

## **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 0/4 to 20 mA, 0/2 to 10 V
- 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
- Stroke 8 to 260 mm (0.3 to 10.2 in) with standard lever; larger stroke with special lever
- Explosion protection:  
II 2 G Ex ia IIC T6 according to ATEX or intrinsic safety acc. to FM, CSA, CU TR, INMETRO
- EMC in accordance with the international standards and laws
- Modular system of additional equipment
  - Limit switches
  - Position transmitter
  - Booster
  - Connection manifold

*Equipment should be installed, operated, serviced, and maintained only by qualified personnel.  
No responsibility is assumed by Schneider Electric for any consequences arising from the use of this material.*

## TECHNICAL DATA

### Input

Signal range .....4 to 20 mA or  
 0 to 20 mA or  
 2 to 10 V (On request) or  
 0 to 10 V (On request)  
 Input resistance ..... < 200 Ohms at 20 °C  
 Stroke range .....8 to 100 mm (0.3 to 4 in)  
 Angular range  
 Linear .....30 ° to 120 °  
 Equal percentage .....90 °; from 70 ° linear

### Output

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

### Supply

Supply air pressure .....1.4 to 6 bar (20 to 90 psig)  
 Air supply .....according to ISO 8573-1  
 - Solid particle size and density class 2  
 - Oil rate .....class 3  
 - Pressure dew point 10 K under ambient temperature

The use of filter regulator for air supply of positioner is strongly recommended. It reduces the air pressure to actuator's maximum pressure and keeps it constant.

### Ambient conditions

Ambient temperature <sup>1)</sup> .....-40 to 80 °C (-40 to 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 to 80 °C (-58 to 176 °F)  
 Storage conditions  
 acc. to IEC 60 721-3-1 ..... 1K5, 1B1, 1C2, 1S3, 1M2  
 Protection class ..... IP 54; IP65 as an option  
 IP65 protection class can be selected from model code option -FA or can be retrofit on existing device by ordering the kit EW 411 406 301.

### 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 2004/108/EC  
 Low-voltage regulation ..... not applicable

### Response characteristic <sup>2)</sup>

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

### Air output

Load effect <sup>3)</sup> ..... -3 % for delivery flow  
 2350 l<sub>n</sub>/h (83 scfh)  
 ..... +3 % for exhausted flow  
 1900 l<sub>n</sub>/h (67 scfh)

### Capacity at max. deviation

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

1) Note the section "Explosion protection" on pages 6 and 7 with respect to explosion-protected equipment  
 2) 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)  
 3) 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  
blue

All moving parts of  
feedback system ..... 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 to12 mm (0.24 to 0.47 in)

Screw terminals ..... Screw terminals for wires  
up to 2.5 mm (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 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 <sup>1)2)3)</sup>

#### Current consumption

Vane clear ..... > 3 mA

Vane interposed ..... < 1 mA

for control circuit with the following electrical values

Supply voltage ..... DC 8 V, R<sub>i</sub> approx. 1 kOhm

Residual ripple ..... < 5 % permissible

line resistance ..... < 100 Ohms

#### Response characteristic <sup>6)</sup>

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 <sup>2)4)</sup>

Supply voltage U<sub>s</sub> ..... DC 10 to 30 V

Residual ripple ..... ± 10 %, U<sub>s</sub> = 30 V

Switching frequency ..... 2 kHz

Constant current ..... 100 mA

#### Response characteristics <sup>6)</sup>

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 <sup>2)5)</sup>

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 <sup>6)</sup>

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 to 10 bar (0 to 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 T, one switching amplifier is required  
For the security version Code 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 to 100 mm (0.3 to 4 in)
Angular range .....	60° to 120 °
Output .....	two-wire system
Signal range .....	4 to 20 mA
Permitted load .....	$R_{Bmax} = (U_S - 12 \text{ V}) / 0.02 \text{ A}$ ( $U_S =$ Supply voltage)
Power supply	
Supply voltage .....	DC 12 to 36 V
Permitted ripple .....	< 10 % p.p.
Supply voltage dependency .....	< 0.2 %
Response characteristic <sup>1)</sup>	
Non-linearity with terminal based setting .....	< 1.0 % F.S.
Hysteresis .....	< 0.5 % F.S.
External resistance dependency .....	< 0.2 % / $\square R_{Bmax}$
Temperature effect .....	< 0.3 % / 10 K
Part set for later installation	
Code F .....	EW 420 661 124

**Common data <sup>2)</sup>**

Ambient conditions	
Ambient temperature <sup>3) 4)</sup> ...	-25 to 80 °C (-13 to 176 °F)
Relative humidity .....	up to 100 %
Operating conditions	
acc. to IEC 654-1 .....	The device can be operated at a class D2 location
Transport and storage temperature .....	-40 to 80 °C (-40 to 176 °F)
Protection class .....	IP 54, IP65
Mounting .....	attachment to positioner
Electrical connections	
Line entry .....	1 or 2 cable glands M20x 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 .....	Screw terminals for wires up to 2.5 mm <sup>2</sup> (AWG 14)
Optionally .....	Screwed gland made of Stainless steel 1.4305
Materials	
Base plate .....	galvanized Steel
Control vane .....	Aluminum
Setting mechanism .....	Fiber glass reinforced Polyamide

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 to 80 °C (-40 to 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 Ex ia/ib <sup>1)</sup>

**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<sub>i</sub> ..... 30 V  
 I<sub>i</sub> ..... 150 mA  
 P<sub>i</sub> ..... refer to following table:

P <sub>i</sub> [W]	T <sub>6</sub> [°C]	T <sub>4</sub> [°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 Ex ib/ia IIB/IIC  
 with the following maximum values:  
 U<sub>i</sub> ..... 16 V  
 I<sub>i</sub> ..... 25 mA  
 P<sub>i</sub> ..... 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 Code F (additional equipment)

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<sub>i</sub> ..... 30 V  
 I<sub>i</sub> ..... 130 mA  
 P<sub>i</sub> ..... 0.9 W

For temperature class T4 and a maximally permissible  
 outside ambient temperature of 60 °C:  
 U<sub>i</sub> ..... 22 V  
 I<sub>i</sub> ..... 66 mA  
 P<sub>i</sub> ..... 0.5 W

The effective internal inductance L<sub>i</sub> left amounts to 9 µH, the effective capacity C<sub>i</sub> 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 <sup>1)</sup>**

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 <sup>1)</sup>**

Electro-pneumatic positioner type BIM 633

Intrinsically safe, Class I, Division 1,

Groups A, B, C, D, hazardous locations

**Explosion protection according to INMETRO**

see certificate

**Explosion protection according to CU TR**

EAC marking see certificate

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1) National installation regulations must be observed

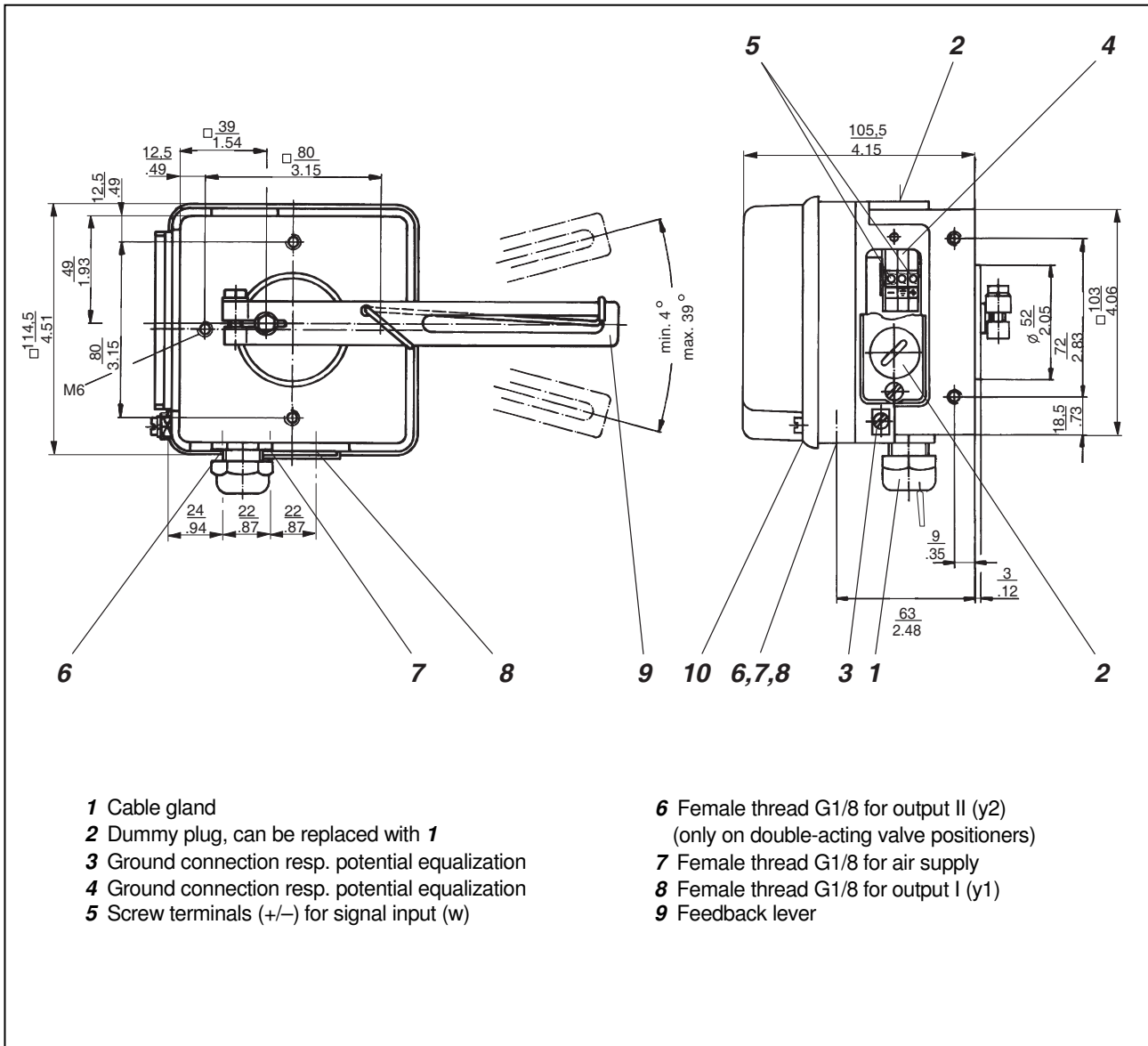




**MODEL CODES Accessories**

<b>Attachment kit</b>	<b>EBZG</b>
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
<i>Further Attachment kits on request. See also our website.</i>	
<b>Couple lever / cam</b>	
Standard (a = 72 mm) .....	-AN
Extended (a = 91 mm) .....	-BN
Inverse equal percentage cam for rotary actuators .....	-CN
<b>Spring set</b>	<b>FESG</b>
Range springs (4 pcs) .....	-FN
<b>Manifold (Connection 1/4-18NPT)</b>	<b>LEXG</b>
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
<b>Booster (Connection 1/4-18NPT)</b>	<b>VKXG</b>
for version single acting (for SRP981, SRI986) .....	-FN
for version double acting (for SRP981, SRI986) .....	-GN
for version single acting with double output capacity (for SRP981, SRI986) .....	-HN
<b>Adapter (Material SS)</b>	<b>AD</b>
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
<b>Cable gland</b>	<b>BUSG</b>
M20x1.5 Plug connector for Fieldbus (ss/ threaded connection 7/8 - UN) .....	-F2
M20x1.5 plastics, color gray .....	-K6
M20x1.5 plastics, color blue .....	-K7
M20x1.5 plastics, color black .....	-K8
M20x1.5 plastics, color white .....	-K9
M20x1.5 Plug connector for Fieldbus (ss/ threaded connection M12) .....	-P3
M20x1.5 HF cable gland for Fieldbus (ss) .....	-P4
M20x1.5 Stainless steel .....	-S6

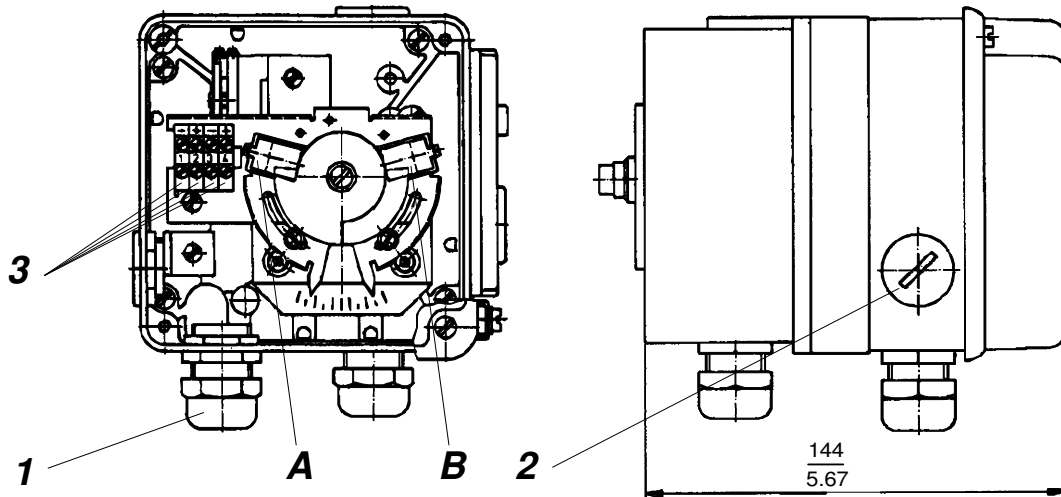
**DIMENSIONS SRI986**



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li><b>1</b> Cable gland</li> <li><b>2</b> Dummy plug, can be replaced with <b>1</b></li> <li><b>3</b> Ground connection resp. potential equalization</li> <li><b>4</b> Ground connection resp. potential equalization</li> <li><b>5</b> Screw terminals (+/-) for signal input (w)</li> </ul> | <ul style="list-style-type: none"> <li><b>6</b> Female thread G1/8 for output II (y2)<br/>(only on double-acting valve positioners)</li> <li><b>7</b> Female thread G1/8 for air supply</li> <li><b>8</b> Female thread G1/8 for output I (y1)</li> <li><b>9</b> Feedback lever</li> </ul> |
|---|--|

**DIMENSIONS Additional Equipment**

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

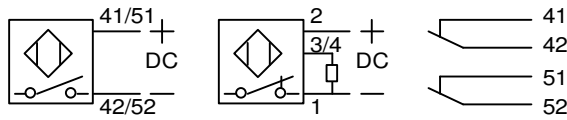
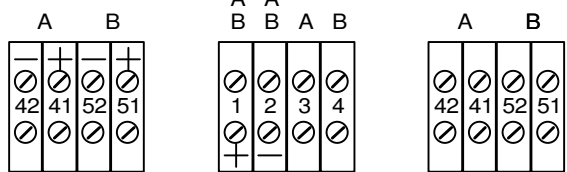


**Built-in Limit Switch Code**

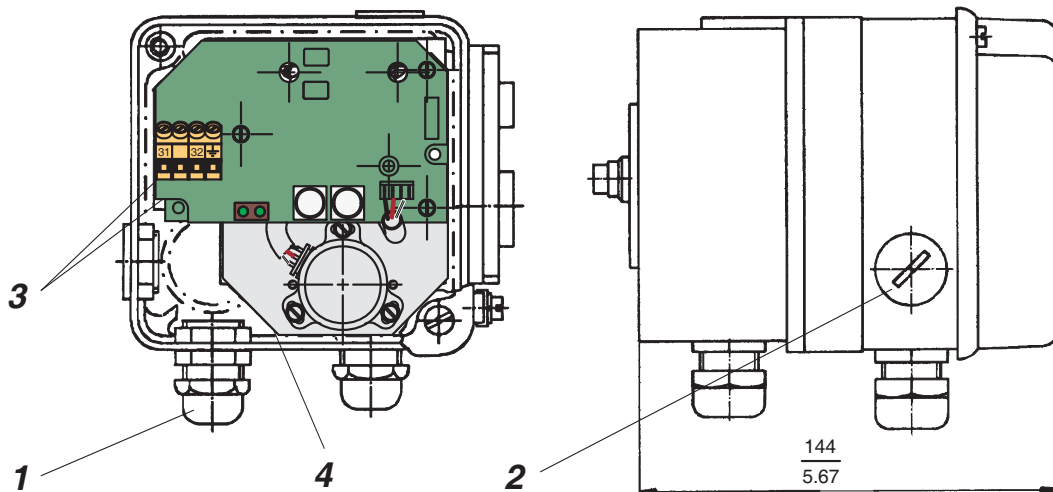
P, Q, T, U

R

V



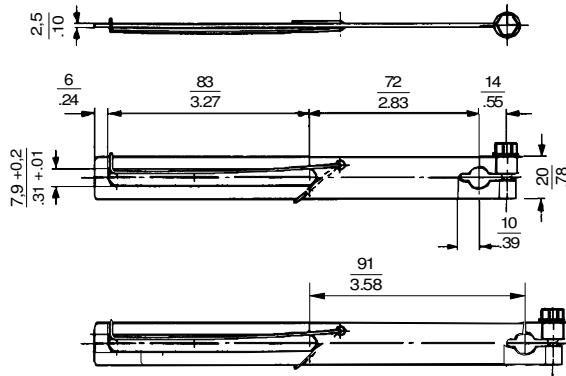
**Built-in Position Transmitter Code F**



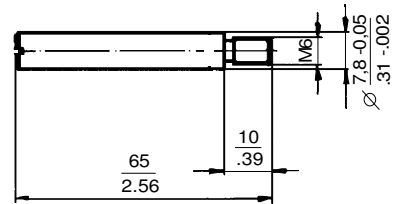
- 1** Cable gland
- 2** Dummy plug, can be replaced with **1**
- 3** Connection terminals (+/-)
- 4** Ground connection
- A** Limit switch
- B** Limit switch

**DIMENSIONS Attachment Kit for Diaphragm Actuators**

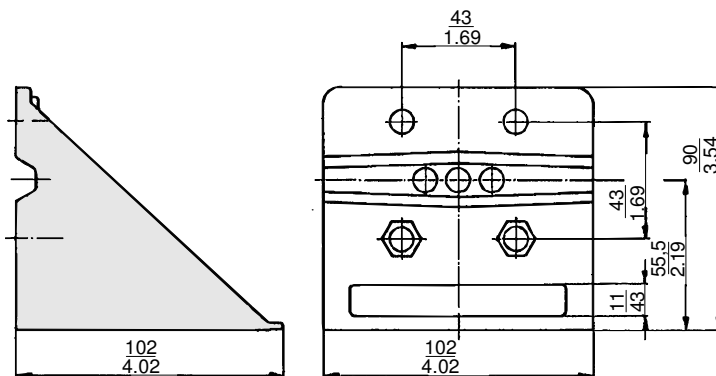
**Feedback lever**  
Code EBZG - HN, - KN, - AN



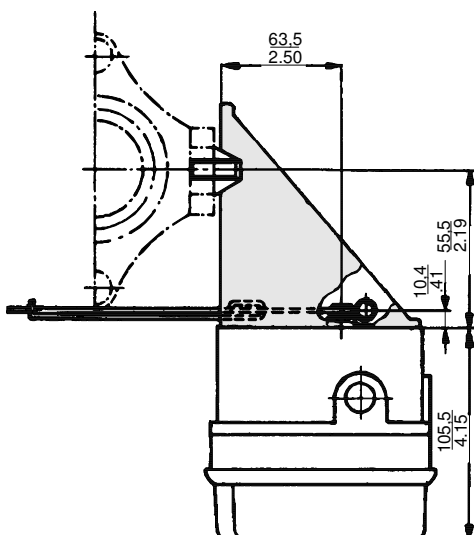
**Carrier bolt for attachment to valve stem**



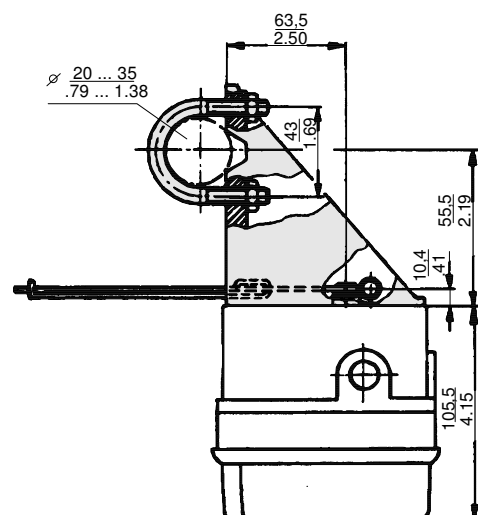
**Dimensions of Mounting bracket acc. to IEC 534-6 (NAMUR)**  
for Code EBZG - HN, - KN



**Attachment to casting yoke**  
acc. to IEC 534-6 (NAMUR)  
Code EBZG - HN

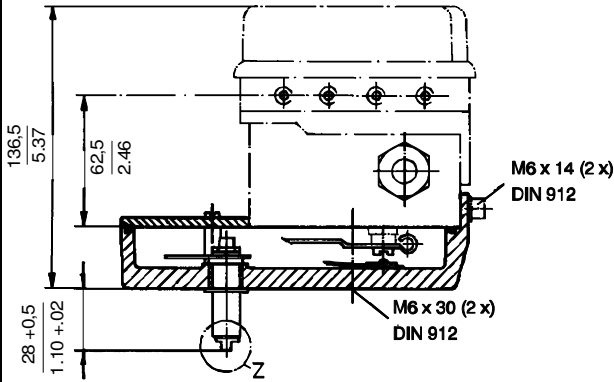


**Attachment to casting yoke**  
acc. to IEC 534-6 (NAMUR)  
Code EBZG - HN

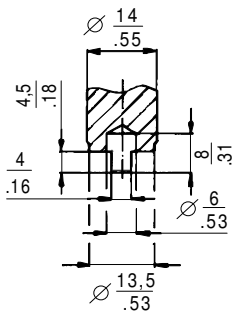


**DIMENSIONS Attachment Kit for Rotary Actuators**

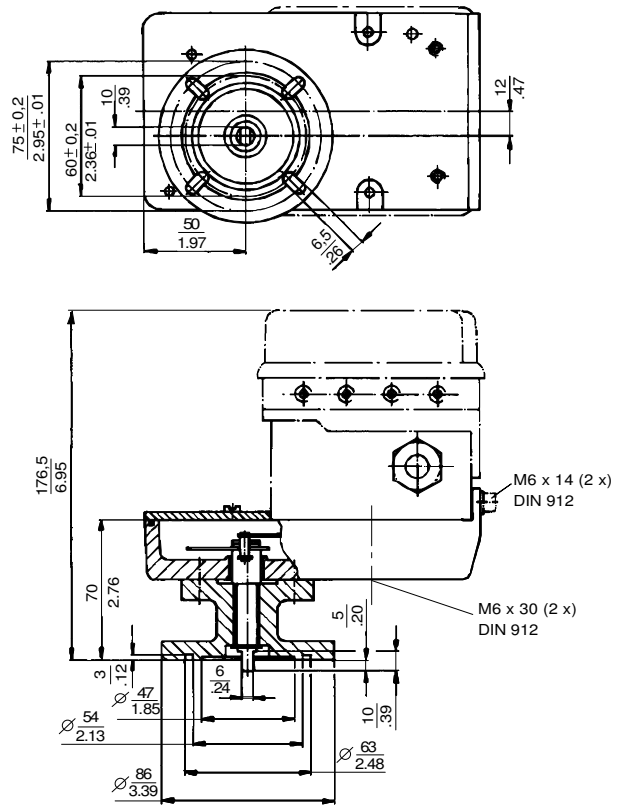
**with shaft (acc. to VDI/VDE 3845)  
Code EBZG - ZN**



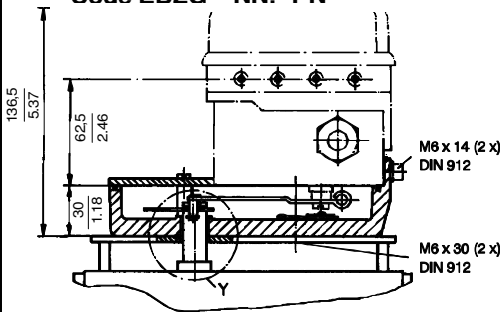
Detail Z



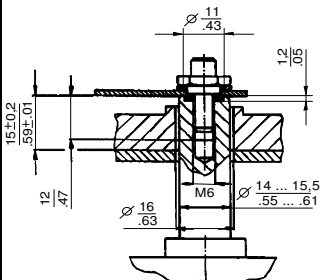
**with flange  
Code EBZG - JN**



**with flange  
Code EBZG - NN. -PN**

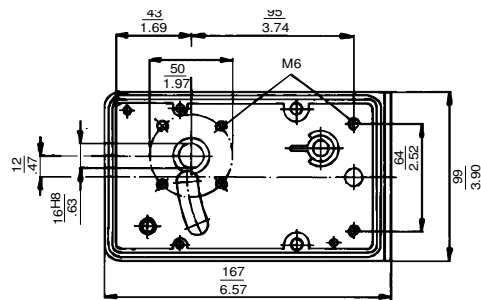


Detail Y



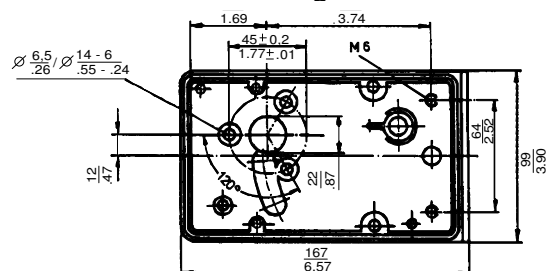
**Housing dimensions**

Attachment kit with shaft -ZN resp. without flange -N



**Housing dimensions**

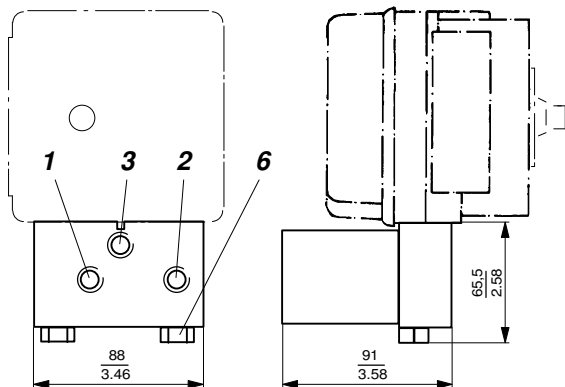
Attachment kit without flange -PN



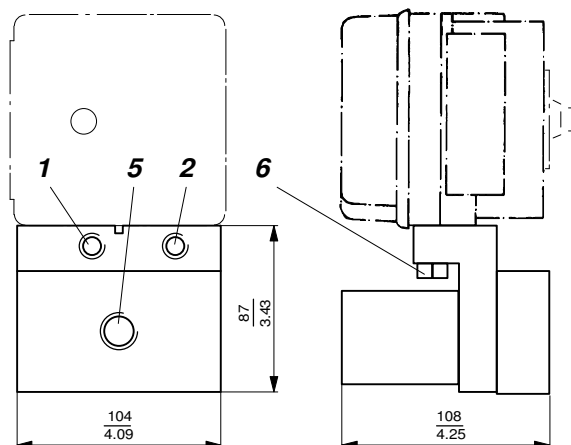
Adaption of the actuator drive shaft end  
and correct axial location by customer!

## DIMENSIONS Booster

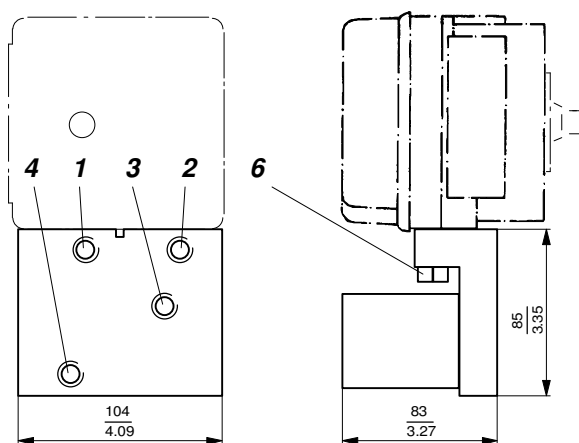
**Booster single acting**  
Code VKXG -FN



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



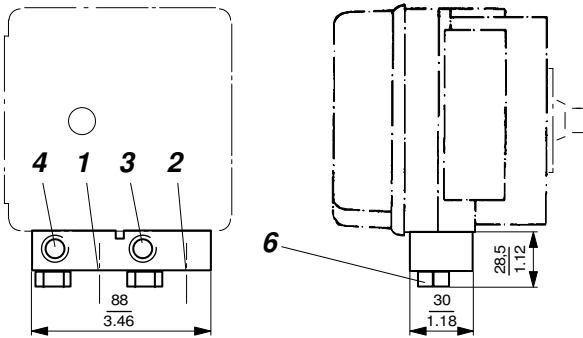
**Booster double acting**  
Code VKXG -GN



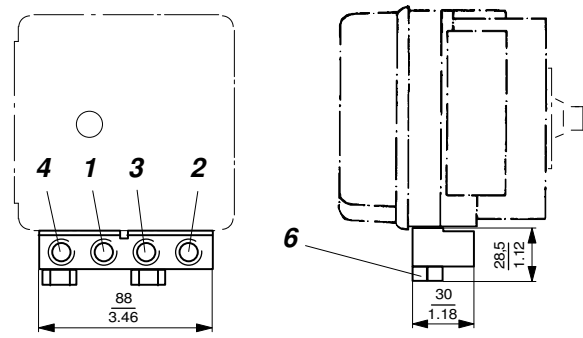
- 1** Female thread 1/4-18 NPT for supply air
- 2** Female thread 1/4-18 NPT not used
- 3** Female thread 1/4-18 NPT for output I (y1)
- 4** Female thread 1/4-18 NPT for output II (y2)
- 5** Female thread 1/2-14 NPT for output I (y1)
- 6** Fixing screws 17 mm A/F

**DIMENSIONS Connection Manifold**

**Connection Manifold  
Code LEXG-BN**

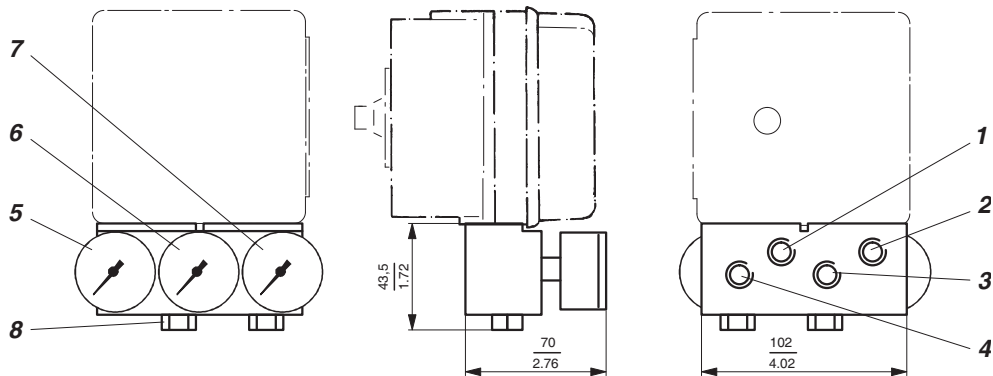


**Connection Manifold  
Code LEXG-CN**



- 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)
- 6 Fixing screws 17 mm A/F

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



Connection Manifold Code	5 Gauge for Supply	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)
- 8 Fixing screws 17 mm A/F

Schneider Electric Systems USA, Inc.  
38 Neponset Avenue  
Foxboro, MA 02035  
United States of America  
<http://www.schneider-electric.com>

Global Customer Support  
Inside U.S.: 1-866-746-6477  
Outside U.S.: 1-508-549-2424  
<https://pasupport.schneider-electric.com>

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