

PPCMA

Integrated Pressure Controller with Mass Flow Meter



The PPCMA pressure controller with integrated mass flow meter provides pressure measurement and control while monitoring mass flow rates for critical process applications (e.g. backside wafer cooling) in a compact package that saves critical space when compared to the previous multi-component systems necessary to accomplish the task.

The PPCMA utilizes leading Baratron® capacitance manometer technology for pressure measurement and patented thermal flow meter to monitor gas mass flow. Both are integrated along with a proportioning control valve and the latest in control electronics providing fast and accurate pressure control with critical flow monitoring as a system diagnostic. The PPCMA can be configured for 10 to 1000 Torr Full Scale pressure with a control range from 5 to 100% of Full Scale. The PPCMA pressure controller is suitable for transport chamber pressure control, critical backside wafer pressure control and process gas panel pressure balancing as well as run-vent pressure control applications. The valve and flow meter can be configured for Full Scale flow rates from 5 to 5000 sccm Full Scale depending on process conditions.

The PPCMA is available with either digital (DeviceNet™ or EtherCAT®) I/O allowing for straightforward integration into new or retrofit applications. In-situ tuning and component diagnostics are enhanced through the device's micro USB user interface accessible via virtually any PC with a web browser.

Product Features

- Backside wafer cooling
- Fast response to set point with minimal overshoot
- Metal-sealed, cleanroom manufactured units meet critical high purity application needs
- Pressure measurement and control with flow metering in a single package requires less space and reduces system cost



Key Benefits

- Compact package
- Integral Baratron capacitance manometer technology provides accuracy, reliability, and wide range
- Patented mass flow sensor* provides exceptional long-term accuracy and zero stability

*Protected under the following U.S. patents: No. 6,779,394, No. 6,668,641, No. 6,810,308, No. 7,004,191 or International Patents and Patents pending

Specifications

Performance

Pressure Type	Absolute
Pressure Full Scale Ranges	10, 20, 50, 100, 200, 500 or 1000 Torr
Transducer Over Pressure Limit	2x Full Scale for all ranges
Maximum Differential Pressure	45 psid
Burst Pressure	1500 psig
Flow/Orifice Full Scale Ranges ¹	50, 200, 1000, 5000 (sccm)
Control Mode	Downstream
Pressure Measurement Accuracy	±0.5% of Reading
Temperature Coefficients	
Zero	±0.02% of Full Scale/°C
Span	±0.04% of Reading/°C
Pressure Readout Units ²	Torr, kPa, mbar, psi
Pressure Resolution	0.1 Torr
Pressure Control Accuracy ³	±1.0% of Reading (≥10% Full Scale) ±0.2% of Full Scale (<10% Full Scale)
Control Range	>5 to 100% of Full Scale
Typical Response Time ⁴	<1.0 second (excluding system time constant)
Flow Reading	
Full Scale Flow Rates (N ₂ equivalent)	5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000
Measurement Range	2% to 100% of F.S.
Accuracy	±1.0% of Reading > 20% of Full Scale; ±0.2% of Full Scale (> 20% of Full Scale flow) (including non-linearity, hysteresis, and non-repeatability referenced to 760 mmHg and 0°C)
Repeatability	±0.3 of Reading
Resolution	0.1% of Full Scale
Temperature Coefficients	
Zero	<0.05% of F.S./°C
Span	<0.08% of Rdg./°C
Operating Temperature Range	10° to 50°C (50° to 122°F)
Storage Temperature Range	-20° to 80°C (-4° to 176°F)
Storage Humidity Range	0 to 95% relative humidity, non-condensing

¹ Orifice Full Scale ranges are nominal Full Scale flow rates for Nitrogen with 15 psig on the inlet and atmosphere on the outlet side.

² Some readout units may not be available over every primary I/O.

³ Accuracy includes linearity, hysteresis, and repeatability.

⁴ Typical response time is excluding system time constant.

Mechanical

Fittings	Swagelok® 4 VCR® Male, 1.5" surface mount (C-seal)
Valve Options	
Type	Normally Closed
Seat Material	PTFE (Teflon®) or Elastomer (Viton®), Buna, Neoprene, EPDM
Leak Integrity	
External (scc/sec He)	<1 x 10 ⁻¹⁰
Through closed valve	<1.0% of orifice Full Scale (Nitrogen at 25 psig on inlet to atmosphere) <0.1% of orifice Full Scale - Elastomer
Wetted Materials	
Standard	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy®, KM-45, Inconel® 718, 825 Incoloy®
Optional (Valve Seat)	PTFE (Teflon) or Elastomer (Viton)
Surface Finish	10 μinches, average Ra
Weight	<5 lbs (1.36 kg)

Note: The pressure controllers require flow to operate, and will not control pressure in "dead-ended" (zero flow) applications.

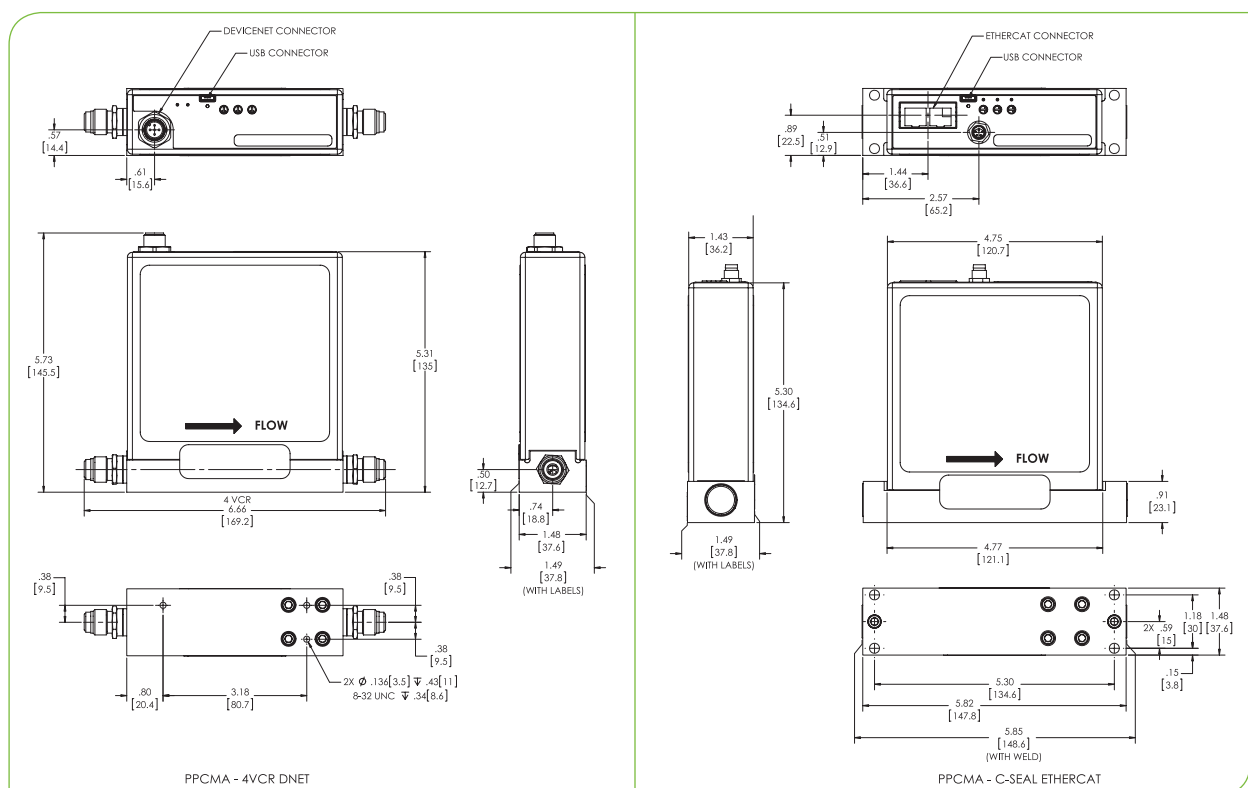
Digital I/O

DeviceNet™

Input Power Required	+11 to +25 VDC per (< 4 watts)
Connector	5 pin micro connector (power and comm.)
Data Rate Switch/Selection	4 positions: 125, 250, 500K (Default), (programmable over network)
Comm. Rate (s)	125 Kbps, 250 Kbps, 500 Kbps
MAC ID Switches/Addresses	2 switches, 10 positions; 0,0 to 6,3, 1 to 254
Network Size	Up to 64 nodes
Visual Indicators	LED Network (green/red) LED Module (green/red)
Compliance	CE

EtherCAT®

Input Power Required	+24 VDC (<5 watts)
Connector	2 x RJ-45 (comm.) male, M8 male, 5 pin (power)
Data Rate Switch/Selection	No switch
Comm. Rate (s)	100 Mbps
Mac ID Switches/Addresses	3 switches, 16 positions
Network Size	Up to 4095 nodes
Visual Indicators	LED Power (green) LED Run (green) LED Error (red) LED Comm (green)
Compliance	CE



Dimensional Drawing

Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

Ordering Information

Ordering Code Example: PPCMA51T01102R8AV120	Code	Configuration
PPCMA Pressure Controller with/Integral MFM	PPCMA	PPCMA
Pressure Range Full Scale and Units		
10 Torr	11T	51T
50 Torr	51T	
100 Torr	12T	
500 Torr	52T	
1000 Torr	13T	
100 mBar	12M	
500 mBar	52M	
1000 mBar	13M	
1 kPa	10K	
5 kPa	50K	
10 kPa	11K	
100 kPa	12K	
Gas (Consult Factory For Other Gases)		
Helium (001)	01	01
Argon (004)	04	
Hydrogen (007)	07	
Nitrogen (013)	13	
Full Scale Flow Rate (sccm) - (minimum is 5 sccm N₂, equivalent)		
5	500	102
10	101	
20	201	
50	501	
100	102	
200	202	
500	502	
1000	103	
2000	203	
5000	503	
Fittings		
Swagelok 4 VCR	R	R
C-Seal	C	
Electrical Connector		
DeviceNet	6	8
EtherCAT	8	
Orifice Size		
A (50 sccm)	A	A
#1 (200 sccm)	1	
#2 (1000 sccm)	2	
#3 (5000 sccm)	3	
Plug Material		
Buna	B	V
EPDM	E	
Neoprene	N	
Teflon	T	
Viton	V	
Valve Type		
Normally Closed	1	1
Firmware		
DeviceNet	10	20
EtherCAT	20	



www.MKSINST.com

+1-978-645-5500 | +1-800-227-8766

PPCMA_09/19

©2019 MKS Instruments, Inc.

MKS products provided subject to the US Export Regulations. Diversion or transfer contrary to US law is prohibited. Some Baratron® capacitance manometer products may not be exported to many end user countries without both US and local government export licenses under ECCN 2B230. Specifications are subject to change without notice. mksinst™ is a trademark and Baratron® is a registered trademark of MKS Instruments, Inc., Andover, MA. Viton® and Teflon® are registered trademarks of E.I. DuPont Co., Inc., Wilmington, DE. Swagelok® and VCR® are registered trademarks of Swagelok Marketing Co., Solon, OH. Incone® and Incoloy® are registered trademarks of Inco Alloys International, Huntington, WV. DeviceNet™ is a trademark of the Open DeviceNet Vendor Association, Coral Springs, FL. EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany. Elgiloy® is a registered trademark of Elgiloy Limited Partnership, Elgin, IL.