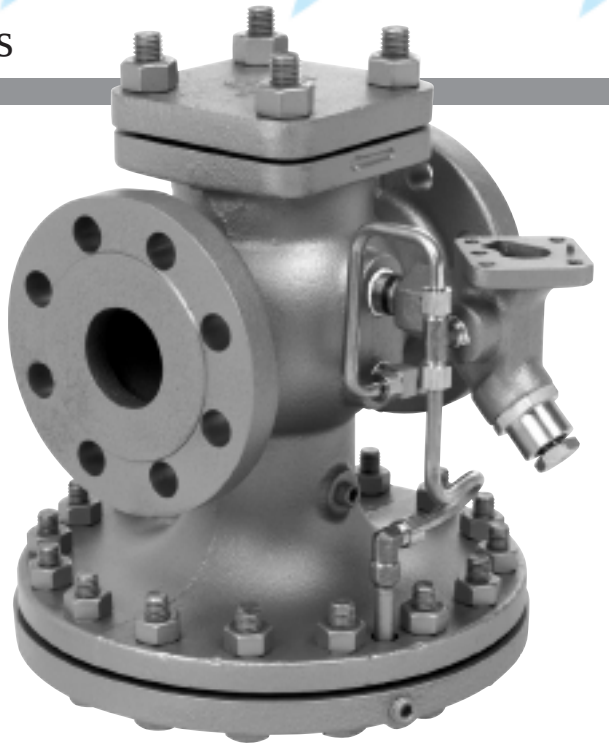
HD Series

Pilot-Operated Regulating Valves



HD Series features & benefits

- Ductile Iron body for higher pressures
- Full port strainer & blowdown valve on pilot adapter for ultimate protection from dirt & scale
- Hardened stainless steel trim for extended life
- Pre-mounted tubing & field reversible pilot adapter

The HD-Series is the upgraded model for the D-Series Regulator. HD & D internal components and pilots are interchangeable.

TYPICAL APPLICATIONS

The Watson McDaniel HD-Series and D-Series pilot operated regulators were designed for extremely accurate control of temperature and pressure in steam service applications. The D-Series is made of Cast-Iron. The HD-Series is made of Ductile-iron for extended pressure and temperature ratings. These regulators use several different control pilots, which can be attached to the valve to control pressure, temperature, or a combination of both. The different control pilots can be added or removed from the regulator body. This modular design adds to the versatility of this product. This product line offers a complete range of overlapping pressure ranges with clearly marked color-coded springs. The most common options include the P-Pilot for pressure reducing, and the T-Pilot for temperature control.

CONTROL PILOTS

Pilot Mounting

Standard pilot mounting is on the right side of the regulator when looking into the outlet port (See diagrams on opposite page which are all right mounted). For opposite mounting, please specify when ordering. Pilot mounting on HD regulators are field reversible.

Pressure

When controlling pressure there are several options you can use for a pilot. The P-Pilot and the P5-Pilot are both spring adjusted pressure pilots. The P-Pilot is used on typical general-purpose pressure reducing applications. The P5-Pilot is used when added accuracy is required. The P5 is capable of maintaining a control pressure window of less then 1 psi. The A-Pilot is air controlled and generally used when adjustment of the regulator and pressure reducing station is done remotely.

Temperature

The T-Pilot is used to control temperature. The T-Pilot is filled with a temperature sensitive liquid, which expands when heated. The expansion of this liquid actuates a bellows that controls the temperature-regulating valve. The T-Pilot is equipped with an overheat bellows that protects the pilot in case of an over temperature condition. The T-Pilot controls temperature through a range from 60-260˚F.

On-Off

On-off control of the regulator is possible by using the S-Solenoid Pilot. The S-Pilot allows the regulator to be shut down or turned on electrically. Normally the regulator is equipped with either a P-Pressure Pilot or T-Temperature Pilot in addition to the S-Solenoid Pilot.

Pressure-Temperature

The PT-Pilot combination is used when it is desirable to control both the pressure and temperature of a system with only one regulating valve. The unique features of this modular valve allow this to be accomplished quite easily. When the PT-Pilot combination is used, the down stream pressure is limited to a maximum setting by the pressure pilot, while the temperature pilot maintains the correct temperature.

Back-Pressure

When controlling the back pressure in a steam system, BP-Pilot is used in conjunction with the HD-Series Regulator. This controls the pressure on the up-stream side of the regulator.

COMBINATION PILOTS

One of the advantages of the HD-Series regulating valve is that it can be used with many different variations of control pilots. Up to three pilots can be used simultaneously to control the operation of these valves. The most common is the Temperature-Pressure combination pilot. In addition to these pilots being used together the S-Solenoid Pilot can be used for turning the system on and off.

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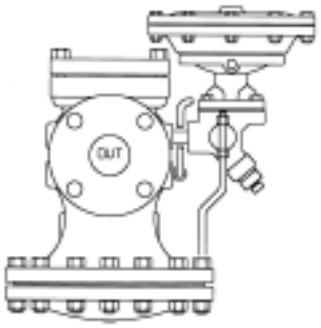
HD Series

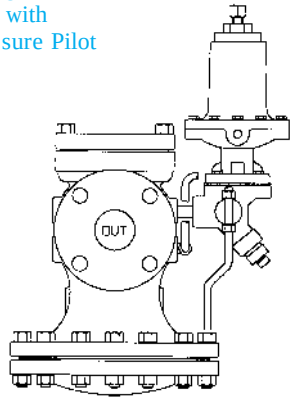
Pilot-Operated Regulating Valves

TYPICAL REGULATOR & PILOT COMBINATIONS

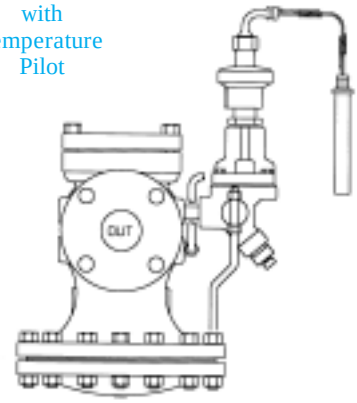
HDA
Regulator with Air Pilot



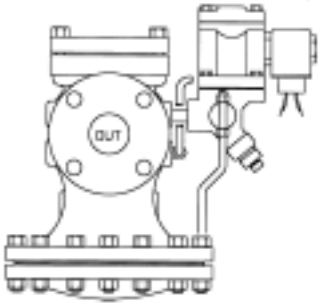
HDP
Regulator with Pressure Pilot



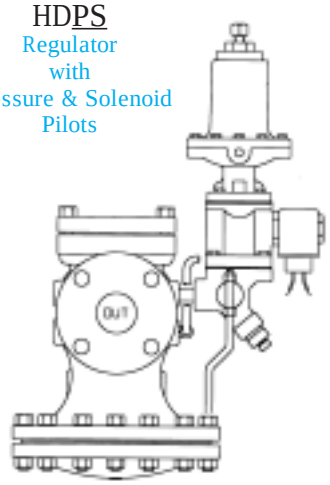
HDT
Regulator with Temperature Pilot



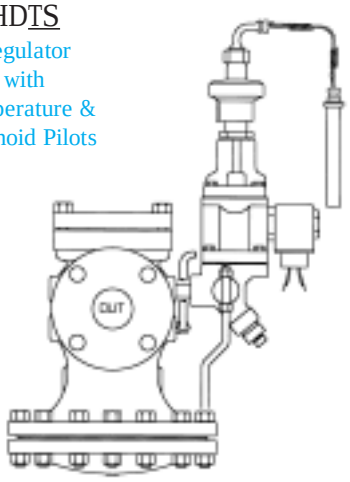
HDS
Regulator with Solenoid Pilot



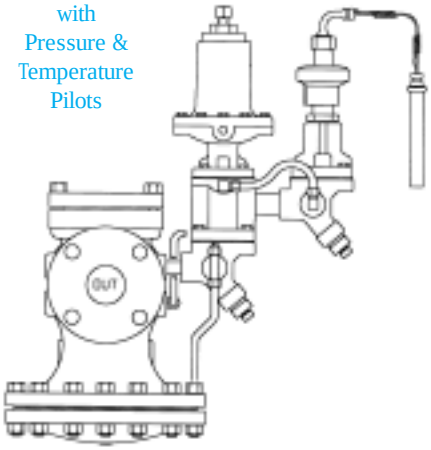
HDPS
Regulator with Pressure & Solenoid Pilots



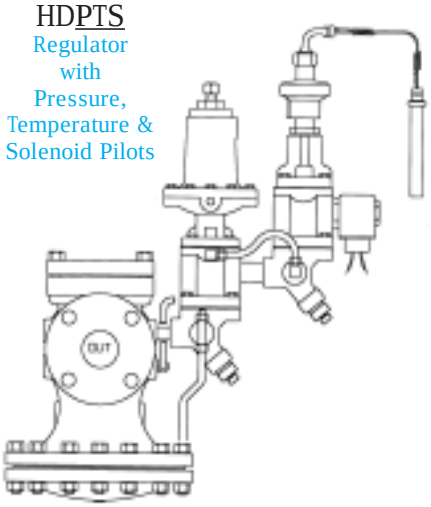
HDTS
Regulator with Temperature & Solenoid Pilots



HDPT
Regulator with Pressure & Temperature Pilots



HDPTS
Regulator with Pressure, Temperature & Solenoid Pilots



OTHER PILOTS COMBINATIONS

- Temperature Regulating Pilot
- Air / Solenoid
- Air / Pneumatic Temperature Controller
- Air / Solenoid / Pneumatic Temperature Controller
- Back Pressure
- Back Pressure / Solenoid

Watson McDaniel's Pilots will fit other Manufacturers' Regulators.

HD Series

Pilot-Operated Regulating Valves

Revised 9/2004

Ductile Iron (HD) Cast Iron (D)

- **Pressure Regulating**
- **Temperature Regulating**
- **Back Pressure Control**

Model	D-Series	HD-Series
Sizes	1/2" - 3"	1/2" - 6"
Connections	Threaded 1/2" - 2" Flanged 125# 2" - 3" Flanged 250# 2" - 3"	Threaded 1/2" - 2" Flanged 150# 1" - 6" Flanged 300# 1" - 6"
Body Material	Cast Iron	Ductile Iron
PMO Max. Operating Pressure	250 PSIG	300 PSIG
Design Pressure/ Temperature Ratings TMA/PMA	NPT 250 PSIG @ 450˚ F 125# FLG 125 PSIG @ 450˚ F 250# FLG 250 PSIG @ 450˚ F	NPT 450 PSIG @ 650˚ F 150# FLG 150 PSIG @ 566˚ F 300# FLG 450 PSIG @ 650˚ F

FEATURES

- No external power source is required. This simplifies the valve and minimizes installation and maintenance costs.
- Pressure and temperature pilots can be used in combination eliminating the need for a separate pressure and temperature regulator.
- The modular design allows any pilot to be added to the main regulating valve. This adds flexibility and reduces inventory.
- Available in Ductile iron for higher-pressure ranges and increased safety. Ductile Iron is a better choice than cast-iron for steam applications.
- The HD regulators come standard with full port strainers and blow down valve on the pilot mount to guard against dirt in the steam system which cause other regulators to fail.
- Hardened stainless steel trim (55Rc) for extended life even in the most demanding applications.
- The innovative design allows the pilot to be mounted on either side of the regulator and is easily field reversible.
- Comes fully assembled with tubing and pilot adapter. The control pilot requires only four bolts to complete the installation.

TYPICAL APPLICATIONS

The Watson McDaniel HD-Series pilot-operated regulators were designed for steam applications. Pilot-operated pressure regulating valves are the best choice when downstream pressure must be accurately controlled regardless of variations in upstream pressure and varying steam load conditions. There are several types of control pilots that can be used with these regulators to control pressure, temperature, on/off control, or a combination of all three.

The HD-Series is the upgraded model for the D-Series Regulator.
HD & D internal components and pilots are interchangeable.

HD
Regulating Valve

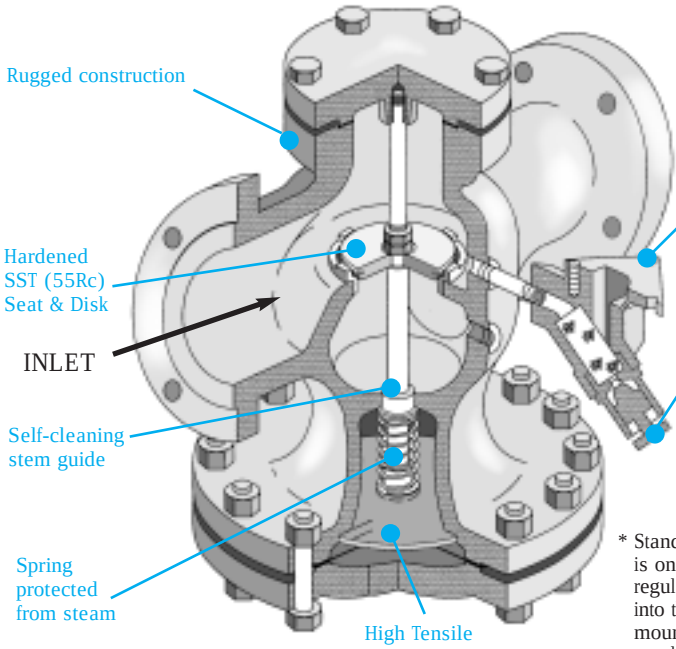
TYPICAL PILOTS

Pressure

Air

Solenoid

Temperature



* Standard pilot mounting is on the right side of the regulator when looking into the outlet port. Pilot mounting on HD regulators are field reversible.

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HD Series

Pilot-Operated Regulating Valves

Revised 9/2004

DIMENSIONS D-Series – inches / pounds

	(A) Face-To-Face						Weight (lbs)		
Size	NPT	125#	250#	B	C	D	NPT	125#	250#
1/2"	5 1/8			5 1/8	2 1/2	5 7/8	18		
3/4"	5 1/2			5 1/2	3 3/8	6 1/2	21		
1"	6 1/8			6 1/8	3 3/8	7	25		
1 1/4"	8 1/2			7	3 1/2	8 3/4	45		
1 1/2"	9 1/2			7 1/8	4 5/8	8 3/4	55		
2"	9 3/4	9 1/2	9 5/8	7 1/8	5	10 7/8	90	95	105
2 1/2"		10	10 5/8	8 3/4	5 1/2	11 3/4		120	135
3"		11	11 3/4	9 1/8	6 1/2	13 3/4		165	180

DIMENSIONS HD-Series– inches / pounds

	(A) Face-To-Face						Weight (lbs)		
Size	NPT	150#	300#	B	C	D	NPT	150#	300#
1/2"	4 3/8			5 1/2	3 3/8	6 1/2	18		
3/4"	4 3/8			5 1/2	3 3/8	6 1/2	18		
1"	5 3/8	5 1/2	6	6 1/4	3 1/2	7	23	40	45
1 1/4"	7 1/4			7 3/8	4 7/8	8 3/4	43		
1 1/2"	7 1/4	6 7/8	7 3/8	7 3/8	4 7/8	8 3/4	43	55	60
2"	7 1/2	8 1/2	9	8 1/4	5 3/8	10 7/8	65	75	85
2 1/2"		9 3/8	10	9	5 3/4	11 3/4		100	105
3"		10	10 3/4	8 7/8	6 3/4	13 1/4		130	145
4"		11 7/8	12 1/2	10 7/8	7 1/2	14 3/4		215	235
6"		15 1/8	16	14 1/8	10	19 3/4		420	470

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*
**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*

HOW TO ORDER

REGULATOR BODY

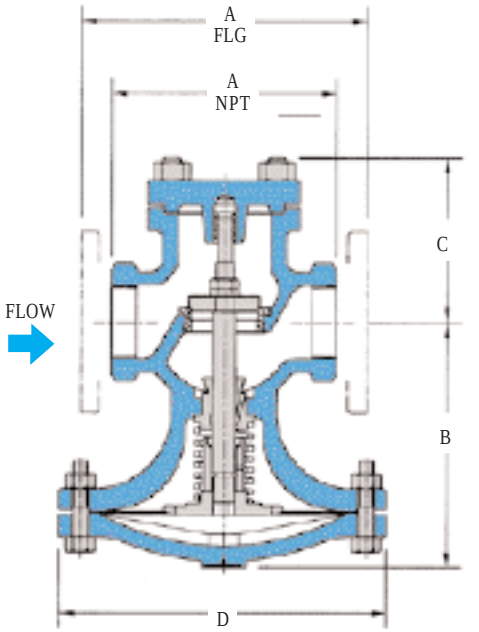
Specify:
- HD or D regulator body
- Regulator size or capacity of steam required
- End connections (threaded, 125/150/250/300# flanged).

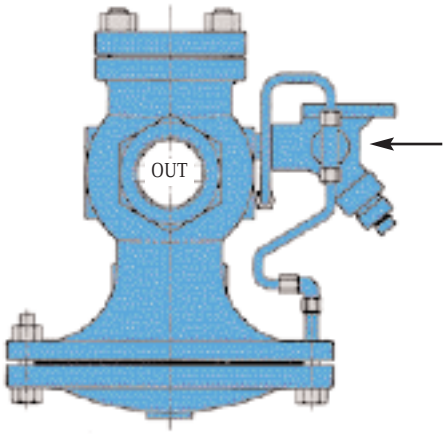
PILOT REQUIRED TO OPERATE THIS VALVE

Note: See "How to Order" in specific Pilot Section
- T Temperature Pilot
- P Pressure Pilot
- A Air Pilot
- S Solenoid Pilot
- BP Back-pressure Pilot

MATERIALS

	D-SERIES	HD-SERIES
Body	Cast Iron	Ductile Iron
Cover	Cast Iron	Ductile Iron
Gasket	Garlock 3400	Garlock 3400
Cover Screws	Steel	Steel
Pilot Adapter	Cast Iron	Ductile Iron
Screen	Stainless Steel	Stainless Steel
Tubing	Copper	Copper
Valve Seat	Hardened SST (55Rc)	Hardened SST (55Rc)
Valve Disc	Hardened SST (55Rc)	Hardened SST (55Rc)
Diaphragm	Phosphor Bronze	Phosphor Bronze





Standard pilot mounting is on the right side of the regulator when looking into the outlet port (shown). Pilot mounting on HD regulators are field reversible.

D & HD Series

Full-Port Regulating Valves

Revised 9/2004

CAPACITIES – Steam (lbs/hr)

Inlet Pressure (PSIG)	Outlet Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"
C_v Factors		3.8	6.7	11	15	21	37	55	71	113	241
+5*	0	85	150	250	350	500	800	1200	1600	2600	5500
	2	80	140	230	310	440	770	1100	1500	2400	5100
+7*	0	115	200	325	450	600	1100	1650	2100	3600	7800
	2	105	180	300	400	575	1000	1500	2000	3100	6700
	3	90	160	275	375	525	900	1300	1800	2800	6000
+10*	0	150	260	425	575	850	1500	2200	2800	4600	9900
	2	140	240	400	550	800	1400	2100	2700	4300	9100
	5	100	175	300	400	600	1000	1600	2000	3200	6900
+12*	0	160	280	475	600	900	1600	2400	3100	4900	10300
	4	140	240	400	550	800	1400	2100	2700	4300	9100
	7	125	200	375	500	700	1200	1900	2400	3800	8200
15	0-3	190	325	550	750	1000	1800	2700	3500	5600	12000
	5	175	300	500	700	900	1700	2500	3200	5200	11100
	8	140	250	400	500	800	1300	2000	2600	4200	8900
20	0-5	210	375	625	850	1200	2100	3100	4000	6400	13700
	10	190	325	550	750	1000	1800	2700	3500	5600	12000
	12	170	300	500	675	950	1600	2500	3200	5100	10800
25	0-7	250	450	775	1050	1500	2600	3800	5000	7900	16900
	10	225	425	700	975	1300	2400	3600	4600	7300	15600
	15	200	350	600	800	1100	2000	3000	3900	6200	13200
30	0-12	275	500	800	1100	1500	2700	4100	5200	8300	17800
	15	250	450	750	1000	1400	2500	3800	4900	7800	16600
	20	225	375	650	850	1200	2100	3200	4100	6500	14000
40	0-18	350	600	1000	1350	1900	3300	5000	6400	10300	21900
	25	300	500	850	1150	1600	2800	4200	5400	8700	18500
	30	250	425	700	1000	1400	2500	3700	4700	7600	16100
50	0-20	400	700	1200	1650	2300	4100	6000	7800	12400	26500
	30	350	650	1100	1500	2000	3600	5400	6900	11000	23600
	40	275	500	800	1100	1500	2700	4100	5200	8300	17800
60	0-30	475	850	1350	1900	2600	4600	6900	8900	14200	30300
	35	425	775	1250	1700	2400	4300	6400	8200	13100	27900
	50	300	525	850	1200	1600	2900	4300	5600	8900	19000
75	0-35	575	1000	1650	2300	3200	5600	8300	10800	17200	36600
	50	475	825	1350	1900	2600	4600	6900	8900	14100	30100
	60	400	700	1150	1600	2200	3900	5800	7400	11800	25200
90	0-45	675	1200	1950	2700	3700	6600	9800	12700	20200	43100
	60	575	1000	1700	2300	3200	5700	8500	10900	17400	37100
	75	425	750	1200	1700	2300	4100	6100	7900	12600	27000
100	0-50	750	1300	2100	3000	4100	7300	10800	14000	22200	47500
	60	700	1200	2000	2700	3800	6700	10000	12900	20500	43800
	80	500	875	1400	1900	2700	4800	7100	9200	14700	31300
125	0-60	925	1650	2700	3700	5200	9100	14000	17500	28000	59500
	75	825	1475	2400	3300	4600	8200	12200	15700	25000	53500
	100	625	1100	1800	2500	3500	6200	9200	11900	19000	40400
150	0-75	1100	1900	3100	4300	6000	10600	15800	20400	32400	69100
	100	925	1600	2700	3600	5100	9000	13400	17400	27700	59000
	125	650	1150	1900	2600	3600	6400	9500	12300	19600	41900
175	0-85	1275	2250	3700	5000	7100	12500	18600	24000	38200	81400
	125	1000	1800	2900	4000	5600	9900	14700	18900	30100	64300
	150	750	1300	2100	2900	4100	7300	10800	14000	22200	47500
200	0-100	1450	2500	4200	5700	8000	14100	21000	27100	43100	92000
	125	1300	2300	3700	5100	7100	12600	18700	24100	38400	81900
	150	1075	1900	3100	4300	6000	10600	15700	20300	32300	68900
225	0-120	1575	2800	4600	6200	8700	15400	22900	29500	47000	100200
	150	1450	2500	4200	5700	8000	14100	21000	27200	43300	92300
	175	1350	2400	3900	5300	7400	13100	19500	25200	40100	85500
250	0-130	1750	3100	5100	6900	9700	17100	25500	32900	53400	111800
	150	1650	2900	4700	6500	9100	16000	23800	30800	49000	104600
	200	1200	2100	3500	4800	6700	11900	17600	22800	36200	77300
300**	0-160	2045	3605	5920	8075	11310	19220	29610	38230	60840	129750
	175	1945	3425	5625	7670	10740	18925	28130	36320	57800	123270
	200	1780	3140	5155	7030	9840	17340	25780	33275	52960	112950

* Shaded portion is for sizing temperature pilot, solenoid, or temperature-solenoid combination valves only.
** For HD Series Regulator only
\+ Specify Low Pressure T-Pilot

D & HD Series

Reduced Port Regulating Valves

Revised 9/2004

CAPACITIES – Steam (lbs/hr)

Inlet Pressure (PSIG)	Outlet Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"
C_V Factors		1.4	3.3	5.6	7.8	13.3	18.8	25.9	41.7	74	163
+5*	0	15	35	59	82	140	197	272	438	777	1712
	2	13	32	53	75	128	181	249	401	712	1569
+7*	0	21	48	82	115	195	276	381	613	1088	2396
	2	20	46	79	110	187	265	365	587	1042	2296
	3	19	44	74	104	177	250	344	554	983	2165
+10*	0	29	70	117	164	279	395	544	876	1554	3423
	2	28	68	115	160	274	387	533	858	1523	3354
	5	25	60	102	142	242	342	471	758	1346	2964
+12*	0	35	83	141	197	335	473	653	1051	1865	4108
	4	33	78	133	185	316	446	615	990	1758	3873
	7	29	68	115	160	272	385	530	854	1515	3336
15	0-3	43	102	173	241	410	580	800	1287	2284	5031
	5	41	98	166	232	395	558	769	1238	2198	4841
	8	37	88	149	208	354	500	690	1111	1972	4343
20	0-5	57	134	227	317	541	764	1053	1696	3009	6629
	10	51	120	204	284	483	684	942	1517	2692	5929
	12	47	111	188	262	447	632	870	1401	2486	5477
25	0-7	70	166	282	393	670	948	1305	2102	3730	8215
	10	67	158	269	375	640	905	1246	2006	3561	7843
	15	59	139	235	328	559	790	1088	1751	3108	6846
30	0-12	81	190	323	450	768	1085	1495	2408	4273	9411
	15	76	180	305	426	726	1025	1413	2275	4037	8892
	20	66	155	263	366	625	883	1216	1958	3475	7654
40	0-18	105	248	420	585	998	1410	1943	3128	5551	12227
	25	99	199	367	511	872	1232	1698	2734	4852	10688
	30	78	183	311	433	739	1044	1439	2317	4111	9056
50	0-20	135	318	539	751	1280	1809	2492	4013	7121	15686
	30	118	277	470	655	1117	1579	2175	3502	6216	13692
	40	88	208	353	491	838	1184	1632	2627	4662	10269
60	0-30	153	360	611	851	1451	2051	2826	4550	8074	17786
	35	143	338	573	798	1361	1924	2651	4268	7573	16682
	50	98	230	390	543	926	1309	1804	2904	5154	11353
75	0-35	195	460	780	1086	1853	2619	3608	5809	10308	22706
	50	164	387	657	916	1561	2207	3040	4895	8687	19135
	60	132	312	529	737	1257	1777	2448	3941	6993	15404
90	0-45	229	540	916	1277	2177	3077	4239	6825	12112	26680
	60	197	465	789	1100	1874	2648	3649	5874	10425	22962
	75	146	345	585	815	1389	1964	2705	4357	7731	17029
100	0-50	255	600	1018	1419	2419	3419	4710	7584	13458	29644
	60	235	554	940	1310	2234	3158	4351	7006	12432	27384
	80	176	416	706	983	1676	2367	3263	5254	9324	20538
125	0-60	322	760	1290	1796	3063	4329	5964	9603	17041	37536
	75	294	693	1176	1638	2793	3948	5439	8757	15540	34230
	100	221	518	882	1229	2095	2961	4079	6568	11655	25672
150	0-75	381	900	1527	2128	3628	5128	7065	11376	20187	44467
	100	329	775	1315	1831	3123	4414	6081	9791	17374	38270
	125	243	575	975	1385	2316	3274	4510	7261	12885	28382
175	0-85	449	1060	1800	2505	4272	6939	8320	13396	23771	52362
	125	360	849	1440	2006	3421	4835	6661	10725	19032	41923
	150	265	625	1060	1476	2518	3558	5606	7893	14008	30855
200	0-100	509	1200	2037	2837	4838	6838	9420	15168	26916	59288
	125	459	1082	1836	2557	4360	6164	8492	13672	24262	53442
	150	389	917	1556	2167	3695	5223	7195	11584	20557	45232
225	0-120	560	1319	2238	3117	5360	7514	10351	16667	29577	65150
	150	493	1162	1972	2747	4684	6621	9121	14686	26061	57405
	175	416	980	1663	2316	3950	5583	7692	12384	21976	48409
250	0-130	628	1480	2511	3498	5964	8431	11614	18700	33184	73095
	150	588	1386	2352	3276	5586	7896	10878	17514	31080	68460
	200	441	1040	1764	2457	4190	5922	8159	13136	23310	51345
300**	0-160	755	1775	3015	4200	7160	10120	13945	22450	39840	87760
	175	715	1690	2865	3990	6800	9615	13250	21330	37850	83370
	200	655	1550	2625	3655	6235	8810	12140	19545	34680	76400

* Shaded portion is for sizing temperature pilot, solenoid, or temperature-solenoid combination valves only.
** For HD Series Regulator only
+ Specify Low Pressure T-Pilot

"P" & "P5" Pilot

Pressure Pilot for HD & D Regulating Valves

Revised 9/2004

Pressure Pilot

- **Outlet Pressure Range: 3-200 PSIG**
- **P-Pilot** Standard for ± 1 PSIG accuracy
- **P5-Pilot** Special for ± 0.5 PSIG accuracy

PRESSURE-ADJUSTING SPRING RANGES

"P" (pressure)	"P5" (pressure)	Identifying Colors
3-25 PSIG	1-10 PSIG	yellow
20-100 PSIG	10-25 PSIG	blue
80-200 PSIG	–	red

MATERIALS

Pilot Body & Cover	Ductile Iron
Gasket	Garlock 3400
Diaphragm	Phosphor Bronze
Head & Seat Assembly	Hardened SST (55Rc)

TYPICAL APPLICATIONS

The "P" or "P5" Pressure Pilots used with either the HD or D Regulator control steam pressure in steam mains or for process equipment. Pilot operated regulators will maintain constant downstream pressure even when the inlet pressure to the valve fluctuates or stream usage varies.

FEATURES

- The "P" Pilot can maintain downstream pressure to ±1 PSIG
- Optional "P5" Pilot can maintain downstream pressure to ±0.5 PSIG
- Choices of 3 overlapping pressure ranges
- In-line change of pressure control spring
- Pilot installs using four bolts
- Full port strainer and blow-down valve on HD pilot adapter to eliminate failure caused by contaminated steam systems
- Can be used with temperature and solenoid control pilot
- Solid floating diaphragm
- Watson McDaniel's pilots can be used with other manufacturers regulators

OPTIONS

- Pressure pilot can be used with temperature pilot to eliminate the need for two separate regulators.
- Solenoid pilot can be added for remote on/off control of regulator
- P5 Options: Call factory for special "P5" Pilot which will maintain ± 0.5 PSIG accuracy

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*
**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*

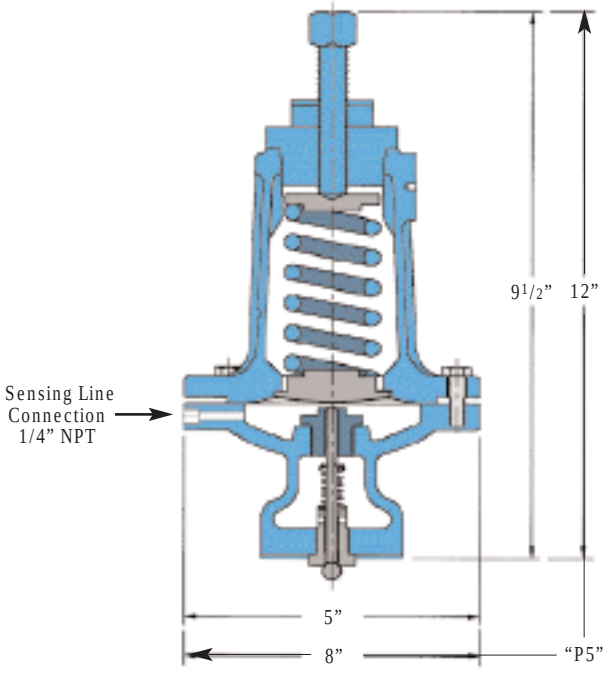
HOW TO ORDER

"P" or "P5" PRESSURE PILOT

Specify: • Reduced pressure range.

REGULATOR BODY

Specify: • HD or D regulator body.
• Regulator size or capacity.
• End connections
(threaded, 125/150/250/300# flanged).



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"BP" Pilot

Back Pressure Pilot for HD & D Regulating Valves

Revised 9/2004

Back Pressure Pilot

- **Back Pressure Range: 10-200 PSIG**

PRESSURE-ADJUSTING SPRING RANGES

Pressure	Identifying Colors
10-25 PSIG	yellow
20-100 PSIG	blue
80-200 PSIG	red

MATERIALS

Pilot Body & Cover	Ductile Iron
Gasket	Garlock 3400
Diaphragm	Phosphor Bronze
Head & Seat Assembly	Hardened SST (55Rc)

TYPICAL APPLICATIONS

The "BP" Back-Pressure Pilot used with either the HD or D regulator, maintain upstream pressure in steam systems. These regulators are commonly used to supply flash steam to low pressure mains.

FEATURES

- The "BP" Pilot can maintain upstream pressure to ±1 PSIG
- Choices of three overlapping pressure ranges
- Pressure adjusting spring can be changed with regulator in-line
- Pilot installs using four bolts
- Full port strainer and blow-down valve on HD pilot adapter to eliminate failure caused by contaminated steam systems
- Solid floating diaphragm
- Watson McDaniel's pilots can be used with other manufacturers regulators

OPTIONS

- Can be used with solenoid pilot for on/off control.

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*
**Minimum Inlet Pressure for Temperature Regulator: 5 psig*

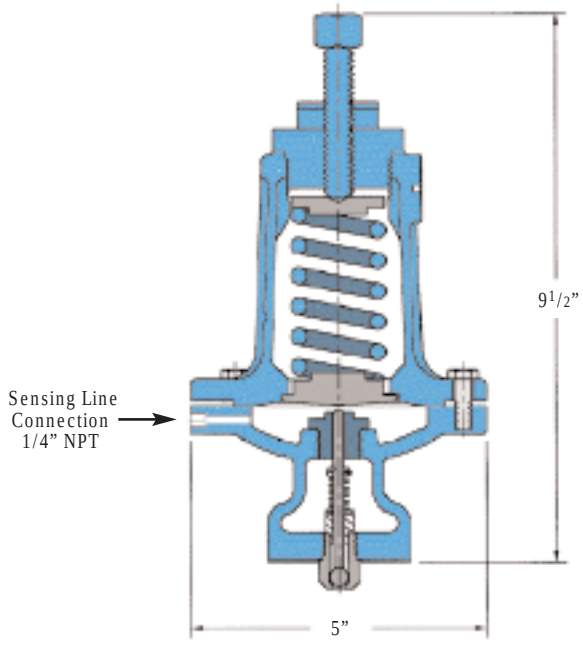
HOW TO ORDER

"BP" BACK PRESSURE PILOT

Specify: • Back pressure range.

REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity.
- End connections (threaded, 125/150/250/300# flanged).



"T" Pilot

Temperature Pilot for HD & D Regulating Valves

Revised 9/2004

Temperature Pilot

- **Temperature Control Range: 60°-260°F**

TYPICAL APPLICATIONS

The "T" Temperature Pilot used with either the HD or D regulator control temperature in various processes and systems. Some examples are:

- Oil heaters
- Process heaters
- Dryers
- Ovens
- Vats
- Jacketed Kettles

FEATURES

- Temperature adjustment is made simple and easy by rotating an adjustment knob to the desired temperature setting
- Thermostatic sensing bulb comes with an 8-ft. or 15-ft. length capillary
- Armored capillary to resist damage
- Overheat protection bellows is incorporated into sensing bulb. 200°F overheat protection up to 350°F
- For steam supply pressure 12 PSIG or under, our low pressure temperature pilot must be used
- Full-port strainer and blow-down valve on pilot adapter to eliminate failure caused by contaminated steam systems

OPTIONS

- Temperature Pilot can be combined with Pressure and Solenoid pilots
- Additional lengths can be ordered in 5-ft. increments; up to 25-ft. maximum length
- Wells are available in 316 stainless steel or brass
- Longer wells can be supplied
- 316 Stainless Steel Sensing Bulb
- Other options available; consult Factory

Note: Watson McDaniel's Low Pressure Temperature Pilot must be used for steam supply pressure less than 12 PSIG

TEMPERATURE-ADJUSTING RANGES

Temperature	Identifying Colors
60 - 120°F (16 - 49°C)	yellow
100 - 160°F (38 - 71°C)	black
120 - 180°F (49 - 82°C)	blue
160 - 220°F (71 - 104°C)	red
200 - 260°F (93 - 127°C)	green

* Other ranges available; consult Factory.

MATERIALS

Body	Ductile Iron
Head & Guide Assembly	Stainless Steel
Seat	Stainless Steel
Sensing Bulb:	
T	Copper
TU	Copper/Brass Union Nut
TUBW	Copper/Brass Well
TUSW	Copper/Stainless Steel Well
TBW	Copper/Brass Well with Gromet
TSW	Copper/Stainless Steel Well with Gromet

"PT"
Pressure & Temperature
Pilot
(optional)

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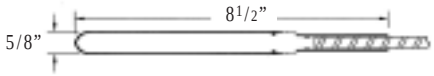
"T" Pilot

Temperature Pilot for HD & D Regulating Valves

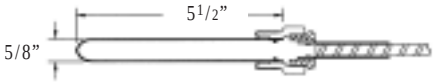
Revised 9/2004

SENSING BULBS AVAILABLE

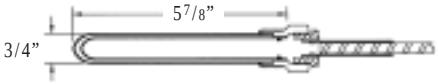
T



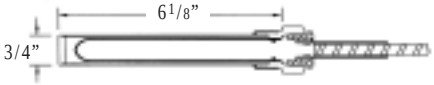
TU



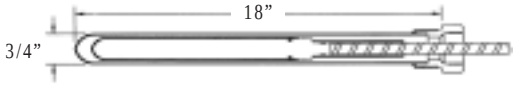
TUBW



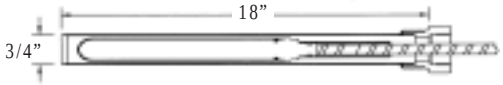
TUSW



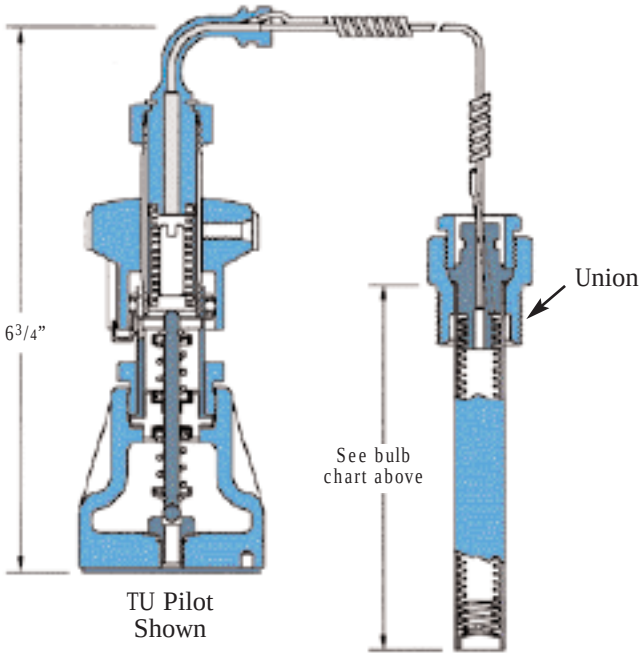
TBW



TSW



All Union Connections are 3/4" NPT



TU Pilot
Shown

T	Plain copper bulb
TU	Union connected copper bulb that can be screwed into the side of tank
TUBW	Type TU bulb with a brass well. The well can be placed in the side of a tank allowing the sensing bulb to be removed without having to drain the tank of liquid
TUSW	Type TU bulb with a corrosion resistant stainless steel well. The well allows the sensing bulb to be removed from tank without draining the liquid.
TBW	Type T bulb with an extended length brass well. The extended well allows deeper insertion of sensing bulb into tanks.
TSW	Type T bulb with extended stainless steel well. The extended well allows deeper insertion of sensing bulb into tanks.

Other options available; consult factory.

HOW TO ORDER

"T" TEMPERATURE PILOT

Specify:
- Temperature range from the chart or indicate the temperature of the process you wish to control.
- The length of capillary required. 8-ft. is standard.
- Bulb type needed:
  T, TU, TUBW, TUSW, TBW & TSW.

REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity of steam required.
- End connections
  (threaded, 125/150/250/300# flanged).

RECOMMENDED PRESSURE

Minimum Inlet Pressure: 5 PSIG*

*For pressures less than 12 PSIG, specify low pressure temperature pilot.

"A" Pilot

Air Pilot for HD & D Regulating Valves

Revised 9/2004

Air Pilot

- **Pressure Control Range: 3 -200 PSIG**
- **Temperature Range: 0°-350°F when used with PTL & PTR controllers**

TYPICAL APPLICATIONS

The "A" Air Pilot used with either the HD or D Regulator control steam pressure on steam mains and process equipment. The "A" Air Pilot can also be used in conjunction with the PTR or PTL pneumatic controllers for controlling temperature in process applications. The significant advantage of the "A" Air Pilot over standard spring loaded pilots is that pressure adjustments to the regulator can be made from a remote location. Regulator placed in a difficult to reach or inaccessible location can now be adjusted by a control panel board placed in a convenient location.

HOW IT WORKS

When air pressure is applied to the upper chamber of the air pilot it exerts a downward force on the air pilots diaphragm. This force controls the outlet pressure of the steam through the regulating valve. The control process is similar to a spring loaded pressure pilot except that the air pressure takes the place of the spring. There are three separate models of air pilots that make up the complete range depending on the steam pressure that needs to be controlled and the control air pressure available. See Pressure Adjusting Ranges Chart.

FEATURES

- Pressure adjustments of the regulator can be done from a remote location
- Air-operated pilot insures instant response and extremely accurate control
- Full port strainer and blow-down valve on pilot adapter to eliminate failure caused by contaminated steam systems
- Control pressure settings within ±1 PSIG

DIMENSIONS – inches

Model	A	B
A1	5 1/4	5
A4	5 1/4	7 7/8
A6	5 1/4	9 1/2

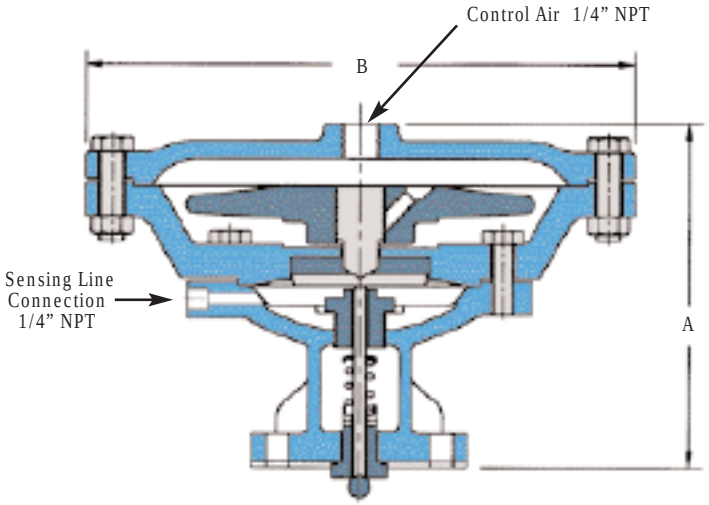
PRESSURE ADJUSTING RANGES

Model	Reduced Pressure Range	Description
A1	3-35 PSIG	1:1 ratio of steam pressure to control air pressure
A4	3-100 PSIG	4:1 ratio of steam pressure to control air pressure
A6	20-200 PSIG	6:1 ratio of steam pressure to control air pressure

The larger Diaphragm area of the "A4" & "A6" Air Pilots allows the use of low control air pressure to regulate higher pressure steam

MATERIALS

Pilot Body & Cover	Ductile Iron
Gasket	Garlock 3400
Cover Screws	Steel, GR5
Head & Seat Assembly	Hardened SST (55Rc)



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"A" Pilot

Air Pilot for HD & D Regulating Valves

Revised 9/2004

CONTROL PANEL BOARDS

There are three different options of remote control panel boards that can be used along with the "A" Air Pilots. Supply air is fed directly through the control panel board to the air pilot. You should choose one of the three options of control panel boards when using the air piloted regulators.

PL1

PL2

PL3

PL1

The PL1 is made up of an air pressure regulator with adjustment knob and pressure gauge that measures the amount of air pressure going to the pilot. Steam pressure of the system is controlled by adjusting the air pressure regulator.

PL2

The PL2 is the same as the PL1 except that it has an extra air pressure gauge for measuring the supply air pressure to the control panel board.

PL3

The PL3 is the same as the PL2 except that it has a steam pressure gauge for measuring steam pressure on outlet side of the regulating valve.

Recommended Pressures

Differential Pressure: 10 PSIG (min.)

Inlet Pressure: 15 PSIG (min.)

Outlet Pressure: 5% of inlet pressure for inlet pressures to 100 PSIG (3 PSIG min.). 10% of the inlet pressure for inlet pressures over 100 PSIG.

Air Supply Pressure: 3 to 35 PSIG

HOW TO ORDER

"A" AIR PILOT

Specify:
- Air Pilot A1, A4, or A6
- Remote Control Panel Board PL1, PL2, or PL3

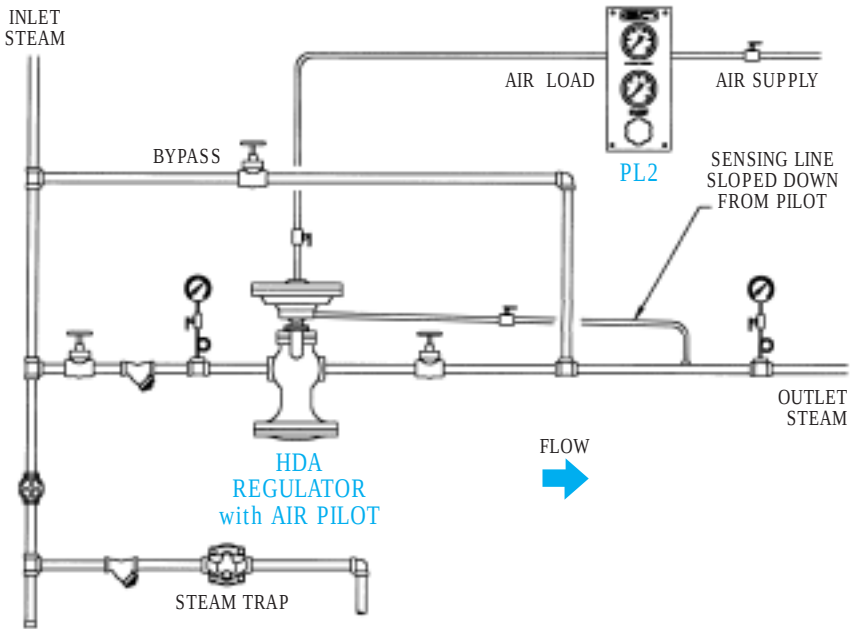
REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity and pressures of steam required.
- End connections (threaded, 125/150/250/300# flanged).

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*
**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*

Pressure Reducing Station Using HD Regulator with an Air Pilot



DESCRIPTION OF OPERATION

The "A" Air Pilot is being used in conjunction with the PL2 Control Panel Board to regulate steam pressure. A small air regulator on the panel board can be adjusted to control the air pressure to the pilot. One gauge on the panel board measures air line pressure to the panel board and the other gauge shows the air pressure being sent to the pilot. Depending on the air pilot model chosen (A1, A4, A6), there will be a 1:1, 4:1, or 6:1 ratio of outlet steam pressure to air pressure.

PTR & PTL Controller

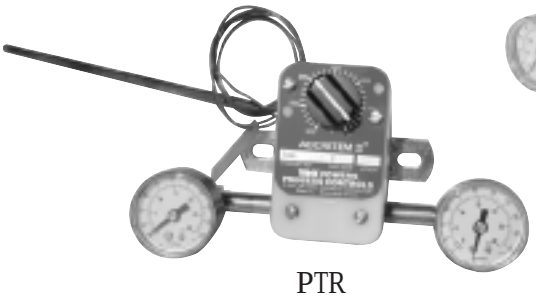
Pneumatic Temperature Controller used with Air Pilot

Revised 9/2004

Pneumatic Temperature Controller

Temperature Range:

- **PTR: 0˚-300˚F**
- **PTL: 50˚-350˚F**



PTR
"Remote"
with 4-ft. Capillary

PTL
"Local"

TYPICAL APPLICATIONS

The PTL and PTR Pneumatic Temperature Controllers operate over a wider temperature range than our standard "T" temperature pilot. These temperature controllers also react quicker to temperature change which make them an excellent choice for instantaneous hot water applications.

HOW IT WORKS

The PTL and PTR Pneumatic Temperature Controllers are used in conjunction with an "A" Air Pilot to control the operation of the HD or D Regulator. The PTL uses a bimetallic element to sense temperature and the PTR uses a hydraulically filled bulb with a 4-ft. capillary to sense temperature. Air supply is connected to the inlet of the controller and the air output signal is fed directly to an air pilot, which controls the opening and closing of the steam regulating valve.

FEATURES

- Accurate and rapid response to temperature changes
- 350˚F control temperature range

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*

**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*

Model	PTL	PTR
Temperature Adjustment Range	50˚ - 350˚F	0˚ - 300˚F
Maximum Air Supply Pressure	35 PSIG	35 PSIG
Sensing Bulb	Bimetallic	Hydraulic Fill
Max. Pressure	250 PSIG	250 PSIG
Max. Temperature	400˚F	350˚F
Material	Copper	Copper
Optional Material	Stainless Steel	Stainless Steel
Capillary Length	N/A	4-ft.

HOW TO ORDER

PTL & PTR PNEUMATIC TEMPERATURE CONTROLLER

Specify: • PTL or PTR controller model (air pilot required for operation)

AIR PILOT

Specify: • A1, A4 or A6 air pilot model

REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity.
- End connections (threaded, 125/150/250/300# flanged).

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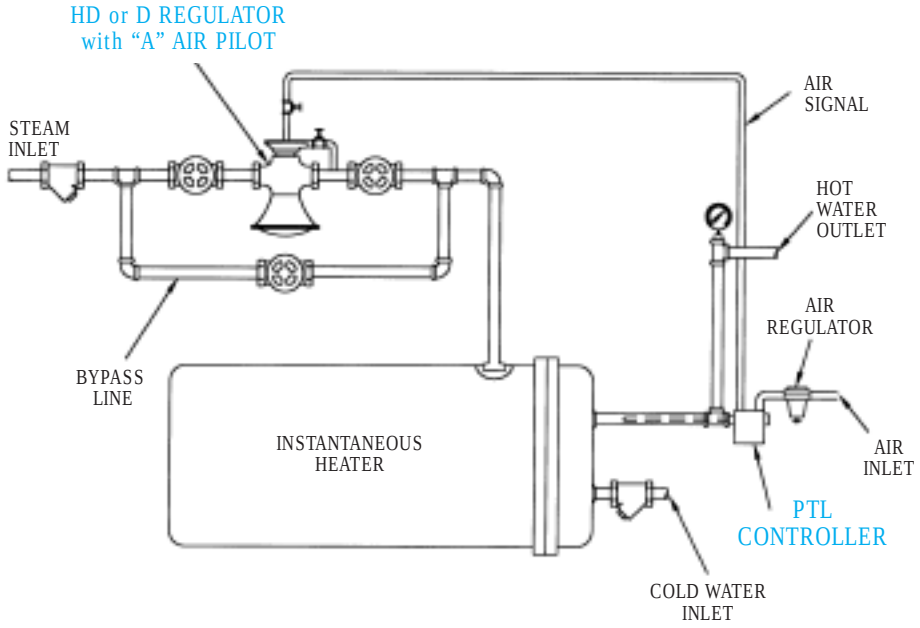
PTR & PTL Controller

Pneumatic Temperature Controller used with Air Pilot

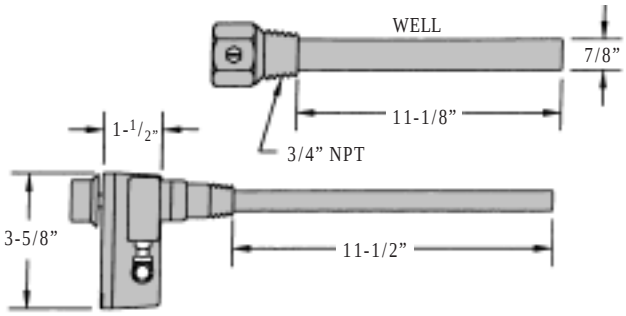
Revised 9/2004

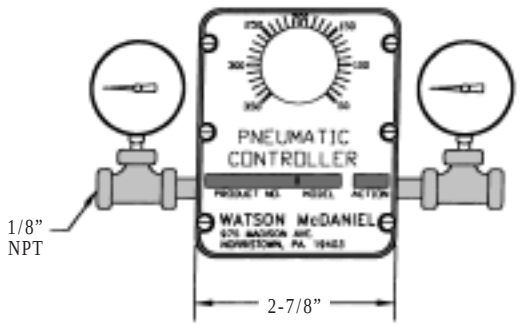


DESCRIPTION OF OPERATION

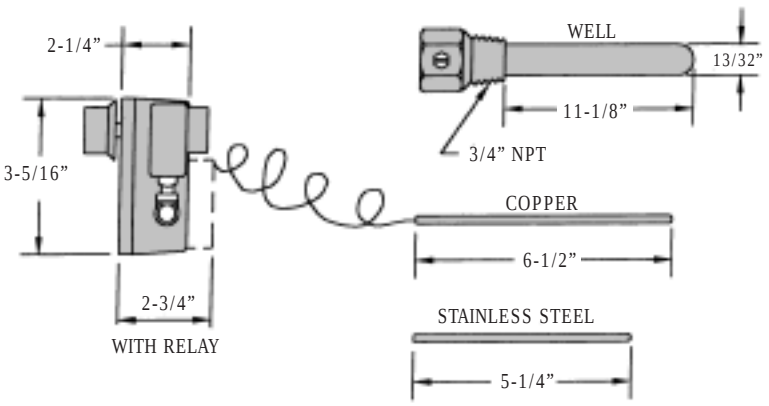
The PTL Pneumatic Temperature Controller senses outlet water temperature on an instantaneous hot water heater. When the outlet water temperature falls below the set point, the PTL pneumatic temperature controller sends an air signal to the A1 Air Pilot which opens the regulator. When the water reaches the desired set temperature, the PTL pneumatic temperature controller shuts off the air signal to the A1 Air Pilot and the regulator closes.

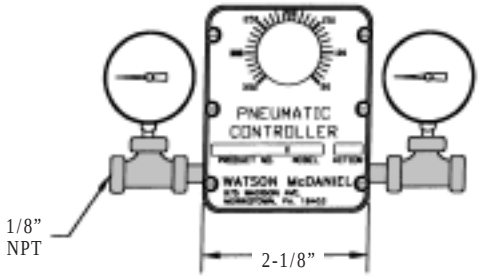
Rigid Bulb Controller – Model PTL





Remote Bulb Controller – Model PTR





"TRP" Pilot

Temperature Pilot for HD & D Regulating Valves

Revised 9/2004

Temperature Pilot

- **Temperature Control Range: 20°-250°F**

TYPICAL APPLICATIONS

The "TRP" Temperature Pilot used with either the HD or D Regulator controls temperature in various processes and systems. Some examples are: Oil heaters, Ovens, Process Heaters, Vats, Dryers and Jacketed Kettles.

The "TRP" will control lower temperatures than the standard "T" Pilot

FEATURES

- Ductile iron pilot body
- Stainless steel valve and seat
- Pilot ranges under 100°F are cross-ambient filled to minimize thermal fluctuations
- Standard capillary is copper with 316 stainless steel armor in 10 ft. length

OPTIONS

- Additional Capillary Length: Available up to 25-ft. in 5-ft. increments.
- Special Materials: Sensing bulb, wells, and capillary are available in special corrosion resistant materials.
  316 stainless steel capillary
  316 stainless armor covering with standard capillary
  Kynar-covered capillary
- Finned Bulb: Special finned sensing bulb for improved temperature sensitivity when controlling air temperature in heating ducts.
- Dry Well: Dry well or separable socket is available in stainless steel or copper.
- Temperature Sensing Dial: Indicates temperature of process being controlled

MATERIALS

Pilot Body	Ductile Iron
Valve and Seat	Copper
Support Bracket	Aluminum
Bulb & Capillary	Copper (optional stainless steel)
All Other Parts	Brass

HOW TO ORDER

"TRP" TEMPERATURE PILOT

Specify:
- Temperature range from the chart or indicate the temperature of the process you wish to control.
- The length of capillary required.

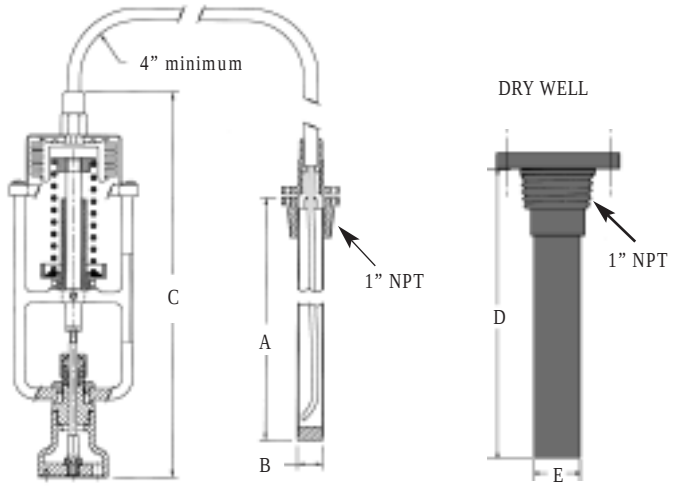
REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity of steam required.
- End connections (threaded, 125/150/250/300# flanged).

DIMENSIONS – inches

Std. Bulb Range °F	Bulb Length A	Bulb Diameter B	Height C	Dry Well or Separable Socket D	E
*20-80°	17 1/2	7/8	17 1/2	18 1/2	1
*40-100°	17 1/2	7/8	17 1/2	18 1/2	1
*60-120°	17 1/2	7/8	17 1/2	18 1/2	1
*80-140°	17 1/2	7/8	17 1/2	18 1/2	1
*100-160°	17 1/2	7/8	17 1/2	18 1/2	1
110-170°	10 1/2	5/8	17 1/2	11 1/2	3/4
130-190°	10 1/2	5/8	17 1/2	11 1/2	3/4
150-210°	10 1/2	5/8	17 1/2	11 1/2	3/4
170-230°	10 1/2	5/8	17 1/2	11 1/2	3/4
190-250°	10 1/2	5/8	17 1/2	11 1/2	3/4

**Cross-ambient filled thermal systems: these units are standard on 100° F or less minimum temperature ranges. If the surrounding air temperature (ambient air temperature) is within 20° F of the minimum temperature that the unit will be used at, a special cross-ambient temperature unit is required which includes the necessary 17 1/2" bulb length.*



"S" Pilot

Electronic Pilot for On/Off Control of HD & D Regulating Valves

Revised 9/2004

Solenoid Pilot

- **For Electrical On-Off Control of Regulating Valves**

TYPICAL APPLICATIONS

Typically used for automatic operation, remote control, programmed cycling, sequential function interlocks with other equipment, and emergency shut-off in case of power failure.

HOW IT WORKS

The "S" Solenoid Pilot is used in conjunction with Pressure, Temperature, or Air Pilots to electrically control on/off operation of the HD or D Regulator. When the solenoid pilot is used, the regulator can be turned on or off by electrically activating or de-activating the solenoid.

Normally Closed (nc) – Standard
The normally closed Solenoid Pilot remains closed in the non- activated state. The regulating valve will remain closed until an electrical signal is sent to the solenoid pilot. This is known as a fail-safe condition.

Normally Opened (no) – Optional
The normally opened Solenoid Pilot remains open in the non- activated state. The regulating valve will function normally unless an electrical signal is used to shut-off the solenoid pilot.

FEATURES

- Available normally opened (no) or normally closed (nc)
- Full-port strainer and blow-down valve on pilot adapter to eliminate failure caused by contaminated steam systems

OPTIONS

- Normally open solenoid
- NEMA Ratings: NEMA 4 and NEMA 7
- Voltage: 24 VAC, 220 VAC, 240 VAC

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*
**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*

STANDARD SOLENOID PILOTS AVAILABLE

Steam Inlet Pressure	0-180 PSIG 180-250 PSIG
NEMA Ratings	NEMA 1 – (standard) NEMA 4 – Waterproof (optional) NEMA 7 – Explosion-proof (optional)
Voltage	120 Volt AC (standard) 24 Volt AC (optional) 220 Volt AC (optional) 240 Volt AC (optional)

MATERIALS

Pilot Body & Cover	Ductile Iron
Gasket	Garlock 3400
Cover Screws	Steel, GR5
Internals	Stainless Steel

HOW TO ORDER

"S" SOLENOID PILOT

Specify:
- Inlet Steam Pressure range 0-180 PSIG or 180-250 PSIG
- NEMA rating – NEMA 1, NEMA 4 or NEMA 7 (if not specified NEMA 1 Standard will be supplied)
- Control Voltage – 24, 110, 220 or 240 Volts

REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity of steam required.
- End connections (threaded, 125/150/250/300# flanged).

HDP

Pilot-Operated Pressure Regulating Valve

Revised 9/2004

HD Regulating Valve with "P" Pressure Pilot

- **Reduced Outlet Pressure Range: 3-200 PSIG**
- **Inlet Pressure Max: 300 PSIG**
  Inlet Pressure Min: 15 PSIG

The HD-Series is the upgraded model for the D-Series Regulator. HD & D internal components and pilots are interchangeable.

TYPICAL APPLICATIONS

The HD or D Regulator with the "P" Pressure Pilot is used for reducing steam pressure in piping mains and process applications. Pilot-operated regulators will maintain constant downstream pressure even when the inlet pressure to the regulator fluctuates or steam usage varies.

FEATURES

- The "P" Pilot can maintain downstream pressure to ±1 PSIG
- Optional "P5" pilot can maintain pressure to ±0.5 PSIG
- Choices of three overlapping pressure ranges
- Pressure adjusting spring can be changed with regulator in-line
- Pilot is installed using four bolts
- Full port strainer and blow-down valve on pilot adapter to eliminate failure caused by contaminated steam systems
- Watson McDaniel's pilots can be used with other manufacturer's regulators

OPTIONS

- Pressure and temperature pilots can be combined on the same regulator
- Solenoid pilot can be added for electrical on/off control of the regulator
- Can be used with solenoid and temperature pilots

PRESSURE-ADJUSTING SPRING RANGES "P"

Pressure	Identifying Colors
3-25 PSIG	yellow
20-100 PSIG	blue
80-200 PSIG	red

PRESSURE-ADJUSTING SPRING RANGES "P5"

1-10 PSIG	gold
10-25 PSIG	blue

MATERIALS

	D-SERIES	HD-SERIES
Body	Cast Iron	Ductile Iron
Cover	Cast Iron	Ductile Iron
Gasket	Garlock 3400	Garlock 3400
Cover Screws	Steel	Steel
Pilot Adapter	Cast Iron	Ductile Iron
Screen	Stainless Steel	Stainless Steel
Tubing	Copper	Copper
Valve Seat	Hardened SST (55Rc)	Hardened SST (55Rc)
Valve Disc	Hardened SST (55Rc)	Hardened SST (55Rc)
Diaphragm	Phosphor Bronze	Phosphor Bronze

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*

**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*

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HDP

Pilot-Operated Pressure Regulating Valve

Revised 9/2004

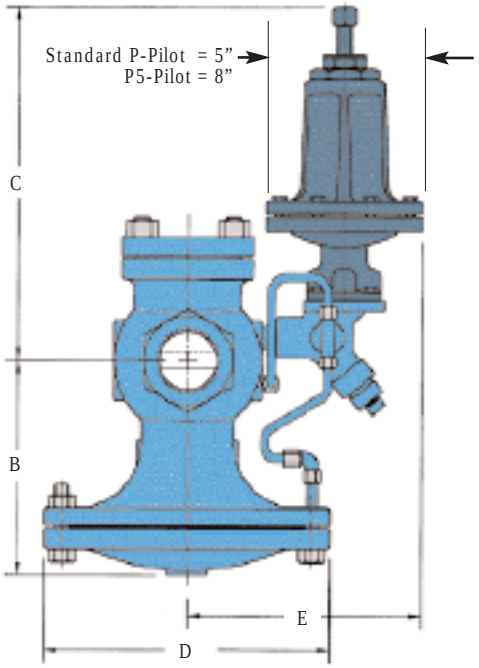
DIMENSIONS D-Series – inches/pounds

Size	Face-To-Face NPT	125#	250#	B	C*	D	E**	Weight (lbs) NPT	FLG
1/2"	5 1/8			5 1/8	11	5 7/8	7	18	
3/4"	5 1/2			5 1/2	11	6 1/2	7 1/4	21	
1"	6 1/8			6 1/8	11	7	7 1/2	25	
1 1/4"	8 1/2			7	11 7/8	8 3/4	8	45	
1 1/2"	9 1/2			7 1/8	11 7/8	8 3/4	8 1/2	55	
2"	9 3/4	9 1/2	9 5/8	7 1/8	11 7/8	10 7/8	9	90	105
2 1/2"		10	10 5/8	8 3/4	11 7/8	11 3/4	9 1/2		135
3"		11	11 3/4	9 1/8	11 7/8	13 1/4	10		180

DIMENSIONS HD-Series – inches/pounds

Size	Face-To-Face NPT	150#	300#	B	C*	D	E**	Weight (lbs) NPT	FLG
1/2"	4 3/8			5 1/2	11 7/8	6 1/2	7 3/4	18	
3/4"	4 3/8			5 1/2	11 7/8	6 1/2	7 3/4	18	
1"	5 3/8	5 1/2	6	6 1/4	11 7/8	7	7 3/4	23	35
1 1/4"	7 1/4			7 3/8	11 7/8	8 3/4	8 1/4	43	
1 1/2"	7 1/4	6 7/8	7 3/8	7 3/8	11 7/8	8 3/4	8 1/4	43	60
2"	7 1/2	8 1/2	9	8 1/4	11 7/8	10 7/8	8 1/2	65	85
2 1/2"		9 3/8	10	9	11 7/8	11 3/4	8 1/2		105
3"		10	10 3/4	8 7/8	11 7/8	13 1/4	9 1/2		145
4"		11 7/8	12 1/2	10 7/8	11 7/8	14 3/4	10 1/2		235
6"		15 1/8	16	14 1/8	12 1/2	19 3/4	11 3/4		470

For P5 Pilot:
** For sizes 1/2" to 1-1/2" add 2-1/2" to "C" dimension.*
For sizes 2" to 6" add 5" to "C" dimension.
*** Add 1-1/2" to "E" dimension for all sizes.*



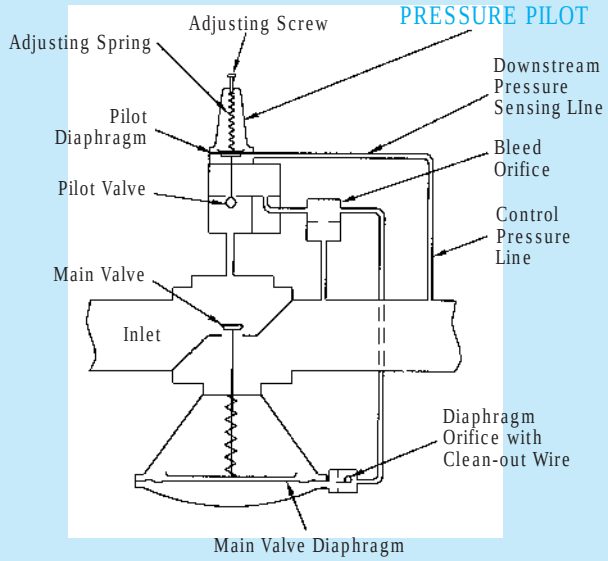
HOW TO ORDER

P or P5 PRESSURE PILOT

Specify: • Reduced pressure range.
(P5 Pilot requires a special adapter block on 3 & 4" valves)

REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity and pressures of steam required.
- End connections (threaded, 125/150/250/300# flanged).



HOW IT WORKS

The purpose of the pressure pilot is to control the operation of the pressure regulating valve. A sensing line used to detect pressure connects the pressure pilot to the downstream side of the regulator. The pressure in the sensing line is directed under the diaphragm in the pressure pilot. When the pressure in the system reaches the adjusted spring set point it pushes the diaphragm upwards against the force of the adjusting spring and closes the pilot valve. When the pilot valve is shut, steam can no longer pass through to the underside of the regulator diaphragm and the valve main closes. When the steam pressure falls below it's set point, the pilot valve opens allowing steam to lift the main diaphragm and open up the regulating valve.

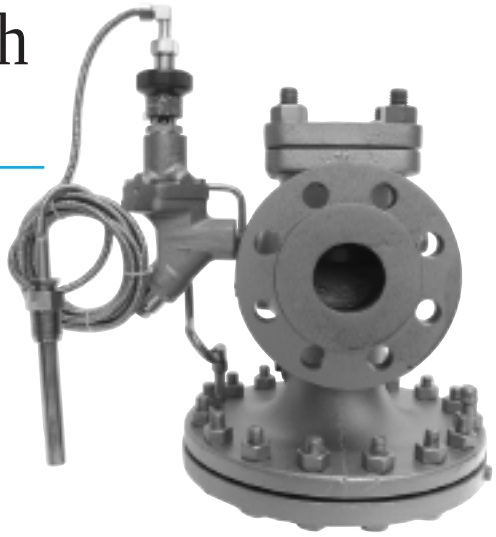
HDT

Pilot-Operated Temperature Regulating Valve

Revised 9/2004

HD Regulating Valve with "T" Temperature Pilot

- **Temperature Control Range: 60˚–260˚F**
- **Inlet Pressure Max: 300 PSIG**
  Inlet Pressure Min: 5 PSIG



The HD-Series is the upgraded model for the D-Series Regulator. HD & D internal components and pilots are interchangeable.

TYPICAL APPLICATIONS

The HD or D Regulator with the "T" Temperature Pilot is used for controlling temperature in various processes and systems, such as Oil Heaters, Ovens, Process Heaters, Vats, Dryers, and Jacketed Kettles.

FEATURES

- Temperature adjustment made simple and easy by rotating an adjustment knob to the desired temperature setting
- Thermostatic sensing bulb comes with 8-ft. or 15-ft. capillary. Additional lengths up to 25-ft. max.
- Capillary is armored to protect against damage
- Optional stainless steel sensing bulb and capillary
- Overheat protection bellows is incorporated into sensing bulb. 200˚F overheat protection up to 350˚F
- Can be used with Pressure Pilots for simultaneous control of pressure and temperature
- Hardened stainless steel trim on regulator for extended service life
- Full port strainer and blow-down valve on pilot adapter to eliminate failure caused by contaminated steam systems

OPTIONS

- Temperature Pilot can be combined with Pressure and Solenoid pilots.
- Additional capillary lengths can be ordered in 5-ft. increments; up to 25-ft. maximum length.
- Wells are available in 316 stainless steel.
- Longer wells can be supplied.
- Low pressure (under12 PSI) temperature pilot.
- Consult factory for other options.

TEMPERATURE-ADJUSTING RANGES

Temperature	Identifying Colors
60 - 120°F (16 - 49°C)	yellow
100 - 160°F (38 - 71°C)	black
120 - 180°F (49 - 82°C)	blue
160 - 220°F (71 - 104°C)	red
200 - 260°F (93 - 127°C)	green

* Other ranges available; consult Factory.

MATERIALS

	D-SERIES	HD-SERIES
Body	Cast Iron	Ductile Iron
Cover	Cast Iron	Ductile Iron
Gasket	Garlock 3400	Garlock 3400
Cover Screws	Steel	Steel
Pilot Adapter	Cast Iron	Ductile Iron
Screen	Stainless Steel	Stainless Steel
Tubing	Copper	Copper
Valve Seat	Hardened SST (55Rc)	Hardened SST (55Rc)
Valve Disc	Hardened SST (55Rc)	Hardened SST (55Rc)
Diaphragm	Phosphor Bronze	Phosphor Bronze

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HDT

Pilot-Operated Temperature Regulating Valve

Revised 9/2004

DIMENSIONS D-Series – inches / pounds

Size	Face-To-Face NPT	Face-To-Face 125#	Face-To-Face 250#	B	C	D	E	Weight (lbs) NPT	Weight (lbs) FLG
1/2”	5 1/8			5 1/8	8 1/4	5 7/8	6 1/8	18	
3/4”	5 1/2			5 1/2	8 1/4	6 1/2	6 3/8	21	
1”	6 1/8			6 1/8	8 1/4	7	6 5/8	25	
1 1/4”	8 1/2			7	9 1/4	8 3/4	7 1/8	45	
1 1/2”	9 1/2			7 1/8	9 1/4	8 3/4	7 5/8	55	
2”	9 3/4	9 1/2	9 5/8	7 1/8	9 1/4	10 7/8	8 1/4	90	105
2 1/2”		10	10 5/8	8 3/4	9 1/4	11 3/4	8 5/8		135
3”		11	11 3/4	9 1/8	9 1/4	13 1/4	9 1/8		180

DIMENSIONS HD-Series – inches / pounds

Size	Face-To-Face NPT	Face-To-Face 150#	Face-To-Face 300#	B	C	D	E	Weight (lbs) NPT	Weight (lbs) FLG
1/2”	4 3/8			5 1/2	9 1/4	6 1/2	6 1/2	18	
3/4”	4 3/8			5 1/2	9 1/4	6 1/2	6 1/2	18	
1”	5 3/8	5 1/2	6	6 1/4	9 1/4	7	8 1/4	23	35
1 1/4”	7 1/4			7 3/8	9 1/4	8 3/4	7 1/4	43	
1 1/2”	7 1/4	6 7/8	7 3/8	7 3/8	9 1/4	8 3/4	7 1/4	43	60
2”	7 1/2	8 1/2	9	8 1/4	9 1/4	10 7/8	7 1/2	65	85
2 1/2”		9 3/8	10	9	9 1/4	11 3/4	7 3/4		105
3”		10	10 3/4	8 7/8	9 1/4	13 1/4	8 1/2		145
4”		11 7/8	12 1/2	10 7/8	9 1/4	14 3/4	9 1/2		235
6”		15 1/8	16	14 1/8	9 3/4	19 3/4	10 3/4		470

HOW TO ORDER

“T” TEMPERATURE PILOT

Specify:

- Temperature range from the chart or indicate the set temperature of the process you wish to control.
- The length of capillary required. 8-ft. or 15-ft. standard. Maximum length: 25-ft. in 5-ft. increments.
- Bulb type needed: T, TU, TUBW, TUSW, TBW & TSW.

REGULATOR BODY

Specify:

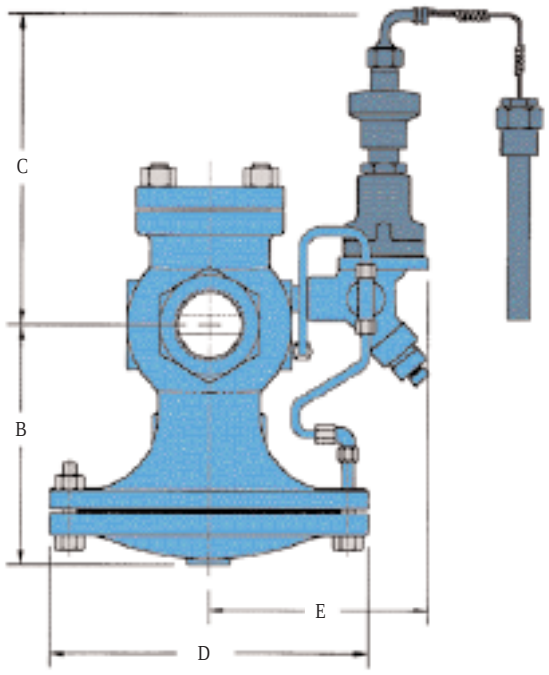
- HD or D regulator body.
- Regulator size or capacity.
- End connections (threaded, 125/150/250/300# flanged).

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 5 PSIG*

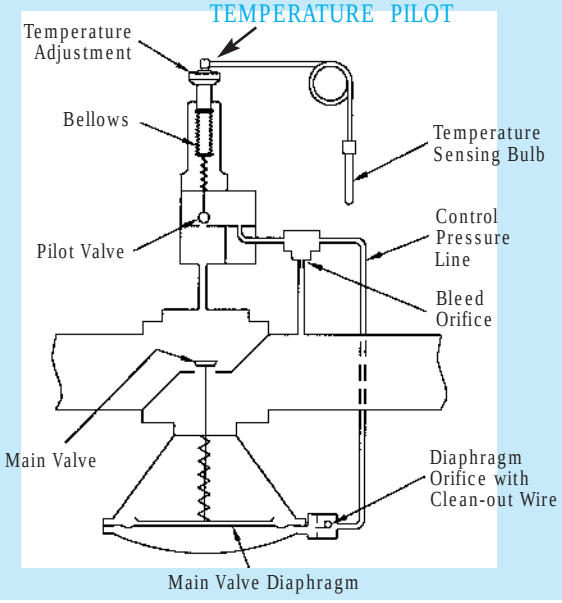
OPTION –
With Standard Pilot: 15 PSIG minimum
With Low Pressure Pilot: 5 PSIG minimum

**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*



HOW IT WORKS

The purpose of the temperature pilot is to control the operation of the temperature regulating valve. A sensing bulb filled with liquid is used as a thermostat to monitor the temperature of whatever is being heated. The sensing bulb is connected to the temperature pilot by a length of capillary tubing. When the sensing bulb is heated the liquid inside expands and in turn expands a bellows inside the temperature pilot. The expansion and contraction of this bellows is what controls the operation of the temperature regulating valve.



REGULATORS

HDA

Air Pilot-Operated Regulating Valve

Revised 9/2004

HD Regulating Valve with "A" Air Pilot

- **Pressure Control Range: 3-200 PSIG**
- **Temperature Range: 0°-350°F when used with PTR or PTL Pneumatic Controller**
- **Inlet Pressure Max: 300 PSIG**

TYPICAL APPLICATIONS

The HD or D Regulator with the "A" Air Pilot is used for reducing steam pressure on steam mains and process equipment. The "A" Air Pilot can also be used in conjunction with the PTR and PTL Pneumatic Controller for controlling temperature in process applications. The significant advantage of the "A" Air Pilot over standard spring-loaded pilots is that pressure adjustments to the regulator can be made from a remote location. A regulator placed in a difficult to reach or inaccessible location can now be adjusted by a control panel board placed in a convenient location.

FEATURES

- Air Pilot can be used with PTR or PTL Pneumatic Temperature Controller.
- Pressure adjustments of the regulator can be done from a remote location.
- Air-operated pilot insures instant response and very accurate control.
- Full port strainer and blow-down valve on pilot adapter to eliminate failure caused by contaminated steam systems
- Control pressure settings within ±1 PSIG.

OPTIONS

- Solenoid can be added for electrical on/off operation of the regulator.

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG

PRESSURE-ADJUSTING RANGES

Model	Reduced Pressure Range	Description
A1	3-35 PSIG	1:1 ratio of steam pressure to control air pressure Example: *With the A1 air pilot 10 PSIG of air pressure maintains 10 PSIG of steam pressure*
A4	3-100 PSIG	4:1 ratio of steam pressure to control air pressure Example: *With the A4 air pilot 10 PSIG of air pressure maintains 40 PSIG of steam pressure*
A6	20-200 PSIG	6:1 ratio of steam pressure to control air pressure Example: *With the A6 air pilot 10 PSIG of air pressure maintains 60 PSIG of steam pressure*

MATERIALS

	D-SERIES	HD-SERIES
Body	Cast Iron	Ductile Iron
Cover	Cast Iron	Ductile Iron
Gasket	Garlock 3400	Garlock 3400
Cover Screws	Steel	Steel
Pilot Adapter	Cast Iron	Ductile Iron
Screen	Stainless Steel	Stainless Steel
Tubing	Copper	Copper
Valve Seat	Hardened SST (55Rc)	Hardened SST (55Rc)
Valve Disc	Hardened SST (55Rc)	Hardened SST (55Rc)
Diaphragm	Phosphor Bronze	Phosphor Bronze

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HDA

Air Pilot-Operated Regulating Valve

Revised 9/2004

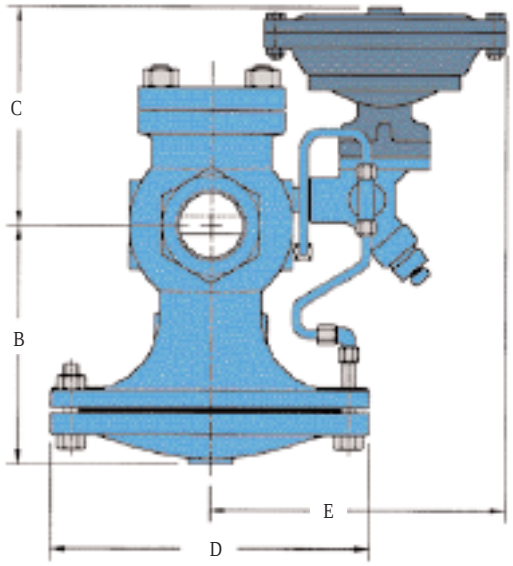
DIMENSIONS D-Series – inches / pounds

Size	Face-To-Face NPT	125#	250#	B	C*	D	E**	Weight (lbs) NPT	FLG
1/2"	5 1/8			5 1/8	8 1/4	5 7/8	7 1/4	18	
3/4"	5 1/2			5 1/2	8 1/4	6 1/2	7 1/4	21	
1"	6 1/8			6 1/8	8 1/2	7	7 1/2	25	
1 1/4"	8 1/2			7	8 1/2	8 3/4	9 1/4	45	
1 1/2"	9 1/2			7 1/8	8 3/4	8 3/4	9 1/2	55	
2"	9 3/4	9 1/2	9 5/8	7 1/8	8 3/4	10 7/8	9 3/4	90	105
2 1/2"		10	10 5/8	8 3/4	9	11 3/4	10 1/4		135
3"		11	11 3/4	9 1/8	9	13 1/4	10 1/2		180

DIMENSIONS HD-Series – inches / pounds

Size	Face-To-Face NPT	150#	300#	B	C*	D	E**	Weight (lbs) NPT	FLG
1/2"	4 3/8			5 1/2	7 1/2	6 1/2	7 3/4	18	
3/4"	4 3/8			5 1/2	7 1/2	6 1/2	7 3/4	18	
1"	5 3/8	5 1/2	6	6 1/4	7 1/2	7	7 3/4	23	35
1 1/4"	7 1/4			7 3/8	7 1/2	8 3/4	8 3/8	43	
1 1/2"	7 1/4	6 7/8	7 3/8	7 3/8	7 1/2	8 3/4	8 3/8	43	60
2"	7 1/2	8 1/2	9	8 1/4	7 1/2	10 7/8	8 3/4	65	85
2 1/2"		9 3/8	10	9	7 1/2	11 3/4	8 3/4		105
3"		10	10 3/4	8 7/8	7 1/2	13 1/4	9 1/2		145
4"		11 7/8	12 1/2	10 7/8	7 1/2	14 3/4	10 1/2		235
6"		15 1/8	16	14 1/8	8 1/4	19 3/4	11 3/4		470

**Add 2-1/2" to "C" dimension when using the A4 or A6 Air Pilots on 2" through 4" valves.*
***Add 1-1/2" to "E" dimension for A4, and 2-1/4" for A6.*



HOW TO ORDER

"A" AIR PILOT

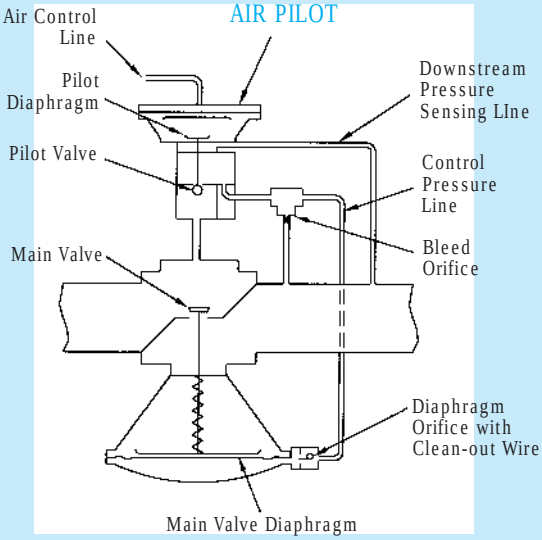
Specify:
- Air Pilot A1, A4, or A6
- Remote Control Panel Board: PL1, PL2, or PL3

REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity and pressures of steam required.
- End connections (threaded, 125/150/250/300# flanged).

HOW IT WORKS

When air pressure is applied to the upper chamber of the air pilot it exerts a downward force on the air pilot's diaphragm. The lower chamber of the air pilot is connected to the outlet side of the regulator using a sensing line. The purpose of the sensing line is to sense the pressure on the outlet side of the regulator. When the intended set pressure is reached the pilot valve closes which then closes off the flow path of steam to the underside of the diaphragm chamber in the regulator body. The regulator modulates maintaining the desired downstream pressure regardless of the amount of steam being used.



REGULATORS

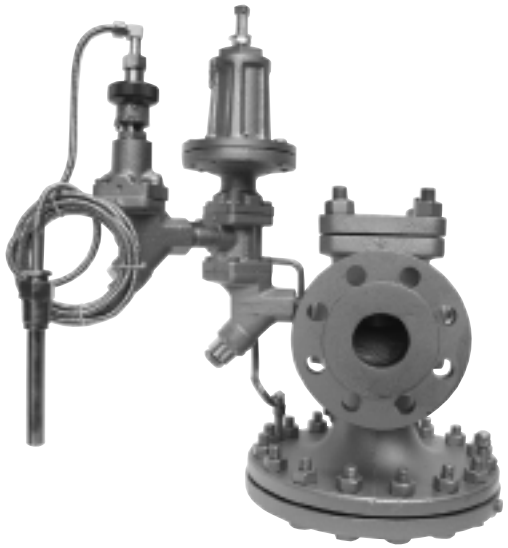
HDPT

Pilot-Operated Pressure & Temperature Regulating Valve

Revised 9/2004

HD Regulating Valve with "P" Pressure & "T" Temperature Pilots

- **Reduced Outlet Pressure Range: 3-200 PSIG**
- **Inlet Pressure Max: 300 PSIG**
  Inlet Pressure Min: 15 PSIG
- **Temperature Control Range: 60°-260°F**



TYPICAL APPLICATIONS

The HD or D Regulator with both the "P" Pressure Pilot and "T" Temperature Pilot is used to simultaneously control both pressure and temperature in process applications.

Using both the temperature and pressure pilot on the same regulator eliminates the need for two separate regulators to control temperature and pressure.

FEATURES

- Pressure and temperature pilot combinations eliminate the need for two separate regulators
- Choices of 3 overlapping pressure ranges
- Pilot is installed using four bolts
- Full port strainer and blowdown valve on pilot adapter to eliminate failure caused by contaminated steam systems
- Watson McDaniel's pilots can be used with other manufacturer's valves
- T-Pilot bulb may be installed at any angle

OPTIONS

- Solenoid Pilot can be added for electrical on/off control of the regulator

RECOMMENDED PRESSURE

Differential Pressure: 10 PSIG minimum
Minimum Inlet Pressure: 15 PSIG*

**Minimum Inlet Pressure for Temperature Regulator: 5 PSIG*

TEMPERATURE-ADJUSTING RANGES

Temperature	Identifying Colors
60 - 120°F (16 - 49°C)	yellow
100 - 160°F (38 - 71°C)	black
120 - 180°F (49 - 82°C)	blue
160 - 220°F (71 - 104°C)	red
200 - 260°F (93 - 127°C)	green

* Other ranges available; consult Factory.

PRESSURE-ADJUSTING SPRING RANGES

Pressure	Identifying Colors
3-25 PSIG	yellow
20-100 PSIG	blue
80-200 PSIG	red

MATERIALS

	D-SERIES	HD-SERIES
Body	Cast Iron	Ductile Iron
Cover	Cast Iron	Ductile Iron
Gasket	Garlock 3400	Garlock 3400
Cover Screws	Steel	Steel
Pilot Adapter	Cast Iron	Ductile Iron
Screen	Stainless Steel	Stainless Steel
Tubing	Copper	Copper
Valve Seat	Hardened SST (55Rc)	Hardened SST (55Rc)
Valve Disc	Hardened SST (55Rc)	Hardened SST (55Rc)
Diaphragm	Phosphor Bronze	Phosphor Bronze

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HDPT

Pilot-Operated Pressure & Temperature Regulating Valve

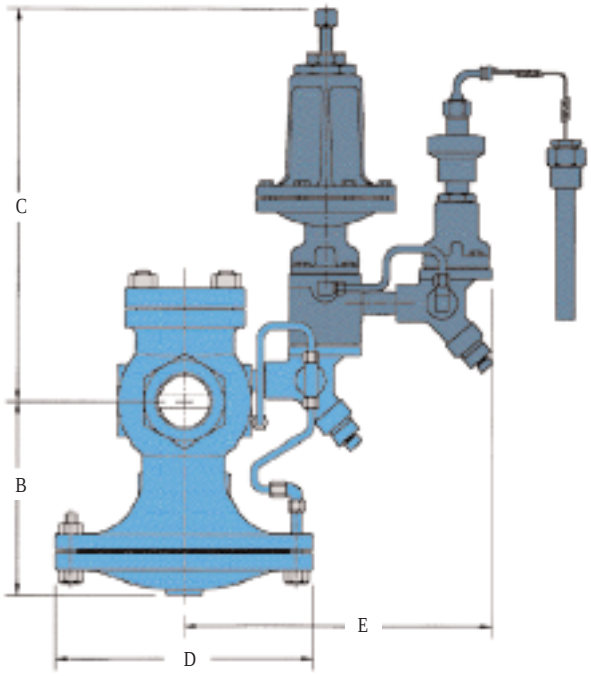
Revised 9/2004

DIMENSIONS D-Series – inches / pounds

Size	Face-To-Face NPT	Face-To-Face 125#	Face-To-Face 250#	B	C	D	E	Weight (lbs) NPT	Weight (lbs) FLG
1/2"	5 1/8			5 1/8	13 1/2	5 7/8	11 1/2	18	
3/4"	5 1/2			5 1/2	13 1/2	6 1/2	11 3/4	21	
1"	6 1/8			6 1/8	13 1/2	7	12	25	
1 1/4"	8 1/2			7	14 3/4	8 3/4	12 1/2	45	
1 1/2"	9 1/2			7 1/8	14 3/4	8 3/4	13	55	
2"	9 3/4	9 1/2	9 5/8	7 1/8	15 1/4	10 7/8	13 1/2	90	105
2 1/2"		10	10 5/8	8 3/4	15 1/4	11 3/4	14		135
3"		11	11 3/4	9 1/8	15 1/4	13 1/4	14 1/2		180

DIMENSIONS HD-Series – inches / pounds

Size	Face-To-Face NPT	Face-To-Face 150#	Face-To-Face 300#	B	C	D	E	Weight (lbs) NPT	Weight (lbs) FLG
1/2"	4 3/8			5 1/2	14 1/2	6 1/2	10 1/4	18	
3/4"	4 3/8			5 1/2	14 1/2	6 1/2	10 1/4	18	
1"	5 3/8	5 1/2	6	6 1/4	14 1/2	7	10 1/4	23	35
1 1/4"	7 1/4			7 3/8	14 1/2	8 3/4	10 3/4	43	
1 1/2"	7 1/4	6 7/8	7 3/8	7 3/8	14 1/2	8 3/4	10 3/4	43	60
2"	7 1/2	8 1/2	9	8 1/4	14 1/2	10 7/8	11 1/4	65	85
2 1/2"		9 3/8	10	9	14 1/2	11 3/4	11 1/4		105
3"		10	10 3/4	8 7/8	14 1/2	13 1/4	12		145
4"		11 7/8	12 1/2	10 7/8	14 1/2	14 3/4	13		235
6"		15 1/8	16	14 1/8	15	19 3/4	14 1/4		470



HOW TO ORDER

"T" TEMPERATURE PILOT

Specify:
- Temperature range from the chart or indicate the set temperature of the process you wish to control.
- The length of capillary required. 8-ft. is standard.
- Bulb type needed: T, TU, TUBW, TUSW, TBW & TSW.

"P" PRESSURE PILOT

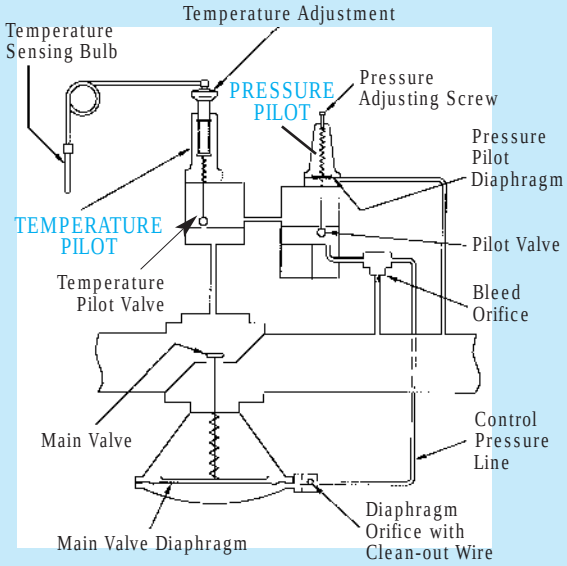
Specify:
- Pressure range from the chart

REGULATOR BODY

Specify:
- HD or D regulator body.
- Regulator size or capacity and pressures of steam required.
- End connections (threaded, 125/150/250/300# flanged).

HOW IT WORKS

A pressure pilot and temperature pilot can be used together to control the operation of the regulator. The pressure pilot limits the outlet pressure of the regulator when the temperature pilot calls for steam. The temperature pilot senses the temperature of the process that is being controlled and opens or closes the regulator accordingly. Using a pressure-temperature pilot combination eliminates having to use two separate valves.



Noise Attenuation

for Pressure Regulating Valves

Revised 9/2004

Noise Attenuation Equipment is used to reduce unwanted or excessive noise that commonly occurs in pressure reducing stations.

Series-A ORIFICE PLATE

Noise Reduction Capability: 5-10 dBA

Series-A
Orifice Plate

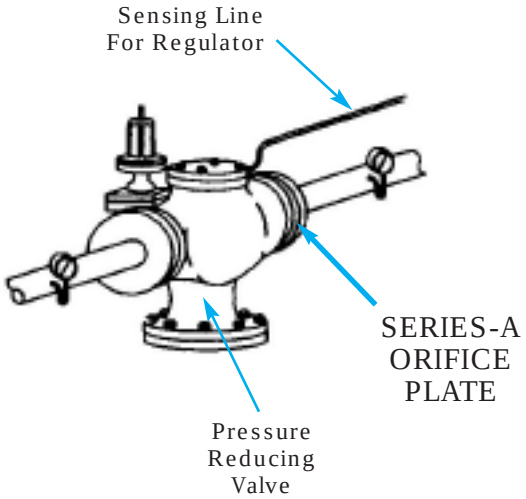
HOW IT WORKS

The Series-A Orifice Plate with its drilled orifice pattern is installed after the pressure regulating valve to smooth out turbulence caused by the pressure drop across the regulator. Noise reduction levels of 5-10 dBA can typically be achieved.

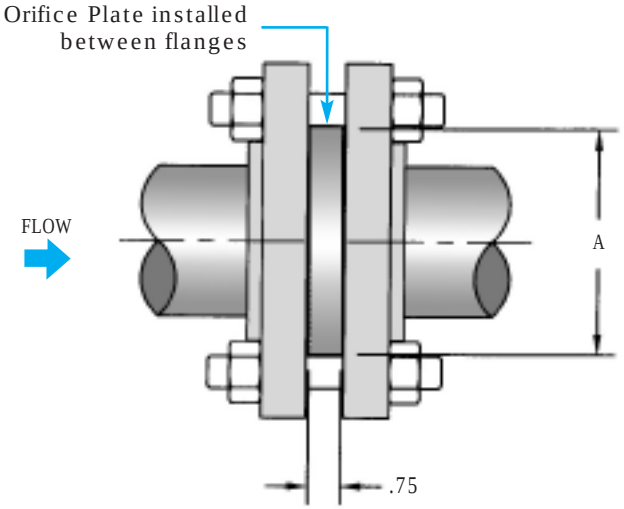
INSTALLATION

Series-A Orifice Plate is installed between ANSI flanges immediately after the regulator. If the regulator is a flanged unit, the orifice plate is placed at the flange outlet connection.

Series-A Typical Hook-up



Series A Dimensions



Series-A DIMENSIONS – inches

Pipe Size	Series A 125# Flange	Series A 250# Flange
2”	6	$4\frac{3}{16}$
$2\frac{1}{2}$”	7	$4\frac{15}{16}$
3”	$7\frac{1}{2}$	$5\frac{11}{16}$
4”	9	$6\frac{15}{16}$
6”	11	$9\frac{11}{16}$

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Noise Attenuation

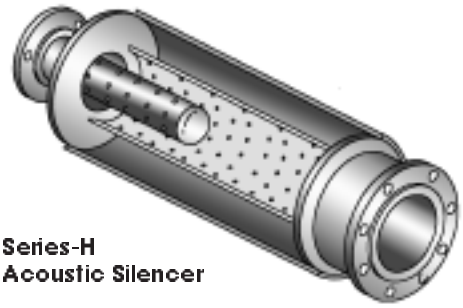
for Pressure Regulating Valves

Revised 9/2004

Noise Attenuation Equipment is used to reduce unwanted or excessive noise that commonly occurs in pressure reducing stations.

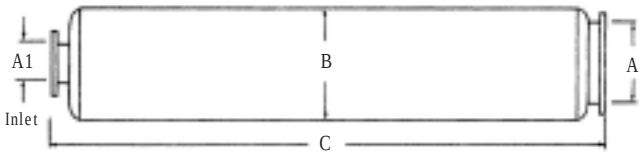
Series-H ACOUSTIC SILENCER

Noise Reduction Capability: 20-30 dBA



Series-H
Acoustic Silencer

Series-H Dimensions



HOW IT WORKS

The Series-H Acoustic Silencer incorporates a Dual Diffuser tube design. The inner tube has a drilled orifice pattern and the outer tube contains an integral layer of sound absorbing insulation. Noise reduction levels of 20-30 dBa can typically be achieved.

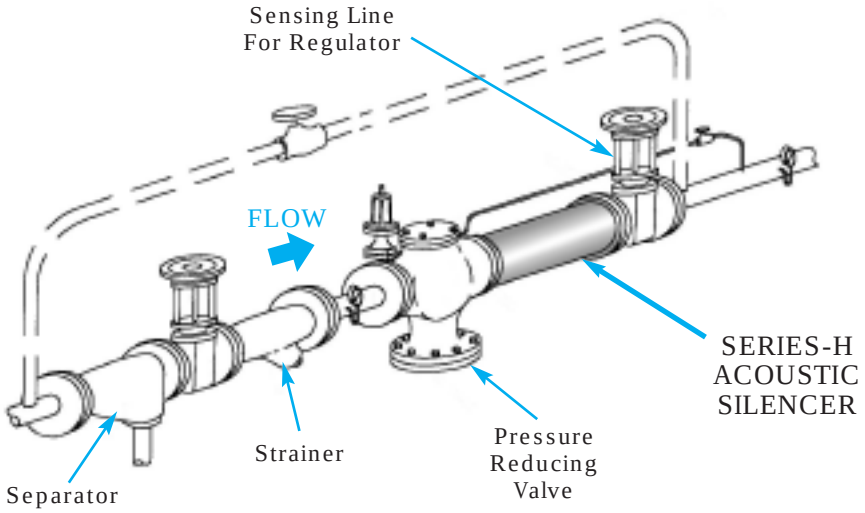
INSTALLATION

The Series-H Diffuser Tube should be installed immediately downstream of the regulator.

Series-H DIMENSIONS – inches

Model	A1	A	B	C	Weight (lbs)
LCV-8	4	8	14	57	145
LCV-10	6	10	16	71	210
LCV-12	6	12	18	81	295

Series-H Typical Hook-up



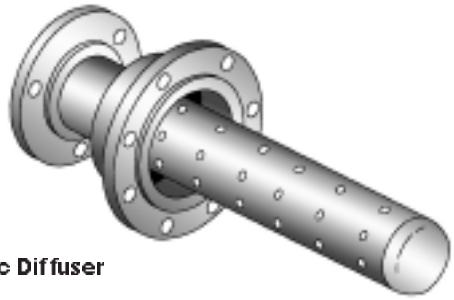
Noise Attenuation

for Pressure Regulating Valves

Revised 9/2004

Series-S ACOUSTIC DIFFUSER

Noise Reduction Capability: 10-15 dBA



Series-S
Acoustic Diffuser

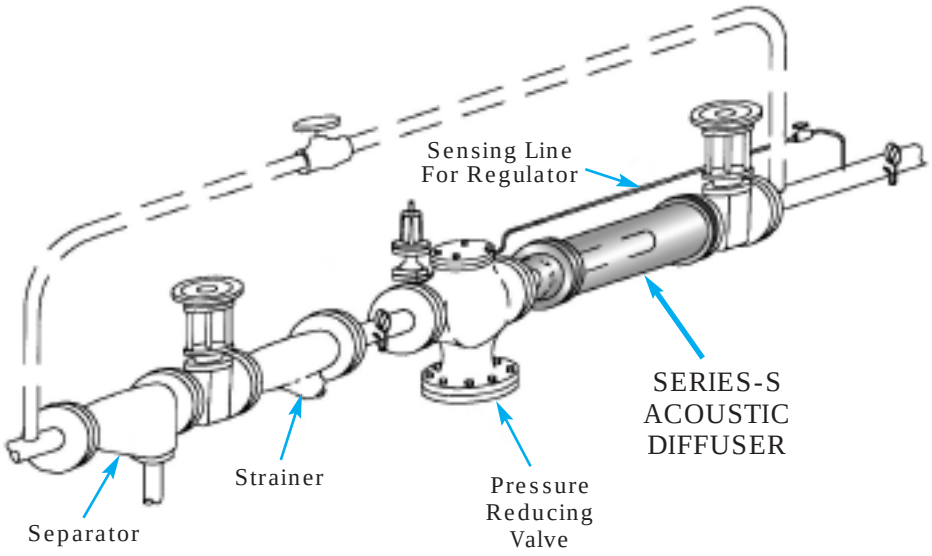
HOW IT WORKS

The Series-S Acoustic Diffuser incorporates a single tube with a drilled orifice pattern which reduces downstream turbulence. Noise reduction levels of 10-15 dBa can typically be achieved.

INSTALLATION

The Series-S Diffuser Tube should be installed immediately downstream of the regulator.

Series-S Typical Hook-up



Model Selection Chart for Series-S Diffuser

Steam Capacity (lbs/hr)	Valve Inlet Pressure (PSIG)															
	15	20	25	30	40	50	60	75	90	100	125	150	175	200	225	250
1000	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3
1500	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3
2000	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4
3000	S-4	S-4	S-4	S-4	S-4	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5
4000	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5
6000	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6
8000	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8
10000	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8

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Noise Attenuation

for Pressure Regulating Valves

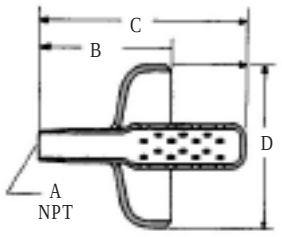
Revised 9/2004

Series-S Dimensions – inches

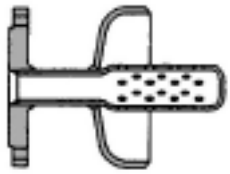
Model	Inlet		Outlet	NPT x Weld Dimensions		
	NPT	FLG	FLG/BW	B	C	D
S-3	3/4		2	5 1/2	13 1/2	2 3/8
S-3	1		2	5 1/2	13 1/2	2 3/8
S-4	3/4		4	6 1/2	13 1/2	4 1/2
S-4	1		4	6 1/2	13 1/2	4 1/2
S-4	1 1/4		4	6 1/2	13 1/2	4 1/2
S-4	1 1/2		4	6 1/2	13 1/2	4 1/2
S-4	2		4	6 1/2	13 1/2	4 1/2
S-5	3/4		4	6 1/2	16 1/2	4 1/2
S-5	1		4	6 1/2	16 1/2	4 1/2
S-5	1 1/4		4	6 1/2	16 1/2	4 1/2
S-5	1 1/2		4	6 1/2	16 1/2	4 1/2
S-5	2		4	6 1/2	16 1/2	4 1/2
S-5	2 1/2	2 1/2	4	6 1/2	16 1/2	4 1/2
S-6	1 1/4		6	8	14	5 5/8
S-6	1 1/2		6	8	14	5 5/8
S-6	2		6	8	14	5 5/8
S-6	2 1/2	2 1/2	6	8	14	5 5/8
S-6	3	3	6	8	14	5 5/8
S-8	1 1/2		8	10	17	8 5/8
S-8	2		8	10	17	8 5/8
S-8	2 1/2	2 1/2	8	10	17	8 5/8
S-8	3	3	8	10	17	8 5/8
S-8	4	4	8	10	17	8 5/8
S-10	2		12	12	14	12 3/4
S-10	2 1/2	2 1/2	12	12	14	12 3/4
S-10	3	3	12	12	14	12 3/4
S-10	4	4	12	12	14	12 3/4
S-10	6	6	12	12	14	12 3/4
S-12	2 1/2	2 1/2	12	12	21	12 3/4
S-12	3	3	12	12	21	12 3/4
S-12	4	4	12	12	21	12 3/4
S-12	6	6	12	12	21	12 3/4

Note: 150 & 300 # flanges available

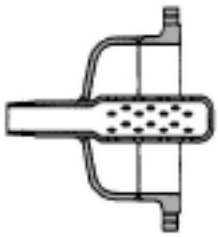
NPT x Weld



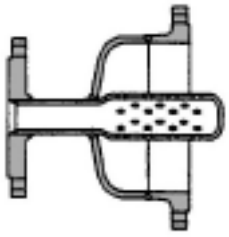
Flanged x Weld



NPT x Flanged



Flanged x Flanged



REGULATORS

"O" Series

Pressure Regulating Valve

Revised 9/2004

Model	"O" Series
Service	Steam, Air, Water, Other Liquids
Sizes	3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2"
Connections	Threaded
Body Material	Cast Iron
Seat & Disc	Hardened 420 Stainless Steel
Diaphragm	Phosphor Bronze – Steam Neoprene/Nylon – Water, Air & Oil (180° F Max.) Viton up to 300°F (optional)
Max. Inlet Pressure	250 PSIG
Min. Inlet Pressure	15 PSIG
Max. Diff. Pressure	125 PSI
Min. Diff. Pressure	15 PSI

DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

NPT 250 PSIG @ 450° F

TYPICAL APPLICATIONS

The "O" Series Pressure Regulating Valves are used for reducing pressure in steam, air, and water systems. Commonly used in heating and other process applications.

FEATURES

- Hardened stainless steel seat and disc for extended service life (55Rc)
- Neoprene & Nylon fiber diaphragm for water, oil, and air service. 180°F maximum temperature
- Viton diaphragm for up to 300°F service
- Phosphor Bronze diaphragm for steam service
- Double spring available for extended outlet pressure range
- Integral stainless steel strainer on 3/4"HC, 1", 1 1/4, 1 1/2", 2"

HOW TO ORDER

Specify:
- Regulator "O" Series
- Size based on capacity chart
- Spring range or outlet pressure required
- Liquid, Air or Steam Service

Example: 1" O-Series – 10-30 Spring Range

PRESSURE-ADJUSTING SPRING RANGES – *Spring No. & Color Code*

	Outlet Pressure	Size 3/8"	1/2"	3/4"	3/4"HC	1"	1 1/4"	1 1/2"	2"
Single Spring	0-10	13 blue/yellow	13 blue/yellow	13 blue/yellow	3 red	7 red/green	7 red/green	8 red/blue	8 red/blue
	10-30	–	–	–	4 green	8 red/blue	8 red/blue	9 red/yellow	9 red/yellow
	10-50	14 black/yellow	14 black/yellow	14 black/yellow	–	–	–	–	–
	30-50	–	–	–	5 blue	9 red/yellow	9 red/yellow	10 green/blue	10 green/blue
	40-85	–	–	–	6 yellow	10 green/blue	10 green/blue	11 green/yellow	11 green/yellow
	40-100	9 red/yellow	9 red/yellow	9 red/yellow	–	–	–	–	–
	100-200	10 green/blue	10 green/blue	10 green/blue	–	–	–	–	–
Double Spring	0-75	–	–	–	7, red/green 8, red/blue	8, red/blue 9, red/yellow	8, red/blue 9, red/yellow	8, red/blue 9, red/yellow	8, red/blue 9, red/yellow
	30-130	–	–	–	8, red/blue 9, red/yellow	9, red/yellow 10, green/blue	9, red/yellow 10, green/blue	9, red/yellow 10, green/blue	9, red/yellow 10, green/blue

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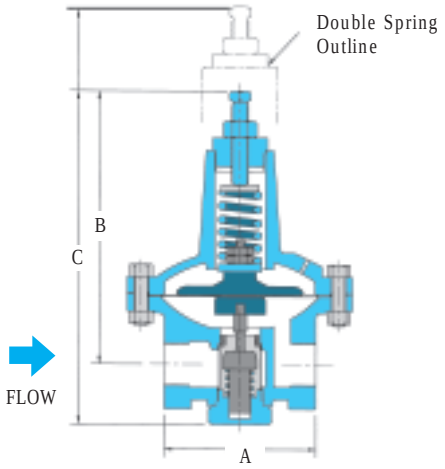
"O" Series
Pressure Regulating Valve

Revised 9/2004

DIMENSIONS & WEIGHTS – inches/pounds

Size	A	B	C	C Double Spring	Weight (lbs)
3/8"	3 1/4	6 1/2	8	-	8
1/2"	3 1/4	6 1/2	8	-	8
3/4"	3 1/4	6 1/2	8	-	8
3/4" HC*	4	8	10	12 1/2	15
1"	4 1/2	8 1/2	10 1/2	13	18
1 1/4"	4 1/2	8 1/2	10 1/2	13	18
1 1/2"	6 1/2	8 3/4	12	14 1/2	40
2"	6 1/2	8 3/4	12	14 1/2	40



Note: 3/4 HC – High Capacity version of standard 3/4" valve

CAPACITIES – Steam (lbs/hr) *Air (scfm) *Water (gpm)

Inlet Press.	Outlet Press.	3/8", 1/2", 3/4"			3/4" HC			1"			1 1/4"			1 1/2"			2"		
		Steam	Air	Water	Steam	Air	Water	Steam	Air	Water	Steam	Air	Water	Steam	Air	Water	Steam	Air	Water
15	2	46	26	6	92	51	11	130	73	16	145	81	18	180	100	22	199	111	25
	5	38	21	4	75	42	9	106	59	13	119	66	14	147	82	18	163	91	19
20	5	65	36	8	130	72	15	184	102	22	205	114	25	254	141	30	281	156	34
	10	61	34	6	123	69	13	174	97	18	194	109	20	241	134	25	266	149	27
	15	45	25	4	90	51	9	128	72	13	143	80	14	177	99	18	196	109	19
30	5	83	46	10	167	93	20	236	131	28	264	147	32	327	181	39	362	201	43
	10	83	46	10	167	93	18	236	131	25	264	147	28	327	181	35	362	201	39
	20	71	40	6	142	79	13	201	112	18	225	126	20	278	155	25	308	172	27
50	5	121	67	13	242	134	27	342	190	38	382	212	42	473	263	53	523	291	58
	25	121	67	10	242	134	20	342	190	28	382	212	32	473	263	39	523	291	43
	40	87	49	6	174	97	13	247	138	18	276	154	20	341	191	25	377	211	27
100	30	214	119	17	428	238	33	607	337	47	678	376	53	839	466	66	928	515	73
	50	214	119	14	428	238	28	607	337	40	678	376	45	839	466	55	928	515	61
	70	195	109	11	275	154	18	390	218	25	436	244	28	540	301	35	597	333	39
125	30	261	145	19	522	290	39	739	410	55	826	458	62	1021	567	76	1130	627	84
	50	261	145	17	522	290	35	739	410	49	826	458	55	1021	567	68	1130	627	75
	70	261	145	15	522	290	30	739	410	42	826	458	47	1021	567	58	1130	627	64
	100	201	112	10	402	225	20	569	318	28	636	355	32	787	440	39	871	486	43
150	30	307	171	22	615	341	44	871	484	62	974	540	69	1204	668	86	1332	740	95
	50	307	171	20	615	341	40	871	484	57	974	540	63	1204	668	78	1332	740	87
	70	307	171	18	615	341	36	871	484	51	974	540	57	1204	668	70	1332	740	78
	100	298	166	14	596	333	28	844	471	40	943	527	45	1167	652	55	1291	721	61
	120	239	133	11	478	267	22	677	378	31	756	422	35	935	523	43	1035	578	47
200	30	401	222	26	802	445	52	1135	630	74	1269	705	83	1570	871	102	1737	964	113
	50	401	222	24	802	445	49	1135	630	69	1269	705	78	1570	871	96	1737	964	106
	70	401	222	23	802	445	46	1135	630	65	1269	705	72	1570	871	89	1737	964	99
	100	401	222	20	802	445	40	1135	630	57	1269	705	63	1570	871	78	1737	964	87
250	50	494	274	28	988	549	57	1400	777	80	1565	869	90	1935	1074	111	2141	1189	123
	70	494	274	27	988	549	54	1400	777	76	1565	869	85	1935	1074	105	2141	1189	116
	125	494	274	22	988	549	45	1400	777	63	1565	869	71	1935	1074	88	2141	1189	97

For capacities of other gases multiply the air capacities by the following factors: Argon–0.85 Co_2–0.81 Helium–2.69 Nitrogen–1.02

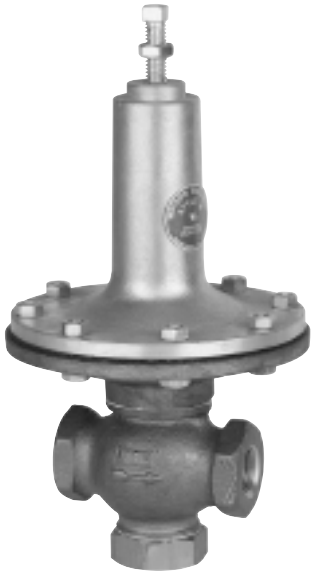
** Air and water capacities are based on using elastomeric diaphragms.*

B Series

Pressure Regulating Valves

Revised 9/2004

Model	B Series
Service	Water, Air, Oil, Other Gases & Liquids
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4"
Connections	NPT, 125# & 250# Flanged
Body Material	1/2"– 2 1/2" Bronze 3"& 4" Cast Iron
Disc	Neoprene (standard) 200°F max. Viton up to 300°F (optional)
Diaphragm	Neoprene/Nylon 200°F max. Viton up to 300ºF (optional)
Max. Inlet Pressure	250 PSIG
Min. Inlet Pressure	10 PSIG
Max. Diff. Pressure	125 PSI
Min. Diff. Pressure	20% of inlet pressure



DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

NPT	250 PSIG @ 400° F
125# FLG	125 PSIG @ 450° F
250# FLG	250 PSIG @ 450° F

TYPICAL APPLICATION

The B Series Pressure Regulating Valves are used for reducing pressure in air and water systems. These regulators are commonly found in industrial plants, apartment buildings, water supply systems, schools, and underground water distribution systems.

FEATURES & OPTIONS

- Diaphragm, disc, and cup packing available in Viton for 300º F service (optional)
- Balance pressure regulator insures accurate control even when incoming pressure fluctuates
- Internally senses pressure, no external sensing line required
- Soft disc in Neoprene or Viton for Class-V shut-off rating

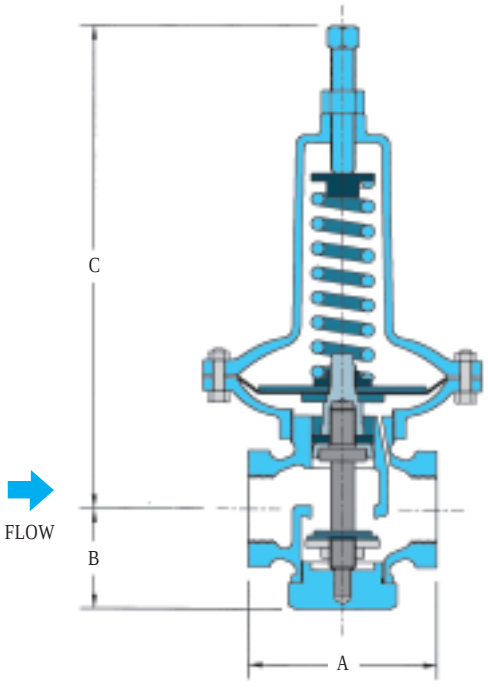
HOW TO ORDER

Specify:
- Regulator B Series
- Size based on capacity chart
- Spring range or outlet pressure required

Example: 2" B Series – 20-70 lbs. Spring Range

PRESSURE-ADJUSTING SPRING RANGES

Outlet Pressure (PSIG)	Spring No.
1-12	4 (1/2" – 1" only)
5-35	3
20-70	2
40-125	1



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B Series

Pressure Regulating Valves

Revised 9/2004

DIMENSIONS & WEIGHTS – inches/pounds

Size	Face-to-Face A			B	C	D Spring Case Dia. (in.)	Weight (lbs)
	Screwed	125# Flanged	250# Flanged				
1/2", 3/4"	3 3/8			1 7/8	9	5	7
1"	3 5/8			2 1/4	9 1/2	5	8
1 1/4"	4 1/4			2 3/8	10 1/2	6 3/4	13
1 1/2"	4 3/4			2 1/2	10 3/4	6 3/4	15
2"	5 7/8			3 3/8	11 5/8	6 3/4	20
2 1/2"	6 1/2			4 1/4	12 3/4	6 3/4	30
3"		10 1/4	11	4 1/2	21 1/2	9 1/4	125
4"		13	13 5/8	5 3/4	23	9 1/4	182

CAPACITIES – Water (gal/min) Air (scfm)

Inlet Press.	Outlet Press.	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		Water	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air
10	5	5.5	25	10	45	13	60	22	100	33	150	55	250	88	400	132	600	176	800
20	5	9.8	48	18	86	23	114	39	190	59	285	98	475	156	760	234	1140	312	1520
	10	8.0	43	14	77	19	102	32	170	48	255	80	425	128	680	192	1020	256	1360
	15	5.5	30	10	54	13	72	22	120	33	180	55	300	88	480	132	720	176	960
30	5	12.5	68	23	122	30	162	50	270	75	405	125	675	200	1080	300	1620	400	2160
	10	11.3	63	20	113	27	150	45	250	68	375	113	625	180	1000	270	1500	360	2000
	20	8.0	48	14	86	19	114	32	190	48	285	80	475	128	760	192	1140	256	1520
50	5	16.8	98	30	176	40	234	67	390	101	585	168	975	268	1560	402	2340	536	3120
	25	12.5	88	23	158	30	210	50	350	75	525	125	875	200	1400	300	2100	400	2800
	40	8.0	63	14	113	19	150	32	250	48	375	80	625	128	1000	192	1500	256	2000
70	10	19.3	128	35	230	46	306	77	510	116	765	193	1275	308	2040	462	3060	616	4080
	30	15.8	125	28	225	38	300	63	500	95	750	158	1250	252	2000	378	3000	504	4000
	50	11.3	95	20	171	27	228	45	380	68	570	113	950	180	1520	270	2280	360	3040
100	30	21.0	175	38	315	50	420	84	700	126	1050	210	1750	336	2800	504	4200	672	5600
	50	17.5	165	32	297	42	396	70	660	105	990	175	1650	280	2640	420	3960	560	5280
	70	13.8	135	25	243	33	324	55	540	83	810	138	1350	220	2160	330	3240	440	4320
125	30	24.3	213	44	383	58	510	97	850	146	1275	243	2125	388	3400	582	5100	776	6800
	50	21.5	213	39	383	52	510	86	850	129	1275	215	2125	344	3400	516	5100	688	6800
	100	12.5	140	23	252	30	336	50	560	75	840	125	1400	200	2240	300	3360	400	4480
150	30	27.5	250	50	450	66	600	110	1000	165	1500	275	2500	440	4000	660	6000	880	8000
	50	25.0	250	45	450	60	600	100	1000	150	1500	250	2500	400	4000	600	6000	800	8000
	100	17.5	205	32	369	42	492	70	820	105	1230	175	2050	280	3280	420	4920	560	6560
	125	12.5	153	23	275	30	366	50	610	75	915	125	1525	200	2440	3000	3660	400	4880
200	70	28.5	325	51	585	68	780	114	1300	171	1950	285	3250	456	5200	684	7800	912	10400
	100	25.0	263	45	473	60	630	100	1050	150	1575	250	2625	400	4200	600	6300	800	8400
	125	21.5	223	39	401	52	534	86	890	129	1335	215	2225	344	3560	516	5340	688	7120
250	100	30.8	403	55	725	74	966	123	1610	185	2415	308	4025	492	6440	738	9660	984	12880
	125	28.0	393	50	707	67	942	101	1570	168	2355	280	3925	448	6280	672	9420	896	12560

For capacities of other gases multiply the air capacities by the following factors: Argon–0.85 Co_2–0.81 Helium–2.69 Nitrogen–1.0

455 Series

Pressure Regulating Valve

Revised 9/2004

Model	455 Series
Service	Steam, Water, Air, Other Gases
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4"
Connections	NPT, 125# FLG, 250# FLG
Body Material	1/2"– 1 1/2" Bronze 2"– 4" Cast Iron
Seat & Disc	Stainless Steel
Diaphragm	Neoprene/Nylon
Max. Inlet Pressure	250 PSIG
Min. Inlet Pressure	5 PSIG
Max. Diff. Pressure	125 PSI
Min. Diff. Pressure	20% of inlet pressure

DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

NPT	250 PSIG @ 400˚ F
125# FLG	125 PSIG @ 450˚ F
250# FLG	250 PSIG @ 450˚ F

PRESSURE-ADJUSTING SPRING RANGES

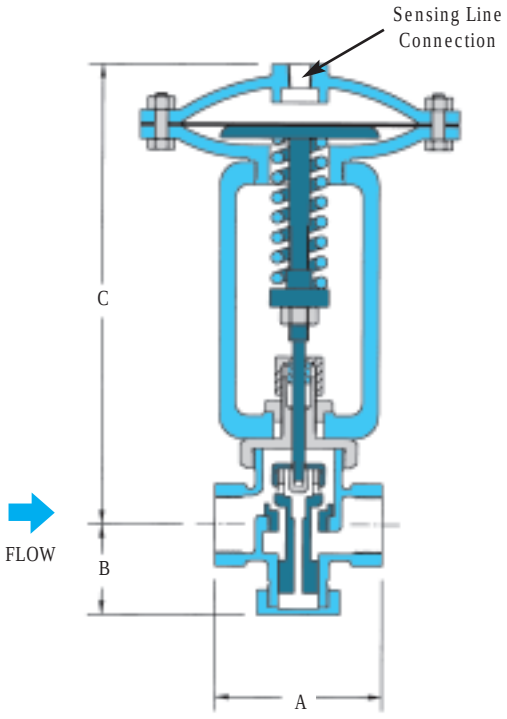
Size	Outlet Pressure (PSIG)	Spring No.	Spring Case Dia. (in.)
1/2" through 1 1/2"	1-6	4	6"
	5-20	3	6"
	15-45	2	6"
	40-70	1	6"
	60-125	1	5"
2" through 4"	1-6	4	13"
	5-20	4	9"
	15-45	3	9"
	40-70	3	7"
	60-125	2	7"

FEATURES

- Operates with inlet pressures down to 5 PSIG
- Stainless steel internals
- Excellent for use in steam systems that contain large amounts of scale and other contamination that may cause failure in pilot-operated regulators

TYPICAL APPLICATIONS

The 455 Series Externally-Sensed Pressure Regulating Valves are used for reducing pressure in steam, air, and water systems. Commonly used in heating and other process applications. Externally-sensed regulators are often more accurate then internally-sensed regulators when the sensing line is connected close to the process it is intending to control.



HOW TO ORDER

Specify:
- Regulator 455 Series
- Size based on capacity chart
- Spring range or outlet pressure required
- Water service - must specify

Example: 1 1/2" 455 Series – 40-70 lbs. Spring Range

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455 Series

Pressure Regulating Valve

Revised 9/2004

DIMENSIONS & WEIGHTS – inches/pounds

Size	Face-to-Face A			B	C	Sensing Line Connection NPT	Weight (lbs)
	Screwed	125# Flanged	250# Flanged				
1/2"	4 1/4			2 3/8	10 1/4	1/4"	15
3/4"	4 1/4			2 3/8	10 1/4	1/4"	15
1"	4 1/8			2 3/8	10 1/4	1/4"	15
1 1/4"	5			3 1/8	10 3/4	1/4"	18
1 1/2"	5 1/4			3 3/8	11	1/4"	20
2"	9 1/2	10 3/8	10-7/8	5 3/4	18 1/2	3/8"	75
2 1/2"		10 5/8	11 1/4	6 1/4	18 3/4	3/8"	95
3"		10 7/8	11 5/8	7 1/8	19 1/4	3/8"	135
4"		12 1/2	13 1/8	8 1/4	20	3/8"	158

CAPACITIES – Steam (lbs/hr) Water (gpm)

Inlet Press.	Outlet Press.	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water	Steam	Water
5	2	53	4.3	95	7.8	191	15.6	276	22.5	403	33.0	572	47.0	890	73.0	1166	95.0	1484	121
10	2	95	7.1	171	12.7	342	25.0	494	37.0	722	54.0	1026	76.0	1596	119	2090	156	2660	198
	5	73	5.6	131	10.1	263	20.0	380	29.0	555	42.0	788	60.0	1226	94.0	1606	123	2044	157
20	0-5	157	9.7	283	17.4	565	35.0	816	50.0	1193	75.0	1696	105	2638	163	3454	213	4396	271
	10	125	7.9	225	14.2	450	28.0	650	41.0	950	60.0	1350	85.0	2100	133	2750	174	3500	221
30	0-10	200	11.2	360	20.1	720	40.0	1040	58.0	1520	85.0	2160	121	3360	188	4400	246	5600	313
	20	145	7.9	261	14.2	522	28.0	754	41.0	1102	60.0	1566	85.0	2436	133	3190	174	4060	221
	25	107	5.6	193	10.1	385	20.0	556	29.0	813	42.0	1156	60.0	1798	94.0	2354	123	2996	157
50	0-20	295	13.7	531	24.6	1062	49.0	1534	71.0	2242	104	3186	148	4956	230	6490	301	8260	383
	30	245	11.2	441	20.1	882	40.0	1274	58.0	1862	85.0	2646	121	4116	188	5390	247	6860	313
	40	185	7.9	333	14.2	666	28.0	962	41.0	1406	60.0	1998	85.0	3108	133	4070	174	5180	221
75	0-30	402	16.8	724	30.2	1447	60.0	2090	87.0	3055	127	4342	181	6754	282	8844	369	11256	470
	50	327	12.5	589	22.5	1177	45.0	1700	65.0	2485	95.0	3532	135	5494	210	7194	275	9156	350
	60	255	9.7	459	17.4	918	35.0	1326	50.0	1938	74.0	2754	105	4284	163	5610	213	7140	271
100	0-50	522	17.7	940	31.8	1879	64.0	2714	92.0	3967	134	5638	191	8770	297	11484	389	14616	495
	60	455	15.8	819	28.5	1638	57.0	2366	82.0	3458	120	4914	171	7644	266	10010	348	12740	443
	80	325	11.2	585	20.1	1170	40.0	1690	58.0	2470	85.0	3510	121	5460	188	7150	246	9100	313
125	0-60	635	20.2	1143	36.3	2286	73.0	3302	105	4826	153	6858	218	10668	339	13970	443	17780	564
	70	575	18.5	1035	33.4	2070	67.0	2990	96.0	4370	141	6210	200	9660	311	12650	408	16100	519
	100	420	12.5	756	22.5	1512	45.0	2184	65.0	3192	95.0	4536	135	7056	210	9240	275	11760	350
150	0-70	750	22.4	1350	40.2	2700	80.0	3900	116	5700	170	8100	241	12600	376	16500	492	21000	626
	100	612	17.7	1102	31.8	2203	64.0	3182	92.0	4651	134	6610	191	10282	297	13464	389	17136	495
	125	435	12.5	783	22.5	1566	45.0	2262	65.0	3306	95	4698	135	7308	210	9570	275	12180	350
200	0-100	977	25.0	1759	45.0	3517	90.0	5080	130	7425	190	10552	270	16414	420	21494	550	27356	700
	125	850	21.7	1530	39.0	3060	78.0	4420	113	6460	165	9180	234	14280	364	18700	476	23800	606
250	0-125	1180	28.0	2124	50.3	4248	101	6136	145	8968	212	12744	302	19824	470	25960	615	33040	783

Note: Air in SCFM = Steam(lbs/hr) x 0.36

402/403 Series

Pilot-Operated Pressure Regulating Valve

Revised 9/2004

Model	402	403
Service	Steam, Air	
Sizes	1/2", 3/4", 1", 1¼", 1½", 2", 2½", 3", 4"	
Connections	NPT, 150# & 300# Flanged	
Body Material	Ductile Iron	
Seat & Disc	Hardened 420 Stainless Steel (55Rc)	
Max. Inlet Pressure	250 PSIG	450 PSIG
Min. Inlet Pressure	20 PSIG	20 PSIG
Max. Diff. Pressure	150 PSI	250 PSI
Min. Diff. Pressure	10 PSI or 15% of Inlet pressure	

402/403
Threaded

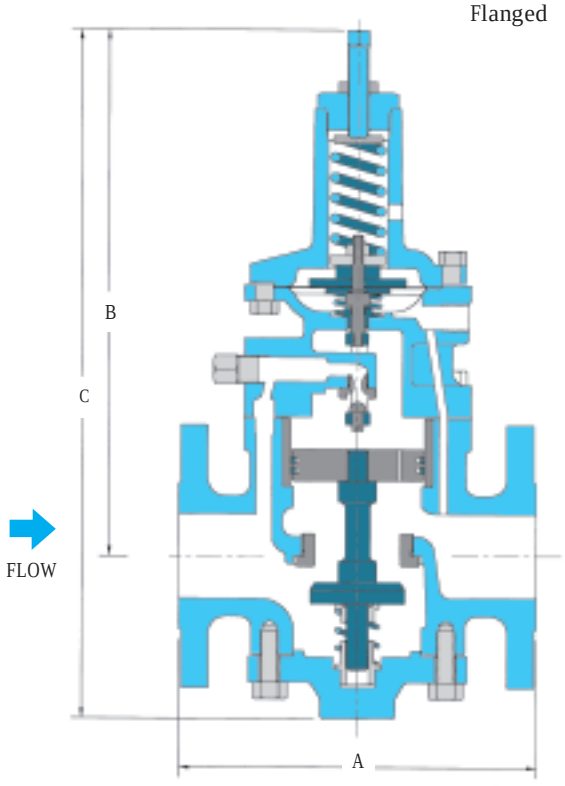
402/403
Flanged

DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

NPT	450 PSIG @ 650° F
150# FLG	150 PSIG @ 566° F
300# FLG	450 PSIG @ 650° F

PRESSURE-ADJUSTING SPRING RANGES

Springs	Outlet Pressure (PSIG)	Spring No.	Identifying Colors
Single	0-10	13	blue/yellow
	10-50	14	black/yellow
	40-100	9	red/yellow
	100-200	10	green/blue
	200 - 280	special	bellville washers
Double	30-125	14	black/yellow
		9	red/yellow
	50-200	9	red/yellow
		10	green/blue



TYPICAL APPLICATIONS

The 402 and 403 Series Internally Pilot-Operated Pressure Regulating Valves are used for pressure reduction on steam mains and other process equipment. Pilot-operated regulators will maintain a constant and accurate downstream pressure regardless of fluctuations in supply pressure or usage. These regulators can be supplied with an internal sensing option eliminating the external sensing line.

FEATURES

- Internal pilot minimizes outlet pressure fluctuations. Outlet pressure remains constant even when load varies
- Internal Sensing option. If requested the regulator can be modified to internally sense pressure. This eliminates having an external sensing line
- Ductile Iron body to handle increased pressure and temperature
- Hardened stainless steel seat and disc (55 Rc)
- 403 Series regulators use stainless steel wear parts for a higher operating pressure (PMO) of 450 PSIG

HOW TO ORDER

Specify:
- Size based on capacity chart
- Spring range or outlet pressure required
- Model 402 or 403 (403 has SS wear parts)
- External Sensing is standard
  Internal sensing is optional, please specify.
  Internal sensing option is not available for 0-10 PSI downstream pressure range.

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402/403 Series

Pilot-Operated Pressure Regulating Valve

Revised 9/2004

DIMENSIONS & WEIGHTS – inches/pounds

Size	Face-to-Face A			Centerline to Top B		Overall C		Weight (lbs)
	Screwed	150# Flanged	300# Flanged	Single Spring	Double Spring	Single Spring	Double Spring	
1/2"	4 1/2			12	14 3/8	14 3/8	16 3/4	19
3/4"	4 1/2			12	14 3/8	14 3/8	16 3/4	19
1"	4 1/2			12	14 3/8	14 3/8	16 3/4	19
1 1/4"	8 3/16			12 3/4	15 1/8	16 1/8	18 1/2	36
1 1/2"	8 3/16			12 3/4	15 1/8	16 1/8	18 1/2	36
2"	8 3/4	8 1/4	8 3/4	13	15 3/8	17 1/8	19 1/2	50
2 1/2"		9 1/8	9 3/4	13 3/4	16 1/8	18 1/4	20 5/8	70
3"		9 3/4	10 1/2	14 3/4	16 1/8	19 3/4	22 1/8	82
4"		13 1/2	14	16	18 3/8	24	26 3/8	170

CAPACITIES – Steam (lbs/hr) Air (scfm)

Inlet Press.	Outlet Press.	1/2", 3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air
20	0-10	175	60	425	145	600	204	850	289	1300	442	2750	935	3850	1309	4900	1666
30	0-10	270	88	655	213	924	300	1309	425	2002	650	4235	1375	5929	1925	7546	2450
	20	203	67	493	162	696	228	986	323	1508	494	3190	1045	4466	1463	5684	1862
50	0-20	385	130	935	315	1320	444	1870	629	2860	962	6050	2035	8470	2849	10780	3626
	30	343	116	833	281	1176	396	1666	561	2548	858	5390	1815	7546	2541	9604	3234
100	0-50	690	231	1675	561	2364	792	3349	1122	5122	1716	10835	3630	15169	5082	19306	6468
	60	637	214	1547	519	2184	732	3094	1037	4732	1586	10010	3355	14014	4697	17836	5978
	80	455	151	1105	366	1560	516	2210	731	3380	1118	7150	2365	10010	3311	12740	4214
125	0-60	865	287	2100	697	2964	984	4199	1394	6422	2132	13585	4510	19019	6314	24206	8036
	70	805	270	1955	655	2760	924	3910	1309	5980	2002	12650	4235	17710	5929	22540	7546
	100	588	196	1428	476	2016	672	2856	952	4368	1456	9240	3080	12936	4312	16464	5488
150	0-70	1019	343	2474	833	3492	1176	4947	1666	7566	2548	16005	5390	22407	7546	28518	9604
	100	858	287	2083	697	2940	984	4165	1394	6370	2132	13475	4510	18865	6314	24010	8036
	125	609	214	1479	519	2088	732	2958	1037	4524	1586	9570	3355	13398	4697	17052	5978
200	0-100	1337	445	3247	1080	4584	1524	6494	2159	9932	3302	21010	6985	29414	9779	37436	12446
	150	1001	333	2431	808	3432	1140	4862	1615	7436	2470	15730	5225	22022	7315	28028	9310
	175	739	245	1794	595	2532	840	3587	1190	5486	1820	11605	3850	16247	5390	20678	6860
250	0-125	1652	550	4012	1335	5664	1884	8024	2669	12272	4082	25960	8635	36344	12089	46256	15386
	175	1358	452	3298	1097	4656	1548	6596	2193	10088	3354	21340	7095	29876	9933	38024	12642
	200	1138	378	2763	918	3900	1296	5525	1836	8450	2808	17875	5940	25025	8316	31850	10584
300	0-150	2016	665	4896	1615	6912	2280	9792	3230	14976	4940	31680	10450	44352	14630	56448	18620
	200	2016	665	4896	1615	6912	2280	9792	3230	14976	4940	31680	10450	44352	14630	56448	18620
	250	1250	417	3035	1012	4284	1428	6069	2023	9282	3094	19635	6545	27489	9163	34986	11662
400	0-200	2657	875	6452	2125	9108	3000	12903	4250	19734	6500	41745	13750	58443	19250	74382	24500
	280	2146	711	5211	1726	7356	2436	10421	3451	15938	5278	33715	11165	47201	15631	60074	19894
450	0-225	2975	984	7225	2389	10200	3372	14450	4777	22100	7306	46750	15455	65450	21637	83300	27538
	280	2975	984	7225	2389	10200	3372	14450	4777	22100	7306	46750	15455	65450	21637	83300	27538

For capacities of other gases multiply the air capacities by the following factors: Argon–0.85 Co2–0.81 Helium–2.69 Nitrogen–1.02

BACK PRESSURE RELIEF VALVES

R Series

Relief and Back Pressure

Revised 9/2004

REGULATORS

Model	R Series / *10691 Series
Service	Liquids
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 3"
Connections	NPT
Body & Seat Material	Bronze
Valve Material	1/2" – 1 1/2" Stainless Steel 2" – 3" Bronze
Model 10691	*1/2", 3/4", 1" EPDM (tight shut-off)
Max. Inlet Pressure	300 PSIG

* For tight shut-off use 10691 with EPDM soft seat. Available in 1/2", 3/4, 1" only.

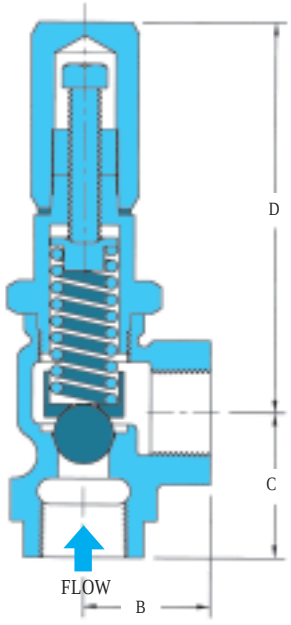
Series 10691 Model Relief Valve has Soft EPDM Seat for tight shut-off in sizes 1/2", 3/4", 1"

DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

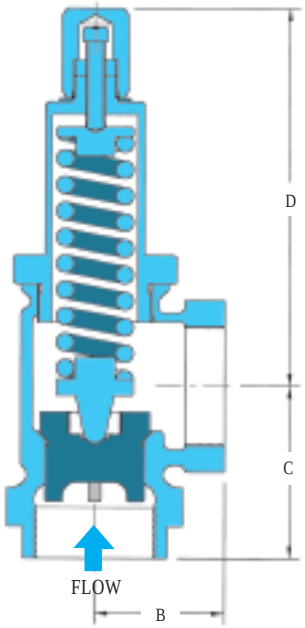
NPT 300 PSIG @ 180° F

PRESSURE-ADJUSTING SPRING RANGES

Relief Pressure (PSIG)	Spring No. – Color
1-6	4, yellow (1/2" – 1 1/2" only)
5-35	3, silver
20-100	2, blue
75-300	1, red



1/2" through 1 1/2"



2" & 3"

TYPICAL APPLICATIONS

The R Series & 10691 Series Back Pressure Relief Valves are used in the following applications:

Water pump bypass for Irrigation, sprinkler systems on golf courses, fountains, and fire protection systems

Fuel oil pump bypass on commercial systems or large residential systems

Caution: Not to be used as an emergency or safety relief valve.

FEATURES & OPTIONS

- Four Springs – easily interchanged to cover pressures from 1 to 300 PSIG
- Heavy-duty bronze valve body
- 10691 Series has EPDM Seat for tight shut-off (1/2"- 1")

PRESSURE ADJUSTMENT

To adjust set pressure of valve, remove top cap, loosen lock nut and adjust pressure with steel setting screw. Rotating the screw clockwise increases the compression on the spring thereby increasing the set pressure. Rotating the screw counter-clockwise lowers the set pressure. Tighten the lock nut and replace top cap and gasket when desired set pressure is reached.

HOW TO ORDER

Specify:
- Regulator R Series
- Size based on capacity chart
- Spring range or relief pressure

Example: 1" R Series – 5 - 35 lbs. Relief pressure range
1" R Series – 20 lbs. (factory set)

DIMENSIONS & WEIGHTS – inches/pounds

Size	B	C	D	Weight (lbs)
1/2"	1 1/8	1 1/2	3 5/8	1.5
3/4"	1 3/8	1 3/4	5 1/2	2
1"	1 5/8	2 1/4	6	3
1 1/4"	1 7/8	2 3/8	6	6
1 1/2"	2 3/16	2 5/8	6 7/8	8
2"	2 1/2	2 5/16	8 3/4	10
3"	3 7/8	4 1/8	10 7/8	25

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R Series

Relief and Back Pressure

Revised 9/2004

CAPACITIES – Water (gpm)

Spring Range	Set Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"
At 10% Over Set Pressure								
1-6	3	1.2	2.2	3.2	4.3	5.4		
5-35	10	0.3	0.4	0.4	0.5	0.5	0.6	0.7
5-35	20	0.6	0.7	0.8	1.0	1.1	1.3	1.6
25-100	50	1.0	1.3	1.6	1.8	2.2	2.6	5.0
25-100	75	1.4	1.9	2.3	2.8	3.4	4.0	5.0
75-300	100	1.9	2.5	3.2	3.8	4.6	5.4	6.9
75-300	200	3.4	4.4	5.8	6.9	8.2	9.7	12.3
At 20% Over Set Pressure								
Spring Range	Set Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"
1-6	3	2.2	3.4	4.6	5.8	7.1		
5-35	10	0.6	0.8	1.1	1.3	1.4	1.8	2.2
5-35	20	1.4	1.9	2.4	3.0	3.4	4.1	4.8
25-100	50	1.8	2.0	3.1	3.8	4.4	5.4	6.4
25-100	75	2.3	3.2	4.0	4.8	5.6	6.9	8.1
75-300	100	3.6	4.2	5.0	6.3	7.0	7.3	8.9
75-300	200	6.5	7.6	9.0	11.2	12.4	13.1	16.0

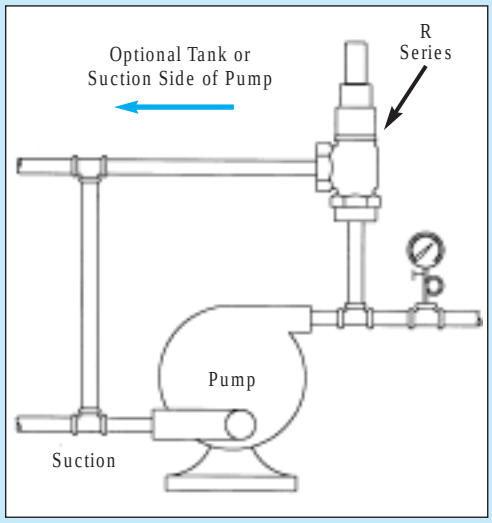
The R Series Relief Valve water capacities at both 10% and 20% over "Set Pressure" are tabulated in the above table. Enter the chart at the desired "Set Pressure" in the left-hand column and read the capacity in GPM to determine proper Valve Size. Select a spring with a relief range that includes the "Set Pressure" required. Example: A 1" valve set at 50 PSIG will pass 3.1 GPM if the system pressure exceeds the set point by 20%.

HOW IT WORKS

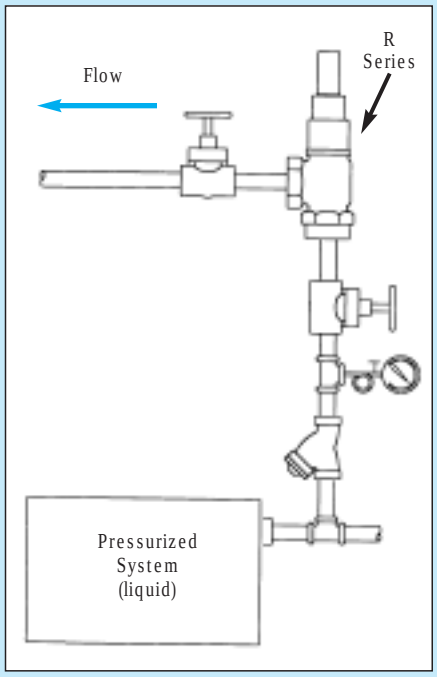
The Relief Valve is actuated by the system pressure on the inlet side of the valve. Valve loading is provided by a spring. The adjustment is done by removing the cap and rotating the screw clockwise or counter-clockwise.

Spring load tends to close the main valve against the opening force of the upstream (or relief) pressure. Valve will be open at the slightest increase in pressure above the spring set point, and closes when the excess pressure has been relieved.

The higher the system pressure is above the relief set point pressure, the more flow the valve will pass. It is therefore typical to specify the maximum capacity of a back pressure relief valve at 10% & 20% over set pressure.



A Relief Valve allows water to recirculate through the pump even when the discharge valve on the pump is completely closed. As a rule a minimum of 20% of the pump capacity must recirculate to stop overheating of the pumped liquid.



REGULATORS

BACK PRESSURE RELIEF VALVES

3040 Series

Relief and Back Pressure

Revised 9/2004

Model	3040 Series
Service	Water, Oil, other Liquids
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2"
Connections	NPT, 125# & 250# Flanged
Body Material	1/2"– 1 1/2" Bronze Threaded 2" Cast Iron Threaded 2" Cast Iron Flanged
Disc Material	Buna-N/Teflon – 200ºF maximum Viton up to 300ºF (optional)
Diaphragm	Neoprene/Nylon–200ºF maximum Viton up to 300ºF (optional)
Max. Inlet Pressure	250 PSIG

DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

NPT	300 PSIG @ 200˚ F
125# FLG	125 PSIG @ 200˚ F
250# FLG	250 PSIG @ 200˚ F

TYPICAL APPLICATIONS

The 3040 Series Back Pressure Valves relieve upstream pressure in a variety of processes. Automatically maintains desired maximum pressure in a vessel or system by relieving excess pressure into lower pressure return line or to atmosphere. Ideally suited for use as pump bypass control valve by maintaining constant pump discharge pressures. Used as a continuously operating valve for protection against overpressure conditions.

Caution: Not to be used as an emergency or safety relief valve.

FEATURES & OPTIONS

- Soft Seat for tight shut-off
- Easy maintenance
- Self-contained
- Fast response
- Accurate control
- Optional Viton trim for 300º F service

PRESSURE ADJUSTMENT

Rotating the adjustment screw clockwise increases the compression on the spring thereby increasing the set pressure. Rotating the adjustment screw counter-clockwise, lowers the set pressure. Tighten lock nut after adjustment.

HOW TO ORDER

Specify:
- Regulator 3040 Series
- Size based on capacity chart
- Spring range or relief pressure

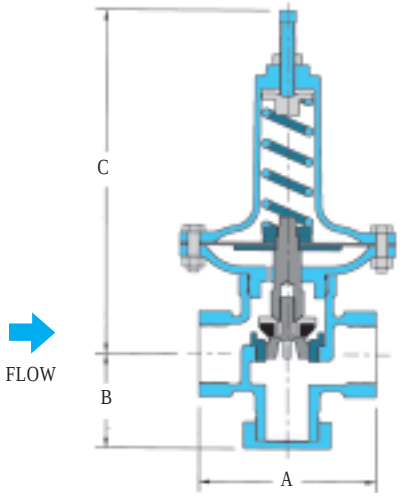
Example: 2" 3040 Series – 5-35 lbs. Spring Range

PRESSURE-ADJUSTING SPRING RANGES

Relief Pressure (PSIG)	Spring No.
1-12	4 (1/2" – 1" only)
5-35	3
20-70	2
40-125	1

DIMENSIONS & WEIGHTS – inches/pounds

Size	Face-to-Face A			B	C	Weight (lbs)
	Screwed	125# Flanged	250# Flanged			
1/2"	4 1/8			2 5/16	9	10
3/4"	4 1/8			2 5/16	9	10
1"	4 1/8			2 5/16	9	10
1 1/4"	4 13/16			3 1/4	12 3/4	15
1 1/2"	5 3/16			3 1/2	13 1/4	17
2"	9 1/2	10 3/8	10 7/8	5 1/2	16 3/4	45



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3040 Series

Relief and Back Pressure

Revised 9/2004

CAPACITIES – Water (gpm)

At 10% Over Set Pressure

Spring Range	Set Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
1-12	5	4.0	8.0	10.0			
5-35	10	5.7	11.4	14.3	29	43	71
5-35	20	8.1	16.2	20.3	41	61	101
20-70	50	12.7	25.4	31.8	64	95	159
20-70	75	15.6	31.2	39.0	78	117	195
40-125	100	18.0	36.0	45.0	90	135	225
40-125	125	20	40	50	100	150	250

At 20% Over Set Pressure

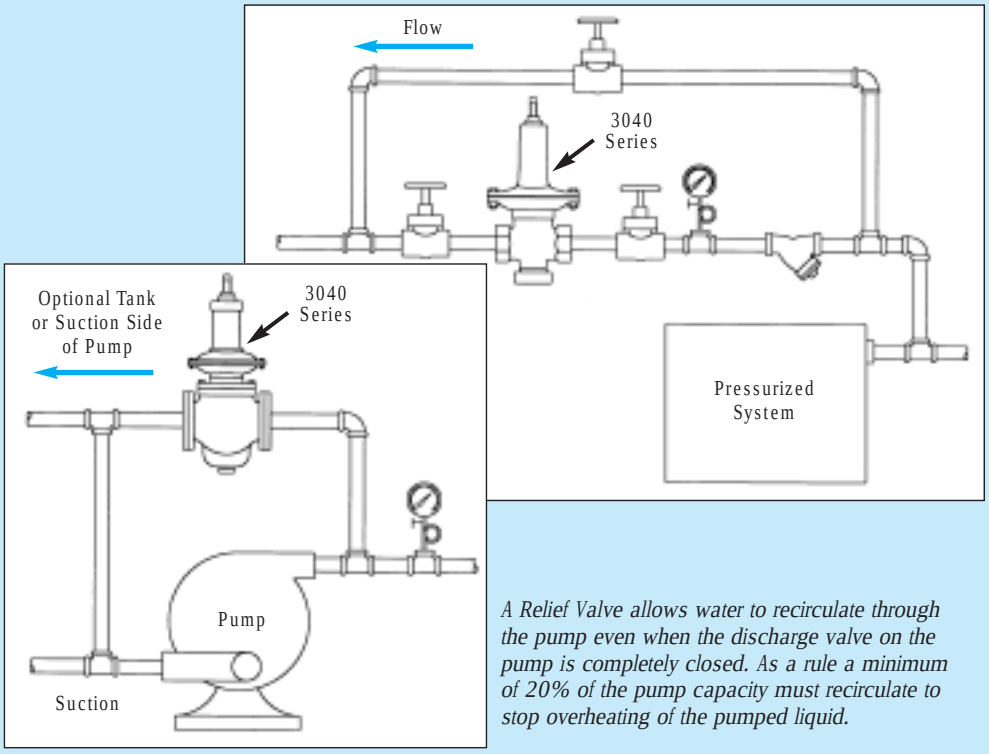
Spring Range	Set Pressure (PSIG)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
1-12	5	4.4	8.8	11.2			
5-35	10	6.3	12.5	16.0	32	47	79
5-35	20	8.9	17.8	22.7	45	67	113
20-70	50	14.0	27.	35.6	71	105	177
20-70	75	17.2	34.3	43.7	87	129	217
40-125	100	19.8	39.6	50.4	101	149	250
40-125	125	22	44	56	112	166	278

The 3040 Series Relief Valve water capacities at both 10% and 20% over "Set Pressure" are tabulated in the above table. Enter the chart at the desired "Set Pressure" in the left-hand column and read the capacity in GPM to determine proper Valve Size. Select a spring with a relief range that includes the "Set Pressure" required. Example: A 1" valve set at 50 psig will pass 35.6 GPM if the system pressure exceeds the set point by 20%.

HOW IT WORKS

The 3040 Series Back Pressure Valve senses upstream pressure acting on the underside of the diaphragm through a port in the bottom diaphragm case. An increase in the upstream pressure above the set point will compress the spring and allow the valve to open. The spring will close the valve as the upstream pressure decreases to the set point.

The higher the system pressurizes above the relief set point pressure, the more flow the valve will pass. It is therefore typical to specify the maximum capacity of a back pressure relief valve at 10% & 20% over set pressure.



A Relief Valve allows water to recirculate through the pump even when the discharge valve on the pump is completely closed. As a rule a minimum of 20% of the pump capacity must recirculate to stop overheating of the pumped liquid.

175/153 Series

Self-Operating Temperature Regulating Valves

Revised 9/2004

175 – HEATING
153 – COOLING

175 / 153
Screwed Connection

175T / 153T*
Screwed Connection with Temperature-Indicating Dial

175 / 153
Flanged Connection

175 / 153
Union-end Connections

** "T" – Temperature-Indicating Dial (Must be field set and calibrated to an actual thermometer)*

TYPICAL APPLICATIONS

The 175 and 153 Series Self-Operating Temperature Regulating Valves require no external power source making them easy to install and maintain. Properly installed, the regulator is capable of maintaining temperatures to within ±3°F.

FEATURES

- Hermetically-sealed Bellows, Capillary Tube & Bulb Assembly for extended service life
- Easily adjusted to any point within its temperature range by simply rotating the adjustment control device
- Optional temperature dial on 175T & 153T models indicates temperature of process being controlled
- For both heating and cooling applications
- Reverse-Acting or Direct-Acting Applications
- Large Range of Sizes & Valve Body Types

HOW IT WORKS

175/153 Self-Operating Temperature Regulators are actuated by a hermetically-sealed bellows, capillary tube and bulb assembly. The bulb is inserted in the fluid at the point where temperature control is needed. As temperature rises around the bulb, the volatile liquid gas inside the bulb, capillary and bellows expands and transmits a force moving the valve stem downward. Conversely, when the temperature at the bulb decreases, the liquid (or gas) contracts, allowing the regulating spring to compress the bellows and move the valve stem upwards. The regulator can easily be adjusted to any point within its temperature range by simply rotating the adjustment control device.

HEATING APPLICATIONS –175/175T

The direct-acting 175 /175T self-operating temperature regulators should be used in applications that require a rise in temperature to close the valve. These regulators will increase the temperature of a medium (liquid or gas) by remotely sensing the medium's temperature and throttling steam flow to it, bringing it to the desired temperature. Use in:

- Plating or Finishing Tanks
- Hot Water Generators & Storage Tanks
- Heat Exchangers
- Fuel Oil Storage Tanks & Heaters
- Circulating Dryers & Ovens
- Steam Tables
- Open Tank or Kettle Control
- Heating Ducts

COOLING APPLICATIONS –153/153T

The reverse-acting 153/153T self-operating temperature regulators should be used in applications that require a rise in temperature to open the valve. These regulators will reduce the temperature of a medium (liquid or gas) by remotely sensing the medium's temperature and throttling a cooling liquid (normally water) to flow to it, bringing it to the desired temperature.
Use in:

- Cooling Ducts
- Engine Jacket Cooling
- Oil Coolers
- Open Cooling Tanks
- Dehumidification

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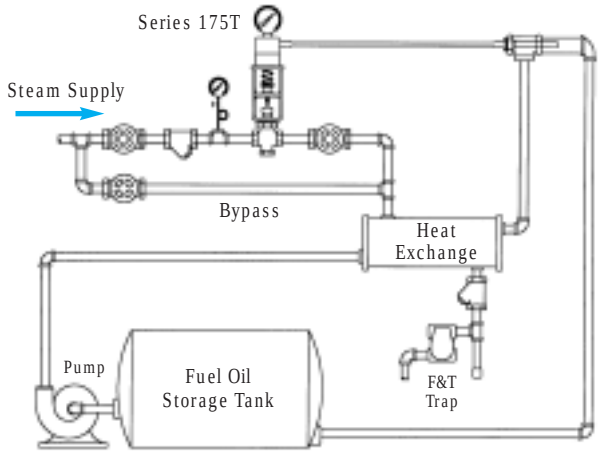
175/153 Series

Self-Operating Temperature Regulating Valves

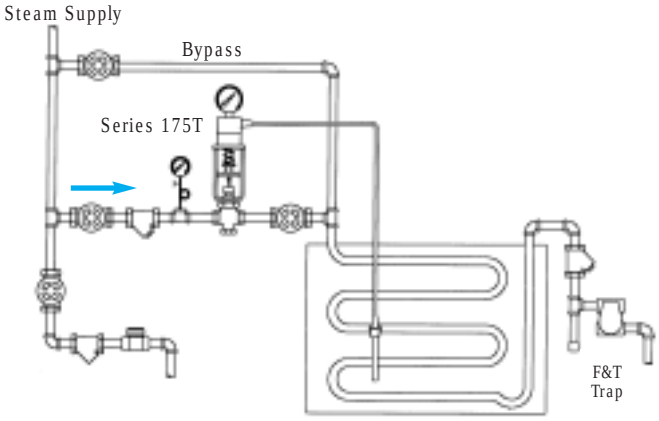
Revised 9/2004

Typical Applications for Temperature Regulators

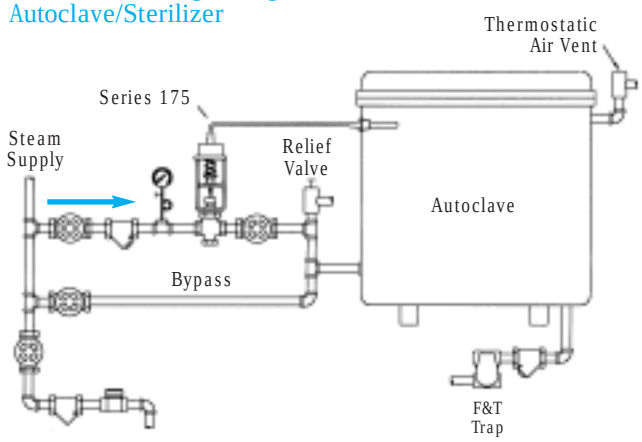
175T Heating Fuel Oil To Proper Temperature



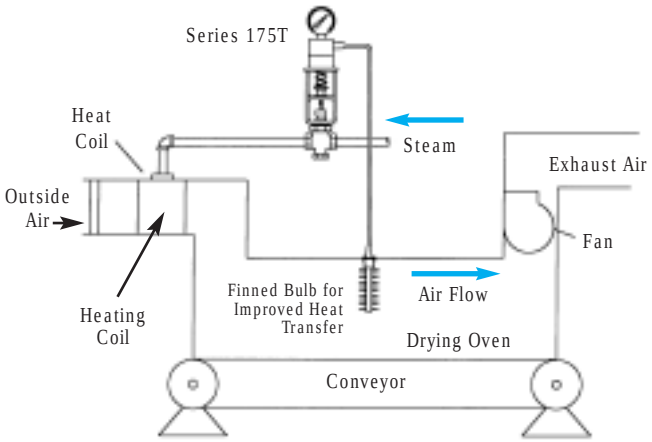
175T Elevating Temperature Of A Plating Or Finishing Tank



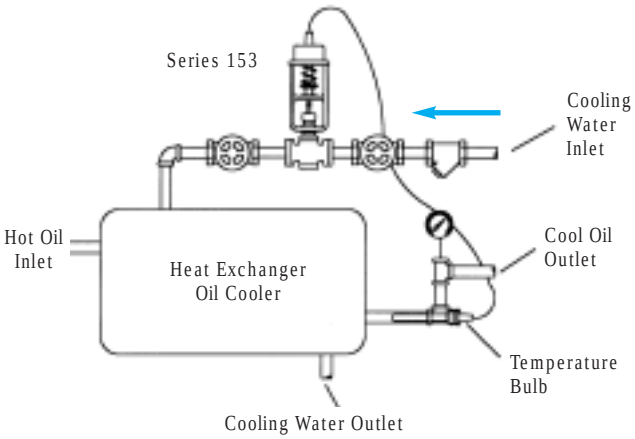
175 Used for Regulating Steam Flow In An Autoclave/Sterilizer



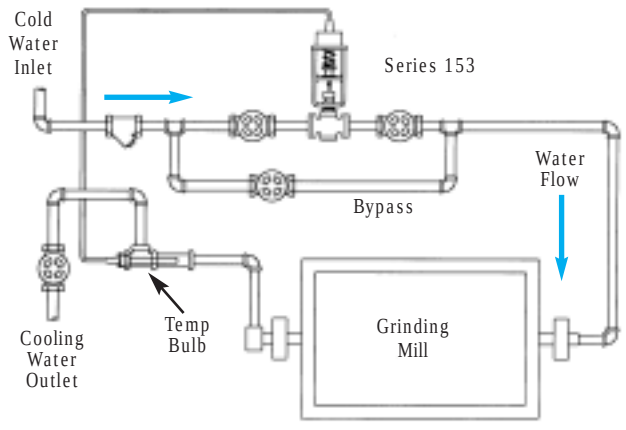
175T Used In A Drying Oven Application



153 Used to Reduce Oil Temperature In A Heat Exchanger



153 Used To Control Water Flow In A Grinding Mill For Temperature Reduction



175/153 Series

Self-Operating Temperature Regulating Valves

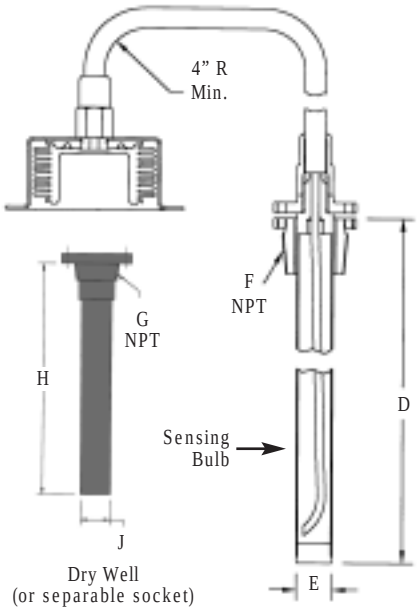
Revised 9/2004

DIMENSIONS for Thermal Head – inches/pounds

Valve Size	Standard Bulb Range	Bulb Length D	Bulb Diameter E	Bushing Thread F	Capillary Length (ft)	Dry Well or Separable Socket G	H	J
1/2" to 2"	*20-80°	17 1/2	7/8	1	10	1	18 1/2	1
	*40-100°	17 1/2	7/8	1	10	1	18 1/2	1
	*60-120°	17 1/2	7/8	1	10	1	18 1/2	1
	*80-140°	17 1/2	7/8	1	10	1	18 1/2	1
	*100-160°	17 1/2	7/8	1	10	1	18 1/2	1
	110-170°	10 1/2	5/8	1	10	1	11 1/2	3/4
	130-190°	10 1/2	5/8	1	10	1	11 1/2	3/4
	150-210°	10 1/2	5/8	1	10	1	11 1/2	3/4
	170-230°	10 1/2	5/8	1	10	1	11 1/2	3/4
	190-250°	10 1/2	5/8	1	10	1	11 1/2	3/4
2-1/2" to 4"	*60-100°	29 3/4	1 1/8	1 1/4	10	1 1/4	30 1/2	1 1/4
	*80-120°	29 3/4	1 1/8	1 1/4	10	1 1/4	30 1/2	1 1/4
	*100-140°	29 3/4	1 1/8	1 1/4	10	1 1/4	30 1/2	1 1/4
	120-160°	17 1/2	7/8	1	10	1	18 1/2	1
	140-180°	17 1/2	7/8	1	10	1	18 1/2	1
	160-200°	17 1/2	7/8	1	10	1	18 1/2	1
	180-220°	17 1/2	7/8	1	10	1	18 1/2	1
	200-240°	17 1/2	7/8	1	10	1	18 1/2	1
	220-260°	17 1/2	7/8	1	10	1	18 1/2	1

*Cross-ambient filled thermal systems: these units are standard on 100° F or less minimum temperature ranges. If the surrounding air temperature (ambient air temperature) is within 20° F of the minimum temperature that the unit will be used at, a special cross-ambient temperature unit is required. Cross-ambient filled bulb lengths are 17 1/2" for 1/2"-2" valves, and a 29 3/4" for 2 1/2"-4" valves.

THERMAL HEAD



NOTE: Dry well must be filled by installer with oil or grease to help in heat transfer.

OPTIONS

Thermal Head Assembly Kits	1/2" - 2"	Model THA
		THA with Dial Indicator
Special Bulbs, Bushings & Capillary	1/2" - 2"	316L SST Bulb & Bushing with 316 SST Capillary & Armor
		316L SST Bulb (no bushing) with 10-ft. of Plain 316L Capillary (over the rim)
		Finned Copper Bulb for Duct Mount
		Wall Bracket for Finned Bulb
	2-1/2" - 4"	316L SST Bulb & Bushing with 316 SST Capillary & Amor
		Finned Copper Bulb for Duct Mount
Additional Capillary in 5-ft. lengths	All Sizes	Standard Capillary - Copper with 316L S Armor
		Stainless Steel Capillary - 316L SST w/316L SST Armor
Separable Wells	All Sizes	Copper Well
		316 SST Well

NOTE: Consult factory for availability of coated bulb, capillary, coated wells or special lengths.

HOW TO ORDER

Specify: Model THA or
THA with Dial Indicator

- Temperature Range
  Note: If ambient room temperature is within 20°F of the minimum temperature in any selected bulb range, a special cross-ambient fill must be specified on your order.
- Special Options for Bulbs, Bushings, Capillary and Wells, see Options chart

FEATURES

- Dial Indicator: The 175T an 153T have a dial indicator on top of the thermal system.
- Capillary Length: Standard capillary length is 10-ft. Additional lengths available in 5-ft. increments. Maximum capillary length is 25-ft.

MATERIALS

Head Assembly	Bulb and capillary	Copper
	All other parts	Brass
Dry well (or separable socket)	Bulb	Copper
	All other parts	Brass
Dry well (or separable socket)	Bulb	316 SST
	All other parts	316 SST

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175/153 Series

Self-Operating Temperature Regulating Valves

Revised 9/2004

Steam flow required through a temperature regulator (lbs/hr)
to heat a specified number of gallons of water per hour (gal/hr)

TABLE 1

Temp Increase (˚F)	Gallons of Water per Hour To Be Heated												Temp Increase ˚F
	25	50	100	200	300	500	700	1000	2000	4000	10,000	20,000	
5°	1	2	4	8	12	21	29	41	83	166	415	830	5°
10°	2	4	8	16	25	41	58	83	166	332	830	1660	10°
15°	3	6	12	25	37	62	87	124	249	498	1245	2490	15°
20°	4	8	17	33	50	83	116	166	332	664	1660	3320	20°
25°	5	10	20	42	62	104	145	207	415	830	2075	4150	25°
30°	6	12	25	50	75	124	174	249	498	996	2490	4980	30°
40°	8	16	33	66	100	166	232	332	664	1328	3320	6640	40°
50°	10	21	42	83	124	207	290	415	830	1660	4150	8300	50°
60°	12	25	50	100	149	249	348	498	996	1992	4980	9960	60°
70°	15	29	58	116	174	290	407	581	1162	2324	5810	11,620	70°
80°	17	33	67	133	199	332	465	664	1328	2656	6640	13,280	80°
90°	19	38	75	149	224	373	523	747	1494	2988	7470	14,940	90°
100°	21	42	83	166	249	415	581	830	1660	3320	8300	16,600	100°
115°	24	48	95	191	286	477	668	955	1909	3818	9544	19,088	115°
130°	27	54	108	216	324	539	755	1079	2158	4316	10,790	21,580	130°
145°	30	60	120	241	361	601	842	1200	2400	4812	12,030	24,060	145°
160°	33	66	133	266	398	664	929	1328	2656	5312	13,280	26,560	160°
175°	36	72	145	290	436	726	1017	1452	2900	5810	14,524	29,048	175°
200°	41	83	166	332	498	830	1162	1660	3320	6640	16,600	33,200	200°
225°	47	94	187	374	560	934	1307	1867	3735	7470	18,680	37,360	225°
250°	52	104	207	415	622	1037	1452	2075	4150	8300	20,750	41,500	250°

Steam Flow Required in Pounds Per Hour (lbs/hr)

HEATING WATER: The amount of steam required to heat water can be found using chart above.
Example: To heat 1000 gallons per hour of water from 40˚F to 140˚F (Temp. increase 100˚F) requires 830 lbs/hr of steam.

HEATING FUEL OIL: The amount of steam required to heat fuel oil is half of that to heat water. Use half the value found in chart above.
Example: To heat 1000 gallons per hour of fuel oil from 40˚F to 140˚F (Temp. increase 100˚F) requires 415 lbs/hr of steam.

CAPACITY CALCULATIONS FOR STEAM LOADS

When BTU Load is Known	Capacity of steam required (lbs/hr)	= BTU / 1000
When Square Feet Equivalent Direct Radiation (EDR) is Known	Capacity of steam required (lbs/hr)	= Sq ft. of EDR / 4
When Heating Water with Steam	Capacity of steam required (lbs/hr)	= GPM x Temp Rise °F / 2
When Heating Fuel Oil with Steam	Capacity of steam required (lbs/hr)	= GPM x Temp Rise °F / 4
When Heating Air with Steam Coils	Capacity of steam required (lbs/hr)	= CFM x Temp Rise °F / 900

175 Series

Self-Operating Temperature Regulating Valves

Revised 9/2004

Model	175/175T - HEATING
Service	Water, Steam, Other Liquids
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4"
Connections	NPT, 125 Flanged 250 Flanged
Body Material	1/2" – 1 1/2" Bronze 2" – 4" Cast Iron
Seat Material	Stainless Steel
Max. Inlet Pressure	250 PSIG

DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

NPT	250 PSIG @ 450° F
125# FLG	125 PSIG @ 450° F
250# FLG	250 PSIG @ 450° F

175 Series Heating Applications

175T
Screwed with
Dial Indicator

175
Flanged,
Non-Indicating

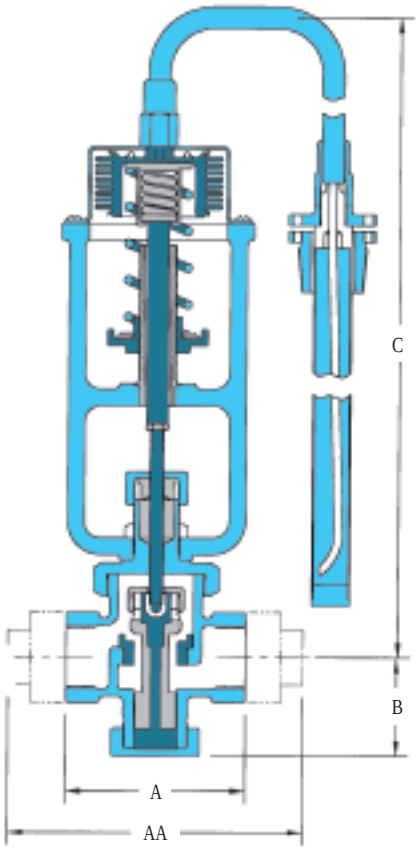
FEATURES

- 10-ft. copper capillary with 316 SST armor
- Heavy duty exterior construction
- Bulb and capillary options include 316 stainless steel and Kynar
- Dial thermometer optional for visual temperature readings on model 175T

HOW TO ORDER

Specify: • Model - Series 175 (non-indicating)
Series 175T (dial indicator)

- Size
- Type of connection - NPT, Union or Flanged
- Temperature Range
- Options - See Options chart



DIMENSIONS – inches/pounds

Size	Max Operating Pressure	A Threaded NPT	A 125 Flanged	A 250 Flanged	AA Union Connection	B	C**	Weight (lbs)	Cv
1/2" A*	250	3 1/4			N/A	1 1/2	14 1/4	12	0.9
1/2" B*	200	3 1/4			N/A	1 1/2	14 1/4	12	1.5
1/2"	250	4 1/8			6 1/2	2 3/8	13 1/2	14	3.3
3/4"	250	4 1/8			6 1/2	2 3/8	13 1/2	14	6.5
1"	200	4 1/8			7	2 3/8	13 1/2	14	11.1
1 1/4"	200	4 13/16			7 1/2	3 1/4	14	17	16.5
1 1/2"	200	5 3/16			8	3 1/2	14 1/2	18	23.1
2" NPT	150	9 1/2			N/A	5 3/4	15 1/4	50	34.2
2" FLG	150		10 3/8	10 7/8		5 3/4	15 1/4	80	34.2
2 1/2"	150		10 5/8	11 1/4		7	24	96	49.0
3"	150		10 7/8	11 5/8		8	25	110	70.2
4"	150		12 1/2	13 1/8		8 3/4	26	160	113.0

* *1/2" A – 1/4" Diameter Internal Port*
* *1/2" B – 3/8" Diameter Internal Port*
** *Add 6" for Indicating Dial*

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175 Series

Self-Operating Temperature Regulating Valves

Revised 9/2004

CAPACITIES – Steam (lbs/hr)

Pressure (PSIG)	Size 1/2" A	1/2" B	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
1	24	43	81	160	275	400	570	840	1,200	1,740	2,800
3	27	48	91	180	310	450	640	950	1,360	1,960	3,150
5	30	54	102	200	345	500	710	1,050	1,520	2,180	3,500
10	37	67	127	250	430	630	900	1,320	1,900	2,720	4,370
15	45	81	153	300	515	760	1,070	1,580	2,280	3,270	5,250
20	52	84	178	350	600	890	1,250	1,850	2,660	3,810	6,120
25	60	108	204	400	692	1,010	1,430	2,120	3,040	4,360	7,000
30	67	121	229	450	775	1,140	1,600	2,380	3,420	4,900	7,870
40	82	150	280	550	950	1,400	1,970	2,900	4,180	5,990	9,620
50	97	177	331	650	1,120	1,650	2,330	3,440	4,940	7,080	11,370
60	112	204	382	750	1,290	1,900	2,700	3,970	5,700	8,170	13,120
70	127	230	433	850	1,470	2,160	3,050	4,500	6,460	9,260	14,870
80	142	258	484	950	1,640	2,410	3,400	5,000	7,220	10,350	16,620
90	157	285	535	1,050	1,810	2,670	3,770	5,560	7,980	11,440	18,370
100	172	312	586	1,150	1,980	2,930	4,130	6,090	8,740	12,530	20,120
125	210	378	714	1,400	2,420	3,560	5,030	7,410	10,640	15,260	24,500
150	245	445	841	1,650	2,850	4,200	5,930	8,740	12,540	18,000	28,800
175	285	513	969	1,900	3,280	4,850	6,830				
200	322	580	1,096	2,150	3,710	5,470	7,730				
250	395	711	1,350	2,650							

CAPACITIES – Water (gpm)

Differential Pressure	Size 1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
1	3	5	10	14	20	29	42	60	96
3	4	9	16	23	34	49	71	102	163
5	6	12	21	32	46	66	96	138	220
10	9	17	30	44	64	92	134	192	307
15	11	21	37	54	78	113	163	234	374
20	12	24	42	63	90	130	189	270	432
25	14	27	47	70	100	145	210	300	480
30	15	30	52	77	111	160	231	330	528
40	17	34	59	88	127	182	264	378	604
50	19	39	67	99	143	206	298	426	681
60	21	43	74	109	157	229	327	468	748
70	23	46	79	117	169	243	352	504	806
80	25	49	84	124	180	258	373	534	854
90	26	52	90	133	192	275	399	570	912
100	28	55	95	140	202	290	420	600	960
125	31	61	106	156	226	324	470	672	1070
150	34	67	116	170	246	353	512	732	1170
175	37	72	125	184	266				
200	40	78	135	200	288				

Note: To determine the differential pressure across the Series 175 subtract the down stream pressure from the supply pressure.

153 Series

Self-Operating Temperature Regulating Valves

Revised 9/2004

Model	153/153T - COOLING
Service	Water, Other Liquids
Sizes	1/2", 3/4", 1", 1 1/4", 1 1/2", 2" 3", 4"
Connections	NPT, 125 # & 250# Flanged
Body Material	1/2"– 1 1/2" Bronze 2"– 4" Cast Iron
Seat Material	Stainless Steel
Max. Inlet Pressure	250 PSIG

DESIGN PRESSURE/TEMPERATURE RATING – PMA/TMA

NPT	250 PSIG @ 450° F
125# FLG	125 PSIG @ 450° F
250# FLG	250 PSIG @ 450° F

153 Series Cooling Applications

153 Flanged Connection

153 Union-end Connections

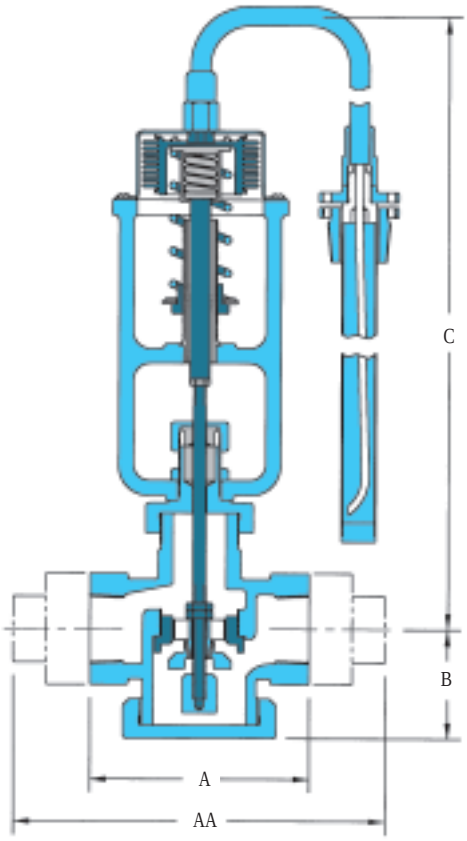
FEATURES

- 10 ft. copper capillary with 316 SST armor
- Heavy duty exterior construction
- Bulb and capillary options include 316 stainless steel and Kynar
- Dial thermometer optional for visual temperature readings on Model 153T

DIMENSIONS & WEIGHTS – inches/pounds

Size	Max Operating Pressure	A Threaded NPT	A 125 Flanged	A 250 Flanged	AA Union Connection	B	C**	Weight (lbs)	Cv Flow Factor
1/2"	125	4 1/8			6 1/2	2 3/8	14	12	2.4
3/4"	125	4 1/8			6 1/2	2 3/8	14	12	2.8
1"	100	4 1/8			7	2 3/8	14	13	5.5
1 1/4"	70	5			7 1/2	3 1/8	14 1/2	15	9.5
1 1/2"	70	5 1/4			8	3 3/8	14 1/2	16	14.0
*2" NPT	150	7 3/8			N/A	3 3/4	16 1/2	40	30.0
*2" FLG	150		7 1/8	7 3/4		3	15 1/2	46	30.0
3"	150		9	9 3/4		5 1/2	32 1/2	125	62.0
4"	150		10 1/8	10 3/4		6 1/2	34 1/2	185	105.0

** 2" NPT – 4" Flanged are double-seated*
*** 1/2" – 2" Add 6" for Indicating Dial*



HOW TO ORDER

Specify:

- Model - Series 153 (non-indicating)
  Series 153T (dial indicator)
- Size
- Type of connection - NPT, Union or Flanged
- Temperature Range
- Options - See Options chart

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153 Series

Self-Operating Temperature Regulating Valves

Revised 9/2004

CAPACITIES – Water (gpm)

Differential Pressure	Size 1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"	4"
1	2	3	6	10	14	30	62	105
3	4	5	9	16	23	50	105	178
5	5	6	12	21	32	69	142	241
10	7	9	17	30	44	96	198	336
15	9	11	21	37	54	110	241	409
20	10	12	24	42	63	135	279	472
25	12	14	27	47	70	150	310	525
30	13	15	30	52	77	165	341	577
40	15	17	34	59	87	189	390	661
50	17	19	39	67	99	213	440	743
60	18	21	43	74	109	234	483	819
70	20	23	45	78	114	252	520	882
80	21	25	50			267	551	930
90	23	26	51			285	589	997
100	24	28	55			300	620	1,050
125	27	31				336	694	1,176

Note: To determine the differential pressure across the Series 153 subtract the down stream pressure from the supply pressure.