

BVS 13 ATEX E039X

Type 8685 / 8686

Feedback Head / Control Head Robolux with approval II 2G Ex ia IIC T4 Gb

Rückmeldekopf / Steuerkopf Robolux mit Zulassung II 2G Ex ia IIC T4 Gb

Tête de recopie de position / Tête de commande Robolux
avec mode de protection II 2G Ex ia IIC T4 Gb



Operating Instructions

Bedienungsanleitung
Manuel d'utilisation



We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
Sous réserve de modifications techniques.

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Operating Instructions 2106/06_EU-m_00809674 / Original DE

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1 OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the device. Keep these instructions in a location which is easily accessible to every user and make these instructions available to every new owner of the device.

The operating instructions contain important safety information.

Failure to observe these instructions may result in hazardous situations.

- ▶ The operating instructions must be read and understood.

1.1 Symbols



DANGER!

Warns of an immediate danger.

- ▶ Failure to observe the warning will result in a fatal or serious injury.



WARNING!

Warns of a potentially dangerous situation.

- ▶ Failure to observe the warning may result in serious injuries or death.



CAUTION!

Warns of a possible danger.

- ▶ Failure to observe this warning may result in a moderate or minor injury.

NOTE!

Warns of damage to property.

- ▶ Failure to observe the warning may result in damage to the device or the equipment.



Indicates important additional information, tips and recommendations.



Refers to information in these operating instructions or in other documentation.

- ▶ Indicates an instruction to prevent risks.

→ Designates a procedure which you must carry out.

1.2 Definition of term / abbreviation

The term “device” used in these instructions always stands for the feedback head Type 8685 and control head Type 8686.



In these instructions, the abbreviation “Ex” always refers to “potentially explosive” or “potentially explosive atmosphere”.

2 AUTHORIZED USE

Non-intended use of the feedback head Type 8685 and the control head Type 8686 may be a hazard to people, nearby equipment and the environment.

The device is designed to be mounted on pneumatic actuators of process valves for the control of media.

- ▶ Do not expose the device to direct sunlight.
- ▶ Use according to the authorized data, service and operating conditions specified in the contract documents and operating instructions. These are described in the chapter on "[6 Technical data](#)".
- ▶ The device may be used only in conjunction with third-party devices and components recommended and authorized by Bürkert.
- ▶ In view of the large number of options for use, it is essential prior to installation to study and, if necessary, to test whether the feedback head or control head is suitable for the specific application case.
- ▶ Correct transportation, storage, and installation, as well as careful use and maintenance are essential for reliable and faultless operation.
- ▶ Use the device only as intended.

2.1 Restrictions

If exporting the system/device, observe any existing restrictions.

3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any

- contingencies and events which may arise during the assembly, operation and maintenance of the devices.
- local safety regulations – the operator is responsible for observing these regulations, also with reference to the installation personnel.



Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.

General hazardous situations

To prevent injuries:

- ▶ Ensure that the system cannot be activated unintentionally.
- ▶ Installation and maintenance work may be carried out only by authorized technicians with the appropriate tools.
- ▶ After an interruption in the power supply or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- ▶ The device may be operated only when in perfect condition and in consideration of the operating instructions.
- ▶ The general rules of technology must be observed for application planning and operation of the device.

To prevent damage to property of the device, ensure:

- ▶ Do not feed any aggressive or flammable media into the pilot air port for Type 8686.
- ▶ Do not feed any liquids into the pilot air port for Type 8686.
- ▶ Do not physically stress the body (e.g. by placing objects on it or standing on it).
- ▶ Do not make any external modifications to the device bodies. Do not paint parts of the body or screws.

NOTE!

Electrostatic sensitive components or modules.

The device contains electronic components, which react sensitively to electrostatic discharge (ESD). Contact with electrostatically charged persons or objects is hazardous to these components. In the worst case scenario, they will be destroyed immediately or will fail after start-up.

- ▶ Observe the requirements in accordance with EN 61340-5-1 to minimize/avoid the possibility of damage caused by a sudden electrostatic discharge.
- ▶ Also, ensure that you do not touch electronic components when the power supply voltage is present.

3.1 INSTRUCTIONS FOR USE IN EX AREA

Abbreviation “Ex“: see chapter “1.2 Definition of term / abbreviation“.

3.1.1 Safety instructions

For use in Ex area zone (gas) 1 and 2, applies:



DANGER!

Danger of explosion caused by electrostatic charge.

If there is a sudden discharge from electrostatically charged devices or persons, there is a danger of explosion in the Ex area.

- ▶ Take appropriate measures to prevent electrostatic charges in the Ex area.
- ▶ Clean the device surface by gently wiping it with a damp or antistatic cloth.

3.1.2 Media in the Ex area



If explosive media are used this can cause additional explosion risks.

3.1.3 Actuators / valves in the Ex area



The actuators / valves can limit the use in an explosive atmosphere. Observe the operating instructions for the actuators / valves.

3.1.4 Cleaning in the Ex area



Check any cleaning agents are approved for use in explosive atmospheres.

3.1.5 Adhesive label for Ex area

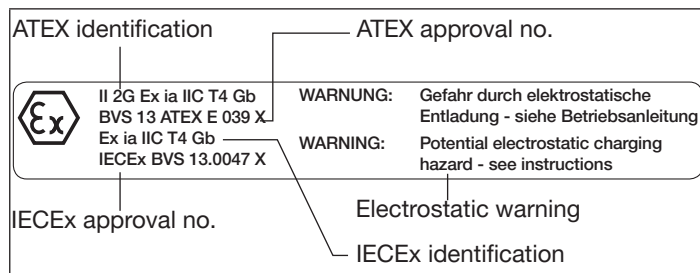


Fig. 1: Label Ex area

3.1.6 Temperature ranges in the Ex area

Pilot valves



A detailed description of the data for the pilot valve can be found on the internet under www.burkert.com Type 6144.

3.1.7 Electrical data in the Ex area

The device with ignition protection type intrinsic safety Ex ia IIC must only be connected to certified, intrinsically safe electric circuits.

Explosion group	IIC
Category	ia
Temperature class	T4

The electric circuits have the following parameters:

Actuator 1:	bottom and top end position: screw terminals Bot 1- / Bot 1+, Top 1- / Top 1+
Actuator 2:	bottom and top end position: screw terminals Bot 2- / Bot 2+, Top 2- / Top 2+

Respectively:

Max. permissible input voltage (Ui)	12 V
Max. permissible input current (Ii)	20 mA
Max. permissible input power (Pi)	60 mW
Max. internal capacitance (Ci)	negligibly
Max. internal inductance (Li)	negligibly

Supply for valve 1:	screw terminals Y1+ / Y1-
Supply für valve 2:	screw terminals Y2+ / Y2-

Respectively:

Voltage value [V] = Ui	15	18	20	22	25	28	30	35
Current value [A] = Ii	0.9	0.44	0.309	0.224	0.158	0.120	0.101	0.073

Tab. 1: Value pairs

Max. permissible input power (Pi) 1.1 W

3.1.8 Establish potential equalisation

Control head Type 8686

Electrically conductive parts of the device must be grounded separately at the ground connection provided. To do this, install the ground terminal consisting of screw, spring washer and fastening element as shown in "Fig. 2" and ground it using a suitable cable with cable lug.

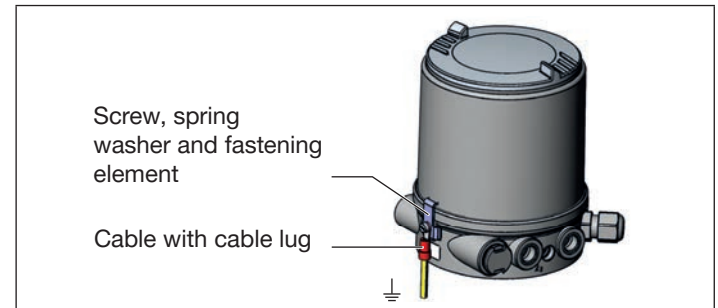


Fig. 2: Ground connection

3.2 Ex approval

The Ex approval is only valid if you use the modules and components authorized by Bürkert in such a way as described in this operating manual.

The feedback head Type 8685 and control head Type 8686 may only be used in combination with types of valves that have been approved by Bürkert. Otherwise, the Ex approval will expire.

If you make any unauthorized changes to the device, the modules or the components, the Ex approval will also expire.

The type-examination certificate

BVS 13 ATEX E039X and

IECEX BVS 13.0047X has been issued

by the DEKRA EXAM GmbH
Dinnendahlstraße 9
44809 Bochum

The PTB (CE0102) audits the manufacture.

4 GENERAL INFORMATION

4.1 Contact address

Germany

Bürkert Fluid Control Systems

Sales Center

Christian-Bürkert-Str. 13-17

D-74653 Ingelfingen

Tel. + 49 (0) 7940 - 10 91 111

Fax + 49 (0) 7940 - 10 91 448

E-mail: info@de.buerkert.com

International

Contact addresses can be found on the final pages of the printed operating instructions.

And also on the Internet at: www.burkert.com

4.2 Warranty

The warranty is only valid if the feedback head and control head are used as intended in accordance with the specified application conditions.

4.3 Information on the Internet

The operating instructions and data sheets for Type 8685 and Type 8686 can be found on the Internet at:

www.burkert.com

5 SYSTEM DESCRIPTION

5.1 Intended application area

The feedback head Type 8685 and the control head Type 8686 are designed to be mounted on pneumatic actuators of valves Type 2036 for the control of media.

The devices satisfy the requirements of electrical equipment for use in the explosion-risk area of Zone I if they are operated on an isolating switching amplifier authorized by the Physikalisch technische Bundesanstalt or on an isolation barrier and a valve control module. The electric circuits for the feedback of end positions have been designed according to Namur DIN EN60947-5-6.

The feedback or control head may be installed in the explosion-risk area of Zone 1. However, isolating switching amplifier or isolation barrier and valve control module must be installed outside the explosion-risk area.



Follow instructions for use in the Ex area.
See chapter [“3.1”](#).

5.2 General description

The feedback head Type 8685 and the control head Type 8686 are designed exclusively for integrated mounting on an actuator of the diaphragm valve Type 2036 in sizes RV50, RV70, RV110.

The actuator size is adjusted with DIP switches.

The valve position is recorded by a permanent magnet on the spindle extension. When a stroke movement occurs, the spindle extension is guided along a reed sensor (lower/upper end position).

5.3 Structure of feedback head Type 8685

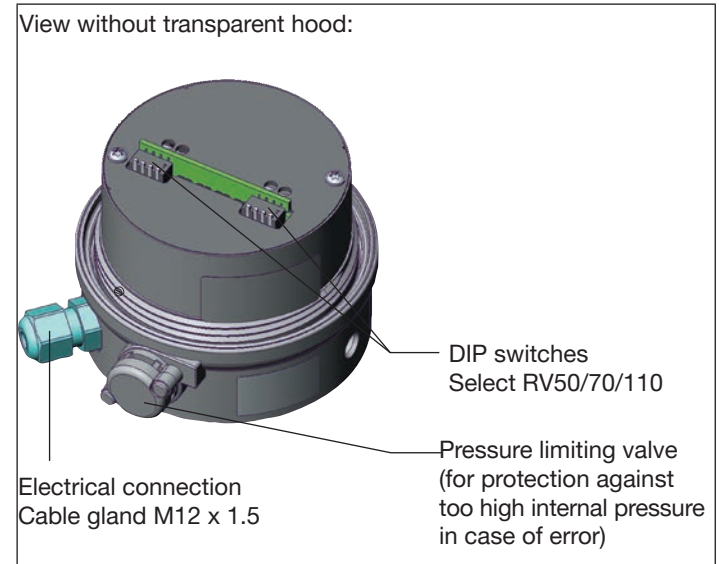


Fig. 3: Structure of feedback head Type 8685

5.4 Structure of control head Type 8686

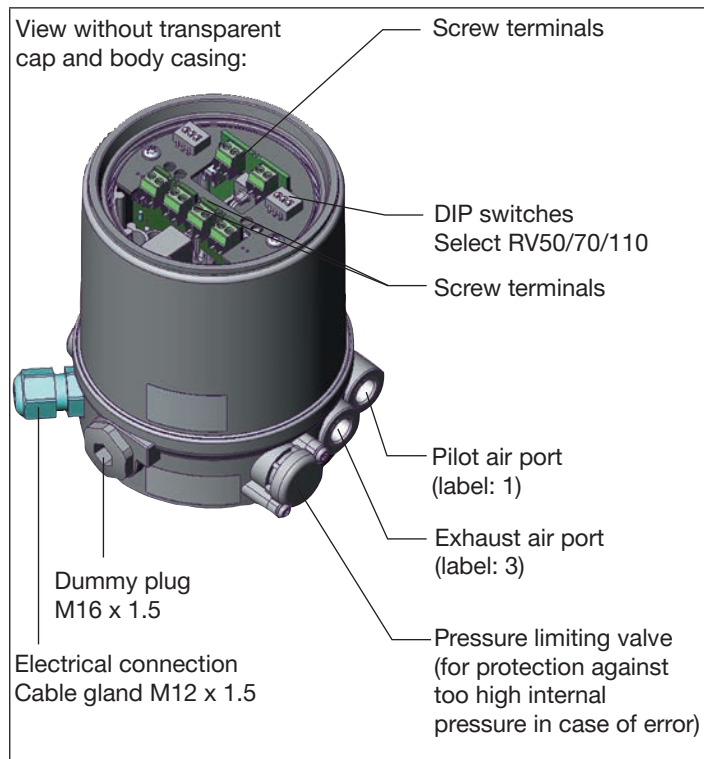


Fig. 4: Structure of control head Type 8686

5.5 Structure of adaption set for actuator Type 2036

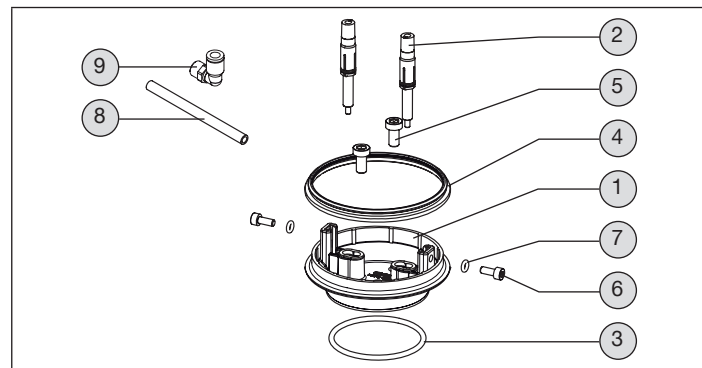


Fig. 5: Adaption set for Type 2036

Item	Quantity	Designation
1	1	Robolux adaptation body
2	6	2 units each Switch spindle RV50, RV70, RV110 cpl.
3	1	O-ring 52 x 3 EPDM 75
4	1	Form seal
5	2	Cylinder head screw M6 x 12 A2 DIN 912
6	2	Cylinder head screw M4 with shank
7	2	O-ring 3.5 x 1.5 EPDM 70
8	2	Hose 280 mm
9	4	Angular connection G1/8 SL6 Legris

Tab. 2: Parts list for adaption set

6 TECHNICAL DATA

6.1 Conformity

The feedback head Type 8685 and the control head Type 8686 comply with EU directives in accordance with the EU Declaration of Conformity.

6.2 Standards

The applied standards, which verify conformity with the EU Directives, can be found on the EU Type Examination Certificate and / or the EU Declaration of Conformity.

6.3 Approvals

The device is authorized for use in Zone 1 according to the ATEX directive 2014/34/EU of category 2 G.



Follow instructions for use in the Ex area.
See chapter [“3.1”](#).

6.4 Operating conditions



WARNING!

Solar radiation and temperature fluctuations may cause malfunctions or leaks.

- ▶ If the device is used outdoors, do not expose it unprotected to the weather conditions.
- ▶ Ensure that the permitted ambient temperature does not exceed the maximum value or drop below the minimum value.

Ambient temperature 0 – +55 °C

Degree of protection IP65 / IP67 according to EN 60529 (only if cables, plugs and sockets have been connected correctly and in compliance with the exhaust air concept in chapter [“8.3 Pneumatic installation of control head Type 8686”](#)).

6.5 Mechanical data

Dimensions	See data sheet
Body material	PPS, PC, VA
Sealing material	outside EPDM inside NBR
Stroke range of valve spindle	RV50 actuator size 6 mm RV70 actuator size 9.5 mm RV110 actuator size 13.5 mm

6.6 Pneumatic data

Connections	Plug-in hose connector Ø6 mm / 1/4" Socket connection G1/8
Control medium	neutral gases, air Quality classes in accordance with DIN ISO 8573-1
Dust content	Class 5 Max. particle size 40 µm, max. particle density 10 mg/m ³
Water content of	Class 3 max. pressure dew point -20 °C or min. 10 °C below the lowest operating temperature
Oil content	Class 5 max. 25 mg/m ³
Temperature range	
Control medium	-10 – + 50 °C
Pressure range	
Control medium	6 – 7 bar (for further details see operating instructions Type 2036 and chapter “8.3 Pneumatic installation of control head Type 8686»)
Air output of pilot valve	250 I _N / min (for aeration and deae- ration) (Q _{Nn} value according to definition for pressure drop from 7 to 6 bar absolute)

6.7 Type label (Example)

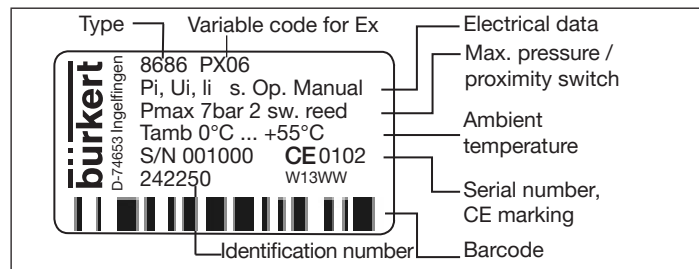


Fig. 6: Example of type label

6.8 Electrical data feedback head Type 8685

Connections	Cable gland M12 x 1.5, wrench size 15 (clamping area 3 – 6.5 mm) with screw terminals (nominal cross section 1.0 mm ² , max. cable cross-section 0.25 mm ²)
Operating voltage	8,2 V DC ± 10% (Operation with Ex-i- NAMUR isolating switching amplifier according to EN 60947-5-6) Isolation barrier with NAMUR inputs U _o = 12 V, I _o = 20 mA, P _o = 60 mW
Output	Switching points according to EN 60947-5-6 End position not reached I > 2.1 mA End position reached I < 1.2 mA

6.9 Electrical data control head Type 8686

Connections	Cable gland M12 x 1.5, wrench size 15 (clamping area 3 – 6.5 mm) with screw terminals (nominal cross section 1.0 mm ² , max. cable cross-section 0.25 mm ²)
Operating voltage	8,2 V DC ± 10% (Operation with Ex-i- NAMUR isolating switching amplifier according to EN 60947-5-6) Isolation barrier with NAMUR inputs U _o = 12 V, I _o = 20 mA, P _o = 60 mW
Output	Switching points according to EN 60947-5-6 End position not reached I > 2.1 mA End position reached I < 1.2 mA
Pilot valve	
Operating voltage	Operation with intrinsically safe valve control module for gases of group IIC
Electrical data	High-impedance version R ₂₀ = 510 Ω Minimum terminal voltage 11.7 V Minimum current 23 mA
Max. permissible surface temperature	see “3.1.6 Temperature ranges in the Ex area”

7 ASSEMBLY



These operating instructions describe the installation of feedback head Type 8685 and control head Type 8686 to a valve Type 2036 with an actuator. The information also applies to Type 2036 valves with two actuators or Type 2034 valve clusters when using Robolux components. The information here also applies if the actuator, adapter kit and feedback/control head are in the position shown in [“Fig. 12”](#)

7.1 Safety instructions



DANGER!

Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.



WARNING!

Risk of injury from improper assembly.

- ▶ Installation may only be carried out by authorized technicians with the appropriate tools.

Risk of injury from unintentional activation of the system and uncontrolled restart.

- ▶ Secure system from unintentional activation.
- ▶ Following assembly, ensure a controlled restart.

7.2 Assembly of Type 8685 and Type 8686 on the actuator Type 2036

An adaption set is required for assembly on the actuator Type 2036. The adaption set (see “Fig. 5”, page 12) includes an adaptation body, a form seal, three O-rings, four cylinder screws and three switch spindle pairs. There are different adaption sets for feedback head and control head. Because of the different working height for actuator sizes RV50, RV70 and RV110, an adaption set contains different spindle lengths.

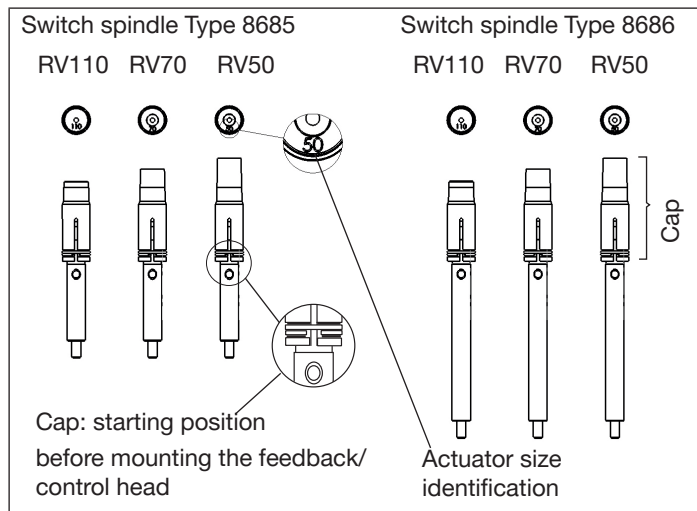


Fig. 7: Switch spindle identification

Designation	Order no.
Adaption set for Type 8685	684267
Adaption set for Type 8686	684268

Tab. 3: Adaption sets

Procedure:

Step 1: Assembly of adaptation body on the actuator

- Unscrew the transparent cap from the actuator.
- Remove cover foil, if present. This makes the coding holes and M6 threads accessible.
- Place the 52 x 3 O-ring in the profile on the bottom of the adaptation body.
- Place the adaptation body on the actuator, paying close attention to the coding pin.
- Screw the adaptation body tightly onto the actuator with two cylinder screws M6 x 12.

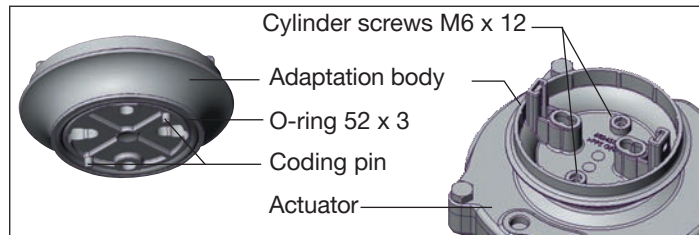


Fig. 8: Assembly of adaptation body

NOTE!

Using a switch spindle that does not fit will result in irreparable destruction of the feedback head and/or control head and the actuator.

- ▶ Use only switch spindles that match the actuator size. The corresponding actuator size identification (RV50, RV70, RV110) for switch spindles are embossed on the front of the PVC cap (see “Fig. 7”).

→ Select the switch spindle that matches the actuator size (see “Fig. 7: Switch spindle identification”).

→ Apply threadlocker (Loctite M290, for example) to the two switch spindles corresponding to the actuator size.

NOTE!

Using the wrong spindle lead-through will result in malfunction.

- ▶ Use only the spindle lead-through that matches the actuator size (see “Fig. 9”).

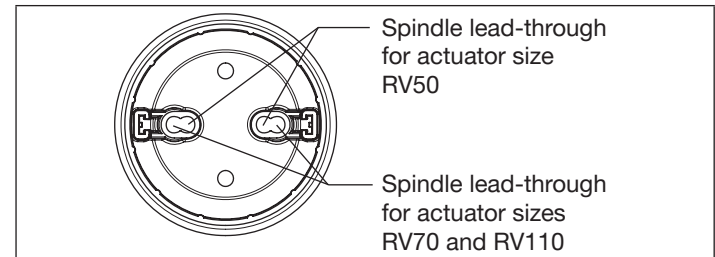


Fig. 9: Spindle lead-through

NOTE!

No detection or faulty detection of end positions.

- ▶ Do not change the position of the cap on the switch spindle.
- ▶ Use the hole $\varnothing 2.3$ for fastening the switch spindle.

→ Push the switch spindles through the matching spindle lead-throughs. The outside lead-throughs are designed for actuator size RV70/110, while the inside lead-throughs for actuator size RV50 (see “Fig. 9”).

→ Attention: Do not bring the screw locking into contact with the spindle seal.

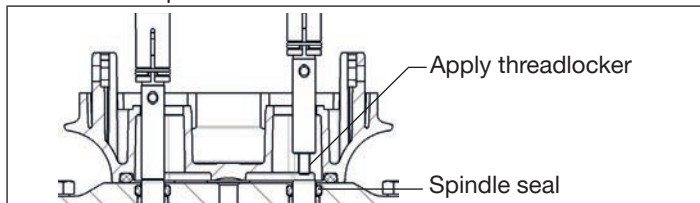


Fig. 10: Threadlocker

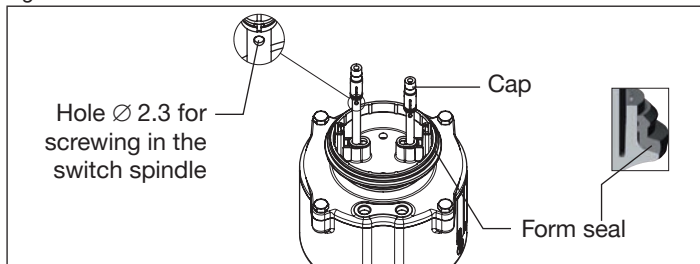


Fig. 11: Assembly of switch spindles and form seal

→ Using a suitable tool, screw the two switch spindles onto the actuator spindles. There is a hole $\varnothing 2.3$ on the spindle side for this purpose (torque $1.0 \text{ Nm} \pm 0.1 \text{ Nm}$).

→ Place the form seal on the adaptation body (smaller diameter points upwards).

Step 2: Assembly of the feedback head / control head on the adaptation body



If the electrical connection is made with a cable gland, we recommend connecting the wires at this point, since otherwise the feedback head / control head will have to be removed again for the electrical connection.



For electrical installation see:

- ▶ [“9.2 Electrical installation for feedback head Type 8685”](#)
- ▶ [“9.3 Electrical installation for control head Type 8686”](#)

NOTE!

Faulty detection of end positions.

- ▶ For actuators with control function B (CFB), the lower end position must be approached before the feedback head / control head is placed on the adaptation body. To do this, pressurize the appropriate pilot air port of the actuator (“Fig. 12”).
- ▶ Make certain the feedback head / control head is correctly positioned relative to the actuator: The dummy plug or pressure-relief valve must be located on the side of the pneumatic connections of the actuator (see “Fig. 12”).

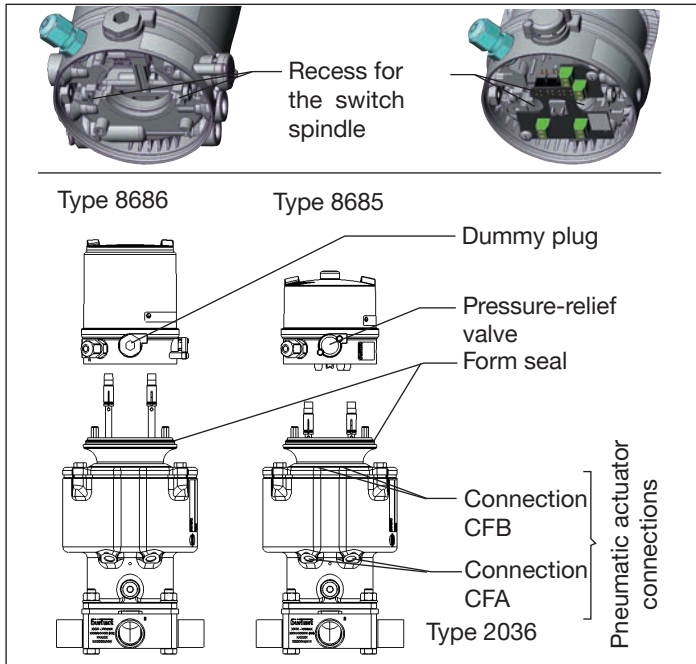


Fig. 12: Assembly of feedback head / control head

- Place the feedback head / control head on the actuator. As you do, note:
- The dummy plug or pressure-relief valve must be located on the side of the pneumatic connections of the actuator.
 - The caps must be in the starting position. If not, move the caps to the starting position (see “Fig. 7”).
 - The switch spindles must lodge inside the recesses on the bottom of the feedback head / control head. Do not move the caps onto the switch spindles.
- Push the feedback head / control head onto the adaptation body until no gap is visible on the form seal. Now align the mounting hole of the feedback head / control head on each side with the square nut of the adaptation body.

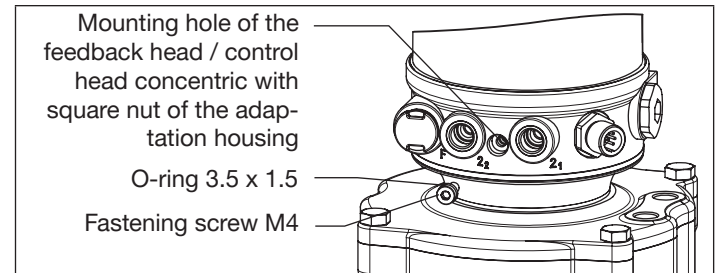


Fig. 13: Fastening of feedback head / control head

NOTE!

If the torque is too high when screwing in the fastening screw or if the O-ring is missing, degree of protection IP65 / IP67 is not ensured.

- ▶ The fastening screw may only be tightened to a maximum torque of $0.5 \text{ Nm} \pm 0.1 \text{ Nm}$.
- ▶ Check the position of the O-ring.

→ Use the two fastening screws M4 and matching O-rings to fasten the feedback head / control head onto the adaptation body (torque: $0.5 \text{ Nm} \pm 0.1 \text{ Nm}$).

The mechanical connection is already completed for the feedback head after these two assembly steps. “Step 3: Assembly of pneumatic connection - install the actuator” must still be performed for the control head.

Control head Type 8686 only:

Step 3: Assembly of pneumatic connection - install the actuator

- Screw the plug-in hose connectors onto the control head and the actuator.
- Cut the enclosed hoses (2 x 280 mm) to length as appropriate for the device layout.
- Using the hoses supplied in the accessory kit, make the pneumatic connection between the control head and actuator according to the control function (CF) with the following “Tab. 4: Overview of pneumatic connections for actuator variants”.

→ When using the control head on a Single actuator, only connect the pilot air outlet 2_1 to the left actuator chamber with a hose. Close the outlet 2_2 on the control head.

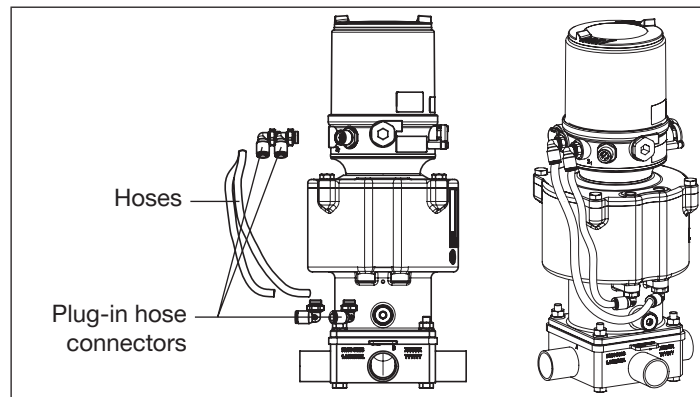


Fig. 14: Assembly of pneumatic connections

NOTE!

Damage or malfunction due to ingress of dirt and moisture.

- ▶ To comply with degree of protection IP65 / IP67, install an exhaust air line on the unneeded pilot air port (for CFA and CFB) in the dry area.

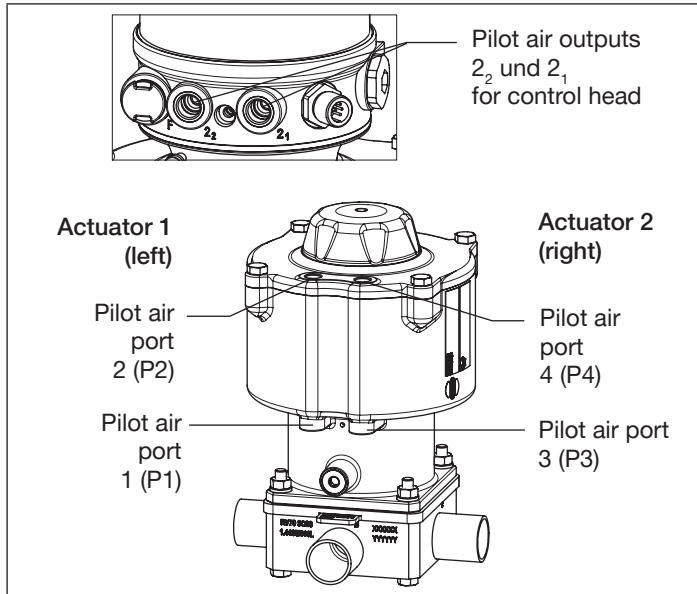


Fig. 15: Pneumatic connection

Type 2036	Actuator 1		Actuator 2	
	CF	Connection	CF	Connection
D11, D55 CFA/CFA	CFA	2 ₁ → P1 P2: Deaeration	CFA	2 ₂ → P3 P4: Deaeration
D12 CFA/CFB	CFA	2 ₁ → P1 P2: Deaeration	CFB	2 ₂ → P4 P3: Deaeration
D21 CFB/CFA	CFB	2 ₁ → P2 P1: Deaeration	CFA	2 ₂ → P3 P4: Deaeration
D22 CFB/CFB	CFB	2 ₁ → P2 P1: Deaeration	CFB	2 ₂ → P4 P3: Deaeration

Tab. 4: Overview of pneumatic connections for actuator variants

CFA, NC: Valve closed in rest position (by spring force)

CFB, NO: Valve open in rest position (by spring force)



For the assignment of control connections see the installation and dimensional drawing included with delivery of the valve or in the Type 2036 operating instructions.

8 PNEUMATIC INSTALLATION

The dimensions of the feedback head / control head and the different complete device models, consisting of control, feedback head / control head, actuator and valve, can be found in the relevant data sheets.

8.1 Safety instructions



DANGER!

Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.



WARNING!

Risk of injury from improper installation.

- ▶ Installation may only be carried out by authorized technicians with the appropriate tools.

Risk of injury from unintentional activation of the system and uncontrolled restart.

- ▶ Secure system from unintentional activation.
- ▶ Following installation, ensure a controlled restart.

8.2 Pneumatic installation of feedback head Type 8685

The feedback head does not require a pilot air supply.



A description of the pneumatic installation of the actuator is included in the valve operating instructions.

8.3 Pneumatic installation of control head Type 8686



DANGER!

Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

Procedure:

- Connect the control medium to the pilot air port (1) (6 – 7 bar; instrument air, free of oil, water and dust).
- Mount the exhaust air line or a silencer on the exhaust air port (3) (see “[Fig. 16: Pneumatic connection Type 8686](#)”).



Important information for the problem-free functioning of the device:

- The installation must not cause back pressure to build up.
- To make the connection, select a hose with sufficient cross section.
- The exhaust air line must be designed in such a way that no water or other liquid can get into the device through the exhaust air connection (3).

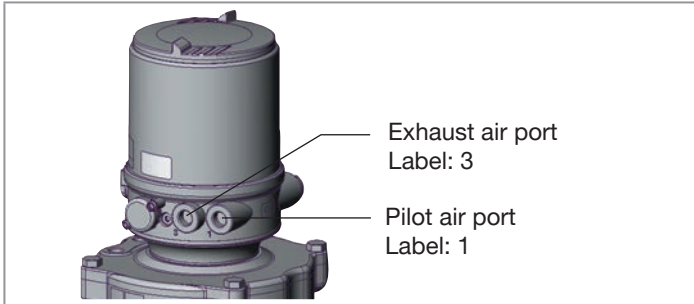


Fig. 16: Pneumatic connection Type 8686



Caution (exhaust air concept): In compliance with degree of protection IP65 / IP67, an exhaust air line must be installed in the dry area.

Always maintain an applied control pressure of at least 0.5 – 1 bar above the pressure which is required to move the actuator to its end position.

9 ELECTRICAL INSTALLATION

9.1 Safety instructions



DANGER!

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.



WARNING!

Risk of injury from improper installation.

- ▶ Installation may only be carried out by authorized technicians with the appropriate tools.

Risk of injury from unintentional activation of the system and uncontrolled restart.

- ▶ Secure system from unintentional activation.
- ▶ Following installation, ensure a controlled restart.

9.2 Electrical installation for feedback head Type 8685

Use a cable cross-section of 0.25 mm² for the electrical connection.

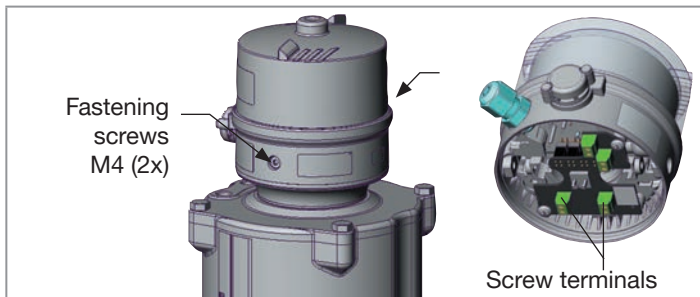


Fig. 17: Position of screw terminals Type 8685

- Loosen the fastening screws M4 and pull the feedback head up (only if the feedback head is already installed).
- Install the cable gland, if necessary (tightening torque approx. 1,5 Nm).
- Guide the cables through the cable gland.

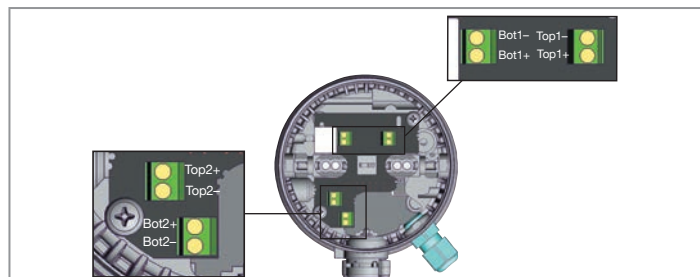


Fig. 18: Designation on PCB Type 8685

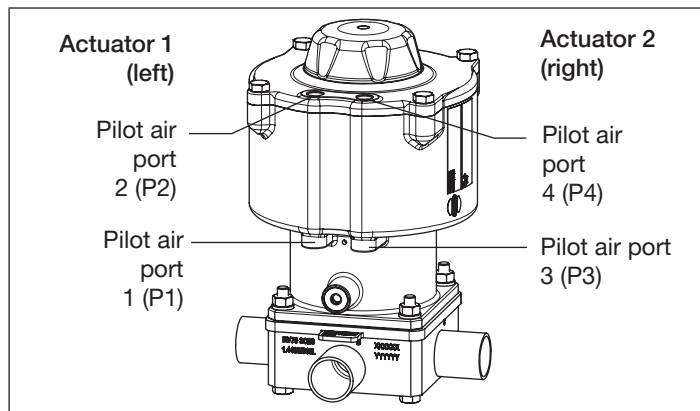


Fig. 19: Actuator assignment

Designation on PCB	Assignment ¹⁾	External circuit	
Bot 1 +	Bottom end position + Bot actuator 1	<p>Operation with Ex-i-NAMUR isolating switching amplifier</p>	
Bot 1 -	Bottom end position - Bot actuator 1		
Top 1 +	Top end position + Top actuator 1		
Top 1 -	Top end position - Top actuator 1		
Bot 2 +	Bottom end position + Bot actuator 2		<p>Operation with Ex isolation barrier</p>
Bot 2 -	Bottom end position - Bot actuator 2		
Top 2 +	Top end position + Top actuator 2		
Top 2 -	Top end position - Top actuator 2		
Top 2 -	Top end position - Top actuator 2		

Tab. 5: Connection for cable gland Type 8685

→ Connect the wires (see pin assignment in “Tab. 5”).

1) Actuator assignment see “Fig. 19”.

NOTE!

Malfunction due to damaged wires.

- ▶ To keep the spindle guides free, guide all wires through the cable holders.

Damage or malfunction due to ingress of dirt and moisture.

- ▶ To ensure degree of protection IP65 / IP67, tighten the union nut of the cable gland according to the cable size you are using (approx. 1.5 Nm).

→ Tighten the union nut of the cable gland (approx. 1.5 Nm).

NOTE!

Faulty detection of end positions.

- ▶ For actuators with control function B (CFB), the lower end position must be approached before the feedback head is placed on the adaptation body. To do this, pressurize the appropriate pilot air port of the actuator (“Fig. 12”).
- ▶ Make certain the feedback head is correctly positioned relative to the actuator: The dummy plug or pressure-relief valve must be located on the side of the pneumatic connections of the actuator (see “Fig. 12”).

- Place the feedback head on the actuator. As you do, note:
- The dummy plug or pressure-relief valve must be located on the side of the pneumatic connections of the actuator.
 - The caps must be in the starting position. If not, move the caps to the starting position (see “Fig. 7”).
 - The switch spindles must lodge inside the recesses on the bottom of the feedback head. Do not move the caps onto the switch spindles.

→ Push the feedback head onto the adaptation body until no gap is visible on the form seal. Now align the mounting hole of the feedback head on each side with the square nut of the adaptation body.

NOTE!

If the torque is too high when screwing in the fastening screw or if the O-ring is missing, degree of protection IP65 / IP67 is not ensured.

- ▶ The fastening screw may only be tightened to a maximum torque of $0.5 \text{ Nm} \pm 0.1 \text{ Nm}$.
- ▶ Check the position of the O-ring.

→ Use the two fastening screws M4 and matching O-rings to fasten the feedback head onto the adaptation body (tightening torque: $0.5 \text{ Nm} \pm 0.1 \text{ Nm}$).

When the operating voltage is applied, the feedback head is operating.

→ Before the device can be used, the basic settings (see section “10.3.1 Basic device settings») must still be made on the feedback head.

9.3 Electrical installation for control head Type 8686

Use a cable cross-section of 0.25 mm^2 for the electrical connection.

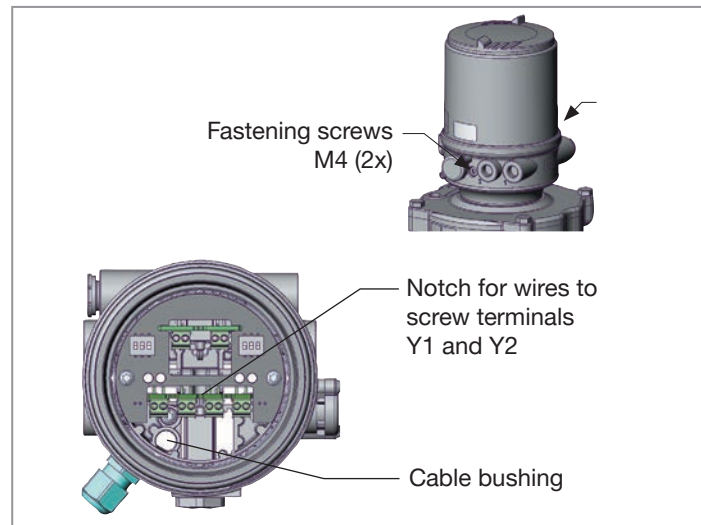


Fig. 20: Position of screw terminals Type 8686

- Loosen the fastening screws M4 and pull the control head up (only if the control head is already installed).
- Unscrewing the transparent cap.
- Guide the cables through the cable gland.

- Strip cable.
- Push wires through the cable bushing into the connection area (top of device).
- Pull cable towards cable gland until the stripped area of the cable is flush with the inside of the cable gland.

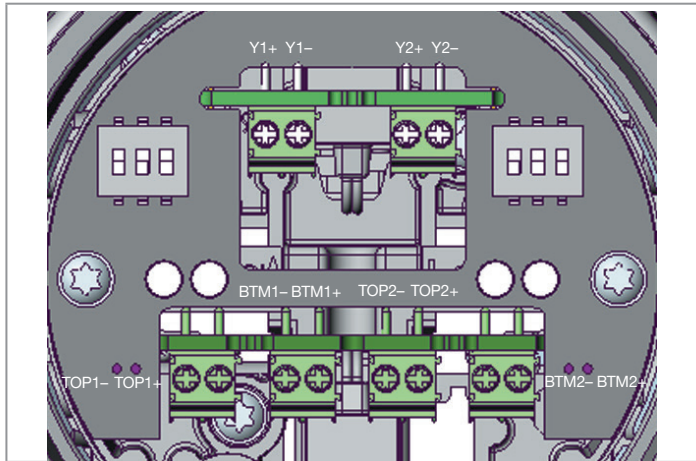


Fig. 21: Designation on PCB Type 8686

- Insert wires for the screw terminals Y1 and Y2 through the notch in the circuit board.

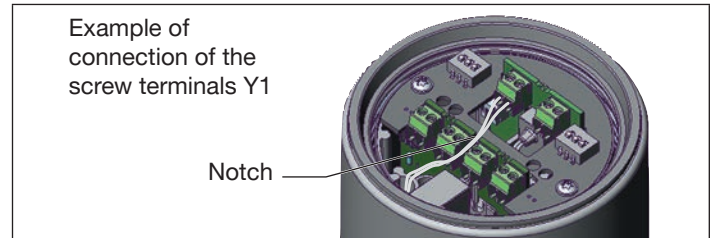


Fig. 22: Connection

- Connect the wires (see pin assignment in “[Tab. 6: Connection for cable gland Type 8686](#)”).

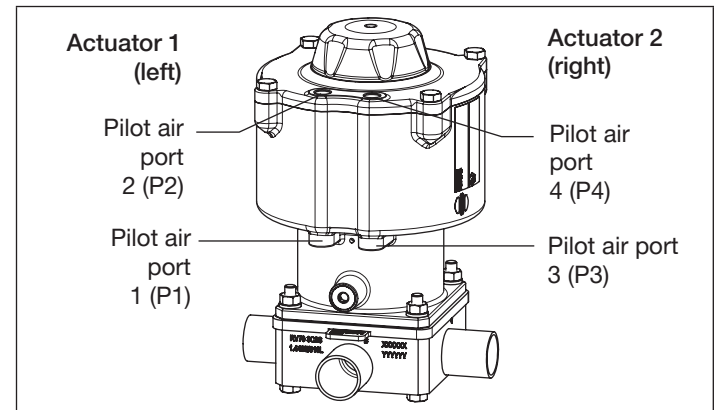


Fig. 23: Actuator assignment

Designation on PCB	Assignment ²⁾	External circuit
Bot 1 +	Bottom end position + Bot actuator 1	<p>Operation with Ex-i-NAMUR isolating switching amplifier</p> <p>Ex area non Ex area</p> <p>NAMUR-Sensor</p>
Bot 1 -	Bottom end position - Bot actuator 1	
Top 1 +	Top end position + Top actuator 1	
Top 1 -	Top end position - Top actuator 1	
Bot 2 +	Bottom end position + Bot actuator 2	<p>Operation with Ex isolation barrier</p> <p>Ex area non Ex area</p> <p>NAMUR-Sensor</p>
Bot 2 -	Bottom end position - Bot actuator 2	
Top 2 +	Top end position + Top actuator 2	
Top 2 -	Top end position - Top actuator 2	
Y1 +	Valve 1 + actuator 1 active	Y1 +
Y1 -	Valve 1 - actuator 1 GND	Y1 -
Y2 +	Valve 2 + actuator 2 active	Y2 +
Y2 -	Valve 2 - actuator 2 GND	Y2 -

Tab. 6: Connection for cable gland Type 8686

NOTE!

Malfunction due to damaged wires.

- ▶ To keep the spindle guides free, guide all wires through the cable holders.

Damage or malfunction due to ingress of dirt and moisture.

- ▶ To ensure degree of protection IP65 / IP67, tighten the union nut of the cable gland according to the cable size you are using (approx. 1.5 Nm).

→ Tighten the union nut of the cable gland (approx. 1.5 Nm).

NOTE!

Faulty detection of end positions.

- ▶ For actuators with control function B (CFB), the lower end position must be approached before the control head is placed on the adaptation body. To do this, pressurize the appropriate pilot air port of the actuator ("Fig. 12").
- ▶ Make certain the control head is correctly positioned relative to the actuator: The dummy plug or pressure-relief valve must be located on the side of the pneumatic connections of the actuator (see "Fig. 12").

2) Actuator assignment see "Fig. 23: Actuator assignment"

- Place the control head on the actuator. As you do, note:
 - The dummy plug or pressure-relief valve must be located on the side of the pneumatic connections of the actuator.
 - The caps must be in the starting position. If not, move the caps to the starting position (see “Fig. 7”).
 - The switch spindles must lodge inside the recesses on the bottom of the control head. Do not move the caps onto the switch spindles.
- Push the control head onto the adaptation body until no gap is visible on the form seal. Now align the mounting hole of the control head on each side with the square nut of the adaptation body.

NOTE!

If the torque is too high when screwing in the fastening screw or if the O-ring is missing, degree of protection IP65 / IP67 is not ensured.

- ▶ The fastening screw may only be tightened to a maximum torque of $0.5 \text{ Nm} \pm 0.1 \text{ Nm}$.
- ▶ Check the position of the O-ring.

- Use the two fastening screws M4 and matching O-rings to fasten the control head onto the adaptation body (torque: $0.5 \text{ Nm} \pm 0.1 \text{ Nm}$).
- Check that the seal is correctly positioned in the body casing (see “Fig. 24”).

NOTE!

Damage or malfunction due to ingress of dirt and moisture.

- ▶ To comply with degree of protection IP65 / IP67, screw in the transparent cap / body casing all the way.

- Close the transparent cap / body casing (auxiliary tool for installing the cover: 674077³⁾).

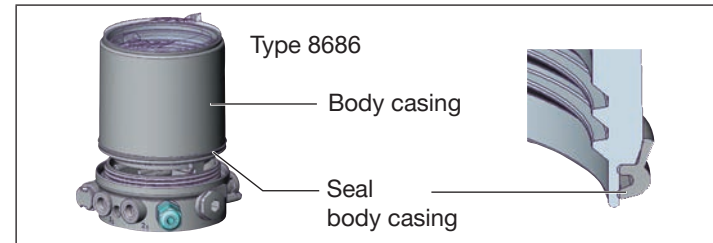


Fig. 24: Position of the seal in the body casing

When the supply voltage is applied, the control head is operating.

- Before the device can be used, the basic settings (see section “10.3.1 Basic device settings») must still be made on the control head.

3) The auxiliary tool for installing the cover (674077) is available through your Bürkert sales office.

10 CONTROL

10.1 Overview of control elements feedback head Type 8685

The items listed below are designed separately for actuator 1 and 2.

Control elements:

- DIP switch for selecting actuator size RV50, RV70, RV110
- DIP switch 4 with the “-” mark has no function.

! If the transparent cap is unscrewed, follow the instructions in [“Step 3: Closing the transparent cap / body casing”, page 32.](#)

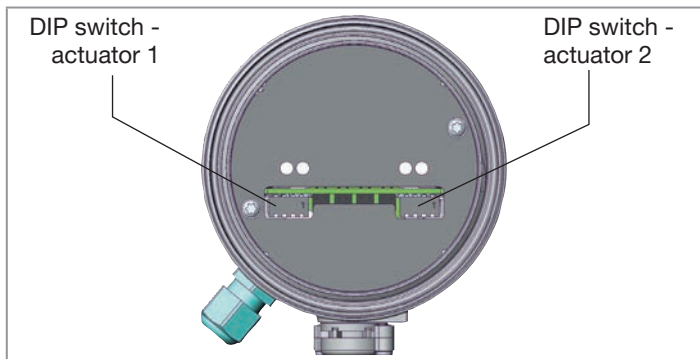


Fig. 25: Control elements for feedback head

10.2 Overview of control elements control head Type 8686

The items listed below are designed separately for actuator 1 and 2.

Control elements:

- DIP switch for selecting actuator size RV50, RV70, RV110

! If the transparent cap / the body casing is unscrewed, follow the instructions in [“Step 3: Closing the transparent cap / body casing”, page 32.](#)

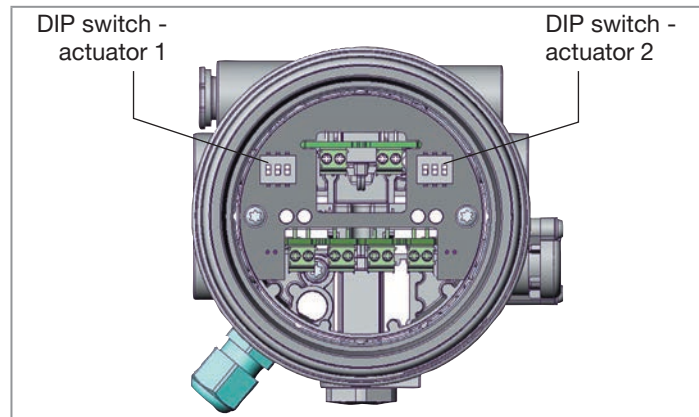


Fig. 26: Control elements for control head

10.3 Control

10.3.1 Basic device settings

To ensure the function of Types 8685 and 8686, these presettings must be made before start-up in the isolated state.



DANGER!

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.

→ Unscrew the transparent cap.

→ Perform steps 1 to 3.

Step 1: Select the actuator size

The control elements are designed for one actuator side only.



Switch only one DIP switch per actuator size to active, depending on the actuator size (see actuator type label). Only one uniform actuator size needs to be selected on both actuator sides.

Incorrect settings of the DIP switches result in malfunctions or no function of the end position feedback.

→ Pushing a DIP switch to the “ON” position causes the end position sensors of the selected actuator size to be activated.

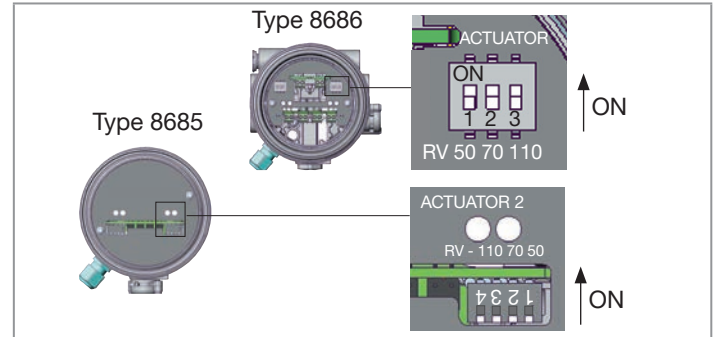


Fig. 27: Selection of actuator size via DIP switch

DIP switch	Actuator size
1	50
2	70
3	110
4 (Type 8685 only)	- (not used)

Tab. 7: Assignment DIP switch - actuator size

Step 2: Reference movement for spindle adjustment

To make the fine adjustment of the spindle for actuator size, it is essential to move both spindles from the lower to the top end position.

Procedure for Type 8685:

Actuator with design control function A (CFA):

- Under maximum pilot pressure, move the spindles up by activating the actuator chambers.
- After the end position is reached, turn off the pilot pressure. The spindle moves to the lower end position.

Actuator with design control function B (CFB):

- Under maximum pilot pressure, move the spindles down by activating the actuator chambers.
- After the end position is reached, turn off the pilot pressure. The spindle moves to the upper end position.

Procedure for Type 8686:

- Under maximum pilot pressure, switch the actuator. The spindle moves to the upper end position.
- After the end position is reached, switch the actuator. The spindle moves to its initial position.

Step 3: Closing the transparent cap / body casing

- Check that the seal is correctly positioned in the transparent cap / body casing (see “Fig. 28”).

NOTE!

Damage or malfunction due to ingress of dirt and moisture.

- ▶ To comply with degree of protection IP65 / IP67, screw in the transparent cap / body casing all the way.

- Close the transparent cap / body casing (auxiliary tool for installing the cover: 674077⁴⁾).

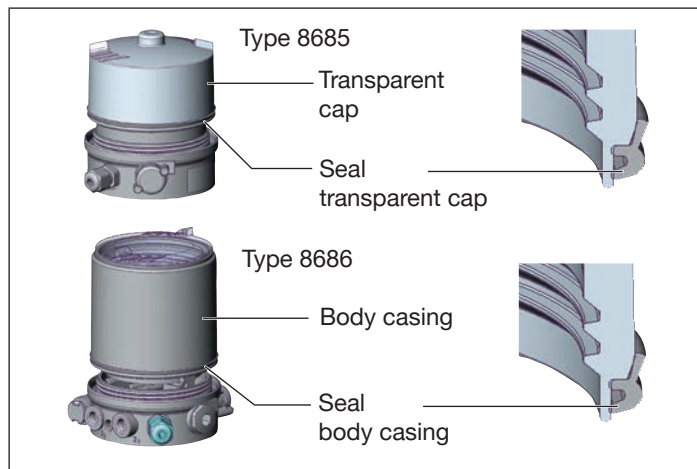


Fig. 28: Position of the seal in the transparent cap / body casing

The device is now configured and ready for operation.

4) The auxiliary tool for installing the cover (674077) is available through your Bürkert sales office.

10.3.2 Changing the settings

Procedure:

- Unscrewing the transparent cap makes the DIP switches accessible.
- Select the actuator size with the DIP switches. Only one uniform actuator size needs to be selected on both actuator sides (see valve type label).
- Check that the seal is correctly positioned in the transparent cap / body casing (see “Fig. 28”).

NOTE!

Damage or malfunction due to ingress of dirt and moisture.

- ▶ To comply with degree of protection IP65 / IP67, screw in the transparent cap / body casing all the way.

- Close the transparent cap / body casing (auxiliary tool for installing the cover: 674077⁵⁾).

5) The auxiliary tool for installing the cover (674077) is available through your Bürkert sales office.

10.3.3 Manual activation of pilot valves with the control head Type 8686

The pilot valves can be switched via a hand lever. With control function A, the spindle moves up with activated hand lever. With control function B, the spindle moves down with activated hand lever.

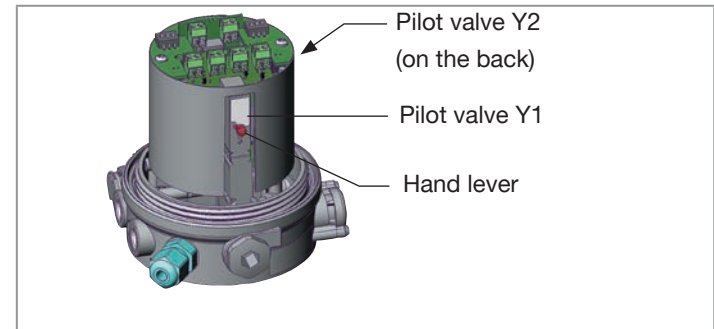


Fig. 29: Position for pilot valves (Type 8686)

Procedure:

⚠ Voltage is absolutely essential on the device!

- Unscrewing the body casing makes the hand lever accessible.

NOTE!

The hand lever may be damaged if it is pressed and turned at the same time.

- ▶ Do not press and turn the hand lever at the same time.

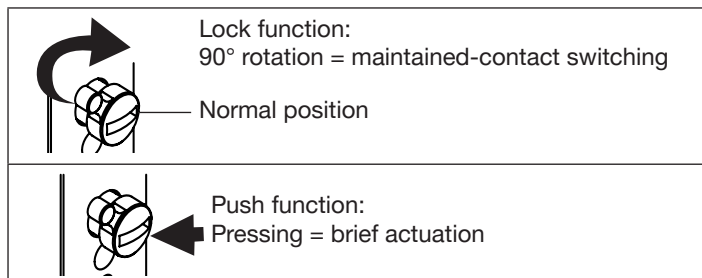


Fig. 30: Switching positions of the hand lever

→ Check that the seal is correctly positioned in the transparent cap / body casing (see “Fig. 31”).

NOTE!

Damage or malfunction due to ingress of dirt and moisture.

▶ To comply with degree of protection IP65 / IP67, screw in the transparent cap / body casing all the way.

→ Close the transparent cap / body casing (auxiliary tool for installing the cover: 674077⁶⁾).

Procedure for replacing the diaphragm for Type 2036

⚠ Voltage is absolutely essential on the device!

→ Replace the diaphragm as described in the operating instructions for Type 2036.

→ After the diaphragm is replaced, perform a reference movement for spindle adjustment (see “10.3.1 Basic device settings», step 2).

→ Check that the seal is correctly positioned in the transparent cap / body casing (see “Fig. 31”).

NOTE!

Damage or malfunction due to ingress of dirt and moisture.

▶ To comply with degree of protection IP65 / IP67, screw in the transparent cap / body casing all the way.

→ Close the transparent cap / body casing (auxiliary tool for installing the cover: 674077⁶⁾).

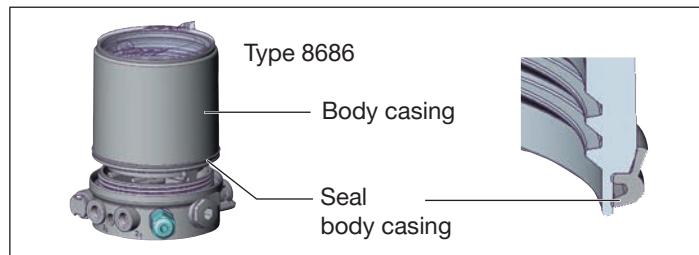


Fig. 31: Position of the seal in the body casing

6) The auxiliary tool for installing the cover (674077) is available through your Bürkert sales office.

11 SAFETY POSITIONS

Safety positions after failure of the electrical or pneumatic auxiliary power:

Actuator type	Designation	Safety positions after failure of the auxiliary power	
		electrical	pneumatic
	single-acting Control function A	down	down
	single-acting Control function B	up	up

Tab. 8: Safety positions

12 MAINTENANCE

12.1 Safety instructions



DANGER!

Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.



DANGER!

Danger due to improper repairs.

Safety and function of the feedback head Type 8685 and the control head Type 8686 are only guaranteed after a repair when the repair work is performed by the manufacturer.

- ▶ Have the device repaired by the manufacturer only.



WARNING!

Risk of injury from improper maintenance.

- ▶ Maintenance may only be carried out by authorized technicians with the appropriate tools.

Risk of injury from unintentional activation of the system and uncontrolled restart.

- ▶ Secure system from unintentional activation.
- ▶ Following maintenance, ensure a controlled restart.

12.2 Service at the air intake filter



DANGER!

Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

To protect the internal pilot valves and the actuator, the control air is filtered.

The direction of flow of the air intake filter in installed state is from the inside to the outside through the filter material.

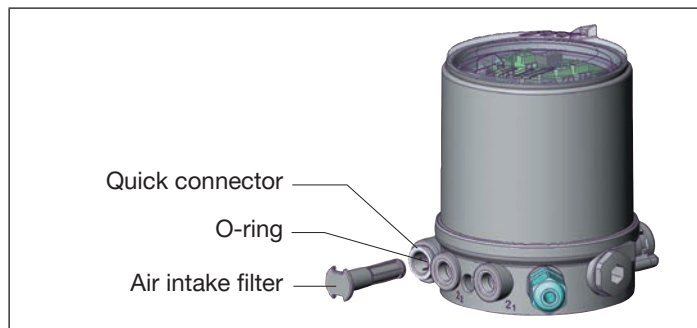


Fig. 32: Service at the air intake filter

Procedure:

- Unlock the quick connector by pressing the holding element and pulling out the air intake filter (if necessary, use a suitable tool in between the recesses in the head of the filter).
- Clean the filter or, if necessary, replace the filter.
- Check inner O-ring and, if required, clean.
- Insert the air intake filter all the way into the quick connector.



DANGER!

Risk of injury due to improper installation.

- ▶ Ensure that the air intake filter is installed correctly.

- Check that the air intake filter is secure.

13 MALFUNCTIONS

Malfunction	Cause and remedial action
End position is not detected	No or inadequate supply voltage → Check the electrical connection and supply voltage
	Wrong size of switch spindles from the adaption set → Replace switch spindles
	Wrong spindle lead-through selected for spindle installation → Push the switch spindle through the matching spindle lead-through
	Wrong actuator size selected with the DIP switches → Select the matching actuator size
	Cap of the switch spindle moved by force during assembly → Remove the feedback head / control head → Pull the cap towards the end of the switch spindle until you can see one groove → Install the feedback head / control head → Perform a reference movement for spindle adjustment

Malfunction	Cause and remedial action
Faulty detection of end position	Wrong actuator size selected with the DIP switches → Select the matching actuator size
	More than one actuator size selected with the DIP switches → Select the matching actuator size
	Feedback head / control head not mounted in the correct position → Mount the feedback head / control head in the correct position (see “Fig. 12”)
Actuator does not switch	No or inadequate supply voltage → Check the electrical connection and supply voltage
	Pressure supply too low → Check the control pressure
	Faulty hose system → Check the pneumatic connections

Tab. 9: Malfunctions

14 SHUTDOWN

14.1 Safety instructions



DANGER!

Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.



WARNING!

Risk of injury from improper removal.

- ▶ Removal may be carried out by authorized technicians only and with the appropriate tools.

14.2 Disassembly

Procedure:

- Turn off the pressure and vent the lines.
- Switch off the power supply.

1. Pneumatic connection (control head Type 8686 only)



DANGER!

Risk of injury from high pressure in the equipment/device.

- ▶ Before working on equipment or device, switch off the pressure and deaerate/drain lines.

- Loosen pneumatic connection.
- Release the pneumatic connection to the actuator.

3. Mechanical connections

- Release the fastening screws.
- Pull the feedback head / control head up and out.

2. Electrical connection



DANGER!

Risk of electric shock.

- ▶ Before working on equipment or device, switch off the power supply and secure to prevent reactivation.
- ▶ Observe applicable accident prevention and safety regulations for electrical equipment.

- Release the cable gland.
- Loosen the wires from the screw terminals.

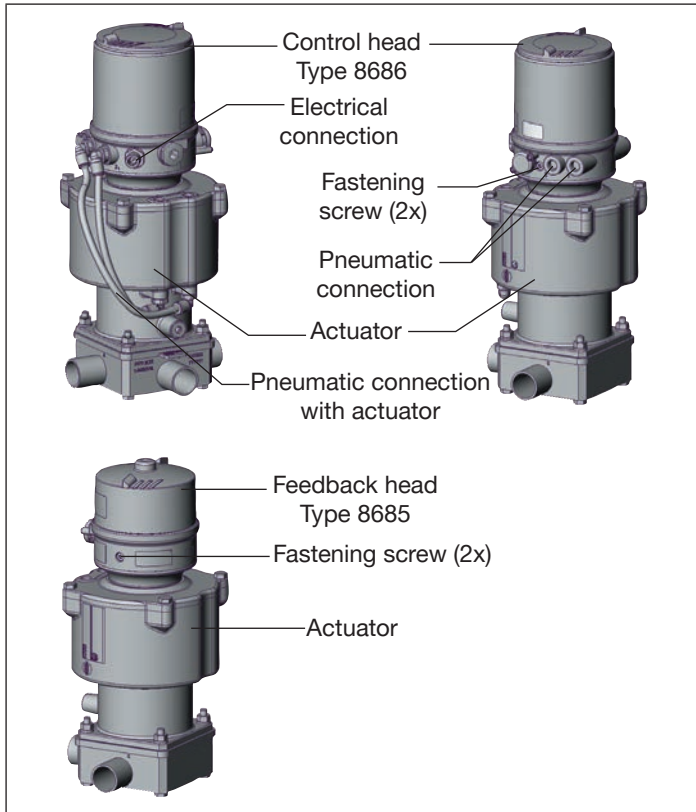


Fig. 33: Disassembly

15 ACCESSORIES

Designation	Order no.
Auxiliary tool for installing the transparent cap	674077

Tab. 10: Accessories

15.1 Cable gland

NOTE!

Damage or malfunction due to ingress of dirt and moisture.

- ▶ To ensure degree of protection IP65 / IP67, tighten the union nut of the cable gland according to the cable size you are using (approx. 1.5 Nm).

16 TRANSPORT, STORAGE, PACKAGING

NOTE!

Transport damage.

Inadequately protected equipment may be damaged during transportation.

- ▶ During transportation protect the device against moisture and dirt in shock-resistant packaging.
- ▶ Prevent the temperature from exceeding or dropping below the permitted storage temperature.
- ▶ Protect the electrical interfaces of the coil and the pneumatic connections from damage by placing protective caps on them.

Incorrect storage may damage the device.

- ▶ Store the device in a dry and dust-free location.
- ▶ Storage temperature -20 – 65 °C.

Damage to the environment caused by device components contaminated with media.

- ▶ Ensure the device and packaging are disposed of in an environmentally sound manner.
- ▶ Observe applicable regulations relating to refuse disposal and the environment.

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