

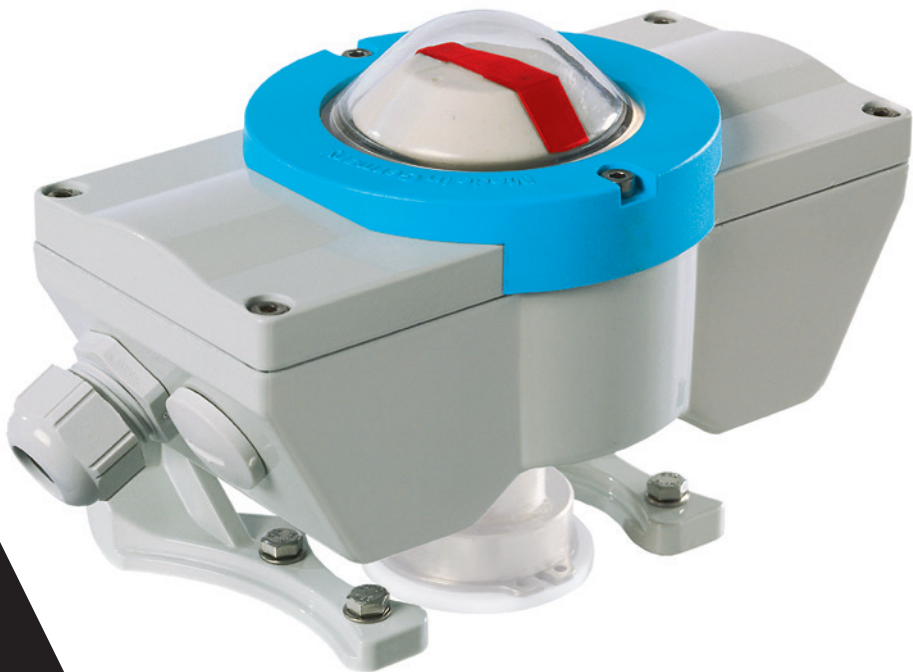
CR-TEC Engineering

Automated Valve Solutions

switch control[®]

Operating, mounting and adjusting instruction

Original operating manual



Safety Regulations:

Read these instructions before commissioning the equipment!

The switchcontrol is designed for operation as an optical display for intermediary and end positions from position indicators, on industrial fittings. Just before reaching the end position, an electrical signal is generated, e.g. for feedback to the process control point.

All of these units are to be installed only by suitably qualified skilled personnel. The hereby quoted regulations are to be strictly adhered to.

Incorrect handling or non-adherence to the designated usage can lead to the loss of function of the unit described in this document!

- Work on the switchcontrol must be always carried out without connection to the voltage supply and under acceptance and adherence to the current national and international Safety Regulations. Also disconnect the compressed air supply to the actuator!
- Before installing, i.e. commissioning the unit described in this document, check the technical parameters, especially the electrical connection values of the applied sensors.
- Take note of the diagram on the inside of the housing.
- A change in the actuator pivoting angle requires renewed adjustment of the unit described in this documentation.
- Do not mount the unit described in this document with the cable glands pointing upwards.
- The unit may only be operated when it is correctly closed according to this documentation.
- In Ex-areas, adjustment work on the opened units only to be carried out under the following conditions:
 - You fulfil the authorised regulations (informing the fire brigade etc.)
 - You follow exactly the local necessary protective measures! (Continuous measurement of combustible atmosphere etc.)
 - You avoid electrostatic charges, even the metallic housing on the sensors.
- When laying cables in Ex-areas, make sure you adhere to DIN EN 60079-14.
- In explosion-protected areas, it may be necessary to provide direct sunlight protection, to shield the surface of the

Safety Regulations:

unit from the overheating effects of too much direct sunlight. In explosion-protected areas, only intrinsically safe solenoid valves may be connected in the bar-switchcontrol.

- Do not use thinners or abrasive mediums to clean the unit, the plastic window may lose its clarity .
- **The switchcontrol is not designed to be used for the transport, leverage in any way of actuators or automatic valves. It is also not a step or climbing help for fitters. The fixings can break under these loads.**



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Technical Data – General Data:

Fixing dimensions:	acc. to VDI/VDE 3845 for flange plates 30 x 80 mm and 30 x 130 mm
Materials: Housing: Viewing glass: Screws: Blanking plugs and cable glands: Plate:	Aluminium, resin-coated Polycarbonat (PC), with A TEX model anti-static coated stainless steel A2 Polyamid (PA) ABS+PC, A TEX model excl. plate
Protection type:	IP 67
Temperature range:	-20 °C to + 70 °C; low temperature: -40 °C to +70 °C on request
Cable glands:	M20x1,5; clamping range 7–13 mm
Cable:	Ø7–13 mm, max. 2,5 mm ² , screw terminal with protection
Weight:	0,8 kg
Display and switching range:	0 to 180° pivoting angle

Technical Data – bar-switchcontrol types:

Micro-switch:	Type SC-M2
Voltage range: Constant current: Switching function:	to 250 VAC 5A changer, contacts precious metal-coated
Inductive round sensor:	Type SC-D2 (Signal „OPEN + CLOSED“); Type SC-DA (Signal „OPEN“); Type SC-DZ (Signal „CLOSED“)
Voltage range: Operating current IL: Idling current Io: Switching function:	10–30 VDC 0–100 mA < 15 mA PNP closer, with yellow switch position display (LED)
Inductive round sensor NAMUR:	Type SC-N2 (Signal „OPEN + CLOSED“) Type SC-NA (Signal „OPEN“) Type SC-NZ (Signal „CLOSED“)
Rated voltage Uo: Current input: Switching function: Switch type: ATEX-Identification:	8 VDC damped < 1 mA; undamped > 3 mA NAMUR opener, yellow switch position display (LED) Pepperl + Fuchs NCN4-12GM35-N0 EC-type examination certificate PTB 00 ATEX 2048 X and ZELM 03 A TEX 0128 X (You find the ATEX certificate also on the Internet: www.pepperl-fuchs.com)  II 2GD EEx ia IIB T6 EEx iaD 21
Inductive slot sensor NAMUR:	Type SC-NS2 (Signal „OPEN + CLOSED“); Type SC-NSA (Signal „OPEN“); Type SC-NSZ (Signal „CLOSED“)
Display and switching range:	0 to 180° pivoting angle
Rated voltage Uo: Current input: Switching function: Switch type: ATEX-Identification:	8 VDC damped < 1 mA; undamped > 3 mA NAMUR opener, yellow switch position display (LED) Pepperl + Fuchs SC3,5-N0-yellow EC-type examination certificate PTB 00 ATEX 2219 X and ZELM 03 A TEX 0128 X (You find the ATEX certificate also on the Internet: www.pepperl-fuchs.com)  II 2GD EEx ia IIB T6 EEx iaD 21

Declaration of Conformity:

Herewith we declare, that product described below

Product denomination: Limit switch box for pneumatic
double piston actuator
Model/type: switchcontrol type SC-M2 and SC-D2
was manufactured according to the following standards:

Where appropriate Harmonized Standards used:

Low-voltage switchgear and control gear EN 60947-5-2
Part 5-2: Control circuit devices and switching elements
Low-voltage switchgear and control gear 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 authorized to compile the technical documentation
(must be established within EU):**

Dattenberg, 08.04.2010 Scholl, Klaus, Manager R&D
Place, Date Surname, first name and function of signatory



Signature

ATEX-Declaration of Conformity:

Product denomination: Limit switch box for pneumatic double piston actuator
Model/type: switchcontrol type SC-N2, SC-NS2, SCE-N2
in association with used switches: SC 3,5-N0; SJ 3,5-SN; NCN 4-12GK35-N0;
NCN 4-12GM35-N0; NJ 2-12GK-N; NJ 4-12GK-SN;
NS 5002

was manufactured according to the following standards:

Where appropriate Harmonized Standards used:

Low-voltage switchgear and control gear EN 60947-5-2;
Part 5-2: Control circuit devices and switching elements
Low-voltage switchgear and control gear EN 60947-5-6;
Part 5-6: Control circuit devices and switching elements
Explosive atmospheres EN 60079-0; Part 0: Equipment – General requirements
Electrical apparatus for explosive gas atmospheres EN 60079-25;
Part 25: Intrinsically safe systems

The products according to the following directives:

94/9/EC	ATEX-directive
2006/95/EC	Low voltage directive
2004/108/EC	EMC directive
2006/95/EC	CE-marking directive

Designation:  II 2 G Ex ia IIB T6
 II 2 D Ex ia D21 T 120 °C

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, 04.10.2010 Scholl, Klaus, Manager R&D



Place, Date

Surname, first name and function of signatory

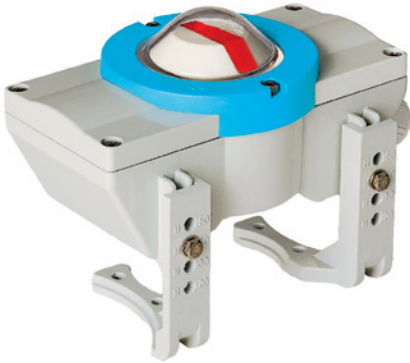
Signature

Mounting the bar-switch control:

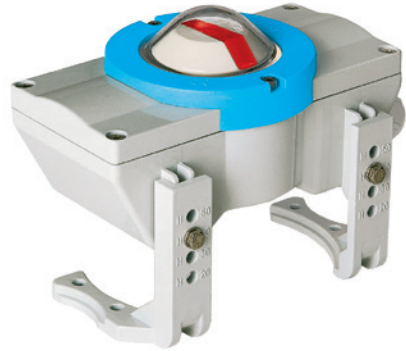
Adjusting the mounting feet

The unit described in this documentation is equipped with mounting feet, which can be mounted onto all actuators fitted with an interface acc. to VDI/VDE 3845.

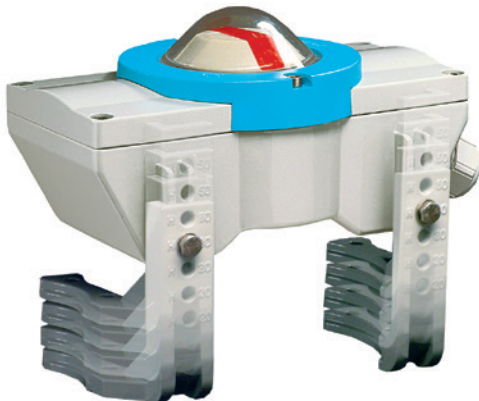
The dimensional width is achieved by having the feet mounted either inwards or outwards (Fig. 1 and 2), and the height is adjusted by sliding the mounting feet along the guides on the side of the housing (Fig. 3).



► Fig. 1: Feet mounted inwards:
Fixing dimensions 80 x 30 mm



► Fig. 2: Feet mounted outwards:
Fixing dimensions 130 x 30 mm



► Fig. 3: Height adjustment for different pinion lengths 20, 30, 40 and 50 mm

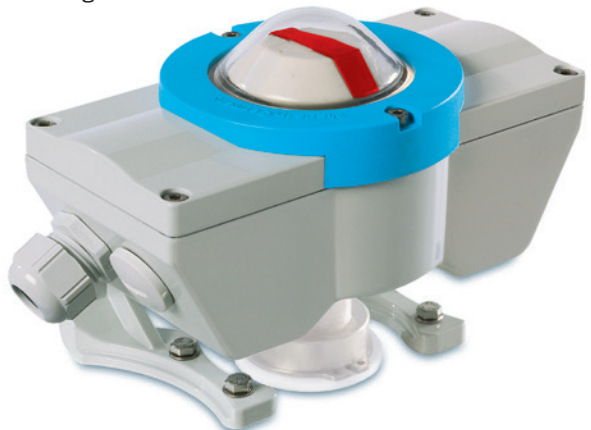
Mounting on the actuator:

Attention!



When mounting the limit switch box onto the actuator interface, it is imperative to take note of the rotational direction of the actuator pinion, because incorrect mounting of round initiators can lead to damage to the initiator and drive. Take care for stress-free mounting of the bar-switchcontrol with the actuator!

- 1a.** For the mounting on actuators which correspond with the provided adjusted mounting measures unscrew the back-sided screws, set the switchcontrol onto the actuator and tighten the screws again.
 - Slide the mounting feet along the guide to reach the desired height.
 - If distance between the mounting feet is not correct, then change over to reach the desired width.
 - Take fixing screws and washers and fix in position.
- 1b.** For mounting onto actuators, whose connection dimensions differ from those of the mounting feet dimensions provided, then follow the instructions below:
 - Loosen and remove the two fixing screws.
- 2.** Place the switchcontrol onto the actuator interface and fix in position using the fixing screw set provided.



Connecting:

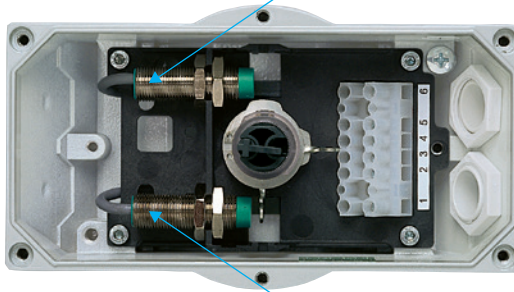
Electrical connection for the bar-switchcontrol

The supply cable must be fixed in position and protected against rotation! Cable and supply lines must comply with DIN EN 60079-14 in Ex-areas! The circuit diagram

on the inside of the housing gives the connection system. Take care to observe the connection data for the switch and/or initiator.

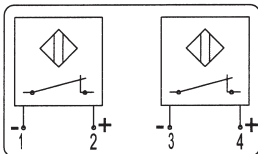
Connecting round initiators (Type SC-D and SC-N)

- ▶ onto terminal 3 and 4 (Type SC-N), and/or 4,5 and 6 (Type SC-D)

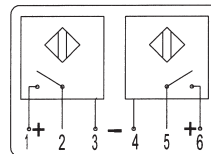


- ▶ onto terminal 1 and 2 (Type SC-N), and/or 1,2 and 3 (Type SC-D)

Connection diagram for round initiators (Type SC-N and SC-D)



- ▶ inductive switch, NAMUR round initiator: (Type SC-N)

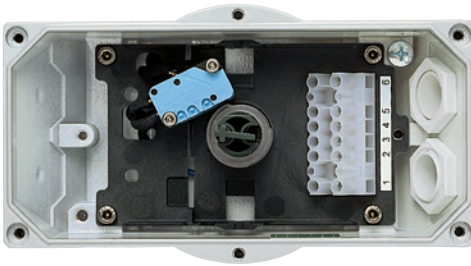


- ▶ inductive switch, 3-core: (Type SC-D)

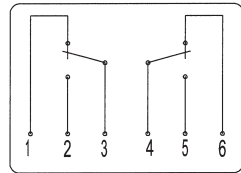
Connecting:

Connecting micro-switches (Type SC-M)

- The upper operating cam/actuating element actuates the higher ranking switch on the switchcontrol (terminal 4-6), which is preferentially allocated the „Open-Position“ of the valve.
- The lower operating cam/actuating element actuates the lower-ranking switch on the switchcontrol (terminal 1-3), which is preferentially allocated the „Closed-Position“ of the valve.
- The micro-switches are changers. The exact terminal connection plan is dependant on the wiring system of the whole plant.

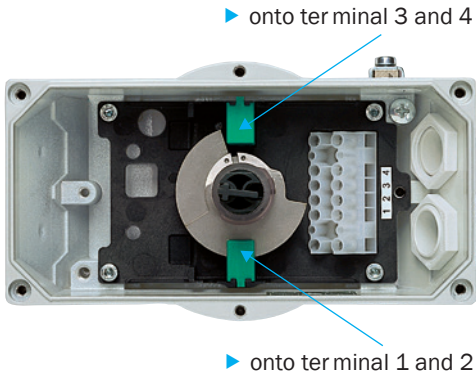


Connection diagram micro-switch (Type SC-M)

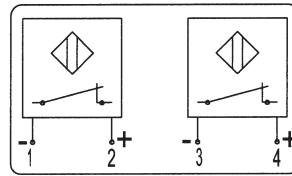


Connecting:

Connecting slot initiators (Type SC-NS)



Connection diagram slot initiator (Type SC-NS)

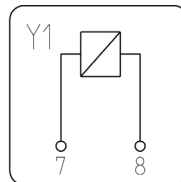


- ▶ Inductive switch, NAMUR slot initiator: (Typ SC-NS)

Connection of slot initiators (type SC-NS) – Attention!



All types of switchcontrol ordered with internal connection of solenoid valves (S1-connection) have an 8-fold terminal block. Connection of terminals 7 and 8 is as per connection diagram.



Solenoid valve connection equal for all types.

Adjusting the switching cam:

General Instructions – Attention!



- Before setting the switching cams in actuators with adjustable pivoting angle-valve and actuator must be adjusted beforehand.
- A suitable electrical testing device is required for setting, e.g. Pepperl and Fuchs ST03 (not for use in Ex-areas).
- Before working on the switchcontrol, make sure the voltage supply is isolated!
- In the setting instructions, it is assumed that the valve (looking from above the axis) closes in a clockwise direction.
- During the setting, it is best to remove the white position indicator from the camshaft.
- Inside every switchcontrol there is an adjusting tool (E) for the cam setting – this can be found in the actuating shaft.



- ▶ **Fig. A:** The lower switching cam can be set, when the adjusting tool is pressed down as far as marking 1 as delivered!



- ▶ **Fig. B:** To set the upper switching cam, adjusting tool is pressed into the opposite-lying recess as far as marking 2.

▶ Fig. C:

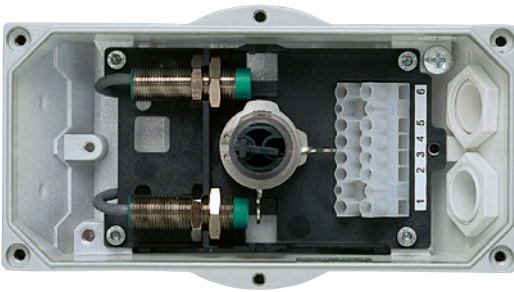
- After the position setting, the adjusting tool (E) must not be rotated. Additionally, it must be then pulled out and inserted into the deeper recess of the camshaft, so that the „Flag“ lies over the other recess (Fig. C), otherwise it is not possible to replace the position indicator .
- After successfully completing the setting, the position indicator is inserted onto the cam-shaft, whereby the cam is finally snapped in place.
- Screw the cover back in position before restarting to replace the position indicator .



Setting the round initiators and Position Indicator:

Setting the round initiators

- According to the General Instructions, the appropriate actuating device for the Open- i.e. Closed-Position in the basic position of the automatic valve is to be set, so that it generates a signal a few degrees before reaching the end position.
- Then set the other actuating device slightly less than 90° to the first actuating device (see picture this page).
- Take the valve to the other end position, and set the actuating device, so it also generates a signal a few degrees before reaching the end position.

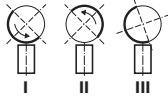
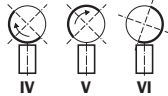
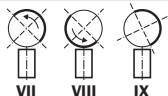
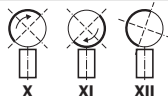


- The red marking is there to indicate the open way for the valve. Simply bend and tear off the unused segment from the red T-formed display clip.



Setting the micro-switches and slot initiators:

Carry out the setting according to Matrix. Attention! In the setting instructions, it is assumed that the valve (looking from above the axis) closes in a clockwise direction!

Micro switches	Operated switching	
Slot initiators	Damped switching	
	Valve	
	„OPEN“  I II III	„CLOSED“  IV V VI
2-fold	1. Open the valve. 2. Insert the adjusting tool according to fig. B/page 12. 3a. The switch is air eady operated/damped: (I) Turn the adjusting tool anticlockwise until the switch is no longer actuated/damped. (II) Keep on turning until switching point is reached. (III) 3b. The switch is not operated/damped: (II) Turn the adjusting tool anticlockwise until switching point is reached. (III)	1. Close the valve. 2. Insert the adjusting tool according to fig. A/page 12. 3a. The switch is air eady operated/damped: (IV) Turn the adjusting tool clockwise until the switch is no longer operated/damped. (V) Keep on turning until switching point is reached. (VI) 3b. The switch is not operated/damped: (V) Turn the adjusting tool clockwise until switching point is reached. (VI)
Micro switches	Not operated switching	
Slot initiators	Undamped switching	
	Valve	
	„OPEN“  VII VIII IX	„CLOSED“  X XI XII
2-fold	1. Open the valve. 2. Insert the adjusting tool according to fig. B/page 12 3a. The switch is not operated/damped: (VII) Turn the adjusting tool anticlockwise until the switch is no longer actuated/damped. (XIII) Keep on turning until switching point is reached. (IX) 3b. The switch is air eady operated/damped: (VIII) Turn the adjusting tool anticlockwise until switching point is reached. (IX)	1. Close the valve. 2. Insert the adjusting tool according to fig. A/page 12. 3a. The switch is not operated/damped: (X) Turn the adjusting tool clockwise until the switch is operated/damped. (XI) Keep on turning until switching point is reached. (XII) 3b. The switch is air eady operated/damped: (XI) Turn the adjusting tool clockwise until switching point is reached. (XII)

Accessories and spare parts:

Name:	Consisting of:	
Spare part set No. 1 Housing feet	2 pieces 2 pieces 4 pieces 8 pieces 12 pieces	Left feet Right feet Screw M5 short Screw M5 long Washer
Spare part set No. 2 Display window	3 pieces 3 pieces 3 pieces 3 pieces 3 pieces 3 pieces	Display glass O-Ring for display glass O-Ring for cover Position indicator Clip Cap
Spare part set No. 3 Actuating shaft Micro-switch	3 pieces 3 pieces 3 pieces 6 pieces	Actuating shaft O-Ring Adjusting tool Switching cam
Spare part set No. 4 Actuating shaft Round Initiator	3 pieces 3 pieces 3 pieces 6 pieces	Actuating shaft O-Ring Adjusting tool Switching cam; Actuating device Round initiator
Spare part set No. 5 Actuating shaft Slot Initiator	3 pieces 3 pieces 3 pieces 6 pieces	Actuating shaft O-Ring Adjusting tool Switching cam; Actuating device Slot initiator
Spare part set No. 6 Pressure compensating element	3 pieces 3 pieces 3 pieces	Pressure compensating element Counter-nut Reducer
Spare part set No. 7 Solenoid valve switching	3 pieces 3 pieces 6 pieces 6 pieces	Terminal block 8x Flathead screw Locking washer; Cable gland Counter-nut
Spare part set No. 8 Micro-switch	2 pieces 2 pieces 2 pieces	Micro-switch with connecting cable Nut M3 Screw M3
Round Initiator NBN 4-12GM40-E2	1 piece	Round initiator
Round Initiator NCN 4-12GM35-NO	1 piece	Intrinsically Round initiator for Ex-Areas
Slot Initiator SC 3,5-NO Gelb	1 piece	Intrinsically Slot initiator for Ex-Areas

Mounting instructions for accessories and spare parts:

Before working on the switchcontrol, isolate the unit from the voltage supply!

Spare part set 2: Display window

The display window can be pressed out using the thumbs. Pull the O-ring over the new display window before replacing the spare part in position.

Spare part set 3:

Actuating shaft micro-switch

- Disconnect switchcontrol and remove from the actuator.
- Press together the snap lock on the actuating shaft and pull out the shaft. Press snap lock together here. Equip the spare actuating shaft with the supplied parts and insert in the housing.
- Mount the switchcontrol, set the cams, and remake the electrical connection.

Type: SC-M2

Connect to lower switch at 1, 2, 3. Connect to upper switch at 4, 5, 6.

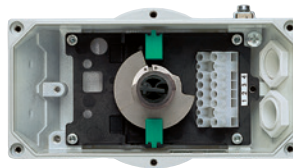


1 blue	4 brown
2 black	5 black
3 brown	6 blue

The assignment of end positions to the switches is depending from the adjustment of the switching cams.

Type: SC-NS2

Connect the switch at 1, 2.
Connect the switch at 3, 4.

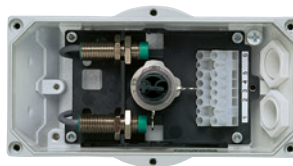


1 blue	3 blue
2 brown	4 brown

The assignment of end positions to the switches is depending from the adjustment of the switching cams.

Type: SC-D2

Connect to switch at 4, 5, 6.
Connect to switch at 1, 2, 3.



4 blue	1 brown
5 black	2 black
6 brown	3 blue

Left end position

Right end position

Mounting instructions for accessories and spare parts:

Before working on the switchcontrol, isolate the unit from the voltage supply!

Spare part set 4:

Actuating shaft round initiator

- Disconnect the switchcontrol and remove from the actuator .
- Press together the snap lock on the actuating shaft and pull out the shaft.
- Place spare actuating shaft in housing.
- Equip the spare cam with the actuating devices, and push onto the spare actuating shaft. Take care to observe, that the actuating devices and their sides are next to one another .
- Mount the switchcontrol, set the actuating device, and remake the electrical connection.

Spare part set 5:

Actuating shaft slot initiator

- Disconnect the switchcontrol and remove from the actuator .
- Turn the actuating device with the adjusting tool, so that the actuating shaft can be pulled out upwards, without colliding with the initiator .
- Press together the snap lock on the actuating shaft and pull out the shaft.
- Place spare actuating shaft in housing.
- Equip the spare cam with the actuating device, and push onto the spare actuating shaft. Take care to observe, that the actuating devices with their sides are next to one another .

- Mount the switchcontrol, set the actuating device, and remake the electrical connection.

Spare part set 6:

Pressure compensating element

Replace blind plugs in the housing with a reducer and screw the pressure compensating element into the reducer.

Spare part set 7:

Solenoid valve switching

- Disconnect the switchcontrol and remove from the actuator .
- Turn the actuating device with the adjusting tool, so that the actuating shaft can be pulled out upwards, without colliding with the initiator .
- Press together the snap lock on the actuating shaft and pull out the shaft.
- Remove the black mounting plate.
- Disconnect the switch/initiator from the terminal block.
- Loosen the terminal block from the mounting plate, whereby the mounting on the underside is pushed temporarily to one side.
- Push and click the 8x terminal block into the mounting plate.
- Reconnect the switch/initiator according to the circuit diagram in the inner side of the housing.
- Connect the descending cable to the solenoid valve to the free terminal block next to the switch/initiator cables.

Mounting instructions for accessories and spare parts:

- Replace mounting plate into the housing, remove cams from the actuating shaft.
- Insert the actuating shaft into the housing.
- Equip the spare cam with the actuating device, and push onto the spare actuating shaft. Take care to observe, that the actuating devices with their sides are next to one another .
- Fit the switchcontrol onto the actuator, make the setting and electrical connection.


Spare part set 8: Micro-switch

- Disconnect the switchcontrol and pull the cam from the actuating shaft. Remove the black mounting plate and disconnect the switch from the terminal block.
- Exchange micro-switches and reconnect according to the circuit diagram on the inner side of the housing.
- Replace mounting plate into the housing.
- Push the cam onto the actuating shaft, whereby the exact positioning is to be secured (see also Fig. C in the chapter „Adjusting the switching cams“).
- Fit the switchcontrol onto the actuator, make the setting and electrical connection.

Spare part:

Round initiator / Slot initiator

- Disconnect the switchcontrol and remove from the actuator .
- Press together the snap lock on the actuating shaft and pull out the shaft.
- Remove mounting plate and exchange initiator.
- Screw mounting plate back in position and place actuating shaft in the housing.
- Remount the switchcontrol, reset the actuating device, and remake the electrical connection.



The descriptions and photographs contained in this product specification sheet are supplied by way of information only and are not binding.
CR-TEC Engineering, Inc. reserves the right to carry out any technical and design improvements to its products without prior notice.

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