



## SP7-20, SP7-21 and SP7-22 Smart Positioner

### Description

The SP7-2\* is an electronically configurable positioner with communication capabilities designed for mounting on pneumatic linear or rotary actuators. It features a small and compact design, a modular construction, and an excellent cost-performance ratio. Fully automatic determination of the control parameters and adaptation to the positioner allow for considerable time savings as well as optimum control behaviour.

The positioner has a local communication interface (LCI) as standard in the SP7-20. Additionally, a 'HART® communication' option for communication via the 20 mA signal is available. Both communications are based on the HART® Protocol. Alternatively, HART®5 or HART®7 are available.

Other available options are the SP7-21 with a PROFIBUS PA module or the SP7-22 with FOUNDATION Fieldbus module.

In addition to its input for the analog position set point, the positioner is equipped with a digital input which can be used to activate control system functions in the device. A digital output allows you to output collective messages (alarms/faults).



Throughout the document SP7-2\* is written where the information is relevant to all versions; the SP7-20, SP7-21 and SP7-22. Where the information is specific it will be referenced as the version appropriate.

### Air supply

The SP7-2\* positioner must be provided with a high quality air supply to ISO 8573-1:2010 Class 3:3:3

### Approvals

	<b>ATEX rating</b>	II 2 G Ex db IIC T4/T5/T6 Gb
	<b>IECEx rating</b>	Ex db IIC T4/T5/T6 Gb
	<b>CCC (China)</b>	Ex d mb IIB T5 Gb
	<b>NEPSI rating</b>	EX d IIC T4/T5/T6 Gb

### Applications

The SP7-2\* can be used with any actuator that conforms to NAMUR, this includes all of the following Spirax Sarco pneumatic actuators:

**BVA300 rotary**

**PN1600 series**

**PNS3000 and PNS4000 series**

**PN9000 series**

**TN2000 series**

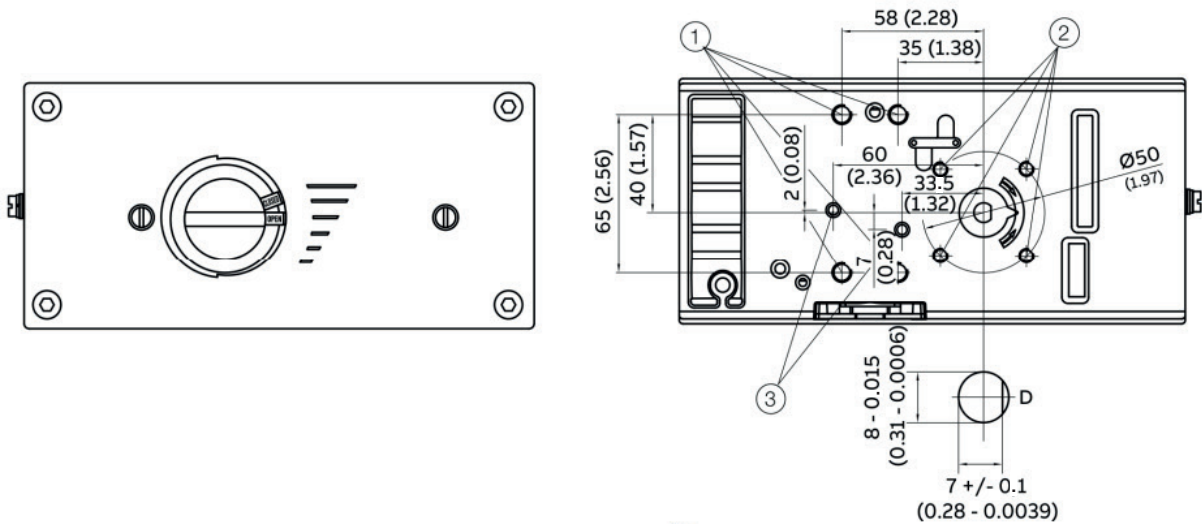
## Materials

Part	Material	Finish
Case and cover	Die cast aluminium	Case - Anti-corrosive paint, Black
		Cover - Anti-corrosive paint to RAL9016
Mounting kits	Stainless steel	-
Follower pin cone	Nylon	-

## Technical data

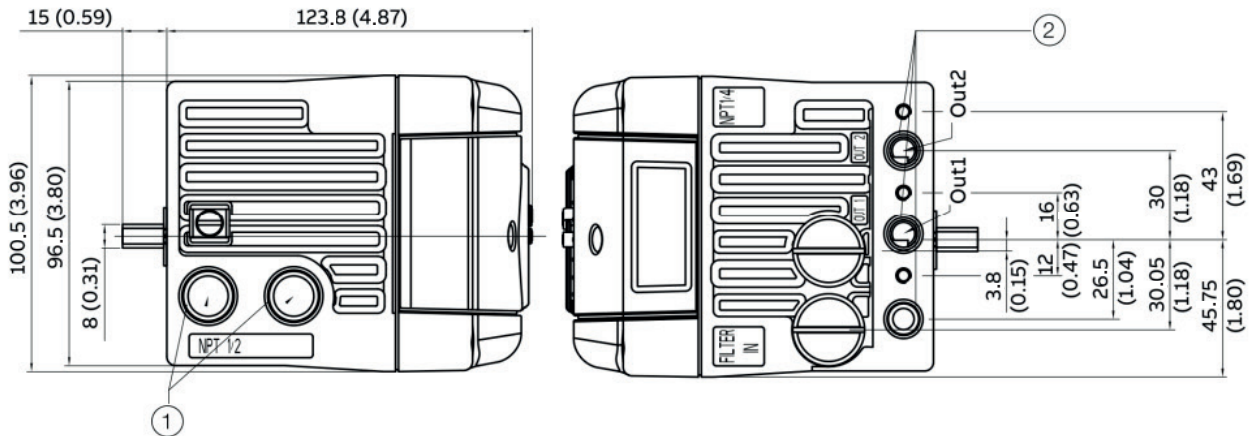
<b>Input signal</b>	4-20 mA (split range minimum amplitude 8 mA) or PROFIBUS PA or FOUNDATION Fieldbus	
<b>Impedance</b>	Max 485 +/- 15 $\Omega$ (for 4-20mA input signal only)	
<b>Air supply</b>	1.4 to 6.0 bar	
<b>Air quality</b>	ISO 8573-1:2010 Class 3:3:3	
<b>Output pressure</b>	0 to 100% supply pressure	
<b>Actuator stroke</b>	20 mm to 150 mm or 55 ° to 90 °	
<b>Action</b>	Single acting/fail vent/Double acting	
<b>Operating temperature</b>	-40 to 85 °C	
<b>Air connections</b>	¼" NPT female	
<b>Deviation</b>	≤ 0.5 %	
<b>Tolerance band</b>	0.3 to 10 %, adjustable	
<b>Configurable dead zone</b>	0.1 to 10 %, adjustable for 4-20 mA, HART and PROFIBUS PA, 0.1 to 5 % for FOUNDATION Fieldbus	
<b>Resolution (AD-conversion)</b>	> 16,000 steps	
<b>Sampling frequency</b>	20 ms (for 4-20mA input signal only).	
<b>Ambient temperature effect</b>	≤ 0.5 % per 10 K	
<b>Reference temperature</b>	20 °C	
<b>Influence of vibration</b>	≤ 1 % to 10 g and 80 Hz	
<b>Degree of protection</b>	IP65	
<b>Weight</b>	Linear mounting kit - 0.78 kg	
	Rotary mounting kit - 0.4 kg	
	Positioner (without mounting kits or gauge blocks) - 3.0 kg	
<b>Basic positioner options</b>	SP7-20	4-20 mA or 4-20 mA with HART
	SP7-21	PROFIBUS PA
	SP7-22	FOUNDATION Fieldbus

**Dimensions (approximate) in mm (and inches)**



- ① Threaded hole M8 (10 mm (0.39") deep)
- ② Threaded hole M6 (8 mm (0.31") deep)

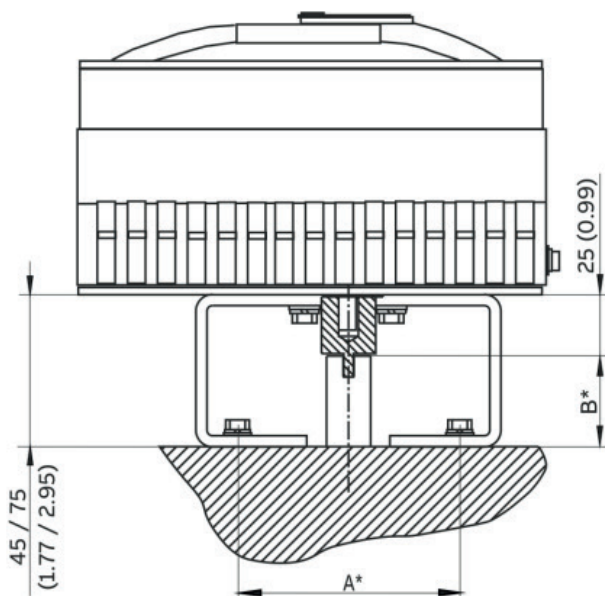
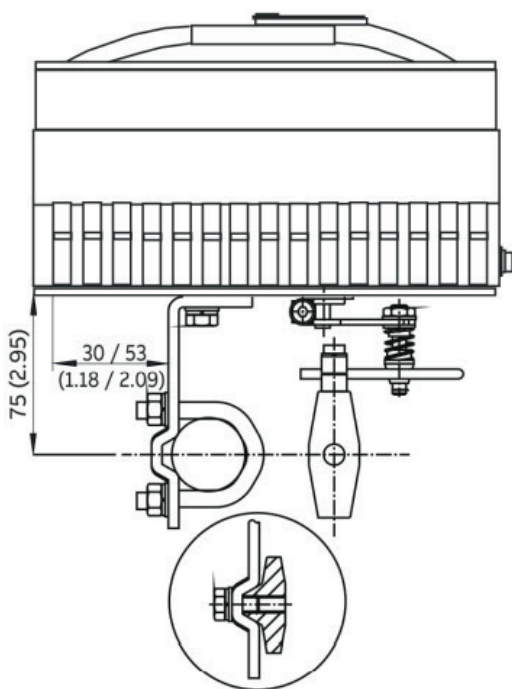
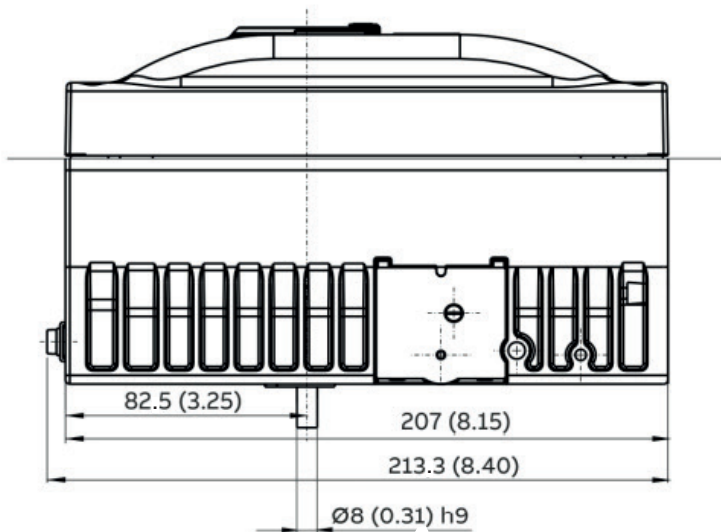
- ③ Threaded hole M5 x 0.5 (air outputs for integral mount)



- ① NPT 1/2" or M20 x 1.5

- ② Pneumatic connections, NPT 1/4" - 18 oder G1/4"

**Dimensions** (approximate) in mm (and inches)



\* Dimensions A and B depend on the rotary actuator

**Rotary positioner mounting kits**

Actuator mounting dimensions	Spirax kit nomenclature
80/20 mm	AKR13
80/30 mm	AKR14
130/30 mm	AKR15
130/50 mm	AKR16

For BVA actuators the AKR14 mounting kit is required.

## Positioner options - SP7-20 - 4-20mA or 4-20 mA with HART

<b>Standard</b>	<b>Case/Mounting</b>	Case made of aluminium, varnished, for mounting to linear actuators acc. DIN/IEC 534/NAMUR or to rotary actuators acc. VDI/VDE 3845	<b>10</b>
		Case made of aluminium, varnished, with mechanical position indicator, for mounting to linear actuators acc. DIN/IEC 534/NAMUR or to rotary actuators acc. VDI/VDE 3845	<b>20</b>
	<b>Operation</b>	With operator panel and display integrated in the enclosure cover	<b>1</b>
	<b>Explosion Protection</b>	ATEX II 2G Ex db II C T4/T5/T6 Gb	<b>1</b>
		IECEX Ex db II C T4/T5/T6 Gb	<b>6</b>
		NEPSI EX d IIC T4/T5/T6 Gb	<b>X</b>
	<b>Output/Safe Position (in case of an electrical power failure)</b>	Single acting, fail safe	<b>1</b>
		Single acting, fail freeze	<b>2</b>
		Double acting, fail safe	<b>3</b>
		Double acting, fail freeze	<b>4</b>
	<b>Connections</b>	Cable: Thread M20 x 1.5, air pipe: Thread 1/4-18 NPT	<b>2</b>
		Cable: Thread 1/2-14 NPT, air pipe: Thread 1/4-18 NPT	<b>3</b>
	<b>Option Modules for Analog or Digital Position Feedback</b>	Without	<b>0</b>
		Plug-in module for analog position feedback, signal range 4 ... 20 mA, two-wire	<b>1</b>
		Plug-in module for digital position feedback	<b>3</b>
		Plug-in module for analog position feedback, signal range 4 ... 20 mA, two-wire, and digital position feedback	<b>4</b>
	<b>Optional Mechanical Kit for Digital Position Feedback</b>	Without	<b>0</b>
		Mechanical kit for digital position feedback with proximity switches SJ2-SN (NC or logical 1)	<b>1</b>
		Mechanical kit for digital position feedback with 24 V AC/DC microswitches (change-over contacts) (Note 2)	<b>3</b>
	<b>Parameter Setting/Bus Address</b>	Factory setting for HART devices	<b>1</b>
<b>Design (Varnish/Coding)</b>	Standard	<b>1</b>	
	Higher Stiffness + Lower Air Capacity	<b>H</b>	
	Protection Class IP 66	<b>P</b>	
<b>Device Identification Label</b>	Without	<b>0</b>	
	Label (Note 3)	<b>1</b>	
	Stainless steel 18.5 x 65 mm (0.73 x 2.56 in.) (Note 3)	<b>2</b>	
<b>Optional</b>	<b>SIL2 - Declaration of Conformity</b>	SIL2 - Declaration of Conformity (Note 4)	<b>CS2</b>
	<b>CCC Certification</b>	3CC for Ex i & CCC for Ex d	<b>CCC</b>

**SP7-20**  
 Note 1: Only with cable connection NPT thread  
 Note 2: Only for Ex d version  
 Note 3: Plain text, max. 16 letters  
 Note 4: With single acting, fail safe pneumatic only

**Ordering Code Example:** SP7-20 10 1 1 3 2 0 1 1 1 2

## Positioner options - SP7-21 - PROFIBUS PA

<b>Standard</b>	<b>Case/Mounting</b>	Case made of aluminium, varnished, for mounting to linear actuators acc. DIN/IEC 534/NAMUR or to rotary actuators acc. VDI/VDE 3845	<b>10</b>
		Case made of aluminium, varnished, with mechanical position indicator, for mounting to linear actuators acc. DIN/IEC 534/NAMUR or to rotary actuators acc. VDI/VDE 3845	<b>20</b>
	<b>Operation</b>	With operator panel and display integrated in the enclosure cover	<b>1</b>
	<b>Explosion Protection</b>	ATEX II 2G Ex db II C T4/T5/T6 Gb	<b>1</b>
		IECEX Ex db II C T4/T5/T6 Gb	<b>6</b>
		NEPSI EX d IIC T4/T5/T6 Gb	<b>X</b>
	<b>Output/Safe Position (in case of an electrical power failure)</b>	Single acting, fail safe	<b>1</b>
		Single acting, fail freeze	<b>2</b>
		Double acting, fail safe	<b>3</b>
		Double acting, fail freeze	<b>4</b>
	<b>Connections</b>	Cable: Thread M20 x 1.5, air pipe: Thread 1/4-18 NPT	<b>2</b>
		Cable: Thread 1/2-14 NPT, air pipe: Thread 1/4-18 NPT	<b>3</b>
	<b>Option Module for Shutdown Function</b>	Without	<b>0</b>
	<b>Optional Mechanical Kit for Digital Position Feedback</b>	Without	<b>03</b>
		Mechanical kit for digital position feedback with proximity switches SJ2-SN (NC or logical 1)	<b>13</b>
		Mechanical kit for digital position feedback with 24 V AC/DC microswitches (change-over contacts) (Note 2)	<b>33</b>
	<b>Design (Varnish/Coding)</b>	Standard	<b>1</b>
		Higher Stiffness + Lower Air Capacity	<b>H</b>
		Protection Class IP 66	<b>P</b>
	<b>Device Identification Label</b>	Without	<b>0</b>
Label including text, with separate sticker (Note 3)		<b>1</b>	
Stainless steel 18.5 x 65 mm (0.73 x 2.56 in.) (Note 3)		<b>2</b>	
<b>Optional</b>	<b>CCC Certification</b>	3CC for Ex i & CCC for Ex d	<b>CCC</b>

**SP7-21** Note 1: Only with cable connection NPT thread  
 Note 2: Only for Ex d version  
 Note 3: Plain text, max. 16 letters

**Ordering Code Example:** SP7-21 20 1 1 2 2 0 0 3 1 0

## Positioner options - SP7-22 - FOUNDATION Fieldbus

<b>Standard</b>	<b>Case/Mounting</b>	Case made of aluminium, varnished, for mounting to linear actuators acc. DIN/IEC 534/NAMUR or to rotary actuators acc. VDI/VDE 3845	<b>10</b>
		Case made of aluminium, varnished, with mechanical position indicator, for mounting to linear actuators acc. DIN/IEC 534/NAMUR or to rotary actuators acc. VDI/VDE 3845	<b>20</b>
	<b>Operation</b>	With operator panel and display integrated in the enclosure cover	<b>1</b>
	<b>Explosion Protection</b>	ATEX II 2G Ex db II C T4/T5/T6 Gb	<b>1</b>
		IECEX Ex db II C T4/T5/T6 Gb	<b>6</b>
		NEPSI EX d IIC T4/T5/T6 Gb	<b>X</b>
	<b>Output/Safe Position (in case of an electrical power failure)</b>	Single acting, fail safe	<b>1</b>
		Single acting, fail freeze	<b>2</b>
		Double acting, fail safe	<b>3</b>
		Double acting, fail freeze	<b>4</b>
	<b>Connections</b>	Cable: Thread M20 x 1.5, air pipe: Thread 1/4-18 NPT	<b>2</b>
		Cable: Thread 1/2-14 NPT, air pipe: Thread 1/4-18 NPT	<b>3</b>
	<b>Option Modules for Shutdown Function</b>	Without	<b>0</b>
	<b>Optional Mechanical Kit for Digital Position Feedback</b>	Without	<b>04</b>
		Mechanical kit for digital position feedback with proximity switches SJ2-SN (NC or logical 1)	<b>14</b>
		Mechanical kit for digital position feedback with 24 V AC/DC microswitches (change-over contacts) (Note 2)	<b>34</b>
	<b>Design (Varnish/Coding)</b>	Standard	<b>1</b>
		Higher Stiffness + Lower Air Capacity	<b>H</b>
		Protection Class IP 66	<b>P</b>
	<b>Device Identification Label</b>	Without	<b>0</b>
Label including text, with separate sticker (Note 3)		<b>1</b>	
Stainless steel 18.5 x 65 mm (0.73 x 2.56 in.) (Note 3)		<b>2</b>	
<b>Optional</b>	<b>CCC Certification</b>	3CC for Ex i & CCC for Ex d	<b>CCC</b>

**SP7-22** Note 1: Only with cable connection NPT thread  
 Note 2: Only for Ex d version  
 Note 3: Plain text, max. 16 letters

**Ordering Code Example:** SP7-22 10 1 1 3 2 0 34 P 2

## Mounting/linkage kit : Positioner mounting kits for central mounting

Actuator Model	Valve Models	Valve Sizes	Spirax kit Nomenclature
PN9100	Spira-trol two port and QL three port	DN15 to DN50	AKL10
PN9200		DN15 to DN100	AKL10
PN9300		DN15 to DN100	AKL10
PN9400		DN125 to DN300	AKL17
TN2150	Spira-trol two port and QL three port	DN15 to DN100	AKL10
TN2300		DN125 to DN300	AKL17
TN2400	Spira-trol two port and QL three port	DN125 to DN300	AKL17
		DN125 to DN300	AKL17
TN2270		DN125 to DN300	AKL17
PN3000 Sprg Ext	LE, LEA and Steri-trol	DN15 to DN100	AKL10
PN4000 Sprg Ret		DN15 to DN100	AKL10
PN5000	KE, KEA, LE and QL three port	DN15 to DN100	AKL10 + UBC
PN6000		DN15 to DN100	AKL10 + UBC
PN5000	QL three port	DN125 to DN200	AKL11 + UBC
PN6000		DN125 to DN200	AKL11 + UBC
PN1600	"C" series	DN65 to DN100	AKL11
PN1600		DN125 to DN200	AKL11
PN1600	Spira-trol	DN125 to DN300	AKL11

### BVA actuators

For BVA actuators the AKR14 mounting kit is required.

### Gauge blocks

		Spirax Nomenclature	Weight
6 bar/87 psi NPT 1/4"	Single acting	GBS6A	0.28 kg
	Double acting	GBD6A	0.32 kg
0.6 Mpa/87 psi NPT 1/4"	Single acting	GBS06A	0.28 kg
	Double acting	GBD06A	0.32 kg

### How to order

**Example:** 1 off Spirax Sarco SP7-20-10113201112 Smart positioner with AKL10 mounting kit and GBS6A gauge block.

**Caution:** The SP7-20 positioner must have a high quality air supply to ISO 8573-1:2010 Class 3:3:3.