet temperature $\vartheta_{G,max}$ [1] | 248 °F | 248 °F |
| Gas pressure $p_{max}$ | 44 psi | 44 psi |
| Pressure drop Δp (v=2.5 lpm) | 0.04 psi | 0.04 psi |
| Max. Cooling capacity $Q_{max}$ | 327 Btu/h | 188 Btu/h |
| Dead volume $V_{dead}$ | 2.9 cu. in. | 2.5 cu. in. |
| Gas connections (metric) | GL 14 (6 mm) [2] | DN 4/6 |
| Gas connections (US) | GL 14 (1/4") [2] | 1/4"-1/6" |
| Condensate out connection (metric) | GL 18 (10 mm) [2] | G1/4 |
| Condensate out connection (US) | GL 18 (10 mm) [2] | NPT 1/4" |

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

[2] Gasket inside diameter.

## Dimensions




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

## Ordering instructions

### Gas cooler with two heat exchangers in series

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

| 4596 | 3 | 1 | 2 | 0 | X | X | X | X | X | 0 | X | X | X | 0 | 0 | 0 | 0 | 0 | Product characteristic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | **Power supply** |
| | | | | | 1 | | | | | | | | | | | | | | 115 V AC, 60 Hz |
| | | | | | 2 | | | | | | | | | | | | | | 230 V AC, 50/60 Hz |
| | | | | | | | | | | | | | | | | | | | **Heat exchanger** |
| | | | | | | 1 | 2 | 2 | | | | | | | | | | | Duran glass, STG-2, metric |
| | | | | | | 1 | 2 | 7 | | | | | | | | | | | Duran glass, STG-2, US |
| | | | | | | 1 | 3 | 2 | | | | | | | | | | | PVDF, STV-2, metric |
| | | | | | | 1 | 3 | 7 | | | | | | | | | | | PVDF, STV-2, US |
| | | | | | | | | | | | | | | | | | | | **Condensate drain** |
| | | | | | | | | | 0 | | | | | | | | | | without condensate drain |
| | | | | | | | | | 2 | | | | | | | | | | CPdouble with hose nipple, angled |
| | | | | | | | | | 4 | | | | | | | | | | CPdouble with screw connection, metric/US |
| | | | | | | | | | | | | | | | | | | | **Filter and moisture detector** |
| | | | | | | | | | | | 0 | 0 | | | | | | | without filter, without moisture detector |
| | | | | | | | | | | | 0 | 1 | | | | | | | without filter, 1 moisture detector |
| | | | | | | | | | | | 1 | 0 | | | | | | | 1 filter, without moisture detector |
| | | | | | | | | | | | 1 | 1 | | | | | | | 1 filter, 1 moisture detector |
| | | | | | | | | | | | | | | | | | | | **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 |
|---|---|
| 41020050 | Filter element F2-L; unit 2 count (for type RC 1.1) |
| 41030050 | Filter element F2; unit 5 count (for type RC 1.2+) |
| 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 |
| 459600026 | Adapter plate EGK 1/2 to RC 1.1 and RC 1.2+ |
| see data sheet 410001 | Fine mesh filter AGF-PV-30 |
| see data sheet 450020 | Peristaltic Condensate Pumps CPsingle, CPdouble |