41C, 42C, 51C, 52C

Pressure Switches

The 41C, 42C, 51C and 52C Vacuum and Atmospheric 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 41C and 42C models are referenced to atmospheric pressure, while the 51C and 52C products are referenced to vacuum. The 41C/42C 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 51C/52C switches include soft pumping, gas box switching, and safety interlocks.

Product Features

- Precise control for a wide variety of production applications including semiconductor processing tools, high vacuum pumps, compressors, blowers, medical equipment and machine tools
- 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
- Rugged high overpressure rating (2 × Full Scale or 45 psia, whichever is greater) for pressure cycling applications

Key Benefits

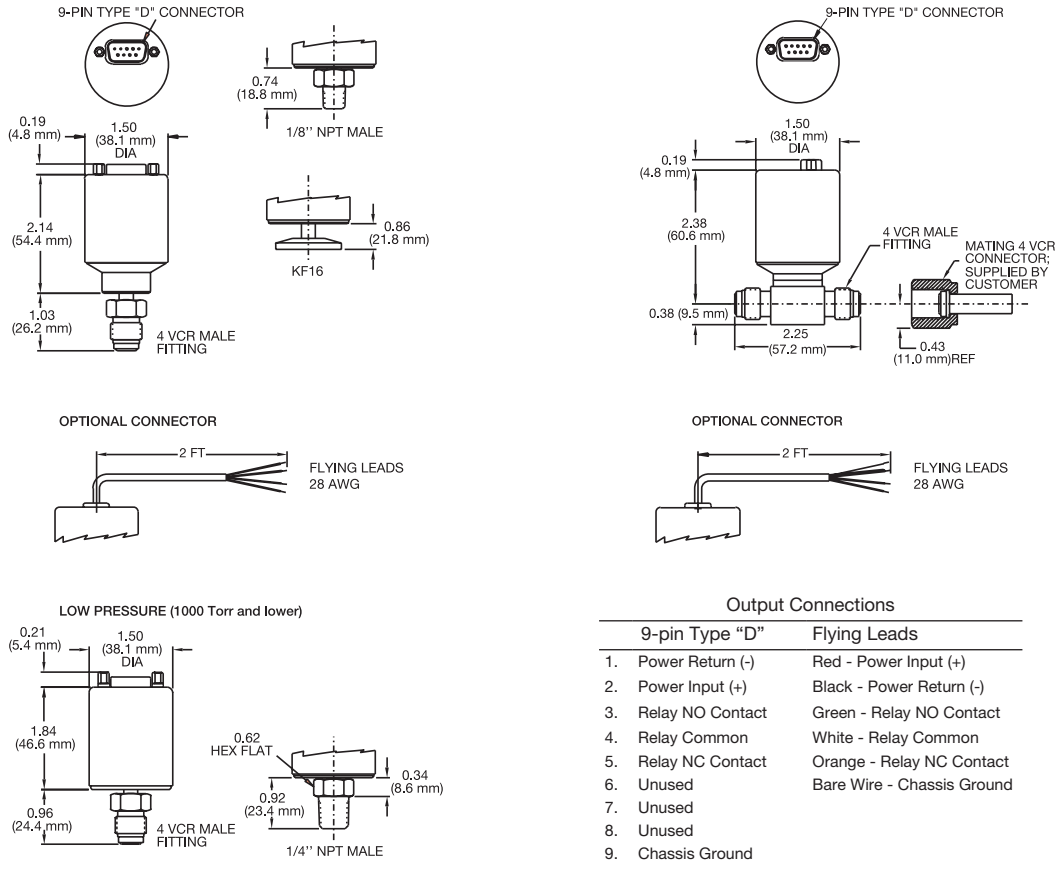
- Provides high reliability which reduces downtime and lowers the cost of ownership
- Superb set point accuracy and repeatability: 0.5% of Full Scale increases process control
- Fast response switching: 20 msec
- Excellent long term stability

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



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	

Dimensional Drawings

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

Specifications	
Full Scale Pressure 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 Full Scale
Accuracy*	±0.5% of Full Scale (±temperature coefficient)
Temperature Coefficient*	±0.07% of Full Scale/°C
Ambient Operating Temperature	0° to 50°C
Trip Point Dead Band	±3% of Full Scale (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 × Full Scale 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 **42C/52C** **41C/51C**	 4 VCR® male 4 VCR male and female, NW 16 KF, 1/8'' male NPT, 1/4'' male NPT
Compliance	CE, UL recognized* (cULus E520864), EN/IEC CB Approved to all National Deviations *standard MKS part numbers only

*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 Code Example: 41C11TCA1AA005 41C, 42C, 51C, 52C Unheated Vacuum/Pressure Switch	Code	Configuration
Model		
Single-ended gauge Flow-through gauge Single-ended absolute Flow-through absolute	41C 42C 51C 52C	41C
Full Scale Ranges Available (Contact Applications Engineering for other engineering units)		
10 Torr 30 Torr 100 Torr 500 Torr — 41C/51C only 1000 Torr 20 psi 50 psi 100 psi 250 psi 500 psi	11T 31T 12T 52T 13T 21P 51P 12P RDP 52P	11T
For Reverse Calibration only1 (trip point below atmospheric pressure): 10 Torr 30 Torr 100 Torr 500 Torr — 41C only 1000 Torr 20 psi 50 psi 100 psi 250 psi 500 psi — 41C/42C only	11D 31D 12D 52D 13D 21C 51C 12C RDC 52C	
Fittings		
NW 16 KF 1/8 NPT male 1/4 NPT male 4 VCR fixed male 4 VCR female — 41C/51C only 4 VCR fixed male — 42C/52C only	GA FE FB CA CD CH	CA
Input/Output		
10-20 VDC 20-30 VDC	1 2	1
Relay Mode		
Energizes with pressure above the set point Energizes with pressure below the set point	A B	A
Connector		
9-pin Type “D” male Flying leads - 2 ft. shielded cable	A F	A
Trip Point[2]		
Three digit value (in same units as Full Scale 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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41C, 42C, 51C, 52C_03/23