

# Connectors for Diagnostic Testing with the FlowScanner™ Valve Diagnostic System

## Contents

Introduction .....	1	PMV P-1200 Positioner .....	15
Scope of Manual .....	1	PMV P-1500 Positioner .....	15
Description .....	2	PMV P-2000 Positioner .....	15
Specifications .....	3	Type 471 Actuator .....	15
Educational Services .....	3	Type 481 Actuator .....	16
Installation .....	3	Type 490 Actuator .....	16
Connector for Mounting Orientation .....	3	Type 513, 513R Diaphragm Actuators .....	16
Piping .....	3	Types 585, 585R Actuators .....	16
Supply Pressure .....	4	Type 657, 1051, 1052 Diaphragm Actuators .....	17
Principle of Operation .....	4	Type 667 Diaphragm Actuator	
Maintenance .....	4	Sizes 30 - 87 .....	17
Parts .....	4	Sizes 80, 100 .....	17
Parts Ordering .....	4	Type 1031 Piston Rotary Actuators	
Connector/Hardware .....	5	Fail Closed, Model 33072 .....	17
Positioners .....	5	Fail Closed, Models 33082, 33102, 33122, 45102, 45122, 45171, 45211 .....	17
Actuators .....	6	Double-Action, Models 45102, 45121, 45171, 45211 .....	18
Assembly Drawings .....	8	Fail Open, Model 33072 .....	18
Type 546 Electro-Pneumatic Transducer .....	8	Fail Open, Models 33082, 33102, 33122 .....	18
Type 646 Electro-Pneumatic Transducers .....	8	Type 1032 Rack-and-Pinion Rotary Actuators	
Type i2P-100 Electro-Pneumatic Transducers .....	8	Double-Action .....	18
Type 2625 Volume Booster		Spring-Return .....	19
With Diaphragm Actuator .....	9	Type 1061 Piston Rotary Actuator .....	19
With Piston Actuator .....	9	Types 1066, 1066SR Piston Rotary Actuators .....	19
3570 Series Positioner With		Types 1250, 1250R Actuators .....	20
Type 377 Valve .....	10		
3582 Series Valve Positioner .....	10		
Type 3582i Valve Positioner .....	10		
Type 3590 Positioner .....	11		
Type 3610J Positioner .....	11		
Type 3610JP Positioner .....	11		
Type 3620J Positioner .....	11		
Type 3620JP Positioner .....	11		
Type 3660 Positioner .....	12		
Type 3661 Positioner .....	12		
Type 3710 Pneumatic Positioner			
Single-Action .....	12		
Double-Action .....	13		
Bailey P88-21 Positioner			
Single-Action .....	13		
Double-Action .....	13		
Moore 61H Booster Relay			
With Spring/Diaphragm Actuator .....	14		
With Piston Actuator .....	14		

## Introduction

### Scope of Manual

This instruction manual describes “quick” connectors available from Emerson Process Management™ to support diagnostic testing of process control valve packages. Process control valve packages include a control valve, actuator, positioner, and accessories.

The connectors are for use with any actuator, positioner, or volume booster, or other products available from Emerson Process Management. The

# Connectors for FlowScanner™ System

Table 1. Specifications

<p><b>Available Configurations</b></p> <p>Pipe nipple, pipe tee, pipe bushing, and connector body. Install for ease of connection with the FlowScanner System</p> <p><b>Recommended Applications</b></p> <p><b>Fisher (instruction manuals):</b> ■ 377 Series Trip Valves, ■ Types 546 and 546S Electro-Pneumatic Transducers, ■ Type 646 Electro-Pneumatic Transducer, ■ Type i2P-100 Electro-Pneumatic Transducer, ■ Type 2625 Volume Booster, ■ 3570 Series Pneumatic Valve Positioners, ■ 3582 Series Valve Positioners, Type 3582i Valve Positioner, and Type 3583 Valve Stem Position Transmitter, ■ Types 3590, -S, and -ST Electro-Pneumatic Valve Positioners, ■ 3610J and 3620J Series Positioners, ■ Types 3660 and 3661 Positioners, ■ Type 3710 Pneumatic Positioner, ■ 471 Series Actuators, ■ Type 481 Actuator, ■ 490 Series Actuators, ■ Type 513 and 513R Diaphragm Actuators, ■ Types 585 and 585R Actuators, ■ Type 657 Diaphragm Actuator, ■ Type 667 Diaphragm Actuator, ■ Type 1031 Piston Rotary Actuators, ■ Type 1032 Rack-and-Pinion Rotary Actuators, ■ Types 1051 and 1052 Diaphragm Rotary Actuators, ■ Type 1061 Piston Rotary Actuators, ■ Types 1066 and 1066SR Piston Rotary Actuators, ■ Types 1250 and 1250R Actuators</p> <p>Contact your Emerson Process Management sales office if assistance is needed in obtaining any of the above instruction manuals.</p>	<p><b>Other Manufacturers:</b> ■ PMV Positioners, ■ Moore® 61H Booster Relay, ■ Bailey® P88-21 Positioner when these products are installed on Fisher valve/actuator packages</p> <p><b>Connector</b></p> <p>■ Stainless steel or ■ brass</p> <p><b>Connector Body:</b> 1/8 inch NPT male with female “quick-connect” receptacle. 46.5 mm (1.83 inches) overall length. Internal poppet valve</p> <p><b>Body Protector:</b> Male component (solid plug). 44.5 mm (1.75 inches) overall length. Inserted into connector body to protect internal body components against damage or plugging caused by foreign contamination</p> <p><b>Stem:</b> 1/8 inch NPT female, for gauge, with male component (open connection). 51.3 mm (2.02 inches) overall length. Stem does not contain internal valve</p> <p>The FlowScanner System comes equipped with flexible tubing and stems to mate with installed connector bodies for diagnostic testing</p> <p><b>Maximum Temperature Limit</b></p> <p>70°C (250°F)</p> <p><b>Maximum Safe Working Pressure</b></p> <p><b>When coupling/uncoupling body/stem:</b> 17 bar (250 psi)</p> <p><b>When body/stem are coupled</b></p> <p><i>SST:</i> 207 bar (3000 psi)</p> <p><i>Brass:</i> 138 bar (2000 psi)</p>
---	---

connectors allow a quick positive connection between installed control devices and the Instrument & Valve Services FlowScanner™ Valve Diagnostic System. To support the use of the FlowScanner System, connectors are recommended for all Fisher® actuators and positioners, especially as retrofit items for installed units.

No person may install diagnostic connectors or install, operate, or maintain process control equipment without first • being fully trained and qualified in valve, actuator and accessory installation, operation and maintenance, and • carefully reading and understanding the contents of this manual. If you have any questions regarding these instructions, contact your Emerson Process Management sales office before proceeding.

## Description

The FlowScanner System from Instrument & Valve Services is a portable, microprocessor-based diagnostic and calibration system specifically designed for use with pneumatically-operated process control valves. The FlowScanner System analyzes each pneumatic valve assembly as a complete process control package. This system also analyzes individual components such as the I/P transducer, positioner, actuator, volume booster, and other accessories. The FlowScanner System then determines critical valve parameters such as bench set, seat load, valve stroke, packing and bearing friction, and other relevant aspects of valve performance.

To facilitate diagnostic testing with the FlowScanner System, Emerson Process Management offers a standard connector assembly for all inputs and outputs from process control equipment. The connector assembly consists of pipe nipple, pipe tee, and pipe bushing as necessary to tap pneumatic lines and a connector body and body protector. See figure 1 for standard installation orientations of the connector. With connectors installed, the FlowScanner system can be rapidly configured for testing of a control valve package.

For more information about the FlowScanner System, contact your Emerson Process Management sales office

## Specifications

Specifications for diagnostic connectors are listed in table 1.

## Educational Services

For information on available courses for diagnostic connectors or process control equipment, as well as a variety of other products, contact:

Emerson Process Management  
Educational Services, Registration  
P.O. Box 190; 301 S. 1st Ave.  
Marshalltown, IA 50158-2823  
Phone: 800-338-8158 or  
Phone: 641-754-3771  
FAX: 641-754-3431  
e-mail: education@emersonprocess.com

### Note

**Neither Emerson®, Emerson Process Management, Fisher, 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.**

## Installation

### Connector Mounting Orientation

Assemble the pipe nipple, pipe tee, pipe bushing, and connector according to the orientations shown in figure 1. Refer to the appropriate assembly drawing for the installation points for diagnostic testing. Rotate the connector body for ease of connection to the FlowScanner System.

## Piping

### WARNING

**To avoid personal injury or property damage resulting from the sudden release of pressure, do not install any system components, including piping, where service conditions could exceed the limits given in this manual, in product manuals, or on product nameplates. Use pressure relieving devices as required by government or accepted industry codes and good engineering practices.**

### WARNING

**Personal injury or property damage could result from fire or explosion of accumulated gas, or from contact with hazardous gas, if a flammable or hazardous gas is used as the supply pressure medium. Follow appropriate safety practices and instructions given in product instruction manuals when installing connectors in piping carrying flammable or hazardous gas.**

Refer to the appropriate assembly drawings in this manual and figures in the product instruction manual for the location of all input and output connections where connectors will be installed. Use the correct size and type of tubing or piping for all connections. Always follow accepted engineering, installation, and safety practices to ensure the safe and accurate transmission of pneumatic signals and process pressures. Install shutoff valves, vents, and drains, or seal systems as required by accepted practices.

## Supply Pressure

### WARNING

Severe personal injury or property damage may occur if the instrument air supply is not clean, dry, and oil-free, or noncorrosive gas. While use and regular maintenance of a filter that removes particles larger than 40 microns in diameter will suffice in most applications, check with an Emerson Process Management field office and industry instrument air quality standards for use with corrosive gas or if you are unsure about the proper amount or method of air filtration or filter maintenance.

Supply pressure must be clean, dry air or noncorrosive gas. Follow instructions given for specific products when installing process control valve packages with connectors.

## Principle of Operation

The connector body contains an internal poppet valve. The poppet valve provides positive shutoff to minimize pressure loss when removing the stem or body protector.

Inserting the stem or body protector into the body does not open the poppet valve until the stem or body protector is seated in the body. When removing the stem, the poppet valve seals before the stem or body protector leaves the body.

**To Couple:** Align stem with body. Push stem into body until stem and body lock together.

**To Uncouple:** Pull knurled sleeve on body toward stem until stem and body unlock. Remove the stem from the body.

## Maintenance

Connectors are subject to normal wear. Inspect and replace parts as necessary. Inspection and maintenance frequency depends on the severity of service conditions.

### WARNING

If maintenance procedures require taking process control devices out of service, avoid personal injury and property damage caused by uncontrolled process pressure. Observe the following before performing any maintenance procedures:

- Always wear protective clothing, gloves, and eyewear.
- Provide some temporary means of control for the process before taking the controller out of service.
- Shut off the supply pressure to the controller.
- Disconnect any operating lines providing supply air pressure, a process input signal, or other pressure source to the controller.
- Follow all procedures given in the appropriate product instruction manuals.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Select the appropriate maintenance procedure from the appropriate product instruction manual and perform the numbered steps. Shut off the supply pressure and process pressure before beginning maintenance.

## Parts

### Parts Ordering

Whenever corresponding with your Emerson Process Management sales office about process control equipment, always mention the serial number of each component. When ordering replacement parts, refer to the 11-character part number of each required part as found in the following parts list.

#### Note

**Use only genuine Fisher replacement parts. Components that are not**

supplied by Emerson Process Management, should not, under any circumstances, be used in any Fisher instrument. Use of components not supplied by Emerson Process Management will void your warranty, might adversely affect the performance of the instrument, and might jeopardize worker and workplace safety.

**Note**

Neither Emerson, Emerson Process Management, Fisher, 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.

**Connector/Hardware, for Diagnostic Testing (FlowScanner System Hook-Up)**

Part numbers listed here are for complete FlowScanner System hook-up assemblies. Each assembly includes the connector body, body protector, gauge stem, and hardware such as pipe tees, bushings, and nipples. Contact your Emerson Process Management sales office for assistance in ordering individual parts.

Key	Description	Part Number
-----	-------------	-------------

**Positioners**

For Type 546 Transducers (see figure 2)

If the Type 546 transducer is used in a valve assembly with a positioner, no hook-up for diagnostic testing is required for the Type 546. The hook-up for the diagnostic testing should be installed at the positioner.

For units with gauges		
SST fittings		12B8041X012
Brass fittings		12B8041X022
For units without gauges		
SST fittings		12B8041X032
Brass fittings		12B8041X042

Key	Description	Part Number
-----	-------------	-------------

For Type 646 and i2P-100 Transducers (see figure 3 and 4)

If the Type 646 or i2P-100 transducer is used in a valve assembly with a positioner, no hook-up for diagnostic testing is required for the Type 646 or i2P-100. The hook-up for the diagnostic testing should be installed at the positioner.

**Front Output**

**Type 646 transducer only**

For units with gauges		
SST fittings		12B8040X012
Brass fittings		12B8040X022
For units without gauges		
SST fittings		12B8040X032
Brass fittings		12B8040X042

**Side Output**

**Type 646 and i2P-100 transducers**

For units with gauges		
SST fittings		12B8040X052
Brass fittings		12B8040X062
For units without gauges		
SST fittings		12B8040X072
Brass fittings		12B8040X082

For Type 2625 Volume Booster (see figures 5 and 6)

For unit used with diaphragm actuator		
SST fittings		12B8042X012
Brass fittings		12B8042X022
For unit used with piston actuator		
SST fittings		12B8043X012
Brass fittings		12B8043X022

For Type 3570 Series Positioners w/Type 377 Valve (see figure 7)

For units with gauges		
SST fittings		12B8044X012
Brass fittings		12B8044X022
For units without gauges		
SST fittings		12B8044X032
Brass fittings		12B8044X042

For Type 3582 Series Valve Positioners (see figure 8)

For units with gauges		
SST fittings		12B8045X012
Brass fittings		12B8045X022
For units without gauges		
SST fittings		12B8045X032
Brass fittings		12B8045X042

For Type 3582i Valve Positioner (see figure 9)

For units with gauges		
SST fittings		12B8046X012
Brass fittings		12B8046X022
For units without gauges		
SST fittings		12B8046X032
Brass fittings		12B8046X042

# Connectors for FlowScanner™ System

Key	Description	Part Number	Key	Description	Part Number
<b>For Type 3590 Positioners (see figure 10)</b>			<b>For Type 3710 Pneumatic Positioners (cont'd)</b>		
	For units with gauges		<b>Double-Action Units</b>		
	SST fittings	12B8047X012	For units with gauges		
	Brass fittings	12B8047X022	SST fittings		12B8055X012
	For units without gauges		Brass fittings		12B8055X022
	SST fittings	12B8047X032	For units without gauges		
	Brass fittings	12B8047X042	SST fittings		12B8055X032
			Brass fittings		12B8055X042
<b>For Type 3610J Positioners (see figure 11)</b>			<b>For Bailey P88-21 Positioners (see figures 19 and 20)</b>		
	For units with gauges		<b>Single-Action</b>		
	SST fittings	12B8048X012	For units with gauges		
	Brass fittings	12B8048X022	SST fittings		12B8062X012
	For units without gauges		Brass fittings		12B8062X022
	SST fittings	12B8048X032	For units without gauges		
	Brass fittings	12B8048X042	SST fittings		12B8062X032
			Brass fittings		12B8062X042
<b>For Type 3610JP Positioners (see figure 12)</b>			<b>Double-Action</b>		
	For units with gauges		For units with gauges		
	SST fittings	12B8050X012	SST fittings		12B8056X012
	Brass fittings	12B8050X022	Brass fittings		12B8056X022
	For units without gauges		For units without gauges		
	SST fittings	12B8050X032	SST fittings		12B8056X032
	Brass fittings	12B8050X042	Brass fittings		12B8056X042
<b>For Type 3620J Positioners (see figure 13)</b>			<b>For Moore 61H Booster Relay (see figures 21 and 22)</b>		
	For units with gauges		<b>Used with Spring/Diaphragm Actuator</b>		
	SST fittings	12B8049X012	SST fittings		12B8058X012
	Brass fittings	12B8049X022	Brass fittings		12B8058X022
	For units without gauges		<b>Used with Piston Actuator</b>		
	SST fittings	12B8049X032	SST fittings		12B8057X012
	Brass fittings	12B8049X042	Brass fittings		12B8057X022
<b>For Type 3620JP Positioners (see figure 14)</b>			<b>For PMV P-1200 Series Positioner (see figure 23)</b>		
	For units with gauges		For units with gauges		
	SST fittings	12B8051X012	SST fittings		12B8059X012
	Brass fittings	12B8051X022	Brass fittings		12B8059X022
	For units without gauges		For units without gauges		
	SST fittings	12B8051X032	SST fittings		12B8059X032
	Brass fittings	12B8051X042	Brass fittings		12B8059X042
<b>For Type 3660 Positioners (see figure 15)</b>			<b>For PMV P-1500 Series Positioner (see figure 24)</b>		
	For units with supply gauges		For units with gauges		
	SST fittings	12B8052X012	SST fittings		12B8060X012
	Brass fittings	12B8052X022	Brass fittings		12B8060X022
	For units without supply gauges		For units without gauges		
	SST fittings	12B8052X032	SST fittings		12B8060X032
	Brass fittings	12B8052X042	Brass fittings		12B8060X042
<b>For Type 3661 Positioners (see figure 16)</b>			<b>For PMV P-2000 Series Positioner (see figure 25)</b>		
	For units with supply gauges		For units with gauges		
	SST fittings	12B8053X012	SST fittings		12B8061X012
	Brass fittings	12B8053X022	Brass fittings		12B8061X022
	For units without supply gauges		For units without gauges		
	SST fittings	12B8053X032	SST fittings		12B8061X032
	Brass fittings	12B8053X042	Brass fittings		12B8061X042
<b>For Type 3710 Pneumatic Positioners (see figures 17 and 18)</b>			<b>Actuators</b>		
	<b>Single-Action Units</b>		<b>For Type 471 Actuator, Sizes 30–130 (see figure 26)</b>		
	For units with gauges		SST fittings		13B8717X012
	SST fittings	12B8054X012	Brass fittings		13B8717X022
	Brass fittings	12B8054X022			
	For units without gauges				
	SST fittings	12B8054X032			
	Brass fittings	12B8054X042			

# Instruction Manual

Form 5330  
April 2006

# Connectors for FlowScanner™ System

Key	Description	Part Number	Key	Description	Part Number
<b>For Type 481 Actuator, Sizes 30–130 (see figure 27)</b>			<b>For Type 1031 Fail-Close Actuator, Models 33082, 33102, 33122, 45102, 45122, 45171, 45211 (see figure 35)</b>		
	SST fittings	13B8718X012		SST fittings	13B8724X012
	Brass fittings	13B8718X022		Brass fittings	13B8724X022
<b>For Type 490 Actuator, All Sizes (see figure 28)</b>			<b>For Type 1031 Double-Acting Actuator, Models 45102, 45121, 45171, 45211 (see figure 36)</b>		
	SST fittings	13B8721X012		SST fittings	13B8726X012
	Brass fittings	13B8721X022		Brass fittings	13B8726X022
<b>For Type 513 Actuator, Sizes 20, 32 (see figure 29)</b>			<b>For Type 1031 Fail-Open Actuator, Models 33072 (see figure 37)</b>		
	SST fittings	13B8720X012		SST fittings	13B8728X012
	Brass fittings	13B8720X022		Brass fittings	13B8728X022
<b>For Type 513R Actuator, Sizes 20, 32 (see figure 29)</b>			<b>For Type 1031 Fail-Open Actuator, Models 33082, 33102, 33122 (see figure 38)</b>		
	SST fittings	13B8720X032		SST fittings	13B8727X012
	Brass fittings	13B8720X042		Brass fittings	13B8727X022
<b>For Type 585, 585R Actuator, Sizes 25, 50, 100 (see figure 29)</b>			<b>For Type 1032 Double-Acting Actuator, All Sizes (see figure 39)</b>		
	SST fittings	13B8715X012		SST fittings	13B8722X012
	Brass fittings	13B8715X022		Brass fittings	13B8722X022
<b>For Type 657 Actuator, Sizes 30–87 with or R without Top-Mtd Handjack (see figure 31)</b>			<b>For Type 1032 Spring Return Actuator, All Sizes (see figure 40)</b>		
	SST fittings	12B8097X012		SST fittings	13B8723X012
	Brass fittings	12B8097X022		Brass fittings	13B8723X022
<b>For Type 667 Actuator, Sizes 30–34, 40 (see figure 32)</b>			<b>For Types 1051, 1052 Actuator, Sizes 30–70, with or without Top Mtd Handjack (see figure 31)</b>		
	SST fittings	12B8098X012		SST fittings	12B8097X012
	Brass fittings	12B8098X022		Brass fittings	12B8097X022
<b>For Type 667 Actuator, Sizes 45, 50 (see figure 32)</b>			<b>For Type 1061 Actuator, Sizes 30–68 (see figure 41)</b>		
	SST fittings	12B8098X032		SST fittings	13B8716X012
	Brass fittings	12B8098X042		Brass fittings	13B8716X022
<b>For Type 667 Actuator, Sizes 46, 60, 70, 87 (see figure 32)</b>			<b>For Type 1066, 1066SR Actuator, Sizes 20–75 (see figure 42)</b>		
	SST fittings	12B8098X052		SST fittings	13B8714X012
	Brass fittings	12B8098X062		Brass fittings	13B8714X022
<b>For Type 667 Actuator, Sizes 80, 100 (see figure 33)</b>			<b>For Type 1250 Actuator, Sizes 225, 450, 675 (see figure 43)</b>		
	SST fittings	12B8099X012		SST fittings	13B8719X012
	Brass fittings	12B8099X022		Brass fittings	13B8719X022
<b>For Type 1031 Fail-Close Actuator, Model 33072 (see figure 34)</b>			<b>For Type 1250R Actuator, Sizes 225, 450, 675 (see figure 43)</b>		
	SST fittings	13B8725X012		SST fittings	13B8719X032
	Brass fittings	13B8725X022		Brass fittings	13B8719X042

# Connectors for FlowScanner™ System

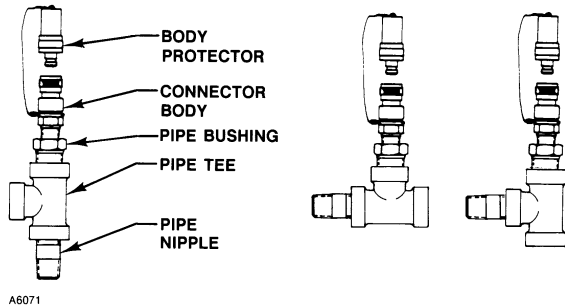


Figure 1. Standard Application Arrangement

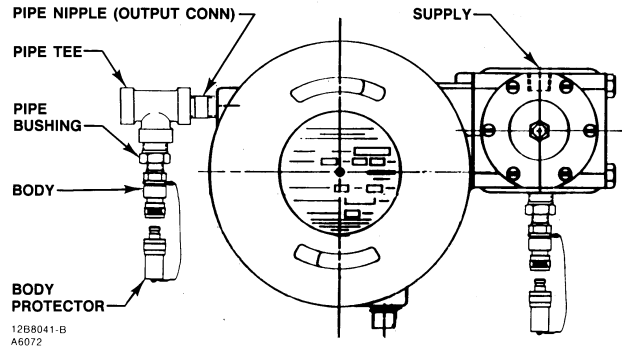


Figure 2. Type 546 Electro-Pneumatic Transducer

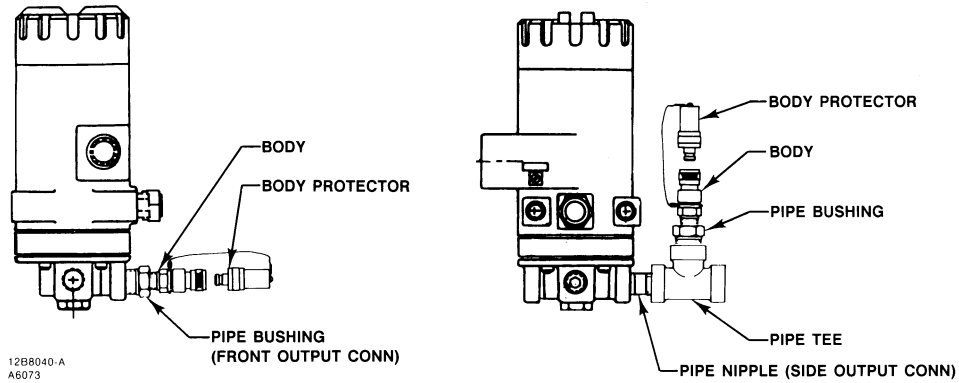


Figure 3. Type 646 Electro-Pneumatic Transducer

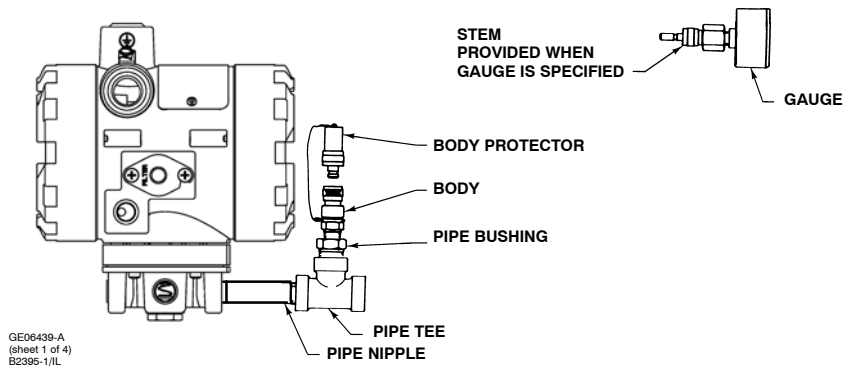


Figure 4. Type i2P-100 Electro-Pneumatic Transducer



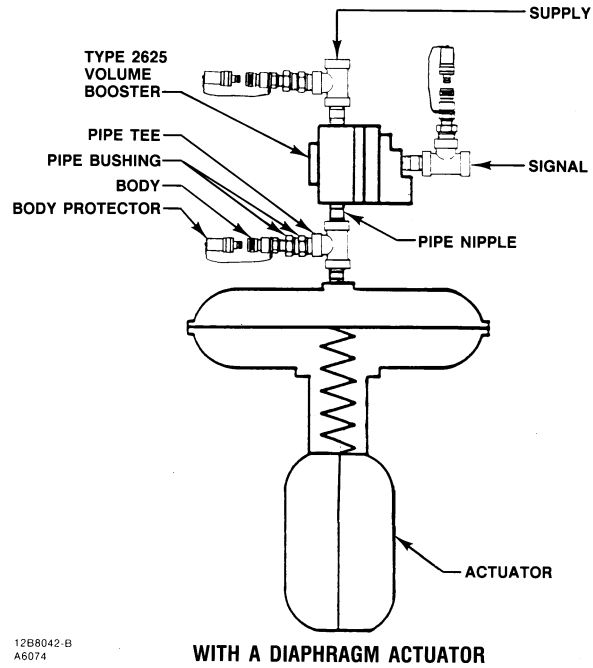


Figure 5. Type 2625 Volume Booster with Diaphragm Actuator

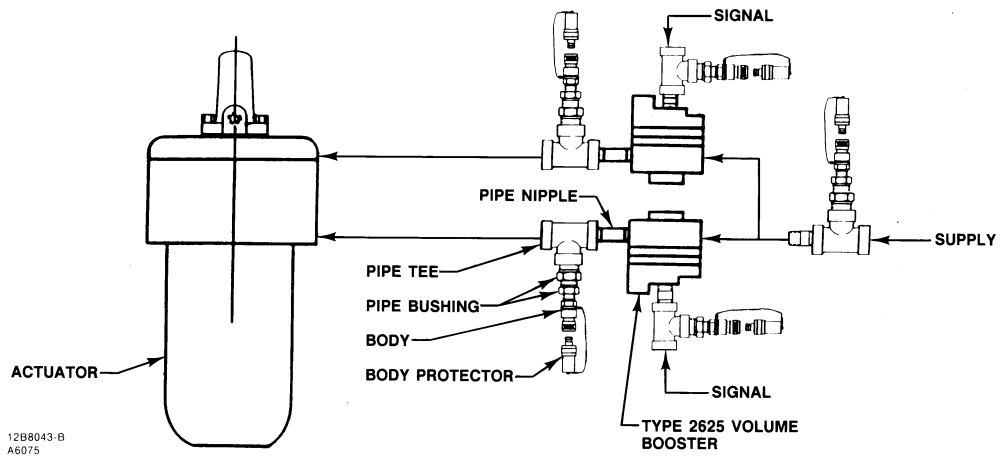


Figure 6. Type 2625 Volume Booster with Piston Actuator

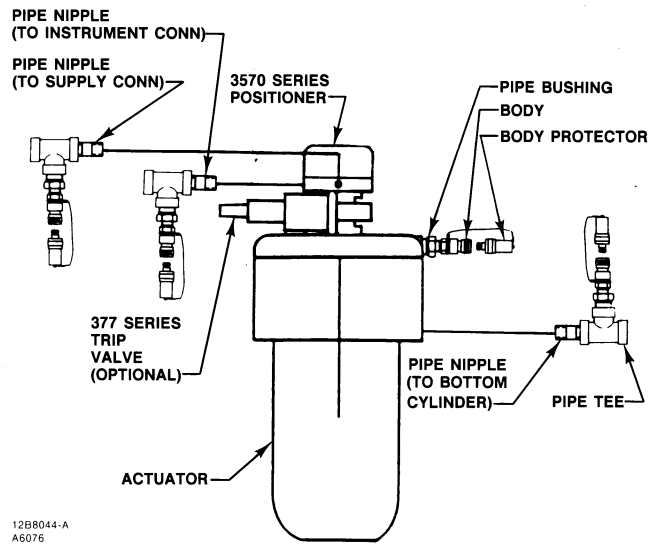


Figure 7. 3570 Series Positioner with Type 377 Valve

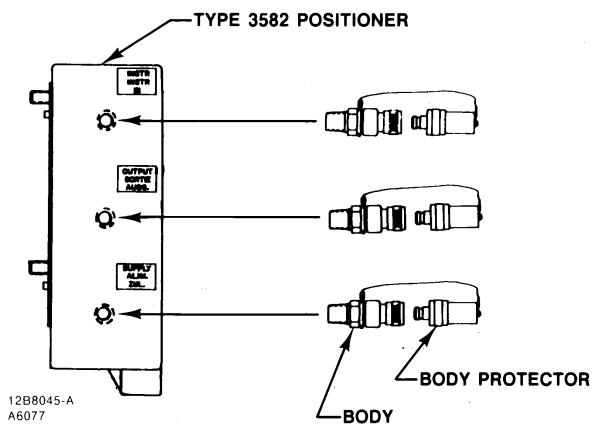


Figure 8. 3582 Series Valve Positioner

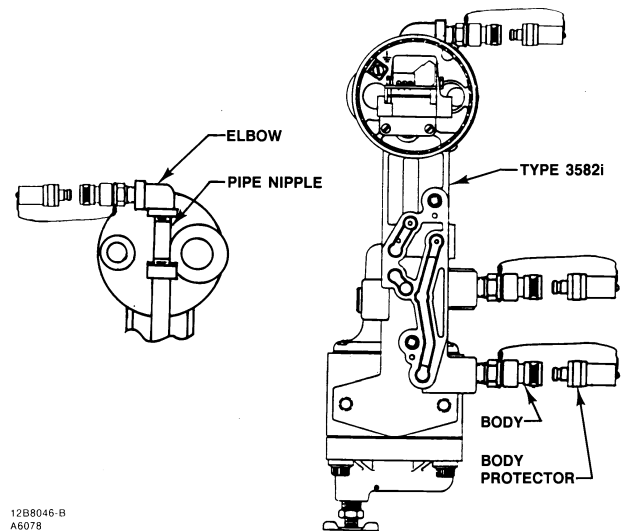


Figure 9. Type 3582i Valve Positioner

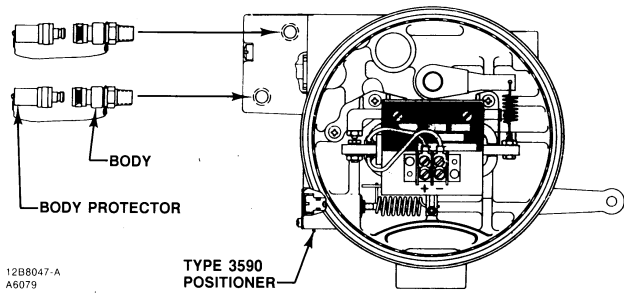


Figure 10. Type 3590 Positioner

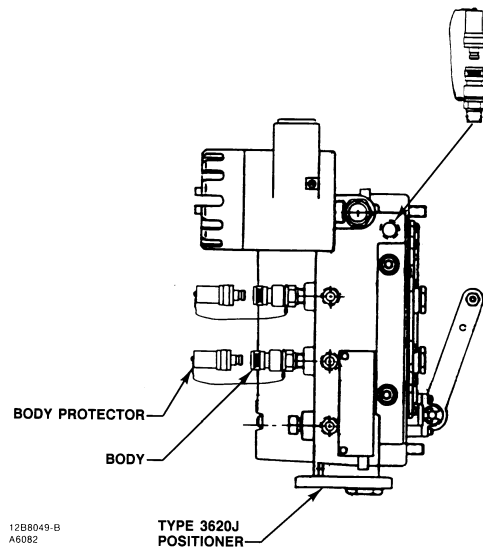


Figure 13. Type 3620J Positioner

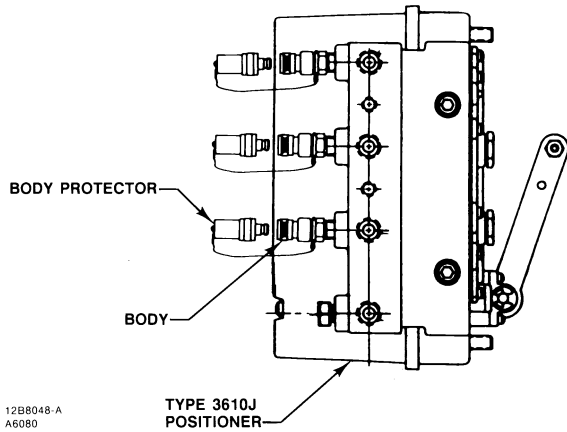


Figure 11. Type 3610J Positioner

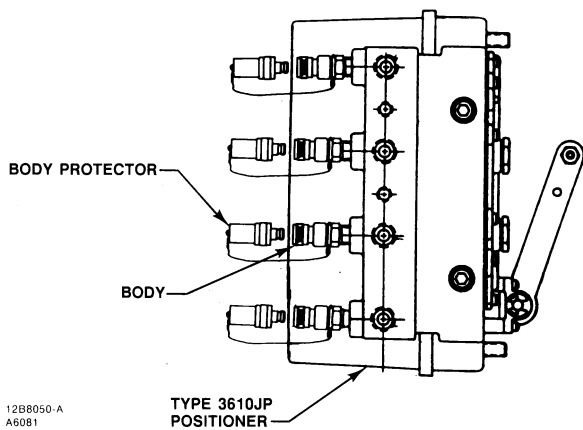


Figure 12. Type 3610JP Positioner

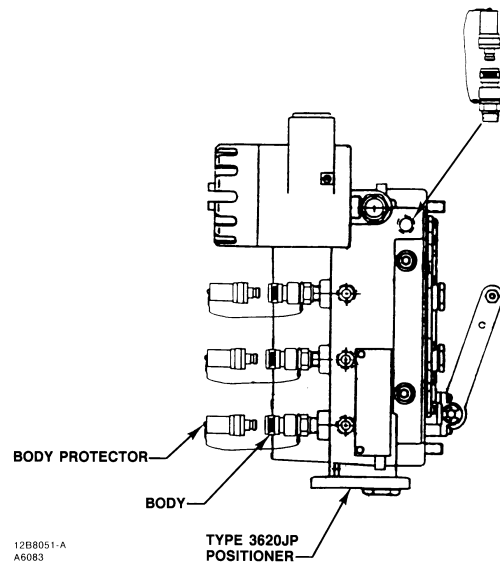


Figure 14. Type 3620JP Positioner

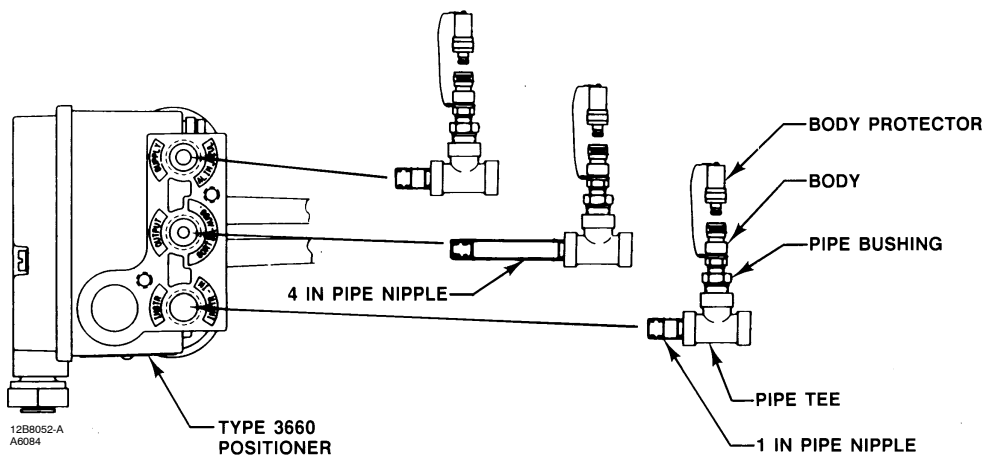


Figure 15. Type 3660 Positioner

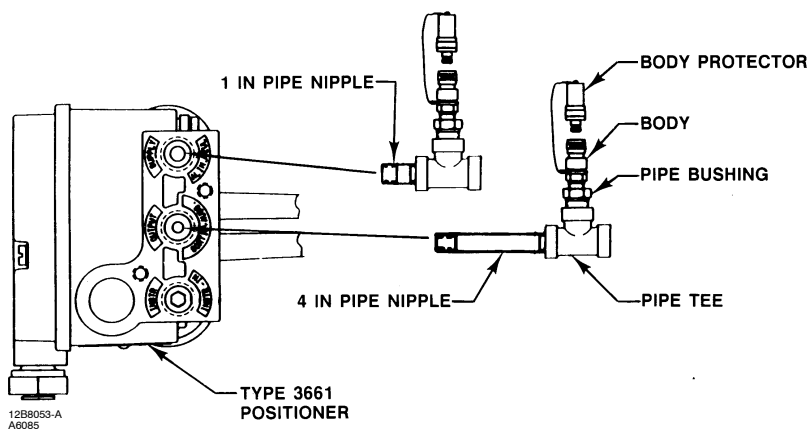


Figure 16. Type 3661 Positioner

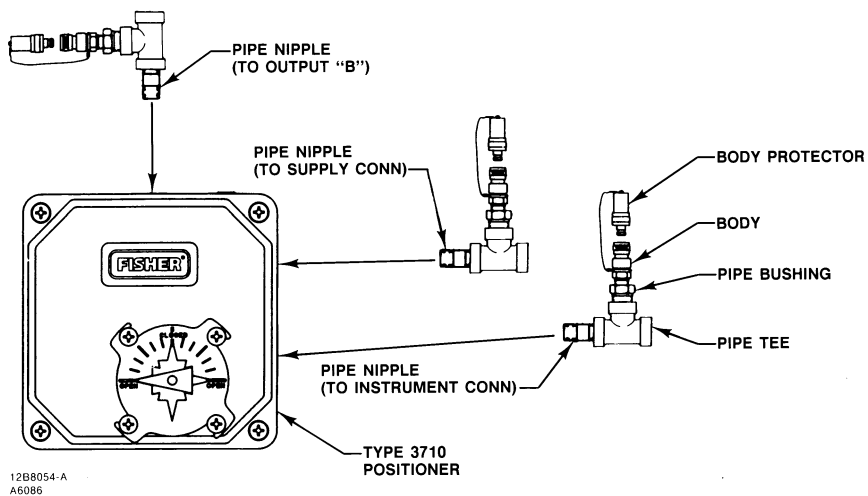


Figure 17. Type 3710 Pneumatic Positioner, Single-Action

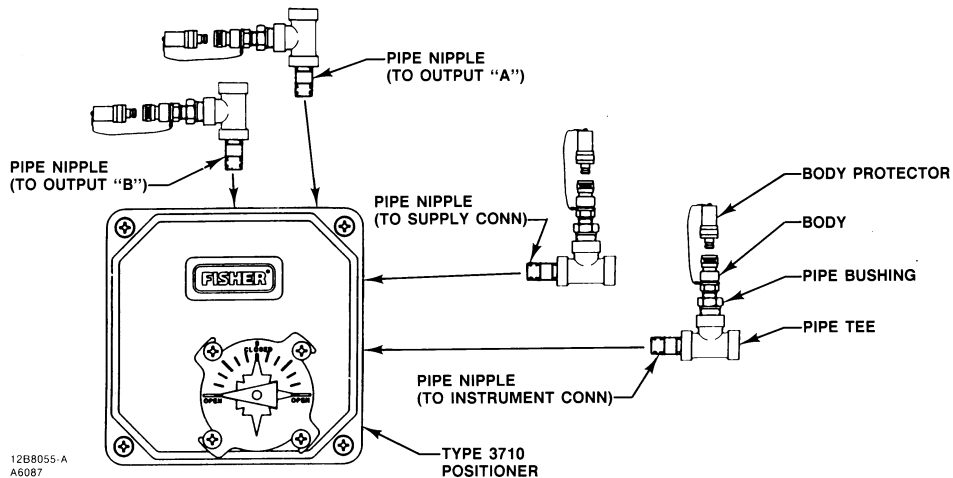


Figure 18. Type 3710 Pneumatic Positioner, Double-Action

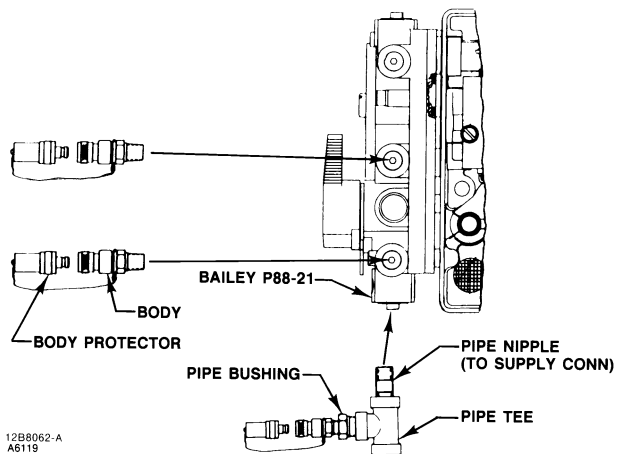


Figure 19. Bailey® P88-21 Positioner, Single-Action

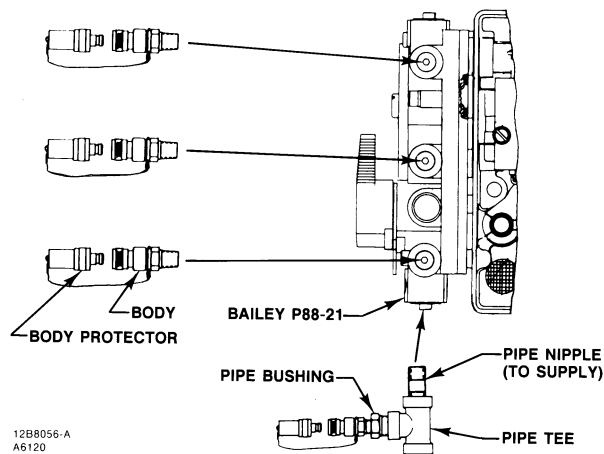


Figure 20. Bailey® P88-21 Positioner, Double-Action

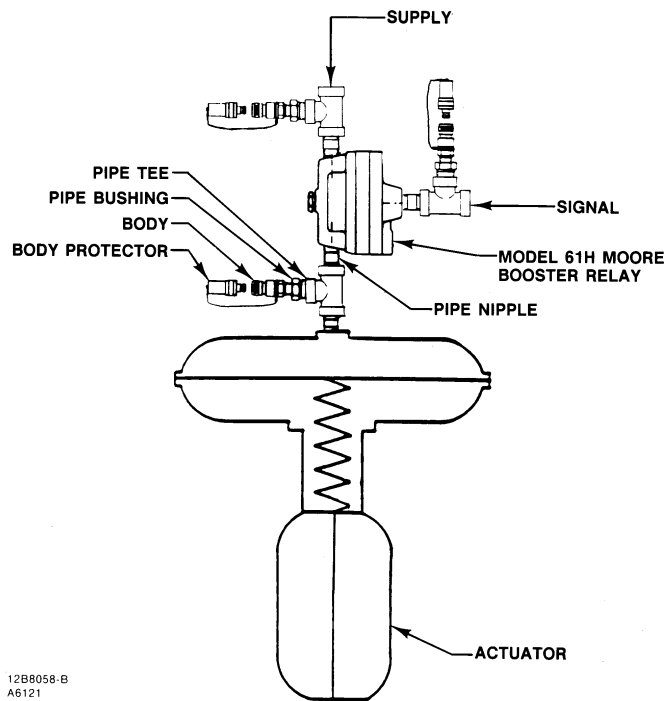


Figure 21. Moore® 61H Booster Relay, Used with Spring/Diaphragm Actuator

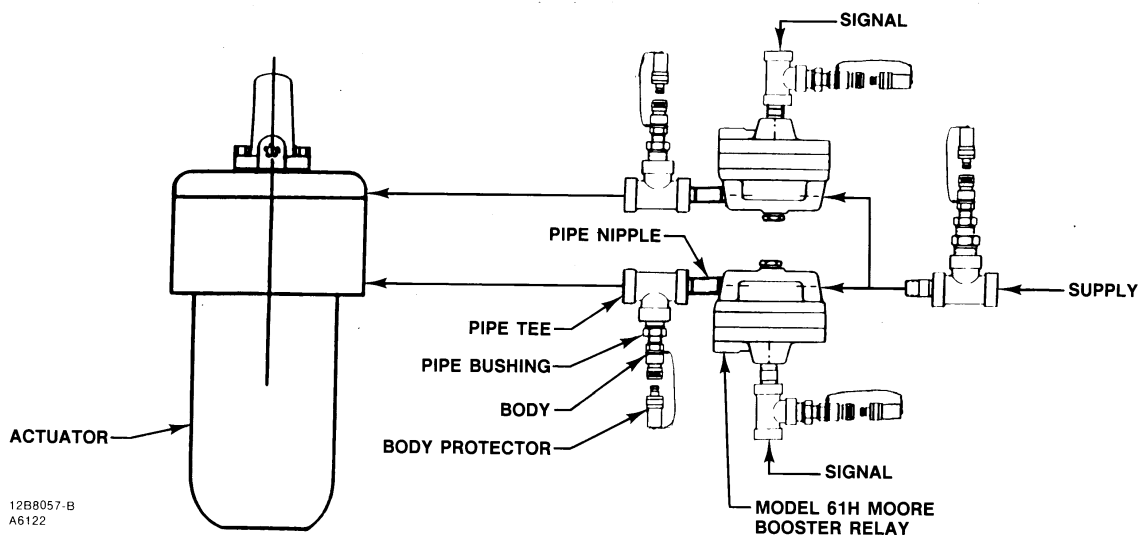


Figure 22. Moore® 61H Booster Relay, Used with Piston Actuator

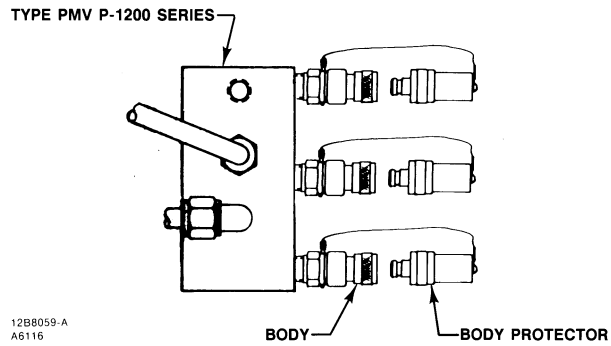


Figure 23. PMV P-1200 Series Positioner

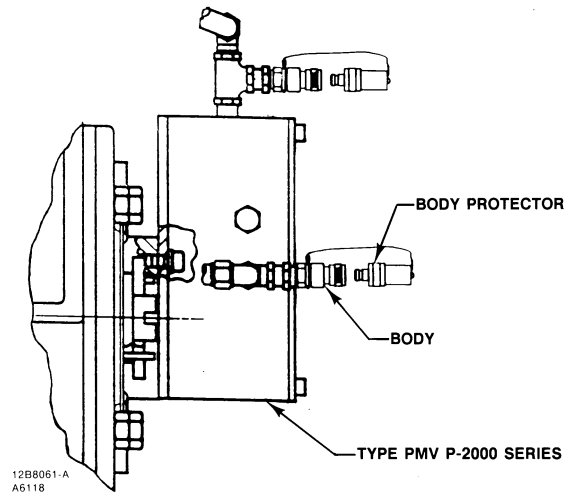


Figure 25. PMV P-2000 Series Positioner

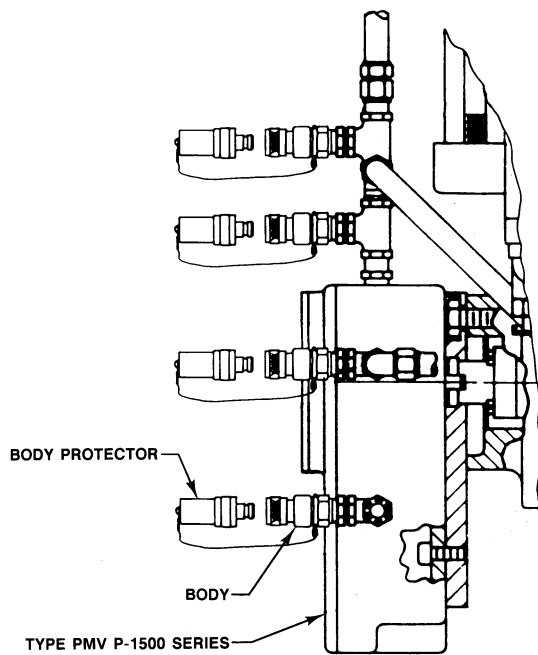


Figure 24. PMV P-1500 Series Positioner

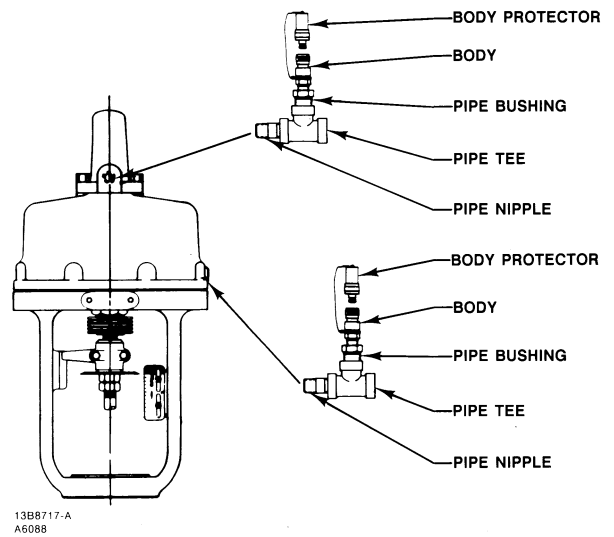
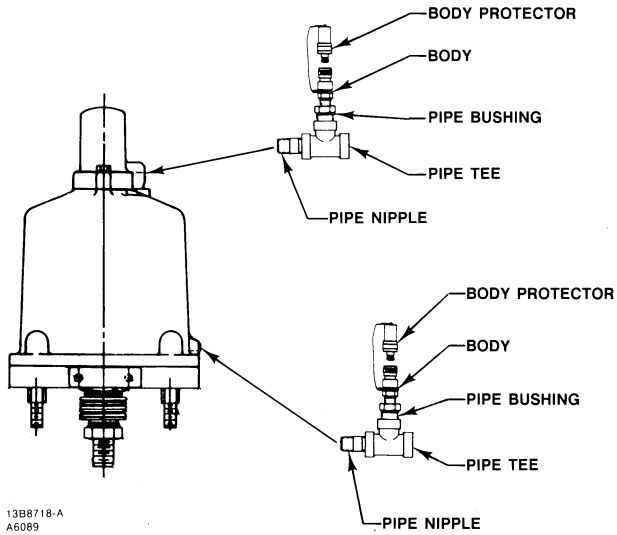
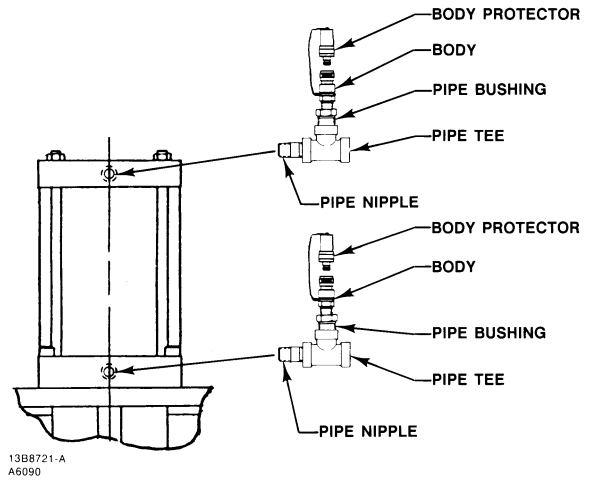


Figure 26. Type 471 Actuator



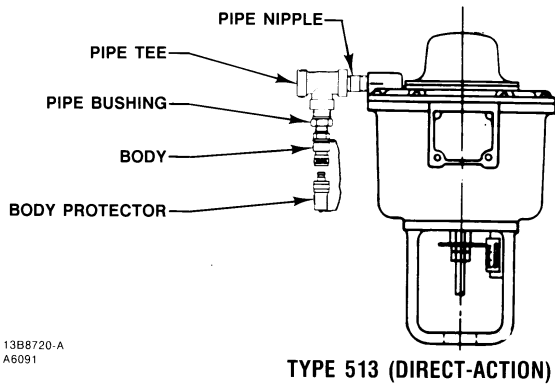
13B8718-A  
A6089

Figure 27. Type 481 Actuator



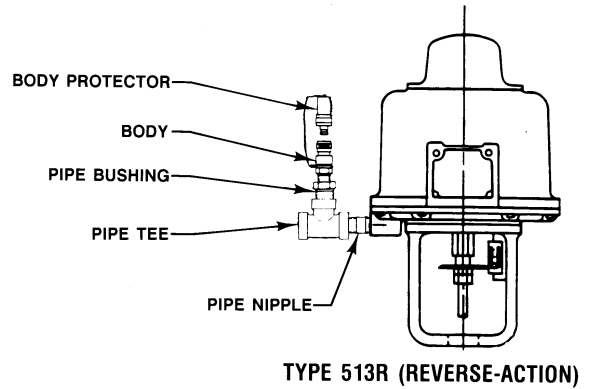
13B8721-A  
A6090

Figure 28. Type 490 Actuator



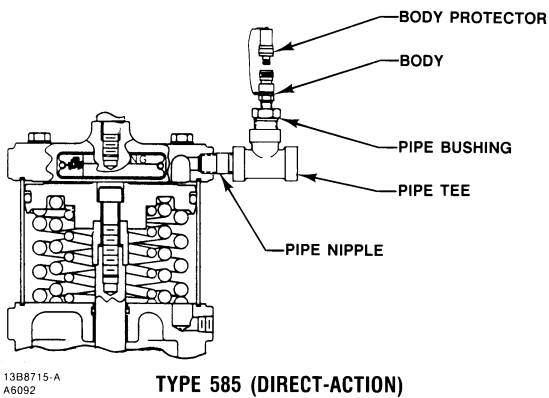
13B8720-A  
A6091

TYPE 513 (DIRECT-ACTION)



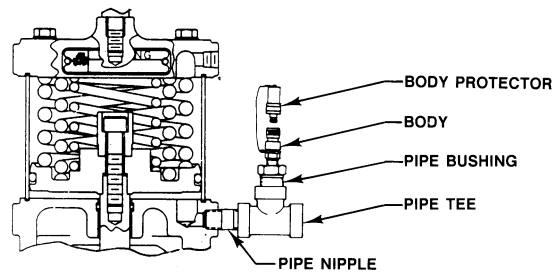
TYPE 513R (REVERSE-ACTION)

Figure 29. Type 513, 513R Diaphragm Actuator



13B8715-A  
A6092

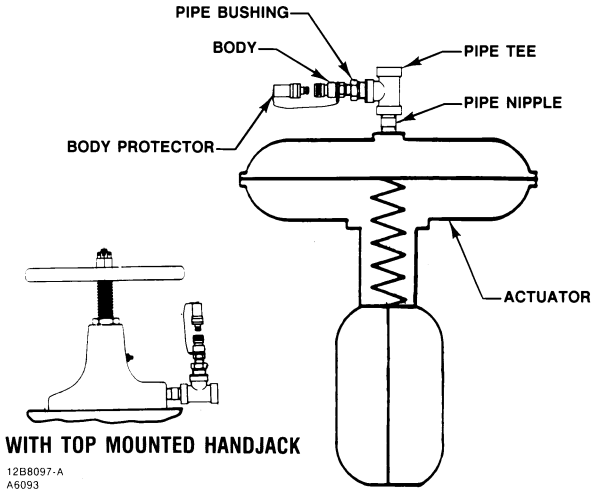
TYPE 585 (DIRECT-ACTION)



TYPE 585R (REVERSE-ACTION)

Figure 30. Type 585, 585R Actuators

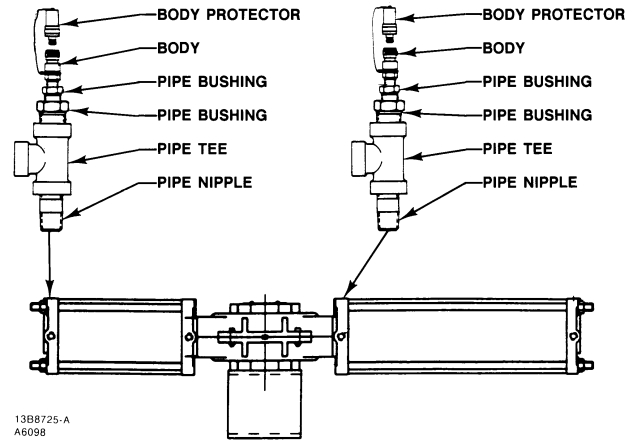




WITH TOP MOUNTED HANDJACK

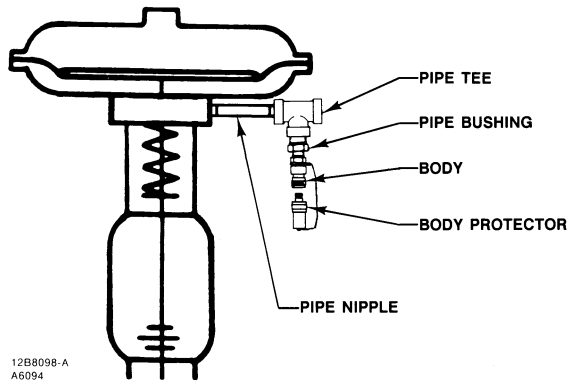
12B8097-A  
A6093

Figure 31. Type 657, 1051, 1052 Diaphragm Actuators



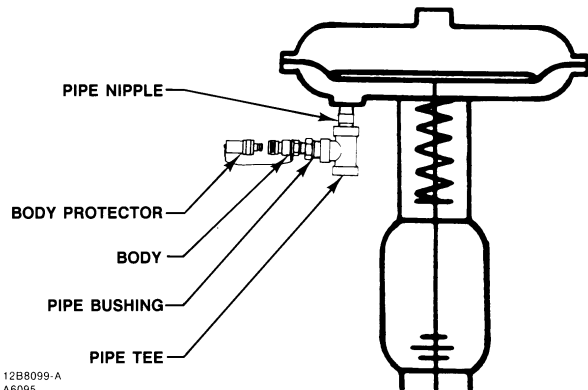
13B8725-A  
A6098

Figure 34. Type 1031 Piston Rotary Actuator (Fail Closed, Model 33072)



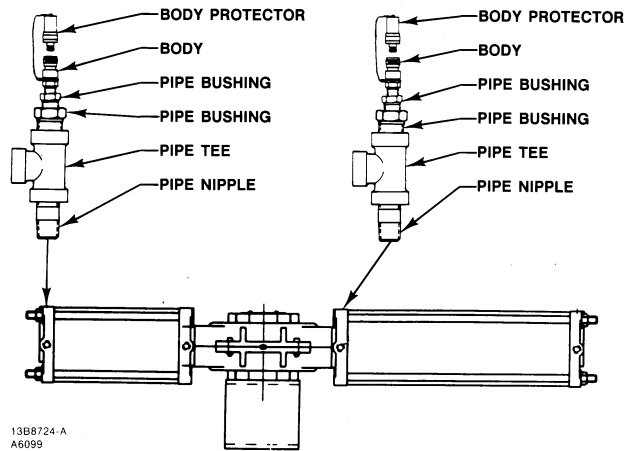
12B8098-A  
A6094

Figure 32. Type 667 Diaphragm Actuators (Sizes 30-87)



12B8099-A  
A6095

Figure 33. Type 667 Diaphragm Actuators (Sizes 80-100)



13B8724-A  
A6099

Figure 35. Type 1031 Piston Rotary Actuator (Fail Closed, Models 33082, 33102, 33122, 45102, 45122, 45171, 45211)

# Connectors for FlowScanner™ System

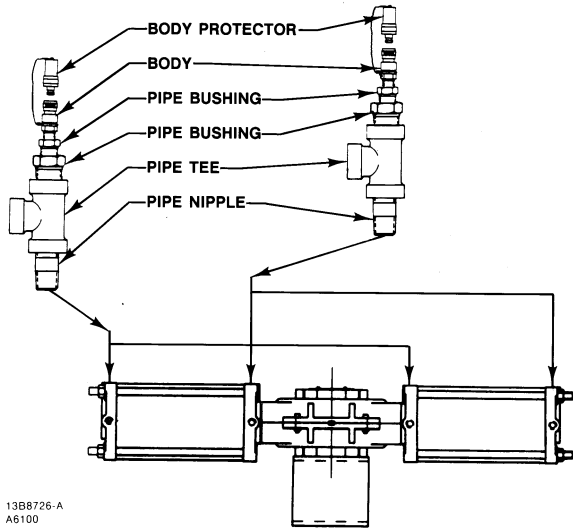


Figure 36. Type 1031 Piston Rotary Actuator (Double-Action, Models 45102, 45121, 45171, 45211)

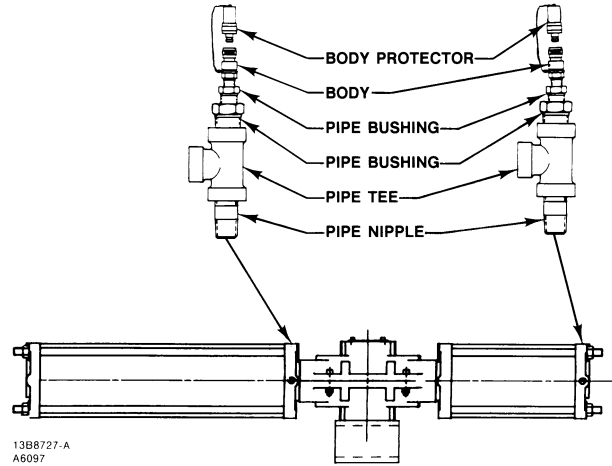


Figure 38. Type 1031 Piston Rotary Actuator (Fail Open, Models 33082, 33102, 33122)

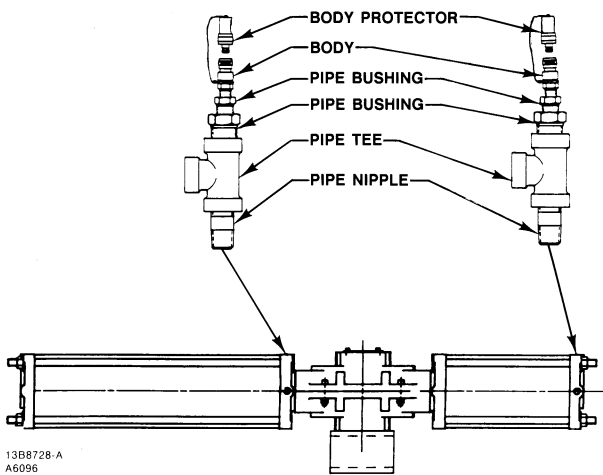


Figure 37. Type 1031 Piston Rotary Actuator (Fail Open, Model 33072)

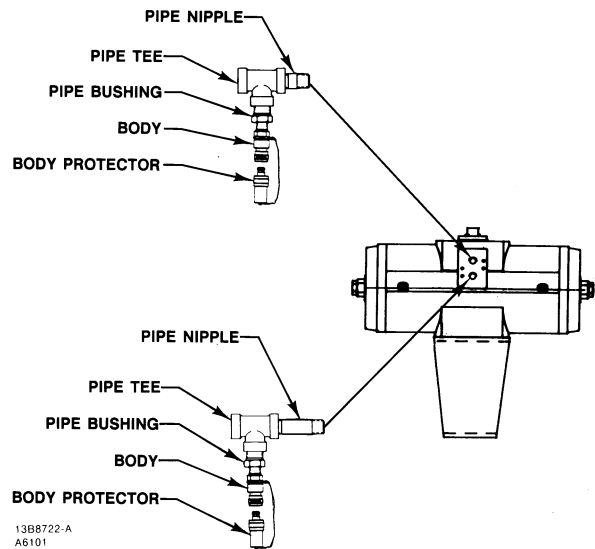


Figure 39. Type 1032 Rack-and-Pinion Rotary Actuator (Double-Action)

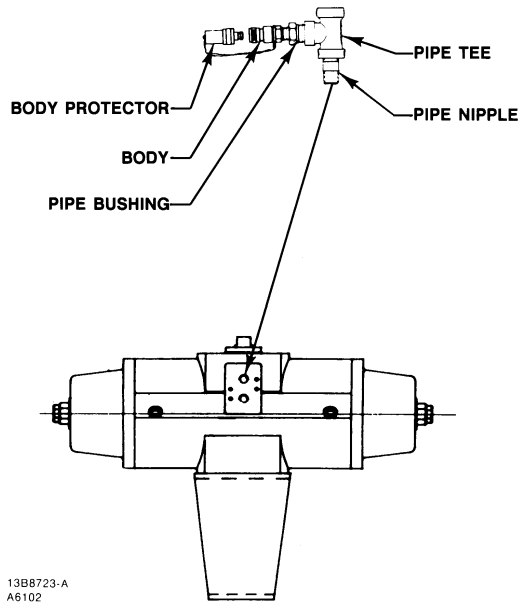


Figure 40. Type 1032 Rack-and-Pinion Rotary Actuator (Spring-Return)

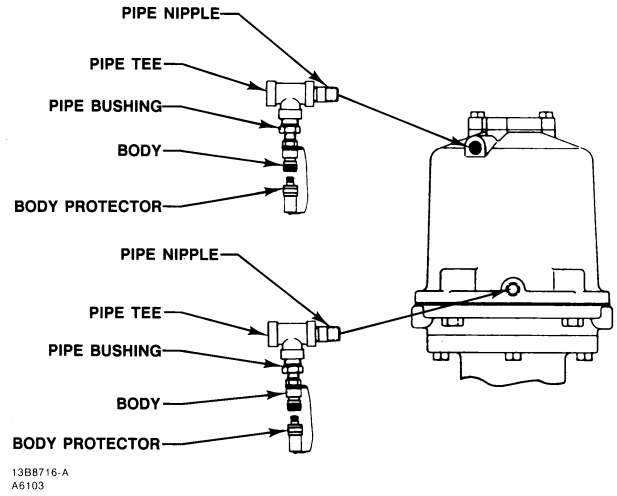


Figure 41. Type 1061 Piston Rotary Actuator

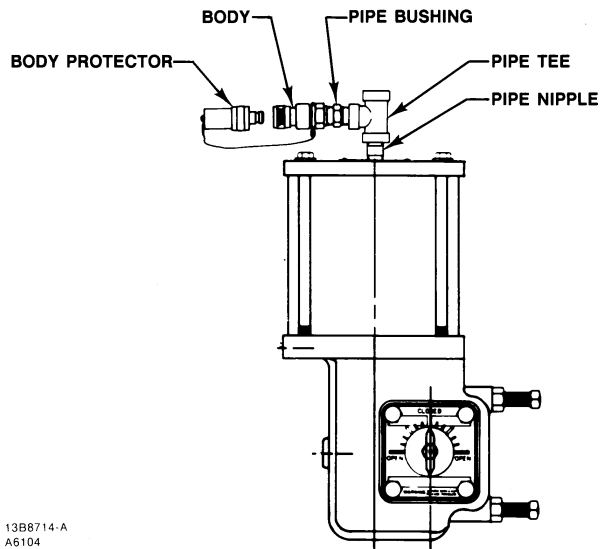


Figure 42. Type 1066, 1066SR Piston Rotary Actuator

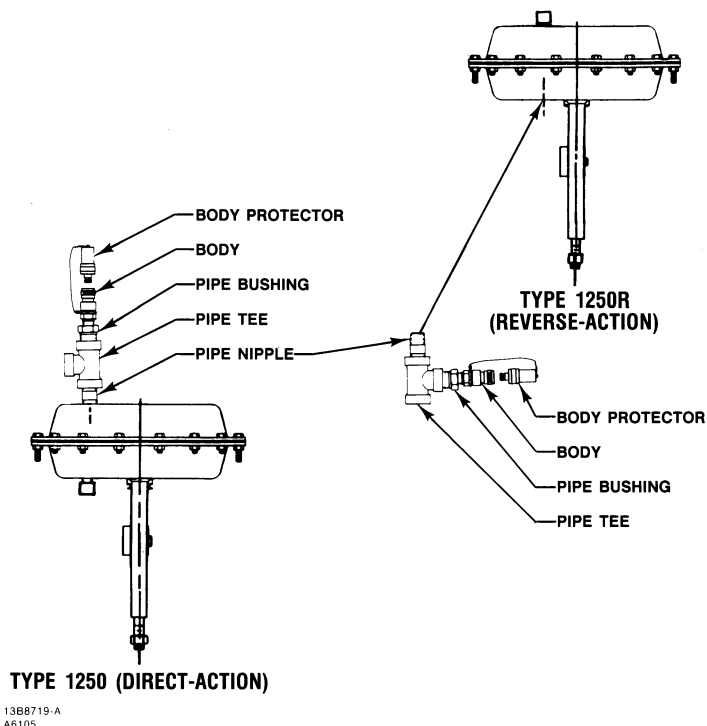


Figure 43. Type 1250, 1250R Actuators

FlowScanner 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. Moore is a mark owned by Moore Industries-International, Inc. Bailey Is a mark owned by ABB ASEA Brown Boveri Ltd. Corp. 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, Fisher, 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  
Instrument & Valve Services  
205 South Center Street  
Marshalltown, Iowa 50158 USA