



TELEDYNE HASTINGS INSTRUMENTS

Everywhere you look™

HFM-D-301A/B Mass Flow Meter
HFC-D-303A/B Mass Flow Controller

HFM-D-305A/B Mass Flow Meter
HFC-D-307A/B Mass Flow Controller

FEATURES

- 301/303 Range 0 - 25 slm to 0-1000 slm
- 305/307 Range 0-1000 slm to 0-2500 slm (N₂ Equivalent)
- Excellent Accuracy
±(0.5% of Reading + 0.2% of Full Scale)
- Touchscreen Display/Control Option
- 0-5 VDC, 0-10 VDC, 0-20 mA or 4-20 mA I/O
- RS232 / RS485
- Typical Settling Time:
 - HFM-D-301/305 < 1 second
 - HFC-D-303/307 1 –2 seconds
- Self-diagnostic Status LEDs
- Auto-Zero (Controllers Only)
- Totalizer
- Large Diameter Sensor Tube (low dP)
- Low Wetted Surface Area
- Operating Pressures to 500 psi or higher
- NIST Traceable Calibration

APPLICATIONS

- Leak Testing
- High Purity Gas Delivery
- Heat Treat
- Gas Blending
- Secondary Calibration Reference
- Fuel Cell R&D
- Environmental Monitoring

BENEFITS

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

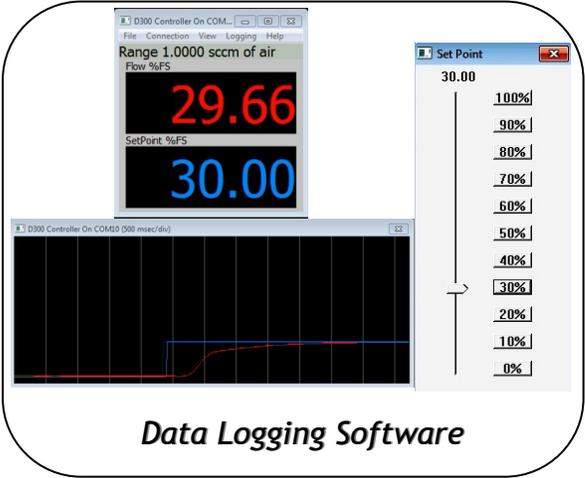
Mass Flow Meters & Controllers



HFC-D-303A 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 0-10,000 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 flow controller features 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 A 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.

"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. Both the A & B Series are compatible with Teledyne's data logging software.



HFC-D-303B Mass Flow Controller

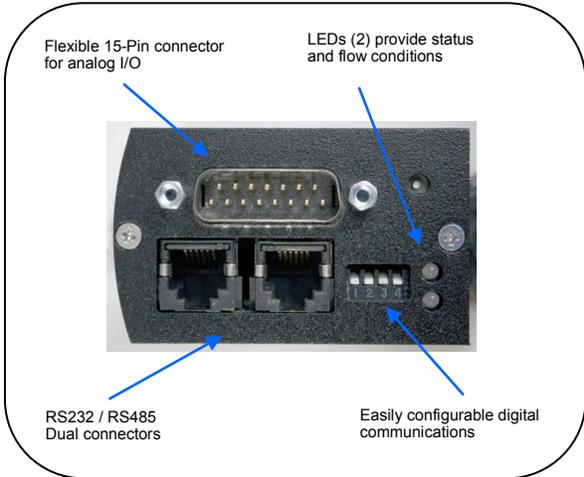


HFC-D-302B Mass Flow Controller

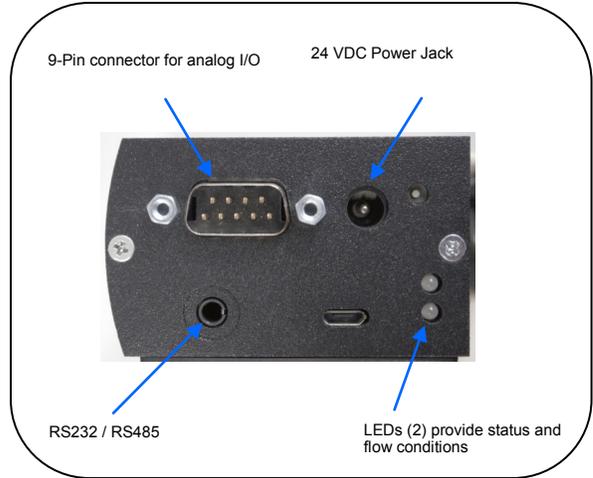
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Viton® is a registered trademark of Dupont Performance Elastomers
Kalrez® is a registered trademark of Dupont Performance Elastomers
Teflon® is a registered trademark of E.I. Dupont de Nemours & Co.
VCR® is a registered trademark of Swagelok Company.

Comparison



HFM-D-301A/305A (meter)
HFC-D-303A/307A (controller)



HFM-D-301B/305B (meter)
HFC-D-303B/307B (controller)

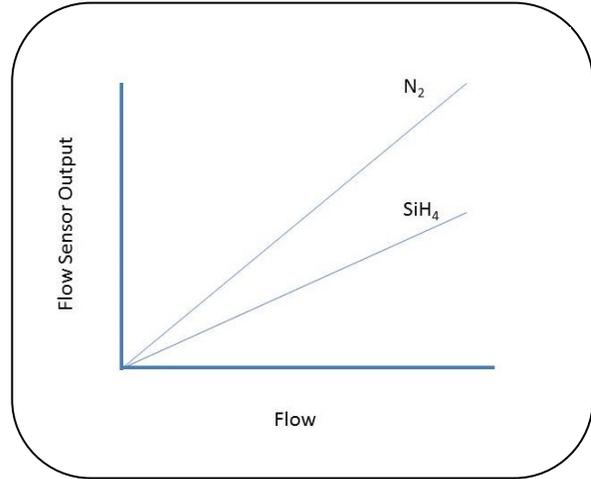
	A Series	B Series
D-Connector	15-Pin	9-Pin
RS232/485 Connector	Dual RJ	Video Bayonet
Status/Flow LEDs	✓	✓
Color Display/Control Option	—	✓
Compatible with Data Logging Software	✓	✓
Power Jack	—	✓
CE	✓	✓
RoHS	✓	✓

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.

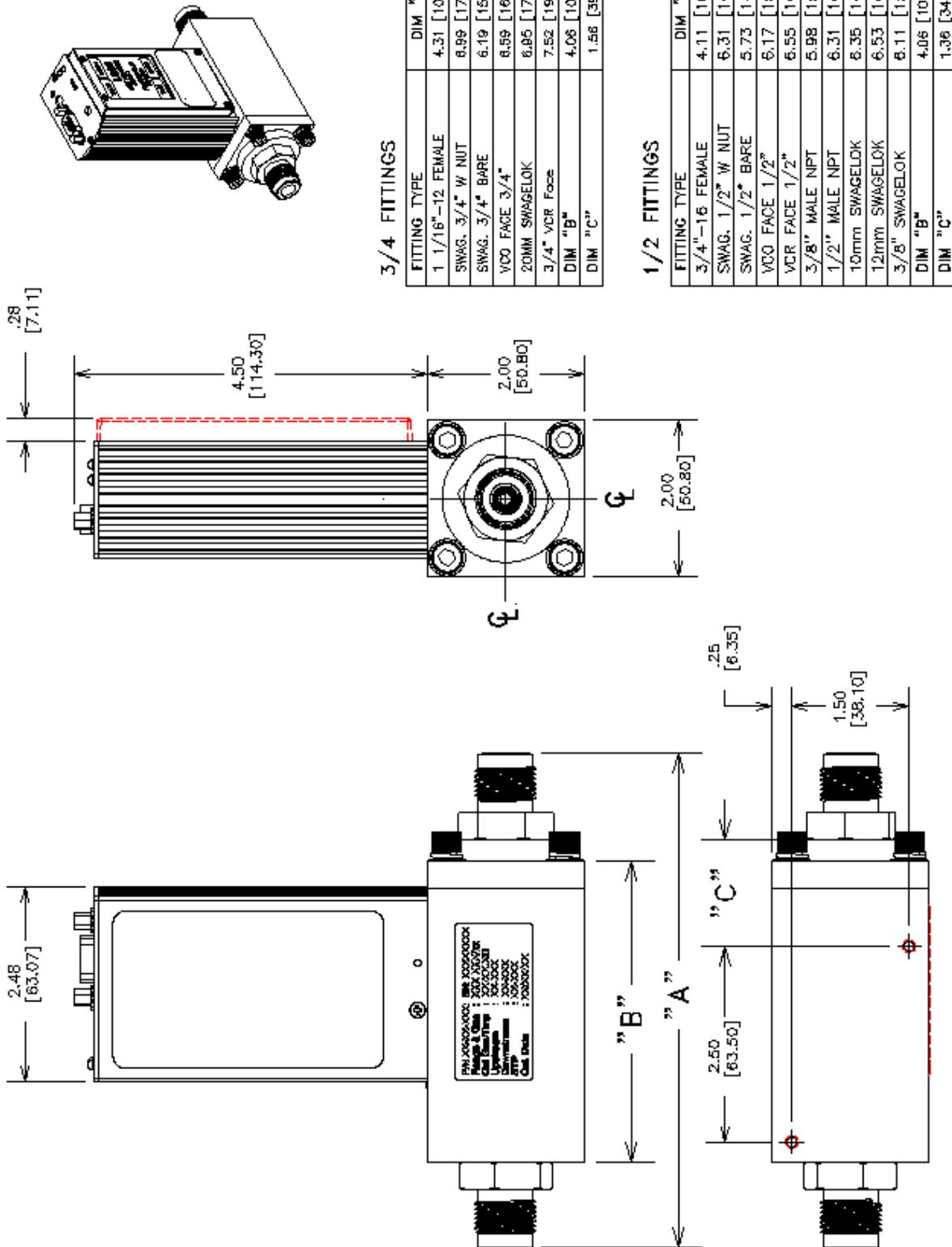
The patented sensor contains fast electronic circuitry. This is critical when the flow meter is coupled with a proportional control valve to create a thermal mass flow controller. The fast response of the sensor combined with high-speed digital control gives the user excellent control of the process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



<i>Specifications</i>	<i>HFM-D-301A/B & 305A/B (flow meter)</i>	<i>HFC-D-303A/B & 307 A/B (flow controller)</i>
Full Scale Ranges:	HFM-D-301A/B (L): 0-25 slm to 300 slm (N ₂) HFM-D-301A/B (H): 0-300 slm to 1000 slm (N ₂) HFM-D-305A/B: 0-1000 slm to 2500 slm (N ₂)	HFC-D-303A/B (L): 0-25 slm to 300 slm (N ₂) HFC-D-303A/B (H): 0-300 slm to 1000 slm (N ₂) HFC-D-307A/B: 0-1000 slm to 2500 slm (N ₂)
Accuracy	± (0.5% of reading + 0.2% of full scale)	± (0.5% of reading + 0.2% of full scale)
Repeatability	± 0.15% of full scale	± 0.15% of full scale
Maximum Working Pressure	500 psig (Optional 1000 psig for HFM-D-301)	500 psig (Optional 1000 psig for HFC-D-303)
Operating Temperature	-20 — 70°C in non-condensing environment	-20 — 70°C in non-condensing environment
Warm up time	30 min for optimum accuracy 6 min within rated accuracy	30 min for optimum accuracy 6 min within rated accuracy
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 reading max (-20—70°C)	< ± 0.1% / °C of reading max (-20—70°C)
Attitude Sensitivity of Zero	< 1.4 % of full scale (N ₂ @ 50 psig)	< 1.4 % of full scale before autozero (N ₂ @ 50 psig)
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, 302 SS, PTFE, Viton	316L SS, Nickel 200, 302 SS, PTFE, Viton, Kalrez® (valve seat)
Weight (approx.)	HFM-D-301A 3.6 lb. (1.6 kg) HFM-D-301B 3.7 lb. (1.7 kg) HFM-D-305A 8.4 lb. (3.8 kg) HFM-D-305B 8.5 lb. (3.9 kg)	HFC-D-303A 5.4 lb. (2.5 kg) HFC-D-303B 5.5 lb. (2.5 kg) HFC-D-307A 15.5 lb. (7.0 kg) HFC-D-307B 15.6 lb. (7.1 kg)
	<i>HFM-D-301A & 305A (meter)</i>	<i>HFC-D-303A & 307A (controller)</i>
Analog Connector	15 Pin D-sub	15 Pin D-sub
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)
	<i>HFM-D-301B & 305B (meter)</i>	<i>HFC-D-303B & 307B (controller)</i>
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 @ 4.6 Watt (max), Unipolar or Bipolar (e.g. ± 15 VDC, ± 12 VDC)	11-36 VDC @ 8.2 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-301 A & B Series



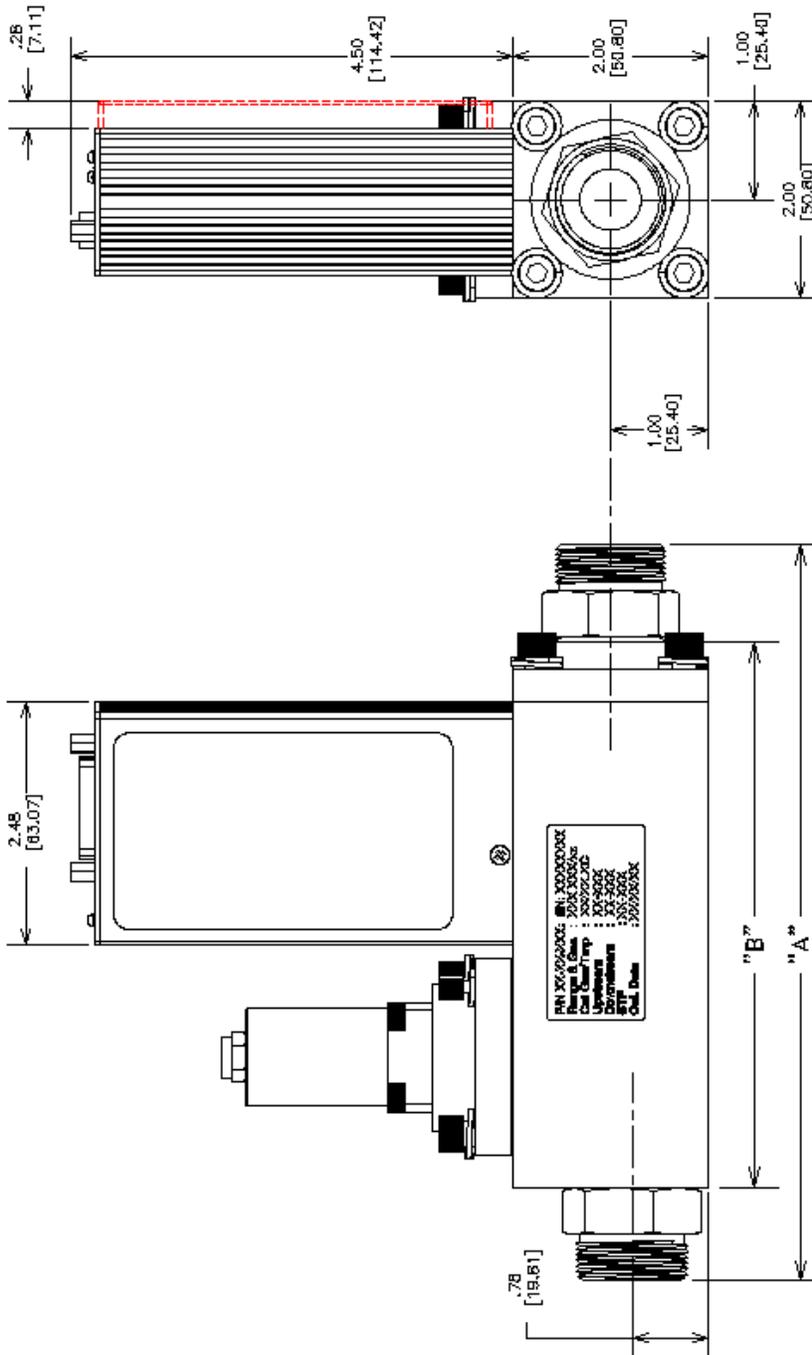
3/4 FITTINGS

FITTING TYPE	DIM "A"
1 1/16"-12 FEMALE	4.31 [109.47]
SWAG. 3/4" W NUT	6.99 [177.56]
SWAG. 3/4" BARE	6.19 [157.23]
VCO FACE 3/4"	6.59 [167.39]
20MM SWAGELOK	6.05 [176.53]
3/4" VCR Face	7.52 [191.06]
DIM "B"	4.08 [103.12]
DIM "C"	1.56 [39.67]

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]
3/8" MALE NPT	5.98 [151.89]
1/2" MALE NPT	6.31 [160.27]
10mm SWAGELOK	6.35 [161.29]
12mm SWAGELOK	6.53 [165.86]
3/8" SWAGELOK	6.11 [155.19]
DIM "B"	4.06 [103.12]
DIM "C"	1.36 [34.59]

Outline Drawings HFC-D-303 A & B Series

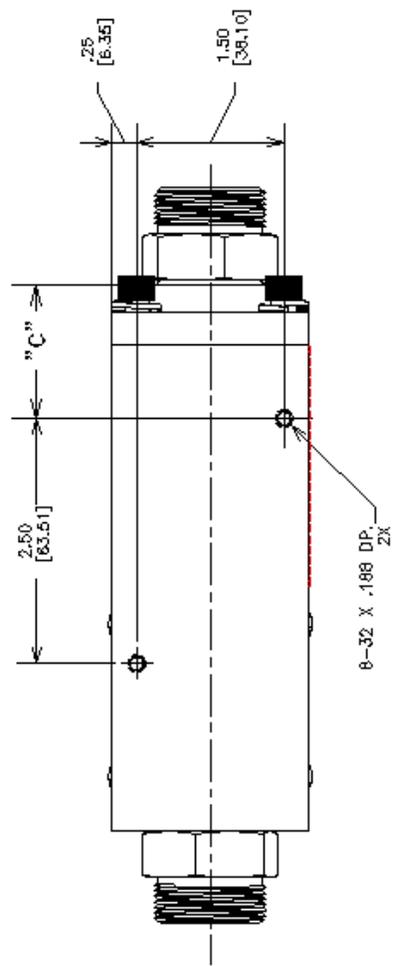


1/2" FITTING

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	6.96 [177.29]
VCR FACE 1/2"	7.42 [188.47]
VCR FACE 1/2"	7.80 [198.12]
3/8" MALE NPT	7.25 [183.84]
1/2" MALE NPT	7.56 [192.02]
10mm SWAGELOK	7.60 [193.04]
12mm SWAGELOK	7.78 [197.61]
3/8" SWAGELOK	7.36 [186.84]
DIM "B"	5.36 [136.14]
DIM "C"	1.36 [34.59]

3/4" FITTING

FITTING TYPE	DIM "A"
1 1/8"-12 FEMALE	5.76 [146.30]
SWAG. 3/4" W NUT	6.44 [164.38]
SWAG. 3/4" BARE	7.64 [194.06]
VCR FACE 3/4"	8.04 [204.22]
20mm SWAGELOK	8.40 [213.36]
3/4" VCR Face	6.97 [177.09]
DIM "B"	5.76 [146.30]
DIM "C"	1.56 [39.67]



8-32 X .188 DP, 2X

Selection Chart - HFM-D-301A & HFC-D-303A

For Models	Circuit Board	Output	Fittings	Seals	Working Pressure	Calibration Options	Digital
HFM-D-301A							
HFC-D-303A							

Circuit Board	
01	H Pin (Std)

Output	
01	0-5 volt (Std)
02	0-10 volt
03	4-20 mA
04	0-20 mA

Small Base Fittings	
01	1/2" VCR®
02	1/2" Swagelok (Std)
03	1/2" VCO®
06	3/8" Male NPT
07	1/2" Male NPT
08	3/4"-16 Fem S. Thread
10	10 mm Swagelok
12	12 mm Swagelok
14	Surface Mount (meter only)

Large Base Fittings	
04	3/4" Swagelok (Std)
05	3/4" VCO®
09	1 1/16"-12 Female ST
11	3/4" VCR
13	20 mm Swagelok

Seals	
01	Viton® (Std)
02	Kalrez®
03	Neoprene
04	Buna-N

Working Pressure	
01	500 psig max (Std)
02	1000 psig

Calibration Options	
01	1 Calibration Certificate (Std)
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

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 HFM-D-301B & HFC-D-303B

For Models	Output	Fittings	Seals	Working Pressure	Calibration Records	Digital	Calibration Type	Display
HFM-D-301B								
HFC-D-303B								

Output	
01	0-5 volt (Std)
02	0-10 volt
03	4-20 mA
04	0-20 mA

Small Base Fittings	
01	1/2" VCR®
02	1/2" Swagelok (Std)
03	1/2" VCO®
06	3/8" Male NPT
07	1/2" Male NPT
08	3/4"-16 Fem S. Thread
10	10 mm Swagelok
12	12 mm Swagelok
14	Surface Mount (meter only)

Large Base Fittings	
04	3/4" Swagelok (Std)
05	3/4" VCO®
09	1 1/16"-12 Female ST
11	3/4" VCR
13	20 mm Swagelok

Seals	
01	Viton® (Std)
02	Kalrez®
03	Neoprene
04	Buna-N

Working Pressure	
01	500 psig max (Std)
02	1000 psig

Calibration Records	
01	1 Calibration Certificate (Std)
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

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

Selection Chart - HFM-D-305A & HFC-D-307A

For Models	Circuit Board	Output	Fittings	Seals	Working Pressure	Calibration Type	Digital
HFM-D-305A							
HFC-D-307A							

Circuit Board	
01	H Pin (Std)

Output	
01	0-5 volt (Std)
02	0-10 volt
03	4-20 mA
04	0-20 mA

Fittings	
01	1" VCR®
02	1" Swagelok (Std)
03	1" VCO®
04	25 mm Swagelok
05	3/4" Swagelok
06	1" Male NPT
07	3/4" Male NPT
08	No Fitting 1 5/16"-12 MS ST
09	1" Female NPT

Seals	
01	Viton® (Std)
02	Kalrez®
03	Neoprene
04	Buna-N

Working Pressure	
01	500 psig max (Std)

Calibration Type	
01	1 NIST Traceable Calibration Report (Std)
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

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 - HFM-D-305B & HFC-D-307B

For Models	Output	Fittings	Seals	Working Pressure	Calibration Records	Digital	Calibration Type	Display
HFM-D-305B								
HFC-D-307B								

Output	
01	0-5 volt (Std)
02	0-10 volt
03	4-20 mA
04	0-20 mA

Fittings			
01	1" VCR®	05	3/4" Swagelok
02	1" Swagelok (Std)	06	1" Male NPT
03	1" VCO®	07	3/4" Male NPT
04	25 mm Swagelok	08	No Fitting 1 5/16"-12 M
		09	1" Female NPT

Seals	
01	Viton® (Std)
02	Kalrez®
03	Neoprene
04	Buna-N

Working Pressure	
01	500 psig max (Std)

Calibration Records	
01	1 Calibration Certificate (Std)
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

Digital	
01	RS232 (std)
02	RS485

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

Display	
01	Touchscreen Display
02	No Display (Standard)

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 & Accessories



THCD-100 Single Channel Power Supply Meter	
THCD-100	Includes brackets, connectors, and backshells



24 VDC Switching Power Supply	
12-01-169	For use with "B" Series or THCD-100 (Please specify AC Input Clip)



Flow Transducer Cable Part Numbers: Connect Hastings Power Supply to "A" Series Flow Meters & Controllers	
AF-4-AM	4' Cable
AF-25-AM	25' Cable
AF-50-AM	50' Cable
AF-100-AM	100' Cable



"A" Series—Serial Communication Cable:	
CB-RS232-RJ12	RS232 Cable (9-Pin "D" Female to RJ12)



"B" Series—Serial Communication Cable:	
CB-RS232-TRRS	RS232 Cable (9-Pin "D" Female to Male TRRS Jack 8 Ft)