

# Valve positioner

pneumatic and electropneumatic  
incl. position transmitter



Positioners improve the control accuracy of valves and butterfly valves considerably.

Friction in the stuffing box and fluid born fluctuations of the spindle cause deviations in the valve position. These are balanced out by the positioner.

The positioning speed is increased.

**There are four basic types of positioners available for the control of pneumatic actuators with analogous control signal:**

<b>Typ 824.P</b>	<b>pneumatic</b>
<b>Typ 824.E</b>	<b>electropneumatic</b>
<b>Typ 824.X</b>	<b>electropneum. EExi (intrinsically safe)</b>
<b>Typ 824.D</b>	<b>electropneum. EExd (pressure resistant)</b>

### ● Single- or double acting

For piston and diaphragm actuators. The control system piston-bushing makes both actions possible.

### ● Split range

Problem free split range operation is also possible with simple modification.

### ● High air capacity

The positioner furnishes 6 m<sup>3</sup>/h at 1.4 bar supply air pressure, therefore an additional amplifier is not required even with bigger actuators.

### ● Short response time

The low number of moving parts and the lightness of the I/P converter system result in fast reactions of the instrument output.

### ● Cam disc

Valve characteristics can be changed by three control curves; e.g. the non-linear characteristics of butterfly-, ball- and hose valves.

### ● Long life

The working parts have been proved to be reliable, even after a decade in the most difficult operating conditions.

### ● Vibration proof

Valves are constantly exposed to vibrations. ARCA positioners are robust and operate even under the most difficult conditions. The movable system of the I/P module owns a very low mass (100 mg). This makes the instrument, also without any damping, insensitive against shocks and vibrations. An external damping e. g. with oil is not necessary.

### ● Non-critical

The pneumatic instrument does not need any critical nozzle preamplification. Therefore unclean air does not affect the function.

The usual nozzles and restrictors are replaced with a well-proved control piston.

The electropneumatic instrument however requires clean instrument air.

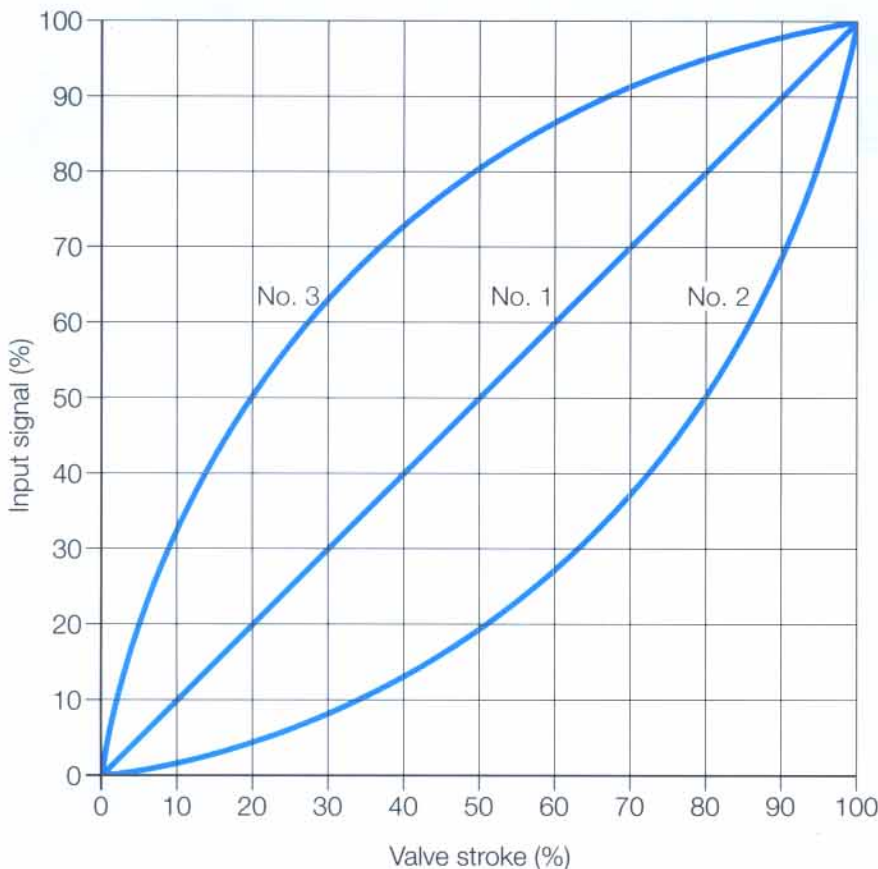
### ● Integrated mounting

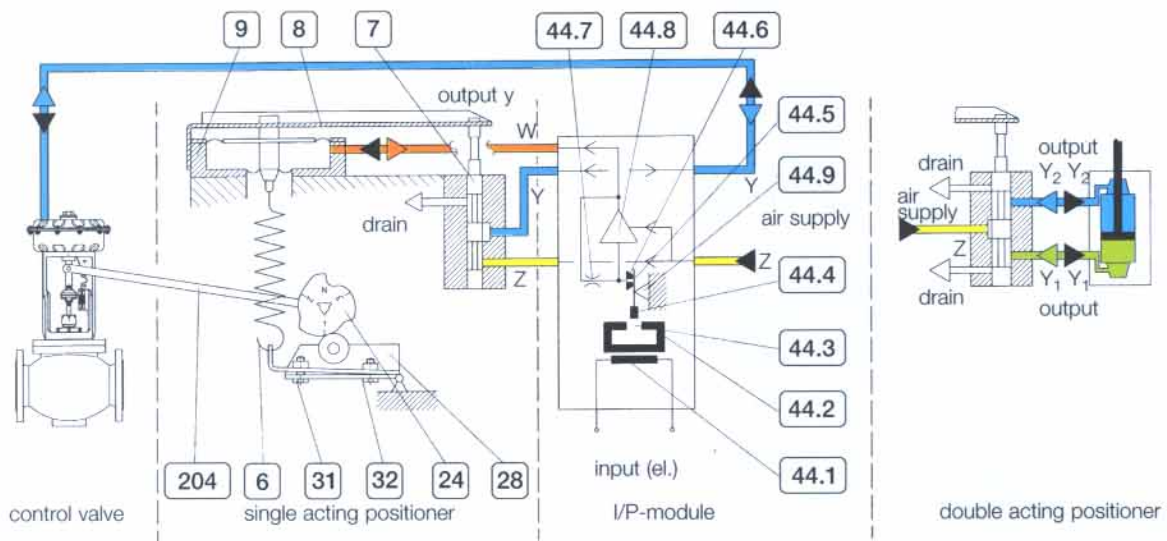
The valve positioner can be plugged very simply to the compact actuator ARCAPAQ. Susceptible piping is replaced with internal channels. The spring chamber of the actuator can be ventilated.

(Further mounting possibilities see page 4).

### ● Modulare structure/ Position transmitter

By flanging the I/P module to the pneumatic positioner it can be changed into an electropneumatic positioner at any time. Instead of the position transmitter a solenoid valve can be mounted. There is also the possibility of mounting additional inductive limit switches and a potentiometer or an electronic position transmitter. A gauge group can be supplied with all versions.





The positioner works according to the force-balance principle. The input signal, coming from the control equipment, acts on a diaphragm chamber. The force produced in such a way is constantly compared to the feedback force produced by the stroke scanning lever (204), cam-disc (24) and spring (6). According to the control divergence the valve spindle is forced into the correct position by higher or lower output pressure on the actuator, until the control divergence between input force and reset force has become zero.

Looking at the I/P module in the above scheme, the input current  $I$  flows through a fixed coil (44.1). Thereby a soft magnetic system (44.2) is magnetised. The flux lines of this system being exposed at a gap (44.3) apply a force proportional to the input current to a small magnet (44.4) made of highly coercive alloy. Together with the flapper (44.5) this small magnet forms the moving parts of the system.

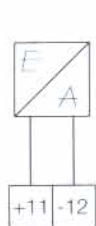
The flapper more or less covers a nozzle (44.6), the air flowing from the nozzle forming a restoring force balanced by the force applied to the magnet. The nozzle is supplied with air through a fix orifice (44.7) by the output of a controlling unit (44.8)

influenced by the pressure change before the nozzle. Hence a well linear correspondance of electric input and pneumatic output signal is achieved.

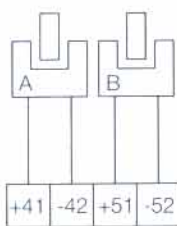
Zero adjustment is made in the pneumatic part of the unit by adjusting the screw (31), the rough range adjustment is performed at the stroke lever (204) and the final adjustment at the adjusting screw (32). The adjustment of the limit switches is made possible by adjustable control flappers (damped and undamped).

The zero and range adjustment of the electronic position transmitter ensue at the marked adjusting screws (0/100%) of the transmitting module.

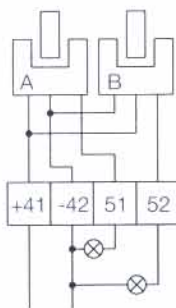
## Additional electrical equipment



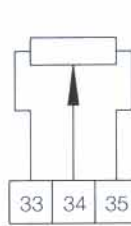
I/P-converter



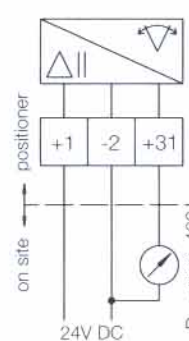
Inductive limit switch (2-wire, N & SN)



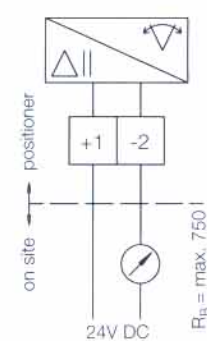
Inductive limit switch (3-wire, E2)



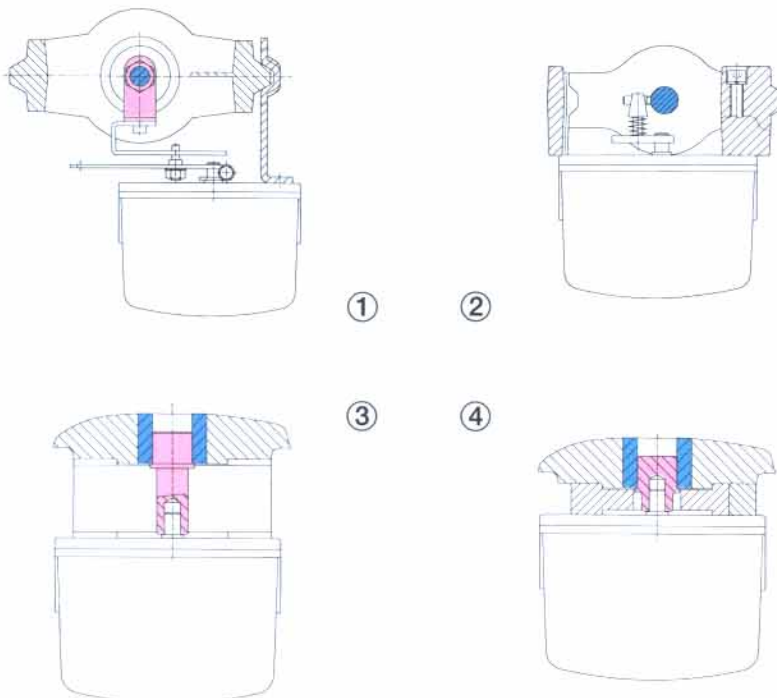
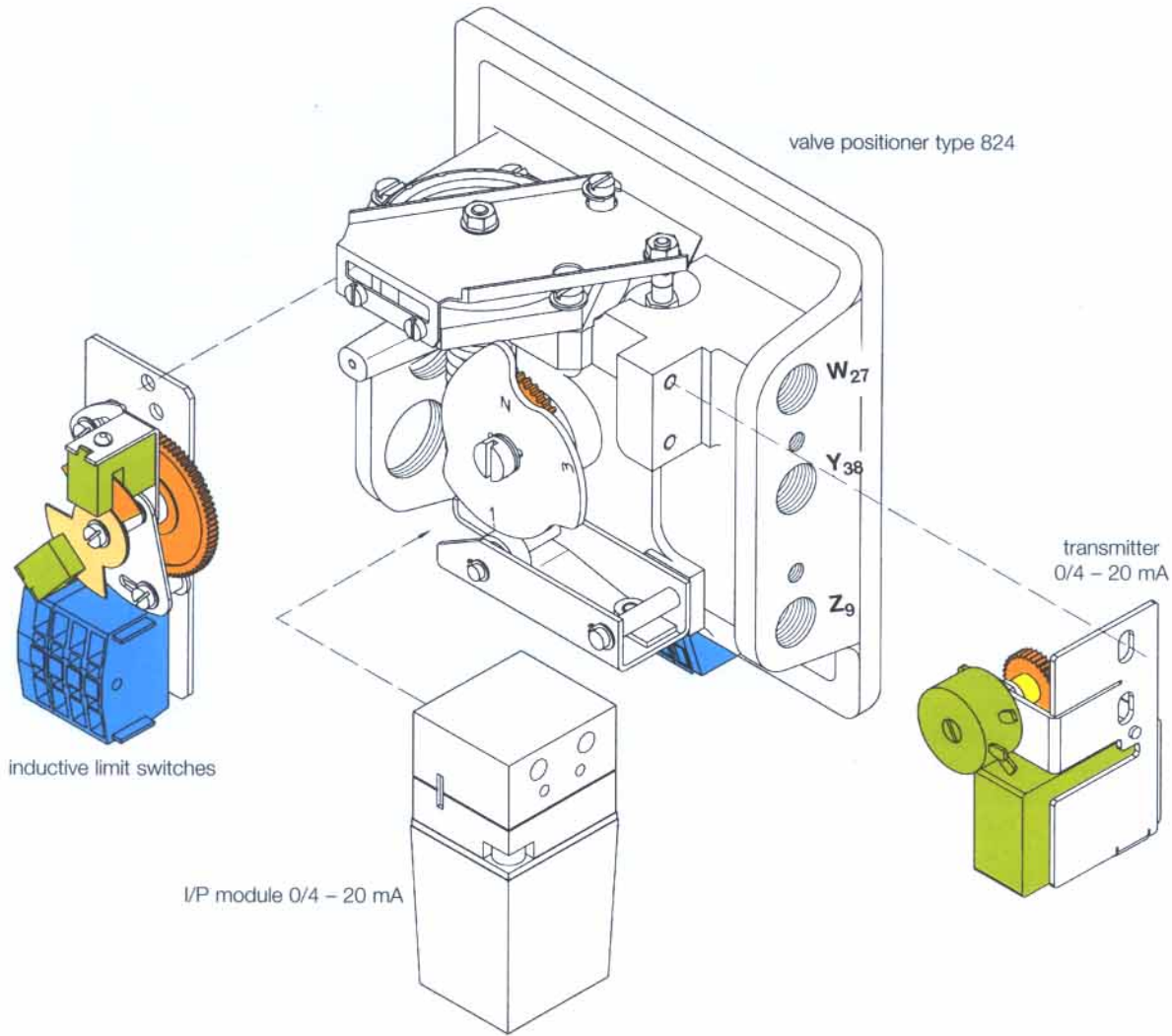
Potentiometer transmitter



Position transmitter (3-wire)



Position transmitter (2-wire)



## Mounting possibilities

- ① mounting to casted support acc. to DIN/IEC 534 (NAMUR)
- ② integrated mounting to compact actuator type 812
- ③ mounting to quarter-turn actuator, rotating angle 90°, acc. VDI/VDE
- ④ integrated mounting to ARCATORQUE

## Basic Instrument

### Positioner

824 . [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ]

Type	824.P . . .	824.E . . .	824.X . . .	824.D . . .
	P-Positioner	E/P-Positioner, not ex-proof	E/P-Positioner intrinsically safe	E/P-Positioner, Ex- and pressure resist.
<b>Input</b>				
Signal range	0.2 - 1.0 bar	4(0) - 20 mA		
Split-range	0.2 - 0.6 - 1.0	4(0) - 12(10) or 12(10) - 20 mA		
Working resistance R <sub>i</sub>	-	170 Ω	260 Ω	
<b>Output</b>	between 0 and 6 bar			
<b>Auxiliary energy</b>				
Input air pressure	1.4 to max. 6 bar			
Instrument air	free from oil, water and dust according to DIN/IEC 770			
Solid particles	< 50 μm	< 25 μm		
Pressure dew-point	< - 40°C ②			
Standby consumption	< 0.5 Nm <sup>3</sup> /h	< 0.6 Nm <sup>3</sup> /h at 1.4 bar supply air		
<b>Transmission</b>				
Amplification	max. 100			
Output air capacity	6 Nm <sup>3</sup> /h or 7 kg/h at 1.4 bar supply			
Hysteresis	< 0.7 % of the control range			
Response level	< 0.5 % of the control range			
Supply air influence	< 0.1 % / 0.1 bar	< 0.2 % / 0.1 bar change		
Nonlinearity	≤ 2 % of the control range			
Vibration resistance	< 10 g according to DIN 89011			
Sense of action	reversible			
<b>Angular range</b>	60° for linear valves (10- 120 mm) and 90° for part-turn valves			
<b>Ambient temperature</b>	- 20 to + 80°C ②			
<b>Connections</b>				
External pneumatic piping	(W), Y u. Z: at side G 1/4 ③		at rear G 1/4 ③	
Pneumatic integrated piping	(W), u. Z: at side G 1/4 ③		Y: at rear G 1/8	Z: at rear G 1/4 ③ Y: at rear G 1/8
Cable gland	M20 x 1,5		M 20 x 1.5	
Cable terminals	suitable for max. 2.5 mm <sup>2</sup>		screwed terminals.	
<b>Protection class</b>	IP 54		IP 65	
Climate class	ZQF according to DIN 40040		GPF/DIN 40040	
<b>Explosion-protection</b>	-		EE x ia IICT 6	EE x d IIBT 6
Conformity Certificate	-		Ex-93.C.2104 X	90.C.2016 X
<b>Weight</b>	1.8 kg	2.0 kg		2.8 kg
Pressure gauge group	add. 0.5 kg			

## Limit value transmitter

Positioner

824 . [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ]

available with types:	824.P . . .	824.E . . .	824.X . . .	824.D . . .
<b>Inductive limit-value transmitter</b>				
<b>Standard design</b>	2-wire system according to DIN 19234 (NAMUR) for secondary switching amplifier			-
2 slotted switch initiators	Typ SJ 3,5 N			-
Function	NC, (normally closed)			-
Switching difference	≤ 1 %			-
Control current circuit	see secondary switching amplifier			-
Explosion proof class	-		EE x ia IICT6 ④	-
Conformity certificate	-		Ex-83./2022 X	-
EMV conformance	EN 60947-5-2 and DIN 19234			
<b>Increased safety design</b>	2-wire system. acc. to. DIN 19234 (NAMUR) for switch amplifier in safety execution (to be supplied by user)			-
2 slotted switch initiators	Typ SJ 3.5 SN			-
Function	NC, (normally closed)			-
Switching difference	≤ 1 %			-
Control current circuit	see secondary switching amplifier			-
Explosion proof class	-		EE x ia IICT6 ④	-
Conformity certificate	-		Ex-83./2022 X	-
EMV conformance	EN 60947-5-2 and DIN 19234			
<b>Direct switching design</b>	3-wire system with integrated switching amplifier for direct switching			-
2 slotted switch initiators	Typ SJ 3.5 E2			-
Function	NO, (normally open)			-
Switching difference	≤ 1 %			-
Operating voltage	10...30 V DC			-
max. output current load	100 mA			-



## Position Transmitter

Positioner:

824 . [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ]

available with types:	824.P . . .	824.E . . .	824.X . . .	824.D . . .
<b>Feedback-Potentiometer</b>				
Resistance	200, 500 or 1000 Ohm ⑤			
Unlinearity	≤ 2 % ⑥			
Internal capacity C <sub>i</sub>	3.5 pF			
Internal inductivity L <sub>i</sub>	10 μH			
Explosion proof class	-		EE x i ⑦	
Conformity Certificate	-		not required	
<b>Position transmitter</b>				
<b>3-wire configuration</b>				
	RWG, Typ 4522			
Operating voltage	15 ... 24 V DC			
Output	4(0) - 20 mA, shortcut-proof			
Current limitation	at approx. 28 mA			
Load R <sub>i</sub>	400 Ohm at 24 V DC			
Unlinearity	≤ 2 % ⑥			
<b>2-wire configuration</b>				
	RWG, Typ TMT 136R			
Operating voltage	8.5 ... 36 V DC			
Output	4 - 20 mA, shortcut-proof			
Current limitation	at approx. 36 mA			
Load R <sub>i</sub>	750 Ohm at 24 V DC			
Unlinearity	≤ 2 % ⑥			
<b>2-wire configuration</b>				
			RWG, / Typ TMT 136Z	
Operating voltage	-		10 ... 29.4 V DC	
Output	-		4 - 20 mA	
Current limitation	-		at approx. 36 mA	
Load R <sub>i</sub>	-		750 Ω at 24 V	
Linearity deviation	-		≤ 2 % ⑥	
Explosion proof class	-		EE x ia IICT6	
Conformity certificate	-		EX-91.C.153	

② Special execution up to -40°C (pressure dew-point < -50°C)

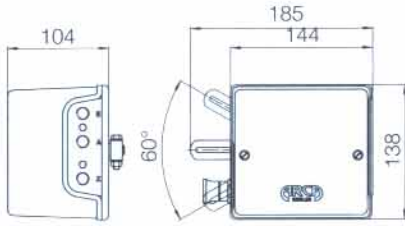
③ Special execution NPT 1/4"

④ Only in combination with corresponding ex-proof switching amplifier

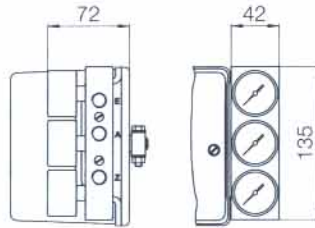
⑤ Zero-point and range must be adjusted at the receiving instrument.

⑥ A deviation of up to 5% is possible, depending the installation mode of the positioner and/or the stroke-range.

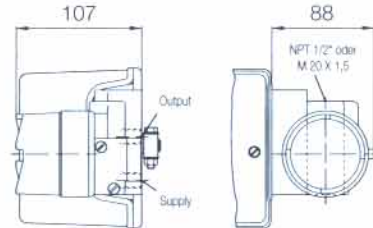
⑦ Passiv element; a conformity certificate is, therefore, not required, but the allowable external inductivity (L<sub>a</sub>) and capacity (C<sub>a</sub>) must both be larger than L<sub>i</sub> and C<sub>i</sub> of the potentiometer.



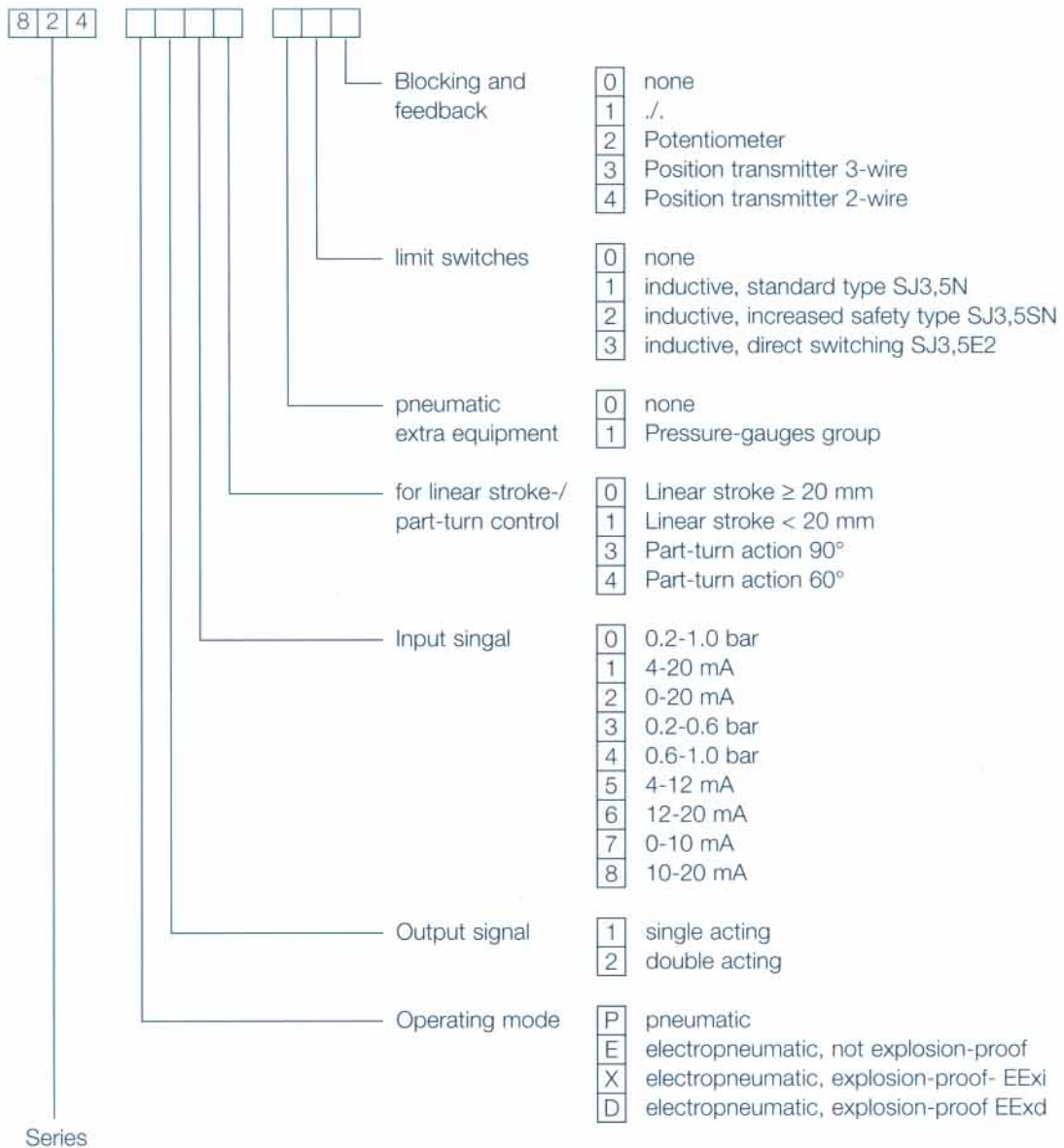
Basic device



gauge group



I/P-converter (flameproof enclosure)



Subject to technical changes.