THC in Hydrogen Trace Analyzer

Heated FID H-100

The J.U.M. Engineering HFID Model H100 is a compact 19" rack mount or table top heated FID analyzer for the Measurement of Low Trace Total Hydrocarbon Concentration in Hydrogen.

High accuracy, high sensitivity and high stability are reached with the FID housed in a high temperature heated oven.

The Model H100 is ideally suited for the detection of very low traces of hydrocarbons in pressurized high purity Hydrogen or in mixed Hydrogen/Helium or Hydrogen/Nitrogen fuel gasses.

The H100 is well suited for the integration systems for low concentration online inspection systems for automotive Hydrogen for fuel cell driven cars.

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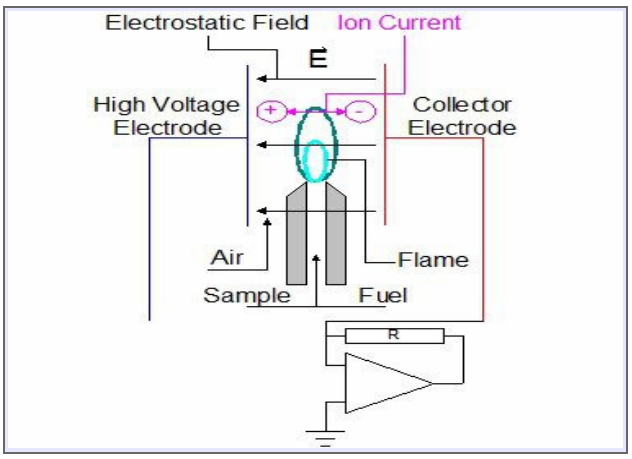
General:

The H100 may also be well suited for the integration in low concentration online Hydrogen inspection systems. The Model H100 uses a hydrogen flame ionization detector (FID) in a heated oven to prevent the loss of high molecular weight hydrocarbons and to provide long term stability and reliable performance in the analysis of low trace concentration levels of hydrocarbon contaminants in high purity Hydrogen. Except the sample back pressure regulator, all sample wetted components are integrated into the heated FID oven for lowest hang up, stable base line and fast response.

Principle of Operation

The Heated Flame Ionization Detection (HFID) method is used to determine the presence of total hydrocarbon concentrations in gaseous samples. Burning hydrocarbon-free hydrogen in hydrocarbon-free air produces a negligible number of ions in the detector. Once a sample which contains any organic carbon matter is introduced into this flame, a very complex ionization process is started. This process creates a large number of ions. A high polarizing voltage is applied between the two electrodes around the burner nozzle and produces an electrostatic field. Now negative carbon ions migrate to the collector electrode and positive hydrogen ions migrate to the high voltage electrode. The so generated ionization current between the two electrodes is directly proportional to the hydrocarbon concentration in the sample that is burned by the flame. This signal is measured and amplified by a highly sensitive and stable electrometer amplifier unit.

Our proprietary sample pressure regulator provides a controlled sample pressure and flow which gives admittance of a constant sample flow rate to the FID burner. This technique of using our non sample contact regulator is time proven for over 40 years by J.U.M. Engineering to provide the highest possible sample low flow rate stability at the lowest maintenance. Our compactly designed flow control module for fuel, ignition and air flow rates via low thermal mass needle valves use high precision pressure regulators. The adjustment valves are factory adjusted and sealed to ensure the optimization of the burner.



Analyzer Features

- Heated oven FID, low priced, veryeconomical
- Low maintenance
- Excellent long term stability
- Conventional sample back pressure regulator (BPR)
- 19-inch slim line design, 132mm high
- Automatic flame out indicator with automatic fuel shut off valve
- Fast response
- Low fuel and low combustion air consumption
- Very selective
- All heated components in oven, except BPR
- Microprocessor PID type temperature controller for FID oven

Applications

- Online inspection of high purity Hydrogen plumbing systems in the semiconductor industry
- Online monitoring on loading terminals for hydrocarbon contamination in Hydrogen
- Online monitoring for quality assurance of automotive Hydrogen at filling stations for fuel cell cars for hydrocarbon contamination
- Detection of low trace hydrocarbon levels in high purity Hydrogen
- Detection of low trace hydrocarbon levels in high purity mixed Hydrogen/Helium and Hydrogen/Nitrogen fuel gas
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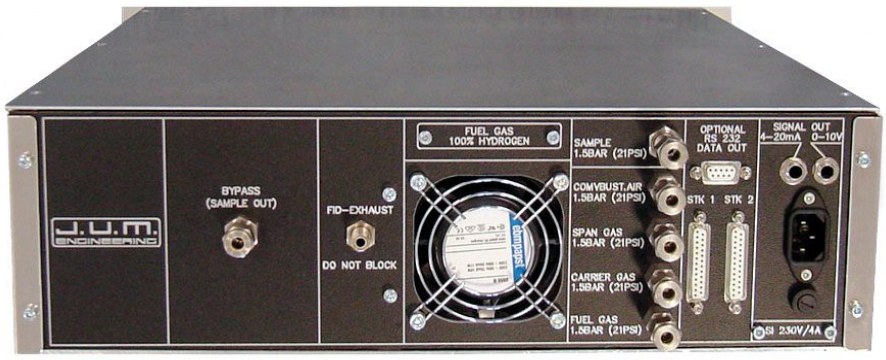

Rear Panel View H-100

Technical Specifications

Method	Heated Flame Ionization Detector (HFID)
Sensitivity	Max. 1 ppm CH_4 full scale
Response time	@ sample inlet >0.8 seconds
t_{90} time	@ sample inlet <2 seconds
Zero drift	<2% full scale / 24h
Span drift	<2% full scale / 24h
Linearity	Up to 10.000 ppm full scale within 1%
Oxygen synergism	< 2% FSD
Measuring ranges (ppm)	0-10,100, 1.000, 10.000, 100.000, 0-1, 0-10, 0-100, o-1000, o-1.000 optional. Front panel turn switch. Automatic or remote range change optional
Concentration Display	6-digit direct reading ppm units. 24 bit high resolution. measures up to 3 overlapping ranges without range change
Signal outputs	0-10 VDC, 4-20 mA, and RS-232 data output
Sample filter	2 micron disposable mesh filter in gas fitting
Zero and span adjust	Manual via duo dials on front panel
Oven temperature	**190°C**
Fuel gas	Minimum quality 5.0
Burner air consumption	Approx. 150 ml/min @ 1.5 bar
Carrier gas consumption	Zero grade Nitrogen, 1,2 liter/min
Oven temperature	190°C (374°F), digital PID controller
Power requirements	230VAC/50Hz, 850 W. 120 VAC/60Hz optional
Ambient temperature	5-43°C (41-110°F)
Dimensions (W x D x H)	19" (483 mm) x 460 mm x 132 mm
Weight	approx. 22 kg (50 lbs)

Available Options

AZM 100	Automatic flame ignition and re-ignition
AMU 100	Automatic range change with range identification
FOAS 100	Flame out control with automatic fuel shut off valve
LTO 100	Measurement of low trace hydrocarbon levels from 0-1 ppm up.
RCA 100	0-20mA analog output instead of 4-20mA
RCI0 100	0-20 mA analog output, galvanic isolated
RCI4 100	4-20 mA analog output, galvanic isolated
TPR 100	External temperature controller for J.U.M. heated sample lines Model TJ 100 or other with “J” type thermocouple

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