



# TELEDYNE HASTINGS INSTRUMENTS

Everywhere you look™

**HFM-D-300A/B** Mass Flow Meter  
**HFC-D-302A/B** Mass Flow Controller

## FEATURES

- Range 0 - 5 sccm to 0-25 slm (N<sub>2</sub> Equivalent)
- Excellent Accuracy  
±(0.5% of Reading + 0.2% of Full Scale)
- All-Metal Seals  
HFC-D-302 Valve Features Kalrez® Seat
- Touchscreen Display/Control Option
- USB ("B" Series)
- 0-5 VDC, 0-10 VDC, 0-20 mA or 4-20 mA I/O
- RS232 / RS485
- Typical Settling Time:
  - HFM-D-300 < 1 second
  - HFC-D-302 1 –2 seconds
- Status LEDs
- Auto-Zero (HFC-D-302 Controller Only)
- Totalizer
- IP-67 Enclosure Available ("A" Series)
- Large Diameter Sensor Tube (low dP)
- Operating Pressures to 500 psi or higher
- NIST Traceable Calibration

## APPLICATIONS

- Leak Testing
- High Purity Gas Delivery
- Thin Film Deposition
- Gas Blending
- Pharmaceutical
- Fuel Cell R&D
- Environmental Monitoring
- Medical Research

## BENEFITS

- High Accuracy
- Fast Metering Response
- Superior Linearity
- Rapid Controller Settling Time
- Digital Extended Range

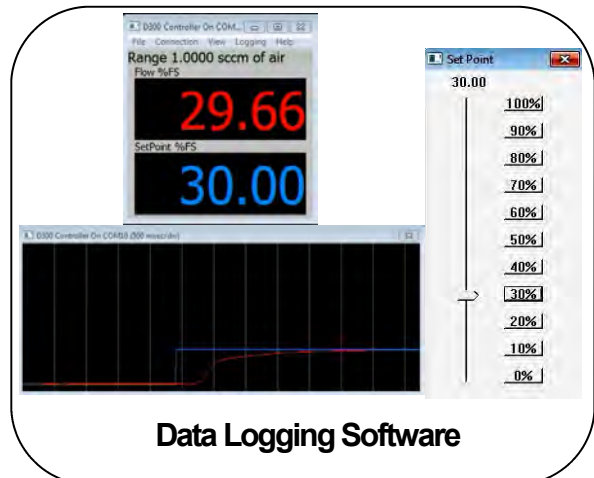
# Mass Flow Meters & Controllers



HFC - D - 302B Mass Flow Controller



Optional Touchscreen Display



Data Logging Software

# Description

The Digital 300 Series of thermal mass flow meters and controllers from Teledyne are designed to accurately measure mass flow without corrections or compensations for gas pressure and temperature. They are accurate to better than  $\pm(0.5\%$  of reading + 0.2% of full scale) for full scale flow rates from 0-5 sccm to 0-25 slm.

The Digital 300 Series uses a thermal-based mass flow sensor. This sensor is designed to provide exceptional linear response to changing flow rates. In addition, the electronics associated with each sensor are precisely tuned to give fast response times. The HFC-D-302A & B flow controllers feature a precision solenoid proportional control valve. Teledyne configures and tests each individual valve based on the users flow rate, gas, and pressure conditions.

## "A" Series

The A Series of the Digital 300 line of thermal mass flow meters and controllers utilizes a 15-pin d-sub connector which is compatible with Teledyne Hastings' power supplies and cables. The Series also employs dual RJ communication ports for RS232/485 communication. The A Series is backwards compatible with previous versions of Teledyne's Digital 300. Also, the A Series can be configured with the optional IP-67 enclosure to provide protection against water and dust.

## "B" Series—300 Vue

The B Series features an optional touchscreen display which allows the user to view and control the flow rate directly from the flow controller. The main screen displays the flow rate, the flow setpoint (in the case of a flow controller), the units of measure, and the valve mode (Auto, Open, Closed). The user also has access to menus that allow quick configuration of the flow instrument for changing requirements. The display can also graphically display changes in flow over time. The B Series also features a USB port which is standard on all meters and controllers. Both the A & B Series are compatible with Teledyne's data logging software.

*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.*

Viton® is a registered trademark of the Chemours Company.  
Kalrez® is a registered trademark of the E.I. du Pont de Nemours and Co  
VCR® is a registered trademark of the Swagelok® Company.



HFC-D-302A Mass Flow Controller



"A" Series with Optional IP-67 Enclosure

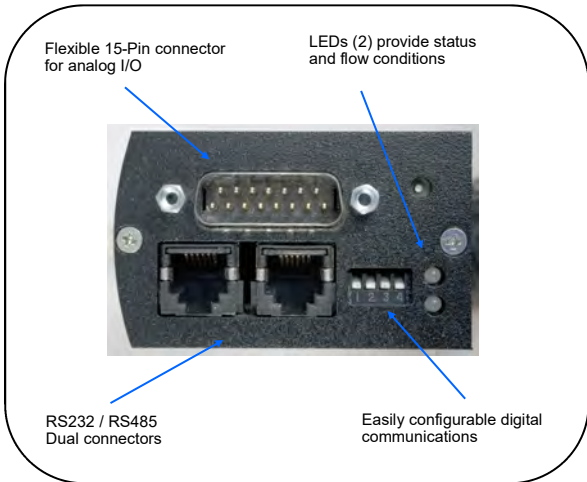


HFC-D-302B Mass Flow Controller

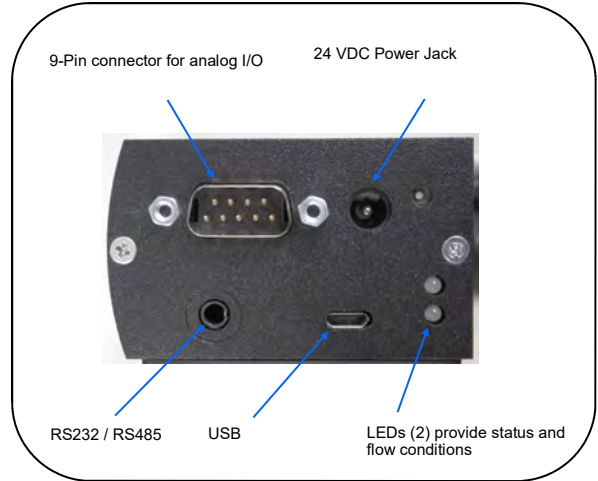


"B" Series features USB



# Comparison



**HFM-D-300A (meter)**  
**HFC-D-302A (controller)**



**HFM-D-300B (meter)**  
**HFC-D-302B (controller)**

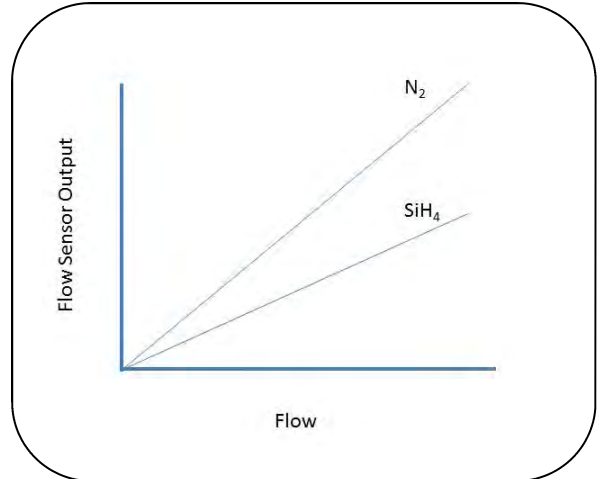
	A Series	B Series
D-Connector	15-Pin	9-Pin
RS232/485 Connector	Dual RJ	Video Bayonet
Status/Flow LEDs	✓	✓
Color Display/Control Option	—	✓
USB	—	✓
Compatible with Data Logging Software	✓	✓
Power Jack	—	✓
IP-67 Option	✓	—
 	✓	✓

**Digital 300 Series Flow Sensor**

The Digital 300 Series is built using a patented (Patent #6,125,695) flow sensor. The sensor's excellent linearity, in turn, leads to improved accuracy. Flow calibrations are typically performed in N2 or air. The output can then be scaled for use in other gases (see graph to the right). The 300 Series excellent linearity allows the linearity to be retained when switching from the calibration gas to the process gas.

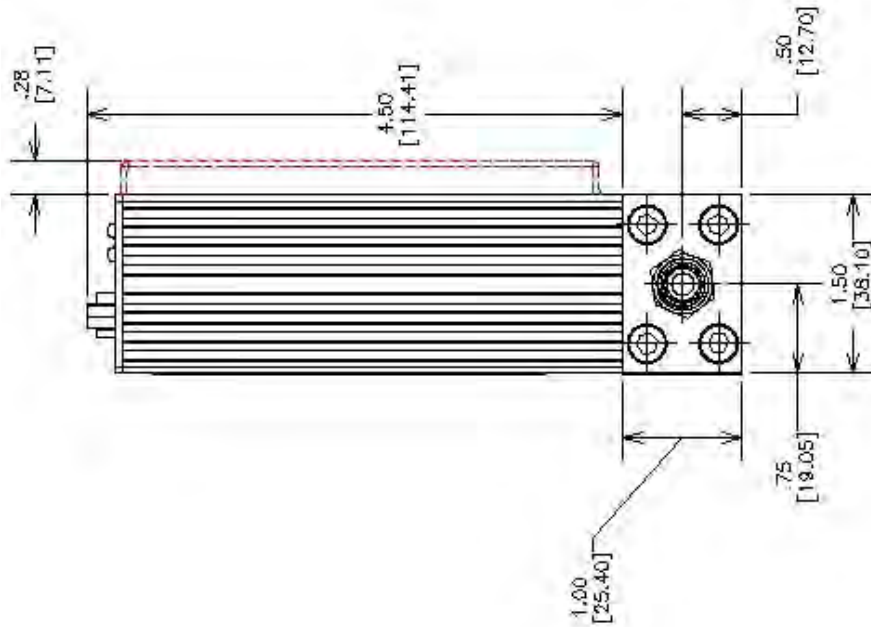
The patented sensor contains fast electronic circuitry. This is critical when the flow meter is coupled with a proportional control valve to create a thermal mass flow controller. The fast response of the sensor combined with high-speed digital control gives the user excellent control of the process gas flow.

The sensor tube utilized in the flow sensor has a relatively large diameter. This allows the Digital 300 flow meter to have a small pressure drop. A low differential pressure drop across the flow meter is ideal for leak detection and gas sampling applications.

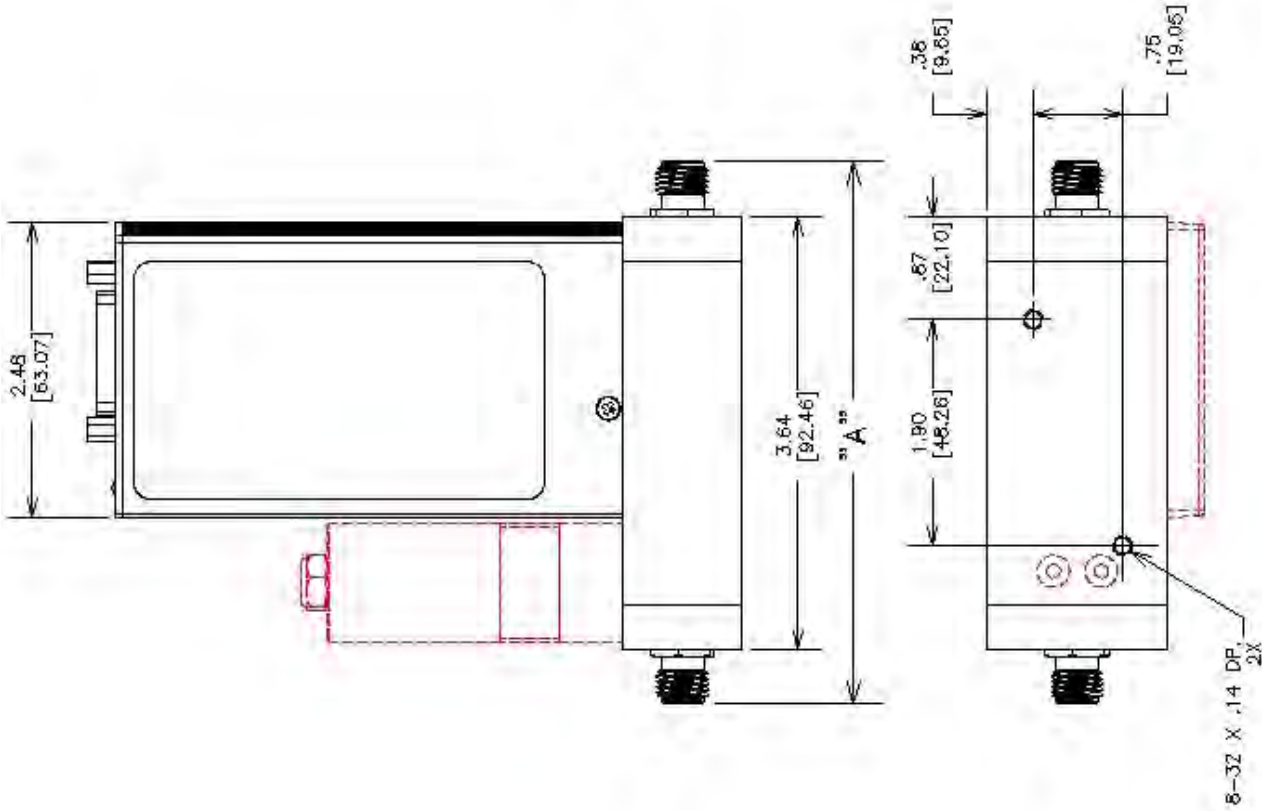


<b>Specifications</b>	<b>HFM-D-300A/B (meter)</b>	<b>HFC-D-302A/B (controller)</b>
Range	0 - 5 sccm to 0 - 25 slm (N2)	0 - 5 sccm to 0 - 25 slm (N2)
Accuracy	± (0.5% of reading + 0.2% of full scale)	± (0.5% of reading + 0.2% of full scale)
Repeatability	± 0.15% of F.S.	± 0.15% of F.S.
Maximum Working Pressure	500 psig (Optional 1000 psig)	500 psig (Optional 1000 psig)
Operating Temperature	-20 — 70°C	-20 — 70°C
Warm up time	30 min for optimum accuracy (typical) 6 min within rated accuracy (typical)	30 min for optimum accuracy (typical) 6 min within rated accuracy (typical)
Settling Time	Typically ≤ 1 seconds	Typically < 1-2 seconds
Temperature Coefficient of Zero	< ± 0.2% / °C of full scale max (-20—70°C)	N/A for controller with auto-zero enabled
Temperature Coefficient of Span	< ± 0.1% / °C of full scale max (-20—70°C)	< ± 0.1% / °C of full scale max (-20—70°C)
Attitude Sensitivity of Zero	< 1.4 % of full scale (N2 @ 50 psig)	< 1.4 % of full scale before autozero
Analog I/O (standard)	0-5 VDC	0-5 VDC
Analog I/O (optional)	0-10 VDC, 0-20 mA, 4-20 mA	0-10 VDC, 0-20 mA, 4-20 mA
Wetted Materials	316L SS, Nickel 200, 304 SS, 302 SS	316L SS, Nickel 200, 302 SS, 304 SS, Kalrez® (valve seat)
Weight (approx.)	2.2 lb. (1.0 kg)	2.7 lb. (1.2 kg)
	<b>HFM-D-300A (meter)</b>	<b>HFC-D-302A (controller)</b>
Analog Connector	15 Pin D-sub	15 Pin D-sub
IP-67 Connector (Analog & Digital)	12 Pin Sealed Circular	12 Pin Sealed Circular
Digital Connector	Dual RJ-12, 6P6C modular jack	Dual RJ-12, 6P6C modular jack
Power Requirements	11-36 VDC @ 3.1 Watt (max), Unipolar or Bipolar (e.g. ± 15 VDC, ± 12 VDC)	11-36 VDC @ 6.7 Watt (max), Unipolar or Bipolar (e.g. ± 15 VDC, ± 12 VDC)
	<b>HFM-D-300B (meter)</b>	<b>HFC-D-302B (controller)</b>
Analog Connector	9 Pin D-sub	9 Pin D-sub
Digital Connector	Bayonet, 4-conductor TRRS 3.5 mm jack	Bayonet, 4-conductor TRRS 3.5 mm jack
Power Requirements (w/ display)	11-36 VDC @ 4.7 Watt (max), Unipolar or Bipolar (e.g. ± 15 VDC, ± 12 VDC)	11-36 VDC @ 8.3 Watt (max) * Unipolar or Bipolar (e.g. ± 15 VDC, ± 12 VDC)
		*15 VDC min reqd. for 0-20 & 4-20 mA operation

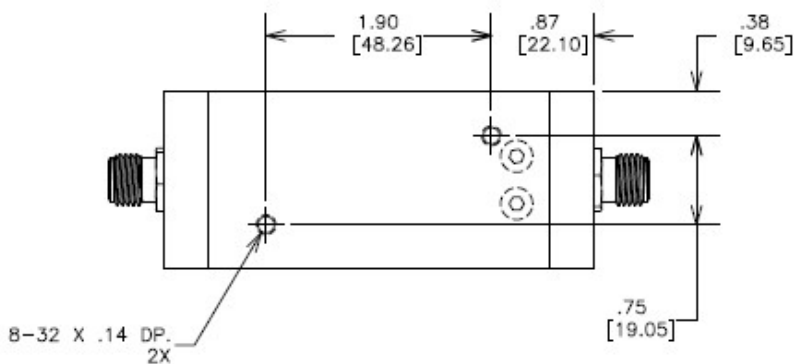
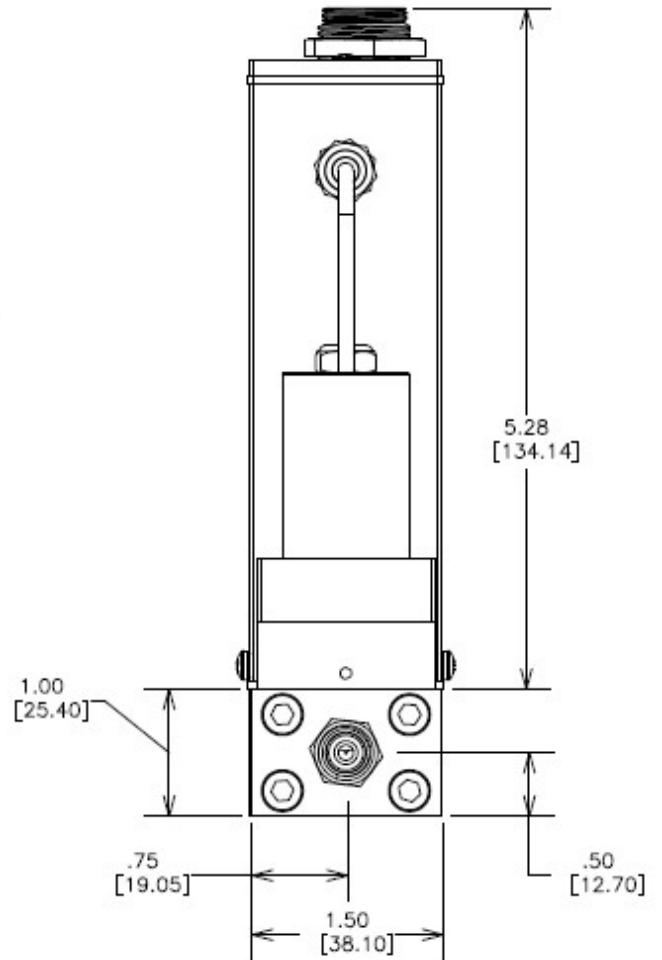
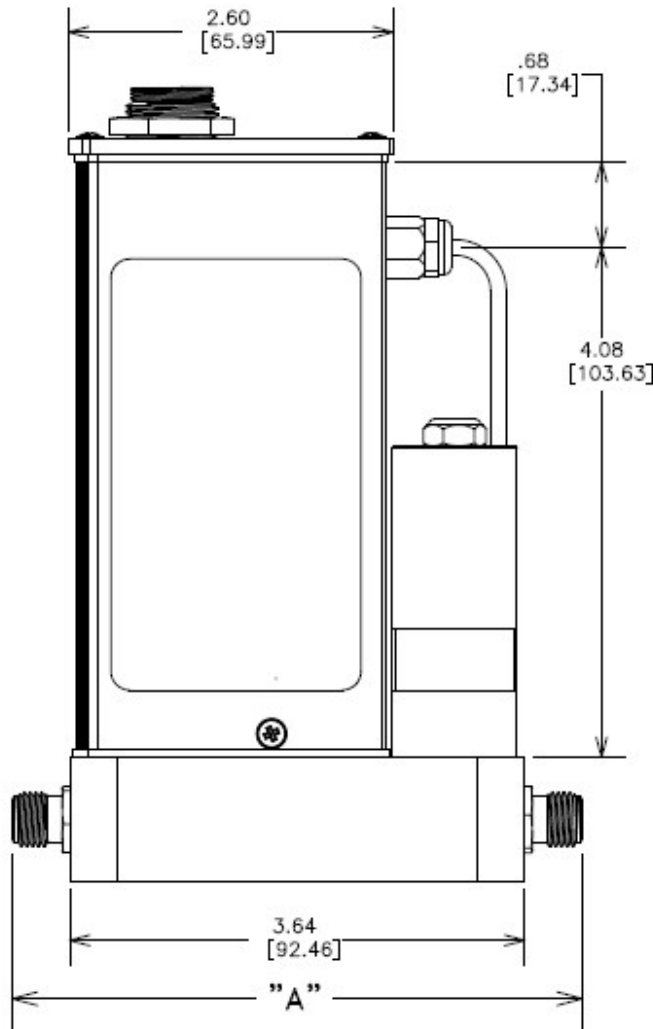
Outline Drawings HFM-D-300 & HFC-D-302 A & B Series



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]
SURFACE MOUNT	4.88 [123.95]
SWAG 6MM W NUT	5.15 [130.81]

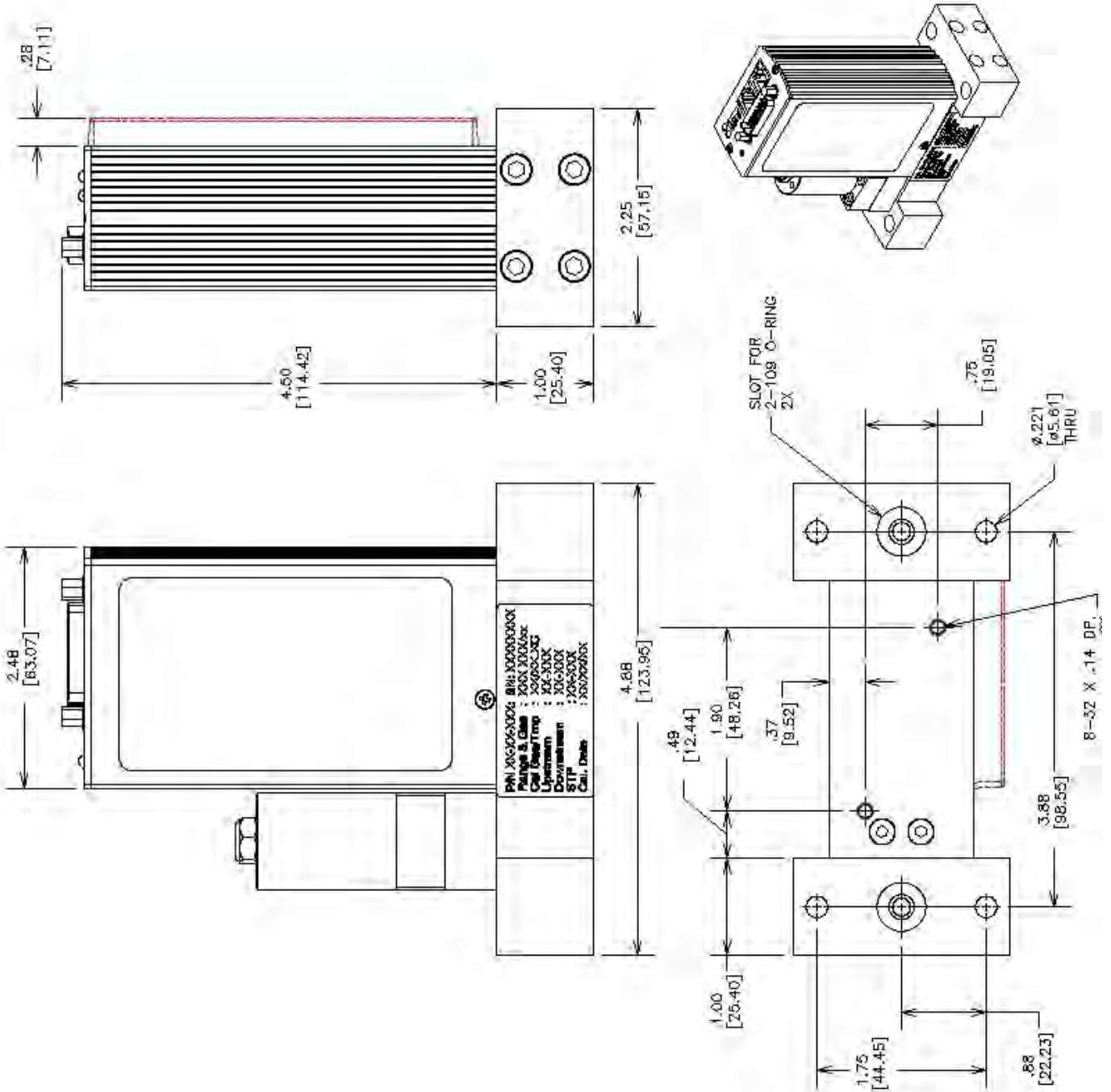


Outline Drawings HFM-D-300 & HFC-D-302 A Series (with IP-67)



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]
SURFACE MOUNT	4.88 [123.95]
SWAG 6MM W NUT	5.15 [130.81]

Outline Drawing (Surface Mount) - "A" & "B" Series



# Selection Chart - "A" Series

Model No.	Circuit Board	Input / Output	Fittings	Working Pressure	Cal Records	Digital
HFM-D-300A HFC-D-302A						

Circuit Board	
01	Pinout H (Hastings)
02	IP-67 Enclosure

Input/Output	
01	0-5 VDC (Std)
02	0-10 VDC
03	4-20 mA
04	0-20 mA

Fittings	
01	1/4" VCR®
02	1/4" Swagelok (Std)
03	1/8" Swagelok
04	1/4" VCO®
05	9/16 - 18 Female ST
06	Surface mount
07	6mm Swagelok (non-weld)

Working Pressure	
01	500 psig (Std)
02	1000 psig (1500 proof)

Calibration Records	
01	1 NIST Traceable Cal Reports
02	2 NIST Traceable Cal Reports
03	3 NIST Traceable Cal Reports
04	4 NIST Traceable Cal Reports
05	5 NIST Traceable Cal Reports
06	6 NIST Traceable Cal Reports
07	7 NIST Traceable Cal Reports
08	8 NIST Traceable Cal Reports

Digital	
01	RS232 (Std)
02	RS485

**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



# Selection Chart - "B" Series

Model No.	Input / Output	Fittings	Working Pressure	Cal Records	Digital	Cal Type	Display
HFM-D-300B HFC-D-302B							

Input/Output	
01	0-5 VDC (Std)
02	0-10 VDC
03	4-20 mA
04	0-20 mA

Fittings	
01	1/4" VCR®
02	1/4" Swagelok (Std)
03	1/8" Swagelok
04	1/4" VCO®
05	9/16 - 18 Female ST
06	Surface mount
07	6mm Swagelok (non-weld)

Working Pressure	
01	500 psig (Std)
02	1000 psig (1500 proof)

Calibration Records	
01	1 NIST Traceable Cal Reports
02	2 NIST Traceable Cal Reports
03	3 NIST Traceable Cal Reports
04	4 NIST Traceable Cal Reports
05	5 NIST Traceable Cal Reports
06	6 NIST Traceable Cal Reports
07	7 NIST Traceable Cal Reports
08	8 NIST Traceable Cal Reports

Digital	
01	RS232 (Std)
02	RS485

Calibration Type	
01	NIST 5 Point (Std)
02	NIST 10 Point
03	NIST 20 Point

Display	
01	Touchscreen Display
02	No Display (Std)

**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

**Power Supplies & Cables**



**THCD-101 Single Channel Power Supply Meter**

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<b>THCD-101</b>	Includes brackets, connectors, and backshells
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**24 VDC Switching Power Supply**

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<b>12-01-169</b>	For use with "B" Series or THCD-101 (Please specify AC Input Clip)
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**Connects Hastings Power Supply (15-pin) to 300 "A" Series (15-pin)**

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<b>AF-8-AM</b>	8' Cable (~2.4m)    Other lengths available
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**Connects Hastings Power Supply (15-pin) to 300 "B" Series (9-pin)**

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<b>CB-AF-8-24VM</b>	8' Cable (~2.4m)    Other lengths available
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**"A" Series—IP-67 Cables**

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<b>CB-12PCF-XXX-LDS</b> (Bare Leads) <b>CB-12PCF-XXX-AM</b> (Hastings Power Supply)	Custom Length Cables
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**"B" Series—Serial Communication Cable**

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<b>CB-RS232-TRRS</b>	RS232 Cable (9-pin "D" Female to Male TRRS) 6' Cable (~1.8m)
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**"A" Series—Serial Communication Cable**

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<b>CB-RS232-RJ12</b>	RS232 Cable (9-pin "D" Female to RJ12) 14' (~4.3m)
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