

	TECHNICAL PRODUCT DOCUMENTATION	A781 - DTR
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ELECTROPNEUMATIC POSITIONER **TYPE A781**

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1. APPLICATION

The electropneumatic positioner type A781 is designed for co-operation with single-side pneumatic actuator in automatic control systems of manufacturing processes in chemical, food and power engineering industry, etc. The task of positioner is providing equivalent relationship between the current input signal and shift (rotation angle) of actuator stem.

The electropneumatic positioner type A781 can operate in standard version, that is, input signal increase causes pressure increase fed to the co-operating actuator, or in reverse operation version. The position setter can operate both with actuators in standard version ("closing") and in reverse operation version ("opening").

The electropneumatic positioner (position setter) type A781 is mainly designed for co-operation with membrane actuators of "Z. A. POLNA S.A." - PRZEMYSŁ, and other companies like: MASONEILAN, SAMSON, ARCA REGLER, ARA PNEUMATIC, EBRO ARMATUREN, EL-O-MATIC.

The positioner can operate with actuators made by other producers, after using of adequate coupling elements.

The spark-safety version of electropneumatic positioner type A781 is made in the spark-safety degree

 II 2 G Ex ia IICT6/T5/T4 with certificate KDB 04 ATEX 025X



2. TECHNICAL DESCRIPTION

2.1. Instructions and warnings

Body damage and/or serious material damages might be formed if user doesn't keep of instructions and warnings. Servicing staff have to be instructed and acquaint with whole safety instructions and warnings.

For well and safe positioner's working there has to be assured right transport, storage, assembly, starting and recommendations at 9th section of this documentation.

Main attentions of safety in mentioned technical product documentation were marked as pictograms:

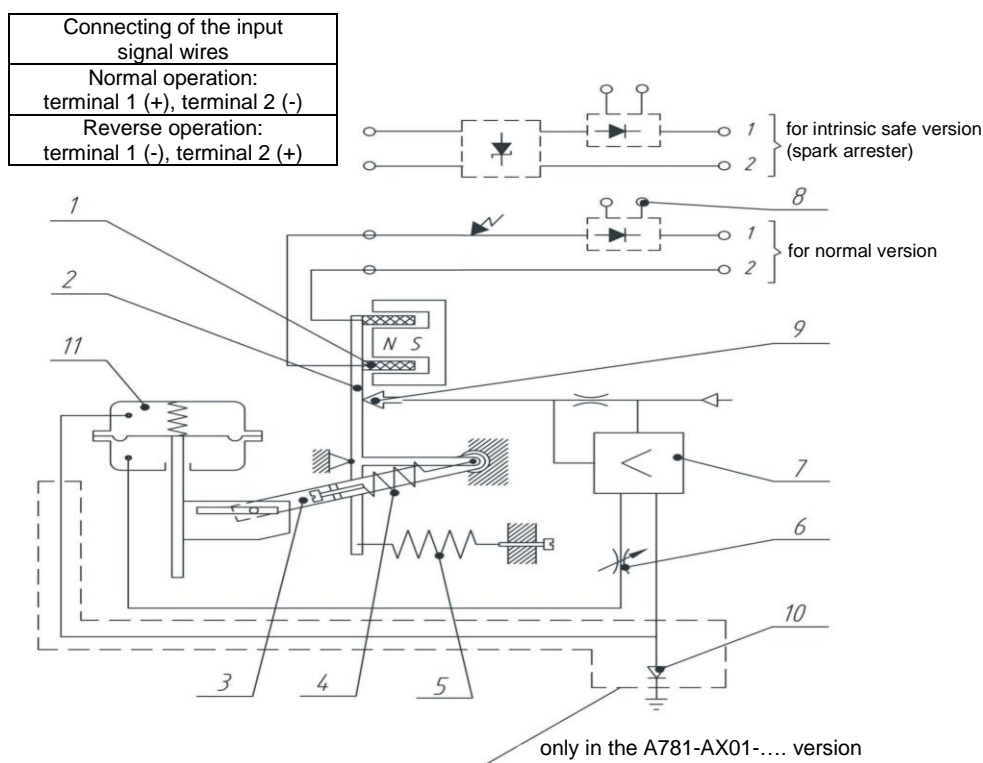
	<p>This sign means: Pointer.</p> <p>„Pointer” indicates on action or any process important for well-working of product. Material damages might be formed if user doesn't keep of instructions.</p>
	<p>This sign means: Warning.</p> <p>„Warning ” indicates on action or any process, which might be danger for staff or makes material damages if those aren't made correctly.</p>

2.2. Working rules

Operation of positioner A781 is based on the principle of force moments balance. The balance lever compares a force moment caused by the input current, flowing through the coil, placed in magnetic field of permanent magnet, with a force moment arising in result of permanent tension force of the range spring on the arm, proportional to the actuator stem movement.

Increase in input current causes a change in force generated by the coil, distorts the balance lever and covering of the control cascade nozzle. A resulting change in cascade pressure, amplified by the pneumatic amplifier of power and pressure causes an increase in control pressure, acting on the actuator diaphragm and changing the actuator stem position.

The stem movement lasts until the moment when the increased arm of range spring operation causes an increase of the feedback moment and balances the action of input moment. Then, a new state of equilibrium is set. The idea diagram is shown in drawing no. 1.



Drawing no. 1. Functional diagram of position setting unit type A781

- | | |
|---------------------------------------|---|
| 1 - Coil | 7 - Pneumatic amplifier |
| 2 - Balance lever | 8 - Checking jacks for input signal measurement |
| 3 - Setting lever | 9 - Nozzle |
| 4 - Range adjustment spring | 10 - Non-return deaerating valve |
| 5 - Zero adjustment spring | 11 - Co-operating actuator |
| 6 - Galnd "ATTENUATION" („TŁUMIENIE") | |

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2.3. Housing

The positioner type A781 consists of the following assemblies: force balance, pneumatic amplifier, electric connector assembly, tub (tank), cover, pneumatic connector unit and coupling unit.

The force balance consists of the following:

- a) body wherein the permanent magnet and immovable elements of such units as: zeroing springs, nozzle-aperture (diaphragm) unit and bearing suspension unit are attached; the force balance assembly is screwed to the tub bottom
- b) lever - with spring suspensions arrayed on bearings, wherein one attached the coil moving in the permanent magnet gap; the lever has got zeroing screw suspensions, travel range adjustment spring suspension and aperture/diaphragm unit suspension; in spark-safe version of positioner – the lever has got an array of diodes.

Simple or reverse operation, (increase in input signal causes increase or drop of control signal), is realized by adequate selection of coil current flow direction. Electric connectors of input signal are available after removing the casing cover. The electric connectors unit has got a circuit of diodes and control jacks enabling input current measurement, without necessity of wires disconnecting.

Matching of positioner to actuator's travel is realized by replacement of range spring and/or adjusting its tension, as well as by a proper selection of setting lever arm.

Depending on positioner's version, input signal range and travel range (rotation angle) of actuator stem, one should use the following range springs:

Positioner's version	Input signal range [mA]	Travel range (rotation angle) of actuator stem	Range spring denotation
A781-AX00-..., A781-AX02...AX08-..., A781-AX13-... and A781-AX14-....	4...20; 0...20	10...50 mm	1
		50...100 mm	2
	4...12; 12...20; 0...10; 10...20	10...50 mm	2
		50...100 mm	3
A781-AX09-.... and A781-AX10-...	4...20; 0...20	60°	1
	4...12; 12...20; 0...10; 10...20	60°	2
A781-AX01-.....	4...20; 0...20	20 mm	1
		38 mm; 50 mm	2
	4...12; 12...20; 0...10; 10...20	20 mm	2
		38 mm; 50 mm	3
A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-....	4...20; 0...20 4...12; 12...20; 0...10; 10...20	90°	3

Positioners in version A781-AX00-...AX10-...and A781-AX13-... AX14-... are delivered with mounted spring denoted "1". Other versions are delivered with mounted spring denoted "3". Additional springs are supplied in bulk as positioner accessories.

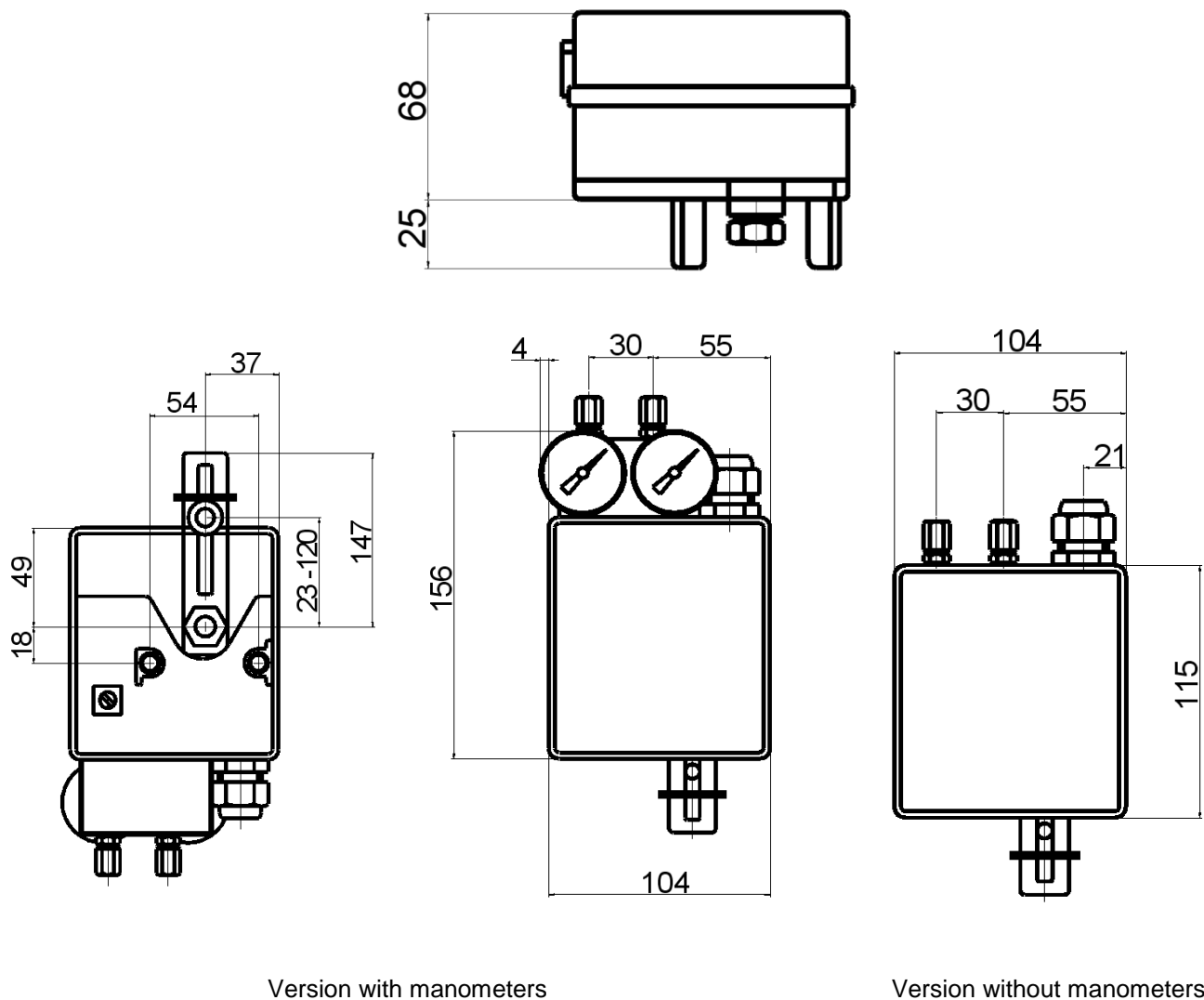
To the positioner – acc. to client's request – are delivered adequate parts for coupling the actuator stem with the positioner setting lever and parts necessary for mounting of positioner on the actuator.

Positioners, used for direct mounting on the body of actuators type POLNA P3/R3, have got on their casing a connecting cube designed for mounting to the actuator body with two screws. This cube has got ducts leading the control signal to the actuator (without necessity of external connections by means of conduits) and ducts feeding air to spring chamber from the pneumatic amplifier deaeration unit. Leading of deaeration outside the positioner-actuator unit is done from the cube through a check (non-return) valve.

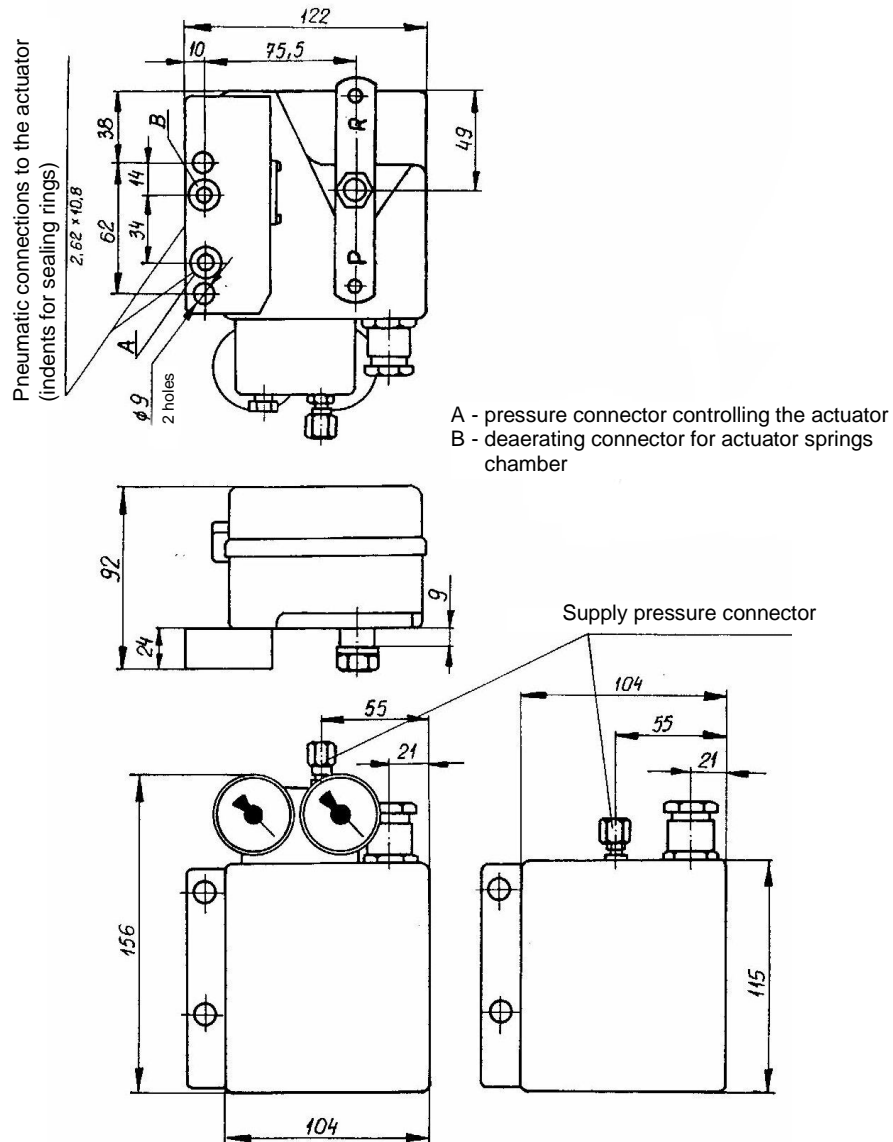
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Owing to such solution, clean air from the positioner deaeration unit protects the actuator springs against corrosive action of surrounding atmosphere.

2.4. Dimensions of the positioners and types of performances

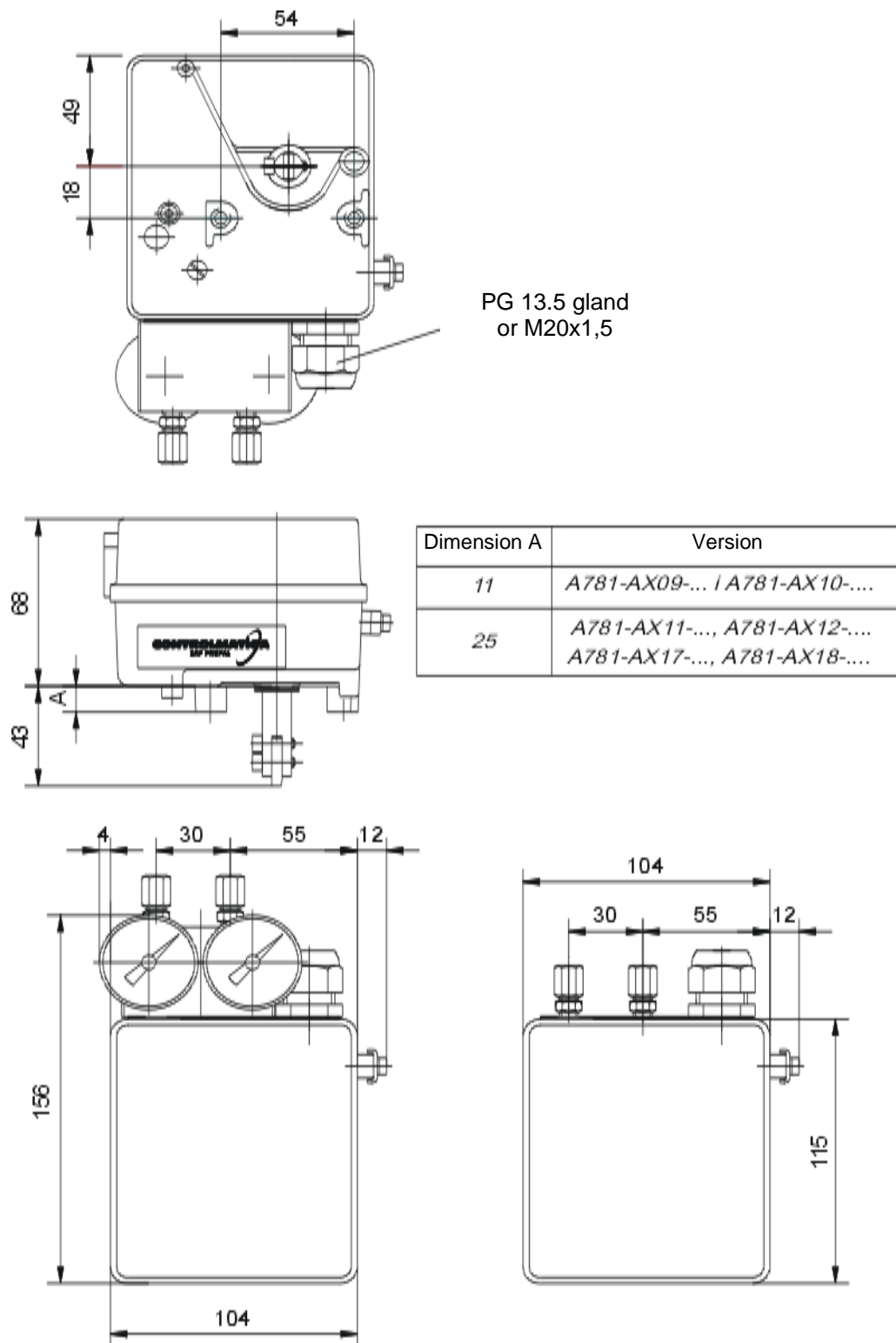


Drawing no. 2 Dimensioned drawing of positioner types: A781 - AX00 -..., A781 - AX02...AX08 -..., A781-AX13-..., A781-AX14-....



a) Version with manometers of dia. 40mm b) Version without manometers


Drawing no. 3 Dimensioned drawing of positioner type A781 - AX01 -...



a) Version with manometers of dia. 40mm b) Version without manometers

Drawing no. 4 Dimensioned drawing of positioner types: A781 - AX09 -..., A781-AX10-..., A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-....

Ordering method of A781:

Electro-pneumatic positioner		A781	-	A	X	X	X	-	X	X	,	X	X	,	X	X	X	,	X	X	,	X	X
Version																							
Standard																							
Spark-safety with certificate KDB 04 ATEX 025X ( II 2 G Ex ia II CT6/T5/T4)																							
Elements made from galvanized carbon steel enabling to assembly on actuator																							
membrane type 37 or 38 from POLNA S.A.																							
membrane type P3 or R3 from POLNA S.A.																							
membrane type P or R from POLNA S.A.																							
membrane type P1 or R1 from POLNA S.A.																							
Membrane rotary type BR99-R from POLNA S.A. covered by pulverize lacquer in actuator's colour (RAL5010)																							
Membrane rotary type BR99-P from POLNA S.A. covered by pulverize lacquer in actuator's colour (RAL5010)																							
rotary single-sided, consistent with EN ISO 5211, DIN 3337, VDI/VDE 38450 Namur standard (the actuator mandrel rotates left, i.e. anticlockwise), made from galvanized carbon steel, e.g.: rotary actuators from ARA PNEUMATIC series AT...S, EBRO ARMATUREN type EB-EW, EL-O-MATIC series PE and ES																							
rotary single-sided, consistent with EN ISO 5211, DIN 3337, VDI/VDE 38450 Namur standard (the actuator mandrel rotates right, i.e. clockwise), made from galvanized carbon steel, e.g.: rotary actuators from ARA PNEUMATIC series AT...S, EBRO ARMATUREN type EB-EW, EL-O-MATIC series PE and ES																							
with control valve with rib, acc. to PN-EN-60534-6-1:2001, e.g. actuator with valve from Samson or Arca Regler																							
Elements made from stainless steel enabling to assembly on actuator																							
membrane type 37 or 38 from POLNA S.A.																							
membrane type P or R from POLNA S.A.																							
membrane type P1 or R1 from POLNA S.A.																							
rotary single-sided, consistent with EN ISO 5211, DIN 3337, VDI/VDE 38450 Namur standard (the actuator mandrel rotates left, i.e. anticlockwise), made from stainless steel, e.g.: rotary actuators from ARA PNEUMATIC series AT...S, EBRO ARMATUREN type EB-EW, EL-O-MATIC series PE and ES																							
with control valve with rib, acc. to PN-EN60534-6-1:2001, e.g. actuator with valve from Samson or Arca Regler																							
rotary single-sided, consistent with EN ISO 5211, DIN 3337, VDI/VDE 38450 Namur standard (the actuator mandrel rotates right, i.e. clockwise), made from stainless steel, e.g.: rotary actuators from ARA PNEUMATIC series AT...S, EBRO ARMATUREN type EB-EW, EL-O-MATIC series PE and ES																							
Other elements to assembly																							
actuator acc. to customer's needs																							
no fixing elements																							
Power supply and dynamics																							
0,14...0,25 MPa, the positioners in standard version																							
0,25...0,60 MPa, the positioners in standard version																							
0,14...0,25 MPa, the positioners with higher dynamics																							
0,25...0,60 MPa, the positioners with higher dynamics																							

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Ordering method of A781 – continuation

Electro-pneumatic positioner										A781	-	A	X	X	X	-	X	X	,	X	X	,	X	X	,	X	X		
Pneumatic connectors																													
Hole STB 1/8"										L	0																		
copper pipes connector ø 6mm										L	1																		
copper pipes connector ø 8mm										L	2																		
polyethylene pipes connector ø 6mm										L	3																		
quick joint connector for polyethylene pipes ř6 mm (operational temp. -20°C...+80°C)										L	4																		
IMPORTANT: Not used in spark-safety version																													
Equipment – manometers																													
without manometers										M	0	0																	
Manometers Ø40mm, version: standard																													
supply pressure manometer										M	0	1																	
output signal manometer										M	0	2																	
supply pressure and output signal manometer										M	0	3																	
Manometers Ø50mm, version: stainless steel																													
supply pressure manometer										M	0	4																	
output signal manometer										M	0	5																	
supply pressure and output signal manometer										M	0	6																	
Manometers Ø50mm, version: housing – stainless steel, other elements: standard																													
supply pressure manometer										M	0	7																	
output signal manometer										M	0	8																	
supply pressure and output signal manometer										M	0	9																	
Electric cable insert for spark-safety versions																													
** standard cable PG 13.5 or M20x1.5 (metal from galvanized carbon steel, cable diameter 6...10 mm)										D	1																		
polyvinyl cable M20x1.5, cable diameter 5...8 mm (blue colour)										D	4																		
polyvinyl cable M20x1.5, cable diameter 7...8 mm (blue colour)										D	5																		
polyvinyl cable M20x1.5, cable diameter 9...13 mm (blue colour)										D	6																		
metal cable M20x1.5 (bass covered nickel coat) cable diameter 5...8 mm										D	7																		
metal cable M20x1.5 (bass covered nickel coat) cable diameter 7...10,5 mm										D	8																		
metal cable M20x1.5 (bass covered nickel coat) cable diameter 9...13 mm										D	9																		
Electric cable key for standard versions																													
** standard cable PG 13.5 or M20x1.5 (metal from galvanized carbon steel, cable diameter 6...10 mm)										D	1																		
polyamide cable PG 13.5, cable diameter 8...13 mm or M20x1.5, cable diameter 7...10.5 mm (grey colour)										D	2																		
Sinusoidal vibrations resistance																													
Standard (acc. to PN-EN61514:2002)																										W	0		
increased																										W	1		

** not in connection with elements, allowing for installation on stainless steel actuator

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ORDER EXAMPLE:

Electropneumatic positioner A781 in standard version, with fixing elements for actuator type 37 from POLNA, made from galvanized carbon steel, for pressure range 0.14...0.25 MPa, pneumatic amplifier in standard version, with connector for copper pipes $\varnothing 6$ mm, with supply pressure and output signal manometer (manometer diameter 40 mm, standard material), universal cable PG13.5, with standard sinusoidal vibrations resistance has a designation:

Electropneumatic positioner type typ A781 - A100 - 01, L1, M03, D1, W0

3. TECHNICAL DATA

Input signal	
- full:	4...20mA, 0...20mA
- half:	4...12 mA, 12...20 mA, 0...10 mA, 10... 20 mA
Input resistance	$\leq 250 \Omega$ (control terminals shorted)
Output signal (at overload >4%)	0...100% of supply pressure
Supply pressure:	0,14...0,25 MPa or 0,25...0,6 MPa




It's not allow using higher than permissible value of control pressure the cooperating actuator supply pressure

Actuator mandrel stroke or rotation:	10...102 mm (1/2"...4") (if the versions table does not show another values), 60° (acc. to actuator type BR99), 90°
Working characteristic:	linear
Sensitivity threshold:	0,05% for supply pressure 0,14...0,25 MPa 0,12% for supply pressure 0,25...0,60 MPa
Nonlinearity: (except the characteristic distortion in the actuator mandrel movement restriction point)	max. 1 %
Hysteresis:	max. 0,5% for supply pressure 0,14...0,25 MPa max. 1% for supply pressure 0,25...0,6 MPa
Proportionality range:	
- in relation with control signal with range width 0,08 MPa	max. 1 % for supply pressure 0,14...0,25 MPa max. 1,2% for supply pressure 0,25...0,6 MPa
- in relation with control signal with range width 0,16 MPa	max. 2 % for supply pressure 0,14...0,25 MPa max. 2,5% for supply pressure 0,25...0,6 MPa
Output air flux:	
- at $p_z=0,14$ MPa	$\geq 7,5$ kg/h
- at $p_z=0,25$ MPa	≥ 15 kg/h
- at $p_z=0,6$ MPa	≥ 26 kg/h

Air flux at steady state
(own air consumption):

Control signal [MPa]	Supply pressure [MPa]			
	0,14	0,25	0,4	0,6
0,02	0,310 kg/h	0,380 kg/h	-----	-----
0,1	0,380 kg/h	0,510 kg/h	0,580 kg/h	0,710 kg/h
0,2	-----	0,610 kg/h	0,710 kg/h	0,800 kg/h

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Ambient temperature:	-40...+80°C
Relative humidity:	< 100%
Additional errors:	
- from supply pressure changes 0,14...0,25 MPa,	0,5%/10%
- from supply pressure changes 0,25...0,6 MPa,	1%/10%
- from ambient temperature changes	0,4%/10°C
- from vibrations in range: 10...60 Hz, amplitude< 0,35mm, 60...500 Hz, acceleration5g	1%
- from the influence of constant and alternate magnetic field at strength 100A/m, 50Hz (acc. to PN-EN 6100- 4-8:1998)	max. 0,5 of allowable nonlinearity
- from the electromagnetic field radiation perturbations at the radio frequency 10 V/m, in the frequency range from 80MHz to 1GHz (acc. to PN-EN 6100-4-3:2002)	max. 0,5 of allowable nonlinearity
- from the series of quick intermediate states, caused by the voltage of peak value 2KV (acc. to PN-EN 6100-4-4:2002)	max. 0,5 of allowable nonlinearity
- from the surge at 0,5kV (acc. to PN-EN 6100-4-5:2006)	max. 1%
Positioner's operations:	normal or reversed (change by the current direction switch - the current floating by coil)
Spark safety mark:	 II 2 G Ex ia IIC T6/T5/T4
Certificate	KDB 04 ATEX 025X
Use conditions in the danger zone:	

1. Positioner A781 - A2XX - ... may cooperate only with the spark protected circuit with the following parameters:

$$U_j = 28 \text{ V dc}, I_j = 100 \text{ mA}, P_j = 0,7 \text{ W}$$

2. The connection between positioner and cooperating devices must be made from the separate wires or cable, which will connect the spark protected circuits only. The L and C parameters of the external circuit should be the same as for the device cooperating with positioner.

3. The allowable ambient temperature, according to the temperature class:

Gases and liquid vapours temperature class	T6	T5	T4
Allowable ambient temperature (T_a)			
• version without manometers	-40 °C...+50°C	-40 °C...+65°C	-40 °C...+80°C
• version with manometers	-25 °C...+50°C	-25 °C...+65°C	-25 °C...+65°C

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Housing protection degree:	IP54 acc. to PN – EN 60529: 2003.
Operational position:	arbitrary
Pneumatic connectors:	acc. to versions table
Electric connectors:	screw terminals for cables with diameter up to 2,5 mm
Mass:	
- A781–AX00-... and AX02...AX14-..., A781-AX17-... and A781-AX18-... without manometers	1,2 kg
- A781-AX00-... and AX02...AX14-..., A781-AX17-... and A781-AX18-... with manometers	1,5 kg
- A781–AX01-... without manometers	1,5 kg
- A781–AX01-... with manometers	1,8 kg

MATERIALS

Housing:	powder coated aluminium alloy, colour RAL5010
Pneumatic connectors:	nickel plated brass or stainless steel
Manometers:	brass, galvanized and lacquered steel or stainless steel
Other external parts:	stainless or galvanized steel

4. WORKING CONDITIONS

The A781 positioner is designed to work in the following conditions:

- a) working medium:
air free from dust, oil, aggressive impurities, particulates larger than 1.5 µm, with the relative humidity allowing for the dew point temperature not lower than 10°C (10oK) from the ambient temperature (acc. to PN-EN 60654-2:1999)
- b) ambient temperature:
-40...+80°C - version without manometers
-25...+65°C - version with manometers
- c) allowable vibrations:
10...60 Hz, amplitude <0,35 mm, 60...5000 Hz, acceleration 5g
(acc. to PN-EN 60654-3:2000; class VH6)
- d) working position - arbitrary

5. TRANSPORT MANUALS

The positioner, together with quality certificate, needle bag with parts using for connection the positioner with actuator and a foil bag containing the hygroscopic medium, is placed in a tight plastic bag and then put into paperboard with absorbing insert, being the unit packaging of the product.

The units in the above mentioned packing are placed for transport in larger packing boxes, protecting the instruments against possible damages and atmospheric effects. The weight of box with products should not be bigger than 50 kg.

Ambient temperature during the transport should not exceed the range of -40°C...+80°C. The instruments in transport packing (boxes) should be protected against direct effects of precipitations.

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6. UNPACKING AND STORING MANUALS

The user after receive the shipment should check the state of transport packing. Then one ought to take the positioners out of single packages, unpack them and not opening the plastic bag, check by inspection if the product was not damaged.

The instruments should be stored in single packages, in closed rooms. Air in the storage room should not contain any additions of aggressive vapours and gases.

7. INSTALLING MANUALS

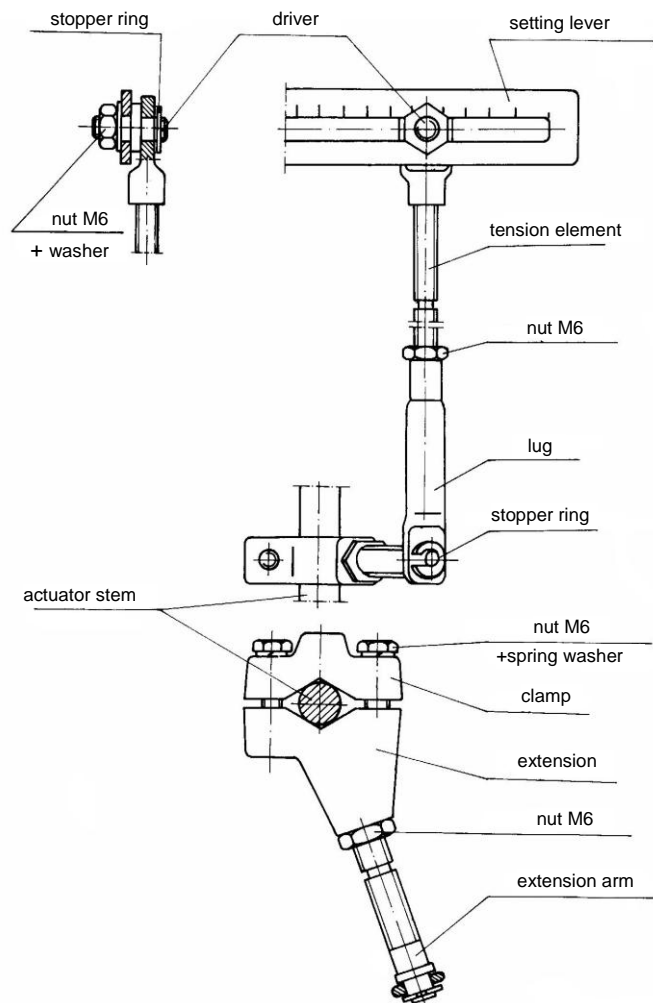
7.1. Assembly the positioners type A781-AX00-... and A781-AX02-... on the actuator

The positioner is attached to the actuator by bracket with two M8 screws. Actuator's stem is coupled with the positioner setting lever by means of parts, included in the accessories, in the way shown in drawing no. 5.

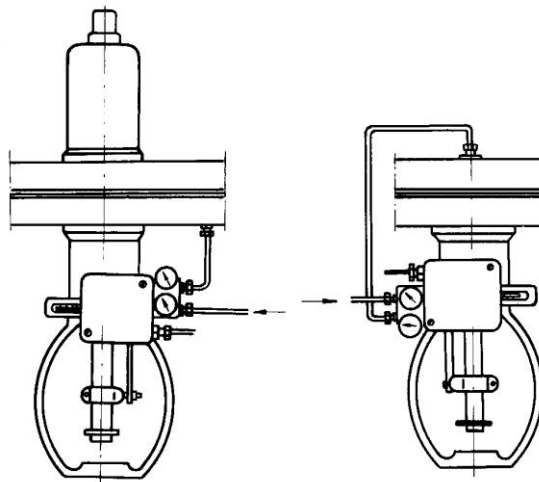
The positioner can be attached both to the actuators of normal operation (closing) and reverse operation (opening). Ways of positioner installing to each of the mentioned actuator types are shown in drawings no. 6 and 7.

Before proceeding to assembly the positioner on actuator, one should keep positioners in foil bags for so long until positioner temperature is equal to temperature of a room wherein they are to be assembled. Assembly of positioner on actuator should be done in the following sequence:

- a) take the positioner out of foil bag
- b) determine the operating position of positioner depending on the kind of co-operating actuators (drawings no. 6 and 7)
- c) depending on the operating position of positioner one should determine the position of manometers
- d) screw the bracket to the positioner (two lugs at distance of 56 mm) with 2 screws M8 included; bracket should be screwed in such a way that its free end should be directed in opposite direction to pneumatic connectors
- e) the positioner, including the bracket, should be slightly attached to actuator by means of two M8 screws
- f) mount the driver on the positioner setting lever at a point corresponding to actuator travel
- g) one should mount on the driver the assembly, consisting of tension element and lug, included in the positioner mounting kit of accessories (see drawing no. 5)
- h) fix extension arm to the actuator stem, and then adjust its length and shift the whole positioner in relation to actuator, thanks to longitudinal recess for fixing screws, so that tension element and lug attached later to extension arm are parallel to actuator stem
- i) cut the tension element properly and adjust the assembly length so that the connector assembly end, with lever set horizontally (at 50% position), will be distant vertically from extension arm by half of actuator travel; after coupling of connector assembly with extension arm, the lever movement - corresponding to actuator stem travel – should be symmetrically arranged in relation to horizontal lever position. Connections of tension element with settling lever and extension arm ought to be protected with stopper rings, while all the screws and nuts are to be tightly screwed in.



Drawing no. 5. Connecting of positioner with actuator stem



Drawing no. 6
Assembly the positioner in case
of cooperation with actuator of reverse
operation (opening)

Drawing no. 7
Assembly the positioner in case
of cooperation with actuator of simple
operation (closing)

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7.2. Assembly the positioner type A781-AX01-... on the actuator

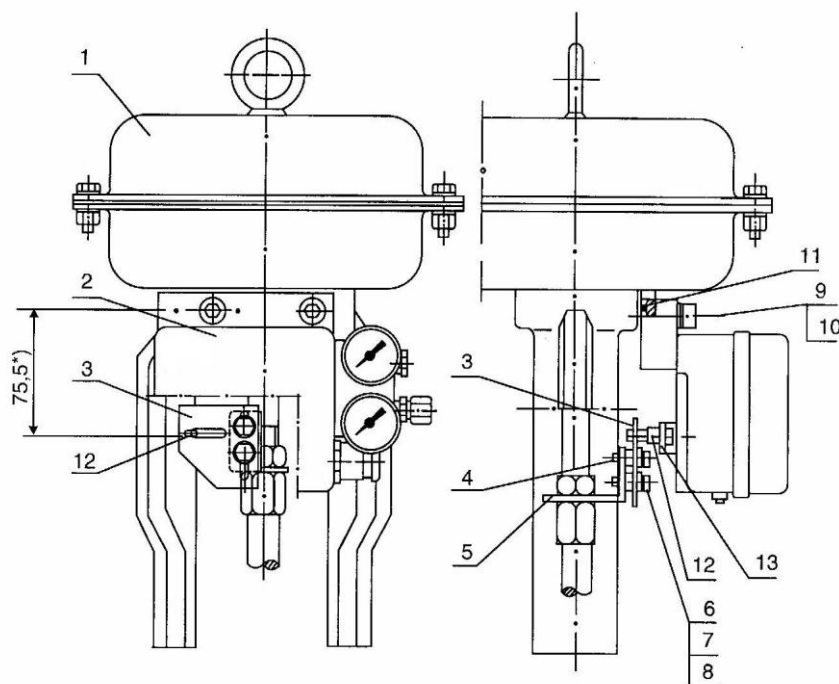
In order to mount the positioner on the actuator yoke (slotted lever) and couple actuator stem with the positioner setting lever, one should use parts, included in the positioner accessories. Mounting way is shown on drawing no. 8.

The positioner can be installed both on the actuator of normal operation (actuator type P3) and reverse operation (actuator type R3). Drawing no. 8 shows positioner assembled on actuator of reverse operation: plate, item 3, is protruded to the left from mounting axis, and driver, item 12, is placed in the lever arm hole, item 13, marked with letter "R". In case of cooperation of positioner with actuator of simple operation, mounting way is different from that presented in fig. 8 only by this detail – driver is mounted on the setting lever arm marked with letter "P", while plate, item 3, is directed to the right so that the driver enters its horizontal hole.

Before proceeding to mounting of positioner unit on actuator, one should keep positioners in foil bags for so long until positioner temperature is equal to temperature of a room wherein they are to be attached.

Assembly the positioner on actuator should be done in the following sequence:

- a) take the positioner out of foil bag
- b) determine the mounting place of driver on setting lever, depending on the kind of co-operating actuator and, if required, remount it
- c) mount on the actuator stem, acc. to drawing no. 8 and remarks, point 7.2, parts – items 3 ... 8. Pay attention to parallel setting of plate, item 3, to actuator yoke
- d) adjust the plate, item 3, so that – in the middle position of actuator stem (with actuator stem travel of 50%) - one can keep the distance from axis of longitudinal hole in plate to axis of holes for mounting the positioner in actuator yoke at 75.5 mm (see drawing no. 8). Screws, item 6, are to be tightly screwed
- e) sealing rings, item 11, are to be put into the positioner connecting cube
- f) one should loosely fix positioner to actuator, by means of two M8 screws
- g) tilt the positioner from actuator yoke, tighten the positioner setting lever properly and enter the driver end in the longitudinal hole in coupling plate, during these operations one should pay attention not to fall the sealing rings, item 11, out of their seats. Screws fixing positioner to actuator are to be tightly screwed.



Drawing no. 8 Assembly the positioner on actuator

- 1 - actuator
- 2 - positioner
- 3 - coupling plate
- 4 - distance washer (4 or 15 mm)
- 5 - bracket
- 6 - screw M6x16 or M6x25
- 7 - round washer 6,5
- 8 - spring washer 6,1
- 9 - socket screw M8x35
- 10 - spring washer
- 11 - sealing ring 2,6x10,8
- 12 - driver
- 13 - positioner setting lever

REMARK:

The parts – items 3 ... 11 – are delivered in bulk as positioner accessories.

Part, item 12 – initially mounted on the positioner setting lever.

Parts, items 4 and 6, are to be chosen according to the needs.

*) - this dimension is obligatory at the middle position of actuator stem (with actuator stem travel of 50%)

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7.3. Assembly the positioners type A781-AX03-... and A781-AX04-... on the actuator


The positioner is assembled to actuator, with bracket, and depending on the actuator column axis spacing, and with special holders tightened with M8 nuts. The actuator stem is coupled with positioner setting lever, by means of parts delivered in accessories, in the way shown in drawings no. 9 and 10. The positioner can be installed both to actuators of normal and reverse operation (see drawings no. 9 and 10).

Before proceeding to mounting of positioner on actuator, one should keep positioners in foil bags for so long until positioner temperature is equal to temperature of a room wherein they are to be assembled.

Assembling of positioner on actuator should be done in the following sequence:


- a) take the positioner out of foil bag
- b) determine the operating work of positioner depending on the kind of co-operating actuator (drawings no. 9 and 10)
- c) depending on the operating work of positioner one should determine the position of manometers
- d) screw the bracket home, drawing no. HP17-7124- to positioner by means of included M8 screws
- e) screw it to the actuator stem:
 - for column axis spacing 110 and 132 mm (drawing no. 9) – clamps, angle bar – screw them with M6 screws. Next, with two M5 screws attach to angle bar, acc. to drawing no. A781-C150-200, another angle bar, acc. to drawing no. HP16-3421-001
 - for column axis spacing 216 mm (drawing no. 10) – travel indicator, screwed with two nuts, delivered with the actuator, angle bar screwed to indicator with M8 screw. Angle bar, acc. to drawing no. HP16-3421-001, is to be screwed to angle bar with two M5 screws
 - screw the angle bar acc. to drawing no. HP16-3421-001

ATTENTION:

	<p>Position of angle bar, acc. to drawing no. A781-C150-200 (column axis spacing of 110 and 132 mm) as well as A781-C152-100 (column axis spacing of 216mm) should be changed by 180° depending on the set actuator travel. Depending on the needs, one can also change position of both angle bars in relation to actuator stem, owing to longitudinal recesses under fixing screws</p>
---	---


- f) mount the driver on the positioner setting lever at a point corresponding to actuator travel
- g) positioner is to be slightly attached, with bracket to actuator, by means of two holders which are to be screwed by M8 nuts

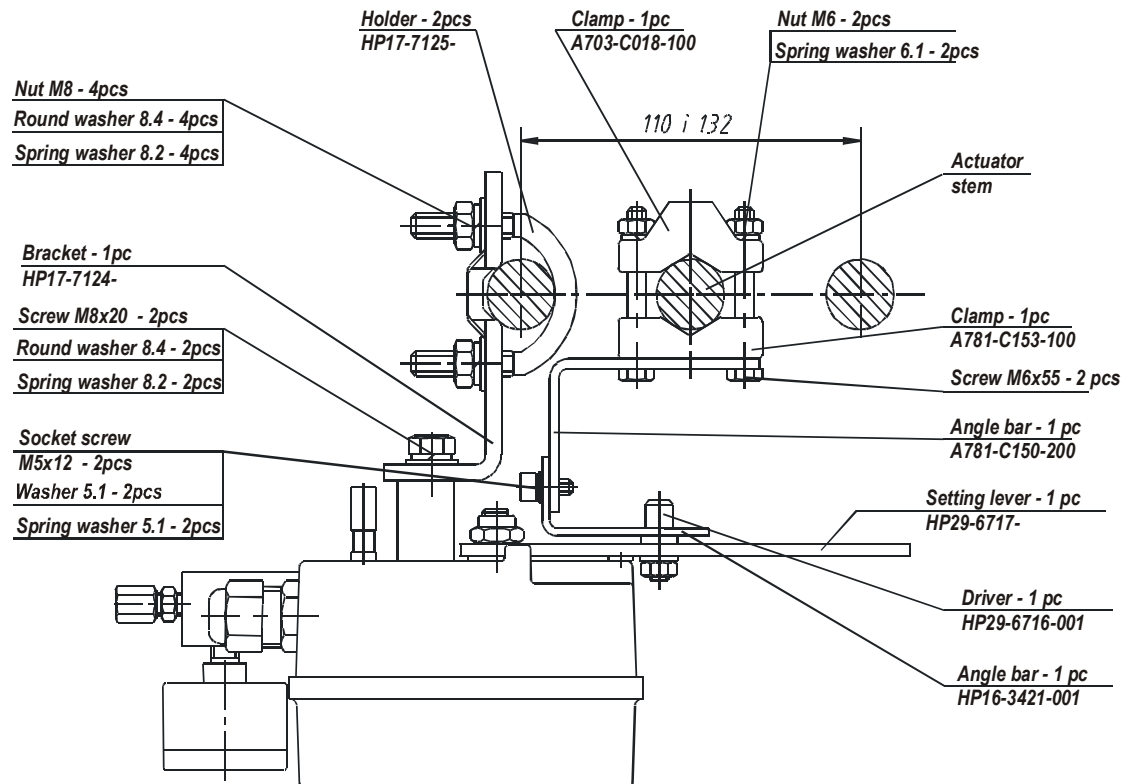
ATTENTION:

	<p>Do not couple the positioner, by means of the driver, with angle bar mounted on actuator stem.</p>
---	--

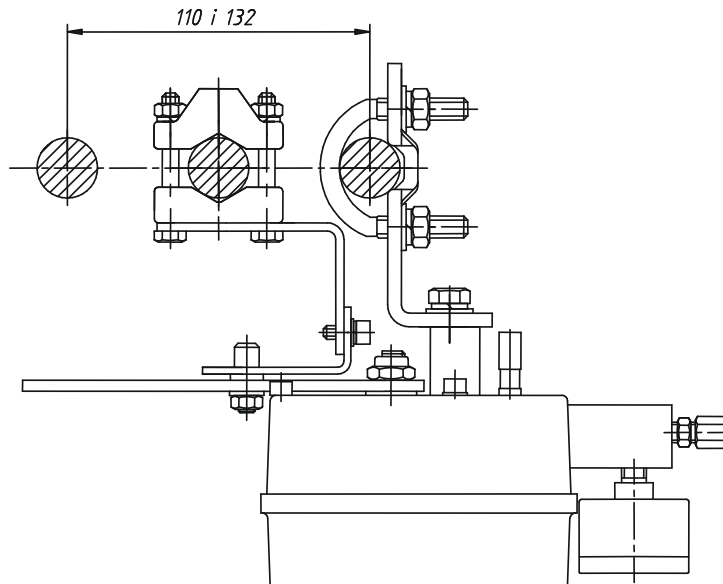
- h) set the actuator stem position in the middle of set actuator travel (50%)
- i) connect the positioner driver with horizontal recess in angle bar, drg. no. HP16-3421-001 so that the positioner setting lever could stay at horizontal position. At this position one should immobilise the positioner on actuator column, screwing tightly four M8 nuts.

ATTENTION:

	<p>After coupling of driver with angle bar, the lever movement - corresponding to full actuator stem travel – should be symmetrically arranged in relation to horizontal lever position</p>
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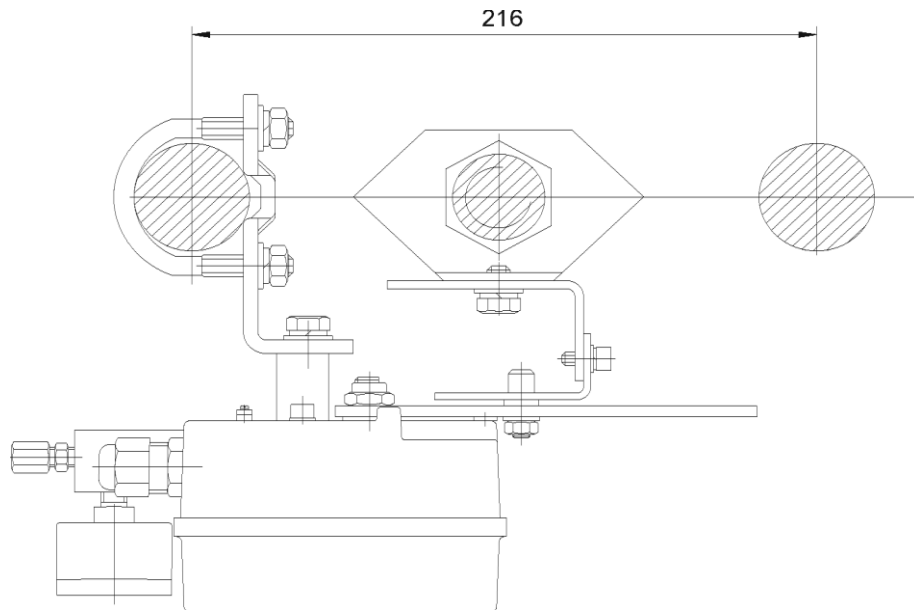


Simple operation actuator (closing)

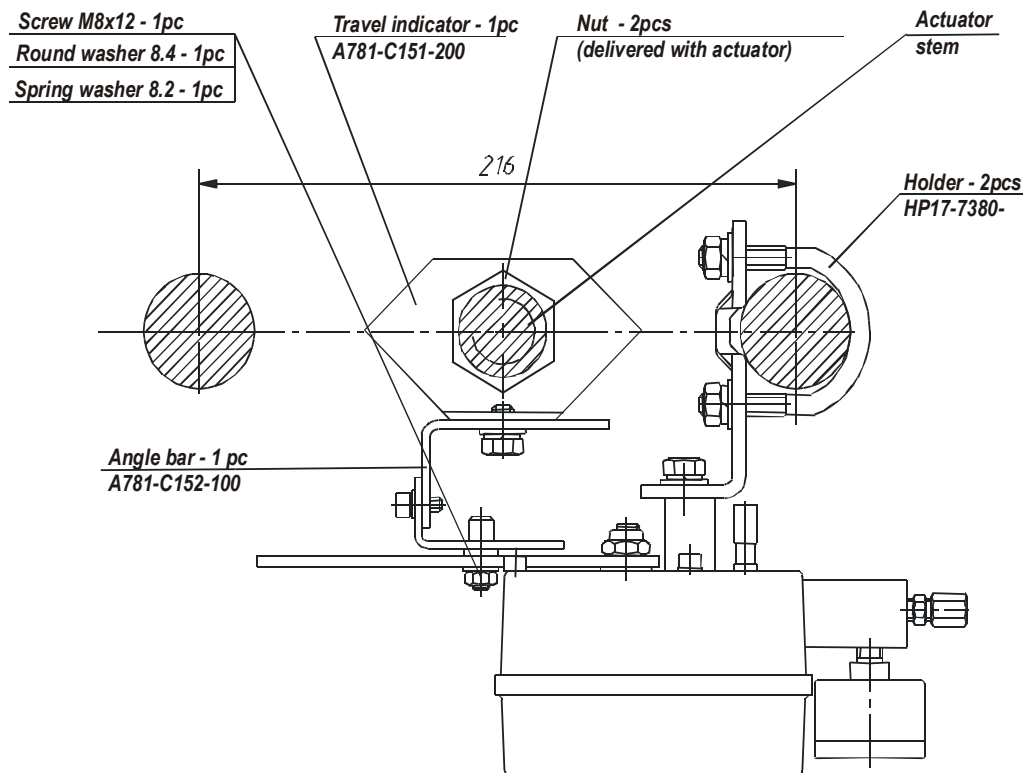


Reverse operation actuator (opening)

Drawing no. 9. Assembly the positioner on actuator, with spacing of 110 and 132 mm



Simple operation actuator (closing)



Reverse operation actuator (opening)

Drawing no. 10 Assembly the positioner on actuator, with spacing of 216 mm

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7.4. Assembly the positioners type A781-AX07-... and A781-AX08-... on the actuator

The positioner is assembled to the actuator by plate and bracket with M8 screws. Actuator stem is coupled with the positioner setting lever by means of parts, included in the accessories, in the way shown in drawings no. 5, 11, 12.


The positioner can be attached both to the actuators of normal operation (actuator type P1) and reverse operation (actuator R1). Drawings no. 11, 12 and 13 show the way of positioner installing to normal operation actuator. In case of cooperation with actuator of reverse operation, position of positioner in relation to actuator is shown in drawing no. 6.

Before proceeding to assembly of positioner unit on actuator, one should keep positioners in foil bags for so long until positioner temperature is equal to temperature of a room wherein they are to be attached.

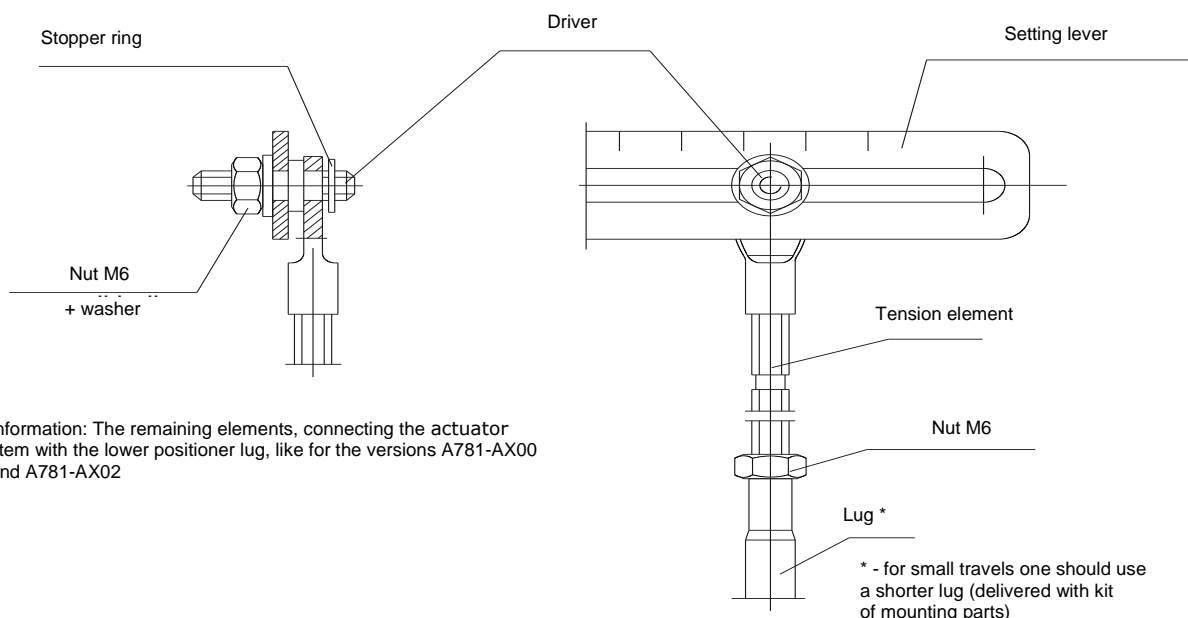
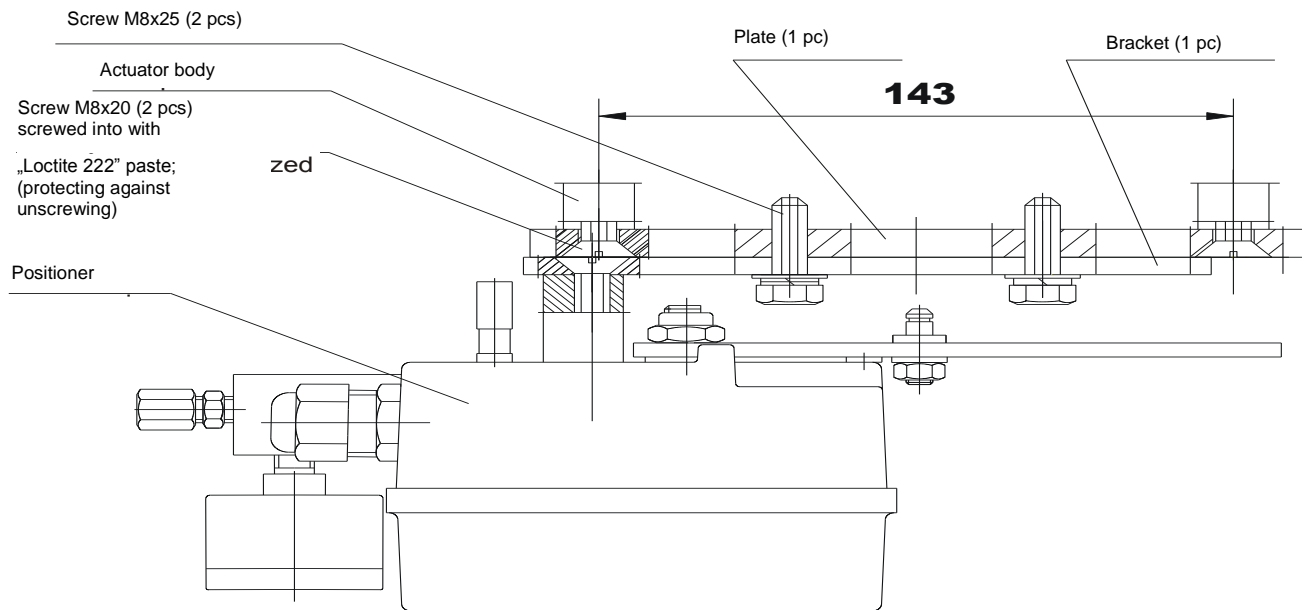
Assembly of positioner on actuator should be done in the following sequence:

- take the positioner out of foil bag
- determine the operating position of positioner depending on the kind of co-operating actuator (drawings no. 6 and 7)
- depending on the operating position of positioner one should determine the position of manometers
- screw the bracket to the positioner (two lugs at distance of 56 mm) with 2 screws M8 included; bracket should be screwed in such a way that its free end should be directed in opposite direction to pneumatic connectors
- screw it home to actuator body, paying attention to the spacing of holes for fixing the plate by two M8 screws (see drawings no. 11 and 12)
- the positioner, including the bracket, should be slightly attached to plate by means of two M8 screws
- mount the driver on the positioner setting lever at a point corresponding to actuator travel
- one should mount on the driver the assembly, consisting of tension element and lug, included in the positioner mounting kit of accessories (see drawings no. 5, 11, 12)

ATTENTION:

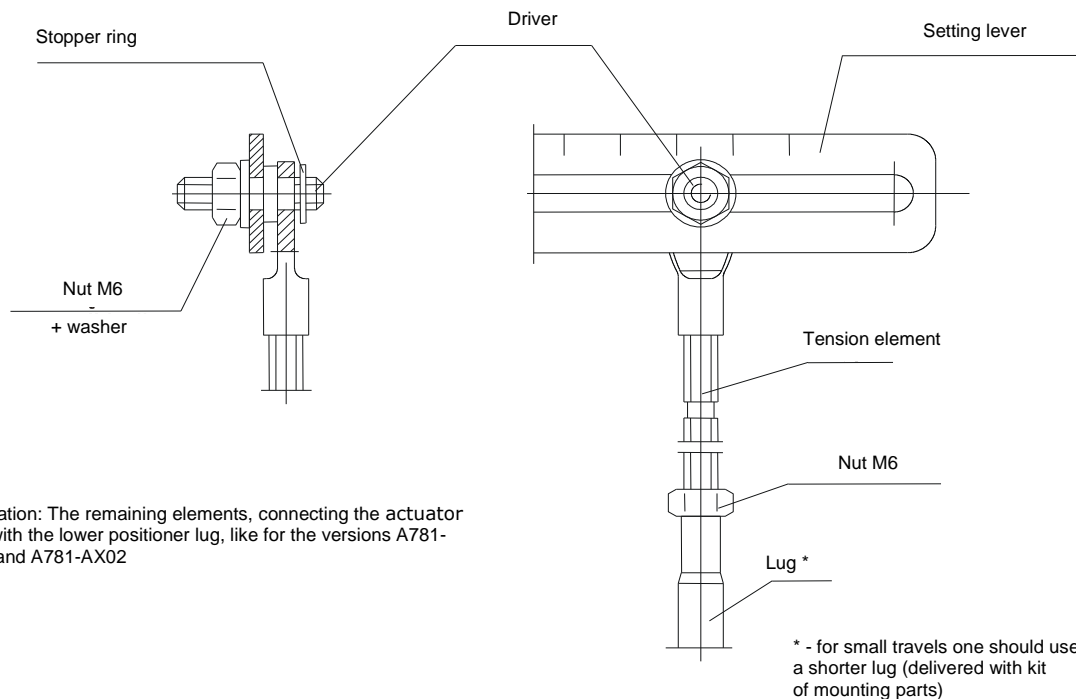
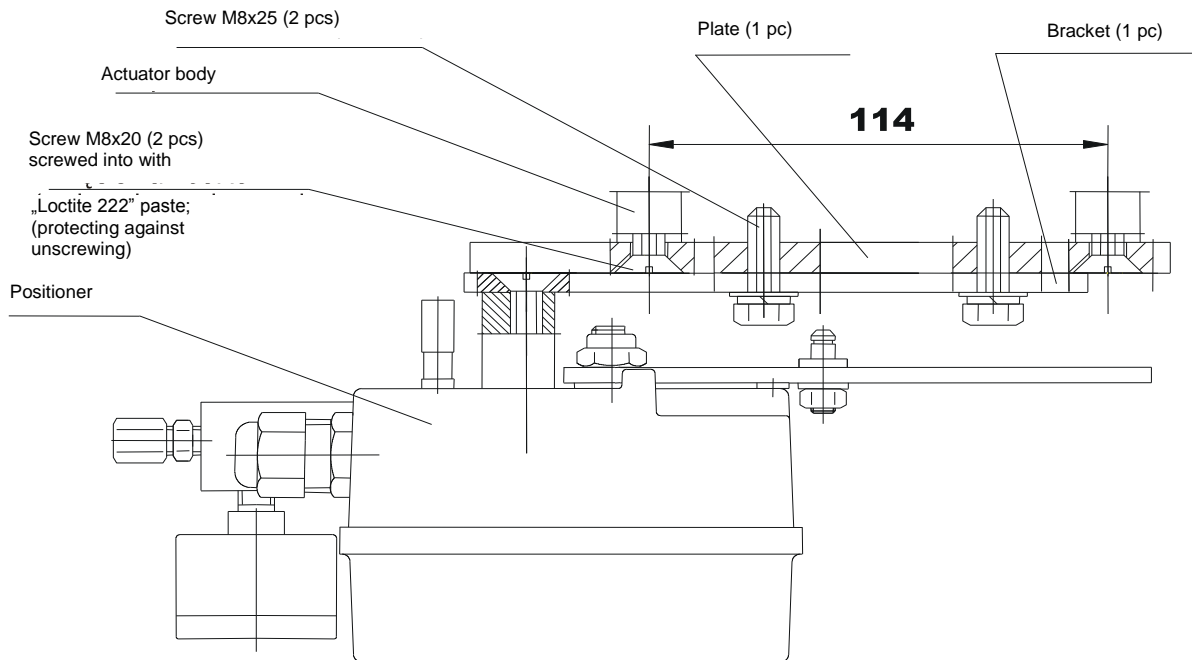
	<p>For small travel values one should use a shorter lug (delivered with kit of mounting parts).</p>
---	--

- fix extension arm to the actuator stem, and then adjust its length and shift the whole positioner in relation to actuator, thanks to longitudinal recess for fixing screws, so that tension element and lug attached later to extension arm are parallel to actuator stem, in two planes mutually perpendicular to each other (see drawing no. 13).
- cut the tension element properly and adjust the assembly length so that the connector assembly end, with lever set horizontally (at 50% position), will be distant vertically from extension arm by half of actuator travel; after coupling of connector assembly with extension arm, the lever movement - corresponding to actuator stem travel – should be symmetrically arranged in relation to horizontal lever position. Connections of tension element with settling lever and extension arm ought to be protected with stopper rings, while all the screws and nuts are to be tightly screwed in.

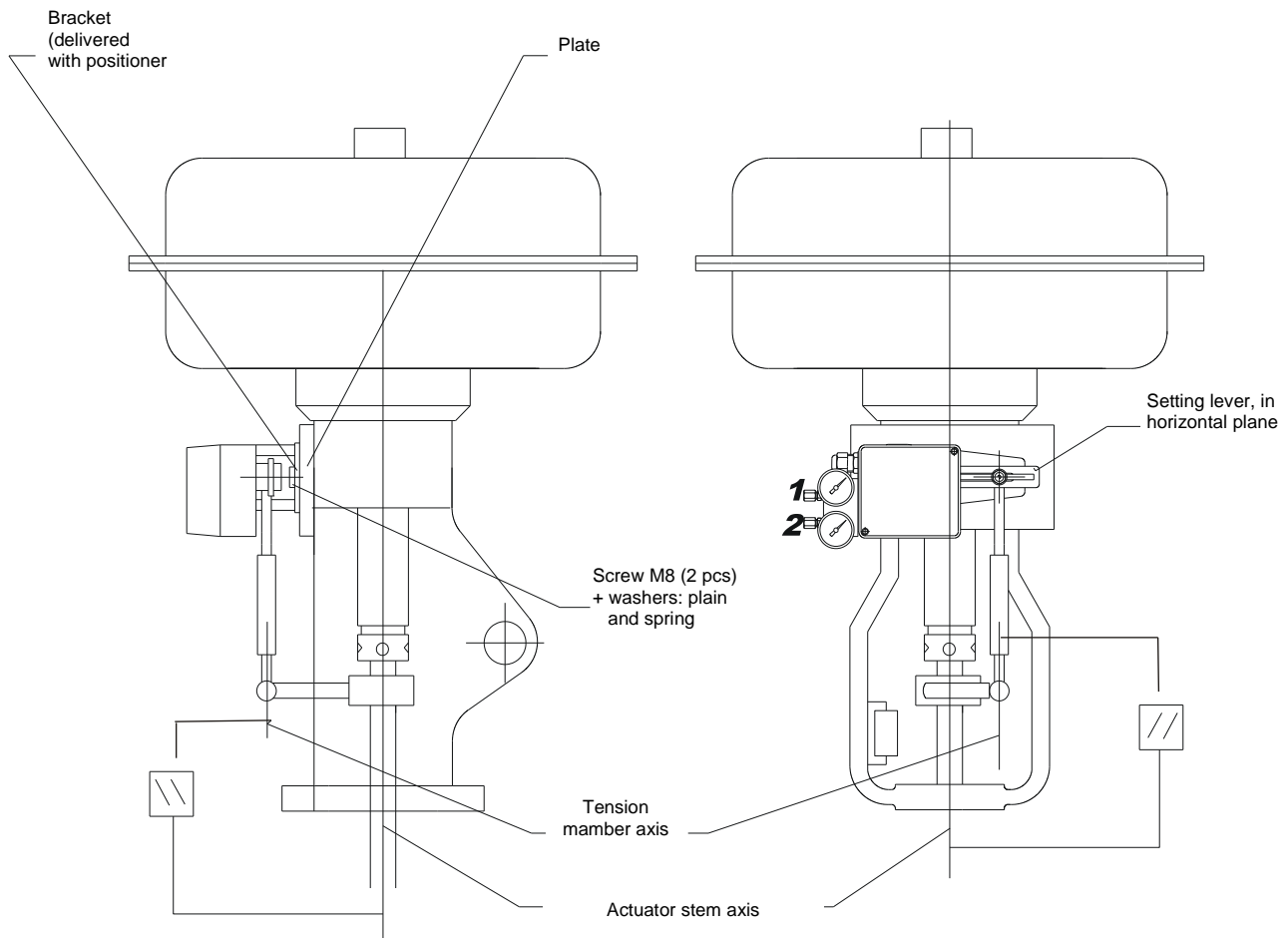


Information: The remaining elements, connecting the actuator stem with the lower positioner lug, like for the versions A781-AX00 and A781-AX02

Drawing no. 11. Assembly the positioner on actuator, of normal operation (type P1), with fixing holes spacing of 143 mm.



Drawing no. 12. Assembly the positioner on actuator, of normal operation (type P1), with fixing holes spacing of 114 mm.



Drawing no.13. Assembly the positioner on actuator type P1 – tension element axis should be parallel to actuator stem axis, in two planes mutually perpendicular to each other.

7.5. Assembly the positioners type A781-AX09 -... and A781-AX10-... on the actuator

The positioner is assembled to the actuator by bracket with three M6 screws. The movable “flipper” of positioner stem, placed in the actuator stem recess, provides clearance-less coupling of both product stems.

The positioner in version A781-AX09-... is designed on the actuator of reverse operation (actuator BR99-R), while version A781-AX10-... is for normal operation (actuator BR99-P). Drawing no. 14 presents the positioner installed actuator of reverse operation, while fig. 15 shows positioner mounted on actuator of normal operation.

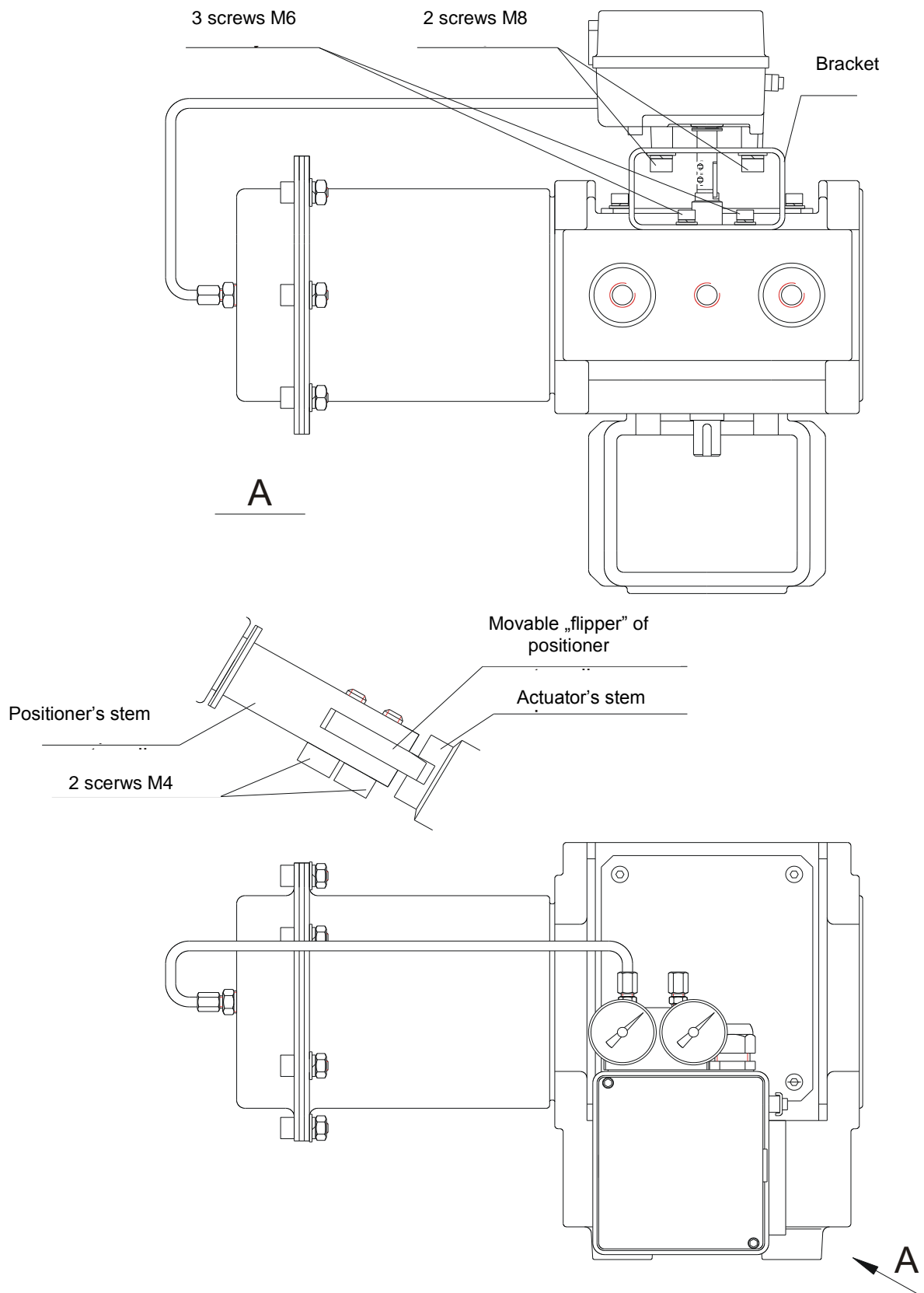
Before proceeding to assembly the positioner on actuator, one should keep positioners in foil bags for so long until positioner temperature is equal to temperature of a room wherein they are to be attached.

Assembly the positioner on actuator should be done in the following sequence:

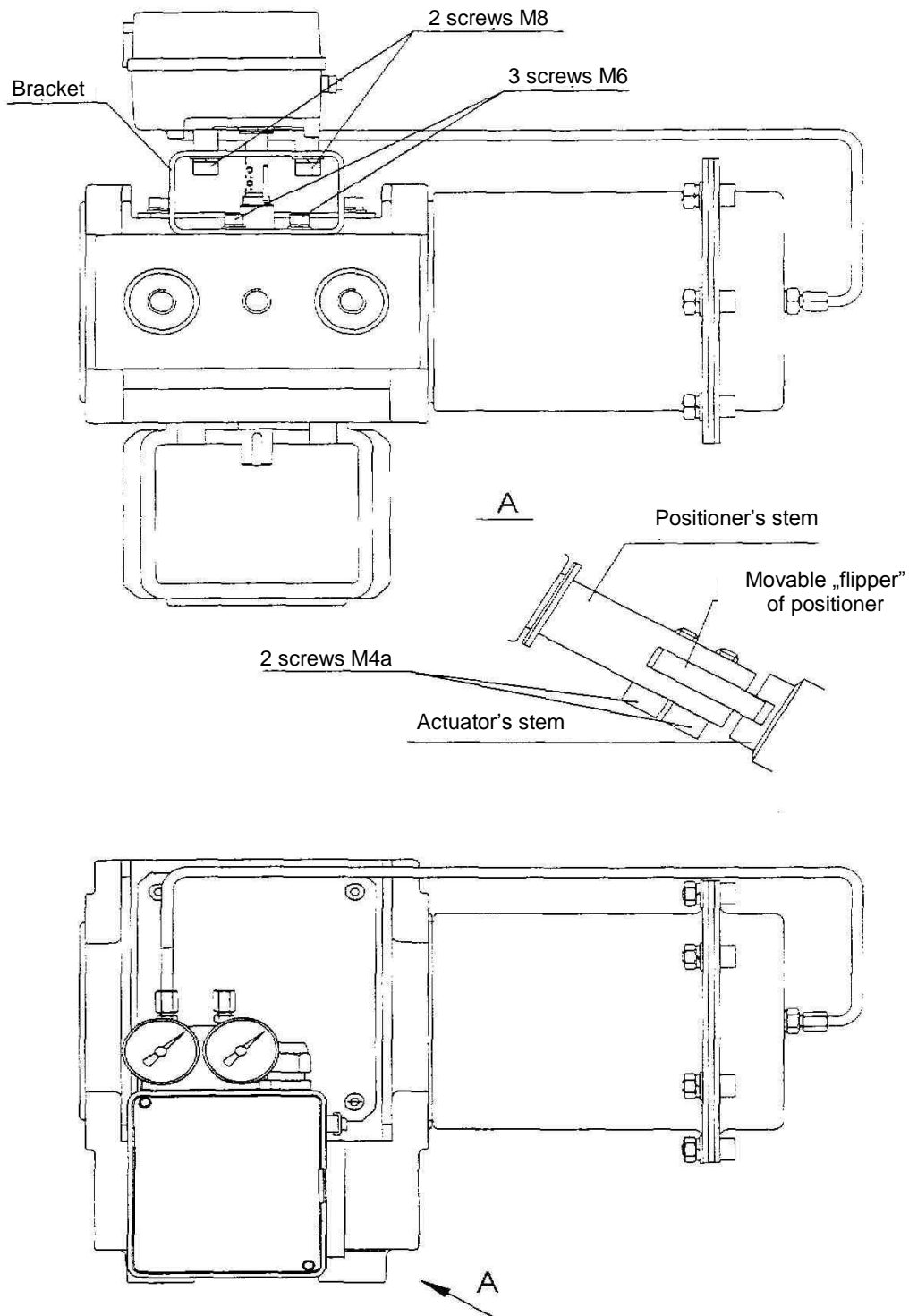
- take the positioner out of foil bag
- screw the bracket to the positioner (two lugs at distance of 56 mm) with 2 screws M8 included. Bracket should be screwed so as to make possible mounting of positioner on actuator at position presented in drawings no.14 or 15.
- loosen two M4 screws, protecting the movable “flipper” of positioner stem against shifting (see the view 'A' in drawings no. 14 or 15)
- attach the positioner bracket slightly to actuator by means of three M6 screws included in the positioner mounting kit of accessories

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- e) check visually if positioner stem axis is aligned with actuator stem axis and if movable “flipper” of positioner stem is placed in actuator stem recess. In case of need, one should correct mutual position of actuator in relation to positioner, making clearance on the holes for M6 screws in positioner bracket
- f) tighten three M6 screws, fixing the positioner bracket on actuator
- g) remove the clearance between actuator stem and positioner stem, by adequate inserting of movable “flipper” of positioner stem into recess in actuator stem (see the view ‘A’ in drawings no. 14 or 15)
- h) protect the movable “flipper” of positioner stem against shifting by tightening of two M4 screws.



Drawing no.14. Assembly of positioner on BR99-R actuator.



Drawing no.15. Assembly the positioner on BR99-P actuator

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7.6. Assembly the positioners type A781-AX13-... and A781-AX14-... on the actuator

The positioner is assembled to the actuator by plate and angle bar. The plate is screw down into the valve's (actuator's) body by M8 screw but the angle bar is screw down by four M8 screws. Valve's (actuator's) stem is coupled with the positioner setting lever by means of parts, included in the accessories, in the way shown in drawing no. 16.


The positioner can be attached both to the actuators of normal operation (closing) and reverse operation (opening). Drawing no. 16 shows the way of positioner installing to each type of mentioned actuators.

Before proceeding to assembly of positioner unit on actuator, one should keep positioners in foil bags for so long until positioner temperature is equal to temperature of a room wherein they are to be attached.

Assembly of positioner on actuator should be done in the following sequence:


- determine the operating position of positioner depending on the kind of co-operating actuator (see drawing no. 16)
- depending on the operating position of positioner one should determine the position of manometers
- screw the angle bar III into the positioner (two lugs at distance of 56 mm) with 2 screws M8 included;
- screw the plate into valve's (actuator's) body using M8 screw

ATTENTION:

	<p>Put the plate on valve's (actuator's) body (depending on needs) is regulated by assembly on one of two holes made in the plate against the screw</p>
--	--


- clamping rings I and II should be assembled to the contacting valve and actuator stems and screw down by two M6 screws keeping visual parallelism condition shown on drawing no. 16.
- Angle bar I has to be screw down into clamping ring II by M8 screw and angle bar II has to be screw down into angle bar I use two M5 screws.

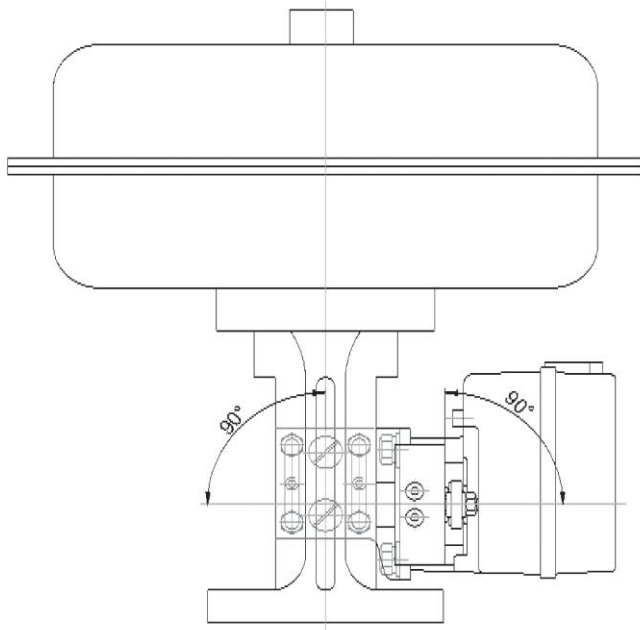
ATTENTION:

	<p>Proper angle bar II position at angle bar I has to be obtain by using oblong cut-out under the assembly screws M5 in angle bar II</p>
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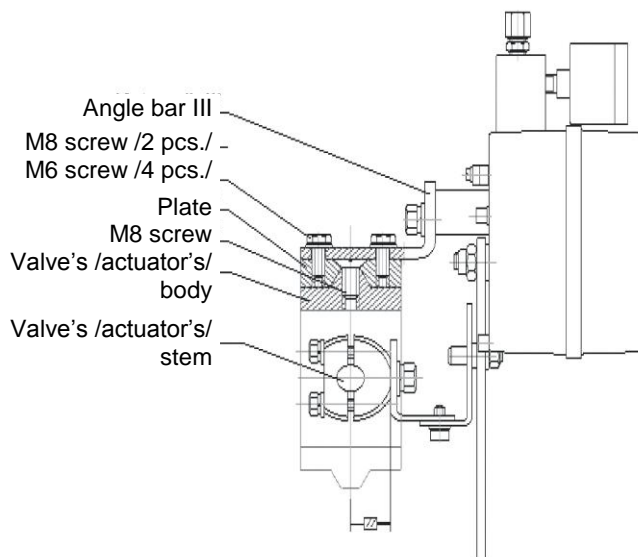
- mount the driver on the positioner setting lever at a point corresponding to actuator travel
- fix lightly the positioner with angle bar III into the plate using four M6 screws simultaneously coupling the positioner by driver with angle bar assembled into actuator's stem
- fix position of actuator's (valve's) stem in the half (50%) setting travel
- move the positioner with angle bar III relative to plate and/or angle bar II at angle bar I in the way the positioner setting lever is in vertical position. In this position the positioner has to be fixed relative to plate strongly screwing four M6 screws and/or fixed the angle bar I strongly screwing two M5 screws simultaneously keeping visual perpendicularity conditions (angle 90°) shown on drawing no. 16

ATTENTION:

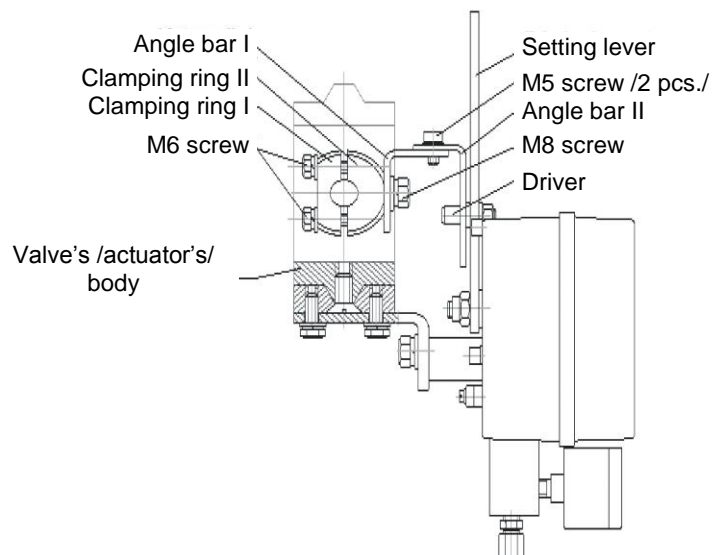
	<p>Correct realization of this point is characterized by that movement of the lever corresponding full actuator's (valve's) stem travel will be visual disposed relatively horizontal position of the lever.</p>
---	---



The drawing shows assembly
the positioner on the actuator
on standard working



The drawing shows assembly
the positioner on the actuator
on reverse working



Drawing no.16. Assembly the positioners type A781-AX13-.... and A781-AX14-... on the actuator with control valve with rib acc. to PN-EN 60534-6-1: 2001.

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7.7. Assembly the positioners type A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-... non the actuator.

The positioner is assembled to the actuator by bracket with four M5 screws. The movable “flipper” of positioner stem, placed in the actuator stem recess, provides clearance-less coupling of both product stems.


The positioners in version A781-AX11-..., A781-AX12-... are designed on the actuator, where the actuator's stem turns left (it's mean in direction reverse than clock hand), and positioners in version A781-AX17-... and A781-AX18-... are designed on the actuator, where the actuator's stem turns right (it's mean in direction compatible than clock hand). Drawing no. 17 presents the positioner assembled on mentioned types of actuators..

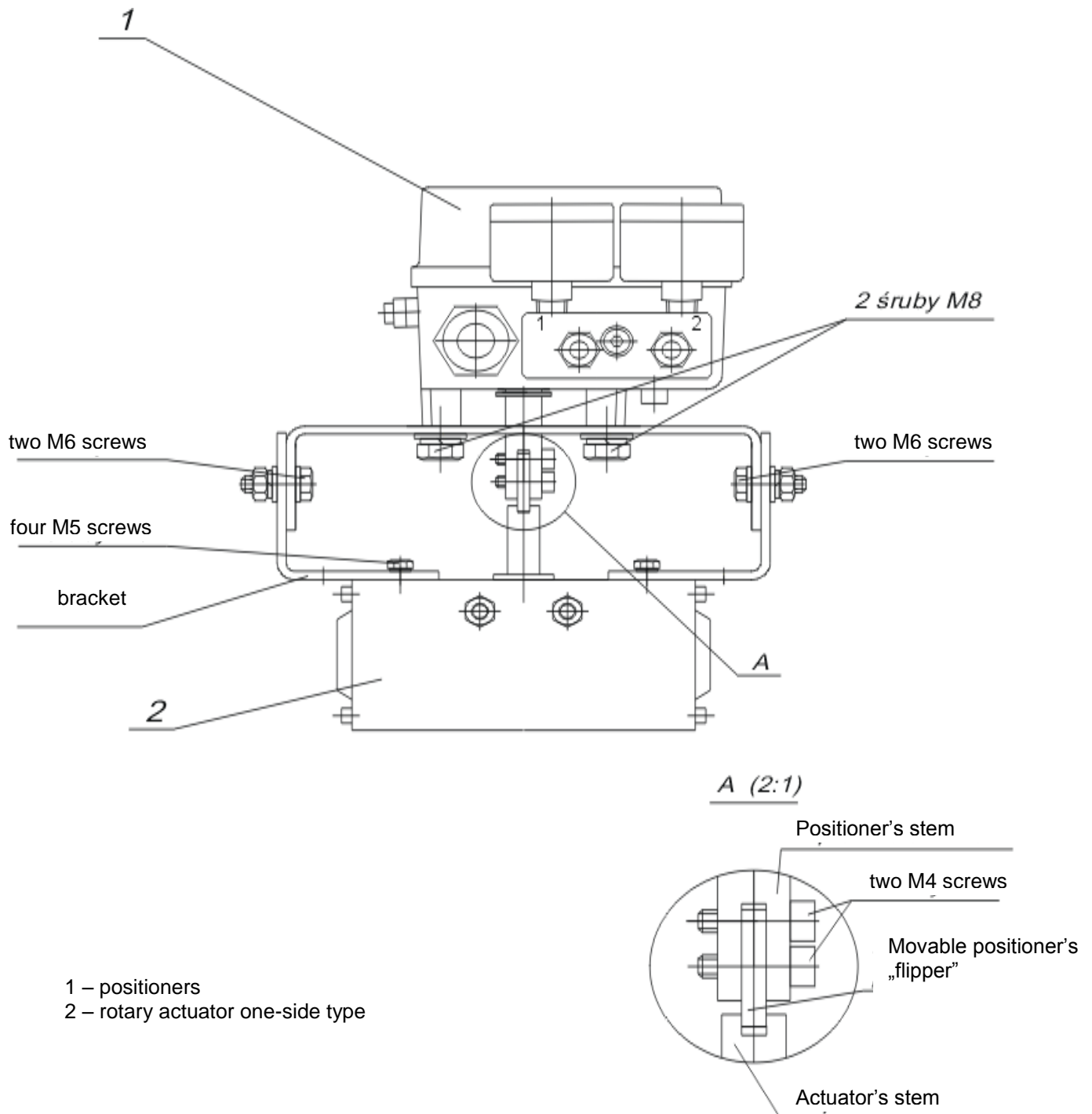
Before proceeding to assembly the positioner on actuator, one should keep positioners in foil bags for so long until positioner temperature is equal to temperature of a room wherein they are to be attached.

Assembly the positioner on actuator should be done in the following sequence:

- screw the bracket to the positioner (two lugs at distance of 56 mm) with 2 screws M8 included. Bracket should be screwed so as to make possible assembling of positioner on actuator at position presented in drawings no.17
- loosen four M6 screws and make increase or decrease (if needs) the high of bracket in the way it will be possible assembly the positioner into the actuator
- attach the positioner bracket slightly to actuator by means of four M5 screws included in the positioner mounting kit of accessories
- put movable “flipper” into cut-out the actuator's stem and check visually if positioner stem axis is aligned with actuator stem axis (it is possible to make correction of this position by using clearance on holes assembled the bracket into the actuator)
- tighten four M5 screws, fixing the positioner bracket on actuator
- screw home four M5 screws on side bracket walls to eliminate clearances between movable positioner's stem and cut-out in actuator keeping simultaneously visual parallelism between upper part of bracket and upper actuator's plane.

ATTENTION:

	<p>The clearance between movable positioner's „flipper” and actuator's stem may be eliminate too by turn on two M4 screws on positioner's stem and put movable positioner's „flipper” in actuator's stem and make safety by moving this „flipper” by turn in earlier eased of two M4 screws (see view A on drawing no. 17).</p>
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Drawing no.17. Assembly of positioners type A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-... on rotary actuator one-side type

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7.8. Installing rules of the pneumatic tubes

The pneumatic tubes from the supply pressure reducer should be as short as possible. The tubes and fittings should be fixed so that as not to be exposed to action of any mechanical loads.

While leading the tubes, one should avoid sharp curves. Before connecting of tubes one should blow them with warm air in order to dry them and removing all the impurities. The best recommended material is copper tube $\varnothing 6 \times 1$ or $\varnothing 8 \times 1$, etched from inside, covered outside with protective lacquer coating.

Supply pressure should be applied to the pneumatic connector marked "1", while the output signal conduit, led out from connector marked "2", is to be connected with actuator chamber.

7.9. The connection of electric tubes

The external earthing / grounding conductor should be connected to terminal placed on the positioner housing.

One ought to remove the positioner housing cover in order to obtain access to electric connectors of input signal.

Cable applying the input signal to positioner should be led into casing interior through a gland.

Diameter of connecting cable depends on DX option and we have:

- for version A781-AXXX-XX,XX,XXX,**D1**,XX – 6...10mm,
- for version A781-AXXX-XX,XX,XXX,**D2**,XX – 8...13mm dla PG13,5; 7...10,5mm dla M20x1,5,
- for version A781-AXXX-XX,XX,XXX,**D4**,XX – 5...8mm,
- for version A781-AXXX-XX,XX,XXX,**D5**,XX – 7...10,5mm,
- for version A781-AXXX-XX,XX,XXX,**D6**,XX – 9...13mm,
- for version A781-AXXX-XX,XX,XXX,**D7**,XX – 5...8mm,
- for version A781-AXXX-XX,XX,XXX,**D8**,XX – 7...10,5mm,
- for version A781-AXXX-XX,XX,XXX,**D9**,XX – 9...13mm,

The gland nut is to be tightened in order to immobilise the cable, and next, connect the wires to a terminal strip.

For operation of positioner at "NORM" mode – the input signal wire (+) is to be connected to terminal "1", while wire (-) is to be connected to terminal "2". "REV" operation mode – wires are to be connected in reverse way.

7.10. Assembly of spark-safety version of positioners

The installation requirements of positioner, given in Certificate KDB 04 ATEX 025X should be met for the spark-safety circuits.

Providing of spark-safety of circuits co-operating with positioner, in version A781-A2XX-..., can be obtained by using of the protective barrier and meeting the requirements included in the certificate for this barrier.

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8. MANUAL INSTRUCTION

8.1. Start-up

8.1.1. General information

Before starting the positioner up, one should check:

- if a travel given on rating plate of actuator corresponds to driver position on indicating dial of positioner setting lever (it does not apply to versions A781-AX01-..., A781-AX09-..., A781-AX10-..., A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-...)
- if driver position on setting lever corresponds the type of cooperating actuator “P” or “R” (it refers only to A781-AX01-...)
- if the rotation angle given on rating plate of actuator corresponds to the angle given on rating plate of positioner (it apply only to versions A781-AX09-..., A781-AX10-..., A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-...)
- if the range regulation spring mounted in positioner is suitable for the applied range of input signal and travel (rotation angle) of actuator (it applies to all the versions).

Range regulation spring is to be chosen in accordance with the table:

Range spring denotation	Input current range width	Travel range (rotation angle) of actuator	Rotation angle of positioner lever
1	16mA (4...20mA, -20...-4mA) 20mA (0...20mA, -20... 0mA)	10...50,8 mm	12,5°
	16mA (4...20mA, -20...-4mA) 20mA (0...20mA, -20... 0mA)	60°	30°
2	16mA (4...20mA, -20...-4mA) 20mA (0...20mA, -20... 0mA)	50...101,6mm	25°
	8mA (4...12mA, 12...20mA, -20...-12mA, -12...-4mA) 10mA (0...10mA, 10...20mA, -20...-10mA, 0...10mA)	10...50,8mm	12,5°
	8mA (4...12mA, 12...20mA, -20...-12mA, -12...-4mA) 10mA (0...10mA, 10...20mA, -20...-10mA, 0...10mA)	60°	30°
3	8mA (4...12mA, 12...20mA, -20...-12mA, -12...-4mA) 10mA (0...10mA, 10...20mA, -20...-10mA, 0...10mA)	50...101,6mm	25°
	16mA (4...20mA, -20...-4mA) 20mA (0...20mA, -20... 0mA) 10mA (0...10mA, 10...20mA, -20...-10mA, 0...10mA) 8mA (4...12mA, 12...20mA, -20...-12mA, -12...-4mA)	90°	90°

The producer delivers the positioners with mounted spring no. 1 (it doesn't apply to versions A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-... – these versions are delivered with mounted spring no. 3). The remaining springs are delivered in bulk in the accessories kit.


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8.1.2. Adjustment of the actuator's stroke (angle of rotation)


The regulation is done on the actuator installed acc. to:

- point 7.1. (it applies to versions A781-AX00- ... and A781-AX02- ...)
- point 7.2. (it applies to versions A781-AX01- ...)
- point 7.3. (it applies to versions A781-AX03- ... and A781-AX04- ...)
- point 7.4. (it applies to versions A781-AX07- ... and A781-AX08- ...)
- point 7.5. (it applies to versions A781-AX09- ... and A781-AX10- ...)
- point 7.6. (it applies to versions A781-AX13- ... and A781-Ax14- ...)
- point 7.7. (it applies to versions A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-...)

a) Set the required supply pressure

	<p>Supply pressure cannot exceed the permissible pressure value applied to actuator</p>
---	--

b) increase slowly the input signal observing the actuator's stem. Beginning of movement should occur at the input signal equal to the lower limit range value, that is, 4 mA in case of range 4...20 mA or 12mA in case of range 12...20mA, or -20mA in case of range -20...-4mA, etc. Measurements should be done with accuracy of not less than 0.2%. If beginning of actuator movement stem occurs at another input signal, one ought to adequately change the zeroing spring tension.

	<p>Positioners are preliminarily factory-regulated for input signal range 4...20 mA – simple operation. In case of switching into reverse operation during the range beginning adjustment ('zero' adjustment), acc. to point b) zeroing spring tension should be increased. The need of voltage difference depends on input signal range and it is significant.</p>
---	--

In case when it is required that an „opening” actuator cooperating with positioner will close the valve by full force of its spring, one should during regulation make zeroing of positioner, so that actuator stem movement beginning will occur at input current of ~2% of range value. At the input current change down to the lower limit range value, the valve plug should stop against the seat, while output pressure from positioner should be lowered first to the lower limit value of its range, and next, it should drop slowly to zero. Output pressure changes from positioner should be controlled by observing the pressure gauge indications for a few tens of seconds, positioner is equipped with this gauge.

c) increase the input signal to a value at which the actuator stem will reach the other extreme position. It should occur at the upper limit value of input signal range, that is, 20 mA in case of 4...20 mA range or 12mA in case of 4...12mA, or -4mA in case of -20...-4mA, etc. If the actuator stem obtains 100% of movement at a lower input signal, one should increase the range adjustment spring tension, or adequately decrease, if obtaining of 100% stem movement occurs at a higher input signal.

In case when it is required that an „closing” actuator cooperating with positioner will close the valve by control pressure of above 90% value, one should the positioner acc. to point 8.1.2. b), while during the adjustment acc. to point 8.1.2. c) the range spring should be so tensioned that after input current change up to the upper limit range value the actuator stem reaches 100% movement, and output pressure from positioner first grew up to the upper limit of its range value, and then slowly gained up to the supply pressure value. At the input signal drop to a value equal 96% of range, there should occur beginning of actuator stem movement towards valve opening. Changes in output pressure should be controlled by watching the indications of pressure gauge, which is the positioner equipment.

d) repeat the regulation acc. to b) and c) until obtaining of adequate accuracy.

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Pay attention to that all the screws and nuts should be firmly tightened.

If the pneumatic amplifier of positioner deaerates too rapidly, there is a need of making the actuator operation slower, or if it happens that an actuator with installed positioner operates in unstable way, one should slightly screw the gland into amplifier body, gland marked with plate "attenuation". Screwing the gland in causes decrease in air flow in the output track of positioner and slower operation.

The gland is fully open, if its front surface (having the cross cuts for screwdriver) is placed in the plane of amplifier body wall. Usually, this factory-set gland is already screwed in so that it decreases the rapidness of deaerating.

For positioner versions A781-AX11-..., A781-AX12-..., A781-AX17-..., A781-AX18-... in case the working of positioner will be not stable, one should be change the standard pneumatic connectors mounted to the positioner on connectors with proper gland added to the mentioned positioners equipment.

8.2. Putting the positioners into operation

Putting the positioner into operation is carried out by applying of supply pressure set in the range of 0.14...0.6 MPa, selected adequately for cooperating actuator and applying of a proper control signal.

8.3. Exploitation

The positioner properly installed and prepared for operation does not require any service, during the exploitation.

A condition of proper operation is suitably prepared supply pressure. One should observe the periodical checking of filtering devices, placed in the pneumatic supply line.

8.4. Disassembly of the positioners from the actuator

When it is necessary to dismount the positioner from actuator, one should:

- a) switch off the current input signal applied to positioner
- b) decrease the supply pressure to zero
- c) disconnect from positioner the electric wires of input signal and grounding, as well as pneumatic supply and output tubes, pneumatic switches of positioner and actuator are to be protected against contamination
- d) - unscrew the fixing screws and remove the positioner, together with bracket, from the actuator - it does not apply to version A781-AX01-...,
- unscrew the fixing screws and remove the positioner from the actuator, take the sealing rings from pneumatic connector sockets - it refers only to A781-AX01-...
- e) disassembly from the actuator the remaining elements fixing the positioner to actuator and coupling the actuator stem with positioner, attach to them sealing rings from pneumatic connectors and fix them to positioner, just in order not to lose them.

Further storing and possible packaging of positioner for its shipment should be in accordance with requirements given under points 5 and 6.

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9. MAINTENANCE

During the operation of positioner, once in six months or more frequently, one should check tightness of pneumatic tubes and tighten the nuts of the connectors.

Any leakages found are to be immediately removed. In order to provide proper cleanness of working medium, one should observe the periodical inspection of filtering devices, installed in the supply line of the positioner.

10. POSITIONER'S EQUIPMENT

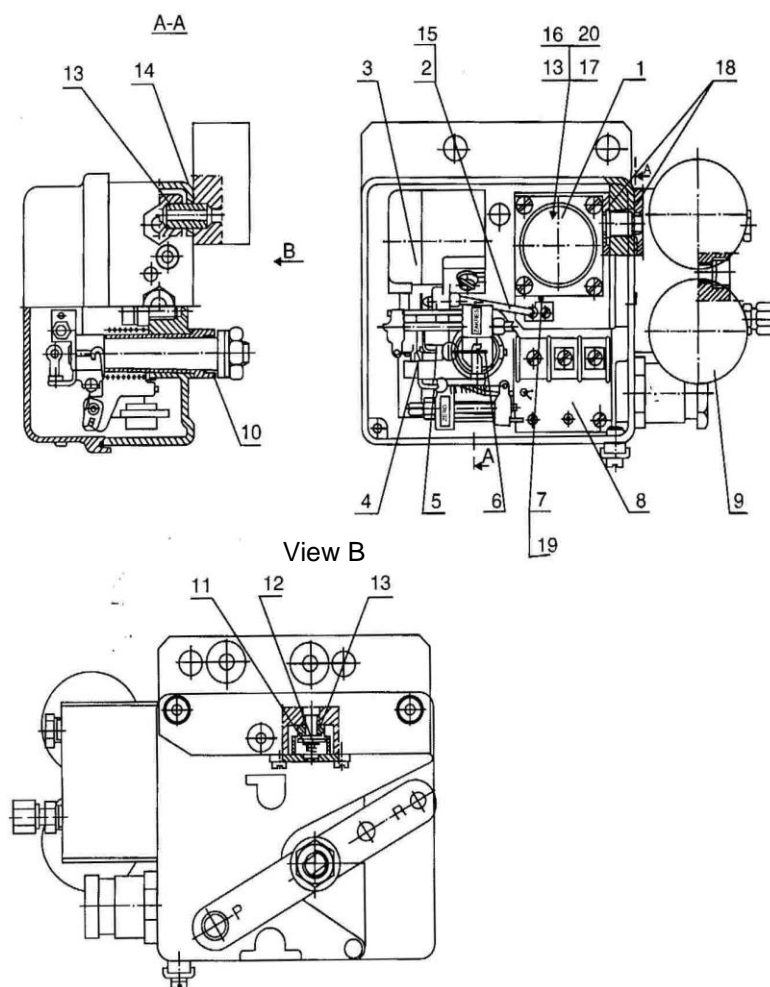
Each positioner is provided with a kit of parts enabling mounting on the given actuator type, complete set of sealing rings, range spring unit no. 2 and 3, with the suspension.

11. DEFECTS AND REPAIRS

Item	DEFECTS	REASONS OF DEFECT	WAY OF REMOVING
1.	Supply pressure manometer does not indicate	Supply reducer damaged or switched off	Defect out of positioner
		Manometer damaged	Replace the manometer
2.	Output pressure manometer does not indicate e	Manometer damaged	Replace the manometer
3.	Actuator does not respond to output pressure changes from the positioner	Valve or actuator damaged	Defect out of positioner
		The tube, connecting the positioner with the actuator, is collapsed or damaged	Replace the tube / conduit
4.	Positioner does not respond to the input current changes. At exceeding of a certain value, output pressure suddenly changes so that actuator stem does not move to the opposite extreme position	The driver, mounted onto improper lever arm - it applies to versions A781-AX01-...	Correct the fixing of positioner on actuator, according to point 7.2.
5.	Actuator does not respond to changes in current input signal. Output pressure is equal to zero or supply pressure	Untightened or contaminated steady resistance of pneumatic cascade	Clean or exchange the steady resistance, remove any possible leakages
		Untightened track between the nozzle and input chamber of amplifier	Replace pneumatic tube and/or seal under amplifier cover., or find and remove the possible leakages
		Amplifier damaged	Replace amplifier
6.	Hysteresis exceeds permissible value	Friction in the balance unit	Remove the source of friction
		High movement resistance in bearing system of setting lever	Clean the lever shaft and bearing sleeve, replace the seal
7.	Hysteresis exceeds permissible value or positioner does not respond to input signal changes	Damaged suspension of balance lever (due to careless manipulations during the positioner adjustment)	Replace the suspension

8.	Hysteresis exceeds permissible value. At mechanical shocks there occurs stepwise change in output signal	Air gap in the magnet – contaminated	Clean air gap in the magnet
9.	The positioner-actuator system does not operate in stable way: Actuator stem makes movements “back and forth	Choke “ATTENUATION” is unscrewed too deep	Screw the choke, marked “ATTENUATION/TŁUMIENIE”, deeper into amplifier body
10.	Actuator stem moves too slowly	Choke “ATTENUATION” is screwed home too deep	Unscrew (approx. 1-2 turns) the choke, marked “ATTENUATION/TŁUMIENIE”, from amplifier body

12. SPARE PARTS



Drawing no.18. Localization of spare parts - in accordance with the version A781-AX01-...

Item no. acc. to drg. 18	Name of parts	Drg. no. / Code of part or assembly	Remarks
1.	Pneumatic amplifier	E206-A001	Supply pressure 0.14...0.25 MPa
1.	Pneumatic amplifier	E206-A003	Supply pressure 0.25...0.6 MPa
1.	Pneumatic amplifier	E206-A001-S01	Supply pressure 0.14...0.25 MPa (increased dynamics)
1.	Pneumatic amplifier	E206-A003-S01	Supply pressure 0.25...0.6 MPa (increased dynamics)
2.	Pneumatic conduit	A781-B026-100	
3.	Balance unit (standard version)	A781-B001-300	Acc. to version with supply pressure 0.25...0.6 MPa
3.	Balance unit (standard version)	A781-B001-100	Acc. to version with supply pressure 0.14...0.25 MPa
4.	Complete suspension	A781-B010-100	
5.	Spring unit (no. 1)	A781-B027-100	
5.	Spring unit (no. 2)	A781-B027-200	
5.	Spring unit (no. 3)	A781-B027-300	
6.	Suspension	A781-C102-100	
7.	Gland	E206-C009-100	It refers to amplifier E206-A001 version
7.	Gland	E206-C009-600	It refers to amplifier E206-A003 version
8.	Electric connector	A201-B007-200	It refers to version A781-A101-...
8.	Electric connector	A781-B015-100	It refers to all the versions, excluding A781-AX01-...
9.	Manometer 0...0.6 MPa (of dia. 40mm)	R110-H005-100	
9.	Manometer 0...0.4 MPa (of dia. 40mm)	R110-H005-400	
10.	Seal / Gasket	A781-C101-100	
11.	Spring	A781-C216-100	It refers to version A781-A101-...
12.	Plug	A781-B206-100	
13.	Sealing ring	Y812-C117-100	
14.	Sealing ring	Y812-C106-100	It refers to version A781-A101-...
15.	Sealing ring	Y812-C101-100	
16.	Sealing ring	Y812-C114-100	
17.	Sealing ring	Y812-C109-100	
18.	Sealing ring	Y812-C111-100	
19.	Sealing ring	Y812-C102-100	
20.	Seal / Gasket	E206-C010-100	
21.	Kit of mounting parts	A781-L001-100	The kit does not appear in drawing no. 18 (actuator type 37 and 38 – parts from zinc-coated carbon steel)
		A781-L001-200	The kit does not appear in drawing no. 18 (actuator type 37 and 38 – parts from stainless steel)


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		A781-L003-100	The kit does not appear in drawing no. 18 (actuator type P and R – parts from zinc-coated carbon steel)
		A781-L003-200	The kit does not appear in drawing no. 16 (actuator type P and R – parts from stainless steel)
		A781-L001-300	The kit does not appear in drawing no. 18 (actuator type P1 and R1 – parts from zinc-coated carbon steel)
		A781-L001-400	The kit does not appear in drawing no. 18 (actuator type P1 and R1 – parts from stainless steel)
		A781-L005-100	The kit does not appear in drawing no. 18 (actuator type BR99)
		A781-L006-100	The kit does not appear in drawing no. 18 (actuator with valve and rib acc. to PN-EN-60534-6-1:2001 for example: Samson, Arca Regler made) – parts from zinc-coated carbon steel
		A781-L006-200	The kit does not appear in drawing no. 18 (actuator with valve and rib acc. to PN-EN-60534-6-1:2001 for example: Samson, Arca Regler made) – parts stainless steel
21 continuation	Kit of mounting parts	A781-L007-100	The kit does not appear in drawing no. 18 (1side rotary actuator acc. to EN ISO 5211, DIN 3337, VDI/VDE 38450 standards, for e.g.: the actuator made by ARA PNEUMATIC AT...S series, EBRO ARMATUREN type EB-EW, EL-O-MATIC PE and ES series) – parts from zinc-coated carbon steel
		A781-L006-200	The kit does not appear in drawing no. 18 (1side rotary actuator acc. to EN ISO 5211, DIN 3337, VDI/VDE 38450 standards, for e.g.: the actuator made by ARA PNEUMATIC AT...S series, EBRO ARMATUREN type EB-EW, EL-O-MATIC PE and ES series) – parts from stainless steel

13. GUARANTY CONDITIONS

Guaranty terms are determined in guarantee card of Manufacturer – Controlmatica ZAP-PN EFAL Sp. z o.o., Ostrów Wlkp., Poland – guarantee card is added to the each piece of positioner.

ATTENTION: The right of introducing design changes in the product, without deteriorating of its operation parameters, is reserved.

	<p>Any repairs should be conducted by the manufacturer or authorized service. In the event of the repairs performed by the third persons, the manufacturer shall not bear any responsibility for security and proper operation of the product.</p>
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14. SCOPE OF DELIVERY

- Electro-pneumatic positioner
- Technical Product Documentation
- Acceptance Certificate
- Packaging

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