

Hydrocarbon Analyzer

- Measure as low as 0 to 1 ppm
- Precision 1% of fullscale
- Digital output display
- Automatic fuel shut-off
- Automatic flame-out indicator
- Automatic sample shut-off (optional)
- Seven selectable ranges
- Remote range change control capability
- Enhanced system diagnostics



FEATURES

Rosemount Analytical has designed the Model 400A Hydrocarbon Analyzer for high sensitivity, stability and safety. The Model 400A uses the flame ionization detection method in a field-proven design to provide reliable performance in analysis in high purity gases and trace levels of hydrocarbon contaminants in ambient air or other gases.

To assure analyzer stability, the Model 400A features an integral temperature control system that maintains the internal case temperature at 120°F (49°C) to minimize ambient temperature effects upon the flow control system and electronics. In addition, the flow system is housed in a semi-isolated chamber away from the main system electronics. This allows normal adjustments to be made without upsetting the temperature. These key features provide optimum stability throughout the entire ambient temperature range of 32° to 110°F (0° to 43 °C).

Designed for convenience and ease of operation, the front panel includes a digital display indicating hydrocarbon content, range and flame-out status.

The Model 400A is designed to provide a high degree of operational safety. An automatic fuel shut-off system is included to stop fuel flow to the burner in the event of a flame-out condition. All tubing upstream of the

burner is rigid metallic tubing made with ferrule/nut-type compression fittings. Should an internal fuel leak develop, an inlet fuel flow restrictor, ventilation holes in the enclosure and an internal circulation fan serve to dilute and dissipate the hydrogen fuel to a safety factor below 25% of the LEL of hydrogen - even for a worst case leak. If the sample is flammable, an optional sample flow restrictor and automatic solenoid valve shut-off kit provides additional protection against an internal sample leak.

The analyzer is packaged in a single, compact enclosure for panel, relay rack or bench mounting. A hinged door on the front panel provides convenient access to the controls for zero, span and range change. Case design permits top, front and rear access for convenient maintenance.

The range switch provides seven selectable ranges of x1, x2.5, x10, x25, x100, x250 and x1,000 signal attenuation, while also allowing remote range change by means of contact closures. An eighth range position marked "RMT" enables this remote range change function. In addition to the front panel digital readout, a 4 to 20 mA output or a 0 to 5 VDC output (overrangeable to 0 to 10 VDC) is available for connecting controllers, recorders or data acquisition devices.

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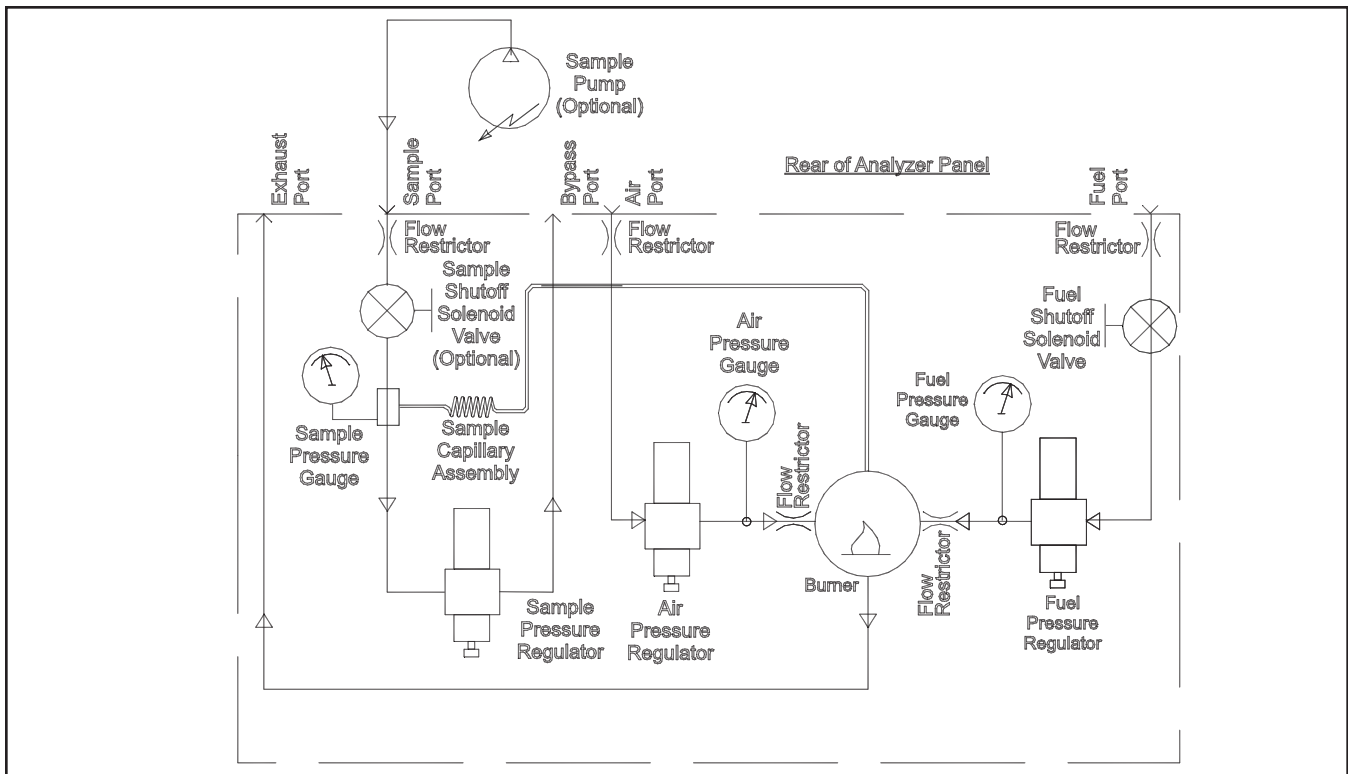
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PRINCIPLE OF OPERATION

The flame ionization detection (FID) method is used in the Model 400A to determine the concentration of total hydrocarbons present in a gaseous sample. Hydrogen burned in air produces a flame containing a negligible number of ions; introduction of a hydrocarbon sample into the flame results in a complex ionization creating a large number of ions. A polarizing voltage applied between the burner jet and a collector produces an electrostatic field. This results in migration of positive ions to the collector and negative ions to the burner jet establishing an ionization current between the two points. This current is directly proportional to the hydrocarbon concentration in the flame.

During the operation of the Model 400A, sample is introduced to the burner at a constant flow rate. This rate is determined by the sample pressure regulator which provides a controlled back pressure at the sample capillary. Bypass flow rates may be adjusted from 350 to 3,000 cc per minute to control system response. Fuel and air flow rates to the burner are determined by regulating the gas pressures against controlled porosity restrictors. The regulators are high precision, direct action units compactly designed for precise flow control.



STATIONARY SOURCE – VOC MONITORING

The Model 400A is used to measure total hydrocarbon emissions downstream from solvent recovery or solvent destruction systems to validate efficiency of VOC reduction system as well as indicate VOC emission concentration.

PURE/ULTRA-PURE GASES

An additional application for the Model 400A is the determination of traces of hydrocarbon contaminants in high purity gases such as nitrogen, argon, hydrogen and oxygen. This application is of special importance in the semiconductor industry and is also useful in other process industries for checking blanketing gases wherever the presence of hydrocarbons is critical.

CONTAMINANTS IN AMBIENT AIR AND OTHER GASES

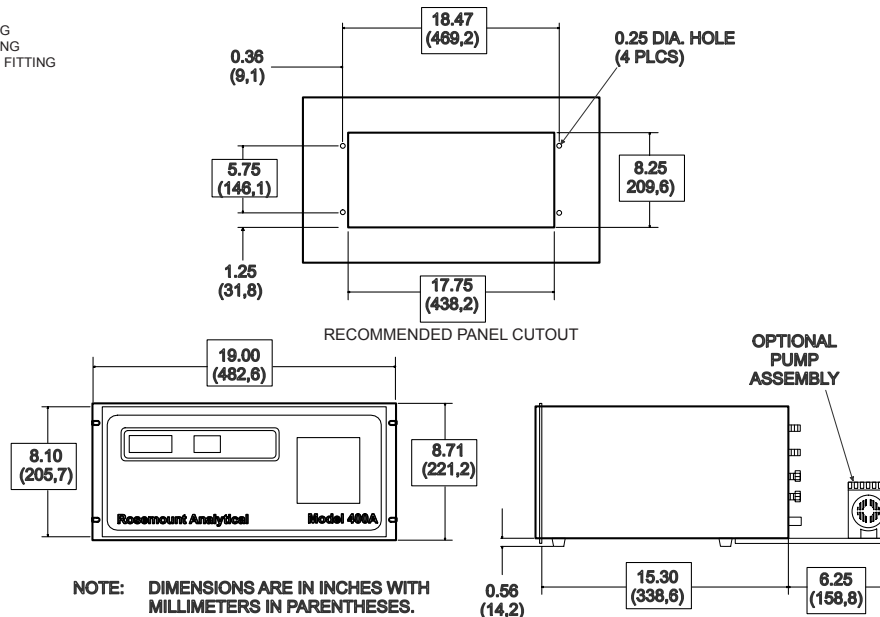
The Model 400A is ideally suited for monitoring ambient air for hydrocarbons where emissions must be controlled or checked, as in perimeter monitoring. It is also useful in determining the efficiency of waste gas incinerators and air purifiers of various types.

APPLICATIONS

- Ideal for bag, continuous dilution or raw exhaust vehicle emissions applications
- Detects trace levels of hydrocarbon contaminants in pure gases
- Monitors hydrocarbon contaminants in ambient air
- Monitors engine combustion efficiency
- Carbon bed scrubber or thermal oxidizer inlet/outlet

MOUNTING AND DIMENSIONAL DRAWINGS

EXHAUST: .50 INCH TUBE FITTING
 SAMPLE IN: .25 INCH TUBE FITTING
 BYPASS OUTLET: .25 INCH TUBE FITTING
 AIR IN: .25 INCH TUBE FITTING
 FUEL IN: .25 INCH TUBE FITTING



NOTE: DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

SPECIFICATIONS

Sensitivity: 0 to 4 ppm through 0 to 1% fullscale as CH₄ (standard)
 0 to 100 ppm through 0 to 10% fullscale as CH₄ (using high range capillary)
 0 to 1 ppm through 0 to 2500 ppm fullscale as CH₄ (with pure hydrogen fuel accessory)

(See ordering information)

Precision: ± 1% fullscale

Zero Drift: ± 1% fullscale per 24 hours

Span Drift: ± 1% fullscale per 24 hours

Response Time: 90% of fullscale in 0.6 seconds at bypass flow rate of 3,000 cc/min.

Ranges: Standard: x1, x2.5, x10, x25, x100, x250, x1,000 attenuation with remote range selection. In addition, SPAN control provides continuously variable adjustment within a dynamic range of 4:1.

Display: Digital

Output: Standard: 0 to 100 mV, 0 to 1 V, 0 to 5 VDC (selectable)

Optional: 4 to 20 mA, isolated

Fuel Gas

Requirement: Mixed fuel (40/60 H₂/N₂ or H₂/He) standard. Pure Hydrogen fuel restrictors and sample capillary available as an option.

Burner Air

Requirement: 350 to 400 cc/min. or zero grade air at 25 to 50 psi.

Sample

Requirements: Non-flammable samples: 0.35 to 3 liters/min.

Flammable

Samples: 400 cc/min. maximum allowable (for safety)*. Consult factory for clarification.

Ambient Temperature

Limits: 32° to 110°F (0° to 43°C) with less than 36°F (20°C) change per 24 hours

Ambient Humidity

Limits: 95% relative humidity

Safety Features: Flame-on indication and automatic flame-out fuel shut-off (standard)

Power

Requirements: 115 VAC ± 10%, 50/60 Hz (230 VAC ± 10%, 50/60 Hz options), 250 W max.

Instrument

Weight: 22 pounds (10 kg)

Shipping Weight: 35 pounds (16 kg)

ACCESSORIES

- Pump assembly
- Current output
- Isolated range control and range identification kit
- Pure hydrogen fuel kit
- Sample automatic shut-off kit (required if sample is flammable)*

* Safety design basis presumes flammable sample having LEL not less than that of hydrogen. Specifications subject to change without notice.

ORDERING INFORMATION

Model	Description	
400A	Process Hydrocarbon Analyzer (400A)	
Level 1	Seven Ranges with Remote Range Control, Range Multiplier	
	01	Seven ranges adjustable between 0-4 ppm through 0-1%
	03	Seven ranges adjustable between 0-100 ppm through 0-10%
	04	Seven ranges adjustable between 0-1 ppm through 0-2500 ppm (Includes 100% H ₂ capillary)
Level 2	Output	
	01	Selectable 0-100 mV, 0-1 V, 0-5 VDC
	02	Current, 4-20 mA Isolated
Level 3	Operation	
	01	115 VAC, 50/60 Hz
Level 4	Sample Line	
	01	Standard (brass/copper)
	02	Standard with Sample shut off valve
	03	Stainless Steel
	04	Stainless Steel with Sample shut off valve
Level 5	Case	
	01	Standard
Level 6	Range ID	
	01	Features as selected above
	02	Range ID

Option Notes	
Level 1:	Option: 04 Low range requires pure hydrogen fuel.
Level 1:	Option: 01, 03, 04 X1, X2.5, X10, X25, X250, X1000
Level 3:	Option: 01 A transformer (P/N 90523) can be ordered as an accessory to operate at 230 VAC, 50/60 Hz.

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