

HASTINGS

# PRODUCT REVIEW

HASTINGS



Flowmeters and Controllers



Vacuum Instrumentation



**TELEDYNE INSTRUMENTS**

*Hastings Instruments*

A Teledyne Technologies Company

# TELEDYNE HASTINGS VACUUM INSTRUMENTATION



VT SERIES

CVT

## Thermocouple Gauges

### ANALOG METERS AND CONTROLLERS - VT Series

- Three Standard Ranges: 0 to 100 mTorr, 0 to 1000 mTorr and 0 to 20 Torr • Optional Single or Double Control Points

*Note: For both VT and VH Series, Hastings thermocouple vacuum gauge tubes required and sold separately. Hastings calibration reference tubes recommended.*



DIGITAL VT

VACUUM  
GAUGE TUBES

### VACUUM GAUGE METERS

#### Digital VT

- Economical • Operates Hastings Instruments' Most Popular Gauge Tubes • Compatible with Calibration Reference Tubes • Ranges: DV-6 (0 to 1000 mTorr), DV-4 (0 to 20 Torr) • Bright, Easy-to-Read Digital Display • Supplied with Flexible Power Converter Module • Easy Installation and Operation



HPM 4/6 WITH  
CARRYING CASE

HPM 4/6

### BATTERY OPERATED PORTABLE VACUUM METER

#### Model HPM 4/6

- Works with DV-6 and DV-4 Vacuum Gauge Tubes • Switch between DV-6 and DV-4 Ranges • Standard 8 Pin Octal Connector • Operates on a Single 9 Volt Battery • Available in Torr or mbar Scales • Rugged Carrying Case Included • Light Weight • Easy to Use • Hastings Thermocouple Vacuum Gauge Tubes Required and Sold Separately • Hastings Calibration Reference Tubes Recommended and Sold Separately



VACUUM GAUGE TUBES



REFERENCE TUBES



ACCESSORIES

### THERMOCOUPLE VACUUM GAUGE TUBES

- The Original DV-4, DV-6 Vacuum Gauge Tubes and Other Range TC Technology • Corrosion-Resistant • Non-Contaminating • Stable Calibration • Rugged Under Demanding Conditions • Color Coded For Easy Identification

### REFERENCE TUBES

- Instant Calibration Check • NIST Recalibration of Hastings Instruments • Adjusts Gauge for Any Length Cable • Stable • Accurate • Rugged • Reliable

### ACCESSORIES

- Save Time • Ease of Installation/Replacement of Tubes



**MODEL 2002 WITH CONTROLLER AND DIAGNOSTIC TUBE**



**OBE**



**THPS 760 PLUS**



**IGE-3000**

## DUAL VACUUM SENSOR Model 2002®

**WINNER**

- Wide Dynamic Range:  $10^{-4}$  Torr to 1000 Torr
- Piezo and Patented Thin-Film Pirani Sensor in a Single Gauge Tube
- Piezo is Inherently Linear
- Piezo Accuracy  $\pm 1.5\%$  of Reading
- Piezo is Gas Independent
- Piezo Sensitive up to Atmosphere
- Pirani Thin Film Sensor Sensitive down to  $10^{-4}$  Torr
- Compact Sensor Design
- Sensor Modules are Interchangeable
- Over Pressure to 50 psi
- Diagnostic Tube Accessory Available



## DUAL VACUUM SENSOR WITH ELECTRONICS OBE

- Award Winning Model 2002 Technology
- Wide Dynamic Range:  $1 \times 10^{-4}$  Torr to 1000 Torr
- Combined Piezo and Pirani Sensors in a Single Tube
- Simple Sensor Replacement – No Calibration Required
- Economical Electronics Module
- Wide Input Voltage 9-30 VDC
- Output Options Include: Analog (0-10v, 4-20 mA) or RS 232/485 or *DeviceNet™*
- Configurations Available with Display and/or Process Control Relays

## DIGITAL VACUUM CONTROLLER 760 Plus

- Range: 0.1 Torr to 999.9 Torr
- Accuracy  $\pm 0.25\%$  of Full Scale
- Resolution: 0.1 Torr
- Two Control Points
- Fast Response and Linear Output
- Complete Installation and Calibration Accessories
- Compact Design

## 760s STAND-ALONE SENSOR CONFIGURATION

- Input Voltage 15-30 VDC
- Optional Outputs: 0-5 VDC, 0-10 VDC, 2-10 mA, 4-20 mA
- Compact
- Independent of Gas Composition

## IONIZATION GAUGE ELECTRONICS AND SENSORS IGE-3000

- Range:  $10^{-10}$  Torr to  $10^{-2}$  Torr
- Miniature Bayard-Alpert Style Package
- 24 VDC Power Input
- Bright LED Display
- RS232/485 Communication
- Two Independent TTL Setpoints
- Selectable Emission Current
- Dual Filaments with Status Indicators
- Precision Electrometer
- Stable, Accurate Electrode Voltages

*DeviceNet* is a trademark of the Open *DeviceNet* Association, Inc.



# TELEDYNE HASTINGS MASS FLOW CONTROLLERS



**HFM-200, HFC-202**



**HFM-E-200, HFC-E-202**



**HFM-201**



**HFC-203**



**HFM-200 WITH LFE**



**LFE CONFIGURATIONS**

## 200 Series - General Purpose

### LOW CAPACITY MASS FLOWMETER & CONTROLLER

#### HFM-200, HFC-202

- FS Ranges from 10 to 25,000 sccm (N<sub>2</sub> Equivalent) • Accuracy  $\pm 1\%$  of Full Scale • Operating Pressure: 500 psig Standard, 1000 psig Optional • NIST Traceable Calibration • Proven Reliability • Optional Features Include: Fittings, O-Ring Seals, Fast Response Circuitry, High Pressure Rating and Oxygen Service Cleaning • Wetted Materials Include: 316 SS, Viton® (Optional Neoprene® & Buna N), 82/18 Au/Ni Braze, 302 SS, Trace Silver Solder, Nickel Plating, Kalrez®
- Accessories Include: Power Supplies/Readout and Cables

### EDGE CARD LOW CAPACITY MASS FLOWMETER & CONTROLLER

#### HFM-E-200, HFC-E-202

- FS Ranges from 10 to 25,000 sccm (N<sub>2</sub> Equivalent) • Accuracy  $\pm 1\%$  of Full Scale • Operating Pressure: 500 psig Standard, 1000 psig Optional • NIST Traceable Calibration • Proven Reliability
- Optional Features Include: Fittings, O-Ring Seals, Fast Response Circuitry, High Pressure Rating and Oxygen Service Cleaning • Wetted Materials Include: 316 SS, Viton (Optional Neoprene & Buna N), 82/18 Au/Ni Braze, 302 SS, Trace Silver Solder, Nickel Plating, Kalrez • Tylan FC-260 Footprint

### MEDIUM CAPACITY MASS FLOWMETER & CONTROLLER

#### HFM-201, HFC-203

- FS Ranges from 25 to 500 slm (N<sub>2</sub> Equivalent) • Accuracy  $\pm 1\%$  of Full Scale • Operating Pressure: 500 psig Standard, 1000 psig Optional • NIST Traceable Calibration • Proven Reliability • Optional Features Include: Fittings, O-Ring Seals, Fast Response Circuitry, High Pressure Rating and Oxygen Service Cleaning • Wetted Materials Include: 316 SS, Nickel, Viton, 82/18 Au/Ni Braze, Teflon®
- Accessories Include: Power Supplies/Readout and Cables

### HIGH CAPACITY MASS FLOWMETER

#### HFM-200 with LFE (Laminar Flow Element)

- FS Ranges from 25 to 15,000 slm (N<sub>2</sub> Equivalent) • Accuracy  $\pm 1\%$  of Full Scale • Inherently Linear Response • Lowest Pressure Drop • Excellent Rangeability • Modular Construction
- 15-Pin "D" Connector • NIST Traceable Calibration

### LFE CONFIGURATIONS FLOWMETER

- Used with HFM-200 • All Welded, Modular Construction
- Available in Various Sizes and Configurations from 3/8" NPT Up To 8" Flanged • NIST Traceable Calibration

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©Teflon is a registered trademark of E.I. Dupont de Nemours.



HFM-300



HFC-302

## 300 Series - Fast Response

### METALINE® MASS FLOWMETER & CONTROLLER HFM-300, HFC-302

- FS Ranges from 5 to 25,000 sccm (N<sub>2</sub> Equivalent) • Accuracy  $\pm 0.75\%$  of Full-Scale • Settling Time  $\leq 500$  msec (Model 300), 750 msec (Model 302)
- Operating Pressure: 500 psig Standard, 1000 psig Optional • NIST Traceable Calibration • Low Wetted Surface Area • Large Diameter Sensor Tube • Wetted Materials Include: 316 SS, Nickel 200 (Gaskets), Kalrez, Nickel Plated Pole Piece, 302 SS



HFM-301



HFC-303

### 300 SERIES MASS FLOWMETER & CONTROLLER HFM-301, HFC-303

- FS Ranges from 25 to 1000 slm (N<sub>2</sub> Equivalent) • Accuracy  $\pm 1.0\%$  of Full-Scale • Rapid Settling Time  $\leq 0.4$  seconds (Model 301),  $\leq 2.0$  seconds (Model 303) • Operating Pressure: 500 psig Standard, 1000 psig Optional
- NIST Traceable Calibration • Wetted Materials Include: 316 SS, Nickel 200 (Gaskets), Kalrez, Nickel Plated Pole Piece, 302 SS



HFM-305



HFC-307

### 300 SERIES MASS FLOWMETER & CONTROLLER HFM-305, HFC-307

- FS Ranges from 1000 to 2500 slm (N<sub>2</sub> Equivalent) • Accuracy  $\pm 1\%$  of Full-Scale
- Higher Flow Limits up to 3000 slm with Accuracy of  $\pm 2\%$  • Rapid Settling Time  $\leq 0.4$  seconds (Model 305),  $\leq 2.0$  seconds (Model 307) • Operating Pressure: 500 psig • NIST Traceable Calibration • Wetted Materials Include: 316 SS, Nickel 200 (Gaskets), Kalrez, Nickel Plated Pole Piece, 302 SS



**HFC-D-303**



**HFC-D-307**



**H SERIES TRANSDUCER**

**NALL POWER SUPPLY**



**Power Pod 400**



**THPS-100 POWER SUPPLY**

## Digital 300 Series

### DIGITAL 300 SERIES MASS FLOWMETER & CONTROLLER HFM-D-301, HFC-D-303

- FS Ranges from 25 to 1000 slm (N<sub>2</sub> Equivalent) • Multiple Gas Calibrations
- Accuracy  $\pm(0.5\%$  of Reading  $+0.2\%$  of Full Scale) • Linear Sensor and Flow Divider Design • NIST Traceable Calibration • Wetted Materials Include: 316 SS, Nickel 200 (Gaskets), Kalrez, Nickel Plated Pole Piece, 302 SS •  $\pm 12$ ,  $\pm 15$  or 24 VDC Power Supply • Isolated Outputs • RS232 or RS485 up to 19.2K baud • Auto Zero • Runs Transparently in Analog or Digital Modes

### DIGITAL 300 SERIES MASS FLOWMETER & CONTROLLER HFM-D-305, HFC-D-307

- FS Ranges from 1000 to 2500 slm (N<sub>2</sub> Equivalent) • Accuracy  $\pm(0.5\%$  of Reading  $+0.2\%$  of Full Scale) • Multiple Gas Calibrations • Linear Sensor and Flow Divider Design • NIST Traceable Calibration • Low Wetted Surface Area • Wetted Materials Include: 316 SS, Nickel 200 (Gaskets), Kalrez, Nickel Plated Pole Piece, 302 SS •  $\pm 12$ ,  $\pm 15$  or 24 VDC Power Supply • Isolated Outputs • RS232 or RS485 up to 19.2K baud • Auto Zero • Runs Transparently in Analog or Digital Modes

### NALL SERIES MASS FLOWMETER

- FS Ranges from 10 sccm to 500 scfm • High Temperature Option to 200°C
- Working Pressures up to 1000 psig • Hermetically Sealed Transducer • 15 Standard Flow Ranges

## Power Supplies

### Power Pod 100

- Single Channel Power Supply for Flowmeters, Controllers and All-Media Pressure Transducers • 100, 115, or 230 VAC • 4-1/2 Digital LED Display
- Alarm Outputs, RS232

### Power Pod 400

- Four Channels of Simultaneous Display • Independent Channel Programmability • Displays: Flow, Pressure, Totalizer, Gas ID and Units-of-Measure
- Totalizer Set Points with Count-up and Count-down Capability • High and Low Set Points • Analog I/O 0-5 VDC, 0-10 VDC, 4-20 mA • Analog Signals Available on Back Panel • Ratio Control • User Selectable AC Input
- RS232/485

# PROFILE

Teledyne Hastings Instruments manufactures a complete line of instruments for precise measurement and control of vacuum and gas flows.

Founded in 1944 as Hastings Instrument Company by Charles and Mary Hastings, the company boasts a long history of success. The late 1940s saw the introduction of thermocouple (TC) technology.

This technology was the foundation for many early Hastings produced instruments such as air velocity indicators, thermal mass flowmeters, stack emission monitors and, of course, the thermopile vacuum sensor.

By 1964, Hastings Instruments had grown into one of the leading vacuum and thermal mass flow companies in America and in 1968 became part of Teledyne Incorporated.

Today the company operates within the Teledyne Instruments Group; a group of specialty instrumentation companies providing innovative measurement devices to monitor critical manufacturing processes, improve productivity, facilitate energy exploration and protect the environment.

Teledyne Hastings Instruments has earned the latest ISO 9001 certification, along with CE Mark approval, confirming a longstanding commitment to internationally accepted standards of quality. We are compliant to ISO 17025, the international standard describing general requirements for the competence of testing and certification laboratories.



*OBE Dual Sensor Vacuum Gauge*

## Vacuum Instruments

With over 60 years of practical experience in vacuum technology, Teledyne Hastings Instruments maintains a full line of quality digital and analog vacuum instrumentation to satisfy stringent requirements of every market within the vacuum industry, including semiconductor processing, refrigeration, air conditioning, vacuum pump control

and monitoring, metallurgy, food processing, neon sign and lighting production. Teledyne Hastings products are used in government, industrial and academic R&D labs throughout the world. Over the years, the Model VT and CVT instruments, together with the reliability of the rugged TC gauge tube technology, have proven themselves as the standard in the industry by OEM and other equipment suppliers.

Two highly versatile vacuum instruments are part of the Teledyne Hastings product line. The Model 2002<sup>®</sup> dual vacuum sensor measures above atmospheric pressure to  $10^{-4}$  Torr pressure using a small, dual sensor. The OBE is an economical OEM version of the successful Model 2002. Most recently, the company introduced the IGE-3000, the Bayard-Alpert style Ion Gauge, thus offering instrumentation covering the range from atmosphere to  $10^{-10}$  Torr.



*IGE-3000 ionization gauge electronics and sensors*



*Model 2002<sup>®</sup> wide range digital vacuum meter with evolutionary thermal conductive sensor and diagnostic tube.*

Additional vacuum instruments offered by Teledyne Hastings Instruments include absolute pressure sensors which are independent of gas composition.



## Flow Instruments

The current Models HFM Mass Flowmeter and HFC Mass Flow Controller represent the culmination of more than 60 years' experience in manufacturing quality mass flow instruments. Teledyne Hastings' core technology strengths include advanced mass flow sensor technology as well as high flow metering, control and calibration capability. Mass flow measurement techniques provide more reliable, accurate, and repeatable gas flow rate measurements compared to volumetric methods such as rotometers and turbine meters.

Current designs can accommodate flow rates from 5 sccm to 15,000 SLM nitrogen equivalent, with fast response and low overshoot electronics. Other flow instruments include meters and controllers for specific applications such as low pressure drop, high capacity flow, high temperature, high pressure and hermetically sealed systems. These instruments are an asset to any industry requiring accurate gas measurement and/or control. Primary industries include R&D process flow, vapor deposition, leak testing, gas blending and semiconductor support processes.

The general purpose **200 Series** line features elastomeric sealed mass flow meters and controllers which have earned a reputation for being among the most stable and repeatable instruments available. These instruments have flow ranges

for 0-10 sccm to 0-500 SLM. In addition, large flows to 15,000 SLM can be measured using a laminar flow element. The instrument electronics provide accurate analog input and output signals. The base is constructed of stainless steel. Flow rates of corrosive gases, with the exception of the halogens, are easily measured in pressures up to 1000 psig (optional). The proportional control valve controllers typically have normally closed valves.



*300 Series Mass Flowmeter & Controller HFC-307*

The **300 Series** line employs a patented flow sensor which allows fast response to changing flow rates. This series is available in both analog and highly accurate digital versions. Digital versions also offer multiple gas calibrations as well as totalizer capability and alarms and warnings for underflow or overflow. Hastings mass flow instruments do not require periodic maintenance under normal operating conditions with clean gases.

Teledyne Hastings provides a wealth of expertise with regard to high flow meters, controllers, and calibration services. The HFC-307 measures and control flow rates up to 2500 SLM. Laminar flow elements utilizing the HFM-200 technology can certify flow rates up to 15,000 SLM.

For more information about Teledyne Hastings Instruments, please call (1-800-950-2468) or visit our website ([www.teledyne-hi.com](http://www.teledyne-hi.com)).





<http://www.teledyne-hi.com>



Teledyne Hastings Instruments offers product bulletins for each of these fine instruments. Included on each bulletin are the features, specifications, and dimensions as well as all ordering information for each product. Request any of these bulletins by calling Teledyne Hastings at (800) 950-2468 or by visiting our website at [www.teledyne-hi.com](http://www.teledyne-hi.com)

*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.*



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