

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
- Explosion protection:
II 2 G EEx ia IIC T6 according to ATEX or
intrinsic safe 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

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 ¹⁾ -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 -F 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 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 effect³⁾ -3 % for delivery flow
2350 l/h (83 scfh)
. +3 % for exhausted flow
1900 l/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 VKXG-FN/GN I _N /h (scfh)	18 000 (636)	24 000 (847)	40 000 (1 492)	55 000 (1 942)
with booster VKXG-HN I _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
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 to 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

Reponse 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 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

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]	T6 [°C]	T4 [°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

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

Electro-Pneumatic Positioner		SRI986										070715
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		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										
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										
Designed For Auxiliary Energy Oxygen Max 6 Bar (With BAM Certificate)		-S										
LLoyd's Register of Shipping		-X										
Certificate EN 10204-2.1 - Certificate of compliance with the order		-1										
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

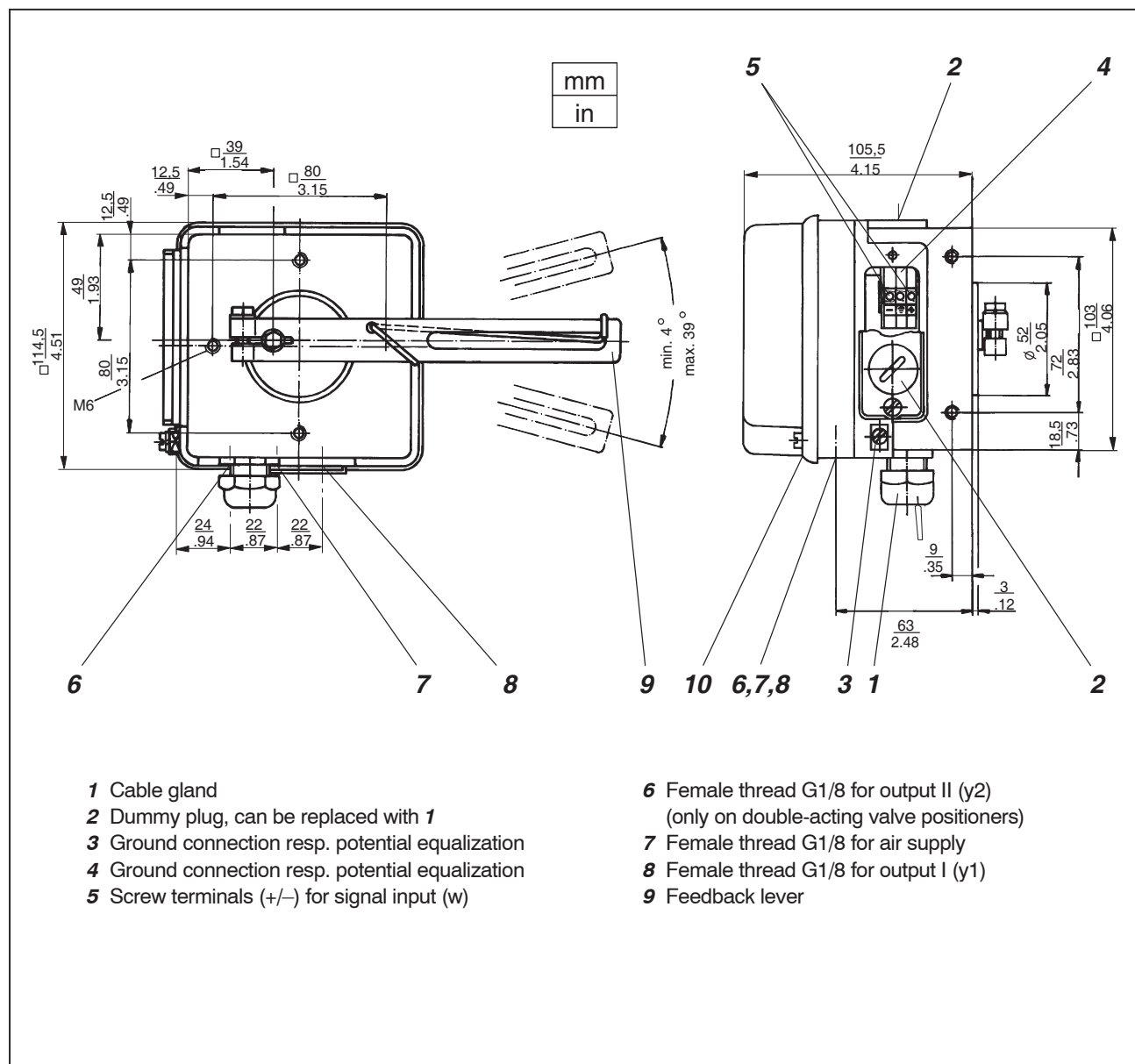
a) Not available with FAA & CAA

d) Not available with Limit Switch Codes R, V

MODEL CODES Accessories

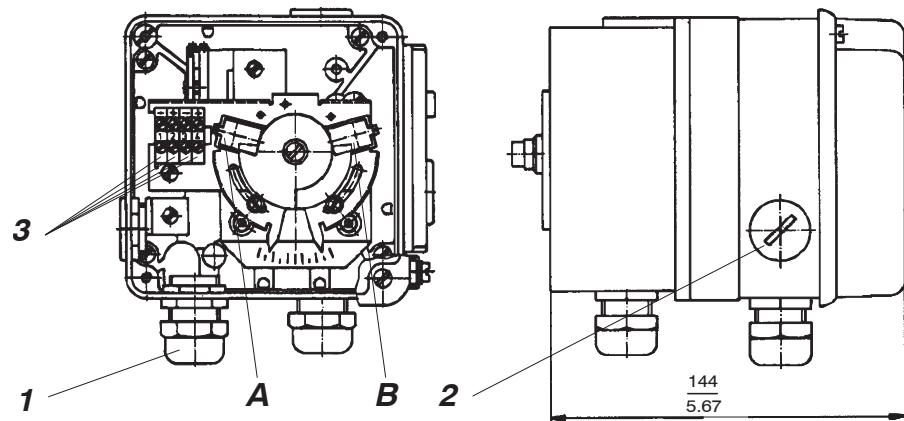
Attachment kit	EBZG	
for diaphragm actuators with casting yoke acc. to NAMUR (incl. standard Couple lever) (for SRI986)		-HN
for diaphragm actuators with pillar yoke acc. to NAMUR (incl. standard Couple lever) (for SRI986)		-KN
for rotary actuators, without flange, 3 drill holes 6.5 mm (for SRP981, SRI983, 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 http://www.foxboro-eckardt.eu/products/positioners_en/Attachment_Kits</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 (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 SRI986

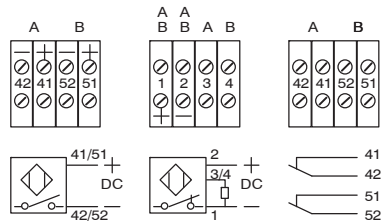


DIMENSIONS Additional Equipment

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

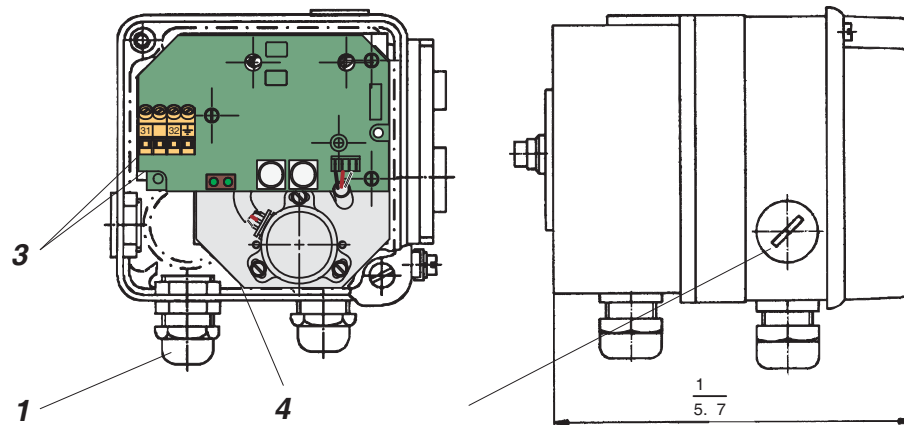


Built-in Limit Switch Code
P, Q, T, U R V



mm
in

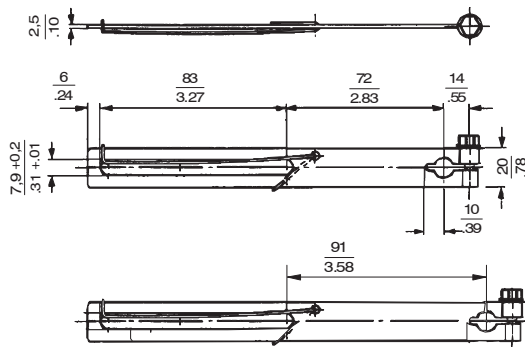
Built-in Position Transmitter Code F



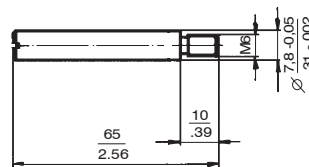
- 1 Cable gland
- 2 Dummy plug, can be replaced with 1
- 3 Connection terminals (+/-)
- 4 Ground connection
- A Limit switch
- B Limit switch

DIMENSIONS Attachment Kit for Diaphragm Actuators

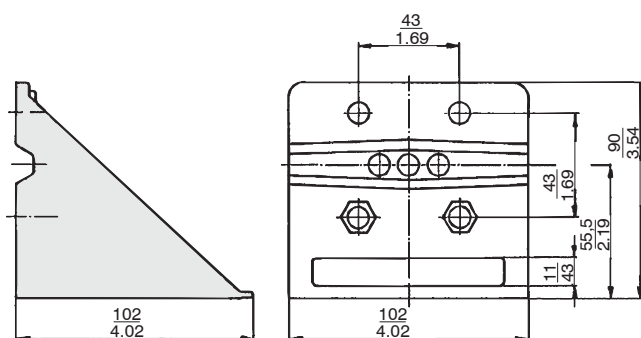
Feedback lever
Code EBZG - HN, - KN, - AN



Carrier bolt for attachment to valve stem

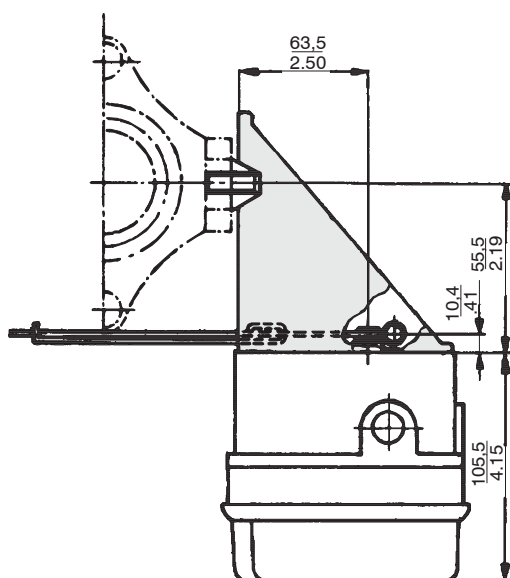


Dimensions of Mounting bracket acc. to IEC 534-6 (NAMUR) for Code EBZG - HN, - KN

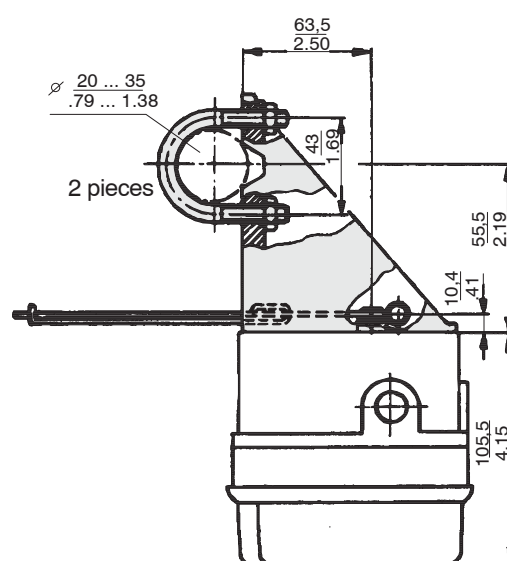


mm
in

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

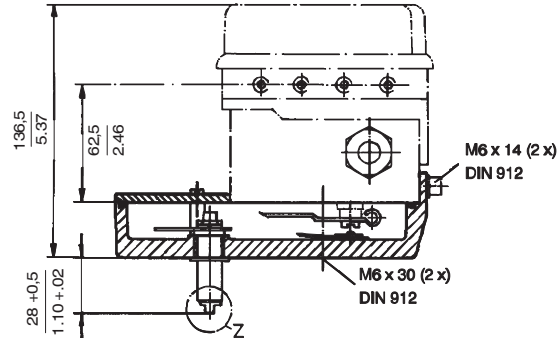


Attachment to pillar yoke acc. to IEC 534-6 (NAMUR) Code EBZG - KN

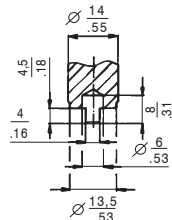


DIMENSIONS Attachment Kit for Rotary Actuators

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

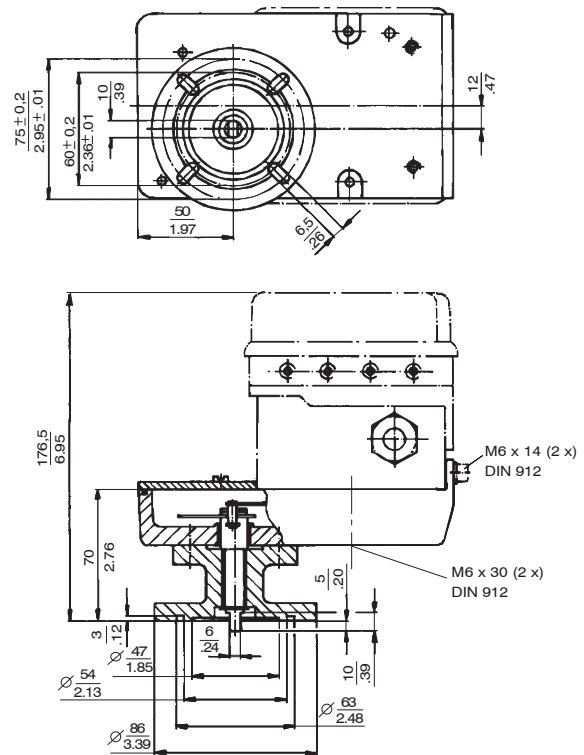


Detail Z



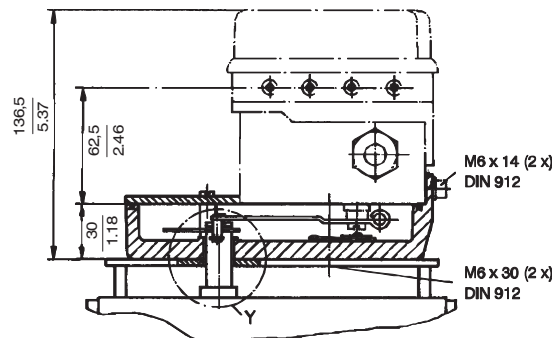
mm
in

with flange
Code EBZG - JN

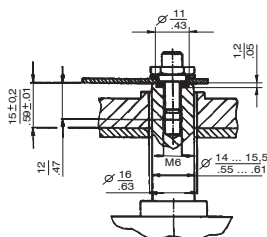


Rotation angle max. 120°; torque requirement 0.14 Nm

without flange
Code EBZG - NN, -PN

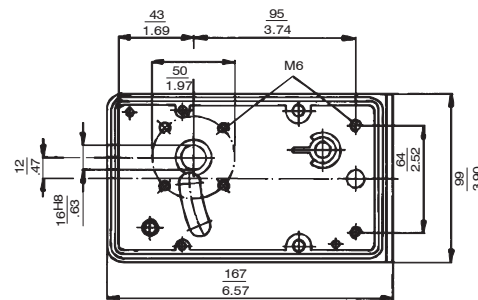


Detail Y

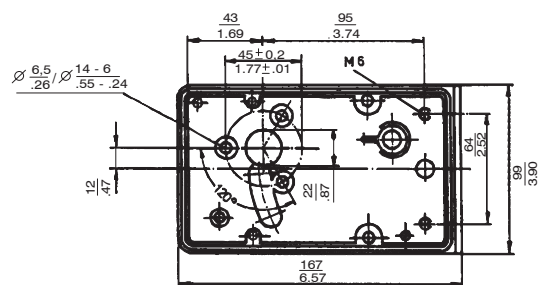


Adaptation of the actuator drive shaft end
and correct axial location by client!

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

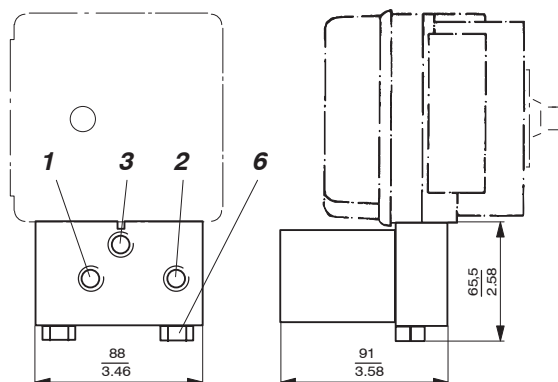


Housing dimensions
attachment kit without flange -PN

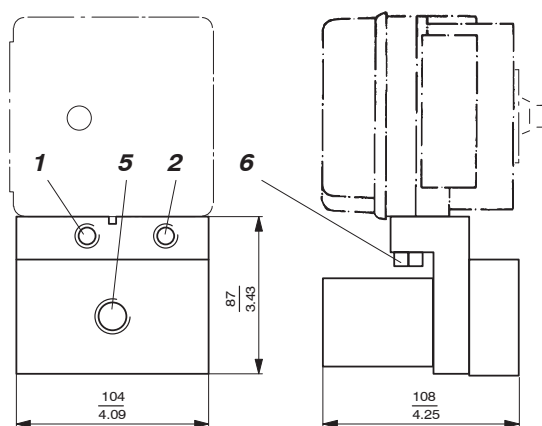


DIMENSIONS Booster

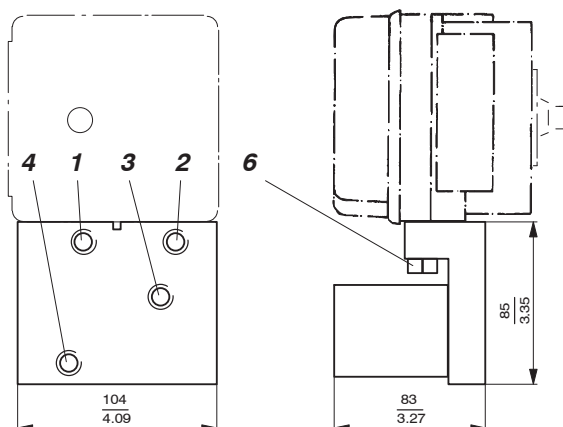
Booster single acting
Code VKXG - FN



Booster single acting with double capacity
Code VKXG - HN



Booster double acting
Code VKXG - GN

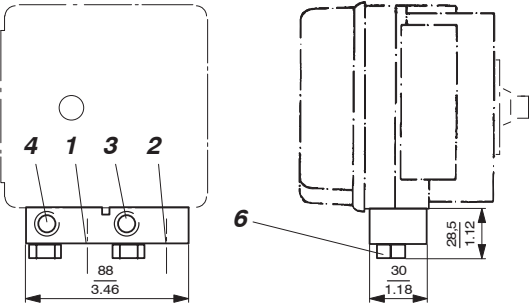


mm
in

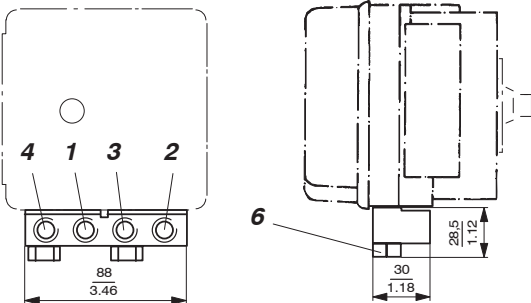
- 1** Female thread 1/4-18 NPT for supply air
- 2** Female thread 1/4-18 NPT not used
- 3** Female thread 1/4-18 NPT for output I (y1)
- 4** Female thread 1/4-18 NPT for output II (y2)
- 5** Female thread 1/2-14 NPT for output I (y1)
- 6** Fixing screws 17 mm A/F

DIMENSIONS Connection Manifold

Connection Manifold
Code LEXG - BN



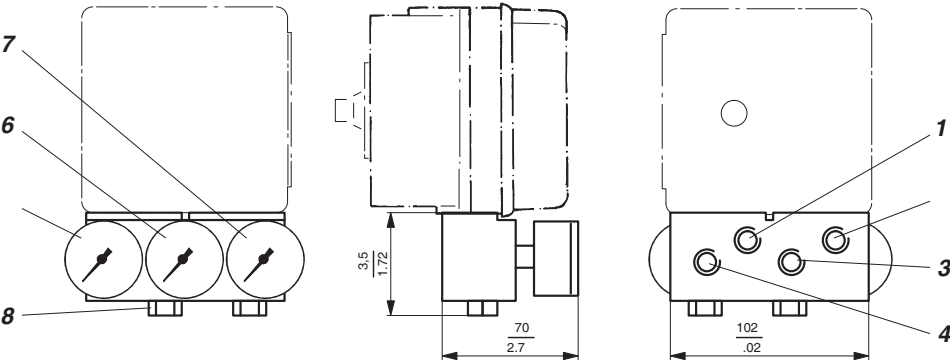
Connection Manifold
Code LEXG - CN



mm
in

- 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



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)
- 8 Fixing screws 17 mm A/F

Additional Documentation for this product

Technical Information of Attachment Kits for Positioners:

[TI EVE0011 A](#) Overview of Attachment Kits of all positioners on actuators/valves of different manufacturers

Quick Guide:

[QG EVE0102 A](#) Extract of Master Instruction for an easily to use, easy understandable and fast start-up.
This document highlights the most important aspects.

Master Instructions:

[MI EVE0102 A](#) SRI986

Additional Documentation for other products

Specifications website

PSS EVE0101	SRP981	Pneumatic Positioner
PSS EVE0102	SRI986	Electro-Pneumatic Positioner
PSS EVE0103	SRI983	Electro-Pneumatic Positioner- explosion proof or EEx d version
PSS EVE0105	SRD991	Intelligent Positioner
PSS EVE0107	SRI990	Analog Positioner
PSS EVE0109	SRD960	Universal Positioner
PSS EMO0100 Accessories for devices with HART Protocol		

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