

+ 2000 series NUFLO Scanner

Flow computer

The 2000 series NUFLO* Scanner flow computer delivers improved user experience and ROI to your operations, whether you need single-stream flow measurement or a full SCADA solution for optimal measurement and control. Each 2000 series NUFLO Scanner flow computer comes field-ready with simple wired or wireless configurations—ready for installation.

APPLICATIONS

Measurement and control of

- + Hydrocarbon liquid or gas
- + Water
- + Steam

BENEFITS

Automation cost reduction through

- + LAN-style wireless
- + Imbedded power source
- + Factory-integrated flowmeters

FEATURES

- + Custody-transfer-caliber measurement
- + Wellhead tubing, casing pressure, or other remote terminal unit (RTU) monitoring
- + Electronic flowmeter and RTU functionality
- + Proportional-integral-derivative (PID) controller option
- + Modbus® communications
- + Sensors for differential pressure or pulse-producing flowmeters

NUFLO SCANNER 2000 FLOW COMPUTER

- + Self-contained chart recorder or SCADA node
- + Compact enclosure
- + Wired data transfer
- + DC power input or integral single-use lithium batteries
- + Turbine, multivariable transmitter (MVT), or remote mount
- + Class I, Division 1 National Electrical Code (NEC) and Canadian Electrical Code (CEC) certifications
- + ATEX/ IECEx global certifications
- + FOUNDATION™ fieldbus communications available



NUFLO SCANNER 2100 AND 2105 FLOW COMPUTERS

- + Optional SmartMesh® short-haul communications
- + Large enclosure that easily accommodates expansion I/O and associated wiring connections
- + Easy access to rechargeable sealed lead acid (SLA) or extra-long-life single-use lithium batteries
- + Direct solar input or 4 to 20mA loop powered (NUFLO Scanner 2105 computer only)
- + Class I, Division 1 and 2 National Electrical Code (NEC) and Canadian Electrical Code (CEC) certifications
- + ATEX/ IECEx global certifications (NUFLO Scanner 2100 only)



NUFLO SCANNER 2200 FLOW COMPUTER

- + Long-haul communication device support
- + Large enclosure that accommodates wireless devices and automation accessories
- + Easy access to rechargeable SLA batteries or extra-long-life single-use lithium batteries
- + Direct solar or DC power input
- + Class I, Division 2 National Electrical Code (NEC) and Canadian Electrical Code (CEC) certifications



The 2000 series NUFLO Scanner flow computer is among the most versatile flow measurement devices on the market. Each device can operate independently as a flow computer, RTU, or process controller or as an electronic flow meter (EFM) node in a comprehensive SCADA network.

The 2000 series NUFLO Scanner flow computer is a dependable alternative to a manual chart recorder or it can be used as a measurement and control point in a SCADA network.

The NUFLO Scanner 2100 flow computer builds on the NUFLO Scanner 2000 computer functionality and makes deployment in a wired SCADA network easier with more wire entries, more termination space, and nearly 2 years of battery autonomy.

The NUFLO Scanner 2105 computer offers power and I/O options not found on the NUFLO Scanner 2100 computer. When installing the NUFLO Scanner 2105 computer, you can choose from four power source options:

- + Rechargeable/removable SLA battery pack. The quick-change SLA battery pack provides 21 days of power autonomy and can be charged off-site. A patent-pending high-precision power monitor accurately reports the amount of battery life remaining. The SLA battery pack is not classified as dangerous goods and can be transported by air. Accessing the battery pack in a Division 1 hazardous location requires declassification of the area.
- + Lithium battery pack, 7.2V
- + Solar panel. An unregulated solar panel input enables in situ charging of the SLA pack. The NUFLO Scanner 2105 computer's patent-pending battery charge monitor and controller gather energy for solar panels even when they are unable to deliver full voltage due to low or indirect ambient light conditions.
- + External DC source with or without internal battery pack
- + Two-wire loop power. The standard 4- to 20-mA output on the NUFLO Scanner 2105 computer can be assigned to represent a variety of variables. When connected, the NUFLO Scanner 2105 computer is powered by the energy in this loop. This makes the NUFLO Scanner 2105 computer as cost-efficient to deploy as a standard process transmitter.

An optional input board supports two analog inputs and an additional frequency input.

The NUFLO Scanner 2200 flow computer comes with a Division 2 weatherproof package providing ample space for long-haul communications devices, charge controller or DC power supply, and rechargeable battery for solar-powered installations.

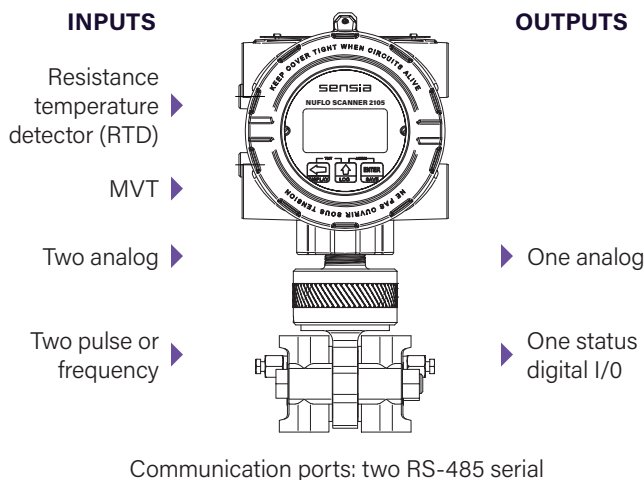
VERSATILE MEASUREMENT

The 2000 series NUFLO Scanner flow computer can measure standard volume, mass, and energy flows of saturated steam and many types of gases and liquids. All measurements are custody-transfer caliber and supported with records that comply with requirements such as the Sarbanes–Oxley Act, Federal Energy Regulatory Commission FERC 23, and Alberta Energy Regulator Directive 17.

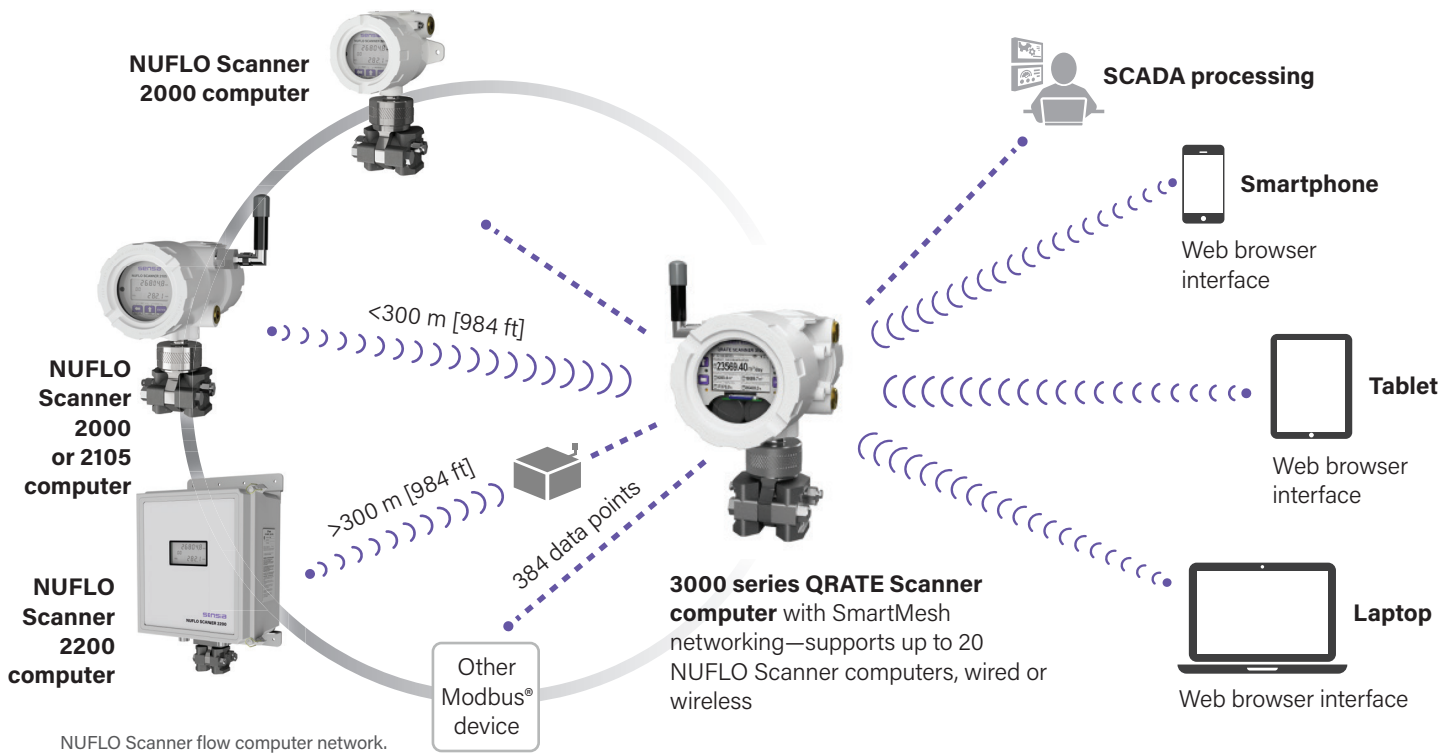
The NUFLO Scanner 2000, 2100, and 2200 flow computers can operate autonomously on an internal lithium battery for a year or longer. When external power is applied, the lithium battery pack is on standby to ensure uninterrupted measurement without an expensive reserve power system.

An integrated sensor for differential pressure, absolute pressure, and temperature measurements makes this self-contained flow computer an efficient alternative to chart recorders. When connected to additional flowmeters, a 2000 series NUFLO Scanner flow computer is powerful enough to measure the gas, oil, and water from a two- or three-phase separator.

NUFLO Scanner flow computers can be factory mounted and configured to NUFLO cone meters for cost savings and efficient field commissioning. They can also be remote mounted to automation devices and flowmeters, including our gas and liquid turbine and ultrasonic flowmeters.



PID control.



NUFLO Scanner flow computer network.

DATA LOGGING

The 2000 series NUFLO Scanner computers can monitor multiple values simultaneously, including those used solely for process system analysis compared with conventional RTUs and flow computers.

In addition to daily logs, users can record up to 14 measurements as frequently as every 5 seconds for monitoring flow-sensitive processes such as well startup or well testing. The duration of the interval log varies depending on device memory and configuration.

CONTROL

The 2000 series NUFLO Scanner computers enable threshold values to be assigned to any measured or computed value for controlling a process with a status output. The output can be configured to trigger when one or all selected conditions exceed the threshold and can be latched (requiring user acknowledgment to reset) or unlatched for automatic reset.

When equipped with a 4- to 20-mA output and the PID control option, the 2000 series NUFLO Scanner computers can effectively control process variables such as static pressure, differential pressure, temperature, or flow rate. The output is configured to regulate a control valve or an adjustable speed drive and control parameters are tuned with the software provided. An NUFLO Scanner computer with an PID can control a single parameter or a parameter in combination with a secondary pressure control.

FOUNDATION FIELDBUS COMMUNICATIONS

The NUFLO Scanner computer for FOUNDATION™ fieldbus is certified by the Fieldbus Foundation for interoperability. The fieldbus network supplies power for normal operations.

A fieldbus host may read differential pressure, pressure, temperature, and flow rate from analog input blocks, and additional measurement variables from transducer blocks. The remaining RS-485 serial port may be used to collect Modbus data or history logs, configure a flow run, or maintain flow run configurations.

DISTRIBUTED AUTOMATION SOLUTION

When automation requirements exceed the capacity of a single flow computer, our networking innovation provides a cost-saving solution. Through the deployment of multiple NUFLO Scanner computers and a web-accessible 3000 series QRATE Scanner integrated control flow computer network manager, users can access data for up to 22 flow streams through a single device with enhanced data protection.

Unlike centralized automation systems in which lost or delayed data transmissions threaten the integrity of flow computations, the Sensia solution is, by design, immune to these risks. Each computer measures and logs the flow data at the point of measurement before sending a copy to the network manager, so even if a transmission fails, the data remains secure and API 21.1 compliant. Should communications be interrupted, NUFLO Scanner computers and the network manager automatically synchronize to restore missing data records.

Other benefits include the following:




- + Reduced cost. Installation costs are reduced due to two-wire RS-485 communication.
- + System overload protection. Computing capacity increases with each computer added to the network, so the system is never overloaded.
- + Reduced dependency on power. Each 2000 series NUFLO Scanner computer can operate for months on a single battery pack; if external power is lost, measurement continues uninterrupted.
- + Local data access. Current flow results are displayed at the point of measurement.

WIRELESS FLOW COMPUTING

The potential for cost savings of up to 50% on flow computer installation has sparked growing interest in wireless instrumentation. Standard wireless process transmitters cannot provide data rapidly and reliably but our wireless option can.

Our innovative use of low-power flow computers for capturing primary measurements and computing results—and storing them at the point of measurement—has revolutionized the use of wireless as a viable flow computing option. This redundant storage technique allows operators to optimize their deployments with a combination of 2000 series NUFLO Scanner computers and wireless or wired communications without compromising data integrity.

SERIES 2000 NUFLO SCANNER FLOW COMPUTER MODEL SPECIFICATIONS

	NUFLO Scanner 2000 computer	NUFLO Scanner 2100 and 2105 computer	NUFLO Scanner 2200 computer
			
Approvals			
CSA (US and Canada)	Explosion-proof† Class I, Div. 1, Groups B, C, D, T6 FOUNDATION fieldbus (optional)	Explosion-proof† Class I, Div. 1, Groups C, D, T6 2105—, Class I, Div 2 with SLA, T4A 2105— Class I, Div 2 with lithium, T5	—
	Nonarcing Class I, Div. 2, Groups A, B, C, D, T6 Type 4 weatherproof† rating	Nonarcing Class I, Div. 2, Groups A, B, C, D, T6 Type 4 weatherproof† rating	Class I, Div. 2, Groups A, B, C, D, T4 Rated for Internal Pollution Degree 2 Type 4 or 4X weatherproof† rating (4X requires MVT with stainless-steel or Inconel® bolts)
	ANSI 12.27.01 single seal (MVT ≤ 3,000 psi)	ANSI 12.27.01 single seal (MVT ≤ 3,000 psi)	ANSI 12.27.01 single seal (MVT ≤ 3,000 psi) at process temperatures from -40 to 250 degF [-40 to 121 degC]
ATEX and IECEx	Flame-proof† Equipment Group II, Category 2 for gas and dust Ex d IIC Gb T6 Ex tb IIIC Db T85 degC IP66 weatherproof† rating FOUNDATION fieldbus requires communications isolation accessory	2100 only — Flame-proof† Equipment Group II, Category 2 for gas and dust Ex d [ia Ga] ib IIC T5 Gb Ex tb [ia Da] ib IIIC T100 degC Db IP66 weatherproof rating NUFLO* SCANNER 2105 computer ratings pending	—
	CE EMC Directive 2014/30/EU	CE EMC Directive 2014/30/EU	— —
ATEX	Intrinsically safe Equipment Group II, Category 2 for gas Ex ia IIB T4 Gb IP66 weatherproof† rating FOUNDATION fieldbus requires communications isolation accessory	—	—
	CE EMC Directive 2004/108/EC	— —	— —
Other	ASME (MVT ≤ 3,000 psi) CRN 0F10472.5C Measurement Canada (MVT ≤ 1,500 psi), AG-0557 EAC (formerly GOST-R/GOST-K)	ASME (MVT ≤ 3,000 psi) CRN 0F10472.5C — —	ASME (MVT ≤ 3,000 psi) CRN 0F10472.5C — —
Operating temperature, degF [degC]	-40 to 158 [-40 to 70]	-40 to 158 [-40 to 70] 2105 — with SLA battery, -40 to 140 [-40 to 60]	Standard: 5 to 122 [-15 to 50] Extended range with optional battery: -40 to 140 [-40 to 60]

† Explosion-proof, flame-proof, weatherproof, and intrinsically safe as defined by CEC, NEC, ATEX, IEC, and CE codes.

	NUFLO Scanner 2000 computer	NUFLO Scanner 2100 and 2105 computer	NUFLO Scanner 2200 computer
Physical			
Enclosure	Cast aluminum (less than 0.05% copper) painted with epoxy and polyurethane; 316 stainless-steel optional for marine applications	Cast aluminum (less than 0.05% copper) painted with epoxy and polyurethane	Fiberglass®, weatherproof†: rectangular
	Single ended with window	Double ended with window	
	Three conduit entries, 3/4-in national pipe thread (NPT) standard; capacity for five conduit entries with optional terminal housing	Four conduit entries, 3/4-in NPT standard; capacity for eight conduit entries with a special option four-port MVT adapter on model 2100	Two conduit entries, 1/2-in NPT hubs plus one sealed hole
	Dimensions: 5.71-in wide, 5-in deep, 9.6-in tall with MVT; 7.92-in tall with turbine mount adapter	Dimensions: 5.43-in wide, 11.28-in deep, 10.76-in tall	Dimensions: 12-in wide, 8-in deep, 14-in tall
Display and keypad	Two-line scrolling LCD that displays up to 12 user-defined parameters and up to 99 daily logs	Two-line scrolling LCD that displays up to 12 user-defined parameters and up to 99 daily logs	Two-line scrolling LCD that displays up to 12 user-defined parameters
	Three-key membrane switch that supports limited configuration for device maintenance	Three-key membrane switch that supports limited configuration for device maintenance	—
Weight	11.2 lbm [5.08 kg] with MVT	17.3 lbm [7.85 kg] with MVT and antenna	50 lbm [22.7 kg] with a rechargeable battery and MVT
Mounting options	Direct mount to turbine or differential pressure meter; remote mount to 2-in pole	Direct mount to differential pressure meter; remote mount to 2-in pole	Wall mount or 2-in pole mount
Power	Lithium DD battery pack (air transport regulations apply)	Lithium DD battery pack (holds two packs) (air transport regulations apply) 2105 —rechargeable sealed lead acid (SLA) battery pack (not dangerous goods—air transportable)	Lithium DD battery pack as optional uninterruptable power supply (air transport regulations apply)
	External power supply (6 to 30 VDC) with internal lithium battery backup	2100 —External power supply (6- to 30-VDC CSA version; 9- to 30-VDC ATEX and IEC version) with internal lithium battery backup 2105 —External power supply (9- to 30-VDC)	External power supply (16 to 28 VDC) or solar power Optional 12-V, 33-A/h rechargeable battery or charge controller with 24-V output option for powering external instruments
	Fieldbus power supply with internal lithium battery backup	2105 —4- to 20-mA-loop powered	—
Communications and archive	Wired	Wireless SmartMesh† or wired	Long-haul wireless or wired
	Two onboard RS-485 ports (reduced to one port for intrinsically safe device, FOUNDATION fieldbus device, or when an external USB or RS-485 adapter is installed)	Two onboard RS-485 ports (reduced to one port for a wireless device or when an external USB or RS-485 adapter is installed)	One onboard RS-485 port; second port shared by three connections; supports USB, RS-232, or RS-485 (only one can transmit or receive at a time)
	Modbus protocol 300–38,400 bps	Modbus protocol 300–38,400 bps	Modbus protocol 9,600–38,400 bps
External connections	USB or RS-485 (optional)	USB or RS-485 (optional)	USB (standard)
Wireless communications	—	IEEE 802.15.4 2.4-GHz SmartMesh networking wireless radio with time-slotted channel hopping (supports network communications to a series 3000 QRATE Scanner computer network manager)†	Any third-party communication device (spread spectrum, cellular, satellite, etc.); power control provided by the NUFLO Scanner computer based on state of charge or time of day
Accessories	—	Antennas and cables	Antennas and cables, serial-to-Ethernet converter
FOUNDATION fieldbus	Optional with explosion-proof-rated† device	—	—

† Explosion-proof, weatherproof, and intrinsically safe as defined by CEC, NEC, ATEX, IEC, and CE codes.

* NUFLO Scanner products were previously branded as Cameron by Schlumberger prior to the Sensia joint venture with Rockwell Automation. During the brand transition 3000 series QRATE Scanner models may be delivered with legacy Cameron brand identity.

	NUFLO Scanner 2000 computer	NUFLO Scanner 2100 and 2105 computer	NUFLO Scanner 2200 computer
I/O			
Turbine input	One	One	Two
Pulse input	One with I/O expansion board (can be a second turbine input)	One with I/O expansion board (can be a second turbine input)	Two
Process temperature input	One	One	One
Analog input	Two with I/O expansion board	Two with I/O expansion board	Two
Digital output	One	One	Two
Analog output	One with I/O expansion board	2100 —One with I/O expansion board 2105 —One standard	One
Data logging	Up to 16 user-selected parameters; adjustable logging frequency from 5 s to 24 h Daily records: 768 (> 2 years) Interval (hourly) records: 2,304 (> 3 months) standard; 6,392 (> 8 months) with I/O expansion board	Up to 16 user-selected parameters; adjustable logging frequency from 5 s to 24 h Daily records: 768 (> 2 years) Interval (hourly) records: 2,304 (> 3 months) standard; 6,392 (> 8 months) with I/O expansion board	Up to 16 user-selected parameters; adjustable logging frequency from 5 s to 24 h Daily records: 768 (> 2 years) Interval (hourly) records: 6,392 (> 8 months)
Hardware options	I/O expansion board (not available with FOUNDATION fieldbus communications) PID control (requires I/O expansion board) External USB adapter External RS-485 adapter Momentary control switch — Terminal housing (adds two conduit entries); approved for Class I, Div. 1, Groups C and D installations only	I/O expansion board (not available on NUFLO Scanner 2100 computer equipped for SmartMesh networking) PID control (requires analog output) External USB adapter External RS-485 adapter Momentary control switch 2100 —Toggle power switch —	— PID control — — — — —

CALCULATIONS

The 2000 series NUFLO Scanner flow computers can measure standard volume, mass, and energy flows of saturated steam and many types of gases and liquids. All measurements are custody-transfer caliber and fully compliant to API 21.1 requirements. Records comply with requirements of Sarbanes-Oxley Act, Federal Energy Regulatory Commission (FERC) 23, and Alberta Energy Regulator Directive 17.

FLOW RATE (NATURAL GAS, STEAM, OR LIQUID)

- + AGA-3 (1992 and 2012)
- + AGA-7
- + ISO 5167
- + ASME MFC-14M
- + Cone
- + Averaging pilot tube

FLUID PROPERTIES

- + AGA-8-94 (detail and gross)
- + AGA-3, App. F
- + GPA 2145
- + IF-97 (steam)
- + Generic liquid (water or emulsions)
- + API 11.1

WET CORRECTION (STEAM)

- + James (orifice meters)
- + Chisolm-Steven (orifice and cone meters)

I/O	
Turbine input	Configurable sensitivity adjustment (20–200 mV, peak to peak) Frequency range: 0–3,500 Hz Input amplitude: 20–3,000 mV, peak to peak With the NUFLO 2200 computer, turbine input 2 can be used simultaneously as an input status
Process temperature input, degF [degC]	100-ohm platinum RTD with two-, three-, or four-wire interface Sensing range: –40 to 800 [–40 to 427] Accuracy: 0.36 [0.2] over sensing range at calibrated temperature Temperature effect: ±0.54 [±0.3] over operating range
Pulse input	Accepts a signal from a turbine meter or PD meter Optically isolated Input: 3–30 VDC or contact closure
Analog input	Three-wire sensor interface (0 to 5 V, 1 to 5 V, 4 to 20 mA) Sensor power for the NUFLO 2105 computer provides power for low-powered transmitters except when in loop-powered mode Accuracy: 0.1% of full scale Temperature effect: 0.25% of full scale over operating temperature range Resolution: 20 bits User-adjustable sample time and damping
Digital output	Configurable as pulse output or alarm output Solid-state relay Output rating: 60-mA maximum at 30 VDC Pulse output: Configurable pulse duration Maximum frequency: 50 Hz Configurable pulse representation (1 pulse = 1,000 ft ³) Based on any accumulator (flow run or turbine inputs) Alarm output: Low and high Out of range Status and diagnostic Latched and unlatched Normally open and normally closed
Analog output	4 to 20 mA Accuracy: 0.1% full scale at 77 degF [25 degC] Temperature drift: 27.8 ppm/degF [50 ppm/degC] Representation of 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
MVT	Linearized digital data for static pressure (absolute) and differential pressure Available with bottom ports (gas) or side ports (liquid or steam) Compliance with prequalified materials of NACE MR0175/ISO 15156 [†] Process temperature: –40 to 250 degF [–40 to 121 degC] User-adjustable sample time and damping

[†] This certification does not imply or warrant the application of the MVT in compliance with NACE MR0175/ISO 15156 service conditions in which the MVT is installed.

STAINLESS-STEEL NUFLO SCANNER 2000 FLOW COMPUTER OPTION

For corrosion-free service in harsh marine applications, Sensia offers a 316 stainless-steel flame-proof NUFLO Scanner 2000 flow computer enclosure option.

- + Ex d IIC T6 Gb (combustible gas)
- + Ex tb IIIC T85 degC Db (combustible dust)
- + Ambient temperature: –40 to 158 degF [–40 to 70 degC]
- + IP 66 rating



The stainless-steel model is 3.4 lbm [1.54 kg] heavier than the standard model. Dimensions are identical. The housing exterior is unpainted, cast stainless steel; nonstructural surface imperfections are common.

To complete the marine package, the NUFLO Scanner 2000 flow computer is coupled to a turbine flowmeter by a 304 stainless-steel tube or connected to a 316 stainless-steel MVT with Inconel bolts. NUFLO and BARTON* turbine flowmeters with ATEX and PED certifications are available upon request.

COMMISSIONING, TRAINING, AND SUPPORT SERVICES

As a leading provider of flow equipment to worldwide oil, gas, and process industries, Sensia offers expert support to help customers improve productivity, enhance system performance, and increase profitability.

Our services include:

- + Measurement consulting
- + Startup assistance and commissioning
- + Measurement audits
- + Field services
- + Product training and measurement seminars

MVT SPECIFICATIONS

- + Linearized measurement for static pressure and differential pressure
- + Pressure measurement in absolute and displays in gauge
- + Standard MVT has bottom ports, ideal for gas measurement†
- + Process temperature: -40 to 250 degF [-40 to 121 degC]
- + User-adjustable sample time and damping
- + Compliance with prequalified materials of NACE MR0175/ISO 15156§

MVT Accuracy

Differential pressure (DP), %	± 0.05 of range for all except 30-in H ₂ O ± 0.1 of range for 30-in H ₂ O
Static pressure, %	± 0.05 of range
Temperature effect	± 0.25 of full scale over operating range
Stability (long-term drift), %	Less than ± 0.05 of upper range limit (URL) per year over a 5-year period
Resolution	24 bits

Effect on DP for a 100-psi Pressure Change

Range, in Water	Zero Shift, % URL	Span Shift, % Reading
30	.05	.01
200†	.01	.01
400	.04	.01
800	.04	.01

† 200 x 300 psi has a zero shift of .007% and a span shift of .01%.

DATA REPORTING TOOL

The ScanData analysis and reporting software opens and formats the flow history records, alarm logs, change logs, and configuration reports acquired from a NUFLO Scanner computer download. The flow records are presented in spreadsheet or graphical styles and can be directed to the configurable report writer. To share records with others, all the data can be formatted in multiple Windows formats or converted to Quorum PGAS® and Flow-Cal software formats.

Users can view flow data in tabular or trend displays and create a customized template for generating professional reports that are personalized with a company name and logo.

CONFIGURATION INTERFACE

ModWorX software is our custom interface for configuring and maintaining 2000 series NUFLO Scanner flow computers. Features include:

- + 12-point calibration
- + Real-time polling
- + Downloads of flow logs, configuration data, and event and alarm records
- + Configuration file upload tool for configuring multiple units
- + PID tuning controls (for units that are factory-configured with the PID control option)

MVT Pressure Ranges†

Static Pressure and Safe Working Pressure (SWP), psi (Absolute)	Differential Pressure, in H ₂ O	Maximum Overrange Pressure, psi (Absolute)
100	30	150
300	200 or 840	450
500	30 or 200	750
1,500	200, 400, or 840	2,250
3,000	200, 400, or 840	4,500
5,300	200, 400, or 840	7,420

† Other custom ranges available on request.

Materials of Construction

Body bolts and nuts	B7/2H alloy steel standard
Process cover	316 stainless steel†
Process cover gasket	Glass-filled polytetrafluoroethylene (PTFE)
Diaphragm	316L stainless steel†
Vent and drain	Stainless-steel bleed (316 stainless-steel plug is standard for NACE and coastal applications)

† Custom ranges available by special order

Body Bolts and Nuts (Nonprocess Wetted)

	B7/2H Alloy Steel	B7M/2HM Alloy Steel	316 Stainless Steel	17-4 PH® Stainless Steel	Inconel 718
NACE use	No	Yes	No	No	Yes
Coastal use	Possible†	Possible†	Yes	No†	Yes
Maximum pressure, psi	5,300	1,500	1,500	3,000	5,300
Coating	Plated	Black oxide	-	-	-

† B7 and B7M alloy steel susceptible to corrosion.

‡ Chloride stress cracking risk.

‡ Side port MVT for liquid measurement is available by special order.

§ This certification does not imply or warrant the application of the MVT in compliance with NACE MR0175/ISO 15156 service conditions in which the MVT is installed.

NUFLO Scanner 2000 flow computer

Code	Description
Certification	
X1	CSA for US and Canada, Class I, Div. 1 (explosion-proof†); Class I, Div. 2 (weatherproof†)
X4	CSA for US and Canada, Class I, Div. 1 (explosion-proof†); Class I, Div. 2 (weatherproof†) with Measurement Canada approval
XA	ATEX, IECEx II 2 GD Ex d IIC T6 IP66 (flame-proof†)—aluminum housing
XC	ATEX, IECEx II 2G Ex ia IIB T4 IP66 (intrinsically safe†) wired connections limited to an RTD, frequency input, and pulse output; Special communication port restrictions and interface required
XZ	ATEX, IECEx II 2 GD Ex d IIC T6 IP66 (flame-proof†)—316 stainless-steel housing

Note: The enclosure is individually rated for IP68 and Type 4X protection.

Direct-Mount MVT or Turbine

00	None (brass conduit plug installed)
X1	MVT with CRN—Enclosure 4
HP	MVT, high pressure, no CRN—Enclosure 4
X2	NUFLO turbine flowmeter, plated steel adapter—Enclosure 4—available with CSA only
X3	NUFLO turbine flowmeter, stainless-steel tube standoff—available with ATEX only
X5	BARTON turbine flowmeter, stainless-steel tube standoff—available with ATEX only

	MVT Materials and Trim Package (Omit Code When MVT is Not Required)	Pressure Rating, psi	Diaphragms	1/4-in NPT Side Ports	Bolts and Nuts
A	Standard	All	316 stainless steel	Stainless-steel vent plug	Plated steel
C	Stainless-steel bolting	≤ 3,000	316 stainless steel	Stainless-steel vent plug	316 stainless steel
D	NACE (B7M not for offshore)	≤ 1,500	316 stainless steel	316 stainless-steel pipe plug	B7M/ 2HM
E	NACE (Inconel bolting)	All	316 stainless steel	316 stainless-steel pipe plug	Inconel 718

MVT Certificates and Reports (Omit Code When MVT Documentation is Not Required)

M	Mill test reports for MVT
N	NACE certificate
F	Full—NACE certificate with mill test reports for MVT
MVT Process Connections	
LP	One set on bottom, for gas service, vertical piping. For liquid or steam service, install the NUFLO Scanner computer upside down and rotate the display 180° (requires display extension cable)
SI	Two sets on each end, for liquid or steam service, horizontal piping (special order)

MVT Ranges

0103	100 psi (absolute), 30 in H ₂ O	
0503	500 psi (absolute), 30 in H ₂ O	Special order
0320	300 psi (absolute), 200 in H ₂ O	
0384	300 psi (absolute), 840 in H ₂ O	
0520	500 psi (absolute), 200 in H ₂ O	
1520	1,500 psi (absolute), 200 in H ₂ O	
1540	1,500 psi (absolute), 400 in H ₂ O	
1584	1,500 psi (absolute), 840 in H ₂ O	
3020	3,000 psi (absolute), 200 in H ₂ O	
3040	3,000 psi (absolute), 400 in H ₂ O	3,000-psi range with 316 stainless-steel bolts has a CRN SWP limit of 2,725 psi.
3084	3,000 psi (absolute), 840 in H ₂ O	
5320	5,300 psi (absolute), 200 in H ₂ O	
5340	5,300 psi (absolute), 400 in H ₂ O	5,300-psi range requires MVT code HP and has a CRN SWP limit of 3,625 psi. Single seal is limited to 3,000 psi.
5384	5,300 psi (absolute), 840 in H ₂ O	
XX1K	> 300 psi (absolute), 1,000 in H ₂ O	Special order

Battery

X	None
1	Lithium—2D, 7.2 VDC—restricts transportation methods

The NUFLO Scanner 2000 empty housing is weatherproof certified by the manufacturer as enclosure 4X.

NUFLO Scanner 2000 flow computer**Code Description****Expansion Board**

00	None
A1	I/O type, one turbine flowmeter, two analog input, one analog output, one pulse input
F1	FOUNDATION Fieldbus communications

Firmware

00S	Standard
PID	PID control (available with I/O expansion board only)

Mounting Bracket

00	None
0C	Pole or wall mount—plated steel
0D	Pole or wall mount—stainless steel

RTD Temperature Sensor Assembly

RTDs, thermowells, and manifolds should be ordered as separate line items

A	None
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Terminal Housing (Consider NUFLO Scanner Model 2100 as an Alternate)

00	None	Class I, Div. 1, Groups B, C, D (explosion-proof†) or Class I, Div. 2, Groups A, B, C, D not available with ATEX flameproof† code (XA)
TB	Terminal housing with brass plugs	
TS	Terminal housing with stainless-steel plugs	Class I, Div. 1, Groups C, D (explosion-proof†) or Class I, Div. 2; not available with ATEX flameproof† code (XA)

Conduit Connections

BB	Brass plugs	
BC	Brass plug with RS-485 communication connector	
BR	Brass plug with reset switch	Not available with terminal housing option TS
BU	Brass plug with USB communication connector	
SS	Stainless-steel plugs	
SC	Stainless-steel plug with RS-485 communication connector	
SR	Stainless-steel plug with reset switch	Not available with terminal housing option TB
SU	Stainless-steel plug with USB communication connector	
RC	Reset switch with RS-485 communication connector	
RU	Reset switch with USB communication connector	

† Explosion-proof, flame-proof, weatherproof, and intrinsically safe as defined by CEC, NEC, ATEX, IEC, and CE Codes.

Note: Consider the number of conduit openings and limited interior wiring space in the 2000 series NUFLO Scanner flow computer housing when selecting options. When the NUFLO Scanner flow computer is equipped with an MVT, the NUFLO Scanner 2100 or 2105 flow computer is recommended. When the NUFLO Scanner flow computer is to be attached directly to a turbine meter, the terminal housing is recommended.

NUFLO Scanner 2100 and 2105 flow computer

Code	Description				
Enclosure					
X	Explosion-proof† and weatherproof†				
Certification					
X5	NEC (US) and CEC (Canada) Class I, Div. 1, Groups C and D, Div. 2, Enclosure 4				
XB	ATEX/IECEX (NUFLO Scanner 2000 only), II 2 GD Ex D IIC T6 IP66 (Flame-proof)				
Direct-Mount MVT					
00	None (brass conduit plug installed)				
X1	MVT with CRN—Enclosure 4				
HP	MVT, high pressure, no CRN—Enclosure 4				
	MVT Materials and Trim Package (Omit Code When MVT is Not Required)	Pressure Rating, psi	Diaphragms	1/4-in NPT Side Ports	Bolts and Nuts
A	Standard	All	316 stainless steel	Stainless-steel vent plug	Plated steel
C	Stainless-steel bolting	≤ 3,000	316 stainless steel	Stainless-steel vent plug	316 stainless steel
D	NACE (B7M not for offshore)	≤ 1,500	316 stainless steel	316 stainless-steel pipe plug	B7M/ 2HM
E	NACE (Inconel bolting)	All	316 stainless steel	316 stainless-steel pipe plug	Inconel 718
MVT Certificates and Reports (Omit Code When MVT Documentation is Not Required)					
M	Mill test reports for MVT (mill certification increases the price and delivery lead time)				
N	NACE certificate				
F	Full—NACE certificate with mill test reports for MVT				
MVT Process Connections (Omit Code When MVT is Not Required)					
LP	One set on bottom, for gas service, vertical piping. Invert NUFLO Scanner flow computer for liquid or steam service. Requires option to invert the display.				
SI	Two sets on each end, alternative for liquid or steam service, horizontal piping				
MVT Ranges (Omit Code When MVT is Not Required)					
0103	100 psi (absolute), 30 in H ₂ O				
0503	500 psi (absolute), 30 in H ₂ O	Special order			
0320	300 psi (absolute), 200 in H ₂ O				
0384	300 psi (absolute), 840 in H ₂ O				
0520	500 psi (absolute), 200 in H ₂ O				
1520	1,500 psi (absolute), 200 in H ₂ O				
1540	1,500 psi (absolute), 400 in H ₂ O				
1584	1,500 psi (absolute), 840 in H ₂ O				
3020	3,000 psi (absolute), 200 in H ₂ O				
3040	3,000 psi (absolute), 400 in H ₂ O	3,000-psi range with 316 stainless-steel bolts has a CRN SWP limit of 2,725 psi.			
3084	3,000 psi (absolute), 840 in H ₂ O				
5320	5,300 psi (absolute), 200 in H ₂ O				
5340	5,300 psi (absolute), 400 in H ₂ O	5,300-psi range requires MVT code (HP) and has a CRN SWP limit of 3,625 psi. Single seal is limited to 3,000 psi.			
5384	5,300 psi (absolute), 840 in H ₂ O				
XX1K	> 300 psi (absolute), 1,000 in H ₂ O	Special order			
Battery					
X	None				
8	NUFLO Scanner 2100: Lithium battery. Twin DD, 7.2 VDC square battery packs. Restricts transportation methods. Battery pack may be purchased and shipped separately from the NUFLO Scanner 2100 flow computer				
9	NUFLO Scanner 2105: Lithium battery				
E	NUFLO Scanner 2105: SLA battery				
Expansion Board					
00	None				
A1	NUFLO Scanner 2100 only: I/O, one pulse or turbine input flowmeter, two analog inputs, and one analog output (NUFLO Scanner 2100 computer only)				
A2	NUFLO Scanner 2105 only: I/O type, one pulse/TFM input, two analog inputs, extra memory (analog output is on NUFLO Scanner 2105 main board)				

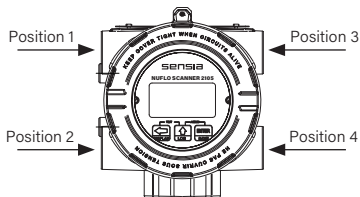
Note: The combined selection of Expansion Board option A2 and SmartMesh wireless communications is available only in the NUFLO Scanner 2105.

NUFLO Scanner 2100 and 2105 flow computer

Code	Description
Firmware	
00S	Standard
PID	PID control – requires analog output
RTD Temperature Sensor Assembly	
A	Ordered as a separate line item
External Explosion-Proof Communications Connector	
X	None
1	Two-pin RS-485
2	USB
Explosion-Proof Switches	
XX	None
RX	Momentary switch only (see diagram)
0X	NUFLO Scanner 2100 only: Toggle switch only (see diagram)
R0	NUFLO Scanner 2100 only: Momentary and toggle switches
Switch Lockout Option (Available with Switch Options RX, 0X, R0 Only)	
0	No lockout
1	NUFLO Scanner 2100 only: With lockout
SmartMesh Wireless Communications (Internal Radio, Explosion-Proof-to-IS Adapter for Antenna)	
00	None
B0	Radio with no antenna (antenna supplied separately by Sensia or other manufacturer); not available with expansion board (A1)
B1	Radio with right-angle antenna (see diagram); not available with expansion board (A1)
Explosion-Proof Conduit Plugs (Unused Conduit Openings Must be Plugged)	
B	Brass plugs
S	Stainless-steel plugs

† Explosion-proof, flame-proof, and weatherproof as defined by CEC, NEC, ATEX, IEC, and CE Codes.

Option	Position in Housing
Momentary switch	4
Toggle switch	2
Communication adapter	1
RTD	–
Antenna	3



NUFLO Scanner 2200 flow computer

Code	Description				
Certification					
00	None				
A1	CSA for US and Canada, Class I, Div. 2, Groups A, B, C, D, Type 4				
B1	CSA for US and Canada, Class I, Div. 2, Groups A, B, C, D, Type 4X				
Direct-Mount MVT					
00	None				
X1	MVT, standard				
HP	MVT, high pressure				
MVT Materials and Trim Package (Omit Code when MVT is Not Required)					
		Pressure Rating, psi	Diaphragms	1/4-in NPT Side Ports	Bolts and Nuts
A	Standard	All	316 stainless steel	Stainless-steel vent plug	Plated steel
C	Stainless-steel bolting	≤ 3,000	316 stainless steel	Stainless-steel vent plug	316 stainless steel
D	NACE (B7M not for offshore)	≤ 1,500	316 stainless steel	316 stainless-steel pipe plug	B7M/ 2HM
E	NACE (Inconel bolting)	All	316 stainless steel	316 stainless-steel pipe plug	Inconel 718
MVT Certificates and Reports (Omit Code when MVT Documentation is Not Required)					
M	Mill test reports for MVT				
N	NACE certificate				
F	Full—NACE certificate with mill test reports for MVT				
MVT Process Connections					
LP	One set on bottom, for gas service, vertical piping				
SI	Two sets on each end, for liquid or steam service, horizontal piping (special order)				
MVT Ranges					
0103	100 psi (absolute), 30 in H ₂ O				
0503	500 psi (absolute), 30 in H ₂ O	Special order			
0320	300 psi (absolute), 200 in H ₂ O				
0520	500 psi (absolute), 200 in H ₂ O				
1520	1,500 psi (absolute), 200 in H ₂ O				
1540	1,500 psi (absolute), 400 in H ₂ O				
1584	1,500 psi (absolute), 840 in H ₂ O				
3020	3,000 psi (absolute), 200 in H ₂ O				
3040	3,000 psi (absolute), 400 in H ₂ O	3,000-psi range with 316 stainless-steel bolts has a CRN SWP limit of 2,725 psi.			
3084	3,000 psi (absolute), 840 in H ₂ O				
5320	5,300 psi (absolute), 200 in H ₂ O				
5340	5,300 psi (absolute), 400 in H ₂ O	5,300-psi range requires MVT code (HP) and has a CRN SWP limit of 3,625 psi. Single seal is limited to 3,000 psi.			
5384	5,300 psi (absolute), 840 in H ₂ O				

NUFLO Scanner 2200 flow computer

Code	Description
Power Supply	
P1	Solar power input with charge controller—standard
P2	DC power input (16-28VDC) with charge controller
XX	DC power input (6-28 VDC) (no charge controller)—requires battery code (X) or (1) and solar panel code (X)
P4	Solar power input with charge controller and 24 VDC for connected devices
Battery	
X	None
1	Lithium—DD, 7.2 VDC
D	12 VDC, 33 AH
5	12 VDC, 33 AH + DD lithium backup battery
Solar Panel	
X	None
Note: Solar panel up to 50 W. May be supplied as a separate line item	
Firmware	
00S	Standard
PID	PID control
RTD Temperature Sensor Assembly	
A	None
B	12-ft cable, universal for 2-in to 6-in line
Communication Options	
00	None
UR	Universal radio bracket