



Operation Instructions

Actuator ATEX PSA / PSAE

BC-Systemtechnik



Mounting and operation manual

Pneumatic actuator

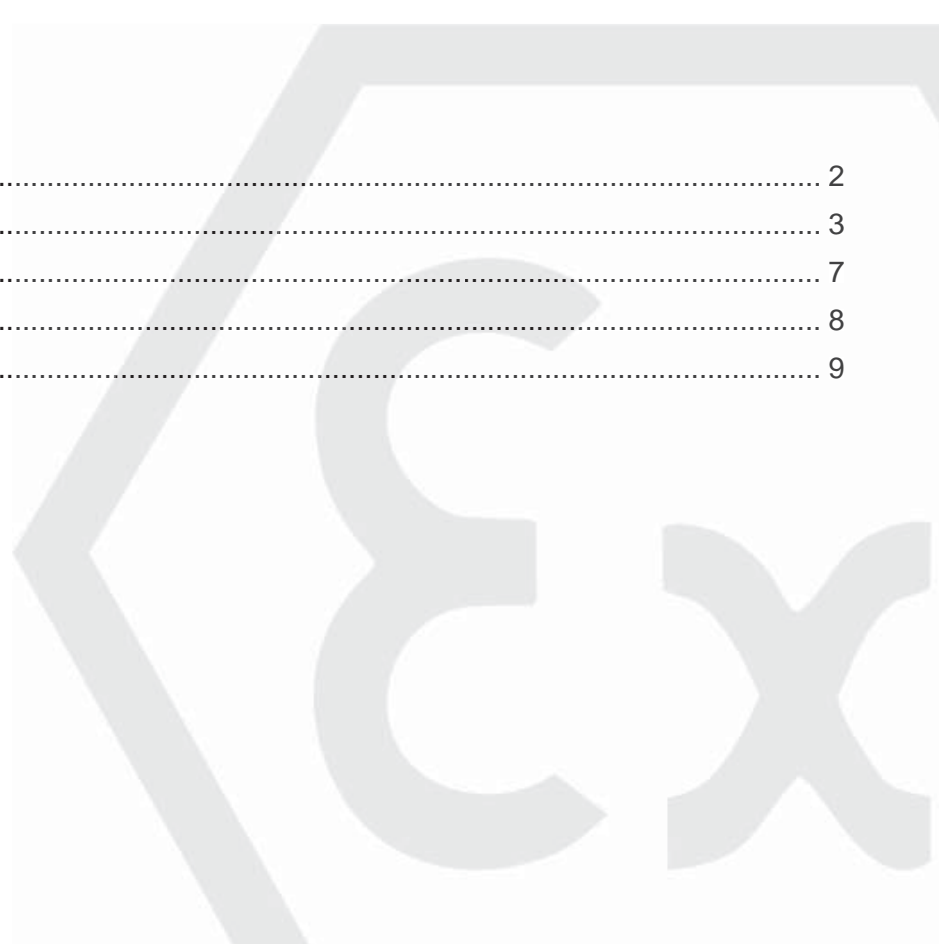
BC-PSA
BC-PSAE

acc. to ATEX Ex I M2 GD c X



Contents

Safety advice	.....	2
Mounting	.....	3
Label	.....	7
Technical Data	.....	8
Declaration of conformity	.....	9



Safety advice for pneumatic actuators

Usage acc. to regulations:

The actuators described in this manual are designed for armatures with 90° pivoting angle (actuator or flap). Furthermore, special designs may be applied for other pivoting angles. The actuators are run by a gaseous or liquid medium with a 10 bar maximum working pressure. (some sizes may be able to handle differing working pressures).

It is absolutely necessary to comply with the maximum pressure of 10 bar for safety reasons.

Pressure peaks have to be avoided at all time.

The installation, usage and maintenance of the actuator have to be done by trained personell and acc. to the operation manual only.

Appliance in firedamp areas has to be realised acc. to the specific safety regulations.

The outer shell of the actuator contains aluminium and therefore, when the actuator is used in coal mining (group I) in protected arrangement.

Operation of the rotary actuator without protection of the housing is not permitted.

This requirement also applies during transport and installation.

Generaal safety advice

For mounting and maintenance it is strictly necessary to ensure, that the actuator is not pressurised, before any actions are taken. Furthermore, the springs of actuators, that are resetted by spring power, have to be released of tension.

Damage of the surface

If a damaging of the actuators surface is present, the device has to be put out of action immediately and should be transported out of the danger zone (EX-Zone).

Working media requirements

The working medium has to be clean and free of grease. Contents, that may lead to danger through explosions have to be avoided at all time. Compliance with the quality of the media mentioned in the operation and mounting manual is essential.

In firedamp areas (EX-Zones) the intrusion of ambient atmosphere must be avoided.

We suggest the usage of a 3/2- or 5/2-way-pilot valve and if needed a strainer.

The maximum working temperature of the working medium has to be limited to 35°C . If the medium is warmer, adequate heat abstraction is necessary under high switching frequencies.

Electrical spare parts requirements

Electrical spare parts like pilot valves or end-position-feedback are in general only admissable, if complying with EX-protection regulations.

Cleaning of the actuator

The actuators surface should be kept clean at all times

Reduction of manipulating speed

If the manipulating speed of the actuator is too high, adequate measures have to be taken, to avoid over-valued brake forces in the ending positions. We will gladly give you informations about adequate measures. If necessary, feel free to contact us.

Usage of pilot valves

If the actuator is applied in firedamp areas, 3/2- or 5/2-way pilot valves have to be used generally. Prevent intrusion of explosive atmosphere into the spring-chambers (e.g. through strainers / filters)

Manipulating speed

High manipulating speeds may lead to improper braking forces of the devices end positions.

Solutions

1. Curb the exhaust air (double acting actuators)

Double acting actuators of type PSA in combination with 5/2-way solenoid valves by insertion of exhaust throttles (extra accessory) into the exhaust air channels of the valve

2. Exhaust air throttling for single acting actuators

Single acting actuators of Type PSAE in combination with 3/2- and 5/2-way solenoid valves by insertion of exhaust throttles (extra accessory) into the exhaust air channels of the valve

Usage of single acting actuators in firedamp / mining and Ex-areas is permitted only in combination with 3/2- or 5/2-way solenoid valves. Valves of other designs may be applied only after consulting the manufacturer

Stainless steel actuators

Additional to the the aluminium-alloy actuators, actuators with stainless steel housings are available.

Mounting

General

Mounting, pneumatic connection and commissioning of the actuators should be done by qualified personnel and according to the directives given in this instruction only.

The pneumatic actuators of type PSA and PASE may possess high torques, hence it is necessary, that the effective national and international safety rules are followed accurately in order to avoid accidents.

Standard-actuators are applied to control industrial armatures that are continuously operating between differing end-positions using pressurised air.

Other pressurising media (fluids) and uses have to be clarified with the manufacturer.

Maintenance and other operations concerning the actuator always require the pressure connection to be turned off respectively branched off. Mind the technical parameters, especially pressure, torque, and temperature.

Make sure, the actuator faces towards the correct direction.

Ensure, that the actuators delay angle is configured correctly and that the seals of the armature are not ridden over, for they may be damaged.

Faulty or unconventional usage voids all warranty claims..

Information concernign Ex-zones

Operation of the rotary actuator without protection of the housing is not permitted.

Only special designs possess end-position- and/or hydraulic-damping, or enable the positioning of the actuating element between the ending-positions.

Mount the device in Ex-zones using potential equalisation.

Obviate searching for leakage using ultrasound while in a Ex-protected zone.

Combine the device with ex-approved accessory only, if applied in an Ex-zone. Especially when determining which pneumatic valve or end-position-feedback device to apply.

When using tools in an Ex-zone, abide formation of sparks.

Abide larger ammounts of dust in Ex-zones by vacuum-cleaning or sweeping.

Connection of compressed air supply

1. Usage of a NAR pilot valve

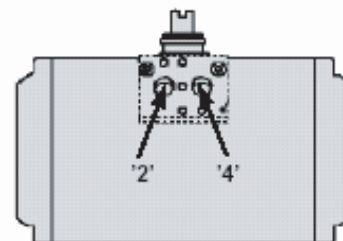
Install acc. to the valves manual using two screws directly to the NAMUR interface of the actuator.

If applied below ground, a 3/2- or 5/2-solenoid valve must be used.

2. Usage of a externally mounted valve

The pilot valve is mounted externally and connected via the compressed-air line with the actuator.

Apply compressed air line as follows:



Type PSA – double acting

Both connections, „2“ and „4“ have to be connected to the particular pressure outflow of the pilot valve. If using a 5/2-way valve, mind which direction the actuator shall perform switching when not energised.

Type PSAE – single acting

If applied below ground, a 3/2- or 5/2-way-pilot valve must be used.

The compressed air line towards the spring-box has to be connected to port „4“.

Connection of signalling devices

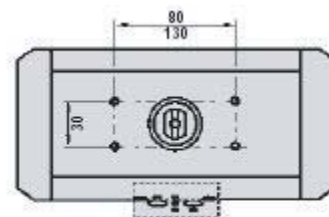
1. Usage of a signalling device acc. to NAMUR

The mounting has to be done acc. to the manual of the signalling device.

If applied below ground, special signalling devices must be applied

2. Usage of a signalling device without NAMUR connection

The mounting and installation of the signalling device must not affect the actuators operation. In case of doubt contact the manufacturer.

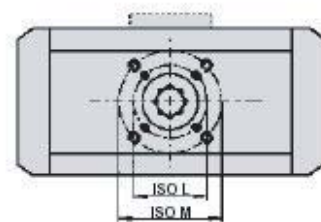


Connection of the armature

The Mounting has to be done according to the installation manual of the armature respectively the actuator. The actuators dimensioning has to be chosen according to the expectable torque with adequate safety.

Mind the torque-data given by the manufacturer.

Before mounting the armature, the disired direction of rotation and the interface of the bevel / gearshaft should be tested.



Adjustment of ending positions

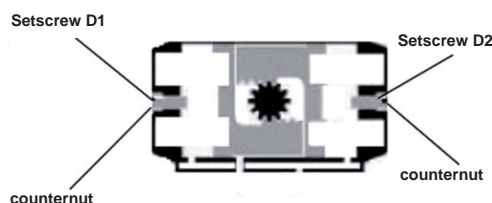
Never set up setting screw against the direction of effekt of the pneumatic pressure (pressurised connection „2“).

Mind, that the actuators gear faces the correct direction.

If using armatures, that may not excess a certain pivoting angle (e.g, metalically sealing flaps) make sure, that the set pivoting angle of the armature does not exceed the admissible pivoting angle.

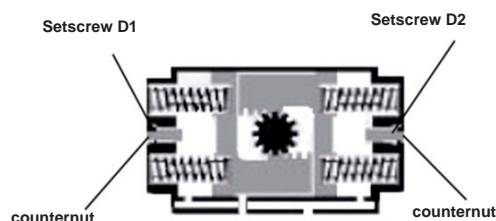
Double acting actuators:

1. Drive piston into connection „2“ in switching position by pressurisation.
2. Loosen counternut of ending-position-screws D1 and D2.
3. Aerate connections „2“ and „4“
4. Set setscrew D2 anticlockwise approx. 5 turns.
 - Setting setscrews D1 and D2 anticlockwise enlarges the delay angle
 - Setting setscrews D1 and D2 clockwise reduces the delay angle
5. Set Setscrew D1 acc. to desired pivoting angle.
6. Charge connection „2“ with pressure to test positions.
If need be repeat setting.
7. Tighten setscrew D1 with defined lapping torsional moment
(see appendix).
8. Adjust setscrew D2 clockwise against piston.
9. Tighten counternut of setscrew D2 with defined lapping torsional moment
(see appendix).



Single acting actuator:

1. Drive piston into switching position by pressurisation of connection „2“.
2. Loosen counternut of ending-position-screws D1 and D2.
3. Aerate connection „2“.
4. Set setscrew D2 anticlockwise approx. 5 turns.
 - Setting setscrews D1 and D2 anticlockwise enlarges the delay angle
 - Setting setscrews D1 and D2 clockwise reduces the delay angle
5. Set Setscrew D1 acc. to desired pivoting angle.
6. Charge connection „2“ with pressure to test positions.
If need be repeat setting.
7. Tighten setscrew D1 with defined lapping torsional moment
(see appendix).
8. Adjust setscrew D2 clockwise against piston.
9. Tighten counternut of setscrew D2 with defined lapping torsional moment
(see appendix).



Attention! High risk of injury!

Single acting actuators with nominal-/delay-angle bigger than 90° (e.g.. 120°, 135°, 180°) have caps with high prestressing. Do not open these actuators, send them to the manufacturer for maintenance and repair instead.



Attention! High risk of injury!

Single acting actuators with the adjoining symbol are equipped with unsecured springs. Maintenance and mounting operations bear a highend risk of injury. Do not open these actuators, send them to the manufacturer for maintenance and repair instead.

Assembly and disassembly of units

Never drive the piston of the actuator out of the housing using pressurised air.

Disconnect the pressurised air connection before undertaking any attempt to maintain or disassemble.

Single acting actuators require the return springs to be removed, do not overexpand the circlip.

Disassembling the piston

1. Disassemble the side-cover of the actuator.
2. Remove the reset springs of single acting actuators.
3. Drive the piston out of the housing by turning the gear.

Assembling the piston

1. Insert the piston into the housing. Assure, that the gear rods of the piston engage the denticulation correctly and that the pistons shift symmetrically.
2. Insert the reset springs into single acting actuators, mind the chapter „Assembling the reset spring“
3. Mount the actuators side-cover, mind the required clamping torque for the cover-screw (technical data).

Make sure, the gaskets position and location are correct.

Assembly of the gear

Install the gear from below into the housing. Make sure, the position of the dihedral and four cornered shaft, the gear and the actuating-piston are correct.

Install the sliding ring and place the circlip with a adequate calliper onto the gear. Check correct hub of the circlip, do not overstress the circlip.

Disassembly of the gear

Remove the circlip and the sliding ring of the gear, do not overstretch the circlip.

Push the gear downwards out of the housing.

Assembly of springs

Danger! Risk of Injury!

Open the actuator only if not pressurised.

Disassemble the side-cover of the actuator.

Put the desired number of springs into the round cavities on the piston. Make sure, that the forces

are spread symmetrically. (acc. to equipment)

Mount the sidecover, mind the adequate breakaway torque for the cover screws (appendix).
Make sure, the cover-gasket has the correct position.

Appendix

Breakaway torque of counternuts	
Type PSA /PSAE	torque (Nm)
052, 063	2
075, 083, 092	3
110, 118	4,5
127, 143, 160	8
190, 210	13
254, 255	20
300	30

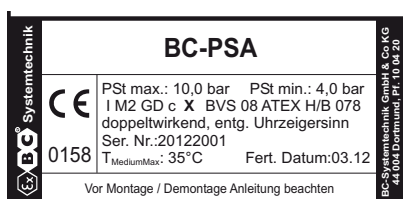
Breakaway torque of counternuts	
Type PSA /PSAE	torque (Nm)
052, 063	8
075, 083, 092	12
110, 118, 127	15
143, 160	20
190, 210	28
254, 255, 300	40

allocation of resetsprings		
number of springs		piston on the right side
2	1	1
3	1	1+4
4	1+4	1+4
5	1+4	2+4+6
6	2+4+6	2+4+6
7	2+4+6	2+3+5+6
8	2+3+5+6	2+3+5+6
9	2+3+5+6	1+2+3+5+6
10	1+2+3+5+6	1+2+3+5+6
11	1+2+3+5+6	all
12	all	all
>12	all	all

Mark 1 - 6 can be found inside the cavities of the piston.

Label

e.g.



Technical data

for pneumatic actuators

- type PSA – double acting (both direction by appliance of press. air)
 type PSAE – single acting, spring reset (one direction by press. air, reset by prestressed springs)



Technical data

Design:	Double piston actuator, single or double acting
Materials:	Housing: Aluminium-alloy, epoxyd-resin-coated Cover: Aluminium-alloy, epoxyd-resin-coated Piston: Aluminium-alloy Gear: Steel, nickel-plated Seals: Nitrile-caoutchouc (NBR, Perbunan) Storages: Plastic
Mounting position:	Any
Ambient temperature:	0 - 60 °C
Piloting pressure:	4 up to 10 bar
Max. pressure:	10 bar
Max. media temperature:	35°C
Control-medium/ Quality:	Filtered air concerning rest-oil, dust and water, leastwise acc. to DIN ISO 8573-1 / class 4
Piloting:	Optional with directly mounted 5/2- or 3/2-way ATEX solenoid valve, electrically, hydraulically, pneumatically or manually consult manufacturer before applying valves
Certified acc. to:	ATEX 98, ExVo Ex I M2 GD c X
Stainless steel edition:	Housing: Stainless steel Cover: Stainless steel Piston: Stainless steel Gear, Stainless steel, nickel-plated Seals:Nitrile-caoutchouc (NBR, Perbunan). Storages: Plastic

EC Conformity Declaration according to Directive 2006/42/EC

Close: 06/2011

We hereby declare that our pneumatic pivoting actuators of the PSA/E series are incomplete machines as defined by the EC Machinery Directive 2006/42/EC. Commissioning of the incomplete machine is forbidden unless the valve on which the actuator is mounted has been installed in a pipeline system.

Any modification to the actuators that affects their technical specification or function invalidates this Declaration. This EC Conformity Declaration applies to double-acting and single-acting pneumatic actuators type EPSA/E.

We confirm compliance with the fundamental requirements of the European Directive ATEX 94/9EC Equipment and Protective Systems intended for use in potentially explosive atmospheres of Group II Category 2, non-electrical equipment.

Product: Actuator for operation with hydraulic media and compressed air

Model/series code: PSA/E

Operating medium: Water, emulsion (water-oil mixture), compressed air

Special conditions for safe use:

- **The outer shell of the actuator contains aluminium and therefore, when the actuator is used in coal mining (group I) in protected arrangement. Operation of the rotary actuator without protection of the housing is not permitted. This requirement also applies during transport and installation.**
- Before the actuator is started, the pipelines and compartment must be flushed with the medium at least 5 times to flush away any remaining atmosphere.
- It must be ensured that there is no electric potential difference between the actuator and other parts of equipment. The actuator must be integrated in the central equipotential bonding system.
- It must be ensured that the pipeline is free from corrosion particles which could be charged with static electricity.
- Only media that are **not potentially explosive substances** shall be used.
- Only original parts shall be used.
- The operating instructions must be observed.
- Compliance with the specifications, environment and the safety instructions under the specified operating conditions must be ensured.

Applicable norms: EN 13463-1:2001
EN 1127-1:1997

Applied national norms VDI/VKE 3845
(Joints, valves, actuators and technical specifications, auxiliary equipment)

The product must be labelled according to ATEX 95 ExVo:

I M2 GD c X

Specifications may change as design revisions take place.
Dortmund 01/03/2012



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