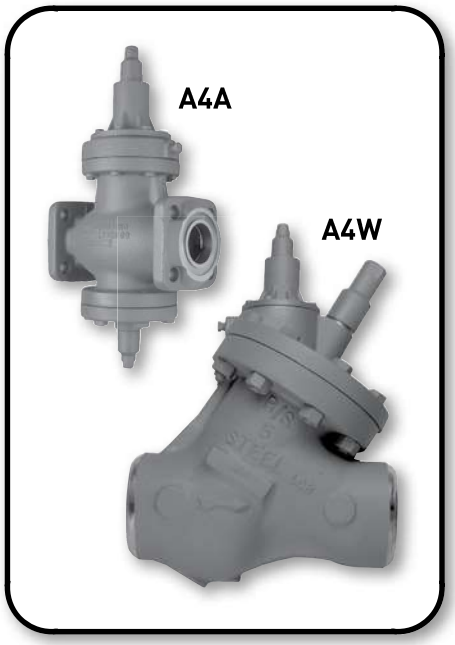
A4 Adaptomode® Series Pressure Regulators

The A4 family of regulators includes valves that control inlet, outlet or differential pressure. Each regulator is available with an assortment of additional variations which enable one regulator to perform several functions. The most common arrangements are shown on the following pages **6** - **7**.



Specifications

Body: 20mm -100mm (¾" - 4") ..... Gray Iron (ASTM A126 Class B)
125mm - 200mm (5" - 8") ..... Cast Steel (A-352 GR, LCB)
Temperature Range: 20mm -100mm (¾" - 4") ..... -45°C - 105°C (-50°F - 220°F)
125mm - 200mm (5" - 8") ..... -50°C - 105°C (-60°F - 220°F)
Maximum Rated Pressure (MRP) ..... 27.6 barg (400 psig)
Maximum Operating Pressure Differeance (S Features Only) ..... 20.7 bard (300 psid)

DIN Specifications

Body: 20mm - 100mm (¾" - 4") ..... Ductile Iron (DIN GGG 40.3)
Temperature Range: 20mm -100mm (¾" - 4") ..... -45°C - 105°C (-50°F - 220°F)
Maximum Rated Pressure (MRP) ..... 28 barg (406 psig)
Maximum Operating Pressure Differeance (S Features Only) ..... 20.7 bard (300 psid)

General Information

Port Size		Reduced Capacity Plugs	Type	Flow Coefficient		Connections Available			
mm	inch			Kv	Cv	FPT	SW, WN	ODS	WN (DN)
20	¾	50% 17%	A4A A4A A4A	6.2 3.1 1.0	7.2 3.6 1.2	¾", 1", 1¼"	¾", 1", 1¼"	⅞", 1⅛", 1⅜"	20, 25, 32
25	1	①	A4A	8.6	10	¾", 1", 1¼"	¾", 1", 1¼"	⅞", 1⅛", 1⅜"	20, 25, 32
32	1¼	35%	A4A A4A	15 5.2	18 6.1	1¼", 1½"	1¼", 1½"	1⅝"	32
40	1⅝	35%	A4A A4A	29 10	33 12	1½", 2"	1½", 2"	2⅛", 2⅝"	38, 50
50	2	②	A4A	42	50	1½", 2"	1½", 2"	2⅛", 2⅝"	38, 50
65	2½	35%	A4A A4A	60 21	70 25	—	2½", 3"	2⅝", 3⅛"	65, 75
75	3	35%	A4A A4A	86 30	100 35	—	3"	3⅛", 3⅝"	75
100	4	35%	A4A A4A	130 38	150 44	—	4"	4⅛	100
125	5	STD	A4W	170	200	—	5" WN only	—	—
150	6	STD	A4W	310	360	—	6" WN only	—	—
200	8	STD	A4W	470	550	—	8" WN only	—	—

Standard connection styles: FPT for 20mm - 50mm (¾" - 2"); SW for 65mm - 100mm (2½" - 4").
Standard size and style will be furnished unless specified otherwise.

① All 20mm (¾") plugs also fit in 25mm (1") valves.
② All 40mm (1⅝") plugs also fit in 50mm (2") valves.

A4 regulators with variations are factory assembled and tested.

A4 Adaptomode® Series Pressure Regulators

A4A
Basic Inlet

A4A0
Outlet Pressure Regulator

A4AL
Differential Pressure Regulator

A4AZ
Inlet Pressure Regulator
with Modudapter®

A4AK
Re-seating Relief
Regulator

A4AP
Pneumatically
Compensated Regulator

A4AB
Inlet Pressure Regulator
with Wide Opening Feature

A4AS
Inlet Pressure Regulator
with Electric Shut-Off Feature

A4AD
Dual Inlet Pressure
Regulator

A4AM
Electrically Compensated
Inlet Pressure Regulator

A4AJS
Electronic Pilot Operated
Regulator with Electric
Shut-Off Feature

A4 Adaptomode® Series Pressure Regulators

Application Guide

There are many possible combinations of A4 regulator variations. The electric shut-off (S), electric wide-opening (B) and dual pressure (D) variations are often combined with each other. Or they may be used in combination with the compensated (M, P, 3P and T), outlet pressure (O) or differential pressure (L) regulators. Remote configurations of most variations are available using the A4R regulator separate from pilot controls.

The A4A Series flanged body regulators are available with 20mm - 100mm (¾" - 4") ports.
The A4W Series weld end body regulators are available with 125mm - 200mm (5" - 8") ports.

Variation	Type Suffix	Type	Function	Operation	Typical Applications
Basic Regulator	—	A4A A4W	Control inlet pressure	Operates at present inlet pressure. Can be field adjusted. Opens on rising inlet pressure.	1. Evaporator pressure control 2. Condenser pressure control 3. Any inlet pressure control
Electric Shut-Off	S	A4AS A4WS	Control inlet pressure or shut off regulator	Regulates when electrically energized; closed when not energized.	1. Open for temperature control 2. Closed for defrosting
Electric Wide Opening	B	A4AB A4WB	Control inlet pressure or wide open regulator	Regulates when not electrically energized; wide open when energized.	1. Wide open for maximum cooling 2. Regulating for defrost 3. Regulating for temperature control.
Dual Pressure	D	A4AD A4WD	Dual pressure control	Regulates at lower pressure when electrically energized; at higher pressure when not energized.	1. Higher pressure for defrost 2. Higher pressure for temperature control. 3. Internal pressure relief.
Re-seating Relief	K	A4AK	Re-seating relief regulator	Open wide above set point. Repeatedly re-seats after operation.	1. Defrost relief 2. Non-atmospheric relief 3. High to low relief
Outlet Pressure Regulator	O	A4AO A4WOE	Control outlet pressure	Regulates at preset outlet pressure. Can be field adjusted. Opens on a drop in outlet pressure.	1. Crankcase pressure regulation 2. Hot gas bypass; booster loading 3. Receiver pressure control
Differential Pressure Regulator	L	A4AL	Control pressure difference across regulator	Regulates pressure difference at or below a pre-set amount.	1. Liquid pump relief regulator 2. Reduce liquid or vapor line pressure
Electrically Compensated	M	A4AM A4WM	Motor changes pressure set-point	Potentiometer or solid state type thermostat readjusts set-point to match evaporator temperature to a varying load.	1. Precise control of process cooling 2. Liquid chillers 3. For load change compensation
Pneumatically Compensated	P 3P	A4AP A4WP A4A3P A4W3P	Air pressure changes set-point (1:1 ratio); A4A3P for 3:1 ratio	Pneumatic thermostat readjusts set-point to match evaporator temperature to a varying load.	1. Precise control of process cooling 2. Liquid chillers 3. For load change compensation
Electronic Pilot Operated	J	A4AJ	Electronic signal controls regulator opening	Pilot position is proportional to electronic signal.	1. Precise control 2. Liquid chiller 3. System with load change
Externally Equalized	E	A4AE A4AOE A4AOES	Control at external pressure sensed remote from valve	Same as standard regulator except controlled pressure is sensed away from regulator.	1. Low Pressure drop (A4AE) 2. Hot gas bypass (A4AOE)
Main regulator for Remote Pilot	R	A4AR A4WR	Main regulator is controlled by separate pilots	Main regulator modulates, closes or opens in response to remote pilots.	1. Simple inventory of regulator and pilots 2. Convenient placement of pilots 3. Unusual pilots or circuits
Basic Regulator Assembly	Z	A4AZ	Complete regulator assembly to which modules can be added.	Can be built into most of the A4A variation regulators. Has a Modudapter® and two Moduplates®.	Versatile unit for inventory along with Adaptomode Modules sold separately.

These are the most common variations of the type A4 regulator. For other combinations, please consult factory.

A4 Adaptomode® Series Pressure Regulators

Modudapter® (MD, SMD)

The special adapter to which the modular solenoid pilot, modular pressure pilot and Moduplate are bolted.

The Series Modudapter (SMD) is used with special regulators such as A4ADS, A4ABDS, etc. and with all A4W regulators.

Furnished with bolts and gaskets. (Standard part of regulators with S, B, D and Z variations)

Port Sizes:
MD25: 20mm - 25mm (¾" - 1")
MD32: 32mm (1¼")
MD50: 40mm - 50mm (1⅝" to 2")
MD65: 65mm (2½")
MD75: 75mm (3")
MD100: 100mm (4")
SMD65: 20mm - 65mm (¾" - 2½") and 125mm - 200mm (5" - 8")
SMD100: 75mm - 100mm (3" - 4")

Outlet Regulator Kit (OR)

An auxiliary adapter which converts A4A inlet regulators to outlet regulators with OE variation.

Furnished with all internal parts, bolts and gaskets.

Port Sizes:
OR50 for 20mm - 50mm (¾" - 2")
OR200 for 65mm - 200mm (2½" - 8")

Moduplate® (MP)

Provides blank off or cross-over of pilot circuit on Type A4S or Type A4B.

Attaches to Modudapter. Same for all regulator sizes.

Furnished with bolts and three O-rings.

Vacuum Cartridge (VC)

A pilot seat with vacuum range cartridge. Will change A range A4, A2B or A2D to vacuum range:

500mm Hg - 8.3 barg (20" Hg - 120 psig)

Furnished with diaphragm and necessary gasket. Same for all regulator sizes.

A2D Modular Pressure Pilot

Adds dual (D) variation when combined with Modular Solenoid Pilot. Provides a second higher control pressure.

Furnished with bolts and O-rings. Mounts to Modudapter®.

Port Sizes:
Use A2D2 with 20mm - 25mm (¾" - 1")
Use A2D with 65mm - 200mm (2½" - 8")
Range A: (standard)
0.35 barg - 10 barg (5 psig - 150 psig)
Range D:
5.2 barg - 19.3 barg (75 psig - 280 psig)

Pressure Bonnet Kit (PK)

Converts any A4, A4O or A2 Series regulator to 1:1 Pressure Compensation (P) variation . Standard in A range. Use with Type VC vacuum cartridge for V range.

Also available 3:1 pressure compensation (3P) variation. Furnished with ¼" FPT bonnet connection for air or refrigerant pressure, bolts and gaskets. 3:1 kit includes above plus auxiliary adapter.

Same for all port sizes.

Type:
PK1 for 1:1 ratio.
PK3 for 3:1 ratio

Motor Bonnet Kit (MB)

Converts to electric compensation (M) variation any A4 Series regulator. Standard in A range. Combine with VC vacuum cartridge for V range.

Furnished with bonnet, all internal parts, cam, bolts, gaskets, motor and transformer with 24 Volt secondary to operate motor.
Same for all port sizes.

A4 Adaptomode® Series Pressure Regulators

Pressure Setting Ranges

Code	Set Point Range	Approx. Pressure Change per Turn of Adjustment Screw	Factory Set Point (unless other wise specified)	Factory Set Point "T" (unless other wise specified)
A ①	0.35 - 10 barg (5 - 150 psig)	1.7 barg (25 psig)	2.8 barg (40 psig)	5.5 barg (80 psig)
V	500mm Hg - 8.3 barg (20 in Hg - 120 psig)	1.7 barg (25 psig)	1.0 barg (15 psig)	—
D	5.2 - 19.3 barg (75 - 280 psig)	3.7 barg (53 psig)	9.7 barg (140 psig)	9.7 barg (140 psig)

① Standard
For variations "K" and "BK", the set point is factory set and sealed. Standard set point for each range is shown in the table above. A custom setting may be specified.

Manual Opening and Pressure Adjusting Stem

Port Size		Manual Opening Stem		Pressure Adjusting Stem
mm	inch	Bypass Mode	Regulating Mode	
20 - 100	¾ - 4	Counter-Clockwise	Clockwise	In Increases Set Point
100 - 200	5 - 8	Clockwise	Counter-Clockwise	In Increases Set Point

Suction Capacities - A4

R-717 (KW)

Evap T (°C) P (barg)	Pressure Drop (bar)	20mm ②	25mm	32mm ③	40mm ③	50mm	65mm ③	75mm ③	100mm ③	125mm	150mm	200mm
10° 5.14	0.14	51	70	123	235	349	493	704	951	1409	2536	3874
	0.35	79	110	193	368	546	772	1103	1488	2205	3969	6064
	0.70	110	153	268	512	758	1072	1532	2068	3063	5514	8424
	1.40	150	208	364	694	1029	1455	2079	2807	4158	7485	11435
5° 4.14	0.14	46	64	113	215	319	451	644	869	1288	2319	3542
	0.35	72	101	176	336	498	704	1006	1359	2013	3623	5535
	0.70	100	139	244	465	689	975	1393	1880	2785	5014	7660
	1.40	135	187	327	625	926	1310	1871	2526	3742	6736	10291
0° 3.28	0.14	42	59	103	196	290	411	587	792	1174	2112	3227
	0.35	66	91	160	305	453	640	915	1235	1829	3292	5030
	0.70	91	126	220	421	623	882	1259	1700	2519	4534	6927
-5° 2.53	0.14	38	53	93	178	264	373	532	719	1065	1917	2928
	0.35	60	83	145	276	409	579	827	1117	1654	2978	4549
	0.70	81	113	198	378	560	792	1131	1527	2263	4073	6223
-10° 1.89	0.14	35	48	84	161	238	337	481	649	962	1731	2645
	0.35	54	74	130	249	368	521	744	1004	1488	2678	4092
	0.70	73	101	176	337	499	706	1008	1361	2017	3630	5546
-15° 1.35	0.14	31	43	76	144	214	303	432	584	865	1556	2378
	0.21	38	52	92	175	260	367	525	709	1050	1889	2887
	0.35	48	66	116	222	329	465	665	898	1330	2394	3657
-20° 0.89	0.035	14	20	34	66	97	137	196	265	392	706	1079
	0.14	28	39	68	129	191	271	386	522	773	1391	2126
	0.21	34	47	82	156	232	328	468	632	936	1685	2575
-25° 0.50	0.035 ①	13	18	31	58	87	123	175	236	350	630	963
	0.14	25	34	60	115	170	240	343	464	687	1236	1888
-30° 0.18	0.035 ①	11	16	27	52	77	109	155	210	311	559	854
	0.14	22	30	53	101	150	212	303	409	606	1090	1666
-35° *-0.08*	0.035 ①	10	14	24	46	68	96	137	185	274	493	753
	0.14	19	26	46	88	131	185	265	358	530	954	1457
-40° *-0.30*	0.035	8.6	12	21	40	59	84	120	162	240	432	660
	0.14	17	23	40	77	113	161	229	310	459	825	1261

Capacities for R717 are based on 30°C liquid. Capacities are maximum and have no reserve for excess loads. Capacities apply to any A4A or A4W regulator (or S4A and S4W) regardless of variation used.

Sub-cooled liquid: For each 5°C liquid is colder than base temperature, increase table valves 3% for R717.

① 0.034 bar pressure drop capacities apply only to regulators with LPD (low pressure drop) variation.
② The 20mm regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
③ The 32mm, 40mm, and 65mm - 100mm are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Note: For liquid overfeed applications (nominal 2:1 to 5:1 ratio), add 20% to the evaporator load and select a regulator based on this increased load value.

Suction Capacities - A4

R-717 (TONS)

Evap T (°F) P (psig)	Pressure Drop (psi)	¾" ②	1"	1¼" ③	1⅝" ③	2"	2½" ③	3" ③	4"	5"	6"	8"
50° 74.5	2	14	20	35	66	98	139	199	268	398	716	1093
	5	22	31	54	104	154	218	311	420	622	1120	1712
	10	31	43	76	144	214	303	432	584	865	1557	2379
	20	42	59	103	196	291	411	588	793	1175	2115	3231
40° 58.6	2	13	18	31	60	89	126	180	243	360	648	990
	5	20	28	49	94	139	197	281	380	562	1012	1546
	10	28	39	68	130	193	272	389	525	778	1401	2140
	20	38	52	91	175	259	366	523	705	1045	1881	2874
30° 45.0	2	12	16	28	54	80	113	162	219	324	584	892
	5	18	25	44	84	125	177	253	341	505	909	1389
	10	25	35	61	116	172	243	348	469	695	1251	1912
20° 33.5	2	10	15	25	49	72	102	145	196	291	523	799
	5	16	23	39	75	112	158	226	305	451	812	1241
	10	22	31	54	103	152	216	308	416	616	1109	1694
10° 23.8	2	9.3	13	23	43	64	91	130	175	259	466	713
	5	14	20	35	67	99	140	200	270	400	720	1100
	10	19	27	47	90	134	189	270	364	540	972	1484
0° 15.7	2	8.3	11	20	38	57	80	115	155	229	413	631
	3	10	14	24	46	69	97	139	188	278	501	765
	5	13	18	31	59	87	123	176	237	352	633	967
-10° 9.0	0.5 ①	3.7	5.1	9.0	17	25	36	51	69	103	185	282
	2	7.3	10	18	34	50	71	101	136	202	363	555
	3	8.8	12	21	41	60	85	122	165	244	439	671
-20° 3.6	0.5 ①	3.2	4.5	7.9	15	22	32	45	61	90	162	248
	2	6.3	8.8	15	29	44	62	88	119	176	317	484
-30° *1.6 in Hg*	0.5 ①	2.8	3.9	6.9	13	19	27	39	53	78	141	216
	2	5.5	7.6	13	25	38	53	76	103	152	274	418
-40° *8.8 in Hg*	0.5 ①	2.4	3.4	5.9	11	17	24	34	46	68	122	186
	2	4.7	6.5	11	22	32	45	65	87	130	233	356

Capacities for R717 are based on 86°F liquid. Capacities are maximum and have no reserve for excess loads. Capacities apply to any A4A or A4W regulator (or S4A and S4W) regardless of variation used.

Sub-cooled liquid: For each 10°F liquid is colder than base temperature, increase table valves 3% for R717.

① 0.5 psig pressure drop capacities apply only to regulators with LPD (low pressure drop) variation.
② The ¾" regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
③ The 1¼", 1⅝", and 2½" - 4" regulators are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Note: For liquid overfeed applications (nominal 2:1 to 5:1 ratio), add 20% to the evaporator load and select a regulator based on this increased load value.

Suction Capacities - A4

R-22 (KW)

Evap T (°C) P (barg)	Pressure Drop (bar)	20mm ②	25mm	32mm ③	40mm ③	50mm	65mm ③	75mm ③	100mm ③	125mm	150mm	200mm
10°	0.14	18	24	43	81	120	170	243	328	487	876	1338
5.80	0.7	38	53	93	177	262	371	530	715	1060	1908	2915
5°	0.14	16	22	39	74	110	156	223	301	446	803	1227
4.83	0.7	35	48	85	162	239	339	484	653	967	1741	2661
0°	0.14	15	20	36	68	101	143	204	275	408	734	1121
3.97	0.7	32	44	77	147	218	308	440	593	879	1583	2418
-5°	0.14	13	19	32	62	92	130	186	250	371	668	1020
3.20	0.7	29	40	70	133	197	278	398	537	795	1431	2186
-10°	0.14	12	17	29	56	83	118	168	227	337	606	926
2.53	0.7	26	36	63	119	177	250	357	482	715	1286	1965
-15°	0.14	11	15	27	51	75	106	152	205	304	547	836
1.95	0.7	23	32	56	106	158	223	319	430	638	1148	1754
-20°	0.14	10	14	24	46	68	96	137	185	273	492	752
1.44	0.35	15	21	37	70	104	147	210	284	421	758	1157
-25°	0.14	8.8	12	21	41	61	86	122	165	245	440	673
1.00	0.35	13	19	33	62	93	131	187	252	374	673	1029
-30°	0.035 ①	4.0	5.5	10	19	27	39	55	75	111	199	305
0.63	0.14	7.8	11	19	36	54	76	109	147	218	392	598
-35°	0.035 ①	3.5	4.9	8.6	16	24	34	49	66	98	177	271
0.31	0.14	6.9	10	17	32	48	67	96	130	192	346	529
-40°	0.035 ①	3.1	4.3	7.6	15	22	30	43	59	87	156	239
0.04	0.14	6.1	8.4	15	28	42	59	84	114	169	304	464

R-22 (TONS)

Evap T (°F) P (psig)	Pressure Drop (psi)	¾" ②	1"	1¼" ③	1⅝" ③	2"	2½" ③	3" ③	4" ③	5"	6"	8"
50°	2	5.0	7.0	12	23	35	49	70	95	140	252	385
84.1	10	11	15	27	51	76	107	153	206	305	549	840
40°	2	4.6	6.4	11	21	31	45	64	86	127	229	350
68.6	10	10	14	24	46	68	97	138	186	276	497	759
30°	2	4.1	5.7	10	19	28	40	57	78	115	207	316
55.0	10	8.9	12	22	41	61	87	124	167	248	446	682
20°	2	3.7	5.2	9.1	17	26	36	52	70	104	186	285
43.1	10	8.0	11	19	37	55	77	111	149	221	398	609
10°	2	3.3	4.6	8.1	15	23	32	46	63	93	167	255
32.8	10	7.1	10	17	33	49	69	98	132	196	353	539
0°	2	3.0	4.1	7.2	14	20	29	41	56	83	149	227
24.0	5	4.6	6.4	11	21	32	45	64	86	128	230	351
-10°	2	2.6	3.7	6.4	12	18	26	37	49	73	132	201
16.5	5	4.0	5.6	10	19	28	39	56	76	112	202	309
-20°	0.5 ①	1.2	1.6	2.9	5.5	8.1	11	16	22	33	59	90
10.2	2	2.3	3.2	5.6	11	16	23	32	44	64	116	177
-30°	0.5 ①	1.0	1.4	2.5	4.8	7.1	10	14	19	29	52	79
4.9	2	2.0	2.8	4.9	9.4	14	20	28	38	56	101	155
-40°	0.5 ①	0.9	1.3	2.2	4.2	6.2	8.8	13	17	25	45	69
0.6	2	1.8	2.4	4.3	8.1	12.1	17	24	33	49	88	134

Capacities for R22 are based on 40°C (100°F) liquid and 5°C (10°F) superheat entering the regulator. Capacities are maximum and have no reserve for excess loads. Capacities apply to any A4A or A4W regulator (or S4A and S4W) regardless of variation used.

Sub-cooled liquid: For each 5°C/10°F liquid is colder than base temperature, increase table valves 4% for R22.

① 0.034 bar (0.5 psig) pressure drop capacities apply only to regulators with LPD (low pressure drop) Variation.
② 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
③ The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Note: For liquid overfeed applications (nominal 2:1 to 5:1 ratio), add 20% to the evaporator load and select a regulator based on this increased load value.

Suction Capacities - A4

R-134a (KW)

Evap T (°C) P (barg)	Pressure Drop (bar)	20mm ②	25mm	32mm ③	40mm ③	50mm	65mm ③	75mm ③	100mm ③	125mm	150mm	200mm
10°	0.14	14	19	33	64	94	133	190	257	381	686	1047
3.13	0.7	29	41	71	136	202	285	407	550	815	1466	2240
5°	0.14	12	17	30	57	85	120	172	232	343	618	944
2.48	0.7	26	36	64	122	180	255	364	491	728	1310	2001
0°	0.14	11	15	27	51	76	108	154	208	308	555	848
1.91	0.7	23	32	56	108	160	226	323	436	645	1162	1775
-5°	0.14	10	14	24	46	68	96	138	186	275	496	757
1.42	0.7	20	28	50	95	140	198	284	383	567	1021	1560
-10°	0.14	8.8	12	21	41	61	86	122	165	245	441	674
0.99	0.7	18	25	43	82	122	172	246	332	492	886	1354
-15°	0.14	7.8	11	19	36	54	76	108	146	217	390	596
0.63	0.7	15	21	37	70	104	147	210	284	420	756	1155
-20°	0.14	6.9	10	17	32	47	67	95	129	190	343	524
0.31	0.35	10	14	25	48	70	100	142	192	285	512	783
-25°	0.14	6.0	8.3	15	28	41	58	83	112	166	299	457
0.05	0.35	8.8	12	21	41	60	85	122	164	243	438	670
-30°	0.035 ①	2.7	3.7	6.5	12	18	26	37	50	75	134	205
-0.17	0.14	5.2	7.2	13	24	36	50	72	97	144	259	395
-35°	0.035 ①	2.3	3.2	5.7	11	16	23	32	44	65	116	178
-0.35	0.14	4.4	6.1	11	21	30	43	61	83	123	221	338
-40°	0.035 ①	2.0	2.8	4.9	9.3	14	19	28	38	56	100	153
-0.50	0.14	3.7	5.2	9.1	17	26	36	52	70	104	187	285

R-134a (TONS)

Evap T (°F) P (psig)	Pressure Drop (psi)	¾" ②	1"	1¼" ③	1⅝" ③	2"	2½" ③	3" ③	4" ③	5"	6"	8"
50°	2	4.0	5.5	10	18	27	39	55	74	110	198	303
45.4	10	8.5	12	21	39	58	83	118	159	236	424	648
40°	2	3.5	4.9	8.6	16	24	34	49	66	98	177	270
35.0	10	7.5	10	18	35	51	73	104	140	208	374	572
30°	2	3.1	4.4	7.6	15	22	30	44	59	87	157	239
26.1	10	6.5	9.1	16	30	45	64	91	123	182	327	500
20°	2	2.8	3.8	6.7	13	19	27	38	52	77	138	211
18.4	10	5.7	7.9	14	26	39	55	79	106	157	283	432
10°	2	2.4	3.4	5.9	11	17	24	34	45	67	121	185
11.9	10	4.8	6.7	12	22	33	47	67	90	134	241	368
0°	2	2.1	2.9	5.1	10	14	20	29	40	59	105	161
6.5	5	3.2	4.4	7.7	15	22	31	44	59	88	159	242
-10°	2	1.8	2.5	4.4	8.4	13	18	25	34	51	91	139
1.9	5	2.7	3.7	6.5	12	18	26	37	50	75	134	205
-20°	0.5 ①	0.8	1.1	2.0	3.7	5.5	7.8	11	15	22	40	61
3.7 in Hg	2	1.6	2.2	3.8	7.2	11	15	22	29	43	78	119
-30°	0.5 ①	0.7	1.0	1.7	3.2	4.7	6.7	10	13	19	34	53
9.8 in Hg	2	1.3	1.8	3.2	6.1	9.0	13	18	25	36	66	100
-40°	0.5 ①	0.6	0.8	1.4	2.7	4.0	5.7	8.1	11	16	29	44
14.8 in Hg	2	1.1	1.5	2.6	5.0	7.5	11	15	20	30	54	83

Capacities for R134a are based on 40°C (100°F) liquid and 5°C (10°F) superheat entering the regulator. Capacities are maximum and have no reserve for excess loads. Capacities apply to any A4A or A4W regulator (or S4A and S4W) regardless of variation used.

Sub-cooled liquid: For each 5°C/10°F) liquid is colder than base temperature, increase table valves 4% for R134a.

① 0.034 bar (0.5 psig) pressure drop capacities apply only to regulators with LPD (low pressure drop) Variation.
② 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
③ The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Note: For liquid overfeed applications (nominal 2:1 to 5:1 ratio), add 20% to the evaporator load and select a regulator based on this increased load value.

Suction Capacities - A4

R-404a (KW)

Evap T (°C) P (barg)	Pressure Drop (bar)	20mm ②	25mm	32mm ③	40mm ③	50mm	65mm ③	75mm ③	100mm ③	125mm	150mm	200mm
10°	0.14	15	21	37	70	103	146	209	282	417	751	1147
7.26	0.7	33	46	80	152	226	319	456	616	912	1641	2508
5°	0.14	14	19	33	63	94	132	189	255	378	681	1040
6.11	0.7	30	41	72	138	204	288	412	556	824	1483	2265
0°	0.14	12	17	30	57	85	120	171	231	342	615	939
5.09	0.7	27	37	65	124	183	259	370	500	741	1334	2038
-5°	0.14	11	15	27	51	76	108	154	207	307	553	845
4.18	0.7	24	33	58	111	164	232	332	448	663	1194	1824
-10°	0.14	10	14	24	46	68	96	138	186	275	496	757
3.38	0.7	21	30	52	99	146	207	295	398	590	1063	1624
-15°	0.14	8.8	12	21	41	61	86	123	166	246	442	676
2.67	0.7	19	26	46	87	129	183	261	352	522	940	1436
-20°	0.14	7.9	11	19	36	54	76	109	147	218	393	600
2.06	0.35	12	17	30	56	84	118	169	228	338	608	928
-25°	0.14	6.9	10	17	32	48	67	96	130	193	347	530
1.52	0.35	11	15	26	50	73	104	148	200	297	534	816
-30°	0.035 ①	3.1	4.3	7.5	14	21	30	43	58	86	154	236
1.06	0.14	6.1	8.5	15	28	42	59	85	114	169	304	465
-35°	0.035 ①	2.7	3.8	6.6	13	19	26	38	51	75	135	206
0.67	0.14	5.3	7.4	13	25	37	52	74	100	147	265	406
-40°	0.035 ①	2.4	3.3	5.7	11	16	23	33	44	65	118	180
0.34	0.14	4.6	6.4	11	21	32	45	64	86	128	230	351

R-404a (TONS)

Evap T (°F) P (psig)	Pressure Drop (psi)	¾" ②	1"	1¼" ③	1⅝" ③	2"	2½" ③	3" ③	4" ③	5"	6"	8"
50°	2	4.4	6.1	11	20	30	43	61	82	122	220	335
105.3	10	10	13	23	45	66	93	133	180	267	480	733
40°	2	3.9	5.5	10	18	27	38	55	74	109	197	301
86.9	10	8.6	12	21	40	59	83	119	161	238	429	655
30°	2	3.5	4.9	8.6	16	24	34	49	66	98	176	269
70.7	10	7.6	11	19	35	52	74	106	143	212	381	583
20°	2	3.1	4.3	7.6	15	22	30	43	59	87	156	239
56.6	10	6.7	9.4	16	31	46	66	94	126	187	337	515
10°	2	2.8	3.8	6.7	13	19	27	38	52	77	138	211
44.3	10	5.9	8.2	14	27	41	58	82	111	164	296	452
0°	2	2.4	3.4	5.9	11	17	24	34	46	68	122	186
33.7	5	3.8	5.2	9.2	18	26	37	52	71	105	189	288
-10°	2	2.1	3.0	5.2	10	15	21	30	40	59	106	163
24.6	5	3.3	4.6	8.0	15	23	32	46	62	91	164	251
-20°	0.5 ①	0.9	1.3	2.3	4.3	6.4	9.1	13	18	26	47	72
16.8	2	1.8	2.6	4.5	8.6	13	18	26	35	51	92	141
-30°	0.5 ①	0.8	1.1	2.0	3.8	5.6	7.9	11	15	22	40	62
10.3	2	1.6	2.2	3.9	7.4	11	15	22	30	44	80	122
-40°	0.5 ①	0.7	1.0	1.7	3.2	4.8	6.8	10	13	19	35	53
4.9	2	1.4	1.9	3.3	6.3	9.3	13	19	25	38	68	104

Capacities for R404a are based on 40°C (100°F) liquid and 5°C (10°F) superheat entering the regulator. Capacities are maximum and have no reserve for excess loads. Capacities apply to any A4A or A4W regulator (or S4A and S4W) regardless of variation used.

Sub-cooled liquid: For each 5°C/10°F liquid is colder than base temperature, increase table valves 4% for R404a.

① 0.034 bar (0.5 psig) pressure drop capacities apply only to regulators with LPD (low pressure drop) Variation.
② 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
③ The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Note: For liquid overfeed applications (nominal 2:1 to 5:1 ratio), add 20% to the evaporator load and select a regulator based on this increased load value.

Suction Capacities - A4

R-410a (KW)

Evap T (°C) P (barg)	Pressure Drop (bar)	20mm ②	25mm	32mm ③	40mm ③	50mm	65mm ③	75mm ③	100mm ③	125mm	150mm	200mm
10°	0.14	21	29	51	98	146	206	294	397	589	1059	1618
9.87	0.7	47	65	113	216	320	453	647	873	1293	2328	3557
5°	0.14	19	27	47	90	134	189	270	364	540	972	1484
8.35	0.7	43	59	104	198	293	414	592	799	1183	2130	3254
0°	0.14	18	25	43	82	122	173	247	333	493	888	1357
6.99	0.7	39	54	94	180	267	377	539	728	1079	1941	2966
-5°	0.14	16	22	39	75	111	157	225	303	450	809	1236
5.79	0.7	35	49	86	163	242	343	489	661	979	1762	2692
-10°	0.14	15	20	36	68	101	143	204	276	408	735	1122
4.73	0.7	32	44	77	148	219	310	442	597	884	1592	2432
-15°	0.14	13	18	32	62	91	129	185	249	369	664	1015
3.80	0.7	29	40	70	133	197	278	397	536	795	1431	2186
-20°	0.14	12	17	29	55	82	116	166	224	332	598	914
2.99	0.35	19	26	45	86	128	181	259	349	517	931	1422
-25°	0.14	11	15	26	50	74	104	149	201	298	536	819
2.29	0.35	17	23	40	77	114	162	231	312	462	831	1270
-30°	0.035 ①	4.8	6.7	12	22	33	47	67	91	134	242	369
1.69	0.14	9.6	13	23	44	66	93	133	179	266	478	730
-35°	0.035 ①	4.3	6.0	10.4	20	30	42	60	81	119	215	328
1.18	0.14	8.5	12	21	39	58	82	118	159	235	424	647
-40°	0.035 ①	3.8	5.3	9.2	18	26	37	53	71	105	190	290
0.74	0.14	7.5	10.4	18	35	51	73	104	140	207	373	570

R-410a (TONS)

Evap T (°F) P (psig)	Pressure Drop (psi)	¾" ②	1"	1¼" ③	1⅝" ③	2"	2½" ③	3" ③	4" ③	5"	6"	8"
50°	2	6.1	8.5	15	29	42	60	85	115	171	307	469
143.2	10	14	19	33	63	93	131	188	253	375	675	1032
40°	2	5.6	7.8	14	26	38	54	78	105	155	279	426
118.8	10	12	17	30	57	84	119	170	229	340	612	935
30°	2	5.1	7.0	12	23	35	49	70	95	140	253	386
97.4	10	11	15	27	51	76	107	153	207	307	552	843
20°	2	4.6	6.3	11	21	31	44	63	85	126	228	348
78.7	10	9.9	14	24	46	68	96	138	186	275	495	756
10°	2	4.1	5.7	9.9	19	28	40	57	77	113	204	312
62.4	10	8.8	12	21	41	61	86	123	166	245	441	674
0°	2	3.6	5.1	8.9	17	25	35	51	68	101	182	278
48.4	5	5.7	7.9	14	26	39	55	79	106	158	284	434
-10°	2	3.2	4.5	7.9	15	22	31	45	61	90	162	247
36.5	5	5.0	7.0	12	23	35	49	70	94	140	251	384
-20°	0.5 ①	1.4	2.0	3.5	6.7	9.9	14	20	27	40	72	110
26.3	2	2.9	4.0	6.9	13	20	28	40	53	79	143	218
-30°	0.5 ①	1.3	1.8	3.1	5.9	8.7	12	18	24	35	63	97
17.8	2	2.5	3.5	6.1	11.6	17	24	35	47	69	125	191
-40°	0.5 ①	1.1	1.5	2.7	5.1	7.6	11	15	21	31	55	84
10.8	2	2.2	3.0	5.3	10.1	15	21	30	41	60	109	166

Capacities for R410a are based on 40°C (100°F) liquid and 5°C (10°F) superheat entering the regulator. Capacities are maximum and have no reserve for excess loads. Capacities apply to any A4A or A4W regulator (or S4A and S4W) regardless of variation used.

Sub-cooled liquid: For each 5°C/10°F liquid is colder than base temperature, increase table valves 4% for R410a.

① 0.034 bar (0.5 psig) pressure drop capacities apply only to regulators with LPD (low pressure drop) Variation.
② 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
③ The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Note: For liquid overfeed applications (nominal 2:1 to 5:1 ratio), add 20% to the evaporator load and select a regulator based on this increased load value.

Suction Capacities - A4

R-507a (KW)

Evap T (°C) P (barg)	Pressure Drop (bar)	20mm ②	25mm	32mm ③	40mm ③	50mm	65mm ③	75mm ③	100mm ③	125mm	150mm	200mm
10°	0.14	15	21	36	69	102	144	206	279	413	743	1135
7.45	0.7	33	45	79	151	223	316	451	609	903	1625	2483
5°	0.14	13	19	33	62	93	131	187	252	374	673	1028
6.28	0.7	29	41	71	136	202	285	408	550	815	1467	2242
0°	0.14	12	17	30	56	84	118	169	228	338	608	928
5.23	0.7	26	37	64	122	181	257	366	495	733	1319	2016
-5°	0.14	11	15	27	51	75	106	152	205	304	547	835
4.30	0.7	24	33	57	110	162	230	328	443	656	1180	1804
-10°	0.14	10	14	24	45	67	95	136	184	272	489	748
3.48	0.7	21	29	51	97	144	204	292	394	584	1050	1605
-15°	0.14	8.7	12	21	40	60	85	121	164	242	436	667
2.76	0.7	19	26	45	86	128	181	258	348	516	929	1419
-20°	0.14	7.7	11	19	36	53	75	108	145	215	387	592
2.13	0.35	12	17	29	56	82	117	167	225	333	600	916
-25°	0.14	6.8	9.5	17	32	47	66	95	128	190	342	522
1.59	0.35	11	15	26	49	72	102	146	197	293	527	805
-30°	0.035 ①	3.0	4.2	7.4	14	21	30	42	57	84	152	232
1.12	0.14	6.0	8.3	15	28	41	58	83	112	167	300	458
-35°	0.035 ①	2.7	3.7	6.5	12	18	26	37	50	74	133	203
0.71	0.14	5.2	7.3	13	24	36	51	73	98	145	261	399
-40°	0.035 ①	2.3	3.2	5.6	11	16	22	32	43	64	115	176
0.37	0.14	4.5	6.3	11	21	31	44	63	85	125	226	345

R-507a (TONS)

Evap T (°F) P (psig)	Pressure Drop (psi)	¾" ②	1"	1¼" ③	1⅝" ③	2"	2½" ③	3" ③	4" ③	5"	6"	8"
50°	2	4.3	6.0	11	20	30	42	60	82	121	217	332
108.0	10	10	13	23	44	65	93	132	178	264	476	727
40°	2	3.9	5.4	9.5	18	27	38	54	73	108	195	298
89.2	10	8.5	12	21	39	58	83	118	159	236	425	649
30°	2	3.5	4.8	8.5	16	24	34	48	65	97	174	266
72.7	10	7.6	10	18	35	52	73	105	142	210	378	577
20°	2	3.1	4.3	7.5	14	21	30	43	58	86	155	236
58.3	10	6.7	9.3	16.2	31	46	65	93	125	185	334	510
10°	2	2.7	3.8	6.6	13	19	27	38	51	76	137	209
45.7	10	5.9	8.1	14	27	40	57	81	110	163	293	447
0°	2	2.4	3.3	5.8	11	17	23	33	45	67	120	184
34.8	5	3.7	5.2	9.1	17	26	36	52	70	104	186	285
-10°	2	2.1	2.9	5.1	10	14	20	29	39	58	105	160
25.5	5	3.2	4.5	7.9	15	22	32	45	61	90	162	248
-20°	0.5 ①	0.9	1.3	2.2	4.3	6.3	9.0	13	17	26	46	71
17.6	2	1.8	2.5	4.4	8.4	13	18	25	34	51	91	139
-30°	0.5 ①	0.8	1.1	1.9	3.7	5.5	7.8	11	15	22	40	61
11.0	2	1.6	2.2	3.8	7.3	11	15	22	29	44	78	120
-40°	0.5 ①	0.7	0.9	1.7	3.2	4.7	6.6	9.5	13	19	34	52
5.4	2	1.3	1.9	3.3	6.2	9.2	13	19	25	37	67	102

Capacities for R507a are based on 40°C (100°F) liquid and 5°C (10°F) superheat entering the regulator. Capacities are maximum and have no reserve for excess loads. Capacities apply to any A4A or A4W regulator (or S4A and S4W) regardless of variation used.

Sub-cooled liquid: For each 5°C/10°F liquid is colder than base temperature, increase table valves 4% for R507a.

① 0.034 bar (0.5 psig) pressure drop capacities apply only to regulators with LPD (low pressure drop) Variation.
② 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
③ The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Note: For liquid overfeed applications (nominal 2:1 to 5:1 ratio), add 20% to the evaporator load and select a regulator based on this increased load value.

Liquid Capacities - A4 (typical application: screw compressor oil feed control)

R-717 (KG/MIN & M³/HR)

Liquid Temp (°C)	Press. Drop (bar)	20mm ①		25mm		32mm ②		40mm ②		50mm		65mm ②		75mm ②		100mm ②	
		kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr
5°	0.69	68	68	95	95	165	165	314	314	466	466	658	658	941	941	1271	1271
-20°		70	70	97	97	169	169	323	323	478	478	676	676	966	966	1304	1304
-40°		71	71	99	99	172	172	329	329	487	487	688	688	984	984	1328	1328
5°	1.03	83	83	116	116	202	202	385	385	571	571	806	806	1152	1152	1556	1556
-20°		86	86	119	119	207	207	395	395	586	586	828	828	1183	1183	1597	1597
-40°		87	87	121	121	211	211	402	402	597	597	843	843	1205	1205	1627	1627
5°	1.38	96	96	134	134	233	233	445	445	659	659	931	931	1331	1331	1797	1797
-20°		99	99	137	137	239	239	456	456	676	676	956	956	1366	1366	1844	1844
-40°		101	101	140	140	244	244	465	465	689	689	973	973	1391	1391	1879	1879

R-717 (LB/MIN & GPM)

Liquid Temp (°F)	Press. Drop (psi)	¾" ①		1"		1¼" ②		1⅝" ②		2"		2½" ②		3" ②		4" ②	
		lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm
40°	10	151	29	210	40	367	70	701	133	1038	197	1468	278	2098	397	2832	537
0°		155	28	215	39	376	68	717	130	1063	192	1503	272	2146	388	2898	524
-40°		158	27	219	38	383	67	732	127	1085	188	1534	266	2191	380	2958	514
40°	15	185	35	257	49	450	85	858	163	1272	241	1798	341	2569	487	3468	657
0°		189	34	263	48	460	83	878	159	1301	235	1840	333	2629	476	3549	642
-40°		193	34	268	47	470	82	896	156	1328	231	1879	326	2684	466	3623	629
40°	20	214	40	297	56	519	98	991	188	1468	278	2077	393	2966	562	4005	759
0°		219	40	304	55	531	96	1014	183	1503	272	2125	384	3036	549	4098	741
-40°		223	39	310	54	542	94	1035	180	1534	266	2169	377	3099	538	4183	726

R-22 (KG/MIN & M³/HR)

Liquid Temp (°C)	Press. Drop (bar)	20mm ①		25mm		32mm ②		40mm ②		50mm		65mm ②		75mm ②		100mm ②	
		kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr
5°	0.69	96	4.6	134	6.3	233	11	445	21	659	31	932	44	1331	63	1798	85
-20°		100	4.4	138	6.2	241	11	459	20	681	30	961	43	1374	61	1855	83
-40°		102	4.3	141	6.0	246	10	469	20	696	30	983	42	1404	60	1896	81
5°	1.03	118	5.6	164	7.8	286	14	545	26	808	38	1142	54	1632	77	2204	104
-20°		122	5.4	169	7.5	295	13	562	25	833	37	1177	52	1683	75	2272	101
-40°		125	5.3	173	7.4	301	13	575	25	852	36	1204	51	1720	73	2323	99
5°	1.38	136	6.5	189	9.0	330	16	629	30	933	44	1317	63	1883	89	2543	121
-20°		141	6.3	195	8.7	340	15	649	29	962	43	1360	61	1943	87	2624	117
-40°		144	6.1	200	8.5	348	15	664	28	984	42	1390	59	1986	85	2682	114

R-22 (LB/MIN & GPM)

Liquid Temp (°F)	Press. Drop (psi)	¾" ①		1"		1¼" ②		1⅝" ②		2"		2½" ②		3" ②		4" ②	
		lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm
40°	10	214	20	297	28	519	49	991	94	1469	139	2078	197	2968	281	4007	379
0°		220	20	305	27	534	48	1020	91	1511	135	2137	191	3053	273	4121	369
-40°		225	19	313	27	547	47	1045	89	1549	132	2190	187	3128	266	4223	360
40°	15	262	25	364	34	636	60	1214	115	1799	170	2545	241	3635	344	4907	464
0°		269	24	374	33	654	59	1249	112	1851	166	2617	234	3739	334	5047	452
-40°		276	23	383	33	671	57	1280	109	1897	162	2682	228	3832	326	5173	441
40°	20	302	29	420	40	735	70	1402	133	2078	197	2938	278	4197	397	5667	536
0°		311	28	432	39	756	68	1442	129	2137	191	3022	270	4317	386	5828	521
-40°		319	27	442	38	774	66	1478	126	2190	187	3097	264	4424	377	5973	509

Capacities are based on -18°C (0°F) liquid ammonia and no flash gas.
For evaporator temperatures between 4°C to -40°C (40°F to -40°F), capacities are within 5%.
Correction factors for temperatures between -40°C (-40°F) and 30°C (86°F) are negligible.

① 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
② The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Liquid Capacities - A4 (typical application: screw compressor oil feed control)

R-134a (KG/MIN & M³/HR)

Liquid Temp (°C)	Press. Drop (bar)	20mm ①		25mm		32mm ②		40mm ②		50mm		65mm ②		75mm ②		100mm ②	
		kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr
5°	0.69	97	4.6	134	6.3	235	11	447	21	663	31	937	44	1339	63	1808	85
-20°		100	4.4	139	6.1	242	11	461	20	683	30	966	43	1380	61	1863	82
-40°		102	4.3	142	6.0	247	10	471	20	698	30	986	42	1410	60	1904	81
5°	1.03	119	5.6	165	7.7	287	13	548	26	813	38	1148	54	1641	77	2216	104
-20°		122	5.4	170	7.5	296	13	565	25	837	37	1183	52	1690	75	2282	101
-40°		125	5.3	173	7.3	303	13	577	24	855	36	1208	51	1727	73	2332	99
5°	1.38	137	6.4	190	8.9	332	16	632	30	938	44	1325	62	1893	89	2556	120
-20°		141	6.2	196	8.7	342	15	652	29	967	43	1366	60	1951	86	2635	116
-40°		144	6.1	200	8.5	349	15	666	28	988	42	1395	59	1994	84	2692	114

R-134a (LB/MIN & GPM)

Liquid Temp (°F)	Press. Drop (psi)	¾" ①		1"		1¼" ②		1⅝" ②		2"		2½" ②		3" ②		4" ②	
		lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm
40°	10	215	20	298	28	522	49	997	93	1477	138	2089	196	2984	279	4028	377
0°		221	20	307	27	537	48	1024	91	1518	135	2146	190	3066	272	4139	367
-40°		226	19	314	27	550	46	1049	89	1555	131	2198	186	3141	265	4240	358
40°	15	263	25	365	34	640	60	1221	114	1809	169	2558	240	3655	342	4934	462
0°		270	24	376	33	657	58	1254	111	1859	165	2629	233	3755	333	5070	450
-40°		277	23	385	33	673	57	1285	109	1904	161	2692	228	3846	325	5193	439
40°	20	304	28	422	40	739	69	1410	132	2089	196	2954	277	4220	395	5697	533
0°		312	28	434	38	759	67	1448	128	2146	190	3035	269	4336	384	5854	519
-40°		320	27	444	38	777	66	1483	125	2198	186	3109	263	4441	375	5996	507

R-404a (KG/MIN & M³/HR)

Liquid Temp (°C)	Press. Drop (bar)	20mm ①		25mm		32mm ②		40mm ②		50mm		65mm ②		75mm ②		100mm ②	
		kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr
5°	0.69	91	4.8	126	6.7	221	12	421	22	624	33	881	47	1259	67	1700	90
-20°		95	4.7	131	6.5	229	11	437	21	648	32	916	45	1309	64	1767	87
-40°		97	4.5	135	6.3	235	11	449	21	665	31	940	44	1343	63	1814	85
5°	1.03	112	5.9	155	8.2	270	14	515	27	764	41	1079	57	1542	82	2082	111
-20°		116	5.7	161	7.9	281	14	536	26	794	39	1122	55	1603	79	2165	106
-40°		119	5.6	165	7.7	288	13	550	26	815	38	1151	54	1645	77	2222	104
5°	1.38	129	6.8	179	9.5	312	17	595	32	882	47	1246	66	1780	94	2404	128
-20°		134	6.6	186	9.1	324	16	618	30	917	45	1295	64	1851	91	2499	123
-40°		138	6.4	191	8.9	333	16	635	30	941	44	1329	62	1900	89	2565	120

R-404a (LB/MIN & GPM)

Liquid Temp (°F)	Press. Drop (psi)	¾" ①		1"		1¼" ②		1⅝" ②		2"		2½" ②		3" ②		4" ②	
		lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm
40°	10	202	21	281	30	491	52	938	99	1390	147	1965	208	2807	297	3790	401
0°		209	21	291	29	509	50	971	96	1439	142	2034	201	2906	287	3924	387
-40°		215	20	299	28	524	49	999	93	1481	138	2095	195	2992	279	4039	376
40°	15	248	26	344	36	602	64	1148	121	1702	180	2407	255	3438	364	4642	491
0°		256	25	356	35	623	61	1189	117	1762	174	2492	246	3560	351	4805	474
-40°		264	25	366	34	641	60	1224	114	1814	169	2565	239	3665	341	4947	461
40°	20	286	30	397	42	695	73	1326	140	1965	208	2779	294	3970	420	5360	567
0°		296	29	411	41	719	71	1373	135	2035	201	2877	284	4110	406	5549	548
-40°		305	28	423	39	741	69	1413	132	2095	195	2962	276	4232	394	5713	532

Capacities are based on -18°C (0°F) liquid ammonia and no flash gas.
For evaporator temperatures between 4°C to -40°C (40°F to -40°F), capacities are within 5%.
Correction factors for temperatures between -40°C (-40°F) and 30°C (86°F) are negligible.

① 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
② The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Liquid Capacities - A4 (typical application: screw compressor oil feed control)

R-410a (KG/MIN & M³/HR)

Liquid Temp (°C)	Press. Drop (bar)	20mm ①		25mm		32mm ②		40mm ②		50mm		65mm ②		75mm ②		100mm ②	
		kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr
5°	0.69	92	4.8	128	6.7	222	12	424	22	629	33	888	46	1269	66	1714	89
-20°		96	4.6	133	6.4	232	11	441	21	654	32	924	45	1321	64	1784	86
-40°		98	4.5	136	6.2	238	11	453	21	672	31	949	43	1357	62	1832	84
5°	1.03	113	5.9	156	8.2	272	14	519	27	770	40	1088	57	1555	81	2100	110
-20°		117	5.6	163	7.8	284	14	541	26	801	39	1132	55	1618	78	2185	105
-40°		120	5.5	167	7.6	291	13	555	25	823	38	1163	53	1662	76	2244	103
5°	1.38	130	6.8	180	9.4	315	16	600	31	889	46	1256	66	1795	94	2424	127
-20°		135	6.5	188	9.0	327	16	624	30	925	45	1307	63	1868	90	2523	122
-40°		139	6.4	193	8.8	336	15	641	29	950	43	1343	61	1919	88	2591	118

R-410a (LB/MIN & GPM)

Liquid Temp (°F)	Press. Drop (psi)	¾" ①		1"		1¼" ②		1⅝" ②		2"		2½" ②		3" ②		4" ②	
		lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm
40°	10	204	21	283	29	495	52	946	98	1401	146	1982	206	2831	294	3822	398
0°		211	20	293	28	513	50	980	95	1452	141	2054	199	2934	284	3961	384
-40°		218	20	302	28	529	48	1009	92	1496	137	2116	193	3022	276	4080	372
40°	15	250	26	347	36	607	63	1158	120	1716	179	2427	252	3467	361	4681	487
0°		259	25	359	35	629	61	1200	116	1779	172	2515	244	3593	348	4851	470
-40°		267	24	370	34	648	59	1236	113	1832	167	2591	236	3702	338	4997	456
40°	20	288	30	400	42	701	73	1337	139	1982	206	2802	292	4003	416	5405	562
0°		299	29	415	40	726	70	1386	134	2054	199	2904	281	4149	402	5601	542
-40°		308	28	427	39	748	68	1428	130	2116	193	2992	273	4274	390	5770	527

R-507a (KG/MIN & M³/HR)

Liquid Temp (°C)	Press. Drop (bar)	20mm ①		25mm		32mm ②		40mm ②		50mm		65mm ②		75mm ②		100mm ②	
		kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr	kg/min	m³/hr
5°	0.69	91	4.8	127	6.7	221	12	422	22	625	33	883	47	1262	67	1705	90
-20°		95	4.6	132	6.4	230	11	439	21	650	32	919	45	1313	64	1773	87
-40°		98	4.5	135	6.3	236	11	450	21	668	31	943	44	1348	62	1820	84
5°	1.03	112	5.9	155	8.2	271	14	516	27	766	40	1082	57	1546	82	2088	110
-20°		116	5.7	162	7.9	282	14	537	26	796	39	1125	55	1608	78	2171	106
-40°		120	5.5	166	7.7	289	13	551	26	818	38	1155	53	1651	76	2229	103
5°	1.38	129	6.8	179	9.5	313	17	596	31	884	47	1249	66	1785	94	2411	127
-20°		134	6.6	187	9.1	325	16	620	30	920	45	1299	63	1857	91	2507	122
-40°		138	6.4	191	8.9	334	15	637	29	944	44	1334	62	1906	88	2574	119

R-507a (LB/MIN & GPM)

Liquid Temp (°F)	Press. Drop (psi)	¾" ①		1"		1¼" ②		1⅝" ②		2"		2½" ②		3" ②		4" ②	
		lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm	lb/min	gpm
40°	10	203	21	281	30	493	52	940	99	1393	147	1970	207	2815	296	3800	400
0°		210	21	292	29	510	50	974	96	1443	142	2041	200	2915	286	3936	386
-40°		216	20	300	28	525	49	1003	93	1486	137	2102	194	3002	278	4053	375
40°	15	248	26	345	36	603	63	1151	121	1706	180	2413	254	3447	363	4654	490
0°		257	25	357	35	625	61	1193	117	1767	173	2499	245	3571	350	4820	473
-40°		265	24	368	34	643	60	1228	114	1820	168	2574	238	3677	340	4964	459
40°	20	287	30	398	42	697	73	1329	140	1970	207	2786	293	3980	419	5374	565
0°		297	29	412	40	722	71	1377	135	2041	200	2886	283	4123	404	5566	546
-40°		306	28	425	39	743	69	1418	131	2102	194	2972	275	4246	393	5732	530

Capacities are based on -18°C (0°F) liquid ammonia and no flash gas.
For evaporator temperatures between 4°C to -40°C (40°F to -40°F), capacities are within 5%.
Correction factors for temperatures between -40°C (-40°F) and 30°C (86°F) are negligible.

① 20mm (¾") regulator is available with throttling plug capacities equivalent to approximately 50% and 17% of the ratings in the tables.
② The 32mm (1¼"), 40mm (1⅝"), and 65mm - 100mm (2½" - 4") are available with throttling plug capacities equivalent to approximately 35% of the ratings in the tables.

Oil Capacities - A4 (typical application: screw compressor oil feed control)

300 SSU Viscosity (M^3/HR)

For 30°C to 50°C Oil ①			
Port Size (mm)	Pressure Drop		
	0.3 bar	0.7 bar	3.0 bar
20	3.9	5.4	12
25	5.4	7.5	17
32	9.3	13	30
40	18	25	57
50	27	36	84
65	39	52	120
75	54	75	170

300 SSU Viscosity (GPM)

For 85°F to 120°F Oil ①			
Port Size (inch)	Pressure Drop		
	5.0 psi	10 psi	50 psi
¾	17	24	54
1	24	33	74
1¼	41	58	130
1⅝	79	110	250
2	120	160	370
2½	170	230	520
3	240	330	750

① Based on no foaming of oil through regulator.

ADAPTOMODE® INLET PRESSURE REGULATORS

Types: A4AS, A4AB, A4AD, A4AZ

PORT SIZE 20 - 100 mm (3/4" - 4")
FOR AMMONIA, R-12, R-22, R-502
OTHER REFRIGERANTS AND OIL

FEATURES

- Pilot operated characterized Modulating Plug for precise control
- Suitable for all common refrigerants and oil
- 27.6 bar (400 psig) maximum rated pressure (MRP)
- Flanges for threaded or welded steel pipe and copper tube (copper not for ammonia)
- Unique Modular construction
- Interchangeable parts
- Easy to service
- Close coupled strainers, optional
- Many control variations are possible with the use of a few Modules and kits.
- Stainless Steel Diaphragm
- Chrome Plated Pilot Seat
- Manual Opening Stem

A4AZ

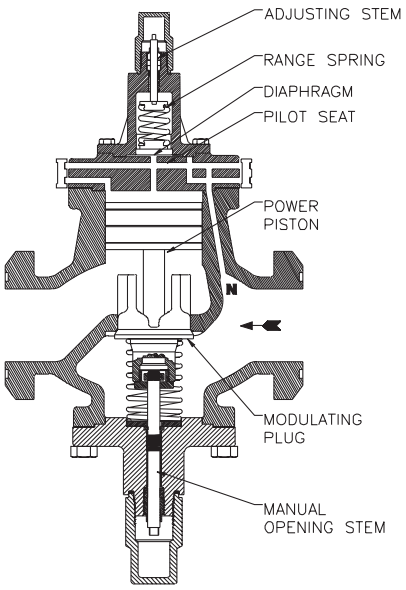


Fig. 1

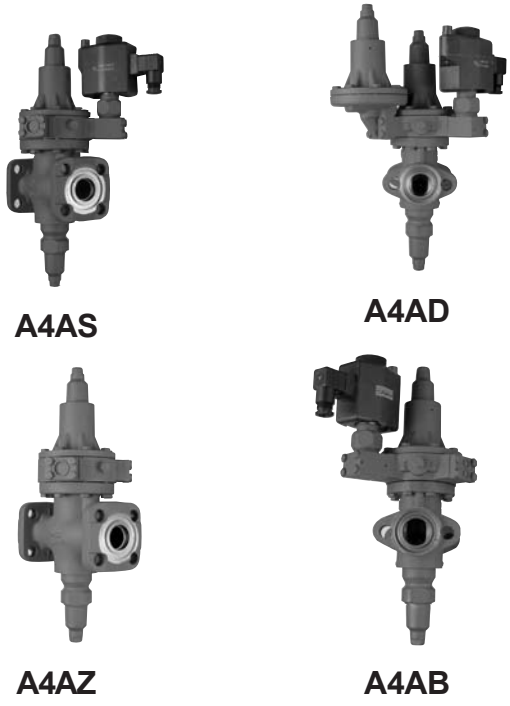
Description:

These compact, heavy duty, pilot operated, iron alloy (ASTM A126 Class B high strength semi-steel) Inlet Pressure Regulators are suitable for Ammonia, R-12, R-22, R-502 and other common refrigerants and fluids approved for use in refrigeration systems.

All A4 Regulators are pilot operated using upstream pressure for the opening force and require a minimum 0.14 bar (2 psi) pressure drop to fully open.

These valves are generally ordered with close coupled upstream strainer to prevent entrance of foreign material into the valve and the rest of the system. (See current Bul. 00-10 for strainer information.)

BULLETIN 23-06B
A4A Series



January 2003
Installation, Service and Parts Information

Purpose

Modulates flow of refrigerant gas or liquid to maintain a constant upstream (or inlet) pressure as set-for, despite load fluctuations.

The fluid temperature range for the A4 Series of Regulators is -45°C to 105°C (-50°F to 220°F).

Principles of Operation (See Fig. 1)

The inlet pressure enters the space under the diaphragm through passage N. When the force created by the pressure exceeds the force of the range spring, the diaphragm is lifted off the pilot seat allowing pressure to enter on top of the power piston. This causes the power piston to move downward forcing the modulating plug to open and modulate to maintain constant inlet pressure. An increase in inlet pressure lifts the diaphragm further, allowing more pressure on top of the power piston and opening the valve wider. A decrease in inlet pressure causes the diaphragm to move closer to the pilot seat reducing the pressure on the top of the power piston and causing the closing spring to reduce the valve opening. The pressure on top of the power piston is controlled by the flow through the pilot seat and the bleed off through the bleed hole in the power piston and through the clearance between the piston and cylinder. A minimum of 0.14 bar (2 psi) pressure drop across the valve is required to open it fully.

The A4A Inlet Pressure Regulator therefore opens on a rise in the inlet pressure above its set point and closes on a drop in inlet pressure below its set point. The inlet pressure set point is not appreciably affected by variations in the outlet pressure.

Manual Opening Stem

All Type A4A Regulators are provided with a manual opening stem. To open the regulator manually, back the stem out (turn counter-clockwise) until it stops. To put the regulator into automatic operation, turn the stem in (clockwise) until only the flats on the stem protrude from the packing nut.

Adjustment

Install an accurate pressure gauge in the gauge port. Back the adjusting stem all the way out to stop. This will reduce the set point to its lowest level and cause the valve to open wide. Start the system, and when suction pressure is about the desired pressure, turn the adjusting stem in until the pressure gauge shows a slight rise in the inlet pressure. At this point the adjusting stem may be turned in (clockwise) to raise the pressure further, or backed out (counter-clockwise) to lower it; but the final adjustment should be made after the system has been operating for a period of time.

INLET PRESSURE SETTING RANGES

	Set Point Ranges	Approx. Pressure Change per Turn of Adjusting Screw	Factory Set Point (unless otherwise specified)
A:	0 to 10.3 bar (0 to 150 psig)	1 .7 bar (25 psi)	2.8 bar (40 psig)
V:	500mm hg to 8.3 bar (20 in hg to 120 psig)	1.7 bar (25 psi)	1 . 0 bar (15 psig)
D:	5.2 to 19.3 bar (75 to 280 psig)	3.7 bar (53 psi)	9.7 bar (140 psig)

Type A4AZ (See Figs 1 and 2)

Description

The A4AZ Inlet Pressure Regulator is the basic building block from which most Series A4 variations are made. This regulator incorporates the specially designed Modudapter® to accommodate the Adaptomode® bolt on modules, providing unique modular construction and many control valve variations with the use of a few modules and kits. See page 3 for an explanation of "Basic Adaptomode Functions", describing modules, module placement and schematic pilot circuit flow diagrams for all variations covered within this bulletin.

The A4AZ regulator is a complete factory assembled and bench tested valve and, in itself, may be used as a basic inlet pressure regulator. In addition, this valve can easily be modified in the field to perform the function of the A4AS, A4AB or A4AD valve variations.

Type A4AS (See Fig. 3)

Description

The Type A4AS is an inlet pressure regulator with a pilot electric shut off. The integrally mounted solenoid must be energized for the valve to function as a regulator. When de-energized the regulator is closed regardless of inlet pressure.

Purpose

The Type A4AS should be used whenever it is required to stop all flow (in the normal fluid flow direction) through the regulator. This could include use in defrost applications as well as part of a temperature control system.

Principles of Operation

The operation of the A4AS is the same as that described on page 1, except the inlet pressure from passage N must pass through the S6A Pilot Solenoid Valve before it can reach the diaphragm. Thus the S6A Pilot Solenoid must be energized before the A4AS can begin to regulate regardless of inlet pressure.

Adjustment

With the solenoid pilot electrically energized, proceed as described above.

Type A4AB (See Fig. 4)

Description

The Type **A4AB** is an Inlet Pressure Regulator with a Pilot Electric Wide-opening, or Bypass, variation. When the integrally mounted solenoid is energized the main valve is wide open, thereby bypassing the regulator function i.e. not regulating. However, in the wide open mode the regulator will still require the 0.14 bar (2 psi) minimum pressure drop. When the solenoid is de-energized the valve functions as an Inlet Pressure Regulator.

Purpose

The Type A4AB frequently is used with the wide-open function where maximum refrigeration capacity from an evaporator is required. During the defrost of the evaporator, the regulator pilot solenoid is de-energized thus functioning as a defrost relief regulator or for high pressure limit protection.

When used in a discharge pressure line, it can when de-energized, hold back enough pressure for some heat reclaim or defrosting function and then, when energized, allow the discharge pressure to drop to a lower level. Frequently this regulator is used in the wide open mode for evaporator pump out prior to hot gas defrost.

Principles of Operation

The operation of the A4AB is the same as that described on page 1 when operating as a regulator (Pilot Solenoid de-energized). When the solenoid is energized the upstream pressure from passage N bypasses the underside of the diaphragm and is fed directly to the top of the piston where, provided a 0.14 bar (2 psi) pressure difference exists across the main valve, the Modulating Plug will be held wide open.

Adjustment

With the solenoid pilot electrically de-energized, proceed as described above.

Type A4AD (See Fig. 5)

Description

The Type A4AD is a Dual Inlet Pressure Regulator capable of regulating at two different pressure set-points. When the integrally mounted S6A Pilot Solenoid Valve is energized the regulator is controlling at the lower of two set-points, which must be adjusted on the pressure pilot over the center of the main valve. When the solenoid is de-energized the regulator is controlling at the higher set-point, which must be adjusted on the bolt-on (outboard) pressure pilot.

Purpose

The Type A4AD uses are similar to those for the A4AB except, instead of operating in a wide-open position when the pilot solenoid is energized, the regulator Is controlling at some preset level.

Typical uses include capacity control of an evaporator at two different pressure levels to regulate temperature, and evaporator pressure control combined with defrost pressure relief.

Principles of Operation

The operation of the A4AD is similar to that described on page 1. When the Pilot Solenoid is energized, upstream pressure from passage N is made available to both diaphragms. Since the path of least resistance will be through the Pressure Pilot with the lower set-point (lower range spring force) that pilot will control.

When the Pilot Solenoid Is de-energized, upstream pressure from passage N can flow only to the high pressure pilot, which will then control the regulator.

Adjustment

Electrically de-energize the solenoid pilot and adjust the modular (bolt-on) pressure pilot for the desired high pressure setting following the adjusting procedure as described above. Energize the solenoid pilot and adjust the integral pressure pilot for the desired low pressure setting following the adjusting procedure described above.

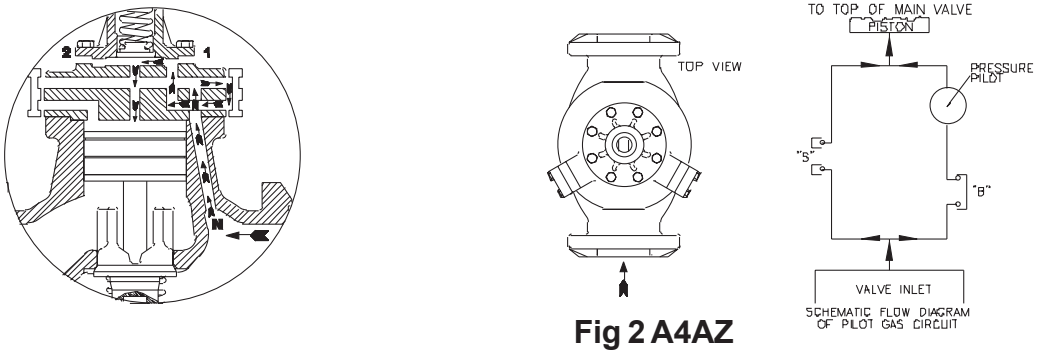


Fig 2 A4AZ

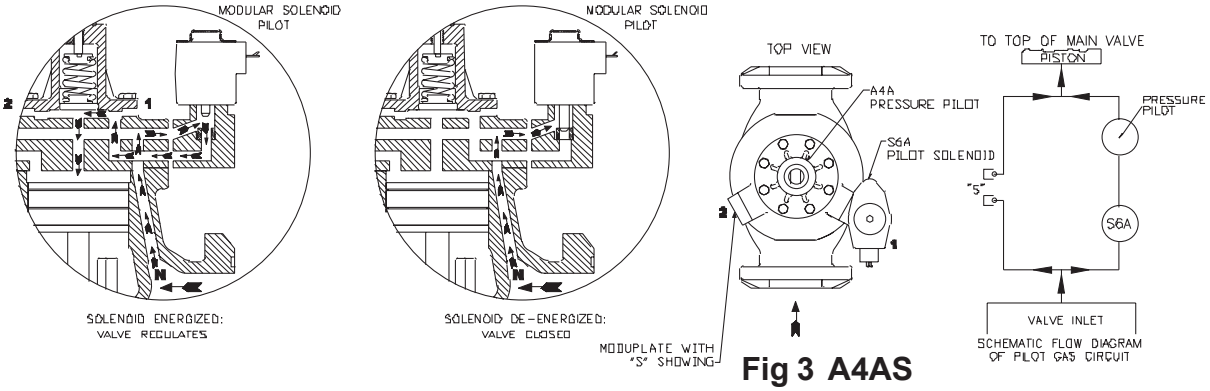


Fig 3 A4AS

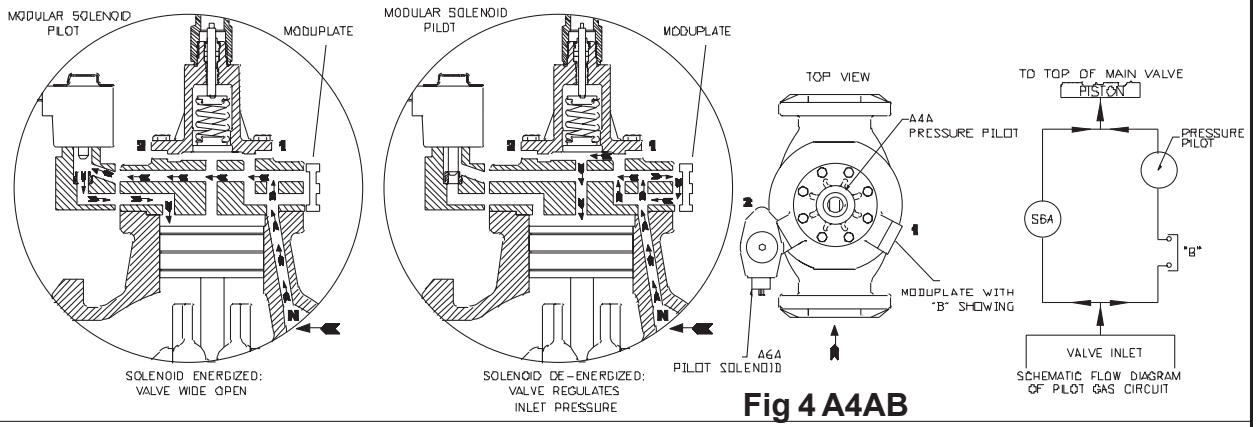


Fig 4 A4AB

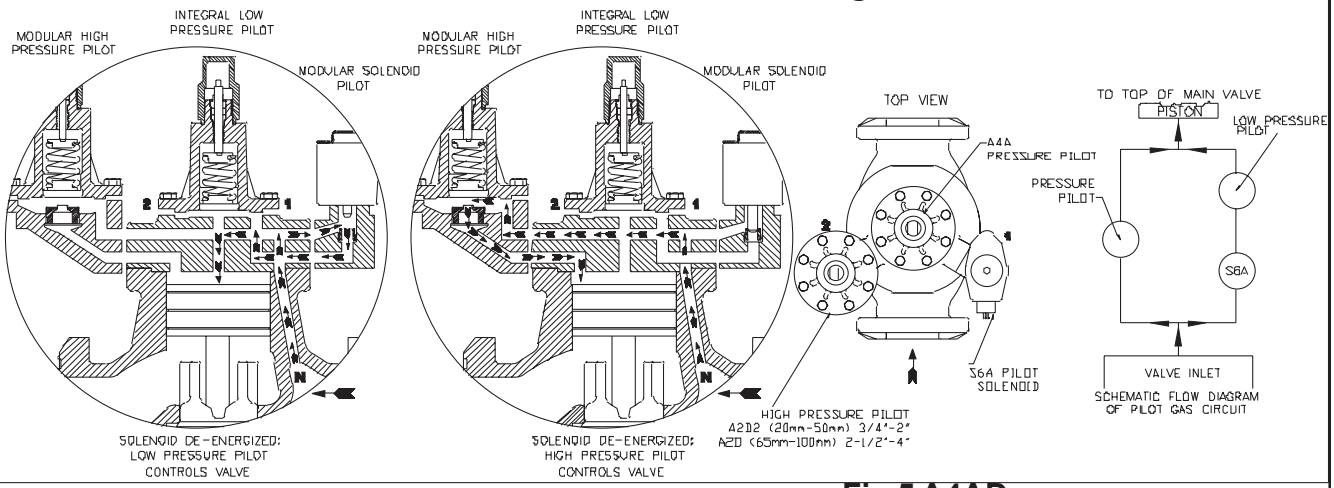


Fig 5 A4AD

Installation

All regulators are packed for maximum protection. Unpack carefully. Check the carton to make sure all flanges and other items are unpacked. Save the enclosed instructions for the installer and eventual user.

Do not remove the protective coverings from the inlet and outlet of the regulator until the regulator is ready to be installed. Protect the inside of the regulator from moisture, dirt and chips before and during installation. When welded or brazed flange connections are used, all slag, scale and loose particles should be removed from the flange interior before the regulator is installed between the flanges. It is advisable to install a close-coupled companion strainer (RSF) at the inlet of the regulator to help protect it from any foreign material in the system.

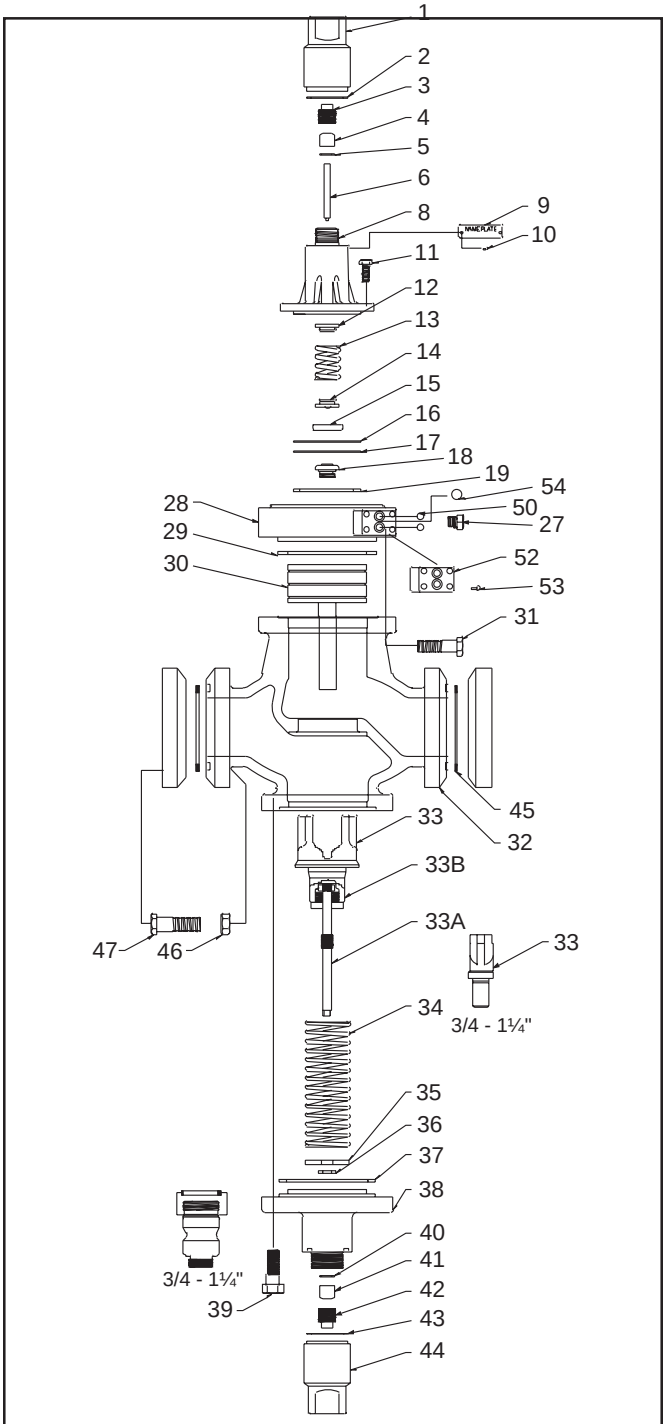


Fig. 6

The A4A series of regulators will give optimum performance if mounted in a horizontal line in a vertical position with the manual opening stem on bottom. Where other positions are desired, the factory should be consulted; please give application and piping details. The regulator must be installed with the arrow on the valve body pointing in the direction of the fluid flow for the regulator to function properly. Backward flow through the regulator is uncontrolled and will vary with the valve model and the reverse pressure drop encountered. The regulator is not a check valve.

Tighten the flange bolts and nuts evenly to provide proper seating of the flange gasket and to avoid damage to gaskets or flanges. (See Flange Bolt Torque Table, page 16) Avoid using the regulator flange bolts to stretch or align pipe. Even the heavy duty semisteel body of an A4A can be distorted, causing the precision parts to bind.

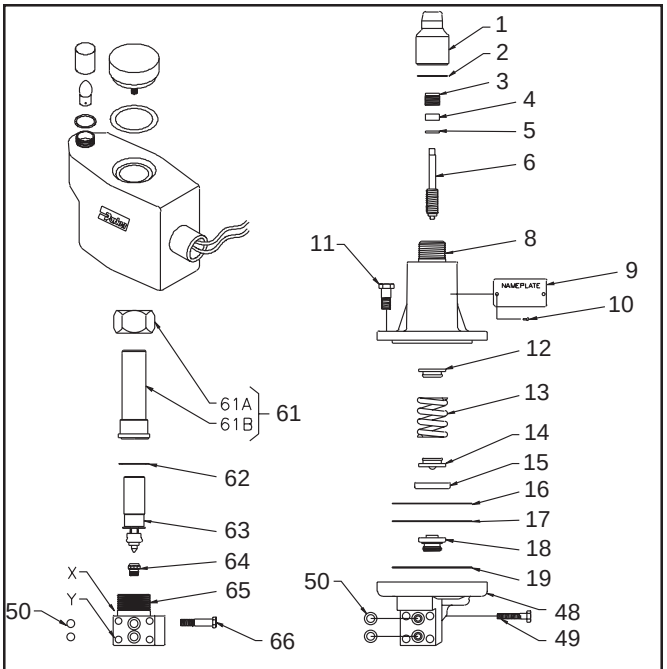
The regulator should be installed in a location where it is easily accessible for adjustment and maintenance. The location should be such that the regulator can not be easily damaged by material handling equipment. When it is necessary to insulate the regulator (and companion strainer), the insulation should be installed to provide access to the regulator (and companion strainer) for adjustment and maintenance. Do not insulate the solenoid coil and coil housing. Proper indicating gauges should be installed to be easily visible to the operating engineer for system checking and adjusting purposes.

Disassembly and Assembly

Refer to the exploded views, Figs. 6 and 7, in this section.

Before disassembling any A4A type regulator, read the information in this bulletin and Bulletin RSB, Safety Procedures for Refrigerating Specialties Division Refrigeration Control Valves.

Before a regulator is removed from the line or disassembled in the line, make sure that all refrigerant has been removed from the regulator, including the bonnet where applicable, and the close coupled strainer. The regulator must be isolated from the rest of the system in a safe manner. When pumping down to remove the refrigerant, the manual opening stem 33A must be turned out (counter clockwise) to make sure the valve is open.



S6A MODULAR SOLENOID PILOT
(For A4 - Port Sizes 20-100mm
3/4" - 4")

A2D2, A2D MODULAR
PRESSURE PILOT
A2D2 Port Sizes 20-50mm
(3/4" - 2")
A2D Port Sizes 65-100mm
(2½" - 4")

Fig. 7

Disassembly and Assembly (continued)

All A4A Regulators General Procedure

The construction of the regulator and the method of disassembly are relatively simple, but some procedures must be followed to avoid damage. The following describes the procedure for the basic A4A; special instructions for other types are included in other appropriate sections.

Disassembly - Take care when removing Seal Caps 1 and 44 in case some refrigerant may be trapped inside. Back the Adjusting Stem 6 all the way out to remove any pressure from Range Spring 13 otherwise damage to Diaphragm 17 or Pilot Seat 18 may occur. Remove Bonnet 8 by carefully removing Cap Screws 11. Take care not to damage Diaphragm Follower 15. Remove Adapter 28 by removing Cap Screws 31. Turn the Manual Opening Stem 33A all the way in until the flats on the stem barely protrude from the stuffing box nut. Push Piston 30 down against the spring force. The piston should move freely down and be returned by the spring force. If the piston is jammed or sticky, remove Bottom Cap Assembly which includes Items 33 through 42 by removing Cap Screws 39 or unscrewing Bottom Cap, 20mm through 32mm (3/4" through 1-1/4"). Using a hard wood dowel rod inserted through the bottom of the valve, tap the piston upward and out. Thoroughly clean all parts. If jamming has taken place and the piston and bore are scored, remove all burrs by polishing the piston, bore and throttling plug with fine crocus cloth. Inspect the seating area of the Throttling Plug 33 for damage or erosion. If damaged it should be replaced. It would be advisable to replace the entire bottom cap assembly. Inspect all gaskets and "O" rings for damage and replace where necessary.

Assembly - When reassembling the valve, all internal parts should be clean, dry and lightly oiled with refrigerant oil, except "O" rings. Apply silicone grease to the "O" rings. Care must be taken especially when the parts are cold since moisture can condense on parts and cause rapid rusting. When replacing gaskets, they should be oiled very lightly with refrigerant oil before assembly. Install bottom cap assembly first and tighten in place. Carefully replace the piston; never try to force it in place. Align the Adapter Gasket 29 carefully with the proper holes in the adapter and valve body and fasten adapter in place. Before assembling the bonnet be sure the Adjusting Stem 6 is turned all the way out and that the Bonnet 8 and Diaphragm Follower 15 are properly aligned, otherwise damage to the diaphragm and pilot seat may occur. Place Gasket 19 in the adapter and align Gasket 16 and Diaphragm 17 to the center of the bonnet. The raised center of the diaphragm must be towards the bonnet. For range "D" use two diaphragms. Tighten Cap Screws 11 evenly. The ideal tightening torque is 1.5 Kg-m (11 ft. lbs.). Valve is now ready to be adjusted for normal operation.

If close coupled strainer is used, it may be cleaned before putting the valve back in operation. The regulator must be tested for leaks with refrigerant gas or other appropriate gas before the system is put into operation.

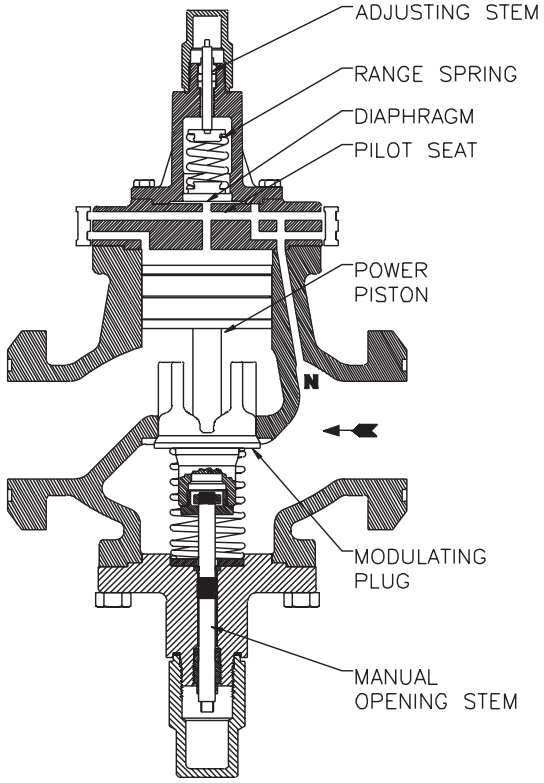
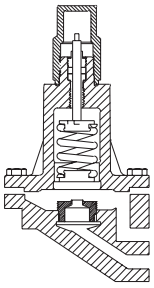
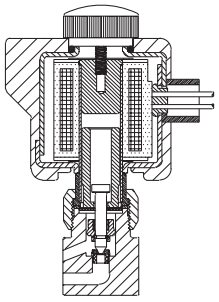


Fig. 8 (A4AZ)



A2D
MODULAR PRESSURE PILOT

MODUPLATE



S6A
MODULAR SOLENOID PILOT

Fig. 9

Disassembly and Assembly (continued)

Basic Modules Disassembly and Assembly

Refer to exploded views (Figs. 10 and 11) and also page 3 for explanation of "Basic Adaptomode Functions" to assist in clarification of module placement, as discussed in this section. Before disassembling and assembling any modules, refer to page 4 of this bulletin and to Bulletin RSB, Safety Procedure for Refrigerating Specialties Division Refrigeration Control Valves.

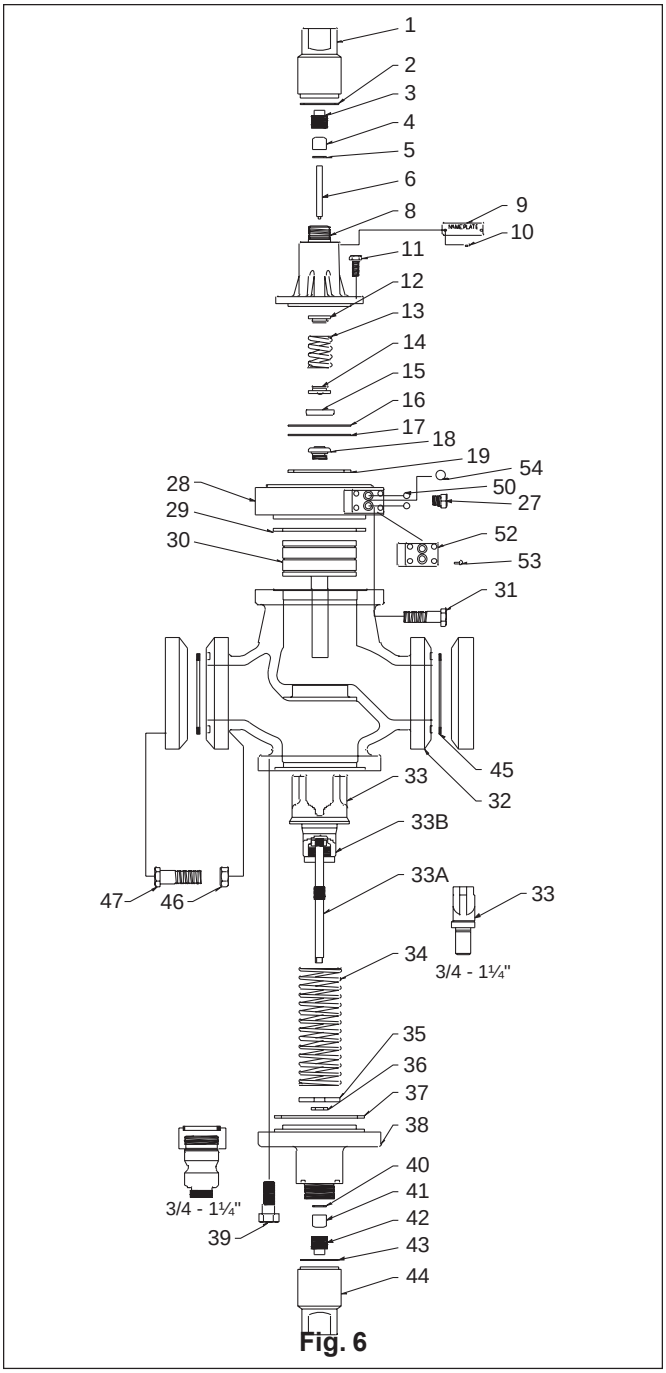


Fig. 6

Modudapter

The Modudapter 28 will accommodate the Modular Pilots and Moduplates illustrated on page 3. When assembling make sure the Modudapter gauge port is directly lined up with the inlet of the regulator. Passage N must communicate upstream pressure through the hole in Adapter Gasket 29 as well as into Modudapter 28 and thence to the pilot modules. It is imperative that proper alignment of these items be made to assure regulator function.

Before disassembly, make sure all refrigerant has been removed from the regulator and strainer, if used.

Protect the surfaces of Pads 1 and 2 of the Modudapter at all times since these surfaces determine the sealing tightness of the "O" Rings.

A2D, A2D2 Modular Pressure Pilots (Figs. 11 and 12)
These pressure pilots are used where a dual pressure regulator is desired and is mounted on Pad 2. Follow the disassembly and assembly procedure for the A4A pilot (pages 4 and 5). When mounting the pilot, place the "O" Rings 50 into the proper grooves and tighten the Cap Screws 49 evenly. The ideal tightening torque is 1.1 Kg-m (8 ft. lbs).

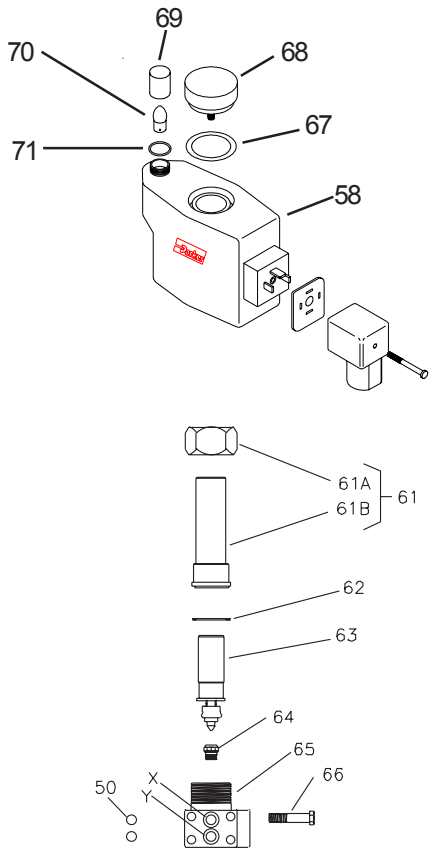
S6A Modular Solenoid Pilot (Figs. 10 and 12)
This solenoid pilot may be mounted on either Pad 1 or 2 depending on the function desired (see pages 2 and 3). Before working on any solenoid pilot, make sure the coil is de-energized and will remain so during the servicing period.

Disassembly (Fig. 10) - Remove Coil Housing Screw 55 and pull entire Coil and Housing Assembly, 56 through 60, upward and off of Bonnet-Tube Assembly 61. Carefully remove Bonnet-Tube Assembly. Lift out Plunger-Needle Assembly 63, avoid damaging the needle. Remove Seat Assembly 64 by using a 7/16" (11 mm) socket wrench. Inspect all parts, clean or replace as needed.

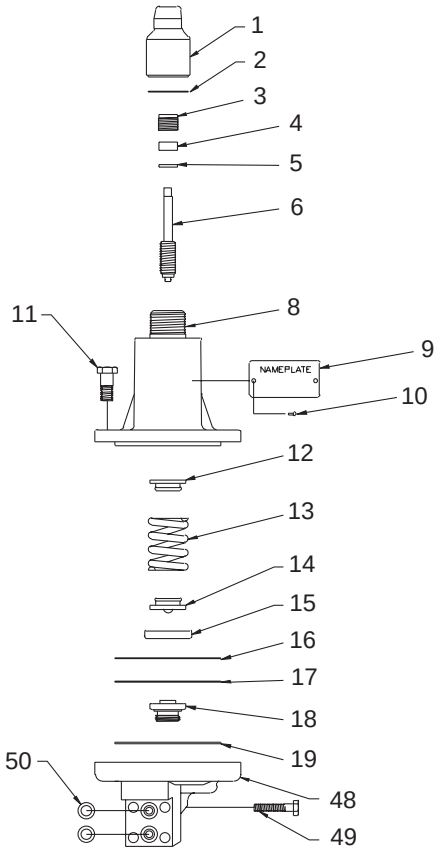
Assembly (Fig. 10) - Reinstall the Seat Assembly and tighten (no gasket needed). Carefully insert the Plunger Needle Assembly. Replace the Gasket 62 and reinstall Bonnet-Tube Assembly. Replace entire Coil and Housing Assembly and tighten Coil Housing Screw.

Make sure the solenoid coil is of the proper voltage and frequency.

When mounting the solenoid pilot, place the "O" Rings 50 into the proper grooves and tighten the Cap Screws 66, evenly. The ideal tightening torque is 1.1 kg-m (8 ft. lbs.).



S6A MODULAR SOLENOID PILOT
For A4 Port Sizes 20 - 100mm (¾" - 4")
Fig. 10



A2D2, A2D MODULAR PRESSURE PILOT
A2D2 Port Sizes 20-50mm (3/4" - 2")
A2D Port Sizes 65-100mm (2½" - 4")

Moduplate (Figs. 6 and 12)

These Moduplates 52 are used to direct the flow or stop the flow through the flow paths of the Modudapter. Protect the "O" Ring surfaces at all times. When mounting the Moduplate, place "O" Rings 50 (or "O" Ring 54) into the proper grooves (lubricate with silicone grease) and tighten the Cap Screws 53 evenly to avoid distortion and assure proper sealing. The ideal tightening torque is 1.1 Kg-m (8 ft. lbs.).

Maintenance and Service General Procedure:

Before disassembly of regulator, make certain that all refrigerant has been removed (pumped out) from the regulator and its companion strainer where one is used. Read Safety Bulletin RSB.

Dirt In the system Is the greatest single cause of regulator malfunction. All screens or filters must be cleaned or replaced when they become dirty. At start up it is especially important that these Items are cleaned or changed frequently. When the RSF close-coupled companion strainers are used, maintain according to instructions in Bulletin 00-10. Moisture in halocarbon systems in particular can cause corrosion or form ice, causing the piston to freeze in position. Filter-driers should be used and maintained for halocarbon systems.

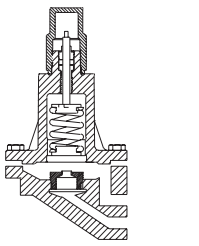
Before deciding to disassemble a regulator for servicing, the following investigations should be made:

Check the manual opening stem; it should be turned in for automatic operation.

Check the regulator setting to make sure it is properly adjusted. Turn adjusting screw slowly to see if regulator responds. Check regulator pressure range; if wrong, range spring must be replaced.

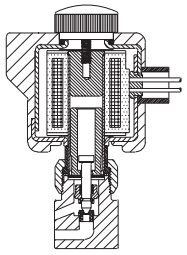
Check other system components for proper operation. Make sure that the regulator receives the proper electrical signal where modular pilot solenoids are used. Make sure they are same as the power supply.

Check hand valves in the system to make sure they are open or closed as required and the system is receiving liquid or gas as the case may be.



A2D
MODULAR PRESSURE PILOT

MODUPLATE



S6A
MODULAR SOLENOID PILOT

Fig. 12

Solenoid Coils and Coil Housing

The solenoid coils and coil housing, identified and described on page 8 for the Type S6A Solenoid Pilot, are an improved design which provide a higher MOPD and a cooler coil resulting in longer life. The new coil and its heavily plated, rust resisting housing are interchangeable with the obsolete coil and cast iron housing as follows: The new coil, which has its Part Number stamped on the side, can be used in both the old and new coil housing; the old coil which has its 30-0030-XX Series Part Number stamped on one end, can be used in the old, cast iron housing only. There is no bottom marking on the new coil; either end may be positioned up. The color coding of lead wires for various voltage and frequencies has not been changed. The fuses used with the old coils are suitable for the new coils; the new coil power consumption is 33 Watts instead of 37.

The S6A pilot solenoid valve is also available with a coil using a quick electrical connector or plug, permitting easy wiring connection with an exposed rubber covered cable instead of a rigid or flexible conduit and enclosed wiring. This type of coil cannot be used with the old, cast Iron housing.

The new coils and new housing described above for the S6A valve are also used with Solenoid Valve Types S4, S5, S6N, S7, S8 and S9.

Maintenance and Service (continued)

Electrical

The Refrigerating Specialties Division molded water resistant Class "B" solenoid coil is designed for long life and powerful opening force. The standard coil housing meets NEMA 3R and 4 requirements. This sealed construction can withstand direct contact with moisture and ice. The coil housing far exceeds the requirements of NEMA Standard ICS, 1-110.57 salt spray test for rust resistance.

By definition, Class "B" coil construction will permit coil temperatures, as measured by resistance method, as high as 130°C (266°F). Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures so the maximum coil temperature is not exceeded. Conversely, low fluid temperatures permit higher ambient temperatures.

The molded Class "B" coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies, as well as for direct current. Coils are also available as transformer type with a 6 volt secondary winding for use with the Refrigerating Specialties Division Pilot Light Assembly (see current copy of Bulletin 60-10, "Pilot Light Assembly and Solenoid Transformer Coil").

The solenoid coil must be connected to electrical lines with volts and Hertz same as stamped on coil. The supply circuits must be properly sized to give adequate voltage at the coil leads even when other electrical equipment is operating. The coil is designed to operate with line voltage from 85% to 110% of rated coil voltage. Operating with a line voltage above or below these limits may result in coil burnout. Also, operating with line voltage below the limit will definitely result in lowering the valve opening pressure differential. Power consumption during normal operation will be 33 watts or less.

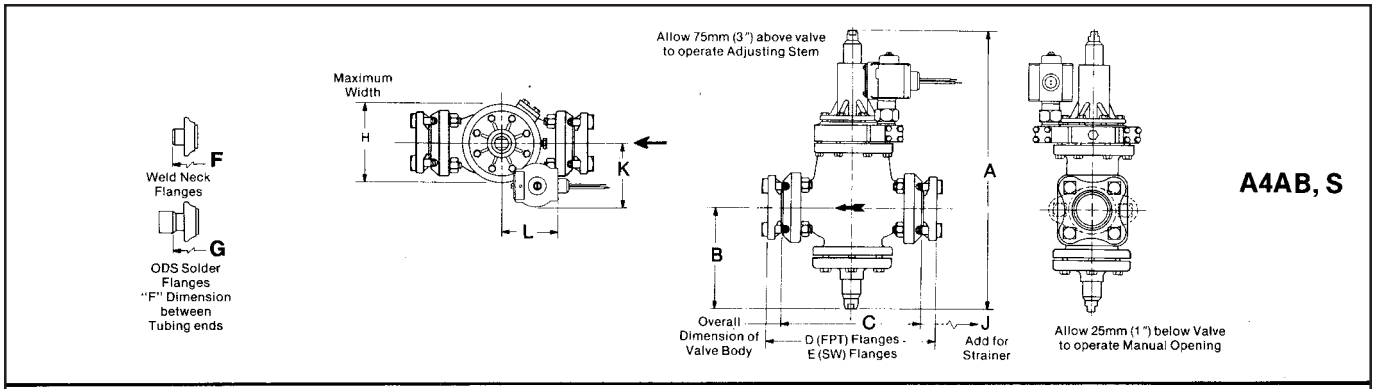
Inrush and running current is listed below:

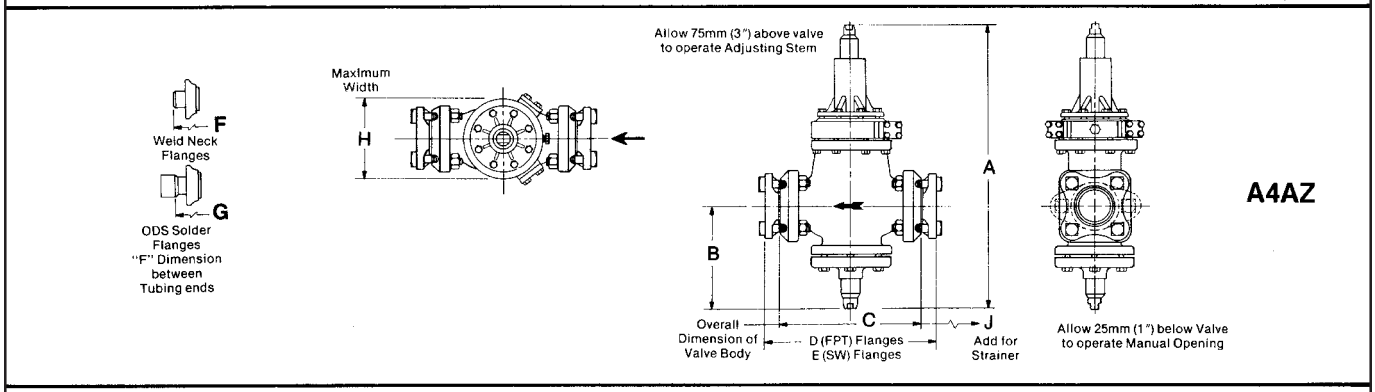
Standard Coil Vohs/Hertz	Inrush Current (Amps)	Running Current (Amps)	Fuse Size (Amps)
120/60 (Blue leads)	1.1860	0.46	1
208/60 (Blue & Red leads)	0.63	0.26	1
240/60 (Red leads)	0.60	0.23	1
440/60 (Yellow & Red leads)	0.39	0.13	1
115/50 (Yellow & Blue leads)	1.22	0.21	1
230/50 (Yellow leads)	0.65	0.26	1
Other	Contact Factory		

On transformer coil the 6 volt leads are always black.

SERVICE POINTERS (Check General Procedure)

SYMPTOM	PROBABLE REASON	CORRECTION
Regulator does not shut off flow.	Diaphragm or seat dirty, damaged or frozen.	Clean or replace. Clean strainer.
	Diaphragm follower stuck or damged.	Clean or replace. Install follower carefully.
	Piston jammed with excess dirt.	Remove and polish piston and bore with crocus cloth. Clean valve and strainer.
	Throttling plug leaking due to excess dirt or damage.	Clean or replace. If used on liquid, check for erosion due to excessive flash gas. Reduce flash gas by subcooling or by reducing pressure drop across valve by providing restriction at valve outlet.
	Diaphragm ruptured or badly deformed.	Replace. If Range "D" make sure has 2 diaphragms.
	A4AB Modular Solenoid Pilot seat leaking.	Check seat and needle. Replace as needed,
	A4AS Modular Solenoid Pilot seat leaking.	Check seat and needle. Replace as needed.
	Diaphragm and seat eroded due to flash gas.	Replace. Reduce flash gas by subcooling or by reducing pressure drop across regulator by providing restriction at valve outlet.
	Modular Solenoid Pilot not closing.	Check power at leads, make sure coil is de-energized.
Regulator does not open	A4A (inlet) Pressure Regulator Diaphragm ruptured or badly deformed.	Replace. It Range D make sure has 2 diaphragms.
	Diaphragm follower stuck, damaged or frozen.	Clean or replace. Install follower carefully.
	A4AS/A4AB Modular Solenoid Pilot not opening.	Pressure drop across valve too high; over 21 bar (300 psig). Lower pressure drop. Improper power supply. Correct. Replace solenoid coil.
	Piston worn, too much clearance.	Replace piston. Check for reason. If used on liquid, check for flash gas.
Regulator Operation erratic.	Diaphragm or seat dirty or damaged.	Clean or replace. Clean strainer.
	Diaphragm follower has dirt on the outside diameter or outside diameter is damaged.	Clean or replace.
	Other system components, line controllers, thermostats, etc., erratic.	Adjust, repair or replace.
	Regulator too far oversized.	Check load. Replace with smaller regulator or investigate use of reduced capacity plug.
Pressure drop across regulator too high.	Inlet or outlet restricted.	Check for restriction. Clean strainer.
	Regulator too small.	Open manually to be sure valve is full open. Replace with proper size regulator.
	Large amount of flash gas in liquid line.	Reduce flash gas by subcooling. Reduce line restriction by increasing line size, particularly at the regulator outlet. Replace with larger regulator.
	High pressure drop causes high rate of expansion of gas at regulator outlet.	Increase pipe size at the outlet of the regulator.
	Regulator does not open all the way.	Check piston for wear. Replace, it needed.





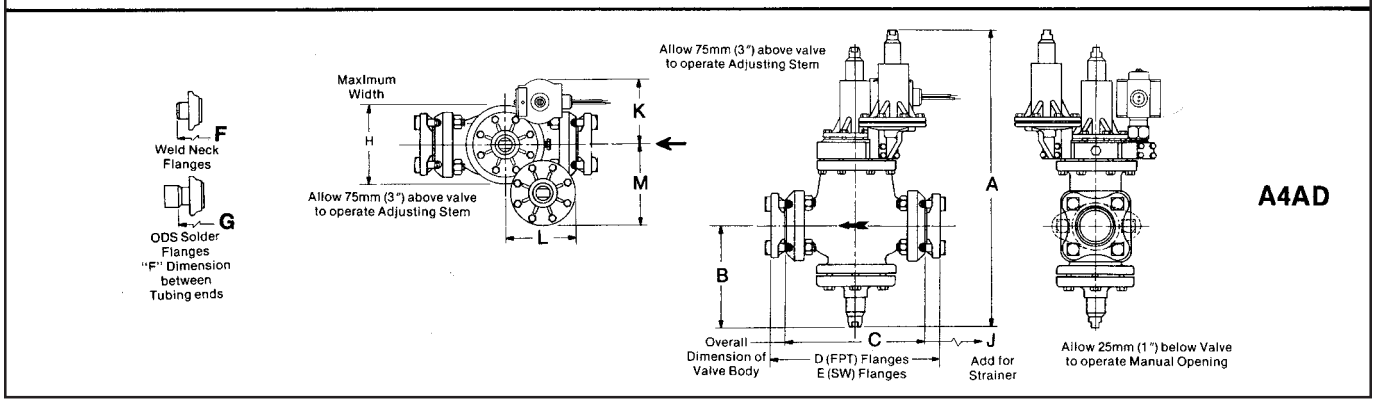
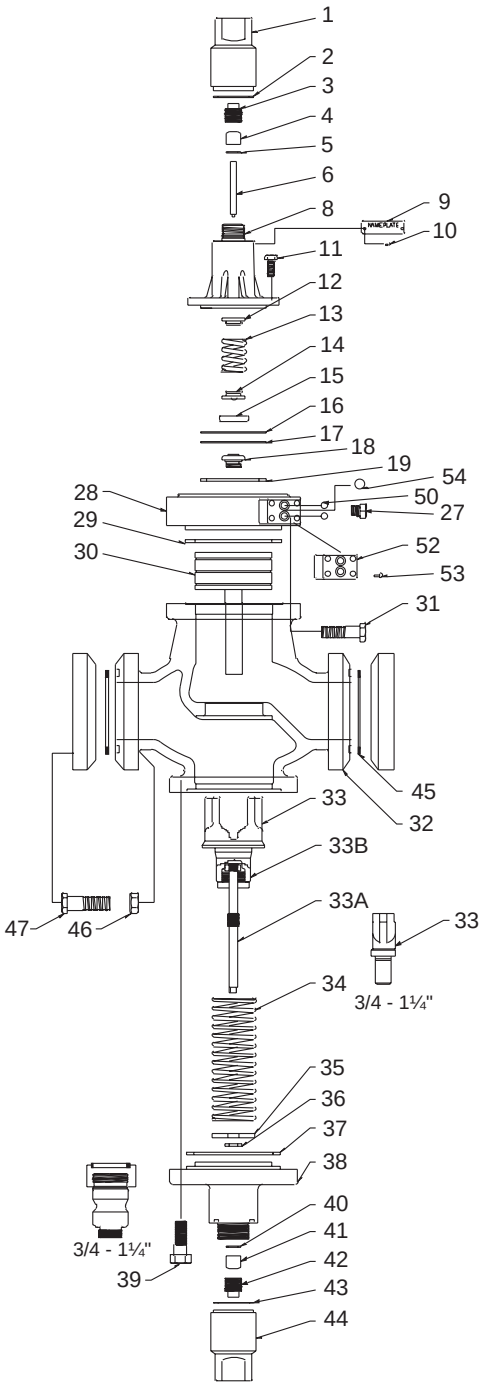


TABLE OF DIMENSIONS FOR INLET PRESSURE REGULATORS Types A4AS, A4AB, A4AD and A4AZ																Types A4AS, A4AB & A4AZ 100mm (4")			Type A4AD only 100mm (4")		
Type	20mm & 25mm (3/4 & 1")			32mm (1-1/4")			40mm & 50mm (1-5/8 & 2")			65mm (2-1/2")			75mm (3")								
DIMENSION		mm	inch		mm	inch		mm	inch		mm	inch		mm	inch		mm	inch		mm	inch
A		429	16.9		447	17.6		500	19.7		513	20.2		632	24.9		685	27.0		685	27.0
B		148	5.8		162	6.3		177	6.9		181	7.1		273	10.7		292	11.5		292	11.5
C		164	6.2		203	8.0		251	9.9		251	9.9		311	12.2		339	14.1		339	14.1
(D) (FPT) for PIPE SIZES SHOWN	1/2"	216	8.5	1-1/4"	256	10.1	1-1/2"	307	12.1	2-1/2"	331	13.0	3"	389	15.3	4"	450	17.7	4"	450	17.7
	3/4"	216	8.5																		
	1"	216	8.5	1-1/2"	256	10.1	2"	307	12.1												
	1-1/4"	216	8.5																		
(E) (SW) FOR PIPE SIZES SHOWN	1/2"	216	8.5	1-1/4"	256	10.1	1-1/2"	307	12.1	2-1/2"	331	13.0	3"	389	15.3	4"	450	17.7	4"	450	17.7
	3/4"	216	8.5																		
	1"	216	8.5	1-1/2"	256	10.1	2"	307	12.1												
	1-1/4"	216	8.5																		
(F) (WN) FOR PIPE SIZES SHOWN	—	—	—	1-1/4"	300	11.8	1-1/2"	364	14.3	2-1/2"	401	15.6	3"	478	18.8	4"	571	22.5	4"	571	22.5
	3/4"	254	10.0																		
	1"	261	10.3	1-1/2"	304	12.0	2"	371	14.6												
	1-1/4"	261	10.3																		
(G) (ODS) FOR TUBE SIZES SHOWN	7/8"	239	9.4	1-3/8"	269	10.6	1-5/8"	358	14.1	2-5/8"	348	13.7	3-1/8"	414	16.3	4-1/8"	503	19.8	4-1/8"	503	19.8
	1-1/8"	239	9.4																		
	1-3/8"	231	9.1	1-5/8"	279	11.0	2-1/8"	338	13.3	3-1/8"	389	15.3	3-5/8"	432	17.0						
	1-5/8"	239	9.4	2-1/8"	305	12.0	2-5/8"	358	14.1												
H		117	4.6		117	4.6		140	5.5		159	6.2		178	7.0		222	8.8		222	8.8
J		98	3.9		178	7.0		251	9.9		314	12.4		314	12.4		363	14.3		363	14.3
K		112	4.4		112	4.4		117	4.6		124	4.9		142	5.6		158	6.2		157	6.2
L		122	4.8		122	4.8		135	5.3		133	5.2		122	4.8		152	6.0		140	5.5
M		138	5.4		138	5.4		140	5.5		150	5.9		170	6.6					190	7.7

Repair Kits for A4AS, A4AB, A4AD and A4AZ



Item No.	Description		20mm (3/4") Kit No.	Qty	25mm (1") Kit No.	Qty
1	Seal Cap		Only Avail. with Kit	1	Only Avail. with Kit	1
2	Seal Cap Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
1-2	Cap Kit, Seal		202110	1	202110	1
3	Nut, Packing		Only Avail. with Kit	1	Only Avail. with Kit	1
4	Packing, Stem		Only Avail. with Kit	1	Only Avail. with Kit	1
5	Washer, Flat		Only Avail. with Kit	1	Only Avail. with Kit	1
3-5	Packing Kit, Stem		202100	1	202100	1
6	Stem, Adjusting		Only Avail. with Kit	1	Only Avail. with Kit	1
4-6	Stem Kit, Adjusting		202120	1	202120	1
12	Plate, Spring, Upper		Only Avail. with Kit	1	Only Avail. with Kit	1
13	Spring, Comp.		Only Avail. with Kit	1	Only Avail. with Kit	1
14	Plate, Spring, Lower		Only Avail. with Kit	1	Only Avail. with Kit	1
15	Follower, Diaphragm		Only Avail. with Kit	1	Only Avail. with Kit	1
3-5,6,	Spring/	Rge. A/V	202006	1	202006	1
12-15	Stem Kit	Rge. D	202007	1	202007	1
8	Bonnet		Only Avail. with Kit	1	Only Avail. with Kit	1
11	Screw, Hx.Hd.		Only Avail. with Kit	8	Only Avail. with Kit	8
16	Bonnet Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
1-6,8,	Spring Kit	Rge. A/V	202008	1	202008	1
11-16	with Bonnet	Rge. D	202009	1	202009	1
12-14,	Spring Kit,	Rge. A/V	202481	1	202481	1
16	less Bonnet	Rge. D	202482	1	202482	1
17	Diaphragm		Only Avail. with Kit	1	Only Avail. with Kit	1
19	Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
16,17,19	Diaphragm Kit	Rge. A/V	200770	1	200770	1
17	Diaphragms	Rge. D	Only Avail. with Kit	2	Only Avail. with Kit	2
16,17,19	Diaphragm Kit	Rge. D	200771	1	200771	1
16-19	VC Vacuum Cartridge		Only Avail. with Kit	1	Only Avail. with Kit	1
	Pilot Seat/	Rge. A	202000	1	202000	1
16-19	Diaphragm Kit	Rge. V	202004	1	202004	1
	(Not A4AO)	Rge. D	202002	1	202002	1
27	Plug Pkg, 1/4" NPT		202552	5	202552	5
28	Adapter		Only Avail. with Kit	1	Only Avail. with Kit	1
29	Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
19,27,28, 29,31	Adapter Kit		200591	1	200591	1
30	Piston/Stem Assembly		Only Avail. with Kit	1	Only Avail. with Kit	1
29,30	Piston Kit		200760	1	200760	1
32	Valve Body		Not Available		Not Available	
34	Spring, Comp.		Only Avail. with Kit	1	Only Avail. with Kit	1
35	Washer, Flat		Only Avail. with Kit	1	Only Avail. with Kit	1
36	Wiper, Dirt		Only Avail. with Kit	1	Only Avail. with Kit	1
37	"O" Ring		Only Avail. with Kit	1	Only Avail. with Kit	1
34-37	Spring Kit,	(A4A)	202300	1	202300	1
	Closing	(A4AK)	202298	1	202298	1
33	Plug/Stem Assembly		Only Avail. with Kit	1	Only Avail. with Kit	1
40	Washer, Flat		Only Avail. with Kit	1	Only Avail. with Kit	1
41	Packing, Stem		Only Avail. with Kit	1	Only Avail. with Kit	1
42	Nut, Packing		Only Avail. with Kit	1	Only Avail. with Kit	1
33,34-37,	Full Cap. Plug		202021	1	202022	1
40-42	Kit, Modul.					
33,34-37,	50% Cap. Plug		202029	1	(*)	
40-42	Kit, Modul.					
33.34-37,	35% Cap. Plug		Not Available		Not Available	
40-42	Kit, Modul.					
33,34-37,	17% Cap. Plug		202030	1	(*)	
40-42	Kit, Modul.					

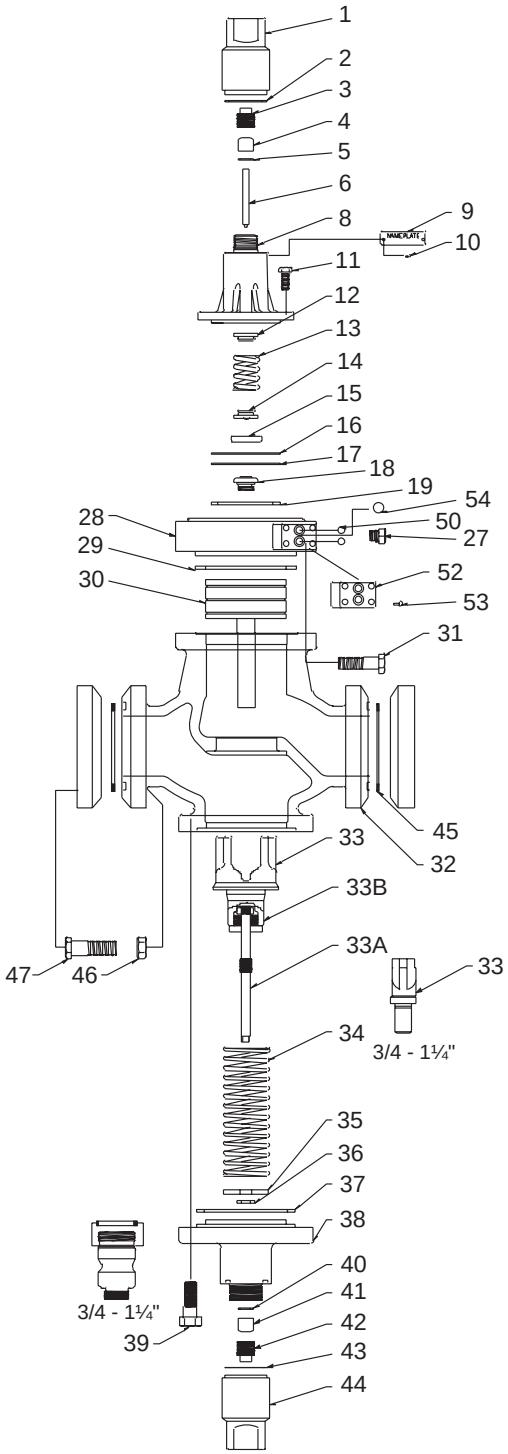
* All Plug Kits and Bottom Assembly Kits for 3/4" Port Size Valves can be used in the 1" Port Size Valves for reducing capacity.

Repair Kits for A4AS, A4AB, A4AD and A4AZ

	32mm (1-1/4)		40mm (1-5/8")		50mm (2")		65mm (2-1/2")		75mm (3")		100mm (4")	
Item No.	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty
1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
2	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
1-2	202110	1	202110	1	202110	1	202110	1	202110	1	202110	1
3	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	only Avail w th Kit	1
4	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
5	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	I	Only Avail. with Kit	1
3-5	202100	1	202100	1	202100	1	202100	1	202100	1	202100	1
6	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
4-6	202120	1	202120	1	202120	1	202120	1	202120	1	202120	1
12	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
13	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
14	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
15	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
3-5,6,	202006	1	202006	1	202006	1	202006	1	202006	1	202006	1
12-15	202007	1	202007	1	202007	1	202007	1	202007	1	202007	1
8	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
11	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8
16	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
1-6,8,	202008	1	202008	1	202008	1	202008	1	202008	1	202008	1
11-16	202009	1	202009	1	202009	1	202009	1	202009	1	202009	1
12-14,	202481	1	202481	1	202481	1	202481	1	202481	1	202481	1
16	202482	1	202482	1	202482	1	202482	1	202482	1	202482	1
17	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
16,17,19	200770	1	200770	1	200770	1	200770	1	200770	1	200770	1
17	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2
16,17,19	200771	1	200771	1	200771	1	200771	1	200771	1	200771	1
16-19	Only Avail. with Kit	1	Only Avail. with Kit	1	202004	1	202004	1	202004	1	202004	1
16-19	202000	1	202000	1	202000	1	202001	1	202001	1	202001	1
	202004	1	202004	1	202004	1	202004	1	202004	1	202004	1
	202002	1	202002	1	202002	1	202003	1	202003	1	202003	1
27	202552	5	202552	5	202552	5	202552	5	202552	5	202552	5
28	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19,27,28, 29,31	200593	1	200595	1	200595	1	200597	1	200599	1	200606	1
30	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29,30	200767	1	200389	1	200389	1	200391	1	200393	1	200227	1
32	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
34	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
35	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
36	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
37	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
34-37	202301	1	202302	1	202302	1	202303	1	202304	1	202305	1
	202299	1	202302	1	202302	1	202303	1	202304	1	202305	1
33	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
40	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
41	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
42	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
33,34-37,	202023	1	202024	1	202025	1	202026	1	202027	1	202028	1
40-42												
33,34-37,	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
40-42												
33,34-37,	202031	1	202032	1	(**)		202033	1	202034	1	202035	1
40-42												
33,34-37,	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
40-42	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	

**All Plug Kits and Bottom Assembly Kits for 1-5/8" Port Size Valves can be used in the 2" Port Size Valves for reducing capacity.

Repair Kits for A4AS, A4AB, A4AD and A4AZ



			20mm (3/4")		25mm (1")	
Item No.	**Description**		**Kit No.**	**Qty**	**Kit No.**	**Qty**
37	"O" Ring		Only Avail. with Kit	1	Only Avail. with Kit	1
38	Cover, Bottom		Only Avail. with Kit	1	Only Avail. with Kit	1
40	Washer, Flat		Only Avail. with Kit	1	Only Avail. with Kit	1
41	Packing, Stem		Only Avail. with Kit	1	Only Avail. with Kit	1
37,38,40,41	Cover Kit		200761	1	200761	1
42	Nut, Packing		Only Avail. with Kit	1	Only Avail. with Kit	1
40-42	Packing Kit, Stem		202100	1	202100	1
43	Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
44	Seal Cap		Only Avail. with Kit	1	Only Avail. with Kit	1
43,44	Seal Cap, Kit		202110	1	202110	1
33-38,	Full Cap. Bottom	A4A	202010	1	202011	1
40-44	Assembly Kit	A4AK	202018	1	202019	1
33-38,	50% Cap. Bottom	A4A	202347	1	(*)	1
40-44	Assembly Kit	A4AK	202348	1	(*)	1
33-38,	17% Cap. Bottom	A4A	202346	1	(*)	1
40-44	Assembly Kit	A4AK	Not Available		Not Available	
3-6, 12-19,	Full Cap. Repair	Rge. A	202041	1	202044	1
29, 30, 33-37,	Kit, Reg. (All	Rge. V	202040	1	202043	1
40-42	except A4AK)	Rge. D	202042	1	202045	1
3-6, 12-19,	50% Cap. Repair	Rge. A	202352	1	(*)	1
29-30, 33-37,	Kit, Reg. (All	Rge, V	202354	1	(*)	1
40-42	except A4AK)	Rge. D	202353	1	(*)	1
3-6, 12-19,	17% Cap. Repair	Rge. A	202349	1	(*)	1
29-30, 33-37,	Kit, Reg. (All	Rge. V	202351	1	(*)	1
40-42	except A4AK)	Rge. D	202350	1	(*)	1
112	Cover, Top		Only Avail. with Kit	1	Only Avail. with Kit	1
29,112	A4AR Cover Kit		200680	1	200680	1
2,16(2),19(2),	**Gasket Kits (includes complete set of gaskets plus "O" Rings If applicable)**					
25, 26, 29, 37, 43,45(3)	Gasket Kit A4/S4		202112		202112	
	Indv'I Gaskets, "O" Rings & Valve Pk'g sold & pkgd in qtys only as Indicated.					
29	Gasket Pkg, Adapter		202406	5	202406	5
37	"O" Ring/Gasket Pkg. Bottom Cap		202384	3	202384	3
43	Gasket Pkg, Seal Cap (Bottom)		202408	12	202408	12
2	Gasket Pkg, Seal Cap (Top)		202408	12	202408	12
45	Gasket Pkg, Flange		202079	12	202079	12
4	Packing Pkg, Stem (Top)		202478	25	202478	25
41	Packing Pkg, Stem (Bottom)		202478	25	202478	25
	Bolt Package Kits					
11	Bolt Package, A4A Bonnet		202246	8	202246	8
31	Bolt Package, Adapter		202248	8	202249	8
39	Bolt Package, Bottom Cap		Not Required		Not Required	
	Flange Bolt Package Includes bolts and nuts; no gaskets					
46	Nut		5/8"-11	2	5/8"-11	2
47	Bolt		5/8"-11x3"	2	5/8"-11x3"	2
46,47	Bolt Kit, Flange		201585	1	201585	1
50,52-54	Moduplate Kit "MP"		200518		200518	
52	Moduplate		Only Avail. with Kit	1	Only Avail. with Kit	1
54	O-Ring, "B"		Only Avail. with Kit	1	Only Avail. with Kit	1
50	O-Ring, "S", "D"		Only Avail. with Kit	2	Only Avail. with Kit	2

	Flange Kit	**FK-25**				**FK-25**			
	Specify Flange, Style, Connection, Size	**FPT, SW, WN**		**ODS**		**FPT, SW, WN**		**ODS**	
	Kit includes 2 Flanges only Connections Available	Std	Also Avail.	Std	Also Avail.	Std	Also Avail.	Std	Also Avail.
	Sizes in Inches	3/4	1, 1-1/4	7/8	1-1/8, 1-3/8	1	3/4 1-1/4	1-1/8	1-3/8 1-5/8

* All Plug Kits and Bottom Assembly Kits for 3/4" Port Size Valves can be used in the 1" Port Size Valves for reducing capacity.

Repair Kits for A4AS, A4AB, A4AD and A4AZ

	32mm (1-1/4")		40mm (1-5/8")		50mm (2")		65mm (2-1/2")		75mm (3")		100mm (4")	
Item No.	**Kit No.**	**Qty**	**Kit No.**	**Qty**	**Kit No.**	**Qty**	**Kit No.**	**Qty**	**Kit No.**	**Qty**	**Kit No.**	**Qty**
37	Only Avail. with Kit	1										
38	Only Avail. with Kit	1										
40	Only Avail. with Kit	1										
41	Only Avail. with Kit	1										
37,38,40,41	200761	1	Not Available		Not Available		Not Available		Not Available		Not Available	
42	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
40-42	202100	1	202100	1	202100	1	202100	1	202101	1	202101	1
43	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
44	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
43,44	202110	1	202110	1	202110	1	202110	1	202111	1	202111	1
33-38,	202012	1	202013	1	202014	1	202015	1	202016	1	202017	1
40-44	202020	1	202013	1	202014	1	202015	1	202016	1	202017	1
33-38, 40-44	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
33-38, 40-44	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
3-6, 12-19,	202047	1	202050	1	202053	1	202056	1	202059	1	202062	1
29, 30, 33-37,	202046	1	202049	1	202052	1	202055	1	202058	1	202061	1
40-42	202048	1	202051	1	202054	1	202057	1	202060	1	202063	1
3-6, 12-19, 29-30, 33-37, 40-42	NOTE: 50% Capacity Repair Kit is not available for port sizes 1-1 /4" to 4". Capacity reduction can be obtained through use of field installing "Reduced Capacity Plug Kits". See description and contents of these kits elsewhere this section.											
3-6, 12-19, 29-30, 33-37, 40-42	NOTE: 17% Capacity Repair Kit is not available for port sizes 1-1 /4" to 4". Capacity reduction can be obtained through use of field installing "Reduced Capacity Plug Kits". See description and contents of these kits elsewhere this section.											
112	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29,112	200669	1	200673	1	200673	1	200690	1	200676	1	200677	1
7,16(2),19(2)	**Gasket Kits (includes complete set of gaskets plus "O" Rings if applicable)**											
25,26,29,37 43,45(3)	202113		202114		202114		202115		202116		202117	
Individual Gaskets, '10" Rings and Valve Packing sold and packaged In quantities only as Indicated.												
29	202407	5	202397	3	202397	3	202396	3	202399	3	202400	3
37	202384	3	202374	6	202374	6	202374	6	202382	3	202383	3
43	202408	12	202408	12	202408	12	202408	12	202404	5	202404	5
2	202408	12	202408	12	202408	12	202408	12	202408	12	202408	12
45	202080	12	202081	12	202081	12	202082	12	202083	12	202084	12
4	202478	25	202478	25	202478	25	202478	25	202478	25	202478	25
41	202478	25	202478	25	202478	25	202478	25	202479	5	202479	5
Bolt Package Kits												
11	202246	8	202246	8	202246	8	202246	8	202246	8	202246	8
31	202248	8	202249	8	202249	8	202249	8	202250	6	202250	6
39	Not Required		202251	6	202251	6	202251	6	202252	6	202252	6
Flange Bolt Package Includes bolts and nuts; no gaskets												
46	5/8"-11	4	5/8"-11	4	5/8"-11	4	3/4"-10	4	3/4"-10	4	7/8"-9	4
47	5/8"-11x2-3/4"	4	5/8"-11x3-1/4"	4	5/8"-11x3-1/4"	4	3/4"-10x3-3/4"	4	3/4"-10x3-3/4"	4	7/8"-9x4-1/2"	4
46,47	201595	1	201604	1	201604	1	201611	1	201611	1	201620	1
50,52-54	200518		200518		200518		200518		200518		200518	
52	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
54	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
50	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2

	FK-32				FK-40				FK-50				FK-65				FK-75				FK-100			
	FPT, SW WN		ODS		FPT, SW WN		ODS		FPT, SW WN		ODS		FPT, SW WN		ODS		FPT, SW WN		ODS		FPT, SW WN		ODS	
	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.
	1-1/4	1-1/2	1-3/8	1-5/8, 2-1/8	1-1/2	2	1-5/8	2-1/8, 2-5/8	2	1-1/2	2-1/8	2-5/8	2-1/2		2-5/8	3-1/8	3		3-1/8	3-5/8	4		4-1/8	

Item	Description		Qty.	Kit Number
1-2	Seal Cap Kit		1	202110
3-5	Packing Kit/Stem		1	202100
3-6,	Spring/Stem Kit	Rge. A/V	1	202006
12-15		Rge. D	1	202007
1-6,8	Bonnet/Spring Kit	Rge. A/V	1	202008
11-16		Rge. D	1	202009
12-14,	Spring Kit, Bonnet	Rge. A/V	1	202481
16		Rge. D	1	202482
16,17	Diaphragm Kit	Rge. A/V	1	200770
19		Rge. D	1	200771u
u Rge. D Diaphragm Kit has two (2) Diaphragms				
16-19	Seat Kit, Pilot	Rge. A	1	202001
		Rge. V	1	202004
		Rge. D	1	202003
48	Body			Not available separately
49-50	Bolt/"O" Ring Kit	Bolts	4	201572
		"O"Ring	2	onlyAvail.w/Kit

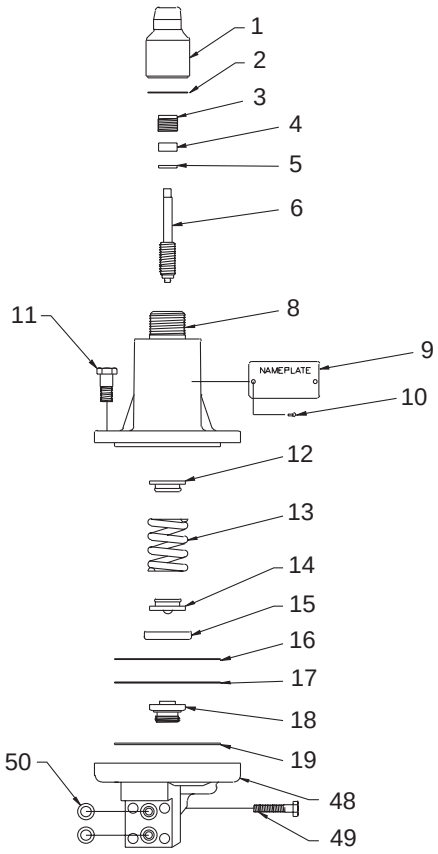
Note: Pressure Pilot A2D2 used on main valve sizes 3/4" to 2" port.
Pressure Pilot A2D used on main valve sizes 2-1/2" to 4" port.

Repair Kits indicated for the A2D2 and A2D are common parts used on the integral pressure pilot mounted on the A4A Series Regulator.

Spare or Additional A2D2 and A2D Repair Kit Packages

Note: The following items are included in the above Kits in the exact numbers as required for field repair. If additional "O" Rings, Gaskets or Stem Packing are desired for spares or future use, order from the following listing:

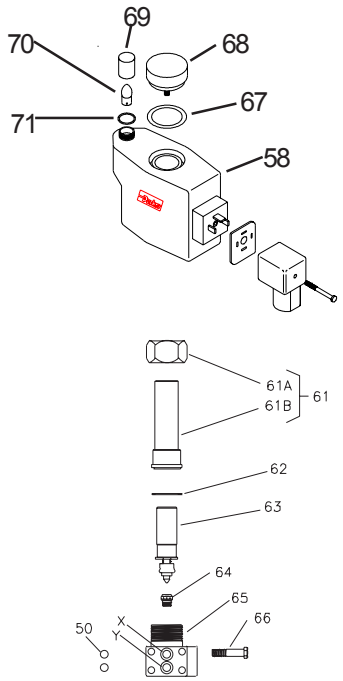
Item	Description	Qty.	Kit Package Number
2	Gasket Pkg./Seal Cap	12	202408
50	"O"Ring Pkg/Moduplate	12	202424
4	Stem Packing, Pkg.	25	202478



A2D2, A2D MODULAR PRESSURE PILOT
A2D2 Port Sizes 20-50mm (3/4" - 2")
A2D Port Sizes 65-100mm (2½" - 4")

Repair Parts Kits for S6A Modular Pressure Pilot Solenoid

Item	Description	Qty.	Kit Number
55	Screw	1	Only Available with Kit
58	Coil Assembly	1	Consult Factory
67	O-Ring	1	Only Available with Kit
68	Knob	1	Only Available with Kit
67, 68	Knob Kit	1	205047
69	Lens	1	Only Available with Kit
70	Bulb Kit	6	205282
71	O-Ring	1	Only Available with Kit
69, 71	Lens Kit	6	205279
61B	Tube Assembly, Solenoid	1	Only Available with Kit
61A	Nut, Solenoid Tube	1	Only Available with Kit
62	Gasket	1	Only Available with Kit
61A, 61B 62	Tube Kit, Solenoid	1	201036
50	"O" Ring	2	Only Available with Kit Also available in package. See below.
66	Bolts	4	Only Available with Kit
50,66	Bolt/"O" Ring Kit	1	201574
62	Gasket	1	Only Available with Kit
63	Plunger/Needle Assembly	1	Only Available with Kit
62,63	Plunger Kit, Needle	1	201019
62	Gasket	1	Only Available with Kit
63	Plunger/Needle Assembly	1	Only Available with Kit
62, 63	Plunger Kit, Needle (D.C only)	1	201021
62	Gasket	1	Only Available with Kit
63	Plunger/Needle Assembly	1	Only Available with Kit
64	Seat Assembly	1	Only Available with Kit
62,63,64	Plunger Seat Kit	1	201630
50	"O" Ring Pkg., Moduplate	12	202424
65	Body S6A	1	Not Available Separately



S6A MODULAR SOLENOID PILOT
For A4 Port Sizes 20 - 100mm (¾" - 4")

FLANGES

VALVE SIZE		À FPT FLANGES		WELDING FLANGES								Ã FLANGES				
		Nom. Pipe Size	Flange Pkg. No.	Nominal Pipe Size		Sock Weld Socket I.D.		Weld Neck Neck O.D.		Flange Package Number(2/Pkg)		Tubing O.D.		Fitting I.D.		Flge Pkg. No. (2/Pkg)
mm	Inches	Inches	(2/Pkg)	Inches	Á NW No.	Inches	mm	Inches	mm	Socket Weld	Weld Neck	Inches	Â mm	Inches	mm	
20	3/4	3/4	200016	3/4	20	1.070	27.81	1.050	26.67	200020	200023	1-1/8	28.57	1.130	28.70	200027
and	and	1	200017	1	25	1.365	34.67	1.315	33.40	200021	200024	1-3/8	34.92	1.380	33.05	200028
25	1	1-1/4	200018	1-1/4	32	1.705	43.31	1.660	42.16	200022	200025	1-5/8	41.27	1.631	41.43	200029
		1-1/4	200030	1-1/4	32	1.705	43.31	1.660	42.16	200032	200034	1-3/8	34.92	1.380	35.05	200036
32	1-1/4	1-1/2	200031	1-1/2	40	1.930	49.02	1.900	48.26	200033	200035	1-5/8	41.27	1.631	41.43	200037
												2-1/8	53.97	2.131	54.13	200038
40	1-5/8	1-1/2	200039	1-1/2	40	1.930	49.02	1.900	48.26	200041	200043	1-5/8	41.27	1.631	41.43	200045
and	and	2	200040	2	50	2.445	62.10	2.375	60.33	200042	200044	2-1/8	53.97	2.131	54.13	200046
50	2											2-5/8	66.67	2.631	66.83	200047
65	2-1/2	2-1/2	200048	2-1/2	65	2.945	—	2.875	73.03	200049	200050	2-5/8	66.67	2.631	66.83	200051
												3-1/8	79.37	3.131	79.53	200052
75	3	3	200053	3	80	3.575	90.81	3.500	88.90	200054	200055	3-1/8	79.37	3.131	79.53	200056
												3-5/8	92.07	3.631	92.23	200057
100	4	4	200062	4	100	4.575	116.20	4.500	114.30	200063	200064	4-1/8	104.77	4.132	104.95	200065

À FPT: Internal NPT (USA Standard Taper Pipe Thread).
Á NW: Metric equivalent nominal size for steel tubing.
Â Metric copper tubing used for refrigeration.
Ã ODS connections to fit copper tubing of given outside diameter. (Not for use with ammonia)

Definitions:
ODS - Outside Diameter Sweat
I.D. - Inside Diameter
O.D. - Outside Diameter
N.A. - Not Available

Flange Bolt Torque Requirements

Bolt Diameter	Valve Port Size	Torque
11mm (7/16")	13mm (1/2 ")	3.9 mkg (28 ft lb)
16mm (5/8")	20-50mm (3/4 "- 2")	11.8 mkg (85 ft lb)
19mm (3/4")	65-75mm (2-1/2 "- 3")	14.5 mkg (105 ft lb)
22mm (7/8")	100mm (4")	22.1 mkg (150 ft lb)

Safe Operation (See also Bulletin RSBCV)

People doing any work on a refrigeration system must be qualified and completely familiar with the system and the Refrigerating Specialties Division valves involved, or all other precautions will be meaningless. This includes reading and understanding pertinent Refrigerating Specialties Division product Bulletins, and Safety Bulletin RSB prior to installation or servicing work.

Where cold refrigerant liquid lines are used, it is necessary that certain precautions be taken to avoid damage which could result from liquid expansion. Temperature increase in a piping section full of solid liquid will cause high pressure due to the expanding liquid which can possibly rupture a gasket, pipe or valve. All hand valves isolating such sections should be marked, warning against accidental closing, and must not be closed until the liquid is removed. Check valves must never be installed upstream of solenoid valves, or regulators with electric shutoff, nor should hand valves upstream of solenoid valves or downstream of check valves be closed until the liquid has been removed. It is advisable to properly install relief devices in any section where liquid expansion could take place.

Avoid all piping or control arrangements which might produce thermal or pressure shock.

For the protection of people and products, all refrigerant must be removed from the section to be worked on before a valve, strainer, or other device is opened or removed.

Flanges with ODS connections are not suitable for ammonia service.

Warranty

All Refrigerating Specialties Products are warranted against defect in workmanship and materials for a period of one year from date of shipment from factory. This warranty is in force only when products are properly installed, field assembled, maintained and operated in use and service as specifically stated in Refrigerating Specialties Catalogs or Bulletins for normal refrigeration applications, unless otherwise approved in writing by Refrigerating Specialties Division. Defective products, or parts thereof, returned to the factory with transportation charges prepaid and found to be defective by factory inspection will be replaced or repaired at Refrigerating Specialties' option, free of charge, F.O.B. factory. Warranty does not cover products which have been altered or repaired in the field; damaged in transit, or have suffered accidents, misuse, or abuse. Products disabled by dirt, or other foreign substances will not be considered defective.

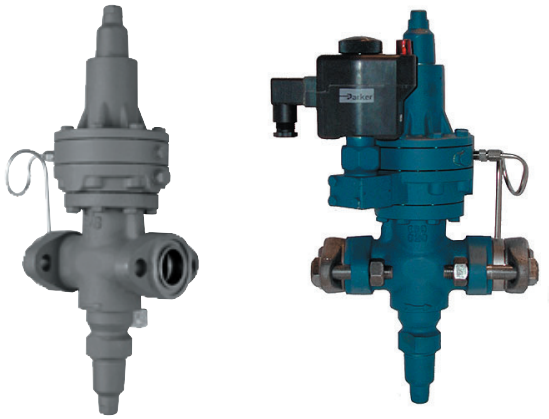
THE EXPRESS WARRANTY SET FORTH ABOVE CONSTITUTES THE ONLY WARRANTY APPLICABLE TO REFRIGERATING SPECIALTIES PRODUCTS, AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OR MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. No employee, agent, dealer or other person is authorized to give any warranties on behalf of Refrigerating Specialties, nor to assume, for Refrigerating Specialties, any other liability in connection with any of its products.

ADAPTOMODE® OUTLET PRESSURE REGULATORS

Types: A4AO, A4AOE, A4AOS and A4AOSE

Port Size 20 - 100 mm (3/4" - 4")
FOR AMMONIA, R-12, R-22, R-502
OTHER REFRIGERANTS AND OIL

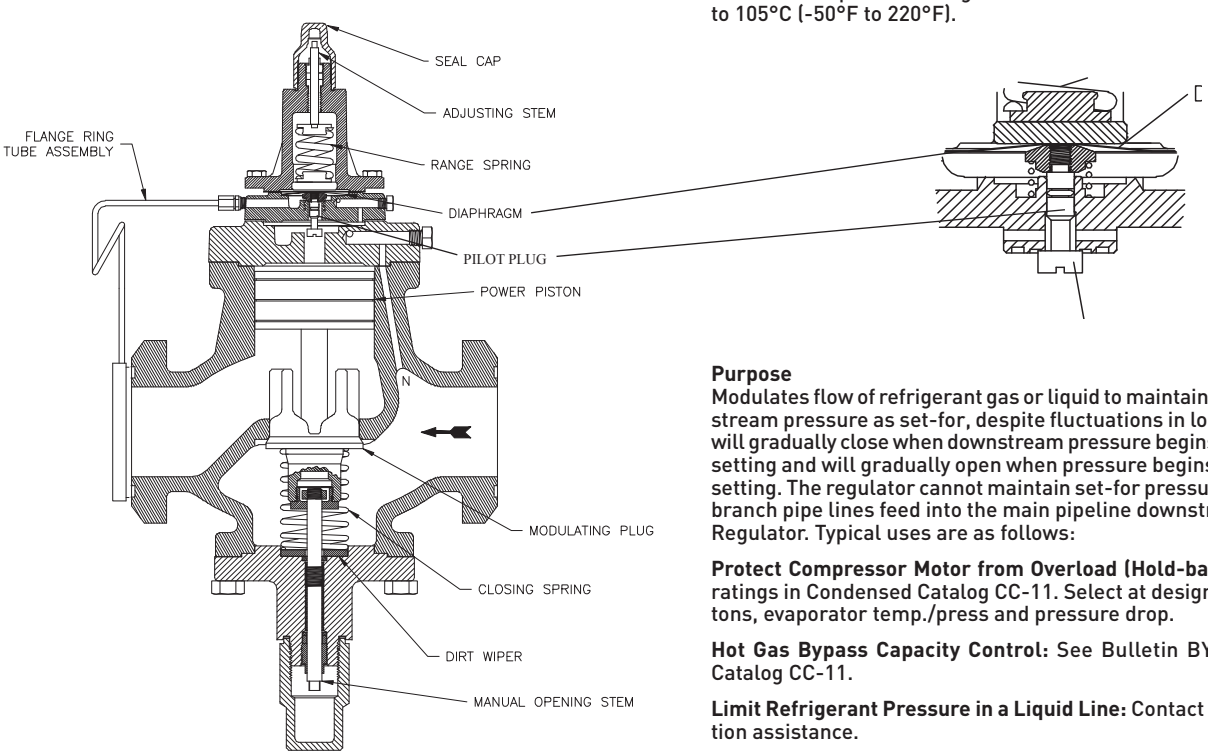
BULLETIN 23-07B
Type A4AO, A4AOE, A4AOS, A4AOSE



August 2006
Installation, Service and Parts Information

FEATURES

- Pilot operated characterized Modulating Plug precise control
- Suitable for all common refrigerants and oil
- 27.6 bar (400 psig) design pressure (MRP)
- Flanges for threaded or welded steel pipe and copper tube (copper not for ammonia)
- Interchangeable parts
- Easy to service
- Close coupled strainers, optional
- Many control variations are possible with the use of a few Modules and kits. (See Adaptomode Pressure Regulator Bul. 23-06)
- Stainless Steel Diaphragm
- Chrome Plated Pilot Seat
- Manual Opening Stem



Description
These compact, heavy duty, pilot operated, iron alloy (ASTM A126 Class B) Outlet Pressure regulators are suitable for Ammonia, R-12, R-22, R-502 and other common refrigerants and fluids approved for use in refrigerant valves. All A4 Regulators are pilot operated using upstream pressure for the opening force and requires a minimum 0.14 bar (2 psig) pressure drop to fully open.

These valves are generally ordered with close coupled strainer to prevent entrance of foreign material into the valve and the rest of the system. (See current Bulletin 00-10 for strainer information.)

The fluid temperature range for the A4 Series of Regulators is -45°C to 105°C (-50°F to 220°F).

Purpose
Modulates flow of refrigerant gas or liquid to maintain a constant downstream pressure as set-for, despite fluctuations in load. The regulator will gradually close when downstream pressure begins to rise above the setting and will gradually open when pressure begins to fall below the setting. The regulator cannot maintain set-for pressure if uncontrolled branch pipe lines feed into the main pipeline downstream of the A4AO Regulator. Typical uses are as follows:

Protect Compressor Motor from Overload (Hold-back): See capacity ratings in Condensed Catalog CC-11. Select at design parameters i.e., tons, evaporator temp./press and pressure drop.

Hot Gas Bypass Capacity Control: See Bulletin BYG-4, Condensed Catalog CC-11.

Limit Refrigerant Pressure in a Liquid Line: Contact factory for selection assistance.

Prevent Deep Vacuum in Booster Suction: See capacity ratings Condensed Catalog CC-11 "Compressor Suction Loading". For selections other than those shown, contact factory.

Prevent Pressure Rise in Suction Main: Select valve based on mass flow requirements. Valve Cv and pressure drop across regulator. Contact factory for proper selection assistance, if required.

Hot Gas Defrost Control: Refer to Condensed Catalog CC-1 1 and Bulletin 90-10 for ratings and application information.

Principles of Operation (See Fig. 1 & 1A)

The outlet pressure is sensed under the diaphragm through the sensing tube, which is part of the Flange Ring-tube assembly. When the force created by the outlet pressure acting under the diaphragm is less than the force of the range spring, the pilot is open, allowing pressure to enter on top of the piston. This causes the power piston to force the modulating plug to open to maintain constant outlet pressure. Decrease in the outlet pressure allows the range spring to open the pilot further, allowing more pressure on top of the piston and opening the modulating plug further. An increase in the outlet pressure will lift the diaphragm against the force of the range spring, allowing the pilot plug to start closing. The pressure on top of the power piston is decreased and the closing spring acts to reduce the opening of the modulating plug and the flow of fluid through the regulator. The pressure on top of the power piston is controlled by the flow through the pilot seat and the bleed through a bleed hole in the power piston and through the clearance between the piston and cylinder. A minimum of 0.14 bar (2 PSIG) pressure drop across the regulator is required to open it fully.

The A4AO Outlet Pressure Regulator therefore opens on a drop in the outlet pressure below its set point and closes on a rise in outlet pressure above its set point. The outlet pressure set point is not appreciably affected by variations in the inlet pressure.

Manual Opening Stem

All Type A4A Regulators are provided with a manual opening stem. To open the regulator manually, back the stem out (turn counterclockwise) until it stops. To put the regulator into automatic operation, turn the stem in (clockwise) until only the flats on the stem protrude from the packing nut.

Adjustment

Install a pressure gauge at the regulator gauge port in the A4AO Adapter next to the sensing tube. Back the adjusting stem all the way out to stop (counterclockwise). This will reduce the set-point to its lowest level and cause the valve to close. Operate the system until the outlet pressure is lower-than desired. Slowly turn in the adjusting stem (clockwise) until the desired outlet pressure is reached.

A4AO Outlet Pressure Setting Ranges

Set Point Ranges	Approx. Pressure Change per Turn of Adjusting Screw	Factory Set Point (unless otherwise specified)
V:500mm hg to 8.3 bar (20in hg to 120 psig)	1.7 bar (25 psi)	2.8 bar (40 psig)
D:5.2 to 19.3 bar (75 to 280 psig)	3.7 bar (53 psi)	9.7 bar (140 psig)

TYPE A4AOE (See Fig. 2)

Description
A4AOE Outlet Pressure Regulator,
Remote Sensing Connection

This regulator allows control of downstream pressure at a point remote from the outlet of the regulator. The pressure from the desired sensing point is connected directly to the A4AOE adapter at Fitting 7A in place of the Flange Ring-tube Assembly 20 shown for the A4AO. Thus the regulator will control the pressure at the sensing point. The regulator operation and adjustment is the same as for A4AO.

Type A4AOS (See Figs. 2, 3, and 4)

Description
A4AOS Outlet Pressure Regulator
With Electric Shut-Off

The A4AOS Pressure Regulator controls outlet pressure when the modular solenoid is energized, and closes when the solenoid pilot is de-energized regardless of the pressure setting or pressure in the regulator. The Modudapter (Fig. 2, item 28A) is used only with the A4AOS. The Pilot Solenoid is mounted on Pad #1 of the Modudapter along with Moduplate, item #52, mounted on Pad #2 with "S" showing to the outside of the regulator.

Adjustment: With the solenoid energized, proceed as with the A4AO.

Installation

All regulators are packed for maximum protection. Unpack carefully. Check the carton to make sure all flanges and other items are unpacked. Save the enclosed instructions for the installer and eventual user.

Do not remove the protective coverings from the inlet and outlet of the regulator until the regulator is ready to be installed. Protect the inside of the regulator from moisture, dirt and chips before and during installation. When welded or brazed flange connections are used, all slag, scale and loose particles should be removed from the flange interior before the regulator is installed between the flanges. It is advisable to install a close-coupled companion strainer (RSF) at the inlet of the regulator to help protect it from any foreign material in the system.

The A4A series of regulators will give optimum performance if mounted in a horizontal line in a vertical position with the manual opening stem on bottom. Where other positions are desired, the factory should be consulted, please give application and piping details. The regulator must be installed with the arrow on the valve body pointing in the direction of the fluid flow for the regulator to function properly. Backward flow through the regulator is uncontrolled and will vary with the valve model and the reverse pressure drop encountered. The regulator is not a check valve.

Tighten the flange bolts and nuts evenly to provide proper seating of the flange gasket and to avoid damage to gaskets or flanges. (See Flange Bolt Torque Table, page 12). Avoid using the regulator flange bolts to stretch or align pipe. Even the heavy duty semi-steel body of an A4A can be distorted, causing the precision parts to bind.

The regulator should be installed in a location where it is easily accessible for adjustment and maintenance. The location should be such that the regulator cannot be easily damaged by material handling equipment. When it is necessary to insulate the regulator (and companion strainer), the insulation should be installed to provide access to the regulator (and companion strainer) for adjustment and maintenance. Do not insulate the solenoid coil and coil housing. Proper indicating gauges should be installed to be easily visible to the operating engineer for system checking and adjusting purposes.

Disassembly and Assembly

Refer to Figs. 2, 3 and 4 in this section.

Before disassembling any A4A type regulator, read the information in this bulletin and Bulletin RSB, Safety Procedures for Refrigerating Specialties Division Refrigeration Control Valves.

Before a regulator is removed from the line or disassembled in the line, make sure that all refrigerant has been removed from the regulator, including the bonnet where applicable, and the close coupled strainer. The regulator must be isolated from the rest of the system in a safe manner. When pumping down to remove the refrigerant, the manual opening stem 33A must be turned out (counterclockwise) to make sure the valve is open.

All A4A Regulators General Procedure

The construction of the regulator and the method of disassembly are relatively simple, but some procedures must be followed to avoid damage. The following describes the procedure for the basic A4A; special instructions for other types are included in other appropriate sections.

Disassembly and Assembly (continued)

Disassembly - Take care when removing Seal Caps 1 and 44 in case some refrigerant may be trapped inside. Back the Adjusting Stem 6 all the way out to remove any pressure from Range Spring 13 otherwise damage to Diaphragm 17 or Pilot Seat 18 may occur. Remove Bonnet 8 by carefully removing Cap Screws 11. Take care not to damage Diaphragm Follower 15. Remove Adapter 28 by removing Cap Screws 31. Turn the Manual Opening Stem 33A all the way in until the flats on the stem barely protrude from the stuffing box nut. Push Piston 30 down against the spring force. The piston should move freely down and be returned by the spring force. If the piston is jammed or sticky, remove Bottom Cap Assembly which includes Items 33 through 42 by removing Cap Screws 39 or unscrewing Bottom Cap, 20mm through 32mm (3/4" through 1-1/4"). Using a hard wood dowel rod inserted through the bottom of the valve, tap the piston upward and out. Thoroughly clean all parts. If jamming has taken place and the piston and bore are scored, remove all burrs by polishing the piston, bore and modulating plug with fine crocus cloth. Inspect the seating area of the Modulating Plug 33 for damage or erosion. If damaged it should be replaced. It would be advisable to replace the entire bottom cap assembly. Inspect all gaskets and "O" rings for damage and replace where necessary.

Assembly - When reassembling the valve, all internal parts should be clean, dry and lightly oiled with refrigerant oil, except "O" rings. Apply silicone grease to the "O" rings. Care must be taken especially when the parts are cold since moisture can condense on parts and cause rapid rusting. When replacing gaskets, they should be oiled very lightly with refrigerant oil before assembly. Install bottom cap assembly first and tighten in place. Carefully replace the piston; never try to force it in place. Align the Adapter Gasket 29 carefully with the proper holes in the adapter and valve body and fasten adapter in place. Before assembling the bonnet be sure the Adjusting Stem 6 is turned all the way out and that the Bonnet 8 and Diaphragm Follower 15 are properly aligned, otherwise damage to the diaphragm and pilot seat may occur. Place Gasket 19 in the adapter and align Gasket 16 and Diaphragm 17 to the center of the bonnet. The raised center of the diaphragm must be towards the bonnet. For range "D" use two diaphragms. Tighten Cap Screws 11 evenly. The ideal tightening torque is 1.5 Kg-m (11 ft. lbs.). Valve is now ready to be adjusted for normal operation.

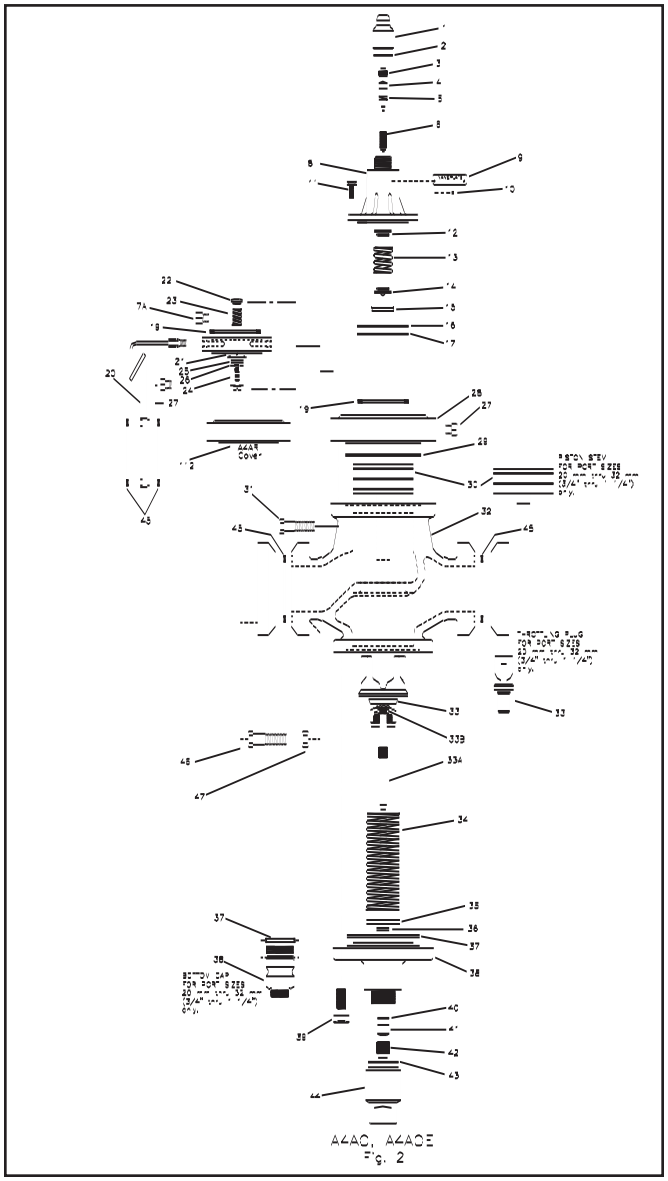
If close coupled strainer is used, it may be cleaned before putting the valve back in operation. The regulator must be tested for leaks with refrigerant gas or other appropriate gas before the system is put into operation.

Basic Modules (Used on A4A0S/A4A0SE)

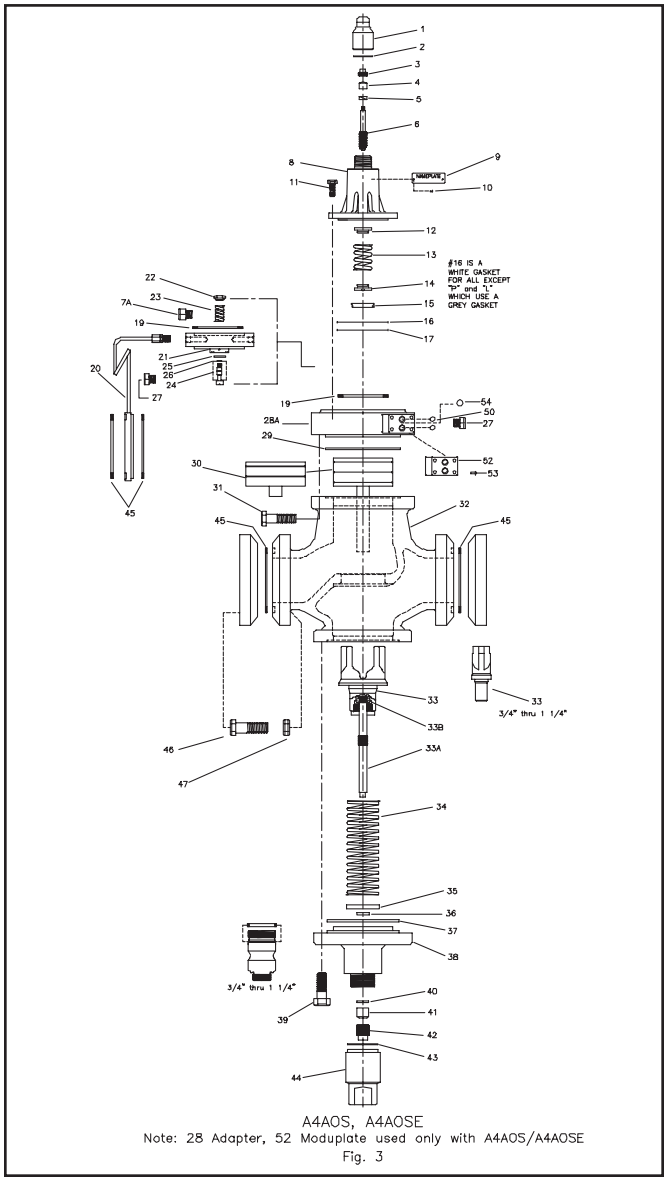
Disassembly and Assembly

Refer to exploded views (Figs. 3 and 4), illustrating the Modular Solenoid Pilot and Moduplate. These modules are used only with the A4A0S/ A4A0SE Outlet Pressure Regulator with Electric Shut Off. The Modudapter, Item #28 (Fig. 2) accommodates these modules. The Pilot Solenoid is mounted on Pad #1 of the Modudapter along with the Moduplate, item #52, mounted on Pad #2 with the "S" showing to the outside of the regulator.

Before disassembling and assembling any modules, refer to page 2 of this bulletin and to Bulletin RSB, Safety Procedure for Refrigerating Specialties Division Refrigeration Control Valves.



A4A0, A4A0E
Fig. 2



A4A0S, A4A0SE
Note: 28 Adapter, 52 Moduplate used only with A4A0S/A4A0SE
Fig. 3

Disassembly and Assembly (continued)

Modudapter (See Figs. 1, 2 and 3)

The Modudapter 28 will accommodate the Modular Pilot Solenoid and Moduplate. When assembling make sure the Modudapter gauge port is directly lined up with the inlet of the regulator. Passage N must communicate upstream pressure through the hole in the Adapter Gasket 29 as well as into Modudapter 28 and thence to the pilot modules. It is imperative that proper alignment of these items be made to assure regulator function.

Before disassembly, make sure all refrigerant has been removed from the regulator and strainer, if used.

Protect the surfaces of Pads 1 and 2 of the Modudapter at all times since these surfaces determine the sealing tightness of the "O" Rings.

S6A Modular Solenoid Pilot (Fig. 4)

This solenoid pilot is mounted on Pad 1. Before working on any solenoid pilot, make sure the coil is de-energized and will remain so during the servicing period. Refer to page 10 for Repair Parts Kit details of S6A Solenoid Pilot.

Disassembly (Fig. 4) - Remove Coil Housing Screw 55 and pull entire Coil and Housing Assembly, 56 through 60, upward and off of Bonnet Tube Assembly 61. Carefully remove Bonnet-Tube Assembly. Lift out Plunger-Needle Assembly 63, avoid damaging the needle. Remove Seat Assembly 64 by using a 7/16" (11 mm) socket wrench. Inspect all parts, clean or replace as needed.

Assembly (Fig. 4) - Reinstall the Seat Assembly and tighten (no gasket needed). Carefully insert the Plunger Needle Assembly. Replace the Gasket 62 and re-install Bonnet-Tube Assembly. Replace entire Coil and Housing Assembly and tighten Coil Housing Screw.

Make sure the solenoid coil is of the proper voltage and frequency.

When mounting the solenoid pilot, place the "O" Rings 50 into the proper grooves and tighten the Cap Screws 66, evenly. The ideal tightening torque is 1.1 kg-m (8 ft. lbs.).

Moduplate (Fig. 2)

The Moduplate Item #52 is used to stop the flow through the flow path of the Modudapter. Protect the "O" Ring surfaces at all times. When mounting the Moduplate, place "O" Rings 50 into the grooves (lubricate with silicone grease) and tighten the Cap Screws 53 evenly to avoid distortion and assure proper sealing. The ideal tightening torque is 1.1 Kg-m (8 ft. lbs.).

Maintenance and Service

General Procedure:

Before disassembly of regulator, make certain that all refrigerant has been removed (pumped out) from the regulator and its companion strainer where one is used. Read Safety Bulletin RSB.

Dirt in the system is the greatest single cause of regulator malfunction. All screens or filters must be cleaned or replaced when they become dirty. At start up it is especially important that these items are cleaned or changed frequently. When the RSF close-coupled companion strainers are used, maintain according to instructions in Bulletin 00-10. Moisture in halocarbon systems in particular can cause corrosion or form ice, causing the piston to freeze in position. Filter-driers should be used and maintained for halocarbon systems.

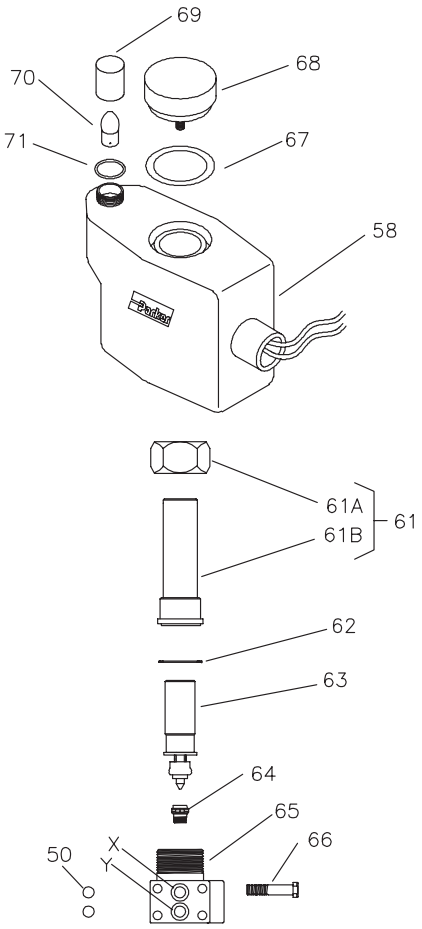
Before deciding to disassemble a regulator for servicing, the following investigations should be made:

Check the manual opening stem; it should be turned in for automatic operation.

Check the regulator setting to make sure it is properly adjusted. Turn adjusting screw slowly to see if regulator responds. Check regulator pressure range; if wrong, range spring must be replaced.

Check other system components for proper operation. Make sure that the regulator receives the proper electrical signal where modular pilot solenoids are used. Make sure they are same as the power supply.

Check hand valves in the system to make sure they are open or closed as required and the system is receiving liquid or gas as the case may be.



S6A Modular Solenoid Pilot
(For A4AOS/A4AOSE)
Fig 4

Solenoid Coils and Coil Housing

The solenoid coils and coil housing, identified and described on page 8 for the Type S6A Solenoid Pilot, are an improved design which provide a higher MOPD and a cooler coil resulting in longer life. The new coil and its heavily plated, rust resisting housing are interchangeable with the obsolete coil and cast iron housing as follows: The new coil, which has its Part Number stamped on the side, can be used in both the old and new coil housing; the old coil which has its 30-0030-XX Series Part Number stamped on one end, can be used in the old, cast iron housing only. There is no bottom marking on the new coil; either end may be positioned up. The color coding of lead wires for various voltage and frequencies has not been changed. The fuses used with the old coils are suitable for the new coils; the new coil power consumption is 33 Watts instead of 37.

The S6A pilot solenoid valve is also available with a coil using a quick electrical connector or plug, permitting easy wiring connection with an exposed rubber covered cable instead of a rigid or flexible conduit and enclosed wiring. This type of coil cannot be used with the old, cast iron housing.

The new coils and new housing described above for the S6A valve are also used with Solenoid Valve Types S4, S5, S6N, S7, S8 and S9.

Maintenance and Service (continued)

Electrical

The Refrigerating Specialties Division molded water resistance Class "B" solenoid coil is designed for long life and powerful opening force. The standard coil housing meets NEMA 3R and 4 requirements. This sealed construction can withstand direct contact with moisture and ice. The coil housing far exceeds the requirements of NEMA Standard ICS, 1-110.57 salt spray test for rust resistance.

By definition, Class "B" coil construction will permit coil temperatures as measured by resistance method, as high as 130°C (266°F). Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures so the maximum coil temperature is not exceeded. Conversely, low fluid temperatures permit higher ambient temperatures.

The molded Class "B" coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies, as well as for direct current. Coils are also available as transformer type with a 6 volt secondary winding for use with the Refrigerating Specialties Division Pilot Light Assembly (see current copy of Bulletin 60-10, "Pilot Light Assembly and Solenoid Transformer Coil"). The solenoid coil must be connected to electrical lines with volts and Hertz same as stamped on coil. The supply circuits must be properly sized to give adequate voltage at the coil leads even when other electrical equipment is operating. The coil is designed to operate with line voltage from 85% to 110% of rated coil voltage. Operating with a line voltage above or below these limits may result in coil burnout. Also, operating with line voltage below the limit will definitely result in lowering the valve opening pressure differential. Power consumption during normal operation will be 33 Watts or less.

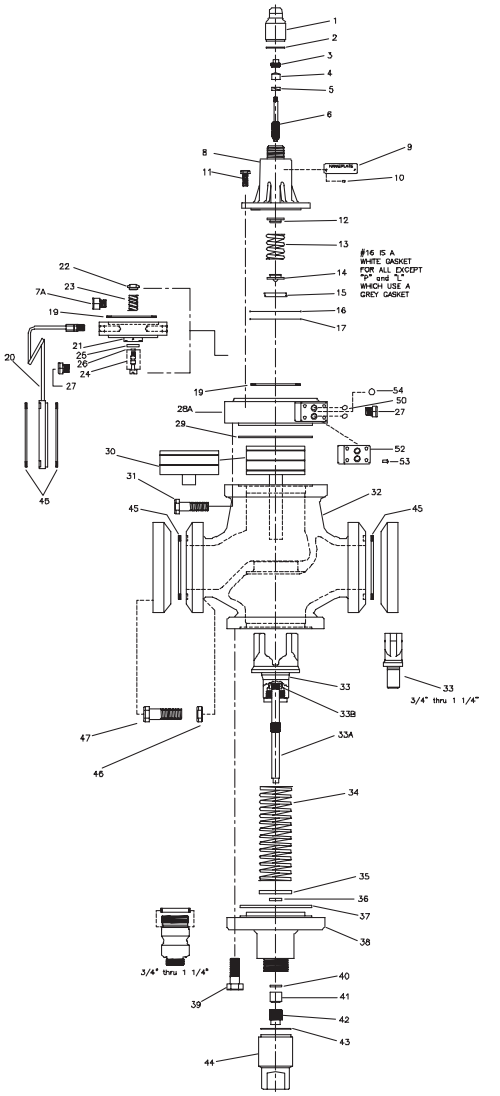
Inrush and running current is listed below:

Standard Coil Volts/Hertz	Inrush Current (Amps)	Running Current (Amps)	Fuse Size (Amps)
120/60 (Blue leads)	1.86	0.46	1
208/60 (Blue & Red leads)	0.63	0.26	1
240/60 (Red leads)	0.60	0.23	1
440/60 (Yellow & Red leads)	0.39	0.13	1
115/50 (Yellow & Blue leads)	1.22	0.21	1
230/50 (Yellow leads)	0.65	0.26	1
Other	(Contact Factory)		

On transformer coil the 6 volt leads are always black.

SERVICE POINTERS (Check General Procedure)

SYMPTOM	PROBABLE REASON	CORRECTION
Regulator does not shut off flow.	Diaphragm or seat dirty, damaged or frozen.	Clean or replace. Clean strainer.
	Diaphragm follower stuck or damaged.	Clean or replace. Install follower carefully.
	Piston jammed with excess dirt.	Remove and polish piston and bore with crocus cloth. Clean valve and strainer.
	Modulating plug leaking due to excess dirt or damage.	Clean or replace. If used on liquid, check for erosion due to excessive flash gas. Reduce flash gas by subcooling or by reducing pressure drop across valve by providing restriction at valve outlet.
	Diaphragm ruptured or badly deformed.	Replace. If Range "D" make sure has 2 diaphragms.
	A4A0S/A4A0SE Modular Solenoid Pilot Seat leaking.	Check seat and needle. Replace as needed.
	Diaphragm and seat eroded due to flash gas.	Replace. Reduce flash gas by subcooling or by reducing pressure drop across regulator by providing restriction at valve outlet.
	Modular Solenoid Pilot not closing.	Check power at leads, make sure coil is de-energized.
Regulator does not open.	Pressure Regulator Diaphragm ruptured or badly deformed.	Replace. If Range D make sure has 2 diaphragms.
	Diaphragm follower stuck, damaged or frozen.	Clean or replace. Install follower carefully.
	A4A0S/A4A0SE Modular Solenoid Pilot not opening.	Pressure drop across valve too high; over 21 bar (300 psig). Lower pressure drop. Improper power supply. Correct. Replace solenoid coil.
	Piston worn, too much clearance.	Replace piston. Check for reason. If used on liquid, check for flash gas.
	Piston jammed with excess dirt.	Remove and polish piston and bore with crocus cloth. Clean valve and strainer.
Regulator Operation erratic.	Diaphragm or seat dirty or damaged.	Clean or replace. Clean strainer.
	Diaphragm follower has dirt on the outside diameter or outside diameter is damaged.	Clean or replace.
	Other system components, line controllers, thermostats, etc., erratic.	Adjust, repair or replace.
	Regulator too far oversized.	Check load. Replace with smaller regulator or investigate use of reduced capacity plug.
Pressure drop across regulator too high.	Inlet or outlet restricted.	Check for restriction. Clean strainer.
	Regulator too small.	Open manually to be sure valve is full open. Replace with proper size regulator.
	Large amount of flash gas in liquid line.	Reduce flash gas by subcooling. Reduce line restriction by increasing line size, particularly at the regulator outlet. Replace with larger regulator.
	High pressure drop causes high rate of expansion gas at regulator outlet.	Increase pipe size at the outlet of the regulator.
	Regulator does not open all the way.	Check piston for wear. Replace, if needed.



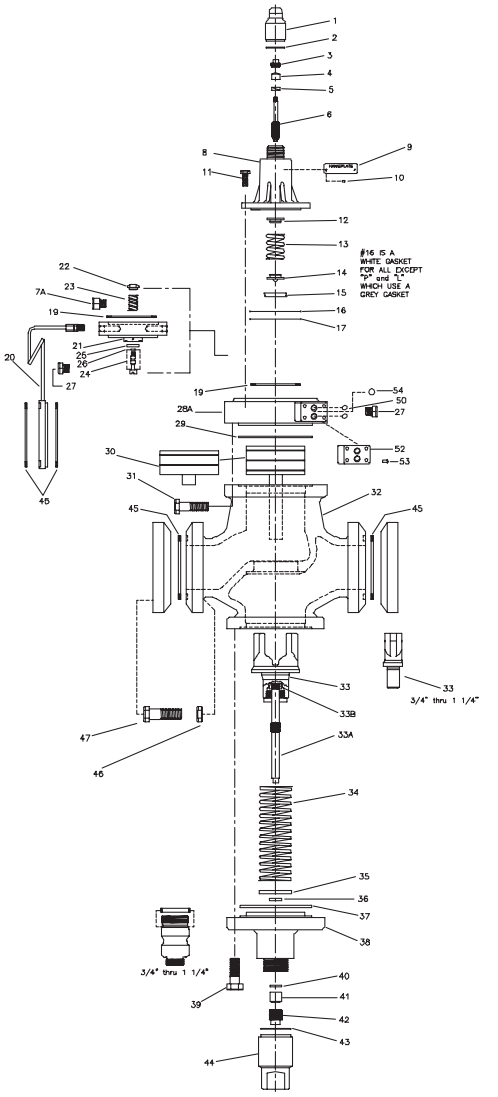
A4AO, A4AOE, A4AOS, A4AOSE
Note: 28 Adapter, 52 Moduplate used only with A4AOS/A4AOSE
28 Adapter, 52 Moduplate used only with A4AO/A4AOE
Fig. 3

			20mm (3/4")		25mm (1")	
Item No.	Description		Kit No.	Qty	Kit No.	Qty
1	Seal Cap		Only Avail. with Kit	1	Only Avail. with Kit	1
2	Seal Cap Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
1-2	Cap Kit, Seal		202110	1	202110	1
3	Nut, Packing		Only Avail. with Kit	1	Only Avail. with Kit	1
4	Packing,Stem		Only Avail. with Kit	1	Only Avail. with Kit	1
5	Washer, Flat		Only Avail. with Kit	1	Only Avail. with Kit	1
3-5	Packing Kit, Stem		202100	1	202100	1
6	Stem, Adjusting		Only Avail. with Kit	1	Only Avail. with Kit	1
4-6	Stem Kit, Adjusting		202120	1	202120	1
12	Plate, Spring, Upper		Only Avail. with Kit	1	Only Avail. with Kit	1
13	Spring, Comp.		Only Avail. with Kit	1	Only Avail. with Kit	1
14	Plate, Spring, Lower		Only Avail. with Kit	1	Only Avail. with Kit	1
15	Follower, Diaphragm		Only Avail. with Kit	1	Only Avail. with Kit	1
3-5,6,	Spring	Rge. V	202006	1	202006	1
12-15	Stem Kit	Rge. D	202007	1	202007	1
8	Bonnet		Only Avail. with Kit	1	Only Avail. with Kit	1
11	Screw, Hx. Hd.		Only Avail. with Kit	8	Only Avail. with Kit	8
16	Bonnet Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
1-6,8	Spring Kit	Rge. V	202008	1	202008	1
11-16	with Bonnet	Rge. D	202009	1	202009	1
12-14	Spring Kit	Rge. V	202481	1	202481	1
16	less Bonnet	Rge. D	202482	1	202482	1
17	Diaphragm		Only AvTl. with Kit	1	Only Avail. with Kit	1
19	Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
16,17,19	Diaphragm Kit	Rge. V	200770	1	200770	1
17	Diaphragms	Rge. D	Only Avail. with Kit	2	Only Avail. with Kit	2
16,17,19	Diaphragm Kit	Rge. D	200771	1	200771	1
19	Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
22	Nut, Retainer		Only Avail. with Kit	1	Only Avail. with Kit	1
23	Spring		Only Avail. with Kit	1	Only Avail. with Kit	1
24	Plug, Pilot		Only Avail. with Kit	1	Only Avail. with Kit	1
25	O-Ring		Only Avail. with Kit	1	Only Avail. with Kit	1
26	O-Ring		Only Avail. with Kit	1	Only Avail. with Kit	1
19,22-26	Plug Kit, Pilot		200777	1	200777	1
21	Adapter		Only Avail. with Kit	1	Only Avail. with Kit	1
19,22-26	Plug Kit, Pilot A4AO/A4AOS		Only Avail. with Kit	1	Only Avail. with Kit	1
21,19,22-26	Outlet-Regulator Kit		OR-50(200516)	1	OR-50(200516)	1
	(See List Price Schedule)					
20	Ring/Tube Assbly. Flge.		Only Avail. with Kit	1	Only Avail. with Kit	1
45	Gasket, Flange		Only Avail. with Kit	1	Only Avail. with Kit	1
20,45	Flge. Ring/Tube Kit A4AO/A4AL		FRT-20 (200439)	1	FRT-25 (200439)	1
27	Plug Pkg. 1/4" NPT		202552	5	202552	5
28	Adapter, A4AO/A4AOE		Only Avail. with Kit	1	Only Avail. with Kit	1
29	Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
19,28,29	Adapter Kit A4AO/A4AOE		200703	1	200703	1
28A	Adapter, A4AOS/A4AOSE		Only Avail. with Kit	1	Only Avail. with Kit	1
29	Gasket		Only Avail. with Kit	1	Only Avail. with Kit	1
19,28A,29	Adapter Kit A4AOS/A4AOSE		MD-25(200591)	1	MD-25 (200591)	1
	(See List Price Schedule)					
30	Piston/Stem Assembly		Only Avail. with Kit	1	Only Avail. with Kit	1
29,30	Piston Kit		200760	1	200760	1
32	Valve Body		Not Available		NotAvailable	
34	Spring, Comp.		Only Avail. with Kit	1	Only Avail. with Kit	1
35	Washer, Flat		Only Avail. with Kit	1	Only Avail. with Kit	1
36	Wiper, Dirt		Only Avail. with Kit	1	Only Avail. with Kit	1
37	"O"Ring		Only Avail. with Kit	1	Only Avail. with Kit	1
34-37	Spring Kit, Closing		202300	1	202300	1

Repair Kits for A4AO, A4AOE, A4AOS and A4AOSE

	32mm (1-1/4")		40mm (1-5/8")		50mm (2")		65mm (2-1/2")		75mm (3")		100mm (4")	
Item No.	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty
1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
2	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
1-2	202110	1	202110	1	202110	1	202110	1	202110	1	202110	1
3	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
4	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
5	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
3-5	202100	1	202100	1	202110	1	200110	1	200110	1	200110	1
6	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
4-6	202120	1	202120	1	202120	1	202120	1	202120	1	202120	1
12	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
13	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
14	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
15	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
3-5,6	202006	1	202006	1	202006	1	202006	1	202006	1	202006	1
12-15	202007	1	202007	1	202007	1	202007	1	202007	1	202007	1
8	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
11	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8
16	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
1-6,8	202008	1	202008	1	202008	1	202008	1	202008	1	202008	1
11-16	202009	1	202009	1	202009	1	202009	1	202009	1	202009	1
12-14	202481	1	202481	1	202481	1	202481	1	202481	1	202481	1
16	202482	1	202482	1	202482	1	202482	1	202482	1	202482	1
17	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
16,17,19	200770	1	200770	1	200770	1	200770	1	200770	1	200770	1
17	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2
16,17,19	200771	1	200771	1	200771	1	200771	1	200771	1	200771	1
19	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
22	Only Avail, with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
23	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
24	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
25	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
26	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19,22-26	200777	1	200777	1	200777	1	200778	1	200778	1	200778	1
21	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19,22-26	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
21,19,22-26	OR-50 (200516)	1	OR-50 (200516)	1	OR-50 (200516)	1	OR-200 (200517)	1	OR-200 (200517)	1	OR-200 (200517)	1
20	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
45	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
20,45	FRT-32 (200441)	1	FRT-40 (200443)	1	FRT-50 (200443)	1	FRT-65 (200445)	1	FRT-75 (200447)	1	FRT-100 (200449)	1
27	202552	5	202552	5	202552	2	202552	2	202552	2	202552	2
28	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19,28,29	200700	1	200725	1	200725	1	200685	1	200713	1	200716	1
28A	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19,28A,29	MD-32 (200593)	1	MD-50 (200595)	1	MD-50 (200595)	1	MD-65 (200597)	1	MD-75 (200599)	1	MD-100 (200606)	1
30	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29,30	200767	1	200389	1	200389	1	200391	1	200393	1	200227	1
32	Not Available		NotAvailable		NotAvailable		Not Available		Not Available		Not Available	
34	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
35	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
36	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
37	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
34-37	202301	1	202302	1	202302	1	202303	1	202304	1	202305	1

Repair Kits for A4A0, A4A0E, A4A0S and A4A0SE



A4A0, A4A0E, A4A0S, A4A0SE
Note: 28 Adapter, 52 Moduplate used only with A4A0S/A4A0SE
28 Adapter, 52 Moduplate used only with A4A0/A4A0E
Fig. 3

		20mm (3/4")		25mm (1")	
Item No.	Description	Kit No.	Qty	Kit No.	Qty
33	Plug/Stem Assembly	Only Avail. with Kit	1	Only Avail. with Kit	1
40	Washer, Flat	Only Avail. with Kit	1	Only Avail. with Kit	1
41	Packing, Stem	Only Avail. with Kit	1	Only Avail. with Kit	1
42	Nut, Packing	Only Avail. with Kit	1	Only Avail. with Kit	1
33,34-37,40-42	Full Cap. Plug Kit Modul.	202021	1	202022	1
33,34-37,40-42	50% Cap. Plug Kit, Modul.	202029	1	(*)	
33,34-37,40-42	35% Cap. Plug Kit, Modul.	Not Available		Not Available	
33,34-37,40-42	17% Cap. Plug Kit, Modul.	202030	1	(*)	
37	O-Ring	Only Avail. with Kit	1	Only Avail. with Kit	1
38	Cover, Bottom	Only Avail. with Kit	1	Only Avail. with Kit	1
40	Washer, Flat	Only Avail. with Kit	1	Only Avail. with Kit	1
41	Packing, Stem	Only Avail. with Kit	1	Only Avail. with Kit	1
37,38,40,41	Cover Kit	200761	1	200761	1
42	Nut, Packing	Only Avail. with Kit	1	Only Avail. with Kit	1
40-42	Packing Kit, Stem	202100	1	202100	1
43	Gasket	Only Avail. with Kit	1	Only Avail. with Kit	
44	Seal Cap	Only Avail. with Kit	8	Only Avail. with Kit	8
43,44	Seal Cap, Kit	202110	1	202110	1
33-38,40-44	Full Cap. Bottom Assembly Kit	202010	1	202011	1
33-38,40-44	50% Cap. Bottom Assembly Kit	202347	1	(*)	1
33-38,40-44	17% Cap. Bottom Assembly Kit	202346	1	(*)	1
3-6,12-19,	Full Cap. Repair				
29,30,33-37	Kit, Req. Rge. V	202040	1	202043	1
40-42	Rge. D	202042	1	202045	1
3-6,12-19,	50% Cap. Repair				
29,30,33-37	Kit. Reg. Rge. V	202354	1	(*)	1
40-42	Rge. D	202353	1	(*)	1
3-6,12-19,	17% Cap. Repair				
29,30,33-37	Kit. Reg. Rge. V	202351	1	(*)	1
40-42	Rge. D	202350	1	(*)	1
2,16(2),19(2)					
25,26,29,37,	Gasket Kit A4/S4	202112		202112	
43,45(3)					
Indv'l Gaskets, O- Rings & Valve Packing sold & packaged in qtys only as indicated					
29	Gasket Pkg. Adapter	202406	5	202406	5
37	O-Ring/Gasket Pkg. Bottom Cap	202384	3	202384	3
43	Gasket Pkg. Seal Cap (Bottom)	202408	12	202408	12
2	Gasket Pkg. Seal Cap (Top)	202408	12	202408	12
45	Gasket Pkg. Flange	202079	12	202079	12
4	Packing Pkg. Stem (Top)	202478	25	202478	2
41	Packing Pkg. Stem (Bottom)	202478	25	202478	25
Bolt Package Kits					
11	Bolt Package, A4A0 Bonnet	202247	8	202247	8
31	Bolt Package, Adapter	202248	8	202249	8
39	Bolt Package, Bottom Cap	Not Required		Not Required	
Flange Bolt Package includes bolts and nuts; no gaskets					
46,47	Bolt Kit, Flange	201585	1	201585	1

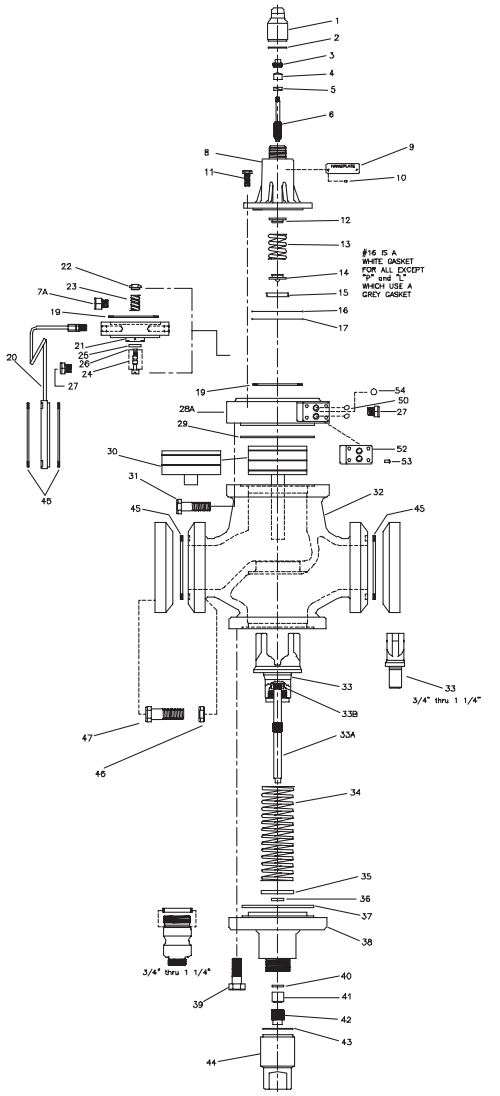
(*) All Plug Kits and Bottom Assembly Kits for 3/4" Port Size Valves can be used in the 1" Port Size Valves for reducing capacity.

Repair Kits for A4A0, A4A0E, A4A0S and A4A0SE

	32mm (1-1/4")		40mm (1-5/8")		50mm (2")		65mm (2-1/2")		75mm (3")		100mm (4")	
Item No.	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty
33	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
40	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
41	202110	1	202110	1	202110	1	202110	1	202110	1	202110	1
42	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
33,34-37,40-42	202023	1	202024	1	202025	1	202025	1	202027	1	202028	1
33,34-37,40-42	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
33,34-37,40-42	202031	1	202032	1	(**)		202033	1	202034	1	202035	1
33,34-37,40-42	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
37	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
38	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
40	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
41	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
37,38,40,41	200761	1	Not Available		Not Available		Not Available		Not Available		Not Available	
42	Only Avail. with Kit	I	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
40-42	202100	1	202100	1	202100	1	202100	1	202101	1	202101	1
43	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
44	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
43,44	202110	1	202110	1	202110	1	202110	1	202110	1	202110	1
33-38,40-44	202012	1	202013	1	202014	1	202015	1	202016	1	202017	1
33-38,40-44	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
33-38,40-44	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
3-6,12-19	202047	1	202050	1	202053	1	202056	1	202059	1	202062	1
29,30,33-37	202046	1	202049	1	202052	1	202055	1	202058	1	202061	1
40-42	202048	1	202051	1	202054	1	202057	1	202060	1	202063	1
3-6,12-19, 29-30,33-37, 40-42	NOTE: 50% Capacity Repair Kit is not available for port sizes 1-1/4" to 4". Capacity reduction can be obrtained through use of field installing "Reduced Capacity Plug Kits". See description and contents of these kits elsewhere in this section.											
3-6,12-19, 29-30,33-37, 40-42	NOTE: 17% Capacity Repair Kit is not available for port sizes 1-1/4" to 4". Capacity reduction can be obrtained through use of field installing "Reduced Capacity Plug Kits". See description and contents of these kits elsewhere in this section.											
2,16(2),19(2)	Gasket Kits (includes complete set of gaskets plus O-Rings if applicable)											
25,26,29,37	202113		202114		202114		202115		202116		202117	
43,45(3)												
	Individual Gaskets, O- Rings and Valve Packing sold and packaged in quantities only as directed.											
29	202407	5	202397	3	202397	3	202396	3	202399	3	202400	3
37	202384	3	202374	6	202374	6	202374	6	202382	3	202383	3
43	202408	12	202408	12	202408	12	202408	12	202404	5	202404	5
2	202408	12	202408	12	202408	12	202408	12	202408	12	202408	12
45	202080	12	202081	12	202081	12	202082	12	202083	12	202084	12
4	202478	25	202478	25	202478	25	202478	25	202478	25	202478	25
41	202478	25	202478	25	202478	25	202478	25	202479	5	202471	5
	Bolt Package Kits											
11	202247	8	202247	8	202247	8	202247	8	202247	8	202247	8
31	202248	8	202249	8	202249	8	202249	8	202250	6	202250	6
39	Not Required		202251	6	202251	6	202251	6	202252	6	202252	6
	Flange Bolt Package includes bolts and nuts; no gaskets											
46,47	201595	1	201604	1	201604	1	201611	1	201611	1	201620	1

(*) All Plug Kits and Bottom Assembly Kits for 3/4" Port Size Valves can be used in the 1" Port Size Valves for reducing capacity.

Repair Kits for A4A0, A4A0E, A4A0S and A4A0SE



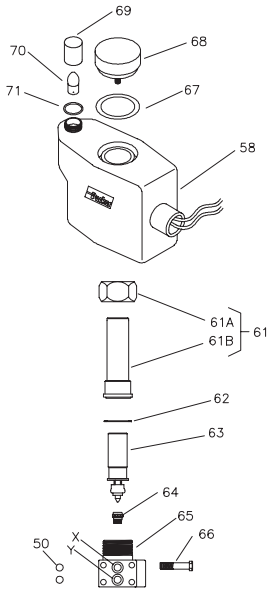
A4AO, A4AOE, A4AOS, A4AOSE
Note: 28 Adapter, 52 Moduplate used only with A4AOS/A4AOSE
28 Adapter, 52 Moduplate used only with A4AO/A4AOE
Fig. 3

		20mm (3/4")		25mm (1")	
Item No.	Description	Kit No.	Qty	Kit No.	Qty
	Flange Bolt Package includes bolts and nuts; no gaskets				
50,52-54	Moduplate Kit "MP"	200518		200518	
52	Moduplate	Only Avail. with Kit	1	Only Avail. with Kit	1
54	O-Ring, "B"	Only Avail. with Kit	1	Only Avail. with Kit	1
50	O-Ring, "S", "D"	Only Avail. with Kit	2	Only Avail. with Kit	2

	Flange Kit	FK-20				FK-25			
	Specify Flange, Style, Connection, Size	FPT, SW, WN		ODS		FPT, SW, WN		ODS	
	Kit includes 2 Flanges only	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail
		3/4	1,1¼	7/8	11/8, 13/8	1	3/4, 1¼	11/8	13/8, 15/8

Repair Kits for S6A Modular Pressure Pilot Solenoid

Item	Description	Qty	Kit Number
55	Screw	1	Only Avail. with Kit
58	Coil Assemly	1	See Page 8
67	O-Ring	1	Only Avail. with Kit
68	Knob	1	Only Avail. with Kit
67, 68	Knob Kit	1	205047
69	Lens	1	Only Avail. with Kit
70	Bulb Kit	6	205282
71	O-Ring	1	Only Avail. with Kit
69 , 71	Lens Kit	6	205279
61B	Tube Assembly, Solenoid	1	Only Avail. with Kit
61A	Nut, Solenoid Tube	1	Only Avail. with Kit
62	Gasket	1	Only Avail. with Kit
61A,61B 62	Tube Kit, Solenoid	1	201036
50	O-Ring	2	Only Avail. with Kit Also available in package. See below.
66	Botts	4	Only Avail. with Kit
50,66	Bolt/"O"Ring Kit	1	201574
62	Gasket	1	Only Avail. with Kit
63	Plunger/Needle Assembly	1	Only Avail. with Kit
62,63	Plunger Kit, Needle	1	202019
62	Gasket	1	Only Avail. with Kit
63	Plunger/Needle Assembly	1	Only Avail. with Kit
62,63	Plunger Kit, Needle (D.C. only)	1	201021
62	Gasket	1	Only Avail. with Kit
63	Plunger/Needle Assembly	1	Only Avail. with Kit
64	SeatAssembly	1	Only Avail. with Kit



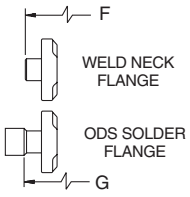
S6A Modular Solenoid Pilot (for A4AOS/A4AOSE) Port Sizes 20-100mm 3/4" - 4" Fig. 4

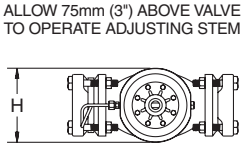
Repair Kits for A4A0, A4A0E, A4A0S and A4A0SE

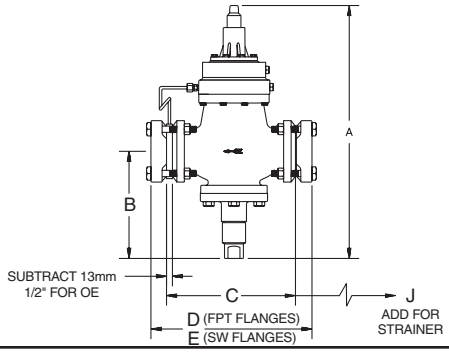
	32mm (1-1/4")	40mm (1-5/8")	50mm (2")	65mm (2-1/2")	75mm (3")	100mm (4")
Flange Bolt Package includes bolts and nuts; no gaskets (cont'd from page 9)						
Item No.	Kit No. Qty	Kit No. Qty	Kit No. Qty	Kit No. Qty	Kit No. Qty	Kit No. Qty
50,52-54	200518	200518	200518	200518	200518	200518
52	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1
54	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1
50	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1	Only Avail. with Kit 1

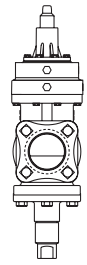
	FK-32				FK-40				FK-50				FK-65				FK-75				FK-100			
	FPT, SW, WN		ODS		FPT, SW, WN		ODS		FPT, SW, WN		ODS		FPT, SW, WN		ODS		FPT, SW, WN		ODS		FPT, SW, WN		ODS	
	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail	Std	Also Avail
	1¼	1½	13/8	15/8, 21/8	1½	2	15/8	21/8, 25/8	2	1½	21/8	25/8	25/8		25/8	31/8	3		31/8	35/8	4		41/8	

A4AO, A4AOE

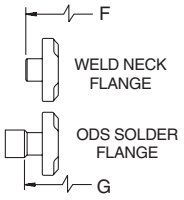


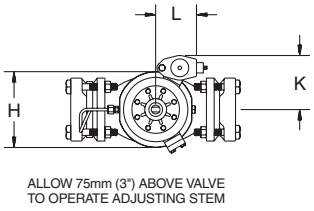


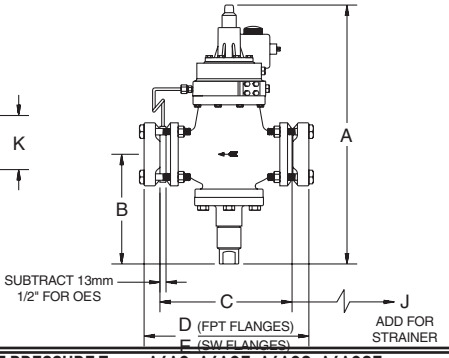




A4AOS, A4AOSE







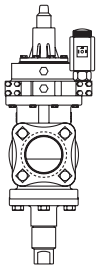


TABLE OF DIMENSIONS FOR INLET PRESSURE Types A4A0, A4A0E, A4A0S, A4A0SE

TYPE	20mm & 25mm (3/4 & 1 ")			32mm (1-1/4")			40mm & 50mm (1-5/8 & 2")			65mm (2-1/2")			75mm (3")			100mm (4")		
DIMENSIONS		mm	inches		mm	inches		mm	inches		mm	inches		mm	inches		mm	inches
A		454	17.9		472	18.6		525	20.7		538	21.2		657	25.9		710	28.4
B		148	5.8		162	6.3		177	6.9		181	7.1		273	10.7		292	11.5
C		177	6.7		216	8.5		264	10.4		264	10.4		324	12.7		352	14.6
D (FPT) FOR PIPE SIZES SHOWN	1/2"	229	9.0	1-1/4"	269	10.6	1-1/2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
	3/4"	229	9.0															
	1"	229	9.0	1-1/2"	269	10.6												
	1-1/4"	229	9.0															
E (S.W.)FOR PIPE SIZES SHOWN	1/2"	229	9.0	1-1/4"	269	10.6	1-1/2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
	3/4"	229	9.0															
	1"	229	9.0	1-1/2"	269	10.6	2"	320	12.6									
	1-1/4"	229	9.0															
F (W.N.) FOR PIPE SIZES SHOWN	3/4"	267	10.5	1-1/4"	313	12.3	1-1/2"	377	14.8	2-1/2"	414	16.1	3'	491	19.3	4"	584	23.0
	1"	274	10.8	1-1/2"	317	12.5	2"	384	15.1									
	1-1/4"	274	10.0															
G (O.D.S.) FOR TUBE SIZES SHOWN	7/8"	252	9.9							2-5/8"	361	14.2	3-1/8"	427	16.8	4-1/8"	516	20.3
	1-1/8"	252	9.9	1-3/8"	282	11.1	1-5/8"	371	14.6									
	1-3/8"	244	9.6	1-5/8"	292	11.5	2-1/8"	351	13.8	3-1/8"	402	15.8	3-5/8"	445	17.5			
	1-5/8"	252	9.9	2-1/8"	318	12.5	2-5/8"	371	14.6									
H		117	4.6		117	4.6		140	5.5		159	6.2		178	7.0		222	8.8
J		98	3.9		178	7.0		251	9.9		314	12.4		314	12.4		363	14.3
K		112	4.4		112	4.4		117	4.6		124	4.9		142	5.6		157	6.2
L		122	4.8		122	4.8		135	5.3		133	5.2		122	4.8		152	6.0

VALVE SIZE		FPT FLANGES		WELDING FLANGES						FLANGES						
		Nom. Pipe Size	Flange Pkg. No. (2/Pkg)	Nominal Pipe Size		Sock Weld Socket I.D.		Weld Neck Neck O.D.		Flange Package Number(2/Pkg)		Tubing O.D.		Fitting I.D.		Flge Pkg. No. (2/Pkg)
mm	Inches	Inches		Inches	NW No.	Inches	mm	Inches	mm	Socket Weld	Weld Neck	Inches	mm	Inches	mm	
20	3/4	3/4	200016	3/4	20	1.070	27.81	1.050	26.67	200020	200023	1-1/8	28.57	1.130	28.70	200027
and	and	1	200017	1	25	1.365	34.67	1.315	33.40	200021	200024	1-3/8	34.92	1.380	33.05	200028
25	1	1-1/4	200018	1-1/4	32	1.705	43.31	1.660	42.16	200022	200025	1-5/8	41.27	1.631	41.43	200029
		1-1/4	200030	1-1/4	32	1.705	43.31	1.660	42.16	200032	200034	1-3/8	34.92	1.380	35.05	200036
32	1-1/4	1-1/2	200031	1-1/2	40	1.930	49.02	1.900	48.26	200033	200035	1-5/8	41.27	1.631	41.43	200037
												2-1/8	53.97	2.131	54.13	200038
40	1-5/8	1-1/2	200039	1-1/2	40	1.930	49.02	1.900	48.26	200041	200043	1-5/8	41.27	1.631	41.43	200045
and	and	2	200040	2	50	2.445	62.10	2.375	60.33	200042	200044	2-1/8	53.97	2.131	54.13	200046
50	2											2-5/8	66.67	2.631	66.83	200047
65	2-1/2	2-1/2	200048	2-1/2	65	2.945	—	2.875	73.03	200049	200050	2-5/8	66.67	2.631	66.83	200051
												3-1/8	79.37	3.131	79.53	200052
75	3	3	200053	3	80	3.575	90.81	3.500	88.90	200054	200055	3-1/8	79.37	3.131	79.53	200056
												3-5/8	92.07	3.631	92.23	200057
100	4	4	200062	4	100	4.575	116.20	4.500	114.30	200063	200064	4-1/8	104.77	4.132	104.95	200065

Definitions:
ODS - Outside Diameter Sweat
I.D. - Inside Diameter
O.D. - Outside Diameter
N.A. - Not Available

Flange Bolt Torque Requirements

Bolt Diameter	Valve Port Size	Torque
11mm (7/16")	13mm (1/2 ")	3.9 mkg (28 ft lb)
16mm (5/8")	20-50mm (3/4 "- 2")	11.8 mkg (85 ft lb)
19mm (3/4")	65-75mm (2-1/2 "- 3")	14.5 mkg (105 ft lb)

Safe Operation (See also Bulletin RSBCV)

People doing any work on a refrigeration system must be qualified and completely familiar with the system and the Refrigerating Specialties Division valves involved, or all other precautions will be meaningless. This includes reading and understanding pertinent Refrigerating Specialties Division product Bulletins, and Safety Bulletin RSB prior to installation or servicing work.

Where cold refrigerant liquid lines are used, it is necessary that certain precautions be taken to avoid damage which could result from liquid expansion. Temperature increase in a piping section full of solid liquid will cause high pressure due to the expanding liquid which can possibly rupture a gasket, pipe or valve. All hand valves isolating such sections should be marked, warning against accidental closing, and must not be closed until the liquid is removed. Check valves must never be installed upstream of solenoid valves, or regulators with electric shutoff, nor should hand valves upstream of solenoid valves or downstream of check valves be closed until the liquid has been removed. It is advisable to properly install relief devices in any section where liquid expansion could take place.

Avoid all piping or control arrangements which might produce thermal or pressure shock.

For the protection of people and products, all refrigerant must be removed from the section to be worked on before a valve, strainer, or other device is opened or removed.

Flanges with ODS connections are not suitable for ammonia service.

Warranty

All Refrigerating Specialties Products are warranted against defect in workmanship and materials for a period of one year from date of shipment from factory. This warranty is in force only when products are properly installed, field assembled, maintained and operated in use and service as specifically stated in Refrigerating Specialties Catalogs or Bulletins for normal refrigeration applications, unless otherwise approved in writing by Refrigerating Specialties Division. Defective products, or parts thereof, returned to the factory with transportation charges prepaid and found to be defective by factory inspection will be replaced or repaired at Refrigerating Specialties' option, free of charge, F.O.B. factory. Warranty does not cover products which have been altered or repaired in the field; damaged intransit, or have suffered accidents, misuse, or abuse. Products disabled by dirt, or other foreign substances will not be considered defective.

THE EXPRESS WARRANTY SET FORTH ABOVE CONSTITUTES THE ONLY WARRANTY APPLICABLE TO REFRIGERATING SPECIALTIES PRODUCTS, AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OR MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. No employee, agent, dealer or other person is authorized to give any warranties on behalf of Refrigerating Specialties, nor to assume, for Refrigerating Specialties, any other liability in connection with any of its products.