NUFLO™

Scanner® 2000 microEFM

Key Features & Functions

- Autonomous operation for 1 year (typical) via integral lithium battery pack*
- Measures
  - Industrial and Hydrocarbon Gases
  - Liquids
  - Saturated Steam
- Senses
  - Differential Pressure
  - Pressure
  - Temperature
  - Flowmeter Pulses
- Computes
  - Standard Volume
  - Mass
  - Energy
- Logs, indicates and communicates any measured or computed variable
- Downloads historical data at high speeds for analysis and data export using full-featured Windows-based software
- Certified internationally for measurement and electrical safety
  - ATEX/IECEx
  - CSA
  - Measurement Canada
  - GOST
- Supports a variety of protocols
  - RTU Modbus®
  - Enron Modbus®
  - FOUNDATION™ Fieldbus

* Actual battery life is dependent on calculation, sampling, and display update frequency.

The Scanner 2000 microEFM is among the most versatile flow computers on the market. The device can operate alone to fulfill a variety of measurement applications or be networked with other devices to provide a comprehensive flow management SCADA solution.
The Scanner 2000 can operate autonomously with an integral battery for a year or longer. Using only its integrated sensors, the Scanner 2000 can measure differential pressure, pressure, temperature and flow meter pulses. The device can scale and calculate flow, indicate and record data, which can be downloaded to a user’s PC via a USB connection. Alternatively, the integral keypad can be used to configure basic parameters and access historical data.

The instrument can be factory-installed on Cameron gas and liquid turbine meters, orifice meters, and cone meters or shipped separately for connection to other primary flow sensors. The Scanner 2000 can measure the standard volume, mass and energy flows of saturated steam and many types of gasses and liquids with custody transfer precision.

In its most basic form, the Scanner 2000 replicates the Barton 202 flow recorder, the Barton 242 pressure and temperature recorder, and the Barton 200 and 227 differential pressure indicators.

With the addition of external connections, the Scanner 2000 can also act as a multi-variable transmitter, RTU and PID controller. This additional information can be transferred to and from the 2000 by analog or pulse (frequency), Modbus® or FOUNDATION™ fieldbus serial communications.

A single Scanner 2000 is powerful enough to measure the gas, oil and water flow from a 2- or 3-phase separator or compute the flow from an ultrasonic gas flow meter. The Scanner 2000 is also versatile enough to act as a simple two-stream turbine totalizer or provide a fieldbus connection to a positive displacement or turbine meter.

For more information about Scanner 2000 applications, see the following publications:
- Scanner 2000 microEFM Solutions
- Scanner 2200 EFM Solutions
- Scanner 2000 microEFM Well Testing Solution
- Feature Profile on PID Control

PID Control*
When purchased with the PID control option, the Scanner 2000 can be used to control process variables such as static pressure, differential pressure, temperature, and flow rate. A 4-to-20 mA output is configured to regulate a control valve or adjustable speed drive (ASD), and control parameters are tuned with the easy-to-use tools that are built into the standard Scanner 2000 software platform, ModWorX Pro. Users can configure the Scanner 2000 to provide PID control for a single parameter, or opt for PID control of flow rate with a secondary pressure control.

See our Feature Profile on PID Control on the Cameron website for more information.

* Not available with FOUNDATION™ fieldbus model

FOUNDATION™ Fieldbus Communications
The Scanner 2000 for FOUNDATION™ fieldbus is an a CSA explosionproof and ATEX intrinsically safe device that is approved by the Fieldbus Foundation™. An integral fieldbus module converts Scanner 2000 Modbus® data to fieldbus signals. Additional inputs, flow volumes and calculations can be read by a fieldbus host and recorded. Power and communications are supplied by a fieldbus network, and the integral lithium battery provides backup power.
Approvals
Explosion-proof Package
• CE approved
• Complies with EMC Directive 2004/108/EC
• ATEX and IECEx certified, II 2 GD Ex d IIC T6 IP68 (-40°C to 70°C)
• CSA certified for US and Canada Class I, Div. 1, Groups B, C, D, Class I, Div. 2, Groups A,B,C,D (non-sparking), Type 4 enclosure, ANSI 12.27.01 single seal (0 to 3000 psi)
• Measurement Canada certified for custody transfer, Approval No. AG-0557C
• GOST-R/GOST-K certified
• ASME pressure vessel code compliant (0 to 3000 psi); CRN 0F10472.5C
• Fieldbus Foundation™ approved

Intrinsically Safe Package
• CE approved
• ATEX certified, II 2G Ex ia IIB T4 IP66 (-40° to 78°C)
• Fieldbus Foundation™ approved

Display
• Two-line LCD with easy-to-read alphanumeric characters
  o 8-digit display of values (top line)
  o 6-digit display identifies each scrolling parameter and its engineering unit (bottom line)
• View up to 12 user-defined parameters
• View daily log data (99 days)
• User-selectable units of measurement
• Character height - 0.3 in.
• Adjustable contrast and update period

Power
• Lithium battery for autonomous operation
• External power supply (6-30 VDC) optional with internal battery backup
• Fieldbus network power (Scanner 2000 FOUNDATION™ fieldbus model only)
Outputs

Digital Output
- Configurable as pulse output or alarm output
- Solid-state relay
- Output rating: 60 mA max @ 30 VDC
- Pulse output
  - Configurable pulse duration
  - Maximum frequency: 50 Hz
  - Configurable pulse representation (1 pulse = 1 MCF)
  - Based on any accumulator (flow run or turbine inputs)

Operational:
- Alarm output
  - Low/high
  - Out-of-range
  - Status/diagnostic
  - Latched/unlatched
  - Normally open/normally closed

Analog Output (Expansion Board Required*)
- 4-20 mA
- Accuracy: 0.1% of full scale @ 25°C (77°F), 50 PPM/°C (27.8 PPM/°F) temperature drift

Keypad Configuration
With the three-button keypad, changes to basic parameters can be made quickly and easily simply by removing the enclosure lid (computer software is not required). The slave address, baud rate, date and time, and orifice plate size can all be configured from the keypad.

Keypad Configuration:
- Configuration: Move between menus and menu selections
- Operation: View next parameter
- Configuration: Change digits and other menu selections
- Operation: View daily logs
- Configuration: Save configuration settings
- Operation: Save totals

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Memory
• Non-volatile memory for configuration and log data
  ○ 256 KB (512 KB with expansion board option)
  ○ Data stored for 10 years without power

MVT
• Provides linearized digital data
  ○ Static pressure
  ○ Differential pressure
• Available with bottom ports (gas measurement) or side ports (liquid or steam measurement)
• NACE-compliant units also available
• User-adjustable sample time and damping

MVT Accuracy
• Stability: Long-term drift is less than ±0.05% of URL per year over a 5-year period
• Differential pressure: ±0.05% of span
  ○ Effect on differential pressure for a 1000-psi change in pressure
    • Zero shift: ±0.05% of URL
    • Span shift: ±0.01% of reading
• Static pressure: ±0.05% of span
• Temperature performance: 0.25% of full scale over full operating temperature range
• Resolution: 24 bits

Environmental
Operating Temperature Range
• -40°F to +158°F (-40°C to +70°C)
• LCD contrast is reduced below -22°F (-30°C)

Audit Trail
• Daily records: 768 (>2 years)
• Interval records: 2304 (>3 months of 1-hour intervals); 6392 (>8 months of 1-hour intervals) with expansion board option
  ○ Adjustable from 5 seconds to 12 hours
• Event/alarm records: 1152
• Records up to 16 user-defined parameters

Interface Software
• Provided at no charge
• Easy to use
• Real-time data polling
• Complete configuration
  ○ Configuration upload tool for configuring multiple units

• Multi-level security
• Field calibration
  ○ 1 to 12 calibration points for each parameter
  ○ Three methods: multi-point, set zero point, and verify
  ○ Inputs are automatically locked during calibration
• Maintenance
  ○ Change plate
  ○ Change cone (linearization: 1 to 12 points)
  ○ Change averaging pitot tube
  ○ Change gas composition
  ○ Change steam properties
  ○ Change liquid parameters
  ○ Change flow coefficients
  ○ Change K-factor (linearization: 1 to 12 points)
  ○ Change turbine flowmeter
• Archive data downloads
  ○ Configurable downloads of “all” or “new” records
  ○ Download types: daily, interval, and event/alarm records
  ○ Downloads are automatically saved in uneditable binary (SDF) files
  ○ Exports to .xls, .csv, .rtf, .html, Flow-Cal® and PGAS® formats
• Reporting
  ○ Daily logs (table or trend graph)
  ○ Interval logs (table or trend graph)
  ○ Event/alarm logs
  ○ Configuration settings
  ○ Calibration settings
  ○ Snapshot of current status data and calculated parameters
• Online documentation
  ○ Quick Start guides
  ○ Hardware manual
  ○ Software manual

MVT Pressure Ranges

<table>
<thead>
<tr>
<th>Static Pressure (PSIA)</th>
<th>Differential Pressure (In. H₂O)</th>
<th>Maximum Overrange Pressure (PSIA)</th>
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<tbody>
<tr>
<td>100</td>
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<td>150</td>
</tr>
<tr>
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</tr>
</tbody>
</table>

* These ranges are stocked for quicker delivery.
** Available on request.
*** Not evaluated for Measurement Canada approval.
The ModWorX Pro software interface offers easy access to the most commonly used functions from one main display screen.

Task-based menus help operators perform their jobs quickly and easily.

- **Calibrate Inputs:**
  - Differential Pressure
  - Static Pressure
  - Process Temperature
  - Calibrate, Verify and Set Zero Offset selections available for each parameter.

- **Maintain Flow Run:**
  - Change Orifice Plate
  - Change Cone
  - Change Gas Composition
  - Change Steam Properties
  - Change Flow Coefficients
  - Change Avg. Pitot Tube

- **Maintain Turbine:**
  - Change Turbine
  - Flowmeter
  - Change K-Factors

- **Configure:**
  - SYSTEM PARAMETERS
    - Device ID
    - Date and Time
  - Communications
  - Security
  - Display
  - Archive
  - Alarm
  - Modbus Registers
  - FLOW RUN SETUP
  - TURBINE SETUP
  - INPUTS
    - Differential Pressure
    - Static Pressure
    - Process Temperature
  - OUTPUTS
    - Digital

Dedicated button for quick and easy downloads

Four menus simplify navigation

Documentation for quick reference