

# Ultra Low Flow High Performance Digital Gas Mass Flow Meters and Controllers

## FEATURES

- Measure and Control Flow of Gas from 4 sccm (smlm) down to 0.08 sccm (smlm)
- Digital performance
- Includes Dial-A-Gas® multi-gas capability that enables use with 10 different gases
- Digital communications protocols supported
  - MODBUS
  - Profibus DP
  - Foundation Fieldbus (pending)
  - Device Net (pending)
- Optional Compod Control Module for programming of flow systems and process controls
- All control functions are also available from your PC or workstation
- 316 stainless steel construction suitable for any clean gas, even corrosives and toxics
- Small footprint makes installation easy
- Single-sided power input reduces installation cost and complexity
- Every Micro-Trak Instrument includes:
  - RS-232 Communication
  - Analog communication
  - Software for Windows OS
  - Source code
  - Calibration certificate
  - Electrical Connector or Cable

# MicroTrak 101™



## DESCRIPTION

**M**icroTrak™ measures and controls micro mass flows of gas previously thought to be too low for a reliable reading. MicroTrak™ is specifically designed for flow ranges under 4 sccm (smlm) with a minimum controllable mass flow rate of 0.08 sccm (smlm).

The Model 101 is a specialized and highly engineered instrument for those who need accurate and reliable micro mass flow control of clean gases including corrosives and toxics. MicroTrak™ is based on Sierra's award-winning family of digital instruments. As a result, ease of operation, field configuration, multi-gas capability and application flexibility are standard features.



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The information contained herein is subject to change without notice.

## PERFORMANCE SPECIFICATIONS

### Accuracy

+/- 1% of full scale including linearity under calibration conditions

### Dial-A-Gas

+/- 1% of full scale in all 10 standard gases

### Repeatability

+/- 0.2% of full scale

### Temperature Coefficient

+/- 0.025% of full scale per °F (0.05% of Full Scale per °C), or better

### Pressure Coefficient

+/- 0.01% of full scale per psi (0.15% of Full Scale per bar), or better

### Response Time

Governed by total volume of installation. Contact Sierra for suggestions on optimized installation.

## OPERATING SPECIFICATIONS

### Gases

All clean gases including corrosives & toxics; specify when ordering. The following ten gases make up the Dial-A-Gas® feature of every MicroTrak™ instrument; up to nine alternate gases may be substituted.

Dial-A-Gas Rates	
Gas	Micro-Trak Flow Range (sccm)
Air	0.10 to 4.0
Argon (Ar)	0.14 to 5.6
Carbon Dioxide (CO <sub>2</sub> )	0.14 to 5.6
Carbon Monoxide (CO)	0.10 to 4.0
Methane (CH <sub>4</sub> )	0.075 to 3.0
Helium (He)	0.14 to 5.6
Hydrogen (O <sub>2</sub> )	0.10 to 4.0
Oxygen (N <sub>2</sub> )	0.10 to 4.0
Nitrogen (N <sub>2</sub> O)	0.10 to 4.0
Nitrous Oxide (N <sub>2</sub> O)	0.072 to 2.9



Flow ranges specified are for an equivalent flow of nitrogen at 760 mm Hg and 21°C (70°F); other ranges in other units are available (e.g., nlpm, scfh, nm<sup>3</sup>/h, kg/h)

### Gas Pressure

500 psig (34.5 barg) maximum, burst tested to 750 psig (52 barg)

### Pressure Drop Across a Meter

0.36 psi (24.5 mbar)

### Differential Pressure Requirement For Controllers

30 psi (2040 mbar) optimum

1 psi (68 mbar) minimum at 21° C with outlet at ambient pressure

### Gas & Ambient Temperature

32°F to 122°F (0°C to 50°C)

### Leak Integrity

5 X 10<sup>-9</sup> standard cc/sec of helium maximum

## DIGITAL COMMUNICATIONS

RS-232 standard, RS-485 optional

Profibus DP

Modbus

Foundation Fieldbus

## OPERATING SPECIFICATIONS (CONTINUED)

**Power Requirements** (Ripple noise not to exceed 100mV peak-to-peak)

For Mass Flow Meters: 15 to 24 VDC +/- 10% (130 mA maximum)

For Mass Flow Controllers: 24 VDC +/- 10% (400 mA, regulated) for C101

### Control Range For Controllers

2–100% of Full Scale flow; automatic shut-off at 1.9 %

### Output Signal

#### Analog:

Linear 4 to 20 mA, 500 ohms maximum loop resistance and one of the following: Linear 0 to 5 VDC, 0 to 10 VDC, 1 to 5 VDC, 1000 ohms minimum load resistance

#### Digital:

RS-232; Pilot Module Display optional

### Command Signal

#### Analog (choice of one):

Linear 4 to 20 mA, 0 to 5 VDC, 0 to 10 VDC, 1 to 5 VDC

#### Digital:

RS-232; Pilot Module Display optional

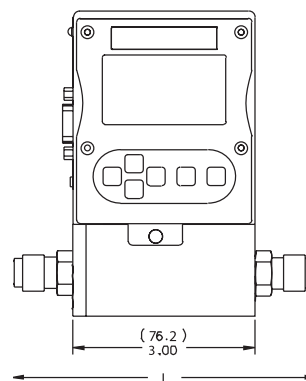
### Wetted Material

316 stainless steel, 416 stainless steel; synthetic ruby, Viton® "O"-rings and valve seat standard; other elastomers are available (consult factory)

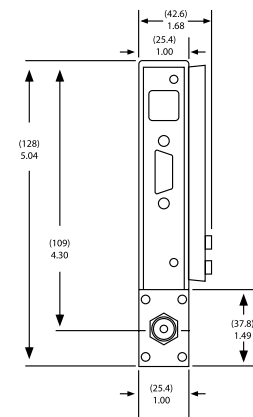
## PHYSICAL DIMENSIONS

All dimensions are in inches with mm in brackets. Certified drawings are available on request.

### 101 MicroTrak™ Front View

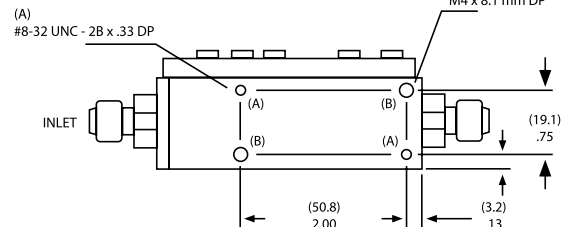


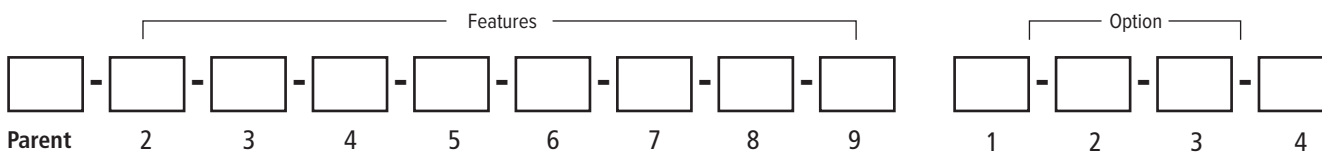
### 101 MicroTrak™ Inlet View



L dimension ranges from 4.6" [117] to 5.2" [132] depending on fittings used.

### 101 MicroTrak™ Bottom View





Instructions: To order a 101 please fill in each number block by selecting the codes from the corresponding features below and the following page.

Parent Number	
<b>M101</b>	MicroTrak mass flow meter. Ultra Low-Flow Gas Mass Flow Meters & Controllers: Full scale flow = 4 sccm, range = 0.08 to 4.0 sccm
<b>C101</b>	MicroTrak mass flow controller. Ultra Low-Flow Gas Mass Flow Meters & Controllers: Full scale flow = 4 sccm, range = 0.1 to 4.0 sccm

Feature 2: Pilot Module Display	
<b>NR</b>	No display/interface. If option 2 digital communications are selected, NR must be selected.
<b>DD</b>	Pilot Module Display/Interface mounted on the enclosure
<b>RD</b>	Remote Display Pilot Module Display/Interface. Includes 10 foot (3 meter) CAT 5 cable. Optional cables up to 50 feet (4.17 inches) may be used. May be used with digicomms but not simultaneously
<b>CMNR</b>	Compod with RS-485 Modbus communication mounted on the enclosure
<b>CMDD</b>	Compod with RS-485 Modbus communication and Display mounted on the enclosure

Note: For Digital communication options, See option 2 below.  
Only one option may be selected for Feature 2.

Feature 3: Inlet / Outlet Fittings			
<b>1</b>	1/8-inch compression. For low flow bodies and 101. (maximum 5 slpm)	<b>8</b>	1/4-inch VCR. For low flow bodies and 101. (maximum 50 slpm)
<b>2</b>	1/4-inch compression (standard up to 30 slpm). For low flow bodies and 101 (maximum 50 slpm)	<b>10</b>	6 mm Compression. For low flow bodies and 101. (maximum 50 slpm)
<b>5</b>	1/4-inch VCO. For low flow bodies and 101. (maximum 50 slpm)	<b>13</b>	1/4-FNPT adapter bushing (maximum 200 slpm). For low and med flow bodies, and 101 only.

Feature 4: Flow Body Elastomers	
<b>OV1</b>	Viton® or equivalent (standard)
<b>OV1-F</b>	Viton® (For phosphine only)
<b>ON1</b>	Neoprene®
<b>90D-L</b>	90D Viton® for CO <sub>2</sub> only
<b>90D-M</b>	90D Viton® for CO <sub>2</sub> only
<b>90D-H</b>	90D Viton® for CO <sub>2</sub> only

Note: Consult factory for other elastomers.

Feature 6: Input Power	
<b>PV1M</b>	15-24 VDC for meters (optional)
<b>PV2</b>	24 VDC for all instruments (standard)

Feature 7: Output Signal	
<b>V1</b>	0-5 VDC and 4-20 mA linear output signals
<b>V2</b>	1-5 VDC and 4-20 mA linear output signals
<b>V3</b>	0-10 VDC and 4-20 mA linear output signals

Note: Alternate among V1, V2, V3 with Pilot Module display/interface or Smart-Trak Software

Feature 5: Valve Seat (MFC only)			
<b>SV1</b>	Viton®	<b>SK3</b>	Kalrez® (or equivalent for high flow bodies)
<b>SN1</b>	Neoprene® (or equivalent)	<b>VX1 (low flow only)</b>	ValFlex™ required for CO <sub>2</sub>
<b>SK1</b>	Kalrez® (or equivalent for low flow bodies)	<b>VX2 (medium flow only)</b>	ValFlex™ required for CO <sub>2</sub>
<b>SK2</b>	Kalrez® (or equivalent for medium flow bodies)	<b>VX3 (high flow only)</b>	ValFlex™ required for CO <sub>2</sub>

Note: VX1, VX2, VX3; Consult factory, use CO<sub>2</sub> Elastomer Compatibility Concentration vs. Pressure application tool to determine required elastomers for MFC valve seat.

Feature 8: External Setpoint Signal (MFC only)			
<b>S0</b>	Pilot Module/RS-232 (standard for Pilot Module/digital operation)	<b>S3</b>	0-10 VDC , linear
<b>S1</b>	0-5 VDC, linear, standard for analog operation	<b>S4</b>	4-20 mA , linear
<b>S2</b>	1-5 VDC, linear	<b>S5</b>	0-20 mA , linear

Note: Alternate among S0, S1, S2, S3, S4 with Pilot Module display/interface or Smart-Trak Software

Feature 9: Electrical Connection			
<b>C0</b>	15-pin mating connector with no cable	<b>C10</b>	100-Analog Cable (10 foot): 15 conductor cable with D-connector on one end, fly leads on the other. 10 foot length (3 m)
<b>C1</b>	100-Analog Cable (1 foot): 15 conductor cable with D-connector on one end, fly leads on the other. 1 foot length (300 mm)	<b>C 25</b>	100-Analog Cable (25 foot): 15 conductor cable with D-connector on one end, fly leads on the other. 25 foot length (8 m)
<b>C3</b>	100-Analog Cable (3 foot): 15 conductor cable with D-connector on one end, fly leads on the other. 3 foot length (1 m)	<b>C ( )</b>	100-Analog Cable ( ): Custom length communication cable. Specify cable length in feet in parenthesis. Maximum length 50 feet (16 meters). Fixed price any length. Note: Longer lengths available for analog models.

NOTE: All communications, both analog and digital, go through the cable on Smart-Trak 2 instruments

Option 1: Special Cals	
<b>A1</b>	<p>High accuracy calibration, +/- 0.5% of FS at calibration conditions A1 Accuracy Statement Highest Accuracy Calibration; +/- 0.5% of F.S. (at operating conditions) only applies to the single gas used during calibration; Also includes 10 point linearization on actual gas. A1 Operating Conditions: Flow range: up to 50 slpm or nlpm ( valid from 10 to 100% of the calibrated range)</p> <p>Gases: Air, Nitrogen, Helium, or Argon Pressure: up to 10.3 barg (150 psig) Temperature range: 10°C to 30°C (50°F to 86°F) Orientation: horizontal only Note: Not available for MicroTrak For other operating conditions contact factory.</p>
<b>GS</b>	Gas substitution: One or more gases or mixtures may be substituted for 9 of the standard Dial-A-Gas gases. See application data sheet for specifics.
<b>LF</b>	Low flow calibration for all C100L and M100L; required for 0 to 10 sccm - 0 to 20 sccm full scale calibrations or less; not required for 101 Series

Option 2: Digital Communications	
<b>DP</b>	Profibus DP (NR Only)
<b>FF</b>	Foundation Fieldbus full device description (DD) (NR only)

Option 3: Certificates	
<b>MC</b>	Material Certificates--US Mill certs on all wetted flow body parts
<b>CC</b>	Certificate of Conformance

Note: Pilot Module Not Available with Digital Communications

Option 4: O2 Cleaning	
<b>O2C</b>	O2 Cleaning. Includes certification. Product cleaned for O2 service. Inspected with Ultra-Violet light and double-bagged prior to shipment

