Replacement of Fisher™ 685 Actuators with Fisher™ 785C Double-Acting Springless Actuators

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Management of Change

Management of Change (MOC) is a procedure used to proactively manage changes that have the potential to impact safety or the process within a plant. Evaluating new techniques for improving MOC approval procedures can have an impact on plant efficiency. Historically, upgrading obsolete products or replacing existing process control equipment had been delayed or abandoned due to the extensive paperwork involved in completing a complex MOC approval sheet.

Figure 1. Fisher 785C double-acting springless actuator

Background

The Fisher 785C Series is a double-acting springless or single-acting or double-acting spring-return actuator that provides accurate, high thrust output for up to 610 mm (24 inch) travel sliding-stem valve applications. The purpose of this document is to simplify the transition from existing double-acting springless piston actuator technologies to the Fisher 785C double-acting springless actuator.

Contained in this guide are two sections, the first contains questions and answers and the second compares the Fisher 785C actuator to the Fisher 685 actuator. The first section helps users complete MOC approval documents when replacing existing actuators with the 785C model. The second section helps users better understand the differences and similarities between the 785C and the 685 actuator.

Question & Answer Checklist

1 **Q:** Does the proposed modification cause any changes to the piping and instrumentation diagram (P&ID)?

A: No.

2 **Q:** Does the proposed modification change process chemistry, technology, or operating and control philosophies?

A: No.

3 **Q:** Does the proposed modification change how the existing plant is operated?

A: No.

4 **Q:** Does the proposed modification change process flows?

A: No.

5 **Q:** Does the proposed modification change existing pressure relief cases?

A: No.

6 **Q:** Does the proposed modification change the process description?

A: No.

7 **Q:** Have the codes and standards to which the new equipment was designed changed?

A: No.

8 **Q:** Does the proposed modification change the materials of construction, such as a change in material form (cast, forged, or alloy)?

A: No. The plant can specify the materials of constructions as desired.

9 **Q:** Does the proposed modification introduce new equipment items that require periodic predictive maintenance?

A: No. The new equipment items will require the same periodic predictive maintenance required by the old equipment items.

10 **Q:** Does the proposed modification change existing operator training requirements?

A: No. Please refer to the instruction manual when performing maintenance on the Fisher 785C actuator.

11 **Q:** Does the proposed modification introduce new equipment items that require spare parts, training manuals, maintenance procedures or training to teach the maintenance department how to maintain them?

A: Yes, however the new equipment items have the same theory of operation and maintenance procedures as the old equipment items. Documentation for training and maintenance can be obtained in the instruction manual or by contacting your local Emerson sales office.

12 **Q:** Does the proposed modification introduce new equipment items that require spares or obsolete spares for existing equipment?

A: Yes. Spares for old equipment items cannot be used with new equipment items due to differences in dimensions. Documentation on recommended spares can be obtained by providing the two serial numbers, located on the actuator, to your local Emerson sales office.

13 **Q:** Does the proposed modification permanently remove the spares for existing pieces of equipment?

A: No.

14 **Q:** Does the proposed modification change the inspection scope or inspection interval?

A: No.

15 **Q:** Does the proposed modification require welding work to be performed?

A: No.

16 **Q:** Have the materials of construction been reviewed to ensure that the metallurgy is correct?

A: No.

Comparison of Fisher 785C and Fisher 685 Actuators

Even though the Fisher 785C and 685 actuators have identical theories of operation, there are certain key differences and advantages in the design and feature set of the 785C actuator. This section provides insight on the differences and similarities between these two actuators.

Basic Design and Features

The 785C actuator has the same theory of operation, valve-to-actuator mounting type, and valve stem connection diameters as the 685 actuator. The 785C actuator can also be mounted and installed onto the same valves that the 685 actuator is available for and currently installed on. Tables 1, 2, 3 and 4 provide side-by-side comparisons of design specifications, instrument compatibility, materials of construction, and certifications between the 785C and 685 actuators.

Specification	Fisher 785C Actuator(1)	Fisher 685 Actuator(1)
Actuator Type	Double-Acting Piston for Sliding Stem (Globe) Valves	
Yoke Boss Diameter	5, 5H, or 7 inch	5H or 7 inch
Valve Stem Connection	1, 1 1/4, or 2 inch	1 1/4 or 2 inch
Manual Override Capability	Top Mounted Handwheel (280 - 385) Manual Handpump (435 - 685)	Side Mounted Handwheel
Cylinder Diameter	280 to 685 mm (11 to 27 inches)	304 to 660 mm (12 to 26 inches)
Travel	25 to 609.6 mm (1 to 24 inches)	25 to 610 mm (1 to 24 inches)
Operating Pressure	2.7 to 12 bar (40 to 174 psig)	2.7 to 10.3 bar (40 to 150 psig)
Operating Temperature Limits	Standard: -20 to 100°C (-4 to 212°F) Low Temp: -60 to 100°C (-76 to 212°F) High Temp: -20 to 200°C (-4 to 392°F)	Standard: -40 to 93°C (-40 to 200°F) Low Temp: -54 to 93°C (-65 to 200°F) High Temp: -29 to 204°C (-20 to 400°F)
Thrust(2)	1600 KN (359,000 lbs.)	354 KN (79,639 lbs.)
Pressure Connections	3/4, 1/2, 1, or 1 1/4 NPT	3/4, 1, or 1 1/4 NPT

1. Representative of standard constructions
2. Thrust varies depending on supply pressure, cylinder diameter, and stroke direction (push or pull). Values listed are for the push stroke direction.

Table 1. Design specifications comparison

Instrument	Compatible (Yes/No)	
	Fisher 785C Actuator	Fisher 685 Actuator
Fisher FIELDVUE™ DVC6000 Series Positioners	No	Yes
Fisher FIELDVUE DVC6200 Series Positioners	Yes	Yes
Fisher 2625 Volume Booster	Yes	Yes
Fisher SS-263 Volume Booster	No (Available by Request)	Yes
Fisher 377 Trip Valve	Yes	Yes
TopWorx™ GO Switch™ Position Sensor	Yes	Yes

Table 2. Instrument compatibility comparison

Part	Fisher 785C Actuator	Fisher 685 Actuator
Yoke	Carbon Steel	Carbon Steel
Piston	Carbon Steel	Carbon Steel
Cylinder	Carbon Steel	Carbon Steel
Upper/Lower Heads	Carbon Steel	Carbon Steel
Tie Bolt	Carbon Steel or Stainless Steel	Carbon Steel
Piston Rod	Stainless Steel	Stainless Steel
Stem Connector	Carbon Steel or Stainless Steel	Carbon Steel
Nameplate and Travel Scale	Stainless Steel	—

Table 3. Materials of construction comparison for standard temperature range

Certification	Fisher 785C Actuator	Fisher 685 Actuator
PED	PED 2014/68/EU	PED (97/23/EC)
ATEX	ATEX Group II Category 2 Gas and Dust	ATEX Group II Category 2 Gas and Dust
SIL	Safety Instrumented System, SIL 3 Capable	Safety Instrumented System, SIL 2 Capable
CUTR	Customs Union Technical Regulations (CUTR) 010/2011 and 012/2011	Customs Union Technical Regulations (CUTR) 010/2011 and 012/2011

Table 4: Certifications comparison

Weight

See Table 5 for side-by-side comparisons of design weight without manual override between the Fisher 785C and 685 actuators. For complete weight comparisons check the Fisher 785C product bulletin and Fisher 685 product bulletin.

Fisher 785C Actuator		Fisher 685 Actuator	
Cylinder Size, mm (inch)	**Weight(1,2), kg (lbs.)**	**Cylinder Size, mm (inch)**	**Weight(1,2), kg (lbs.)**
280 (11)	142 (313)	Cylinder sizes not available for maximum travel of 203 mm (8 inch)	
335 (13)	173 (381)		
385 (15)	240 (529)		
435 (17)	283 (624)		
485 (19)	325 (717)	508 (20)	430 (947)
535 (21)	373 (822)	558 (22)	505 (1114)
585 (23)	490 (1080)	609 (24)	702 (1548)
635 (25)	561 (1237)	660 (26)	804 (1771)
685 (27)	660 (1455)	—	—

1. Representative of actuator without handwheel.
2. Representative of actuator with 5H yoke boss.

Table 5: Weight comparison

Envelope Dimensions

Refer to Tables 6, 7, and 8 with Figure 2 for a comparison of envelope dimensions between the 785C and 685 actuators.

	Width, mm (Inches)			
	785C Size 485 (19)	**685 Size 508 (20)**	**785C Size 535 (21)**	**685 Size 558 (22)**
Without Manual Override	630 (25)	591 (23)	680 (27)	654 (26)

Table 6: Width envelope dimensions

Travel, mm (inch)	**Height for a 127 mm (5H) Yoke Boss Diameter, mm (inches)**			
	Without Manual Override			
	785C Size 485 (19.09)	**685 Size 508 (20)**	**785C Size 535 (21.06)**	**685 Size 558 (22)**
102 (4)	767 (30.20)	754 (29.69)	798 (31.42)	754 (29.69)
203 (8)	952 (37.48)	941 (37.06)	994 (39.13)	941 (37.06)

Table 7: Height envelope dimensions for actuators with 5H yoke boss diameter

Travel, mm (inch)	Height for a 178 mm (7 inch) Yoke Boss Diameter, mm (inches)			
	Without Manual Override			
	785C Size 485 (19.09)	685 Size 508 (20)	785C Size 535 (21.06)	685 Size 558 (22)
102 (4)	797 (31.38)	786 (30.94)	799 (31.46)	786 (30.94)
203 (8)	1028 (79.84)	1018 (40.06)	1030 (40.55)	1018 (40.06)

Table 8: Height envelope dimensions for actuators with 7 yoke boss diameter

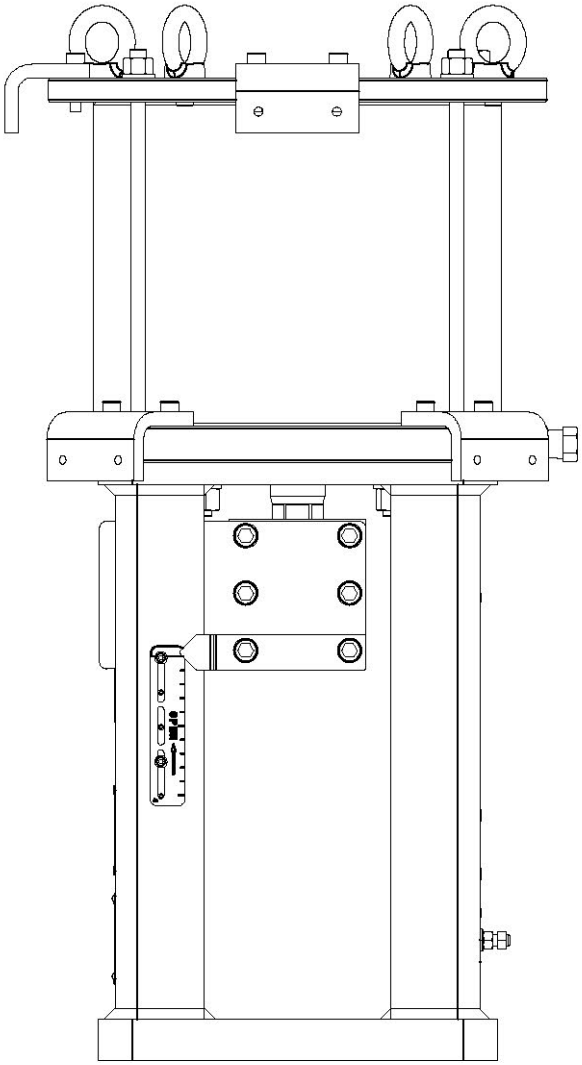

Figure 2: Fisher 785C Double-Acting Springless Without Manual Override Actuator

Conclusion

Introducing the Fisher 785C actuator in addition to the Fisher 685 actuator will not affect Fisher 685 actuators currently installed in plants. The Fisher 785C actuator offers new sizes and features in addition to the previous 685 actuator offerings and will offer at least the same application coverage range as the 685 actuators.

Please contact your local Emerson sales office for additional details or questions regarding Fisher 785C actuators.

Visit Fisher.com to find an Emerson sales contact in your area.

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