P-K COMPACT® (01/07/2020)
1004905933 - Warren 2900

P-K COMPACT® Temperature Control Equipment Guide

To be used in conjunction with the latest editions of:
P-K COMPACT® Semi-Instantaneous Water Heater I&OM
P-K COMPACT® Supplemental Equipment Guide

Patterson-Kelley
155 Burson Street
East Stroudsburg, PA 18301
Telephone: (570) 476-7261
Toll Free: (877) 728-5351
Facsimile: (570) 476-7247
www.pattersonkelley.com

P-K COMPACT TEMPERATURE CONTROL EQUIPMENT GUIDE
P-K COMPACT TEMPERATURE CONTROL EQUIPMENT GUIDE
P-K COMPACT TEMPERATURE CONTROL EQUIPMENT GUIDE
P-K COMPACT TEMPERATURE CONTROL EQUIPMENT GUIDE
P-K COMPACT TEMPERATURE CONTROL EQUIPMENT GUIDE
P-K COMPACT TEMPERATURE CONTROL EQUIPMENT GUIDE

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

NOTES:

Warren Series 2900 Control Valve

WARREN CONTROLS

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

IOM

Series 2900

HIGH CAPACITY GENERAL PURPOSE GLOBE VALVES

TABLE OF CONTENTS

PRODUCT OVERVIEW

This document covers the installation, operation and maintenance of the Series 2900 High Capacity, General Purpose, Globe Control Valves presented in the "Series 2900 Product Specification", including the 2920 Two-Way Single Seat Unbalanced Valve, the 2922 Two-Way Double Seat Balanced Valve, the 2923 Two-Way Cylinder Balanced Valve, the 2930 Three-Way Mixing Valve, and the 2932 Three-Way Diverting/ Mixing Valve. Warren Controls Series 2900 High Capacity General Purpose Globe Control Valves feature rugged iron bodies with a variety of trim materials. The equal percentage plugs in the 2-way valves and linear plugs in the 3-way valves provide excellent modulating control of a wide variety of fluids. The Series 2900 is ideally suited where value and long life are important objectives for applications including but not limited to: Food & Beverage, Packaged Water Heaters, Pharmaceutical, General Service, and Waste Water having moderate pressure drops and temperatures from -20° to 400°F.

GENERAL INFORMATION

The instructions given herein cover generally the operation and maintenance of subject equipment. Should any questions arise which may not be answered specifically by these instructions, they should be referred to Warren Controls Inc. for further detailed information and technical assistance. This manual cannot possibly cover every situation connected with the operation, adjustment, inspection, test, overhaul and maintenance of the equipment furnished. Every effort is made to prepare the text of this manual so that engineering and design data is transformed into the most easily understood wording. Warren Controls Inc., in furnishing this equipment and this manual, must presume that the operation and maintenance personnel assigned thereto have sufficient technical knowledge and experience to apply sound safety and operational practices which may not be covered herein. In applications where Warren Controls Inc. furnished equipment is to be integrated with a process or other machinery,

Valve Identification

these instructions should be thoroughly reviewed to determine the proper integration of the equipment into the overall plant operational procedures. Warren Controls does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Warren Controls product remains solely with the purchaser and end-user

ACTUATORS AND ACCESSORIES

Series 2900 High Capacity, General Purpose, Globe Control Valves are available with a variety of actuators and accessories. These actuators and accessories have separate instructions. For complete control valve installation, operation, and maintenance instructions see also the instructions for the actuator and accessories in use.

VALVE IDENTIFICATION

To use these instructions it is necessary to identify the configuration of the valve. Factory assembled control valves have a nameplate mounted on the actuator. The valve's part number (P/N) is present on the plate. The part number represents the configuration of the control valve. To identify the valve's type, size, actuator, accessories, and other characteristics decode the part number using configuration table. If the information is incomplete, incorrect, or not present contact the factory with the valve serial number listed on the plate. (See Information Present on Control Valves section for location of part number, serial number, and other important information on valve.)

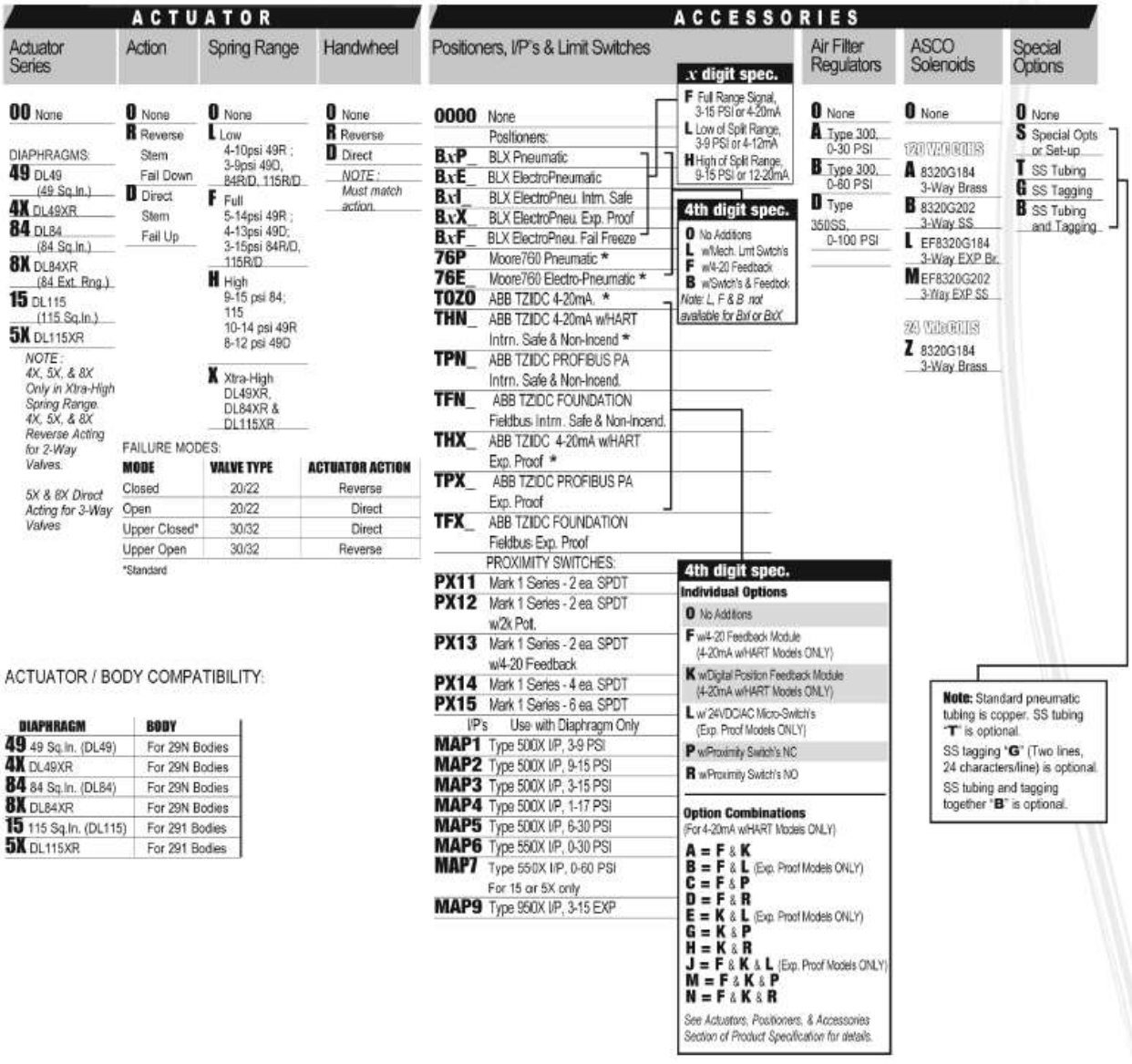
VALVE BODY

Model	Valve Type	Size	Body Material	End Connection	Trim Style	Trim Material	Trim Cv	Packing Type
29N 49" or 84" Pneumatic **291** 115" Pneumatic	**20** 2-Way Single Seat **22** 2-Way Double Seated **23** 2-Way Cylinder Bal. **30** 3-Way Mixing **32** 3-Way Diverting	**250** 2-1/2 inch **300** 3 inch **400** 4 inch **500** 5 inch **600** 6 inch **800** 8 inch **010** 10 inch	**R** Cast Iron	**F** 125 lb. Flanged **G** 250 lb. Flanged	**E** Equal % Types 20/22/23 **L** Linear Types 30/32/23	**B** Bronze **S** 300 SS **H** 17-4 PH **6** Alloy 6 Wrapped	**F** Full Port	**T** Teflon **G** Graphite Graphite Packing Available for Harsh Service **V** Vacuum Service **L** EPDM EPDM Packing NOT available with the 291 Model

NOTE: Valve Type 22 is Only Used with 29N Body & DL49/DL84 Actuators.

The 291 model CANNOT use Bronze Trim - NO EXCEPTIONS!

Valve Type 23 Linear Trim NOT available in Bronze



ACTUATOR / BODY COMPATIBILITY:

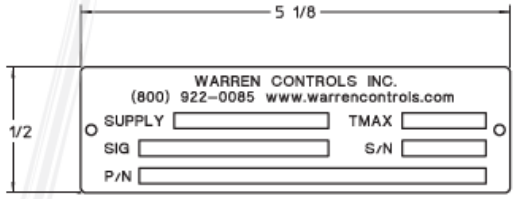
DIAPHRAGM	BODY
49 49 Sq.In. (DL49)	For 29N Bodies
4X DL49XR	For 29N Bodies
84 84 Sq.In. (DL84)	For 29N Bodies
8X DL84XR	For 29N Bodies
15 115 Sq.In. (DL115)	For 291 Bodies
5X DL115XR	For 291 Bodies

Information Present on Control Valves

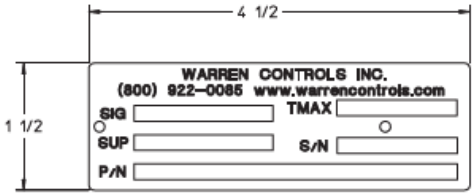
INFORMATION PRESENT ON CONTROL VALVES

There is a great deal of information present on each control valve ranging in importance from the part number and serial number to the color of the paint and casting numbers. This information is important for identifying the valve, installing it correctly, and obtaining parts. Examples of the current factory nameplates and flow arrow plates used on Series 2900 control valves are shown here. The accompanying table identifies the information present and where to find it on the control valve. There may also be other casting numbers and foundry marks present that do not provide useful information. Customer specific tagging may also present. The plates used, and information present, on Warren Controls other product lines or older valves may be different, contact the factory for details.

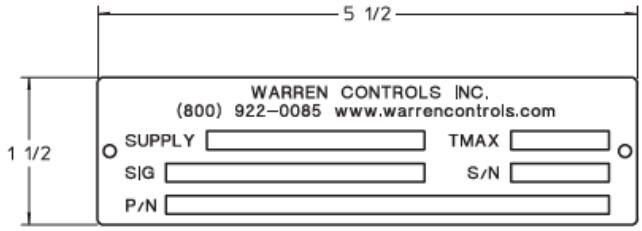
ACTUATOR NAMEPLATES



DL84

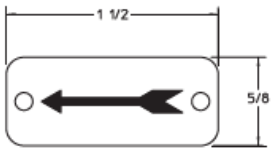


DL49



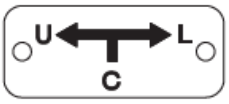
DL115

FLOW ARROW PLATES

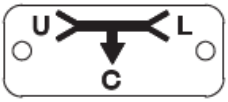


2-WAY FLOW

3-WAY MIXING

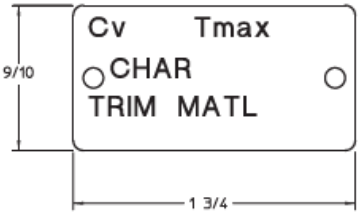


3-WAY DIVERTING



3-WAY DIVERTING AS MIXING

VBA NAMEPLATES



INDUSTRIAL VBA

Information Present on Control Valve Series 2900

INFORMATION PRESENT ON CONTROL VALVE SERIES 2900

Part Number & Serial Number

Information	Symbol(s)	Location	Notes
Part number (Configuration)	**P/N**	On actuator	• On **Actuator Nameplate** attached to leg(s) of actuator.
Serial number	**S/N**	On actuator and valve body	• On **Actuator Nameplate** attached to leg(s) of actuator. • Number only stamped on top of valve body top cover or top of valve body (2900).* * Number stamped using approximately 1/8 inch tall characters

Flow Direction(s)

Information	Symbol(s)	Location	Notes
Flow direction through valve	➡	On valve body	• On **Flow Arrow Plate** attached to valve body bottom port flange (2900 3-way) between the end connections. • On **Flow Arrow Plate** attached to valve body top cover flange (2900 2-way except 2922 1-1/2 thru 4 inch) between the end connections. • Arrow cast on valve body between the end connections (2922 1-1/2 thru 4 inch).
Port locations for 3-way valves	**U** upper port, **L** lower port, **C** common port	On valve body	• On **Flow Arrow Plate** attached to valve body bottom port flange (2900 3-way) between the end connections.

Input Signal & Supply

Information	Symbol(s)	Location	Notes
Input signal	**SIG**	On actuator	• On **Actuator Nameplate** attached to leg(s) of actuator.
Supply pressure	**SUP or SUPPLY**	On actuator	• On **Actuator Nameplate** attached to leg(s) of actuator.

Valve Attributes

Information	Symbol(s)	Location	Notes
Maximum temperature rating of valve body	**TMAX or Tmax**	On actuator and valve body	• On **Actuator Nameplate** attached to leg(s) of actuator. • On **Industrial VBA Nameplate** attached to top cover flange (2900) between the end connections on side opposite flow arrow plate.
Trim Cv (Flow coefficient)	**Cv**	On valve body	• On **Industrial VBA Nameplate** attached to top cover flange between the end connections on side opposite flow arrow plate.
Trim style (Characteristic)	**CHAR**	On valve body	• On **Industrial VBA Nameplate** attached to top cover flange between the end connections on side opposite flow arrow plate.
Trim material	**TRIM MATL**	On valve body	• On **Industrial VBA Nameplate** attached to top cover flange between the end connections on side opposite flow arrow plate.
Valve body material		On valve body	• If the factory applied paint is black the valve body material is iron.

Body Style Versus Application

BODY STYLE VERSUS APPLICATION

2-Way Valves (Control of Liquids, Gases, and Steam)

2920 Two-Way Single Seat Unbalanced Valve

The most commonly applied solution for sizes 3" and under with ANSI Class IV shut-off.

Sizes:	2-1/2, 3, 4, 5, 6, 8, 10 inch
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange
Trim:	EQ%, Bronze (2-1/2 thru 6), 300 Series Stainless Steel (2-1/2 thru 10), or 17-4 PH Hardened Stainless Steel (2-1/2 thru 6)
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (Best for Water Service), 350°F Max Guided Low-Friction TFE V-Ring, Spring Loaded (Best for Steam Service), 400°F Max
Temperature:	+32 to 350°F (125 FLG) +32 to 400°F (250 FLG)
Rangeability:	50:1

The valve closes — The valve opens

2922 Two-Way Double Seat Balanced Valve

A balanced valve that is an effective solution for sizes over 3" and for higher pressures. Its double seat design allows for dirtier fluids and requires less force to operate than unbalanced valves so smaller actuators can be used. It is limited to ANSI Class III shut-off.

Sizes:	2-1/2, 3, 4, 5, 6, 8, 10 inch
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange
Trim:	EQ%, Bronze or 300 Series Stainless Steel
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (Best for Water Service), 350°F Max Guided Low-Friction TFE V-Ring, Spring Loaded (Best for Steam Service), 400°F Max
Temperature:	+32 to 350°F (125 FLG) +32 to 400°F (250 FLG)
Rangeability:	50:1

The valve closes — The valve opens

2923 Two-Way Cylinder Balanced Valve

A balanced valve that is an effective solution for sizes over 3" and for higher pressures. It requires less force to operate than unbalanced valves so smaller actuators can be used. Its single seat o-ring seal design facilitates ANSI Class IV shut-off. It is limited to cleaner fluids.

Sizes:	2-1/2, 3, 4, 5, 6 inch
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange
Trim:	EQ% (Bronze, 300 Series Stainless Steel 17-4 PH Hardened Stainless Steel, or Alloy 6), Linear (300 Series Stainless Steel, 17-4 PH Hardened Stainless Steel, or Alloy 6)
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (Best for Water Service), 350°F Max Guided Low-Friction TFE V-Ring, Spring Loaded (Best for Steam Service), 400°F Max
O-Ring:	EPDM (BRZ) Fluoraz 797 (300 SSTrim, 17-4 pH or Alloy 6 Trim)
Temperature:	+32 to 300°F (BRZ) +32 to 350°F (125 FLG w/ 300 SSTrim, 17-4 PH or Alloy 6 Trim) +32 to 400°F (250 FLG w/ 300 SSTrim, 17-4 PH or Alloy 6 Trim)
Rangeability:	50:1

3-Way Valves (Control of Liquids)

2930 Three-Way Mixing Valve

This valve has two inlets and one outlet, and is the simplest solution for mixing or bypass applications with ANSI Class IV shut-off. In normal applications the inlet pressures are near equal and control is possible from 5% to 95% of travel with inlet pressures up to 100 PSI.

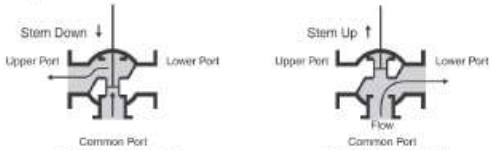
Sizes:	2-1/2, 3, 4, 5, 6, 8 inch
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange
Trim:	Linear, Bronze (2-1/2 thru 6) or 300 Series Stainless Steel (2-1/2 thru 8)
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (Best for Water Service), 350°F Max Guided Low-Friction TFE V-Ring, Spring Loaded (Best for Steam Service), 400°F Max
Temperature:	+32 to 350°F (125 FLG) +32 to 400°F (250 FLG)
Rangeability:	50:1

The upper port opens and the lower port closes — The upper port closes and the lower port opens

2932 Three-Way Diverting/Mixing Valve

Designed as a diverting valve with one inlet and two outlets with ANSI Class II shutoff. However, flow can be reversed for mixing if this port configuration is desirable. The difference between the upper port and lower port pressure must not exceed 50PSID.

Sizes:	2-1/2, 3, 4, 5, 6, 8 inch
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange
Trim:	Linear, Bronze or 300 Series Stainless Steel
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (Best for Water Service), 350°F Max Guided Low-Friction TFE V-Ring, Spring Loaded (Best for Steam Service), 400°F Max
O-Ring:	EPR
Temperature:	+32 to 300°F (2-1/2 through 5) +32 to 150°F (6 & 8)
Rangeability:	50:1



The upper port opens and the lower port closes — The upper port closes and the lower port opens

Body Pressure-Temperature Ratings:		
Temperature (F)	125 FLG	250 FLG
+32° To 150°	175	400
175°	170	385
200°	165	370
225°	155	355
250°	150	340
275°	145	325
300°	140	310
350°	125	280
375°	-	265
400°	-	250

Pressure ratings are PSIG

For applications below 32° consult factory

Trim Materials	Flowing Differential Pressure Limit
Bronze	50 PSID
300 Series Stainless Steel	100 PSID
17-4 pH Hardened Steel	200 PSID
Alloy 6	300 PSID

Dimensions and Weights

DIMENSIONS & WEIGHTS

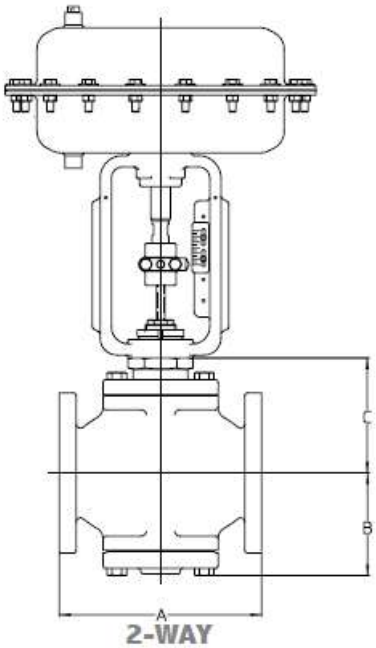
Dimension (IN) 2920		Valve Size (IN)						
		2-1/2	3	4	5	6	8	10
A	125FLG	9	10	13	15-3/4	17-3/4	16-1/4	20
	250FLG	9-5/8	10-3/4	13-5/8	16-5/8	18-5/8	16-1/4	21-3/8
B		4-3/4	5-3/8	6-3/8	5-3/4	6-1/2	8-7/8	9-7/8
C		5-1/4	6-1/8	7-1/8	7-3/4	8-3/8	9-5/8	10-3/8
Weight (LB)	125FLG	55	72	119	134	175	270	417
	250FLG	64	77	131	166	233	360	510

Dimension (IN) 2923		Valve Size (IN)				
Variable		2-1/2	3	4	5	6
A	125FLG	9	10	13	15-3/4	17-3/4
	250FLG	9-5/8	10-3/4	13-5/8	16-5/8	18-5/8
B		4-3/4	5-3/8	6-3/8	5-3/4	6-1/2
C		5-3/4	6-5/8	7-3/4	8-1/4	8-7/8
Weight (LB)	125FLG	57	75	127	149	197
	25FLG	66	80	139	181	256

Dimension (IN) 2922		Valve Size (IN)						
		2-1/2	3	4	5	6	8	10
A	125FLG	7-3/4	9	11-3/8	12	14-1/8	16-1/4	20
	250FLG	8-3/8	9-3/4	12	12-7/8	14-1/2	16-1/4	21-3/8
B		4-1/8	4-3/8	5	6-7/8	7-5/8	8-7/8	9-7/8
C		4-7/8	5-1/8	6-5/8	7-5/8	8-1/2	9-5/8	10-3/8
Weight (LB)	125FLG	32	42	77	124	169	290	435
	250FLG	42	54	96	162	220	380	540

Consult factory for drawings, weights, and dimensions of configurations not shown.

Face to face dimensions conform to historical Warren Controls standard and are **NOT** ANSI/ISA compatible.



Valve shown with DL84 Actuator as typical.

For additional actuator information see Series 2900 Product Specification and the Installation Operation and Maintenance Instructions for the actuator in use.

DIMENSIONS & WEIGHTS

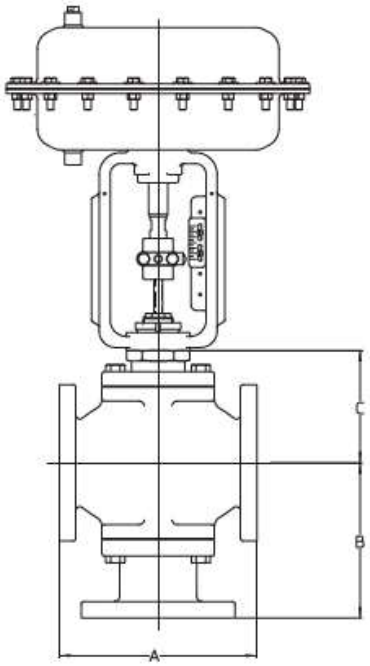
Dimension (IN) 2930		Valve Size (IN)					
Variable		2-1/2	3	4	5	6	8
A	125FLG	9	10	13	15-3/4	17-3/4	16-1/4
	250FLG	9-5/8	10-3/4	13-5/8	16-5/8	18-5/8	16-1/4
B	125FLG	7-1/8	8	9-7/8	9-1/4	9-7/8	11-7/8
	250FLG	7-3/8	8-3/8	10-1/4	10-3/8	11	12-3/8
C		5-1/4	6-1/8	7-1/8	6	6-3/4	9-5/8
Weight (LB)	125FLG	64	83	139	157	202	306
	250FLG	73	94	157	211	283	398

Dimension (IN) 2932		Valve Size (IN)					
Variable		2-1/2	3	4	5	6	8
A	125FLG	9	10	13	12	14-1/8	16-1/4
	250FLG	9-5/8	10-3/4	13-5/8	12-7/8	14-1/2	16-1/4
B	125FLG	7-1/8	8	9-7/8	10-1/2	11-1/8	11-7/8
	250FLG	7-3/8	8-3/8	10-1/4	11	11-1/2	12-3/8
C		5-1/4	6-1/8	6-7/8	7-1/2	8-1/8	9-1/4
Weight (LB)	125FLG	59	78	140	154	203	316
	250FLG	73	94	166	215	284	407

Consult factory for drawings, weights, and dimensions of configurations not shown.

Actual shipping weights may vary.

Face to face dimensions conform to historical Warren Controls standard and are **NOT** ANSI/ISA compatible.



3-WAY

Valve shown with DL84 Actuator as typical.

For additional actuator information see Series 2900 Product Specification and the Installation Operation and Maintenance Instructions for the actuator in use.

Installation

INSTALLATION

See also separate actuator and accessory instructions for additional installation guidelines.

- Be sure that the flow medium, ambient temperature and the selected location will not exceed the maximum temperature of the valve, actuator, or accessories. Information can be found in the product specifications and on the nameplate(s) regarding these limits (See Information Present on Control Valves section for location of important information on valve).
- Follow good piping practices. Install a bypass around the valve. Install stop valves in inlet and outlet piping to provide means to isolate valve.
- A straight run of pipe is recommended for 10 pipe diameters upstream of the valve and 20 pipe diameters downstream of the valve.
- Protect valve and downstream equipment with a self-cleaning strainer.
- Provide proper inlet and outlet drainage in steam service to prevent water hammer or possible erosion in equipment.
- Install gauges in inlet and outlet piping to provide means for checking adjustment and operation.
- For maximum efficiency and minimum wear install valve in vertical position with the stem pointing upward.
- Actuators mounted in any position other than vertical must be supported independent of the valve. **DO NOT MOUNT DL115 ACTUATORS IN THE HORIZONTAL POSITION.**
- Be sure to leave clearance to allow for actuator removal (See Dimensions & Weights section of Product Specification for actuator removal clearance).
- Before installing, be sure valve and piping are clean inside and free of scale, chips, welding spatter, and foreign material. Thoroughly blow out or flush pipe lines.
- The valve must be installed with the fluid flowing in the correct direction(s). For proper operation in all applications, control valves must be piped according to the corresponding flow arrows, inlet markings, and port markings present on each valve (See Information Present on Control Valves section for location of important information on valve).

Check valve for any damage due to improper storage or transportation. Immediately notify your sales organization of any damaged goods upon receipt. Do not attempt to move or disturb the valve further so photos may be taken. If the shipping container is noticeably damaged refuse receipt, as the shipping company should be held liable until a shipping representative is available to take photos.

OPERATION

- Close inlet and outlet stop valves.
- Check that valve responds through rated travel in relation to changes in input signal. Rated travel is shown by position of travel indicator on valve stem relative to travel indicator on yoke.
- For valves fitted with a handwheel, manually operate valve using handwheel through rated travel to check freedom of movement. Return handwheeel to its standby position.
- Place valve in operation.

For proper operation in all applications, control valves must be piped properly. If you need detailed information, please refer to the "Heat Exchanger Bypass Piping Applications" document.

- Pipes must be aligned squarely with the valve at each connection.
- If the valve has screwed ends, do not apply pipe dope to the threads of the valve body or to the first two threads of the pipe.
- If the valve has flanged ends, tighten flange bolts evenly to prevent excessive stress and the possibility of cracking.
- If the valve has welded ends, prevent plug and cage distortion by keeping excess heat from the body.
- The valve, actuator, and accessories (if so equipped) are assembled, tested, and calibrated at the factory. The actuator nameplate specifies set-up parameters used (See Information Present on Control Valves section for location of important information on valve). Do not exceed the supply pressure listed on the actuator nameplate or you will damage the valve and void the warranty.
- Supply air or voltage, instrument signal, and accessories should be connected to ports or terminals as indicated on the control valve.
- Final tuning may be required under actual operating conditions.
- On critical or dangerous equipment, provide suitable safety and emergency systems to protect personnel and property from injury due to a valve malfunction. If the valve handles flammable, toxic, corrosive or explosive fluids, provide for safety in the event of valve leakage or malfunction.
- Do not obscure flow arrow plates or nameplates with paint. If flow arrow plates or nameplates will be covered with insulation, it is recommended the information on the plates be transcribed on the outside of the insulation in the same location as the plate.

Maintenance

MAINTENANCE

Series 2900 High Capacity General Purpose Globe are for the most part maintenance free when properly selected and installed. Rebuilding of these valves should not be necessary under normal operating conditions. For best operation follow installation guidelines (See Installation section); maintain the fluid pressure, temperature, flow, flowing differential pressure, and shut-off differential pressure within the limits of the valve (See Series 2900 Product Specification for details). In installations where high vibration exists, pneumatic and/or electrical connections should periodically be checked for integrity. In water or water and glycol applications, good water quality must be maintained or the service life of the valve may be reduced (See Water Quality Guidelines). The valve stem must be kept free of debris, deposits, dirt, dust, and scratches or the packing parts may be damaged resulting in a packing leak. Control valve hunting will cause excessive stroking of the valve stem and result in premature failure of the packing seal. The system must be stabilized to prevent hunting to ensure reasonable packing life and optimal control performance. Oversizing of a control valve will result in an unstable condition, which can cause noise, vibration, and premature trim and packing seal failure. The use of Warren Controls ValveWorks sizing program will facilitate the selection of the optimum valve.

PACKING ADJUSTMENT

Series 2900 High Capacity General Purpose Globe Control Valves have either self-adjusting packing or adjustable packing. **29N** models with Packing Type **T** V-ring, **V** Vacuum Service, or **L** Lip Packing have self-adjusting packing and require no external adjustment. **291** models with Packing Type **T** V-ring Packing also have self-adjusting packing and require no external adjustment. If the valve has self-adjusting packing and a packing leak is observed replace the packing and if necessary the stem and plug assembly.

29N models with Packing Type **G** Graphite have adjustable packing. **291** models with Packing Type **G** Graphite also have adjustable packing. If the valve has adjustable packing and a packing leak is observed, tighten the packing nut ¼ turn and observe. If the leak continues tighten the packing nut another ¼ turn and observe. Repeat as necessary. If the leak continues and the packing nut cannot be tightened further with reasonable force replace the packing and if necessary the stem and plug assembly.

PARTS/ OVERHAUL

Damaged or worn parts can decrease performance and shorten valve life.

Damaged or worn packing parts including the packing, bearings, spring, and other bonnet parts can cause a packing leak resulting in damage to the actuator, accessories, and surrounding equipment. Damaged or worn packing parts can also cause increased hysteresis resulting in poor control.

Damaged or worn trim parts including the plug, stem, seat ring, piston, piston chamber, piston guide, piston seal, and o-ring can cause increased hysteresis, poor control, excessive internal leakage, and poor shut-off. Damaged or worn trim parts can also cause damage to the packing parts resulting in a packing leak.

Damaged or worn body gaskets or o-ring seals can cause external leakage resulting in damage to the actuator, accessories, and surrounding equipment.

Should parts become worn or damaged, parts kits are available. Repack Kits are available to replace the packing. Repack/Inspection Kits are available to allow the valve to be opened for inspection of its internal parts. Rebuild/Repack Kits are available to completely rebuild/ overhaul the valve. Parts kits come with complete step-by-step instructions. Each kit has its own part number. Please provide the valve's serial number to ensure getting the correct kit part number and correct parts.

DO NOT ATTEMPT TO SERVICE WITHOUT A REPACK/INSPECTION KIT & SUPPLEMENTAL INSTRUCTIONS.

Parts Kits

PARTS KITS

REPACK KIT
FOR 29N MODELS WITH PACKING TYPE T V-RING — SEE DWG C3769950

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	RETAINER BEARING	6	1	MALE ADAPTER
3	1	PACKING RETAINER	7	1	PACKING SPRING
5	1	V-RING PACKING SET	12	1	TUBE STEM LUBE

REPACK KIT
FOR 29N MODELS WITH PACKING TYPE G GRAPHITE — SEE DWG C3769952

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	PACKING RETAINER	5	1	PACKING CARTRIDGE
3	1	RETAINER BEARING	8	1	TUBE STEM LUBE

REPACK KIT
FOR 29N MODELS WITH PACKING TYPE V VACUUM SERVICE — SEE DWG C3761956

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	PACKING RETAINER	7	1	FEMALE ADAPTER
3	1	RETAINER BEARING	8	1	PACKING SPRING
5	1	MALE ADAPTER	13	1	TUBE STEM LUBE
6	1	V-RING PACKING SET			

REPACK KIT
FOR 29N MODELS WITH PACKING TYPE L LIP PACKING — SEE DWG C3769956

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	PACKING RETAINER	5	3	LIP PACKING
3	1	RETAINER BEARING	8	1	TUBE STEM LUBE

REPACK KIT
FOR 291 MODELS WITH PACKING TYPE T V-RING — SEE DWG C3760085

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	INTERNAL PACKING NUT	7	1	O-RING RETAINER
4	1	V-RING PACKING SET	8	1	O-RING
5	1	PACKING LOAD WASHER	10	1	TUBE STEM LUBE
6	1	WAVE SPRING			

REPACK KIT
FOR 291 MODELS WITH PACKING TYPE G GRAPHITE — SEE DWG C3760052

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	INTERNAL PACKING NUT		1	TUBE STEM LUBE
4	1	GRAPHITE RING PACKING			

PARTS KITS

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 20 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3241352

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
12	2	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 20 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3241352

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	12	2	GASKET
4	1	TRAVEL STOP (As required)	15	1	TUBE PERMATEX #2
8	1	GROOVE PIN		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
9	1	PLUG		1	REPACK KIT
10	1	SEAT RING			

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 20 SIZE 500 & 600 (5 &6 INCH)
SEE DWG D3241554

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
8	1	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 20 SIZE 500 & 600 (5 & 6 INCH)
SEE DWG D3241554

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	12	1	PLUG
8	1	GASKET	13	1	SEAT RING
9	1	TRAVEL STOP (As required)	17	1	TUBE PERMATEX #2
10	1	THREAD INSERT (Model **29N** with St Stl Trim)		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
11	1	GROOVE PIN		1	REPACK KIT

PARTS KITS

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 20 SIZE 800 & 010 (8 & 10 INCH)
SEE DWG D3241750

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
14	2	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 20 SIZE 800 & 010 (8 & 10 INCH)
SEE DWG D3241750

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	12	1	PLUG
8	1	TRAVEL STOP	14	2	GASKET
9	1	GROOVE PIN	16	1	TUBE PERMATEX #2
10	1	THREAD INSERT (Model **29N** with St Stl Trim)		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
11	1	SEAT RING		1	REPACK KIT

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 22 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3201354

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
8	2	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT *
FOR MODEL 29N & 291 VALVE TYPE 22 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3201354

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	10	1	PLUG
4	1	TRAVEL STOP (As required)	12	1	TUBE PERMATEX #2
7	1	GROOVE PIN		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
8	2	GASKET		1	REPACK KIT

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 22 SIZE 500 & 600 (5 & 6 INCH)
SEE DWG D3201752

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
14	2	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

* Seat rings for valve Type 22 size 250 thru 400 (2 1/2 thru 4 inch) and size 10 (10 inch) are machined in the valve and are NOT available separtely as parts.

PARTS KITS

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 22 SIZE 500 & 600 (5 & 6 INCH)
SEE DWG D3201752

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	12	1	LOWER SEAT RING
8	1	TRAVEL STOP	14	2	GASKET
9	1	GROOVE PIN	16	1	TUBE PERMATEX #2
10	1	UPPER SEAT RING		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
11	1	PLUG		1	REPACK KIT

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 22 SIZE 800 & 010 (8 & 10 INCH)
SEE DWG D3201950

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
14	2	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT *
FOR MODEL 29N & 291 VALVE TYPE 22 SIZE 800 & 010 (8 & 10 INCH)
SEE DWG D3201950

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	14	2	GASKET
8	1	GROOVE PIN	16	1	TUBE PERMATEX #2
9	1	UPPER SEAT RING (Valve size 8 inch)		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
10	1	PLUG		1	REPACK KIT
11	1	LOWER SEAT RING (Valve size 8 inch)			

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 23 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3241354

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
12	3	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 23 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3241354

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	12	3	GASKET
3	1	TRAVEL STOP (As required)	15	1	TUBE O-RING LUBE
6	1	GROOVE PIN	16	1	TUBE PERMATEX #2
8	1	O-RING		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
9	1	PLUG		1	REPACK KIT
10	1	SEAT RING			

PARTS KITS

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 23 SIZE 500 & 600 (5 & 6 INCH)
SEE DWG D3241556

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
7	2	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 23 SIZE 500 & 600 (5 & 6 INCH)
SEE DWG D3241556

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	11	1	SEAT RING
3	1	TRAVEL STOP	15	1	TUBE O-RING LUBE
4	1	GROOVE PIN	16	1	TUBE PERMATEX #2
7	2	GASKET		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
9	1	O-RING		1	REPACK KIT
10	1	PLUG			

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 30 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3261351

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
13	2	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 30 SIZE 250 THRU 400 (2-1/2 THRU 4 INCH)
SEE DWG C3261351

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	13	2	GASKET
7	1	VALVE BODY SEAT RING	15	1	TUBE PERMATEX #2
8	1	GROOVE PIN		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
9	1	PLUG		1	REPACK KIT
10	1	BOTTOM PORT SEAT RING			

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 30 SIZE 500 & 600 (5 & 6 INCH)
SEE DWG D3261551

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
10	1	GASKET		1	REPACK KIT
	1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)			

PARTS KITS

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 30 SIZE 500 & 600 (5 & 6 INCH)
SEE DWG D3261551

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	13	2	TUBE PERMATEX #2
5	1	GROOVE PIN			
6	1	PLUG		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
7	2	SEAT RING		1	REPACK KIT
10	1	GASKET			

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 30 SIZE 800 & 010 (8 & 10 INCH)
SEE DWG D3261751

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
6	1	GASKET TOP COVER		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
14	1	GASKET BOTTOM PORT		1	REPACK KIT

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 30 SIZE 800 & 010 (8 & 10 INCH)
SEE DWG D3261751

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	11	1	PLUG
6	1	GASKET TOP COVER	14	1	GASKET BOTTOM PORT
8	2	SEAT RING	17	1	TUBE PERMATEX #2
9	1	THREAD INSERT (As required)		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
10	1	GROOVE PIN		1	REPACK KIT

REPACK / INSPECTION KIT
FOR MODEL 29N & 291 VALVE TYPE 32 SIZE 250 THRU 800 (2-1/2 THRU 8 INCH)
SEE DWG D3261752

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
6	1	TOP COVER GASKET		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
17	1	BOTTOM PORT GASKET		1	REPACK KIT

REBUILD / REPACK KIT
FOR MODEL 29N & 291 VALVE TYPE 32 SIZE 250 THRU 800 (2-1/2 THRU 8 INCH)
SEE DWG D3261752

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM	12	1	PISTON
6	1	TOP COVER GASKET	13	1	SEAT RING
7	1	PISTON CHAMBER	17	1	BOTTOM PORT GASKET
8	4	HEX JAM NUT	20	1	TUBE PERMATEX #2
9	1	PISTON SEAL (Valve sizes 6 & 8 inch)	21	1	TUBE O-RING LUBE
10	1	O-RING		1	ADDITIONAL BONNET SUBASSEMBLY PARTS (SEE TABLE)
11	1	PISTON GUIDE		1	REPACK KIT

PARTS KITS

ADDITIONAL BONNET SUBASSEMBLY PARTS IN REPACK/ INSPECTION KIT

FOR **29N** MODELS WITH PACKING TYPE **T** V-RING SEE DWG C3769950

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
8	1	O-RING RETAINER	9	1	O-RING

FOR **29N** MODELS WITH PACKING TYPE **G** GRAPHITE SEE DWG C3769952

NONE

FOR **29N** MODELS WITH PACKING TYPE **V** VACUUM SERVICE SEE DWG C3761956

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
9	1	O-RING RETAINER	10	1	O-RING

FOR **29N** MODELS WITH PACKING TYPE **L** LIP PACKING SEE DWG C3769956

NONE

FOR **291** MODELS WITH PACKING TYPE **T** V-RING SEE DWG C3760085

NONE

FOR **291** MODELS WITH PACKING TYPE **G** GRAPHITE SEE DWG C3760052

NONE

ADDITIONAL BONNET SUBASSEMBLY PARTS IN REBUILD/ REPACK KIT

FOR **29N** MODELS WITH PACKING TYPE **T** V-RING SEE DWG C3769950

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
8	1	O-RING RETAINER	10	1	BONNET BEARING
9	1	O-RING	11	1	BONNET

FOR **29N** MODELS WITH PACKING TYPE **G** GRAPHITE SEE DWG C3769952

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
6	1	BONNET	7	1	BONNET BEARING

FOR **29N** MODELS WITH PACKING TYPE **V** VACUUM SERVICE SEE DWG C3761956

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
9	1	O-RING RETAINER	11	1	BONNET BEARING
10	1	O-RING	12	1	BONNET

FOR **29N** MODELS WITH PACKING TYPE **L** LIP PACKING SEE DWG C3769956

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
6	1	BONNET	7	1	BONNET BEARING

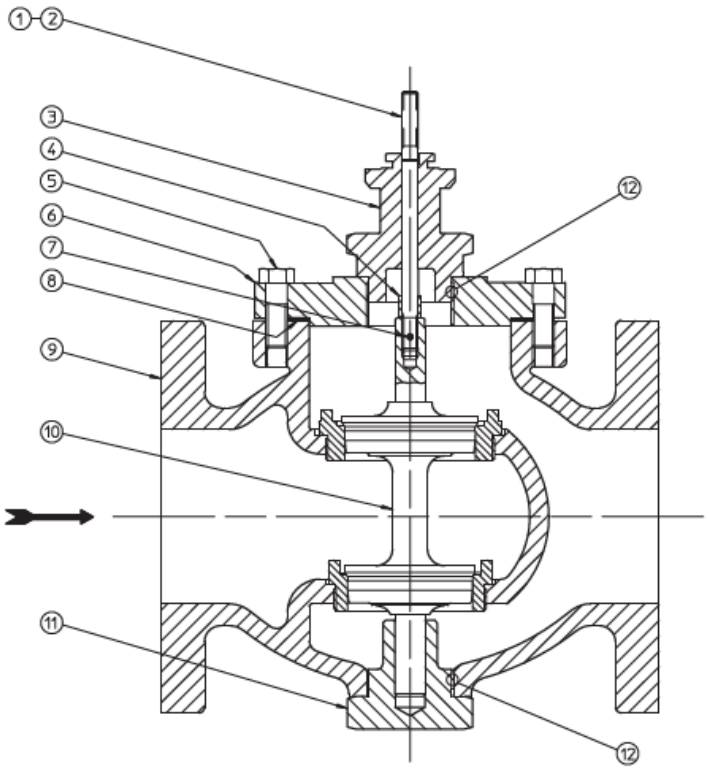
FOR **291** MODELS WITH PACKING TYPE **T** V-RING SEE DWG C3760085

NONE

FOR **291** MODELS WITH PACKING TYPE **G** GRAPHITE SEE DWG C3760052

NONE

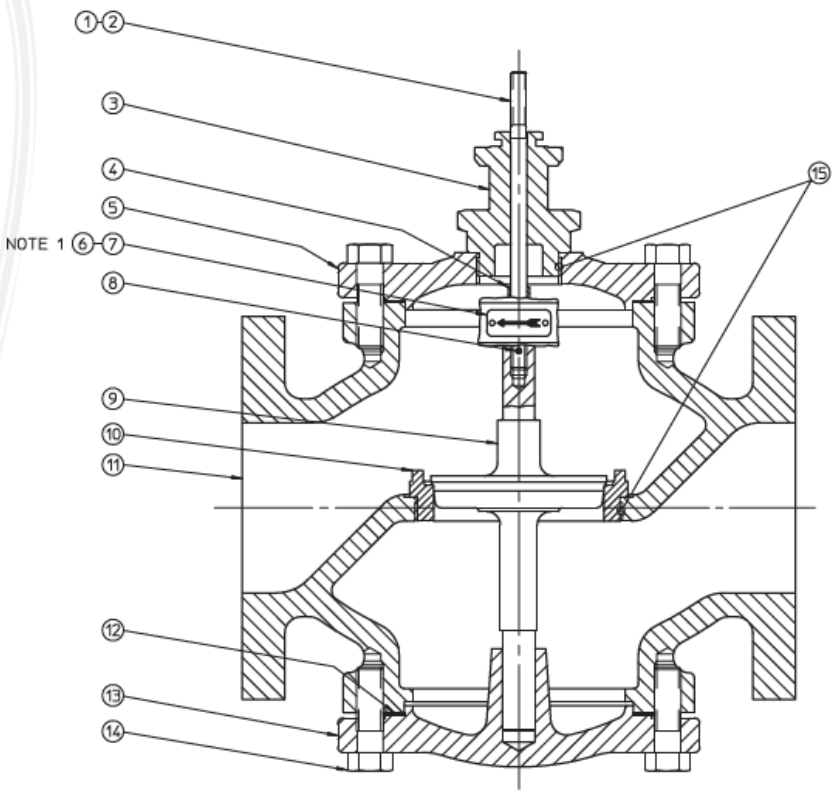
C3201354



ITEM	QTY	DESCRIPTION
12	A/R	PERMATEX #2
11	1	BOTTOM GUIDE PLUG
10	1	PLUG
9	1	VALVE BODY WITH SEAT RINGS
8	1	GASKET
7	1	GROOVE PIN
6	1	TOP COVER
5	A/R	HEX HEAD CAPSCREW
4	A/R	TRAVEL STOP
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

DRAWN	DATE	WARREN CONTROLS CORPORATION BROADWAY, NEW JERSEY 08808			
J.MARTOCCI	10/7/96				
CHECKED		1 1/2 THRU 4 INCH TYPE 22 VBA			
APPROVED					
		SIZE: C	FSCM NO: 03847	DWG NO: C3201354	REV

C3241352



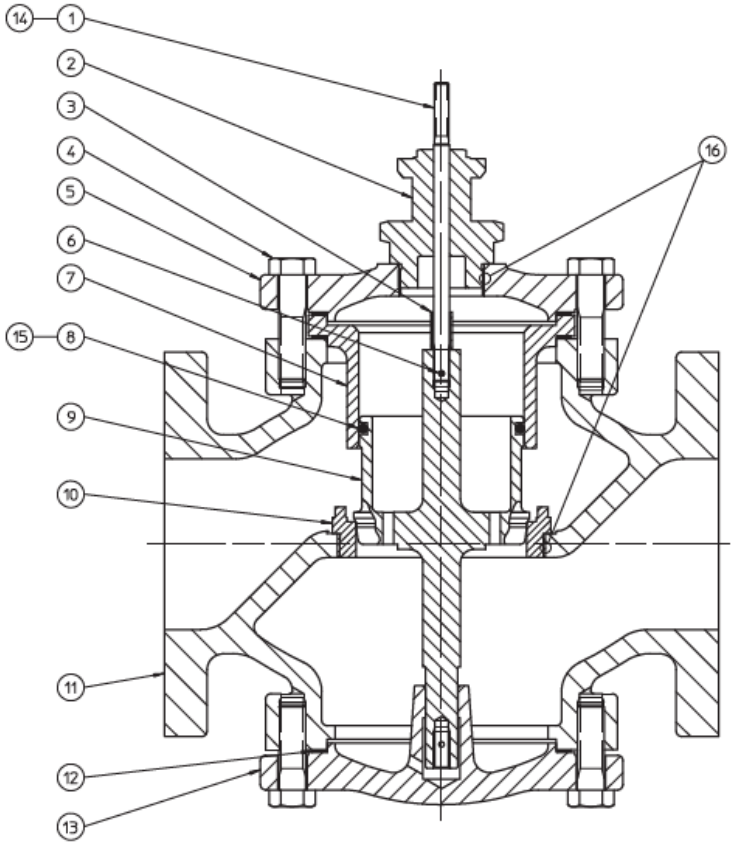
ITEM	QTY	DESCRIPTION
15	A/R	PERMATEX #2
14	A/R	HEX HEAD CAPSCREW
13	1	BOTTOM GUIDE COVER
12	2	GASKET
11	1	VALVE BODY
10	1	SEAT RING
9	1	PLUG
8	1	GROOVE PIN
7	2	DRIVE SCREW NO 4 x 1/4
6	1	FLOW ARROW PLATE
5	1	TOP COVER
4	1	TRAVEL STOP
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

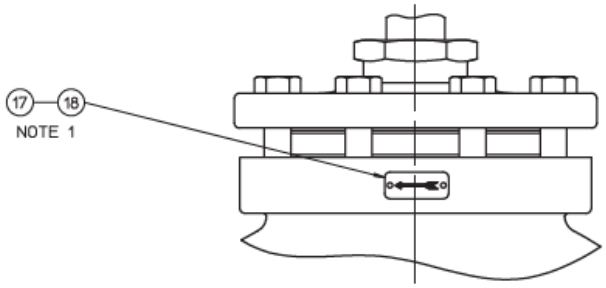
NOTES:

1) SECURE FLOW ARROW PLATE (6) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (7)

DRAWN J.MARTOCCI	DATE 10/10/96	WARREN CONTROLS CORPORATION BROADWAY, NEW JERSEY 08808	
CHECKED		2 1/2, 3 & 4 INCH TYPE 20 VBA	
APPROVED		SIZE C	PSCN NO 03847	DWG NO C3241352	REV

C3241354





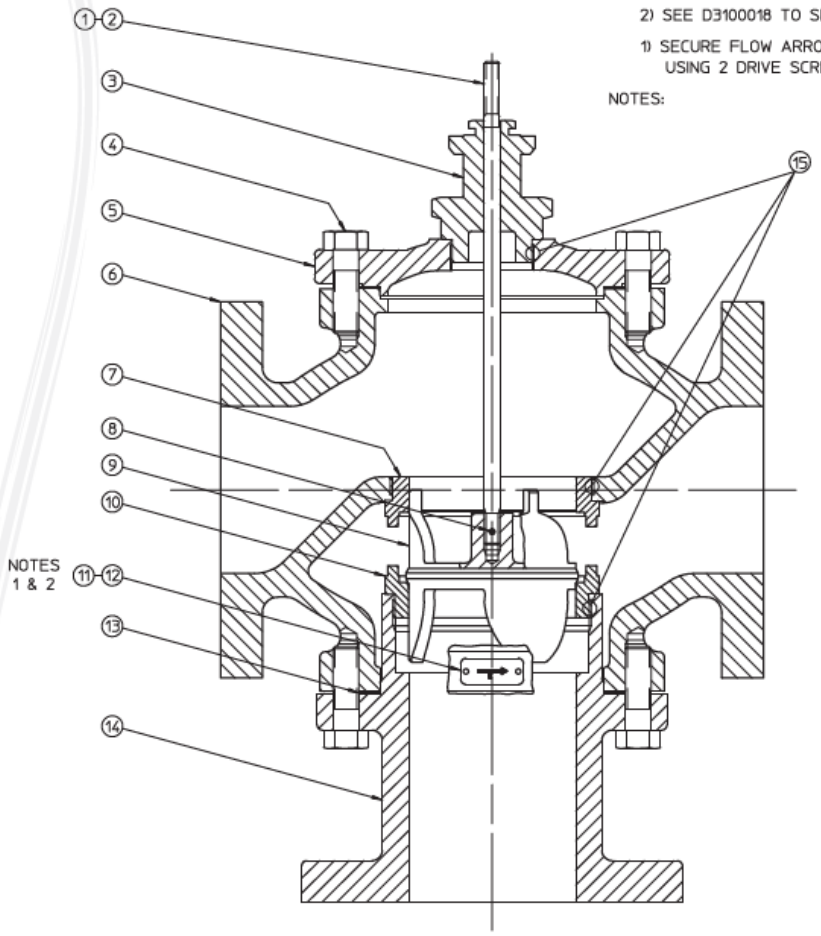
NOTES:

1) SECURE FLOW ARROW PLATE (17) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (18).

ITEM	QTY	DESCRIPTION
18	2	DRIVE SCREW #4 x 1/4
17	1	FLOW ARROW PLATE
16	A/R	PERMATEX #2
15	A/R	O-RING LUBE
14	A/R	STEM LUBE
13	1	BOTTOM COVER
12	3	GASKET
11	1	VALVE BODY
10	1	SEAT RING
9	1	PLUG
8	1	O-RING
7	1	PISTON CHAMBER
6	1	GROOVE PIN
5	1	TOP COVER
4	A/R	HEX HD CAPSCREW
3	1	TRAVEL STOP
2	1	BONNET SUBASSEMBLY SEE SEPARATE DRAWING
1	1	VALVE STEM

DRAWN	DATE	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010			
BLB	3/9/04				
CHECKED		2 1/2 - 4 INCH TYPE 23 VALVE BODY ASSEMBLY			
APPROVED					
		SIZE C	FSCM NO 03847	DWG NO C3241354	REV

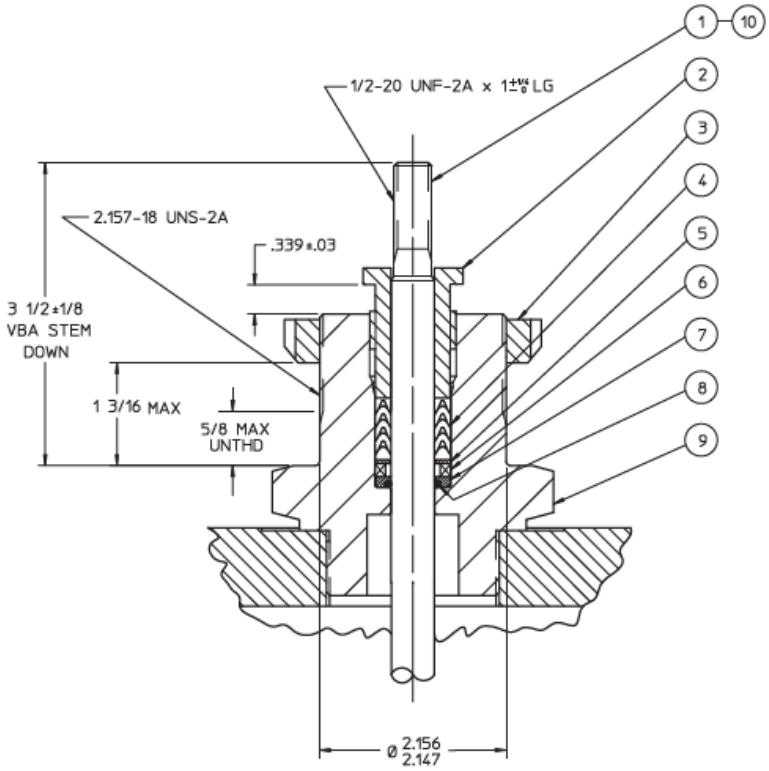
C3261351



ITEM	QTY	DESCRIPTION
15	A/R	THREAD SEALANT
14	1	BOTTOM PORT
13	2	GASKET
12	2	DRIVE SCREW NO 4 x 1/4
11	1	FLOW ARROW PLATE
10	1	BOTTOM PORT SEAT RING
9	1	PLUG
8	1	GROOVE PIN
7	1	VALVE BODY SEAT RING
6	1	VALVE BODY
5	1	TOP COVER
4	A/R	HEX HEAD CAPSCREW
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

DRAWN	DATE	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010			
J.MARTOCCI	11/13/96				
CHECKED		2 1/2, 3 & 4 INCH TYPE 30 VBA			
APPROVED					
		SIZE C	FSCM NO 03847	DWG NO C3261351	REV A

C3760085



ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
10	A/R	A0940021	DC111 LUBE	
9	1	C1181952	ADAPTER BONNET	BRASS
8	1	04910014	O-RING -014	TEFLON
7	1	B1800053-01	O-RING RETAINER	BRASS
6	1	B1820068	WAVE SPRING	ST STL 17-7 PH
5	1	B2060003-01	PACKING LOAD WASHER	ST STL TYPE 316
4	1	B1700073	V-RING PACKING SET	TEFLON
3	1	B1640033-01	YOKE LOCKNUT	STL PLTD
2	1	B1720052	INTERNAL PACKING NUT	BRASS
1	1	AS REQD	VALVE STEM	ST STL TYPE 316

REMOVE ALL SHARP EDGES AND BURRS
DIMENSIONED PER ASME Y14.5M-1994
THIRD ANGLE PROJECTION
NEXT ASSEMBLY
UNLESS OTHERWISE SPECIFIED:
DECIMAL .XX ±.010
DECIMAL .XXX ±.005
FRACTION ± 1/64
ANGLE ± 1°
ALL FILLET RADII 1/32 MAX
125 FINISH ON ALL MACHINED SURFACES
MATERIAL: SEE TABLE
TREATMENT
FINISH
DRAWN: EPC
DATE: 1-11-01
CHECKED
APPROVED

WARREN CONTROLS CORPORATION
BROADWAY, NEW JERSEY 08808

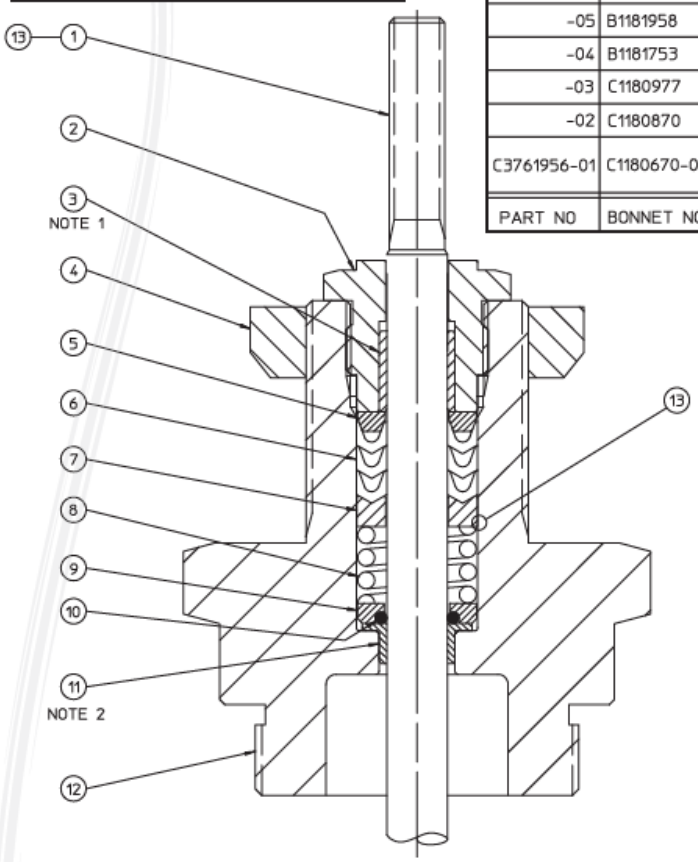
NON ADJUSTABLE V-RING PACKING SUBASSY BRASS 115 ADAPTER BONNET 2.157-18, 2-18

SIZE	PSCH NO	DWG NO	REV
C	03847	C3760085	

SCALE: FULL | WT | SHEET

C3761956

REV	DESCRIPTION	DATE	APPROVED
A	REDRAWN WITH CHANGE ECN 2161	BLB 11/11/05	



PART NO	BONNET NO	BONNET BEARING NO	USED ON
-06	B1181959	B1060057	10 INCH TYPE 22/72 250# FLG
-05	B1181958	B1060057	10 INCH TYPE 22/72 125# FLG
-04	B1181753	B1060057	8 INCH TYPE 22/72
-03	C1180977	B1060055	2 INCH TYPE 20/70, 30
-02	C1180870	B1060055	1 1/2 INCH TYPE 20/70, 30
C3761956-01	C1180670-01	B1060057	1/2 - 1 & 2 1/2 - 10 INCH TYPE 20/70, 30, 32 1 1/2 - 6 INCH TYPE 22/72

NOTES:

1) RETAINER BEARING (3) IS NOT A SYMMETRICAL PART & SHOULD ONLY BE ASSEMBLED AS FOLLOWS. PRESS RETAINER BEARING (3) INTO PACKING RETAINER (2) UNTIL THE END WITH THE CHAMFER ON THE ID IS ABOVE OR FLUSH WITH THE BOTTOM OF THE PACKING RETAINER (2)

2) PRESS BONNET BEARING (11) INTO BONNET (12), ORIENTED AS SHOWN, UNTIL IT BOTTOMS OUT IN PACKING GLAND

ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
13	A/R	A0940021	DC111 LUBE	
12	1	SEE TABLE	BONNET	BRASS OR BRONZE
11	1	SEE TABLE	BONNET BEARING	FIBER REINFORCED POLYETHERETHERKETONE
10	1	04910012	O-RING -012	TEFLON
9	1	B1800050-01	O-RING RETAINER	BRASS
8	1	B1820059	SPRING	ST STL TYPE 302
7	1	B1010066-01	FEMALE ADAPTER	BRASS
6	1	A1700054	V-RING PACKING SET	TEFLON
5	1	B1010050-03	MALE ADAPTER	BRASS
4	1	B1640034-01	YOKE LOCKNUT	STEEL PLATED
3	1	B1060056	RETAINER BEARING	FIBER REINFORCED POLYETHERETHERKETONE
2	1	C1720062-03	PACKING RETAINER	BRASS
1	1	AS REQD	VALVE STEM	ST STL TYPE 316

UNLESS OTHERWISE SPECIFIED: DECIMAL .XX ±.010, DECIMAL .XXX ±.005, FRACTION ± 1/64, ANGLE ± 1°, ALL FILLET RADII 1/32 MAX, FINISH ON ALL MACHINED SURFACES, ALL DIMENSIONS ARE IN INCHES

MATERIAL: SEE TABLE | TREATMENT | FINISH

DRAWN: BLB 11/11/05 | CHECKED | APPROVED

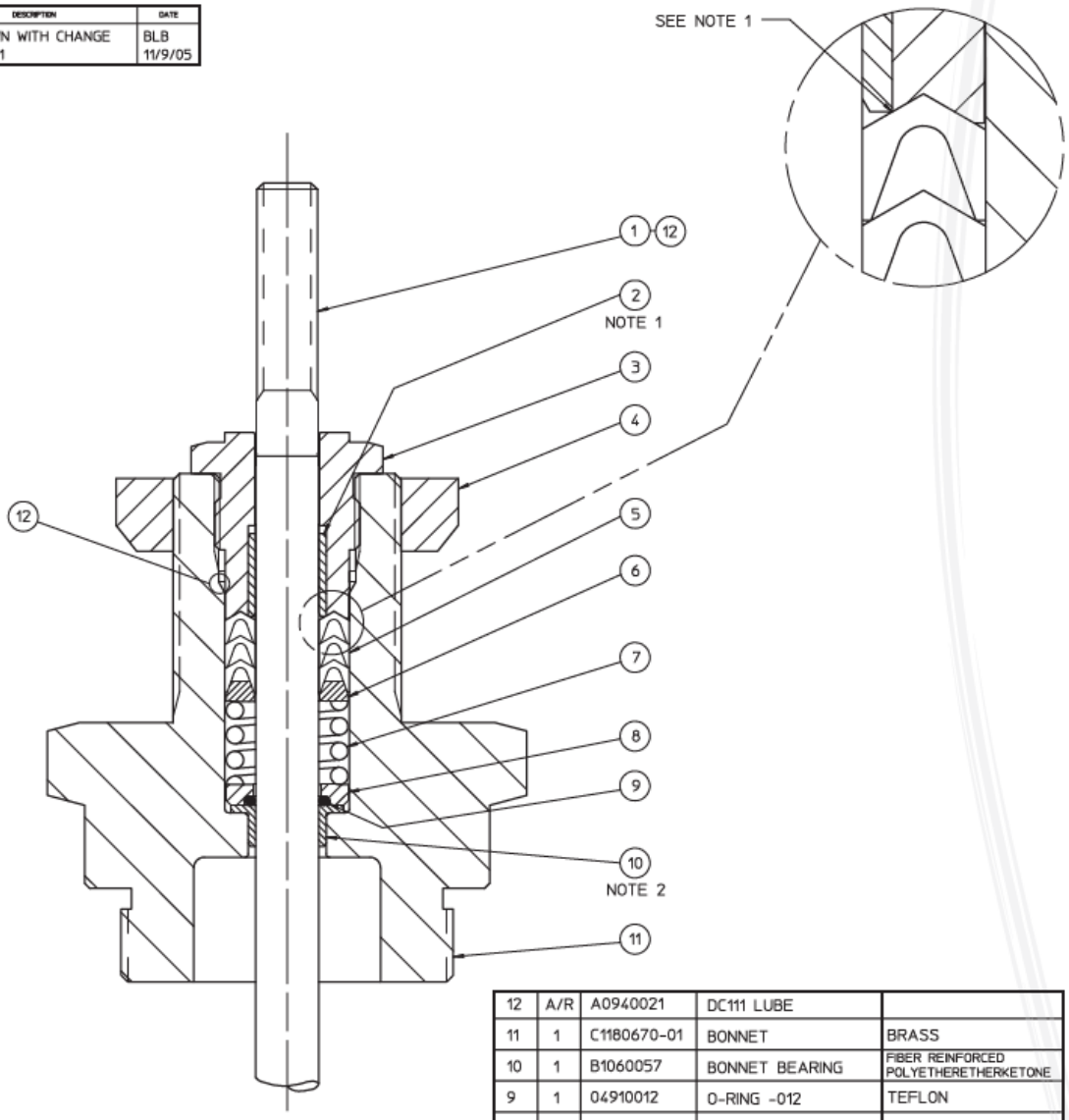
WARREN CONTROLS INCORPORATED
BETHLEHEM, PENNSYLVANIA 18020-8010

BONNET SUBASSY VACUUM SERVICE
GLFVP 1.376-18 W/ BEARINGS

SIZE	FSCM NO	DWG NO	REV
C	03847	C3761956-	A

C3769950

REV	DESCRIPTION	DATE
A	REDRAWN WITH CHANGE ECN 2161	BLB 11/9/05



ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
12	A/R	A0940021	DC111 LUBE	
11	1	C1180670-01	BONNET	BRASS
10	1	B1060057	BONNET BEARING	FIBER REINFORCED POLYETHERETHERKETONE
9	1	04910012	O-RING -012	TEFLON
8	1	B1800050-01	O-RING RETAINER	BRASS
7	1	B1820059	PACKING SPRING	ST STL TYPE 302
6	1	B1010050-03	MALE ADAPTER	BRASS
5	1	A1700054	V-RING PACKING SET	TEFLON
4	1	B1640034-01	YOKE LOCKNUT	STEEL PLATED
3	1	C1720060-03	PACKING RETAINER	BRASS
2	1	B1060056	RETAINER BEARING	FIBER REINFORCED POLYETHERETHERKETONE
1	1	AS REQD	VALVE STEM	ST STL TYPE 316

NOTES:

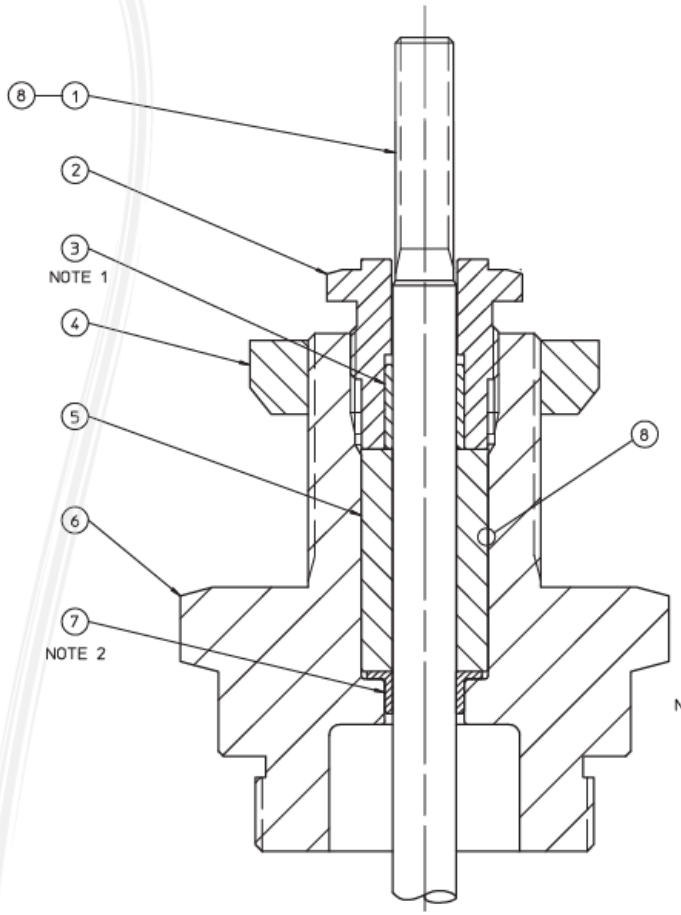
1) RETAINER BEARING (2) IS NOT A SYMMETRICAL PART & SHOULD ONLY BE ASSEMBLED AS FOLLOWS. PRESS RETAINER BEARING (2) INTO PACKING RETAINER (3) UNTIL THE END WITH THE CHAMFER ON THE ID IS ABOVE OR FLUSH WITH THE INSIDE EDGE OF THE V-NOTCH. THE BEARING MUST NOT EXTEND PAST THE V-NOTCH AND INTERFERE WITH THE V-RING PACKING.

2) PRESS BONNET BEARING (10) INTO BONNET (11), ORIENTED AS SHOWN, UNTIL IT BOTTOMS OUT IN PACKING GLAND.

MATERIAL: SEE TABLE	DRAWN: BLB	DATE: 4/15/03	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010
TREATMENT	CHECKED		NONADJUSTABLE V-RING PACKING SUBASSY BONNET 1.376-18, 2-18 W/BEARINGS
FINISH	APPROVED		SIZE: C; PSCH NO: 03847; DWG NO: C3769950; REV: A

C3769952

REV	DESCRIPTION	DATE
A	REDRAWN WITH CHANGE ECN 2161	BLB 11/10/05



NOTES:

1) RETAINER BEARING (3) IS NOT A SYMMETRICAL PART & SHOULD ONLY BE ASSEMBLED AS FOLLOWS. PRESS RETAINER BEARING (3) INTO PACKING RETAINER (2) UNTIL THE END WITH THE CHAMFER ON THE ID IS ABOVE OR FLUSH WITH THE BOTTOM OF THE PACKING RETAINER (2)

2) PRESS BONNET BEARING (7) INTO BONNET (6), ORIENTED AS SHOWN, UNTIL IT BOTTOMS OUT IN PACKING GLAND

ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
8	A/R	A0940021	DC111 LUBE	
7	1	B1060057	BONNET BEARING	FIBER REINFORCED POLYETHERETHERKETONE
6	1	C1180670-01	BONNET	BRASS
5	1	B1700056	PACKING CARTRIDGE	GRAPHITE
4	1	B1640034-01	YOKE LOCKNUT	STEEL PLATED
3	1	B1060056	RETAINER BEARING	FIBER REINFORCED POLYETHERETHERKETONE
2	1	C1720061-03	PACKING RETAINER	BRASS
1	1	AS REQD	VALVE STEM	ST STL TYPE 316

MATERIAL	DRAWN	DATE	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010			
SEE TABLE	BLB	11/10/05				
	CHECKED		BONNET SUBASSY ADJUSTABLE GRAPHITE PACKING 1.376-18 2-18 W/ BEARINGS			
TREATMENT	APPROVED					
FINISH			SIZE C	FSCM NO 03847	DWG NO C3769952	REV A

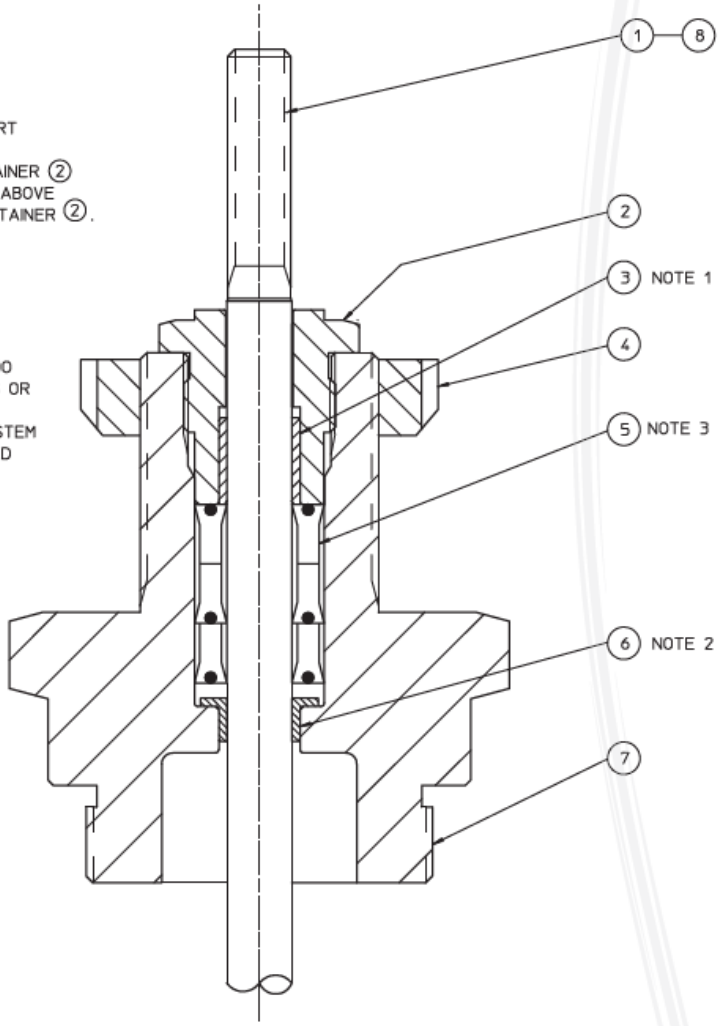
C3769956

NOTES:

1) RETAINER BEARING (3) IS NOT A SYMMETRICAL PART & SHOULD ONLY BE ASSEMBLED AS FOLLOWS. PRESS RETAINER BEARING (3) INTO PACKING RETAINER (2) UNTIL THE END WITH THE CHAMFER ON THE ID IS ABOVE OR FLUSH WITH THE BOTTOM OF THE PACKING RETAINER (2).

2) PRESS BONNET BEARING (6) INTO BONNET (7), ORIENTED AS SHOWN, UNTIL IT BOTTOMS OUT IN PACKING GLAND.

3) PROTECT ID & OD SEALING LIPS OF PACKING FROM CUTS, NICKS OR SCRAPES DURING INSTALLATION. DO NOT FORCE SEALING LIPS PAST BONNET THREADS OR STEM THREADS. USE OF INSTALLATION SLEEVE IS RECOMMENDED. LUBRICATE PACKING ID & OD AND STEM BEFORE INSTALLATION. PACKING MUST BE ORIENTED AS SHOWN.

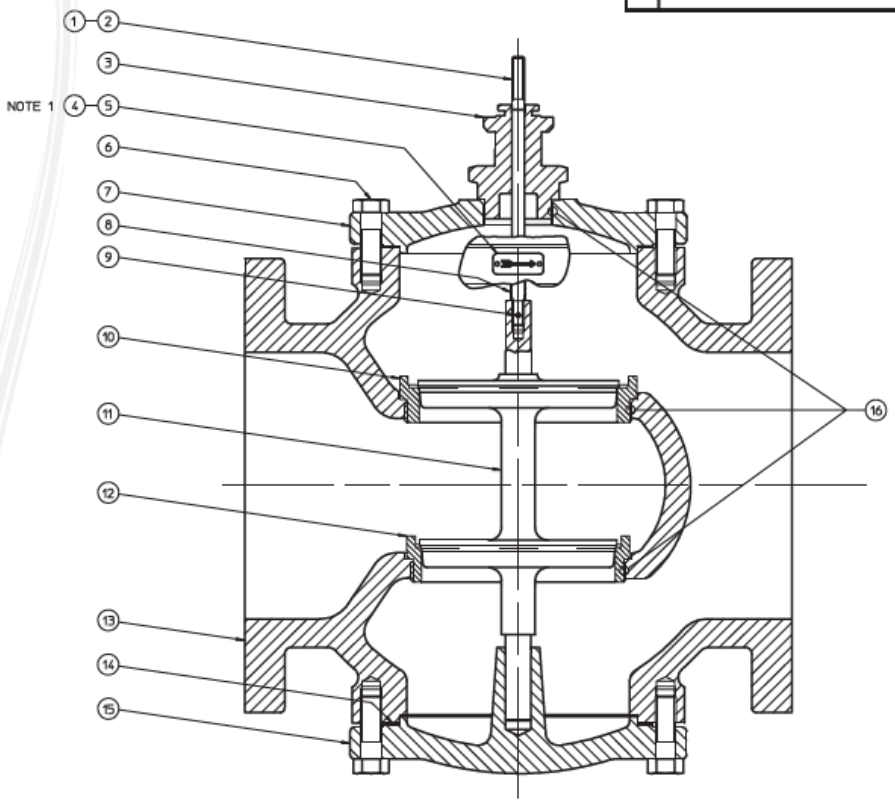


ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
8	A/R	A0940021	DC111 LUBE	
7	1	C1180670-01	BONNET	BRASS ASTM B16 H02
6	1	B1060057	BONNET BEARING	FIBER REINFORCED POLYETHERETHERKETONE
5	3	4207-18700375-312	LIP PACKING	HIGH TEMP ETHYLENE PROPYLENE 90 DURO
4	1	B1640034-01	YOKE LOCKNUT	STL PLTD
3	1	B1060056	RETAINER BEARING	FIBER REINFORCED POLYETHERETHERKETONE
2	1	C1720061-03	PACKING RETAINER	BRASS ASTM B16
1	1	AS REQD	VALVE STEM	ST STL TYPE 316

MATERIAL: SEE TABLE	DRAWN: BLB	DATE: 11/10/05	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010
TREATMENT	CHECKED		BONNET SUBASSEMBLY NLP PACKING 400°F EPDM 1.376-18 2-18 W/ BEARINGS
FINISH	APPROVED		SIZE: C · FSCM NO: 03847 · DWG NO: C3769956 · REV: A

D3201752

REV	DESCRIPTION	DATE
A	ECN 1427	JM 1-22-97

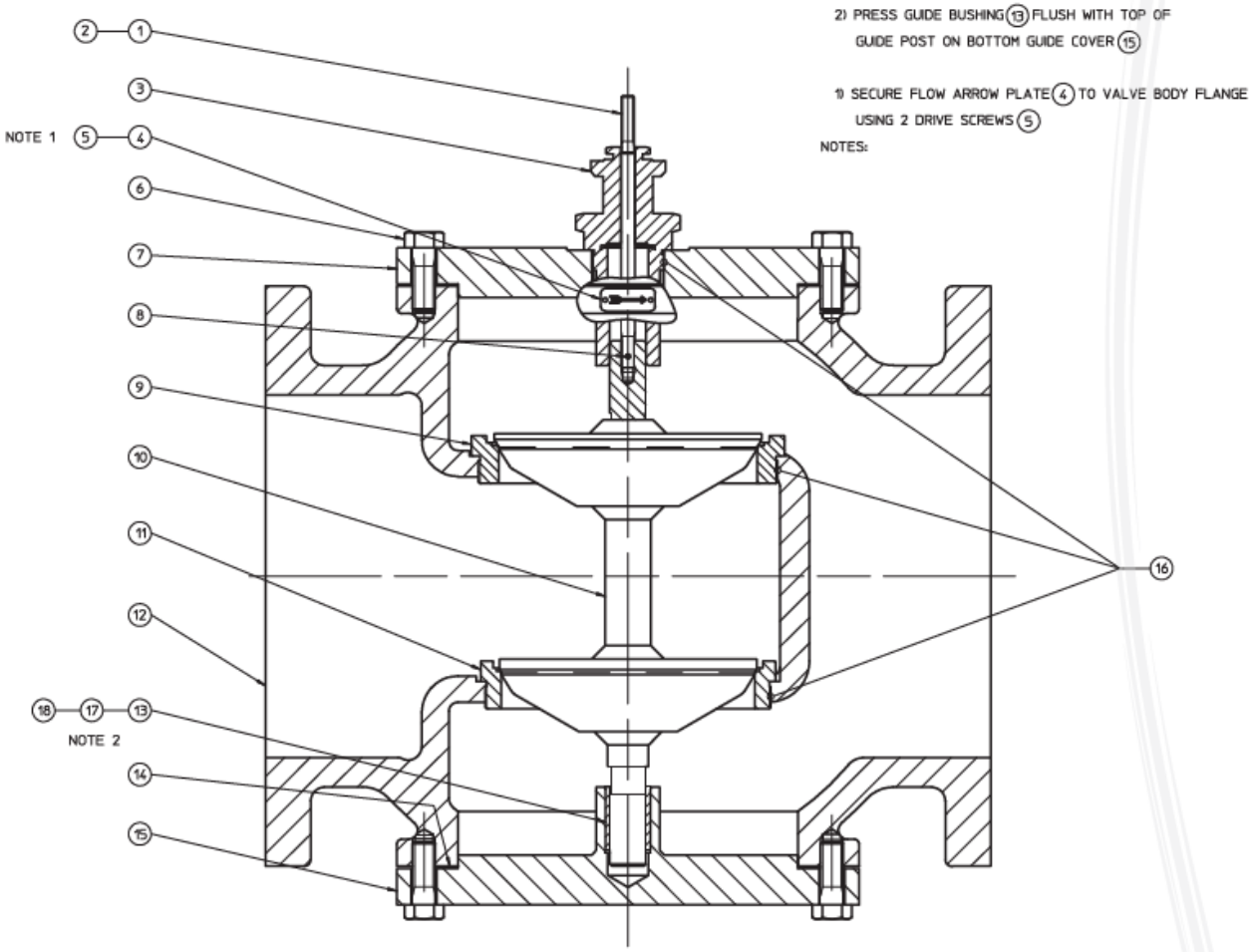


16	A/R	PERMATEX #2
15	1	BOTTOM GUIDE COVER
14	2	GASKET
13	1	VALVE BODY
12	1	LOWER SEAT RING
11	1	PLUG
10	1	UPPER SEAT RING
9	1	GROOVE PIN
8	1	TRAVEL STOP
7	1	TOP COVER
6	A/R	HEX HEAD CAPSCREW
5	2	DRIVE SCREW NO 4 X 1/4
4	1	FLOW ARROW PLATE
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM
ITEM	QTY	DESCRIPTION

NOTES:
1) SECURE FLOW ARROW PLATE (4) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (5)

DRAWN J.MARTOCCI	DATE 11/5/96	WARREN CONTROLS CORPORATION BROADWAY, NEW JERSEY 08808		
CHECKED				
APPROVED		5 & 6 INCH TYPE 22 VBA		
	SIZE D	PACK NO 03847	DWG NO D3201752	REV A

D3201950

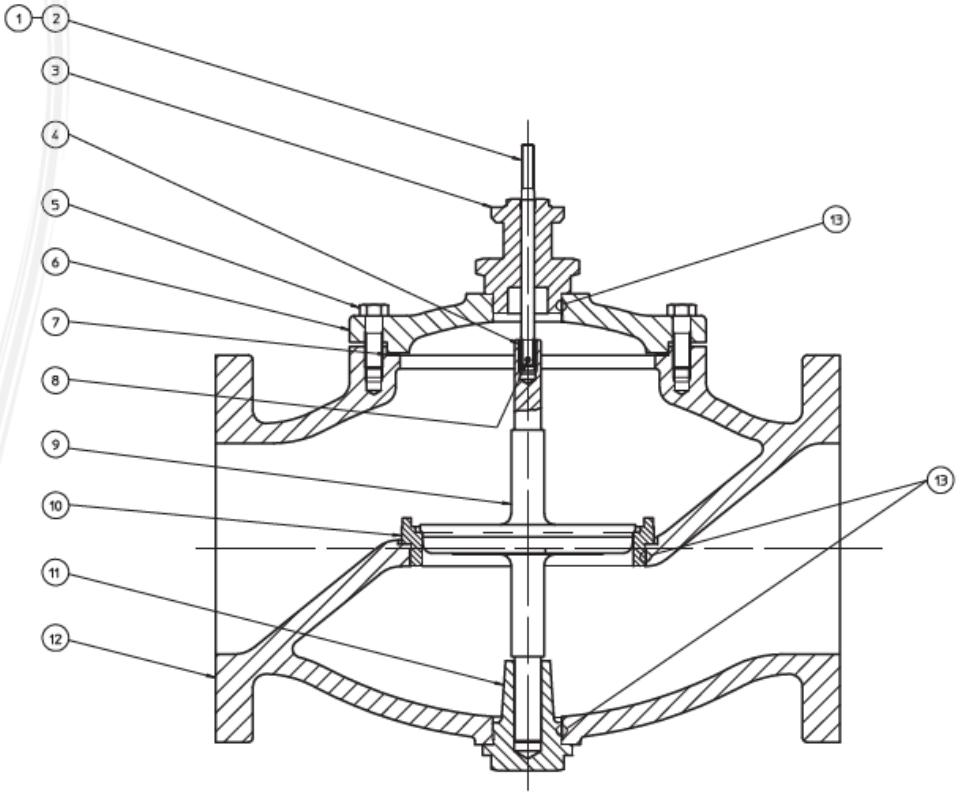


ITEM	QTY	DESCRIPTION
18	A/R	LOCTITE PRIMER T
17	A/R	LOCTITE 272
16	A/R	PERMATEX #2
15	1	BOTTOM GUIDE COVER
14	2	GASKET
13	1	GUIDE BUSHING
12	1	VALVE BODY
11	1	LOWER SEAT RING
10	1	PLUG
9	1	UPPER SEAT RING
8	1	GROOVE PIN
7	1	TOP COVER
6	A/R	HEX HEAD CAPSCREW
5	2	DRIVE SCREW NO 4 x 1/4
4	1	FLOW ARROW PLATE
3	1	BONNET SUBASSEMBLY SEE SEPARATE DRAWING
2	A/R	STEM LUBE
1	1	VALVE STEM

DRAWN BLB	DATE 1/23/97	WARREN CONTROLS CORPORATION BROADWAY, NEW JERSEY 08808	
CHECKED		VALVE BODY ASSEMBLY 8 & 10 INCH TYPE 22	
APPROVED			
		SIZE D	PATCH NO 03847
		DWG NO D3201950	REV

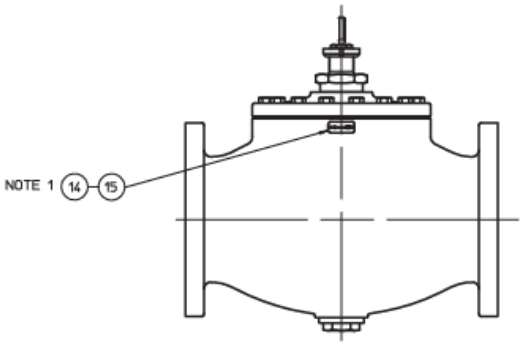
D3241554

REV	DESCRIPTION	DATE
A	REDRAWN WITH CHANGE ECN 2284	BLB 7/2/07



NOTES:

1) SECURE FLOW ARROW PLATE (ITEM 14) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (ITEM 15).

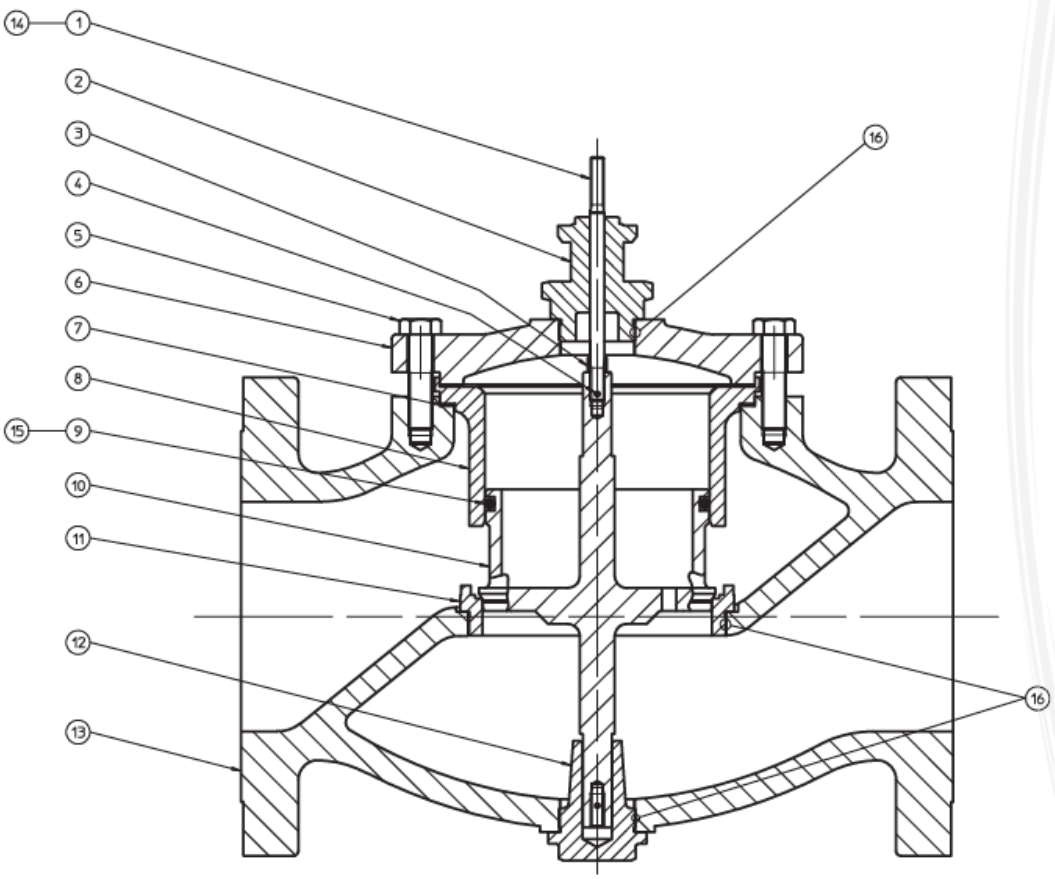


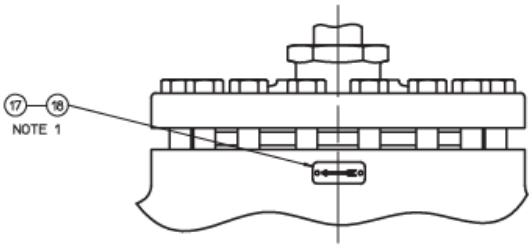
ITEM	QTY	DESCRIPTION
15	2	DRIVE SCREW NO 4 x 1/4
14	1	FLOW ARROW PLATE
13	A/R	THD SEALANT
12	1	VALVE BODY
11	1	BOTTOM GUIDE PLUG
10	1	SEAT RING
9	1	PLUG
8	1	GROOVE PIN
7	1	GASKET
6	1	TOP COVER
5	A/R	HEX HEAD CAPSCREW
4	A/R	THREAD INSERT
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

DRAWN	DATE	WARREN CONTROLS INCORPORATED
BLB	7/2/07	BETHLEHEM, PENNSYLVANIA 18020-8010
CHECKED		5 & 6 INCH TYPE 20 VALVE BODY ASSEMBLY
APPROVED		

SIZE	PROD NO	DWG NO	REV
D	03847	D3241554	A

D3241556





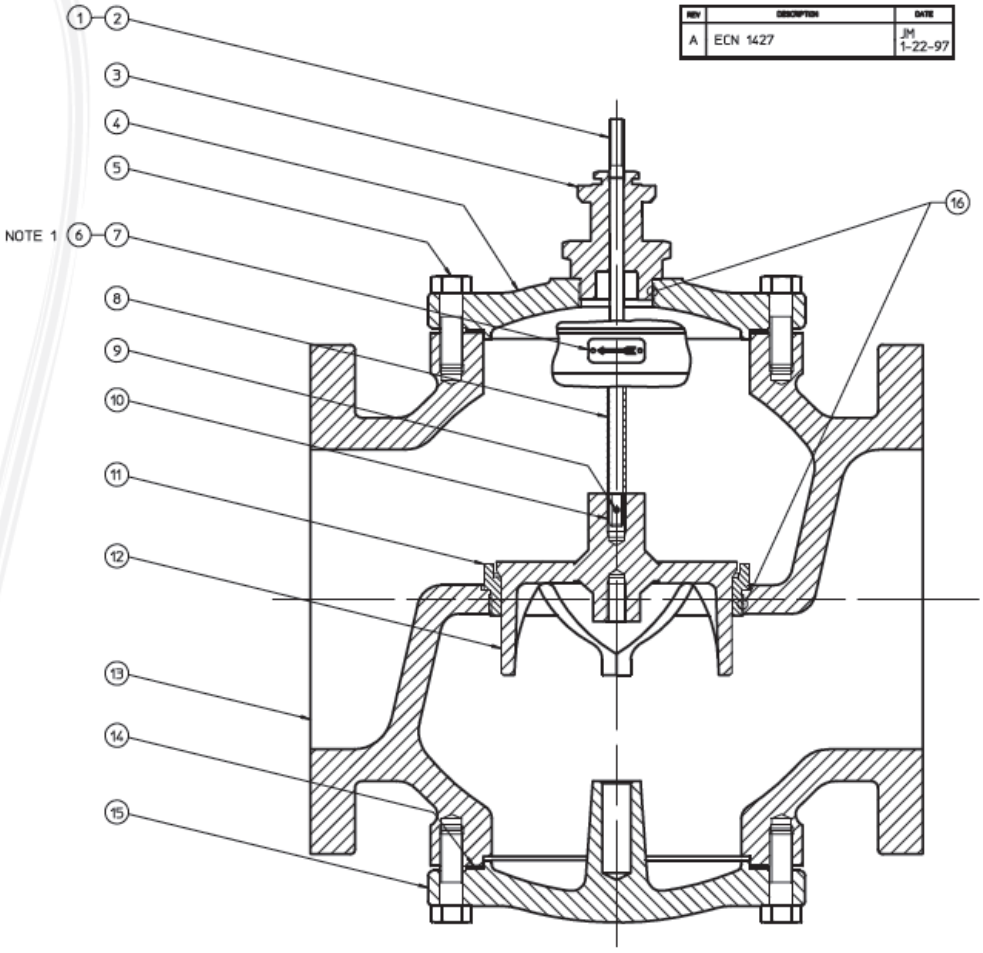
NOTES:
1) SECURE FLOW ARROW PLATE (17) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (18).

ITEM	QTY	DESCRIPTION
18	2	DRIVE SCREW #4 x 1/4
17	1	FLOW ARROW PLATE
16	A/R	PERMATEX #2
15	A/R	O-RING LUBE
14	A/R	STEM LUBE
13	1	VALVE BODY
12	1	BOTTOM GUIDE PLUG
11	1	SEAT RING
10	1	PLUG
9	1	O-RING
8	1	PISTON CHAMBER
7	2	GASKET
6	1	TOP COVER
5	A/R	HEX HD CAPSCREW
4	1	GROOVE PIN
3	1	TRAVEL STOP
2	1	BONNET SUBASSEMBLY SEE SEPARATE DRAWING
1	1	VALVE STEM

DRAWN: BLB	DATE: 6/20/03	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010
CHECKED:		5 - 6 INCH TYPE 23 VALVE BODY ASSEMBLY
APPROVED:		SIZE: D · PROD NO: 03847 · DWG NO: D3241556 · REV:

D3241750

REV	DESCRIPTION	DATE
A	ECN 1427	JM 1-22-97



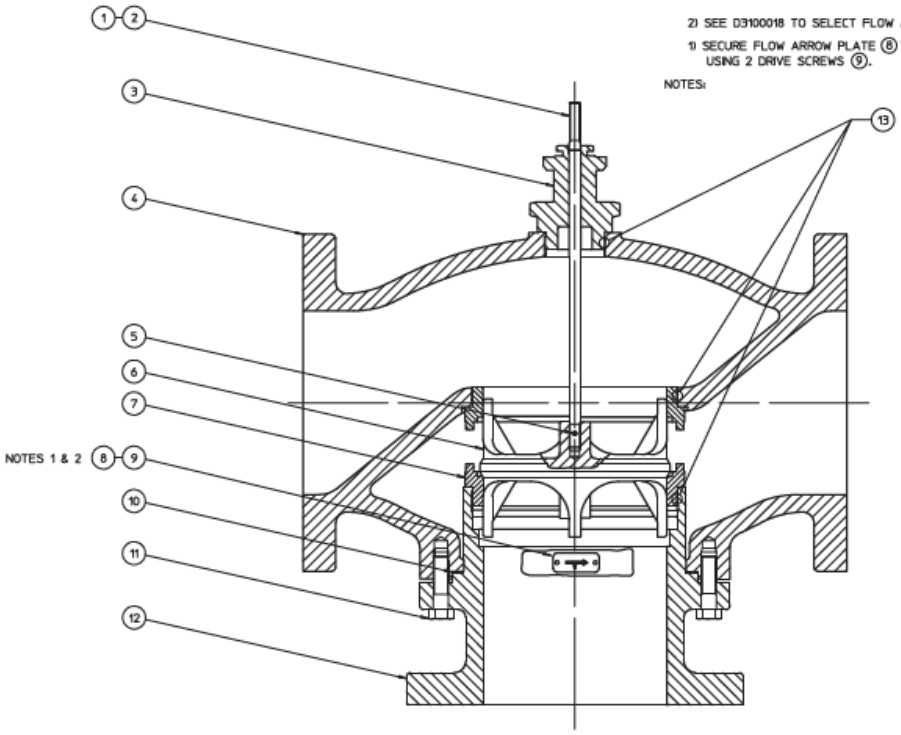
ITEM	QTY	DESCRIPTION
16	A/R	PERMATEX #2
15	1	BOTTOM GUIDE COVER
14	2	GASKET
13	1	VALVE BODY
12	1	PLUG
11	1	SEAT RING
10	A/R	THREAD INSERT
9	1	GROOVE PIN 1/8 DIA x 1
8	1	TRAVEL STOP
7	2	DRIVE SCREW NO 4 x 1/4
6	1	FLOW ARROW PLATE
5	32	HEX HEAD CAPSCREW 5/8-11 x 2
4	1	TOP COVER
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

NOTES:

1) SECURE FLOW ARROW PLATE (6) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (7)

DRAWN	DATE	WARREN CONTROLS CORPORATION BROADWAY, NEW JERSEY 08808			
J.MARTOCCI	11/1/96				
CHECKED		8 & 10 INCH TYPE 20 VBA			
APPROVED					
		SIZE D	PATCH NO 03847	DWG NO D3241750	REV A

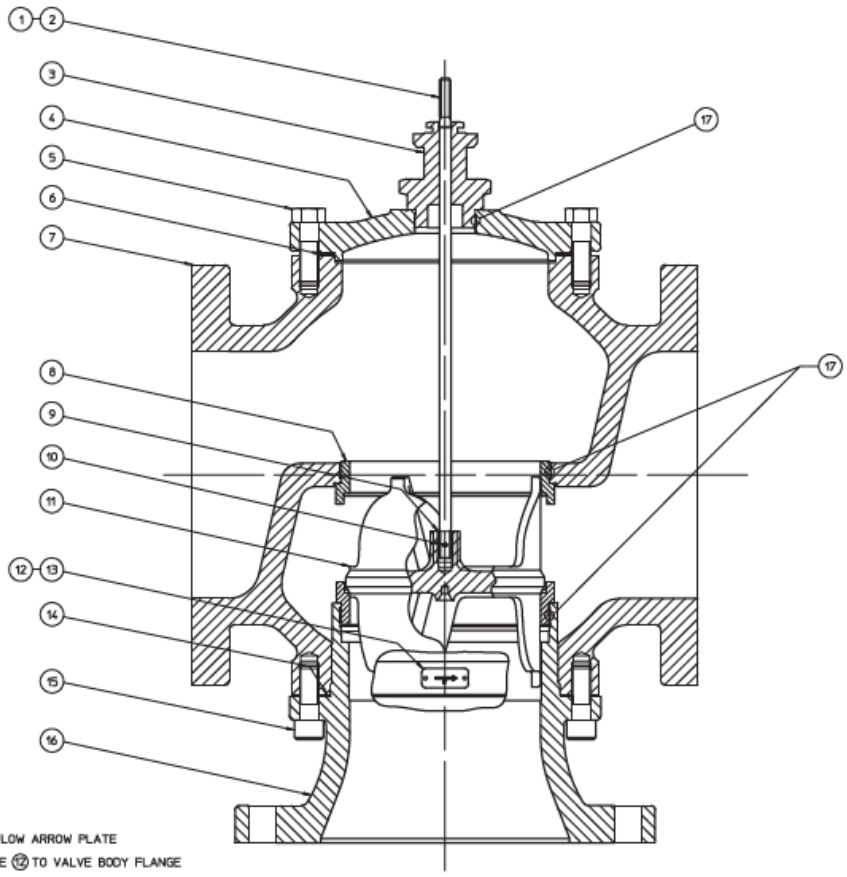
D3261551



ITEM	QTY	DESCRIPTION
13	A/R	THREAD SEALANT
12	1	BOTTOM PORT
11	A/R	HEX HEAD CAPSCREW
10	1	GASKET
9	2	DRIVE SCREW NO 4 x 1/4
8	1	FLOW ARROW PLATE
7	2	SEAT RING
6	1	PLUG
5	1	GROOVE PIN
4	1	VALVE BODY
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

DRAWN JMARTOCCI	DATE 11/1/96	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010	
CHECKED		5 & 6 INCH TYPE 30 VBA	
APPROVED			
	SIZE D	PROD NO 03847	DWG NO D3261551 REV A

D3261751

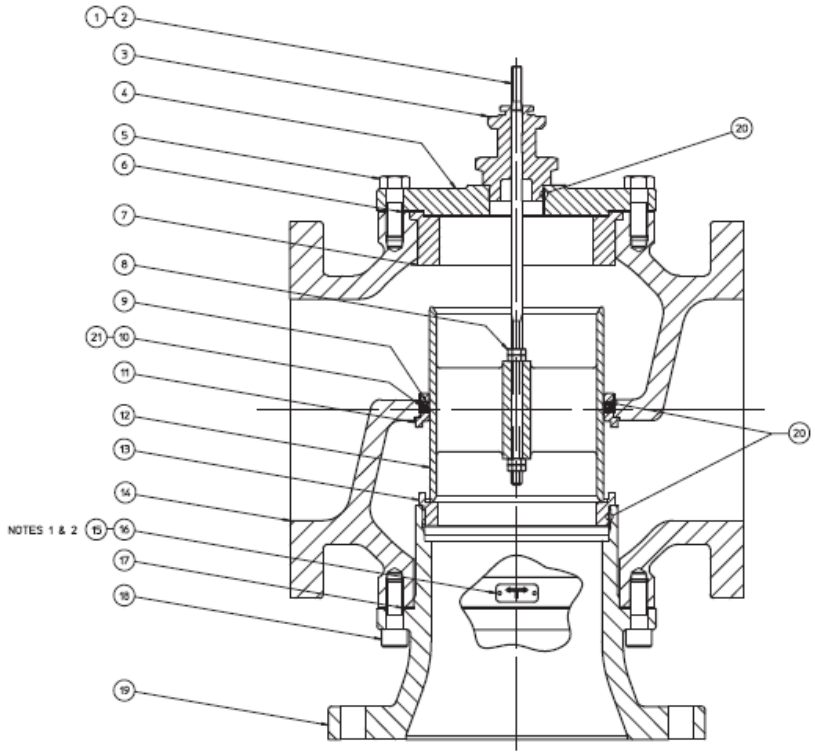


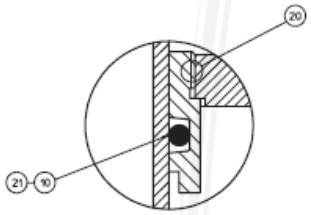
NOTES:
1) SECURE FLOW ARROW PLATE (12) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (13)
2) SEE D3100018 TO SELECT FLOW ARROW PLATE

ITEM	QTY	DESCRIPTION
17	A/R	PERMATEX #2
16	1	BOTTOM PORT
15	16	SOCKET HEAD CAPSCREW 5/8-11 x 1 3/4
14	1	GASKET BOTTOM PORT
13	2	DRIVE SCREW NO 4 x 1/4
12	1	FLOW ARROW PLATE
11	1	PLUG
10	1	GROOVE PIN 1/8 DIA x 1
9	A/R	THREAD INSERT
8	2	SEAT RING
7	1	VALVE BODY
6	1	GASKET TOP COVER
5	16	HEX HEAD CAPSCREW 5/8-11 x 2
4	1	TOP COVER
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

J.MARTOCCI	11/7/96	WARREN CONTROLS CORPORATION BROADWAY, NEW JERSEY 08808
		8 INCH TYPE 30 VBA
	SIZE D	PROD NO 03847 — DWG NO D3261751 — REV

D3261752





2 1/2-5 INCH
PISTON SEAL

2 1/2-6 INCH
BOTTOM PORT
BOLTING

NOTES:
1) SECURE FLOW ARROW PLATE (15) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (16)
2) SEE D3100018 TO SELECT FLOW ARROW PLATE

ITEM	QTY	DESCRIPTION
21	A/R	O-RING LUBE
20	A/R	PERMATEX #2
19	1	BOTTOM PORT
18	A/R	SOCKET HEAD CAPSCREW
17	1	BOTTOM PORT GASKET
16	2	DRIVE SCREW NO 4 x 1/4
15	1	FLOW ARROW PLATE
14	1	VALVE BODY
13	1	SEAT RING
12	1	PISTON
11	1	PISTON GUIDE
10	1	O-RING
9	1	PISTON SEAL
8	4	JAMNUT 3/8-24
7	1	PISTON CHAMBER
6	1	TOP COVER GASKET
5	A/R	HEX HEAD CAPSCREW
4	1	TOP COVER
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

J.MARTOCCI	11/8/96	WARREN CONTROLS CORPORATION BROADWAY, NEW JERSEY 08808
		2 1/2-8 INCH TYPE 32 VBA
	SIZE D	PATCH NO 03847 — DWG NO D3261752 — REV

WARREN CONTROLS INC.
A VETERAN OWNED, PRIVATELY HELD, SMALL BUSINESS
WARREN CONTROLS INC.

WARREN CONTROLS

2600 EMRICK BLVD • BETHLEHEM, PA 18020 • USA
800-922-0085 • WWW.WARRENCONTROLS.COM

Spence T-61 Temperature Controller

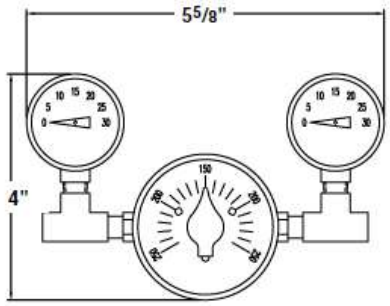
SPENCE
A division of CIRCOR International, Inc.

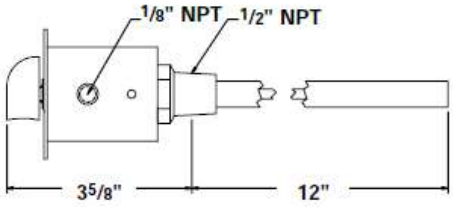
Technical Data

SD 4522C

SPENCE ENGINEERING COMPANY, INC. 150 COLDENHAM ROAD, WALDEN, NY 12586-2035

SD 4522C/0205





TYPE T61, T62 & T63 PILOT

Air Master TYPE T61, T62 & T63 PNEUMATIC TEMPERATURE CONTROLLER

The T61 Series Temperature Regulator is ideal for wide ranging, fast changing loads on instantaneous heaters and other difficult process applications. The cascade principle, normally used only on instrument type regulators, is the basis for this inexpensive design. The T61, when used with a properly selected A Series Pilot or Control Valve, continuously adjusts a pressure regulator to the required heater pressure. This action, coupled with the fast response of a bimetallic thermostat, gives exceptional results. Added convenience and economy results from the wide (200°F) adjustable range and the low air consumption (.35 cfm). These controllers have adjustable proportional band as well as overtemperature protection.

SPECIFICATIONS

Max. Air Supply Pressure	32 psi
Max. Signal Pressure	2 psi below Supply
Mounting	1/2" NPT
Air Connections	1/8" NPT
Air Consumption, Maximum	0.70 SCFM
Air Consumption, Normal	0.35 SCFM
Proportional Band (Adjustable)	1/4 to 2 psi per 1°F
Weight	2 3/4 lb.

TEMPERATURE RANGES

T61 & T62	50° to 250°F
T63	150° to 300°F

PRINTED IN U.S.A.

OPERATING PRINCIPLE

When used with Regulator

The regulator is operated by it's initial steam pressure. It is normally closed, being held so by initial pressure on the disc and by an internal main spring. The pressure pilot is actuated by means of an air signal applied to it's diaphragm. This signal is received from the temperature pilot as a result of the temperature bulb sensing a drop in temperature from the control setting.

When steam is turned on, it flows through the pressure pilot (Fig. 2) to the No 8B tee. Bleedport No. 4A restricts the flow, builds pressure under the diaphragm and opens the main valve. Restriction No. 5A steadies the operation of the regulator.

Steam flowing to the heater develops a rising delivery pressure which feeds back through the control pipe to the pressure pilot diaphragm. As this pressure approached a balance with the air pressure signal supplied by the temperature pilot , the pressure pilot throttles. This, in turn, allows the main valve to assume a position to maintain the set temperature.

As the temperature at the outlet of the heater increases, it causes the T61 Pilot to reduce the loading air pressure and this, in turn, will cause the pressure regulator to modulate the steam flow to the heater.

When used with Pneumatic Control Valve

The T61 Series Pilot will send a proportional air signal from 0 psi to a maximum of 30 psi (not greater than 2 psi less than the supplied pressure) within a ???? degree span. The Pilot will increase signal as the temperature falls, which will either open or close the control valve, depending upon actuator configuration.

Installation

INSTALLATION

PLANNING

Locate the regulator in a horizontal pipe. Prevent water hammer and erratic operation by providing a trap ahead of the regulator. Avoid damaging effects of scale and dirt in pipelines by using a strainer to protect the regulator. Provide a three valve bypass to facilitate inspection of the regulator without interrupting service.

MAIN VALVE

Flush the main piping system thoroughly to clear it of welding beads, scale, sand, etc. Mount main valve with diaphragm chamber down and arrow on body pointing in the direction of flow. Screwed end valve should be mounted in unions.

PILOT

Mount the pilot with the bulb projecting entirely into the liquid or air being controlled. If the body is not in a horizontal position with air gages on top, the set screw (5) on bottom of body nearest the bulb may be loosened and body rotated to horizontal position. Retighten the set screw.

Connect a reliable source of clean compressed air (not to exceed 32 psi) to the inlet of the pilot. The supply air should be set at 2 psi above the maximum desired air signal. If air is available at a higher pressure, install a pressure reducing valve. CAUTION: Be sure to blow out all lines before making final connections.

Connect pilot outlet to 1/4" tap on top of pressure pilot.

START-UP AND SETTING

With supply air shut off, set temperature adjusting knob at the lowest temperature setting. Turn on supply air. The supply air should be set at 2 psi above the maximum desired air signal. If air is available at a higher pressure, install a pressure reducing valve. No more than 1 to 2 pounds should show on the control air gage (supplied with the T61 Pilot).

Gradually turn up temperature adjusting knob until rising loading air pressure causes regulator to open. Continue raising temperature setting in this fashion until desired control temperature is reached.

The T61 Pilot is factory set so that 5 degrees variation above and below the controlled temperature will cause the loading air pressure to vary approximately 8 pounds. The factory setting will usually produce satisfactory control.

If closer control is desired, the sensitivity of the T61 Pilot can be increased by turning the sensitivity screw (7) clockwise. This will cause the control temperatures to move to a position below the set point. This effect must then be corrected by readjusting the temperature adjusting knob (4).

Make these adjustments slowly, turning the sensitivity screw no more than 1/8 turn and allow two or three minutes after each adjustment for the system to settle out. Practical range of adjustment of the sensitivity screw is 1/2 turn from the factory setting.

After final setting is reached, it may be necessary to release the set screw in the temperature adjusting knob and reposition it so that the indicator is aligned with the temperature being controlled. At this point, the set screw is retightened.

If a hunt develops (a steadily swinging temperature) when the sensitivity is increased, the temperature pilot is being called on to function at a setting finer than the installation will permit. At this point, factors such as thermostat location, trapping and valve size should be reexamined.

If the regulator swings immediately on startup and does not settle out and decreasing the sensitivity by turning the sensitivity screw (7) counterclockwise cannot be tolerated, the installation as a whole should be restudied.

RECOMMENDED INSTALLATION

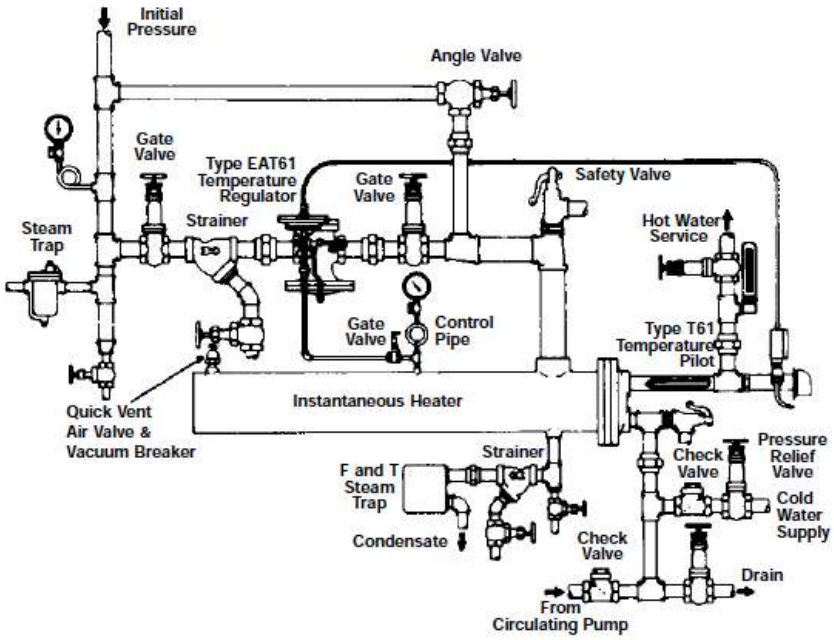


FIGURE 1

Troubleshooting

TROUBLE SHOOTING

FAILURE TO OPEN

1. Check supply gage to be sure it shows 2 psi higher than the required signal pressure.
2. Turn adjusting knob to top of temperature range. Pressure should go to within 2 or 3 pounds of supply pressure. If not, check for dirt in sensitivity screw and ball seating surface.

FAILURE TO CLOSE OR OVERRIDING DELIVERY PRESSURE

1. Adjusting knob may have been tampered with.
2. If air pressure will not bleed down when adjusting knob is turned to bottom of range, it is likely that vent is plugged. Sensitivity screw (7) improperly adjusted (open too wide).

ERRATIC CONTROL

1. Hunting
2. Gradual wandering over too wide a spread.
3. Fast over and under rides are the result of fast load changes, usually accentuated by the thermostat being located at a point where it cannot immediately sense a change in conditions.

INSTALLATION FAULTS

1. Poor circulation through heater. Constant circulation should be employed.
2. Traps on the return may be discharging erratically or may be improperly installed.
3. Sticky check valve.
4. High lift to condensate hot well. Gravity drainage from heater should be arranged or return pump installed.

DISMANTLING

1. Remove sensitivity screw (7) and clean.
2. Unlock knob set screw. Loosen and move adjusting knob (4) out to clear stop on dial plate and lock to shaft. Unscrew spool (3) from body by rotating adjusting knob counterclockwise.

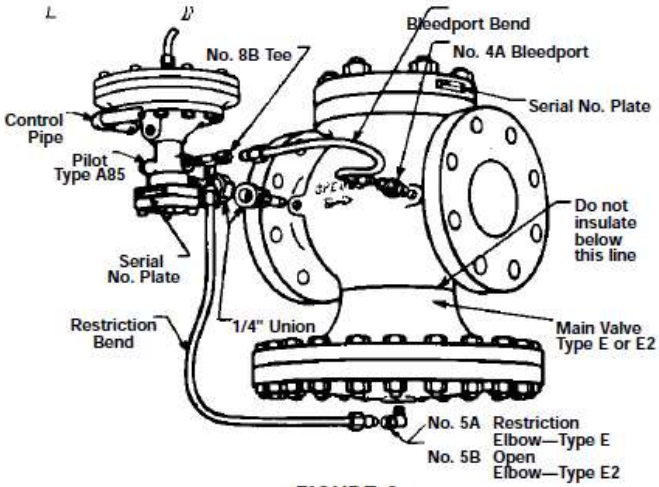


FIGURE 2

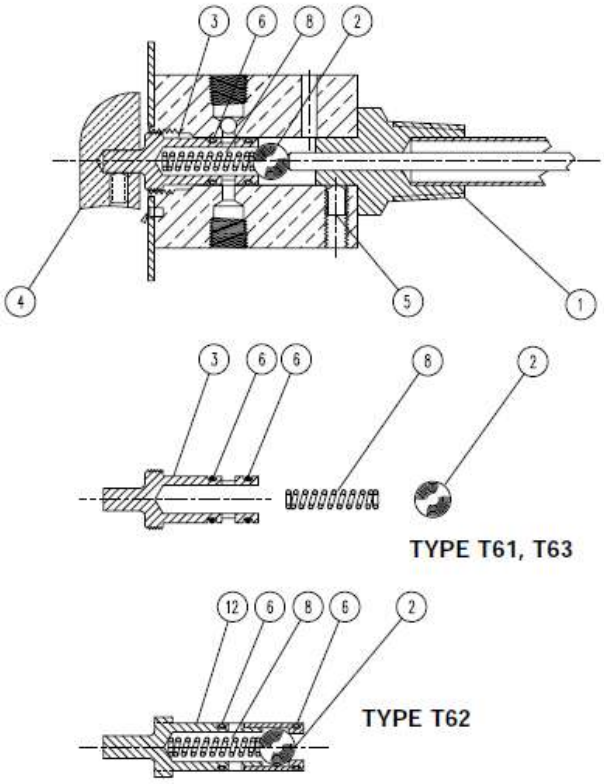


FIGURE 3

3. Care should be taken not to damage O-rings (6). Examine for nicks and other defects.
4. Examine spool (3) and ball (2) for defects.
5. Clean spool and ball with air pressure.
6. Reassemble.

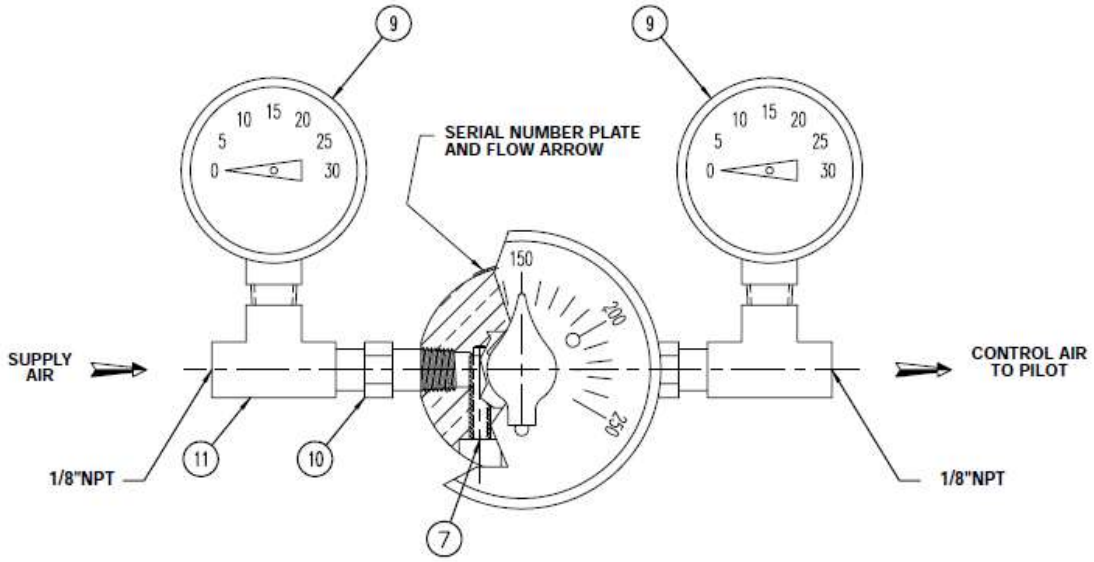
TESTING & CALIBRATING

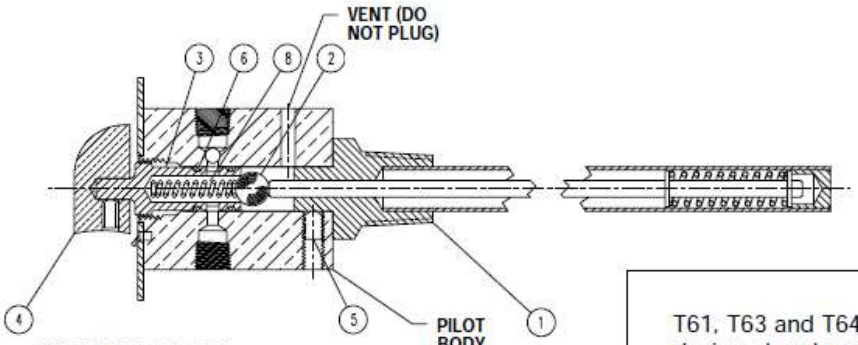
Reverse or Direct Acting

1. Plug the pilot control air port and apply supply pressure 2 psi above the control range to the supply air port.
2. Open the sensitivity screw (7) one turn while establishing a steady system temperature.

Reverse Acting (T61 & T63) Pilots Only
(Control pressure decreases with increasing temperature)

1. Turn the spool (3) clockwise to the point where the invar rod, ball and seat are in contact. The control gauge should show pressure near the top of the control range.
2. Turn the spool counter-clockwise until the control pressure is at the middle of the range.
3. Continue to turn the spool counter-clockwise until the low end of the range is reached. Adjust the sensitivity screw as required so this occurs within a 5° change on the dial. The control pressure should vary from the minimum to the maximum (15 or 30 psi) with a 10° change of the dial setting. When used with an A-pilot the minimum is 3 psi, when used with a control valve the minimum is the lower end of the bench range.





TYPE T61 PILOT
REVERSE ACTING

T61, T63 and T64 Pilots are designed and manufactured in accordance with Aritcle 3, Section 3 of the Pressure Equipment Directive 97/23/EC.

ITEM NO.	PART NAME	MATERIAL	PART NO.
1	Bulb Assy. 50-250 (T61,T62 except SS)	Bronze	07-40190-03
	Bulb Assy. 150-350 (T63 & T61,T62 SS only)	St. Steel	07-40191-03
2	*Ball	St. Steel	05-07709-00
3	*Spool Reverse Acting - T61 & T63	Brass	04-07741-00
4	Adjusting Knob	Plastic	05-07927-00
5	Body Set Screw	Steel	05-11134-00
6	*Spool Sealing Rings	Viton	05-04004-00
7	*Sensitivity Screw	Steel	05-07930-0
8	*Valve Spring	St. Steel	05-05175-00
9	Pressure Gauge		05-17460-00
10	1/8 Nipple	Brass	05-17459-00
11	1/8 Tee	Brass	05-17458-00
12	Spool Direct Acting Assy. - T62	Brass	07-43770-00
	Repair Kit - T61, T63, T64 (Reverse Acting)		08-11507-01

*These parts furnished in Repair Kit

T61–Reverse Acting
T62–Direct Acting
T63–High Temperature Reverse Acting
Reverse Acting–Air control signal decreases as process temperature increases.
Direct Acting–Air control signal increases as process temperature increases.

When ordering parts, it is essential that the pilot type, service and serial number be stated.

Select part by item number, but order by part number. Specify complete part number when ordering.

NOTES: