SECTION II
CONTROL VALVES

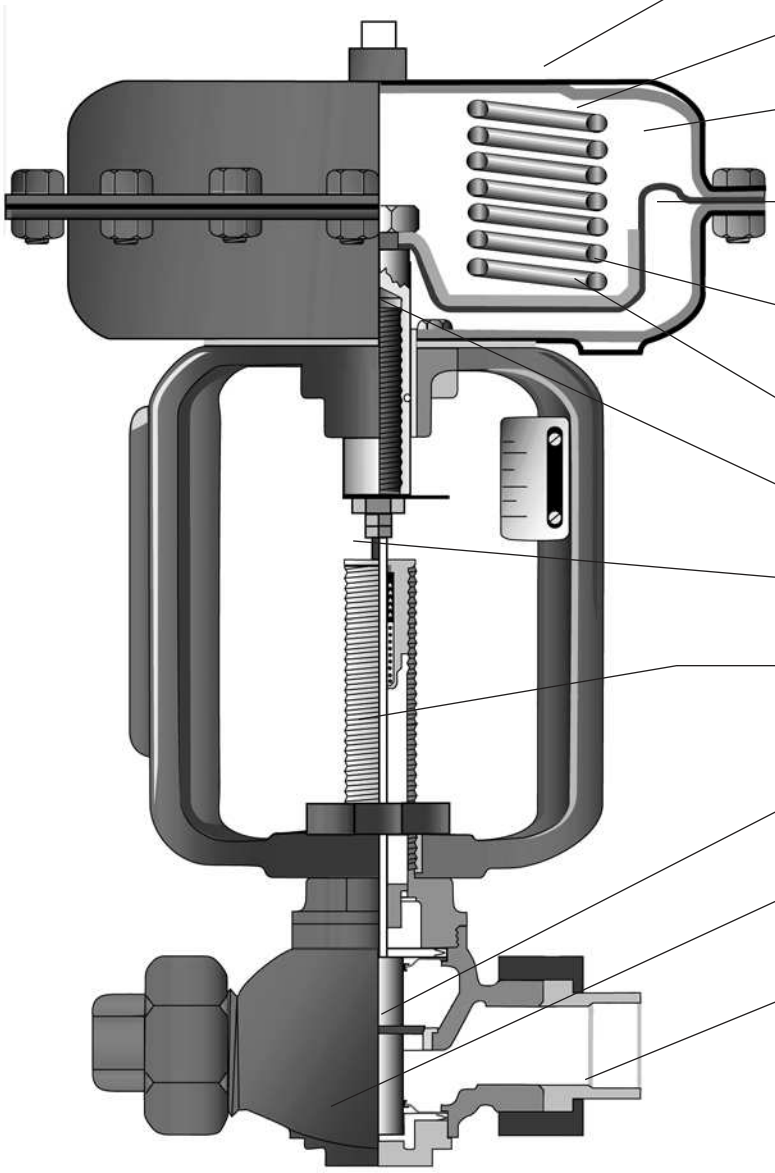
KOMBAT K1 Pneumatic Control Valve

Pressures To 400 PSIG
Temperatures to 400°F

Applications

- Bottle Washing Machinery
- Steam Tables
- Plating Tanks
- Heating Ducts
- Fuel Oil Heaters
- Cooking Vats
- Heat Exchangers
- Induction Furnaces
- Industrial Compressors
- Cold Storage Boxes
- Cooling Ducts
- Engine Jacket Cooling
- Liquid Chillers
- Water Heaters
- Parts Washers

KOMBAT K1 FEATURES



High-thrust Compact Actuator
offers the muscle required to positively position plug in response to control signal

Fixed Actuator 3-15 Spring Ranges
conform to standard controller outputs

36 and 60 sq. in. Actuator Sizes
with stainless steel internals match different operating conditions

Bolted Diaphragm Joint
for maximum strength, ease of maintenance and high-pressure tightness

Molded Reinforced Rolling Diaphragm
provides linearity of diaphragm loading pressure to valve travel for accuracy of control

Corrosion Protected Multiple Springs
for lower hysteresis and minimal deadband

Low Friction Actuator Design
for accurate repetitive positioning

Low Friction Burnished Stem
provides precise control and long life

Spring Loaded Chevron Type Packing Assembly
eliminates leakage which reduces maintenance

Erosion Resistant Stainless Steel Seat Rings and Disc
for precise flow control and long life

High Capacity Bronze Body
minimizes turbulence and pressure drop

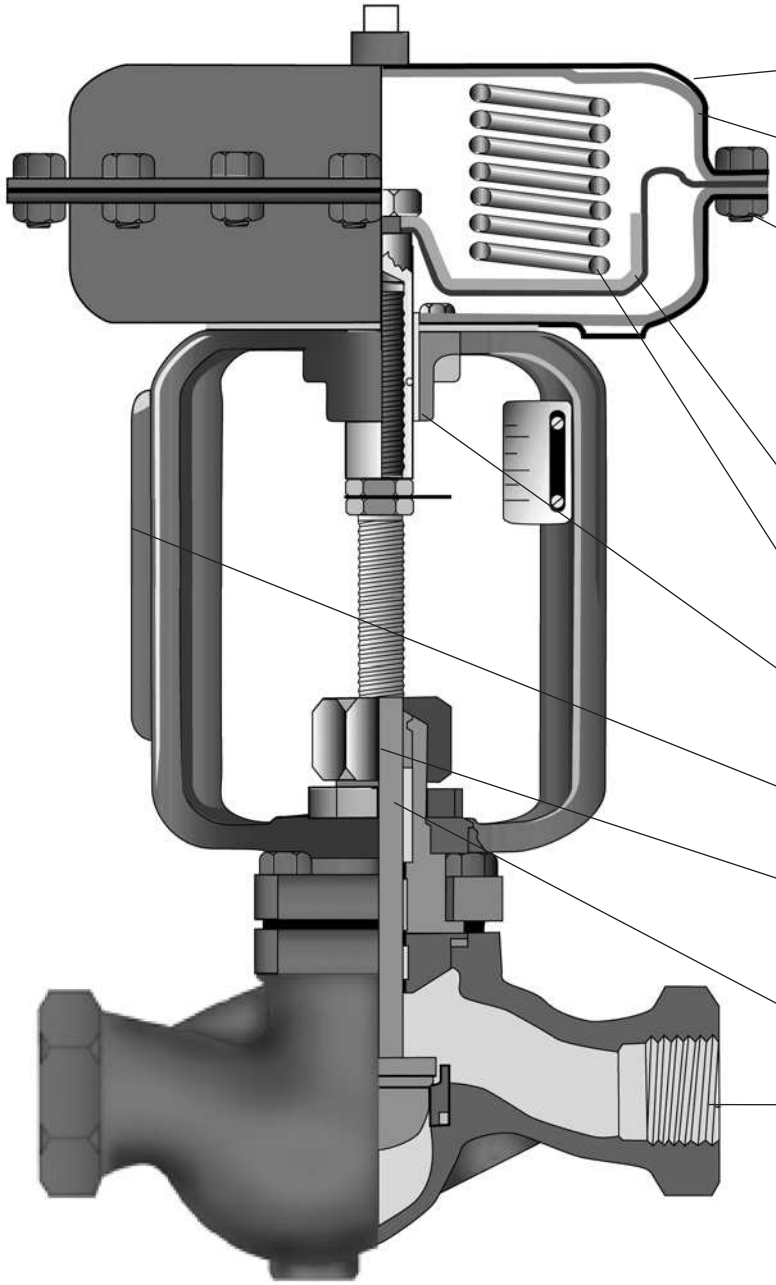
Galvanized Iron Union Ends
for easy installation

Applications

- Process control systems for food, pulp and paper, chemical, petrochemical & other industries
- HVAC systems
- Feed water and fuel system controls in boiler rooms
- Packaged systems (OEM) such as heat exchangers, water purification systems & vaporizer, metal cleaning and plating

INTIMIDATOR Type J Control Valve

Pressures to 1440 PSIG
Temperatures to 600ºF



High-thrust, Compact Actuator
offers the muscle required to positively position the plug in response to control signal

36 & 60 Inch Actuator
sizes match different operating conditions

Bolted Diaphragm Joint
for maximum strength, ease of maintenance and high-pressure tightness

Molded, Reinforced Rolling Diaphragm
provides dependable, accurate control

Corrosion-protected Multiple Springs
for lower hysteresis and positive shutoff with 3-15 psi signal

Low-friction Actuator Stem Guiding
for accurate repetitive positioning

Mounting Pad NEMUR 4 Compliant
drilled and tapped for accessories

Superfinished Stem
reduces friction, extends packing life

High Performance, Low Friction Packing
selections to meet your system requirements

High-capacity Streamlined Body
minimizes turbulence and pressure drop

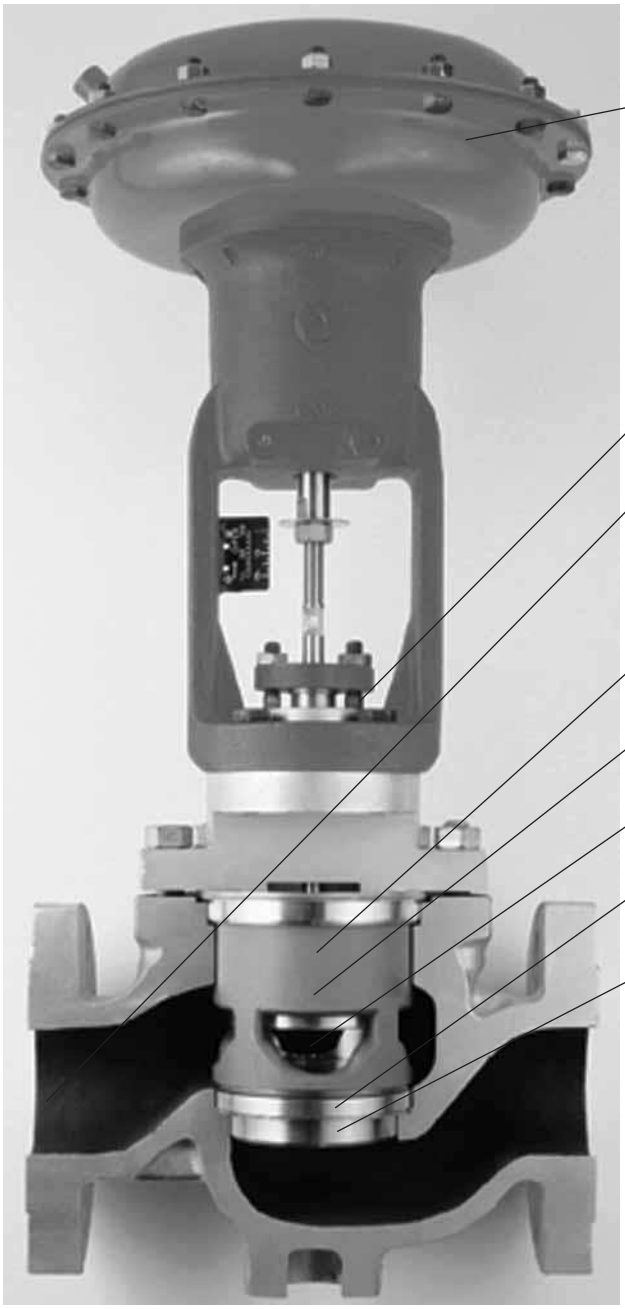
BOSS Series D Control Valve

Pressures to 1550 PSIG
Temperatures to 800ºF

Applications

- Process control systems for food, pulp and paper, chemical, petrochemical & other industries
- HVAC systems
- Feed water and fuel system controls in boiler rooms
- Packaged systems (OEM) such as heat exchangers, water purification systems & vaporizer, metal cleaning and plating

BOSS SERIES D FEATURES



Ultra Compact Actuators
install in tight spaces

Bolted Actuator Yoke
Four bolt mounting guarantees easy disassembly

High Flow Capacities
Valve body flow areas 42% of pipe area, reducing velocities and pressure loss

Multiple Cage Options
for maximum versatility

Hung Cage Design
eliminates problems associated with fixed cages

Rugged Piston Seal
with three times the wear surface of competitive valves for long lasting leak tight seal

Hardened Stainless Steel Trim
provides twice the service life of 316 stainless trim

Controlled Seat Loading
maintains constant seat gasket load

Balanced Plug Design
provides smooth high pressure control

Tighter Shutoffs to Class VI
Superior design provides exceptional performance up to Class VI

CONTROL VALVES

KOMBAT K1 CONTROL VALVE

KOMBAT SERIES K
CONTROL VALVE

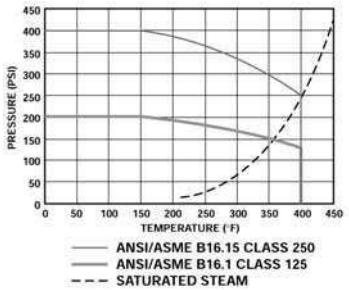
SIZES 1/2" – 4"
ANSI Class 125/250

- **Shutoff to 400 PSI without Positioner** for broad range of applications.
- **Ultra Compact Multi-spring Pneumatic Actuator** installs in tight spaces.
- **3–15 lb. Spring Ranges** in durable epoxy coated pneumatic actuators accommodate most standard input devices.
- **Powerful Electric Actuator** accepts a wide variety of signals while providing highest shutoff in it's class.
- **Live Loaded V ring Packing Assembly** is self adjusting.
- **Stainless Steel Valve Plugs & Seat Rings** resist wear and corrosion
- **Optional 3-Way Body** for mixing or diverting

Application Data

- Process control systems for food, pulp and paper, chemical, petrochemical & other industries
- HVAC systems
- Feed water and fuel system controls in boiler rooms
- Packaged systems (OEM) such as heat exchangers, water purification systems & vaporizer, metal cleaning and plating
- Mixing or diverting applications

PRESSURE/TEMPERATURE CHART



Models

- Type K1 — Single Seat Bronze w/union ends & Pneumatic Actuator
- Type K3 — 3-Way Bronze w/union ends & Pneumatic Actuator
- Type K4 — Single Seat Flanged Cast Iron w/Pneumatic Actuator
- Type K5 — Same as K1 w/Electric Actuator, fail closed
- Type K6 — Same as K1 w/Electric Actuator, fail open
- Type K7 — Same as K3 w/Electric Actuator

Options

- 36 or 60 sq. in. Pneumatic Actuator
- Electric Actuator

Applicable Codes

- Meets or exceeds ANSI B16.15 Class 250 or ANSI B16.1 Class 125
- ANSI/FCI 70-2 Class IV Seat Leakage

Plug Characteristics

Modified Equal Percent, 30:1 flow rangeability

KOMBAT SERIES K VALVE ORDERING CODE

Model		Orifice Size	Valve Size	Connections	Trim Material	Packing	Actuator		Spring		Positioner		Posit. Set		Accessories	
K	1	T	E	8	1	1	- 3	6	R	B	M	- P	0	2	0	1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Model -
Position 1 & 2
K1 = Bronze, Pneumatic
K3 = Bronze, 3 Way, Pneumatic
K4 = Cast Iron, Pneumatic
K5 = Bronze, Electric, FC
K6 = Bronze, Electric, FO
K7 = Bronze, 3 Way, Electric

Orifice Size -
Position 3
A
B
C
E
T

Valve Size -
Position 4
C = 1/2
D = 3/4
E = 1
F = 1¼
G = 1½
H = 2
J = 2½
K = 3
M = 4

Connections -
Position 5
2 = 125 Flg
8 = Unions

Trim Material -
Position 6
1 = Metal

Packing -
Position 7
1 = V-ring

Actuator -
Position 8 & 9
K1, K3, K4 only
01 = None
36 = 36 sq. in.
60 = 60 sq. in.
K5, K6, K7 only
90 = 0-10vDC
91 = 4-20mA
92 = 0-135ohm

Spring -
Position 10 & 11
All except K4
DA = Dir 36
DC= Dir 36
DD = Dir 36
DG = Dir 60
FM = Dir 36
RA = Rev 36
RB = Rev 36
RC = Rev 36
RD = Rev 36
RE = Rev 36
DF = Dir 60
DG = Dir 60
RG = Rev 60
K4 only
DH = Dir 60
RH = Rev 60
RQ = Rev 60
RT = Rev 60

Positioner -
Position 12 & 13
A = None
MI = Moore I/P
MP= Moore P
4P = PMV P4 P
5I = PMV P5 I/P
5P = PMV P5 P

Positioner Set
Position 14 & 15
01 = None
02 = 8-15/4-20 mA
03 = 3-9/4-12 mA
04 = 9-15/12-20 mA

Accessories -
Position 16 & 17
01 = None
02 = Limit Switch, Mechanical
03 = Limit Switch, Proximity Sw.
04 - Feedback Potentiometer 1K
05 = Feedback 4-20mA Posit. Tra

KOMBAT SERIES K
CONTROL VALVE

SPECIFICATION

Valve shall be pneumatically or electrically actuated, have a bronze or cast iron body and meet ANSI B16.15 Class 250 or ANSI B16.1 Class 125 accommodating pressures to 400 PSIG. Guiding shall be low friction utilizing spring loaded self adjusting chevron type teflon packing, burnished stem and double guided stainless steel monolithic disc assembly. Valve trim shall be erosion resistant stainless steel with a modified equal percent flow characteristic capable of exceeding ANSI/FCI 70-2 Class IV shut off. Valve connections shall be female NPT with integral galvanized cast iron unions or flanged.

Pneumatic actuator shall be 36 sq. in. or 60 sq. in and have a high thrust multi spring diaphragm. Actuator components shall be stainless steel and epoxy coated. Fixed 3-15 pound springs shall be utilized to accommodate standard controller outputs without a positioner.

The electric actuator shall accept 0-10 VDC, 4-20 mA or 0-135 ohm input signal. Spring shall return to initial position on loss of signal. Actuator shall have manual override. It shall close to 400 psi. Enclosure shall meet NEMA 1.

MATERIALS OF CONSTRUCTION

Body K1, K3, K5, K6, K7 .....Bronze ASTM B62
K4 .....Cast Iron ASTM A126 CL B
Bonnet K4.....DI ASTM A536 65-45-12
Seat K1, K3, K5, K6, K7.....303 SS ASTM A276
K4 .....420 SS ASTM A743
Plug/Stem Assy K1, K3, K5, K6, K7 .....303 SS ASTM A276
Plug K4 .....420 SS ASTM A743
Stem .....303SS ASTM A582
Stem Guide - Body K1, K3, K5, K6, K7 ...301 SS/Monel/Brass
Live Loaded Packing .....PTFE/302 SS Spring/Viton O-Ring
Actuator Casing K1, K3, K4 ...Steel SAE 1006 - 1008/Epoxy
K5, K6, K7 .....Powder Coated Aluminum
Actuator Spring K1, K3, K4 .....Music Wire ASTM A228
Diaphragm K1, K3, K4.....Nitrile/Polyester
Yoke K1, K3, K4 .....D Iron ASTM A536/Epoxy
K5, K6, K7 .....Powder Coated Aluminum

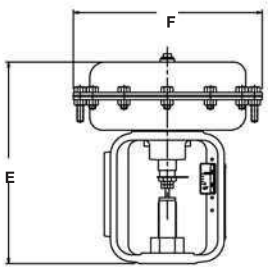
MAXIMUM RATED FLOW COEFFICIENTS* (Cv)

VALVE	VALVE SIZE								
	½	¾	1	1¼	1½	2	2½	3	4
2-WAY	5.2	7	11	20	25	30	71	94	146
3-WAY	5.4	6.4	8.7	19.5	24	34	—	—	—

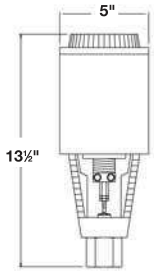
*See Flow Characteristic Chart on following pages.

K1, K4, K5 & K6 DIMENSIONS inches (mm)
AND WEIGHTS pounds (kg)

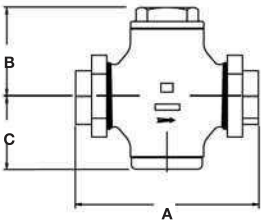
Size	A	B	C	Weight		
				K1, K4 36 in²	K1, K4 60 in²	K5, K6
½-¾ (15)-(20)	5½ (140)	11 1/16 (43)	1 3/16 (30)	21 (9.5)	— —	13 (6)
1 (25)	7 3/16 (183)	2⅞ (74)	2 5/16 (58)	25½ (11.6)	39 (17)	17½ (8)
1¼-1½ (32)-(40)	8⅞ (226)	3⅛ (79)	2⅞ (74)	31½ (14.3)	45 (20)	23½ (11)
2 (50)	8⅞ (226)	3⅛ (79)	2⅞ (74)	33½ (15.2)	47 (21)	25½ (12)
2½ (65)	9⅜ (238)	5¼ (133)	3⅞ (118)	— —	72 (33)	— —
3 (80)	10 (254)	6⅜ (155)	4⅝ (136)	— —	84 (39)	— —
4 (100)	11⅞ (302)	7¼ (181)	6½ (187)	— —	145 (66)	— —



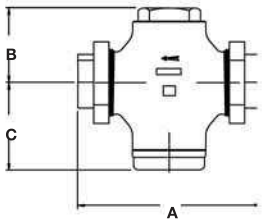
K1, K3, K4 ACTUATOR



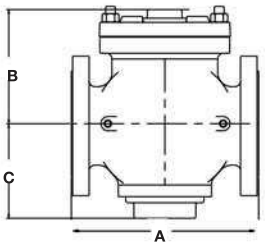
K5, K6, K7 ACTUATOR



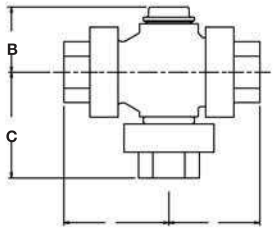
K1, K5 ½" - 2"



K6 ½" - 2"



K4 2½" - 4"



K3, K7 ½" - 2"

PNEUMATIC ACTUATOR
DIMENSIONS inches (mm)

Size	E		F	
	36 in²	60 in²	36 in²	60 in²
½-¾ (15)-(20)	9⅞ (251)	— —	9¼ (235)	— —
1 (25)	9⅞ (251)	11¾ (298)	9¼ (235)	11¼ (286)
1¼-1½ (32)-(40)	9⅞ (251)	11¾ (298)	9¼ (235)	11¼ (286)
2 (50)	9⅞ (251)	11¾ (298)	9¼ (235)	11¼ (286)
2½ (65)	— —	11⅞ (302)	— —	11¼ (286)
3 (80)	— —	11⅞ (302)	— —	11¼ (286)
4 (100)	— —	11⅞ (302)	— —	11¼ (286)

K3, K7 DIMENSIONS inches (mm)
AND WEIGHTS pounds (kg)

Size	A	B	C	D	Weight	
					36 in²	60 in²
½-¾ (15)-(20)	3⅝ (92)	3 3/16 (84)	4⅛ (105)	2⅞ (73)	28 (13)	—
1 (25)	3⅝ (92)	3 3/16 (84)	4⅛ (105)	2⅞ (73)	28 (13)	—
1¼ (32)	4 1/16 (119)	4⅛ (105)	4 1/16 (119)	3⅛ (79)	35 (16)	48 (22)
1½ (40)	4 1/16 (119)	4⅛ (105)	4 1/16 (119)	3⅛ (79)	37 (17)	50 (23)
2 (50)	4⅞ (124)	4 3/16 (106)	4⅝ (125)	3⅛ (79)	42 (19)	55 (25)

Control Tip: Pair with Airmaster Pneumatic Temperature Controller for local temperature control. *SEE PAGE 79.*

Control Tip: Install with Model 65A Air Filter Regulator to convert plant air to instrument quality air. *SEE PAGE 169.*

K1, K4, K5, K6 ACTUATOR SHUTOFF TABLE

(Refer to Temperature Limits)

Size	Orifice	Act. Size	Bench Range	Actuator Code	Reverse Shutoff, K1,K4*			Bench Range	Actuator Code	Direct Shutoff, K1,K4*			Shutoff, K5,K6
					3-15 psi	0-20 psi†	0-30 psi‡			3-15 psi	0-20 psi†	0-30 psi‡	
1/2	A, C, E	36	6-15	RA	400	400	—	3-12	DA	400	400	—	400
	B	36	6-15	RA	400	400	—	3-12	DA	300	400	—	
			—	—	—	—	—	3-9	DB	400	400	—	
	T	36	6-15	RA	300	400	—	3-9	DB	400	400	—	
3/4	T	36	6-15	RA	100	300	—	3-9	DB	250	400	—	400
			9-15	RR	225	350	—	—	—	—	—	—	
			12-15	RC	300	400	—	—	—	—	—	—	
		60	12-15	RC	400	400	—	3-7	DG	400	400	—	
1	T	36	9-15	RB	150	250	—	3-9	DB	100	200	—	330
			12-15	RC	250	400	—	—	—	—	—	—	
			13-15	RE	400	400	—	—	—	—	—	—	
		60	—	—	—	—	—	3-7	DG	400	400	—	
1¼	T	36	9-15	RB	150	175	—	3-9	DR	150	250	—	210
			12-15	RC	200	250	—	—	—	—	—	—	
			13-15	RE	250	275	—	—	—	—	—	—	
		60	12-15	RG	300	400	—	3-7	DG	300	400	—	
			13-15	RH	400	400	—	—	—	—	—	—	
1½	T	36	12-15	RC	150	225	—	—	—	—	—-	—	161
			13-15	RE	200	250	—	—	—	—	—	—	
		60	12-15	RG	225	275	—	3-7	DG	200	400	—	
			13-15	RH	275	300	—	—	—	—	—	—	
2	T	36	12-15	RC	50	75	—	—	—	—	—	—	121
			13-15	RE	75	100	—	—	—	—	—	—	
		60	12-15	RG	125	200	—	3-7	DG	100	300	—	
			13-15	RH	175	250	—	—	—	—	—	—	
2½	T	60	10-15	RH	75	—	100	3-8	DH	70	—	200	—
			12-15	RQ	125	—	125	3-8	DH	70	—	200	
			22-30	RT	—	—	125	3-8	DH	70	—	200	
3	T	60	10-15	RH	40	—	60	3-8	DH	40	—	100	—
			12-15	RQ	60	—	80	3-8	DH	40	—	100	
			22-30	RT	—	—	110	3-8	DH	40	—	100	
4	T	60	12-15	RQ	20	—	32	3-8	DH	10	—	25	—
			22-30	RT	—	—	50	3-8	DH	10	—	25	

* Shutoff pressures are in conformance with ANSI/FCI 70-2 Class IV
Reverse Acting - Fail Closed/Air to Open (FC/ATO)
Direct Acting - Fail Open/Air to Close (FO/ATC)

† Based on 20 psi air supply.
‡ Based on 30 psi air supply.

K1, K4, K5, K6 C_V TABLE

PERCENT OF TRAVEL			5	10	20	30	40	50	60	70	80	90	100
Valve Size	Travel	Orifice	Cv										
1/2	1/4	C	0.1	0.2	0.3	0.36	0.41	0.46	0.51	0.56	0.6	0.65	0.7
		E	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2	2.1
		A	0.3	0.6	1.2	1.7	2.2	2.6	2.9	3.1	3.2	3.25	3.3
		B	0.15	0.25	0.65	1.5	2.7	3.3	3.7	3.9	4.1	4.2	4.3
		T	0.7	1.2	2.0	2.7	3.2	3.8	4.3	4.7	4.9	5.1	5.2
3/4	5/16	T	0.7	1.3	2.4	3.3	4.2	4.9	5.5	6.0	6.4	6.8	7.0
1	1/4	T	0.7	1.3	2.4	3.8	5.5	7.4	9.0	10.0	10.6	10.9	11.0
1-1/4	5/16	T	0.8	1.7	4.0	6.5	9.3	12.6	15.3	17.0	18.1	19.1	20.0
1-1/2	5/16	T	1.0	2.0	4.5	7.2	9.9	12.4	15.2	18.2	20.9	23.4	25.0
2	5/16	T	1.0	2.0	4.5	7.4	10.6	15.1	18.8	22.8	26.1	28.3	30.0
2-1/2	3/4	T	5	11	23	36	46	53	59	62.5	65.7	68	71
3	3/4	T	5	11	30	47	61	72	79	85	90	92	94
4	3/4	T	12	23	46	69	89	104	116	127	134	140	146

K3, K7 ACTUATOR SHUTOFF TABLE

(Refer to Temperature Limits)

Size	Act. Size	Bench Range	Actuator Code	K3 Reverse Shutoff*		Bench Range	Actuator Code	K3 Direct Shutoff**		K7 Shutoff
				3-15 psi	0-20 psi			3-15 psi	0-20 psi	
1/2	36	5.5 - 12.5	RA	125	300	4.5 - 13.5	DM	85	400	
		6.5 - 11.5	RB	175	375	6 - 12	DA	175	400	400
		8 - 11	RC	250	400	-	-	-	-	
3/4	36	5.5 - 12.5	RA	125	300	4.5 - 13.5	DM	85	400	
		6.5 - 11.5	RB	175	375	6 - 12	DA	175	400	400
		8 - 11	RC	250	400	-	-	-	-	
1	36	5.5 - 12.5	RA	75	200	4.5 - 13.5	DM	60	250	
		6.5 - 11.5	RB	125	250	6 - 12	DA	125	300	295
		8 - 11	RC	200	300	-	-	-	-	
1¼	36	5.5 - 12.5	RC	60	125	6 - 12	DC	80	200	
		7.5 - 10.5	RE	110	200	7 - 11	DD	100	225	185
	60	7.5 - 12	RG	200	300	7 - 11	DG	175	XX	
		8 - 11	RH	225	350	-	-	-	-	
1½	36	5.5 - 12.5	RC	50	100	6 - 12	DC	60	150	
		7.5 - 10.5	RE	85	150	7 - 11	DD	75	175	145
	60	7.5 - 12	RG	125	250	7 - 11	DG	135	XX	
		8 - 11	RH	175	275	-	-	-	-	
2	36	5.5 - 12.5	RC	35	75	6 - 12	DC	45	100	
		7.5 - 10.5	RE	70	100	7 - 11	DD	60	135	105
	60	7.5-12	RG	75	175	7-11	DG	100	XX	
		8 - 11	RH	125	200	--	-	-	-	

* Lower Part (B) Fail Closed

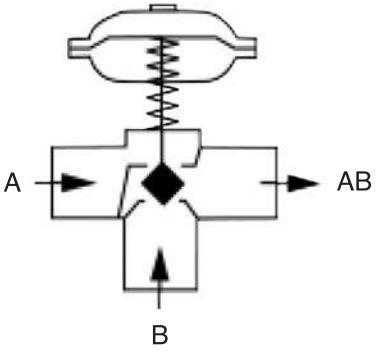
** Upper Part (A) Fail Closed

K3, K7 C_V TABLE

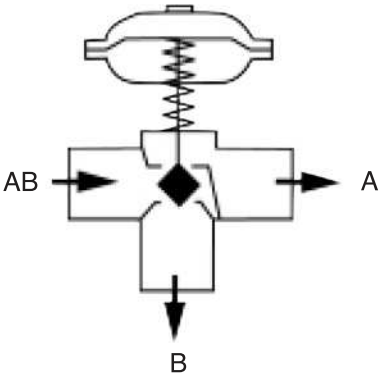
PERCENT OF TRAVEL			0	10	20	30	40	50	60	70	80	90	100
Valve Size	Travel (In)	Port	Cv										
1/2	7/32	Lower	0	0.9	1.9	2.7	3.6	4.3	4.8	5.2	5.3	5.35	5.4
		Upper	5.6	5.55	5.5	5.3	4.9	4.5	3.9	3.1	2.2	1.2	0
3/4	7/32	Lower	0	0.9	2	3	4	4.9	5.5	6	6.2	6.3	6.4
		Upper	7.1	7	6.9	6.5	5.9	5.2	4.4	3.4	2.3	1.2	0
1	7/32	Lower	0	0.8	1.7	2.9	4	5.3	6.2	7.2	7.8	8.4	8.7
		Upper	9.2	8.5	7.9	7.1	6.2	5.3	4.2	3.2	2.1	1.1	0
1-1/4	1/2	Lower	0	2.7	6.2	10.2	15	18.8	20	20.8	21.2	21.6	22
		Upper	19.5	19	18.5	17.5	15.5	13.5	11	8	5	2.5	0
1-1/2	1/2	Lower	0	2	6	11	16	20	22.5	24.5	26	27	28
		Upper	24	23	22	20	18	15	12	9	6	2.7	0
2	1/2	Lower	0	2.2	5.7	10.9	16	21	24	27.4	30	32	34
		Upper	35	32.4	30	27	23.5	20	16	12	8	4	0

K3, K7 OPERATION

MIXING



DIVERTING



When used for mixing service, the forces developed by the two inlet flows oppose each other, creating little, if any, unbalance. Thus, the actuator can control the flow efficiently with very little power lost in overcoming dynamic unbalance.

When used for diverting service, simply reverse the valve installation.

K1, K4, K5, K6 SATURATED STEAM CAPACITY TABLE

(Modified Equal Percent Contour Plug) (Lb/Hr)

Pressure (PSI)		Valve Size and Port												
P1	P2	1/2" C	1/2" E	1/2" A	1/2" B	1/2" T	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
10	5	22	65	102	133	161	217	341	620	775	930	2237	2962	4601
	0	27	81	128	166	201	270	425	773	966	1159	2846	3768	5853
15	10	24	72	114	148	179	241	379	689	861	1033	2477	3280	5094
	5	31	92	145	189	229	308	484	880	1099	1319	3216	4257	6613
	0	34	101	159	207	250	337	529	962	1202	1443	3586	4748	7374
20	15	26	79	124	161	195	262	412	750	937	1125	2692	3565	5537
	10	34	102	161	209	253	341	536	974	1217	1461	3543	4691	7286
	0	40	119	187	243	294	396	623	1132	1416	1699	4262	5643	8765
30	25	30	90	142	184	223	300	472	858	1072	1287	3072	4067	6316
	15	46	137	215	280	338	455	715	1301	1626	1951	4755	6295	9778
	0	51	152	239	312	377	507	797	1450	1812	2174	5525	7315	11362
40	25	52	156	245	319	385	519	815	1482	1852	2223	5384	7128	11071
	15	59	178	280	365	442	595	935	1699	2124	2549	6297	8337	12948
	0	62	185	290	378	457	615	967	1758	2198	2637	6724	8903	13827
50	35	57	172	271	353	427	575	903	1643	2053	2464	5943	7869	12222
	30	63	190	299	389	470	633	995	1809	2262	2714	6596	8732	13563
	25	67	202	318	414	501	674	1059	1925	2406	2888	7076	9368	14550
	2-0	72	217	341	444	537	723	1136	2066	2582	3099	7905	10466	16256
60	45	63	188	295	384	464	625	982	1786	2232	2679	6444	8531	13250
	40	69	208	327	426	515	693	1090	1981	2477	2972	7194	9524	14792
	35	74	223	351	457	552	744	1169	2125	2656	3187	7767	10282	15971
	4-0	83	249	391	509	616	829	1303	2370	2962	3555	9067	12005	18645
75	55	77	232	365	476	575	774	1216	2212	2765	3318	7996	10587	16443
	50	84	251	395	514	622	837	1315	2391	2989	3587	8690	11505	17870
	45	89	266	417	544	658	885	1391	2530	3162	3795	9246	12241	19013
	8-0	99	296	466	607	734	988	1552	2822	3527	4233	10797	14294	22202
100	75	97	291	457	596	721	970	1525	2773	3466	4159	10020	13266	20604
	60	113	340	534	696	841	1133	1780	3236	4045	4854	11845	15683	24358
	15-0	125	375	589	767	927	1249	1962	3567	4459	5351	13649	18071	28068
125	100	109	326	512	667	806	1086	1706	3102	3877	4652	11169	14787	22968
	75	138	413	649	845	1022	1376	2163	3933	4916	5899	14409	19077	29630
	21-0	151	452	710	925	1119	1507	2367	4304	5381	6457	16470	21806	33869
150	125	119	356	560	730	882	1188	1866	3394	4242	5090	12192	16142	25071
	100	153	460	723	943	1140	1535	2412	4385	5481	6577	15975	21150	32850
	28-0	176	529	831	1082	1309	1762	2769	5035	6293	7552	19264	25505	39614
175	150	128	384	604	787	951	1281	2013	3659	4574	5489	13124	17376	26988
	125	168	503	791	1030	1246	1677	2635	4791	5989	7187	17388	23021	35755
	100	189	567	891	1161	1403	1889	2969	5398	6747	8097	19859	26293	40838
	35-0	202	605	951	1239	1498	2016	3168	5761	7201	8641	22031	29168	45304
200	150	181	542	852	1110	1342	1806	2839	5161	6452	7742	18677	24728	38407
	125	206	618	971	1265	1529	2059	3235	5882	7353	8823	21533	28509	44279
	41-0	227	681	1069	1393	1685	2268	3565	6481	8101	9722	24799	32833	50996
225	175	193	578	908	1183	1430	1925	3025	5500	6875	8250	-	-	-
	150	221	664	1043	1359	1644	2213	3478	6323	7904	9485	-	-	-
	48-0	252	755	1187	1547	1870	2518	3956	7194	8992	10790	-	-	-
250	200	204	611	960	1251	1512	2036	3199	5817	7271	8725	-	-	-
	150	256	769	1208	1574	1904	2563	4027	7322	9153	10984	-	-	-
	100	275	825	1297	1690	2044	2752	4324	7862	9827	11792	-	-	-
	54-0	277	830	1304	1699	2055	2766	4346	7902	9878	11854	-	-	-

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

K1, K4, K5, K6 SATURATED STEAM CAPACITY TABLE

(Modified Equal Percent Contour Plug) (Kg/Hr)

Pressure (bar)		Valve Size and Port												
P1	P2	1/2" C	1/2" E	1/2" A	1/2" B	1/2" T	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
0.7	0.3	10	31	49	64	78	104	164	298	373	447	1079	1429	2220
	0.2	11	34	53	69	84	113	177	322	402	483	1171	1551	2409
1	0.7	10	31	48	63	76	102	161	292	365	438	1049	1389	2157
	0.5	12	37	59	76	92	125	196	356	445	534	1289	1707	2651
	0.3	14	42	65	85	103	139	218	396	495	594	1448	1918	2978
1.5	1	14	43	67	87	106	142	224	407	508	610	1467	1942	3017
	0.7	17	50	79	103	124	167	263	479	598	718	1746	2312	3591
	0.5	18	53	84	109	132	178	280	508	635	762	1870	2476	3846
2	1.5	16	47	74	97	117	157	247	449	562	674	1616	2139	3323
	1.2	19	56	88	115	139	188	295	536	670	804	1945	2575	3999
	1	20	60	95	124	149	201	316	575	719	862	2100	2781	4319
3	2	24	73	114	149	180	242	381	692	865	1038	2508	3321	5158
	1.0	29	87	137	179	216	291	457	832	1040	1248	3098	4102	6371
	0	32	97	152	198	239	322	506	920	1149	1379	3264	4322	6713
3.5	3.0	20	59	92	120	145	195	307	558	698	838	2000	2647	4112
	2.0	30	89	140	182	221	297	466	848	1060	1272	3099	4103	6373
	1.0	33	99	155	202	245	329	518	941	1176	1412	3531	4675	7261
	.1-0	36	108	170	222	268	361	567	1031	1289	1547	3661	4847	7528
4	3.0	28	83	130	169	204	275	432	786	983	1179	2836	3755	5832
	2.0	34	103	162	211	255	344	540	982	1228	1473	3615	4786	7433
	1.0	37	110	172	224	271	365	574	1044	1305	1566	3942	5219	8105
	.3-0	39	118	186	242	293	394	620	1126	1408	1690	4000	5296	8225
5	4.0	30	91	144	187	226	305	479	870	1088	1306	3131	4145	6438
	3.0	39	117	184	239	290	390	612	1113	1392	1670	4069	5387	8367
	2.0	43	128	201	262	317	427	671	1220	1525	1830	4544	6016	9344
	.6-0	47	140	220	287	347	467	734	1334	1667	2001	4757	6299	9783
7	5.0	47	140	221	288	348	468	736	1338	1672	2007	4848	6419	9970
	3.0	56	169	265	346	418	563	884	1607	2009	2411	5987	7926	12311
	1.0-0	62	187	293	382	462	622	978	1778	2222	2667	6311	8356	12978
9	7.0	53	160	252	328	397	534	839	1526	1907	2289	5505	7289	11321
	5.0	67	200	314	410	496	667	1048	1906	2382	2859	7015	9288	14425
	1.6-0	77	230	361	470	569	765	1203	2187	2733	3280	7762	10277	15962
10	8.0	56	168	265	345	417	562	882	1605	2006	2407	5780	7652	11885
	5.0	75	224	353	459	556	748	1175	2137	2671	3205	7916	10480	16277
	1.8-0	84	251	395	515	623	838	1317	2395	2994	3592	8502	11256	17483
12	10.0	62	185	291	379	458	616	968	1761	2201	2641	6327	8376	13009
	7.0	85	254	399	520	629	846	1330	2418	3023	3627	8886	11764	18272
	5.0	90	270	425	553	669	900	1415	2573	3216	3859	9633	12753	19808
	2.4-0	98	294	462	602	728	979	1539	2798	3498	4197	9939	13158	20438
14	10.0	87	261	410	535	647	871	1368	2488	3110	3732	-	-	-
	5.0	104	312	491	640	774	1041	1636	2975	3719	4463	-	-	-
	2.9-0	112	337	530	691	835	1124	1767	3213	4016	4819	-	-	-
15	12.0	81	243	383	499	603	812	1275	2319	2898	3478	-	-	-
	5.0	111	332	521	679	821	1105	1737	3158	3948	4737	-	-	-
	3.1-0	120	359	564	734	888	1195	1878	3415	4269	5123	-	-	-
17	15.0	73	219	344	448	542	730	1147	2086	2607	3129	-	-	-
	10.0	115	346	544	709	858	1155	1815	3300	4125	4950	-	-	-
	5.0	127	380	597	778	941	1266	1990	3619	4523	5428	-	-	-
	3.7-0	133	400	629	819	990	1333	2095	3809	4762	5714	-	-	-

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

K1, K4, K5, K6 WATER CAPACITY TABLE

(Modified Equal Percent Contour Plug) (G.P.M.)

Pressure (PSI)		Valve Size and Port												
P1	P2	1/2" C	1/2" E	1/2" A	1/2" B	1/2" T	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
10	5	2	5	7	10	12	16	25	45	56	67	159	210	326
	3	2	6	9	11	14	19	29	53	66	79	188	249	386
15	10	2	5	7	10	12	16	25	45	56	67	159	210	326
	7	2	6	9	12	15	20	31	57	71	85	201	266	413
	4	2	7	11	14	17	23	36	66	83	99	235	312	484
20	15	2	5	7	10	12	16	25	45	56	67	159	210	326
	10	2	7	10	14	16	22	35	63	79	95	225	297	462
	5	3	8	13	17	20	27	43	77	97	116	275	364	565
30	22	2	6	9	12	15	20	31	57	71	85	201	266	413
	17	3	8	12	16	19	25	40	72	90	108	256	339	526
	6	3	10	16	21	25	34	54	98	122	147	348	461	715
40	25	3	8	13	17	20	27	43	77	97	116	275	364	565
	20	3	9	15	19	23	31	49	89	112	134	318	420	653
	8	4	12	19	24	29	40	62	113	141	170	402	532	826
50	35	3	8	13	17	20	27	43	77	97	116	275	364	565
	30	3	9	15	19	23	31	49	89	112	134	318	420	653
	25	4	11	17	22	26	35	55	100	125	150	355	470	730
	10	4	13	21	27	33	44	70	126	158	190	449	595	923
60	50	2	7	10	14	16	22	35	63	79	95	225	297	462
	40	3	9	15	19	23	31	49	89	112	134	318	420	653
	25	4	12	20	25	31	41	65	118	148	177	420	556	864
	12	5	15	23	30	36	48	76	139	173	208	492	651	1012
75	70	2	5	7	10	12	16	25	45	56	67	159	210	326
	50	4	11	17	22	26	35	55	100	125	150	355	470	730
	25	5	15	23	30	37	49	78	141	177	212	502	665	1032
	15	5	16	26	33	40	54	85	155	194	232	550	728	1131
100	75	4	11	17	22	26	35	55	100	125	150	355	470	730
	60	4	13	21	27	33	44	70	126	158	190	449	595	923
	20	6	19	30	38	47	63	98	179	224	268	635	841	1306
125	100	4	11	17	22	26	35	55	100	125	150	355	470	730
	75	5	15	23	30	37	49	78	141	177	212	502	665	1032
	24	7	21	33	43	52	70	111	201	251	301	714	945	1467
150	125	4	11	17	22	26	35	55	100	125	150	355	470	730
	100	5	15	23	30	37	49	78	141	177	212	502	665	1032
	29	8	23	36	47	57	77	121	220	275	330	781	1034	1606
175	150	4	11	17	22	26	35	55	100	125	150	355	470	730
	125	5	15	23	30	37	49	78	141	177	212	502	665	1032
	100	6	18	29	37	45	61	95	173	217	260	615	814	1264
	34	8	25	39	51	62	83	131	237	297	356	843	1116	1734
200	150	5	15	23	30	37	49	78	141	177	212	502	665	1032
	100	7	21	33	43	52	70	110	200	250	300	710	940	1460
	39	9	27	42	55	66	89	140	254	317	381	901	1193	1853
225	175	5	15	23	30	37	49	78	141	177	212	-	-	-
	100	8	23	37	48	58	78	123	224	280	335	-	-	-
	43	9	28	45	58	70	94	148	270	337	405	-	-	-
250	200	5	15	23	30	37	49	78	141	177	212	-	-	-
	150	7	21	33	43	52	70	110	200	250	300	-	-	-
	100	9	26	40	53	64	86	135	245	306	367	-	-	-
300	48	10	30	47	61	74	99	156	284	355	426	-	-	-
	250	5	15	23	30	37	49	78	141	177	212	-	-	-
	150	9	26	40	53	64	86	135	245	306	367	-	-	-
	58	11	33	51	67	81	109	171	311	389	467	-	-	-
400	350	5	15	23	30	37	49	78	141	177	212	-	-	-
	200	10	30	47	61	74	99	156	283	354	424	-	-	-
	77	13	38	59	77	93	126	198	359	449	539	-	-	-

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

K1, K4, K5, K6 WATER CAPACITY TABLE

(Modified Equal Percent Contour Plug) (M3/Hr.)

Pressure (bar)		Valve Size and Port												
P1	P2	1/2" C	1/2" E	1/2" A	1/2" B	1/2" T	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
0.7	0.3	0.4	1.1	1.8	2.4	2.8	3.8	6.0	10.9	13.7	16.4	38.8	51.4	79.9
	0.2	0.4	1.3	2.0	2.6	3.2	4.3	6.7	12.2	15.3	18.3	43.4	57.5	89.3
1	0.7	0.3	1.0	1.6	2.0	2.5	3.3	5.2	9.5	11.8	14.2	33.6	44.5	69.2
	0.5	0.4	1.3	2.0	2.6	3.2	4.3	6.7	12.2	15.3	18.3	43.4	57.5	89.3
	0.25	0.5	1.6	2.5	3.2	3.9	5.2	8.2	15.0	18.7	22.5	53.2	70.4	109.3
1.5	1	0.4	1.3	2.0	2.6	3.2	4.3	6.7	12.2	15.3	18.3	43.4	57.5	89.3
	0.7	0.5	1.6	2.6	3.3	4.0	5.4	8.5	15.5	19.3	23.2	54.9	72.7	112.9
	0.3	0.7	2.0	3.1	4.1	4.9	6.6	10.4	18.9	23.7	28.4	67.3	89.0	138.3
2	1.5	0.4	1.3	2.0	2.6	3.2	4.3	6.7	12.2	15.3	18.3	43.4	57.5	89.3
	1	0.6	1.8	2.9	3.7	4.5	6.1	9.5	17.3	21.6	25.9	61.4	81.3	126.3
	0.4	0.8	2.3	3.6	4.7	5.7	7.7	12.0	21.9	27.3	32.8	77.7	102.8	159.7
3	2	0.6	1.8	2.9	3.7	4.5	6.1	9.5	17.3	21.6	25.9	61.4	81.3	126.3
	1.5	0.7	2.2	3.5	4.6	5.5	7.4	11.7	21.2	26.5	31.8	75.2	99.6	154.6
	0.6	0.9	2.8	4.4	5.8	7.0	9.4	14.7	26.8	33.5	40.2	95.1	125.9	195.6
3.5	3	0.4	1.3	2.0	2.6	3.2	4.3	6.7	12.2	15.3	18.3	43.4	57.5	89.3
	2	0.7	2.2	3.5	4.6	5.5	7.4	11.7	21.2	26.5	31.8	75.2	99.6	154.6
	1.5	0.9	2.6	4.0	5.3	6.4	8.6	13.5	24.5	30.6	36.7	86.8	115.0	178.6
	0.7	1.0	3.0	4.8	6.2	7.5	10.1	15.9	28.9	36.2	43.4	102.7	136.0	211.3
4	3.5	0.4	1.3	2.0	2.6	3.2	4.3	6.7	12.2	15.3	18.3	43.4	57.5	89.3
	3	0.6	1.8	2.9	3.7	4.5	6.1	9.5	17.3	21.6	25.9	61.4	81.3	126.3
	2	0.9	2.6	4.0	5.3	6.4	8.6	13.5	24.5	30.6	36.7	86.8	115.0	178.6
	0.8	1.1	3.2	5.1	6.7	8.0	10.8	17.0	30.9	38.7	46.4	109.8	145.4	225.9
5	4	0.6	1.8	2.9	3.7	4.5	6.1	9.5	17.3	21.6	25.9	61.4	81.3	126.3
	3	0.9	2.6	4.0	5.3	6.4	8.6	13.5	24.5	30.6	36.7	86.8	115.0	178.6
	2	1.0	3.1	4.9	6.4	7.8	10.5	16.5	30.0	37.4	44.9	106.3	140.8	218.7
	1	1.2	3.6	5.7	7.4	9.0	12.1	19.0	34.6	43.2	51.9	122.8	162.6	252.5
6	5	0.6	1.8	2.9	3.7	4.5	6.1	9.5	17.3	21.6	25.9	61.4	81.3	126.3
	3	1.0	3.1	4.9	6.4	7.8	10.5	16.5	30.0	37.4	44.9	106.3	140.8	218.7
	1.2	1.3	4.0	6.3	8.1	9.9	13.3	20.8	37.9	47.4	56.8	134.5	178.1	276.6
8	6	0.9	2.6	4.0	5.3	6.4	8.6	13.5	24.5	30.6	36.7	86.8	115.0	178.6
	5	1.0	3.1	4.9	6.4	7.8	10.5	16.5	30.0	37.4	44.9	106.3	140.8	218.7
	1.6	1.5	4.6	7.2	9.4	11.4	15.3	24.1	43.8	54.7	65.6	155.3	205.6	319.4
10	8	0.9	2.6	4.0	5.3	6.4	8.6	13.5	24.5	30.6	36.7	86.8	115.0	178.6
	5	1.4	4.1	6.4	8.3	10.1	13.5	21.3	38.7	48.3	58.0	137.3	181.8	282.3
	2	1.7	5.1	8.1	10.5	12.7	17.1	26.9	48.9	61.1	73.4	173.7	229.9	357.1
12	10	0.9	2.6	4.0	5.3	6.4	8.6	13.5	24.5	30.6	36.7	86.8	115.0	178.6
	8	1.2	3.6	5.7	7.4	9.0	12.1	19.0	34.6	43.2	51.9	122.8	162.6	252.5
	5	1.6	4.8	7.6	9.8	11.9	16.0	25.2	45.8	57.2	68.6	162.4	215.1	334.0
	2.3	1.9	5.7	8.9	11.6	14.0	18.9	29.6	53.9	67.3	80.8	191.2	253.2	393.2
14	10	1.2	3.6	5.7	7.4	9.0	12.1	19.0	34.6	43.2	51.9	-	-	-
	5	1.8	5.4	8.6	11.2	13.5	18.2	28.5	51.9	64.9	77.8	-	-	-
	2.7	2.0	6.1	9.6	12.5	15.1	20.3	32.0	58.1	72.7	87.2	-	-	-
15	12	1.0	3.1	4.9	6.4	7.8	10.5	16.5	30.0	37.4	44.9	-	-	-
	5	1.9	5.7	9.0	11.8	14.2	19.1	30.1	54.7	68.4	82.0	-	-	-
	2.9	2.1	6.3	9.9	12.9	15.6	21.1	33.1	60.2	75.2	90.2	-	-	-
17	14	1.0	3.1	4.9	6.4	7.8	10.5	16.5	30.0	37.4	44.9	-	-	-
	10	1.6	4.8	7.6	9.8	11.9	16.0	25.2	45.8	57.2	68.6	-	-	-
	5	2.1	6.3	9.9	12.9	15.6	21.0	33.0	59.9	74.9	89.9	-	-	-
	3.2	2.2	6.7	10.6	13.8	16.7	22.5	35.3	64.2	80.3	96.4	-	-	-
20	17	1.0	3.1	4.9	6.4	7.8	10.5	16.5	30.0	37.4	44.9	-	-	-
	14	1.5	4.4	7.0	9.1	11.0	14.8	23.3	42.4	53.0	63.5	-	-	-
	3.9	2.4	7.3	11.5	14.9	18.0	24.3	38.2	69.4	86.7	104.1	-	-	-
27	24	1.0	3.1	4.9	6.4	7.8	10.5	16.5	30.0	37.4	44.9	-	-	-
	20	1.6	4.8	7.6	9.8	11.9	16.0	25.2	45.8	57.2	68.6	-	-	-
	5.2	2.8	8.5	13.3	17.4	21.0	28.3	44.4	80.8	100.9	121.1	-	-	-

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

INTIMIDATOR TYPE J
CONTROL VALVE

SIZES 1/2" - 2"
ANSI CLASS 150, 300, 600

- **High Capacity Streamlined Body** reduces velocity and pressure loss.
- **Compact Design** for ease of installation.
- **Multiple Port Sizes** allows flexibility in sizing.
- **Stainless Steel Trim** for long life and corrosion resistance.
- **Super Polished, Extra Thick Stem** provides low friction and precise control.
- **Live Loaded V ring Packing** is self adjusting.
- **Slip-on Flanges** for flexibility in piping.
- **NEMUR 4 Mounting Pad** for accessories.

Application Data

- Process control systems for food, pulp and paper, chemical, petrochemical & other industries
- HVAC systems
- Feed water and fuel system controls in boiler rooms
- Packaged systems (OEM) such as heat exchangers, water purification systems & vaporizer, metal cleaning and plating

Models

- J1 — Cast Iron
- J3 — Stainless Steel*

Options

- 36 or 60 sq. in. actuators
- Soft Seats- 450° F
- Moore, PMV, Eckardt Accessories
- Threaded of Flanged Connections
- Graphite or High Temperature Packing
- High Temperature 600°F

Applicable Codes

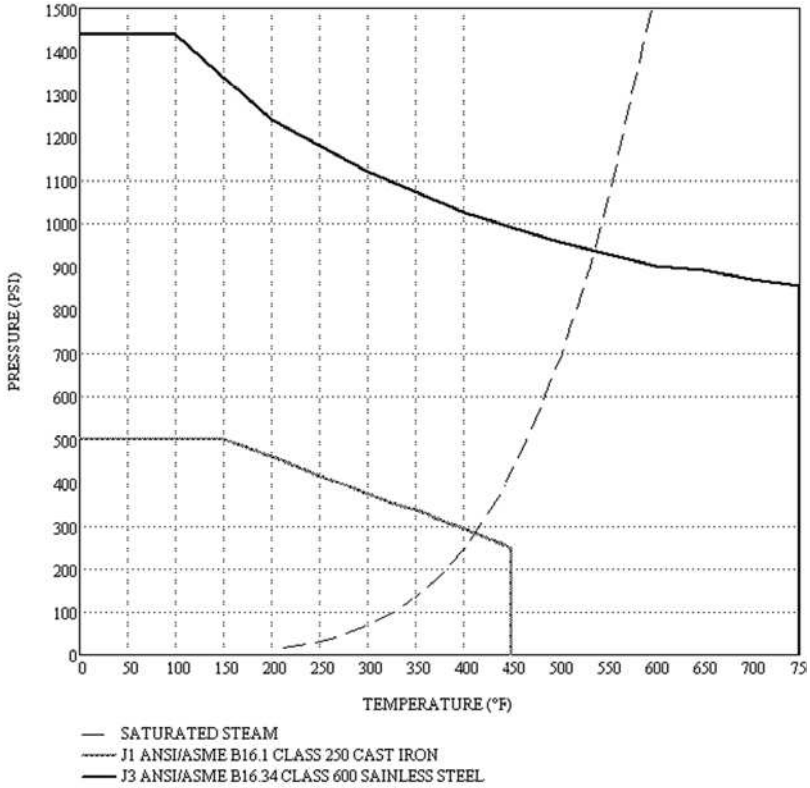
- ANSI/ISA 70-2 Class IV & VI seat leakage
- NEMUR 4 mounting of accessories

Plug Characteristics

- 1/8" to 1/4" Port Sizes - Equal Percent, 50:1 flow rangeability
- 5/8" to 2-1/4" Port Sizes - Modified Equal Percent, 100:1 flow rangeability

Canadian Registration # OC 0591.9C

PRESSURE/TEMPERATURE CHART

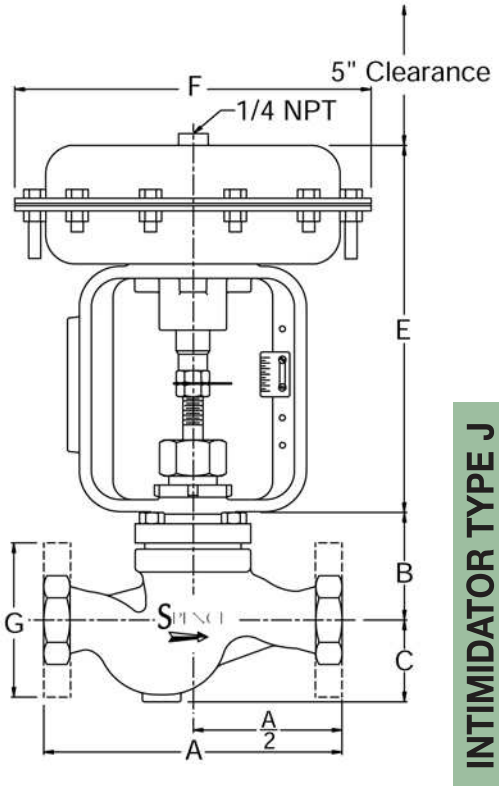


MAXIMUM RATED FLOW COEFFICIENTS* (Cv)

VALVE SIZE				
1/2	3/4	1	1 1/2	2
5.1	10.3	18.2	37	67

* Body is ANSI Class 600. Pressure rating may be limited by choice of flanges.

INTIMIDATOR TYPE J
CONTROL VALVE



SPECIFICATION

The valve shall be single seated, top guided compact pneumatic globe control valve with a streamlined body. The actuator shall have all SS hardware with a maximum deadband of .3 PSIG. the valve trim shall be all 316SS with replaceable threaded seats for easy maintenance. Standard packing shall be spring loaded teflon V-Rings. Optional graphite or high temperature packings available. The valve seat leakage shall conform to ANSI/ISA 70-2 Class IV for metal seats and Class VI for teflon soft seats. The valve shall conform to NEMUR 4 for mounting of accessories.

MATERIALS OF CONSTRUCTION

Body .....316 SS ASTM A351 CF8M
.....Cast Iron ASTM A126 CL B
Seat Ring .....316 SS ASTM A276 Cond A
Packing.....PTFE V ring
..... PTFE/Graphite
..... Graphite
Plug & Stem Ass'y.....316 SS ASTM A276 Cond A
Yoke.....DI ASTM A536/Epoxy
Diaphragm .....Nitrile/Polyester
Piston.....316 SS ASTM A743 Grd CF8
Spring .....Music Wire ASTM A228
Actuator Housing .....Steel SAE 1006-1008/Epoxy

DIMENSIONS inches **AND WEIGHTS** pounds

	A		B	C	E		F		G (Flange Diameter)		Weights* Screwed		Weights* Flanged	
Size	Scrd.	Flg.			36 in.²	60 in.²	36 in.²	60 in.²	150	300/600	36 in.²	60 in.²	36 in.²	60 in.²
½	7 5/8	8	2 11/16	1 7/8	9 7/8	11 7/8	9 1/4	11 1/4	3 1/2	3 3/4	20 1/2	36 1/2	23 1/2	39 1/2
¾	7 5/8	8 1/8	2 11/16	1 7/8	9 7/8	11 7/8	9 1/4	11 1/4	3 7/8	4 5/8	20 1/2	36 1/2	25 3/4	41 3/4
1	7 3/4	8 1/4	2 3/4	2 1/8	9 7/8	11 7/8	9 1/4	11 1/4	4 1/4	4 7/8	22 1/2	38 3/4	29	45 1/4
1½	9 1/4	9 7/8	33/8	2 11/16	9 7/8	11 7/8	9 1/4	11 1/4	5	6 1/8	29 1/4	45 1/2	40 1/4	57 1/2
2	10 1/2	11 1/4	3 9/32	3 5/16	9 7/8	11 7/8	9 1/4	11 1/4	6	6 1/2	38 1/4	54 1/4	50 1/4	68 1/4

*Weights are approximate.

PRESSURE RECOVERY FACTORS

For Gas: X_T=0.7, For F_L: See Chart

½		¾			1				1½			2		
¼	5/8	¼	5/8	7/8	¼	5/8	7/8	1¼	7/8	1¼	1¾	1¼	1¾	2¼
.851	.79	.864	.82	.775	.869	.839	.805	.768	.843	.82	.782	.841	.811	.772

INTIMIDATOR ORDERING CODE

CODE SELECTION CHART

Model		Orifice	Size	Connections	Trim	Packing-		Actuator		Spring		Positioner		Posit. Set		Accessories	-	Inlet Pressure		
J	1	J	C	9	1	1	-	3	6	R	M	M	P	0	2	0	1	-	1	2	5
1	2	3	4	5	6	7		8	9	10	11	12	13	14	15	16	17		18	19	20

Model -
Position 1 & 2
J1 = Cast Iron
J3 = Stainless

Orifice -
Position 3
F = ⅛
G = 3⁄16
H = ¼
J = ⅝
K = ⅞
L = 1¼
M = 1¾
N = 2¼

Size -
Position 4
C = ½
D = ¾
E = 1
G = 1½
H = 2

Connections -
Position 5
1 = 150
3 = 300
6 = 600#
9 = Threaded

Trim -
Position 6
1 = Metal
2 = Soft

Packing -
Position 7
1 = V-ring
2 = Graphite
3 = Hi-Temp

Actuator -
Position 8 & 9
01 = None
36 = 36 sq. in.
60 = 60 sq. in.

Spring -
Position 10 & 11
DC = 3-13 Dir 36
DD = 3-10 Dir 36
DE = 3-5 Dir 36
DF = 3-10 Dir 60*
DG = 3-11 Dir 60
DH = 3-8 Dir 60
RC = 5-15 Rev 36
RD = 8-15 Rev 36
RE = 10-15 Rev 36
RG = 8-15 Rev 60
RH = 10-15 Rev 60
RK = 20-60 Rev 60
RL = 20-60 Rev 60*
RQ = 12-15 Rev 60

* 2¼" port only.

Positioner -
Position 12 & 13
AA = None
EI = Eckardt I/P
EP = Eckardt P
MI = Moore I/P
MP = Moore P
4P = PMV P4 P
5I = PMV P5 I/P
5P = PMV P5 P

Positioner Set
Position 14 & 15
01 = None
02 = 3-15/4-20 mA
03 = 3-9/4-12 mA
04 = 9-15/12-20 mA

Accessories -
Position 16 & 17
01 = None
02 = Limit Switch, Mechanical
03 = Limit Switch, Proximity Switch
04 = Feedback Potentiometer 1K
05 = Feedback 4-20mA Posit. Trans

Inlet Pressure -
Position 18, 19 & 20
__ __ __ = Actual Setting

INTIMIDATOR SHUTOFF & CV TABLES

ACTUATOR SHUTOFF TABLE

PORT SIZE	ACTUATOR SIZE	BENCH RANGE	REVERSE SHUTOFF		BENCH RANGE	DIRECT SHUTOFF	
			3-15 PSI	0-20 PSI*		3-15 PSI	0-20 PSI
1/8	36	5 - 15	0 - 750	0 - 750	3 - 13	0 - 750	0 - 750
3/16, 1/4	36	5 - 15	0 - 250	0 - 750	3 - 13	0 - 250	0 - 750
5/8	36	5 - 15	–	0 - 50	3 - 10	0 - 300	0 - 750
		8 - 15	0 - 350	50 - 500	3 - 5	300 - 750	300 -750
		10 - 15	350 - 550	500 - 750	–	–	–
7/8	36	8 - 15	0 - 200	0 - 300	3 - 10	0 -150	0 - 350
		10 - 15	200 - 300	300 - 450	3 - 5	150 - 400	350 - 650
	60	8 - 15	0 - 500	0 - 700	3 - 11	0 - 300	0 - 600
		10 - 15	500 - 650	700 - 750	3 - 8	300 - 500	600 - 750
		12 - 15	650 - 750	–	–	–	–
1-1/4	36	–	–	–	3 - 10	0 - 150	0 - 300
		10 - 15	0 - 150	0 - 225	3 - 5	150 - 225	300 - 375
	60	8 - 15	0 - 200	0 - 300	3 - 11	0 - 150	0 - 350
		10 - 15	200 - 250	300 - 350	3 - 8	150 - 250	350 - 450
		12 - 15	250 - 300	350 - 400	–	–	–
		20 - 60**	–	0 - 750**	–	–	–
1-3/4	36	10 - 15	0 - 75	0 - 125	3 - 5	0 - 100	0 - 200
	60	8 - 15	0 - 75	0 - 125	3 - 11	0 - 100	0 - 200
		10 - 15	75 - 125	125 - 175	3 - 8	100 - 125	200 - 250
		12 - 15	125 - 175	175 - 225	–	–	–
		20 - 60**	–	0 - 375**	–	–	–
2-1/4	60	12 - 15	0 - 100	0 - 125	3 - 10	0 - 50	0 - 100
		20 - 60**	–	0 - 225**	–	–	–

* Based on 20 psi air supply w/ EPC or Positioner

** Based on 60 psi air supply w/ EPC or Positioner

NOTES:

1) For pressures over 750 psi please consult factory
2) For direct configured actuators 60 psi air signal will achieve 750 psi shutoff except for 2.25 port which will achieve 650 psi shutoff
3) Do not exceed 60 psi air signal to actuator

ACTUATOR SELECTION

Select Actuator size and bench range that will accommodate require shut off with port size selected. Select reverse for air to open fail close applications, direct for air to close fail open applications.

Cv TABLE

SIZE	TRAVEL	PORT SIZE	PLUG CONTOUR	PERCENT OF TRAVEL										
				5	10	20	30	40	50	60	70	80	90	100
1/2	3/4	1/8	EP	0.002	0.003	0.006	0.011	0.021	0.032	0.042	0.052	0.062	0.072	0.08
		3/16	EP	0.004	0.008	0.014	0.021	0.03	0.045	0.063	0.095	0.145	0.25	0.5
		1/4	EP	0.03	0.04	0.07	0.12	0.18	0.25	0.36	0.49	0.7	1.1	1.5
		5/8	MEP	0.05	0.1	0.18	0.31	0.49	0.73	1.1	1.6	2.3	3.4	5.1
3/4	3/4	1/8	EP	0.002	0.003	0.006	0.011	0.021	0.032	0.042	0.052	0.062	0.072	0.08
		3/16	EP	0.004	0.008	0.014	0.021	0.03	0.045	0.063	0.095	0.145	0.25	0.5
		1/4	EP	0.03	0.04	0.07	0.12	0.18	0.25	0.36	0.49	0.7	1.1	1.5
		5/8	MEP	0.05	0.07	0.18	0.31	0.47	0.73	1.1	1.6	2.4	3.8	6
		7/8	MEP	0.07	0.19	0.58	1	1.3	1.9	2.5	3.8	5.7	8.7	10.3
1	3/4	5/8	MEP	0.04	0.07	0.16	0.31	0.54	0.79	1.1	1.8	2.2	4	6.2
		7/8	MEP	0.07	0.15	0.42	0.75	1.2	1.9	2.9	4.2	6.7	9.8	12.1
		1-1/4	MEP	0.09	0.27	0.63	1	1.4	3.2	5.3	7.5	11.5	15.6	18.2
1-1/2	3/4	7/8	MEP	0.11	0.21	0.54	0.89	1.4	1.9	2.7	3.9	6.4	10.1	13.2
		1-1/4	MEP	0.14	0.37	0.99	1.5	2.4	3.6	5.3	7.5	12.3	16.8	22
		1-3/4	MEP	0.41	0.85	2.4	4.3	6.4	9.9	15.7	22.7	29	34.2	37
2	3/4	1-1/4	MEP	0.14	0.37	0.99	1.5	2.4	3.6	5.3	7.5	12.3	17.3	23
		1-3/4	MEP	0.41	0.85	2.4	4.3	6.5	10	16	23	31	37	43
	1-1/16	2-1/4	MEP	0.75	1.5	3.5	6.5	10.5	15.5	26	39	50	60	67

INTIMIDATOR SATURATED STEAM CAPACITY TABLE

(Lbs./Hr.)

Pressure (PSI)		Valve Size and Port																	
		1/2				3/4					1			1-1/2			2		
P1	P2	1/8	3/16	1/4	5/8	1/8	3/16	1/4	5/8	7/8	5/8	7/8	1-1/4	7/8	1-1/4	1-3/4	1-1/4	1-3/4	2-1/4
10	5	2	16	47	159	2	16	47	187	322	194	378	569	412	687	1156	719	1344	2094
	3	3	18	53	181	3	18	53	213	366	220	430	646	469	781	1314	817	1527	2380
15	10	3	17	52	177	3	17	52	208	357	215	419	630	457	762	1281	796	1489	2320
	7	3	21	62	212	3	21	62	250	429	258	503	757	549	915	1540	957	1789	2788
	5	4	22	67	229	4	22	67	269	463	278	543	817	593	988	1662	1033	1931	3009
20	15	3	19	56	192	3	19	56	226	387	233	455	685	497	828	1392	865	1617	2520
	10	4	25	74	253	4	25	74	297	510	307	599	902	654	1090	1833	1139	2130	3319
	7	4	27	81	275	4	27	81	324	555	334	652	981	712	1186	1995	1240	2319	3613
30	22	4	26	79	268	4	26	79	315	541	326	636	957	694	1156	1945	1209	2260	3522
	17	5	32	95	323	5	32	95	380	652	393	766	1153	836	1393	2343	1457	2723	4243
	10	6	36	108	369	6	36	108	434	744	448	874	1315	954	1590	2674	1662	3108	4842
40	25	6	38	113	384	6	38	113	452	775	467	911	1370	994	1656	2786	1732	3237	5044
	20	7	41	124	423	7	41	124	497	854	514	1003	1508	1094	1823	3067	1906	3564	5553
	3-0	8	47	141	480	8	47	141	564	969	583	1138	1711	1241	2069	3479	2163	4043	6300
50	35	7	42	125	424	7	42	125	498	855	515	1005	1511	1096	1827	3073	1910	3571	5564
	30	7	46	138	470	7	46	138	553	950	572	1116	1679	1217	2029	3413	2121	3966	6179
	25	8	49	148	505	8	49	148	594	1019	614	1198	1801	1307	2178	3662	2277	4256	6632
	6-0	9	55	166	564	9	55	166	663	1139	686	1338	2013	1460	2433	4091	2543	4755	7409
60	45	7	45	135	460	7	45	135	541	928	559	1090	1640	1189	1982	3334	2072	3874	6037
	40	8	50	151	513	8	50	151	604	1036	624	1217	1831	1328	2213	3722	2313	4325	6739
	35	9	54	163	554	9	54	163	652	1119	674	1315	1977	1434	2390	4020	2499	4672	7279
	9-0	10	64	191	648	10	64	191	763	1309	788	1538	2314	1678	2797	4704	2924	5466	8517
75	55	9	56	168	571	9	56	168	671	1153	694	1354	2036	1477	2462	4140	2574	4811	7497
	50	10	61	182	620	10	61	182	730	1253	754	1472	2214	1606	2677	4501	2798	5231	8151
	45	10	65	194	660	10	65	194	777	1334	803	1567	2356	1709	2848	4791	2978	5568	8675
	14-0	12	76	227	772	12	76	227	909	1560	939	1833	2757	1999	3332	5604	3484	6513	10148
100	75	11	70	210	715	11	70	210	841	1444	869	1697	2552	1851	3085	5188	3225	6029	9394
	60	13	83	249	847	13	83	249	996	1710	1029	2009	3021	2191	3652	6142	3818	7138	11122
	22-0	15	96	288	978	15	96	288	1151	1975	1189	2321	3491	2532	4219	7096	4411	8247	12850
125	100	13	78	234	797	13	78	234	938	1609	969	1891	2844	2063	3438	5782	3594	6719	10469
	75	16	101	303	1030	16	101	303	1212	2081	1252	2444	3676	2666	4444	7474	4646	8686	13534
	30-0	19	116	348	1182	19	116	348	1391	2388	1437	2805	4220	3060	5101	8578	5332	9969	15534
150	125	14	86	257	875	14	86	257	1029	1766	1063	2075	3121	2264	3773	6346	3945	7375	11491
	100	18	112	336	1142	18	112	336	1343	2306	1388	2709	4074	2955	4925	8283	5149	9626	14998
	38-0	22	136	407	1385	22	136	407	1629	2796	1683	3285	4941	3584	5973	10045	6244	11674	18190
175	150	15	92	275	936	15	92	275	1101	1890	1138	2221	3340	2422	4037	6790	4221	7891	12296
	125	20	122	367	1249	20	122	367	1469	2522	1518	2963	4457	3232	5387	9060	5632	10529	16406
	100	22	139	418	1421	22	139	418	1672	2870	1728	3372	5072	3678	6131	10311	6409	11983	18671
	46-0	25	155	466	1585	25	155	466	1865	3202	1927	3761	5657	4103	6838	11501	7149	13366	20826
200	150	21	131	392	1333	21	131	392	1569	2693	1621	3164	4759	3451	5752	9674	6014	11243	17518
	125	24	152	455	1549	24	152	455	1822	3127	1883	3674	5526	4008	6680	11235	6984	13056	20344
	54-0	28	175	525	1784	28	175	525	2098	3602	2168	4232	6365	4616	7694	12939	8043	15038	23431
225	175	22	139	417	1418	22	139	417	1669	2865	1724	3365	5062	3671	6119	10291	6397	11960	18635
	150	26	162	485	1649	26	162	485	1940	3331	2005	3913	5885	4268	7114	11964	7437	13904	21665
	63-0	31	194	583	1981	31	194	583	2330	4001	2408	4700	7069	5127	8545	14371	8933	16701	26023
250	200	23	147	441	1498	23	147	441	1762	3025	1821	3554	5345	3877	6461	10866	6755	12628	19676
	175	27	172	515	1751	27	172	515	2060	3536	2129	4154	6249	4532	7554	12704	7897	14764	23004
	150	30	189	566	1926	30	189	566	2266	3889	2341	4569	6872	4984	8307	13971	8685	16237	25300
	71-0	34	214	641	2179	34	214	641	2564	4401	2649	5170	7776	5640	9400	15808	9827	18372	28626

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

INTIMIDATOR SATURATED STEAM CAPACITY TABLE

(Kg./Hr.)

Pressure (bar)		Valve Size and Port																	
		1/2				3/4					1			1-1/2			2		
P1	P2	1/8	3/16	1/4	5/8	1/8	3/16	1/4	5/8	7/8	5/8	7/8	1-1/4	7/8	1-1/4	1-3/4	1-1/4	1-3/4	2-1/4
0.7	0.3	1	8	23	77	1	8	23	90	155	93	182	274	199	331	557	346	647	1008
	0.2	1	8	25	83	1	8	25	98	169	101	198	298	216	360	606	376	704	1097
1	0.7	1	7	22	75	1	7	22	88	151	91	178	267	194	323	543	337	631	983
	0.5	1	9	27	92	1	9	27	108	186	112	218	328	238	397	667	415	775	1208
	0.3	2	10	30	103	2	10	30	121	208	125	245	368	267	445	748	465	869	1354
1.5	1	2	10	31	104	2	10	31	123	211	127	247	372	270	450	756	470	879	1370
	0.7	2	12	37	124	2	12	37	146	251	151	295	444	322	536	902	561	1048	1633
	0.5	2	13	39	133	2	13	39	157	269	162	316	475	345	574	966	600	1122	1749
2	1.5	2	11	34	115	2	11	34	136	233	140	273	411	298	497	836	520	972	1514
	1.2	2	14	41	139	2	14	41	163	280	169	329	495	359	599	1007	626	1170	1823
	1	2	15	44	151	2	15	44	178	305	184	358	539	391	651	1095	681	1273	1983
3	2	3	18	53	179	3	18	53	211	362	218	425	639	464	773	1299	808	1510	2353
	1.5	3	20	60	205	3	20	60	241	414	249	487	732	531	885	1489	925	1730	2696
	.3-0	4	23	68	231	4	23	68	272	467	281	549	826	599	998	1679	1044	1951	3040
3.5	3.0	2	14	42	143	2	14	42	169	289	174	340	511	371	618	1040	646	1208	1883
	2.0	3	22	65	221	3	22	65	260	446	268	524	788	571	952	1601	996	1861	2900
	1.0	4	24	73	249	4	24	73	293	503	303	591	889	645	1075	1808	1124	2101	3273
	.4-0	4	25	76	259	4	25	76	304	523	315	614	923	670	1116	1877	1167	2181	3399
4	3.0	3	20	59	202	3	20	59	238	409	246	480	722	524	873	1468	912	1706	2657
	2.0	4	25	75	256	4	25	75	301	517	311	607	913	662	1104	1856	1154	2158	3362
	1.0	4	27	81	276	4	27	81	325	558	336	656	986	715	1192	2005	1246	2330	3631
	.6-0	4	28	84	286	4	28	84	337	578	348	679	1021	741	1234	2076	1290	2413	3759
5	4.0	4	22	66	224	4	22	66	264	453	272	532	800	580	967	1625	1010	1889	2943
	3.0	5	28	85	290	5	28	85	341	585	352	687	1034	750	1250	2101	1306	2442	3805
	2.0	5	31	94	321	5	31	94	378	649	391	762	1146	831	1386	2331	1449	2708	4220
	.9-0	5	33	100	341	5	33	100	401	688	414	808	1215	881	1469	2471	1536	2871	4474
7	5.0	5	34	102	345	5	34	102	406	698	420	820	1233	894	1490	2506	1558	2913	4538
	3.0	7	42	125	424	7	42	125	499	856	515	1006	1513	1097	1829	3075	1912	3574	5569
	1.6-0	7	44	132	449	7	44	132	529	908	546	1066	1604	1163	1939	3260	2027	3789	5904
9	7.0	6	38	115	392	6	38	115	462	793	477	931	1400	1016	1693	2847	1770	3309	5155
	5.0	8	49	147	500	8	49	147	589	1010	608	1187	1786	1295	2158	3630	2256	4219	6573
	2.1-0	9	55	164	557	9	55	164	656	1126	678	1322	1989	1442	2404	4043	2513	4699	7321
10	8.0	6	41	122	414	6	41	122	487	836	503	982	1478	1072	1786	3004	1867	3491	5439
	5.0	9	55	165	561	9	55	165	660	1132	682	1330	2001	1451	2419	4068	2529	4727	7366
	2.5-0	10	60	179	609	10	60	179	716	1230	740	1445	2173	1576	2627	4417	2746	5134	7999
12	10.0	7	44	133	451	7	44	133	530	910	548	1069	1608	1167	1944	3270	2033	3800	5921
	7.0	10	62	186	634	10	62	186	746	1280	771	1504	2262	1641	2735	4599	2859	5345	8328
	5.0	11	67	201	683	11	67	201	803	1379	830	1620	2437	1768	2946	4955	3080	5758	8972
	3.2-0	11	70	210	715	11	70	210	841	1444	869	1697	2552	1851	3085	5188	3225	6030	9395
14	10.0	10	63	189	644	10	63	189	757	1300	783	1527	2297	1666	2777	4670	2903	5427	8456
	7.0	12	75	225	766	12	75	225	901	1546	931	1817	2733	1982	3303	5555	3453	6456	10059
	3.8-0	13	80	241	820	13	80	241	965	1656	997	1946	2927	2123	3538	5950	3699	6915	10775
15	12.0	9	59	176	597	9	59	176	703	1207	726	1417	2132	1546	2577	4334	2694	5037	7849
	10.0	11	71	213	724	11	71	213	852	1462	880	1718	2584	1874	3123	5253	3265	6104	9511
	4.2-0	14	85	256	870	14	85	256	1024	1758	1058	2065	3106	2252	3754	6313	3925	7337	11432
17	15.0	8	53	158	536	8	53	158	630	1082	651	1271	1911	1386	2310	3885	2415	4515	7035
	12.0	12	76	229	778	12	76	229	915	1572	946	1846	2777	2014	3357	5645	3509	6561	10223
	10.0	14	85	255	868	14	85	255	1022	1754	1056	2060	3099	2248	3746	6300	3916	7322	11408
	4.8-0	15	96	287	975	15	96	287	1147	1969	1185	2314	3480	2524	4206	7075	4398	8222	12811

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

INTIMIDATOR AIR CAPACITY TABLE

(SCFH)

Pressure (PSI)		Valve Size and Port																	
		1/2				3/4					1			1-1/2			2		
P1	P2	1/8	3/16	1/4	5/8	1/8	3/16	1/4	5/8	7/8	5/8	7/8	1-1/4	7/8	1-1/4	1-3/4	1-1/4	1-3/4	2-1/4
10	5	48	300	901	3064	48	300	901	3605	6189	3725	7270	10936	7931	13219	22232	13820	25837	40258
	3	55	341	1023	3477	55	341	1023	4091	7023	4227	8250	12409	9000	15000	25227	15682	29318	45682
15	10	54	335	1005	3418	54	335	1005	4021	6904	4156	8110	12199	8847	14745	24799	15416	28821	44907
	7	64	403	1208	4106	64	403	1208	4831	8293	4992	9743	14655	10629	17714	29792	18519	34623	53948
	5	69	434	1303	4429	69	434	1303	5211	8945	5385	10508	15806	11464	19106	32133	19975	37344	58188
20	15	59	367	1100	3739	59	367	1100	4399	7552	4546	8872	13345	9678	16131	27129	16864	31528	49126
	10	77	482	1445	4914	77	482	1445	5781	9924	5973	11658	17535	12718	21196	35648	22160	41429	64552
	7	84	524	1572	5346	84	524	1572	6290	10797	6499	12684	19078	13837	23062	38786	24110	45075	70234
30	22	83	517	1552	5276	83	517	1552	6208	10656	6414	12519	18830	13657	22761	38280	23796	44488	69318
	17	100	623	1868	6350	100	623	1868	7470	12824	7719	15065	22660	16435	27391	46067	28636	53537	83419
	10	113	708	2124	7222	113	708	2124	8497	14586	8780	17135	25774	18693	31155	52398	32572	60895	94882
40	25	119	746	2239	7612	119	746	2239	8955	15373	9253	18059	27163	19701	32835	55222	34327	64177	99996
	20	131	820	2461	8367	131	820	2461	9844	16898	10172	19851	29859	21656	36094	60703	37734	70547	109922
	3-0	148	924	2773	9429	148	924	2773	11093	19043	11463	22371	33649	24405	40674	68407	42523	79500	123871
50	35	133	830	2489	8463	133	830	2489	9956	17091	10288	20078	30200	21903	36505	61395	38164	71351	111174
	30	147	920	2760	9384	147	920	2760	11040	18951	11408	22263	33487	24287	40478	68077	42318	79117	123275
	25	158	986	2958	10057	158	986	2958	11832	20312	12227	23862	35891	26031	43385	72966	45357	84798	132127
	6-0	175	1094	3281	11156	175	1094	3281	13124	22530	13562	26467	39810	28873	48122	80933	50310	94057	146555
60	45	145	906	2717	9238	145	906	2717	10868	18657	11231	21918	32967	23910	39850	67021	41662	77889	121362
	40	162	1010	3031	10306	162	1010	3031	12125	20814	12529	24452	36778	26674	44457	74769	46478	86894	135393
	35	174	1090	3270	11119	174	1090	3270	13081	22455	13517	26380	39679	28778	47963	80665	50143	93746	146070
	9-0	202	1263	3789	12882	202	1263	3789	15155	26017	15661	30563	45971	33342	55570	93459	58096	108614	169236
75	55	181	1133	3399	11558	181	1133	3399	13598	23343	14051	27422	41247	29915	49859	83853	52125	97451	151842
	50	197	1231	3692	12554	197	1231	3692	14769	25354	15262	29785	44800	32493	54154	91078	56616	105847	164925
	45	209	1309	3926	13349	209	1309	3926	15704	26959	16228	31670	47636	34549	57582	96843	60199	112547	175364
	14-0	243	1516	4549	15466	243	1516	4549	18195	31236	18802	36694	55193	40030	66717	112206	69749	130401	203183
100	75	230	1436	4309	14650	230	1436	4309	17235	29587	17810	34758	52281	37918	63196	106285	66069	123520	192462
	60	271	1696	5087	17295	271	1696	5087	20347	34928	21025	41032	61718	44763	74604	125471	77995	145817	227204
	22-0	310	1939	5817	19777	310	1939	5817	23267	39941	24042	46921	70576	51187	85311	143478	89189	166745	259811
125	100	259	1617	4850	16490	259	1617	4850	19400	33303	20046	39123	58846	42679	71132	119631	74365	139031	216630
	75	333	2082	6245	21232	333	2082	6245	24979	42881	25812	50375	75770	54954	91591	154039	95754	179018	278935
	30-0	378	2361	7084	24087	378	2361	7084	28338	48647	29282	57148	85958	62343	103906	174750	108629	203088	316440
150	125	285	1779	5338	18148	285	1779	5338	21350	36651	22062	43057	64763	46971	78285	131660	81843	153011	238412
	100	372	2328	6983	23742	372	2328	6983	27932	47950	28863	56330	84727	61450	102417	172247	107073	200179	311907
	38-0	445	2784	8352	28398	445	2784	8352	33409	57352	34523	67375	101341	73500	122500	206023	128068	239432	373068
175	150	309	1928	5785	19669	309	1928	5785	23140	39723	23911	46665	70191	50907	84846	142695	88702	165835	258394
	125	408	2551	7654	26024	408	2551	7654	30617	52559	31637	61744	92871	67357	112262	188804	117365	219421	341889
	100	466	2910	8729	29679	466	2910	8729	34917	59940	36080	70415	105914	76816	128027	215319	133847	250235	389902
	46-0	513	3207	9620	32708	513	3207	9620	38480	66058	39763	77602	116723	84657	141094	237295	147508	275775	429696
200	150	441	2758	8274	28130	441	2758	8274	33094	56812	34197	66740	100385	72807	121345	204080	126861	237174	369551
	125	508	3175	9526	32390	508	3175	9526	38105	65414	39376	76846	115587	83832	139720	234984	146071	273089	425511
	54-0	581	3629	10888	37019	581	3629	10888	43551	74763	45003	87829	132106	95813	159689	268567	166947	312119	486325
225	175	472	2950	8851	30094	472	2950	8851	35404	60778	36585	71399	107394	77890	129816	218328	135717	253732	395350
	150	548	3422	10266	34905	548	3422	10266	41065	70495	42434	82815	124564	90343	150572	253235	157416	294300	458560
	63-0	648	4051	12152	41317	648	4051	12152	48608	83444	50229	98027	147445	106938	178230	299751	186332	348359	542792
250	200	501	3131	9394	31941	501	3131	9394	37577	64507	38830	75781	113984	82670	137783	231726	144046	269303	419612
	175	584	3653	10959	37262	584	3653	10959	43837	75254	45298	88405	132973	96442	160736	270329	168043	314167	489515
	150	641	4008	12024	40881	641	4008	12024	48096	82564	49699	96993	145890	105810	176350	296589	184366	344685	537067
	71-0	716	4473	13420	45628	716	4473	13420	53680	92150	55469	108254	162828	118095	196825	331024	205771	384703	599421

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

INTIMIDATOR AIR CAPACITY TABLE

(M3/Hr.)

Pressure (bar)		Valve Size and Port																	
		1/2				3/4					1			1-1/2			2		
P1	P2	1/8	3/16	1/4	5/8	1/8	3/16	1/4	5/8	7/8	5/8	7/8	1-1/4	7/8	1-1/4	1-3/4	1-1/4	1-3/4	2-1/4
0.7	0.3	1.4	9.0	27	92	1.4	9.0	27	109	186	112	219	329	239	398	669	416	778	1212
	0.2	1.6	10	29	100	1.6	10	29	118	202	122	237	357	259	432	726	451	844	1315
1	0.7	1.4	8.9	27	90	1.4	8.9	27	106	183	110	214	323	234	390	656	408	762	1187
	0.5	1.7	11	33	111	1.7	11	33	131	224	135	263	396	287	479	805	500	936	1458
	0.3	2.0	12	37	125	2.0	12	37	147	252	151	295	444	322	537	904	562	1050	1636
1.5	1	2.0	12	37	127	2.0	12	37	150	257	155	302	454	329	549	923	573	1072	1671
	0.7	2.4	15	44	151	2.4	15	44	178	305	184	359	539	391	652	1097	682	1274	1986
	0.5	2.5	16	48	162	2.5	16	48	190	327	197	384	577	419	698	1174	730	1364	2125
2	1.5	2.2	14	42	142	2.2	14	42	167	286	172	336	505	366	611	1027	638	1194	1860
	1.2	2.7	17	50	170	2.7	17	50	200	344	207	404	607	441	734	1235	768	1435	2236
	1	2.9	18	54	184	2.9	18	54	216	371	223	436	655	475	792	1333	828	1549	2413
3	2	3.5	22	65	221	3.5	22	65	261	447	269	525	790	573	955	1607	999	1867	2909
	1.5	4.0	25	75	254	4.0	25	75	299	512	308	602	905	657	1095	1841	1144	2139	3333
	.3-0	4.5	28	84	284	4.5	28	84	334	574	345	674	1014	735	1225	2060	1281	2395	3731
3.5	3.0	2.8	17	52	178	2.8	17	52	209	359	216	422	635	461	768	1291	803	1501	2338
	2.0	4.3	27	81	275	4.3	27	81	324	556	335	653	982	712	1187	1997	1241	2321	3616
	1.0	4.9	31	92	313	4.9	31	92	368	631	380	742	1116	809	1349	2268	1410	2636	4108
	4-0	5.0	31	94	320	5.0	31	94	376	646	389	758	1141	827	1379	2319	1442	2695	4200
4	3.0	4.0	25	75	254	4.0	25	75	299	513	309	602	906	657	1095	1842	1145	2141	3336
	2.0	5.1	32	95	323	5.1	32	95	380	652	393	766	1152	836	1393	2342	1456	2722	4242
	1.0	5.5	34	103	351	5.5	34	103	413	709	427	833	1253	909	1515	2547	1583	2960	4613
	.6-0	5.6	35	104	355	5.6	35	104	418	717	431	842	1267	919	1531	2575	1601	2992	4662
5	4.0	4.4	28	83	283	4.4	28	83	333	571	344	671	1009	732	1220	2051	1275	2384	3714
	3.0	5.8	36	108	367	5.8	36	108	432	741	446	870	1309	949	1582	2661	1654	3093	4819
	2.0	6.4	40	120	409	6.4	40	120	481	826	497	970	1459	1058	1763	2965	1843	3446	5370
	.9-0	6.7	42	125	426	6.7	42	125	501	860	518	1010	1520	1102	1837	3089	1920	3590	5594
7	5.0	6.9	43	130	442	6.9	43	130	521	894	538	1050	1579	1145	1909	3210	1995	3731	5813
	3.0	8.5	53	160	545	8.5	53	160	641	1100	662	1292	1944	1410	2350	3952	2457	4593	7157
	1.6-0	8.9	56	167	567	8.9	56	167	667	1145	689	1345	2024	1468	2446	4114	2557	4781	7450
9	7.0	8.0	50	149	507	8.0	50	149	597	1025	617	1204	1811	1313	2189	3681	2288	4278	6666
	5.0	10	63	190	645	10	63	190	759	1303	784	1531	2302	1670	2783	4680	2909	5439	8475
	2.1-0	11	70	209	709	11	70	209	834	1433	862	1683	2531	1836	3060	5146	3199	5981	9318
10	8.0	8.4	53	158	537	8.4	53	158	632	1085	653	1274	1916	1390	2316	3896	2422	4528	7055
	5.0	12	72	216	733	12	72	216	863	1481	891	1740	2617	1898	3163	5319	3307	6182	9632
	2.5-0	12	76	229	780	12	76	229	917	1575	948	1850	2783	2018	3364	5657	3517	6575	10244
12	10.0	9.3	58	174	592	9.3	58	174	696	1195	720	1404	2112	1532	2553	4294	2669	4990	7776
	7.0	13	81	244	829	13	81	244	976	1675	1008	1967	2959	2146	3577	6016	3740	6992	10894
	5.0	14	88	264	897	14	88	264	1055	1812	1091	2129	3202	2322	3870	6509	4046	7564	11786
	3.2-0	14	90	271	921	14	90	271	1084	1860	1120	2185	3287	2384	3973	6682	4154	7766	12100
14	10.0	13	83	250	849	13	83	250	999	1715	1032	2014	3030	2197	3662	6159	3829	7158	11153
	7.0	16	99	296	1006	16	99	296	1183	2031	1223	2386	3589	2603	4338	7296	4536	8480	13212
	3.8-0	17	104	313	1063	17	104	313	1250	2147	1292	2522	3793	2751	4585	7711	4793	8961	13963
15	12.0	12	78	233	791	12	78	233	930	1597	961	1876	2822	2047	3411	5737	3566	6667	10388
	10.0	15	94	281	957	15	94	281	1126	1932	1163	2270	3414	2476	4127	6942	4315	8067	12570
	4.2-0	18	111	333	1133	18	111	333	1333	2289	1378	2689	4044	2933	4888	8222	5111	9555	14888
17	15.0	11	70	209	711	11	70	209	837	1436	864	1687	2537	1840	3067	5158	3207	5995	9341
	12.0	16	101	304	1034	16	101	304	1216	2088	1257	2452	3689	2675	4459	7499	4662	8715	13579
	10.0	18	113	339	1152	18	113	339	1355	2326	1400	2732	4110	2981	4968	8355	5193	9709	15129
	4.8-0	20	125	375	1275	20	125	375	1500	2575	1550	3025	4550	3300	5500	9250	5750	10750	16751

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

INTIMIDATOR WATER CAPACITY TABLE

(G.P.M.)

Pressure (PSI)		Valve Size and Port																	
		1/2				3/4					1			1-1/2			2		
P1	P2	1/8	3/16	1/4	5/8	1/8	3/16	1/4	5/8	7/8	5/8	7/8	1-1/4	7/8	1-1/4	1-3/4	1-1/4	1-3/4	2-1/4
10	5	0.18	1.1	3.4	11.4	0.18	1.1	3.4	13.4	23.0	13.9	27.1	40.7	29.5	49.2	82.7	51.4	96.2	150
	4	0.20	1.2	3.7	12.5	0.20	1.2	3.7	14.7	25.2	15.2	29.6	44.6	32.3	53.9	90.6	56.3	105	164
15	10	0.18	1.1	3.4	11.4	0.18	1.1	3.4	13.4	23.0	13.9	27.1	40.7	29.5	49.2	82.7	51.4	96.2	150
	7	0.23	1.4	4.2	14.4	0.23	1.4	4.2	17.0	29.1	17.5	34.2	51.5	37.3	62.2	105	65	122	190
	6	0.24	1.5	4.5	15.3	0.24	1.5	4.5	18.0	30.9	18.6	36.3	54.6	39.6	66.0	111	69	129	201
20	15	0.18	1.1	3.4	11.4	0.18	1.1	3.4	13.4	23.0	13.9	27.1	40.7	29.5	49.2	82.7	51.4	96.2	150
	10	0.25	1.6	4.7	16.1	0.25	1.6	4.7	19.0	32.6	19.6	38.3	57.6	41.7	69.6	117	72.7	136	212
	8	0.28	1.7	5.2	17.7	0.28	1.7	5.2	20.8	35.7	21.5	41.9	63.0	45.7	76.2	128	79.7	149	232
30	25	0.18	1.1	3.4	11.4	0.18	1.1	3.4	13.4	23.0	13.9	27.1	40.7	29.5	49.2	83	51.4	96	150
	20	0.25	1.6	4.7	16.1	0.25	1.6	4.7	19.0	32.6	19.6	38.3	57.6	41.7	69.6	117	72.7	136	212
	12	0.34	2.1	6.4	21.6	0.34	2.1	6.4	25.5	43.7	26.3	51.3	77.2	56.0	93.3	157	98	182	284
40	25	0.31	1.9	5.8	19.8	0.31	1.9	5.8	23.2	39.9	24.0	46.9	70.5	51.1	85.2	143	89.1	167	259
	20	0.36	2.2	6.7	22.8	0.36	2.2	6.7	26.8	46.1	27.7	54.1	81.4	59.0	98.4	165	103	192	300
	15	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
50	35	0.31	1.9	5.8	19.8	0.31	1.9	5.8	23.2	39.9	24.0	46.9	70.5	51.1	85.2	143	89.1	167	259
	30	0.36	2.2	6.7	22.8	0.36	2.2	6.7	26.8	46.1	27.7	54.1	81.4	59.0	98.4	165	103	192	300
	25	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
	15	0.47	3.0	8.9	30.2	0.47	3.0	8.9	35.5	60.9	36.7	71.6	107.7	78.1	130	219	136	254	396
60	45	0.31	1.9	5.8	19.8	0.31	1.9	5.8	23.2	39.9	24.0	46.9	70.5	51.1	85.2	143	89.1	167	259
	40	0.36	2.2	6.7	22.8	0.36	2.2	6.7	26.8	46.1	27.7	54.1	81.4	59.0	98.4	165	103	192	300
	35	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
	25	0.47	3.0	8.9	30.2	0.47	3.0	8.9	35.5	60.9	36.7	71.6	107.7	78.1	130	219	136	254	396
75	55	0.36	2.2	6.7	22.8	0.36	2.2	6.7	26.8	46.1	27.7	54.1	81.4	59.0	98.4	165	103	192	300
	50	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
	45	0.44	2.7	8.2	27.9	0.44	2.7	8.2	32.9	56.4	34.0	66.3	99.7	72.3	120	203	126	236	367
	31	0.53	3.3	9.9	33.8	0.53	3.3	9.9	39.8	68.3	41.1	80.3	121	88	146	245	153	285	444
100	75	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
	60	0.51	3.2	9.5	32.3	0.51	3.2	9.5	37.9	65.1	39.2	76.5	115	83.5	139	234	145	272	424
	50	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	86	129	93	156	262	163	304	474
125	100	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
	75	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	55	0.67	4.2	12.5	42.7	0.67	4.2	12.5	50.2	86.2	51.9	101	152	110	184	310	192	360	561
150	125	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
	100	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	75	0.69	4.3	13.0	44.2	0.69	4.3	13.0	52.0	89	53.7	105	158	114	191	320	199	372	580
175	150	0.40	2.5	7.5	25.5	0.40	2.5	7.5	30.0	51.5	31.0	60.5	91.0	66.0	110	185	115	215	335
	125	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	100	0.69	4.3	13.0	44.2	0.69	4.3	13.0	52.0	89.2	53.7	105	158	114	191	320	199	372	580
	75	0.80	5.0	15.0	51.0	0.80	5.0	15.0	60.0	103	62.0	121	182	132	220	370	230	430	670
200	150	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	125	0.69	4.3	13.0	44.2	0.69	4.3	13.0	52.0	89.2	53.7	105	158	114	191	320	199	372	580
	85	0.86	5.4	16.1	54.7	0.86	5.4	16.1	64.3	110	66.5	130	195	142	236	397	247	461	718
225	175	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	150	0.69	4.3	13.0	44.2	0.69	4.3	13.0	52.0	89.2	53.7	105	158	114	191	320	199	372	580
	100	0.89	5.6	16.8	57.0	0.89	5.6	16.8	67.1	115	69.3	135	203	148	246	414	257	481	749
250	200	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	175	0.69	4.3	13.0	44.2	0.69	4.3	13.0	52.0	89.2	53.7	105	158	114	191	320	199	372	580
	150	0.80	5.0	15.0	51.0	0.80	5.0	15.0	60.0	103	62.0	121	182	132	220	370	230	430	670
	125	0.89	5.6	16.8	57.0	0.89	5.6	16.8	67.1	115	69.3	135	203	148	246	414	257	481	749
300	250	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	200	0.80	5.0	15.0	51.0	0.80	5.0	15.0	60.0	103	62.0	121	182	132	220	370	230	430	670
	125	1.1	6.6	19.8	67.5	1.1	6.6	19.8	79.4	136	82.0	160	241	175	291	489	304	569	886
400	350	0.57	3.5	10.6	36.1	0.57	3.5	10.6	42.4	72.8	43.8	85.6	129	93.3	156	262	163	304	474
	300	0.80	5.0	15.0	51.0	0.80	5.0	15.0	60.0	103	62.0	121	182	132	220	370	230	430	670
	175	1.2	7.5	22.5	76.5	1.2	7.5	22.5	90.0	155	93.0	182	273	198	330	555	345	645	1005

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

INTIMIDATOR WATER CAPACITY TABLE

(M3/Hr.)

Pressure (bar)		Valve Size and Port																	
		1/2				3/4					1			1-1/2			2		
P1	P2	1/8	3/16	1/4	5/8	1/8	3/16	1/4	5/8	7/8	5/8	7/8	1-1/4	7/8	1-1/4	1-3/4	1-1/4	1-3/4	2-1/4
0.7	0.5	0.03	0.2	0.6	2.0	0.03	0.2	0.6	2.3	4.0	2.4	4.7	7.0	5.1	8.5	14.3	8.9	16.6	25.9
	0.3	0.04	0.3	0.8	2.8	0.04	0.3	0.8	3.3	5.6	3.4	6.6	10.0	7.2	12.0	20.2	12.6	23.5	36.6
1	0.7	0.04	0.2	0.7	2.4	0.04	0.2	0.7	2.8	4.9	2.9	5.7	8.6	6.3	10.4	17.5	10.9	20.4	31.7
	0.5	0.05	0.3	0.9	3.1	0.05	0.3	0.9	3.7	6.3	3.8	7.4	11.1	8.1	13.5	22.6	14.1	26.3	41.0
	0.4	0.05	0.3	1.0	3.4	0.05	0.3	1.0	4.0	6.9	4.2	8.1	12.2	8.8	14.7	24.8	15.4	28.8	44.9
1.5	1	0.05	0.3	0.9	3.1	0.05	0.3	0.9	3.7	6.3	3.8	7.4	11.1	8.1	13.5	22.6	14.1	26.3	41.0
	0.7	0.06	0.4	1.2	3.9	0.06	0.4	1.2	4.6	8.0	4.8	9.4	14.1	10.2	17.0	28.6	17.8	33.3	51.8
	0.6	0.07	0.4	1.2	4.2	0.07	0.4	1.2	4.9	8.5	5.1	9.9	14.9	10.8	18.0	30.4	18.9	35.3	55.0
2	1.5	0.05	0.3	0.9	3.1	0.05	0.3	0.9	3.7	6.3	3.8	7.4	11.1	8.1	13.5	22.6	14.1	26.3	41.0
	1	0.07	0.4	1.3	4.4	0.07	0.4	1.3	5.2	8.9	5.4	10.5	15.7	11.4	19.0	32.0	19.9	37.2	57.9
	0.8	0.08	0.5	1.4	4.8	0.08	0.5	1.4	5.7	9.8	5.9	11.5	17.2	12.5	20.8	35.1	21.8	40.7	63.5
3	2	0.07	0.4	1.3	4.4	0.07	0.4	1.3	5.2	8.9	5.4	10.5	15.7	11.4	19.0	32.0	19.9	37.2	57.9
	1.5	0.08	0.5	1.6	5.4	0.08	0.5	1.6	6.4	10.9	6.6	12.8	19.3	14.0	23.3	39.2	24.4	45.5	71.0
	1.0	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
3.5	3	0.05	0.3	0.9	3.1	0.05	0.3	0.9	3.7	6.3	3.8	7.4	11.1	8.1	13.5	22.6	14.1	26.3	41.0
	2	0.08	0.5	1.6	5.4	0.08	0.5	1.6	6.4	10.9	6.6	12.8	19.3	14.0	23.3	39.2	24.4	45.5	71.0
	1.5	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
	1	0.11	0.7	2.1	7.0	0.11	0.7	2.1	8.2	14.1	8.5	16.5	24.9	18.0	30.1	50.6	31.4	58.8	91.6
4	3.5	0.05	0.3	0.9	3.1	0.05	0.3	0.9	3.7	6.3	3.8	7.4	11.1	8.1	13.5	22.6	14.1	26.3	41.0
	3	0.07	0.4	1.3	4.4	0.07	0.4	1.3	5.2	8.9	5.4	10.5	15.7	11.4	19.0	32.0	19.9	37.2	57.9
	2	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
	1.7	0.10	0.7	2.0	6.7	0.10	0.7	2.0	7.9	13.5	8.1	15.9	23.9	17.3	28.9	48.5	30.2	56.4	87.9
5	4	0.07	0.4	1.3	4.4	0.07	0.4	1.3	5.2	8.9	5.4	10.5	15.7	11.4	19.0	32.0	19.9	37.2	57.9
	3	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
	2.5	0.11	0.7	2.1	7.0	0.11	0.7	2.1	8.2	14.1	8.5	16.5	24.9	18.0	30.1	50.6	31.4	58.8	91.6
	2.2	0.12	0.7	2.2	7.4	0.12	0.7	2.2	8.7	14.9	9.0	17.5	26.3	19.1	31.8	53.5	33.3	62.2	97.0
6	5	0.07	0.4	1.3	4.4	0.07	0.4	1.3	5.2	8.9	5.4	10.5	15.7	11.4	19.0	32.0	19.9	37.2	57.9
	4	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
	3.5	0.11	0.7	2.1	7.0	0.11	0.7	2.1	8.2	14.1	8.5	16.5	24.9	18.0	30.1	50.6	31.4	58.8	91.6
8	6	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
	5	0.12	0.7	2.2	7.6	0.12	0.7	2.2	9.0	15.4	9.3	18.1	27.3	19.8	33.0	55.4	34.5	64.4	100
	4	0.14	0.9	2.6	8.8	0.14	0.9	2.6	10.4	17.8	10.7	20.9	31.5	22.8	38.0	64.0	39.8	74.4	116
10	8	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
	6	0.14	0.9	2.6	8.8	0.14	0.9	2.6	10.4	17.8	10.7	20.9	31.5	22.8	38.0	64.0	39.8	74.4	116
	5	0.15	1.0	2.9	9.9	0.15	1.0	2.9	11.6	19.9	12.0	23.4	35.2	25.5	42.5	71.5	44.5	83.1	130
12	10	0.10	0.6	1.8	6.2	0.10	0.6	1.8	7.3	12.6	7.6	14.8	22.3	16.1	26.9	45.2	28.1	52.6	81.9
	8	0.14	0.9	2.6	8.8	0.14	0.9	2.6	10.4	17.8	10.7	20.9	31.5	22.8	38.0	64.0	39.8	74.4	116
	6	0.17	1.1	3.2	10.8	0.17	1.1	3.2	12.7	21.8	13.1	25.6	38.6	28.0	46.6	78.4	48.7	91.1	142
	5	0.18	1.1	3.4	11.7	0.18	1.1	3.4	13.7	23.6	14.2	27.7	41.6	30.2	50.3	84.7	52.6	98.4	153
14	10	0.14	0.9	2.6	8.8	0.14	0.9	2.6	10.4	17.8	10.7	20.9	31.5	22.8	38.0	64.0	39.8	74.4	116
	8	0.17	1.1	3.2	10.8	0.17	1.1	3.2	12.7	21.8	13.1	25.6	38.6	28.0	46.6	78.4	48.7	91.1	142
	6	0.20	1.2	3.7	12.5	0.20	1.2	3.7	14.7	25.2	15.2	29.6	44.5	32.3	53.8	90.5	56.3	105	164
15	12	0.12	0.7	2.2	7.6	0.12	0.7	2.2	9.0	15.4	9.3	18.1	27.3	19.8	33.0	55.4	34.5	64.4	100
	10	0.15	1.0	2.9	9.9	0.15	1.0	2.9	11.6	19.9	12.0	23.4	35.2	25.5	42.5	71.5	44.5	83.1	130
	7	0.20	1.2	3.7	12.5	0.20	1.2	3.7	14.7	25.2	15.2	29.6	44.5	32.3	53.8	90.5	56.3	105	164
17	14	0.12	0.7	2.2	7.6	0.12	0.7	2.2	9.0	15.4	9.3	18.1	27.3	19.8	33.0	55.4	34.5	64.4	100
	12	0.15	1.0	2.9	9.9	0.15	1.0	2.9	11.6	19.9	12.0	23.4	35.2	25.5	42.5	71.5	44.5	83.1	130
	10	0.18	1.1	3.4	11.7	0.18	1.1	3.4	13.7	23.6	14.2	27.7	41.6	30.2	50.3	84.7	52.6	98.4	153
	9	0.20	1.2	3.7	12.5	0.20	1.2	3.7	14.7	25.2	15.2	29.6	44.5	32.3	53.8	90.5	56.3	105	164
20	17	0.12	0.7	2.2	7.6	0.12	0.7	2.2	9.0	15.4	9.3	18.1	27.3	19.8	33.0	55.4	34.5	64.4	100
	15	0.15	1.0	2.9	9.9	0.15	1.0	2.9	11.6	19.9	12.0	23.4	35.2	25.5	42.5	71.5	44.5	83.1	130
	9	0.23	1.4	4.3	14.6	0.23	1.4	4.3	17.2	29.5	17.8	34.7	52.2	37.9	63.1	106	66.0	123	192
27	20	0.18	1.1	3.4	11.7	0.18	1.1	3.4	13.7	23.6	14.2	27.7	41.6	30.2	50.3	84.7	52.6	98.4	153
	15	0.24	1.5	4.5	15.3	0.24	1.5	4.5	18.0	30.9	18.6	36.2	54.5	39.5	65.9	111	68.9	129	201
	12	0.27	1.7	5.0	17.1	0.27	1.7	5.0	20.1	34.5	20.8	40.5	61.0	44.2	73.7	124	77.0	144	224

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

BOSS D SERIES PNEUMATIC CONTROL VALVE

BOSS SERIES D
CONTROL VALVE

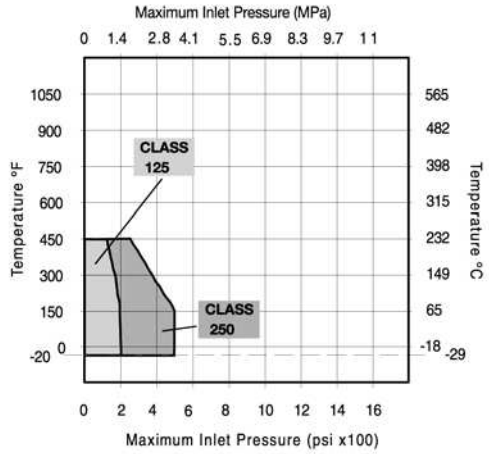
SIZES 2" – 8"
ANSI CLASS 125/250, 250/300, 600

- **Available in Pneumatic & Electric Actuators** for modulating control and on/off applications.
- **Electric Actuator Accepts Analog Signals** 4-20 mA, 0-10 VDC or Profibus DP
- **High Flow Capacities** - Valve body flow areas 42% of pipe area, reducing velocities and pressure loss.
- **Controlled Seat Loading** maintains constant seat gasket load.
- **Hung Cage Design** eliminates problems associated with fixed cages.
- **Hardened/Stainless Steel Trim** provides twice the service life of 316 stainless trim.
- **Rugged Piston Seal** with three times the wear surface of competitive valves for long lasting leak tight seal.
- **Multiple Cage Options** for maximum versatility.
- **Balanced Plug Design** provides smooth high pressure control.
- **Tighter Shut Offs to Class VI** - Superior design provides exceptional performance up to Class VI.

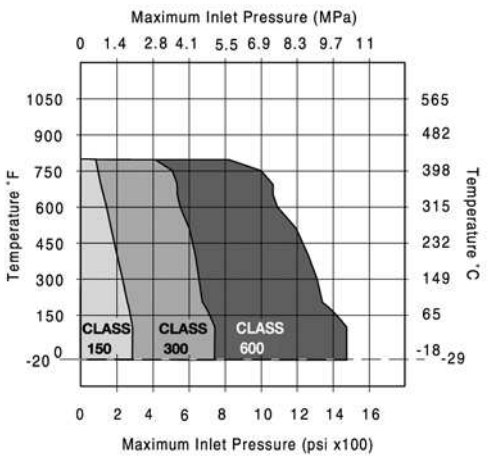
Application Data

- Process control systems for food, pulp and paper, chemical, petrochemical & other industries
- HVAC systems
- Feed water and fuel system controls in boiler rooms
- Packaged systems (OEM) such as heat exchangers, water purification systems & vaporizer, metal cleaning and plating

CAST IRON A126 CLASS B



CARBON STEEL A216WCB



Models

- D1 — Cast Iron Stainless Trim, Pneumatic or Electrically Actuated
- D2 — Cast Steel Stainless Trim, Pneumatic or Electrically Actuated

Options

- 35, 55, 85 or 135 sq. in. Actuator, Reverse or Direct
- Electric Actuator Accepts Analog Signals 4-20 mA, 0-10 VDC or Profibus DP
- Soft Seats
- Thread of Flange Connection
- Moore and PMV Accessories
- Noise and Cavitation Reducing Trim
- Reduced Flow Caging
- Alternate Packings for Severe Service
- High Temperature Trim

Applicable Codes

- ANSI B16.10 Face-To-Face Dimensions and ISA S75.03 Uniform Face-To-Face Dimensions for Flanged Globe Style Control Valves
- ANSI B16.37 Hydrotesting of Control Valves
- ISA S75.02 Control Valve Capacity Test Procedure
- Canadian Registration # OC 0591.9C

BOSS SERIES D
CONTROL VALVE
SPECIFICATION

All cage-guided control valves shall be designed, built and tested in accordance with the latest revision of applicable industry standards (see previous page). Valve body materials and end connections shall be as specified on the valve data sheets, in accordance with ANSI B16.34 and B16.5. Bonnets shall be through bolted, of the same material as the valve body. Stem packing shall be adjustable and suitable for the intended service. Asbestos or asbestos filled packings are prohibited. If graphite packing is selected or specified, use alternating rings of braided and die-cut anti-extrusion rings. Live-loaded PTFE V-ring packing shall be used to 450˚F. Packing gland, clamp, studs and nuts shall be of 300 Series stainless steel. Cage type guiding and throttling shall be used for 2" valves and larger. Valves shall be of a "quick change" trim design utilizing a hung cage in all pressure classes. Seat rings shall be non-threaded and retained by a load spring with laminated graphite seat/body gasket. Trim shall be of 400 Series hardened stainless steel. Plugs shall be balanced unless otherwise noted. Where specified or required, valves shall be provided with stellite seating surfaces on 400 Series hardened stainless steel plug and seat ring. Seat stellite thickness shall be 3/32" minimum. Valve characteristic shall be modified linear or equal percent. Valve leakage shall be ANSI/ISA 70-2 Class IV unless otherwise specified. Valve stems shall be 316 stainless steel with a minimum 16 RMS finish. Plug/stem assemblies shall be of a two piece threaded and pinned design. Actuators shall be of the spring and diaphragm type or electrically driven. Pneumatic Actuators shall be capable of shutting off the valve without the use of line pressure assist. Pneumatic Actuator yokes shall be of cast iron unless otherwise specified and bolted or clamped to the valve bonnet. Locknut mounting is not preferred. Electric Actuators shall have integral handwheel permitting easy manual operation when power is lost. Top mounted handwheel manual overrides shall be provided where specified. Rim pull required to operate valve shall not exceed 40 pounds.

Valve body size shall not be less than 1/2 the nominal inlet pipe size. Provide reduced window cages where required. Valves shall be sized to control within manufacturers published rangeability. Size valve to pass 110% of maximum stated flow. Valve generated noise shall not exceed 85 dBA when measured 3 feet downstream and 3 feet away from the pipe.

MATERIALS OF CONSTRUCTION

BODY ASSEMBLY:
Style: Single seated, top entry bolted bonnet, globe style body, cage guided balanced plug

BODY/BONNET MATERIALS:
Cast Iron, ASTM A126 Class B
Carbon Steel, ASTM A216 Gr WCB
Chrome Moly, ASTM A217 Gr WC-9
Note: See ANSI B16.1 (cast iron) or ANSI B16.34 (other materials) for pressure/temp. limits of body/bonnet assemblies.

SIZES: 2"-8" (50-200mm)

END CONNECTIONS:
ANSI Class 125/150 Integral Flanged, 2-8"
ANSI Class 250/300 Integral Flanged, 2-8"
ANSI Class 600 Integral Flanged, 2-8"
Threaded, NPT - 2" only, (ANSI 250 Cast Iron Bodies), (ANSI 600 Carbon Steel & Alloy)
Socketweld - 2" only, (ANSI 600 Class)
Buttweld Ends
DIN Flanges: ND-16, ND-25, ND-40, ND-64, ND-100

BONNET:
Bolted Bonnet, Standard

BODY/BONNET BOLTING:
ASTM A-193 GRB7 Studs
ASTM A-194 GR2H Nuts

STEM PACKING:
PTFE V-Rings, -40 to 460˚F(-22 to 238˚C)
PTFE/Graphite, -40 to 500˚F(-22 to 260˚C)
Laminated Graphite,-320 to 800˚F (-195 to 426˚C)

PACKING STUDS, NUTS & FOLLOWER:
300 Series Stainless Steel

GASKETS:
Body/Bonnet and Seat Ring/Body:
Filled 304 stainless steel 500˚F (260˚C) Max.
Inconel/Graphite: 800˚F (426˚C) Max.

TRIM SIZES:
Full Port and 40% reduced

PLUG (PISTON) SEAL MATERIALS:
Standard TFE/Graphite, max. temp. 500˚ (Class IV shutoff)
Ni-Resist, max. temp. 800˚F (Class III shutoff)

FLOW CHARACTERISTICS:
Modified Linear, Standard
Equal % (w/ CAM Characterized Positioner)

SHUTOFF CLASS (ANSI /ISA 70-2):
Standard trim, 0-500˚F(-18 to 260˚C) Max.
Class IV (.01% Cv).
Metal/PTFE seats - Class VI, bubble tight to 460˚F (238˚C).
High-temp trim, 0-800˚F(-18 to 426˚C), Class III (.1% Cv).
For optional Class IV or V shutoff above 500˚F, contact factory.

TRIM MATERIAL COMBINATIONS:

ACTUATORS:
Standard: Spring & Diaphragm
Digi Electric
Optional: Piston Double Acting/Spring Return
Hydraulic

PRESSURE RECOVERY FACTOR:
Liquid: F_L = 0.8, Gas: X_T = 0.7

ANSI BODY RATINGS:
Class 125 & 250 Cast Iron
Class 150, 300, & 600 Steel and Alloy

BOSS SERIES D ORDERING CODE

Model	Orifice	Size	Connections	Trim	Packing	-	Actuator	Spring	Positioner	Posit. Set	Accessories	-	Inlet Pressure
D	1	T	H	1	1	1	-	3	4	D	A	M	I	2	2	-	#	#	#
1	2	3	4	5	6	7		8	9	10	11	12	13	14	15	16	17	18	19	20

Model -
Position 1 & 2
D1 - Cast Iron
D2 - Cast Steel

Orifice -
Position 3
T = STD
P = 40%
Q = Seco-Sonic
R = Seco-Cav

Size -
Position 4
H = 2
J = 2½
K = 3
M = 4
P = 6
Q = 8

Connections -
Position 5
1 = 150 RF Flg
2 = 125#
3 = 300RF Flg
4 = 250#
6 = 600 RF Flg
9 = Threaded

Trim - Position 6
1 = Metal
2 = Soft
3 = Hi-Temp
4 = Stellite

Packing -
Position 7
1 = V-ring
2 = Graphite
3 = Hi-Temp

Actuator -
Position 8 & 9
01 = None
02 = ST5112-34
03 = ST5113-07
04 = ST5114-17
34 = 35
35 = 35R
52 = 55
53 = 55R
54 = 55A
55 = 55AR
82 = 85
83 = 85R
84 = 85A
85 = 85AR
86 = 135
87 = 135R

Spring -
Position
10 & 11
AA = None
TA - 38422
TB - 41968
TC - 23239
TD - 35014
TE - 24296
TF - 24297
TG - 24299
TH - 24301
TJ - 42489
TK - 23996
TL - 61264
TM - 42489/25390

Positioner - Position 12 & 13
AA = None
MI = Moore I/P
MP = Moore P
4P = PMV P4 P
5I = PMV P5 I/P

Positioner Set - Position 14 & 15
1 = None
2 = Std 3-15
3 = S.R. 3-9
4 = S.R. 9-15

Accessories - Position 16 & 17
1 = None
2 = Limit Switch, Mechanical
3 = Limit Switch, Proximity Switch
4 = Feedback Potentiometer 1K

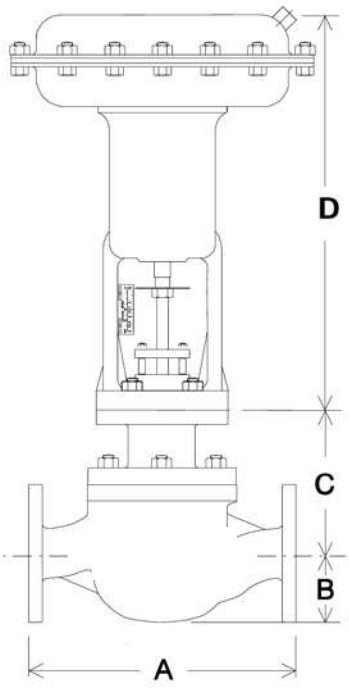
Inlet Pressure - Position 18, 19 & 20
___ = Actual Setting

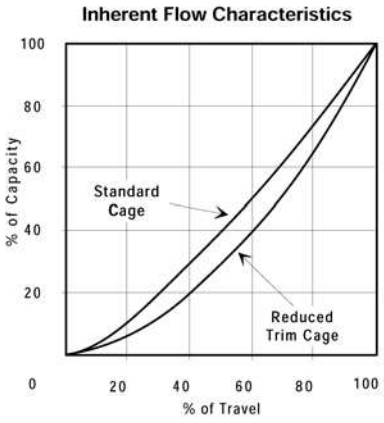
BOSS SERIES D CONTROL VALVE

DIMENSIONS

PNEUMATIC ACTUATOR

CONTROL VALVE – CAST IRON DIMENSIONS IN INCHES						CONTROL VALVE – CAST STEEL DIMENSIONS IN INCHES					
SIZE	A	B	C	D*	WGT.*	SIZE	A	B	C	D*	WGT.*
			THREADED						THREADED		
2	9 1/4	3 3/4	7 1/4	12 3/8	80 lb.	2	9 1/4	3	7 1/8	12 3/8	45 lb.
125 LB. ANSI FLANGE STANDARD						150 LB. ANSI FLANGE STANDARD					
2	10	3 3/4	7 1/4	12 3/8	85 lb.	2	10	3	7-1/8	12 3/8	85 lb.
2 1/2	10 7/8	4 3/8	6 5/8	15 1/4	125 lb.	2 1/2	10 7/8	3 1/2	6 5/8	15 1/4	125 lb.
3	11 3/4	4 1/2	6 7/8	15 1/4	145 lb.	3	11 3/4	3 3/4	6 7/8	15 1/4	145 lb.
4	13 7/8	5 1/2	8 1/8	15 1/4	190 lb.	4	13 7/8	4 1/2	8 5/8	15 1/4	190 lb.
6	17 3/4	5 7/8	9 3/4	19 5/8	460 lb.	6	17 3/4	5 1/2	9 3/4	19 5/8	450 lb.
8	21 3/8	7 5/8	12 1/4	27 3/8	625 lb.	8	21 3/8	6 3/4	12 1/4	27 3/8	600 lb.
250 LB. ANSI FLANGE STANDARD						300 LB. ANSI FLANGE STANDARD					
2	10 1/2	3 3/4	7 1/4	12 3/8	88 lb.	2	10 1/2	3 1/4	7 1/8	12 3/8	88 lb.
2 1/2	11 1/2	4 3/8	6 5/8	15 1/4	130 lb.	2 1/2	11 1/2	3 3/4	6 5/8	15 1/4	130 lb.
3	12 1/2	4 1/2	6 7/8	15 1/4	152 lb.	3	12 1/2	4 1/8	6 7/8	15 1/4	152 lb.
4	14 1/2	5 1/2	8 1/2	15 1/4	198 lb.	4	14 1/2	5	8 5/8	15 1/4	198 lb.
6	18 5/8	5 7/8	9 3/4	19 5/8	480 lb.	6	18 5/8	6 1/4	9 3/4	19 5/8	470 lb.
8	22 3/8	7 5/8	12 1/4	27 3/8	640 lb.	8	22 3/8	7 1/2	12 1/4	27 3/8	635 lb.
						600 LB. ANSI FLANGE STANDARD					
–	–	–	–	–	–	2	11 1/4	3 1/4	7 1/8	12 3/8	90 lb.
–	–	–	–	–	–	2 1/2	12 1/4	3 3/4	6 5/8	15 1/4	135 lb.
–	–	–	–	–	–	3	13 1/4	4 1/8	6 7/8	15 1/4	158 lb.
–	–	–	–	–	–	4	15 1/2	5 3/8	8 5/8	15 1/4	205 lb.
–	–	–	–	–	–	6	20	7	9 3/4	19 5/8	485 lb.
–	–	–	–	–	–	8	24	8 1/4	12 1/4	27 3/8	660 lb.
DIMENSIONS IN MILLIMETERS						DIMENSIONS IN MILLIMETERS					
SIZE	A	B	C	D*	WGT.*	SIZE	A	B	C	D	WGT.*
			THREADED						THREADED		
50	235	95	184	314	36.3 kg	50	235	76	181	314	20.4 kg
DIN 2533 FLANGE STANDARD (ND-16)						DIN 2543 FLANGE STANDARD (ND-16)					
50	254	95	184	314	39 kg	50	254	76	181	314	39 kg
65	276	111	168	387	57 kg	65	276	89	168	387	57 kg
80	299	114	175	387	66 kg	80	299	95	175	387	66 kg
100	352	140	206	387	86 kg	100	352	114	219	387	86 kg
160	451	149	248	499	209 kg	160	451	140	248	499	204 kg
200	543	194	311	695	284 kg	200	543	172	311	695	272 kg
DIN 2534 FLANGE STANDARD (ND-25)						DIN 2545 FLANGE STANDARD (ND-40)					
50	267	95	184	314	40 kg	50	267	83	181	314	40 kg
65	292	111	168	387	59 kg	65	292	95	168	387	59 kg
80	318	114	175	387	69 kg	80	318	105	175	387	69 kg
100	368	140	206	387	90 kg	100	368	127	219	387	90 kg
160	473	149	248	499	218 kg	160	473	159	248	499	213 kg
200	568	194	311	695	290 kg	200	568	191	311	695	288 kg
						DIN 2547 FLANGE STANDARD (ND-100)					
–	–	–	–	–	–	50	286	83	181	314	41 kg
–	–	–	–	–	–	65	311	95	168	387	61 kg
–	–	–	–	–	–	80	337	105	175	387	72 kg
–	–	–	–	–	–	100	394	137	219	387	93 kg
–	–	–	–	–	–	160	508	178	248	499	220 kg
–	–	–	–	–	–	200	610	210	311	695	299 kg





* With standard actuator

Dimensions are subject to change without notice.
Request certified drawings for installation purposes

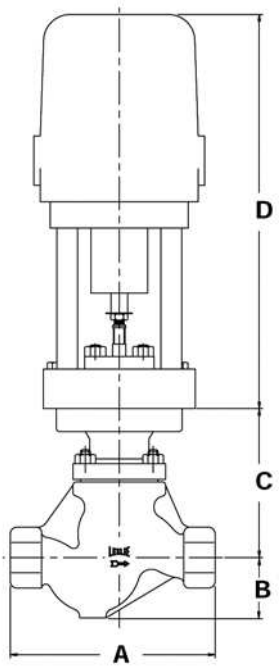
C_V TABLE

Valve Size	Full Port Cv	Full Port Range	40% Red. Cv	40% Red. Range	Seco-Sonic Cv	Seco-Sonic Range	Seco-Cav Cv	Seco-Cav Range	Stroke (in.)	Seat Dia.	Unbalanced Area (in^2)
2	65	30:1	26	20:1	48	30:1	32	14:1	0.750	2.3	0.14
2½	90	40:1	36	25:1	70	40:1	40	17:1	0.875	2.9	0.18
3	125	40:1	50	25:1	97	40:1	63	20:1	1.00	3.5	0.21
4	205	50:1	82	30:1	156	50:1	103	25:1	1.25	4.6	0.28
6	435	50:1	174	30:1	349	50:1	217	25:1	2.00	6.9	0.42
8	760	50:1	304	30:1	579	50:1	304	25:1	2.75	9.2	0.56

BOSS SERIES D CONTROL VALVE

DIMENSIONS

ELECTRIC ACTUATOR



ELECTRIC ACTUATORS SPECIFICATIONS, DIMENSIONS inches (mm) AND WEIGHTS pounds (kg)

Model	Std. Stroke (in)	Max Thrust (lb/f)	Stroke Time (sec)	Sec./ Inch	Rating	Power Supply	Power Consumption	Ambient Temp. Limits	D	Wgt.
ST5112-34	1.57	674	39	25	IP-65	24V(DC), 115V, 230V, 50/60 Hz	18VA	-68°F to 158°F	16 1/16 (424)	12 (5.5)
ST5113-07	2.36	1348	38	16	IP-55	24V(DC), 115V, 230V, 50/60 Hz	72VA	-68°F to 140°F	21 5/16 (541)	23 (10.5)
ST5114-17	3.14	2248	91	29	IP-55	24V(DC), 115V, 230V, 50/60 Hz	66VA	-68°F to 140°F	21 15/16 (558)	23 (10.5)

CLASS IV SHUTOFF

VALVE SIZE	VALVE STROKE (IN)	MAXIMUM DELTA P (PSI)		
		ST5112-34	ST5113-07	ST5114-17
2	3/4	750	—	—
2 1/2	7/8	600	—	—
3	1	600	750	—
4	1 1/4	—	750	—
6	2	—	350	500
8	2 3/4	—	—	300

DIGI ACTUATOR OPTIONS

Model	Prod. Ref. No.
Heater, 12 volt	E68717
Heater, 115 volt	E68718
Heater, 230 volt	E68719
Limit Switch Set	E68720
Field Bus	*

* Consult factory.

DIGI MOUNTING KITS

Actuator Code**	Model	Valve Size	Prod. Ref. No.
02	ST5112-34	1/2 to 1 1/2 2 to 4	U009005096 U009005097
03	ST5113-07	1/2 to 1 1/2 2 to 4	U009005096 U009005097
04	ST5114-17	1/2 to 1 1/2 2 to 4	U009005096 U009005097

** Use Actuator Code for ordering.

CARBON STEEL AND CHROME MOLY VALVE BODY ASSEMBLY

DIMENSIONS† inches (mm) AND WEIGHTS pounds (kg)

SIZE	A				B	C	WEIGHT	
	THD	150	300	600			THD	FLG
2 (50)	9 1/4 (235)	10 (254)	10 1/2 (267)	11 1/2 (286)	2 5/8 (67)	7 1/8 (181)	85 (39)	90 (41)
2 1/2 (65)	— —	10 7/8 (276)	11 1/2 (292)	12 1/4 (311)	3 1/4 (83)	6 3/4 (172)	— —	135 (61)
3 (80)	— —	11 3/4 (299)	12 1/2 (318)	13 1/4 (337)	3 5/8 (92)	6 7/8 (175)	— —	158 (72)
4 (100)	— —	13 7/8 (352)	14 1/2 (368)	15 1/2 (394)	4 1/8 (105)	8 1/8 (206)	— —	205 (93)
6 (160)	— —	17 3/4 (451)	18 5/8 (473)	20 (508)	5 1/2 (140)	9 3/4 (248)	— —	485 (220)
8 (200)	— —	21 3/8 (543)	22 3/8 (568)	24 (610)	7 1/4 (184)	12 1/4 (311)	— —	660 (299)

† Threaded Carbon Steel & Chrome Moly available in 2" only. Flanged (150, 300 & 600#) Carbon Steel & Chrome Moly available in 2" to 8".

CAST IRON VALVE BODY ASSEMBLY

DIMENSIONS† inches (mm) AND WEIGHTS pounds (kg)

SIZE	A			B	C	WEIGHT	
	THD	125	250			THD	FLG
2 (50)	9 1/4 (235)	10 (254)	10 1/2 (267)	3 3/4 (95)	7 1/8 (181)	85 (39)	90 (41)
2 1/2 (65)	— —	10 7/8 (276)	11 1/2 (292)	4 3/8 (111)	6 3/4 (172)	— —	135 (61)
3 (80)	— —	11 3/4 (299)	12 1/2 (318)	4 1/2 (114)	6 7/8 (175)	— —	158 (72)
4 (100)	— —	13 7/8 (352)	14 1/2 (368)	5 1/2 (140)	8 1/8 (206)	— —	205 (93)
6 (160)	— —	17 3/4 (451)	18 5/8 (473)	5 7/8 (149)	9 5/8 (245)	— —	485 (220)
8 (200)	— —	21 3/8 (543)	22 3/8 (568)	7 5/8 (194)	12 1/4 (311)	— —	660 (299)

† Threaded Cast Iron available in 2" only. Flanged (125 and 250#) Cast Iron available in 2" to 8".

BOSS SATURATED STEAM CAPACITY TABLE

(Modified Equal Percent Contour Plug) (Lb/Hr)

Pressure (PSI)		Valve Port and Trim											
		2		2-1/2		3		4		6		8	
P1	P2	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic
10	5	2022	1483	2800	2162	3888	2996	6377	4819	13531	10781	23641	17885
	0	2531	1840	3505	2683	4867	3718	7982	5979	16938	13376	29594	22191
15	10	2244	1648	3107	2403	4315	3330	7077	5355	15018	11980	26238	19876
	5	2876	2097	3982	3059	5531	4238	9071	6816	19248	15249	33629	25299
	0	3158	2283	4373	3330	6074	4614	9961	7421	21137	16603	36929	27544
20	15	2443	1795	3382	2618	4698	3628	7705	5835	16349	13054	28563	21656
	10	3181	2325	4405	3390	6118	4698	10034	7556	21291	16904	37198	28044
	0	3726	2682	5159	3912	7165	5420	11751	8717	24935	19502	43565	32355
30	25	2793	2055	3867	2997	5371	4152	8808	6678	18690	14940	32654	24786
	15	4253	3102	5889	4523	8179	6268	13414	10080	28464	22552	49730	37414
	0	4780	3427	6618	4998	9192	6926	15074	11139	31987	24919	55886	41342
40	25	4839	3539	6701	5161	9307	7151	15263	11501	32387	25729	56585	42685
	15	5572	4039	7715	5891	10716	8163	17574	13128	37291	29369	65152	48724
	3-0	5798	4157	8028	6063	11150	8401	18286	13512	38801	30228	67791	50148
50	35	5356	3923	7416	5721	10300	7928	16892	12750	35844	28524	62623	47322
	30	5909	4314	8181	6291	11363	8718	18635	14021	39543	31366	69087	52038
	25	6298	4582	8720	6682	12111	9259	19863	14891	42147	33313	73637	55267
	7-0	6808	4882	9426	7119	13092	9865	21471	15865	45560	35493	79600	58884
60	45	5824	4271	8063	6228	11199	8631	18367	13880	38973	31052	68091	51517
	40	6469	4732	8958	6900	12441	9562	20403	15378	43295	34403	75642	57076
	35	6948	5067	9620	7389	13361	10239	21912	16467	46496	36840	81235	61118
	11-0	7814	5603	10819	8171	15027	11323	24644	18210	52293	40738	91362	67586
75	55	7215	5287	9990	7710	13876	10684	22756	17182	48287	38440	84363	63773
	50	7809	5709	10812	8325	15017	11536	24628	18553	52259	41507	91303	68862
	45	8271	6032	11453	8797	15906	12190	26087	19605	55355	43859	96711	72763
	16-0	9304	6672	12883	9730	17893	13482	29345	21683	62268	48509	108790	80478
100	75	9045	6629	12523	9667	17393	13395	28525	21543	60529	48195	105752	79957
	60	10584	7714	14655	11249	20354	15588	33381	25070	70832	56086	123753	93048
	25-0	11757	8434	16279	12300	22609	17045	37079	27412	78680	61325	137463	101740
125	100	10110	7420	13998	10822	19442	14996	31885	24117	67659	53953	118209	89509
	75	12865	9372	17813	13668	24741	18939	40574	30459	86097	68143	150422	113051
	33-0	14194	10178	19653	14842	27295	20567	44765	33077	94988	74000	165956	122767
150	125	11056	8123	15309	11846	21262	16416	34870	26400	73992	59062	129273	97986
	100	14327	10463	19837	15258	27552	21143	45185	34004	95880	76073	167515	126207
	42-0	16601	11904	22987	17360	31926	24056	52358	38688	111102	86553	194109	143593
175	150	11918	8762	16501	12778	22918	17707	37586	28478	79756	63709	139344	105695
	125	15642	11443	21659	16687	30081	23124	49334	37189	104684	83199	182895	138029
	100	17674	12852	24472	18743	33988	25972	55741	41770	118280	93447	206650	155031
	51-0	18986	13621	26288	19863	36511	27525	59878	44267	127059	99034	221988	164299
200	150	16831	12328	23305	17978	32368	24913	53083	40066	112639	89634	196795	148705
	125	19228	14013	26624	20436	36977	28318	60642	45543	128680	101887	224821	169034
	59-0	21359	15315	29574	22335	41075	30950	67362	49775	142940	111356	249734	184742
225	175	17939	13152	24838	19179	34497	26577	56575	42743	120050	95623	209743	158641
	150	20666	15086	28614	22000	39741	30485	65176	49028	138300	109684	241628	181969
	67-0	23720	17009	32844	24804	45616	34372	74810	55278	158744	123667	277345	205167
250	200	18963	13913	26256	20290	36467	28116	59806	45218	126906	101160	221721	167827
	175	21990	16073	30447	23439	42288	32480	69352	52237	147162	116862	257111	193878
	150	23966	17442	33183	25437	46088	35248	75584	56688	160385	126820	280212	210398
	76-0	26058	18685	36080	27249	50111	37759	82182	60726	174387	135854	304676	225385

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

BOSS SATURATED STEAM CAPACITY TABLE

(Modified Equal Percent Contour Plug) (Kg/Hr)

Pressure (bar)		Valve Port and Trim											
		2		2-1/2		3		4		6		8	
P1	P2	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic
0.7	0.3	973	713	1348	1039	1872	1440	3069	2317	6513	5183	11379	8598
	0.2	1051	768	1456	1120	2022	1552	3316	2497	7036	5586	12293	9267
1	0.7	951	699	1317	1019	1830	1413	3001	2272	6367	5083	11124	8432
	0.5	1161	850	1608	1239	2233	1717	3662	2762	7770	6179	13575	10252
	0.3	1294	943	1792	1376	2489	1906	4082	3066	8662	6859	15133	11379
1.5	1	1326	973	1836	1418	2550	1966	4182	3161	8875	7072	15506	11732
	0.7	1564	1142	2166	1665	3008	2307	4933	3710	10468	8300	18288	13769
	0.5	1664	1210	2304	1765	3200	2445	5249	3933	11138	8798	19459	14596
2	1.5	1464	1075	2027	1568	2815	2173	4617	3494	9798	7817	17118	12968
	1.2	1749	1280	2422	1866	3364	2586	5517	4159	11707	9304	20454	15435
	1	1879	1371	2602	1999	3614	2770	5928	4455	12578	9967	21976	16536
3	2	2259	1653	3128	2411	4344	3341	7124	5374	15117	12022	26411	19944
	1.5	2566	1868	3552	2724	4934	3774	8092	6070	17170	13580	29999	22529
	.3-0	2798	2006	3874	2926	5380	4054	8823	6520	18723	14586	32711	24198
3.5	3.0	1817	1337	2516	1950	3494	2702	5731	4345	12161	9721	21246	16128
	2.0	2771	2021	3837	2948	5329	4085	8740	6569	18546	14696	32402	24381
	1.0	3092	2229	4282	3251	5947	4505	9752	7245	20694	16208	36155	26889
	.4-0	3123	2240	4325	3266	6006	4526	9850	7279	20902	16283	36518	27015
4	3.0	2564	1880	3550	2742	4930	3800	8085	6111	17157	13671	29975	22680
	2.0	3216	2338	4453	3410	6185	4725	10143	7599	21522	17001	37602	28205
	1.0	3437	2471	4759	3603	6610	4993	10840	8030	23002	17965	40188	29805
	.6-0	3449	2473	4775	3606	6632	4997	10877	8037	23081	17981	40325	29830
5	4.0	2836	2083	3927	3038	5455	4209	8946	6769	18983	15144	33165	25125
	3.0	3641	2655	5041	3872	7001	5366	11482	8629	24364	19306	42567	32029
	2.0	4005	2896	5545	4224	7701	5853	12630	9413	26800	21058	46823	34936
	.9-0	4102	2941	5680	4290	7889	5944	12937	9560	27452	21386	47963	35481
7	5.0	4366	3196	6045	4661	8396	6458	13770	10386	29220	23236	51050	38549
	3.0	5276	3816	7306	5565	10147	7711	16641	12402	35311	27745	61693	46030
	1.6-0	5404	3875	7483	5651	10393	7831	17044	12594	36167	28176	63189	46744
9	7.0	4976	3649	6890	5322	9569	7375	15693	11860	33300	26534	58180	44020
	5.0	6241	4537	8641	6617	12002	9169	19683	14746	41766	32990	72970	54732
	2.1-0	6690	4797	9264	6996	12866	9695	21101	15592	44775	34881	78227	57869
10	8.0	5230	3839	7242	5598	10059	7757	16496	12476	35004	27910	61156	46304
	5.0	7007	5080	9702	7409	13475	10266	22099	16510	46893	36937	81927	61279
	2.5-0	7300	5235	10108	7634	14039	10579	23024	17013	48857	38061	85359	63145
12	10.0	5736	4214	7943	6146	11032	8516	18092	13697	38390	30642	67072	50836
	7.0	7916	5759	10960	8399	15223	11639	24965	18718	52975	41875	92553	69472
	5.0	8455	6101	11708	8898	16261	12330	26667	19830	56587	44362	98864	73598
	3.2-0	8569	6145	11865	8961	16479	12417	27026	19970	57348	44676	100194	74119
14	10.0	8118	5938	11240	8659	15612	12000	25603	19298	54329	43174	94920	71626
	7.0	9476	6866	13121	10012	18223	13874	29886	22313	63416	49919	110796	82817
	3.8-0	9822	7043	13600	10271	18888	14232	30977	22889	65731	51207	114840	84954
15	12.0	7559	5546	10466	8088	14536	11208	23840	18026	50587	40326	88381	66902
	10.0	9073	6623	12563	9659	17448	13385	28615	21526	60719	48157	106083	79893
	4.2-0	10421	7472	14429	10897	20040	15100	32866	24285	69740	54330	121845	90135
17	15.0	6791	4997	9403	7287	13060	10098	21419	16240	45450	36332	79406	60276
	12.0	9773	7145	13532	10420	18795	14440	30824	23222	65407	51953	114274	86191
	10.0	10803	7859	14958	11460	20775	15881	34072	25540	72299	57139	126315	94794
	4.8-0	11661	8362	16146	12194	22426	16898	36778	27176	78041	60797	136348	100864

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

BOSS AIR CAPACITY TABLE

(Modified Equal Percent Contour Plug) (SCFH)

Pressure (PSI)		Valve Port and Trim											
		2		2-1/2		3		4		6		8	
P1	P2	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic
10	5	38908	28546	53872	41630	74823	57687	122709	92775	260383	207554	454921	344337
	0	49154	35773	68059	52169	94527	72291	155024	116262	328954	260099	574724	431511
15	10	43431	31902	60135	46524	83520	64470	136974	103683	290651	231957	507804	384823
	5	56067	40924	77631	59681	107822	82701	176827	133004	375219	297554	655555	493650
	0	62112	44987	86001	65606	119446	90911	195892	146208	415672	327093	726232	542656
20	15	47534	34945	65816	50962	91411	70618	149914	113572	318111	254080	555780	421526
	10	62271	45541	86221	66414	119751	92031	196392	148009	416734	331122	728087	549340
	0	74057	53434	102540	77925	142417	107982	233563	173661	495610	388511	865893	644550
30	25	54839	40359	75931	58856	105460	81558	172954	131165	367001	293440	641196	486825
	15	84296	61532	116718	89734	162108	124346	265857	199979	564136	447389	985618	742230
	0	96540	69304	133671	101068	185654	140051	304473	225237	646077	503896	1128778	835977
40	25	96492	70607	133604	102969	185562	142685	304321	229473	645754	513372	1128215	851697
	15	112097	81384	155212	118685	215572	164464	353538	264498	750190	591730	1310677	981695
	2-0	118211	84808	163677	123678	227330	171383	372821	275626	791107	616625	1382164	1022996
50	35	107378	78698	148678	114768	206497	159036	338655	255770	718609	572203	1255500	949299
	30	118861	86856	164576	126665	228578	175521	374868	282282	795452	631514	1389756	1047699
	25	127156	92616	176062	135066	244531	187162	401030	301004	850966	673399	1486745	1117186
	5-0	139823	100312	193601	146289	268891	202714	440981	326015	935740	729353	1634855	1210016
60	45	117295	86063	162409	125509	225568	173919	369931	279705	784976	625750	1371452	1038135
	40	130667	95638	180924	139473	251284	193269	412105	310825	874467	695370	1527804	1153638
	35	140754	102747	194890	149839	270680	207635	443916	333928	941968	747056	1645737	1239386
	8-0	161435	115816	223525	168899	310452	234046	509140	376403	1080371	842082	1887545	1397035
75	55	146686	107542	203103	156832	282088	217324	462624	349511	981666	781920	1715095	1297225
	50	159129	116421	220333	169781	306018	235268	501870	378369	1064943	846479	1860591	1404330
	45	168983	123354	233976	179892	324966	249279	532945	400902	1130883	896890	1975796	1487963
	12-0	193951	139073	268547	202814	372982	281043	611690	451986	1297977	1011174	2267730	1677564
100	75	185945	136350	257463	198843	357587	275540	586443	443136	1244403	991375	2174129	1644717
	60	218861	159670	303038	232852	420886	322666	690253	518926	1464683	1160932	2558987	1926016
	20-0	247881	177833	343220	259340	476694	359371	781778	577958	1658894	1292996	2898298	2145113
125	100	209464	153808	290028	224304	402816	310821	660619	499876	1401800	1118313	2449122	1855310
	75	268632	195905	371952	285694	516601	395891	847225	636690	1797770	1424390	3140932	2363099
	27-0	302061	216594	418239	315866	580887	437700	952655	703930	2021487	1574817	3531793	2612662
150	125	230652	169523	319364	247221	443561	342578	727440	550950	1543593	1232575	2696851	2044873
	100	300776	219837	416459	320595	578416	444254	948602	714470	2012888	1598397	3516769	2651782
	35-0	355938	255354	492837	372392	684496	516028	1122573	829901	2382045	1856638	4161734	3080210
175	150	250081	183926	346266	268225	480924	371683	788716	597758	1673617	1337292	2924021	2218602
	125	329987	241563	456905	352279	634590	488158	1040728	785079	2208373	1756363	3858307	2913852
	100	375147	273137	519434	398325	721436	551965	1183155	887696	2510597	1985936	4386331	3294719
	42-0	410172	294115	567930	428917	788792	594357	1293619	955873	2744997	2138459	4795857	3547759
200	150	356925	261583	494204	381475	686394	528616	1125687	850145	2388652	1901926	4173277	3155344
	125	409880	299020	567526	436071	788231	604270	1292699	971816	2743043	2174127	4792443	3606932
	50-0	463995	332875	642454	485443	892297	672685	1463368	1081845	3105195	2420280	5425168	4015308
225	175	382039	280236	528978	408677	734691	566310	1204894	910766	2556726	2037548	4466923	3380344
	150	442100	323009	612138	471055	850192	652748	1394314	1049780	2958667	2348547	5169165	3896300
	57-0	518283	371636	717622	541969	996697	751014	1634584	1207816	3468507	2702102	6059920	4482856
250	200	405650	297762	561669	434237	780096	601728	1279358	967728	2714734	2164981	4742984	3591760
	175	472265	345453	653905	503786	908202	698103	1489451	1122722	3160543	2511731	5521868	4167027
	150	516974	376690	715810	549339	994180	761227	1630456	1224242	3459748	2738849	6044616	4543821
	65-0	572051	410396	792071	598495	1100099	829342	1804162	1333788	3828344	2983923	6688601	4950405

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

BOSS AIR CAPACITY TABLE

(Modified Equal Percent Contour Plug) (M3/Hr.)

Pressure (bar)		Valve Port and Trim											
		2		2-1/2		3		4		6		8	
P1	P2	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic
0.7	0.3	1171	847	1621	1235	2252	1712	3692	2753	7835	6158	13689	10216
	0.2	1268	915	1756	1335	2439	1850	3999	2975	8486	6655	14827	11040
1	0.7	1149	834	1591	1216	2209	1684	3623	2709	7688	6060	13432	10054
	0.5	1408	1018	1949	1484	2707	2057	4439	3307	9420	7399	16458	12276
	0.3	1576	1135	2182	1655	3031	2294	4971	3689	10548	8253	18429	13692
1.5	1	1615	1169	2236	1705	3105	2363	5092	3801	10806	8503	18879	14107
	0.7	1914	1380	2650	2013	3681	2789	6037	4485	12810	10035	22381	16648
	0.5	2045	1469	2831	2143	3932	2969	6448	4775	13683	10682	23905	17722
2	1.5	1799	1304	2490	1902	3459	2636	5673	4239	12037	9483	21030	15732
	1.2	2158	1559	2988	2274	4150	3151	6806	5067	14442	11337	25232	18808
	1	2325	1676	3220	2444	4472	3386	7334	5446	15563	12184	27190	20214
3	2	2809	2031	3890	2962	5402	4104	8859	6600	18799	14766	32845	24497
	1.5	3209	2308	4443	3366	6171	4665	10120	7502	21475	16783	37519	27844
	.2-0	3562	2522	4931	3678	6849	5097	11233	8197	23835	18338	41644	30423
3.5	3.0	2264	1645	3135	2398	4354	3323	7140	5345	15151	11958	26470	19838
	2.0	3484	2511	4825	3662	6701	5074	10990	8161	23319	18257	40742	30288
	1.0	3935	2806	5448	4092	7567	5670	12409	9119	26332	20400	46005	33844
	.3-0	4007	2836	5549	4136	7706	5732	12638	9218	26818	20622	46855	34213
4	3.0	3224	2335	4464	3405	6200	4719	10168	7589	21575	16977	37695	28166
	2.0	4081	2932	5650	4276	7848	5926	12870	9530	27310	21320	47714	35370
	1.0	4412	3138	6109	4577	8485	6342	13915	10199	29526	22818	51586	37855
	.5-0	4449	3150	6160	4594	8556	6367	14031	10239	29774	22906	52019	38002
5	4.0	3592	2605	4974	3799	6908	5264	11330	8466	24041	18940	42003	31421
	3.0	4644	3346	6430	4880	8930	6762	14645	10875	31076	24329	54294	40363
	2.0	5152	3684	7134	5373	9908	7446	16249	11975	34479	26789	60240	44444
	.8-0	5336	3779	7389	5511	10262	7636	16830	12281	35712	27475	62394	45582
7	5.0	5612	4057	7771	5917	10792	8199	17700	13186	37558	29500	65618	48941
	3.0	6866	4910	9507	7161	13204	9923	21655	15958	45951	35702	80282	59230
	1.4-0	7111	5036	9846	7343	13675	10176	22427	16365	47589	36613	83144	60741
9	7.0	6442	4666	8920	6805	12389	9429	20318	15165	43115	33926	75327	56284
	5.0	8153	5858	11289	8544	15680	11839	25714	19040	54565	42596	95332	70668
	2.0-0	8886	6292	12303	9176	17088	12716	28024	20450	59466	45750	103895	75900
10	8.0	6821	4943	9444	7209	13117	9990	21512	16066	45648	35942	79752	59629
	5.0	9254	6632	12813	9672	17795	13403	29184	21555	61927	48222	108195	80001
	2.3-0	9773	6921	13532	10093	18794	13985	30823	22492	65404	50319	114270	83480
12	10.0	7522	5457	10415	7958	14466	11027	23724	17735	50341	39675	87952	65823
	7.0	10485	7539	14518	10994	20163	15235	33068	24501	70169	54814	122594	90938
	5.0	11295	8061	15639	11756	21721	16290	35622	26199	75588	58611	132063	97237
	2.9-0	11548	8177	15989	11925	22207	16525	36420	26576	77281	59456	135020	98639
14	10.0	10764	7777	14905	11342	20701	15716	33949	25276	72039	56547	125861	93813
	7.0	12688	9089	17568	13254	24400	18367	40017	29538	84913	66082	148354	109631
	3.5-0	13323	9434	18447	13758	25621	19065	42019	30661	89162	68593	155777	113798
15	12.0	10043	7277	13906	10612	19313	14706	31674	23650	67211	52910	117426	87778
	10.0	12119	8740	16780	12746	23305	17662	38221	28405	81103	63547	141697	105427
	3.8-0	14211	10062	19676	14674	27328	20334	44819	32703	95103	73162	166157	121378
17	15.0	9044	6570	12523	9581	17392	13277	28524	21353	60526	47769	105746	79251
	12.0	13103	9462	18142	13799	25197	19122	41324	30753	87687	68800	153199	114141
	10.0	14559	10466	20158	15263	27998	21150	45916	34014	97431	76096	170225	126245
	4.4-0	15986	11319	22135	16507	30743	22874	50419	36787	106986	82299	186918	136537

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

BOSS WATER CAPACITY TABLE

(Modified Equal Percent Contour Plug) (G.P.M.)

Pressure (PSI)		Valve Port and Trim											
		2		2-1/2		3		4		6		8	
P1	P2	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic
10	5	145	72	201	89	280	141	458	230	973	485	1699	680
	3	206	101	285	126	395	199	648	326	1376	686	2403	961
15	10	145	72	201	89	280	141	458	230	973	485	1699	680
	5	206	101	285	126	395	199	648	326	1376	686	2403	961
	0	252	124	349	155	484	244	794	399	1685	840	2943	1177
20	15	145	72	201	89	280	141	458	230	973	485	1699	680
	10	206	101	285	126	395	199	648	326	1376	686	2403	961
	0	291	143	402	179	559	282	917	461	1945	970	3399	1360
30	25	145	72	201	89	280	141	458	230	973	485	1699	680
	10	291	143	402	179	559	282	917	461	1945	970	3399	1360
	0	346	175	480	219	666	345	1093	564	2319	1189	4051	1665
40	25	252	124	349	155	484	244	794	399	1685	840	2943	1177
	10	356	175	493	219	685	345	1123	564	2383	1189	4163	1665
	0	384	202	531	253	738	398	1210	651	2567	1372	4484	1923
50	40	206	101	285	126	395	199	648	326	1376	686	2403	961
	30	291	143	402	179	559	282	917	461	1945	970	3399	1360
	25	325	160	450	200	625	315	1025	515	2175	1085	3800	1520
	0	417	226	578	283	802	445	1316	728	2793	1534	4879	2150
60	45	252	124	349	155	484	244	794	399	1685	840	2943	1177
	40	291	143	402	179	559	282	917	461	1945	970	3399	1360
	25	385	189	532	237	740	373	1213	609	2573	1284	4496	1798
	0	449	248	621	310	863	488	1415	798	3002	1681	5244	2355
75	55	291	143	402	179	559	282	917	461	1945	970	3399	1360
	50	325	160	450	200	625	315	1025	515	2175	1085	3800	1520
	25	460	226	636	283	884	445	1450	728	3076	1534	5374	2150
	0	492	277	681	346	946	546	1551	892	3290	1879	5749	2633
100	75	325	160	450	200	625	315	1025	515	2175	1085	3800	1520
	50	460	226	636	283	884	445	1450	728	3076	1534	5374	2150
	0	556	320	770	400	1070	630	1754	1030	3722	2170	6503	3040
125	100	325	160	450	200	625	315	1025	515	2175	1085	3800	1520
	50	563	277	779	346	1083	546	1775	892	3767	1879	6582	2633
	0	614	355	850	444	1181	699	1936	1143	4109	2408	7179	3374
150	100	460	226	636	283	884	445	1450	728	3076	1534	5374	2150
	50	650	320	900	400	1250	630	2050	1030	4350	2170	7600	3040
	0	667	386	923	482	1282	759	2103	1241	4462	2615	7796	3664
175	150	325	160	450	200	625	315	1025	515	2175	1085	3800	1520
	100	563	277	779	346	1083	546	1775	892	3767	1879	6582	2633
	50	716	358	991	447	1376	704	2257	1152	4789	2426	8367	3399
	0	716	414	991	517	1376	815	2257	1332	4789	2807	8367	3933
200	150	460	226	636	283	884	445	1450	728	3076	1534	5374	2150
	50	761	392	1054	490	1464	772	2401	1261	5096	2658	8903	3723
	0	761	440	1054	551	1464	867	2401	1418	5096	2987	8903	4184
225	150	563	277	779	346	1083	546	1775	892	3767	1879	6582	2633
	50	805	423	1114	529	1547	833	2537	1363	5384	2871	9407	4022
	0	805	465	1114	582	1547	916	2537	1498	5384	3156	9407	4421
250	200	460	226	636	283	884	445	1450	728	3076	1534	5374	2150
	150	650	320	900	400	1250	630	2050	1030	4350	2170	7600	3040
	50	846	453	1171	566	1626	891	2667	1457	5659	3069	9886	4299
	0	846	489	1171	611	1626	963	2667	1574	5659	3317	9886	4647
300	250	460	226	636	283	884	445	1450	728	3076	1534	5374	2150
	100	919	453	1273	566	1768	891	2899	1457	6152	3069	10748	4299
	0	922	533	1277	667	1773	1050	2908	1717	6171	3617	10781	5067
400	350	460	226	636	283	884	445	1450	728	3076	1534	5374	2150
	150	1028	506	1423	632	1976	996	3241	1629	6878	3431	12017	4807
	0	1059	612	1466	765	2036	1206	3339	1971	7084	4152	12377	5817

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

BOSS WATER CAPACITY TABLE

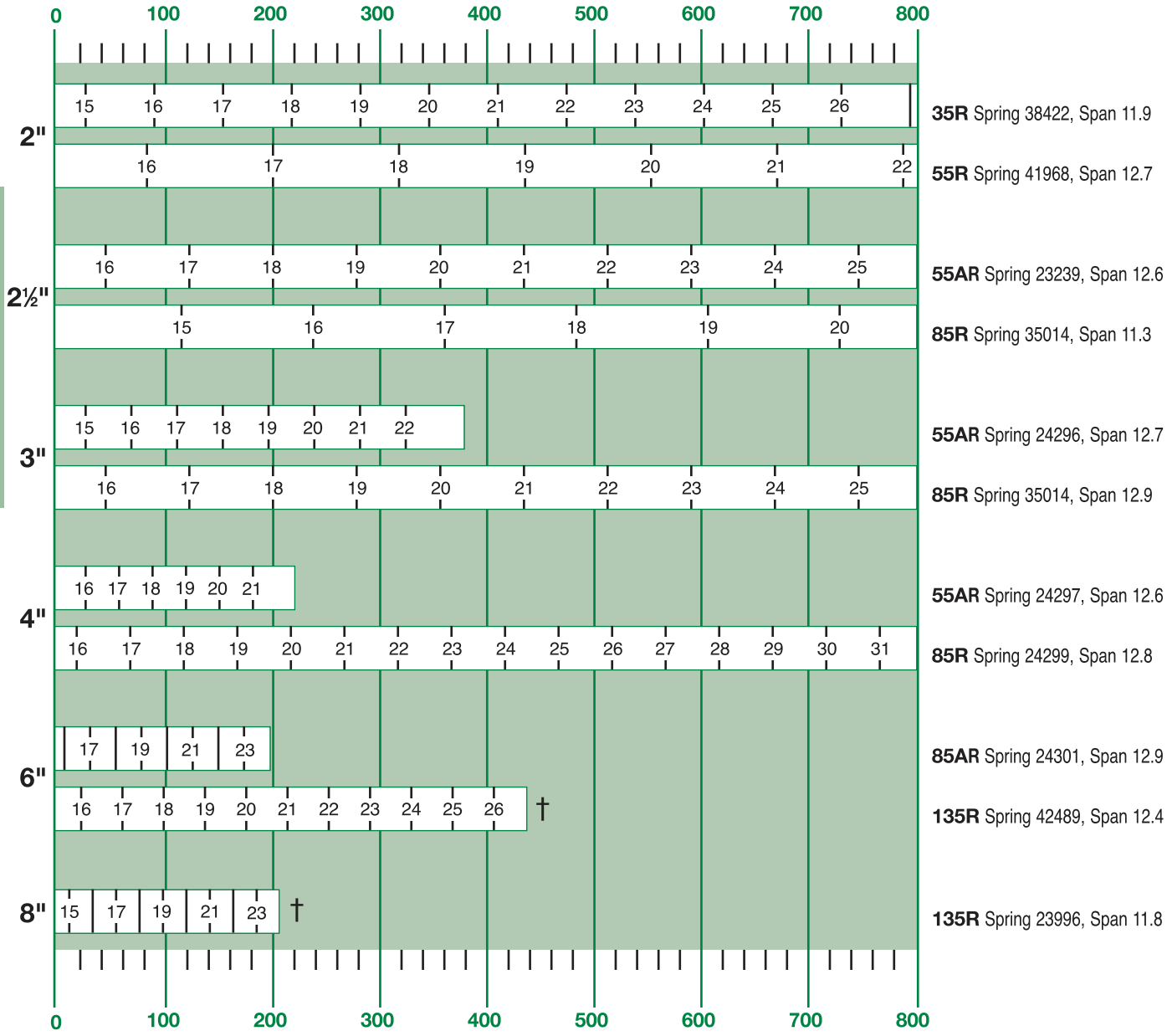
(Modified Equal Percent Contour Plug) (M3/Hr.)

Pressure (bar)		Valve Port and Trim											
		2		2½		3		4		6		8	
P1	P2	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic	Full	Sonic
0.7	0.5	25	12	35	15	48	24	79	40	168	84	294	118
	0	59	34	81	42	113	67	185	109	392	230	684	322
	0.7	31	15	43	19	59	30	97	49	206	103	360	144
1	0.5	63	20	88	24	122	39	200	63	425	133	742	186
	0	63	37	88	46	122	72	200	118	425	249	742	349
	1	40	20	55	24	76	39	125	63	266	133	465	186
1.5	0.7	71	25	98	31	137	49	224	80	475	168	830	235
	0	71	41	98	51	137	81	224	132	475	279	830	390
	1.5	40	20	55	24	76	39	125	63	266	133	465	186
2	1	56	28	78	35	108	54	177	89	376	188	657	263
	0	78	45	108	56	150	89	245	145	521	305	910	428
	2	56	28	78	35	108	54	177	89	376	188	657	263
3	1	90	39	124	49	173	77	283	126	601	265	1051	372
	0	90	52	124	65	173	102	283	167	601	352	1051	494
	3	40	20	55	24	76	39	125	63	266	133	465	186
3.5	2	69	34	95	42	132	67	217	109	461	230	805	322
	1	95	44	132	55	183	86	301	141	638	297	1114	416
	0	95	55	132	69	183	109	301	177	638	374	1114	524
	3	56	28	78	35	108	54	177	89	376	188	657	263
4	2	79	39	110	49	153	77	251	126	532	265	929	372
	1	100	48	139	60	193	94	317	154	672	325	1175	455
	0	100	58	139	73	193	114	317	187	672	394	1175	552
	4	56	28	78	35	108	54	177	89	376	188	657	263
5	3	79	39	110	49	153	77	251	126	532	265	929	372
	2	97	48	135	60	187	94	307	154	652	325	1138	455
	0	110	64	152	80	212	125	347	205	737	432	1287	605
	5	56	28	78	35	108	54	177	89	376	188	657	263
6	4	79	39	110	49	153	77	251	126	532	265	929	372
	0	119	69	165	86	229	135	375	221	796	466	1390	653
	6	79	39	110	49	153	77	251	126	532	265	929	372
8	5	97	48	135	60	187	94	307	154	652	325	1138	455
	0	135	78	187	98	259	154	425	251	902	529	1577	741
	8	79	39	110	49	153	77	251	126	532	265	929	372
10	5	126	62	174	77	242	122	396	199	841	420	1470	588
	0	149	86	206	108	287	170	470	278	998	585	1743	819
	10	79	39	110	49	153	77	251	126	532	265	929	372
12	8	112	55	156	69	216	109	355	178	752	375	1314	526
	5	149	73	206	92	286	144	469	236	995	496	1739	696
	0	162	94	224	117	312	185	511	302	1085	636	1895	891
	10	112	55	156	69	216	109	355	178	752	375	1314	526
14	5	174	83	241	104	335	163	549	267	1165	563	2036	789
	0	174	101	241	126	335	198	549	324	1165	683	2036	957
	10	126	62	174	77	242	122	396	199	841	420	1470	588
15	5	180	88	249	109	346	172	567	282	1204	593	2103	831
	0	180	104	249	130	346	205	567	335	1204	705	2103	988
	14	97	48	135	60	187	94	307	154	652	325	1138	455
17	10	149	73	206	92	286	144	469	236	995	496	1739	696
	5	191	96	264	120	367	189	602	309	1277	650	2230	911
	0	191	110	264	138	367	217	602	355	1277	748	2230	1048
	15	126	62	174	77	242	122	396	199	841	420	1470	588
20	10	178	88	246	109	342	172	561	282	1190	593	2078	831
	0	206	119	285	149	396	235	650	384	1379	808	2409	1132
	20	149	73	206	92	286	144	469	236	995	496	1739	696
27	10	232	114	321	143	446	225	731	367	1551	774	2710	1084
	0	238	138	329	172	458	271	750	443	1592	933	2782	1307

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

BOSS SHUTOFF TABLE - REVERSE ACTING

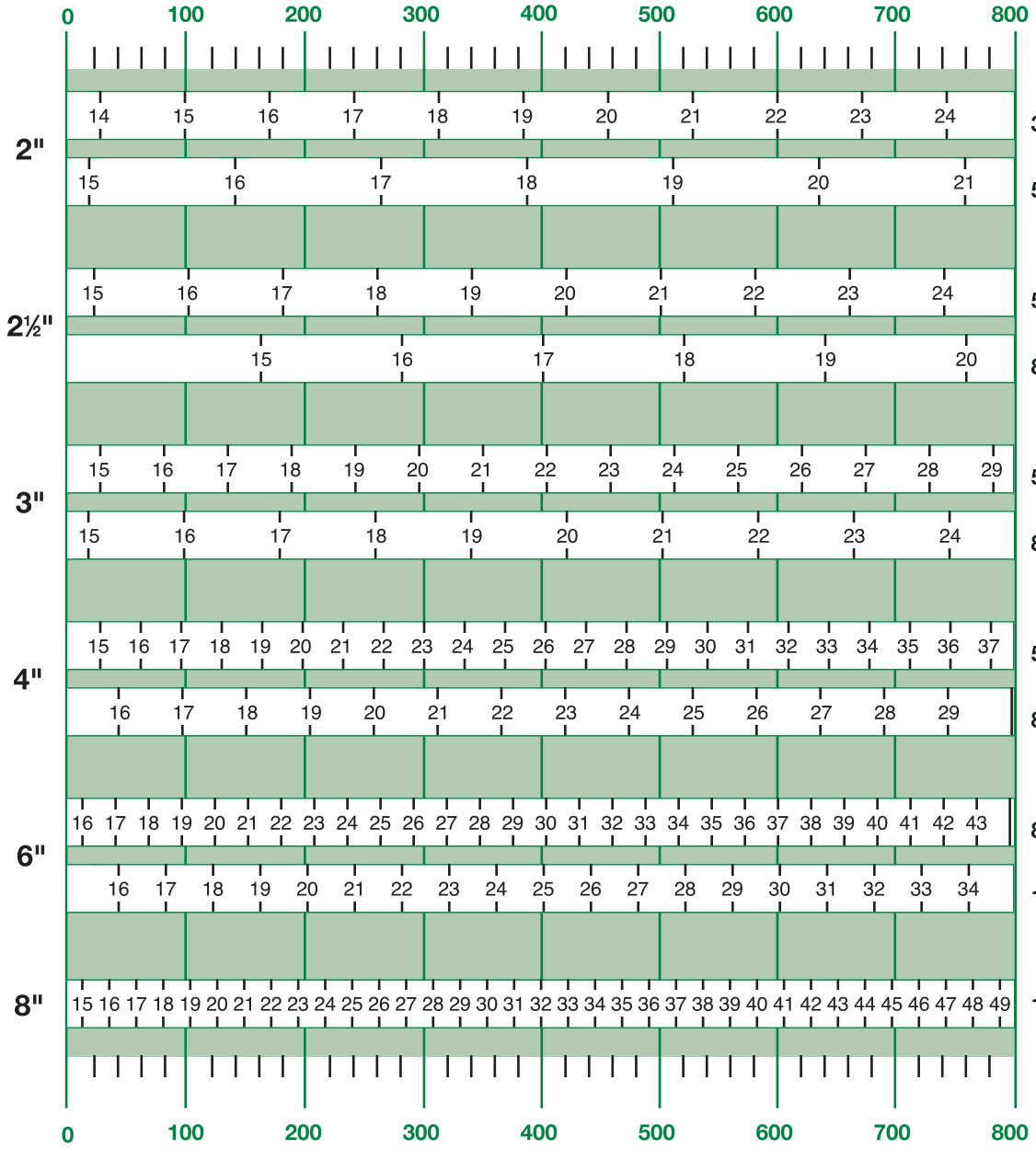
ACTUATOR SHUTOFF TABLE



† For shutoff pressure above this value, consult factory. Max air supply to actuator is 60psi

BOSS SHUTOFF TABLE - DIRECT ACTING

ACTUATOR SHUTOFF TABLE



35 Spring 38422, Span 10.8

55 Spring 41968, Span 12.7

55A Spring 23239, Span 12.0

85 Spring 35014, Span 10.9

55A Spring 24296, Span 12.0

85 Spring 35014, Span 12.4

55A Spring 24297, Span 12.0

85 Spring 24299, Span 12.4

85A Spring 24301, Span 12.4

135 Spring 42489, Span 12.0

135 Spring 23996, Span 11.6

BOSS SERIES D CONTROL VALVE

HUNG CAGE DESIGN

Unlike competitor's valves (which use the cage to compress the seat ring into the body), Spence's cage is suspended in the body from a machined shoulder. This eliminates bonnet gasket leakage, cage deformation, sticking plugs, seat gasket and body washout which can occur with cage retained seat designs. The Spence hung cage design utilizes a 17-4 Ph stainless steel Belleville load ring to maintain a constant seat gasket load, even in temperature cycling service.

The Spence Boss D Series Control Valves are specifically designed for high pressure drop service. Pressure drop, high velocities and throttling occur between the cage window and the plug, thereby protecting the seat ring and tight shutoff capability of the valve. An optional "protected seat" seat ring provides outstanding wear and shutoff performance.

STANDARD CAGE

The full ported, standard cage, provides maximum flow with minimum pressure drop. The inherent modified linear flow characteristic provides excellent low flow control, high rangeability and maximum flows per given body size.

40% REDUCED TRIM CAGE

This optional cage reduces the maximum Cv and flow to 40% of the normal, full port valve. Used to provide body velocity control, future flow expandability, or to correct for oversized valve conditions.

ANTI-CAVITATION CAGE

The Seco-Cav cage eliminates the effects of valve cavitation providing a normal valve/trim life expectancy in cavitating conditions. Diametrically opposed holes, increase the valves cavitation index (Kc) and direct impinging flows to the center of the cage, preventing mechanical trim/body damage.

NOISE REDUCING CAGE

The Seco-Sonic cage is designed to reduce valve generated noise up to 10dBA in steam, gas or any compressible fluid service. When used in conjunction with a Seco-Sonic silencing orifice, noise attenuations of 15-20dBA can be achieved.

TRIM MATERIAL SELECTION

Balanced Plug design allows line pressure under the plug to build up above the plug, effectively cancelling out any unbalanced stem force due to pressure. In addition to providing smooth, high pressure control, balanced plugs allow use of small, light, cost effective actuators. Class III, IV or VI shutoff can be provided.

The piston seal is critical to maintaining tight shutoff in any cage valve. The Boss's heavy cupwasher style PTFE plug seal has three times the cross sectional area and wear surface of competitive valves and provides tight shutoff for longer than competitor's designs at both low and high pressures.

Table 1	Maximum Service Temp.	Plug	Seat Ring	Gaskets	ANSI/ISA 70-2 Shut-off
Standard Balanced Trim	500˚F (260˚C)	AISI 410 St. St. w/PTFE Seal	AISI Type 400 St. St.*	Filled Type 304 St. St	IV
Stellite Balanced Trim	500˚F (260˚C)	AISI 410 St. St. w/PTFE Seal	AISI Type 400 St. St. Stellited	Filled Type 304 St. St	IV
High Temp. Trim	800˚F (426˚C)	AISI 410 St. St. w/ Ni-Resist Seal	AISI Type 400 St. St. Stellited	Inconel Graphite	III
Soft-Seated Trim	500˚F (260˚C)	AISI 410 St. St. w/PTFE Seal	AISI Type 400 St. St. w/PTFE Insert	Filled Type 304 St. St	VI

* Stellite seat optional.

STANDARD & STELLITE BALANCED PLUG

Balanced plug design eliminates large stem forces allowing the use of small, cost-effective actuators. Provides smooth throttling control even at pressures to 1000 psi. Standard PTFE piston seal provides ANSI Class IV tight shut-off to temperatures of 500˚F.

HIGH-TEMP BALANCED PLUG

Balanced plug with high-temp ni-resist or carbon piston seal provides ANSI Class II shut-off at temperatures up to 800˚F.

SOFT SEATED TRIM

Balanced plug with PTFE piston seal and an optional seat design with PTFE insert provide ANSI Class VI bubble tight shut-off at temperatures up to 460˚F.

Linear Valve Specification Form

SPENCE

CONTROL VALVE SPEC SHEET

Project/Job _____

Unit/Customer _____

P.O./LCO File # _____

Item _____

Contract _____

MFR Serial# _____

Data Sheet____of____

Spec _____

Tag _____

Dwg _____

Service _____

Fluid ☐ Steam ☐ Water ☐ Gas_____ ☐ Liquid_____ Crit Pres PC

Service Conditions

Flow ☐ #/hr ☐ gpm ☐ scfh ☐ _____

Inlet Pressure ☐ psig ☐ psia ☐ _____

Outlet Pressure ☐ psig ☐ psia ☐ _____

Temperature ☐ °C ☐ °F ☐ _____

Max Press/Temperature:_____ /_____

Density/MW/SG

Viscosity

Vapor Pressure ☐ psia ☐ _____

Required C_V _____

Noise (dBA) Allowable_____

Max. Flow	Norm. Flow	Min. Flow	Shut-off Pressure

Line Info Pipe Size In_____/Sch_____ Pipe Size Out_____/Sch_____

Valve, Body & Bonnet

Body Size in. ☐ ½ ☐ ¾ ☐ 1 ☐ 1¼ ☐ 1½ ☐ 2 ☐ 2½ ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 10 ☐12 ☐ 16

ANSI Class ☐ 125 ☐ 150 ☐ 250 ☐ 300 ☐600 ☐ 900 ☐ 1500 ☐ 2500 ☐ 4500 ☐ Other_____

Body/Bonnet Material: ☐ Cast Iron ☐ Cast Steel ☐ Cr Mo ☐316SS ☐ Bronze ☐ Hast C ☐ Titanium ☐ Alloy 20 ☐ Other_____

End Conn. Inlet/Outlet: ☐ NPT ☐SWE ☐ BWE Sch._____ ☐ Sep. Flanges ☐ Int. Flanges ☐ Other_____

Packing Material: ☐ PTFE ☐ BTG ☐ Laminated Graphite ☐ Kalrez ☐ Other

Trim Size ☐ 100% ☐ 60% ☐ 40% ☐ 20% ☐ Other_____

Actuator

Spring Action: ☐ Air to Open ☐ Air to Close ☐ Last Position ☐ None

Available Air Supply Pressure: ☐ Max._____ ☐ Min._____

Manual Override: ☐ Yes ☐ No ☐ Type_____

Solenoid ☐ Yes ☐ No ☐ Type_____ ☐ Voltage_____

Positioner ☐ Yes ☐ No ☐ Type_____ ☐ Pneu ☐ I/P

Switch ☐ Yes ☐ No ☐ Type_____

Air Set ☐ Yes ☐ No ☐ Type:_____ ☐ Range:_____

Other Accessories ☐ Yes ☐ No ☐ Type_____

Test ANSI/FCI Leakage Class: ☐ II ☐ III ☐ IV ☐ V ☐ VI ☐ Leslie VIII

Linear Valve Specification Form

SPENCE

CONTROL VALVE SPEC SHEET

Project/Job _____

Unit/Customer _____

P.O./LCO File # _____

Item _____

Contract _____

MFR Serial# _____

Data Sheet ____of____

Spec _____

Tag _____

Dwg _____

Service _____

Fluid ☐ Steam ☐ Water ☐ Gas_____ ☐ Liquid_____ Crit Pres PC

Service Conditions

Flow ☐ #/hr ☐ gpm ☐ scfh ☐ _____

Inlet Pressure ☐ psig ☐ psia ☐ _____

Outlet Pressure ☐ psig ☐ psia ☐ _____

Temperature ☐ °C ☐ °F ☐ _____

Max Press/Temperature:_____ /_____

Density/MW/SG

Viscosity

Vapor Pressure ☐ psia ☐ _____

Required C_V _____

Noise (dBA) Allowable_____

Max. Flow	Norm. Flow	Min. Flow	Shut-off Pressure

Line Info Pipe Size In_____/Sch_____ Pipe Size Out_____/Sch_____

Valve, Body & Bonnet

Body Size in. ☐ ½ ☐ ¾ ☐ 1 ☐ 1¼ ☐ 1½ ☐ 2 ☐ 2½ ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 10 ☐ 12 ☐ 16

ANSI Class ☐ 125 ☐ 150 ☐ 250 ☐ 300 ☐ 600 ☐ 900 ☐ 1500 ☐ 2500 ☐ 4500 ☐ Other_____

Body/Bonnet Material: ☐ Cast Iron ☐ Cast Steel ☐ Cr Mo ☐ 316SS ☐ Bronze ☐ Hast C ☐ Titanium ☐ Alloy 20 ☐ Other_____

End Conn. Inlet/Outlet: ☐ NPT ☐ SWE ☐ BWE Sch._____ ☐ Sep. Flanges ☐ Int. Flanges ☐ Other_____

Packing Material: ☐ PTFE ☐ BTG ☐ Laminated Graphite ☐ Kalrez ☐ Other

Trim Size ☐ 100% ☐ 60% ☐ 40% ☐ 20% ☐ Other_____

Actuator

Spring Action: ☐ Air to Open ☐ Air to Close ☐ Last Position ☐ None

Available Air Supply Pressure: ☐ Max._____ ☐ Min._____

Manual Override: ☐ Yes ☐ No ☐ Type_____

Solenoid ☐ Yes ☐ No ☐ Type_____ ☐ Voltage_____

Positioner ☐ Yes ☐ No ☐ Type_____ ☐ Pneu ☐ I/P

Switch ☐ Yes ☐ No ☐ Type_____

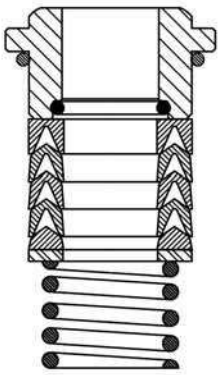
Air Set ☐ Yes ☐ No ☐ Type:_____ ☐ Range:_____

Other Accessories ☐ Yes ☐ No ☐ Type_____

Test ANSI/FCI Leakage Class: ☐ II ☐ III ☐ IV ☐ V ☐ VI ☐ Leslie VIII

Control Valve Options & Accessories

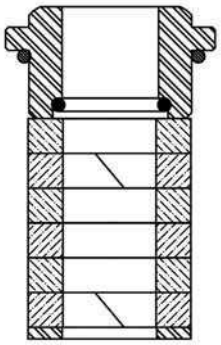
PACKING CONFIGURATIONS



LIVE-LOADED PTFE - V-RING (STANDARD)

Live-loaded PTFE V-ring packing provides the most maintenance free stem seal. The V-ring packing is both pressure energized and live-loaded by a 304 stainless steel spring to automatically compensate for packing wear. Maximum service temperature is 460˚F (238˚C). V-rings can be inverted for vacuum service.

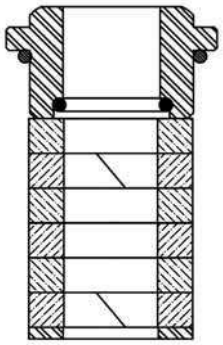
Available on Kombat, Intimidator and Boss.



PTFE/GRAPHITE (OPTIONAL)

Split rings allow packing replacement without removal of actuator. Graphite impregnated PTFE provides 500˚F (260˚C) service temperature, better memory and sealing than pure PTFE rings, lowered stem hysteresis, and is ideal for fluids that contain suspended particles.

Available on Intimidator and Boss.



HIGH TEMPERATURE LAMINATED GRAPHITE (OPTIONAL)

Split rings allow packing replacement without removal of actuator. Precision die-cut laminated graphite rings provide a reliable, tight stem seal to operating temperatures of 800+˚F (426˚C).

Available on Intimidator and Boss.

ACTUATORS

KOMBAT K1, K4 AND INTIMIDATOR

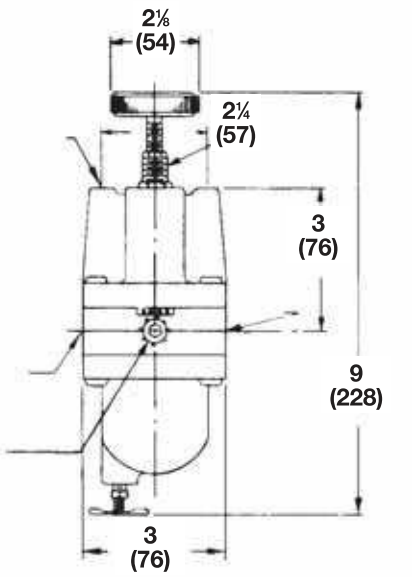
- Pneumatic Actuated
- 36 and 60 sq. in.
- High Thrust Multiple Spring
- Epoxy Coated
- Stainless Steel Internals
- Fixed 3-15 pound Springs
- Cast Iron Yoke

KOMBAT K5, K6

- Electric Actuated
- Accepts 0-10vDC, 4-20mA or 0-135 ohm signal
- Spring Return to Fail Safe Position
- Manual Override
- NEMA 1 Enclosure
- Powder Coated Die Cast Aluminum Housing

BOSS

- 35, 55 and 85 sq. in.
- High Thrust
- Four Bolt Yoke Mounting
- Cast Iron Yoke
- External Access for Spring Preload Adjustment
- Rolling Boot Seal on Stem for Increased Accuracy & Long Service Life (Reverse only)



MODEL 65A AIR FILTER REGULATOR

Application Data

- Provides Remote Control of E8, A Series Pilots, Positioners, EPC-1.
- To Upgrade Plant Air to Instrument Quality Air

MODEL 65A
AIR FILTER REGULATOR

- **Converts Plant Air to Instrument Quality**
- **Delivers 0 to 50 PSIG**

Specification

Air Filter Regulator shall provide remote control for air actuated regulators and control valves. It shall convert plant air to instrument quality air and provide 0 to 50 psi delivery pressure. The Regulator shall have a flow capacity of 22 scfm.

Options *See page 43*

- **MODEL A AIR ADJUSTMENT PANEL** includes an air adjusting valve incorporating its own bleed and two gages; one for the supply air, the other to indicate the adjusting air. It comes complete and ready to be mounted directly on a control board or box.
- **MODEL B AIR ADJUSTMENT PANEL** is the same as the Model A with the exception that it has, in addition, a gage indicating the delivery pressure.

ELECTRO-PNEUMATIC (I/P) TRANSDUCER

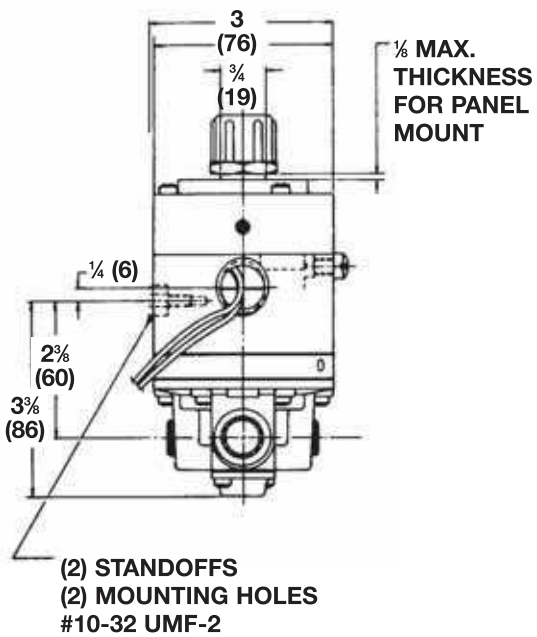
- **Converts Current Signal to Pneumatic Signal**
- **Handles up to 150 PSIG Supply Air**
- **Accommodates 4-20 mA and 10-50 mA Input Signals**

Specification

Electro-pneumatic Transducer shall convert 4-20 mA or 10-50 mA input signals to a proportional 3-15 PSIG pneumatic output. Output capacity shall be a minimum of 17 SCFM with a 20 PSIG supply or 47 SCFM with a 120 PSIG supply.

Materials of Construction

Housing	Aluminum
Orifice	Sapphire
Nozzle	Bronze
PC Board	Fiberglass
Cover	Aluminum



ELECTRO-PNEUMATIC TRANSDUCER

Application Data

- Simple way to control pneumatic valves with current signal

RTD RESISTANCE PROBE THERMOMETER

- **304 SS closed end probe measures temperature**
- **Varies electrical resistance in proportion to temperature changes**
- **Communicates change in resistance to automated systems**

Options

- 304 SST Thermowell

Specification

The RTD shall have a 304 stainless steel closed end probe with a 1/2 inch NPT male with hex fitting process connection. The RTD shall change resistance in proportion to a change in temperature and be capable of connecting to a device (such as a signal conditioning card) which can convert that resistance change to a standard 4-20 mA signal.

Materials of Construction

Connector Head:.....NB 1 Cast Iron
Probe: .....304 SS Closed End
Process Connection: .....1/2" NPT Male w/Hex fitting
Electrical Connection:.....1/2" NPT Female
Sheath Length .....5½" or 11½"
Sheath Diameter .....¼"

RTD RESISTANCE PROBE THERMOMETER

Application Data

- Building control systems
- Process control systems
- Systems utilizing the EPC Electro-Pneumatic Controller

ELECTRONIC PRESSURE TRANSMITTER

ELECTRONIC PRESSURE TRANSMITTER

- **Solid state, calibrated transmitter measures pressure to ±0.5% accuracy**
- **Outputs 4-20 mA signal; 10-30 VDC unregulated; 100 ohms output impedance**
- **Integral metal diaphragm and polysilicon bridge are virtually unaffected by shock, vibration or mounting**
- **Available in ranges 0-30, 0-300 and 0-1000 psig, overpressure protected**
- **NEMA 4 compliant with cable or waterproof connector**
- **Operates in 40-200°F**
- **1/8 NPT male or female process connection**

Specification

The Electronic Pressure Transmitter shall have a 1/8 NPT male or female 316 stainless steel process connection. The Electronic Pressure Transmitter shall measure pressure to ±0.5% accuracy and output a standard 4-20 mA signal with 100 ohms output impedance. The Electronic Pressure Transmitter shall be shock and vibration resistant, overpressure protected, operate within 40-200°F and be NEMA 4 compliant.

Materials of Construction

Case: .....304 SS
Diaphragm: .....17-4 PH SS
Process Connection: .....316 SS

Application Data

- Building control systems
- Process control systems
- Systems utilizing the EPC Electro-Pneumatic Controller

ECKARDT PNEUMATIC POSITIONER W/GAUGES

ECKARDT POSITIONER

- **Pneumatic or Electro-Pneumatic**
- **Modular Design**
- **Boost Adjustable**
- **Separate Control for Zero Point and Range of Travel**

Options

- Gages

Models

P6981 Pneumatic Positioner

EP6986 Electro-pneumatic Positioner

Specification

The positioner shall be SIRA and WIB approved and shall be mounted directly onto the valve. Feedback, I/P Transducer and/or Limit Switch options shall be available.

Application Data

- Control of Intimidator Control Valve
- Split Range for Parallel Stations
- Fine Tune Control
- Where Required Air Pressure is Greater than Controller Output
- Where Change of Actuator Action is Desired (Reverse to Direct & vice versa)

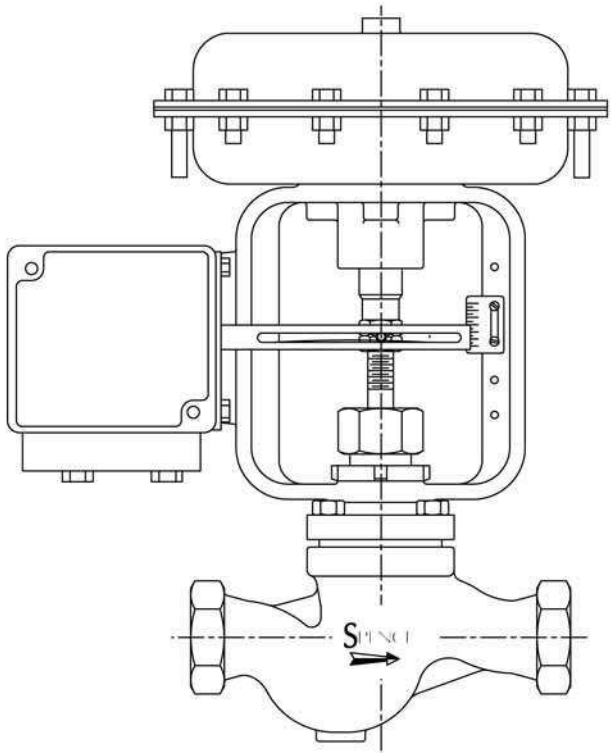
Ratings

Temperature Range	-40 to 176°F (-40 to 80°C)
Pneumatic Connections	1/4" NPT
Supply Pressure	60 psig
Air Consumption	0.11 to 0.21 scfm
Input Signal	3-15 psig, Split Range, 4-20mA*
Hysteresis	≤0.3%
Body Construction	Aluminum

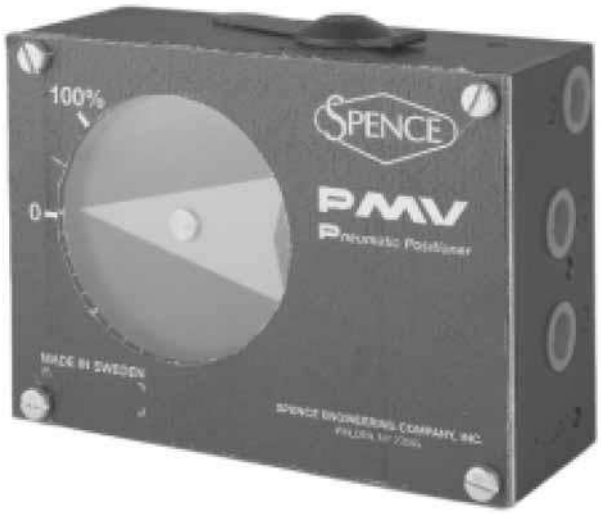
Applicable Codes

SIRA & WIB Approved

*Applies to EP6986 only



ECKARDT P6981 POSITIONER
ON INTIMIDATOR TYPE J CONTROL VALVE



PMV POSITIONER

- **Pneumatic or Electro-Pneumatic**
- **Compact, Rugged Design**
- **Easy to Calibrate**
- **Bright, Visible Indicator**
- **Low Air Consumption**
- **Mounts Compactly on Valve**
- **Stainless Steel Cam**
- **External Zero Adjustment**
- **Modular Design**

Application Data

- Control of Intimidator, Boss and Doctor Control Valves
- Split Range for Parallel Stations
- Fine Tune Control
- Where Required Air Pressure is Greater than Controller Output
- Where Change of Actuator Action is Desired (Reverse to Direct & vice versa)

Ratings

Temperature Range	-4 to 185°F (-20 to 85°C)
Supply Pressure	60 psig
Air Consumption	0.31 scfm (P4) 0.71 scfm (P5) 0.78 scfm (EP5)
Input Signal	3-15 psig, Split Range 4-20 mA
Linearity	±0.7% (P4) ≤0.5% (P5 & EP5)
Hysteresis	0.8% (P4) ≤0.75% (P5) ≤0.5% (EP5)
Body Construction	Aluminum

Applicable Codes

CENELEC, FM & CSA approved

Options

- Mechanical Limit Switch
- Proximity Limit Switch
- 4-20 mA Position Transmitter Feedback
- Potentiometer 1K Feedback
- Gauges

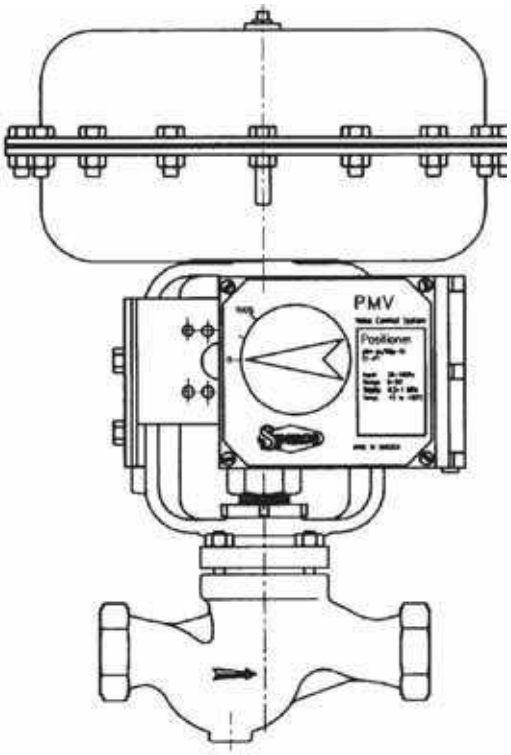
Models

P5 Pneumatic Positioner w/Gauges

EP5 Electro-pneumatic Positioner w/Gauges

Specification

The Positioner shall be modular and cam characterized with FM, CSA and CENELEC certifications and shall be mounted directly onto the valve. Feedback, I/P Transducer and/or Limit Switch options shall be available.



PMV POSITIONER
ON INTIMIDATOR TYPE J CONTROL VALVE

MOORE POSITIONER

- **Pneumatic or Electro-Pneumatic**
- **Modular Design**
- **Cam Characterized for Added Turndown**
- **Gauges Included**
- **Proportional Control**
- **Easy to Calibrate**
- **Non-Interacting Zero and Span**
- **Mounts compactly on Valve**
- **Provides Precise Control**

Options

- Mechanical Limit Switch
- Proximity Limit Switch
- 4-20 mA Position Transmitter Feedback
- Potentiometer 1K Feedback

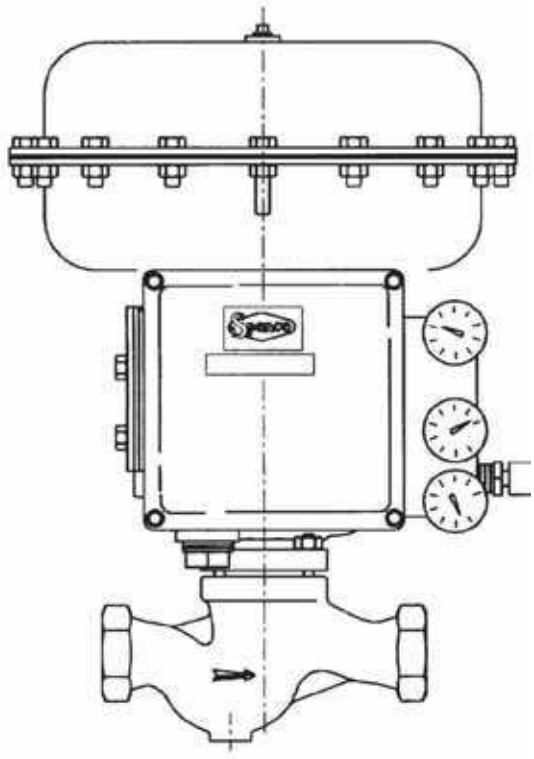
Models

760P Pneumatic Positioner

760EP Electro-pneumatic Positioner w/Integral I/P Transducer

Specification

The Positioner shall be modular and cam characterized with NEMA 4X, FM, CSA, CENELEC and Sirs certifications and shall be mounted directly onto the valve. Feedback, I/P Transducer and/or Limit Switch options shall be available. The Positioner shall include gages,have non-interacting zero and span and consume 0.5 to 0.6 scfm.



MOORE 760P POSITIONER ON INTIMIDATOR TYPE J CONTROL VALVE

MOORE 760P PNEUMATIC POSITIONER

Application Data

- Control of Intimidator, Boss & Doctor Control Valves
- Split Range for Parallel Stations
- Fine Tune Control
- Where Required Air Pressure is Greater than Controller Output
- Where Change of Actuator Action is Desired (Reverse to Direct & vice versa)

Ratings

Temperature Range	-40 to 185°F (-40 to 85°C)
Pneumatic Connections	1/4" NPT
Gauge Connections	1/8' NPT
Electrical Connections	3/4" NPT
Exhaust Connections	1/4" NPT
Action	Direct or Reverse
Supply Pressure	60 psig
Air Consumption, Typical	0.5 scfm
Input Signal	3-15 psig, Split Range, 4-20 mA*
Span	Adjustable, -60% to +25% of normal
Zero	Adjustable, -10% to +60% of normal
Linearity, Typical	0.5% of normal span 0.75% of normal span*
Hysteresis, Typical	0.75% of normal span 1.0% of normal span*
Deadband	≤0.25% of span

Applicable Codes

NEMA 4X, IP 65

FM, CSA, CENELEC, Sira Approved

*Applies to 760EP only

Linear Valve Specification Form

SPENCE

CONTROL VALVE SPEC SHEET

Project/Job _____

Unit/Customer _____

P.O./LCO File # _____

Item _____

Contract _____

MFR Serial# _____

Data Sheet ____of____

Spec _____

Tag _____

Dwg _____

Service _____

Fluid ☐ Steam ☐ Water ☐ Gas_____ ☐ Liquid_____ Crit Pres PC

Service Conditions

Flow ☐ #/hr ☐ gpm ☐ scfh ☐ _____

Inlet Pressure ☐ psig ☐ psia ☐ _____

Outlet Pressure ☐ psig ☐ psia ☐ _____

Temperature ☐ °C ☐ °F ☐ _____

Max Press/Temperature:_____ /_____

Density/MW/SG

Viscosity

Vapor Pressure ☐ psia ☐ _____

Required C_V _____

Noise (dBA) Allowable_____

Max. Flow	Norm. Flow	Min. Flow	Shut-off Pressure

Line Info Pipe Size In_____/Sch_____ Pipe Size Out_____/Sch_____

Valve, Body & Bonnet

Body Size in. ☐ ½ ☐ ¾ ☐ 1 ☐ 1¼ ☐ 1½ ☐ 2 ☐ 2½ ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 10 ☐ 12 ☐ 16

ANSI Class ☐ 125 ☐ 150 ☐ 250 ☐ 300 ☐ 600 ☐ 900 ☐ 1500 ☐ 2500 ☐ 4500 ☐ Other_____

Body/Bonnet Material: ☐ Cast Iron ☐ Cast Steel ☐ Cr Mo ☐ 316SS ☐ Bronze ☐ Hast C ☐ Titanium ☐ Alloy 20 ☐ Other_____

End Conn. Inlet/Outlet: ☐ NPT ☐ SWE ☐ BWE Sch._____ ☐ Sep. Flanges ☐ Int. Flanges ☐ Other_____

Packing Material: ☐ PTFE ☐ BTG ☐ Laminated Graphite ☐ Kalrez ☐ Other

Trim Size ☐ 100% ☐ 60% ☐ 40% ☐ 20% ☐ Other_____

Actuator

Spring Action: ☐ Air to Open ☐ Air to Close ☐ Last Position ☐ None

Available Air Supply Pressure: ☐ Max._____ ☐ Min._____

Manual Override: ☐ Yes ☐ No ☐ Type_____

Solenoid ☐ Yes ☐ No ☐ Type_____ ☐ Voltage_____

Positioner ☐ Yes ☐ No ☐ Type_____ ☐ Pneu ☐ I/P

Switch ☐ Yes ☐ No ☐ Type_____

Air Set ☐ Yes ☐ No ☐ Type:_____ ☐ Range:_____

Other Accessories ☐ Yes ☐ No ☐ Type_____

Test ANSI/FCI Leakage Class: ☐ II ☐ III ☐ IV ☐ V ☐ VI ☐ Leslie VIII

Control Valve Sizing

VALVE SIZING BY COMPUTATION

FORMULA KEY

C_V = Valve flow coefficient

D = Nominal pipe size, inches

d_P = Nominal valve size, inches

F_L = Pressure recovery factor, Liquid (See valve page)

F_P = Piping geometry factor, which is a capacity correction factor for a valve with reduced inlet and expanded outlet piping of the same size or a valve with expanded outlet piping only. (For Intimidator, see table on facing page.)

$$= \frac{1}{\sqrt{\frac{\sum k\, C_V^2}{890 d^4} + 1}}$$

F_R = Valve Reynolds Number factor
= 1 if $C_V > 0.1$ and viscosity <1000 cs.
(consult factory for other applications)

G = Specific gravity of liquid at flowing temperature

K = Specific heat ratio (see table)
$\frac{Cp}{Cv} = \frac{\text{Specific heat at constant pressure}}{\text{Specific heat at constant volume}}$

M = Molecular weight (see table)

P_1 = Initial fluid pressure psia
= [p_1 (psig) + 14.7]

P_2 = Reduced fluid pressure psia
= [p_2 (psig) + 14.7]

P_C = Critical pressure of liquid
(water = 3206 psia)

P_V = Vapor pressure of liquid at inlet temperature
(water @ 60°F = 0.2563 psia)

ΔP = Comparative fluid pressure factor
= $P_1 - P_2$

ΔP_C = Critical pressure drop (psi)

$$= P_1 - .96\, P_V + .28 \sqrt{\frac{P_V^3}{P_C}}$$

Q = Flow - SCFM or GPM

T_1 = Initial absolute temperature of gas
= [t_1 (°F) + 460]

W = Flow - lb/hr

X_T = Pressure recovery factor, Gas (See valve page)

Z = Compressibility factor (Typically = 1)

$\sum k$ = Valve/piping friction factor

$$1.5 \left(1 - \frac{d^2}{D^2}\right)^2$$

STEAM (MASS)

$$C_V = \frac{W}{19.3\, F_P\, P_1\, Y\, F_R} \sqrt{\frac{T_1\, Z}{XM}}$$

GAS (VOLUME)

$$C_V = \frac{Q}{7320\, F_P\, P_1\, Y\, F_R} \sqrt{\frac{T_1\, MZ}{X}}$$

SUBCRITICAL FLOW	CRITICAL FLOW
if $X < \frac{X_T\, K}{1.4}$	if $X \geq \frac{X_T\, K}{1.4}$
$X \quad \frac{\Delta P}{P_1} = \frac{P_1 - P_2}{P_1}$	$X \quad \frac{X_T\, K}{1.4}$
$Y \quad 1 - \frac{X}{2.14\, X_T\, K}$	$Y \quad .667$

LIQUID (VOLUME)

SUBCRITICAL FLOW

if $\Delta P < \Delta P_C\, F_L^2$

$$C_V = \frac{Q}{F_P\, F_R \sqrt{\frac{\Delta P}{G}}}$$

CRITICAL FLOW

if $\Delta P \geq \Delta P_C\, F_L^2$

$$C_V = \frac{Q}{F_L\, F_P\, F_R \sqrt{\frac{\Delta P_C}{G}}}$$

AVERAGE VALUE OF K & M TABLE

	K	M
Air	1.4	29
Nitrogen	1.404	28
Oxygen	1.401	32
Hydrogen	1.41	2
Carbon Dioxide	1.304	44
Steam	1.31	18.3

INTIMIDATOR PIPING GEOMETRY FACTORS

F_P
for Expanded Outlet Only

d/D	Valve Size	1/2		3/4			1				1-1/2			2		
	Port Size	1/4	5/8	1/4	5/8	7/8	1/4	5/8	7/8	1 1/4	7/8	1 1/4	1 3/4	1 1/4	1 3/4	2 1/4
1		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.9		1.0	1.03	1.0	1.01	1.04	1.0	1.0	1.02	1.06	1.0	1.01	1.04	1.0	1.02	1.05
.8		1.0	1.05	1.0	1.02	1.07	1.0	1.01	1.04	1.09	1.01	1.02	1.06	1.01	1.03	1.07
.7		1.0	1.05	1.0	1.02	1.07	1.0	1.01	1.04	1.1	1.01	1.02	1.06	1.01	1.03	1.08
.6		1.0	1.05	1.0	1.02	1.07	1.0	1.01	1.04	1.09	1.01	1.02	1.06	1.01	1.03	1.07
.5		1.0	1.04	1.0	1.02	1.05	1.0	1.0	1.03	1.07	1.01	1.02	1.05	1.01	1.02	1.06
.4		1.0	1.03	1.0	1.01	1.04	1.0	1.0	1.02	1.05	1.0	1.01	1.03	1.0	1.01	1.04
.3		1.0	1.02	1.0	1.01	1.02	1.0	1.0	1.01	1.03	1.0	1.01	1.02	1.0	1.01	1.02

F_P
for Reduced Inlet & Expanded Outlet of the Same Size

d/D	Valve Size	1/2		3/4			1				1-1/2			2		
	Port Size	1/4	5/8	1/4	5/8	7/8	1/4	5/8	7/8	1 1/4	7/8	1 1/4	1 3/4	1 1/4	1 3/4	2 1/4
1		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.9		1.0	.995	1.0	.997	.993	1.0	.999	.996	.992	.999	.998	.994	.999	.997	.992
.8		.998	.981	.999	.991	.976	1.0	.997	.987	.971	.997	.992	.978	.997	.989	.974
.7		.997	.963	.999	.983	.953	.999	.993	.974	.945	.994	.984	.958	.993	.978	.95
.6		.995	.945	.998	.974	.929	.999	.989	.96	.917	.991	.976	.936	.99	.967	.925
.5		.993	.926	.998	.965	.906	.999	.985	.947	.891	.988	.967	.915	.986	.955	.90
.4		.991	.91	.997	.956	.886	.999	.981	.935	.868	.985	.96	.897	.983	.944	.88
.3		.99	.897	.997	.95	.87	.999	.979	.925	.85	.982	.953	.882	.98	.936	.862

Linear Valve Specification Form

SPENCE

CONTROL VALVE SPEC SHEET

Project/Job _____

Unit/Customer _____

P.O./LCO File # _____

Item _____

Contract _____

MFR Serial# _____

Data Sheet ____of____

Spec _____

Tag _____

Dwg _____

Service _____

Fluid ☐ Steam ☐ Water ☐ Gas_____ ☐ Liquid_____ Crit Pres PC

Service Conditions

Flow ☐ #/hr ☐ gpm ☐ scfh ☐ _____

Inlet Pressure ☐ psig ☐ psia ☐ _____

Outlet Pressure ☐ psig ☐ psia ☐ _____

Temperature ☐ °C ☐ °F ☐ _____

Max Press/Temperature:_____ /_____

Density/MW/SG

Viscosity

Vapor Pressure ☐ psia ☐ _____

Required C_V _____

Noise (dBA) Allowable_____

Max. Flow	Norm. Flow	Min. Flow	Shut-off Pressure

Line Info Pipe Size In_____/Sch_____ Pipe Size Out_____/Sch_____

Valve, Body & Bonnet

Body Size in. ☐ ½ ☐ ¾ ☐ 1 ☐ 1¼ ☐ 1½ ☐ 2 ☐ 2½ ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 10 ☐ 12 ☐ 16

ANSI Class ☐ 125 ☐ 150 ☐ 250 ☐ 300 ☐ 600 ☐ 900 ☐ 1500 ☐ 2500 ☐ 4500 ☐ Other_____

Body/Bonnet Material: ☐ Cast Iron ☐ Cast Steel ☐ Cr Mo ☐ 316SS ☐ Bronze ☐ Hast C ☐ Titanium ☐ Alloy 20 ☐ Other_____

End Conn. Inlet/Outlet: ☐ NPT ☐ SWE ☐ BWE Sch._____ ☐ Sep. Flanges ☐ Int. Flanges ☐ Other_____

Packing Material: ☐ PTFE ☐ BTG ☐ Laminated Graphite ☐ Kalrez ☐ Other

Trim Size ☐ 100% ☐ 60% ☐ 40% ☐ 20% ☐ Other_____

Actuator

Spring Action: ☐ Air to Open ☐ Air to Close ☐ Last Position ☐ None

Available Air Supply Pressure: ☐ Max._____ ☐ Min._____

Manual Override: ☐ Yes ☐ No ☐ Type_____

Solenoid ☐ Yes ☐ No ☐ Type_____ ☐ Voltage_____

Positioner ☐ Yes ☐ No ☐ Type_____ ☐ Pneu ☐ I/P

Switch ☐ Yes ☐ No ☐ Type_____

Air Set ☐ Yes ☐ No ☐ Type:_____ ☐ Range:_____

Other Accessories ☐ Yes ☐ No ☐ Type_____

Test ANSI/FCI Leakage Class: ☐ II ☐ III ☐ IV ☐ V ☐ VI ☐ Leslie VIII