G3 Frost Point Generator



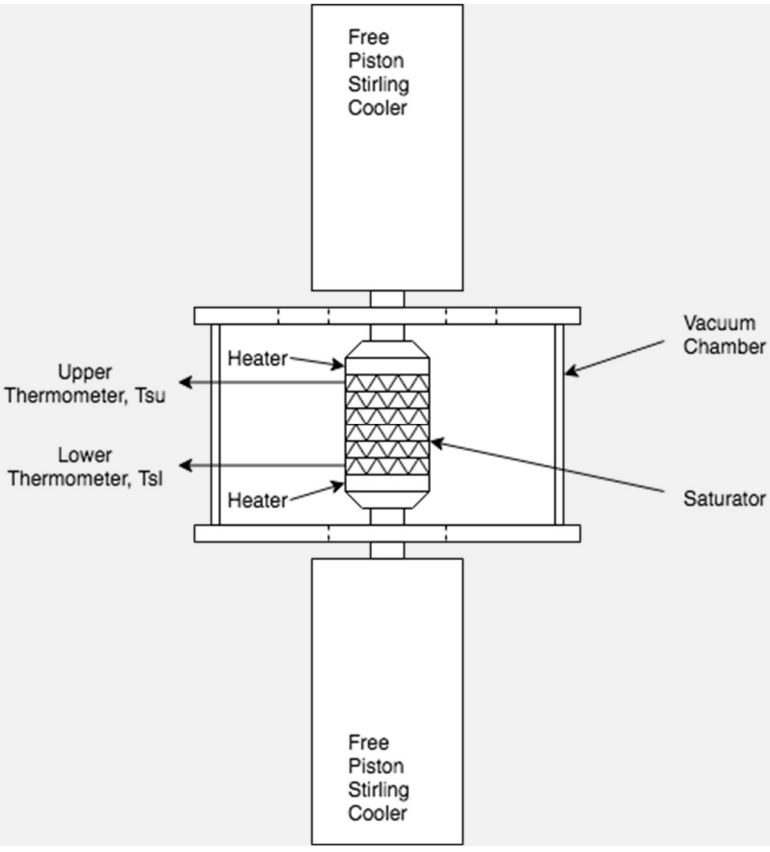
Low Frost Point Humidity Generator

- **Ultra-low -120 °C FP to +10 °C DP**
- **Vacuum insulated/isolated saturator and control valves**
- **Universal power input, 100-240 VAC, 5-060 Hz**
- **Hybrid two-temperature, two-pressure principle**
- **Dual CFC-free Cryocoolers**
- **1 to 3 independent flow controlled outputs**

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The RHS hybrid two-pressure, two-temperature principle

A hybrid humidity generator combines the features of the NIST-proven two-pressure and two-temperature humidity generation principles. Utilizing these principles, a stream of gas at an elevated pressure is saturated with respect to the liquid or solid phase of water at a given saturation temperature. Here, saturation temperature is the major determining factor for the quantity of water vapor admixed with the carrier gas. Pressure within the saturator is the major determining factor for the carrier gas quantity of the mixture. Upon leaving the saturator, the humidified gas stream (consisting of the water vapor admixed with the carrier gas) is then expanded to a lower pressure and warmed to an alternate temperature at the point of use, such as a Device Under Test (DUT). Measurements of the pressure and temperature within the saturator, and the pressure and temperature following expansion (generally at the DUT), are then used to determine the resulting humidity content of the gas stream. Humidity is then accurately controlled by regulation of the temperature and pressure within the saturator.



What is the G3 Frost Point Generator?

The G3 is a low humidity generator that encapsulates essential tubing, pressure regulator, flow regulator, and saturator within a sealed vacuum chamber. Use of the vacuum chamber eliminates atmospheric water vapor permeation and the need for thermal insulation materials in and around thermally controlled components. Additionally, Stirling cryo-coolers (more accurately Free-Piston Stirling Coolers) are used to cool the saturator.

With these improvements over conventional designs, the G3 has better accuracy and performance at low humidity due to reduced permeation effects, improved thermal insulation and control, faster cool down characteristics, and better maintenance access.

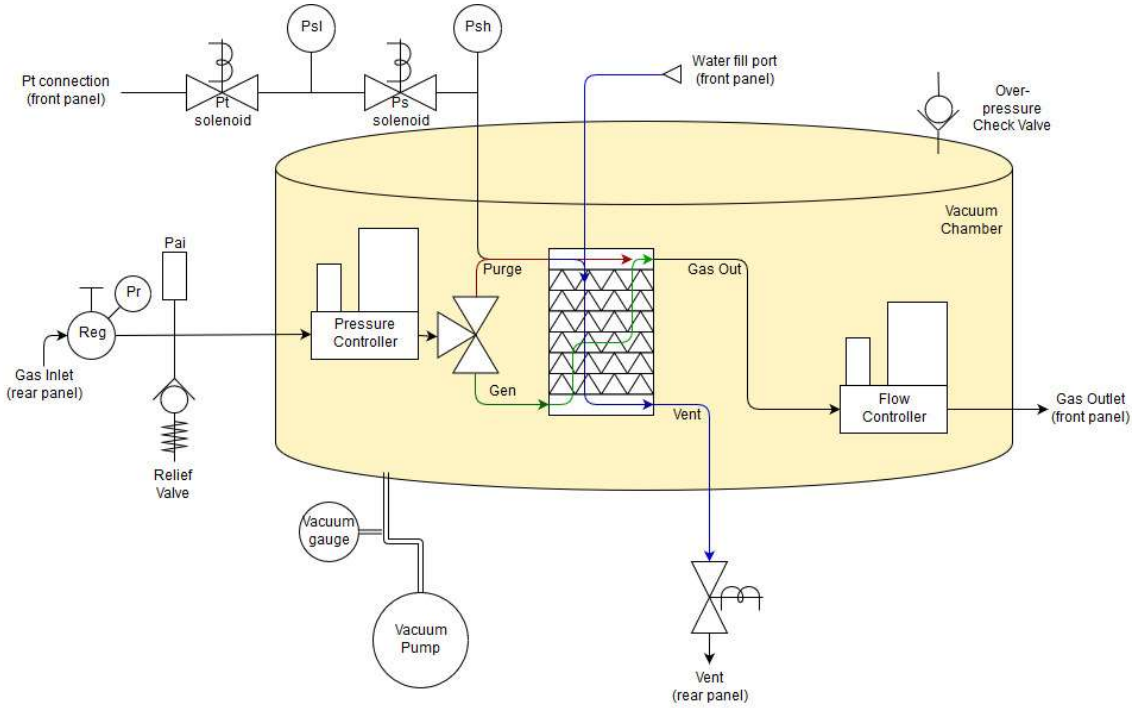
Multiple flow controlled outputs

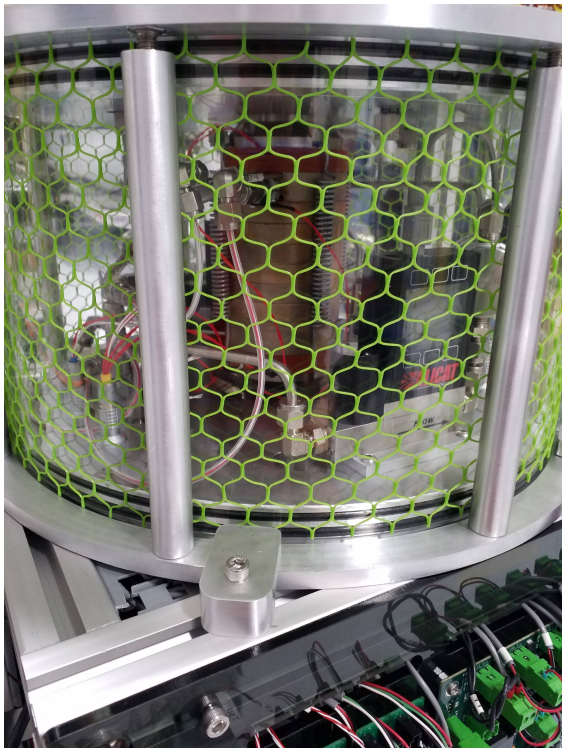
The G3 offers up to 3 independent flow controlled outputs. Each output can flow up to 5 liters/min, with a total combined flow up to 10 liters/min.

Ultra-low range capability

Based on the highly efficient dual cryo-cooling mechanism, the G3 is capable of generating ultra-low humidity, achieving humidity concentration below 1 PPB (Part Per Billion).

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Vacuum prevents Water Vapor Permeation

Water vapor permeates many things, especially elastomers and other sealing materials typically found within valves, regulators, and other gas path components. In the G3, permeation susceptible valves and components are housed within the vacuum chamber. As the vacuum intensifies due to removal of gas molecules from within the chamber, water vapor within the vacuum chamber is significantly reduced as well. This removal of water vapor from the exterior surfaces of normally susceptible components thereby prevents water vapor from permeating into these components and affecting the internal gas path humidity.

Vacuum provides Thermal Insulation

Rather than using standard insulation techniques such as fiberglass, urethane foams, or other thermal barrier materials, the saturator sits at the center of a high-vacuum chamber. Devoid of molecules which could otherwise transfer thermal energy, the vacuum chamber offers excellent thermal insulation. So rather than adding thermal barrier materials, we utilize vacuum to prevent thermal transfer by limiting molecular interaction.

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Specifications	G3 Frost Point Generator
Generated Humidity Output	
Water Vapor Concentration Range	<1 PPB … 12000 PPM
Frost/Dew Point Temperature Range	-120 °C FP … +10 °C DP
Frost/Dew Point Temperature Stability	±0.05 °C
Frost/Dew Point Temperature Accuracy	±0.1 °C (FP > -80 °C)
Generated Flow Rate Output	
Gas Flow Rate Range, per output	1 to 3 outputs at 0 … 5 slpm each
Gas Flow Rate Range, total	0 … 10 slpm
Gas Flow Rate Accuracy	±0.2 slpm
Gas Flow Rate Stability	±0.1 slpm
Temperature	
Saturation Temperature Control Range	-120 °C … +20 °C
Saturation Temperature Control Accuracy	±0.05 °C
Saturation Temperature Control Stability	±0.03 °C
Test Temperature Connections	2 external temperature connections
Measurement Accuracy	±0.05 °C
Probe type	Pt100, 4-wire
Pressure	
Saturation Pressure Control Range	Near ambient to 1 MPa (150 psia)
Saturation Pressure Accuracy	±0.05% FS
Test Pressure Measurement Range	0.07 … 0.12 MPa (11 … 17 psia)
Test Pressure Accuracy	±0.05% FS
Utility Requirements	
Gas Supply	0.3 … 1MPa @ 10 slpm. Max pressure 3 MPa
Gas Type	Dry air or nitrogen
Supply Voltage	100-240 VAC, 50/60 Hz, Single phase
Power Consumption	1.5 kW
Environmental	
Operating Temperature	+15 °C … +40 °C
Storage Temperature	0 °C … 50 °C
Humidity	10-95 %RH, non-condensing
Weight & Dimensions	
Height	1.2 m
Width	0.8 m
Depth	0.8 m
Shipping Weight	318 kg

G3 3/2022 We reserve the right to change design or technical data without notice.

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