PNEUMATIC POSITIONERS
PP981

DESCRIPTION

The ADCATrol PP981 is a pneumatic positioner used for direct operation of pneumatic linear or rotary actuators by means of pneumatic controllers with a 0,2 to 1 bar proportional control signal. The positioner compares the output signal from a controller with the position feedback, and varies a pneumatic output signal to the actuator accordingly. The actuator position is therefore guaranteed for any controller output signal and the effects of varying differential pressure.
The positioner features a compact design and a modular construction which allows easy attachment of options such as limit switches, analog feedback modules, manifolds, volume boosters, amongst others.

MAIN FEATURES

Compact and flexible design.
Mounting onto any linear or rotary actuator.
Single or double acting.
Supply pressure up to 6 bar.
Adjustable amplification and damping.
Independent adjustment of stroke range and zero position.
Resistant to vibration effect in all directions.
ATEX approvals.

OPTIONS AND ACCESSORIES

Module for analog position feedback.
Digital position feedback with inductive switches (two or three-wire system).
Digital position feedback with microswitches.
Attachment kit for linear actuators acc. to IEC 534/NAMUR.
Attachment kit with rotary adaptor for rotary actuators acc. to VID/VDE 3845.
Connection manifold with gauges.
Volume boosters.

TECHNICAL DATA

GENERAL	
Material	Housing: Aluminium finished with DD-varnish grey blue; Cover: impact resistant polyester grey blue; Moving parts of feedback system: AISI 303 /1.4305 or AISI 316Ti / 1.4571 Mounting bracket: AISI 304 / 1.4301
IP rating	Protection class IP 54 (IP 65 on request)
Pneumatic connections	Female threaded ISO 228 G 1/8”
Weight	Single acting without gauges: approx. 0,7 kg Single acting with gauges: approx. 0,8 kg Double acting: approx. 0,9 kg Attachment kit: For linear actuators: approx. 0,3 kg For rotary actuators: approx. 0,5 kg

AMBIENT CONDITIONS	
Ambient temperature	-40 ºC to 80 ºC
Relative humidity	Up to 100%
Operating conditions	According to IEC 654-1; The device can be operated at a class D2 location
Transport and storage temperature	-50 ºC to 80 ºC

RESPONSE CHARACTERISTIC *	
Amplification	Adjustable
Sensitivity	< 0,1% F.S.
Non-linearity (terminal based adjustment)	< 1,0 % F.S.
Hysteresis	< 0,3 % F.S.
Supply air dependency	< 0,2 % / 0,1 bar
Temperature effect	< 0,3 % / 10 K

* Data based on the following parameters: stroke 30 mm, feedback lever 117,5 mm, max. amplification, air supply pressure 3 bar.

GAUGES	
Indication range	
Input	0 to 1,6 bar
Output	0 to 10 bar
Error limit	Class 1.6

INPUT SIGNAL	
Signal range	0,2 to 1 bar or split range down to Δw 0,2 bar
Stroke range	8 to 100 mm
Angular range	Linear: 30 º to 120 º Equal percentage: 90 º; from 70 º linear

OUTPUT SIGNAL	
Output to actuator	0 to 100 % supply air pressure

AIR SUPPLY	
Air supply pressure	1,4 to 6 bar
Supply air	Free of oil, dust or water, according to IEC 654-2

AIR CONSUMPTION	
Single acting	With 1,4 bar air supply: 200 Nl/h
	With 3 bar air supply: 400 Nl/h
	With 6 bar air supply: 600 Nl/h
Double acting	With 1,4 bar air supply: 350 Nl/h
	With 3 bar air supply: 550 Nl/h
	With 6 bar air supply: 750 Nl/h

AIR OUTPUT
Load effect *
-3 % for delivery flow 2350 Nl/h
+3 % for exhausted flow 1900 Nl/h

***** Measured with air supply 1,4 bar and 50% of the signal range.

CAPACITY AT MAXIMUM DEVIATION (Nl/h)				
AIR SUPPLY PRESSURE	**1,4 bar**	**2 bar**	**4 bar**	**6 bar**
Without booster	2700	3500	5500	7500
With booster LEXG-FN/GN	18000	24000	40000	55000
With booster LEXG-HN	38000	48000	80000	110000

OPTIONS AND ACCESSORIES

INDUCTIVE LIMIT SWITCH (TWO-WIRE SYSTEM)	
Input	Stroke / angle from actuator via positioner feedback lever
Output	2 inductive proximity sensors acc. to DIN 19 234 resp. NAMUR for connection to a switching amplifier with an intrinsically safe control circuit **a)**
Current consumption	Vane clear: > 3 mA Vane interposed: < 1 mA
Supply voltage	DC 8 V, Ri approx. 1 kΩ
Residual ripple	< 5 %
Permissible line resistance	< 100 Ω
Response characteristic b)	Gain: continuously adjustable from 1:1 to approx. 7:1 Switching differential: < 1 % Switching point repeatability: < 0,2 %
Explosion protection c)	Type of protection: II 2 G EEx ib/ia IIB/IIC T4/T6 Certificate of conformity: PTB 02 ATEX 2153 For operation in certified intrinsically safe circuits with the following maximum values: Umax: 16 V Imax: 25 mA Pmax: 64 mW Internal inductance: 100αH Internal capacitance: 30 nF
Ambient temperature	Temperature class T6: - 40 to 65 °C T1 to T5: - 40 to 80 °C

a) For the standard version one switching amplifier is required. For the security version, a fail-safe amplifier for each inductive proximity sensor is required; Operating mode minimum (= low) / maximum (= high) selectable by adjustment of switch vanes; Operating mode normally closed circuit / normally open circuit selectable at switch amplifier output.
b) For feedback lever effective length 117,5 mm, stroke 30 mm (1,28 in) and maximum gain.
c) National installation regulations must be observed;
For retrofitting the product must be tested by a qualified inspector as a special version in accordance with ElexV.

LIMIT SWITCH ASSEMBLY WITH MICROSWITCHES	
Input	Stroke / angle from actuator via positioner feedback lever
Output	2 micro switches **f)**
Connected load, alternating current	Switching capacity: max. 250 VA Switching voltage: max. 250 V Switching current with ohmic resistance: max. 5 A Inductive resistance: max. 2 A Bulb, metal filament: max. 0,5 A
Connected load, direct current (refer to the following table)	

Switching voltage, max. (V)	Ohmic load (A)	Inductive load (A)
30	5	3
50	1	1

Response characteristic g)	Gain: continuously adjustable from 1:1 to approx. 7:1 Switching differential: < 2,5 % Switching point repeatability: < 0,2 %

f) Operating mode minimum (= low) / maximum (= high) selectable by adjustment of switch vanes; Contact closed within the positive range.
g) For feedback lever effective length of 117,5 mm, stroke 30 mm and maximum gain.

INDUCTIVE LIMIT SWITCH (THREE-WIRE SYSTEM)	
Input	Stroke / angle from actuator via positioner feedback lever
Output	2 inductive proximity sensors, three-wire system, LED indication, contact, pnp **d)**
Supply voltage US	DC 10 to 30 V
Residual ripple	± 10 %, US = 30 V
Switching frequency	2 kHz
Constant current	100 mA
Response characteristic e)	Gain: continuously adjustable from 1:1 to approx. 7:1 Switching differential: < 1 % Switching point repeatability: < 0.2 %

d) Operating mode minimum (= low) / maximum (= high) selectable by adjustment of switch vanes; Contact closed within the positive range.
e) For feedback lever effective length 117,5 mm, stroke 30 mm and maximum gain.

ANALOG POSITION FEEDBACK	
Sensor	Resistive precision conductive plastic element.
Input	Stroke/angle from actuator via position feedback lever; Stroke range: 15 to 80 mm (< 15 mm on request) Angular range: 60º to 120º
Output	Two-wire system; Signal range: 4 to 20 mA
Permitted load	R_{Bmax} = (US - 12 V) / 0,02A (US = Supply voltage)
Power supply	Supply voltage: DC 12 to 36 V Permitted ripple: < 10 % p.p. Supply voltage dependency: < 0,2 %
Response characteristic h)	Non-linearity with terminal based setting: < 1,0 % F.S Hysterisis: < 0,5 % F.S. External resistance dependency: < 0,2 % / $\Delta R_{B\,max}$ Temperature effect: < 0,3 % / 10 K
Explosion protection i)	Type of protection: II 2 G EEx ib/ia IIB/IIC T4/T6 Certificate of conformity: PTB 02 ATEX 2153 For operation in certified intrinsically safe circuits with the following maximum values: Umax: T4: 30 V; T6: 22 V Imax: T4: 130 mA ; T6: 66 mA Pmax: T4: 0,9 W ; T6: 0,5 W Internal inductance: 9 µH Internal capacitance: to earth 10 nF or 6 nF differential
Ambient temperature	Temperature class T6: - 40 to 40 °C Temperature class T5: - 40 to 55 °C Temperature class T4: - 40 to 80 °C

h) For feedback lever effective length of 117,5 mm, stroke 30 mm and maximum gain.
i) National installation regulations must be observed; For retrofitting the product must be tested by a qualified inspector as a special version in accordance with ElexV.

COMMON DATA FOR OPTIONS AND ACCESSORIES

GENERAL

IP rating	Protection class IP 54; IP 65 on request
Mounting	Attachment to positioner
Electrical connections	Line entry: 1 or 2 cable glands M20 x 1,5 (others with Adapter AD-...) Cable diameter: 6 to 12 mm Screw terminals: max. 2.5 mm² (AWG14)
Materials	Base plate: galvanized steel Control vane: alluminium Setting mechanism: fibre glass-reinforced polyamide

AMBIENT CONDITIONS

Ambient temperature j)	- 25 to 80 ºC; - 40 to 80 ºC
Relative humidity	Up to 100%
Operating conditions	According to IEC 654-1; The device can be operated at a class D2 location
Transport and storage temperature	- 40 ºC to 80 ºC

j) Without explosion protection; - 40 to 80 °C for the fail-safe version of inductive limit switch.

CE MARKING

Electromagnetic compatibility	89/336/EWG
Low-voltage regulation	w/o Ex: 73/23/EWG (with Ex: not applicable)

ELECTROMAGNETIC COMPATIBILITY (EMC)

Operating conditions	Industrial environment
Immunity	Acc. to NAMUR recommendation NE21, EN 61326 and EN 61000-6-2
Emission	According to EN 55011, Group 1, Class A and EN 61000-6-2

SAFETY

Acc. to DIN EN 61010-1 (DIN IEC 61010-1) (VDE 0411 part 1)	safety class III; over voltage category I; internal fuses: none; external fuses: Limitation of power supplies for fire protection has to be observed due to EN 61010-1 9.3.