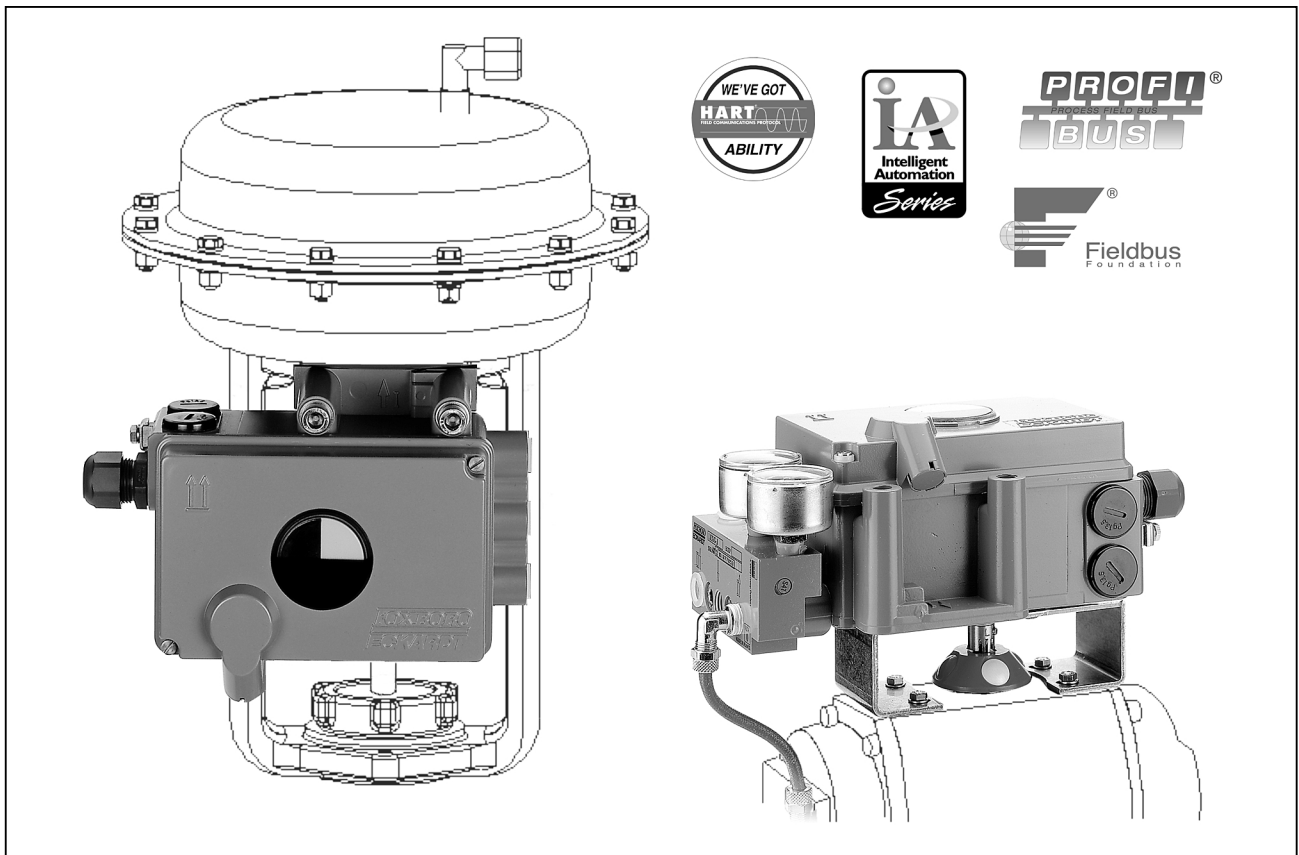


SRD991 Intelligent Positioner with HART, FoxCom, PROFIBUS or FOUNDATION Fieldbus



The intelligent positioner SRD991 is designed to operate pneumatic valve actuators and can be operated from control systems (e.g. the Foxboro I/A Series System), controllers or PC-based configuration- and operation tools such as PC20 / IFDC. The positioner is available with different communication protocols. This includes versions with analog setpoint (4 to 20 mA) and superimposed HART- or FoxCom signal; digital with FoxCom protocol, or fieldbus communication according to PROFIBUS-PA and FOUNDATION fieldbus H1 based on IEC 1158-2.

FEATURES

- Auto-start with self-calibration
- Self diagnostics, status- and diagnostic messages
- Communication HART, FoxCom, PROFIBUS-PA or FOUNDATION Fieldbus H1
- Configuration by means of local keys, hand-held terminal, PC or I/A Series system
- Easy operation with three key pads
- Low air consumption
- Low vibration effect in all directions
- Stroke 8 to 120 mm (0.3 to 4.7 in)
- Angle range up to 95 °
- Supply air pressure up to 6 bar (90 psig)
- Single or double-acting
- Mechanical travel indicator
- Mounting on linear actuators directly or according to IEC 534, Part 6 (NAMUR)
- Mounting on rotary actuators according to VDI/VDE 3845
- Protection class IP 65, NEMA 4X
- Explosion protection: EEx ia IIC according to CENELEC / ATEX or "Intrinsic safety" according to FM and CSA
- Built-in independent inductive limit switches (optional)
- Sensors for supply air pressure and output pressure (optional)
- Booster relay to minimize stroke time (optional)
- Additional Inputs / outputs (optional):
 - 2 binary outputs (limit signals)
 - Position feedback 4 to 20 mA,
 - 1 Alarm output
 - 2 binary inputs

FOXBORO
ECKARDT

FUNCTIONAL SPECIFICATIONS (common data for all versions)

Travel range

Stroke range 8 to 70 mm (0.3 to 2.8 in),
and 60 to 120 mm
(2.4 to 4.7 in)
Rotation angle range up to 95 °
(without mechanical stop)

Characteristic

Acting configurable: direct / inverse
Split range practicable
Characteristic curve configurable:
linear /
equal percentage /
inverse equal percentage /
quick opening /
freely defined with max.
22 points
Stroke limitation configurable
Tight close range with hysteresis
configurable

Travel indication mechanical (display
window)
transmission (approx.) . . . 1:2 or 1:6 switchable

Output

Action single acting
optional double acting
Output to actuator 0 to ~100 % of supply air
pressure

Supply

Supply air pressure 1.4 to 6 bar (20 to 90 psig)
Supply air free of oil, dust, water
according to IEC 654-2

Additional features

Autostart travel direction, zero, span,
control parameters
(control parameters
adjustable via local key
pads and communication)

Position feedback via communication
optional 4 to 20 mA by means of
additional in-/outputs

Alarms via communication
optional 1 Alarm output by means of
additional in-/outputs

Limit values via communication
detects position alarms

Online diagnosis via communication

- determines number of cycles, movements of actuator
- shows condition of device:
 - state of position sensor
 - exceeding range
 - actuator is jammed (remaining control deviation)
resp. interruption in feedback control system of
positioner
- if equipped with pressure sensors (optional):
 - surveillance of air supply and positioning pressure
 - each with display of physical value

Additional diagnostical possibilities in control
operation by means of external sensors (optional).

Response characteristic ^{1) 2)}

Sensitivity ≤ 0.1 % of travel span
Non-linearity (terminal
based adjustment) ≤ 0.4 % of travel span
Hysteresis ≤ 0.3 % of travel span
Supply air dependence . . . ≤ 0.1 % / 1 bar (15 psi)
Temperature effect ≤ 0.3 % / 10 K
Mechanical vibration
10 to 60 Hz up to 0.14 mm,
60 to 500 Hz up to 2 g ≤ 0.25 % of travel span

Air output I_n/h (scfh)

at max. deviation, single and double acting

| Supply air pressure bar (psig) | 1.4 (20) | 2 (30) | 4 (60) | 6 (90) |
|--------------------------------------|-------------------|-------------------|-------------------|--------------------|
| without booster | 2 700 (95) | 3 500 (124) | 5 500 (194) | 7 500 (265) |
| with booster code F, G | 18 000 (636) | 24 000 (847) | 40 000 (1 492) | 55 000 (1 942) |
| with booster code H | 36 000 (1 271) | 48 000 (1 695) | 80 000 (2 825) | 110 000 (3 884) |

The air capacity can be reduced with built-in nozzles.

Air consumption (steady state) I_n/h (scfh)

| Supply air pressure bar (psig) | 1.4 (20) | 3 (45) | 6 (90) |
|--------------------------------------|--------------|--------------|---------------|
| single acting | 100 (3.5) | 110 (3.9) | 150 (5.3) |
| double acting | 200 (7.0) | 220 (7.8) | 300 (10.6) |

1) Data measured according to VDI/VDE 2177

2) With stroke 30 mm and lever length 90 mm

Failure handling

Safety position at

- Air supply failure pressure y1 = zero
- Electric power failure . . . pressure y1 = zero
- Failure of electronics . . . configurable as
pressure y1 = zero or
stop at last value

- Failure of communication

is recognized by configurable watch dog with
response delay of 0.1 s to 24 hbehavior configurable as
pressure y1 = zero or
stop at last value or
a configured value

Diagnostic report via communication

- historical status is set if alarm was acti-
vated at any time (also just short alarms)

Reset by acknowledging

PHYSICAL SPECIFICATIONS**Mounting**

Attachment

to stroke actuators

- direct with attachment kit EBZG -D
- direct, FoxPak/FoxTop. . . with attachment kit EBZG -E
- for casting yoke acc. to
IEC 534-6 (NAMUR) . . . with attachment kit EBZG -H

Stroke range

with standard feedback lever. 8 - 70 mm
with extended feedback lever 60 - 120 mm

- for pillar yoke acc. to

IEC 534-6 (NAMUR) . . . with attachment kit EBZG -K

Stroke range

with standard feedback lever. 8 - 70 mm
with extended feedback lever 60 - 120 mm

- to rotary actuators

acc. to VDI/VDE 3845. . . with attachment kit EBZG -R

- Further attachment kits on request -

Mounting orientation see attachment dimen-
sions on pages 16 to 18**Weight**

Single acting approx. 1.7 kg (3.7 lbs)

Double acting approx. 2.0 kg (4.4 lbs)

MaterialsHousing. Aluminum (Alloy No. 230)
finished with DD-varnish

All moving parts of

feedback system 1.4306 / 1.4571 / 1.4104

Mounting bracket. Aluminum (Alloy No. 230)

Pneumatic connection

NAMUR mounting 3 x female threads

1/4-18 NPT for pipe diameter 6 to 12 mm (0.24 to 0.47
in) for air supply and outputs y1, y2 to the actuator

Direct mounting Instead of the output y1

an air connection on the backside with O-ring
will be used (closed at NAMUR mounting).**Ambient conditions**

Operating conditions acc. to IEC 654-1

The device can be operated at a class Dx location

Ambient temperature . . . -40 to 80 °C (-40 to 176 °F)
(devices before rev 2.1 . -20 to 80 °C (-4 to 176 °F)

Relative humidity ≤ 100 %

Transport and storage

Ambient temperature . . . -40 to 80 °C (-40 to 176 °F)

Storage conditions according to IEC 60721-3-1:

1K5; 1B1; 1C2; 1S3; 1M2

Protection class

acc. to IEC 529 IP 65 ¹⁾

acc. to NEMA Type 4X

Electromagnetic compatibility EMC

Operating conditions industrial environment

Immunity according to

- EN 50 082-2 fulfilled

Emission according to

- EN 55 011

Group 1, Class A fulfilled

- EN 50 081-2 fulfilled

NAMUR recommendation Status May 1993 fulfilled

SAFETY REQUIREMENTS**CE label**

Electromagnetic

compatibility ²⁾ 89/336/EWG

Low-voltage regulation. . . 73/23/EWG not applicable

Safety

According to EN 61010-1

(or IEC 1010-1) safety class III

Overvoltage Category I

Internal fuses. not replaceable

External fuses limitation of power supplies

for fire protection must be observed acc. to

EN 61010-1, appendix F (or IEC 1010-1).

1) Under service as directed

2) With PROFIBUS or FOUNDATION Fieldbus only, if shield of wiring is
grounded on both sides.

FUNCTIONAL SPECIFICATIONS (basic device, HART or FoxCom version)

With HART communication:

| | |
|---------------------------------|--|
| Input | Two-wire system, 4-20 mA |
| Reverse polarity protection | standard feature |
| Operating range | 3.6 to 21 mA |
| Voltage | DC 12 to 36 V |
| max. load | 600 Ω |
| Communication signal | HART, 1200 Baud, FSK ¹⁾ modulated on 4 to 20 mA |
| Input impedance Zi | ~ 250 Ω (0.5 to 5 kHz) |
| Configuration: | |
| local | with local keys and LEDs ²⁾ |
| Software | PC20/IFDC or ABO991, WPP991 |
| Hardware | Modem MOD991 for PC, IBM compatible |
| Hand Terminal. | HT991 |
| | See also product specifications "Accessories for devices with HART Protocol" PSS EMO0100 A-(en) |
| I/A Series System | on request |
| other Control systems | AMS |

With FOXCOM communication:

Operating mode digital

| | |
|--------------------------------|---|
| Input | Two-wire system, digital |
| Reverse polarity protection | standard feature |
| Supply voltage | DC 13 to 48 V |
| Supply current | ~ 9 mA at 24 V |
| Communication signal | FoxCom dig., 4800 Baud, FSK ¹⁾ modulated on supply voltage |
| Input impedance Zi | ~ 500 Ω (0.5 to 20 kHz) |
| Configuration: | |
| local | with local keys and LEDs ²⁾ |
| Software | PC20 / IFDC |
| Hardware | Modem PC10 |
| I/A Series System | with FBM43 |

Operating mode analog

| | |
|--------------------------------|--|
| Input | Two-wire system, 4-20 mA |
| Reverse polarity protection | standard feature |
| Operating range | 3.6 to 21.5 mA |
| Voltage | DC 13 to 48 V |
| max. Load | 650 Ω |
| Communication signal | FoxCom, 600 baud, FSK ¹⁾ modulated on 4 to 20 mA |
| Input impedance Zi | ~ 500 Ω (0.5 to 20 kHz) |
| Configuration: | |
| local | with local keys and LEDs ²⁾ |
| Software | PC20 / IFDC |
| Hardware | Modem PC10 |
| I/A Series System | with FBM44 |

Electrical Connection

| | |
|------------------------------|---|
| Line entry | 1 or 2 cable glands M20 x1.5 (others with Adapter AD-...) |
| Cable diameter | 6 to 12 mm (0.24 to 0.47 in) |
| Screw terminals | 2 terminals for input, optional 4 additional terminals for - two binary outputs or - position feedback 4 - 20 mA or - binary inputs |
| Wire cross section | 0.3 to 2.5 mm ² (AWG 22-14) |
| Test sockets | |
| | - for connection of communicators |
| | - for non-interruptable current measurement at Code H, F, E; interlock diode can be switched off |

1) Frequency Shift Key

2) Key configuration lockable with software

**Electrical classification hereto: ¹⁾²⁾ (basic device,
HART or FoxCom version**

See certificate of conformity EX EVE0105 A

Type of protection CENELEC “intrinsically safe”

Type BIA 637 EEx ia IIC T4

Certificate of conformity . . PTB No. Ex-96.D.2175

For use in hazardous areas in circuits certified as intrinsically safe with the following maximum values:

Input circuit:

$U_{\max} = 30 \text{ V}$, $I_{\max} = 130 \text{ mA}$, $P_{\max} = 0,9 \text{ W}$

$L_i = \text{negligible}$, $C_i = 1,4 \text{ nF}$

Ambient temperature max. 80 °C (176 °F)

Explosion protection Zone 2

It is recommended to use the positioner with explosion protection “intrinsically safe” (consider temperature class).

In the Federal Republic of Germany these positioners may be operated in Zone 2 with non-intrinsically safe circuits if the operating values do not exceed the maximum reference values.

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

*) In preparation

1) With appropriate order only

2) National requirements must be observed

ADDITIONAL EQUIPMENT (built into basic device, HART or FoxCom version)

Additional Inputs / Outputs:

Two binary outputs

Stroke / angle derivated from positioner feedback, configurable

galvanically separated 2 limit signals, two-wire system, according to DIN 19234

supply voltage external, DC 8 to 48 V ¹⁾

Logic:

limit value not exceeded < 1mA

limit value exceeded. . . ≥ 2.2 mA

device fault < 50 µA

Reference: AB1 for upper, AB2 for lower limit

Terminals for AB1 81+, 82–

AB2 83+, 84–

Explosion protection hereto:

Type of protection CENELEC “intrinsically safe”

Type BIA 637 L EEx ia IIC

Certificate of Conformity . PTB Nr.Ex-96.D.2175

For use in hazardous areas in circuits certified as intrinsically safe with the following maximum values:

| | | | |
|----|-------|--------|--------|
| Ui | 30 V | 15 V | 30 V |
| Ii | 18 mA | 130 mA | 130 mA |
| Pi | 0.9 W | 0.9 W | 272 mW |

The applicable internal inductance and capacitance is negligible.

Type of protection FM “intrinsic safety”

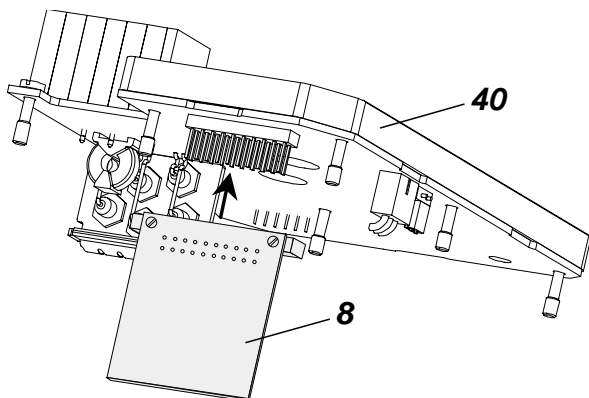
Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)



One option board “Additional Inputs / Outputs” **8** plugged in main board **40**

*) In preparation

1) In hazardous areas other values, see “Explosion protection”

Additional Inputs / Outputs:

Position feedback 4 to 20 mA

Stroke / angle derivated from positioner feedback, One output analog, galvanically separated

two-wire system

supply voltage DC 8 to 48 V ¹⁾

signal range 3.8 to 21.5 mA

0 % and 100 % configurable

device fault < 1 mA

Terminals for AI1 31+, 32–

One Binary output alarm, galvanically separated, two-wire system, according to DIN 19234

supply voltage external, DC 8 to 48 V ¹⁾

logic no alarm < 1 mA

alarm ≥ 2.2 mA

device fault < 50 µA

Terminals for AB1 81+, 82–

The binary output for Alarm will be activated in the following cases:

- Remaining control deviation
- Circuit to I/P module is disturbed
- Circuit to potentiometer is disturbed
- Calibration error:
 - no angle calibration
 - no current calibration
- Autostart failed

These alarms can be selected by means of communication.

Explosion protection hereto:

Type of protection CENELEC “intrinsically safe”

Type BIA 637 M. EEx ia IIC

Certificate of Conformity. . PTB Nr.Ex-96.D.2175

Channel 1: Alarm output

For use in hazardous areas in circuits certified as intrinsically safe with the following maximum values:

| | | | |
|----|-------|--------|--------|
| Ui | 30 V | 15 V | 30 V |
| Ii | 18 mA | 130 mA | 130 mA |
| Pi | 0.9 W | 0.9 W | 272 mW |

The applicable internal inductance and capacitance is negligible.

Channel 2: Position feedback

For use in hazardous areas in circuits certified as intrinsically safe with the following maximum values:

Ui = 30 V, Ii = 130 mA, Pi = 0.9 W

The applicable internal inductance and capacitance is negligible.

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Additional Inputs / Outputs:

Two Binary inputs

Two independent binary inputs with internal supply for connection of sensors. A connected switch is loaded with 3.5 V, 150 µA.

Both binary inputs can be used for diagnostics or also configurable for the control functions.

| Switch 1 | Switch 2 | Actuator control function |
|----------|----------|---------------------------|
| close | close | normal operation |
| open | close | go to stop at 0 % |
| close | open | go to stop at 100 % |
| open | open | hold last position |

Terminals for EB1 13+, 14-
EB2 15+, 16-

Explosion protection hereto:

Type of protection CENELEC “intrinsically safe”

Type BIA 637 N. EEx ia IIC
Certificate of Conformity. . PTB Nr.Ex-96.D.2175
For use in hazardous areas in circuits certified as intrinsically safe with the following maximum values:
U_o=7.25 V, I_o=46.4 mA, P_o=84 mW, L_o=2 mH, C_o=1.4 µF

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Limit Switch, built into basic device,

HART or FoxCom version

Inductive Limit Switch

– normal version (SJ2-N) Option T

– security version (SJ2-SN) Option U

Stroke / angle derived from positioner feedback, two-wire system

Output. 2 inductive proximity sensors acc. to DIN 19 234 or NAMUR for connection to switching amplifier with intrinsically safe control circuit ²⁾

Current consumption

vane clear ≥ 2.2 mA

vane interposed. ≤ 1 mA

for control circuit with the following electrical values

supply voltage DC 8 V, R_i approx. 1 kΩ

residual ripple ≤ 10 % p.p.

permissible

line resistance ≤ 100 Ω

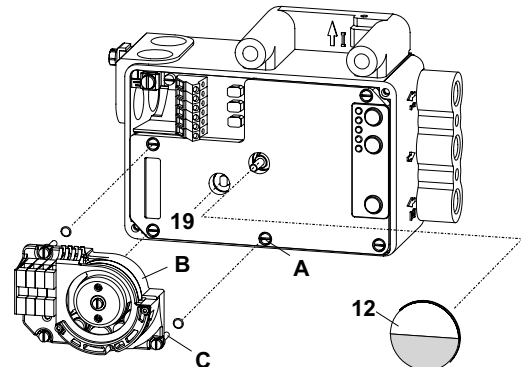
Response characteristic ^{3) 4)}

switching differential . . . ≤ 1 %

switching point repeatability . . . ≤ 0.2 %

Terminals for GW1 41+, 42-

GW2 53+, 54-



Explosion protection hereto:

Type of protection CENELEC “intrinsically safe”

Type BIA 637 K. EEx ia IIC
Certificate of Conformity. . PTB Nr.Ex-96.D.2175
For use in hazardous areas in circuits certified as intrinsically safe with the following maximum values:

U_{max} = 16 V, I_{max} = 76 mA, P_{max} = 242 mW

Li = 100 µH, Ci = 60 nF

Permissible temperature class and ambient temperature dependent on the built-in intelligent positioner.

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

*) In preparation
2) Operating mode min. (= low) / max. (= high) selectable by adjustment of switch vanes
3) Data measured according to VDI/VDE 2177
4) With stroke 30 mm and lever length 90 mm

FUNCTIONAL SPECIFICATION**(basic device, PROFIBUS-PA or FOUNDATION Fieldbus H1 version)****With Fieldbus communication:****PROFIBUS-PA**

| | |
|-----------------------------|---|
| Input signal | digital |
| Supply voltage | DC 9 to 32 V ¹⁾ |
| Operating current | 10.5 mA ± 0.5 mA (base current) |
| Current amplitude | ± 8 mA |
| Fault current | base current + 0 mA in case of fault in device, or base current + 4 mA by means of independent FDE-safety circuit |
| Operating values | according to IEC 1158-2 |
| Bus connection | Fieldbus interface based on IEC 1158-2 according to FISCO-Model |
| Power supply | Power supply is achieved dependant on the applica- tion by means of segment- coupler |
| Data transfer | according to PROFIBUS- PA profile class B based on EN 50170 and DIN 19245 part 4 |
| GSD file | the actual file can be down- loaded from our homepage |

Configuration:

| | |
|---------------------------------|--|
| local | with local keys and LEDs ²⁾ |
| Software | PC20 / IFDC |
| Hardware | PC- or PCMCIA-interfaces from Softing ³⁾ |
| I/A Series System | on request |
| Other control systems | PROFIBUS-PA compatible |

Electrical connection

| | |
|--------------------------------|--|
| Connection | terminals acc. to IEC 1158-2 |
| Screw terminals | 2 terminals for input, option 4 additional terminals for - two binary outputs or - position feedback 4 to 20 mA or - binary inputs |
| Line entry | 1 or 2 cable glands M20 x1.5 (others with Adapter AD-...) |
| Fieldbus-cable-types | twisted and shielded two- wire cable (Type A) accor- ding to recommendation based on IEC 1158-2 |
| Cable diameter | 6 to 12 mm (0.24 to 0.47 in) |

With Fieldbus communication:**FOUNDATION Fieldbus H1**

| | |
|-----------------------------|---|
| Input signal | digital |
| Supply voltage | DC 9 to 32 V ¹⁾ |
| Operating current | 10.5 mA ± 0.5 mA (base current) |
| Current amplitude | ± 8 mA |
| Fault current | base current + 0 mA in case of fault in device, or base current + 4 mA by means of independent FDE-safety circuit |
| Operating values | according to IEC 1158-2 |
| Bus connection | Fieldbus interface based on IEC 1158-2 according to FISCO-Model |
| Power supply | Power supply is achieved dependant on the applica- tion by means of segment- coupler |
| Data transfer | FF Specification Rev. 1.4, Link-Master (LAS) |
| Function blocks | AO, Transducer, Resource, PID (in preparation) |
| Files | the actual file can be down- loaded from our homepage |

Configuration:

| | |
|---------------------------------|---|
| local | with local keys and LEDs ²⁾ |
| Software | National Instruments NI-FBUS configurator |
| Hardware | FBUS-interfaces from National Instruments (AT-FBUS and PCMCIA- FBUS) |
| I/A Series System | on request |
| Other control systems | FOUNDATION Fieldbus H1-compatible |

1) Data of "intrinsically safe" version

2) Key configuration lockable with software

3) PC20/IFDC is exclusively supported by these interfaces

Electrical classification: ¹⁾²⁾ (basic device, version PROFIBUS-PA or FOUNDATION Fieldbus H1)**Type of protection “intrinsically safety”**

II 2 G EEx ia IIB/IIC, II 2 G EEx ib IIB/IIC

Temperature classes T4 / T6

(Electronics family AI 638)

EC Approval document No. PTB 00 ATEX 2128

For connections in hazardous areas with “intrinsically safe” certified (fieldbus) circuits, with the maximum values:

 $U_i = 24 \text{ V}$; $I_i = 380 \text{ mA}$; $P_i = 5.2 \text{ W}$

Internal capacitance and inductance:

 $C_i = 1.3 \text{ nF}$ differential or 5.3 nF to earth $L_i = 5 \text{ }\mu\text{H}$

Ambient temperature ranges:

Temperature class T4: -40 to 80°C Temperature class T6: -40 to 55°C

The input circuit is galvanically separated from earth.

The input is suitable for connection to a fieldbus system according to the FISCO model (e.g. PROFIBUS PA)

Type of protection “intrinsically safety”

II 3 G EEx n A/L IIB/IIC *)

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

*) In preparation

1) With appropriate order only

2) National requirements must be observed

ADDITIONAL EQUIPMENT

(built into basic device, PROFIBUS-PA or FOUNDATION Fieldbus H1 version)

Additional Inputs / Outputs:

Two binary outputs (limit signals)

Stroke / angle derivated from positioner feedback, configurable

galvanically separated 2 limit signals, two-wire system, according to DIN 19234, for external supply supply voltage DC 8 to 48 V ¹⁾

Logic:

limit value not exceeded < 1mA

limit value exceeded. . . ≥ 2.2 mA

device fault < 50 µA

Reference: AB1 for upper, AB2 for lower limit

Terminals for AB1 81+, 82–

AB2 83+, 84–

Explosion protection hereto: (Electronics AI 638 P)

Ex protection and temp. classes as basic device.

For connections to certified circuits, with the maximum values:

Ui=16 V; Ii=80 mA; Pi=250 mW

Internal capacitance and inductance: Ci=26 nF, Li=5 µH

The circuits Binary outputs are galvanically separated from all other circuits and from earth.

Type of protection FM “intrinsic safety”

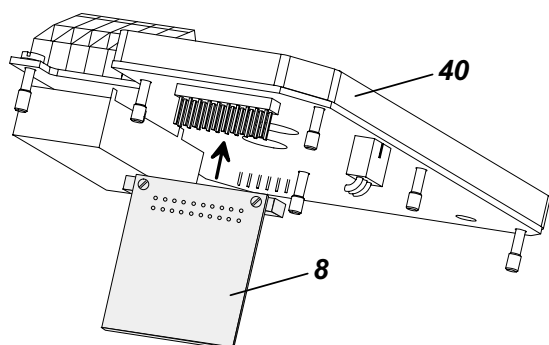
Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)



One option board “Additional Inputs / Outputs” **8** plugged in main board **40**

Additional Inputs / Outputs:

Position feedback 4 to 20 mA

Stroke / angle derivated from positioner feedback, 1 output analog, galvanically separated, two-wire system according to DIN 19234, for external supply

supply voltage DC 8 to 48 V ¹⁾

signal range 3.8 to 21.5 mA

0 % and 100 % configurable

device fault < 1 mA

Terminals for AI1 31+, 32–

1 Binary output alarm, galvanically separated, two-wire system, according to DIN 19234, for external supply supply voltage DC 8 to 48 V ¹⁾

Logic no alarm < 1 mA

alarm ≥ 2.2 mA

device fault < 50 µA

Terminals for AB1 81+, 82–

The binary output for Alarm will be activated in the following cases:

- Remaining control deviation
- Circuit to I/P module is disturbed
- Circuit to potentiometer is disturbed
- Calibration error:
 - no angle calibration
 - no current calibration
- Autostart failed

These alarms can be selected by means of communication.

Explosion protection hereto:

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

*) In preparation

1) In hazardous areas other values

Additional Inputs / Outputs:

Two Binary inputs

Two independent binary inputs, supplied by the basic device, for connection of sensors. A connected switch is loaded with 3.5 V, 150 µA.

Both binary inputs can be used for diagnostics or also configurable for the control functions.

| Switch 1 | Switch 2 | Actuator control function |
|----------|----------|---------------------------|
| close | close | normal operation |
| open | close | go to stop at 0 % |
| close | open | go to stop at 100 % |
| open | open | hold last position |

Terminals for EB1 13+, 14-
EB2 15+, 16-

Explosion protection hereto: (Electronics AI 638B)

Ex protection and temp. classes as basic device. At this circuit only circuits which are passive and galvanically separated from earth may be connected. The circuit has the following maximum values: Uo= 7.88 V; Io= 11.4 mA; Po= 23 mW

Linear characteristics

For the maximum values of outer inductance and capacitance Lo and Co see the following table (Li and Ci integrated):

| IIC | | IIB | |
|---------|---------|---------|---------|
| Lo [mH] | Co [µF] | Lo [mH] | Co [µF] |
| 100 | 0.72 | 100 | 3.9 |
| 10 | 1.1 | 10 | 5.5 |
| 1 | 1.6 | 1 | 8.7 |
| 0.1 | 2.7 | 0.1 | 15 |
| 0.01 | 4.7 | 0.01 | 27 |

The circuits Binary inputs are galvanically connected to all other circuits and galvanically separated from earth.

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Built-in Limit Switch (illustration see page 7)

Inductive Limit Switch

standard version (SJ2-N) option T

security version (SJ2-SN) option U

Stroke / angle derived from positioner feedback, two-wire system

Output 2 inductive proximity sensors acc. to DIN 19 234 or NAMUR for connection to switching amplifier with intrinsically safe control circuit ¹⁾

Current consumption

vane clear ≥ 2.2 mA

vane interposed. ≤ 1 mA

for control circuit with the following electrical values

supply voltage DC 8 V, Ri approx. 1 kΩ

supply voltage range . . . DC 5...25 V (only with ZZZ)

residual ripple ≤ 10 % p.p.

permissible

line resistance ≤ 100 Ω

Response characteristic ^{2) 3)}

switching differential . . . ≤ 1 %

switching point repeatability . . . ≤ 0.2 %

Terminals for GW1 41+, 42-

GW2 53+, 54-

Explosion protection hereto:

Standard version “T” (Electronics AI 638T)

Ex protection and temp. classes as basic device.

For connections to certified circuits, with the maximum values:

Ui=16 V; li=25 mA; Pi=64 mW

Internal capacitance and inductance:

Ci=30 nF, Li=100 µH

The circuits Limit Switch are galvanically separated from all other circuits and from earth.

Security version “U” *)

Type of protection FM “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection FM “non-incendive”

Class I, Div. 2, Groups A, B, C, D, F, G, hazardous locations indoor and outdoor, NEMA Type 4X *)

Type of protection CSA “intrinsic safety”

Class I, Div. 1, Groups A, B, C, D, hazardous locations indoor and outdoor, NEMA Type 4X *)

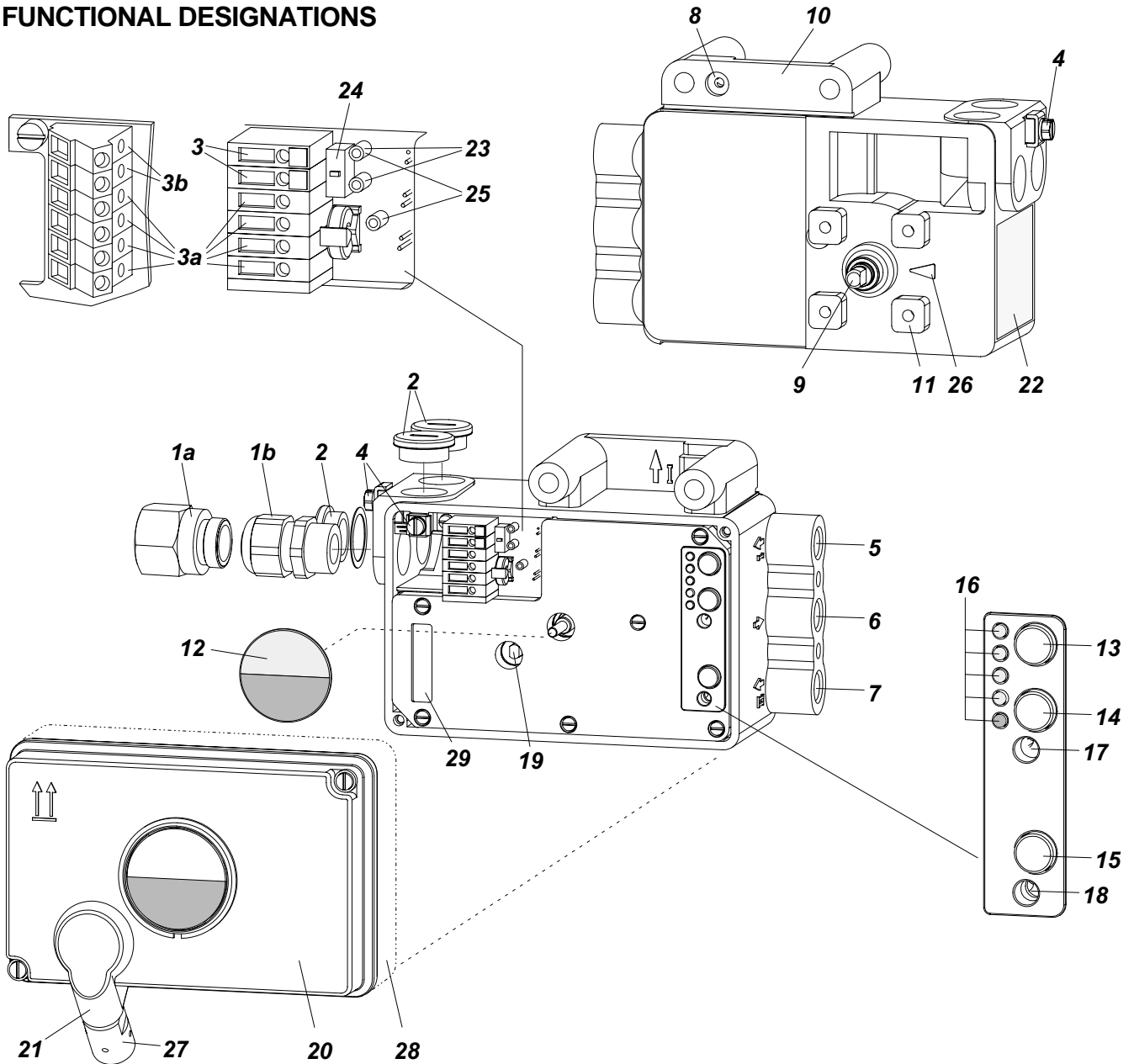
*) In preparation

1) Operating mode min. (= low) / max. (= high) selectable by adjustment of switch vanes

2) Data measured according to VDI/VDE 2177

3) With stroke 30 mm and lever length 90 mm

FUNCTIONAL DESIGNATIONS



1a Adapter, eg. 1/2"-14 NPT

1b Cable gland

2 Plug, interchangeable with Pos. **1**

3 Screw terminals (11 + / 12 -) for input (w)

3a Screw terminals for additional inputs / outputs

3b Screw terminals for bus connection IEC 1158-2 ³⁾

4 Ground connection

5 Female thread 1/4-18 NPT for output I (y1)

6 Female thread 1/4-18 NPT for air supply (s)

7 Female thread 1/4-18 NPT for output II (y2)

8 Direct attachment hole for output I (y1)

9 Feedback shaft

10 Connection manifold for attachment to stroke actuators

11 Connection base for attachment to rotary actuators

12 Travel indicator

13 Key UP

14 Key DOWN

15 Key M (Menu)

16 Status display (1 red LED, 4 green LEDs)

17 Damping screw ¹⁾ for output I

18 Damping screw ¹⁾ for output II

19 Fixing shaft for limit switch (see page 4)

20 Cover with window to **12**

21 Air vent, dust and water protected

22 Data label

23 Tip jacks ²⁾ for current measurement, 2 mm dia.

24 Switch ²⁾ for current measurement

25 Tip jacks ²⁾ for communication, 2 mm dia.

26 Arrow is perpendicular to shaft **9** at angle 0 degree

27 Ball valve for protection class NEMA 4X

28 High cover with built-in limit switch

29 Plug for service connector ³⁾

1) Not available from Rev.2.1 on

2) Not with PROFIBUS-PA and FOUNDATION Fieldbus H1 version

3) Only with PROFIBUS-PA and FOUNDATION Fieldbus H1 version

MODEL CODES SRD991

| | | | | | | | | |
|--|---------------|----|---|--|--|---|---|-----|
| Intelligent Positioner | SRD991 | | | | | | | |
| Version | | | | | | | | |
| Single acting | | -B | | | | | | |
| Double acting | | -C | | | | | | |
| Input/Communication | | | | | | | | |
| HART communication (4-20mA) | | | H | | | | | |
| FOXCOM communication (4-20mA / IT1) | | | E | | | | | |
| FOXCOM communication (digital / IT2) | | | F | | | | | |
| PROFIBUS-PA | | | P | | | | | |
| FOUNDATION Fieldbus H1 | | | Q | | | | | |
| Additional Inputs/Outputs | | | | | | | | |
| without (e) | | | | | | M | | |
| Prepared for additional In-/Outputs (a) | | | | | | N | | |
| Binary inputs (a) | | | | | | B | | |
| Two Binary outputs (a) | | | | | | P | | |
| Position feedback 4-20mA (a)(e) | | | | | | Q | | |
| Built-in limit switch | | | | | | | | |
| without | | | | | | | S | |
| Inductive limit switch-intrinsic safe (standard version) (a) | | | | | | | T | |
| Inductive limit switch-intrinsic safe (security version) (a)(e) | | | | | | | U | |
| Cable Entry | | | | | | | | |
| M20x1.5 w/o cable gland | | | | | | | | 1 |
| M20x1.5 with one plastic cable gland, color gray | | | | | | | | 7 |
| Electrical classification | | | | | | | | |
| without | | | | | | | | ZZZ |
| EEx ia IIC T4 (e) | | | | | | | | EA4 |
| EEx ia/ib IIB/IIC T4/T6 and EEx nA/L IIB/IIC according to ATEX (d) | | | | | | | | EAA |
| FM Non-incendive for Class I, Division 2, Groups A, B, C, D, hazardous locations indoors and outdoors, NEMA 4X (e) | | | | | | | | NFM |
| FM approved for intrinsic safety Class I, Division 1, Groups A, B, C, D, hazardous locations indoors and outdoors, NEMA 4X (e) | | | | | | | | FAA |
| CSA approved for intrinsic safety Class I, Division 1, Groups A, B, C, D, hazardous locations indoors and outdoors, NEMA 4X (e) | | | | | | | | CAA |
| Options | | | | | | | | |
| two Built-in pressure sensors for supply air and output to actuator y1 | | | | | | | | -B |
| Custom Configuration | | | | | | | | -T |
| Tag.No. Labeling Stamped with weather resistant color | | | | | | | | -G |
| Tag.No. Labeling Stainless steel label fixed with wire | | | | | | | | -L |

Example: SRD991 -B H M S 1 ZZZ -L

Footnotes
 (a) only with Electrical classification ZZZ, EA4, EAA, NFM & FAA others pending
 (b) not released
 (c) pending
 (d) only with input / communication P and Q
 (e) Not with Input / communication P and Q

Parts
 Auxiliaries see EVE9902
 Fittings see EOO9001

Accessories, for all basic devices:

Gauges manifold, Code LEXG -J, -M

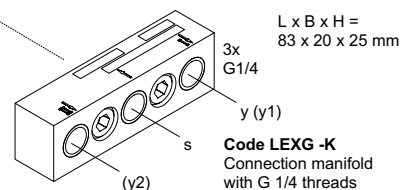
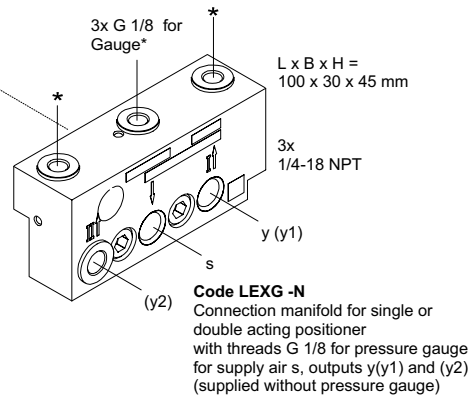
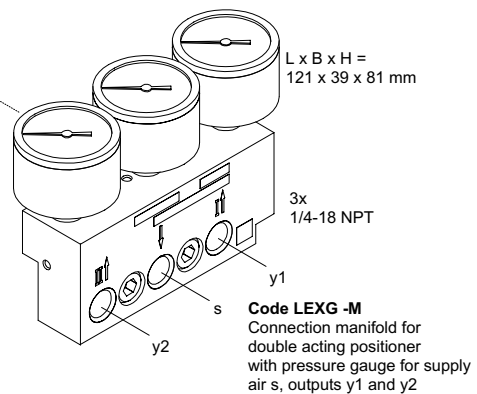
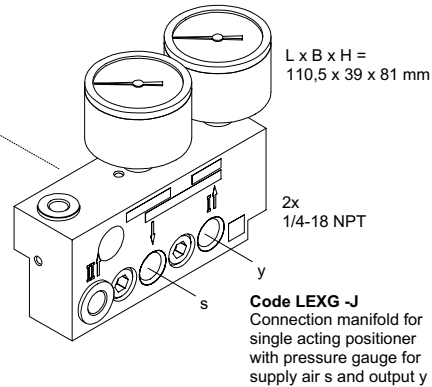
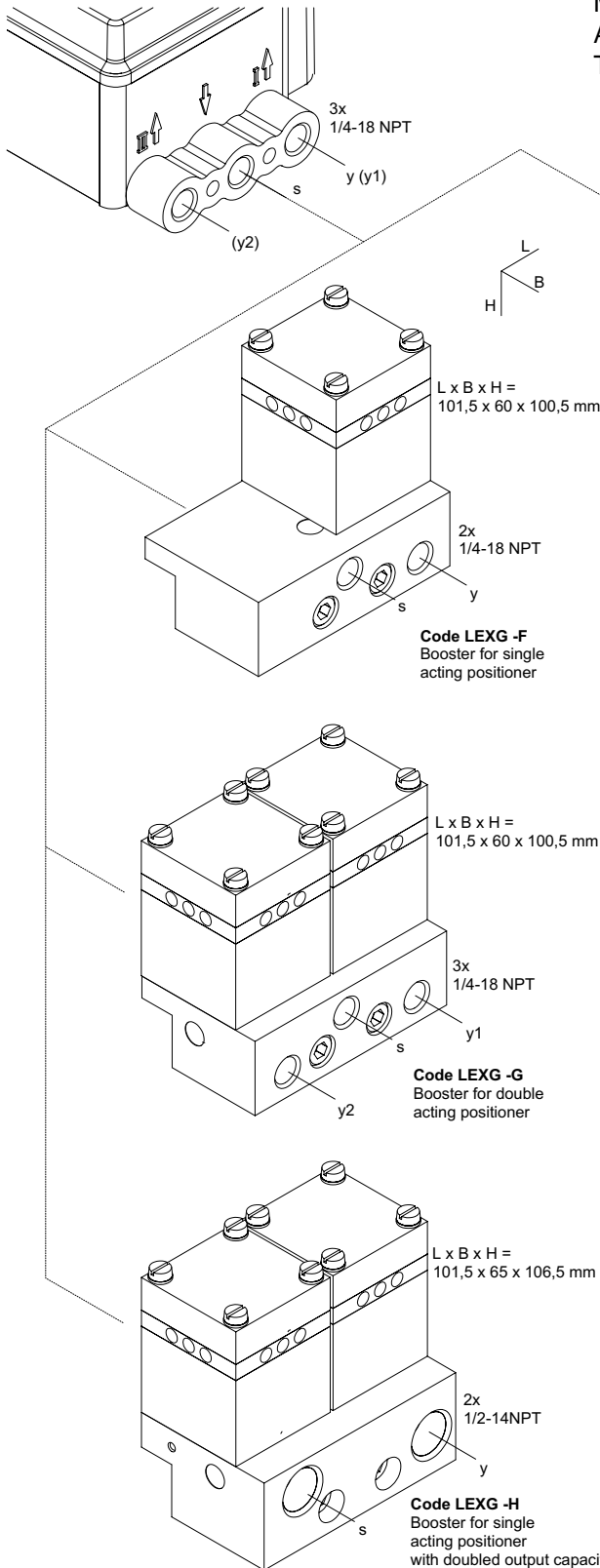
Lateral attachment to positioner
with 2 or 3 gauges
Indicating range 0 to 10 bar (0 to 150 psig)

Booster relay, Code LEXG -F, -G, -H

Lateral attachment to positioner
Air output. see table on page 2

Two built-in pressure sensors, Code Option -B

For supply air and output to actuator y1
Measuring range 0 to 8 bar (0 to 120 psig)
Accuracy 0.5 %
Temperature influence . . . 0.5 % / 10k (-40 to 80 °C)

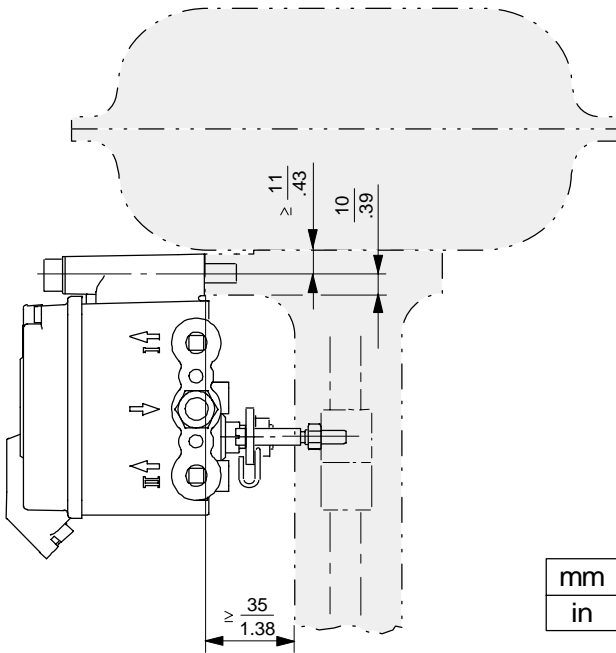


* Unused threads for pressure gauge are closed by means of lock screw Part No. 425 024 013.

Model Codes Accessories

| Parts for Intelligent Positioner | |
|--|-------------|
| Attachment kit | EBZG |
| for diaphragm actuators with casting yoke acc. NAMUR (incl. standard couple lever) | -H |
| for diaphragm actuators with pillar yoke acc. NAMUR (incl. standard couple lever) | -K |
| for directly mounting (incl. standard couple lever) | -D |
| for mounting to rotary actuators acc. VDI/VDE 3845 (without bracket) | -R |
| for FoxTop / FoxPak | -E |
| Further Attachment kits on request. See also http://www.foxboro-eckardt.com /Products /Positioners /Attachment kits | |
| Couple lever | |
| standard (stroke max. 80 mm) | -A |
| extended (stroke max. 120 mm) | -B |
| Manifold | LEXG |
| with connection G 1/4 | -K |
| Gauges manifold (connection 1/4 - 18 NPT) | |
| without gauges | -N |
| with gauges for version single acting | -J |
| with gauges for version double acting | -M |
| Booster relay | |
| with connection 1/4 -18 NPT for version single acting | -F |
| with connection 1/4 -18 NPT for version double acting | -G |
| with connection 1/2 -18 NPT for version single acting with doubled output capacity | -H |
| Adapter (Material SS) | AD |
| Adapter PG 13.5 to 1/2" - 14 NPT (internal thread) | -A1 |
| Adapter PG 13.5 to M20 x 1,5 (internal thread) | -A2 |
| Adapter 1/2" NPT to 3/4" NPT | -A3 |
| Adapter PG 13.5 to G 1/2" (internal thread) | -A4 |
| 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 – Direct attachment to stroke actuators

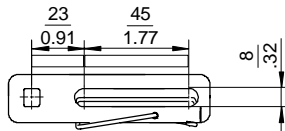


mm
in

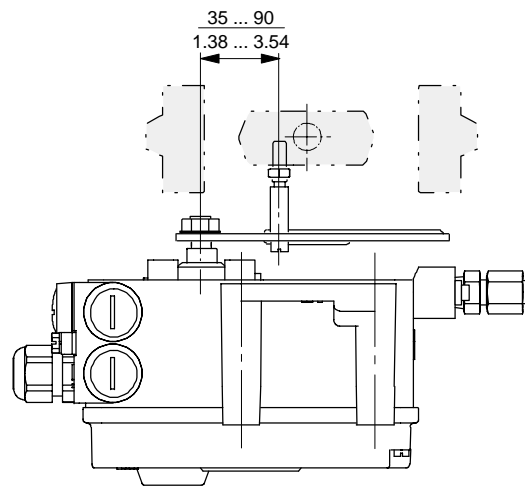
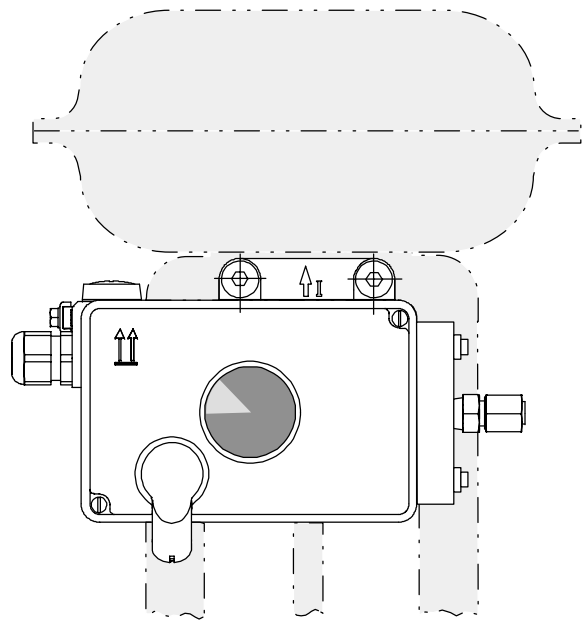
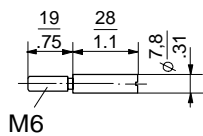
Feedback lever Code EBZG-A for 8..70 mm travel



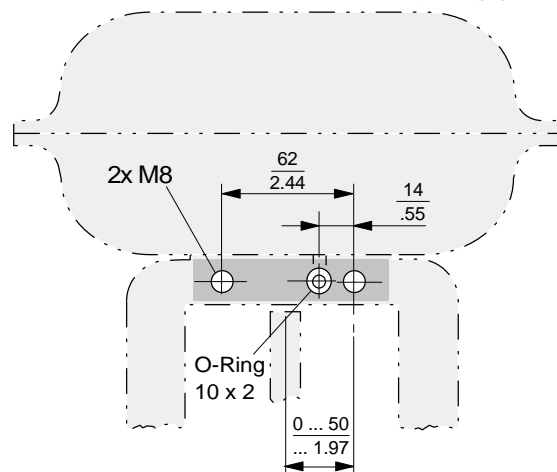
Feedback lever FoxPak/FoxTop in Code EBZG-E



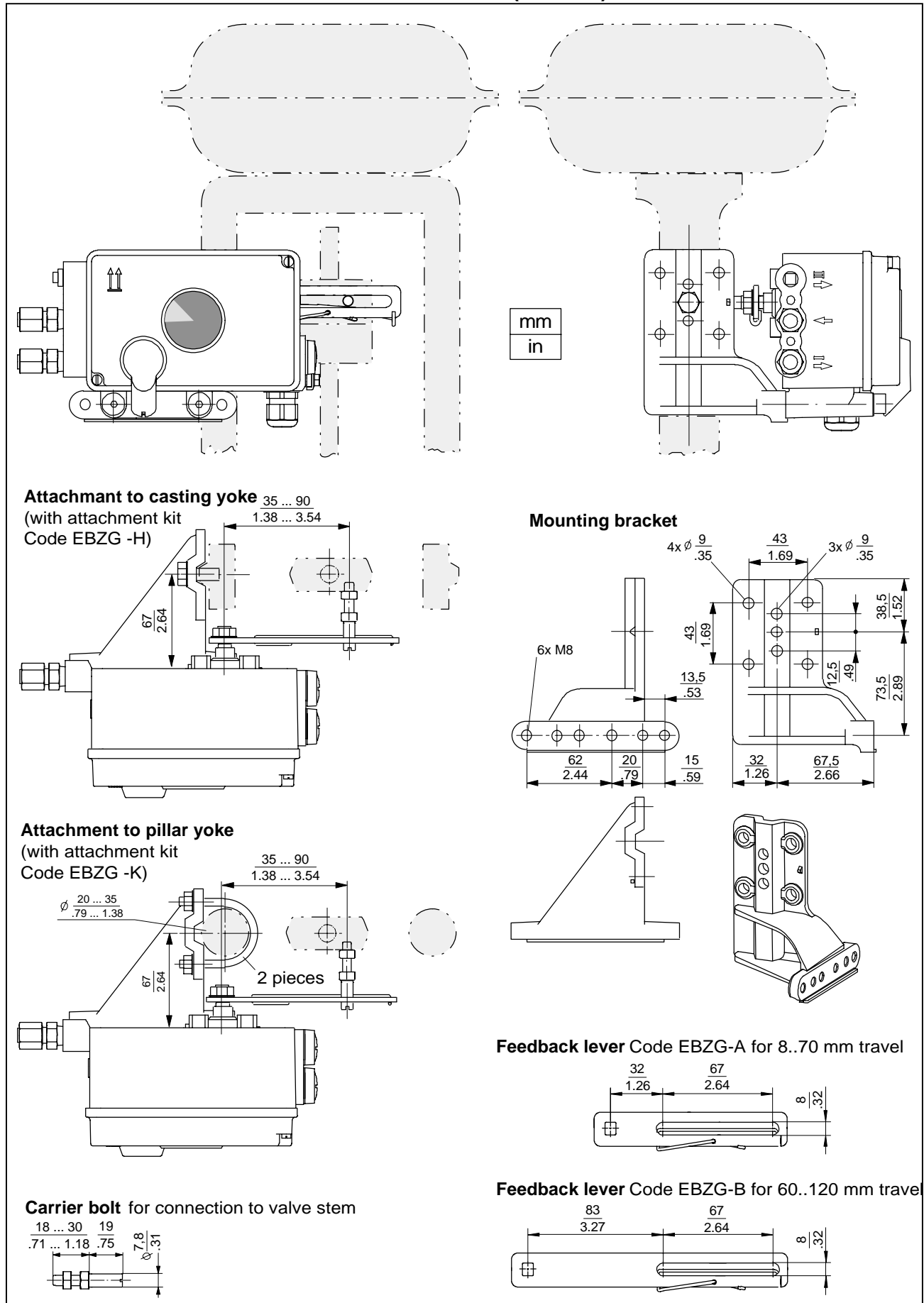
Carrier bolt for connection to valve stem

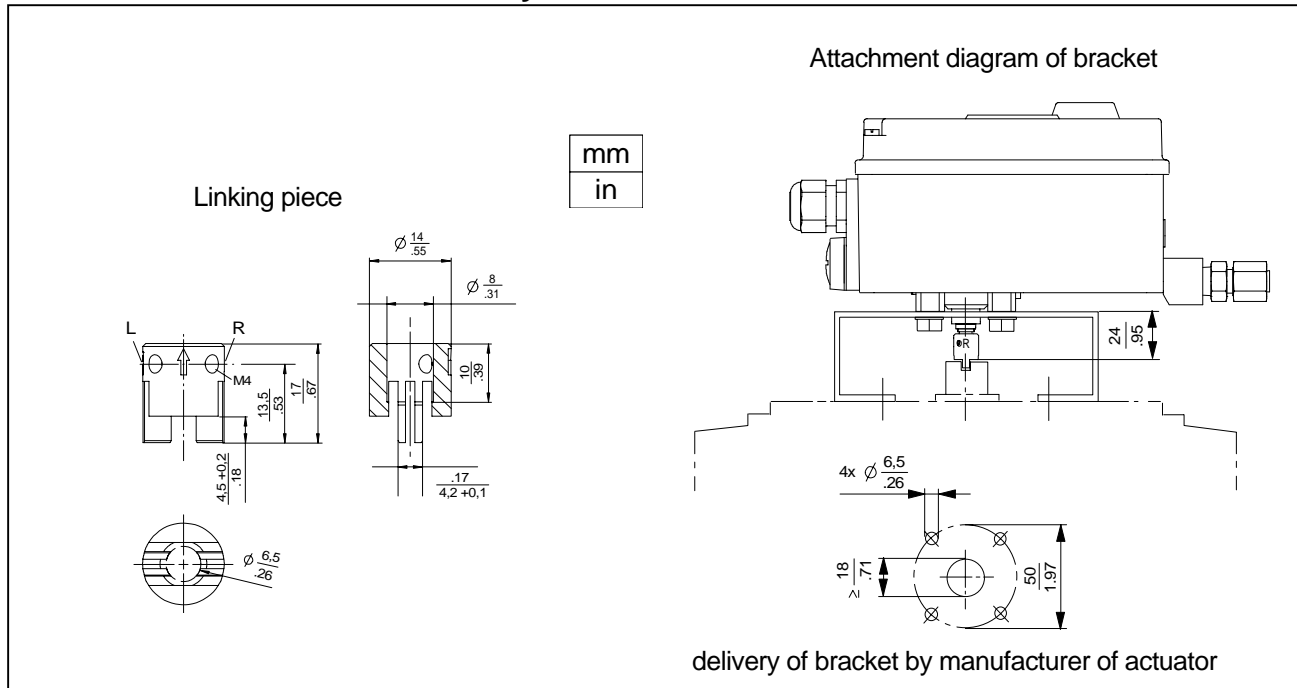


Connection to yoke using the direct connection hole for rear output I (y/y1)



Attachment to stroke actuators acc. to IEC 534-6 (NAMUR)



DIMENSIONS – Attachment to rotary actuators acc. to VDI/VDE 3845**Master Instructions:**

SRD991 -HART, -FoxCom MI EVE0105 A
 SRD991 -PROFIBUS-PA
 -FOUNDATION Fieldbus H1 MI EVE0105 D

Communication protocols:

SRD991 -PROFIBUS-PA TI EVE0105 P
 SRD991 -FOUNDATION Fieldbus.H1 TI EVE0105 Q

Configuration with Hand-Held Terminal, PC or I/A Series System:

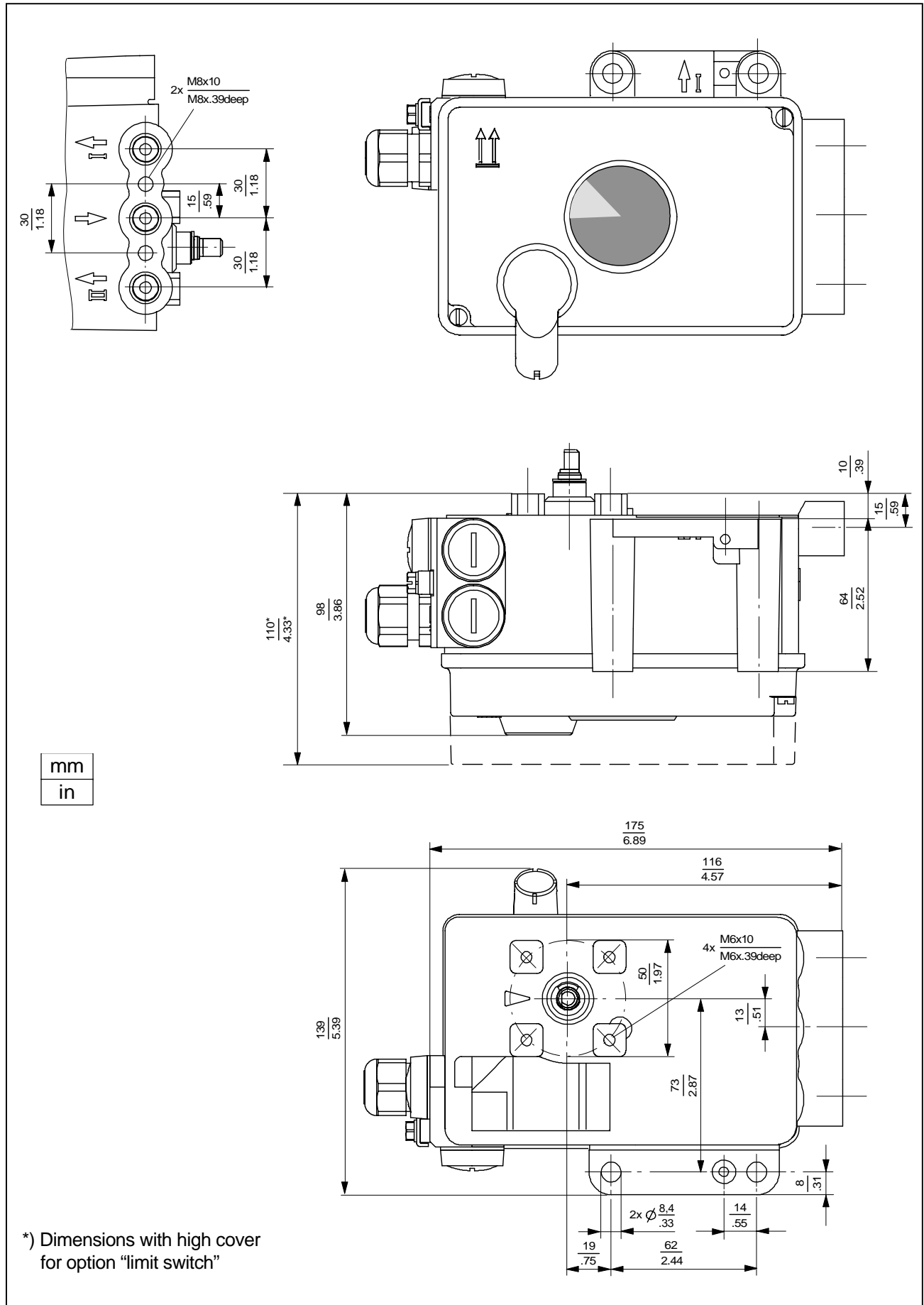
see Master Instructions:

HART with Hand-Held Terminal MI EVE0105 B
 HART with PC via ABO991 MI EVE0105 C
 HART/FoxCom with PC via PC20/IFDC MI 020-495
 I/A Series System B 0193 VH

Product Specifications

| | | |
|--------------------|--------|--|
| PSS EVE0101 A-(en) | SRP981 | Pneumatic Positioner |
| PSS EVE0102 A-(en) | SRI986 | Electro-Pneumatic Positioner |
| PSS EVE0103 A-(en) | SRI983 | Electro-Pneumatic Positioner- explosion proof or EEx d version |
| PSS EVE0105 A-(en) | SRD991 | Intelligent Positioner |
| PSS EVE0106 A-(en) | SRD992 | Digital Positioner |
| PSS EVE0107 A-(en) | SRI990 | Analog Positioner |
| PSS EMO0100 A-(en) | | Accessories for devices with HART Protocol |

DIMENSIONS



| |
|----|
| mm |
| in |

*) Dimensions with high cover for option "limit switch"

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