Connectors for Diagnostic Testing with the FlowScanner™ Valve Diagnostic System

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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

Instrument & Valve Services
Connectors for FlowScanner™ System

Available Configurations

Pipe nipple, pipe tee, pipe bushing, and connector body. Install for ease of connection with the FlowScanner System.

Recommended Applications

Fisher (instruction manuals):
- 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,
- Types 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

Other Manufacturers:
- PMV Positioners,
- Moore® 61H Booster Relay,
- Bailey® P88-21 Positioner when these products are installed on Fisher valve/actuator packages

Connector

- Stainless steel or brass

Connector Body: 1/8 inch NPT male with female “quick-connect” receptacle. 46.5 mm (1.83 inches) overall length. Internal poppet valve

Body Protector: 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

Stem: 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

The FlowScanner System comes equipped with flexible tubing and stems to mate with installed connector bodies for diagnostic testing

Maximum Temperature Limit

70°C (250°F)

Maximum Safe Working Pressure

- When coupling/uncoupling body/stem: 17 bar (250 psi)
- When body/stem are coupled
  - SST: 207 bar (3000 psi)
  - Brass: 138 bar (2000 psi)

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.

contact your Emerson Process Management sales office if assistance is needed in obtaining any of the above instruction manuals.

collectors 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.
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

**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.

**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.
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.

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Output</td>
<td>For Type 646 and i2P-100 Transducers (see figure 3 and 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

For 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

For 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 |

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 |
### Connectors for FlowScanner™ System

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#### For Type 3590 Positioners (see figure 10)
- **For units with gauges**
  - SST fittings: 12B8047X012
  - Brass fittings: 12B8047X022
- **For units without gauges**
  - SST fittings: 12B8047X032
  - Brass fittings: 12B8047X042

#### For Type 3610J Positioners (see figure 11)
- **For units with gauges**
  - SST fittings: 12B8048X012
  - Brass fittings: 12B8048X022
- **For units without gauges**
  - SST fittings: 12B8048X032
  - Brass fittings: 12B8048X042

#### For Type 3610JP Positioners (see figure 12)
- **For units with gauges**
  - SST fittings: 12B8050X012
  - Brass fittings: 12B8050X022
- **For units without gauges**
  - SST fittings: 12B8050X032
  - Brass fittings: 12B8050X042

#### For Type 3620J Positioners (see figure 13)
- **For units with gauges**
  - SST fittings: 12B8049X012
  - Brass fittings: 12B8049X022
- **For units without gauges**
  - SST fittings: 12B8049X032
  - Brass fittings: 12B8049X042

#### For Type 3620JP Positioners (see figure 14)
- **For units with gauges**
  - SST fittings: 12B8051X012
  - Brass fittings: 12B8051X022
- **For units without gauges**
  - SST fittings: 12B8051X032
  - Brass fittings: 12B8051X042

#### For Type 3660 Positioners (see figure 15)
- **For units with supply gauges**
  - SST fittings: 12B8052X012
  - Brass fittings: 12B8052X022
- **For units without supply gauges**
  - SST fittings: 12B8052X032
  - Brass fittings: 12B8052X042

#### For Type 3661 Positioners (see figure 16)
- **For units with supply gauges**
  - SST fittings: 12B8053X012
  - Brass fittings: 12B8053X022
- **For units without supply gauges**
  - SST fittings: 12B8053X032
  - Brass fittings: 12B8053X042

#### For Type 3710 Pneumatic Positioners (see figures 17 and 18)
- **Single-Action Units**
  - **For units with gauges**
    - SST fittings: 12B8054X012
    - Brass fittings: 12B8054X022
  - **For units without gauges**
    - SST fittings: 12B8054X032
    - Brass fittings: 12B8054X042

#### For型3710 Pneumatic Positioners (cont’d)
- **Double-Action Units**
  - **For units with gauges**
    - SST fittings: 12B8055X012
    - Brass fittings: 12B8055X022
  - **For units without gauges**
    - SST fittings: 12B8055X032
    - Brass fittings: 12B8055X042

#### For Type 3710 Pneumatic Positioners (cont’d)
- **For Bailey P88-21 Positioners (see figures 19 and 20)**
  - **Single-Action**
    - **For units with gauges**
      - SST fittings: 12B8056X012
      - Brass fittings: 12B8056X022
    - **For units without gauges**
      - SST fittings: 12B8056X032
      - Brass fittings: 12B8056X042

#### For Moore 61H Booster Relay (see figures 21 and 22)
- **Used with Spring/Diaphragm Actuator**
  - SST fittings: 12B8057X012
  - Brass fittings: 12B8057X022
- **Used with Piston Actuator**
  - SST fittings: 12B8058X012
  - Brass fittings: 12B8058X022

#### For PMV P-1200 Series Positioner (see figure 23)
- **For units with gauges**
  - SST fittings: 12B8059X012
  - Brass fittings: 12B8059X022
- **For units without gauges**
  - SST fittings: 12B8059X032
  - Brass fittings: 12B8059X042

#### For PMV P-1500 Series Positioner (see figure 24)
- **For units with gauges**
  - SST fittings: 12B8060X012
  - Brass fittings: 12B8060X022
- **For units without gauges**
  - SST fittings: 12B8060X032
  - Brass fittings: 12B8060X042

#### For PMV P-2000 Series Positioner (see figure 25)
- **For units with gauges**
  - SST fittings: 12B8061X012
  - Brass fittings: 12B8061X022
- **For units without gauges**
  - SST fittings: 12B8061X032
  - Brass fittings: 12B8061X042

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#### Actuators

- **For Type 471 Actuator, Sizes 30–130 (see figure 26)**
  - SST fittings: 13B8717X012
  - Brass fittings: 13B8717X022
### Connectors for FlowScanner™ System

#### Key Description Part Number

**For Type 481 Actuator, Sizes 30–130 (see figure 27)**
- SST fittings 13B8718X012
- Brass fittings 13B8718X022

**For Type 490 Actuator, All Sizes (see figure 28)**
- SST fittings 13B8721X012
- Brass fittings 13B8721X022

**For Type 513 Actuator, Sizes 20, 32 (see figure 29)**
- SST fittings 13B8720X012
- Brass fittings 13B8720X022

**For Type 513R Actuator, Sizes 20, 32 (see figure 29)**
- SST fittings 13B8720X032
- Brass fittings 13B8720X042

**For Type 585, 585R Actuator, Sizes 25, 50, 100 (see figure 29)**
- SST fittings 13B8715X012
- Brass fittings 13B8715X022

**For Type 657 Actuator, Sizes 30–87 with or R without Top-Mtd Handjack (see figure 31)**
- SST fittings 12B8097X012
- Brass fittings 12B8097X022

**For Type 667 Actuator, Sizes 30–34, 40 (see figure 32)**
- SST fittings 12B8098X012
- Brass fittings 12B8098X022

**For Type 667 Actuator, Sizes 45, 50 (see figure 32)**
- SST fittings 12B8098X032
- Brass fittings 12B8098X042

**For Type 667 Actuator, Sizes 46, 60, 70, 87 (see figure 32)**
- SST fittings 12B8098X052
- Brass fittings 12B8098X062

**For Type 667 Actuator, Sizes 80, 100 (see figure 33)**
- SST fittings 12B8099X012
- Brass fittings 12B8099X022

**For Type 1031 Fail-Close Actuator, Model 33072 (see figure 34)**
- SST fittings 13B8725X012
- Brass fittings 13B8725X022

**For Type 1031 Double-Acting Actuator, Models 45102, 45121, 45171, 45211 (see figure 36)**
- SST fittings 13B8726X012
- Brass fittings 13B8726X022

**For Type 1031 Fail-Open Actuator, Models 33072 (see figure 37)**
- SST fittings 13B8728X012
- Brass fittings 13B8728X022

**For Type 1031 Double-Acting Actuator, All Sizes (see figure 39)**
- SST fittings 13B8722X012
- Brass fittings 13B8722X022

**For Type 1032 Spring Return Actuator, All Sizes (see figure 40)**
- SST fittings 13B8723X012
- Brass fittings 13B8723X022

**For Types 1051, 1052 Actuator, Sizes 30–70, with or without Top Mtd Handjack (see figure 31)**
- SST fittings 12B8097X012
- Brass fittings 12B8097X022

**For Type 1061 Actuator, Sizes 30–68 (see figure 41)**
- SST fittings 13B8716X012
- Brass fittings 13B8716X022

**For Type 1066, 1066SR Actuator, Sizes 20–75 (see figure 42)**
- SST fittings 13B8714X012
- Brass fittings 13B8714X022

**For Type 1250 Actuator, Sizes 225, 450, 675 (see figure 43)**
- SST fittings 13B8719X012
- Brass fittings 13B8719X022

**For Type 1250R Actuator, Sizes 225, 450, 675 (see figure 43)**
- SST fittings 13B8719X032
- Brass fittings 13B8719X042
Figure 1. Standard Application Arrangement

Figure 2. Type 546 Electro-Pneumatic Transducer

Figure 3. Type 646 Electro-Pneumatic Transducer

Figure 4. Type 12P-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 11. Type 3610J Positioner

Figure 12. Type 3610JP Positioner

Figure 13. Type 3620J Positioner

Figure 14. Type 3620JP Positioner
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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
Connectors for FlowScanner™ System

Figure 23. PMV P-1200 Series Positioner

Figure 24. PMV P-1500 Series Positioner

Figure 25. PMV P-2000 Series Positioner

Figure 26. Type 471 Actuator
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Figure 27. Type 481 Actuator

Figure 28. Type 490 Actuator

Figure 29. Type 513, 513R Diaphragm Actuator

Figure 30. Type 585, 585R Actuators
Figure 31. Type 657, 1051, 1052 Diaphragm Actuators

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

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

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

Figure 35. Type 1031 Piston Rotary Actuator (Fail Closed, Models 33082, 33102, 33122, 45102, 45122, 45171, 45211)
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Figure 36. Type 1031 Piston Rotary Actuator (Double-Action, Models 45102, 45121, 45171, 45211)

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

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

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