GEMÜ 44A0

Multi-functional valve actuation

Features

- Communication and programming interface IO-Link
- Self-initialization through autonomous detection of end positions
- Condition monitoring through integrated sensor system
- Configuration and status diagnostics via GEMÜ App
- Contactless position detection
- Electrical and mechanical position indicator as well as advanced diagnostic messages via high-visibility LED
- Uniform mounting kit with integrated air supply and control pressure detection

Description

Independent of the actuator size, the GEMÜ 44A0 multi-functional valve actuation, as an automation module, is compatible with all pneumatically operated process valves with single acting linear actuator of the new valve generation. Depending on the order variant and the set device functions, the connected process valves can be controlled conventionally open/closed (combi switch-box) or the valve position can be precisely controlled (positioner). Contactless position detection determines the valve position precisely, reliably and without being subject to wear. The current valve position is displayed via high visibility LEDs, and fed back via electrical signals. In addition to this, there is an integrated mechanical position indicator. Modern communication interfaces, an integrated sensor system and the GEMÜ app operating option are all features that characterize this innovative product.

Technical specifications

- **Ambient temperature:** -10 to 60 °C
- **Supply voltages:** 18 - 30 V DC l 24 V DC
- **Electrical connection types:** M12 plug
- **Communication modes:** IO-Link
- **Protection class:** IP 65
- **Mode of action:** Single acting
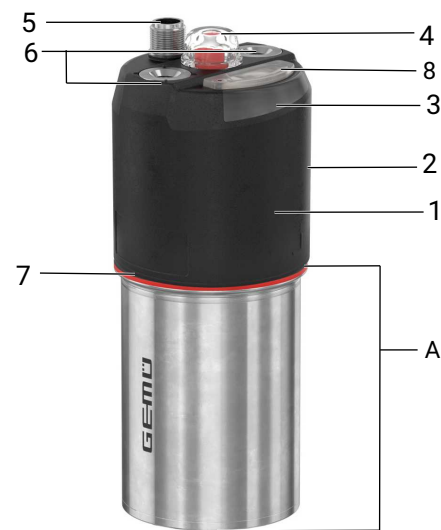- **Operating pressure :** 0.5 to 7 bar

Technical data depends on the respective configuration

⊘ IO-Link

further information
webcode: GW-44A0

Product description

Construction

Actuator **A** must be ordered separately.

Item	Name	Materials
1	Housing cover, black	PC
2	Housing ventilation	ePTFE
3	LED signalling window	PC
4	Transparent cap	PC
5	Electrical threaded connection	SS/1.4305
6	Pneumatic connectors	SS/1.4305
7	Seal	FKM
8	Type E1B0 Bluetooth module (optional) with slider cover	-

High visibility LEDs

As well as the electrical position indicator and error output, a visual signal of the various operating conditions is emitted by high visibility LEDs **1** integrated into the housing. The LEDs are arranged so that two light bands integrated on the side are illuminated, making the condition also apparent from a distance. The following conditions are illustrated here:

Valve position indicator for OPEN/CLOSE actuation device function (combi switchbox) [1]

Colour of high visibility LEDs		Function
Standard	**Inversed** [2]	
Green	Orange	Process valve in OPEN position
Orange	Green	Process valve in CLOSED position
Flashing green	Flashing orange	Movement of process valve in OPEN direction
Flashing orange	Flashing green	Movement of process valve in CLOSED direction

Valve position indicator for positioner device function [1]

Colour of high visibility LEDs		Function
Standard	**Inversed** [2]	
Orange (100% brightness)	Green (100% brightness)	Process valve in CLOSED position
Green 25% brightness	Orange 25% brightness	Process valve ≤ 25% open
Green 50% brightness	Orange 50% brightness	Process valve ≤ 50% open
Green 75% brightness	Orange 75% brightness	Process valve ≤ 75% open
Green 100% brightness	Orange 100% brightness	Process valve > 75% open

[1] The valve position indicator can be dimmed or deactivated via parameters.

[2] Inverted display can be activated via parameters

Status indication of all device functions

Colour of high visibility LEDs	Function
Standard	
Flashing yellow/white	Initialization active
Flashing white	Localization active
Flashing orange/red	Warning active
Flashing red	Error active
Flashing yellow/turquoise	Maintenance required
Flashing blue (briefly)	Wireless connection established
Flashing purple/green	Internal update process active
Flashing turquoise (briefly)	Device start

Overview of available functions

Function	OPEN/CLOSE actuation	Positioner
Adjustable device function for order version: Basic device version (code B)	X	-
Adjustable device function for order version: Positioner device version (code C)	X	X
Start initialization	X	X
Deactivation/dimming of high visibility position indicator	X	X
Position feedback OPEN	X	X
Position feedback CLOSED	X	X
Reading option for the current valve position (0.0 to 100.0%)	X	X
Reading option for initialized end positions	X	X
Reading option for the determined travel time	X	X
Reading option for the condition monitoring sensor values (temperature, air humidity, internal pressure)	X	X
Adjustable warning threshold for exceeding or not reaching the sensor values	X	X
Transmission of warning or error messages	X	X
Automatic detection of the valve control function	X	X
Monitoring the valve movement profile for deviations	X	X
Feedback for operating mode	X	X
Location function	X	X
Inversion of LED colours	X	X
Inversion of feedback signals	X	X
Switch point setting (tolerance)	X	X
Operating hours counter reading	X	X
Cycle counter reading (on-site)	X	X
Total cycle counter reading	X	X
Digital parameter representation	X	X
Configurable process data variables	X	X
App operating option (BLE)	X	X
Reset to default settings	X	X
Adjustable error position	X	X
Adjustable preferred direction (for implausible signals)	X	X
Self-commissioning function (autonomous detection of end positions)	X	-
Open and close valve via control bit	X	-
Control valve position (0–100%)	-	X
Adjustable control characteristics	-	X

Function	OPEN/CLOSE actuation	Positioner
Adjustable permissible system deviation (dead zone)	-	X
Adjustable regulating distance limit (stroke/travel stop)	-	X
Freely definable error position	-	X
Break/control operation signal change-over	-	X
Configurable split-range function	-	X
Inversion of the set value direction of action	-	X
Configurable control characteristic	-	X
Adjustable close tight function (separate for OPEN and CLOSED)	-	X

Sensor system for status monitoring

Various sensors are installed on the device which make it possible to diagnose the status. The measured values are output on the electrical interface(s) and so can be processed. Additionally, for each relevant measured value, warning thresholds are defined that generate a warning or error message when they are not reached or are exceeded. This means that unacceptable influences that would damage the device or reduce its service life can be reacted to in a timely manner.

The following measured values are detected internally:

- Internal temperature
- Internal humidity
- Internal pressure
- Control air supply pressure
- Actuator chamber pressure
- Installation position (in two directions)
- Acceleration (in three axes)
- Current consumption
- Supply voltage

Range overview

Compatibility with linear actuators on the new platform generation

Every size is compatible with one or more actuator sizes of valves with linear actuators on the new platform generation. Please ensure that the size is compatible with the actuator size on the selected valve.

44A0 size	Compatible actuator size
1	1
2	2, 3
3	4, 5, 6

Order data

The order data provide an overview of standard configurations.

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

Note: If there are restrictions on the customer or on the system side which prohibit the use of a Bluetooth interface, we recommend using an order variant with a deactivated Bluetooth interface or without a Bluetooth interface.
For designs with a Bluetooth interface, the option also exists to deactivate the interface via parameters independently later or to uninstall the type E1B0 Bluetooth module.
For designs without a Bluetooth interface, the option also exists to retrofit the interface independently later.

Note:
- Basic device version (code B) = OPEN/CLOSE valve actuation (combi switchbox)
- Positioner device version (code C) contains both the positioner function and OPEN/CLOSE actuation (adjustable via parameter)

Order codes

1 TYPE	Code
Multi-functional valve actuation	44A0

2 Electrical interface	Code
IO-Link	IO

3 Action	Code
Single acting	1

4 Direction of movement	Code
Linear	L

5 Device version	Code
Basic	B
Positioner	C

6 Interface/size	Code
Size 2	2

7 Body material	Code
Plastic	P

8 Options	Code
Without	0

9 Electrical connection	Code
M12 connector	1

10 Air supply	Code
Integrated	I

11 Wireless interface	Code
Bluetooth	B
None	0

12 Local User Interface	Code
LEDs	L

13 Mechanical option	Code
Without	0

Order example

Ordering option	Code	Description
1 TYPE	44A0	Multi-functional valve actuation
2 Electrical interface	IO	IO-Link
3 Action	1	Single acting
4 Direction of movement	L	Linear
5 Device version	B	Basic
6 Interface/size	2	Size 2
7 Body material	P	Plastic
8 Options	0	Without
9 Electrical connection	1	M12 connector
10 Air supply	I	Integrated
11 Wireless interface	B	Bluetooth
12 Local User Interface	L	LEDs
13 Mechanical option	0	Without

Technical data

Medium

Working medium:	Compressed air and inert gases
Dust content:	Class 3, max. particle size 5 µm, max. particle density 5 mg/m³
Pressure dew point:	Class 4, max. pressure dew point +3 °C
Oil content:	Class 5, max. oil concentration 25 mg/m³ Quality classes to DIN ISO 8573-1

Temperature

Ambient temperature:	-10 — 60 °C
Control medium temperature:	-20 — 60 °C
Storage temperature:	-20 — 70 °C

Pressure

Control pressure:	0.5 max. 7 bar The applied pressure must not exceed the maximum control pressure of the process valve. (If the measured control pressure is <= 1.0 bar, a warning is issued as standard to indicate that the control pressure has not been reached, and if it is >= 7.1 bar, a warning is issued to indicated that the control pressure has been exceeded. The warning thresholds can be changed.)
Air consumption:	0 Nl/min (when idle)

Product compliance

EMC Directive:	2014/30/EU
RoHS Directive:	2011/65/EU
Approval:	Fieldbus/communication: IO-Link specification V1.1.4

Mechanical data

Installation position:	Optional
Weight:	262 g

Travel sensor:		
Minimum stroke: [1]	2.0 mm	
Maximum stroke:	29.0 mm	
Correlation – travel sensor spindle/valve position	Retracted (top) ≙ 100% (valve open) Extended (bottom) ≙ 0% (valve closed)	
[1] Relevant for successful initialization		

Operating conditions

| Ambient conditions: | **Use indoors and outdoors** |
| | Dry and wet environments |

Height: Up to 2000 m (above sea level)

Relative air humidity: 0–100%

Protection class:

Single device as supplied	Mounted to actuator
Unintended operating condition	IP 65

Degree of contamination: 4 (pollution degree)

Electrical data

Supply voltage Uv: 18 - 30 V DC (in accordance with IO-Link specification)
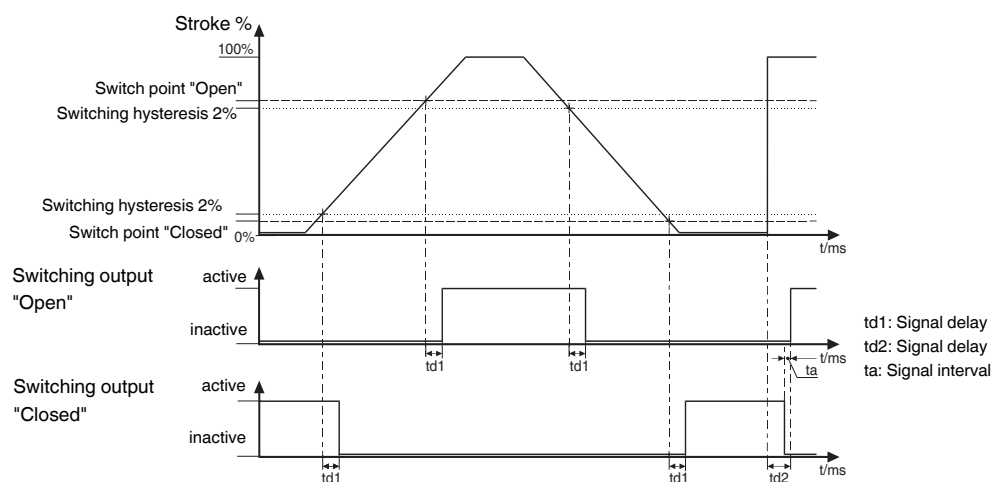
Duty cycle: Continuous duty

Reverse battery protection: yes

Electrical protection class: III

Current consumption: Maximum 135 mA

Electrical connection type: 1 x 5-pin M12 plug (A-coded)

Switching characteristic:

Switch points in data in percent of the programmed stroke, with reference to the lower end position (0%)

Technical data

Switch points:

Switch point CLOSED	Default setting: 12% (adjustable from 0–90%)
Switch point OPEN	Default setting: 75% (adjustable from 10–100%)
Min. switch point CLOSED	0.8 mm
Min. switch point OPEN	0.5 mm
Switching hysteresis	2% (relative to the initialized range upstream of the respective switch point)

If the percentage switch points dependent on the programmed stroke are less than the permissible min. switch points, the min. switch points apply automatically. The min. switch points refer to the value before achieving the initialized end position values for the respective item. For example, the CLOSED end position is output at the very latest from 0.8 mm before reaching the initialized end position value of the CLOSED position. The detection and feedback of end positions can also take place earlier (dependent on the stroke) due to the set percentage value of switch point OPEN or CLOSED. A difference of at least 10% must be maintained between the switch point settings.

Travel sensor:

Linearity: < 0.6%
Repeatability: < 0.3%
These values refer to properties including influences of a reference interference field in the form of an identical device with the smallest possible distance to each other

Interface:

	Bluetooth Low Energy (only with integrated wireless interface)	IO-Link
Function	Parameterization, configuration, diagnostics and operation	Parameterization, configuration, diagnostics and operation
Prerequisite	Compatible smartphone/tablet with Android or iOS [1] • Apple iOS: Version 16.6 or higher • Android: Version 8.0 ("Oreo") or higher • Bluetooth 4.0 LE or newer	IO-Link master spec. 1.1
Version	Bluetooth 5.4 (Low Energy)	IO-Link spec. V1.1.4

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

Wireless-specific parameters

Technology: Bluetooth Low Energy (only possible in conjunction with the GEMÜ app)

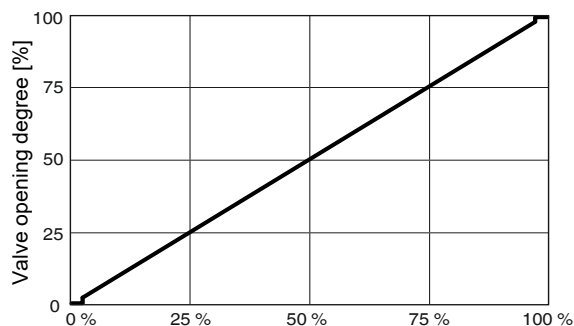**Frequency:**   2.4 GHz (2.4–2.4835 GHz)

Output power: Max. 11.2 dBm

Positioner data (positioner device function)

Note: The following diagram is valid for valves with a standard assignment of the spindle position to the valve position.
(See section "Mechanical data, correlation between travel sensor spindle/valve position")

Control diagram:

The digital electro-pneumatic positioner automatically detects the control function of the valve during initialization: Normally open (NO) or normally closed (NC).

For the 0% signal specification, the position of the valve is closed.

The close tight function that is integrated as standard ensures that the valve is moved completely to the end position when the signal "Open valve" or "Close valve" is specified.

Positioner information:

|	
System deviation:	1% default setting
(dead zone)	0.1−25.0% (can be set at fixed values)
	0.1−5.0% (adaptive self-adjustment)
Parameterization:	Via IO-Link or app
Initialization:	Automatic, via IO-Link or app
Close tight function:	Closed: Set value ≤ 0.5%
	Open: Set value ≥ 99.5%
	(alterable via parameter)

Sensor system for status monitoring

Value	Value range	Sensor resolution	Deviation	Typical deviation	Long term stability
Internal temperature	-40 to 100 °C	0.016 °C	± 1.60 °C [1]	± 0.20 °C [1]	< ± 0.02 °C/year
Internal humidity	0 to 100%	0.03%	± 3.5% between 20 to 80% ± 6.5% between 0 to 100%	± 2% between 20 to 80% ± 3.5% between 0 to 100%	± 0.25%/year
Internal pressure	260 to 1260 mbar	24 bits	± 1.0 mbar	± 0.1 mbar	-
Control air supply pressure	0 to 30 bar	1.31 mbar	± 110 mbar	± 30 mbar	± 30 mbar/year
Actuator chamber pressure	0 to 30 bar	1.31 mbar	± 110 mbar	± 30 mbar	± 30 mbar/year
Installation position (in two directions)	-180° to 180°	16 bits	- [2]	± 3.1° [2]	-
Acceleration (in three axes)	-156.96 m/s² to 156.96 m/s²	16 bits	± 1.48 m/s²	± 0.52 m/s²	-
Current consumption	0 to 375 mA	16 bits	± 3.0 mA	± 0.5 mA	-
Supply voltage	0 to 36 V	16 bits	± 0.35 V	± 0.05 V	-

[1] The value is measured on the inside of the housing with the corresponding influences of the device electronics (e.g. heating).

[2] The data refers to a vibration-free status. In the case of vibrations, the deviation can be significantly greater or a value can no longer be determined.
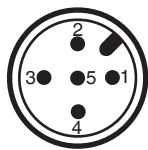
Sensor system for status monitoring

Dimensions

M12x1

10

F

G

E

∅ A

C

B
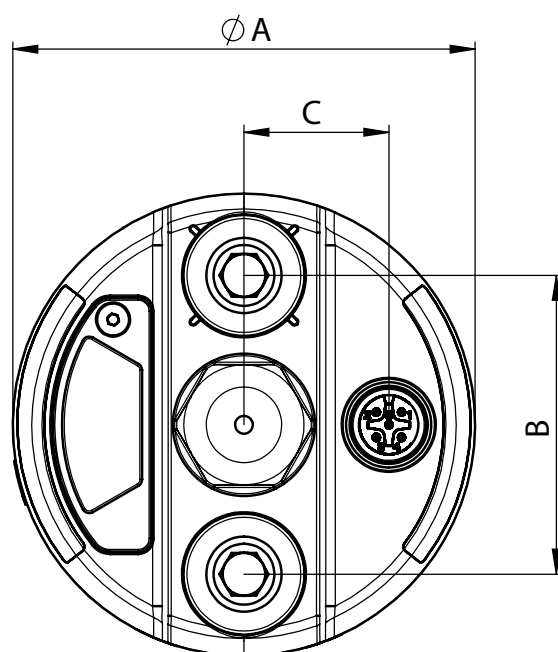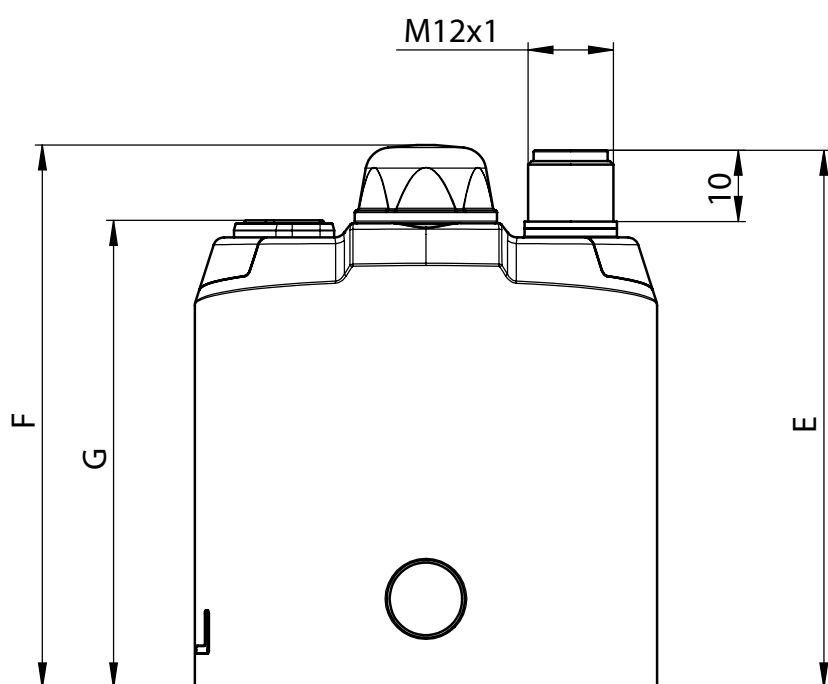
	Dia. A	B	C	E	F	G
BG1	65.0	42.0	20.4	68.1	86.8	75.8
BG2	65.0	42.0	20.4	75.6	76.3	65.7

BG = size
Dimensions in mm

Electrical connection

IO-Link

	Description
1	Uv+, 24 V DC, supply voltage
2	n.c.
3	Uv-, GND
4	C/Q IO-Link
5	n.c.

Pneumatic connection
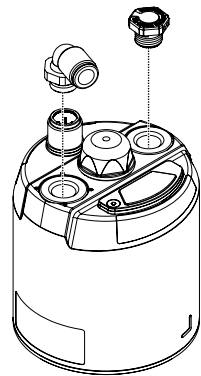
Connection	Marking	Designation	Connection size
1	Marking on the connection	Air supply connection (with integrated control pressure detection)	G1/8
2	(without marking)	Venting connection and process valve spring chamber ventilation	G1/8

The product comes with two pneumatic connections (for commercially available 6x4 mm pneumatic tubing) and a venting plug as standard. These are provided as follows:

Control function of valve actuator	Connector 1	Connector 2
Single acting (NO or NC) (see figure at the top right)	Pneumatic connection	Venting plug*
* With piped air outlet: Pneumatic connection. The venting plug is not suitable for IP 67 and is not recommended for damp ambient conditions.		

Error response

Error	Process valve
Electrical power supply failure or minimum supply voltage not reached	**Vented**
Pneumatic compressed air supply failure or minimum control pressure not reached	**Vented**
Malfunctions detected by the software in the **Error** category (see operating instructions, chapter "Troubleshooting")	Set error position ("Error position" parameter) is performed. - "Hold position", - "Open", - "Closed", - **"Safety position"** *, or - "Free position"
Malfunctions detected by the software in the **Error2** category (see operating instructions, chapter "Troubleshooting")	**Vented**
* Safety position = default setting. The actuator is **vented** in the process.	
These error responses are **not** a substitute for the required plant-specific precautions and safety facilities.	

Specific data relating to IO-Link

Physics:	Physics 2 (3-wire design)
Port configuration:	Type A port
Transmission rate:	38400 baud
Min. cycle time:	10 ms
Vendor ID:	401
Device ID:	4497409 (0x44A001)
ISDU support:	Yes
SIO operation:	No
IO-Link specification:	V1.1.4
Block parameterization:	Yes

Information for IO-Link: IODD files can be downloaded via https://ioddfinder.io-link.com/ or www.gemugroup.com.

Process data

Outputs (master → device)			
Bit	**Description**	**Default setting function**	**Logic**
0	Digital device input 1	"OPEN/CLOSE actuation" device function: Pilot valve actuation "Positioner" device function: De-activated	"OPEN/CLOSE actuation" device function: 0 = Integrated pilot valve not actuated 1 = Integrated pilot valve actuated
1	Digital device input 2	Deactivated	
2	Digital device input 3	Initialization input	0 = normal operation 1 = activate initialization
3	Digital device input 4	Localization input	0 = location function inactive 1 = activate location function
4	Digital device input 5	Deactivated	
5	Digital device input 6	Deactivated	
6	Digital device input 7	Deactivated	
7	Digital device input 8	Deactivated	
8 to 23	Set value input	"OPEN/CLOSE actuation" device function: Deactivated	0.0 to 100.0% Process valve position
		"Positioner" device function: Specification of target valve position	

Device-side digital input signals can be used to start various actions, such as starting initialization/location function The function can be set by the associated non-cyclical parameter data			
Digital device input 1 to 8 function	0	Deactivated	No function
	1 [1]	Actuation of pilot valve	The integrated pilot valve is actuated if this signal is active.
	3	Initialization input	Initialization is activated if this signal is active.
	4	Localization input	The location function is activated if this signal is active.
	5	On/off error position	If there is no active signal, the valve is moved to the defined position via the "Error position" parameter. If this signal is active, operation is performed in accordance with the set operating mode.
	6 [2]	Break/Normal control	If there is no active signal, the automatic control system is paused and the valve is therefore kept in the current position. If this signal is active, control is performed in accordance with the set value signal and set operating mode.
	7 [2]	Open until OPEN travel stop	If there is an active signal, the process valve is moved to the mechanical OPEN end position (thereby also leaving a set operating range)
	8 [2]	Open until CLOSED travel stop	If there is an active signal, the process valve is moved to the mechanical CLOSED end position (thereby also leaving a set operating range)
[1] Only "OPEN/CLOSE actuation" device function			
[2] Only "Positioner" device function			

Inputs (device → master)			
Bit	Description	Default setting function	Logic
0	Digital device output 1	OPEN feedback	0 = process valve not in OPEN position 1 = process valve in OPEN position
1	Digital device output 2	CLOSED feedback	0 = process valve not in CLOSED position 1 = process valve in CLOSED position
2	Digital device output 3	Feedback for initialization active	0 = normal operation 1 = initialization mode active
3	Digital device output 4	Deactivated	
4	Digital device output 5	Deactivated	
5	Digital device output 6	Deactivated	
6	Digital device output 7	Deactivated	
7	Digital device output 8	Deactivated	
8 to 23	Analogue device output	Valve position feedback	0.0 to 100.0% process valve position

Device-side digital output signals can be used to output various statuses, for example end position feedback/errors/alarms. → The function can be set via the associated non-cyclical parameter data			
Digital device output 1 to 8 function	0	Deactivated	No function
	1	OPEN feedback	Feedback for valve position OPEN
	2	CLOSED feedback	Feedback for valve position CLOSED
	3	Error output	Output if an error is detected
	4	Warning output	Output if a warning is detected
	5	Feedback for initialization active	Feedback when initialization is active
	6 [1]	Feedback for "Off" operating mode	Feedback when the product is in operating mode "Off" (see "Operating mode" parameter)

[1] Only "Positioner" device function

IO-Link system commands

System commands can be transmitted via the subindex 0x0002. The following are supported by the device:

Designation	System command	Description
Application Reset	0x81	Resets the technology-specific parameters. This allows the device to be brought into a pre-defined state without interrupting the corresponding communication and without the need for a switch-off cycle.
Back-to-Box	0x83	This function allows the device to be reset to the original parameterization. This command is useful if, for example, a device is removed from an existing plant and reactivated as a spare part. After the command has been executed, IO-Link communication is stopped until the next device start.
Reset Cycle Counter User	0xA2	Resets the user switching cycle counter.
Reset Valve Actuation Counter User	0xA3	Resets the user valve actuation counter.

Accessories

GEMÜ 1219

Cable socket / cable plug M12

GEMÜ 1219 is an M12, 5-pin connector (cable socket/cable plug). Straight and/or 90° angled plug type. Defined cable length or with threaded connection without cable. Various materials available for the threaded ring.

It is recommended that a straight connector is used for this product.

Description	Length	Order number
5-pin, straight	without cable	88205544
	2 m cable	88205542
	5 m cable	88205543
	10 m cable	88270972
	15 m cable	88346791
5-pin, angle	without cable	88205545
	2 m cable	88205534
	5 m cable	88205540
	10 m cable	88210911
	15 m cable	88244667

GEMÜ 1560

IO-Link master

The GEMÜ 1560 IO-Link master is used for parametrization, actuation, commissioning and for evaluating process and diagnostics data on products with IO-Link interface with communication standard in accordance with IEC 61131-9. The IO-Link master is available with USB port for use on a computer or with a Bluetooth or WLAN interface for use on mobile devices (iOS and Android). GEMÜ 1560 can be ordered separately or as a set for GEMÜ products including the required adapter.

Description	Order designation	Order number
IO-Link master kit (adapter plus cable)	1560USBS 1 A40A12AU A	99072365
IO-Link master kit (adapter plus cable)	1560 BTS 1 A20A12AA A	99130458

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