FB2100 Flow Computer

The FB2100 is a cost-effective low-power field-mounted flow computer that measures and controls oil and gas flow. The FB2100 supports a single meter run (a gas differential pressure meter, a gas linear meter, or a liquid linear meter).

The FB2100 is part of Emerson's new field mount flow computer family that delivers a convenient approach to remote oil and gas sites by addressing challenges to power, safety, measurement reliability and accuracy.

Designed for simple configuration and ease of use, the cost effective FB2100 flow computer focuses on metering applications where control is not required. The FB2100 provides a full audit trail, including enhanced history, alarm, and event logs. The I/O options can be as simple as a single discrete output (DO) for driving an odorizer or can be expanded to give two user configurable analog (AI or AO) channels and two user configurable discrete (DI, DO or PI) channels. The FB2100 includes power options for remote sites and flexible communication capabilities for both remote and SCADA connected sites.

The new flow computers also come with the latest Rosemount™ multivariable measurement sensor technology, providing high accuracy differential pressure and static pressure measurement with long term stability to help measurement confidence and production efficiency.

Features

The FB2100 flow computer includes the following key features:

- Increased measurement confidence and reduced measurement uncertainty
- Measurement and I/O capability focused on metering applications
- Industry leading differential and static pressure measurement including 0.05% of reading accuracy and 5-year stability
- High accuracy temperature measurement including curve matching via the Callendar-Van Dusen equation
- Reduced need to re-calibrate resulting in less time spent on site
- Simplified configuration and set-up with the FBxConnect™ configuration software tool
- Flexible design with configurable I/O power and communication options to meet site needs
- Standard firmware supports global calculations for orifice, cone, Venturi, nozzle, conditioning orifice, turbine, PD, Auto-Adjust, and Coriolis
- Standard firmware supports Property Calculations for Natural Gas, Pure Gas, Crude Oil, and NGL/LPG
- Simple selection of engineering units suits local requirements
- Global Hazardous Area Approvals – Class 1 Div2, ATEX & IEC Ex ec
- Corrosion resistant aluminum and fiberglass enclosure options include radio mounting bracket and battery box for solar use
- FBxWifi™ allows secure local wireless access from safe area
- Ease of integration with support for Modbus, ROC, BSAP and DNP3 protocols

FB2100

- Enhanced security helps prevent unauthorized access
- Enhanced alarming and historical data storage and improved audit trail
- Superior performance gives better control of your operations and maximizes profits
- API 21.1 compliant

FBxWifi™

The optional FBxWifi communications enables you to connect your laptop or tablet to the flow computer through a secure wireless connection. Once connected wirelessly, you can use FBxConnect™ configuration software to view process values, edit configuration parameters, and collect logs stored in the flow computer – all from within the safe area.

Firmware

The base firmware in the FB2100 flow computer measures static pressure, differential pressure or pulse frequency, and temperature for a single meter run. The flow computer performs gas and liquid flow calculations based on those inputs in either U.S., metric, or other user-selectable units based on the calculation type.

Note: The base hardware model includes 1 RTD and 1 DO only. Necessary hardware options need to be added for the measurement inputs. For DP Meter application – integral sensor, or expansion I/O must be ordered to measure DP and SP. For a Linear Meter application - expansion I/O must be ordered to get a pulse input for linear meter

The flow computer performs flow calculations based on the following set of user selectable global calculations. To fully satisfy local requirements, the engineering units are fully user-selectable between either U.S. or metric, or a combination of each.

The firmware supports the following flow calculations:

- AGA 3 1992/2013 (volume, mass/density, and mass/relative density)
- ISO 5167 1991/1998/2003 (orifice, Venturi, and nozzle)
- Rosemount 405C Compact Orifice and 1595 Conditioning Orifice Plate
- McCrometer V-Cone® and Wafer Cone®
- NUFLO™ Cone
- AGA 7 2006 (pulsed turbine, PD, and ultrasonic)
- AGA 11 2013 (Coriolis pulses)
- Auto-Adjust™ meter
- AGA 9 (Multipath Ultrasonic)
- API 20.1 Liquid Allocation Measurement
- API 12.2 Calculation of Petroleum Quantities

The firmware supports the following property calculations:

- AGA 8 1994 (Detailed, Gross 1, and Gross 2)
- AGA8 2017 Part 1 and Part 2 (GERG 2008)
  Note: AGA8 Part 2 / GERG provides support for the following pure gases (100%) as well as any mixtures (0% to 100%): Nitrogen, Carbon Dioxide, Hydrogen, Oxygen, Carbon Monoxide, Water Vapor, Hydrogen Sulfide, Helium, and Argon
- Speed of Sound calculated via AGA 10 and AGA 8 2017 Part 2
- NX-19 1962, MOD, VDI/VDE 2040, Miller
- ISO 12213 2006 (parts 2 and 3)
- SGERG 1991 (Std., Alt1, Alt2, and Alt3)
- GPA 2172 2009 (including saturated vapor calculation)
- ISO 6976 1995 (superior and inferior, incorporating Technical Corrigendum 2 [1997] and 3 [1999])
- AGA 5 2009
- API 11.1 Temperature and Pressure correction for Crude Oils, Refined Products, and Lubricating Oils
- GPA 8217/API 11.2.4 Table E (formerly TP-27) Temperature Correction for NGL and LPG
- GPA 8117/API 11.2.5 (formerly TP15) Vapor Pressure and API 11.2.2, API 11.2.2M, API 11.1 Pressure Correction for NGL and LPG

The firmware accepts gas density, base density, and specific gravity form any of the following sources:

- Fixed value
- Periodic download from SCADA
- An external signal, such as analog input
- Calculated based on gas composition
- For liquid meters, the flow meter signal can be provided by a pulse input, an analog flowrate, or a direct accumulation from the meter electronics.

The firmware includes the following flow rates and totals for gas DP and gas linear meters:

- Uncorrected volume
- Corrected (standard) volume
- Mass
- Energy
- Integral Value (DP meter) or Pulse Totals (linear meter)

In addition to the normal totals, the firmware also supports the following fault totals which can be

enabled for a gas meter. The conditions to trigger the fault totals are user configurable:

- Uncorrected volume fault totals
- Corrected volume fault totals
- Mass fault totals
- Energy fault totals

The firmware includes the following flow rates and totals for API 12.2 and API 20.1 (low water):

- Indicated Volume / Mass
- Gross Volume
- Gross Standard Volume
- Net Standard Volume
- Water Volume
- Mass
- Flow time
- Pulses

The firmware includes the following flow rates and totals for API 20.1 (high water):

- Indicated volume / mass
- Gross Volume
- Oil (Unshrunk and Theoretical Production)
- Natural Gas Liquid
- Flashed Gas
- Water (Uncorrected and Corrected Volume)
- Flow Time
- Pulses

  Note: The firmware can accept a water cut from an on-line analyzer or from an off-line analyser corrected to metering conditions.

The firmware supports a fallback mode when a process variable's value is questionable. The fallback options can be one of the following:

- Use last good value
- Use a fixed fallback value

Alarms and Events

The flow computer supports extensive alarming capability to enhance operational efficiency and improve the audit trail. Alarms are pre-allocated to meter runs for standard values such as pressure, temperature, differential pressure, or frequency as well as meter run flow rates. In addition to these standard alarms, the FB2100 provides a number of user alarms that you can assign to other database parameters simply by “filling in the blanks” in user alarm templates in the FBxConnect configuration tool. Storage is provided for the most recent 1000 alarms in the alarm log.

The event log stores the significant events during operation and can be configured to either store all events in a single log of 2000 events or the user can select to store the metrology/legal events in a separate log from the operational events. With the latter option the event log capacity is 1000 metrology events and 1000 operation events.

Automated Checksum Verification (ACV)

As an extended auditing feature, the flow computer provides an option to perform online integrity checks by generating firmware and configuration checksums. The checksum is a 32-bit CRC number which is routinely calculated and compared against the last verified checksum. If a newly calculated checksum does not match with the last verified checksum, the system generates a checksum error and the flow computer goes into an unverified state.

History

The FB2100 features expanded and flexible history capability to ensure measurement confidence and meet the increasing demands for secure data.

The flow computer has four standard periodic logs available providing hourly, daily, weekly, and monthly history. These logs can contain up to 110 variables including flow weighted average data, totals, and gas composition. For averaging, the FB2100 supports either flow weighted or flow dependent which can be linear or formulaic.

For gas meter averages, you can choose between flow-dependent linear per API Chapter 21.1 (2013) or flow-dependent formulaic, flow-weighted linear, or flow-weighted formulaic averages per API Chapter 21.1 (1993). Liquid meter averages are flow-weighted averages per API Chapter 21.2 (2000).

The FB2100 can store the following standard periodic logs for 35 variables. With the flexible history design, the number of variables and the time duration for different periodic logs can be adjusted to meet the application requirement.

- Hourly logs 62 days or 1500 records
- Daily logs 12 months or 365 records
- Weekly logs 12 months or 52 records
- Monthly logs 60 months or 60 records

Note: This is only the initial default history. With the flexible history design, the number of variables and the time duration for different periodic logs can be adjusted to meet the application requirement.

The flow computer also supports two user periodic logs, the duration or period of each is user selectable between 1 minute and 200 hours. The first user periodic logs include 10 parameters over 4,000 periods and the second contains 20 parameters over 500 periods.

The flow computer with FBxConnect provides pre-formatted EFM reports for hours and days. The format of the reports can be .csv, .pdf, or secure .pdf.

In addition to the above reports, the flow computers can produce FLOWCAL-compliant .cfx files through the FBxConnect tool as well as calibration reports which contain U.S. Bureau of Land Management specific parameters.

Power Options

You can power the FB2100 with an external DC power supply or from an internal rechargeable battery linked to a solar system. The internal battery can power the device for up to 45 days depending on the application.

Note: The internal battery option is available only with Class 1 Div 2.

Housing Options

The FB2100 has two housing options, both suitable for hazardous area installation. The corrosion-resistant aluminum and the fiberglass enclosures each protect the electronics from physical damage and harsh environments. The enclosures include a battery box to house a rechargeable battery for use with solar systems and an optional radio mounting bracket. The lockable door also provides a viewing window for the optional LCD. The door can also be fitted with an optional security switch, to generate an alarm each time the door is opened.

Hazardous Area Certifications

The FB2100 has the following Global Hazardous Area Approvals:

- North American certification for Class I Division 2 Groups A, B, C and D.
- ATEX and IECEx certification for Ex ec, Zone 2 hazardous locations.

Configuration Software

Emerson's FBxConnect tool is a Microsoft® Windows®-based tool that enables you to easily monitor, configure, service, and calibrate the FB2100 flow computer. Designed for ease-of-use, FBxConnect provides at-a-glance monitoring, quick access to commonly performed tasks, and a guided configuration process to quickly get your measurement up and running.

The wizard-driven approach simplifies configuration and ensures that you only need to enter the required data once. Whether you are an experienced engineer or a new technician, you can be confident configuration is done correctly the first time.

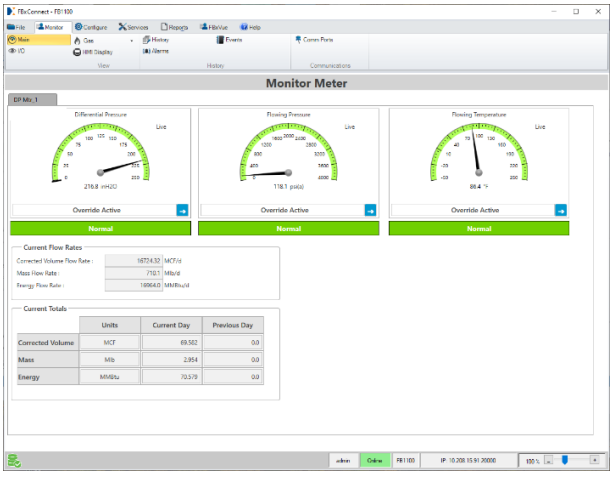
FBxConnect runs on a Windows PC or tablet. You connect securely to the flow computer using one of its serial ports or optionally through the FBxWifi wireless connection. For more information, refer to product data sheet *FBxConnect* (D301789X012).

Security

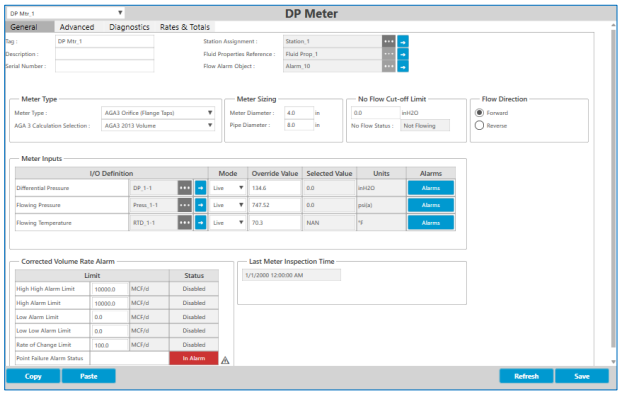
To secure your valuable process and data, the FB2100 provides multi-level role-based access, user account authentication, and password encryption.

The system administrator can set a minimum password length (up to 20 characters) that accommodates lower case, upper case, numbers, and symbols, as well as configure a user lock-out feature that locks out invalid users after a defined number of failed login attempts.

Additionally, the DNP3 protocol lends itself to an added layer of security through Secure Authentication (SA). SA version 5 (SAv5) is available in the FB2100 Flow Computer as a selection in the firmware. SAv5 authenticates the devices which significantly improves resistance to outside influence.



Monitor Screen



DP Meter

Integral Pressure Sensor Options

The flow computer can be supplied with one of three sensor options to suit your metering needs:

- Integral Multivariable Sensor (MVS) measuring both Static Pressure and Differential Pressure (DP)
- Integral inline static pressure sensor
- NO integral pressure sensor – external transmitters are used

The NO integral sensor option is typically used at locations where regulations classify the location of the pressure measurement sensor as either C1 D1 or ATEX/IEC Exd Zone 1. In this instance, the FB2100 without an integral sensor can be mounted in the C1 D2 / Zone 2 area and be connected via a serial port to a remote 4088B MVT transmitter.

Enabled by superior sensor technology and engineered for optimal flow performance, the integral pressure sensor on the flow computer delivers unparalleled accuracy, over a wide range of operating conditions, and industry leading stability to ensure you meet standards and regulations.

Pressure sensors on the flow computer can measure DPs of up to 1000” of water / 2500 mBar and static pressures up to 4000 psi / 275 Bar in either gauge or absolute with accuracies up to 0.05% of reading.

Temperature Input (RTD/PRT)

With industry-leading measurement accuracy, the temperature measurement of the FB2100 ensures that you minimize your measurement uncertainty in all operating conditions. The input accepts 2-, 3-, or 4-wire connections reducing any field wiring induced errors and also supports sensor curve matching using the optional Callendar-Van Dusen constants to define the unique characteristics of the RTD/PRT to further improve process temperature measurement uncertainty.

The FB2100 flow computer’s superior static pressure, DP, and temperature measurement performance and stability ensures you meet standards and regulations so you can avoid fines, penalties, leaseholder disputes, and lost revenue.

Inputs and Outputs

Base I/O

In addition to the integral pressure sensor, the FB2100 includes the following I/O points in the base unit:

- One discrete output (DO)
- One RTD/PRT (2-, 3-, or 4-wire)

The DO can be software configured as scaled pulse output, latched, toggled, momentary, or timed duration output. The solid state, normally open switch is rated at 500mA and is often used to drive an odorizer.

Expansion I/O

The FB2100 can also be supplied with the following expanded I/O:

- Integral pressure sensor
- Two analog channels – individually software selectable as analog inputs (AI) or analog outputs (AO)
- Two discrete channels – individually software selectable as discrete inputs (DI), discrete outputs (DO), or pulsed inputs (PI)
- One PRT/RTD (2-, 3-, or 4-wire)
- Two optional relays allow for additional loads up to 30Vdc at 6A. 24 Vdc power is required to energize the relays.

  Note: This option is available only with Class 1 Div 2 approval.

Analog Inputs (AI) are individually software configurable for either 4 to 20mA or 1 to 5 Vdc operation.

To keep measurement uncertainty at a minimum when external transmitters are being used, both the AI and AO channels have industry-leading measurement accuracy with an excellent performance over a wide ambient temperature range.

Each Discrete Input (DI) channel can also be software configured to function as a latched DI.

The Discrete Output (DO) channels are solid-state, normally open switches rated at 500 mA, enough to directly drive most samplers. Each channel can be software configured as a latched, toggled, momentary, timed duration output (TDO), or scaled pulse output.

The PI channels are most commonly used to interface with turbine meters, Coriolis meters, ultrasonic meters, and Positive Displacement (PD) meters. The high-speed input supports signal up to 10.5 KHz.

Communications

The FB2100 has three user selectable serial communications ports with support for RS-232, RS-422, and/or RS-485 operation and one optional port that provides FBxWifi (802.11 b/g) communications using DNP3 protocol:

- COM1 – 4-wire serial communications. Software selectable for RS-232, RS-422, or RS-485 operation.
- COM2 – 2-wire serial communications. Software selectable for RS-232 or RS-485 operation.
- COM3 – 2-wire serial communications. Software selectable for RS-232 or RS-485 operation.
- COM4 –FBxWifi (802.11 b/g) communications (optional)

Communications Protocols

The FB2100 supports DNP3, Modbus slave (ASCII and RTU), BSAP and ROC protocols on all serial ports.

Mounting Options

The FB2100 supports either direct mount to a manifold on the pipeline, simple wall mounting or mounted on a two-inch pipe with the stainless steel pipe mounting kit.

FB2100 Flow Computer

CPU Module			
Processor	The central processing unit (CPU) of the flow computer is an NXP® Kinetis® K61 series CPU with an ARM® Cortex® M4 processor.		
Memory	SRAM	8 MB, holds current states of all variables and historical archives.	
	Flash	128 MB, holds firmware image and configuration files.	
Clock	Type	Real-time clock	
	Accuracy	0 °C to 40 °C	60 seconds/year
		-40 °C to 80 °C	110 seconds/year
	Watchdog Timer	1175 milliseconds	
Diagnostics	Battery voltage monitor, external voltage monitor, SRAM battery status		
Communications			
Ports	COM1	4-wire serial communications. Software-selectable for RS-232, RS-422, or RS-485 operation.	
	COM2	2-wire serial communications. Software-selectable for RS-232 or RS-485 operation.	
	COM3	2-wire serial communications. Software-selectable for RS-232 or RS-485 operation. Can communicate to 4088B transmitters	
	COM4	FBxWifi (optional) (802.11 b/g)	
Protocols	Serial ports support DNP3, Modbus slave (ASCII or RTU), BSAP, and ROC. Wi-Fi supports DNP3 DNP3 includes level 3 protocol subset		

Base I/O

The base FB2100 includes the following I/O:

- 1 multivariable or static pressure sensor
- 1 process temperature input (PRT/RTD)
- 1 discrete output (DO)

Expansion I/O (optional)

When the FB2100 is supplied with the expanded I/O option, the following options are available:

- 2 channels that are individually software selectable as either analog inputs or analog outputs
- 2 channels that are individually software selectable as either discrete inputs, discrete outputs, or pulse inputs
- 1 process temperature input (RTD/PRT)

Temperature Input (RTD/PRT)	Type	Pt100 2-wire, 3-wire, or 4-wire (software-selectable)
	Measuring Range	-200 to +850 °C (-328 to 1562 °F)
	Reference Accuracy	+/- 0.07 °C from -30 to 60 °C (±0.126 °F from -22 to +140 °F) +/- 0.1 °C from -60 to 200 °C (±0.18 °F from -76 to 392 °F)

	Ambient Temperature Effect	−30 to 60°C	+/- 0.017 °C per 10 °C (+/- 0.03 °F per 18 °F) from the calibration temperature	
		−60 to 200°C	+/- 0.034 °C per 10 °C (+/- 0.06 °F per 18 °F) from the calibration temperature	
	Calculation Type	User selectable between:	Callendar–Van Dusen	
			IEC 751/DIN 43760 (α 0.00385/°C)	
			IEC (α 0.003920/°C)	
	Scan Rate	1 second		
	Voltage Input Impedance	Greater than 3 MΩ DC		
	Excitation Current	205 µA		
	Surge Suppression	36 Vdc		
	Common Mode Rejection	100 dB at DC		
	Normal Mode Rejection	100 dB at 50/60 Hz		
Relays (Optional)	Provides two relays inside the flow computer enclosure. **Note:** This option is available **only** with Class 1 Div 2 approval.			
I/O Specifications				
Analog Inputs	Type	Single-ended		
	Input Range	1 to 5 Vdc or 4 to 20 mA (software-selectable)		
		Over Range	1 to 5 Vdc	0.8 to 5.2 Vdc
			4 to 20 mA	3.2 to 20.8 mA
	Resolution	16 bits		
	Scan Rate	10 samples per second		
	Input Impedance	1 to 5 Vdc Inputs	200 kΩ	
		4 to 20 mA Inputs	250 Ω	
	Fault Mode	User-entered default value or last good value		
	Software Filter	Software damping is available in FBxConnect configuration software		
	Input Filter	20 HZ @ -3 dB		
	Surge Suppression	30 Vdc		
	Reference Accuracy	+/- 0.05% of span **Note**: To achieve the stated accuracy when analog inputs are used in voltage mode, you must wire analog input reference(s) to the AGND terminals *separately* from the discrete and communication ground references.		

	Ambient Temperature Effect	+/- 0.05% of span per 10°C (18°F) from the calibration temperature	
	Long Term Stability	3 years	
	SNR	87 dB	
	Loop Power	External	
Analog Outputs	Type	Single-ended, externally sourced	
	Output Range	4 to 20 mA	
	Resolution	14 bits	
	Surge Suppression	30 Vdc	
	Reference Accuracy	± 0.1% of span **Note**: To achieve the stated accuracy when analog outputs are used in voltage mode, you must wire analog output reference(s) to the AGND terminals *separately* from the discrete and communication ground references.	
	Ambient Temperature Effect	± 0.05% of span per 10°C (18°F) from the calibration temperature	
	Long Term Stability	3 years	
	Fault Mode	User-entered default value or last good value	
	Scan Rate	1 second	
	Surge Suppression	30 Vdc	
	Impedance	Current Mode	Configured to drive a load impedance of 0 to 900 Ω
		Voltage Mode	100 kΩ
	Load Loop Resistance	0 to 900 Ω	
	Max External Supply	30 Vdc	
	Loop Power	External	
Discrete Inputs	Type	Dry contact or an open collector	
	Scan Rate	1 second	
	Input Filter	10 Hz	
	Input Current	Software-selectable 66µA or 2mA	
	Voltage Rating	30 Vdc maximum	
	Frequency	10 Hz maximum	

	Input Type	Latched or unlatched	
	Loop Power	Internally sourced	
	Surge Suppression	30 Vdc	
	Fault Mode	User-entered default value or last good value	
Discrete Outputs	Type	Open drain	
	Current	500 mA maximum	
	Operating Voltage Range	30 Vdc maximum	
	Frequency	50 Hz maximum	
	Output Type	Latched, momentary, toggle, TDO, or scaled pulse	
	Surge Suppression	30 Vdc	
	Fault Mode	User-entered default value or last good value	
	Notes: Discrete outputs are rated to 500mA maximum. In a small number of applications, however, the load on the DO could have an effect on the uncertainty of the analog inputs and outputs. The typical increase in uncertainty is around 0.05% and **only** occurs when **all** the following are true: • **Either** of the two *analog* channels is used as an AI (in voltage mode) or as an AO **and** • **Either** of the two *discrete* channels is used as a DO **and** • The total current load on these two DOs is **greater** than 300mA Analog inputs in current mode are **not** affected.		
Pulse Inputs	Type	Dry contact or open collector	
	Frequency	Low Range	0 to 300 Hz
		High Range	0 to 10.5 kHz
	Input Filter	Low Frequency	1 ms software selectable filter
		High Frequency	30 µs software selectable filter
	Input Current	Software-selectable 66 µA or 2 mA	
	Voltage Rating	30 Vdc maximum	
	Loop Power	Internally sourced	
	Surge Suppression	30 Vdc	
Relay Option			
SPDT Relay	Internally mounted	Quantity	2 (Relays each require a discrete output from the flow computer)
	Input	24 Vdc (24 Vdc is required to energize relays)	

Contact Rating	0 to 30 Vdc Maximum Current 6A

Note: This option is available only with Class 1 Div 2 approval.

Integral Sensors

The FB2100 is available with the following integral sensor options:

- Multi-Variable Sensor – providing differential pressure and static pressure
- Static Pressure Sensor – providing static pressure only
- No integral sensor fitted – with interface to Rosemount™ 4088B MVT transmitters or analog transmitters

Multivariable Sensor (optional)

The standard Rosemount™ MultiVariable™ sensor has a stainless steel coplanar flange, a stainless steel (316L) diaphragm, and silicone fill fluid. Optional versions include:

- A Hastelloy® C-276 sensor diaphragm, a Hastelloy C-276 coplanar flange, with either NACE MRO175/ISO 15156 or MRO103 certification
- Stainless steel traditional flange, a stainless steel diaphragm, and silicon fill fluid.

Differential Pressure Input	DP Range 1	−25 to 25 inches H_2O (−62.16 to 62.16 mbar)		
		Reference Accuracy	± 0.1% span; For spans less than 5:1, ± (0.025+0.015 [USL/Span]) % span	
		Stability	±0.2% USL for 1 year	
		Ambient Temperature Effect per 50°F (28°C)	from 1:1 to 30:1	± (0.2% USL + 0.25% span)
			from 30:1 to 50:1	± (0.24% USL + 0.15% span)
		Static Pressure Effects	Zero Error	± 0.25% USL per 1000 psi (69 bar)
			Span Error	± 0.4% of reading per 1000 psi (69 bar)
		Over Pressure Limit	SP Range G4/A4	2000 psi (137.89 bar)
		Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)
		Notes: ▪ 25-inch sensor is only available with static pressure SP Range 3, maximum pressure limited to 2000 psi. ▪ 25-inch sensor is only available with stainless steel sensor & coplanar flange.		
	DP Range 2: Standard	0 to 250 inches H_2O (623 mbar)		
		Reference Accuracy	± 0.1% span; For spans less than 10:1, ± (0.01 [USL/Span]) % span	
		Stability	± 0.1% USL for 1 year	
		Ambient Temperature	from 1:1 to 30:1	± (0.15% USL)

	Effect per 50°F (28°C)	from 30:1 to 50:1	± (0.20% USL)
	Static Pressure Effects	Zero Error	± 0.1% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.2 + 0.0001 * (Ps - 2000)] % per 1000 psi
		Span Error	± 0.2% of reading per 1000 psi (69 bar)
	Over Pressure Limit	SP Range G4/A4	1600 psi (110.32 bar)
		SP Range G7/A7	3626 psi (250.00 bar)
		SP Range G4/A4	3626 psi (250.00 bar)
	Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)
	Note: 0.1% Accuracy is not available on traditional flange.		
DP Range 2: Enhanced	0 to 250 inches H_2O (623 mbar)		
	Reference Accuracy	± 0.075% span; For spans less than 10:1, ± (0.025 +0.005 [USL/Span]) % span	
	Stability	± 0.125% USL for 5 years; For ± 50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure	
	Ambient Temperature Effect per 50°F (28°C)	± (0.0175% USL + 0.1% span) from 1:1 to 5:1, ± (0.035% USL + 0.125% span) from 5:1 to 100:1	
	Static Pressure Effects	Zero Error	± 0.05% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi
		Span Error	± 0.2% of reading per 1000 psi (69 bar)
	Over Pressure Limit	SP Range G6/A6	1600 psi (110.32 bar)
		SP Range G7/A7	3626 psi (250.00 bar)
		SP Range G4/A4	3626 psi (250.00 bar)
	Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)

DP Range 2: Enhanced for Flow	0 to 250 inches H_2O (623 mbar)		
	Reference Accuracy	± 0.05% of reading; for readings less than 8:1, ± [0.05 + 0.0023(USL / Rdg)] % reading	
	Stability	± 0.125% USL for 5 years; For ± 50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure	
	Ambient Temperature Effect per 50°F (28°C)	± 0.13% of reading from 1:1 to 5:1, ± [0.13 + 0.04 (USL / RDG)] % of reading from 5:1 to 100:1	
	Static Pressure Effects	Zero Error	± 0.05% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi
		Span Error	± 0.2% of reading per 1000 psi (69 bar)
	Over Pressure Limit	SP Range G6/A6	1600 psi (110.32 bar)
		SP Range G7/A7	3626 psi (250.00 bar)
		SP Range G4/A4	3626 psi (250.00 bar)
	Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)
DP Range 2: Extended	0 to 250 inches H_2O (623 mbar)		
	Reference Accuracy	± 0.075% of span for spans 25 to 250 in H_2O; For readings above span, ± 0.15% reading	
	Stability	± 0.125% USL for 5 years; For ± 50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure	
	Ambient Temperature Effect per 50°F (28°C)	For units spanned 75 to 250 in H_2O, ± (0.025% MSL + 0.125% span) For pressures between span and 250 in H_2O, ± (0.025% MSL + 0.125% reading)	
		For units spanned 25 to 75 in H_2O, ± (0.09% MSL + 0.03% span) For pressures between span and 250 in H_2O, ± (0.09% MSL + 0.03% reading)	
		For pressure readings above 250 in H_2O, ±0.15% reading	
	Static Pressure Effects	Zero Error	± 0.05% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi
		Span Error	± 0.2% of reading per 1000 psi (69 bar)

	Over Pressure Limit	SP Range G6/A6	1600 psi (110.32 bar)
		SP Range G7/A7	3626 psi (250.00 bar)
	Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)
DP Range 3: Standard	0 to 1000 inches H_2O (2.5 bar)		
	Reference Accuracy	± 0.1% span; For spans less than 10:1, ± (0.01 [USL/Span]) % span	
	Stability	± 0.1% USL for 1 year	
	Ambient Temperature Effect per 50°F (28°C)	from 1:1 to 30:1	± (0.15% USL)
		from 30:1 to 50:1	± (0.20% USL)
	Static Pressure Effects	Zero Error	± 0.1% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.2 + 0.0001* (Ps - 2000)] % per 1000 psi
		Span Error	± 0.2% of reading per 1000 psi (69 bar)
	Over Pressure Limit	SP Range G7/A7	3626 psi (250.00 bar)
		SP Range G4/A4	3626 psi (250.00 bar)
	Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)
	Notes: ▪ 0.1% accuracy is **not** available on traditional flange. ▪ 1000" DP range with 0.1% accuracy **only** available with stainless steel sensor and coplanar flange. ▪ 1000" DP range is **not** available with 300 psi static pressure (SP Range 1).		
DP Range 3: Enhanced	0 to 1000 inches H_2O (2.5 bar)		
	Reference Accuracy	± 0.075% span; For spans less than 10:1, ± (0.025 +0.005 [USL/Span]) % span	
	Stability	± 0.125% USL for 5 years; For ± 50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure	
	Ambient Temperature Effect per 50°F (28°C)	± (0.0175% USL + 0.1% span) from 1:1 to 5:1, ± (0.035% USL + 0.125% span) from 5:1 to 100:1	

	Static Pressure Effects	Zero Error	± 0.05% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.1 + 0.0001* (Ps - 2000)] % per 1000 psi
		Span Error	± 0.2% of reading per 1000 psi (69 bar)
	Over Pressure Limit	SP Range G7/A7	3626 psi (250.00 bar)
		SP Range G4/A4	3626 psi (250.00 bar)
	Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)
	Note: 1000" DP range is **not** available with 300 psi static pressure (SP Range 1).		
DP Range 3: Enhanced for Flow	0 to 1000 Inches H_2O (2.5 bar) DP		
	Reference Accuracy	± 0.05% of reading; for readings less than 8:1, ± [0.05 + 0.0023(USL / Rdg)] % reading	
	Stability	± 0.125% USL for 5 years; For ± 50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure	
	Ambient Temperature Effect per 50°F (28°C)	± 0.13% of reading from 1:1 to 5:1, ± [0.13 + 0.04 (USL / RDG)] % of reading from 5:1 to 100:1	
	Static Pressure Effects	Zero Error	± 0.05% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi
		Span Error	± 0.2% of reading per 1000 psi (69 bar)
	Over Pressure Limit	SP Range G7/A7	3626 psi (250.00 bar)
		SP Range G4/A4	3626 psi (250.00 bar)
	Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)
	Note: 1000" DP range is **not** available with 300 psi static pressure (SP Range 1).		
DP Range 4: Standard	0 to 2000 psi (137.89 bar)		
	Reference Accuracy	± 0.1% of span; for spans less than 10:1, ± [0.01(USL / span)] % span	
	Stability	±0.1% USL for 1 year	

Ambient Temperature Effect per 50°F (28°C)	± (0.225% of USL) from 1:1 to 50:1	
Static Pressure Effects	Zero Error	± 0.2% USL per 1000 psi (69 bar) For Static Pressures above 2000 psi: ± [0.4 + 0.0002* (Ps - 2000)] % per 1000 psi
	Span Error	± 0.2% of reading per 1000 psi (69 bar)
Over Pressure Limit	SP Range G4/A4	3626 psi (250.00 bar)
Burst Pressure Limit	All SP ranges	10,000 psi (689.47 bar)

Static Pressure Input

The following details are for the static pressure measurement of the MultiVariable sensor

SP Range 1	Gauge – G6	–14.7 to 300 psig (–1.01 to 20.7 barg)
	Absolute – A6	0 to 300 psia (–1.01 to 20.7 bara)
SP Range 2	Gauge – G7	–14.7 to 1500 psig (–1.01 to 103.4 barg)
	Absolute – A7	0 to 1500 psia (–1.01 to 103.4 bara)
SP Range 3	Gauge – G4	–14.7 to 3600 psig (–1.01 to 250 barg)
	Absolute – A4	0 to 3600 psia (–1.01 to 250 bara)
Reference Accuracy	Standard	± 0.1% span; For spans less than 5:1, ± [0.017 (USL/Span)] % span
	Enhanced	± 0.075% span; For spans less than 5:1, ± [0.013 (USL/Span)] % span
	Enhanced for Flow	± 0.05% span; For spans less than 5:1, ± [0.006 (USL/Span)] % span
Stability	Standard	± 0.1% USL for 1 year
	Enhanced	± 0.125% USL for 5 years
	Enhanced for Flow	± 0.125% USL for 5 years
Ambient Temperature Effects per 28 °C (50 °F)	Standard	± (0.175% USL) from 1:1 to 10:1, ± (0.225% USL) from 10:1 to 25:1
	Enhanced	± (0.050% USL + 0.125% span) from 1:1 to 10:1, ± (0.060% USL + 0.175% span) from 10:1 to 25:1
	Enhanced for Flow	± (0.040% USL + 0.060% span) from 1:1 to 10:1, ± (0.050% USL + 0.150% span) from 10:1 to 40:1

Static Pressure Sensor (optional)

The following section applies to the “In-Line” Integral Static Pressure sensor, without differential pressure, which would typically be used with linear meters that provide a pulsed signal for flow.

These static pressure sensors are provided in stainless steel with a 1/2” – 14 NPT Female process connections.

Static Pressure Input	SP Range 1	Gauge – G1	−14.7 to 30 psi_g (−1.01 to 2.06 bar)
		Absolute – A1	0 to 30 psi_a (0 to 2.06 bar)
	SP Range 2	Gauge – G2	−14.7 to 150 psi_g (−1.01 to 10.34 bar)
		Absolute – A2	0 to 150 psi_a (0 to 10.34 bar)
	SP Range 3	Gauge – G3	−14.7 to 800 psi_g (−1.01 to 55.15 bar)
		Absolute – A3	0 to 800 psi_a (0 to 55.15 bar)
	SP Range 4	Gauge – G4	−14.7 to 4000 psi_g (−1.01 to 275.79 bar)
		Absolute – A4	0 to 4000 psi_a (0 to 275.79 bar)
	Reference Accuracy	Standard	± 0.1% span For spans less than 10:1, ± (0.01 [USL/Span]) % span
		Enhanced	± 0.075% span For spans less than 10:1, ± (0.025 + 0.005 [USL / Span]) % span
	Stability	Standard	±0.1% USL for 1 year
		Enhanced	±0.125% USL for 5 years
	Ambient Temperature Effects per 28 °C (50 °F)	Standard	± (0.175% USL) from 1:1 to 30:1 ± (0.225% USL) for 30:1 to 50:1
		Enhanced	± (0.050% USL + 0.125% span) from 1:1 to 30:1 ± (0.060% USL + 0.175% span) for 30:1 to 100:1
	Over Pressure Limit	SP Range G1/A1	750 psi (51.71 bar)
		SP Range G2/A2	1500 psi (103.42 bar)
		SP Range G3/A3	1600 psi (110.32 bar)
		SP Range G4/A4	6000 psi (413.69 bar)
	Burst-Pressure Limit	All SP ranges	11000 psi (758.42 bar)
Power			
External DC Power Supply	10.5 Vdc to 30 Vdc external supply (Max power at 10 watts)		
Optional Rechargeable Lead Acid Battery	Internal mounted 10.5 Ah 12 Vdc battery The battery can power the unit for up to 45 days without any solar charging depending on the application, ambient temperature, and solar regulator type and can be charged by a suitable solar panel and solar charge regulator/controller panel. **Note:** This option is available **only** with Class 1 Div 2 approval		

Solar Panel and Regulator Options	Optional 30W 12 Vdc solar panel with built-in SunKeeper™ SK-6 regulator With the SunKeeper SK-6 solar regulator the battery can power the unit without charging up to 32 days the depending on the application. Optional internally mounted SunSaver SS-6-12 Vdc regulator With the SunSaver SS-6-12 solar regulator the battery can power the unit without charging up to 45 days depending on the application. **Note:** These options are available **only** with Class 1 Div 2 approval
SRAM Battery	Lithium coin cell type BR2335 or BR2330 Typical battery life 5-7 years with power; 10,000 hours without power

Power Modes

To keep power consumption to a minimum, especially for remote sites, the FB2100 can run in two different power modes, low and standard. The FB2100 normally runs in low power mode for standard metering applications.

When running in low power mode, the radio power control function is used to switch to standard power mode and enable the serial ports. During communication periods, the unit uses the standard power mode and then automatically reverts to low power mode when the communication period is over.

Note: Serial connection to a remote 4088B MVT can run in low power mode.

The local display and FBxWifi can be configured to switch off after a period of inactivity (configurable between 1 and 60 minutes) or be permanently left on.

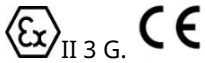
When running in low power mode, if you need to use more than the default number of data points for logging, consult the *Emerson FB2100 Flow Computer Instruction Manual* (D301783X012) to determine the possible impact on power consumption.

The figures below are typical power values in mW measured at room temperature.

Low Power Mode	**Base unit** with integral multivariable DP and pressure sensor and temperature measurement, single DO available		55 mW @ 12Vdc	
	Base unit with expanded I/O, integral multivariable DP, and pressure sensor and temperature measurement, 2 discrete and 2 analog channels available		67 mW @ 12Vdc	
	Additional Load Options	Display and Backlight active	340 mW @ 12Vdc	
		FBxWifi	379 mW @ 12Vdc	
		FBxWifi and Display active	398 mW @ 12Vdc	
		DO active (1 Hz, 50:50 duty cycle, no load)	12 mW @ 12Vdc	
		PI active (10KHz, 50:50 duty square wave)	12 mW @ 12Vdc	
Standard Power Mode	**Base unit** with integral multivariable DP and pressure sensor and temperature measurement, single meter run		240 mW @ 12Vdc	290 mW @ 24Vdc
	Base unit with temperature measurement, (no integral sensor) communicating to remote 4088 (externally powered), single meter run		220 mW @ 12Vdc	268 mW @ 24Vdc

	Base unit with integral multivariable DP and pressure sensor and temperature measurement, 2 discrete and 2 analog channels available, single meter run		260 mW @ 12Vdc	313 mW @ 24Vdc
	Base unit with temperature measurement, integral static pressure sensor, and pulsed input, single meter run		276 mW @ 12Vdc	330 mW @ 24Vdc
	Additional Load Options	Display and Backlight active	159 mW @ 12Vdc	188 mW @ 24Vdc
		FBxWiFi	191 mW @ 12Vdc	202 mW @ 24Vdc
		FBxWiFi and Display active	233 mW @ 12Vdc	245 mW @ 24Vdc
		DO active (1 Hz, 50:50 duty cycle, no load)	20 mW @ 12Vdc	23 mW @ 24Vdc
		PI active (10KHz, 50:50 duty square wave)	14 mW @ 12Vdc	15 mW @ 24Vdc
Physical				
Aluminum Enclosure	Construction	Powder-coat aluminum, with lockable door		
	Ingress Protection	NEMA 4X		
	Dimensions	356 mm H by 305 mm W by 152 mm D (14 in. H by 12 in. W by 6 in. D)		
	Mounting	2 In. pipe, direct manifold or panel mount		
	Wiring	Size 12 to 28 American Wire Gauge (AWG) (0.3 to 2mm diameter)		
	Wiring Access	2 conduit entry points, 3/4 in. NPT, 1 blanked 5/8” (16mm) hole		
	Weight	FB2100 with MVS coplanar flange sensor: 10.75 Kg (23.7 lb)		
		FB2100 with static pressure sensor: 9.98 Kg (22 lb)		
		FB2100 without sensor: 8.21 Kg (18.1 lb)		
		Internal battery: 3.28 Kg (7.23 lb)		
Fiberglass Enclosure	Construction	Compression-molded fiberglass, with lockable door		
	Ingress Protection	NEMA 4X		
	Dimensions	305 mm H by 254 mm W by 152 mm D (12 in. H by 10 in. W by 6 in. D)		
	Mounting	2-inch pipe, direct manifold, or panel mount		
	Wiring	Size 12 to 28 American Wire Gauge (AWG) (0.3 to 2mm diameter)		
	Wiring Access	2 conduit entry points, 3/4 in. NPT, 1 blanked 5/8” (16mm) hole		
	Weight	FB2100 with MVS coplanar flange sensor: 6.94 Kg (15.3 lb)		
		FB2100 with static pressure sensor: 6.17 Kg (13.6 lb)		
		FB2100 without sensor: 4.4 Kg (9.7 lb)		

	Internal battery: 3.28 Kg (7.23 lb)	
HMI	20 characters per line; 4 lines in display.	
Security Switch (Optional)	Provides an alarm each time the enclosure door is opened.	
Local Display (Optional)	Type	Backlight LCD display
Environmental		
Operating Temperature	–40 °C to +80 °C (–40 °F to +176 °F) (see ambient temps in Approvals section) **Note:** Please check Approvals section for any restrictions. The display exhibits increased response time and decreased contrast at temperatures below –30 °C (–22 °F).	
Storage Temperature	–40 to 85 °C (–40 to 185 °F)	
Operating Humidity	5 to 95%, non-condensing	
Conformal Coating	All boards are conformal coated with a coating that complies with ANSI/ISA 71.04 Class G3 environments.	
Environmental Rating	Product conforms to ANSI/ISA 71.04 Class G3 environmental standards with all conduit openings sealed.	
Electro Magnetic Compatibility	The following EMC Emissions and Immunity are evaluated per EMC directive 2014/30/EU. Harmonized standards used: EN 61326-2-3-2013 Immunity EN 61326-1-2013 Emissions	
Immunity	EN 61000-4-2 (Electro Static Discharge) EN 61000-4-3 (Radiated Immunity) * EN 61000-4-4 (Fast Transients) EN 61000-4-5 (Surges) EN 61000-4-6 (Conducted RF) EN 61000-4-8 (Power Frequency Magnetic Field) EN 61000-4-17 (Voltage Ripple) EN 61000-4-29 (Voltage Dips and Interrupts) *Meets CE compliance 10V/m industrial requirements (deviations < 1% span for RTD and Pressure readings in addition to original specification)	
Radiated Emissions	EN 550022 Class A	
Vibration	2g over 10 to 150 Hz 1g over 150 to 200 Hz	
Approvals		
Product Markings for Hazardous Locations	UL	Class I, Div 2 Groups A, B, C, D Hazardous Locations, Temperature Code T4

		Ambient Temperature	Aluminum enclosure -40 °C to +80 °C (−40 °F to +176 °F) (no battery) -40 °C to +45 °C (−40 °F to +113 °F) (with rechargeable lead acid battery) **Note 1** -40 °C to +60 °C (-40 °F to +140 °F) (with optional relays) Fiberglass housing -35 °C to +80 °C (−31 °F to +176 °F) (no battery) -35 °C to +45 °C (−31 °F to +113 °F) (with rechargeable lead acid battery) **Note 1** -35 °C to +60 °C (-31 °F to +140 °F) (with optional relays)
		Note: Maximum ambient temperature for models with the internal SunSaver SS-6-12 Vdc solar regulator is 60 °C (140 °F). However, the internal lead acid battery is limited to +45 °C (+113 °F).	
		Evaluated per Approval Standards	ANSI/ISA 12.12.01-2015 CSA C22.2 No. 213-15, 1st Ed CSA C22.2 NO. 61010-1-12 3rd Ed. UL61010-1 3rd Ed.
	UL	ATEX Cert: DEMKO 16 ATEX 1579X IECEx Cert: IECEx UL IECEx UL 16.0069X Ex ec IIC T4 Gc UL 22UKEX2395X	
		Ambient Temperature	−25 to +55 °C (−13 to +131 °F)
			
			EMC Directive 2016
		Evaluated per Approval Standards	Directive 2014/34/EU IEC 60079-0:2017 IEC 60079-7:2017 EN IEC 60079-0:2018 EN IEC 60079-7:2015 + A1:2018
		Note: ATEX and IECEx approval requires the use of an external DC power supply.	
Miscellaneous Approvals	Customs Union	 TR CU 004/2011, TR CU 020/2011 Conforms to the requirements of the technical regulations of the Customs Union	
	RoHS2	**Device without integral MVS or SP Sensor**: RoHS (2) EU Directive 2011/65/EU **Device with integral MVS or SP Sensor**: RoHS (2) EU Directive 2011/65/EU: This product may be considered out-of-scope when used for the intended design purpose in a Large Scale Fixed Installation (LSFI). Consult *https://www.emerson.com/compliance* for up-to-date product information.	

RoHS	
NEPSI China	National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation Cert. No. GYJ17.1349X Ex nA IIC T4 Gc
CCOE India	Chief Controller of Explosives Approval No. A/P/HQ/MH/104/5883 (P420903) Ex nA IIC T4 Gc
KOREA (KC)	EMC - Broadcasting and communication Equipment Cert. No.: E23A-9B32-26C2-3662
NMi	Report Numbers: NMi-1901499-02 & 1901499-01 API Chapter 21.1:2013 compliance for “Flow measurement using Electronics Metering Systems – Electronic Gas Measurement” and independent verification for natural gas properties and flow calculations

Ordering Information

Model/ Seg	Description	Approval	Selection
Flow Computer			
00	FB2100 Flow Computer		FB2100
Hazardous Area Approvals			
10	Class 1 Div2 cULus		A4
	IECEx/UKCA Ex ec		A5
	ATEX/UKCA Ex ec		A6
Metrology Approvals			
20	Not required		B0
Housing Options			
30	Powder-coated aluminum enclosure for use with options J0 & J1	A4, A5, A6	C5
	Fiberglass enclosure for use with options J0 & J1	A4, A5, A6	C7
Power Options			
40	DC supply (no internal battery, no solar regulator)	A4, A5, A6	D2
	Solar-ready: supplied with internal Power-Sonic® 12V 10.5 Ah battery, fuses, and 10 feet of cable (solar panel and solar regulator provided by others)	A4	D4
	Solar-ready: supplied with internal Power-Sonic® 12V 10.5 Ah battery, fuses, internal SunSaver™ 6 solar regulator, and 10 feet of cable (solar panel by others)	A4	D8
Local Operator Interface Display			
50	Not required	A4, A5, A6	E0
	Display included	A4, A5, A6	E1
Measurement Type/Pressure Sensor			
60	Not required; external transmitters being used	A4, A5, A6	F0
	Integral Multivariable; DP & Static P	A4, A5, A6	F1
	Integral Static Pressure Only; Inline (no DP)	A4, A5, A6	F2
Multivariable Sensor (includes Differential P, Static P, and Material/Flange Type Selections)			
70	Multivariable Sensor (includes Differential P, Static P, and Material/Flange Selections)		
Differential Pressure Range & Accuracy			
71	25 Inches H2O (62.3 mbar) DP, 0.1% Accuracy **Note**: 25" DP option is only available with static pressure options G4 or A4 and the maximum pressure is limited to 2000 psi.	A4, A5, A6	B221
	250 Inches H2O (623 mbar) DP, 0.1% Accuracy	A4, A5, A6	B222

Model/ Seg	Description	Approval	Selection
	Note: 0.1% Accuracy is not available on traditional flange.		
	250 Inches H2O (623 mbar) DP, 0.075% Accuracy	A4, A5, A6	B122
	250 Inches H2O (623 mbar) DP, 0.05% Reading Accuracy, Enhanced for Flow **Note:** Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types.	A4, A5, A6	B322
	250 Inches H2O (623 mbar) Extended Range DP, 0.075% Accuracy **Note:** 250" Extended Range is only available with SP range G6, A6, G7, A7 and not available with SP range G4, A4	A4, A5, A6	B12A
	1000 Inches H_2O (2.5 bar) DP, 0.1% Accuracy **Note**: 1000" DP range is not available with 300 psi static pressure.	A4, A5, A6	B223
	1000 Inches H2O (2.5 bar) DP, 0.075% Accuracy **Note:** 1000" DP range is not available with 300 psi static pressure.	A4, A5, A6	B123
	1000 Inches H2O (2.5 bar) DP, 0.05% Reading Accuracy, Enhanced for Flow **Notes:** • 1000" DP range is not available with 300 psi static pressure • Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types.	A4, A5, A6	B323
	2000 psi (137.9 bar) DP, 0.1% Accuracy **Note:** 2000 psi DP range is only available with SP range G4 3626 psi and Hastelloy Diaphragm 3E13. Any other SP Range including A4 is not available.	A4, A5, A6	B225
	No Differential Pressure required, static pressure only accuracy 0.1% **Note**: Only available with option F2 and "Inline" sensor option 2K11	A4, A5, A6	B2

Model/ Seg	Description	Approval	Selection
	No Differential Pressure required, static pressure only accuracy 0.075% **Note**: Only available with option F2 and "Inline" sensor option 2K11	A4, A5, A6	B1
	No Differential Pressure required, no static pressure sensor required **Note**: Only available with option F0 in segment 60	A4, A5, A6	NN
Static Pressure Range (for use with multivariable sensor B22n or B12n above)			
72	MV 300 psi gauge (20.7 barg) **Notes**: • 1000" DP range is not available with 300 psi static pressure • Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types.	A4, A5, A6	G6
	MV 300 psi absolute (20.7 bara) **Notes**: • 1000" DP range is not available with 300 psi static pressure • Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types.	A4, A5, A6	A6
	MV 1500 psi gauge (103.4 barg) **Note:** Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types.	A4, A5, A6	G7
	MV 1500 psi absolute (103.4 bara) **Note:** Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types.	A4, A5, A6	A7
	MV 3600 psi gauge (250 barg) **Note**: When used with 25" DP option, maximum working pressure is 2000 psi/137.9 Bar.	A4, A5, A6	G4

Model/ Seg	Description	Approval	Selection
	MV 3600 psi absolute (250 bara) **Note**: When used with 25” DP option, maximum working pressure is 2000 psi/137.9 bar	A4, A5, A6	A4
	Static Pressure Range (for use with Static P sensor only, B1 or B2 above)		
	SP 30 psi gauge (2.06 barg)	A4, A5, A6	G1
	SP 30 psi absolute (2.06 bara)	A4, A5, A6	A1
	SP 150 psi gauge (10.34 barg)	A4, A5, A6	G2
	SP 150 psi absolute (10.34 bara)	A4, A5, A6	A2
	SP 800 psi gauge (55.15 barg)	A4, A5, A6	G3
	SP 800 psi absolute (55.15 bara)	A4, A5, A6	A3
	SP 4000 psi gauge (275.79 barg)	A4, A5, A6	G4
	SP 4000 psi absolute (275.79 bara)	A4, A5, A6	A4
	No differential pressure or static pressure sensor required **Note**: Only available with option F0 in segment 60	A4, A5, A6	NN
Sensor Material and Flange Type			
73	Stainless steel sensor and coplanar flange	A4, A5, A6	2E12
	Hastelloy® diaphragm and Hastelloy coplanar flange **Note**: Not available with 25" DP sensor range and 300/1500 psi range with 0.05% reading accuracy enhanced for flow options.	A4, A5, A6	3E13
	Stainless steel sensor and traditional flange **Note**: Traditional Flange is not available with 0.1% Accuracy sensor	A4, A5, A6	2F12
	Stainless steel inline connection 1/2" 14 NPT female-for use with option B1 or B2 above	A4, A5, A6	2K11
	No differential pressure and no static pressure sensor required **Note**: Only available with option F0 in segment 60	A4, A5, A6	NN
Sensor Material Certificates			
74	Not required	A4, A5, A6	Q0
	3.1 B Traceability certs to EN 10205	A4, A5, A6	Q8
	NACE MRO 175/ISO 15156; requires Hastelloy option **Note**: Available **only** with 3E13	A4, A5, A6	Q15
	NACE MRO 103; requires Hastelloy option	A4, A5, A6	Q25

Model/ Seg	Description	Approval	Selection
	Note: Available **only** with 3E13		
Inputs & Outputs			
80	PRT/RTD input (2, 3, or 4-wire) and Single Discrete Output	A4, A5, A6	G1
	PRT/RTD input (2, 3, or 4-wire) of 2 AI/AO & 2 DI/DO/PI	A4, A5, A6	G2
Reserved			
90	Not required	A4, A5, A6	H0
FBxWifi™			
100	Not required	A4, A5, A6	J0
	FBxWifi with internal antenna (mounted inside enclosure)	A4, A5, A6	J1
Radio Ready			
110	Not required	A4, A5, A6	K0
	Radio Mounting Bracket (no cables)	A4, A5, A6	K9
Integral Relay			
120	Not required	A4, A5, A6	L0
	Two internal relays mounted in enclosure (30 Vdc at 6.0A) **Note**: L2 is only available with power option D2, as the relays require 24 Vdc power.	A4	L2
Sensor Calibration Certificates			
130	Not required	A4, A5, A6	M0
	Pressure/MVS (DP &/or Static P) Sensor & PRT/RTD input calibration certificate	A4, A5, A6	M1
	Pressure/MVS (DP &/or Static P) Sensor & PRT/RTD input Analog I/O calibration certificate	A4, A5, A6	M2
	Analog I/O & PRT/RTD input calibration certificate **Note**: Available **only** with option F0	A4, A5, A6	M3
Security Intrusion Switch			
140	Not required	A4, A5, A6	N0
	Intrusion Switch on Door Entry	A4, A5, A6	N1
Local Serial Port (mounted on bottom of chassis)			
150	Not required	A4, A5, A6	P0
	Serial Port socket: compatible with ROC/FloBoss cable; cable (part no. W20008X0012) sold separately.	A4, A5, A6	P1
	Serial Port socket: compatible with ABB cable (cable not included)	A4, A5, A6	P2

Model/ Seg	Description	Approval	Selection
Mounting Bracket			
160	Panel mount kit		R0
	2" Pipe-mounting kit (stainless steel) for aluminum housing C5/C6 only	A4, A5, A6	R5
	2" Pipe-mounting kit (stainless steel) for fiberglass housing C7/C8 only	A4, A5, A6	R6
Meter Runs (Streams)			
170	Single Stream	A4, A5, A6	S1
Fluid Types & Calculations			
180	Natural Gas	A4, A5, A6	T1
	Natural Gas & Liquid Hydrocarbon **Note**: Current implementation of Liquid calculation supports Crude Oil and Light Hydrocarbons (NGL/LPG).	A4, A5, A6	T3
Reserved			
190	Not required		U0
Reserved			
200	Not required		V0
Reserved			
210	Not required		W0

Sr. No.	Description	Approval	Selection
	Extra Certificates and Accessories		
1	Certificate of Conformance (one per order)	A4, A5, A6	CERT001
2	Certificate of Origin (one per order)	A4, A5, A6	CERT002
3	Chamber Certificate of Origin	A4, A5, A6	CERT003
4	LOI Cable Assembly, LOI to 3-Pin, Coiled, 20'	A4, A5, A6	W20008X0012

Sensor Summary for FB1000 and FB2000 Series Flow Computers

The following table identifies the sensor combinations that are available for the FB1000 and FB2000 Series Flow Computers.

			Coplanar Flange		Coplanar Flange		Traditional Flange	
DP		**SP**	**Stainless Steel**		**Hastelloy**		**Stainless Steel**	
Range	**Accuracy**	**Range**	Gauge	Absolute	Gauge	Absolute	Gauge	Absolute
25”	**0.1%**	**2000 psi**	Available	Available	N/A	N/A	N/A	N/A
250”	**0.1%**	**300 psi**	Available	Available	Available	Available	N/A	N/A
		1500 psi	Available	Available	Available	Available	N/A	N/A
		3626 psi	Available	Available	Available	Available	N/A	N/A
250”	**0.075%**	**300 psi**	Available	Available	Available	Available	Available	Available
		1500 psi	Available	Available	Available	Available	Available	Available
		3626 psi	Available	Available	Available	Available	Available	Available
250” Enhanced for Flow	**0.05% of Reading**	**300 psi**	Available	Available	N/A	N/A	Available	Available
		1500 psi	Available	Available	N/A	N/A	Available	Available
		3626 psi	Available	Available	Available	Available	Available	Available
250” Extended	**0.075%**	**300 psi**	Available	Available	Available	Available	Available	Available
		1500 psi	Available	Available	Available	Available	Available	Available
1000”	**0.1%**	**1500 psi**	Available	Available	N/A	N/A	N/A	N/A
		3626 psi	Available	Available	N/A	N/A	N/A	N/A
1000”	**0.075%**	**1500 psi**	Available	Available	Available	Available	Available	Available
		3626 psi	Available	Available	Available	Available	Available	Available
		3626 psi	Available	Available	Available	Available	Available	Available
1000” Enhanced for Flow	**0.05% of Reading**	**1500 psi**	Available	Available	N/A	N/A	Available	Available
		3626 psi	Available	Available	Available	Available	Available	Available
2000 psi	**0.1%**	**3626 psi**	N/A	N/A	Available	N/A	N/A	N/A

		Inline Stainless Steel	
Accuracy	SP Range	Gauge	Absolute
0.1%	30 psi	Available	Available
	150 psi	Available	Available
	800 psi	Available	Available
	4000 psi	Available	Available
0.075%	30 psi	Available	Available
	150 psi	Available	Available
	800 psi	Available	Available
	4000 psi	Available	Available

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