1221 Distillation Sample Probe

GENERAL DESCRIPTION

The Universal Analyzers Model 1221 series distillation sample probes are a unique self-cleaning and temperature stabilized primary sample conditioning system for demanding on-line gas analysis applications.

The 1221 and 1221R solve the key issues compromising plant and furnace performance by improving measurement accuracy and reliability. The self-cleaning separator condenses heavy components in the sample and washes them back into the process along with any deposited solids avoiding the regular 'plugging' that occurs with conventional conditioning systems. Maintenance is also simplified, once isolated from the main-line, the separator can be serviced without the need to remove the probe assembly.

The 1221 and 1221R use a multiple-stage cooling design which is made entirely of 316SS. Multiple stage cooling provides efficient removal of entrained liquids due to its high surface area and the thermal efficiency of our patented TraceBoost® technology.

This high-performance probe is ideal for use in applications such as ethylene effluent and decoke analysis as well as FCCUs. The unique reflux design minimizes the effect of changing ambient and process temperatures as it cools the sample and simultaneously removes particulates, liquid, and high boiling-point compounds. The 1221 and 1221R ensure high-accuracy analyzer performance and protection against liquid carry-over. The electronic controller includes self-diagnostics, local and remote monitoring displays, configurable fail-safe alarms, and optional DCS integration, which eliminate the need for regularly scheduled maintenance.

International and USA Patented

Applications

- Ethane and Naphtha Cracking Furnaces (ethylene, propylene and C2/C3 ratio measurements)
- Decoke Operations (CO/CO_2 measurement)
- Fluidized Catalytic Cracking Units (FCCU)
- Syngas

Typical Installations

- Ethylene Effluent
- Decoke headers
- Hot, wet or dirty process gases
- Pyrolysis gases
- Heavy particulate removal

"We've completely eliminated liquid reaching the GC and reduced our routine maintenance from a monthly occurrence to once a year at turn around."

Customer feedback from a large petrochemical customer

FEATURES

Temperature Controller Options
- Pneumatic
- Electronic - local
- Electronic - remote

Efficent Heat Transfer
- Proprietary Insulation
- Consistent and Reliable Outlet Temperature

Low Air Consumption
- TraceBoost® Design provides optimal conductive heat transfer

Spine Technology
- Replaceable in field
- Self Cleaning reflux action
- Resistant to plugging

AMETEK®
THERMAL PROCESS MANAGEMENT

1221 Distillation Sample Probe

Specifications

- Process contacting parts: 316 SS
- Inlet flange available in most sizes, ratings and specifications
- Weight: 1221 - 150 lbs (68 kg), 1221R - 120 lbs (55 kg)
- Max process pressure and temperature determined by connecting flange specified
- Ambient temperature: 32° to 100°F (0 to 38°C) with pneumatic controller
  32° to 104°F (0 to 40°C) with electronic controller
- Sample outlet: 1/4" Compression Tube Fitting
- Suitable for: Class I, Div. 2, A, B, C, D
- Sample inlet, outlet, and coolant temperature monitoring with the electronic controllers
- Electronic controller data available via Modbus TCP/IP and SD card data logging
- Probe sample gas flow rate: 2 - 5 LPM based on ambient and process conditions
- Sample outlet temperature: ± 6°F (± 3°C) with pneumatic controller
  ± 2°F (± 1°C) with electronic controller

Supply Requirements

- Electronic Controller: user configurable for 24 VDC or 110/240 VAC 50/60 Hz
  Power consumption: 41W @ 24 VDC (<2A)
  47W @ 115 or 230 VAC (< 1A)
- Instrument Air (-40°C/F dewpoint)
  40 scfm @ 80-100 psi (68 m^3/hr @ 5.5 - 6.9 bar)
  80 scfm @ 80-100 psi (134 m^3/hr @ 5.5 - 6.9 bar) for dual vortex option

		Air Consumption scfh (m^3/hr)					
		40 scfm (68 m^3/hr) Vortex Tube Duty Cycle % Time on					
		10%	20%	40%	60%	80%	100%
Pressure psi (bar)	80 (5.5)	192 (5.5)	384 (10.9)	768 (21.7)	1152 (326)	1536 (43.5)	1920 (54.4)
	90 (6.2)	216 (6.1)	432 (12.2)	864 (24.5)	1296 (36.7)	1728 (48.9)	2160 (61.2)
	100 (6.9)	240 (6.8)	480 (13.6)	960 (27.2)	1440 (40.8)	1920 (54.4)	2400 (68.0)

Note: 40 scfm & 80 scfm only required while probe is actively cooling. Typical duty cycle is 20%.

1221 Distillation Sample Probe

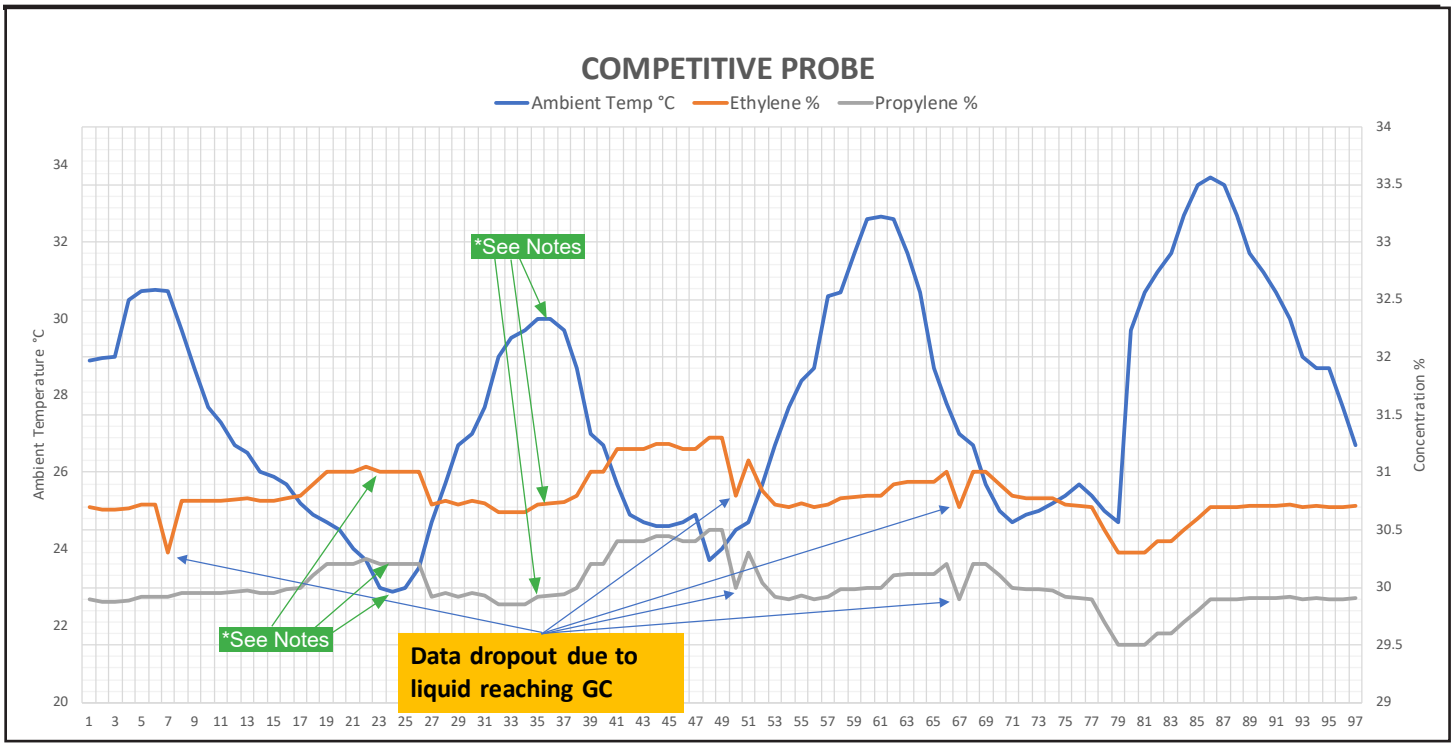

FIGURE 1 – RESULTS FROM COMPETITORS DISTILLATION SAMPLER

10.8°C Ambient Temperature Range from Average of 27.7°C

1% variance in Ethylene concentration ~ 1% variance in Propylene concentration

***Influence of High and Low ambient temperatures on the sample outlet temperature can drive more or less water in the sample, inversely impacting Ethylene and Propylene measurements and decisions by operations.**

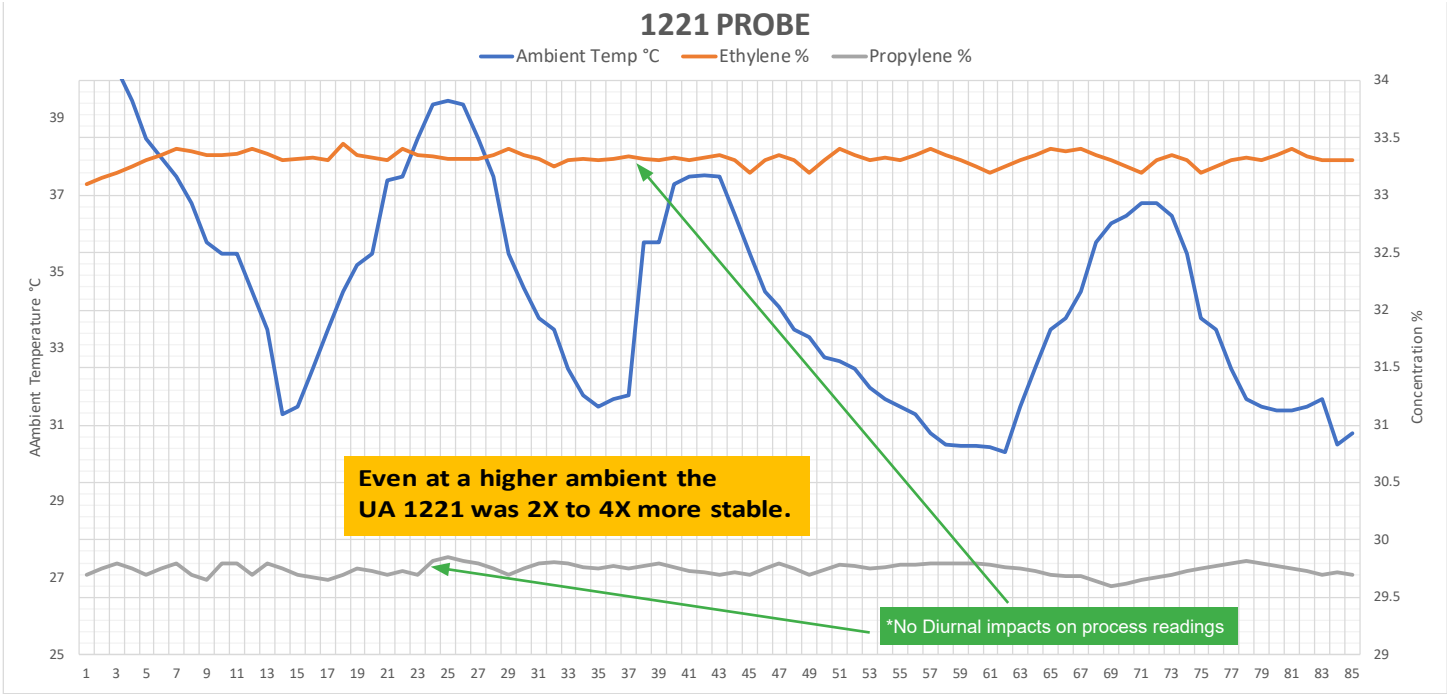

FIGURE 2 – RESULTS FROM Model 1221 DISTILLATION SAMPLER

10.2°C Ambient Temperature Range from Average of 34.5°C

0.5% variance in Ethylene concentration ~ 0.25% variance in Propylene concentration

*** Less influence of ambient temperatures for more steady sample measurements and more reliable decisions.**

AMETEK®
THERMAL PROCESS MANAGEMENT

1221 Distillation Sample Probe

Selection and Configuration

- Mounting restrictions:
  Inlet flange available in most sizes, ratings and specifications. *(Consult factory for additional options)*
  Each unit requires a minimum of 12” clearance / 300mm above the unit for maintenance.
- Determine required cooling capacity:
  Sample flow rate?
  % water in sample?
  Inlet temperature?
  Control/outlet temperature?
- Sample transport bundle configured and supplied separately
- Select cooling media:

Instrument Air	Water	Process Fluid
80 psi (5.5 bar) minimum *40 scfm (68 m^3/hr) minimum	Maximum water inlet temperature should be 5°F(3°C) below the desired sample setpoint temperature	Consult factory

**Average expected duty cycle at this consumption is 20% ON.*

Body Size							
1221	Nominal height 55”/ 1.4M - 1/4” and 3/8” sample outlet connections						
1221R	Nominal height 35”/ 0.9M - 1/4” and 3/8” sample outlet connections						
	Chamber Material						
	S	316 Stainless Steel					
		Mounting Flange Size					
		F2-150	2” 150# Flange				
		F2-300	2” 300# Flange				
		F3-150	3” 150# Flange				
		F3-300	3” 300# Flange				
			Control				
			LC	Local controller (32° to 104°F /0° to 40°C ambient temperature)			
			RC	External remote controller (32° to 104°F /0° to 40°C ambient temperature) *(Requires remote controller supplied separately)*			
			PA	Pneumatic controller with automated shut-off (32° to 100°F / 0° to 38°C ambient temperature)			
			N	No Controller			
				Cooling Method			
				V	Single vortex air cooler (40 scfm / 68 m^3/hr))		
				V2	Dual vortex air coolers for Decoke and >35% water (80 scfm / 134 m^3/hr)		
				R	Refrigerant Gas Cooled (must have LC or RC Control)		
				L	Liquid cooler (must use LC or RC controller)		
					Disc Configuration		
					STD	Standard 316 Stainless Steel	
						Bundle/Cable Entry	
						2	2” Boot for heated sample line 0.75 - 1.6”/19 - 40mm diameter
						3	3” Boot for heated sample line 1.38 - 2.75”/35 - 70mm diameter

Additional Options	
1221-STEAM-300	Steam port flush with hand valve for separator. 50 psi (3.5 bar) saturated steam maximum
1221-SRCP	Single remote controller for (1) 1221 Probe with RC Control option, Panel Mount
1221-SRCE	Single remote controller for (1) 1221 Probe with RC Control option, Enclosure Mount
1221-RCP2	Remote Controller for (2) 1221 Probes, with RC Control option, Panel Mount
1221-RCP3	Remote Controller for (3) 1221 Probes, with RC Control option, Panel Mount
1221-RCP4	Remote Controller for (4) 1221 Probes, with RC Control option, Panel Mount
1221-RCE2	Remote Controller for (2) 1221 Probes, with RC Control option, Enclosure Mount
1221-RCE3	Remote Controller for (3) 1221 Probes, with RC Control option, Enclosure Mount
1221-RCE4	Remote Controller for (4) 1221 Probes, with RC Control option, Enclosure Mount