

SRD960 Universal Positioner SRD960-T Position Transmitter

For Ex d / Explosion Proof applications



The Universal Positioner SRD960 is designed to operate pneumatic valve actuators and is available in the version Ex d / explosionproof (flameproof) or Ex ia / intrinsic safety. 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 FDT/DTM. The positioner is available with different communication protocols. This includes versions with analog setpoint (4 to 20 mA) without communication or with superimposed HART signal; or fieldbus communication according to PROFIBUS-PA and FOUNDATION Fieldbus H1 based on IEC 1158-2 MBP acc. to FISCO. The multi-lingual full text graphic LCD in connection with the external 4 push buttons allows a comfortable and easy local configuration and operation as well as the display of valve specific data, and status- and diagnostic messages.

DEVICE FEATURES

Intelligent

- Auto-start with self-calibration
- Self diagnostics, status- and diagnostic messages
- Easy operation with three keys
- Multi-Lingual full text graphical LCD

With communication

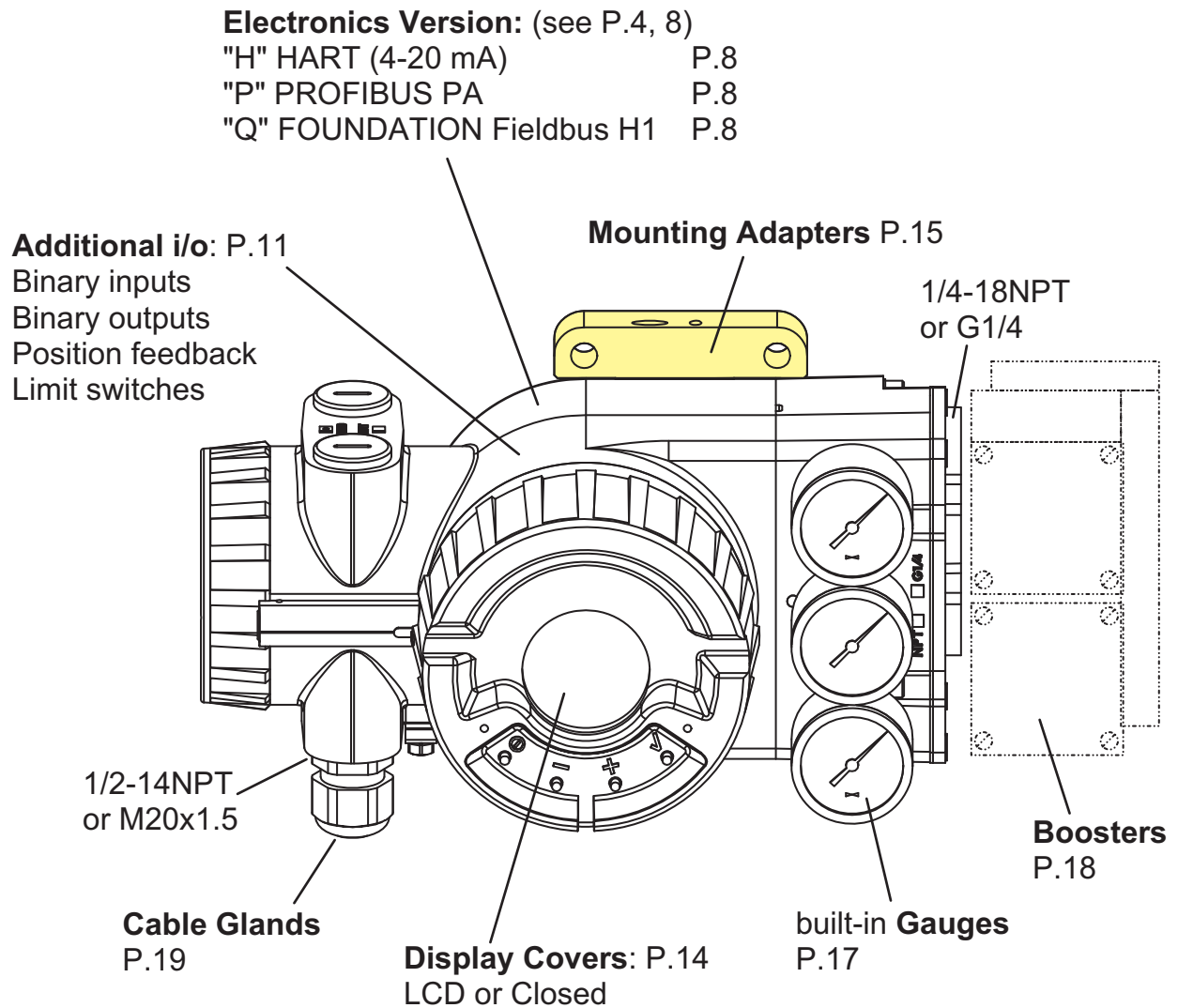
- HART, FOUNDATION Fieldbus H1, PROFIBUS-PA
- Configuration by means of local keys, hand held terminal (HART), PC with FDT-DTM or I/A Series system

COMMON FEATURES

- Stroke 8 to 120 mm / 260 mm (0.3 to 14.7 in / 10.2 in)
- Angle range up to 95°
- 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 50534-6-1 – 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 according to ATEX - Ex d; Explosion proof according to FM

*Equipment should be installed, operated, serviced, and maintained only by qualified personnel.
No responsibility is assumed by Schneider Electric for any consequences arising from the use of this material.*

OVERVIEW of SRD960 Positioner



Combinations

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

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

Travel range

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

Supply

Supply air pressure ⁵⁾..... 1.4 to 6 bar (20 to 90 psig)
with spool valve ⁴⁾..... 1.4 to 7 bar (20 to 105 psig)
Output to actuator0 to ~100 % of supply air
pressure (up to 5.5 bar at
6 bar supply air pressure)
Air supply ¹⁾according to ISO 8573-1
Solid particle size and density class 2
Oil rateclass 3
Pressure dew point 10 K under ambient temperature
For air supply, we recommend the FOXBORO 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 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)

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)	18000 (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.

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 4-20 mA + binary alarm output
 - 2 binary inputs

Operation and configuration

Local..... with four keys
Display..... Multi-Lingual Graphic LCD
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⁾ 4-20 mA position feedback
Alarms via communication
Optional ¹⁾ 1 alarm output
Position alarms via communication
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

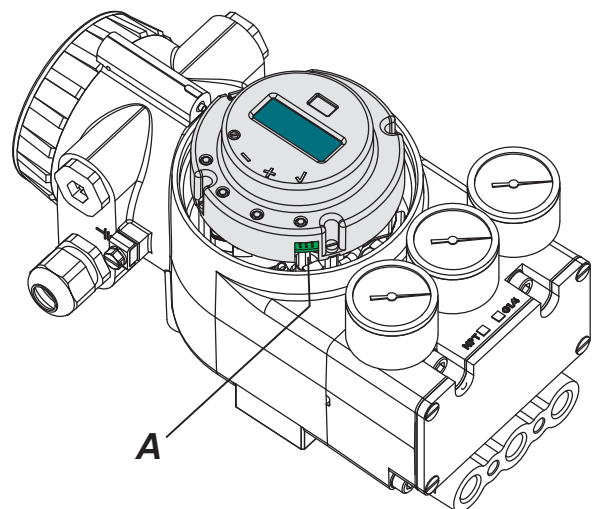
Diagnosis

- 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

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.



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
- I/A Series System, Foxboro Evo and other DCSs

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 feedback lever:

- standard (EBZG-A) 8 to 70 mm / 0.31 to 2.76 in
 - extended (EBZG-B) 60 to 120 mm / 2.36 to 4.72 in
 - extended (EBZG-A1) 110 to 260 mm / 4.33 to 10.24 in
- Larger stroke ranges can be realized with special levers.

- for pillar yoke acc. to

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

Stroke range with feedback lever

- standard.....8 to 70 mm / 0.31 to 2.76 in
- extended.....60 to 120 mm / 2.36 to 4.72 in

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 (5.9 lbs)

Double acting approx. 3 kg (6.6 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 1/2-14 NPT
or M 20 x1.5 (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;

Tightening torque min. 0.5 Nm, max. 0.6 Nm

Wire cross section..... solid wire 0.5 to 6 mm²

stranded wire 0.5 to 4 mm²

crimped wire 0.5 to 2.5 mm² (AWG 21-14)

Test sockets integrated in terminals, for
options and communicator
connection

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)
 Relative humidityup to 100 %
 Protection class
 acc. to IEC 529IP 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 NE21fulfilled

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

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 ends

5) With appropriate order only

6) National requirements must be observed

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

Type of protection CSA “explosion proof”

Ex d II (H2) T4/T6 Gb

Class I, Division 1, Groups B, C and D

Class II, Division 1, Groups E, F and G

hazardous locations, indoor and outdoor, NEMA 4X

SRD960 with HART communication SRD960-xHxxxx

Signal Input

Two wire system
 Reverse polarity protection . standard feature
 Signal range 4-20 mA Operating range
 3.6 to 21.5 mA
 Voltage range of unloaded
 input signal DC 12 to 36 V
 Load 420 Ohms, 8.4 V at 20 mA
 Communication signal HART, 1200 Baud, FSK
 (Frequency Shift Key)
 modulated on 4-20 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 µF.

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

Interruption time without power down:
 - with LCD 85 ms¹⁾

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 communication PROFIBUS-PA SRD960-xPxxxx

Data transfer acc. 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)

SRD960 with communication FOUNDATION Fieldbus H1 SRD960-xQxxxx

Data transfer FF Specification Rev. 1.4,
 Link-Master (LAS)

Two revisions of Firmware can be selected for the
 FOUNDATION Fieldbus devices in the model code of
 the positioner. The selection of the Firmware revision
 is depending of the DCS compatibility, the DD Files
 already installed in the DCS and the installed base on
 your site.

Double check interoperability of following
 characteristics with your DCS before ordering!

When selected **Firmware FF16** in the model code :

Certified according to ITK 4.6
 Function Blocks PID, AO, 2xDI, 1xDO
 Transducer, Resource

When selected **Firmware FF18** in the model code :

Certified according to ITK 6.0.1
 Function Blocks PID, AO, 4xDI, 1xDO, IS, OS,
 AI, MAI, Transducer, Resource

Additional functionality Flat Addressing
 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 V²⁾
 max. Supply voltage DC 36 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 s

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

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

2) Data of "Intrinsically Safe" version

Special SRD960 versions for particular use

These devices contain only the functions described below and are constructed without controller and without pneumatic parts in a shortened housing.

SRD960 -TXQ: Stand alone Position Transmitter unit

The actual value of the actuator is converted to a 4-20 mA signal.

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

Power supply

Reverse polarity protection	standard feature
Supply voltage.....	$U_s = \text{DC } 12 \text{ to } 36 \text{ V}$
Permitted ripple	< 10 % p.p.
Supply voltage dependency	negligible

Response characteristic

Non-linearity (terminal based adjustment).....	< 1% F.S.
Hysteresis	< 0.5% F.S.
Load dependency.....	negligible
Temperature effect	< 0.1 % / 10 K
Weight	approx. 2.3 kg

Configuration and status

Local configuration	2 push buttons and 2 LEDs
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SRD960 -TXT, -TXU, -TXR, -TXV: Limit Switch

Contains a limit switch pair that monitors the actual value of the actuator. When exceeding the adjustable value, a signal is generated. Inductive limit switch or microswitch.

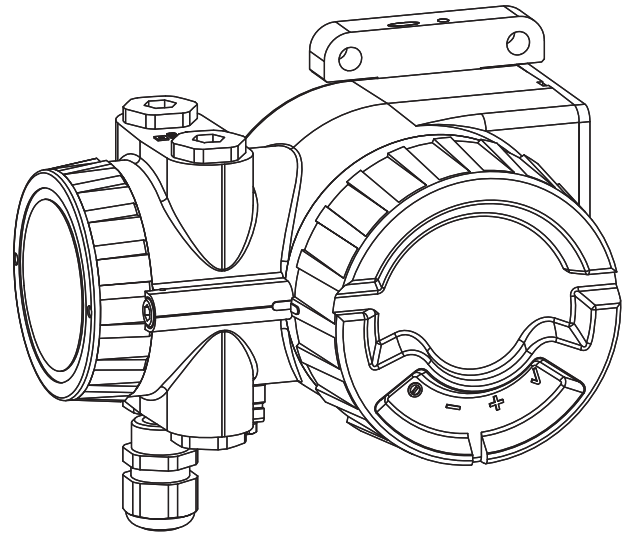
Inductive Limit Switch

- Standard version (SJ2-N) SRD960-TXT
- Security version (SJ2-SN)..... SRD960-TXU
- in three wire technology (SI 2-K08-AP7) SRD960-TXR

Mechanical Limit Switches

- Micro Switches SRD960-TXV

Details see page 13.



SRD960-TXNSSX -H: Potentiometer unit for remote mounting application

Contains a potentiometer, which is the value of the actuator, forwarded the value on to the actual positioner mounted in a protected place.

Can be used for applications where vibrations or extreme temperatures may disturb or damage the positioner.

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 ° (without mechanical stop)

Response Characteristic

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

Weight	approx 2.3 kg
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Ambient conditions

Ambient temperature.....	-40 to 100 °C (-40 to 212 °F) IP66
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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

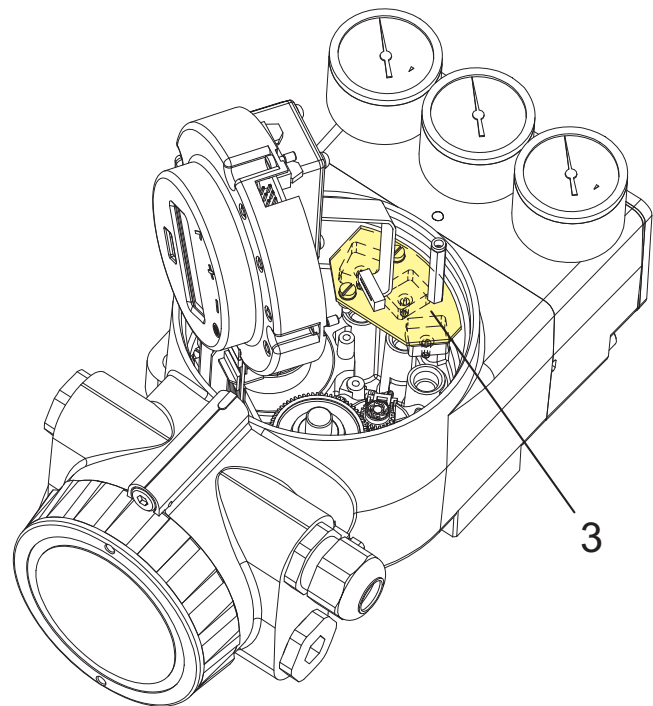
Measuring range0 to 8 bar (0 to 120 psig)

Accuracy0.5 %

Temperature influence0.5 % / 10 K (-40 to 80 °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 4-20 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-

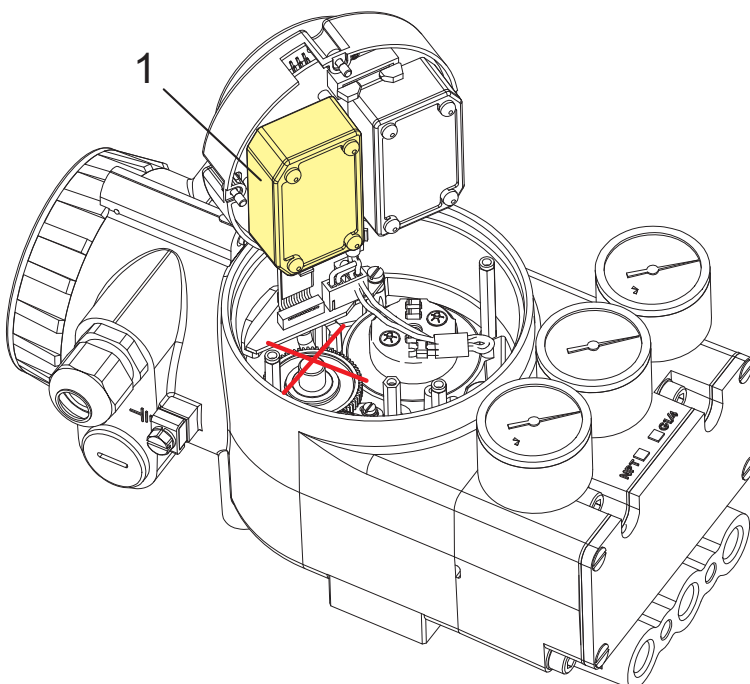
The binary output for Alarm will be activated in the following cases:

- 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

Order in Model Code: SRD960-□□ E

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

Two Binary Signal Inputs/Outputs [item 1]

Two Binary Inputs/Outputs are configured 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 to 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 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, R_i approx. 1 kOhm
 supply voltage range DC 5 to 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 %

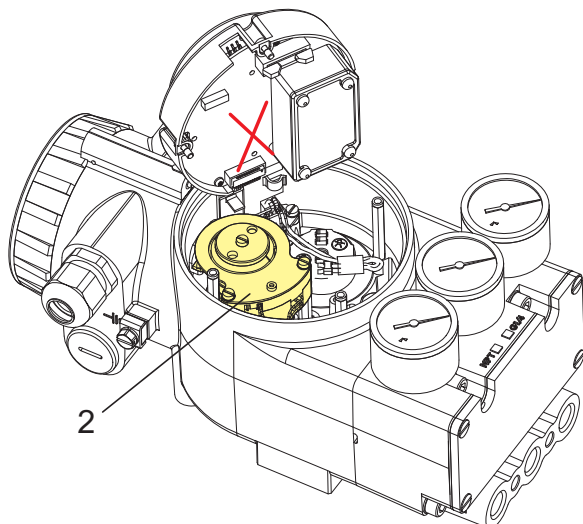
Terminals for Code T GW1 . 41+, 42-
 GW2 . 53+, 54-

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

Explosion protection thereto see page 7.

Part 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 derived 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 has 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-□□□□□□□□□□□□□□□□

- Cover with LCD and 4 external 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.

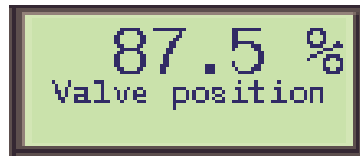
Displayed data in operation:

- 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)

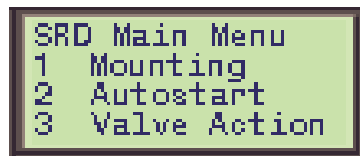
For configuration details see Master Instructions (MI) or Quick Guide (QG).



Value
What is displayed



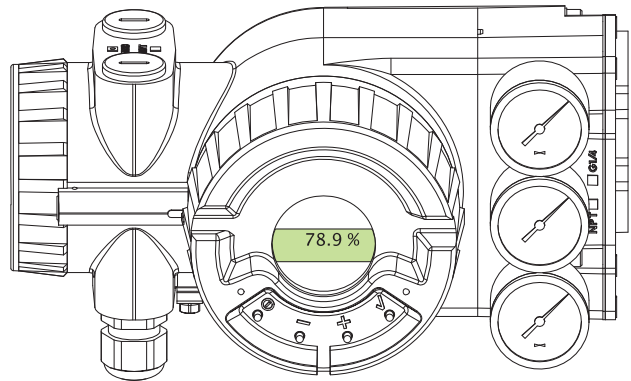
Status and diagnostic message



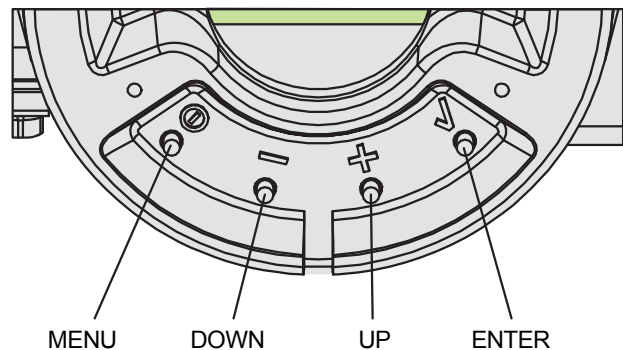
Configuration Menus

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

LCD 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.

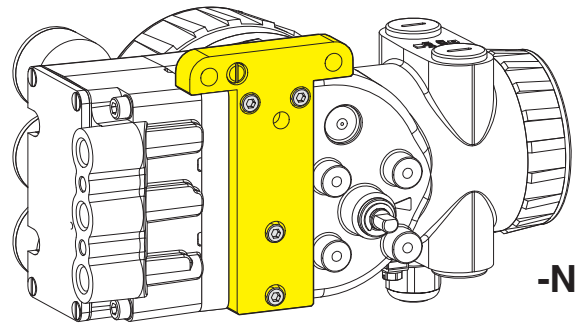
The standard Mounting Adapter is marked with Option N.

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

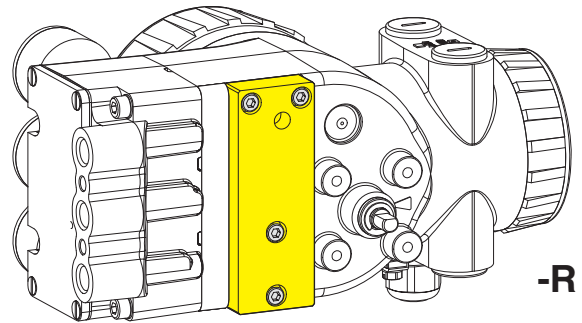
Order Option N.



Preparation for attachment to:

- Rotary actuators acc. to VDI/VDE 3845

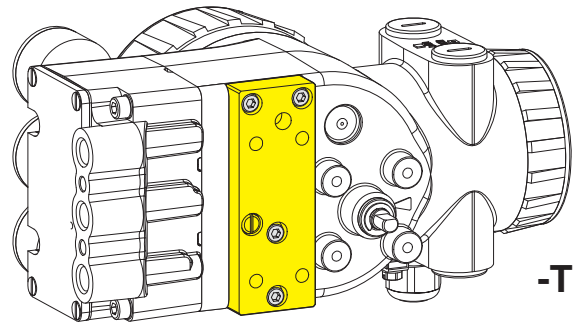
Order Option R.



Preparation for attachment to:

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

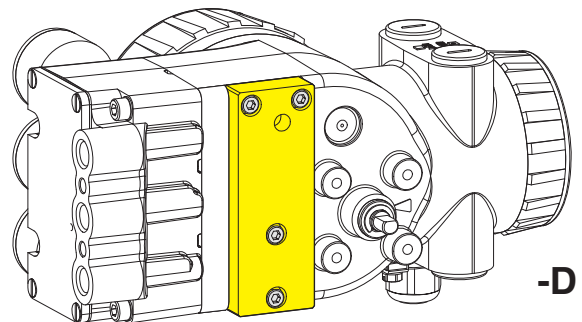
Order Option T.



Preparation for attachment to:

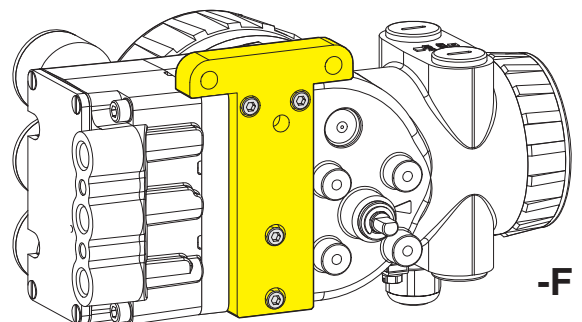
- NAMUR, according to VDI/VDE 3847
- Rotary actuators acc. to VDI/VDE 3845

Order Option D.

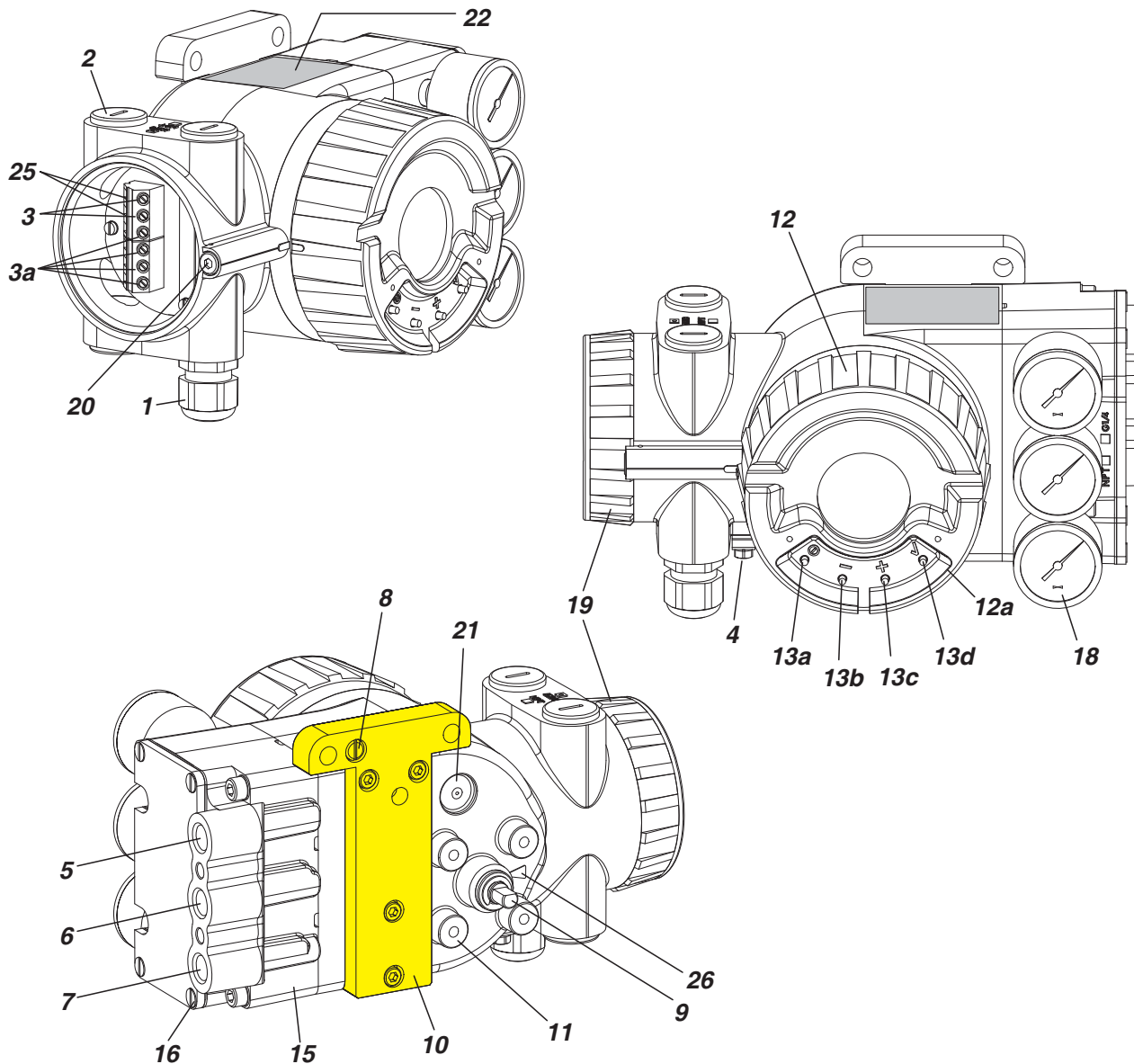


As Option N, but no y1-d air supply (with external tubing for y)

Order Option F.



FUNCTIONAL DESIGNATIONS



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

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

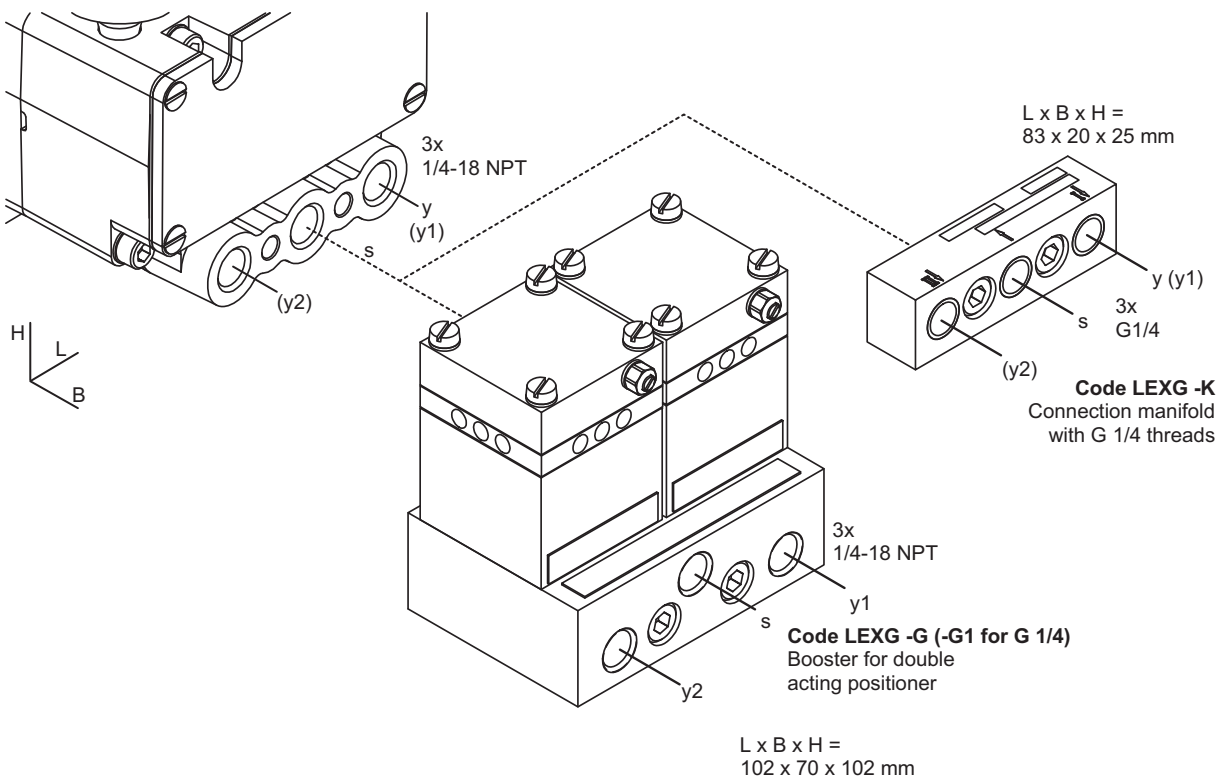
Universal Positioner		SRD960
Version		
Single Acting	-B	
Double Acting	-C	
Position Transmitter (w/o pneumatic components)	-T	
Local Control Panel (LCP960) for PST Monitoring	-L	
Input/Communication		
HART (4 - 20 mA)	(g) (p)	H
Profibus PA based on IEC 1158-2 (MBP)		
according to FISCO (Fieldbus)	(g)(p)	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)	(p)	T
Limit Switches (security version SJ2-SN)	(p)	U
Limit Switch (three-wire version)	(p)	R
Mechanical Switches (Micro Switches)	(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
Gauges		
Without Gauges		S
Built-In Gauges with scale in bar/psi	(g)(p)	M
Built-In Stainless Steel Gauges with scale in bar/psi	(g)(p)	Z
Pneumatical 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
Explosion-proof according to CSA (w/o cable glands or plugs)	(g)(p)	DZ
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 /	(e)(g)	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

Model Codes SRD960 (continued)

LCD Language in English / German / Dutch	(e)(g)(p).....	O
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)(g).....	-M
Premium Diagnostics Features (made with built-in pressures sensors) (HART); Build in pressure sensors (analog, FF, Profibus).....	(d)(g)(p).....	-B
Cover for protection of local push buttons	(g)(k).....	-X
Approved for SIL2 / SIL3 application	(i)(p)(g).....	-Q
Custom Configuration	(g)(p).....	-T
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)(q)		-H
Version for ESD Valve with PST functionalities	(b)(p)(g).....	-E
FOUNDATION Fieldbus H1 firmware revision 16		-FF16
FOUNDATION Fieldbus H1 firmware revision 18		-FF18
Tag No. Labeling		
Stamped with Weather Resistant Color		-G
Stainless Steel Label Fixed with Wire		-L
<p>(a) Not released</p> <p>(b) ONLY WITH (additional Inputs/Outputs E) AND (Optional Feature -B)</p> <p>(d) Not available with Input / Communication D</p> <p>(e) Only with Display / Indication D</p> <p>(f) NOT WITH Version -B, Version C</p> <p>(g) Not available with Version -T</p> <p>(h) Not available with Display / Indication D</p> <p>(i) Only available for Version single-acting -B in connection with Input/Communication D and H</p> <p>(j) ONLY WITH (Version: C)</p> <p>(k) Not in connection with Display / Indication S</p> <p>(l) ONLY with Electrical Classification xDx</p> <p>(m) Only available with Version T, Input/communication X, Additional inputs outputs N, Display S, Gauges S, Pneumatical connection X, Electrical classification xDx or ZZZ, Mounting preparation F, Language S</p> <p>(n) WITH (Version: B, C) OR WITH (Version: T) AND (Input: X) AND (Optional Features: H)</p> <p>(p) NOT WITH Version -L</p>		

ACCESSORIES, FOR ALL DEVICES
Booster relays, Code LEXG -F, -G, -H
Connection manifold, LEXG -K, -L, -D, -D1

Lateral attachment to positioner
Air outputsee 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).....	-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 FlowTop / FlowPak.....	-E1

Further Attachment kits on request. See also our Internet site.

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

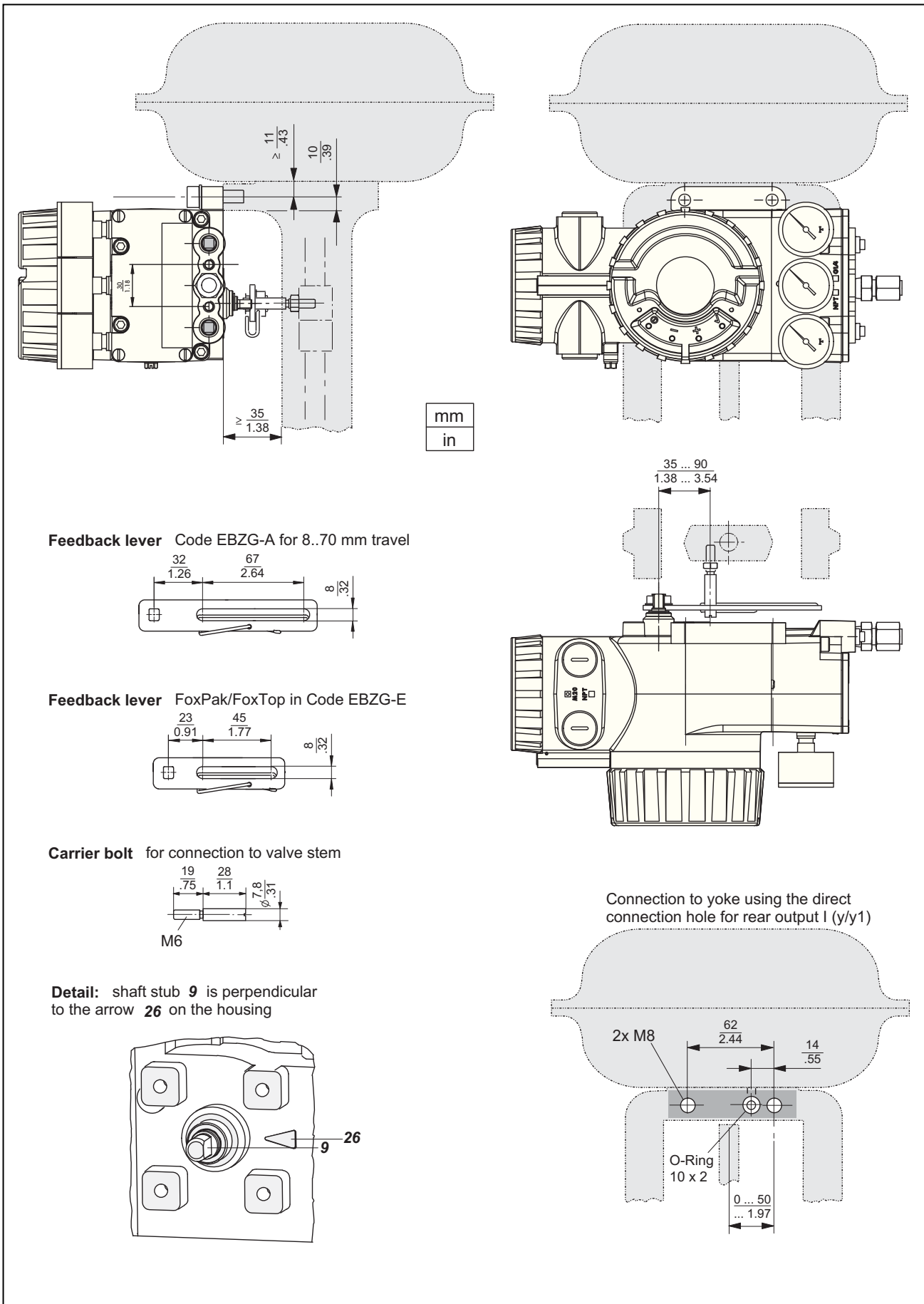
Booster Relay (for SRD960, SRD991 and SRI990, with connection 1/4 - 18 NPT)	
for Version single acting.....	-F
for Version double.....	-G
for Version single acting with doubled output capacity.....	-H
with connection G1/4 - 18	
for Version single acting.....	-F1
for Version double acting.....	-G1
for 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

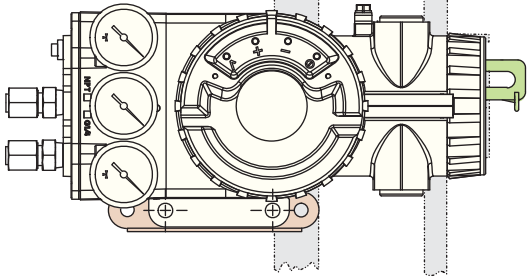
Cable Gland	BUSG
M20 x 1.5 stainless steel.....	-S6
M20 x 1.5 plastics, color gray.....	-K6
M20 x 1.5 plastics, color blue.....	-K7
M20 x 1.5 plastics, color white.....	-K9
M20 x 1.5 HF-cable gland for Fieldbus.....	-P4
M20 x 1.5 Plug-connector for Fieldbus (ss / threaded connection 7/8 - UN).....	-F2
M20 x 1.5 Plug-connector for Profibus PA (ss / threaded connection M12).....	-P3
M20 x 1.5 stainless steel, Ex d.....	-S7
M20 x 1.5 Brass Zink plated, Ex d.....	-S8
1/2-14 NPT cable gland 6 to 12 mm, Stainless steel, Ex d.....	-N1
1/2-14 NPT cable gland 6 to 12 mm, Steel Zink plated, Ex d.....	-N2
1/2-14 NPT, Brass Zink plated, Ex d.....	-N3
M20 x 1.5 Plug, plastic.....	-V3
M20 x 1.5 Plug, Ex d / explosionproof certified, stainless steel.....	-V4
1/2-14 NPT Plug, Ex d / explosionproof certified, stainless steel.....	-V5
M20 x 1.5 Plug, Brass Zink plated, Ex d.....	-V6
1/2-14 NPT Plug, Brass Zink plated, Ex d.....	-V7

DIMENSIONS – Direct attachment to stroke actuators

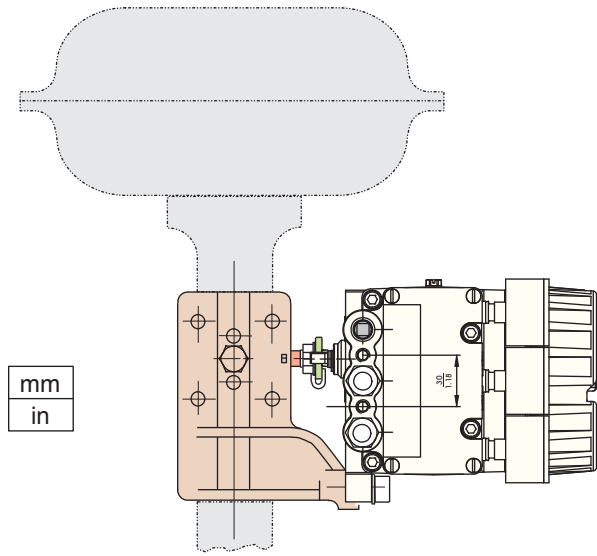


Attachment to stroke actuators acc. to IEC 534-6 (NAMUR)

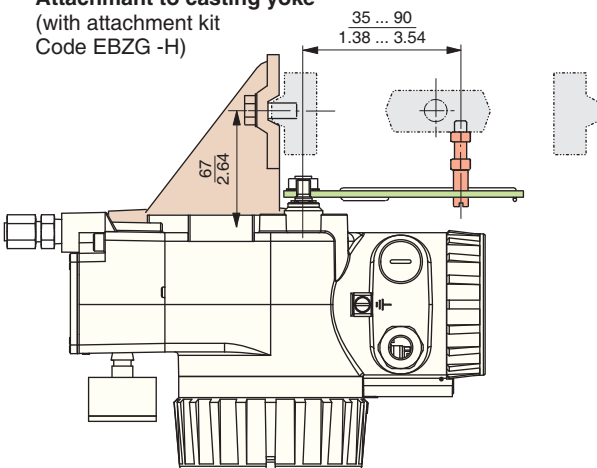
LCD orientation can be changed by means of local push buttons under Menu 9.9.2 to „flipped“, to ensure a correct orientation of the display.



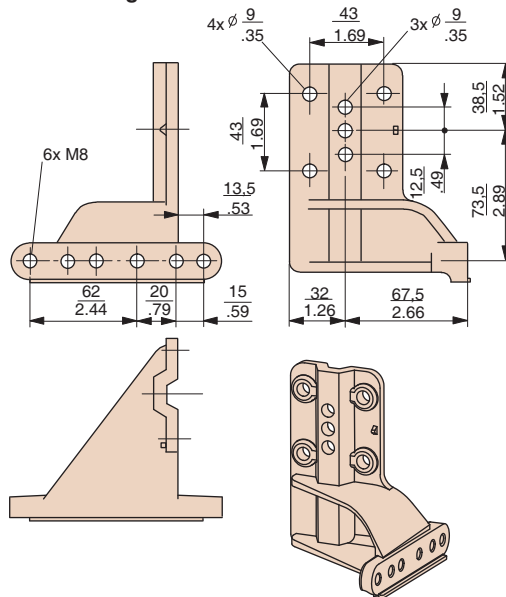
mm
in



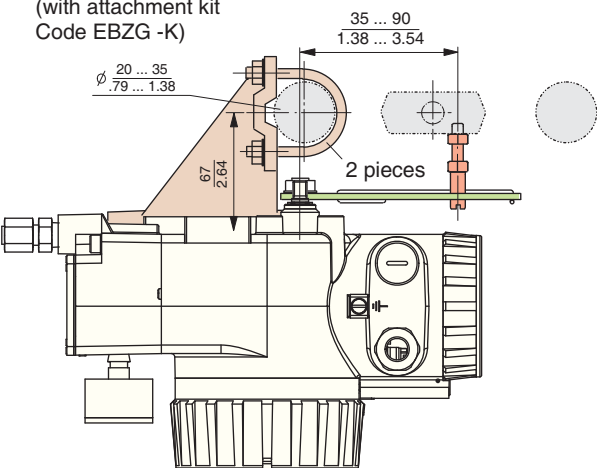
Attachment to casting yoke
(with attachment kit
Code EBZG -H)



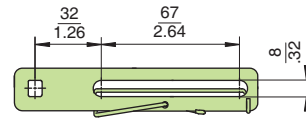
Mounting bracket



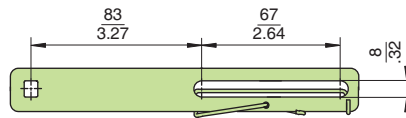
Attachment to pillar yoke
(with attachment kit
Code EBZG -K)



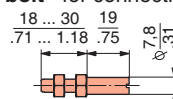
Feedback lever Code EBZG-A for 8..70 mm travel



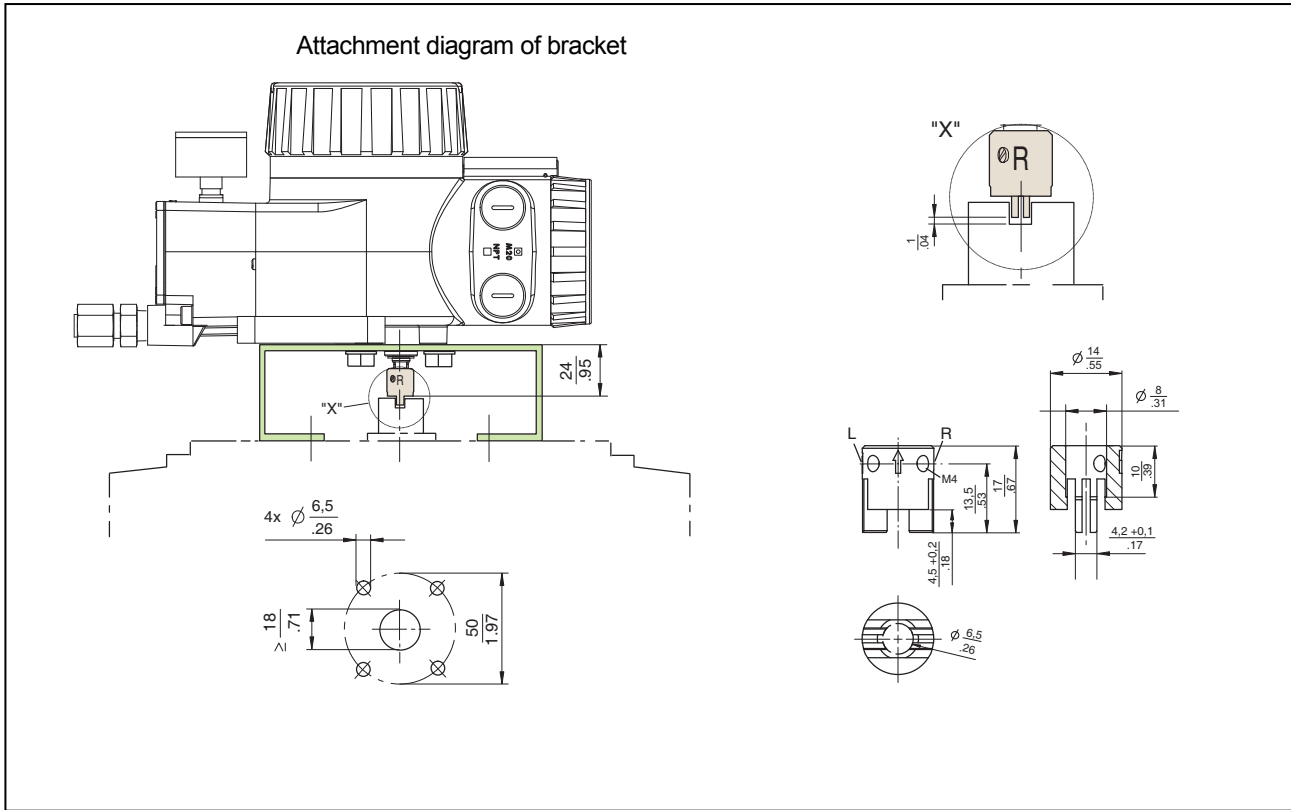
Feedback lever Code EBZG-B for 60..120 mm travel



Carrier bolt for connection to valve stem

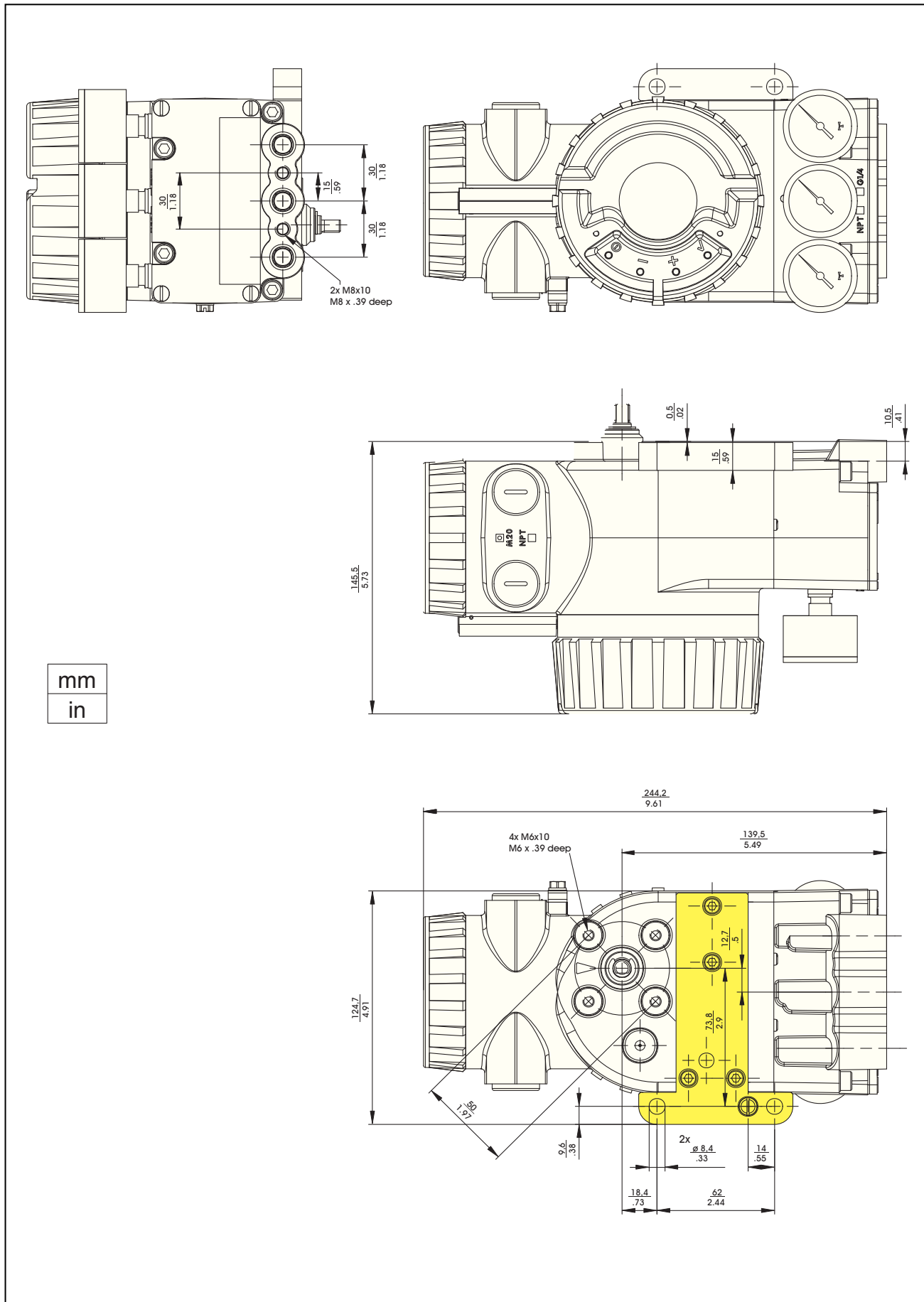


DIMENSIONS – Attachment to rotary actuators acc. to VDI/VDE 3845



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

DIMENSIONS

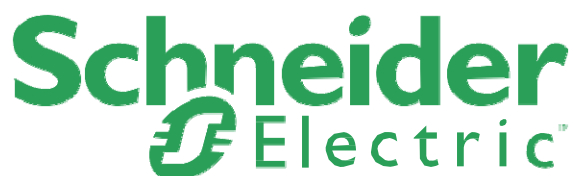


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