

644 and 645 Differential Pressure Pump Governor Actuators

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 figures 1 and 3), 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.
2. Find the sensitivity factor for the desired spring and actuator casing combination from table 1.



W2265-1 / IL

Figure 1. 644 Actuator Mounted on easy-e® Valve Body

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)



644 and 645 Pump Governors

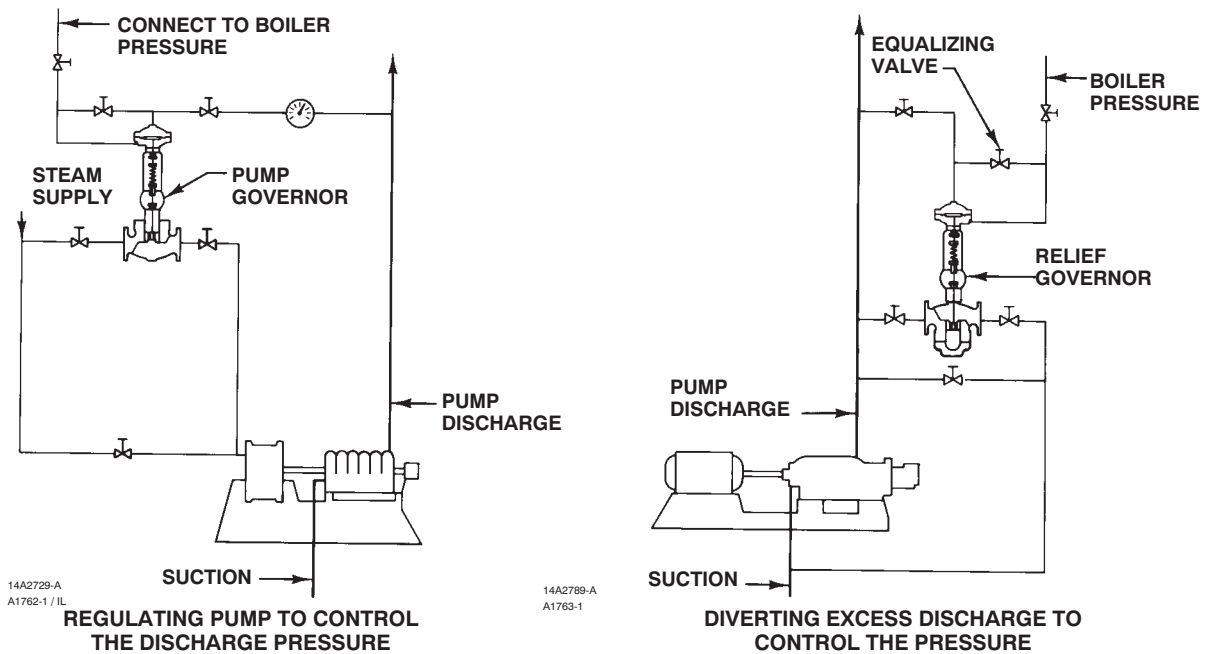


Figure 2. Typical Installation for Pump Governors

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	0.3-1.2	5-18	56	314	26.1	0.0707	1F945527032
	Casing	1.2-1.9	18-27	107	609	13.5	0.0365	1F945627032
	Size 2	1.9-2.8	27-40	107	609	9.0	0.0244	1F945627032
	Casing	2.8-3.8	40-55	165	940	6.2	0.0168	1F945727042
645	Size 1	3.8-4.7	55-68	107	609	5.4	0.0146	1F945627032
	Casing	4.7-6.9	68-100	165	940	3.7	0.0101	1F945727042
		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	

Product Bulletin

61.9:644
August 2008

644 and 645 Pump Governors

Installation

These actuators may be installed in any position. Typical installations are shown in figure 2. Dimensions are shown in figure 4.

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.

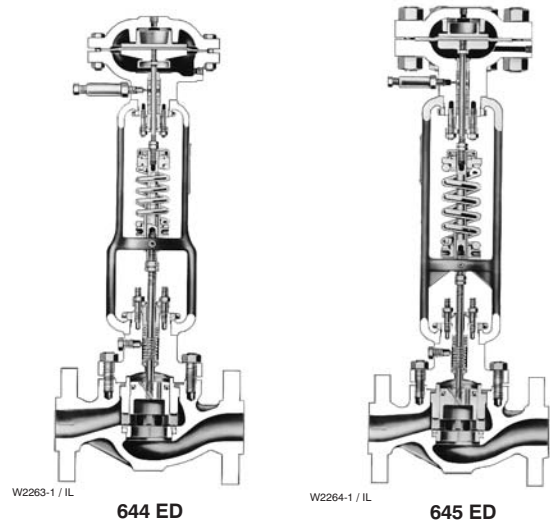


Figure 3. Typical Pump Governor Sectionals

Valve Body and Accessories

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

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						

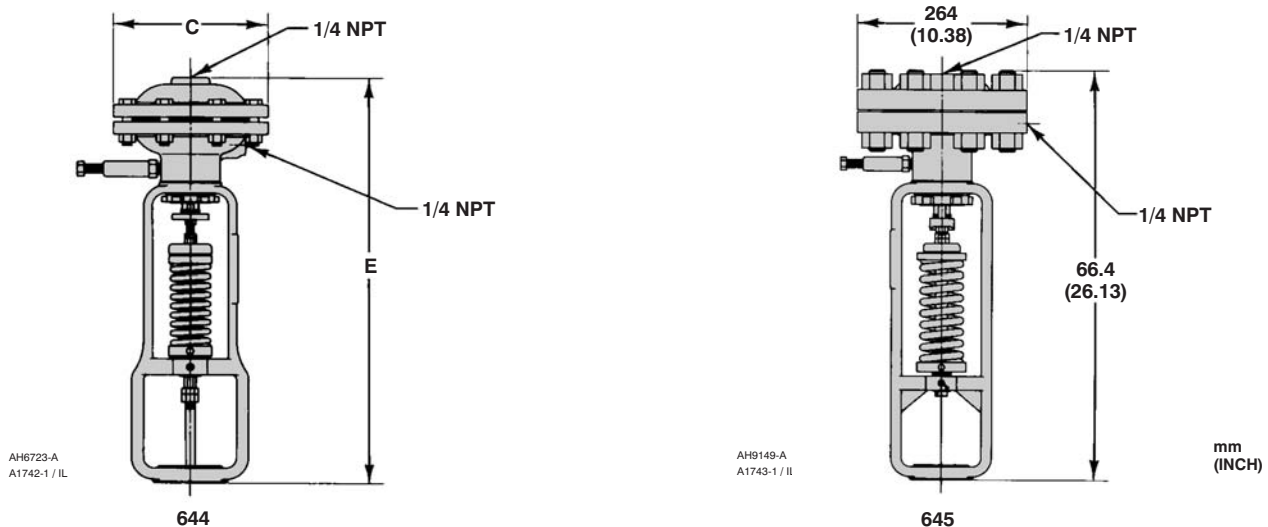


Figure 4. Dimensions

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)

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the

selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

easy-e and Fisher are marks owned by Fisher Controls International LLC, a member of the Emerson Process Management business division of Emerson Electric Co. Emerson Process Management, Emerson, and the Emerson logo are trademarks and service marks of Emerson Electric Co. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use and maintenance of any product remains with the purchaser and end-user.

Emerson Process Management

Marshalltown, Iowa 50158 USA

Sorocaba, 18087 Brazil

Chatham, Kent ME4 4QZ UK

Dubai, United Arab Emirates

Singapore 128461 Singapore

www.Fisher.com



EMERSON
Process Management