

## NUFLO Scanner 2200 EFM

Cameron's NUFLO™ Scanner® 2200 EFM is Cameron's one-box solution for gas, liquid and steam measurement. This scanner pairs the same high-efficiency electronics used in the Scanner 2000 with a weatherproof enclosure, providing room for a battery, charge controller and radio or modem all in a single box.

### Three Power Options

The Scanner 2200 can be powered with the integral lithium battery, customer-supplied DC power or a customer-supplied solar panel.

The lithium battery supplied with the device ensures worry-free performance, and provides months of autonomous power even if the primary power source fails. Where there is a need to power communications peripherals, external power is recommended.

Solar-powered units and DC-powered units are shipped with an integral solar charge controller/DC power supply and a 12V, 33 amp/hr battery for supplying power to the instrument.

### Broad Range of Applications

High-speed communication via industry standard Modbus® and Enron Modbus protocols makes the integration of input and output devices easy and effective.

The Scanner 2200 can calculate flow from the differential pressure output of an orifice or cone meter using either the integral multivariable transmitter or a remote transmitter. Additionally, it can calculate flow from the linear pulse output of a turbine, positive displacement or vortex flow meter.

### Common applications include:

- AGA-3 compliant gas measurements using the integral MVT and a process temperature input
- AGA-7 compliant gas measurements using a pulse output gas meter (turbine, rotary or vortex)
- Compensated liquid measurements using an orifice, cone or averaging pitot meter
- Temperature-compensated liquid measurements using a liquid turbine meter and an in-line RTD

The instrument's integral MVT and two turbine inputs enable simultaneous measurements of three separate flow runs, which could represent a gas measurement, water measurement and oil measurement. Two pulse/contact inputs, two analog inputs, two digital outputs and an analog output are also provided.



*You really can have it all – data collection for up to three flow runs, worry-free lithium battery power and communications—in a single ready-to-install box.*

### PID Control



When purchased with the PID control option, the Scanner 2200 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, and control parameters are tuned with the easy-to-use tools, such as ModWorX Pro, that are built into the standard Scanner 2200 software platform.

Users can configure the Scanner 2200 to provide PID control of a single parameter, or opt for PID control of flow rate with a secondary pressure control.

See our feature profile on PID control for more information.

### Easy Configuration

Every Scanner 2200 EFM is shipped with ModWorX Pro software for configuring hardware and flow calculations, calibrating inputs and collecting and viewing flow history. Measurements can be logged as frequently as every five seconds, or once every 12 hours. The instrument can log 768 daily records (more than two years), 6392 interval records (more than eight months at one-hour intervals), and 1152 event alarm records.

### Quick and Easy Downloads

Data downloads to a laptop computer have never been easier. Just plug a USB cable into your computer and connect the other end to the external USB port in the side of the enclosure. Configurable radio power controls can also be enabled to power the radio only during desired download periods.

### Enclosure

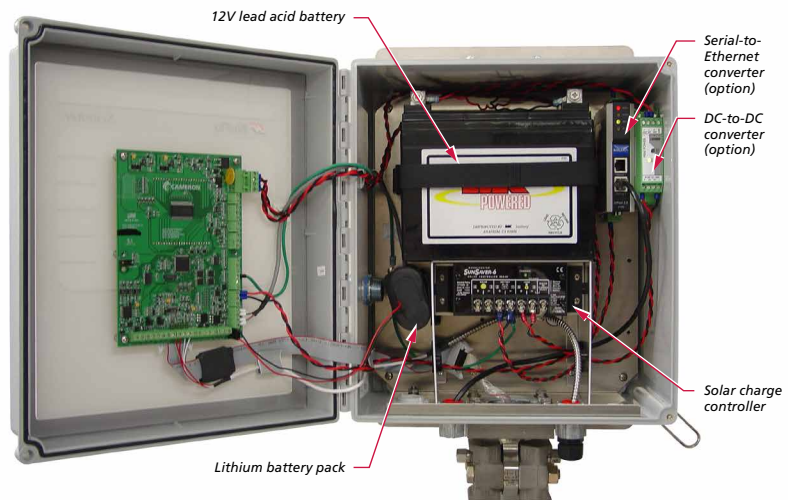
- Dimensions: 14" x 12" x 8"
- Supports mounting and signal connections for radios and modems

### Display

- Adjustable contrast
- Adjustable update period
- Two-line LCD readout
  - Eight-digit value display (top line)
  - Six-digit parameter scrolling display (bottom line)
- Easy-to-read 0.5" characters
- View up to 12 user-defined parameters
- Configurable units of measurement
- Adjustable contrast, update period and scroll duration

### Calculations

- Flow rate (natural gas, steam and liquid)
  - AGA-3
  - AGA-7
  - Compensated liquid turbine



The 14" x 12" x 8" weatherproof Scanner 2200 enclosure houses the electronic circuitry, an integral solar charge controller or DC power supply, a 12V, 33 amp/hour battery, a lithium battery pack and a radio or modem. Communications options include a DC-to-DC converter for powering an analog input or output loop with solar power, and a serial to Ethernet converter for connecting the EFM to an Ethernet network.

- ISO 5167
- Cone
- Averaging pitot tube (Annubar®)
- Fluid properties
  - AGA-8-92 (detail and gross)
  - 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)

### Certification

- Electrical classification
  - Approved by CSA for US and Canada-Class I, Div. 2, Groups A, B, C, D, T4
  - Rated for Internal Pollution Degree 2
  - CSA/UL Type 4 or 4X enclosure rating (ingress protection); Type 4X requires MVT with stainless steel bolts
  - ANSI 12.27.01 single seal (up to 3000 psi) at process temperatures from -40° F to 250° F (-40° C to 121° C)
- Pressure Classification
  - ASME pressure vessel code compliant, 0 to 3000 psi (CRN 0F10472.5C)

### Communications

- RTU Modbus communications
- Communications Port 1 – RS-485
  - Can be used simultaneously with Port 2
  - Selectable baud rate: 9600 to 38,400
- Communications Port 2 – USB, RS-232 or RS-485
  - External USB port for quick connections
  - Three connection options (only one can transmit/receive at a time)
  - Can be used simultaneously with Port 1
  - Selectable baud rate: 9600 to 38,400
  - Configurable radio control (can be used to manage radio power, based on state of charge or time of day)
- Full download in approximately 6 minute
- Enron Modbus compliant downloads
- User-defineable block reads allow the grouping of up to 25 floating point values for faster data transfer using a SCADA system

### Inputs

#### Turbine Meter Inputs 1 and 2

- Configurable sensitivity adjustment (20 mV to 200 mV, peak-to-peak)
- Frequency range: up to 3500 Hz
- Input amplitude: 20 mV to 3000 mV, peak-to-peak

### Pulse Inputs 1 and 2

- Accepts a signal from a turbine meter or positive displacement meter
- Optically isolated
- Input: 3 to 30 VDC or contact closure
- Can be used as a status input when Turbine Meter Input 2 is in use

### Analog Inputs 1 and 2

- Three-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 two-, three-, or four-wire interface
- Sensing Range: -40° F to 800° F (-40° C to 427° C)
- Accuracy: 0.36° F (0.2° C) 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 Outputs 1 and 2

- Configurable as pulse output or alarm output
- Solid-state relay
- Output rating: Maximum of 60 mA max at 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)
- Alarm output
  - Low/high
  - Out-of-range
  - Status/diagnostic

- Latched/unlatched
- Normally open/closed

#### Analog Output

- 4 to 20 mA
- Accuracy: 0.1% of full scale at 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)
- Regulates control valve in PID control applications
- Optically isolated
- Resolution: 16 bits

#### Memory

- Non-volatile memory for configuration and log data
  - 512 KB
  - Data stored for up to 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  $\pm 0.05\%$  of URL per year over a five-year period
- Differential pressure:  $\pm 0.05\%$  of span
  - Effect on differential pressure for a 100 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

#### Operating Temperatures

- Standard: 5° F to 122° F (-15° C to 50° C)
- Extended range with optional battery: -40° F to 140° F (-40° C to 60° C)
- LCD contrast is reduced below -22° F (-30° C)

#### Audit Trail

- API 21.1 compliant
- Daily records: 768 (more than 2 years)
- Interval records: 6392 (more than eight months of one-hour intervals)
  - Adjustable from five seconds to 12 hours
- Event/alarm records: 1152
- Records up to 16 user-defined parameters

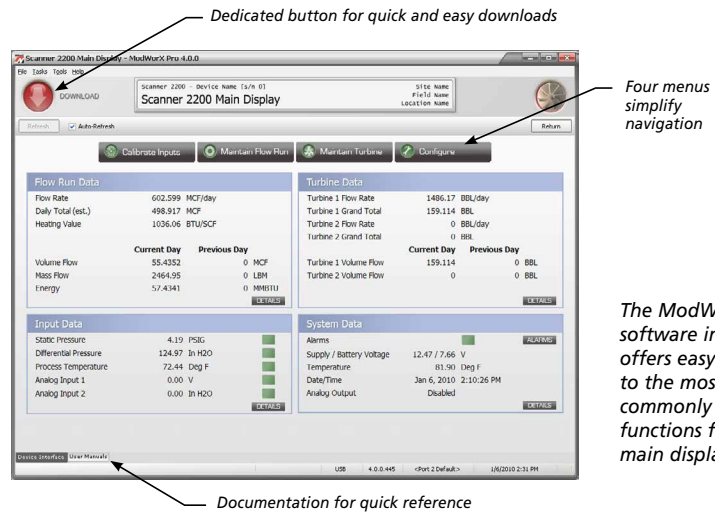
#### Interface Software

- Provided at no charge
- Easy-to use
- Internal links to hardware and software manuals
- Real-time data polling
- Complete configuration
  - Configuration upload tool for configuring multiple units
- Multilevel security
- Field calibration
  - 1 to 12 calibration points for each parameter
  - Three methods: multipoint, set zero point and verify
  - Inputs are automatically locked during calibration

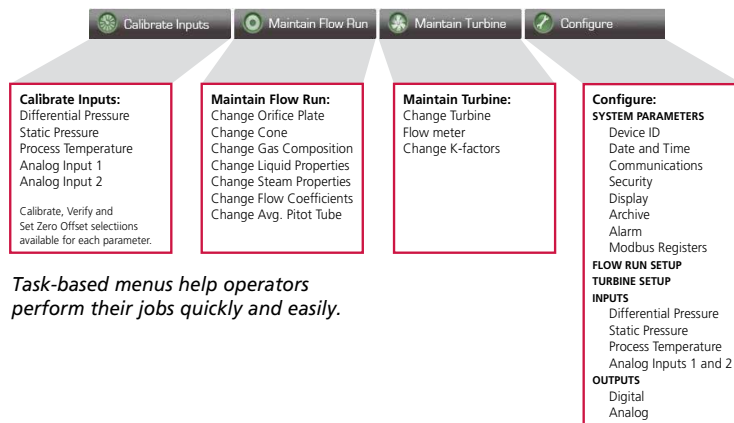
#### MVT Pressure Ranges

Static Pressure /SWP (PSIA)	Differential Pressure (In. H <sub>2</sub> 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

- 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 flow meter
- 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



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.

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