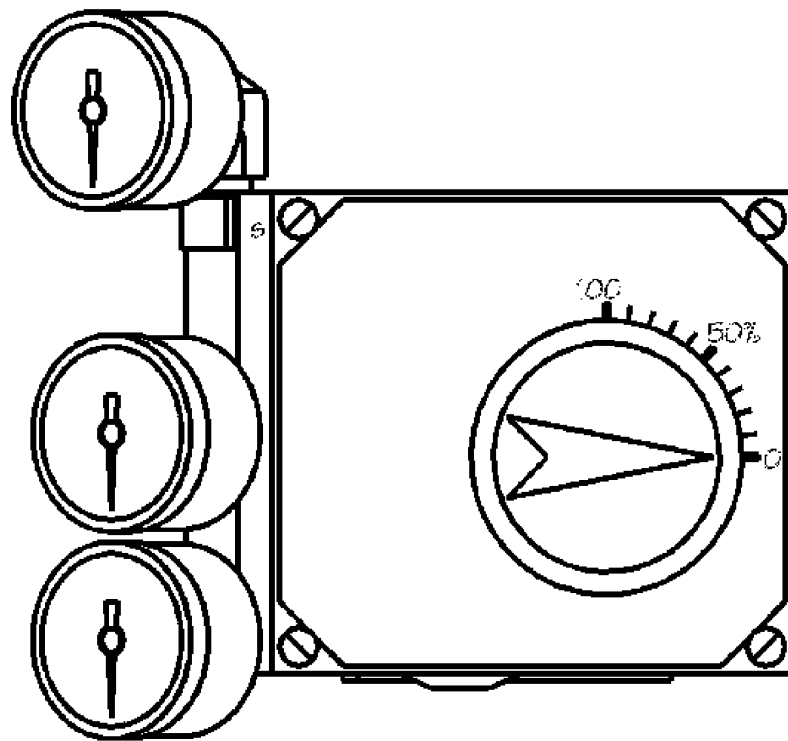




**PMV P36C AND P41C
POSITIONERS
USED WITH DeZURIK PNEUMATIC
ACTUATORS**



Instruction **D10327**
August 2012

DeZURIK

PMV P36C and P41C Positioners

used with DeZURIK Pneumatic Actuators

Instructions

These instructions provide information about Models P36C and P41C PMV Positioners. They are for use by personnel who are responsible for installation, operation and maintenance of Models P36C and P41C PMV Positioners.

Safety Messages

All safety messages in the instructions are flagged with an exclamation symbol and the word Caution, Warning or Danger. These messages indicate procedures that must be followed exactly to avoid equipment damage, personal injury or death. Safety label(s) on the product indicate hazards that can cause equipment damage, personal injury or death. If a safety label becomes difficult to see or read, or if a label has been removed, please contact DeZURIK for replacement label(s).



WARNING!

Personnel involved in the installation or maintenance of valves should be constantly alert to potential emission of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline materials. Handle valves that have been removed from service with the assumption of pipeline material within the valve.

Inspection

Your positioner has been packaged to provide protection during shipment; however, it can be damaged in transport. Carefully inspect the unit for damage upon arrival and file a claim with the carrier if damage is apparent.

Parts

Order parts from your local DeZURIK sales representative, or directly from DeZURIK. When ordering parts, please include the 7-digit part number and 4-digit revision number (example: **9999999R000**) located on the data plate attached to the valve assembly. Also include the part name, the assembly drawing number, the balloon number and the quantity stated on the assembly drawing.

DeZURIK Service

DeZURIK service personnel are available to install, maintain and repair all DeZURIK products. DeZURIK also offers customized training programs and consultation services.

For more information, contact your local DeZURIK sales representative or visit our website at www.dezurik.com.

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Technical Specifications

	Model P36C	Both Models	Model P41C
Input signal	20–100 kPa 3–15 psi		4–20mA
Linearity	=<0,5% ^a		=<0,75% ^a
Hysteresis	=<0,75% ^a		=<1%
Repeatability	=<0,5% ^a		=<0,5% ^a
Gain factor at 80% load. (Supply: 87 psi)		1000 (kPa/kPa) 1000 (psi/psi)	
Gain factor at 50% load. (Supply: 87 psi)		1250 (kPa/kPa) 1250 (psi/psi)	
Air consumption at supply pressure:	±20%		±20%
0,2 MPa/29 psi	5,4 nl/min 0.19 SCFM		6,1 nl/min 0.22 SCFM
0,4 MPa/58 psi	12,3 nl/min 0.43 SCFM		13,6 nl/min 0.48 SCFM
0,6 MPa/87 psi	20 nl/min 0.71S CFM		22 nl/min 0.78 SCFM
0,8 MPa/116 psi	27,8 nl/min 0.98 SCFM		30,5 nl/min 1.08 SCFM
1 MPa/145 psi	35,7 nl/min 1.26 SCFM		39 nl/min 1.38 SCFM
Air delivery at Supply pressure:		±20%	
0,2 MPa/29 psi		135 nl/min 4.7 SCFM	
0,4 MPa/58 psi		250 nl/min 8.7 SCFM	
0,6 MPa/87 psi		360 nl/min 12.6 SCFM	
0,8 MPa/116 psi		480 nl/min 16.8 SCFM	
1 MPa/145 psi		590 nl/min 20.6 SCFM	
Supply Pressure	Max 1 MPa 145 psi		0,15–1 MPa 8–145 psi
Temperature Range		-15°C to +85°C (5°F to 185°F)	
Connector threads		1/4" NTP or G	
Gauge threads		1/8" NTP or G	
Weight std.	1,1 kg 2.4 lbs		1,6kg 3.5 lbs
Weight with gauges	1,3 kg 2.9 lbs		1,8 kg 4 lbs
Ingress Protection			IP 65/NEMA 4
a. Percent of full scale.			

**PMV P36C and P41C Positioners
used with DeZURIK Pneumatic Actuators****Description**

The positioner is a precision instrument which, when used in conjunction with a DeZURIK actuator, can provide the exacting control necessary to satisfy the most demanding process requirements.

The model P36C will accept a 3-15psi, 3-9psi, or 9-15 psi input signal.

The model P41C will accept either a 0-20mA or a 4-20mA input signal.

The modular design allows for easy parts replacement, and quick access to Zero and Span adjustments. The housing uses an O-ring seal that can be adjusted to a sealed or drained position.

Operation

P36C and P41C positioners operate on a force balance principal. Force is applied from a signal pressure that is transmitted through a diaphragm (1) to the balance arm (2). The feedback spring (3) provides the opposing force. This force is proportional to the level of the lower arm (4). The lower arm level is determined by the position of the cam (5), which is secured to the spindle (6). The spindle is connected to the actuator shaft thus providing the feedback from the actuator and valve. See Figure 1.

When the opposing forces are equal, the balance arm (2) and the spool in the pilot valve (7) are in neutral position and the complete system is in a balanced condition.

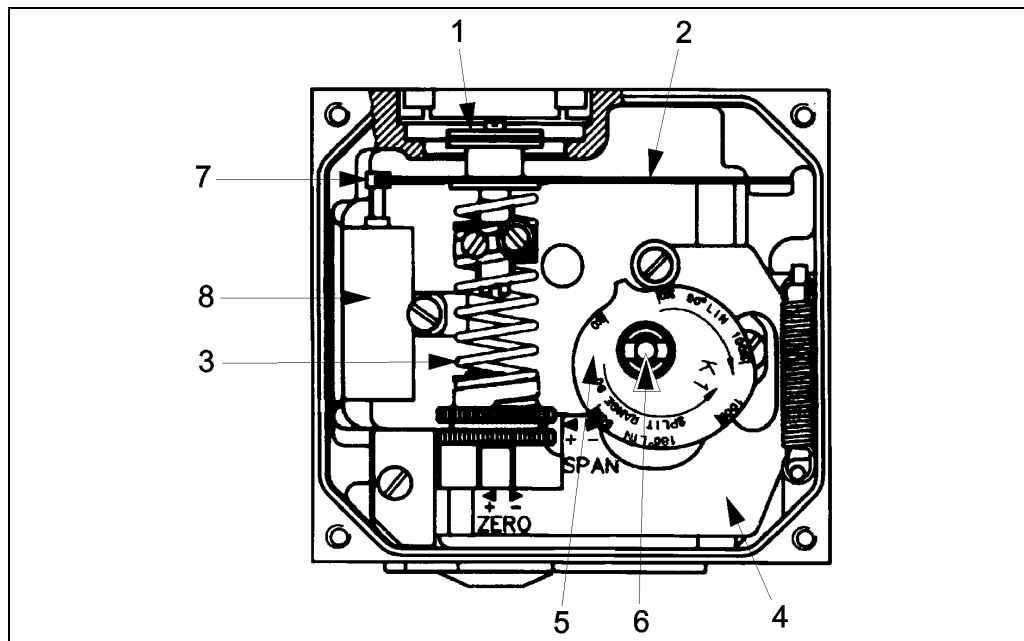


Figure 1 – Internal Parts

Air is supplied through port S to the pilot valve, which controls air flow through ports C1 and C2. Starting from a balanced condition, an increased control pressure will deflect the diaphragm (1) down, compressing the feedback spring (3). The balance arm (2) moves the spool (7) in the pilot valve (8) thus supplying air to the actuator. At the same time air is exhausted from the actuator and vented to atmosphere through the pilot valve and the OUT port.

Air pressure to the actuator is increased, causing the actuator to move the valve and the positioner spindle (6). The spindle and cam (5) rotate, forcing the lower arm upward, compressing the feedback spring (3). This motion continues until the two forces are equal and the system returns to a balanced condition.

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used with DeZURIK Pneumatic Actuators

Cam Selection

Each cam is designed to provide split range instrument signals. Standard cam characterization is linear; however, other characterizations are available.

Installation



WARNING!

Positioners installed in hazardous areas can be ignition sources. Ensure positioners used in hazardous areas have proper fire/explosion ratings.

Air Requirements

Maximum positioner supply pressure is 145 psi (1 MPa).

Supply air must be clean, dry and free from oil, water, moisture, dirt and debris. The air should be freeze-dried or similar to a dew point of at least 18 degrees F (10°C) below lowest ambient temperature.

A 30 micron (or finer) filter/regulator should be installed as close to the positioner as possible to ensure proper supply air quality.

Air Connections

Air connections are for 1/4" NPT male connectors and are marked on the positioner. Gauge ports are for 1/8" NPT.

DeZURIK recommends Loctite® 577 tape or similar for sealing.

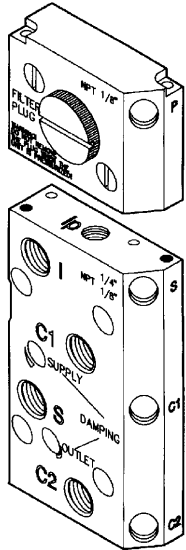
Port I	Input instrument pneumatic signal 3-15 psi (20-100kPa)	
Port S	Supply air, maximum 145 psi (1 MPa), minimum 21 psi (0.15 MPa) for P41C	
Port C1, C2	Actuator connections. C2 opening port	
OUTLET	Exhaust air port. Do not plug.	
Port I _p	Gauge port for pneumatic input signal (P36C).	
Port I _e	Input electric signal (4–20 mA) (P41C)	
Port P	Gauge port for I/P unit output pressure (P41C)	

Figure 2 - Connecting Block

**PMV P36C and P41C Positioners
used with DeZURIK Pneumatic Actuators****Installation (Continued)**

The outlet port is used for venting the positioner. All air from the positioner, actuator and I/P unit is vented to atmosphere through this port. **Do not plug this port.** A high flow silencer or an exhaust pipe can be connected to the outlet port to prevent foreign objects from entering and blocking the exhaust. When using gas for supply, please contact. Port I should be plugged on the P41C. For single acting operation, plug port C1 for increasing signal to OPEN, or C2 for increasing signal to CLOSE.

Note: See Figure 4 for proper cam position.

With the I/P unit mounted, the positioner is supplied with air from port S and does not need an external air supply. See pages 8–11 for more information on the I/P unit.

I/P Unit Electrical Connections

Electrical connection on I/P unit accepts 1/2" NPT or PG 13,5 cable gland.

See Figure 10E for wiring connections. Maximum recommended wire size is 16 AWG.

Front Cover and Indicator Cover

The front cover is secured to the pneumatic positioner with four captive screws and sealed with an O-ring (1). This sealing system allows for complete sealing or draining of the positioner by changing the position of the O-ring. The O-ring system is common to the Pneumatic positioner, I/P unit and Feedback unit in the Valve Control System.

The O-ring can be looped over notches (2) in the front cover to allow for drainage. There are eight locations on the front cover where the O-ring can be looped. See Figure 3.

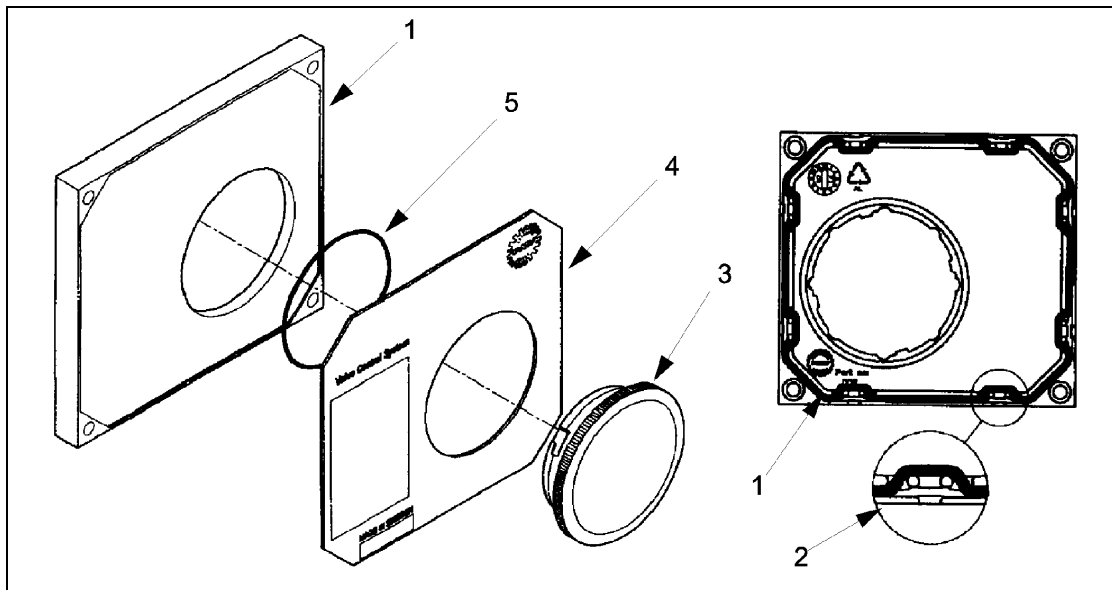


Figure 3 – Front Cover and Indicator Cover

The indicator cover (3) is O-ring sealed and secured by a bayonet coupling. The indicator cover is also used to secure the identification cover (4).

To remove the indicator cover turn it slightly counterclockwise until it loosens. Once loosened, the identification cover and O-ring (5) can be removed. When installing the indicator cover and identification cover ensure the O-ring is properly sealed.

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Reversing the Positioner Action

To change the positioner action from increasing signal to OPEN to increasing signal to CLOSE, or vice versa, follow the steps below.



WARNING!

Moving parts from accidental operation of power actuator can cause personal injury or equipment damage. Disconnect and lock out power to the actuator before servicing.

1. Shut off the supply air pressure and the input signal pressure.
2. On double-acting cylinders, disconnect and reverse the two connections to positioner ports C1 and C2. For spring-return cylinders, proceed to step 3.
3. Remove the positioner cover and dial indicator.
4. Loosen the cam locking nut screw and remove the cam locking nut.
5. Turn the cam over and position the cam so the cam roller is about 1/32" from the stop on the cam. See Figure 4.

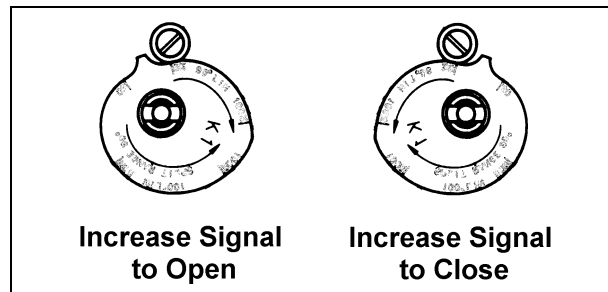


Figure 4 – Cam Positions

6. Tighten the locking screw — allow room for movement of the cam as the cam locking nut is tightened.
7. Turn on the supply and input pressures and operate the valve.
8. Adjust the zero and span adjustments, if necessary.

Cam Adjustment

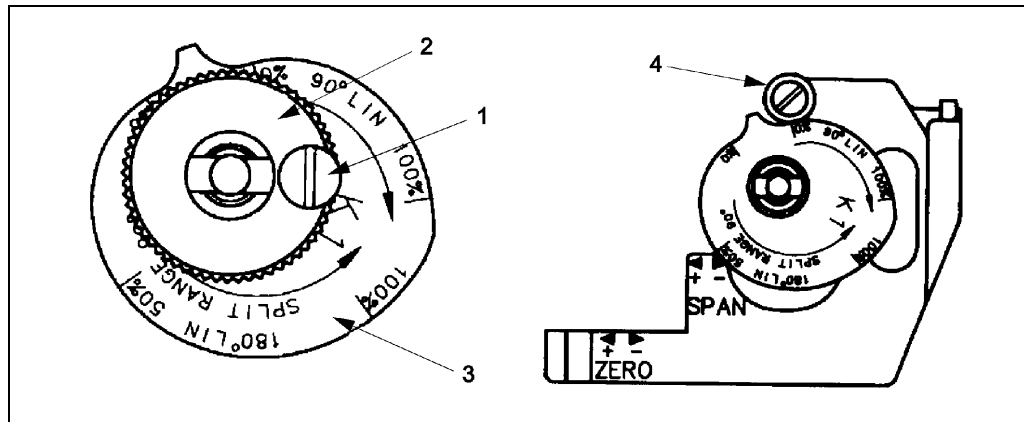


Figure 5 – Cam Adjustment

1. With the cover and indicator removed, loosen the screw (1) and turn the cam locking nut (2) counterclockwise until the cam loosens. See Figure 5.
2. Adjust the cam (3) as desired, making sure the ball bearing (4) is always riding on an active lobe on the cam.
3. Finger tighten the locking nut and tighten the screw (1).

Note: Ensure screw (1) is loose from the cam before tightening locking nut (2).

4. Install and adjust the indicator, and install cover.

Zero and Span Adjustment

Span Adjustment

Span is adjusted with the yellow (upper) thumb wheel (1) located on the feedback spring. See Figure 6. To adjust the span, loosen the locking screw (2) and turn the yellow thumb wheel. Do not allow the top of the spring to contact the spring guide (3). When span is set, tighten the locking screw. Always check Zero after adjusting Span.

Zero Adjustment

Zero is adjusted by turning the silver (lower) thumb wheel (4) located on the lower arm (5). It can also be adjusted externally with a screwdriver (7), through the zero adjust opening. Remember to re-install the zero adjust cover (6) to keep the unit clean.

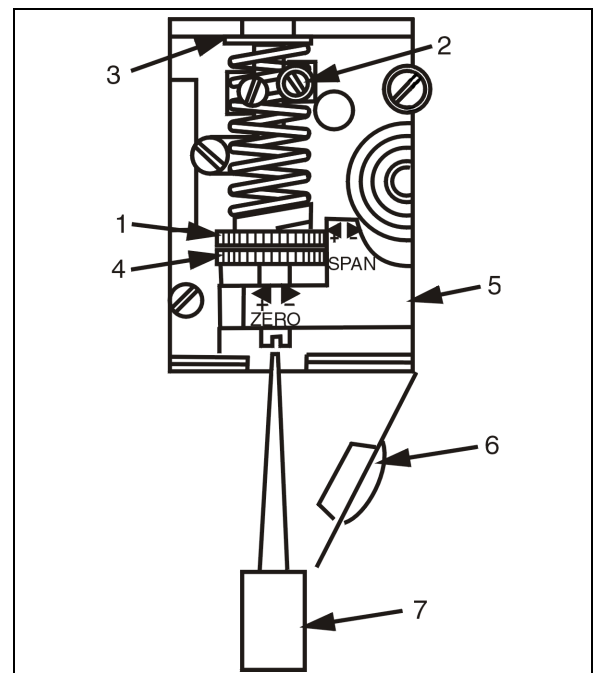


Figure 6 – Zero and Span Adjustment

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Resetting the Range Spring

If the correct span cannot be obtained after 2 or 3 zero/span adjustments, reset the range spring as follows:

1. Disconnect air supply and remove the range spring from the positioner.
2. Loosen screws (1 and 2).
3. Adjust the collar so it is $3/16"$ or $9/32"$ * below the flange face.

*Depending on spring style—see Figure 7

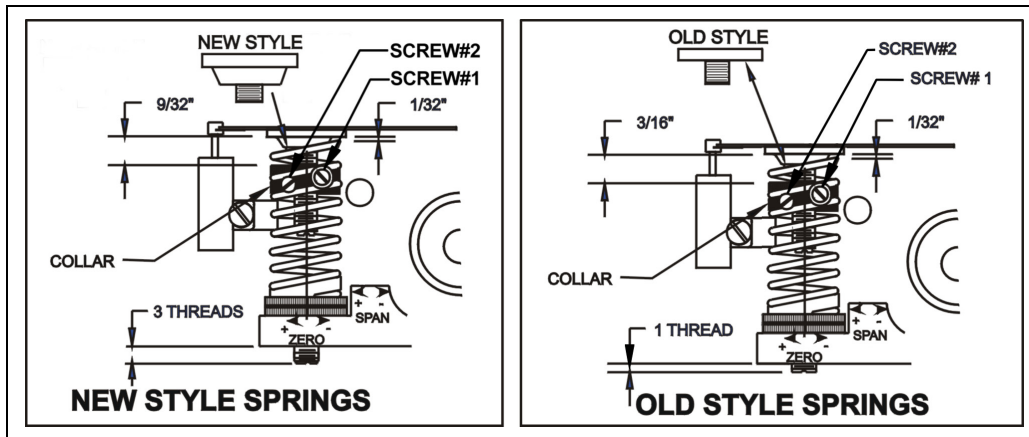


Figure 7 – Spring Styles

4. Adjust the spring end to $1/32"$ clearance.
5. Tighten screws (1 and 2).
6. Adjust the lower zero screw so that 1 or 3 threads are showing (depending on spring style).
7. Reinstall the range spring assembly.

Indicator Adjustment

To adjust the indicator, remove front cover and pull the indicator upward until it comes off the Allen screw. Before installing the indicator make sure the Allen screw is tightened. Press the indicator on the screw and adjust it by rotating clockwise into position.

Adjusting Travel Speed Dampers

The dampers (5) located on the connecting block provide a simple means of adjusting the actuator travel speed. See Figure 8.

For double acting actuators, set the damper marked Supply to fully open and adjust only the damper marked Outlet.

For single acting actuators, adjust both the Supply and Outlet dampers for operation.

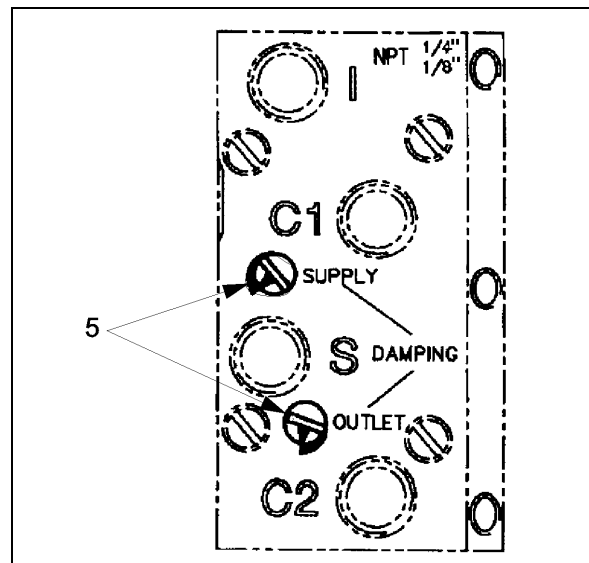


Figure 8 – Speed Dampers

I/P Electric Control Unit, P41C

The I/P Unit

The I/P unit is mounted directly on top of the positioner. Span and Zero for the I/P converter are factory set. No external air supply is needed, as the I/P unit is supplied with air from the positioner. The I/P unit accepts a 4–20 mA input signal. (Other ranges are available on request.)



WARNING!

Positioners installed in hazardous areas can be ignition sources. Ensure positioners used in hazardous areas have proper fire/explosion ratings.

Filter



WARNING!

The filter plug can blow out and cause injury or damage if it is removed while under pressure. Do not remove the filter plug when the positioner is pressurized.

The I/P unit is equipped with a built in filter. The threaded filter plug can easily be removed for replacement. During replacement, always check the filter compartment, and clean if necessary. Make sure the filter plug O-ring is in good condition.

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Installing I/P Unit On Positioner



WARNING!

Positioners installed in hazardous areas can be ignition sources. Ensure positioners used in hazardous areas have proper fire/explosion ratings.

1. Turn off the supply air and remove the connecting block (1), gauge or plug from port IP, and the existing gasket (4) between the positioner (2) and connecting block. See Figure 9.
2. Carefully install the new gasket supplied with the I/P unit.

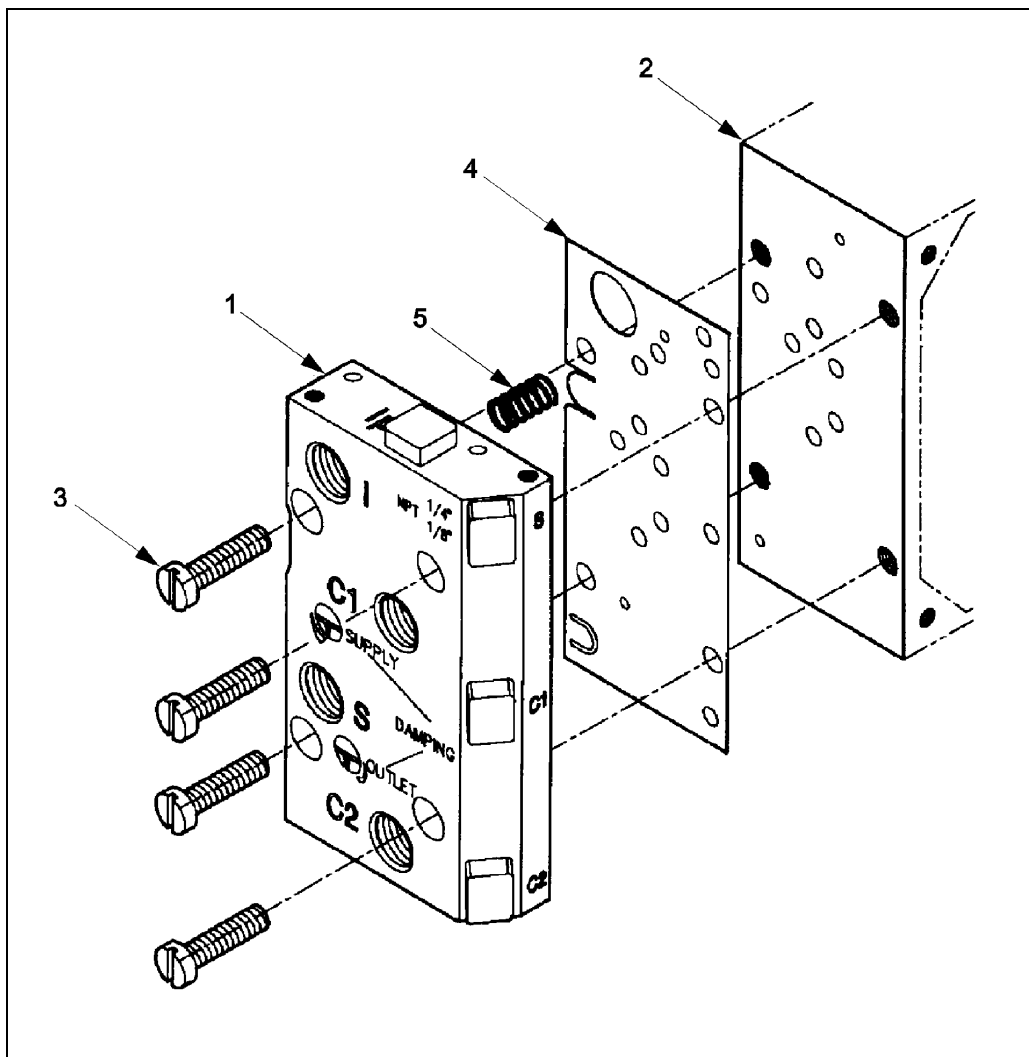


Figure 9 – Installing I/P Electric Control Unit P41C

3. Ensure the relief valve spring (5) is installed properly.
4. Install the connecting block on the Positioner, and plug port I.
5. Remove cover on I/P unit.

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Installing I/P Unit On Positioner (Continued)

6. Install the I/P unit on the top of the positioner, making sure the four O-rings are in the correct places. See Figure 10b.
7. Tighten the I/P unit with the three screws. See Figure 10a.

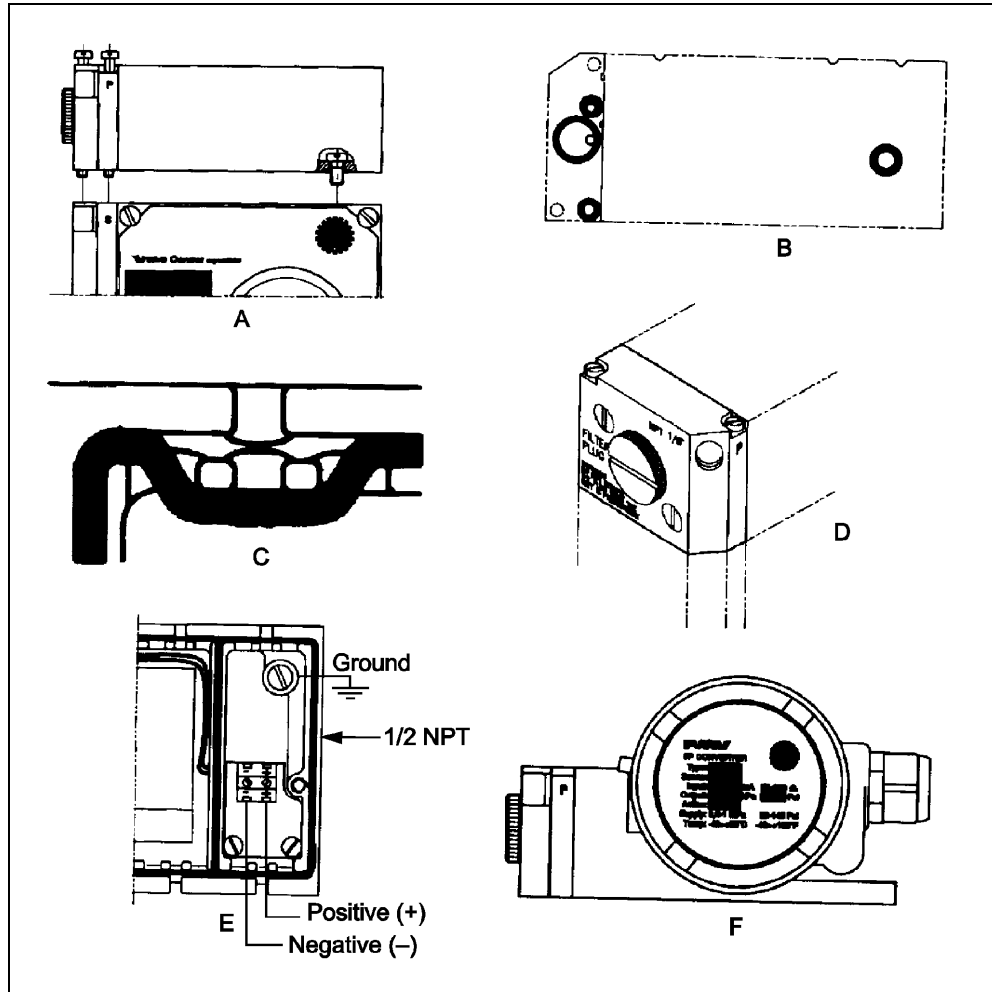


Figure 10 – I/P Unit On Positioner

8. Connect input signal cable to port IE and tighten the cable gland (see Figure 10e).
9. Adjust the O-ring on the I/P unit housing to desired position; sealed or drained (see Figure 10c).
10. Install a plug or a gauge in port P, and make sure the filter plug is tightened (see Figure 10d).

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Maintenance for Positioners

Pilot Valve

To remove the pilot valve for cleaning:

1. Remove the screw (1) and carefully lift out the complete assembly (2).
2. Gently remove the spool (3) from the block.
3. Clean the parts, using methylate cleaner or similar.
4. Blow the parts dry with compressed air.

Note: If the parts show signs of wear, replace the assembly. Do not mix parts from other assemblies.

5. Check the O-rings, then secure and install the pilot valve assembly to the positioner and secure it with the screw (1).
6. Ensure the leaf spring (4) on the balance arm (5) is properly fitted in the groove on the spool (6).
7. Check again to ensure smooth operation of the assembly.

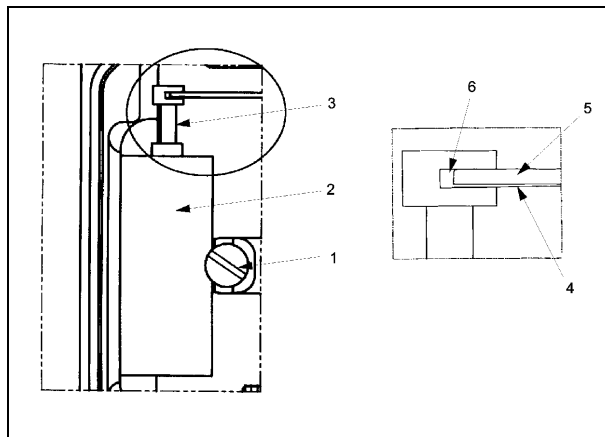


Figure 11 – Location of Pilot Valve Spool

Diaphragm

On P41C positioners the I/P unit must be removed to reach the diaphragm. See Figure 12.

1. Loosen screws (1), remove the diaphragm cover (2).
2. Loosen screw (3), then remove diaphragm (4) and washers (5).
3. When installing the diaphragm, place one washer on each side of the diaphragm. Ensure the raised circle on the washers is facing the diaphragm.
4. Install the screw (3) and tighten.
5. Check the O-ring on the diaphragm cover (2), then install and secure the cover with screws (1).

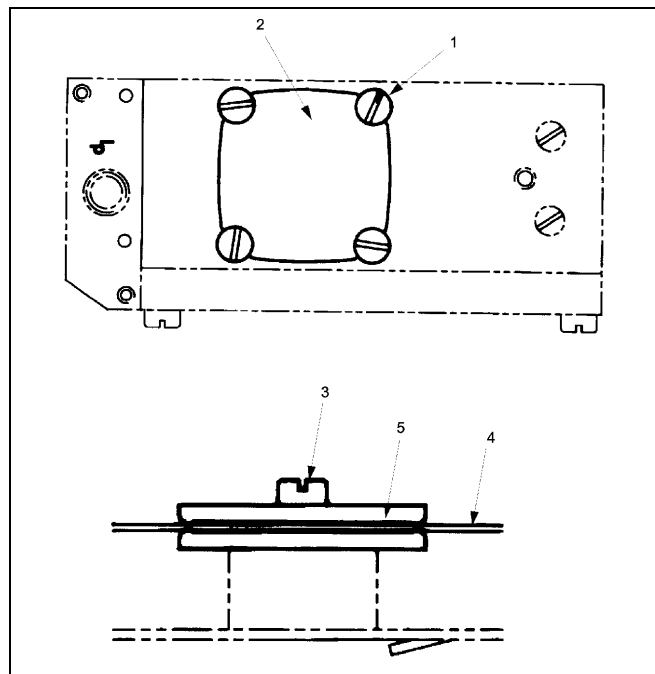
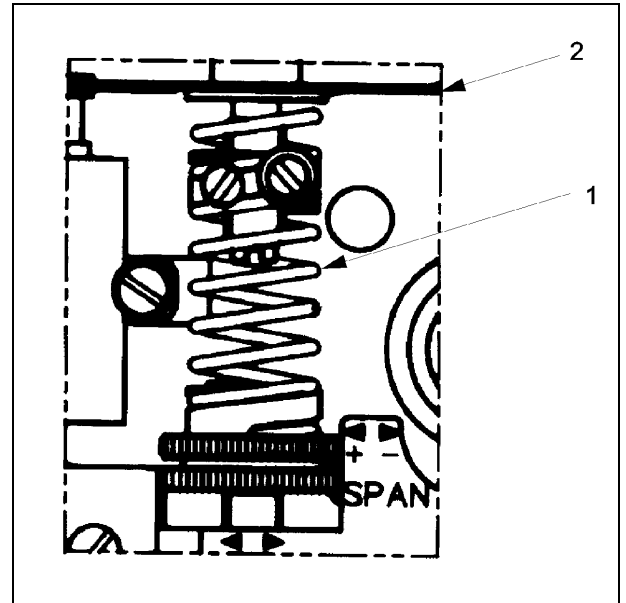


Figure 12 – Diaphragm Removal and Installation

Maintenance for Positioners *(Continued)***Feedback Spring**

Once the front cover and indicator are removed, the feedback spring can be easily reached. See Figure 13.

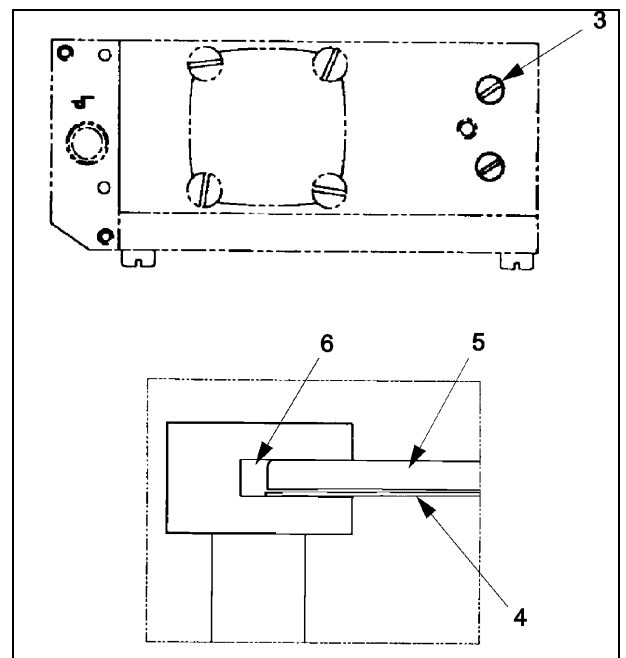
1. Hold the spring (1) from the top, pull down and out.
2. When installing, hold the assembly at the top, guide the lower part to position on the zero screw, then press down until it fits easily under the balance arm (2).
3. Ensure the assembly is aligned properly against the balance arm.

**Figure 13 – Feedback Spring Access****Balance Arm**

The balance arm can only be removed after I/P unit, diaphragm and feedback spring have been removed. See Figure 14.

Refer to "Diaphragm" and "Feedback" sections above.

1. Loosen the screws (3) and remove the balance arm.
2. When installing the balance arm make sure the leafspring (4) on the underside of the balance arm (5) is properly engaged in the groove (6) of the spool in the pilot valve.
3. Tighten the two screws (3) holding the balance arm to the positioner.

**Figure 14 – Balance Arm Access**

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Maintenance for Positioners (Continued)

Lower Arm

After the front cover has been removed, the lower arm can be easily reached. See Figure 15.

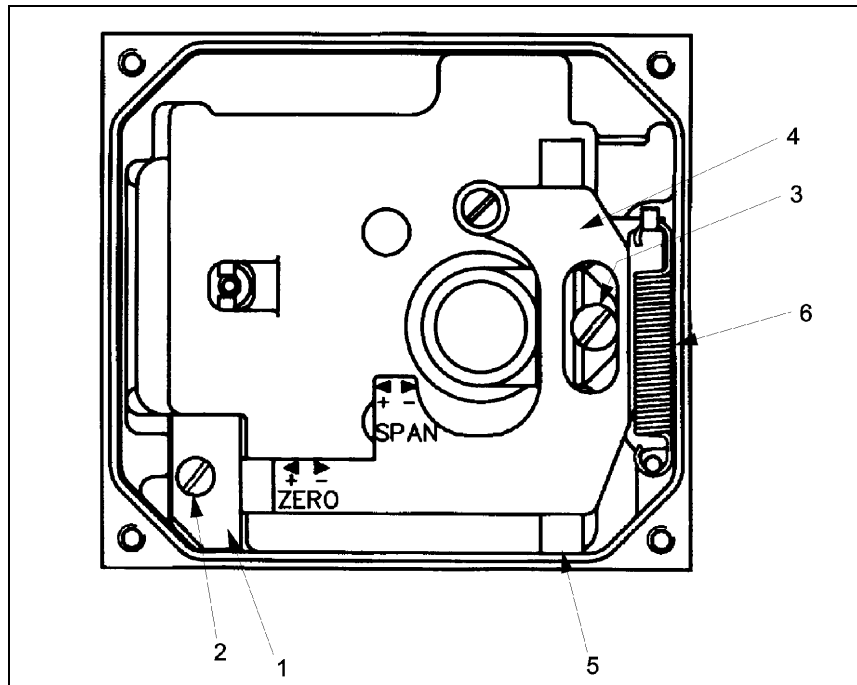


Figure 15 – Lower Arm

1. Remove the indicator, feedback spring and the cam.
2. Loosen screw (2) and remove twist stop (1).
3. Remove screw (3), lower arm (4), rod (5) and spring (6).
4. Check rod and lower arm for wear, and replace if necessary.
5. Clean the rod and install it in the lower arm.
Note: The lower arm should move easily and smoothly.
6. Install the lower arm and rod assembly into the positioner housing, making sure the spring (6) is attached properly to the lower arm and positioner housing.
7. Secure the lower arm and rod assembly with the screw (3).
8. Check again that the lower arm moves smoothly.
9. Apply a small amount of grease on the small tongue on the lower arm, then install and secure the twist stop.
10. Install the cam, feedback spring, indicator and front cover.

O-Rings

With time and use, O-rings can become brittle. This can cause poor operation or failure. Always check O-rings when performing work on the positioner, and replace any brittle O-rings.

Note: A thin layer of silicon grease applied on the O-rings prolongs their life.

**PMV P36C and P41C Positioners
used with DeZURIK Pneumatic Actuators****Troubleshooting**

Condition	Possible Cause	Corrective Action
Signal change has no effect on actuator position.	Indicator is loose.	Check indicator and screw. Re-position indicator and tighten.
	Air supply is not adequate.	Check air supply to positioner, and tubing to actuator.
	Input signal is fluctuating.	Check input signal. Repair or replace wiring.
	Diaphragm is damaged.	Check diaphragm for damage or leakage. Repair or replace diaphragm.
	Pilot valve is dirty or worn.	Check pilot valve function. Clean or replace pilot valve.
	Cam is incorrectly positioned.	Check cam for correct setting.
Signal change results in actuator running to end position	Positioner is loose.	Check coupling between positioner and actuator.
	Cam is loose.	Check cam position and locking screw.
	Input signal is fluctuating.	Check input signal. Repair or replace wiring.
Inaccurate Positioning	Pilot valve is dirty or worn.	Check pilot valve function. Clean or replace pilot valve.
	Diaphragm is damaged.	Check diaphragm; repair or replace diaphragm.
	Input signal is fluctuating.	Check input signal. Repair or replace wiring.
	Actuator is not sized correctly.	Check sizing. Replace with correct actuator.
	Valve torque is increased from wear or damage.	Rebuild or replace valve.

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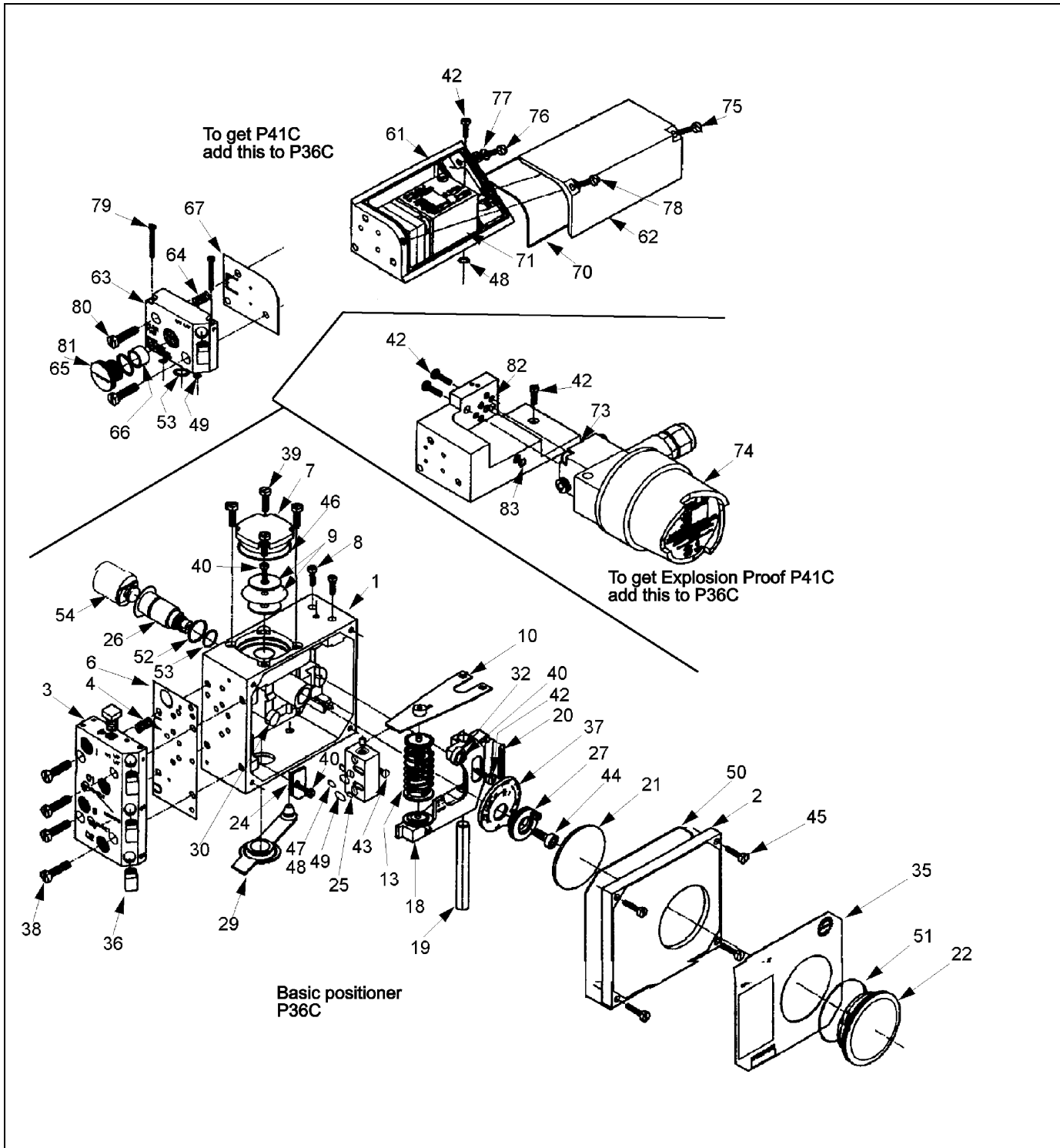


Figure 16 – Positioner Configurations

**PMV P36C and P41C Positioners
used with DeZURIK Pneumatic Actuators**

Parts

Table A: Parts - Positioner

Part No.	Qty	Description
1	1	Housing
2	1	Front cover with O-ring
3	1	Connecting block ^a
4	1	Relief valve spring
6	1	Gasket P5 ^a
7	1	Diaphragm cover with O-ring
8	1	Diaphragm
9	2	Diaphragm washer
10	1	Balance arm
13	1	Feedback spring ^b
18	1	Lower arm assembly
19	1	Rod
20	1	Spring
21	1	Indicator: arrow, flag, or pointer
22	1	Indicator Cover ^c
24	1	Twist stop
25	1	Pilot valve with O-rings
26	1	Shaft with O-rings and screw
27	1	Cam locking nut
29	1	Zero cover
30	1	Cover
32	11	Ball bearing
35	1	Identification cover

- a. Specify 1/4" NTP or G.
- b. Specify 3–15 psi or 6–30 psi Spring Assembly.
- c. Specify Flag, Transparent or Opaque.

Table A: Parts – Positioner, continued

Part No.	Qty	Description
36	4	Plug ^a
37	1	Cam
38–45	1	Screw set
46–53	1	O-ring set
54	1	Spindle adaptor

a. Specify 1/8" NTP or G.

Table B: Parts – I/P Unit

Part No.	Qty	Description
61	1	I/P box
62	1	I/P cover with screws
63	1	I/P nose assembly ^a
64	1	Relief valve spring
65	1	Filter and plug
66	1	Filter (5 nos)
67	1	I/P Gasket
70	1	O-ring
71	1	I/P converter
73	1	Round I/P mounting bracket with hardware
74	1	I/P enclosure with converter ^b

- a. Specify 1/4" NTP or G.
- b. Specify Std., Cenelec (flameproof), or Explosion Proof FM.