

May 2024

Spence Type D50A Pressure Regulator



WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire and/or chemical contamination causing property damage and personal injury or death.

Emerson Pressure Regulator must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations and Emerson Process Management Regulator Technologies, Inc. (Emerson) instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Only a qualified person shall install or service the Type D50A pressure regulator.



WARNING

CALIFORNIA PROPOSITION 65

This product can expose you to chemicals including lead, nickel and cobalt, which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.



Figure 1. Type D50A Pressure Regulator

Introduction

Scope of the Manual

This manual provides instructions for the installation, maintenance and parts ordering for Type D50A pressure regulator.

Product Description

The Type D50A pressure reducing regulator automatically reduces a high inlet pressure to a lower delivery pressure and maintains the lower pressure within reasonably close limits regardless of the pressure fluctuations on the inlet side of the regulator.



Type D50A

Specifications

The specifications section on this page provide the ratings and other specifications for the Type D50A.

Body Sizes and End Connection

1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2 and 2 NPTF

Maximum Inlet Pressure⁽¹⁾

Air or water: 200 psi / 13.8 bar

Steam: 150 psi / 10.3 bar

Maximum Outlet Pressure⁽¹⁾

Air or water: 150 psi / 10.3 bar

Steam: 125 psi / 8.62 bar

Maximum Operating Temperature⁽¹⁾

Air or water: 180°F / 82°C

Steam: 400°F / 204°C

Outlet Pressure Range⁽¹⁾

See Table 1

Materials of Construction

Body: Iron

Spring: Steel

Bottom Plug: Brass

Seat Disk

Air or Water: Nitrile (NBR)

Steam: Polytetrafluoroethylene (PTFE)

Diaphragm

Air or Water: Nitrile (NBR)

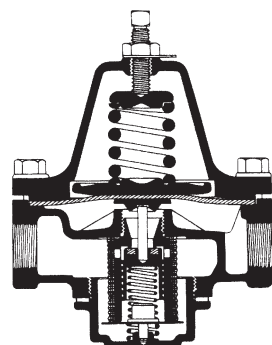
Steam: Bronze

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

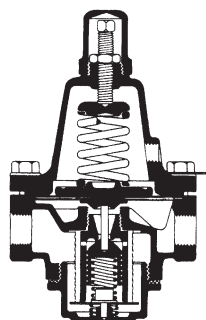
Table 1. Outlet Pressure Range

BODY SIZE, NPT	SPRING RANGE			
	Air or Water		Steam	
	psi	bar	psi	bar
1/4	2 to 25	0.14 to 1.72	2 to 25	0.14 to 1.72
	20 to 60	1.38 to 4.14	20 to 60	1.38 to 4.14
	30 to 100	2.07 to 6.90	30 to 100	2.07 to 6.90
	50 to 150	3.45 to 10.3	50 to 125	3.45 to 8.62
3/8	2 to 30	0.14 to 2.07	2 to 30	0.14 to 2.07
	20 to 70	1.38 to 4.83	20 to 70	1.38 to 4.83
	40 to 110	2.76 to 7.58	40 to 110	2.76 to 7.58
	90 to 150	6.21 to 10.3	90 to 125	6.21 to 8.62
1/2	2 to 30	0.14 to 2.07	2 to 30	0.14 to 2.07
	10 to 50	0.69 to 3.45	10 to 50	0.69 to 3.45
	30 to 125	2.07 to 8.62	30 to 125	2.07 to 8.62
	50 to 150	3.45 to 10.3	50 to 125	3.45 to 8.62
3/4	2 to 20	0.14 to 1.38	2 to 20	0.14 to 1.38
	10 to 35	0.69 to 2.41	10 to 35	0.69 to 2.41
	30 to 75	2.07 to 5.17	30 to 75	2.07 to 5.17
	50 to 110	3.45 to 7.58	50 to 110	3.45 to 7.58
	105 to 150	7.24 to 10.3	105 to 125	7.24 to 8.62
1	2 to 20	0.14 to 1.38	2 to 20	0.14 to 1.38
	10 to 45	0.69 to 3.10	10 to 45	0.69 to 3.10
	20 to 60	1.38 to 4.14	20 to 60	1.38 to 4.14
	55 to 100	3.79 to 6.90	55 to 100	3.79 to 6.90
1-1/4 and 1-1/2	2 to 15	0.14 to 1.03	2 to 15	0.14 to 1.03
	10 to 30	0.69 to 2.07	10 to 30	0.69 to 2.07
	20 to 50	1.38 to 3.45	20 to 50	1.38 to 3.45
	45 to 100	3.10 to 6.90	45 to 100	3.10 to 6.90
	90 to 150	6.21 to 10.3	90 to 125	6.21 to 8.62
2	2 to 20	0.14 to 1.38	2 to 20	0.14 to 1.38
	10 to 60	1.69 to 4.14	10 to 60	1.69 to 4.14
	20 to 100	1.38 to 6.90	20 to 100	1.38 to 6.90
	90 to 150	6.21 to 10.3	90 to 125	6.21 to 8.62





AIR OR WATER SERVICE



STEAM SERVICE

Figure 2. Type D50A Schematic

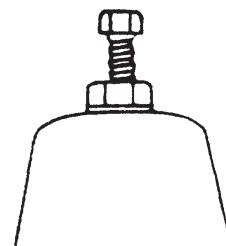
Air and Water Service

Type D50A regulators are available in 1/4 to 2 NPT sizes with iron bodies and feature a variety of optional internal trim (diaphragm, piston and cylinder) that enable them to be used in a wide range of applications.

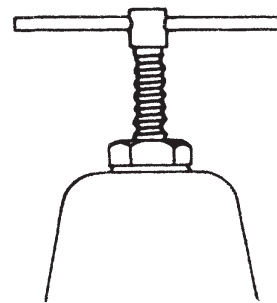
Each regulator is equipped with a pressure spring selected to provide the desired outlet or reduced delivery pressure setting. Depending on the adjusting spring installed, delivery pressures may be adjusted from a minimum of 2 psi / 0.14 bar to a maximum of 150 psi / 10.3 bar. The range of adjustment or satisfactory working range of the individual springs that may be fitted to each regulator size is listed in the spring range table. See Table 2.

The regulator is designed for systems with a maximum operating temperature of 180°F / 82°C. In addition to the standard specifications indicated in Table 1, any combination of body material, piston cylinder and diaphragm is available to special order.

The Type D50A air and water regulators are suitable for a variety of applications including paint spray equipment, dishwashers, air tanks and equipment, food, chemical and industrial process gases and many other applications.



STANDARD
ADJUSTING SCREW



T-HANDLE

Figure 3. Type D50A Adjusting Screw Options

Steam Service

These regulators are designed for steam operating temperatures up to 400°F / 204°C and are available in 1/4 to 2 NPT sizes with iron bodies. Iron body regulators have a PTFE seat and are for systems with initial pressures up to 150 psi / 10.3 bar.

Regulators will normally be equipped as indicated in the table but other combinations of body material, piston-cylinder and diaphragm are available to special order.

The Type D50A Steam Pressure Reducing and Regulating Regulator is ideally suited for installation in pressing irons, steam cookers, degreasers, sterilizers, vulcanizers and hundreds of other applications. Type D50A Steam Regulators can also be furnished with a differential pressure control feature which may be desirable in steam/oil atomizing service.

Type D50A

Table 2. Type D50A Torque Values

VALVE SIZE, NPT	TORQUE	
	BOTTOM PLUG	ASSEMBLY BOLT
1/4	80 to 90 ft-lbs / 108 to 122 N•m	70 to 100 in-lbs / 7.9 to 11.3 N•m
3/8		
1/2		150 to 200 in-lbs / 16.9 to 22.6 N•m
3/4		
1		225 to 275 in-lbs / 25.4 to 31.1 N•m
1-1/4		
1-1/2	27 to 31 ft-lbs / 36.6 to 42.0 N•m	325 to 375 in-lbs / 36.7 to 42.4 N•m
2		

Optional Differential Pressure Control

The Type D50A Steam Regulator can be factory modified to serve as a constant differential pressure control regulator by incorporating a 1/4 NPT side tap in the spring housing.

In a typical steam-oil atomizing installation, fluid loading pressure is introduced above the diaphragm of the regulator and steam is delivered through the regulator at a regulated pressure higher than the loading pressure, with the difference in pressure being determined by the diaphragm spring setting. The outlet steam pressure is maintained automatically to provide a constant, fixed pressure differential between the steam pressure and the oil pressure. Variations in the loading pressure are reflected in a pound-for-pound change in the discharge pressure.

Regulators equipped with the optional differential pressure control are fitted with a pressure-tight closing cap and gasket over the pressure adjusting screw and a gasket above the diaphragm to ensure a good seal between the spring housing and the regulator body.

Principle of Operation

When the fluid supply is cut in, the regulator is in wide open position. Fluid flowing to the system creates a rising delivery pressure which feeds back through the control ports to the underside of diaphragm. As the pressure on diaphragm approaches a balance with the force exerted by adjusting spring, disk is throttled to a position where just enough water flows to maintain the set delivery pressure.

Installation



WARNING

**Personal injury or system damage
may result if this pressure regulator**

is installed, without appropriate overpressure protection, where service conditions could exceed the limits given in the Specifications section and/or pressure regulator nameplate.

Additionally, physical damage to the pressure regulator may result in personal injury or property damage due to escaping of accumulated gas. To avoid such injury and damage, install the pressure regulator in a safe location.

All pressure equipment should be installed in a non-seismic area; should not be exposed to fire; and should be protected from thunderbolt (lightning) strikes.

1. Install a strainer upstream of the Type D50A. The built-in strainer screen is secondary protection only.
2. Install Type D50A regulator in a horizontal position with the spring chamber upright. For other installation requirements, consult the factory.
3. Before installing the regulator, thoroughly flush out the piping and the regulator to remove any foreign material.
4. Install the regulator with the inlet pipe fitted to the inlet connection identified on the regulator body. Use a good pipe joint compound on the male pipe threads and do not over tighten the regulator connections.

Adjusting the Delivery Pressure

1. Loosen the adjusting screw lock nut (key 3).
2. Adjust the regulator's delivery pressure setting by turning the adjusting screw (key 2) or optional T-handle (key 1) at the top of the spring chamber (key 5).
3. To increase the delivery pressure, turn the adjusting screw clockwise (into the spring chamber). To decrease the delivery pressure, turn the adjusting screw counter-clockwise (out of the spring chamber).
4. Tighten the adjusting screw lock nut after the adjustment has been made.
5. Draw flow through the regulator and shutoff, after adjustment, to check for proper set pressure.

Maintenance



WARNING

To avoid personal injury, property damage or equipment damage caused by sudden release of pressure or explosion of accumulated gas, do not attempt any maintenance or disassembly without first isolating the pressure regulator from system pressure and relieving all internal pressure from the pressure regulator.

Pressure regulator that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Emerson should be used for repairing this pressure regulator.

Due to normal wear or damage that may occur from external sources, this pressure regulator should be inspected and maintained periodically. The frequency of inspection and replacement of parts depends upon the severity of service conditions or the requirement of local, state and federal rules and regulations.



CAUTION

Before attempting to replace any spare parts, be sure to shut off all pressure connections to the regulator. With the regulator closed however, system pressure could still be locked between the shutoff valve and the inlet and/or outlet sides of the regulator. Before proceeding with any regulator service, be certain to relieve the pressure from both sides of the regulator.

For ease of operation and maintenance, install the manual shutoff valves upstream and downstream from the regulator.

Servicing Diaphragm(s) and Pressure Spring

1. Loosen the lock nut and turn the adjusting screw counterclockwise until the pressure spring is no longer under tension. When reassembling,

run the adjusting screw down until the lock nut almost touches the spring chamber. This will give you approximately the same set as before disassembly.

2. Remove the assembly screws securing the spring chamber to the body. During reassembly, tighten the screws evenly in a star pattern. See Table 2 for torque values.
3. Remove the spring chamber, then remove the spring button, pressure spring and pressure plate.
4. Remove the diaphragm(s) and diaphragm gasket (a diaphragm gasket is only present when construction calls for metal diaphragms).
5. Remove the pusher post button. During reassembly, ensure the pusher post button is centered properly on the pusher post.
6. Inspect all parts for wear and damage and replace if necessary. Reassemble parts in reverse order. Do not overtighten. Follow the Operation Instructions to reset the delivery pressure.

Servicing the Cylinder, Piston, Strainer Screen and Plug Gasket

1. Loosen the lock nut and turn the adjusting screw counterclockwise until the pressure spring is no longer under tension. When reassembling, run the adjusting screw down until the lock nut almost touches the spring chamber. This will give you approximately the same set as before disassembly.
2. Remove the bottom plug. Take care, as the bottom plug is under slight tension as a result of the piston spring acting against the bottom plug. Remove the piston, piston spring and strainer screen.
3. Thoroughly clean the strainer screen and remove any debris from the valve body.
4. Remove the hexagon cylinder.
5. Inspect all parts for wear and damage. If either the cylinder or piston need replacing, it is necessary to replace both as both parts wear equally.
6. Reassemble the valve in reverse order. Do not overtighten. Follow the Operation Instructions to reset the delivery pressure.

Type D50A

Parts Ordering

When corresponding with your local Sales Office about this equipment, always reference the equipment regulator size, service and serial number.

When ordering replacement parts, reference the key number of each needed part as found in the following parts list and indicate the part number.

Parts List

Key	Description	Part Number
1	Adjusting screw Standard 1/4 NPT 3/8, 1/2 and 3/4 NPT 1 and 1-1/4 NPT 1-1/2 NPT 2 NPT T-Handle 1/4 NPT 3/8, 1/2 and 3/4 NPT 1, 1-1/4 and 1-1/2 NPT	 GT11312106 GT11312097 GT11312094 GT11312095 GT11312354 GT11424490 GT11318293 GT11318307
2	Lock nut 1/4 NPT 3/8, 1/2 and 3/4 NPT 1, 1-1/4 and 1-1/2 NPT 2 NPT (Standard)	 GT11312107 GT11312099 GT11312104 GT11312105
3	Nameplate	-----
4	Spring Chamber, Iron 1/4 NPT 3/8 NPT 1/2 NPT 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11516430 GT11516431 GT11516432 GT11516434 GT11516437 GT11516439 GT11516440
5	Spring Button 1/4 NPT 3/8, 1/2, 3/4, 1, 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312572 GT11312187 GT11318131
6	Spring, Steel	See Table 3
7	Pressure Plate 1/4 NPT 3/8 NPT 1/2 NPT 3/4 NPT 1, 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312588 GT11314448 GT11312454 GT11312994 GT11312455 GT11314447
8	Diaphragm Air or Water, Nitrile (NBR) 1/4 NPT 3/8 NPT 1/2 NPT 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT Steam, Bronze 1/4 NPT (3 required) 3/8 NPT (3 required) 1/2 NPT (3 required) 3/4 NPT (3 required) 1 NPT (4 required) 1-1/4 and 1-1/2 NPT (4 required) 2 NPT (4 required)	 GT11312394 GT11312404 GT11312379 GT11312382 GT11312408 GT11312413 GT11312417 GT11312392 GT11312406 GT11312383 GT11312385 GT11312411 GT11312415 GT11312534

Key	Description	Part Number
9	Diaphragm Gasket (For Steam only) 1/4 NPT 3/8 NPT 1/2 NPT 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312393 GT11312407 GT11312384 GT11312386 GT11312412 GT11312416 GT11312535
10	Screw (6 required) 1/4 NPT 3/8 NPT 1/2 and 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312276 GT11312088 GT11312102 GT11312089 GT11312093 GT11312090
11	Nut (6 required) (not shown) 1/4 NPT 3/8 NPT 1/2, 3/4 and 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312280 GT11312086 GT11312103 GT11312091 GT11312092
12	Pusher Post Button 1/4 NPT 3/8 NPT 1/2 and 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312258 GT11312405 GT11312366 GT11312442 GT11310766 GT11310026
13	Screen 1/4 and 3/8 NPT 1/2 and 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312395 GT11312380 GT11312488 GT11312489 GT11312525
14	Cylinder 1/4 NPT 3/8 NPT Air or Water Steam 1/2 and 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312559 GT11312560 GT11312559 GT11312443 GT11313032 GT11317832 GT11327029
15	Piston Assembly Air or Water, Nitrile (NBR) 1/4 NPT 3/8 NPT 1/2 and 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT Steam, Bronze 1/4 NPT 3/8 NPT 1/2 and 3/4 NPT 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312587 GT11312708 GT11318275 GT11310769 GT11325019 GT11312709 GT11320549 GT11320550 GT11320196 GT11319040 GT11319042 GT11319043
16	Piston Spring 1/4 and 3/8 NPT 1/2, 3/4 and 1 NPT 1-1/4 and 1-1/2 NPT 2 NPT	 GT11312214 GT11312192 GT11312414 GT11312528

Table 3. Key 6, Spring Part Number

BODY SIZE, NPT	SPRING RANGE				PART NUMBER
	Air or Water		Steam		
	psi	bar	psi	bar	
1/4	2 to 25	0.14 to 1.72	2 to 25	0.14 to 1.72	GT11312401
	20 to 60	1.38 to 4.14	20 to 60	1.38 to 4.14	GT11312402
	30 to 100	2.07 to 6.90	30 to 100	2.07 to 6.90	GT11312537
	50 to 150	3.45 to 10.3	50 to 125	3.45 to 8.62	GT11312583
3/8	2 to 30	0.14 to 2.07	2 to 30	0.14 to 2.07	GT11312188
	20 to 70	1.38 to 4.83	20 to 70	1.38 to 4.83	GT11312189
	40 to 110	2.76 to 7.58	40 to 110	2.76 to 7.58	GT11312190
	90 to 150	6.21 to 10.3	90 to 125	6.21 to 8.62	GT11312191
1/2	2 to 30	0.14 to 2.07	2 to 30	0.14 to 2.07	GT11312189
	10 to 50	0.69 to 3.45	10 to 50	0.69 to 3.45	GT11312190
	30 to 125	2.07 to 8.62	30 to 125	2.07 to 8.62	GT11312191
	50 to 150	3.45 to 10.3	50 to 125	3.45 to 8.62	GT11314453
3/4	2 to 20	0.14 to 1.38	2 to 20	0.14 to 1.38	GT11312189
	10 to 35	0.69 to 2.41	10 to 35	0.69 to 2.41	GT11312190
	30 to 75	2.07 to 5.17	30 to 75	2.07 to 5.17	GT11312191
	50 to 110	3.45 to 7.58	50 to 110	3.45 to 7.58	GT11314453
	105 to 150	7.24 to 10.3	105 to 125	7.24 to 8.62	GT11312196
1	2 to 20	0.14 to 1.38	2 to 20	0.14 to 1.38	GT11313528
	10 to 45	0.69 to 3.10	10 to 45	0.69 to 3.10	GT11312221
	20 to 60	1.38 to 4.14	20 to 60	1.38 to 4.14	GT11310547
	55 to 100	3.79 to 6.90	55 to 100	3.79 to 6.90	GT11312257
	90 to 150	6.21 to 10.3	90 to 125	6.21 to 8.62	GT11313564
1-1/4 and 1-1/2	2 to 15	0.14 to 1.03	2 to 15	0.14 to 1.03	GT11313528
	10 to 30	0.69 to 2.07	10 to 30	0.69 to 2.07	GT11312221
	20 to 50	1.38 to 3.45	20 to 50	1.38 to 3.45	GT11310547
	45 to 100	3.10 to 6.90	45 to 100	3.10 to 6.90	GT11312257
	90 to 150	6.21 to 10.3	90 to 125	6.21 to 8.62	GT11313564
2	2 to 20	0.14 to 1.38	2 to 20	0.14 to 1.38	GT11313529
	10 to 60	1.69 to 4.14	10 to 60	1.69 to 4.14	GT11312744
	20 to 100	1.38 to 6.90	20 to 100	1.38 to 6.90	GT11312238
	90 to 150	6.21 to 10.3	90 to 125	6.21 to 8.62	GT11312538

Key	Description	Part Number	Key	Description	Part Number
17	Body, Iron		19	Bottom Plug Assembly, Brass	
	1/4 NPT	GT11516421		1/4 and 3/8 NPT	GT11318731
	3/8 NPT	GT11516422		1/2 and 3/4 NPT	GT11330000
	1/2 NPT	GT11516423		1 NPT	GT11318746
	3/4 NPT	GT11516424		1-1/4 and 1-1/2 NPT	GT11318744
	1 NPT	GT11516425		2 NPT	GT11469313
	1-1/4 NPT	GT11516427	22	Screw (Bottom Plug) (6 required), For 2 NPT only	GT11312113
	1-1/2 NPT	GT11516428			
	2 NPT	GT11516429			
18	Bottom Plug Gasket				
	1/4 and 3/8 NPT	GT11464918			
	1/2 and 3/4 NPT	GT11464919			
	1, 1-1/4 and 1-1/2 NPT	GT11313278			
	2 NPT	GT11464920			

Type D50A

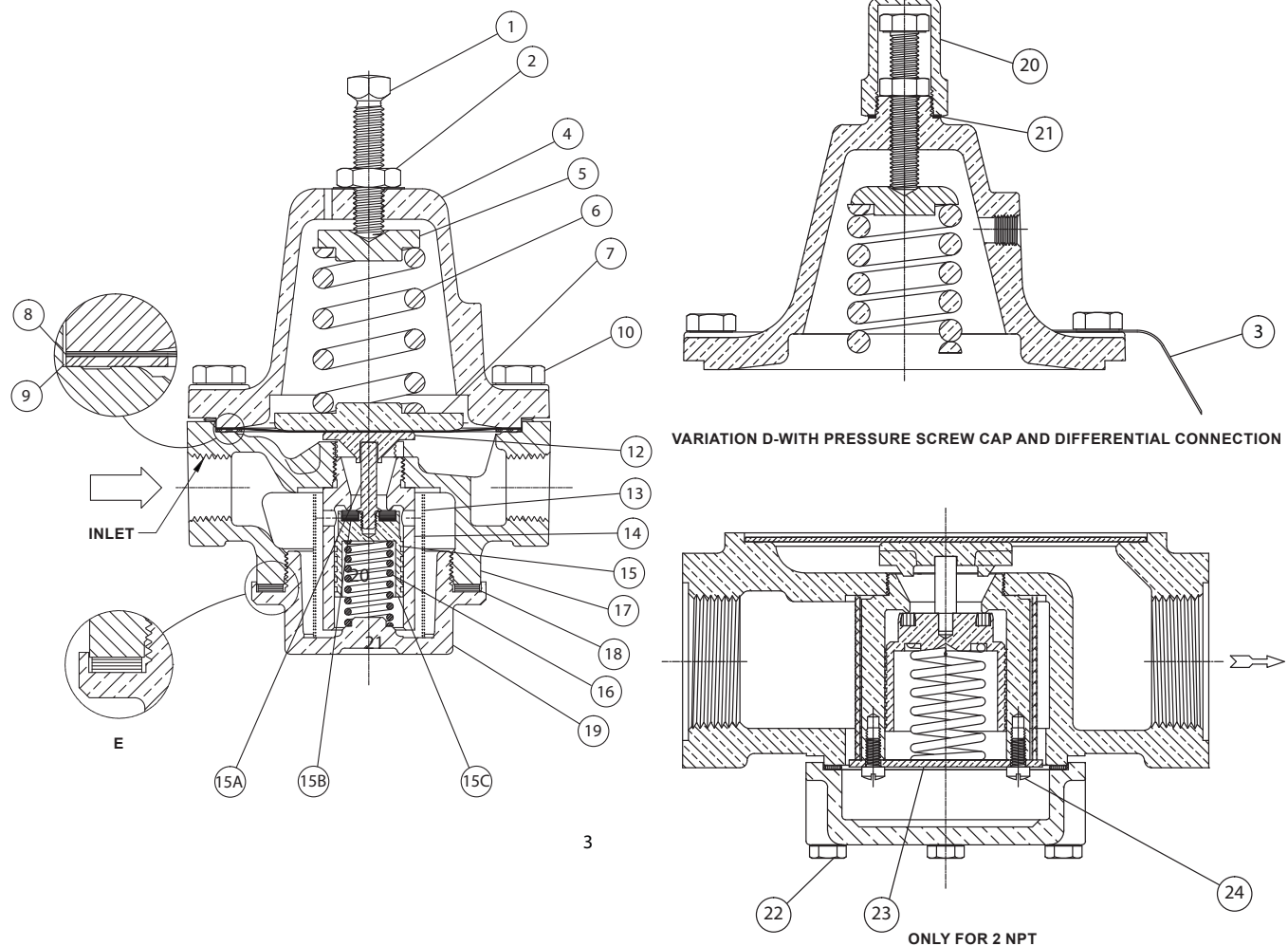


Figure 4. Type D50A Pressure Regulator Assembly

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