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Pressure & Vacuum Measurement Solutions

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41B, 42B, 51B, 52B

PRESSURE SWITCHES

The 41B, 42B, 51B and 52B Vacuum, Atmospheric, and Pressure Switches offer accurate and reliable protection for vacuum equipment, atmospheric switching, and vacuum/pressure processes. Designed for applications where a DC signal output is not required, these switches provide relay outputs that are readily interfaced with alarms, valve actuators, computers, process controllers, load locks and other protection devices.

The 41B and 42B models are referenced to atmospheric pressure, while the 51B and 52B products are referenced to vacuum. The 41B/42B switches are often used to ensure a loadlock pressure has equilibrated to local atmospheric pressure before opening the door. The trip point on MKS' atmospheric switches can be set to trip above, below (reverse calibration), or exactly at current atmospheric pressure. Applications for the 51B/52B switches include soft pumping, gas box switching, and safety interlocks.

Features & Benefits

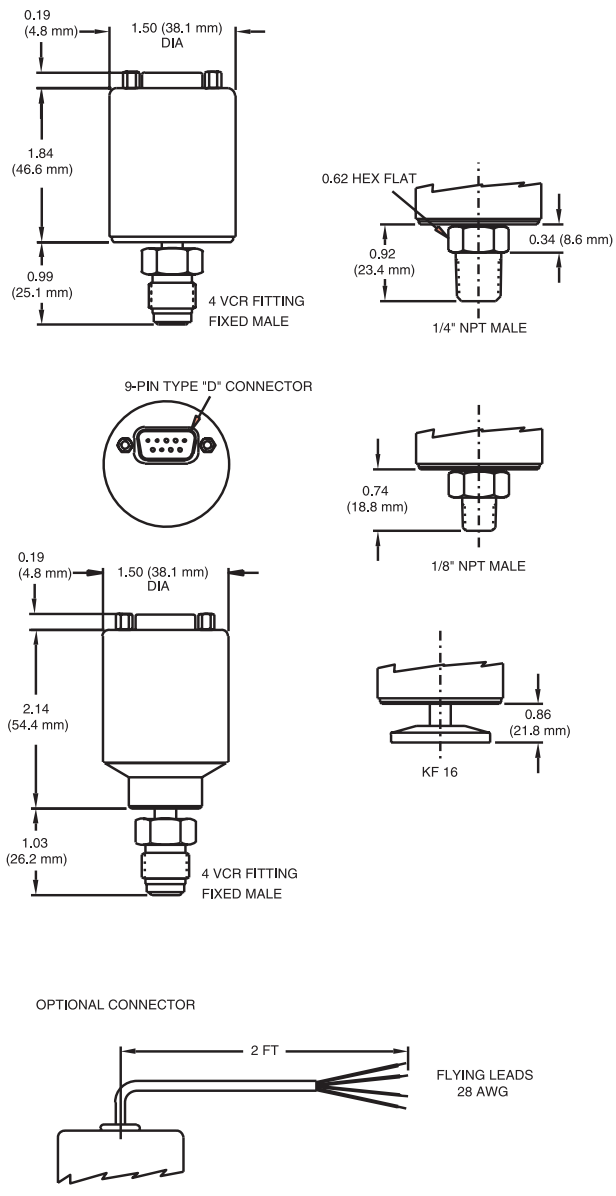
- Precise control for a wide variety of production applications including semiconductor processing tools, high vacuum pumps, compressors, blowers, medical equipment and machine tools
- Provides high reliability which reduces downtime and lowers the cost of ownership
- Superb set point accuracy and repeat-ability: 0.5% of F.S. increases process control
- Corrosion-resistant: all-metal, all-welded construction exposes only 316L S.S. and Inconel® to the media
- Switch relay can be set to energize above or below set point for fail-safe operation
- Low hysteresis due to capacitance technology improves set point accuracy over mechanical switches
- Factory-set trip point from 5% to 100% of Full Scale means no need for personnel to adjust the set point and elimination of safety concerns from an erroneously adjusted set point
- Fast response switching: 20 msec
- Excellent long term stability
- Rugged high overpressure rating (2 × F.S. or 45 psia, whichever is greater) for pressure cycling applications

The design of these switches is based on the well-known MKS Baratron® capacitance manometer principle of operation. MKS has utilized this capacitance technology for more than three decades and it remains the most stable, accurate, and reliable sensor available today. The pressure switches sense the deflection of a diaphragm due to applied pressure, providing a switched output when pressure exceeds or drops below the chosen set point. The dual electrode sensor is an all-metal, all-welded design, thus exposing only corrosion-resistant 316L S.S. and Inconel® to process gases. The sensor is then mated to sophisticated electronics to further optimize performance. The resulting enhanced accuracy and long-term stability yield a switch with unparalleled repeatability.

The relay mode on 41B, 42B, 51B, and 52B switches can be set to either energize above or below the set point. If the unit loses power, the relay switches to the Normally Closed position. The user can indicate whether the Normally Closed position is above or below the set point. Using Energize Above the set point as an example, the relay is in the Normally Open position when the pressure is higher than the trip point and Normally Closed when the pressure is below the trip point. The scenario is reversed for Energize Below the set point option. In vacuum systems, the fail-safe operation is if the system loses power causing the relay to de-energize, the relay is in the same state as the high pressure condition. Therefore, most vacuum systems require the relay energize with pressure decreasing or below the set point.

The 41B, 42B, 51B and 52B Vacuum, Atmospheric and Pressure Switches provide increased accuracy over mechanical type switches, thereby providing tighter control and repeatability of process, improving throughput and yield.

Low Pressure (1000 Torr and lower)



Dimensional Drawing: Single Ended—

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

Output Connections	
9-pin Type "D"	**Flying Leads**
1. Power Return (-)	Red - Power Input (+)
2. Power Input (+)	Black - Power Return (-)
3. Relay NO Contact	Green - Relay NO Contact
4. Relay Common	White - Relay Common
5. Relay NC Contact	Orange - Relay NC Contact
6. Unused	Bare Wire - Chassis Ground
7. Unused	
8. Unused	
9. Chassis Ground	

Specifications

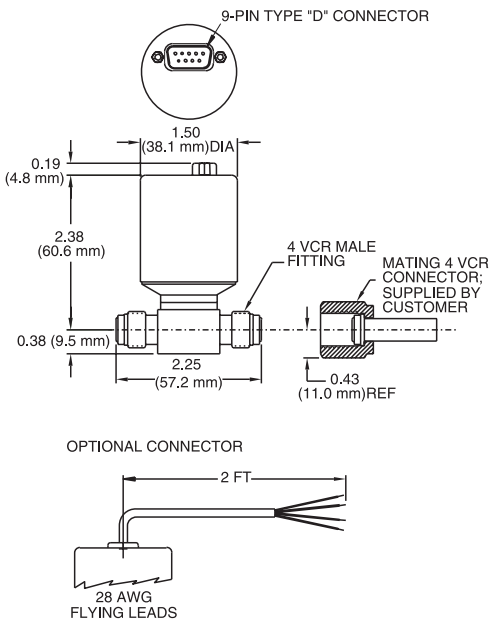
Full Scale Ranges	10 Torr through 500 psi (Consult Applications Engineering on Full Scale ranges in other engineering units. Selection of trip point and Full Scale range should be as close as possible as trip point accuracy is affected by the Full Scale range)
Trip Point Range	5% to 100% of F.S.
Accuracy	±0.5% of F.S. (±temperature coefficient)
Temperature Coefficient*	±0.07% of F.S./°C
Ambient Operating Temperature	0° to 50°C
Trip Point Dead Band	±3% of F.S.(nominal)
Response Time	<20 msec
Materials Exposed to Process Gases	Inconel and 316L S.S. 10 µRa max. on switches with Swagelok® VCR® fittings (5 µRa max. optional)
Internal Volume	3.3 cc for single-ended, 6.6 cc for flow-through
Overpressure	2 × F.S. or 45 psia, whichever is greater
Outputs	
Electromechanical relay	SPDT (isolated) contacts rated up to 1 Amp @ 30 VDC resistive. Relay is energized either with increasing pressure or decreasing pressure.
Input Power Required	10 to 20 VDC @ 35 mA max. or 20 to 30 VDC @ 30 mA max.
Fittings	
42B/52B	4 VCR® male
41B/51B	4 VCR® male and female, NW 16 KF, 1/8" male NPT, 1/4" male NPT
Compliance	CE

*Example: A 100 Torr sensor with a 2°C change has a trip point temperature-induced error less than or equal to:
(0.0007 x 100 Torr x 2) = 0.14 Torr error anywhere within the trip point range

Note: Atmospheric switches provide a means by which the trip set point is referenced to current atmospheric conditions. “Reverse Calibration” allows the trip point to be set at or below the current atmospheric pressure. When ordering, a value of 000 in the last three digits of the model code would equate to atmospheric pressure. A value of 002 would equate to 2 Torr or 2 PSIG below atmospheric pressure, depending on the use of the “D” or “C” ordering code for Full Scale range.

This method provides an excellent mechanism to achieve switching at current atmospheric conditions, regardless of the location of the installed base or present weather conditions.

Ordering Information



Dimensional Drawing: Flow Through-

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

Ordering Code Example: 41B11TCA1AA005

41B, 42B, 51B, 52B Unheated Vacuum/Pressure Switch	Code	Configuration
Single-ended gauge	41B	41B
Flow-through gauge	42B	
Single-ended absolute	51B	
Flow-through absolute	52B	
Full Scale Ranges Available (Contact Applications Engineering for other engineering units)		
10 Torr (41B/51B only)	11T	11T
30 Torr (41B/51B only)	31T	
100 Torr (41B/51B only)	12T	
500 Torr (41B/51B only)	52T	
1000 Torr	13T	
20 psi	21P	
50 psi	51P	
100 psi	12P	
250 psi	RDP	
500 psi	52P	
For Reverse Calibration only[1] (trip point below atmospheric pressure):		
10 Torr (41B only)	11D	
30 Torr (41B only)	31D	
100 Torr (41B only)	12D	
500 Torr (41B only)	52D	
1000 Torr (41B/42B only)	13D	
20 psi (41B/42B only)	21C	
50 psi (41B/42B only)	51C	
100 psi (41B/42B only)	12C	
250 psi (41B/42B only)	RDC	
500 psi (41B/42B only)	52C	
Fittings		
NW 16 KF (41B/51B only)	GA	CA
1/8 NPT male (41B/51B only)	FE	
1/4 NPT male (41B/51B only)	FB	
4 VCR fixed male (41B/51B only)	CA	
4 VCR female (41B/51B only)	CD	
4 VCR fixed male (42B/52B only)	CH	
Input Voltage		
10-20 VDC	1	1
20-30 VDC	2	
Relay Mode		
Energizes with pressure above the set point	A	A
Energizes with pressure below the set point	B	
Connector		
9-pin Type "D" male	A	A
Flying leads - 2 ft. shielded cable	F	
Trip Point[2]		
Three digit value (in same units as F.S. ranges) (For reverse calibration, the trip point is given as value below atmosphere.)	XXX	005

[1] For a trip point of 000 (atmospheric pressure), use a reverse calibration Full Scale range code.

[2] For the absolute model, the trip point is the actual pressure at which the relay should trip. For the atmosphere model, the trip point is the pressure above or below atmospheric pressure at which the relay should trip.

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