SIPART PS2 and PS
Electropneumatic Positioners

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SIPART PS2/PS2 PA, SIPART PS2 EEx d and SIPART PS2 EEx d PA

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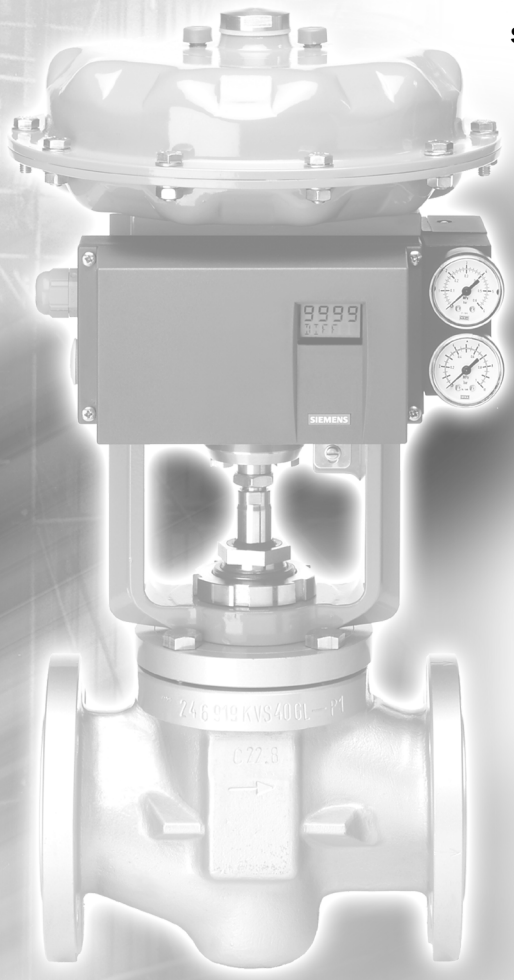
Software

See Sec. 6	SIMATIC PDM, to parameterize HART or PROFIBUS-PA devices



SIPART PS2, SIPART PS2 PA, SIPART PS2 EEx d and SIPART PS2 EEx d PA

Application, design

Application

The SIPART PS2 electropneumatic positioner is used to control the final control element of pneumatic linear or part-turn actuators. The electropneumatic positioner moves the actuator to a valve position corresponding to the setpoint. Additional function inputs can be used to block the valve or to set a safety position. A binary input is present as standard in the basic device for this purpose.

The SIPART PS2 positioner is characterized by significant advantages compared to conventional devices, such as:

- Only one device version for linear and part-turn actuators
- Simple operation and programming using three keys and a two-line LCD
- Automatic startup function with self-adjustment of zero and span
- Manual operation without additional equipment
- Selectable or freely-programmable characteristics
- Diagnostic functions for valve or actuator (see page 5/4)
- Minimum air consumption
- Selectable setpoint and manipulated variable limiting
- Programmable "tight shut-off function".

The SIPART PS2 positioner is available:

- In a plastic or metal casing for single-action actuators
- In a plastic casing for double-action actuators
- For non-hazardous or hazardous applications in designs
  - as intrinsically-safe device (EEx ia/ib) or
  - in flameproof casing (EEx d)

and in the versions:

- With 0/4 to 20 mA communication using HART signals (option)
- With PROFIBUS-PA communications interface (EEx ia).

Design

The SIPART PS2 positioner is a digital field device with a highly-integrated microcontroller.

The positioner consists of the following components:

- Casing and cover
- PCB with corresponding electronics with or without communication via HART
  or with electronics for communication according to the PROFIBUS-PA specification, IEC 1158-2; bus-supplied device
- Actuator travel detection system
- Terminal housing with screw terminals
- Pneumatic valve manifold with piezoelectric valve precontrol.

The valve manifold is located in the housing, the pneumatic connections for the inlet air and the positioning pressure on the right-hand side. A pressure gauge block and/or a safety solenoid valve can be connected there as options. The circuit board container in the casing provides slots for separately ordered boards with the following functions:

- I_y module:
  - Position feedback as a two-wire signal 4 to 20 mA.
- Alarm module (3 outputs, 1 input):
  - Signalling of two limits of the travel or angle by binary signals. The two limits can be set independently as maximum or minimum values.
  - Output of an alarm if the setpoint position of the final control element is not reached in automatic mode or if a device fault occurs
  - Second binary input for alarm signals of for triggering safety reactions or for blocking/signalling function or safety position.

Fig. 5/1 SIPART PS2 or SIPART PS2 PA electropneumatic positioner

Fig. 5/2 SIPART PS2 EEx d or SIPART PS2 EEx d PA electropneumatic positioner in flameproof casing

Fig. 5/3 SIPART PS2 or SIPART PS2 PA in stainless steel casing

All signals in the I_y and alarm modules as well as the SIA module (see page 5/3) are electrically isolated from one another and from the basic unit. The outputs indicate self-signalling faults.

Fig. 5/4 Platzhalter für neues Bild

Stainless steel casing for extreme ambient conditions

The SIPART PS2 (including the EEx d version) is available in a stainless steel casing (see Fig. 5/3) for use in particularly aggressive environments (e.g. offshore operation, chlorine plants etc.). The device functions are the same as with the basic device.

Limit signalling via slot-type initiators (SIA module)

Two limits can be signalled redundantly as NAMUR signals (DIN 19 234) by slot-type initiators using an easy-to-fit module. The module additionally contains an alarm output (see alarm module).

Separate connection of actuator travel detection system and controller unit

The actuator travel detection system and controller unit can be connected separately for all casing versions of the SIPART PS2. Measurement of the travel or angle is carried out as usual directly on the actuator by means of the corresponding attachment set and e.g. a SIPART PS2 casing which contains the travel detection system (internal potentiometer and sliding clutch). The controller unit can then be fitted a certain distance away, e.g. on a mounting pipe or similar, and is connected to the travel detection system via an electric cable and to the actuator via one or two pneumatic lines (see Fig. 5/5). Such a split design is frequently advantageous if the ambient conditions at the fitting exceed the specified values for the positioner, e.g.:

- Extremely high/low ambient temperature
- Extremely high vibrations
- Nuclear (e.g. neutron) radiation.

The use of linear potentiometers (10 kΩ resistance) is recommendable for very small actuators with a short valve travel since, on the one hand, the space required by the linear potentiometer is very small and, on the other, the transmission characteristic is optimum for a small travel.

Non-contacting position sensor (NCS)

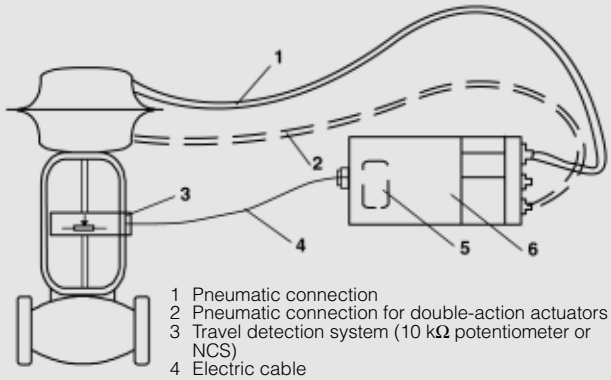
The actuator travel detection unit can also consist of a non-contacting position sensor instead of a potentiometer. All coupling elements are omitted such as coupling wheel and driver pin with part-turn actuators or lever and pick-up bracket with linear actuators.

This results in:

- Even greater resistance to vibration and shock
- No wear of sensor
- Problem-free mounting on very small actuators
- No hysteresis with very small travels.

The sensor does not require an additional power supply, i.e. SIPART PS2 can be operated in a two-wire system. The NCS (Non Contacting Position Sensor) consists of a potted sensor housing which must be mounted permanently and a magnet which is mounted on the spindle of linear actuators or on the shaft butt of part-turn actuators.

The installation of a special EMC filter module is necessary in the positioner (controller unit) to guarantee EMC according to EN 50 081-1 or EN 50 082-2 when using external sensors (see Ordering data: EMC filter module).



1 Pneumatic connection
2 Pneumatic connection for double-action actuators
3 Travel detection system (10 kΩ potentiometer or NCS)
4 Electric cable
5 Retrofitted EMC filter module (in device)
6 SIPART PS2

Fig. 5/5 Separate mounting of actuator travel detection system and controller unit

Mode of operation

Mode of operation

The SIPART PS2 electropneumatic positioner works in a completely different way to normal positioners.

Comparison of the setpoint and the actual value takes place electronically in a microcontroller. If the microcontroller detects a deviation, it uses a 5-way switch procedure to control the piezoelectric valves, which in turn regulate the flow of air into the actuating chambers. When connected in a two-wire system, the SIPART PS2 draws its power exclusively from the 4 to 20 mA setpoint signal. The electric power is also connected via the two-wire bus signal with PROFIBUS mode (SIPART PS2 PA).

The way the SIPART PS2 works, together with its integrated additional functions, offer the user considerable benefits in the installation and operation of the positioner:

- Simple installation and largely automatic commissioning means time savings and guarantees reliable operation
- An on-line adaptation procedure means very high-quality control even under unfavorable operating conditions
- The SIPART PS2 is not affected by vibration as it has very few moving parts
- The effect of temperature and compressed air pressure on the SIPART PS2 positioner is negligible
- Maintenance-free operation
- The valve position can be adjusted manually with the help of a display and keyboard. A separate current source is not required
- The firmware contained in the SIPART PS2 positioner provides a number of functions that can be activated simply by configuring the positioner accordingly, e.g. valve characteristic, stroke limitation or split range operation
- The "tight shut-off" function ensures maximum positioning pressure on the valve seat
- Compressed air consumption when operating the positioner is negligible compared to a traditional positioner.

The SIPART PS2 positioner is fitted to the linear or part-turn actuator using an appropriate mounting assembly. The linear or rotary motion of the actuator is detected by the mounting assembly and transferred via a rigid connection to a potentiometer made of a wear-resistant plastic conductive material.

The angular error of the pick-up in cases where the assembly is mounted on a linear actuator is corrected automatically.

The microprocessor then outputs an electric control command to the piezoelectric valve in accordance with the magnitude and direction of the deviation (deviation between setpoint *w* and control output *x*).

The piezoelectric valve converts the command into a pneumatic positional increment. The positioner outputs a continuous signal in the area where there is a large control deviation (high-speed zone); in areas of moderate control deviation (slow-speed zone) it outputs a sequence of pulses. No positioning signals are output in the case of a small control deviation (adaptive or variable dead zone).

Pneumatic valve manifold with piezoelectric valve precontrol

The valve manifold is characterized by an extremely long service life. The pilot element is a piezoelectric bending converter which switches the pneumatic main control unit. The piezoelectric valve can release very short control pulses because of its low mass. A high positioning accuracy can then be achieved.

Three explosion-proof versions

The basic version of the device is available in an intrinsically-safe design with degree of protection EEx ia/ib or in a non-intrinsically-safe design for zone 2 (see Technical data for intrinsically-safe versions).

An non-intrinsically-safe application is permissible in zone 1 for the SIPART PS2 EEx d flameproof version (also in zone 0 with FM certification, see Technical data). It is then permissible to use all option modules.

Operation and monitoring with the SIMATIC PDM communications program

The SIMATIC PDM program is available for communication via the HART interface and also for the PROFIBUS-PA coupling.

The SIMATIC PDM communications software permits easy remote operation and monitoring via a PC or laptop. The positioner can also be configured using this program. Parameters which provide important information for maintenance and fault diagnosis of the complete unit can additionally be determined using process data and comparison data. When operating the SIPART PS2 via the HART interface, the connection to the PC or laptop is made directly to the two-wire cable to the SIPART PS2 positioner via a HART modem connected to the COM interface. The signals required for communication according to the HART protocol are superimposed on the current signal according to frequency shift keying.

Commissioning

Commissioning (initialization) is carried out automatically to a large extent.

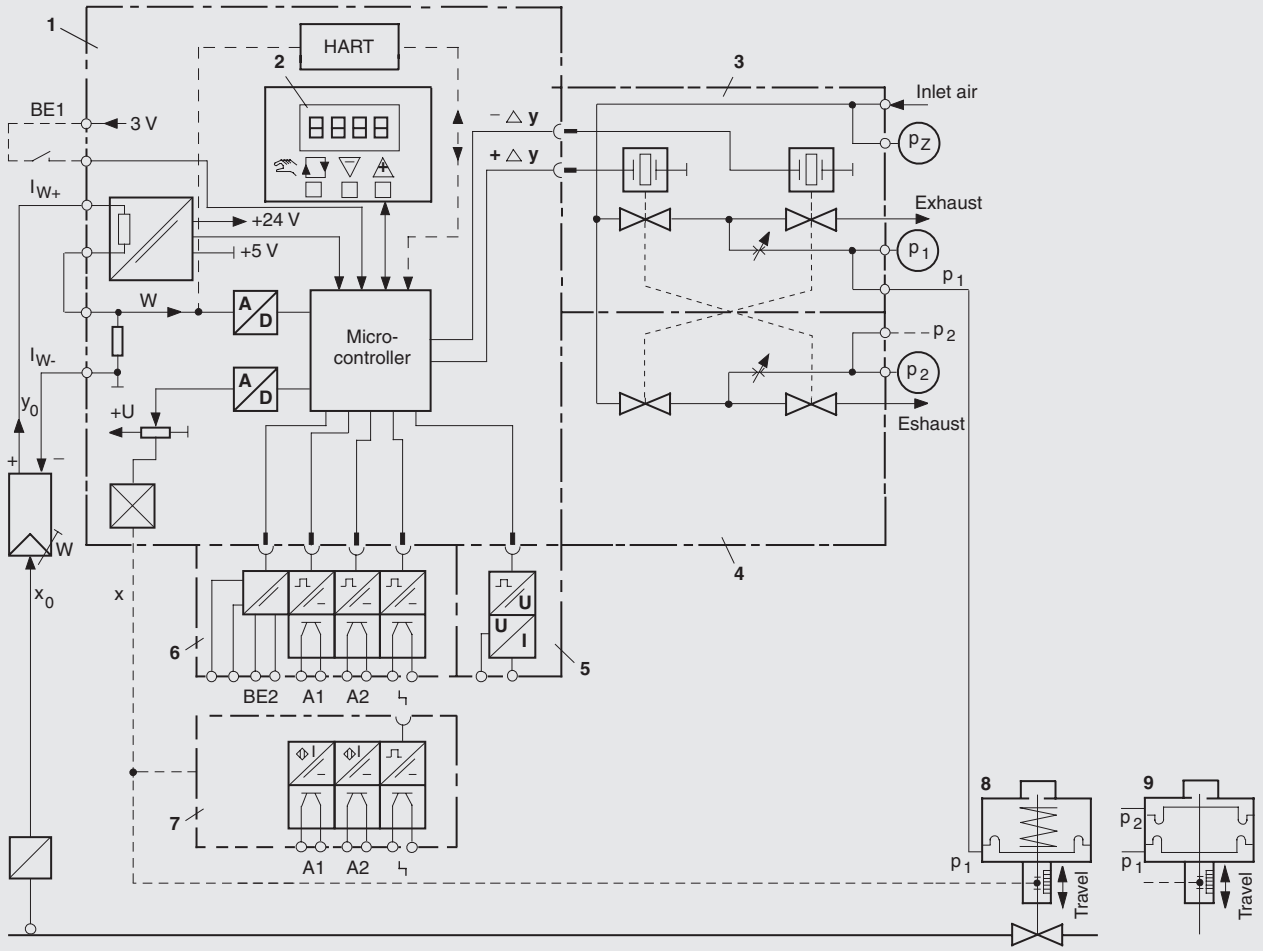
During initialization, the microcontroller automatically determines the zero, full-scale value, direction of action and positioning speed of the actuator. It uses these to determine the minimum pulse time and the dead zone, thus optimizing the control.

The pneumatic actuator can also be operated manually using the pushbuttons and the LCD of the SIPART PS2 positioner.

Monitoring and diagnostics functions for positioners, actuators and valves

The SIPART PS2 (6DR5...) has various monitoring functions with which changes on the actuator and valve can be detected and signalled if applicable when a selectable limit has been exceeded. This information may be important for diagnosis of the actuator or valve. The measured values (some of whose limits can be adjusted) to be determined and monitored include:

- Travel integral
- Number of changes in direction
- Alarm counter
- Self-adjusting dead zone
- Valve limit position (e.g. wear of valve seat)
- Operating hours (also according to temperature classes) as well as min./max. temperatures
- Operating cycles of piezoelectric valves
- Valve positioning time
- Actuator leakages.



1 Motherboard with microcontroller and input circuit
2 Control panel with LCD and pushbuttons
3 Piezoelectric valve unit, always present
4 Valve unit, present as accessory in double-action positioner
5 I_y module for SIPART PS2 controller
6 Alarm module for 3 alarm outputs and 1 binary input
7 SIA module (slot initiator alarm module)
8 Spring-loaded pneumatic actuator (single-action)
9 Springless pneumatic actuator (double-action)

Note:
Alarm module (6) and SIA module (7) can only be inserted as alternatives.

Fig. 5/6 SIPART PS2, electropneumatic positioner, function diagram

Mode of operation

Electric connection of two-wire devices (6DR50.., 6DR51..)

Devices of types 6DR50.. and 6DR51.. are operated in a two-wire system.

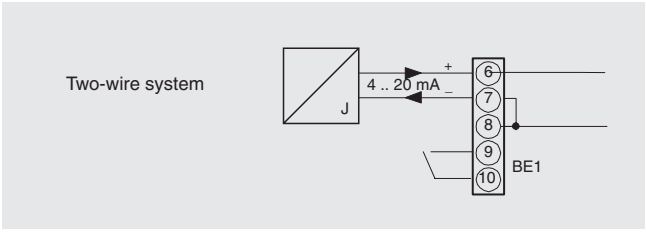


Fig. 5/7 SIPART PS2 electropneumatic positioner, input circuit for 6DR50.. and 6DR51..

Electric connection of PROFIBUS-PA devices (6DR41..)

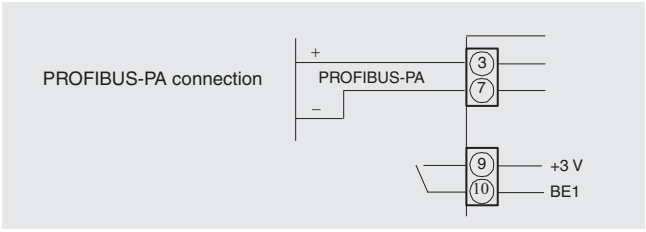


Fig. 5/8 SIPART PS2 PA electropneumatic positioner, input circuit for 6DR41..

Electric connection of two/three/four-wire devices (6DR52..)

Devices of type 6DR52.. can be operated in a two-wire, three-wire or four-wire system.

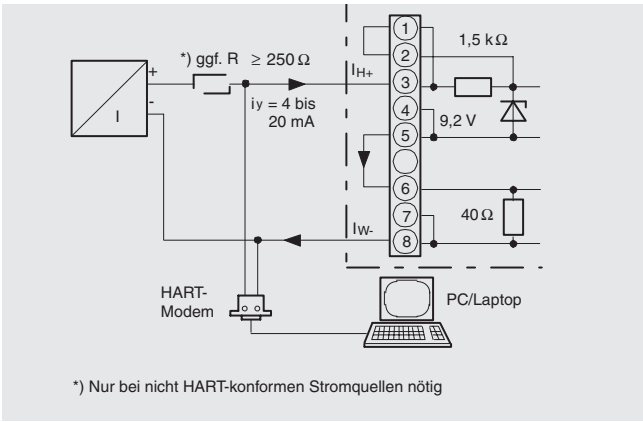


Fig. 5/9 SIPART PS2 electropneumatic positioner, example of connection for communication with HART for 6DR52..

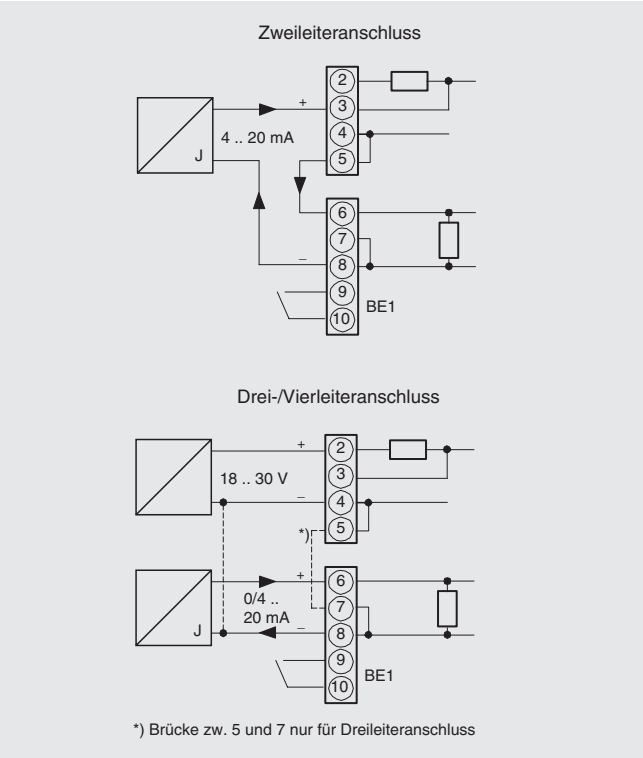


Fig. 5/10 SIPART PS2 electropneumatic positioner, input circuits for 6DR52..

SIMATIC PDM

Task	Parameterization, startup and diagnosis of process devices using PROFIBUS-DP, PROFIBUS-PA and HART interfaces
Required computer hardware	Personal computer/programming device with Pentium processor and 32 Mbyte RAM (64 Mbyte or more recommended)
Operating system	Windows 95, Windows NT
With integration in STEP 7	STEP 7, matching the SIMATIC PDM version
Memory requirements with SIMATIC PDM	Approx. 10 Mbyte, plus 70 Mbyte for SIMATIC PDM without option "Integration in STEP 7"
PROFIBUS-DP connection For PG 720/740/760 programming device For personal computer	Built-in MPI interface Communications processor CP 5511 6GK1 551-1AA00 CP 5611 6GK1 561-1AA00 Required drivers are included in delivery of SIMATIC PDM and in STEP7
Transition from PROFIBUS-DP to PROFIBUS-PA	DP/PA coupler, Ex version: 6ES7157-0AD00-0XA0, DP/PA coupler, non-Ex version: 6ES7157-0AC00-0XA0, DP/PA link: 6ES7157-0AA00-0XA0
Transition from PROFIBUS-DP to HART	IM 153-2 interface module 6ES7153-2AA01-0XB0, HART analog input module 6ES7331-7TB00-0AB0
HART point-to-point connection	Via HART modem 7MF4997-1DA

» » Input Value			
Direction	Rising		Loaded
Lower Value	0	%	Loaded
Upper Value	100	%	Loaded
Unit (Input)	%		Loaded
Setpoint Cut-Off CLOSE	0	%	Loaded
Setpoint Cut-Off OPEN	100	%	Loaded
Tight closing	Not active		Loaded
» » Working Range			
Lower Value	0	%	Loaded
Upper Value	100	%	Loaded
Unit (Output)	%		Loaded
Lower Limit Valve Position	0	%	Loaded
Upper Limit Valve Position	100	%	Loaded
Y normalization:	to mech. travel		Loaded
» » Characterization			
Characterization Type	Linear		Loaded
» Output			
Alarm Output	No function		Loaded
Fault output	Fault		Loaded
Mode (Response Threshold)	AUTO		Loaded
Response Threshold	0,1	%	Loaded
Mode (Delay Time)	AUTO		Loaded
Delay Time	1	s	Loaded
» » Output Limits			
Alarm 1	10	%	Loaded
Alarm 2	90	%	Loaded
» Performance Characteristics			
Mode (Deadband)	AUTO		Loaded
Deadband	1,0	%	Loaded
» » Power Loss			
Actuator action	Not initialized		Loaded
Fail Safe Mode	Fail Safe Value is used as control regulator input		Loaded
Fail Safe Time	30	s	Loaded
Fail Safe Default Value	0	%	Loaded
» » Travel Time			
Min. Travel Time CLOSE	5,16	s	Loaded
Min. Travel Time OPEN	5,3	s	Loaded
Travel Time CLOSE	0	s	Loaded
Travel Time OPEN	0	s	Loaded
Mode (Travel Time)	MAN		Loaded

Fig. 5/12 SIMATIC PDM, parameter table

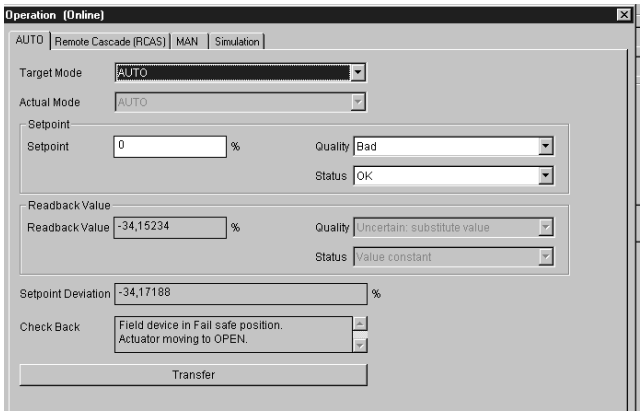


Fig. 5/11 SIMATIC PDM, measured-value display

Configuring

The following settings can be configured in configuring mode as required, e.g. with SIPART PS2:

- Input current range 0 to 20 mA or 4 to 20 mA
- Rising or falling characteristic at the setpoint input
- Positioning speed limit (setpoint ramp)
- Split-range operation; adjustable start-of-scale and full-scale values
- Response threshold (dead zone); self-adjusting or fixed
- Direction of action; rising or falling output pressure with rising setpoint
- Limits (start-of-scale and full-scale values) of positioning range
- Limits (alarms) of the final control element position; minimum and maximum values
- Automatic "tight shut-off" (with adjustable response threshold for 6DR5...)
- The travel can be corrected in accordance with the valve characteristic. The following can be selected:
  - Linear characteristic
  - Equal-percentage characteristic 1: 25
  - Equal-percentage characteristic 1: 50
  - Any characteristic, to be entered as a polygon with 21 interpolation points.
- Function of binary inputs
- Function of alarm output.

The SIPART PS2 and SIPART PS2 PA positioners are configured differently.

Configuring

SIPART PS2 and SIPART PS2 EEx d configurations

Parameter name	Function	Parameter values	Dimension
1. YFCT	Type of actuator: part-turn/linear		
	- Part-turn actuator	turn	
	- Linear actuator	WAY	
	- Linear actuator without sine-wave correction	LWAY	
	- Part-turn actuator with NCS	ncSt	
	- Part-turn actuator with NCS, reverse direction	-ncSt	
2. YAGL [1]	Rated angle of feedback	90 ° 33 °	Degrees
3. YWAY [2]	Travel range 5 to 130 mm		
	- None	OFF	
	- Short lever 33°	5/10/15/20	mm
	- Short lever 90°	25/30/35	
	- Long lever 90°	40/50/60/70/90/110/130	
4. INITA	Initialization (automatic)	noini no / ##.# Strt	
5. INITM	Initialization (manual)	noini no / ##.# Strt	
6. SCUR	Current range of setpoint 0 to 20 mA 4 to 20 mA	 0 MA 4 MA	mA
7. SDIR	Setpoint direction rising Setpoint direction falling	riSE FALL	
8. SPRA	Start-of-scale for split range setpoint	0.0 to 100.0	%
9. SPRE	Full-scale for split range setpoint	0.0 to 100.0	%
10. TSUP	Setpoint ramp OPEN	Auto 0 to 400	s
11. TSDO	Setpoint ramp CLOSED	0 to 400	s
12. SFCT	Setpoint function - Linear - Equal percentage - Equal percentage, reversed - Freely adjustable	 Lin 1:25, 1:33, 1:50 1:25, 1:33, 1:50 FrEE	
13. SL0 [3] 14. SL1 . . 32. SL19 33. SL20 [3]	Setpoint interpolation points at 0 %, 5 %, ... 95 %, 100 %	0.0 to 100.0	%
34. DEBA	Controller dead zone	Auto 0.1 to 10.0	%
35. YA	Start of manipulated variable limit	0.0 to 100.0	%
36. YE	End of manipulated variable limit	0.0 to 100.0	%
37. YNRM	Manipulated variable scaling Mech. travel Flow	 MPOS FLOW	
38. YDIR	Manipulated variable direction for display Rising Falling	 riSE FALL	
39. YCLS	"Tight shut-off" with man. variable None Only up Only down Up and down	 no uP do uP do	

[1]) 33 ° cannot be set if "turn" is selected.
[2]) Parameter only appears if 1. YFCT=turn has been selected.
[3]) Interpolation points only appear if 12.SFCT=FrEE has been selected.
[4]) NC means: action with opened switch or Low level.
NO means: action with closed switch or High level.
[5]) Normal means: High level without fault.
Inverted means: Low level without fault.

Parameter name	Function	Parameter values	Dimension
40. YCDO	Value for "tight shut-off", down	0.0 to 100.0	%
41. YCUP	Value for "tight shut-off", up	0.0 to 100.0	%
42. BIN1 [4]	Function of binary input 1		
	None	OFF	
	NO		
	Only signal	on	
	Block configuring	bLoc1	
	Block config. and manual	bLoc2	
	Drive valve to up position	uP	
	Drive valve to down position	doWn	
	Block movement	StoP	
	NC		
	Only signal	-on	
	Drive valve to up position	-uP	
	Drive valve to down position	-doWn	
	Block movement	-Stop	
43. BIN2 [4]	Function of binary input 2		
	None	OFF	
	NO		
	Only signal	on	
	Drive valve to up position	uP	
	Drive valve to down position	doWn	
	Block movement	StoP	
	NC		
	Only signal	-on	
	Drive valve to up position	-uP	
	Drive valve to down position	-doWn	
	Block movement	-StoP	
44. AFCT [5]	Alarm function		
	None	oFF	
	A1=min,A2=max: normal	Mi:MA	
	inverted	Mi:MA	
	A1=min,A2=min: normal	Mi:Mi	
	inverted	Mi:Mi	
	A1=max,A2=max: normal	MA:MA	
	inverted	MA:MA	
45. A1	Response threshold for alarm 1	0.0 to 100.0	%
46. A2	Response threshold for alarm 2	0.0 to 100.0	%
47. ϟ FCT [5]	Function of alarm output Fault:		
	normal	ϟ	
	inverted	-ϟ	
	Fault + not Automatic:		
	normal	ϟ nA	
	inverted	-ϟ nA	
	Fault + not Automatic + BI:		
	normal	ϟ nA.b	
	inverted	-ϟ nA.b	
	(+ means logical OR operation)		
48. ϟ TIM	Monitoring time for setting of fault signal "Control deviation"	Auto 0 to 100	s
49. ϟ LIM	Response threshold of fault signal "Control deviation"	Auto 0.0 to 100.0	%
50. ϟ STRK	Limit for travel integral	OFF 1 to 1.00E9	
51. ϟ DCHG	Limit for change in direction	OFF 1 to 1.00E9	
52. ϟ ZERO	Limit for zero limit monitoring	OFF 0 to 100.0	%
53. ϟ OPEN	Limit for open limit monitoring	OFF 0 to 100.0	%
54. ϟ DEBA	Limit for dead zone monitoring	OFF 0 to 100.0	%
55. PRST	Preset - Nothing activated - Start of factory settings - Display after pressing key for 5 s	 no Strt oCAY	

SIPART PS2 and SIPART PS2 EEx d PA configurations (PROFIBUS versions)

Parameter name	Function	Parameter values	Dimension
1. YFCT	Type of actuator: part-turn/linear		
	- Part-turn actuator	turn	
	- Linear actuator	WAY	
	- Linear actuator without sine-wave correction	LWAY	
2. YAGL [1]	Rated angle of feedback	90 ° 33 °	Degrees
3. YWAY [2]	Travel range 5 to 130 mm		
	- None	OFF	
	- Short lever 33°	5/10/15/20	mm
	- Short lever 90°	25/30/35	
	- Long lever 90°	40/50/60/70/90/110/130	
4. INIT	Initialization (automatic commissioning)	no Strt run 1 to run 5 ##.# or oFF	
5. SDIR	Setpoint direction rising Setpoint direction falling	riSE FALL	
6. TSI	Setpoint ramp OPEN	AUto 0 to 400	s
7. TSD	Setpoint ramp CLOSED	AUto 0 to 400	s
8. SFCT	Setpoint function - Linear - Equal percentage - Equal percentage, reversed - Freely adjustable	Lin 1:25, 1:33, 1:50 1:25, 1:33, 1:50 FrEE	
9. SL0 [3] . . 29. SL20	Setpoint interpolation points with free characteristic 0 %, 5 %, 10 % ... 100 %	0.0 to 100.0	%
30. DEBA	Controller dead zone	AUto 0.1 to 10.0	%
31. YA	Start of manipulated variable limit	0.0 to 100.0	%
32. YE	End of manipulated variable limit	0.0 to 100.0	%
33. YNRM	Manipulated variable scaling mech. travel/flow	MPoS FLow	
34. YCLS	"Tight shut-off" with man. variable	no uP: :dW uP:dW	
35. YCDO	Value for "tight shut-off", down	0.0 to 100.0	%
36. YCUP	Value for "tight shut-off", up	0.0 to 100.0	%
37. BIN1 [4]	Function of binary input 1		
	None	OFF	
	NO		
	Only signal	on	
	Block configuring	bLc1	
	Block config. and manual	bLc2	
	Drive valve to ye	uP	
	Drive valve to ya	doW	
	Block movement	StoP	
	NC		
	Only signal	-on	
	Drive valve to ye	-uP	
	Drive valve to ya	-doW	
	Block movement	-Stop	
38. BIN2 [4]	Function of binary input 2		
	None	OFF	
	NO		
	Only signal	on	
	Drive valve to ye	uP	
	Drive valve to ya	doW	
	Block movement	StoP	
	NC		
	Only signal	-on	
	Drive valve to ye	-uP	
	Drive valve to ya	-doW	
	Block movement	-StoP	
39. AFCT	Alarm function		
	None	oFF	
	min : max: normal	Mi:MA	
	min : max: inverted	Mi:MA	
	min : min: normal	Mi:Mi	
	min : min: inverted	Mi:Mi	
	max : max: normal	MA:MA	
	max : max: inverted	MA:MA	
40. A1	Response threshold for alarm 1	0.0 to 100.0	%
41. A2	Response threshold for alarm 2	0.0 to 100.0	%
42. ϟ FCT [5]	Function of alarm output Fault:		
	normal	ϟ	
	inverted	-ϟ	
	Fault + not Automatic:		
	normal	ϟ nA	
	inverted	-ϟ nA	
	Fault + not Automatic + BI:		
	normal	ϟ nA.b	
	inverted	-ϟ nA.b	
	(+ means logical OR operation)		
43. ϟ TIM	Monitoring time for setting of fault signal "Control deviation"	Auto 0 to 100	s
44. ϟ LIM	Response threshold of fault signal "Control deviation"	Auto 0.0 to 100.0	%
45. PRST	Preset (factory setting)	no Strt oCAY	
46. FSTY	Safety setting: Parameterized safety setpoint Last setpoint Open exhaust air valve	FSVL FSSP FSAC	
47. FSTI	Monitoring time for setting of safety position	0 to 100	s
48. FSVL	Safety setpoint	0 to 100.0	%
49. STNR	Station number	0 to 126	

1) 33 ° cannot be set if "turn" is selected.
2) Parameter only appears if 1. YFCT=turn has been selected.
3) Interpolation points only appear if 12.SFCT=FrEE has been selected.
4) NC means: action with opened switch or Low level.
NO means: action with closed switch or High level.
5) Normal means: High level without fault.
Inverted means: Low level without fault.

Technical data

Technical data

SIPART PS2 SIPART PS2 EEx d SIPART PS2 PA SIPART PS2 EEx d PA	
General data	
Travel range (linear actuators)	3 to 130 mm (angle of feedback shaft 16 to 90°)
Angle or rotation (part-turn actuators)	30 to 100°
Installation	
• On linear actuators	Using mounting kit 6DR4004-8V and additional lever arm 6DR4004-8L if required on actuators according to IEC 534-6 (NAMUR) with ledge, columns or plane surface
• On part-turn actuators	Using mounting kit 6DR4004-8D on actuators with fixing platform according to VDI/VDE 3845 and DIN 3337: the mounting plate must be provided on the actuator side; shaft with nut and M6 female thread (see Fig. 5/15)
Controller	
• Five-point switch	Self-adjusting
• Dead zone dEbA = Auto dEbA = 0.1 to 10%	Self-adjusting or fixed setting
• Controllable response time	≥ 1.5 s, reduced resolution with smaller positioning times
A/D converter	
• Scanning time	10 ms
• Resolution	≤ 0.05 %
• Transmission error	≤ 0.2 %
• Temperature influence	≤ 0.1 %/10 K
Binary input BI1 (connected electrically to I_w current input)	Can be used for floating contact
Contact rating	≤ 5 µA at 3 V
Degree of protection	IP 65 to EN 60 529
Mounting position	Any; in wet environment, pneumatic connections and exhaust opening not upwards
CE marking	Conforms to EMC guideline 89/336 EEC in compliance with the following standards
• Emitted interference	EN 50 081-1
• Noise immunity	EN 50 082-2 and NAMUR NE21 May 93
Material of:	
• Casing - 6DR5 ■■ 0-... (plastic) - 6DR5 ■■ 1-... (metal) - 6DR4 ■■ 5-... (metal)	Glass-fiber-reinforced Macrolon GK-AlSi7Mg GK-AlSi7Mg
• Pressure gauge block	Aluminium AlMgSi, anodized
Resistance to vibration	10 g

Pneumatic data				
Supply (inlet air) • Pressure	1.4 to 7 bar: sufficiently larger than max. actuator pressure (positioning pressure)			
Air quality according to ISO 8573-1 • Size and density of particulates	Class 2			
• Pressure dew point	Class 2 (min. 20 K below ambient temperature)			
• Oil concentration	Class 2			
Unrestricted flow of:	At	2 bar	4 bar	6 bar
• Inlet air valve [Nm^3/h]		4.1	7.1	9.8
• Outlet air valve [Nm^3/h]		8.2	13.7	19.2
Valve leakage	< 6 x 10^{-4} Nm^3/h			
Throttle ratio	Adjustable up to ∞ : 1			
Consumption of inlet air in stable state	< 3.6 x 10^{-2} Nm^3/h			
Types of actuators				
• In plastic casing	Single-action and double-action			
• In metal casing	Single-action			
• In flameproof casing	Single-action and double-action			

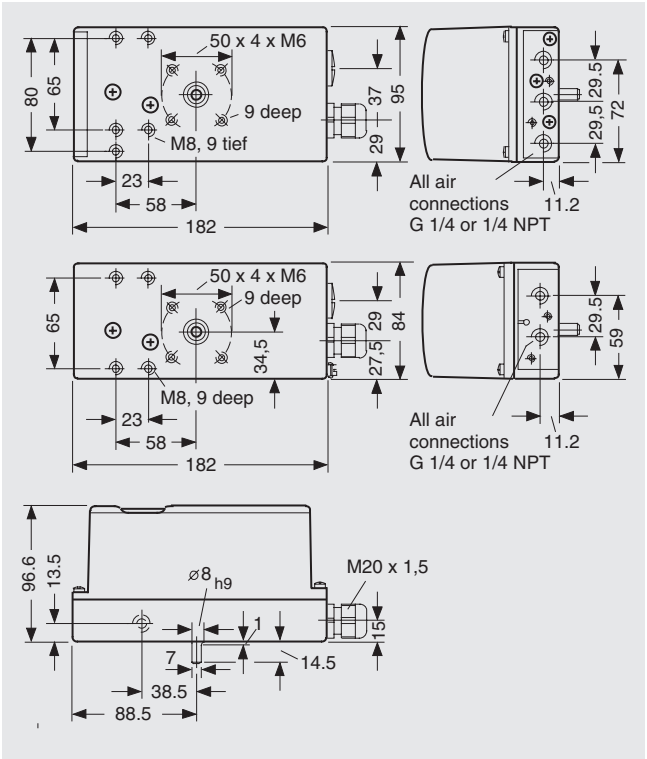


Fig. 5/13 Dimensions (top: plastic casing, center: metal casing, bottom: plastic casing and metal casing)

Technical data

SIPART PS2		
Explosion protection to EN 50 014 and EN 50 020	EEx n II 3G Ex nV II T4	EEx ia/ib II G EEx ib II C T6
Mounting location	Zone 2	Zone 1
Permissible ambient temperature for operation	T4: -30 to +80 °C [1])	T4:-30 to +80 °C [1]) T5:-30 to +65 °C [1]) T6:-30 to +50 °C [1])
Electrical data	**Basic device without Ex protection**	**Basic device with Ex protection EEx ia/ib or Ex n**
Input		
Two-wire system (6DR50.. and 6DR51..)		
• Rated signal range	4 to 20 mA	
• Current to maintain power supply	≥ 3.6 mA	
• Required load voltage U_B (≙ Ω at 20 mA) - Without HART - With HART	6.4 V (≙ 320 Ω) 6.5 V (≙ 325 Ω)	8.0 V (≙ 400 Ω) 8.8 V (≙ 440 Ω)
• Static destruction limit	± 40 mA	–
• Internal capacitance C_i	–	≤ 15 nF
• Internal inductance L_i	–	≤ 0.12 mH
• Sources	–	Intrinsically-safe with U_o ≤ 30 V DC I_k ≤ 100 mA P ≤ 1 W
Two-wire/three-wire/four-wire system (6DR52..)		
• Power supply U_H	18 to 30 V DC	
• Current consumption I_H	(U_H - 7.5 V)/2.4 kΩ [mA]	
• Internal capacitance C_i	–	≤ 4 nF
• Internal inductance L_i	–	≤ 0.12 mH
• For connection to intrinsically-safe sources with	– – –	U_o ≤ 30 V DC I_k ≤ 100 mA P ≤ 1 W
Current input i_W		
• Rated signal range		4 to 20 mA
• Load voltage at 20 mA		1 V (≙ 50 Ω)
• Internal capacitance C_i	–	≤ 15 nF
• Internal inductance L_i	–	≤ 0.12 mH
• For connection to intrinsically-safe sources with	– – –	U_o ≤ 30 V DC I_k ≤ 100 mA P ≤ 1 W
Electrical isolation		Between U_H and I_W (2 intrinsically-safe circuits)
• Test voltage	840 V DC (1 s)	
Connections		
• Electric	Screw terminals 2.5 AWG28-12 Cable bushing M20 or 1/2" NPT (see Ordering data)	
• Pneumatic	Female thread G1/4 DIN 45 141 or 1/4" 18 NPT (see Ordering data)	

Binary input BI1	See "General data", page 5/10
Weight, basic device	
• Plastic casing	Approx. 0.9 kg
• Metal casing	Approx. 1.3 kg
Dimensions	See Fig. 5/13
Climatic class	To IEC 721
• Storage	1K5, but -40 to +80 °C [2])
• Transport	2K4, but -40 to +80 °C [2])
• Operation	
- Without purging air	3K3, but -30 to +80 °C [1])
- With purging air	3K4, but -30 to +80 °C [1])

SIPART PS2 EEx d	
Explosion protection to EN 50 014 and EN 50 018	II 2G EEx d II C T6
Permissible ambient temperature for operation	T4: -30 to +80 °C [1]) T5: -30 to +65 °C [1]) T6: -30 to +50 °C [1])
Electrical data	
Input	
Two-wire system	
• Rated signal range	4 to 20 mA
• Current to maintain power supply	≥ 3.6 mA
• Required load voltage U_B - Without HART - With HART	6.4 V (≙ 320 Ω) 6.5 V (≙ 325 Ω)
• Static destruction limit	± 40 mA
Three/four-wire system	
• Power supply U_H	18 to 35 V DC
• Current consumption I_H	(U_H -7.5 V)/2.4 kΩ [mA]
• Static destruction limit	± 35 V
Current input i_W	
• Rated signal range	0 or 4 to 20 mA
• Load voltage at 20 mA	1 V (≙ 50 Ω)
• Static destruction limit	± 40 mA
Electrical isolation	Between U_H and I_W
• Test voltage	500 V (50 Hz, 1 min)
Connection	Screw terminals 2.5 AWG28-12
• Electric	1/2" NPT [3]) or M25 x 1.5 [3]) or M20 x 1.5
• Pneumatic	Female thread G1/4 DIN 45 141 or 1/4" 18NPT
Binary input BI1	See "General data", page 5/10
Weight, basic device	Approx. 5.2 kg
Dimensions	See Fig. 5/14
Climatic class	To IEC 721
• Storage	1K5, but -40 to +80 °C [2])
• Transport	2K4, but -40 to +80 °C [2])
• Operation with purging air	3K4, but -30 to +80 °C [2])

[1]) Limited refresh rate of LCD below -10 °C.
[2]) When commissioning at ≤ 0 °C make sure that the valves are purged with the dry medium for a sufficiently long time.
[3]) With EEx-d certified cable bushing.

Technical data

Technical data (continued)

SIPART PS2 PA	Basic device without Ex protection	Basic device with Ex protection EEx ia
Explosion protection to EN 50 014 and EN 50 020		EEx ia IIC T4/T5/T6
Permissible ambient temperature	–	T4: -30 to +80 °C T5: -30 to +65 °C T6: -30 to +50 °C
Electrical data		
Power supply	Via bus	
Bus voltage	9 to 32 V	9 to 24 V
Current consumption	12 mA ± 10 %	
Electronic current limiting	I_{max} = ≤ 16 mA in event fault	
Effective internal inductance	–	L_i ≤ 7.2 mH
Effective internal capacitance	–	C_i ≤ 550 pF
Connection	–	Certified intrinsically-safe circuit
Supply unit	U_p = 24 V; I_p = 128 mA	
Electrical isolation	Between bus and secondary circuit	Between bus and secondary circuit (2 intrinsically-safe circuits)
Test voltage (50 Hz, 1 min)	–	500 V_{rms}
Communication	Layers 1 + 2 according to PROFIBUS-PA, transmission system to IEC 1158-2; slave function Layer 7 (protocol layer) according to PROFIBUS-DP, standard EN 50 170 with extended PROFIBUS functionality (all data acyclic; manipulated variable, feedbacks and status cyclic in addition)	
C2 connections	Four connections to master class 2 are supported, automatic establishment of connection 60 s following interruption in communication	
Device profile	PROFIBUS-PA profile B, version 3.0; more than 150 objects	
Response time to master telegram	Typ. 10 ms	
Device address	126 (when delivered)	
PC parameterization software	SIMATIC PDM, executes on Windows 95 or Windows NT; supports all device objects The software is not included in the scope of delivery	
Connections		
• Electric	Screw terminals 1.5 AWG14 Cable bushing M20 (1/2" NPT, see Ordering data)	
• Pneumatic	Female thread G1/4 DIN 45 141 (1/4" NPT, see Ordering data)	
Binary input BI1	See "General data", page 5/10	
Weight, basic device		
• Plastic casing	Approx. 0.9 kg	
• Metal casing	Approx. 1.3 kg	
Dimensions	See Fig. 5/13	
Climatic class	To IEC 721	
• Storage	1K5, but -40 to +80 °C [1])	
• Transport	2K4, but -40 to +80 °C [1])	
• Operation		
- Without purging air	3K3, but -30 to +80 °C [2])	
- With purging air	3K4, but -30 to +80 °C [2])	

SIPART PS2 EEx d PA	
Explosion protection to EN 50 014 and EN 50 018	II 2G EEx d II C T6
Permissible ambient temperature for operation	T4: -30 to +80 °C [2]) T5: -30 to +65 °C [2]) T6: -30 to +50 °C [2])
Electrical data	
Power supply	Via bus
Bus voltage	9 to 32 V
Current consumption	12 mA ± 10 %
Electronic current limiting	I_{max} = ≤ 16 mA in event of fault
Supply unit	U_p = 24 V; I_p = 128 mA
Electrical isolation	Between bus and secondary circuit
Test voltage (50 Hz, 1 min)	500 V_{rms}
Communication	Layers 1 + 2 according to PROFIBUS-PA, transmission system to IEC 1158-2; slave function Layer 7 (protocol layer) according to PROFIBUS-DP, standard EN 50 170 with extended PROFIBUS functionality (all data acyclic; manipulated variable feedbacks and status cyclic in addition)
C2 connections	Four connections to master class 2 are supported, automatic establishment of connection 60 s following interruption in communication
Device profile	PROFIBUS-PA profile B, version 3.0; more than 150 objects
Response time to master telegram	Typ. 10 ms
Device address	126 (when delivered)
PC parameterization software	SIMATIC PDM, executes on Windows 95 or Windows NT; supports all device objects The software is not included in the scope of delivery
Connections	Screw terminals 1.5 AWG14 EEx d certified cable bushing
• Electric	1/2" 14NPT or M25 x 1.5
• Pneumatic	Female thread G1/4 DIN 45 141 1/4" 18NPT
Binary input BI1	See "General data", page 5/10
Weight, basic device	Approx. 5.2 kg
Dimensions	See Fig. 5/14
Climatic class	To IEC 721
• Storage	1K5, but -40 to +80 °C [1])
• Transport	2K4, but -40 to +80 °C [1])
• Operation	3K4, but -30 to +80 °C [2])

[1]) When commissioning at ≤ 0 °C make sure that the valves are purged with the dry medium for a sufficiently long time.
[2]) Limited refresh rate of LCD below -10 °C.

Technical data (continued)

Option modules

Electrical data	**Without Ex protection**	**With Ex protection**
Explosion protection to EN 50 014 and EN 50 020	–	II2G EEx ia/ib II C T4/T5/T6 [1]
Mounting location	–	Zone 1
Permissible ambient temperature for operation	-30 to +80 °C	T4: -30 to +80 °C T5: -30 to +65 °C T6: -30 to +50 °C
Alarm module Binary alarm outputs $\overline{A1}$, $\overline{A2}$ and alarm output	6DR4004-8A (without Ex protection)	6DR4004-6A (with Ex protection)
Signal status High (not triggered)	Conductive R = 1 kΩ, +3/-1 %	≥ 2.1 mA [2]
Signal status Low [3] (triggered)	Non-conductive I_R < 60 µA	≤ 1.2 mA [2]
Internal capacitance C_i	–	≤ 4.7 nF
Internal inductance L_i	–	Negligible
Power supply U_H	≤ 35 V	–
Connection to intrinsically-safe switching amplifier to DIN 19 234	–	U_o ≤ 15.5 V DC I_k ≤ 52 mA P ≤ 169 mW
Binary input BI2		
• Electrically connected to basic device		
- Signal status 0 - Signal status 1 - Contact rating	Floating contact, open Floating contact, closed 3 V, 5 µA	
• Electrically isolated from basic device		
- Signal status 0 - Signal status 1 - Input resistance	≤ 4.5 V or open ≥ 13 V ≥ 25 kΩ	
Static destruction limit	± 35 V	–
Internal inductance and capacit.	–	Negligible
Connection to intrinsically-safe voltage source	–	U_i ≤ 30 V
Electrical isolation	The 3 outputs, the input BI2 and the basic device are electrically isolated from each other	
Test voltage	500 V (50 Hz, 1 min)	

I_y module	6DR4004-8J (w/o Ex protection)	6DR4004-6J (with Ex protection)	
Direct current output for position feedback	Two-wire system		
Rated signal range i	4 to 20 mA, short-circuit-proof		
Operating range	3.6 to 20.5 mA		
Power supply U_H	+12 to 35 V	+12 to 30 V	
External load R_B [kΩ]	≤ (U_H [V] - 12 V) /i [mA]		
Transmission error	≤ 0.3 %		
Temperature influence	≤ 0.1 %/10 K		
Resolution	≤ 0.1 %		
Residual ripple	≤ 1 %		
Internal capacitance C_i	–	≤ 10 nF	
Internal inductance L_i	–	0.2 mH	
For connection to intrinsically-safe sources with		*for T6*	*for T6*
• U_i	–	≤30 V	≤30 V
• I_i	–	≤100 mA	≤30 mA
• P_i	–	≤1 W	≤0.3 W

SIA module

Limit monitor with slot-type initiators and alarm output	6DR4004-8G or 6DR4004-6G (only for 6DR5...)
Connection	Two-wire system to DIN 19 234 (NAMUR), for series-connected switching amplifiers
2 slot-type initiators	Type SJ2-SN
Function	NC
Connection to intrinsically-safe switching amplifier, DIN 19 234	
Ex protection	EEx ia/ib IIC T4/T5/T6
EMC	Acc. to EN 60 947-5-2 and DIN 19 234
Alarm output	See alarm module

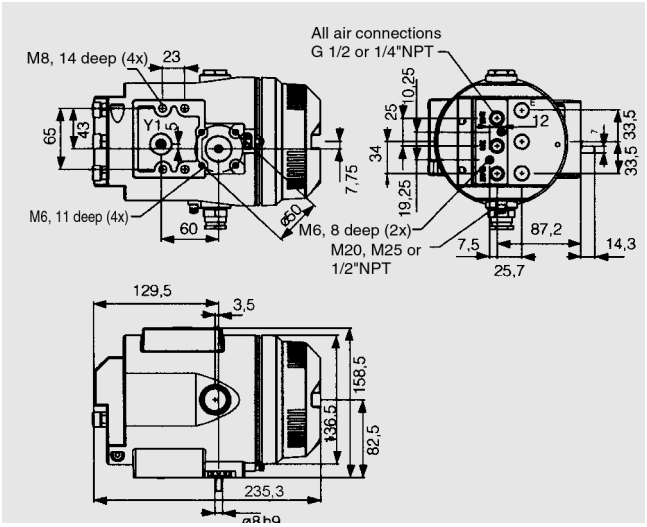


Fig. 5/14 Dimensional drawing of flameproof casing

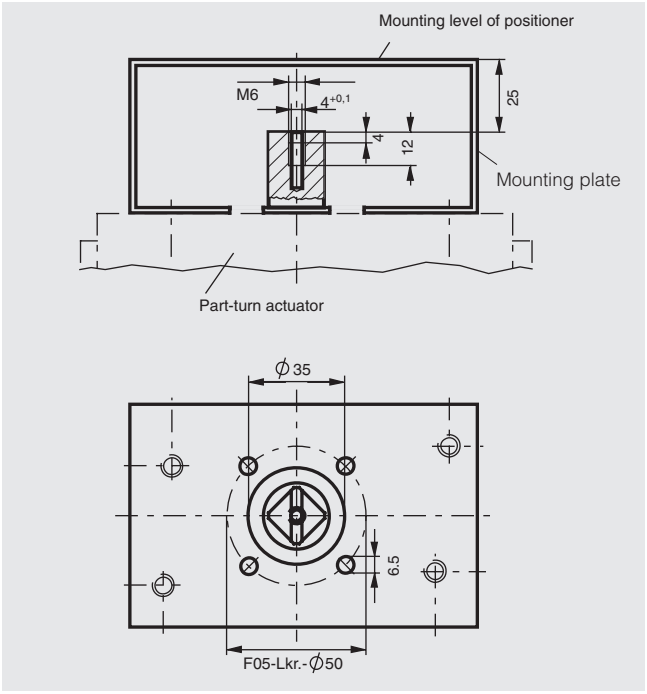


Fig. 5/15 Mounting onto part-turn actuators; mounting plate (scope of delivery of actuator manufacturer), extract from VDI/VDE 3845, dimensions

[1]) Only in conjunction with the basic device 6DR4 ■■■ - ■ E ■■■.
[2]) Switching thresholds with supply to DIN 19 234: U_H = 8.2 V, R_i = 1 kΩ.
[3]) Low is also the state if the basic device is faulty or without an electrical power supply.

Ordering data

Ordering data (preliminary)	Order No.
SIPART PS2 electropneumatic positioner (4 to 20 mA), two-wire version [5]	
In plastic casing	
Without explosion protection	
Without HART	
- Single-action	**6DR5010-0NG00-0AA0**
- Double-action	**6DR5020-0NG00-0AA0**
With HART	
- Single-action	**6DR5110-0NG00-0AA0**
- Double-action	**6DR5120-0NG00-0AA0**
In metal casing [2][4][5]	
Single-action	
- Without explosion protection	**6DR4001-1N**
- With explosion protection CENELEC	**6DR4001-1E**
- With explosion protection FM [1]	**6DR4001-1F**
SIPART PS2 electropneumatic positioner PA (PROFIBUS-PA) [4]	
In plastic casing	
Single-action	
- Without explosion protection	**6DR4100-1N**
- With explosion protection CENELEC	**6DR4100-1E**
- With explosion protection FM [1]	**6DR4100-1F**
Double-action	
- Without explosion protection	**6DR4100-2N**
- With explosion protection CENELEC	**6DR4100-2E**
- With explosion protection FM [1]	**6DR4100-2F**
In metal casing [2]	
Single-action	
- Without explosion protection	**6DR4101-1N**
- With explosion protection CENELEC	**6DR4101-1E**
- With explosion protection FM [1]	**6DR4101-1F**
SIPART PS2 electropneumatic positioner EEx d [2][4][5]	
Single-action	
- With explosion protection CENELEC and FM [1]	**6DR4005-1E**
Double-action	
- With explosion protection CENELEC and FM [1]	**6DR4005-2E**
SIPART PS2 electropneumatic positioner EEx d PA [2][4]	
Single-action	
- With explosion protection CENELEC and with explosion protection FM [1]	**6DR4105-1E**
Double-action	
- With explosion protection CENELEC and with explosion protection FM [1]	**6DR4105-12**

Ordering data	Order No.
Accessories	
Alarm module for 3 alarm outputs and 1 binary input (functions: 2 limit monitors, 1 fault indication, 1 binary input)	
- Without explosion protection	**6DR4004-8A**
- With explosion protection CENELEC	**6DR4004-6A**
- With explosion protection FM [1]	**6DR4004-7A**
SIA module (slot initiator alarm module, not for 6DR4...)	
- Without explosion protection	**6DR4004-8G**
- With explosion protection CENELEC and FM	**6DR4004-6G**
I_y module for position transmitter signal (4 to 20 mA)	
- Without explosion protection	**6DR4004-8J**
- With explosion protection CENELEC	**6DR4004-6J**
- With explosion protection FM [1]	**6DR4004-7J**
HART module (for 6DR400■-■■)	
- Without explosion protection	**6DR4004-8H**
- With explosion protection CENELEC	**6DR4004-6H**
- With explosion protection FM [1]	**6DR4004-7H**
HART communicator With battery, charger for AC 230 V and bag, type of protection "Intrinsic safety" EEx ia II T4	
• German	**7MF4998-8KF**
• English	**7MF4998-8KT**
HART modem for connection to PC or laptop for 6DR400■-■■	**7MF4997-1DA**
Mounting kit Mounting of positioner on:	
• Linear actuator up to 35 mm travel	**6DR4004-8V**
• Part-turn actuator	**6DR4004-8D**
• SAMSON actuator, type 3277, yoke dimension H5 = 101 mm [3] (integrated mounting without pipe)	**6DR4004-8S**
Lever arm for travels from 35 to 130 mm	**6DR4004-8L**
Reduced mounting set for linear actuator (without bracket and U-bolt)	
• With short lever up to 35 mm travel	**6DR4004-8VK**
• With long lever > 35 mm travel	**6DR4004-8VL**

■ Available ex-stock.

[1] U.S. certification by FM institute.
[2] Version made of stainless steel on request.
[3] With a yoke dimension H5 = 95 mm, only the SIPART PS2 in metal casing can be used.
[4] All explosion-proof device versions are also available with a ¼" NPT thread. Supplement Order No. by "N"; Order No. example: 6DR4000-1EN.
[5] With explosion protection and three-wire/four-wire version 6DR400....

Ordering data	Order No.
Accessories (continued)	
Pressure gauge block including pressure gauges	
• For single-action SIPART PS2 positioner (2 pressure gauges)	**6DR4004-1M**
• For double-action SIPART PS2 positioner (3 pressure gauges)	**6DR4004-2M**
Connection block for safety solenoid with extended mounting flange to NAMUR	
• For mounting according to IEC 534-6	**6DR4004-1B**
• For SAMSON actuator (integrated mounting), see above	**6DR4004-1C**
Set of rating plates Ex n (for 6DR400■-■E) for conversion to Ex n mode approval (zone 2)	**C73451-A430-D55**
External position detection system for separate mounting of position sensor and controller, comprising:	**C73451-A430-D78**
• SIPART PS2 plastic casing with integral potentiometer and sliding clutch (without electronics and valve block)	
• EMC filter module for controller (required for CE marking; separate ordering item), see below	
NCS sensor for non-contacting detection of position	**On request**
EMC filter module for connection of external position sensor (10 kΩ)	**C73451-A430-D23**
Documentation	
Assembly and Installation Instructions	
• German/English	**A5E00074600**
• French/Italian/Spanish	**A5E00074601**
Manual	
• German	**A5E00074630**
• English	**A5E00074631**
Data brochure	
• German	**A5E00074610**
• English	**A5E00074611**
• French	**A5E00074612**
• Spanish	**A5E00074613**
• Italian	**A5E00074614**
SITRANS I output isolating HART (see page 2/55) with	
• 24 V AC/DC power supply	**7NG4130-1AA11**
• 230 V AC power supply	**7NG4130-1BA11**

■ Available ex stock.

Ordering data

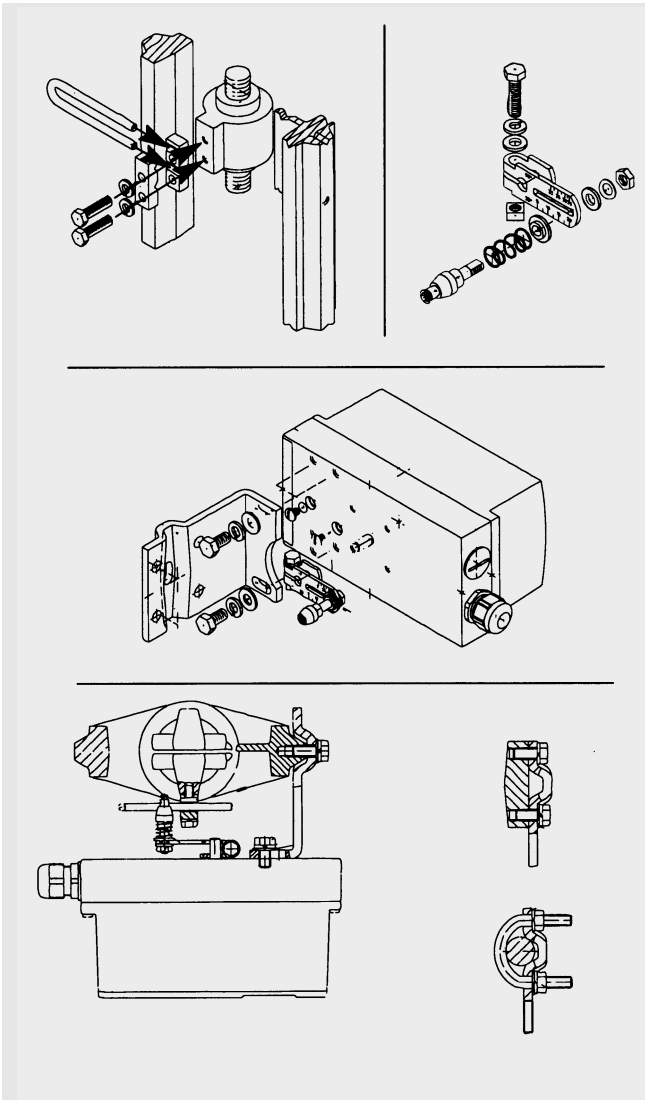


Fig. 5/16 Mounting of SIPART PS2 (PA) on linear actuators

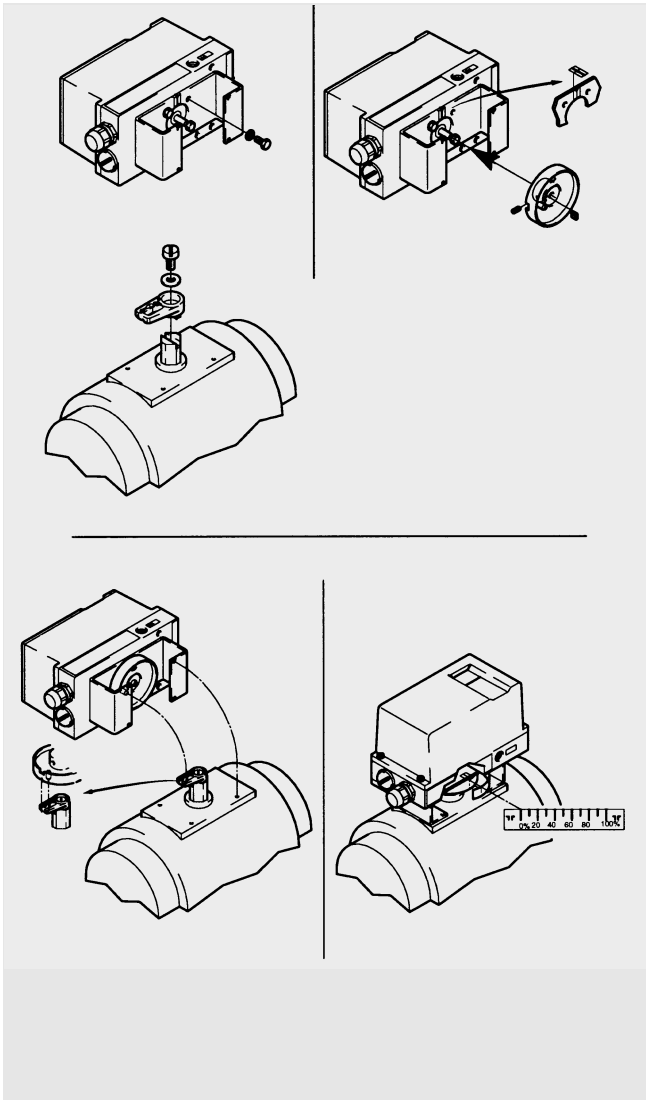


Fig. 5/17 Mounting of SIPART PS2 (PA) on part-turn actuators

Ordering data

Scope of delivery for positioner

Scope of delivery includes:

1	SIPART PS2 positioner as ordered
1	Assembly and Installation Instructions (German/ English) according to device type
1 each	SIPART PS2 Configuring Instructions - a concise overview in German and English

Scope of delivery for mounting kit 6DR4004-8V (for linear actuators)

1	Mounting bracket
2	Mounting prisms
1	U-bracket
1	Lever arm with adjustable pick-up roll
2	U-bolts

Various screws and lock washers

Scope of delivery for mounting kit 6DR4004-8D (for part-turn actuators)

1	Coupling wheel
1	Driver pin
8	Scales
1	Pointer

Various screws and lock washers

Caution:

The mounting consoles and the screws for mounting onto the part-turn actuator are not included in the scope of delivery and must be provided by the customer (see Technical data).

Available ex-stock

Items marked ■ are available ex-stock.

Training

Refer to Catalog ITC for details of training courses for these devices.

Special designs on request

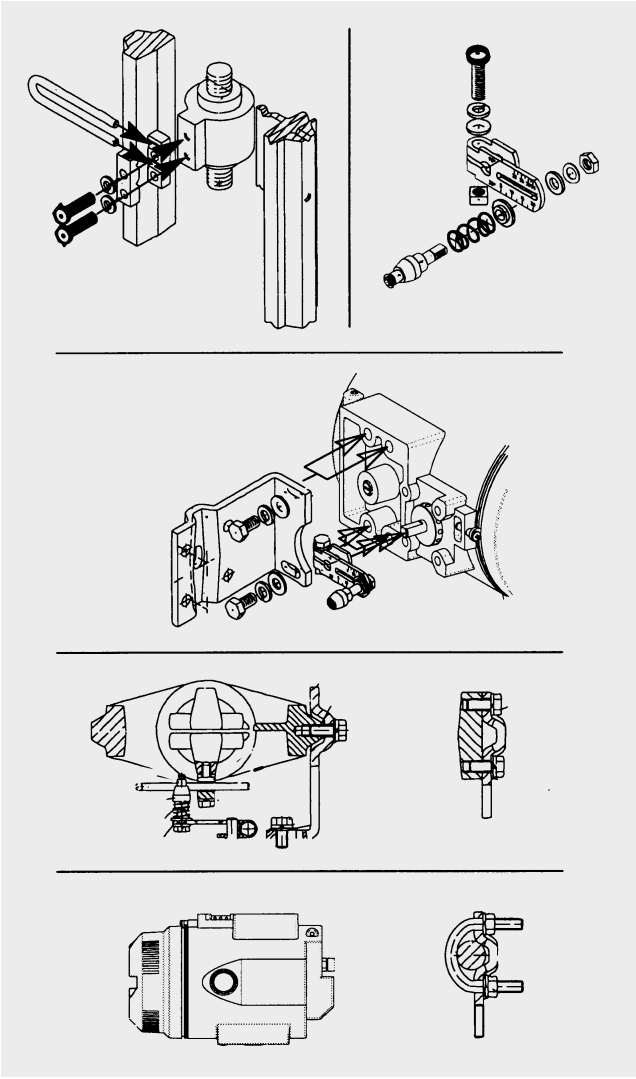


Fig. 5/18 Mounting of SIPART PS2 EEx d (PA) on linear actuators

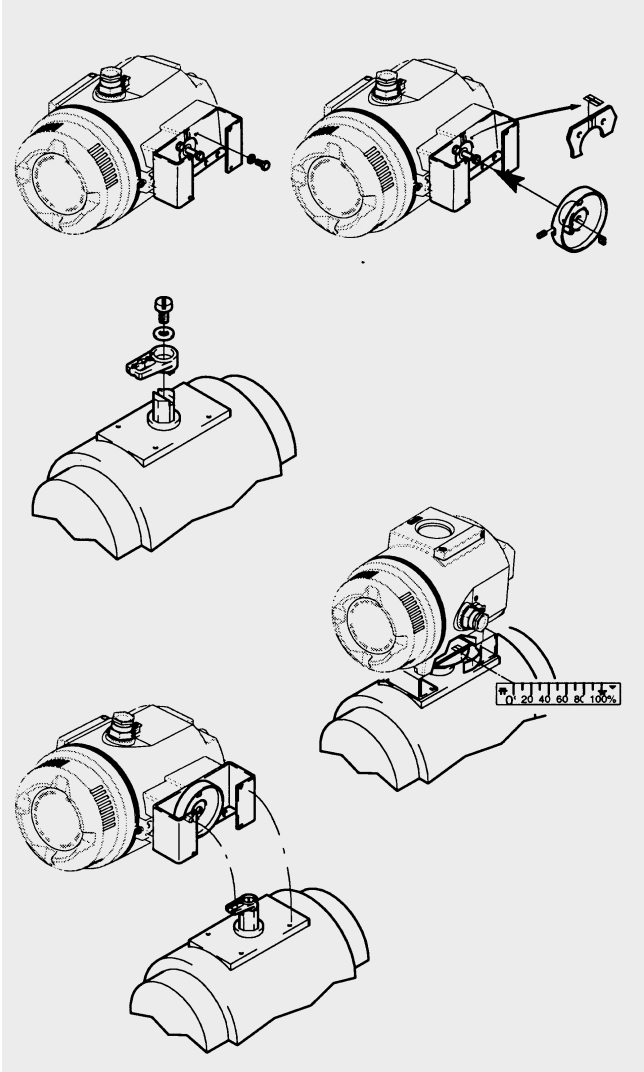


Fig. 5/19 Mounting of SIPART PS2 EEx d (PA) on part-turn actuators

SIPART PS electropneumatic positioners
for operation with natural gas as pneumatic supply

Application, design, mode of operation

Fig. 5/20 SIPART PS electropneumatic positioner

Application

The SIPART PS electropneumatic positioner can be basically used for the same applications as the SIPART PS2 except that the pneumatic supply for this device can be purified natural gas (without H_2S). When operating with natural gas, the system must be installed outdoors. In addition, the natural gas must be free of oxygen. The natural gas exhausted from the positioner must be routed away from the actuator (see below).

The SIPART PS positioner is available:

- For mounting onto linear or part-turn actuators
- As a single-action positioner for spring-loaded actuators or as a double-action positioner for springless actuators
- With or without HART communication.

Design

The SIPART PS positioner is a digital field device with a highly-integrated microcontroller.

The positioner consists of the following components:

- Plastic casing and cover
- Actuator travel detection system
- PCB with analog and digital circuits, LCD display and keyboard for entering configuring data and manual operation
- With the HART version, a HART module can be plugged onto the PCB or retrofitted
- Terminal housing with screw terminals
- Piezoelectric valve manifold

The piezoelectric valve manifold is located on the bottom of the housing and contains

- an air diffuser containing the pneumatic connections and a connection thread for the pressure gauges for inlet air pressure and positioning pressure which must be ordered separately and for inlet air pressure and positioning pressure and
- a piezoelectric valve unit with the single-action positioner or two piezoelectric valve units with the double-action positioner. The piezoelectric valve units are screwed to the air diffuser.

When using natural gas as the pneumatic supply, an adapter is screwed underneath the valve manifold. A pipe or hose is screwed onto this adapter. The natural gas exhausted from the actuator during pressure venting of the actuator chamber(s) is then routed away from the positioner.

The cover of the positioner can be replaced by a cover containing an integral option module providing the following additional functions:

- Position feedback as a two-wire signal 4 to 20 mA
- Indication of two limits of the travel or angle via binary signals; both limits can be set independently as a maximum or minimum value
- Alarm indication in case the set position of the final control element is not obtained in automatic operation (binary signal).

All alarm signals are electrically isolated from one another and the controller itself.

Mode of operation

The mode of operation of the SIPART PS electropneumatic positioner is basically the same as that of the SIPART PS2. However, it should be noted that operation of the device is similar, but not exactly identical to that of the SIPART PS2.

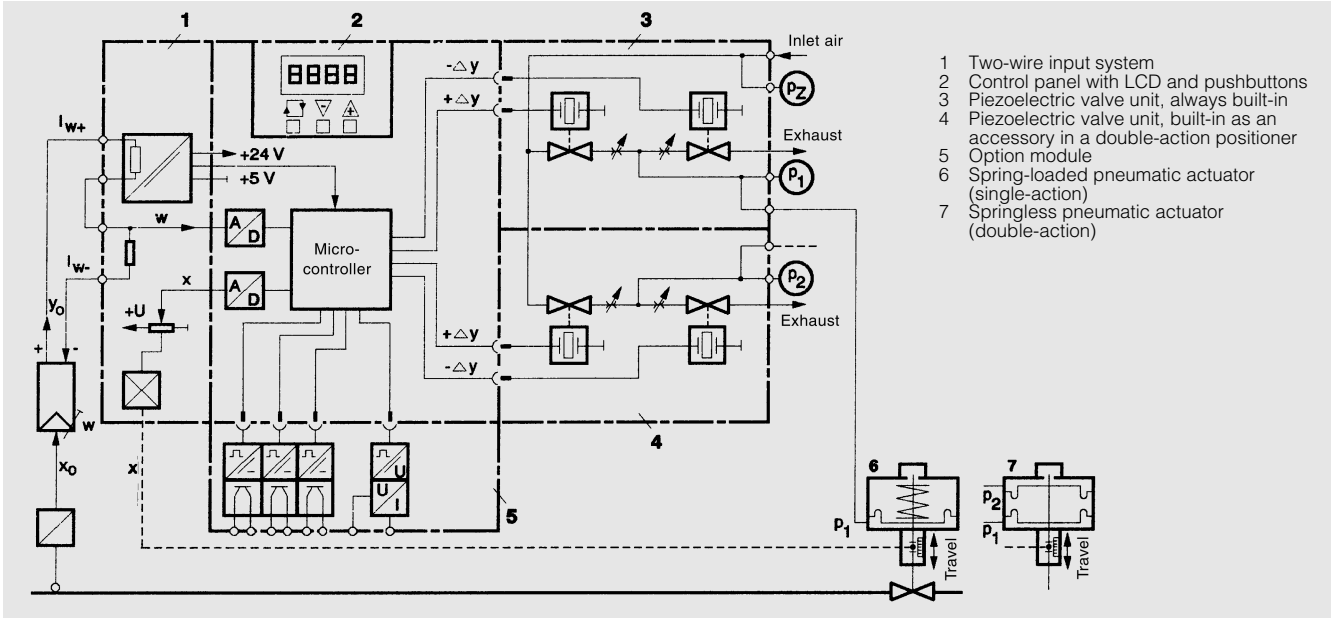


Fig. 5/21 SIPART PS electropneumatic positioner, function diagram

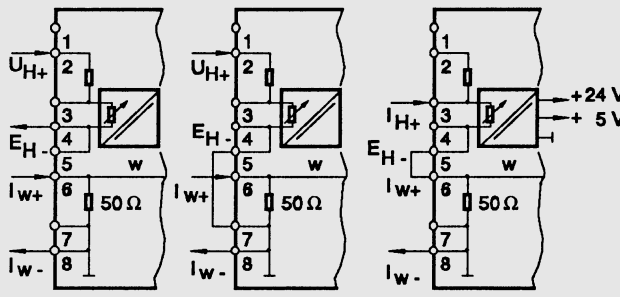


Fig. 5/22 SIPART PS electropneumatic positioner, input systems

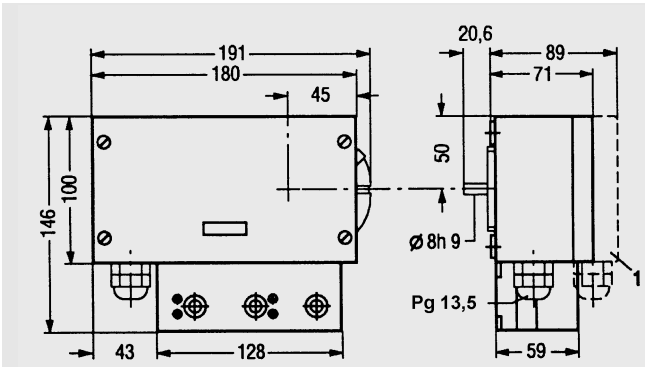


Fig. 5/23 SIPART PS electropneumatic positioner, dimensions

Configuring

Configuring and also the functionality largely correspond to that of the SIPART PS2:

Configurations

Display: Configuring position	Display: Settings/value	Factory setting	Resolution	Dimension	Reference	
YFct	Lin, nLin	nLin	–	–	Position feedback function, linear/non-linear	
init	no/oCAY, Strt	no	–	–	Initialization	
SCUr	0 MA, 4 MA	4 MA	–	–	Setpoint, current range 0 to 20 mA or 4 to 20 mA	
Sdir	riSE, FALL	riSE	–	–	Setpoint direction	
SPrA	0.0 to 100.0	0.0	0.1	%	Setpoint direction; split range	Start-of-scale
SPrE	0.0 to 100.0	100.0	0.1	%		Full-scale
tS	AUto, 0 to 40	0	1	s	Setpoint ramp	
SFct	Lin 1:25 1:50 FrEE	Lin	–	–	Setpoint function	Linear Equal percentage 1:25 Equal percentage 1:50 Freely adjustable[1])
SL 0 SL 1 SL 2 SL 3 SL 4 SL 5 SL 6 SL 7 SL 8 SL 9 SL 10	0.0 to 100.0	0.0 28.5 50.0 62.6 71.5 78.5 84.1 88.9 93.1 96.7 100	0.1	%	Setpoint turn. points 0% for freely adjustable 10% setpoint function 20% 30% 40% 50% 60% 70% 80% 90% 100%	Turning points appear only with SFct = FrEE
dEbA	AUto, 0.1 to 10.0	AUto	0.1	%	Controller dead zone	
Ydir	riSE, FALL	riSE	–	–	Manipulated variable direction of action	
YnrM	MPoS, FLoW	MPoS	–	–	Manipulated variable scaling of mech. travel, flow	
YA	0.0 to 100.0	0.0	0.1	%	Manipulated variable limit	Start-of-scale
YE	0.0 to 100.0	100.0	0.1	%		Full-scale
YCLS	YES, no	no	–	–	Manipulated variable sealing	
AFct	oFF Mi : MA Mi : Mi MA : MA	oFF	– – – –	– – – –	Alarms; function:	Without A1 min, A2 max A1 min, A2 min A1 max, A2 max
A1	0.0 to 100.0	10.0	0.1	%	Alarm 1; response threshold	
A2	0.0 to 100.0	90.0	0.1	%	Alarm 2; response threshold	
↯Fct	↯ ↯.H.C	↯	–	–	Alarm output function	↯ ↯+H+C
PrSt	no/oCAY, Strt	no	–	–	Preset (factory setting)	

[1]) The inverse function 1:25 is stored in the factory setting of the setpoint function (SFct = FrEE).

Technical data

Technical data

General data	
Mounting position	Any
Travel range	10 to 120 mm
Angle of rotation	0 to 90° (0 to 60°)
Weight	
• Basic device	Appr. 1.3 kg
• Option module	Appr. 0.4 kg
• Mounting parts	Appr. 1.3 kg
Dimensions	See Fig. 5/23
Installation	
• On linear actuators	Using mounting kit on actuators according to NAMUR with ledge, columns or plane surface
• On part-turn actuators	Using mounting kit on actuators with fixing platform to VDI/VDE 3845 and DIN 3337: the required mounting plate must be provided on the actuator side and must adhere to the following: • Central drill hole for centering flange on positioner, 35 mm diameter • 4 drill holes 6.5 mm, diameter of pitch circle 50 mm • Material thickness max. 6 mm • Distance between shaft end and positioner fixing platform 25 mm Shaft with nut and internal thread M6
Electric connection	Screw terminals
• Conductor cross-section	1.5 mm x 1.5 mm AWG14
• Cable bushing	M20
Pneumatic connections	Female thread $G^1/_8$ DIN 45 141
Controller	
Five-point switch	Self-adjusting
Dead zone • dEBA = Auto • dEBA = 0.1 to 10 %	Self-adjusting or fixed setting
Controllable response time	≥ 2.5 s

	Basic device without explosion protection	Basic device with explosion protection
Explosion protection to EN 50014 and EN 50020	–	EEx ib IIC T4, T5, T6
Permissible ambient temperature for operation	-20 to +80 °C	T4: -20 to +80 °C T5: -20 to +65 °C T6: -20 to +50 °C
Climatic class to IEC 721		
• Operation (for EEx ib, see permitted ambient temperature for operation)	Without purging air 3k3, but -20 to +80 °C With purging air 3k4, but -20 to +80 °C During commissioning, the valves must be purged with a dry medium (air) for a suitable period at a temperature > 0 °C	
• Storage	1k5, but -40 to +80 °C	
• Transport	2k4, but -40 to +80 °C	

Protection according to EN 60 529	IP 54 (basic device) IP 65 with exhaust air adapter or outlet air adapter 6DR3004-8C
Material	
• Casing	Glass-fiber reinforced polyester
• Air diffuser	Al Mg Si, anodized
Resistance to vibration to IEC 65 B Sec. 133 (draft)	6 g; up to 300 Hz (measured on ARCA drive series 812)

Input

	Basic device without Ex protection	Basic device with Ex protection
Two-wire system		
• Rated signal range	I = 4 to 20 mA	
• Current to maintain power supply	$I \geq$ 3.6 mA	
• Load voltage	U_B = 11 V	
• Static destruction limit	± 40 mA	
• Internal capacitance	–	Negligible
• Internal inductance	–	Negligible
• Connection to intrinsically-safe voltage sources with	–	$U_0 \leq$ 30 V $I_K \leq$ 100 mA $P \leq$ 1 W
Three-wire and four-wire systems		
• Range	U_H=18 to 35 V	U_H=18 to 30 V
• Current consumption	$I_H=(U_H\text{-}10\ V)/(1.2\ k\Omega+\Sigma R_L)\geq 4$ mA U_H in V; ΣR_L in kΩ; sum of all (line) resistances in the electric circuit	
• Static destruction limit	± 35 mA	–
• Internal capacitance	–	Negligible
• Internal inductance	–	Negligible
• Connection to intrinsically-safe voltage sources with	–	$U_0 \leq$ 30 V $I_K \leq$ 100 mA $P \leq$ 1 W
Current input		
• Rated signal range	I_W=0 to 20 mA or 4 to 20 mA	
• Load	50 Ω ± 2 %	
• Static destruction limit	± 40 mA	
• Internal capacitance	–	Negligible
• Internal inductance	–	Negligible
• Connection to intrinsically-safe voltage sources with	–	$U_0 \leq$ 30 V $I_K \leq$ 100 mA $P \leq$ 1 W
Electrical isolation	Between U_H and I_W	Between U_H and I_W (2 intrinsically-safe electric circuits)
• Test voltage	500 V, 50 Hz, 1 min	
A/D converter		
• Scanning time	12.5 ms	
• Resolution	≤ 0.05 % of input signal range	
• Transmission error	≤ 0.2 % of input signal range	
• Temperature influence	≤ 0.1 % of input signal range/10K	

Technical data (continued)

Pneumatic data	
Supply	Instrument air, free of oil, water and dust or purified natural gas
Inlet air pressure	1.4 to 6 bar
Solids	< 30 µm (particle size)
Dew point	20 K below the lowest ambient temperature
Unrestricted flow	
• In the inlet air valve	5.5 Nm^3/h with a pressure drop from 6 to 5 bar
• In the outlet air valve	5 Nm^3/h with a pressure drop from 1 to 0 bar
Leakage in valve unit	< $6 \cdot 10^{-4}$ Nm^3/h
Throttle ratio	Adjustable up to ∞ : 1
Response time	2.5 to 40 s
Power consumption in stable state	
• Single-action	< $3.6 \cdot 10^{-2}$ Nm^3/h
• Double-action	< $6 \cdot 10^{-2}$ Nm^3/h

Option module

	Module without explosion protection	Module with explosion protection
Direct current output for position feedback	Two-wire connection	
Rated signal range	I_y = 4 to 20 mA, short-circuit proof	
Operating range	3.6 to 21.6 mA	
Power supply	U_H=12 to 35 V	U_H=12 to 30 V
External load	R_B (kΩ) ≤ (U_H - 12 V)/I_y I_y in mA; U_H in V	
Transmission error	≤ 0.3 % of the output signal	
Temperature influence	≤ 0.1 % of the output signal/10K	
Resolution	≤ 0.05 % of the output signal	
Residual ripple	≤ 1 % of the output signal	
Internal capacitance	–	C_i ≤ 6 nF
Internal inductance	–	L_i ≤ 1 mH
Connection to intrinsically-safe voltage sources with	–	U_0 ≤ 30 V I_K ≤ 100 mA P ≤ 1 W

	Module without explosion protection	Module with explosion protection
Binary outputs A1, A2 and ↳		
Connections "+24 V" and "-"		
Signal status "High" (not activated)	Conductive: R = 1 kΩ –1 to + 3 %	R = 2.43 kΩ –1 to + 2 %
Signal status "Low" (activated)	Non-conduct. I_R < 60 µA	I_R < 60 µA
Auxiliary voltage	U_H ≤ 35 V	U_H ≤ 30 V
Static destruction limit	± 35 mA	-
Internal capacitance	–	Negligible
Internal inductance	–	Negligible
Connection to intrinsically-safe voltage sources with	–	U_0 ≤ 30 V
Connections "5K" and "+24 V" Auxiliary resistance for reversal of the direction of action	R = 5.11 kΩ ± 1 %, 0.25 W	-
Connections "+" and "–" for switching amplifier to DIN 19 234		
Signal status "High" (not activated)	–	I ≥ 2.1 mA
Signal status "Low" (not activated)	–	I ≥ 1.2 mA; operating points with reference to supply according to DIN 19 234 with U_H = 8.2 V; R_i = 1 kΩ
Internal capacitance	–	Negligible
Internal inductance	–	Negligible
Connection to intrinsically-safe switching amplifier to DIN 19 234 with	–	U_0 ≤ 30 V
Electrical isolation	Between option module and basic device and between the 4 outputs	Each of the 4 outputs is in an intrinsically-safe electric circuit; the basic device forms an intrinsically-safe electric circuit
Test voltage	500 V, 50 Hz, 1 min	
Explosion protection	–	As basic device, only together with this device
Ambient temperature	As basic device	

SIPART PS2 electropneumatic positioners
for operation with natural gas as pneumatic supply

Ordering data

Ordering data	Order No.	
	For a pneumatic	
	linear actuator	part-turn actuator
SIPART PS electropneumatic positioner		
Single-action		
• Without explosion protection	**6DR3100-1N**[1])	**6DR3101-1N**[1])
• With explosion protection	**6DR3300-1E**[1])	**6DR3301-1E**[1])
Double-action		
• Without explosion protection	**6DR3100-2N**[1])	**6DR3101-2N**[1])
• With explosion protection	**6DR3300-2E**[1])	**6DR3301-2E**[1])
Accessories		
Option module		
Functions: One position transmitter, two limit monitors one fault indication		
• Without explosion protection	**6DR3104-8N**	
• With explosion protection	**6DR3304-8E**	
HART module		
For retrofitting of HART communication	**C73451-A330-L8**	
Mounting kit		
Mounting of positioner on:		
• Linear actuator	**6DR3004-8V**	
• Part-turn actuator	**6DR3004-8D**	
Exhaust air adapter set		
Accessories and muffler IP 65	**6DR3004-8C**	
Pressure gauge (1 off)		
Display range		
• 0 to 600 kPa (0 to 6 bar)	**6DR3004-8A**	
• 0 to 1000 kPa (0 to 10 bar)	**6DR3004-8B**	
Documentation		
Operation Instructions (German/English/French/Spanish/Italian) for		
• 6DR3000- (for linear actuators)	**C73000-B7464-C136**	
• 6DR3001- (for part-turn actuators)	**C73000-B7464-C138**	
Assembly and Installation Instructions (German/English) for		
• 6DR3000- (for linear actuators)	**C73000-M7474-C33**	
• 6DR3001- (for part-turn actuators)	**C73000-M7474-C32**	
SIPART PS Configuring Instructions - a concise overview (for 6DR3000- and 6DR3001-)		
• German	**C73000-B7400-C139**	
• English	**C73000-B7476-C139**	

Output isolators see page 2/55.

[1]) Device with HART communication: supplement Order No. by "H". Example: 6DR3300-1EH

Scope of delivery for positioner

Scope of delivery includes:

1 SIPART PS positioner as ordered by 6DR330■-■E including fitted assembly for routing away the vented pneumatic supply (natural gas)
1 Assembly and Installation Instructions (German/English) according to device type
1 each SIPART PS Configuring Instructions - a concise overview - in German and English

Scope of delivery for mounting kit 6DR3004-8V (for linear actuators)

1 Mounting bracket
1 Driver pin
1 Guide rail
1 Spacer
2 Lever arms (up to 50 mm / up to 110 mm)
2 U-shaped bolts
Various screws and washers

Scope of delivery for mounting kit 6DR3004-8D (for part-turn actuators)

1 Rear wall adapter
1 Coupling wheel
1 Driver pin
8 Scales
1 Pointer
Various screws and washers

Caution:
The mounting consoles and the screws for mounting onto the part-turn actuator are not included in the scope of delivery and must be provided by the customer (see Technical data).

Available ex-stock

Items marked ■ are available ex-stock.

Training

Refer to Catalog ITC for details of training courses for these devices.