

Fisher™ 644 and 645 Differential Pressure Pump Governor Actuators

Fisher 644 and 645 actuators are used in combination with any of several sliding-stem valves to automatically control steam-driven boiler feedwater pumps (reciprocating or turbine). The 644 or 645 actuator (see figure 2), when used in combination with one of several push-down-to-close sliding-stem valves, forms a pump governor.

644 and 645 actuators may also be combined with push-down-to-open valves to be used as relief governors. Relief governors are used to divert excess pump discharge back to the suction side of the pump.

Features

- **Rugged Construction**—Steel and cast iron construction provides long service life.
- **Ease of Maintenance**—Few moving parts and easy access reduce maintenance and downtime.
- **Ease of Adjustment**—Spring adjustment is readily accessible without removing any parts.
- **Fast Acting**—Direct-operated configuration provides fast speed of response.

Determining Buildup or Droop

To determine the buildup (for relief applications) or droop (for pressure reducing applications):

1. Find a pressure setting limit range that includes the required pressure setting from table 1.



W2265-1

Fisher 644 Actuator Mounted on easy-e™ Valve Body

2. Find the sensitivity factor for the desired spring and actuator casing combination from table 1.
3. Use the formula below to determine the buildup or droop required for normal actuator travel.

$$P = \frac{Y}{X}$$

where,

P = Buildup (for pressure relief) or Droop (for pressure reduction), bar (psig)

Y = Normal actuator travel, mm (inches)

X = Sensitivity factor from table 1 mm/newtons (inches/psig)

Specifications

Actuator Sizes

See table 1

Actuator Travel

Chloroprene Diaphragm: 11 mm (0.4375 inch) maximum

Stainless Steel Diaphragm: 3 mm (0.125 inch) maximum

Operating Principle

- Direct-acting with push-down-to-close valve
- Reverse-acting with push-down-to-open valve

Differential Pressure Ranges

See table 1

Maximum Casing Pressure

644 Actuator:

Cast-Iron Casing: 20.7 bar (300 psig)

Steel Casing: 41.4 bar (600 psig)

645 Actuator:

Cast-Iron Casing: 34.5 bar (500 psig)

Steel Casing: 69.0 bar (1000 psig)

Construction Materials

Diaphragm:

644: ■ Chloroprene or ■ Stainless steel

645: Chloroprene

Diaphragm Casing: ■ Cast iron or ■ Steel

Diaphragm Head: ■ Cast iron or ■ Steel

Diaphragm Rod: Stainless Steel

Packing: ■ Graphite or ■ PTFE

Maximum ΔP Across Diaphragm

13.8 bar (200 psi)

Effective Diaphragm Area

644:

Size 1: 146 cm² (8.9 inch²)

Size 2: 243 cm² (14.8 inch²)

Size 3: 364 cm² (22.2 inch²)

645: 338 cm² (20.6 inch²)

Material Temperature Capabilities

644:

Chloroprene Diaphragm: -40 to 82°C (-40 to 180°F)

Stainless Steel Diaphragm:

Cast-iron casing: -40 to 232°C (-40 to 450°F); *Steel casing:* -40 to +399°C (-40 to 750°F)

645: -37 to 82°C (-35° to 180°F)

Casing Pressure Connections

1/4 NPT internal

Spring Ranges and Sensitivity

See table 1

Stem Size

644: 9.5 mm (3/8 inch)

645: 12.7 mm (1/2 inch)

Yoke Boss Diameters

644: ■ 54 mm (2-1/8 inch) or

■ 71 mm (2-13/16 inch)

645: 71 mm (2-13/16 inch)

Installation

These actuators may be installed in any position. Typical installations are shown in figure 1. Dimensions are shown in figure 3.

Ordering Information

Application

1. Differential pressure
2. Temperature (normal operating and maximum)

3. Required spring

Actuator

Refer to the specifications table. Review the description to the right of each specification and in the referenced table. Specify a choice wherever there is a selection to be made.

Valve Body and Accessories

Refer to separate valve bulletin and bulletins covering accessories for ordering information.

Figure 1. Typical Installation for Pump Governors

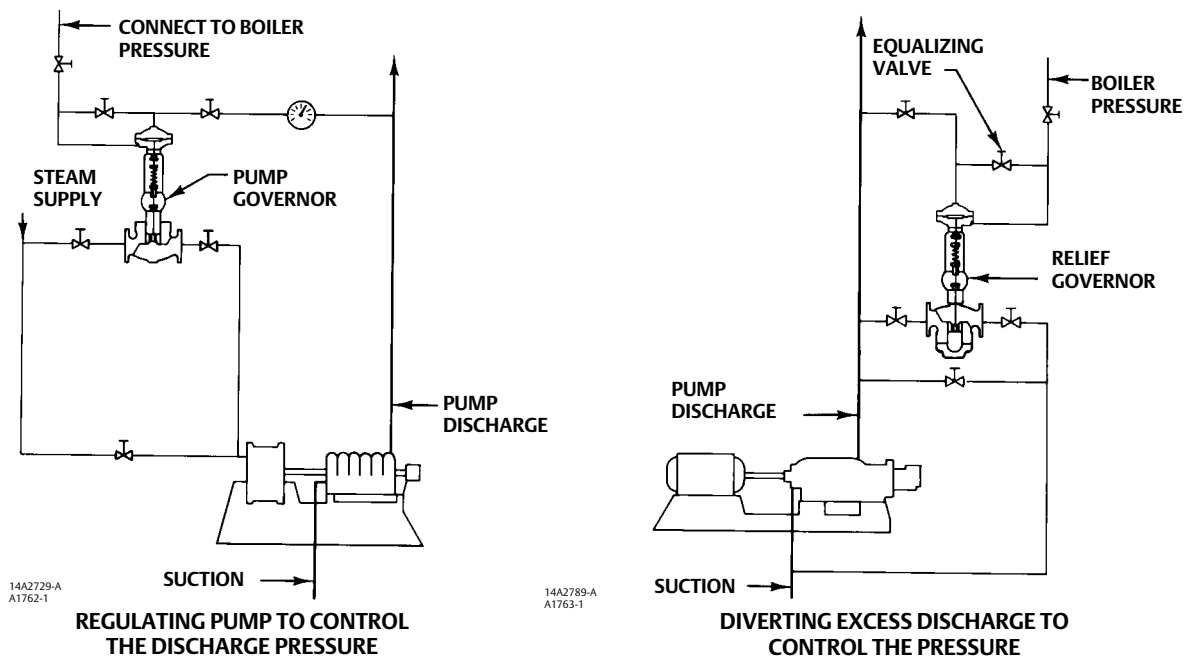


Table 1. Spring Information

| ACTUATOR | | DIFFERENTIAL PRESSURE RANGE | | SPRING RATE | | SENSITIVITY | | SPRING PART NUMBER |
|----------|------------------|-----------------------------|---------|-------------|--------|-------------|-------------|--------------------|
| | | Bar | Psi | N/mm | Lbf/in | mm/N | In/Psi | |
| 644 | Size 3 Casing | 0.3-1.2 | 5-18 | 56 | 314 | 26.1 | 0.0707 | 1F945527032 |
| | | 1.2-1.9 | 18-27 | 107 | 609 | 13.5 | 0.0365 | 1F945627032 |
| | Size 2 Casing | 1.9-2.8 | 27-40 | 107 | 609 | 9.0 | 0.0244 | 1F945627032 |
| | | 2.8-3.8 | 40-55 | 165 | 940 | 6.2 | 0.0168 | 1F945727042 |
| | Size 1 Casing | 3.8-4.7 | 55-68 | 107 | 609 | 5.4 | 0.0146 | 1F945627032 |
| 4.7-6.9 | | 68-100 | 165 | 940 | 3.7 | 0.0101 | 1F945727042 | |
| 645 | | 1.0-1.7 | 14-24 | 43 | 246 | 21.0 | 0.057 | 1F714427112 |
| | | 1.7-2.4 | 24-35 | 64 | 368 | 14.0 | 0.038 | 1F176727032 |
| | | 2.4-3.2 | 35-47 | 86 | 490 | 10.5 | 0.0286 | 1F176827092 |
| | | 3.2-4.1 | 47-59 | 107 | 612 | 11.0 | 0.0299 | 1F176927092 |
| | | 4.1-4.3 | 59-62 | 129 | 735 | 7.1 | 0.0191 | 1E792327092 |
| | | 4.3-5.9 | 62-85 | 145 | 830 | 6.2 | 0.0169 | 1F714327092 |
| | | 5.9-6.8 | 85-99 | 221 | 1260 | 4.1 | 0.0111 | 1E795327082 |
| | | 6.8-8.2 | 99-119 | 257 | 1470 | 3.5 | 0.0095 | 1E792427082 |
| | | 8.2-9.7 | 119-140 | 310 | 1770 | 2.9 | 0.0079 | 1E795427082 |
| | 9.7-10.7 | 140-155 | 368 | 2100 | 2.5 | 0.0067 | 1E793327082 | |

Figure 2. Typical Pump Governor Sectionals

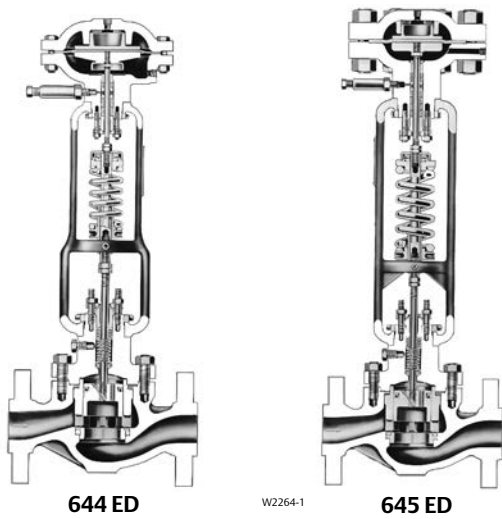


Figure 3. Dimensions

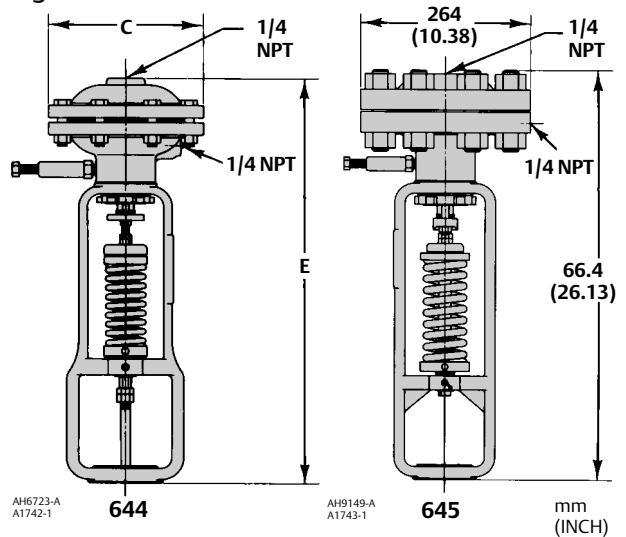


Table 2. Dimensions

| ACTUATOR | YOKE BOSS DIAMETER | | E | | | | | | C (DIAMETER) | | | | | |
|----------|--------------------|---------|--------|-------|--------|-------|--------|-------|--------------|------|--------|------|--------|------|
| | | | SIZE 1 | | SIZE 2 | | SIZE 3 | | SIZE 1 | | SIZE 2 | | SIZE 3 | |
| | mm | Inch | mm | Inch | mm | Inch | mm | Inch | mm | Inch | mm | Inch | mm | Inch |
| 644 | 54 | 2-1/8 | 503 | 19.81 | 521 | 20.50 | 522 | 20.56 | 152 | 6.00 | 206 | 8.12 | 229 | 9.00 |
| | 71 | 2-13/16 | 548 | 21.56 | 565 | 22.25 | 567 | 22.31 | | | | | | |

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Emerson Automation Solutions
Marshalltown, Iowa 50158 USA
Sorocaba, 18087 Brazil
Cernay 68700 France
Dubai, United Arab Emirates
Singapore 128461 Singapore

www.Fisher.com

