

TELEDYNE HASTINGS

MEDIUM CAPACITY FLOWMETERS AND CONTROLLERS

INSTRUMENTS

Models HFM-301, HFC-303

FEATURES

- $\pm 1.0\%$ of Full-Scale Accuracy¹
- Rapid Settling Times
HFM-301 ≤ 0.4 sec
HFC-303 ≤ 2.0 sec
- Range — 25 to 1000 slm (Air Equivalent)
- Operating Pressures to 500 PSI or Higher
- NIST Traceable Calibration

APPLICATIONS

- Leak Testing
- Research
- Vapor Deposition
- R&D and Process Flows
- Semiconductor Processes
- Pollution Monitoring
- Gas Blending
- Chromatography



HFM-301



HFC-303



Power Supplies Available

DESIGN FEATURES

Teledyne Hastings Instruments (THI) products represent over 60 years of experience in the design and manufacture of mass flow products. The 300 Series is a culmination of this experience with patented technologies that make these the finest flowmeters and controllers available today.

The THI Mass Flow 300 Series meters and controllers are designed to accurately measure mass flow without corrections or compensations for gas pressure and temperature. They are accurate to better than $\pm 1.0\%$ of full scale. THI mass flow instruments do not require any periodic maintenance under normal operating conditions with clean gases. No damage will occur from the use of moderate overpressures (~500 psi) or overflows. Instruments are normally calibrated with the appropriate standard calibration gas (air & N₂), then a gas conversion factor (GCF) is used to adjust the output for the intended gas. Special calibrations for other gases, such as oxygen, helium and argon, are available upon special order.

These products contain a number of features that set them apart from other available instruments: (1) They are inherently linear; no linearization circuitry is employed. Should recalibration in the field be desired (a calibration standard is required), the customer needs to simply set the zero and span points. (2) The output signal is linear for very large overflows and will not come back on scale when a flow an order of magnitude over the full scale flow rate is measured. (3) The instrument incorporates a removable/replaceable sensor module. (4) The unit has very fast settling times.

MODELS HFM-301, HFC-303

Optional Features

Fittings—VCR, VCO and Swagelok®
 High pressure rating (1000 psig)
 Cleaned for oxygen service

Accessories

Power Supplies with integral Flow Totalizers
 & Alarm Set Points
 Interconnecting cables

*Note: After changing components, instruments require recalibration to meet accuracy specifications.

COMMON SPECIFICATIONS HFM-301/HFC-303

| | |
|---------------------------------------|---|
| Accuracy¹ | ± 1.0% of F.S. |
| Repeatability | ± 0.07% of F.S. |
| Standard Operating Pressure | 500 psi |
| High-Pressure Option | 1000 psi (proof tested to 1500 psi) |
| Pressure Coefficient | <0.026% of readings/psi (N ₂) (0-1000 psig) |
| Leak Integrity | < 1x10 ⁻⁹ sccs He |
| Temperature Coefficient (zero) | < 0.085%/°C of F.S. (0-60°C) |
| Temperature Coefficient (span) | < 0.11%/°C of reading (15-60°C) |
| Standard Output | 0-5 VDC |
| Optional Output | 4-20 mA |
| Connector | 15-pin subminiature D |
| *Attitude Sensitivity of Zero | < 0.25% of F.S. |
| *Attitude Sensitivity of Span | < 0.06% of reading |

*N₂ @ 19.7 psia

SPECIFICATIONS HFM-301

| | |
|--------------------------|---|
| Settling Time | ≤ 0.4 sec (0% to 100% F.S.) |
| Power Requirement | ± 15 VDC @ ± 55 mA |
| Wetted Materials | Viton®, 316 SS, 302 SS, Nickel 200 |
| Weight (approx.) | 3.5 lb (1.6 kg) (0-300 slm) 3.4 lb (1.5 kg) (300-1000 slm) |

SPECIFICATIONS HFC-303

| | |
|-------------------------------------|--|
| Settling Time | ≤ 2.0 sec (10% to 100% F.S.) |
| Power Requirement | ± 15 VDC @ 150 mA |
| Wetted Materials² | 302SS, 316L SS, Nickel 200, Viton, Teflon®, Kalrez® (valve seat) |
| Setpoint Input | 0-5 VDC (standard)/4-20 mA (optional) |
| Weight (approx.) | 5.3 lb (2.4 kg) (0-300 slm) 5.2 lb (2.3 kg) (300-1000 slm) |

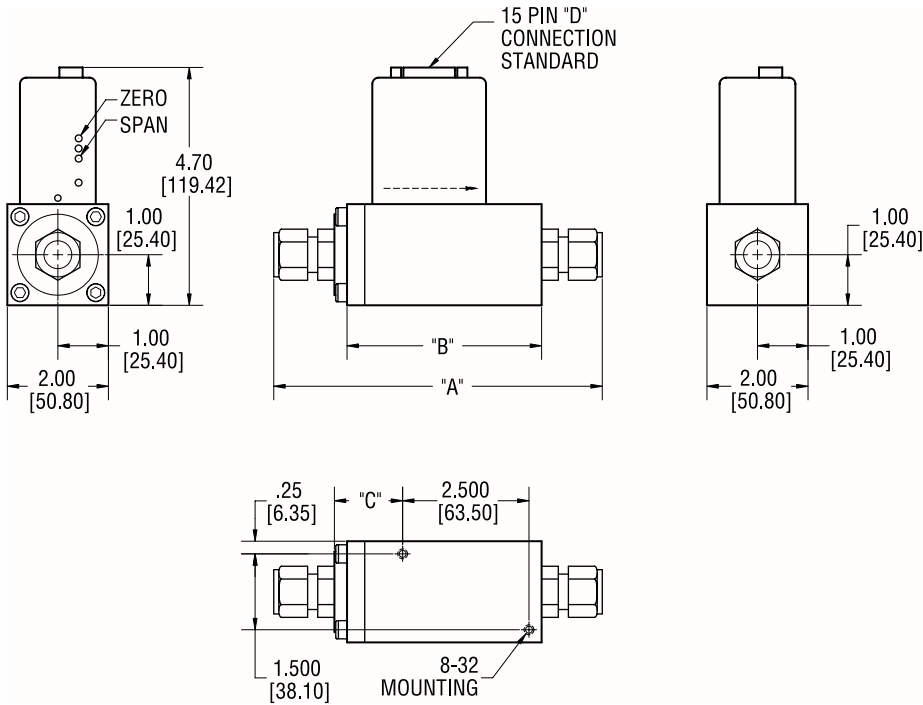
Teledyne Hastings Instruments reserves the right to change or modify the design of its equipment without any obligation to provide notification of change or intent to change.

¹ See Product Manual for critical information on instrument accuracy and the use of GCFs (gas conversion factors). Stated accuracy is for nitrogen or other gas specific calibration and use with this gas only.

² See Selection Chart for optional materials. Viton is standard O-Ring option.

Kalrez® is a registered trademark of Dupont Dow Elastomers L.L.C.
 Swagelok® is a registered trademark of Crawford Company.
 Teflon® is a registered trademark of E.I. Dupont de Nemours.
 VCR® is a registered trademark of Cajon Company.
 VCO® is a registered trademark of Cajon Company.
 Viton® is a registered trademark of Dupont Dow Elastomers L.L.C.

Model HFM-301



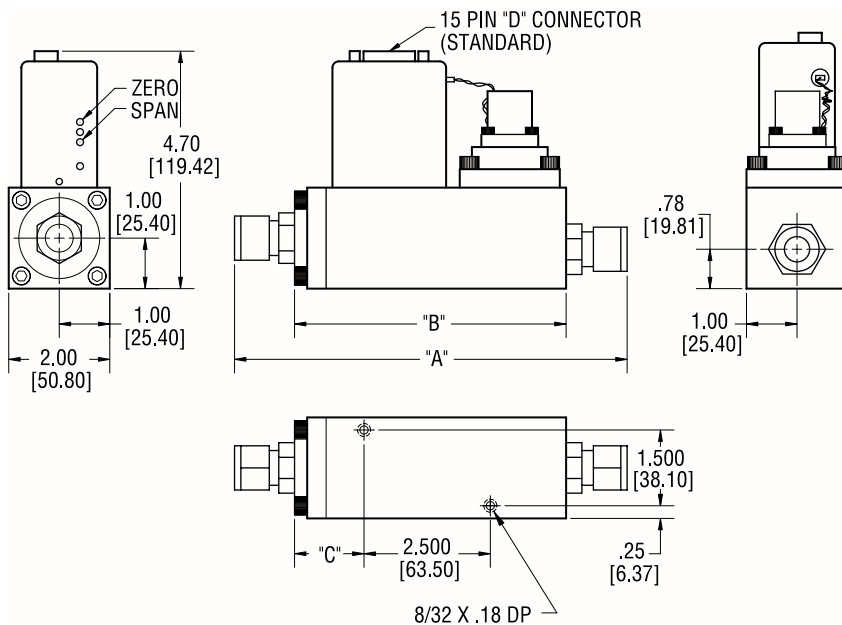
HFM-301 1/2 FITTING

| FITTING TYPE | DIM "A" |
|------------------|---------------|
| 3/4"-16 FEMALE | 4.11 [104.39] |
| SWAG, 1/2" W NUT | 6.31 [160.27] |
| SWAG, 1/2" BARE | 5.73 [145.54] |
| VCO FACE 1/2" | 6.17 [156.72] |
| VCR FACE 1/2" | 6.55 [166.37] |
| DIM "B" | 4.11 [104.39] |
| DIM "C" | 1.36 [34.59] |

HFM-301 3/4 FITTING

| FITTING TYPE | DIM "A" |
|-------------------|---------------|
| 1 1/16"-12 FEMALE | 4.31 [109.47] |
| SWAG, 3/4" W NUT | 6.99 [177.55] |
| SWAG, 3/4" BARE | 6.19 [157.23] |
| VCO FACE 3/4" | 6.59 [167.39] |
| DIM "B" | 4.31 [109.47] |
| DIM "C" | 1.56 [39.67] |

Model HFC-303



HFC-303 1/2 FITTING

| FITTING TYPE | DIM "A" |
|------------------|---------------|
| 3/4"-16 FEMALE | 5.36 [136.14] |
| SWAG, 1/2" W NUT | 7.56 [192.02] |
| SWAG, 1/2" BARE | 6.98 [177.29] |
| VCO FACE 1/2" | 7.42 [188.47] |
| VCR FACE 1/2" | 7.80 [198.12] |
| DIM "B" | 5.36 [136.14] |
| DIM "C" | 1.36 [4.59] |

HFC-303 3/4 FITTING

| FITTING TYPE | DIM "A" |
|-------------------|---------------|
| 1 1/16"-12 FEMALE | 5.76 [146.30] |
| SWAG, 3/4" W NUT | 8.44 [214.38] |
| SWAG, 3/4" BARE | 7.64 [194.06] |
| VCO FACE 3/4" | 8.04 [204.22] |
| DIM "B" | 5.76 [146.30] |
| DIM "C" | 1.56 [39.67] |

MODELS HFM-301, HFC-303

Selection Chart

Typical instrument ordering/options number:

| Model No. | Circuit Board | Output | Fittings | Seals | Pressure | Calibration Type |
|-----------|---------------|--------|----------|-------|----------|------------------|
| HFM-301 | 01 | 01 | 02 | 01 | 01 | 01 |

| Order No. | Options |
|----------------------|----------------------|
| Circuit Board | |
| 01 | Pinout H (Standard) |
| 02 | Pinout U |
| 03 | Pinout M |
| Output | |
| 01 | 0-5 Volts (Standard) |
| 02 | 4-20mA |

| Order No. | Options |
|-------------------|------------------------------------|
| Fittings** | |
| 01 | 1/2" VCR® |
| 02 | 1/2" Swagelok (Standard < 300 slm) |
| 03 | 1/2" VCO® |
| 04 | 3/4" Swagelok (Standard > 300 slm) |
| Seals | |
| 01 | Viton (Standard) |
| 02 | Kalrez® |
| 03 | Neoprene |
| 04 | Buna-N |

**3/4" Swagelok required for flows above 300 slm

| Order No. | Options |
|-------------------------|-------------------------|
| Pressure | |
| 01 | 500 psi (Standard) |
| 02 | 1000 psi (1500 proof) |
| Calibration Type | |
| 01 | NIST 5 Point (Standard) |
| 02 | NIST 10 Point |
| 03 | NIST 20 Point |
| 04 | Curve |

Range Information
 Range _____
 Flow Units _____
 Gas _____

Standard Conditions* _____
 *Referenced to standard temperature and pressure (0°C and 760 Torr, respectively).

Selection Chart

Typical instrument ordering/options number:

| Model No. | Circuit Board | Output | Fittings | Seals | Pressure | Calibration Type |
|-----------|---------------|--------|----------|-------|----------|------------------|
| HFC-303 | 01 | 01 | 02 | 01 | 01 | 01 |

| Order No. | Options |
|----------------------|----------------------|
| Circuit Board | |
| 01 | Pinout H (Standard) |
| 02 | Pinout U |
| 03 | Pinout M |
| Output | |
| 01 | 0-5 Volts (Standard) |
| 02 | 4-20mA |
| 03 | I/O 4-20mA |

| Order No. | Options |
|-------------------|------------------------------------|
| Fittings** | |
| 01 | 1/2" VCR® |
| 02 | 1/2" Swagelok (Standard < 300 slm) |
| 03 | 1/2" VCO® |
| 04 | 3/4" Swagelok (Standard > 300 slm) |
| Seals | |
| 01 | Viton (Standard) |
| 02 | Kalrez® |
| 03 | Neoprene |
| 04 | Buna-N |

**3/4" Swagelok required for flows above 300 slm

| Order No. | Options |
|-------------------------|-------------------------|
| Pressure | |
| 01 | 500 psi (Standard) |
| 02 | 1000 psi (1500 proof) |
| Calibration Type | |
| 01 | NIST 5 Point (Standard) |
| 02 | NIST 10 Point |
| 03 | NIST 20 Point |
| 04 | Curve |

Range Information
 Range _____
 Flow Units _____
 Gas _____

Upstream Pressure _____
Downstream Pressure _____

Is downstream pressure dependent on flow resistance? Y/N _____

Standard Conditions* _____
 *Referenced to standard temperature and pressure (0°C and 760 Torr, respectively).

Your Customer Service Representative



TELEDYNE INSTRUMENTS
 Hastings Instruments
 A Teledyne Technologies Company

Telephone: (757) 723-6531
 Toll Free: (800) 950-2468
 Fax: (757) 723-3925
 World Wide Web: <http://www.teledyne-hi.com>
 E-mail: hastings_instruments@teledyne.com
 P.O. Box 1436
 Hampton, VA 23661