

Works with

- | | |
|------------------|----------|
| * ATI | * Sauter |
| * Barber coleman | * Staefa |
| * Honeywell | * T/A |
| * Johnson | * TEG |
| * Landis & Gyr | * Others |
| * Satchwell | |

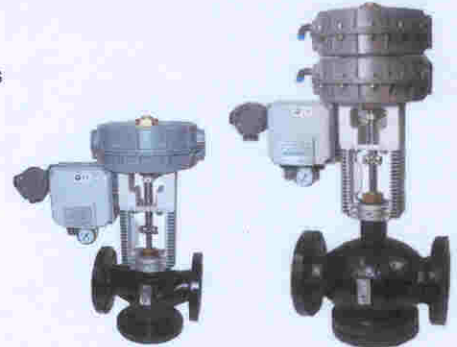
Pneumatic Actuators

Diaphragm with linear travel shaft

APC21.140...

APC21.140651000

- Aux. output: P0=None, 1=ASP.35, 2=ASP.36, 4=ASP.38 6=ASP.40
- 7= 140Ω, 8= 1000Ω
- Positioner input signals: 0=None, 02=0~3Bar, 51=4~20mA, 61=0~10Vdc, 9=Options
- OUTPUT FORCE: 1=300N 2=600N 3=900N 4=1200N 5=2400N
- 6=4800N 7=6000N 9=Options
- STROKE: 1=10mm 2=20mm 3=30mm 4=40mm 5=50mm 9=Options
- Action : 1= Direct, 2=Reverse
- Extension block:
- 0=No block 1: block type 1,2: Type 2, Type 3
- Type of Chamber: A,B,C
- Type of power drives
- I= Induction, Q= Synchronous, P= Pneumatic, Z= Stepper
- PRODUCT GROUP: A= Actuator V=Valve



Description

Pneumatic actuators for the actuation of two and three port seat valves having stroke from 20 to 40mm linear action.

- APA2... effective area of 125 cm²
- APB2... effective area of 250 cm²
- APC2... effective area of 500 cm²
- all types with or without
 - positioner
 - position indicator
 - position switches
 - manual handle

Application

In heating, ventilating, air conditioning and other industrial installations for control of standard 2-port and 3-port control valves with On-Off or proportional controls. For valves made by others are also available.

Positioner

In heating, ventilating, air conditioning and other industrial installations for control of standard 2-port and 3-port control valves with On-Off or proportional controls. For valves made by others are also available.

Position indicator

In heating, ventilating, air conditioning and other industrial installations for control of standard 2-port and 3-port control valves with On-Off or proportional controls. For valves made by others are also available.

Position switch

In heating, ventilating, air conditioning and other industrial installations for control of standard 2-port and 3-port control valves with On-Off or proportional controls. For valves made by others are also available.

Manual handle

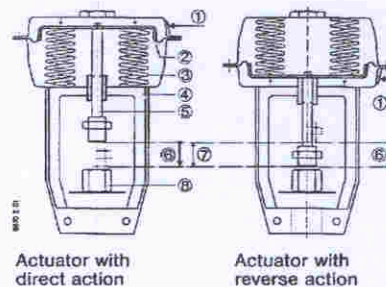
In heating, ventilating, air conditioning and other industrial installations for control of standard 2-port and 3-port control valves with On-Off or proportional controls. For valves made by others are also available.

Operation

Actuators

The piston, which is connected to the actuator spindle, is in an equilibrium position when the operating pressure on one side of the piston and the force of the springs on the other are identical. An increase of the operating pressure causes the spindle to move. The piston is reset by means of the springs after the operating pressure has been reduced.

Visual differentiation between direct and reverse acting actuators is possible by the location of the air chamber and the reset springs as shown below.

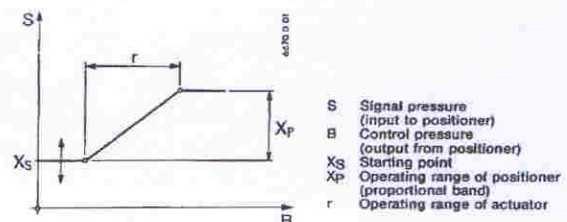


1. Operating pressure (compressed air)
2. Piston and diaphragm
3. Spring
4. Console
5. Actuator spindle
6. Direction of travel when operating pressure is increased
7. Stroke (Max. travel of actuator spindle)
8. Coupling piece between actuator and valve spindle
(This part may be different according to the type number)

Positioner

The positioner is a pneumatic, direct acting P-controller with a large, variable proportional band. The true position of the actuator spindle is fed back to the positioner by means of a spring. The feedback force is a measure for the correction of the spindle position if it does not correspond with the signal pressure.

Function diagram

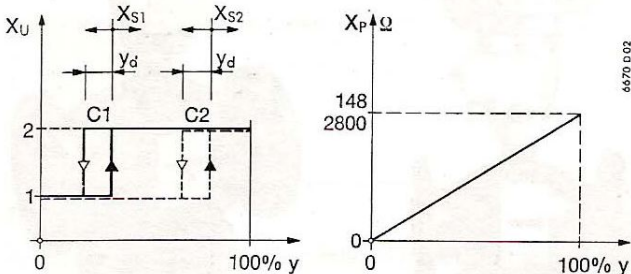


Position indicator

The positioner can be selected according to the application. Thus, we describe our standard type.

The movement of a cam fitted to the actuator spindle is transmitted to two other cams which actuate two separate micro switches. Likewise, the wiper arm of a potentiometer is kept in a position which is proportional to the spindle position.

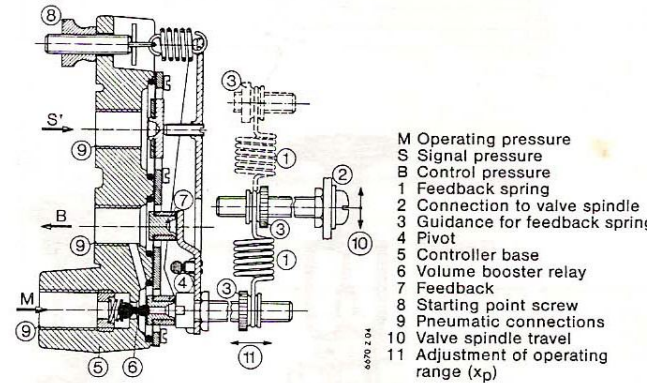
Function diagram



X_U	Switching position	C1	Upper changeover switch
1	Contact not actuated	C2	Lower changeover switch
2	Contact actuated	X_{S1}, X_{S2}	Switching position (adjustable)
	Contact connection*	X_p	Potentiometer output
	1	y	Valve spindle position
	2	Y_d	Switching differential
C1	9-7		
C2	6-4		
	9-8		
	6-5		

* Refer to the Internal Diagram and the Wiring Diagram for the position indicator.

The starting point is selected with the aid of a setting screw fitted to the controller base. The operating range (X_p) is adjusted by changing the leverage of the feedback spring. The controller base is provided with internal pas threads for the pneumatic connection between the positioner and the air chamber(s) of the actuator(s). A aluminium cover protects the positioner from unauthorized interference.



Hand adjuster

The auxiliary switches and potentiometer are contained in an elegant die cast aluminium housing with cable entry glands. The position indicator is fitted to the actuator console.

Hand adjuster

The adjuster consists of a sleeve and a spindle both of which are made of plated steel, and a hand wheel made of bakelite. The hand adjuster is supplied with a valve console if it is mounted directly onto the valve.

Application Advice

Actuators have to be provided with a positioner if they are used in control loops where precise valve control position is required. However good results can be obtained without a positioner if the valve size DN is between 15 and 25mm and the differential pressure across the valve small.

Actuators with a positioner must be used for sequence control (e.g. heating/cooling). The operating ranges have to be adjusted so that there is a dead zone of about 10kPa (0.1bar) between the sequence operation (e.g. closing of the heating valve/opening of the cooling valve). A dead zone is not required if valves with the same action are used in sequence operation (e.g. heating/heating).

The positioner is direct acting but it can be used with both direct and reverse acting actuators without having to make modifications and without accessories.

The hand adjuster has been designed for temporary use when the installation is serviced. It can be easily mounted or removed without having to employ special tools.

The ambient temperature must not drop below the pressure dewpoint temperature of the compressed air used, in order to prevent condensation in the actuator head.

Installation advice

The action of the actuators can be easily changed on site. It is possible to convert a SPB... actuators into a APC... or vice versa without having to use special tools. All accessories can be subsequently be mounted.

Each type of actuator can be fitted with all accessories. If the hand adjuster is to be mounted at a later stage, allowance must be made for the necessary space above the actuator.

Actuator and hand adjuster should be mounted in a vertical position.

Commissioning Notes

Checking of the actuator action:

Actuator action: Movement of the actuator spindle when control pressure rises:

direct spindle extends
reverse spindle retracts

Action of positioner:

An increase of the signal pressure (S) causes the control pressure (B) to rise. An increase of the force of the feedback spring causes the control pressure (B) to drop.

Hand adjuster

Turning the hand wheel causes the actuator spindle to move up and down.

Design Features

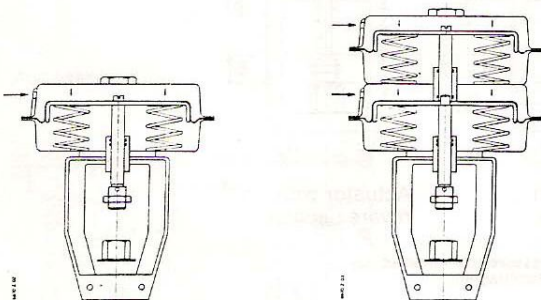
Actuators

Maintenance free pneumatic actuators, consisting of die cast aluminium housing with sheet metal piston, fiber reinforced diaphragm, coil springs, stainless steel spindle and a console made of die cast aluminium.

Modular design:

Direct and reverse acting actuators which consist of identical actuator modules. Direct or reverse action is achieved by the appropriate mounting of the module.

The APC... actuator provides the equivalent thrust of two APB actuators by mounting two modules in tandem.



APB... with one standard module direct action.

APC... with two standard module direct action.

Positioner

The positioner is a proportional controller using the power comparison principle with feedback and volume booster relay. The controller base is made of die cast aluminium. The feedback of the spindle position to the controller is achieved with the help of a position indicator bracket which can be fitted to the spindle and a spring, the size of which depends on the stroke of the actuator. The positioner can be easily fitted to reverse action is obtained by the appropriate mounting of the positioner.

Summary of Types

Actuators

Dia area cm ²	Action	Nominal stroke mm	Operating range in kPa	Bar	Type designation
250	direct	20	40-80	0.4-0.8	APB20.120
250	reverse	20	40-80	0.4-0.8	APB20.220
500	direct	20	40-80	0.4-0.8	APC20.120
500	reverse	20	40-80	0.4-0.8	APC20.220
500	direct	30	40-80	0.4-0.8	APC20.130
500	reverse	30	40-80	0.4-0.8	APC20.230
500	direct	40	40-80	0.4-0.8	APC20.140
500	reverse	40	40-80	0.4-0.8	APC20.240
250	direct	20	40-80	0.4-0.8	APB21.120
250	reverse	20	40-80	0.4-0.8	APB21.220
250	direct	30	40-80	0.4-0.8	APB21.130
250	reverse	30	40-80	0.4-0.8	APB21.230
500	direct	20	40-80	0.4-0.8	APC21.120
500	reverse	20	40-80	0.4-0.8	APC21.220
500	direct	30	40-80	0.4-0.8	APC21.130
500	reverse	30	40-80	0.4-0.8	APC21.230
500	direct	40	40-80	0.4-0.8	APC21.140
500	reverse	40	40-80	0.4-0.8	APC21.240

Positioner

- without mounting kit 4~20mA	ASP.50
- without mounting kit 0~10Vdc	ASP.60
- mounting kit for YTL1000	ASP.1
- mounting kit for YTL2000	ASP.2

Position indicator

- 2 aux. switches and potentiometer of 140 ohms without mounting kit	ASP.30
- 2 aux. switches and potentiometer of 2800 ohms without mounting kit	ASP.31
- mounting kit for ASP.30 and ASP.31	ASP.5

position indicators used with APA, APB, APC Actuators

Hand adjuster

- for use with APA..	ASP.80
- for used with APB,APC..	ASP.81
- Actuator adjustment handle	ASP.85

Combination with auxiliary units

- ASP.50 positioner with ASP.1. mounting kit	ASP.51
- ASP.60 positioner with ASP.1 mounting kit	ASP.61
- ASP.00 positioner with ASP.2 mounting kit	ASP.02
- ASP.30 position indicator with ASP.5 mounting kit	ASP.35
- ASP.31 position indicator with ASP.5 mounting kit	ASP.36

Ordering Specification

When ordering, please give full designation and type reference of unit;

Ex: **APC21.140-6-51-00** Pneumatic Valve Actuator
 Proportional, 0..10V.d.c
 40mm Stroke, 24Vac, 60s, 2400Nf
 (H)for Honeywell valves only

* For ordering complete unit with valves please refer to the valve data sheet.

Combination with Actuators

Actuator type	APB21.120	APB21.220	APC21.140
- extension block none	0	1	2
block type 1 for VT(X)F..	1	2	3
block type 2 for None Standard	2	3	4
- action direct	1	2	3
reverse	2	3	4
- stroke 20 mm	20	30	40
30 mm	30	40	50
40 mm	40	50	60
- actuator return force Nf	4	5	6
1=300,2=600,3=900,4=1200	5	6	7
5=2400,6=4800,7=6000,8=8000	6	7	8
- without positioner	00	01	02
- with positioner and mounting kit	51	61	02
ASP 51 (4~20mA)	51	61	02
ASP 61 (0~10Vdc)	61	02	
ASP 02 (0~3Bar)	02		
- without positioner indicator	0	1	2
- with position indicator ASP.35	1	2	3
ASP.36	2	3	4
ASP.38	4	6	7
- with 1 limit switch	4	6	7
- with 2 limit switches	6	7	8
- Aux output 0~140 Ω	7	8	
0~1000 Ω	8		
- without hand adjuster	0	1	
- with hand adjuster	0	1	
ASP.80/ ASP.81	0	1	
ASP.85	1		

Technical Data

Actuators

Nominal operating pressure in kPa(Bar)	350 (3.5)
Max. operating pressure in kPa(Bar)	400(4.0)
Action	see summary of types
Diaphragm area	of types
Stroke	
Operating range	
Permissible ambient temperature	-15...+50°C

	APA2		APB2		APC2	
	20 - 40 kPa(Bar)	40 - 80 kPa(Bar)	40 - 80 kPa(Bar)	40 - 80 kPa(Bar)	40 - 80 kPa(Bar)	40 - 80 kPa(Bar)
Operating range	20 - 40	40 - 80	40 - 80	40 - 80	40 - 80	40 - 80
Spindle travel	0 Max	0 Max	0 Max	0 Max	0 Max	0 Max
Control pressure in the air chamber	* for other range of operating pressure please consult with local dealers					
0 kPa(0 Bar)	200	200	850	450	820	175C
140kPa(1.4Bar)	140C	120C	700	115C	235C	130C
						164C 350C 470C 260C

	APA2	APB2	APC2
Air chamber volume in dm ³ at a stroke of 20mm	0.4	1.1	2.2
25mm	0.5	-	-
40mm	-	1.55	3.1C
Connection Number	1	1	1
Size	G1/8'	G1/8'	G1/8'
Weight in kg	Int thread	Int thread	Int thread
- complete with console	2.5	4.2	8.0
- Actuator module	2.0	3.0	6.2
- Console	0.8	1.0	1.2

Positioner

See positioner manuals provided with the actuators.

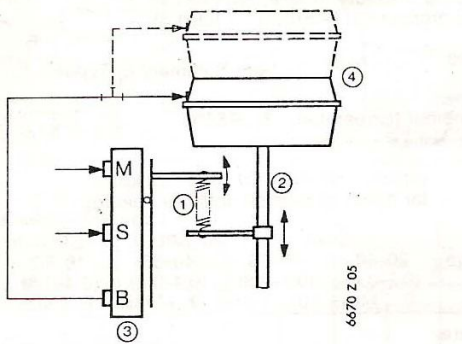
Internal diagram

Internal diagrams are different according to the type of positioner and the control characteristics.

See positioner manuals provided with the actuators.

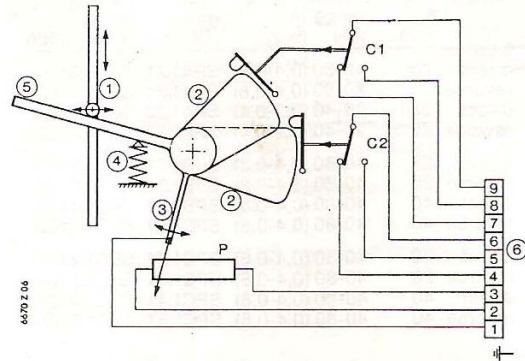
Internal Diagram and Wiring Diagram

Positioner



- M Operating pressure 140 kPa (1,4 bar)
- S Signal pressure
- B Control pressure
- 1 Feedback spring
- 2 Actuator spindle
- 3 Positioner
- 4 Actuator

Position indicator

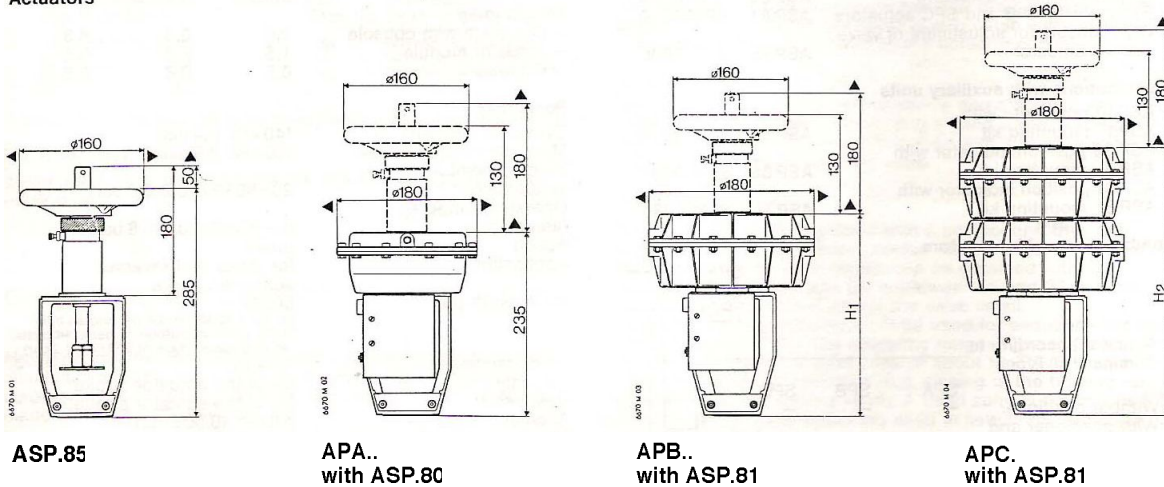


- P Potentiometer 148Ω or 2800Ω
- C1 Upper changeover switch
- C2 Lower changeover switch
- 1 Actuator spindle with adjustable cam which actuates lever 5
- 2 Cams (positions adjustable)
- 3 Potentiometer wiper arm
- 4 Reset spring
- 5 Lever (actuates potentiometer wiper arm 3 and cams 2)
- 6 Wiring terminals

Dimension

For actuator-valve-assemblies refer to the Data Sheets of the corresponding valves.

Actuators



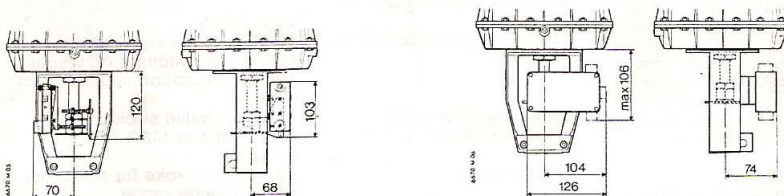
ASP.85

APA.. with ASP.80

APB.. with ASP.81

APC. with ASP.81

Accessories



ASP.11 positioner
(without cover, actuator with reverse action)

ASP.35/ASP.36
position indicator

Actuator Stroke	H1	H2
20 mm	260	340
40 mm	280	380

We reserve the right to make changes and improvements in all products which may affect the accuracy of the information contained in this manual.

Dimensions in mm