

NUFLO™

Scanner® 2000 microEFM

The NuFlo Scanner 2000 microEFM packs the gas, steam, and liquid measurement capabilities traditionally found in large flow computers into a compact, low-power instrument.

Simplicity and ease of use are integral to this instrument's design. Basic parameters can be configured quickly from a keypad inside the enclosure. All other parameters are easily configured using a PC or laptop and the ModWorX™ Pro software provided free with every Scanner 2000 purchase.

The Scanner 2000 is an economical chart recorder replacement, a flow computer, and a stand-alone totalizer. Its measurement capabilities include compensated gas, steam, and liquid measurements based on the differential pressure input supplied by an orifice plate or a cone meter, or the frequency input from a turbine meter. A turbine input can be used for liquid measurement or compensated gas measurement in accordance with AGA-7. Modbus® protocol and two RS-485 communication ports allow remote communication to host systems. The instrument's ability to measure gas and water simultaneously is also a clear advantage for coalbed methane operators.

The Scanner 2000 microEFM is available in two packages: an explosion-proof package certified for use in hazardous areas, and a weatherproof package.

Explosion-proof Package

The explosion-proof package features:

- an integral MVT
- Lithium battery (standard) for autonomous power
- External power supply (6-30 VDC) optional with internal battery backup
- Keypad for basic configuration inside the enclosure

Options include:

- Explosion-proof control switch
 - Push-button control of display parameters and daily log views
 - Eliminates need to open enclosure
- Explosion-proof communications adapter
 - Quick connect to laptop
 - Installs in conduit opening for easy access
 - Eliminates need to open enclosure
- Pole mount kit



Mounting options include:

- Direct mount to an orifice meter or cone meter using a flange-by-flange manifold
- Remote mount to an orifice meter or cone meter using a pole mount kit
- Direct mount to a Barton 7000 Series turbine meter

The explosion-proof package (both with and without the expansion board) has received the following approvals:

- CE approved
- ATEX-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, Type 4 enclosure, single seal
- Measurement Canada certified for custody transfer, Approval No. AG-0557C
- ASME pressure vessel code compliant pressure sensor; CRN 0F10472.5C

Weatherproof Package

The weatherproof package features:

- an 8-in. square enclosure
- an integral MVT
- USB connection for downloading data to a laptop
- Lithium battery (standard) for autonomous power
- External power supply (6-30 VDC) optional with internal battery backup
- Solar power optional with internal battery backup
- Keypad for basic configuration inside the enclosure



Options include:

- Solar kit (solar charger and two rechargeable 6V batteries; solar panel sold separately)
- Radio kit
- Pole mount kit

Mounting options include:

- Direct mount to an orifice meter or cone meter using a flange-by-flange manifold
- Remote mount to an orifice meter or cone meter using a pole mount kit

* The weatherproof package has not been tested or certified for use in hazardous areas.

The Scanner 2000 offers

- Low-power operation for remote installations
- Fully autonomous operation via lithium battery pack (1-year typical)
- Extremely accurate, stable and repeatable input readings using an integral MVT
- API 21.1 compliant
- Archives up to 16 user-selectable parameters
- Generous log capacity: 768 daily records, 2304 interval records (6392 with expansion board option), 1152 event/ alarm records
- Fast data transfer: full archive download in approximately 3 minutes with main board only (6 minutes with expansion board option)
- Two RS-485 communication ports
- Modbus® protocol
- Configurable inputs/outputs
- A process temperature input, a turbine meter input, a digital output (volumetric pulse output or alarm)
- With expansion board, a second turbine meter input, a pulse input, two analog inputs, and an analog output
- Easy-to-read LCD
- Quick and easy configuration and calibration (1 to 12 calibration points available for all inputs)
- Non-volatile memory
- Performs industry standard calculations: AGA-3, AGA-7, ISO 5167, AGA-8 (Detail & Gross), GPA 2172, Cone, IF-97 (Steam), and API-2540 (Liquid).

Display

- Two-line LCD with easy-to-read alphanumeric characters
 - 8-digit display of values (top line)
 - 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

Calculations

- Flow rate (Natural Gas, Steam and Liquid)
 - AGA-3
 - AGA-7
 - Compensated Liquid Turbine
 - ISO 5167
 - Cone
- Fluid properties
 - AGA-8-92 (Detail and Gross)
 - GPA 2172
 - IF-97 (Steam)
 - Generic Liquid (Water or Emulsions)
 - API-2540 Liquid (Crude Oil, Gasoline, Jet Fuel, Fuel Oils, Lube Oil)
- Wet correction (Steam)
 - James (Orifice)
 - Chisholm (Orifice)
 - Steven (Cone)

Communications/ Archive Retrieval

- Modbus (RTU) with two on-board RS-485 communications slave ports
 - COM 1 and COM 2 baud rates: 300 to 38.4K
- Enron Modbus compliant downloads
- User-definable block reads allows the grouping of up to 25 floating point values for faster data transfer when used with a SCADA system
- Full archive download in approximately 3 minutes with main board only (6 minutes with expansion board option)

Inputs

Turbine Meter Inputs 1 and 2 (Expansion Board Required for Turbine Input 2)

- Configurable sensitivity adjustment (20 mV to 200 mV, peak to peak)
- Frequency range: 0 to 3500 Hz
- Input amplitude: 20 mV to 3000 mV, peak to peak
- Turbine Input 2 cannot be used simultaneously with a pulse input

Pulse Input (Expansion Board Required)

- Accepts a signal from a turbine meter or PD meter
- Optically isolated
- Input: 3 to 30 VDC or contact closure
- Cannot be used simultaneously with Turbine Input 2

Analog Inputs 1 and 2 (Expansion Board Required)

- 3-wire sensor interface
- Sensor power same as external power supply for main board (6 to 30 VDC)
- Accuracy: 0.1% of full scale
- Temperature effect: 0.25% of full scale over operating temperature range of -40°F to 158°F (-40°C to 70°C)
- Resolution: 20 bits
- User-adjustable sample time and damping

Process Temperature Input

- 100-ohm platinum RTD with 2-wire, 3-wire, or 4-wire interface
- Sensing Range: -40°F to 800°F (-40°C to 427°C)
- Accuracy: 0.2°C (0.36°F) over sensing range at calibrated temperature
- Temperature effect (Fahrenheit): 0.54°F over operating range of -40°F to 158°F
- Temperature effect (Celsius): 0.3°C over operating range of -40°C to 70°C
- Resolution: 24 bits
- User-adjustable sample time and damping

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
 - Configurable pulse representation (1 pulse = 1 MCF)
 - Based on any accumulator (flow run or turbine inputs)
- 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
- Represents any measured variable (e.g., differential pressure) or calculated parameter (e.g., flow rate)
- Optically isolated
- Resolution: 16 bits

Memory

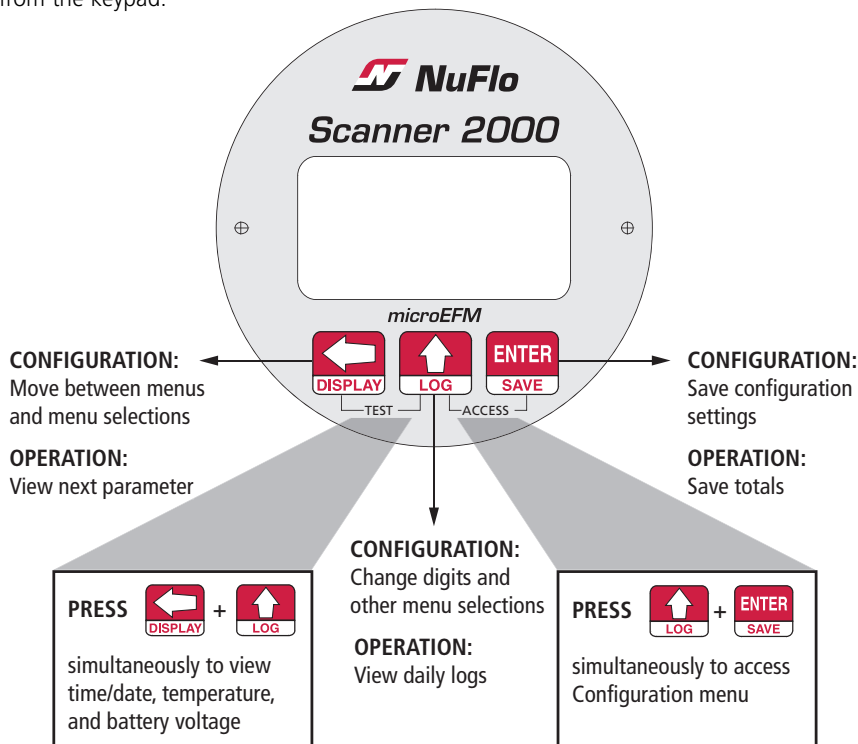
- Non-volatile memory for configuration and log data
 - 256 KB (512 KB with expansion board option)
 - Data stored for 10 years without power

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

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.



MVT Accuracy

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

MVT Pressure Ranges

Static Pressure /SWP (PSIA)	Differential Pressure (In. H ₂ O)	Maximum Overrange Pressure (PSIA)
100	30	150
300*	200*	450
	840	450
500*	200*	750
1500*	200*	2250
	300	2250
	400*	2250
	840	2250
3000**	200	4500
	300	4500
	400	4500
	840	4500
5300**	200	7420
	300	7420
	400	7420
	840	7420

* This MVT range is available in an explosion-proof or weatherproof package. Unmarked ranges are available in an explosion-proof package only.

** Not evaluated for Measurement Canada approval

Environmental

Operating Temperature Range

- -40°F to +158°F (-40°C to +70°C)
- LCD contrast is reduced below -22°F (-30°C)

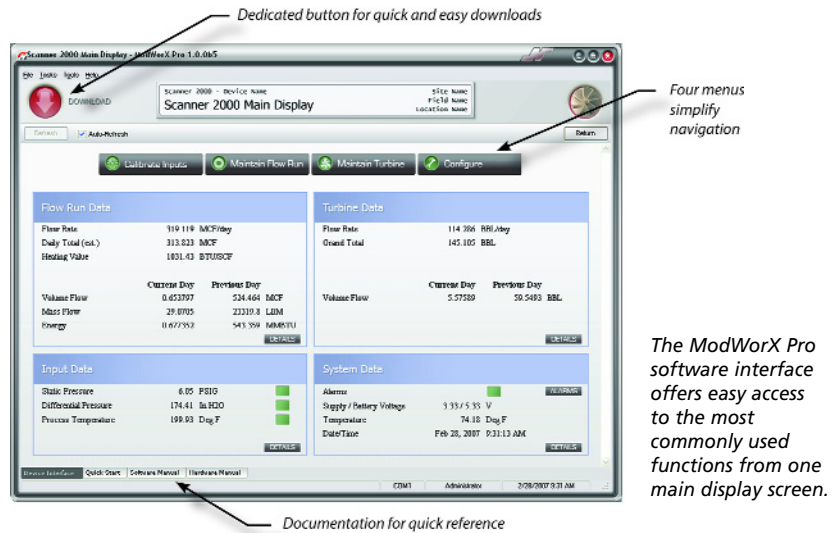
Audit Trail

- 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

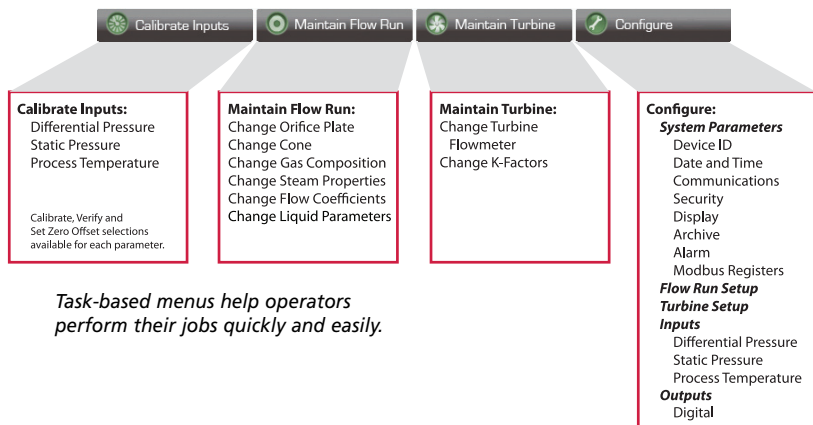
Interface Software

- 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 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, and Flow-Cal® 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



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.

MEASUREMENT SYSTEMS

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