

# TELEDYNE HASTINGS

## INSTRUMENTS

### METALINE® LOW CAPACITY FLOWMETERS AND CONTROLLERS

#### Models HFM-300, HFC-302

#### FEATURES

- Accuracy<sup>1</sup>  
 $\pm 0.75\%$  of Full-Scale for .005 to 10 slm  
 $\pm 1.0\%$  of Full-Scale for 10 to 25 slm
- All-Metal Seals
- 4 Ra Finish Available
- Settling Times:  
 HFM-300  $\leq 0.50$  sec  
 HFC-302  $\leq 0.75$  sec
- Range — 5 to 25,000 sccm (N<sub>2</sub> Equivalent)
- Large Diameter Sensor Tube
- Low Wetted Surface Area
- 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-300



HFC-302



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 all-metal seal 300 Series Metaline is a culmination of this experience with patented technologies that make these instruments the finest flowmeters and controllers available today.

The THI Mass Flow 300 Metaline 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  $\pm 0.75\%$  of full-scale for .005 to 10 slm and  $\pm 1.0\%$  of full-scale for 10 to 25 slm. 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 (nitrogen), 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 HFM-300 incorporates a removable/replaceable sensor module.

# MODELS HFM-300, HFC-302

## DESIGN FEATURES (cont)

(4) The sensor tube is less likely to be clogged due to its large internal diameter (0.026"). (5) The low differential pressure drop across the flowmeter is ideal for leak detection applications. (6) The unit has very fast settling times and low thermal drift.

### 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-300/HFC-302

<b>Accuracy</b> <sup>1</sup>	± 0.75% of F.S. 5 sccm to 10 slm ± 1.00% of F.S. 10 slm to 25 slm
<b>Repeatability</b>	± 0.07% of F.S.
<b>Standard Operating Pressure</b>	500 psi
<b>High-Pressure Option</b>	1000 psi (proof tested to 1500 psi)
<b>Pressure Coefficient</b>	0.01% of reading/psi (N <sub>2</sub> )(0-50 psig)
<b>Leak Integrity</b>	< 1x10 <sup>-9</sup> sccs He
<b>Temperature Coefficient (zero)</b>	< 0.10%/°C of F.S. (0-60°C)
<b>Temperature Coefficient (span)</b>	< 0.03%/°C of reading (15-60°C)
<b>Standard Flow Ranges</b>	5, 10, 20, 50, 100, 200, 500 sccm 1, 2, 5, 10, 20, 25 slm (N <sub>2</sub> equivalent)
<b>Standard Output</b>	0-5 VDC
<b>Optional Output</b>	4-20 mA
<b>Connector</b>	15-pin subminiature D
<b>*Attitude Sensitivity of Zero</b>	< 0.7% of F.S.
<b>*Attitude Sensitivity of Span</b>	< 0.05% of reading

\*N<sub>2</sub> @ 19.7 psia

## SPECIFICATIONS HFM-300

<b>Settling Time</b>	≤ 0.3 sec (0% to 100% F.S.) (0-10 slm) ≤ 0.5 sec (0% to 100% F.S.) (0-25 slm)
<b>Power Requirement</b>	± 15 VDC @ 55 mA
<b>Wetted Materials</b>	316L SS, Nickel 200, 302 SS
<b>Weight (approx.)</b>	1.95 lb (0.9 kg)

## SPECIFICATIONS HFC-302

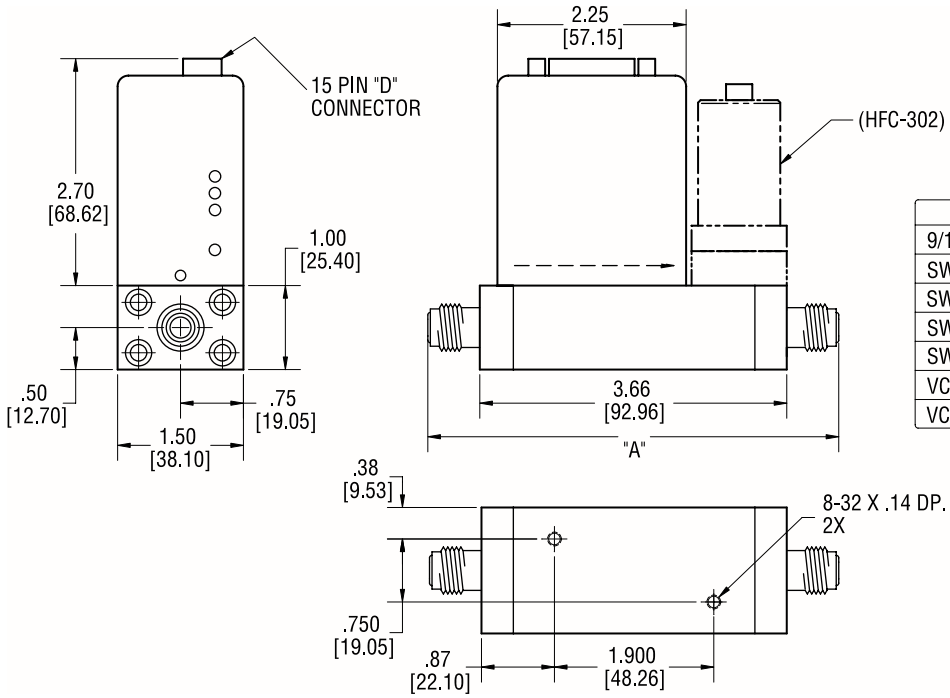
<b>Settling Time</b>	≤ 0.75 sec (10% to 100% F.S.)
<b>Power Requirement</b>	± 15 VDC @ 150 mA
<b>Wetted Materials</b>	316L SS, Nickel 200, 302 SS, Kalrez® (valve seat)
<b>Setpoint Input</b>	0-5 VDC (standard)/4-20 mA (optional)
<b>Weight (approx.)</b>	2.45 lb (1.1 kg)

*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.*

<sup>1</sup> 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.

Kalrez® is a registered trademark of Dupont Dow Elastomers L.L.C.  
Swagelok® is a registered trademark of Crawford Company.  
VCR® is a registered trademark of Cajon Company.  
VCO® is a registered trademark of Cajon Company.

## Models HFM-300 & HFC-302



FITTING TYPE	DIM "A"
9/16"-18 FEMALE	4.05 [102.87]
SWAG 1/8" W NUT	5.09 [129.29]
SWAG 1/8" BARE	4.57 [116.08]
SWAG 1/4" W NUT	5.15 [130.81]
SWAG 1/4" BARE	4.57 [116.08]
VCO FACE 1/4"	4.57 [116.08]
VCR FACE 1/4"	4.88 [123.95]

# MODELS HFM-300, HFC-302

## Selection Chart

Typical instrument ordering/options number:

Model No.	Circuit Board	Output	Fittings	Pressure	Calibration Type
HFM-300	01	01	02	01	01

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

Order No.	Options
<b>Fittings</b>	
01	1/4" VCR®
02	1/4" Swagelok (Standard)
03	1/8" Swagelok
04	1/4" VCO®
<b>Pressure</b>	
01	500 psi (Standard)
02	1000 psi (1500 proof)

Order No.	Options
<b>Calibration Type</b>	
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	Pressure	Calibration Type
HFC-302	01	01	02	01	01

Order No.	Options
<b>Circuit Board</b>	
01	Pinout H (Standard)
02	Pinout U
03	Pinout M
<b>Output</b>	
01	0-5 Volts (Standard)
02	4-20mA
03	I/O 4-20mA
<b>Fittings</b>	
01	1/4" VCR®
02	1/4" Swagelok (Standard)
03	1/8" Swagelok
04	1/4" VCO®
05	Threaded End Cap

Order No.	Options
<b>Pressure</b>	
01	500 psi (Standard)
02	1000 psi (1500 proof)
<b>Calibration Type</b>	
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



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