Fisher® 685 Piston Actuator

The 685 is a double-acting piston actuator that provides accurate, high thrust output for short to long travel applications. This actuator is designed for use with a variety of medium to large Fisher sliding-stem control valves including the easy-e™, FB, TBX, HP, EH, and 461.

The 685 family is available in several configurations to cover a wide range of application requirements. Typical travels range from 25 to 610 mm (1 to 24 inches) and cylinder diameters range from 305 to 660 mm (12 to 26 inches). Thrust capabilities extend to 354 kN (79,000 lbf) and above with special constructions.

The 685 can be used with the FIELDVUE™ DVC6200 digital valve controller for throttling applications, or with switching valves for on-off control. This actuator can also be fitted with volume boosters for fast stroking requirements.

X0922

Features

- High Thrust Capability – Maximum thrusts of up to 354 kN (79,000 lbf) can be produced.
- Broad Application Coverage – Standard constructions offer travels of up to 610 mm (24 inches) and cylinder diameters of up to 660 mm (26 inches). Even larger constructions are available upon request.
- Low Friction – Low friction piston seals and either chrome plated or fluoropolymer coated cylinder bores reduce sliding friction and wear.
- Wide Temperature Range – Standard constructions offer a temperature range of -40 to 93°C (-40 to 200°F), however higher or lower temperatures are possible. Special constructions can operate as low as -54°C (-65°F) and as high as 204°C (400°F).
- Manual Override – An optional side-mounted handwheel is capable of extending or retracting the actuator manually and can be engaged at any position from full open to full closed.

Table 1. Specifications

Operating Pressure(1)

Minimum: 2.7 bar (40psig)

Maximum Allowable: 10.3 bar (150 psig)

Consult your Emerson Process Management sales office for supply pressures under 2.7 bar (40 psig)

Travel(2)

25 mm (1 inch) through 610 mm (24 inch)
See table 4

Thrust Capabilities

See table 5

Piston Diameter and Area(2)

Available in 51 mm (2 inch) increments between 305 mm (12 inch) and 660 mm (26 inch)
See table 4

For additional sizes, contact your Emerson Process Management sales office.

Operative Temperature Limits

Standard: -40 to 93°C (-40 to 200°F)

Low Temperature: -54 to 93°C (-65 to 200°F)(3)
High Temperature: -29 to 204°C (-20 to 400°F)(3)

Yoke Boss and Valve Stem Diameter

■ 127 mm (5H inch) yoke boss with 32 mm (1-1/4 inch) stem ■ 178 mm (7 inch) yoke boss with 51 mm (2 inch) stem

Pressure Connections

Standard: 3/4 NPT

Optional: 1 and 1-1/4 NPT
See figure 2 and table 6

Instrument Mounting

Mounting kits are available for use with the FIELDVUE DVC6200 series positioner

Construction Materials

PART	MATERIAL
Yoke	ASTM A36 (steel)
Piston	ASTM A36 (steel)
Cylinder	**305 to 559 mm (12 to 22 inch) cylinder:** 1026 DOM (steel) with chrome-plated bore **610 to 660 mm (24 to 26 inch) cylinder:** ASTM A516 Grade 70 (steel) with fluoropolymer coated bore
Upper/Lower Heads	ASTM A36 (steel)
Tie Bolt	ASTM A311 1045, Class B (steel)
Piston Rod	S31603 (316L stainless steel)
Stem Connector	ASTM A36 (steel)

Weights

See tables 11 and 12

Lifting Point Load Ratings

See table 2

Options

■ Mechanical Handwheel, ■ Pneumatic fail mode via Fisher 377 trip valve, ■ Volume Boosters, ■ Fisher Optimized Digital Valve (ODV) Package

Dimensions

See figure 3 and tables 7, 8, 9, and 10

Optional Certifications(4)

■ Pressure Equipment Directive (PED) 97/23/EC,
■ ATEX Group II Category 2 Gas and Dust

CE ⟨Ex⟩ II 2 G D ,

■ Customs Union Technical Regulations (CUTR) 010/2011 and 012/2011

EAC ⟨Ex⟩ II Gb c T* X/III Db c T* X ,

Fisher 685 actuators have been evaluated for ignition hazard and certified for CUTR 012/2011 under "protection by constructional safety". To ensure conformity with CUTR, only Fisher parts and materials can be used.

■ Safety Instrumented System, SIL 2 Capable - certified by TUV Rheinland

1. The pressure/temperature limits in this bulletin and any other applicable standard or code should not be exceeded.
2. Consult your Emerson Process Management sales office for larger travels or cylinder diameters. The Fisher 585C family of actuators can be used for smaller travels or cylinder diameters.
3. Consult your Emerson Process Management sales office for applications requiring low or high temperature requirements.
4. Refer to the product nameplates to determine which certifications each actuator construction possesses.

Principle of Operation

685 piston actuators utilize a pneumatically controlled piston that moves inside of a cylinder to generate thrust. A seal contained on the circumference of the piston provides a seal between the piston and the cylinder, preventing supply pressure leakage.

From an equilibrium state, the actuator operates by reacting to a force unbalance that is created by increasing supply pressure on one side of the piston, and decreasing it on the other. This moves the piston up or down, and results in a repositioning of the attached control valve. Travel can be adjusted using travel limits within a valve positioner, which limit the travel range of the actuator. The optional handwheel manual override does not have the ability to act as a hard travel stop.

An optional handwheel manual override is capable of extending or retracting the actuator manually and can be engaged at any position from full open to full close. This override utilizes a worm gear assembly that is attached to the stem connector and not attached to the cylinder or piston rod. This enables the manual override to reposition the control valve even if the actuator cylinder or piston is removed for maintenance.

Instrument Selection

An excellent selection of sensitive and accurate instruments is available for 685 piston actuators. These include the FIELDVUE DVC6200 digital valve controller, as well trip valves and volume boosters.

DVC6200 Digital Valve Controller

FIELDVUE DVC6200 digital valve controllers are communicating, microprocessor-based current-to-pneumatic instruments. In addition to the traditional function of converting a current signal to a pressure signal, DVC6200 digital valve controllers, using HART® or FOUNDATION™ fieldbus communications protocol, give easy access to information critical to process operation.

For additional information, refer to Fisher bulletin 62.1:DVC6200 (D103415X012) or 62.1:DVC6200f (D103399X012), available at www.FIELDVUE.com or from your Emerson Process Management sales office.

Figure 1. Fisher 685 Piston Actuator

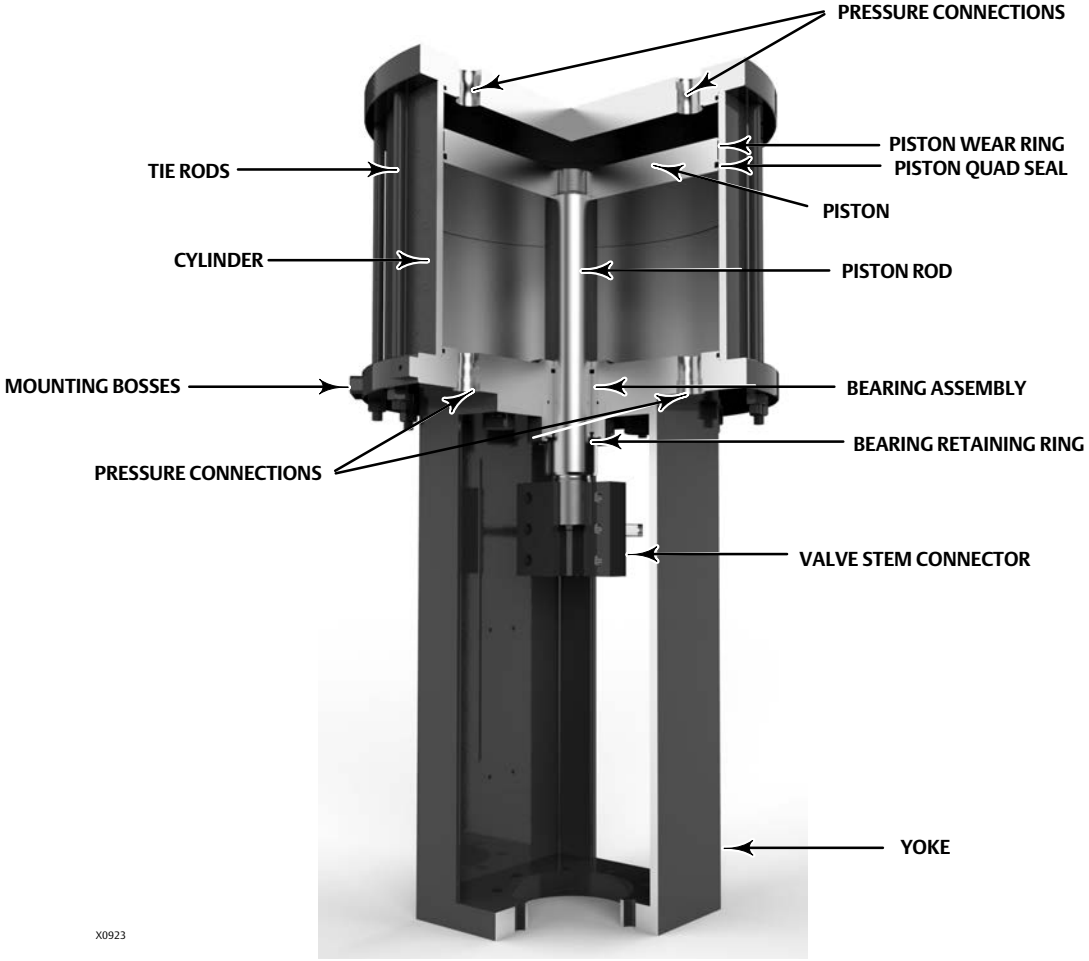


Table 2. Lifting Point Load Ratings

ACTUATOR SIZE	LIFTING ORIENTATION	NUMBER OF LIFTING POINTS USED	MAXIMUM LOAD	
			kg	lbs
12 to 24	Actuator Centerline Horizontal	2	1540	3400
26		2	2860	6300
12 to 24	Actuator Centerline Vertical	2	3760	8300
26		2	6350	14000

Table 3. Handwheel Specification

ACTUATOR SIZE	OUTPUT THRUST		HANDWHEEL DIAMETER		TURNS PER mm OF TRAVEL	TURNS PER INCH OF TRAVEL	MAXIMUM RIM FORCE REQUIRED	
	N	lbs	mm	Inch			N	lbs
12	44482	10000	305	12	3.8	96	290	65
14 to 18	88964	20000	406	16	3.0	80	380	85
20 to 26	133447	30000	610	24	2.8	72	450	100

Table 4. Standard Constructions[1]

ACTUATOR SIZE	PISTON DIAMETER	PISTON ROD AREA	PISTON AREA	VALVE STEM CONNECTOR SIZE	YOKE BOSS DIAMETER	VALVE TRAVEL	
						Minimum	Maximum
mm (cm^2 for Area)							
12	305	16	730	32 or 51	127 or 178	>203	610
14	356	32	993	32 or 51	127 or 178	>203	610
16	406	32	1297	32 or 51	127 or 178	>203	610
18	457	32	1642	32 or 51	127 or 178	>203	610
20	508	46	2027	32 or 51	127 or 178	25	610
22	559	46	2452	32 or 51	127 or 178	25	610
24	610	62	2919	32 or 51	127 or 178	25	610
26	660	62	3425	32 or 51	127 or 178	25	610
Inches ($inch^2$ for Area)							
12	12	2.41	113	1 1/4 or 2	5H or 7	>8	24
14	14	4.91	154	1 1/4 or 2	5H or 7	>8	24
16	16	4.91	201	1 1/4 or 2	5H or 7	>8	24
18	18	4.91	254	1 1/4 or 2	5H or 7	>8	24
20	20	7.07	314	1 1/4 or 2	5H or 7	1	24
22	22	7.07	380	1 1/4 or 2	5H or 7	1	24
24	24	9.62	452	1 1/4 or 2	5H or 7	1	24
26	26	9.62	531	1 1/4 or 2	5H or 7	1	24

1. Consult your Emerson Process Management sales office for additional sizes.

Table 5. Thrust

ACTUATOR SIZE	STROKE	THRUST AT SUPPLY PRESSURE, N (LBF)[1]			
		4.1 barg (60 psig)	5.5 barg (80 psig)	6.9 barg (100 psig)	10.3 barg (150 psig)[2]
12	Push	30183 (6786)	40245 (9048)	50306 (11310)	75459 (16965)
14		41083 (9236)	54777 (12315)	68472 (15394)	102707 (23091)
16		53659 (12064)	71546 (16085)	89432 (20106)	134149 (30159)
18		67913 (15268)	90550 (20358)	113188 (25447)	169782 (38170)
20		83843 (18850)	111790 (25133)	139738 (31416)	209607 (47124)
22		101450 (22808)	135266 (30411)	169083 (38013)	253625 (57020)
24		120734 (27143)	160978 (36191)	201223 (45239)	301834 (67858)
26		141694 (31856)	188926 (42474)	236157 (53093)	354236 (79639)
12	Pull	29540 (6641)	39387 (8855)	49234 (11069)	73851 (16603)
14		39773 (8942)	53030 (11922)	66288 (14903)	99432 (22354)
16		52349 (11769)	69799 (15692)	87248 (19615)	130873 (29423)
18		66602 (14974)	88803 (19965)	111004 (24956)	166506 (37434)
20		81956 (18425)	109275 (24567)	136593 (30709)	204890 (46063)
22		99563 (22384)	132751 (29845)	165938 (37306)	248907 (55959)
24		118166 (26566)	157555 (35422)	196944 (44277)	295416 (66415)
26		139127 (31279)	185503 (41705)	231878 (52131)	347817 (78196)

1. Consult your Emerson Process Management sales office for supply pressures below 40 psig.
2. Maximum available thrust.

Figure 2. Position of Pressure Connections

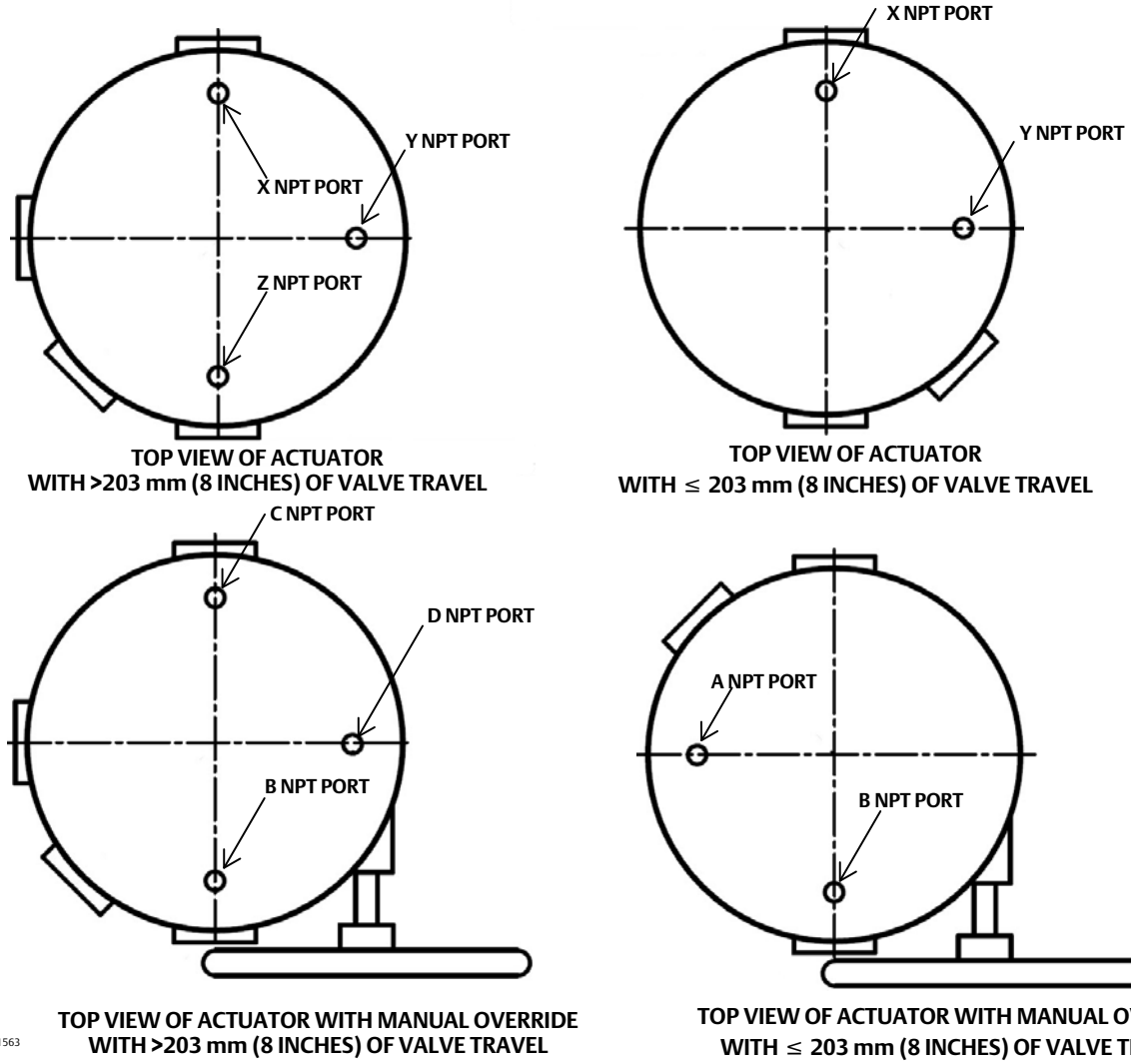
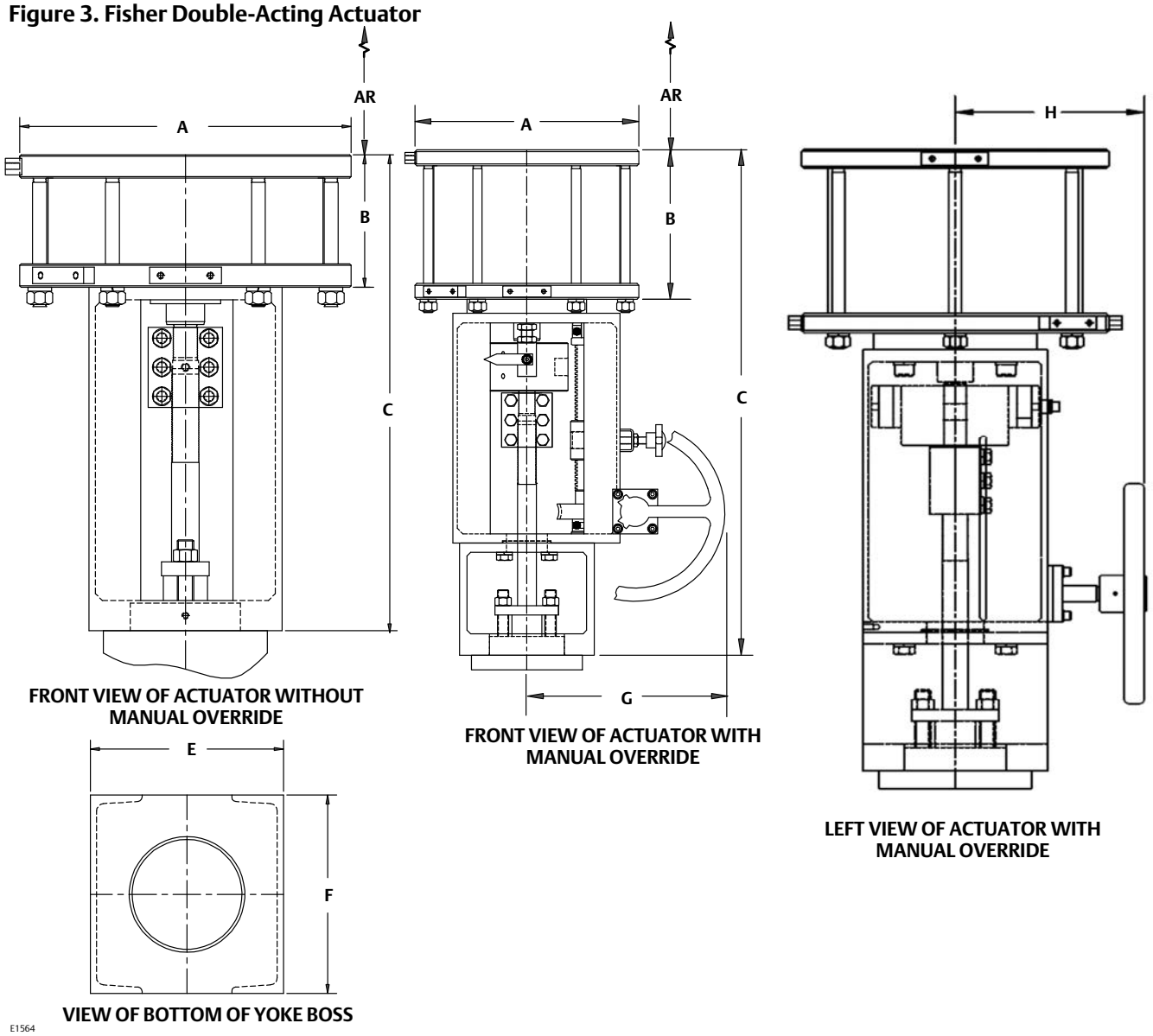


Table 6. Pressure Connections

WITH MANUAL OVERRIDE	ACTUATOR SIZE	TRAVEL		SUPPLY CONNECTION		
		mm	Inches	Size, NPT(2)	Quantity (Top/Bottom)(2)	Location(1)
No	12	>203	>8	3/4	1/1	Z
					2/2	X and Z
	14 to 26	>203	>8	3/4, 1, or 1-1/4	1/1	Z
					2/2	Y and Z
	20 to 26	≤ 203	≤ 8	3/4, 1, or 1-1/4	1/1	Y
					2/2	X and Y
Yes	12	>203	>8	3/4	1/1	B
					2/2	B and C
	14 to 26	>203	>8	3/4, 1, or 1-1/4	1/1	B
					2/2	B and D
	20 to 26	≤ 203	≤ 8	3/4, 1, or 1-1/4	1/1	A
					2/2	A and B

1. Refer to figure 2.
2. Quantity of 2 top and 2 bottom is available as standard for 3/4 NPT only.

Figure 3. Fisher Double-Acting Actuator



FRONT VIEW OF ACTUATOR WITHOUT MANUAL OVERRIDE

FRONT VIEW OF ACTUATOR WITH MANUAL OVERRIDE

LEFT VIEW OF ACTUATOR WITH MANUAL OVERRIDE

VIEW OF BOTTOM OF YOKE BOSS

Table 7. Dimensions A, G, and H

ACTUATOR SIZE	A		G		H	
	mm	Inch	mm	Inch	mm	Inch
12	381	15.00	338	13.31	235	9.25
14	432	17.00	435	17.13	253	9.98
16	489	19.25	435	17.13	253	9.98
18	543	21.38	435	17.13	253	9.98
20	591	23.25	581	22.88	434	17.10
22	654	25.75	581	22.88	434	17.10
24	711	28.00	584	23.00	484	19.06
26	775	30.50	584	23.00	484	19.06

Table 8. Dimension B

ACTUATOR SIZE	Dimension B for Maximum Valve Travel, mm (Inch)											
	102 mm (4 inch)		203 mm (8 inch)		305 mm (12.00 inch)		406 mm (16.00 inch)		508 mm (20.00 inch)		610 mm (24.00 inch)	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
12					432	17.00	533	21.00	635	25.00	737	29.00
14					445	17.50	546	21.50	648	25.50	749	29.50
16					445	17.50	546	21.50	648	25.50	749	29.50
18					445	17.50	546	21.50	648	25.50	749	29.50
20	259	10.20	361	14.20	462	18.20	564	22.20	665	26.20	767	30.20
22	259	10.20	361	14.20	462	18.20	564	22.20	665	26.20	767	30.20
24	265	10.45	367	14.45	469	18.45	570	22.45	672	26.45	773	30.45
26	265	10.45	367	14.45	469	18.45	570	22.45	672	26.45	773	30.45

Table 9. Dimensions E and F

ACTUATOR SIZE	WITHOUT MANUAL OVERRIDE								WITH MANUAL OVERRIDE							
	E				F				E				F			
	5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
12	222	8.75	267	10.50	203	8.00	229	9.00	251	9.88	279	11.00	229	9.00	229	9.00
14	229	9.00	267	10.50	203	8.00	229	9.00	238	9.38	279	11.00	305	12.00	305	12.00
16	229	9.00	267	10.50	203	8.00	229	9.00	238	9.38	279	11.00	305	12.00	305	12.00
18	229	9.00	267	10.50	203	8.00	229	9.00	238	9.38	279	11.00	305	12.00	305	12.00
20	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	330	13.00	330	13.00
22	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	305	12.00	330	13.00	330	13.00
24	406	16.00	406	16.00	457	18.00	457	18.00	476	18.75	476	18.75	457	18.00	457	18.00
26	406	16.00	406	16.00	457	18.00	457	18.00	476	18.75	476	18.75	457	18.00	457	18.00

Table 10. Dimensions C and AR (Actuator Removal Clearance)

ACTUATOR SIZE	MAXIMUM VALVE TRAVEL		WITHOUT MANUAL OVERRIDE								WITH MANUAL OVERRIDE							
			C				AR (Actuator Removal Clearance)				C				AR (Actuator Removal Clearance)			
			5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
12	267	10.50	1078	42.44	1078	42.44	381	15.00	381	15.00	1192	46.94	1192	46.94	381	15.00	381	15.00
	279	11.00	1078	42.44	1078	42.44	318	12.50	318	12.50	1192	46.94	1230	48.44	318	12.50	356	14.00
	305	12.00	1078	42.44	1078	42.44	305	12.00	305	12.00	1218	47.94	1230	48.44	330	13.00	343	13.50
	368	14.50	1281	50.44	1281	50.44	381	15.00	381	15.00	1319	51.94	1395	54.94	305	12.00	381	15.00
	381	15.00	1281	50.44	1281	50.44	318	12.50	318	12.50	1319	51.94	1434	56.44	241	9.50	356	14.00
	406	16.00	1281	50.44	1281	50.44	305	12.00	305	12.00	1421	55.94	1434	56.44	330	13.00	343	13.50
	470	18.50	1484	58.44	1484	58.44	381	15.00	381	15.00	1599	62.94	1599	62.94	381	15.00	381	15.00
	483	19.00	1484	58.44	1484	58.44	318	12.50	318	12.50	1599	62.94	1637	64.44	318	12.50	356	14.00
	508	20.00	1484	58.44	1484	58.44	305	12.00	305	12.00	1624	63.94	1637	64.44	330	13.00	343	13.50
	572	22.50	1688	66.44	1688	66.44	381	15.00	381	15.00	1802	70.94	1802	70.94	381	15.00	381	15.00
	584	23.00	1688	66.44	1688	66.44	318	12.50	318	12.50	1802	70.94	1840	72.44	318	12.50	356	14.00
	610	24.00	1688	66.44	1688	66.44	305	12.00	305	12.00	1827	71.94	1840	72.44	330	13.00	343	13.50
14, 16, and 18	267	10.50	1124	44.25	1124	44.25	381	15.00	381	15.00	1294	50.94	1294	50.94	381	15.00	381	15.00
	279	11.00	1124	44.25	1124	44.25	318	12.50	318	12.50	1294	50.94	1332	52.44	318	12.50	356	14.00
	305	12.00	1124	44.25	1124	44.25	305	12.00	305	12.00	1319	51.94	1332	52.44	330	13.00	343	13.50
	368	14.50	1327	52.25	1327	52.25	381	15.00	381	15.00	1421	55.94	1497	58.94	305	12.00	381	15.00
	381	15.00	1327	52.25	1327	52.25	318	12.50	318	12.50	1421	55.94	1535	60.44	241	9.50	356	14.00
	406	16.00	1327	52.25	1327	52.25	305	12.00	305	12.00	1522	59.94	1535	60.44	330	13.00	343	13.50
	470	18.50	1530	60.25	1530	60.25	381	15.00	381	15.00	1700	66.94	1700	66.94	381	15.00	381	15.00
	483	19.00	1530	60.25	1530	60.25	318	12.50	318	12.50	1700	66.94	1738	68.44	318	12.50	356	14.00
	508	20.00	1530	60.25	1530	60.25	305	12.00	305	12.00	1726	67.94	1738	68.44	330	13.00	343	13.50
	572	22.50	1734	68.25	1734	68.25	381	15.00	381	15.00	1903	74.94	1903	74.94	381	15.00	381	15.00
	584	23.00	1734	68.25	1734	68.25	318	12.50	318	12.50	1903	74.94	1942	76.44	318	12.50	356	14.00
	610	24.00	1734	68.25	1734	68.25	305	12.00	305	12.00	1929	75.94	1942	76.44	330	13.00	343	13.50
20 and 22	102	4.00	754	29.69	786	30.94	334	13.13	365	14.38	937	36.88	949	37.38	381	15.00	394	15.50
	152	6.00	941	37.06	967	38.06	343	13.50	368	14.50	1140	44.88	1102	43.38	406	16.00	368	14.50
	203	8.00	941	37.06	1018	40.06	292	11.50	368	14.50	1140	44.88	1153	45.38	356	14.00	368	14.50
	267	10.50	1183	46.56	1183	46.56	381	15.00	381	15.00	1318	51.88	1318	51.88	381	15.00	381	15.00
	279	11.00	1183	46.56	1183	46.56	318	12.50	318	12.50	1318	51.88	1356	53.38	318	12.50	356	14.00
	305	12.00	1183	46.56	1183	46.56	305	12.00	305	12.00	1343	52.88	1356	53.38	330	13.00	343	13.50
	368	14.50	1386	54.56	1386	54.56	381	15.00	381	15.00	1445	56.88	1521	59.88	305	12.00	381	15.00
	381	15.00	1386	54.56	1386	54.56	318	12.50	318	12.50	1445	56.88	1559	61.38	241	9.50	356	14.00
	406	16.00	1386	54.56	1386	54.56	305	12.00	305	12.00	1546	60.88	1559	61.38	330	13.00	343	13.50
	470	18.50	1589	62.56	1589	62.56	381	15.00	381	15.00	1724	67.88	1724	67.88	381	15.00	381	15.00
	483	19.00	1589	62.56	1589	62.56	318	12.50	318	12.50	1724	67.88	1762	69.38	318	12.50	356	14.00
	508	20.00	1589	62.56	1589	62.56	305	12.00	305	12.00	1750	68.88	1762	69.38	330	13.00	343	13.50
	572	22.50	1792	70.56	1792	70.56	381	15.00	381	15.00	1927	75.88	1927	75.88	381	15.00	381	15.00
	584	23.00	1792	70.56	1792	70.56	318	12.50	318	12.50	1927	75.88	1965	77.38	318	12.50	356	14.00
	610	24.00	1792	70.56	1792	70.56	305	12.00	305	12.00	1953	76.88	1965	77.38	330	13.00	343	13.50

-continued-

Table 10. Dimensions C and AR (Actuator Removal Clearance) (continued)

ACTUATOR SIZE	MAXIMUM VALVE TRAVEL		WITHOUT MANUAL OVERRIDE								WITH MANUAL OVERRIDE							
			C				AR (Actuator Removal Clearance)				C				AR (Actuator Removal Clearance)			
			5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss		5H Yoke Boss		7 Inch Yoke Boss	
	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
24 and 26	102	4.00	794	31.26	826	32.51	334	13.13	365	14.38	1000	39.38	1013	39.88	381	15.00	394	15.50
	152	6.00	981	38.63	1007	39.63	343	13.50	368	14.50	1203	47.38	1165	45.88	406	16.00	368	14.50
	203	8.00	981	38.63	1057	41.63	292	11.50	368	14.50	1203	47.38	1216	47.88	356	14.00	368	14.50
	267	10.50	1223	48.13	1223	48.13	381	15.00	381	15.00	1381	54.38	1381	54.38	381	15.00	381	15.00
	279	11.00	1223	48.13	1223	48.13	318	12.50	318	12.50	1381	54.38	1419	55.88	318	12.50	356	14.00
	305	12.00	1223	48.13	1223	48.13	305	12.00	305	12.00	1407	55.38	1419	55.88	330	13.00	343	13.50
	368	14.50	1426	56.13	1426	56.13	381	15.00	381	15.00	1508	59.38	1584	62.38	305	12.00	381	15.00
	381	15.00	1426	56.13	1426	56.13	318	12.50	318	12.50	1508	59.38	1623	63.88	241	9.50	356	14.00
	406	16.00	1426	56.13	1426	56.13	305	12.00	305	12.00	1610	63.38	1623	63.88	330	13.00	343	13.50
	470	18.50	1629	64.13	1629	64.13	381	15.00	381	15.00	1788	70.38	1788	70.38	381	15.00	381	15.00
	483	19.00	1629	64.13	1629	64.13	318	12.50	318	12.50	1788	70.38	1826	71.88	318	12.50	356	14.00
	508	20.00	1629	64.13	1629	64.13	305	12.00	305	12.00	1813	71.38	1826	71.88	330	13.00	343	13.50
	572	22.50	1832	72.13	1832	72.13	381	15.00	381	15.00	1991	78.38	1991	78.38	381	15.00	381	15.00
	584	23.00	1832	72.13	1832	72.13	318	12.50	318	12.50	1991	78.38	2029	79.88	318	12.50	356	14.00
	610	24.00	1832	72.13	1832	72.13	305	12.00	305	12.00	2016	79.38	2029	79.88	330	13.00	343	13.50

Table 11. Approximate Weights for Constructions without Handwheels

MAXIMUM VALVE TRAVEL	APPROXIMATE WEIGHT FOR ACTUATOR SIZE, kg (lbs)							
mm (inches)	12	14	16	18	20	22	24	26
102 (4.00)					402 (886)	475 (1048)	662 (1459)	761 (1677)
203 (8.00)					430 (947)	505 (1114)	702 (1548)	804 (1771)
305 (12.00)	157 (346)	245 (541)	292 (643)	337 (742)	457 (1008)	535 (1180)	743 (1637)	847 (1866)
406 (16.00)	168 (370)	262 (577)	311 (686)	358 (789)	485 (1069)	565 (1246)	783 (1726)	889 (1961)
508 (20.00)	179 (395)	278 (614)	331 (729)	379 (836)	512 (1129)	595 (1311)	823 (1815)	932 (2056)
610 (24.00)	190 (420)	295 (650)	350 (773)	401 (883)	540 (1190)	625 (1377)	864 (1904)	975 (2150)

Table 12. Approximate Weights for Constructions with Handwheels

MAXIMUM VALVE TRAVEL	APPROXIMATE WEIGHT FOR ACTUATOR SIZE, kg (lbs)							
mm (inches)	12	14	16	18	20	22	24	26
102 (4.00)					591 (1304)	664 (1463)	834 (1838)	925 (2038)
203 (8.00)					622 (1372)	696 (1535)	873 (1924)	965 (2128)
305 (12.00)	226 (499)	363 (800)	292 (643)	454 (1000)	653 (1440)	729 (1607)	912 (2010)	1006 (2218)
406 (16.00)	239 (527)	380 (838)	311 (686)	474 (1046)	684 (1508)	762 (1679)	951 (2096)	1047 (2308)
508 (20.00)	252 (555)	397 (876)	331 (729)	495 (1092)	715 (1576)	794 (1751)	990 (2182)	1088 (2398)
610 (24.00)	264 (583)	415 (914)	350 (773)	516 (1138)	746 (1644)	827 (1823)	1029 (2268)	1129 (2488)

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