J.U.M. ENGINEERING

THC in Hydrocarbon 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 which is designed forthe measurement of Total Hydrocarbon Contaminants in pure Hydrogen, Hydrogen/Helium or Hydrogen/Nitrogen gasses

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 mixed Hydrogen gasses.

The H100 is well suited for the integration in low trace concentration Hydrogen online inspection systems.

Printed on 100% Recycled Paper 22N5-1201-2024

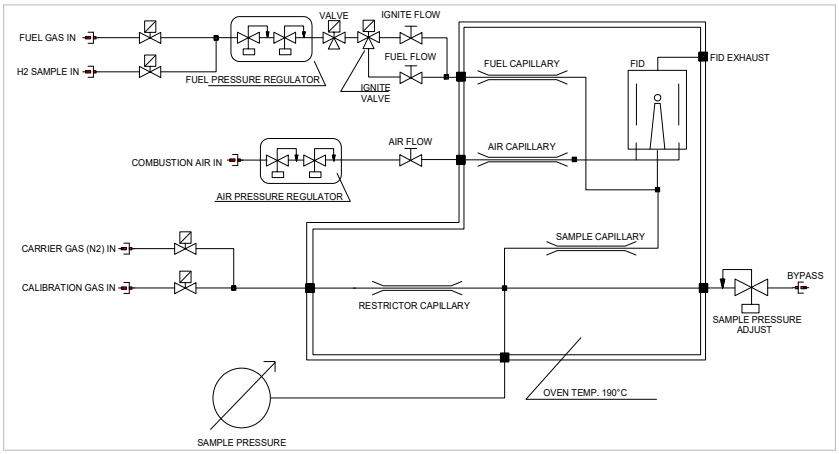
General:

Besides the measurement of total hydrocarbon concentrations in high purity Hydrogen or mixed Hydrogen gas, the H100 may also be well suited for the integration in low concentration Hydrogen online inspection systems at loading stations for Hydrogen Transportation 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 carrier gas back pressure regulator, all sample wetted components are integrated into the heated FID oven for lowest hang up, stable base line and fast response.

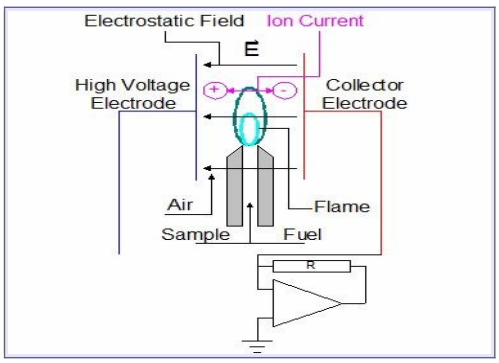
Principle of Operation

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. The FID response is linear over six orders of magnitude. The typical detection limit of the Detector is 100 ppb.**

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 long lasting service life of the optimization of the burner.



Complete Flow Schematic



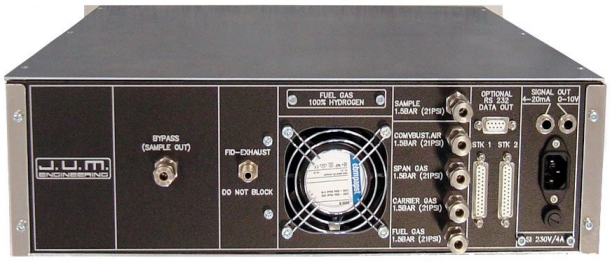
Detector Schematic

Analyzer Features

- Made in Germany
- 190°C Heated oven FID, low priced
- Very economical, low cost of ownership
- Low maintenance
- Excellent long term stability
- Conventional sample back pressure regulator (BPR)
- 19-inch slim line design, 132 mm high
- Automatic flame out indicator with automatic fuel shut off valve
- Fast response
- Low fuel and air consumption
- Very selective
- All heated components in oven, except BPR
- Microprocessor PID type temperature controller for FID oven

Applications

- Detection of low trace hydrocarbon levels in high purity Hydrogen or Hydrogen gas mixtures
- Detection of low trace hydrocarbon levels in high purity mixed Hydrogen/Helium and Hydrogen/Nitrogen fuel gas
- Online inspection of high purity Hydrogen plumbing systems in the semiconductor industry
- Online monitoring on Hydrogen loading terminals during filling process for hydrocarbon contamination in Hydrogen gasses



Rear Panel

Technical Specifications

Method	Heated Flame Ionization Detector (HFID)
Sensitivity	Max. 1 ppm CH_4 full scale
Response time	@ sample inlet >1 second
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, others on request. Front panel turn switch. Automatic or remote range change optional
Concentration Display	6-digit direct reading ppm units. 24 bit high resolution. measure up to 3 overlapping ranges without range change
Signal outputs	0-10 VDC, 4-20 mA, including RS-232 data output
Sample filter	2 micron disposable mesh filter in gas fitting
Zero and span adjust	Manual duo dial on front panel
Oven temperature	**190°C**
Fuel gas	Same as sample 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
LTO 100	Measurement of low trace hydrocarbon levels.
RCI4 100	4-20 mA analog output, galvanic isolated

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