

“ADCATROL” ELECTRO-PNEUMATIC POSITIONERS PE 986

DESCRIPTION

The ADCATROL PE986 positioner requires an input signal of 4÷20 mA for proportional control actuator. 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.

MAIN FEATURES

Independent adjustment of stroke range and zero

- Adjustable amplification and damping
- Split range up to 3-fold possible
- Input signal 4 to 20 mA; 2 to 10 V on request
- Supply pressure up to 6 bar (90 psig)
- Low vibration effect in all directions
- Mounting according to IEC 534, part 6 (NAMUR)
- Rotation adapter for angles up to 120°
- EMC in accordance with the international standards and laws
- Modular system of additional equipment
- Limit switches
- Position transmitter
- Booster
- Connection manifold

- OPTIONS: Inductive limit switch, two wire system
 Inductive Limit Switch, three-wire system
 Limit switch assembly with Micro-switch
 Connection manifold with gauges
 Electrical position transmitter 4-20mA
 Explosion protection:
 II 2 G EEx ia IIC T6 according to ATEX or
 intrinsic safe according to FM and CSA
 II 2G EEx d (flame proof) according to ATEX
 (PE983)
 Booster relay to minimize stroke time

AVAILABLE

MODELS: PE 986



CONNECTIONS:

- Pneumatic
 Female G 1/8 ISO 228
- Electric
 Line entry 1 or 2 cable glands
 M20 x 1.5 or 1/2-14 NPT
 (others with Adapter AD-...)
 Cable diameter.. 6 -12 mm(0.24 - 0.47 in)
 Screw terminals Screw terminals for
 wires up to 2.5 mm² (AWG 14)

INSTALLATION: Any position



TECHNICAL DATA

Input

Signal range 4 ... 20 mA or 2 ... 10 V
 Input resistance < 200 Ohm at 20°C
 Stroke range 8 ... 100 mm (0.3 ... 4 in)
 Angular range
 linear. 30 ° ... 120 °
 equal percentage 90 %; from 70 ° linear

Output

Output to actuator 0 ... 100 % supply air pressure

Supply

Supply air pressure 1.4 ... 6 bar (20 ... 90 psig)
 Air supply ¹⁾ according to ISO 8573-1
 Solid particle size and density class 2.
 Oil rate class 3
 For air supply, we recommend the ADCA P10 filter regulator.

Ambient conditions

Ambient temperature ²⁾ -40 ... 80°C (-40 ... 176°F)
 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 ... 80 °C (-58 ... 176 °F)
 Storage conditions
 acc. to IEC 60 721-3-1 1K5, 1B1, 1C2, 1S3, 1M2
 Protection class IP 54; IP 65 on request

CE marking

Electromagnetic compatibility 89/336/EWG
 Low-voltage regulation 73/23/EWG not applicable

Materials

Housing Aluminium (Alloy No. 230)
 finished with DD-varnish black or grey blue
 All moving parts of
 feedback system WNr. 1.4305 / 1.4571
 Mounting bracket Aluminium (Alloy No. 230)

Response characteristic ³⁾

Amplification adjustable
 Sensitivity < 0.1 % F.S.
 Non-linearity (terminal
 based adjustment) < 1.0 % F.S.
 Hysteresis < 0.3 % F.S.
 Supply air dependency. < 0.3 % / 0.1 bar (1.5 psi)
 Temperature effect. < 0.5 % / 10 K

Air consumption

Air consumption single acting
 Supply air 1.4 bar (20 psig) 200 l_N/h (7.1 scfh)
 Supply air 3.0 bar (45 psig) 400 l_N/h (12.4 scfh)
 Supply air 6.0 bar (90 psig) 600 l_N/h (21.2 scfh)
 Air consumption double acting
 Supply air 1.4 bar (20 psig) 350 l_N/h (10.6 scfh)
 Supply air 3.0 bar (45 psig) 550 l_N/h (17.7 scfh)
 Supply air 6.0 bar (90 psig) 750 l_N/h (33.5 scfh)

Air output

Load effect ⁴⁾ -3 % for delivery flow
 2350 l_N/h (83 scfh)
 +3 % for exhausted flow
 1900 l_N/h (67 scfh)

Electromagnetic compatibility EMC

Operating conditions industrial environment
 Immunity according to
 - EN 61326, EN 61000-6-2 . . fulfilled
 Emission according to
 - EN 61326, Class A,
 - EN 61000-6-3 fulfilled
 NAMUR recommendation. . fulfilled

- 1) Pressure dew point 10K under ambient temperature
- 2) Note the section "Explosion Protection" on pages 5 and 6
- 3) Data based on the following parameters: stroke 30 mm, feedback lever 117,5 mm, max. amplification, supply air pressure 3 bar.
- 4) Measured at air supply 1.4 bar and 50 % of the signal range



Weight

single acting approx. 1.5 kg (3.3 lbs)
double acting approx. 1.8 kg (3.9 lbs)
Attachment kit
for diaphragm actuators. . . approx. 0.3 kg (0.6 lbs)
for rotary actuators approx. 0.5 kg (1.1 lbs)

Capacity at maximum deviation				
Supply air pressure bar	1,4	2	4	6
Without booster In/h	2700	3500	5500	7500
With booster LEXG-FN/GN In/h	18000	24000	40000	55000
With booster LEXG-HN In/h	38000	48000	80000	110000

ADDITIONAL EQUIPMENT

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 1) 2) 3)

Current consumption
Vane clear > 3 mA
Vane interposed < 1 mA
for control circuit with the following electrical values

Supply voltage DC 8 V, R_i approx. 1 kOhm
Residual ripple < 5 %
Permissible line resistance < 100 Ohm

Response characteristic 6)
Gain continuously adjustable from 1:1 to approx. 7:1
Switching differential < 1 %
Switching point repeatability. < 0.2 %
EMC acc. to EN 60 947-5-2

Limit Switch Assembly with Micro-switches

Input Stroke / angle from actuator via positioner feedback lever

Output 2 micro switches 2) 5)

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

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 2) 4)

Supply voltage U_S DC 10 ... 30 V
Residual ripple ± 10 %, U_S = 30 V
Switching frequency 2 kHz
Constant current 100 mA

Response characteristic 6)
Gain continuously adjustable from 1:1 to approx. 7:1
Switching differential < 1 %
Switching point repeatability. < 0.2 %

Connection Manifold with Gauges
Indicating range 0 ... 10 bar (0 ... 150 psig)
Error limit class 1.6
Pneumatic connections. Female threads Q1/4-18 NPT acc. to DIN 45 141

1)For the standard version one switching amplifier is required. For the security version fail-safe amplifier for each inductive proximity sensor is required.
2)Operating mode min. (=low) / max. (=high) selectable by adjustment of switch vanes
3)Operating mode normally closed circuit / normally open circuit selectable at switch amplifier output
4>Contact closed within the positive range
5>Contact open within the positive range
6)For feedback lever effective length 117.5 mm (4.63 in), stroke 30 mm (1.28 in) and maximum gain



Connected load, direct current		
Switching voltage, max.	Ohmic load	Inductive load
V	A	A
30	5	3
50	1	1
75	0,75	0,75
125	0,5	0,03
250	0,25	0,03

Response characteristic ⁶⁾
 Gain continuously adjustable
 from 1:1 to approx. 7:1
 Switching differential < 2.5 %
 Switching point
 repeatability. < 0.2 %

Electrical Position Transmitter

Sensor. resistive precision
conductive plastic element

Input Stroke / angle from actuator
 via positioner feedback lever
 Stroke range 8 ... 100 mm (0.3 ... 4 in)
 Angular range 60 ... 120°C

Output two-wire system
 Signal range 4 ... 20 mA

Permitted load. $R_{B \max} = \frac{U_s - 12V}{0.02A}$
 (U_s = Supply voltage)

Power supply
 Supply voltage DC 12 ... 36 V
 Permitted ripple < 10 % p.p.
 Supply voltage dependency < 0.2 %

Response characteristic ¹⁾
 Non-linearity with terminal based setting < 1.0 % F.S.
 Hysteresis. < 0.5 % F.S.

External resistance dependency < 0.2 % / $\Delta R_{B \max}$
 Temperature effect < 0.3 % / 10 K

1)For feedback lever with effective length 117.5 mm (4.63 in) and stroke 30 mm (1.28 in)
 2)Except manifold with gauges
 3)Note the section "Explosion protection" at page 5 with respect to explosion-protected equipment.
 4)-40 ... 80°C (-40 ... 176°F) for the fail-safe version of inductive limit switch

Common data ²⁾

Ambient conditions
 Ambient temperature ^{3) 4)} . . -25 ... 80°C (-13 ... 176°F)
 -40 ... 80°C (-40 ... 176°F)
 Relative humidity. up to 100 %

Operating conditons
 according to IEC 654-1 . . . The device can be operated
 at a class D2 location
 Transport and storage temperature -40 ... 80 °C (-40 ...
 176 °F)

Protection class. IP 54, IP65

Mounting attachment to positioner

Electrical connections
 Line entry 1 or 2 cable glands
 M20 x 1.5 or 1/2-14 NPT
 (others with Adapter AD-...)
 Cable diameter. 6 -12 mm (0.24 - 0.47 in)
 Screw terminals Screw terminals for wires
 up to 2.5 mm² (AWG 14)

Optionally Screwed gland made of stainless steel WNr. 1.4305

Materials
 Base plate. galvanized steel
 Control vane Aluminium

Setting mechanism Fibre-glass reinforced polyamide



SAFETY REQUIREMENTS

Acc. to EN 61 010-1 (resp. IEC 1010-1) safety class III, pollution degree 2, over voltage category I

Limit Switch Code V (additional equipment) safety class II, pollution degree 2, over voltage category II

Explosion protection type EEx ia/ib

Basic device Type AI 633

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 of input circuit:

U_i 30 V

I_i 150 mA

P_i refer to following table:

P _i [W]	T ₆ [°C]	T ₆ [°C]
2	40	90
1,5	50	90
1	57,5	90

Internal inductance negligible

Internal capacitance negligible

The control circuit is galvanically separate from earth and all other electric circuits

Explosion protection Zone 2

It is recommended that the instrument version for protection type EEx ia is used.

In the Federal Republic of Germany these instruments may be operated in Zone 2 with non-intrinsically safe circuits if the operating values do not exceed the maximum reference values.

Explosion protection according to FM and CSA

Electro-pneumatic positioner type BIM 633

Intrinsically safe, Class I, Division 1,

Groups A, B, C, D, hazardous locations

Limit Switch

Type of protection Intrinsic safety EEx ib/ia IIB/IIC with the following maximum values:

U_i 16 V

I_i 25 mA

P_i 64 mW

Internal inductance 100∞H

Internal capacitance 30 nF

The signal circuits are galvanically separate from earth, from each other and from all other electric circuits.

Position Transmitter

Type of protection Intrinsic safety EEx ib/ia IIB/IIC with the following maximum values:

for temperature class T4 and a maximally permissible outside ambient temperature of 80 °C:

U_i 30 V

I_i 130 mA

P_i 0.9 W

for temperature class T4 and a maximally permissible outside ambient temperature of 60 °C:

U_i 22 V

I_i 66 mA

P_i 0.5 W

The effective internal inductance L_i left amounts to 9 μH, the effective capacity C_i against earth amounts to 10 nF and/or differential 6 nF.

The supply- and signal circuits are galvanically separate from earth and from all other electric circuits.