

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 range4 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 range8 to 100 mm (0.3 to 4 in)
 Angular range
 Linear30 ° to 120 °
 Equal percentage90 °; from 70 ° linear

Output

Output to actuator 0 to 100 % supply air pressure

Supply

Supply air pressure1.4 to 6 bar (20 to 90 psig)
 Air supplyaccording to ISO 8573-1
 - Solid particle size and density class 2
 - Oil rateclass 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 ¹⁾-40 to 80 °C (-40 to 176 °F)
 Relative humidityup to 100 %
 Operating conditions
 According to IEC 654-1The 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 conditionsindustrial environment
 Immunity according to
 - EN 61326, EN 61000-6-2fulfilled
 Emission according to
 - EN 61326, Class A,
 - EN 61000-6-3fulfilled
 NAMUR recommendationfulfilled

CE marking

Electromagnetic compatibility 2004/108/EC
 Low-voltage regulation not applicable

Response characteristic ²⁾

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 ³⁾ -3 % for delivery flow
 2350 l_n/h (83 scfh)
 +3 % for exhausted flow
 1900 l_n/h (67 scfh)

Capacity at max. deviation

Supply air pressure bar (psig)	1.4 (20)	2 (30)	4 (60)	6 (90)
without booster l _n /h (scfh)	2 700 (95)	3 500 (124)	5 500 (194)	7 500 (265)
with booster VKXG-FN/GN l _n /h (scfh)	18 000 (636)	24 000 (847)	40 000 (1 492)	55 000 (1 942)
with booster VKXG-HN l _n /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 bracketAluminum (Alloy No. 230)

Weight

single actingapprox. 1.5 kg (3.3 lbs)

double actingapprox. 1.8 kg (3.9 lbs)

Attachment kit
for diaphragm actuatorsapprox. 0.3 kg (0.6 lbs)

for rotary actuatorsapprox. 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 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 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 to 30 V

Residual ripple ± 10 %, U_s = 30 V

Switching frequency 2 kHz

Constant current 100 mA

Response characteristics 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 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 ¹⁾	
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 ²⁾

Ambient conditions	
Ambient temperature ^{3) 4)} ...	-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 ² (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 ¹⁾

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 following table:

P _i [W]	T ₆ [°C]	T ₄ [°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_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 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_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.

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 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 ¹⁾

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

1) National installation regulations must be observed

MODEL CODES SRI986

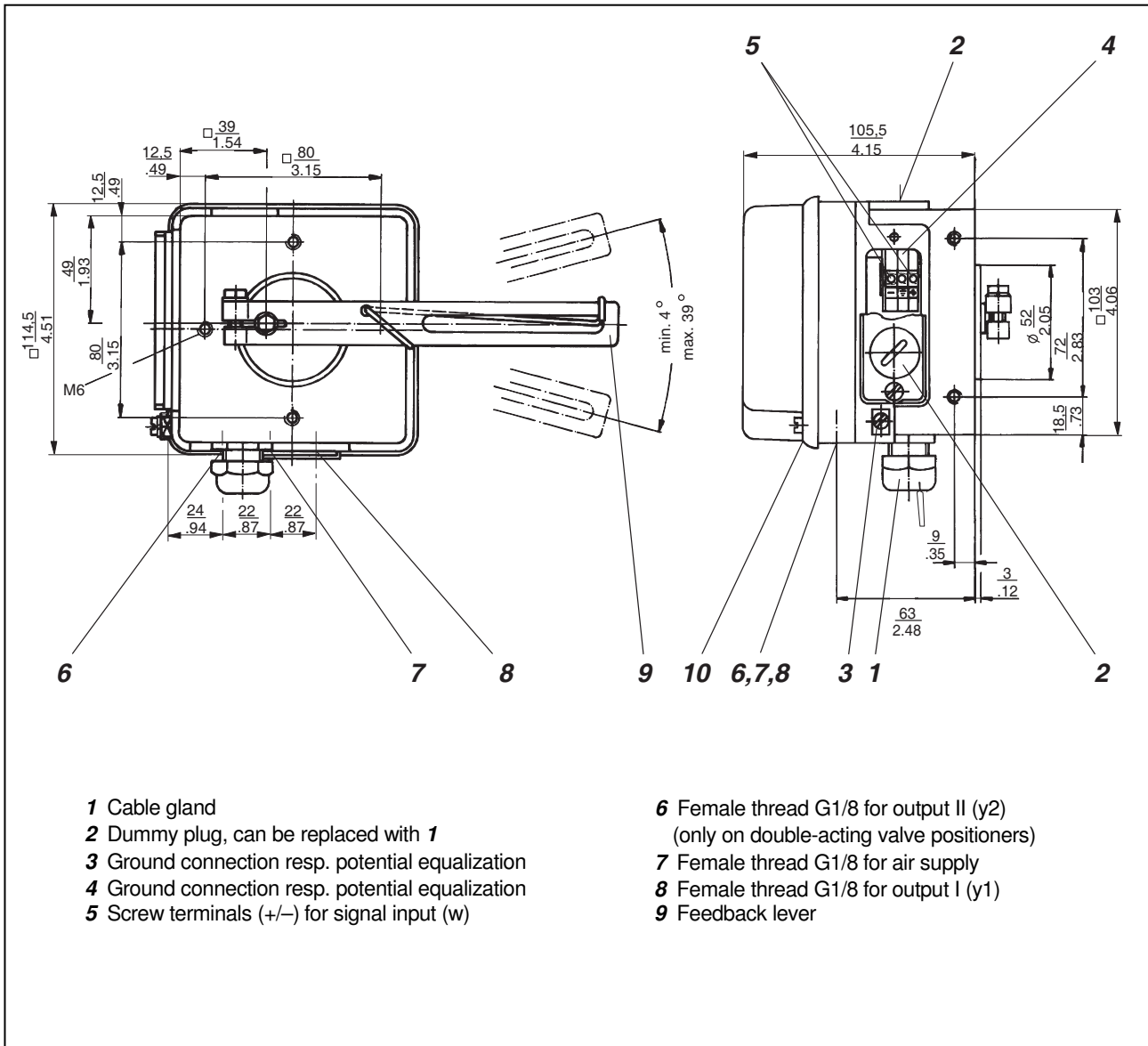
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Electro-Pneumatic Positioner		SRI986								
Version										
Single acting.....										-B
Double acting										-C
Input										
Signal range 4 – 20 mA.....										I
Mode of Action										
Direct Version: Increasing input increases output.....										D
Reverse Version: Increasing input decreases output.....									(z)	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 Ex ia IIC T6 Gb 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
EAC approved for intrinsic safety										EAC
INMETRO approved for intrinsic safety										BAA
Without.....										ZZZ
Attachment Kit										
Order as auxiliary										N
Manifold										
Order as auxiliary										A
Options										
Amplifier free of nonferrous metals									(a)	-C
Protection Class IP65 made with non return valve exhaust.....										-FA
Certificate EN 10204-2.1 certificate of compliance with the order										-1
Tag No. Labeling										
Stamped with water resistant color										-G
Stainless steel label fixed with wire.....										-L
<p>a) Not available with FAA & CAA d) Not available with limit switch codes R, V</p>										

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
<i>Further Attachment kits on request. See also our website.</i>	
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 (4 pcs)	-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 double 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
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

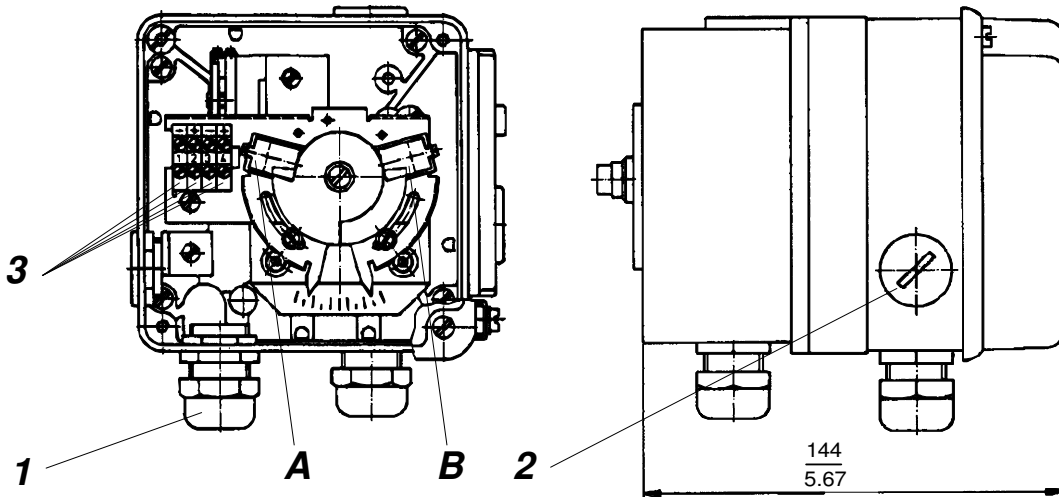
DIMENSIONS SRI986



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

DIMENSIONS Additional Equipment

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

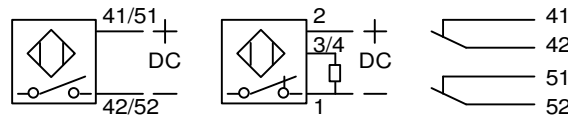
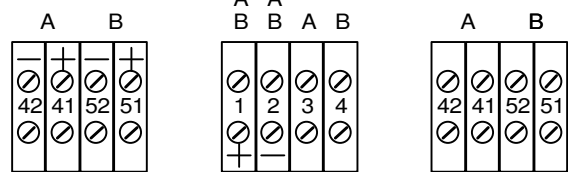


Built-in Limit Switch Code

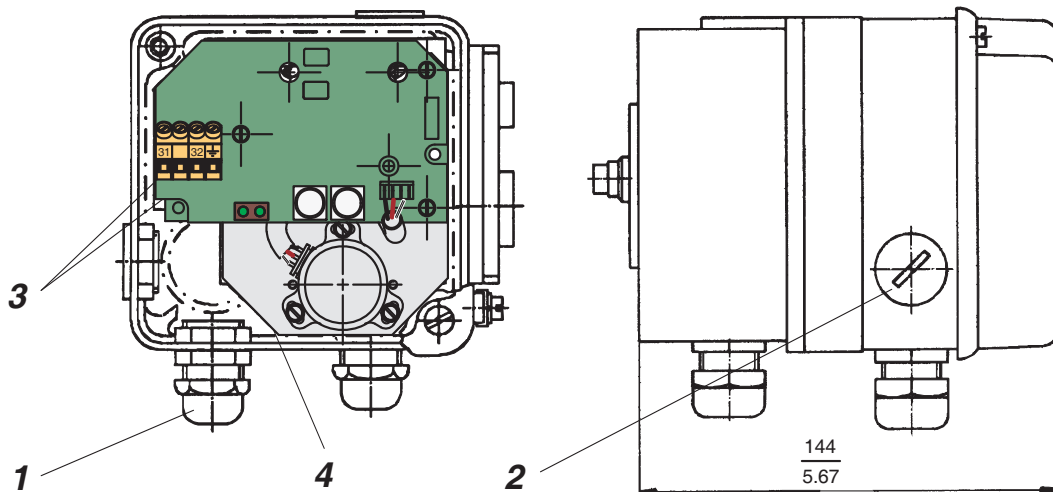
P, Q, T, U

R

V



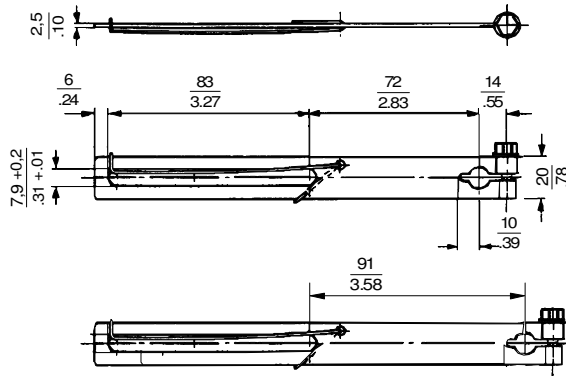
Built-in Position Transmitter Code F



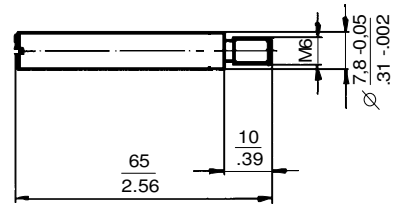
- 1** Cable gland
- 2** Dummy plug, can be replaced with **1**
- 3** Connection terminals (+/-)
- 4** Ground connection
- A** Limit switch
- B** Limit switch

DIMENSIONS Attachment Kit for Diaphragm Actuators

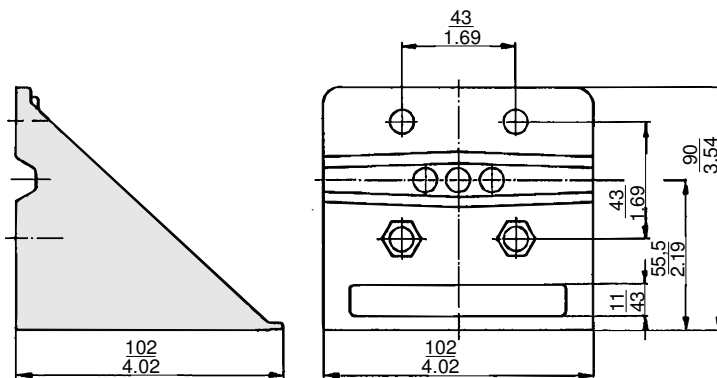
Feedback lever
Code EBZG - HN, - KN, - AN



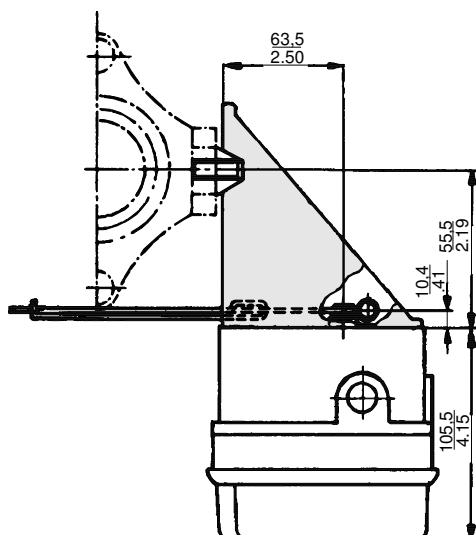
Carrier bolt for attachment to valve stem



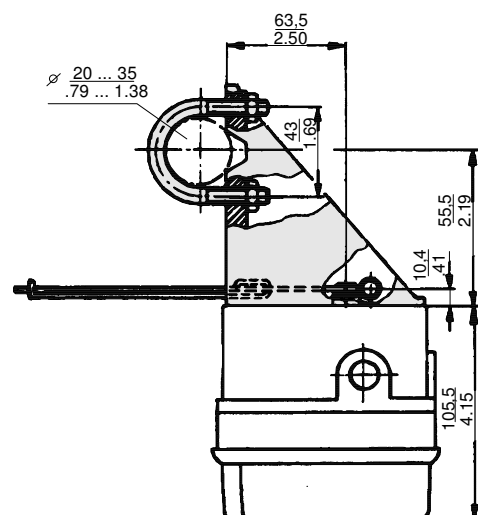
Dimensions of Mounting bracket acc. to IEC 534-6 (NAMUR)
for Code EBZG - HN, - KN



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

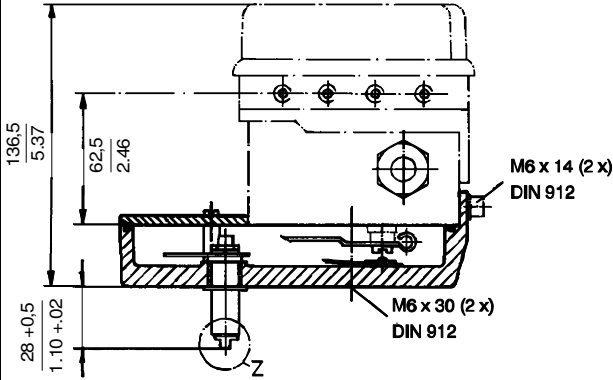


Attachment to casting yoke
acc. to IEC 534-6 (NAMUR)
Code EBZG - HN

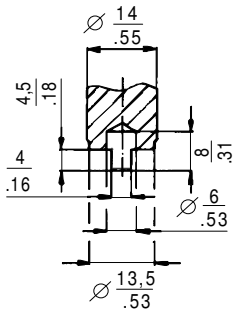


DIMENSIONS Attachment Kit for Rotary Actuators

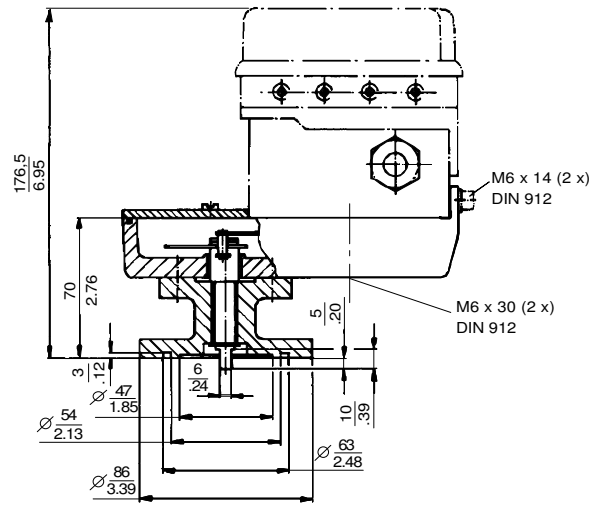
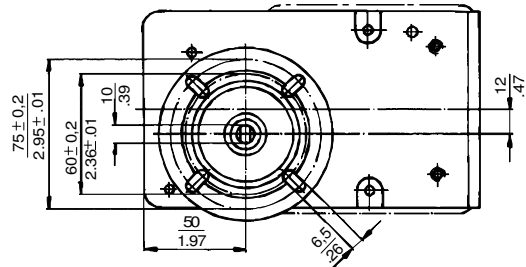
**with shaft (acc. to VDI/VDE 3845)
Code EBZG - ZN**



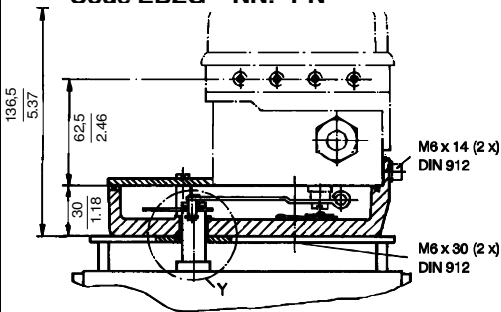
Detail Z



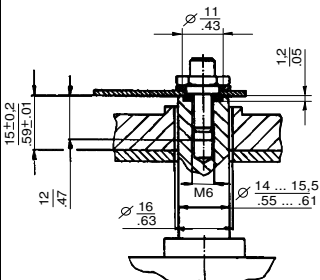
**with flange
Code EBZG - JN**



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

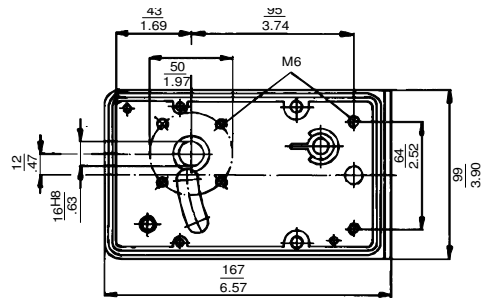


Detail Y



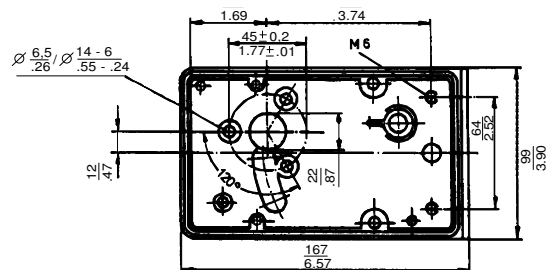
Housing dimensions

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



Housing dimensions

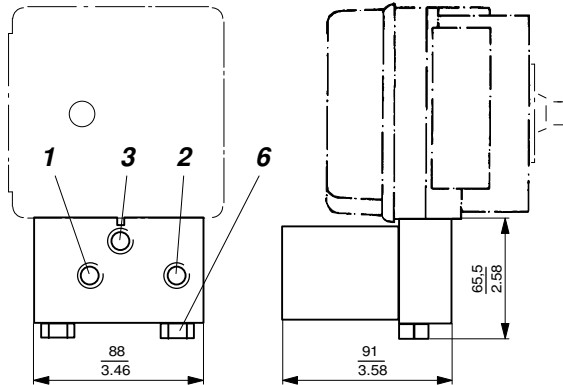
Attachment kit without flange -PN



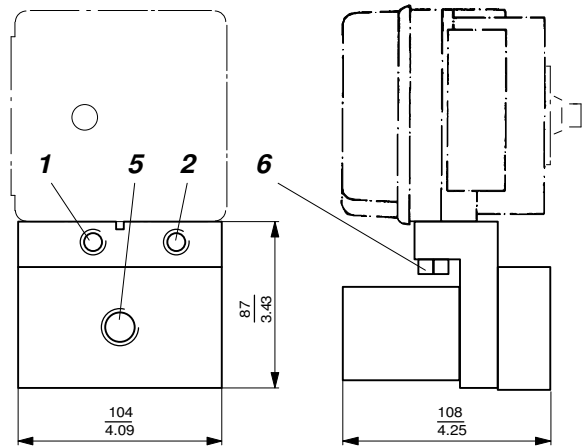
Adaption of the actuator drive shaft end
and correct axial location by customer!

DIMENSIONS Booster

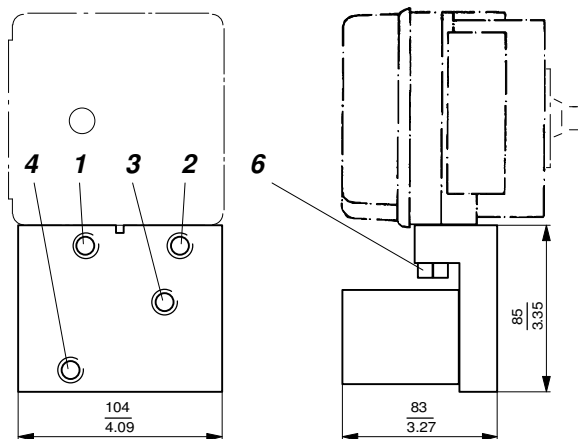
Booster single acting
Code VKXG -FN



Booster single acting with double capacity
Code VKXG -HN



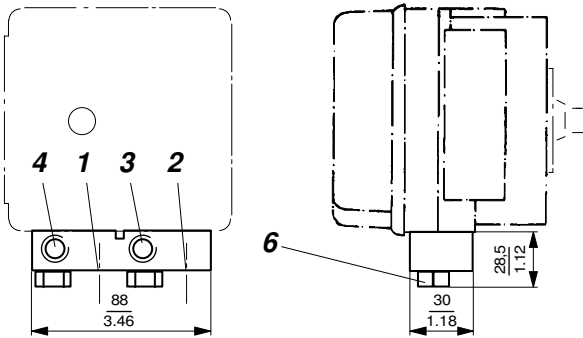
Booster double acting
Code VKXG -GN



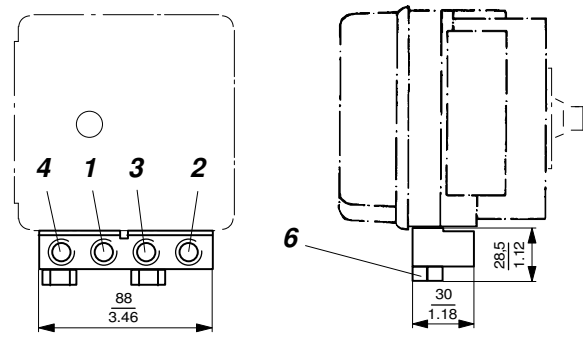
- 1** Female thread 1/4-18 NPT for supply air
- 2** Female thread 1/4-18 NPT not used
- 3** Female thread 1/4-18 NPT for output I (y1)
- 4** Female thread 1/4-18 NPT for output II (y2)
- 5** Female thread 1/2-14 NPT for output I (y1)
- 6** Fixing screws 17 mm A/F

DIMENSIONS Connection Manifold

**Connection Manifold
Code LEXG-BN**

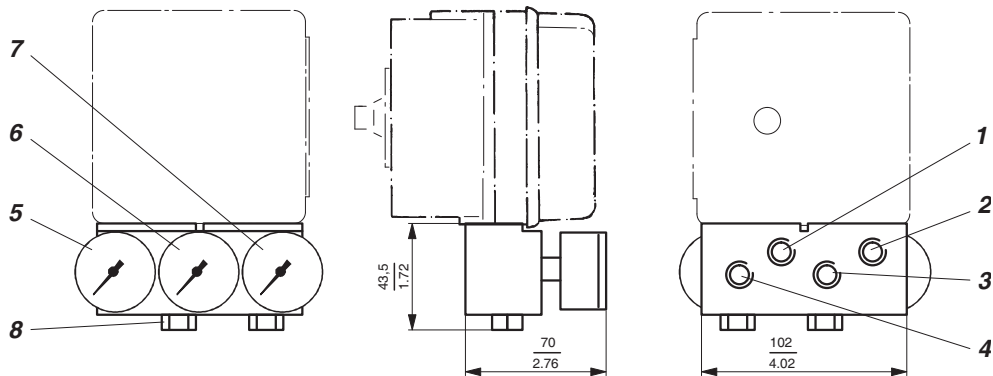


**Connection Manifold
Code LEXG-CN**



- 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