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Type PC90 with a rotatable 4 character dot matrix LED display

Flow Solutions

WWW.MKSINST.COM

πPC

INTEGRATED PRESSURE CONTROLLER FOR CLOSED LOOP PRESSURE MEASUREMENT AND CONTROL OF PROCESS CRITICAL APPLICATIONS

The πPC is a critical process control instrument in the MKS line of digital control, web-enabled products, providing the latest in pressure measurement and control technology necessary to meet the process demands of the semiconductor and other leading edge process industries.

The πPC Pressure Controller provides pressure measurement and control of process critical pressures utilizing MKS Instruments' industry leading Baratron capacitance manometer technology. The πPC is available with a Full Scale pressure from as low as 1000 torr up to 100 psia. Baratron capacitance manometers - well-known for their percent of Reading accuracy, stability and resolution – provide precise measurements at lower pressures and over a wider dynamic range than strain gage transducers.

The πPC Pressure Controller is a self-contained, compact, closed-loop electronic pressure control system designed for a wide range of pressure and flow conditions. It contains a capacitance manometer, normally closed or normally open control valve and closed–loop control electronics. The πPC is available in either an upstream or downstream pressure control configuration making it well suited for controlling process chamber backpressure or process gas delivery pressure. With either digital (DeviceNet or RS-485) or analog I/O and its Ethernet setup and diagnostics capabilities, the πPC is easily integrated into the process tool.

Features & Benefits

- Integral Baratron® capacitance manometer technology provides for accurate measurement and process gas pressure control
- Digital control loop provides rapid response to setpoint independent of gas flow rate minimizing process cycle time
- Complete, compact pressure control package minimizes cost and space requirements
- Straightforward configuration, tuning and diagnostics through its Ethernet interface utilizing a standard web browser
- Bright rotatable LED 4 digit display provides easy viewing of process pressure, full scale, temperature and Ethernet IP address

**Protected under the following U.S. patent: No. 6,810,308 or International Patents and Patents pending.*

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Performance

Pressure Type	Absolute
Pressure Full Scale Ranges	1000 Torr, 2000 Torr, 100 Psia
Transducer Over Pressure Limit	2x Full Scale for all ranges
Maximum Differential Pressure	45 Psid
Burst Pressure	1500 Psig
Orifice Full Scale Ranges[1]	(sccm) 50, 200, 1000, 5000, 10000, 20000, 30000, 50000
Control Modes	Upstream or Downstream
Pressure Measurement Accuracy[2]	± 1.0% of Reading
Temperature Coefficients	
Zero	± 0.02% of Full Scale /°C
Span	± 0.04% of Reading /°C
Pressure Readout Units	(For all Torr Full Scale ranges) Torr, kPa; (For Psi Full Scale Range) Psi, kPa
Pressure Resolution	0.1 Torr for 0 to 100 Torr, 1 Torr for >100 Torr, 0.1 Psi for 0 to 100 Psi
Pressure Control Accuracy[2]	± 0.2% of Full Scale (< 10% Full Scale); ± 1.0% of Reading (≥ 10% Full Scale)
Control Range	> 2 to 100% of Full Scale
Typical Response Time[3]	< 1.0 second
Temperature Display Range	0 to 100°C
Temperature Readout Units	°C
Temperature Accuracy	± 2°C
Temperature Resolution	0.1°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]Accuracy includes linearity, hysteresis, and repeatability.
[3]Typical response time is excluding system time constant.

Mechanical

Fittings	Swagelok 4 VCR Male, 1-1/8" surface mount (C-seal, W-seal)
Valve Options	
Type	Normally Closed or Normally Open
Seat Material	PTFE (Teflon) or Sapphire (Metal)
Display	4 digits for value, 4 characters for unit
Leak Integrity	
External (scc/sec He)	< 1×10^{-10}
Through closed valve	< 1.0% of orifice Full Scale (Nitrogen at 25 psig on inlet to atmosphere)
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 Sapphire (Metal)
Surface Finish	5 µinches, average Ra
Weight	< 3 lbs (1.36 kg)

Electrical Analog I/O (CE Compliant to EMC Directive 2004/108/EC)

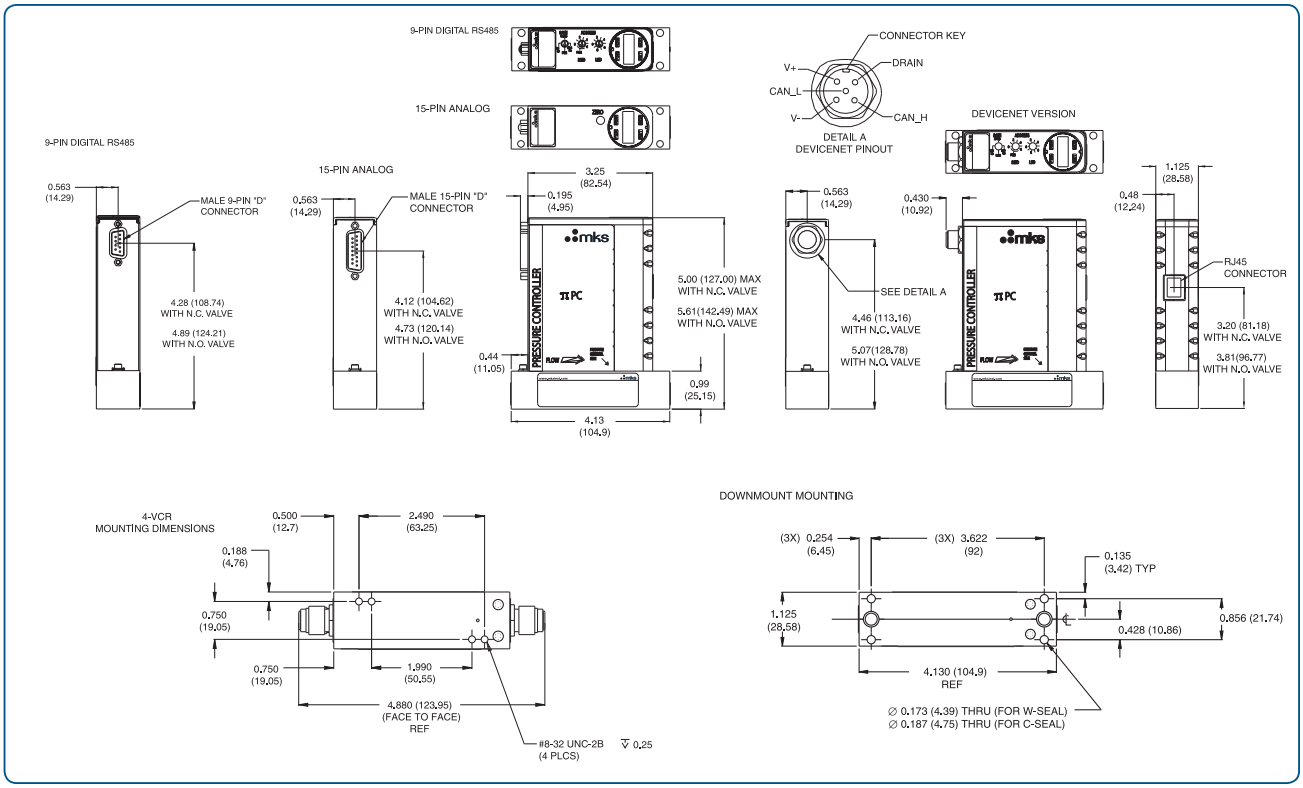
Input Power Required	+15 to +24 VDC @ 350mA max
Pressure Set Point	0 to 10 VDC (Default), 0 to 5 VDC (User Switchable)
Command/Output Signal	
Valve Test Point Signal	0 to 5 VDC
Trip Points	Two open collector transistors, adjustable from 0 to 100% of Full Scale.
Rated Current	30VDC / 250mA
State	On, above, or below trip point
Hysteresis	3% of Full Scale (factory set)
Status LEDs	Red when the transistor is on
Output Impedance	< 1 Ω
Connector	15-pin Type "D" Male

Specifications

Digital I/O (CE Compliant to EMC Directive 2004/108/EC)

Digital I/O	DeviceNet	RS-485 w/Analog Pressure Out
Input Power Required	+11 to +25 VDC per DeviceNet specification (@ <3.5 watts)	+15 to +24 VDC @ 350mA max
Connector	5 pin microconnnector (DeviceNet)	9 pin Type D male
Data Rate Switch	4 positions: 125, 250, 500K (Default), PGM (programmable over the network)	3 positions: 9.6, 19.2, 38.4K (Default)
Data Rate/Network Length	Data Rate (User Selectable) 125 Kbps, 500 meters (1,640 feet) 250 Kbps, 250 meters (820 feet) 500 Kbps, 100 meters (328 feet)	Data Rate (User Selectable) 9.6 Kbps, 1200 meters (4,000 feet) 19.2 Kbps, 1200 meters (4,000 feet) 38.4 Kbps, 1200 meters (4,000 feet)
MAC ID Switches	2 switches, 10 positions; 0,0 to 6,3 are hardware ID numbers; 7,0 to 9,9 are software ID numbers; (6,4 to 6,9 are unused and, if selected will default to hardware ID number 6,3)	2 switches, 10 positions; 0,0 to 9,9. Available MAC ID's are 3,2 to 9,9.
Network Size	Up to 64 nodes	Up to 32 nodes
Network Topology	Linear (trunkline/dropline) power and signal on same network cable	Master/slave
Visual Communication Indicators	LED network status (green/red) LED module status (green/red) Scrolling LED displays(πPC Type, Pressure Full Scale, IP address) Push-Button Display toggles between (Pressure in TORR & KPA or PSI & KPA, Temperature and Scrolling display)	LED network status (green/red) LED module status (green/red) Scrolling LED displays(πPC Type, Pressure Full Scale, IP address) Push-Button Display toggles between (Pressure in TORR & KPA or PSI & KPA, Temperature and Scrolling display)

Note: Type PC90 Control Valves should not be used for positive shutoff. Where positive shutoff is required, a separate valve should be installed. When selecting the location of an external shutoff valve, consideration should be given to the maximum pressure rating of the internal transducer and to the possibility that leakage across the internal valve over time can build up and result in a sudden surge of gas.

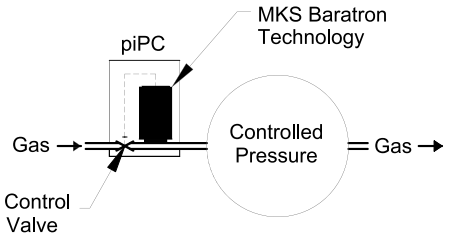


Dimensional Drawing

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

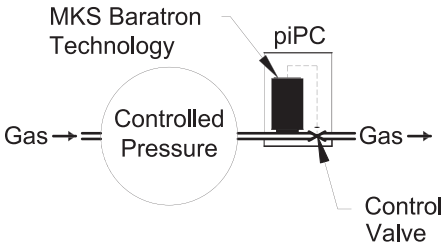
Ordering Information

DOWNSTREAM CONTROL



Downstream Controller Configuration

UPSTREAM CONTROL



Upstream Controller Configuration

Ordering Code Example: PCA012PHB5DT	Model	Code	Configuration
πPC Pressure Controller			
Model Number		PCA	PCA
Pressure Reading			
Absolute	PC90	0	0
Pressure Range Full Scale			
1000 Torr (mmHg)		13T	12P
2000 Torr (mmHg)		23T	
100 psi		12P	
Fittings (compatible with)			
Swagelok 4 VCR male		R	H
C-Seal		C	
W-Seal (1.125")		H	
Electrical Connector			
RS-485 (9 pin D)		5	B
DeviceNet		6	
15 Pin D (Analog I/O)		B	
Valve Orifice # (see NOTE)			
A (50 sccm)		A	5
#1 (200 sccm)		1	
#2 (1000 sccm)		2	
#3 (5000 sccm)		3	
#4 (10000 sccm)		4	
#5 (20000 sccm)		5	
#6 (30000 sccm)		6	
#7 (50000 sccm)		7	
Pressure Control			
Upstream		U	D
Downstream		D	
Valve Seal Material/Operation			
Metal/NC (≤5000 sccm orifice only)		M	T
Teflon/NO (≤30000 sccm orifice only)		P	
Teflon/NC		T	
Firmware DeviceNet Version only			
Unless otherwide specified, MKS will ship firmware revision current to date		10	10

NOTE: *To determine appropriate valve orifice, see MKS Application Note #01/06: Pressure Controller-Valve Orifice Selection Guide available at http://www.mksinst.com/docs/R/OrificeSelectionAppNote.pdf*

Analog 15-pin D male	
Pin Number	Signal Description
Pin 1	Valve Test Point
Pin 2	Pressure Signal Output
Pin 3	Valve Close
Pin 4	Valve Open
Pin 5	Power Supply Common Ground
Pin 6	No Connection
Pin 7	+15 to +24 VDC
Pin 8	Setpoint Input
Pin 9	No Connection
Pin 10	Optional Input
Pin 11	Signal Common
Pin 12	Signal Common
Pin 13	Trip Point A
Pin 14	Trip Point B
Pin 15	Chassis Ground

RS-485 9-pin D male	
Pin Number	**Signal Description**
Pin 1	Pressure Signal Output
Pin 2	Signal Common
Pin 3	+15 to +24 VDC
Pin 4	Power Supply Common Ground
Pin 5	No Connection
Pin 6	RS-485 Return
Pin 7	RS-485 +
Pin 8	RS-485 -
Pin 9	Shield

πPC, PC90 Pressure Controller Pinouts

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