TELEDYNE HASTINGS INSTRUMENTS

Dig. 300 Series - Med/High Capacity

MODELS

HFM-D-301 & 305
HFC-D-303 & 307

FEATURES

- Flows from 0-25 slm (N_2 Equivalent)
  up to 0-2500 slm (N_2 Equivalent)
- Accuracy in Nitrogen ± (0.2% of Full scale + 0.5% of Reading)
- Flexible Operation with ±12, ±15 or 24 VDC Power Supply
- RS232/485
- Auto-Zero (Flow Controllers Only)
- Self-Diagnostics –Sensor, Valve and Overflow
- Analog or Digital Control and Indication
- Can Store Up to 10 Gas Calibrations
- Can Provide Totalized Flow
- Can Provide Alarms

APPLICATIONS

- Fuel cell testing
- Pharmaceutical production
- Secondary calibration reference
- Gas generators
- Research

BENEFITS

- Enhanced Accuracy
- Superior Linearity
- Digital Communications

HFM-D-301

DESCRIPTION

The Hastings Instruments Digital 300 Series thermal mass flow meter or controller complements an extensive array of wide ranged analog instrumentation.

The heart of the instrument is the same patented thermal transfer sensor and a patented laminar flow shunt assembly that are used in the analog HFM300 series flow instrumentation. Each of these parts were improved over the standard parts by examining the physics behind the nonlinearities in the common thermal sensor and flow shunt design and altering the operation and construction of these to remove the primary sources of error.

The major source of non-linearities for a laminar flow element is a result of pressure drops due to a fluid entering or exiting from a flow channel. The 300 series laminar flow element is designed such that the pressure drops that are measured occur in an annular region around the flow shunt after the entrance effects and before the exit effects.

This great;y improves the linearity of the flow divider and minimizes the large changes in linearity that typically occur when the specific gravity of the flowing medium changes.

- (cont)

Design Features (cont)

The typical errors in thermal sensors are due to the use of a difference in the voltage in the heating circuit between the upstream and downstream heater coil. This thermal sensor controls the heated coils to a constant temperature above the measured ambient temperature and measures the power difference to heat up the upstream and the downstream heater coils.

These instruments contain a number of features that set them apart from all others, for example:

1) An internal curve fitting routine removes the small non-linearities measured for the calibration gas.
2) The status word provides a alarms and warnings to inform the user of an overflow/underflow conditions. (
3) Up to 10 different ranges/gas calibrations can be stored internally.
4) A totalized flow variable can be used to measure the total amount of gas added to a system.
5) The Digital 300 Series can emulate an analog controller or it can operate with digital commands.

Optional Features

Fittings – VCR, VCO, Swagelok
Straight Thread
NPT
High-Pressure Rating (1000 psig)
Cleaning for Oxygen Service

Accessories

Power Supplies/Readouts
Available with
Totalizer
Alarms
Quick Start Kit
Cables: 8', 25', 50', 100' & 200'

COMMON SPECIFICATIONS

Accuracy (Calibration Gas Only)	± (0.2% of F.S. + 0.5% of reading)
Repeatability	± 0.1% of F.S.
Maximum Operating Pressure	500 psi
High-Pressure Option	1000 psi (proof tested to 1500 psi) Not available on HFM-D-305 & HFC-D-307
Pressure Coefficient	(Span) 0.01%/psi (N2) (0-50 psig)
Leak Integrity	< $1x10^{-9}$ sccs He
Operating Temperature	0-50°C
Temperature Coefficient	(span) < 0.05%/°C of reading
Full Scale Flow Ranges	25 - 300 slm; HFM-D-301(L)/HFC-D-303(L) 300 -1000 slm; HFM-D-301(H)/HFC-D-303(H) 1000 - 2500 slm; HFM-D-305/HFC-D-307
Standard Output	0-5 VDC
Optional Outputs	0-10 VDC, 4-20mA, 0-20mA
Connector	15-pin subminiature D
***Attitude Sensitivity (N_2 @ 19.7psia)**	Zero < 0.7% of F.S. Span < 0.05% of reading

SPECIFICATIONS HFM-D-301 and HFM-D-305

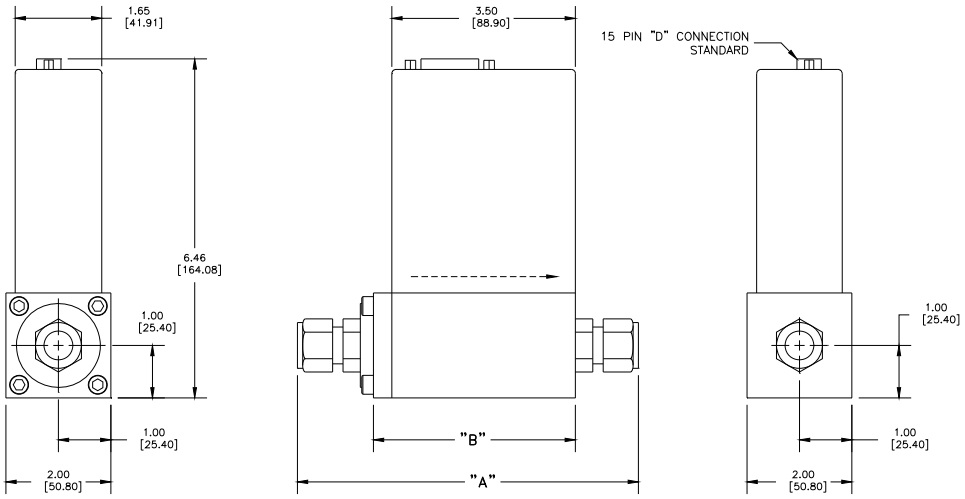
Settling Time	0.5 seconds 0-100% F.S.
Power Requirements	5.5 watts
Temperature Coefficient	(zero) < 0.2%/°C of Full Scale
Wetted Materials	316L SS, Nickel 200, 302 SS, Viton®**
Weight (approx.)	3.5 lb (1.6 kg) HFM-D-301 8.2 lb (3.7 kg) HFM-D-305

SPECIFICATIONS HFC-D-303 and HFC-D-307

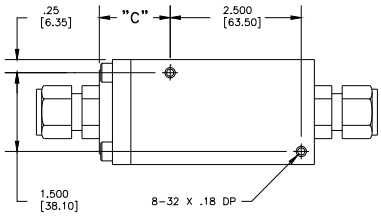
Command Input (analog)	0-5 VDC (std), 0-10 VDC, 0-20 mA, 4-20 mA
Power Requirements	7.5 watts
Temperature Coefficient	(zero) insignificant when auto zero is active
Wetted Materials	316L SS, Nickel 200, Kalrez® valve seat, 302 SS, Teflon®, Viton®**
Weight (approx.)	5.3 lb (2.4 kg) HFC-D-303 15.3 lb (6.94 kg) HFC-D-307

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.

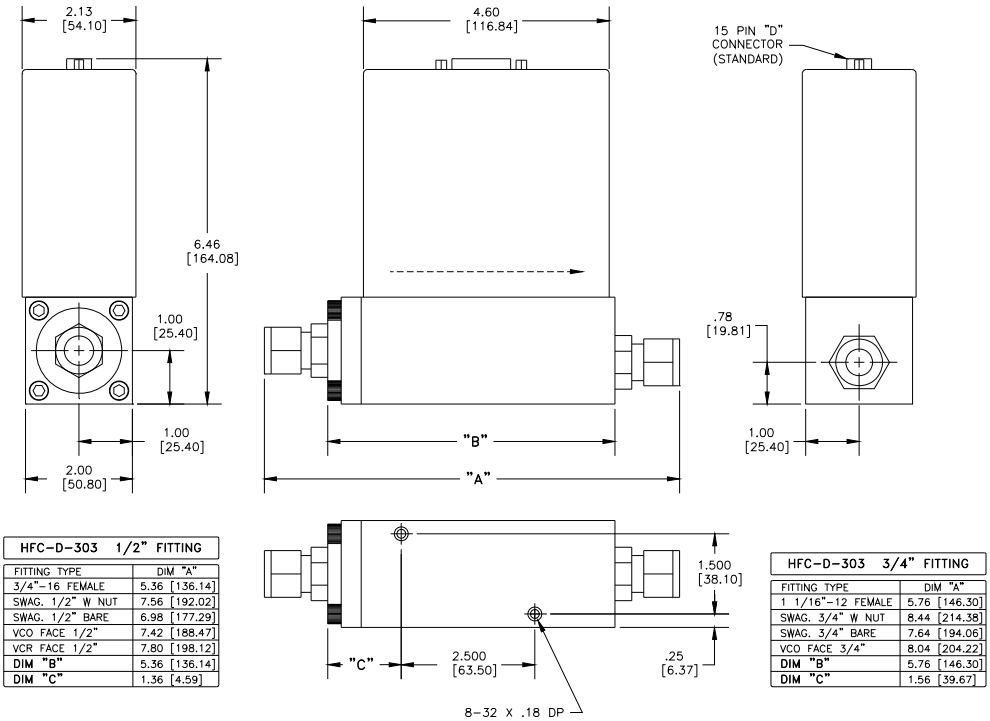
Outline Drawing 301 / 303



HFM-D-301 1/2 FITTINGS	
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]



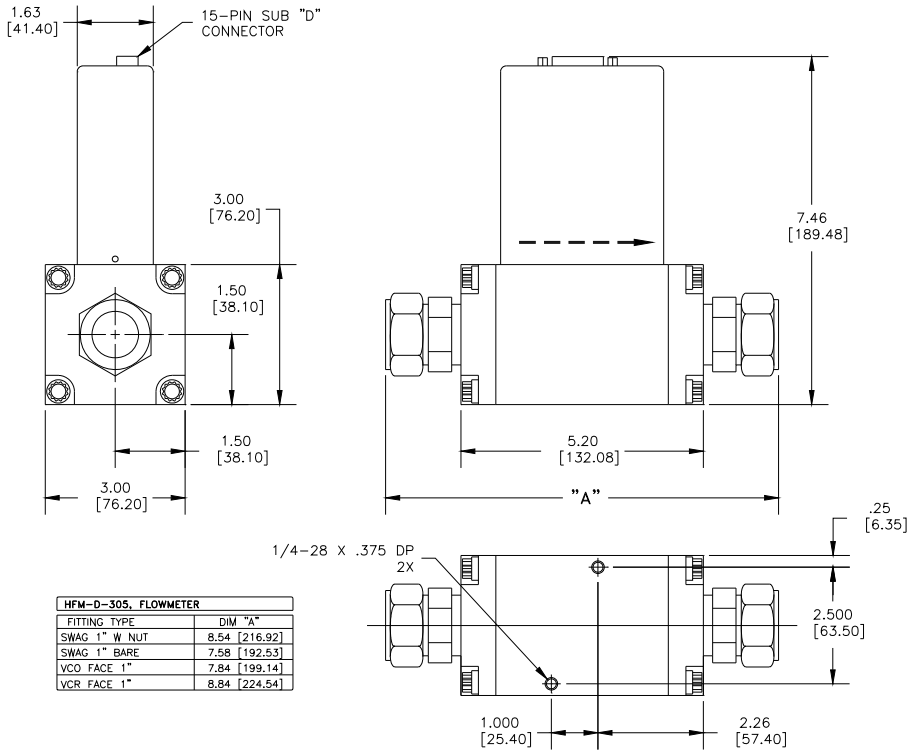
HFM-D-301 3/4 FITTINGS	
FITTING TYPE	DIM "A"
1 1/16"-12 FEMALE	4.31 [109.47]
SWAG. 3/4" W NUT	6.99 [177.55]
SWAG. 3/4" BARE	6.19 [157.23]
VCO FACE 3/4"	6.59 [167.39]
DIM "B"	4.31 [109.47]
DIM "C"	1.56 [39.67]



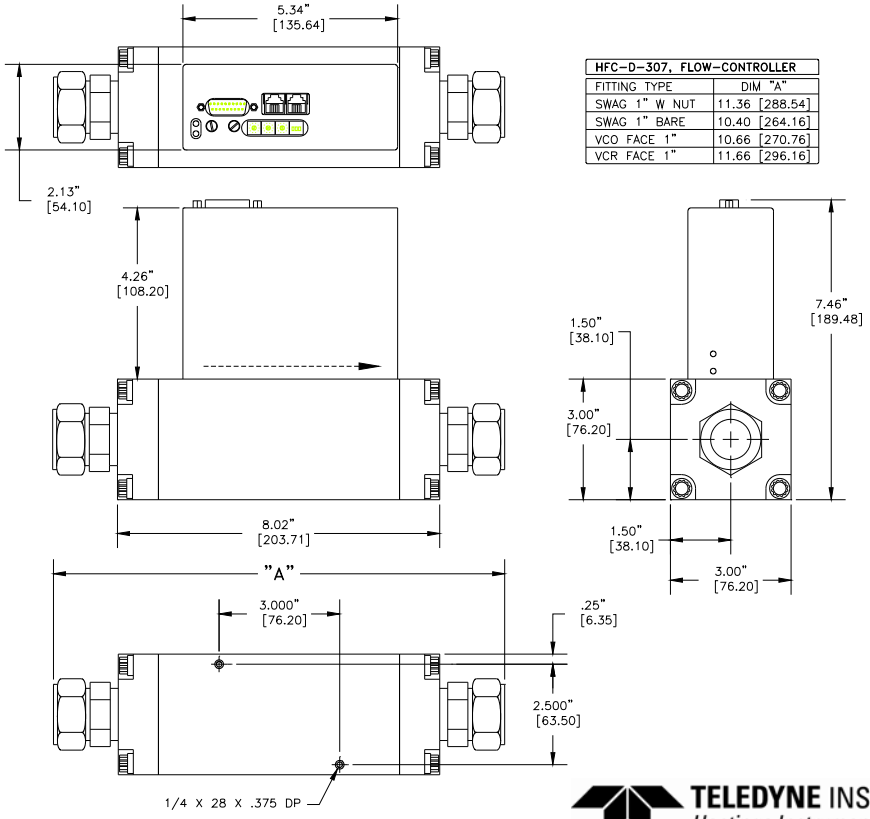
HFC-D-303 1/2" FITTING	
FITTING TYPE	DIM "A"
3/4"-16 FEMALE	5.36 [136.14]
SWAG. 1/2" W NUT	7.56 [192.02]
SWAG. 1/2" BARE	6.98 [177.29]
VCO FACE 1/2"	7.42 [188.47]
VCR FACE 1/2"	7.80 [198.12]
DIM "B"	5.36 [136.14]
DIM "C"	1.36 [4.59]

HFC-D-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]

Outline Drawing 305 / 307



HFM-D-305, FLOWMETER	
FITTING TYPE	DIM "A"
SWAG 1" W NUT	8.54 [216.92]
SWAG 1" BARE	7.58 [192.53]
VCO FACE 1"	7.84 [199.14]
VCR FACE 1"	8.84 [224.54]



HFC-D-307, FLOW-CONTROLLER	
FITTING TYPE	DIM "A"
SWAG 1" W NUT	11.36 [288.54]
SWAG 1" BARE	10.40 [264.16]
VCO FACE 1"	10.66 [270.76]
VCR FACE 1"	11.66 [296.16]

301 / 303 Selection Chart

For Models
HFM-D-301
HFC-D-303

Pin Out	Output	Fittings	Seals	Cal	Digital
			N/A		

Order No.	Pinout Options
01	H Pin (Std)
02	U Pin

Order No.	Output Options
01	0-5 volt (Std)
02	0-10 volt
03	4-20 mA
04	0-20 mA

Order No.	Fittings Options
01	1" VCR®
02	1" Swagelok (Std)
03	1" VCO®
04	25 mm Swagelok
05	No Fittings

Order No.	Seals Options
01	Viton® (Std)
02	Kalrez®
03	Neoprene
04	Buna-N

Order No.	Calibration Options
01	N2 or Air
02	2 NIST Traceable Calibration Reports
03	3 NIST Traceable Calibration Reports
04	4 NIST Traceable Calibration Reports
05	5 NIST Traceable Calibration Reports
06	6 NIST Traceable Calibration Reports
07	7 NIST Traceable Calibration Reports
08	8 NIST Traceable Calibration Reports
09	9 NIST Traceable Calibration Reports
10	10 NIST Traceable Calibration Reports

Order No.	Digital Options
01	RS232 (std)
02	RS485
03	Special

Range Information for all Instruments

Each calibration will require the following information:

Range _____

Flow Units _____

Gas _____

For the HFC Instruments also

Upstream Pressure _____
(maximum & minimum)

Downstream Pressure _____
(maximum & minimum)

Does the downstream pressure change with flowrate? Y/N _____

For volumetric units the standard temperature and pressure of the unit is also required 0°C & 760 Torr will be used when other values are not specified

305 / 307 Selection Chart

For Models	Pin Out	Output	Fittings	Seals	Cal	Digital
HFM-D-305				N/A		
HFC-D-307						

Order No.	Pinout Options
01	H Pin (Std)
02	U Pin

Order No.	Output Options
01	0-5 volt (Std)
02	0-10 volt
03	4-20 mA
04	0-20 mA

Order No.	Fittings Options
01	1" VCR®
02	1" Swagelok (Std)
03	1" VCO®
04	25 mm Swagelok
05	No Fittings

Order No.	Seals Options
01	Viton® (Std)
02	Kalrez®
03	Neoprene
04	Buna-N

Order No.	Calibration Options
01	N2 or Air
02	2 NIST Traceable Calibration Reports
03	3 NIST Traceable Calibration Reports
04	4 NIST Traceable Calibration Reports
05	5 NIST Traceable Calibration Reports
06	6 NIST Traceable Calibration Reports
07	7 NIST Traceable Calibration Reports
08	8 NIST Traceable Calibration Reports
09	9 NIST Traceable Calibration Reports
10	10 NIST Traceable Calibration Reports

Order No.	Digital Options
01	RS232 (std)
02	RS485
03	Special

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Upstream Pressure _____
(maximum & minimum)

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For volumetric units the standard temperature and pressure of the unit is also required 0°C & 760 Torr will be used when other values are not specified

TELEDYNE INSTRUMENTS
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A Teledyne Technologies Company

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