

Atomic Layer Deposition Diaphragm Valves

ALD Series

Introduction

Atomic Layer Deposition (ALD) is a technique that deposits materials in the form of one atomic layer at a time on the substrate surface. FITOK ALD Series Atomic Layer Deposition Diaphragm Valves are ideal for the ALD process, delivering precise doses of gas during semiconductor chip manufacturing. These valves ensure the uniform gas deposition required for advanced technology.

Features

- ⦿ Ultra long cycle life
- ⦿ No dead space in the flow path
- ⦿ High Cv consistency and stability
- ⦿ Quick response to offer a total opening / closing response time of less than 15 ms
- ⦿ Standard and thermal types optional, the thermal type has a working temperature up to 392 °F (200 °C)
- ⦿ For the valve fitted with a solenoid valve, the solenoid valve is circularly rotatable along the actuator for easy position adjustment

Technical Data

Port Size		1/4" to 3/8", 6 mm to 8 mm or 1.125" to 1.5"	3/8" to 1/2", 10 mm to 12 mm or 1.5"
Flow Coefficient (Cv)		0.27 ^①	0.62 ^①
Orifice Size		0.16" (4.1 mm)	0.23" (5.9 mm)
Working Pressure		Vacuum to 145 psig (10 bar)	
Actuator Operating Pressure		60 ~ 90 psig (4.2 ~ 6.2 bar)	
Temperature	Body	Standard model: 32 ~ 248 °F (0 ~ 120 °C)	
		Thermal model: 32 ~ 392 °F (0 ~ 200 °C)	
	Actuator	32 ~ 248 °F (0 ~ 120 °C)	
	Solenoid Valve	-0.4 ~ 122 °F (-18 ~ 50 °C)	
Leak Rate (Helium)	Sensor	-13 ~ 158 °F (-25 ~ 70 °C)	
	Internal	≤1×10 ⁻⁹ std cm ³ /s	≤1×10 ⁻⁸ std cm ³ /s
		≤1×10 ⁻⁹ std cm ³ /s	≤1×10 ⁻⁹ std cm ³ /s

① The shown Cv is at normal temperature and is adjustable before shipment.
Cv may fluctuate due to temperature variations. For more details, please contact FITOK.



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Flow Data

Air @ 70 °F (21 °C) Water @ 60 °F (16 °C)

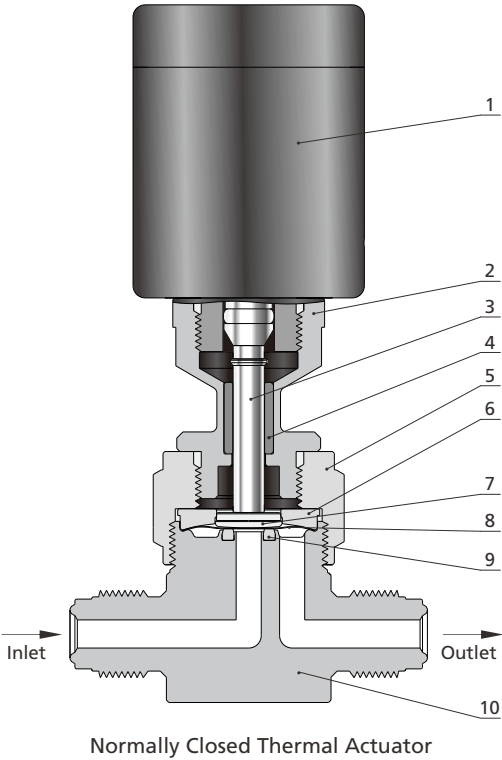
Orifice Size in. (mm)	Pressure Drop to Atmosphere psig (bar)	Air (l/min)	Water (l/min)
0.16 (4.1)	10 (0.68)	86	3.2
	50 (3.4)	230	7.2
	100 (6.8)	410	10.2
0.23 (5.9)	10 (0.68)	199	7.4
	50 (3.4)	530	16.6
	100 (6.8)	945	23.6

Process Specification

Process Specification	
Item	Ultra High Purity Process (FC-03)
Material	316L SS, 316L SS VAR
Wetted Surface Roughness	Ra 5 µin. (0.13 µm)
Polishing Process	Electropolished
Cleaning	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	ISO Class 4 (FS 209E Class 10 equivalent) cleanroom
Packaging	Double bagged in cleanroom

Notes: Refer to page P-01 for a detailed description of Process Specification.

Major Materials of Construction



Item	Component	Material/Specification
1	Actuator	Aluminum
2	Thermal Isolation Coupling Housing (Thermal Model Only)	316 SS/ASTM A479
3	Thermal Isolation Coupling Stem (Thermal Model Only)	S17400/ASTM A564
4	Guide (Thermal Model Only)	PTFE/ASTM D1710
5	Bonnet Nut	316 SS/ASTM A479
6	Bonnet	S17400/ASTM A564
7	Button	316 SS/ASTM A479
8	Diaphragm	Cobalt Alloy/AMS 5876
9	Seat	PFA/ASTM D3307
10	Body	316L SS or 316L SS VAR

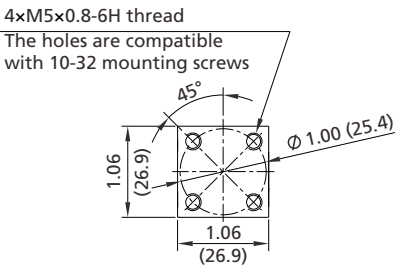
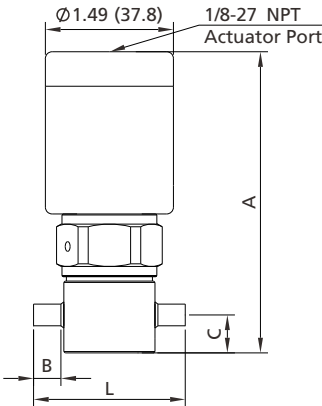
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Dimensions and Ordering Information

Dimensions, in inches (millimeters), are for reference only.

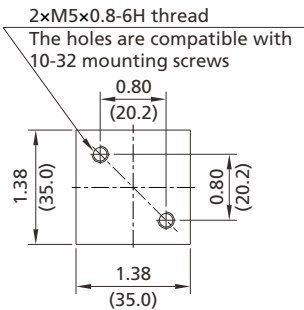
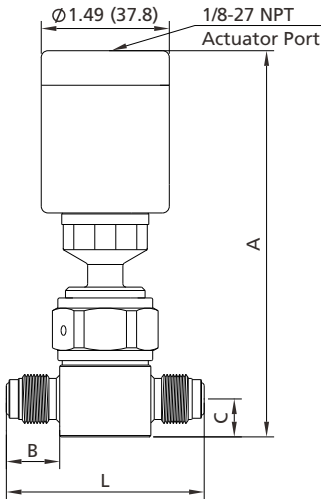
2-Port Valves

Standard Model



Orifice 0.16 in. (4.1 mm) Bottom

Thermal Model



Orifice 0.23 in. (5.9 mm) Bottom

Orifice Size in. (mm)	Cv	Valve Type	Basic Ordering Number	Connection Type and Size	Dimensions, in. (mm)				
					A	B	C	L	
0.16 (4.1)	0.27	Standard	ALD□□-TB4-4-	1/4"x0.035" Tube Butt Weld	3.50 (88.9)	0.30 (7.6)	0.44 (11.2)	1.74 (44.2)	
			ALD□□-TB6-4-	3/8"x0.035" Tube Butt Weld		0.26 (6.6)			
			ALD□□-FFR4-4-	1/4" Rotatable Female FR Metal Gasket Face Seal Fitting		0.86 (21.8)		2.78 (70.6)	
			ALD□□-RFR4-4-	1/4" Rotatable Male FR Metal Gasket Face Seal Fitting					
			ALD□□-FR4-4-	1/4" Integral Male FR Metal Gasket Face Seal Fitting				2.30 (58.4)	
		Thermal	ALD□□-TB4-4-HT-	1/4"x0.035" Tube Butt Weld	4.50 (114.0)	0.30 (7.6)	0.44 (11.2)	1.74 (44.2)	
			ALD□□-TB6-4-HT-	3/8"x0.035" Tube Butt Weld		0.26 (6.6)			
			ALD□□-FFR4-4-HT-	1/4" Rotatable Female FR Metal Gasket Face Seal Fitting		0.86 (21.8)		2.78 (70.6)	
			ALD□□-RFR4-4-HT-	1/4" Rotatable Male FR Metal Gasket Face Seal Fitting					
			ALD□□-FR4-4-HT-	1/4" Integral Male FR Metal Gasket Face Seal Fitting				2.30 (58.4)	
0.23 (5.9)	0.62	Standard	ALD□□-TB6-6-	3/8"x0.035" Tube Butt Weld	3.66 (93)	0.67 (17.0)	0.50 (12.7)	2.72 (69.0)	
			ALD□□-TB8-6-	1/2"x0.049" Tube Butt Weld		0.94 (24.0)		3.27 (83.0)	
			ALD□□-FFR8-6-	1/2" Rotatable Female FR Metal Gasket Face Seal Fitting					
			ALD□□-RFR8-6-	1/2" Rotatable Male FR Metal Gasket Face Seal Fitting					
			ALD□□-FR8-6-	1/2" Integral Male FR Metal Gasket Face Seal Fitting		0.81 (20.6)		3.00 (76.2)	
		Thermal	ALD□□-TB6-6-HT-	3/8"x0.035" Tube Butt Weld	4.65 (118.1)	0.67 (17.0)	0.50 (12.7)	2.72 (69.0)	
			ALD□□-TB8-6-HT-	1/2"x0.049" Tube Butt Weld		0.94 (24.0)		3.27 (83.0)	
			ALD□□-FFR8-6-HT-	1/2" Rotatable Female FR Metal Gasket Face Seal Fitting					
			ALD□□-RFR8-6-HT-	1/2" Rotatable Male FR Metal Gasket Face Seal Fitting				4.06 (103.0)	
			ALD□□-FR8-6-HT-	1/2" Integral Male FR Metal Gasket Face Seal Fitting		0.81 (20.6)		3.00 (76.2)	

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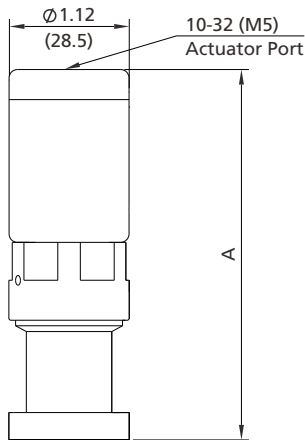
Integrated Systems

Other Products

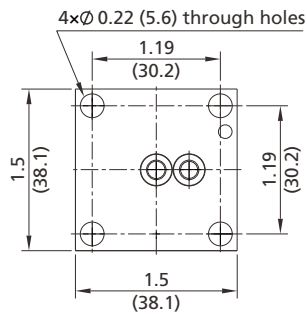
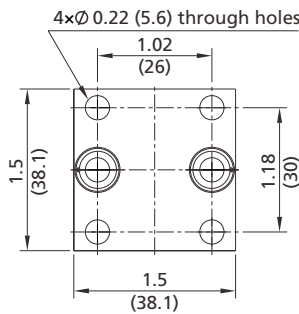
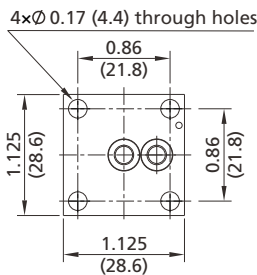
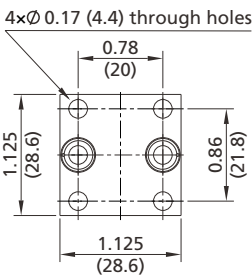
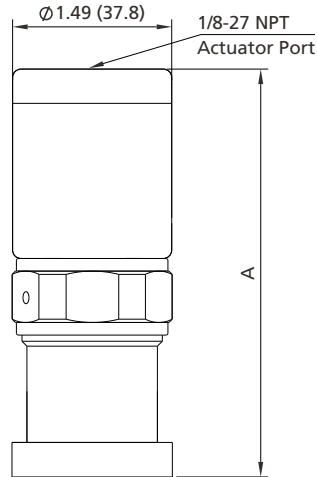
Technical Information

Modular Surface-Mount Valves

1.125" Surface-Mount



1.5" Surface-Mount



1.125" W-Seal Bottom

1.125" C-Seal Bottom

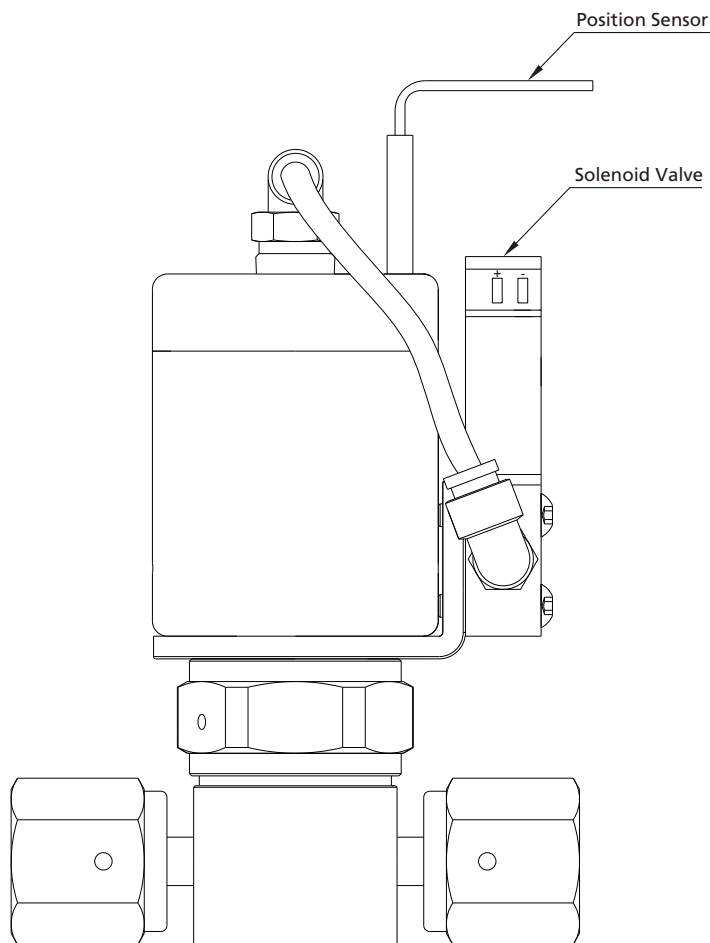
1.5" W-Seal Bottom

1.5" C-Seal Bottom

Orifice Size in. (mm)	Cv	Valve Type	Basic Ordering Number	Connection Type and Size	Dimension, in. (mm)
					A
0.16 (4.1)	0.27	Standard	ALD□□-WS11-4-	1.125" W-Seal	3.40 (86.4)
			ALD□□-CS11-4-	1.125" C-Seal	
			ALD□□-WS15-4-	1.5" W-Seal	3.70 (94.0)
			ALD□□-CS15-4-	1.5" C-Seal	
		Thermal	ALD□□-WS11-4-HT-	1.125" W-Seal	4.39 (111.5)
			ALD□□-CS11-4-HT-	1.125" C-Seal	
			ALD□□-WS15-4-HT-	1.5" W-Seal	4.69 (119.1)
			ALD□□-CS15-4-HT-	1.5" C-Seal	
0.23 (5.9)	0.62	Standard	ALD□□-CS15-HF-6-	1.5" C-Seal (High Flow)	3.81 (96.9)
		Thermal	ALD□□-CS15-HF-6-HT-	1.5" C-Seal (High Flow)	4.80 (122.0)

Options and Accessories

Position sensors and solenoid valves are optional. Valve bodies can be equipped with heater cartridge and thermocouple holes.



Normally Closed Standard Actuator

Position Sensors

Transmit a signal to an electrical device indicating the open and closed position of pneumatically actuated valves

Technical Information

Output		3-wire V (dc), PNP
Output Function		Normally open or normally closed
Voltage		10 ~ 30 V (dc)
Operating Temperature		-13 ~ 158 °F (-25 ~ 70 °C)
Electrical Connection	Standard Sensor	Grey cable with a diameter of 3.3 mm and a length of 2 m
	Explosion-Proof Sensor	Blue cable with a diameter of 3.0 mm and a length of 2 m

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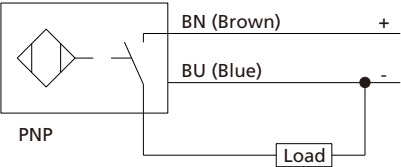
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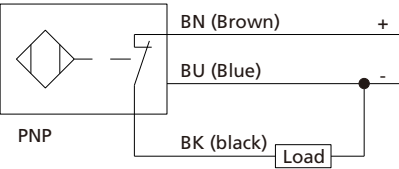
V-11 Diaphragm Valves

Wiring Diagram

Normally Open Position Sensor



Normally Closed Position Sensor



Note: For normally closed pneumatic actuator valves, when fitted with normally open sensors, the sensors transmit signals with indicators illuminated when the valves are open. Conversely, when fitted with normally closed sensors, the sensors transmit signals with indicators illuminated when the valves are closed.

Solenoid Valve Assemblies

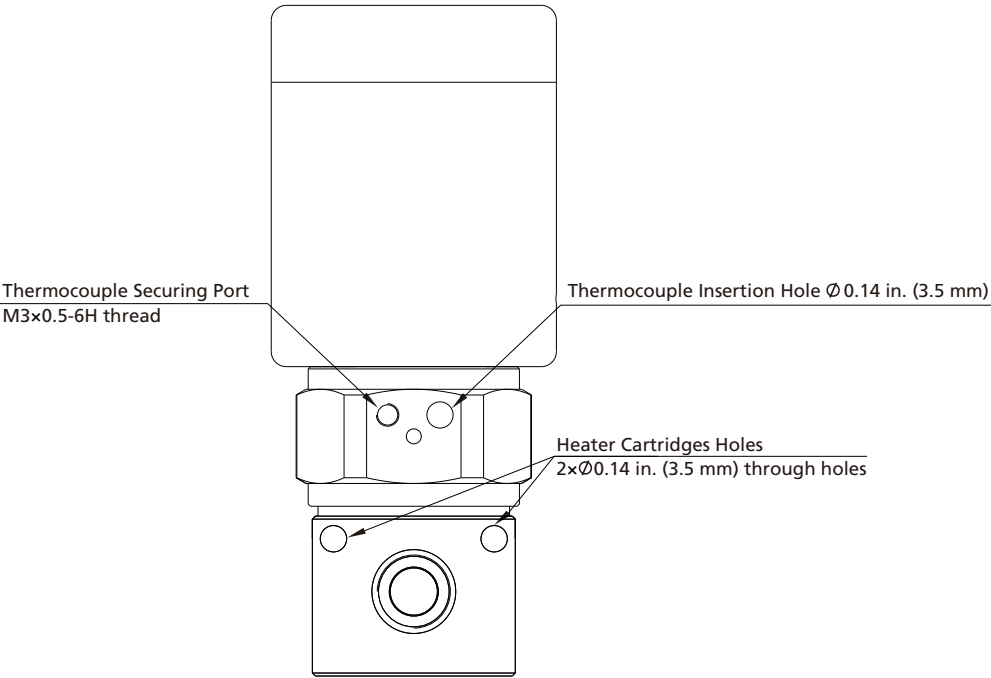
With fast-acting and high-flow features, the solenoid valve reduces overall response time. The solenoid valve assembly includes tubing, fittings, and a rotatable mounting bracket, offering flexibility for adjusting the solenoid valve position.

Technical Information

Solenoid Valve	Voltage/Power	24 V (dc)/4.0 W
	Electrical Connection	Black cable with a diameter of 1.6 mm and a length of 0.45 m
	Temperature Range	-0.4 ~ 122 °F (-18 ~ 50 °C)
	Port	M5×0.8-6H thread, compatible with 10-32 screws
Fitting	Material	316 SS
Tubing		Polyurethane
Bracket		304 SS
O-Ring		Fluorocarbon FKM

Heater Cartridge and Thermocouple Insertion Hole

Heater cartridges holes: 2-port and 3-port modular surface-mounted valves have 1 Hole, while other 2-port valves feature 2 Holes. Thermocouple Insertion Hole: 2-port and 3-port valves have 1 Thermocouple Insertion Hole and 1 Thermocouple Securing Port.



Normally Closed Standard Actuator

ALD6LV - FR4 - 4 - HT - 3P - CF3MOVBC

Body Material		Port Type		Port Size		Orifice Size		Valve Type		Ports		Actuator Type		Position Sensor		Process Specification		Accessory		Heater Cartridge Holes and Thermocouple Holes	
6L	316L SS	TB	Fractional Tube Butt Weld	4	1/4" or 1/4"x0.035"	4	0.16" (4.1 mm)					C	Normally Closed		None						
6LV	316L SS VAR	MTB	Metric Tube Butt Weld	6	6 mm or 3/8"x0.035"	6	0.23" (5.9 mm)					O	Normally Open	MO	Normally Open Position Sensor						
		FR	Integral Male FR Metal Gasket Face Seal Fitting	8	8 mm or 1/2"x0.049"									MC	Normally Closed Position Sensor						
		FFR	Rotatable Female FR Metal Gasket Face Seal Fitting	10	10 mm				Standard							Note: MO and MC sensors are only applicable to normally closed pneumatically actuated valves					
		RFR	Rotatable Male FR Metal Gasket Face Seal Fitting	12	12 mm			HT	Thermal												
		WS	W-Seal	11	1.125"																
		CS	C-Seal	15	1.5"																
				-HF	High Flow	3P	3-Port														

Note: 3P applies only to valves with W/C sealed ports.

