

## BENEFITS

- Custody transfer/metrology quality heating value and composition
- Reduced installation costs
- Lower maintenance costs
- Minimum training costs
- Lower utility costs

This “*transmitter-like*” natural gas analyzer provides for on-site gas analysis and heating value where conventional chromatograph technology is not practical. The fast analysis cycle and automatic setup features make installation and maintenance unusually easy. The modular design makes ‘mean-time-to-repair’ as short as a couple of hours instead of weeks. The state-of-the-art digital pressure regulator and other electronics allow months between calibrations.

## STANDARD FEATURES

- Modular Design:
  - ◊ Sampling Systems
  - ◊ Stream Selector Module
  - ◊ Analysis Section contains a dual-train chromatograph in a single, replaceable module
  - ◊ Controlling Electronics
  - ◊ Electronic Carrier Pressure Regulation
- Microsoft® Windows® 2000, NT, or XP based man-machine interface software
- Lithium battery-backed RAM
- Three remote serial digital communications ports; one local port
- Comprehensive diagnostics available to users
- Three-level security code for user access control
- Audit-quality historical data; date and time stamped
- Auto-start cycle automatically:
  - ◊ Stabilizes oven temperature
  - ◊ Confirms modules’ functions
  - ◊ Sets valve operation times
  - ◊ Locates natural gas components
  - ◊ Sets carrier gas pressure
  - ◊ Gates Natural Gas components
  - ◊ Validates/calibrates
  - ◊ Returns to pipeline streams

- Operational alarms available with each analysis cycle.
- Detectors – glass encapsulated thermister beads for rugged service and long life. Will not burn out on loss of carrier.
- Four and six port valves have no moving metal parts.

## DESCRIPTION

A natural gas sample is extracted from a flowing pipeline, transported to the analyzer, processed for particle removal and phase integrity, injected onto the chromatographic columns where component separation occurs.



The Btu/CV Transmitter analyzes each sample utilizing established chromatographic techniques. The resulting information consists of mole percent values for the following:

Air (Contains N<sub>2</sub>, CO and O<sub>2</sub>)  
C1 CO<sub>2</sub> C2 C3 IC4 NC4  
NeoC5 IC5 NC5 C6+

Using process chromatographic techniques, the columns are back flushed so that the Btu/CV Transmitter measures a C6+ peak. Users may input the results of a comprehensive lab analysis that reflects the split or ratio of C6 through C10 components. This ratio can be used in subsequent analysis and energy calculations. Calculated values include:

- Real Relative Density (Specific Gravity)
- Btu/CV Value
- GPM (gallons of liquid per thousand cubic feet)
- Wobbe Index

All of these values as well as composition are available on various modbus communication protocols. The sample is then vented and results are stored in memory and communicated to other devices as needed.

## INSTALLATION

The Btu/CV Transmitter is a weatherproof device designed for installation “on the pipe”, or at least close to the sampling point - this means it is safe acceptable to mount outside - in a temperature range of 0°F to 122°F (-18°C to 50°C), onto a pipeline with 2" to 12" pipe sizes or with an optional wall mount configuration. A cold weather enclosure is also available if ambient conditions are below either the sampled gas dew point or the operational specifications of the unit.

### Sample System:

The integral stream selector for the Btu/CV Transmitter allows sampling up to three (3) different natural gas streams. An additional sample stream designated as the “calibration/validation sample” is also provided. Optional sample conditioning modules are available to address natural gas streams that are less than pipeline quality and provide additional filtering and “speed loops” to reduce sample transport lag times.

## SAMPLE PROBE

Totalflow recommends the use of a sample probe to obtain a representative sample from the middle 1/3 of the flowing gas stream. Three brands of optional sample probes are available from Totalflow and are specifically designed to require no power and avoid sample probe regulator icing. An electrically heated probe is also available.

## OPERATOR INTERFACE

Functional setup and operation of the Btu/CV Transmitter is accomplished by using Man-Machine Interface (BtuMMI) software (supplied with each unit) operating on a Laptop PC in a Microsoft® Windows® 2000, NT, or XP environment. The “Windows®” utilities, combined with software designed specifically for the Btu/CV transmitter, provide a powerful tool for operations, diagnostics, and downstream data handling. The PC can be directly connected to the Btu/CV Transmitter via an RS-232 serial interface cable, or indirectly by some remote telemetry method (phone modem, radio, cell phone, satellite, etc.). The user is prompted through dialog boxes for setup, operations, data collection and monitoring.

## MAINTENANCE

The Btu/CV Transmitter was designed to be maintained by personnel with little or no prior knowledge of Gas Chromatography. Both hardware and software are designed to provide low maintenance through easily replaceable electro-mechanical modules such as:

- Sample Conditioning Module (SCM)
- Electronic Carrier Pressure Regulator Module (PRM)
- Chromatographic Analysis Module (GCM)
- Analyzer Controller Module (ACM)
- Stream Selector Module (SSM)

### Other Maintenance Support Features:

- Intuitive Microsoft® Windows® 2000, NT, or XP Local Operator Interface (Btu MMI32)
- Diagnostic software for maintenance (printer/console engineering interface)
- Digitized detector output (chromatogram) to the Man-Machine Interface (MMI)
- Remote operation of MMI

There is also a scalable chart recorder output (often not practical on remote sites that have no AC power available) a  $\pm 2.5$  DC volt (peak to peak) output is provided for each of the detectors.

**HISTORICAL DATA**

The Btu/CV Transmitter is designed to retain historical data. This data can be used for custody transfer needs, verify transmitter operation over time, and provide a limited data backup for communication link reliability. The user is allowed to configure the period of the data retained by the Btu/CV transmitter via the Operator Interface. Choices available to the user include:

- The most recent previous 100 days OR 100 hours average, OR 100 Analysis Cycles containing:
  - ◇ Normalized components
  - ◇ UN-normalized components
  - ◇ Ideal Btu/CV
  - ◇ Real Btu (wet and dry) / CV (superior and inferior)
  - ◇ Relative Density (Specific Gravity)
  - ◇ Density
  - ◇ GPM
  - ◇ Wobbe index
  - ◇ Alarms
- Stream Averages for last hour, last day and the last month analyses
- Operational Parameters for the last 100 cycles (Diagnostics Report):
  - ◇ Selected peak times
  - ◇ Selected peak areas
  - ◇ Ideal Btu/CV
  - ◇ Carrier regulator pressure
  - ◇ Oven temperature
  - ◇ Ambient temperature
  - ◇ Sample pressure
  - ◇ Detector noise values
  - ◇ Detector balance values
- Audit logs
  - ◇ Last 100 alarms
  - ◇ Last 100 events

Data retained by the Btu/CV transmitter can be collected via a remote communication link or by the Laptop PC local operator interface (Btu MMI32).

**SPECIFICATIONS**

- Designed for Pipeline-Quality Natural Gas. 800 to 1500 Btu per standard cubic foot (29.8 to 55.9 megajoules/meter<sup>3</sup>)<sup>1</sup>
- Calculations Per: GPA 2172-96 (Z by AGA 8 or single virial summation) and 2145-00 Rev 2 or ISO 6976-95, GOST or ISO mass
- Carrier Gas: Helium (consumption rate <50 ml/minute during analysis cycle)
- Analysis Time: Approximately three (3) minutes; interval between cycles is user adjustable up to 500 minutes.
- Repeatability: ±0.5 Btu per 1,000 Btu (±0.05%)
- Three (3) sample streams
- One (1) auto-calibrate/validation stream.
- Temperature Range (Operation): 0°F to +122°F (-18° to 50°C)<sup>1</sup>
- Temperature Range (Storage): -22°F to +140°F (-30°C to 60°C)
- Supply Voltage = 12.5 to 16 volts DC
- Power Consumption (Nominal) = 6 Watts
- Power Consumption (at start up) = 25 Watts
- Hazardous Area Certifications:
  - ◇ NEC & CEC Class I, Div. 1, Groups C and D [Exia] T4
  - ◇ ATEX **CE** 0344~~6~~ II 2G EEx d, [ib] IIB T4.
- EMI/RFI: IEC 801-2, 3, 4, 6; EN 55011, EN50082-2.
- Miscellaneous Type Approvals and Certifications:
  - ◇ Industry Canada
  - ◇ PTB (Germany)
  - ◇ GOST (CIS)
  - ◇ NORSOK
  - ◇ CPCU
  - ◇ Indonesia
  - ◇ China
  - ◇ Romania
  - ◇ Malaysia
  - ◇ France
  - ◇ Enagas (Spain)
- Communications Supported:
  - ◇ RS-232 (Explosion Proof)
  - ◇ RS-422 (Intrinsic Safe)
  - ◇ RS-485 (Intrinsic Safe)
  - ◇ RS-232 Man-Machine Interface (I.S.)

- Protocols Supported:
  - ◊ Remote / Local MMI
  - ◊ Printer/console (Engineering interface)
  - ◊ Host computer interface ASCII (HCIA)
  - ◊ Modbus ASCII or RTU (Modicom, WordS-wap, or Danalyzer)
  - ◊ DSFG
  - ◊ PTB Printout
- Dimensions: 21.75" wide × 23.00" high × 14.00" deep (55.25cm × 58.42cm × 35.56cm)
- Weight: Approximately 80 lb. (36.29 Kg)
- Shipping Weight: 83.5 lb. (37.88 Kg).
- Weatherproof Construction: NEMA/Type-4X, aluminum alloy with white polyester powder coating or aluminum lacquer.
- Regulators (carrier and calibration blend)
- Start-up calibration/validation gas sample (±2% blend)
- Carrier Gas: 99.995% pure helium (chromatographic grade)
- Export crating
- Tool kit
- Welker liquid shut-offs
- Various maintenance kits
- Customer Factory Acceptance Test (FAT)

*<sup>1</sup> This range can be extended beyond the stated limits.*

**AVAILABLE OPTIONS**

- Solar/Battery-Powered Configuration (packaged system with 200ah batteries, 100 watt solar panel, NEMA 4 box)
- 120/240 VAC to 12VDC and 24VDC to 12VDC GP and Exp power supplies
- Wall or pipeline mounting
- Cold weather enclosure (also available in pipe mount configuration)
- Modular Sample System Conditioner Options for
  - ◊ Non-pipeline quality natural gas sample
  - ◊ Sample transport lag-time needs
- Probes
  - ◊ Temperature compensation fixed
  - ◊ Retractable
  - ◊ Liquid rejection
  - ◊ Electrically heated

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