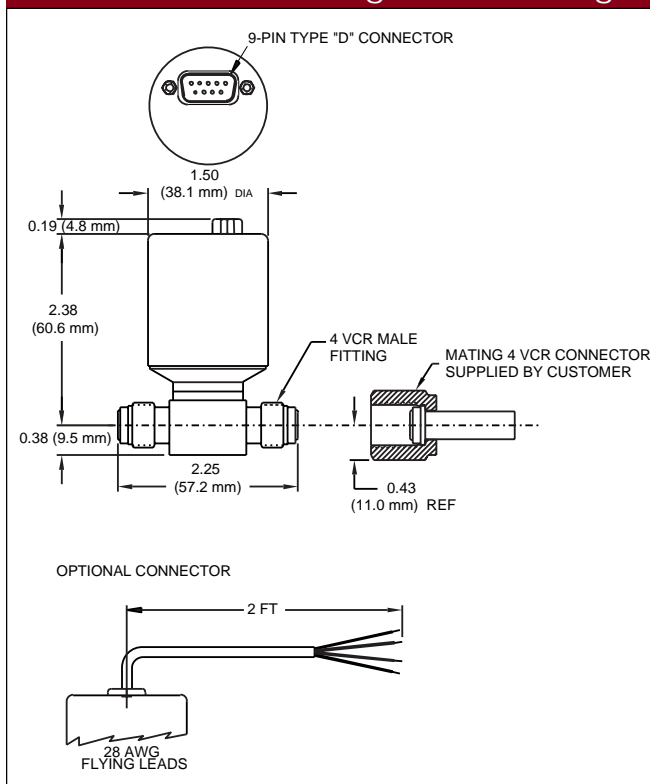




Baratron® Vacuum, Atmospheric, and Pressure Switches

Type 41A Single-ended, Gage
Type 42A Flow-through, Gage
Type 51A Single-ended, Absolute
Type 52A Flow-through, Absolute

Dimensional Drawing: Flow-Through

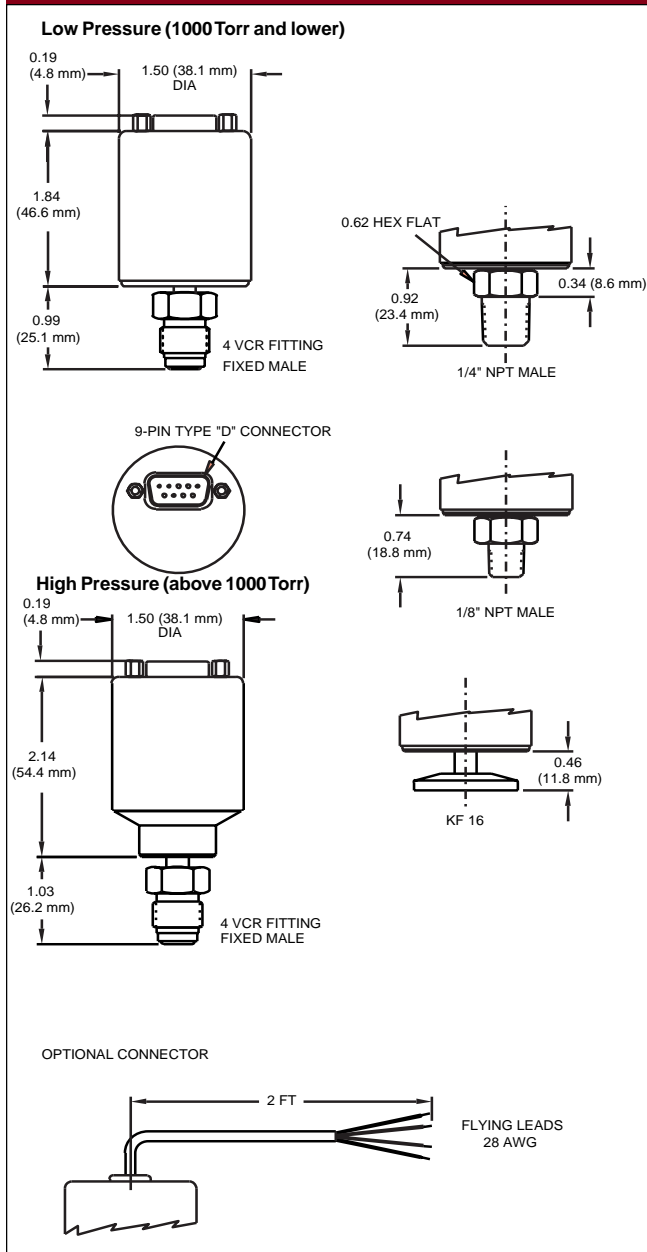


Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

Features and 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 repeatability: 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 ($2 \times$ F.S. or 45 psia, whichever is greater) for pressure cycling applications
- ☐ Fully CE Compliant to EMC Directive 89/336/EEC, relays are UL and CSA approved

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	

Description

The MKS Types 41, 42, 51 and 52 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 Type 41/42 switches reference atmosphere while the Type 51/52 switches reference vacuum. The Type 41/42 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 51/52 switches include soft pumping, gas box switching, and safety interlocks.

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

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.
Response Time	< 20 msec
Materials Exposed to Process Gases max. optional)	Inconel and 316L S.S. 10 µRa max. on switches with Swagelok VCR® fittings (5 µRa
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 Type 42/52 Type 41/51	4 VCR male 4 VCR male, NW 16 KF, 1/8 NPT, 1/4 NPT
Electromagnetic Compatibility	Fully CE Compliant to EMC Directive 89/336/EEC when used with an overall metal braided shielded cable, properly grounded at both ends (flying leads are already shielded but must be properly grounded at user's end to comply)

Specifications are subject to change without notice.
 Baratron® is a registered trademark of MKS Instruments, Inc., Andover, MA.
 Inconel® is a registered trademark of Inco Alloys International, Huntington, WV.
 Swagelok®, VCR®, VCO® are registered trademarks of Swagelok Marketing Co., Solon, OH.

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

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.

Type 41, 42, 51 and 52 Unheated Vacuum/Pressure Switch

Ordering Information

model number example:

41A	11T	CA	1	A	A	005
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Type Numbers

Ordering Code

Single-ended gage	41A
Flow-through gage	42A
Single-ended absolute	51A
Flow-through absolute	52A

Full Scale Ranges Available (Contact Applications Engineering for other engineering units)

10 Torr	Type 41/51 only	11T
30 Torr		31T
100 Torr		12T
500 Torr		52T
1000 Torr		13T
20 psi	Type 41/51 only	21P
50 psi		51P
100 psi		12P
250 psi		RDP
500 psi		52P

For Reverse Calibration only¹ (trip point below atmospheric pressure):

10 Torr	Type 41 only	11D
30 Torr		31D
100 Torr		12D
500 Torr		52D
1000 Torr		13D
20 psi	Type 41/42 only	21C
50 psi		51C
100 psi		12C
250 psi		RDC
500 psi		52C

Fittings

NW 16 KF	Type 41/51 only	GA
1/8 NPT male		FE
1/4 NPT male		FB
4 VCR fixed male		CA
4 VCR fixed male	Type 42/52 only	CH

Input Voltage

10-20 VDC	1
20-30 VDC	2

Relay Mode

Energizes with pressure above the set point	A
Energizes with pressure below the set point	B

Connector

9-pin Type "D" male	A
Flying leads - 2 ft. shielded cable	F

Trip Point²

Three digit value (in same units as F.S. ranges)	XXX (For reverse calibration, the trip point is given as value below atmosphere.)
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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.