Product Data Sheet
PS-001484, Rev D
February 2018

Micro Motion® Gas Specific Gravity Meters

Gas specific gravity and relative density meter

Precision gas specific gravity measurement

- Direct, fast response gas specific gravity, molecular weight, relative and base density measurement
- Gas specific gravity and molecular weight measurement accuracy up to ±0.1% reading
- Derived multi-variable outputs including Hydrogen Purity, Gas Energy, Calorific Value/BTU, Wobbe Index, and Energy Flow (when external device connected)

Superior multi-variable I/O, meter health, and application capabilities

- Hazardous-area approved, head-mounted transmitter that supports local configuration and display
- Internal diagnostics for fast verification of meter health and installation
- Application-specific factory configurations ensure fit-for-purpose operation

Installation flexibility and compatibility

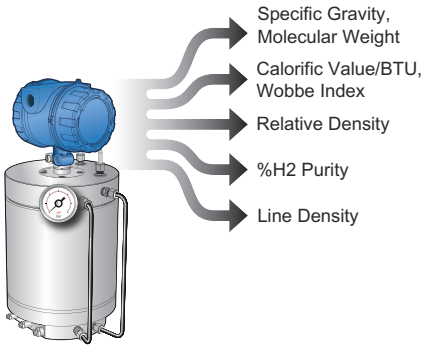
- Unaffected by process or compositional variations using proven Ni-Span-C vibrating cylinder technology
- Supports multiple protocols for connection to DCS, PLC, and flow computers
- Wide range of process conditions accommodated by an integrated sample conditioning system option

Micro Motion® Gas Specific Gravity Meters

Micro Motion® Gas Specific Gravity Meters use proven Ni-Span-C vibrating cylinder technology to provide fast-response, precision gas specific gravity measurement over a wide operating range. These meters can be calibrated to directly measure specific gravity, molecular weight, relative density, and base density; and, can be configured for hydrogen purity, calorific value/BTU and wobbe index. No additional calculation using temperature and pressure compensation is required. The Gas Specific Gravity Meter can be used in applications such as natural gas custody transfer, fuel gas combustion control and hydrogen purity monitoring.

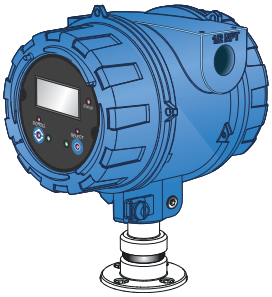
Application configurations

You can preselect an application-specific configuration for your meter from a wide range of options.



Integral transmitter

Supports Time Period Signal (TPS), Analog (4-20 mA), HART, WirelessHART®, and Modbus RS-485 communications.



Meter diagnostics

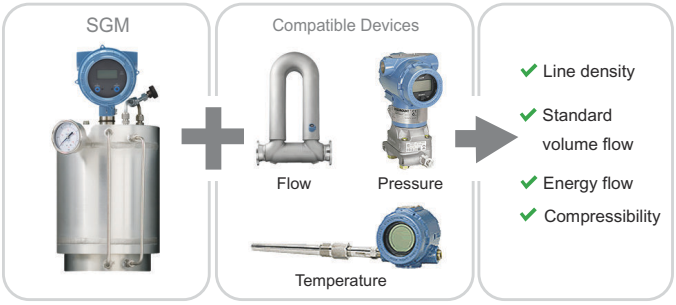
Ensure measurement health through known density verification (KDV) and other meter and installation diagnostic capabilities.

Installation capabilities

The SGM has a modular design with an optional sample conditioning system that enhances installation flexibility.

Interconnectivity

Integral HART I/O allows direct input of external temperature, pressure, and flow measurements for enhanced measurements, such as energy flow and compressibility.



ProLink® III software: a configuration and service tool

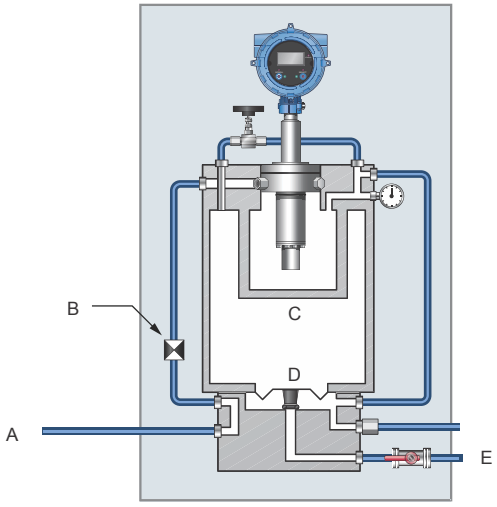
ProLink III software is an easy-to-use interface that allows you to view key process variables and diagnostics data for your meter. For more information on ordering the software, contact your local sales representative or email customer support at *flow.support@emerson.com*.

Operating principle

Sample gas conditioning

- The gas to be measured is conditioned by an integral restriction orifice, reference chamber and pressure control diaphragm.
- After conditioning, the density of this gas is insensitive to changes in pressure (P), temperature (T), and compressibility (Z).
- The density of the gas is now only sensitive to changes in molecular weight.

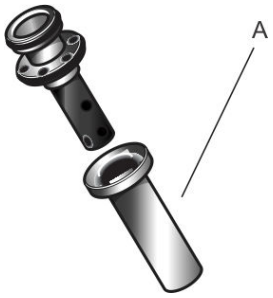
$$\text{Density, } \rho \alpha \frac{MW \times P}{T \times Z}$$



A. Gas inlet (supply pressure)
B. Restriction orifice
C. Reference chamber
D. Diaphragm
E. Gas outlet

Cylinder vibration

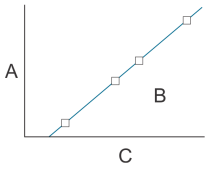
- A Ni-Span C cylinder is mounted inside a pressure-retaining assembly containing the process gas.
- The Ni-Span C cylinder is vibrated electro-magnetically at its natural frequency.
- Changes in sample gas composition and, thus density, which is now proportional to molecular weight, cause the natural frequency of the cylinder to change.



A. Ni-Span C cylinder

Customer cylinder calibration

- Micro Motion transmitters accurately measure time period.
- Measured time periods are converted into molecular weight or specific gravity readings using meter calibration coefficients.
- Up to three calibration points for gas blending and Hydrogen purity provided.



A. Density (kg/m^3)
B. Time period = 1 ÷ frequency
C. $[Time\ period]^2$ (μs^2)

Performance specifications

Specific gravity measurement

Specification	Value	
Accuracy	Up to ±0.1% of reading	
Calibration	Using gas samples with known specific gravity	
Gas flow rate	0.2 to 60 cm^3/sec	0.012 to 3.66 in^3/sec
Process gas	Dry, clean, non-corrosive gas	
Reference chamber pressure	1.2 to 7.0 bara at 20 °C	17 to 101 psia at 68 °F
Repeatability	±0.02% of reading	
Response time	Less than 5 seconds upon entry into device	
Specific gravity range	0.1 to 3.0 typical	
Supply pressure with sample conditioning system	■ Minimum: 1.4 bara (20 psia) ■ Maximum: 100 bara (1450 psia)	
Supply pressure without sample conditioning system	■ Minimum: 1.4 bara (20 psia) ■ Maximum: 12 bara (174 psia)	

Temperature measurement

Specification	Value	
Temperature range(1)	–18 °C to +50 °C	–0 °F to +122 °F
Temperature coefficient	0.01% per °C	0.005% per °F

(1) Or, as limited by the dew point of the gas.

Transmitter specifications

Available transmitter versions

For more information on the transmitter outputs and ordering codes, see the product ordering information.

Analog

	Output channels		
Typical application	A	B	C
■ General purpose measurement ■ DCS/PLC connection	4–20 mA + HART	4–20 mA	Modbus/RS-485

Discrete

	Output channels		
Typical application	A	B	C
General purpose measurement with output switch	4–20 mA + HART	Discrete output	Modbus/RS-485

Time Period Signal (TPS)

	Output channels		
Typical application	A	B	C
■ Fiscal/Custody Transfer ■ Flow computer connection	4–20 mA + HART	Time Period Signal (TPS)	Modbus/RS-485

Fixed

	Output channels		
Typical application	A	B	C
■ Fiscal/Custody Transfer ■ Flow computer connection	4–20 mA (temperature)	Time Period Signal (TPS)	Disabled

Local display

Design	Features
Physical	■ Segmented two-line LCD screen. ■ Can be rotated on transmitter, in 90-degree increments, for ease of viewing. ■ Suitable for hazardous area operation. ■ Optical switch controls for hazardous area configuration and display. ■ Glass lens. ■ Three-color LED indicates meter and alert status.
Functions	■ View process variables. ■ View and acknowledge alerts. ■ Configure mA and RS-485 outputs. ■ Supports Known Density Verification (KDV). ■ Supports multiple languages.

Process measurement variables

Type	Description
Standard	■ Specific gravity ■ Molecular weight ■ Relative density ■ Base density ■ Temperature
Derived	The derived output variables vary, depending on the application configuration of the meter. ■ Wobbe index ■ Calorific Value/BTU ■ % Hydrogen in air ■ % Hydrogen in CO_2 ■ % Air in CO_2 ■ % Nitrogen in air
Derived (when external device connected)	■ Line density ■ Compressibility ■ Standard volume flow ■ Energy flow

Additional communication options

The following communications accessories are purchased separately from the meter.

Type	Description
WirelessHART	WirelessHART is available via the THUM adapter
HART® Tri-Loop	Three additional 4-20 mA outputs are available via connection to a HART Tri-Loop

Hazardous area approvals

Ambient and process temperature limits are defined by temperature graphs for each meter and electronics interface option. Refer to the detailed approval specifications, including temperature graphs for all meter configurations, and safety instructions. See the product page at *www.emerson.com*.

ATEX, CSA C-US, and IECEx approvals

Type	Description
ATEX	With display: ■ II 2G Ex ia IIC T4 Gb [0 °F to +149 °F (-18 °C to +65 °C)] ■ II 2G c T4 ■ II 3G Ex IIC T3 (sample conditioning system only) ■ II 3G Ex IIC T4 (sample conditioning system only) Without display: ■ II 2G Ex ia IIC T6 Gb [0 °F to +149 °F (-18 °C to +65 °C)] ■ II 2G c T6 ■ II 3G Ex IIC T6 (sample conditioning system only)
CSA C-US	■ Class I, Division I, Groups A, B, C & D ■ Class II, Division I, Groups E, F, & G
IECEx	With display: ■ Ex ia IIC T4 Ga [0 °F to +149 °F (-18 °C to +65 °C)] Without display: ■ Ex ia IIC T6 Ga [0 °F to +149 °F (-18 °C to +65 °C)]

Required barriers and isolators for hazardous area installations

When installing the meter in a hazardous area, safety barriers and galvanic isolators must be installed between the meter and the signal processing equipment. Micro Motion provides the required barriers and isolators for purchase according to the transmitter output type.

Table 1: Safety barrier/galvanic isolator kits ordering information

Model code	Description	Barrier/Isolator	Output	Notes
BARRIERSETAA	Barrier set, including barriers for all intrinsically safe transmitter versions (CH B: mA, TPS, or DO)	MTL7728P+	mA + HART	
		MTL7728P+	mA / TPS / DO	
		MTL7761AC	RS-485	
		MTL7728P+	Power	
ISOLATORSETBB	Isolator set, including isolators for intrinsically safe Analog version (CH B: mA)	MTL5541	mA + HART	RS-485 barrier is not isolated
		MTL5541	mA	
		MTL7761AC	RS-485	
		MTL5523	Power	

Table 1: Safety barrier/galvanic isolator kits ordering information *(continued)*

Model code	Description	Barrier/Isolator	Output	Notes
ISOLATORSETCC	Isolator set, including isolators for intrinsically safe Time Period Signal (TPS)/ Discrete versions (CH B: TPS or DO)	MTL5541	mA + HART	RS-485 barrier is not isolated
		MTL5532	TPS/DO	
		MTL7761AC	RS-485	
		MTL5523	Power	

Environmental specifications

Type	Rating
Electromagnetic compatibility	All versions conform to the latest international standards for EMC, and are compliant with EN 61326
Ingress protection rating	IP66/67, NEMA4

Physical specifications

Materials of construction

Part	Material
Pressure-retaining wetted parts	
Interior liner	416 stainless steel
Pressure housing	316L stainless steel
Reference chamber	Aluminum alloy
Nonpressure-retaining wetted parts	
Cylinder	Ni-Span C
Spool body	Stycast catalyst 11, Invar/Radiometal
Non-wetted part materials	
Transmitter housing	Polyurethane-painted aluminum

Weight

Specification	Value	
Specific gravity meter: without enclosure	7 kg	15.4 lbs
Specific gravity meter: with large enclosure	47 kg	104 lbs

Dimensions

These dimensional drawings are intended to provide a basic guideline for sizing and planning. Complete and detailed dimensional drawings can be found through the product drawings link at our online store (*www.emerson.com*).

Figure 1: Gas specific gravity meter dimensions

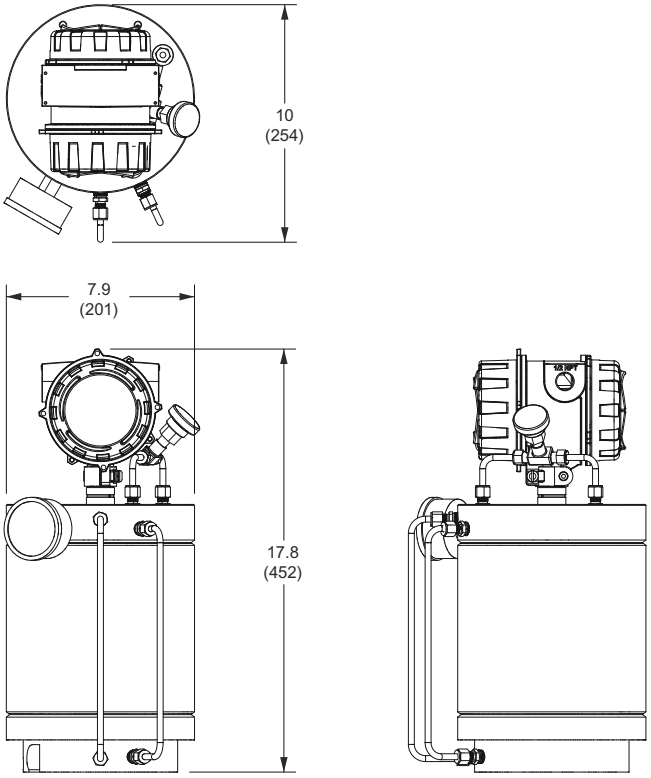
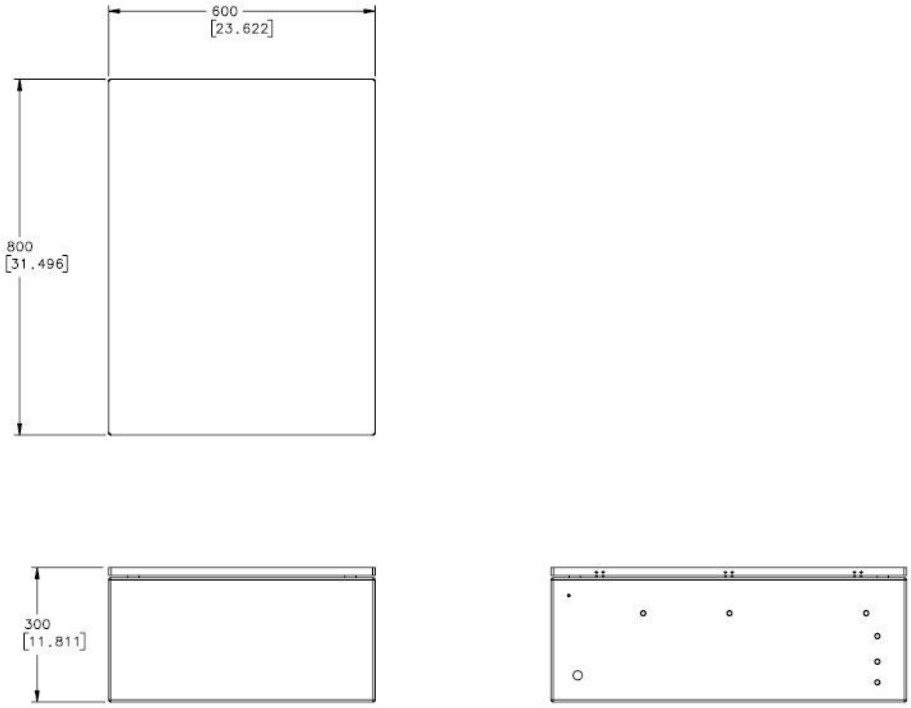


Figure 2: Large enclosure dimensions for gas specific gravity meter



Additional options for installation and configuration

SGM sample conditioning system

Micro Motion provides an option to order the meter installed and configured in a sample conditioning system.

The sample conditioning system preconditions the measurement gas from pipeline pressures and temperatures to those required by the meter.

This option reduces installation complexity and simplifies commissioning. Contact your local sales representative or customer support at *flow.support@emerson.com* for more information.

Ordering information

Model	Description
SGM	Gas specific gravity meter

Code	Enclosure type(1)
2	Stainless steel insulated enclosure (600 x 800 x 300 mm)
3	No enclosure
4(2)	Stainless steel insulated enclosure (600 x 800 x 300 mm) with sample conditioning system

(1) Safety approval for the SGM model does not include insulating enclosure. Therefore, hazardous area labeling applies only to the enclosed instrument. However, the published performance specification of the meter is with the instrument fitted inside an insulated enclosure.

(2) Available only with approval options V and B

Code	Future option 1
A	Reserved for future use

Code	Regulator
A	Not applicable
B(1)	High pressure 0-100 bar with slam-shut pressure valve

(1) Available only with enclosure type 4.

Code	Heater
A	Not applicable
B(1)	Heater 115V

Code	Heater
C[2]	Heater 230V

(1) Available only with enclosure type 4 and approval option B.

(2) Available only with enclosure type 4.and approval option V.

Code	Flow meter
A	Not applicable
B[1]	Variable area flow meter — no switch alarm

(1) Available only with enclosure type 4.

Code	Transmitter output option
B	Integral transmitter, Channel B = Time Period Signal, Channel A = mA + HART, Channel C = Modbus/RS-485
C	Integral transmitter, Channel B = mA output, Channel A = mA + HART, Channel C = Modbus/RS-485
D	Integral transmitter, Channel B = Discrete output, Channel A = mA + HART, Channel C = Modbus/RS-485
E	Integral transmitter, fixed outputs, Channel A = mA (Temperature), Channel B = Time Period Signal, Channel C = Inactive

Code	Display option
2[1]	Integral-mount two-line display (non-backlit)
3	No display

(1) Not available with the Transmitter output options code E

Code	Approvals
Z	ATEX – (zone 1)
B	CSA (US and Canada) – Class 1 Div. 1 Groups A,B,C,D
E	IECEx – (zone 1)
V	ATEX – Assembly (zone 2)
G	Country-specific approval. Requires an R1 or R2 selection from the *Special tests and certificates, tests, calibrations and services (optional)* table.

Also see, *Required barriers and isolators for hazardous area installations*.

Code	Application configuration[1]
Available with all transmitter output options	
7	Process temperature (4 mA = -20 °C, 20 mA = 50 °C)
X[2]	Special (ETO) analog output configuration (customer data required)
Available with transmitter output option codes C and D only	
0	No application configuration
1	Specific gravity (4 mA = 0, 20 mA = 1)
2	Specific gravity (4 mA = 0.5, 20 mA = 1)
3	Specific gravity (4 mA = 0.5, 20 mA = 1.5)
4	Relative Density (4 mA = 0, 20 mA = 1)
5	Relative Density (4 mA = 0.5, 20 mA = 1.5)

Code	Application configuration(1)
6	Molecular Weight (4 mA = 15 g/mol, 20 mA = 20 g/mol)
A	Molecular Weight (4 mA = 0 g/mol, 20 mA = 5 g/mol)
B	Molecular Weight (4 mA = 0 g/mol, 20 mA = 20 g/mol)
C	Calorific Value (4 mA = 25 MJ/m^3, 20 mA = 35 MJ/m^3)
D	Calorific Value (4 mA = 30 MJ/m^3, 20 mA = 40 MJ/m^3)
E	Calorific Value (4 mA = 35 MJ/m^3, 20 mA = 45 MJ/m^3)
F	Wobbe Index (4 mA = 35 MJ/m^3, 20 mA = 45 MJ/m^3)
G	Wobbe Index (4 mA = 40 MJ/m^3, 20 mA = 50 MJ/m^3)
H	Wobbe Index (4 mA = 45 MJ/m^3, 20 mA = 55 MJ/m^3)
J	% Hydrogen concentration in Air (4 mA = 85%, 20 mA = 100%) – (requires pure Hydrogen and pure dry Air gas calibration)
K	% Hydrogen concentration in CO2 (4 mA = 0%, 20 mA = 100%) – (requires pure Hydrogen and pure CO2 gas calibration)
L	% Air concentration in CO2 (4 mA = 0%, 20 mA = 100%) – (requires pure dry Air and pure CO2 gas calibration)
M	% Nitrogen concentration in Air (4 mA = 0%, 20 mA = 100%) – (requires pure Nitrogen and pure dry Air gas calibration)
N	Base Density (4 mA = 0 kg/m^3, 20 mA = 1 kg/m^3)
P	Base Density (4 mA = 0.5 kg/m^3, 20 mA = 1.5 kg/m^3)

(1) When the transmitter output options code is B, C or D, the chosen application configuration code low and high limits are also programmed as the channel A mA output 4mA and 20mA points.

(2) Requires factory option X.

Code	Language (manual and software)
Transmitter display language English	
E	English installation manual and English configuration manual
I	Italian installation manual and English configuration manual
M	Chinese installation manual and English configuration manual
R	Russian installation manual and English configuration manual
Transmitter display language French	
F	French installation manual and English configuration manual
Transmitter display language German	
G	German installation manual and English configuration manual
Transmitter display language Spanish	
S	Spanish installation manual and English configuration manual

Code	Barrier/Isolator type
Z	None
B	Barrier set, CDM/GDM/SGM barriers, Channel B all
C	Isolator set, CDM/GDM/SGM, Channel B mA

Code	Barrier/Isolator type
D	Isolator set, CDM/GDM/SGM, Channel B Time Period Signal / Discrete Out

Code	Conduit connections
Z	Standard 1/2-inch NPT fittings (no adapters)
B	M20 stainless steel adapters

Code	Factory options
Z	Standard product
X(1)	Special (ETO) product

(1) Requires Factory Option X.

Code	Special tests and certificates, tests, calibrations, and services (all optional)(1)
Pressure Testing	
HT	Hydrostatic Test Certificate 3.1 (Pressure retaining parts only)
Sensor Completion Options	
WG	Witness General
SP	Special Packaging
Instrument Tagging	
TG	Instrument Tagging - customer information required (max. 24 characters)
Country-specific approvals (select only one when Approvals option G is selected)	
R0(2)	EAC Zone 1 - Hazardous area approval - intrinsically safe

(1) Multiple add-ons may be selected.

(2) Available only with approval G

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