

MULTI PARAMETER GAS MASS FLOWMETERS

For Clean Gases

FMA6600 Series



- ✓ Multi-Drop Capability of Up to 256 Units (for RS485 Option)
- ✓ Stores Calibration Data for Up to 10 Different Gases
- ✓ Supports 10 Different Engineering Units Including User Defined
- ✓ Programmable 12-Digits Totalizer Indicates Total Gas Volume
- ✓ Flow Alarm Limits for High and Low Gas Flow with Relay Output
- ✓ Pressure Alarm (FMA6700) Limits for High and Low Gas Pressure with Relay Output
- ✓ Temperature Alarm (FMA6700) Limits for High and Low Gas Temperature with Relay Output
- ✓ Digital (RS232 or RS485) and Analog Outputs Operate Simultaneously
- ✓ Internal Conversion Factors for Up to 32 Gases

Interface

All features of the FMA6600 and FMA6700 Series flow meters can be accessed via the local four button keypad and LCD. The digital interface operates via RS485 (optional RS232 available) and provides access to applicable internal data including: flow, temperature, and pressure readings, 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, 0 to 10 Vdc or 4 to 20 mA outputs for flow, pressure and temperature (jumper selectable).

Auto Zero

The FMA6600 and FMA6700 Series supports automatic sensor zero offset adjustment that can be activated locally via keypad or remotely via digital interface. The auto zero feature requires absolutely no flow through the meter during auto zero process. Provisions are made to either start, stop or save the current auto zero value via digital commands.



FMA6701 shown actual size.

Totalizer

The total volume of the gas is calculated by integrating the actual gas flow rate with respect to time. Both keypad menu and digital interface commands are provided to:

- Set the totalizer to ZERO
- Start the totalizer at a preset flow
- Assign action at a preset total volume
- Start/stop totalizing the flow
- Read totalizer

Totalizer conditions become true, when the totalizer reading and the "Stop at Total" volumes are equal.

Flow Alarm

High and Low gas flow ALARM limits can be preprogrammed via keypad or remotely via digital interface. ALARM conditions become true when the current flow reading is equal or higher/lower than corresponding values of high and low alarm levels. Alarm action can be assigned with preset delay interval (0 to 3600 seconds) to activate the contact closer (separate for High and Low alarm).

Pressure Alarm (FMA6700 Series)

High and Low gas pressure ALARM limits can be preprogrammed via keypad or remotely via digital interface. Pressure alarm conditions become true when the current pressure reading is equal or higher than corresponding values of high pressure alarm settings or equal or lower than corresponding values of low pressure alarm settings. Alarm action can be assigned to activate the contact closer (separate for High and Low pressure alarm).

Temperature Alarm (FMA6700 Series)

High and Low gas temperature ALARM limits can be preprogrammed via keypad or remotely via digital interface. Temperature alarm conditions become true when the current temperature reading is equal or higher than corresponding values of high temperature alarm settings or equal or lower than corresponding values of low temperature alarm settings. Alarm action can be assigned to activate the contact closer (separate for High and Low temperature alarm).

Engineering Units

The flow set points, measured gas flow and associated totalizer data are scaled directly in engineering units via the front panel keypad or digital interface.

The following units of measure are supported: %F.S., L/min, L/h, mL/min, mL/h, SCFH, SCFM, LbPH, LbPM, User Defined EU.

Multi-Gas Calibration

The FMA6600 Series is capable of storing primary calibration data for up to 10 gases. This feature allows the same FMA6600 Series to be calibrated for multiple gases while maintaining the rated accuracy on each.

Standard 10-Point NIST Calibration

Optional up to 9 additional 10-point calibration may be ordered for additional cost.

Conversion Factors

Conversion factors for up to 32 gases are stored in the FMA6600 and FMA 6700 Series. In addition the provision is made for a user defined conversion factor. Conversion factors may be applied to any of the ten gas calibrations via keypad or digital interface commands.

Contact Closure

Two sets of dry contact relay outputs are provided to actuate user supplied equipment. These are programmable via local keypad or digital interface such that the relays can be made to switch when a specified event occurs (e.g. when a low or high flow, pressure or temperature alarm limit is exceeded or when the totalizer reaches a specified value).

Leak Integrity

1 x 10⁻⁹ sccs of Helium maximum to the outside environment.



SPECIFICATIONS

Accuracy:

FMA6700: ±1% of FS including linearity [0 to 50°C and 0.35 to 6.8 bar (5 to 100 psia)]

FMA6600: ±1% of FS at calibration conditions [101 KPA (14.7 psia) and 21.1°C (70°F)]

Pressure Range: 0 to 6.8 bar (100 psig) (measurement)

Pressure Accuracy: ±1% of FS

Temperature Range: 0 to 50°C (measurement)

Temperature: ±1°C accuracy

Repeatability: ±0.15% of full scale

Response Time: Units up to 10 LPM @ 1 second, units greater than 10 LPM @ 2 seconds to within ±2% of setpoint over 25 to 100% of full scale

Temperature Coefficient: 0.15% of full scale/°C or better.

Pressure Coefficient: 0.01% of full scale/psi (0.07 bar) or better

Maximum Gas Pressure: 6.8 bar (100 psig)

Maximum Burst Pressure: 13.6 bar (200 psig)

Maximum Pressure Drop: 8 psi (at 100 L/min flow)

Gas & Ambient Temperature: 5 to 50°C (41 to 122°F)

Output Signals: Linear 0 to 5 Vdc (3000 Ω min load impedance); 0 to 10 Vdc (6000 Ω min impedance); 4 to 20 mA optional (500 Ω max loop resistance). Maximum noise 20 mV peak to peak.

Input Power: May be configured for three different options: ±15Vdc (±200 mA maximum); +12Vdc (300 mA maximum) optional; +24Vdc (250 mA maximum) optional; Circuit boards have built-in polarity reversal protection. Resettable fuses provide power input protection.

Materials in Fluid Contact: 316 stainless steel, FKM O-rings. EPDM or Perfluoroelastomer O-rings optional

Connections:

Models >= 15 LPM: Standard ¼" compression fittings

Models 20 to 50 LPM: Standard ¼" compression fittings

Models 60 to 100 LPM: Standard ⅜" compression fittings

Display: 128 x 64 graphic LCD with backlight (up to 8 lines of text)

Calibration: Standard one 10 points NIST calibration. Optional up to 9 additional calibrations may be ordered for an additional cost, per gas.

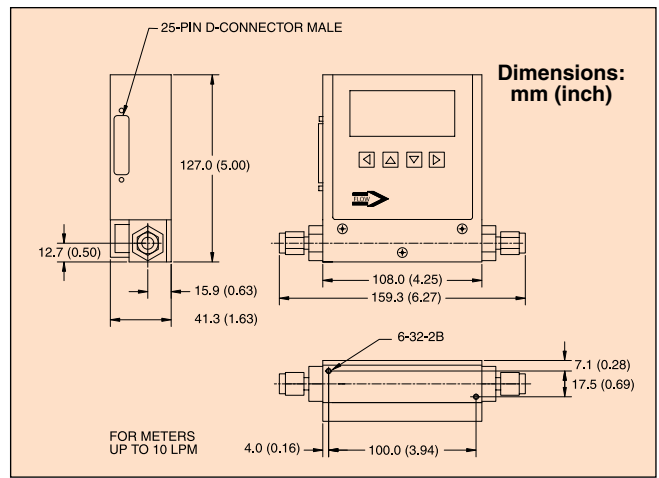
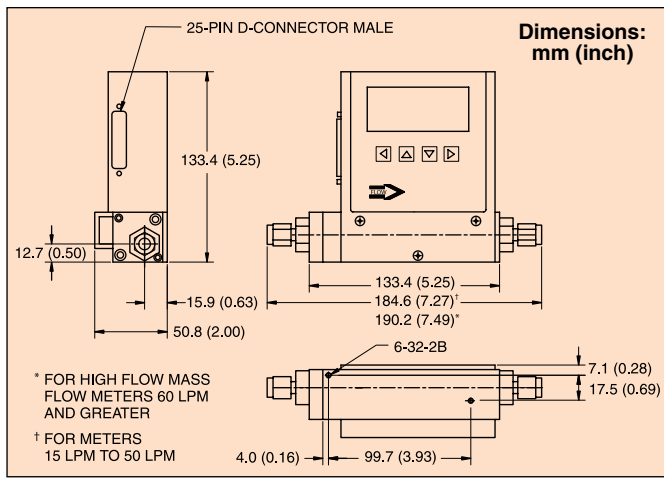
CE Compliance: EN 55011 class 1, class B; EN50082-1

Environmental (per IEC 664): Installation Level II; Pollution Degree II

Approximate Shipping Weights:

Models up to 15 SLPM: 1.68 kg (3.7 lb)

Models from 20 to 100 LPM: 1.97 kg (4.34 lb)



| To Order | | | |
|----------------------|------------------------------|----------------------------|---------------------|
| Flow Meter Model No. | Flow/Pressure/Temp Model No. | Max Flow (N ₂) | Compression Fitting |
| FMA6601 | FMA6701 | 10 cc/min SCCM | 1/4" |
| FMA6602 | FMA6702 | 20 cc/min SCCM | 1/4" |
| FMA6603 | FMA6703 | 50 cc/min SCCM | 1/4" |
| FMA6604 | FMA6704 | 100 cc/min SCCM | 1/4" |
| FMA6605 | FMA6705 | 200 cc/min SCCM | 1/4" |
| FMA6606 | FMA6706 | 500 cc/min SCCM | 1/4" |
| FMA6607 | FMA6707 | 1 LPM | 1/4" |
| FMA6608 | FMA6708 | 2 LPM | 1/4" |
| FMA6609 | FMA6709 | 5 LPM | 1/4" |
| FMA6610 | FMA6710 | 10 LPM | 1/4" |
| FMA6611 | FMA6711 | 15 LPM | 1/4" |
| FMA6612 | FMA6712 | 20 LPM | 1/4" |
| FMA6613 | FMA6713 | 30 LPM | 1/4" |
| FMA6614 | FMA6714 | 40 LPM | 1/4" |
| FMA6615 | FMA6715 | 50 LPM | 1/4" |
| FMA6616 | FMA6716 | 60 LPM | 3/8" |
| FMA6617 | FMA6717 | 80 LPM | 3/8" |
| FMA6618 | FMA6718 | 100 LPM | 3/8" |

Options

| Ordering Suffix | Add'l Cost | Description |
|-----------------|------------|---|
| -I | N/C | 4 to 20 mA output (replaces standard 0 to 5V) |
| -12V | ✓ | 12 Vdc power |
| -24V | ✓ | 24 Vdc power |
| -K | ✓ | Perfluoroelastomer O-rings |
| -B | N/C | Buna O-Rings |
| -E | N/C | EPR O-Rings |
| -VCR | ✓ | VCR fittings |
| -RS232 | N/C | RS232 communications (replaces RS485) |
| -O2CLEAN | ✓ | Cleaned for Oxygen use |

Comes complete with operator's manual, software, cable (FMA65-C) and NIST traceable certificate for Nitrogen.

Power supply sold separately.

Note: Computer must be running Windows XP in order to work with supplied software.

Note: Flow rates are stated for Nitrogen at STP conditions [21.1°C (70°F) at 1 atm].

Accessories

| Model No. | Description |
|------------------|---|
| FMA66-PW | 115 Vac to ±15 Vdc power supply |
| FMA66-12PW | 115 Vac to 12 Vdc power supply |
| FMA66-24PW | 115 Vac to 24 Vdc power supply |
| FMA66-230EU | 230 Vac to ±15 Vdc power supply |
| FMA66-12PW-230EU | 230 Vac to 12 Vdc power supply |
| FMA66-24PW-230EU | 230 Vac to 24 Vdc power supply |
| FMA65-C | Replacement cable 25 pin D-conn with 1.8 m (6') wire branch to power supply |

Ordering Examples: FMA6609, 1/4" compression fitting, 5 LPM max, and FMA66-PW, power supply.

FMA6618, 3/8" compression fitting, 100 LPM max, and FMA66-PW, power supply.