ELECTRO-PNEUMATIC POSITIONERS
PE986

DESCRIPTION

The ADCATrol PE986 is an electro-pneumatic positioner used for direct operation of pneumatic linear or rotary actuators by means of electrical controllers or control systems with a 4 to 20 mA, 2 to 10 V or split ranges output.
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 effects in all directions.
ATEX approval (Ex ia).

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 according to IEC 534/NAMUR.
Attachment kit with rotary adaptor for rotary actuators according to VID/VDE 3845.
Connection manifold with gauges.
ATEX approval (Ex d): Version PE983.
Volume boosters.

LRQA CERTIFIED ISO 9001

TECHNICAL DATA

GENERAL	
Material	Housing: Aluminum finished with DD-varnish black; Mounting bracket: Aluminum; Moving parts of feedback system: AISI 303 /1.4305 or AISI 316Ti / 1.4571
IP rating	Protection class IP 54 (IP 65 on request)
Pneumatic connections	Female threaded ISO 228 G 1/8"
Electrical connections	M20 x 1,5 Cable glands Screw terminals: max. 2,5 mm²
Weight	Single acting: approx. 1,5 kg Double acting: approx. 1,8 kg Attachment kit: For diaphragm actuators: approx. 0,3 kg For rotary actuators: approx. 0,5 kg

AMBIENT CONDITIONS	
Ambient temperature	-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	-50 to 80 ºC
Storage conditions	According to IEC 60 721-3-1: 1K5, 1B1, 1C2, 1S3, 1M2

RESPONSE CHARACTERISTIC *	
Amplification	Adjustable
Sensitivity	< 0,1% FS
Non-linearity (terminal based adjustment)	< 1,0% FS
Hysteresis	< 0,3% FS
Supply air dependency	< 0,3% / 0,1 bar
Temperature effect	< 0,5% / 10 K

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

ELECTROMAGNETIC COMPATIBILITY (EMC)	
Operating conditions	Industrial environment
Immunity	According to EN 61326 and EN 61000-6-2
Emission	According to EN 61326, Class A and EN 61000-6-3

Remark: NAMUR recommendation fulfilled.

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

INPUT SIGNAL	
Signal range	4 to 20 mA or 2 to 10 V
Input resistance	< 200 Ω at 20 ºC
Stroke range	20 to 100% of the nominal operating range
Angular range	Linear: 30 to 120 º Equal percentage: 90º; from 70º linear

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

AIR SUPPLY *	
Air supply pressure	1,4 to 6 bar (20 to 90 psig)
Solid particle size and density	Class 2
Oil rate	Class 3
Pressure dew point	10K below ambient temperature

* According to ISO 8573-1.
Remark: For air supply, we recommend the ADCA P10 filter regulator.

AIR CONSUMPTION	
Single acting	Air supply 1,4 bar (20 psig) 200 Nl/h (7,1 scfh)
	Air supply 3 bar (45 psig) 400 Nl/h (12,4 scfh)
	Air supply 6 bar (90 psig) 600 Nl/h (21,2 scfh)
Double acting	Air supply 1,4 bar (20 psig) 350 Nl/h (10,6 scfh)
	Air supply 3 bar (45 psig) 550 Nl/h (17,7 scfh)
	Air supply 6 bar (90 psig) 750 Nl/h (33,5 scfh)

AIR OUTPUT
LOAD EFFECT *
-3% for delivery flow 2350 Nl/h (83 scfh)
+3% for exhausted flow 1900 Nl/h (67 scfh)

* 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 according 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 approximately 1 kΩ
Residual ripple	< 5%
Permissible line resistance	< 100 Ω
Response characteristic **(b)**	Gain: continuously adjustable from 1:1 to approximately 7:1 Switching differential: < 1% Switching point repeatability: < 0,2% EMC: according to EN 60 947-5-2

(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 (4,63 in), stroke 30 mm (1,28 in) and maximum gain.

LIMIT SWITCH ASSEMBLY WITH MICROSWITCHES	
Input	Stroke / angle from actuator via positioner feedback lever
Output	2 micro switches **(d)**
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
75	0,75	0,75
125	0,5	0,03
250	0,25	0,03

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

(d) For feedback lever effective length 117,5 mm (4,63 in), stroke 30 mm (1,28 in) 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 **(b)**
Supply voltage U_S	DC 10 to 30 V
Residual ripple	±10%, U_S = 30 V
Switching frequency	2 kHz
Constant current	100 mA
Response characteristic **(c)**	Gain: continuously adjustable from 1:1 to approximately 7:1 Switching differential: < 1% Switching point repeatability: < 0,2%

(b) Operating mode minimum (=low) / maximum (=high) selectable by adjustment of switch vanes; Contact closed within the positive range.
(c) For feedback lever effective length 117,5 mm (4,63 in), stroke 30 mm (1,28 in) and maximum gain.

ANALOG POSITION FEEDBACK	
Sensor	Resistive precision conductive plastic element
Input	Stroke / angle from actuator via position feedback lever; Stroke range: 8 to 100 mm (0,3 to 4 in) Angular range: 60 to 120º
Output	Two-wire system Signal range: 4 to 20 mA
Permitted load	R_{Bmax} = (U_S - 12 V) / 0,02A (U_S = Supply voltage)
Power supply	Supply voltage: DC 12 to 36 V Permitted ripple: < 10% p.p. Supply voltage dependency: < 0,2%
Response characteristic **(e)**	Non-linearity with terminal based setting: < 1,0% FS Hysteresis: < 0,5% FS External resistance dependency: < 0,2% / $R_{B\,max}$ Temperature effect: < 0,3% / 10 K

(e) For feedback lever effective length 117,5 mm (4,63 in), stroke 30 mm (1,28 in) and maximum gain.

CONNECTION MANIFOLD WITH GAUGES	
Indicating range	Stroke / angle from actuator via positioner feedback lever
Error limit	Class 1.6
Pneumatic connections	Female threads Q1/4-18 NPT according to DIN 45 141

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 or 1/2"-14 NPT (others with Adapter AD-...) Cable diameter: 6 to 12 mm (0,24 to 0,47 in) Screw terminals: max. 2,5 mm² (AWG14) Optionally: Threaded gland made of AISI 303 (1.4305)
Materials	Base plate: galvanized steel; Control vane: aluminum; Setting mechanism: fiber glass-reinforced polyamide

AMBIENT CONDITIONS	
Ambient temperature	-25 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 to 80 ºC

SAFETY REQUIREMENTS

SAFETY	
Acc. to EN 61 010-1 (resp. IEC 1010-1)	Safety class III, pollution degree 2, overvoltage category I
Limit Switch (accessory equipment)	Safety class II, pollution degree 2, overvoltage category II

EXPLOSION PROTECTION TYPE Ex ia/ib	
Basic device type	AI 633
Type of protection	II 2 G Ex 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 the following table:

P_i (W)	T6 (ºC)	T4 (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 Ex 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.

* National installation regulations must be observed.

LIMIT SWITCH

Type of protection intrinsic safety Ex ib/ia IIB/IIC with the following maximum values:

U_i: 16 V
I_i: 25 mA
P_i: 64 mW
Internal inductance: 100 µH
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 Ex 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 Li left amounts to 9 µH, the effective capacity Ci 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.