TRAC REGULATOR CO.,INC.

STYLE ‘J’

COMBINATION PRESSURE AND TEMPERATURE REGULATOR

MIL-V-19772A and MIL-DTL-19772B

TYPE IV SERIES 100 (BRONZE) and 150 (STEEL)

SUITABLE FOR SHIPBOARD SERVICE

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GENERAL INFORMATION

INTRODUCTION

The Trac Style 'J' Combination Pressure and Temperature Regulator is basically an internal pilot operated steam pressure reducing valve with the addition of a provision which automatically modifies the reduced pressure setting as a function of the process temperature by means of a temperature signal feedback circuit into the pilot section. The regulator will automatically control steam flow through the valve in response to changes in the temperature of the controlling medium and/or changes in outlet pressure. The regulating valve requires no external source of power to operate the valve or to detect changes in the temperature of the controlling medium. The valve can be set to control at any temperature within the limits of the temperature range stamped on the nameplate.

APPLICATIONS

The Trac Style 'J' Combination Pressure and Temperature Regulator is a precision regulator. This type of regulator should be specified when close temperature control in required. Applications are normally limited to heating situations where the heating medium will be steam, and the steam supply available is at a higher pressure than needed for heating.

Any water heater, fuel oil heater, or lube oil heater operated off of a high-pressure steam source can use a Style 'J' Combination Pressure and Temperature Regulator advantageously. Process systems of all kinds – dryers, charge heaters, reactors, heat exchangers, cookers, coaters, evaporators, curing ovens, and kilns are potential Style 'J' applications.

PRINCIPLES OF OPERATION

The back-pressure from steam flowing to heat-utilization equipment is always being sensed on the outlet side of the Style 'J' Combination Pressure and Temperature Regulator. It is balanced at the pilot valve against the need-for-heat signal delivered by thermostatic element. Outlet steam back-pressure continually pushes against the diaphragm that actuates the pilot valve. Whenever downstream pressure rises above the set point, pressure under the diaphragm begins to exceed the force of the pressure adjusting spring above it, and pilot valve closes. The inlet steam supply to the piston chamber is reduced as the pilot valve closes. When the pressure above the main valve piston can no longer hold the main valve open, the piston rises and the main valve return spring forces the main valve to its seat.

As soon as steam admitted in a pressure regulated mode brings the system up to temperature, the Style 'J' Combination Pressure and Temperature Regulator shifts automatically to a temperature regulating mode of control action. See Figure 1 for illustration of pressure and temperature adjustment components and main actuating components.

Upon an increase above set temperature at the thermo. bulb, the liquid within the bulb expands and begins to generate vapor pressure. The vapor pressure generated within the bulb is transmitted through the capillary tubing to the thermostatic diaphragm, causing it to expand. The thermostatic element amplifies the vapor pressure, generating the necessary thrust to operate the temperature signal feedback circuit into the pilot section.

An increase in temperature at the bulb tends to push the stem downward, pushing on one end of the lever and forcing the compression of the pressure adjusting spring on the other end. This action tends to override the outlet pressure setting and relieves spring load on the diaphragm. Pressure in the diaphragm chamber begins to exceed the force of the pressure adjusting spring above it, and the pilot valve closes. The inlet steam supply to the piston chamber is reduced as the pilot valve closes. When the pressure above the main valve piston can no longer hold the main valve open, the piston rises and the main valve return spring forces the main valve to its seat.

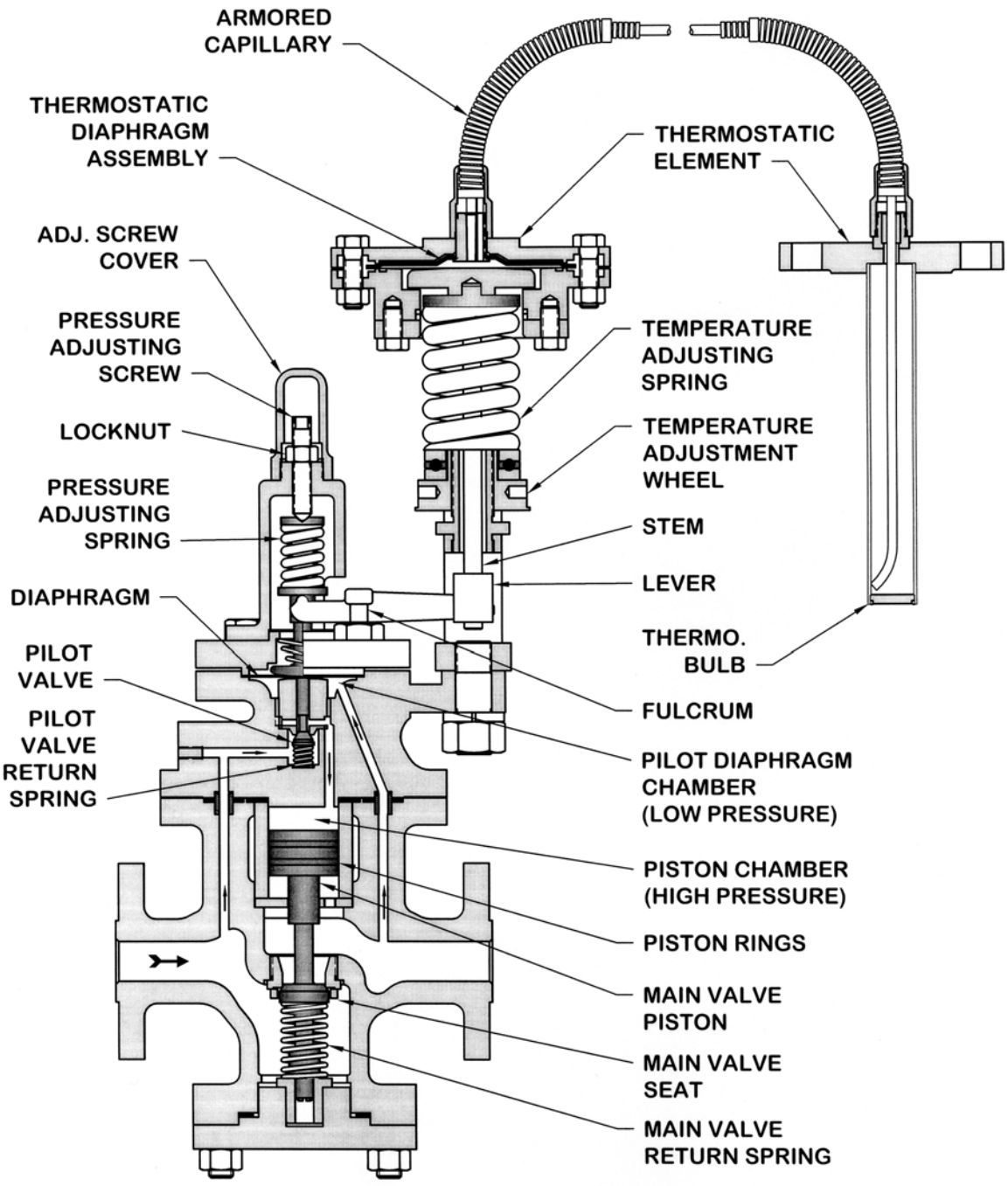


Figure 1 ADJUSTMENT AND ACTUATING COMPONENTS

DETAILED DESCRIPTION

SETTING THE REGULATOR

The first adjustment made during a Style 'J' installation is the maximum pressure setting. With the valve installed in the system and steam pressure supplied to the valve inlet, the set pressure can be adjusted by turning the pressure adjusting screw. Whenever downstream back-pressure rises above this set point, pressure under the diaphragm begins to exceed the force of the pressure adjusting spring above it, and pilot valve closes. The piston rises, and the main valve throttles steam flow. See Figure 1 for illustration of pressure and temperature adjustment components and main actuating components.

Setting The Outlet Pressure - The valve can be set to control at any pressure from 15 to 135 psig by changing the load on the pressure adjusting spring. More or less tension of spring will cause the valve to control at a higher or lower pressure.

To increase pressure, remove adjusting screw cover, loosen Locknut, and turn adjustment screw clockwise.

To decrease pressure, remove adjusting screw cover, loosen Locknut, and turn adjustment screw counter-clockwise.

After pressure setting adjustment has been made, always lock adjustment screw to prevent rotation with locknut and replace cover.

Setting The Controlling Temperature - The valve can be set to control at any temperature within the limits of the temperature range stamped on the nameplate, by making a simple adjustment to the valve. Using a 1/4" dowel or drill blank rotate the temperature adjustment wheel as follows:

To raise the set temperature: Turn the adjusting wheel counterclockwise (looking from the top of the regulator).

To decrease the set temperature: Turn the adjusting wheel clockwise (looking from the top of the regulator).

Wait until the temperature at the bulb stabilizes at one steady reading. It may be necessary to adjust the temperature adjustment wheel incrementally to obtain the desired set temperature.

FAIL POSITION

Should the thermostatic element fail in operation, the thermostatic diaphragm will not apply any downward thrust on the stem and the temperature adjusting spring will relieve the load on the lever acting on the pressure adjusting spring. Although process temperature control would be lost, the Style 'J' valve would still regulate outlet pressure and prevent any catastrophic over pressure condition within the system.

MANUAL OVERRIDE (OPTIONAL)

The Trac Style 'J' Combination Pressure and Temperature Regulator is available with a manual override option. As described above, process temperature control would be lost should the thermostatic element fail in operation. The Style 'J' valve would continue to operate in automatic pressure regulating mode. With the addition of the manual override option, process temperature control could be maintained manually. The manual override feature allows the operator to adjust the main valve position from the automatic pressure regulating mode to the full closed position or to any intermediate position.

INSTALLATION

INSTALLATION OF THE REGULATOR

The regulating valve must be clean and free from packing material and other foreign matter before installing into a clean pipeline. Connect the valve into the pipe line so that the flow is in the direction indicated by the arrow cast on the body. The valve will work equally well in any position, but it is preferable to install the valve with the adjusting spring vertically upward. This will minimize wear on all moving parts. See Figure 2 for illustration of a typical Style 'J' Combination Pressure and Temperature Regulator installation.

LOCATION AND INSTALLATION OF THERMAL BULB

Correct bulb position and bulb location are vitally important factors in obtaining accurate temperature control.

BULB POSITION

The standard thermostatic element can be installed horizontally, vertically, or at any other angle as long as the bulb mounting flange is uppermost.

When mounting the bulb horizontally, be sure that the word "TOP" stamped on the bulb mounting flange is on top. When brazing or welding a bulb bushing into the piping system, be sure that the bolt pattern straddles the vertical center line.

BULB LOCATION

INSTANTANEOUS HEATERS: The bulb should be installed in the heater outlet line and as close as possible to the point where this line comes out of the heater.

STORAGE HEATERS: The bulb should be installed in the storage heater tank higher than the heating surface or coil, but not directly over it. The bulb should be no closer than 4 inches to the heating surface.

ADDITIONAL COMMENTS:

When the bulb is installed in a Tee fitting, ensure that the maximum possible surface of the bulb is in contact with the flow of the controlling medium. Installation of the bulb in dead areas of piping is to be avoided.

It is recommended that the length of pipe containing the bulb be enlarged to ensure unrestricted flow around the bulb.

For optimal regulation accuracy, the capillary length should be kept to a minimum.

BULB MOUNTING CONFIGURATIONS

STANDARD BULB/ BULB MOUNTING: CRES 304 Bulb with 1-1/4" ANSI-B16.5 150# Steel Flg.

AVAILABLE FLANGE SPECIFICATIONS: MIL-F-20042, ANSI-B16.24, ANSI-B16.5

AVAILABLE FLANGE MATERIALS: STEEL, BRONZE, STAINLESS STEEL

AVAILABLE BULB MATERIALS: STAINLESS STEEL, CARBON STEEL, COPPER

Separable socket wells are available with silbraz, socket weld, NPT, or flanged connections in accordance with the following specifications.

SILBRAZ/SOCKET WELD- (MIL-F-1183/NAVSEA 803 6397430)
NPT- (ANSI/ASME B1.20.1)
MILITARY FLANGE- (MIL-F-20042 150# and 250#)
COMMERCIAL FLANGE- (ANSI-B16.24 or ANSI-B16.5 150# , 300#, and 600#)

INSTALLATION

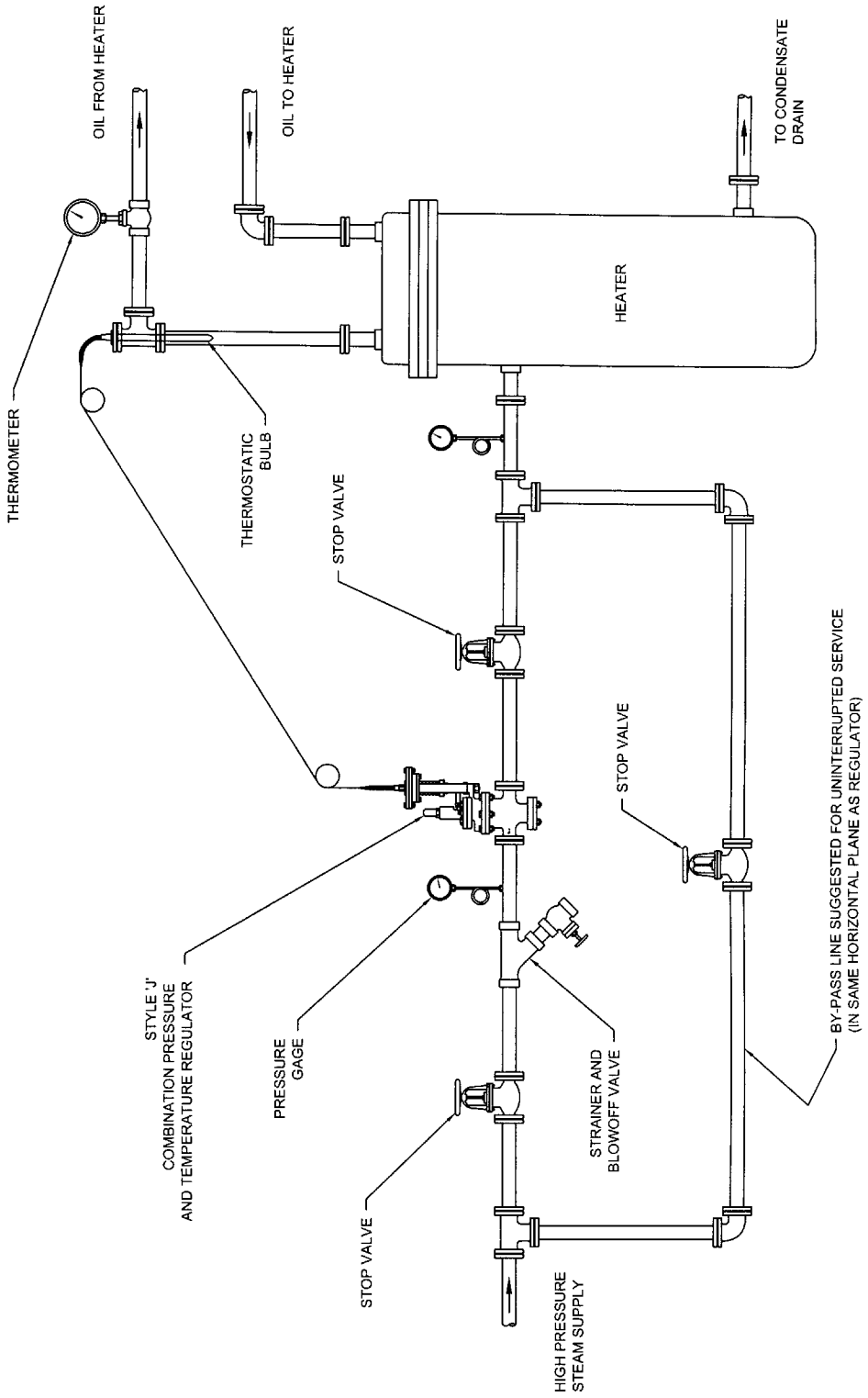


Figure 2 – TYPICAL INSTALLATION

ORDERING INFORMATION

MANDATORY INFORMATION

In order to correctly size a temperature regulating valve for a particular application, the user must have a complete understanding of the conditions at the valve. As a minimum, the user should know the following conditions:

SET TEMPERATURE (REQUIRED TEMPERATURE RANGE) This is the temperature that the regulator is required to maintain during normal operation. The valve can be set to control at any temperature within the limits of the temperature range stamped on the nameplate. If the actual set temperature is not known, specify the range of expected temperature settings.

STANDARD RANGES	
50– 150 Deg.F	100– 200 Deg.F

CAPILLARY LENGTH The capillary length from the temperature regulator to the bulb installation location should be kept to a minimum. Generally this length is specified between 10 and 20 feet. Capillary length over 25 feet is available but not recommended. The standard capillary length of the temperature regulating valves described herein is 10 feet.

THERMOSTATIC BULB/ BULB MOUNTING Unless otherwise specified the thermostatic bulb provided shall be 1" OD x 15" long and have an 1-1/4" ANSI-B16.5 150# mounting flange. Other bulb configurations and mounting arrangements are available upon request.

MAXIMUM INLET PRESSURE This is the maximum pressure that the temperature regulating valve will be subjected to under any operating conditions. This value is used to choose the appropriate pressure rating of the valve and to establish the end connection rating.

PRESSURE RATINGS AND AVAILABLE END CONNECTIONS	
RATED PRESSURE (PSIG)	FLANGED END
100 (Bronze)	MIL-F-20042
150 (Steel)	ANSI-B16.5

MINIMUM INLET PRESSURE It is of primary importance to know the minimum inlet pressure at the valve. This value is used in calculating the appropriate size of the temperature regulating valve.

OUTLET SET PRESSURE The outlet set pressure is adjustable from 15 to 135 psig.

PRESSURE DROP ACROSS VALVE A minimum of 15 psig pressure drop across the valve is required to operate the regulating valve. If the actual pressure drop is not known or not given, it is generally assumed to be 20 psig for sizing purposes.

REQUIRED CAPACITY (AT MINIMUM INLET PRESSURE) In most cases inlet pressure varies widely from maximum to minimum inlet pressure values. To correctly size a temperature regulating valve for a particular application, the required flow at minimum inlet pressure must be known.

REFERENCE DATA

NAMEPLATE

For specific information regarding an installed Trac Style 'J' Combination Pressure and Temperature Regulator, consult the nameplate (Figure 3) affixed to the bracket of each production valve. For operating characteristics of a valve installed in a particular shipboard system consult the applicable certification data sheet or ship's drawing index. When contacting Trac Regulator Co.,Inc. regarding troubleshooting, repair, or replacement, please have the following nameplate information available: Valve ID Number and Serial Number.

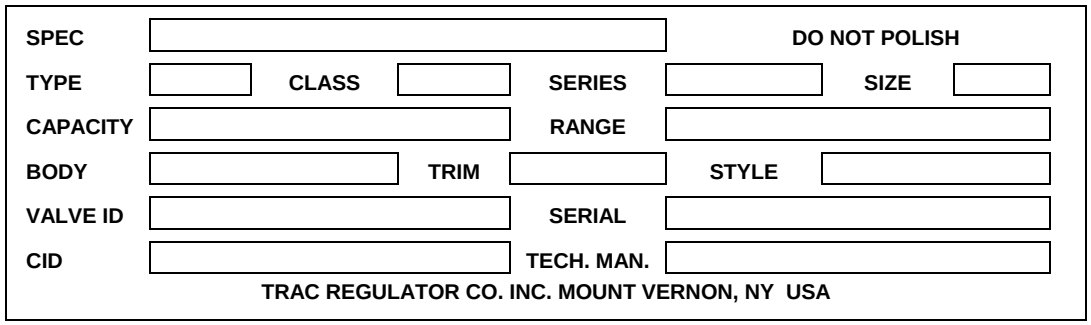


Figure 3 NAMEPLATE

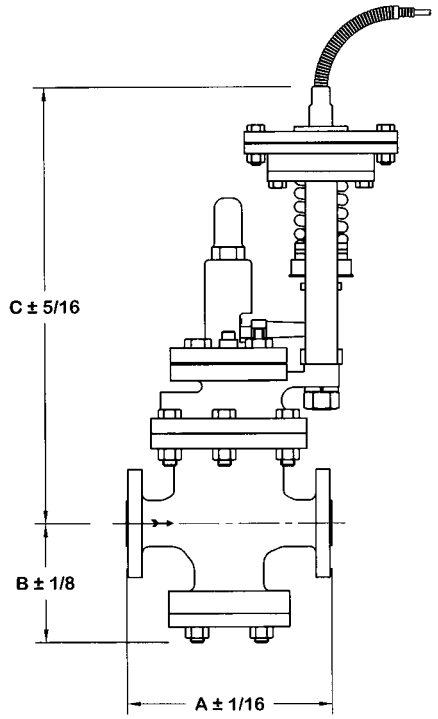
STEAM CAPACITY TABLE

In the following steam capacity table inlet and outlet pressure values are pounds per square inch gauge (PSIG), steam capacity values are pounds per hour (lbs/hr), and valve sizes are US Iron pipe sizes (IPS). Lower outlet pressures than those noted in the “outlet” pressure column do not increase valve capacity.

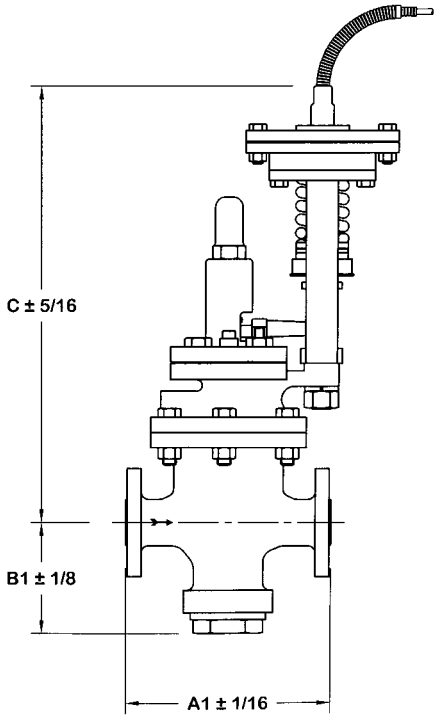
STEAM CAPACITY TABLE							
PRESSURE		**VALVE SIZE**					
INLET	**OUTLET**	**1/2”**	**3/4”**	**1”**	**1-1/4”**	**1-1/2”**	**2”**
20	**5**	82	200	245	470	750	1100
25	**10**	92	252	305	495	820	1230
30	**10**	104	280	345	560	850	1380
	15	100	275	340	510	840	1365
35	**15**	113	315	375	610	1030	1540
	20	105	300	365	600	990	1485
40	**20**	134	365	450	735	1210	1800
	25	130	355	440	720	1185	1770
50	**25**	155	418	545	835	1365	2050
	30	150	412	510	820	1350	2020
	35	142	392	485	785	1295	1930
65	**30**	165	474	585	945	1560	2340
	35	160	470	581	935	1545	2310
	45	151	415	512	860	1340	2050
75	**35**	194	530	653	1056	1740	2735
	40	190	520	640	1034	1705	2550
	50	185	506	620	1003	1610	2480
	60	171	468	573	930	1540	2280
100	**45**	242	665	820	1340	2200	3280
	55	226	626	770	1240	2060	3070
	65	218	593	730	1185	1950	2930
	75	183	512	618	1031	1650	2480
	85	152	414	512	827	1370	2040
125	**70**	284	775	960	1560	2570	3840
	80	279	760	940	1520	2540	3745
	90	260	720	890	1440	2390	3560
	100	220	630	785	1260	2110	3090
	110	173	472	585	944	1560	2350
150	**80**	390	724	1202	2150	3010	4920
	100	375	705	1145	2070	2800	4815
	125	305	565	932	1618	2320	3830

SPACE ENVELOP DIMENSIONS

The space envelope dimensions provided herein are for reference only and should not be interpreted as the only available valve configurations. Other face to face (flanged) dimensions are available to meet specific fit requirements. Custom configurations including screwed end, union end, reduced trim, and/or a manual override feature may be developed upon request, consult Trac Regulator Co. for more information.



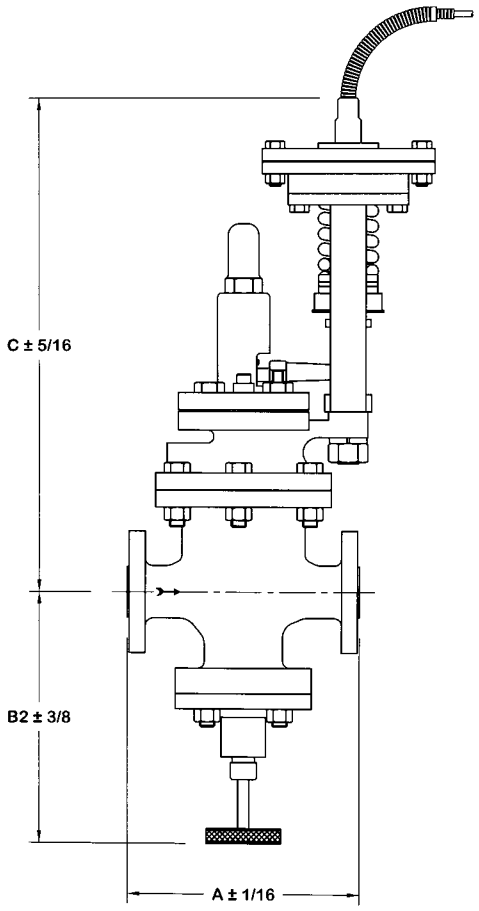
SPECIFICATION VALVE
STEEL ANSI-B16.5 FLANGE



COMMERCIAL VALVE
BRONZE MIL-F-20042 FLANGE

STANDARD VALVE DIMENSIONS ANSI-B16.5 150# and MIL-F-20042 150#					
VALVE SIZE	**'A' DIM ANSI-B16.5**	**'A1' DIM MIL-F-20042**	**'B' DIM**	**'B1' DIM**	**'C' DIM**
1/2"	7-3/4		4-5/16		16-1/8
3/4"	7-3/4	7-3/4	4-5/16	4	16-1/8
1"	7-3/4		4-5/16		16-1/8
1-1/4"	7-7/8	7-7/8	4-1/8	4-1/8	16-3/4
1-1/2"	10-9/16		4-1/2		16-3/4
2"	10-9/16		4-1/4		16-3/4

SPACE ENVELOP DIMENSIONS (CONTINUED)



SPECIFICATION VALVE
STEEL ANSI-B16.5 FLANGE
WITH MANUAL OVERRIDE

MANUAL OVERRIDE VALVE DIMENSIONS			
VALVE SIZE	**'A' DIM ANSI-B16.5**	**'B2' DIM**	**'C' DIM**
1/2"	7-3/4	7-7/8	16-1/8
3/4"	7-3/4	7-7/8	16-1/8
1"	7-3/4	7-7/8	16-1/8
1-1/4"	7-7/8	7-7/8	16-3/4
1-1/2"	10-9/16		16-3/4
2"	10-9/16		16-3/4