Type 8694
Positioner TopControl Basic

Electropneumatic position controller
Elektropneumatischer Stellungsregler
Positionneur électropneumatique

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

Important Safety Information.
Read Quickstart carefully and thoroughly. Study in particular the chapters entitled “Basic safety instructions” and “Authorized use”.
▶ Quickstart must be read and understood.

Quickstart explains, for example, how to install and start-up the device.

A detailed description of the device can be found in the operating instructions for positioner Type 8694.

The operating instructions can be found on the Internet at: www.burkert.com

1.1 Definition of term / abbreviation
The term “device” used in these instructions always stands for the positioner Type 8694.
In these instructions, the abbreviation “Ex” always refers to “potentially explosive atmosphere”.

1.2 Symbols
The following symbols are used in these instructions.

⚠️ DANGER!
 Warns of an immediate danger.
▶ Failure to observe the warning may 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 medium or minor injury.

NOTE!
 Warns of damage to property.

⚠️ indicates important additional information, tips and recommendations.

📚 refers to information in these operating instructions or in other documentation.
▶ Designates an instruction to prevent risks.
→ designates a procedure that must be carried out.
2  AUTHORIZED USE

Non-authorized use of the positioner Type 8694 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, operating conditions and conditions of use specified in the contract documents and operating instructions. These are described in the chapter entitled “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, before installation, it is essential to study and if necessary to test whether the positioner is suitable for the actual use planned.
- Correct transportation, correct storage and installation and careful use and maintenance are essential for reliable and faultless operation.
- Use the positioner Type 8694 only as intended.

3  BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any

- contingencies and events which may arise during the installation, 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 injury, ensure:

▶ In the potentially explosive atmosphere the positioner Type 8691 may be used only according to the specification on the separate approval sticker. For use observe the additional instructions enclosed with the device together with safety instructions for potentially explosive atmosphere.
▶ Devices without a separate approval sticker may not be used in a potentially explosive atmosphere.
▶ Installation and repair work may be carried out by authorized technicians only and 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 apply to 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.
▶ Do not feed any liquids into the pilot air port.
▶ When unscrewing and screwing in the body casing or the transparent cap, do not hold the actuator of the process valve but the connection housing of Type 8694.
▶ Do not put any loads on the housing (e.g. by placing objects on it or standing on it).
▶ Do not make any external modifications to the device housings.

NOTE!

Electrostatic sensitive components / 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 or avoid the possibility of damage caused by sudden electrostatic discharge.
▶ Also ensure that you do not touch electronic components when the power supply voltage is present.
4 GENERAL INFORMATION

4.1 Contact address

Germany
Bürkert Fluid Control System
Sales Center
Chr.-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 49 (0) 7940 - 10 91 111
Fax + 49 (0) 7940 - 10 91 448
E-mail: info@burkert.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 positioner Type 8694 is used as intended in accordance with the specified application conditions.

4.3 Information on the internet

The operating instructions and data sheets for Type 8694 can be found on the Internet at:
www.burkert.com

5 STRUCTURE AND FUNCTION

Fig. 1: Structure 1

Positioner Type 8694 is an electropneumatic position controller for pneumatically actuated control valves with single-acting actuators. Together with the pneumatic actuator, the positioner forms a functional unit.

The control valve systems can be used for a wide range of control tasks in fluid technology and, depending on the application conditions, different process valves from the Bürkert range can be combined with the positioner. Angle seat valves, straight seat valves, diaphragm valves or ball valves are suitable.

The position of the actuator is regulated according to the position set-point value. The nominal position value is specified by an external standard signal.
6 TECHNICAL DATA

6.1 Conformity
In accordance with the EU Declaration of conformity, the positioner Type 8694 is compliant with the EU Directives.

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 Licenses
The product is approved for use in zone 2 and 22 in accordance with ATEX directive 2014/34/EU category 3GD.

Observe instructions on operation in an explosion-risk (Ex) area. Observe the ATEX additional instructions.

The product is cULus approved. Instructions for use in the UL area see chapter “6.8 Electrical data”.

Fig. 2: Structure 2
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.

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>see type label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluated by the manufacturer:</th>
<th>Evaluated by UL:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP65 / IP67 according to EN 60529*</td>
<td>UL Type 4x Rating indoor only*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating altitude</th>
<th>up to 2000 m above sea level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative air humidity</td>
<td>max. 90% at 60 °C (non condensing)</td>
</tr>
</tbody>
</table>

* Only if cables, plugs and sockets have been connected correctly and in compliance with the exhaust air concept see chapter “8 Pneumatic installation”.

6.5 Mechanical data

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>See data sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing material</td>
<td>exterior: PPS, PC, VA, interior: PA 6; ABS</td>
</tr>
<tr>
<td>Sealing material</td>
<td>EPDM / (NBR)</td>
</tr>
</tbody>
</table>

6.6 Type labels

6.6.1 Type label standard (example)

![Type label (example)](image-url)

6.6.2 UL type label (example)

![UL type label (example)](image-url)
6.6.3 UL additional label (example)

![UL additional label example]

- Type 4X enclosure
- NEC Class 2 only
- Supply voltage: 24 V

Fig. 5: UL additional label (example)

6.7 Pneumatic data

Control medium: neutral gases, air

Quality classes in accordance with ISO 8573-1

- Dust content: Class 7
  max. particle size 40 µm, max. particle density 10 mg/m³

- Water content: Class 3
  max. pressure dew point -20 °C or min. 10 °C below the lowest operating temperature

- Oil content: Class X
  max. 25 mg/m³

Temperature range control medium: -10 – +50 °C

Pressure range control medium: 3 – 7 bar

Air output of pilot valve: 7 l/min (for aeration and deaeration)
(QNn, value according to definition for pressure drop from 7 to 6 bar absolute)
optional: 130 l/min (for aeration and deaeration)
(only single-acting)

Connections

- Plug-in hose connector Ø 6 mm / 1/4"
- Socket connection G1/8

6.8 Electrical data

**WARNING!**

Only circuits with limited power may be used for UL approved components according to “NEC Class 2”.

6.8.1 Electrical data without bus control 24 V DC

- Protection class: III as per DIN EN 61140 (VDE 0140-1)
- Connections: Cable gland M16 x 1.5, wrench size 22 (clamping area 5 – 10 mm)
  with screw-type terminals for cable cross-sections 0.14 – 1.5 mm²
  Circular plug-in connector (M12 x 1, 8-pole)

- Pilot valve
  - Operating voltage: 24 V DC ± 10 %
  - Power input: ≤ 3.5 W
  - Input resistance for set-point value signal: 75 Ω at 0/4 – 20 mA / 12 bit resolution

- Analogue position feedback
  - max. load for current output: 0/4 – 20 mA
  - 560 Ω
Technical data

Digital input

- 0 – 5 V = log “0”,
- 12 – 30 V = log “1”

inverted input in reverse order

Communications interface

Direct connection to PC via USB adapter with integrated interface driver, communication with communications software.

6.8.2 Electrical data with AS interface bus control

Protection class

III as per DIN EN 61140 (VDE 0140-1)

Connections

Circular plug-in connector (M12 x 1, 4-pole)

Operating voltage

29.5 V – 31.6 V DC (according to specification)

Devices without external supply voltage:

Max. power consumption 150 mA

Devices with external supply voltage:

External supply voltage 24 V ± 10 %

The power supply unit must include a secure disconnection in accordance with IEC 364-4-41 (PELV or SELV)

Max. power consumption 100 mA

Max. power consumption from AS interface 50 mA

6.9 Factory settings of the positioner

Functions can be activated via DIP switches:

<table>
<thead>
<tr>
<th>Function</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUTOFF</td>
<td>Sealing function below</td>
<td>2 %</td>
</tr>
<tr>
<td></td>
<td>Sealing function above</td>
<td>98 %</td>
</tr>
<tr>
<td>CHARACT</td>
<td>Select characteristic</td>
<td>FREE(^1)</td>
</tr>
<tr>
<td>DIR.CMD</td>
<td>Effective direction set-point value</td>
<td>rise</td>
</tr>
</tbody>
</table>

Tab. 1: Factory settings - Functions

Additional functions are described in the operating instructions Type 8694. These instructions can be found on the Internet at www.burkert.com.

\(^1\) Without change to the settings via the communications software a linear characteristic is stored in FREE.

Type 8694
7 INSTALLATION

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

Risk of injury from unintentional activation of the system and an uncontrolled restart.
- Secure system from unintentional activation.
- Following assembly, ensure a controlled restart.

7.2 Installing the positioner on process valves belonging to series 2103 and 23xx

NOTE!

When mounting on process valves with a welded body, follow the installation instructions in the operating instructions for the process valve.

When the positioner is being installed, the collets of the pilot air ports must not be fitted to the actuator.

→ Align the puck and the positioner until
  1. the puck can be inserted into the guide rail of the positioner (see “Fig. 6”) and
  2. the connection pieces of the positioner can be inserted into the pilot air ports of the actuator (see also “Fig. 6”).

NOTE!

Damaged printed circuit board or malfunction.
- Ensure that the puck is situated flat on the guide rail.

![Fig. 6: Aligning the puck](image)
→ Push the positioner, without turning it, onto the actuator until no gap is visible on the form seal.

**NOTE!**

Too high torque when screwing in the fastening screw does not ensure degree of protection IP65 / IP67.

- The fastening screws may be tightened to a maximum torque of 1.5 Nm only.

→ Attach the positioner to the actuator using the two side fastening screws. In doing so, tighten the screws only hand-tight (max. torque: 1.5 Nm).

Fig. 7: Installing the positioner, series 2103, 2300 and 2301

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### 7.3 Installing the positioner on process valves belonging to series 26xx and 27xx

**Procedure:**

![Guide rail](image1)

![Puck](image2)

Fig. 8: Aligning the puck

→ Push the positioner onto the actuator. The puck must be aligned in such a way that it is inserted into the guide rail of the positioner.

**NOTE!**

Damaged printed circuit board or malfunction.

- Ensure that the puck is situated flat on the guide rail.

→ Press the positioner all the way down as far as the actuator and turn it into the required position.
Ensure that the pneumatic connections of the positioner and those of the actuator are situated preferably vertically one above the other (see “Fig. 9”).

**NOTE!**

Too high torque when screwing in the fastening screw does not ensure degree of protection IP65 / IP67.
- The fastening screws may be tightened to a maximum torque of 1.5 Nm only.

→ Attach the positioner to the actuator using the two side fastening screws. In doing so, tighten the screws only hand-tight (max. torque: 1.5 Nm).

**NOTE!**

Damage or malfunction due to ingress of dirt and moisture. To observe degree of protection IP65 / IP67:
- In the case of actuator size Ø 80, Ø 100 connect the pilot air outlet which is not required to the free pilot air port of the actuator or seal with a plug.
- In the case of actuator size Ø 125 seal the pilot air outlet 2₂ which is not required with a plug and feed the free pilot air port of the actuator via a hose into a dry environment.

→ Make the pneumatic connection between the positioner and actuator with the “Tab. 2: Pneumatic connection to actuator”.

“In rest position” means that the pilot valves of the positioner Type 8694 are isolated or not actuated.

**Fig. 9: Installing the pneumatic connection to actuator, series 26xx and 27xx**
8 PNEUMATIC INSTALLATION

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) (3 – 7 bar; instrument air, free of oil, water and dust).
- Attach the exhaust air line or a silencer to the exhaust air port (3) and, if available to the exhaust air port (3.1) (see “Fig. 10”).

Keep the adjacent supply pressure always at least 0.5 – 1 bar above the pressure which is required to move the actuator to its end position. This ensures that the control behavior is not extremely negatively affected in the upper stroke range on account of too little pressure difference. During operation keep the fluctuations of the pressure supply as low as possible (max. ±10 %). If fluctuations are greater, the control parameters measured with the X.TUNE function are not optimum.
Important information for the problem-free functioning of the device:

▶ The installation must not cause back pressure to build up.
▶ Select a hose for the connection with an adequate 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 port (3) or (3.1).

---

**9 ELECTRICAL INSTALLATION**

All electrical inputs and outputs of the device are **not** galvanically isolated from the supply voltage.

**9.1 Safety instructions**

![DANGER!](Exhaust air concept)

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!](Exhaust air concept)

Risk of injury from improper installation.

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

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

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

Minimum temperature rating of the cable to be connected to the field wiring terminals: 75 °C

**9.2 Electrical installation 24 V DC**

Two kinds of connections are used for the electrical bonding of the positioner:

• Cable gland with screw-type terminals
• Multi-pole with circular plug-in connector M12 x 1, 8-pole

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

---

**Fig. 10: Pneumatic connection**
9.2.1 Electrical installation with cable gland

NOTE!

Breakage of the pneumatic connection pieces due to rotational impact.

- When unscrewing and screwing in the body casing, do not hold the actuator of the process valve but the connection housing.

→ Unscrew the body casing (stainless steel) in a counter-clockwise direction.

→ Push the cables through the cable gland.

→ Connect the wires.

![Fig. 11: Open positioner](image)

![Fig. 12: Screw-type terminals](image)

### Input signals from the control centre (e.g. PLC)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Configuration</th>
<th>External circuit / signal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Set-point value +</td>
<td>4 – + (0/4 ... 20 mA)</td>
</tr>
<tr>
<td>5</td>
<td>Set-point value GND</td>
<td>5 – GND</td>
</tr>
<tr>
<td>1</td>
<td>Digital input +</td>
<td>1 – + 0 ... 5 V (log. 0) 10 ... 30 V (log. 1) with reference to terminal 7 (GND)</td>
</tr>
</tbody>
</table>

Tab. 3: Assignment of screw-type terminals - input signals of the control center

### Operating voltage

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Configuration</th>
<th>External circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Operating voltage +</td>
<td>6 – 24 V DC ± 10 % max. residual ripple 10 %</td>
</tr>
<tr>
<td>7</td>
<td>Operating voltage GND</td>
<td>7 – GND</td>
</tr>
</tbody>
</table>

Tab. 4: Assignment of screw-type terminals - operating voltage
Output signals to the control center (e.g. PLC; for analog output option only)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Configuration</th>
<th>External circuit / signal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Analogue position feedback +</td>
<td>2 GND + (0/4 ... 20 mA)</td>
</tr>
<tr>
<td>3</td>
<td>Analogue position feedback GND</td>
<td>3 GND</td>
</tr>
</tbody>
</table>

Tab. 5: Assignment of screw-type terminals - output signals to the control center - option

NOTE!

Breakage of the pneumatic connection pieces due to rotational impact.
- When unscrewing and screwing in the body casing, do not hold the actuator of the process valve but the connection housing.

Damage or malfunction due to penetration of dirt and humidity.
To ensure degree of protection IP65 / IP67:
- Tighten the union nut on the cable gland according to the cable size or dummy plugs used (approx. 1.5 Nm).
- Screw the body casing in all the way.

→ Tighten union nut on the cable gland (torque approx. 1.5 Nm).
→ Close the device (assembly tool: 674077²).

When the supply voltage is applied, the positioner is operating.
→ Actuate the automatic adjustment of the positioner, as described in the chapter entitled “10.2 Automatic adjustment X.TUNE”.

2) The assembly tool (674077) is available from your Bürkert sales office.
9.2.2 Electrical installation 24 V DC with circular plug-in connector

→ Connect the positioner according to the table.

![Circular plug M12 x 1, 8-pole](image)

Fig. 14: Circular plug M12 x 1, 8-pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire color3)</th>
<th>Configuration</th>
<th>External circuit / signal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>white</td>
<td>Set-point value + (0/4 ... 20 mA)</td>
<td>1 + (0/4 ... 20 mA)</td>
</tr>
<tr>
<td>2</td>
<td>brown</td>
<td>Set-point value GND</td>
<td>2 GND</td>
</tr>
<tr>
<td>5</td>
<td>grey</td>
<td>Digital input + GND</td>
<td>5 + 0 ... 5 V (log. 0) 10 ... 30 V (log. 1)</td>
</tr>
<tr>
<td>6</td>
<td>pink</td>
<td>Digital input GND</td>
<td>identical to Pin 3 (GND)</td>
</tr>
</tbody>
</table>

Tab. 6: Pin assignment - input signals of the control center

### Operating voltage

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire color3)</th>
<th>Configuration</th>
<th>External circuit / signal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>green</td>
<td>GND</td>
<td>3 24 V DC ± 10 % max. residual ripple 10 %</td>
</tr>
<tr>
<td>4</td>
<td>yellow</td>
<td>+ 24 V</td>
<td>4 GND</td>
</tr>
</tbody>
</table>

Tab. 7: Pin assignment - operating voltage

### Output signals to the control center (e.g. PLC) - (required for analogue output option only)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire color3)</th>
<th>Configuration</th>
<th>External circuit / signal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>red</td>
<td>Analogue position feedback +</td>
<td>8 + (0/4 ... 20 mA)</td>
</tr>
<tr>
<td>7</td>
<td>blue</td>
<td>Analogue position feedback GND</td>
<td>7 GND</td>
</tr>
</tbody>
</table>

Tab. 8: Pin assignment - output signals of the control center - option

When the supply voltage is applied, the positioner is operating.

→ Actuate the automatic adjustment of the positioner, as described in the chapter entitled “10.2 Automatic adjustment X.TUNE”.

3) The indicated colors refer to the connecting cable available as an accessory (919061).
9.3 Electrical installation AS Interface

A detailed description of the bus communication can be found in the operating instructions Type 8694.

9.3.1 Connection with circular plug-in connector M12 x 1, 4-pole, male

Connector views
The views show the image from the front looking at the pins, the solder connections are behind them.

Bus connection without external / with external supply voltage

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bus +</td>
<td>AS Interface bus line +</td>
</tr>
<tr>
<td>2</td>
<td>NC or GND (optional)</td>
<td>not used or external supply voltage – (optional)</td>
</tr>
<tr>
<td>3</td>
<td>Bus –</td>
<td>AS Interface bus line –</td>
</tr>
<tr>
<td>4</td>
<td>NC or 24 V + (optional)</td>
<td>not used or external supply voltage + (optional)</td>
</tr>
</tbody>
</table>

Tab. 9: Pin assignment of circular plug-in connector for AS Interface

When the supply voltage is applied, the positioner is operating.
→ Actuate the automatic adjustment of the positioner, as described in the chapter entitled “10.2 Automatic adjustment X.TUNE”.

9.3.2 Connection with multi-pole cable and ribbon cable terminal

As an alternative to the bus connection model with 4-pole circular plug, there is the positioner with multi-pole cable (M12 circular plug) and ribbon cable terminal. The wiring diagram of the circular plug corresponds to the bus connection of the M12 4-pole circular plug and can easily be connected to the ribbon cable terminal.

When designing the system, consider the length of the cable which is fed directly to the positioner for the maximum bus line length (see example calculation in the operating instructions).
9.3.3 Programming data AS Interface

<table>
<thead>
<tr>
<th></th>
<th>Version Profile S-7.3.4</th>
<th>Version Profile S-7.A.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O configuration</td>
<td>7 hex</td>
<td>7 hex</td>
</tr>
<tr>
<td>ID code</td>
<td>3 hex (analog profile)</td>
<td>A hex</td>
</tr>
<tr>
<td>Extended ID code 1</td>
<td>F hex (Default value, can be changed by the user)</td>
<td>7 hex</td>
</tr>
<tr>
<td>Extended ID code 2</td>
<td>4 hex</td>
<td>5 hex</td>
</tr>
<tr>
<td>Profile</td>
<td>S-7.3.4</td>
<td>S-7.A.5</td>
</tr>
</tbody>
</table>

Tab. 10: Programming data

10 START-UP

10.1 Safety instructions

⚠️ WARNING!

Risk of injury from improper operation.
Improper operation may result in injuries as well as damage to the device and the area around it.
- Before start-up, ensure that the operating personnel are familiar with and completely understand the contents of the operating instructions.
- Observe the safety instructions and intended use.
- Only adequately trained personnel may operate the equipment/the device.

10.2 Automatic adjustment X.TUNE

⚠️ WARNING!

To adjust the positioner to local conditions, the X.TUNE function must be run following installation.

Danger due to the valve position changing when the X.TUNE function is running.
When the X.TUNE is running under operating pressure, there is an acute risk of injury.
- Never run X.TUNE while a process is running.
- Take appropriate measures to prevent the equipment from being accidentally actuated.
**NOTE!**

Avoid maladjustment of the controller due to an incorrect pilot pressure or applied operating medium pressure.

- Run *X.TUNE whenever* the pilot pressure (= pneumatic auxiliary energy) is available during subsequent operation.
- Run the *X.TUNE* function preferably *without* operating medium pressure to exclude interference caused by flow forces.

![Diagram of Open Positioner](image)

**NOTE!**

Breakage of the pneumatic connection pieces due to rotational impact.

- When unscrewing and screwing in the transparent cap, do not hold the actuator of the process valve but the connection housing.

→ Screw off the transparent cap of the positioner to operate the keys and DIP switches.

![Diagram of Positioner](image)

→ Start the *X.TUNE* by pressing key 1\(^4\) for 5 s.

While the *X.TUNE* is running, LED 1 flashes quickly (green).

When the automatic adjustment is complete, LED 1 flashes slowly (green)\(^5\).

The changes are automatically transferred to the memory (EEPROM) provided the *X.TUNE* function is successful.

4) *The X.TUNE can also be started via communications software.*

5) *If a fault occurs, LED 1 is lit red.*
NOTE!

Breakage of the pneumatic connection pieces due to rotational impact.
▶ When unscrewing and screwing in the transparent cap, do not hold the actuator of the process valve but the connection housing.

Damage or malfunction due to penetration of dirt and humidity.
▶ To observe degree of protection IP65 / IP67, screw the transparent cap in all the way.

→ Close the device (assembly tool: 674077⁶).

Important:
When the Teach function is activated the actuator cannot be actuated via the AS Interface.

10.3 Control and display elements

A detailed description of the operation and functions of the positioner and the communication software can be found in the respective operating instructions.

NOTE!

Breakage of the pneumatic connection pieces due to rotational impact.
▶ When unscrewing and screwing in the transparent cap, do not hold the actuator of the process valve but the connection housing.

→ Screw off the transparent cap of the positioner to operate the keys and DIP switches.

6) The assembly tool (674077) is available from your Bürkert sales office.
**NOTE!**

Breakage of the pneumatic connection pieces due to rotational impact.

- When unscrewing and screwing in the transparent cap, do not hold the actuator of the process valve but the connection housing.

Damage or malfunction due to penetration of dirt and humidity.

- To observe degree of protection IP65 / IP67, screw the transparent cap in all the way.

→ Close the device (assembly tool: 674077\(^7\)).

---

**10.3.1 Operating status**

**AUTOMATIC (AUTO)**

Normal controller mode is implemented and monitored in AUTOMATIC operating state.

LED 1 flashes green.

**MANUAL (MANU)**

In MANUAL operating state the valve can be opened and closed manually via the keys.

LED 1 flashes red / green alternately.

The DIP switch 4 can be used to switch between the two operating states AUTOMATIC and MANUAL.

<table>
<thead>
<tr>
<th>DIP switches</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>Operating status MANUAL</td>
</tr>
<tr>
<td></td>
<td>(MANU)</td>
</tr>
<tr>
<td>OFF</td>
<td>Operating status</td>
</tr>
<tr>
<td></td>
<td>AUTOMATIC (AUTO)</td>
</tr>
</tbody>
</table>

---

\(^7\) The assembly tool (674077) is available from your Bürkert sales office.
10.3.2 Functions of the keys

The configuration of the 2 keys on the board varies depending on the operating status (AUTOMATIC / MANUAL).

**Fig. 22: Keys**

**MANUAL operating status (DIP switch 4 set to ON):**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function&lt;sup&gt;8)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aerate (manually open / close the actuator)&lt;sup&gt;9)&lt;/sup&gt;</td>
</tr>
<tr>
<td>2</td>
<td>Deaerate (manually open / close the actuator)&lt;sup&gt;9)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**Tab. 12: Configuration of the keys for MANUAL operating status**

**AUTOMATIC operating status (DIP switch 4 set to OFF):**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press for 5 s to start the X.TUNE function</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

**Tab. 13: Configuration of the keys for AUTOMATIC operating status**

---

8) No function if the digital input was activated with the "Manual/Auto change-over" via the communications software.

9) Depending on the operating principle of the actuator.
10.3.3 Function of the DIP switches

<table>
<thead>
<tr>
<th>DIP switches</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ON</td>
<td>Reversal of the effective direction of the set-point value (set-point value 20 – 4 mA corresponds to position 0 – 100 %), descending (DIR.CMD)</td>
</tr>
<tr>
<td>OFF</td>
<td>Normal effective direction of the set-point value (set-point value 4 – 20 mA corresponds to position 0 – 100 %), ascending</td>
</tr>
<tr>
<td>2 ON</td>
<td>Sealing function active. The valve completely closes below 2 %(^{10}) and opens above 98 % of the set-point value (CUTOFF)</td>
</tr>
<tr>
<td>OFF</td>
<td>No sealing function</td>
</tr>
<tr>
<td>3 ON</td>
<td>Correction characteristic for adjustment of the operating characteristic (linearization of the process characteristic CHARACT) (^{10})</td>
</tr>
<tr>
<td>OFF</td>
<td>Linear characteristic</td>
</tr>
<tr>
<td>4 ON</td>
<td>Operating status MANUAL (MANU)</td>
</tr>
<tr>
<td>OFF</td>
<td>Operating status AUTOMATIC (AUTO)</td>
</tr>
</tbody>
</table>

Tab. 14: DIP switches

\(^{10}\)Can be changed via communications software.

10.3.4 Display of the LEDs

Fig. 23: Display of the LEDs

LED 1 (green / red) Display of AUTO, MANU, X.TUNE and FAULT

LED 2 (green / yellow) Display of state of actuator (open, closed, opens or closes)
LED 1 (green / red)

<table>
<thead>
<tr>
<th>LED States</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td>red</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>flashes slowly</td>
<td>off</td>
</tr>
<tr>
<td>flashing slowly</td>
<td>flashing alternating</td>
</tr>
<tr>
<td>flashes quickly</td>
<td>off</td>
</tr>
<tr>
<td>off</td>
<td>flashes slowly</td>
</tr>
</tbody>
</table>

Acceleration phase when Power ON
Operating status AUTO (AUTOMATIC)
MANUAL operating status
X.TUNE function
ERROR (see operating instructions)
AUTO operating status for sensor break detection

Tab. 15: Display LED 1

LED 2 (green / yellow)

<table>
<thead>
<tr>
<th>LED States</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td>yellow</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>off</td>
<td>on</td>
</tr>
<tr>
<td>flashes slowly</td>
<td>off</td>
</tr>
<tr>
<td>off</td>
<td>flashes slowly</td>
</tr>
<tr>
<td>flashes quickly</td>
<td>off</td>
</tr>
<tr>
<td>off</td>
<td>flashes quickly</td>
</tr>
</tbody>
</table>

Actuator closed
Actuator open
Remaining control deviation (actual value > set-point value)
Remaining control deviation (actual value < set-point value)
Closing in MANUAL operating status
Opening in MANUAL operating status

Tab. 16: Display LED 2
## 12 ACCESSORIES

<table>
<thead>
<tr>
<th>Designation</th>
<th>Order no.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>USB adapter for connection to a PC in conjunction with an extension cable</td>
<td>227093</td>
<td></td>
</tr>
<tr>
<td>Communicator</td>
<td>Information at <a href="http://www.burkert.com">www.burkert.com</a></td>
<td></td>
</tr>
<tr>
<td>Connection cable M12 x 1, 8-pole</td>
<td>919061</td>
<td></td>
</tr>
<tr>
<td>Assembly tool</td>
<td>647077</td>
<td></td>
</tr>
</tbody>
</table>

*Tab. 18: Accessories*

### 12.1 Communications software

The PC operating program “Communicator” is designed for communication with the devices from the Bürkert positioner family (valid since serial number 20000).

> A detailed description and precise schedule of the procedure for the installation and operation of the software can be found in the associated documentation.

### 12.2 USB interface

The PC requires an USB interface for communication with the positioners as well as an additional adapter with interface driver (see “Tab. 18”).

### 12.3 Download

Download the software at: [www.burkert.com](http://www.burkert.com)

## 13 PACKAGING, TRANSPORT, STORAGE

### NOTE!

**Transport damages.**

Inadequately protected equipment may be damaged during transport.

- During transportation protect the device against wet and dirt in shock-resistant packaging.
- Avoid exceeding or dropping below the permitted storage temperature.

**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.**

- Dispose of the device and packaging in an environmentally friendly manner.
- Observe applicable regulations on disposal and the environment.