

# BUTTERFLY VALVE

Lug or Wafer, EPDM or PTFE, Electric or Pneumatic Actuators

MODEL CHART						
Size	Cv (gal/min)	Popular Hand Operated Model	Popular Double Acting Pneumatic Model	Popular Spring Return Pneumatic Model	NEMA 4X Two-Position Electric (110 VAC) Model	NEMA 4X Modulating Electric (110 VAC) Model
2"	135	WE20-AHD00-WE	WE20-ADA03-WE	WE20-ASR04-WE	WE20-ATD02-WE-A	WE20-AMD02-WE-A
2-1/2"	220	WE20-BHD00-WE	WE20-BDA03-WE	WE20-BSR04-WE	WE20-BTD02-WE-A	WE20-BMD02-WE-A
3"	302	WE20-CHD00-WE	WE20-CDA04-WE	WE20-CSR06-WE	WE20-CTD02-WE-A	WE20-CMD02-WE-A
4"	600	WE20-DHD00-WE	WE20-DDA05-WE	WE20-DSR07-WE	WE20-DTD03-WE-A	WE20-DMD03-WE-A
5"	1022	WE20-EHD00-WE	WE20-EDA06-WE	WE20-ESR08-WE	WE20-ETD04-WE-A	WE20-EMD04-WE-A
6"	1579	WE20-FHD00-WE	WE20-FDA07-WE	WE20-FSR09-WE	WE20-FTD04-WE-A	WE20-FMD04-WE-A
8"	3136	WE20-GHD00-WE	WE20-GDA08-WE	WE20-GSR10-WE	WE20-GTD05-WE-A	WE20-GMD05-WE-A
10"	5340	WE20-HHD00-WE	WE20-HDA09-WE	WE20-HSR11-WE	WE20-HTD06-WE-A	WE20-HMD06-WE-A
12"	8250	WE20-IHD00-WE	WE20-IDA11-WE	WE20-ISR11-WE	WE20-ITD07-WE-A	WE20-IMD07-WE-A

MODEL CHART - HAND OPERATED & PNEUMATIC ACTUATOR									
Example	WE20	-BSR04	-WE	-A	A	00	WE20-BSR04-WE-AA00		
Series	WE20						Butterfly valve		
Size and Actuator		AHD00 BHD00 CHD00 DHD00 EHD00 FHD00 GHD00 HHD00 IHD00 ADA03 BDA03 CDA04 DDA05 EDA06 FDA07 GDA08 HDA09 IDA11 ASR04 BSR04 CSR06 DSR07 ESR08 FSR09 GSR10 HSR11 ISR11					2" hand operated 2-1/2" hand operated 3" hand operated 4" hand operated 5" hand operated 6" hand operated 8" hand operated 10" hand operated 12" hand operated 2" double acting 2-1/2" double acting 3" double acting 4" double acting 5" double acting 6" double acting 8" double acting 10" double acting 12" double acting 2" spring return 2-1/2" spring return 3" spring return 4" spring return 5" spring return 6" spring return 8" spring return 10" spring return 12" spring return		
Body Type /Liner			WE WP LE LP				Wafer-EPDM Wafer-PTFE Lug-EPDM Lug-PTFE		
Solenoid				N A			No solenoid NEMA 4X NAMUR solenoid		
Solenoid Voltage					N A B C D E		No solenoid 120 VAC 220 VAC 24 VAC 24 VDC 12 VDC		
Positioner and Switches						00 01 02 03 04 06 07 08 09	None 42AD0 exp limit switch 45VD0 exp position transmitter 42AD0-B ATEX limit switch 42AD0-IE IECEx limit switch QV-210101 poly limit switch VPS and P1 prox switch 265ER-D5 positioner 285ER-D5 smart positioner		
Options							NO	Fail open spring return actuator	

MODEL CHART - ELECTRIC ACTUATOR					
Example	WE20	-DMH05	-WE	-A	WE20-DMH05-WE-A
Series	WE20				Butterfly valve
Size and Actuator		ATD02 BTD02 CTD02 DTD03 ETD04 FTD04 GTD05 HTD06 ITD07 AMD02 BMD02 CMD02 DMD03 EMD04 FMD04 GMD05 HMD06 IMD07 ATH03 BTH03 CTH05 DTH05 ETH06 FTH08 GTH09 HTH10 ITH11 AMH03 BMH03 CMH05 DMH05 EMH06 FMH08 GMH09 HMH10 IMH11			2" NEMA 4X two-position 2-1/2" NEMA 4X two-position 3" NEMA 4X two-position 4" NEMA 4X two-position 5" NEMA 4X two-position 6" NEMA 4X two-position 8" NEMA 4X two-position 10" NEMA 4X two-position 12" NEMA 4X two-position 2" NEMA 4X modulating 2-1/2" NEMA 4X modulating 3" NEMA 4X modulating 4" NEMA 4X modulating 5" NEMA 4X modulating 6" NEMA 4X modulating 8" NEMA 4X modulating 10" NEMA 4X modulating 12" NEMA 4X modulating 2" exp two-position 2-1/2" exp two-position 3" exp two-position 4" exp two-position 5" exp two-position 6" exp two-position 8" exp two-position 10" exp two-position 12" exp two-position 2" exp electric modulating 2-1/2" exp electric modulating 3" exp electric modulating 4" exp electric modulating 5" exp electric modulating 6" exp electric modulating 8" exp electric modulating 10" exp electric modulating 12" exp electric modulating
Material/ Liner			WE WP LE LP		Wafer-EPDM Wafer-PTFE Lug-EPDM Lug-PTFE
Actuator Voltage				A B C D	110 VAC 220 VAC 24 VAC 24 VDC

ACCESSORIES	
Model	Description
R2-2120	Air regulator
AFR4	Air filter regulator 0 to 120 psi
VB-01	Volume booster

# PNEUMATIC AND ELECTRIC ACTUATORS

## Actuators for Valve and Damper Automation



ACT-SR03



ACT-TD01-110VAC



ACT-MI02-110VAC

The W.E. Anderson **SERIES ACT** Actuators are available in either pneumatic or electric models. The wide range of torques and voltages means there is an actuator for almost any application. The standard ISO 5211 mounting configuration makes installation to any valve or damper quick and simple.

W.E. Anderson pneumatic ACT models are a compact rack-and-pinion design with a symmetrical structure that ensures fast and steady action, high precision and high output power. The corrosion resistant anodized aluminum body is designed to withstand the harsh and abusive industrial environments and provide reliable service. We offer double acting and spring return models in a variety of sizes to fit any application.

W.E. Anderson electric ACT models are available in two-position or modulating configurations and NEMA 4X or NEMA 7 rated enclosures. All electric actuators utilize a high grade powder coated aluminum enclosure with visual indicators. The two-position models come standard with two auxiliary switches, and modulating models offer an output for position monitoring. Certain models are equipped with manual overrides allowing the operator to cycle the valve manually for installation or maintenance checks.

### FEATURES/BENEFITS

- ISO 5211 Mounting configuration for easy installation
- Pneumatic actuators offer corrosion resistance anodized finish
- NAMUR mounting configuration on pneumatic actuators
- Two-position electric actuators include auxiliary limit switches
- Modulating electric actuators offer an output for position monitoring

### APPLICATION

- Designed for quarter turn valve or damper control

### SPECIFICATIONS

**Pneumatic "DA" and "SR" Series Type:** DA series is double-acting and SR series is spring return (rack and pinion).

**Normal Supply Pressure:** DA: 40 to 115 psi (2.7 to 7.9 bar); SR: 80 psi (5.5 bar).

**Maximum Supply Pressure:** 120 psi (8.6 bar).

**Air Connections:** DA01: 1/8" female NPT; DA02 to DA14: 1/4" female NPT; SR02 to SR14: 1/4" female NPT.

**Housing Material:** Anodized aluminum body and epoxy coated aluminum end caps.

**Temperature Limits:** -40 to 176°F (-40 to 80°C).

**Accessory Mounting:** NAMUR standard.

### Electric "TD" and "MD" Series

**Power Requirements:** 110 VAC, 220 VAC, 24 VAC or 24 VDC (MD models not available in 24 VDC).

**Power Consumption:** See manual.

**Cycle Time (per 90°):** TD01: 4 s; MD01: 10 s; TD02 and MD02: 20 s; TD03 and MD03: 30 s; TD04 and MD04: 30 s; TD05 and MD05: 30 s; TD06 and MD06: 45 s; TD07 and MD07: 45 s.

**Duty Rating:** 85%.

**Enclosure Rating:** NEMA 4X (IP67).

**Housing Material:** Powder coated aluminum.

**Temperature Limits:** -22 to 140°F (-30 to 60°C).

**Electrical Connection:** 1/2" female NPT.

**Modulating Input:** 4 to 20 mA.

**Standard Features:** Manual override, position indicator, and TD models come with two limit switches.

### Electric "TI" and "MI" Series

**Power Requirements:** 110 VAC, 220 VAC, 24 VAC or 24 VDC.

**Power Consumption:** See instruction manual.

**Cycle Time (per 90°):** See instruction manual.

**Duty Rating:** See instruction manual.

**Enclosure Rating:** NEMA 7.

**Housing Material:** Powder coated aluminum.

**Temperature Limits:** -40 to 140°F (-40 to 60°C).

**Electrical Connection:** 1/2" female NPT.

**Modulating Input:** 4 to 20 mA.

**Standard Features:** Position indicator and two limit switches.

# PNEUMATIC AND ELECTRIC ACTUATORS

Actuators for Valve and Damper Automation

MODEL CHART			
Pneumatic Model	Description	Electric Model	Description
ACT-DA01	Double acting pneumatic actuator, 98 in-lb	ACT-TD01-110VAC	Electric two-position, 177 in-lb, 110 VAC
ACT-DA02	Double acting pneumatic actuator, 207 in-lb	ACT-TD02-110VAC	Electric two-position, 442 in-lb, 110 VAC
ACT-DA03	Double acting pneumatic actuator, 365 in-lb	ACT-TD03-110VAC	Electric two-position, 885 in-lb, 110 VAC
ACT-DA04	Double acting pneumatic actuator, 603 in-lb	ACT-TD04-110VAC	Electric two-position, 1770 in-lb, 110 VAC
ACT-DA05	Double acting pneumatic actuator, 792 in-lb	ACT-TD05-110VAC	Electric two-position, 3540 in-lb, 110 VAC
ACT-DA06	Double acting pneumatic actuator, 1135 in-lb	ACT-TD06-110VAC	Electric two-position, 8850 in-lb, 110 VAC
ACT-DA07	Double acting pneumatic actuator, 1690 in-lb	ACT-MD01-110VAC	Electric modulating, 265 in-lb, 110 VAC
ACT-DA08	Double acting pneumatic actuator, 2993 in-lb	ACT-MD02-110VAC	Electric modulating, 442 in-lb, 110 VAC
ACT-DA09	Double acting pneumatic actuator, 4506 in-lb	ACT-MD03-110VAC	Electric modulating, 885 in-lb, 110 VAC
ACT-DA10	Double acting pneumatic actuator, 6866 in-lb	ACT-MD04-110VAC	Electric modulating, 1770 in-lb, 110 VAC
ACT-DA11	Double acting pneumatic actuator, 11065 in-lb	ACT-MD05-110VAC	Electric modulating, 3540 in-lb, 110 VAC
ACT-DA12	Double acting pneumatic actuator, 15207 in-lb	ACT-MD06-110VAC	Electric modulating, 8850 in-lb, 110 VAC
ACT-DA13	Double acting pneumatic actuator, 23834 in-lb	ACT-TI01-110VAC	EXP electric two-position, 100 in-lb, 110 VAC
ACT-DA14	Double acting pneumatic actuator, 33516 in-lb	ACT-TI02-110VAC	EXP electric two-position, 200 in-lb, 110 VAC
ACT-SR02	Spring return pneumatic actuator, 95 in-lb	ACT-TI03-110VAC	EXP electric two-position, 300 in-lb, 110 VAC
ACT-SR03	Spring return pneumatic actuator, 176 in-lb	ACT-TI04-110VAC	EXP electric two-position, 400 in-lb, 110 VAC
ACT-SR04	Spring return pneumatic actuator, 274 in-lb	ACT-TI05-110VAC	EXP electric two-position, 675 in-lb, 110 VAC
ACT-SR05	Spring return pneumatic actuator, 381 in-lb	ACT-TI06-110VAC	EXP electric two-position, 1000 in-lb, 110 VAC
ACT-SR06	Spring return pneumatic actuator, 536 in-lb	ACT-TI07-110VAC	EXP electric two-position, 1500 in-lb, 110 VAC
ACT-SR07	Spring return pneumatic actuator, 815 in-lb	ACT-TI08-110VAC	EXP electric two-position, 2000 in-lb, 110 VAC
ACT-SR08	Spring return pneumatic actuator, 1411 in-lb	ACT-TI09-110VAC	EXP electric two-position, 3840 in-lb, 110 VAC
ACT-SR09	Spring return pneumatic actuator, 2460 in-lb	ACT-TI10-110VAC	EXP electric two-position, 5000 in-lb, 110 VAC
ACT-SR10	Spring return pneumatic actuator, 3733 in-lb	ACT-TI11-110VAC	EXP electric two-position, 7020 in-lb, 110 VAC
ACT-SR11	Spring return pneumatic actuator, 6166 in-lb	ACT-MI01-110VAC	EXP electric modulating, 100 in-lb, 110 VAC
ACT-SR12	Spring return pneumatic actuator, 5253 in-lb	ACT-MI02-110VAC	EXP electric modulating, 200 in-lb, 110 VAC
ACT-SR13	Spring return pneumatic actuator, 7923 in-lb	ACT-MI03-110VAC	EXP electric modulating, 300 in-lb, 110 VAC
ACT-SR14	Spring return pneumatic actuator, 9546 in-lb	ACT-MI04-110VAC	EXP electric modulating, 400 in-lb, 110 VAC
		ACT-MI05-110VAC	EXP electric modulating, 675 in-lb, 110 VAC
		ACT-MI06-110VAC	EXP electric modulating, 1000 in-lb, 110 VAC
		ACT-MI07-110VAC	EXP electric modulating, 1500 in-lb, 110 VAC
		ACT-MI08-110VAC	EXP electric modulating, 2000 in-lb, 110 VAC
		ACT-MI09-110VAC	EXP electric modulating, 3840 in-lb, 110 VAC
		ACT-MI10-110VAC	EXP electric modulating, 5000 in-lb, 110 VAC
		ACT-MI11-110VAC	EXP electric modulating, 7020 in-lb, 110 VAC

**Note:** Optional voltages available for the electric actuators. Change the -110 VAC to -220 VAC, 24 VDC or 24 VAC. The ACT-TD and ACT-MD are not available with 24 VAC.

MODEL CHART - DOUBLE ACTING ACTUATOR TORQUE										
Model	Double Acting Pneumatic Actuator Output Torque (in-lb)									
	Air Pressure									
	40 psi	50 psi	60 psi	70 psi	80 psi	90 psi	100 psi	110 psi	115 psi	
ACT-DA01	49	61	74	86	98	110	123	135	142	
ACT-DA02	104	130	155	181	207	233	259	285	300	
ACT-DA03	182	228	274	319	365	411	456	502	529	
ACT-DA04	302	377	453	528	603	679	754	830	875	
ACT-DA05	396	495	594	693	792	891	990	1089	1148	
ACT-DA06	567	709	851	993	1135	1277	1419	1561	1646	
ACT-DA07	845	1056	1267	1478	1690	1901	2112	2323	2450	
ACT-DA08	1497	1871	2245	2619	2993	3367	3742	4116	4340	
ACT-DA09	2253	2816	3379	3942	4506	5069	5632	6195	6533	
ACT-DA10	3433	4291	5149	6008	6866	7724	8582	9440	9955	
ACT-DA11	5532	6916	8299	9682	11065	12448	13831	15214	16044	
ACT-DA12	7603	9504	11405	13306	15207	17107	19008	20909	22050	
ACT-DA13	11917	14896	17875	20855	23834	26813	29792	32772	34559	
ACT-DA14	16758	20948	25137	29327	33516	37706	41896	46085	48599	

ACCESSORIES	
Models	Description
R2-2120	Air regulator
AFR4	Air filter regulator 0 to 120 psi
VB-01	Volume booster
SN-5A	5/2 NAMUR 110 VAC solenoid
SN-3A	3/2 NAMUR 110 VAC solenoid

MODEL CHART - SPRING RETURN ACTUATOR TORQUE															
Model	Spring Sets	Torque List of Spring Return Pneumatic Actuator (in-lb)													
		Spring Torque		Air Pressure											
				70 psi		80 psi		90 psi		100 psi		110 psi		115 psi	
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
ACT-SR02	10	69.9	95.5	111.4	85.8	137.3	111.7	163.2	137.6	189.1	163.5	215	189.4	230.6	204.9
ACT-SR03	10	120	176	199	143	245	189	291	235	336	280	382	326	409	353
ACT-SR04	10	180	274	348	254	424	330	499	405	575	481	650	556	695	601
ACT-SR05	10	263	381	430	312	529	411	628	510	727	609	826	708	885	767
ACT-SR06	10	385	536	608	458	750	599	891	741	1033	883	1175	1025	1260	1110
ACT-SR07	10	695	815	783	663	994	874	1206	1085	1417	1297	1628	1508	1755	1635
ACT-SR08	10	937	1411	1682	1208	2056	1583	2430	1957	2804	2331	3178	2705	3403	2930
ACT-SR09	10	1640	2460	2303	1483	2866	2046	3429	2609	3992	3173	4556	3736	4894	4074
ACT-SR10	10	2529	3733	3479	2274	4337	3133	5195	3991	6053	4849	6911	5707	7426	6222
ACT-SR11	10	4104	6166	5578	3516	6961	4899	8344	6282	9727	7665	11111	9048	11940	9878
ACT-SR12	10	5253	8258	8052	5048	9953	6948	11854	8849	13755	10750	15656	12651	16796	13791
ACT-SR13	10	7923	14103	12932	6752	15911	9731	18890	12710	21869	15690	24849	18669	26636	20456
ACT-SR14	10	9546	18350	19781	10977	23970	15167	28160	19357	32349	23546	36539	27736	39053	30249

# SELF-ACTING TEMPERATURE CONTROL VALVE

Requires No External Power



**SERIES 38R** Self-Acting Temperature Control Valves require no external power sources and are ideal for regulating the temperature of tanks, process streams and various types of industrial equipment. The actuators are made with a rugged die-cast aluminum housing with a fully enclosed bellow assembly and internal over-range protection. Valves are offered in 1/2" through 6" connection sizes and 1/8" through 6" port sizes. The valve bodies are available in single-seated direct or reverse-acting, double-seated direct or reverse-acting, and 3-way designs with four choices of body material: bronze, cast-iron, cast-steel, and 316 SS. Actuators are available with or without indicating dials or in Fail-Safe. Non-indicating actuators feature a lower profile and should be implemented where space constraints may be an issue while the indicating actuator allows the operator to verify the process temperature and aid in temperature adjustment. Fail-Safe actuators are designed to cause the valve to fail in the safe control position (open in cooling application, closed in a heating application) should some accidental damage occur to the terminal system, resulting in loss of pressure charge. Also available with the Series 38R are a wide range of capillaries, bulbs, and thermowells.

Please request a copy of our Valve Catalog, CT-VC, or visit our website at [www.dwyer-inst.com](http://www.dwyer-inst.com) to see full model information and ordering details for the Series 38R.

## FEATURES/BENEFITS

- Self-operated design
- Internal over range protection
- Heavy duty die cast aluminum actuator

## APPLICATIONS

- Temperature control without external power or control inputs

## SPECIFICATIONS

### VALVE BODY

**Service:** Compatible liquids, gases, and steam.

**Line Size:** 1/2" to 2".

**Body Style:** 2-way or 3-way.

**End Connections:** 1/2" to 2" female NPT.

**Pressure Limit:** 250 psi (17.2 bar).

**Wetted Materials:** Body material: Bronze or 316 SS; Trim: 316 SS; Packing: PTFE.

**Temperature Limits:** 410°F (210°C) @ 250 psi (17.24 bar).

### ACTUATOR

**Power Requirements:** Fully self-contained, no external power required.

**Indicator:** 3-1/2" dial thermometer, SS case, swivel and angle adjustable (available for indicating actuator only).

**Housing:** Die cast aluminum, epoxy powder coated blue finish.

**Set Point Scale:** Integral to housing.

**Bellows:** High-pressure brass, corrosion resistant, tinplated finish.

**Adjustment Screws:** Brass.

**Range Adjustment Spring:** Cadmium plated.

**Overrange Protection:** 100°F over upper range limit for temporary situations.

**Note:** See website for additional options.



# SELF-ACTING TEMPERATURE CONTROL VALVE

Requires No External Power

MODEL CHART									
Example	38R	-D00VA32	-1	01	36	2	-R09	38R-D00VA32-101362-R09	
Series	38R							Self-acting temperature control valve	
Valve		D00VA32 D01VA32 D02VA32 D03VA32 D04VA32 D05VA32 R00VA32 R01VA32 R02VA32 R03VA32 R04VA32 R05VA32 D00VA42 D01VA42 D02VA42 D03VA42 D04VA42 D05VA42 R00VA42 R01VA42 R02VA42 R03VA42 R04VA42 R05VA42 300WA31 301WA31 302WA31 303WA31 304WA31 305WA31 300WA41 301WA41 302WA41 303WA41 304WA41 305WA41							1/2" NPT single seat two-way bronze valve, direct acting 3/4" NPT single seat two-way bronze valve, direct acting 1" NPT single seat two-way bronze valve, direct acting 1-1/4" NPT single seat two-way bronze valve, direct acting 1-1/2" NPT single seat two-way bronze valve, direct acting 2" NPT single seat two-way bronze valve, direct acting 1/2" NPT single seat two-way bronze valve, reverse acting 3/4" NPT single seat two-way bronze valve, reverse acting 1" NPT single seat two-way bronze valve, reverse acting 1-1/4" NPT single seat two-way bronze valve, reverse acting 1-1/2" NPT single seat two-way bronze valve, reverse acting 2" NPT single seat two-way bronze valve, reverse acting 1/2" NPT single seat two-way 316 SS valve, direct acting 3/4" NPT single seat two-way 316 SS valve, direct acting 1" NPT single seat two-way 316 SS valve, direct acting 1-1/4" NPT single seat two-way 316 SS valve, direct acting 1-1/2" NPT single seat two-way 316 SS valve, direct acting 2" NPT single seat two-way 316 SS valve, direct acting 1/2" NPT single seat two-way 316 SS valve, reverse acting 3/4" NPT single seat two-way 316 SS valve, reverse acting 1" NPT single seat two-way 316 SS valve, reverse acting 1-1/4" NPT single seat two-way 316 SS valve, reverse acting 1-1/2" NPT single seat two-way 316 SS valve, reverse acting 2" NPT single seat two-way 316 SS valve, reverse acting 1/2" NPT three-way bronze valve 3/4" NPT three-way bronze valve 1" NPT three-way bronze valve 1-1/4" NPT three-way bronze valve 1-1/2" NPT three-way bronze valve 2" NPT three-way bronze valve 1/2" NPT three-way 316 SS valve 3/4" NPT three-way 316 SS valve 1" NPT three-way 316 SS valve 1-1/4" NPT three-way 316 SS valve 1-1/2" NPT three-way 316 SS valve 2" NPT three-way 316 SS valve
Actuator			1 2					Non-indicating actuator Indicating actuator	
Bulb and Capillary				01 02 03 04 05 06 07 08 09 10				Brass union connection 316 SS union connection Brass adjustable union connection 316SS adjustable union connection Brass plain bulb 316 SS plain bulb FEP Covered brass bulb FEP Covered 316 SS bulb Brass union with stainless steel spiral armor 316 SS union with stainless steel spiral armor	
Capillary Length					36			Capillary length in feet. Example 36 is 36' length	
Thermowell						0 1 2		No thermowell 316 SS thermowell, 1-1/4" external connection Brass thermowell, 1-1/4" external connection	
Temperature Range							R03 R04 R05 R06 R07 R09 R10 R11 R12 R13 R14	30 to 115°F (-1 to 46°C) 50 to 140°F (10 to 60°C) 75 to 165°F (24 to 74°C) 105 to 195°F (41 to 91°C) 125 to 215°F (52 to 102°C) 155 to 250°F (68 to 121°C) 200 to 280°F (93 to 138°C) 225 to 315°F (107 to 157°C) 255 to 370°F (124 to 188°C) 295 to 420°F (146 to 216°C) 310 to 440°F (154 to 227°C)	

# HI-FLOW™ CONTROL VALVES

Globe Valves, Ideal for Steam and Water Flow Control, 1/2" to 2-1/2" Sizes, 2-Way or 3-Way



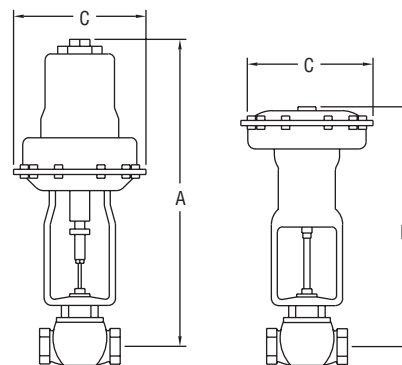
2-way with positioner



2-way with air-to-close actuator



2-way with air-to-open actuator



**HI-FLOW™** control valves are single seated, top or cage guided globe valves - probably the simplest, from a construction standpoint, yet most versatile control valve in use. The Hi-Flow™ valve can fit applications with a smaller size valve since the valve has a greater flow capacity than most conventional valves of the same size. Coupled with the high flow capacity, the Hi-Flow™ valve maintains a wide rangeability of 50:1 to insure precise control. Heavy duty Hi-Flow™ valves are ruggedly constructed of the highest quality materials, precision machined, and performance tested to assure years of trouble free service. Standard packing consists of PTFE V-rings and wiper to minimize friction without leakage at high operating pressures. Available in brass, iron, or 316 SS body, trim is 316 SS with all welded plug construction to provide superior durability and corrosion resistance.

## FEATURES/BENEFITS

- Wide rangeability of 50:1
- Exceptional shut-off and leak rate that meets ANSI/FCI 70-2 Class IV (0.01% of Cv in the closed position)
- Selectable fail safe condition with Air-to-Raise or Air-to-Lower actuators and Push-to-Open or Push-to-Close valve bodies
- Linear or equal percentage flow characteristics
- Low flow options of restricted trim or needle plug
- Removable and replaceable seat ring

## APPLICATIONS

- Flow control, mixing, or diverting service
- Perfect for steam, water or compatible glycol solutions

## HOW TO ORDER

Select model number from model chart or standard product chart and supply maximum upstream pressure, USP.

## SPECIFICATIONS

### VALVE BODY

**Service:** Compatible liquids, gases, and steam.

**Line Size:** 1/2" to 2".

**Body Style:** 2-way or 3-way globe.

**End Connections:** 1/2" to 2" female NPT.

**Pressure Limit:** Iron and bronze body: 250 psi (17.2 bar); 316 SS body: 300 psi (20.7 bar).

**Wetted Materials:** Body material: Iron, bronze, or 316 SS; Trim: 316 SS.

**Packing:** PTFE.

**Temperature Limits:** 20 to 400°F (-7 to 204.4°C).

### ACTUATOR

**Type:** Pneumatic spring/diaphragm.

**Control Signal:** 3 to 15 psi (0.21 to 1.0 bar) standard. Custom ranges available.

**Maximum Supply Pressure:** 220, 222, and 230: 100 psi (6.89 bar). 221, 223, 231, and 233: 50 psi (3.45 bar).

**Air Connection:** 1/4" female NPT.

**Temperature Limit:** 150°F (66°C).

**Note:** Positioners and current-to-pressure transducers available factory mounted.



**Caution:** Use of an actuator supply gas other than air can create a hazardous environment because a small amount of gas continuously vents to atmosphere.

# HI-FLOW™ CONTROL VALVES

Globe Valves, Ideal for Steam and Water Flow Control, 1/2" to 2-1/2" Sizes, 2-Way or 3-Way

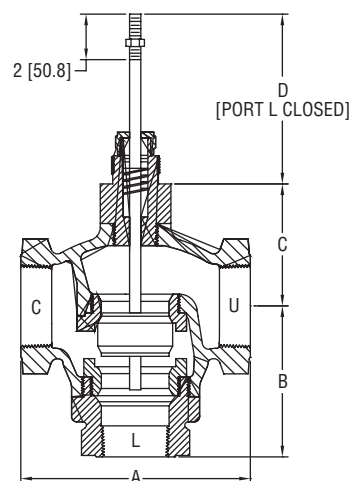
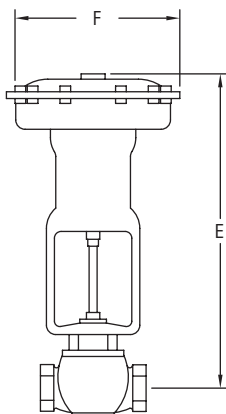
Use the chart below to aid in the selection of Hi-Flow™ Control Valve. As long as the maximum upstream pressure (USP) is less than, or equal to, the value listed, the model shown can be manufactured and calibrated to your specific requirements. Specify maximum upstream pressure, USP, when ordering.

MODEL CHART - 2-WAY SIMPLIFIED SELECTION GUIDE WITH STANDARD PRODUCTS										
Pipe Size	Cv 100%	Body Material	Air-To-Open Model	Max USP psi [bar] 3.15 [.21-1.0]	A in [mm]	C in [mm]	Air-To-Close Model	Max USP psi [bar] 3.15 [.21-1.0]	B in [mm]	C in [mm]
1/2"	6.45	Bronze	2000VA32-230	250 [17.2]	19-3/4 [501.7]	7-3/4 [196.9]	2000VA32-220	250 [17.2]	18-7/16 [468.3]	7-3/4 [196.9]
1/2"	6.45	316SS	2000VA42-230	300 [20.7]	19-3/4 [501.7]	7-3/4 [196.9]	2000VA42-220	300 [20.7]	18-7/16 [468.3]	7-3/4 [196.9]
3/4"	10.75	Bronze	2001VA32-230	250 [17.2]	19-3/4 [501.7]	7-3/4 [196.9]	2001VA32-220	250 [17.2]	18-7/16 [468.3]	7-3/4 [196.9]
3/4"	10.75	Bronze	2001VA32-231	250 [17.2]	20-3/8 [517.5]	10-5/8 [269.9]	2001VA32-221	250 [17.2]	19-1/8 [485.8]	10-5/8 [269.9]
3/4"	10.75	316SS	2001VA42-230	285 [19.7]	19-3/4 [501.7]	7-3/4 [196.9]	2001VA42-220	300 [20.7]	18-7/16 [468.3]	7-3/4 [196.9]
3/4"	10.75	316SS	2001VA42-231	300 [20.7]	20-3/8 [517.5]	10-5/8 [269.9]	2001VA42-221	300 [20.7]	19-1/8 [485.8]	10-5/8 [269.9]
1"	17.42	Bronze	2002VA32-230	166 [11.4]	20-3/16 [512.8]	7-3/4 [196.9]	2002VA32-220	192 [13.2]	18-7/8 [479.4]	7-3/4 [196.9]
1"	17.42	Bronze	2002VA32-231	250 [17.2]	20-13/16 [528.6]	10-5/8 [269.9]	2002VA32-221	250 [17.2]	19-9/16 [496.9]	10-5/8 [269.9]
1"	17.42	316SS	2002VA42-230	166 [11.4]	20-3/16 [512.8]	7-3/4 [196.9]	2002VA42-220	192 [13.2]	18-7/8 [479.4]	7-3/4 [196.9]
1"	17.42	316SS	2002VA42-231	300 [20.7]	20-13/16 [528.6]	10-5/8 [269.9]	2002VA42-221	300 [20.7]	19-9/16 [496.9]	10-5/8 [269.9]
1-1/4"	25.30	Bronze	2003VA32-230	98 [6.8]	20-5/16 [515.9]	7-3/4 [196.9]	2003VA32-220	115 [7.9]	19 [482.6]	7-3/4 [196.9]
1-1/4"	25.30	Bronze	2003VA32-231	245 [16.9]	20-15/16 [531.8]	10-5/8 [269.9]	2003VA32-221	250 [17.2]	19-11/16 [500.1]	10-5/8 [269.9]
1-1/4"	25.30	Bronze	2003VA32-233	250 [17.2]	25-13/32 [645.3]	13-3/8 [339.7]	2003VA32-223	250 [17.2]	23-1/8 [587.4]	13-3/8 [339.7]
1-1/4"	25.30	316SS	2003VA42-230	98 [6.8]	20-5/16 [515.9]	7-3/4 [196.9]	2003VA42-220	115 [7.9]	19 [482.6]	7-3/4 [196.9]
1-1/4"	25.30	316SS	2003VA42-231	245 [17.0]	20-15/16 [531.8]	10-5/8 [269.9]	2003VA42-221	300 [20.7]	19-11/16 [500.1]	10-5/8 [269.9]
1-1/4"	25.30	316SS	2003VA42-233	300 [20.7]	25-13/32 [645.3]	13-3/8 [339.7]	2003VA42-223	300 [20.7]	23-1/8 [587.4]	13-3/8 [339.7]
1-1/2"	32.10	Bronze	2004VA32-230	65 [4.5]	20-11/16 [525.5]	7-3/4 [196.9]	2004VA32-220	80 [5.5]	19-3/8 [492.1]	7-3/4 [196.9]
1-1/2"	32.10	Bronze	2004VA32-231	168 [11.6]	21-5/16 [541.3]	10-5/8 [269.9]	2004VA32-221	235 [16.2]	20-1/16 [509.6]	10-5/8 [269.9]
1-1/2"	32.10	Bronze	2004VA32-233	250 [17.2]	25-25/32 [654.8]	13-3/8 [339.7]	2004VA32-223	250 [17.2]	23-1/2 [596.9]	13-3/8 [339.7]
1-1/2"	32.10	316SS	2004VA42-230	65 [4.5]	20-11/16 [525.5]	7-3/4 [196.9]	2004VA42-220	80 [5.5]	19-3/8 [492.1]	7-3/4 [196.9]
1-1/2"	32.10	316SS	2004VA42-231	168 [11.6]	21-5/16 [541.3]	10-5/8 [269.9]	2004VA42-221	235 [16.2]	20-1/16 [509.6]	10-5/8 [269.9]
1-1/2"	32.10	316SS	2004VA42-233	300 [20.7]	25-25/32 [654.8]	13-3/8 [339.7]	2004VA42-223	300 [20.7]	23-1/2 [596.9]	13-3/8 [339.7]
2"	50.30	Bronze	2005VA32-230	31 [2.1]	20-15/16 [531.8]	7-3/4 [196.9]	2005VA32-220	44 [3.0]	19-5/8 [498.5]	7-3/4 [196.9]
2"	50.30	Bronze	2005VA32-231	88 [6.1]	21-9/16 [547.7]	10-5/8 [269.9]	2005VA32-221	140 [9.7]	20-5/16 [515.9]	10-5/8 [269.9]
2"	50.30	Bronze	2005VA32-233	175 [12.1]	26-1/32 [661.2]	13-3/8 [339.7]	2005VA32-223	250 [17.2]	23-3/4 [603.3]	13-3/8 [339.7]
2"	50.30	316SS	2005VA42-230	31 [2.1]	20-15/16 [531.8]	7-3/4 [196.9]	2005VA42-220	44 [3.0]	19-5/8 [498.5]	7-3/4 [196.9]
2"	50.30	316SS	2005VA42-231	88 [6.1]	21-9/16 [547.7]	10-5/8 [269.9]	2005VA42-221	140 [9.7]	20-5/16 [515.9]	10-5/8 [269.9]
2"	50.30	316SS	2005VA42-233	175 [12.1]	26-1/32 [661.2]	13-3/8 [339.7]	2005VA42-223	272 [18.8]	23-3/4 [606.3]	13-3/8 [339.7]

MODEL CHART - CONTROL VALVES - HI-FLOW™ SERIES, 2-WAY, STOCKED MODELS					
Pipe Size	Cv 100%	Body Material	Air-To-Open Model	Set at USP psig [bar]	Adjustable USP Range psig [bar]
1/2"	6.45	Bronze	2000VA32-230-QS	125 [8.6]	96-200 [6.8-13.8]
3/4"	10.75	Bronze	2001VA32-230-QS	125 [8.6]	81-155 [5.6-10.7]
1"	17.42	Bronze	2002VA32-230-QS	125 [8.6]	123-166 [8.5-11.5]
1"	17.42	Bronze	2002VA32-231-QS	125 [8.6]	71-155 [4.9-10.7]
1-1/4"	25.30	Bronze	2003VA32-230-QS	98 [6.8]	66-98 [4.6-6.8]
1-1/4"	25.30	Bronze	2003VA32-231-QS	125 [8.6]	121-165 [8.3-11.4]
1-1/2"	32.10	Bronze	2004VA32-231-QS	125 [8.6]	104-137 [7.2-9.5]
2"	50.30	Bronze	2005VA32-231-QS	88 [6.1]	68-88 [4.7-6.1]
2"	50.30	Bronze	2005VA32-233-QS	125 [8.6]	116-145 [8.0-10.0]

# HI-FLOW™ CONTROL VALVES

## 3-Way Standard Products for Mixing or Diverting



DIMENSIONS			
Pipe Size	B in [mm]	C in [mm]	D in [mm]
1/2"	2-9/16 [65.1]	2-3/16 [55.6]	4-1/8 [104.8]
3/4"	2-9/16 [65.1]	2-3/16 [55.6]	4-1/8 [104.8]
1"	3 [76.2]	2-7/16 [61.9]	4 [101.6]
1-1/4"	3-3/16 [81.0]	2-1/2 [63.5]	3-3/4 [95.3]
1-1/2"	3-3/4 [95.3]	2-3/4 [69.9]	3-11/16 [93.7]
2"	3-15/16 [100.0]	3-3/16 [81.0]	3-11/16 [93.7]

Use the standard models chart to aid in the selection of the most economical Hi-Flow™ 3-Way Control Valve for your application.  
Standard models include: LIN-E-AIRE® Air-To-Lower Actuator (port L opens on loss of air)

### Mixing Service

FLOW IN - ports U&L; FLOW OUT - port C

Specify maximum upstream pressures [USP's]: USP<sub>U</sub> and USP<sub>L</sub>

To determine shutoff pressure: (USP<sub>U</sub> - USP<sub>C</sub>) + (USP<sub>L</sub> - USP<sub>C</sub>)

### Diverting Service

FLOW IN - port C; FLOW OUT - ports U&L

Specify maximum upstream pressures [USP's]: USP<sub>C</sub>; based on standard 3-15 psi [.21-1.0 bar] pneumatic control signal

To determine shutoff pressure: USP<sub>U</sub> + USP<sub>C</sub>

**MODEL CHART - HI-FLOW™ CONTROL VALVES, 3-WAY SIMPLIFIED SELECTION GUIDE WITH STANDARD PRODUCTS**

Pipe Size	Cv 100%	Body Material	Model	USP [S] psi [bar]	E in [mm]	F in [mm]
1/2"	6.45	Bronze	3000WA32-220	250 [17.2]	18-1/16 [458.8]	7-3/4 [196.9]
1/2"	6.45	316SS	3000WA42-220	300 [20.7]	18-1/16 [458.8]	7-3/4 [196.9]
3/4"	10.75	Bronze	3001WA32-220	250 [17.2]	18-1/16 [458.8]	7-3/4 [196.9]
3/4"	10.75	316SS	3001WA42-220	300 [20.7]	18-1/16 [458.8]	7-3/4 [196.9]
1"	17.42	Bronze	3002WA32-220	200 [13.8]	18-5/16 [465.1]	7-3/4 [196.9]
1"	17.42	Bronze	3002WA32-221	250 [17.2]	19 [482.6]	10-5/8 [269.9]
1"	17.42	316SS	3002WA42-220	200 [13.8]	18-5/16 [465.1]	7-3/4 [196.9]
1"	17.42	316SS	3002WA42-221	300 [20.7]	19 [482.6]	10-5/8 [269.9]
1-1/4"	25.30	Bronze	3003WA32-220	120 [8.4]	18-3/8 [466.7]	7-3/4 [196.9]
1-1/4"	25.30	Bronze	3003WA32-221	250 [17.2]	19-1/16 [484.2]	10-5/8 [269.9]
1-1/4"	25.30	316SS	3003WA42-220	120 [8.3]	18-3/8 [466.7]	7-3/4 [196.9]
1-1/4"	25.30	316SS	3003WA42-221	300 [20.7]	19-1/16 [484.2]	10-5/8 [269.9]
1-1/2"	32.10	Bronze	3004WA32-220	80 [5.6]	18-5/8 [473.1]	7-3/4 [196.9]
1-1/2"	32.10	Bronze	3004WA32-221	200 [13.8]	19-5/16 [490.5]	10-5/8 [269.9]
1-1/2"	32.10	Bronze	3004WA32-223	250 [17.2]	21-3/8 [542.9]	13-3/8 [339.7]
1-1/2"	32.10	316SS	3004WA42-220	80 [5.5]	18-5/8 [473.1]	7-3/4 [196.9]
1-1/2"	32.10	316SS	3004WA42-221	200 [13.8]	19-5/16 [490.5]	10-5/8 [269.9]
1-1/2"	32.10	316SS	3004WA42-223	300 [20.7]	21-3/8 [542.9]	13-3/8 [339.7]
2"	50.30	Bronze	3005WA32-220	45 [3.1]	19-1/16 [484.2]	7-3/4 [196.9]
2"	50.30	Bronze	3005WA32-221	100 [6.9]	19-3/4 [501.7]	10-5/8 [269.9]
2"	50.30	Bronze	3005WA32-223	175 [12.1]	21-13/16 [554.0]	13-3/8 [339.7]
2"	50.30	316SS	3005WA42-220	45 [3.1]	19-1/16 [484.2]	7-3/4 [196.9]
2"	50.30	316SS	3005WA42-221	100 [6.9]	19-3/4 [501.7]	10-5/8 [269.9]
2"	50.30	316SS	3005WA42-223	175 [12.1]	21-12/16 [554.0]	13-3/8 [339.7]

**Caution:** Use of an actuator supply gas other than air can create a hazardous environment because a small amount of gas continuously vents to atmosphere.

# ANGLE SEAT VALVE - BRONZE & STAINLESS STEEL NPT

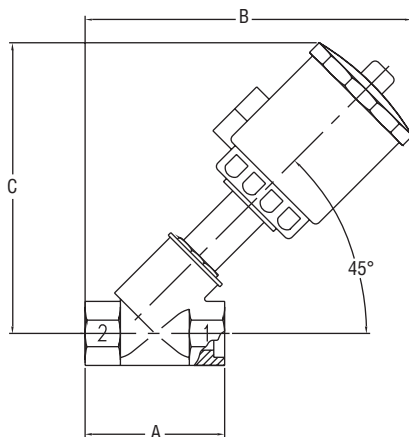
Low Cost, Compact Design, For Use with Gases and Liquids



SAV-BT



SAV-ST



SERIES SAV-BT						
Port Connection	A	B	C	Actuator Diameter	NO Cv	NC Cv
1/2"	2.56"	6.42"	5.51"	2.76"	6.61	6.61
3/4"	2.95"	6.81"	5.79"	2.76"	12.18	12.18
1"	3.54"	8.11"	6.93"	3.32"	23.2	23.2
1-1/4"	4.33"	10.04"	8.66"	3.32"	33.06	33.64
1-1/2"	4.72"	10.63"	9.25"	4.58"	33.3	53.36
1-1/2"	4.72"	12.05"	10.67"	4.58"	-	53.94
2"	5.91"	11.02"	9.45"	4.58"	-	68.44
2"	5.91"	12.44"	10.87"	5.54"	53.94	77.72

SERIES SAV-ST						
Port Connection	A	B	C	Actuator Diameter	NO Cv	NC Cv
1/2"	3.35"	7.48"	6.14"	2.76"	6.61	6.61
3/4"	3.74"	7.68"	6.3"	2.76"	12.18	12.18
1"	4.13"	8.62"	7.17"	3.32"	23.2	23.2
1-1/4"	4.72"	10.47"	8.9"	3.32"	33.06	33.64
1-1/2"	5.12"	10.67"	9.06"	4.58"	33.3	53.36
1-1/2"	5.12"	12.09"	10.47"	4.58"	-	53.94
2"	5.91"	11.22"	9.45"	4.58"	-	68.44
2"	5.91"	12.64"	10.87"	5.54"	53.94	77.72

Save space while maintaining flow rates with the compact **SERIES SAV-BT & SAV-ST** Angle Seat Valves. The pneumatic, externally piloted angle seat valve is operated by a single acting actuator with a mechanical spring for failsafe operation. Select from either normally closed (NC) or normally open (NO) configurations. NO valves can be used to prevent waterhammer on valve closure in liquid applications.

## FEATURES/BENEFITS

- Can be used in most gas, liquid and steam applications
- Integral heat sink protects Polyamide actuator
- Can be mounted in any position
- Actuator can be rotated 360° for positioning pressure ports

## SPECIFICATIONS

### VALVE BODY

**Service:** Gases and liquids compatible with wetted materials.

**Wetted Materials:** Valve body: SAV-BT: Bronze; SAV-ST: AISI 316L SS; Plug and stem: AISI 316L SS; Stem O-ring: Fluoroelastomers; Seat and seal: PTFE.

**Line Sizes:** 1/2" to 2" NPT.

**Pressure Limits:** See table.

**Flow Leakage:** Meets ANSI Class VI.

**Temperature Limits:** 14 to 358°F (-25 to 180°C).

### ACTUATOR

**Type:** Piston/pneumatic spring.

**Pilot Connections:** NAMUR solenoid mounting pad.

**Pilot Media:** Air, water, inert gas.

**Pressure Limits:** See table.

**Temperature Limit:** 185°F (85°C).

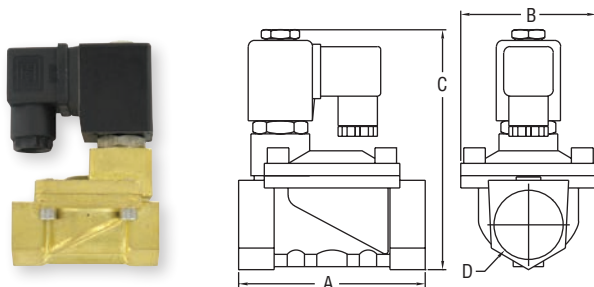
MODEL CHART					
Port Connection	Actuator Diameter	Normally Closed Model	Normally Open Model	Normally Closed Model	Normally Open Model
1/2 NPT	2.76"	SAV-BTA1-NC	SAV-BTA2-NO	SAV-STA1-NC	SAV-STA2-NO
3/4 NPT	2.76"	SAV-BTB1-NC	SAV-BTB2-NO	SAV-STB1-NC	SAV-STB2-NO
1 NPT	3.32"	SAV-BTC1-NC	SAV-BTC3-NO	SAV-STC2-NC	SAV-STC3-NO
1-1/4 NPT	3.32"	SAV-BTD3-NC	SAV-BTD3-NO	SAV-STD3-NC	SAV-STD3-NO
1-1/2 NPT	4.58"	SAV-BTE2-NC	-	SAV-STE2-NC	-
1-1/2 NPT	5.54"	SAV-BTE3-NC	SAV-BTE3-NO	SAV-STE3-NC	SAV-STE3-NO
2 NPT	4.58"	SAV-BTF2-NC	-	SAV-STF2-NC	-
2 NPT	5.54"	SAV-BTF3-NC	SAV-BTF3-NO	SAV-STF3-NC	SAV-STF3-NO

LINE AND PILOT PRESSURE CHART (PSI)											
Port Connection	Actuator Diameter	Normally Closed					Normally Open				
		Max. Line Pressure	Max. Steam Pressure	Flow Direction	Min. Pilot Pressure	Max. Pilot Pressure	Max. Line Pressure	Max. Steam Pressure	Flow Direction	Min. Pilot Pressure	Max. Pilot Pressure
1/2 NPT	2.76"	230	150	Overseat	60	143	230	150	Underseat	60	143
3/4 NPT	2.76"	230	150	Overseat	60	143	230	150	Underseat	60	143
1 NPT	3.32"	290	150	Overseat	60	143	230	150	Underseat	60	143
1-1/4 NPT	3.32"	230	150	Overseat	60	114	230	150	Underseat	60	114
1-1/2 NPT	4.58"	230	150	Overseat	60	114	230	150	Underseat	60	114
1-1/2 NPT	5.54"	230	150	Overseat	60	114	230	150	Underseat	60	114
2 NPT	4.58"	143	150	Overseat	60	114	230	150	Underseat	60	114
2 NPT	5.54"	232	150	Overseat	60	114	230	150	Underseat	60	114



# BRASS SOLENOID VALVES, 2-WAY GUIDED NC

Compact Design, Immune to Mounting Orientation



Model	A in [mm]	B in [mm]	C in [mm]	D NPT	Weight lb [kg]
SBSV-B1NX	1-5/8 [41]	1-5/32 [29]	3-9/32 [83]	1/8"	0.82 [0.37]
SBSV-B2NX	1-5/8 [41]	1-5/32 [29]	3-9/32 [83]	1/4"	0.79 [0.36]
SBSV-B3NX	2-5/8 [66]	1-57/64 [48]	4-7/16 [112]	3/8"	1.54 [0.7]
SBSV-B4NX	2-5/8 [66]	1-57/64 [48]	4-7/16 [112]	1/2"	1.98 [0.9]
SBSV-B5NX	2-61/64 [75]	2-19/64 [58]	4-21/32 [118]	3/4"	1.98 [0.9]
SBSV-B6NX	3-25/32 [96]	2-49/64 [70]	5-11/64 [131]	1"	3.09 [1.4]
SBSV-B7NX	5-11/64 [131]	3-25/32 [96]	3-3/4 [146]	1-1/4"	6.17 [2.8]
SBSV-B8NX	5-11/64 [131]	3-25/32 [96]	5-3/4 [146]	1-1/2"	5.95 [2.7]
SBSV-B9NX	6-1/2 [165]	4-47/64 [120]	6-37/64 [167]	2"	10.58 [4.8]

The **SERIES SBSV-B** Solenoid Valves are compact, general-service, two-way guide type solenoid valves for air, gas, water and other liquid applications. They are available in brass with a normally closed design and can be oriented in any position. The solenoid enclosure provides protection against dust, while also protecting against seepage of oil and non-corrosive coolants. The Series SBSV-B valves come assembled with an NBR seal, having a maximum process temperature of 176°F (80°C). The series offers a wide range of valve sizes and flow ranges, with connection sizes from 1/8" to 2" NPT and orifices from 3 mm to 50 mm.

MODEL CHART				
Model	Connection, NPT	Orifice in [mm]	Cv Value	Voltage
SBSV-B1N1	1/8"	0.12 [3]	0.23	110 VAC
SBSV-B2N1	1/4"	0.12 [3]	0.23	110 VAC
SBSV-B3N1	3/8"	0.51 [13]	4.5	110 VAC
SBSV-B4N1	1/2"	0.51 [13]	4.5	110 VAC
SBSV-B5N1	3/4"	0.79 [20]	7.6	110 VAC
SBSV-B6N1	1"	0.98 [25]	12	110 VAC
SBSV-B7N1	1-1/4"	1.38 [35]	22	110 VAC
SBSV-B8N1	1-1/2"	1.57 [40]	30	110 VAC
SBSV-B9N1	2"	1.97 [50]	48	110 VAC

Note: Consult factory for 220 VAC, 24 VAC and 24 VDC.

## SPECIFICATIONS

**Service:** Compatible gases and liquids.  
**Line Size:** 1/8 to 2" NPT.  
**End Connections:** Female NPT.  
**Operating Pressure:** 1/8 to 1/4": 0 psi (0 bar) to 188.5 psi (13 bar); 3/8 to 2": 7.3 psi (0.5 bar) to 188.5 psi (13 bar).  
**Pressure Limit:** 246.6 psi (17 bar).  
**Wetted Material:** Body: Brass; Spring: 304 SS; Seal: NBR.  
**Temperature Limits:** Process: 176°F (80°C); Ambient: 32 to 149°F (0 to 65°C).

**Power Requirements:** Standard: 110 VAC; Optional: 220 VAC, 24 VDC, 24 VAC consult factory. **Power Consumption:** See table.  
**Enclosure Rating:** NEMA 13 (IP54).  
**Electrical Connection:** DIN connection.  
**Other Materials:** Nylon.  
**Mounting Orientation:** Any position, best if solenoid vertically above valve.  
**Weight:** See table.  
**Type of Operation:** NC.  
**Agency Approvals:** CE.

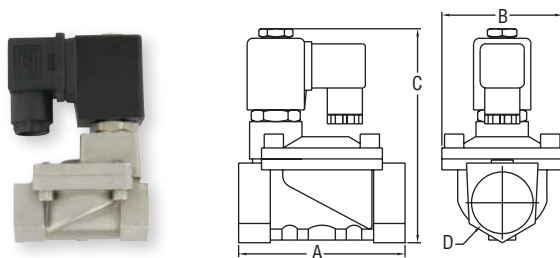
Voltage	50 Hz (VA)		60 Hz (VA)		DC (W)
	Inrush	Holding	Inrush	Holding	
220 VAC	55	22	55	18	-
110 VAC	55	22	55	18	-
24 VAC	45	18	45	15	-
24 VDC	-	-	-	-	13

● Solenoid Coils: See page 450 (Series SRC)

## SERIES SBSV-S | W.E. ANDERSON BY DWYER

# SS SOLENOID VALVES, 2-WAY GUIDED NC

Compact Design, Immune to Mounting Orientation



Model	A in [mm]	B in [mm]	C in [mm]	D NPT	Weight lb [kg]
SBSV-S1FX	1-5/8 [41]	1-5/32 [29]	3-9/32 [83]	1/8"	0.82 [0.37]
SBSV-S2FX	1-5/8 [41]	1-5/32 [29]	3-9/32 [83]	1/4"	0.79 [0.36]
SBSV-S3FX	2-5/8 [66]	1-57/64 [48]	4-7/16 [112]	3/8"	1.65 [0.75]
SBSV-S4FX	2-5/8 [66]	1-57/64 [48]	4-7/16 [112]	1/2"	1.54 [0.7]
SBSV-S5FX	2-61/64 [75]	2-19/64 [58]	4-21/32 [118]	3/4"	1.98 [0.9]
SBSV-S6FX	3-25/32 [96]	2-49/64 [70]	5-11/64 [131]	1"	2.87 [1.3]
SBSV-S7FX	5-11/64 [131]	3-25/32 [96]	3-3/4 [146]	1-1/4"	5.73 [2.6]
SBSV-S8FX	5-11/64 [131]	3-25/32 [96]	3-3/4 [146]	1-1/2"	5.51 [2.5]
SBSV-S9FX	6-1/2 [165]	3-47/64 [120]	6-37/64 [167]	2"	9.7 [4.4]

**SERIES SBSV-S** Solenoid Valves are compact, general-service, two-way guide type solenoid valves for air, gas, water and other liquid applications. They are available in brass with a normally closed design and can be oriented in any position. The solenoid enclosure provides protection against dust, while also protecting against seepage of oil and non-corrosive coolants. The Series SBSV-B valves come assembled with an NBR seal, having a maximum process temperature of 176°F (80°C). The series offers a wide range of valve sizes and flow ranges, with connection sizes from 1/8" to 2" NPT and orifices from 3 mm to 50 mm.

MODEL CHART				
Model	Connection, NPT	Orifice in [mm]	Cv Value	Voltage
SBSV-S1F1	1/8"	0.12 [3]	0.23	110 VAC
SBSV-S2F1	1/4"	0.12 [3]	0.23	110 VAC
SBSV-S3F1	3/8"	0.51 [13]	4.5	110 VAC
SBSV-S4F1	1/2"	0.51 [13]	4.5	110 VAC
SBSV-S5F1	3/4"	0.79 [20]	7.6	110 VAC
SBSV-S6F1	1"	0.98 [25]	12	110 VAC
SBSV-S7F1	1-1/4"	1.38 [35]	22	110 VAC
SBSV-S8F1	1-1/2"	1.57 [40]	30	110 VAC
SBSV-S9F1	2"	1.97 [50]	48	110 VAC

Note: Consult factory for 220 VAC, 24 VAC and 24 VDC.

## SPECIFICATIONS

**Service:** Compatible gases and liquids.  
**Line Size:** 1/8 to 2" NPT.  
**End Connections:** Female NPT.  
**Operating Pressure:** 1/8 to 1/4": 0 psi (0 bar) to 188.5 psi (13 bar); 3/8 to 2": 7.3 psi (0.5 bar) to 188.5 psi (13 bar).  
**Pressure Limit:** 246.6 psi (17 bar).  
**Wetted Material:** Body: 316 SS; Spring: 304 SS; Seal: Fluoroelastomer.  
**Temperature Limits:** Process: 176°F (80°C); Ambient: 32 to 149°F (0 to 65°C).

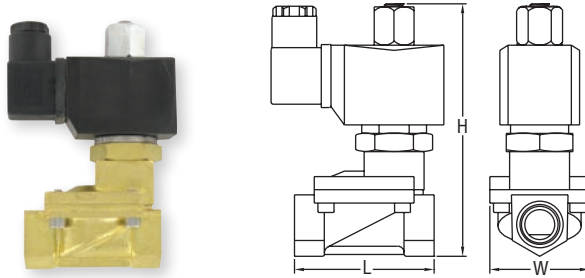
**Power Requirements:** Standard: 110 VAC; Optional: 220 VAC, 24 VDC, 24 VAC consult factory. **Power Consumption:** See table.  
**Enclosure Rating:** NEMA 13 (IP54).  
**Electrical Connection:** DIN connection.  
**Other Materials:** Nylon.  
**Mounting Orientation:** Any position, best if solenoid vertically above valve.  
**Weight:** See table.  
**Type of Operation:** NC.  
**Agency Approvals:** CE.

Voltage	50 Hz (VA)		60 Hz (VA)		DC (W)
	Inrush	Holding	Inrush	Holding	
220 VAC	55	22	55	18	-
110 VAC	55	22	55	18	-
24 VAC	45	18	45	15	-
24 VDC	-	-	-	-	13

● Solenoid Coils: See page 450 (Series SRC)

# BRASS SOLENOID VALVES, 2-WAY GUIDED NO

Compact Design, Immune to Mounting Orientation



Model	L in [mm]	H in [mm]	W in [mm]	Weight lb [kg]
SSV-B1NX	1-5/8 [41]	3-15/32 [88]	1-9/64 [29]	0.88 [0.40]
SSV-B2NX	1-5/8 [41]	3-17/64 [83]	1-9/64 [29]	0.86 [0.39]
SSV-B3NX	2-19/32 [66]	4-57/64 [124]	1-57/64 [48]	1.98 [0.90]
SSV-B4NX	2-19/32 [66]	4-57/64 [124]	1-57/64 [48]	1.98 [0.90]
SSV-B5NX	2-61/64 [75]	5-1/8 [130]	2-9/32 [58]	2.42 [1.10]
SSV-B6NX	3-25/32 [96]	5-5/8 [143]	2-3/4 [70]	3.52 [1.60]
SSV-B7NX	5-5/32 [131]	6-7/32 [158]	3-25/32 [96]	6.60 [3.00]
SSV-B8NX	5-5/32 [131]	6-7/32 [158]	3-25/32 [96]	6.16 [2.80]
SSV-B9NX	6-1/2 [165]	7-3/64 [179]	4-47/64 [120]	5.00 [11.0]

**SERIES SSV-B** Solenoid Valves are compact, general-service, two-way guide type solenoid valves for air, gas, water, and other liquid applications. They are available in brass with a normally open design and can be oriented in any position. The solenoid enclosure provides protection against dust while also protecting against seepage of oil and non-corrosive coolants. The Series SSV-B valves come assembled with an NBR seal having a maximum process temperature of 176°F (80°C). The series offers a wide range of valve sizes and flow ranges with connection sizes from 1/8" to 2" NPT and orifices from 3 mm to 50 mm.

## SPECIFICATIONS

**Service:** Compatible gases and liquids.  
**Line Size:** 1/8 to 2" NPT.  
**End Connections:** Female NPT.  
**Operating Pressure:** 1/8 to 1/4": 0 psi (0 bar) to 87 psi (6 bar); 3/8 to 2": 7.3 psi (0.5 bar) to 116 psi (8 bar).  
**Pressure Limit:** 174 psi (12 bar).  
**Wetted Material:** Body: Brass; Spring: 304 SS; Seal: NBR.  
**Temperature Limits:** Process: 176°F (80°C); Ambient: 32 to 149°F (0 to 65°C).

**Power Requirements:** Standard: 110 VAC; Optional: 220 VAC, 24 VDC consult factory. ①  
**Power Consumption:** See table.  
**Enclosure Rating:** NEMA 13 (IP54).  
**Electrical Connection:** DIN connection.  
**Other Materials:** Nylon.  
**Mounting Orientation:** Any position, best if solenoid vertically above valve.  
**Weight:** See table.  
**Type of Operation:** NO.  
**Agency Approvals:** CE.

MODEL CHART				
Model	Connection, NPT	Orifice in [mm]	Cv Value	Voltage
SSV-B1N1	1/8"	0.12 [3]	0.25	110 VAC
SSV-B2N1	1/4"	0.12 [3]	0.25	110 VAC
SSV-B3N1	3/8"	0.51 [13]	4.5	110 VAC
SSV-B4N1	1/2"	0.51 [13]	4.5	110 VAC
SSV-B5N1	3/4"	0.79 [20]	7.6	110 VAC
SSV-B6N1	1"	0.98 [25]	12	110 VAC
SSV-B7N1	1-1/4"	1.38 [35]	22	110 VAC
SSV-B8N1	1-1/2"	1.57 [40]	30	110 VAC
SSV-B9N1	2"	1.97 [50]	48	110 VAC

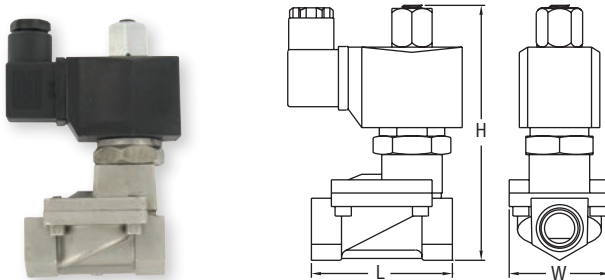
Note: Consult factory for 220 VAC, 24 VAC and 24 VDC.

Voltage	50 Hz (VA)		60 Hz (VA)		DC (W)
	Inrush	Holding	Inrush	Holding	
220 VAC	82	33	82	28	-
110 VAC	82	33	82	28	-
24 VDC	-	-	-	-	32

①Solenoid Coils: See page 450 (Series SRC)

# SS SOLENOID VALVES, 2-WAY GUIDED NO

Compact Design, Immune to Mounting Orientation



Model	L in [mm]	H in [mm]	W in [mm]	Weight lb [kg]
SSV-S1FX	1-5/8 [41]	3-15/32 [88]	1-9/64 [29]	0.88 [0.40]
SSV-S2FX	1-5/8 [41]	3-17/64 [83]	1-9/64 [29]	0.86 [0.39]
SSV-S3FX	2-19/32 [66]	4-57/64 [124]	1-57/64 [48]	2.09 [0.95]
SSV-S4FX	2-19/32 [66]	4-57/64 [124]	1-57/64 [48]	1.98 [0.90]
SSV-S5FX	2-61/64 [75]	5-1/8 [130]	2-9/32 [58]	2.42 [1.10]
SSV-S6FX	3-25/32 [96]	5-5/8 [143]	2-3/4 [70]	3.30 [1.50]
SSV-S7FX	5-5/32 [131]	6-7/32 [158]	3-25/32 [96]	6.16 [2.80]
SSV-S8FX	5-5/32 [131]	6-7/32 [158]	3-25/32 [96]	5.94 [2.70]
SSV-S9FX	6-1/2 [165]	7-3/64 [179]	4-47/64 [120]	10.1 [4.60]

The **SERIES SSV-S** Solenoid Valves are compact, general-service, two-way guide type solenoid valves for air, gas, water, and other liquid applications. They are available in stainless steel with a normally open design and can be oriented in any position. The solenoid enclosure provides protection against dust, while also protecting against seepage of oil and non-corrosive coolants. The Series SSV-S valves come assembled with a fluorocarbon seal, having a maximum process temperature of 248°F (120°C). The series offers a wide range of valve sizes and flow ranges, with connection sizes from 1/8" to 2" NPT and orifices from 3 mm to 50 mm.

## SPECIFICATIONS

**Service:** Compatible gases and liquids.  
**Line Size:** 1/8 to 2" NPT.  
**End Connections:** Female NPT.  
**Operating Pressure:** 1/8 to 1/4": 0 psi (0 bar) to 87 psi (6 bar); 3/8 to 2": 7.3 psi (0.5 bar) to 116 psi (8 bar).  
**Pressure Limit:** 174 psi (12 bar).  
**Wetted Material:** Body: 316 SS; Spring: 304 SS; Seal: Fluorocarbon.  
**Temperature Limits:** Process: 248°F (120°C); Ambient: 32 to 149°F (0 to 65°C).

**Power Requirements:** Standard: 110 VAC; Optional: 220 VAC, 24 VDC consult factory. ①  
**Power Consumption:** See table.  
**Enclosure Rating:** NEMA 13 (IP54).  
**Electrical Connection:** DIN connection.  
**Other Materials:** Nylon.  
**Mounting Orientation:** Any position, best if solenoid vertically above valve.  
**Weight:** See table.  
**Type of Operation:** NO.  
**Agency Approvals:** CE.

MODEL CHART				
Model	Connection, NPT	Orifice in [mm]	Cv Value	Voltage
SSV-S1F1	1/8"	0.12 [3]	0.25	110 VAC
SSV-S2F1	1/4"	0.12 [3]	0.25	110 VAC
SSV-S3F1	3/8"	0.51 [13]	4.5	110 VAC
SSV-S4F1	1/2"	0.51 [13]	4.5	110 VAC
SSV-S5F1	3/4"	0.79 [20]	7.6	110 VAC
SSV-S6F1	1"	0.98 [25]	12	110 VAC
SSV-S7F1	1-1/4"	1.38 [35]	22	110 VAC
SSV-S8F1	1-1/2"	1.57 [40]	30	110 VAC
SSV-S9F1	2"	1.97 [50]	48	110 VAC

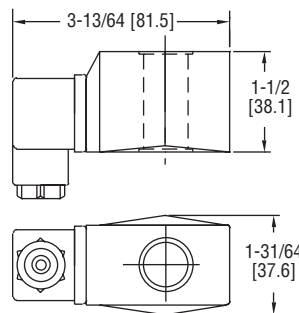
Note: Consult factory for 220 VAC, 24 VAC and 24 VDC.

Voltage	50 Hz (VA)		60 Hz (VA)		DC (W)
	Inrush	Holding	Inrush	Holding	
220 VAC	82	33	82	28	-
110 VAC	82	33	82	28	-
24 VDC	-	-	-	-	32

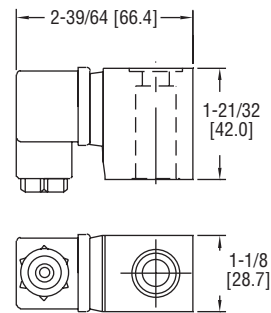
①Solenoid Coils: See page 450 (Series SRC)

## SOLENOID REPLACEMENT COILS

For the Series SSV and SBSV Solenoid Valves



Models SRC-X180X &amp; SRC-X280X



Models SRC-XXS0X

The **SERIES SRC** Solenoid Coils electrically operate the SSV and SBSV solenoid valves. When the solenoid coil receives an electrical input signal it acts upon the valve, changing its state. These coils are field replaceable with their compatible solenoid valves and come in a wide range of voltages.

## SPECIFICATIONS

**Compatible Valves:** SSV or SBSV.

**Power Requirements:** 220 VAC, 110 VAC, 24 VAC or 24 VDC.

**Electrical Connections:** DIN connection.

**Enclosure Rating:** NEMA 13 (IP54).

**Power Consumption:** See table.

**Agency Approvals:** CE.

## SSV COMPATIBLE COILS

Model	Voltage	50 Hz (VA)		60 Hz (VA)		DC (W)
		Inrush	Holding	Inrush	Holding	
SRC-D1B0P	220 VAC	82	33	82	28	-
SRC-D2B0P	110 VAC	82	33	82	28	-
SRC-D3B0P	24 VAC	72	29	72	25	-
SRC-D4B0P	24 VDC	-	-	-	-	32

**Note:** Consult factory for 220 VAC, 24 VAC and 24 VDC.

## SBSV COMPATIBLE COILS

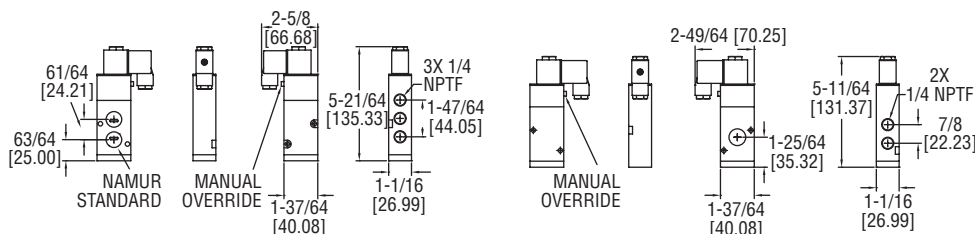
Model	Voltage	50 Hz (VA)		60 Hz (VA)		DC (W)
		Inrush	Holding	Inrush	Holding	
SRC-D1S0C	220 VAC	55	22	55	18	-
SRC-D2S0C	110 VAC	55	22	55	18	-
SRC-D3S0C	24 VAC	45	18	45	15	-
SRC-D4S0C	24 VDC	-	-	-	-	13

**Note:** Consult factory for 220 VAC, 24 VAC and 24 VDC.

## SERIES SN | PROXIMITY BY DWYER

## NAMUR MOUNT SOLENOID VALVE

Manual Override, 100% Duty Rating



SN-5X Models

SN-3X Models

The **SERIES SN** Solenoid Valves are designed to easily mount directly to pneumatic valve actuators reducing the need for tubing, fittings or brackets, thereby reducing assembly cost. The SN solenoid comes with nitrile o-rings and offers a manual override as a standard feature. The 3/2 solenoids are designed for spring return actuators and 5/2 solenoids are designed to be used with double acting actuators. The SN series is available in a variety of voltages for any application.

## FEATURES/BENEFITS

- NAMUR mount means the solenoid can be mounted directly to valve actuators
- Designed for double acting or spring return actuators
- 100% continuous duty rating
- Manual override

## SPECIFICATIONS

**Service:** Air only.

**Power Requirements:** 24 VAC, 110 VAC, 220 VAC, 12 VDC, or 24 VDC.

**Supply Pressure:** 22 to 116 psi (1.5 to 7.9 bar).

**Air Connections:** 1/4" female NPT.

**Temperature Limits:** 23 to 140°F (-5 to 60°C).

**Electrical Connection:** DIN 43650 form A.

**Enclosure Rating:** IP65.

**Mounting:** NAMUR.

**Standard Features:** Manual override.

**Weight:** 1.0 lb (.45 kg).

**Agency Approvals:** CE.

## MODEL CHART

Model	Power	Action	Actuator Type	Model	Power	Action	Actuator Type
SN-5A	110 VAC	5/2	Double acting	SN-3A	110 VAC	3/2	Spring return
SN-5B	220 VAC	5/2	Double acting	SN-3B	220 VAC	3/2	Spring return
SN-5C	24 VAC	5/2	Double acting	SN-3C	24 VAC	3/2	Spring return
SN-5E	24 VDC	5/2	Double acting	SN-3E	24 VDC	3/2	Spring return
SN-5D	12 VDC	5/2	Double acting	SN-3D	12 VDC	3/2	Spring return



Model SN mounted to an actuator

# PILOT SOLENOID VALVE

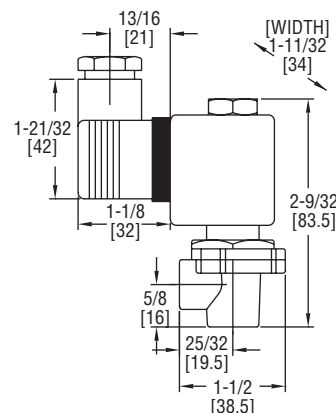
For Use with Remote Valves



RSV1D



RSV1L



The **SERIES RSV** Pilot Solenoid Valve is used to operate the Series RDCV remote type diaphragm valve to air pulse clean filters in dust collectors. Consult factory for mounting of RSV valves with our DCT timer boards together in one enclosure all pre-wired.

MODEL CHART			
Model	Voltage	Electrical Connections	Cv Value
RSV1D	110 VAC	DIN	.33
RSV2D	220 VAC	DIN	.33
RSV3D	24 VDC	DIN	.33
RSV1L	110 VAC	Wire leads	.33
RSV2L	220 VAC	Wire leads	.33
RSV3L	24 VDC	Wire leads	.33

## SPECIFICATIONS

**Service:** Compatible gases, filtered and oil free.  
**Wetted Materials:** Body: Aluminum; Core and spring: 304 SS; Seals: NBR.  
**Pressure Limits:** Min of 4.4 psi (0.3 bar), max of 124.7 psi (8.6 bar).  
**Temperature Limits:** Ambient: -4 to 122°F (-20 to 50°C); Operating: -4 to 185°F (-20 to 85°C).  
**Power Requirements:** 110 VAC, 220 VAC, or 24 VDC.  
**Power Consumption:** 12 W, inrush: 17 VA, holding: 14.5 VA.  
**Enclosure Rating:** NEMA 4X (IP66).  
**Electrical Connection:** DIN connection or wire leads, 18 AWG, 22" (55 cm) long.  
**Process Connection:** 1/8" female NPT.  
**Mounting Orientation:** Any position.  
**Weight:** 0.60 lb (0.27 kg).  
**Pneumatic Tube Length:** Maximum of 9.8' (3 m).  
**Agency Approvals:** CE.

## SERIES SVE

# SOLENOID VALVE ENCLOSURE

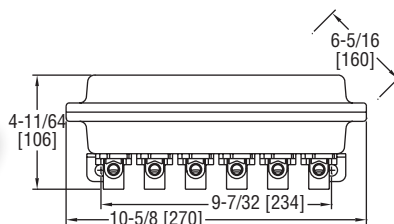
For the Series RSV Remote Solenoid Valves



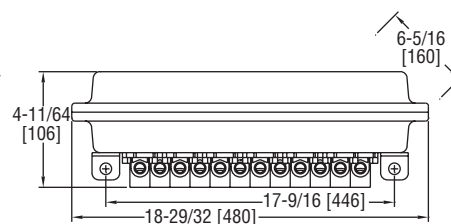
SVE06WP61



SVE06WP61



SVE06



SVE12

The **SERIES SVE** are multi-valve enclosures for the RSV pilot valve. The SVE offers a convenient weatherproof enclosure package with all solenoids pre-wired to a terminal block. Enclosures are available in 6 or 12 valve size with choice of pilot valve voltage.

MODEL CHART			
Model	Quantity of Solenoid	Enclosure Type	Voltage
SVE06WP61	6	Weatherproof	110 VAC
SVE06WP62	6	Weatherproof	220 VAC
SVE06WP63	6	Weatherproof	24 VDC
SVE12WP121	12	Weatherproof	110 VAC
SVE12WP122	12	Weatherproof	220 VAC
SVE12WP123	12	Weatherproof	24 VDC

## SPECIFICATIONS

**Service:** (For RSV) Compatible gases, filtered and oil free.  
**Wetted Materials:** (For RSV) Body: Aluminum; Core and spring: 304 SS; Seals: NBR.  
**Pressure Limits:** (For RSV) Min of 4.4 psi (0.3 bar), max of 124.7 psi (8.6 bar).  
**Temperature Limits:** Ambient: -4 to 122°F (-20 to 50°C); Operating: -4 to 185°F (-20 to 85°C).  
**Power Requirement:** (For RSV) 110 VAC, 220 VAC, or 24 VDC.  
**Power Consumption:** (For RSV) 12 W, inrush: 17 VA, holding: 14.5 VA.  
**Enclosure Rating:** NEMA 4X (IP66).  
**Enclosure Material:** Anodized aluminum with NBR gasket.  
**Electrical Connection:** All RSV are pre-wired to a terminal strip.  
**Process Connection:** (For RSV) 1/8" female NPT.  
**Conduit Connection:** 3/4" female NPT.  
**Mounting Orientation:** Any position.  
**Pneumatic Tube Length:** Max of 9.8' (3 m).



# SPRINGLESS DIAPHRAGM VALVES

Pulse Valve, Ideal for Dust Collection Systems and Bag Houses



DCS35T1D



DCS35C1D



RDCS20C



RDCS35T



RDCS35C



The **SERIES DCS/RDCS** Springless Dust Collection Valves are ideal for use with the Series DCT1000 and Series DCT500 duct collection timer boards. A springless design offers not only durability, but also reliability for an exceptional cleaning pulse. Both the Series DCS and RDCS have the option for either coupling or NPT connections. The coupling connection allows for a quick and simple installation. Only the stub pipe and blowtube need to be cleaned and deburred before the valve is fit into position. The "T" Series DCS has female threaded connections and the "C" Series DCS has a coupling connection. Both the "T" and "C" versions have a 90° angle between the inlet and outlet: the most suitable configuration for pulse valve applications. The valves are offered in both integrated and remote coil configurations.

## FEATURES/BENEFITS

- Thermoplastic polyurethane diaphragm for longer life
- High flow factor for effective cleaning
- Unique diaphragm design eliminates spring
- Valve can be mounted in any position
- Quick on & off response time

MODEL CHART					
Model	Size	Solenoid	Connection	Number of Diaphragms	Cv Factor (gal/min)
RDCS20T	3/4"	Remote	NPT	1	14
RDCS20C	3/4"	Remote	Coupling	1	14
DCS20T1D	3/4"	Integral*	NPT	1	14
DCS20C1D	3/4"	Integral*	Coupling	1	14
RDCS25T	1"	Remote	NPT	1	23
RDCS25C	1"	Remote	Coupling	1	23
DCS25T1D	1"	Integral*	NPT	1	23
DCS25C1D	1"	Integral*	Coupling	1	23
RDCS35T	1-1/2"	Remote	NPT	1	42
RDCS35C	1-1/2"	Remote	Coupling	1	42
DCS35T1D	1-1/2"	Integral*	NPT	1	42
DCS35C1D	1-1/2"	Integral*	Coupling	1	42

\*110 VAC with DIN connector

MODEL CHART - GUIDE					
Example	DCS	20	T	1D	DCS20T1D
Construction	DCS RDCS				Integrated coil Remote coil
Size		20 25 35			3/4" 1" 1-1/2"
Connection			T C		NPT Coupling
Voltage				1D 2D 3D	110 VAC DIN (for integrated coil only) 220 VAC DIN (for integrated coil only) 24 VDC DIN (for integrated coil only)

ACCESSORIES	
Model	Description
A-237	Muffler
BDA-5030-Q	3/4" DCS/RDCS pulse valve replacement diaphragm
BDA-5230-Q	1" DCS/RDCS pulse valve replacement diaphragm
BDA-5430-Q	1-1/2" DCS/RDCS pulse valve replacement diaphragm
RSV1D-COIL	110 VAC DIN replacement solenoid coil
RSV2D-COIL	220 VAC DIN replacement solenoid coil
RSV3D-COIL	24 VAC DIN replacement solenoid coil

## SPECIFICATIONS

**Service:** Compatible gases, filtered and oil free.

**Wetted Materials:** Body: Aluminum; Diaphragm disc: Thermoplastic polyurethane; Solenoid seals: NBR.

**Other Materials:** Cover: Aluminum; Body bolts: Zinc plated SS; Solenoid: Nylon.

**Pressure Limits:** Min. of 4.4 psi (0.3 bar), max. of 124.7 psi (8.6 bar).

**Temperature Limits:** Ambient: -4 to 140°F (-20 to 60°C); Operating: -4 to 185°F (-20 to 85°C).

**Power Requirements:** 110 VAC, 220 VAC, or 24 VDC for DCS models.

**Power Consumption:** 12 W; Inrush: 17 VA; Holding: 14.5 VA for DCS models.

**Electrical Connection:** DIN connection for DCS models.

**Enclosure Rating:** NEMA 4X (IP65) for DCS models.

**Process Connection:** See model chart.

**Mounting Orientation:** Any position.

**Agency Approvals:** CE.

## DIAPHRAGM VALVE CONSTRUCTION

NEMA 4X (IP65)  
solenoid coil



Solenoid

Integrated solenoid  
stem



Cover

Unique diaphragm  
design eliminates  
need for a spring



Diaphragm



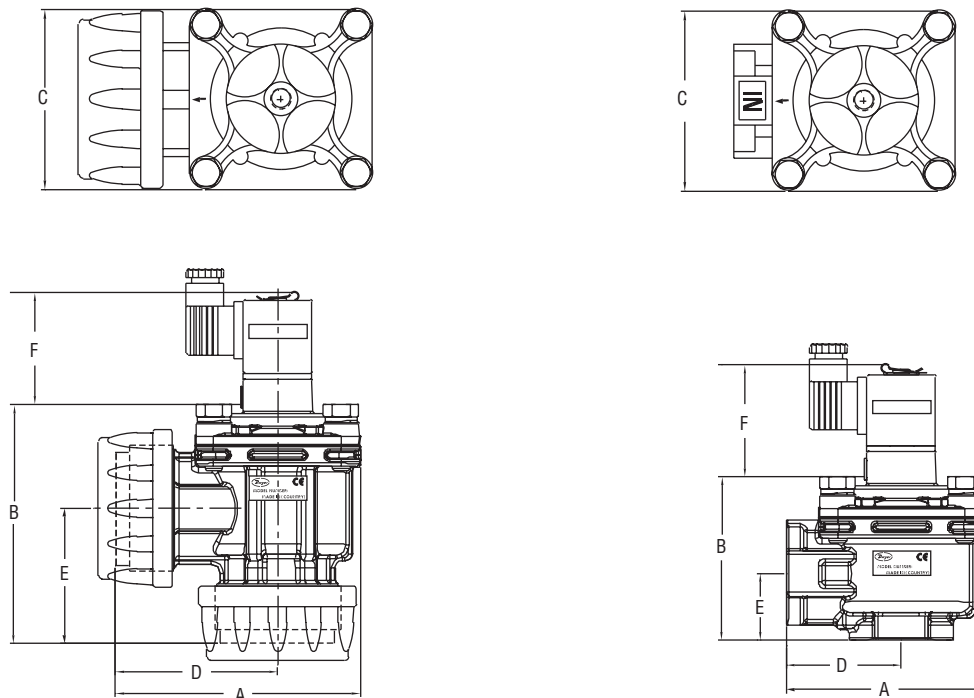
Body

Robust die cast  
aluminum body



# SPRINGLESS DIAPHRAGM VALVES

Pulse Valve, Ideal for Dust Collection Systems and Bag Houses



DIMENSIONAL CHART							
Model	Connection	A in [mm]	B in [mm]	C in [mm]	D in [mm]	E in [mm]	F in [mm]
DCS20TxD	NPT	3-1/8" [79.38]	2-47/64" [69.45]	2-45/64" [68.66]	1-37/64" [40.08]	1-15/64" [31.35]	2-5/32" [54.77]
DCS25TxD	NPT	3-19/64" [83.74]	3-7/32" [81.76]	2-53/64" [71.83]	1-55/64" [47.23]	1-31/64" [37.70]	2-11/32" [59.53]
DCS35TxD	NPT	4-11/32" [110.33]	3-43/64" [93.27]	3-1/2" [88.9]	2-17/32" [64.29]	1-15/32" [37.31]	2-3/8" [60.33]
DCS20CxD	Coupling	4-9/64" [105.17]	3-25/64" [86.10]	2-45/64" [68.66]	2-39/64" [66.28]	1-51/64" [45.64]	2-11/64" [55.17]
DCS25CxD	Coupling	4-7/16" [112.71]	4-43/64" [118.67]	2-53/64" [71.83]	3" [76.20]	2-49/64" [70.25]	2-23/64" [59.93]
DCS35CxD	Coupling	5-23/64" [136.13]	5-21/64" [135.33]	3-1/2" [88.9]	3-35/64" [90.09]	2-61/64" [75.01]	2-3/8" [60.33]
RDCS20T	NPT	3-1/8" [79.38]	2-47/64" [69.45]	2-45/64" [68.66]	1-37/64" [40.08]	1-15/64" [31.35]	-
RDCS25T	NPT	3-19/64" [83.74]	3-7/32" [81.76]	2-53/64" [71.83]	1-55/64" [47.23]	1-31/64" [37.70]	-
RDCS35T	NPT	4-11/32" [110.33]	3-43/64" [93.27]	3-1/2" [88.9]	2-17/32" [64.29]	1-15/32" [37.31]	-
RDCS20C	Coupling	4-9/64" [105.17]	3-25/64" [86.10]	2-45/64" [68.66]	2-39/64" [66.28]	1-51/64" [45.64]	-
RDCS25C	Coupling	4-7/16" [112.71]	4-43/64" [118.67]	2-53/64" [71.83]	3" [76.20]	2-49/64" [70.25]	-
RDCS35C	Coupling	5-23/64" [136.13]	5-21/64" [135.33]	3-1/2" [88.9]	3-35/64" [90.09]	2-61/64" [75.01]	-

## OPERATING PRINCIPLE

The valve is divided into two chambers by a diaphragm. These upper and lower chambers are connected by a small air passage so both chambers see the same pressure. When the exhaust is closed air cannot vent out of the upper chamber and the valve stays closed as shown in Figure 1. When the exhaust on the upper chamber is opened the air pressure decreases on top of the diaphragm allowing the air pressure on the bottom to force open the valve by pushing the diaphragm up as shown in Figure 2. When the valve opens an abrupt air blast comes through the valve outlet and is directed by the dust collector to the dirty filter. The air pulse then blows out through the filter from the inside blowing the particulate accumulation off of the filter to clean it. After the air pulse the pressure in the upper and lower chamber will equalize and the diaphragm will return to the closed position. The valve exhaust port is controlled by either an integral or remote solenoid.

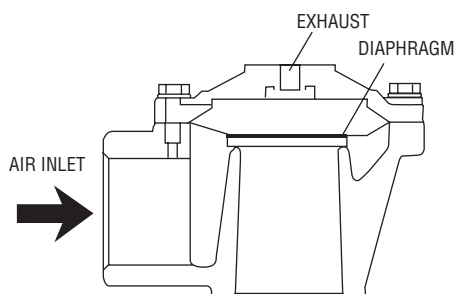


Figure 1: Closed Position

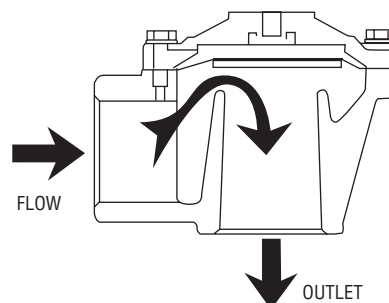


Figure 2: Open Position

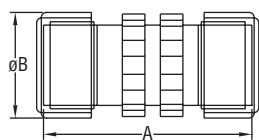
## SERIES BHC

# BULK HEAD CONNECTOR

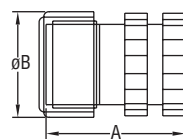
## Coupling Accessories



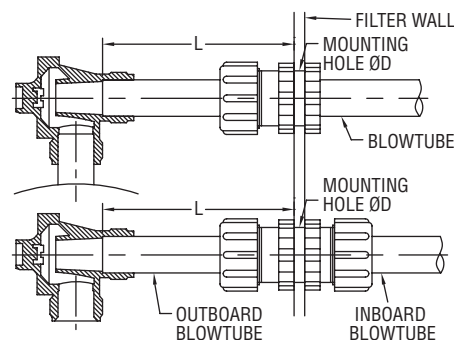
BHC35DD



BHC35D



Model	A in [mm]	B in [mm]	D in [mm]	Min L in [mm]
BHC20D	2-3/8" [60.5]	2-5/16" [58.5]	1-25/32" to 2" [45 to 51]	3-27/32" [97]
BHC20DD	3-19/32" [91]	2-5/16" [58.5]	1-25/32" to 2" [45 to 51]	3-27/32" [97]
BHC25D	2-23/32" [69]	2-3/4" [70]	2-7/32" to 2-7/16" [56 to 62]	4-21/32" [118]
BHC25DD	3-31/32" [101]	2-3/4" [70]	2-7/32" to 2-7/16" [56 to 62]	4-21/32" [118]
BHC35D	2-15/16" [75]	3-15/32" [88]	2-27/32" to 3-1/16" [72 to 78]	6-3/16" [157]
BHC35DD	4-11/32" [110]	3-15/32" [88]	2-27/32" to 3-1/16" [72 to 78]	6-3/16" [157]



The **SERIES BHC** Bulk Head Connectors allow for easy installation of blow tube through the dust collector wall and eliminate the need for welding or use of additional flanges. The fittings enable easy removal and reassembly of blow tubes for cleaning and maintenance. BHC models are available in single connection for through tube mounting or double connection for two piece tube mounting.

## SPECIFICATIONS

**Service:** Compatible gases.

**Wetted Material:** Body, ring nut, DIN nut: Aluminum; Washer: SS41; Gasket: NBR.

**Pressure Limits:** 124.7 psi (8.6 bar).

**Temperature Limits:** -4 to 185°F (-20 to 85°C).

## ACCESSORY

Model	Description
A-237	Muffler

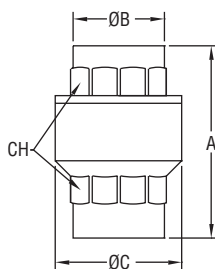
## MODEL CHART

Model	Size	Connections	Model	Size	Connections
BHC20D	3/4"	One	BHC25DD	1"	Two
BHC20DD	3/4"	Two	BHC35D	1-1/2"	One
BHC25D	1"	One	BHC35DD	1-1/2"	Two

## SERIES BICV | W.E. ANDERSON BY DWYER

# BRASS INLINE CHECK VALVE

## Economical, Spring-Loaded for Fast Seating



NPT Size	A in [mm]	B in [mm]	C in [mm]	CH in [mm]
1/4"	1-47/64 [44]	51/64 [20]	1-1/16 [27]	51/64 [20]
3/8"	1-47/64 [44]	51/64 [20]	1-1/16 [27]	51/64 [20]
1/2"	2-21/64 [59]	63/64 [25]	1-23/64 [34.5]	63/64 [25]
3/4"	2-9/16 [65]	1-13/64 [30.5]	1-21/32 [42]	1-7/32 [31]
1"	2-49/64 [70]	1-31/64 [37.5]	1-15/16 [49]	1-1/2 [38]
1-1/4"	2-15/16 [74.5]	1-7/8 [47.5]	2-13/32 [61]	1-57/64 [48]
1-1/2"	3-11/64 [80.5]	2-7/64 [53.5]	2-7/8 [73]	2-1/8 [54]
2"	3-3/8 [85.5]	2-11/16 [68]	3-15/32 [88]	2-41/64 [67]
2-1/2"	4-3/8 [111]	3-15/64 [82]	4-25/64 [111.5]	3-17/64 [83]
3"	4-55/64 [123.5]	3-27/32 [97.5]	5-15/64 [133]	3-55/64 [98]
4"	5-13/32 [137.5]	5 [127]	6-27/64 [163]	5-3/64 [128]

The **SERIES BICV** Brass Inline Check Valves are ideal for use with a broad array of service mediums including compatible oils, gases, fuels and hydrocarbons. They incorporate a soft seat for a bubble-tight shutoff and are spring-loaded for rapid reseating at high and low temperatures. The Series BICV was designed with a smooth flow profile to minimize head loss and accumulation of debris. The low 0.5 psi (0.04 bar) cracking pressure and patented guided-disc technology ensure reliability at low and high service pressure.

## SPECIFICATIONS

**Service:** Liquids and gases compatible with wetted material.

**Body:** 1-piece.

**Line Size:** See model chart.

**Process Connection:** Female NPT.

**Pressure Limits:** 1/4" to 2": 400 psi (27.6 bar) WOG; 2-1/2" to 4": 175 psi (12.1 bar) WOG; All sizes: 125 psi (8.6 bar) SWP.

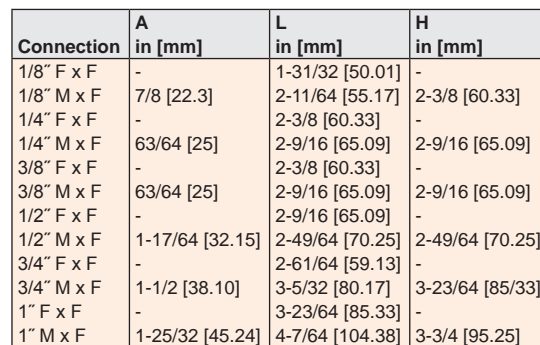
**Wetted Materials:** Valve body: Brass (CW617N); Obstructor: Polyetherimide; Seat: 1/4": NBR rubber, 3/8" to 4": Fluoroelastomer; Spring: 302 SS.

**Temperature Limits:** 10 to 352°F (-12 to 178°C).

## MODEL CHART

Model	Connection Size	Cv Value	Weight
BICV-0N00	1/4"	4.55	3.5 oz (100 g)
BICV-0F01	3/8"	4.55	5.9 oz (168 g)
BICV-0F02	1/2"	6.0	5.1 oz (145 g)
BICV-0F03	3/4"	11.0	7.8 oz (222 g)
BICV-0F04	1"	16.9	10.9 oz (308 g)
BICV-0F05	1-1/4"	27.4	1.1 lb (.051 kg)
BICV-0F06	1-1/2"	39.1	1.6 lb (0.73 kg)
BICV-0F07	2"	60.7	2.3 lb (1.03 kg)
BICV-0F08	2-1/2"	98.4	4.8 lb (2.19 kg)
BICV-0F09	3"	158.0	6.7 lb (3.04 kg)
BICV-0F10	4"	225.4	12.4 lb (5.64 kg)

For Use with Gas and Liquids, Pressures Up to 6000 psi

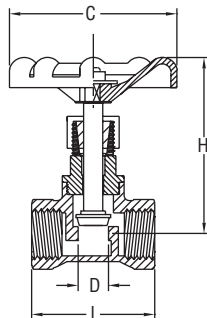


**Other Materials:** Handle: 316 SS.

Dwyer Instruments, Inc. | [www.dwyer-inst.com](http://www.dwyer-inst.com) 455

# HAND OPERATED GLOBE VALVE

## Low Cost, High Pressure Rating



Pipe Size	D in [mm]	L in [mm]	H (Open) in [mm]	C in [mm]
1/4"	13/32 [10]	2-3/64 [52]	4-1/64 [102]	2-3/8 [60]
3/8"	15/32 [12]	2-3/64 [52]	4-1/64 [102]	2-3/8 [60]
1/2"	19/32 [15]	2-3/64 [52]	4-1/64 [102]	2-3/8 [60]
3/4"	25/32 [20]	2-3/8 [60]	4-7/16 [113]	2-3/4 [70]
1"	63/64 [25]	2-53/64 [72]	4-27/32 [123]	2-3/4 [70]
1-1/4"	1-1/4 [32]	3-5/32 [80]	5-53/64 [148]	3-5/32 [80]
1-1/2"	1-37/64 [40]	3-35/64 [90]	6-19/64 [160]	3-17/32 [90]
2"	1-31/32 [50]	4-11/64 [106]	7-3/32 [180]	3-15/16 [100]

The **SERIES HGV** Hand Operated Globe Valves are an economical and functional alternative to large actuator/control valve packages. Metal-to-metal seating ensures excellent flow control and shut-off service. The body and bonnet are each constructed of CF8M (316) SS for superb corrosion resistance and chemical compatibility.

### FEATURES/BENEFITS

- Threaded ends conform to ANSI B 2.1, BS 21, DIN 259/2999, ISO 228
- SS inside screw, screwed bonnet, swivel disc integral seat, rising stem and hand wheel

MODEL CHART				
Model	Size	Cv Value	Model	Size
HGV00	1/4"	0.6	HGV04	1"
HGV01	3/8"	1.38	HGV05	1-1/4"
HGV02	1/2"	2.46	HGV06	1-1/2"
HGV03	3/4"	5.76	HGV07	2"

### SPECIFICATIONS

**Service:** Compatible liquids and gases.

**End Connections:** Female NPT.

**Pressure Limits:** 725 psi (50.0 bar) from -20 to 200°F (-28.9 to 93.3°C); 500 psi (34.5 bar) at 300°F (148.9°C); 450 psi (31.0 bar) at 325°F (162.8°C); 100 psi (6.9 bar) at 350°F (176.7°C).

**Wetted Materials:** Body, bonnet, packing nut: CF8M (316) SS. disc, stem, retainer ring; Gland: 316 SS; Packing: PTFE.

**Temperature Limits:** -20 to 356°F (-28.9 to 180°C).

**Other Materials:** Hand wheel: Cast iron; Plate: Aluminum; Wheel nut: 316 SS.

## SERIES BYS & SYS | W.E. ANDERSON BY DWYER

# BRASS OR STAINLESS STEEL Y-STRAINER

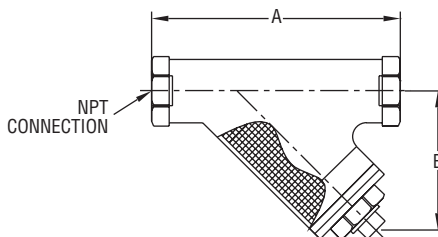
## Cost Effective, Excellent Filtration, High Flow



BYS



SYS



BYS Dimensions		
NPT Size	A in [mm]	B in [mm]
1/4"	1-31/32 [50.04]	2-11/16 [68.07]
3/8"	1-31/32 [50.04]	2-11/16 [68.07]
1/2"	1-31/32 [50.04]	2-11/16 [68.07]
3/4"	2-23/64 [59.94]	3-59/64 [99.57]
1"	2-41/64 [67.06]	4-17/32 [115.06]
1-1/4"	3-3/16 [81.03]	5-25/64 [136.91]
1-1/2"	3-7/16 [87.12]	6-17/64 [159.00]
2"	4-19/64 [108.97]	7-31/64 [189.99]

SYS Dimensions		
NPT Size	A in [mm]	B in [mm]
1/4"	2-33/64 [64.00]	1-27/32 [46.99]
3/8"	2-33/64 [64.00]	1-27/32 [46.99]
1/2"	2-33/64 [64.00]	1-27/32 [46.99]
3/4"	3-1/16 [78.00]	2-15/64 [56.90]
1"	3-35/64 [90.00]	2-41/64 [67.06]
1-1/4"	4-11/64 [106.00]	2-53/64 [71.88]
1-1/2"	4-11/16 [119.00]	3-5/32 [80.01]
2"	5-33/64 [140.00]	3-21/32 [92.96]

The **SERIES BYS & SYS** Y-Strainers are a cost effective option for use in any type of industrial application. Versatile Y configuration and availability in a wide range of sizes allow for many different uses. Body, cap, and plug are made from either a high quality brass or stainless steel to ensure reliability. The seal is constructed of PTFE to ensure long service life. The stainless steel strainer provides excellent filtration to help prevent damage to valves, meters, etc. from rust and dirt, without sacrificing high flow characteristics.

### SPECIFICATIONS

**Service:** Gases, steam and liquids compatible with wetted materials.

**End Connections:** Female NPT.

**Pressure Limits:** See model chart.

**Temperature Limits:** -10 to 250°F (-23 to 121°C).

**Wetted Materials:** BYS: Valve Body: Cast Brass; Cap and Plug: Brass; Screen: SS; Seal: PTFE; SYS: Valve Body and Cap: Cast 316 SS (CF8M); Plug and Screen: 316 SS; Seal: PTFE.

MODEL CHART											
Model	Pipe Size	Max. Pressure	Model	Pipe Size	Max. Pressure	Model	Pipe Size	Max. Pressure	Model	Pipe Size	Max. Pressure
BYS-00	1/4"	400 psi (27.6 bar)	BYS-04	1"	300 psi (20.7 bar)	SYS-00	1/4"	800 psi (55.2 bar)	SYS-04	1"	800 psi (55.2 bar)
BYS-01	3/8"	400 psi (27.6 bar)	BYS-05	1-1/4"	300 psi (20.7 bar)	SYS-01	3/8"	800 psi (55.2 bar)	SYS-05	1-1/4"	800 psi (55.2 bar)
BYS-02	1/2"	400 psi (27.6 bar)	BYS-06	1-1/2"	300 psi (20.7 bar)	SYS-02	1/2"	800 psi (55.2 bar)	SYS-06	1-1/2"	800 psi (55.2 bar)
BYS-03	3/4"	400 psi (27.6 bar)	BYS-07	2"	300 psi (20.7 bar)	SYS-03	3/4"	800 psi (55.2 bar)	SYS-07	2"	800 psi (55.2 bar)

# 2-VALVE BLOCK MANIFOLD

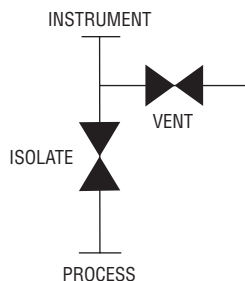
Stainless Steel Body, NPT Connections



BBV-0F



BBV-0N



The **SERIES BBV-0** 2-Valve Block Manifold is perfect for use over a broad range of industrial applications including oil refineries, nuclear power stations, petrochemical processing, and more. The Series BBV-0 is forged from 316 stainless steel bar stock and designed to withstand repeated open and close operations. Suited to control oil, water, toxic fluids, chemicals, air, and steam; the 2-valve block manifold has (1) isolate and (1) vent valves. Each valve stem is precision machined with hard seats to reduce operating torque.

## APPLICATION

- Industrial gage or transmitter isolation

## SPECIFICATIONS

**Service:** Compatible liquids, gases, or steam.

**End Connections:** Process connection: 1/2" female NPT; Instrument connection: No flange: 1/2" male NPT; Flange: 1/2" DIN 19213 flange; Vent/test: 1/4" female NPT.

**Wetted Materials:** Body, stem, valve assembly: 316 SS; Stem packing: PTFE.

**Pressure Limit:** 6000 psi (400 bar).

**Temperature Limit:** 464°F (240°C).

**Other Materials:** Handle: 304 SS.

## MODEL CHART

Model	Description
BBV-0F	Flanged 2-valve block manifold
BBV-0N	2-valve block manifold

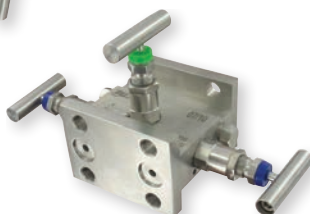
## SERIES BBV-1 | W.E. ANDERSON BY DWYER

# 3-VALVE BLOCK MANIFOLD

Stainless Steel Body, NPT Connections



BBV-1M



BBV-1D



BBV-1F

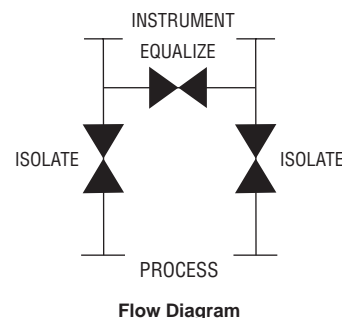


BBV-1

\*Please see website for dimensional drawing



BBV-1B



The **SERIES BBV-1** Block Manifold can be used over a broad range of industrial applications including oil refineries, nuclear power stations, petrochemical processing, and more. The Series BBV-1 body is forged from 316 stainless steel bar stock and designed to withstand repeated open and close operations. Suited to control oil, water, toxic fluids, chemicals, air, and steam.

## FEATURES/BENEFITS

- High pressure shut-off
- All stainless steel and PTFE wetted materials
- Precision machined hard seats to reduce operating torque

## APPLICATION

- Industrial gage or transmitter isolation

## SPECIFICATIONS

**Service:** Compatible liquids, gases, or steam.

**End Connections:** BBV-1B: 1/4" NPT x 1/4" NPT; BBV-1: 1/2" NPT x 1/2" NPT; BBV-1F: 1/2" NPT x DIN 19213 flange; BBV-1M: 1/2" NPT x DIN 19213 flange; BBV-1D: DIN 19213 flange x DIN 19213 flange.

**Wetted Materials:** Body, stem, valve assembly: 316 SS; Stem packing: PTFE.

**Pressure Limit:** 6000 psi (400 bar).

**Temperature Limit:** 464°F (240°C).

**Other Material:** Handle: 304 SS.

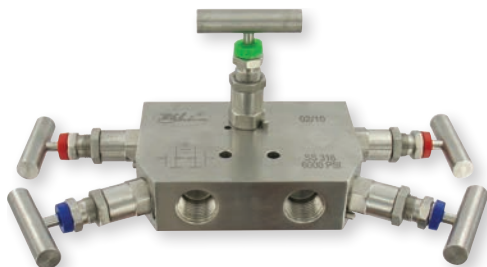
## MODEL CHART

Model	Description
BBV-1B	Mini 3-valve block manifold
BBV-1	3-valve block manifold
BBV-1F	Flanged 3-valve block manifold
BBV-1M	Multiplanar 3-valve manifold
BBV-1D	Double flanged 3-valve block manifold

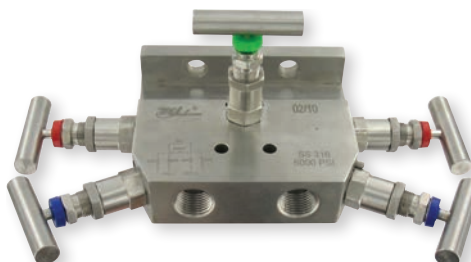


# 5-VALVE BLOCK AND BLEED MANIFOLD

## Stainless Steel Body, NPT Connections



BBV-21



BBV-21F



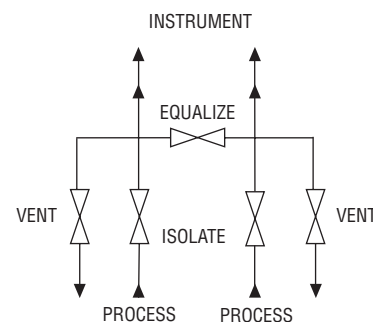
BBV-23F



BBV-22



BBV-22F



Flow Diagram

**SERIES BBV-2** Block and Bleed Manifold is ideal for use over a broad range of industrial applications including oil refineries, nuclear power stations, petrochemical processing, and more. The Series BBV-2 body is forged from 316 stainless steel bar stock and designed to withstand repeated open and close operations. Suited to control oil, water, toxic fluids, chemicals, air, and steam; the 5-Valve Block and Bleed Manifold has (2) isolate, (1) equalizing, and (2) vent valves. Each valve stem is precision machined with hard seats to reduce operating torque.

Flanged models are designed to mount to an industrial differential pressure transmitter. The BBV-21F and BBV-22F come with four 7/16-20 UNF mounting bolts and two PTFE gaskets. The BBV-23F comes with eight 7/16-20 UNF mounting bolts and two PTFE gaskets.

### FEATURES/BENEFITS

- High pressure shut-off
- All stainless steel and PTFE wetted materials
- Precision machined hard seats to reduce operating torque

### APPLICATION

- Industrial gage or transmitter isolation

### SPECIFICATIONS

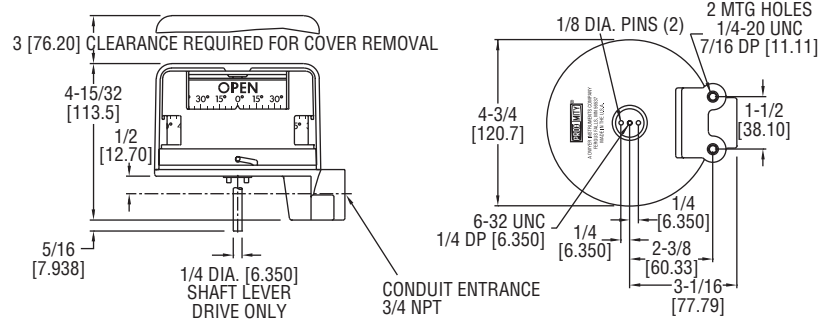
**Service:** Compatible liquids, gases, or steam.  
**End Connections:** Process connection: No flange: 1/2" female NPT; Flange: DIN 19213 flange; Instrument connection: No flange: 1/2" female NPT; Flange: DIN 19213 flange; Vent/test: 1/4" female NPT.  
**Wetted Materials:** Body, stem, valve assembly: 316 SS; Stem packing: PTFE.  
**Pressure Limit:** 6000 psi (400 bar).  
**Temperature Limit:** 464°F (240°C).  
**Other Materials:** Handle: 304 SS.

### MODEL CHART

Model	Description
BBV-21	5-valve manifold with side mounted vent valves
BBV-21F	Flanged 5-valve manifold with side mounted vent valves
BBV-22	5-valve manifold with top mounted vent valves
BBV-22F	Flanged 5-valve manifold with top mounted vent valves
BBV-23F	Double flanged 5-valve manifold with top mounted vent valves

# QUICK-VIEW® VALVE POSITION INDICATOR/SWITCH

Ultra-Low Cost, Compact, Backlit, Corrosion Resistant



The **SERIES QV** Quick-View® Rotary Valve Position Indicators, now UL and CSA rated, are produced by Proximity with up to four individual mechanical or proximity switches. The Quick-View® indicator is also available with optional backlighting.

## FEATURES/BENEFITS

- The lowest cost position indication
- Extremely compact design
- Easily interchangeable with key competition
- Backlighting option available for maximum visibility
- Quick-View® Indicator and mounting kits, including NAMUR kits, are stocked for fast delivery
- Flame retardant
- UV protection
- Hazardous location option

## APPLICATIONS

- Rotary or linear valve indication
- Industrial damper position monitoring

## SPECIFICATIONS

**Minimum Rotation Travel (Switches only):** 5°.  
**Maximum Rotation Travel (Switches only):** 360°.  
**Temperature Limits:** -40 to 180°F (-40 to 82°C).  
**Switch Type:** SPDT.  
**Electrical SPDT Switch Ratings:** QV-X1XXXX: 10 A @ 125/250 VAC; 0.5 A 125 VDC; 10 A @ 24 VDC mech. switch; QV-X2XXXX: 1 A @ 125 VAC; 1A @ 24 VDC mech. switch; QV-X3XXXX: 2 A @ 125 VAC; 2A @ 30 VDC prox. switch; QV-X4XXXX: 5-25 VDC namur sensor; QV-X5XXXX: 10-30 VDC inductive sensor; QV-X6XXXX: 10 A @ 125/250 VAC mech. switch.  
**Lighting Supply Voltage:** 24-28 VDC.  
**Enclosure Material:** Polycarbonate housing and conduit.  
**Conduit Entrance:** One 3/4" NPT.  
**Enclosure Rating:** NEMA 4, 4X (IP66, IP56). Optional explosion-proof, rated: Class I, Groups A, B, C, D; Class II, Groups F & G; Div. 2.  
**Maximum Altitude:** 2000 m (6560 ft).  
**Agency Approvals:** CE, CSA, cULus.

MODEL CHART	
Model	Backlighting
QV-210101	No
QV-210111	Yes

**Note:** Stocked position indicators include two 10 amp SPDT mechanical snap switches, are direct drive type and include the standard quarter-turn OPEN/CLOSED visual indicator. Standard units are CSA & UL approved but not for hazardous locations. Specify "EX" for hazardous location option. Consult factory for optional VI colors



Model QV mounted to an actuator

MODEL CHART						
Example	QV	-2	1	01	0	1
<b>Series</b>	QV					
<b>Number of Switches</b>		0 1 2 3 4				
<b>Switch Type</b>		0 1 2 3 4 5 6				
<b>Driving Style</b>			01 02 03			
<b>Lighting Option</b>				0 1		
<b>Visual Indication</b>					0 1 2	
<b>Additional Options</b>						EX

**QV-210101**  
 Quick-View® valve position indicator/switch  
 None\*  
 One\*  
 Two\*  
 Three\*  
 Four\*  
 No switches\*  
 10A mechanical snap switch  
 1A mechanical gold contacts  
 2A Proximity reed switch\*  
 5-25 VDC namur sensor  
 10-30 VDC inductive sensor  
 10A mechanical snap switch  
 Direct\*  
 Lever\*  
 Namur\*  
 None\*  
 24 to 28 VDC bright white LED's  
 None  
 Standard (open closed)\*  
 Upside down (open closed)\*  
 EX Class I, Div. II, Groups A, B, C & D; Class II, Div. II Groups F & G.

\*EX, Explosion-proof option available.  
**Note:** The 1st, 2nd, 3rd and 6th codes can not all be zero.

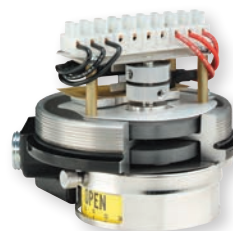
# POSITION INDICATORS/SWITCHES/TRANSMITTERS



**Mark 1**  
Stainless Steel  
(Environmentally sealed  
for corrosive areas)



**Mark 1**  
Polyester Coated Aluminum  
(Environmentally sealed  
for corrosive areas)



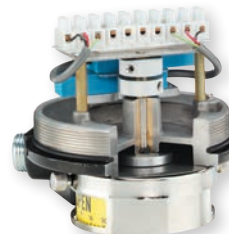
**Mark 1**  
Magnetic Coupling Cutaway  
Model 12VDOJ2



**Mark 1**  
with WirelessHART®  
Model 191OD0



**Mark 3**  
Multi Turn



**Mark 4**  
Thru-Shaft Cutaway  
Model 42RDOJ2



The Proximity™ **MARK SERIES** is a line of position indicators with a selection of various output options. Three model styles make up the Mark series to cover almost any application. Standard models in the Mark Series have visual position indicators and are weatherproof, explosion-proof, and submersible. A large variety of outputs are available to fit specific applications. There is a choice of 1 to 6 switch outputs of 14 varieties including inductive sensors, high temperature switches, gold contact switches, hermetically sealed switches, and high current switches. Besides the switch outputs the Series offers potentiometer outputs, transmitters, HART® and WirelessHART® Communications. The units are purchased for either direct drive applications, such as rotary valves, or lever drive applications, such as linear valves. Adjustable visual indicator is standard on direct drive units that displays OPEN / CLOSED status and degrees.

A magnetic drive that completely seals the switch compartment from the atmosphere for maximum leak protection is utilized in the Mark 1. The Mark 3 uses the same magnetic drive of the Mark 1, but it can be used for multi-turn applications with 1 to 25 revolutions, such as gate valves. A through shaft drive is incorporated in the Mark 4 making the unit a more cost effective alternative to the Mark 1 for applications that are not as demanding.

## MARK WITH WIRELESSHART® FEATURES/BENEFITS

- Available on Mark 1 and 4 model indicators
- WirelessHART® allows for adjustment of settings without needing to remove the device from a hazardous environment
- Wireless ability saves on installation costs associated with running conduit and wires

## MARK 1 FEATURES/BENEFITS

- Features a magnetic coupling that isolates the switch compartment, completely sealing the unit from the surrounding atmosphere for maximum hazard and leak protection
- EZ set cams on switch models provide simple set point adjustment
- Flexible design allows multiple switches and transmitter options
- Ideal for corrosive environments

## MARK 3 FEATURES/BENEFITS

- Features a magnetic coupling that isolates the switch compartment, completely sealing the unit from the surrounding atmosphere for maximum hazard and leak protection
- Multi-Turn models that can provide switch signals between 1 and 25 revolutions, and transmitter models for up to 10 revolutions without gear reduction
- Flexible design allows multiple switches and transmitter options
- Ideal for corrosive environments

## MARK 4 FEATURES/BENEFITS

- Thru-Shaft design that features a 1" bushing for long life and O-rings to seal the switch compartment for hazard, corrosion, and leak protection
- EZ set cams on switch models provide simple set point adjustment
- Flexible design allows multiple switches and transmitter options
- A more cost effective alternative to the Mark 1 Series for less demanding applications

MODEL CHART					
Model	Function	Design	Model	Function	Design
12AD0	2 SPDT	Magnetic coupling	42AD0	2 SPDT	Thru-shaft drive
12AL0	2 SPDT (lever drive)	Magnetic coupling	44AD0	4 SPDT	Thru-shaft drive
14AD0	4 SPDT	Magnetic coupling	45VD0	2 SPDT & 4-20 mA position transmitter	Thru-shaft drive
15VD0	2 SPDT & 4-20 mA position transmitter	Magnetic coupling	42VD0-J1	2 SPDT	Thru-shaft drive
12AD1	2 SPDT	Magnetic coupling	44VD0-J1	4 SPDT	Thru-shaft drive
14AD1	4 SPDT	Magnetic coupling			
12VD0-J1	2 SPDT	Magnetic coupling			
14VD0-J1	4 SPDT	Magnetic coupling			



**Mark Series**  
mounted to an actuator

Mounting kits with drive yoke (see drawing), or slotted lever arm, bracket, fasteners and other zinc plated or stainless steel hardware fit over 2000 popular valves and actuators. A high strength spring tempered stainless steel drive yoke/coupling is tailored to fit securely to a specific valve or actuator stem. There is no slippage or binding. No special alignment fixtures are required due to switch offset design and yoke to stem engagement that makes installation a "snap". Each kit is specially designed for a particular valve or actuator, making field mounting simple with standard tools. Please specify make and model of valve or actuator on order. Mounting kits can be used interchangeably with all models since external mounting features are identical. Rotary valves utilize direct drive couplings and a slotted lever drive is used with linear valves. Lever drives convert linear motion to rotary. Stainless steel visual indicators are standard for direct drive, automated quarter-turn valve applications.

## POSITION INDICATORS/SWITCHES/TRANSMITTERS

Construction	1 3 4				Mark 1, Magnetic Coupling Mark 3, Multi-Turn Mark 4, Thru-Shaft	Available Options "A" signifies available with corresponding construction style. Mark		
						1	3	4
Output Type	1				1 Switch	A	—	A
	2				2 Switches	A	A	A
	3				1 kΩ Potentiometer 1/2%. Available with switches, see note below.*	A	A	A
	31				1 kΩ Potentiometer 1/4%. Available with switches, see note below.*	A	A	A
	32				2 kΩ Potentiometer. Available with switches, see note below.*	A	A	A
	35				5 kΩ Potentiometer. Available with switches, see note below.*	A	A	A
	310				10 kΩ Potentiometer. Available with switches, see note below.*	A	A	A
	320				20 kΩ Potentiometer. Available with switches, see note below.*	A	A	A
	4				4 Switches	A	A	A
	5				Transmitter 1 kΩ Potentiometer 1/2%. 4 to 20mA. Available with switches, see note below.*	A	A	A
	51				Transmitter 1 kΩ Potentiometer 1/4%. Available with switches, see note below.*	A	A	A
	52				Transmitter 2 kΩ Potentiometer. Available with switches, see note below.*	A	A	A
	7				AS-interface and 1 Switch. Available with Switch Types B, I, R, W.	A	A	A
	8				AS-interface and 2 Switches. Available with Switch Types B, I, R, W.	A	—	A
	9				Transmitter with HART® communication. Available with switches, see note below.*	A	—	A
	91				Transmitter with WirelessHART® communication. Not available with switches.	A	—	A
Switch Type & Rating		A			SPDT Snap, Rated: 15 A @ 125/250/480 VAC (~); 1/8 hp @ 125 VAC (~), 1/4 hp @ 250 VAC (~), 1/2 A @ 125 VDC (—), 1/4 A @ 250 VDC (—).	A	A	A
		B			Inductive Sensor. 10 to 30 VDC (—). Load: 0.1 A.	A	—	A
		C			SPDT High Temperature Snap, 350 °F (176 °C) for 600 hours, Rated: 15.1 A @ 125/250/277 VAC (~).	A	A	A
		D			DPDT Snap, Rated: 10 A @ 125/250 VAC (~), 0.3 A @ 125 VDC (—), 0.15 A @ 250 VDC (—).	A	A	A
		G			SPDT Gold Contact Snap, Rated: 1 A @ 125 VAC (~).	A	A	A
		H			SPDT Hermetically Sealed Snap, Rated: 1 A @ 125 VAC (~).	A	—	A
		I			NAMUR Inductive Sensor. 15 mA max @ 5-25 VDC (—).	A	—	A
		M			SPDT Magnetic Blow-Out, Rated: 10 A @ 125 VAC (~)/VDC (—), 1/4 hp @ 125 VAC (~)/VDC (—).	A	A	A
		O			No Switches	A	A	A
		R			SPDT Hermetically Sealed Reed, Rated: 2 A @ 125 VAC (~), 2 A @ 24 VDC (—).	A	—	A
		S			SPDT Snap, Rated: 4 A @ 125/250 VAC (~).	A	—	A
		T			SPDT High Temperature Snap, 250 °F (121 °C) Continuous, Rated: 5 A @ 125/250/480 VAC (~).	A	A	A
		V			SPDT Snap, Rated: 10 A @ 125/250 VAC (~), 1/3 hp @ 125/250 VAC (~), 1/2 A @ 125 VDC (—), 1/4 A @ 250 VDC (—), 4 A @ 125 VAC (~) (tungsten).	A	A	A
Driving Method		W			SPDT Gold Contact Snap, Rated 0.1 A @ 125 VAC (~).	A	A	A
			A		A Direct or Yoke Drive without Visual Indicator.	A	A	A
Enclosure		D			Direct Drive (or Yoke) with Visual Indicator.	A	A	A
		E			Direct or Yoke Drive with Visual Indicator, Single Window.	A	A	A
		L			Lever Drive (Shaft Projection) without Visual Indicator.	A	A	A
		M			Lever (Shaft Projection) with Visual Indicator.	A	A	A
Options			0		Aluminum, Painted Black	A	A	A
			1		Aluminum, Painted White Epoxy with SS trim	A	A	A
			2		Aluminum, Painted Red	A	A	A
			5		Aluminum, Painted (color not yet specified)	A	A	A
			6		Cast 316 Stainless Steel	A	A	A
			7 thru 20		Aluminum, Painted (color not yet specified)	A	A	A
				C1	Long Dwell Cam (not on Mark 3)	A	—	A
Options				C2	Double Cam (not on Mark 3)	A	—	A
				FKM	FKM Seals	A	A	A
				J1	Junction Package with One 1/2" NPT Female Conduit Connection and Terminal Strip.	A	A	A
				J2	Junction Package with Two 1/2" NPT Female Conduit Connection and Terminal Strip.	A	A	A
				SV1	1 Attached Solenoid Valve (Must be ordered with J1 option).	A	—	A
				SV2	2 Attached Solenoid Valves (Must be ordered with J2 option).	A	—	A
				MT	Metric Threaded Conduit Connection, M25 X 1.5 (M20 X 1.5 for optional J1 and J2 connections).	A	A	A
				B	Any Output Type except 91: Directive 2014/34/EU, KEMA 03ATEX2391 X, CE 0518 Ex II 2G Ex db IIC T6 Gb (-25/-40/-50 °C ≤ Tamb ≤ 70 °C and T5 for -25 °C/-40 °C/-50 °C ≤ Tamb ≤ 80 °C). Depending on output switch type selected.	A	A	A
				B	Output Type 91: Directive 2014/34/EU, KEMA 03ATEX2391 X, CE 0518 Ex II 2G Ex db IIC T4 Gb (-40 °C ≤ Tamb ≤ 80 °C).	A	—	A
				IS	Any Output Type except 91: Directive 2014/34/EU, KEMA 03ATEX1392 X, CE 0518 Ex II 1G Ex ia IIC T4 Ga.	A	A	A
				IS	Output Type 91: Directive 2014/34/EU, KEMA 03ATEX1392 X, CE 0518 Ex II 1G Ex ia IIC T4 Ga for -40 °C ≤ Tamb ≤ 80 °C.	A	—	A
				IE	Any Output Type except 91: IECEx DEK 11.0056X Ex db IIC T6 Gb (-25/-40/-50 °C ≤ Tamb ≤ 70 °C and T5 for -25/-40/-50 °C ≤ Tamb ≤ 80 °C) optional wording depending on output and switch type selected.	A	A	A
				IE	Output Type 91: IECEx DEK 11.0056X, Ex db IIC T4 Gb.	A	—	A
				IE	Any Output Type except 91: IECEx DEK 11.0061X Ex ia IIC T4 Ga.	A	—	A
				II	Output Type 91: IECEx DEK 11.0061X Ex ia IIC T4 Ga.	A	A	A
				II	Certificate NCC 13.02339X; Marking: Ex d IIC T6 Gb or Ex d IIC T5 Gb	A	A	A
				EM	Certificate: NCC 13.02338X; Marking: Ex ia IIC T4 Ga	A	A	A
				IM	Output Type 91 with Suffix B Directive 2014/34/EU, KEMA 03ATEX2391 X, CE 0518 Ex II 2G Ex db IIC T4 Gb (-40 °C ≤ Tamb ≤ 80 °C). Battery not included.	A	A	A
				LB	Output Type 91 with Suffix IS Directive 2014/34/EU, KEMA 03ATEX1392 X, CE 0518 Ex II 2G Ex ia IIC T4 Ga for -40 °C ≤ Tamb ≤ 80 °C. Battery not included.	A	—	A
				LB	Output Type 91 with Suffix IE IECEx DEK 11.0056X, Ex db IIC T4 Gb. Battery not included.	A	—	A
				LB	Output Type 91 with Suffix II IECEx DEK 11.0061X Ex ia IIC T4 Ga. Battery not included.	A	—	A
				PP	Plug J1, J2 Ports	A	A	A
				PT	Paper Tag	A	A	A
				STR	Stainless Steel Tag Riveted	A	A	A
				STW	Stainless Steel Tag Wired	A	A	A

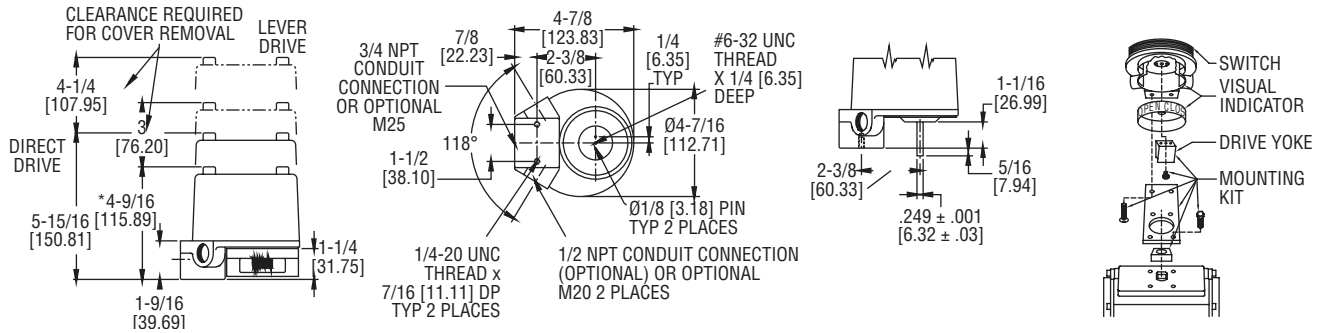
\*Note: Mark 1 and 4 potentiometer and transmitter outputs will have no switches when ordered with switch type O; 2 switches if ordered with switch types B, C, D, I, R, V, or W; and 4 switches if ordered with switch type S. Mark 3 potentiometer and transmitter outputs will have no switches when ordered with switch type O, and 2 switches if ordered with switch types A, D, G, M or T. WirelessHART® not available with switches.

Example: 12VDO-J1. Mark 1, 2 Switches both Type V – SPDT, Direct Drive, Painted Aluminum Enclosure with Junction Package.

Example: 15VDO. Mark 1, 2 Switches both Type V – SPDT, 4 to 20 mA transmitter, Direct Drive, Painted Aluminum Enclosure.



# POSITION INDICATORS/SWITCHES/TRANSMITTERS



For Models 11, 12, 41 &amp; 42

## SPECIFICATIONS

### Mark 1, 3, and 4 with Potentiometer

**Accuracy:**  $\pm 0.5\%$  of full span. Optional  $\pm 0.25\%$  of full span.

**Temperature Limits:** -40 to 176°F (-40 to 80°C). (ATEX flameproof, -B suffix and IECEx flameproof, -IE suffix, rated -40 to 145°F (-40 to 63°C) for switch types A, G, M, O, R, S, T, V, or W, -13 to 145°F (-25 to 63°C) for switch types B, D, or I; ATEX intrinsically safe, -IS suffix and IECEx intrinsically safe, -II suffix, rated -13 to 104°F (-25 to 40°C) for switch type I, -40 to 104°F (-40 to 40°C) for switch types O, R, S, V, or W.

**Power Rating:** 1.5 Watt maximum.

**Output Signal:** 1000  $\Omega$  standard. Optional 2000, 5000, 10000, or 20000  $\Omega$ .

**Zero and Span Adjustments:** Span trim pot with 2000 $\Omega$  adjustment. No zero adjustment.

**Rotational Travel:** Mark 1 and 4: Minimum: 0°, Maximum: 340°. Mark 3: 0 to 10 revolutions.

### Mark 1, 3, and 4 with Transmitter

**Accuracy:**  $\pm 0.5\%$  of full span. Optional  $\pm 0.25\%$  of full span.

**Temperature Limits:** -40 to 176°F (-40 to 80°C). (ATEX flameproof, -B suffix and IECEx flameproof, -IE suffix, rated -40 to 145°F (-40 to 63°C) for switch types A, G, M, O, R, S, T, V, or W, -13 to 145°F (-25 to 63°C) for switch types B, D, or I; ATEX intrinsically safe, -IS suffix and IECEx intrinsically safe, -II suffix, rated -13 to 104°F (-25 to 40°C) for switch type I, -40 to 104°F (-40 to 40°C) for switch types O, R, S, V, or W.

**Power Requirements:** 5 to 30 VDC.

**Current Consumption:** 50 mA max.

**Output Signal:** 4 to 20 mA.

**Zero and Span Adjustments:** Trim pots for adjusting both. Mark 1 and 4: Span is adjustable from 50 to 300°. Mark 3: Span is adjustable from 1.5 to 8.5 revolutions.

**Conduit Connection:** 3/4" female NPT standard. Optional one or two 1/2" female NPT. M25 X 1.5 and M20 X 1.5 optional.

**Rotational Travel:** Mark 1 and 4: Minimum: 50°, Maximum: 300°. Mark 3: Minimum: 1.5 revolutions, Maximum: 8.5 revolutions.

### Mark 1 and 4 Transmitter with HART® communication

**Accuracy:**  $\pm 0.5\%$  of full span. Optional  $\pm 0.25\%$  of full span.

**Temperature Limits:** -40 to 176°F (-40 to 80°C). (ATEX flameproof, -B suffix and IECEx flameproof, -IE suffix, rated -40 to 145°F (-40 to 63°C) for switch types A, G, M, O, R, S, V, or W, -13 to 145°F (-25 to 63°C) for switch types B, D, or I; ATEX intrinsically safe, -IS suffix and IECEx intrinsically safe, -II suffix, rated -40 to 104°F (-40 to 40°C) for switch types O, R, S, V, or W; -13 to 104°F (-25 to 40°C) for switch type I.)

**Power Requirements:** 8 to 30 VDC.

**Current Consumption:** 21 mA.

**Output Signal:** 4 to 20 mA.

**HART® Receive Impedance:** Rx = 500 k $\Omega$ ; Cx = 2500 pF.

**Zero and Span Adjustments:** Pushbuttons or HART® communication master for setting both. Mark 1 and 4: Span is adjustable from 0 to 330°. Mark 3: Span is adjustable from 1.5 to 8.5 revolutions.

**Conduit Connection:** 3/4" female NPT standard. Optional one or two 1/2" female NPT. M25 X 1.5 and M20 X 1.5 optional.

**Rotational Travel:** Mark 1 and 4: Maximum: 330°.

### Mark 1 and 4 Transmitter with WirelessHART® communication

**Accuracy:**  $\pm 0.5\%$  of full span. Optional  $\pm 0.25\%$  of full span.

**Temperature Limits:** -40 to 158°F (-40 to 70°C). (ATEX flameproof, -B suffix and IECEx flameproof, -IE suffix, rated -40 to 145°F (-40 to 63°C). ATEX intrinsically safe, -IS suffix and IECEx intrinsically safe, -II suffix, rated -40 to 176°F (-40 to 80°C).

**Power Requirements:** 8 to 30 VDC.

**Current Consumption:** 50 mA max.

**Power Output:** +10 dBm (10 mW).

**Operating Frequency:** 2400 to 2483.5 MHz.

**Operating Channels:** 15.

**Sensitivity:** -85dB.

**Zero and Span Adjustments:** Pushbuttons or WirelessHART® communication master for setting both. Span is adjustable from -160 to 160°.

**Conduit Connection:** Two 1/2" female NPT, M20 X 1.5 optional.

**Rotational Travel:** Mark 1 and 4: Maximum: 320°.

## SPECIFICATIONS

### Product Ratings:

Weatherproof and flameproof. NEMA 1, 2, 3, 3R, 3S, 4, 4X, 6, 7, 9, 12, 13.

UL rated: Class I, Div. 1 & 2, Groups B, C, D (Some units available for Group A, consult factory); Class II, Div. 1 & 2, Groups E, F, and G.

CSA rated: Class I, Div. 1 & 2, Groups A, B, C, D; Class II, Div. 1 & 2, Groups E, F, and G. Submersible to 15 meters (IP68); It is up to the end user to source the proper fittings to ensure a watertight seal.

### ATEX Compliant:

-B suffix, any Output Type except 91: Directive 2014/34/EU, KEMA 03ATEX2391 X, 0518 II 2G Ex db IIC T6 Gb for -25°C/-40°C/-50°C  $\leq$  Tamb  $\leq$  63°C and T5 for -25°C/-40°C/-50°C  $\leq$  Tamb  $\leq$  63°C, optional wording depending on output and switch type selected. Compliant per EN 60079-0:2012+A11:2013 and EN 60079-1:2014.

-B suffix, Output Type 91, with or without -LB suffix: Directive 2014/34/EU, KEMA 03ATEX2391 X, 0518 II 2G Ex db IIC T4 Gb for -40°C  $\leq$  Tamb  $\leq$  63°C. Compliant per EN 60079-0:2012 + A11:2013, EN 60079-1:2014 and EN 60079-11:2012.

-IS suffix, any Output Type except 91: Directive 2014/34/EU, KEMA 03ATEX1392 X, 0518 II 1G Ex ia IIC T4 Ga. Compliant per EN 60079-0:2012 + A11: 2013 and EN 60079-11:2012.

-IS suffix, Output Type 91, with or without -LB suffix: Directive 2014/34/EU, KEMA 03ATEX1392 X, 0518 II 2G Ex ia IIC T4 Ga. Compliant per EN 60079-0:2012+A11:2013 and EN 60079-11:2012.

### IECEx Compliant:

-IE suffix, any Output Type except 91: IECEx DEK 11.0056X Ex db IIC T6 Gb for -25°C/-40°C/-50°C  $\leq$  Tamb  $\leq$  63°C and T5 for -25°C/-40°C/-50°C  $\leq$  Tamb  $\leq$  63°C, optional wording depending on output and switch type selected. Compliant per IEC 60079-0:2011 and IEC 60079-1:2014.

-IE suffix, Output Type 91, with or without -LB suffix: IECEx DEK 11.0056X, Ex db IIC T4 Gb for -40°C  $\leq$  Tamb  $\leq$  63°C. Compliant per IEC 60079-0:2011, IEC 60079-1:2014 and IEC 60079-11: 2011.

-II suffix, any Output Type except 91: IECEx DEK 11.0061X Ex ia IIC T4 Ga.

Compliant per IEC 60079-0:2011, IEC 60079-11:2011, and IEC 60079-26:2014.

-II suffix, Output Type 91, with or without -LB suffix: DEK 11.0061X Ex ia IIC T4 Ga. Compliant per IEC 60079-0:2014, and IEC 60079-11:2011.

### INMETRO Compliant:

IM suffix, Certificate: NCC 13.02338 X; Marking: Ex ia IIC T4 Ga

EM suffix, Certificate: NCC 13.02339 X; Marking: Ex d IIC T6 Gb or Ex d IIC T5 Gb

**Electrical Connections:** Screw terminal. Optional factory sealed leads that are 36" (914.4 mm) of 16 AWG.

**Conduit Connection:** Standard: one 3/4" female NPT; optional one to two 1/2" female NPT; WirelessHART® models: two 1/2" female NPT; Optional: M25 X 1.5 or M20 X 1.5 connections may be supplied in lieu of 3/4" and 1/2" female NPT for all models.

**Mounting Orientation:** Not position sensitive.

**Weight:** 4 to 6 lb (1.5 to 3.0 kg).

**Operational Life:** Over 10,000,000 cycles.

**Maximum Altitude:** 2000 meters.

### Mark 1, 3 and 4 with Switch Outputs

**Temperature Limits:** -58 to 176°F (-50 to 80°C). Switch Type C rated to 350°F (176°C) for 600 hours, Switch Type T rated to 250°F (121°C) continuous. (ATEX flameproof, -B suffix and IECEx flameproof, -IE suffix, rated -58 to 145°F (-50 to 63°C) for switch types A, G, H, T, or M, -40 to 145°F (-40 to 63°C) for switch type O, R, S, V, or W, -13 to 145°F (-25 to 63°C) for switch type B, D, I, or AS Interface; ATEX intrinsically safe, -IS suffix and IECEx intrinsically safe, -II suffix, rated -13 to 104°F (-25 to 40°C) for switch type D or I, -40 to 104°F (-40 to 40°C) for switch type R, V, or W, or -58 to 104°F (-50 to 40°C) for switch type A, G, or H.)

**Switch Type:** See page reference 1 below.

**Electrical Rating:** See page reference 2 below.

**Set Point Adjustment:** Mark 1 and 4: 5 to 360°.

● Switch Type: See page 461 (Series Mark)

● Electrical Rating: See page 461 (Series Mark)



# VALVE POSITION SENSOR

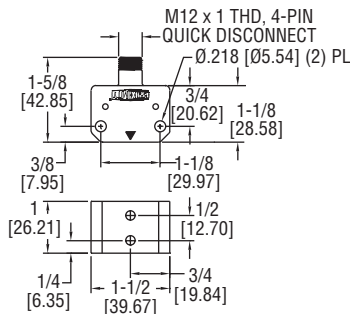
Dual Inductive, 2-Wire AC/DC Sensor, Fully Adjustable Target in 2° Increments



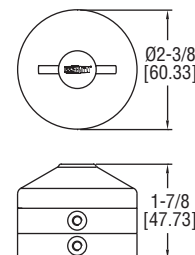
VPS2411



P1



VPS2411



P1

The dual inductive, 2-wire AC/DC **SERIES VPS** Valve Position Sensor maintains VDI/VDE 3845 dimensions so positioners can be easily mounted on top of the sensor and target. The Model VPS2411 Sensor and Model P1 Target mount easily and directly to actuators with ISO NAMUR topworks (see picture below). Solid state components are fully embedded in an epoxy resin to prevent condensation build-up and to protect against vibration and shock. The rugged PBTP housing provides excellent corrosion resistance and moisture protection.

## FEATURES/BENEFITS

- Fully adjustable target in 2° increments
- LED indication for visual indication
- 4-pin quick disconnect electrical connection



Model VPS and P1  
mounted on an actuator

## SPECIFICATIONS

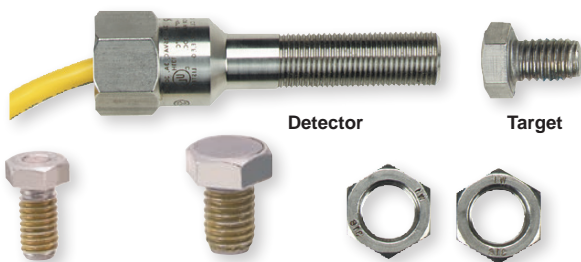
**Temperature Limits:** -13 to 176°F (-25 to 80°C).  
**Power Requirements:** 20 to 140 VAC (50/60 Hz), 10 to 200 VDC.  
**Enclosure Material:** Polybutylene terephthalate.  
**Switch Type:** Dual NO.  
**Electrical Rating:** 200 mA.  
**Minimum Load Current:** 5 mA.  
**Leakage Current:** 0.8 mA.  
**Voltage Drop:** 5.0 V.  
**Repeatability:** 0.01 mm.  
**Hysteresis:** 3 to 15% of sensing range.  
**Switching Frequency:** 25 Hz.  
**Mounting Holes:** NAMUR mounting - 3.15" x 1.18" (80 x 30 mm) or 5.118" x 1.18" (130 x 30 mm).  
**Electrical Connection:** 4-pin quick disconnect.

## MODEL CHART

Model	Description
VPS2411	Valve position sensor
P1	Valve position target
VIP82	Quick disconnect cable

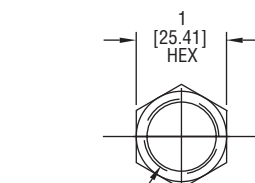
# DETECTOR POSITION SENSOR

Reliable Magnetic Point Sensor, Stainless Steel Housing, AC or DC

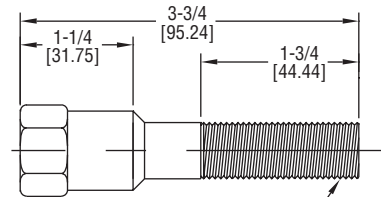


**Standard Target**  
with DT1060 H  
(3/8-16 UNC X 3/4")

**High Strength Target**  
with DT1160  
(1/2-13 UNC X 3/4")



1/2-14 NPT  
**Actuator**



**Detector**

The **SERIES DT** Detector Position Sensors are reliable, magnetically actuated, SS, completely interchangeable with competitive units. AC or DC for user friendly operation. They have no moving parts, eliminate costly seal fittings and offer enhanced reliability by eliminating arcing. Unintentional actuation by metals is not a problem. The sensor consists of a durable hermetically sealed reed switch potted in a SS housing and a separate 316 SS magnetic actuator bolt. As the actuator moves within the sensing range of the sensor, the magnet in the actuator changes the state of reed switch contacts inside the sensor. This either opens or closes a circuit depending on wiring configuration. Sensing distance is 0.1" (2.54 mm) for the standard target. Greater sensitivity of a larger magnetic target increases the sensing distance to 0.5" (12.7 mm).

## FEATURES/BENEFITS

- Excellent for hazardous and corrosive environments
- Can be mounted in any position
- Designed to NEMA 1, 3, 4, 4X, 6, 7, 9, 12 and 13

## APPLICATIONS

- Position monitoring and indication with devices such as linear valves – actuators & cylinders – rotary valves – dampers

## SPECIFICATIONS

**Temperature Limits:** -40 to 163°F (-40 to 73°C).

**Switch Type:** Tungsten, SPDT, Form C.

**Electrical Rating:** 3 A @ 125 VAC, 3 A @ 30 VDC.

**Enclosure Rating:** Weatherproof; Hermetically sealed; Explosion-proof UL & CSA listed for Class I, Groups A, B, C, & D; Class II, Groups E, F & G. Divisions 1 & 2.

**Intrinsically Safe:** Simple apparatus (w/barrier).

**Operating/Response Time:** 3.0 ms.

**Initial Contact Resistance:** 0.50 Ω (max).

**Repeatability:** 0.005" (.01 cm). **Hysteresis:** 0.030" (.08 cm).

**Electrical Connection:** Factory sealed leads with 18" min, 4 conductor, PVC insulated, 18 AWG – green/red/black/white (ground/NC/ NO/common).

**Housing:** 316 SS.

**Potting:** Epoxy resin.

**Conduit:** 1/2"-14" female NPT.

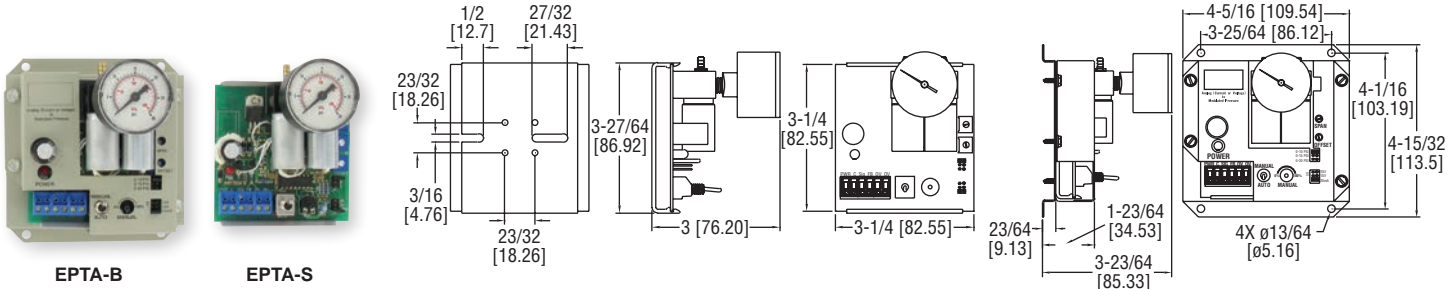
**Weight:** 0.32 lb (145 g); 0.45 lb (204 g) with actuator.

**Agency Approvals:** CSA, cULus.

MODEL CHART		
Model	Description	Sensing Distance
DT1060	Detector and standard actuator	0.1" (2.54 mm)
DT1160	Detector and high strength actuator	0.5" (12.7 mm)

# ELECTRO-PNEUMATIC TRANSDUCER

Low Cost, Selectable Input/Output, Manual Override



Shown with snap-track mounting

Shown with metal bracket mounting

The **SERIES EPTA** is an electric to pneumatic transducer that converts an analog input signal to a linearly proportionate pneumatic output by modulating its control valves to regulate branch line pressure to the set point determined by the input signal. All models incorporate two low voltage valves, an integral in-barb filter, a 0 to 30 psi analog gauge, an anodized aluminum manifold, and brass barbed fittings. The EPTA offers adjustable span and offset as well as manual override. This unit has no air consumption and is immune to mounting orientation. Output pressure ranges include field-selectable 0 to 10, 0 to 15, and 0 to 20 psig. Also included is an analog 0 to 5 VDC feedback signal indicating the resultant branch line pressure. Universal 24 VAC/24 VDC supply voltage and field-selectable 4 to 20 mA, 0 to 5 VDC, 0 to 10 VDC, or 0 to 15 VDC inputs ensure single unit compatibility with most systems. The standard models maintain branch pressure on power loss while the Fail-Safe models will drop the branch pressure to 0 psi on power loss. Mounting configurations include a metal bracket mount in the EPTA-B models and a snap-track mount in the EPTA-S models. The A-400 accessory kit will allow the EPTA-S models to be mounted on a standard DIN rail.

MODEL CHART	
Model	Description
EPTA-S0	Standard snap-track mount transducer
EPTA-B0	Standard metal bracket mount transducer
EPTA-S1	Snap-track mount transducer with fail-safe
EPTA-B1	Metal bracket mount transducer with fail-safe

## SPECIFICATIONS

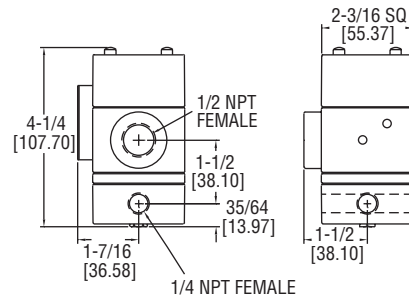
<b>Service:</b> Clean dry air or any inert gas. <b>Input Signal:</b> DC current (4 to 20 mA) or DC voltage (0-5/0-10/0-15). <b>Input Impedance:</b> Current: 250 Ω; Voltage: Infinite. <b>Output Signal:</b> Jumper selectable 0 to 10 psig (0 to 69 kPa), 0 to 15 psig (0 to 103 kPa), or 0 to 20 psig (0 to 138 kPa). <b>Feedback Output:</b> 0 to 5 VDC. <b>Air Supply:</b> 25 psig (172 kPa) max. <b>Air Flow:</b> 750 scfm. <b>Air Consumption:</b> 0 scfm normal operation, fail-safe model vents to 0 psi on power loss. <b>Accuracy:</b> ±1.0% FS @ room temperature; ±2.0% FS @ 32 to 120°F (0 to 48.8°C).	<b>Supply Voltage:</b> 24 VDC (+10%/-5%) or 24 VAC (±10%) 50/60 Hz. <b>Supply Current:</b> 180 mA max, 200 mA max on fail-safe model. <b>Temperature Limits:</b> Operating: 32 to 120°F (0 to 48.8°C); Storage: -20 to 150°F (-6.7 to 65.6°C). <b>Operating Humidity Range:</b> 5 to 95%, non-condensing. <b>Pressure Connections:</b> 1/4" OD (polyethylene tubing optimum). <b>Electrical Connections:</b> Plug-in block terminal type with 5 mm pin spacing. <b>Wire Size:</b> Up to one 14 AWG per terminal. <b>Weight:</b> EPTA-S0: 6.9 oz. (196 g); EPTA-S1: 9.2 oz. (261 g); EPTA-B: 14.5 oz. (411 g).
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## ACCESSORIES

Model	Description
A-400	DIN mounting kit
A-403	Replacement integral barb filter

# CURRENT TO PRESSURE TRANSDUCER

Intrinsically Safe, NEMA 4X Enclosure, Field Reversible, Low Cost



The **SERIES IP** Current to Pressure Transducer converts a current input signal to a linearly proportional pneumatic output pressure. The features include built-in volume booster, low air consumption, field reversible (provides output which is inversely proportional to input signal) and flexible zero and span adjustments. The rugged NEMA 4X enclosure allows splashdown and outdoor installation. The IP can be used for applications that require operation of valve actuators, pneumatic valve positioners, damper and louver actuators, final control elements and relays.

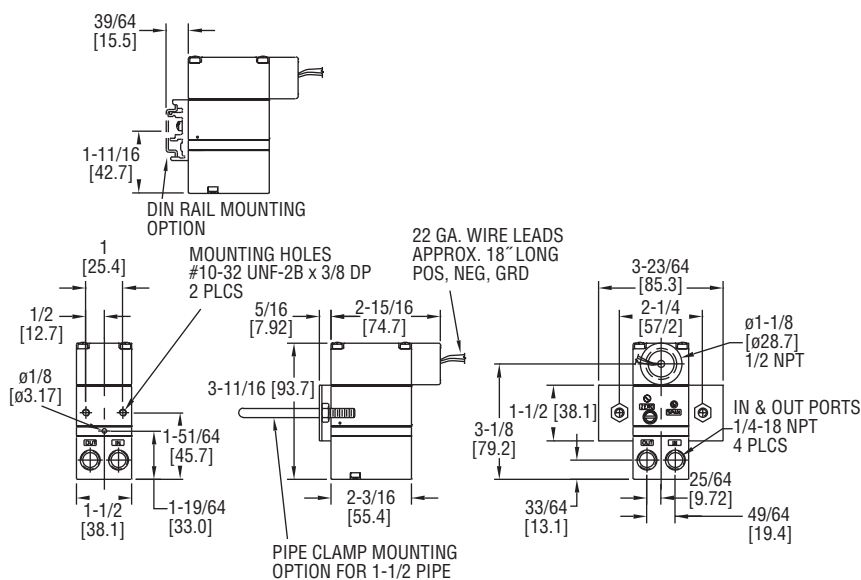
MODEL CHART			
Model	Input Ranges	Output Range	
		psi	kPa
IP-42	4 to 20 mA	3 to 15	20 to 100
IP-43	4 to 20 mA	3 to 27	20 to 185
IP-44	4 to 20 mA	6 to 30	40 to 200

## SPECIFICATIONS

<b>Service:</b> Oil free, clean dry air filtered to 40 microns. <b>Input Signal:</b> 4 to 20 mA. <b>Input Impedance:</b> IP-42: 180 ohms; IP-43 and IP-44: 220 Ω. <b>Air Pressure:</b> Min: 3 psig (21 kPa) above max output; Maximum: 100 psig (700 kPa). <b>Linearity:</b> < ±0.75% of span. <b>Hysteresis:</b> < 1% of span. <b>Repeatability:</b> < 0.5% of span. <b>Supply Pressure Sensitivity:</b> < ±0.1% of span per psig (< ±0.15% of span per 10 kPa). <b>Power Requirements:</b> Loop-powered. <b>Temperature Limits:</b> -20 to 140°F (-30 to 60°C).	<b>Pressure Connections:</b> 1/4" female NPT. <b>Electrical Connection:</b> 1/2" female NPT. <b>Air Consumption:</b> 0.03 SCFM (0.5 m³/h) typical. <b>Output Capacity:</b> 4.5 SCFM (7.6 m³/h ANR) at 25 psig (175 kPa) supply; 12 SCFM (20 m³/h) at 100 psig (700 kPa) supply. <b>Relief Capacity:</b> 2 SCFM (3.4 m³/h) at 5 psig (35 kPa) above 20 psig (140 kPa) setpoint. <b>Weight:</b> 2.1 lb (0.94 kg). <b>Agency Approvals:</b> CE, FM.
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# CURRENT TO PRESSURE TRANSDUCER

NEMA 4X Enclosure, Compact Size, Reliable



The **SERIES 2700** Current to Pressure Transducer combines economical startup cost, low air consumption, and reliable performance to make the 2700 a great investment. The unit converts a variable current signal to a proportional pneumatic output. It has input and output ports on both the front and back which allows for versatile plumbing. The NEMA 4X enclosure enables the unit to be installed indoors or outdoors; however, the unit is not vibration resistant. It is FM and CSA approved for intrinsically safe operation. The 2700 is designed for remote or panel mounting. An integral volume booster provides high flow capacity, increasing control speed in critical applications. Other features include external zero and span adjustments which are convenient for field calibration.

The **SERIES 2800** Current to Pressure Transducer utilizes a closed loop pressure feedback system that closely controls output and compensates for vibration, mounting angle, temperature, and supply pressure variations. These characteristics make this unit ideal for field mounting on a valve. The control mechanism is a piezoceramic actuator encapsulated in a protective skin, which provides a constant defense against humidity and contaminants. These features make this unit ideal for use in demanding applications. The 2800 also comes in a NEMA 4X enclosure and is field reversible. It is FM and CSA approved intrinsically safe, as well. For ease of installation, this model has input and output ports on both the front and back and can be easily panel mounted.

MODEL CHART		
Model	Input	Output
2713-WP	4 to 20 mA	3 to 15 psig (0.2 to 1.0 bar)
2716-WP	4 to 20 mA	6 to 30 psig (0.4 to 2.1 bar)
2813-WP	4 to 20 mA	3 to 15 psig (0.2 to 1.0 bar)
2816-WP	4 to 20 mA	6 to 30 psig (0.4 to 2.1 bar)

ACCESSORIES	
Model	Description
A-180	Valve mounting bracket, for Hi-Flow™ control valves (Series 2800 only)
A-181	DIN rail mounting kit, suitable for EN-50035, EN-50042, and EN-50022 rails
A-182	Pipe mounting kit, for 1-1/2 and 2" pipes

OPTION	
Description	
Valve mount, for factory mounting and calibration to Hi-Flow™ control valves, add current-to-pressure transducer model number as suffix (Series 2800 only)	

## SPECIFICATIONS

**Service:** Oil free, clean dry air filtered to 40 microns.  
**Input Signal:** 4 to 20 mA.  
**Air Supply:** Min: 5 psig (0.3 bar) above max output; Max: 100 psig (6.9 bar).  
**Output:** 3 to 15 psig (0.2 to 1.0 bar), 6 to 30 psig (0.4 to 2.1 bar).  
**Accuracy:** Series 2800:  $\pm 0.1\%$  of span.  
**Linearity:** Series 2700:  $< \pm 0.5\%$  of span.  
**Hysteresis:** Series 2700:  $< 0.5\%$  of span; Series 2800:  $\pm 0.1\%$  of span.  
**Repeatability:** Series 2700:  $< 0.5\%$  of span; Series 2800:  $\pm 0.1\%$  of span.  
**Deadband:** Series 2800: 0.02% of span.  
**Supply Pressure Sensitivity:** Series 2700:  $< 0.1\%$  of span per 1.0 psig (0.1 bar).  
**Power Requirement:** Loop powered.  
**Temperature Limits:** Series 2700: -20 to 150°F (-29 to 66°C); Series 2800: Operating: -40 to 160°F (-40 to 71°C); Storage: -40 to 200°F (-40 to 93°C).  
**Pressure Connections:** 1/4" female NPT.  
**Electrical Connection:** 1/2" female NPT.  
**Air Consumption:** Series 2700: 0.03 scfm (0.01 l/s) at midrange typical; Series 2800: 0.025 scfm (0.01 l/s) at midrange typical.  
**Output Capacity:** 4.5 scfm (2.1 l/s) at 25 psig (1.7 bar) supply; 12.0 scfm (5.7 l/s) at 100 psig (6.9 bar) supply.  
**Enclosure:** Chromate-treated aluminum with epoxy paint.  
**Enclosure Rating:** NEMA 4X (IP66) and intrinsically safe.  
**Weight:** Series 2700: 1.3 lb (0.59 kg); Series 2800: 0.8 lb (0.37 kg).  
**Agency Approvals:** CE, CSA, FM.

## SERIES 2700

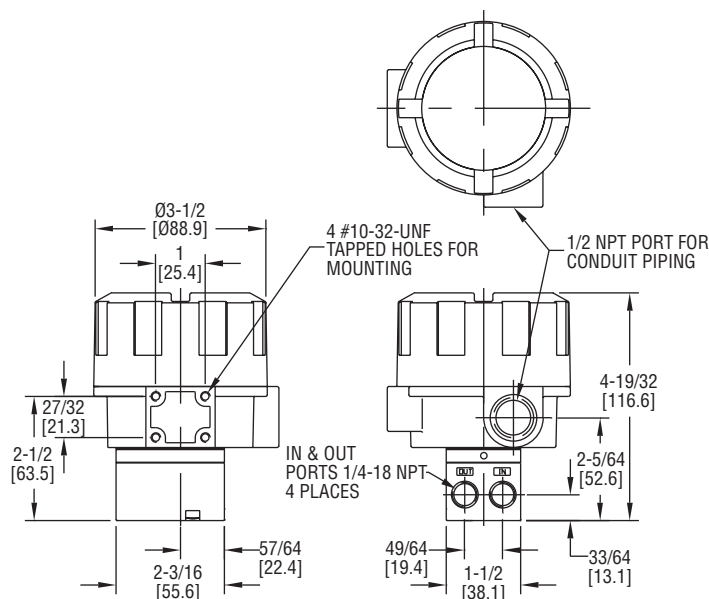
**FM Intrinsically Safe Ratings:** Class I, II, III, Division 1, Groups C, D, E, F and G; Class I, Division 2, Groups A, B, C and D; Class II and III, Division 2, Groups F and G.  
**CSA Intrinsically Safe Ratings:** Class I, Division 2, Groups C and D; Class II, Groups E, F and G; Class III.

## SERIES 2800

**FM Intrinsically Safe Ratings:** Class I, II, and III, Division 1, Groups C, D, E, F, and G; Class I, Zone 0, Group IIB; Class I, II, and III, Division 2, Groups A, B, C, D, F, and G.  
**CSA Intrinsically Safe Ratings:** Class I, Division 2, Groups A, B, C and D; Class II, Division 2, Groups F and G; Class III.

# CURRENT TO PRESSURE TRANSDUCER

Intrinsically Safe, Explosion-Proof, NEMA 4X Enclosure



The **SERIES 2900** Current to Pressure Transducer delivers reliable high performance for the toughest applications in the most hazardous environments. Its NEMA 4X housing is designed and FM and CSA approved for both intrinsically safe and explosion-proof operation. This unit has advanced circuitry which includes electronic feedback control for superior vibration protection and highly accurate output. The 2900 is not position sensitive and the easily accessible zero and span adjustments make field calibration quick and easy. For ease of installation, this model has input and output ports on both the front and back. It is also not vibration sensitive, which makes the 2900 ideal for field mounting on a valve. These features coupled with the unit's compact size help make set-up and installation simple.

## FEATURES/BENEFITS

- Designed for hazardous environments
- Vibration resistant
- Explosion-proof
- Weatherproof and intrinsically safe

MODEL CHART		
Model	Input	Output
2913-E	4 to 20 mA	3-15 psig (0.2-1.0 bar)
2916-E	4 to 20 mA	6-30 psig (0.4-2.1 bar)

ACCESSORIES	
Model	Description
A-180	Valve mounting bracket, for Hi-Flow™ control valves (Series 2800 only)

OPTION	
Description	
Valve mount, for factory mounting and calibration to Hi-Flow™ control valves, add current-to-pressure transducer model number as suffix (Series 2800 only)	

## SPECIFICATIONS

**Service:** Oil free, clean dry air filtered to 40 microns.  
**Input Signal:** 4 to 20 mA.  
**Air Supply:** Min: 5 psig (0.3 bar) above max output; Max: 100 psig (6.9 bar).  
**Output:** 3 to 15 psig (0.2 to 1.0 bar), 6 to 30 psig (0.4 to 2.1 bar).  
**Accuracy:**  $\pm 0.1\%$  of span.  
**Hysteresis:**  $\pm 0.1\%$  of span.  
**Repeatability:**  $\pm 0.1\%$  of span.  
**Deadband:** 0.02% of span.  
**Power Requirement:** Loop powered.  
**Temperature Limits:** Operating: -40 to 160°F (-40 to 71°C); Storage: -40 to 200°F (-40 to 93°C).  
**Pressure Connections:** 1/4" female NPT.  
**Electrical Connection:** 1/2" female NPT.  
**Air Consumption:** 0.05 scfm (0.02 l/s) at midrange typical.  
**Output Capacity:** 4.5 scfm (2.1 l/s) at 25 psig (1.7 bar) supply; 12.0 scfm (5.7 l/s) at 100 psig (6.9 bar) supply.  
**Enclosure:** Chromate-treated aluminum with epoxy paint.  
**Enclosure Rating:** Weatherproof NEMA 4X (IP66), explosion-proof and intrinsically safe.  
**Weight:** 1.8 lb (0.82 kg).  
**Agency Approvals:** CE, CSA, FM.

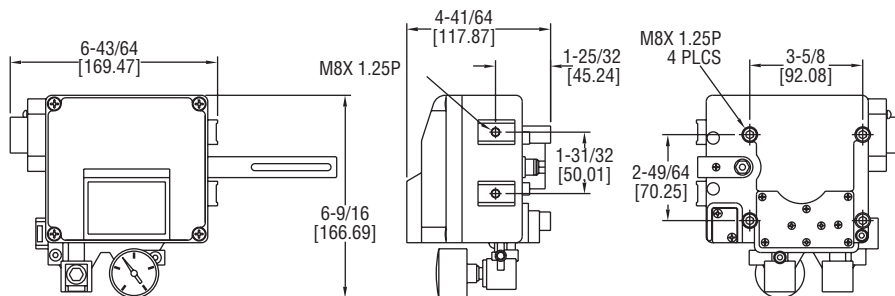
**FM Ratings:** Explosion-proof for Class I Division 1, Groups B, C, and D, T6; Dust Ignitionproof for Class I, Division 1, Groups E, F, and G, T6; Intrinsically safe for Class I, II, and III, Division 1, Groups C, D, E, F, and G, T4 hazardous (classified) locations and intrinsically safe for Class I, Zone 0, Group IIB, T4 hazardous (classified) locations and suitable for Class I, Groups A, B, C, D, T4, and Class II and III, Division 2, Groups F and G, T6 hazardous (classified) locations.

**CSA Ratings:** Class I Division 1, Groups B, C, and D; Class I, Division 2, Groups A, B, C and D; Class II, Division 1, Groups E, F, and G; Class II and III, Division 2, Groups F and G.

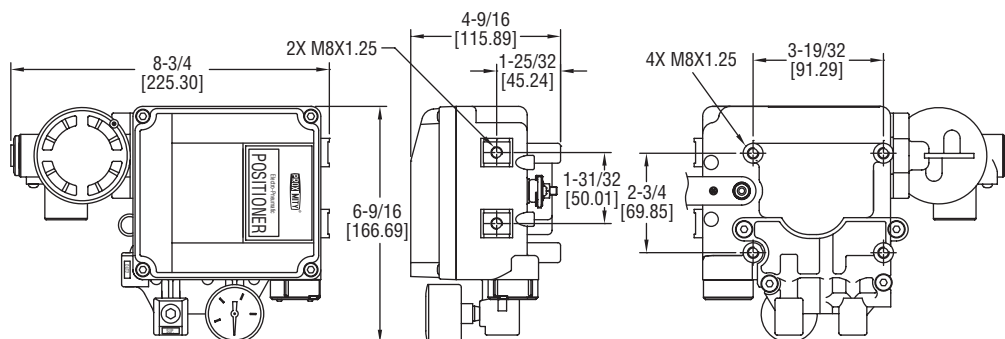


# PRECISOR® II PNEUMATIC AND ELECTRO-PNEUMATIC POSITIONER

Linear Operation, Field Selectable Cam Design, 316 SS Models



Series 165NL



Series 165EL

The **SERIES 165 PRECISOR® II** Pneumatic and Electro-Pneumatic Positioners deliver stable process control at an exceptionally low price. Its rugged, durable design makes it ideal for harsh environments while maintaining precise, accurate positioning of the control element. Units can be easily changed from direct to reverse action, or vice versa. Low air consumption keeps operating costs at a minimum, while still responding quickly and accurately. Excellent for use in chemical processing, food and beverage, pulp and paper, and pharmaceutical industries, as well as many others.

## FEATURES/BENEFITS

- Field selectable cam for direct or reverse acting

## APPLICATIONS

Series 165 PRECISOR® II Pneumatic and Electro-Pneumatic Positioners provide excellent modulating control when used between the Dwyer Temperature Controllers, Current to Pressure Transducer, and the Hi-Flow™ Valve in such industries as the food and beverage processing, chemical, pharmaceutical, and wood pulp and paper.

## HOW TO ORDER:

1. Select Model No. to specify input control signal.
2. For proper mounting hardware, order according to which actuator the positioner will be mounted to.

MODEL CHART		
Model	Input	Enclosure
165NL	3 to 15 psig	Aluminum
165EL	4 to 20 mA	Aluminum
165EL-SS	4 to 20 mA	Stainless steel

ACCESSORIES - MOUNTING KITS	
Model	For Actuator Models
A-233	220 and 221 air-to-lower
A-234	222 and 223 air-to-lower
A-235	230 and 231 air-to-raise
A-236	233 air-to-raise

## SPECIFICATIONS

**Input Signal:** Pneumatic: 3 to 15 psig (0.2 to 1 bar); Electro-pneumatic: 4 to 20 mA DC.  
**Input Impedance:** (165EL only): 250 ±15 Ω.  
**Enclosure Material:** Aluminum diecasting or 316 SS.  
**Air Supply:** 20 to 100 psig (1.4 to 6.9 bar).  
**Air Supply Connection:** 1/4" NPT.  
**Gage Connection:** 1/8" NPT.  
**Electrical Connection:** Screw terminal.  
**Conduit Connection:** 1/2" NPT (165EL only).  
**Linearity:** ±0.2% FS.  
**Hysteresis:** 1% FS.  
**Sensitivity:** ±0.2% FS.  
**Repeatability:** ±0.5% FS.  
**Air Consumption:** 0.10 scfm (3 LPM) at 20 psig (1.4 bar) supply.  
**Flow Capacity:** 28 scfm (80 LPM) at 20 psig (1.4 bar) supply.  
**Stroke:** 0.5 to 6" (10 to 150 mm).  
**Enclosure Rating:** IP66 (NEMA 4X).  
**Temperature Limits:** Aluminum: -4 to 158°F (-20 to 70°C); SS: -40 to 158°F (-40 to 70°C).  
**Weight:** 165NL: 3.1 lb (1.7 kg); 165EL: 6.1 lb (2.7 kg).  
**Agency Approvals:** CE (165EL only).

## OPTION

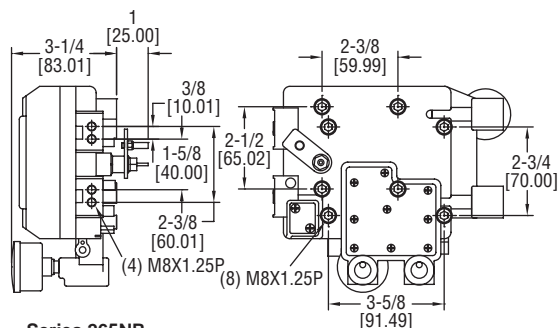
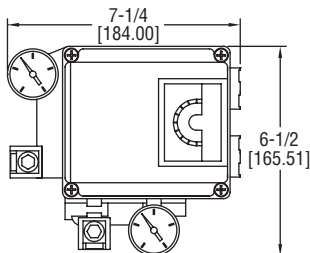
### Description

Valve mount, for factory mounting and calibration to Hi-Flow™ control valves, add suffix to valve model number of positioner. (Does not include valve or positioner price)

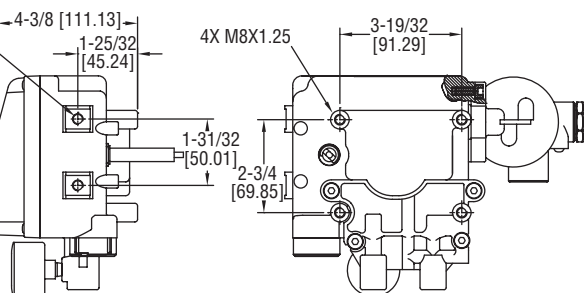
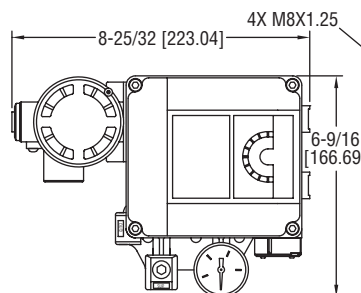
**Example:** 2004VA32-231-165EL

# PRECISOR® II PNEUMATIC AND ELECTRO-PNEUMATIC POSITIONER

Rotary Operation, Field Selectable Cam Design, 316 SS Models



Series 265NR



Series 265ER

Proximity **SERIES 265** PRECISOR® II Pneumatic and Electro-Pneumatic Positioners combine outstanding performance with an extremely low price, making it an exceptional value for industrial applications. Rotary valves with single or double acting pneumatic actuators can be precisely controlled, such as our ball and butterfly valves. The Precisor® II positioner proportionally modulates the valve from either an electric 4 to 20 mA or pneumatic 3 to 15 psig input signal, based on the model chosen and is user-selectable for single or double action. Its rugged, durable design makes it ideal for use in harsh environments, while maintaining precise, accurate positioning of the control elements. Includes a bracket for mounting onto actuators with NAMUR standard connections, and features a versatile linear cam for direct action, reverse action, or split ranges.

## FEATURES/BENEFITS

- Field selectable cam for direct or reverse acting
- User selectable single or double action
- Highly visible indicator for local indication

MODEL CHART			
Model	Input	Lever Type	Enclosure
265NR-D5	3 to 15 psig	NAMUR	Aluminum
265ER-D5	4 to 20 mA	NAMUR	Aluminum
265ER-D5SS	4 to 20 mA	NAMUR	Stainless steel

## SPECIFICATIONS

**Input Signal:** Pneumatic: 3 to 15 psig (0.2 to 1 bar); Electro-pneumatic: 4 to 20 mA DC.

**Input Impedance:** (265ER only): 250 ±15 Ω.

**Enclosure Material:** Aluminum diecasting or 316 SS.

**Air Supply:** 20 to 101 psig (1.4 to 7.0 bar).

**Air Supply Connection:** 1/4" NPT.

**Gage Connection:** 1/8" NPT.

**Electrical Connection:** Screw terminal.

**Conduit Connection:** 1/2" NPT (265ER only).

**Linearity:** ±2% FS.

**Hysteresis:** 1% FS.

**Sensitivity:** ±0.5% FS.

**Repeatability:** ±0.5% FS.

**Air Consumption:** 0.10 scfm (3 LPM) at 20 psig (1.4 bar) supply.

**Flow Capacity:** 28 scfm (80 LPM) at 20 psig (1.4 bar) supply.

**Stroke:** 0 to 90°.

**Enclosure Rating:** IP66.

**Temperature Limits:** -4 to 158°F (-20 to 70°C).

**Weight:** 265NR: 3.1 lb (1.7 kg); 265ER: 6.2 lb (2.8 kg).

**Agency Approvals:** CE (265ER only).

ACCESSORIES	
Model	Description
A-228	SS steel flex hose, 12" (30.48 cm) L, 1/8" male NPT connections
A-332	Brass adapter, 1/8" female NPT to 1/4" male NPT

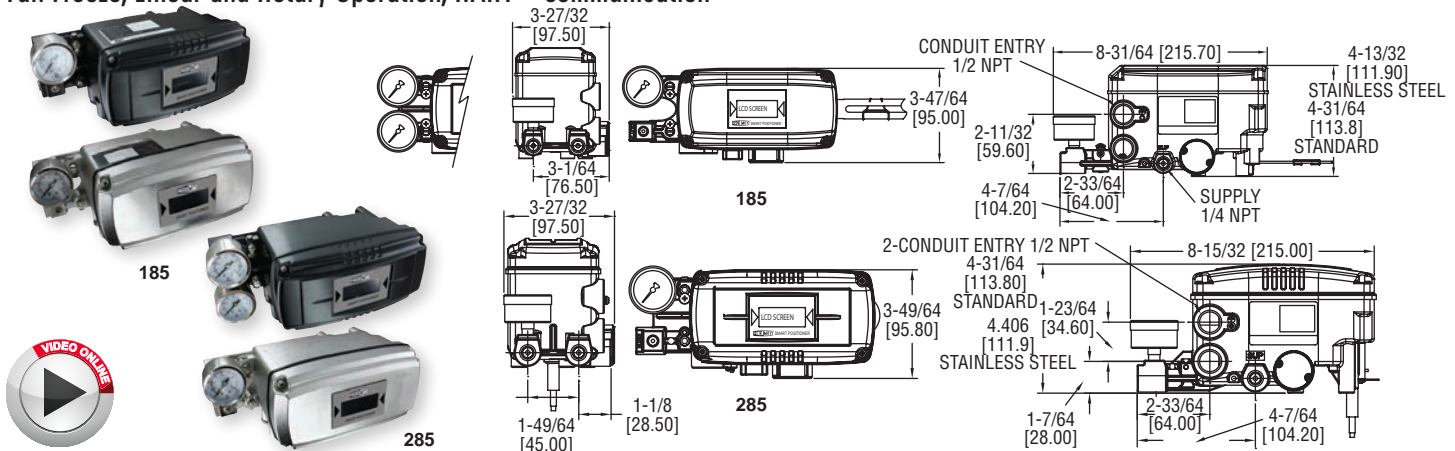


## Pneumatic Hosing and Fittings

Hosing and fittings for connecting positioners, current to pressure transducers, air filter gauges and other accessories to pneumatic actuated valves.

# LINEAR & ROTARY SMART POSITIONERS

Fail Freeze, Linear and Rotary Operation, HART<sup>®</sup> Communication



Proximity **SERIES 185 & 285** Smart Positioners combine an easy to use, high performance unit with a low price. Series 185 models accurately control the valve stroke of linear motion valves and Series 285 models accurately control the valve stroke of rotary motion valves. An analog feedback signal is outputted to stabilize any valve system, and easy to use functions such as auto calibration ensure the accuracy of the unit. The compact design of this unit makes it easy to use with any size actuator. Smart Positioners feature a LCD screen attached to the outer surface of the unit, allowing for an easy inspection of the positioner condition while in the field. Available in user selectable single or double action, with HART<sup>®</sup> communication as standard. In the event that the 4-20 mA input signal is lost the 185 and 285 will fail in place.

MODEL CHART		
Model	Communication	Enclosure
185EL-D1	HART <sup>®</sup>	Aluminum
185EL-D1SS	HART <sup>®</sup>	Stainless steel
285ER-D5	HART <sup>®</sup>	Aluminum
285ER-D5SS	HART <sup>®</sup>	Stainless steel

## SPECIFICATIONS

**Input Signal:** 4 to 20 mA DC.  
**Input Impedance:** 460  $\Omega$  max @ 20 mA DC.  
**Enclosure Material:** Aluminum or 316 SS.  
**Air Supply:** 35 to 116 psi (2.4 to 8 bar).  
**Air Connection:** 1/4" NPT.  
**Gage Connection:** 1/8" NPT.  
**Conduit Connection:** 1/2" NPT.  
**Linearity:**  $\pm 0.5\%$  FS.  
**Hysteresis:**  $\pm 0.5\%$  FS.  
**Sensitivity:**  $\pm 0.2\%$  FS.

**Repeatability:**  $\pm 0.3\%$  FS.  
**Air Consumption:** .0004 scfm (.01 LPM) at 20 psig (1.4 bar) supply.  
**Flow Capacity:** 2.1 scfm (60 LPM) at 20 psig (1.4 bar) supply.  
**Stroke:** 0.5 to 6" (10 to 150 mm) or 0 to 90°.  
**Enclosure Rating:** NEMA 4X (IP66).  
**Temperature Limits:** -22 to 185°F (-30 to 85°C).  
**Weight:** 3.3 lb (1.5 kg); SS models: 6.4 lb (2.9 kg).

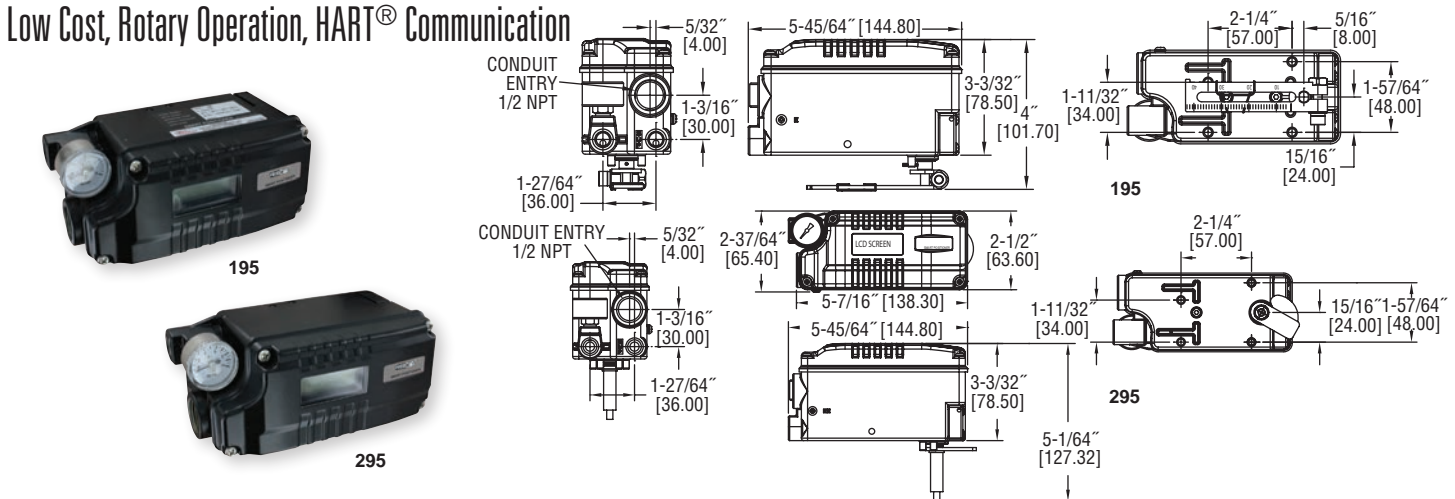
HART<sup>®</sup> is a registered trademark of Hart Communication Foundation

Filters and Regulators: See pages 471-472

## SERIES 195 & 295 | PROXIMITY BY DWYER

# COMPACT LINEAR & ROTARY SMART POSITIONERS

Low Cost, Rotary Operation, HART<sup>®</sup> Communication



Proximity **SERIES 195 & 295** Smart Positioners are a compact, high performance unit with a low price. Series 195 models accurately control the valve stroke of linear motion valves and Series 295 models accurately control the valve stroke of rotary motion valves. An analog feedback signal is outputted to stabilize any valve system, and easy to use functions such as auto calibration ensure the accuracy of the unit. The handheld size of this unit makes it easy to use with any size actuator, and can be used in applications where a larger positioner may not fit. Series 195 and 295 Smart Positioners feature a LCD screen attached to the outer surface of the unit, allowing for an easy inspection of the positioner condition while in the field. Available with HART<sup>®</sup> communication.

MODEL CHART		
Model	Action	Communication
195EL-S1	Single	None
195EL-S2	Single	HART <sup>®</sup>
295ER-S1	Single	None
295ER-S2	Single	HART <sup>®</sup>

## SPECIFICATIONS

**Input Signal:** 4 to 20 mA DC.  
**Input Impedance:** 460  $\Omega$  max @ 20 mA DC.  
**Enclosure Material:** Aluminum.  
**Air Supply:** 35 to 116 psi (2.4 to 8 bar).  
**Air Connection:** 1/4" NPT.  
**Gage Connection:** 1/8" NPT.  
**Conduit Connection:** 1/2" NPT.  
**Linearity:**  $\pm 0.5\%$  FS.  
**Hysteresis:**  $\pm 0.5\%$  FS.  
**Sensitivity:**  $\pm 0.2\%$  FS.

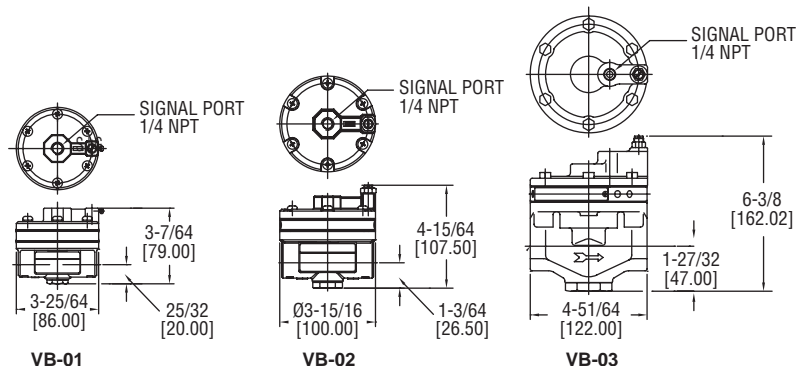
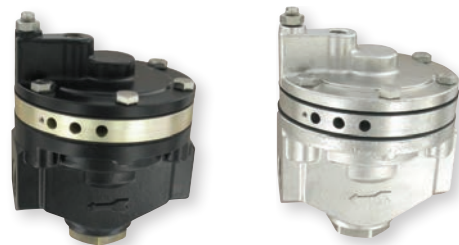
**Repeatability:**  $\pm 0.3\%$  FS.  
**Air Consumption:** .0004 scfm (.01 LPM) at 20 psig (1.4 bar) supply.  
**Flow Capacity:** .32 scfm (9 LPM) at 20 psig (1.4 bar) supply.  
**Stroke:** 0.19 to 1.38" (5 to 35 mm) or 0 to 90°.  
**Enclosure Rating:** NEMA 4X (IP66).  
**Temperature Limits:** -22 to 185°F (-30 to 85°C).  
**Weight:** 1.8 lb (.82 kg).

HART<sup>®</sup> is a registered trademark of Hart Communication Foundation

Filters and Regulators: See pages 471-472

# VOLUME BOOSTER

Economical, 1:1 Ratio



The **SERIES VB** Volume Booster is a one to one signal to output relay and an ideal solution to increasing valve stroke speed. A large input signal change to the booster delivers high volume for quick throttling control. Volume booster responds to the slightest changes in input signal, which in turn increases accuracy of the output of air pressure to the actuator. This booster receives the positioner's signal output and supplies the proper air pressure to the actuator to reduce response and adjustment time. Available in aluminum or stainless steel.

MODEL CHART				
Model	Cv	Weight	In/Out Connection	Construction
VB-01	1.02	1.1 lb (0.5 kg)	1/4" NPT	Aluminum
VB-01SS	1.02	2.9 lb (1.3 kg)	1/4" NPT	SS
VB-02	2.32	1.7 lb (0.76 kg)	1/2" NPT	Aluminum
VB-02SS	2.32	4.2 lb (1.9 kg)	1/2" NPT	SS
VB-03	4.98	5.1 lb (2.3 kg)	3/4" NPT	Aluminum
VB-03SS	4.98	11 lb (5 kg)	3/4" NPT	SS

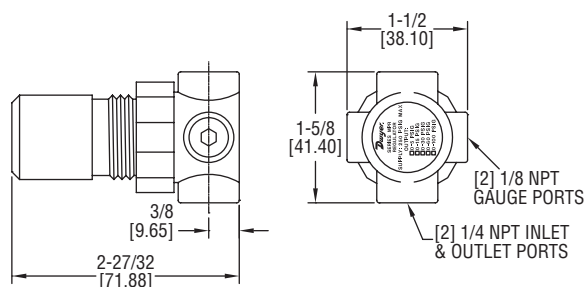
## SPECIFICATIONS

**Service:** Air only.  
**Wetted Materials:** Body: Aluminum or SS; Diaphragm: Nitrile elastomer.  
**Max Supply Pressure:** 145 psi (10 bar).  
**Max Signal/Output Pressure:** 101.5 psi (7 bar).  
**Signal Connection:** 1/4" NPT.  
**In/Output Pressure Ratio:** 1:1.  
**Temperature Limits:** -4 to 158°F (-20 to 70°C).  
**Linearity:** ±1% FS.  
**In/Output Connection:** See model chart.  
**Weight:** See model chart.

## SERIES MPR | PROXIMITY BY DWYER

# MINIATURE PRESSURE REGULATOR

Air or Water Regulator, Compact and Lightweight, Low Cost



The **SERIES MPR** Miniature Pressure Regulators are compact units that provide low cost, high performance pressure regulation of compressed air or air/water. The low torque, non-rising adjustment knob with locking capability provides easy and precise adjustment. Models for use with air are self relieving. Models for air/water are non-relieving.

MODEL CHART		
Air Model	Air/Water Model	Range
MPR1-0	MPR2-0	0 to 5 psi
MPR1-1	MPR2-1	0 to 15 psi
MPR1-2	MPR2-2	0 to 30 psi
MPR1-3	MPR2-3	0 to 60 psi
MPR1-4	MPR2-4	0 to 100 psi

ACCESSORIES	
Model	Description
MPR-B	Mounting bracket
MPR-N	Panel mounting nut

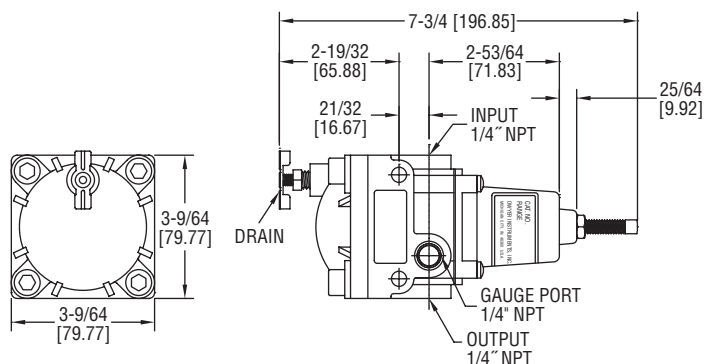
## SPECIFICATIONS

**Service:** Compressed air or water.  
**Wetted Materials:** Body: Zinc; Bonnet: Acetal; Diaphragm/seals: Nitrile; Internals: Aluminum, brass, acetal, steel, music wire (MPR2 is plated with electroless nickel for water use).  
**Maximum Supply Pressure:** 250 psig (17.2 bar).  
**Temperature Limits:** 0 to 150°F (-18 to 60°C).  
**Flow Capacity:** 24 SCFM (48 m3/hr) at 100 psig (6.9 bar) supply, 60 psig (4.1 bar) output.  
**Process Connection:** Inlet and outlet: Two 1/4" female NPT; Two 1/8" female NPT gage ports.  
**Weight:** 4 oz (113 g).



**Dwyer**  
SERIES AFR

# AIR FILTER REGULATOR



**SERIES AFR** Air Filter Regulator provides clean air pressure to pneumatic controllers, valve positioners, air cylinders and other equipment. Self-relieving regulator is equipped with a 40 micron filter housed in a dripwell with gage port.

## MODEL CHART

Model	Range
AFR1	0 to 10 psi (0 to 65 kPa)
AFR2	0 to 30 psi (0 to 200 kPa)
AFR3	0 to 60 psi (0 to 400 kPa)
AFR4	0 to 120 psi (0 to 800 kPa)

## ACCESSORY

Model	Description
AFR-BRKT	Mounting bracket

## SPECIFICATIONS

**Service:** Air only.

**Wetted Materials:** Body: Aluminum alloy, irridite, and lock epoxy finish; Filter: Phenolic impregnated cellulose; Diaphragm and valve seat plug: Nitrile elastomer.

**Max. Supply Pressure:** 250 psig (1700 kPa).

**Temperature Limits:** 0 to 160°F (-18 to 71°C).

**Sensitivity:** 1" (2.5 cm) of water.

**Consumption:** <6 SCFH (0.17 m<sup>3</sup>/hr).

**Flow Capacity:** 20 SCFM (33 m<sup>3</sup>/hr) @ 100 psig (700 kPa) supply.

**Exhaust Capacity:** 0.1 SCFM (0.17 m<sup>3</sup>/hr) with downstream pressure 5 psig (35 kPa) above set point.

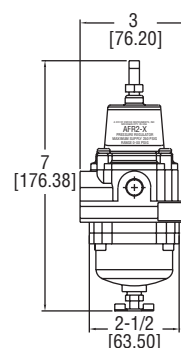
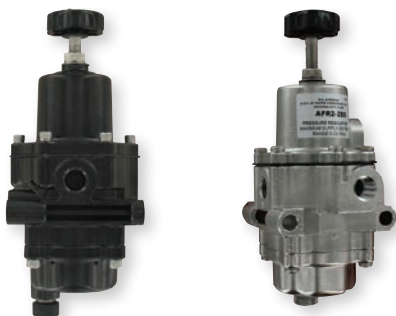
**Process Connection:** 1/4" female NPT.

**Weight:** 1.6 lb (725 g).

## SERIES AFR2 | PROXIMITY BY DWYER

# INSTRUMENT AIR FILTER REGULATOR

Compact, Stainless Steel Models, Cost-Effective



**SERIES AFR2** Air Filter Regulator provides clean air pressure to pneumatic controllers, valve positioners, air cylinders and other equipment. Self-relieving regulator is equipped with a 40 micron filter housed in a dripwell with gage port.

## MODEL CHART

Model	Range	Body
AFR2-1	0 to 60 psi (0 to 4 bar)	Aluminum
AFR2-1SS	0 to 60 psi (0 to 4 bar)	Stainless steel
AFR2-2SS	0 to 121 psi (0 to 8 bar)	Stainless steel

## SPECIFICATIONS

**Service:** Air only.

**Wetted Materials:** Body: Aluminum or SS; Filter: Polyethylene; Diaphragm and valve seat plug: Nitrile elastomer.

**Max. Supply Pressure:** 250 psi (17.2 bar).

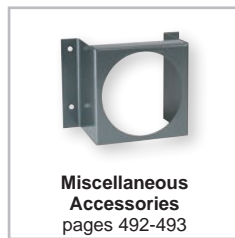
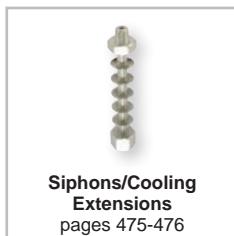
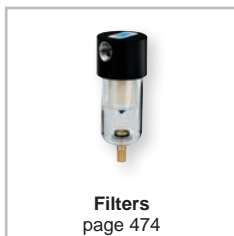
**Temperature Limits:** -4 to 158°F (-20 to 70°C).

**Minimum Filtering Size:** 5 microns.

**Process Connection:** 1/4" NPT.

**Weight:** 1.7 lb (0.6 kg), SS models: 3.0 lb (1.4 kg).





## FEATURED PRODUCTS

### STAINLESS STEEL STATIC PRESSURE TIPS

page 490



- Corrosive resistant pressure tips for use in both ducts and rooms provides long service-life
- Kitted to included gasket and screws, eliminates searching for parts and simplifying installation

### STATIC PRESSURE PICK-UP

page 491

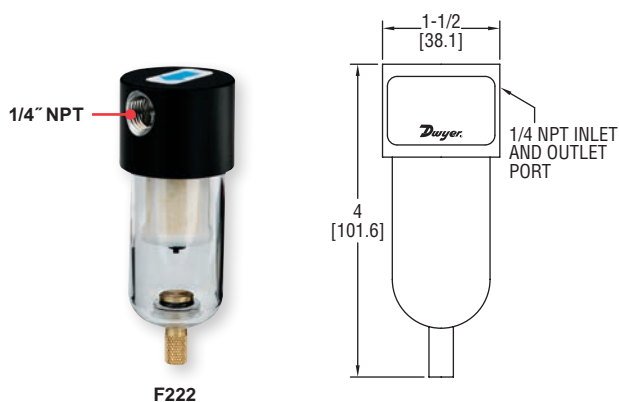


- Wall plate design provides an effective means to pick-up room pressure without exposing sensing elements to damage
- Easy mounting to multitude of wall surfaces permits flexible use and helping to support room designs

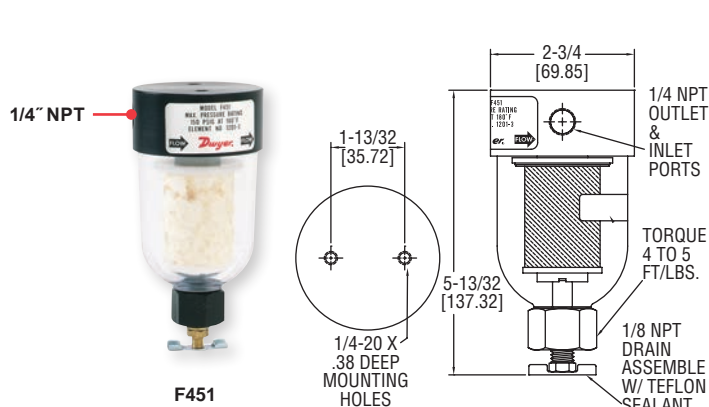


## MODEL F222 &amp; F451

## LIQUID/PARTICLE FILTERS



F222



F451

**MODEL F222 & F451** Compressed Air Filters protect equipment and instrumentation from harmful contaminants such as dirt, water and oil. Liquids are continuously coalesced and released through the manual drain valves. Replaceable filter element removes particles and droplets as small as 0.01 micron with 93% efficiency. Units have 1/4" female NPT inlet and outlet and manual drain valve.

MODEL CHART	
Model	Description
F222	Liquid/particle filter
F451	Liquid/particle filter
1201-3	Replacement filters for F451 (pack of 3)

## SPECIFICATIONS

**Filtration Efficiency:** 93% (removal of 0.01 micron particles).

**Maximum Pressure:** 150 psig (10 bar).

**Maximum Temperature:** 130°F (54°C).

**Max. Flow at 100 psig:** 22 SCFM (F222); 45 SCFM (F451).

**Inlet & Outlet Ports:** 1/4" female NPT.

**Mounting:** In-line only (F222); 1/4-20 mounting holes (F451).

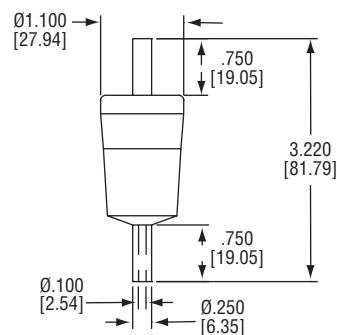
**Materials of Construction:** Anodized aluminum head, polycarbonate bowl, cadmium plated steel tie rod, nylon internals, Buna-N seal.

**Weight:** 0.5 lb (0.2 kg) (F222); 1.1 lb (0.5 kg) (F451).

## MODEL F195

## DISPOSABLE IN-LINE FILTER

Flowmeter Accessories and Options



Remove 99.99% of unwanted particles from within your gas flow with the **MODEL F195** Disposable In-Line Filter. Encapsulated microfiber filter elements are able to filter particles as small as 0.1 micron. Filters are completely disposable — simply remove the filter from your line and throw it away when it becomes dirty. The transparent nylon housing makes it simple to determine if the filter needs to be changed.

MODEL CHART	
Model	Description
F195	Disposable in-line filter

LINE PRESSURE VS. FLOW										
Line Pressure (psig)	1.5	10	20	30	40	60	80	100	125	
Gas Flow (scfm)	0.6	0.9	1.3	1.6	2.0	2.7	3.5	4.2	5.7	

**Note:** 1.5 psi pressure drop.

## SPECIFICATIONS

**Filtration Efficiency:** 99.99% (removal of 0.1 micron particles).

**Housing Construction:** Nylon.

**Filter Tube Dimensions:** 0.59 ID x 1.39 L.

**Maximum Temperature:** 230°F @ 0 psig (110°C @ 0 bar), 120°F @ 125 psig (49°C @ 9 bar).

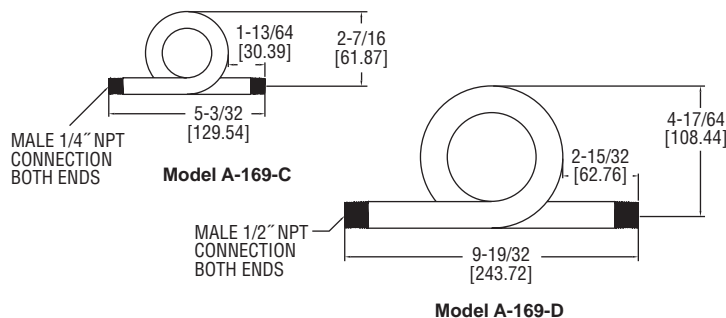
**Maximum Pressure:** 125 psig (8.6 bar).

**Maximum Differential Pressure:** 60 psi (4 bar) (in-to-out flow direction), 20 psi (1.4 bar) (out-to-in flow direction).

**Internal Volume:** 11.5 cc (11.5 ml).

**Connections:** Barbed for 1/4" ID tubing.

# CARBON STEEL SIPHONS



The **SERIES A-169** Carbon Steel Siphons protect pressure instruments in high temperature applications. Water held in the 180° coil prevents steam from contacting the instrument. Constructed with carbon steel, the A-169 siphons can withstand high temperature and pressure. They are ideal for use with pressure gages and instrumentation where the process media temperature exceeds the rating of the instrument. The male NPT connection allows for easy installation and secure attachment.

## SPECIFICATIONS

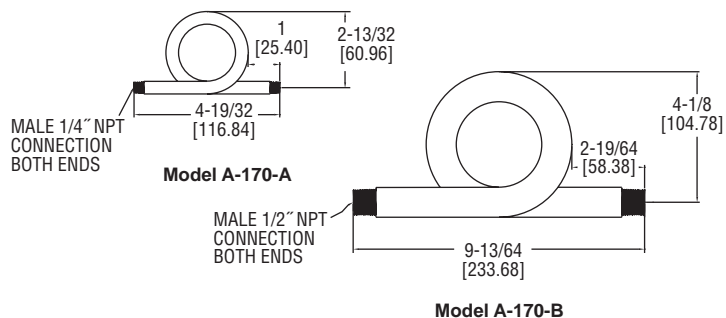
**Service:** Compatible liquids and gases.  
**Wetted Materials:** Carbon steel.  
**Pressure Limits:** 500 psi (34 bar).  
**Temperature Limits:** 680°F (360°C).  
**Process Connections:** See chart.  
**Weight:** 1/4" NPT models: 8 oz (226.8 g); 1/2" NPT models: 34.9 oz (988.8 g).

## MODEL CHART

Model	Process Connections	Material
A-169-C	1/4" NPT male	Carbon steel SCH 80
A-169-D	1/2" NPT male	Carbon steel SCH 80

## SERIES A-170

# 316 STAINLESS STEEL SIPHONS



The **SERIES A-170** 316 Stainless Steel Siphons protect pressure instruments in high temperature applications. Water held in the 180° coil prevents steam from contacting the instrument. Constructed with 316 stainless steel, the A-170 siphons offer the best resistance to corrosion, high temperature, and pressure. They are ideal for use with pressure gages and instrumentation where the process media temperature exceeds the rating of the instrument. The male NPT connection allows for easy installation and secure attachment.

## SPECIFICATIONS

**Service:** Compatible liquids and gases.  
**Wetted Materials:** 316 SS.  
**Pressure Limits:** See chart.  
**Temperature Limits:** See chart.  
**Process Connections:** See chart.  
**Weight:** 1/4" NPT models: 8 oz (226.8 g); 1/2" NPT models: 25.6 oz (725.75 g).  
**Agency Approvals:** RoHS\*.  
 \*Model A-170 is not RoHS certified.

## MODEL CHART

Model	Process Connections	Material	Pressure Limit
A-170*	1/4" NPT male	316 SS SCH80	2307 psi @ 200°F
A-170-A	1/4" NPT male	316 SS SCH40	500 psi @ 680°F
A-170-B	1/2" NPT male	316 SS SCH40	500 psi @ 680°F

\*Model A-170 is not RoHS certified.



SERIES A-240/A-250

# PERFORATED OR SPIRAL COOLING TOWER

Protect Instrumentation in High Temperature Applications

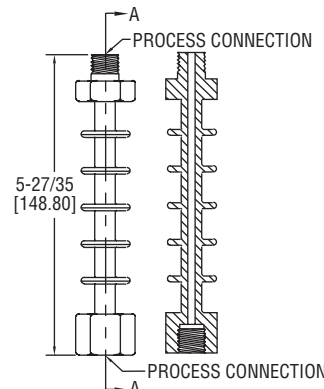
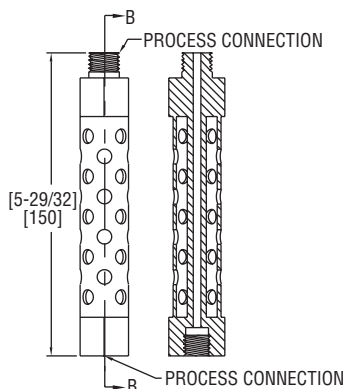


A-240



A-250

CONNECTION CHART	
1/4" male/female NPT	
3/8" male/female NPT	
1/2" male/female NPT	
1/4" male/female BSPP	
3/8" male/female BSPP	
1/2" male/female BSPP	



The **SERIES A-240/A-250** Perforated and Spiral Cooling Towers protect pressure instruments during high temperature applications. Both the spiral and perforated styles are made with 316L SS, and are available with various process connections in NPT or BSPP style. Both Cooling Towers are ideal for use with pressure gages, switches, and transmitters where the process media temperature exceeds the rating of the instrument.

## SPECIFICATIONS

**Service:** Compatible liquids and gases.  
**Wetted Parts:** 316L SS.  
**Temperature Limits:** 428°F (220°C).  
**Pressure Limits:** 5800 psi (400 bar).  
**Process Connections:** See chart.  
**Height:** 6" (150 mm).  
**Weight:** 8 oz (227 g).

MODEL CHART					
Model	Style	Connections	Model	Style	Connections
A-240-A	Perforated	1/4" male/female NPT	A-250-A	Spiral	1/4" male/female NPT
A-240-B	Perforated	3/8" male/female NPT	A-250-B	Spiral	3/8" male/female NPT
A-240-C	Perforated	1/2" male/female NPT	A-250-C	Spiral	1/2" male/female NPT
A-240-D	Perforated	1/4" male/female BSPP	A-250-D	Spiral	1/4" male/female BSPP
A-240-E	Perforated	3/8" male/female BSPP	A-250-E	Spiral	3/8" male/female BSPP
A-240-F	Perforated	1/2" male/female BSPP	A-250-F	Spiral	1/2" male/female BSPP

# ADJUSTABLE PRESSURE SNUBBER

Protect Instruments from Pressure Spikes or Fluid Hammer

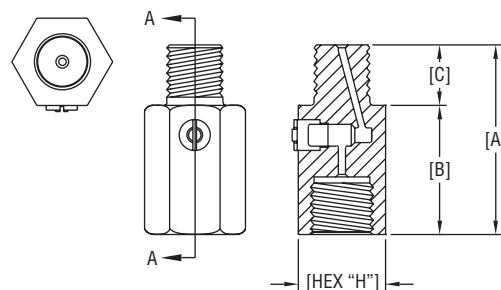


Brass



316 SS

DIMENSIONS				
Connections	A	B	C	H
1/4" M x F	55	42	13	25.0
3/8" M x F	60	44	16	25.0
1/2" M x F	60	40	20	28.0



The **ADJUSTABLE PRESSURE SNUBBERS** protect pressure instruments against fluctuations, surges, spikes and fluid hammer. The fine thread adjustable valve allows you to fine tune harmful harmonic vibration from the fluid systems and isolate the instrument from process when service or replacement is necessary. These Pressure Snubbers are designed to provide fully field adjustable dampening. By using our Adjustable Pressure Snubbers, you will alleviate surges and pulsations to assure steady pressure readings and extend the life of your instrument.

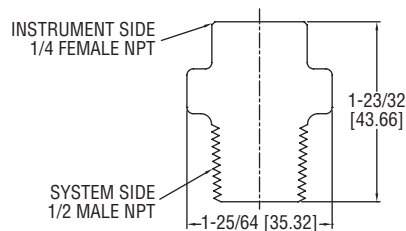
## SPECIFICATIONS

**Service:** Compatible liquids and gases.  
**Wetted Parts:** Brass or 316 SS.  
**Pressure Limits:** 5690 psi (392 bar).  
**Temperature Limits:** -4 to 302°F (-20 to 150°C).  
**Process Connections:** See chart.  
**Weight:** 8.4 oz (238 g).

MODEL CHART					
Model	Material	Connections	Model	Material	Connections
A-251	Brass	1/4" male/female BSPP	A-257	316 SS	1/4" male/female BSPP
A-252	Brass	3/8" male/female BSPP	A-258	316 SS	3/8" male/female BSPP
A-253	Brass	1/2" male/female BSPP	A-259	316 SS	1/2" male/female BSPP
A-254	Brass	1/4" male/female NPT	A-260	316 SS	1/4" male/female NPT
A-255	Brass	3/8" male/female NPT	A-261	316 SS	3/8" male/female NPT
A-256	Brass	1/2" male/female NPT	A-262	316 SS	1/2" male/female NPT



# GAGE GUARD



Protecting pressure or vacuum instruments from clogging, corrosion, or damage, the **SERIES GG** Gage Guard provides a protective barrier between the process fluid and the instrument. The hermetically-sealed uni-body protects from the possibility of leaking. Glass-filled Polypropylene housing is suitable for most inorganic chemicals and temperatures up to 185°F (85°C). A fluid fill station is recommended for proper installation.

MODEL CHART	
Model	Description
GG1	Buna-N diaphragm
GG2	Fluoroelastomer diaphragm

## SPECIFICATIONS

**Maximum Pressure:** Liquids: 160 psi (11 bar) @ 70 to 185°F (21 to 85°C); Gases: 100 psi (6.9 bar) @ 70 to 100°F (21 to 38°C) and 30 psi (2.1 bar) @ 100 to 185°F (38 to 85°C).

**Accuracy:** ±4%.

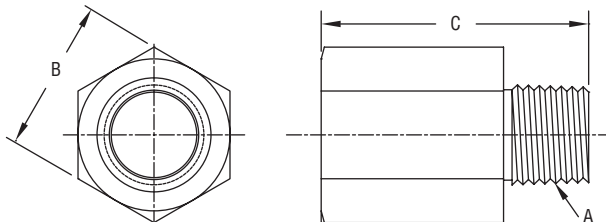
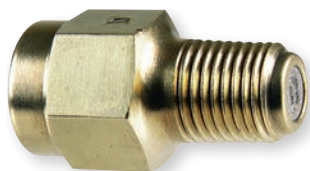
**Maximum Temperature:** 185°F (85°C).

**Wetted Parts:** Glass-filled polypropylene housing, Buna-N or fluoroelastomer diaphragm.

**Dimensions:** 1/4" female NPT instrument side; 1/2" male NPT system side; 1-3/8" (35 mm) diameter.

## SERIES PS

# PRESSURE SNUBBER



DIMENSIONS			
Model	A	B	C
PS114	1/8" NPT	1/2"	1-7/64"
PS214	1/8" NPT	1/2"	1-7/64"
PS122	1/4" NPT	3/4"	1-1/2"
PS124	1/4" NPT	3/4"	1-1/2"
PS222	1/4" NPT	3/4"	1-1/2"
PS224	1/4" NPT	3/4"	1-1/2"
PS225	1/4" NPT	3/4"	1-1/2"

The **SERIES PS** is designed to protect pressure instrumentation by dampening surges and pulsations and assuring steady average pressure readings. Snubbers are available in a variety of pore sizes for use with gases, water, and oils.

MODEL CHART		
Model	Service	Construction
PS114	Air & gases	Brass 1/8" NPT
PS214	Air & gases	SS 1/8" NPT
PS122	Water & oils	Brass 1/4" NPT
PS124	Air & gases	Brass 1/4" NPT
PS222	Water & oils	SS 1/4" NPT
PS224	Air & gases	SS 1/4" NPT
PS225	Pulsating gas	SS 1/4" NPT

## SPECIFICATIONS

**Maximum Pressure:** Brass: 10,000 psi (689 bar), SS: 15,000 psi (1034 bar).

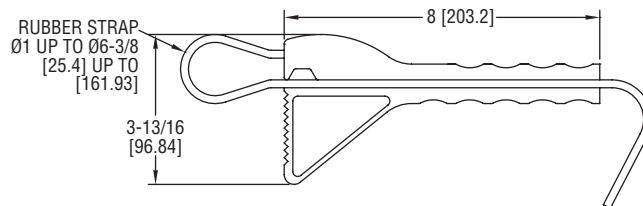
**Filter Disc Material:** AISI 316 SS.

**Approx. Micron Rating:** Air & gases: 2-5µ; water & oils (30-225 SSU): 10µ.

**Dimensions:** 1/4" NPT: 3/4" (19 mm) hex size, 1.5" (38 mm) length.

## MODEL SWUK1

# STRAP WRENCH



The **MODEL SWUK1** offers the user a versatile tool to grip, undo & tighten a wide variety of awkwardly shaped and sized objects. The SWUK1 also makes the job of fitting Adjustable Signal Flags (ASF) covers to Magnehelic® Differential Pressure Gages much easier by simply following the instruction included with each cover supplied.

MODEL CHART	
Model	Description
SWUK1	Strap wrench

## FEATURES/BENEFITS

- Reinforced plastic handle provides extra leverage
- Rubber strap reinforced with 38 cords of high tensile polycarbon to give a breaking strength in excess of 2000 lb
- Strap will grip objects from .79" to 6.30" diameter
- Low cost, rugged and simple to use
- Handy multi-purpose tool

# INTRODUCTION TO STAINLESS STEEL FITTING LINE

**THE DWYER SERIES A-1000 QUALITY TUBE FITTINGS** have been designed and manufactured to provide reliable leak-free connections in a wide variety of applications. A reliable leak-free tubing system will be achieved by combining the proper selection and handling of tubing with the proper tube fitting selection and installation. The following information is provided to assist in the tube selection process.

## MATERIAL

The tubing material chosen must be compatible with the system's contained media, pressure and temperature, as well as with the environment in which it will be installed. Also, the tubing and fittings materials should be similar for optimum sealing action to occur (stainless fittings for stainless tube, brass fittings for copper tube, carbon steel fittings for carbon steel tube, etc.). The mixing and contact of dissimilar materials may leave the system susceptible to galvanic corrosion and/or not allow proper tube fitting makeup to be achieved.

## PRESSURE AND FLOW

The size of the tube's outside diameter (OD) and the necessary wall thickness are determined by the system's pressure and flow requirements. Table A details the suggested tubing sizes and wall thickness for use with instrumentation tube fittings. If no pressure is shown on the table for a particular size, the tube is not recommended for use with instrumentation tube fittings. The tubing system should not be utilized above the tube's maximum allowable working pressure.

## TEMPERATURE

The system's operating temperature may affect the initial choice of tubing material and may also affect the maximum allowable working temperature for the given tube size (see Table B for temperature stress factors).

## LIGHT GAS SERVICE

To provide a successful connection for light gas service, the tubing must have a thick enough wall to provide resistance for the setup action of the ferrules to further compensate for the tube's potential surface condition.

## HANDLING AND INSTALLATION

Surface scratches and gouges on tubing are a source of potential leaks. Some precaution when handling the tubing can help reduce surface scratches and maintain the surface finish as originally intended by the manufacturer. Tubing should never be dragged across rocks, blacktop, pavement, or tubing storage racks as scratches and gouges can occur. Sharp blades should always be used in the tube cutters or hacksaws used to cut the tubing so as to provide a clean, square cut. Dull cutting blades can cause internal and external hanging burrs, and cause the tubing to become oval and affect proper insertion within the fitting. As a good handling practice, tubing should always be deburred prior to tube fitting installation to help assure easy and complete tube insertion. Additionally, for bent tube assemblies, it is important to bend tubing prior to installing tube fittings, and to provide a sufficient straight length of tubing after the bend to allow the tube to be fully inserted into the fitting. Also, to eliminate weight stress from the tubing upon the fitting and to provide additional system support for vibration and thermal shock resistance, the tubing should always be supported by tube hangers, clamps or trays.

**TABLE A - STAINLESS STEEL TUBING**

**Maximum Allowable Working Pressure (psig)**

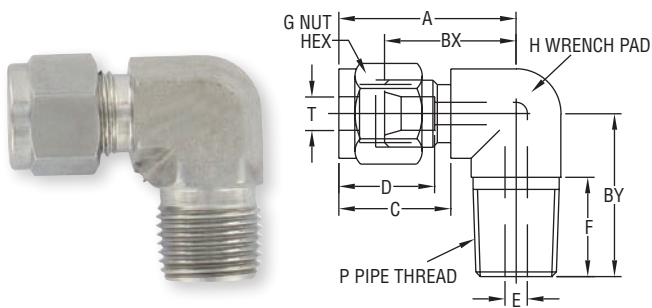
Tube OD [Size (in)]	Wall Thickness of Tube (Inches)															
	.010	.012	.014	.016	.020	.028	.035	.049	.065	.083	.095	.109	.120	.134	.156	.188
1/16	5600	6850	8150	9500	12100	-	-	-	-	-	-	-	-	-	-	-
1/8	-	-	-	-	-	8550	11000	-	-	-	-	-	-	-	-	-
3/16	-	-	-	-	-	5450	7000	10300	-	-	-	-	-	-	-	-
1/4	-	-	-	-	-	4000	5100	7500	10300	-	-	-	-	-	-	-
5/16	-	-	-	-	-	-	4050	5850	8050	-	-	-	-	-	-	-
3/8	-	-	-	-	-	-	3300	4800	6550	-	-	-	-	-	-	-
1/2	-	-	-	-	-	-	2450	3500	4750	6250	-	-	-	-	-	-
5/8	-	-	-	-	-	-	-	2950	4000	5200	6050	-	-	-	-	-
3/4	-	-	-	-	-	-	-	2400	3300	4250	4950	5800	-	-	-	-
7/8	-	-	-	-	-	-	-	2050	2800	3600	4200	4850	-	-	-	-
1	-	-	-	-	-	-	-	-	2400	3150	3650	4200	4700	-	-	-
1-1/4	-	-	-	-	-	-	-	-	-	2450	2850	3300	3650	4150	4900	-
1-1/2	-	-	-	-	-	-	-	-	-	-	2350	2700	3000	3400	4000	4900
2	-	-	-	-	-	-	-	-	-	-	-	2000	2200	2500	2900	3600

**TABLE B - STRESS FACTORS FOR DETERMINING TUBING PRESSURE RATINGS AT ELEVATED TEMPERATURES**

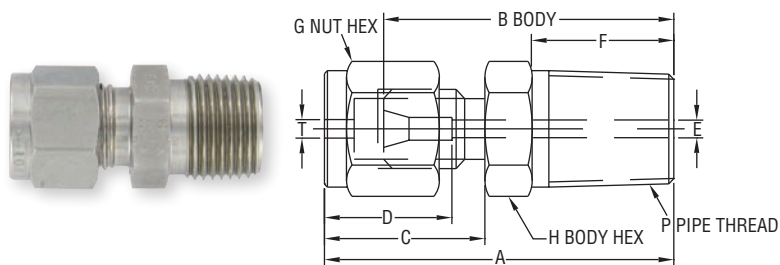
Temperature		Stainless Steel 316
°F	°C	
100	38	1.00
200	93	1.00
300	149	1.00
400	200	.97
500	260	.90
600	316	.85
700	371	.82
800	427	.80*
900	482	.78*
1000	538	.73*
1200	649	.37*

\*The precipitation of chromium carbides potentially resulting in intergranular corrosion may occur when exposed to operating temperatures.

# STAINLESS STEEL FITTING LINE



Series A-1001 Male Elbow Fitting Line



Series A-1002 Male Connector Fitting Line

MODEL CHART					
Model	T = Tube OD	P = Pipe Thread Male	Model	T = Tube OD	P = Pipe Thread Male
A-1001-1	1/16"	1/16"	A-1001-18	3/8"	1/2"
A-1001-2	1/16"	1/8"	A-1001-19	3/8"	3/4"
A-1001-3	1/8"	1/16"	A-1001-20	1/2"	1/4"
A-1001-4	1/8"	1/8"	A-1001-21	1/2"	3/8"
A-1001-5	1/8"	1/4"	A-1001-22	1/2"	1/2"
A-1001-6	3/16"	1/8"	A-1001-23	1/2"	3/4"
A-1001-7	3/16"	1/4"	A-1001-24	5/8"	3/8"
A-1001-8	1/4"	1/8"	A-1001-25	5/8"	1/2"
A-1001-9	1/4"	1/4"	A-1001-26	5/8"	3/4"
A-1001-10	1/4"	3/8"	A-1001-27	3/4"	1/2"
A-1001-11	1/4"	1/2"	A-1001-28	3/4"	3/4"
A-1001-12	5/16"	1/8"	A-1001-29	7/8"	3/4"
A-1001-13	5/16"	1/4"	A-1001-30	1"	3/4"
A-1001-15	3/8"	1/8"	A-1001-31	1"	1"
A-1001-16	3/8"	1/4"	A-1001-32	1-1/4"	1-1/4"
A-1001-17	3/8"	3/8"	A-1001-33	1-1/2"	1-1/2"

SPECIFICATIONS
<b>Service:</b> Liquid, steam and compatible gases.
<b>Wetted Materials:</b> 316 SS.
<b>Temperature Ranges:</b> See reference Table B.●
<b>Pressure Ranges:</b> See reference Table A.●
<b>Connections:</b> A-1001: 1/16" to 1-1/2"; A-1002: 1/16" to 2".
<b>Dimensions:</b> Consult website, or contact factory.

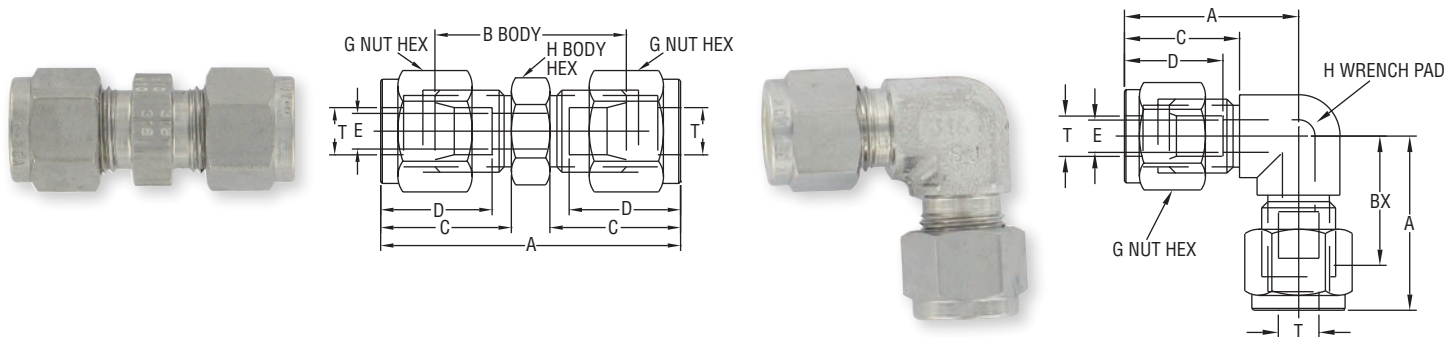
MODEL CHART					
Model	T = Tube OD	P = Pipe Thread Male	Model	T = Tube OD	P = Pipe Thread Male
A-1002-1	1/16"	1/16"	A-1002-24	3/8"	3/4"
A-1002-2	1/16"	1/8"	A-1002-25	1/2"	1/8"
A-1002-3	1/16"	1/4"	A-1002-26	1/2"	1/4"
A-1002-4	1/8"	1/16"	A-1002-27	1/2"	3/8"
A-1002-5	1/8"	1/8"	A-1002-28	1/2"	1/2"
A-1002-6	1/8"	1/4"	A-1002-29	1/2"	3/4"
A-1002-7	1/8"	3/8"	A-1002-30	5/8"	3/8"
A-1002-8	1/8"	1/2"	A-1002-31	5/8"	1/2"
A-1002-9	3/16"	1/8"	A-1002-32	5/8"	1/2"
A-1002-10	3/16"	1/4"	A-1002-33	5/8"	3/4"
A-1002-11	1/4"	1/16"	A-1002-34	3/4"	1/2"
A-1002-12	1/4"	1/8"	A-1002-35	3/4"	3/4"
A-1002-13	1/4"	1/4"	A-1002-36	3/4"	1"
A-1002-15	1/4"	1/2"	A-1002-37	7/8"	3/4"
A-1002-16	1/4"	3/4"	A-1002-39	1"	1/2"
A-1002-17	5/16"	1/8"	A-1002-40	1"	3/4"
A-1002-18	5/16"	1/4"	A-1002-41	1"	1"
A-1002-19	5/16"	3/8"	A-1002-42	1-1/4"	1"
A-1002-20	3/8"	1/8"	A-1002-43	1-1/4"	1-1/4"
A-1002-21	3/8"	1/4"	A-1002-44	1-1/2"	1-1/2"
A-1002-22	3/8"	3/8"	A-1002-45	2"	2"
A-1002-23	3/8"	1/2"			

●Table B: See page 478 (Introduction to Stainless Steel Fitting Line)  
 ●Table A: See page 478 (Introduction to Stainless Steel Fitting Line)



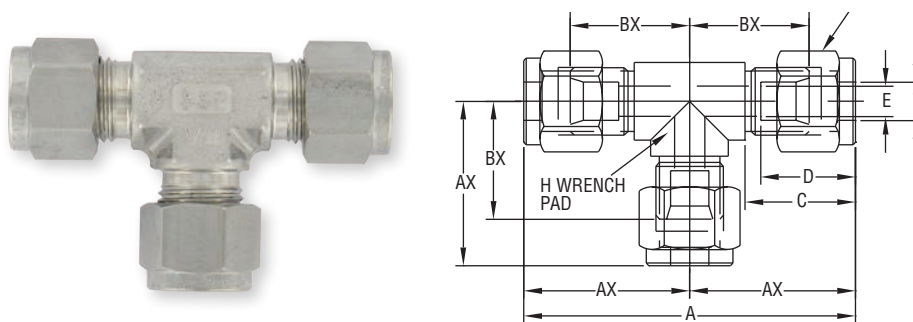
SERIES A-1000

# STAINLESS STEEL FITTING LINE



Series A-1003 Union Fitting Line

Series A-1004 Union Elbow Fitting Line



Series A-1005 Union Tee Fitting Line

MODEL CHART			
Model	T = Tube OD	Model	T = Tube OD
A-1003-1	1/16"	A-1003-8	5/8"
A-1003-2	1/8"	A-1003-9	3/4"
A-1003-3	3/16"	A-1003-10	7/8"
A-1003-4	1/4"	A-1003-11	1"
A-1003-5	5/16"	A-1003-12	1-1/4"
A-1003-6	3/8"	A-1003-13	1-1/2"
A-1003-7	1/2"	A-1003-14	2"

MODEL CHART			
Model	T = Tube OD	Model	T = Tube OD
A-1004-1	1/16"	A-1004-8	5/8"
A-1004-2	1/8"	A-1004-9	3/4"
A-1004-3	3/16"	A-1004-10	7/8"
A-1004-4	1/4"	A-1004-11	1"
A-1004-5	5/16"	A-1004-12	1-1/4"
A-1004-6	3/8"	A-1004-13	1-1/2"
A-1004-7	1/2"	A-1004-14	2"

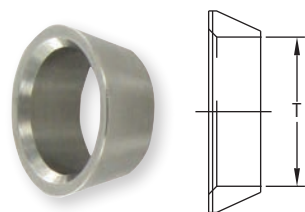
MODEL CHART			
Model	T = Tube OD	Model	T = Tube OD
A-1005-1	1/16"	A-1005-8	5/8"
A-1005-2	1/8"	A-1005-9	3/4"
A-1005-3	3/16"	A-1005-11	1"
A-1005-4	1/4"	A-1005-12	1-1/4"
A-1005-5	5/16"	A-1005-13	1-1/2"
A-1005-6	3/8"	A-1005-14	2"
A-1005-7	1/2"		

SPECIFICATIONS	
<b>Service:</b> Liquid, steam and compatible gases.	
<b>Wetted Materials:</b> 316 SS.	
<b>Temperature Ranges:</b> See reference Table B.●	
<b>Pressure Ranges:</b> See reference Table A.●	
<b>Connections:</b> 1/16" to 2".	
<b>Dimensions:</b> Consult website, or contact factory.	

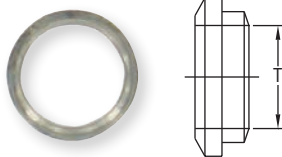
●Table B: See page 478 (Introduction to Stainless Steel Fitting Line)  
 ●Table A: See page 478 (Introduction to Stainless Steel Fitting Line)



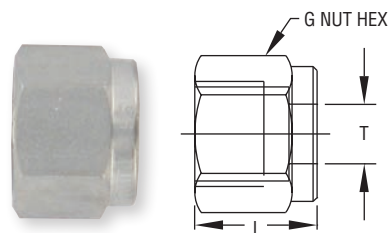
# STAINLESS STEEL FITTING LINE



Series A-1006 Front Ferrule Fitting Line



Series A-1007 Back Ferrule Fitting Line



Series A-1008 Nut Fitting Line



Series A-1012 Stainless Steel Fitting Line

MODEL CHART			
Model	T = Tube OD	Model	T = Tube OD
A-1006-1	1/16"	A-1006-8	5/8"
A-1006-2	1/8"	A-1006-9	3/4"
A-1006-3	3/16"	A-1006-10	7/8"
A-1006-4	1/4"	A-1006-11	1"
A-1006-5	5/16"	A-1006-12	1-1/4"
A-1006-6	3/8"	A-1006-13	1-1/2"
A-1006-7	1/2"	A-1006-14	2"

SPECIFICATIONS	
<b>Service:</b> Liquid, steam and compatible gases.	
<b>Wetted Materials:</b> 316 SS.	
<b>Temperature Ranges:</b> See reference Table B.●	
<b>Pressure Ranges:</b> See reference Table A.●	
<b>Connections:</b> A-1006, A-1007, A-1008: 1/16" to 2"; A-1012: 1/8" to 1/2".	
<b>Dimensions:</b> A-1008, A-1012: Consult website or contact factory.	

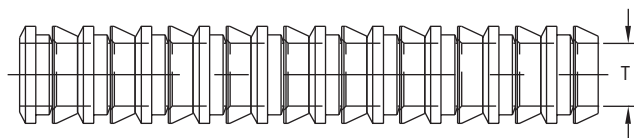
MODEL CHART			
Model	T = Tube OD	Model	T = Tube OD
A-1007-1	1/16"	A-1007-8	5/8"
A-1007-2	1/8"	A-1007-9	3/4"
A-1007-3	3/16"	A-1007-10	7/8"
A-1007-4	1/4"	A-1007-11	1"
A-1007-5	5/16"	A-1007-12	1-1/4"
A-1007-6	3/8"	A-1007-13	1-1/2"
A-1007-7	1/2"	A-1007-14	2"

MODEL CHART			
Model	T = Tube OD	Model	T = Tube OD
A-1008-1	1/16"	A-1008-8	5/8"
A-1008-2	1/8"	A-1008-9	3/4"
A-1008-3	3/16"	A-1008-10	7/8"
A-1008-4	1/4"	A-1008-11	1"
A-1008-5	5/16"	A-1008-12	1-1/4"
A-1008-6	3/8"	A-1008-13	1-1/2"
A-1008-7	1/2"	A-1008-14	2"

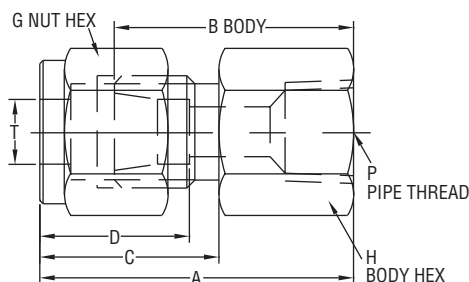
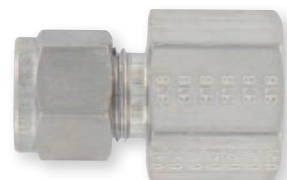
MODEL CHART		
Model	Hose Barb	T = Tube OD
A-1012-1	1/8"	1/8"
A-1012-2	1/8"	1/4"
A-1012-3	1/4"	1/4"
A-1012-4	1/4"	3/8"
A-1012-6	3/8"	3/8"
A-1012-9	1/2"	1/2"

●Table B: See page 478 (Introduction to Stainless Steel Fitting Line)  
 ●Table A: See page 478 (Introduction to Stainless Steel Fitting Line)

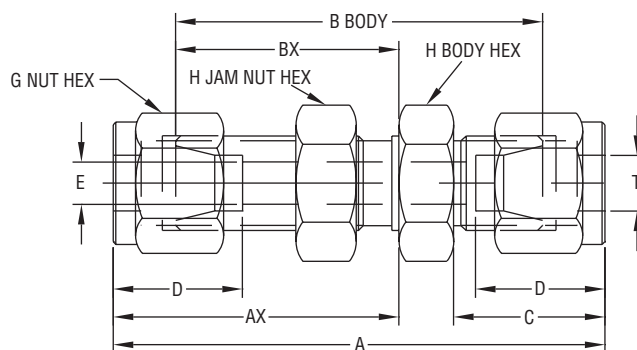
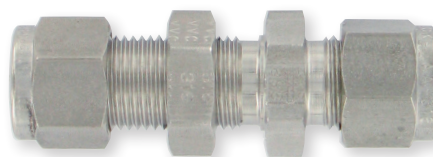
## STAINLESS STEEL FITTING LINE



Series A-1009 Ferrule Set Fitting Line



Series A-1011 Female Connector Fitting Line



Series A-1010 Bulkhead Union Fitting Line

MODEL CHART	
Model	T = Tube OD
A-1009-1	1/16"
A-1009-2	1/8"
A-1009-3	3/16"
A-1009-4	1/4"
A-1009-5	5/16"
A-1009-6	3/8"
A-1009-7	1/2"

MODEL CHART	
Model	T = Tube OD
A-1010-1	1/16"
A-1010-2	1/8"
A-1010-3	3/16"
A-1010-4	1/4"
A-1010-5	5/16"
A-1010-6	3/8"
A-1010-7	1/2"
A-1010-8	5/8"
A-1010-9	3/4"
A-1010-10	1"

## SPECIFICATIONS

**Service:** Liquid, steam and compatible gases.

**Wetted Materials:** 316 SS.

**Temperature Ranges:** See reference Table B.●

**Pressure Ranges:** See reference Table A.●

**Connections:** A-1009: 1/16" to 2"; A-1010: 1/16" to 1"; A-1011: 1/16" to 1-1/2".

**Dimensions:** A-1010, A-1011: Consult website, or contact factory.

MODEL CHART								
Model	T = Tube OD	P = Pipe Thread Male	Model	T = Tube OD	P = Pipe Thread Male	Model	T = Tube OD	P = Pipe Thread Male
A-1011-1	1/16"	1/16"	A-1011-12	3/8"	1/8"	A-1011-22	5/8"	1/2"
A-1011-2	1/16"	1/8"	A-1011-13	3/8"	1/4"	A-1011-23	3/4"	1/2"
A-1011-3	1/8"	1/8"	A-1011-14	3/8"	3/8"	A-1011-24	3/4"	3/4"
A-1011-4	1/8"	1/4"	A-1011-15	3/8"	1/2"	A-1011-25	7/8"	3/4"
A-1011-5	3/16"	1/8"	A-1011-16	3/8"	3/4"	A-1011-26	1"	3/4"
A-1011-6	1/4"	1/8"	A-1011-17	1/2"	1/4"	A-1011-27	1"	1"
A-1011-7	1/4"	1/4"	A-1011-18	1/2"	3/8"	A-1011-28	1-1/4"	1-1/4"
A-1011-8	1/4"	3/8"	A-1011-19	1/2"	1/2"	A-1011-29	1-1/2"	1-1/2"
A-1011-9	1/4"	1/2"	A-1011-20	1/2"	3/4"			
A-1011-11	5/16"	1/4"	A-1011-21	5/8"	3/8"			

●Table B: See page 478 (Introduction to Stainless Steel Fitting Line)

●Table A: See page 478 (Introduction to Stainless Steel Fitting Line)

# STAINLESS STEEL FITTING LINE

Our stainless steel fittings and pipe nipples are made from 304 or 316 SS and are rated at 150 psi.



**A-2018 316 SS**  
Hose Barb: Male  
Pipe Thread



**A-2019 Cap:**  
Female Pipe Thread



**A-2020 Cross:**  
Female Pipe  
Thread



**A-2021 Coupling:**  
Female Pipe Thread



**A-2022 Elbow:**  
Female Pipe  
Thread, 90°



**A-2023 Elbow:** Female  
Pipe Thread, 45°



**A-2024 Reducer**  
Bushings

MODEL CHART	
Model	Male NPT x HB
A-2018-1	1/4" x 1/4"
A-2018-2	1/4" x 3/8"

MODEL CHART	
Model	Female NPT
A-2019-1	1/8"
A-2019-2	1/4"
A-2019-3	3/8"
A-2019-4	1/2"
A-2019-5	3/4"
A-2019-6	1"

MODEL CHART	
Model	Female NPT
A-2020-1	1/8"
A-2020-2	1/4"
A-2020-3	3/8"
A-2020-4	1/2"
A-2020-5	3/4"
A-2020-6	1"

MODEL CHART	
Model	Female NPT
A-2021-1	1/8" x 1/8"
A-2021-2	1/4" x 1/4"
A-2021-3	3/8" x 3/8"
A-2021-4	1/2" x 1/2"
A-2021-5	3/4" x 3/4"
A-2021-6	1" x 1"
A-2021-7	1-1/4" x 1-1/4"
A-2021-8	1-1/2" x 1-1/2"
A-2021-9	2" x 2"
A-2021-10	3" x 3"

MODEL CHART	
Model	Female NPT
A-2022-1	1/8" x 1/8"
A-2022-2	1/4" x 1/4"
A-2022-3	3/8" x 3/8"
A-2022-4	1/2" x 1/2"
A-2022-5	3/4" x 3/4"
A-2022-6	1" x 1"
A-2022-7	1-1/4" x 1-1/4"
A-2022-8	1-1/2" x 1-1/2"
A-2022-9	2" x 2"
A-2022-10	3" x 3"

MODEL CHART	
Model	Female NPT
A-2023-1	1/8" x 1/8"
A-2023-2	1/4" x 1/4"
A-2023-3	3/8" x 3/8"
A-2023-4	1/2" x 1/2"
A-2023-5	3/4" x 3/4"
A-2023-6	1" x 1"
A-2023-7	1-1/4" x 1-1/4"
A-2023-8	1-1/2" x 1-1/2"
A-2023-9	2" x 2"
A-2023-10	3" x 3"

MODEL CHART	
Model	Male NPT x Female NPT
A-2024-1	1/4" x 1/8"
A-2024-2	3/8" x 1/4"
A-2024-3	1/2" x 1/4"
A-2024-4	1/2" x 3/8"
A-2024-5	3/4" x 1/4"
A-2024-6	3/4" x 1/2"
A-2024-7	1" x 1/2"
A-2024-8	1" x 3/4"
A-2024-9	1-1/4" x 3/4"
A-2024-10	1-1/4" x 1"
A-2024-11	1-1/2" x 3/4"
A-2024-12	1-1/2" x 1"
A-2024-13	1-1/2" x 1-1/4"
A-2024-14	2" x 1"
A-2024-15	2" x 1-1/4"
A-2024-16	2" x 1-1/2"
A-2024-17	3" x 2"

## STAINLESS STEEL FITTING LINE



**A-2025 Street Elbow:**  
Female Pipe Thread by Male  
Pipe Thread



**A-2026 Tee:**  
Female Pipe Thread



**A-2027 Union:**  
Female Pipe Thread



**A-2028 Nipple:**  
Male Pipe Thread

## MODEL CHART

Model	Female NPT x Male NPT
A-2025-1	1/8" x 1/8"
A-2025-2	1/4" x 1/4"
A-2025-3	3/8" x 3/8"
A-2025-4	1/2" x 1/2"
A-2025-5	3/4" x 3/4"
A-2025-6	1" x 1"
A-2025-7	1-1/4" x 1-1/4"
A-2025-8	1-1/2" x 1-1/2"
A-2025-9	2" x 2"
A-2025-10	3" x 3"

## MODEL CHART

Model	Female NPT
A-2027-1	1/8"
A-2027-2	1/4"
A-2027-3	3/8"
A-2027-4	1/2"
A-2027-5	3/4"
A-2027-6	1"
A-2027-7	1-1/4"
A-2027-8	1-1/2"
A-2027-10	3"

## MODEL CHART

Model	Female NPT
A-2026-1	1/8"
A-2026-2	1/4"
A-2026-3	3/8"
A-2026-4	1/2"
A-2026-5	3/4"
A-2026-6	1"
A-2026-7	1-1/4"
A-2026-8	1-1/2"
A-2026-9	2"
A-2026-10	3"

## MODEL CHART

Model	Male NPT x Length	Model	Male NPT x Length
A-2028-1	1/8" x 3/4"	A-2028-15	3/4" x 2"
A-2028-2	1/8" x 1-1/2"	A-2028-16	1" x 1-1/2"
A-2028-3	1/8" x 2"	A-2028-17	1" x 2"
A-2028-4	1/4" x 7/8"	A-2028-18	1-1/4" x 1-5/8"
A-2028-5	1/4" x 1-1/2"	A-2028-19	1-1/4" x 2"
A-2028-6	1/4" x 2"	A-2028-20	1-1/2" x 1-3/4"
A-2028-7	3/8" x 1"	A-2028-21	1-1/2" x 2"
A-2028-8	3/8" x 1-1/2"	A-2028-22	2" x 2"
A-2028-9	3/8" x 2"	A-2028-23	2" x 2-1/2"
A-2028-10	1/2" x 1-1/8"	A-2028-24	3" x 2-5/8"
A-2028-11	1/2" x 1-1/2"	A-2028-25	3" x 3"
A-2028-12	1/2" x 2"	A-2028-26	4" x 2-7/8"
A-2028-13	3/4" x 1-3/8"	A-2028-27	4" x 4"
A-2028-14	3/4" x 1-1/2"		



# NYLON FITTINGS

Dwyer Instruments offers a wide variety of nylon and SS fittings. Nylon fittings are generally acceptable for use at working pressures up to 150 psi at normal room temperatures, and at very low pressures, temperatures can approach 175°F.



**A-2002 Female Pipe Thread (FPT) by Hose Barb (HB)**



**A-2005 Elbows: Female Pipe Thread by Male Pipe Thread**



**A-2007 Tees: Female Pipe Thread**



**A-2001 Male Pipe Thread (MPT) by Hose Barb (HB)**



**A-2003 Elbows: Male Pipe Thread by Hose Barb**



**A-2006 Elbows: Female Pipe Thread-90°**



**A-2008 Tees: Female Pipe Thread with 1/4" Gauge Port**



**A-2004 Elbows: Female Pipe Thread by Hose Barb**



**A-2009 Reducer: Bushings**

MODEL CHART	
Model	Male NPT x HB
A-2001-1	1/8" x 3/16"
A-2001-2	1/8" x 1/4"
A-2001-3	1/8" x 5/16"
A-2001-4	1/8" x 3/8"
A-2001-5	1/4" x 3/16"
A-2001-6	1/4" x 1/4"

MODEL CHART	
Model	Female NPT x HB
A-2002-1	1/4" x 1/4"
A-2002-2	1/4" x 3/8"
A-2002-3	3/8" x 1/4"
A-2002-4	3/8" x 3/8"

MODEL CHART	
Model	Male NPT x HB
A-2003-1	1/8" x 1/4"
A-2003-2	1/8" x 3/8"
A-2003-3	1/4" x 3/16"
A-2003-4	1/4" x 1/4"

MODEL CHART	
Model	Female NPT x HB
A-2004-1	1/8" x 1/4"
A-2004-2	1/4" x 1/4"

MODEL CHART	
Model	Female NPT x Male NPT
A-2005-1	1/4" x 1/4"
A-2005-2	3/8" x 3/8"
A-2005-3	1/2" x 1/2"

MODEL CHART	
Model	Female NPT x Female NPT
A-2006-1	1/2" x 1/2"
A-2006-2	3/4" x 3/4"
A-2006-3	1" x 1"

MODEL CHART	
Model	Female NPT
A-2007-1	1/4"
A-2007-2	1/2"
A-2007-3	3/4"

MODEL CHART	
Model	Female NPT
A-2008-1	1/2"

MODEL CHART	
Model	Male NPT x Female NPT
A-2009-1	3/8" x 1/8"
A-2009-2	3/8" x 1/4"
A-2009-3	1/2" x 1/8"
A-2009-4	1/2" x 1/4"
A-2009-5	1/2" x 3/8"
A-2009-6	3/4" x 1/8"
A-2009-7	3/4" x 1/4"
A-2009-8	3/4" x 3/8"
A-2009-9	3/4" x 1/2"
A-2009-10	1" x 1/2"
A-2009-11	1" x 3/4"
A-2009-13	1-1/4" x 1"
A-2009-14	1-1/2" x 3/4"
A-2009-15	1-1/2" x 1"
A-2009-16	1-1/2" x 1-1/4"
A-2009-17	2" x 3/4"
A-2009-18	2" x 1"
A-2009-19	2" x 1-1/4"
A-2009-20	2" x 1-1/2"

# NYLON FITTINGS



A-2010 Reducing Nipples:  
Male Pipe Thread



A-2011 Nipples: Male Pipe  
Thread by Male Pipe Thread



A-2012 Couplings:  
Female Pipe Thread



A-2013 Elbows:  
Hose Barb



A-2014 Hose Menders  
without Center Stop



A-2015 Hose Menders  
with Center Stop



A-2016 Tees:  
Hose Barb



A-2017 Tees: Male Pipe  
Thread by Hose Barb

## MODEL CHART

Model	Male NPT x Male NPT
A-2010-1	1/4" x 1/8"
A-2010-2	3/8" x 1/8"
A-2010-3	3/8" x 1/4"
A-2010-4	1/2" x 1/4"
A-2010-5	1/2" x 3/8"
A-2010-6	3/4" x 3/8"
A-2010-7	3/4" x 1/2"

## MODEL CHART

Model	Female NPT x Female NPT
A-2012-1	1/2" x 1/2"
A-2012-2	3/4" x 3/4"
A-2012-3	1" x 1"

## MODEL CHART

Model	HB x HB
A-2015-1	1/8" x 1/8"
A-2015-2	1/4" x 1/4"

## MODEL CHART

Model	HB (1) x HB (2&3)
A-2016-1	1/4" x 1/4"
A-2016-2	1/4" x 3/8"

## MODEL CHART

Model	Male NPT x Male NPT
A-2011-1	1/8" x 1/8"
A-2011-2	1/4" x 1/4"
A-2011-3	3/8" x 3/8"
A-2011-4	1/2" x 1/2"

## MODEL CHART

Model	HB x HB
A-2013-1	1/4" x 1/4"
A-2013-2	3/8" x 1/4"

## MODEL CHART

Model	HB x HB
A-2014-1	1/4" x 3/16"
A-2014-2	5/16" x 5/16"

## MODEL CHART

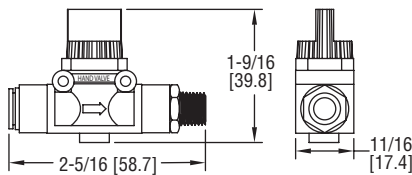
Model	Male NPT (1) x HB (2&3)
A-2017-1	1/8" x 1/4"
A-2017-2	1/4" x 1/4"
A-2017-3	1/4" x 3/8"
A-2017-4	1/4" x 1/2"

## SERIES A-4000

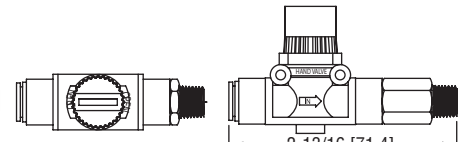
# QUICK CONNECT PNEUMATIC VALVES



A-4002 Valves:  
Tubing to Male NPT



A-4022 Valves: Tubing to Male  
NPT with Extension



MODELS WITH EXTENSION

## MODEL CHART

Model	Tubing (O.D.) x NPT
A-4002-0	5/32" x 1/8"
A-4002-1	5/32" x 1/4"
A-4002-2	1/4" x 1/8"
A-4002-3	1/4" x 1/4"
A-4002-4	5/16" x 1/8"
A-4002-5	5/16" x 1/4"
A-4002-6	3/8" x 1/8"
A-4002-7	3/8" x 1/4"

**Note:** Please contact factory for metric and alternate connection sizes.

## MODEL CHART

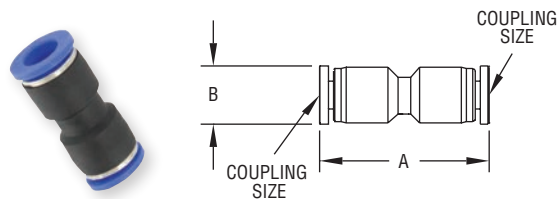
Model	Tubing (O.D.) x NPT with Extension
A-4022-2	1/4" x 1/8" with Extension
A-4022-4	5/16" x 1/8" with Extension

**Note:** Please contact factory for metric and alternate connection sizes.

## SPECIFICATIONS

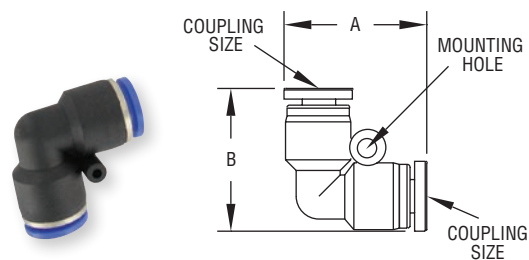
**Service:** Air (no other gases or liquids).  
**Wetted Materials:** Polyurethane, polyethylene and nylon.  
**Pressure Limits:** -29.5 in Hg (-750 mm Hg) to 150 psi (10 bar).  
**Temperature Limits:** 32 to 140°F (0 to 60°C).  
**Weight:** A-4002: 1 oz (28 g); A-4022: 1.3 oz (36 g).

# QUICK CONNECT PNEUMATIC FITTINGS



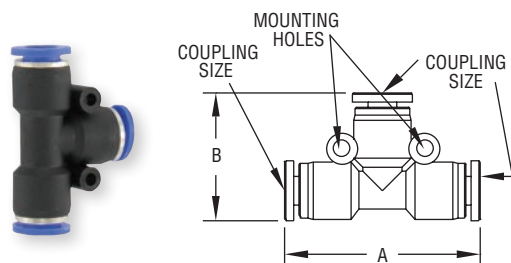
Model	A	B	Model	A	B
A-3025-0	1.33 [33.8]	0.45 [11.5]	A-3029-0	1.33 [33.8]	0.45 [11.5]
A-3025-1	1.38 [35]	0.55 [14]	A-3029-1	1.38 [35]	0.55 [14]
A-3025-2	1.53 [38.9]	0.57 [14.6]	A-3029-2	1.53 [38.9]	0.57 [14.6]
A-3025-3	1.62 [41.1]	0.69 [17.6]	A-3029-3	1.62 [41.1]	0.69 [17.6]

A-3025 Fittings: Quick Coupling Straight  
A-3029 Fittings: Quick Coupling Straight Adapter



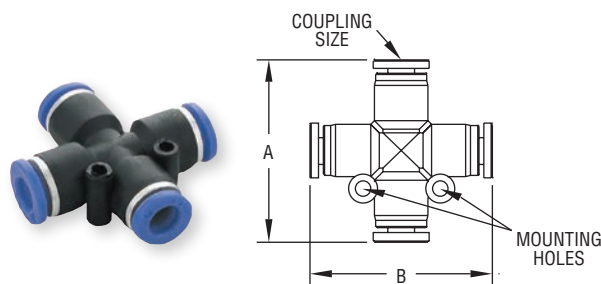
Model	A	B
A-3026-0	0.93 [23.7]	0.93 [23.7]
A-3026-1	1.09 [27.8]	1.09 [27.8]
A-3026-2	1.20 [30.6]	1.20 [30.6]
A-3026-3	1.33 [33.8]	1.33 [33.8]

A-3026 Fittings: Quick Coupling 90 Degree



Model	A	B	Model	A	B
A-3027-0	1.49 [37.8]	0.97 [23.7]	A-3030-0	1.49 [37.8]	0.97 [23.7]
A-3027-1	1.64 [41.6]	1.09 [27.8]	A-3030-1	1.64 [41.6]	1.09 [27.8]
A-3027-2	1.83 [46.6]	1.20 [30.6]	A-3030-2	1.83 [46.6]	1.20 [30.6]
A-3027-3	1.98 [50.4]	1.33 [33.8]	A-3030-3	1.98 [50.4]	1.33 [33.8]

A-3027 Fittings: 3 Way Quick Coupling  
A-3030 Fittings: 3 Way Quick Coupling Adapter



Model	A	B
A-3028-0	1.49 [37.8]	1.49 [37.8]
A-3028-1	1.64 [41.6]	1.64 [41.6]
A-3028-2	1.83 [46.6]	1.83 [46.6]
A-3028-3	1.98 [50.4]	1.98 [50.4]

A-3028 Fittings: 4 Way Quick Coupling

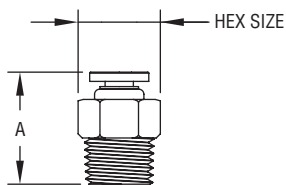
MODEL CHART	
Model	Coupling (O.D.) x Coupling (O.D.)
A-3025-0	3/16" x 3/16"
A-3025-1	1/4" x 1/4"
A-3025-2	5/16" x 5/16"
A-3025-3	3/8" x 3/8"
A-3026-0	3/16" x 3/16"
A-3026-1	1/4" x 1/4"
A-3026-2	5/16" x 5/16"
A-3026-3	3/8" x 3/8"
A-3029-0	1/4" x 3/16"
A-3029-1	5/16" x 1/4"
A-3029-2	3/8" x 1/4"
A-3029-3	3/8" x 5/16"

MODEL CHART	
Model	Coupling (O.D.)
A-3027-0	3/16"
A-3027-1	1/4"
A-3027-2	5/16"
A-3027-3	3/8"
A-3028-0	3/16"
A-3028-1	1/4"
A-3028-2	5/16"
A-3028-3	3/8"
A-3030-0*	1/4" x 1/4" x 3/16"
A-3030-1*	5/16" x 5/16" x 1/4"
A-3030-2*	3/8" x 3/8" x 1/4"
A-3030-3*	3/8" x 3/8" x 5/16"

\*Please contact factory for metric sizes.

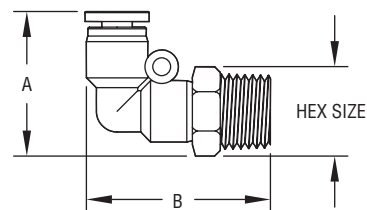
SPECIFICATIONS	
<b>Service:</b> Air (no other gases or liquids).	
<b>Pressure Limits:</b> -29.5 in Hg (-750 mm Hg) to 150 psi (10.3 bar).	
<b>Temperature Limits:</b> 32 to 140°F (0 to 60°C).	
<b>Wetted Materials:</b> Polyurethane, polyethylene and nylon.	
<b>Weight:</b> 0.4 oz (11 g) to 0.7 oz (19 g).	

## QUICK CONNECT PNEUMATIC FITTINGS



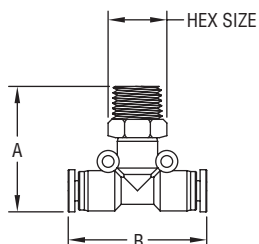
Model	A
A-3021-1	0.79 [20.3]
A-3021-2	0.86 [21.8]
A-3021-3	0.82 [20.9]
A-3021-4	0.88 [22.4]
A-3021-5	1.01 [25.7]
A-3021-6	0.95 [24.2]

A-3021 Fittings: Quick Coupling to NPT Straight



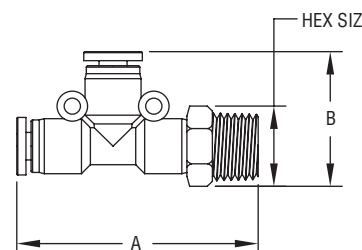
Model	A	B
A-3022-1	0.98 [24.9]	1.26 [32]
A-3022-2	1.02 [25.9]	1.30 [33]
A-3022-3	1.09 [27.7]	1.41 [35.8]
A-3022-4	1.13 [28.8]	1.45 [36.8]
A-3022-5	1.23 [31.3]	1.53 [38.9]
A-3022-6	1.26 [32]	1.57 [39.9]

A-3022 Fittings: Quick Coupling to NPT 90 Degree



Model	A	B
A-3023-1	1.31 [33.3]	1.49 [37.8]
A-3023-2	1.35 [34.3]	1.49 [37.8]
A-3023-3	1.43 [36.3]	1.64 [41.6]
A-3023-4	1.47 [37.3]	1.64 [41.6]
A-3023-5	1.53 [38.9]	1.83 [46.6]
A-3023-6	1.57 [39.9]	1.83 [46.6]

A-3023 Fittings: 3 Way-Quick Coupling by Quick Coupling to NPT



Model	A	B
A-3024-1	1.83 [46.4]	1.02 [25.9]
A-3024-2	1.87 [47.4]	1.06 [26.9]
A-3024-3	1.97 [50.1]	1.09 [27.8]
A-3024-4	2.01 [51.1]	1.13 [28.8]
A-3024-5	2.16 [54.9]	1.23 [31.3]
A-3024-6	2.20 [55.9]	1.26 [32]

A-3024 Fittings: 3 Way-Quick Coupling by NPT to Quick Coupling

## MODEL CHART

Model	Coupling (O.D.) x NPT
A-3021-1	1/4" x 1/8"
A-3021-2	1/4" x 1/4"
A-3021-3	5/16" x 1/8"
A-3021-4	5/16" x 1/4"
A-3021-5	3/8" x 1/8"
A-3021-6	3/8" x 1/4"
A-3022-1*	1/4" x 1/8"
A-3022-2*	1/4" x 1/4"
A-3022-3*	5/16" x 1/8"
A-3022-4*	5/16" x 1/4"
A-3022-5*	3/8" x 1/8"
A-3022-6*	3/8" x 1/4"

\*Please contact factory for metric sizes.

## MODEL CHART

Model	Coupling (O.D.) x NPT x Coupling (O.D.)
A-3023-1	1/4" x 1/4" x 1/8"
A-3023-2	1/4" x 1/4" x 1/4"
A-3023-3	5/16" x 5/16" x 1/8"
A-3023-4	5/16" x 5/16" x 1/4"
A-3023-5	3/8" x 3/8" x 1/8"
A-3023-6	3/8" x 3/8" x 1/4"
A-3024-1*	1/4" x 1/4" x 1/8"
A-3024-2*	1/4" x 1/4" x 1/4"
A-3024-3*	5/16" x 5/16" x 1/8"
A-3024-4*	5/16" x 5/16" x 1/4"
A-3024-5*	3/8" x 3/8" x 1/8"
A-3024-6*	3/8" x 3/8" x 1/4"

\*Please contact factory for metric sizes.

## SPECIFICATIONS

**Service:** Air (no other gases or liquids).

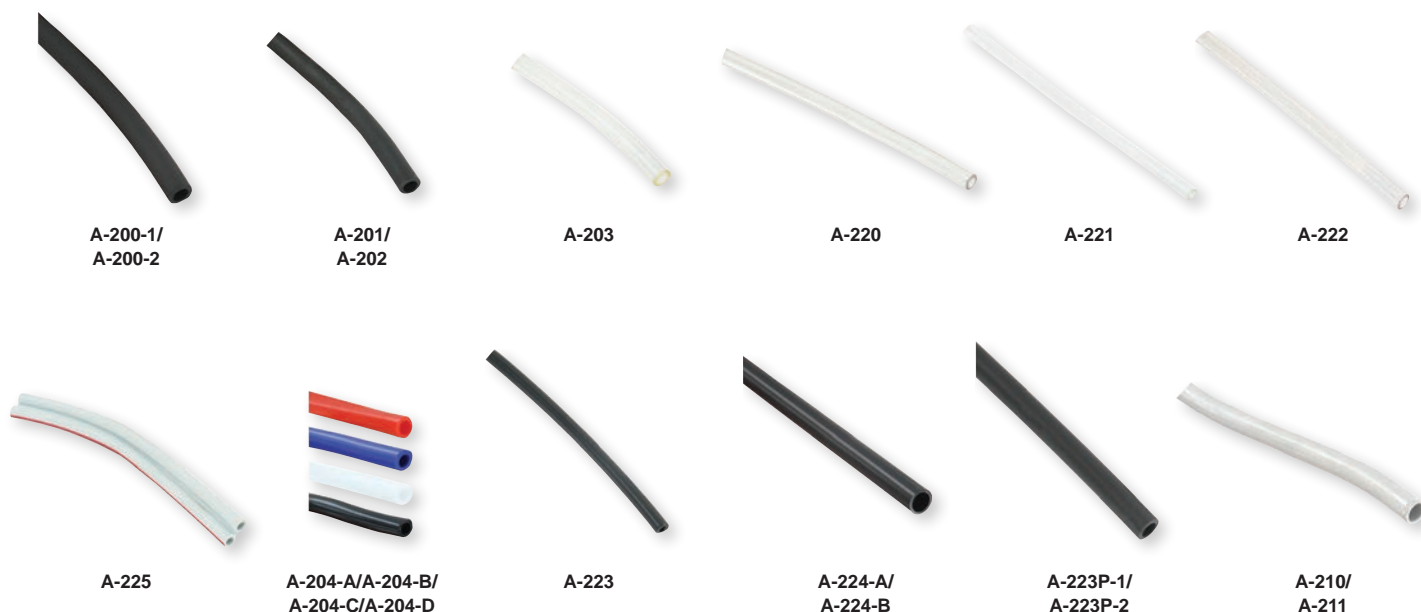
**Wetted Materials:** Polyurethane, polyethylene and nylon. **Note:** (A-3021 nickel plated brass).

**Pressure Limits:** -29.5 in Hg (-750 mm Hg) to 150 psi (10.3 bar).

**Temperature Limits:** 32 to 140°F (0 to 60°C).

**Weight:** 0.4 oz (11 g) to 0.7 oz (19 g).

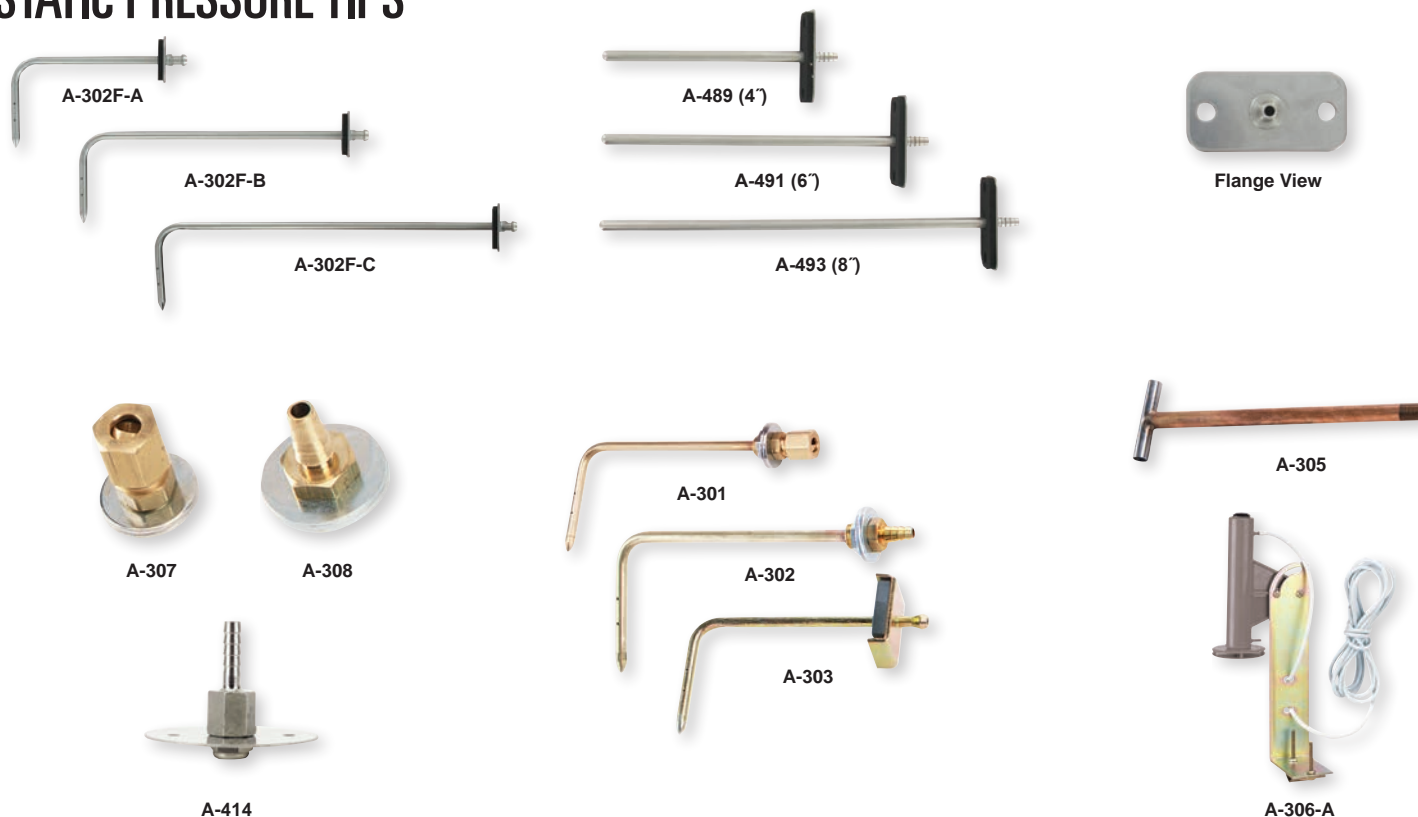
# GAGE TUBING ACCESSORIES



MODEL CHART	
Model	Description
Norprene® tubing is useful in a wide range of temperatures from -75 to 275°F (-60 to 135°C) and will not weaken after long term exposure to heat and ozone.	
A-200-1	3/16" ID x 5/16" OD, 13 psi maximum pressure @ 73°F (90 kPa @ 23°C); 50'
A-200-2	1/4" ID x 3/8" OD, 10 psi maximum pressure @ 73°F (69 kPa @ 23°C); 50'
Rubber latex tubing has less tendency to kink in storage and occupies less space, thus is best for portable work.	
A-201	3/16" ID, 9' length
A-202	3/16" ID, lengths to 50'
Clear PVC tubing is easily inspected and is therefore best for test applications where a possibility of fluid entering the tubing exists.	
A-203	1/8" ID x 1/4" OD, lengths to 100'; 60 psi max. pressure @ 73°F (22°C)
Clear flexible vinyl tubing is easily inspected, and is therefore best for test applications where a possibility of fluid entering the tubing exists.	
A-220	3/16" ID x 5/16" OD, lengths to 500'; 45 psi maximum pressure @ 73°F (310 kPa @ 23°C)
A-221	1/8" ID x 3/16" OD, lengths to 500'; 40 psi maximum pressure @ 165°F (276 kPa @ 74°C)
A-222	.240" ID x .375" OD, lengths to 500'; 35 psi maximum pressure @ 73°F (240 kPa @ 23°C)
Flexible double column plastic tubing is used with Mark II manometers and the Wind Speed Indicator. Light gray with red color code stripe.	
A-225	1/8" ID, lengths to 750'
Flexible colored vinyl tubing is quickly distinguishable in applications where more than one line is required aiding installation.	
A-204-A	3/16" ID x 5/16" OD, lengths to 500'; 45 psi maximum pressure @ 165°F (310 kPa @ 74°C); Opaque red
A-204-B	3/16" ID x 5/16" OD, lengths to 500'; 45 psi maximum pressure @ 165°F (310 kPa @ 74°C); Opaque blue
A-204-C	3/16" ID x 5/16" OD, lengths to 500'; 45 psi maximum pressure @ 165°F (310 kPa @ 74°C); Opaque white
A-204-D	3/16" ID x 5/16" OD, lengths to 500'; 45 psi maximum pressure @ 165°F (310 kPa @ 74°C); Opaque black
Black polyethylene tubing offers long life, great stability and resistance to corrosion.	
A-223	1/8" ID x 1/4" OD, 10' length; 200 psi maximum @ 140°F (1379 kPa @ 60°C)
Black nylon tubing is recommended for high temperature and pressure applications. Lengths to 1312 ft; -40 to 248°F (-40 to 120°C).	
A-224-A	0.23" ID x 5/16" OD; 362 psi (2500 kPa) working pressure
A-224-B	0.256" ID x 3/8" OD, 406 psi (2800 kPa) working pressure
Black plenum fire retardant polyethylene tubing meets NFPA standard 90A for installation in air-conditioning and ventilating plenum spaces; also used in building automation systems. Lengths to 500', 100 psig maximum pressure @ 75°F (689 kPa @ 24°C).	
A-223P-1	.17" ID x .25" OD
A-223P-2	1/4" ID x 3/8" OD
Aluminum tubing is recommended for permanent installations.	
A-210	1/4" OD, 5' length, 500 psi maximum pressure @ 200°F (3447 kPa @ 93°C)
A-211	1/4" OD, 50' length, 500 psi maximum pressure @ 200°F (3447 kPa @ 93°C)



# STATIC PRESSURE TIPS



## MODEL CHART

### Model Description

The stainless steel static pressure tips are used to measure static pressures in ducts or rooms. They are to be connected to differential pressure switches and transmitters. Two static sensors are used in applications where differential pressure is required across a filter or coil. These sensors include a mounting flange with integral rubber gasket and two screws for simplifying mounting on a duct.

<b>A-302F-A</b>	4" hook style SS static pressure tip with mounting flange
<b>A-302F-B</b>	6" hook style SS static pressure tip with mounting flange
<b>A-302F-C</b>	8" hook style SS static pressure tip with mounting flange
<b>A-489</b>	4" straight SS static pressure tip with mounting flange
<b>A-491</b>	6" straight SS static pressure tip with mounting flange
<b>A-493</b>	8" straight SS static pressure tip with mounting flange

Designed for simplified installation, these are easy to install, inexpensive, and provides accurate static pressure sensing in smooth air at velocities up to 1500 FPM.

<b>A-307</b>	Static pressure fitting, for 1/4" metal tubing connection
<b>A-307-SS</b>	SS static pressure fitting, for 1/4" metal tubing connection
<b>A-308</b>	Static pressure fitting, for 3/16" and 1/8" ID plastic or rubber tubing
<b>A-414</b>	SS clean room pressure sensor

These static pressure tips are ideal for applications such as sensing the static pressure drop across industrial air filters and refrigerant coils. Here the probability of air turbulence requires that the pressure sensing openings be located away from the duct walls to minimize impingement and aspiration, and thus ensure accurate readings. For a permanent installation of this type, the Dwyer No. A-301 or A-302 static pressure tip is used. It senses static pressure through radially-drilled holes near the tip and can be used in air flow velocities up to 12,000 FPM. The angled tips shown have 4" insertion depth. Each has four radially drilled .040" sensing holes. All except Model A-303 mount in 3/8" hole in duct. For portable use, a magnet holds No. A-303 in place.

<b>A-301</b>	Static pressure tip, for 1/4" metal tubing connection
<b>A-301-A</b>	Static pressure tip, same as A-301 with 6" insertion depth
<b>A-301-B</b>	Static pressure tip, same as A-301 with 8" insertion depth
<b>A-301-C</b>	Static pressure tip, same as A-301 with 12" insertion depth
<b>A-301-SS</b>	SS static pressure tip, for 1/4" metal tubing connection
<b>A-302</b>	Static pressure tip, for 3/16" and 1/8" ID plastic or rubber tubing
<b>A-302-A</b>	Static pressure tip, same as A-302 with 6" insertion depth
<b>A-303</b>	Portable static pressure tip, for 3/16" ID rubber or plastic tubing with 4" insertion

A-305 low resistance static pressure tip is designed for use in dust-laden air and for rapid response applications. It is recommended where a very low actuation pressure is required for a pressure switch or indicating gage — or where response time is critical.

<b>A-305</b>	Static pressure tip, low resistance application, furnished with two (2) hex jam nuts and two (2) mounting washers for duct mounting and with 1/8" NPT pipe thread for pressure connection
<b>A-305-SS</b>	SS static pressure tip, low resistance application, furnished with two (2) hex jam nuts and two (2) mounting washers for duct mounting and with 1/8" NPT pipe thread for pressure connection
<b>A-306</b>	Outdoor static pressure sensor. Provides average outdoor pressure signal for reference in building pressurization applications. Includes sensor, 50' vinyl tubing, mounting bracket and hardware. Red sensor
<b>A-306-A</b>	Outdoor static pressure sensor. Provides average outdoor pressure signal for reference in building pressurization applications. Includes sensor, 50' vinyl tubing, mounting bracket and hardware. Gray sensor

# STATIC PRESSURE ACCESSORIES



A-465



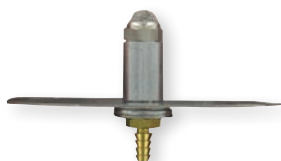
A-417A



A-418E



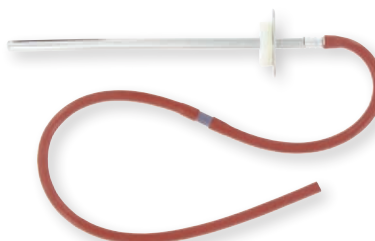
A-418N



A-419A



A-420A



A-421



Surge  
Damper

## MODEL CHART

Model	Description
A-465	Static pressure pick-up provides a clean solution for sensing space pressure. The sensor can be mounted on sheetrock walls, single gang electrical boxes, or on ceiling tiles. Molded from ABS plastic, the A-465 provides an integral barb fitting and includes tubing, mounting screws and anchors.
A-417A	Static pressure pickup. For use in clean rooms, 60 micron filter picks up static pressure. Stainless steel wall plate fits 2" x 4" electrical box. Sealed with foam gasket, screws included. Barbed brass fitting holds 1/8" to 3/16" ID tubing.
A-418E	Static pressure pickup. Room mount with plastic enclosure fits 2" x 4" electrical box. Fine mesh screen hides static pressure pickup port. Clean connection to 1/8" to 3/16" ID tubing and pressure sensor. Sealed with foam gasket, screws included.
A-418N	Static pressure pickup. Room mount with plastic enclosure fits 2" x 4" electrical box. Fine mesh screen hides static pressure pickup port. Clean connection to 1/8" to 3/16" ID tubing and pressure sensor. Sealed with foam gasket, screws included.
A-419A	Static pressure pickup ceiling mount. Plate rests on top of standard 3/4" thick ceiling tile while 60 micron filter faces down through 5/8" hole in tile. Filter is barely noticeable in room being monitored. Unit mounts to junction box. Barbed brass fitting holds 1/8" to 3/16" ID tubing.
A-420A	Static pressure pickup for roof or outside mount. Reduces effects of wind gusts to keep pressure readings stable when plate is parallel to ground. Structure withstands harsh environmental elements. Structure is 3-1/4" across and 2-3/8" deep. EMT Conduit fitting is 1/2". Pressure connection is brass barbed fitting for 1/8" and 3/16" ID tubing.
A-421	Static pressure tip measures duct static air pressure. Assembly includes 6" probe, silicon rubber hose, and screws. Built-in surge damper ensures stable readings on pressure sensor. Pressure spike reducer can be added to end of tube to further smooth over pressure fluctuations.

## ACCESSORIES - FITTINGS & FILTERS



### MODEL CHART

Model	Description
A-323	Elbow compression fitting, brass 1/8" NPT to 1/4" metal tubing
A-324	Compression fitting, brass 1/8" NPT to 1/4" metal tubing
A-326	Compression fitting, brass 1/8" NPT to 3/8" tubing
A-327	5/16" nylon tube union
A-328	1/4" nylon tube union
A-329	1/8" NPT close coupled street ell, brass
A-330	1/8" pipe plug, socket hex, plated steel
A-331	1/8" NPT filter vent plug, nylon and sintered metal
A-332	Bushing, brass, 1/8" to 1/4" NPT
A-333	Bushing, brass, 1/8" to 1/2" NPT
A-334	Close nipple, brass, 1/8" NPT
A-336	90° street L, brass, 1/8" NPT
A-337	Coupling, brass, 1/8" NPT
A-338	Servel adapter, brass 3/8" and 5/16" N.F. threads for gas appliances to 1/8" and 3/16" ID rubber or plastic tubing
A-339	Adapter, brass, 1/8" NPT to 3/16" rubber and 1/8" ID plastic tubing
A-340	Adapter, nylon, 1/8" NPT to 3/16" ID rubber or 1/4" plastic tubing
A-342	"T" assembly, plastic, for 3/16" ID rubber or 1/4" plastic tubing
A-343	"T" assembly, plastic, for 3/16" plastic tubing
A-343-1	"T" assembly, plastic, for 1/8" ID plastic tubing
A-344	Terminal tube, brass 1/4" diameter tube, 8" L (not shown)
A-345	Flange, aluminum with gasket and sheet metal screws, 1/8" NPT
A-346	"T" compression fitting, brass, 1/4" metal tubing
A-349	Reducer, brass, 1/4" female NPT to 1/8" male NPT
A-385	1/2" plastic hole plugs 20/bag
A-386	5/16" metal hole plugs 20/bag
A-391	Line filter for Capsuhelic® gage, 1/4" female NPT x 1/4" male NPT
A-392	Line filter for Magnehelic® gage, 1/8" female NPT x 1/8" male NPT
A-398	Probe extension adapter for series 640 air velocity transmitter, brass, 1/2" female NPT x 5/16" compression

## ACCESSORIES - VALVES & CONNECTORS



### MODEL CHART

Instrument valves for permanent installation. They mount in part A-316, A-317, type C manometer connections or Magnehelic® gage and connect to metal tubing or 1/8" pipe.

Model	Description
A-310A	3-way vent valve, plastic, 1/8" NPT to 1/4" metal tubing. Positions are: (1) Line: Gage connected to pressure source. (2) Off: Both gage and connection to pressure source closed. (3) Vent: Gage vented to atmosphere and connection to pressure source closed. 80 psi rating. Replaces former model A310 (brass)
A-310B	Same as A-310A but with 10 psi rating
A-311	Shut off valve, brass, 1/8" NPT to 1/8" NPT
A-312	Shut off valve, brass, 1/8" NPT to 1/4" metal tubing
A-5001-1	PVC 1/8" hose barb inlet x 1/8" hose barb outlet x 1/8" hose barb outlet (125 psi maximum)
A-5002-2	PVC 1/4" hose barb inlet x 1/4" hose barb outlet x 1/4" hose barb outlet (125 psi maximum)
A-5003-3	PVC 1/8" female NPT inlet x 1/8" female NPT outlet x 1/8" female NPT outlet (125 psi maximum)
A-5003-5	PVC 1/8" male NPT inlet x 1/8" female NPT outlet x 1/8" female NPT outlet (125 psi maximum)
A-5004-4	PVC 1/4" female NPT inlet x 1/4" female NPT outlet x 1/4" female NPT outlet (125 psi maximum)
A-5004-6	PVC 1/4" male NPT inlet x 1/4" female NPT outlet x 1/4" female NPT outlet (125 psi maximum)
A-5005-3	PVC 1/8" female NPT inlet x 1/8" male NPT outlet x 1/8" male NPT outlet (125 psi maximum)
A-5006-4	PVC 1/4" female NPT inlet x 1/4" male NPT outlet x 1/4" male NPT outlet (125 psi maximum)
A-355	Porting valve, acrylic plastic, 1/8" NPT inserts. Used for convenient indication of pressure at two points with a single gage
A-365	Dual porting valve, acrylic plastic, 1/8" NPT fittings. For monitoring three pressures, two at a time, with one gage

### MODEL CHART

Gage Connectors for Manometers. Molded nylon construction, threaded .786 x 27 N.S., with O-ring seal.

Model	Description
A-315	Gage connector, shut off type, for 3/16" rubber tubing
A-316	Gage connector, bushing, 1/8" pipe thread opening
A-317	Gage connector, 1/8" pipe thread opening, less OD thd., for slip fit in 3/4" dia. opening in 250 series A.F. gages
A-318	Gage connector 1/4" pipe thread opening
A-319	Flexible red P.V.C. connector, 3/16" ID rubber tubing to 1/4" ID plastic tube for 1221, 1222 and 1227 manometers
A-321	Brass safety relief valve protects Magnehelic® or Photohelic® gage against over pressure due to regulator failure etc. Opens at 10 psi. Mounts in tee fitting in sensing line or in unused gage port with addition of A-349 reducer. 1/4" male NPT (Use two for D.P. application)
A-322	Gage connector for 1/4" tubing. Slip fits in 3/4" opening in 250 series A.F. gages (compression nut and ferrule not included)

# ACCESSORIES - GAGE FLUIDS



MODEL CHART	
Model	Description
Red gage fluid, .826 sp. gr. The standard fluid for use in inclined manometers, "D" type vertical manometers and all Dwyer gages using red fluid.	
A-101	1 oz unbreakable plastic dispenser bottle
A-102	4 oz plastic bottle with screw cap
A-103	1 pt plastic bottle with screw cap
A-104	1 qt plastic bottle with screw cap
Blue gage fluid, 1.910 sp. gr. For special instruments and Mark II Models 26 and 28.	
A-110	1 oz unbreakable plastic dispenser bottle
A-111	1 pt plastic bottle with screw cap
Violet gage fluid, 1.000 sp. gr. Use in place of water if better meniscus is desired.	
A-120	1 oz unbreakable plastic dispenser bottle
A-121	4 oz plastic bottle with screw cap
A-122	1 pt plastic bottle with screw cap
Fluorescein green color concentrate, water coloring agent. Not to be used full strength. Add 3/4 oz to a quart of distilled water. Contains a wetting agent to improve the meniscus characteristics. Use in vertical manometers only.	
A-126	1 oz unbreakable plastic dispenser bottle
Caution: Use only Dwyer fluids in Dwyer gages.	

# ACCESSORIES - MISCELLANEOUS



MODEL CHART	
Model	Description
A-298	Flat aluminum bracket for flush mounting Capsuhelic® gage, 603A, 605, and 3000MR
A-299	Mounting bracket, flush mount Magnehelic® gage in bracket, bracket is then surface mounted, steel with gray hammertone epoxy finish
A-300	Flat aluminum bracket for flush mounting Magnehelic® gage
A-351	Pinch clamp to seal rubber tubing, as in a leakage test
A-352	Magneclip, slip on magnetic holder for acrylic plastic gages, per pair
A-353	Magnetic mounting, flat style, secures to flowmeter, etc. with 6-32 machine screw and boots insert
A-354	Magnetic mounting, edge style, secures edge of acrylic manometer with 10-32 machine screw and boots insert
A-356	Gage plug with retainer loop, polyethylene plastic, for 1/4" ID tubing, slip loop over tubing OD and insert plug for seal
A-357	Thermometer and terminal tube holder, SS wire
A-360	Aluminum DIN rail, 1 m
A-362	Stand-hang bracket, aluminum, for Minihelic® II gage
A-363	Scale clamp bar for 1221 manometer
A-364	Magnet assembly for 1222 manometers, 2 required (3 required for 1222-36 and M-1000)
A-366	Manometer cleaning brush 1/4" OD x 2-1/8" long, attach to wire for use
A-368	Surface mounting plate, aluminum, for Magnehelic® gage
A-369	Stand-hang bracket, aluminum, for Magnehelic® gage
A-370	Mounting bracket, flush mount Capsuhelic® gage or Series 631B transmitter in bracket, bracket is then surface mounted, steel with gray hammertone epoxy finish
A-371	Surface mounting bracket, use with Photohelic® gage on horizontal or vertical surfaces, also for Capsu-Photohelic® gages on vertical only
A-395	Surface mounting bracket for Series 4000 Capsuhelic® gages, steel with gray hammertone epoxy finish
A-397	Rugged step drill quickly provides true round holes in thin materials, ideal for installation of Dwyer pitot tubes in sheet metal duct, no centerpunch needed to steel, drills 3/16" through 1/2" holes in 1/16" increments
A-464	Flush mount kit for Magnehelic® gages
A-465	Flush mount space pressure sensor
A-497	Surface mounting bracket for Minihelic®II gage, steel with satin black finish

# ACCESSORIES - KITS FOR AIR FILTER SWITCHES



MODEL CHART	
Model	Description
A-602	Air filter kit, accessory package for using switch without a gage includes two pressure tips with integral compression fittings, two 5' lengths of 1/4" aluminum tubing and two 1/8" NPT to 1/4" tubing compression fittings
A-603	"T" kit, accessory package for using pressure switch in conjunction with an air filter kit equipped Magnehelic® or Series 250 AF gages includes two 1/8" NPT to 1/4" tubing compression fittings and two compression tees
A-604	"T" kit, accessory package for using pressure switch in conjunction with Mark II gages, includes two plastic tubing connector tees and two plastic tubing to 1/8" NPT adapters



# GLOSSARY

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**Absolute Pressure (psia):** The total force per unit area exerted by a fluid. The sum of atmospheric and gage pressures.

**Accuracy:** The degree to which an observed value matches the actual value of a measurement over a specified range.

**Alternating Current (AC):** Current that reverses polarity at a uniform frequency.

**ANSI:** The American National Standards Institute is a private nonprofit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

**ASTM:** (Formerly known as The American Society for Testing and Materials) An international standards developing organization that develops and publishes voluntary technical standards for a wide range of materials, products, systems, and services.

**Atmospheric Pressure:** The force exerted per unit area by the weight of the atmosphere.

**British Thermal Unit (BTU):** The amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. Melting a pound of ice at 32°F requires 143 BTU.

**BSPT:** British Standard Pipe Thread.

**Capacitance:** A measure of the amount of electric charge stored (or separated) for a given electric potential. The most common form of charge storage device is a two-plate capacitor.

**Cavitation:** The process where vapor bubbles in a flowing liquid collapse inside a control valve as the pressure begins to increase.

**Closed Loop:** A control system that provides feedback to a controller on the state of the process variable.

**Cold Junction:** The end of thermocouple that is kept at a constant temperature in order to provide a reference point.

**Contacts:** Elements used to mechanically make or break an electric circuit.

**Critical Pressure:** The ratio of upstream to downstream pressure where the gas velocity out of the valve is sonic and further decreases in downstream pressure no longer increase the flow.

**Cv or Valve Flow Coefficient:** The number of US gallons per minute of water at 60°F that will pass through the valve with a pressure drop of 1 psi.

**Deadband:** The value of measurement between when a switch actuates and deactuates.

**Density:** The mass of a given substance per unit volume.

**Derivative Control:** A method of changing the output of a controller in proportion to the rate of change of the process variable.

**Dewpoint:** The temperature to which air must be cooled for the air to be saturated with water.

**Dielectric:** The insulating material between the conductors of a capacitor.

**Dielectric Constant:** The ratio of the insulating ability of a material to the insulating ability of vacuum.

**DIN:** Deutsches Institut für Normung e.V., The German national organization for standardization and is that country's ISO member body. DIN and mini-DIN connectors, as well as DIN rails are several examples of older DIN standards that are today used around the world.

**Direct Current (DC):** A current with a constant polarity.

**Double Pole Double Throw (DPDT) Switch:** Two separate switches that operate simultaneously, each with a normally open and a normally closed contact and a common connection.

**Drift:** A gradual change in an element over time when the process conditions are constant.

**Dry Bulb Temperature:** The ambient air temperature measured by a thermometer that is freely exposed to the air but shielded from other heating or cooling effects.

**Emissivity:** The ratio of energy radiated by the material to energy radiated by a black body at the same temperature. It is a measure of a material's ability to absorb and radiate energy.

**Form-C Contact:** A contact that has both normally open and normally closed contacts.

**Fuzzy Logic:** A system that uses mathematical or computational reasoning based on fuzzy sets derived from analog inputs.

**Gage Pressure (psig):** The measure of force per area exerted by a fluid using atmospheric pressure as the zero reference.

**Gain:** The ratio of change in output to the change in input of a process.

**Hot Junction:** The joined end of the thermocouple that is exposed to the process where the temperature measurement is desired.

**Humidity:** The amount of water vapor in a given volume of air or gas.

**Hydrostatic Pressure:** The pressure due to the head of a liquid column.

**Hysteresis:** A property of a device or instrument whereby it gives different output values in relation to its input values, depending on the directional sequence in which the input values have been applied. [IEC 61298-2]

**Impedance:** The opposition in an electric circuit to the flow of an alternating current consisting of inductive reactance, ohmic resistance and capacitive reactance.

**Inaccuracy:** Maximum positive and negative deviation from the specified characteristic curve observed in testing a device under specified conditions and by a specified procedure. [IEC 61298-2]

**Note 1:** Accuracy is defined in IEC 60050-300, definition 311-06-08.

**Note 2:** The term inaccuracy is sometimes referred to as measured accuracy. This term should not be used.

**Inductive Load:** Current passing through wound or coiled wire creates a magnetic field that in turn produces mechanical work.

**Integral Control:** A method of changing the output of a controller by an amount proportional to the error and the duration of that error.

**Laminar Flow:** Smooth fluid flow that has a parabolic flow profile with no mixing between streamlines.

**Linearity:** Ability of a measuring instrument to provide an indication having a linear relationship with a defined quantity other than an influence quantity. [IEC 60050-300]

**Note:** The method of expression of lack of linearity is different for different kinds of instruments and is established in each particular instance.

**Long-Term Span Drift:** The amount of change of a measured reading with 90% of full scale range pressure applied and constant ambient conditions over a given period of time which is typically quoted as an annual figure. [IEC 61298-2]

**Long-Term Zero Drift:** The amount of change of a measured reading with zero pressure applied and constant ambient conditions over a given period of time which is typically quoted as an annual figure.

**Low Pressure Steam:** As defined by ASME, steam under 15 psi pressure.

**Manual Reset:** A control that must have human input before it will return to its normal state from an alarm state.



# GLOSSARY

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**Maximum Surge Pressure:** Safe pressure for the switch housing but which may damage the mechanism by continuous or repetitive application.

**NEMA:** The National Electrical Manufacturers Association, a trade association in the US of electrical equipment manufacturers that develops many industry technical standards, such as the standard for electrical equipment enclosures.

**NIST:** The National Institute of Standards and Technology, is a non-regulatory agency of the United States Department of Commerce's Technology Administration. The institute provides standard references and calibration services.

**Non-Linearity:** Deviation from linearity. [IEC 61298-2]

**Note 1:** Linearity is defined in IEC 60050(300), definition 311-06-05.

**Note 2:** Non-linearity does not include hysteresis.

**Non-Repeatability:** Deviation from repeatability. [IEC 61298-2]

**Note 3:** Repeatability is defined in IEC 60050(300), definition 311-06-06.

**Normally Closed Switch:** A switch in which the contacts are normally closed. Actuation opens the contact.

**Normally Open Switch:** A switch in which the contacts are normally open. Actuation closes the contacts.

**NPT:** National Pipe Thread.

**NSF:** A not-for-profit, non-governmental organization that develops standards and provides product certification and education in the field of public health and safety.

**Null Switch:** A floating contact switch with a zone of no contact. Often used to operate reversible motors.

**pH:** An indication of the acidity or alkalinity of a solution in units ranging from 0 (most acidic), to 7 (neutral), to 14 (most alkaline).

**Pressure Drop:** The difference in upstream and downstream pressure of the fluid flowing through a valve.

**Proportional Control:** A method of changing the output of a controller by an amount proportional to the error.

**Proportional-Integral Control (PI):** Proportional and integral control combined.

**Proportional-Integral-Derivative Control (PID):** Proportional, integral, and derivative control combined.

**Range:** The span of rates within which the sensing element of a given switch can be set to actuate an electric switch.

**Rated Pressure:** The maximum pressure that the actuating components of the switch in contact with the media can withstand continuously and/or repeatedly without risk of permanent damage.

**Relative Humidity:** The ratio of the quantity of water vapor in the air to the quantity of water vapor required for saturation at the same temperature.

**Repeatability:** The closeness of agreement between the results of successive measurements of the same measured, carried out under the same conditions of measurement, i.e.: by the same measurement procedure; by the same observer; with the same measuring instruments, used under the same conditions; at relatively short intervals of time. [IEC 60050-300]

**Repetitive Accuracy:** The ability of a switch to operate repetitively at its set point under consistent conditions.

**Response Time:** The time it takes an element to respond to a change in the value of the measured variable or to produce a change in the output signal.

**Rotameter:** A variable area flowmeter consisting of tapered tube and a float.

**RS-232:** (Recommended Standard 232) is a standard for serial binary data signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment).

**RS-485:** (Now known as EIA-485) is an OSI model physical layer electrical specification of a two-wire, half-duplex, multipoint serial connection.

**Saturation Point:** The point at which condensation is formed.

**Serial Transmission:** Sending one bit at a time on a single transmission line.

**Set or Actuation Point:** The exact rate which will cause the electric switch to actuate.

**Single-Pole Single Throw (SPST) Switch:** A switch that only has one of either a normally open or a normally closed contact.

**Single-Pole Double-Throw (SPDT) Switch:** A switch combining both normally open and normally closed switch contacts.

**Solid State:** Any element that controls current without moving parts, vacuum gaps or heated filaments.

**Span:** The difference between the highest and lowest numbers in a range.

**Span Temperature Coefficient:** The maximum amount the span reading could change at any point within the compensated temperature range. This error is typically expressed as a percentage of full scale output of reading. It can also be expressed as percentage of full scale per °C, °F or K e.g.  $\pm 0.02\%FS/^{\circ}C$ .

**Specific Gravity:** The ratio of the density of a fluid to the density of a reference fluid.

**Static Pressure:** The pressure exerted by a fluid at rest. The outward push of a fluid against the walls of a container.

**Temperature Compensation:** The correction for the influence of temperature on a measurement.

**3-A:** 3-A Sanitary Standards Inc., A non-profit association representing equipment manufacturers, processors, regulatory sanitarians, and other public health professionals that creates standards and accepted practices for dairy and food processing equipment and systems.

**Total Pressure:** The sum of velocity and static pressure.

**Transducer:** Any device that generates an electrical signal from physical measurements.

**Transmitter:** A device that translates the low-level output of a sensor or transducer to a higher level signal suitable for transmission to a site where it can be further processed.

**Turbulent Flow:** Fluid flow in which the flow profile is a flattened parabola, the streamlines are not present, and the fluid is freely mixing.

**Turndown Ratio:** The ratio of the maximum to minimum measurable value that can still produce full-scale output.

**Velocity Pressure (Dynamic Pressure):** The pressure exerted by the velocity of a fluid. Can be measured by the difference between total and static pressure.

**Viscosity:** The resistance of a fluid to flow when subjected to shear stress.

**Wet Bulb Temperature:** The lowest temperature that can be obtained through the cooling effect of water evaporating into the atmosphere.

**Zero Temperature Coefficient:** The maximum amount the output reading at zero pressure might deviate over the compensated temperature range. This error is typically expressed as a percentage of full scale output of reading. It can also be expressed as percentage of full scale per °C, °F or K e.g.  $\pm 0.02\%FS/^{\circ}C$ .

# REFERENCE TABLES

AREA OF CIRCLES IN FT <sup>2</sup>			
Diam. in Inches	Area Square Feet	Diam. in Inches	Area Square Feet
1	.0054	30	4.909
1-1/2	.0123	31	5.241
2	.0218	32	5.585
2-1/2	.0341	33	5.940
3	.0491	34	6.305
3-1/2	.0668	35	6.611
4	.0873	36	7.069
4-1/2	.1105	37	7.467
5	.1364	38	7.876
5-1/2	.1650	39	8.296
6	.1964	40	8.727
6-1/2	.2305	41	9.168
7	.2673	42	9.621
7-1/2	.3068	43	10.08
8	.3491	44	10.56
8-1/2	.3940	45	11.04
9	.4418	46	11.54
9-1/2	.4923	47	12.05
10	.5454	48	12.57
11	.6600	49	13.10
12	.7854	50	13.64
13	.9218	51	14.19
14	1.069	52	14.75
15	1.227	53	15.32
16	1.396	54	15.90
17	1.576	56	17.10
18	1.767	58	18.35
19	1.969	60	19.63
20	2.182	62	20.97
21	2.405	64	22.34
22	2.640	66	23.76
23	2.885	68	25.22
24	3.142	70	26.73
25	3.409	72	28.27
26	3.687	74	29.87
27	3.976	76	31.50
28	4.276	78	33.18
29	4.587	80	34.91

ALTITUDE PRESSURE TABLE		
Mercury at 0°C (32°F)		
Altitude in feet	Inches of Mercury	In Millimeters of Mercury
-1,000	31.02	787.9
0	29.921	760.0
1,000	28.86	732.9
2,000	27.82	706.6
3,000	26.81	681.1
4,000	25.84	656.3
5,000	24.89	632.3
6,000	23.98	609.0
7,000	23.09	586.4
8,000	22.22	564.4
9,000	21.38	543.2
10,000	20.58	522.6
15,000	16.88	428.8
20,000	13.75	349.1
25,000	11.10	281.9
30,000	8.88	225.6
35,000	7.04	178.7
40,000	5.54	140.7
45,000	4.36	110.8
50,000	3.436	87.30



















SPECIFIC GRAVITIES OF GASES		
(Based on 68°F and 14.7 lb. abs.)		
Acetylene	C <sub>2</sub> H <sub>2</sub>	.897
Air	.....	1.000
Ammonia	NH <sub>3</sub>	.587
Argon	A	1.378
Butane-N	C <sub>4</sub> H <sub>10</sub>	2.390
Butane-ISO	(CH <sub>3</sub> ) <sub>2</sub> CH CH <sub>3</sub>	1.990
Carbon Dioxide	CO <sub>2</sub>	1.517
Carbon Monoxide	CO	.966
Chlorine	CL <sub>2</sub>	2.452
Ethane	C <sub>2</sub> H <sub>6</sub>	1.035
Helium	He	.138
Hydrogen	H <sub>2</sub>	.070
Methane	CH <sub>4</sub>	.553
Natural Gas	.....	.665 (Approx. Avg.)
Nitric Oxide	NO	1.035
Nitrogen	N <sub>2</sub>	.966
Nitrous Oxide	N <sub>2</sub> O	1.518
Oxygen	O <sub>2</sub>	1.103
Propane	C <sub>3</sub> H <sub>8</sub>	1.550
Sulphur Dioxide	SO <sub>2</sub>	2.209

VOLUME EQUIVALENTS		
1 Cu. Ft.	1 Gal. (U.S.)	1 Liter
1728 Cu. In.	231 Cu. In.	.0353 Cu. Ft.
7.481 Gal. (U.S.)	.1337 Cu. Ft.	.2642 Gal. (U.S.)
28.317 Liters	3.785 Liters	1000 Cu. Cm.
28.317 Cu. Cm.	3785 Cu. Cm.	

FLOW EQUIVALENTS							
1 Cu. Ft./Hr.	1 Cu. Ft./Min.	1 CC/Min.	1 CC/Hr.	1 LPM	1 LPH	1 Gal/Min.	1 Gal/Hr.
.0166 Cu. Ft./Min.	60 Cu. Ft./Hr.	60 CC/Hr.	.0167 CC/Min.	60 LPH	.0166 LPM	60 Gal/Hr.	.0167 Gal/Min.
.4719 LPM	28.316 LPM	.000035 Cu. Ft./Min.	.0000005 Cu. Ft./Min.	.035 Cu. Ft./Min.	.00059 Cu. Ft./Min.	.1337 Cu. Ft./Min.	.002 Cu. Ft./Min.
28.316 LPH	1699 LPH	.0021 Cu. Ft./Hr.	.00003 Cu. Ft./Hr.	2.1189 Cu. Ft./Hr.	.035 Cu. Ft./Hr.	8.021 Cu. Ft./Hr.	.1337 Cu. Ft./Hr.
471.947 CC/Min.	28317 CC/Min.	.001 LPM	.000017 LPM	1000 CC/Min.	16.667 CC/Min.	3.785 LPM	.063 LPM
28317 CC/Hr.	1,699,011 CC/Hr.	.06 LPH	.001 LPH	60,002 CC/Hr.	1000 CC/Hr.	227.118 LPH	3.785 LPH
.1247 Gal/Min.	7.481 Gal/Min.	.00026 Gal/Min.	.000004 Gal/Min.	.264 Gal/Min.	.004 Gal/Min.	3,785.412 CC/Min.	63.069 CC/Min.
7.481 Gal/Hr.	448.831 Gal/Hr.	.0159 Gal/Hr.	.00026 Gal/Hr.	15.851 Gal/Hr.	.264 Gal/Hr.	227,125 CC/Hr.	3785 CC/Hr.

# REFERENCE TABLES

SPECIFIC GRAVITY OF LIQUID	
Liquid	Specific Gravity
Acetone	0.792
Alcohol, ethyl	0.791
Alcohol, methyl	0.810
Ammonia, saturated	0.655
Benzene	0.9
Brine (10% Na Cl)	1.08
Carbolic acid	0.950 to 0.965
Carbon disulfide	1.293
Carbon tetrachloride	1.595
Chloroform	1.489
Ether	0.736
Fuel oil 1	0.82 to 0.95
Fuel oil 2	0.82 to 0.95
Fuel oil 3	0.82 to 0.95
Fuel oil 5A	0.82 to 0.95
Fuel oil 5B	0.82 to 0.95
Fuel oil 6	0.82 to 0.95
Gas oils	0.89
Gasoline a	0.74
Gasoline b	0.72
Gasoline c	0.68
Glycerine	1.260
Heptane-n	0.688
Hexane	0.664
Kerosene	0.820
Mercury	13.600
Methyl acetate	0.93
Methyl iodide	2.28
Milk	1.028 to 1.035
Naptha, petroleum ether	0.665
Naptha, wood	0.848 to 0.810
Oil, castor	0.969
Oil, coconut	0.925
Oil, cotton seed	0.926
Oil, creosote	1.040 to 1.200
Oil, linseed, boiled	0.924
Oil, olive	0.918
Oil, palm	0.924
Oil, peanut	0.92
Oil, sesame seed	0.923
Oil, soy bean	0.924 to .928
Pentane	.623
Propylene glycol	1.038
SAE 30 lube oil	0.9
Sea water	1.025
Sodium chloride, 5%	1.037
Sodium chloride, 25%	1.196
Sodium hydroxide (caustic soda), 20%	1.22
Sodium hydroxide (caustic soda), 30%	1.33
Sodium hydroxide (caustic soda), 40%	1.43
Turpentine (spirits)	0.870
Water	1.000

AGENCY APPROVALS	
	Products with this symbol meet certain requirements for 3-A Sanitary Standards for design and fabrication as governed by 3-A SSI.
	Products with this symbol have had representative samples tested to meet BTL compatibility.
	Products with this symbol conform to certain standards and are eligible to be placed on the market in the European Community.
	This symbol assures you that the product meets certain safety standards and/or performance criteria as set by the Canadian Standards Association.
	Products with this symbol conform to certain ATEX requirements as set by the European Union
	Products with this mark meet certain requirements as reported by Factory Mutual Research.
	Products with this mark meet certain Canadian requirements as reported by Factory Mutual Research.
	Products with this mark meet certain Canadian and U.S. requirements as reported by Factory Mutual Research.
	Products with this symbol certify to standards for safety of electrical equipment for explosive atmosphere requirements as set by the IECEx Management Committee ExMC.
	The National Institute of Metrology, Standardization and Industrial Quality is a Brazilian federal autarchy, linked to MDIC, the Ministry of Development, Industry and Foreign Commerce.
	Products with this symbol are listed by NSF International. Samples of these products have been evaluated by NSF and meet the safety standards set forth by NSF International.
	Products with this symbol meet the European Union's Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC.
	Products with this symbol have had representative samples tested to meet UL's safety requirements. These requirements are primarily based on UL's own published Standards for Safety.
	Products with this symbol have been evaluated by UL to Canadian safety requirements, which may be somewhat different from U.S. safety requirements.
	Products with this symbol indicate compliance with both Canadian and U.S. safety requirements.
	Products with this symbol are certified UL recognized components to U.S. requirements. Component parts are part of a larger product or system. These components may have restrictions on their performance or may be incomplete in construction.
	Products with this symbol are certified UL recognized components to Canadian requirements.
	Products with this symbol are certified UL recognized components to both Canadian and U.S. requirements.

# REFERENCE TABLES

HAZARDOUS LOCATIONS LISTINGS	
Class I (-4)	Flammable gases or vapors are or may be present in sufficient quantities to produce explosive or ignitable mixtures.
Division I (-4A)	Gases or vapors are or may be in the atmosphere in normal operations.
Group A (-2)	Containing acetylene.
Group B (-2)	Containing hydrogen, ethylene oxide & propylene oxide or gases or vapors of equivalent hazard.
Group C (-2)	Containing ethyl-ether vapor, ethylene or cyclopropane.
Group D (-2)	Containing gasoline, hexane, naptha, benzine, butane, propane, alcohol, acetone, lacquer solvent or natural gas.
Division II (-4B)	Gases or vapors are not normally present. They may be present due to leakage, accidents or maintenance. It is possible for one atmosphere to contain the same items as listed for Groups of Division I of this class.
Class II (-5)	Combustible dust may be present in sufficient quantities to produce an explosive atmosphere.
Division I (-5A)	Dust in suspension. Dust is or may be present in the atmosphere due to normal operating conditions.
Group E (-2)	Containing metal dust, including aluminum, magnesiums and their commercial alloys, and other metals of similar hazardous characteristics.
Group F (-2)	Containing carbon black, coal or coke dust.
Group G (-2)	Containing flour, starch or grain dust.
Division II (-5D)	Dust not normally in suspension. Possibly containing the same items as listed for Groups of Division I of this class.
Class III (-6)	Ignitable fibers are present, but not necessarily present in air in quantities sufficient to produce ignitable mixtures.
Division I (-6A)	Easily ignitable fibers or materials producing combustible flyings are handled, manufactured or used.
Division II (-6B)	Easily ignitable fibers are stored or handled.

NEMA STANDARDS FOR INDUSTRIAL ENCLOSURES	
Type 1	General purpose - indoor.
Type 2	Drip-proof - indoor. Protects against limited amounts of falling liquids and dirt.
Type 3	Dust-tight, raintight and sleet resistant - outdoor. Protects against windblown dust, rain sleet and external ice formation.
Type 3R	Same as Type 3, except not dust-tight.
Type 3S	Same as Type 3, but provides for operation of external mechanism when ice-laden.
Type 4	Watertight and dust-tight - indoor and outdoor. Protects against windblown dust and rain, splashing water and hose-directed water.
Type 4X	Same as Type 4 except also corrosion resistant.
Type 5	Dust-tight - indoor. Protects against dust and falling dirt.
Type 6	Submersible, watertight and dust-tight - indoor and outdoor. Protects against water entry during occasional temporary submersion to a limited depth.
Type 6P	Same as Type 6 except for prolonged submersion.
Type 7	Class I indoor hazardous locations. Explosion-proof, may be A, B, C or D.
Type 8	Class I indoor or outdoor hazardous locations - oil immersed equipment, may be A, B, C or D.
Type 9	Class II indoor hazardous locations. Explosion-proof, may be E, F or G.
Type 10	Mining Enforcement Safety Administration. Explosion-proof in methane or natural gas.
Type 11	Corrosion resistant and drip-proof - oil-immersed - indoor.
Type 12	Dust-tight and drip-tight - indoor, non-corrosive dripping liquids.
Type 12K	Same as Type 12 except enclosures have knockouts.
Type 13	Oil-tight and dust-tight - indoors, non-corrosive spray of water, oil and coolant.

# TRADEMARK ACKNOWLEDGMENTS

## REGISTERED TRADEMARKS OF DWYER INSTRUMENTS, INC.



Capsuhelic®	Iso Verter®	Photohelic®
Capsu-Photohelic®	Lin-E-Aire®	Plast-A-Vane®
Digihelic®	Magnehelic®	Precisor® Quick-View®
DigiMag®	MagneSense® Mercoid®	Rate-Master®
Duotect®	Mercoid Control®	Safe-T-Ohm®
Durablock®	Microtector®	Slack Tube®
Dwyer Group®	Minihelic® Mini-Master®	Spirahelic®
Dwyer®	Mini-Photohelic®	The Low Pressure People®
Flex-Tube®	One-Touch®	Visi-Float®
Flotect®	Optitrol®	

## COMMON LAW MARKS OF DWYER INSTRUMENTS, INC.



AQStick™	Mother Node™	SMART Air Hood™
Even-Action™	PredictAir™	Tell Tale™
Hi-Flow™	Pre-Trac™	Tell Tale Jr.™
Loop Alarms™	Proximity™	Thermoguide™
Lovelink™	S-D™	Ultra-Mag™
Mini-Node™	Slide Guide™	Ultra-View™
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BACnet  
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Alumel®	Conceptech, Inc.	IOS®	Cisco Systems, Inc.	Velcro®	Velcro Industries B.V.
Android®	Google, Inc.	Lexan®	SABIC Innovative Plastic IP B.V.	Windows®	Microsoft Corporation
Chromel®	Conceptech, Inc.	Loctite®	Henkel Corporation	Windows NT®	Microsoft Corporation
Darina®	Shell Trademark Management B.V.	Modbus®	Schneider Automation, Inc.	Windows Vista®	Microsoft Corporation
Duracell®	The Gillette Company	Norprene®	Saint-Gobain Abrasives, Inc. Corporation	Excel®	Microsoft Corporation
Eveready®	Eveready Battery Company, Inc.	Nylatch®	Southco, Inc.	PowerPoint®	Microsoft Corporation
Fluon®	AGC Chemicals Americas, Inc.	Open I/O®	Easton Controls, Inc.	Air Flow™	TSI, Inc.
Fluorolube®	Gabriel Performance Products LLC	Open Signal®	Easton Controls, Inc.	No More Leaks™	Permatex
Freon®	E.I. DuPont De Nemours and Company	Sensorpak®	Easton Controls, Inc.	Precision Flow™	Sierra Instruments, Inc.
HART®	Hart Communication Foundation	Sensorpulse®	Easton Controls, Inc.	ProHood™	TSI, Inc.
Hirschmann®	Hirschmann Electronics GMBH	Swagelock®	Swagelock Company	Smart Interface™	Ientek Co., Ltd.
HyperTerminal®	Hilgraeve, Inc.	Trendreader®	ACR Systems, Inc.		
Igilde®	Igus GMBH	Tygon®	Saint-Gobain Abrasives, Inc. Corporation		
Inconel®	Huntington Alloys Corporation	VCR®	Swagelok Company		

## INFORMATION ABOUT MERCURY-ADDED PRODUCTS

Dwyer Instruments, Inc. continues its development of non-mercury replacement alternatives for those products currently offered containing mercury. We will continue to work with all customers to supply mercury added products as needed for replacement of products currently in use and to guide customers towards non-mercury added products for new applications.

Dwyer Instruments, Inc. will comply with all local, state, federal, and international laws regarding the sale of mercury added products. These laws may affect our ability to sell, distribute, or transport products into restricted states and/or countries. Mercury added product sales may be limited or denied to certain customers depending on the location or intended use of the product.

Dwyer Instruments, Inc. encourages all customers to become familiar and comply with all mercury legislation. Sales of any and all mercury added products will be discontinued to any customer that knowingly or willfully disregards any legislation concerning mercury.

Dwyer Instruments, Inc. requests that all mercury containing products are properly disposed of at the end of their useful life. Many web sites are available to help educate consumers about proper disposal of mercury added products. Please visit [www.newmoa.org](http://www.newmoa.org) for additional information related to mercury usage.



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# PRESSURE CONVERSION CHART

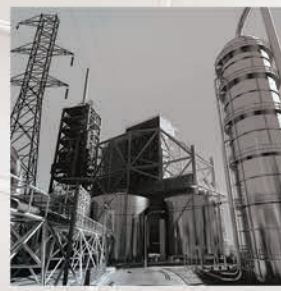
in/H <sub>2</sub> O	P.S.I.	in/Hg	mm/H <sub>2</sub> O	mm/Hg	kg/cm <sup>2</sup>	bar	mbar	Pa	kPa
.1	.0036	.0073	2.534	.1863	.0002	.0002	.2482	24.82	.0248
.2	.0072	.0146	5.067	.3726	.0005	.0005	.4964	49.64	.0496
.4	.0144	.0293	10.13	.7452	.0010	.0010	.9928	99.28	.0993
.6	.0216	.0440	15.20	1.118	.0015	.0015	1.489	148.9	.1489
.8	.0288	.0588	20.34	1.496	.0020	.0020	1.992	199.2	.1992
1.0	.0361	.0735	25.41	1.868	.0025	.0025	2.489	248.9	.2489
2	.0722	.1470	50.81	3.736	.0051	.0050	4.978	497.8	.4978
3	.1083	.2205	76.22	5.604	.0076	.0075	7.467	746.7	.7476
4	.1444	.2940	101.62	7.472	.0102	.0099	9.956	995.6	.9956
5	.1804	.3673	127.0	9.335	.0127	.0124	12.44	1244	1.244
6	.2165	.4408	152.4	11.203	.0152	.0149	14.93	1493	1.493
7	.2526	.5143	177.8	13.072	.0178	.0174	17.42	1742	1.742
8	.2887	.5878	203.2	14.940	.0203	.0199	19.90	1990	1.990
9	.3248	.6613	228.6	16.808	.0228	.0224	22.39	2239	2.239
10	.3609	.7348	254.0	18.676	.0254	.0249	24.88	2488	2.488
11	.3970	.8083	279.4	20.544	.0279	.0274	27.37	2737	2.737
12	.4331	.8818	304.8	22.412	.0304	.0299	29.86	2986	2.986
13	.4692	.9553	330.2	24.280	.0330	.0324	32.35	3235	3.235
14	.5053	1.029	355.6	26.148	.0355	.0348	34.84	3484	3.484
15	.5414	1.102	381.0	28.016	.0381	.0373	37.33	3733	3.733
16	.5774	1.176	406.4	29.879	.0406	.0398	39.81	3981	3.981
17	.6136	1.249	431.8	31.752	.0431	.0423	42.31	4231	4.231
18	.6496	1.322	457.2	33.616	.0457	.0448	44.79	4479	4.479
19	.6857	1.396	482.6	35.484	.0482	.0473	47.28	4728	4.728
20	.7218	1.470	508.0	37.352	.0507	.0498	49.77	4977	4.977
21	.7579	1.543	533.4	39.22	.0533	.0523	52.26	5226	5.226
22	.7940	1.616	558.8	41.09	.0558	.0547	54.74	5474	5.474
23	.8301	1.690	584.2	42.96	.0584	.0572	57.23	5723	5.723
24	.8662	1.764	609.6	44.82	.0609	.0597	59.72	5972	5.972
25	.9023	1.837	635.0	46.69	.0634	.0622	62.21	6221	6.221
26	.9384	1.910	660.4	48.56	.0660	.0647	64.70	6470	6.470
27	.9745	1.984	685.8	50.43	.0685	.0672	67.19	6719	6.719
28	1.010	2.056	710.8	52.26	.0710	.0696	69.64	6964	6.964
29	1.047	2.132	736.8	54.18	.0736	.0722	72.19	7219	7.219
30	1.083	2.205	762.2	56.04	.0761	.0747	74.67	7467	7.467
31	1.119	2.278	787.5	57.91	.0787	.0772	77.15	7715	7.715
32	1.155	2.352	812.8	59.77	.0812	.0796	79.63	7963	7.963
33	1.191	2.425	838.2	61.63	.0837	.0821	82.12	8212	8.212
34	1.227	2.498	863.5	63.49	.0862	.0846	84.60	8460	8.460
35	1.263	2.571	888.9	65.36	.0888	.0871	87.08	8708	8.708
36	1.299	2.645	914.2	67.22	.0913	.0896	89.56	8956	8.956
37	1.335	2.718	939.5	69.08	.0938	.0920	92.04	9204	9.204
38	1.371	2.791	964.9	70.95	.0964	.0945	94.53	9453	9.453
39	1.408	2.876	990.9	72.86	.0990	.0971	97.08	9708	9.708
40	1.444	2.940	1016	74.72	.1015	.0996	99.56	9956	9.956
41	1.480	3.013	1042	76.59	.1040	.1020	102.04	10204	10.204
42	1.516	3.086	1067	78.45	.1066	.1045	104.5	10452	10.45
43	1.552	3.160	1092	80.31	.1091	.1070	107.0	10701	10.70
44	1.588	3.233	1118	82.18	.1116	.1095	109.5	10949	10.95
45	1.624	3.306	1143	84.04	.1142	.1120	112.0	11197	11.20
46	1.660	3.378	1168	85.90	.1167	.1144	114.5	11445	11.44
47	1.696	3.453	1194	87.76	.1192	.1169	116.9	11694	11.69
48	1.732	3.526	1219	89.63	.1218	.1194	119.4	11942	11.94
49	1.768	3.600	1244	91.49	.1243	.1219	121.9	12190	12.19
50	1.804	3.673	1270	93.35	.1268	.1244	124.4	12438	12.44
51	1.841	3.748	1296	95.27	.1294	.1269	126.9	12693	12.69
52	1.877	3.822	1321	97.13	.1320	.1294	129.4	12941	12.94
53	1.913	3.895	1346	98.99	.1345	.1319	131.9	13190	13.19
54	1.949	3.968	1372	100.8	.1370	.1344	134.4	13438	13.44
55	1.985	4.041	1397	102.7	.1395	.1369	136.9	13686	13.69
56	2.021	4.115	1422	104.6	.1421	.1393	139.3	13934	13.93
57	2.057	4.188	1448	106.4	.1446	.1418	141.8	14182	14.18
58	2.093	4.261	1473	108.3	.1471	.1443	144.3	14431	14.43
59	2.129	4.335	1498	110.2	.1497	.1468	146.8	14679	14.68
60	2.165	4.408	1524	112.0	.1522	.1493	149.3	14927	14.93
61	2.202	4.483	1550	113.9	.1548	.1518	151.8	15182	15.18
62	2.238	4.556	1575	115.8	.1573	.1543	154.3	15430	15.43
63	2.274	4.630	1600	117.7	.1599	.1568	156.8	15679	15.68
64	2.310	4.703	1626	119.5	.1624	.1593	159.3	15927	15.93
65	2.346	4.776	1651	121.4	.1649	.1618	161.8	16175	16.18
66	2.382	4.850	1676	123.3	.1674	.1642	164.2	16423	16.42
67	2.418	4.923	1702	125.1	.1700	.1667	166.7	16672	16.67
68	2.454	4.996	1727	127.0	.1725	.1692	169.2	16920	16.92
69	2.490	5.070	1752	128.8	.1750	.1717	171.7	17168	17.17
70	2.526	5.143	1778	130.7	.1776	.1742	174.2	17416	17.42
71	2.562	5.216	1803	132.6	.1801	.1766	176.6	17664	17.66
72	2.598	5.290	1828	134.4	.1826	.1791	179.1	17912	17.91
73	2.635	5.365	1854	136.4	.1852	.1817	181.7	18168	18.17
74	2.671	5.438	1880	138.2	.1878	.1842	184.2	18416	18.42
75	2.707	5.511	1905	140.1	.1903	.1866	186.6	18664	18.66
76	2.743	5.585	1930	141.9	.1928	.1891	189.1	18912	18.91
77	2.779	5.658	1956	143.8	.1954	.1916	191.6	19160	19.16
78	2.815	5.731	1981	145.7	.1979	.1941	194.1	19409	19.41
79	2.851	5.805	2006	147.5	.2004	.1966	196.6	19657	19.66
80	2.887	5.878	2032	149.4	.2030	.1991	199.1	19905	19.90
81	2.923	5.951	2057	151.2	.2055	.2015	201.5	20153	20.15
82	2.959	6.024	2082	153.1	.2080	.2040	204.0	20402	20.40
83	2.996	6.100	2108	155.0	.2106	.2066	206.6	20657	20.66
84	3.032	6.173	2134	156.9	.2131	.2091	209.1	20905	20.90
85	3.068	6.246	2159	158.8	.2157	.2115	211.5	21153	21.15
86	3.104	6.320	2184	160.6	.2182	.2140	214.0	21401	21.40
87	3.140	6.393	2210	162.5	.2207	.2165	216.5	21650	21.65
88	3.176	6.466	2235	164.4	.2233	.2190	219.0	21898	21.90
89	3.212	6.450	2260	166.2	.2258	.2215	221.5	22146	22.15
90	3.248	6.613	2286	168.1	.2283	.2239	223.9	22394	22.39
91	3.284	6.686	2311	169.9	.2309	.2264	226.4	22642	22.64
92	3.320	6.760	2336	171.8	.2334	.2289	228.9	22890	22.89
93	3.356	6.833	2362	173.7	.2359	.2314	231.4	23139	23.14
94	3.392	6.906	2387	175.5	.2384	.2339	233.9	23387	23.39
95	3.429	6.981	2413	177.4	.2410	.2364	236.4	23642	23.64
96	3.465	7.055	2438	179.3	.2436	.2389	238.9	23890	23.89
97	3.501	7.128	2464	181.2	.2461	.2414	241.4	24138	24.14
98	3.537	7.201	2489	183.0	.2486	.2439	243.9	24387	24.39
99	3.573	7.275	2514	184.9	.2512	.2464	246.4	24635	24.64
100	3.609	7.348	2540	186.8	.2537	.2488	248.8	24883	24.88

S.I.	in/H <sub>2</sub> O	in/Hg	mm/H <sub>2</sub> O	mm/Hg	kg/cm <sup>2</sup>	bar	mbar	Pa	kPa
1.0	27.71	2.036	703.1	51.75	.0703	.0689	68.95	6895	6.895
1.1	30.45	2.240	773.4	56.89	.0773	.0758	75.84	7584	7.584
1.2	33.22	2.443	843.7	62.06	.0844	.0827	82.74	8274	8.274
1.3	35.98	2.647	914.0	67.23	.0914	.0896	89.63	8963	8.963
1.4	38.75	2.850	984.3	72.40	.0984	.0965	96.52	9652	9.652
1.5	41.52	3.054	1055	77.57	.1055	.1034	103.4	10340	10.34
1.6	44.29	3.258	1125	82.74	.1125	.1103	110.3	11030	11.03
1.7	47.06	3.461	1195	87.92	.1195	.1172	117.2	11720	11.72
1.8	49.82	3.665	1266	93.09	.1266	.1241	124.1	12410	12.41
1.9	52.59	3.868	1336	98.26	.1336	.1310	131.0	13100	13.10
2.0	55.36	4.072	1406	103.4	.1406	.1379	137.9	13790	13.79
2.1	58.13	4.276	1476	108.6	.1476	.1448	144.8	14480	14.48
2.2	60.90	4.479	1547	113.8	.1547	.1517	151.7	15170	15.17
2.3	63.67	4.683	1617	118.9	.1617	.1586	158.6	15860	15.86
2.4	66.43	4.886	1687	124.1	.1687	.1655	165.5	16550	16.55
2.5	69.20	5.090	1758	129.3	.1758	.1724	172.4	17240	17.24
2.6	71.97	5.294	1828	134.5	.1828	.1793	179.3	17930	17.93
2.7	74.74	5.497	1898	139.6	.1898	.1862	186.2	18620	18.62
2.8	77.51	5.701	1969	144.8	.1968	.1930	193.0	19300	19.30
2.9	80.27	5.904	2039	150.0	.2039	.1999	199.9	19990	19.99
3.0	83.04	6.108	2109	155.1	.2109	.2068	206.8	20680	20.68
3.1	85.81	6.312	2180	160.3	.2180	.2137	213.7	21370	21.37
3.2	88.58	6.515	2250	165.5	.2250	.2206	220.6	22060	22.06
3.3	91.35	6.719	2320	170.7	.2320	.2275	227.5	22750	22.75
3.4	94.11	6.922	2390	175.8	.2390	.2344	234.4	23440	23.44
3.5	96.88	7.126	2461	181.0	.2461	.2413	241.3	24130	24.13
3.6	99.65	7.330	2531	186.2	.2531	.2482	248.2	24820	24.82
3.7	102.4	7.535	2601	191.3	.2601	.2551	255.1	25510	25.51
3.8	105.2	7.737	2672	196.5	.2672	.2620	262.0	26200	26.20
3.9	108.0	7.940	2742	201.7	.2742	.2689	268.9	26890	26.89
4.0	110.7	8.144	2812	206.9	.2812	.2758	275.8	27580	27.58
4.1	113.5	8.348	2883	212.0	.2883	.2827	282.7	28270	28.27
4.2	116.3	8.551	2953	217.2	.2953	.2896	289.6	28960	28.96
4.3	119.0	8.775	3023	222.4	.3023	.2965	296.5	29650	29.65
4.4	121.8	8.958	3094	227.5	.3094	.3034	303.4	30338	30.34
4.5	124.6	9.162	3164	232.7	.3164	.3103	310.3	31030	31.03
4.6	127.3	9.366	3234	237.9	.3234	.3172	317.2	31720	31.72
4.7	130.1	9.569	3304	243.1	.3304	.3240	324.0	32400	32.40
4.8	132.9	9.773	3375	248.2	.3375	.3310	331.0	33100	33.10
4.9	135.6	9.976	3445	253.4	.3445	.3378	337.8	33780	33.78
5.0	138.4	10.18	3515	258.6	.3515	.3447	344.7	34470	34.47
5.1	141.2	10.38	3586	263.7	.3586	.3516	351.6	35160	35.16
5.2	143.9	10.59	3656	268.9	.3656	.3585	358.5	35850	35.85
5.3	146.7	10.79	3726	274.1	.3726	.3654	365.4	36540	36.54
5.4	149.5	10.99	3797	279.3	.3797	.3723	372.3	37230	37.23
5.5	152.2	11.20	3876	284.4	.3867	.3792	379.2	37920	37.92
5.6	155.0	11.40	3973	289.6	.3937	.3861	386.1	38610	38.61
5.7	157.8	11.60	4008	294.8	.4007	.3930	393.0	39300	39.30
5.8	160.5	11.81	4078	299.9	.4078	.3999	399.9	39990	39.99
5.9	163.3	12.01	4148	305.1	.4148	.4068	406.8	40680	40.68
6.0	166.1	12.22	4218	310.3	.4218	.4137	413.7	41370	41.37
6.1	168.8	12.42	4289	315.5	.4289	.4206	420.6	42060	42.06
6.2	171.6	12.62	4359	320.6	.4359	.4275	427.5	42750	42.75
6.3	174.4	12.83	4429	325.8	.4429	.4344	434.4	43440	43.44
6.4	177.2	13.03	4500	331.0	.4500	.4413	441.3	44130	44.13
6.5	179.9	13.23	4570	336.1	.4570	.4482	448.2	44820	44.82
6.6	182.7	13.44	4640	341.3	.4640	.4550	455.0	45500	45.50
6.7	185.5	13.64	4711	346.5	.4710	.4619	461.9	46190	46.19
6.8	188.2	13.84	4781	351.7	.4781	.4688	468.8	46880	46.88
6.9	191.0	14.05	4851	356.8	.4851	.4757	475.7	47570	47.57
7.0	193.8	14.25	4922	362.0	.4921	.4826	482.6	48260	48.26
7.1	196.5	14.46	4992	367.2	.4992	.4895	489.5	48950	48.95
7.2	199.3	14.66	5062	372.3	.5062	.4964	496.4	49640	49.64
7.3	202.1	14.86	5132	377.5	.5132	.5033	503.3	50330	50.33
7.4	204.8	15.07	5203	382.7	.5203	.5102	510.2	51020	51.02
7.5	207.6	15.27	5273	387.9	.5273	.5171	517.1	51710	51.71
7.6	210.4	15.47	5343	393.0	.5343	.5240	524.0	52400	52.40
7.7	215.9	15.88	5484	403.4	.5484	.5378	537.8	53780	53.78
8.0	221.4	16.29	5625	413.7	.5625	.5516	551.6	55160	55.16
8.2	227.0	16.70	5765	424.1	.5765	.5654	565.4	56540	56.54
8.4	232.5	17.10	5905	434.5	.5905	.5792	579.2	57920	57.92
8.6	238.0	17.51	6047	444.7	.6046	.5929	592.9	59290	59.29
8.8	243.6	17.92	6187	455.1	.6187	.6067	606.7	60670	60.67
9.0	249.1	18.32	6328	465.4	.6328	.6205	620.5	62050	62.05
9.2	254.7	18.73	6468	475.8	.6468	.6343	634.3	63430	63.43
9.4	260.2	19.14	6609	486.1	.6609	.6481	648.1	64810	64.81
9.6	265.7	19.54	6750	496.5	.6749	.6619	661.9	66190	66.19
9.8	271.3	19.95	6890	506.8	.6890	.6757	675.7	67570	67.57
10.0	276.8	20.36	7031	517.1	.7031	.6895	689.5	68950	68.95
11.0	304.5	22.40	7734	568.9	.7734	.7584	758.4	75840	75.84
12.0	332.2	24.43	8437	620.6	.8437	.8274	827.4	82740	82.74
13.0	359.8	26.47	9140	672.3	.9140	.8963	896.3	89630	89.63
14.0	387.5	28.50	9843	724.0	.9843	.9652	965.2	96520	96.52
14.7	406.9	29.93	10340	760.2	1.033	1.014	1014	101400	101.4
15.0	415.2	30.54	10550	775.7	1.055	1.034	1034	103400	103.4
16.0	442.9	32.58	11250	827.4	1.125	1.103	1103	110300	110.3
17.0	470.6	34.61	11950	879.1	1.195	1.172	1172	117200	117.2
18.0	498.2	36.65	12660	930.9	1.265	1.241	1241	124100	124.1
19.0	525.9	36.68	13360	982.6	1.336	1.310	1310	131000	131.0
20.0	553.6	40.72	14060	1034	1.406	1.379	1379	137900	137.9
21.0	581.3	42.76	14770	1086	1.476	1.448	1448	144800	144.8
22.0	609.0	44.79	15470	1138	1.547	1.517	1517	151700	151.7
23.0	636.7	46.83	16170	1189	1.617	1.586	1586	158600	158.6
24.0	664.3	48.86	16870	1241	1.687	1.655	1655	165500	165.5
25.0	692.0	50.90	17580	1293	1.758	1.724	1724	172400	172.4

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