

PROGRAMMABLE GAS MASS FLOWMETERS AND TOTALIZERS

For Clean Gases

TRODEKS®

FMA-4100/4300 Series



- ✓ 23 Selectable Engineering Units (Including User Defined)
- ✓ Programmable Totalizer
- ✓ High and Low Gas Flow Alarms
- ✓ Two Sets Programmable SPDT Relays with Latching Feature
- ✓ Selectable Analog 0 to 5 Vdc or 4 to 20 mA Outputs
- ✓ Internal Conversion Factors for Up to 32 Gases
- ✓ Digital Interface RS232 Standard
- ✓ Automatic Sensor Zero Offset Adjustment (Via Digital Interface or Local Push Button)
- ✓ Self-Diagnostic Tests
- ✓ Display Units Include Adjustable Back Lighting

The FMA-4100/4300 Series flow rate can be displayed in 23 different volumetric flow or mass flow engineering units including a user specific selection. Flowmeters can be programmed remotely via RS232 or RS485 (optional). FMA-4100/4300 flowmeters support various functions including, programmable flow totalizer, high and low flow alarm, automatic zero adjustment, 2 relay outputs, jumper selectable 0 to 5 Vdc or 4 to 20 mA analog outputs, status LED diagnostic, storage of up to 10 different gas calibrations, internal or user-specific K-factors. Display models have local 2 lines x 16 characters LCD display with adjustable back light provides flow,



FMA-4303, shown smaller than actual size.

total and diagnostic reading simultaneously. The digital RS232 or RS485 (optional) interface provides access to applicable internal data including, flow, CPU temperature, auto zero, totalizer and alarms settings, gas table, conversion factors and engineering units selection, dynamic response compensation and linearization table adjustment. The analog interface provides 0 to 5 Vdc or 4 to 20 mA (jumper selectable) outputs for flow reading.

The FMA-4100/4300 supports automatic sensor zero offset adjustment which can be activated locally via the maintenance push button or remotely via digital interface. The auto zero feature necessitates a condition of absolutely no flow through the meter during the adjustment process. Provisions are made to either start, read, or save the current auto zero value via digital commands. Digital totalizer

commands include: set to zero, start at a preset flow, assign action to a preset value, start/stop totalizing and read. High and Low gas flow alarm limits can also be preprogrammed via digital interface. Alarm action can be assigned with preset delay interval (0 to 3600 seconds) to activate the contact closer (separate for high and low alarm). Latch mode control feature allows each relay to be latched on or follow the corresponding alarm status.

SPECIFICATIONS

Calibrations: Performed at standard conditions [101.4 kPa (14.7 psia) and 21.1°C (70°F)] unless otherwise requested or stated

Environmental (PER IEC 664):

Installation Level II; Pollution Degree II

Flow Accuracy (Including Linearity):

±1% of FS at calibration temperature and pressure

Repeatability: ±0.15% of full scale

Flow Temperature Coefficient:

0.15% of full scale/°C or better

Flow Pressure Coefficient: 0.01% of full scale/psi (6.895 kPa) or better

Turndown Ratio: 50:1

Flow Response Time: 600 ms time constant; approximately 2 seconds to within $\pm 2\%$ of set flow rate for 25 to 100% of full scale flow

Maximum Gas Pressure: 3447 kPa gauge (500 psig)

Maximum Pressure Drop:

Maximum Flow ≤ 10 SLM:

1.28 kPa (0.18 psi)

Maximum Flow > 10 SLM:

27.58 kPa (4 psi)

Gas and Ambient Temperature:

5 to 50°C (41 to 122°F)

Relative Gas Humidity: Up to 70%

Leak Integrity: 1×10^{-9} SCCS He max to the outside environment

Attitude Sensitivity: Deviation of up to 1% from stated accuracy, after re-zeroing

Output Signals: Linear 0 to 5 Vdc (3000 Ω min load impedance); Linear 4 to 20 mA (500 Ω max loop resistance). Max noise 20 mV peak to peak (for 0 to 5 Vdc output)

Relay: SPDT (30 Vdc, 1A)

Transducer Input Power:

11 to 26 Vdc, 100 mV max peak to peak output noise

Power Consumption: +12 Vdc

(200 mA max); +24 Vdc (100 mA max);

Circuit board has built-in polarity reversal protection, 300 mA resettable fuse provide power input protection

Wetted Materials:

Standard Aluminum Models:

Anodized aluminum, brass,

316 stainless steel, FKM O-rings

Optional Stainless Steel Models:

316 stainless steel, FKM O-rings

Optional O-ring Materials:

Buna, EPR (Ethylene Propylene),

or perfluoroelastomer

Inlet and Outlet Connections:

Model FMA-4100/4300: Standard 6.35 mm ($\frac{1}{4}$ ") compression fittings, for units 60 SLM and larger 9.53 mm ($\frac{3}{8}$ ")

Optional: 3.18 or 9.53 mm ($\frac{1}{8}$ or $\frac{3}{8}$ ") compression fittings

Display (FMA-4300 Models): Local

2 lines x 16 characters LCD with

adjustable backlight (2-lines of text)

Calibration Options: Standard is one

10-points NIST traceable calibration.

Optional, up to 9 additional calibrations

may be ordered at additional charge.

Contact TRODEX for additional

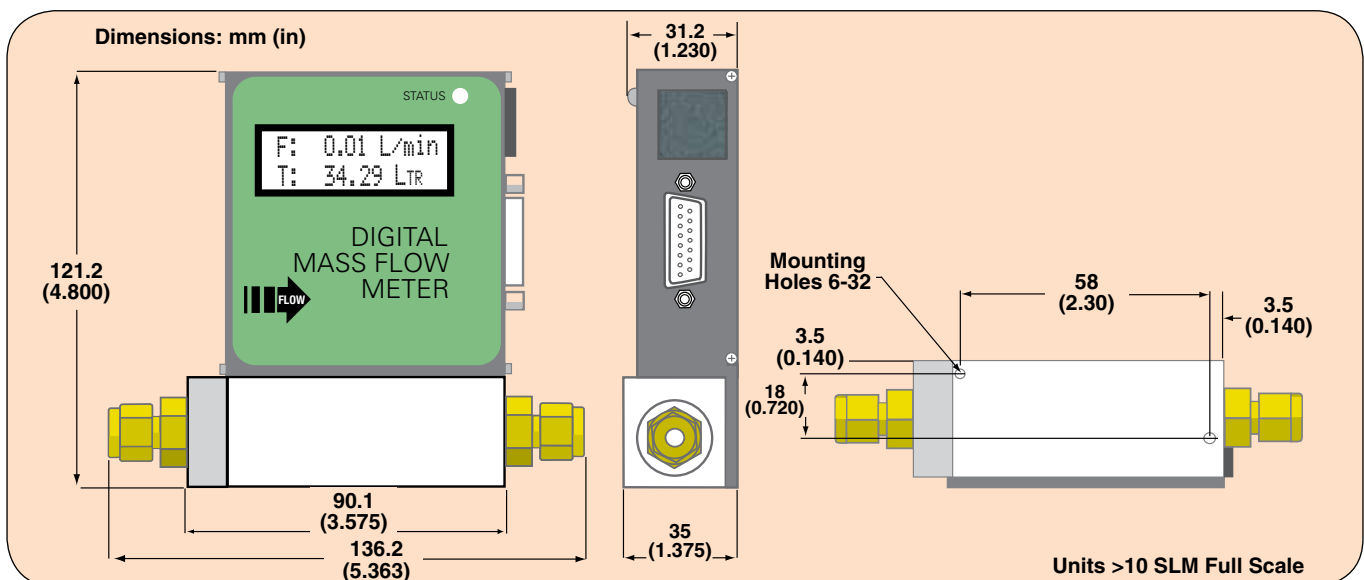
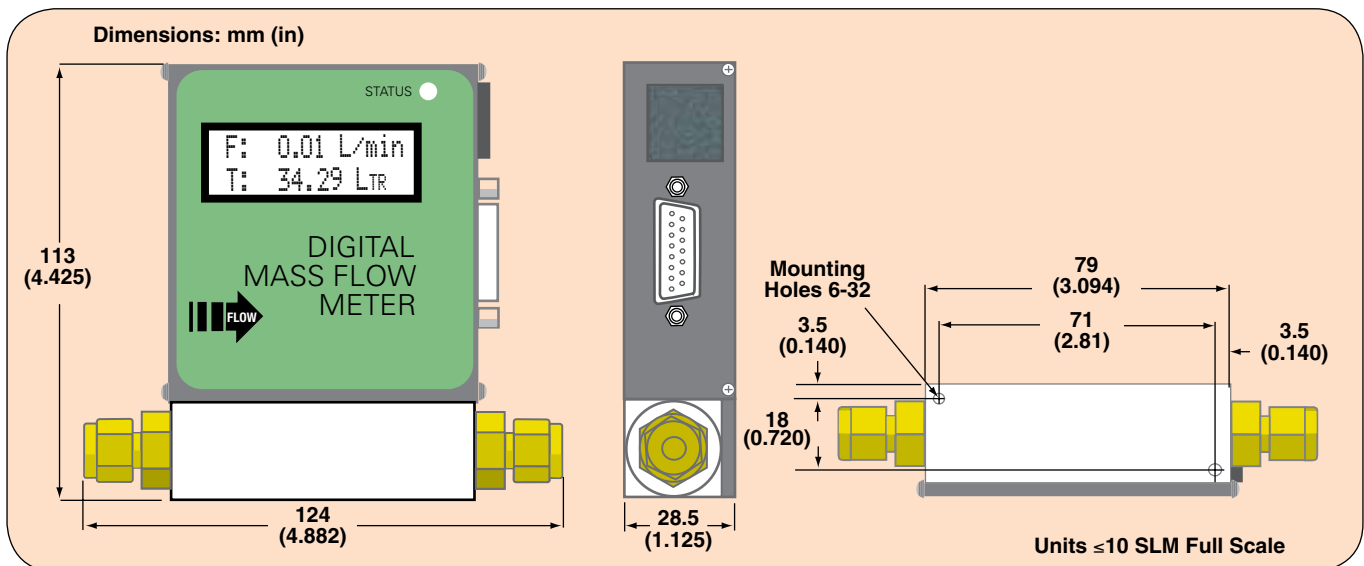
information

CE Compliance: EMC compliance with 89/336/EEC as amended

Emission Standard: EN 55011:1991, Group 1

Class A Immunity Standard:

EN 55082-1:1992



To Order				
Model No.	Body	Integral Display	Inlet and Outlet Compression Fittings mm (inch)	Range
FMA-4102	Aluminum	-	6.35 (¼)	0 to 5 SCCM
FMA-4103	Aluminum	-	6.35 (¼)	0 to 10 SCCM
FMA-4104	Aluminum	-	6.35 (¼)	0 to 20 SCCM
FMA-4105	Aluminum	-	6.35 (¼)	0 to 50 SCCM
FMA-4106	Aluminum	-	6.35 (¼)	0 to 100 SCCM
FMA-4107	Aluminum	-	6.35 (¼)	0 to 200 SCCM
FMA-4108	Aluminum	-	6.35 (¼)	0 to 500 SCCM
FMA-4109	Aluminum	-	6.35 (¼)	0 to 1 SLM
FMA-4110	Aluminum	-	6.35 (¼)	0 to 2 SLM
FMA-4111	Aluminum	-	6.35 (¼)	0 to 5 SLM
FMA-4112	Aluminum	-	6.35 (¼)	0 to 10 SLM
FMA-4113	Aluminum	-	6.35 (¼)	0 to 20 SLM
FMA-4114	Aluminum	-	6.35 (¼)	0 to 30 SLM
FMA-4115	Aluminum	-	6.35 (¼)	0 to 40 SLM
FMA-4116	Aluminum	-	6.35 (¼)	0 to 50 SLM
FMA-4117	Aluminum	-	9.53 (¾)	0 to 60 SLM
FMA-4118	Aluminum	-	9.53 (¾)	0 to 80 SLM
FMA-4119	Aluminum	-	9.53 (¾)	0 to 100 SLM
FMA-4302	Aluminum	Y	6.35 (¼)	0 to 5 SCCM
FMA-4303	Aluminum	Y	6.35 (¼)	0 to 10 SCCM
FMA-4304	Aluminum	Y	6.35 (¼)	0 to 20 SCCM
FMA-4305	Aluminum	Y	6.35 (¼)	0 to 50 SCCM
FMA-4306	Aluminum	Y	6.35 (¼)	0 to 100 SCCM
FMA-4307	Aluminum	Y	6.35 (¼)	0 to 200 SCCM
FMA-4308	Aluminum	Y	6.35 (¼)	0 to 500 SCCM
FMA-4309	Aluminum	Y	6.35 (¼)	0 to 1 SLM
FMA-4310	Aluminum	Y	6.35 (¼)	0 to 2 SLM
FMA-4311	Aluminum	Y	6.35 (¼)	0 to 5 SLM
FMA-4312	Aluminum	Y	6.35 (¼)	0 to 10 SLM
FMA-4313	Aluminum	Y	6.35 (¼)	0 to 20 SLM
FMA-4314	Aluminum	Y	6.35 (¼)	0 to 30 SLM
FMA-4315	Aluminum	Y	6.35 (¼)	0 to 40 SLM
FMA-4316	Aluminum	Y	6.35 (¼)	0 to 50 SLM
FMA-4317	Aluminum	Y	9.53 (¾)	0 to 60 SLM
FMA-4318	Aluminum	Y	9.53 (¾)	0 to 80 SLM
FMA-4319	Aluminum	Y	9.53 (¾)	0 to 100 SLM

Accessories

Model No.	Description
FMA-4000PS-NA	Power supply 110 Vac, N American plug
FMA-4000PS-EU	Power supply 230 Vac, European plug
FMA-4000PS-UK	Power supply 240 Vac, U.K. plug
FMA-4000PS-AU	Power supply 240 Vac, Australian plug
FMA-4000PS-NA-A	Power supply 110 Vac, N American plug with analog wires
FMA-4000PS-EU-A	Power supply 230 Vac, European plug with analog wires
FMA-4000PS-UK-A	Power supply 240 Vac, U.K. plug with analog wires
FMA-4000PS-AU-A	Power supply 240 Vac, Australian plug with analog wires
FMA-4000C	15-pin D pre-wired 1.8 m (6') to PC, 0.9 m (3') to power supply

Comes complete with software CD (operator's manual included on CD), 15-pin D pre-wired 1.8 m (6') cable, and NIST certificate.

Power supplies sold separately. Power supplies also include cable.

For models with stainless steel body, add suffix, “-ST” to model number, consult Flow Engineering for price.

To replace the RS232 communications with RS485, add suffix “-RS485” to model number, no additional cost.

For units with ¼" compression fittings, add suffix “-1/8” to model number, no additional cost.

For units with ⅜" compression fittings, add suffix “-3/8” to model number, no additional cost.

Ordering Examples: FMA-4308, aluminum flowmeter with display, 0 to 500 SCCM and FMA-400PS-NA, 110 vac plug-in power supply.

FMA-4102, aluminum flowmeter without display, 0 to 5 SCCM.