Proline Promass Q 300 / 500 Abridged Specifications

Bulletin SS0M042 Issue/Rev. 0.2 (11/19)

Coriolis Mass Flowmeters

The Proline Promass Coriolis Mass Flowmeters provided by TechnipFMC brings the industry's best technology in Coriolis meters to the oil and gas industry.

The Proline Promass Q sensor offers the highest flow and density measurement performance in a Coriolis mass flow meter and is ideal for custody transfer and other challenging measurement applications. Multi-frequency technology optimizes measurement performance in difficult to measure fluids such as liquids with entrained gas. The accuracy is immune from fluid properties such as density and viscosity and auto-compensates for low Reynolds number flowing conditions.

The 300 and 500 transmitter options provide users with flexibility in communication protocols, I/O capacity and remote/local mounting options. Cutting edge features such as Heartbeat diagnostics, HistoROM data logging and the web server interface provide users simple access to comprehensive process data and diagnostics.

These technologies allow the Promass Q to maintain the highest quality of measurement, without interruption, for critical applications that depend upon accurate and repeatable readings under all operating conditions, including many upset and transient conditions.

Note: For complete specifications and dimensions refer to bulletins TI01322O for Q 300 and TI01327O for Q 500.

Features and Benefits

- Optimized performance for liquids with entrained gas using Multi Frequency technology for uninterrupted measurement performance under difficult operating conditions.
- Immunity to physical fluid properties such as viscosity or density and the effects of low Reynolds number flowing conditions.
- Simple and intuitive operation via the 4 line Illuminated touch control display with optional built in WLAN.
- Web server interface makes accessing meter data and configurations as simple as viewing a web page using either the RJ45 wired engineering interface or the optional WLAN wireless connection.
- Exceptional density performance for diagnostic batch monitoring or other process control applications. Accurate to within ±0.0002 g/cc under reference conditions.
- Up to four individually configurable I/O slots available. The user configurable I/O option can be field adjusted to either analog or digital, input or output.
- Heartbeat Technology offering truly advanced diagnostic functionality, compliant with ISO 9001 measuring points relevant to quality.
  - Continuous self-monitoring
  - External monitoring through data transfer to Condition Monitoring System
  - in-situ Verification for simple pass/fail report of meter functions. No need for complex interpretation or expert knowledge. Outputs a traceable verification report according to the requirement of ISO 9001: 2008 - Control of monitoring and measuring equipment

Promass Q Sensor Reference Specifications

All 100, 300, and 500 sensors maintain same Modbus register as original 80, 83, and 84 sensors.

Base Volumetric and Mass Flow Accuracy[1]		
	PremiumCal.	Standard Calibration
Liquid	+/- 0.05% o.r.	+/- 0.10% o.r.
Gas	+/- 0.35% o.r. (Mass)	

Base Repeatability[2]	
Mass Flow, Volume Flow (Liquid)	+/- 0.025% o.r.
Mass Flow (Gas)	+/- 0.25% o.r.
Density Measurement (Liquid)	+/- 0.0001 g/cc

Base Temperature Accuracy
±0.18 °F ± 0.003 • (T – 32) °F (±0.1 °C ± 0.003 • T °C)

Flow Ranges[3]				
Size	**lb/min**	**kg/min**	**BPD**	**m³/h**
1"	0 to 736	334	3,780	25.1
2"	0 to 2,944	1,336	15,120	100.2
3"	0 to 7,360	3,339	37,800	250.4
4”	0 to 20,240	9,181	103,940	688.6

Process Temperature Range[4]		
	Standard Measurement Tube	**Low Temperature Version**
Promass 300 Q	-58 to 401°F (-50 to 205°C)	-321 to +302°F (-196 to +150°C)
Promass 500 Q	-58 to 401°F (-50 to 205°C)	-321 to +302°F (-196 to +150°C)

Density Accuracy	
Base accuracy, valid between 20° C and 60° C, 0 to 2 g/cc.	+/- 0.0002 g/cm³

Zero Point Stability	
Size	**lb/min**
1"	0.013
2"	0.066
3”	0.20
4”	0.42

Nominal Pressure Rating	
Per ASME B16.5 Cl 150, Cl 300, Cl. 600 (-20°F to 100°F)	
Sensor Tubes (Primary)	
Pressure Class	**Stainless Steel**
150	285 psig
300	740 psig
600	1,480 psig
The Promass Q flanges are constructed of ASME B16.5 group 2.2 stainless steel but are rated to the equivalent Class 1.1 pressures. Flanges also available to EN 1092-1 (DIN 2501)	
Sensor Body Secondary Containment (Designed with a safety factor ≥4x)	
580 psi (40 bar) for 1" and 2" 362 psi (25 bar) for 3" and 4"	

Material Of Construction	
Sensor Housing	Stainless steel, 1.4301 (304)
Measuring Tubes	Stainless steel, 1.4404 (316/316L)
Process Connection	Stainless steel, 1.4404 (F316/F316L)

300 and 500 Series Transmitter Features

Summary: The 300 Series is for application requiring custody transfer approvals or the use of the two additional configurable I/O options.

The 500 Series is a remote mounted solution which adds an additional I/O configuration slot. The remote mounted transmitter can be located in a safe or hazardous zone.

1. For flow <= (zero point stability ÷ base accuracy) *100%, max error = ± (zero point stability ÷ measured value) • 100% o.r.
2. For flow < = ½ • (zero point stability ÷ base accuracy) *100%, max repeatability = ± ½ • (zero point stability ÷ measured value) • 100% o.r.
3. Volumetric flow range table values are evaluated for a S.G. of 0.8. For other fluids, multiply the chart value by (0.8/S.G.), at operating conditions, to determine the operating volumetric flow range.
4. Maximum process temperature may require a reduction in ambient temperature rating and vice versa. Consult Technical Information Manuals for details.

300 and 500 Series Transmitter Features (continued)

Approvals

Custody Transfer: NTEP, OIML R117, OIML R137, MID,

Hazardous area: ATEX/ IECEx, CSA C/US, INMETRO, *EAC Ex Approved

CE Mark certifies conformance to all applicable, EU Directives

Local Display

4 Line Illuminated with Touch Control

- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: -4 to +140 °F (-20 to +60 °C)

4 Line Illuminated with Touch Control + WLAN

Optional WLAN interface for access to the Web based interface via DHCP.

Integrated Web Server

The device can be operated and configured via a Web browser and via the RJ 45 service interface or the optional WLAN interface.

Supported functions

Data exchange between the operating unit (such as a notebook for example) and the measuring device:

- Uploading the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file, create documentation of the measuring point configuration)
- Export the Heartbeat verification log (PDF file, only available with the "Heartbeat Verification" application package)
- Flash firmware version for device firmware upgrade, for instance

Power

DC 24 V +/-20%

AC 100 to 240 V, -15 to +10%, 50/60 Hz

DC 24 V +/-20% and AC 100 to 240 V, -15 to +10%, 50/60 Hz

Consumption: Max 10 Watts

Communication Options

BA: Current Output 4 to 20 mA HART

Active or passive selectable, Galvanically isolated; Adjustable damping; HART protocol 7. Readout of up to 4 user assignable dynamic variables and 8 device variables.

MA: Modbus RS 485

RS-485 in accordance with EIA/TIA-485 standard. Integrated terminating resistor activated via DIP switches.

Input, Output Options

A: Not assigned

Empty slot

D: User configurable input/output

The output is user assignable to one of the following during commissioning:

1. **Current Output 4 to 20 mA (active)** for indication of mass or volume flow, corrected volume flow, density, ref. density or temperature
2. **Current Output 0/4 to 20 mA (passive)** for indication of mass or volume flow, corrected volume flow, density, ref. density or temperature
3. **Pulse/frequency/Switch Output:** Pulse output active/passive selectable for indication of mass or volume flow, corrected volume flow, density, ref. density or temperature. Switch output selectable to flow direction, diagnostic behavior, PV alarm or flow status
4. **Current input 4 to 20 mA (active)** for input of pressure, temperature or density value
5. **Current input 0/4 to 20 mA (passive)** for input of pressure, temperature or density value
6. **Status Input:** Low signal: DC -3 to +5 V, High signal: DC 12 to 30 V for signal to reset totalizers or flow override

F: Pulse output phase shifted

Pulse outputs are 180 degrees phase shifted, must occupy slots 2 and 3. Selectable for indication of mass or volume flow, corrected volume flow, density, ref. density or temperature.

H: Relay output

Open/closed contact indicating device status. Selectable to flow direction, diagnostic behavior, PV alarm or flow status.

Housing

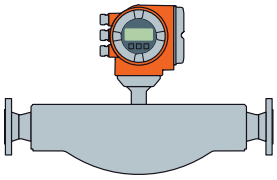
Material: Coated aluminum or cast stainless steel

Electrical connection: Gland M20, Thread M20, G½, NPT½

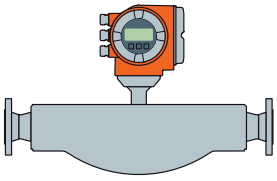
300 and 500 Series Transmitter Features

Proline 300
(compact version)

Non-Ex
Ex: Zone 2, Class I Div. 2

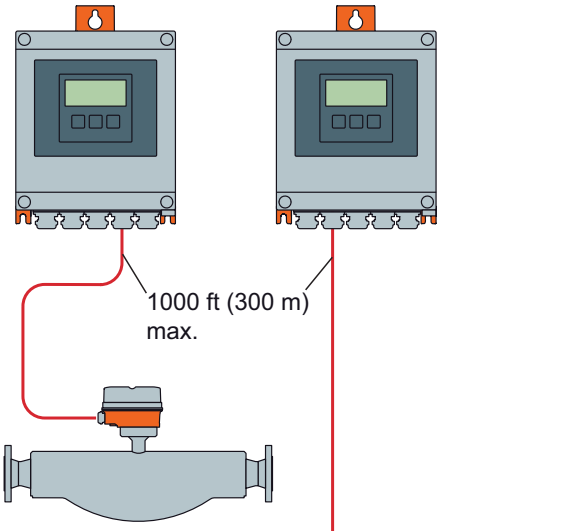


Ex: Zone 1, Class I Div. 1

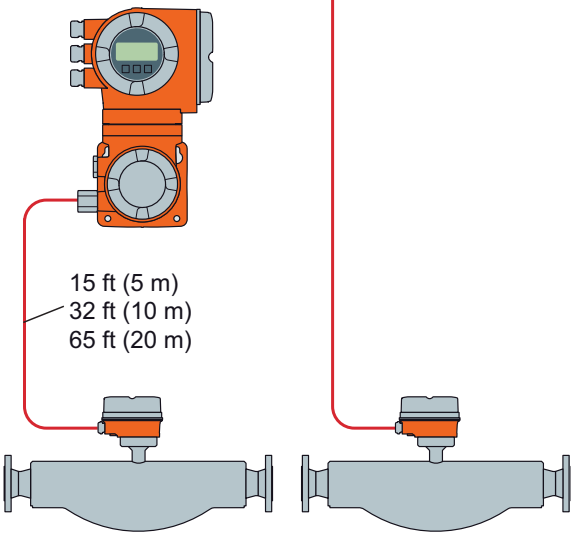


Proline 500
(remote version)

Proline 500 - Digital
Non-Ex
Ex: Zone 2, Class I Div. 2



Proline 500
Ex: Zone 1, Class I Div. 1



* For complete specifications and dimensions refer to bulletins TI01322O for Q 300 and TI01327O for Q 500.

Flowmeter Selection

Note: Refer to the Application Worksheet FM0M027 provided by your TechnipFMC representative for a more in depth list of requirements needed to properly order a meter.

Input, Output Options		
	Promass	
Available Combinations	**300**	**500**
Features		
Backlit Display	4-line	4-line
Communication		
HART®	•	•
Modbus	•	•
Web based interface	•	•
WLAN	•	•
Local display via optical buttons	•	•
Housing		
Ultra Compact		
Compact with expandable I/O	•	
Remote wall mount		•
Outputs		
Communication port	1	1
Selectable I/O port	2	3
HART 4-20	•	•
Ethernet/IP		
Modbus	•	•
Measured Variables		
Mass flow	•	•
Volumetric flow	•	•
Density	•	•
Temperature	•	•
Totalizers	3	3
Sensor Memory Chip (S-DAT)	•	•
Transmitter Memory Chip (T-DAT)	•	•
Application Packages		
Heartbeat Technology	•	•
Concentration Measurement	•	•
Special Density	•	•
HistoROM	•	•
Hazardous Area Approvals		
CSA C/US Class I, II, III, Div. 1	•	•
CSA C/US Class I, Div. 2	•	•
Power Supply		
100-230 VAC	•	•
24 VDC	•	•

1. Not available with Modbus communication option.
2. Includes a pulse/frequency/switch output.

Promass sensor sizing requires the following information:
- Flow Rate (Min., Max., and Nominal)
- Operating Viscosity
- Specific Gravity
- Line Size
- Pressure
- Temperature

The following steps guide flowmeter selection:

1. Determine the correct sensor model for application
- **E Sensor:** Non-custody transfer, 1/2" to 3"
- **F Sensor:** General purpose high accuracy, custody transfer 1/2" to 10"
- **Q Sensor:** Highest performance, challenging applications custody transfer.
- **O Sensor:** High pressure custody transfer, corrosion resistant duplex steel, 3" to 6"
- **X Sensor:** High capacity custody transfer, 14" with 1" to 16" inlet flange.

2. Material of construction

Verify material of construction is suitable for process application.

3. Choose the correct meter size. Typical guidelines
- The minimum recommended full scale value is approx. 1/20 of the max. full scale value.
- In most applications, 20 to 50% of the maximum full scale value can be considered ideal.
- Select a lower full scale value for abrasive substances such as fluids with entrained solids (flow velocity <1 m/s (<3 ft/s)).

For gas measurement the following rules apply:
- Flow velocity in the measuring tubes should not be more than half the sonic velocity (0.5 Mach).
- The maximum mass flow depends on the density of the gas: formula.

4. Calculate flow measurement accuracy. Use the larger of the zero point stability and base level accuracy:

PremiumCal

±0.05%, [(zero point stability ÷ measured value) • 100]% o.r.

Standard

±0.10%, [(zero point stability ÷ measured value) • 100]% o.r.

Gas

±0.35%, [(zero point stability ÷ measured value) • 100]% o.r.

Special Application Packages

Heartbeat Technology	
Heartbeat Diagnostics	All Proline measuring devices with Heartbeat Technology come standard with an integrated self-monitoring system that monitors the entire measurement chain from the sensor to the outputs. This integrated self-monitoring system supplies additional information (measured variables) for the direct assessment of the state of the measuring device, and information on process influences that affect the measuring function and performance.
Heartbeat Verification + Monitoring Application Package 	**Heartbeat Monitoring** Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for preventive maintenance or process analysis. These data enable the operator to: • Draw conclusions - using these data and other information - about the impact process influences (such as corrosion, abrasion, buildup etc.) have on the measuring performance over time. • Schedule servicing in time. • Monitor the process or product quality, e.g. gas pockets. **Heartbeat Verification** Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment". • Functional testing in the installed state without interrupting the process. • Traceable verification results on request, including a report. • Simple testing process via local operation or other operating interfaces. • Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications. • Extension of calibration intervals according to operator's risk assessment.

Concentration and Special Density	
Density Measurement	Measurement of fluid density is included as standard and is available output to the control system.
Concentration Measurement and Special Density Application Packages	**Special Density** The "Special Density" application package offers high-precision density measurement over a wide density and temperature range particularly for applications subject to varying process conditions. **Concentration** With the help of the "Concentration Measurement" application package, the measured density is used to calculate other process parameters: • Temperature-compensated density (reference density). • Percentage mass of the individual substances in a two-phase fluid. (Concentration in %). • Fluid concentration is output with special units (°Brix, °Baumé, °API, etc.) for standard applications.

Extended HistoROM	
Event Memory	Memory for the last 20 event message entries stored in chronological order is included as standard
HistoROM Application Package	**HistoROM** Comprises extended functions concerning the event log and the activation of the measured value memory. **Event log:** Event message memory is extended from 20 entries up to 100 entries. Data logging (line recorder): • Memory capacity for up to 1000 measured values is activated. • 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user. • Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.

Options and Modeling

Model codes can be configured using either the printed price list or an E+H online store. For the use of online configuration tools the meter base code must be entered first. Additional options are selected from the pull-down menus.

Configuration example: TechnipFMC 3" Q Sensor with 300 Series Transmitter

Q Sensor Base model codes selection:

Sensor	Transmitter	Nominal Pipe Size
O8Q	**3**	**B25**
Q = Q Sensor	3 = 300	B25 = 1” (DN 25)
	5 = 500	B50 = 2” (DN 50)
		B80 = 3” (DN 80)
		B1H = 4” (DN 100)

Base Model Code													
O8Q3BXX	010	015	020	021	022	030	040	050	060	070	080	480	490
O8Q3B80	CD	D	MA	D	D	F	A	D	SA	AAS	A	A2	FA

Additional Options									
+	500	520	540	570	580	590	620	850	895

Code	Description
O8Q3BXX	Base Model Code
010	Area Classification
015	Power supply
020	Output; Input 1:
021	Output; Input 2:
022	Output; Input 3:
030	Display; Operation:
040	Housing:
050	Electrical Connection
060	Meas. Tube Mat., Wetted Parts Surface:
070	Process Connection:
080	Calibration Flow:
480	Device Model:
490	Customer:

Code	Description
500	>Operation Language Display:
520	>>Sensor Option:
540	>>Application Package:
570	>>Service:
580	>>Test, Certificate:
590	>>Additional Approval:
620	>>Accessory Enclosed:
850	>Firmware Version:
895	>>Marking:

Dimensions and Weights

For a complete list of sensor (1 to 4 inch) and transmitter dimensions, please refer to specifications bulletins:
Promass 300 Q.....Bulletin TI01322O
Promass 500 Q.....Bulletin TI01327O

Revisions included in SS0M042 Issue/Rev. 0.2 (11/19):
Page 7: Base Model Code O8Q3B80 480 changed from A1 to A2.

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