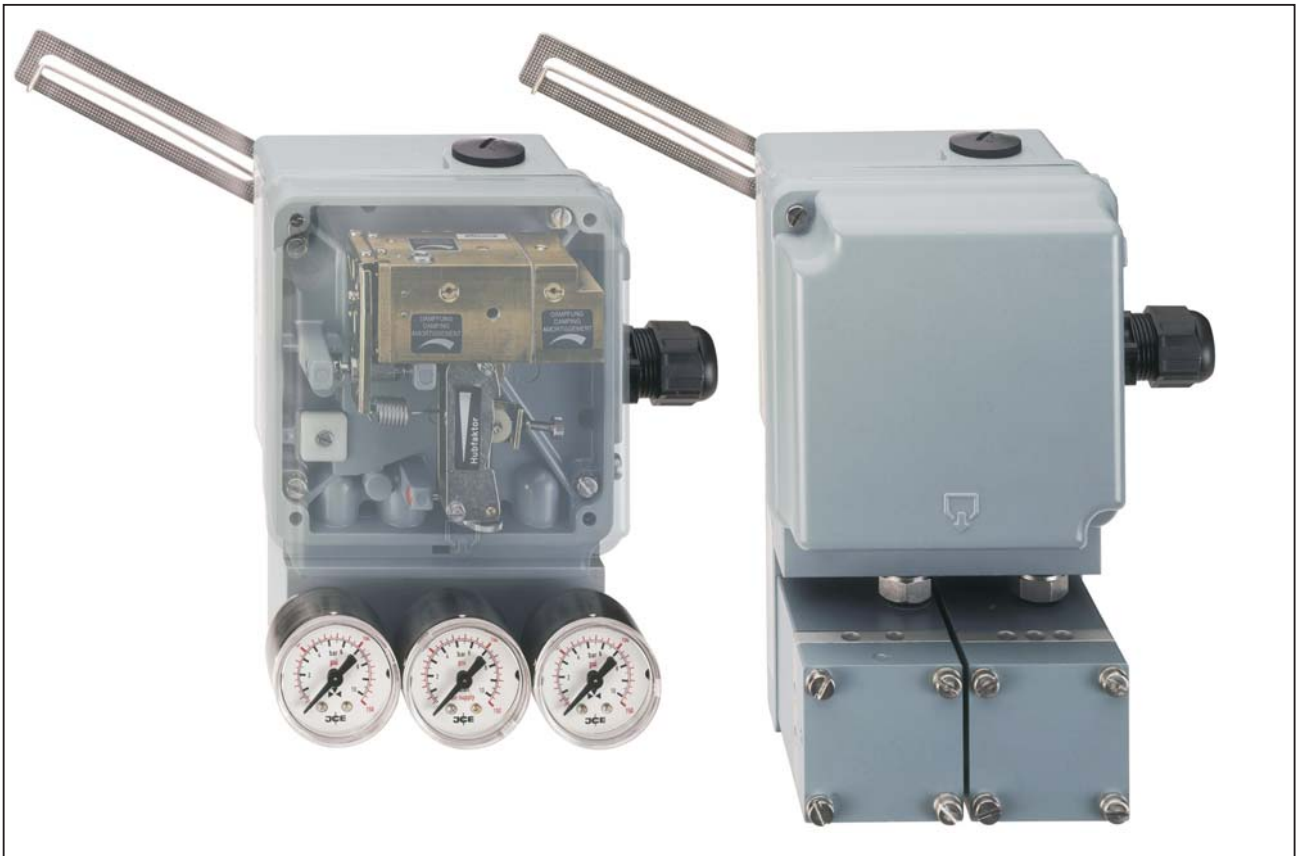


SRI986 Electro-Pneumatic Positioner



The SRI986 Positioner is for operation of pneumatic valve actuators from control systems and electrical controllers with electric control signals. It is used to reduce the adverse effects of valve friction, for higher thrust and shorter positioning time.

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°
- Explosion protection:
 - II 2 G EEx ia IIC T6 according to ATEX or intrinsic safe according to FM and CSA
- EMC in accordance with the international standards and laws
- Modular system of additional equipment
 - Limit switches
 - Position transmitter
 - Booster
 - Connection manifold

TECHNICAL DATA

Input

Signal range 4 ... 20 mA or
 0 ... 20 mA or
 2 ... 10 V (On request) or
 0 ... 10 V (On request)
 Input resistance < 200 Ohms 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 FOXBORO ECKARDT
 FRS923 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

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

CE marking

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

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

Air output

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

Capacity at max. deviation

Supply air pressure bar (psig)	1.4 (20)	2 (30)	4 (60)	6 (90)
without booster I _n /h (scfh)	2 700 (95)	3 500 (124)	5 500 (194)	7 500 (265)
with booster LEXG-FN/GN I _n /h (scfh)	18 000 (636)	24 000 (847)	40 000 (1 492)	55 000 (1 942)
with booster LEXG-HN I _n /h (scfh)	36 000 (1 271)	48 000 (1 695)	80 000 (2 825)	110 000 (3 884)

1) Pressure dew point 10 K under ambient temperature
 2) Note the section "Explosion protection" on pages 6 and 7 with respect to explosion-protected equipment

3) Data based on the following parameters:
 stroke 30 mm (1.28 in), range spring FES 628/1,
 feedback lever 117.5 mm (4.63 in), max. amplification,
 supply air pressure 3 bar (45 psig)
 4) Measured at air supply 1.4 bar (20 psig) and 50 % of the signal range

Materials

Housing Aluminum (Alloy No. 230)
finished with DD-varnish
grey blue

All moving parts of
feedback system WNr. 1.4305 / 1.4571
Mounting bracket Aluminum (Alloy No. 230)

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)

Connection

Pneumatic Female threads
G 1/8 acc. to 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)

Mounting

Type of mounting for attaching to diaphragm
actuators acc. to IEC 534-6
(NAMUR) and to rotary
actuators
Mounting orientation. any

ADDITIONAL EQUIPMENT

Additional equipment is installed by the manufacturer, but some types can also be put in later on. Therefore special part sets are available.

Inductive Limit Switch, two-wire system Code P, Q, T, U

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 kOhms
Residual ripple < 5 %
Permissible
line resistance < 100 Ohms

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

Part set for later installation

Code P, Q. not available
Code T EW 419 510 343
Code U EW 419 510 361

Inductive Limit Switch, three-wire system Code R

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 %

Part set for later installation . EW 419 510 307

Limit Switch Assembly with Micro-switches Code V

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

Connected load, direct current

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 ⁶⁾

Gain continuously adjustable
from 1:1 to approx. 7:1

Switching differential < 2.5 %
Switching point
repeatability. < 0.2 %

Part set for later installation EW 420 421 026

Connection Manifold with Gauges Code JN, MN, RN, SN

Indicating range 0 ... 10 bar (0 ... 150 psig)

Error limit class 1.6

Pneum. connections. Female threads

Q1/4-18 NPT
acc. to DIN 45 141

- 1) For the standard version Code P, T one switching amplifier is required. For the security version Code Q, U a 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

Electrical Position Transmitter**Code F**

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 °
Output	two-wire system
Signal range	4 ... 20 mA
Permitted load	$R_{Bmax} = \frac{U_S - 12V}{0.02A}$ (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 % / ΔR_{Bmax}
Temperature effect	< 0.3 % / 10 K

Part set for later installation

Code F	EW 420 661 106
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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 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 polyamid

- 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" on pages 6 and 7 with respect to explosion-protected equipment.
- 4) -40 ... 80 °C (-40 ... 176 °F) for the fail-safe version of inductive limit switch Code Q, U

SAFETY REQUIREMENTS

Safety

acc. to EN 61 010-1

(resp. IEC 1010-1) safety class III,
pollution degree 2,
overvoltage category I

Limit Switch Code V

(additional equipment) safety class II,
pollution degree 2,
overvoltage category II

Explosion protection type EEx ia/ib ¹⁾

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.

Limit Switch Code T, U (additional equipment)

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 μ H

Internal capacitance 30 nF

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

Position Transmitter Code F (additional equipment)

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 μ H, 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.

1) National installation regulations must be observed
The national regulations must be strictly observed when retrofitting the electrical position transmitter type AI 633 in the electro-pneumatic positioner of type AI 633 or the inductive limit switch type AI 633 K in the electro-pneumatic positioner of type AI 633 (SRI986-BIDS2EBB and SRI986-CIDS2EBB).
The following regulations apply to the Federal Republic of Germany:
The installation must be carried out by the manufacturer, or the product must be tested by a qualified inspector as a special version in accordance with ElexV.

Explosion protection Zone 2 ¹⁾

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 ¹⁾

Electro-pneumatic positioner type BIM 633

Intrinsically safe, Class I, Division 1,

Groups A, B, C, D, hazardous locations

1) National installation regulations must be observed

MODEL CODES SRI986

Electro-Pneumatic Positioner	SRI986									010407
Version										
Single Acting		-B								
Double Acting		-C								
Input										
Signal Range 4 - 20 mA			-I							
Mode of Action										
Standard Version Increasing Input Increases Output				D						
Universal Version Set To Increasing Input Decreases Output				R						
Built-In Limit Switch/Position Transmitter										
Without					S					
Inductive Limit Switch Three-Wire Technique, Without Explosion Protection . (a)					R					
Inductive Limit Switch (Standard Version) (a)					T					
Inductive Limit Switch (Security Version) (a)					U					
Two Micro Switches, Without Explosion Protection. (a)					V					
Position Transmitter 4 - 20 mA. (a)					F					
Cable Entry										
1/2"-14 NPT (with Adapter(s) M20x1,5 to 1/2"-14 NPT)						6				
M20 x 1.5 With One Plastic Cable Gland, Color Gray						7				
Electrical Certification: (Only Standard Device)										
II 2 G EEx ia IIC T6 according to ATEX (d)								EAA		
FM Approved For Intrinsic Safety Cl. I, Div. 1, Groups A,B,C,D Hazardous Locations Indoors								FAA		
CSA Approved For Intrinsic Safety Cl. I, Div. 1, Groups A,B,C,D Hazardous Locations Indoors								CAA		
GOST Approved For Intrinsic Safety								GAA		
Without								ZZZ		
Attachment Kit										
Order as Auxiliary									N	
Manifold										
Order as Auxiliary										A
Options										
Amplifier Free Of Nonferrous Metals (a)(b)										-C
Protection Class IP65										-F
Designed For Auxiliary Energy Oxygen Max 6 Bar (With BAM Certificate)										-S
Tag No. Labeling										
Stamped With Weather Resistant Color										-G
Stainless Steel Label Fixed With Wire										-L

Example: SRI986 -B I D S 7 ZZZ N A -CG

Footnotes

- a) Not available with FAA & CAA
- b) Only available with Version -B
- d) Not available with Limit Switch Codes R, V

Parts

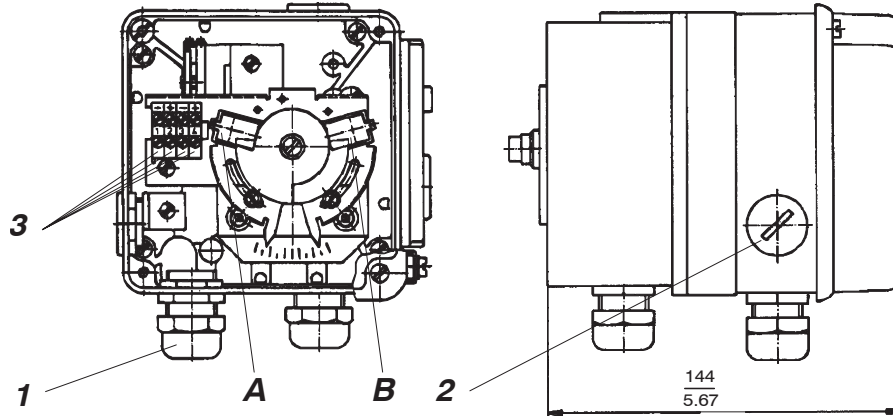
Auxiliaries see EVE9902
 Fittings see EOO9001

MODEL CODES Accessories

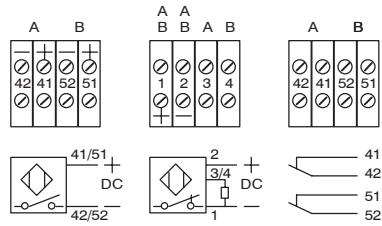
Attachment kit	EBZG	
for diaphragm actuators with casting yoke acc. to NAMUR (incl. standard Couple lever) (for SRI986)		-HN
for diaphragm actuators with pillar yoke acc. to NAMUR (incl. standard Couple lever) (for SRI986)		-KN
for rotary actuators, without flange, 3 drill holes 6,5 mm (for SRP981, SRI983, SRI986, SMP981, SMI983, SGE985)		-PN
for rotary actuators, without flange, 4 threads M6 (for SRP981, SRI983, SRI986, SMP981, SMI983, SGE985)		-NN
for rotary actuators, with flange (for SRP981, SRI983, SRI986, SMP981, SMI983, SGE985)		-JN
for rotary actuators, with shaft (for SRP981, SRI983, SRI986, SMP981, SMI983, SGE985)		-ZN
for Masoneilan type Camflex II (for SRP981, SRI983, SRI986, SMP981, SMI983, SGE985)		-RN
Couple lever / cam		
standard (a = 72 mm)		-AN
extended (a = 91 mm)		-BN
inverse equal percentage cam for rotary actuators		-CN
Spring set	FESG	
range-springs (4pc.)		-FN
Manifold (Connection 1/4-18NPT)	LEXG	
staggered connections (for SRP981, SRI986)		-BN
connections same level (for SRP981, SRI986)		-CN
with gauges for supply air, y, for version single acting (for SRP981, SRI986)		-JN
with gauges for supply air, y1, y2, for version double acting (for SRP981, SRI986)		-MN
gauge manifold without gauge, for version single acting (for SRP981, SRI986)		-RN
gauge manifold without gauge, for supply air, y1, y2, for version double acting (for SRP981, SRI986)		-SN
Booster (Connection 1/4-18NPT)	VKXG	
for Version single acting (for SRP981, SRI986)		-FN
for Version double acting (for SRP981, SRI986)		-GN
for Version single acting with doubled output capacity (for SRP981, SRI986)		-HN
Adapter (Material SS)	AD	
Adapter 1/2" NPT to 3/4" NPT		-A3
Adapter (stainless steel) M20x1.5 to 1/2"-14NPT (internal thread)		-A6
Adapter (stainless steel) M20x1.5 to PG 13.5 (internal thread)		-A7
Adapter (stainless steel) M20x1.5 to G 1/2" (internal thread)		-A8
Adapter (plastic) M20x1.5 to PG 13.5 (internal thread)		-A9
Cable gland	BUSG	
PG 13.5 Plug-connector for Fieldbus (ss/ threaded connection 7/8 - UN)		-F1
M20x1.5 Plug-connector for Fieldbus (ss/ threaded connection 7/8 - UN)		-F2
PG 13.5 plastics, color gray		-K1
PG 13.5 plastics, color blue		-K2
PG 13.5 plastics, color white		-K4
M20x1.5 plastics, color gray		-K6
M20x1.5 plastics, color blue		-K7
M20x1.5 plastics, color black		-K8
M20x1.5 plastics, color white		-K9
PG 13.5 Plug-connector for Fieldbus (ss/ threaded connection M12)		-P1
PG 13.5 HF-cable gland for Fieldbus (ss)		-P2
M20x1.5 Plug-connector for Fieldbus (ss/ threaded connection M12)		-P3
M20x1.5 HF-cable gland for Fieldbus (ss)		-P4
PG 13.5 stainless steel		-S1
M20x1.5 stainless steel		-S6

DIMENSIONS Additional Equipment

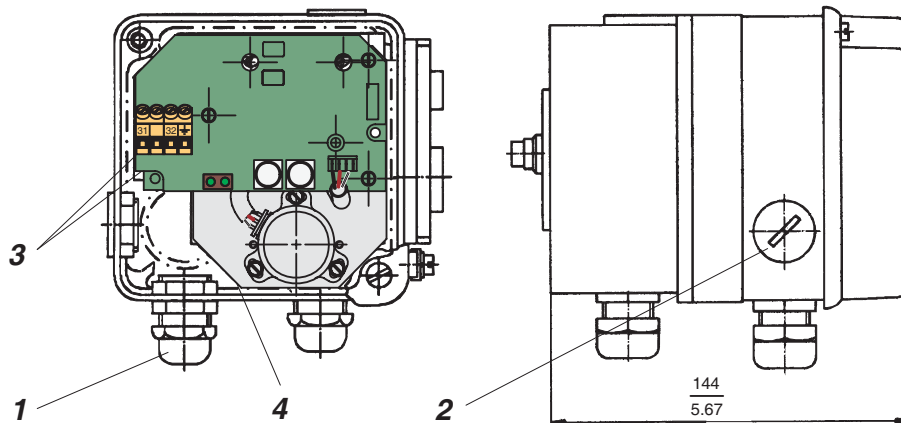
Built-in Limit Switch Code P, Q, R, T, U, V



**Built-in Limit Switch Code
P, Q, T, U R V**

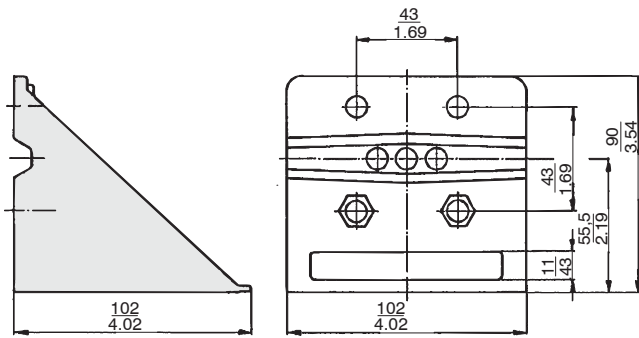
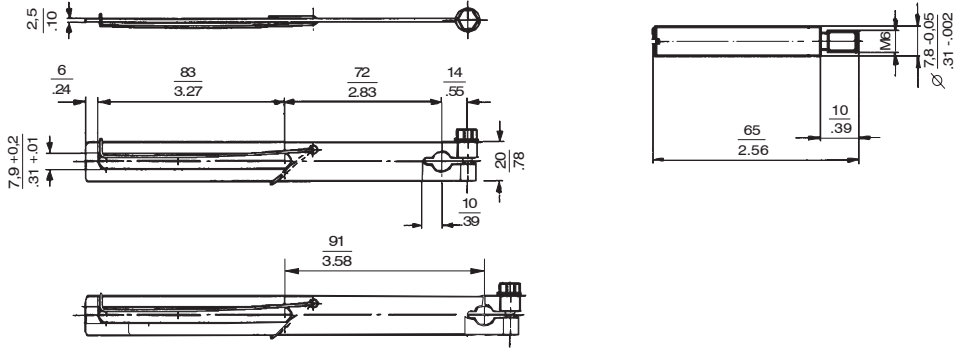


Built-in Position Transmitter Code F



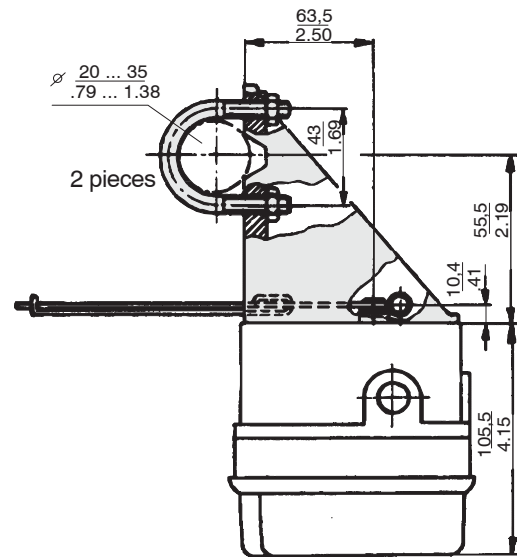
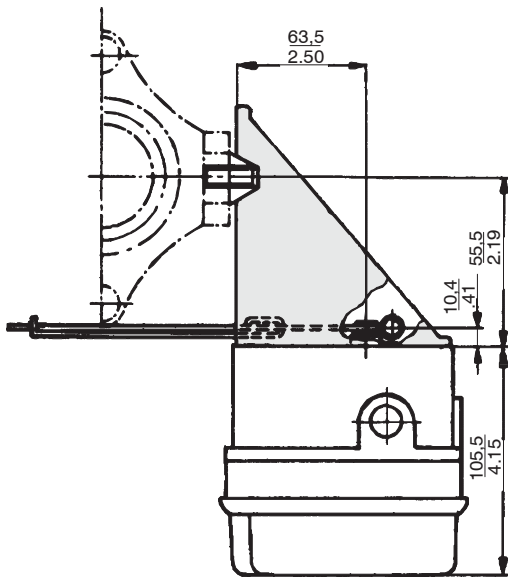
- 1** Cable gland
- 2** Dummy plug, can be replaced with **1**
- 3** Connection terminals (+/-)
- 4** Ground connection
- A** Limit switch
- B** Limit switch

DIMENSIONS Attachment Kit for Diaphragm Actuators



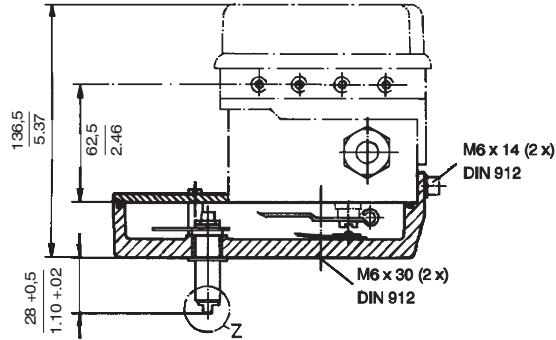
mm
in

Attachment to pillar yoke
acc. to IEC 534-6 (NAMUR)
Code EBZG - KN

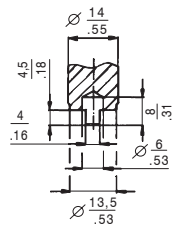


DIMENSIONS Attachment Kit for Rotary Actuators

**with shaft (acc. to VDI/VDE 3845)
Code EBZG - ZN**

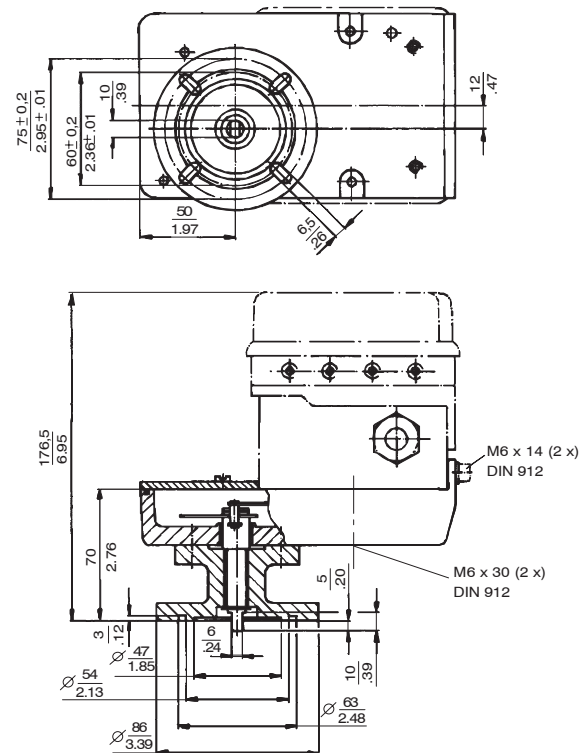


Detail Z



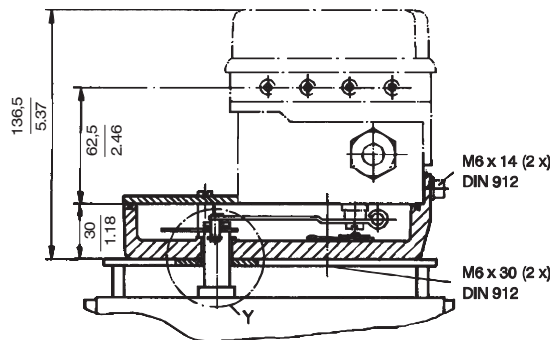
mm
in

**with flange
Code EBZG - JN**

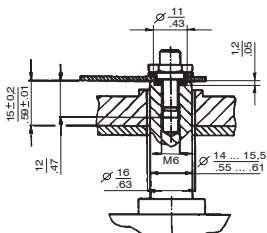


Rotation angle max. 120 °; torque requirement 0.14 Nm

**without flange
Code EBZG - NN, -PN**

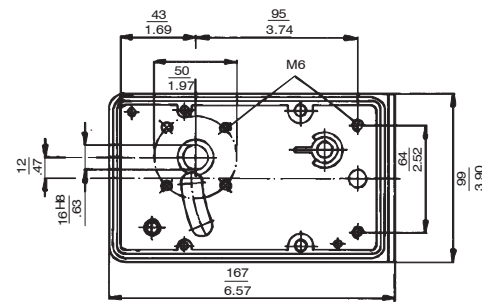


Detail Y

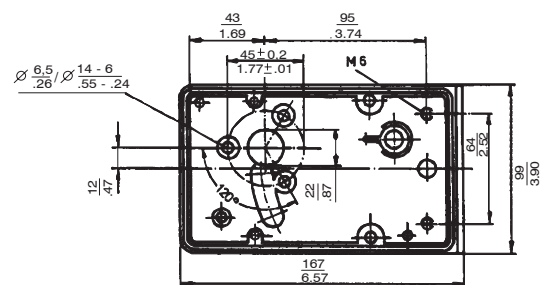


Adaptation of the actuator drive shaft end and correct axial location by client!

**Housing dimensions
attachment kit with shaft -ZN resp. without flange -NN**

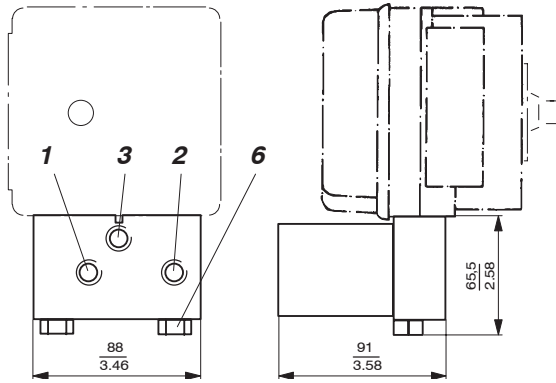


**Housing dimensions
attachment kit without flange -PN**

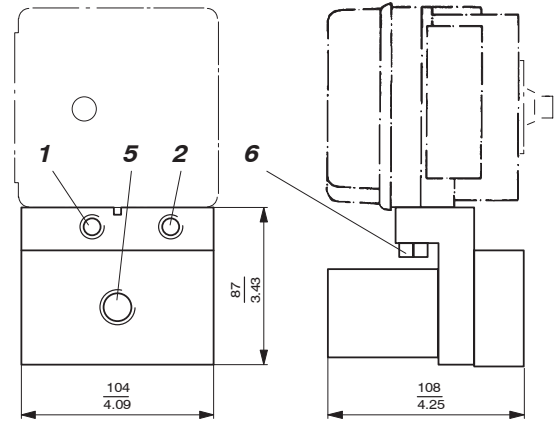


DIMENSIONS Booster

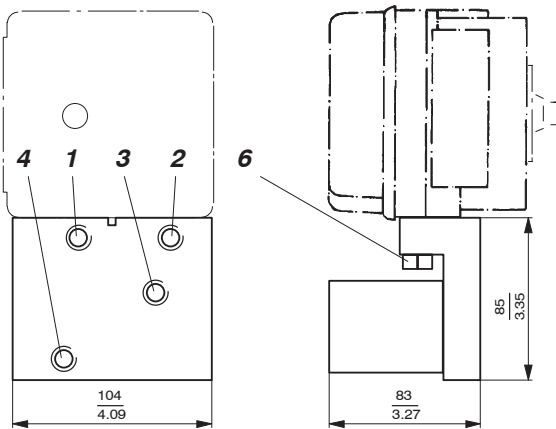
**Booster single acting
Code VKXG - FN**



**Booster single acting with double capacity
Code VKXG - HN**



**Booster double acting
Code VKXG - GN**

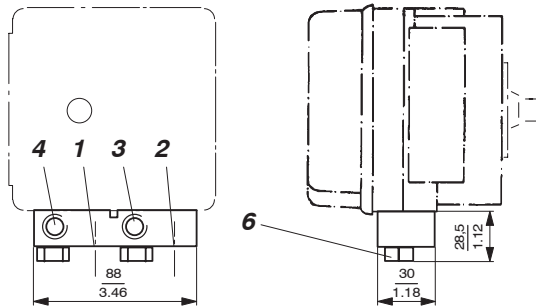


mm
in

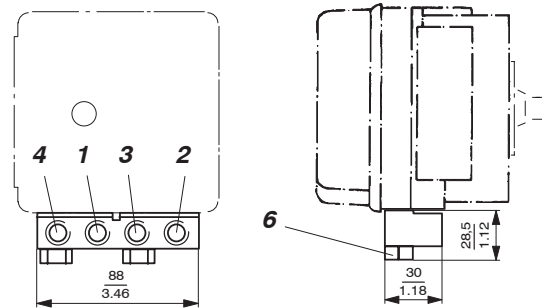
- 1** Female thread 1/4-18 NPT for supply air
- 2** Female thread 1/4-18 NPT not used
- 3** Female thread 1/4-18 NPT for output I (y1)
- 4** Female thread 1/4-18 NPT for output II (y2)
- 5** Female thread 1/2-14 NPT for output I (y1)
- 6** Fixing screws 17 mm A/F

DIMENSIONS Connection Manifold

**Connection Manifold
Code LEXG - BN**

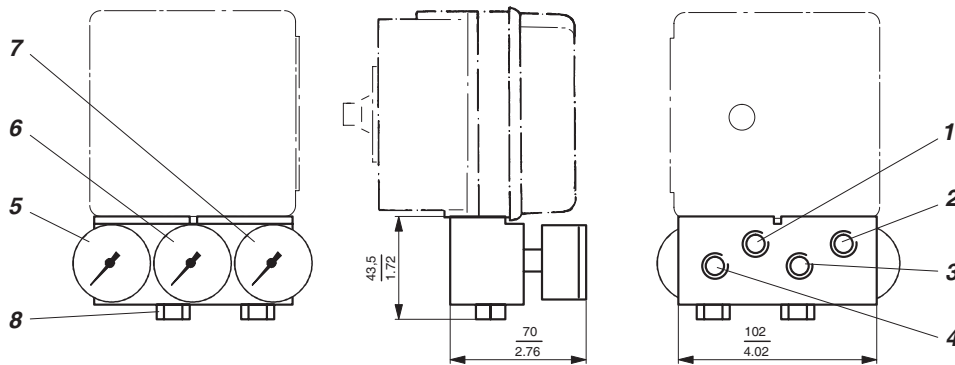


**Connection Manifold
Code LEXG - CN**



mm
in

**Connection Manifold with Gauges
Code LEXG - JN, - MN**



Conne- tion Manifold Code	5 Gauge for Supply air	6 Gauge for Output I (y / y1)	7 Gauge for Output II (y2)	single acting	double acting
JN	Supply air	Output (y)	without	yes	-
MN	Supply air	Output I (y1)	Output II (y2)	-	yes
RN	without	without	without	yes	-
SN	Supply air	Output I (y1)	Output II (y2)	-	yes

- 1 Female thread 1/4-18 NPT for supply air
- 2 Female thread 1/4-18 NPT not used
- 3 Female thread 1/4-18 NPT for output I (y1)
- 4 Female thread 1/4-18 NPT for output II (y2)
(not for Connection Manifold LEXG - JN)
- 6 Fixing screws 17 mm A/F
- 8 Fixing screws 17 mm A/F

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