

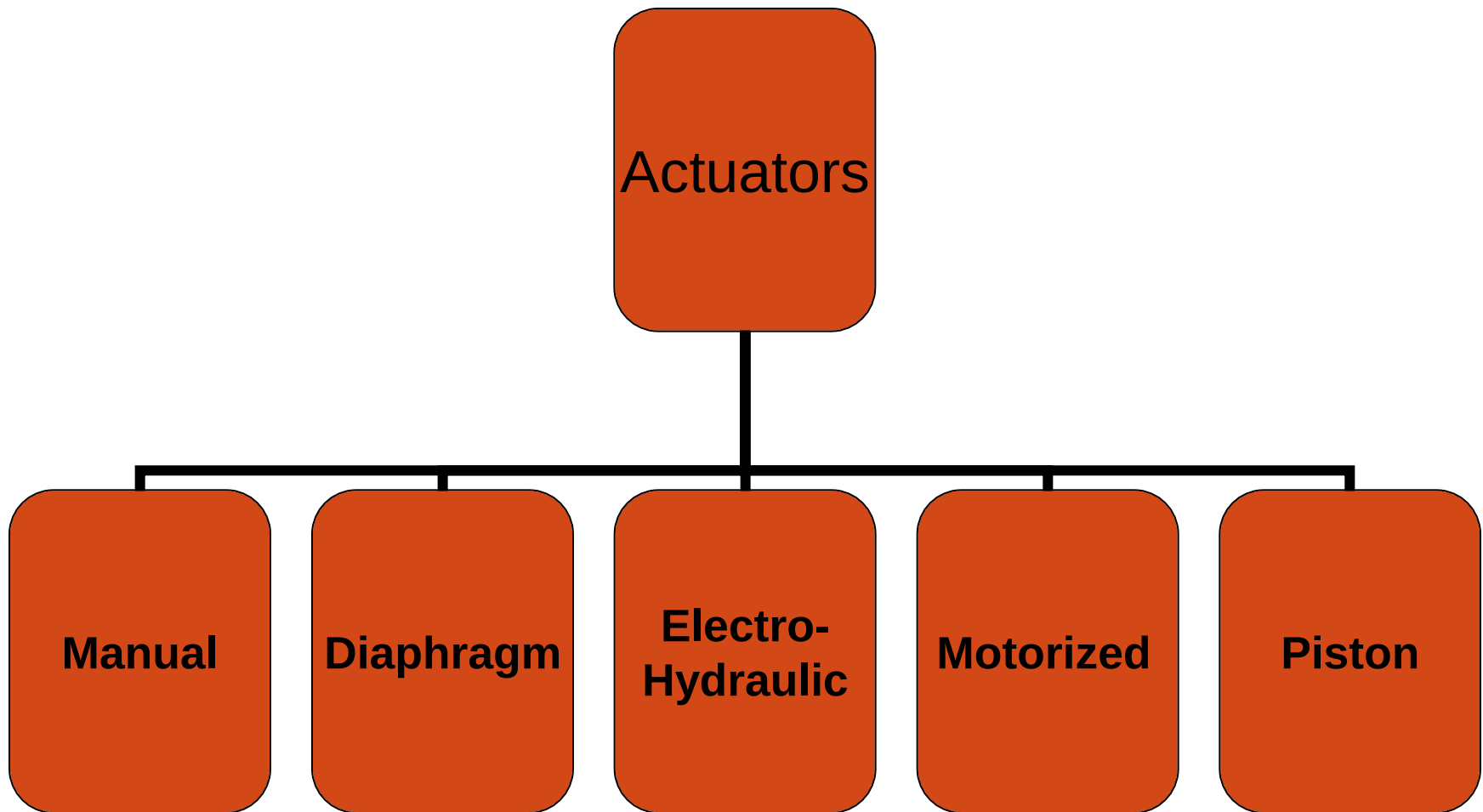
Control Valve Accessories

- Samson Koshy

Contents:

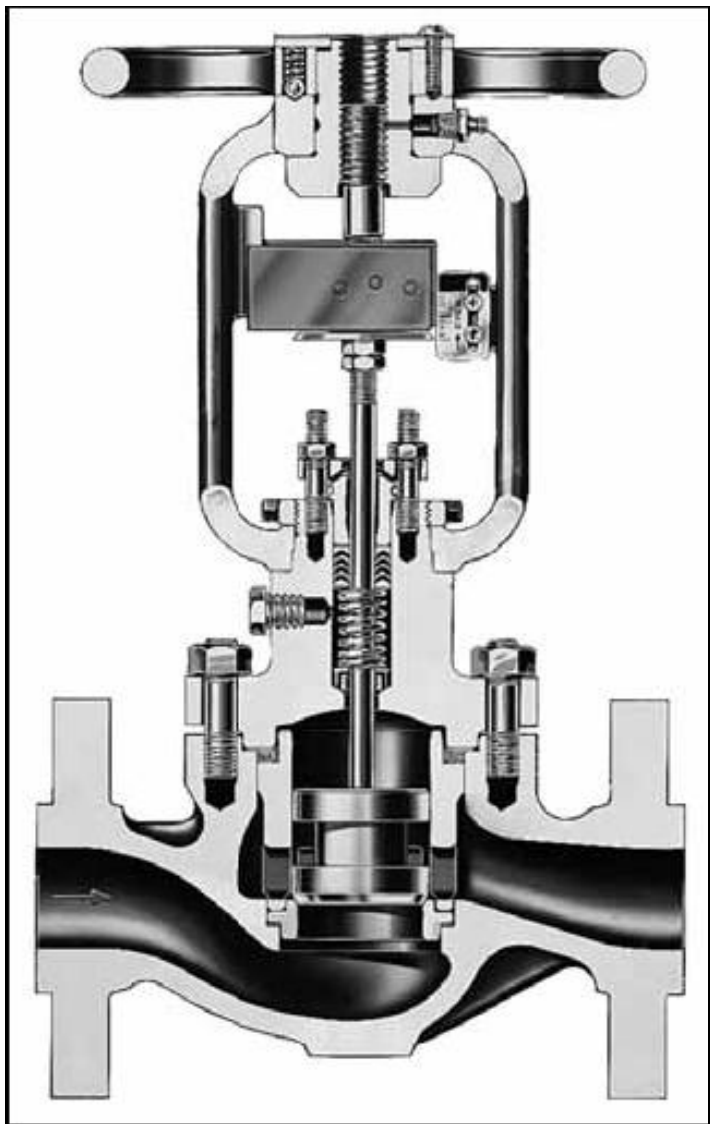
- Actuator
- Air filter Regulator
- Valve Positioner
- Volume Booster
- Air Lock Relay
- Solenoid Valve
- Limit switches
- Position Transmitter
- Interlock Detail

Actuators

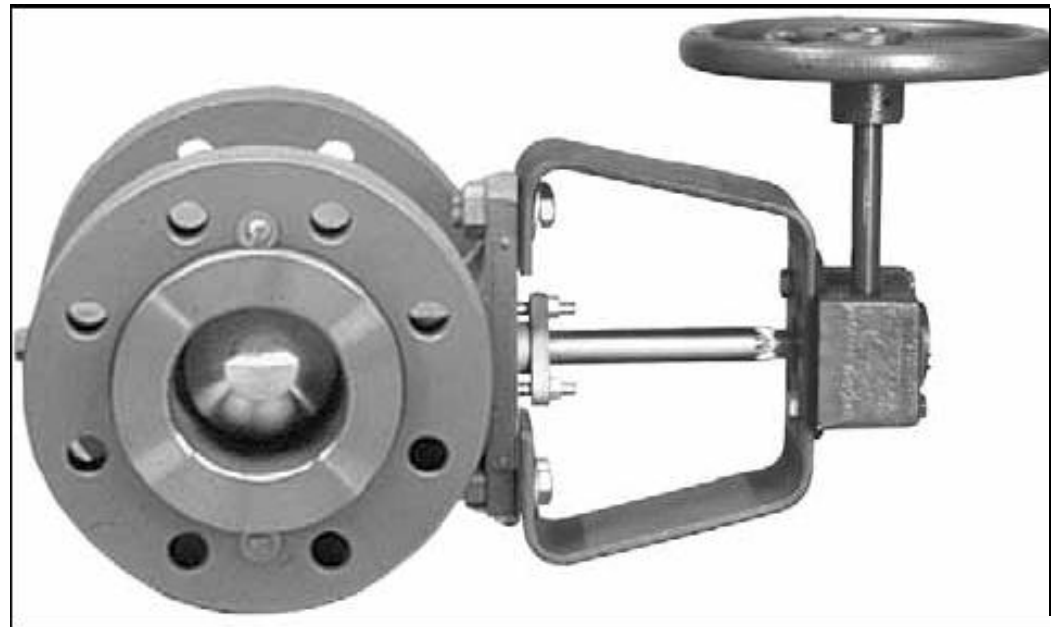


Manual Actuators :

- Useful where automatic control is not required.
- For manual control of the process during maintenance or shutdown of the automatic system.
- Much less expensive than automatic actuators.
- Are available in various sizes for both globe-style valves and rotary-shaft valves.



FOR SLIDING-STEM VALVES

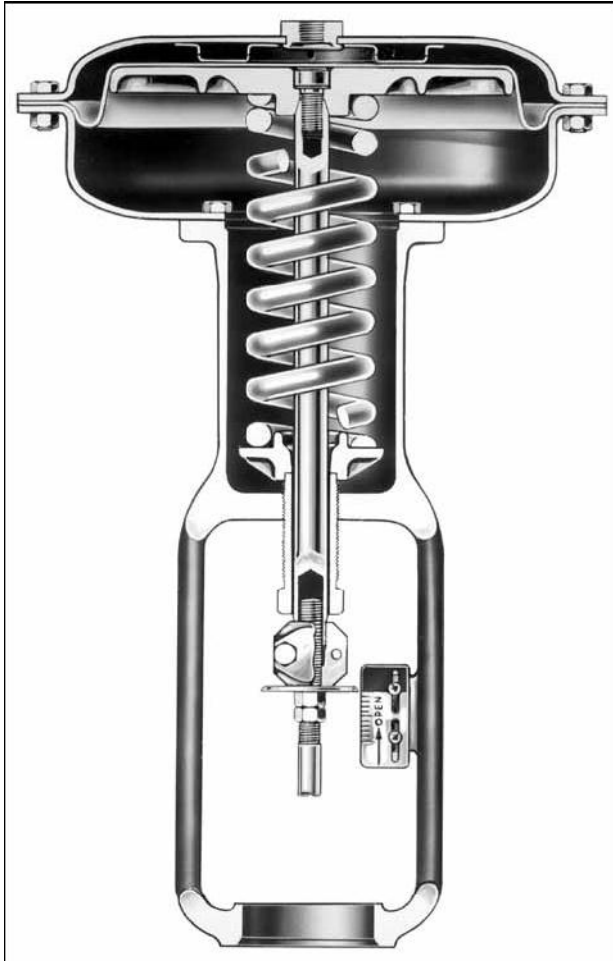


FOR ROTARY-SHAFT VALVES

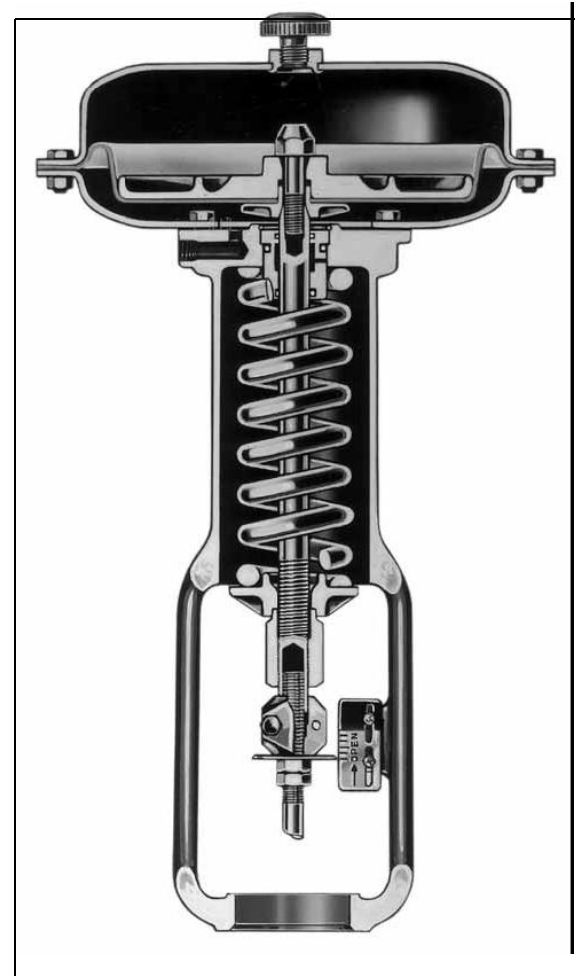
Diaphragm Actuators :

- Uses input signal from the I/P converter , Positioner or other source like Manual Loader.
- Advantages :
 - Dependable
 - Simple
 - Economical
- Types :
 - Direct Acting
 - Reverse Acting

Diaphragm Actuators :



DIRECT-ACTING



REVERSE-ACTING

Electro-Hydraulic Actuators :



Disadvantages :

- More complex.
- More expensive than pneumatic Actuators.

Offers **Advantages** where :

- No air supply source is available.
- Low ambient temperature could freeze the condensed water in pneumatic supply.
- Large stem forces are needed.

Piston Actuators :

- Uses high pressure plant air up to 150 psig.
- Provides fast stroking speeds.
- Types :
 - single acting
 - Double acting

Single acting Piston Actuators :

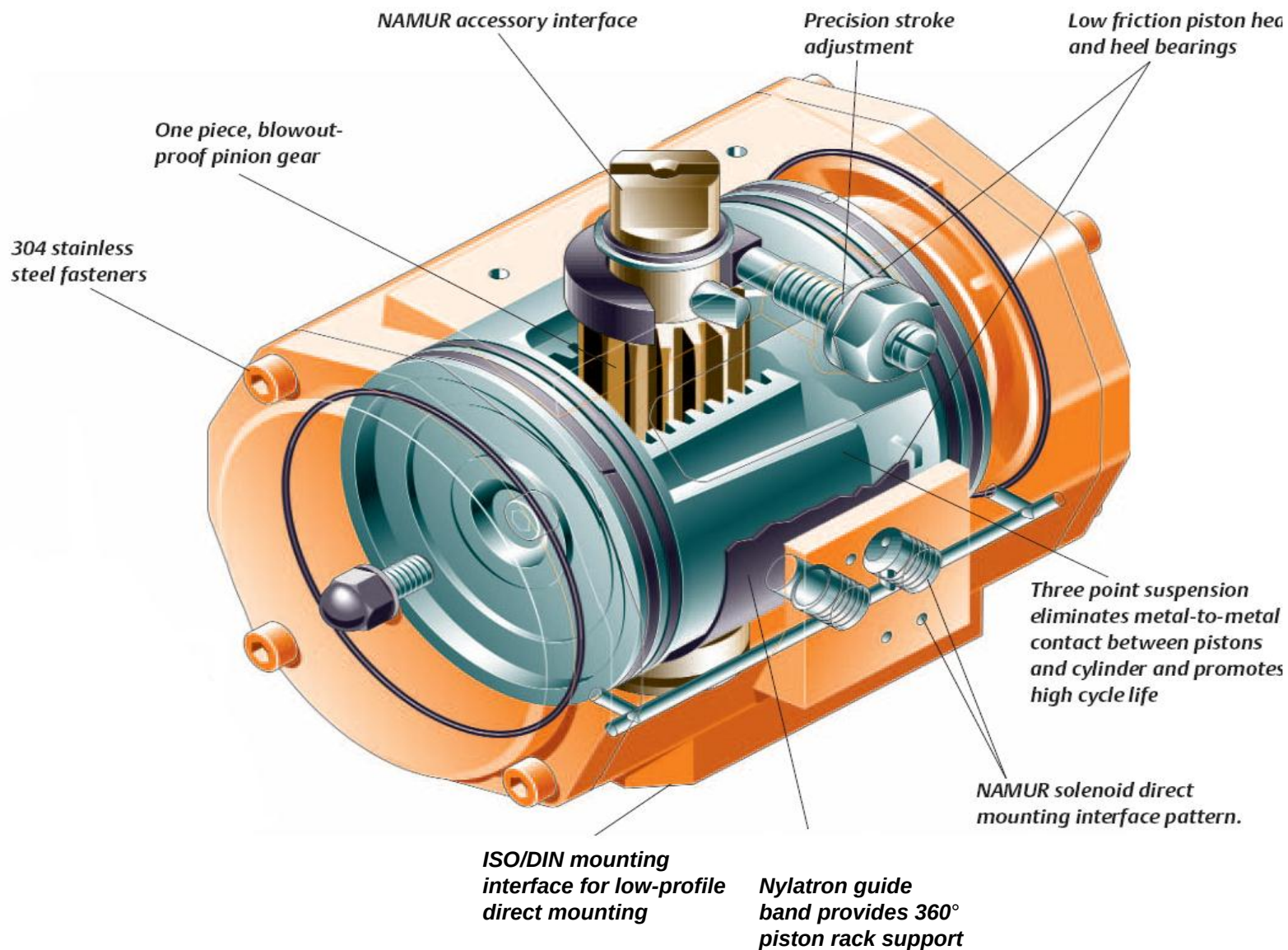
- Can produce work in only one direction.
- Uses Built-in spring.
- Limitation :
 - Stroke length is limited.
- Applications :
 - Fail open or fail closed operation.

Double Acting Piston Actuators :

- No return spring.
- Able to work in both directions.
- Same two ports are used for supply and exhaust ports.
- Applications :
 - mostly used where max. force is required in both directions.

Control Valve with Double-Acting Piston actuator

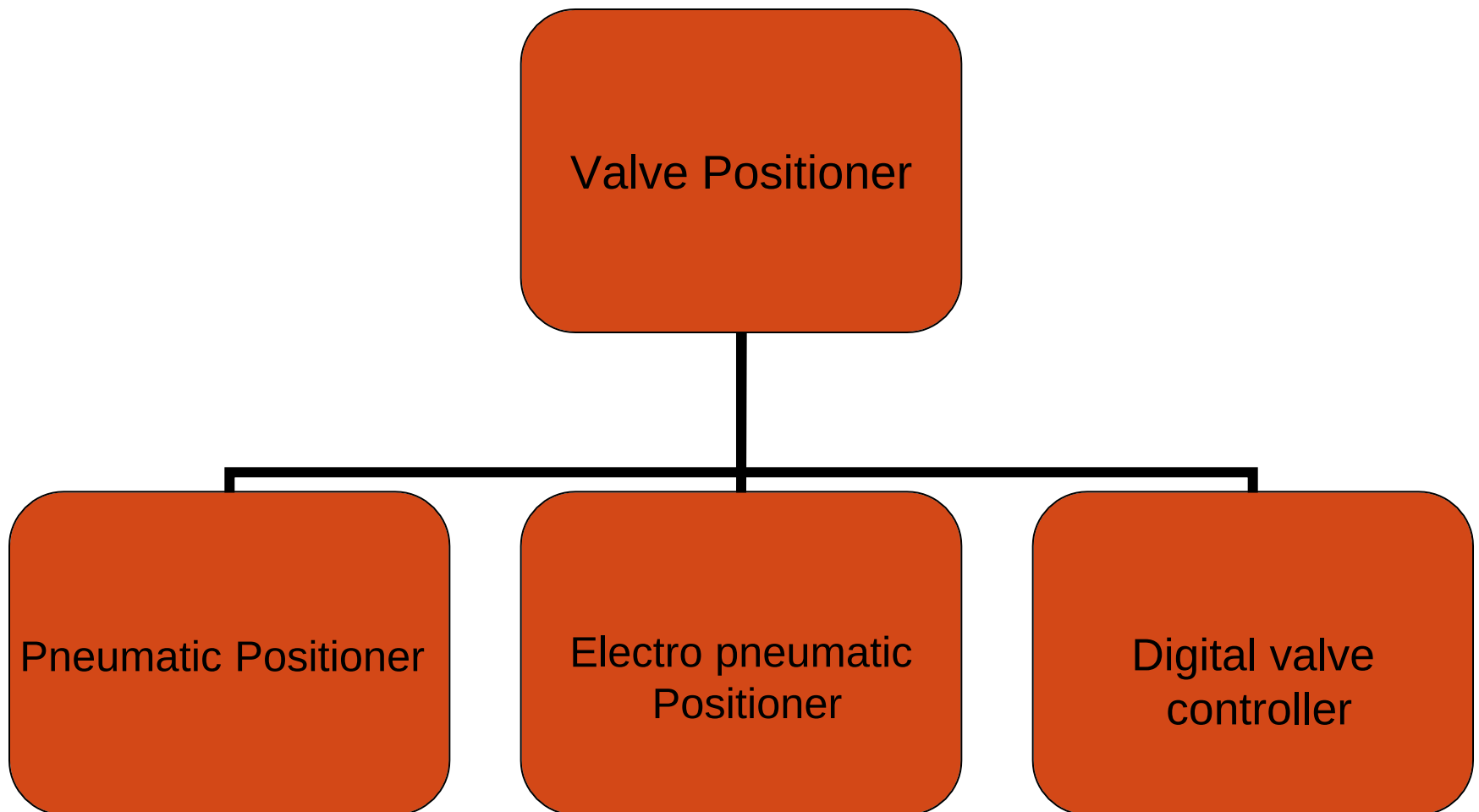




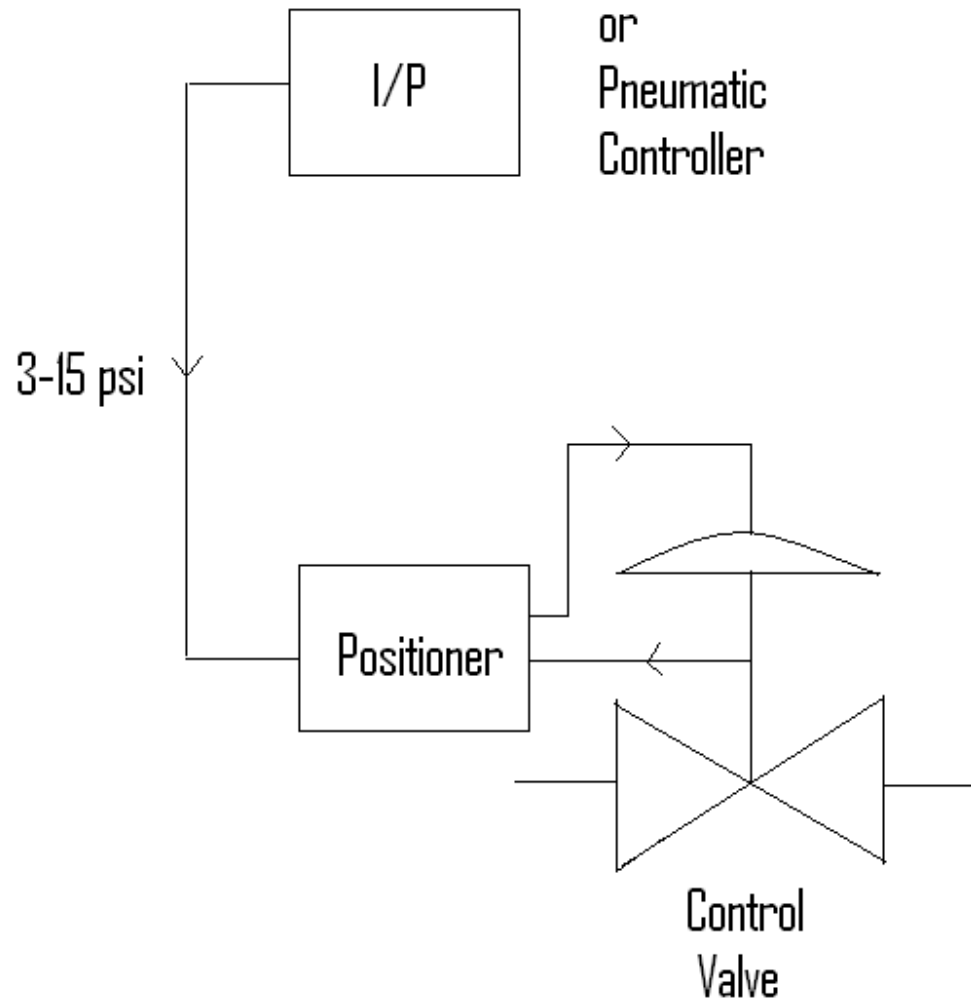
Double Acting Piston Actuator



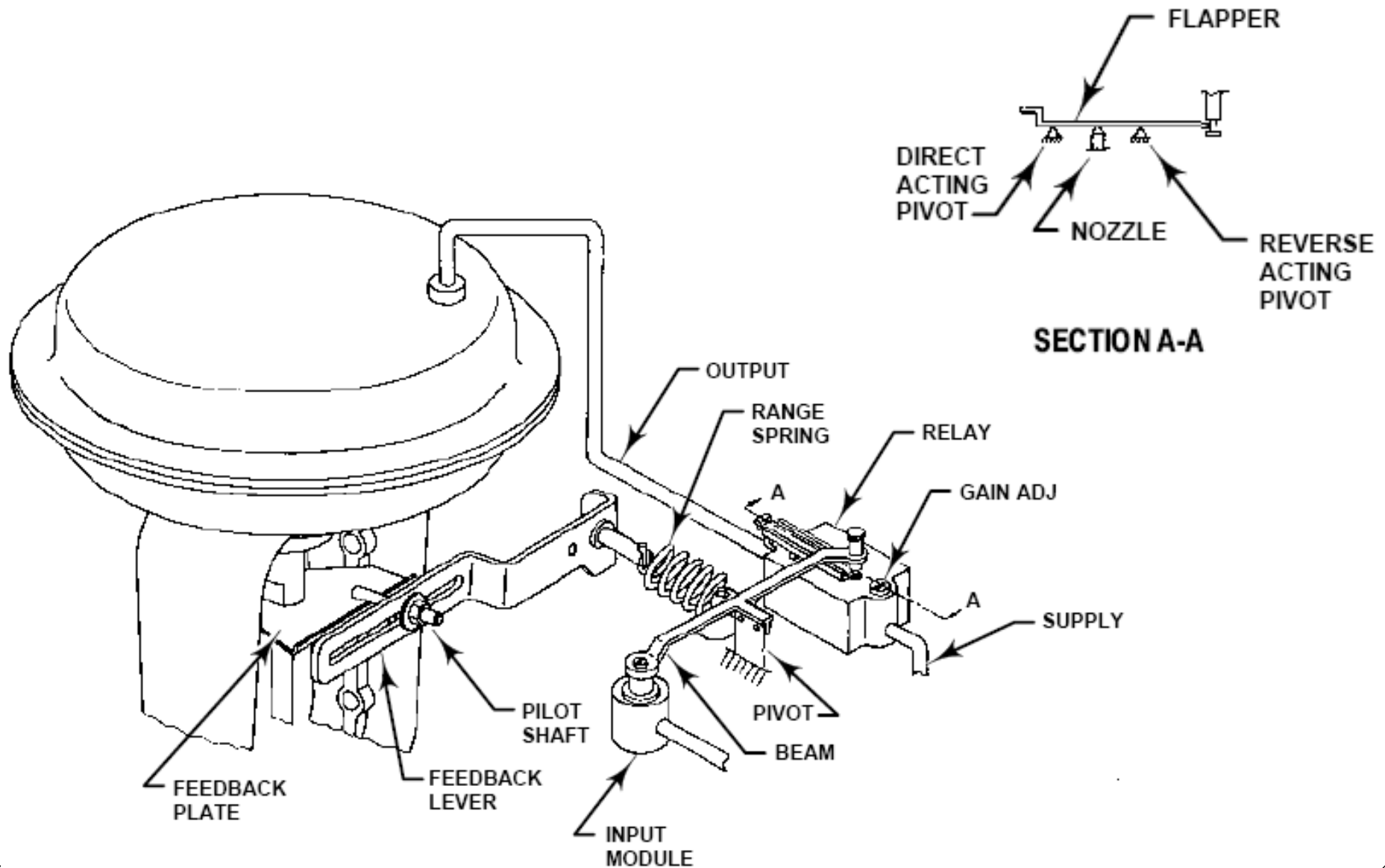
Valve Positioner



Pneumatic Positioners :



Operational schematic

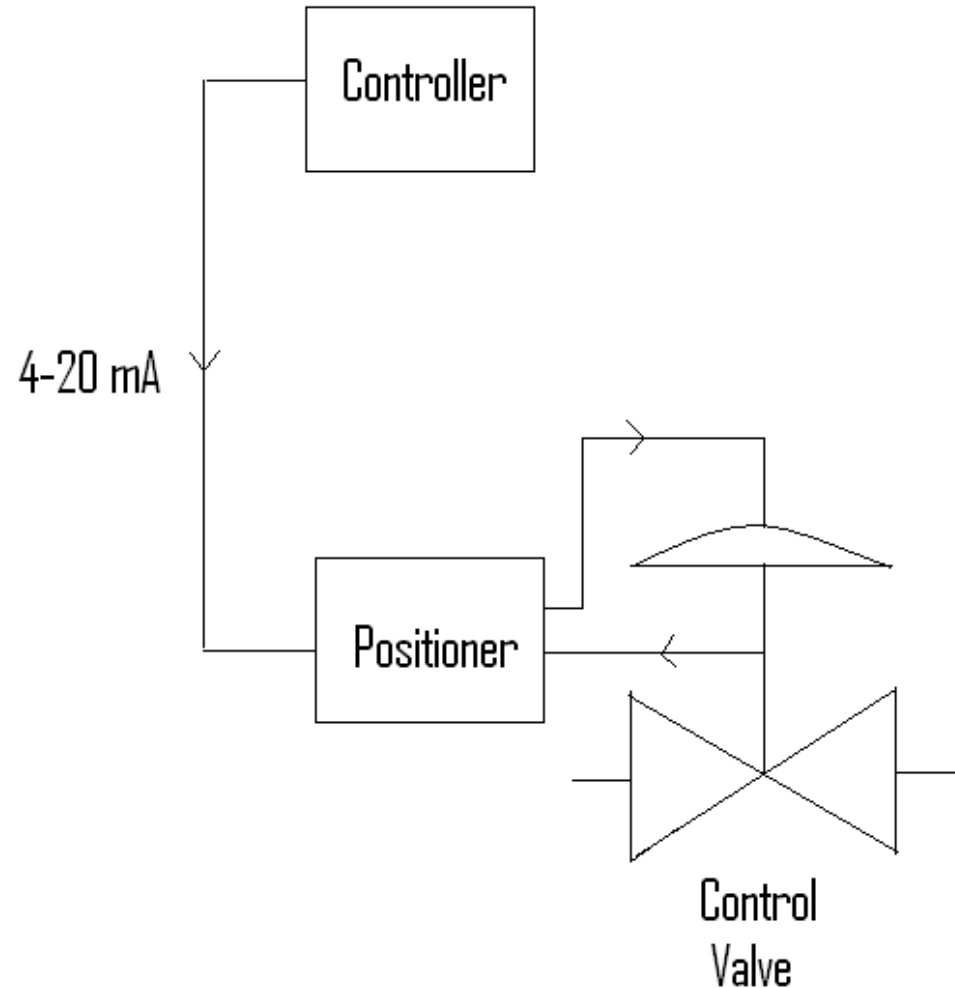


Pneumatic Positioner



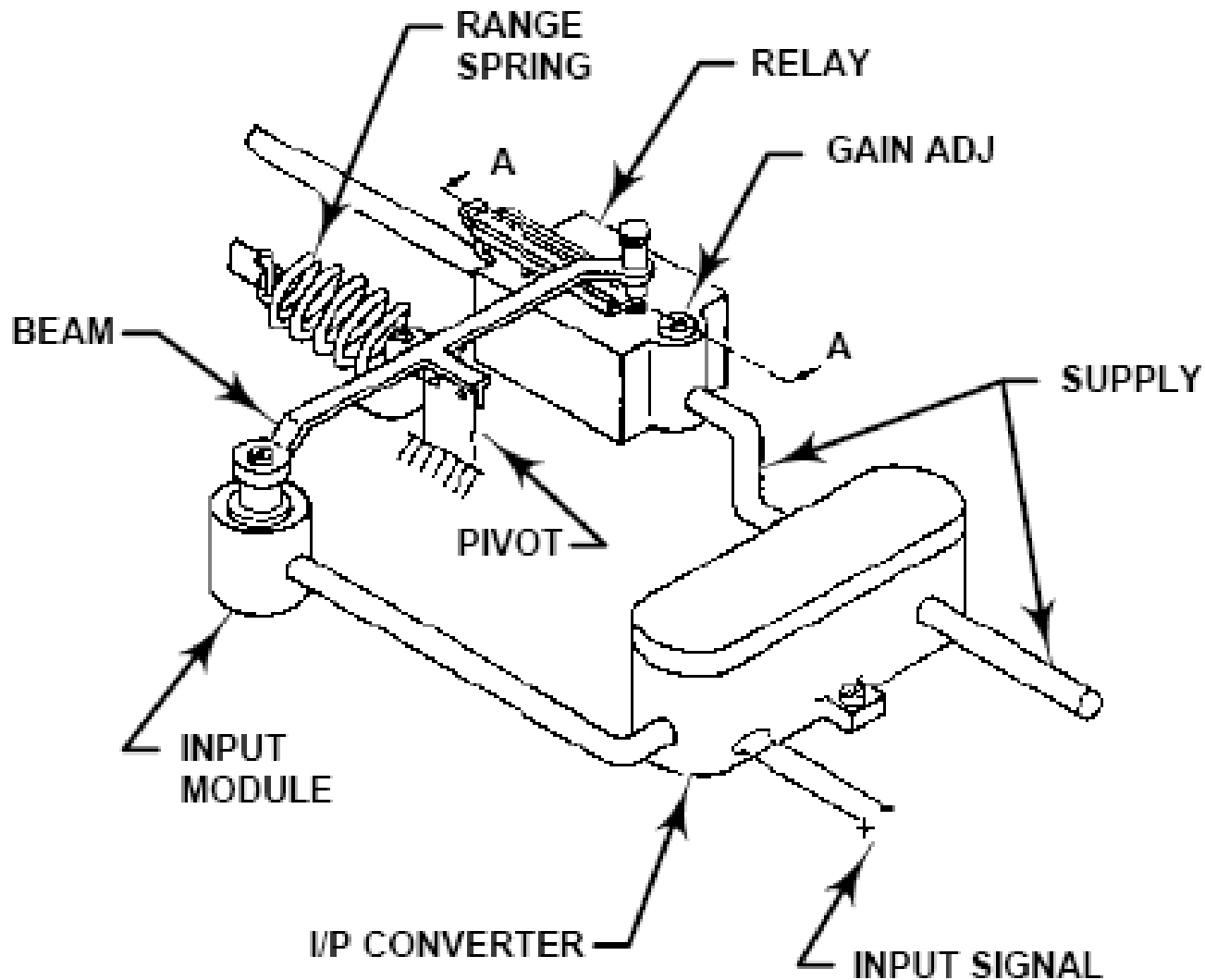
W7174 / IL

Electro pneumatic Positioner :

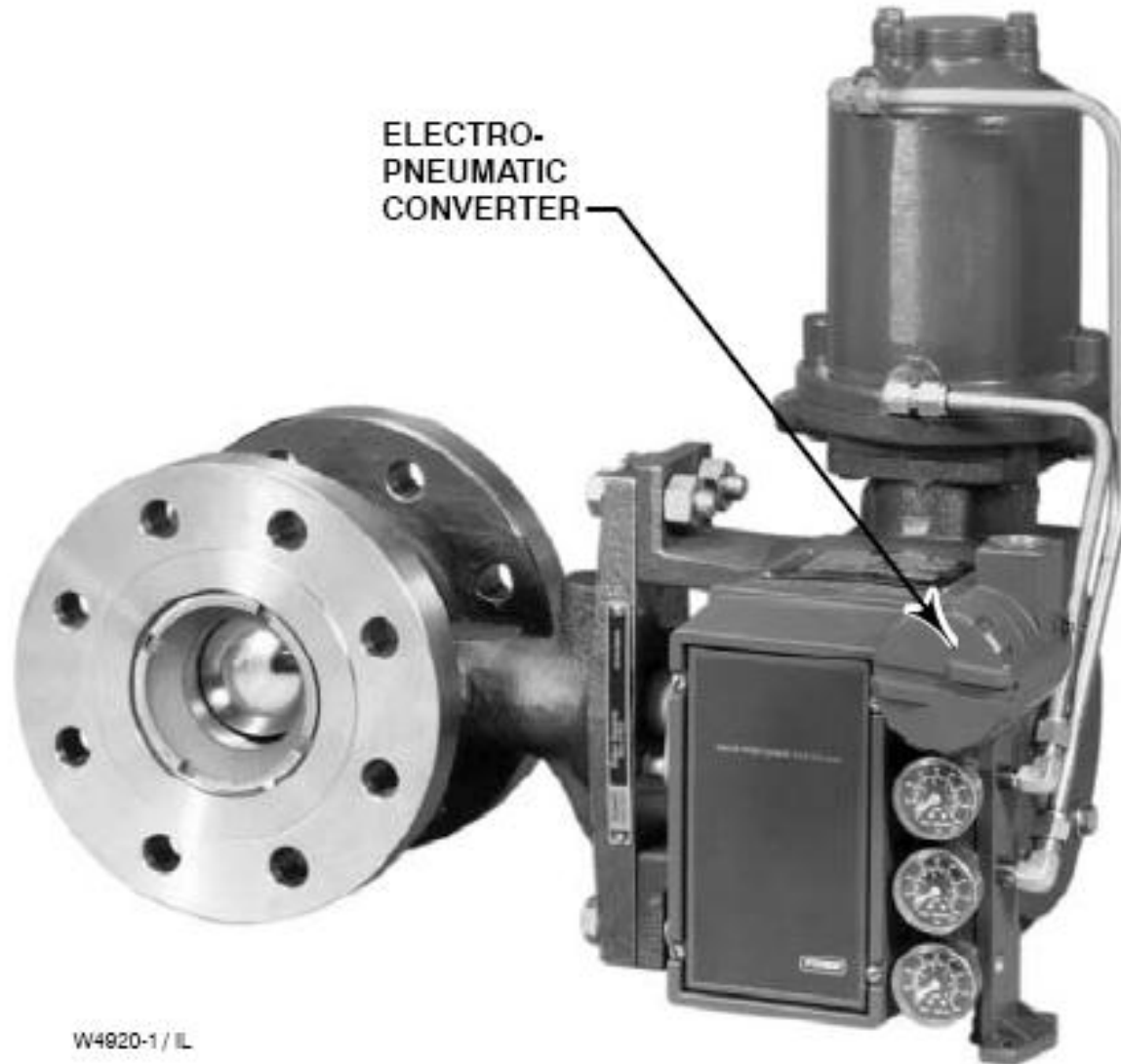


Electro pneumatic Positioner

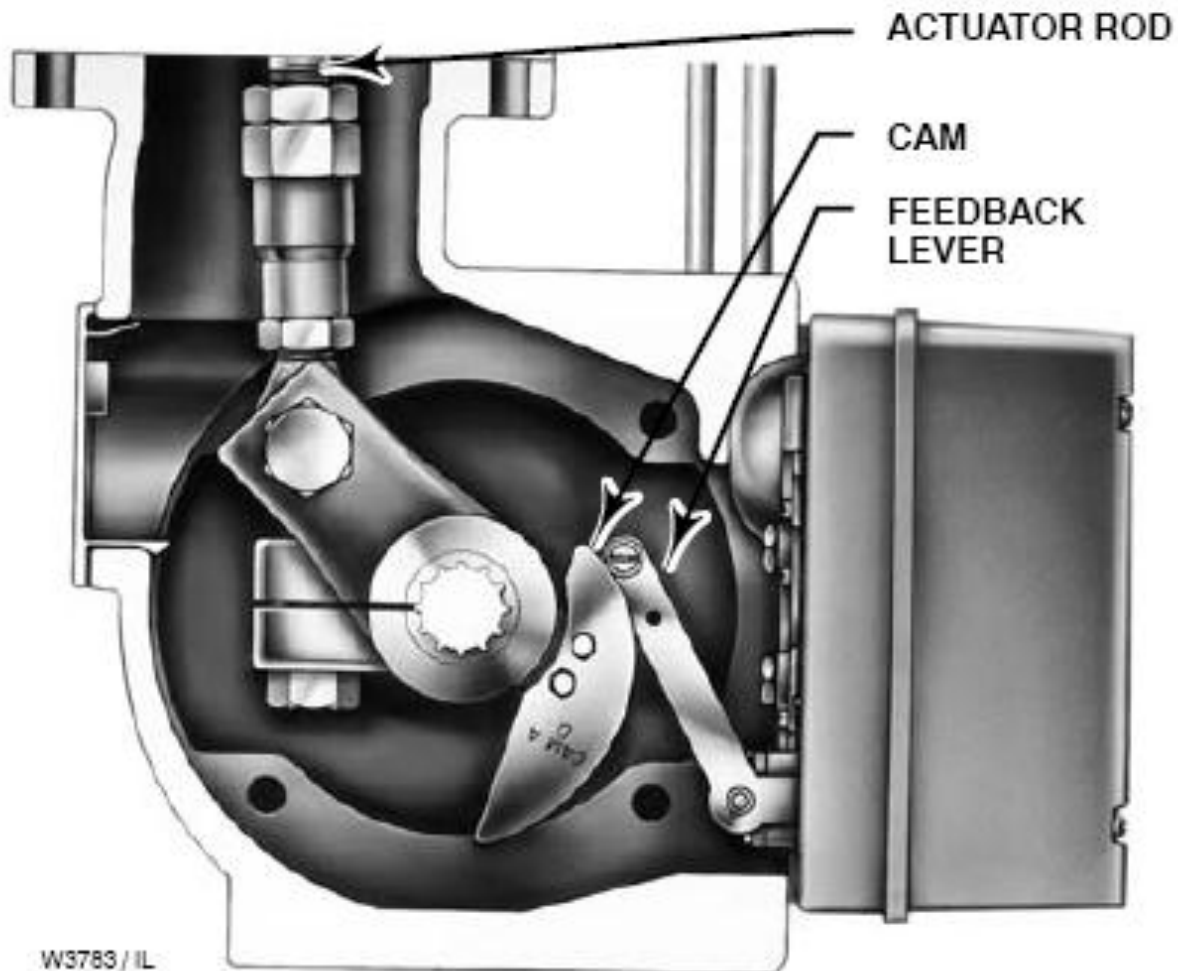
Operational schematic



Valve Positioner with Rotary Actuator

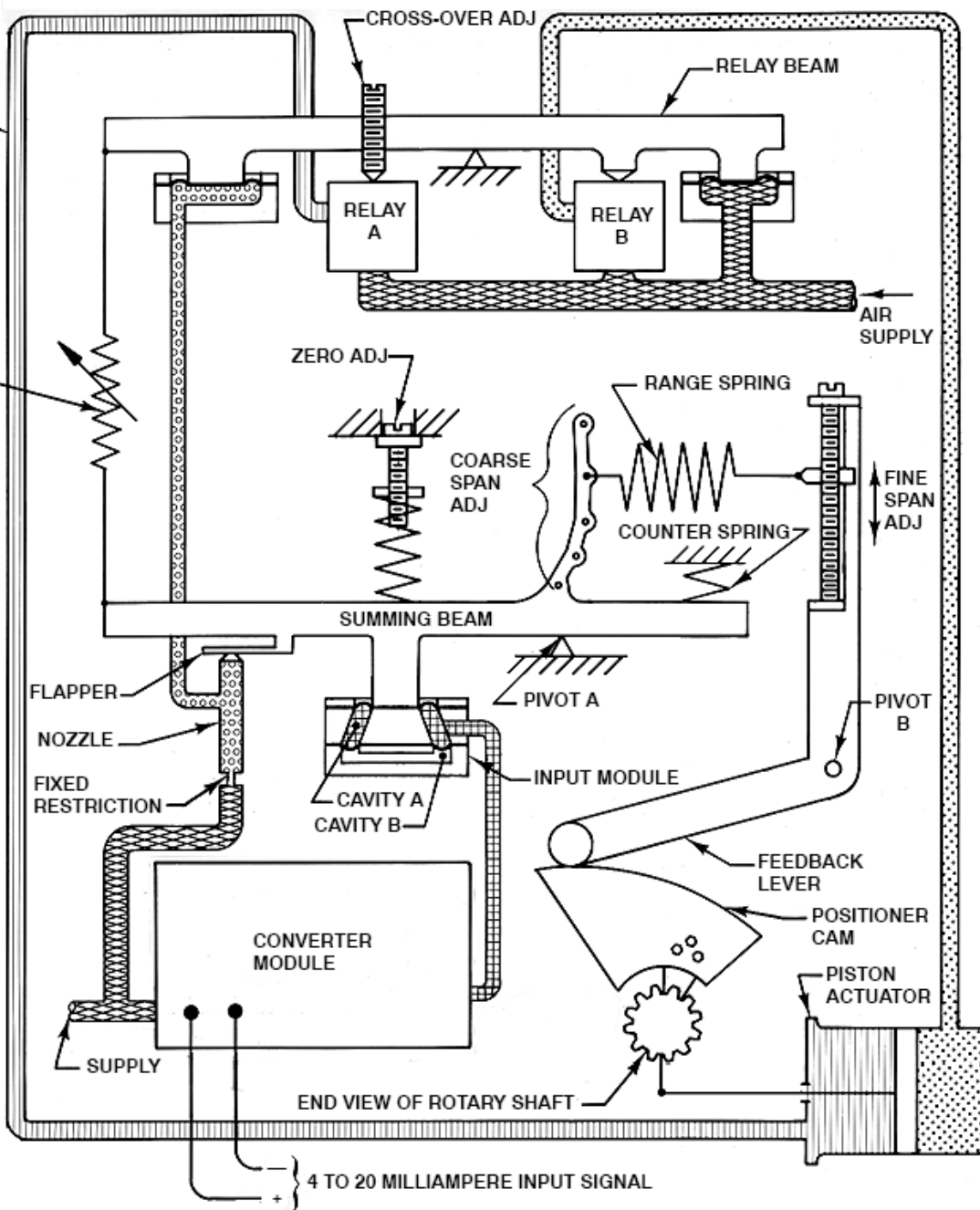


Positioner mounting



FOR TYPE 3620JP
POSITIONER ONLY

MINOR LOOP
GAIN ADJ

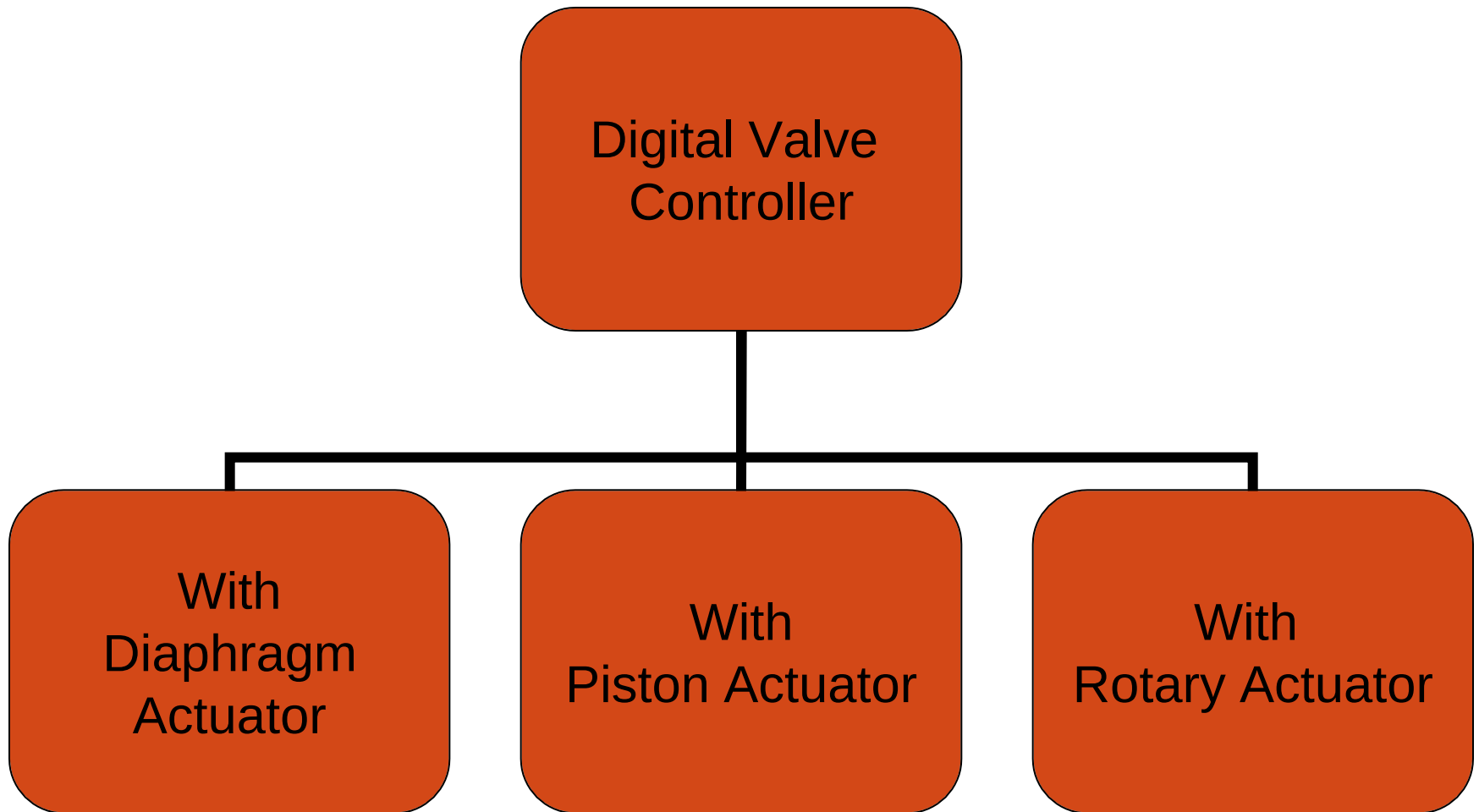


4 TO 20 MILLIAMPERE INPUT SIGNAL

Digital Valve controllers :

- Communicating (HART, Field-Bus) , Microprocessor based current-to-pneumatic instruments.
- Features :
 - easy access to information which is critical to process operation.
 - avoids high cost of running separate power and signal wiring.

Digital Valve controller





Digital valve controller mounted
on Diaphragm Actuator

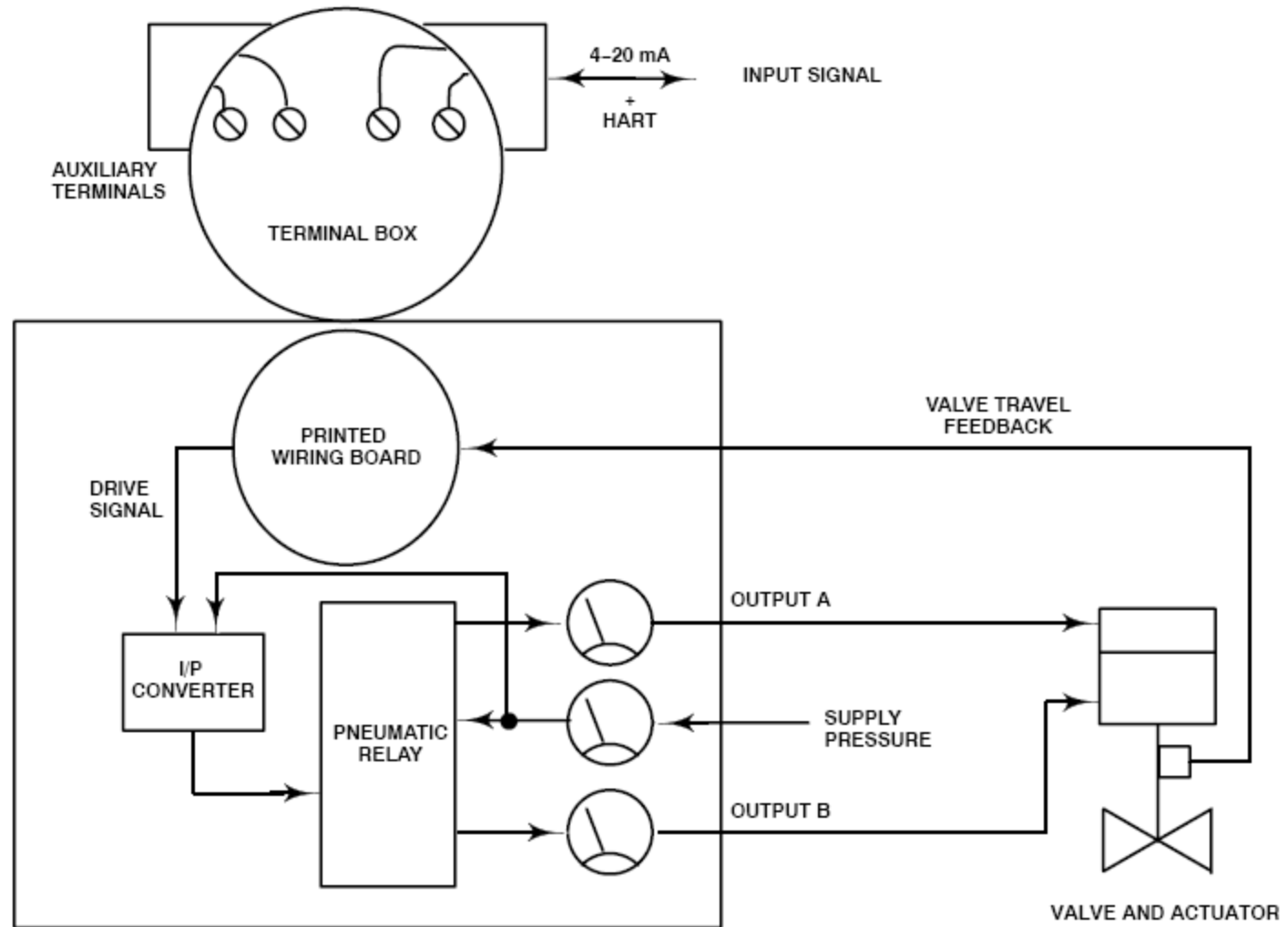


Digital valve controller mounted
on Piston Actuator

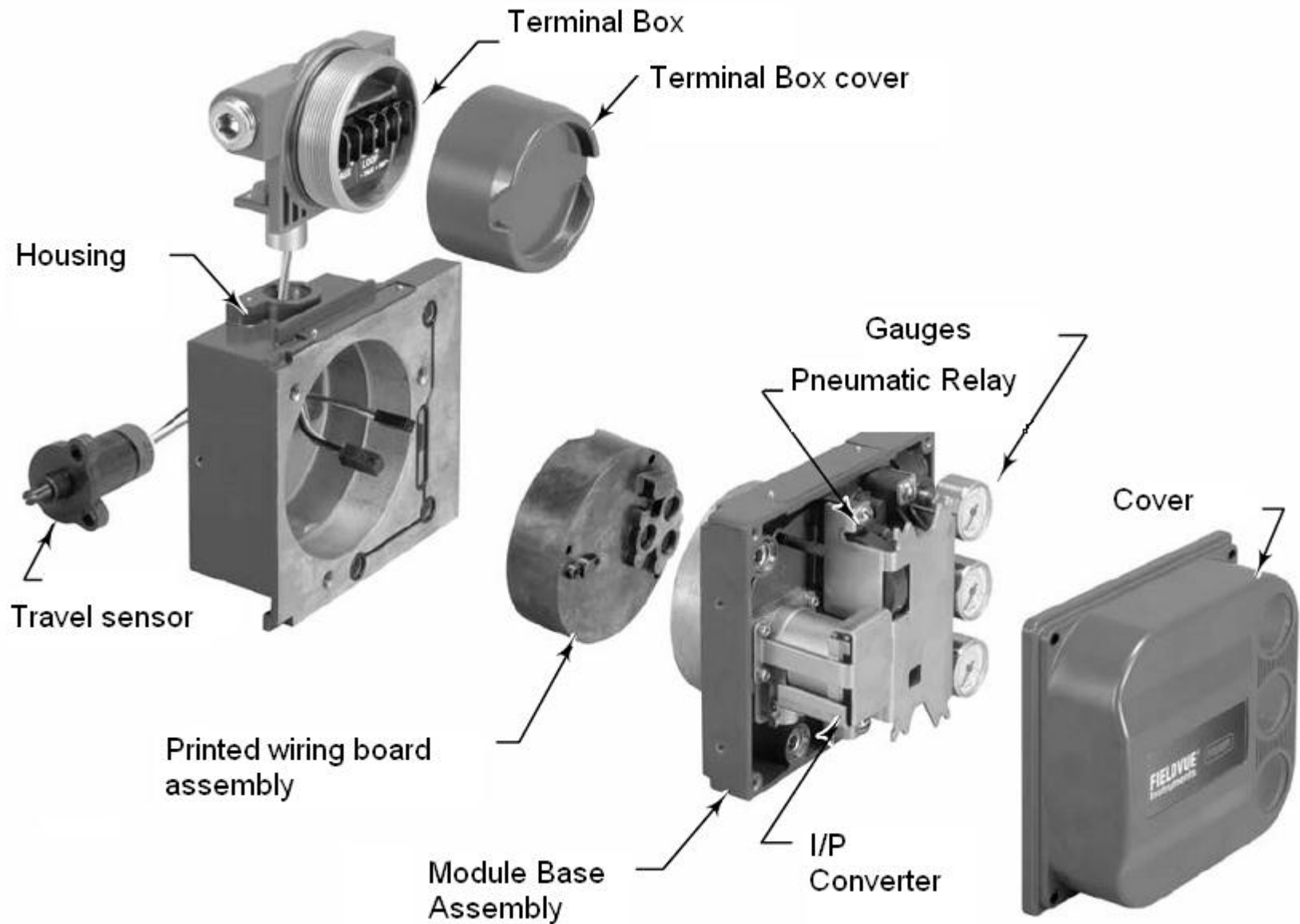


Digital valve controller with Rotary Actuator

Block Diagram



Principle Of Operation :



Electronic Position Transmitter



Limit Switches

- 1) Potential Free Contact Type
- 2) Proximity Type

1) Potential Free Contact Type :



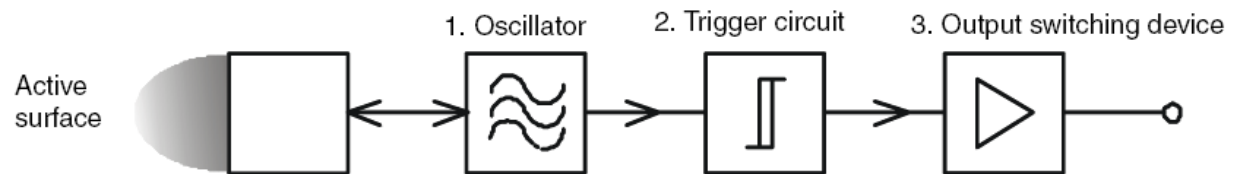
Micro Switch :



2) Proximity switches :

- Inductive proximity switches for metal object
- capacitive proximity switch for plastic or paper or a liquid (oil or water), granulate or powder.

Inductive proximity switches :



Working principle :

- Two oscillator coils are used to generate electromagnetic fields.
- Target cuts the field. Eddy currents are induced in the target.
- Power loss in resonant circuit.
- Oscillator amplitude consequently falls. Trigger circuit activates the output switching device once a certain amplitude is reached.

Types of Design :



Rectangular proximity switches



Surface switches (FP)



Slot type inductive proximity switches



Screw mounted proximity switches



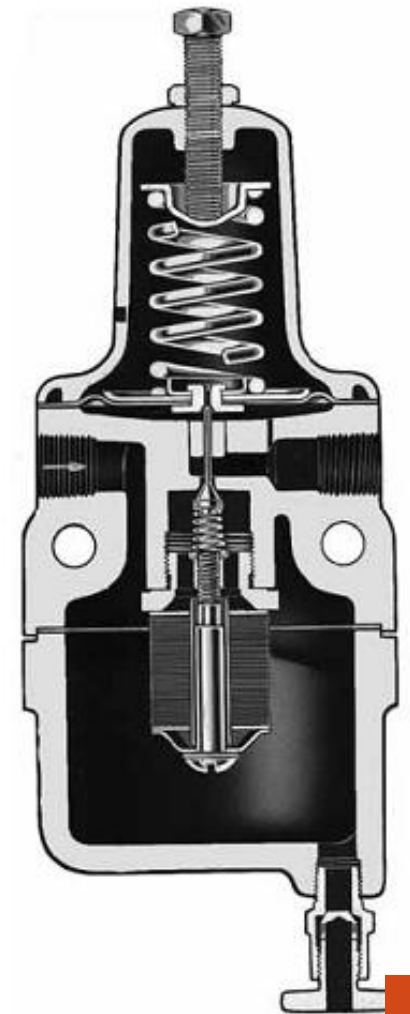
Ring type inductive proximity switches



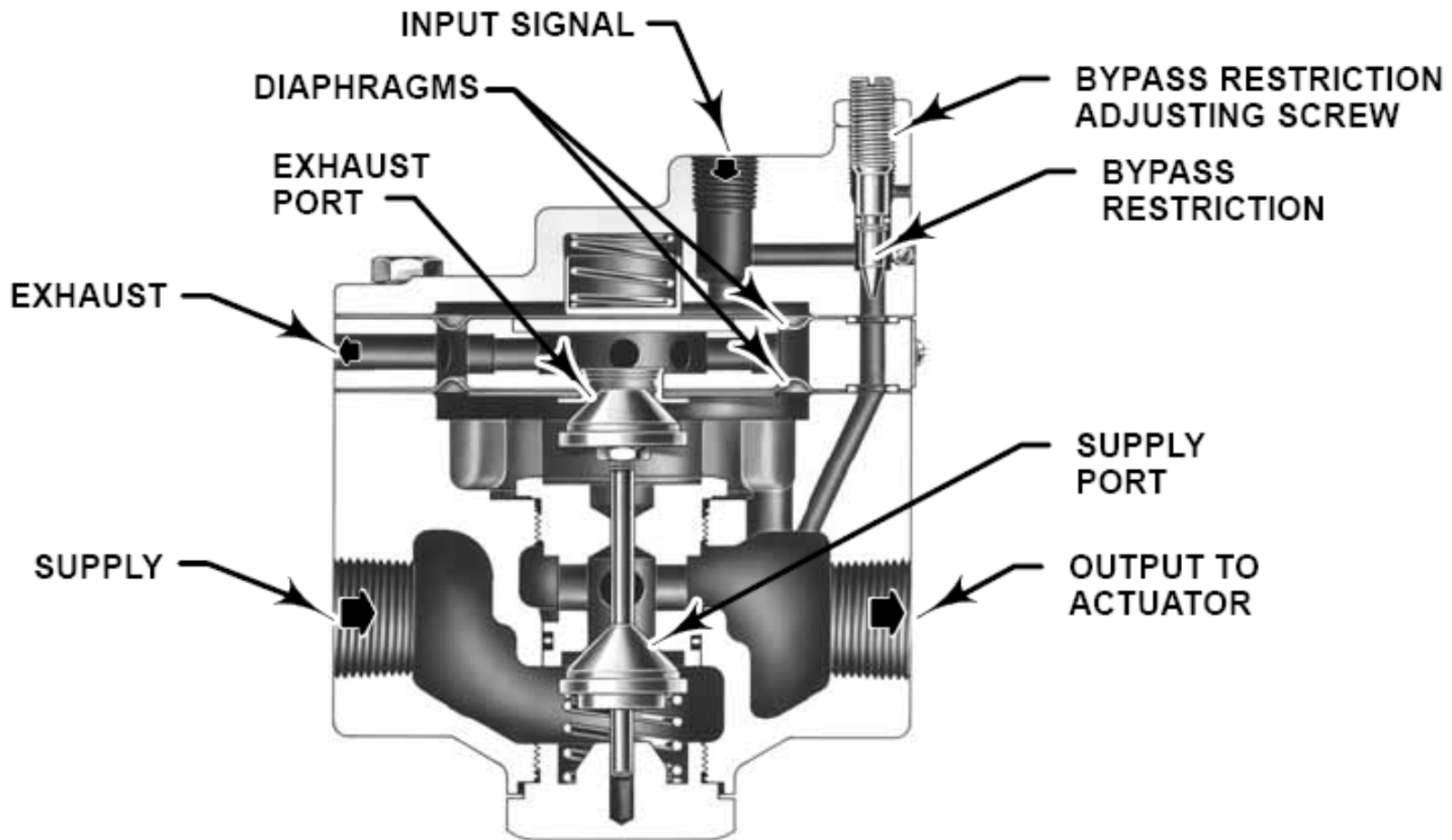
Cylindrical proximity switches



Air Filter Regulator



Volume Booster



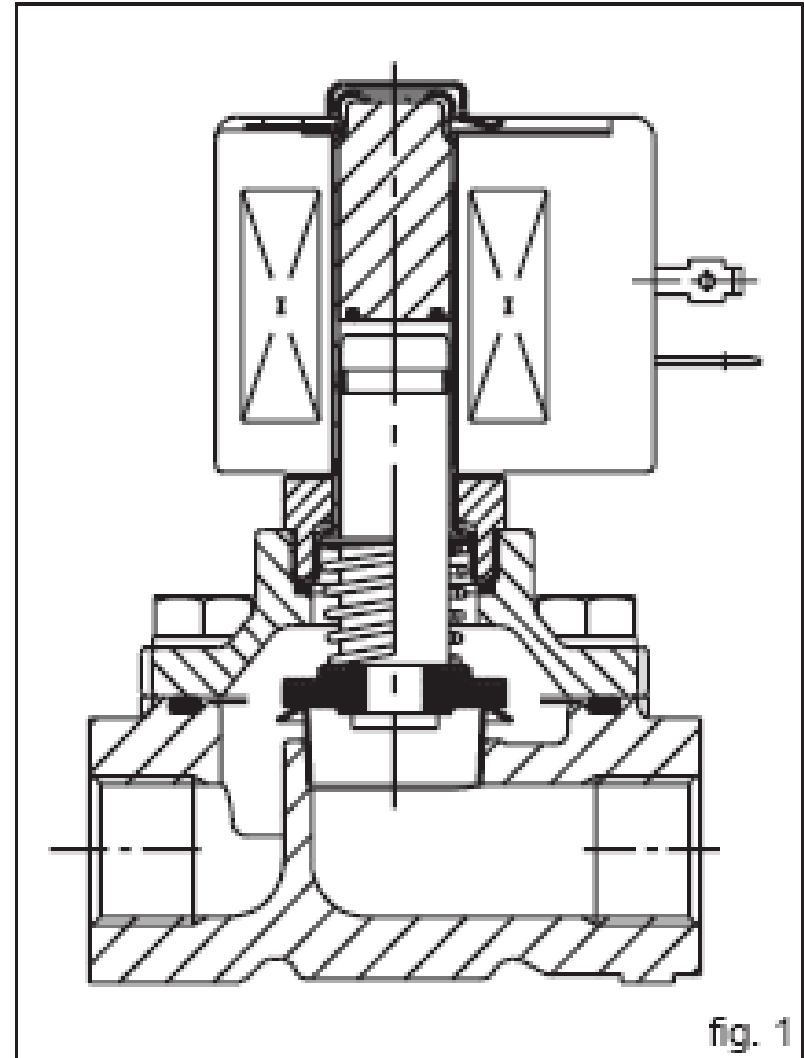
Solenoid Valves

PRINCIPLE OF OPERATION :

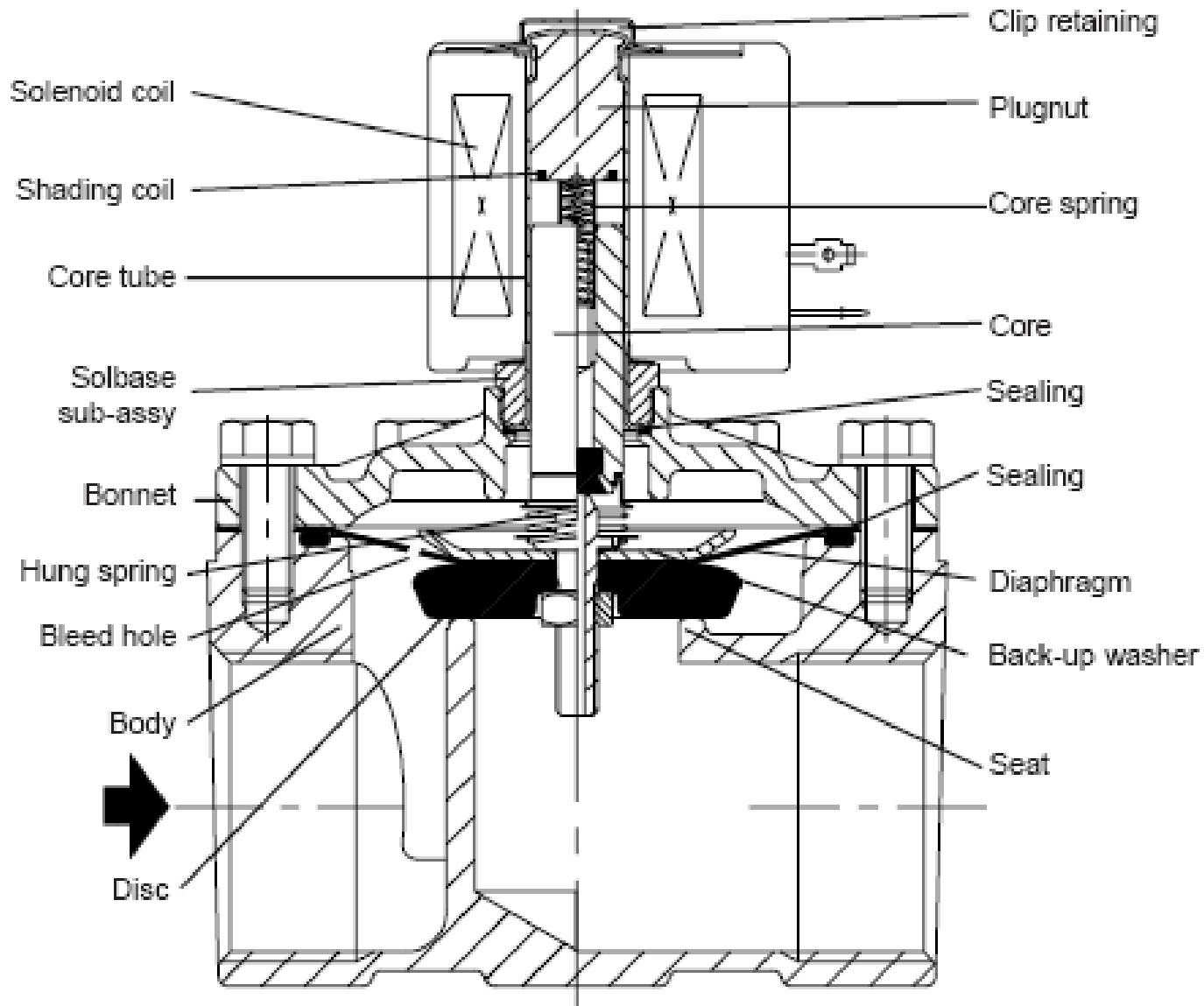
- A solenoid valve is a combination of two basic functional units:
 1. Solenoid (electro-magnet) with its core (plunger).
 2. A valve containing an orifice in which a disc or plug is positioned to stop or allow flow.
- The valve is opened or closed by movement of the magnetic core which is drawn into a solenoid when the coil is energized.

Direct operated valve :

- In a direct operated valve the solenoid core is mechanically connected to the valve disc and directly opens / closes the orifice, dependent upon energisation or de-energisation of the solenoid.



Pilot Operated Valve :



Types Of Valves :

1) 2/2 (2-Way Valves)

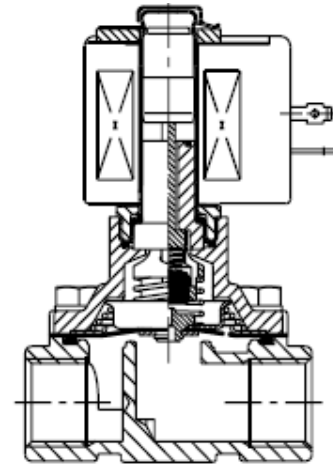
- It has one inlet and one outlet pipe connection.

-Normally Closed Construction

Valve is closed when de-energized and open when energized.

-Normally Open Construction

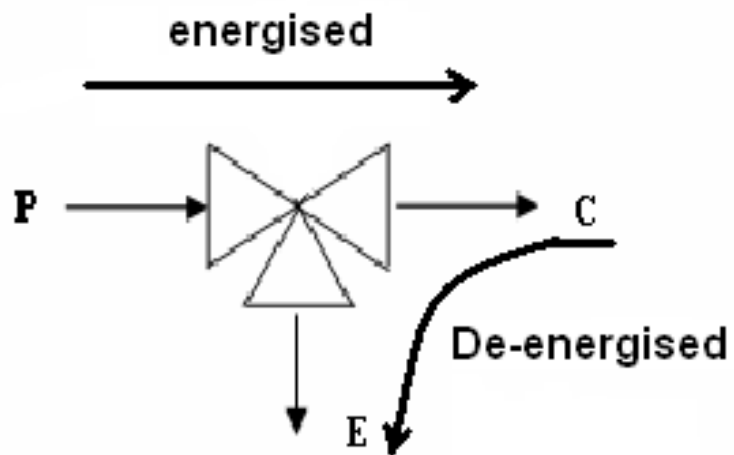
Valve is closed when energized and open when de-energized.



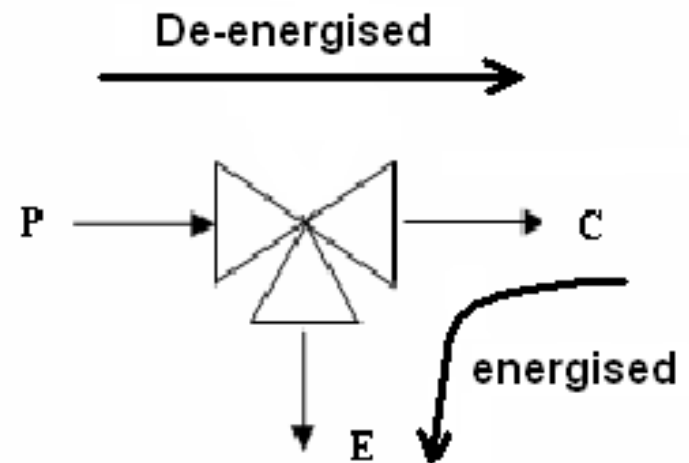
2) 3/2 (3-WayValves)

- Three pipe connections and two orifices Used to alternately apply pressure to and exhaust from diaphragm.
- **Normally closed Construction**
- **Normally Open Construction**





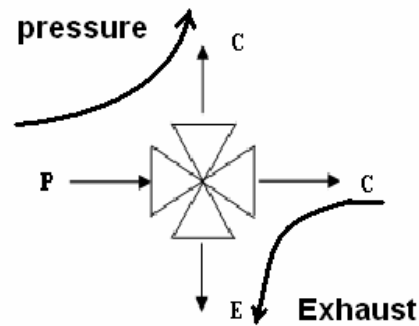
Normally closed



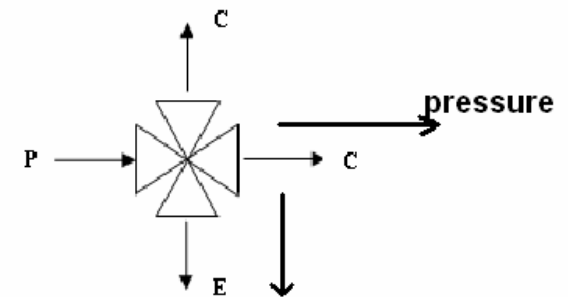
Normally open

3) 4/2 and 5/2 (4-Way Valves)

- Four or five pipe connections one pressure, two cylinder and one or two exhausts.



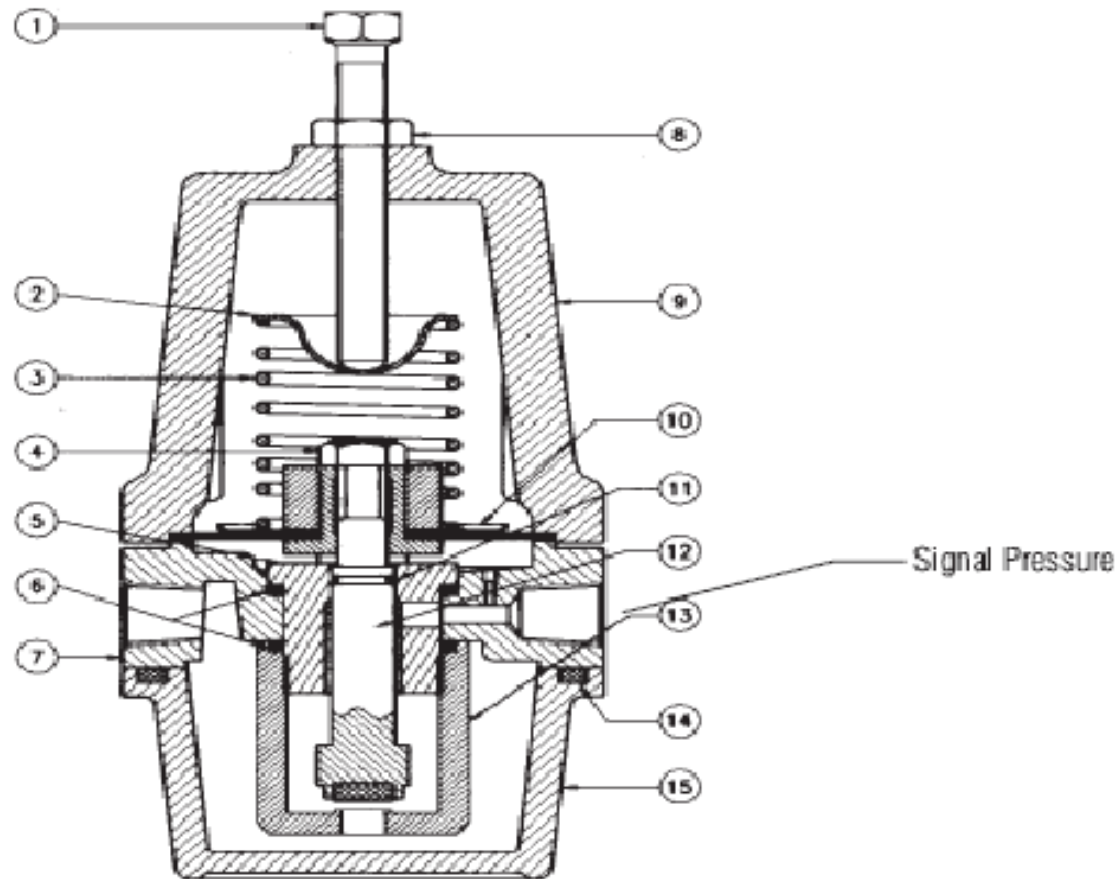
Energised



De-energised



AIR LOCK RELAY

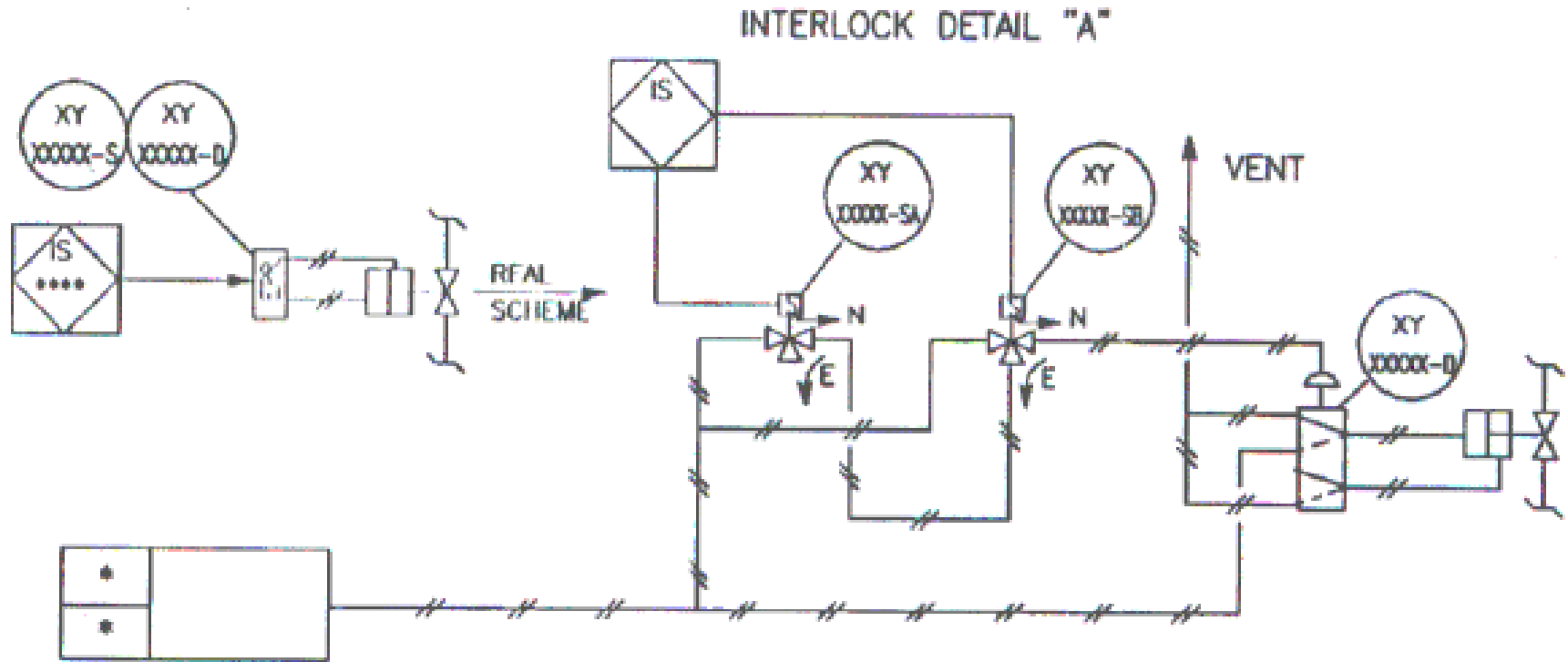


Model - MIL 776 Air Lock Relay



Pneumatic Hookup Acting Piston Actuator

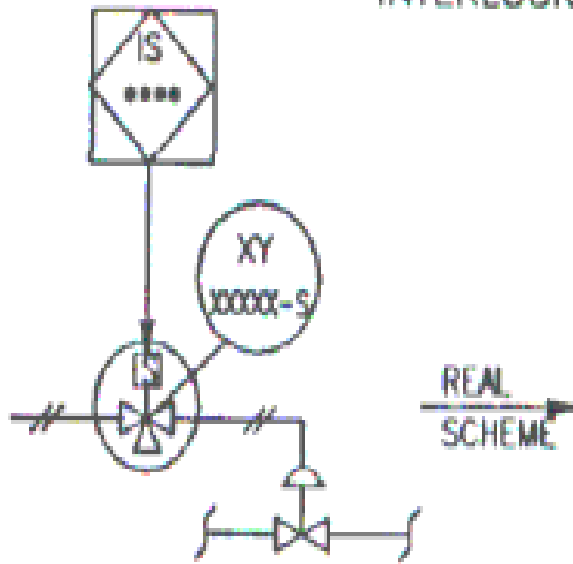
Double



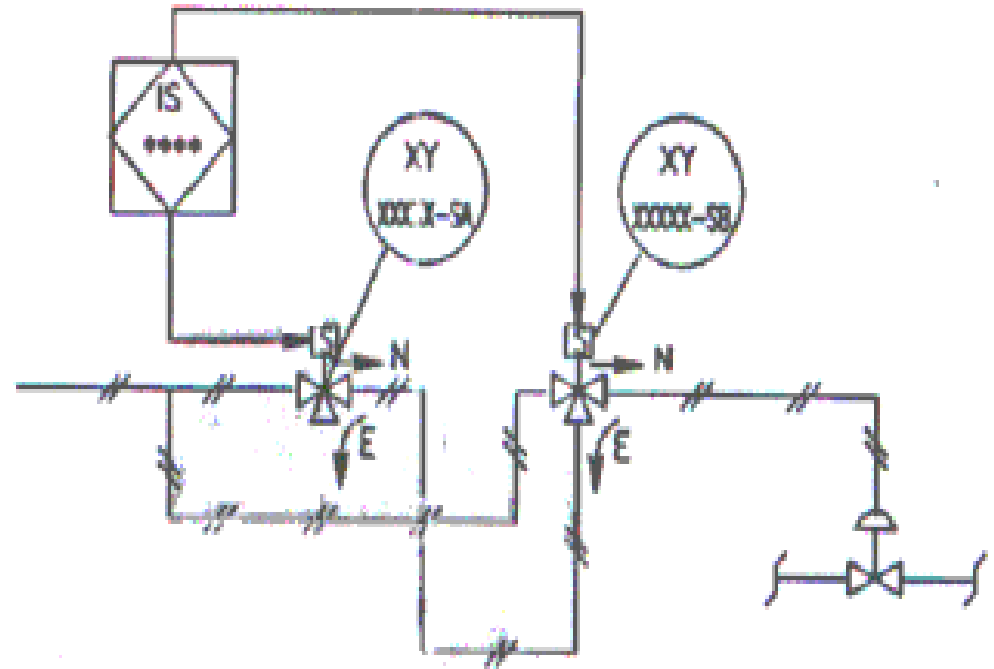
Pneumatic Hookup

Redundant Solenoid Valves

INTERLOCK DETAIL "B"



REAL
SCHEME



Thank You