

Scanner 3100

- Bi-directional measurement of two integral flow streams
- Capacity to manage up to 20 external flow streams
- Measurement and control of industrial and hydrocarbon gases and liquids
- Computation of standard volume, mass, and energy
- Daily, interval (1 second to 12 hours), and triggered (1-second) logs
- Display and storage of data (configuration, real-time, and historical) for networked Scanner 2000 Series devices
- Gas chromatograph support
- Ethernet and serial communications
- Lithium backup power (no power redundancy system necessary)
- On-board storage for more than 5 years of daily records, 3 years of hourly records*, and 98,000 events

* Based on 14-parameter logs. Log capacity varies with the number of parameters selected and logging frequency.

Web-based Configuration and Data Monitoring

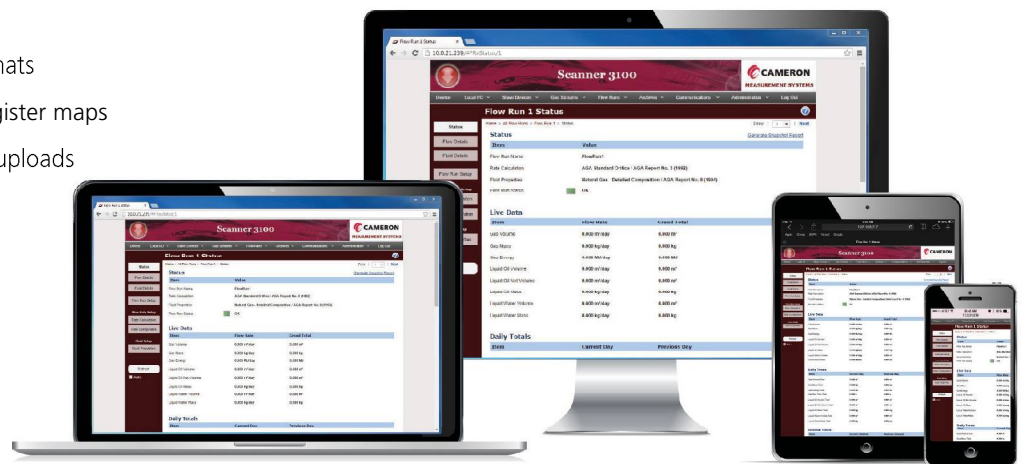
- Configure the device from a web browser (no configuration

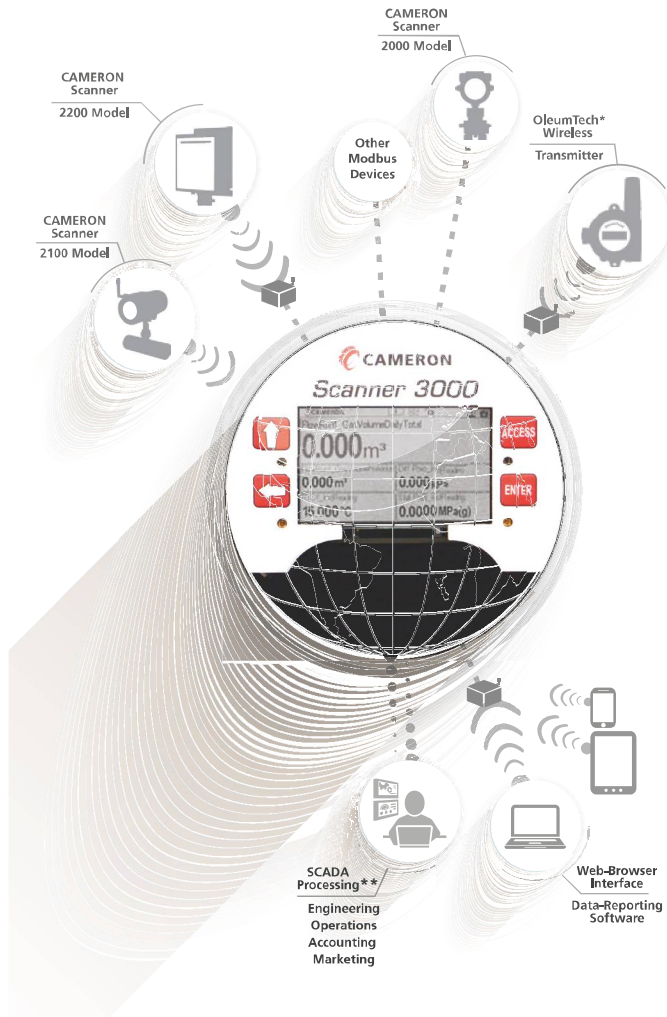


The Scanner 3100 is four devices in one: Flow Computer, Network Manager, Process Controller, and RTU.

Functions include:

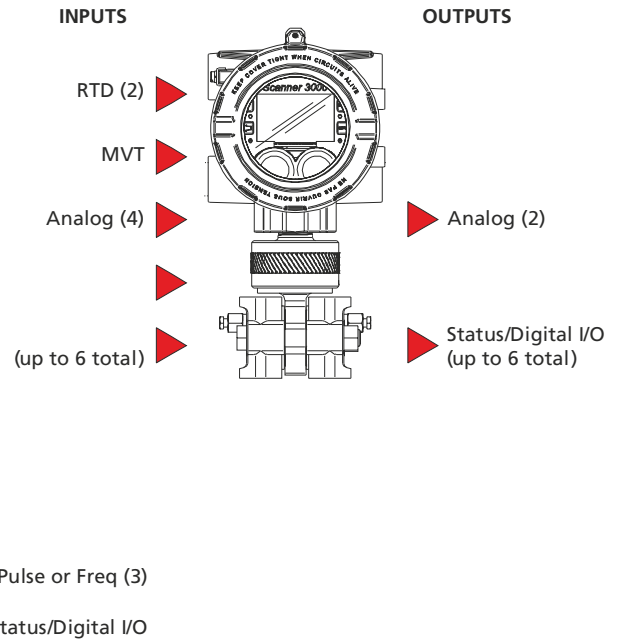
- Standard and custom reports
- Data export to common file formats
- Creation of custom Modbus® register maps
- Firmware and configuration file uploads





Flow Computer/RTU/Controller

The Scanner 3100 supports two integral flow runs, 17 inputs/



Network Manager

When multiple points of measurement are required, the Scanner 3100's distributed flow computing platform and optional wireless communications create a scalable automation solution capable of supporting up to 22 flow streams.

- Automatically integrates up to 20 wired and/or wireless Scanner flow computers
- Inherent protection from data loss (data is stored at the point of measurement before being copied to the Scanner 3100)
- Communicates wirelessly with Scanner 2100 EFM via SmartMesh® radio
- Data management and protocol customization software simplifies SCADA integration with an established host

Approvals	CSA (US and Canada) Class I, Div. 1, Groups C and D, T4 Type 4 weatherproof* protection
	ATEX/IECEX Ex d [ia Ga] ib IIC T5 Gb Ex tb [ia Da] ib IIC T100°C Db IP66 protection from dust, water
	ANSI 12.27.01 single seal (MVT ≤ 3000 psi)
	ASME Pressure Vessel Code (MVT ≤ 3000 psi); CRN 0F10472.5C
Environmental Safety	Relative humidity 0% to 95% non-condensing
	Altitude: Up to 2000 meters
Enclosure	Cast aluminum (less than 0.05 % copper), painted with epoxy and polyurethane
	Double-ended with single window
	5 conduit ports, 3/4" FNPT connections
System Power	External user-provided power supply (9 to 30 VDC, 150 mA) with backup power supplied by two replaceable 7.2V lithium battery packs (air transport regulations apply)
Real-time Clock	Accurate within 2 min/year over temperature range
	Lithium coin cell battery maintains clock during loss of system power (lithium content: 0.11 g)
Processor	32-bit dual-core ARM Cortex M4
Operating Temperature	-40° C to 70° C (-40° F to 158° F)
	LCD contrast is reduced below -30° C (-22° F)
LCD Display/Keypad	2.7 in. diagonal graphic display, 400 × 240 pixels
	0.3 in. high characters
	Displays up to 32 user-defined parameters, five at a time, with auto-scrolling
	Battery level indicators
	Wireless radio indicator
	Configurable background (dark or light)
	4-button keypad for advancing display, viewing communication settings
Memory	2.18 MB RAM for processing
	512 kB non-volatile memory for configuration data
	32+1 MB on-board system flash memory
	48 MB on-board archive flash memory
Meter Types	Turbine meter Cone meter Orifice meter Ultrasonic meter Positive displacement meter Coriolis meter Venturi meter
Download Types	Per Device
	Complete (all records including slave device records as applicable) Local (integral flow records in a condensed file, ideal for emailing) Events Triggered (1-second) logs (includes PID tuning)
	Per Flow Run
	Daily Interval (hourly) Recent (past 7 days of interval logs)
	Slave Logs
	Daily Interval (hourly) Recent (past 7 days of interval logs)

Archive Capacity Per Integral Flow Run	Up to 59 archivable parameters per flow run; Up to 19 archivable parameters per triggered log
	Daily logs: 2,048
	Interval logs (configurable, 1 second to 12 hours): 24,576 hourly (2.8 years) with 14 parameters; 6,144 hourly (1 year) with 59 parameters
	Triggered logs: 1,351,680 with 1 parameter 135,168 with 19 parameters Configurable to log periodically (1 second to 12 hours), on a real-time period (daily, weekly, etc.), on device alarm, on digital input, or by remote user activation
	Event logs: 98,304 records
	Downloadable via FTP, HTTP (web interface), or Enron Modbus protocol (see Scanner Data Manager for information on viewing data files)
	Logs stored in non-volatile memory for up to 10 years
Slave Archive Capacity	Daily logs: 768 per slave device Interval logs: 11,264 hourly per slave device
Communications/Archive Retrieval	Wireless
	Optional SmartMesh radio, external antenna available. See Hardware Options, page 6
	Wired RS-485
	Two dedicated ports (1 and 2) One shared RS-485/RS-232 port (3)
	Software-selectable 120-termination resistor
	Selectable master or slave protocols
	Wired RS-232
	Shared RS-485/RS-232 port (port 3)
	TXD, RXD, RTS, CTS
	Time-of-day digital output configuration
	Ethernet/TCP
	One RJ-45 connection supports 2 TCP/IP user-configurable ports with selectable slave protocols
	Continuous use requires external power
	Supports 10/100 Mbps/second
Port Pass-Through	
	Any communication port can be routed to another. Ethernet can be bridged to serial communications for remotely interfacing with connected Modbus devices. (For example, Scanner slave devices can be configured via ModWorX Pro software without changing wiring connections.)
Flow Rate Calculations	Gases: AGA-3 (1992 and 2012), ISO 5167-2 (2003), ASME MFC-14M (2003), AGA-7
	Liquids: API MPMS 5.3, AGA-3, ISO 5167, AGA-7
Fluid Property Calculations	Gases: AGA-8, AGA-3, AGA-5, GPA 2145-09, GERG-08, SGERG-88
	Liquids: API MPMS 11.1 (2004)
Liquid Compensation and Correction Factors	Temperature and pressure compensation
	Meter factor compensation
	Shrinkage factor compensation
	Live BS&W correction
	Live density correction
	Dynamic oil fraction (watercut) is derived from flowing density or watercut analyzer; automatic base density updates from flowing density measurement

*Weatherproof as defined by CEC and NEC codes.



Flow Streams	Two integral compensated flow runs
	Up to 20 remote flow runs via local area Scanner network
	Three additional integral flow runs for uncompensated measurement via pulse/frequency inputs
	Up to eight gas streams using gas chromatograph inputs or user-entered compositions
	16-point calibrations for all inputs (linear factor, multipoint, and multi-point meter factor calibrations supported)
	Bi-directional flow measurement
	Stacked inputs for rangeability
Analog Inputs	4 channels
	1-5 V, 0-5 V, 4-20 mA, or 0-20 mA
	Accuracy $\pm 0.030\%$ of span max. error @ 25° C (77° F)
	Temperature effect $\pm 0.25\%$ of span over operating range
	Impedance > 60 Kohm for 1-5V input; approximately 250 ohm for 4-20 mA input
	Over-voltage protection ± 30 VDC
	A/D resolution 22 bits
	Linearity error $\pm 0.020\%$ max.; $\pm 0.010\%$ typical
	Single-ended inputs
	Sample rate: 0.1 seconds to 12 hours
	Four previous calibrations available for restore
	Configurable shut-off for saving power when transducer warm-up period is not required
	Integral battery backup
RTD Inputs	2 channels
	100-ohm platinum RTD with 2-wire, 3-wire, or 4-wire interface
	Range -40° C to 427° C (-40° F to 800° F)
	Accuracy: 0.2°C (0.36°F) over sensing range at calibrated temperature
	Temperature effect $\pm 0.3^\circ$ C (0.54° F) over operating range
	A/D resolution 24 bits
	Sample rate: 0.1 seconds to 12 hours
	Configurable shut-off for saving power when transducer warm-up period is not required
Pulse/Frequency (TFM) Inputs	3 channels
	Maximum voltage: 30 VDC
	Maximum frequency: 10,000 Hz
	Gated transmitter power for each input channel
	Transmitter voltage supply: 10 VDC @ 20 mA, protected to 50 mA
	TFM channel 3 has no sleep mode and increased power consumption
	Measures uncorrected gas or liquid volume from a turbine, PD, Coriolis, or ultrasonic meter; measures mass from a Coriolis meter
	Accepts contact closure, open collector, or DC pulse (3-30 VDC) outputs, and turbine magnetic pickup outputs
	Configurable turbine sensitivity (20, 50, 100 mV, peak-to-peak)

Analog Outputs	2 channels
	Type 4 to 20 mA, optically isolated, externally powered
	Accuracy (after calibration) $\pm 0.1\%$ of span max. error at 77° F (25° C)
	50 ppm/° C (27.8 ppm/° F) temperature drift
	Output load R (ohms) = {supply (volts) – 5.5} / 0.02
	Maximum voltage: 30 VDC
	D/A resolution: 16 bits
	Calibration (zero and full-scale) via software
	Programmable output alarm value for use during loss of power or communication to CPU
	Regulates control valve in PID control applications
Digital I/O	6 channels, user configurable as input or output
	DIO1, DIO2, DIO3, and DIO4 are optically isolated with a max. output of 60 mA @ 30 VDC
	DIO5 and DIO6 are non-isolated with a max. output of 500 mA @ 30 VDC
	Input Types
	Control switch
	Pulse
	Open collector
	Contact closure
	Special functions: Advance display Turn transmitter on/off Reset flow run totals Reset pulse input totals Unlatch DIOs Reset trigger archive
	Output Modes
	Pulse (based on pulse count or time period)
	Alarm (based on the status of any or all selected alarms – up to 32 user-configured alarms are selectable)
	Conditional (value above or below setpoint, out of setpoint range)
	Programmed (time of day or output state – normally open/normally closed)
	Pulse Output
	Maximum frequency: 50 Hz
	Configurable pulse duration (10 msec to 1 day)
	Configurable pulse representation (1 pulse = 1 MCF) based on time or volume
	Based on any accumulator (flow run or turbine meter run)
	Alarm Output
Low/high	
Out-of-range	
Status/diagnostic	
User Interface	Web browser based (access via laptop, tablet, smart phone)
	Complete configuration, calibration, and maintenance of flow runs, I/O, and gas streams
	Real-time data polling, data downloads
	Recent interval and daily logs (up to 7 days) viewable in interface (other historical logs viewable in Scanner Data Manager)
	Three user security levels, up to 20 operators
	Configuration of Modbus slave/master communications

MVT Specifications

- Linearized measurements for static pressure and differential pressure
- Measures pressure in absolute and displays in gauge
- Standard MVT has bottom ports, ideal for gas measurement
- Can be inverted for liquid measurement (LCD auto-corrects for easy viewing)*
- Process temperature: -40° F to 250° F (-40° C to 121° C)
- User-adjustable sample time and damping
- Complies with pre-qualified materials of NACE MR0175/ISO 15156**

* 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.

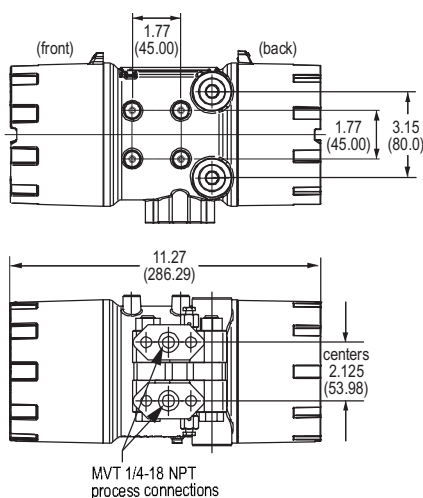
MVT Accuracy	
Differential Pressure	± 0.05% of range for all except 30 in. H ₂ O ± 0.1% of range for 30 in. H ₂ O
Static Pressure	± 0.05% of range
Temperature Effect	0.25% of full scale over operating range
Stability (Long-Term Drift)	Less than ±0.05 % of URL per year over a five-year period
Resolution	24 bits

Effect on Differential Pressure for a 100-psi Pressure Change		
Differential Pressure Range* (in. H ₂ O)	Zero Shift (% URL)	Span Shift (% reading)
± 30	.05	.01
± 200**	.01	.01
± 400	.04	.01
± 840	.04	.01

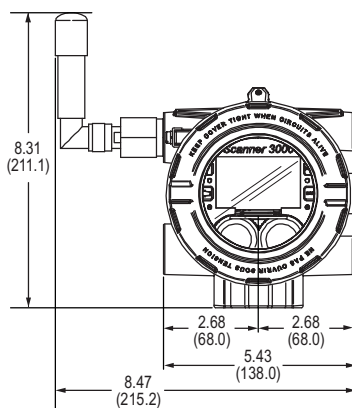
* ± indicates bi-directional capabilities. Example: A range of 30 in. H₂O is -30 to +30 H₂O.

** 200 x 300 psi has a zero shift of .007% and a span shift of 0.01%.

Dimensions and Weight



Dimensions in inches (millimeters)



Scanner 3100 Base Unit (no MVT, no batteries)	9.1 lb (4.1 kg)
MVT	8.3 lb (3.8 kg)
Batteries (2 stick-style battery packs)	1.1 lb (0.5 kg)
Total Weight (Wired Version)*	18.4 lb (8.3 kg)
Direct-Mount Antenna and Coupler (Wireless)	0.6 lb (0.3 kg)
Total Weight (Wireless Version)*	19.0 lb (8.6 kg)

*Includes MVT and batteries

MVT Pressure Ranges*

Static Pressure/SWP (psia)	Differential Pressure (in. H ₂ O)	Maximum Overrange Pressure (psia)
100	± 30	150
300	± 200 or 840	450
500	± 30 or 200	750
1500	± 200, 400, or 840	2250
3000	± 200, 400, or 840	4500
5300	± 200, 400, or 840	7420

* Custom ranges available by special order.

Materials of Construction

Body Bolts and Nuts	B7/2H alloy steel, standard (see table below for alternate materials)
Process Cover	316 SS*
Process Cover Gasket	Glass-filled PTFE
Diaphragm	316L SS*
Vent/Drain	SS bleed (316 SS plug is standard for NACE and coastal applications)

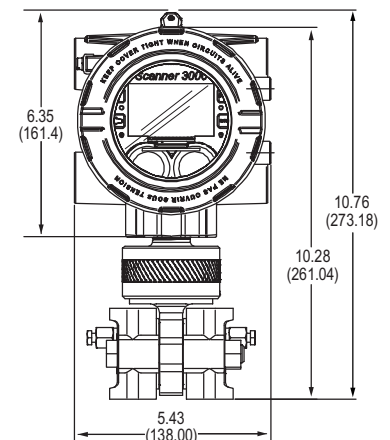
* Custom ranges available by special order.

Body Bolts and Nuts (non-process wetted)

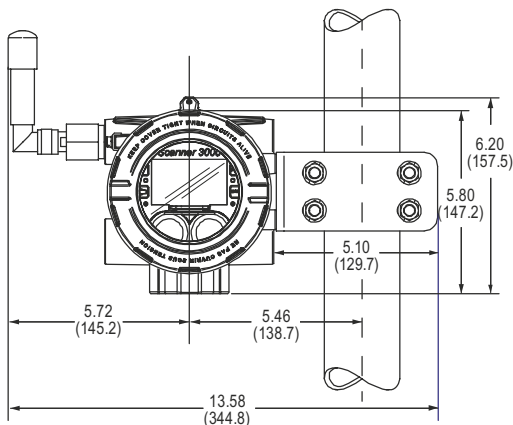
	B7/2H alloy steel	B7M/2HM alloy steel	316SS	17-4 PH SS	Inconel 718
NACE Use	No	Yes	No	No	Yes
Coastal Use	Possible*	Possible*	Yes	No**	Yes
Max. Pressure	5300	1500	1500	3000	5300
Coating	Plated	Black oxide	None	None	None

* B7 and B7M alloy steel is susceptible to corrosion.

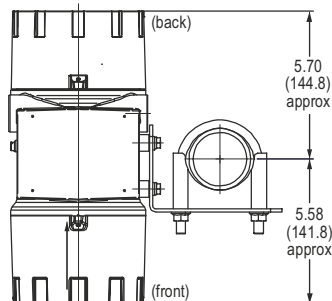
**Chloride stress cracking risk.



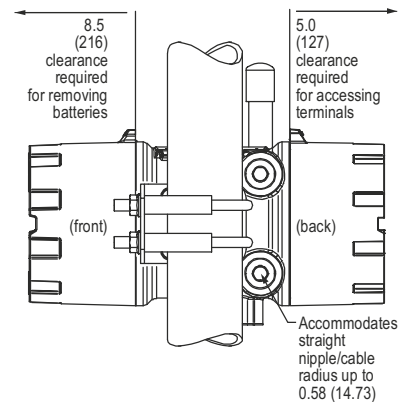
Dimensions with Pole Mount








CSA Requirement: When using standard cable, a conduit seal must be installed within 6 in. (152.4 mm) of the Scanner.



Dimensions in inches (millimeters)

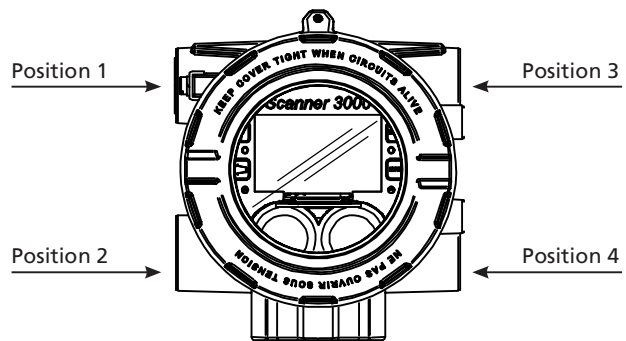


Hardware Options

<p>Wireless SmartMesh Radio</p> 	<p>2.4 GHz, self-healing and self-sustaining network</p> <p>Factory installed</p> <p>Transmits up to 985 ft (300 m) node to node</p> <p>Supports communications with up to 20 remote Scanner 2100 devices (each node can transmit and receive data)</p> <p>Certifications: North America: FCC, IC Argentina: CNC Australia/New Zealand: ACMA, R-NZ (Z571 Limited), C-Tick Bahrain: TRA Egypt: NRTA Europe: CE Mark, R&TTE India: WPC Indonesia: SDPPI Kuwait: MOC Malaysia: SIRIM Mexico: IFETEL Oman: TRA Qatar: TRA Saudi Arabia: CITC Thailand: SDoC UAE: TRA Venezuela: TA</p>		<p>Toggle switch is available with or without lockout mechanism (shown) to prevent unauthorized changes to switch position</p>
<p>External Antenna</p> 	<p>Direct-mount antenna, omnidirectional, elbow connection, 3.75 in. tall</p> <p>Remote-mount antenna, omnidirectional, straight connection, 3.85 in. tall (cable sold separately by Cameron)</p> <p>N male brass nickel-plated connector for use with N female explosion-proof 1/2 in. coupler, as shown</p> <p>10 ft, 20 ft, and 30 ft cable lengths with connectors for remote-mount antennas, Type 400, -40° C to 70° C (-40° F to 158° F)</p>	<p>Pole Mount Kit</p> 	<p>Stainless steel mounting kit for 2 in. pole, mounts to side of the electrical enclosure</p>
<p>Control Switch</p> 	<p>Explosion-proof* switch, fits 3/4 in. female pipe thread, momentary contact or toggle action</p> <p>Momentary contact switch provides a keypad alternative for pacing the display or activating a triggered log</p>	<p>RTD Temperature Sensor</p>	<p>Consult factory for various alternatives and configurations</p>
		<p>Thermowell</p>	<p>Nominal 0.26 in. (6.6 mm) bore, 1/2 in. FNPT instrument connection. Consult factory for various materials, process connections, insertion lengths and options.</p>
		<p>5-Valve Manifold</p>	<p>Consult factory for direct-mount or remote-mount manifold and materials</p>
		<p>Portable Ethernet Router</p>	<p>Supports the connection of a PC or other browser-equipped device to a Scanner 3100 flow computer. The router connects to the Scanner with an RJ-45 cable, and connects to a PC via Wi-Fi. The router is available in USB-powered or battery-powered models. See page 8 for additional wi-fi solutions.</p>
		<p>Customer Tag</p>	<p>Stainless steel tag for customer-specified information, 3 in. x 1 in., wired on, 5 lines of text, maximum of 45 characters per line</p>
		<p>Software CD</p>	<p>The Scanner Software CD (Part No. 50263697) contains all software and software manuals for Scanner 3100 and Scanner 2000 Series devices (Scanner Data Manager, ScanMap, ScanFlash, and ModWorX Pro). This software is also available for download from the Cameron website, www.c-a-m.com/measurement. See Scanner Software, page 8, for software descriptions.</p>

*Explosion-proof as defined by CEC, NEC, IEC, and ATEX codes.

Code	Description				
3100					
X	Enclosure: Explosion-Proof/Weatherproof				
	Certification: CSA for US (National Electrical Code) and Canada (Canadian Electrical Code) Class I, Div. 1, Groups C and D, Enclosure 4 ATEX, IECEx II 2 GD Ex d [ja Ga] ib IIC T5 Gb or Ex tb [ja Da] ib IIIC T100°C Db IP66 (Flame Proof) Note: The enclosure is individually rated for IP 68 and Type 4X protection.				
00	Direct Mount Multi-Variable Transducer (MVT): None (brass conduit plug installed)				
X1	MVT with CRN – Enclosure Type 4				
HP	MVT, High Pressure, No CRN				
	MVT Materials/Trim Package: (Omit code when MVT is not required)	Pressure Rating	Diaphragms	1/4 in. NPT Side Ports	Bolts/Nuts
A	Standard	ALL	316SS	SS Vent Plug	Plated Steel
C	SS bolting	≤ 3000	316SS	SS Vent Plug	316SS
D	NACE (B7M not for offshore)	≤ 1500	316SS	316 SS Pipe Plug	B7M/ 2HM
E	NACE (Inconel bolting)	ALL	316SS	316 SS Pipe Plug	Inconel 718
M	MVT Certificates and Reports: (Omit code when MVT documentation is not required)				
N	Mill Test Reports for MVT (Mill certs significantly increase the price and delivery lead time)				
F	NACE Certificate				
	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				
SI	Two sets on each end, for liquid or steam service, horizontal piping (Special Order)				
	MVT Ranges: (Omit code when MVT is not required)		MVT Ranges:		
0103	100 psia, 30 in. H ₂ O		3020	3000 psia, 200 in. H ₂ O	3000 psi range with 316 SS bolts has a CRN safe working pressure limit of 2725 psi.
0503	500 psia, 30 in. H ₂ O	Special Order	3040	3000 psia, 400 in. H ₂ O	
0320	300 psia, 200 in. H ₂ O		3084	3000 psia, 840 in. H ₂ O	
0384	300 psia, 840 in. H ₂ O		5320	5300 psia, 200 in. H ₂ O	5300-psi range requires MVT code (HP) and has a CRN safe working pressure limit of 3625 psi. Single seal is limited to 3000 psi.
0520	500 psia, 200 in. H ₂ O		5330	5300 psia, 300 in. H ₂ O*	
1520	1500 psia, 200 in. H ₂ O		5340	5300 psia, 400 in. H ₂ O	
1540	1500 psia, 400 in. H ₂ O		5384	5300 psia, 840 in. H ₂ O	
1584	1500 psia, 840 in. H ₂ O		XX1K	>300 psia, 1000 in. H ₂ O	Special Order
X	Battery: None				
8	Lithium – 7.2 VDC battery pack containing twin D batteries. Restricts transportation methods. Battery pack may be shipped separately. Two battery packs per device				
	Firmware: Standard				
00S	Explosion-Proof Switches (factory-mounted): None				
XX	Momentary Switch Only (see diagram at right)				
OX	Toggle Switch Only (see diagram at right)				
R0	Momentary and Toggle Switch				
	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				
A0	Radio with No Antenna (antenna supplied separately by Cameron or other manufacturer)				
A1	Radio with Right-Angle Antenna (see diagram at right)				
	Explosion Proof Conduit Plugs: (unused conduit openings must have a plug)				
B	Brass Plugs				
S	Stainless Steel Plugs				


MOUNTING LOCATION OF FACTORY-INSTALLED OPTIONS

Unallocated (Plugged)	Position 1
Toggle Switch	Position 2
Antenna	Position 3
Momentary Switch	Position 4

*Explosion-proof as defined by CEC, NEC, IEC, and ATEX codes.



Wi-Fi Connections

A wireless router connected to the Ethernet port of the Scanner 3100 allows users to connect wirelessly to the Scanner using a PC or other web-enabled device. If an existing wi-fi network is not available to support this connection, users can create a wi-fi access point using one of the following solutions:

- A portable battery-powered router
- A permanent Class I, Div. 2 qualified router assembly with an optional solar power subsystem and optional cellular connectivity

Scanner Software

The Scanner 3100 web interface eliminates the need for PC-based configuration software.

Scanner Data Manager	Data analysis, reporting, and export/conversion tool
	Tabular and trend presentations
	Customized reports
ScanMap	Tool for creating custom Scanner 3100 Modbus register maps, including user-specified units, rates, and register names for SCADA integration
	Firmware-specific templates
	Auto-generated protocol manual (for print or upload to web interface)
ScanFlash	Firmware, configuration, and custom protocol map upload utility
ModWorX Pro	Configuration of Scanner 2000 Series devices