Cash Valve

TA Series

Temperature Regulators

Issued - January 2001
CAVMC-0519-US-0609
ISO 9001 Certified

tyco / Flow Control

Applications

Figure 1 - Controlling Storage Heater

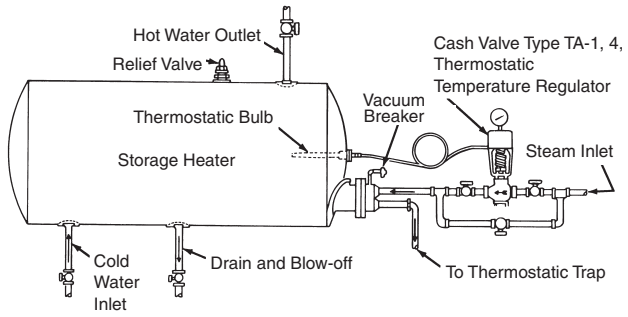


Figure 2 - Controlling Oil Preheater

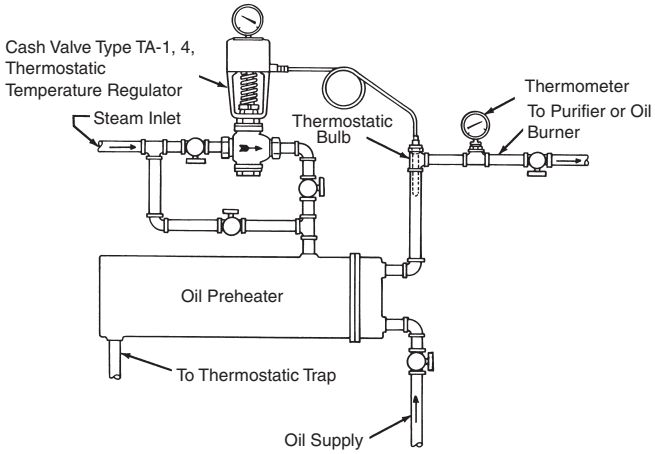


Figure 3 - Controlling Instantaneous Water Heater

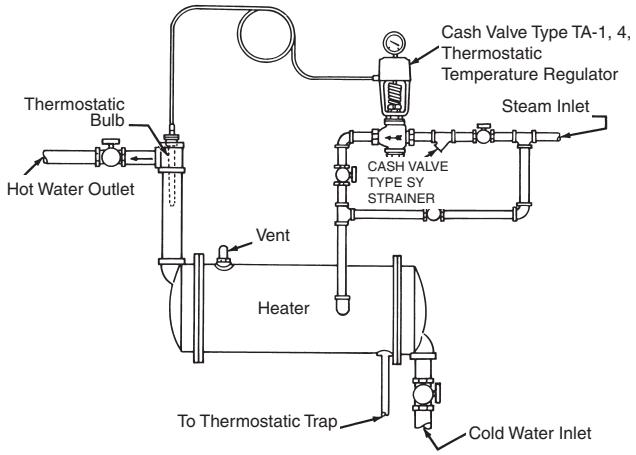


Figure 4 - Controlling Oil Cooler

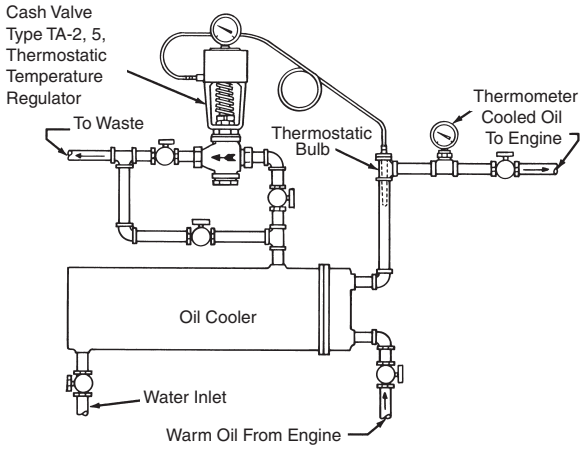


Figure 5 - Type TA 3-Way Used As A Mixing Valve (Flow travels in direction of arrow cast on body.)

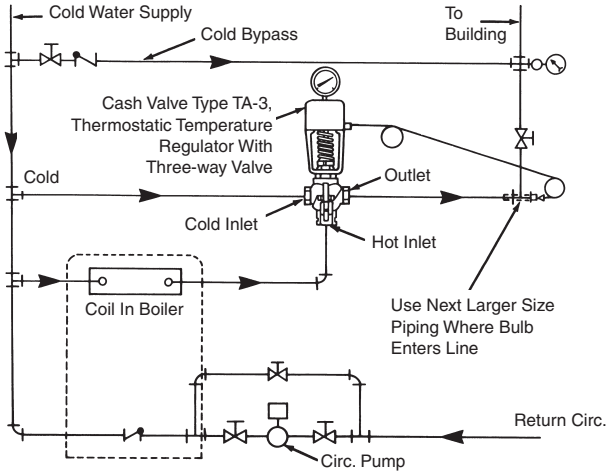
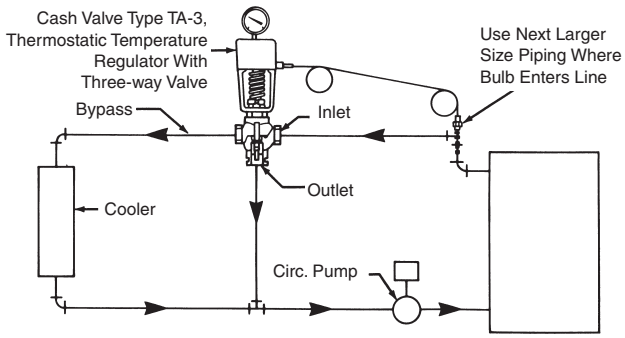
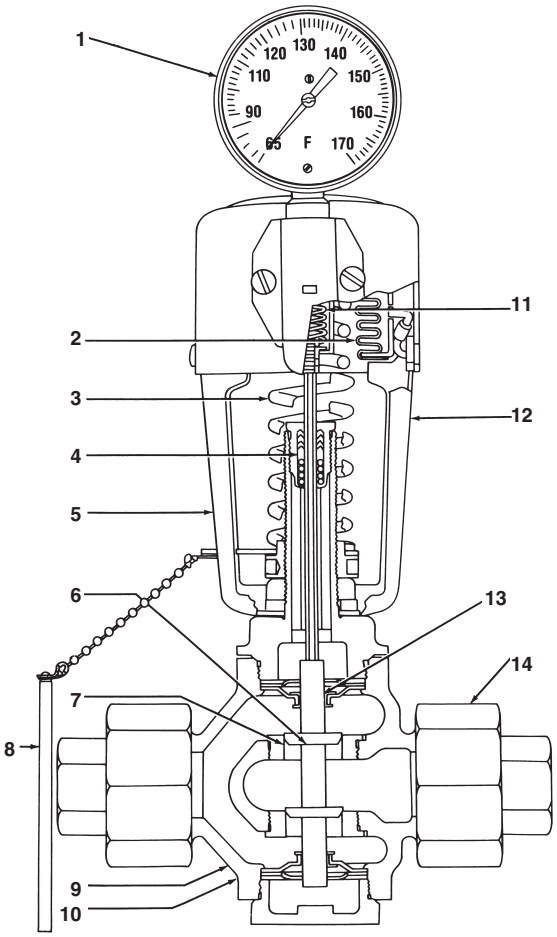


Figure 6 - Type TA 3-Way Used As A Diverting Valve (Flow travels in opposite direction of arrow cast on body.)



Features



1. Positionable **Temperature Indicator**: may be turned in direction of easiest reading. Highly accurate, stainless steel case, with bayonet lock ring.
2. **Thermal System**: heavy duty bronze bellows, with bronze spiral armored copper capillary, copper bulb, with epoxy coated bellows housing. (See page 5 for other line and bulb materials.)
3. Extra long **Adjusting Spring**: permits adjustment over wide range of temperatures.
4. **Packing Assembly**: spring loaded self adjusting chevron type teflon packing, eliminates completely the human factor of improper adjustment.
5. Full scale **Adjustment**: makes repeating settings easy and accurate.
6. **Stainless Steel Disc**: self-aligning to assure accurate seating, long wear, and tight closure.
7. **Stainless Steel Seat Rings**: threaded and bonded to eliminate any possibility of leakage through seat ring threads.
8. **Adjusting Key**: conveniently located — always there when settings have to be changed.
9. Heavy section valve **Body**: tough, solid and durable, will withstand severe piping strains, for pressures to 250 psig at 406°F [208°C].
10. Full ported and full flow valve body: provides maximum capacity for each valve size. Valve body is bronze.
11. Over temperature protection: prevents damage to regulator through inadvertent over-heating.
12. Epoxy-coated compact one-piece channel **Frame**: permits installation in tight location.
13. Double guided stainless steel monolithic **Disc Assembly**: maintains proper alignment of all moving parts.
14. Galvanized iron **Union Ends**: for sturdiness and ease of installation.

Patented temperature compensator: on double seated valves compensating connector is used to assure uniform positioning of discs for tight shut-off when changes in temperature affect the valve body.

Only stainless steel trim is available. We feel it's much better to furnish a longer-lasting trim because it cuts down on maintenance costs.

All Cash Valve temperature regulators are furnished as standard with a brass or stainless steel union bushing. In "over the rim" installations, please specify "no union bushing."

Wells are available upon request. They come in brass or stainless steel. See page 8 for details.

The leakage rate on both the single and double ported valves is considerably lower than most other kinds of temperature regulators. Our single port leakage is less than .5%. Our double port leakage is less than 1%.

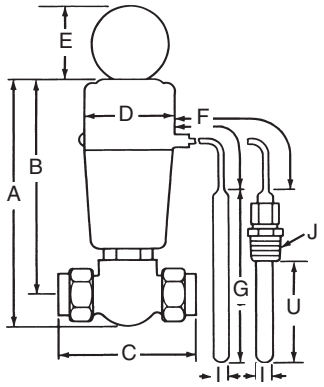
Specifications - Direct Acting/Reverse Acting

Specifications given on this page are for direct acting (for heating) and reverse acting (for cooling) temperature regulators. Direct Acting valves are designed with a normally open valve seat which closes on increasing temperature. Reverse Acting valves are designed with normally closed valve seats that open on increasing temperature. All Cash Valve Direct Acting and Reverse Acting Temperature Regulators are available with either single seat or double seat. All temperature regulators are indicating. See page 5 for thermal system information.

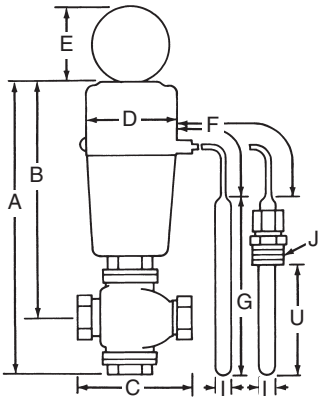
Type	Specifications
TA-1	Direct Acting, Single Seat, Indicating
TA-2	Reverse Acting, Single Seat, Indicating
TA-3	3-Way, Single Seat, Indicating
TA-4	Direct Acting, Double Seat, Indicating
TA-5	Reverse Acting, Double Seat, Indicating

	Single Seat			Double Seat		
Size	Type Indicating	Flow Coefficient C_v	Max. Upstream Press.-psig	Type Indicating	Flow Coefficient C_v	Max. Upstream Press.-psig
*1/2C	TA-1 TA-2	0.40	250	NOT AVAILABLE IN DOUBLE SEAT		
*1/2D		1.00				
*1/2E		1.80				
*1/2A		3.29				
*1/2B		4.29	200			
1/2		5.22	140	TA-4 TA-5	7.93	250
3/4		6.85	90		10.4	
1		9.15	65		12.9	
1 1/4		14.3	40		20.6	
1 1/2		15.1	30		24.8	
2		17.2	20		33.0	

*Indicates non-standard valve, special order only.
NOTE: Maximum upstream pressure of all single seat valves decreases as the valve size increases (see table above).
Particular attention should be given to this fact when sizing for your pressure conditions; the more nearly balanced double seat valve is recommended for higher upstream pressures.



Single-Seated Direct Acting Bronze Valve



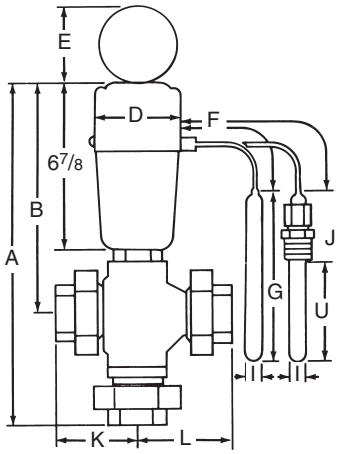
Double-Seated Reverse Acting Bronze Valve

Dimensions								
Size	Type	A	B	C	D	E	F	Ship. Wt Lbs.
1/2 (A,B,C,D,E) 1/2, 3/4	TA-1 TA-2	9 3/4	8 1/2	5 1/2	3 1/2	2 13/16	8 ft.	13
1/2 3/4	TA-4 TA-5	12 7/16	9 3/4	7 3/16	3 1/2	2 13/16	8 ft.	13
1	TA-1	12 7/16	9 3/4	7 3/16	3 1/2	2 13/16	8 ft.	13
1 1/4 1 1/2 2	TA-2 TA-4 TA-5	12 7/8	9 31/32	8 15/16	3 1/2	2 13/16	8 ft.	20 20 21

Bulb Sizes	G	U	I			J
			Plain	Union	Well	
Small	13 3/8	10 1/2	5/8	5/8	3/4	3/4 NPT
Large	15 5/8	12 1/2	1	1	1 1/8	1 NPT
Extra Large	19	16	1	1	1 1/8	1 NPT

Specifications - Three-Way

Cash Valve Three-Way temperature regulators are designed so that hot and cold water are throttled to provide a controlled mix temperature. For typical installations, see “Applications,” page 2. All Cash Valve Three-Way temperature regulators are single seat, indicating valves. See below for thermal system information.



Three-way Valve

Three-Way			
Size	Type Indicating	Flow Coefficient C_v	Max. Diff. Between inlet Pressures* - psi
1/2	TA-3	5.22	140
3/4		6.85	90
1		9.15	65
1 1/4		14.3	40
1 1/2		15.1	30
2		17.2	20

NOTE: Maximum upstream pressure on all 3-way valves is 250 psi. Maximum differential between inlet pressures decreases as valve size increases. See table above.

Dimensions									
Size	Type	A	B	D	E	F	K	L	Ship. Wt Lbs.
1/2	TA-3	13 7/8	9 3/4	3 1/2	2 13/16	8 ft.	3 5/16	3 5/8	13
3/4		13 7/8	9 3/4	3 1/2		8 ft.	3 5/16	3 5/8	13
1		13 7/8	9 3/4	3 1/2		8 ft.	3 5/16	3 5/8	13
1 1/4		14 21/32	9 31/32	3 1/2		8 ft.	4 1/8	4 11/16	20
1 1/2		14 21/32	9 31/32	3 1/2		8 ft.	4 1/8	4 11/16	20
2		14 7/8	9 31/32	3 1/2		8 ft.	4 3/16	4 7/8	21

Bulb Sizes	G	U	I			J
			Plain	Union	Well	
Small	13 3/8	10 1/2	5/8	5/8	3/4	3/4 NPT
Large	15 5/8	12 1/2	1	1	1 1/8	1 NPT
Extra Large	19	16	1	1	1 1/8	1 NPT

Specifications - Thermal Systems

The thermal system on all Cash Valve Temperature Regulators is accurate to ±5°F [±3°C] or better. Standard bulb is bronze, standard capillary line is bronze with armor cover. Standard line length is 8'. Optional line lengths of 15', 20', 30' and 40' are available on special order.

Extra large bulb is available on special order only.

Bulbs and capillary lines are available coated with PVC or Teflon® on special order only. Maximum operating temperature is 180°F [82°C] for PVC and 450°F [232°C] for Teflon®. Maximum Teflon® line length is 15'.

Ranges, Bulb Sizes, And Maximum Line Lengths			
Ranges		Bulb Size	†Max. Line Length
°FAHR	°CENT.		
*45/145	*10/60	Extra Large	40 ft.
*65/170	*20/75	†Large	20 ft.
		Extra Large	40 ft.
*120/230	*50/100	Small	40 ft.
*240/340	*115/170	Small	40 ft.
280/415	140/210	Small	40 ft.

* Indicates standard temperature ranges. Other ranges shown are available on special order only.

† Indicates standard bulb size. Other bulb sizes shown are available on special order only.

Size/Applications Maximum Water Flow - For Cooling

EXAMPLE: Find the correct regulator valve size that will feed a compressor intercooler that requires 100 gallons of water per minute under maximum operating conditions. The supply (inlet) pressure (P_1) is 60 psi and the downstream pressure (P_2) under maximum flow conditions is 20 psi. The 20 psi pressure is required to force the full flow of water through the compressor's cooling system. Inlet pressure must not exceed maximum upstream pressure, per pages 4 and 5.

ANSWER: The pressure drop permitted across the regulator is P_1 minus P_2 or 40 psi. Locate 40 psi in the differential pressure column and read across to the required gallons per minute. Read to the highest value in this case 130 GPM. The chart shows that a 1 1/4-inch double seated valve is required.

	Single Seat/Three-Way Valves						Double Seated Valves					
psig	1/2	3/4	1	1 1/4	1 1/2	2	1/2	3/4	1	1 1/4	1 1/2	2
Diff. Press.	Water Flow – U.S. GAL. PER MIN.											
5	12	15	20	32	34	38	18	23	29	46	55	74
10	17	22	29	45	48	54	25	33	41	65	78	104
15	20	27	35	55	59	67	31	40	50	80	96	128
20	23	31	41	64	68	77	35	47	58	92	111	148
25	26	34	46	72	76	86	40	52	65	103	124	165
30	29	38	50	78	83		43	57	71	113	136	181
40	33	43	58	90			50	66	82	130	157	209
50	37	48	65				56	74	91	146	175	233
60	40	53	71				61	81	100	160	192	256
70	44	57					66	87	108	172	207	276
80	47	61					71	93	115	184	222	295
90	50	65					75	99	122	195	235	313
100	52						79	104	129	206	248	330
110	55						83	109	135	216	260	346
120	57						87	114	141	226	272	361
130	60						90	119	147	235	283	376
140	62						94	123	153	244	293	390
150							97	127	158	252	304	404
160							100	132	163	261	314	417
170							103	136	168	269	323	430
180							106	140	173	276	333	443
190							109	143	178	284	342	455
200							112	147	182	291	351	467
210							115	151	187	299	359	478
220							118	154	191	306	368	489
230							120	158	196	312	376	500
240							123	161	200	319	384	511
250							125	164	204	326	392	522

NOTE: Blank spaces indicate that pressure limitations have been exceeded.

Steam Flow Requirement - For Heating

Use this chart to determine the pounds of steam per hour required to raise the temperature in tank of known capacity to the temperature required. Determine the rise in temperature (control temp. - room temp.) on the left hand column, read the corresponding pounds of steam per hour under the corresponding gallons of water to be heated. Use the lbs. steam/hr. figure in the chart on page 7 to determine valve size.

Formula for converting the length, width, and depth of solutions, all measured in feet, to gallons of solution:

gallons = 7.48 x length x width x depth

Temp. Rise °F	Gallons Of Water Heated Per Hour											
	25	50	75	100	150	200	300	400	500	750	1000	LBS. Steam/HR.
10	2	4	6	8	12	17	25	33	42	63	83	
20	4	8	12	17	25	33	50	67	83	120	167	
30	6	12	19	25	37	50	70	100	120	190	250	
40	9	17	25	33	50	66	100	130	170	250	330	
50	11	21	31	42	63	84	125	170	210	310	420	
60	13	25	37	50	75	100	150	200	250	370	500	
80	17	33	50	67	100	130	200	270	330	500	670	
100	21	42	63	83	120	170	250	330	420	630	830	
120	25	50	75	100	150	200	300	400	500	750	1000	
140	29	58	88	117	175	230	350	470	580	880	1170	
160	33	66	100	133	200	270	400	530	660	1000	1330	

Size/Applications - Maximum Dry Saturated Steam Flow - For Heating

Valve Size		Single Seated/Three-Way Valves											Double Seated Valves					
Inlet	Outlet	1/2C	1/2D	1/2E	1/2A	1/2B	1/2	3/4	1	1 1/4	1 1/2	2	1/2	3/4	1	1 1/4	1 1/2	2
Press. psig	Press. psig	Dry Saturated Steam - lbs. of Steam hr.																
5	UP TO 9" HG. VAC	12	30	53	97	130	155	200	270	420	450	510	235	305	380	610	735	975
	6" HG. VAC	11	29	52	95	125	150	195	265	415	440	500	230	300	375	600	720	960
	2	8	21	38	70	90	110	145	195	305	320	365	170	220	275	440	525	700
10	UP TO 3" HG. VAC	15	35	65	120	160	195	255	340	530	565	635	295	385	480	765	920	1220
	3	13	33	60	110	145	175	230	305	480	510	575	265	345	430	690	830	1100
	7	10	24	44	80	105	125	165	220	345	370	415	190	250	310	500	600	800
20	UP TO 4	21	52	95	170	225	270	355	475	745	790	895	415	540	670	1070	1290	1720
	10	19	47	85	155	200	245	325	430	675	715	810	375	490	610	970	1170	1550
	15	15	37	66	120	155	190	250	335	525	555	630	290	380	470	755	910	1200
30	UP TO 10	27	67	120	220	290	350	460	615	960	1020		530	695	865	1380	1660	2210
	15	25	63	115	210	270	330	435	580	905	960		500	660	815	1300	1570	2090
	25	17	42	75	140	180	220	290	385	605	640		335	440	545	870	1050	1390
40	UP TO 15	33	82	150	270	350	430	560	750	1170			650	855	1060	1690	2030	2710
	20	32	79	140	260	340	415	540	725	1130			625	820	1020	1630	1960	2610
	30	25	63	115	210	270	330	435	580	905			505	660	820	1300	1570	2090
50	UP TO 20	39	97	175	320	415	505	665	890				770	1010	1250	2000	2400	3200
	30	36	90	160	295	385	470	615	820				710	935	1150	1850	2220	2960
	40	28	70	125	230	300	365	480	640				555	730	905	1440	1740	2310
60	UP TO 25	45	112	200	370	480	585	770	1020				890	1160	1440	2310	2780	3700
	30	44	110	198	360	470	575	755	1000				870	1140	1410	2260	2720	3620
	50	30	75	135	250	325	400	525	700				605	795	985	1570	1890	2520
70	UP TO 30	51	127	230	420	545	665	870					1010	1320	1640	2610	3150	4190
	40	49	122	220	400	520	635	830					965	1260	1570	2500	3010	4010
	60	33	82	150	270	350	430	560					650	855	1060	1690	2030	2700
80	UP TO 35	57	140	255	465	610	740	975					1120	1470	1830	2920	3520	4690
	50	53	130	240	435	565	690	905					1050	1370	1705	2720	3280	4360
	70	35	85	155	285	375	455	600					690	910	1120	1800	2160	2880
90	UP TO 41	65	155	285	515	675	820	1070					1240	1630	2020	3230	3890	5180
	60	57	140	255	465	610	740	975					1120	1470	1830	2920	3520	4680
	80	35	90	165	305	395	480	630					730	960	1190	1900	2290	3040
100	UP TO 46	70	170	310	565	740	900						1360	1790	2220	3540	4260	5680
	60	65	165	295	540	705	855						1300	1700	2110	3380	4060	5410
	90	40	95	175	320	415	505						770	1010	1250	2000	2400	3200
110	UP TO 52	75	185	335	615	800	975						1480	1940	2410	3850	4640	6170
	70	70	175	315	575	750	910						1380	1810	2250	3590	4330	5760
	90	55	135	245	450	590	715						1090	1430	1770	2830	3400	4530
120	UP TO 57	80	200	365	665	865	1050						1600	2100	2600	4160	5010	6670
	80	75	185	330	605	790	965						1460	1920	2380	3800	4580	6090
	100	55	145	260	475	615	750						1140	1490	1850	2960	3560	4740
130	UP TO 62	85	215	390	715	930	1130						1720	2250	2800	4470	5380	7160
	80	80	205	370	680	885	1080						1630	2140	2660	4250	5120	6810
	110	60	150	270	495	645	780						1190	1560	1930	3080	3710	4940
140	UP TO 68	95	230	420	765	995	1215						1840	2410	2990	4780	5750	7660
	90	85	215	390	715	930	1130						1720	2250	2800	4470	5380	7160
	120	60	155	280	510	670	815						1230	1620	2010	3210	3860	5140
150	UP TO 72	100	245	445	815	1060							1960	2570	3180	5090	6120	8150
	90	95	240	430	780	1020							1880	2470	3060	4900	5890	7840
	120	75	190	345	625	820							1510	1980	2460	3930	4730	6290
160	UP TO 78	105	260	470	860	1120							2080	2720	3380	5400	6500	8650
	100	100	250	450	820	1070							1970	2590	3210	5120	6170	8210
	140	65	165	300	550	715							1320	1730	2150	3440	4140	5500
170	UP TO 83	110	275	500	810	1190							2190	2880	3570	5700	6870	9140
	100	105	270	485	785	1150							2130	2790	3470	5540	6660	8870
	140	80	205	370	670	875							1620	2120	2630	4210	5070	6740
180	UP TO 89	115	290	525	960	1250							2310	3030	3760	6010	7240	9640
	120	110	270	485	890	1150							2140	2800	3480	5550	6690	8900
	160	70	175	320	585	760							1400	1840	2290	3650	4400	5850
190	UP TO 95	125	305	555	1010	1310							2430	3190	3960	6320	7610	10100
	120	115	290	525	960	1250							2310	3030	3760	6000	7220	9610
	160	85	215	390	715	930							1720	2260	2800	4470	5380	7160
200	UP TO 100	130	320	580	1060	1380							2550	3350	4150	6630	7980	10600
	120	125	310	560	1020	1330							2470	3240	4010	6410	7720	10300
	180	75	185	335	615	805							1480	1940	2410	3850	4640	6180
210	UP TO 105	135	335	605	1110								2670	3500	4350	6940	8360	11100
	120	130	330	595	1080								2620	3430	4260	6800	8190	10900
	180	90	230	415	755								1820	2380	2960	4720	5680	7560
220	UP TO 110	140	350	635	1160								2790	3660	4540	7250	8730	11600
	140	135	335	600	1100								2640	3470	4300	6870	8270	11000
	200	80	195	355	645								1560	2040	2530	4050	4870	6480
230	UP TO 115	145	365	660	1210								2910	3810	4730	7560	9100	12100
	140	140	355	635	1160								2800	3680	4560	7290	8780	11700
	200	95	240	435	790								1910	2500	3100	4960	5970	7940
240	UP TO 120	155	380	690	1250								3030	3970	4930	7870	9470	12600
	160	140	355	640	1160								2810	3690	4570	7300	8790	11700
	200	110	280	500	915								2200	2890	3580	5720	6890	9170
250	UP TO 126	160	395	715	1300								3150	4130	5120	8180	9840	13100
	160	150	375	675	1240								2980	3910	4850	7750	9330	12400
	220	100	250	455	830								1990	2620	3240	5180	6240	8300

NOTE: Blank spaces indicate that pressure limitations have been exceeded.

EXAMPLE: The maximum anticipated flow requirements for a regulator on heating service is 500 lbs. of steam per hour. The unit steam pressure is 50 psig and the downstream pressure is essentially zero because the steam downstream is discharged into an open drain.

ANSWER: In the chart below locate 50 psi on the inlet pressure scale on the left side of the chart. Choose the outlet pressure line up to 20 psig because the downstream pressure is essentially zero. Follow the (up to 20 outlet pressure) line until you come to the value closest to 500 lbs. of steam per hour, in this case 505. Read upward to the valve size and we see that the 1/2" single seated valve is the correct size.

For exact calculation use the following formula when the outlet pressure is equal to or less than 53% of the absolute inlet pressure. Q (lbs. of steam/hr.) = 1.5 x C_V x inlet pressure (psia)

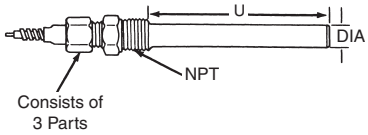
When the outlet pressure is greater than 53% use Q (lbs. of steam/hr.) = 3 x C_V x $\sqrt{\text{pressure drop (psi) x outlet pressure (psia)}}$

Specifications - Accessories

Wells

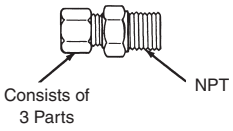
Cat No.	Material	Bulb Dia.	NPT	U	Well Dia.
A	Brass	5/8"	3/4"	10 1/2"	3/4"
E	304 St. St.	5/8"	3/4"	10 1/2"	3/4"
G	316 St. St.	5/8"	3/4"	10 1/2"	3/4"
J	Brass	1"	1"	12 1/2"	1 1/8"
*K	Brass	1"	1"	19"	1 1/8"
N	304 St. St.	1"	1"	12 1/2"	1 1/8"
Q	316 St. St.	1"	1"	12 1/2"	1 1/8"

*Indicates optional well available on special order only.



Union Bushing

Cat No.	Material	Bulb Dia.	NPT
AA	Brass	5/8"	3/4"
CC	St. St.	5/8"	3/4"
EE	Brass	1"	1"
FF	St. St.	1"	1"



How To Order

Type	Specifications
TA-1	Direct Acting, Single Seat, Indicating
TA-2	Reverse Acting, Single Seat, Indicating
TA-3	3-Way, Single Seat, Indicating
TA-4	Direct Acting, Double Seat, Indicating
TA-5	Reverse Acting, Double Seat, Indicating

1. Select proper temperature regulator listed in chart at left.
2. Size regulator for specific conditions: See page 6 for water flows. See page 7 for steam flows.
3. Specify range desired. See Thermal Systems, page 5 for available ranges.
4. Specify maximum line length desired. See Thermal Systems, page 5 for limitations.
5. Standard line and bulb material is bronze. For special order options see Thermal Systems, page 5.
6. Specify bulb size. See Thermal Systems, page 5.
7. If a well is desired, select from chart above.

NOTE: ALL CASH VALVE TYPE TA TEMPERATURE REGULATORS ARE INDICATING VALVES.

Cash Valve
953 Old U.S. Highway 70
Black Mountain, NC 28771
Phone: 800-879-2042 • 828-669-3700
Fax: 800-879-2057 • 828-669-0586

www.cashvalve.com