ELECTRO-PNEUMATIC POSITIONERS
PE986 (ATEX)

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.
- Explosion protection:
  II 2 G EEx ia IIC T6 according to ATEX

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.
Intrinsic safe according to FM and CSA
II 2G EEx d (flame proof) according to Atex (PE983).
Booster relay to minimize stroke time.

AVAIL.
MODELS: PE986.

CONNECTIONS:

Pneumatic:
Female G1/8" 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 20ºC
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 [a] . . . . . 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 [b]. . . . . -40 ... 80ºC (-40 ... 176ºF)
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 [c]
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 [d] . . . . . -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

a) Pressure dew point 10K under ambient temperature
b) Note the section “Explosion Protection” on pages 5 and 6
c) Data based on the following parameters: stroke 30 mm, feedback lever 117,5 mm, max. amplification, supply air pressure 3 bar.
d) 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				
AIR PRESSURE SUPPLY (bar)	**1,4**	**2**	**4**	**6**
Without booster (Ln/h)	2700	3500	5500	7500
With booster LEXG-FN/GN (Ln/h)	18000	24000	40000	55000
With booster LEXG-HN (Ln/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 ... 120ºC

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 % / ⌝Δ $R_B$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 ... 80ºC (-40 ... 176ºF) for the fail-safe version of inductive limit switch

Common data [2)]

Ambient conditions
Ambient temperature [3) 4)] . . -25 ... 80ºC (-13 ... 176ºF)
-40 ... 80ºC (-40 ... 176ºF)
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 mm^2 (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:

Pi (W)	T6 (ºC)	T6 (ºC)
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.