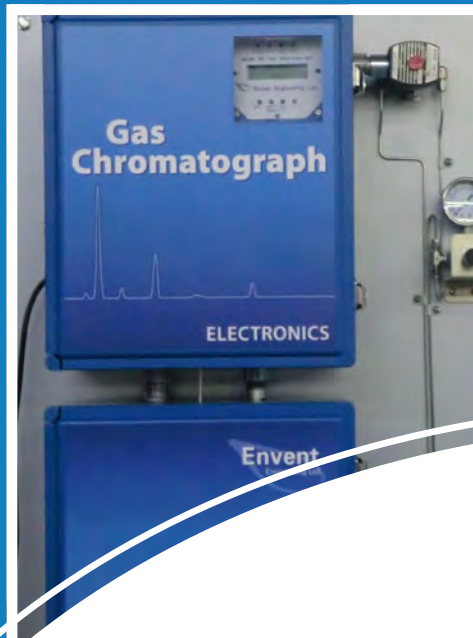
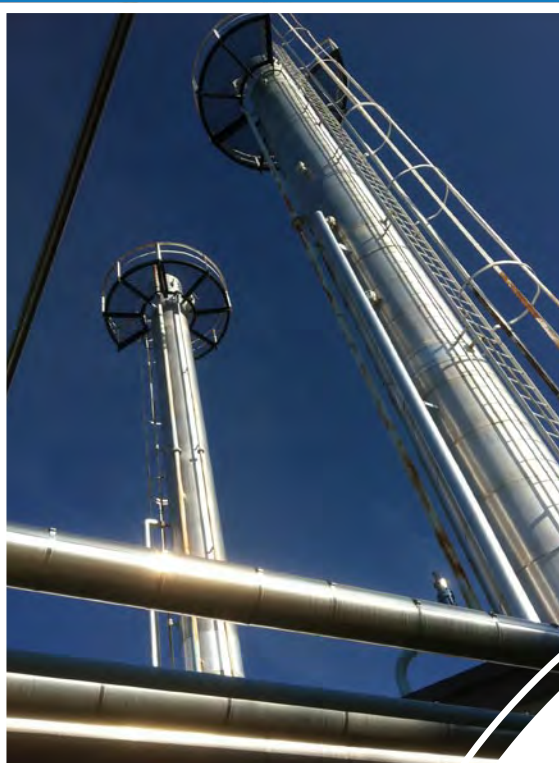
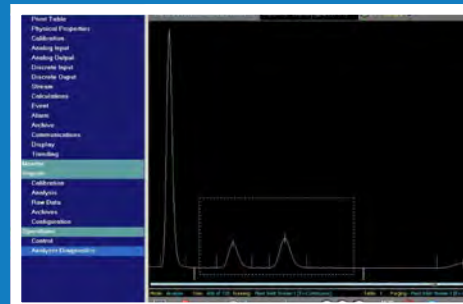


Envent

Engineering Ltd.



**ENVENT NATURAL GAS
CHROMATOGRAPHS**
MODELS 131/132
www.envent-eng.com

Accurate and **RELIABLE ANALYSIS**



Envent Engineering's Model 131/132 Gas Chromatographs (GC) are versatile and reliable online natural gas analyzers.

Robustly designed by engineers and experienced field technicians. The 131/132 GC's are designed to operate in remote production areas with dirty samples, unreliable power, no instrument air and limited maintenance.

The Envent GC provides accurate and reliable full compositional analysis of Natural Gas or Natural Gas Liquids (NGL's) including physical property calculations. Custody transfer energy-measurement applications are also supported with analysis to C6+, C7+ or C9+ (pending). An extensive library of physical property calculations is available in accordance with applicable AGA and ISO natural gas standards.



Process GC applications for analysis of light hydro-carbons such as Natural Gas and C2 – C5 Natural Gas Liquids.





Gas Chromatograph

Features

High Precision Analysis

- ± 1.0 BTU/1000 for C6+ Natural Gas Analysis (10 minute analysis)
- ± 0.5 BTU/1000 for C6+ Natural Gas Analysis (5 minute analysis)
- Component measurement to 0.1% full scale accuracy
- Reliable over broad ambient temperatures [-18 to +55°C (0 to 140°F)] Consult factory for additional options

Application Flexibility

- Diverse stream compositions measured within the same GC
- Wide dynamic range from percent to trace level component measurement
- Configurable Modbus registers, archives, alarms, etc. with support for most Modbus protocols
- Programmable math / logic functions
- 12-24 VDC and 100-240 VAC operation
- Class 1 Division I or II Groups C, D area classifications
- Carrier Pressures from 345 to 1034 kPa (40 to 150 psi)
- GC Oven temperatures from 40 to 100°C (104 to 212°F)

User Friendly

- Start up with ICE software setup and diagnostics
- Field replaceable/repairable GC module (valves and column sets are factory calibrated including chromatograms and application data.
- Industry standard reports with export functions to spreadsheets

Low Operation & Maintenance Costs

- No instrument air required
- No shelter required with optional outdoor mounting (heated sample system oven)
- Low helium and power consumption

Remote production areas frequently produce high BTU natural gas with associated natural gas liquids. The Envent GC is designed to operate reliably in these hydro-carbon rich applications.

Application ***FLEXIBILITY***

Shale gas production is frequently rich in natural gas liquids and can also produce high BTU gas (1300 – 1400 BTU). This presents a problem for accurate field analysis when the sample is pressure reduced for transport to the chromatograph. Care must be taken to add heat to counteract the Joule Thompson cooling effect. Sample cooling can cause the heavier high BTU components to drop out (liquify) prior to GC analysis. Large errors in BTU measurement can result in significantly reduced BTU measurement. The Envent GC was designed with an optional, heated, sample system to ensure accurate measurement for high BTU gas.





Typical Applications

Natural Gas

- Standard C6+ or C7+ analysis (including H₂S) (10 Minutes)
- Custody transfer energy measurement (BTU, Joules or Calories) analysis C6+ to C7+
- C9+ analysis with Hydrocarbon Dew-point Calculation (Pending)
- High speed C6+ analysis in 5-6 minutes

Natural Gas Liquids (NGL)

- C3/C4 analysis (3-5 minutes)
- C2 to C5+ analysis (5 minutes)

Acid Gas

- C6+ with CO₂ and H₂S for plant inlet
- CO₂ and H₂S amine contactor overhead to SRU or injection

Petro Chemical

- C₂H₂, C₂H₄, C₂H₆, C₃H₆, C₃H₈, H₂ and CO

Refinery

- NGL Fractionation
- Waste / Fuel Gas analysis

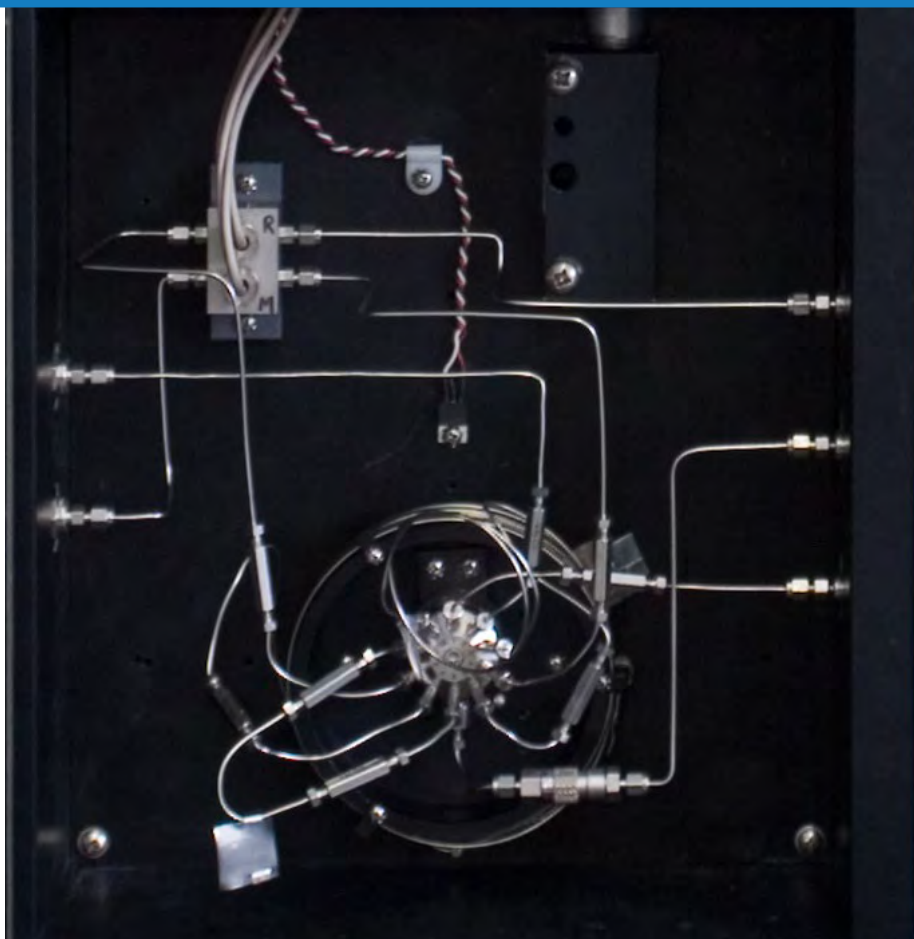
Landfill Gas

- N₂, CO, CO₂, O₂, C1



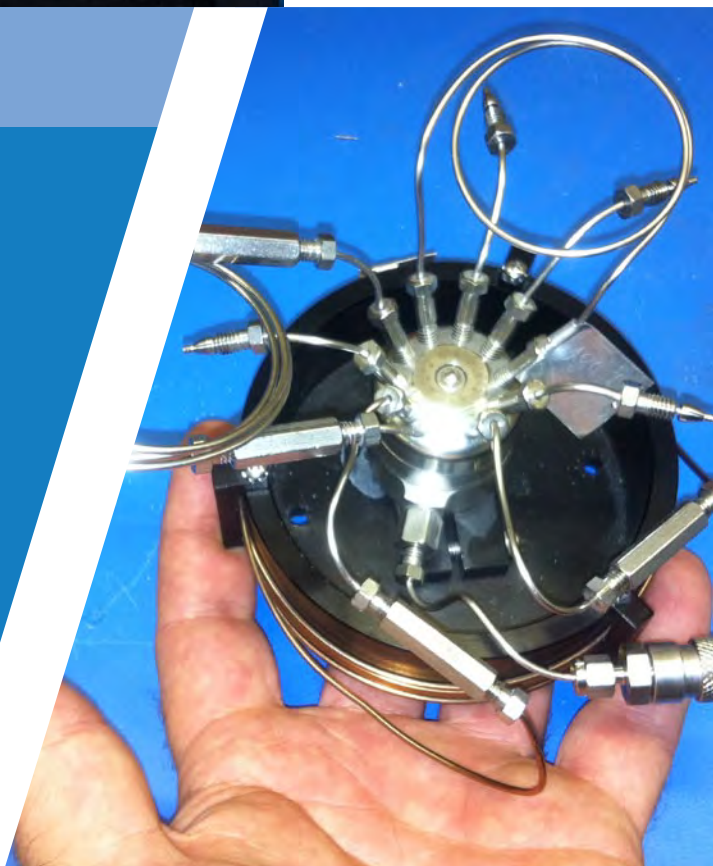
Contact Envent Engineering for additional / custom applications and options

Gas Chromatograph Oven Design for Application Flexibility



FIELD REPLACEABLE GC MODULE

- GC valves 6 port or 10 port diaphragm
- Single 10-port valve design for most applications simplifies troubleshooting
- 1/16" micro-packed or capillary columns
- GC module for easy field retrofit (valve column assembly)
- Full open door oven design allows for easy field service.
- GC modules can be completely replaced to re-app the GC or valves/columns/detectors can be replaced or rebuilt in the field
- 2-valve design for faster applications
- Thermistor based detectors (Measurement & Reference)
- Airless heat-sink design
- Digital temperature indication and PID control through ICE
- Oven Temperature Control $\pm 0.02^{\circ}\text{C}$ in -10°C to 60°C (-0.4 to 131°F) ambient temperature environments





HEATED SAMPLE SYSTEM OVEN

High BTU Applications:

The outdoor mounting option is designed for high BTU applications to prevent C6+ dropout in the calibration standard to ensure measurement integrity.

- Temperature controlled enclosure 20°C
- Multi-stream heated sample conditioning
- Calibration gas temperature controlled to prevent dropout
- No shelter required
- Reduced installation costs (may reduce building requirements in warmer climates)
- Improves calibration accuracy in C6+ and C9+ High BTU applications

Natural Gas Liquids (NGL) Applications:

The heated sample system oven is available with two mounting options in accordance with industry standard practices.

- Integral mounting – below the GC oven (close-coupled)
- Wall mounting – typically mounted on the outside wall of the analyzer building
- Temperature controlled enclosure [30 to 90°C (86 to 194°F)]
- Multi-stream heated sample conditioning
- Allows for use of high temperature pneumatic double block & bleed stream selectors



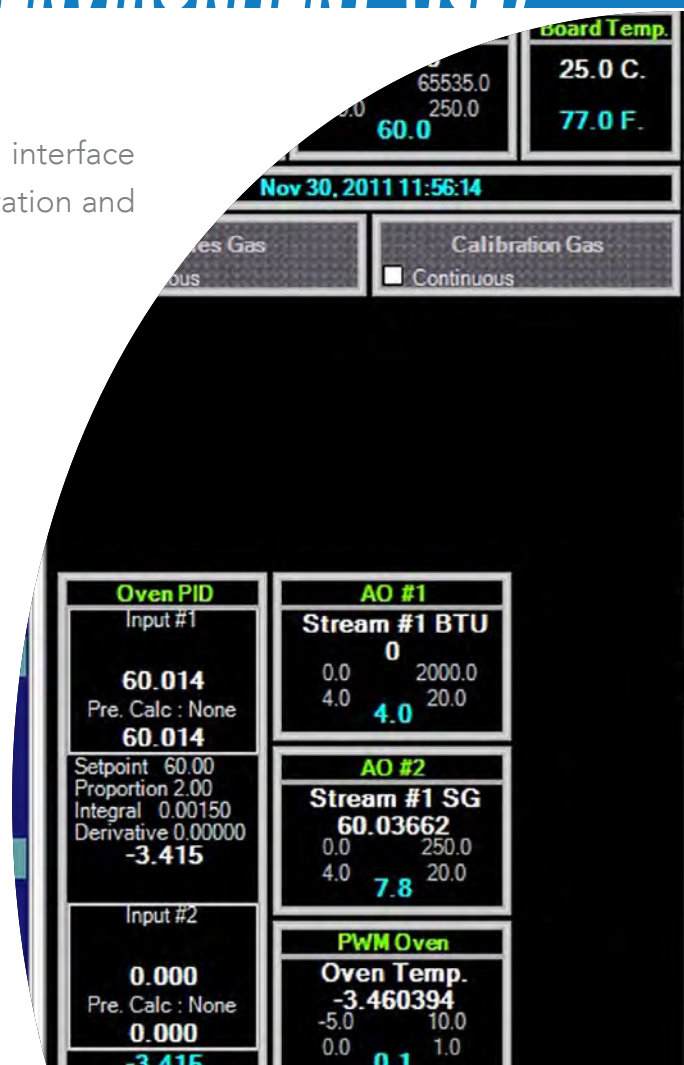


Model 131/132 Gas Chromatograph Software

INTEGRATED CONFIGURATION ENVIRONMENT (ICE)

ICE is Envent Engineering's Windows based user interface software developed specifically for set up, configuration and troubleshooting analyzers. It provides:

- Advanced diagnostics
- Chromatogram diagnostics
 - overlay
 - zoom
 - best fit
- Designed for use with advanced electronic platform for trace component analysis
- Multicomponent analysis with dual calibration tables for analysis of diverse stream compositions
- Hundreds of sequential chromatograms for use by technicians in a single file.
 - "Live" mode GC
 - "Simulated Analysis" mode
 - Offsite



Component Table		Normalized	Component Total		100.00%			
	Cal. Gas (Mole %)	RF	RF Deviation (%)	RT	RT Deviation	LDL	Analysis Method	RT Up Type
C6+	0.1	124416160	10	8.60	3.00	0	Area	Calibration
N2	5	1.709303E+08	10	16.13	1.47	0	Area	Calibration
C1	82.5	3.657874E+07	10	18.00	1.47	0	Area	Analysis
CO2	1	134697024	10	19.80	6.00	0	Area	Calibration
C2	5	167338352	10	25.27	8.00	0	Area	Calibration

Simulated Analysis provides the advanced diagnostic tools to senior level technicians and supervisors to optimize GC operations off-site with simple e-mail attachments or direct communications to the GC. Measurement accuracy can be maintained in custody transfer applications as a result because designated specialists can use "Simulated Analysis" to manipulate actual Raw Data from the field and apply corrective action until optimal results are achieved offline. This empowers the specialist with innovative tools to optimize GC operations for numerous installations without actually going to the field.

REPORTS AND ARCHIVES

Standard Reports

- Analysis Results
- Raw Data
- Configuration
- Calibration

Archives

- 6 fully configurable archives
- Up to 30 entries per archive
- 4MB data storage for years worth of analysis data

Analysis Time (Sec.)		Analysis Time (Sec.)	
Type	Time	Type	Time
FILTER_SYNC500	0.00	FILTER_SYNC1000	29.00
DETECT_GAIN_x_333	0.00	DETECT_GAIN_x_4000	30.00
INHBIT_ON	0.00		
VALVE_4_ON	1.00		
VALVE_4_OFF	2.00		
INHBIT_OFF	7.67		

Discrete #1

Open

Virtual #1

Open

Virtual #2

Open

Analysis Time

14 of 150

Stream On Analysis

Calibration Gas [Ev.Interval] (1 of 3)

Stream Sequence

Sales Gas [Ev.Continuous]

Run Stream Sequence

Reset Stream Sequence

Abort Current Stream

Abort Analysis

Hold

Run

Clear Latches

Valve #1

De-Energized

Valve #2

De-Energized

Valve #3

De-Energized

Valve #4

De-Energized

Solenoid #1

De-Energized

Solenoid #2

De-Energized

Solenoid #3

De-Energized

Solenoid #4

De-Energized

Relay #1

De-Energized

Relay #2

De-Energized

Relay #3

De-Energized

Relay #4

De-Energized

Virtual Point #1

De-Energized

Virtual Point #2

De-Energized

Virtual Point #3

De-Energized

Virtual Point #4

De-Energized

Virtual Point #5

De-Energized

Virtual Point #6

De-Energized

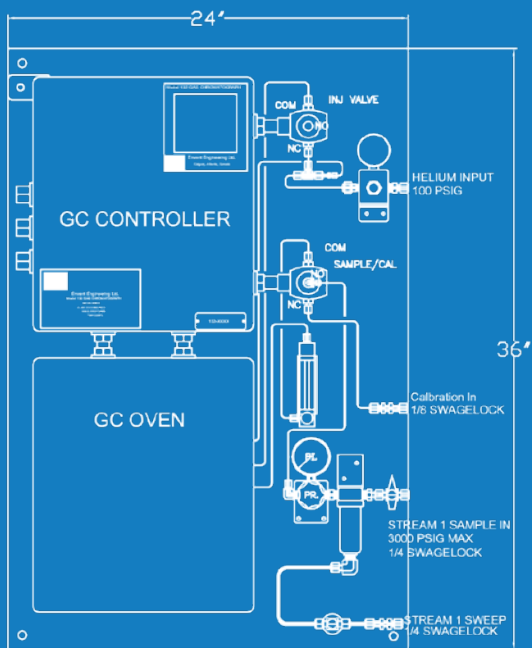
Virtual Point #7

De-Energized

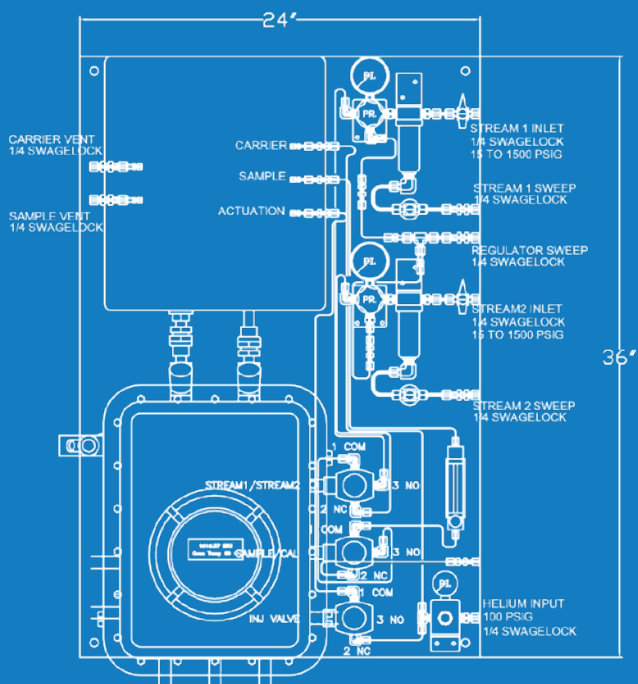
Virtual Point #8

De-Energized

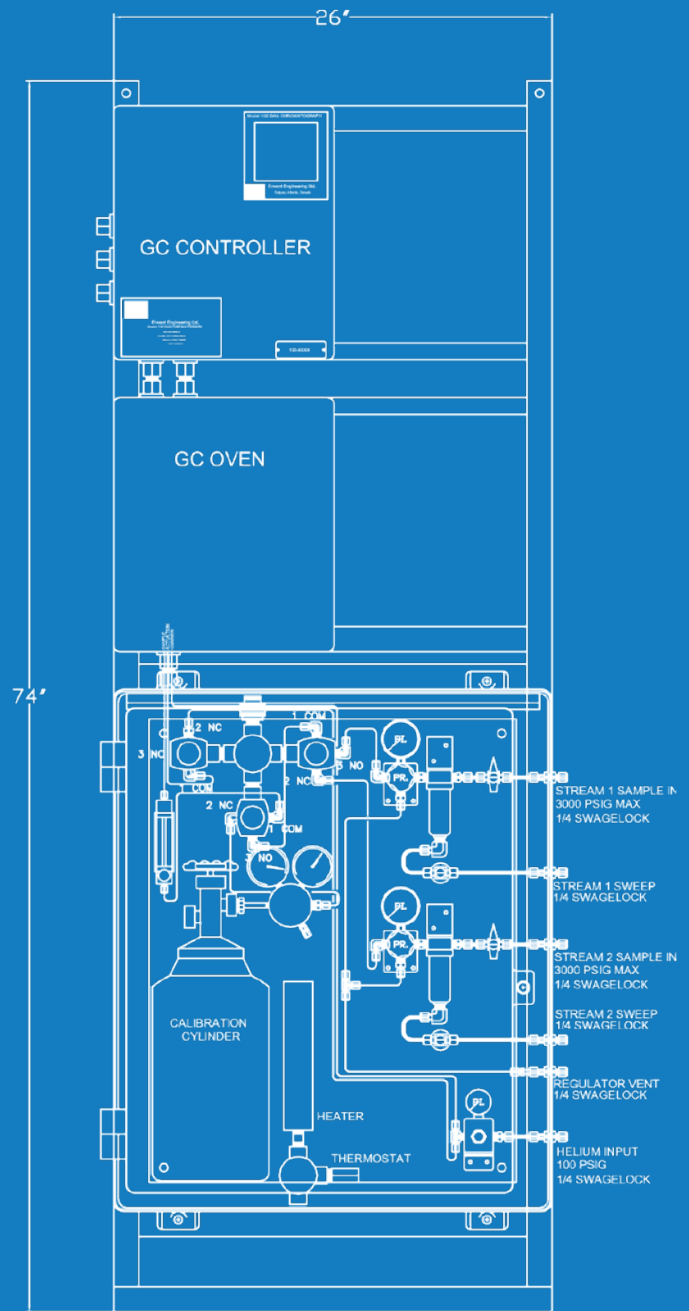
Envent Engineering Ltd. has a vast amount (over 200 years) of in house experience with process analyzers. The client can be assured that Envent will provide reliable, accurate measurement without the added cost associated with conventional process Gas Chromatographs.



Typical single stream Model 132 Class 1 Div2



Typical Dual Stream Model 131 Class 1 Div 1

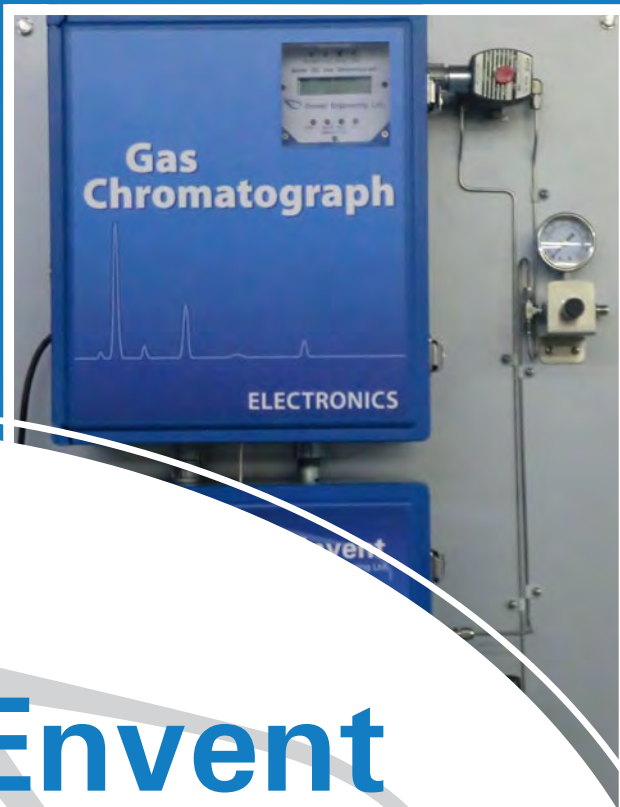
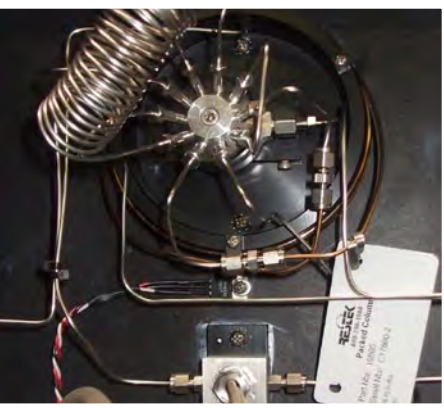


Typical Model 132 High BTU Sample System Class 1 Div 2

SPECIFICATIONS



Power:	100-240 VAC 50/60 HZ (40 watts running, 50 watts start-up) 12-24 VDC (40 watts running, 50 watts start-up)
Environment:	-18 to +55°C (0 to 140°F)
Dimensions:	Model 131: 95.3cm H x 53.4cm W x 25.4 cm D (37.5" H x 21" W x 10" D) Model 132: 81.3cm H x 48.3cm W x 19 cm D (32" H x 19" W x 7.5" D)
Mounting:	Wall-mount (standard) Free-standing (optional) ~ (2" pipe mount pending)
Weight:	Model 131: 30 kg (65 lbs) Model 132: 18 kg (40 lbs)
Certification:	Model 131: Class 1, Div. 1, Groups C, D Model 132: Class 1, Div. 2, Groups C, D
Oven:	Model 131: Airless heat sink, maximum 100°C (212°F), ± 0.02°C Model 132: Airless heat sink, maximum 100°C (212°F), ± 0.02°C
GC Valves:	6-port and 10-port diaphragm valves.
Carrier Gas:	Typically UHP helium 7 to 20 cc/min at 50 to 150 psig 12 – 14 months operation in C6+ BTU applications (10 minute analysis times) 6 – 8 months operation in C6+ BTU applications (5 minute analysis times)
Detector:	Thermal Conductivity Detector (TCD) Thermistors
Gating Options:	Fixed-time, auto-slope detection with automatic gating of peaks on calibration or analysis
Streams:	Up to 8 stream (including calibration streams – 2 maximum) 3 standard, 7 optional
Electronics:	Envent designed ARM7 CPU based analyzer platform
Display:	LCD with back lighting
Analog Inputs:	Two sensor inputs filtered with transient protection (TCD's & GC oven temperature)
Analog Outputs:	Dual isolated 4-20 mA (2-wire standard, loop powered)
Digital Outputs:	Four digital outputs optically isolated with transient protection
Comm. Ports:	One RS-232 and three RS-485 Modbus and Modbus TCP-IP
Modbus:	Enron/Daniel, Modicon 32 bit or 16 bit



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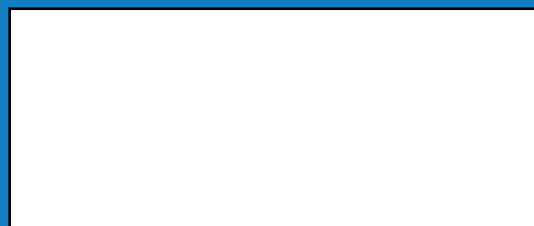
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