

SRD960 Universal Positioner

SRD960-T Position Transmitter

For Ex d / Explosion Proof application



The Universal Positioner SRD960 is designed to operate pneumatic valve actuators and is available in the version Ex d / explosionproof (flameproof). It can be operated from control systems (e.g. the Foxboro I/A Series System), controllers, or PC-based configuration- and operation tools such as VALcare™. The positioner is available with different communication protocols. The multi-lingual backlit full text grafic-LCD in connection with the external 4 push buttons (optional with infrared interface IrCom) allows a comfortable and easy local configuration and operation.

MAIN FEATURES

Intelligent

- Auto-start with self-calibration
- Self diagnostics, status- and diagnostic messages
- Easy operation with four key pads
- Multi-Lingual backlit full text grafical LCD, or LEDs
- With communication HART, FOUNDATION Fieldbus H1, PROFIBUS-PA, FoxCom
- Configuration by means of local keys, hand- held terminal (HART), PC or I/A Series system or with a infrared interface by means of IRCOM
- **Advanced Diagnostic / Premium Diagnostic:** FDT-based Software vor valve diagnostic and Predictiv Maintenance
- Stroke 8 to 120 mm / 260 mm (0.3 to 4.7 in / 10.2 in)
- Angle range up to 95 ° (up to 300° on request)
- Supply air pressure up to 6 bar (90 psig), with spool valve up to 7 bar (105 psig)
- Single or double-acting
- Mounting on linear actuators according to NAMUR – IEC 534, Part 6 – VDI/VDE 3847
- Mounting on rotary actuators acc. to VDI/VDE 3845
- Protection class IP 66, NEMA 4X
- Approved for SIL applications
- Explosion protection: Flameproof acc. to ATEX, Explosion proof acc. to FM

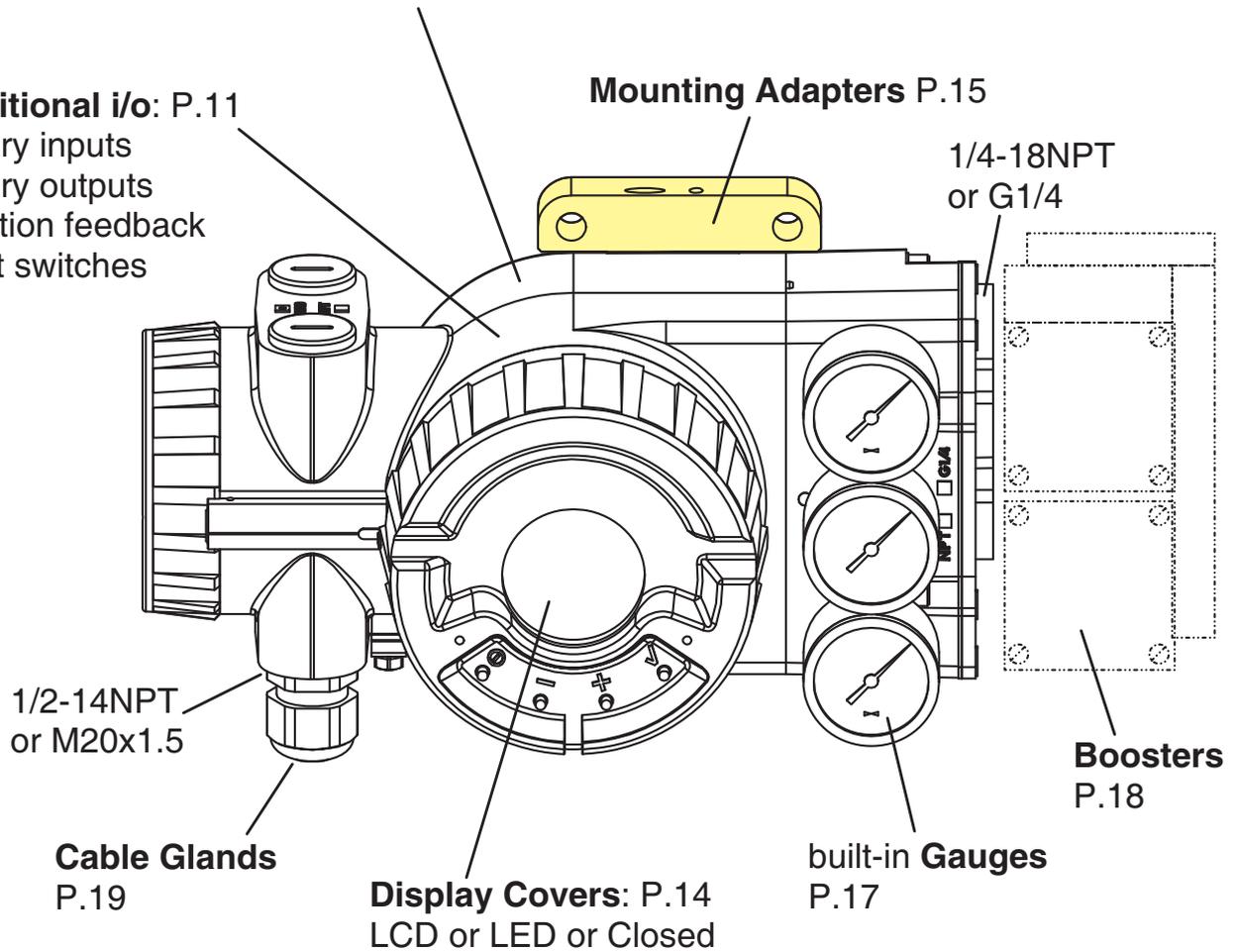
OVERVIEW of SRD960 Positioner

Electronics Version: (see P.4, 8)

- "H" HART (4-20 mA) P.8
- "F" FoxCom (Digital) P.8
- "P" PROFIBUS PA P.9
- "Q" FOUNDATION Fieldbus H1 P.9

Additional i/o: P.11

- Binary inputs
- Binary outputs
- Position feedback
- Limit switches



Combinations

Device version	Controller	Display	local configuration	remote configuration
"H" HART (4-20)	Digital	LCD or 5 LEDs	push buttons	via communication
"P" Profibus	Digital	LCD or 5 LEDs	push buttons	via communication
"Q" F.Fieldbus	Digital	LCD or 5 LEDs	push buttons	via communication
"F" FoxCom	Digital	LCD or 5 LEDs	push buttons	via communication

FUNCTIONAL SPECIFICATIONS (common data for SRD960 -B or C)

Travel range

Stroke range 8 ... 260 mm (0.3 ... 10.2 in)
 with standard feedback levers; special levers on request
 Rotation angle range up to 95 °
 (without mechanical stop)

Supply

Supply air pressure⁵⁾ 1.4 ... 6 bar (20 ... 90 psig)
 with spool valve⁴⁾ 1.4 ... 7 bar (20 ... 105 psig)
 Output to actuator 0 to ~100 % of supply air
 pressure (up to 5.5 bar at
 6 bar supply air pressure)
 Air supply¹⁾ according to ISO 8573-1
 Solid particle size and density class 2
 Oil rate class 3
 Pressure dew point 10 K under ambient temperature
 For air supply, we recommend the FOXBORO ECKARDT
 FRS923 filter regulator.

Response characteristic^{2) 3)}

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)	3 (45)	6 (90)
without booster ⁵⁾	2 700 (95)	5 000 (177)	7 500 (265)
with Spool Valve ⁴⁾	6 000 (211)	12 000 (423)	18 000 (636)
with booster code F, G			21 000 (742)
with booster code H			42 000 (1 484)

Note: The use of boosters in connection with Spool valve is not recommended.

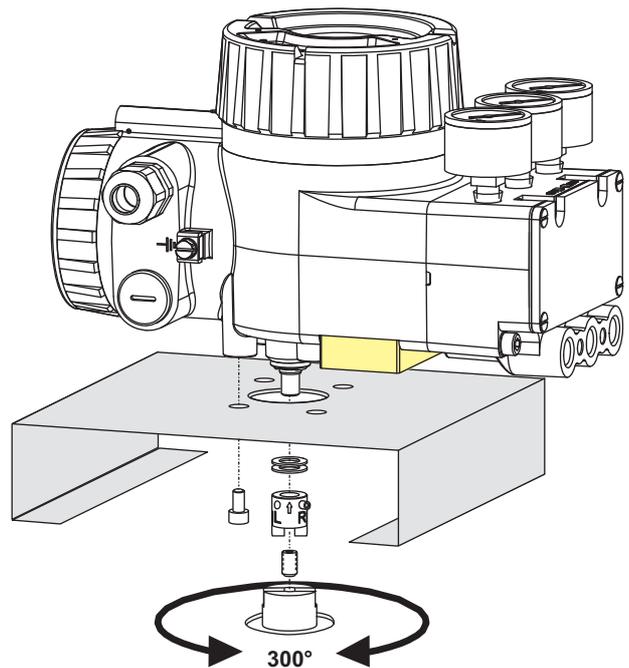
Air consumption (steady state) I_n/h (scfh)

Supply air pressure bar (psig)	1.4 (20)	3 (45)	6 (90)
single acting	80 (2.8)	130 (4.6)	220 (7.8)
double acting	130 (4.6)	230 (8.1)	430 (15.2)
Spool Valve	100 (3.5)	240 (8.5)	500 (17.7)

Special Version of SRD960

SRD960 for actuator with rotation up to 300°

This special version of the SRD960 is designed to be mounted by means of standard attachment kit (like the EBZG-R) onto rotary actuator with rotation up to 300°. This special version is made of a standard SRD960 with new gears.
 To be ordered under special version ECEP EP0265



Please consult TI EVE0109 LP

1) Pressure dew point 10 K under ambient temperature
 2) Data measured according to VDI/VDE 2177
 3) With stroke 30 mm and lever length 90 mm
 4) Spool valve is the type of amplifier used in device SRD960-C
 5) Standard diaphragm amplifier
 Devices SRD960-B and SRD960-Cxxxxxxxx-M are using "standard" diaphragm amplifier

FUNCTIONAL SPECIFICATIONS (common data for SRD960 -B or C)

Features

Automatic start-up Autostart functionality
Automatic detection of mechanical stops, control parameters and of direction of spring force. A dynamic optimization is included in this procedure. This procedure allows a full adaptation on optimization of the positioner to the actuator without any manual adjustments!

Options

- Built-in independent inductive limit switches
- Pressure Sensors for supply air pressure and output pressure I (y1) and II (y2)
- Additional Inputs / outputs:
 - 2 binary outputs (position alarms)
 - Position feedback 4 to 20 mA + binary alarm output
 - 2 binary inputs

Operation and configuration

Local with four keys
Display Multi-Lingual Graphic LCD or five LEDs

The positioner in LCD version is available with three different menu languages:

Two menu languages are standard:

- English
- German

Freely definable third language (additional languages on request):

- French - Portuguese - Spanish
- Italian - Swedish - etc.

The third menu language has to be selected and specified with order.

All additional Menu languages can be downloaded into the positioner by means of the operation- and configuration software VALcare™. Additional language [downloads](#) are available on our homepage.

Position feedback and alarms

Position feedback / valve position . . via communication
Optional ¹⁾ 4 to 20mA position feedback
Alarms via communication
Optional ¹⁾ 1 alarm output
Position alarms via Kommunikation
Hi and Lo alarm
Hi/Hi and Lo/Lo alarm
Optional ¹⁾ 2 binary outputs
Hi and Lo alarm
Hi/Hi and Lo/Lo alarm

Independent feedback:

Limit switch (inductive) Standard version
Security version

Diagnosis

– local

- Self diagnostics
- Status- and diagnostic messages

– via VALcare™ Valve Diagnostic Software:

- Service Management for planning and scheduling of service intervals
- Histograms for displaying the position- and response history over time
- Partial Stroke Test for the functional inspection of safety related actuators
- Hours in operation, cycle counter and travel sum of the actuator are determined
- Surveillance of loop current
- shows condition of device:
 - Potentiometer
 - IP Motor
 - exceeding range of actuator (possible indication for wear of plug or seat)
 - remaining control deviation (possible indication for jammed actuator, blocked valve stem or plug, not sufficient air capacity /supply air pressure /positioning pressure)
- if equipped with pressure sensors (optional):
 - Monitoring of the stem friction
 - Histograms for displaying the friction-history over time
 - surveillance of air supply and output pressure, each with display of physical value
- Additional diagnostical possibilities in control operation by means of external sensors (optional). See also the VALcare™ Documentation.

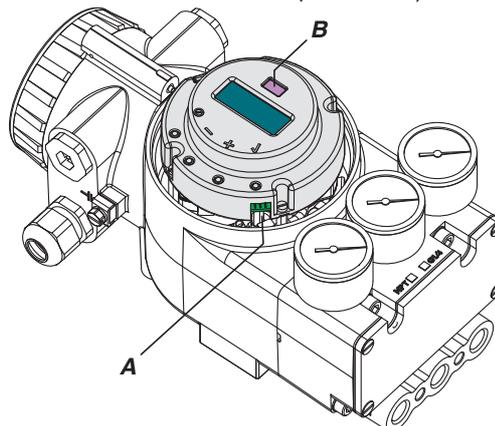
Service plug and IrCom

All basic devices are equipped with a service plug **A** at the front side. There via RS232 interface a PC with VALcare™ (DTM) can be connected via modem EDC82 (galv. separated, not Ex).

Information about EDC82 modem see [TI EVE0102_Y](#).

If the SRD is equipped with option "IrCom" **B**, communication can take place contactless via infrared with the positioner (even with a closed cover!). A modem "IR Interface" (not Ex) connected via RS232 interface to a PC with VALcare™ (DTM) makes communication possible up a range of approx. 0,5 m.

(If the notebook has an IrDa interface, this cannot be used despite being similar technology as IrDa instruction set has no communication commands for positioners.)



1) By means of additional inputs/outputs (Option Board)

Manual settings:

Actuator mode	linear or rotary actuator
Linear valve	left or right mounted
Rotary actuator	opening clockwise or counter-clockwise
Characteristic of setpoint	linear, equal percentage, invers- equal percentage or custom (22 points)
Valve function	opens or closes with increasing setpoint
Split range	free upper and lower values
Travel limits	free upper and lower values
Cutoffs	free upper and lower values
Stroke range	configurable
Temperature unit	configurable (°C or °F)
Autostart	- Endpoints - Standard Autostart - Enhanced Autostart ¹⁾ - Smooth response ¹⁾ - Fast response ¹⁾
Control parameters	Determined during Autostart.
Working range	freely adjustable (for indication on LCD)
Manual adjustment of	P-gain, I-time, T63-time and dead band
Manual operation	Manual input of setpoint to drive the valve in steps with 12.5 % or 1 % ¹⁾
Pneumatic test	Function to test the pneumatic output
Workshop	input and angle calibration
LCD language	dependent on version
LCD orientation	dependent on version
PROFIBUS-PA	Bus address
FOUNDATION Fieldbus	Simulation Switch from Link Master to Basic Field Device

Software supported configurations:

- by means of Hand Held Terminal (HART)
- PC by means of VALcare™ Software
- PC among others by means of PC20 / PC50 / IFDC
- I/A Series System and other DCSs
- Depending on the version, configurations can be achieved by a non-contact, protocol-independent infrared interface by means of IRCOM.

Failure handling

Safety position at	
- Air supply failure	pressure y1 = zero
- Electric power failure	pressure y1 = zero
- Failure of electronics	pressure y1 = zero
- Failure of communication is recognized by configurable watch dog with response delay of 0.1 s to 24 h behavior.	configurable as pressure y1 = zero or stop at last value or a configured value
Diagnostic report	via communication and local LCD
- historical status	is set if alarm was activated at any time (also just short alarms)
Reset.	by acknowledging

1) from HW-Rev. 3.4 / Firmware Rev. 16

PHYSICAL SPECIFICATIONS (common data for SRD960 -B or C or T)

Mounting (see page 17 for details)

Attachment preparation by means of mounting adapter

Option N for

- NAMUR according to IEC 534, Part 6
- Direct to IFC-/Flowserve actuators such as FoxPak and FoxTop

- Rotary actuators according to VDI/VDE 3845

Option R for

- Rotary actuators according to VDI/VDE 3845

Option T for

- Integrated mounting with air connection on back - for details refer to page 21, Attachment prep.

Option D for

- NAMUR according to VDI/VDE 3847
- Rotary actuators according to VDI/VDE 3845

Option F for

- NAMUR according to IEC 534, Part 6
- Rotary actuators according to VDI/VDE 3845

Attachment to stroke actuators

- direct to FlowPak/FlowTop with attachment kit EBZG -E1

- for casting yoke acc. to

IEC 534-6 (NAMUR) with attachment kit EBZG -H

Stroke range

with standard feedback lever EBZG-A: 8 to 70 mm

with extended feedb. lever EBZG-B: 60 to 120 mm

with extended feedb. lever EBZG-A1: 100 to 260 mm

- for pillar yoke acc. to

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

Stroke range

with standard feedback lever . . . 8 to 70 mm

with extended feedback lever . . . 60 to 120 mm

Attachment to rotary actuators

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

- Further attachment kits see ModelCodes page19 -

Materials

Housing and covers Aluminum (Alloy No. 230)
finished with 2 component DD
varnish

All moving parts of

feedback system (V4A) 1.4306 / 1.4571 / 1.4104

Mounting bracket Aluminum (Alloy No. 230)

Pneumatic diaphragm Silicone (suitable for use in
lacquer industry according to Lab-Test)

Weight

Single acting approx. 2.7 kg (3.7 lbs)

Double acting. approx. 3 kg (4.4 lbs)

Pneumatic connection

NAMUR mounting 3 x female threads

1/4-18 NPT or G1/4 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).

Electrical connection

Line entry 1 or 2 cable glands

M20 x1.5 or 1/2-14 NPT
(others with Adapter AD-...)

Cable diameter 6 to 12 mm (0.24 to 0.47 in)

Screw terminals 2 terminals for input,

4 terminals for additional
inputs/outputs

Wire cross section 0.3 to 2.5 mm² (AWG 22-14)

PHYSICAL SPECIFICATIONS (common data for SRD960 -B or -C or -T)

Ambient conditions

Operating conditions acc. to IEC 654-1

The device can be operated at a class Dx location

Ambient temperature for

Operation ¹⁾ -40 to 80 °C (-40 to 176 °F)

Transport and storage . . . -40 to 80 °C (-40 to 176 °F)

Storage conditions acc.

to IEC 60721-3-1: 1K5; 1B1; 1C2; 1S3; 1M2

Display

LCD (visible) ²⁾ -25 to 80 °C (-13 to 176 °F)

LEDs -40 to 80 °C (-40 to 176 °F)

Relative humidity up to 100 %

Protection class

acc. to IEC 529. IP 66 ³⁾

acc. to NEMA Type 4X

Electromagnetic compatibility EMC

Operating conditions: industrial environment

Immunity according to

- EN 61 326-1 fulfilled

Emission according to

- EN 55 011,

Group 1, Class B fulfilled

NAMUR

recommendation NE21. fulfilled

SAFETY REQUIREMENTS

CE label

Electromagnetic

compatibility ⁴⁾ 2004/108/EG

Low-voltage regulation not applicable

Safety

According to EN 61010-1

(or IEC 1010-1) safety class III

Overvoltage Category I

Internal fuses only with PROFIBUS or FOUNDATION Fieldbus, but 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).

Compliance with the essential health and safety requirements has been assured by compliance with EN 50014:1997 + A1 + A2 EN 50018:2000

Electrical Classification ^{5) 6)}

See certificate of conformity EX EVE0109 A (de)(en)

Type of protection ATEX "Ex d – Flameproof"

II 2 G EEx d IIC Temperature class T4...T6

(Design AD 639)

EC-Type-Examination Certificate [PTB 02 ATEX 1084 X](#)

Permissible ambient temperature range:

Temperature class T4 -30 °C to +80 °C
(-22 °F to 176 °F)

Temperature class T4 (on request)
-40 °C to +80 °C
(-40 °F to 176 °F)

Temperature class T6 -30 °C to +75 °C
(-22 °F to 167 °F)

Temperature class T6 (on request)
-40 °C to +75 °C
(-40 °F to 167 °F)

For connections in explosion protected hazardous areas according to directive 94/9/EG appendix II, with the following maximum values:

Input circuit:

Maximum electrical power P max = 2.5 W

Electrical connections U max = up to 60 V

Self-heating of device surface 1.3 K/W

Type of protection FM "explosion proof"

Class I Division 1, Groups B, C, D

hazardous locations, indoor and outdoor, NEMA 4X

- 1) Details see Certificates of Conformity. With built-in "Inductive Limit Switch" Code T only -20 °C
- 2) Below -20 °C reaction time for value changes is reduced
- 3) Under service as directed
- 4) With PROFIBUS or FOUNDATION Fieldbus only, if shield of wiring is grounded on both sides.
- 5) With appropriate order only
- 6) National requirements must be observed

SRD960 with HART communication SRD960-xHxxxx

Signal Input

Two wire system

Reverse polarity protection . . . standard feature

Signal range 4 to 20 mA

Operating range 3.6 to 21.5 mA

Voltage range of unloaded

input signal 12 to 48 V

Load 420 Ohms, 8.4 V at 20 mA

Communication signal HART, 1200 Baud, FSK
(Frequency Shift Key)
modulated on 4 to 20 mA
0.5 Vpp at 1kOhm load

Input impedance Zi Z = 320 Ohms

for ac voltage 0.5 to 10 kHz with < 3 dB non-linearity

Cable capacity and inductance see HART standard specifications. (e.g. C < 100 nF).

Impedance of other devices at the input (parallel or serial) must be within HART spec.

Applications without communication require not to exceed input capacitance parallel to the input not higher than 100 μ F.

Start-up time (init phase) . . . approx. 2 sec

Interruption time without power down:

- with LCD 85 ms ¹⁾

- with LED 75 ms ¹⁾

Configuration

Local / Display see page 4

Software VALcare™ (FDT-Software)

Hardware Modem MOD991 for PC, IBM compatible

Hand Terminal HART Hand held terminal

I/A Series System on request

Other control systems AMS, Siemens SIMATIC PDM
(ProcessDeviceManager)

SRD960 with FoxCom communication SRD960-xFxxxx

Signal Input

Two wire system

Reverse polarity protection . . . standard feature

Input digital

voltage range of supply input DC 8 to 48 V

Supply current approx. 9 mA at DC 24 V

Communication signal FoxCom digital, 4800 Baud,
FSK (Frequency Shift Key)
modulated on supply voltage
0.5 Vpp at 500 Ohms load.

Input impedance Z = 500 Ohms
(for ac voltage 3 kHz to 15 kHz)

Start-up time (init phase) approx. 2 sec

Interruption time without power down:

- with LCD 85 ms ¹⁾

- with LED 75 ms ¹⁾

Configuration

Local / Display see page 4

Software VALcare™ (FDT-Software)

Hardware Modem PC10

I/A Series System FBM 43, FBM 243, 246 ²⁾
in connection with CP60

1) Worst case conditions 4-20mA, with position feedback option, i/p-output with max. current

SRD960 with communication PROFIBUS-PA and FOUNDATION Fieldbus H1 SRD960-xPxxxx or SRD960-xQxxxx

PROFIBUS-PA

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 / Display see page 4

Software VALcare™ (FDT-Software)

Hardware PC- or PCMCIA-interfaces
from Softing

I/A Series System with FBM223

Other control systems All Profibus-PA- compatible,
e.g. Siemens SIMATIC PDM
(ProcessDevice Manager)

FOUNDATION Fieldbus H1

Data transfer according to Fieldbus
FOUNDATION Specification
Rev. 1.4, Link-Master (LAS).

Function Blocks AO, Transducer, Resource,
PID, 2xDI, DO

DD files the actual file can be down-
loaded from our [homepage](#)

Configuration

Local / Display see page 4

Software VALcare™ (FDT-Software)
or National Instruments
NI-FBUS configurator

Hardware FBUS-interfaces (AT-FBUS
and PCMCIA- FBUS)

I/A Series System with FBM220 / 221

Other control systems All Fieldbus FOUNDATION
H1-compatible.
Fisher Rosemount Delta-V,
Honeywell, Yokogawa, ABB

For both fieldbus versions

Input signal digital

Supply voltage DC 9 to 32 V *)

max. Supply voltage DC 48 V

Operating current 10.5 mA ± 0.5
(base current)

Current amplitude ± 8 mA

Fault current base current + 0 mA
(base current + 4 mA by means of independent
FDE-safety circuit) according to IEC 1158-2

Start-up time (init phase) . . . approx. 2 sec

Operating values

Bus connection Fieldbus interface based
on IEC 1158-2 according to FISCO-Model
(see Electrical certifications)

Power supply Power supply is achieved
dependant on the application by means of fieldbus
power supply units or segment coupler

*) Data of "Intrinsically Safe" version

SRD960 as Position Transmitter stand alone unit SRD960 -TxQ

Input Stroke / Rotary angle by means of conductive plastic precision potentiometer

Output Two wire system

Signal range 4 to 20 mA / 20 to 4 mA or free configuration 3.8 to 20.5 mA

Permitted load $R_{bmax} = (U_s - 12 \text{ V}) / 0.02 \text{ A} [\Omega]$ (Us = supply voltage)

Power supply

Reverse polarity protection . . standard feature

Supply voltage $U_s = \text{DC } 12 \text{ to } 36 \text{ V}$

Permitted ripple $< 10 \% \text{ p.p.}$

Supply voltage dependency . negligible

Response characteristic

Non-linearity (terminal based adjustment) $< 1 \% \text{ F.S.}$

Hysteresis $< 0.5 \% \text{ F.S.}$

Load dependency negligible

Temperature effect $< 0.1 \% / 10 \text{ K}$

Weight approx. 2.3 kg

Configuration and status

Local configuration 2 push buttons and 2 LEDs

SRD960 as potentiometer unit for remote mounting application SRD960 -Txxxx - H

Travel Range

Stroke range 8 to 260 mm (0.3 to 10.2 in) with standard feedback levers; special levers on request

Rotation angle range up to 95 ° (to 300° on request) (without mechanical stop)

Response Characteristic

please refer you to the technical data of the positioner SRD960 with which is mounted together.

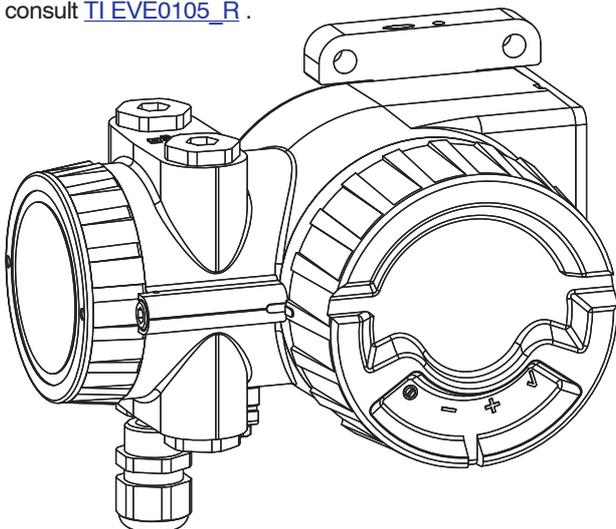
Weight approx 2.3 kg

Ambient conditions

Ambient temperature $-40 \text{ to } 100 \text{ }^\circ\text{C}$ ($-40 \text{ to } 212 \text{ }^\circ\text{F}$)

IP66

For more information about remote mounting please consult [TI EVE0105_R](#).



OPTION for all SRD960 -B or C

Pressure sensors [item 3]

Three built-in pressure sensors, Code "Option -B", for supply air, output y1 and y2 to actuator, necessary for Premium Diagnostic

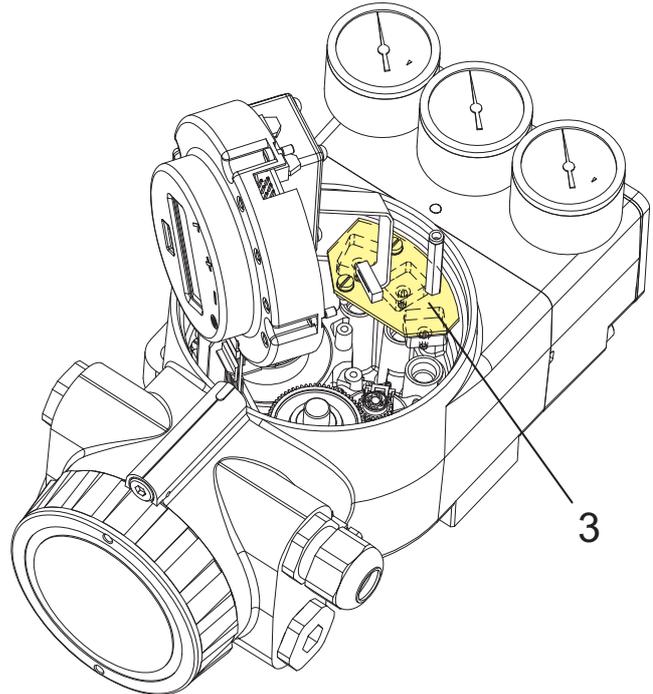
Measuring range 0 to 8 bar (0 to 120 psig)

Accuracy 0.5 %

Temperature influence 0.5 % / 10 K ($-40 \text{ to } 80 \text{ }^\circ\text{C}$)

Parts set for subsequent mounting:

Option B (3x pressure sensors) EW 426 247 311



Option -B "Built-in pressure sensors"

ADDITIONAL EQUIPMENT

Additional Inputs / Outputs, built into any SRD960 -B or C

Order in Model Code: SRD960-□□ P

Two binary outputs (limit signals) [item 1]

Stroke / angle derived 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

Logic:
limit value not exceeded . . . < 1 mA
limit value exceeded > 2.2 mA (typ. 6 mA)
device fault < 50 µA
configurable as switch output:
limit value not exceeded . . . < 50 µA
limit value exceeded > 20 mA / 20 V
> 40 mA / 10 V
(power derated)

Reference: AB1 for upper, AB2 for lower limit
Terminals for AB1 81+, 82-
AB2 83+, 84-

Explosion protection thereto see page 7.

Parts set for subsequent mounting:
Code P EW 426 346 021

Order in Model Code: SRD960-□□ Q

Position feedback 4 to 20 mA [item 1]

Stroke / angle derived 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
signal range 3.8 to 21.5 mA
0 % and 100 % configurable
device fault < 1 mA
Terminals for AI1 31+, 32-

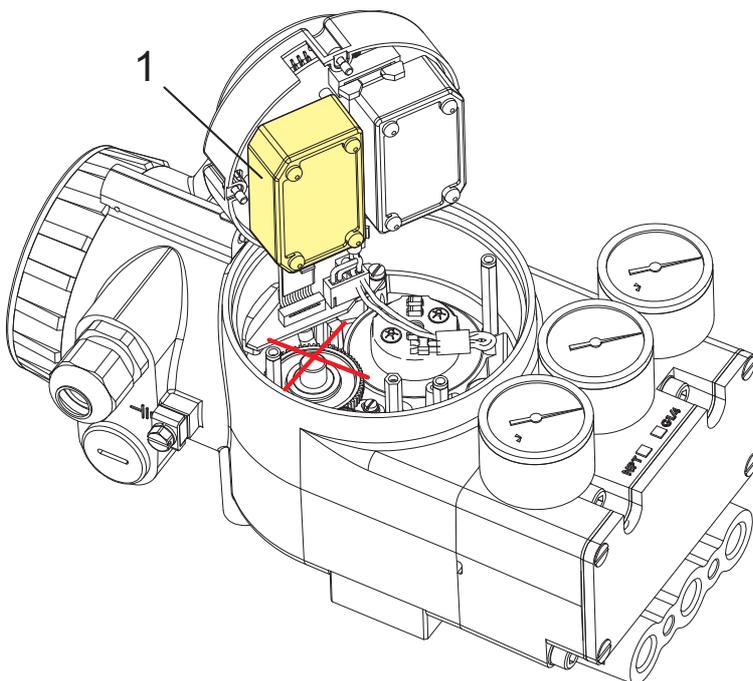
1 Binary output alarm, galvanically separated, two-wire system, according to DIN 19234, for external supply supply voltage. DC 8 to 48 V
Logic no alarm < 1 mA
alarm > 2.2 mA
device fault < 50 µA

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
- (Pre-settings can be configured via communication)

Explosion protection thereto see page 7.

Parts set for subsequent mounting:
Code Q EW 426 346 039



ADDITIONAL EQUIPMENT (continued)

Additional Inputs / Outputs, built into any SRD960 -B or C

Order in Model Code: SRD960-□□ **B**

Two Binary Contact Inputs [item 1]

Two independent binary inputs, supplied by the basic device, for connection of sensors. A connected switch is loaded with 3 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-

Requirements for connected switches:

Capacitance in parallel < 100 nF

Resistance for ON < 2 kOhms
for OFF > 10 kOhms

Hysteresis 2 to 5 kOhms

For application with - mechanical switches
- opto couper outputs
- open collector / drain
outputs of transistor
circuits

For further informationen about the contact inputs please consult [TI EVE0105_B](#).

Explosion protection thereto see page 7.

Parts set for subsequent mounting:

Code B EW 426 346 012

Order in Model Code: SRD960-□□ **E**

Two Binary Signal Inputs/Outputs [item 1]

Two Binary Inputs/Outputs are configure by the device as Input or as output, as well as the kind of Signals as on/off or as to NAMUR signal in accordance (DIN 19234).

Configured as NAMUR:

Input/Output

Logic 0 > 0.35 mA, < 1 mA

Logic 1 > 2.2 mA < 6 mA

Input current Limited to < 6 mA

On/Off Signal

Output:

Logic 0 < 50 μA

Logic 1 > 40 mA / 10 V

Input:

Logic 0 < 4 mA

Logic 1 > 6 mA

Signal Voltage Range 6 ... 36 V

Terminals for Ch1 81+, 82-
Ch2. 83+, 84-

Part set for subsequent mounting:

Code E EW 426 247 417

ADDITIONAL EQUIPMENT (continued)

Additional Inputs/Outputs built into any SRD960 -B or C

Order in Model Code: SRD960-□□ T, U, R, V

Built-in Limit Switch [item 2]

Inductive Limit Switch

standard version (SJ2-N) Code T
 security version (SJ2-SN) Code U
 - in three wire technology
 (SI 2-K08-AP7) Code R

Stroke / angle derivated 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, R_i approx. 1 kOhm
 supply voltage range DC 5...25 V (only with ZZZ)
 residual ripple < 10 % p.p.
 permissible
 line resistance < 100 Ohms

Response characteristic ^{2) 3)}
 switching differential < 1 %
 switching point repeatability < 0.2 %

Terminals for Code T, U GW1 . 41+, 42-
 GW2 . 53+, 54-

Terminals for Code R GW1 . 42
 GW2 . 52
 Supply 41+, 43-

Explosion protection thereto see page 7.

Parts sets for subsequent mounting:
 Code T EW 426 346 057
 Code U EW 426 346 066
 Code R EW 426 346 075

Built-in Limit Switch [item 2]

Mechanical switches

Micro Switches Code V

Stroke / angle derivated from positioner feedback lever

Output 2 mechanical switches (Micro switches) ^{1) 4)}

Manufacturer Saia-Burgess
 Type V4NS-C4-AC1-UL
 UL- and CSA-approved

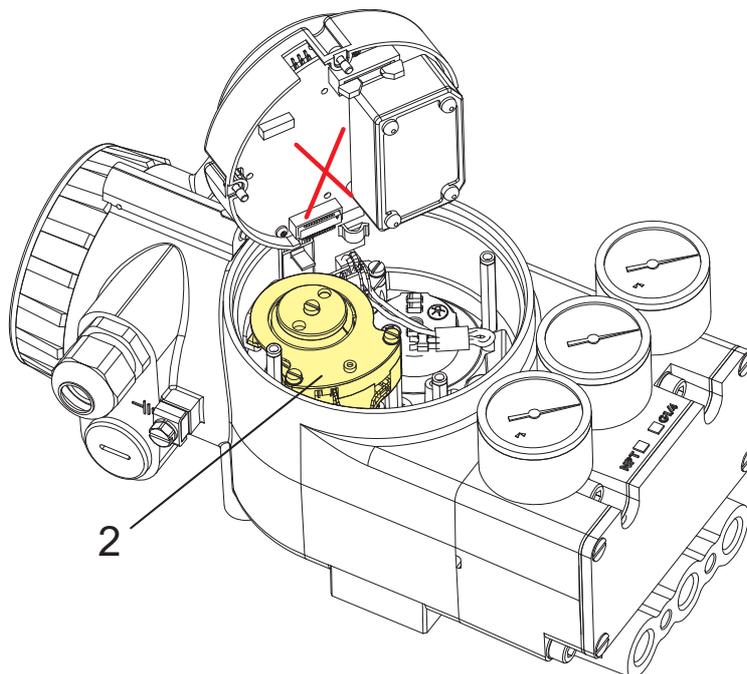
Absolute limit values AC
 of mechanical switches built into positioner:
 U_{max} 42 V AC ⁵⁾
 I_{max} 0.5 A (resistive load) ⁵⁾
 I_{max} 0.03 A (inductive load) ⁶⁾

Absolute limit values DC
 of mechanical switches built into positioner: ⁷⁾
 U_{max} 30 V DC
 I_{max} 1 A

Switching Differential: < 2.5 %
 Terminals for SW1 41, 42
 SW2 51, 52

The circuit of the mechanical switches have to be protected by a suitable fuse. The diameter of the protective conductor needs to be at least 1.5 mm² / AWG 16.

Parts set for subsequent mounting
 Code V EW 426 346 084



- 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
- 4) Operating mode normally open / normally closed selectable by vane adjustment
- 5) Approval according to UL (UL 1054) and CSA (CSA 22.2 No. 55) at 6,000 operations and T = 65 °C / 149 °F
- 6) Based on EN 61058-1, at 10,000 operations and T = 85 °C
- 7) General rating at 50,000 operations and T = 85 °C / 185 °F

LOCAL DISPLAY

Order in Model Code: SRD960-□□□□□□□□□□□□□□□□

There are three Display covers available:

- Cover with LCD and 4 external push buttons
- Cover with 5 LEDs and 4 external push buttons
- Cover, solid, without window; internal push buttons

The positioner in version with LCD is available with three different menu languages:

Standard menu languages:

- English
- German

Freely definable third language (additional languages on request):

- French
- Portuguese
- Spanish
- Italian
- Swedish
- see ModelCode

The third menu language has to be selected and specified with order.

The pre-set menu language is English. This menu language can easily be set to another pre-configured menu language by means of the local push buttons.

All "freely definable" third Menu languages can be downloaded into the positioner by means of the operation- and configuration software VALcare™. This way also the pre-configured third language can be modified. The additional language [downloads](#) are available on our homepage.

Despite some special functions all configurable parameters are accessible by means of the local push buttons.

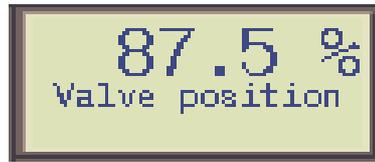
Displayed data in operation:

- valve position
- stem position
- input current
- setpoint digital
- setpoint stem
- supply pressure
- output pressure 1
- output pressure 2
- temperature
- valve cycles
- travel sum
- Hours of operation
- Tag number
- Tag name
- Firmware version

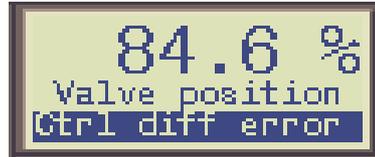
Configuration Main Menus:

- 1: attachment
- 2: autostart
- 3: valve function
- 4: characteristics
- 5: limits / alarms
- 6: parameters
- 7: pneumatic output
- 8: manual setting of valve position
- 9: calibration / workshop
- 10: Bus Address/Simulation (Profibus PA / F.Fieldbus)

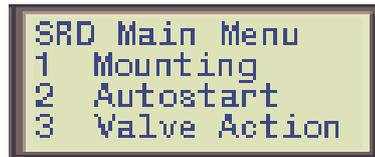
With LED display the configuration functionality is the same as with LCD (but LCD is easier to use). Details see Master Instructions ([MI](#)) or Quick Guide ([QG](#)).



Value
What is displayed



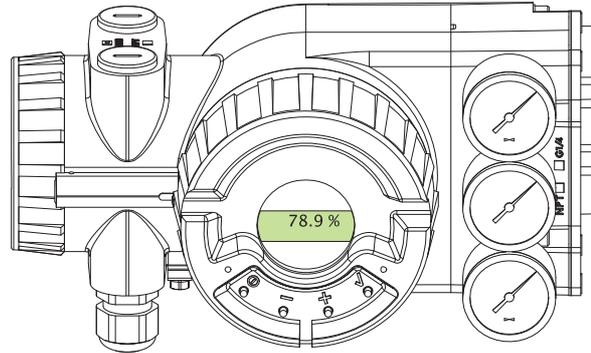
Status and diagnostic message



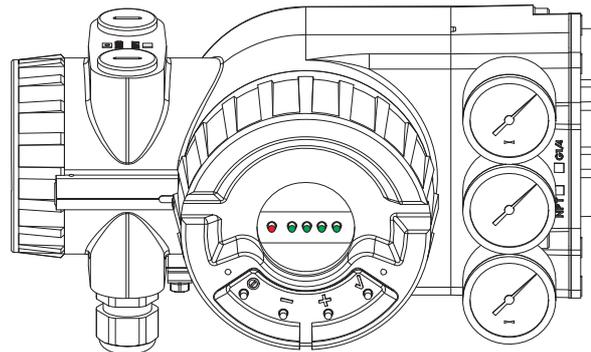
Configuration Menu

LCD orientation can be changed by means of local push buttons under Menu 9.9

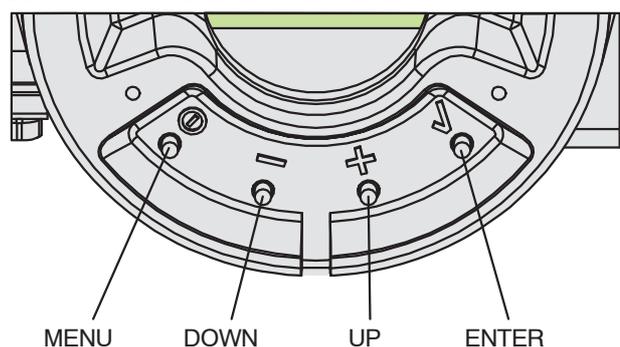
LCD Cover



LED Cover



Local Push buttons:



ATTACHMENT PREPARATION

Order in Model Code: SRD960-□□□□□□□□□□

The Universal Positioner needs a linking piece for attachment to the different brands of actuators.

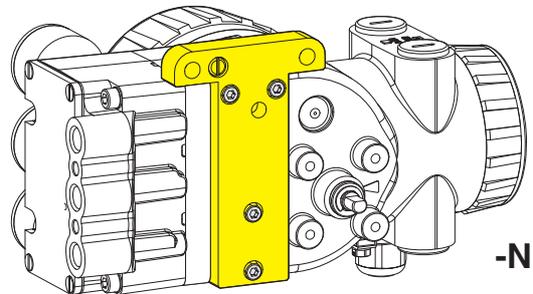
The standard Mounting Adapter is marked with Option N.

Mounting Adapter

Preparation for attachment to:

- NAMUR, according to IEC 534-6
- Direct mounting to FoxPak and FoxTop actuators, with y1-d air supply (no external tubing for y)
- Rotary actuators acc. to VDI/VDE 3845

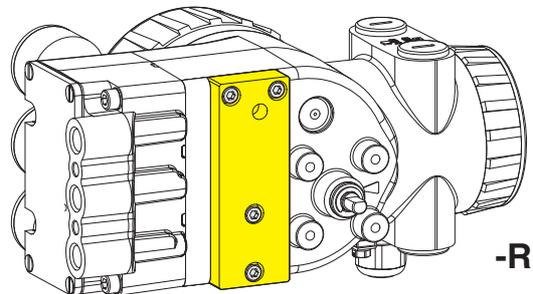
Order Option N.



Preparation for attachment to:

- Rotary actuators acc. to VDI/VDE 3845

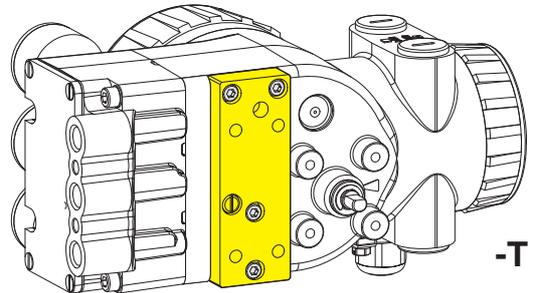
Order Option R.



Preparation for attachment to:

- Integrated mounting with air connections on rear
- Rotary actuators acc. to VDI/VDE 3845

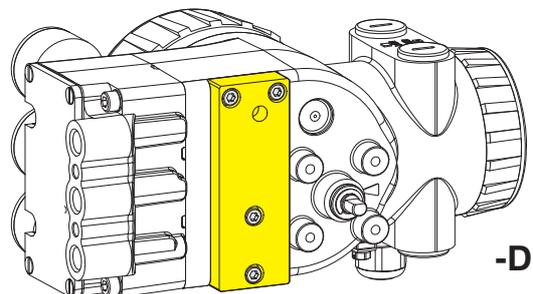
Order Option T.



Preparation for attachment to:

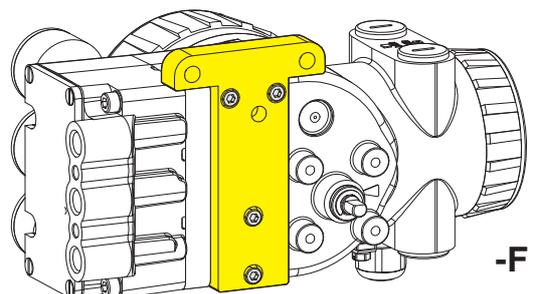
- NAMUR, according to VDI/VDE 3847
- Rotary actuators acc. to VDI/VDE 3845

Order Option D.

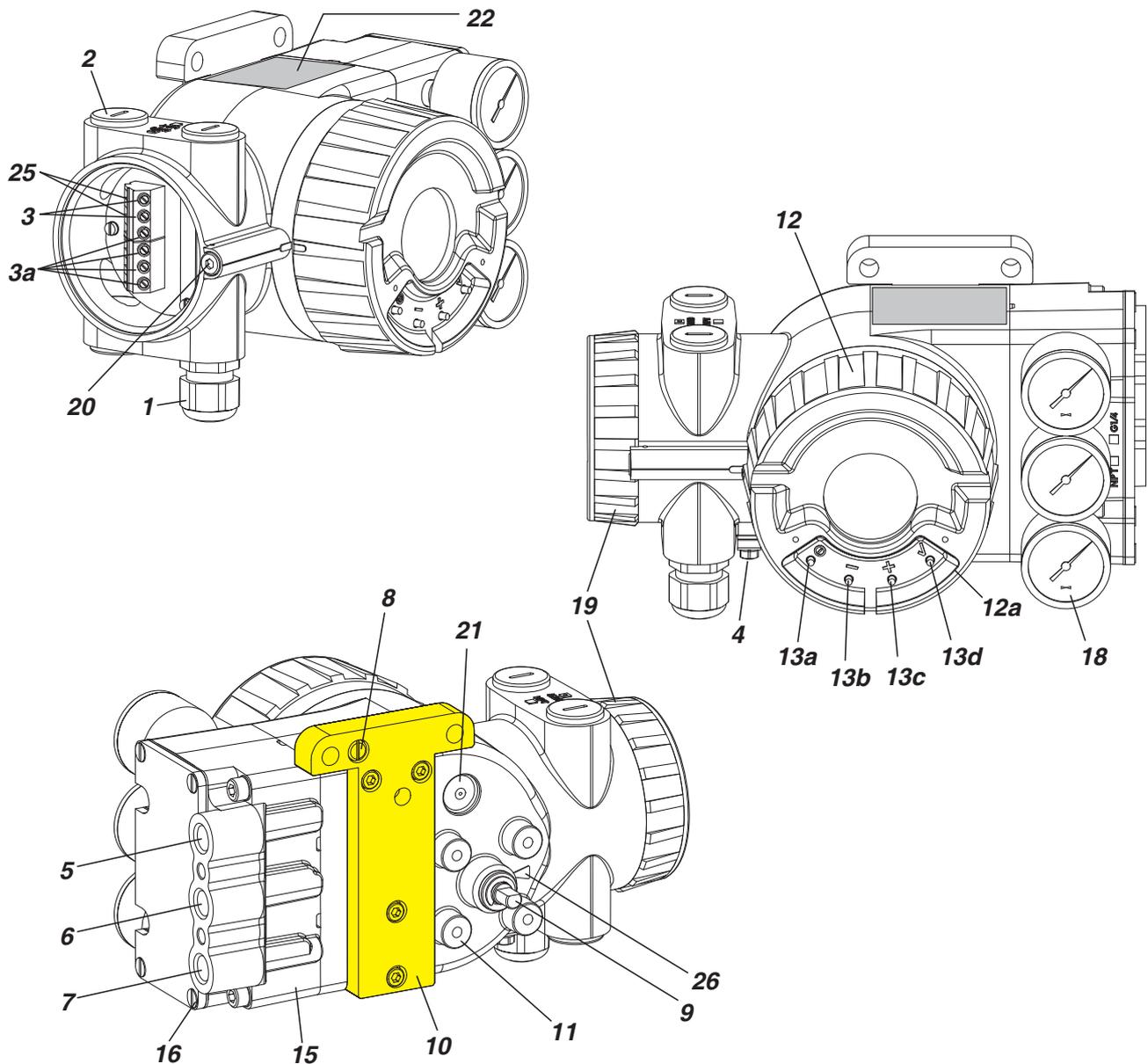


as Option N, but no y1-d air supply (with external tubing for y)

Order Option F.



FUNCTIONAL DESIGNATIONS



- | | |
|---|---|
| <p>1 Cable gland ¹⁾</p> <p>2 Plug, interchangeable with Pos. 1 ¹⁾</p> <p>3 Connection ²⁾ (11 +/12 -) for input (w) or terminals (11 / 12) for bus connection IEC 1158-2</p> <p>3a Connection ²⁾ for additional inputs / outputs</p> <p>4 Ground connection</p> <p>5 Female thread G ¼ or ¼-18 NPT ³⁾ for output I (y1)</p> <p>6 Female thread G ¼ or ¼-18 NPT ³⁾ for air supply (s)</p> <p>7 Female thread G ¼ or ¼-18 NPT ³⁾ for output II (y2)</p> <p>8 Direct attachment hole for output I (y1)</p> <p>9 Feedback shaft</p> <p>10 Connection manifold for attachment to stroke actuators (see page 17 for details)</p> <p>11 Connection base for attachment to rotary actuators</p> <p>12 Cover with window and push buttons</p> <p>12a Push button protection cover (option -X)</p> | <p>13a Key ⬇ MENU</p> <p>13b Key - DOWN</p> <p>13c Key + UP</p> <p>13d Key ✓ ENTER / STORE</p> <p>15 pneumatic unit with amplifier and connection</p> <p>16 4 screws for connection of pneumatic unit</p> <p>18 built-in pressure gauges for air-supply, output Y1 and output Y2</p> <p>19 Cover for electronic connection compartment</p> <p>20 Protection screw for electronic connection- and electronic compartment</p> <p>21 Air vent, dust and water protected (IP65 and NEMA 4X)</p> <p>22 Data label</p> <p>25 Tip jacks, 2 mm dia.</p> <p>26 Arrow is perpendicular to shaft 9 at angle 0 degree</p> |
|---|---|

1) See cable glands BUSG on page 19. The device is supplied with dust protection covers

2) Screw terminals or WAGO Cage clamps

3) Type of thread marked on housing

Model Codes SRD960

Universal Positioner	SRD960	010410
Version		
Single Acting	-B	
Double Acting	-C	
Position Transmitter (w/o pneumatic components)	-T	
Local Control Panel (LCP960) For PST Monitoring	-L	
Input / Communication		
HART (4-20 mA)	(g)(p)	H
FoxCom (Digital)	(g)(p)	F
Profibus PA based on IEC 1158-2 (MBP)		
according to FISCO (Fieldbus)	(g)(p)	P
FOUNDATION Fieldbus H1 based on IEC 1158-2 (MBP)		
according to FISCO (Fieldbus)	(g)(p)	Q
not applicable.	(f)	X
Additional Inputs / Outputs		
Without Additional Inputs / Outputs	(n)(p)	N
Binary Input - integrated.	(g)(p)	B
Binary Output - integrated	(g)(p)	P
Binary Inputs/Outputs (mandatory for ESD application)		E
Analog Position Feedback (4-20 mA)		Q
- integrated and connected as Option Board	(g)(p)	
- stand alone feedback unit	(f)(p)	
Potentiometer Input (for Remote Mounting - main unit) (g)(p)		D
Limit Switches (standard version SJ2-N)	(g)(p)	T
Limit Switches (security version SJ2-SN)	(g)(p)	U
Limit Switch (three-wire version)	(g)(p)	R
Mechanical Switches (Micro Switches)	(g)(p)	V
Display / Indication		
LEDs (cover without window and without external pushbuttons)	(p)	S
Grafical LCD (cover with window and with external pushbuttons)	(g)	D
LEDs (cover with window and with external pushbuttons)	(g)(p)	L
Gauges		
Without Gauges		S
Built-In Gauges with scale in bar/psi.	(g)(p)	M
Pneumtical Connection		
1/4 - 18 NPT	(g)(p)	N
G 1/4	(g)(p)	G
not applicable	(f)	X
Electrical Connection		
1/2 - 14 NPT (w/o cable glands or plugs for certified SRD960)		6
M20 x 1.5 (w/o cable glands or plugs for certified SRD960)		7
Electrical Certification / Explosion protection		
Flameproof II 2 G EEx d IIB/IIC T4/T5/T6 according to ATEX (w/o cable glands or plugs)		EDZ
Explosion-proof according to FM (w/o cable glands or plugs)	(g)(p)	FDZ
GOST Approved For Explosion-proof		GDZ
Without Ex (with cable glands and plugs).		ZZZ
Mounting Preparation on Positioner		
NAMUR acc. to IEC 534-6 / Direct Mounting to Flowserve actuators FlowPak and FlowTop / / Rotary Actuators according to VDI/VDE 3845	(p)	N
Rotary Actuators according to VDI/VDE 3845	(p)	R
Integrated attachment with air channels on back / Rotary Actuators according to VDI/VDE 3845 (g)(p)		T
Direct mounting acc. to NAMUR VDI/VDE 3847 / Rotary Actuators according to VDI/VDE 3845(a)(g)(p).		D
NAMUR acc. to IEC 534-6 / Rotary Actuators according to VDI/VDE 3845		F
Language		
LCD Language in English / German / French	(e)(g)(p)	A
LCD Language in English / German / Spanish	(e)(g)(p)	B
LCD Language in English / German / Portuguese	(e)(g)(p)	C
LCD Language in English / German / Polish	(e)(g)(p)	D
LCD Language in English / German / Czech.	(e)(g)(p)	E
LCD Language in English / German / Italian	(e)(g)(p)	F
LCD Language in English / German / Turkish	(e)(g)(p)	G
LCD Language in English / German / Swedish.	(e)(g)(p)	H
LCD Language in English / German / Finnish	(e)(g)(p)	J
LCD Language in English / German / Chinese	(a)(e)(g)(p)	K
LCD Language in English / German / Russian	(e)(g)(p)	L
LCD Language in English / German / Hungarian.	(e)(g)(p)	M
LCD Language in English / German / Serbian	(e)(g)(p)	N
LCD Language in English / German / Dutch	(e)(g)(p)	O
(continued on next page)		

MODEL CODES SRD960 (continued)

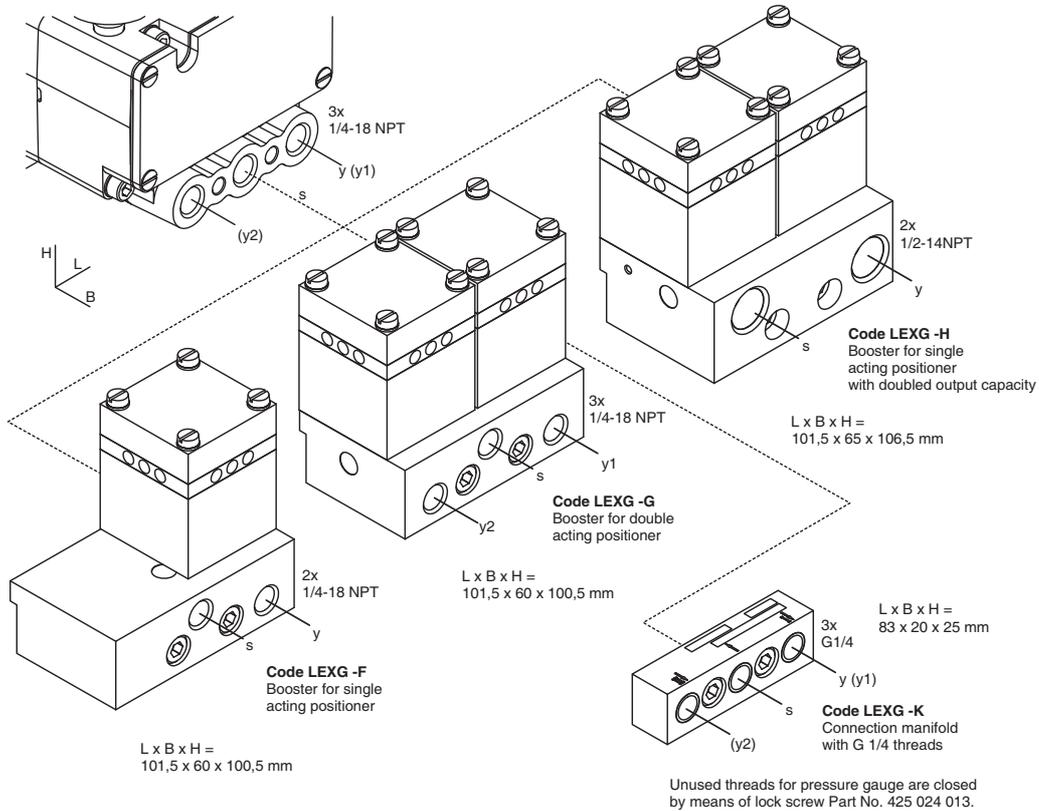
LCD Language in English / German / Romanian.	(e)(g)(p)	P
LCD Language in English / German / Lithuanian.	(e)(g)(p)	Q
Without	(h)(p)	S
Options		
Diaphragm Amplifier for double acting positioner.	(j)(p)	-M
Premium Diagnostics Features (made with built-in pressures sensors) (HART and FoxCom); Build in pressure sensors (analog, FF, Profibus)	(d)(g)(p)	-B
Infrared Interface for communication by means of IRCOM	(d)(g)(k)(p)	-I
Cover for protection of local push buttons	(g)(k)	-X
Approved for SIL2 / SIL3 application	(i)(p)	-Q
Custom Configuration	(g)(p)	-T
ATEX application down to -40°C	(l)	-F
Certificate EN 10204-2.1 - Certificate of compliance with the order		-1
Cage Clamp Connection (WAGO) instead of Screw terminals.	(p)	-W
Feedback-Unit for Remote Mounting - Version of Position Transmitter only with a potentiometer (m)(p).		-H
Version for ESD Valve with PST functionalities	(b)(p)	-E
Tag No. Labeling		
Stamped With Weather Resistant Color		-G
Stainless Steel Label Fixed With Wire		-L
<p>(a) Not released (b) ONLY WITH (additional Inputs/Outputs E) AND (Optional Feature -B) (d) Not available with Input / Communication D (e) Only with Display / Indication D (f) NOT WITH Version -B, Version C (g) Not available with Version -T (h) Not available with Display / Indication D (i) Only available for Version single-acting -B in connection with Input/Communication D and H (j) ONLY WITH (Version: C) (k) Not in connection with Display / Indication S (l) ONLY with Electrical Classification EDZ (m) Only available with Version T, Input/communication X, Additional inputs outputs N, Display S, Gauges S, Pneumatical connection X, Electrical classification EDZ or GDZ or ZZZ, Mounting preparation F, Language S (n) WITH (Version: B, C) OR WITH (Version: T) AND (Input: X) AND (Optional Features: H) (p) NOT WITH Version -L</p>		

ACCESSORIES, FOR ALL DEVICES

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

Connection manifold, Code LEXG -K, -L, -D, -D1

Lateral attachment to positioner
 Air output see table on page 3



The use of boosters together with a spool valve amplifier is not recommended.

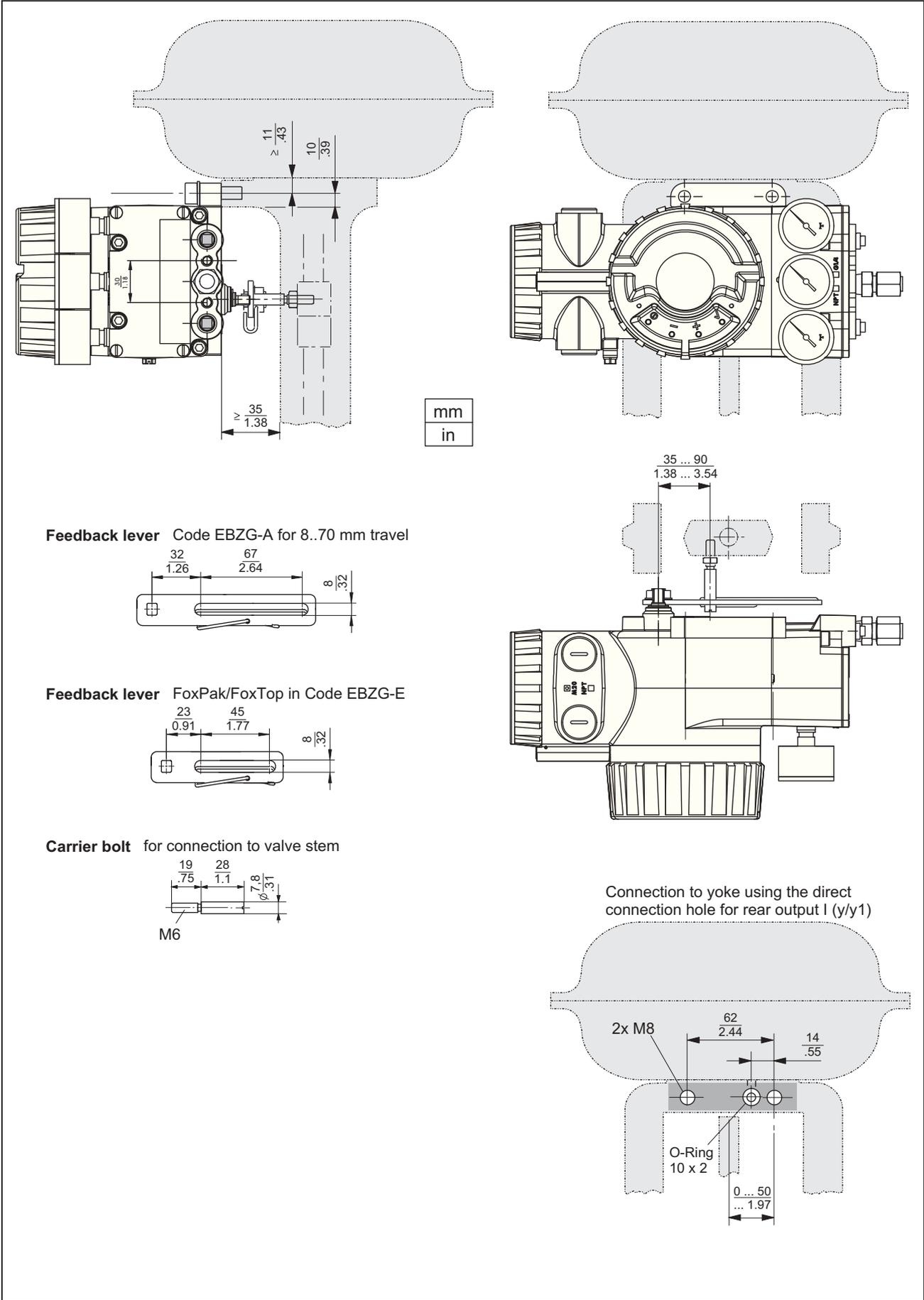
So avoid to select LEXG-G with SRD960-C

In case of need select LEXG-G with SRD960-Cxxxxxxxx-M

Model Codes Accessories

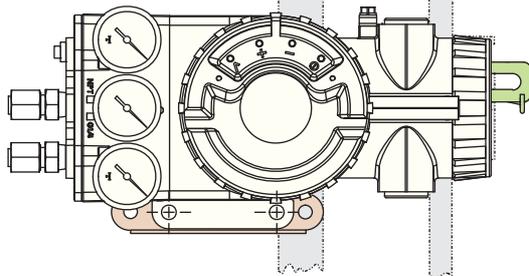
Parts for Intelligent Positioner	
Attachment kit	EBZG
for diaphragm actuators with casting yoke acc. NAMUR (incl. standard couple lever)	-H2
for diaphragm actuators with pillar yoke acc. NAMUR (incl. standard couple lever)	-K
for directly mounting (incl. standard couple lever)	-D
for mounting to rotary actuators acc. VDI/VDE 3845 (without bracket)	-R
for FlowTop / FlowPak	-E1
Further Attachment kits on request. See also http://www.foxboro-eckardt.eu/products/positioners_en.html .	
Couple lever	
standard (stroke max. 80 mm)	-A
extended (stroke max. 120 mm)	-B
extended (stroke max. 260 mm)	-A1
Manifold (for SRD960, SRD991 and SRI990)	LEXG
With Connection G 1/4.	-K
Booster Relay (for SRD960, SRD991 and SRI990, with connection 1/4 - 18 NPT)	
for Version single acting	-F
for Version double acting	-G
for Version single acting with doubled output capacity	-H
with connection G1/4 - 18	
for Version single acting	-F1
for Version double acting	-G1
for Version single acting with doubled output capacity	-H1
Booster Relay (mounted independent from positioner, for SRD960, SRD991 und SRI990, with connection G1/4)	
for Version single acting	-X1
for Version double acting	-Y1
for Version single acting with doubled output capacity	-Z1
Adapter	AD
Adapter 1/2" NPT to 3/4" NPT (stainless steel)	-A3
Adapter M20 x 1.5 to 1/2" - 14 NPT (internal thread) (Brass nickel plated)	-A5
Adapter M20 x 1.5 to 1/2" - 14 NPT (internal thread) (stainless steel)	-A6
Adapter M20 x 1.5 to PG13.5 (internal thread) (stainless steel)	-A7
Adapter M20 x 1.5 to G1/2" (internal thread) (stainless steel)	-A8
Adapter (plastic) M20 x 1.5 to PG13.5 (internal thread)	-A9
Cable Gland	BUSG
M20 x 1.5 stainless steel	-S6
M20 x 1.5 plastics, color gray	-K6
M20 x 1.5 plastics, color blue	-K7
M20 x 1.5 plastics, color white	-K9
M20 x 1.5 HF-cable gland for Fieldbus	-P4
M20 x 1.5 Plug-connector for Fieldbus (ss / threaded connection 7/8 - UN)	-F2
M20 x 1.5 Plug-connector for Profibus PA (ss / threaded connection M12)	-P3
M20 x 1.5 stainless steel EEx d	-S7
M20 x 1.5 brass zink plated EEx d	-S8
1/2-14 NPT cable gland 6...12 mm, Stainless steel, EEx d	-N1
1/2-14 NPT cable gland 6...12 mm, Steel zink plated, EEx d	-N2
1/2-14 NPT, brass zink plated, EEx d	-N3
M20 x 1.5 Plug, plastic	-V3
M20 x 1.5 Plug, EEx d / explosionproof certified, stainless steel	-V4
1/2-14 NPT Plug, EEx d / explosionproof certified, stainless steel	-V5
M20 x 1.5 Plug, brass zink plated, EEx d	-V6
1/2-14 NPT Plug, brass zink plated, EEx d	-V7

DIMENSIONS – Direct attachment to stroke actuators

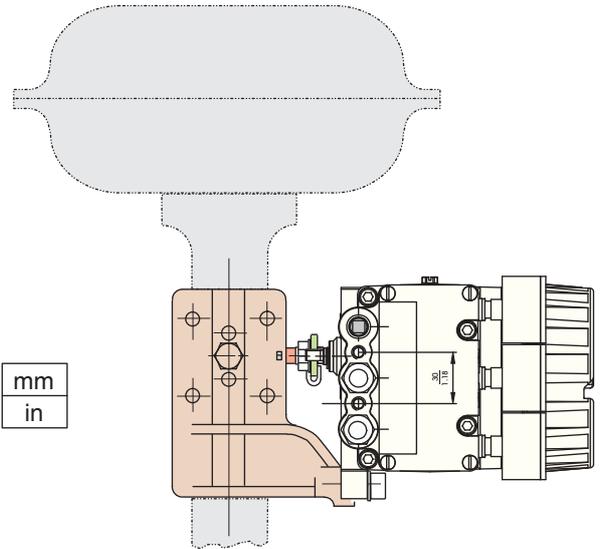


Attachment to stroke actuators acc. to IEC 534-6 (NAMUR)

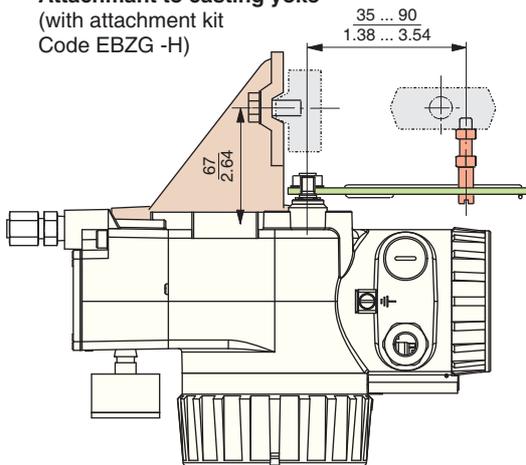
LCD orientation can be changed by means of local push buttons under Menu 9.9.2 to „flipped“, to ensure a correct orientation of the display.



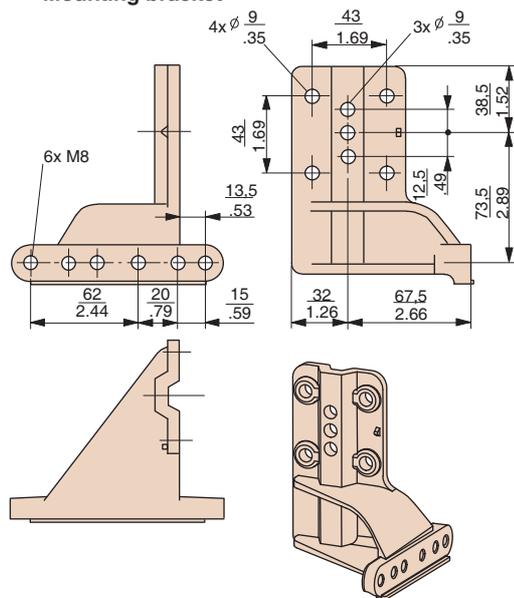
mm
in



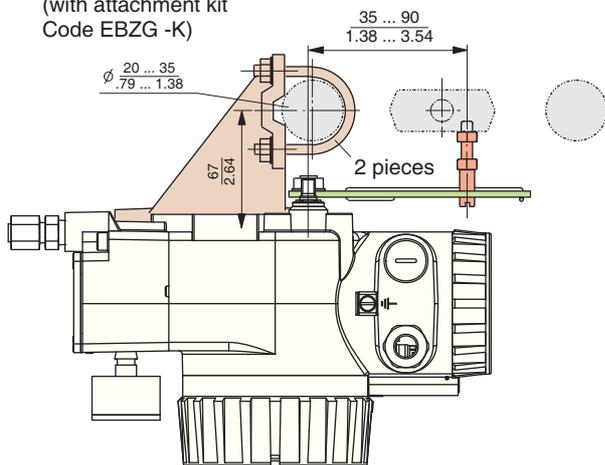
Attachment to casting yoke
(with attachment kit
Code EBZG -H)



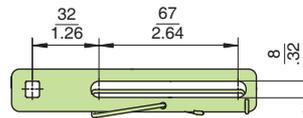
Mounting bracket



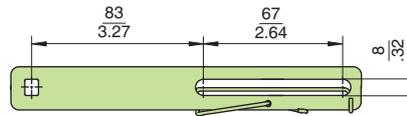
Attachment to pillar yoke
(with attachment kit
Code EBZG -K)



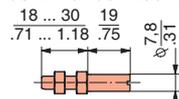
Feedback lever Code EBZG-A for 8..70 mm travel



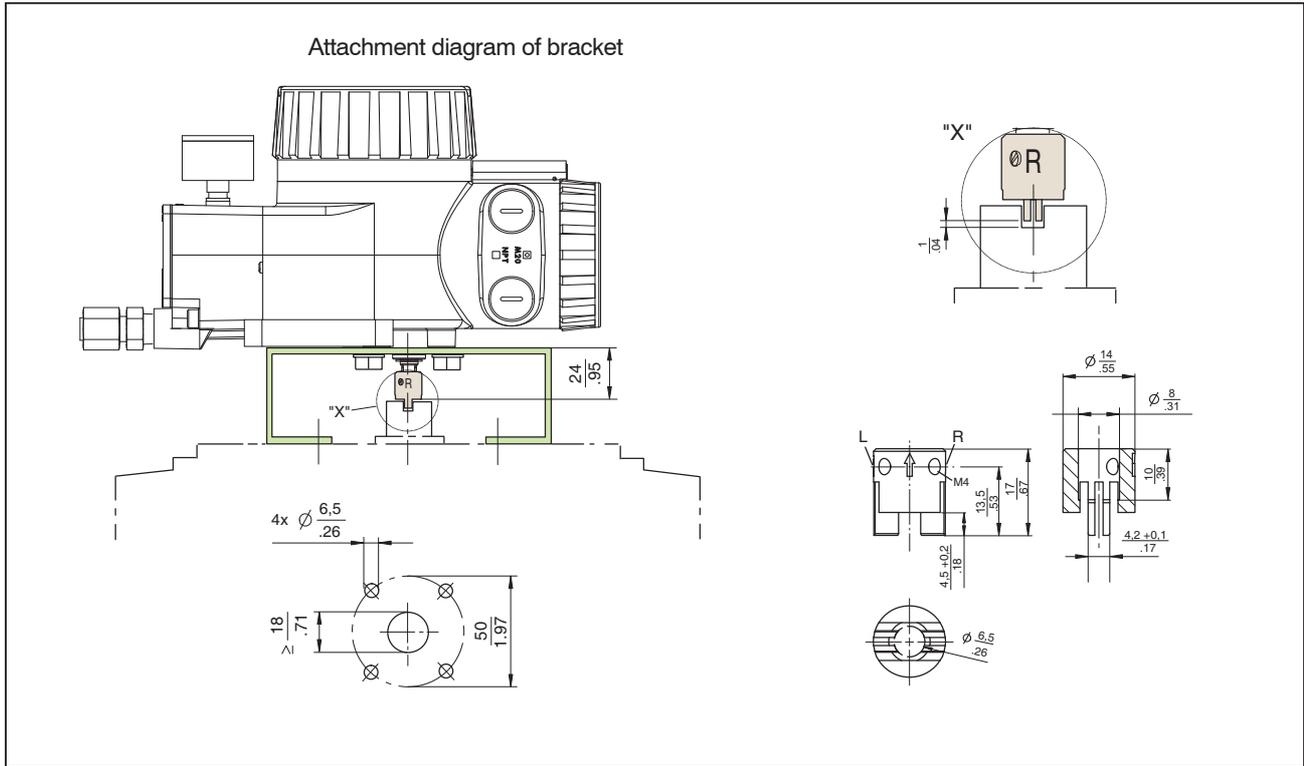
Feedback lever Code EBZG-B for 60..120 mm travel



Carrier bolt for connection to valve stem

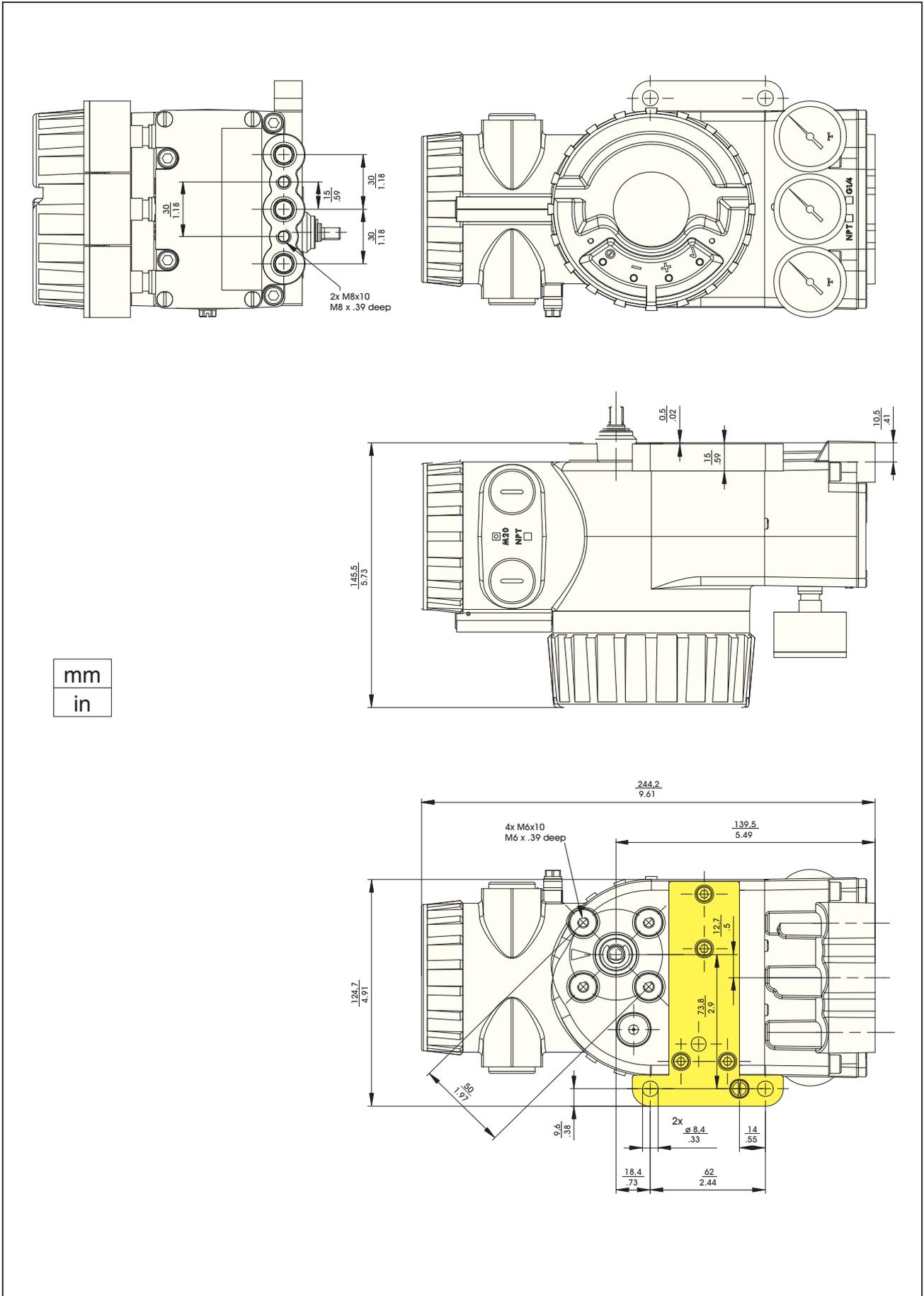


DIMENSIONS – Attachment to rotary actuators acc. to VDI/VDE 3845



Delivery of bracket by manufacturer of actuator
or see EBZG -C1, -C2 or -C3

DIMENSIONS



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 EVE0109 A](#) Extract of Master Instruction for an easy to use, easy understandable and fast start-up.
This document highlights the most important.

Master Instructions:

[MI EVE0109 A](#) SRD960 – all versions –

Technical Information for Fieldbus-Communication:

[TI EVE0105 P](#) SRD991/960 -PROFIBUS-PA

[TI EVE0105 Q](#) SRD991/960 -FOUNDATION Fieldbus H1

Master Instruction for HART-Communication:

[MI EVE0105 B](#) HART with Hand-Held Terminal

Technical Information

[TI EVE0105 S](#) SIL Functional safety

[TI EVE0305 MUX](#) Use of HART Multiplexer

Valve diagnostic-, configuration- and operation-software VALcare™:

[MI EVE0501 V](#) VALcare™ Valve diagnostic for Positioners
HART/ PROFIBUS-PA, FOUNDATION Fieldbus and IRCOM

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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DOKT 533 495 117

i n v e n s y s
Operations Management