PNEUCLEUS
TECHNOLOGIES LLC

The Technology:

The MicroFlo and the MediFlo family of mass flow controllers combine the exceptional performance of the *InSitu-Sense*™ and *Tri-Planar*™ flow sensing and control technologies to create the Pneucleus Advantage; An ultra low-cost, high performance mass flow controller specifically designed to control non-corrosive gases.

The *InSitu-Sense*™ flow sensing technology directly measures gas flow by placing its' microchip-sized flow transducer directly in the gas stream. This *direct-sensing* technology responds instantly to changes in flow due to its infinitesimal thermal mass, while the extremely close proximity of the upstream and downstream sensing elements virtually eliminates common-mode errors caused by thermal/pressure gradients.

The *Tri-Planar*™ proportional valve incorporates a delta spring design that generates a spring rate of 110 lb/in and achieves an impressive 30% yield strength burden to the spring material. This produces a 10,000:1 turndown ratio and provides unparalleled flow control resolution in a stable, vibration-resistant design. The patented thermal compensation mechanism eliminates parasitic drift caused by thermal expansion of the elastomer while maintaining superior internal leak integrity across the seat.

Taking the *direct-sensing* approach to mass flow control allows Pneucleus Technologies to eliminate the costly design features associated with the standard "*bypass*" sensing technology. These features are used by virtually all other MFC manufacturers and include electro-polished stainless steel flow tubes used to isolate corrosive gases from sensing elements, high power metal seal valves that have excessive internal leakage, and the critical "*bypass*" flow-tube geometries that slow response and are prone to contamination failure. By eliminating these features Pneucleus Technologies is able to offer a line of high performance mass flow controllers at a dramatically reduced cost.

Your Perfect Solution:

Mass flow controller manufacturers often discourage OEM designers from requesting special features or performance requirements by making the customization process cost prohibitive and time consuming. Pneucleus Technologies believes that meeting the special design requirements of our customers helps them to keep their competitive edge and identifies us as a valuable member of their design team. Therefore, OEM engineers are encouraged to submit their special design features or performance requirements because that's how we provide the perfect solution and earn our place on your team.

The Pneucleus Advantage:

Founded by engineers, Pneucleus Technologies is committed to serving engineers. We understand that a perfect solution is a cost effective solution. So our *design* engineers work directly with OEM engineers to enhance the essential design/performance features while eliminating those that inflate product cost and add no value to the application. This results in a tailor-made solution at a surprisingly low cost. We call this *The Pneucleus Advantage ...*

InSitu-Sense™ Sensor

This magnified view of the InSitu-Sense™ sensor (center) surrounded by its supporting circuitry reveals two RTD elements separated by a heating element. The thermal mass of the sensor is so small that it responds to flow changes in milliseconds while canceling common-mode errors. Its intrinsic thermophorectic effect repels micron-sized particles, which eliminates clogging and ensures long-term reliability.

Before you pay a heavy price for a mediocre "standard" product from a big name in the industry, contact Pneucleus and let us provide the perfect solution for your application at a fraction of the "standard" cost.

PNEUCLEUS
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SPECIALIZING IN
DIRECT SENSING

Mass Flow Meters & Controllers

*MFC's Shown Proportionately

Design Features

Dual-Cal
- Select up to 2 gases & 2 ranges
- No Correction Factors Needed

Performance
- Ultra-Fast Response, Superior Repeatability, Exceptional Stability

Control
- 0-5V, 0-10V, 4-20mA, RS-232 Addressable, Coming Soon… Profibus!

And...
... Ultra Low Cost!

Applications

Gas Chromatography
- ICP
- FPD/PFPD
- FID

Elemental Analysis

Gas Calibrators

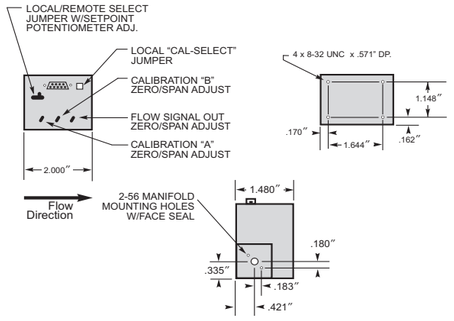
Gas Monitoring

Purging Processes

Vacuum Coating
- Sputtering
- Cathodic Arc

Delivering Exceptional Value...Without Exception!

MicroFlo Mass Flow Controller



Specifications:

Performance:

Linearity	Between +/- .5% & 1.0% of Full Scale (Typical)
Repeatability & Hysteresis	± 0.15% FS
Temperature Coefficient	0.09% / ºC from 21ºC cal-temp
Response Time	40 msec (typical 2%-100% FS)

Fluid Requirements:

Calibration Gas	Any Non-Corrosive Customer Specified Gas
Flow Ranges	Any Customer Specified Range
Pressure Range	0-100 Psi, Cal Pressure: 25 Psi
Internal Leakage	10^{-5} sccm @1, 30 and 100 Psi (He)
External Leakage	2 x 10^{-6} sccm (He)

Electrical Requirements:

Input Voltage (single supply)	12, 15, 18, or 24 volts +10% - 3%
Power Consumption	3.0 Watts Maximum
Control & Output Voltage/Signal	0-5 VDC, 1-5 VDC, 4-20mA RS232 (Addressable) *Profibus (Coming Soon!)

Environmental Requirements:

Operating Ambient Temp.	0-50ºC
Storage Temperature	-40 - 70ºC
Humidity Range	5% - 95% (Relative, non-condensing)
Calibration Temperature	21ºC ± 5ºC

Mechanical Configuration:

Input/Output Ports	10-32 Threaded (Others, Consult Factory)
Dimensions	L: 2.0" W: 1.5" H: 1.85"
Weight	5.4 oz

Construction (wetted materials):

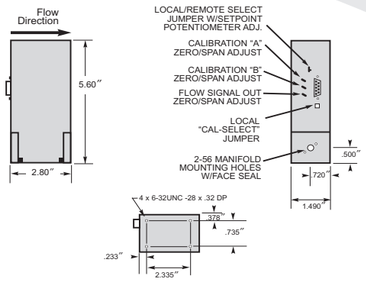
Manifold	Nickel Plated Aluminum
O-Rings	Fluorocarbon (Viton®), others at additional cost
Valve Components	Brass 360, AISI 300 series, 430 FR Stainless Steel
Flow Sensor	Ceramic Flow Tube (non-out gassing), Silicon, Silicon Nitrite Gold, Aluminum Oxide Epoxy Sealant, Fluorocarbon (Viton®), Polythermide (100, 200 & 300 sccm MFC only)

Ordering Matrix

INPUT VOLTAGE	MINIMUM INPUT PRESSURE	MINIMUM OUTPUT PRESSURE	CONTROL SIGNAL	OUTPUT SIGNAL	STP REFERENCE	CAL - A MAX FLOW	CAL - A GAS TYPE	CAL - B MAX FLOW	CAL - B GAS TYPE
	(PSI)	(PSI)				(SCCM)		(SCCM)	
12	0.25	0.25	0 - 5v	0 - 5v	0ºC	10	ARGON	NONE	NONE
15	1.0	1.0	0 - 10v	0 - 10v	20ºC	25	N_2 (O_2, AIR)	10	ARGON
18	4.0	4.0	1 - 5v	1 - 5v	OTHER*	50	HELIUM	25	N_2 (O_2, AIR)
24	10.0	10.0	1 - 10v	1 - 10v		75	HYDROGEN	50	HELIUM
OTHER*	18.0	18.0	4 - 20 mA	4 - 20 mA		100	METHANE	75	HYDROGEN
	35.0	35.0	RS232	RS232 (Addressable)		150	XENON	100	METHANE
	55.0	55.0	OTHER*	OTHER*		200	CO_2	150	XENON
	85.0	85.0				250	OTHER	200	CO_2
	OTHER*	OTHER*				300	NON-CORROSIVE	250	OTHER*
						400		300	
						500		400	
						OTHER*		OTHER*	

*Customizable

MediFlo Mass Flow Controller



Specifications:

Performance:

Linearity	Between +/- .5% & 1.0% of Full Scale (Typical)
Repeatability & Hysteresis	± 0.15% FS
Temperature Coefficient	0.09% / ºC from 21ºC cal-temp
Response Time	100 msec (typical, from 2%-100 FS)

Fluid Requirements:

Calibration Gas	Any Non-Corrosive Customer Specified Gas
Flow Ranges	Any Customer Specified Range
Pressure Range	0-100 Psi, Cal Pressure: 25 Psi
Internal Leakage	10^{-5} @ 1, 30 and 100 Psi (He)
External Leakage	2 x 10^{-6} sccm (He)

Electrical Requirements:

Input Voltage (single supply)	12, 15, 18, or 24 volts +10% - 3%
Power Consumption	3.0 Watts Maximum
Control & Output Voltage/Signal	0-5 VDC, 1-5 VDC, 4-20mA, RS232 (Addressable) *Profibus (Coming Soon!)

Environmental Requirements:

Operating Ambient Temp.	0-50ºC (STD), 70ºC (Optional)
Storage Temperature	-40 - 70ºC
Humidity Range	5% - 95% (Relative, non-condensing)
Calibration Temperature	21ºC ± 5ºC

Mechanical Configuration:

Input/Output Ports	10-32 Threaded (Others Consult Factory)
Dimensions	L: 2.8" W: 1.5" H: 5.5"
Weight	13.0 oz

Construction (wetted materials)

Manifold	Nickel Plated Aluminum
Filter Screen Polyester	
O-Rings	Fluorocarbon (Viton®)
Valve Components	Brass 360, AISI 300 series, 430 FR Stainless Steel
Tubing	Polyurethane
Sealant	Anaerobic Sealant
Flow Sensor	Engineering Thermoplastic Silicon, Silicon Nitrite Gold, Aluminum Oxide Epoxy Sealant, Fluorocarbon (Viton®), Polyester

Ordering Matrix

INPUT VOLTAGE	MINIMUM INPUT PRESSURE	MINIMUM INPUT PRESSURE	CONTROL SIGNAL	OUTPUT SIGNAL	STP REFERENCE	CAL - A MAX FLOW	CAL - B GAS TYPE	CAL - B MAX FLOW	CAL - B GAS TYPE
	(PSI)	(PSI)				(SCCM)		(SCCM)	
12	0.25	0.25	0 - 5v	0 - 5v	0 ºC	250	ARGON	NONE	NONE
15	1.0	1.0	0 - 10v	0 - 10v	20ºC	500	N_2 (O_2, AIR)	250	ARGON
18	4.0	4.0	1 - 5v	1 - 5v	OTHER*	750	HELIUM	500	N_2 (O_2, AIR)
24	10.0	10.0	1 - 10v	1 - 10v		1000	HYDROGEN	750	HELIUM
OTHER*	18.0	18.0	4 - 20 mA	4 - 20 mA		2000	METHANE	1000	HYDROGEN
	35.0	35.0	RS232	RS232 (Addressable)		3000	XENON	2000	METHANE
	55.0	55.0	OTHER*	OTHER*		5000	CO_2	3000	XENON
	85.0	85.0				15000	OTHER	5000	CO_2
	OTHER*	OTHER*				20000	NON-CORROSIVE	15000	OTHER*
						OTHER*		20000	
								OTHER*	

*Customizable