Product Specifications

Thermo Scientific Py-Gas

Reflux Sample Conditioner

Able to simultaneously cool and remove particulates and high boiling compounds, the field-proven Thermo Scientific Py-Gas reflux sample conditioner effectively cleans and conditions hot, dirty and/or wet gas at the sample tap. With pneumatic solenoids and an optional self-cleaning hydraulic ram as the only moving parts, this reliable device is virtually maintenance-free.

Applications

- Ethylene production
- Coke oven gases
- Blast furnace gases
- Coal gasifiers
- FCCU regenerator gas
- Acetylene production (with mechanical controller)
- Reformer sampling for catalyst removal
- Fluidized cat crackers
- Green oil removal

Features & Benefits

- Provides clean uniform sample to analyzer sample conditioning systems
- Self-cleaning (optional cleaning ram for unusually heavy material)
- Coolant options include vortex air, chilled water or vaporizing propylene
- Minimal moving parts
- Designed for hazardous area use
- Sample gas temperature output via 4-20 mA (optional)

Proven Track Record

The reliable Thermo Scientific Py-Gas reflux sample conditioner cleans hot, dirty and/or wet gas samples at the process tap and delivers a reproducible sample to a variety of analyzers, including mass spectrometers and gas chromatographs, for physical property or composition measurement. Designed on simple chemical engineering principles of fractionation combined with controlled sample velocity and temperature differential, it enables analysis of lighter hydrocarbons by removing liquid mist or water, heavy particulates and fine carbons from complex, hot hydrocarbon gas mixtures. Practical for a variety of applications, the Py-Gas conditions the sample via cooling and refluxing and is ideal for treating condensables, polymers and particulates.

Self-Cleaning Design

The Py-Gas was developed to sample a reactive pyrolysis gas online without the problems associated with conventional sampling systems which tend to plug rapidly, suffer from a high degree of unreliability, and require extensive and frequent maintenance. Designed to drop out condensables and wash them back into the process together with any solids, this self-cleaning unit provides a saturated, cooled and representative sample for the required measurement.

Application-Specific Models

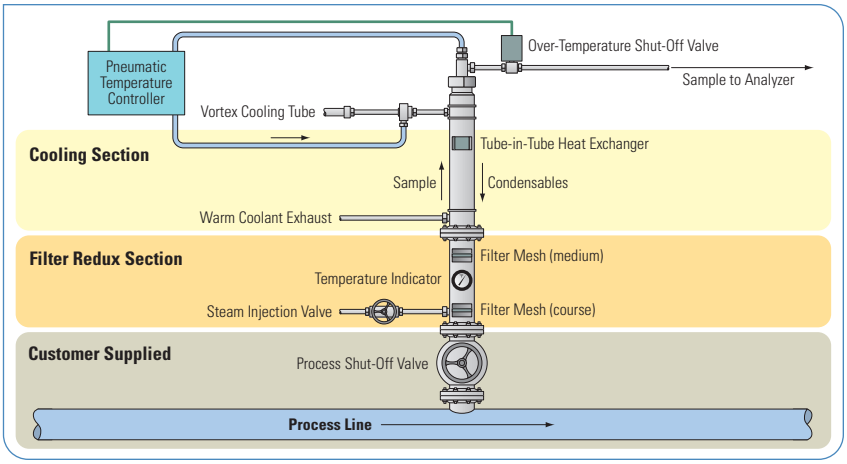
All four Py-Gas models are suitable for hazardous area use and are virtually maintenance-free:

- Series 3000—Most often used in ethylene cracking furnace sampling applications (i.e., ethane/propane and naphtha/gas oil cracking)
- Series 5000—Reliably samples the stack of a FCCU regenerator and features an elongated cooling section and additional density packing to handle higher temperatures
- Series 6000—Used in applications similar to those of the Series 3000 but does not generally handle as much volume as the other two models
- Series 7000—Used for the same applications as the Series 3000 and offers the capacity to handle twice the volume.

De-Coke Operations

When used for certain extreme applications, the self-cleaning function of the Py-Gas may not be adequate to remove all coke buildup at the sample tap. To eliminate potential plugging of the process tap, a manual de-coking option is available. The de-coking option employs a pneumatic ram valve that uses a piston to clear coke accumulations at the sample tap to keep the instrument in top operating condition.

Typical Py-Gas Configuration



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Operating Specifications	**Series 3000**	**Series 5000**	**Series 6000**	**Series 7000**
Sample Line Temperature[1]	+205°C to +650°C (+400°F to +1202°F)	+640°C to +740°C (+1184°F to +1364°F)	+40°C to +540°C (+104°F to +1004°F)	+205˚C to +650˚C (+400°F to +1202°F)
Sample Line Pressure[2]	1.5 to 20 psig (10.5 to 140 Kpa)	5.5 to 11.5 psig (40 to 80 Kpa)	1.5 to 600 psig (10.5 to 4200 Kpa)	1.5 to 20 psig (10.5 to 140 Kpa)

Operating Specifications (all models)	
Sample Inlet	1.5 to 600 psig; +40°C to +740°C (+104°F to +1364°F)
Sample Outlet	Series 3000, 5000 and 6000: 100 to 1500 cc/min (0.2 to 3.2 SCFH); +10°C to +32°C (+50°F to +90°F) Series 7000: 100 to 3000 cc/min (0.2 to 6.4 SCFH); +10°C to +32°C (+50°F to +90°F)
Pressure Drop	Typically 1 psi (6.9 Kpa)
Filter Section Temperature	+50°C to +60°C (+122°F to +140°F)
Utility Requirements	
Vortex Air (standard)[3]	8 SCFM (0.23 m^3/min) @ 80 to 100 psig (5.5 to 6.8 bar) [15 SCFM (0.45 m^3/min) optional] for vortex cooler, temperature controller and/or ram valve Quality: clean, dry, -40°C (-40°F) dew point, oil-free, particles ≤5µ, ISA grade hydrocarbon-free
Chilled Propylene (option)[3]	~0.38 lpm (0.1 gpm) @ 13.8 bar (200 psig) in [2.8 bar (40 psig) out optional] for chilling sample
Chilled Water (option)[3]	7.6 lpm (2 gpm) @ +4.5°C to +13°C (+40°F to +55°F) for chilling sample
Vaporizing Propylene (option)[3]	Dependent on application (consult Thermo Fisher Scientific)
Steam	2 to 2.8 bar (30 to 40 psig), for sample cooling and added reflux (optional depending on application)
Hardware Specifications	
Sample Wetted Materials	316 SS, 347 SS, Teflon, Carpenter 20 (optional depending on model) or Titanium (for corrosive applications, consult Thermo Fisher Scientific)
Process Gas Connections	1-in NPT 1-in, 1.5-in, 2-in, 3-in 150# R.F. ASA Flange 1-in, 1.5-in, 2-in, 3-in 300# R.F. ASA Flange (2-in, 300# model is standard) 2-in, 2.5-in 600# R.F. ASA Flange (optional depending on model)
Sample Outlet	0.25-in tubing fitting
Steam Injection	0.25-in tubing fitting (optional)
Coolant Inlet and Outlet	0.25-in to 0.375-in (optional, depending on cooling medium)
Mounting	Vertical to process line with centerline 90° ±5° from horizontal; outlet of sample conditioner must be upright
Weight (approximate)	Series 3000: 25.9 kg (57 lb) Series 5000: 54.4 kg (120 lb) Series 6000: 29.5 kg (65 lb) Series 7000: 32.7 kg (72 lb)

[1] *Actual maximum limited by pressure and material of construction*
[2] *Actual maximum limited by temperature and material of construction*
[3] *Vortex air is standard; a different utility (i.e., chilled water) may be specified depending on the application*

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