

# Baumann™ 24000 Little Scotty™ Bronze Control Valve

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Figure 1. 24000 Little Scotty Control Valve with Baumann 32 Actuator and FIELDVUE™ DVC2000 Digital Valve Controller



W9753

## Introduction

Baumann Little Scotty industrial control valves (figure 1) are intended for general utility service in pressure, flow, and temperature control applications.

Industrial grade control valves exhibit low hysteresis and deadband, good control characteristics, tight shutoff, rugged construction, high performance packing, and easy maintainability. This translates into reduced maintenance costs, reduced process variability, and increased process availability.

## Scope of Manual

This instruction manual includes installation, maintenance, and parts information for the Baumann 24000 bronze control valve.

Do not install, operate, or maintain Baumann 24000 control valves without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your [Emerson sales office](#) or Local Business Partner before proceeding.

**⚠ WARNING**

Always wear protective gloves, clothing and eyewear when performing any installation operations to avoid personal injury.

Personal injury or property damage caused by sudden release of pressure or bursting of pressure retaining parts may result if service conditions exceed those for which the product was intended. To avoid injury or damage, provide a relief valve for over pressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

**CAUTION**

This valve is intended for a specific range of pressures, temperatures and other application specifications. Applying different pressures and temperatures to the valve could result in parts damage, malfunction of the control valve or loss of control of the process. Do not expose this product to service conditions or variables other than those for which the product was intended. If you are not sure what these conditions are you should contact your Emerson Automation Solutions sales office for more complete specifications. Provide the product serial numbers (shown on the nameplate) and all other pertinent information.

**⚠ WARNING**

If you move or work on an actuator installed on a valve with loading pressure applied, keep your hands and tools away from the stem travel path to avoid personal injury. Be especially careful when removing the stem connector to release all loading on the actuator stem whether it be from air pressure on the diaphragm or compression in the actuator springs.

Likewise take similar care when adjusting or removing any optional travel stop. Refer to the relevant actuator Maintenance Instructions.

If hoisting the valve, take care to prevent people from being injured in case the hoist or rigging slips. Be sure to use adequate sized hoists and chains or slings to handle the valve.

**⚠ WARNING**

Personal injury could result from packing leakage. Valve packing is tightened before shipment; however, the packing might require some readjustment to meet specific service conditions.

## Maintenance

**⚠ WARNING**

Avoid personal injury and property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- Do not remove the actuator from the valve while the valve is still pressurized.
- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.
- Depending on the actuator construction, it will be necessary to manage the pneumatic actuator spring pre-compression. It is essential to refer to the relevant actuator instructions in this manual to perform safe removal of the actuator from the valve.
- Use lock-out procedures to be sure the above measures stay in effect while you work on the equipment.
- The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline*. Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

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**Note**

Whenever a gasket seal is disturbed by removing or shifting gasketed parts, install a new gasket during reassembly. This provides a good gasket seal because the used gasket may not seal properly.

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**⚠ WARNING**

Avoid personal injury or property damage by thoroughly cleaning the line of all dirt, welding chips, scale, oil or grease, and other foreign material. Failure to do so could result in damage to the seating and sealing surfaces of the valve and result in damage to the valve and release of process materials.

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## Installation

1. Before installing the valve in the pipeline, thoroughly clean the line of all dirt, welding chips, scale, oil or grease, and other foreign material.
2. Install the valve so the controlled fluid will flow through the valve body in the direction indicated by the arrow cast on the valve body.
3. A three-valve bypass must be used to permit removal of the control valve from the line without shutting down the system.
4. In case of a heat-insulated installation, insulate the valve body only, not the bonnet.

**⚠ WARNING**

To avoid personal injury or property damage, do not attempt to do any work on a valve while the system is in operation. The valve must be isolated 100% from the active system and the isolated line voided of pressure and/or hazardous fluids.

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## Air Piping

1. For an air-to-extend actuator (air-to-close action), connect the actuating air pressure line to the 1/4 NPT opening in the upper diaphragm case. For an air-to-retract actuator (air-to-open action) connect the actuating air pressure line to the 1/4 NPT to the lower diaphragm case.

2. Use 6.4 mm (1/4 inch) O.D. tubing or equivalent for all air lines. If air line exceeds 8 m (25 ft) in length, 9.5 mm (3/8 inch) tubing is preferred. Air pressure not to exceed 2.41 barg (35 psig).

## Disassembly

### **⚠ WARNING**

If there is evidence of process fluid under pressure leaking from the joint, retighten the valve body/joint nuts and return to the Warning at the beginning of the Maintenance section. This Warning provides proper steps to isolate the valve and relieve process pressure.

### **CAUTION**

When assembling or disassembling the valve, do not turn the valve stem while the plug is in contact with the valve seat. This can damage the seating surface very quickly.

### **CAUTION**

When adjusting the valve stem do not grip the stem directly with pliers or a wrench. This will damage the surface of the stem, and cause damage to the packing in the valve. Instead, counter-tighten the two locknuts (key 27) on the stem (key 5) together. This will allow you to turn the stem by turning the locknuts (key 27) with a wrench.

When placing the valve in a vise, clamp the flat end faces of the valve. Do not try to clamp the rounded sides of the valve. This will ruin the valve.

## Actuator Removal

Access to the internal components of the valve body can be accomplished with the actuator removed. For actuator maintenance see the following instruction manual (Baumann Actuator Instructions, [D103352X012](#)).

### Air-to-Close Actuators

1. Disconnect air supply to the actuator and remove air tubing.
2. Loosen drive nut (key 9) and then remove plug and stem (keys 4 and 5) assembly by holding actuator stem still while unthreading plug and stem assembly counterclockwise.
3. Remove stem locknuts (key 27), travel indicator (key 58), and yoke drive nut (key 9).
4. Remove actuator from valve.
5. Disconnect air supply to actuator and remove air tubing.

### Air-to-Open Actuators

1. Using flexible tubing, apply sufficient air pressure to the actuator to lift the plug off the seat.
2. Loosen drive nut (key 9) and then remove plug and stem (keys 4 and 5) assembly by holding actuator stem still while unthreading plug and stem assembly counterclockwise.
3. Remove stem locknuts (key 27), travel indicator (key 58), and yoke drive nut (key 9).

4. Remove actuator from valve.
5. Disconnect air supply to actuator and remove air tubing.

### Valve Body Disassembly

1. After removing the actuator, unscrew bonnet (key 8), and plug and stem (keys 4 and 5) from valve body (key 1). A new body gasket (key 49) should be installed each time the valve is disassembled.
2. Loosen packing spring load by removing the packing follower (key 10).
3. Remove the plug and stem assembly by pulling it out through the bottom of the bonnet (key 8) while rotating the stem (key 5). This will help prevent damage to the packing components.

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#### Note

Handle the parts carefully to avoid damaging the seating and guiding surfaces. Wipe the parts with a clean soft cloth and examine for signs of wear or damage.

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## Lapping the Valve Seat

If valve seat leakage becomes excessive, it may be necessary to lap the valve seat.

Lapping is the process of mating the valve plug to the seat ring, with an abrasive to produce a close fit. When valve seat leakage becomes excessive, lapping becomes necessary. The plug and seat ring seating surfaces should be free of large scratches or dents and the contact surface of the seats should be as narrow as possible.

1. Use a good quality lapping compound with a mixture that contains 280 to 600 grit. Apply at several spots around the plug seating surface. Replace the plug (key 4) in the bonnet (key 8).
2. Screw the bonnet (key 8) loosely into the valve body (key 1) to serve as a guide during the lapping operation.
3. Lap the valve by applying a slight pressure on the stem and rotate the stem in short oscillating strokes approximately 8 to 10 times or until you see an even and complete lap line. The plug should be intermittently lifted and turned 90 degrees while lapping to keep the plug and seat ring concentric.
4. Clean the valve seat (key 2) and plug (key 4) thoroughly when the lapping is complete, removing all traces of lapping compound.

## Replacing Packing

Refer to the standard and optional packing constructions (figures 3 and 4) to determine the packing that has been preinstalled in your valve.

1. Disassemble the valve as directed earlier. Remove the locknuts (key 27) and indicator disk (key 58), and turn the plug stem (key 5) out through the packing box. Remove the packing box and packing. Push out the old packing by working from the underside of the bonnet (key 8).
2. **For Standard Spring Loaded PTFE V-Ring Packing (figure 3):** Carefully insert each piece in exact order shown in figure 3. Tighten the follower (key 10) until it shoulders on the bonnet (key 8). This will compress the packing spring (key 6) to enable constant stem sealing throughout packing life.
3. **For Optional Molded Graphite Ribbon Packing (figure 4):** Carefully insert each piece in exact order shown in figure 4. Hand tighten packing follower (key 10). Use a wrench to increase tightness by turning the nut an additional 60 degrees.

## Actuator and Valve Body Reassembly

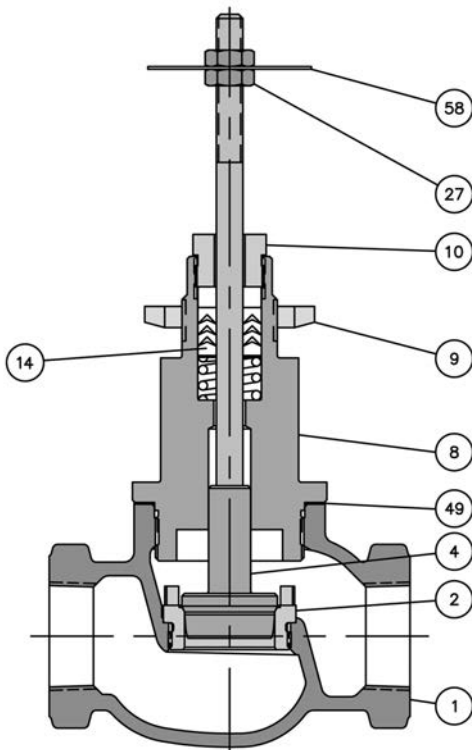
Insert a new valve body gasket (key 49) and install bonnet assembly (key 8). Place the actuator yoke over stem (key 5). While tilting actuator back, drop yoke drive nut (key 9) over stem (key 5). Run lock nuts (key 27), and travel indicator (key 58) down as far as possible and counter tighten locknuts (key 27) to lock.

Carefully position actuator over stem (key 5), lift plug stem and turn plug stem (key 5) into actuator stem as far as it will go before adjusting bench range. See the following instruction manual (Baumann Actuator Instructions, D103352X012).

## CAUTION

**When assembling or disassembling the valve, do not turn the valve stem while the plug is in contact with the valve seat. This can damage the seating surface very quickly.**

Figure 2. Baumann 24000 Valve Body Assembly with Standard Bonnet and Standard PTFE Spring Loaded Packing



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## ⚠ WARNING

**To avoid personal injury or equipment damage due to possible sudden shifting or falling of the valve assembly, do not lift the valve by the handwheel.**

## Parts Ordering

When corresponding with your [Emerson sales office](#) or Local Business Partner about this equipment, always mention the valve serial number. When ordering replacement parts, also specify the key number, part name, and desired material using the following parts tables.

**⚠ WARNING**

Use only genuine Fisher™ replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Table 1. Baumann 24000 Common Parts

KEY NO.	QTY	DESCRIPTION	DN 15 (NPS 1/2)	DN 20 (NPS 3/4)	DN 25 (NPS 1)	DN 40 (NPS 1-1/2)	DN 50 (NPS 2)	
1	1	Valve Body	24000-800	24000-801	24000-802	24000-803	24000-804	
6*	1	V-Ring Packing Set (Std)	24494T001 (See figures 3 and 4 for additional packing options)					
8	1	Bonnet, Standard	24000-805-1	24000-805-1	24000-806-1	24000-807-1	24000-808-1	
9	1	Drive Nut (Yoke)	011757-003-153					
10	1	Packing Follower	24490-1					
27	2	Locknuts	971514-002-250					
49*	1	Valve Body Gasket	009191-702-426	009191-702-426	009191-674-426	009191-704-426	009191-705-426	
58	1	Travel Indicator	24299					

Table 2. Plug and Seat Ring for NPS 1/2, 3/4, and 1 Valves

KEY NO.	DESCRIPTION	PLUG TYPE	PLUG NO.	ORIFICE DIAMETER mm (Inch)	C <sub>v</sub>	K <sub>v</sub>	VALVE SIZE		
							DN 15 (NPS 1/2)	DN 20 (NPS 3/4)	DN 25 (NPS 1)
4*	Plug / Stem	Metal Seat, Micro Trim (Linear)	102	6.3 (0.25)	0.2 <sup>(1)</sup>	0.17 <sup>(1)</sup>	GE46388X012		GE46388X092
		PTFE Seat (Equal %)	577	9.5 (0.375)	1.0	0.86	24893-101-577		
					1.5	1.29	24796-101-577		
					2.5	2.15	24609-101-577		
				20.6 (0.8125)	4	3.44	24010-2-101-577		
					6	5.16	24010-101-577	---	---
					7.5	6.45	---	24010-101-577	---
					8.5	7.31	---	---	24010-101-577
				26.9 (1.0625)	13	11.18	---	---	24011-101-577
		Metal Seat (Equal %)	548 (S41600)	6.3 (0.25)	0.2 <sup>(1)</sup>	0.17 <sup>(1)</sup>	GE46393X092		GE46393X052
					0.5 <sup>(1)</sup>	0.43 <sup>(1)</sup>	GE46394X092		GE46394X052
					1.0	0.86	GE46392X092		GE46392X052
				9.5 (0.375)	1.5	1.29	24634-6-101-548		
					2.5	2.15	24171-12-101-548		
				20.6 (0.8125)	4	3.4	24185-6-101-548		
					6	5.16	24061-5-101-548	---	---
					8	6.88	---	24061-5-101-548	---
					9	7.74	---	---	24061-5-101-548
				26.9 (1.0625)	13	11.18	---	---	24062-1-101-548

-continued-

\*Recommended spare parts

Table 2. Plug and Seat Ring for NPS 1/2, 3/4, and 1 Valves (continued)

KEY NO.	DESCRIPTION	PLUG TYPE	PLUG NO.	ORIFICE DIAMETER mm (Inch)	C <sub>v</sub>	K <sub>v</sub>	VALVE SIZE			
							DN 15 (NPS 1/2)	DN 20 (NPS 3/4)	DN 25 (NPS 1)	
4*	Plug / Stem	Metal Seat (Equal %)	588	6.3 (0.25)	0.2 <sup>(1)</sup>	0.17 <sup>(1)</sup>	GE46390X052		GE46390X092	
					0.5 <sup>(1)</sup>	0.43 <sup>(1)</sup>	GE46391X052		GE46391X092	
					1.0	0.86	GE46389X052		GE46389X092	
				9.5 (0.375)	1.5	1.29	24634-101-588			
					2.5	2.15	24171-101-588			
				20.6 (0.8125)	4	3.4	24185-101-588			
			6		5.16	24061-101-588	---	---		
			8		6.88	---	24061-101-588	---		
			9		7.74	---	---	24061-101-588		
			26.9 (1.0625)	13	11.18	---	---	24062-101-588		
			PTFE Seat (Linear)	677	9.5 (0.375)	0.1	0.086	24660-101-677		
						0.2	0.172	24625-101-677		
		0.5				0.43	24617-101-677			
		1.0				0.86	24631-101-677			
		2.5				2.15	24656-101-677			
		20.6 (0.8125)			5	4.3	24010-1-101-677			
		Metal Seat (Linear)	648 (S41600)	6.3 (0.25)	0.5	0.43	GE46398X052		GE46398X092	
					1.0	0.86	GE46397X052		GE46397X092	
				9.5 (0.375)	1.5	1.29	24669-1-101-648			
					2.5	2.15	24671-2-101-648			
				20.6 (0.8125)	4	3.4	24757-5-101-648			
					6	5.16	24717-3-101-648	---	---	
					8	6.88	---	24717-3-101-648	---	
					9	7.74	---	---	24717-3-101-648	
				26.9 (1.0625)	13	11.18	---	---	24791-1-101-648	
				Metal Seat (Linear)	688	6.3 (0.25)	0.5	0.43	GE46396X052	
		1.0	0.86				GE46395X062		GE46395X102	
		9.5 (0.375)	1.5			1.29	24669-101-688			
2.5	2.15		24671-101-688							
20.6 (0.8125)	4	3.4	24757-101-688							
	6	5.16	24717-101-688			---	---			
	8	6.88	---			24717-101-688	---			
	9	7.74	---			---	24717-101-688			
26.9 (1.0625)	13	11.18	---			---	24791-101-688			
2*	Seat Ring	6.3 mm (0.25 inch) Orifice Diameter, S31600				007635-001-163		24000-341		
		9.5 mm (0.375 inch) Orifice Diameter, S31600				007635-002-163		24000-342		
		20.6 mm (0.8125 inch) Orifice Diameter, S31600				007635-005-163		24000-343		
		26.9 mm (1.0625 inch) Orifice Diameter, S31600				---	---	24000-344		
		6.3 mm (0.25 inch) Orifice Diameter, S41600				007635-002-416		24000-341-1		
		9.5 mm (0.375 inch) Orifice Diameter, S41600				007635-003-416		24000-342-1		
		20.6 mm (0.8125 inch) Orifice Diameter, S41600				007635-005-416		24000-343-1		
		26.9 mm (1.0625 inch) Orifice Diameter, S41600				---	---	24000-344-1		

1. A matching seat ring (key 2) must be furnished with replacement plug orders for Micro Trim plug number 102 and plug number 548 and 588, Cv's 0.2 and 0.5.

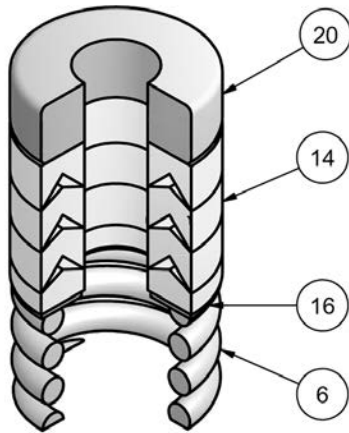


Table 3. Plug and Seat Ring for NPS 1-1/2 and 2 Valves

KEY NO.	DESCRIPTION	PLUG TYPE	PLUG NO.	ORIFICE DIAMETER mm (Inch)	C <sub>v</sub>	K <sub>v</sub>	VALVE SIZE	
							DN 40 (NPS 1-1/2)	DN 50 (NPS 2)
4*	Plug/Stem	PTFE Seat (Equal %)	577	31.8 (1.25)	20	17.2	24411-102-577	---
				38.1 (1.50)	10	8.6	24884-102-577	
					17	14.62	24774-102-577	
					28	24.08	24254-102-577	
		50.8 (2.0)	30	25.8	---	24882-102-577		
		PTFE Seat (Linear)	677	38.1 (1.50)	10	8.6	24799-102-677	
					17	14.62	24798-102-677	
				50.8 (2.0)	30	25.8	---	24891-102-677
					50	43	---	24070-102-677
		Metal Seat (Equal %)	548 (S41600)	31.8 (1.25)	10	8.6	24421-2-102-548	---
					20	17.2	24401-2-102-548	---
				38.1 (1.50)	10	8.6	24635-2-102-548	
					17	14.62	24710-2-102-548	
					28	24.08	24038-2-102-548	
				50.8 (2.0)	30	25.8	---	24905-3-102-548
		50	43		---	24039-1-102-548		
		Metal Seat (Equal %)	588	31.8 (1.25)	10	8.6	24421-102-588	---
					20	17.2	24401-102-588	---
				38.1 (1.50)	10	8.6	24635-102-588	
					17	14.62	24710-102-588	
					28	24.08	24038-102-588	
				50.8 (2.0)	30	25.8	---	24905-102-588
		50	43		---	24039-102-588		
		Metal Seat (Linear)	648 (S41600)	31.8 (1.25)	10	8.6	24424-1-102-648	---
					20	17.2	24424-1-102-648	---
				38.1 (1.50)	10	8.6	24761-2-102-648	
					17	14.62	24899-2-102-648	
					28	24.08	24760-1-102-648	
				50.8 (2.0)	30	25.8	---	24887-1-102-648
		50	43		---	24762-1-102-648		
Metal Seat (Linear)	688	31.8 (1.25)	10	8.6	24424-102-688	---		
			20	17.2	24424-102-688	---		
		38.1 (1.50)	10	8.6	24761-102-688			
			17	14.62	24899-102-688			
			28	24.08	24760-102-688			
		50.8 (2.0)	30	25.8	---	24887-102-688		
50	43		---	24762-102-688				
2*	Seat Ring	38.1 mm (1.25 inch) Orifice Diameter, S31600					24000-542	---
		38.1 mm (1.50 inch) Orifice Diameter, S31600					24000-541	24000-642
		50.8 mm (2.0 inch) Orifice Diameter, S31600					---	24000-641
		38.1 mm (1.25 inch) Orifice Diameter, S41600					24000-542-1	---
		38.1 mm (1.50 inch) Orifice Diameter, S41600					24000-541-1	24000-642-1
		50.8 mm (2.0 inch) Orifice Diameter, S41600					---	24000-641-1

\*Recommended spare parts

Figure 3. Spring Loaded PTFE V-Ring Packing Kit, P/N 24494T001

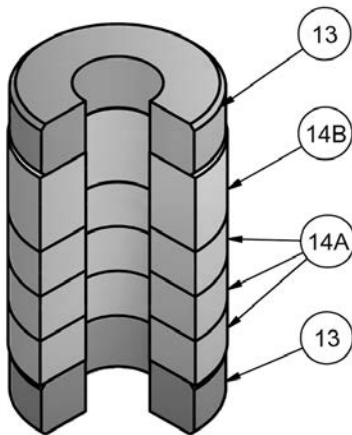


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Table 4. Spring Loaded PTFE V-Ring Packing Kit, P/N 24494T001

KEY NO.	DESCRIPTION	MATERIAL
6	Spring	ASTM A313 S30200
14	Packing Set	PTFE/ carbon filled PTFE
16	Washer	ASTM A240 S31600
20	Spacer	J-2000 (filled (Polytetrafluoroethylene)

Figure 4. Molded Graphite (Flexible Graphite) Packing Kit, P/N 24492T001

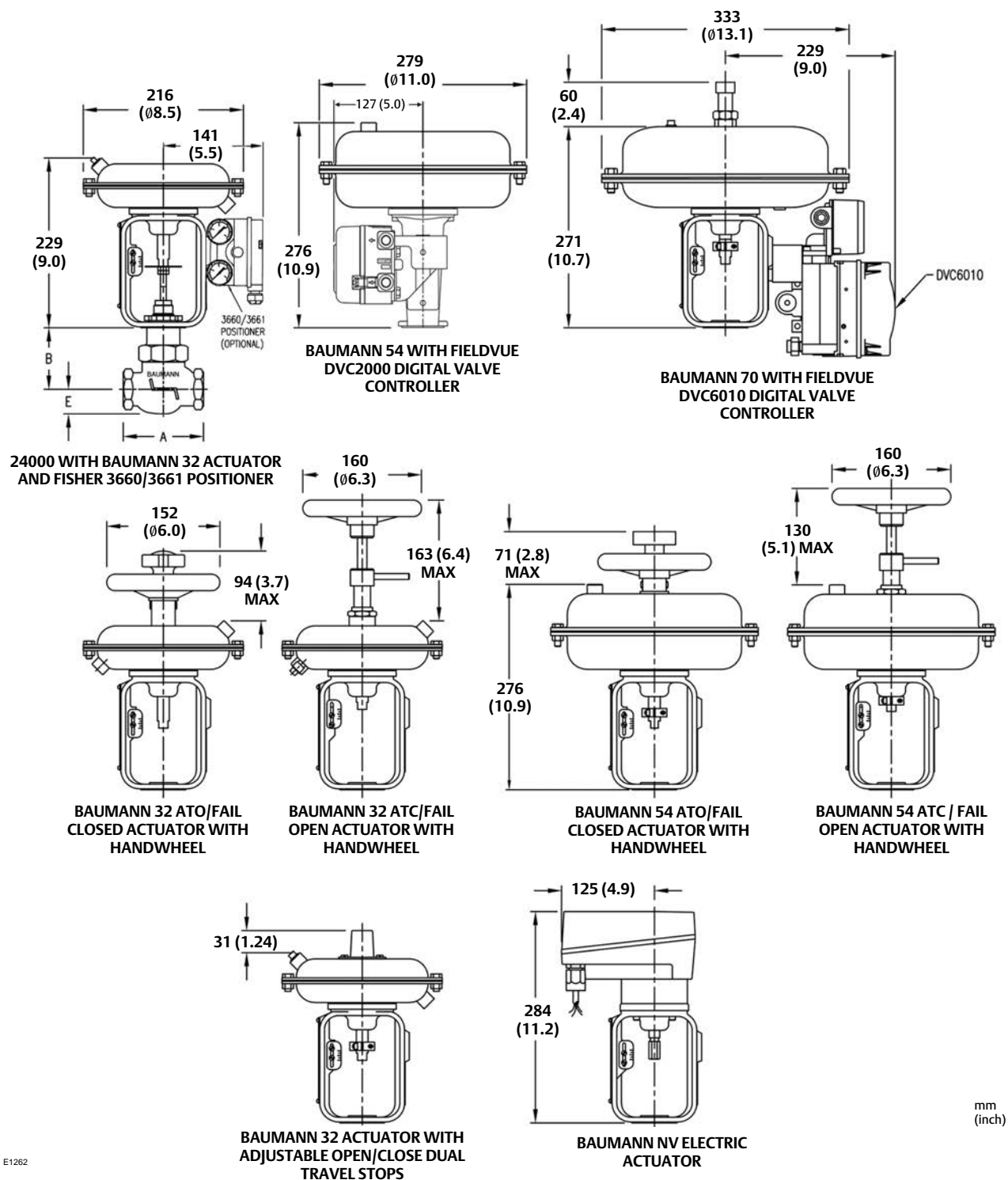


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Table 5. Molded Graphite (Flexible Graphite) Packing Kit, P/N 24492T001

KEY NO.	DESCRIPTION	MATERIAL
13	Bushing, qty 2	Carbon-Graphite
14A	Packing Rings, qty 3	Graphite
14B	Packing Ring	Graphite

Figure 5. Dimensional Drawings



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NOTE: ACTUATOR REMOVAL REQUIRES 115 mm (4.5 INCHES) VERTICAL CLEARANCE.

Table 6. Baumann 24000 Valve Dimensions

VALVE SIZE		A VALVE BODY		B BONNET		E	
DN	NPS	mm	inch	mm	inch	mm	inch
15	1/2	89	3.5	78	3.1	27	1.06
20	3/4	89	3.5	78	3.1	27	1.06
25	1	109	4.3	83	3.3	33	1.3
40	1-1/2	137	5.4	99	3.9	46	1.8
50	2	168	6.6	104	4.1	58	2.3

Table 7. Baumann 24000 Valve Assembly Weights

VALVE SIZE		WEIGHT	
DN	NPS	kg	lb
15	1/2	1.6	3.5
20	3/4	1.6	3.5
25	1	2.3	5.0
40	1-1/2	4.9	10.9
50	2	8.9	19.7

Table 8. Baumann Actuator Weights

ACTUATOR TYPE	WEIGHTS	
	kg	lb
32	4.5	10
54	11.3	25
70	15.4	34
MV1020 <sup>(1)</sup>	10	22
VA1020 <sup>(1)</sup>	14	30
NV24-MFT (non spring return)	1.5	3.3
NVF24-MFT or NVF24-MFT-E <sup>(1)</sup> (spring return)	1.8	4

1. Electric actuators. Reference bulletin 52.1:ECV, [D103347X012](#) for additional information.

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