

IMPORTANT : READ THIS MANUAL THOROUGHLY BEFORE INSTALLATION OR SERVICING!

CONTENTS :

- | | |
|------------------------|--------------------------|
| 1. DESCRIPTION | 4. CALIBRATION |
| 2. OPERATION PRINCIPLE | 5. TROUBLE SHOOTING |
| 3. INSTALLATION | 6. GENERAL SPECIFICATION |

1. DESCRIPTION :

The F10 Positoner provides the means for a pneumatic actuator to be positioned to any point between full open and full closed position. This allows accurate setting of rotary and linear control valves as well as a wide range of dampers and similar devices. The actuator's movement is controlled in proportion to a 0.2 to 1 bar (3-15 psig) incoming pressure signal.

The Posiflex F10 Positoner provides:

- A single model covers both single acting and double acting actuators.
- External zero adjustment
- High accuracy due to "high gain" amplification.
- Four position cam for linear actuators provides for linear, quick opening, equal percentage and split range characteristics.
- Three position cam for rotary actuators provide for linear, quick opening and equal percentage characteristics. A special cam for rotary actuator provides for split range.
- Direct or reverse acting

F10 Positioners are available for both rotary and linear applications and because of the standardized mounting interface (VDI / VDE 3845 or IEC 534 / 6), installation is simple and trouble free. Mounting kits are available for most actuator types.

The purely pneumatic mode of operation means that F10 Positioners may be used in explosion hazardous areas without any additional protection being necessary.

A wide range of modular control options are available. These cover the addition of gauges, indicating switches, position transmitters, etc.

2. GENERAL SPECIFICATIONS : Metric

Hysteresis	:	0.6%
Linearity	:	1.0%
Air Flow	:	210 NI/min. (at 6 bar)
Air Consumption	:	15 NI/min. (at 6 bar)
Min. volume actuator	:	0.1 NI
Temperature	:	-20° to +80° C
Enclosure	:	IP 54 (Option IP65)
Mounting	:	VDI/VDE 3845 or IEC534/6
Air entry	:	G ¼"
Air supply	:	1.4 to 8.6 bar
Input Signal	:	
- Standard	:	0.2 to 1.0 bar (3 to 15 psig)
- Adjustable	:	0.2 to 0.6 bar (3 to 9 psig) 0.6 to 1.0 bar (9 to 15 psig)

- Media :
- Non lubricated instrument air, filtered at 25 micron.
 - Dew point should be 10° C (18°³) below environmental temperature.
 - Air quality class 3-2-3 accord to ISO 8573-1.

3. OPERATING PRINCIPLES :

The Posiflex F10 Pneumatic Positioner is a high gain, motion balance instrument, suitable for use with a wide variety of single acting and double acting rotary and linear actuators.

Referring to the diagram below : The Positioner is shown in a mid position with INSTRUMENT and SUPPLY air connected. The flapper and nozzle (5) maintains the instrument in it's 'balanced' state with just enough pilot air pressure being applied to the spool valve for it to hold the actuator in it's "set" position.

When the actuator is required to move to a new "more open" position, the INSTRUMENT pressure signal is increased accordingly. This closes the air gap at the nozzle (5) causing an amplified pressure increase at the spool valve end, this in turn displaces the spool and allowing an increasing air pressure at the "open" side of the actuator and exhausting air from the "close" side.

When the actuator moves position, it rotates the cam (6) in a CCW (counter clockwise) direction and in doing so it progressively opens the air gap at the nozzle (5). On reaching the new set point the pilot pressure is reduced to the “balanced” state and again locks the actuator in new set position.

Similarly a decreasing INSTRUMENT pressure will cause a CW (Clockwise) Positioner movement.

The operation for single acting actuators is the same except that the unused pneumatic connection OUTPUT 2 is plugged off

4. INSTALLATIONS :

Mechanical installation Rotary actuators.

The Positioner is mounted on to the top surface of the pneumatic actuator using an appropriate mounting kit.

The Positioner's mounting configuration is to the VDE/VDI 3845 standard. If the actuator is to the same standard, a standard NAMUR mounting kit can be used, otherwise a special mounting kit will have to be obtained.

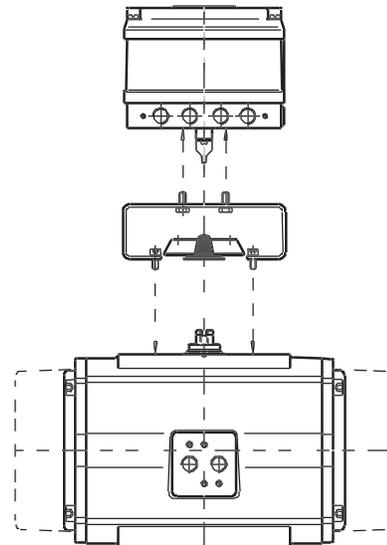
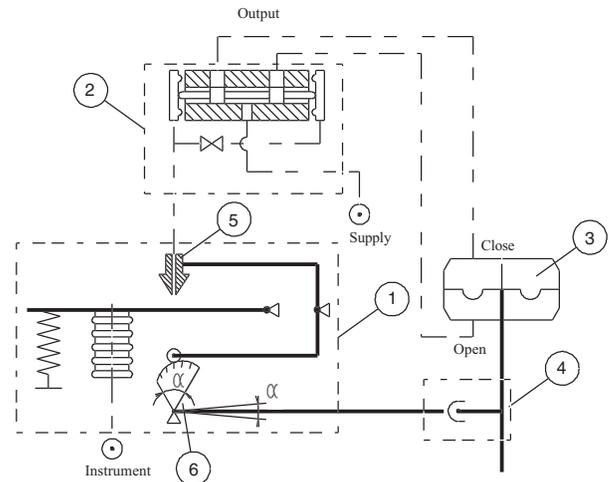
Assuming the installation will use the standard NAMUR mounting kit, proceed as follows :

1. Fix the bracket to the top surface of the actuator using the 4 screws provided.
2. Check that the spring clip is securely in place on the bottom of the Positioner shaft.
3. Locate the Positioner in place on top of the bracket making sure that the 4mm. Tongue locates properly into it's slot in the actuator spindle and the centring screw is in position.
4. Fix the Positioner to the bracket using the 4 screws provided..

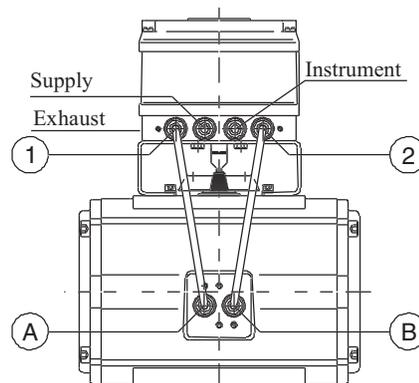
Pneumatic Connections double acting:

This assumes a standard (direct acting) installation with an increasing signal to open the valve in a CCW (counter clockwise) direction.

Before connecting any air supply make sure that the air available is clean dry instrument air filtered to at least 25 microns.



Mechanical Installation



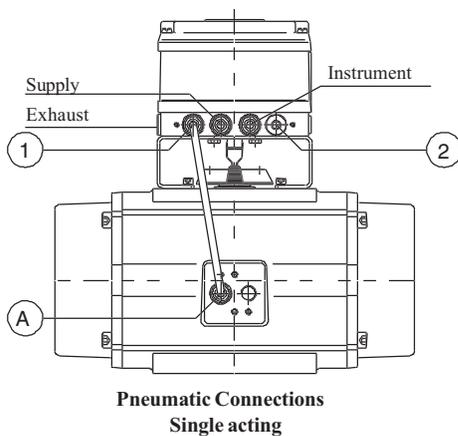
**Pneumatic connections
Double acting**

1. Connect an appropriate piece of air tubing between the port 1 on the Positioner to the “A” port on the actuator. (The “A” port is the one that when air is applied to it, rotates the actuator in a counter clockwise direction).
2. Connect an appropriate piece of air tubing between the port 2 on the Positioner to the “B” port on the actuator. (The “B” port is the one that when air is applied to it, rotates the actuator in a clockwise direction).
3. Connect an air supply to the Positioner port marked “supply”.
4. If the positioner is required to meet enclosure rating IP54, be sure that the “Exhaust” port is connected with elements which prevent the input of water and give no pressure rising inside the housing because of throttling of exhaust flow (no sintered filters, but a piece of tube or a special IP65 Exhaust plug with diaphragm).
5. Connect the instrument air to the port marked “INSTR”.

Note: For a reverse acting assembly, both the air connections and the cam plate must be reversed.

Pneumatic connections single acting.

This assumes a standard installation, direct acting with an increasing signal to open the valve in a CCW (counterclockwise) direction.



Before connecting any air supply make sure that the air available is clean dry instrument air filtered to atleast 25 microns see below:

1. Connect an appropriate piece of air tubing between the port 1 on the Positioner to the “A” port on the actuator. (The “A” port is the one that, when air is applied to it, rotates the actuator in a counterclockwise direction).
2. *Connect an air supply to the Positioner port marked “supply”.
3. The unused Positioner port 2, should be plugged using the pipe plug supplied with your Positioner.

Connect port “exhaust” with elements, which guarantee IP54.

4. If the Positioner is required to meet enclosure rating IP54, be sure that the “Exhaust” port is connected with elements which prevent the input of water and give no pressure rising inside the housing because of throttling of exhaust flow (no sintered filters, but a piece of tube or a special IP65 exhaust plug with diaphragm).
5. Connect the instrument air to the port marked “INSTR”.

Note : For a reverse acting assembly, use the same procedure but remember that a reverse acting actuator must be used.

Air supply requirements :

CAUTION !

Pressure in excess of 8.6 bar (125 psig) will cause damage to the Positioner. Positioner supply air must be clean, dry and oil free.

The air should be filtered to at least 25 microns (as defined in the Instrument Society of America standard ISA S7.3 specifications). The filter should be installed as close to the Positioner as possible to ensure maximum efficiency.

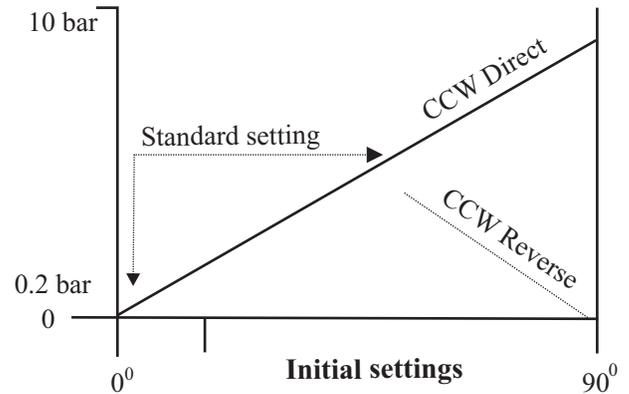
5. INITIAL SETTINGS :

The factory settings provide the Positioner with an initial range of settings that will allow the operation of Positioners on most applications.

- | | |
|------------------|---|
| Signal input | - 0.2 to 1.0 bar (3-15 psig) |
| Range | - 0% to 100% |
| Control function | - Linear |
| Action | - Direct Acting
(Opening on increasing signal in CCW direction). |

The F10 Positioner is provided with the following features for making changes to the initial settings.

- Zero - By the external zero adjustment screw.
- Range - By the internal range adjustment ring.
- Range Spring - The standard range spring is suitable for normal operation and split ranging
- Cam Segment - Six segments are provided for the rotary Positioner (See table).



Cam Changes:

Remove the cover and indicator from the Positioner exposing the cam. The cam is double sided: CCW for direct acting. CW for reverse acting.

If the actuator is fully clockwise and the actuator is to rotate CCW on instrument signal increase, the cam should be on the “CCW” side and the start marking should be on the “CCW” side and the start marking should be in line with the cam follower bearing. If the actuator is fully counterclockwise and the actuator is to rotate CW on instrument signal increase, the cam should be on the “CW” side and the start marking should be in line with the cam follower bearing.

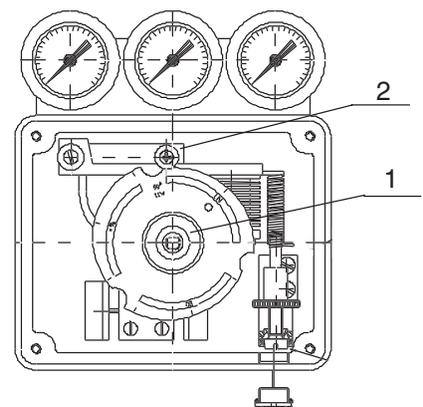
If the cam is not in the correct position, change as follows:

1. Remove the cam nut (1)
2. Re-install the cam plate in the correct position, taking care that the correct segment is adjacent to the cam follower (2)
3. Replace the cam nut and fix it.
4. Replace the indicator disk, taking care that it is in the correct position.

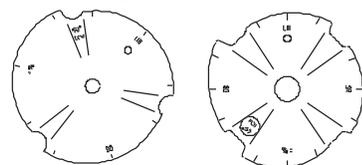
Before making any adjustments Positioner should be properly mounted, the cam should be in the correct sector on the correct side as determined from the cam markings.

Cam Settings			
Rotary actuator		Linear actuator	
90°CCW	90°CCW	40°CCW	40°CW
lin	lin	lin	lin
=%	=%	=%	=%
QO	QO	QO	QO
*	*	SR	SR

- In = linear
- =% = equal percentage
- QO = Quick Opening
- SR = Split Range
- * = Special cam split range



Top view of cam



Rotary actuator Cam 90° Linear actuator Cam 40° (49°)

Zero Adjustment:

The zero adjustment is carried out externally, this is located at the right hand side of the Positioner casing and is accessed by means of a removable plug.

1. Remove the access plug (1)

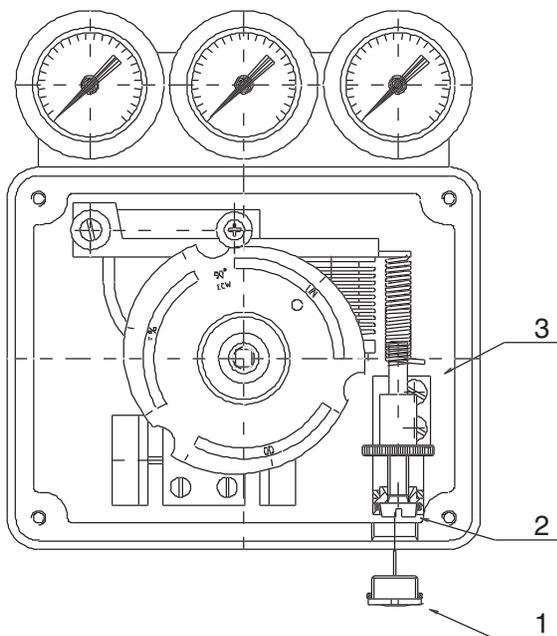
2. Adjust the instrument signal to its minimum value (0.2 bar for a 0.2 - 1.0 bar range). (3 psig for a 3-15 psig range).
3. Rotate the zero adjusting screws (2) until the actuator just begins to move. Turning the adjusting nut clockwise raises the start value.
4. After adjustment, replace the access plug (1).

Range Adjustment

Remove the cover from the Positioner exposing the knurled range adjuster ring, this is located at the right hand side of the assembly.

The factory set range is so that a 0.2 to 1.0 bar (3 - 15 psig) instrument pressure produces a full stroke movement. This may be changed by resetting the full stroke position (max. opening) at the 1.0 bar (max. instrument) pressure. To adjust the range carry out the following:

1. Increase the instrument signal to its maximum value (1.0 bar for a 0.2 to 1.0 bar range). (15 psig for a 3 - 15 psig range).
2. If the actuator does not reach its final position, rotate the knurled adjusting ring (3) in CCW direction until the full stroke position is reached.
3. Turning the range screw CW reduces the range, CCW increases the range.
4. After range adjustment, reset the zero position and adjust it if necessary.



6. TROUBLE SHOOTING :

If it is suspected that the Positioner is not operating correctly, check the following:

1. Is the cam in the proper orientation for your application?
2. Is the Positioner properly mounted?
3. Is the coupling or NAMUR shaft in proper alignment with the Positioner cam shaft and actuator?
4. Is the Positioner piped correctly?
5. Make sure supply pressure exceeds minimum pressure required to move the /actuator.
6. Is there instrument and output pressure at the Positioner ? (If the Positioner is equipped with a gauge block, check the instrument and output pressure readings. If the Positioner is not equipped with a gauge block, connect gauges to the instrument and output ports and note readings.
7. Is the actuator working properly ? (Disconnect the supply pressure from the Positioner and connect the supply pressure to the actuator. Does the actuator move full stroke?)

If additional help is needed contact your local El-o-matic office or representative.

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CONTENTS :

- | | |
|------------------------|---------------------|
| 1. DESCRIPTION | 4. INSTALLATION |
| 2. SPECIFICATION | 5. INITIAL SETTINGS |
| 3. OPERATING PRINCIPLE | 6. FAILURE MODES |

1. DESCRIPTION :

El-o-matic Posiflex Positioners are the most advanced of their type in the market today. This latest version is made possible by a combination of the newest electronics developments with a high precision spool type pneumatic pilot for the volume amplifier.

The F20 is a true 2 wire instrument. An industry standard 4 to 20 mA signal provides both the controlling signal and the power supply for the electronics. As such the Positioner is plug compatible with the current industry standard.

The use of electronics as the controlling element means that all the usual control characteristics. Zero range and sensitivity are all electronically resettable using trimmers on the control card.

Both rotary and linear applications are catered for the difference being with feedback mechanism and the mounting methods. A single universal Positioner is suitable for both double acting and single acting (spring return) actuators.

The standard internal feedback provides a linear relationship between the input signal and the output movement.

2. GENERAL SPECIFICATIONS : Metric

Hysteresis	: 0.6%
Linearity	: 1.0%
Air Flow	: 210 NI/min. (at 6 bar)
Air Consumption	: 10 NI/min. (at 6 bar)
Min. volume actuator	: 0.1 NI
Temperature	: -20° to +80° C
Enclosure	: IP 54 (Option IP65)
Mounting	: VDI/VDE 3845 or IEC534/6
Air entry	: G ¼"
Air supply	: 1.4 to 8.6 bar
Electrical Entry	: M20 x 1.5 (option PG 13.5)
Electrical Signal	
- Standard	: 2 wire: 4 to 20mA (=8 VDC)
- Adjustable	: 4 to 12mA or 12 to 20 mA
	for split range
Resistance	: 400 Ω (at 20 mA)

Media : Non lubricated instrument air, filtered at 25 micron.
Dew point should be 10° C (18° 3)
Below environmental temperature.

3. OPERATING PRINCIPLE :

The Positioner provides the means for a pneumatic actuator to be accurately positioned to any point between full open and full closed position. The actuator's movement is controlled in proportion to a 4-20 mA incoming signal.

The actuator's movement is monitored by the integral feed back potentiometer (7), the signal from this and the incoming signal are fed to the comparative electronics on the main circuit board (1).

Providing these two signals are equal the resulting signal sent to the I/P convertor (2) is "Neutral" and the spool of the pilot valve (3) is held in the mid or blocked position.

In this state the actuator remains locked in the last set position, that is at its "Set point"

If, either the input mA, signal or the valve position changes then the difference is sensed and the signal to the I/P is either increased or decreased. This causes a corresponding movement of the pilot spool (3) which in turn starts the actuator's movement (4) towards the new "Set point". On reaching this the two signals are again equal and movement stops at this new "Set point".

For single acting (spring return) actuators only a single air line is used, the other port at the spool valve (3) is plugged off.

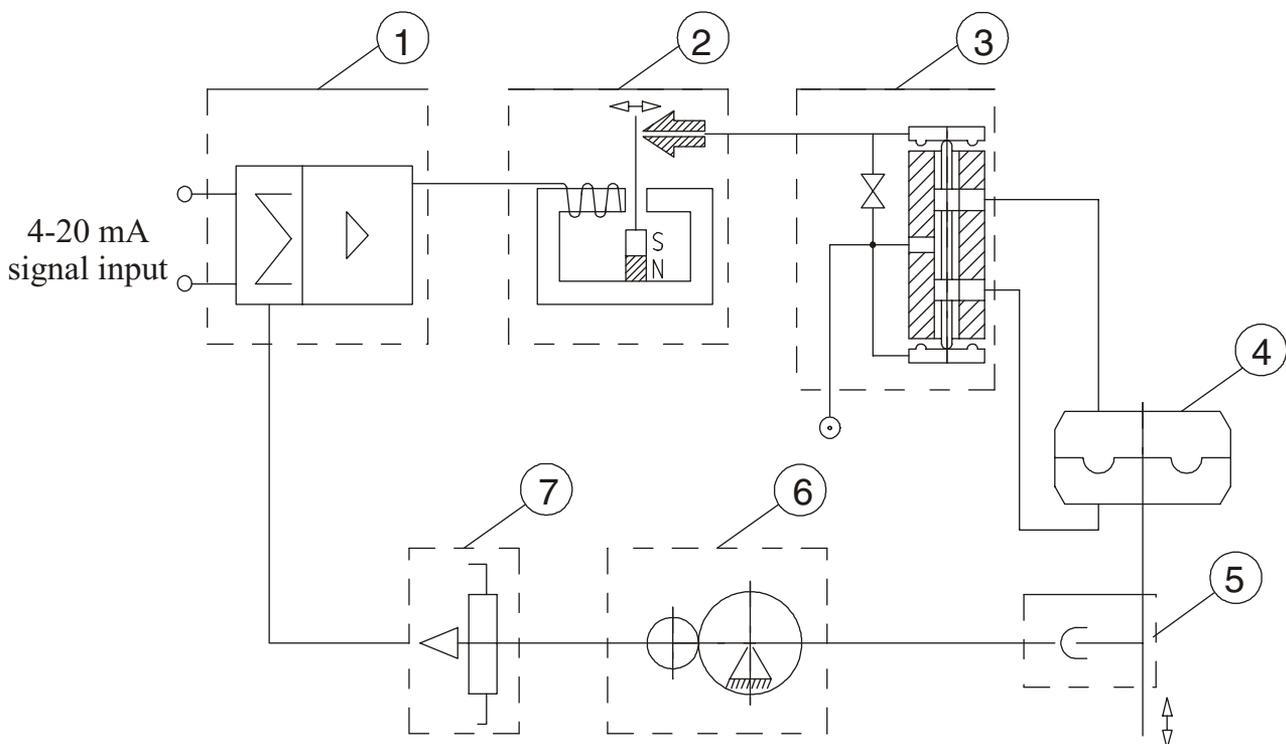


FIG. 1

4. INSTALLATION :

MECHANICAL INSTALLATION ROTARY ACTUATORS :

The Positioner is mounted on to the top surface of the pneumatic actuator using an appropriate mounting kit.

The Positioner's mounting configuration is to the VDE/VDI 3845 standard, if the actuator is to the same standard, a standard NAMUR mounting kit can be used, otherwise a special mounting kit will have to be obtained.

Assuming the installation will use the standard NAMUR mounting kit, proceed as follows:

Fix the bracket to the top surface of the actuator using the 4 screws provided.

Locate the Positioner in place on top of the bracket making sure that the 4 mm tongue locates properly into it's slot in the actuator spindle.

Fix the Positioner to the bracket using the 4 screws provided.

● **PNEUMATIC CONNECTIONS - DOUBLE ACTING :**

Assuming a standard (direct acting) installation with an increasing signal to open the valve in a CCW (Counter clockwise) direction.

Before connecting any air supply make sure that the air available is clean dry instrument air filtered to atleast 25 microns.

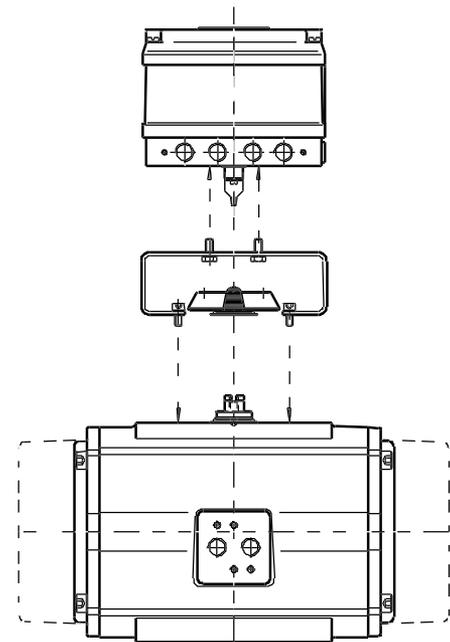
Connect an appropriate piece of air tubing between the port 1 on the Positioner to the "A" port on the actuator. (The "A" port is the one that when air is applied to it, rotates the actuator in a counter clockwise direction).

Connect an appropriate piece of air tubing between the port 2 on the Positioner to the "B" port on the actuator. (The "B" port is the one that when air is applied to it, rotates the actuator in a clockwise direction).

If the Positioner is required to meet enclosure rating IP54, be sure that the sintered filter is in place at the "exhaust" port.

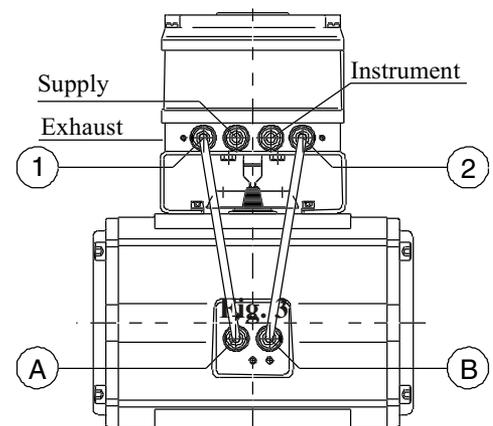
Connect an air supply to the Positioner port marked "Supply".

Note : For a reverse acting assembly, both the air and potentiometer connections must be reversed.



Mechanical Installation

FIG. 2



**Pneumatic connections
Double acting**

FIG. 3

● PNEUMATIC CONNECTIONS - SINGLE ACTING :

Assuming a standard installation. direct acting with an increasing signal to open the valve in a CCW (counter clockwise) direction.

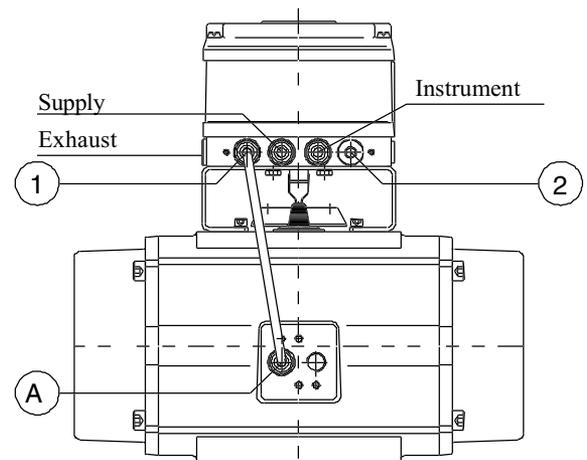
Before connecting any air supply make sure that the air available is clean dry Instrument air filtered to at least 25 microns.

Connect an appropriate piece of air tubing between the port 1. on the Positioner to the "A" port on the actuator. (The "A" port is the one that, when air is applied to it, rotates the actuator in a counter clockwise direction).

Connect an air supply to the Positioner port marked "Supply".

If the Positioner is required to meet enclosure rating IP54, be sure that the sintered filter is in place at the "Exhaust" port.

Note : For a reverse acting assembly, use the same procedure but remember that a reverse acting actuator must be used



**Pneumatic Connections
Single acting**

FIG. 4

5. ELECTRICAL CONNECTIONS :

Connect the 4 - 20 mA signal as shown in FIG. 5 The factory settings:

- Signal input 4 mA - 20 mA
- Range 0% to 100%
- Control function Linear
- Action Direct Acting (CCW with increasing signal)

INITIAL SET UP ZERO, RANGE AND SENSITIVITY:

Before making adjustments the Positioner should be already mounted on the actuator, air supply connected and a 4 - 20 mA (+ & -) signal connected to the signal input terminals as per the polarity.

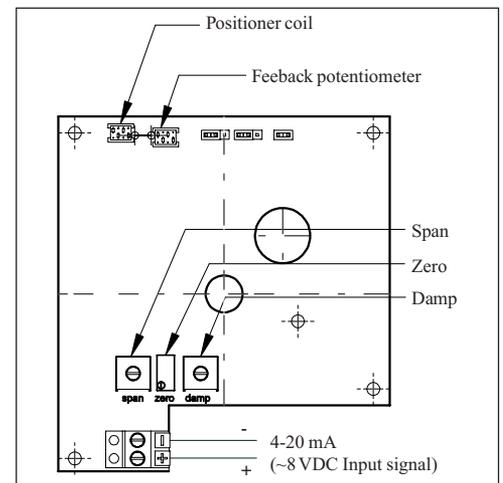


FIG. 5

Zero setting

To change the position for the 4 mA signal, first set the signal to 4mA, then turn the "Zero" trimmer screw until the desired position is reached.

Range setting

To change range, first set the signal to 20 mA then turn the "Span" trimmer screw until the desired position is reached.

Sensitivity Setting

To change sensitivity, first set the signal to an appropriate mid point (12 mA), then turn the "Damp" trimmer screw until the best result is reached.

Split range setting

To change the range from full range to split range remove the split range jumper (see FIG. 6). This way the Positioner can be controlled either by 14 mA signal or a 12 to 20 mA signal.

The start point can be set at 4 or 12 mA with the .ZERO" trimmer. The end point (range) can be set at 12 or 20 mA with the "SPAN" trimmer.

Note : These two adjustments are interrelated, so the zero may have to be reset after changing the range and vice versa.

To increase the signal turn the trimmer screws clockwise (CW). To decrease the signal turn the trimmer screws counter clockwise (CCW).

6 FAILURE MODES :

General on signal failure:

Port 1 is exhausted
Port 2 is pressurized

6.1 FAILURE MODES-DOUBLE ACTING :

The standard set up for double acting actuators is so that an increasing input signal opens the valve. Signal failure, then, moves the valve to the closed position. This may be changed to "open on signal failure" by changing the set up to REVERSE ACTING.

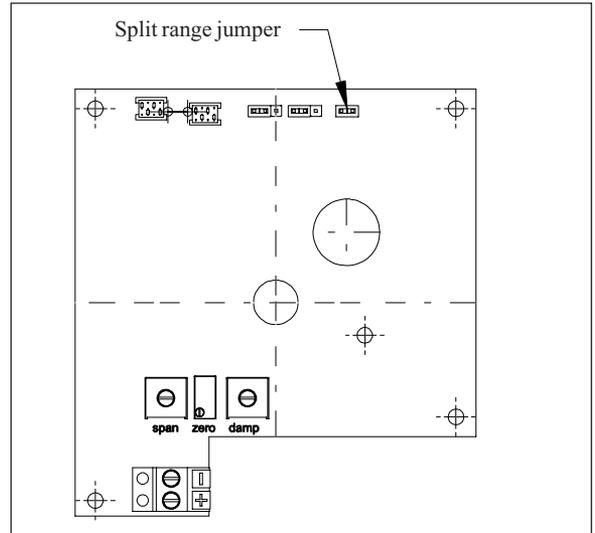


FIG. 6

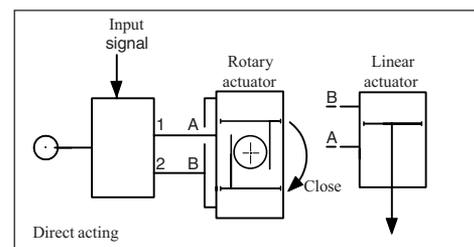


FIG. 7

The effect of signal and air failure depends on the way the air connections and the potentiometer connections are made:

1. DIRECT ACTING - STANDARD SETUP

Action	Air Failure	Signal Failure
Direct	Position not defined	Closed

2. REVERSE ACTING

Action	Air Failure	Signal Failure
Reverse	Position not defined	Open

6.1.1 CHANGES FOR REVERSE ACTING

To change from the standard set up to reverse acting:

1. Change the tubing (see FIG. 8)
2. Remove the cover
3. Change the action jumper setting by setting both jumpers to the right side (see FIG. 10)
4. Replace the cover taking care that the "O" ring seal is in place and the fixing screws are tightened correctly.

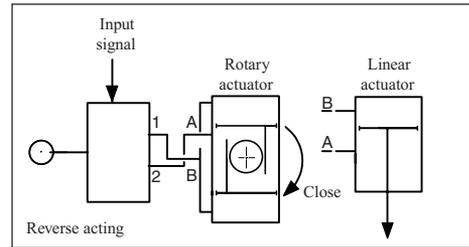


FIG. 8

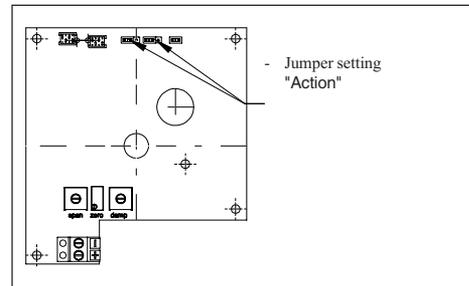


FIG. 9

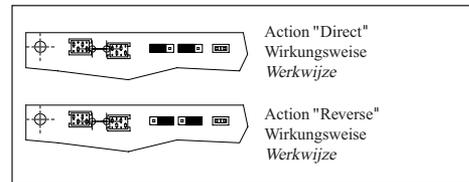


FIG. 10

6.2 FAILURE MODES - SINGLE ACTING (SPRING RETURN).

Spring return actuators may be "Fail open" or "Fail close" depending on what happens when the air fails. This air /failure mode must be built into the actuator and maintained when the actuator is built on to the valve.

In addition both these air failure modes may be either direct acting or reverse acting depending on what happens at the Positioner when the 4 - 20 mA signal fails or is reduced to it's lowest level.

Action	Air Connection		Failure	
	1	2	Air	Signal
Direct	A	Block	Close	Close
Direct	A	Block	Open	Close
Reverse	Block	A	Close	Open
Reverse	Block	A	Open	Open

6.2.1 CHANGES FOR REVERSE ACTING

To change from the standard set up to reverse acting:

1. Change the tubing (see FIG. 13 & FIG. 14)
2. Plug the unused actuator port
3. Remove the cover
4. Change the action jumper setting by setting both jumpers to the right side (see FIG. 10)
5. Replace the cover taking care that the "O" ring seal is in place and the fixing screws are tightened correctly.

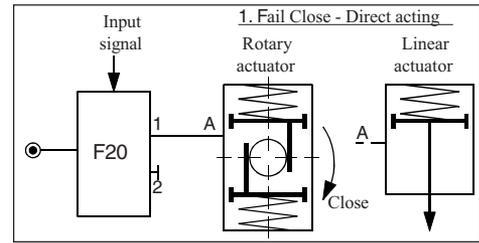


FIG. 11

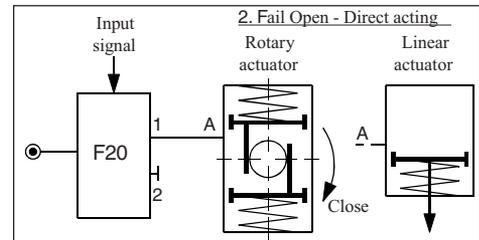


FIG. 12

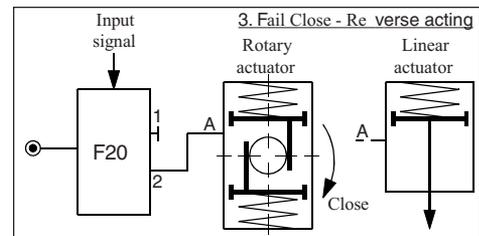


FIG. 13

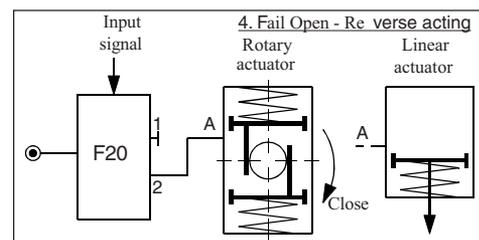


FIG. 14