bar-positurn2

Assembly, Mounting and Operating Instructions

Instructions in Safety and Warnings:

Before commissioning, read these instructions carefully and follow all advice.

In this documentation we use different types of instructions for safety and warning signs:

DANGER!

Indicates a real and near danger.
To ignore this sign means possible death or serious injury as consequence.

WARNING!

Indicates a threat of danger.
To ignore this sign means possible serious injury or material damage as consequence.

ATTENTION!

Indicates a possible danger.
To ignore this sign means possible material damage as consequence.

Stands for advice and tips for a better understanding of instructions or a better handling of the unit.

Scope of Validity:

The afore-mentioned operating instructions are valid for positurn2, a module of the new valve control system bar-vacotrol. They are intended for the operator that means the person that works with the unit. This is not a technical handbook. For questions, arising from the contents of this documentation, please contact our customer service department.

Copyright:

Instructions in Safety and Warnings:

Exemption from Liability:

We guarantee the fault-free function of our product according to our advertising, the product information and this documentation issued by us. Further product features are not promised. We undertake no liability for economy and fault-free function, when the product is used for other purposes, as described in the section „Intended Use“.
Damages are generally excluded, except in the case of criminal intent or gross negligence committed by bar is proved, or in the case of promised product features being absent. If this product is exposed to non-prescribed environments, for which it is not suitable or does not correspond to the technical standard as stipulated therein, we cannot and will not be held responsible for the consequences.
We accept no liability for damages to systems and equipment in whatever form in the surrounding environment around the product, which result from a fault of the product or in this documentation. We are not responsible for injuries to patents and/or other third party rights outside the Federal Republic of Germany.
We cannot be held liable for damages, resulting from the incorrect operation and non-adherence to the instructions laid down in this documentation. We are not liable for losses in profit and resulting damage thereof from the non-adherence to safety instructions and warnings. We undertake no liability for damage, resulting directly or indirectly from the use of accessories and/or consumable products, which have been neither delivered nor certified by bar.
The products manufactured by bar GmbH are designed to give a long service life. They correspond to the state of the art for science and technology and are individually tested in all functions before dispatch. The electrical and mechanical construction corresponds to valid standards and guidelines. bar constantly carries out ongoing tests on the products and the marketplace, to ensure the further development and improvement of their products.
In case of faults and/or technical problems, please contact our service department. We can assure you, that immediate appropriate measures will be initiated. Valid here are the Terms of Warranty from bar GmbH, which we will send to you upon request.

Designated Usage:

The positurn2 is a positioner for mounting onto pneumatic actuators of the series known as the actubar series or actuators according to VDI/VDE 3845 with a pivoting angle of max. 180°. With the help of external solenoid valves and compressed air, the positurn2 converts analog input signals into actuator pivoting movements. Usage as a 3-position control unit with freely se-

Instructions in Safety and Warnings:

lectable middle position and binary control (without analog activation) is possible as an alternative, just as application as position indicator without any activation.
Any other application of this device is to be considered to be outside the designated use. If you have any questions, or would like to use the unit for another purpose, please contact our customer service department. We will be pleased to help with the necessary configurations.

Guarantee:

For this device, we undertake the warranty of faultless condition for a duration of six months within the framework of our Conditions of Warranty. Parts subject to wear-and-tear are excluded from this warranty. The claim is invalidated, when tampering is carried out by persons who are hereby not authorised by bar GmbH.
Inside the warranty period of time, we will repair damage or faults without cost, which can be provenly traced back to a factory error, insofar as this is registered by us immediately upon discovery, at the latest however inside a time span of six months following the date of delivery. The warranty cover will be made according to our estimation, through cost-free repair maintenance of the faulty part(s) or exchange of those parts with faultless parts.
Send the units, for which the claim against warranty is being made, carriage-paid and with a copy of the invoice i.e. the delivery note to bar GmbH. Please get in contact with our customer service department before sending the goods.

Obligations of the Customer:

The owner/operator of this device has to ensure that only persons who

- know the rules about safety at work and prevention of accidents
- have been instructed in the operation of this device
- have completely read and understood these instructions

can use and operate this device. Persons, who operate this device, are obliged:

- to observe all rules pertaining to safety at work and the prevention of accidents
- to read these instructions thoroughly.

Authorised Personnel:

Persons to be seen as authorised, are those with a successfully concluded professional training, technical experience, as well as knowledge of the appropriate standards and guidelines, and who are in a position, to appreciate the tasks they are delegated, and lastly to recognise and act upon possible dangers arising.

Operators of the positurn2

Persons to be seen as authorised, are those who have been instructed in the opera-

Instructions in Safety and Warnings:

tion of a bar-positurn2 and have read and fully understood these instructions.

Personnel for Installation and Care

Persons to be seen as authorised, are those who have been instructed in the importance and consequences of a positioner and have read and fully understood these instructions.

Functional Description:

In its standard form, the positurn2 is designed & manufactured for actuators with a closing direction for valves in a clockwise manner (cw). The actuator undertakes the basic position with a closed valve. In the case of corresponding units, the basic position corresponds to so-called safety effect "current-free closed"
In the initialisation process, the positioner adjusts to the defined actuator pivoting range. The analog activation is triggered from the control point and effects the proportional allocation of the defined pivoting angle to the set value (input) signal.
In a similar manner, the defined pivoting angle is allocated an analog positioning signal.
Binary signals are formed additionally at the start and end of the pivoting range.
Electrical connection is made at terminal blocks inside the unit. Pneumatic connection is made directly at the external solenoid valves.

The positurn2 is mounted

- with bracket onto actuators with interface acc. to VDI/VDE 3845
- or directly onto actuators type actubar.

Solenoid valves are fitted to standard interfaces with type-related material.

Technical Data:

Materials	Housing	GD-AlSi 10Mg (Aluminium press-cast)	
	Screws	A2-70 (stainless steel)	
	Viewing Glass	PMMA	
	Optic fibre	TPE	
	Cable connection	PA	

Pivoting angle		10° to 190°	
Protection Type		IP 65	
Mounting position		random	
Ambient temperature		-20°C to +70°C	
Ambient humidity		10-90%, non-condensing	
Weight	Without valve	ca. 0,65 kg	
	Variant D	Mini-valves: ca. 1,0 kg	Midi-valves: ca. 1,1 kg
	Variant S	Mini-valves: ca. 1,2 kg	Midi-valves: ca. 1,4 kg
	Variant E	Mini-valves: ca. 1,2 kg	Midi-valves: ca. 1,4 kg

Analog control signal	Effective direction	reversible by sliding switch
Actuating signal	Signal type	selectable 4-20 mA, 0-10 V, inverse polarity-protection, proportional to pivoting angle
	Pre-resistor	> 1 kOhm at 0-10 V; < 500 Ohm at 20mA
Dead-zone		± 2% of nominal pivoting angle
Travel speed		Adjustable by throttles in solenoid valves

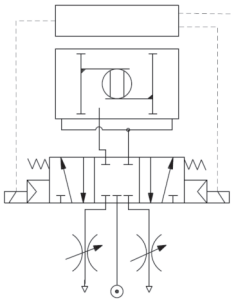
Position signal	Signal type	selectable 4-20 mA, 0-10 V, nominal, active, inverse polarity protection, proportional pivoting angle
	Resolution	< 0,5% of nominal pivoting angle

Limit feedback	Voltage	12-28 VDC
	System	Opto-coupler, short-circuit-proof; 1 kOhm series & 10 kOhm parallel resistance fitted
	Indication	3% of nominal pivoting angle before initiated end position

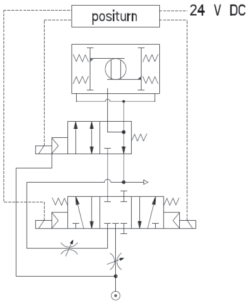
Supply		24 VDC (21 bto 28 VDC), inverse polarity protection	
Power consumption	Variant D	Mini-valves: 1,8W	Midi-valves: 4,2 W
	Variant S	Mini-valves: 3,6W	Midi-valves: 7,2 W
	Variant E	Mini-valves: 3,6W	Midi-valves: 7,2 W

Terminal strip		Clamping range up to 0,75 mm²
Cable to PCS		7 to 13 mm, 0,5 mm², random cable length
Binary input signals	ON/OFF valves	< 10 V for „0“; > 18 V for „1“
Operating pressure		2,5 to 8 bar
Air Quality		Filtered air acc. to DIN ISO 8573-1/Class4

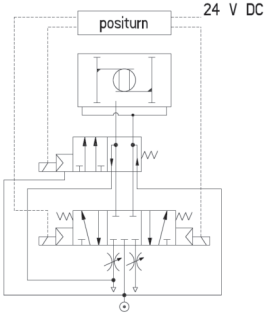
Pneumatic Layout:



Pneumatic scheme for positurn2 PN2-D



PN2-E (single-acting)



PN2-S (double-acting)

Pneumatic schemes for the safety-orientated positurn2

Please note the unit-specific safety descriptions on pages 13 and 14.

Delivery and Unpacking:

Controlling the Delivery:

The unit is dispatched from bar and transported by selected transport companies i.e. parcel services. At the point of arrival on your premises you should check the following:

- Are the number of packages that arrived the same as on the bar delivery note?
- Is the packaging free from visible signs of damage?
- Are the unit(s) and the accessories free from visible signs of damage?
- Are there any signs of careless handling during transport (e.g. burn marks, scratches, paint)?

To be able to present all claims against the transport companies, you should document all possible transport damage (e.g. with photographs and a written report), before you unpack the unit. bar is not responsible in any way for transport damage and can not accept responsibility or liability in any way whatsoever.

Scope of Delivery:

Carefully remove the transport packaging. Please observe all laws and regulations for the disposal of packaging materials.
The positurn2 comes supplied with the external solenoid valve version D, S or E – depending on the actuator type and safety concept. There is a mounting bracket for mounting onto actuators with protruding shaft.
Check the scope of delivery with the delivery note and the order documentation.

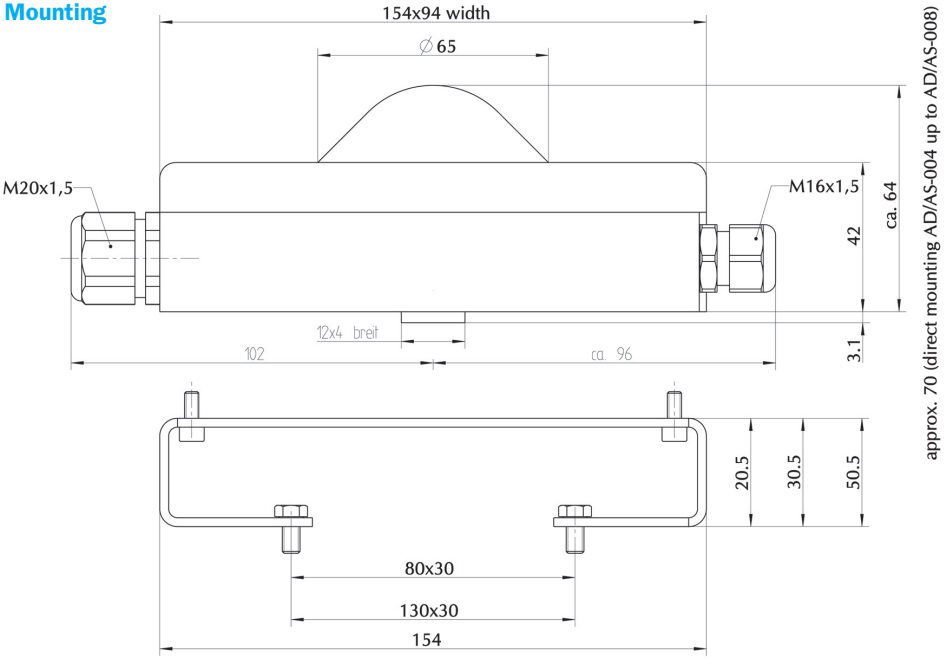
English

Delivery and Unpacking:

Any differences should be registered immediately to bar. Later complaints about incomplete or damaged deliveries cannot be accepted.

Mounting, Electrical Connection, Initialising and Commissioning:

Mounting



WARNING!

Mounting may only be carried out by suitably trained skilled persons. Otherwise there is the danger of an incorrect installation.

- Open the positurn2 and set it onto the actuator.
- Take special care to avoid the entry of dust, dirt and moisture getting into the open housing of the positurn2 during mounting & commissioning
- Guide the base of the positioner into the corresponding groove at the actuator.

English

- Fix in position the positurn2 and solenoid valve by making use of the mounting materials supplied.
- Place the position indicator on top and take care to see that the symbol position coincides with the valve function.
- Take care to ensure the correct direction when assembling the housing cover. The flexible fibre-optic light guides must be free from sharp bends and enter the lead-throughs of the protective cover.

Electrical Connection:

WARNING!

Electrical installation may only be carried out by suitably qualified & skilled persons.

Otherwise there is a real danger of electric shocks.

Positioner

Electrical Connections: PN2-D; PN2-E and PN2-S		
Digital Inputs	1	Activate magnet A (counter-clockwise rotation)
	2	Activate magnet B (clockwise rotation)
	3	Activate positioner-function (24VDC)
Digital Outputs	4	Counter clockwise end position reached
	5	Clockwise end position reached
	6	Stand by
	7	
Analog Input	8	Set value for pivoting angle (+)/(-) to clamp 14
Analog Output	9	Actual value pivoting angle (+)/(-) to clamp 14
	10	Actual value diff. press. (+) (optional) /(-) to clamp 14
Activation Safety valve	11	Magnet C (+)
	12	Magnet C (-)
Power Supply	13	24 VDC
	14	GND (for supply, analog signals and digital inputs)
Activation Solenoid valve	15	Magnet A (-)
	16	Magnet A (+)
	17	Magnet B (-)
	18	Magnet B (+)
Earthing		Earthing point in the housing

English

Electrical Connection:

3-Position Control

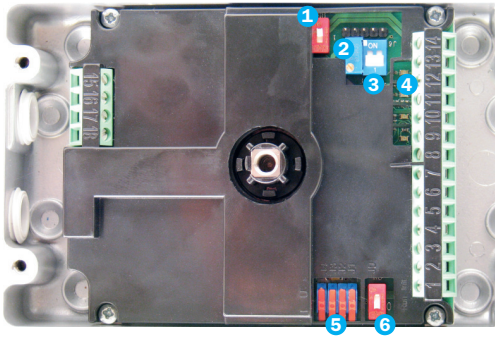
Electrical Connections: PN2-3P-D; PN2-3P-E; PN2-3P-S		
Digital Inputs	1	Activate magnet A (counter-clockwise rotation) 24V DC
	2	Activate magnet B (clockwise rotation) 24V DC
	3	Move to intermediate position 24V DC
Digital Outputs	4	Counter-clockwise end position reached
	5	Clockwise end position reached
	6	Stand by
	7	Intermediate position reached
	8	
Analog Output	9	Actual value pivoting angle (+)/(-) to clamp 14
	10	Actual value diff. press. (+) (optional) /(-) to clamp 14
Activation Safety valve	11	Magnet C (+)
	12	Magnet C (-)
Power Supply	13	24 VDC
	14	GND (for supply, analog signals and digital inputs)
Activation Solenoid valve	15	Magnet A (-)
	16	Magnet A (+)
	17	Magnet B (-)
	18	Magnet B (+)
Earthing		Earthing point in housing

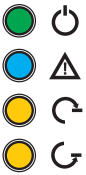
English

Initialising/Commissioning:

ATTENTION!

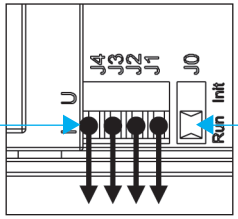
Do not damage switch!



1. Operating direction switch
2. Potentiometer
3. Program Switch:
   1 = Positioner mode
   ON = 3-Position mode
4. 
5. Current / Voltage switches
6. Initialising switch

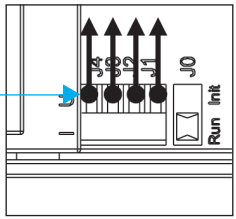
Set current / voltage switches according to the signal type for the unit.

Analog signal
4-20 mA



Initialising switch

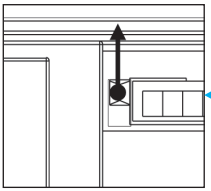
Analog signal
0-10 V

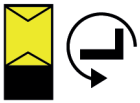


English

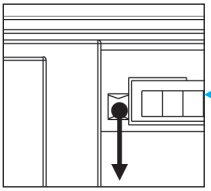
Initialising/Commissioning:

Set operating direction switch according to the direction of actuation for the valve actuator.





Left-rotating actuator in switch position ccw (**L**)
Input & output signal ccw increasing



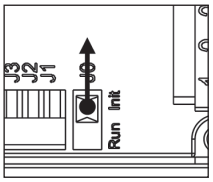
Right-rotating actuator in switch position cw (**R**)
Input & output signal cw increasing

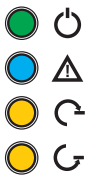
Note:

When initialising, the operating direction switch **must** be set in accordance with the operating direction of the valve actuator, in order to ascertain the real function correctly. In real operation, the operating direction switch may be adjusted when the increase in signal for special cases is to be changed.

Initialising (learning the end positions and other specific data):

- Check whether the **operating direction switch** has been set in accordance with the operating direction of the actuator (**L/ccw or R/cw**).
- Make the electrical connections according to the connection diagram.
- Select program:
  1: Positioner
  On: 3-Position mode
- Set initialisation switch J0 to „**Init**“.
- Establish power supply.





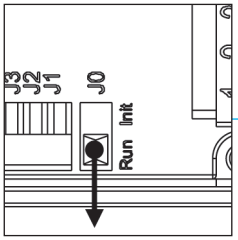
▶ all 4 Status-LEDs illuminate

- The actuator must be taken to each end position 2 times by making use of the emergency manual operation of the solenoid valve. Alternatively, the actuator can be taken to the end positions by alternating terminals 1 and 2 with terminal 13 (24 VDC).
- The end positions must be fully reached at least 2 times. Take care to see that the compressed air flow comes to a standstill.
- Connect digital input terminal 3. If there is no external digital input available for activating the function “Positioner“, lay a bridge between terminal 13 and terminal 3.

ACHTUNG!

Not valid for 3-Position mode!

- Set sliding switch J0 to **„Run“**.
- Set the middle position at the 3-Position control unit via the integrated potentiometer.



or

▶ The green status-LED illuminates and a yellow LED illuminates depending on the particular end position.

ATTENTION!

- Please note that all safety functions are immediately available when switching the initialisation switch from „J0“ to „Run“. This can cause an immediate switching of the actuator!

- In case of every (even accidental) switching to “Init“, the whole initialisation process must be carried out anew, because the previously learned values will have been lost.
- After every change in the end position and re-assembling the actuator, do not forget to make a new initialisation.

English

Explanation of digital signals and status-LEDs					
6	7	5	4	**Digital output terminal no.**	
				**Symbol**	
				Meaning	
●				Operation	
●		●		Clockwise end position reached	
●				Counter-Clockwise end position reached	
●	●		●	Intermediate position reached	
(•)	●	●	●	Initialisation	

Description of Safety Functions:

Positioner mode 4-20 mA:

Unit type: PN2-D

- Digital Input Terminal 3 missing ▶ Valve stays in last position
- Current supply Terminal 13 + 14 missing ▶ Valve stays in last position
- Analog input Terminal 8 missing ▶ Valve stays in last position
- Analog input Terminal 8 < 2mA ▶ Valve stays in last position

Unit type: PN2-S

- Digital Input Terminal 3 missing ▶ Valve moves to safety position
- Current supply Terminal 13 + 14 missing ▶ Valve moves to safety position
- Analog input Terminal 8 missing ▶ Valve moves to safety position
- Analog input Terminal 8 < 2mA ▶ Valve moves to safety position

Unit type: PN2-E

- Digital Input Terminal 3 missing ▶ Valve moves to safety position
- Current supply Terminal 13 + 14 missing ▶ Valve moves to safety position
- Analog input Terminal 8 missing ▶ Valve moves to safety position
- Analog input Terminal 8 < 2mA ▶ Valve moves to safety position

Positioner mode 0-10 V:

Unit type: PN2-D

- Digital Input Terminal 3 missing ▶ Valve stays in last position
- Current supply Terminal 13 + 14 missing ▶ Valve stays in last position
- Analog input Terminal 8 missing ▶ Valve stays in last position

Unit type: PN2-S

- Digital Input Terminal 3 missing ▶ Valve moves to safety position
- Current supply Terminal 13 + 14 missing ▶ Valve moves to safety position
- Analog input Terminal 8 missing ▶ Valve moves to safety position

Unit type: PN2-E

- Digital Input Terminal 3 missing ▶ Valve moves to safety position
- Current supply Terminal 13 + 14 missing ▶ Valve moves to safety position
- Analog input Terminal 8 missing ▶ Valve moves to safety position

3-Position mode:

Unit type: PN2-3P-D

- Digital Input Terminal 1, 2 + 3 missing ▶ Valve stays in last position
- Current supply Terminal 13 + 14 missing ▶ Valve stays in last position

Unit type: PN2-3P-S

- Digital Input Terminal 1, 2 + 3 missing ▶ Valve moves to safety position
- Digital Input Terminal 1, 2 + 3 missing Longer than 3 seconds ▶ Valve moves to safety position
- Current supply Terminal 13 + 14 missing ▶ Valve moves to safety position

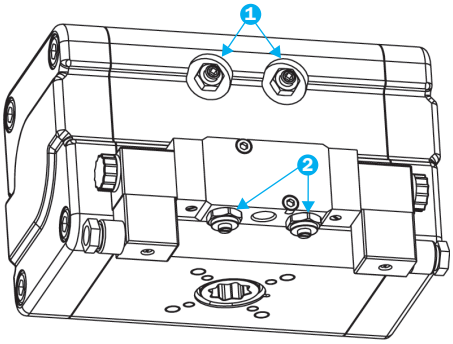
Unit type: PN2-3P-E

- Digital Input Terminal 1, 2 + 3 missing ▶ Valve moves to safety position
- Digital Input Terminal 1, 2 + 3 missing Longer than 3 seconds ▶ Valve moves to safety position
- Current supply Terminal 13 + 14 missing ▶ Valve moves to safety position

Setting the End Positions and the Actuating Speed:

DANGER!

Danger of crushing by moving actuator and valve components! Set and secure the mechanical **end positions** of the actuator.



1. End position adjustment screws
2. Throttles

Use the **throttles** at the pneumatic valves to set the actuating speed of the actuator. Standard setting: minimum 5 seconds pivoting time for 90° pivoting angle.

- If so required, shorten the cable in the solenoid valve wiring or coil it together in a tidy manner and bind together with cable-ties.
- If so required, the coils in the solenoid valves can be exchanged. Take note here to keep the same cabling system and to initialise anew.
- Do not close the throttle completely; the consequence will be that no actuator function will follow.

ATTENTION!

- When using manual operation at the pneumatic valves you have to return them to the initial position afterwards.
- After every change in the end position and re-assembling the actuator, do not forget to make a new initialization.

Faults and their Correction:

Description	Possible cause	Correction
After the initialisation process and switching the initialisation switch to “RUN“, only the end position is reached. Positioning is not possible.	Solenoid valves not correctly connected.	Exchange the valve connections at terminals 15 and 16 with terminals 17 and 18. After this sequence, the unit must be initiated anew.
End position not indicated.	Faulty initialisation of the unit	Initialise anew
Actuator moves to the wrong end position for safety position.	Solenoid valve block wrongly mounted	Loosen solenoid valve block, rotate 180° clockwise and re-tighten. Re-wire the coils.
Unit oscillates around the set intermediate position.	Too-high actuating speed	Throttle-back actuating speed

Cleaning and Maintenance:

Cleaning:

ATTENTION!

Never use aggressive cleaners or materials to clean the housing of the positurn2. This can lead to damage to the viewing glass or paintwork.

- Clean the housing of the positurn2 with a clean, slightly moistened cloth.
- In the case of hardened-on dirt, use a normal household cleaner according to the instructions on the packaging on the cleaner.

Maintenance:

ATTENTION!

Never open the protective cover above the delicate electronics. This can lead to damage to the unit and the loss of all warranty claims.

- The positurn2 works maintenance-free. In case of defects, which take place inside the warranty time, remove the positurn2, and after telephoning us, send it to the address as shown on the rear side.

Declaration of Conformity:

Name and address of the manufacturer — bar pneumatische Steuerungssysteme GmbH
Auf der Hohl 1, 53547 Dattenberg / Germany

Herewith we declare, that product described below

Product denomination: — Positioner for pneumatic double piston actuator
Model/type: — bar-positurn type PN / PN2

was manufactured according to the following standards:

Where appropriate Harmonised Standards used:

Low-voltage switchgear and controlgear EN 60947-5-2
Part 5-2: Control circuit devices and switching elements

Low-voltage switchgear and controlgear EN 60947-5-6
Part 5-6: Control circuit devices and switching elements, -DC interface for proximity sensors

The products according to the following directives:

2006/95/EC	Low voltage directive
2004/108/EC	EMC directive
2006/95/EC	CE-marking directive

Please take care about the technical data and the relevant warning and safety notices.

The person authorised to compile the technical documentation (must be established within EU):

Dattenberg, 01.02.2011 — Scholl, Klaus, Manager R&D

Place, Date — Surname, first name and function of signatory — Signature

English

bar pneumatische Steuerungssysteme GmbH

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