

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 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 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
grey 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 to 12 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 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 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 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

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 $RB_{max} = (U_s - 12 \text{ V}) / 0.02 \text{ A}$
 $(U_s = \text{Supply voltage})$

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 % / $\Delta R_{B \text{ max}}$
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

according 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.....	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 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 TypeAI 633

Type of protectionII 2 G EEx ib/ia IIB/IIC T4/T6

Certificate of conformityPTB 02 ATEX 2153

For operation in certified intrinsically safe circuits with the following maximum values of input circuit:

U_i30 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 inductancenegligible

Internal capacitancenegligible

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_i25 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 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

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

010716

Intelligent 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					
Lloyd's register of shipping.....						-X					
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					
Example:											
		SRI986		-B		I	D	S	ZZZ	N	A -CG

Footnotes

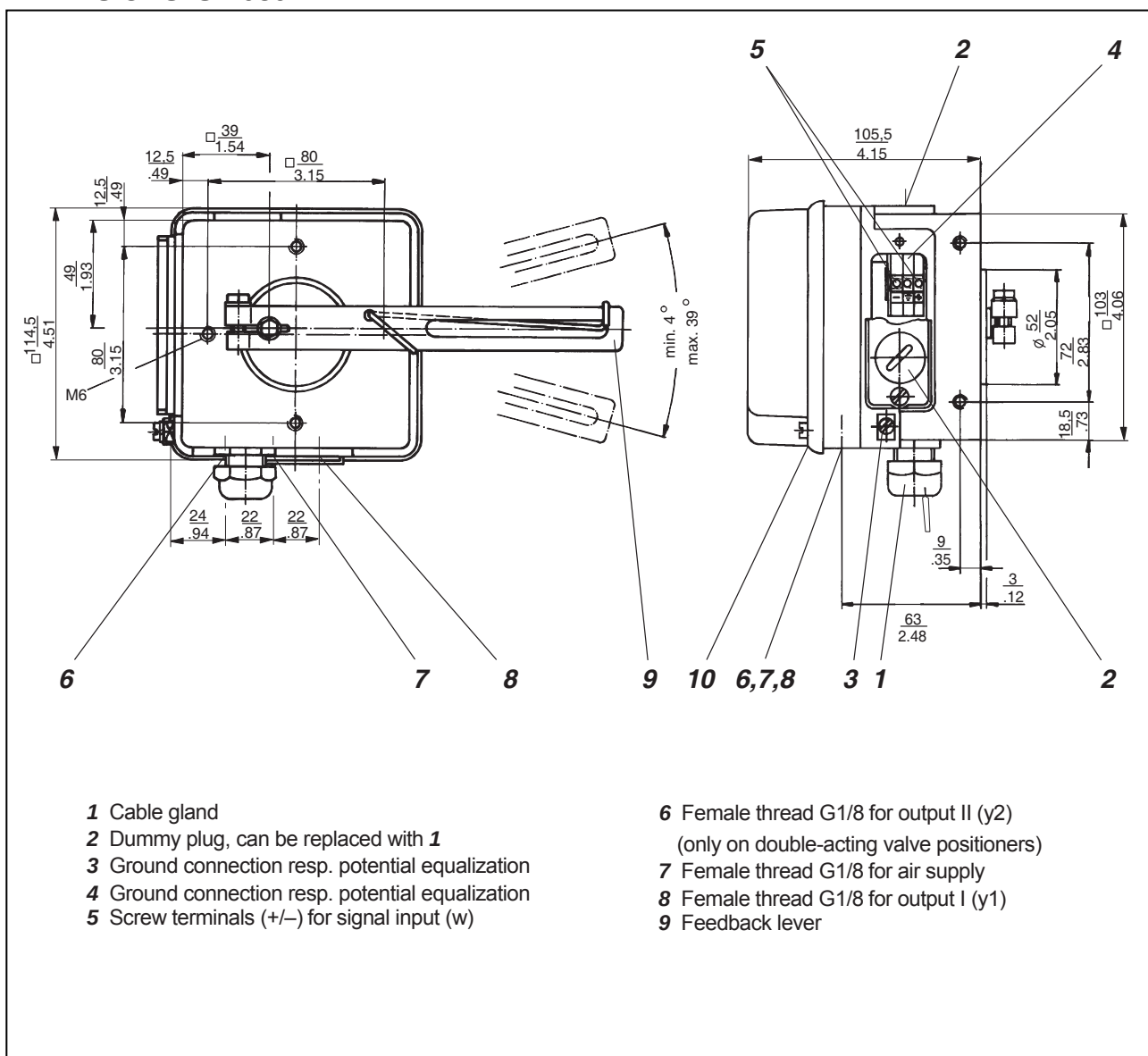
a) Not available with FAA & CAA

d) Not available with limit switch codes R, V

MODEL CODES Accessories

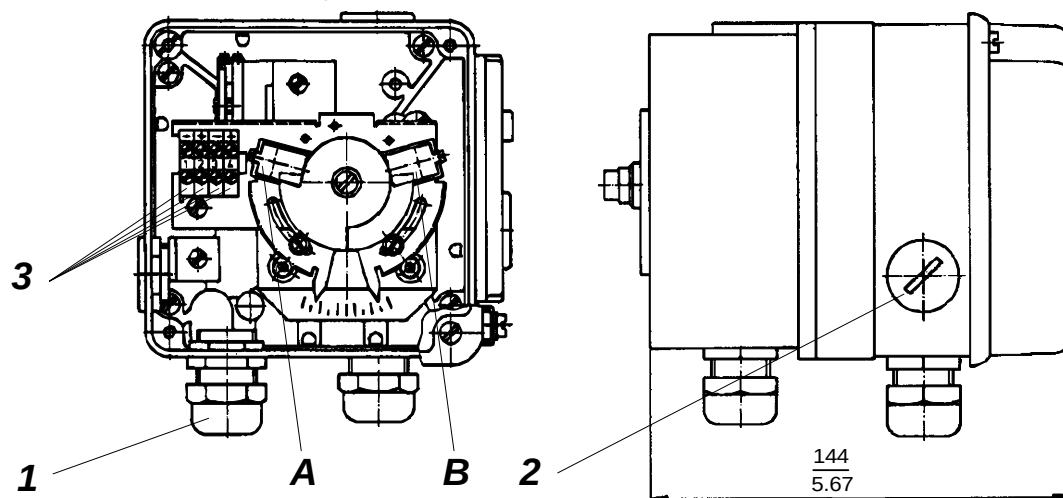
Attachment kit	EBZG
for diaphragm actuators with casting yoke acc. to NAMUR (incl. standard Couple lever) (for SRI986)	-HN
for diaphragm actuators with pillar yoke acc. to NAMUR (incl. standard Couple lever) (for SRI986)	-KN
for rotary actuators, without flange, 3 drill holes 6.5 mm (for SRP981, SRI983, 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 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
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

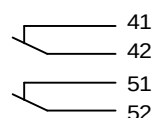
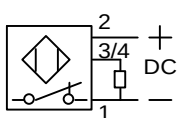
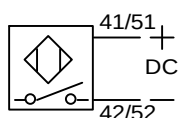
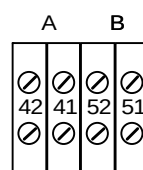
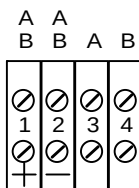
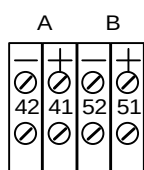


DIMENSIONS Additional Equipment

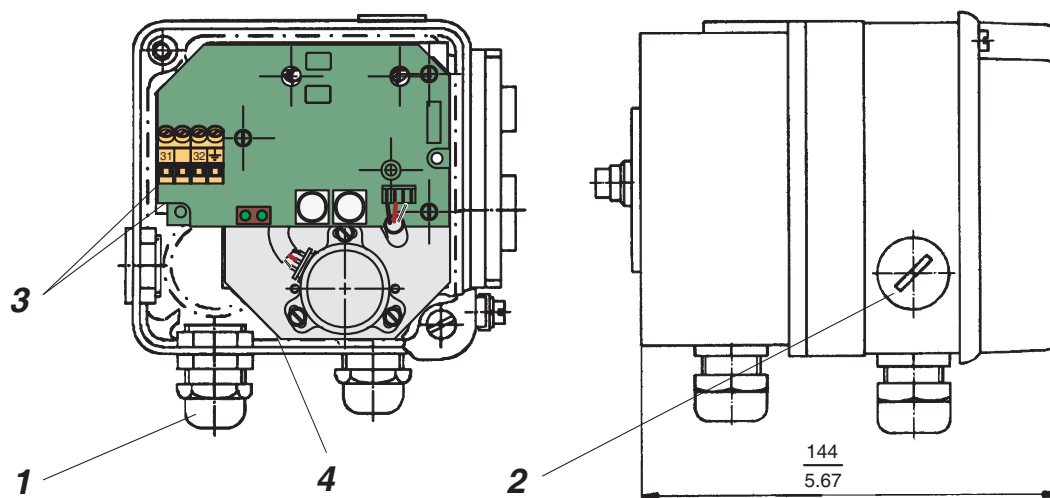
Built-in Limit Switch Code P, Q, R, T, U, V



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



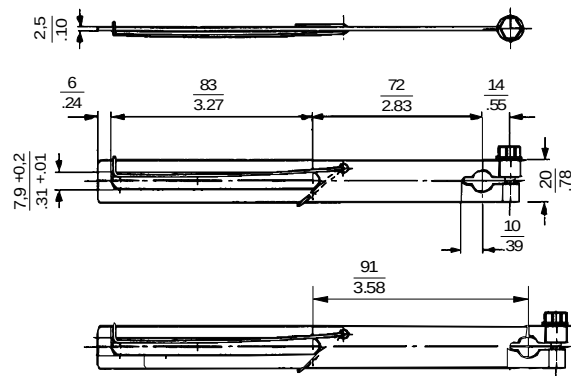
Built-in Position Transmitter Code F



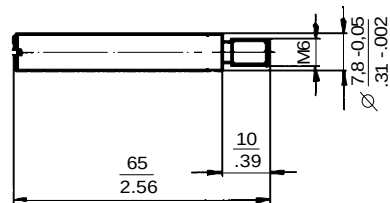
- 1 Cable gland
- 2 Dummy plug, can be replaced with 1
- 3 Connection terminals (+/-)
- 4 Ground connection
- A Limit switch
- B Limit switch

DIMENSIONS Attachment Kit for Diaphragm Actuators

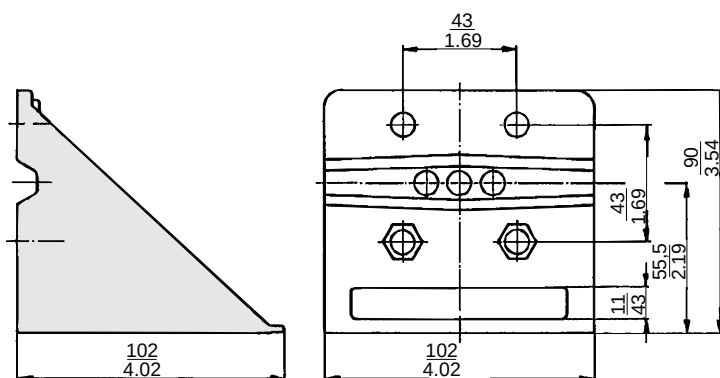
Feedback lever
Code EBZG - HN, - KN, - AN



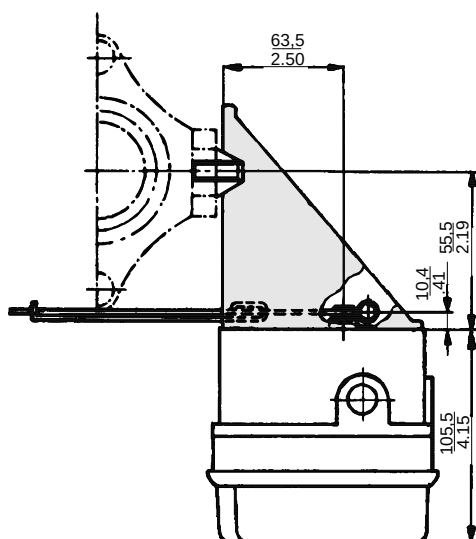
Carrier bolt for attachment to valve stem



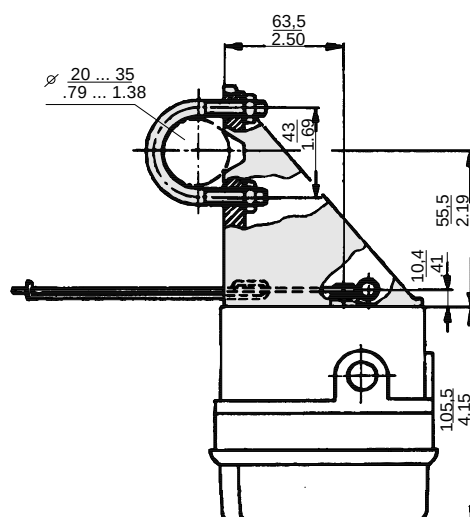
Dimensions of Mounting bracket acc. to IEC 534-6 (NAMUR)
for Code EBZG - HN, - KN



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



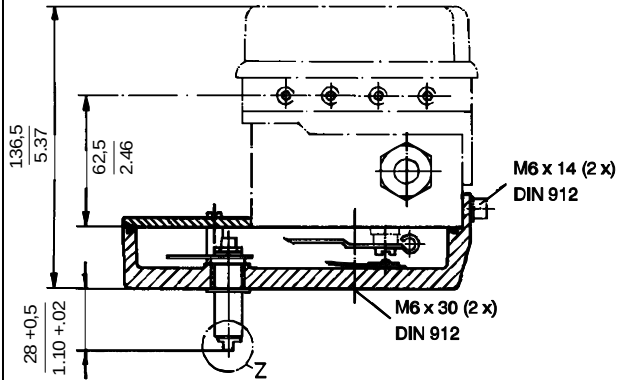
Attachment to casting yoke acc. to IEC 534-6 (NAMUR)
Code EBZG - HN



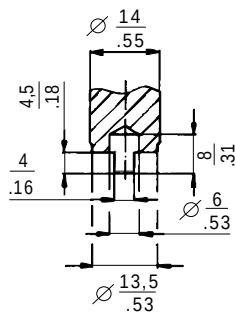
DIMENSIONS Attachment Kit for Rotary Actuators

with shaft (acc. to VDI/VDE 3845)

Code EBZG - ZN

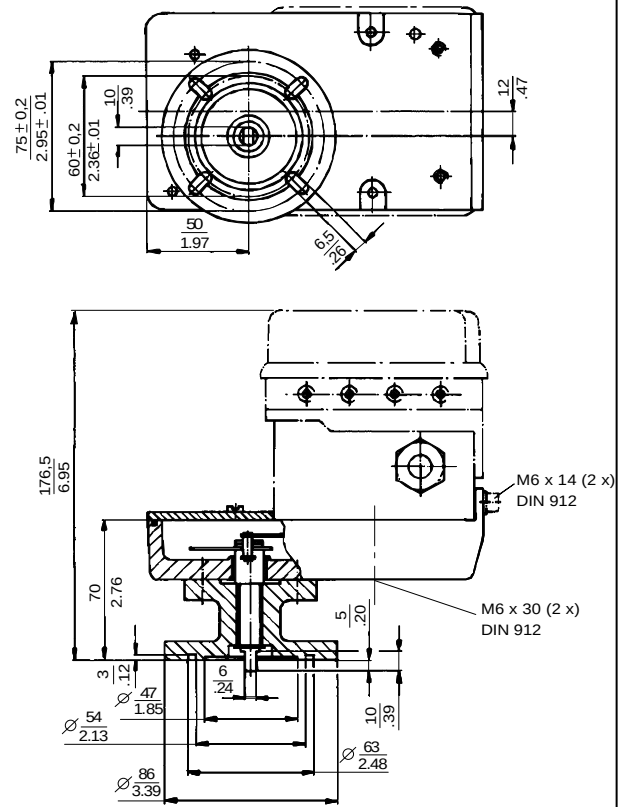


Detail Z



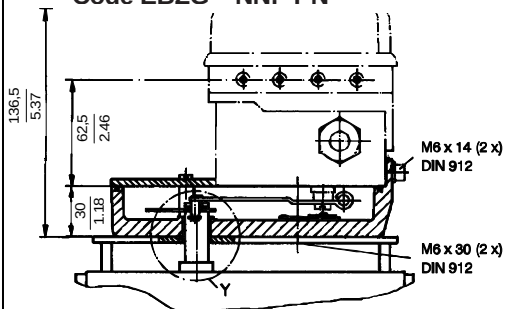
with flange

Code EBZG - JN

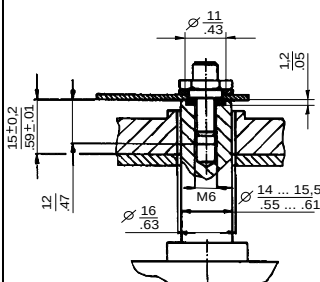


with flange

Code EBZG - NN. -PN



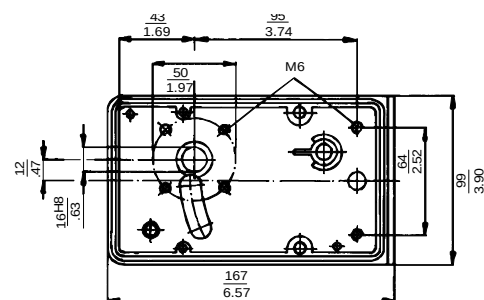
Detail Y



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

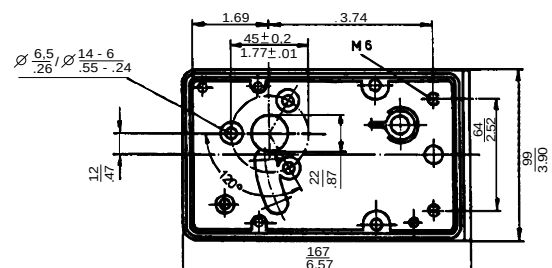
Housing dimensions

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



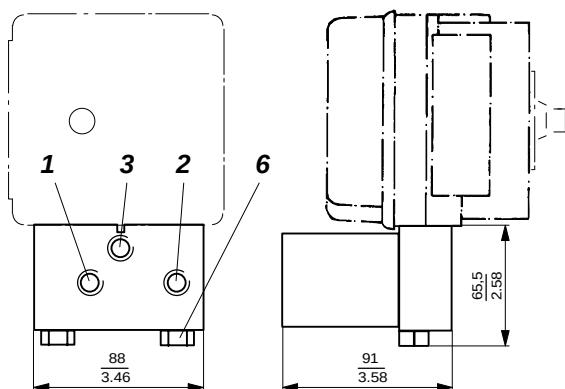
Housing dimensions

Attachment kit without flange -PN

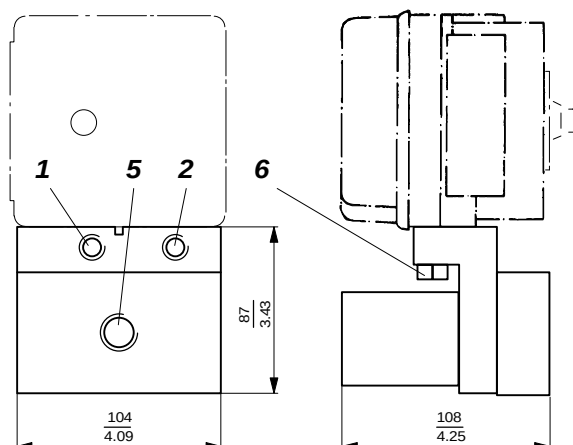


DIMENSIONS Booster

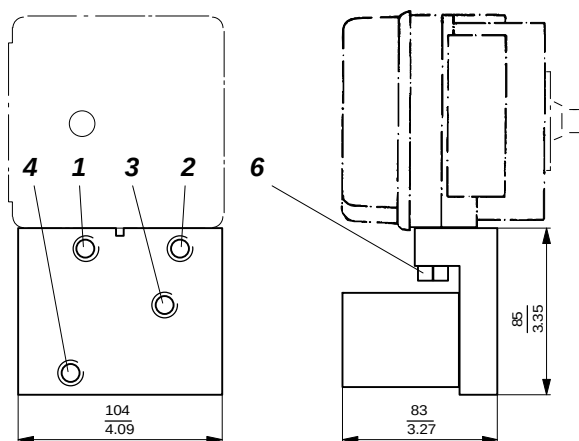
Booster single acting
Code VKXG -FN



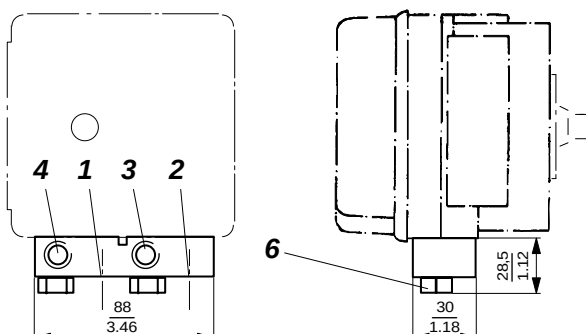
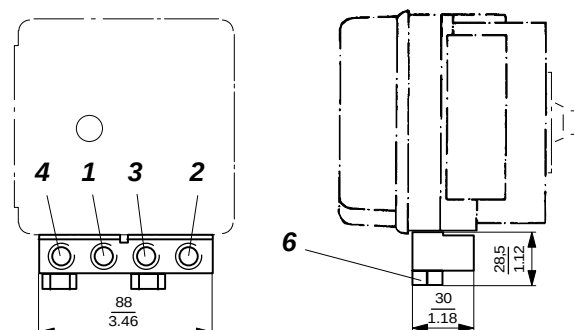
Booster single acting with double capacity
Code VKXG -HN



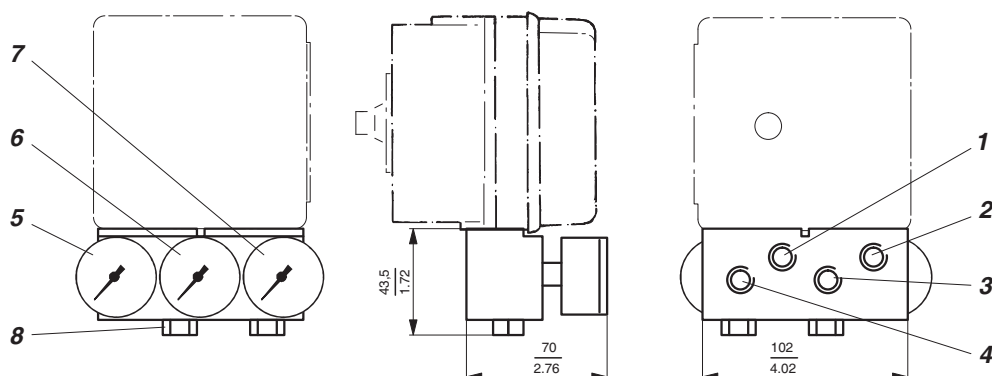
Booster double acting
Code VKXG -GN



- 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 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

Invensys Systems, Inc.
38 Neponset Avenue
Foxboro, MA 02035
United States of America

schneider-electric.com

Global Customer Support
Toll free: 1-866-746-6477
Global: 1-508-549-2424
Website:
<http://www.schneider-electric.com>

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