

GEMÜ 1441 cPos-X

Intelligent electro-pneumatic positioner

EN

Operating instructions



further information
webcode: GW-1441



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26.10.2023

1 Quick commissioning

⚠ CAUTION



Hazardous situation

- ▶ Risk of injury or damage possible.
- For correct commissioning, the product must be calibrated to the process valve via the initialization process.
- During this commissioning, the valve is automatically opened and closed several times. It must therefore be ensured in advance that this does not lead to a dangerous situation.

NOTICE

Operating errors

- Prior to commissioning, familiarize yourself with the operation of the product.

NOTICE

Incorrect initialization

- Always carry out initialization without operating medium pressure on the process valve. Carry out initialization of the process valve in neutral position (NO/NC).

NOTICE

- For delivery of the product assembled on a valve at the factory, the complete construction is already ready for operation at a control pressure of 5.5 to 6 bar without operating pressure. A reinitialization is recommended if the plant is operated with a different control pressure or if the mechanical end positions have been changed (e.g. seal replacement on the valve or actuator replacement). The initialization is retained even in the event of voltage cutoff.

NOTICE

- For delivery of the product without default setting (e.g. for delivery without valve) initialization must be carried out once for correct operation. This initialization must be repeated every time that the process valve is changed (e.g. seal replacement or actuator replacement).

1. Mount the product on the process valve mechanically using the mounting kit.
2. Connect the product pneumatically:
 - ⇒ Supply the connector **1** with pneumatic auxiliary power (max. 7 bar) (observe the process valve's max. control pressure).
 - ⇒ Connect the connector **2** to the process valve's control air connector (on double acting valves, connect connector **4** to the second control air connector on the process valve).
3. Connect the product electrically:
 - ⇒ Connect the set value signal ≥ 4 mA (simultaneously represents the power supply) – pin 1: Iw+; pin 2: Iw-
 - ⇒ Wait until the display indication switches from "Starting" to a normal operating status display
4. Start the automatic initialization (speed-AP function)¹⁾:
 - ⇒ Hold a magnet at the marked initialization position (INIT) until "Remove Magnet" is shown on the status display
 - ⇒ The initialization phase lasts for a few minutes, during which the process valve is opened and closed several times. The initialization process is ended automatically.
5. The product is ready for operation and responds to the current set value signal.

NOTICE

- ▶ The preconfiguration can be changed via the app, whereby you can adapt the configuration of the parameters to the individual control.

¹⁾Alternatively, the initialization can be carried out via the app – in this case, detailed status and results information is also displayed.

²⁾While the wireless connection is active (this can be seen on the connection status indicator in the status display), the magnetic trigger is deactivated. The magnetic trigger can also be permanently deactivated via the app.

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2 General information

2.1 Information

- The descriptions and instructions apply to the standard versions. For special versions not described in this document the basic information contained herein applies in combination with any additional special documentation.
- Correct installation, operation, maintenance and repair work ensure faultless operation of the product.
- Should there be any doubts or misunderstandings, the German version is the authoritative document.
- Contact us at the address on the last page for staff training information.
- For ProfiNet, Profibus DP and DeviceNet fieldbus variants, separate documents are available for the fieldbus-specific and relevant procedures.
General commissioning and basic operation have already been described in this document.

2.2 Symbols used

The following symbols are used in this document:

| Symbol | Meaning |
|--------|-----------------------|
| ● | Tasks to be performed |
| ▶ | Response(s) to tasks |
| – | Lists |

2.3 Definition of terms

Working medium

The medium that flows through the GEMÜ product.

Control function

The possible actuation functions of the GEMÜ product.

Control medium

The medium whose increasing or decreasing pressure causes the GEMÜ product to be actuated and operated.

Speed-^{AP}function

Speed Assembly and Programming, a particularly user-friendly commissioning function for fast mounting, automated setting and initialization of GEMÜ products. Dependent on type, activation uses an external impulse signal or existing precautions on the device (magnetic or housing switch). Changeover to normal operating mode takes place automatically after successful completion.


2.4 Warning notes


Wherever possible, warning notes are organised according to the following scheme:


| SIGNAL WORD | |
|---|---|
| Possible symbol for the specific danger | Type and source of the danger ▶ Possible consequences of non-observance. ● Measures for avoiding danger. |


Warning notes are always marked with a signal word and sometimes also with a symbol for the specific danger.

The following signal words and danger levels are used:




| ⚠ DANGER | |
|---|---|
|  | Imminent danger! ▶ Non-observance can cause death or severe injury. |

| ⚠ WARNING | |
|--|---|
|  | Potentially dangerous situation! ▶ Non-observance can cause death or severe injury. |

| ⚠ CAUTION | |
|---|---|
|  | Potentially dangerous situation! ▶ Non-observance can cause moderate to light injury. |

| NOTICE | |
|---|---|
|  | Potentially dangerous situation! ▶ Non-observance can cause damage to property. |

The following symbols for the specific dangers can be used within a warning note:

| Symbol | Meaning |
|---|---|
|  | Danger of explosion |
|  | Exhaust air and cycle duties generate noise |
|  | Corrosive chemicals! |

3 Safety information

The safety information in this document refers only to an individual product. Potentially dangerous conditions can arise in combination with other plant components, which need to be considered on the basis of a risk analysis. The operator is responsible for the production of the risk analysis and for compliance with the resulting precautionary measures and regional safety regulations.

The document contains fundamental safety information that must be observed during commissioning, operation and maintenance. Non-compliance with these instructions may cause:

- Personal hazard due to electrical, mechanical and chemical effects.
- Hazard to nearby equipment.
- Failure of important functions.
- Hazard to the environment due to the leakage of dangerous substances.

The safety information does not take into account:

- Unexpected incidents and events, which may occur during installation, operation and maintenance.
- Local safety regulations which must be adhered to by the operator and by any additional installation personnel.

Prior to commissioning:

1. Transport and store the product correctly.
2. Do not paint the bolts and plastic parts of the product.
3. Carry out installation and commissioning using trained personnel.
4. Provide adequate training for installation and operating personnel.
5. Ensure that the contents of the document have been fully understood by the responsible personnel.
6. Define the areas of responsibility.
7. Observe the safety data sheets.
8. Observe the safety regulations for the media used.

During operation:

9. Keep this document available at the place of use.
10. Observe the safety information.
11. Operate the product in accordance with this document.
12. Operate the product in accordance with the specifications.
13. Maintain the product correctly.
14. Do not carry out any maintenance work and repairs not described in this document without consulting the manufacturer first.

In cases of uncertainty:

15. Consult the nearest GEMÜ sales office.

4 Product description

4.1 Construction






| Item | Name | Materials |
|------|------------------|----------------|
| 1 | Housing cover | Grivory PA 6.6 |
| 2 | Inspection glass | PC |
| 3 | Housing base | Grivory PA 6.6 |
| 4 | Pneumatic panel | Grivory PA 6.6 |
| C | Conexo | |

4.2 Description

The GEMÜ 1441 cPos-X is an intelligent, digital electro-pneumatic positioner in 2-wire technology used to control pneumatically operated process valves. It can be combined with single acting or double acting linear actuators or quarter turn actuators. This means that it can be used, among other things, for diaphragm, globe and diaphragm globe valves as well as for ball valves and butterfly valves, for instance. The positioner has a robust housing with a covered LCD display for status information. The positioner can be operated remotely using a mobile device in order to configure settings and to view detailed information.

5 Correct use

|  DANGER | |
|---|--|
|  | <p>Danger of explosion</p> <ul style="list-style-type: none"> ▶ Danger of death or severe injury. ● Only use the product in potentially explosive zones confirmed in the declaration of conformity. |

|  WARNING | |
|--|--|
| Improper use of the product! | |
| <ul style="list-style-type: none"> ▶ Risk of severe injury or death ▶ Manufacturer liability and guarantee will be void. ● Only use the product in accordance with the operating conditions specified in the contract documentation and in this document. | |

The product with integrated pilot valves is designed for pneumatic actuators and has a microprocessor-controlled intelligent position control as well as an analogue travel sensor system (potentiometer). This is connected to the actuator spindle in a force-locking way with by means of a mounting kit (spring, operating bush). The valve position and the integrated travel sensor can be monitored via the electrical connections. The pneumatic actuator is directly operated and controlled by means of the pilot valves.

1. Use the product in accordance with the technical data.

5.1 Product without special function X

The product is not intended for use in potentially explosive areas.

5.2 Product with special function X

With the special version X ordering option, the product is intended for use in potentially explosive areas of zones 1 with gases, mists or vapours and zones in accordance with EU Directive 2014/34/EU (ATEX) and IECEx.

The product has the following explosion protection marking:

ATEX

Gas:  II 2G Ex ib IIB T4 Gb

Certificate: IBExU23ATEX1002 X

Notified body: IBExU, no. 0637

IECEx

Gas:  Ex ib IIB T4 Gb

Certificate: IECEx IBE 22.0016 X

The product has been developed in compliance with the following harmonised standards:

- EN 60079-0:2018
- EN 60079-11:2012

Use of the product is permissible in the following ambient temperature ranges: -10 °C to +60 °C

For use in potentially explosive areas, the following conditions or operation limits must be observed:

Index X is applied to the explosion protection marking.

The following special conditions must be complied with:

1. Connection cables and connectors must be protected from damage.
2. Warning label "Danger from electro-static build-up".
3. Warning label "Do not disconnect when live".
4. RFID chips must not be read out in potentially explosive areas.

The intrinsically safe characteristic values in **chapter 7.8.6 Intrinsically safe characteristic values** must be complied with.

6 Order data

The order data provide an overview of standard configurations.

Please check the availability before ordering. Other configurations available on request.

Note: Pneumatic connecting components (union and compressed air tube) for the connection between the process valve and positioner are included with each positioner.

Note: A valve specific mounting kit is required for assembly. For designing the mounting kit, the valve type, nominal size, control function and actuator size must be stated.

Order codes

| 1 Type | Code |
|--------------------|------|
| 2-wire 1441 cPos-X | 1441 |

| 2 Fieldbus | Code |
|------------|------|
| None | 000 |
| HART | HAR |

| 3 Accessory | Code |
|--------------------|------|
| Automation product | A |

| 4 Action | Code |
|--------------------------------------|------|
| Single acting (fail-safe) | 1 |
| Double acting (fail-safe) | 3 |
| Single acting blocking (fail-freeze) | 5 |
| Double acting blocking (fail-freeze) | 6 |

| 5 Device version | Code |
|------------------|------|
| Positioner | SA2 |

| 6 Signal type | Code |
|---------------|------|
| 4–20 mA | A |

| 7 Pneumatic connection | Code |
|---------------------------------|------|
| G1/8 with 6 mm plug-in coupling | 3 |
| G1/8 with 1/4" plug-in coupling | U |

| 8 Option | Code |
|---|------|
| Digital input and output | 0 |
| Analogue output, digital input and output | C |

| 9 Electrical connection | Code |
|-------------------------|------|
| M12 plug | 1 |
| M16 x 1.5 cable gland | 2 |

| 10 Flow rate | Code |
|--------------|------|
| 115 NI/min | 2 |

| 11 Travel sensor version | Code |
|-------------------------------------|------|
| Potentiometer, 75 mm length | 075 |
| Remote potentiometer, M12 connector | S01 |

| 12 Type of design | Code |
|---|------|
| Without | |
| Media wetted area cleaned to ensure suitability for paint applications, parts sealed in plastic bag | 0101 |
| Inversed direction, for quarter turn valves control function NO (2) | 6960 |

| 13 Special version | Code |
|--------------------------|------|
| Without | |
| ATEX (2014/34/EU), IECEx | X |

| 14 CONEXO | Code |
|---|------|
| Integrated RFID chip for electronic identification and traceability | C |

Order example

| Ordering option | Code | Description |
|--------------------------|------|---|
| 1 Type | 1441 | 2-wire 1441 cPos-X |
| 2 Fieldbus | HAR | HART |
| 3 Accessory | A | Automation product |
| 4 Action | 1 | Single acting (fail-safe) |
| 5 Device version | SA2 | Positioner |
| 6 Signal type | A | 4–20 mA |
| 7 Pneumatic connection | 3 | G1/8 with 6 mm plug-in coupling |
| 8 Option | 0 | Digital input and output |
| 9 Electrical connection | 1 | M12 plug |
| 10 Flow rate | 2 | 115 NI/min |
| 11 Travel sensor version | 075 | Potentiometer, 75 mm length |
| 12 Type of design | | Without |
| 13 Special version | | Without |
| 14 CONEXO | C | Integrated RFID chip for electronic identification and traceability |

7 Technical data

7.1 Medium

| | |
|----------------------------|---|
| Working medium: | Compressed air and inert gases |
| Dust content: | Class 4, max. particle size 15 µm, max. particle density 5 mg/m ³ |
| Pressure dew point: | Class 4 (10 K below the ambient temperature) |
| Oil content: | Class 4, max. oil concentration 25 mg/m ³ Quality classes to DIN ISO 8573-1 |



7.2 Temperature

| | |
|-----------------------------|-------------|
| Ambient temperature: | -10 – 60 °C |
| Storage temperature: | -10 – 60 °C |

7.3 Pressure

| | |
|----------------------------|--|
| Operating pressure: | 1.5 – 7 bar The applied pressure must not exceed the maximum control pressure of the process valve. |
| Flow rate: | 115 NI/min (@ 25 °C; 6->5 bar) |
| Air consumption: | ≤ 0.05 NI/min (when idle) |

7.4 Product compliance

| | |
|---|--|
| Machinery Directive: | Machinery Directive 2006/42/EC |
| Explosion protection: | ATEX (2014/34/EU) IECEX |
| ATEX marking: | Gas:  II 2G Ex ib IIB T4 Gb Certificate: IBExU23ATEX1002 X Notified body: IBExU, no. 0637 |
| IECEX marking: | Gas:  Ex ib IIB T4 Gb Certificate: IECEX IBE 22.0016 X |
| EMC Directive: | 2014/30/EU Technical standards used: Interference emission: DIN EN 61000-6-3:2007/A1:2011/AC:2012 DIN EN 61326-1 (industry) (07/2013) Interference resistance: EN IEC 61000-6-1:2019 EN 61326-1:2013 (industry) Class: B Group: 1 |
| RoHS Directive: | 2011/65/EU |
| Radio Equipment Directive (RED): | 2014/53/EU Technical standards used: |

| | |
|---|--|
| Radio Equipment Directive (RED): | Standard regarding the use of radio frequencies: EN 300 328 V2.2.2 (2019-07) Electromagnetic compatibility (EMC) for radio devices and services: EN 301 489-1 V2.2.3 (2019-11) EN 301 489-17 V3.2.4 (2020-09) Electrical safety: EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 |
|---|--|

| | |
|-------------|---|
| FCC: | This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: - this device may not cause harmful interference, and - this device must accept any interference received, including interference that may cause undesired operation. |
|-------------|---|

Changes or modifications made to this equipment to expressly approved by Gemü may void the user's authorization to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Contains FCC ID: QOQ-GM220P

Contains IC: 5123A-GM220P

7.5 Mechanical data

| | |
|-------------------------------|--|
| Installation position: | Optional |
| Weight: | Approx. 970 g |
| Travel sensor: | Integrated for direct mounting, remote mounting possible |

| | Travel sensor version |
|---|--|
| Detection range: | 0–75 mm |
| Operating range: | 0–75 mm |
| Resistance: | 5 kΩ |
| Minimum travel sensor change: | 3% (only relevant for initialization) |
| Correlation - Travel sensor spindle/valve position | Retracted (top) \pm 100% (valve open) Extended (bottom) \pm 0% (valve closed) |

7.6 Acoustic data

| | |
|------------------------|-------------|
| Noise emission: | > 85 dB (A) |
|------------------------|-------------|

7.7 Operating conditions

| | |
|-------------------------------|--------------------------------|
| Height: | Up to 2000 m (above sea level) |
| Relative air humidity: | Maximum 95%, non-condensing |

Protection class: IP 65 acc. to EN 60529

Degree of contamination: 3 (pollution degree)

7.8 Electrical data

7.8.1 Power supply / set value input

Supply power: Via set value signal

Note: The product is not intended to be supplied by a power source.

Power consumption: < 0.3 W

Short-circuit proof: Yes (up to max. 30 V DC)

Duty cycle: Continuous duty

Electrical protection class: III

Set value input: 4–20 mA

Input type: passive

Load impedance: typically 11.2 V DC
(corresponds to 560 Ω at 20 mA)
max. 12 V DC
(corresponds to 600 Ω at 20 mA)

Accuracy/linearity: $\leq \pm 0.5\%$ of full flow

Temperature drift: $\leq \pm 0.1\%$ of full flow

Resolution: 12 bit

Reverse battery protection: Yes

Overload proof: Yes (up to 30 V DC)

7.8.2 Analogue output (optional)

Accuracy: $\leq \pm 1\%$ of full flow

Signal: 4–20 mA

Supply voltage: 10 – 30 V DC

Output type: passive

Temperature drift: $\leq \pm 0.5\%$ of full flow

Resolution: 0.1 %

Short-circuit proof: Yes

Overload proof: Yes (up to 30 V DC)

7.8.3 Digital input

Function: Can be selected using software

| | |
|-------------------------|--------------------------------|
| Input type: | passive |
| Input voltage: | Typically 24 V DC (10–30 V DC) |
| Logic level "1": | 10 – 30 V DC |
| Logic level "0": | 0–4 V DC |
| Input current: | Typically 6 mA DC |

7.8.4 Digital output

Digital output:

| | Version without ATEX | Version with ATEX (special version X) |
|-------------------------|--|---|
| Notes: | Maximum possible output current < 14 mA. | Digital output is configured as a NAMUR contact |
| Function: | Can be selected using software | |
| Supply voltage: | Typically 24 V DC (7–26.4 V DC) | 8.2 V DC to NAMUR |
| Output type: | Passive | |
| Logic level "1": | Conductive | Current consumption > 2.1 mA |
| Logic level "0": | Disabled | Current consumption < 1.2 mA |

7.8.5 Travel sensor input (for travel length code S01 – remote potentiometer)

Note: Travel sensor input is not galvanically isolated from the supply voltage/set value input.

Input voltage range: 0 to U_{P+}

Supply voltage U_{P+} : Typically 0.48 V DC

Resistance range of remote potentiometers: 1.8–6 k Ω (ideal 5 k Ω \pm 20%)

7.8.6 Intrinsically safe characteristic values

Input (energy supply with linear control characteristic):

| Connection | Name | U_i | I_i | P_i | C_i | L_i |
|------------|------|-------|-------|-------|--------|-------------|
| IW (XHART) | IW | 30 V | 65 mA | | 150 nF | 100 μ H |

Input (energy supply with rectangular control characteristic):

| Connection | Name | U_i | I_i | P_i | C_i | L_i |
|------------|------|-------|-------|-------|--------|-------------|
| IW (XHART) | IW | 24 V | 65 mA | | 150 nF | 100 μ H |

Passive outputs (energy supply with linear control characteristic):

| Connection | Name | U_i | I_i | P_i | C_i | L_i |
|------------|------|-------|--------|-------|--------|-------------|
| DigIn | DI | 30 V | 100 mA | 1 W | 250 nF | 150 μ H |
| DigOut | DO | 30 V | 100 mA | 1 W | 250 nF | 150 μ H |
| Iout | AO | 30 V | 90 mA | 1 W | 350 nF | 150 μ H |

Note: The input values are defined for the outputs (U_i , I_i , etc.). These outputs are passive (external power supply).

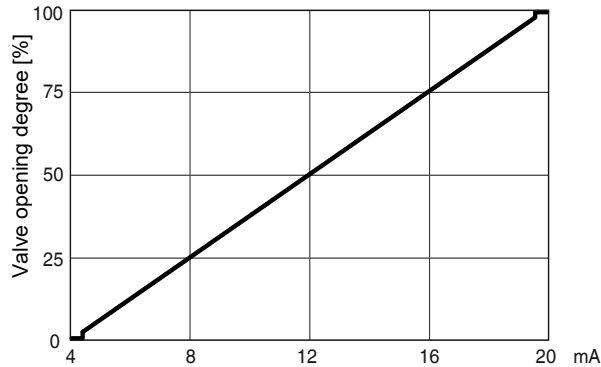
Active outputs (with linear control characteristic):

| Connection | Name | U_o | I_o | P_o | C_o | L_o | Comment |
|------------|----------------------|-------|-------|-------|-------------|-------------|----------------------------------|
| UP | Travel sensor output | 6 V | 5 mA | 30 mW | 997 μ F | 100 μ H | External resistive travel sensor |

7.8.7 Positioner data

Note: The following diagram is valid for valves with a standard assignment of the spindle position to the valve position (see "Mechanical data", page 11).

Control diagram: Default setting / The control characteristic is adjustable.



During initialization, the 1441 cPos-X positioner automatically detects the control function of the valve and is adjusted by default so that the valve is closed when the signal is 4 mA*.

The assignment can subsequently be changed using parameters. The close-tight function that is integrated as standard ensures that the valve is moved completely to the end position when the signal Open or Close valve is given.

* For double acting actuators, depends on the pneumatic actuator

Positioner information:

| | |
|-------------------------------|--|
| Control error: (Dead zone) | 1% default setting 0.1–25.0% (can be set at fixed values) 0.1–25.0% (adaptive self-adjustment) |
| Parameterization: | Via app or HART |
| Initialization: | Automatic via magnetic switch, app, digital input or HART |
| Close tight function: | Closed: $W \leq 0.5\%$ Open: $W \geq 99.5\%$ (can be changed via the app) |

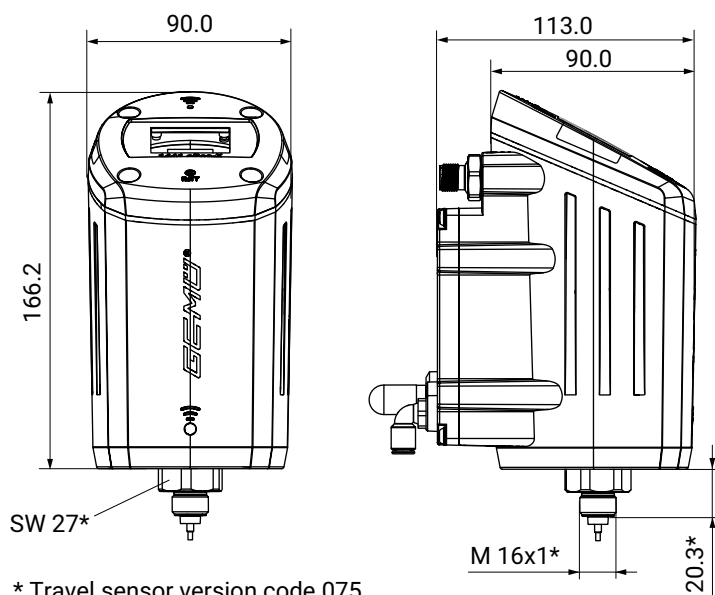
Interface:

| | Bluetooth Low Energy | HART |
|--------------|---|---|
| Function | Parameterization, configuring, diagnostics | Parameterization, configuring, diagnostics |
| | Device status via app ¹⁾ | Protocol Version 7 Device status via EDD |
| Prerequisite | Compatible smartphone/tablet with Android or iOS ¹⁾ - Apple iOS: Version 11 or higher - Android: Version 7.0 ("Nougat") or higher - Bluetooth 4.0 LE or newer | - |

¹⁾ The compatible GEMÜ app can be downloaded in the respective stores (Apple App Store or Google Play Store).

8 Dimensions

8.1 Positioner 1441

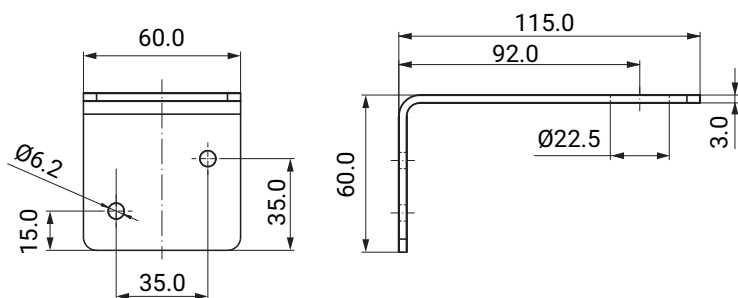


* Travel sensor version code 075

Dimensions in mm

8.2 1441 000 ZMP mounting bracket for remote mounting

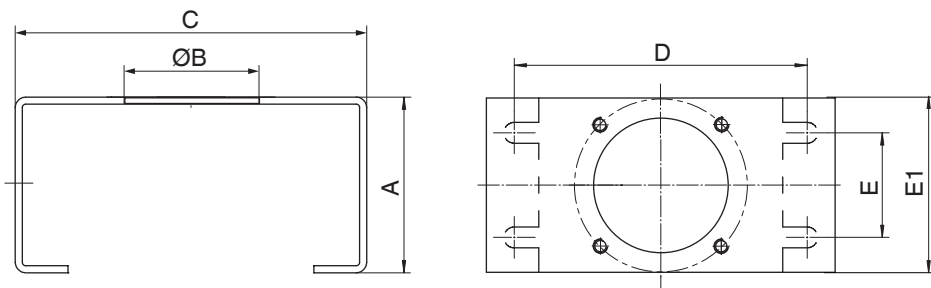
Remote mounting



Dimensions in mm

8.3 1441 000 ZMB mounting bracket for remote mounting with the GEMÜ 4231 travel sensor for remote mounting

Remote mounting

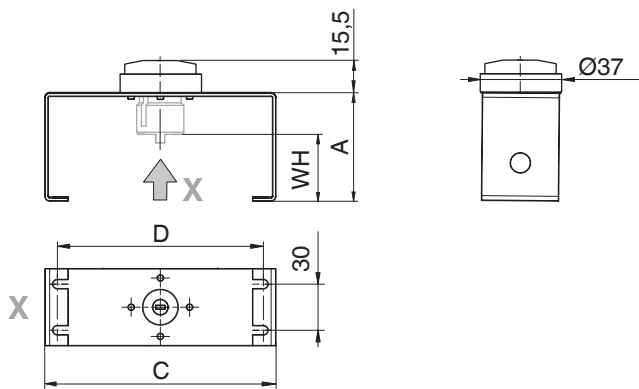


| A | $\varnothing B$ | C | D | E | E1 |
|------|-----------------|-------|------|------|------|
| 45.0 | 36.0 | 100.0 | 84.0 | 50.0 | 30.0 |

Dimensions in mm

8.4 1441PTAZ mounting bracket for direct mounting on quarter turn actuators

Direct mounting



| Shaft height WH | Hole spacing D | A | C |
|--------------------|-------------------|------|-------|
| 20.0 | 80.0 | 40.0 | 100.0 |
| 30.0 | 80.0 | 50.0 | 100.0 |
| 50.0 | 130.0 | 70.0 | 150.0 |

Dimensions in mm

9 Manufacturer's information

9.1 Delivery

- Check that all parts are present and check for any damage immediately upon receipt.

The product's performance is tested at the factory. The scope of delivery consists of the desired controller version as well as pneumatic connecting components (screw connection and compressed air tube) for the connection between process valve and positioner. The scope of delivery is apparent from the dispatch documents and the design from the order number.

9.2 Transport

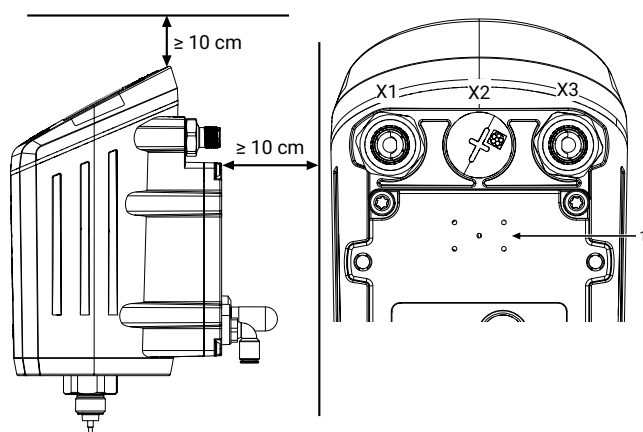
1. Only transport the product by suitable means. Do not drop. Handle carefully.
2. After the installation dispose of transport packaging material according to relevant local or national disposal regulations / environmental protection laws.

9.3 Storage

1. Store the product free from dust and moisture in its original packaging.
2. Avoid UV rays and direct sunlight.
3. Do not exceed the maximum storage temperature (see chapter "Technical data").
4. Do not store solvents, chemicals, acids, fuels or similar fluids in the same room as GEMÜ products and their spare parts.

10 Assembly

10.1 Assembly conditions

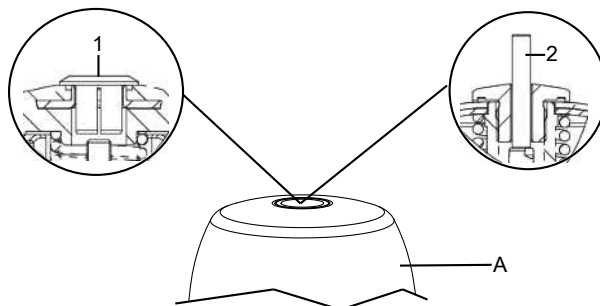


A clearance of 10 cm must be maintained at the rear of the device so that the electrical and pneumatic connections remain accessible. Furthermore, a vertical clearance of 10 cm must be maintained to ensure that the device can be disassembled at any time.

The rear pressure balance openings (right-hand figures) 1 must be maintained (in the event of a malfunction, targeted venting of the housing is guaranteed by the pressure balance openings).

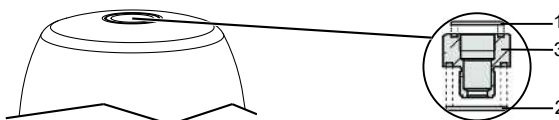
10.2 Preparations for assembly to the valve

1. Move the actuator **A** into zero position (actuator vented).
2. Remove optical position indicator **2** and / or protective cap **1** from the actuator top.



10.3 Threaded adapter assembly (linear actuator)

With some mounting kits, it is necessary to install a threaded adapter as well. This threaded adapter is enclosed with the required mounting kits. Valves with a normally open and double acting control function (code 2+3) also include additional O-rings (1+2).



1. Move the actuator to the closed position.
2. Place O-rings **1** and **2** into threaded adapter **3**.
3. Screw threaded adapter **3** into the actuator opening as far as it will go and tighten.

10.4 Linear travel sensor mounting kit assembly for remote mounting

⚠ CAUTION

Pretensioned spring!

- ▶ Damage to the device.
- Slowly release the tension in the spring.

⚠ CAUTION

Do not scratch the spindle!

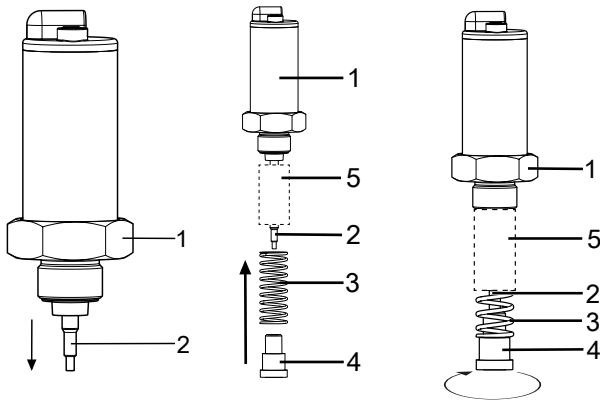
- ▶ A damaged spindle surface may cause failure of the travel sensor.

| Item | Name |
|------|--------------------|
| 1 | Travel sensor |
| 2 | Spindle |
| 3 | Spring |
| 4 | Operating bush |
| 5 | Guide bush* |
| 6 | Threaded adapter** |

*Included depending on version

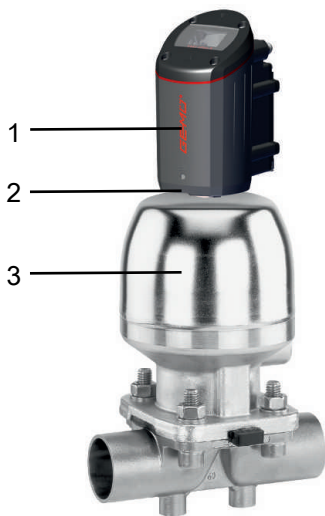
**If a threaded adapter is included, it must be screwed into the actuator top of the process valve

The process described below refers to the mounting kit assembly for direct and remote mounting. For direct mounting, the travel sensor that is shown is integrated in the housing of the positioner.



1. Pull the spindle **2** out of the travel sensor **1**.
2. If included, push the guide bush **5** taper over the spindle **2** first.
3. Push the spring **3** over the spindle **2** and secure with the operating bush **4**.
4. Tighten the operating bush **4** by turning it clockwise.
5. Push in the spindle **2** as far as it will go on the spring **3** and then slowly release the pressure on the spring **3**.

10.5 Direct mounting to linear actuators



1. Mount the travel sensor mounting kit (see "Linear travel sensor mounting kit assembly for remote mounting", page 17).
2. Move the actuator **3** to the open position.
3. Guide the product **1** as far as it will go into the actuator opening or the adapter, and screw it in in a clockwise direction against the initial spring tension, and tighten it using a suitable **WAF27** open-ended spanner.
4. Connect the product's pneumatic supply and connect the product to the process valve.

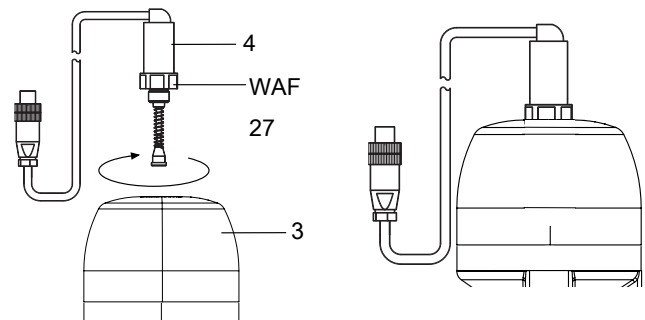
NOTICE

Damage to internal stop

- ▶ Do not turn the internal stop when assembling the product.

If correctly mounted to the corresponding valve, the product can be turned 320°.

10.6 Remote mounting to linear actuators



1. Mount the travel sensor mounting kit (see "Linear travel sensor mounting kit assembly for remote mounting", page 17).
2. Move the actuator **3** to the open position.
3. Guide the travel sensor **4** as far as it will go into the actuator opening or the adapter, and screw in in a clockwise direction against the initial spring tension, and tighten it using a suitable **WAF27** open-ended spanner.
4. Secure the product **1** in a suitable position.
5. The product offers two options for securing:
 - ⇒ Four fixing holes with threaded sleeves are located on the rear of the housing, using which the controller can be installed on holders/routes, etc.
 - ⇒ An attachment point for a mounting bracket is located on the underside of the housing. Two different variants are available as accessories for this. Depending on the version, the product can therefore be mounted on level surfaces or on walls.

NOTICE**Mounting bracket for wall mounting**

- ▶ The GEMÜ 1441 000 ZMP mounting bracket, which is available separately, can be used for this.

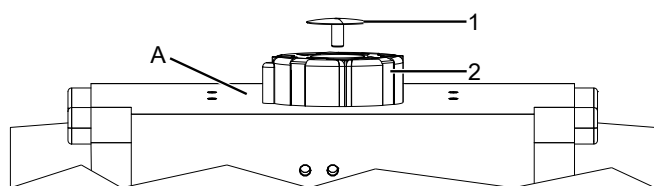
NOTICE**Mounting bracket for mounting on level surfaces**

- ▶ The GEMÜ 1441 000 ZMB mounting bracket, which is available separately, can be used for this.

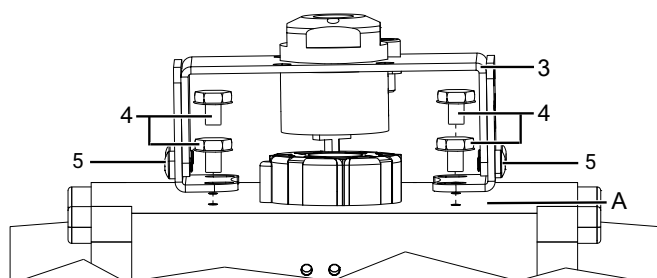
- Electrically connect the travel sensor to the product.
- Connect the product's pneumatic supply and connect the product to the process valve.

10.7 Preparations for assembly to the valve (quarter turn actuator)

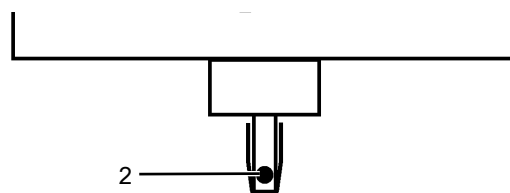
- Move the actuator **A** into zero position (actuator vented).



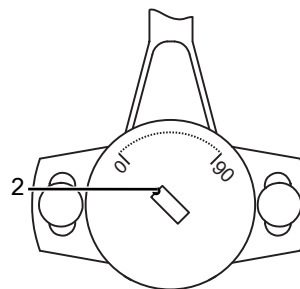
- Remove the screw **1** from the trigger cam **2**.

10.8 Mounting kit assembly (quarter turn actuator) for direct mounting

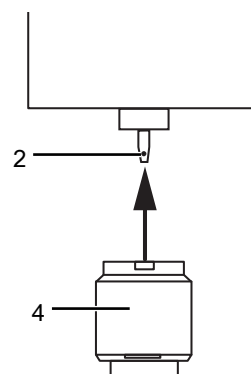
- Adjust the mounting bracket to the required borehole pattern.
 - ⇒ To do this, loosen the side screws **5** and set the retaining feet onto the thread of the actuator, and install it using screws **4**.
- Secure the bracket **3** to the retaining feet as shown. In doing so, the tap shaft must sit free of play in the shaft of the actuator.

10.9 Mounting kit assembly (quarter turn actuator) for remote mounting

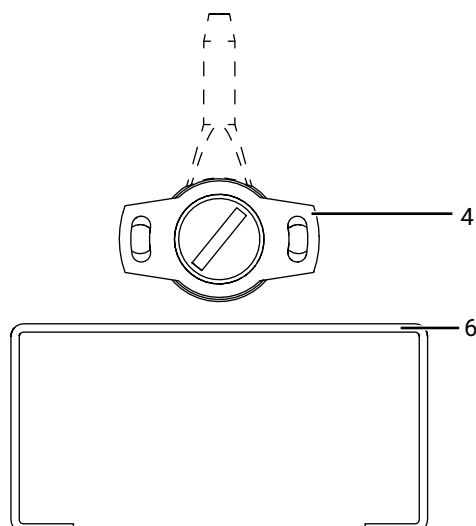
- The shaft of the rotary travel sensor is provided with a marking **2**.



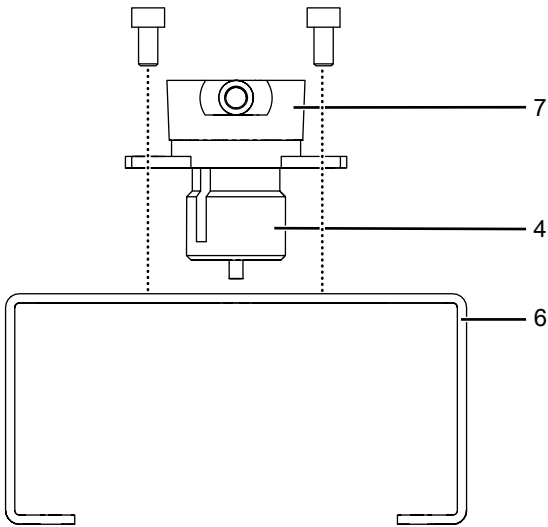
- Set the marking **2** so that it is correctly aligned with the 0° position on the underside of the travel sensor housing. The 0° position is located on the left-hand side of the cable exit (the electrical operating range is located in the travel range between the 0° and 90° positions).



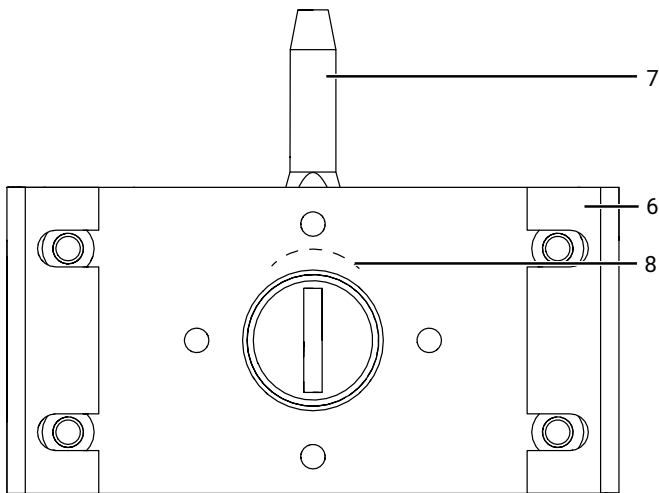
- Place the adapter **4** onto the shaft of the rotary travel sensor **2** without twisting the shaft.



4. Mount the black housing of the rotary travel sensor **4** in parallel to the mounting bracket **6** in a longitudinal direction.

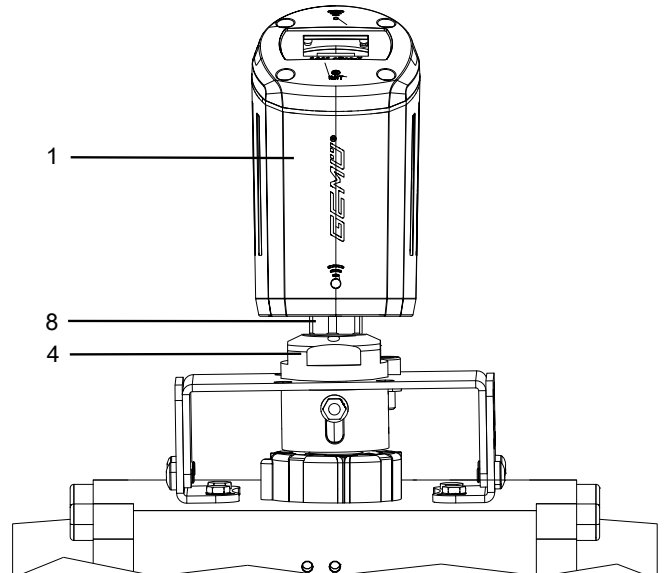
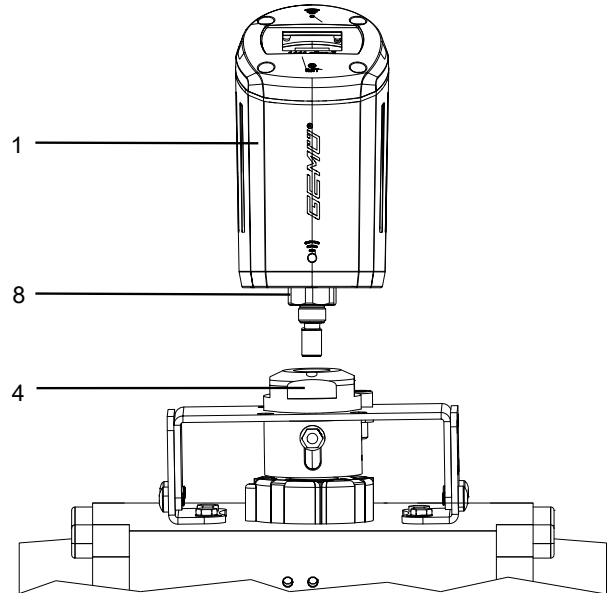


5. Mount the external rotary travel sensor **7** with the adapter **4** on the mounting bracket **6**.



6. Note the direction of the scale **8**.
⇒ View from below of the travel sensor **7** with mounting bracket **6**.

10.10 Direct mounting to quarter turn actuators



1. Mount the travel sensor mounting kit on the product (see "Linear travel sensor mounting kit assembly for remote mounting", page 17).
2. Use the mounted mounting kit to screw the product **1** onto the adapter **4**.
3. Use the spanner flat **8** (WAF 27) of the travel sensor to tighten the product **1**.
4. Turn the housing clockwise to align the pneumatic or electrical connections.
5. Connect the product's pneumatic supply and connect the product to the process valve.

10.11 Remote mounting to quarter turn actuators

NOTICE

- The travel sensor's cable exit protective coating is not UV-resistant and must therefore be protected against direct exposure to weather.

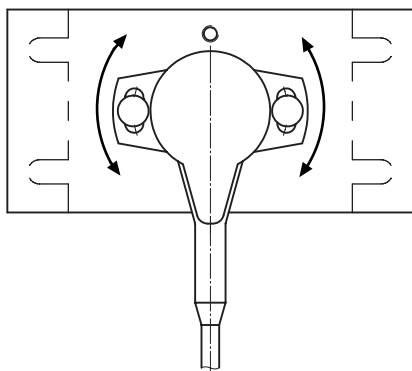


1. Mount the travel sensor mounting kit (see "Mounting kit assembly (quarter turn actuator) for remote mounting", page 19).
2. Place the travel sensor 7 with adapter 4 and mounting bracket 6 on the actuator 3.
 - ⇒ **Note:** The adapter lug 4 must engage in the actuator shaft groove.
3. Mount the mounting bracket 6 on the actuator 3 using the screws, washers and spring washers provided.

NOTICE

Note for the rotary travel sensor

- The slotted holes should be positioned in the centre on the screws. If the travel range is incorrect, (determined by checking the attachment), loosen the two screws slightly and twist the travel sensor. Set the travel up correctly and tighten the screws again.



4. Secure the product 1 in a suitable position.
5. The product offers two options for securing:
 - ⇒ Four fixing holes with threaded sleeves are located on the rear of the housing, using which the controller can be installed on holders/routes, etc.
 - ⇒ An attachment point for a mounting bracket is located on the underside of the housing. Two different variants are available as accessories for this. Depending on the desired version, the product can therefore be mounted on level surfaces or on walls.

NOTICE

Mounting bracket for wall mounting

- The GEMÜ 1441 000 ZMP mounting bracket, which is available separately, can be used for this.

NOTICE

Mounting bracket for mounting on level surfaces

- The GEMÜ 1441 000 ZMB mounting bracket, which is available separately, can be used for this.

6. Electrically connect the travel sensor to the product.
7. Connect the product's pneumatic supply and connect the product to the process valve.

10.12 Checking the mechanical mounting

1. Connect the product electrically (see "Electrical connection", page 24).
2. Connect the product pneumatically.
3. The display shows "Starting..." for approx. 20 seconds and then the following information:



4. The mounted actuator can be moved to the OPEN and CLOSED positions using the app connectivity. Alternatively, the valve actuator can be moved to the other end position by applying direct pressure on the compressed air connection.
5. **Important:** In this case, the displayed valve position ("POS") must be between 2% and 98%. If the display exits this area, check the mechanical mounting again (check the compatibility of the mounting parts) and, if required, readjust the direction of the rotary travel sensor.

11 Pneumatic connection

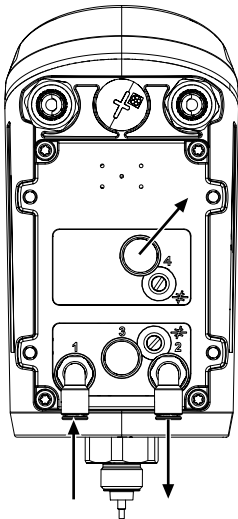
⚠ CAUTION

► Observe the maximum control pressure of the actuator.

| Connection in accordance with DIN ISO 1219-1 | Designation | Size |
|--|---|----------------------------------|
| 1 | Supply connection | G1/8 female thread ¹⁾ |
| 3 | Venting (with silencer) | G1/8 female thread |
| V1 | Supply and exhaust air throttle for A1 | - |
| V2 ²⁾ | Supply and exhaust air throttle for A2 | - |
| 2 | Working connection (1) for process valve (control function NC and NO) | G1/8 female thread ¹⁾ |
| 4 ²⁾ | Working connection (2) for process valve (control function DA) | G1/8 female thread ¹⁾ |

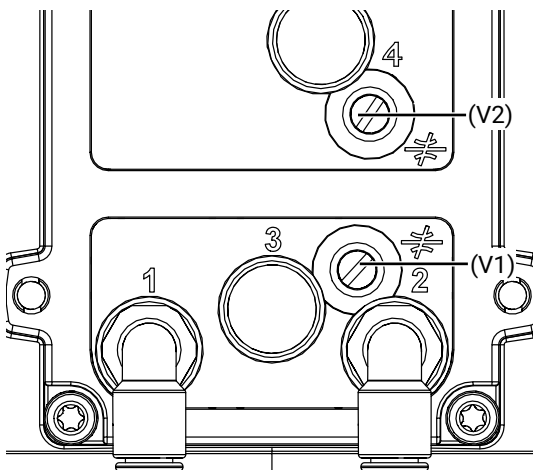
1) The connections that are to be used are equipped with push-in fittings at the factory (depending on the order code for pneumatic lines 6/4 mm or 1/4").

2) Only available for the double acting action (code 3 or 6).



✓ Fittings with a G1/8 thread must be used and must be designed for min. 7 bar.

1. Establish the connection between the pneumatic output 2 (single acting) or connectors 2 and 4 (double acting) and the actuator's pneumatic control air connector.
2. Connect the auxiliary power (air supply) to the air supply connection 1 (max. 7 bar/101 psi).



* Figure shows throttling (V1 and V2) in the unthrottled position

Description for using throttles V1 and V2

The throttle screw **V1** regulates the working connection's flow rate **A1** in both directions.

The throttle screw **V2** (only the double acting version) regulates the working connection's flow rate **A2** in both directions.

3. Activate the throttle function:



- ⇒ Use a flathead screwdriver (maximum slot width 4 mm) to push the throttle in as far as it will go and turn clockwise by approx. 120° (slot vertical = throttle position).

4. Deactivate the throttle function:

- ⇒ Use a flathead screwdriver (maximum slot width 4 mm) to turn the throttle anticlockwise by approx. 120° and release (slot approx. 45° = unthrottled position).

We recommend only using the throttle during initialization. The throttle(s) should be activated if operating times of <1.0 seconds have been determined or the control result is not satisfactory (for example, the control oscillates → reinitialization with activated throttle). Experience has shown that operating times between 1 and 2 seconds lead to optimal control results.

11.1 General notes

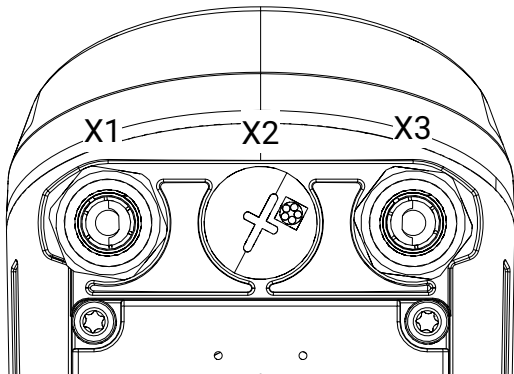
|  CAUTION | |
|--|---|
|  | <p>Exhaust air and cycle duties generate noise</p> <ul style="list-style-type: none"> ▶ Hearing damage ● Wear hearing protection |

The exhaust air connection is equipped with a silencer as standard to reduce noise emissions. Other commercially available silencers with G1/8 male thread can also be fitted. Alternatively, the recessed G1/8 thread can be used to attach commercially available pneumatic screw connections in order to be able to discharge the exhaust air in a targeted manner.

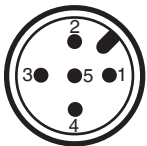
12 Electrical connection

12.1 Electrical connection with M12

Position of the connectors



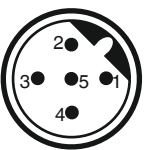
Connection X1



5-pin M12 plug, A-coded

| Pin | Signal name |
|-----|---|
| 1 | Iw+ set value input (4...20 mA current loop)/optionally HART |
| 2 | Iw- set value input (4...20 mA current loop)/optionally HART |
| 3 | n.c. |
| 4 | Iout+, actual value output (4...20 mA / no internal supply; passive) / optional |
| 5 | Iout-, actual value output (4...20 mA / no internal supply; passive) / optional |

Connection X3



5-pin M12 plug, B-coded

| Pin | Signal name |
|-----|-------------|
| 1 | DigIn + |
| 2 | DigIn - |
| 3 | n.c. |
| 4 | DigOut+ |
| 5 | DigOut- |

12.1.1 Order option with external actual value potentiometer, code S01

Connection X2



5-pin M12 built-in socket, A-coded

| Pin | Signal name |
|-----|--|
| 1 | UP+, output potentiometer supply voltage (+) |
| 2 | UP, input potentiometer wiper voltage |
| 3 | UP-, output potentiometer supply voltage (-) |
| 4 | n.c. |
| 5 | n.c. |

12.2 Electrical connection with cable bushing

Note: On the version with an external actual value potentiometer (code S01), a connector is always attached at connection X2.

Connection X1/X3:

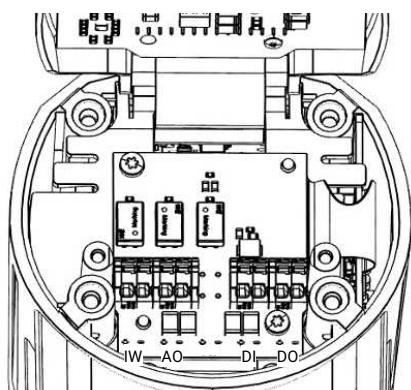
M16 cable gland

Recommended cable diameter:

EX-protected version (blue cable gland: 7–9 mm

Non-EX-protected version (black cable gland: 4–10 mm

Wire cross-section: 0.5–2.5 mm² / AWG 20 to 12



| Terminal | Terminal label | Terminal name | Signal name |
|----------|----------------|---------------|---|
| 1 | IW+ | Iw+ | Iw+, set value input (4–20 mA current loop)/opt. HART |
| 2 | IW- | Iw- | Iw-, set value input (4–20 mA current loop)/opt. HART |
| 3 | AO+ | Iout+ | Iout+, actual value output (4–20 mA/ no internal supply; passive) |
| 4 | AO- | Iout- | Iout-, actual value output (4–20 mA/ no internal supply; passive) |
| 5 | DI+ | DigIn + | Digital input |
| 6 | DI- | DigIn | GND, digital input |
| 7 | DO+ | DigOut+ | Digital output |
| 8 | DO- | DigOut- | GND, digital output |

13 Fail safe functions

Fail safe functions

| Case | Error | Connection A1 (2) | Connection A2 (4) |
|---|-------------------------------|--|---|
| 1 | Power supply failure | Single acting fail safe: Venting Single acting fail freeze: Blocking Double acting fail safe: Venting Double acting fail freeze: Blocking | Single acting: - (No connection available) Double acting fail safe: Venting Double acting fail freeze: Blocking |
| 2 | Compressed air supply failure | Single acting fail safe: Venting Single acting fail freeze: Blocking Double acting fail safe: Venting Double acting fail freeze: Blocking | Single acting: - (No connection available) Double acting fail safe: Venting Double acting fail freeze: Blocking |
| However, the fail safe function does not replace the plant-specific safety devices. | | | |

Adjustable safety reactions

| Error | Connection A1 (2) | Connection A2 (4) |
|--|--|---|
| Set value < 4 mA (range below the set value under I Min W can be adjusted 0–22 mA) | Single and double acting Adjustable function (Open, Close, Hold, Safe*) | Single acting: (Connection not available) Double acting: Adjustable function (Open, Close, Hold, Safe*) |
| Set value > 20 mA (range below the set value I max can be adjusted from 0–22 mA) | Single and double acting :Adjustable function (Open, Close, Hold, Safe*) | Single acting: (Connection not available) Double acting: Adjustable function (Open, Close, Hold, Safe*) |
| * Safe = default setting. In this case, the valve actuator is moved to its safety position (undefined for double acting) | | |

14 Commissioning

- Prior to commissioning, familiarize yourself with the operation of the product.

⚠ WARNING



Corrosive chemicals!

- ▶ Risk of caustic burns
- Wear appropriate protective gear.
- Completely drain the plant.

⚠ CAUTION

Leakage

- ▶ Emission of dangerous materials.
- Provide precautionary measures against exceeding the maximum permitted pressures caused by pressure surges (water hammer).

⚠ CAUTION

Cleaning agent

- ▶ Damage to the GEMÜ product.
- The plant operator is responsible for selecting the cleaning material and performing the procedure.

⚠ CAUTION



Hazardous situation

- ▶ Risk of injury or damage possible.
- For correct commissioning, the product must be calibrated to the process valve via the initialization process.
- During this commissioning, the valve is automatically opened and closed several times. It must therefore be ensured in advance that this does not lead to a dangerous situation.

NOTICE

Incorrect initialization

- Always carry out initialization without operating medium pressure on the process valve. Carry out initialization of the process valve in neutral position (NO/NC).

NOTICE

Note

- ▶ Due to environmental influences on the system side (setting behaviour of elastomers, thermal influences) and configuration-specific infeed behaviour, which could impact the control characteristics, it is recommended that the self-calibration is carried out again by an initialization after commissioning in order to prevent incorrect error messages. If error messages occur which are attributable to the fact that the controller can no longer correctly approach or determine the end positions (for example, despite the positioning signal specification of 0%, the valve position is $>1.0\%^{1)}$, it is recommended to also carry out the initialization again.
- ▶ ¹⁾Dependent on the dead zone setting and close tight function. If the close tight function is deactivated (Δ setting value = 0.0%), the valve is closed only within the set value of the dead zone

NOTICE

- For delivery of the product assembled on a valve at the factory, the complete construction is already ready for operation at a control pressure of 5.5 to 6 bar without operating pressure. A reinitialization is recommended if the plant is operated with a different control pressure or if the mechanical end positions have been changed (e.g. seal replacement on the valve or actuator replacement). The initialization is retained even in the event of voltage cutoff.

NOTICE

- For delivery of the product without default setting (e.g. for delivery without valve) initialization must be carried out once for correct operation. This initialization must be repeated every time that the process valve is changed (e.g. seal replacement or actuator replacement).

1. Use suitable connectors.
2. Connect the control medium lines tension-free and without any bends or knots.
3. Connect the pneumatic tubes and activate the pneumatic auxiliary power of max. 7 bar.
4. Connect the connection cable tension-free and without any bends or knots.
5. Switch on the energy supply via set value signal 4–20 mA DC.
 - ⇒ Wait until the status display switches from "**Starting...**" to a constant operating information display (this takes approx. 20 seconds).
6. Start the automatic initialization (speed-AP function)¹⁾:
 - ⇒ Hold a magnet at the marked initialization position (INIT) until "**Remove Magnet**" is shown on the status display ⁽²⁾.

⇒ The initialization phase lasts for a few minutes, during which the process valve is opened and closed several times. The initialization process is ended automatically.

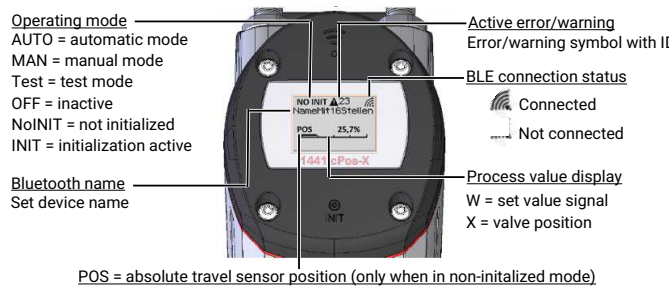
⁽¹⁾ Alternatively, the initialization that is required for the commissioning can be started and carried out via the app. All of the results for each individual step are therefore also displayed in detail. In addition to the described options for activating the initialization, the digital input can also be used to start the process via an external signal (parameter setting: **"Digital input function"** – Start Init).

²⁾ While the wireless connection is active (this can be seen on the connection status indicator in the status display), the magnetic trigger is deactivated. The magnetic trigger can also be permanently deactivated via the app.

15 Operation

15.1 Operating and display elements

15.1.1 Status display information



15.1.2 Wireless interface

Using an integrated Bluetooth Low Energy interface, the following functions can be used in conjunction with the "GEMÜ app":

1. Changing the device configuration (parameter settings).
2. Reading out the current device status.
3. Display and evaluation of historic events.
4. Implementation of the initialization.
5. Moving the valve in manual mode.
6. Resetting the device to the default settings.
7. Activating the localization (device detection).
8. Security management (blocking access for a certain group of participants).

NOTE

- For order variants 00D and HAD, the wireless interface is permanently deactivated and can no longer be activated by the customer.
- During an initialization process that is started by the magnetic trigger, no actions can be taken in the app. After ending the process, the app can be used again without restrictions.
- While the wireless connection is active, starting the initialization via the magnetic trigger is deactivated.

- Only one end device can ever be simultaneously connected to the positioner. For additional participants, this device is not visible during this period.

After starting the app, all compatible GEMÜ products within range are displayed in the connection list. The product that is to be connected can be referenced via the device name that is shown on the display. In the condition as supplied to the customer, this corresponds to the last four digits of the serial number printed on the digital name plate (QR code). The device name can be changed at any time after the connection is established (maximum 16 characters).

Safety notice

The wireless interface can be activated in the condition as supplied to customer, depending on the order version, and is ready for connection immediately after the product has been electrically commissioned.

In the condition as supplied to the customer, the product is protected against unauthorized access via a unique connection password. The password corresponds to the digital name plate (QR code) that is affixed to the product. To enter the password, this can optionally be read via the camera scan function on the smartphone/tablet or entered manually. The password can be managed independently and set to any other password. By amending the original password, you lose the option to read this via the digital name plate. The connection password function can be deactivated, but we do not recommend this.

Furthermore, a configuration lock can be set up for the product using a separate optional password – providing the product with additional protection. If this function is activated, you cannot implement any changes to the settings without first entering the password (read-only mode).

There is an option to reset both passwords if you forget these. The user can define whether one, both or none of the passwords can be reset via the reset mechanism.

Caution! If you forget your passwords and one or both passwords for the reset mechanism are disabled, the product can only be unlocked by GEMÜ.

Caution! If one or both passwords for the reset mechanism are enabled, anyone with access to the digital name plate (QR code) can remove the password protection.

Reset mechanism

There are two options for resetting one of the two passwords (connection or configuration lock password). Both passwords can/must be reset separately from each other.

- **Digital name plate (QR code)**

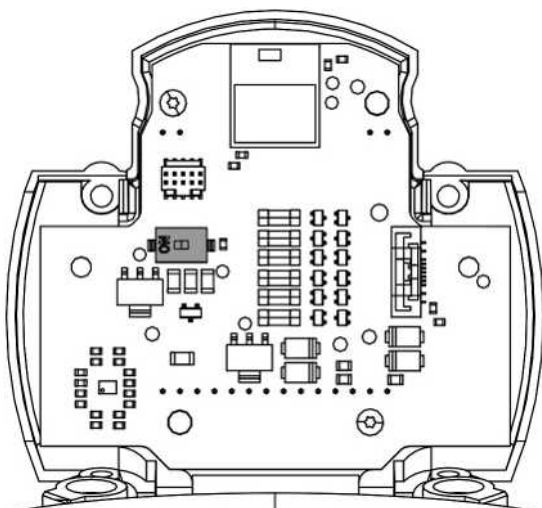
By scanning the QR code that is affixed to the product.

- **RFID**

The RFID chip that is integrated into the housing can be read out by additional hardware (Conexo Pen) that is available separately and this can be used to reset the passwords.

Note: A setting parameter can be used to block the reset of one or both passwords.

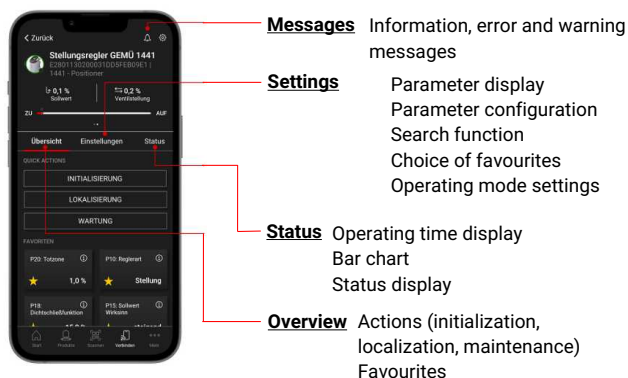
Deactivating the wireless interface



The wireless interface can be deactivated by integrating a DIP switch inside the device. If the DIP switch is changed to the "Off" position, the radio module is disconnected from the power supply.

- To do this, remove the four housing cover screws (Tx 20) and the housing cover beforehand.
- Loosen the display holder by removing the two internal screws (Tx 10) and swivel it upwards/forwards.

15.1.3 Basic operation of the app



The GEMÜ app consists of several function modules that can be called up via the bottom navigation at the bottom of the display. The functions for operating the product are located in the "Connect" area. The figure above gives a rough overview of the structure. By selecting the tabs "Overview", "Settings" or "Status", it is possible to navigate within the "Connect" area. Important information, error or warning messages can be called up on all pages via the bell symbol.

15.1.4 Emergency operation

If there is a fault in the product and/or the wireless interface, the product has two internal buttons that can be used to perform the following actions. The buttons must first be exposed by removing the cover.

| Status | Left-hand button | Right-hand button |
|--|---|---|
| Nolnit operating mode (not initialized) | Manual control of the valve actuator → Pneumatic connection 2 is vented | Manual control of the valve actuator → Pneumatic connection 2 is aerated |
| AUTO, MAN, OFF, TEST operating mode | Press and hold both buttons simultaneously for three seconds, → Delete the initialization and reset the device to the default setting* | |

* The device is therefore simultaneously moved to the **Nolnit** operating mode and, as a result, allows the connected process valve to be controlled manually using the two buttons

16 Parameter list

| Number | Parameter | Description | Settings | Initial setting |
|--------|---|---|-------------------------|-----------------------------------|
| - | Local Bluetooth name | Locally used Bluetooth name | | Serial number of the device |
| M02 | Device functions | Device operating mode (positioner...) | | |
| M01 | Operating mode | Device operating mode | OFF, AUTO, MANUAL, TEST | AUTO |
| S01 | Switching cycle counter | Number of switching cycles can be reset by the customer | 0 to 2147483600 | 0 (is adjusted automatically) |
| S02 | Warning threshold switching cycles | Warning threshold switching cycles of the pilot valves | 0 to 2,147,483,600 | 50,000,000 |
| - | Switching cycles warning ratio | Indicator for valve wear on the pilot valve module | 0.0 to 100.0% | 0.0% (is adjusted automatically) |
| P26 | Initialization quantity of calibration points | Quantity of calibration points when initializing | 1 to 19 | 9 |
| S09 | Operating time OPEN | Operating time of the valve in open direction | 0.0 to 99.9 s | 0.0 s (is adjusted automatically) |

| Number | Parameter | Description | Settings | Initial setting |
|---------|-------------------------------------|---|------------------|-----------------------------------|
| S10 | Operating time CLOSED | Operating time of the valve in closed direction | 0.0 to 99.9 s | 0.0 s (is adjusted automatically) |
| P21 | Decay time D-component | Decay time of the D-component | 1 to 5000 ms | 100 ms |
| P22 | Differential component | Amplifying the D-component | 0.0 to 100.0 | 0.0 |
| P23 | Proportional amplification | P-amplification of the positioner | 0.1 to 100.0 | 1.0 (is adjusted automatically) |
| P20 | Dead zone | Setting the manual dead zone | 0.1 to 25.0% | 1.0% |
| P44 | Dead zone value auto | Dead zone value auto | 0.1 to 25% | 1% (is adjusted automatically) |
| P24 | Dead zones function | Automatic dead zone adjustment | manual, auto | manual |
| | Set value, manual | Current set value for manual operation | 0.0 to 100.0% | - |
| S06(.1) | Set value | Comparison of set value and valve position | 0.0 to 100.0% | - |
| S06(.2) | Valve position | Comparison of actual value and valve position | 0.0 to 100.0% | - |
| - | I set value input | Current target value signal | 0.0 to 22.0 mA | - |
| - | I actual value output | Signal analogue output | 0.0 to 22.0 mA | - |
| - | Position control deviation | Control deviation for positioner | -100.0 to 100.0% | - |
| S05(.1) | Absolute position init. (CLOSED) | Valve absolute position end positions | 0.0 to 100.0% | - (is adjusted automatically) |

| Number | Parameter | Description | Settings | Initial setting |
|---------|-----------------------------------|--|--------------------------|-------------------------------|
| S05(.2) | Absolute position init. (open) | Valve absolute position end positions | 0.0 to 100.0% | - (is adjusted automatically) |
| - | Current absolute position | Current absolute position of the travel sensor | 0.0 to 100.0% | - |
| P43 | Travel sensor direction of action | Direction of action of the travel sensor | rise, fall | rise |
| P33 | Analogue output min | Valve position at output signal of 4 mA | 0 to 100% | 0% |
| P34 | Analogue output max | Valve position at output signal of 20 mA | 0 to 100% | 100% |
| P16 | Set value limit CLOSED | Lower range of the set value limit | 0 to 100% | 0% |
| P17 | Set value limit OPEN | Upper range of the set value limit | 0 to 100% | 0% |
| P18 | Close tight function CLOSED | Lower range of the close tight function | 0.0 to 20.0% | 0.5% |
| P19 | Close tight function OPEN | Upper range of the close tight function | 80.0 to 100.0% | 99.5% |
| P01 | Split range start | Starting point of the split-range function | 0.0 to 90.0% | 0.0% |
| P02 | Split range end | End point of the split-range function | 10.0 to 100.0% | 100.0% |
| P15 | Set value direction of action | Inversion of the target value signal | rise, fall | rise |
| P14 | Control curve | The control curve is defined | Linear, 1:25, 1:50, free | Linear |

| Number | Parameter | Description | Settings | Initial setting |
|--------|---------------------------------|--|---------------|-----------------|
| P03 | Characteristic curve point 0% | Calibration point 0 of the free characteristic | 0.0 to 100.0% | 0.0% |
| P04 | Characteristic curve point 10% | Calibration point 10 of the free characteristic | 0.0 to 100.0% | 10.0% |
| P05 | Characteristic curve point 20% | Calibration point 20 of the free characteristic | 0.0 to 100.0% | 20.0% |
| P06 | Characteristic curve point 30% | Calibration point 30 of the free characteristic | 0.0 to 100.0% | 30.0% |
| P07 | Characteristic curve point 40% | Calibration point 40 of the free characteristic | 0.0 to 100.0% | 40.0% |
| P08 | Characteristic curve point 50% | Calibration point 50 of the free characteristic | 0.0 to 100.0% | 50.0% |
| P09 | Characteristic curve point 60% | Calibration point 60 of the free characteristic | 0.0 to 100.0% | 60.0% |
| P10 | Characteristic curve point 70% | Calibration point 70 of the free characteristic | 0.0 to 100.0% | 70.0% |
| P11 | Characteristic curve point 80% | Calibration point 80 of the free characteristic | 0.0 to 100.0% | 80.0% |
| P12 | Characteristic curve point 90% | Calibration point 90 of the free characteristic | 0.0 to 100.0% | 90.0% |
| P13 | Characteristic curve point 100% | Calibration point 100 of the free characteristic | 0.0 to 100.0% | 100.0% |

| Number | Parameter | Description | Settings | Initial setting |
|--------|----------------------------------|--|--|-----------------|
| P36 | Error position | Valve position at error message | Close, Open, Hold, Safe | Close |
| P27 | Control function | Control function of the process valve | | |
| P37 | Error time | Debounce time of error messages | 0.2 to 100.0 s | 0.2 s |
| P38 | Set value I min | Switch-off limit for cable break recognition of the set value | 0.0 to 22.0 mA | 3.5 mA |
| P39 | Set value I max | Switch-off limit for excess current recognition of the set value | 0.0 to 22.0 mA | 20.5 mA |
| S03 | Hardware version | Hardware version | | |
| S04 | Software version | Software version | | |
| S11 | Production number | Traceability number of the device | | |
| - | Operating hours since last start | Operating hours at device start | | |
| - | Total operating hours | Operating hours | | |
| P29 | Function digital input | Function of the digital input | OFF, OFF / ON, Safe / ON, Parm-SetB0, Poti, Start Init | OFF |
| S07 | Status digital input | Signal applied at the digital input | | |

| Number | Parameter | Description | Settings | Initial setting |
|--------|---------------------------------|--|--|-----------------|
| P30 | Function digital output | Function of the digital output | no, P min, P max, P min/max, W min, W max, W min/max, X min, X max, X min/max, SSE min, SSE max, SSE min/max, Active, Error, Warning | no |
| P35 | Logic digital output | Defines the logic of the digital output | NO, NC | NO |
| P40 | Time delay digital output | Defines the time delay of the digital output | 0.1 to 100.0 s | 1.0 s |
| P31 | Digital output min | Lower switch point of the digital output | 0.2 to 99.8% | 10.0% |
| P32 | Digital output max | Upper switch point of the digital output | 0.2 to 99.8% | 90.0% |
| S08 | Status digital output | Status of digital output | | |
| S12 | Active parameter set | Displays the active parameter set | P1, P2 | P1 |
| P25 | Copying parameter set | Copy to different memories | off, P1 <= W, P1 => P2, P1 <= P2 | off |
| P28 | Initialization start via magnet | Initialization option via magnet contact | | |
| P41 | Display orientation | Display orientation | 0°, 180° | 0° |
| P42 | Full-screen display | Full-screen display | off, on | off |
| - | Location function | Device location function | off, on | off |

17 Messages and troubleshooting

| Message ID and type | Description | Cause and remedial measures |
|---------------------|------------------------------------|--|
| 1 Error | Not calibrated | Device not calibrated. - Send to GEMÜ for repair. |
| 2 Warning | Not initialized | Device not initialized. - Carry out initialization. |
| 10 Error | Set value < 4 mA | The set value signal is lower than 4 mA. - Check the set value signal (if the minimum current signal is not reached, the device switches off). |
| 11 Error | Set value > 20 mA | The set value signal is higher than 20 mA. - Check the set value signal. |
| 22 Error | Pneumatic error | No change in the process valve position can be detected within the permitted time. - Ensure that there is adequate compressed air supply. - Check the pneumatic connections. - Check the pneumatic connection points. - Check that the valve is working correctly. - Check the mounting kit parts and that they are being used correctly and in their entirety. |
| 23 Error | Leakage detected | A continuous change to the valve position without any action has been detected. - Check the pneumatic connection points. |
| 30 Warning | No movement, or incorrect movement | No change in the process valve position can be detected within the permitted time. - Ensure that there is adequate compressed air supply. - Check the pneumatic connections. - Check the pneumatic connection points. - Check that the valve is working correctly. - Check the mounting kit parts and that they are being used correctly and in their entirety. |

| Message ID and type | Description | Cause and remedial measures |
|-----------------------|--|--|
| 60 Error | Travel sensor error | It is no longer possible to read a valid signal from the travel sensor. <ul style="list-style-type: none"> - Check the electrical connection for the external travel sensor. - Ensure that the travel sensor spindle is not pushed as far as it will go or that it has not been removed. - Check the mounting kit parts and that they are being used correctly and in their entirety. - Ensure that the mechanical assembly on the valve is correct. |
| 61 Warning | Button fault | While starting the device, one or both internal emergency buttons were pressed for longer than 60 seconds. <ul style="list-style-type: none"> - Check whether the housing cover actuates the buttons or whether the buttons are jammed. |
| 70 Info | Switching cycles alarm threshold reached | The set number of switching cycles has been reached. <ul style="list-style-type: none"> - If required, replace the pilot module (then reset the switching cycle counter). |
| 71 Info | Switching cycle counter reset | The switching cycle counter has been reset. The message is independently acknowledged after 30 seconds. |
| 90 Warning | Control system quality restricted | The process valve cannot be moved and therefore regulated optimally. |
| 200 Warning | Warning message memory | Internal memory error. <ul style="list-style-type: none"> - Send to GEMÜ for repair. |

The behaviour of the positioner depends on the type of message

Error: The valve is moved to the safety position in a controlled manner (see "Fail safe functions", page 26). The cause of the error must be eliminated for continued operation.

Warning: A warning does not effect the positioner's operating mode; however, under certain circumstances, this may not carry out the required function. We recommend checking the cause and, if required, eliminating it.

Info: The status of a temporary function is displayed.

18 Inspection and maintenance

WARNING

The equipment is subject to pressure!

- ▶ Risk of severe injury or death
- Depressurize the plant.
- Completely drain the plant.

CAUTION

Use of incorrect spare parts!

- ▶ Damage to the GEMÜ product
- ▶ Manufacturer liability and guarantee will be void
- Use only genuine parts from GEMÜ.

NOTICE

Exceptional maintenance work!

- ▶ Damage to the GEMÜ product
- Any maintenance work and repairs not described in these operating instructions must not be performed without consulting the manufacturer first.

The operator must carry out regular visual examinations of the products, depending on the operating conditions and the potentially hazardous situations, in order to prevent leakage and damage.

1. Have servicing and maintenance work performed by trained personnel.
2. Wear appropriate protective gear as specified in the plant operator's guidelines.
3. Shut off plant or plant component.
4. Secure the plant or plant component against recommissioning.
5. Depressurize the plant or plant component.
6. Actuate products which are always in the same position four times a year.

18.1 Spare parts

CAUTION

Danger of explosion!

- ▶ Explosion-protected versions (special function: code X) must not be repaired. Any faulty explosion-protected versions must be replaced by a new device. The following spare parts are only permitted for use in **non** explosion-protected versions.

The following parts are available as spare parts:

Pilot valve module (four different versions: (single acting fail safe/single acting fail freeze/double acting fail safe/double acting fail freeze).

The pilot valve module must fit the device configuration in question (check the reference on the controller's order data or the details on the product label).

Action:

Code 1 = single acting fail safe

Designation: 1441000EVM 1, order number: 88789910

Code 3 = double acting fail safe

Designation: 1441000EVM 3, order number: 88789911

Code 5 = single acting fail freeze

Designation: 1441000EVM 5, order number: 88789912

Code 6 = double acting fail freeze

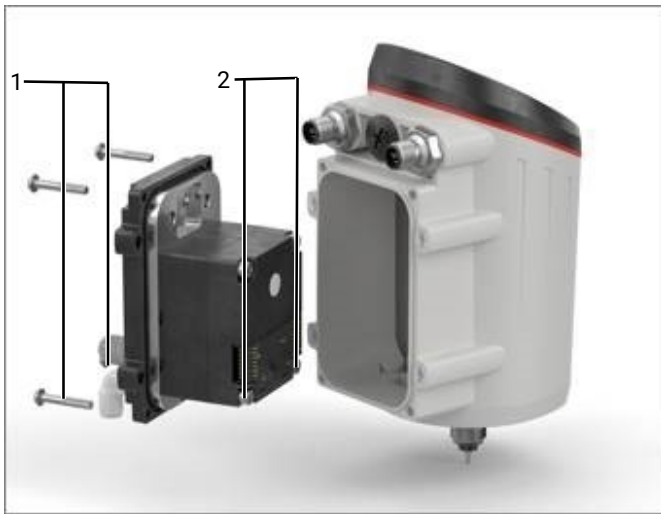
Designation: 1441000EVM 6, order number: 88789913

It is recommended to replace the pilot valve module after a certain number of exceeded switching cycles.

The counter reading of the completed switching cycles can be viewed via parameter S01: "Switching cycle counter", and can be monitored via parameter S02: "Warning threshold switching cycles" (if the counter reading exceeds the set warning threshold, an alarm notification is generated).

Once the pilot valve module has been replaced, it is recommended to reset the switching cycle counter.

Replacing the spare part



1. Disconnect the product from the supply voltage.
2. Deactivate and disconnect the pneumatic connection.
3. Unscrew the four screws **1** in the rear black pneumatic panel (Torx Tx20).
4. Carefully pull the complete unit out backwards (**take care not to damage the connection cable**).
5. Loosen the plug-in contact to the side of the pilot valve module.
6. Remove the four screws **2** that hold the pilot valve module in place (Inbus Sw3).
7. Clean the support plate and check for faults.
8. Refit the replacement part in the reverse order.

18.2 Cleaning the product

- Clean the product with a damp cloth.
- Do **not** clean the product with a high pressure cleaning device.

19 Disassembly

1. Disassemble in reverse order to assembly.
2. Unscrew the electrical wiring.
3. Deactivate the control medium.
4. Disconnect the control medium line(s).
5. Disassemble the product. Observe warning notes and safety information.

20 Disposal

1. Pay attention to adhered residual material and gas diffusion from penetrated media.
2. Dispose of all parts in accordance with the disposal regulations/environmental protection laws.

21 Returns

Legal regulations for the protection of the environment and personnel require that the completed and signed return delivery note is included with the dispatch documents. Returned goods can be processed only when this note is completed. If no return delivery note is included with the product, GEMÜ cannot process credits or repair work but will dispose of the goods at the operator's expense.

1. Clean the product.
2. Request a return delivery note from GEMÜ.
3. Complete the return delivery note.
4. Send the product with a completed return delivery note to GEMÜ.

22 Declaration of Incorporation according to 2006/42/EC (Machinery Directive)



Declaration of Incorporation

according to the EC Machinery Directive 2006/42/EC, Annex II, 1.B
for partly completed machinery

We, GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Straße 6-8
74653 Ingelfingen-Criesbach, Germany

declare that the following product complies with the essential requirements of the Machinery Directive 2006/42/EC.

Product: GEMÜ 1441
Product name: Intelligent electro-pneumatic positioner
From production date: 30.03.2021
Essential requirements of the Machinery Directive 2006/42/EC 1.1.6, 1.5.1, 1.5.2, 1.5.6, 1.5.8, 1.5.16, 1.6.1;
Technical standard used in parts: ISO 12100

We also declare that the specific technical documentation has been compiled in accordance with part B of Annex VII.

The manufacturer, or their authorised representative, undertakes to transmit, in response to a reasoned request, relevant documents on the partly completed machinery to the national authorities. This transmission takes place electronically.

Authorised documentation officer: GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Straße 6-8
74653 Ingelfingen-Criesbach, Germany

This does not affect the industrial property rights.

Important note! The product must only be commissioned in machinery that comply with the provisions of this Directive.

M. Barghoorn
Head of Global Technics

Ingelfingen, 30.03.2022

23 Declaration of conformity in accordance with 2014/53/EU (RED Directive)



Declaration of conformity

in accordance with 2014/53/EU (RED Directive)

We, GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Straße 6-8
74653 Ingelfingen-Criesbach, Germany

declare that the product listed below complies with the safety requirements of the RED Directive 2014/53/EU.

RED Directive 2014/53/EU

Product: GEMÜ 1441
Product name: Intelligent electro-pneumatic positioner

The Essential Safety and Health Requirements are met by compliance with the standards (used in parts) listed below that are applicable for the above mentioned product:

- EN 61326-1:2013
- EN IEC 61000-6-1:2019
- EN 61000-6-3:2007/A1:2011/AC:2012
- EN 61010-1:2010/A1:2019/AC:2019-04
- EN 300 328 V2.2.2: 2019-07
- EN 301 489-1 V2.2.3: 2019-11
- EN 301 489-17 V3.2.4: 2020-09

The sole responsibility for issuing this declaration of conformity lies with the company GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG.

M. Barghoorn
Head of Global Technics

Ingelfingen, 30.03.2022

24 EU Declaration of Conformity in accordance with 2014/34/EU (ATEX Directive)



EU Declaration of Conformity
in accordance with 2014/34/EU (ATEX Directive)

We, the company GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Strasse 6-8
74653 Ingelfingen-Criesbach, Germany

declare that the following product complies with the requirements of Directive 2014/34/EU for intended use in potentially explosive areas.

Product: GEMÜ 1441 cPos-X
Product version: Special version code X
Explosion protection marking: Gas: Ⓜ II 2G Ex ib IIB T4 Gb
EC type examination certificate: IBExU23ATEX1002 X
Notified body: IBExU, no. 0637
Explanations: For special conditions or operation limits, see the "Correct use" chapter in the operating instructions.

The Essential Safety and Health Requirements are met by compliance with the standards used in parts listed below that are applicable for the above mentioned product:

- EN IEC 60079-0:2018
- EN 60079-11:2012

The sole responsibility for issuing this declaration of conformity lies with the company GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG.

M. Barghoorn
Head of Global Technics
Ingelfingen, 19/10/2023

25 Supplier's Declaration of Conformity FCC



Supplier's Declaration of Conformity

Unique Identifier: GEMÜ 1441 cPos-X

Party issuing Supplier's Declaration of Conformity
GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Straße 6-8
D-74653 Ingelfingen-Criesbach
Deutschland
Tel.: +49-79 40 - 123 0
info(at)gemu.com
<https://www.gemu-group.com>

Responsible Party – U.S. Contact Information

GEMÜ Valves Inc.
3800 Camp Creek Parkway SW
Building 2600 Suite 120
Atlanta, Georgia 30331-6247
Tel.: +1-678-5 53 34 00
Fax: +1-404-3 44 9350
info(at)gemu.com
www.gemu.com

FCC Compliance Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

M. Barghoorn
Head of Global Technics

Ingelfingen, 18/11/2022

GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Straße 6-8 D-74653 Ingelfingen-Criesbach

www.gemu-group.com
info@gemue.de



GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Straße 6-8, 74653 Ingelfingen-Criesbach, Germany
Phone +49 (0) 7940 1230 · info@gemue.de
www.gemu-group.com

Subject to alteration

10.2023 | 88796116