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# T205 Series Tank Blanketing Regulators

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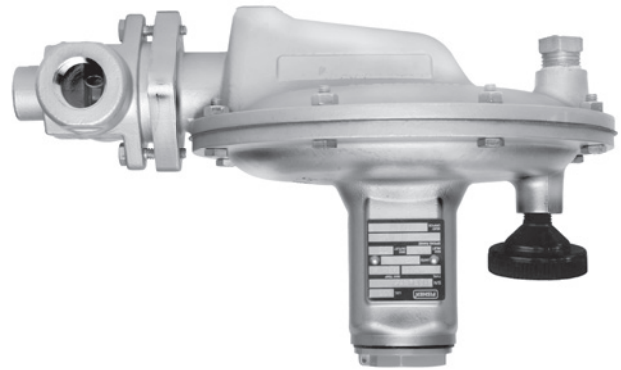


Figure 1. Type T205 Tank Blanketing Regulator



### 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.

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

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

Call a qualified service person to service the unit. Installation, operation and maintenance procedures performed by unqualified person may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Only a qualified person must install or service the T205 Series regulator.

## Introduction

### Scope of the Manual

This Instruction Manual provides instruction for installation, startup, maintenance and parts ordering information for the T205 Series tank blanketing regulators.

### Product Description

T205 Series tank blanketing regulator is a direct-operated and spring-loaded regulator. The regulator prevents a stored liquid from vaporizing into the atmosphere, reduces liquid combustibility and prevents oxidation or contamination of the product by reducing its exposure to air. T205 Series maintains a slightly positive pressure and thereby reduces the possibility of tank wall collapse during pump out operation.

T205 Series is available in two configurations: Type T205 for internal pressure registration requiring no downstream control line and Type T205M which has a blocked throat and a downstream control line connection for external pressure registration.



# T205 Series

## Specifications

The Specifications section on this page provides the ratings and other specifications for the T205 Series. Factory specification such as type, maximum inlet pressure, maximum temperature, maximum outlet pressure, spring range and orifice size are stamped on the nameplate fastened on the regulator at the factory.

### Product Configurations

**Type T205:** Tank blanketing regulator with outlet pressure range of 1-inch w.c. to 7 psig / 2.5 mbar to 0.48 bar in seven different spring ranges and has internal pressure registration requiring no downstream control line.

**Type T205M:** Similar to Type T205 but has a blocked throat and a downstream control line connection for external pressure registration.

### Body Sizes and End Connection Styles

See Table 1

### Maximum Allowable Inlet Pressure<sup>(1)</sup>

See Table 1

### Maximum Operating Inlet Pressure<sup>(1)</sup>

See Table 2

### Maximum Outlet (Casing) Pressure<sup>(1)</sup>

Gray Cast iron: 35 psig / 2.4 bar

WCC Carbon steel or CF8M/CF3M Stainless steel:

75 psig / 5.2 bar

### Maximum Emergency Outlet Pressure to Avoid Internal Parts Damage<sup>(1)</sup>

With Nitrile (NBR) or Fluorocarbon (FKM)

diaphragm: 35 psig / 2.4 bar

With Fluorinated Ethylene Propylene (FEP)

diaphragm: 10 psig / 0.69 bar

### Outlet (Control) Pressure Ranges<sup>(1)</sup>

See Table 3

### Shutoff Classification per ANSI/FCI 70-3-2004

Class VI (Soft Seat)

### Pressure Registration

**Type T205:** Internal

**Type T205M:** External

### Material Temperature Capabilities<sup>(1)(2)</sup>

#### Elastomer Parts

*Nitrile (NBR):*

-40 to 180°F / -40 to 82°C

*Fluorinated Ethylene Propylene (FEP):*

-20 to 180°F / -29 to 82°C

*Fluorocarbon (FKM):*

40 to 300°F / 4 to 149°C

*Ethylene Propylene Diene (EPDM):*

-20 to 225°F / -29 to 107°C

*Perfluoroelastomer (FFKM):*

0 to 300°F / -18 to 149°C

#### Body Materials

Gray Cast Iron: -20 to 300°F / -29 to 149°C

WCC Carbon Steel: -20 to 300°F / -29 to 149°C

CF8M/CF3M Stainless Steel: -40 to 300°F / -40 to 149°C

### Spring Case Vent Connection

1/4 NPT

### Diaphragm Case Control Line Connection (Type T205M)

1/2 NPT

### Approximate Weight

17.7 pounds / 8 kg

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.
2. See Table 5 for operating temperature ranges for available trim combinations.

**Table 1. Body Sizes, End Connection Styles and Maximum Allowable Inlet Pressures**

| BODY SIZE |          | BODY MATERIAL                            | END CONNECTION STYLES <sup>(1)</sup>         | MAXIMUM ALLOWABLE INLET PRESSURE |      |
|-----------|----------|--|--|----------------------------------|------|
| Inch      | DN       |  |  | psig                             | bar  |
| 3/4 or 1  | 20 or 25 | Gray Cast iron                           | NPT  | 150                              | 10.3 |
|           |          | WCC Carbon steel                         | NPT, CL150 RF,<br>CL300 RF or PN 16/25/40 RF | 200                              | 13.8 |
|           |          | CF8M/CF3M Stainless steel <sup>(2)</sup> |  |                                  |      |

1. All flanges are welded. Weld-on flange dimension is 14 inches / 356 mm face-to-face.
2. Pipe nipples and flanges are 316 Stainless steel for flanged body assemblies.

**Table 2. Maximum Operating Inlet Pressures**

| ORIFICE SIZE |     | MAXIMUM OPERATING INLET PRESSURE  |                     |  |                     |  |                     |  |                     |   |                     |   |                     |   |                     |
|--------------|-----|---|---------------------|--|---------------------|--|---------------------|--|---------------------|---|---------------------|---|---------------------|---|---------------------|
|              |     | 1 to 2.5 Inches w.c. /<br>2.5 to 6.2 mbar<br>Outlet (Control)<br>Pressure Setting |                     | 2.5 to 7 Inches w.c. /<br>6.2 to 17 mbar<br>Outlet (Control)<br>Pressure Setting |                     | 7 to 16 Inches w.c. /<br>17 to 40 mbar<br>Outlet (Control)<br>Pressure Setting |                     | 0.5 to 1.2 psig /<br>34 to 83 mbar<br>Outlet (Control)<br>Pressure Setting |                     | 1.2 to 2.5 psig /<br>83 to 172 mbar<br>Outlet (Control)<br>Pressure Setting |                     | 2.5 to 4.5 psig /<br>0.17 to 0.31 bar<br>Outlet (Control)<br>Pressure Setting |                     | 4.5 to 7 psig /<br>0.31 to 0.48 bar<br>Outlet (Control)<br>Pressure Setting |                     |
| Inch         | mm  | psig  | bar                 | psig   | bar                 | psig   | bar                 | psig   | bar                 | psig  | bar                 | psig  | bar                 | psig  | bar                 |
| 1/8          | 3.2 | 200 <sup>(1)</sup>  | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>   | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>   | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>   | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>  | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>  | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>  | 13.8 <sup>(1)</sup> |
| 1/4          | 6.4 | 60  | 4.1                 | 102  | 7.0                 | 102  | 7.0                 | 102  | 7.0                 | 200 <sup>(1)</sup>  | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>  | 13.8 <sup>(1)</sup> | 200 <sup>(1)</sup>  | 13.8 <sup>(1)</sup> |
| 3/8          | 9.5 | 30  | 2.1                 | 40   | 2.8                 | 100  | 6.9                 | 60   | 4.1                 | 125   | 8.6                 | 125   | 8.6                 | 125   | 8.6                 |
| 1/2          | 13  | 15  | 1.0                 | 15   | 1.0                 | 8  | 0.55                | 30   | 2.1                 | 30  | 2.1                 | 30  | 2.1                 | 30  | 2.1                 |
| 9/16         | 14  | 10  | 0.69                | 10   | 0.69                | 20   | 1.4                 | 10   | 0.69                | 30  | 2.1                 | 30  | 2.1                 | 30  | 2.1                 |

1. Inlet pressure is limited to 150 psig / 10.3 bar for gray cast iron bodies.

**Table 3. Outlet (Control) Pressure Ranges and Spring Information**

| OUTLET (CONTROL) PRESSURE RANGE |                  | SPRING PART NUMBER            | SPRING COLOR | SPRING WIRE DIAMETER |     | SPRING FREE LENGTH |      |
|---------------------------------|------------------|-------------------------------|--------------|----------------------|-----|--------------------|------|
| Inch w.c.                       | mbar             |                               |              | Inch                 | mm  | Inch               | mm   |
| 1 to 2.5                        | 2.5 to 6.2       | 1B558527052 <sup>(1)(2)</sup> | Orange       | 0.072                | 1.8 | 3.25               | 82.6 |
| 2.5 to 7                        | 6.2 to 17        | 1B653827052 <sup>(1)</sup>    | Red          | 0.085                | 2.2 | 3.63               | 92.2 |
| 7 to 16                         | 17 to 40         | 1B653927022                   | Unpainted    | 0.105                | 2.7 | 3.75               | 95.2 |
| 0.5 to 1.2 psig                 | 34 to 83         | 1B537027052                   | Yellow       | 0.114                | 2.9 | 4.31               | 109  |
| 1.2 to 2.5 psig                 | 83 to 172        | 1B537127022                   | Green        | 0.156                | 4.0 | 4.06               | 103  |
| 2.5 to 4.5 psig                 | 0.17 to 0.31 bar | 1B537227022                   | Light Blue   | 0.187                | 4.8 | 3.94               | 100  |
| 4.5 to 7 psig                   | 0.31 to 0.48 bar | 1B537327052                   | Black        | 0.218                | 5.5 | 3.98               | 101  |

1. To achieve the published outlet pressure range the spring case must be installed pointing down.  
 2. Do not use Fluorocarbon (FKM) diaphragm with this spring at diaphragm temperatures lower than 60°F / 16°C.

## Principle of Operation

T205 Series tank blanketing regulator controls the vapor space pressure over a stored liquid. When liquid is pumped out of the tank or vapors in the tank condense, the pressure in the tank decreases. Tank pressure is sensed by the actuator diaphragm. Spring force pushes the pusher post assembly upward, the valve disk moves away from the orifice, allowing the gas flow to increase. See Figures 2 and 3.

When pressure in the tank increases, the actuator diaphragm is pushed downward. Through the action of the pusher post assembly, lever and valve stem, the valve disk moves closer to the orifice reducing gas flow.

## Installation



### WARNING

**Personal injury, property damage, equipment damage or leakage due to escaping gas or bursting of pressure-containing parts may result if this regulator is overpressured or installed where service conditions could exceed the limits given in the Specifications section or where conditions exceed any ratings of the adjacent piping or piping connections. Refer to Overpressure Protection section for recommendations on how to prevent service conditions from exceeding those limits.**

**To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation or standard) to prevent service conditions from exceeding limits.**

**Additionally, physical damage to the regulator could cause personal injury or property damage due to escaping gas. To avoid such injury or damage, install the regulator in a safe location.**

## Note

**If the regulator is shipped mounted on another unit, install that unit according to the appropriate Instruction Manual.**

1. Only personnel qualified through training and experience shall install, operate and maintain a regulator. For a regulator that is shipped separately, make sure there is no damage to or debris in the regulator. Also ensure that all tubing and piping are clean and unobstructed.
2. The regulator may be installed in any position as long as the flow through the body is in the direction indicated by the arrow on the body. When using a Type T205 or T205M regulator, for proper operation to achieve the published capacities at low setpoint, the spring case barrel should be installed pointed down as shown in Figure 1. For complete actuator drainage, the regulator should be installed as shown in Figure 4. If continuous operation of the system is required during inspection or maintenance, install a three-valve bypass around the regulator.



### WARNING

**A regulator may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate and cause personal injury, death or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous area. The vent line or stack opening must be protected against condensation or clogging.**

3. To keep the spring case vent (key 26, Figure 7 or 8) from being plugged or the spring case from collecting moisture, corrosive chemicals or other foreign material, point the vent down or otherwise protect it. The diaphragm casing (key 4, Figure 7 or 8) may be rotated in order to obtain desired positioning.
4. To remotely vent the regulator, remove the vent (key 26, Figure 7 or 8) and install obstruction-free tubing or piping into the 1/4 NPT vent tapping. Provide protection on a remote vent by installing a screened vent cap into the remote end of the vent pipe.

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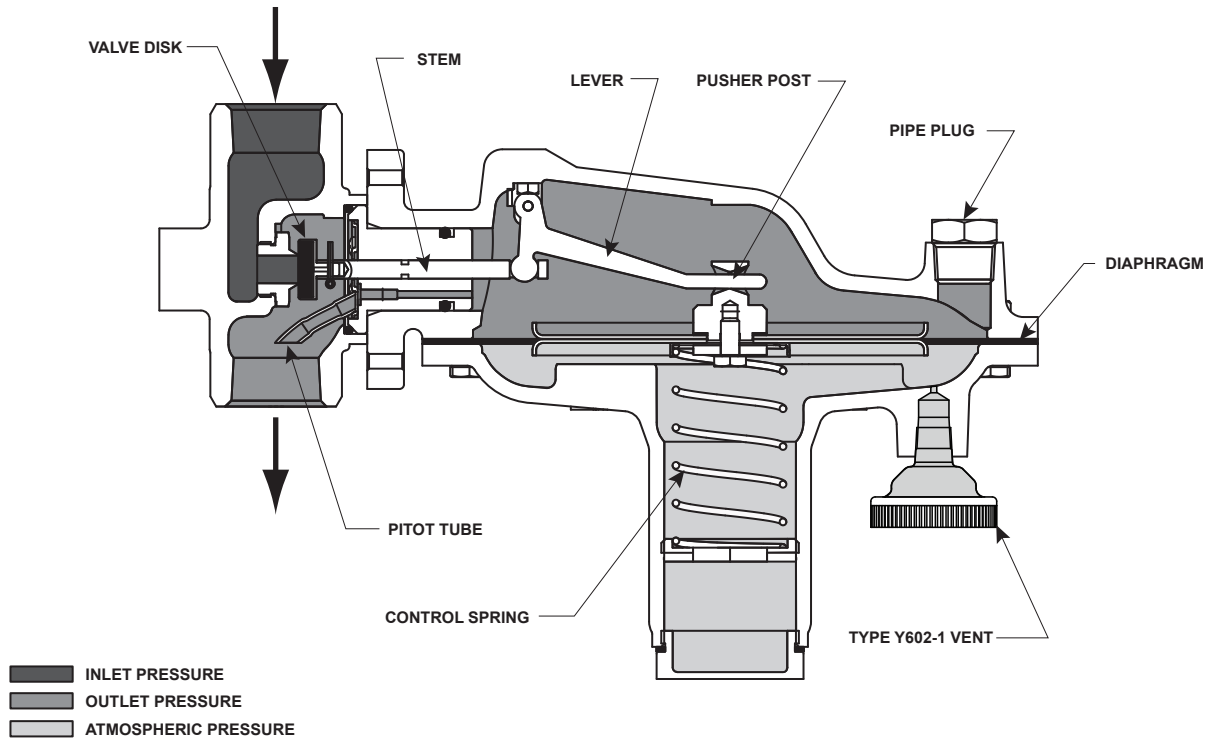


Figure 2. Type T205 with Internal Registration Operational Schematics

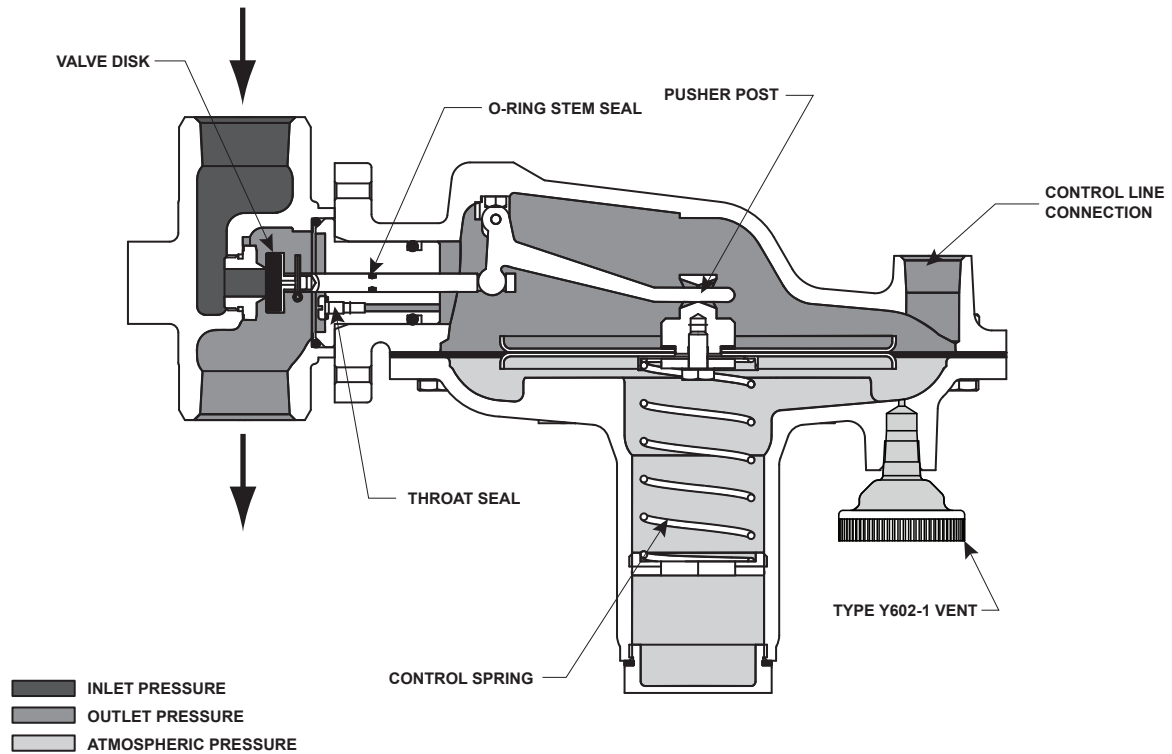


Figure 3. Type T205M with External Registration Operational Schematics

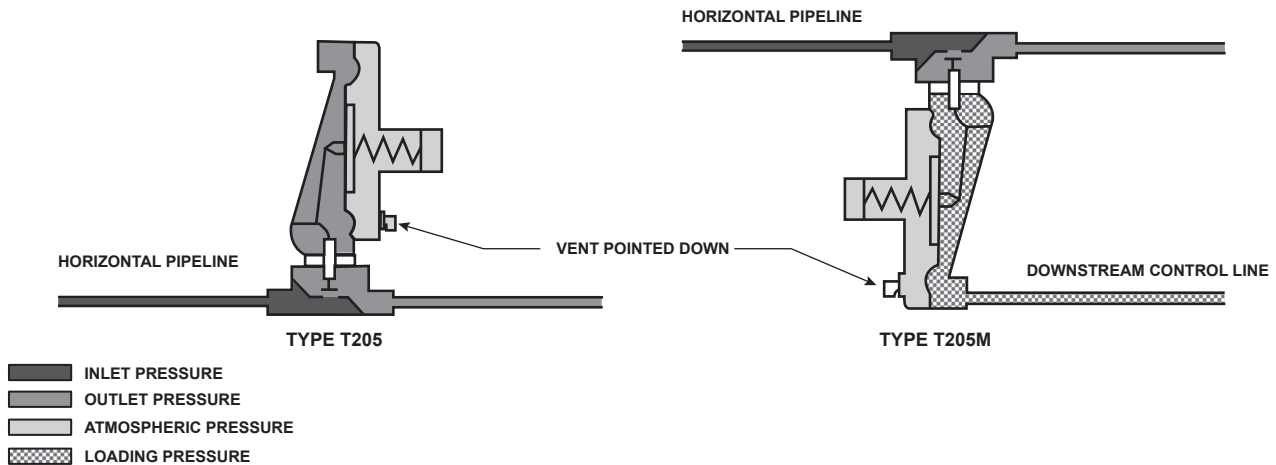


Figure 4. Type T205 Actuator Casing Drainage Schematics

- Type T205M requires a downstream control line. Be sure to install the control line before putting the regulator into operation. Make the control line as short and straight as possible and do not install it in a location where flow may be turbulent. Restrictions in the control line can prevent proper pressure registration. When using a hand valve, it should be a full flow valve, such as a full port ball valve. Install the control line sloping downward toward the tank to prevent condensation buildup and avoid low points (or traps) that could catch liquid. The sensing line must enter the tank above the liquid level at a point that senses the vapor space pressure and is free from turbulence associated with tank nozzles or vents. The control line pipe should be at least 1/2-inch / 13 mm in diameter and increase 1 pipe size for every 10 feet / 3.05 m of control line, with setpoint less than 5-inches w.c. / 12 mbar.
- An upstream shutoff valve is recommended to simplify maintenance to the regulator. It is advisable to install a pressure gauge between the upstream shutoff valve and the blanketing valve.

To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices to prevent service conditions from exceeding those limits.

If the regulator is exposed to an overpressure condition, it should be inspected for any damage that may have occurred. Regulator operation below the limits specified in the Specifications section and regulator nameplate does not preclude the possibility of damage from external sources or from debris in the pipeline.

Type T205 regulators have an outlet pressure rating lower than the inlet pressure rating. The recommended pressure limitations are stamped on the regulator nameplate. Some type of overpressure protection is needed if the actual inlet pressure can exceed the maximum operating outlet pressure rating. Common methods of external overpressure protection include relief valves, monitoring regulators, shut-off devices and series regulation. Overpressuring any portion of the regulators beyond the limits in the Specifications section may cause leakage, damage to regulator parts or personal injury due to bursting of pressure-containing parts.

## Overpressure Protection



Personal injury, equipment damage or leakage due to escaping accumulated gas or bursting of pressure-containing parts may result if this regulator is:

- Overpressured;
- Used with incompatible process fluid;
- Installed where service conditions could exceed the limits given in the Specifications section and on the appropriate nameplate; or
- Where conditions exceed any ratings of adjacent piping or piping connections.

## Startup, Adjustment and Shutdown

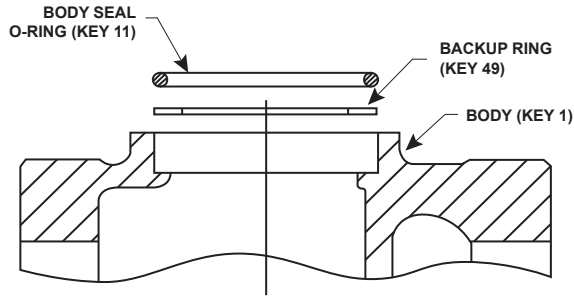
### Note

The Specifications section and Tables 1 and 2 provide the maximum pressure capabilities for each regulator construction. Use pressure gauges to monitor inlet pressure and outlet pressure during startup.

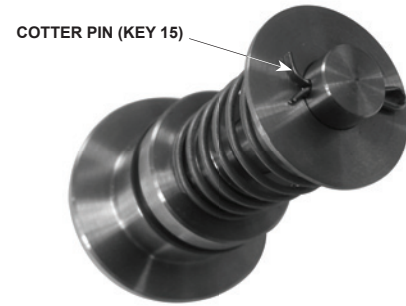
### Startup

- Open shutoff valves between the tank blanketing regulator and the tank (both sensing and outlet).

# T205 Series



**Figure 5.** Expanded View of the Body Area Showing the Body Seal O-ring and Backup Ring Placement



**Figure 6.** Proper Bending of Cotter Pin (key 15)

2. Slowly open the supply line shutoff valve (to the blanketing valve) and leave it fully open.
3. Monitor the tank vapor space pressure.

## Adjustment



### WARNING

**To avoid personal injury, property damage or equipment damage caused by bursting of pressure containing parts or explosion of accumulated gas, never adjust the control spring to produce an outlet pressure higher than the upper limit of the outlet pressure range (see Table 2) for that particular spring. If the desired outlet pressure is not within the range of the control spring, install a spring of the proper range according to the Diaphragm and Spring Case Area section of the maintenance procedure.**

Adjust the regulator control pressure setting to meet the requirements of the specific application. With a spring-loaded regulator, the pressure setting may be adjusted to a value within the spring range shown in Table 3. To adjust the pressure setting, perform the following steps (key numbers are referenced in Figures 6 and 7):

#### For internal flat circular adjusting screw:

1. Remove the closing cap (key 22).
2. Use a 1-inch / 25 mm hex rod or flat screwdriver to turn the adjusting screw (key 35) either clockwise to increase outlet pressure or counterclockwise to decrease outlet pressure. The regulator will go into immediate operation. To ensure correct operation, always use a pressure gauge to monitor the tank blanketing pressure when making adjustments.
3. After making the adjustment, replace the closing cap gasket (key 25) and install the closing cap (key 22).

#### For external square head adjusting screw:

1. Loosen the locknut (key 20).
2. Turn the adjusting screw (key 35) either clockwise to increase outlet pressure or counterclockwise to decrease outlet pressure. Always use pressure gauge

- to monitor the tank blanketing gas pressure when making adjustments.
3. After making the adjustment, tighten the locknut (key 20).

## Shutdown

1. Close the nearest upstream shutoff valve.
2. Close the nearest downstream shutoff valve to vent the regulator properly.
3. For a regulator with control line: Close the valve in the control line and vent the diaphragm casing to the atmosphere.
4. Open the vent valve between the regulator and the downstream shutoff valve nearest to it. All pressure between these shutoff valves is released through the open vent valve, since a T205 Series remains open in response to the decreasing downstream pressure.

## Maintenance

Regulator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends upon the severity of service conditions or the requirements of local, state and federal regulations. Due to the care Regulator Technologies takes in meeting all manufacturing requirements (heat treating, dimensional tolerances, etc.), use only replacement parts manufactured or furnished by Regulator Technologies.



### 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 regulator from system pressure and relieving all internal pressure from the regulator.**

**Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts**

**Table 4. Body Materials and Part Numbers (Body, key 1)**

| BODY MATERIAL    | END CONNECTION STYLE <sup>(1)</sup> | PART NUMBER           |                     |
|------------------|-------------------------------------|-----------------------|---------------------|
|                  |                                     | 3/4-inch / DN 20 Body | 1-inch / DN 25 Body |
| Gray Cast iron   | NPT                                 | ERSA01588A0           | ERSA01755A0         |
| WCC Carbon steel | NPT                                 | ERSA00230A1           | ERSA00194A1         |
|                  | CL150 RF                            | ERSA01469A0           | ERSA01469A1         |
|                  | CL300 RF                            | ERSA01469A2           | ERSA01469A3         |
|                  | PN 16/25/40 RF                      | ERSA01469A4           | ERSA01469A5         |
| Stainless steel  | NPT <sup>(2)</sup>                  | ERSA00230A0           | ERSA00194A0         |
|                  | CL150 RF                            | ERSA01469A6           | ERSA01469A7         |
|                  | CL300 RF                            | ERSA01469A8           | ERSA01469A9         |
|                  | PN 16/25/40 RF                      | ERSA01469B0           | ERSA01469B1         |

1. All flanges are welded. Weld-on flange dimension is 14 inches / 356 mm face-to-face.  
2. NACE Standard MR0175-2002.

**manufactured by Regulator Technologies should be used for repairing Fisher® regulators. Restart gas utilization equipment according to normal startup procedures.**

## General Maintenance

1. Visually inspect the regulator and its parts for any damage.
2. Ensure tight connections, tight seals and safe operation. If there is evidence of leakage or unstable internal motion, a rebuild with seal replacement and relubrication may be necessary.
3. Observe the blanketing pressure.
4. Inspect the inlet pressure for the proper pressure (stamped on the regulator nameplate).

## Body Area

Perform the following procedure to gain access to the disk assembly, orifice, body O-ring and pitot tube if used. Release all pressure from the diaphragm casing and open the disk assembly before performing the following steps. Key numbers are referenced in Figures 7 and 8.

1. Remove the cap screws (key 2) and separate the diaphragm casing (key 4) from the body (key 1).
2. Remove and inspect the body seal O-ring (key 11) and the backup ring (key 49). See Figure 5.
3. Inspect and replace the orifice (key 5) if necessary. Protect the orifice seating surface during disassembly and assembly. Lubricate the threads of the replacement orifice with a good grade of light grease and install with 340 to 470 inch-pounds / 38.5 to 53.1 N•m of torque.
4. Remove the cotter pin (key 15) to replace the disk assembly (key 13). If not necessary, skip to step 8.
5. To replace the pitot tube (key 32, Figure 7) on the Type T205, remove the pitot tube machine screws (key 17), install the new pitot tube and secure with the pitot tube machine screws (key 17) using 14 to

19 inch-pounds / 1.6 to 2.1 N•m of torque. Position the pitot tube so that it points into the outlet of the body by rotating the guide insert (key 18).

6. To inspect the throat seal O-ring (key 31, Figure 8) on the Type T205M, remove the machine screw (key 34, Figure 8). Replace if necessary and reassemble.
7. Install the disk assembly (key 13) and secure it with the cotter pin (key 15). Bend the cotter pin end using pliers or equivalent tool (see Figure 6).
8. Place back-up ring (key 49) into the body (key 1). Then place the body seal O-ring (key 11) into the body. See Figure 5.
9. Place the diaphragm casing (key 4) on the body (key 1). Secure the diaphragm casing to the body with the cap screws (key 2) using 90 to 126 inch-pounds / 10.2 to 14.2 N•m of torque.

## Diaphragm and Spring Case Area

Perform the following procedure to gain access to the spring, diaphragm, lever assembly and stem. Release all pressure from the diaphragm casing before performing the following steps.

### Note

**Remove any remote control drive unit used with a T205 Series regulator from the spring case (key 3) before performing these steps.**

1. **For internal flat circular adjusting screw** – remove the closing cap (key 22) and closing cap gasket (key 25).  
**For external square head adjusting screw** – loosen the locknut (key 20).
2. Turn the adjusting screw (key 35) counterclockwise to remove all the compression from the control spring (key 6).
3. If the only maintenance procedure to be performed is the changing of the control spring (key 6):

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**Table 5. Type T205 Trim Option Code**

| TRIM OPTION CODE  | DIAPHRAGM MATERIAL                   | DISK AND O-RING MATERIAL        | OPERATING TEMPERATURE RANGES |
|-------------------|--------------------------------------|---------------------------------|------------------------------|
| <b>Standard</b>   | Nitrile (NBR)                        | Nitrile (NBR)                   | -40 to 180°F / -40 to 82°C   |
| VV                | Fluorocarbon (FKM)                   | Fluorocarbon (FKM)              | 40 to 300°F / 4 to 149°C     |
| TN                | Fluorinated Ethylene Propylene (FEP) | Nitrile (NBR)                   | -20 to 180°F / -29 to 82°C   |
| TV                | Fluorinated Ethylene Propylene (FEP) | Fluorocarbon (FKM)              | 40 to 180°F / 4 to 82°C      |
| TK <sup>(1)</sup> | Fluorinated Ethylene Propylene (FEP) | Perfluoroelastomer (FFKM)       | 0 to 180°F / -18 to 82°C     |
| TE                | Fluorinated Ethylene Propylene (FEP) | Ethylene Propylene Diene (EPDM) | -20 to 180°F / -29 to 82°C   |

1. Includes 316 Stainless steel Trim Parts.

**For internal flat circular adjusting screw:**

- a. Remove the adjusting screw (key 35).
- b. Take out the control spring and replace with the desired spring.
- c. Reinstall the adjusting screw.
- d. Adjust the outlet pressure to the desired control pressure setting, refer to steps 2 and 3 of Adjustment section.
- e. Change the stamped spring range on the nameplate. Skip to step 13.

**For external square head adjusting screw:**

- a. Remove the adjusting screw (key 35) and locknut (key 20).
- b. Remove the closing cap (key 22), closing cap gasket (key 25) and upper spring seat (key 19).
- c. Take out the control spring and replace with the desired spring.
- d. Reinstall the upper spring seat, closing cap gasket, closing cap, locknut and adjusting screw.
- e. Adjust the outlet pressure to the desired control pressure setting, refer to steps 2 and 3 of Adjustment section.
- f. Change the stamped spring range on the nameplate. Skip to step 13.

4. If further maintenance to the internal diaphragm casing parts is required, remove the hex nuts (key 23) and spring case cap screws (key 24). Remove the diaphragm (key 10) plus attached parts by tilting them so that the pusher post (key 8) slips off the lever assembly (key 16). To separate the diaphragm from the attached parts, unscrew the diaphragm cap screw (key 38) from the pusher post. If the only maintenance is the replacement of the diaphragm components, skip to step 7.
5. To replace the lever assembly (key 16), remove the machine screws (key 17). To replace the stem (key 14), also perform Body Area Maintenance procedure steps 1 and 4 and pull the stem out of the lower casing (key 4). With a Type T205M, grease the replacement stem seal O-ring (key 30) with a good grade of lubricant and install it on the stem (key 14).
6. Install the stem into the lower casing and perform Body Area Maintenance procedure steps 7 through 9 as necessary.

7. Install the lever assembly (key 16) into the stem (key 14) and secure the lever assembly with the machine screws (key 17) using 14 to 19 inch-pounds / 1.6 to 2.1 N•m of torque.
8. Hold the pusher post and place diaphragm assembly parts on the pusher post in the following order:
  - diaphragm head gasket (key 45)
  - diaphragm head (key 7)
  - diaphragm (key 10)
  - diaphragm head
  - lower spring seat (key 50)
  - washer (key 36)

Secure with diaphragm cap screws (key 38) using 60 to 72 inch-pounds / 6.8 to 8.1 N•m of torque.

9. Install the pusher post (key 8) and attached parts onto the lever (key 16).
10. Install the spring case (key 3) on the lower casing (key 4) so that the vent assembly (key 26) is correctly oriented and secure them with the spring case cap screws (key 24) and hex nuts (key 23) to finger tightness only.
11. Install the parts into the spring case (key 3). Follow the order below:

**For internal flat circular adjusting screw:**

- a. control spring (key 6)
- b. adjusting screw (key 35)

**For external square head adjusting screw:**

- a. control spring (key 6)
- b. upper spring seat (key 19)
- c. closing cap gasket (key 25)
- d. closing cap (key 22)
- e. locknut (key 20)
- f. adjusting screw (key 35)

12. Turn the adjusting screw (key 35) clockwise until there is enough control spring force to provide proper slack to diaphragm (key 10). Using a crisscross pattern, finish tightening the spring case cap screws (key 24) and hex nuts (key 23) to 90 to 126 inch-pounds / 10.2 to 14.2 N•m of torque. Adjust the outlet pressure to the desired control pressure setting, refer to the Adjustment section.
13. For Type T205M, connect the downstream control line. Refer to the Startup section before putting the regulator back in operation.



## To Convert Constructions

### From Type T205 to Type T205M

A control line is needed. New parts required: keys 30, 31 and 17.

1. Remove pipe plug (key 27, Figure 7) from the lower casing (key 4). Use this port to connect the control line from downstream. See item number 5 in the Installation section.
2. Refer to steps 1 and 5 in the Body Area Maintenance section to remove the four pitot tube machine screws (key 17) and pitot tube (key 32, Figure 7).
3. Insert the throat seal O-ring (key 31, Figure 8) and one machine screw (key 34).
4. Insert the stem seal O-ring (key 30, Figure 8) by following steps 1 through 6 in the Diaphragm and Spring Case Area Maintenance section.

### From Type T205M to Type T205

New parts required: keys 27, 32 and 17.

1. Insert pipe plug (key 27, Figure 7) in the lower casing (key 4).
2. Follow steps 1, 3 and 4 of Diaphragm and Spring Case Area Maintenance Section to remove one machine screw (key 34, Figure 8), the stem seal O-ring (key 30, Figure 8) and the throat seal O-ring (key 31, Figure 8) blocking the registration port.
3. Insert pitot tube (key 32, Figure 7) and four pitot tube machine screws (key 17) using 14 to 19 inch-pounds / 1.6 to 2.1 N•m of torque as outlined in step 5 of the Body Area Maintenance section.

## Parts Ordering

When corresponding with your local Sales Office about this regulator, include the type number and all other pertinent information stamped on the nameplate. Specify the eleven-character part number when ordering new parts from the following parts list.

## Parts List

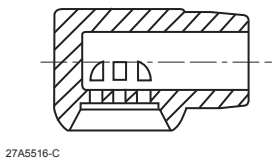
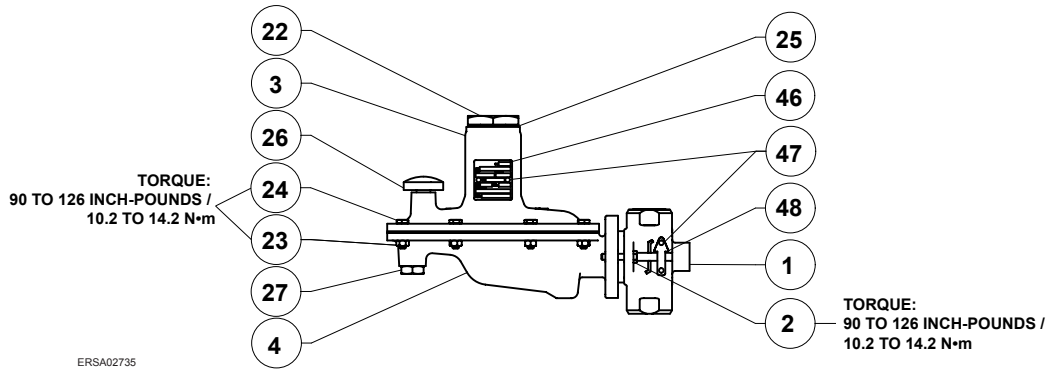
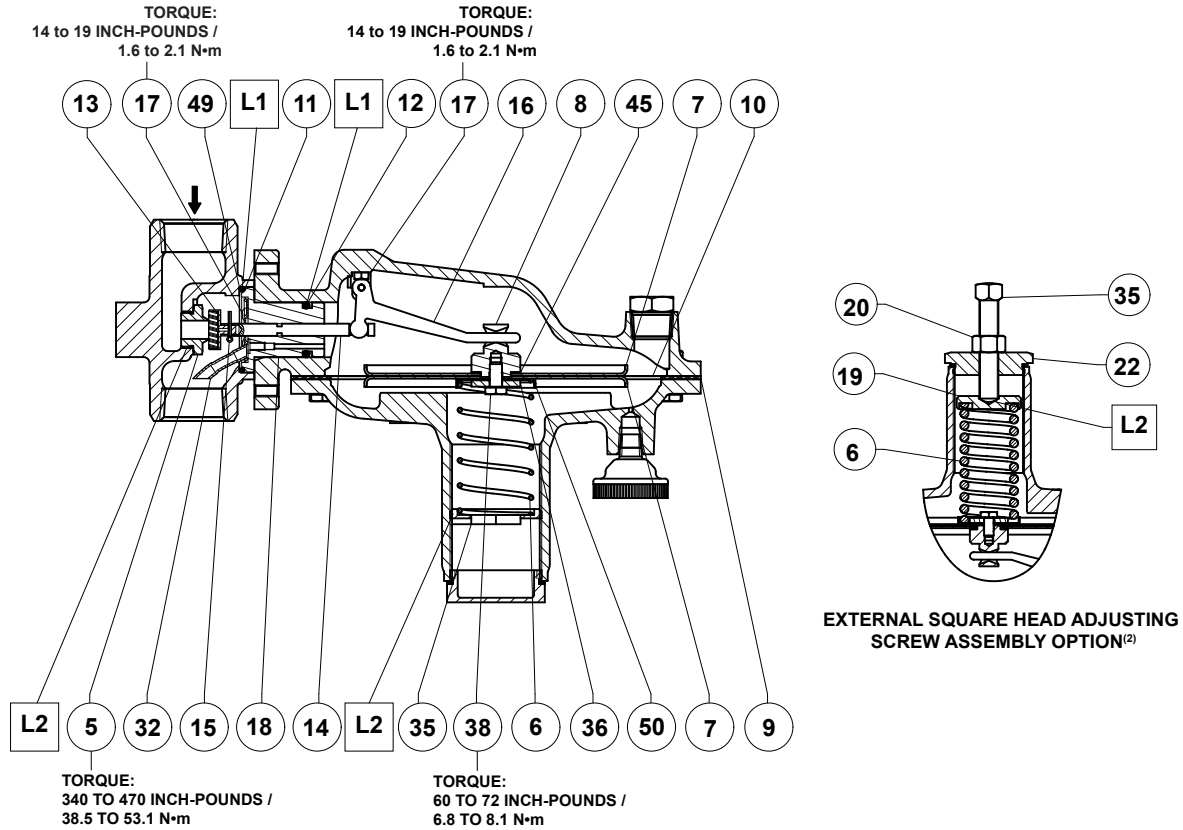
| Key | Description   | Part Number |
|-----|---|-------------|
|     | Spare Parts Kit (Included are keys 9, 10, 11, 12, 15, 25 and 45)<br>(see Table 6 for Trim Option Codes) |             |
|     | Standard Trim   | RT205XXDD12 |
|     | VV Trim   | RT205XXVV12 |
|     | TN Trim   | RT205XXTN12 |
|     | TV Trim   | RT205XXTV12 |
|     | TK Trim   | RT205XXTK12 |
|     | TE Trim   | RT205XXTE12 |

| Key | Description   | Part Number  |
|-----|---|--|
| 1   | Body  | See Table 4  |
| 2   | Cap Screw (2 required)<br>For WCC Carbon steel or Gray Cast iron casing<br>For CF8M/CF3M Stainless steel casing   | 1C856228992<br>18B3456X012   |
| 3   | Spring Case<br>Gray Cast iron<br>WCC Carbon steel<br>CF8M/CF3M Stainless steel  | ERSA02558A0<br>ERSA00195A1<br>ERSA00195A0  |
| 4   | Lower Casing<br>Gray Cast iron<br>WCC Carbon steel<br>CF8M/CF3M Stainless steel   | 47B2271X012<br>ERSA00196A1<br>ERSA00196A0  |
| 5*  | Orifice<br>303 Stainless steel ( <b>standard</b> )<br>1/8-inch / 3.2 mm<br>1/4-inch / 6.4 mm<br>3/8-inch / 9.5 mm<br>1/2-inch / 13 mm<br>9/16-inch / 14 mm<br>316 Stainless steel (NACE) <sup>(2)</sup><br>1/8-inch / 3.2 mm<br>1/4-inch / 6.4 mm<br>3/8-inch / 9.5 mm<br>1/2-inch / 13 mm<br>9/16-inch / 14 mm | 1A936735032<br>0B042035032<br>0B042235032<br>1A928835032<br>1C425235032<br>1A9367X0022<br>0B0420X0012<br>0B0422X0012<br>1A9288X0012<br>1C4252X0022 |
| 6   | Spring  | See Table 3  |
| 7   | Diaphragm Head (2 required)<br>Stainless steel  | 17B9723X032  |
| 8   | Pusher Post<br>For Nitrile (NBR) or<br>Fluorocarbon (FKM) diaphragm<br>303 Stainless steel ( <b>standard</b> )<br>316 Stainless steel (NACE) <sup>(2)</sup><br>For Fluorinated Ethylene<br>Propylene (FEP) diaphragm<br>Stainless steel (NACE) <sup>(2)</sup>   | 18B3462X032<br>18B3462X012<br>ERSA00876A0  |
| 9*  | Diaphragm Gasket<br>For Fluorinated Ethylene<br>Propylene (FEP) diaphragm<br>Nitrile (NBR)  | ERSA00713A0  |
| 10* | Diaphragm<br>Nitrile (NBR)<br>Fluorocarbon (FKM)<br>Fluorinated Ethylene Propylene (FEP)  | 17B9726X012<br>23B0101X052<br>ERSA00193A0  |
| 11* | Body Seal O-ring<br>Nitrile (NBR)<br>Fluorocarbon (FKM)<br>Perfluoroelastomer (FFKM)<br>Ethylene Propylene Diene (EPDM)   | 1H993806992<br>1H9938X0012<br>1H9938X0042<br>1H9938X0022   |
| 12* | Insert Seal O-ring<br>Nitrile (NBR)<br>Fluorocarbon (FKM)<br>Perfluoroelastomer (FFKM)<br>Ethylene Propylene Diene (EPDM)   | 1B885506992<br>1B8855X0012<br>1B8855X0062<br>1B8855X0022   |
| 13* | Disk Assembly<br>303 Stainless steel ( <b>standard</b> )<br>Nitrile (NBR)<br>Fluorocarbon (FKM)<br>Ethylene Propylene Diene (EPDM)<br>316 Stainless steel (NACE) <sup>(2)</sup><br>Nitrile (NBR)<br>Fluorocarbon (FKM)<br>Perfluoroelastomer (FFKM)<br>Ethylene Propylene Diene (EPDM)                          | 1C4248X0202<br>1C4248X0052<br>1C4248X0302<br>1C4248X0252<br>1C4248X0192<br>1C4248X0332<br>1C4248X0152  |
| 14  | Stem<br>303 Stainless steel ( <b>standard</b> )<br>316 Stainless steel (NACE) <sup>(2)</sup>  | 17B3423X012<br>17B3423X022   |

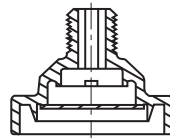
\*Recommended spare part

1. Use for optional external square head adjusting screw assembly recommended for 1.2 to 2.5 psig / 83 to 172 mbar, 2.5 to 4.5 psig / 0.17 to 0.31 bar and 4.5 to 7 psig / 0.31 to 0.48 bar spring ranges only.
2. NACE Standard MR0175-2002.

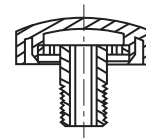
# T205 Series



**SPRING CASE SIDWAYS  
TYPE Y602-12 VENT**



**SPRING CASE DOWNWARD  
TYPE Y602-1 VENT**

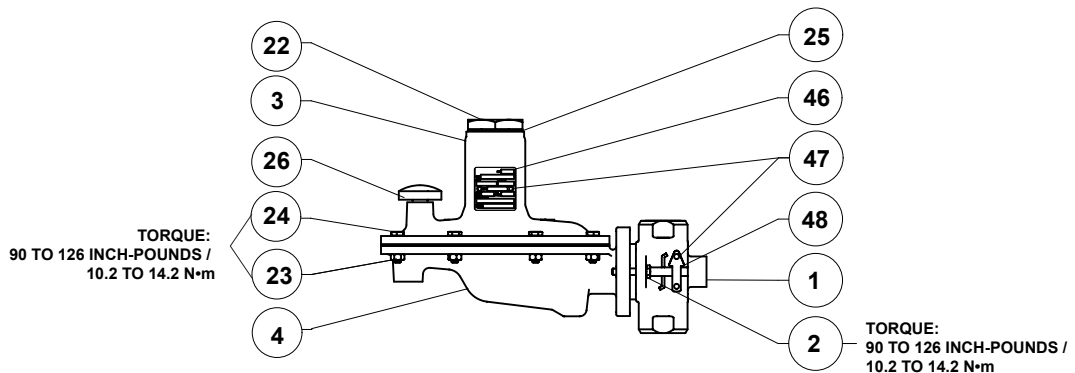
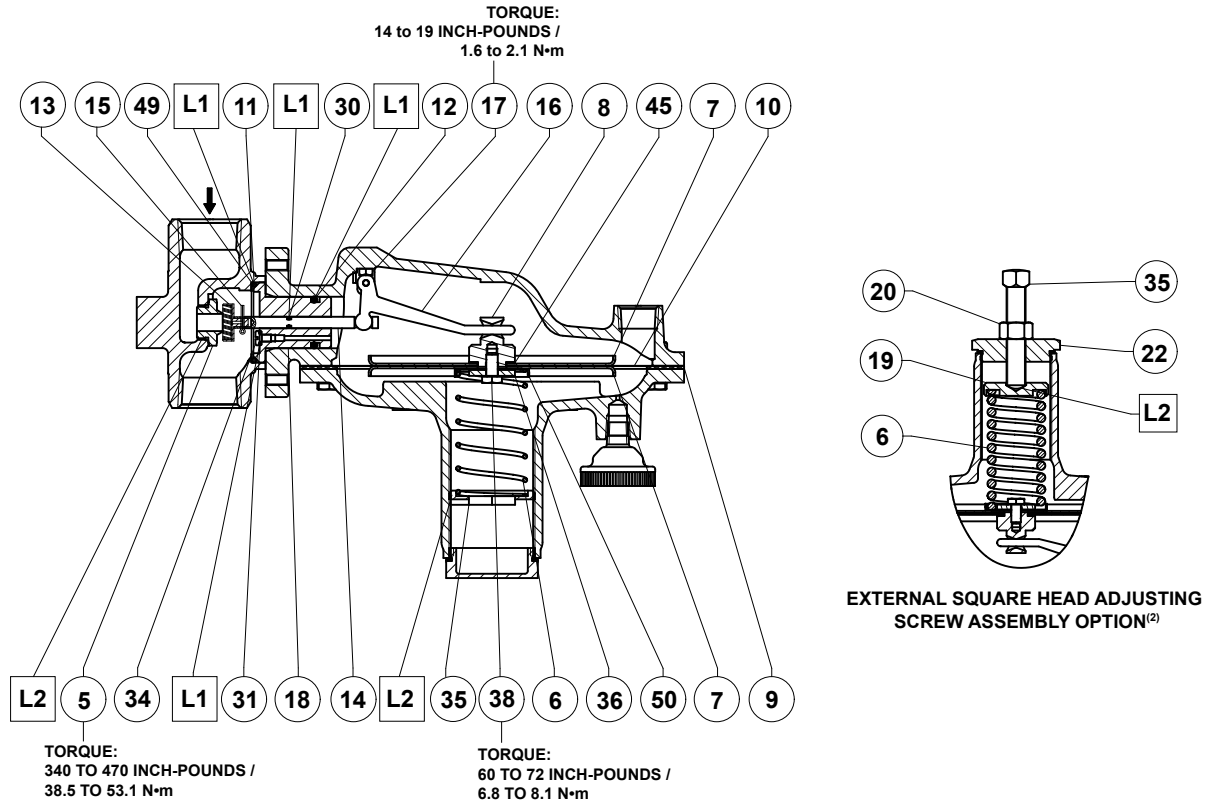


**SPRING CASE UPWARD  
TYPE Y602-11 VENT**

□ **APPLY LUBRICANT<sup>(1)</sup>:**  
L1 = SILICONE GREASE  
L2 = ANTI-SEIZE COMPOUND

- Lubricants must be selected such that they meet the temperature requirements.
- For 1.2 to 2.5 psig / 83 to 172 mbar, 2.5 to 4.5 psig / 0.17 to 0.31 bar and 4.5 to 7 psig / 0.31 to 0.48 bar spring ranges only.

**Figure 7. Type T205 Regulator Assembly with Internal Registration**



ERSA02736

- APPLY LUBRICANT<sup>(1)</sup>:  
L1 = SILICONE GREASE  
L2 = ANTI-SEIZE COMPOUND

1. Lubricants must be selected such that they meet the temperature requirements.
2. For 1.2 to 2.5 psig / 83 to 172 mbar, 2.5 to 4.5 psig / 0.17 to 0.31 bar and 4.5 to 7 psig / 0.31 to 0.48 bar spring ranges only.

**Figure 8.** Type T205M Regulator Assembly with External Registration

# T205 Series

| Key | Description                                   | Part Number | Key | Description                                 | Part Number |
|-----|---|-------------|-----|---|-------------|
| 15* | Cotter Pin, Stainless steel                   | 1A866537022 | 30* | Stem Seal O-ring (Type T205M only)          |             |
| 16  | Lever Assembly, Stainless steel               | 1B5375000B2 |     | Nitrile (NBR)                               | 1H2926G0012 |
| 17  | Machine Screw, Stainless steel                |             |     | Fluorocarbon (FKM)                          | 1H2926X0022 |
|     | Type T205 (6 required)                        | 19A7151X022 |     | Perfluoroelastomer (FFKM)                   | 1H2926X0042 |
|     | Type T205M (2 required)                       | 19A7151X022 |     | Ethylene Propylene Diene (EPDM)             | 1H2926X0012 |
| 18  | Guide Insert, Stainless steel                 | 27B4028X022 | 31* | Throat Seal O-ring (Type T205M only)        |             |
| 19  | Upper Spring Seat, Steel <sup>(1)</sup>       |             |     | Nitrile (NBR)                               | 1D682506992 |
|     | Optional                                      | 1J618124092 |     | Fluorocarbon (FKM)                          | 1D6825X0012 |
| 20  | Lock Nut <sup>(1)</sup>                       |             |     | Perfluoroelastomer (FFKM)                   | 1D6825X0032 |
|     | Optional                                      | 1A413224122 |     | Ethylene Propylene Diene (EPDM)             | 1D6825X0042 |
| 22  | Closing Cap                                   |             | 32  | Pitot Tube (Type T205), Stainless steel     | 17B4479X012 |
|     | Plastic ( <b>standard</b> )                   | T11069X0012 | 34  | Machine Screw, Type T205M only (1 required) |             |
|     | Steel   | 1E422724092 |     | Stainless steel                             | 18A0703X022 |
|     | Stainless steel                               | 1E422735072 | 35  | Adjusting Screw                             |             |
|     | Carbon steel <sup>(1)</sup>                   | ERSA01809A0 |     | Internal Flat Circular ( <b>standard</b> )  | 1B537944012 |
| 23  | Hex Nut (8 required)                          |             |     | External Square Head <sup>(1)</sup>         |             |
|     | For WCC Carbon steel or Gray Cast iron casing | 1A345724122 |     | For Green and Light Blue spring             | 10B3080X012 |
|     | For CF8M/CF3M Stainless steel casing          | 1A3457K0012 |     | For Black spring                            | 1D995448702 |
| 24  | Spring Case Cap Screw (8 required)            |             | 36  | Washer, Plated carbon steel                 | 18B3440X012 |
|     | For WCC Carbon steel or Gray Cast iron casing | 1A579724052 | 38  | Diaphragm Cap Screw, Zinc-plated steel      | 1B290524052 |
|     | For CF8M/CF3M Stainless steel casing          | 1A5797T0012 | 45* | Diaphragm Head Gasket, Composition          | 18B3450X012 |
| 25* | Closing Cap Gasket, Neoprene (CR)             | 1P753306992 | 46  | Nameplate                                   | -----       |
| 26  | Vent Assembly                                 |             | 47  | Drive Screw, Stainless steel (2 required)   | 1A368228982 |
|     | Spring Case Sideways ( <b>standard</b> )      |             | 48  | Flow arrow                                  | -----       |
|     | (Type Y602-12)                                | 27A5516X012 | 49  | Backup Ring, Stainless steel                | 18B3446X012 |
|     | Spring Case Down (Type Y602-1)                | 17A6570X012 | 50  | Lower Spring Seat, Zinc-plated steel        | 1B636325062 |
|     | Spring Case Up (Type Y602-11)                 | 17A5515X012 | 51  | NACE Tag                                    | -----       |
| 27  | Pipe Plug (Type T205 only)                    |             | 52  | Tag Wire                                    | -----       |
|     | Carbon steel ( <b>standard</b> )              | 1A369224492 |     |   |             |
|     | Stainless steel (NACE) <sup>(2)</sup>         | 1A369235072 |     |   |             |

\*Recommended spare part

- Use for optional external square head adjusting screw assembly recommended for 1.2 to 2.5 psig / 83 to 172 mbar, 2.5 to 4.5 psig / 0.17 to 0.31 bar and 4.5 to 7 psig / 0.31 to 0.48 bar spring ranges only.
- NACE Standard MR0175-2002.

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