

10. Control valve accessories

10.1 General

The following chapter deals with the most important accessories of pneumatic actuators designated in general usage as auxiliary devices, although this definition inadequately describes the importance of these devices. It is nevertheless the “accessory” which often enables the success of certain applications and is vital for the action and performance of a final control element.

Positioners, converters, limit switches, position transmitters, solenoid valves and lock-up valves are transfer elements designed to adapt pneumatic control valves to the requirements of industrial plants.

Supply pressure regulators and air reducing stations are used to supply the pneumatic instruments with compressed air.

10.2 Positioners

Positioners ensure a predetermined assignment between the valve position (controlled variable x) and control signal (reference variable w).

They compare the control signal issued by pneumatic or electric automation equipment (controller, control station, process control system) to the travel or opening angle of the control valve and supply a corresponding output signal pressure (output variable y) (p_{st}).

Positioners are often used as servo-booster as they convert low-energy signals into strong proportional signal pressures up to the maximum supply pressure (6 bar/90 psi). They can be used in standard and split-range operation.

Smart positioners are important components in integrating field units into distributed control systems.

Depending on the input signal, a distinction is made between pneumatic (p/p) and electropneumatic (i/p) positioners.

Pneumatic positioners accept an input signal of 0.2 to 1 bar (3 to 15 psi) and issue an output signal pressure (p_{st}) of maximum 6 bar (90 psi).

Electropneumatic (i/p) positioners use an analog direct current signal of 4(0) to 20 mA or 1 to 5 mA as the input variable and issue an output signal pressure (p_{st}) up to 6 bar (90 psi).

The positioners by the SAMSON GROUP can be integrated into different control systems using the manufacturer-independent FDT/DTM and EDD software tools.



Figure 10.2.-1: Type 3730-1
Electropneumatic Positioner, attachment to
NAMUR rib of Type 3271 Actuator

They exchange data using the HART®, FOUNDATION™ fieldbus or PROFIBUS protocols. Their comprehensive software features allow for predictive maintenance and quick detection of faults.



The Type 3730-3 Positioner additionally uses HART® communication between field devices and the process control system.

The Type 3730-4 and Type 3731-4 Positioners with PROFIBUS communication and Type 3730-5 and Type 3731-5 Positioners with FOUNDATION™ fieldbus communication are used to integrate final control elements into fieldbus systems.

Electropneumatic (i/p) converters convert a DC input signal (control signal) directly into a pneumatic control signal (output signal pressure p_{st}).

Limit switches consist of two inductive, electric or pneumatic contacts. They issue a signal whenever an adjusted limit is exceeded or not reached.

Analog position transmitters assign a continuous 4 to 20 mA output signal to the valve travel. They signalize both end positions of the valve "Valve OPEN" and "Valve CLOSED" as well as intermediate valve positions.

Solenoid valves convert binary signals issued by electric control equipment into binary pneumatic control signals.

Lock-up valves shut off the signal pressure line of a pneumatic actuator upon failure of supply air or when the supply air falls below an adjusted value. As a result, the actuator is blocked. The control valve remains in its last position until the fault has been eliminated. The pneumatic remote adjuster is a precision regulator that can be adjusted precisely by hand.

Air reducing stations and supply pressure regulators are used to provide pneumatic measuring and control equipment with filtered supply air at a constant pressure.

1	Pneumatic controller	w	Reference variable
3	p/p positioner	x	Controlled variable
4	Continuous-action electric controller	y	Output variable
5	i/p converter		
6	i/p positioner		
7	Limit switch		
8	3/2-way solenoid valve		
9	Supply pressure regulator		
10	Air supply		

Figure 10.2.-2: Legend for Figure 10.2.-3

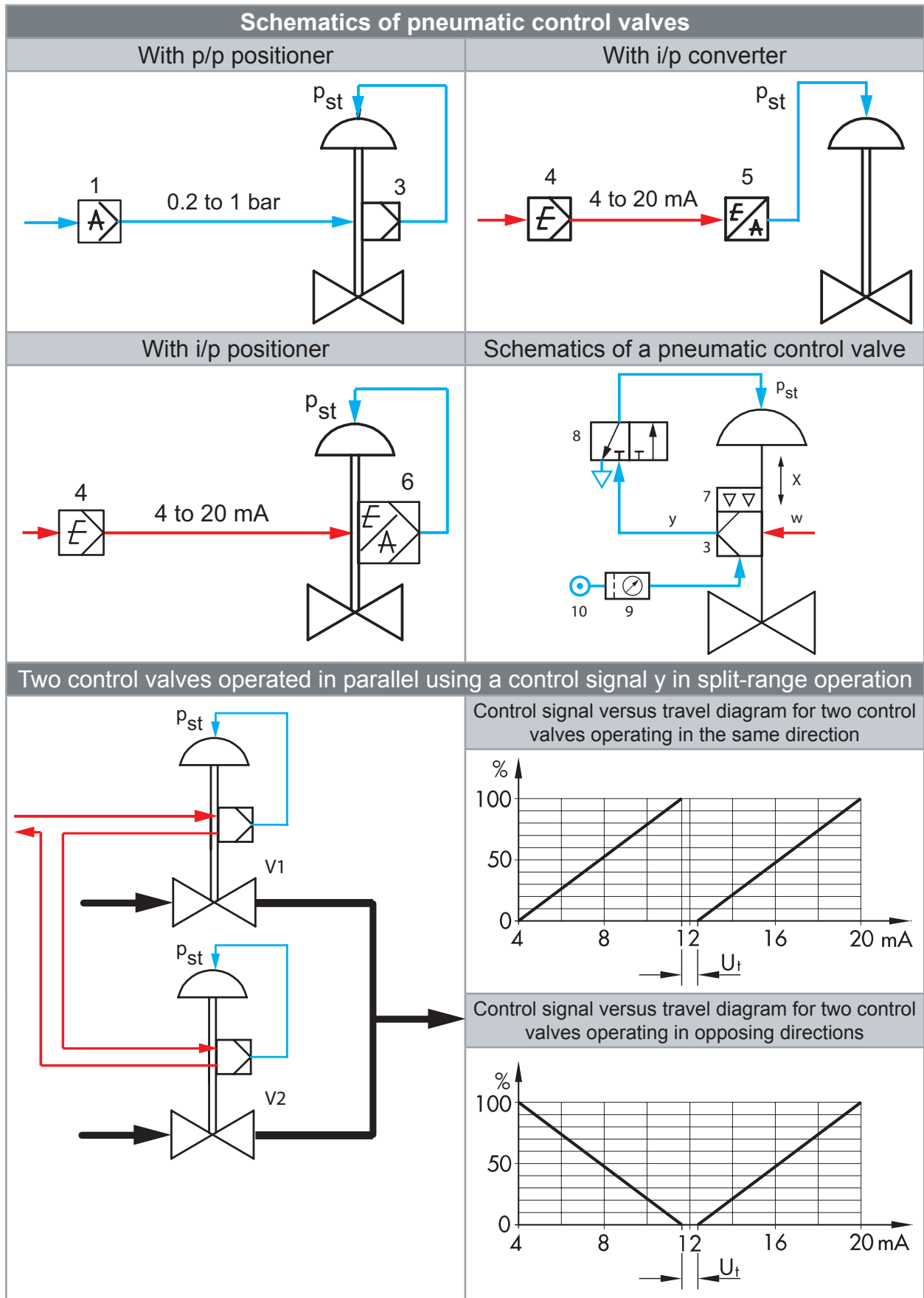


Figure 10.2.-3: Schematics of pneumatic control valves