

Series AV1 / 2 / 4

Characterizable pneumatic positioners

Analog pneumatic and electro-pneumatic positioners built on proven performance for demanding process conditions

Measurement made easy



Proven pilot valve

- increased reliability minimizes downtime and maintenance costs

High capacity

- fast response with high air delivery capacity

Performance Series

- high flow gain pilot valve body achieves maximum flow capacity at small error signal

Position transmitters

- optional integrated 4 to 20 mA position transmitter

Compact rugged design

- NEMA 4X version available

High vibration and shock environments

- withstands vibration and shock at frequencies to 120 Hz and accelerations to 2 G

Fast, accurate calibration

- independent zero and span adjustments

Single or double-acting without additional hardware

- controls single and double-acting, linear and rotary actuators

AV1 positioner fail-safe with pneumatic input signal

AV2 positioner fail-safe with mA input signal

AV27 positioner fail-safe with mA input signal with explosion-proof I/P converter

AV44 positioner fail-in-place with pulse input

Series AV1 / 2 / 4

Characterizable pneumatic positioners

Characterizable pneumatic positioners

Type AV characterizable pneumatic positioners are control devices that satisfy a wide range of applications. They provide fast, sensitive, and accurate positioning of pneumatic single- or double-acting, linear or rotary motion actuators. A mechanical connection from the actuator to a position feedback cam in the positioner establishes actual position. Three characterized segments on one cam provide application flexibility by establishing various relationships between input signal and actuator position. The relationships provided by the segments are square root, linear, and square.

Using the cam and the zero, span and gain adjustments, the actuator responds with characteristics specific to an application.

An optional manifold assembly provides an integral shutoff and equalizing valve. This isolates the positioner from a double-acting actuator (with manual override) without removing the positioner from the process. The manifold also provides disposable filter cartridges that insure fast servicing and minimum downtime. Manifolds also contain three gage ports for mounting one instrument and two output gages. A supply gage is available and must be piped into the supply line by the user.

Type AV1 positioners are pneumatic positioners that use a pneumatic input to control the pneumatic output. Type AV2 positioners are electropneumatic positioners that use an I/P (current-to-pneumatic) converter to accept a 4 to 20 mA input signal and convert it to a pneumatic output. Type AV4 positioners use the I/P converter to operate with a contact input signal for jogging the final control element.

Some nomenclature options include a high temperature type AV1 positioner that can be operated and stored at temperatures up to 127 °C (250 °F). Type AV2 positioners are available with an explosion proof I/P converter, external to the housing, that is mounted on an adapter block manifold. The performance series provides a high flow gain pilot valve body having square ports that provide a maximized air flow for a small motion of the valve stem.

Explosion proof I/P converter

The AV27 positioner includes an explosion proof I/P converter mounted to an adapter block manifold. The adapter block manifold is bolted to the outside of the main positioner housing. The unit is a Type AV12 positioner with the electric to pneumatic (4 to 20 mA to 20.7 to 103.4-kPa (3.0 to 15.0 psig)) conversion occurring within the externally mounted I/P converter.

The 4 to 20 mA input signal wires are connected through an explosion proof conduit entrance on the I/P converter. If no electrical connections are made within the main housing, the entire positioner can be considered suitable for application in the hazardous locations shown on the I/P label. Refer to Fig. 6, page 9 for the external and mounting dimensions of the positioner.

NEMA 4X

The positioners are available with a NEMA 4X housing. To maintain the NEMA 4X classification, the positioner shall meet special installation requirements described in the NEMA 4X mounting kit. Suitable piping must be attached to the vent opening and vented in a manner to prevent the entrance of water under pressure (for example, from a hose). Additionally, the conduit connections must be suitable for a NEMA 4X rating.

Common specification

Standard stroke range (cam selection)*

AV__1____

12.7 to 50.8 mm (0.5 to 2.0 in.)
linear, rotary input 45 °

AV__2____

25.4 to 101.6 mm (1.0 to 4.0 in.)
linear, rotary input 90 °

Gain

Two adjustment levels via gain hinge spring change for standard and performance series (high gain) units are available.

Supply pressure**

172 to 1,034 kPa (25 to 150 psig)

Supply pressure effect

0.05 % per 6.9 kPa for ±69 kPa change
(0.05 % per 1.0 psig for ±10 psig change)

Air consumption

See Fig. 1, page 4

Capacity

Maximum capacity exhausted to atmosphere – see Fig. 2, page 4

Vibration effect***

<2,0% error for:

- 5 to 115 Hz at peak-to-peak constant displacement to 4 mm (0.16 in.)
- 15 to 120 Hz at acceleration to 2 G.

Pneumatic connections

1/4 NPT on supply, signal and output connections
1/8 NPT on pressure gages

Materials of construction

Enclosure

Aluminum and <0.5% magnesium

Pilot valve

303 stainless steel

Enclosure classification

Standard

NEMA 3R classification when vent hole is protected from rain using rain elbow (1/2 NPT street elbow, see Fig. 6, page 9)
NEMA 4X classification with option AV_____N.

* Use 90° cam whenever possible

** Minimum supply pressure must be 34.4 kPa (5.0 psig) above the required operating pressure

*** Tested according to ISA-S75, 13 – 1989

Series AV1 / 2 / 4

Characterizable pneumatic positioners

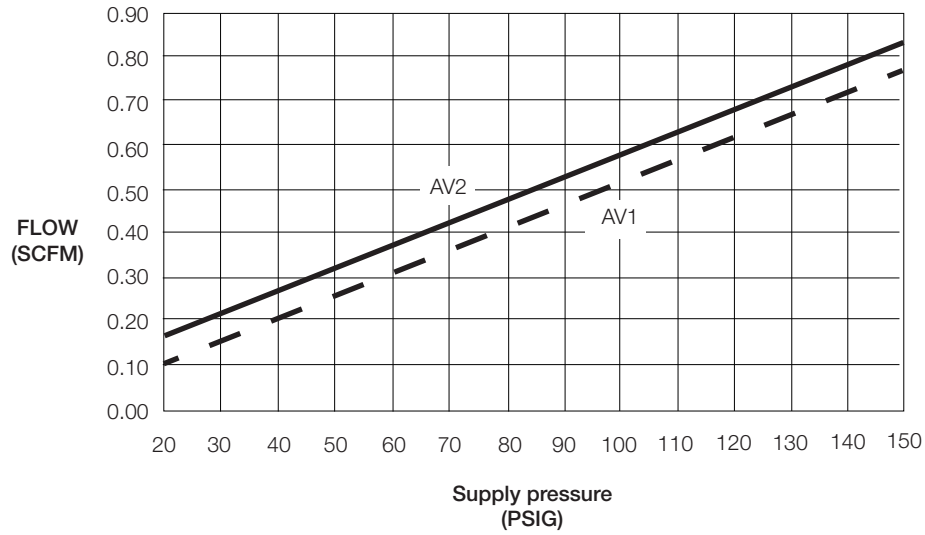


Fig. 1: Air consumption (at null)

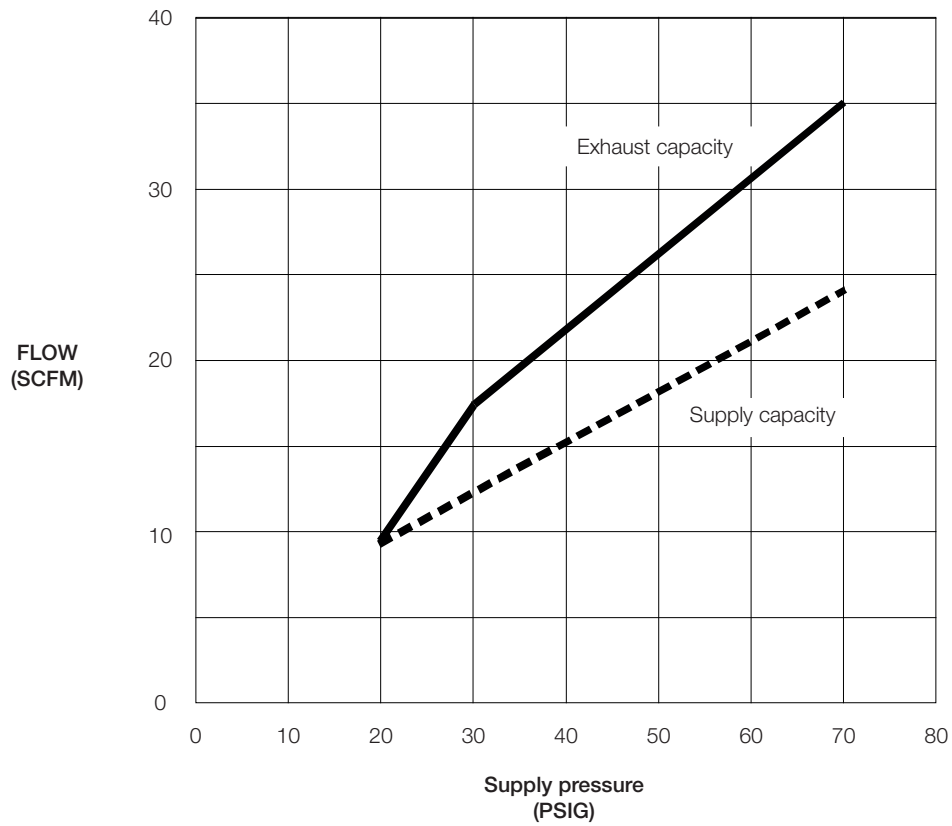


Fig. 2: Capacity (exhaust to atmosphere)

Type AV1 positioner specification

Operation

Input range*

AV11 and AV15

20.7 to 103.4 kPa (3.0 to 15.0 psig)

AV12 and AV16

20.7 to 186.2 kPa (3.0 to 27.0 psig)

Accuracy**

0.80 % of span maximum

Resolution

0.09 % of span maximum

Hysteresis**

0.45 % of span maximum

Repeatability**

0.12 % of span maximum

Deadband**

0.12 % of span maximum

Linearity**

0.70 % of span maximum

Weight

1.84 kg (4.06 lb)

Temperature limits

Operating***

AV11/2 -40 to 82 °C (-40 to 180 °F)

AV15/6 -20 to 121 °C (-4 to 250 °F)

Storage

AV11/2 -40 to 93 °C (-40 to 200 °F)

AV15/6 -20 to 121 °C (-4 to 250 °F)

Humidity limits – operating and storage

0 to 95 % non condensing

Type AV2 positioner specification

Operation

Input range*

4 to 20mA

Input impedance

250 Ω at 20 mA

Accuracy**

0.90 % of span maximum

Resolution

0.30 % of span maximum

Hysteresis**

0.70 % of span maximum

Repeatability**

0.50 % of span maximum

Deadband**

0.30 % of span maximum

Linearity**

0.70% of span maximum

Weight

Standard

2.32 kg (5.11 lb)

Explosion proof

2.95 kg (6.51 lb)

Temperature limits

Operating***

-20 to 82 °C (-4 to 180 °F)

Storage

-20 to 80 °C (-4 to 176 °F)

Humidity limits

Operating and storage

0 to 95% non condensing

* Units have 50% range suppression and / or zero elevation capability.

** Tested according ISA-S75, 13 – 1989

*** For operation below 4.4 °C (40 °F), dew point of supply air must be 10 °C (18 °F) lower than lowest expected operating temperature

* Units have 50% range suppression and / or zero elevation capability.

** Tested according ISA-S75, 13 – 1989

*** For operation below 4.4 °C (40 °F), dew point of supply air must be 10 °C (18 °F) lower than lowest expected operating temperature

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Characterizable pneumatic positioners

Type AV4 positioner specification

Operation

Input range*

Computer DDC (direct digital control),
solid state or contact closure input

Minimum pulse width

Data taken at 20 °C (68 °F) and factory preset fine speed adjustment. Operation at other fine speed adjustments requires different minimum pulse widths. Operation at colder temperatures may require longer minimum pulse widths.

Coarse speed

Position 4

— Minimum pulse width = 40.0 ms

Position 3

— Minimum pulse width = 20.0 ms

Position 2

— Minimum pulse width = 15.0 ms

Position 1

— Minimum pulse width = 12.5 ms

Resolution

0.30 % of span maximum

Deadband**

0.3 % of span maximum

Voltage supply**

| | |
|---------|---------|
| Minimum | 16 V DC |
| Nominal | 24 V DC |
| Maximum | 34 V DC |

Weight

2.35 kg (5.17 lb)

Temperature limits****

Operating***

– 20 to 60 °C (–4 to 140 °F)

Storage

– 20 to 80 °C (–4 to 176 °F)

Humidity limits – operating and storage

0 to 95% non condensing

Temperature effect**

<0.18 % per °C (<0.09 % per °F)

* Units have 50% range suppression and / or zero elevation capability.

** Tested according to ISA-S75, 13-1989

*** Operation below specification will increase stroke time.

**** For operation below 4.4 °C (40 °F), dew point of supply air must be 10 °C (18 °F) lower than lowest expected operating temperature

Type AV1/2_ _ _1 and AV44_ _0 position transmitter specifications

Total resistance

2000 Ω, ±20 % potentiometer

Power rating

1 W up to 70 °C (158 °F),

0 W at or above 125 °C (257 °F)

Wiper rate of change

9.9 Ω nominal per degree of cam rotation

Temperature effect

0.05 % (500 ppm) per °C (0.03 % (278 ppm) per °F) maximum

Maximum voltage

35 V DC or 30 V AC across the potentiometer ends

Temperature limits

Operating

–40 to 82 °C (–40 to 180 °F)

Storage

–40 to 93 °C (–40 to 200 °F)

Operation

Type AV positioners operate by balancing opposing forces. Fig. 3 is an operational diagram of the positioner. A balance beam, hinged at one end and connected to the pilot valve at the other, is acted upon by two forces:

- Upward force of the signal diaphragm assembly
- Downward force from the range spring

A change in input signal changes the force exerted by the signal diaphragm, moving the balance beam, in turn moving the pilot valve. The pilot valve supplies and / or exhausts air to the actuator that ultimately changes its position. The change in actuator position is fed back to the positioning cam. The positioning cam moves, changing the tension of the range spring until a balanced condition once again exists.

The input signal pressure determines the diaphragm force. The Type AV1 positioner uses an external input pressure (either 20.7 to 103.4 kPa (3.0 to 15.0 psig) or 20.7 to 186.2 kPa (3.0 to 27.0 psig)). Types AV2 positioners internally generate the input signal pressure using an I/P converter.

The range spring force is a function of the shape and position of the cam. The cam is coupled to the cam shaft that is connected through linkage (or coupling) to the actuator. Therefore, range spring tension is a function of the actuator position.

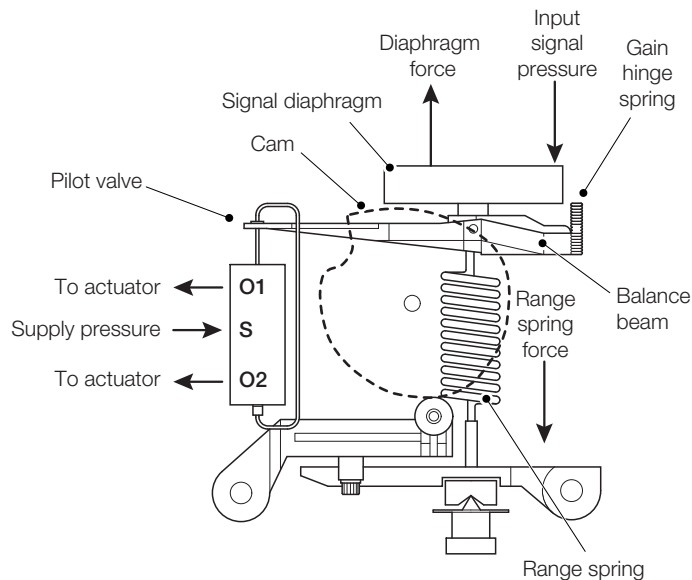


Fig. 3: Operation diagram

Type AV1 pneumatic positioner

Type AV1 positioners receive an external pneumatic signal and converts it to a pneumatic output. This output produces the motive force that positions the power actuator.

Type AV2 4 to 20 mA I/P positioners

Type AV2 positioners receive a current input (4 to 20 mA) from the control device and convert the signal to a pneumatic signal. This pneumatic signal is converted to a pneumatic output that produces the motive force that positions the actuator. The Type AV2 fails open / closed on loss of current input signal.

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Type AV4 pulse input positioner

The Type AV4 positioner receives a contact closure input (pulse) from a control device and converts the signal to a pneumatic signal. This pneumatic signal is converted to a pneumatic output, producing the motive force that positions the actuator.

Position transmitters

Two types of position transmitters are available on Type AV1 and AV2 positioners.

The potentiometric position transmitter uses a high durability plastic film potentiometer to indicate the position of the cam shaft. The resulting resistive value is a function of the shaft position. The resistive output can be used for additional control purposes.

The 4 to 20 mA position transmitter uses a high durability plastic film potentiometer to indicate the cam shaft position. The resulting resistive value is sent to an electronics assembly that produces a proportional 4 to 20 mA signal. This signal can be used for additional control purposes.

Performance series

The performance series provides a high flow gain pilot valve body with square ports that provide maximized air flow for a small motion of the pilot valve stem. A relatively small error signal can therefore cause a relatively large change in output air flow to the actuator. This feature is useful when driving larger actuators that might otherwise be insensitive or slow to respond to small signal changes.

Compared to other positioners on the market, the standard Type AV positioners have a high delivery capacity. The flow gain curves shown in Figs. 4 and 5 show output air flow versus input error signal for the standard and high-gain performance series positioners.

Figs. 4 and 5 show that the large signal maximum air flow for both the standard and performance series positioners is about the same. The performance series positioners achieve maximum flow capacity at a much smaller error signal. Avoid using a performance series positioner on a small actuator as it could cause instability.

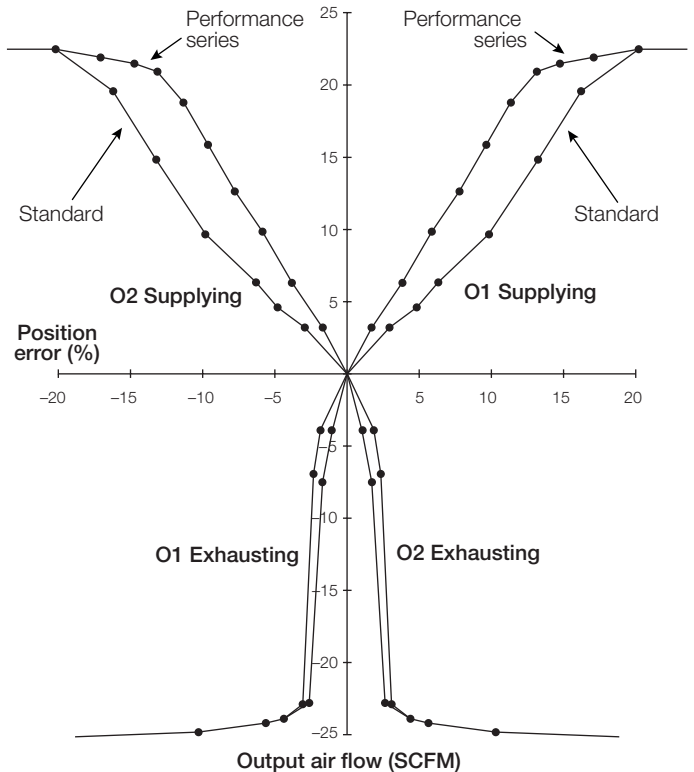


Fig. 4: Output air flow versus error signal - standard and performance series

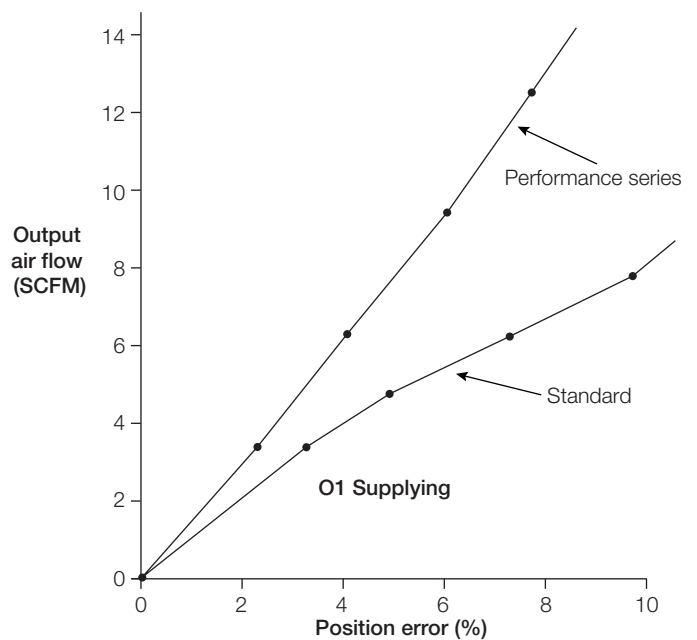
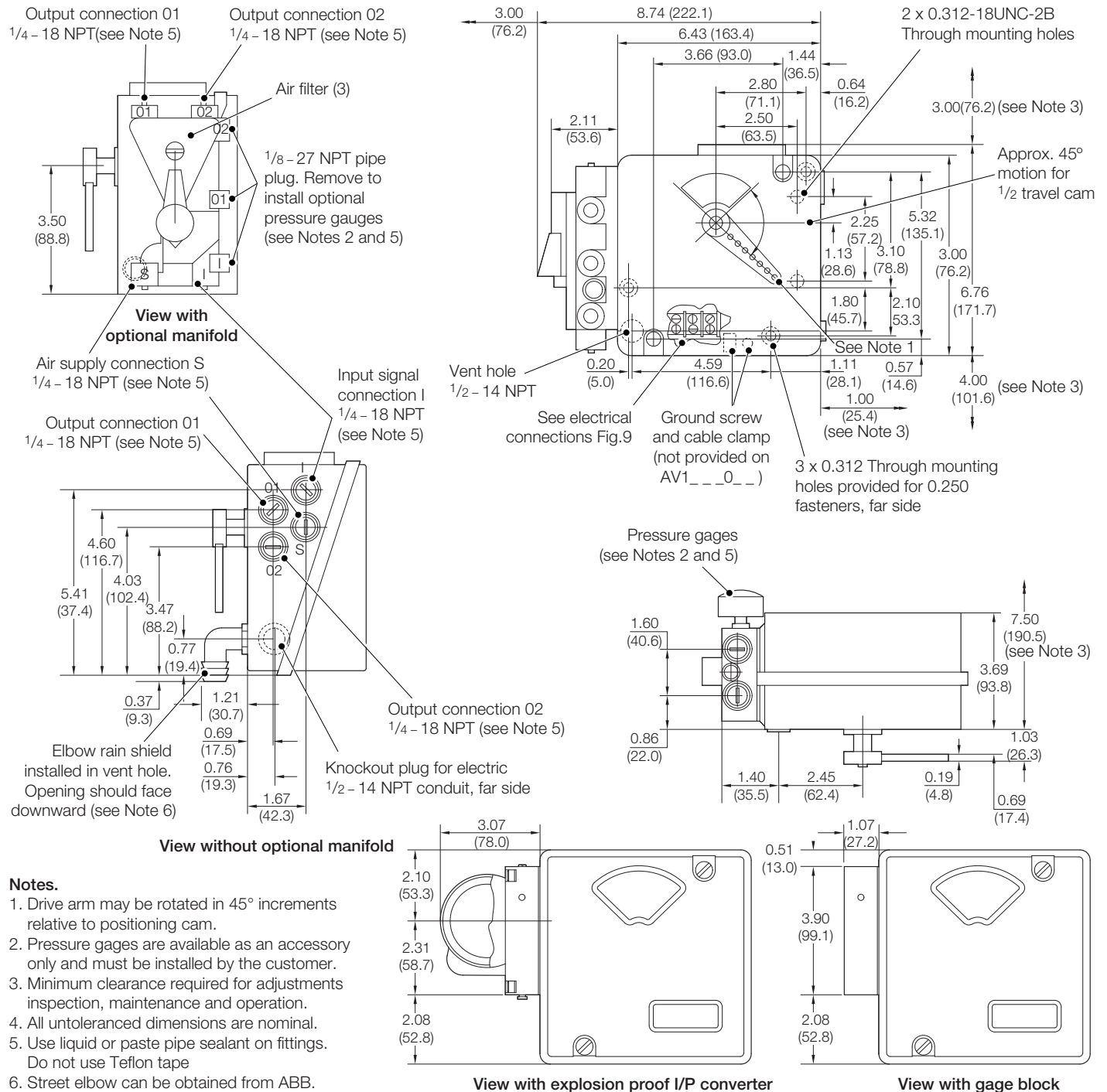


Fig. 5: Expanded first quadrant view of Fig. 4

Dimensions

Dimensions in in. (mm)



Notes.

1. Drive arm may be rotated in 45° increments relative to positioning cam.
2. Pressure gages are available as an accessory only and must be installed by the customer.
3. Minimum clearance required for adjustments inspection, maintenance and operation.
4. All untoleranced dimensions are nominal.
5. Use liquid or paste pipe sealant on fittings. Do not use Teflon tape
6. Street elbow can be obtained from ABB.

Fig. 6: External and mounting dimensions

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Dimensions in in. (mm)

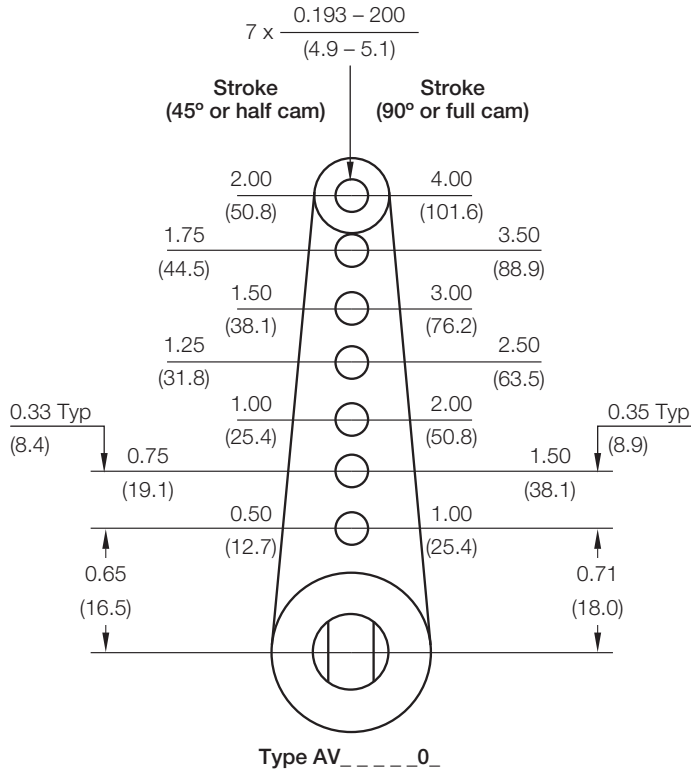


Fig. 7: Drive arm dimensions

Dimensions in in. (mm)

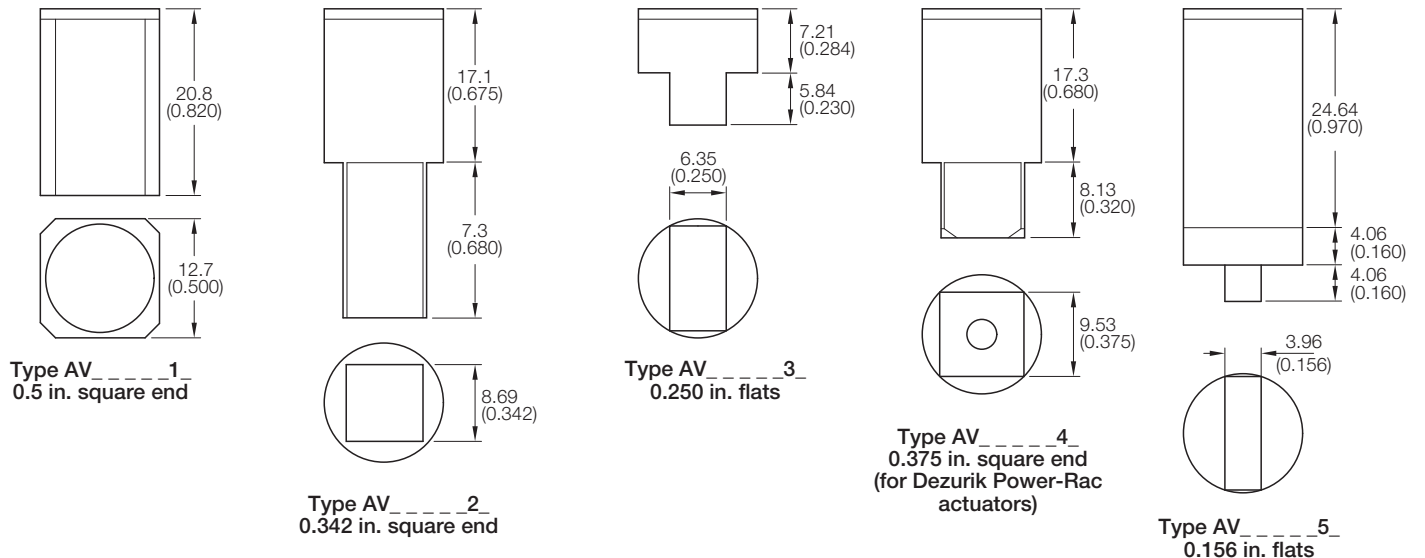
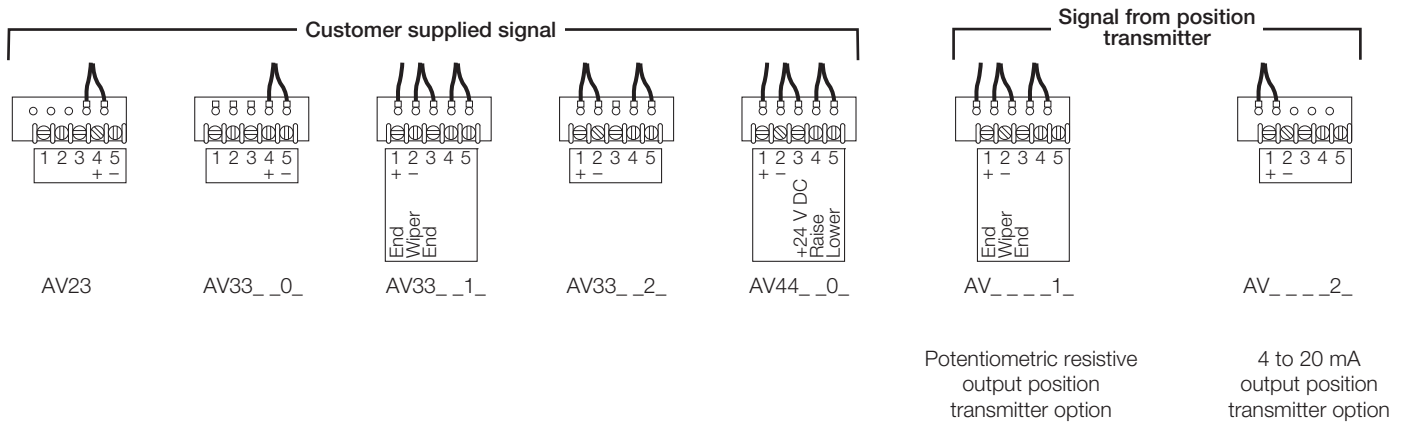


Fig. 8: Drive shaft options dimensions

Signal input and output connections



Note: Type AV27 positioner connections are external to positioner.

Agency approvals

| Nomenclature | Approval / Certification (see Notes below) | |
|------------------|--|--|
| All (see Note 1) | FM Approvals (FM) cFMus approved as non-incendive for: Class I, Division 2, Groups A, B, C, and D Class II, Division 2, Groups F and G Class III, Division 2 | Canadian Standards Association (CSA): See FM Approvals cFMus |
| AV27__0__ | FM Approvals (FM) FM Approved as: Explosion-proof for Class I, Div 1, Grps B, C and D Dust-ignition-proof for Class II and III, Div 1, Grps E, F and G Intrinsically Safe for Class I, II and III, Div 1, Grps A,through G | Canadian Standards Association (CSA): Certified as: Explosion-proof for Class I, Div 1, Grps B, C and D Dust-ignition-proof for Class II and III, Div 1, Grps E, F and G Intrinsically Safe for Class I, II and III, Div 1, Grps A,through G |
| All | This product complies with all applicable European Community product requirements, and specifically with those required to display the CE marking on the product nameplate. | |

Notes.

1. cFMus = FM approved for both Canadian and US requirements.
2. From 1st June 2014, type AV/1/2/4 are approved only for non-incendive installations.
3. Non-incendive hazardous locations approvals are for ambient conditions of -25 to 40 °C (-13 to 104 °F), 86 to 106 kPa (12.5 to 15.7 psig) with a maximum oxygen concentration of 21 %.

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Accessories

| Accessory | Description |
|--|---|
| Mounting kits | Kit number 5327321__. Dependent on valve stem size. Refer to Table 1 for ABB retrofit kits. |
| Speed control orifices | Regulates time constant of positioner and final control device. Orifices are installed directly into positioner output ports – see Table 2. Speed adjustment can also be controlled by using the internal stroke adjustment screws. |
| Pressure gages | For reading signal, supply and output pressures – see Table 3. |
| Blank cam | Part number 5400277A1. Used to characterize the positioner if the standard cams (square, linear, square root) will not produce the desired relationship. Blank cam must be profiled. Note: This option is no longer available. |
| Supply air regulator | See Table 4. |
| Air filters | Installs in supply air line to prevent particles from entering the positioner that can lead to malfunctions – see Table 5. |
| Manifold filters | For addition or replacement of secondary air filters on manifold-equipped positioners. Kit number 258487A1. |
| Bypass valve assembly (Type AV1__1 only) | Part number 5326945A1. External by-pass valve for single-acting diaphragm applications only. Permits transfer of pneumatic control signal directly to diaphragm so that final control element can be operated while positioner is being serviced. |

| Kit number | Drive nomenclature | Retrofit mounting kit |
|------------|--------------------|--|
| 5400309A1 | UP1, UP2 | Type AP positioner to |
| 258493A1 | UP3, UP4 | Type AV positioner |
| 258494C1 | UP5, UP6 | |
| 258527C1 | AC0404 | ABB part number pilot valve positioner to Type AV positioner |
| 258528A1 | AC0608 | |
| 258529A1 | AC0816 | |
| 258530A1 | AC1016 | |
| 258527C1 | AC0404 | Type AP positioner to |
| 258528A1 | AC0608 | Type AV positioner |
| 258529A1 | AC0816 | |
| 258530A2 | AC1016 | |

Table 1: Rotary actuator retrofit mounting kits

| Part no. | Size mm (in.) |
|-----------|-----------------------|
| 5327327A1 | 1.02 (0.04) |
| 5327327A2 | Blank (drill to suit) |

Table 2: Speed control orifices

| Part no. | Legend | Range | |
|-----------|------------|------------|----------|
| | | kPa | psig |
| 5326605A4 | Instrument | 0 to 200 | 0 to 30 |
| 5326605A5 | Supply* | 0 to 1,000 | 0 to 160 |
| 5326605A6 | Output | 0 to 1,000 | 0 to 160 |

Table 3: Pressure gages

* Optional manifold provides gage ports, 1 for instrument (internal input signal), and 2 output gages. Supply gage can be installed in supply line (piping by customer).

| Part no. | Outlet pressure (psig) | Maximum inlet pressure (psig) | Inlet / outlet connections |
|-----------|------------------------|-------------------------------|----------------------------|
| 1951029D5 | 2 to 125 | 250 | 1/4 NPT |

Table 4: Supply air regulators with gages

| Part no. | Maximum outlet pressure (psig) | Maximum inlet pressure (psig) | Inlet / outlet connections |
|-----------|--------------------------------|-------------------------------|----------------------------|
| 5328563D2 | 250 | 250 | 1/4 NPT |

Table 5: Supply air filters

Mounting kits

Dimensions in mm (in.)

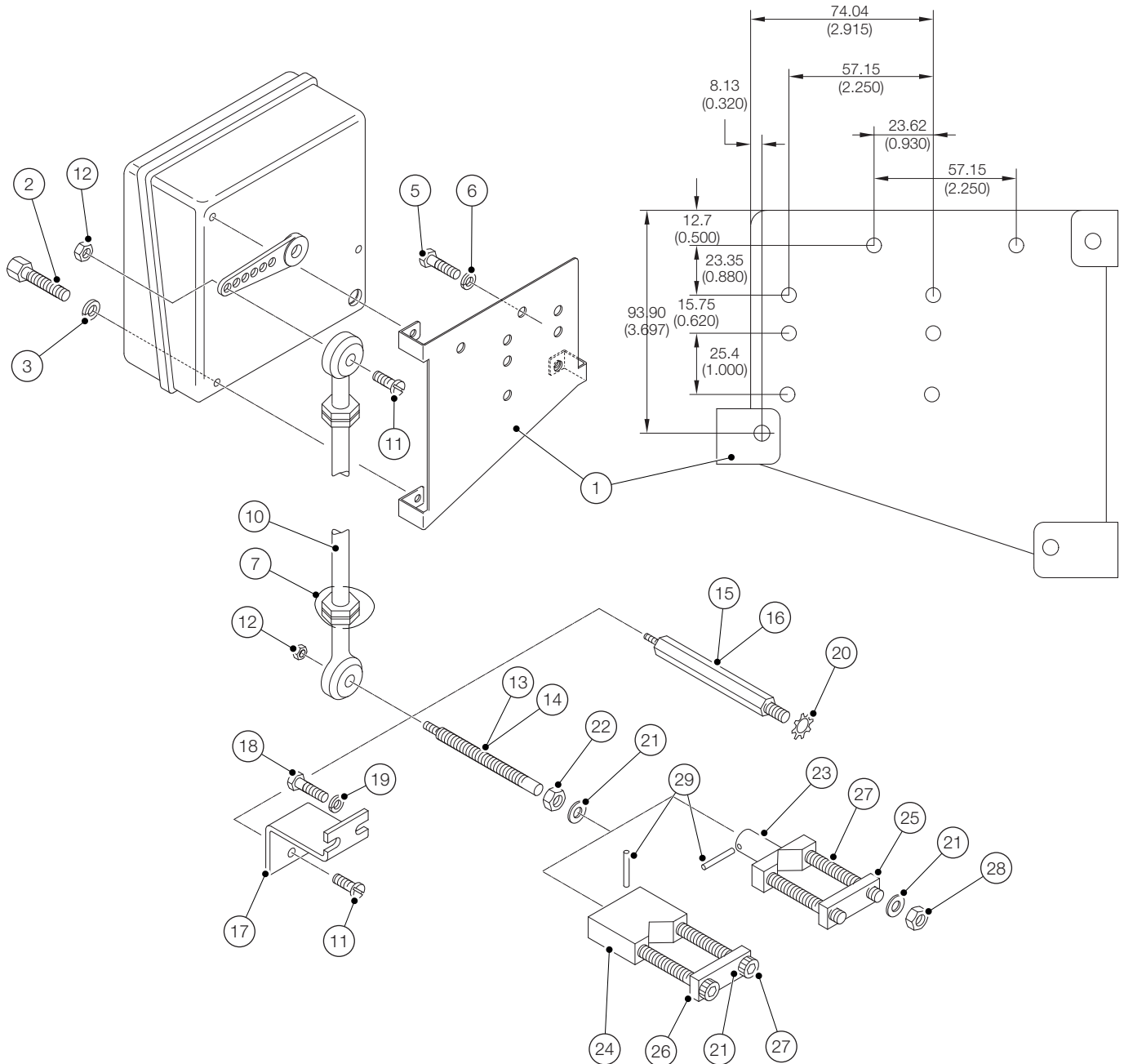


Fig. 9: Mounting kits

Tables 6, 7, and 8 identify the parts shown in Fig. 9 for the available mounting kits.

Series AV1 / 2 / 4

Characterizable pneumatic positioners

| Item | Part number | Description |
|------|------------------|--|
| ① | 5400266A1 | Positioner mounting bracket |
| ② | 0.250-20 x 0.750 | Screw, socket hd (3) |
| ③ | 0.25 | Lock washer, reg spring (3) |
| ⑤ | 0.312-18 x 0.625 | Cap screw, hex socket hd (2) |
| ⑥ | 0.312 | Lock washer, reg spring (2) |
| ⑦ | R6440-0005 | Type 347 stainless steel wire, 0.300 diameter, 6 in. |
| ⑧* | 19934A248 | Spacer |
| ⑨* | 0.190-32 x 1.125 | Screw, pan hd machine |
| ⑩ | 5312449A4 | Connecting link, 12 in. (cut to fit) |
| ⑪* | 0.190-32 x 0.875 | Screw, pan hd machine (2) |

| Item | Part number | Description |
|------|-------------------|--------------------------------------|
| ⑫ | 197120A5 | Nut, elastic stop (2) |
| ⑬ | 5311690G1 | Adjustable stud, 2.69 in. |
| ⑭ | 5311690G2 | Adjustable stud, 3.43 in. |
| ⑰ | 0.375 | Lock washer, med spring (3) |
| ⑱ | 0.375-24 | Nut, hex jam |
| ⑳ | 5311687A2 | Stem clamp, 0.375 to 0.750 in. dia. |
| ㉑ | 5311691C1 | Clamp plate, 0.375 to 0.750 in. dia. |
| ㉒ | 0.375-16 x 1.50 | Screw, hex skt hd cap (2) |
| ㉓ | 0.375-16 | Nut, hex jam (2) |
| ㉔ | 0.125 dia x 0.750 | Groove pin, type 1 |

Table 6: Mounting kit number 5327321A12 – valve stem diameter 0.375 to 0.750 in. (Positioner mounting kits for direct or reverse acting diaphragm actuators and single or double-acting piston actuators with linear (reciprocating) motion)

| Item | Part number | Description |
|------|------------------|--|
| ① | 5400266A1 | Positioner mounting bracket |
| ② | 0.250-20 x 0.750 | Screw, socket hd (3) |
| ③ | 0.25 | Lock washer, reg spring (3) |
| ⑤ | 0.312-18 x 0.625 | Cap screw, hex socket hd (2) |
| ⑥ | 0.312 | Lock washer, reg spring (2) |
| ⑦ | R6440-0005 | Type 347 stainless steel wire, 0.300 diameter, 6 in. |
| ⑧* | 19934A248 | Spacer |
| ⑨* | 0.190-32 x 1.125 | Screw, pan hd machine |
| ⑩ | 5312449A4 | Connecting link, 12 in. (cut to fit) |

| Item | Part number | Description |
|------|-------------------|-------------------------------------|
| ⑪* | 0.190-32 x 0.875 | Screw, pan hd machine (2) |
| ⑫ | 197120A5 | Nut, elastic stop (2) |
| ⑭ | 5311690G2 | Adjustable stud, 3.43 in. |
| ⑰ | 0.375 | Lock washer, med spring (3) |
| ⑱ | 0.375-24 | Nut, hex jam |
| ㉒ | 5312483E1 | Stem clamp, 0.750 to 1.00 in. dia. |
| ㉓ | 5312471D1 | Clamp plate, 0.750 to 1.00 in. dia. |
| ㉔ | 0.375-16 x 1.50 | Screw, hex skt hd cap (2) |
| ㉕ | 0.125 dia x 0.750 | Groove pin, type 1 |

Table 7: Mounting kit number 5327321A13 – valve stem diameter 0.750 to 1.000 in. (Positioner mounting kits for direct or reverse acting diaphragm actuators and single or double-acting piston actuators with linear (reciprocating) motion)

| Item | Part number | Description |
|------|------------------|--|
| ① | 5400266A1 | Positioner mounting bracket |
| ② | 0.250-20 x 0.750 | Screw, socket hd (3) |
| ③ | 0.25 | Lock washer, reg spring (3) |
| ⑤ | 0.312-18 x 0.625 | Cap screw, hex socket hd (2) |
| ⑥ | 0.312 | Lock washer, reg spring (2) |
| ⑦ | R6440-0005 | Type 347 stainless steel wire, 0.300 diameter, 6 in. |
| ⑧* | 19934A248 | Spacer |
| ⑨* | 0.190-32 x 1.125 | Screw, pan hd machine |
| ⑩ | 5312449A4 | Connecting link, 12 in. (cut to fit) |
| ⑪* | 0.190-32 x 0.875 | Screw, pan hd machine (2) |
| ⑫ | 197120A5 | Nut, elastic stop (2) |
| ⑮ | 5319500A11 | Drive stud, 2.69 in. |

| Item | Part number | Description |
|------|-------------------|--------------------------------------|
| ⑬ | 5319500A1 | Drive stud, 3.43 in. |
| ⑰ | 5323155A1 | Stud bracket |
| ⑱ | 0.312-18 x 0.500 | Screw, hex hd (2) |
| ⑲ | 1218-00 | Lock washer, shake proof (2) |
| ㉑ | 5319524A1 | Lock washer, star (3) |
| ㉒ | 0.375 | Lock washer, med spring (3) |
| ㉓ | 0.375-24 | Nut, hex jam |
| ㉔ | 5311687A2 | Stem clamp, 0.375 to 0.750 in. dia. |
| ㉕ | 5311691C1 | Clamp plate, 0.375 to 0.750 in. dia. |
| ㉖ | 0.375-16 x 1.50 | Cap screw, hex socket hd (2) |
| ㉗ | 0.375-16 | Nut, hex jam (2) |
| ㉘ | 0.125 dia x 0.750 | Groove pin, type 1 |

Table 8: Mounting kit number 5327321A14 (for use on Fisher actuators) – valve stem diameter 0.375 to 0.750 in. (Positioner mounting kits for direct or reverse acting diaphragm actuators and single or double-acting piston actuators with linear (reciprocating) motion)

*When fastening item ⑩ to drive arm at first hole (nearest drive shaft), use items ⑧ and ⑨ and omit 1 of item ⑪

Ordering information

Pneumatic positioner type AV1

The AV1 pneumatic positioner accepts linear or non-linear pneumatic input signal ranges to provide sensitive, accurate positioning of a pneumatic final control element.

A feedback cam in the positioner establishes the actual position of the final control element and can be characterized to provide a square root, square or linear relationship to the input signal.

Split range signal – can be field calibrated for 100 % stroke for 50 % signal span or 50 % stroke for 100 % signal span.

The optional manifold / gage block provides gage ports – one for instrument (internal input signal) and two for positioner output.

A supply gage can be installed in the supply line (piping by customer).

When converting a 3 to 15 psig positioner to a 3 to 27 input positioner, or vice versa, both the diaphragm assembly kit and the appropriate diaphragm cover are required.

Refer to Note 4 for AV1 application details.

| | AV1 | X | X | X | X | X | X |
|--|-----|---|---|---|---|---|---|
| Input signal | | | | | | | |
| 0.2 to 1 bar (3 to 15 psi), standard temperature range –40 to 82 °C (–40 to 180 °F) | | 1 | | | | | |
| 0.2 to 1.86 bar (3 to 27 psi), standard temperature range –40 to 82 °C (–40 to 180 °F) | | 2 | | | | | |
| 0.2 to 1 bar (3 to 15 psi), extended temperature range –20 to 121 °C (–4 to 250 °F) | | 5 | | | | | |
| 0.2 to 1.86 bar (3 to 27 psi), extended temperature range –20 to 121 °C (–4 to 250 °F) | | 6 | | | | | |
| Stroke or rotary motion | | | | | | | |
| 12.7 to 50.8 mm (0.5 to 2.0 in.) or 45° rotation | | | | | | 1 | |
| 25.4 to 101.6 mm (1.0 to 4.0 in.) or 90° rotation | | | | | | 2 | |
| Manifold / gage block | | | | | | | |
| No manifold | | | | | | | 0 |
| Manifold with equalizing valve, filters and gage ports (see Notes 1 and 2) | | | | | | | 1 |
| Gage block, gage ports only | | | | | | | 3 |
| Position transmitter | | | | | | | |
| No position transmitter | | | | | | | 0 |
| Potentiometric resistive transmitter (see Note 2) | | | | | | | 1 |
| 4 to 20 mA output (see Note 2) | | | | | | | 2 |
| Drive shaft | | | | | | | |
| Standard with drive arm (for linear actuators) and UP3 / 4 / 5 / 6 | | | | | | | 0 |
| 12.7 mm (0.500 in.) square end (most common for 90° actuators) | | | | | | | 1 |
| 8.69 mm (0.342 in.) square end (older DeZurik / K&M actuators) | | | | | | | 2 |
| 6.35 mm (0.250 in.) flats (UP1 / UP2 manufactured after August, 1995) | | | | | | | 3 |
| 9.525 mm (0.375 in.) square end (for DeZurik PowerRac actuators) | | | | | | | 4 |
| 4 mm (0.157 in.) flats (for NAMUR rotary mounting) | | | | | | | 5 |
| Options | | | | | | | |
| No options | | | | | | | 0 |
| NEMA 4X enclosure rating (must be installed in accordance with drawing 258567) | | | | | | | N |
| Performance series, high pneumatic gain | | | | | | | P |

Notes.

1. Required for double acting actuators with manual override (for example, UP or AC actuators)
2. Not available with input signal codes 5 and 6
3. This optional manifold is recommended on all AC and UP Drives. Not available for AV15_ _ _ _ _ and AV16_ _ _ _ _
4. From 1st June 2014, AV1 is approved only for general purpose and non-incendive installations.

Series AV1 / 2 / 4

Characterizable pneumatic positioners

Electropneumatic positioner type AV2

The AV2 electropneumatic positioner receives a 4 to 20 mA input from a controller and converts the signal via an I/P converter to a pneumatic output that positions a power actuator.

The AV2 can be adjusted by the user to default automatically to either the fully open or fully closed position in the event of input signal loss.

The optional manifold / gage block provides gage ports – one for instrument (internal input signal) and two for positioner output. A supply gage can be installed in the supply line (piping by customer).

| | AV2 | X | X | X | X | X | X |
|---|-----|---|---|---|---|---|---|
| Intrinsically safe / explosion-proof design | | | | | | | |
| Non-incendive design cFMus (see Note 1) | | 3 | | | | | |
| Explosion-proof and intrinsically safe design FM/CSA (see Note 2) | | 7 | | | | | |
| Stroke or rotary motion | | | | | | | |
| 4 to 20 mA input, 12.7 to 50.8 mm (0.5 to 2.0 in.) or 45° rotation | | | 1 | | | | |
| 4 to 20 mA input, 25.4 to 101.6 mm (1.0 to 4.0 in.) or 90° rotation | | | 2 | | | | |
| Manifold / gage block | | | | | | | |
| No manifold | | | | 0 | | | |
| Manifold with equalizing valve, filters and gage ports (see Notes 3 and 4) | | | | 1 | | | |
| Gage block, gage ports only (see Note 4) | | | | 3 | | | |
| Position transmitter | | | | | | | |
| No position transmitter | | | | | 0 | | |
| Potentiometric resistive transmitter (see Note 3) | | | | | 1 | | |
| 4 to 20 mA output (see Note 3) | | | | | 2 | | |
| Drive shaft | | | | | | | |
| Standard with drive arm (for linear actuators) and UP3 / 4 / 5 / 6 | | | | | | | 0 |
| 12.7 mm (0.500 in.) square end (most common for 90° actuators) | | | | | | | 1 |
| 8.69 mm (0.342 in.) square end (older DeZurik / K&M actuators) | | | | | | | 2 |
| 6.35 mm (0.250 in.) flats (UP1 / UP2 manufactured after August, 1995) | | | | | | | 3 |
| 9.525 mm (0.375 in.) square end (for DeZurik PowerRac actuators) | | | | | | | 4 |
| 4 mm (0.157 in.) flats (for NAMUR rotary mounting) | | | | | | | 5 |
| Options | | | | | | | |
| No options | | | | | | | 0 |
| NEMA 4X enclosure rating (must be installed in accordance with drawing 258567) (see Note 4) | | | | | | | N |
| Performance series, high pneumatic gain | | | | | | | P |

Notes.

1. From 1st June 2014, AV23 _ _ _ _ _ is approved only for general purpose and non-incendive applications
2. AV27 _ _ _ _ _ is FM/CSA approved (explosion-proof or intrinsically safe) for Class I, Division 1 applications.
3. Required for double acting actuators with manual override (for example, UP or AC actuators)
4. Not available with intrinsically safe / explosion-proof design code 7

Electropneumatic pulse input positioner type AV4

The AV4 electronic input positioner operates with a contact signal for jogging the final control element. This enables operation of pneumatic valves in a jog mode similar to electronic valve operation.

Designed to meet the special requirements of interfacing with state-of-the-art computer and microprocessor-based control systems, the AV4 utilizes an advanced, pneumatic motor-to-pneumatic signal converter.

In one compact package, it replaces three separate components: a motor-to-motor pneumatic converter, a pneumatic positioner, and a position transmitter.

| | AV4 | X | X | X | X | X | X |
|--|-----|---|---|---|---|---|---|
| Input signal | | | | | | | |
| 24 V DC pulse (see Note 1) | 4 | | | | | | |
| Stroke or rotary motion | | | | | | | |
| 12.7 to 50.8 mm (0.5 to 2.0 in.) or 45° rotation | | | 1 | | | | |
| 25.4 to 101.6 mm (1.0 to 4.0 in.) or 90° rotation | | | 2 | | | | |
| Manifold / gage block | | | | | | | |
| No manifold | | | | 0 | | | |
| Manifold with equalizing valve, filters and gage ports (see Note 2) | | | | 1 | | | |
| Gage block, gage ports only | | | | 3 | | | |
| Position transmitter (see Note 3) | | | | | | | |
| 4 to 20 mA output | | | | | 0 | | |
| Drive shaft | | | | | | | |
| Standard with drive arm (for linear actuators and UP3 / 4 / 5 / 6) | | | | | | 0 | |
| 12.7 mm (0.500 in.) square end (most common for 90° actuators) | | | | | | 1 | |
| 8.69 mm (0.342 in.) square end (older DeZurik / K&M actuators) | | | | | | 2 | |
| 6.35 mm (0.250 in.) flats (UP1 / UP2 manufactured after August, 1995) | | | | | | 3 | |
| 9.525 mm (0.375 in.) square end (for DeZurik PowerRac actuators) | | | | | | 4 | |
| 4 mm (0.157 in.) flats (for NAMUR rotary mounting) | | | | | | 5 | |
| Options | | | | | | | |
| No options | | | | | | | 0 |
| NEMA 4X enclosure rating (must be installed in accordance with drawing 258567) | | | | | | | N |
| Performance series, high pneumatic gain | | | | | | | P |

Notes.

1. From 1st April 2012, AV4 is approved only for general purpose and non-incendive applications
2. Required for double acting actuators with manual override (for example, UP or AC actuators)
3. The 4 to 20 mA output position transmitter is a standard feature of the AV4 positioner

Series AV1 / 2 / 4

Characterizable pneumatic positioners

Accessories

Accessories for AV1, AV2 and AV4 (except where indicated)

| Description | Part number |
|---|-------------|
| Mounting kits, for diaphragm actuators with yoke mounting bosses (includes mounting bracket, linkage and hardware) | |
| For stem size 9.53 to 19.1 mm (0.375 to 0.75 in.), adjustable stud length 68.2 mm (2.687 in.) | 5327321A12 |
| For stem size 19.2 to 25.4 mm (0.75 to 1.0 in.), adjustable stud length 87.3 mm (3.437 in.) | 5327321A13 |
| For stem size 9.53 to 25.4 mm (0.375 to 1.0 in.), adjustable stud length 86.5 mm (3.406 in.) – Fisher | 5327321A14 |
| Mounting bracket, for reciprocating valves (contained in above kits) | 5400266A1 |
| Connecting link, adjustable length 304.8 mm (12 in.) (contained in above kits) | 5312449A4 |
| Mounting kits, for retrofitting UP drives from AP to AV positioners | |
| For UP10, UP20 | 5400309A1 |
| For UP30, UP40 | 258493A1 |
| For UP50, UP60 | 258494C1 |
| Mounting kits, for retrofitting AC drives from old Bailey-Fischer and Porter part number positioners to AV positioners | |
| For AC0404 | 258527C1 |
| For AC0608 | 258528A1 |
| For AC0816 | 258529A1 |
| For AC1016 | 258530A1 |
| Mounting kits, for retrofitting AC drives from AP to AV positioners | |
| For AC0404 | 258527C1 |
| For AC0608 | 258528A1 |
| For AC0816 | 258529A1 |
| For AC1016 | 258530A2 |
| Mounting kits, for adding a Beacon™ indicator or a limit switch package onto the cover of an AV positioner | |
| For adding a Beacon™ Indicator (includes a Westlock black and yellow indicator) | 258570B1 |
| For adding limit switches, Westlock 2004/2007 or equivalent (does not include limit switch package) – for more information see drawing 258570B | 258570A4 |
| Speed control orifices, for use when more than one final control element is being operated from the same control signal and designed to equalize speeds between units. | |
| 1.016 mm (0.040 in.) | 5327327A1 |
| Blank (drill as required) | 5327327A2 |
| Pressure gages, for calibration | |
| Instrument – 0 to 30 psig range (AV1 only) | 5326605A4 |
| Supply – 0 to 160 psig range | 5326605A5 |
| Output – 0 to 160 psig (quantity 2 required for double-acting applications) | 5326605A6 |
| External by-pass valve (for single acting diaphragm applications only) | 5326945A1 |
| Permits transfer of pneumatic control signal directly to diaphragm to enable final control element to be operated during positioner servicing. Use with AV1 _ _ 1 _ _ only. | |
| Supply air filter (coalescing) with bracket. Maximum inlet pressure 250 psi, 1/4 – 18 NPT | 5328563D2 |
| Supply air regulator with bracket. Maximum inlet pressure 250 psi, 1/4 – 18 NPT | 1951029D5 |

Spare parts

Parts kits for AV1, AV2, AV3 and AV4

| Description | Part number |
|---|-------------|
| Diaphragm parts | |
| Diaphragm assembly kit (3 to 15 psig and 3 to 27 psig) | 258486A1 |
| 3 to 15 psig positioner, diaphragm cover | 5400295A1 |
| 3 to 27 psig positioner, diaphragm cover (AV1 only) | 5400295A2 |
| Note. When converting a 3 to 15 psig positioner to a 3 to 27 psig positioner, or vice versa, both the diaphragm assembly kit and the appropriate diaphragm cover are required. | |
| Gage block kit for field addition | 258569A1 |
| Manifold parts | |
| Manifold kit with equalizing valve for field addition | 258491A1 |
| Filter replacement kit | 258487A1 |
| Shut off valve kit | 258270A1 |
| Note. The optional manifold/gage block provides gage ports – one for instrument (internal input signal) and two output gages. A supply gage can be installed in the supply line (by customer). | |
| Characterizing cams | |
| Forward-acting full rise cam, 90 degree rotation | 5400281A1 |
| Reverse-acting full rise cam, 90 degree rotation | 5400281A2 |
| Forward-acting half rise cam, 45 degree rotation | 5400289A1 |
| Reverse-acting half rise cam, 45 degree rotation | 5400289A2 |
| Pilot valve assemblies | |
| Pilot valve assembly kit | 258488B1 |
| Pilot valve assembly kit (performance series, AV _ _ _ _ _ P) | 258488A3 |
| Pilot valve assembly kit (high temperature model, AV15/6) | 258488A2 |
| Pilot valve assembly kit (high temperature and performance series model, AV1 5/6 _ _ _ _ _ P) | 258488A4 |
| Feedback arm | |
| Feedback arm for linkage attachment, for 90 degree cam rotation | 5327445A1 |
| Feedback arm for linkage attachment, for 45 degree cam rotation | 5327445A2 |
| Cover assembly (includes cover, window, gasket and plastic cover inserts) | |
| | 258545A1 |
| Cam follower arm assembly | |
| | 258544A1 |
| Position transmitter – field addition kits | |
| Pneumatic position transmitter | 258492A1 |
| 4 to 20 mA position transmitter | 258670A1 |
| Cam shaft | |
| 1/2 in. square end connection | 5400278A1 |
| Tapered end connection for linear feedback arm | 5400287A1 |
| 0.342 in. square end for older DeZurik / K&M actuators | 5400287A2 |
| 0.250 in. flats (UP1 / UP2 after 8/95) | 5400287A3 |
| 0.375 in. Square End (for DeZurik PowerRac actuators) | 5400287A4 |
| 4 mm (0.156 in.) flats (for Namur rotary mounting) | 5400287A5 |
| Also requires conversion plate | 5400321A1 |

Series AV1 / 2 / 4

Characterizable pneumatic positioners

Parts kits for AV2

| Description | Part number |
|---|-------------|
| I/P converter replacement kit (AV23 only) | 258651A1 |
| Explosion proof positioner parts (AV27 only) | |
| Kit to mount explosion proof I/P converter to pneumatic positioner (does not include I/P) | 258612A1 |
| I/P converter for AV27 | 1949547A2 |

Parts kits for AV3 (see Note)

| Description | Part number |
|---|-------------|
| EMI receiver (AV33 only) | 6639914A1 |
| I/P servo (AV33 only) | 6639300A1 |
| EMI + I/P factory-tested assembly (AV33 only) | 6639300A3 |

Note. Effective December 31, 2015, the AV3 positioner is no longer available. However, the parts kits listed will remain available until December 2017.

The EDP300 positioner replaces the AV3.

Parts kits for AV4

| Description | Part number |
|-----------------------------------|-------------|
| EMI receiver assembly (AV44 only) | 6639914A2 |
| I/P servo assembly (AV44 only) | 6639300A2 |

Notes

Series AV1 / 2 / 4

Characterizable pneumatic positioners

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