

9861 Series

Thermal Mass Flow



9861 Series
Mass Flow Controller/Meters

High Temperature Mass Flow Controllers/Meters

Overview

Originally developed by Unit Instruments (later Celerity Inc.), the 9861 Series of high temperature mass flow controllers and meters continue to be manufactured using the same supply chain and copy exact process by Brooks Instrument who acquired the IP and assets of Celerity Inc. in 2009.

The 9861 Series remains the optimum choice for critical precursor and dopant vapor delivery in semiconductor and optical fiber manufacturing.

Product Description

The 9861 Series are thermal mass flow controllers and meters designed for challenging high temperature delivery of condensable precursors and dopants.

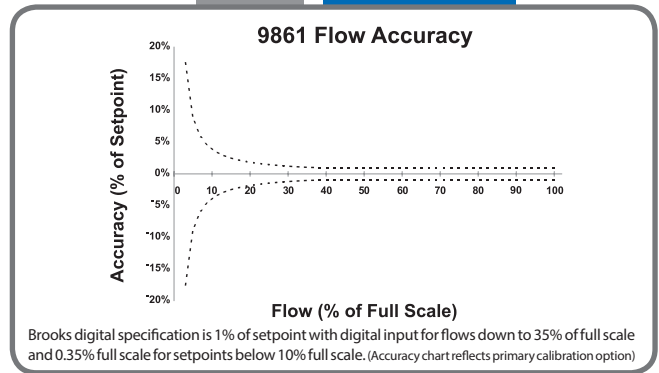
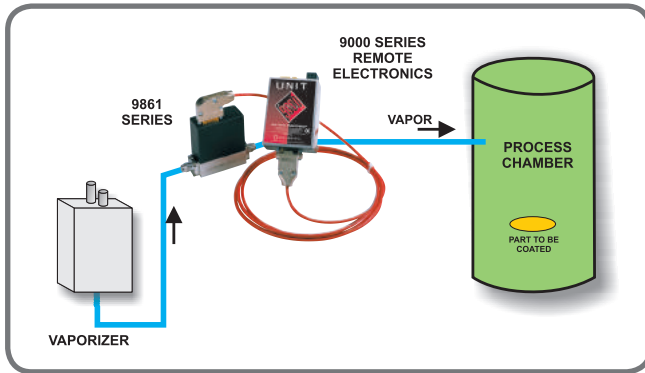
A high purity, high leak integrity metal flow path ensures compatibility with all process gases and vapors. The patented IsoSensor™ is a high stability flow sensor compatible with the elevated environmental temperatures found in heated gas lines and baking systems (temperature-controlled gas boxes). The ultra-low drift performance of the IsoSensor reduces the need for frequent re-zeroing and recalibration typical in high temperature applications.

For maximum flexibility and inventory reduction, the 9861 Series remote electronics come standard with two analog electrical connectors (a 20 pin card edge and a 9 or a 15 pin "D" connector option) and Semi industry standard RS485 digital communication enabling easy retrofit and standardization.

In mass flow controller models, a diaphragm free solenoid control valve provides a wide dynamic control range for superior precision and control. Designed for long-term reliability, the valve has been marathon tested to over 8 million cycles with no degradation in performance.

Features and Benefits

Features	Benefits
High temperature mass flow controller	Reliable delivery of condensable gases and precursors
Digital measurement and control architecture	Enhanced accuracy and process control
Ultra-High purity flow path	Ensures integrity and purity of gas/vapor
Ultra-stable flow measurement sensor	Reduced maintenance for superior uptime and lowest cost of ownership
Upstream pressure buffering (optional)	Stable mass flow delivery under challenging supply conditions
All metal diaphragm free control valve	Enhanced long-term reliability
Dual I/O interfaces	Universal upgrade enabling standardization and inventory reduction



Product Dimensions

Fitting type	Overall	Inlet	Outlet
1/4" VCR Male	4.88 in./124.0 mm	0.94 in./23.9 mm	0.94 in./23.9 mm

X.XX = dimensions in inches
[XX.X] = dimensions in millimeters

9000 Series Remote Electronics Dimensions

* Standard cable length = 3 ft.
The following lengths are available with a specials request:
6.7 ft., 8 ft. & 16.5 ft.

Product Specifications

Performance Specifications	
Settling Time (to within 2% of setpoint)	
Fast Start	≤ 1.0 sec (per SEMI E17-91)
Soft Start	Linear 20% per sec (0 to 100% in 5 sec)
Accuracy (N ₂ equivalent)	
35% to 100% F.S.	±1% setpoint (per SEMI E56-96)
< 35% F.S.	±0.35% full scale (per SEMI E56-96)
Repeatability (full scale)	±0.15% (per SEMI E56-96)
Linearity (full scale)	±0.5% (per SEMI E27-92)
Inlet Pressure Coefficient	0.007% per psi (N ₂)
Ambient Temperature Coefficient	
Zero	0.05% full scale per °C
Span	0.1% full scale per °C
Leak Integrity	1 x 10 ⁻¹⁰ atm-cc/sec (He) (per SEMI E16-90)
Automatic Zero	Optional (customer programmable)
Zero Drift	≤ 0.6% per year without auto-zero
Thermal Siphoning and Attitude Sensitivity	< 0.1% full scale (30 psi SF ₆)
Operating Limits	
Standard Flow Range	3 sccm to 10 slm (N ₂ equivalent)
Control Range (full scale)	2-100%
Valve Leak Rate	≤1% full scale
Gases	All
Ambient Temperature Range	0-150°C (32-302°F)
Maximum Operating Pressure	620 kPa (90 psia)
Differential Operating Pressure (Typical)	1.33-350 kPa (10 torr - 50 psia)
Warm-up Period	30 minutes
Mounting Position	HOV or HOS
Valve	Normally closed solenoid
Electrical Characteristics	
Input/Output Signal	
Setpoint Input	0-5 Vdc linearly proportional to required flow
Output Monitor	0-5 Vdc linearly proportional to flow rate
Digital Input/Output	RS485L (via RJ11 ports)
Valve Off	External: TTL signal
Auto shut-off	Setpoint < 2% full scale commands valve off
Power	
Controller (RS485)	+15 Vdc (160 mA max.), -15 Vdc (160 mA max.)
Meter (Analog)	+15 Vdc (50 mA max.), -15 Vdc (50 mA max.)
Power Consumption	9861 = 5 watts max.
Mechanical Characteristics	
Surface Finish	4μ inch Ra
Fittings	1/4" VCR*, 3/8" VCR*
Valve Position	Downstream
Materials	Wetted Components: 316L SS/KM-45/304/7MO+
Weight	1.2 kg (2.65 lbs)
Calibration References	
Traceability	National Institute of Standards and Technology (N.I.S.T.)
Standard Temperature and Pressure	0°C and 760 mm Hg per (SEMI E 12-96)

Specifications and features are subject to change without notice.

Model Code - 9861 Series

C	Mass Flow Controller
M	Mass Flow Meter
9861	Ultra-High Purity, Metal Seal, RS485 Digital and Analog Interface
A	Auto Shut-off
X	No Auto Shut-off
F	Fast Start 1 Second Response
S	5 Second Linear Soft Start
T	6-10 Second Soft Start
X	No Valve (Meter)
XXXX XXXX	Specify Pre-programmed Gas and Full Scale Range (example: Nitrogen = "0013"; 90sccm= "090C")
4R	1/4" VCR
3R	3/8" VCR
HOV	Horizontal or Vertical Mounting Attitude (Standard)
HOS	Horizontal or Side
A	Atmospheric Downstream Pressure
V	Vacuum Downstream Pressure
MM	Metal O-Ring/ Metal Seat
MX	Metal O-Ring- No Valve (Meter)
T	9 Pin "D" Connector & 20 Pin Card Edge Connector & Dual RJ11 ports, 0-5 VDC
U	15 Pin "D" Connector & 20 Pin Card Edge Connector & Dual RJ11 ports, 0-5 VDC
XXXX	Customer Special Request (CSR)
C	Normally Closed (Standard)
X	No Valve (Meter)
S	Standard (Valve Downstream)
X	No Valve (Meter)
A	Auto-Zero Enabled
X	Auto-Zero Disabled
04E	4μ inch Ra Finish
000	0°C Reference Calibration (Standard)
XXX	Custom Reference Calibration (20°C=20)

Sample Model Code

C	9861	A	F	XXXX XXXX	4R	HOV	A	MM	T	XXXX	C	S	A	04E	000
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Service and Support

Brooks is committed to assuring all of our customers receive the ideal flow solution for their application, along with outstanding service and support (All Brooks products including Tylan, Tylan General, Millipore, Mykrolis, UNIT and Celerity branded products). We operate first class repair facilities located around the world to provide rapid response and support. Each location utilizes primary standard calibration equipment to ensure accuracy and reliability for repairs and recalibration and is certified by our local weights and measures authorities and traceable to the relevant international standards.

Visit www.BrooksInstrument.com to locate the service location nearest to you.

START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required. For some process applications, where ISO-9001 quality certification is important, it is mandatory to verify and/or (re)calibrate the products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

CUSTOMER SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users and maintenance persons. Please contact your nearest sales representative for more details.

Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

TRADEMARKS

Brooks, Celerity, IsoSensor, Tylan, Tylan General, UNITBrooks Instrument, LLC
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