

Scanner Series 2000 Flow Computer

Flow measurement solution used in the broadest range of metering applications

APPLICATIONS

Measurement of

- Hydrocarbon liquid or gas
- Water
- Steam

BENEFITS

Automation cost reduction through

- LAN-style wireless
- Imbedded power source
- Factory integrated flowmeters with Scanner* flow computer

FEATURES

- High scalability
- Cost efficiency
- Custody-transfer-caliber measurement
- Smart multivariable transmitter (MVT)
- Wellhead tubing and casing pressure monitoring
- Turbine totalization
- Electronic flowmeter (EFM) and remote terminal unit (RTU) functionality
- Proportional–integral–derivative (PID) controller

Experience low-power measurement using a stand-alone Scanner* Series 2000 flow computer or a network of Scanner computers in a large-scale SCADA solution. Scanner Series 2000 computers are available in wired or wireless configurations, ready for installation.



Scanner Model 2000 flow computer

- Wired communications
- Three conduit entries (capacity for five with optional terminal housing)
- MVT, turbine mount, or remote mount
- Explosion-proof[†] and intrinsic safety approvals
- Expandable I/O
- FOUNDATION[®] fieldbus communications available



Scanner Model 2100 flow computer

- Wireless short-haul communications
- Five conduit entries (capacity for eight with optional MVT adapter)
- MVT or remote mount
- Explosion-proof[†] approval
- Easy battery access



Scanner Model 2200 flow computer

- Wireless long-haul communications
- Large weatherproof[†] enclosure with integral shelf for radio
- Powered by lithium battery, DC, or solar power
- Available with integral charge controller or DC power supply and a rechargeable battery
- Generous I/O capacity

[†] Explosion-proof, weatherproof, and intrinsically safe as defined by Canadian Electrical Code (CEC), National Electrical Code (NEC), Atmosphères Explosibles (ATEX), International Electrotechnical Commission (IEC), and European Commission (CE) codes.

Scanner Series 2000 Flow Computer

Scanner Series 2000 flow computers are among the most versatile flow measurement devices on the market. Each device can operate independently as a flow computer, RTU, process controller, or node in a comprehensive SCADA network.

The first-generation Scanner Model 2000 EFM flow computer provides a dependable replacement for manual chart recorders and pressure and temperature indicators.

The Scanner Model 2100 flow computer builds on the Scanner Model 2000 computer functionality with short-haul SmartMesh® wireless sensor networking for cost-effective communication of measurement devices, twice the battery capacity of the Scanner Model 2000 computer, and added conduit entries.

The Scanner Model 2200 flow computer completes the Scanner Series 2000 flow computer portfolio with a weatherproof package, providing ample space for a radio or other long-haul communications devices, charge controller or DC power supply, and rechargeable battery for solar-powered installations.

All three Scanner Series 2000 flow computers share common computational capabilities, integral lithium battery power, and an easy-to-use, full-feature interface software for configuration and maintenance. Models vary in packaging, communications, I/O capacity, and hazardous-area certifications.

Versatile measurement

Scanner Series 2000 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 are 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 Scanner Series 2000 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.

†† Not available with Scanner 2100 EFM computer, FOUNDATION fieldbus communications, or intrinsic safety.

Using an integrated sensor for differential pressure, absolute pressure, and temperature measurements, this self-contained flow computer is an efficient alternative to chart recorders. When connected to additional flowmeters, a single Scanner Model 2000 flow computer is powerful enough to measure the gas, oil, and water from a two- or three-phase separator. The Scanner Model 2000 computer is compliant with a comprehensive list of flow measurement standards to satisfy custody transfer applications.

Scanner flow computers can be factory mounted and configured to Camera orifice or 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.

Data logging

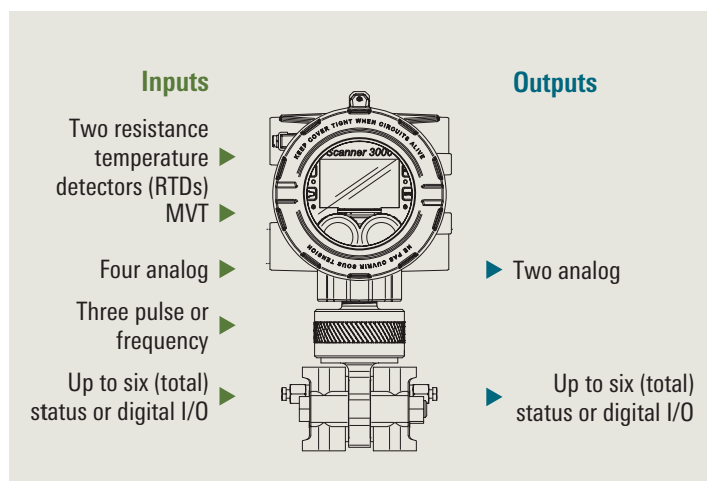
Scanner Series 2000 computers with EFM's can monitor multiple values simultaneously, including those used solely for process automation. The Scanner Series 2000 computer delivers higher-resolution data for process system analysis compared with conventional RTUs and flow computers.

In addition to recording daily logs, users can log up to 16 measurements as frequently as every 5 s 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

Scanner Series 2000 flow 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 option and a PID control option††, Scanner Series 2000 computers can effectively control process variables such as static pressure, differential pressure, temperature, and 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. A Scanner EFM computer can control a single parameter or a parameter in combination with a secondary pressure control.

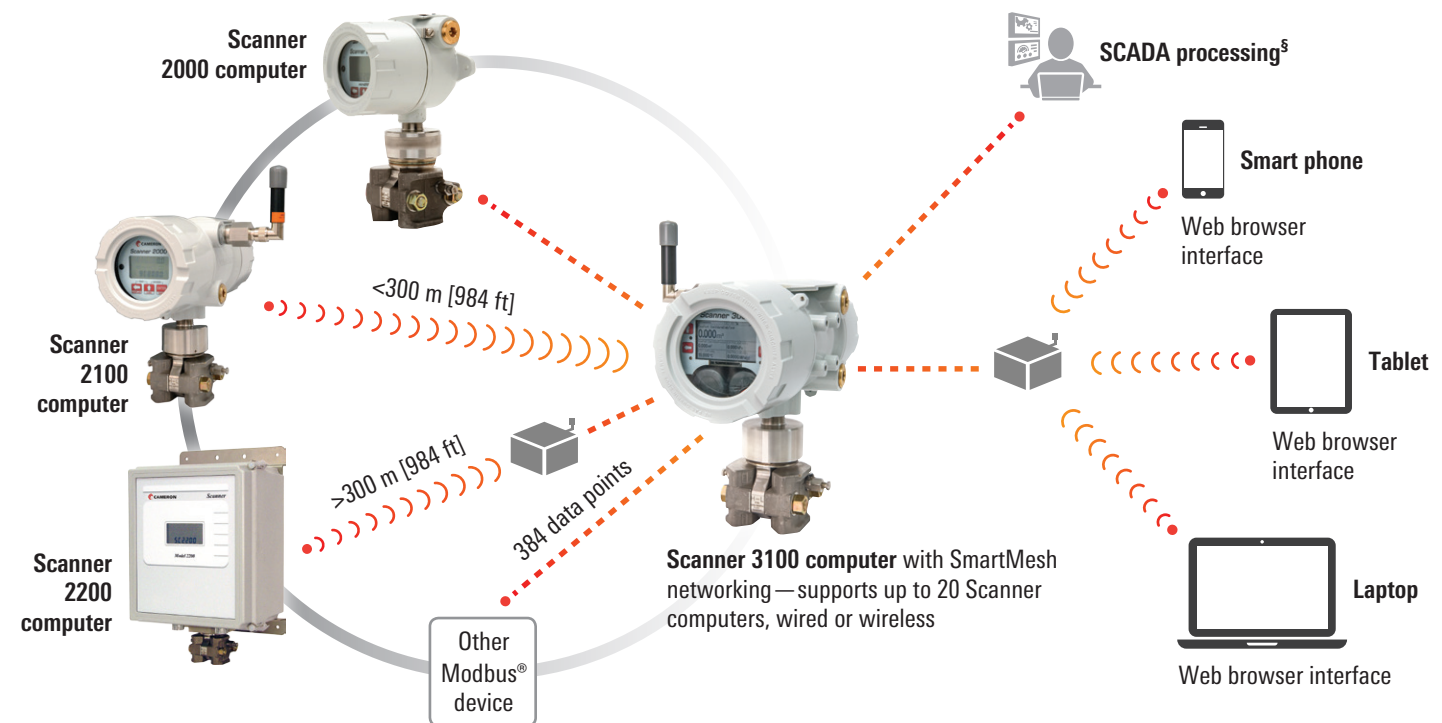


Communication ports: two RS-485 serial, one RS-485/RS-232, and one TCP Ethernet.



PID control.

Scanner Series 2000 Flow Computer



Scanner flow computer network.

FOUNDATION fieldbus communications

The Scanner Model 2000 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 may be read 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 Scanner flow computers and a web-accessible Scanner 3100 computer network manager, our distributed processing solution equips users to access data for up to 22 flow streams through a single device and provides enhanced data protection.

Unlike centralized automation systems in which lost or delayed data transmissions threaten the integrity of flow computations, the Cameron 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 compliant. Should communications be interrupted, the Scanner computers and the network manager automatically synchronize to restore missing data records.

[§]Compatible with eFCAS, a Cameron solution offered in association with CPU, LLC, and other SCADA products

Other benefits include the following:

- Reduced cost—installation costs are reduced by reliance on two-wire RS-485 communications rather than six or more electrical conductors
- System overload protection—computing capacity increases with each computer added to the network, so the system is not easily overloaded
- Reduced dependency on power—each Scanner 2000 computer can operate for months on a single battery pack; if 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 communications for the oil and gas industry. However, opportunities for integrating wireless into the flow computer business were limited by conventional automation systems that depend on the failsafe delivery of input data.

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. With its redundant storage technique, operators can optimize their deployments with a combination of Scanner Series 2000 flow computers and wireless or wired communications without compromising data integrity.

Scanner Series 2000 Flow Computer

Scanner Series 2000 Flow Computer Model Specifications

	Scanner Model 2000 Computer	Scanner Model 2100 Computer	Scanner Model 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	—
	Nonarcing Class I, Div. 2, Groups A, B, C, D, T6	Nonarcing Class I, Div. 2, Groups A, B, C, D, T6	Class I, Div. 2, Groups A, B, C, D, T4 Rated for Internal Pollution Degree 2
	Type 4 weatherproof [†] rating	Type 4 weatherproof [†] rating	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	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	—
	CE	—	—
	EMC Directive 2004/108/EC	—	—
ATEX	Intrinsically safe Equipment Group II, Category 2 for gas Ex ia IIB T4 Gb IP66 weatherproof [†] rating	—	—
	CE	—	—
	EMC Directive 2004/108/EC	—	—
Other	ASME (MVT ≤ 3,000 psi)	ASME (MVT ≤ 3,000 psi)	ASME (MVT ≤ 3,000 psi)
	CRN OF10472.5C	CRN OF10472.5C	CRN OF10472.5C
	Measurement Canada (MVT ≤ 1,500 psi), AG-0557C	—	—
	EAC (formerly GOST-R/GOST-K)	—	—
Operating temperature, degF [degC]	–40 to 158 [–40 to 70]	–40 to 158 [–40 to 70]	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.

Scanner Series 2000 Flow Computer

	Scanner Model 2000 Computer	Scanner Model 2100 Computer	Scanner Model 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, ¾-in national pipe thread (NPT) standard; capacity for five conduit entries with optional terminal housing	Five conduit entries, ¾-in NPT standard; capacity for eight conduit entries with optional four-port MVT adapter	Two conduit entries, ½-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 meter, cone meter, or orifice meter; remote mount to 2-in pole	Direct mount to cone meter or orifice 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)	Lithium DD battery pack (air transport regulations apply)
	External power supply (6 to 30 VDC) with internal lithium battery backup	External power supply (6- to 30-VDC CSA version; 9- to 30-VDC ATEX and IEC version) with internal lithium battery backup	External power supply (16 to 28 VDC) or solar power
	Fieldbus power supply with internal lithium battery backup	—	Optional 12-V, 33-A/h rechargeable battery or charge controller with 24-V output for powering external instruments
	—	—	—
Communications and archive	Wired	Short-haul wireless† 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	Modbus protocol	Modbus protocol
	300–38,400 bps	300–38,400 bps	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 Scanner 3100 computer network manager)†	Any third-party communication device (spread spectrum, cellular, satellite, etc.); power control provided by 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.

‡ A Scanner 3100 computer network can support up to 20 wired or wireless Scanner Series 2000 devices.

Scanner Series 2000 Flow Computer

	Scanner Model 2000 Computer	Scanner Model 2100 Computer	Scanner Model 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	One with I/O expansion board	One
Data logging			
	Up to 16 user-selected parameters; adjustable logging frequency from 5 s to 24 h	Up to 16 user-selected parameters; adjustable logging frequency from 5 s to 24 h	Up to 16 user-selected parameters; adjustable logging frequency from 5 s to 24 h
	Daily records: 768 (> 2 years)	Daily records: 768 (> 2 years)	Daily records: 768 (> 2 years)
	Interval (hourly) records: 2,304 (> 3 months) standard; 6,392 (> 8 months) with I/O expansion board	Interval (hourly) records: 2,304 (> 3 months) standard; 6,392 (> 8 months) with I/O expansion board	Interval (hourly) records: 6,392 (> 8 months)
Hardware options			
	I/O expansion board (not available with FOUNDATION fieldbus communications)	I/O expansion board (not available with SmartMesh networking)	—
	PID control (requires I/O expansion board)	PID control (requires I/O expansion board)	PID control
	External USB adapter	External USB adapter	—
	External RS-485 adapter	External RS-485 adapter	—
	Momentary control switch	Momentary control switch	—
	—	Toggle power switch	—
	—	Four-port MVT adapter (adds four additional conduit entries for factory-installed accessories)	—
	Terminal housing (adds two conduit entries); approved for Class I, Div. 1, Groups C and D installations only	—	—
	RTD temperature sensors	RTD temperature sensors	RTD temperature sensors

Calculations

Scanner Series 2000 flow computers support the following industry-standard calculations:

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).

Scanner Series 2000 Flow Computer

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 Scanner 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 same as external power supply for main board
	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
Analog output	Out of range
	Status and diagnostic
	Latched and unlatched
	Normally open and normally closed
	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)
MVT	Regulates control valve in PID control applications
	Optically isolated
	Resolution: 16 bits
	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 Scanner 2000 computer option

For corrosion-free service in harsh marine applications, Cameron offers a 316 stainless-steel flame-proof^{††} 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 package, the Scanner 2000 computer is coupled to a turbine flowmeter by a 304 stainless-steel tube or connected to a 316 stainless-steel MVT with Inconel bolts. Cameron turbines 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, Cameron offers a full range of services and expert support to help customers improve productivity, enhance system performance, and increase profitability.

Our skilled field service personnel are trained to maintain, replace, refurbish, and support measurement equipment. Our services include

- measurement consulting
- startup assistance and commissioning
- measurement audits
- field services, shop repair, and calibration
- system health checks and maintenance
- product training and measurement seminars.

^{††} Flame-proof as defined by ATEX and IEC codes.

Scanner Series 2000 Flow Computer

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 × 300 psi has a zero shift of .007% and a span shift of .01%.

Data reporting tool

The Scanner computer data manager software opens the computer data files created during a Scanner computer download, enabling users to view, print, and export flow, event, and alarm logs and configuration data for sharing with others in a Windows®-compatible format or for satisfying audit requirements. The software also converts data to Flow-Cal® and PGAS® 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

Cameron ModWorX Pro software is our custom interface for configuring and maintaining Scanner Series 2000 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.

Scanner Series 2000 Flow Computer

Cameron Scanner Model 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	
00	None (brass conduit plug installed)
X1	MVT with CRN—Enclosure 4
HP	MVT, high pressure, no CRN—Enclosure 4
X2	NUFLO* measurement technology turbine meter, plated steel adapter—Enclosure 4—available with CSA only
X3	NUFLO technology turbine meter, stainless-steel tube standoff—available with ATEX only
X5	BARTON* measurement technology turbine meter, 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 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	Code	Description
0103	100 psi (absolute), 30 in H ₂ O	3020	3,000 psi (absolute), 200 in H ₂ O
0503	500 psi (absolute), 30 in H ₂ O	3040	3,000 psi (absolute), 400 in H ₂ O
0320	300 psi (absolute), 200 in H ₂ O	3084	3,000 psi (absolute), 840 in H ₂ O
0384	300 psi (absolute), 840 in H ₂ O	5320	5,300 psi (absolute), 200 in H ₂ O
0520	500 psi (absolute), 200 in H ₂ O	5330	5,300 psi (absolute), 300 in H ₂ O
1520	1,500 psi (absolute), 200 in H ₂ O	5340	5,300 psi (absolute), 400 in H ₂ O
1540	1,500 psi (absolute), 400 in H ₂ O	5384	5,300 psi (absolute), 840 in H ₂ O
1584	1,500 psi (absolute), 840 in H ₂ O	XX1K	> 300 psi (absolute), 1,000 in H ₂ O

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

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)

Scanner Series 2000 Flow Computer

Cameron Scanner Model 2000 Flow Computer

Code	Description		
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		
Terminal Housing: Consider 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	Class I, Div. 1, Groups C, D (explosion-proof†) or Class I, Div. 2; not available with ATEX flameproof† code (XA)	
TS	Terminal housing with stainless-steel plugs		
Conduit Connections		Code	Description
BB	Brass plugs	SS	Stainless-steel plugs
BC	Brass plug with RS-485 communication connector	SC	Stainless-steel plug with RS-485 communication connector
BR	Brass plug with reset switch	SR	Stainless-steel plug with reset switch
BU	Brass plug with USB communication connector	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.

Cameron Scanner Model 2100 Flow Computer

Code	Description				
Enclosure					
X	Explosion-proof† and weatherproof†				
Certification					
X5	CSA for US (NEC) and Canada (CEC) Class I, Div. 1, Groups C and D, Enclosure 4				
XB	ATEX, IECEx 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				
4X	MVT, with CRN and four additional ¾-in conduit entries for factory-installed accessories (RTD, communication, switches); not available with ATEX/IECEx certification (XB)				
4P	MVT, high pressure, no CRN, with four additional ¾-in conduit entries for factory-installed options (RTD, communication, switches); not available with ATEX/IECEx certification (XB)				
MVT Materials and Trim Package (Omit Code when MVT is Not Required)		Pressure Rating, psi	Diaphragms	¼-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 Scanner 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				

Scanner Series 2000 Flow Computer

Cameron Scanner Model 2100 Flow Computer

Code	Description		Code	Description	
MVT Ranges (Omit Code when MVT is Not Required)					
0103	100 psi (absolute), 30 in H ₂ O		3020	3,000 psi (absolute), 200 in H ₂ O	3,000-psi range with 316 stainless-steel bolts has a CRN SWP limit of 2,725 psi.
0503	500 psi (absolute), 30 in H ₂ O	Special order	3040	3,000 psi (absolute), 400 in H ₂ O	
0320	300 psi (absolute), 200 in H ₂ O		3084	3,000 psi (absolute), 840 in H ₂ O	
0384	300 psi (absolute), 840 in H ₂ O		5320	5,300 psi (absolute), 200 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.
0520	500 psi (absolute), 200 in H ₂ O		5330	5,300 psi (absolute), 300 in H ₂ O	
1520	1,500 psi (absolute), 200 in H ₂ O		5340	5,300 psi (absolute), 400 in H ₂ O	
1540	1,500 psi (absolute), 400 in H ₂ O		5384	5,300 psi (absolute), 840 in H ₂ O	
1584	1,500 psi (absolute), 840 in H ₂ O		XX1K	> 300 psi (absolute), 1,000 in H ₂ O	Special order
Battery					
X	None				
8	Lithium — Twin DD, 7.2 VDC square battery packs. Restricts transportation methods. Battery pack may be purchased and shipped separately from the Scanner 2100 computer				
Expansion Board (If A1 is Selected, the Wireless Selections B0 and B1 are Not Available)					
00	None				
A1	I/O type, one turbine flowmeter, two analog input, one analog output, one pulse input				
Firmware					
00S	Standard				
PID	PID control – requires expansion board (A1)				
RTD Temperature Sensor Assembly					
Factory installation: CSA (X5) devices may be ordered with an optional MVT adapter to provide four additional conduit entries (see MVT code 4X or 4P). With this option, an RTD may be factory installed in the position shown. Not available with ATEX/IECEX (XB).					
Field installation in standard conduit entries: When the optional MVT adapter is not required, the RTD is shipped loose for installation in one of the housing's four standard conduit entries.					
Consult Cameron for applicable model codes and part numbers for thermowells and RTDs					
00	None				
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)				
OX	Toggle switch only (see diagram)				
R0	Momentary and toggle switches				
Switch Lockout Option (Available with Switch Options RX, OX, R0 only)					
0	No lockout				
1	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 Cameron 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				

Option	Position in Housing	Factory-Installed Option	Position in MVT Adapter
Momentary switch	4	Momentary switch	6
Toggle switch	2	Toggle switch	5
Communication adapter	1	Communication adapter	8
RTD	—	RTD	7
Antenna	3	Antenna	—

Note: If the Scanner computer is equipped with the optional MVT adapter with four additional conduit openings, the accessory options will automatically be installed in the adapter at the factory. Optional MVT adapter is not available with ATEX/IEC certification. Accessories cannot be field installed in the optional MVT adapter.

The left diagram shows the front view of the Scanner 2100 housing. Position 1 is the top-left conduit entry, Position 2 is the bottom-left, Position 3 is the top-right, and Position 4 is the bottom-right. The right diagram shows the top view of the housing. Position 5 is the left side entry, Position 6 is the bottom center entry, Position 7 is the right side entry, and Position 8 is the top center entry.

3,000-psi range with 316 stainless-steel bolts has a CRN SWP limit of 2,725 psi.

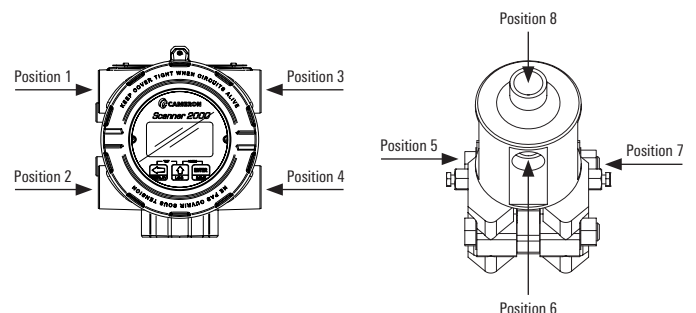
5,300-psi range requires MVT code (HP) and has a CRN SWP limit of 3,625 psi. Single seal is limited to 3,000 psi.

Special order

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

Factory-Installed Option	Position in MVT Adapter
Momentary switch	6
Toggle switch	5
Communication adapter	8
RTD	7
Antenna	—

Note: If the Scanner computer is equipped with the optional MVT adapter with four additional conduit openings, the accessory options will automatically be installed in the adapter at the factory. Optional MVT adapter is not available with ATEX/IEC certification. Accessories cannot be field installed in the optional MVT adapter.



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

Scanner Series 2000 Flow Computer

Cameron Scanner Model 2200 Flow Computer

Code	Description	Code	Description		
Certification		Direct-Mount MVT			
00	None	00	None		
A1	CSA for US and Canada, Class I, Div. 2, Groups A, B, C, D, Type 4	X1	MVT, standard		
B1	CSA for US and Canada, Class I, Div. 2, Groups A, B, C, D, Type 4X	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		Code	Description	3,000-psi range with 316 stainless-steel bolts has a CRN SWP limit of 2,725 psi. 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.	
0103	100 psi (absolute), 30 in H ₂ O	3020	3,000 psi (absolute), 200 in H ₂ O		
0503	500 psi (absolute), 30 in H ₂ O	3040	3,000 psi (absolute), 400 in H ₂ O		
0320	300 psi (absolute), 200 in H ₂ O	3084	3,000 psi (absolute), 840 in H ₂ O		
0520	500 psi (absolute), 200 in H ₂ O	5320	5,300 psi (absolute), 200 in H ₂ O		
1520	1,500 psi (absolute), 200 in H ₂ O	5340	5,300 psi (absolute), 400 in H ₂ O		
1540	1,500 psi (absolute), 400 in H ₂ O	5384	5,300 psi (absolute), 840 in H ₂ O		
1584	1,500 psi (absolute), 840 in H ₂ O				
Power Supply					
P1	Solar power input with charge controller— standard				
P2	DC power input (16-30 VDC) with charge controller				
P3	DC power input (6-30 VDC) supplied as terminal block kit (no charge controller)—requires battery code (X) or (1) and solar panel code (X)				
P4	Solar power input with charge controller and 12–24 V DC to DC				
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		Code	Description		
X	None	A	None		
Note: Solar panel up to 50 W. May be supplied as a separate line item		B	12-ft cable, universal for 2-in to 6-in line		
Firmware		Communication Options			
00S	Standard	00	None		
PID	PID control	UR	Universal radio bracket		

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