



Actuator controls
AC 01.2/ACExC 01.2

Control

→ Parallel

Profibus DP

Modbus RTU

Modbus TCP/IP

Foundation Fieldbus

HART



Read operation instructions first.

- Observe safety instructions.

Purpose of the document:

This document contains information for the commissioning, operation and maintenance staff. It is intended to support local device operation and setting modifications.

Reference documents:

- Operation instructions (Assembly, operation, commissioning) for actuator.

Reference documents can be downloaded from the Internet (www.auma.com) or ordered directly from AUMA (refer to <Addresses>).

Table of contents		Page
1.	Safety instructions.....	8
1.1.	Prerequisites for the safe handling of the product	8
1.2.	Range of application	9
1.3.	Warnings and notes	9
1.4.	References and symbols	9
2.	Short description.....	10
3.	Operation.....	11
3.1.	Operating the actuator from local controls	11
3.2.	Actuator operation from remote	11
3.3.	Menu navigation via push buttons (for settings and indications)	12
3.3.1.	Menu layout and navigation	13
3.4.	User level, password	14
3.4.1.	Password entry	14
3.4.2.	Password change	15
3.4.3.	Timeout for incorrect password entry	15
3.5.	Language in the display	16
3.5.1.	Language change	16
4.	Indications.....	17
4.1.	Indications during commissioning	17
4.2.	Indications in the display	17
4.2.1.	Feedback signals from actuator and valve	18
4.2.2.	Status indications according to AUMA classification	20
4.2.3.	Status indications according to NAMUR recommendation	21
4.3.	Indication lights of local controls	23
4.3.1.	Indication lights: change colour	23
5.	Signals (output signals).....	25
5.1.	Status signals via output contacts (digital outputs)	25
5.1.1.	Assignment of outputs	25
5.1.2.	Coding the outputs	25
5.2.	Configurable status signals	25
5.3.	Analogue signals (analogue outputs)	26
5.3.1.	Assignment of analogue output 1	26
5.3.2.	Signal range of analogue output 1	27
5.3.3.	Adjustment of analogue output 1	27
5.3.4.	Assignment of analogue output 2	28

5.3.5.	Signal range of analogue output 2	28
5.3.6.	Adjustment of analogue output 2	28
6.	Operation	29
6.1.	Operation mode Off	29
6.2.	Operation mode Local	29
6.2.1.	Push-to-run operation or self-retaining Local	29
6.3.	Operation mode remote	30
6.3.1.	Push-to-run operation or self-retaining Remote	30
6.4.	Operation mode EMERGENCY	30
6.5.	Operation mode EMERGENCY stop	31
6.6.	Operation mode Disabled	31
6.7.	Operation mode Service	31
7.	Basic settings for commissioning.....	32
7.1.	Type of seating for end positions	32
7.1.1.	Type of seating: set	32
7.2.	Torque switching	33
7.2.1.	Torque switching: set	34
7.3.	Limit switching	35
7.3.1.	Limit switching: set	35
7.3.2.	End position setting via stroke	37
7.4.	Date and time	40
7.5.	Display formats	40
7.5.1.	Date format	40
7.5.2.	Time format	41
7.5.3.	Number format	41
7.5.4.	Torque unit	41
7.5.5.	Temperature unit	41
7.5.6.	Position units	41
7.5.7.	Process factor units	42
7.5.8.	Analogue working value units (AIN)	43
7.5.9.	Analogue signal output units (AOUT)	43
7.6.	Contrast	44
8.	Application functions.....	45
8.1.	Intermediate positions	45
8.1.1.	Intermediate positions of pivot points: define	45
8.1.2.	Signal behaviour of intermediate positions: set	45
8.1.3.	Hysteresis for intermediate positions: set	46
8.2.	Operation profile (operation behaviour) for intermediate positions	47
8.2.1.	Operation profile: activate	47
8.2.2.	Operation profile for intermediate positions (pivot points): set	47
8.2.3.	Off times for intermediate positions (pivot points): set	48
8.3.	Two-wire control	48
8.4.	Positioner (operation mode Remote SETPOINT)	49
8.4.1.	Positioner: activate	49
8.4.2.	Adaptive behaviour: activate deactivate	49
8.4.3.	Overrun (inner dead band): set manually	50
8.4.4.	Max. error variable (outer dead band): set manually	50
8.4.5.	Dead time: set	51
8.4.6.	Hysteresis for positioner: set	51

8.4.7.	Closing fully/opening fully (end position tolerance for setpoint)	51
8.4.8.	Setting range: limit	51
8.4.9.	Change-over between OPEN - CLOSE control and setpoint control	52
8.4.10.	Input of setpoint position	53
8.4.11.	Input range of setpoint position	53
8.4.12.	Split Range operation	53
8.5.	Process controller	54
8.5.1.	Process controller activation	55
8.5.2.	Process controller: set modulating behaviour	55
8.5.3.	Setpoint source (input for process setpoint)	56
8.5.4.	Behaviour on loss of process setpoint	57
8.5.5.	Inverse operation	57
8.5.6.	Internal process setpoint	57
8.5.7.	Setting procedure	58
8.5.8.	Proportional gain Kp: set	58
8.5.9.	Reset time Ti: set	58
8.5.10.	Rate time Td: set	58
8.5.11.	Actual value source (input for actual process value)	59
8.6.	Stepping mode	59
8.6.1.	Stepping mode: activate	59
8.6.2.	Operation mode for stepping mode	60
8.6.3.	Start and end of stepping mode	60
8.6.4.	On times and off times	60
8.7.	By-pass function	61
8.7.1.	By-pass function: activate	62
8.7.2.	By-pass application: configure	62
8.8.	Lift Plug Valve (LPV)	63
8.8.1.	LPV function: activate	65
8.8.2.	LPV actuator type: configure	65
8.8.3.	Delay time of LPV master actuator: configure	66
8.8.4.	Delay time of LPV slave actuator: configure	66
8.9.	Automatic deblocking	66
8.9.1.	Automatic deblocking function: activate	67
8.9.2.	Operation time for operation in opposite direction: set	67
8.9.3.	Number of deblocking attempts: set	67
8.9.4.	Tolerance range: set	67
8.10.	Heater system and heaters	68
8.10.1.	Heater system within the actuator controls	68
8.10.2.	Heater on control unit (actuator)	68
8.10.3.	Motor heater	69
9.	Failure functions.....	70
9.1.	Reversing prevention time	70
9.2.	Failure behaviour on loss of signal	70
9.2.1.	Failure reaction on loss of signal	70
9.2.2.	Failure source (failure reason) for a failure operation: set	70
9.2.3.	Failure operation (reaction of the actuator) on loss of signal	71
9.2.4.	Preset position: define	71
9.2.5.	Failure position MPV: define	72
9.2.6.	Delay time: set	72
9.3.	EMERGENCY behaviour	72

9.3.1.	EMERGENCY behaviour: activate	73
9.3.2.	EMERGENCY failure reaction	73
9.3.3.	Failure source (failure reason) for an EMERGENCY operation: set	74
9.3.4.	Operation mode for EMERGENCY behaviour	74
9.3.5.	EMERGENCY operation	74
9.3.6.	EMERGENCY position	75
9.3.7.	EMERGENCY position MPV	75
9.3.8.	Torque switching: by-pass	75
9.3.9.	Motor protection: by-pass	75
9.3.10.	Stepping mode: by-pass	76
9.3.11.	Operation profile: by-pass	76
9.3.12.	Interlock: by-pass	76
9.3.13.	Local stop: by-pass	76
9.3.14.	Delay time for EMERGENCY operation	77
9.4.	Enable local controls	77
9.4.1.	Enabling function: activate	77
9.4.2.	Enabling function behaviour	78
9.5.	Priority REMOTE	78
9.5.1.	Priority REMOTE: activate	79
9.5.2.	Priority REMOTE behaviour	79
9.6.	Interlock (enabling operation commands)	79
9.6.1.	Interlock: activate	80
9.6.2.	Source of Interlock enable signal: set	80
9.6.3.	Operation mode for interlock	80
9.6.4.	Interlock behaviour (running direction)	80
9.7.	Local Stop	81
9.7.1.	Behaviour	81
9.8.	EMERGENCY stop function	81
9.9.	Partial Valve Stroke Test (PVST)	82
9.9.1.	PVST activation	83
9.9.2.	PVST source: set	83
9.9.3.	Operation mode for PVST	83
9.9.4.	Behaviour for PVST: define	83
9.9.5.	Partial stroke for PVST: set	84
9.9.6.	PVST monitoring time: set	84
9.9.7.	PVST operating time: set	84
9.9.8.	PVST reversing time: set	84
9.9.9.	PVST reminder	84
9.10.	Bluetooth interface can be activated and deactivated	85
10.	Monitoring functions	88
10.1.	Torque monitoring	88
10.1.1.	Torque by-pass	88
10.1.2.	Torque limitation of torque by-pass	89
10.2.	Motor protection monitoring (thermal monitoring)	90
10.3.	Type of duty monitoring (motor starts and running time)	90
10.4.	Operating time monitoring	92
10.5.	Reaction monitoring	92
10.6.	Motion detector	93
10.6.1.	Activate motion detector	93
10.6.2.	Detection time dt	93

10.6.3.	Travel difference dx	94
10.6.4.	Delay time	94
10.7.	Monitoring of electronics power supply	94
10.8.	Temperature monitoring	95
10.9.	Heater system/heater monitoring	95
10.10.	Verification of sub-assemblies	96
10.11.	Phase failure monitoring	96
10.12.	Phase sequence detection and correction of the direction of rotation	97
11.	Functions: activate and enable.....	98
11.1.	Functions: activate	98
11.2.	Functions: enable	98
12.	Product variants.....	100
12.1.	Multiport valve	100
12.1.1.	Actuator type: set/check	100
12.1.2.	Gear reduction ratio: set/check	100
12.1.3.	Number of ports (positions)	101
12.1.4.	Home port (zero position): set	101
12.1.5.	Positions (of valve ports): define/check	102
12.1.6.	Operate to position via push buttons of the local controls	102
12.1.7.	Operate to position from Remote	103
12.1.8.	Dead band	104
12.1.9.	Correction of inertia	104
12.1.10.	Backlash compensation	105
12.1.11.	Signalling behaviour of positions: set/check	105
12.1.12.	Hysteresis for signalling intermediate positions: set	105
13.	Service functions.....	107
13.1.	Direction of rotation	107
13.2.	Factory setting	107
13.3.	Languages: reload	108
13.4.	Data export	108
13.5.	Data import	108
13.6.	Actual configuration: accept	109
13.7.	Firmware update	109
13.8.	Service software	109
14.	Diagnostics.....	111
14.1.	Electronic device ID	111
14.2.	Bluetooth connection diagnostic	111
14.3.	Diagnostic Interface	112
14.4.	Position transmitter and potentiometer diagnostic	113
14.5.	Diagnostic Position transmitter RWG	113
14.6.	Diagnostic Position transmitter MWG	114
14.7.	Diagnostic Positioner	114
14.8.	Diagnostic On time monitoring	114
14.9.	Diagnostic Process controller	115
14.10.	Diagnostic FQM (fail safe)	115
14.11.	Simulation (inspection and test function)	115
14.11.1.	Actuator signals	115
14.11.2.	Interface signals	116

15.	Asset Management.....	117
15.1.	Operating data	117
15.2.	Event report	118
15.3.	Characteristics	119
15.3.1.	Torque-travel characteristic	119
15.3.2.	Position-time characteristic	121
15.3.3.	Temperature-time characteristic	122
15.4.	Histograms	122
15.4.1.	Motor running time-position (histogram)	122
15.4.2.	Motor running time-temperature (histogram)	123
15.4.3.	Motor running time-torque (histogram)	124
15.5.	Maintenance (information and signals)	124
15.6.	Operating times display	126
15.7.	Device temperature display	126
16.	Corrective action.....	127
16.1.	Primary fuses	127
16.2.	Fault indications and warning indications	127
17.	Appendix.....	134
17.1.	Selection overview for output contacts and indication lights (digital outputs DOUT)	134
17.2.	Selection list of binary signals for digital inputs (DIN)	138
	Index.....	143
	Parameter index.....	147

1. Safety instructions

1.1. Prerequisites for the safe handling of the product

- Standards/directives** The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation. They include among others standards and directives such as IEC 60079 "Explosive atmospheres".
- Part 14: Electrical installations design, selection and erection.
 - Part 17: Electrical installations inspection and maintenance.
- Safety instructions/warnings** All personnel working with this device must be familiar with the safety and warning instructions in this manual and observe the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.
- Qualification of staff** Assembly, electrical connection, commissioning, operation, and maintenance must be carried out by suitably qualified personnel authorised by the end user or contractor of the plant only.
- Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.
- Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant is responsible for respect and control of these regulations, standards, and laws.
- Electrostatic charging** Highly efficient charge generating processes (processes more efficient than manual friction) on the device surface must be excluded at any time, since they will lead to propagating brush discharges and therefore to ignition of a potentially explosive atmosphere.
- This also applies to fireproof coatings or covers available as an option.
- Ignition dangers** Gearboxes were subjected to an ignition hazard assessment in compliance with the currently applicable standard according to ISO 80079-36/ -37. Hot surfaces, mechanically generated sparks as well as static electricity and stray electric currents were identified and assessed as major potential ignition sources. Protective measures to prevent the likelihood that ignition sources arise were applied to the gearboxes. This includes in particular lubrication of the gearbox, the IP protection codes and the warnings and notes contained in these operation instructions.
- Commissioning** Prior to commissioning, imperatively check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.
- Operation** Prerequisites for safe and smooth operation:
- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
 - Only operate the device if it is in perfect condition while observing these instructions.
 - Immediately report any faults and damage and allow for corrective measures.
 - Observe recognised rules for occupational health and safety.
 - Observe national regulations.
 - During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature prior to working on the device using an appropriate thermometer and wearing protective gloves.

Protective measures The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.

Maintenance To ensure safe device operation, the maintenance instructions included in this manual must be observed.

Any device modification requires prior written consent of the manufacturer.

1.2. Range of application

AUMA actuator controls are exclusively designed for the operation of AUMA actuators. Other applications require explicit (written) confirmation by the manufacturer. The following applications are not permitted, e.g.:

- motor control
- pump control

No liability can be assumed for inappropriate or unintended use.

Observance of these operation instructions is considered as part of the device's designated use.

1.3. Warnings and notes

The following warnings draw special attention to safety-relevant procedures in these operation instructions, each marked by the appropriate signal word (DANGER, WARNING, CAUTION, NOTICE).



Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning results in death or serious injury.




Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.



Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning could result in minor or moderate injury. May also be used with property damage.



Potentially hazardous situation. Failure to observe this warning could result in property damage. Is not used for personal injury.

Safety alert symbol  warns of a potential personal injury hazard.

The signal word (here: DANGER) indicates the level of hazard.

1.4. References and symbols

The following references and symbols are used in these instructions:

Information The term **Information** preceding the text indicates important notes and information.

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

M ▷ **Via the menu to parameter**

Describes the menu path to the parameter. When using the push buttons of local controls, the required parameter can be quickly found on the display. Display texts are shaded in grey: **Display**.

➔ **Result of a process step**

Describes the result of a preceding process step.

2. Short description

Actuator controls actuator controls are used to operate AUMA actuators and are supplied ready for use.

The functions of actuator controls include standard valve control in OPEN-CLOSE duty, positioning, process control, logging of operating data right through to diagnostic functions.

**Local controls/
AUMA CDT** Operation, setting, and display can be performed directly at the actuator controls.

When set to local control, it is possible to

- operate the actuator via the local controls (push buttons and display) and perform settings (contents of these instructions).
- read in or out data or modify and save settings via AUMA CDT software (accessory), using a computer (laptop or PC). The connection between computer and actuator controls is wireless via Bluetooth interface (not included in these instructions).

Intrusive - Non-Intrusive

- Intrusive version (control unit: electromechanical):
Limit and torque setting is performed via switches in the actuator.
- Non-Intrusive version (control unit: electronic):
Limit and torque setting is performed via the controls, without removal of actuator or actuator controls covers. For this purpose, the actuator is equipped with an MWG (magnetic limit and torque transmitter), also capable to supply analogue torque feedback signals/torque indication and analogue position feedback signals/position indication at the actuator controls output.

3. Operation

3.1. Operating the actuator from local controls

Local actuator operation is performed using the local controls push buttons of actuator controls.

Figure 1: Local controls



- [1] Push button for operation command in direction OPEN
- [2] Push button STOP
- [3] Push button for operation command in direction CLOSE
- [4] Push button RESET
- [5] Selector switch

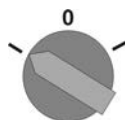


Hot surfaces, e.g. possibly caused by high ambient temperatures or strong direct sunlight!

Risk of burns

→ Verify surface temperature and wear protective gloves.

→ Set selector switch [5] to position **Local control** (LOCAL).



➔ The actuator can now be operated using the push buttons [1 – 3]:

- Run actuator in direction OPEN: Press push button [1]
- Stop actuator: Press push button STOP [2].
- Run actuator in direction CLOSE: Press push button [3]

Information

The OPEN and CLOSE operation commands can be given either in push-to-run or in self-retaining operation mode. For further information, please refer to <Push-to-run operation or self-retaining local> chapter.

3.2. Actuator operation from remote

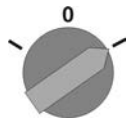


Risk of immediate actuator operation when switching on!

Risk of personal injuries or damage to the valve

- If the actuator starts unexpectedly: Immediately turn selector switch to **0** (OFF).
- Check input signals and functions.

→ Set selector switch to position **Remote control (REMOTE)**.



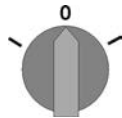
➔ Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE) or analogue setpoints (e.g. 0 – 20 mA).

Information For actuators equipped with a positioner, it is possible to change over between **OPEN - CLOSE control** (Remote OPEN-CLOSE) and **setpoint control** (Remote SET-POINT). For further information, refer to chapter <Change-over between OPEN - CLOSE control and setpoint control>.

3.3. Menu navigation via push buttons (for settings and indications)

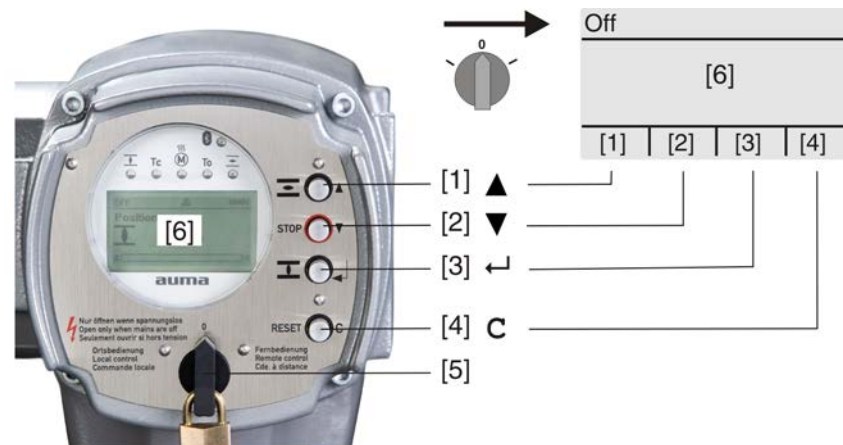
Menu navigation for display and setting is made via the push buttons [1 – 4] of the local controls.

Set the selector switch [5] to position **0 (OFF)** when navigating through the menu.



The bottom row of the display [6] serves as navigation support and explains which push buttons [1 – 4] are used for menu navigation.

Figure 2:



[1–4] Push buttons or navigation support

[5] Selector switch

[6] Display

Table 1: Important push button functions for menu navigation

Push buttons	Navigation support on display	Functions
[1] ▲	Up ▲	Change screen/selection
		Change values
		Enter figures from 0 to 9
[2] ▼	Down ▼	Change screen/selection
		Change values
		Enter figures from 0 to 9
[3] ↵	Ok	Confirm selection
		Save
		Edit
		Details

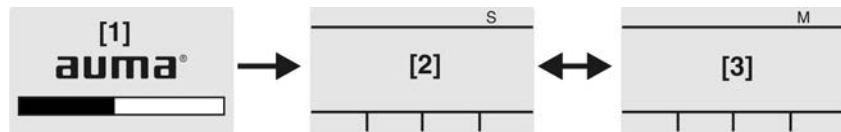
Push buttons	Navigation support on display	Functions
[4] C	Setup	Enter Main menu
	Esc	Cancel process
		Return to previous display

- Backlight**
- The display is illuminated in white during normal operation. It is illuminated in red in case of a fault.
 - The screen illumination is brighter when operating a push button. If no push button is operated for 60 seconds, the display will become dim again.

3.3.1. Menu layout and navigation

Groups The indications on the display are divided into 3 groups:

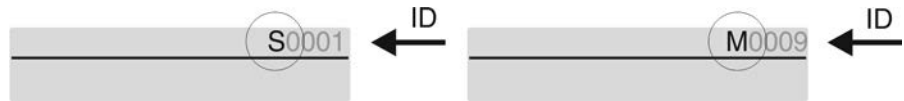
Figure 3: Groups



- [1] Start menu
- [2] Status menu
- [3] Main menu

ID Status menu and main menu are marked with an ID.

Figure 4: Marking with ID

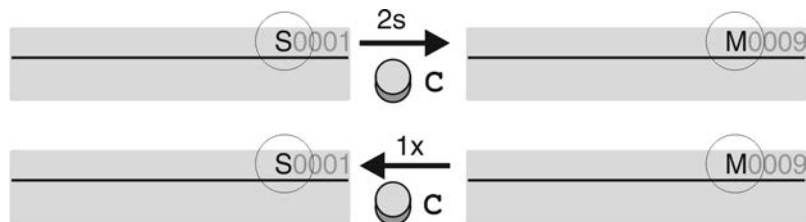


- S ID starts with S = status menu
- M ID starts with M = main menu

Group selection It is possible to select between status menu **S** and main menu **M**:

For this, set selector switch to **0** (OFF), hold down push button **C** for approx. 2 seconds until a screen containing the ID **M...** appears.

Figure 5: Select menu groups



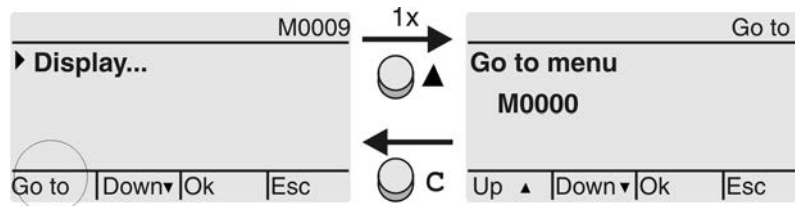
You return to the status menu if:

- the push buttons on the local controls have not been operated within 10 minutes
- or by briefly pressing **C**

Direct display via ID

When entering the ID within the main menu, screens can be displayed directly (without clicking through).

Figure 6: Direct display (example)



Display indicates in the bottom row: **Go to**

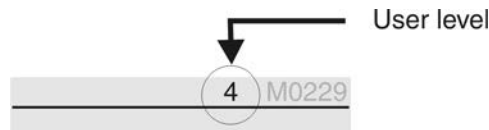
1. Press push button **▲ Go to**.
Display indicates: **Go to menu M0000**
2. Use push buttons **▲▼ Up ▲ Down ▼** to select figures 0 to 9.
3. Press push button **↵ Ok** to confirm first digit.
4. Repeat steps 2 and 3 for all further digits.
5. To cancel the process: Press **C Esc**.

3.4. User level, password

User level The user level defines which menu items or parameters can be displayed or modified by the active user.

There are 6 different user levels. The user level is indicated in the top row:

Figure 7: User level display (example)



Password A password must be entered to allow parameter modification. The display indicates: **Password 0*****

A specific password is assigned to each user level and permits different actions.

Table 2:

User levels and authorisations	
Designation (user level)	Authorisation/password
Observer (1)	Verify settings No password required
Operator (2)	Change settings Default factory password: 0000
Maintenance (3)	Reserved for future extensions
Specialist (4)	Change device configuration e.g. type of seating, assignment of output contacts Default factory password: 0000
Service (5)	Service staff Change configuration settings
AUMA (6)	AUMA administrator



Unauthorised access is made easier due to insecure password!

→ We urgently recommend changing the password during initial commissioning.

3.4.1. Password entry

1. Select desired menu and hold down push button **↵** for approx. 3 seconds.
➡ Display indicates the set user level, e.g **Observer (1)**
2. Select higher user level via **▲ Up ▲** and confirm with **↵ Ok**.
➡ Display indicates: **Password 0*****

3. Use push buttons ▲▼ Up ▲ Down ▼ to select figures 0 to 9.
 4. Confirm first digit of password via push button ←↵ Ok.
 5. Repeat steps 1 and 2 for all further digits.
- ➔ Having confirmed the last digit with ←↵ Ok, access to all parameters within one user level is possible if the password entry is correct.

3.4.2. Password change

Only the passwords of same or lower access level may be changed.

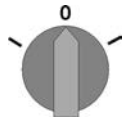
Example: If the user is signed in as Specialist (4), he/she can change passwords as for password levels (1) through (4).

M ▶ **Device configuration M0053**
Service functions M0222
Change passwords M0229

Menu item **Service functions M0222** is only visible, if user level **Specialist (4)** or higher is selected.

Select main menu

1. Set selector switch to position **0** (OFF).



2. Press push button **C Setup** and hold it down for approx. 3 seconds.

➔ Display goes to main menu and indicates: ▶ **Display**

Change passwords

3. Select parameter **Change passwords** either:
 - click via the menu M ▶ to parameter, or
 - via direct display: press ▲ and enter ID **M0229**
- Display indicates: ▶ **Change passwords**
- The user level is indicated in the top row (1 – 6), e.g.:



- For user level 1 (view only), passwords cannot be changed. To change passwords, you must change to a higher user level. For this, enter a password via a parameter.

4. For a user level between 2 and 6: Press push button ←↵ Ok.
- ➔ The display indicates the highest user level, e.g.: **For user 4**
5. Select user level via push buttons ▲▼ Up ▲ Down ▼ and confirm with ←↵ Ok.
- ➔ Display indicates: ▶ **Change passwords Password 0*****
6. Enter current password (→ enter password).
- ➔ Display indicates: ▶ **Change passwords Password (new) 0*****
7. Enter new password (→ enter password).
- ➔ Display indicates: ▶ **Change passwords For user 4** (example)
8. Select next user level via push buttons ▲▼ Up ▲ Down ▼ or cancel the process via Esc.

3.4.3. Timeout for incorrect password entry

A timeout for incorrect password entry is provided with actuator controls. This prevents unauthorised access by systematic trials. The timeout is active for incorrect entries via the local controls as well as incorrect entries via our software tools (AUMA CDT, AUMA Assistant App). After five subsequent incorrect trials, further entry is inhibited for one minute. Each further incorrect entry doubles the timeout period. An active

timeout is displayed on the screen. An individual timeout is available for each user level. This means that you may still log on with user level 3 if user level 4 is inhibited.

The incorrect entry counter can be reset in two ways:

1. Correct password entry with successful access authorisation.
2. 8 hours after the last incorrect entry.

3.5. Language in the display

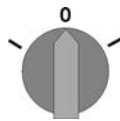
The display language can be selected.

3.5.1. Language change

M ▶ **Display** M0009
Language M0049

Select main menu

1. Set selector switch to position **0** (OFF).



Change language

2. Press push button **C Setup** and hold it down for approx. 3 seconds.
 - ➔ Display goes to main menu and indicates: ▶ **Display**
3. Press **↵ Ok**.
 - ➔ Display indicates: ▶ **Language**
4. Press **↵ Ok**.
 - ➔ Display indicates the selected language, e.g.: ▶ **Deutsch**
5. The bottom row of the display indicates:
 - **Save** → continue with step 10
 - **Edit** → continue with step 6
6. Press **↵ Edit**.
 - ➔ Display indicates: ▶ **Observer (1)**
7. Select user level via **▲▼ Up ▲ Down ▼** resulting in the following significations:
 - black triangle: ▶ = current setting
 - white triangle: ▷ = selection (not saved yet)
8. Press **↵ Ok**.
 - ➔ Display indicates: **Password 0*****
9. Enter password (→ enter password).
 - ➔ Display indicates: ▶ **Language** and **Save** (bottom row)
10. Select new language via **▲▼ Up ▲ Down ▼** resulting in the following significations:
 - black triangle: ▶ = current setting
 - white triangle: ▷ = selection (not saved yet)
11. Confirm selection via **↵ Save**.
 - ➔ The display changes to the new language. The new language selection is saved.

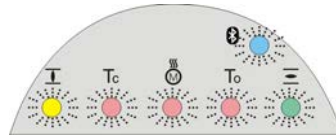
Language selection

4. Indications

4.1. Indications during commissioning

LED test When switching on the power supply, all LEDs on the local controls illuminate for approx. 1 second. This optical feedback indicates that the voltage supply is connected to the controls and all LEDs are operable.

Figure 8: LED test

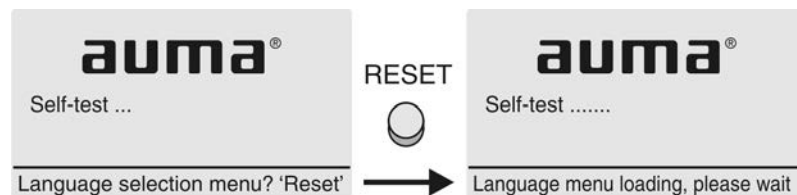


Language selection During the self-test, the language selection can be activated so that the selected language is immediately indicated in the display. For this, set selector switch to position **0** (OFF).

Activate language selection:

1. Display indicates in the bottom line: **Language selection menu? 'Reset'**
2. Hold down push button **RESET** until display of the following text in the bottom line: **Language menu loading, please wait.**

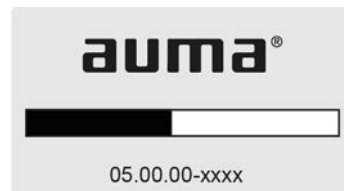
Figure 9: Self-test



The language selection menu follows the startup menu.

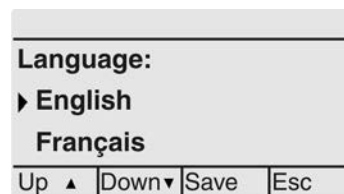
Startup menu The current firmware version is displayed during the startup procedure:

Figure 10: Startup menu with firmware version: 05.00.00–xxxx



If the language selection feature has been activated during the self-test, the menu for selecting the display language will now be indicated. For further information on language setting, please refer to chapter <Language in the display>.

Figure 11: Language selection



If no entry is made over a longer period of time (approx. 1 minute), the display automatically returns to the first status indication.

4.2. Indications in the display

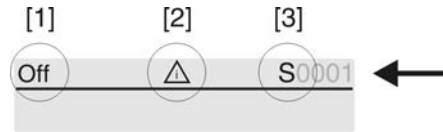


Menus and functions depend on the actuator controls firmware version!

→ Should menus or functions be unavailable, please contact the AUMA Service.

Status bar The status bar (first row in the display) indicates the operation mode [1], the presence of an error [2] and the ID number [3] of the current display indication.

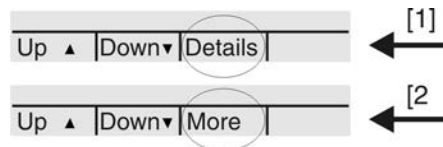
Figure 12: Information in the status bar (top)



- [1] Operation mode
- [2] Error symbol (only for faults and warnings)
- [3] ID number: S = Status page

Navigation support If further details or information are available with reference to the display, the following indications **Details** or **More** appear in the navigation support (bottom display row). Then, further information can be displayed via the ← push button.

Figure 13: Navigation support (bottom)



- [1] shows list with detailed indications
- [2] shows further available information

The navigation support (bottom row) is faded out after approx. 3 seconds. Press any push button (selector switch in position 0 (OFF)) to fade in the navigation support.

4.2.1. Feedback signals from actuator and valve

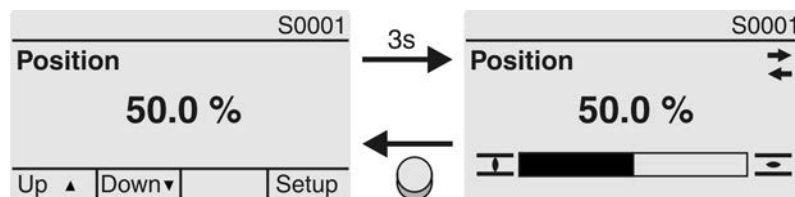
Display indications depend on the actuator version.

Valve position (S0001)

This indication is only available if a position transmitter (potentiometer, EWG, RWG or MWG) is installed in the actuator.

- **S0001** on the display indicates the valve position in % of the travel.
- The bar graph display appears after approx. 3 seconds.
- When issuing an operation command, an arrow indicates the direction (OPEN/CLOSE).

Figure 14: Valve position and direction of operation





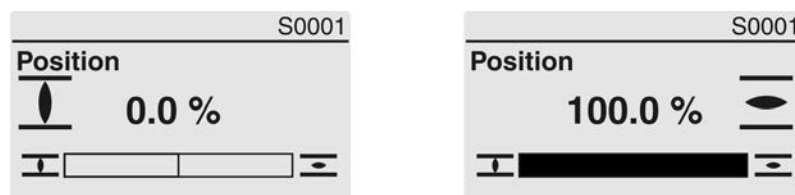
Reaching the preset end positions is additionally indicated via  (CLOSED) and  (OPEN) symbols.

Figure 15: End position CLOSED/OPEN reached

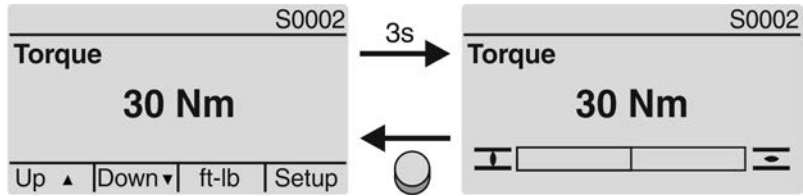


- 0% Actuator is in end position CLOSED
- 100% Actuator is in end position OPEN

Torque (S0002)

- S0002 on the display indicates the torque applied at the actuator output.
- The bar graph display appears after approx. 3 seconds.

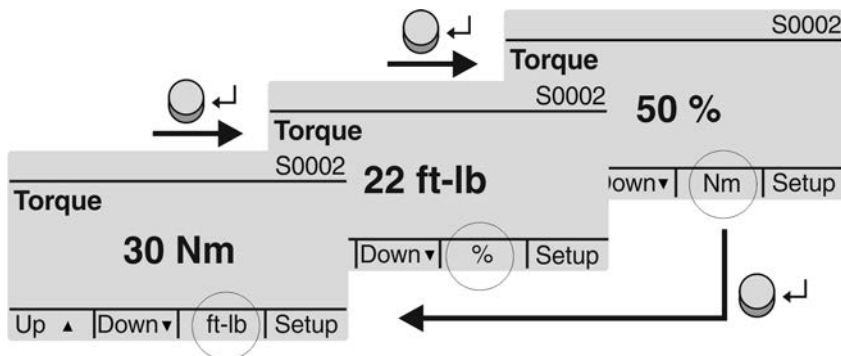
Figure 16: Torque



Select unit

The push button allows to select the unit displayed (percent %, Newton metre Nm or "foot-pound" ft-lb)

Figure 17: Units of torque



Display in percent

100 % indication equals the max. torque indicated on the name plate of the actuator.

Example: Torque range on name plate = 20 – 60 Nm.

- 100 % corresponds to 60 Nm of nominal torque.
- 50 % corresponds to 30 Nm of nominal torque.

Operation commands (S0003)

The display S0003 indicates:

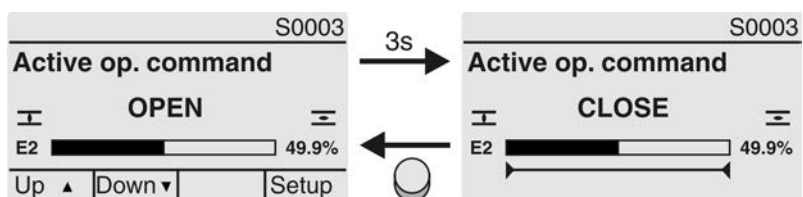
- active operation commands, like e.g.: Operation in direction CLOSE or in direction OPEN
- the actual value E2 as bar graph indication and as value between 0 and 100 %.
- for setpoint control (positioner): setpoint E1
- for stepping mode or for intermediate positions with operation profile: pivot points and operation behaviour of pivot points

The navigation support (bottom row) is faded out after approx. 3 seconds and the axis/axes for pivot point display are shown.

OPEN - CLOSE control

Active operation commands (OPEN, CLOSE, ...) are shown above the bar graph display. The figure below shows the operation command in direction CLOSE.

Figure 18: Display for OPEN - CLOSE control



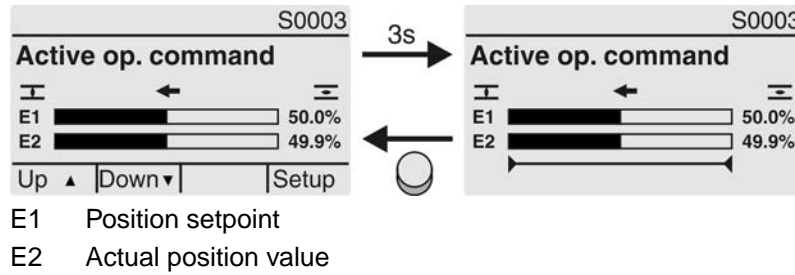
E2 Actual position value

Setpoint control

If the positioner is enabled and activated, the bar graph indication for E1 (position setpoint) is displayed.

The direction of the operation command is displayed by an arrow above the bar graph indication. The figure below shows the operation command in direction CLOSE.

Figure 19: Indication for setpoint control (positioner)



Pivot point axis

The pivot points and their operation behaviour (operation profile) are shown on the pivot point axis by means of symbols.

The symbols are only displayed if at least one of the following functions is activated:

Operation profile M0294

Timer CLOSE M0156

Timer OPEN M0206

Figure 20: Examples: on the left pivot points (intermediate positions); on the right stepping mode



Table 3: Symbols along the pivot point axis

Symbol	Pivot point (intermediate position) with operation profile	Stepping mode
	Pivot point without reaction	End of stepping mode
◀	Stop during operation in direction CLOSE	Start of stepping mode in direction CLOSE
▶	Stop during operation in direction OPEN	Start of stepping mode in direction OPEN
◆	Stop during operation in directions OPEN and CLOSE	–
◁	Pause for operation in direction CLOSE	–
▷	Pause for operation in direction OPEN	–
◇	Pause for operation in directions OPEN and CLOSE	–

4.2.2. Status indications according to AUMA classification

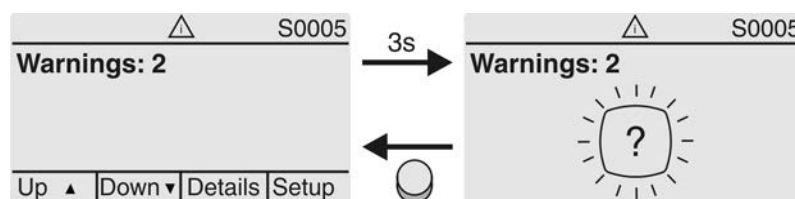
These indications are available if the parameter **Diagnostic classific. M0539** is set to **AUMA**.

Warnings (S0005)

If a warning has occurred, the display shows **S0005**:

- the number of warnings occurred
- a blinking question mark after approx. 3 seconds

Figure 21: Warnings



For further information, please also refer to <Corrective action>.

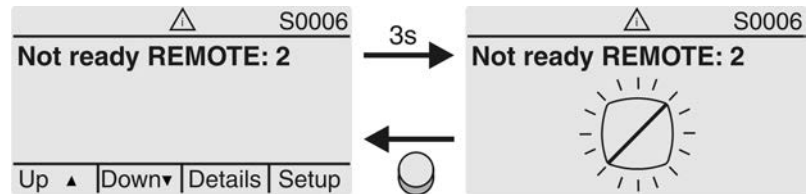
Not ready REMOTE (S0006)

The S0006 display shows indications of the Not ready REMOTE group.

If such an indication has occurred, the display shows S0006:

- the number of indications occurred
- a blinking crossbar after approx. 3 seconds

Figure 22: Not ready REMOTE indications



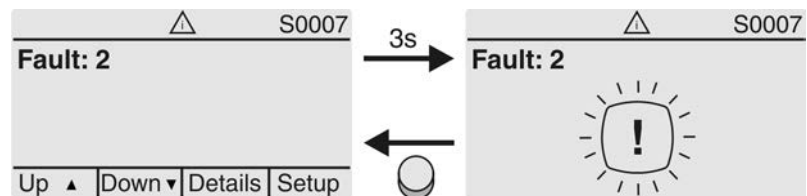
For further information, please also refer to <Corrective action>.

Fault (S0007)

If a fault has occurred, the display shows S0007:

- the number of faults occurred
- a blinking exclamation mark after approx. 3 seconds

Figure 23: Fault



For further information, please also refer to <Corrective action>.

4.2.3. Status indications according to NAMUR recommendation

These indications are available, if the parameter **Diagnostic classific. M0539** is set to **NAMUR**.

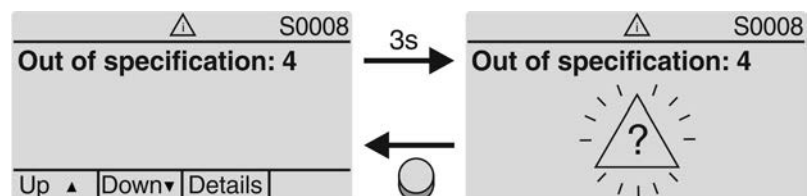
Out of Specification (S0008)

The S0008 indication shows out of specification indications according to NAMUR recommendation NE 107.

If such an indication has occurred, the display shows S0008:

- the number of indications occurred
- a blinking triangle with question mark after approx. 3 seconds

Figure 24: Out of specification



For further information, please also refer to <Corrective action>.

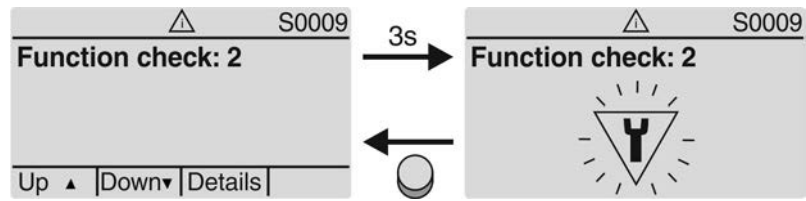
Function check (S0009)

The S0009 indication shows function check indications according to NAMUR recommendation NE 107.

If an indication has occurred via the function check, the display shows S0009:

- the number of indications occurred
- a blinking triangle with a spanner after approx. 3 seconds

Figure 25: Function check



For further information, please also refer to <Corrective action>.

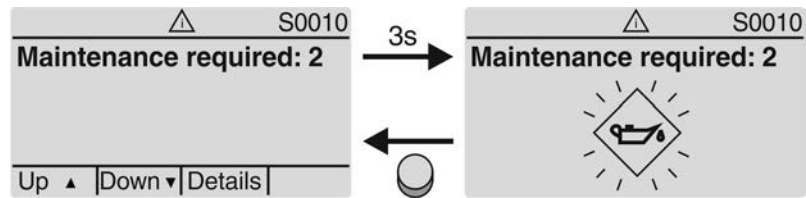
Maintenance required (S0010)

The S0010 indication shows maintenance indications according to NAMUR recommendation NE 107.

If such an indication has occurred, the display shows S0010:

- the number of indications occurred
- a blinking square with an oilcan after approx. 3 seconds

Figure 26: Maintenance required



For further information, please also refer to <Corrective action>.

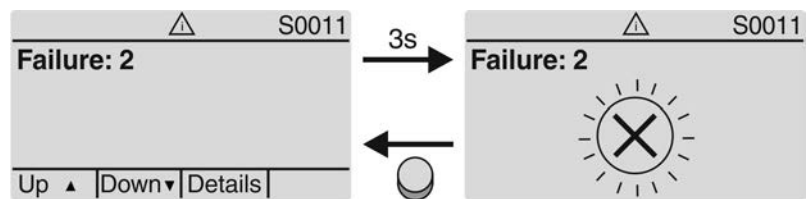
Failure (S0011)

The S0011 indication shows the causes of the failure indication according to NAMUR recommendation NE 107.

If such an indication has occurred, the display shows S0011:

- the number of indications occurred
- a blinking circle with a cross after approx. 3 seconds

Figure 27: Failure



For further information, please also refer to <Corrective action>.

4.3. Indication lights of local controls

Figure 28: Arrangement and signification of indication lights



- [1] Marking with symbols (standard)
- [2] Marking with figures 1 – 6 (option)
- 1 End position CLOSED reached (blinking: operation in direction CLOSE)
- 2 Tc Torque fault CLOSE
- 3 Motor protection tripped
- 4 To Torque fault OPEN
- 5 End position OPEN reached (blinking: operation in direction OPEN)
- 6 Bluetooth connection active

Modify indication light assignment (indications)

Different indications can be assigned to LEDs 1 – 5.

- M ▷ **Device configuration M0053**
 - Local controls M0159
 - Indication light 1 (left) M0093
 - Indication light 2 M0094
 - Indication light 3 M0095
 - Indication light 4 M0096
 - Indicat. light 5 (right) M0097
 - Signal interm. pos. M0167

Default values (Europe):

- Indication light 1 (left) = End p. CLOSED, blink
- Indication light 2 = Torque fault CLOSE
- Indication light 3 = Thermal fault
- Indication light 4 = Torque fault OPEN
- Indicat. light 5 (right) = End p. OPEN, blink
- Signal interm. pos. = OPEN/CLOSED = Off

Further setting values:

Refer to <Appendix>/<Selection overview for output contacts and indication lights>

4.3.1. Indication lights: change colour

User level required to make changes: AUMA (6)

- M ▷ **Device configuration M0053**
 - Local controls M0159

Table 4:

Parameters	Menu	Default values for European variant	Setting values
Colour ind.light 1	M0838	Yellow	Yellow Green Yellow/green
Colour ind.light 2	M0839	Red	Red Blue Purple
Colour ind.light 3	M0840	Red	Red Yellow Orange
Colour ind.light 4	M0841	Red	Red Blue Purple
Colour ind.light 5	M0842	Green	Green Red Orange

Information Default values can vary for other variants.

5. Signals (output signals)

5.1. Status signals via output contacts (digital outputs)

Characteristics Output contacts are used to send status signals (e.g. reaching the end positions, selector switch position, faults...) as binary signals to the control room.

Status signals only have two states: active or inactive. Active means that the conditions for the signal are fulfilled.

5.1.1. Assignment of outputs

The output contacts (outputs DOUT 1 – 12) can be assigned to various signals.

Required user level: **Specialist (4)** or higher.

M ▶ **Device configuration M0053**
I/O interface M0139
Digital outputs M0110
Signal DOUT 1 M0109

Table 5: Default values

Output	Default value:	Output	Default value:
Signal DOUT 1	Fault	Signal DOUT 7	Thermal fault
Signal DOUT 2	End position CLOSED	Signal DOUT 8	OPEN
Signal DOUT 3	End position OPEN	Signal DOUT 9	Limit switch CLOSED
Signal DOUT 4	Selector sw. REMOTE	Signal DOUT 10	Limit switch OPEN
Signal DOUT 5	Torque fault CLOSE	Signal DOUT 11	Torque sw. CLOSED
Signal DOUT 6	Torque fault OPEN	Signal DOUT 12	Torque sw. OPEN

Further setting values:

Refer to <Appendix>/<Selection overview for output contacts and indication lights>

5.1.2. Coding the outputs

The output signals **Coding DOUT 1 – Coding DOUT 12** can be set either to high active or low active.

- High active = output contact closed = signal active
- Low active = output contact open = signal active

Signal active means that the conditions for the signal are fulfilled.

Required user level: **Specialist (4)** or higher.

M ▶ **Device configuration M0053**
I/O interface M0139
Digital outputs M0110
Coding DOUT 1 M0102

Default values:

Coding DOUT 1 = **Low active**

Coding DOUT 2 – Coding DOUT 12 = **High active**

5.2. Configurable status signals

The status signals described here are collective signals of various other signals. For configuration, the contained signals can be selected from a list and activated () or deactivated () individually.

The status signals can either be assigned to a digital output (output contact) or to an indication light (LED).

For detailed information on these signals, refer to [page 127, Fault indications and warning indications](#) chapter.

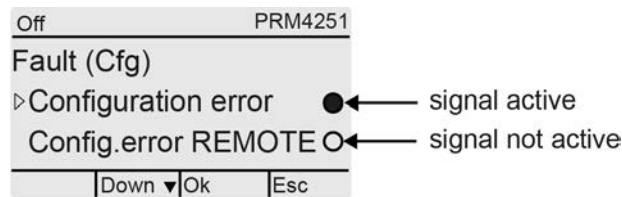
Configure status signals

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration M0053**
 - Config. of signals M0860**
 - Failure (configurable) M0879**
 - Fault (Cfg) M0880**
 - Warnings (Cfg) M0881**
 - Not ready REMOTE (Cfg) M0882**

A dot in the display indicated whether the signal is active or not.

Figure 29: Example



Black dot (●): Signal active

White dot (○): Signal not active

Activation/deactivation is switched on/off by push button **Ok**.

5.3. Analogue signals (analogue outputs)

- Conditions** The actuator is equipped with a position transmitter.
- Characteristics** Depending on the actuator equipment, different signals, such as travel, torque or output speed can be recorded and issued as continuous values, e.g. 4 to 20 mA. Actuator controls are equipped with up to two analogue outputs, AOUT1 and AOUT2.

5.3.1. Assignment of analogue output 1

Required user level: **AUMA (6)**.

- M ▷ **Device configuration M0053**
 - I/O interface M0139**
 - Analogue outputs M0335**
 - Signal AOUT 1 M0131**

Default value: **Actual position**

- Information** The signal range of the output (e.g. 0/4 – 20 mA) is set via a separate parameter (**Signal range AOUT1 M0129**).

Setting values:

- Not used** Analogue output 1 is not assigned.
- Actual position** Position feedback of the valve position (actual position value E2)

Condition: Position transmitter installed in the actuator.

An adjustment to the end positions or the defined travel is not required. An automatic adjustment is done via the end positions (LSC (WSR) and LSO (WOEL)).

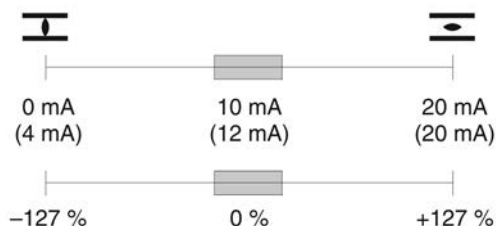
For torque seating, the end positions OPEN and CLOSED of the limit switching should be set as close as possible to the end positions of the valve to minimise the deviation of the feedback.

- Torque** Torque feedback E6
- Condition: MWG position transmitter in actuator.

The zero point is in the centre of the selected output range (10 mA or 12 mA). The torque in direction CLOSE is indicated with 0 – 10 mA or 4 – 12 mA, the torque in direction OPEN with 10 – 20 mA or 12 – 20 mA. For 127 % of the maximum nominal

output torque, 0 or 4 mA are indicated in direction CLOSE, and 20 mA are indicated in direction OPEN.

Figure 30: Actual torque value



-127%= maximum nominal torque in end position CLOSED reached

+127%= maximum nominal torque in end position OPEN reached

- Input AIN 1** Analogue value transmitted via AIN1 (refer to wiring diagram) to the actuator.
Condition: An analogue signal (e.g. 0 – 20 mA) is connected to the analogue input AIN 1.
- Input AIN 2** Analogue value transmitted via AIN 2 (refer to wiring diagram) to the actuator.
Condition: An analogue signal (e.g. 0 – 20 mA) is connected to the analogue input AIN 2.
- Temp. ctrls norm. ‰** Actuator controls temperature (normalised) in per mil.
Condition: MWG position transmitter in actuator.
- Temp. ctrl unit norm ‰** Control unit temperature (normalised) in per mil.
Condition: MWG position transmitter in actuator.

5.3.2. Signal range of analogue output 1

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration M0053**
 - I/O interface M0139**
 - Analogue outputs M0335**
 - Signal range AOUT1 M0129**

Default value: 0 - 20 mA

Setting values:

- 0 - 20 mA** Analogue output 1 generates a 0 – 20 mA signal.
- 4 - 20 mA** Analogue output 1 generates a 4 – 20 mA signal.
- 20 - 0 mA** Analogue output 1 generates a 20 – 0 mA signal.
- 20 - 4 mA** Analogue output 1 generates a 20 – 4 mA signal.
- X to Y mA** The signal range (X-Y) of the analogue output can be freely configured using two parameters.

5.3.3. Adjustment of analogue output 1

Initial values and end values of the signal range can be corrected by ± 10 % of the maximum value range (20 mA)

Example: Parameter **Signal range AOUT1 = 4 - 20 mA**

The initial value (4 mA) can be adapted within a range of 2 mA to 6 mA.

The end value (20 mA) can be adapted within a range of 18 mA to 22 mA.

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration M0053**
 - I/O interface M0139**
 - Analogue outputs M0335**
 - Adjustment AOUT 1 M0544**

0/4 mA (initial value) M0140

20 mA (final value) M0210

Default value: 0**Setting ranges:** -10.0 ... 10.0 % (in %)

5.3.4. Assignment of analogue output 2

Required user level: Specialist (4).

- M ▷ Device configuration M0053
 - I/O interface M0139
 - Analogue outputs M0335
 - Signal AOUT 2 M0132

Default value: Torque**Setting values:**

Description see <Assignment of analogue output 1>.

5.3.5. Signal range of analogue output 2

Required user level: Specialist (4) or higher.

- M ▷ Device configuration M0053
 - I/O interface M0139
 - Analogue outputs M0335
 - Signal range AOUT2 M0130

Default value: 0 - 20 mA**Setting values:**

- 0 - 20 mA Analogue output 2 generates a 0 – 20 mA signal.
- 4 - 20 mA Analogue output 2 generates a 4 – 20 mA signal.
- 20 - 0 mA Analogue output 2 generates a 20 – 0 mA signal.
- 20 - 4 mA Analogue output 2 generates a 20 – 4 mA signal.
- X to Y mA The signal range (X-Y) of the analogue output can be freely configured using two parameters.

5.3.6. Adjustment of analogue output 2

Initial values and end values of the signal range can be corrected by $\pm 10\%$ of the maximum value range (20 mA)

Example: Parameter Signal range AOUT1 = 4 - 20 mA

The initial value (4 mA) can be adapted within a range of 2 mA to 6 mA.

The end value (20 mA) can be adapted within a range of 18 mA to 22 mA.

Required user level: Specialist (4) or higher.

- M ▷ Device configuration M0053
 - I/O interface M0139
 - Analogue outputs M0335
 - Adjustment AOUT 2 M0545
 - 0/4 mA (initial value) M0141
 - 20 mA (final value) M0211

Default values: 0**Setting ranges:** -10.0 ... 10.0 % (in %)

6. Operation

Different operation modes (states) are available. The current operation mode is indicated in the first line of the display:

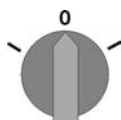
Figure 31: Example: Operation mode Off



This chapter describes the characteristics of the different operation modes; the respective functions are described in separate chapters.

6.1. Operation mode Off

The selector switch is in position **0** (OFF).

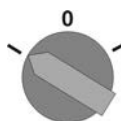


Characteristics

- The indication in the top row of the display shows: **Off**
- Electric operation is not possible (not even EMERGENCY operation).
- The controls remain fully operative as far as signalling is concerned (controls' power supply is maintained).
- Push buttons **▲▼←C** can be used for menu navigation via the display.

6.2. Operation mode Local

Selector switch is in position **Local control** (LOCAL).



Properties

- The indication in the top row of the display shows: **Local**
- In motor operation, the actuator can be controlled locally via the push buttons **┆** (OPEN), **STOP**, **≡** (CLOSE).
- Faults and warnings without automatic reset can be confirmed with the push button **RESET**.

6.2.1. Push-to-run operation or self-retaining Local

Parameter **Self-retaining Local M0076** determines the actuator operation behaviour to operation commands via push buttons on local controls.

M ▷ **Customer settings M0041**
Local controls M0075
Self-retaining Local M0075

Default value: **OPEN and CLOSE**

Setting values:

Off (push-to-run op.) Push-to-run operation activated, self-retaining off:

Actuator only runs in directions **OPEN** or **CLOSE** while an operation command is being received. The actuator stops if the operation command is cancelled.

OPEN In direction **OPEN** = self-retaining (in direction **CLOSE** push-to-run operation):

After an operation command in direction **OPEN**, the actuator continues to run, even if the operation command is cancelled (self-retaining). The actuator is either stopped by the **STOP** command or if end position **OPEN** or an intermediate position **OPEN** has been reached.

CLOSE In direction **CLOSE** = self-retaining (in direction **OPEN** push-to-run operation):

After an operation command in direction CLOSE, the actuator continues to run, even if the operation command is cancelled (self-retaining). The actuator is either stopped by the CLOSE command or if end position CLOSED or an intermediate position CLOSED has been reached.

OPEN and CLOSE In directions OPEN and CLOSE = self-retaining:

After an operation command, the actuator continues to run in directions OPEN or CLOSE, even if the operation command is cancelled (self-retaining). The actuator is either stopped by the STOP command or if an end position or intermediate position has been reached.

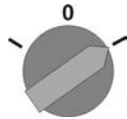
Direct reversal of operation is not possible. Operation commands in directions OPEN or CLOSE must be stopped first by STOP command. Only then is an operation command into the opposite direction allowed.

OPEN & CL w/o STOP In directions OPEN and CLOSE = self-retaining without stop:

Direct reversal of operation is also possible without the STOP command. However, operation can be stopped at any time by the STOP command.

6.3. Operation mode remote

Selector switch is in position **Remote control (REMOTE)**.



Properties The indication in the top row of the display shows the set source of the operation commands:

- **Remote** (parallel interface)
- **Remote II** (parallel interface, service box)

Depending on the control, a distinction is made between:

- **OPEN-CLOSE control (operation mode Remote OPEN-CLOSE):**
Control is made via binary operation commands OPEN, STOP, CLOSE.
(or for activated Multiport Valve function via operation commands CW, CCW)
 - **Setpoint control (operation mode Remote SETPOINT):**
Control via analogue operation commands, e.g. 4 – 20 mA.
- Information**
- Binary signals (e.g. +24 V DC) via digital inputs are only recognised as valid operation commands if the signal is present for at least 10 ms.
 - If a positioner or process controller is available, change-over between OPEN-CLOSE control (operation mode Remote OPEN-CLOSE) and setpoint control (operation mode Remote SETPOINT) is possible. Refer to chapter <Change-over between OPEN-CLOSE control and setpoint control>.

6.3.1. Push-to-run operation or self-retaining Remote

Parameters **Self-retaining Remote M0100**, **Self-retaining M01193** and **Self-retaining Remote II M0101** determine the operation behaviour of the actuator to binary operation commands (OPEN, STOP, CLOSE or CW, CCW), controlling the actuator "from Remote" via the I/O interface.

M ▷ **Customer settings M0041**
I/O interface M0015

Default values:

Self-retaining = Off (push-to-run op.)

Self-retaining Remote II = OPEN and CLOSE

6.4. Operation mode EMERGENCY

See also: Failure function <EMERGENCY behaviour>

- Characteristics**
- The indication in the top row of the display shows: **EMERGENCY**
 - The operation mode EMERGENCY is initiated by the EMERGENCY signal.
 - The actuator performs an EMERGENCY operation. For example, the actuator moves to a predefined EMERGENCY position (i.e. end position OPEN or end position CLOSED).
 - As long as the EMERGENCY signal is present, the actuator does not respond to any other operation commands (EMERGENCY signal has top priority).



The actuator can start immediately when switching on!

Risk of personal injuries or damage to the valve.

- Ensure that the EMERGENCY signal is present when switching on.
- Should the actuator start unexpectedly: Immediately set selector switch to position **0** (OFF).

6.5. Operation mode EMERGENCY stop

See also: Failure function <EMERGENCY stop function>

Condition An EMERGENCY stop button (latching) is either located on the electrical connection or outside.

- Characteristics**
- The indication in the top row of the display shows: **EMCY stop**
 - In an emergency, the EMERGENCY stop button can be used to interrupt the power supply of the motor control (contactors or thyristors).
 - Operation mode EMERGENCY stop supersedes all other operation modes.
 - A new operation command can only be executed once the pressed EMERGENCY stop button is released and operation mode EMERGENCY Stop is cancelled using a Reset command.
 - Once operation mode EMERGENCY Stop is cancelled (Reset command), analogue operation commands present (e.g. 0/4 – 20 mA) will immediately be executed.

6.6. Operation mode Disabled

See also: Application function <Local controls:enable>

- Characteristics**
- The indication in the top row of the display shows: **Disabled**
 - The operation via the push buttons on the local controls is disabled.
 - Operation mode **Disabled** is possible in selector switch positions LOCAL and OFF.

Table 6: Functions depending on the selector switch position:

Selector switch is in position	Function during indication = Disabled
Local control (LOCAL)	Actuator cannot be operated locally
0 (OFF)	Local menu operation not possible

- The **Enable Local** is used for disabling or enabling via a digital input.

6.7. Operation mode Service

Conditions: Set selector switch = position **Local control** (LOCAL) or **Remote control** (REMOTE).
Display indicates in the first row: **Service**

- Characteristics**
- The indication in the top row of the display shows: **Service**
 - For operation mode Service, a PC or laptop with AUMA CDT service software is required. AUMA service uses this software (e.g. during commissioning or maintenance) to perform settings at the actuator controls.

Information In selector position **Local control** (LOCAL), press any push button to exit the service operation mode and to activate operation mode Local.

7. Basic settings for commissioning

Definition Basic settings such as type of seating, torque and limit switching are required for safe commissioning of the actuator controls together with the actuator. Basic settings for display, such as date and time or display formats, can be changed, if required.

7.1. Type of seating for end positions

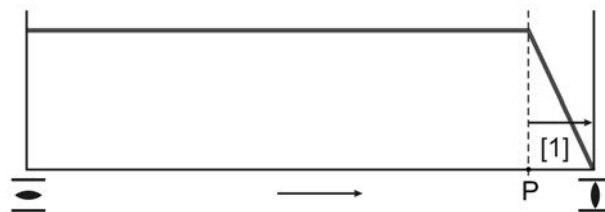
- Function**
- Selection of the type of seating (according to valve manufacturer's specifications)
 - Limit seating in end position
 - Torque seating in end position
 - For end positions OPEN and CLOSED, the following can be set individually:

Limit seating

Actuator controls switch off the actuator in the end positions (OPEN/CLOSED) set via limit switching.

For end position seating via limit switching, you have to account for the overrun of the actuator. Overrun [1] is the travel from switching off until complete standstill. The overrun depends on the inertia of both the actuator and the valve and the delay time of the actuator controls.

Figure 32: Limit seating



P Tripping position

[1] Overrun

Torque seating

Actuator controls switch off the actuator in the end positions via torque tripping.

For this, the torque switching has to be set to the tripping torque specified by the valve manufacturer. When reaching the end position, the torque increases within the valve seat. Actuator controls switch off the actuator once the set tripping torque has been reached.

With this setting, the limit switching is used for signalling and must be set to trip shortly **before** reaching the end position.

7.1.1. Type of seating: set

NOTICE

Valve damage due to incorrect setting!

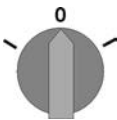
- The type of seating setting (limit or torque seating) must match the selection for the valve.
- Only change the setting with prior consent of the valve manufacturer.

M ▷ Customer settings M0041
 Type of seating M0012
 End position CLOSED M0086
 End position OPEN M0087

Default value: Limit

Setting values:

- Limit Seating in end positions via limit switching.
- Torque Seating in end positions via torque switching.

- | | |
|-------------------------|---|
| Select main menu | <p>1. Set selector switch to position 0 (OFF).</p>  <p>2. Press push button C Setup and hold it down for approx. 3 seconds.</p> <p>➔ Display goes to main menu and indicates: ▶ Display</p> |
| Select parameter | <p>3. Select parameter either:</p> <ul style="list-style-type: none"> ➔ click via the menu M ▶ to parameter, or ➔ via direct display: Press ▲ and enter ID M0086 or M0087 <p>➔ Display indicates: End position CLOSED</p> |
| CLOSE or OPEN | <p>4. Use ▲▼ Up ▲ Down ▼ to select:</p> <ul style="list-style-type: none"> ➔ ▶ End position CLOSED ➔ ▶ End position OPEN <p>➔ The black triangle ▶ indicates the current selection.</p> <p>5. Press ↵ Ok.</p> <p>➔ Display indicates the current setting: Limit or Torque</p> <p>➔ The bottom row of the display indicates either:</p> <ul style="list-style-type: none"> - Edit → continue with step 6 - Save → continue with step 10 <p>6. Press ↵ Edit.</p> <p>➔ Display indicates: ▶ Specialist (4)</p> |
| User login | <p>7. Use ▲▼ Up ▲ Down ▼ to select user:</p> <p>Information: Required user level: Specialist (4) or higher</p> <p>➔ The symbols have the following meaning:</p> <ul style="list-style-type: none"> - black triangle: ▶ = current setting - white triangle: ▷ = selection (not saved yet) <p>8. Press ↵ Ok.</p> <p>➔ Display indicates: Password 0***</p> <p>9. Enter password (→ enter password).</p> <p>➔ The screen indicates the pre-set type of seating (▶ Limit or ▶ Torque) by means of a black triangle ▶.</p> |
| Change settings | <p>10. Use ▲▼ Up ▲ Down ▼ to select new setting.</p> <p>➔ The symbols have the following meaning:</p> <ul style="list-style-type: none"> - black triangle: ▶ = current setting - white triangle: ▷ = selection (not saved yet) <p>11. Confirm selection via ↵ Save.</p> <p>➔ The setting for the type of seating is complete.</p> <p>12. Back to step 4 (CLOSED or OPEN): Press ↵ Esc.</p> |

7.2. Torque switching

- | | |
|-------------------|--|
| Conditions | <p>MWG in actuator (non-intrusive version).</p> <p>For torque switches within the actuator (intrusive version), the torque switching is set as described in the operation instructions pertaining to the actuator.</p> |
| Function | <ul style="list-style-type: none"> • Overload protection across full travel • Tripping in end positions (for torque seating) • Tripping in during manual operation also possible |

- Indication or setting either in percent %, Newton metre Nm or in pounds per foot. ft-lb

Read more <Torque monitoring> chapter

7.2.1. Torque switching: set

Once the set torque is reached, the torque switches will be tripped (overload protection of the valve).

Information The torque switches may also trip during manual operation.

NOTICE

Valve damage due to excessive tripping torque limit setting!

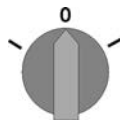
- The tripping torque must suit the valve.
- Only change the setting with the consent of the valve manufacturer.

M ▶ Customer settings M0041
Torque switching M0013
Trip torque CLOSE M0088
Trip torque OPEN M0089

Default value: According to order data

Setting range: Torque range according to actuator name plate

Select main menu 1. Set selector switch to position **0** (OFF).



2. Press push button **C Setup** and hold it down for approx. 3 seconds.
➔ Display goes to main menu and indicates: ▶ **Display**

Select parameter 3. Select parameter either:
→ click via the menu **M ▶** to parameter, or
→ via direct display: press **▲** and enter ID **M0088**.
➔ Display indicates: **Trip torque CLOSE**

CLOSE or OPEN 4. Use **▲▼ Up ▲ Down ▼** to select:
→ ▶ **Trip torque CLOSE**
→ ▶ **Trip torque OPEN**
➔ The black triangle ▶ indicates the current selection.

5. **←** Press **Ok**.
➔ Display shows the set value.
➔ The bottom row indicates: **Edit Esc**

6. **←** Press **Edit**.
➔ Display indicates:
- **Specialist (4)** → continue with step 7
- in bottom row **Up ▲ Down ▼ Esc** → continue with step 11

User login 7. Use **▲▼ Up ▲ Down ▼** to select user:
Information: Required user level: **Specialist (4)** or higher.

➔ The symbols have the following meanings:
- black triangle: ▶ = current setting
- white triangle: ▷ = selection (not saved yet)

8. **←** Press **Ok**.
➔ Display indicates: **Password 0*****

- Change value**
9. Enter password (→ enter password).
 - ➔ Display shows the set value.
 - ➔ The bottom row indicates: **Edit Esc**
 10. ⬅ Press **Edit**.
 11. Enter new value for tripping torque via ▲▼ **Up** ▲ **Down** ▼.

Information: The adjustable torque range is shown in round brackets.
 12. Save new value via ⬅ **Save**.
 - ➔ The tripping torque is set.
 13. Back to step 4 (CLOSED or OPEN): Press ⬅ **Esc**.
- Information**
- The following fault signals are issued if the torque setting performed has been reached **in mid-travel**:
- In the display of the local controls: Status indication **S0007 Fault = Torque fault OPEN** or **Torque fault CLOSE**
- The fault has to be acknowledged before the operation can be resumed. The acknowledgement is made:
1. either by an operation command in the opposite direction.
 - For **Torque fault OPEN**: Operation command in direction **CLOSE**
 - For **Torque fault CLOSE**: Operation command in direction **OPEN**
 2. or, in case the torque applied is lower than the preset tripping torque:
 - in selector switch position **Local control** (LOCAL) via push button **RESET**.
 - in selector switch position **Remote control** (REMOTE):
 - via a digital (I/O interface) with the Reset command if a digital input is configured for **RESET** signal.

7.3. Limit switching

- Conditions** Electronic control unit with MWG in the actuator (non-intrusive version)
For an electro-mechanical control unit equipped with switches in the actuator (intrusive version), the limit switches are set as described in the operation instructions.
- Functions**
- Tripping in end positions (limit seating)
 - Signalling the end positions (torque seating)

7.3.1. Limit switching: set



If the valve cannot be operated during commissioning, only one end position can be set. The other end position must then be set via the stroke.

→ For this, refer to [page 37, End position setting via stroke](#).

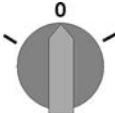
NOTICE

Valve damage at valve/gearbox due to incorrect setting!

- When setting with motor operation: Stop actuator **prior** to reaching end of travel (press STOP push button).
- For limit seating, provide for sufficient backlash between end position and mechanical end stop due to potential overrun.

- M ▷** **Customer settings M0041**
Limit switching M0010
Set end pos. CLOSED? M0084
Set end pos. OPEN? M0085

- Select main menu**
1. Set selector switch to position **0** (OFF).


 2. Press push button **C** and hold it down for approx. 3 seconds.
 - ➔ Display goes to main menu and indicates: ▶ **Display**
- Select parameter**
3. Select parameter either:
 - click via the menu **M ▶** to parameter, or
 - via direct display: press **▲** and enter ID **M0084**.
 - ➔ Display indicates: **Set end pos.CLOSED?**
- CLOSED or OPEN**
4. Select via **▲ ▼ Up ▲ Down ▼**:
 - ▶ **Set end pos.CLOSED? M0084**
 - ▶ **Set end pos. OPEN? M0085**
 - ➔ The black triangle ▶ indicates the current selection.
 5. Press **↵ Ok**.
 - ➔ The display indicates either:
 - **Set end pos.CLOSED? CMD0009** → continue with step 9
 - **Set end pos. OPEN? CMD0010** → continue with step 12
 - **Specialist (4)** → continue with step 6
- User login**
6. Use **▲ ▼ Up ▲ Down ▼** to select user:

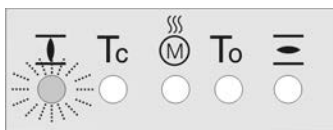
Information: Required user level: **Specialist (4)** or higher

 - ➔ The symbols have the following meaning:
 - black triangle: ▶ = current setting
 - white triangle: ▷ = selection (not saved yet)
 7. Press **Ok** to confirm selected user.
 - ➔ Display indicates: **Password 0*****
 8. Enter password (→ enter password).
 - ➔ The display indicates either:
 - **Set end pos.CLOSED? CMD0009** → continue with step 9
 - **Set end pos. OPEN? CMD0010** → continue with step 12
- Set end position
CLOSED CMD0009**
9. Set end position CLOSED again :
 - 9.1 For large strokes: Set selector switch in position **Local control** (LOCAL) and operate actuator in motor operation via push button **⏏** (CLOSE) in direction of the end position.

Information: Stop actuator **before** reaching end of travel (press **STOP** push button to avoid damage).
 - 9.2 Engage manual operation.
 - 9.3 Turn handwheel until valve is closed.
 - 9.4 Turn back the handwheel by an amount equal to the overrun.
 - 9.5 Set selector switch to position **0** (OFF).
 - ➔ Display indicates: **Set end pos.CLOSED? Yes No**

Confirm new end position

10. Press **↵** **Yes** to confirm new end position.
 - ➔ Display indicates: **End pos. CLOSED set!**
 - ➔ The left LED is illuminated (standard version) and thus indicates that the end position CLOSED setting is complete.



11. Make selection:
 - **Edit** → back to step 9: Set end position CLOSED "once again"
 - **Esc** → back to step 4; either set end position OPEN or exit the menu.

Set end position OPEN
CMD0010

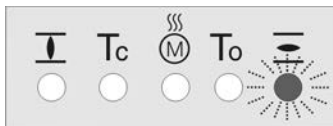
12. Re-set end position OPEN:
 - 12.1 For large strokes: Set selector switch in position **Local control (LOCAL)** and operate actuator in motor operation via push button **⇌** (OPEN) in direction of the end position.

Information: Stop actuator **before** reaching end of travel (press **STOP** push button to avoid damage).
 - 12.2 Engage manual operation.
 - 12.3 Turn handwheel until valve is open.
 - 12.4 Turn back the handwheel by an amount equal to the overrun.
 - 12.5 Set selector switch to position **0 (OFF)**.

➔ Display indicates: **Set end pos. OPEN? Yes No**

Confirm new end position

13. Press **↵** **Yes** to confirm new end position.
 - ➔ Display indicates: **End pos. OPEN set!**
 - ➔ The right LED is illuminated (standard version) and thus indicates that the end position OPEN setting is complete.



14. Make selection:
 - **Edit** → back to step 12: Set end position OPEN "once again"
 - **Esc** → back to step 4; either set end position CLOSED or exit the menu.

Information If an end position cannot be set: Check the type of control unit in actuator.

7.3.2. End position setting via stroke

➔ **For all applications not allowing to operate the valve during commissioning, the second end position can be set via the stroke.**

- The basics are the MWG incremental values shown in this chapter.
- The first end position either OPEN or CLOSED, depending on the valve position during commissioning, can be set as usual using the limit switching. For this, refer to [page 35, Limit switching: set.](#)

NOTICE

Valve damage at valve/gearbox due to incorrect setting!

- When setting with motor operation: Stop actuator **prior** to reaching end of travel (press STOP push button).
- For limit seating, provide for sufficient backlash between end position and mechanical end stop due to potential overrun.

MWG incremental values depending on the actuator type

Depending on the generation, the MWG of actuator controls can represent the following revolutions:

Generation 1: 512 turns at a value of 16 bit

Generation 2: 544 turns at a value of 16 bit

Information

The type of generation integrated within the actuator can be identified by the item "Positioner" of the order-related data sheet. This data sheet can be downloaded from the website www.auma.com via "Service & Support".

Table 7: Determine the generation via the order-related data sheet

Value on the order-related data sheet	MWG generation
30.1	1
30.2, 30.4, 30.5	2

The table below lists the number of incremented values per revolution at the output drive of the respective actuator.

Table 8: Incremented values per revolution (multi-turn actuator)

Actuator	Incremented values per revolution Generation 1	Incremented values per revolution Generation 2
SA 07.2 / SA 07.6	125.490	118.108
SA 10.2	128	120.461
SA 14.2 / SA 14.6	127.543	120.041
SA 16.2	128	120.461

Table 9: Incremented values per revolution (part-turn actuator)

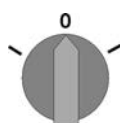
Actuator	Incremented values per 1/4 revolution Generation 1	Incremented values per 1/4 revolution Generation 2
SQ 05.2	665.546	626.397
SQ 07.2	665.546	626.397
SQ 10.2	851.899	801.788
SQ 12.2	1703.798	1603.575
SQ 14.2	3918.737	3688.222

Finally, the incremented values per revolution are to be multiplied by the stroke. Thereafter, the end position can be set via stroke.

- M ▶ **Customer settings M0041**
- Limit switching M0010
- Set end pos. CLOSED? M0084
- Set end pos. OPEN? M0085

Select main menu

1. Set selector switch to position **0** (OFF).



2. Press push button **C** and hold it down for approx. 3 seconds.
- ➔ Display goes to main menu and indicates: ▶ **Display**

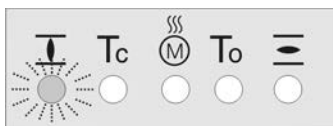
- Select parameter** 3. Select parameter either:
 → click via the menu **M ▶** to parameter, or
 → via direct display: Press **▲** and enter ID **M0084**
 ➔ Display indicates: **Set end pos.CLOSED?**
- OPEN or CLOSED** 4. Select via **▲▼ Up ▲ Down ▼**:
 → **▶ Set end pos.CLOSED? M0084**
 → **▶ Set end pos. OPEN? M0085**
 ➔ The black triangle **▶** indicates the current selection.
 5. Press **↵ Ok**.
- Information** If the end position CLOSED (or end position OPEN) is to be set via stroke, the end position OPEN (or end position CLOSED) must be set first via limit switching. For this, refer to [page 35, Limit switching: set](#).
 ➔ The display indicates either:
 - **Set end pos.CLOSED? CMD0009** → continue with step 9
 - **Set end pos. OPEN? CMD0010** → continue with step 12
 - **Specialist (4)** → continue with step 6
- Log on user** 6. Use **▲▼ Up ▲ Down ▼** to select user:
Information: Required user level: **Specialist (4)** or higher
 ➔ The symbols have the following meaning:
 - black triangle: **▶** = current setting
 - white triangle: **▷** = selection (not saved yet)
 7. Press **↵ Ok** to confirm selected user.
 ➔ Display indicates: **Password 0*****
 8. Enter password (→ enter password).
 ➔ The display indicates either:
 - **Set end pos.CLOSED? CMD0009** → continue with step 9
 - **Set end pos. OPEN? CMD0010** → continue with step 12
Information: If the end position CLOSED is to be set via stroke, the end position OPEN must be set first via limit switching. For this, refer to [page 35, Limit switching: set](#).
- Set end position CLOSED via stroke**
CMD0009
 9. Display indicates: **Set end pos.CLOSED? Stroke Yes No**
 10. Press **▼ Down ▼**.
 ➔ Now, the incremented values for end position CLOSED can be set.
 11. Use **▲▼ Up ▲ Down ▼** to adapt the incremented value in compliance with the table at the beginning of this chapter.



Do not enter 0 as incremented value. Otherwise both set values are at the same valve position.

Confirm incremented value

12. Press **↵ Save** to confirm new end position.
 ➔ Display indicates: **End pos. CLOSED set!**
 ➔ The left LED is illuminated (standard version) and thus indicates that the end position CLOSED setting is complete.



**Set end position
CLOSED via stroke**
CMD0010

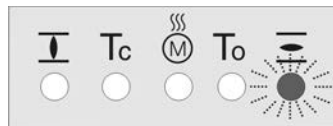
13. Select:
 - **Edit** → back to step 9: Set end position CLOSED "once again"
 - **Esc** → back to step 4; either set end position OPEN or exit the menu.
- Information:** If the end position OPEN is to be set via stroke, the end position CLOSED must be set first via limit switching. For this, refer to [page 35, Limit switching: set](#).
14. Display indicates: **Set end pos.CLOSED? Stroke Yes No**
 15. Press ▼ **Down** ▼.
 - ➔ Now, the incremented values for end position OPEN can be set.
 16. Use ▲▼ **Up** ▲ **Down** ▼ to adapt the incremented value in compliance with the table at the beginning of this chapter.



Do not enter 0 as incremented value. Otherwise both set values are at the same valve position.

**Confirm incremented
value**

17. Press ← **Save** to confirm new end position.
- ➔ Display indicates: **End pos. OPEN set!**
- ➔ The right LED is illuminated (standard version) and thus indicates that the end position OPEN setting is complete.



18. Select:
 - **Edit** → back to step 12: Set end position OPEN "once again"
 - **Esc** → back to step 4; either set end position CLOSE or exit the menu.

Information If an end position cannot be set: Check the type of control unit in actuator.

7.4. Date and time

After commissioning, we recommend checking and setting date and time. Date and time are required for the event report function.

In case of a mains failure, date and time are stored. This data will only have to be checked after a longer downtime.

M ▷ **Display M0009**
Date and time M0221

- Information**
- The date format, e.g. day/month/year, can be changed via the parameter **Date format M0310**.
 - The time format, e.g. 12/24h can be changed via the parameter **Time format M0050**.

7.5. Display formats

The indications on the display can be represented in different formats: Country-specific spellings, for example, can be accounted for.

7.5.1. Date format

The data can be represented in day/month/year or in year/month/day.

M ▷ **Display M0009**
Date format M0310
Default value: DD.MM.YYYY

Setting values:

MM/DD/YYYY Indication in: Month/day/year, example: 01/21/2009

DD.MM.YYYY	Indication in: Day/month/year, example: 21.01.2009
YYYY-MM-DD	Indication in: Year/month/day, example: 2009-01-21

7.5.2. Time format

The time can be indicated in 12 or 24 hour format.

M ▷ **Display** M0009
Time format M0050

Default value: 24h

Setting values:

- 12h Indication of hour/minute/second in 12-hour format, example: 02:25:09 PM
- 24h Indication of hour/minute/second in 24-hour format, example: 14:25:09

7.5.3. Number format

The number format determines the sign for indicating the decimal places. Either a decimal point or a decimal comma can be used to separate integral numbers and decimal places.

M ▷ **Display** M0009
Number format M0231

Default values:

- For English as display language = xx.x
- For all other display languages = xx,x

Setting values:

- xx.x Indication of the decimal places using a decimal point, example: 20.0 mA
- xx,x Indication of the decimal places using a decimal comma, example: 20,0 mA

7.5.4. Torque unit

The torque can be indicated in different units.

M ▷ **Display** M0009
Torque unit M0051

Default value: Nm

Setting values:

- Nm Indication in Nm
- ft-lb Indication in foot-pound
- % Indication in percent

7.5.5. Temperature unit

The temperature unit can either be displayed in Celsius [°C] or Fahrenheit [°F].

M ▷ **Display** M0009
Temperature unit M0052

Default value: °C

Setting range: °C or °F

7.5.6. Position units

The valve position (e.g. actual position, setpoint position) or other positions (e.g. pivot points) are indicated in percent of the travel on the actuator controls display (default setting). By activating the parameter **Position**, you may select other physical units instead of percent to represent the positions. Furthermore, both scaling and maximum value may be adapted. The change-over affects all screens indicating a position. This includes status pages such as **S0001 S0003**, but also the representation of characteristics (e.g. position-time) as well as histograms.

Activate position unit

Required user level: **Specialist (4)** or higher.

- M ▷ **Display** M0009
Units M1205
Position M1206
Position activation M1207

Default value: **Function not active**

Setting values:

Function not active <Units of position> function deactivated. Position indications in the display (e.g. the valve position **S0001**) are indicated in percent.

Function active <Units of position> function activated. Position indications in the display are not shown in percent but in the unit set for the values in parameter group **Position**.

Set max. value, scaling and unit

Required user level: **Specialist (4)** or higher.

- M ▷ **Display** M0009
Units M1205
Position M1206
Max. value at 100.0 % M1208
Scaling M1209
Unit M1210

Default values:

Max. value at 100.0 % = **1000**

Scaling = **1**

Unit = **mA**

Setting ranges/values:

Max. value at 100.0 % = **1 – 1000**

Scaling = **0.001 – 1000** (multiplier factor for unit)

Unit = **mA; °C; bar; m³/h; m³/min; m; cm; mm; °**

7.5.7. Process factor units

Process factors (e.g. process setpoint, actual process value...) are shown in percent of travel in the actuator controls display (default setting). By activating the parameter **Process factor**, you may select other physical units apart from percent. The change-over affects all screens indicating a process value.

Activate process factor units

Required user level: **Specialist (4)** or higher.

- M ▷ **Display** M0009
Units M1205
Process factor M1211
Proc. var. activation M1212

Default value: **Function not active**

Setting values:

Function not active <Process factor units> deactivated. Position indications in the display are shown in percent.

Function active <Process factor units> activated. Position indications in the display are not shown in percent but in the unit set for the values in parameter group **Process factor**.

Set max. value, scaling and unit

Required user level: **Specialist (4)** or higher.

- M ▷ **Display** M0009
 - Units** M1205
 - Process factor** M1211
 - Max. value at 100.0 %** M1213
 - Scaling** M1214
 - Unit** M1215
- Default values:**
Max. value at 100.0 % = 1000
Scaling = 1
Unit = mA
- Setting ranges/values:**
Max. value at 100.0 % = 1 – 1000
Scaling = 0.001 – 1000 (multiplier factor for unit)
Unit = mA; °C; bar; m³/h; m³/min; m; cm; mm; °

7.5.8. Analogue working value units (AIN)

Activate working value units (AIN)

Required user level: Specialist (4) or higher.

- M ▷ **Display** M0009
 - Units** M1205
 - Working values (AIN)** M1216
 - Work. val. activ. (AIN)** M1217

Default value: Function not active

Setting values:

Function not active <Working value units (AIN)> function deactivated.

Function active <Working value units (AIN)> function activated.

Set max. value, scaling and unit

Required user level: Specialist (4) or higher.

- M ▷ **Display** M0009
 - Units** M1205
 - Working values (AIN)** M1216
 - Max. value at 100.0 %** M1217
 - Scaling** M1218
 - Unit** M1219
- Default values:**
Max. value at 100.0 % = 1000
Scaling = 1
Unit = mA
- Setting ranges/values:**
Max. value at 100.0 % = 1 – 1000
Scaling = 0.001 – 1000 (multiplier factor for unit)
Unit = mA; °C; bar; m³/h; m³/min; m; cm; mm; °

7.5.9. Analogue signal output units (AOUT)

Activate signal output units (AOUT)

Required user level: Specialist (4) or higher.

- M ▷ **Display** M0009
 - Units** M1205
 - Signal outputs (AOUT)** M1221
 - Sig. outp. activ. (AOUT)** M1222

Default value: Function not active

Setting values:

Function not active <Signal output units (AOUT)> function deactivated.

Function active <Signal output units (AOUT)> function activated.

Set max. value, scaling and unit

Required user level: Specialist (4) or higher.

M ▷ Display M0009
Units M1205
Signal outputs (AOUT) M1221
Max. value at 100.0 % M1223
Scaling M1224
Unit M1225

Default values:

Max. value at 100.0 % = 1000

Scaling = 1

Unit = mA

Setting ranges/values:

Max. value at 100.0 % = 1 – 1000

Scaling = 0.001 – 1000 (multiplier factor for unit)

Unit = mA; °C; bar; m³/h; m³/min; m; cm; mm; °

7.6. Contrast

The contrast can be used to adapt the display backlight (light or dark background).

M ▷ Display M0009
Contrast M0230

8. Application functions

Definition Application functions are functions used to adapt the actuator controls to special applications. This includes device functions, communication functions and device information.

If they are enabled, these functions can be programmed by the user for his/her specific task using parameters.

8.1. Intermediate positions

Conditions The actuator is equipped with a position transmitter.

- Characteristics**
- With the actuator controls, up to 8 intermediate positions can be set to any value between 0 % and 100 % of the travel.
 - Each intermediate position can be activated or deactivated individually.
 - When reaching an intermediate position, a signal can be generated.
 - A hysteresis can be defined for each pivot point.

8.1.1. Intermediate positions of pivot points: define

Each intermediate position can be set to a value between 0 and 100 % of the travel.

M ▷ **Customer settings M0041**
Intermediate positions M0143
Pivot points M0160
Pivot point 1 M0249

Default values: 0.0 % for all 8 intermediate positions

Setting range: 0.0 % (CLOSED) to 100.0 % (OPEN) of the travel

Information The pivot points also apply to the <Operation profile> function.

8.1.2. Signal behaviour of intermediate positions: set

Reaching a pivot point (intermediate position) can be signalled:

- via indication lights (LEDs) of the local controls or
- via output contacts

Each pivot point (intermediate position) can be assigned a specific signal behaviour.

M ▷ **Customer settings M0041**
Intermediate positions M0143
Signal behaviour M0266
Signal behaviour 1 M0269

Default value: No signal

Setting values:

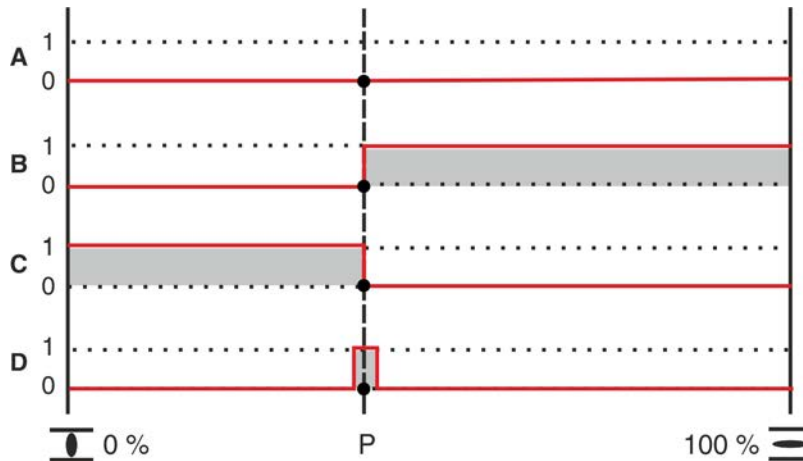
No signal Behaviour **A:** "Off", intermediate position is not signalled.

C _____|_____ O Behaviour **B:** Signal is active from reaching the pivot point (P) up to end position OPEN (100 %)

C _____|_____ O Behaviour **C:** Signal is active from end position CLOSED (0 %) until reaching the pivot point (P).

C _____| |_____ O Behaviour **D:** When passing the pivot point (P), a pulse signal is issued.

Figure 33: Signal behaviour (A to D) of the intermediate positions



Special characteristics of B, C and D

Behaviour of **B** and **C**: The signal is directly activated when reaching the set pivot point (P).

Behaviour **D**: The signal is activated shortly before reaching the set pivot point (P). The switch-on point is determined by pulse duration (+/- range around the pivot point). Pulse duration depends on parameter **Outer dead band M0148** and amounts to 1.0 % of the travel for default setting.

Information For behaviours B and C, the signal might be omitted if, e.g. when using a positioner, pivot point (P) is not fully reached due to the dead band. In this case, behaviour D can be selected as the dead band is considered.

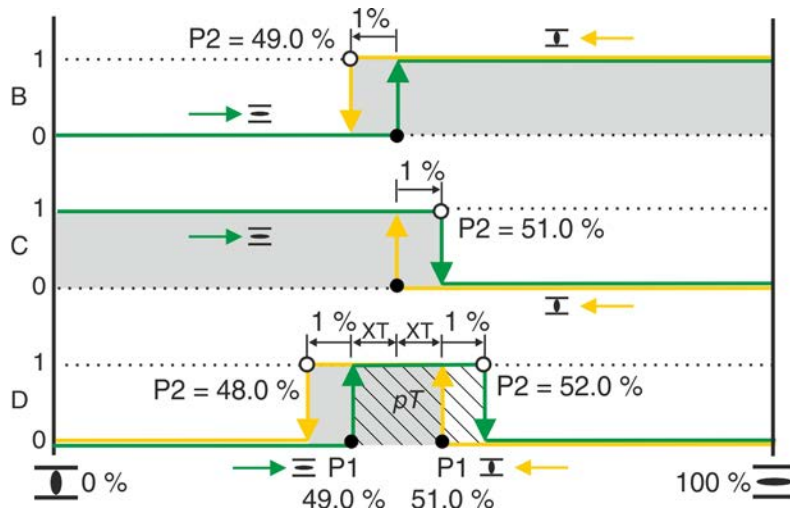
8.1.3. Hysteresis for intermediate positions: set

The hysteresis determines the **tripping point** of the signal.

Example Parameter **Pivot point 6 M0253** is set to 50.0 % of the travel.

Parameter **Hysteresis 6 M0282** is set to 1.0 %.

Figure 34: Signal behaviour B, C, D for hysteresis = 1 %



- P1 Switching on point (●)
- P2 Switch-off point (○)
- pT Pulse duration = 2 times XT + hysteresis

Required user level: **AUMA (6)**.

- M ▷ **Customer settings M0041**
- Intermediate positions M0143**
- Hysteresis M0267**

Hysteresis 1 M0277

Default values: 0.5 % for all 8 positions

Setting range: 0.0 % to 5.0 % of the travel (from OPEN to CLOSED)

Information For signal behaviour D, the value XT (parameter **Outer dead band M0148**) determines pulse duration pT and influences **switch-on point P1**.

8.2. Operation profile (operation behaviour) for intermediate positions

Conditions Function <Positioner>, parameter **Positioner M0158** = **Function active** (Required user level: **Specialist (4)** or higher)

Characteristics The function <Operation profile> can be used to define the operation behaviour of the actuator when reaching an end position. Example: The actuator stops and only continues its operation after another operation command.

This function is required in special applications to avoid water hammer, possibly also in combination with the timer.

8.2.1. Operation profile: activate

Required user level: **Specialist (4)** or higher.

M ▷ **Device configuration M0053**
Application functions M0178
Activation M0212
Operation profile M0294

Default value: Function not active

Setting values:

Function not active Function <Operation profile> deactivated.

Function active Function <Operation profile> activated.

8.2.2. Operation profile for intermediate positions (pivot points): set

When reaching an intermediate position, the operation behaviour of the actuator may be set.

M ▷ **Customer settings M0041**
Intermediate positions M0143
Operation behaviour M0257
Operation behaviour 1 M0258

Default value: Off

Setting values:

Off No intermediate stop, actuator continues the operation.

Stop in OPEN

- Actuator stops at pivot point during operation in direction OPEN.
- Another operation command must be issued to resume operation.
- This function is not active in operation mode Remote SETPOINT.

Stop in CLOSED

- Actuator stops at pivot point during operation in direction CLOSE.
- Another operation command must be issued to resume operation.
- This function is not active in operation mode Remote SETPOINT.

Stop in OPEN & CL.

- Actuator stops automatically upon reaching the pivot point.
- Another operation command must be issued to resume operation.
- This function is not active in operation mode Remote SETPOINT.

Off time in OPEN Actuator stops at pivot point during operation in direction OPEN. If an operation command in direction OPEN is present at the end of the pause time, the actuator resumes operation into direction OPEN. If an operation command in direction CLOSE

is present during the pause time, the pause is aborted and operation into direction CLOSE resumed.

Off time in CLOSED When reaching the pivot point, the actuator stops during operation in direction CLOSE. If an operation command in direction CLOSE is present at the end of the pause time, the actuator resumes operation into direction CLOSE. If an operation command in direction OPEN is present during the pause time, the pause is interrupted and operation into direction OPEN resumed.

Off time in OPEN & CL. Actuator stops automatically upon reaching the pivot point. If an operation command in direction OPEN or CLOSE is present at the end of the pause time, the actuator resumes operation depending on the operation command.

Information The actuator stops for each activated intermediate position for which operation behaviour **Stop in OPEN**, **Stop in CLOSED** or **Stop in OPEN & CL.** is assigned.

8.2.3. Off times for intermediate positions (pivot points): set

An off time can be defined for each pivot point.

If a pivot point is reached with the operation behaviour **Off time in OPEN**, **Off time in CLOSED** or **Off time in OPEN & CL.**, the actuator controls generate a signal during off time: **Operation pause active**

Required user level: **Specialist (4)** or higher.

M ▷ **Customer settings M0041**
Intermediate positions M0143
Off times M0268
Off time 1 M0285

Default values: 00:01.0 min:s (1 second)

Setting ranges: 00:00.2 ... 30:00.0 min : s (0.2 seconds – 30 minutes)

8.3. Two-wire control

Conditions Operation mode **Remote** (Selector switch = position **Remote control**).

Characteristics With the <Two-wire control> function, the actuator can be operated to end position OPEN or CLOSED via **one** digital input.

Information In this function, the actuator only reacts to commands via the input **OPEN / CLOSE**. Other inputs to which the operation commands OPEN, STOP, CLOSE were assigned, do not have any function.

Execute operation commands via digital input:

Designation of digital input **OPEN / CLOSE**

(Wiring diagram designation: OPEN/CLOSE)

- Default setting**
- Input **OPEN / CLOSE** = **low level** (0 V DC or input open):
Actuator runs in direction CLOSE.
 - Input **OPEN / CLOSE** = **high level** (standard: +24 V DC):
Actuator runs in direction OPEN.

Configuration of digital input

For the two-wire control, a digital input for the **OPEN / CLOSE** signal has to be configured.

Required user level: **Specialist (4)**

M ▷ **Device configuration M0053**
I/O interface M0139
Digital inputs M0116

Example Use input DIN 5 for signal **OPEN / CLOSE**:

Parameter: **Signal DIN 5 M0122 = OPEN/CLOSE**

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. Coding DIN 6 M0128), the input is either **High active** or **Low active**. Default setting is **High active**.

8.4. Positioner (operation mode Remote SETPOINT)

Conditions This function requires one of the following equipments within the actuator:

- Electronic control unit (non-intrusive version)
- Potentiometer
- Electronic position transmitter EWG/RWG

Further conditions for the positioner operation mode:

- Positioner enabled and activated.
- Operation mode **Remote** (selector switch = position **Remote control**).

Characteristics The positioner records setpoint position E1 and actual position value E2 for comparison. Depending on the detected deviation, the actuator motor then runs in direction OPEN or CLOSE.

Information

- If the actuator is controlled via a setpoint (e.g. 0 – 20 mA), the status indication **S0003** on the display shows both setpoint position E1 and actual position value E2.
- If the status indication **S0003** only shows the actual position value E2, OPEN-CLOSE control is active and there is no setpoint control via the positioner. In this case, you have to change-over to setpoint control first, refer to <Change-over between OPEN-CLOSE control and setpoint control> chapter.

8.4.1. Positioner: activate

Required user level: **Specialist (4)** or higher.

M ▷ **Device configuration M0053**
Application functions M0178
Activation M0212
Positioner M0158

Default value: **Function not active**

Setting values:

Function not active Function <Positioner> deactivated.

Function active Function <Positioner> activated.

8.4.2. Adaptive behaviour: activate deactivate

Adaptive positioning may reduce the number of starts and compensate for the overrun of the actuator.

M ▷ **Customer settings M0041**
Positioner M0145
Adaptive behaviour M0147

Default value: **Adaptive I**

Setting values:

Off Adaptive behaviour switched off.

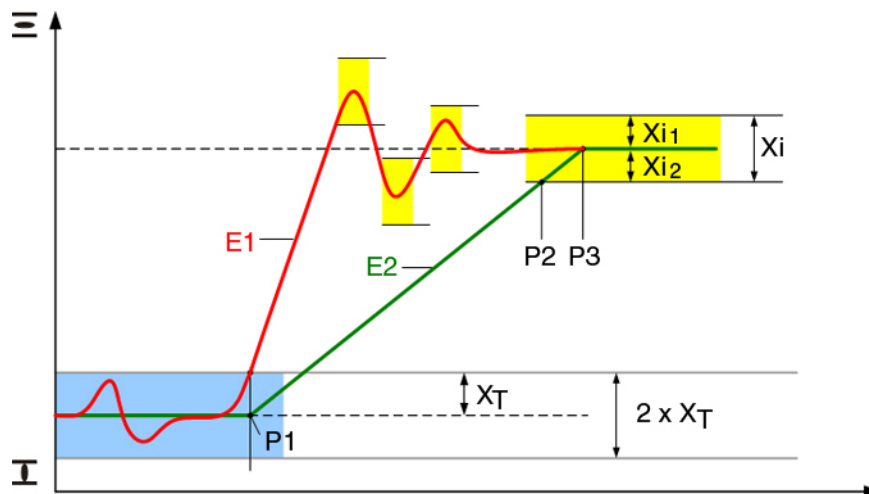
Adaptive I Adaptive behaviour for precise positioning (high positioning accuracy).

Due to the inertia of both actuator and valve, the valve position changes only slightly after switching off the actuator (overrun). The positioner determines the resulting error between setpoint and actual value for both directions and automatically adapts the inner dead bands X_i and therefore switching point P2.

On the basis of the determined inner dead bands X_i and the set hysteresis (parameters **Posit. hyst. OPEN M0598** or **Posit. hyst. CLOSE M0599**), the outer dead bands X_T are automatically determined.

This reduces the error caused by the overrun after only a few operations and a high positioning accuracy is achieved.

Figure 35: Positioner positioning behaviour



E1	Setpoint
E2	Actual value
P1	Switch-on point
P2	Switch-off point in direction OPEN
P3	Setpoint reached
X_T	Max. error (outer dead band)
X_{i1}	Overrun in direction OPEN (inner dead band OPEN)
X_{i2}	Overrun in direction CLOSE (inner dead band CLOSE)

8.4.3. Overrun (inner dead band): set manually

The inner dead band determines the switch-off point of the actuator and, therefore, influences the overrun.

The inner dead band may be set individually for the directions OPEN and CLOSE.

Manual setting is only possible if the adaptive behaviour, parameter **Adaptive behaviour M0147**, is switched off.

- M ▷ **Customer settings M0041**
Positioner M0145
Dead band OPEN M0234
Dead band CLOSE M0235

Default values: 0.5 % (for dead band OPEN and CLOSE)

Setting ranges: 0.0 % to 10.0 % (for dead band OPEN and CLOSE)

- Information**
- Inner dead bands may not be set wider than outer dead bands.
 - Inner dead bands may not be set too narrow as this may cause unnecessary switching procedures (premature wear) or oscillation of the actuator.

8.4.4. Max. error variable (outer dead band): set manually

The outer dead band determines the switching-on point of the actuator.

The motor starts if the actual value (input signal E2) or a change in setpoint is higher than the maximum error variable determined by the outer dead band.

Manual setting is only possible if the adaptive behaviour, parameter **Adaptive behaviour M0147**, is switched off.

- M ▷ **Customer settings M0041**

Positioner M0145
Outer dead band M0148

Default value: 1.0 %

Setting range: 0.1 – 10.0 %

8.4.5. Dead time: set

The dead time prevents the operation to a new setpoint position within a pre-determined time.

M ▷ Customer settings M0041
Positioner M0145
Dead time M0149

Default value: 3.0 s

Setting range: = 0.2 – 60.0 (seconds)

Information Actuator controls ensure that the max. permissible number of starts of the actuator is not exceeded. This can be achieved by setting the dead time to a sufficiently high value.

8.4.6. Hysteresis for positioner: set

The hysteresis determines the switching accuracy. It can be used to reduce the number of starts for example.

This setting can only be made if the adaptive behaviour, parameter Adaptive behaviour M0147, is set to Adaptive I.

M ▷ Customer settings M0041
Positioner M0145
Posit. hyst. OPEN M0598
Posit. hyst. CLOSE M0599

Default values: 0.5 % for OPEN and CLOSE

Setting range: 0.2 % to 5.0 % of travel (from OPEN to CLOSED)

8.4.7. Closing fully/opening fully (end position tolerance for setpoint)

If the end positions cannot be reached due to inaccurate analogue setpoint signals (0/4 mA or 20 mA), a tolerance for the setpoint within the end position range can be set. If the tolerance is exceeded or not reached, the actuator continues the operation until the full end position has been reached. This ensures that the actuator opens and closes fully.

M ▷ Customer settings M0041
Positioner M0145
Tolerance CLOSE M0150
Tolerance OPEN M0151

Default values:

Tolerance CLOSE = 0.0 %

Tolerance OPEN = 100.0 %

Setting ranges: (in percent of the travel)

Tolerance CLOSE = 0.0 – 5.0 %

Tolerance OPEN = 95 – 100.0 %

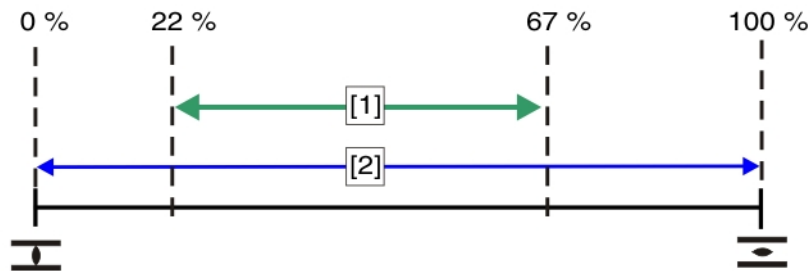
8.4.8. Setting range: limit

Setting range can be limited in directions OPEN and/or CLOSE.

This prevents end position(s) OPEN and/or CLOSED from being approached in modulating duty. The actuator stops when reaching the set limit value.

For OPEN-CLOSE control (LOCAL or REMOTE OPEN-CLOSE operation mode), this limitation is not active. The valve can then be run into the end positions either via the local controls or from remote.

Figure 36: Limitation of setting range



- [1] Permissible actuator travel for setpoint control
- [2] Permissible actuator travel for OPEN-CLOSE control

Activate limitation

- M ▷ Customer settings M0041
 - Positioner M0145
 - Limit setting range M0845
- Default value: Function not active
- Setting values:
 - Function not active Limitation deactivated.
 - Function active Limitation activated.

Adjust setting limits

- M ▷ Parameters Customer settings M0041
 - Positioner M0145
 - Limit OPEN M0162
 - Limit CLOSE M0161
- Default values:
 - Limit OPEN = 100.0 %
 - Limit CLOSE = 0.0 %
- Setting ranges: 0.0 ... 100.0 % of setting range

8.4.9. Change-over between OPEN - CLOSE control and setpoint control

For actuators equipped with a positioner, it is possible to change over between **OPEN - CLOSE control** (Remote OPEN-CLOSE) and **setpoint control** (Remote SETPOINT).

- Condition For the change-over, a digital input for the signal **MODE** has to be available and configured.

Configuration of digital input

Required user level: Specialist (4).

- M ▷ Device configuration M0053
 - I/O interface M0139
 - Digital inputs M0116

- Example Use input DIN 1 for change-over:
 - Parameter: Signal DIN 1 M0118
 - Setting value: **MODE** (wiring diagram designation: MODE)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. Coding DIN 4 M0126), the input is either **High active** or **Low active**. Default setting of **MODE** input is **Low active**.

Change-over via digital input **MODE**

Switching behaviour for coding **Low active**:

(Default factory setting)

- Input **MODE** = **low level** (0 V DC or input open) = Remote SETPOINT
The actuator reacts to a setpoint signal (e.g. 0/4 – 20 mA)
- Input **MODE** = **high level** (standard: +24 V DC) = Remote OPEN-CLOSE:
The actuator reacts to operation commands OPEN, STOP, CLOSE.

8.4.10. Input of setpoint position

The setpoint position is generally led via input AIN1, but can also be led via AIN 2.

Required user level: **AUMA (6)**.

- M ▷ **Device configuration** M0053
 I/O interface M0139
 Analogue inputs M0389
 Signal AIN 1 M0135
 Signal AIN 2 M0138

Default value AIN 1: Setpoint position

8.4.11. Input range of setpoint position

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 I/O interface M0139
 Analogue inputs M0389
 Low limit AIN 1 M0133
 High limit AIN 1 M0134

Default values:

Low limit AIN 1 = 0 mA

High limit AIN 1 = 20 mA

Setting values: 0 ... 20 mA

8.4.12. Split Range operation

Requirements • <Positioner> function must be enabled and activated:

Function In Split Range operation, a setpoint position E1 can be shared by up to three positioners. A typical application example is a pipeline with a by-pass. The actuator mounted on the by-pass reacts in the lower limit (e.g. 0 – 10 mA), the actuator on the main valve in the upper limit (e.g. 10 – 20 mA). If the setpoint position is within the setpoint range defined for the individual actuator, the actuator behaviour will be identical to standard positioner operation. If the setpoint position is higher or lower than the upper or the lower limit of the setpoint range of the respective actuator, the actuator will run to positions OPEN or CLOSED.

The upper and lower limit of the respective actuator is defined via the analogue input. (<Input range of setpoint position>)

In addition, the upper and lower limit of the total target value (valid for all actuators grouped in a split range operation).

Activate split range operation

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053

Application functions M0178
 Activation M0212
 Split range operation M01650

Default value: Function not active

Setting values:

Function not active <Split range operation> function deactivated.
 Function active <Split range operation> function activated.

Set total target value range

The set lower limit of total target value is used as failure source for failure behaviour during split range operation: <Failure behaviour on loss of signal>

M ▷ Customer settings M0041
 Positioner M0145
 Low limit target value M01651
 High limit target value M01652

Default values:

Low limit target value = 0.0 mA
 High limit target value = 20.0 mA

Setting ranges: 0.0 ... 20.0 mA

8.5. Process controller

Requirements This function requires one of the following equipments within the actuator:

- Electronic control unit with MWG (non-intrusive version)
- Potentiometer
- Electronic position transmitter EWG/RWG

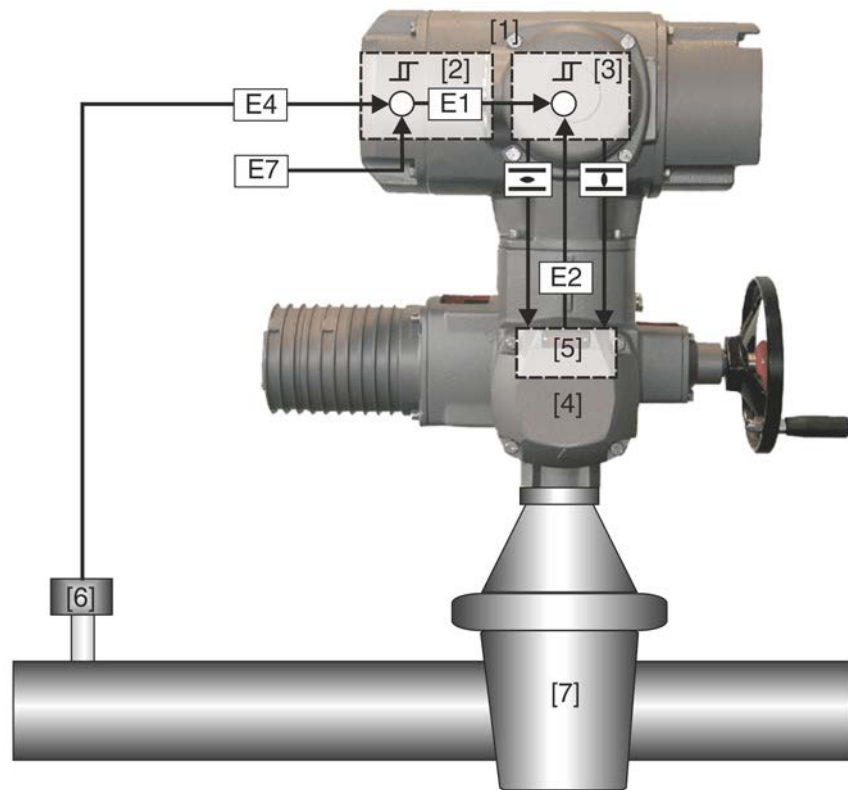
Further conditions for the process controller operation mode:

- Process controller enabled and activated.
- Operation mode **Remote** (Selector switch = position **Remote control**).

Characteristics The following figure illustrates the function of the process controller:

The process controller [2] receives the process setpoint E7 and the actual process value E4 (e.g. from a sensor). On the basis of both values, the process controller calculates the position setpoint E1 for positioner [3]. In turn, the positioner [3] compares this target setpoint with the actual position value E2 of the valve and issues the operation commands (OPEN - CLOSE) for the actuator.

Figure 37: Process controller function



- [1] Actuator controls
- [2] Process controller
- [3] Positioner
- [4] Actuator
- [5] Position transmitter e.g. EWG/RWG/MWG
- [6] Sensor
- [7] Valve
- E1 Position setpoint (internal)
- E2 Actual position value
- E4 Actual process value
- E7 Process setpoint

Application The process controller can be used to control pressure, flow or flow rates, flow levels and temperature.

8.5.1. Process controller activation

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
- Application functions** M0178
- Activation** M0212
- Process controller** M0741

Default value: **Function not active**

Setting values:

- Function not active** <Process controller> function deactivated.
- Function active** <Process controller> function activated.

8.5.2. Process controller: set modulating behaviour

Three controller types are available to ideally adapt the modulating behaviour of the process controller to the respective application.

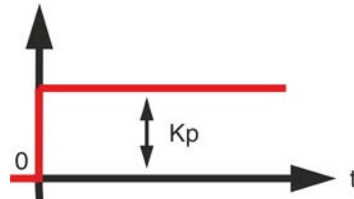
- M ▷ Customer settings M0041
- Process controller M0742
- Modulating behaviour M0887

Default value: PI controller

Setting values:

P controller P controllers immediately react to an error variable (i.e. actively) and amplify the input signal (error variable) proportionally to the set amplification. Setting parameter: Proport. gain K_p M0744

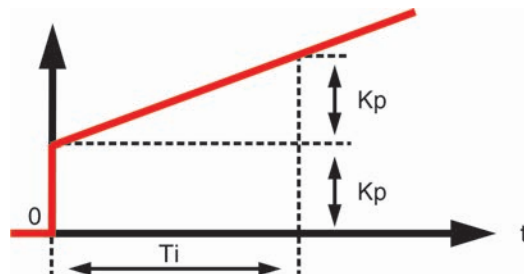
Figure 38: Step response of P controller



P controller application For uncritical closed-loop applications allowing to accept continuous error variables in the event of failures, e.g. pressure, flow, filling level and temperature control.

PI controller PI controllers consist of a P fraction immediately (actively) reacting to an error variable and an I fraction for chronological integration of the input signal (error variable). Due to the additional time constant of the I fraction, the output value takes more time to reach the target status (i.e. inertia of control loop response) whereas positioning accuracy increases at the same time (lower control deviation). Parameters for setting the time constant: Reset time T_i M0745

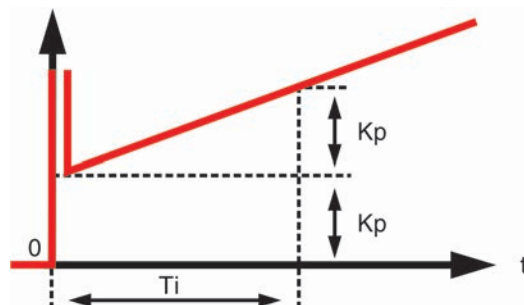
Figure 39: Step response of PI controller



PI controller application Quick control circuits not allowing continuous error variables, e.g. pressure, temperature and ratio control.

PID controller Compared to the PI controller, the PID controller has an additional D fraction accounting for changes in the error variable (change rate). The D fraction quickly reacts to changes, even to minor error variables with large output values. Parameter for setting the D fraction: Rate time T_d M0746

Figure 40: Step response of PID controller



PID controller use For precise and highly dynamic control not allowing a continuous error variable.

8.5.3. Setpoint source (input for process setpoint)

- M ▷ Customer settings M0041
- Process controller M0742

Setpoint source M0743

Default value: I/O interface

Setting values:

I/O interface The process setpoint is defined via an analogue input (AIN 1 or AIN 2) of the I/O interface.

Internal setpoint The process setpoint is generated internally via actuator controls. Parameters **Internal setpoint 1 M0749** / **Internal setpoint 2 M0750**

Information To use internal setpoint 2, a digital input must be configured accordingly.

8.5.4. Behaviour on loss of process setpoint

M ▷ **Customer settings M0041**
Process controller M0742
Beh. setpoint failure M0747

Default value: Internal setpoint 1

Setting values:

Internal setpoint 1 In case of process setpoint signal loss, actuator controls switch to the internal setpoint 1. Parameter **Internal setpoint 1 M0749**

Internal setpoint 2 In case of process setpoint signal loss, actuator controls switch to the internal setpoint 2. Parameter **Internal setpoint 2 M0750**

Failure behaviour In case of process setpoint signal loss, failure behaviour procedure is activated. Parameter **Failure behaviour M0378**

Last setpoint In case of process setpoint signal loss, the last available process setpoint will still be used as setpoint.

8.5.5. Inverse operation

As standard, the valve is opened by the modulating actuator as soon as the actual process value falls below the process setpoint. Depending on the process, it may, however, be necessary that the valve closes as soon as the actual process value falls below the process setpoint. In this case, the respective parameters are used to set the process controller to inverse operation.

M ▷ **Customer settings M0041**
Process controller M0742
Inverse operation M0748

Default value: Function not active

Setting values:

Function not active Inverse operation is deactivated.

Function active Inverse operation is activated.

8.5.6. Internal process setpoint

An internal process setpoint may be set with this parameter. The internal process setpoint is used if:

- Parameter **Setpoint source M0743** is set to **Internal setpoint** or
- Parameter **Beh. setpoint failure M0747** is set to **Internal setpoint 1** or **Internal setpoint 2**.

M ▷ **Customer settings M0041**
Process controller M0742
Internal setpoint 1 M0749
Internal setpoint 2 M0750

Default value: 50.0 %

Setting range: 0.0 ... 100.0 %

8.5.7. Setting procedure

The setting of the process controller largely depends on the area of controller application. A PI controller suffices for most applications.

- Procedure**
1. Operate the controller as PI controller, i.e. set the parameters as follows:
 - Proportional gain $K_p = 1$
 - Reset time $T_i = 1,000$ s
 - Rate time $T_d = 0$
 2. Double proportional gain K_p until the control loop starts to oscillate.
 3. Reduce proportional gain K_p to 60 % of the set value.
 4. Decrease reset time T_i until the error variable equals zero.

8.5.8. Proportional gain K_p : set

In the event of an error variable, the P portion immediately (i.e. actively) changes the position value proportionally to the error variable.

If a small error variable already requires a major valve position adjustment, the proportional gain K_p must be increased.

Information If the reaction is too extreme (overshoot), the value must be reduced. If the reaction is too weak, the value must be increased.

M ▷ **Customer settings M0041**
Process controller M0742
Proport. gain K_p M0744

Default value: 1.0

Setting range: 0.1 ... 10.0

8.5.9. Reset time T_i : set

The reset time determines the I portion of the controller. The more inert a system, the higher this value should be set.

- Information**
- Increase T_i in case of propensity for oscillation.
 - Decrease T_i if the reactions are excessively delayed.
 - Starting value for fast processes (e.g. pressure): 10 s
 - Starting value for slow processes (e.g. temperature): 1000 s

M ▷ **Customer settings M0041**
Process controller M0742
Reset time T_i M0745

Default value: 1,000 s (seconds)

Setting range: 1 ... 1000 s

8.5.10. Rate time T_d : set

The rate time determines the D portion of the controller. Typically, no setting is required here ($= 0$), since actuator and valve – due to the operating time – cannot react abruptly to a sudden occurrence of an error variable.

- Information**
- Increase T_d in case of propensity for oscillation.
 - Initial value for actuators: 0 s

M ▷ **Customer settings M0041**
Process controller M0742
Rate time T_d M0746

Default value: 0 s (seconds)

Setting range: 1 ... 100 s

8.5.11. Actual value source (input for actual process value)

- M ▷ Customer settings M0041
- Process controller M0742
- Actual value source M0756

Default value: I/O interface

Setting values:

I/O interface The actual process value is defined via an analogue input (AIN 1 or AIN 2) of the I/O interface.

8.6. Stepping mode

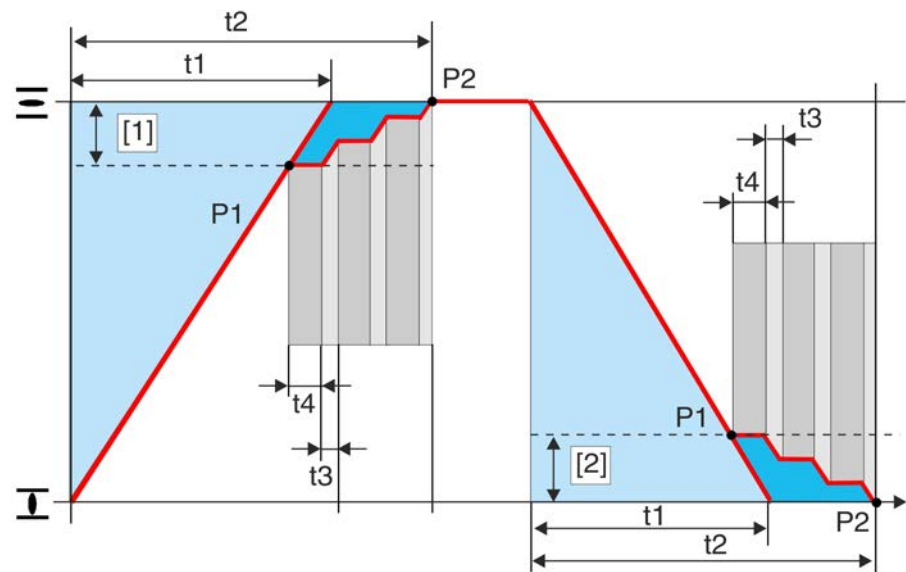
Conditions This function requires one of the following equipments within the actuator:

- Electronic control unit (non-intrusive version)
- Potentiometer
- Electronic position transmitter EWG/RWG

Characteristics

- With stepping mode, the operating time can be increased for the entire or any portion of the valve travel.
- Stepping mode can be individually activated for the directions OPEN and CLOSE.

Figure 41: Stepping mode



- [1] Stepping range OPEN
- [2] Stepping range CLOSE
- P1 Start of stepping mode
- P2 End of stepping mode
- t1 Operating time for normal operation
- t2 Operating time for stepping mode
- t3 Running time
- t4 Off time

8.6.1. Stepping mode: activate

Stepping mode can be individually activated for the directions OPEN and CLOSE.
Required user level: Specialist (4) or higher.

- M ▷ Device configuration M0053
- Application functions M0178

Activation M0212
 Timer CLOSE M0156
 Timer OPEN M0206

Default value: Function not active

Setting values:

Function not active Function <Stepping mode> deactivated.
 Function active Function <Stepping mode> activated.

8.6.2. Operation mode for stepping mode

Stepping mode can be activated via operation modes Local and/or Remote.

M ▷ Customer settings M0041
 Timer M0142
 Step mode CLOSE M0157
 Step mode OPEN M0207

Default value: Off both directions

Setting values:

Off Stepping mode is switched off.
 Remote Stepping mode is active in the operation modes: Remote, Remote II, Fieldbus
 Local Stepping mode is active in the operation modes: Local, Service
 Remote and local Stepping mode is active in the operation modes: Remote, Remote II, Fieldbus, Local, Service
 Information The timer cannot be by-passed in <Operation mode EMERGENCY>.

8.6.3. Start and end of stepping mode

Start and end of stepping mode can be individually set for both directions.

M ▷ Customer settings M0041
 Timer M0142
 End stepping CLOSE M0152
 Start stepping CLOSE M0153
 Start stepping OPEN M0154
 End stepping OPEN M0155

Default values:

End stepping CLOSE = 0.0 %
 Start stepping CLOSE = 100.0 %
 Start stepping OPEN = 0.0 %
 End stepping OPEN = 100.0 %

Setting ranges:

End stepping CLOSE = 0.0 – 99.9 %
 Start stepping CLOSE = 0.1 – 100.0 %
 Start stepping OPEN = 0.0 – 99.9 %
 End stepping OPEN = 0.1 – 100.0 %

8.6.4. On times and off times

On or off times can be set individually for directions OPEN and CLOSE.

M ▷ Customer settings M0041
 Timer M0142
 On time CLOSE M0163
 Off time CLOSE M0164
 On time OPEN M0165
 Off time OPEN M0166

Default values: 00:05.0 min : s (= 5 seconds; for all on and off times)

Setting ranges: 00:01.0 ... 00:05.00.0 min : s (= 1 second up to 30 minutes; for all on and off times)

8.7. By-pass function

Application The by-pass function is used, e.g. for district heating pipelines. Under high pipeline pressure, the gate valve of the main valve cannot be used, pressure compensation via by-pass valve is therefore required.

Function Two MOVs – one main valve and one by-pass valve – are linked via enable signals **Bypass Sync In** and **By-pass Sync Out**. Operation commands can only be executed if one of the two actuators sends the enable signal to the other device. Enable depends on the end position. This ensures that only the following operation commands may be executed:

- The main valve can only be operated in directions OPEN or CLOSE if the by-pass valve is in end position OPEN.

Figure 42: Function

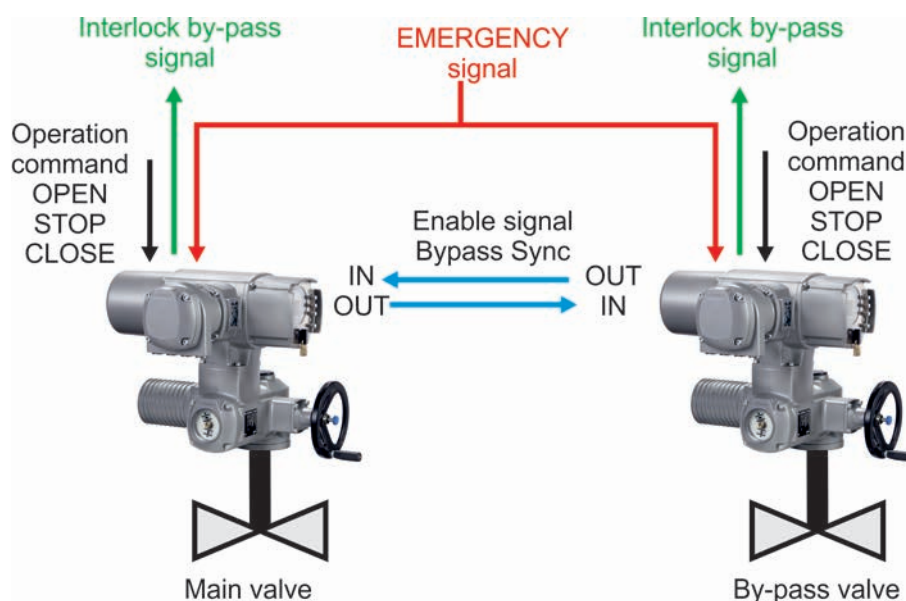


Table 10: Main valve reaction to by-pass valve position

By-pass valve		Main valve
Position	Enable signal Bypass Sync OUT	Release (available operation commands)
End position OPEN	High level (release) (Default: +24 V DC)	in directions OPEN and CLOSE
Other position	Low level (interlock) (0 V DC or input open-circuit):	No operation possible ¹⁾

1) In case of an operation command, the "Interlock by-pass" signal is sent (no release).

Table 11: By-pass valve reactions to main valve position

Main valve		By-pass valve
Position	Enable signal Bypass Sync OUT	Release (available operation commands)
End position CLOSED	High level (release) (Standard: +24 V DC)	in directions OPEN or CLOSE
Other position	Low level (interlock) (0 V DC or input open-circuit):	In direction OPEN or CLOSE ¹⁾

1) In case of an operation command in direction CLOSE, the "Interlock by-pass" signal is sent (no release).

EMERGENCY behaviour The EMERGENCY behaviour of the by-pass function has the same properties as the <EMERGENCY behaviour> function with the following differences:

In an EMERGENCY situation, both actuator controls receive the EMERGENCY signal at the same time. This signal starts the EMERGENCY operation specially defined for the by-pass function. (Parameter **EMCY operation M0204** is therefore not available in the <EMERGENCY behaviour> function).

EMERGENCY operation procedure

1. By-pass valve is opened first.
2. Once the by-pass valve is fully opened, the main valve is closed.
3. Once the main valve is fully closed, the by-pass valve is fully opened.

Configuration of digital inputs

Required user level: **Specialist (4)** or higher.

M ▷ **Device configuration M0053**
I/O interface M0139
Digital inputs M0116

Example Use input DIN4 for signal **Bypass Sync In**:
 Use input DIN6 for signal **EMERGENCY**:

Setting values:

- **Signal DIN 5 M0122 = By-pass Sync In**
 (wiring diagram designation: **BYPASS SYNC IN**)
- **Signal DIN 6 M0121 = EMERGENCY**
 (wiring diagram designation: **NOT / EMERGENCY**)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. **Coding DIN 6 M0128**), the input is either **High active** or **Low active**. Default setting is **High active**.

Configuration of digital output

Required user level: **Specialist (4)** or higher.

M ▷ **Device configuration M0053**
I/O interface M0139
Digital outputs M0110

Example Use output DOUT6 for signal **Bypass Sync Out**:

Parameters: **Signal DOUT 6 M0111**

Setting value: **Bypass Sync Out** (wiring diagram designation: **BYPASS SYNC OUT**)

8.7.1. By-pass function: activate

Required user level: **Specialist (4)** or higher.

M ▷ **Device configuration M0053**
Application functions M0178
Activation M0212
By-pass function M0941

Default value: **Function not active**

Setting values:

Function not active Bypass function deactivated.

Function active Bypass function activated.

8.7.2. By-pass application: configure

The actuators for the two MOVs (valves) have to be configured according to their application (main or by-pass valve).

- M ▷ **Customer settings** M0041
- By-pass function** M0942
- By-pass application** M0943

Default value: Main valve

Setting values:

- Main valve** Actuator for main valve.
- By-pass valve** Actuator for by-pass valve.

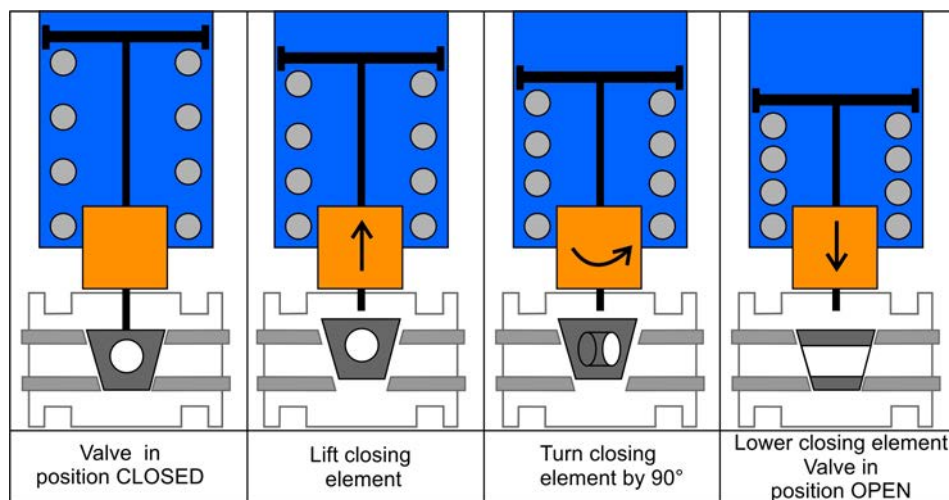
8.8. Lift Plug Valve (LPV)

Application A "Lift Plug Valve" is a special valve whose closing element must first be lifted out of its seat or locking position before being rotated for opening or closing the valve. Valve locking and/or pressure relief prior to rotation of the closing element can thus be implemented. Once the end position has been reached, the closing element has to be lowered again. Such valves are particularly suited in case of significant pressure differences (pressure relief) and safety-related systems (locking).

- Requirements**
- Two actuator controls and actuators are required, one of them is considered as master actuator (MA), the other one as slave actuator (SA).
 - The actuator controls of the master actuator require an additional <Parallel interface > **I/O Interface 2**.

Function Due to the special design of the LPV valves, they can only be operated in OPEN-CLOSE duty (no modulating duty). For this type of duty, two actuators are required which are operated as a master-slave-system with main actuator (rotary movement) and slave actuator (stroke movement). However, only one actuator or actuator controls are "visible" at the DCS, i.e. the slave actuator is completely controlled and monitored by the master actuator. Communication between master and slave actuator is performed via the additional <Parallel interface> **I/O Interface 2**.

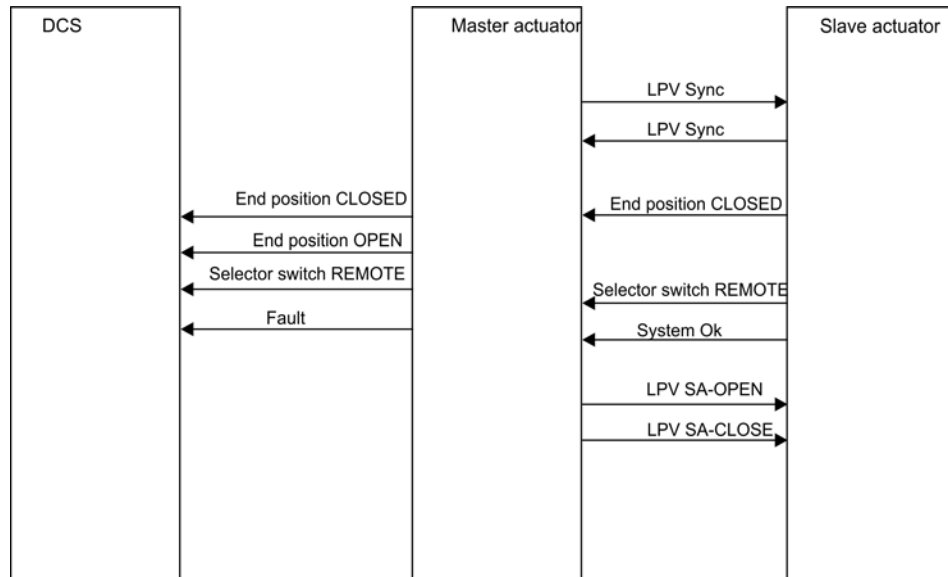
Figure 43: Schematic representation of the function of a Lift Plug Valve



The master actuator may generally only be operated in direction OPEN or CLOSE if the slave actuator is fully opened. This is ensured by a signal of the slave actuator to the digital **LPV Sync In** input of the master actuator as soon as the slave actuator has reached end position OPEN. The slave actuator may generally only be operated in direction CLOSE if the master actuator is in end position OPEN or CLOSED. This is ensured by a corresponding signal of the master actuator to the digital **LPV Sync In** input of the slave actuator. However, it can always be operated in direction OPEN.

If the master actuator receives an operation command for direction OPEN or CLOSE, it will first send a command to the slave actuator for operation in direction OPEN. Once the slave actuator has reached end position OPEN and sends the feedback signal, the master actuator executes the requested operation command itself. After reaching the desired end position, it will request the slave actuator to run to end position CLOSED.

Figure 44: Schematic representation of signals and operation commands between master and slave actuator as well as signals of the master actuator to the DCS



Example of digital input configuration

Required user level: Specialist (4)

- M ▷ Device configuration M0053
 - I/O interface M0139
 - Digital inputs M0116

Master actuator (MA) Use input DIN 7 for signal LPV system ok,
 Use input DIN 8 for signal LPV end position CL,
 Use input DIN 9 for signal LPV Sync In,
 Use input DIN 10 for signal LPV sel.sw.Remote:

Setting values:

- Signal DIN 7 M0383 = LPV system ok (SA)
- Signal DIN 8 M0390 = LPV end position CLOSED (SA)
- Signal DIN 9 M0391 = LPV Sync In
- Signal DIN 10 M0392 = LPV sel. sw. REM (SA)

Slave actuator (SA) Use input DIN 1 for signal LPV Sync In,
 Use input DIN 2 for signal (Run) CLOSE,
 Use input DIN 3 for signal (Run) OPEN,

Setting values:

- Signal DIN 1 M0117 = LPV Sync In
- Signal DIN 2 M0120 = CLOSE
- Signal DIN 3 M0119 = OPEN

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. Coding DIN 7 M0393), the input is either High active or Low active. Default setting is High active.

Example of digital output configuration

Required user level: Specialist (4)

- M ▷ Device configuration M0053
 - I/O interface M0139
 - Digital outputs M0110

- Master actuator (MA)** Only the outputs used for control of the slave actuator are listed, the outputs to the DCS are preset as standard (e.g. **End position CLOSED**, **End position OPEN**, **Selector sw. REMOTE**, **Failure (Cfg)**)
- Use output DOUT 8 for signal **LPV SA-CLOSE**,
Use output DOUT 9 for signal **LPV SA-OPEN**,
Use output DOUT 10 for signal **LPV Sync Out**,
- Setting values:**
- Signal DOUT 8 M0398 = LPV run CLOSE (SA)**
Signal DOUT 9 M0399 = LPV run OPEN (SA)
Signal DOUT 10 M0400 = LPV Sync Out
- Slave actuator (SA)** Use output DOUT 1 for signal **System ok**,
Use output DOUT 2 for signal **End position CLOSED**,
Use output DOUT 3 for signal **LPV Sync Out**,
Use output DOUT 4 for signal **Selector sw. REMOTE**,
- Setting values:**
- Signal DOUT 1 M0109 = System ok**
Signal DOUT 2 M0115 = End position CLOSED
Signal DOUT 3 M0114 = LPV Sync Out
Signal DOUT 4 M0113 = Selector sw. REMOTE
- Information** The logic for the digital outputs may be inverted. Depending on the parameter setting (e.g. **Coding DOUT 1M0102**), the input is either **High active** or **Low active**. Default setting is **High active**.

8.8.1. LPV function: activate

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration M0053**
Application functions M0178
Activation M0212
LPV function M1087

Default value: **Function not active**

Setting values:

- Function not active** Function deactivated.
Function active Function activated.

8.8.2. LPV actuator type: configure

Required user level: **Specialist (4)** or higher.

When using the LPV function, it must be defined for each actuator controls whether it controls the master or the slave actuator.

- M ▷ **Customer settings M0041**
Lift Plug Valve M1089
Sel. master/slave act. M1090

Default value: **MA master actu./rotat.**

Setting values:

- MA master actu./rotat.** Actuator controls/actuator act as master actuator is in charge of the rotation of the closing element.
SA slave act./stroke Actuator controls/actuator act as slave actuator is in charge of the stroke of the closing element.

8.8.3. Delay time of LPV master actuator: configure**Configure delay time for operation in direction OPEN**

A delay time for operation in direction OPEN can be defined in end position CLOSED of the master actuator. When reaching end position OPEN of the slave actuator, the procedure for opening valve will be delayed by this time. The master actuator will then run in direction OPEN.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
Lift Plug Valve M1089
Delay MA direct.OPEN M1091

Default value: 02:00.0

Setting ranges: 00:00.0 ... 15:00.0 min:s (minutes:seconds)

Configure delay time for operation in direction CLOSE

A delay time for operation in direction CLOSE can be defined in end position OPEN of the master actuator. When reaching end position OPEN of the slave actuator, the procedure for closing valve will be delayed by this time. The master actuator will then run in direction CLOSE.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
Lift Plug Valve M1089
Delay MA direct.CLOSE M1092

Default value: 00:00.0

Setting ranges: 00:00.0 15:00.0 min:s (minutes:seconds)

8.8.4. Delay time of LPV slave actuator: configure

A delay time for operation in direction CLOSE of the slave actuator can be defined in end positions OPEN and CLOSED of the master actuator. When reaching end positions OPEN or CLOSED of the master actuator, the procedure for valve opening or closing will be delayed by this time. The slave actuator will then run in direction CLOSE.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
Lift Plug Valve M1089
Delay SA direct.CLOSE M1093

Default value: 00:00,0

Setting ranges: 00:00.0 ... 15:00.0 min:s (minutes:seconds)

8.9. Automatic deblocking

Requirements This function requires one of the following equipments within the actuator:

- Electronic control unit
- Electronic position transmitter EWG/RWG

This function CANNOT be combined with the functions listed below:

- Lift Plug Valve
- By-pass function
- Operation profile
- If the setting range was limited for the positioner (parameter **Limit setting range M0845 = Function active**)

NOTICE

Unexpected starting of actuator!

When using automatic deblocking with level-controlled operation command evaluation, unexpected starting of actuator into the wrong direction might occur when trying to eliminate a double-sided torque fault (torque faults in directions OPEN and CLOSE are present at the same time).

→ Use automatic deblocking only in combination with edge controlled operation command evaluation (parameter **Com. eval. REMOTE M1709**).

Properties

In case of torque switch tripping in intermediate position (i.e. prior to reaching the end position), the actuator automatically attempts to reach the end position by operation into the opposite direction and executing the actual operation command once again.

The torque fault signal is suppressed during automatic deblocking. Should torque switching trip again once automatic deblocking is complete, the actuator is switched off and actuator controls signal a torque fault.

8.9.1. Automatic deblocking function: activate

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration M0053**
- Application functions M0178**
- Activation M0212**
- Automatic deblocking M1678**

Default value: Function not active

Setting values:

- Function not active** Function deactivated.
- Function active** Function activated.

8.9.2. Operation time for operation in opposite direction: set

The actuator controls remember the first seating position and operate the actuator for the set operation time into opposite direction.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
- Automatic deblocking M1680**
- Oper. time opposite M1681**

Default value: 3 s

Setting ranges: 1 ... 60 s (seconds)

8.9.3. Number of deblocking attempts: set

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
- Automatic deblocking M1680**
- Deblocking attempts M1682**

Default value: 3

Setting ranges: 1 ... 5

8.9.4. Tolerance range: set

Tolerance range (+/-) for initial torque seating position, within which a torque fault will be signalled after unsuccessful automatic deblocking.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**

Automatic deblocking M1680

Tolerance range M1683

Default value: 10 %

Setting ranges: 5 ... 30 % (percentage of operating time into opposite direction)

8.10. Heater system and heaters

Possible components:

- Heater system within the actuator controls
- Heaters within the actuator:
 - Control unit heater in switch compartment
 - Motor heater (within motor housing)

8.10.1. Heater system within the actuator controls

The heater system is generally used for low temperature (in low temperature version up to -60 °C). For an installed heater system, the other heaters (control unit, motor heater) will also be connected to the heater system.

Wiring diagram designation: R5 H

Marking of variants within the wiring diagram code (position 11)

- **B** = 115 V AC or 230 V AC externally supplied
- **C, E, H** = internally supplied via actuator controls

The heater system is temperature-controlled. The heater system will automatically be activated for a temperature range between -5 °C and -10 °C and ensures that the temperature within the controls housing does not fall below -20 °C .

8.10.2. Heater on control unit (actuator)

Properties For AUMA actuators with AC actuator controls, a resistance type heater is installed on the control unit (within actuator switch compartment).

The heater minimises condensation within the actuator switch compartment.

Wiring diagram designation: R1 H

Marking within the wiring diagram code: position 11 = A – H

Information The proper function of the heater can be monitored. For further information, refer to <Heater system/heater monitoring>.

Activate/deactivate heater on control unit

The heater on the control unit of the actuator can be activated/deactivated. Activation/deactivation can either be permanent or automatically when exceeding/falling short of defined temperature values. An electronic control unit (MWG) is required for automatic setting.

Information If the heater is deactivated, heater monitoring is also deactivated (parameter **Heater monitor**)!

Required user level: **Specialist (4)**.

M ▷ **Device configuration** M0053
Actuator M0168
Heater control unit M1338

Default value: **Auto**

Setting values:

Off Heater is deactivated.**On** Heater is activated.**Auto** Heater is automatically activated/deactivated by the actuator controls:

- For temperatures exceeding +40 °C within the switch compartment = deactivated
- For temperatures of less than +35 °C within the switch compartment = activated

8.10.3. Motor heater

The motor heater minimises condensation within the motor and improves the start-up behaviour for extremely low temperatures.

Wiring diagram designation: R4 H

Marking within the wiring diagram code: position 11 = D (motor heater externally supplied), G (motor heater internally supplied)

9. Failure functions

Definition Failure functions are started by certain events and lead to a defined action of the controls or the actuator. A failure operation can be started by a manual action (e.g. pressing an EMERGENCY stop button). In general, a failure operation is automatically started by a fault signal from a monitoring function (e.g. loss of signal).

9.1. Reversing prevention time

Application Prevention of impermissible operation states such as: Operation command in direction OPEN, actuator still runs in direction CLOSE due to the delay time.

Properties The reversing prevention time (off-time between two operation commands in opposite direction) prevents a restart for a defined interval once the motor has switched off.

Parameters and instructions for setting

Required user level: AUMA (6).

M ▷ **Device configuration** M0053
Switchgear M0173
Revers. prevent. time M0174

Default values: For 3-phase AC motors = 1.0 s seconds

For 1-phase AC motors = 2.5 s seconds

Setting range: 0.3 ... 30.0 s seconds

9.2. Failure behaviour on loss of signal

Characteristics The failure behaviour can be used to define AC reaction to loss of signal or a defective signal.

Only in operation mode Remote will the failure behaviour react to a signal loss. In operation modes Local or Off, there will be no reaction.

9.2.1. Failure reaction on loss of signal

Required user level: Specialist (4) or higher.

M ▷ **Customer settings** M0041
Failure behaviour M0378
Signal loss beh. M0379

Default value: Good signal first

Setting values:

Good signal first The <Failure behaviour> is only initiated if the monitored signal fails (falling edge). This setting ensures that if the signal is missing, the actuator will not start when switching on (Good signal first).

Immediately active The <Failure behaviour> is immediately initiated if the monitored signal is missing (is not present).

For the setting Immediately active:



Risk of immediate actuator operation when switching on!

Risk of personal injuries or damage to the valve.

→ Ensure that the signal set under parameter **Source** M0385 is present when switching on.

→ If the actuator starts unexpectedly: Immediately turn selector switch to position **Local operation** (LOCAL) or **0** (OFF).

9.2.2. Failure source (failure reason) for a failure operation: set

M ▷ **Customer settings** M0041

Failure behaviour M0378

Source M0385

Default value: I/O interface

Setting values:

I/O interface The failure behaviour is initiated in case of setpoint loss (setpoint position, process setpoint, actual process value).

The monitoring depends on the preset setpoint range, e.g.:

- Setpoint = 4 – 20 mA, E1 lower than 3.7 mA = loss of signal
- Setpoint = 10 – 20 mA, E1 lower than 9.7 mA = loss of signal

Information

- For a setpoint range of 0 – 20 mA , monitoring is not possible.
- Actuator controls will only respond to a setpoint signal loss, if a signal is present at the **MODE** input, i.e. actuator controls are in operation mode Remote SET-POINT (setpoint control).

9.2.3. Failure operation (reaction of the actuator) on loss of signal

The failure operation defines which action is executed by the actuator once the failure behaviour is initiated.

M ▷ **Customer settings** M0041
Failure behaviour M0378
Failure operation M0384

Default value: STOP

Setting values:

STOP The actuator stops in the current position.

CLOSE The actuator runs to end position CLOSED.

OPEN The actuator runs to end position OPEN.

Approach position The actuator runs to the specified position. Conditions:

- The function <Positioner> is activated.
- Parameter **Source** M0385 is set to **I/O interface**

Execute last CMD The actuator executes the last operation command before it is stopped.

If the last operation command was a setpoint definition via analogue input (AIN 1/AIN 2), the lower limit of the setpoint position is used (parameter **Low limit AIN 1/Low limit AIN 2**). The actuator is operated to the defined end position, usually end position CLOSED.

Behaviour depending on the selector switch position

Once the failure operation is triggered, the defined position is approached. If the actuator is then moved to another position (e.g. by manual operation), it will try to perform the set failure operation while the selector switch is in position **Remote control** (REMOTE).

Information To prevent a new approach to the failure position during manual operation, the selector switch must be set to position **Local control** (LOCAL) or **0 (OFF)** prior to operating the handwheel.

9.2.4. Preset position: define

If the **Approach position** failure operation is set, the actuator runs to the preset failure position indicated here.

Required access level: **Specialist (4)** or higher.

M ▷ **Customer settings** M0041
Failure behaviour M0378
Fail.pos.OPEN CLOSE M0387

Default value: 50.0 %

Setting range: 0.0 ... 100.0 % (from end position OPEN to CLOSED)

9.2.5. Failure position MPV: define

This parameter is only available in multiport valve version.

If the **Approach position** failure operation is set, the actuator runs to the preset failure position indicated here.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
Failure behaviour M0378
Failure position MPV M1172

Default value: 0.0 °

Setting range: 0.0 ... 360 °

9.2.6. Delay time: set

A failure operation is only performed once the delay time has expired. This prevents a short-term loss of signal, which does not have an effect on the process, from directly starting a failure operation

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
Failure behaviour M0378
Delay time M0386

Default value: 00:03.0 min:s (3 seconds)

Setting range: 0.0 ... 30:00.00.0 min:s (30 minutes)

9.3. EMERGENCY behaviour

Application The EMERGENCY behaviour can be used to determine the actuator behaviour in an emergency.

- Characteristics**
- The function <EMERGENCY behaviour> is initiated by the EMERGENCY signal.
 - The actuator performs a defined EMERGENCY operation. For example, the actuator moves to a predefined EMERGENCY position (i.e. end position OPEN or end position CLOSED).
 - As long as the EMERGENCY signal is present, the actuator does not respond to any other operation commands (EMERGENCY signal has top priority).
 - After initiating the EMERGENCY behaviour, binary operation commands (via digital inputs) may have to be sent again.
 - Analogue operation commands (e.g. 0/4 – 20 mA) are immediately executed again.

Condition For the function <EMERGENCY behaviour>, a digital input for the signal **EMERGENCY** has to be available and configured.

Configuration of digital input

Required access level: **Specialist (4)**.

- M ▷ **Device configuration** M0053
I/O interface M0139
Digital inputs M0116

Example Use input DIN 4 for signal **EMERGENCY**:

Parameter: **Signal DIN 4** M0118

Setting value: **EMERGENCY** (wiring diagram designation: EMERGENCY)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. Coding DIN 4 M0126), the input is either **High active** or **Low active**. For safety reasons, the **EMERGENCY** signal input is generally set to **Low active**.

Perform EMERGENCY operation via digital input

Switching behaviour for coding Low active:

- Input **EMERGENCY** = **low level** (0 V DC or input open-circuit)
EMERGENCY operation is initiated.
- Input **EMERGENCY** = **high level** (standard: +24 V DC)
No EMERGENCY operation

9.3.1. EMERGENCY behaviour: activate

Required user level: **Specialist (4)** or higher.

M ▷ **Device configuration** M0053
Application functions M0178
Activation M0212
EMCY behaviour M0589

Default value: **Function not active**

Setting values:

Function not active Function <EMERGENCY behaviour> deactivated.

Function active Function <EMERGENCY behaviour> activated.

For activated EMERGENCY behaviour:



Risk of actuator operation due to an EMERGENCY signal!

Risk of personal injuries or damage to the valve.

- For commissioning and maintenance work: Set selector switch to position **0** (OFF). Motor operation can only be interrupted in this selector switch position.
- If the actuator starts unexpectedly: Immediately turn selector switch to position **0** (OFF).

Information EMERGENCY behaviour must be completely configured during first activation. This means the setting of the following parameters must be adapted to the required actuator behaviour in particular: **EMCY fail.reac.** **EMCY source** **EMCY operation mode** **EMCY operation** **EMCY position**

9.3.2. EMERGENCY failure reaction

Required user level: **Specialist (4)** or higher.

M ▷ **Customer settings** M0041
EMCY behaviour M0198
EMCY fail.reac. M0203

Default value: **Good signal first**

Setting values:

Good signal first The <EMERGENCY behaviour> is initiated as soon as the EMERGENCY signal changes from high to low. Example: for binary EMERGENCY input of +24 V DC to 0 V. This prevents the <EMERGENCY behaviour> from being initiated immediately once the actuator controls are switched on and no EMERGENCY signal is present.

Immediately active The <EMERGENCY behaviour> is initiated by a low level at the EMERGENCY signal. For this setting, the EMERGENCY signal has to have a high level before switching on the actuator controls; otherwise <EMERGENCY behaviour> is initiated immediately after switching on.

For the setting **Immediately active**:



The actuator can start immediately when switching on!

Risk of personal injuries or damage to the valve.

- Ensure that the EMERGENCY signal is present when switching on.
- Should the actuator start unexpectedly: Immediately set selector switch to position **0** (OFF).

9.3.3. Failure source (failure reason) for an EMERGENCY operation: set

- M ▷ **Customer settings** M0041
 EMCY behaviour M0198
 EMCY source M0591

Default value: I/O interface

Setting values:

I/O interface The EMERGENCY signal is present as binary signal (standard: +24 V DC) at a digital input. If this voltage (i. e. the signal) is no longer present, the EMERGENCY behaviour is initiated.

Active interface If active interface fails, the EMERGENCY behaviour is initiated; e.g. when changing the command source the failure source for the EMERGENCY signal also fails.

9.3.4. Operation mode for EMERGENCY behaviour

The EMERGENCY behaviour can be activated for the operation modes Remote and/or Local

- M ▷ **Customer settings** M0041
 EMCY behaviour M0198
 EMCY operation mode M0202

Default value: Remote only

Setting values:

Remote only EMERGENCY behaviour is active in the operation modes: **Remote**, **Remote II**, **Fieldbus**

Remote and local EMERGENCY behaviour is active in the operation modes: **Remote**, **Remote II**, **Fieldbus**, **Local**, **Service**

Information In the operation mode Off (selector switch position 0), no emergency operation is executed.

9.3.5. EMERGENCY operation

The EMERGENCY operation determines which action is executed by the actuator once the EMERGENCY behaviour is initiated.

- M ▷ **Customer settings** M0041
 EMCY behaviour M0198
 EMCY operation M0204

Default value: STOP

Setting values:

STOP The actuator stops in the current position.

CLOSE The actuator runs to end position CLOSED.

OPEN The actuator runs to end position OPEN.

Approach EMCY pos. The actuator runs to the specified position.

9.3.6. EMERGENCY position

If the Approach EMCY pos. EMERGENCY operation is set, the actuator runs to the indicated EMERGENCY position.

Required user level: Specialist (4) or higher.

- M ▷ Customer settings M0041
- EMCY behaviour M0198
- EMCY position M0232

Default value: 0.0 %

Setting range: 0.0 ... 100.0 % (from end position OPEN to CLOSED)

9.3.7. EMERGENCY position MPV

This parameter is only visible for Multiport valve product variant and replaces the EMERGENCY position parameter.

If the Approach EMCY pos. EMERGENCY operation is selected, the actuator runs to the currently specified EMERGENCY position of the Multiport valve.

Required user level: Specialist (4) or higher.

- M ▷ Customer settings M0041
- EMCY behaviour M0198
- EMCY position MPV M1171

Default value: 0.0 °

Setting range: 0.0° ... 360.0° (degree)

9.3.8. Torque switching: by-pass

If an EMERGENCY operation is initiated, the torque switches can be by-passed during this operation.

Required access level: Specialist (4) or higher.

- M ▷ Customer settings M0041
- EMCY behaviour M0198
- By-pass torque M0199

Default value: Off

Setting values:

- Off No by-pass of the torque switching.
- On The signals of the torque switching in the actuator are by-passed.

9.3.9. Motor protection: by-pass

If an EMERGENCY operation is initiated, the motor protection can be by-passed during this operation.

Required user level: Specialist (4) or higher.

- M ▷ Customer settings M0041
- EMCY behaviour M0198
- Thermal by-pass M0200

Default value: Off

Setting values:

- Off No by-pass of motor protection.
- On The signals of the thermostiches or the PTC thermistors of the motor winding are by-passed.

Information It is not possible to by-pass the motor protection for actuators with explosion protection.

9.3.10. Stepping mode: by-pass

If an EMERGENCY operation is initiated, stepping mode can be by-passed during this operation.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
EMCY behaviour M0198
By-pass timer M0201

Default value: Off

Setting values:

- Off** No by-pass of stepping mode.
On Stepping mode is by-passed.

9.3.11. Operation profile: by-pass

If an EMERGENCY operation is initiated, the pre-set operation profile (operation behaviour) can be by-passed.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
EMCY behaviour M0198
By-pass operat.profile M0596

Default value: Off

Setting values:

- Off** No by-pass of operation profile.
On The operation profile is by-passed.

9.3.12. Interlock: by-pass

If the Interlock function is activated, you may by-pass this function during EMERGENCY operation to prevent that an enable command must be issued to perform EMERGENCY operation.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
EMCY behaviour M0198
By-pass Interlock M0668

Default value: Off

Setting values:

- Off** By-pass mode is deactivated. Interlock function is even active during EMERGENCY operation.
On By-pass mode is activated. Interlock function is deactivated during EMERGENCY operation.

9.3.13. Local stop: by-pass

If activated, you may by-pass Local Stop function during an EMERGENCY operation to prevent interruption of EMERGENCY operation by pressing the push button STOP.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
EMCY behaviour M0198
By-pass Local STOP M0682

Default value: Off

Setting values:

- Off** By-pass mode is deactivated. Local Stop function is even active during EMERGENCY operation.
- On** By-pass mode is activated. Local Stop function is deactivated during EMERGENCY operation.

9.3.14. Delay time for EMERGENCY operation

An EMERGENCY operation is only performed once the delay time has expired. Consequently, a short-term signal failure will not have an impact on the process and will not immediately initiate an EMERGENCY operation.

Required user level: **AUMA (6)** or higher.

- M ▶** **Customer settings** **M0041**
EMCY behaviour **M0198**
Delay time **M0804**

Default value: 00:01.00 min : s

Setting range: 00:00.0 ... 30:00.0 min : s

9.4. Enable local controls

- Application**
- Protection against unauthorised operation via local controls
 - Protection against unauthorised parameter setting via local controls

Properties The selector switch functions LOCAL and/or OFF may be enabled or disabled.

Condition For the Enable local controls function, a digital input for the signal **Enable Local** has to be available and configured.

Configuration of digital input

Required user level: **Specialist (4)**.

- M ▶** **Device configuration** **M0053**
I/O interface **M0139**
Digital inputs **M0116**

Example Use input DIN 5 for signal **Enable Local**:

Parameters: Signal DIN 5 **M0122**

Setting value: **Enable Local** (wiring diagram designation: Enable LOCAL)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. **Coding DIN 5 M0127**), the input is either **High active** or **Low active**. Default setting is **High active**.

Enable/disable local controls via digital input

Switching behaviour for coding High active:

- Input **Enable Local** = **high level** (standard: +24 V DC):
Operation via local controls enabled
- Input **Enable Local** = **low level** (0 V DC or input open):
Operation via local controls disabled

9.4.1. Enabling function: activate

Required user level: **Specialist (4)** or higher.

- M ▶** **Device configuration** **M0053**
Application functions **M0178**
Activation **M0212**
Enable LOCAL **M0631**

Default value: Function not active

Setting values:

- Function not active Function <Local controls: enable from REMOTE> deactivated.
- Function active Function <Local controls: enable from REMOTE> activated.

9.4.2. Enabling function behaviour

The enable behaviour determines which selector switch functions (LOCAL, OFF) require an additional enable signal.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
 - Local controls** M0075
 - Enable LOCAL** M0628

Default value: Sel. sw. Local

Setting values:

- Sel. sw. Local Disabling or enabling is only effective in operation mode LOCAL (selector switch is in position **Local control**). If no enable signal is present, operation via push buttons on the local controls is disabled and the display shows the following signal: **Disabled**.
- Sel. sw. Local + Off Disabling or enabling is effective in operation modes LOCAL and OFF (selector switch positions **Local control** and **0**). If no enable signal is present, operation via push buttons on the local controls is disabled and the display shows the following signal: **Disabled**.
- Information** If the <Priority REMOTE> function is also activated, the two functions should have different setting values. In case of identical setting values, e.g. **Sel. sw. Local + Off**, the <Enable local controls> function will have no function, since the actuator controls will be exclusively in operation mode REMOTE if the enable signal is missing.

9.5. Priority REMOTE

- Properties** A control signal can provide REMOTE control with priority over actuator operation via local controls (irrespective of the selector switch position)
This function uses the same input signal as the <Enabling local controls> function.
- Application** No changing possibility via selector switch from LOCAL
- Condition** For the <Priority REMOTE> function, a digital input for the signal **Enable Local** has to be available and configured.

Configuration of digital input

Required user level: **Specialist (4)**.

- M ▷ **Device configuration** M0053
 - I/O interface** M0139
 - Digital inputs** M0116

Example Use input DIN 5 for signal **Enable Local**:

Parameters: **Signal DIN 5** M0122

Setting value: **Enable Local** (wiring diagram designation: Enable LOCAL)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. **Coding DIN 5** M0127), the input is either **High active** or **Low active**. Default setting is **High active**.

Priority REMOTE via digital input

Switching behaviour for coding High active:

- Input **Enable Local** = **high level** (standard: +24 V DC):
Operation via local controls enabled
- Input **Enable Local** = **low level** (0 V DC or input open):
Priority REMOTE: Operation via local controls disabled

9.5.1. Priority REMOTE: activate

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
- Application functions** M0178
- Activation** M0212
- Priority REMOTE** M0770

Default value: Function not active

Setting values:

- Function not active** <Priority REMOTE> function is deactivated.
- Function active** <Priority REMOTE> function is activated.

9.5.2. Priority REMOTE behaviour



This function determines which selector switch function (LOCAL, OFF) requires an additional enable signal.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
- Local controls** M0075
- Priority REMOTE** M0773

Default value: Sel. sw. Local

Setting values:

- Sel. sw. Local** Priority of control from REMOTE is only effective in operation mode LOCAL (selector switch is in position **Local control**). If no enable signal is present, operation via push buttons on the local controls is disabled and the actuator can be controlled from REMOTE. The actuator controls indicates the symbol  in the status line of the display (menu S0001).
- Sel. sw. Local + Off** Priority of control from REMOTE is effective in operation modes LOCAL and OFF (selector switch positions **Local control** and **0**). If no enable signal is present, operation via push buttons on the local controls is disabled and the actuator can be controlled from REMOTE. The actuator controls indicates the symbol  in the status line of the display (menu S0001).

9.6. Interlock (enabling operation commands)

- Characteristics**
 - An operation command will only be executed if an additional enable signal for the operation command is present.
 - Enabling may be activated or deactivated individually for operation commands OPEN and CLOSE.
 - Enabling can be set for the different operation modes.

Condition For the function <Interlock>, a digital input for the signal **Enable OPEN** has to be available and configured. **Enable CLOSE**

Configuration of digital input

Required user level: **Specialist (4)**.

- M ▷ **Device configuration** M0053
- I/O interface** M0139
- Digital inputs** M0116

Example Use input DIN 5 to enable operation commands in direction CLOSE:

Parameter: Signal DIN 5 M0122

Setting value: **Enable CLOSE** (wiring diagram designation: Interlock CLOSE)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. Coding DIN 5 M0127), the input is either **High active** or **Low active**. Default setting is **High active**.

Enable/disable commands via digital input

Switching- behaviour for coding High active:

- Input **Enable OPEN = low level** (0 V DC or input open):
Operation command enabled.
- Input or **Enable OPEN = high level** (default: +24 V DC):
Operation command disabled,

9.6.1. Interlock: activate

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration M0053**
Application functions M0178
Activation M0212
Interlock M0663

Default value: **Function not active**

Setting values:

- Function not active** Function <Interlock (enable operation commands)> deactivated.
- Function active** Function <Interlock (enable operation commands)> activated.

9.6.2. Source of Interlock enable signal: set

- M ▷ **Customer settings M0041**
Interlock M0664
Interlock source M1013

Default value: **Active comm. source**

Setting values:

- Active comm. source** Signals for enabling operation commands are sent via the active interface. I.e. changing the command source also changes the failure source of the enable signal.
- Interface** The enable signal for the operation commands must be configured as binary signal (default: +24 V DC) at a digital input (parameter: **Enable OPEN/Enable CLOSE**).

9.6.3. Operation mode for interlock

The additional enable signal can be activated for different operation modes.

- M ▷ **Customer settings M0041**
Interlock M0664
Oper. mode Interlock M0665

Default value: **Off** both directions

Setting values:

- Off** Interlock is off.
- Remote** Interlock is active in operation modes: **RemoteRemote II Fieldbus**
- Local** Interlock is active in operation modes: **Local, Service**
- Remote and local** Interlock is active in operation modes: **Remote, Remote II, Fieldbus, Local, Service**

9.6.4. Interlock behaviour (running direction)

The Interlock behaviour determines which selector switch functions (LOCAL, OFF) require an additional enable signal.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**

Interlock M0664
Running dir. Interlock M0666

Default value: OPEN and CLOSE

Setting values:

- OPEN** The enable signal is only required for operation commands in direction OPEN.
- CLOSE** The enable signal is only required for operation commands in direction CLOSE.
- OPEN and CLOSE** The enable signal is required for operation commands in directions OPEN and CLOSE.

9.7. Local Stop

- Properties**
 - The function Local Stop can be used to stop an operation from Remote locally with the push button STOP.
 - All operation commands are interrupted.
- Information** After releasing push button STOP, an operation command which might still be present will become active immediately.

9.7.1. Behaviour

Required user level: **Specialist (4)** or higher.

M ▷

Customer settings M0041
Local controls M0075
Local STOP M0627

Default value: Off

Setting values:

- Off** Push button STOP can only interrupt an operation in operation mode **Local** (selector switch = position **Local control**).
- Sel.sw.Local + Remote** In the operation modes **Local**, **Remote**, **Remote II**, **EMERGENCY** and **Service**, push button STOP interrupts an operation.
- Information** In operation mode **Disabled**, an interruption is NOT possible.

9.8. EMERGENCY stop function

- Conditions** An EMERGENCY stop button (latching) is either located on the electrical connection or outside.
 - Characteristics**
 - In an emergency, the EMERGENCY stop button can be used to interrupt the power supply. Possibly available operation commands will be reset via self-retaining.
 - The indication in the top row of the display shows: **EMCY stop**
- Figure 45: EMERGENCY stop button on the electrical connection



Information The EMERGENCY stop button is reserved for operation in the event of an emergency. For maintenance work, the mains supply of the actuator controls has to be switched off and protected against accidental switching on.

Information The EMERGENCY stop push button is not available for explosion-proof versions, but only for weatherproof versions of the actuator controls.

Operation commands

After having unlocked the EMERGENCY stop button, a possibly active operation command will **NOT** immediately be re-activated, but only respective acknowledgement by the operator. This resets the EMERGENCY stop status.

The acknowledgement is made:

- via the **RESET** push button in selector switch position **Local control** (LOCAL).
- via a digital input from Remote. Assignment: **RESET**

9.9. Partial Valve Stroke Test (PVST)

Properties The Partial Valve Stroke Test (PVST) is used to check the function of both actuator and actuator controls. During this test, the function of the valve is tested by means of partial opening or closing within a defined period of time without interrupting the process. After successful testing, actuator controls operate the actuator to its initial position.

If the test was not successful, actuator controls will generate the following signals: **PVST fault** **PVST abort**. For monitoring the PVST, these signals must be evaluated by a PLC.

- Requirements**
- Position transmitter in the actuator
 - If the actuator is in safe state (caused by the failure behaviour), the test will not be performed.
 - The test can only be performed during OPEN - CLOSE control. For setpoint control (modulating duty), a test cannot be performed.

For the change-over, a digital input for the signal **Execute PVST** has to be available and configured.

Configuration of digital input

Required user level: **Specialist (4)**.

- M ▶** **Device configuration** **M0053**
I/O interface **M0139**
Digital inputs **M0116**

Example Use input DIN 5 for **Execute PVST** signal:

Parameters: **Signal DIN 4** **M0118**

Setting value: **Execute PVST** (wiring diagram designation: **ESD**)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. **Coding DIN 4** **M0126**), the input is either **High active** or **Low active**. For safety reasons, the **Execute PVST** signal input is generally set to **Low active**.

Execute PVST via digital input

Switching behaviour for coding **Low active:**

- Input **Execute PVST** = **low level** (0 V DC or input open):
No test
- Input **Execute PVST** = **high level** (standard: +24 V DC):
Test is initiated

Execute PVST manually via push buttons of the local controls

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 Service functions M0222
 Execute PVST M0850

The actuator must be in the initial position. The initial position depends on the following parameter settings: **PVST behaviour** M0853, **PVST stroke** M0854

Information

Der PVST kann durch Senden eines Reset-Befehls abgebrochen werden:

- local (manual), in selector switch position **local operation**, via push button **Reset**.
- From Remote, in selector switch position **Remote control** via a digital input. Assignment: **RESET**

9.9.1. PVST activation

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 Application functions M0178
 Activation M0212
 PVST M0851

Default value: Function not active

Setting values:

Function not active <PVST> function deactivated.

Function active <PVST> function activated.

9.9.2. PVST source: set

- M ▷ **Customer settings** M0041
 PVST M0852
 PVST source M1339

Default value: Active interface

Setting values:

Active interface Signals for triggering a PVST are sent via the active interface, i.e. changing the command source also changes the failure source of the PVST.

I/O interface Signals for triggering a PVST must be configured as binary signals (default: +24 V DC) at a digital input.

9.9.3. Operation mode for PVST

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
 PVST M0852
 PVST operation mode M0889

Default value: Stroke

Setting values:

Stroke Stroke controlled PVST; operation across defined stroke (parameter **PVST stroke**) within a defined time (parameter **PVST monitoring**). In this operation mode, the PVST can be started in any valve position (even outside the end position).

End position test Operating time controlled PVST; operation within a defined time (parameter **PVST operating time**) after leaving an end position. In this operation mode, PVST can only be started from one of the end positions.

9.9.4. Behaviour for PVST: define

The test can be performed in direction OPEN or direction CLOSE.

- M ▷ **Customer settings** M0041

PVST M0852
PVST behaviour M0853

Default value: OPEN

Setting values:

OPEN Testing by operation in direction OPEN.
CLOSE Testing by operation in direction CLOSE.

9.9.5. Partial stroke for PVST: set

During stroke controlled PVST execution (parameter PVST operation mode M0889 = Stroke), this parameter determines the partial stroke for a PVST.

Usually, the valve stroke amounts to 10 to 15 %. The amount of the partial stroke depends on process requirements and the required diagnostic coverage rate.

M ▷ Customer settings M0041
PVST M0852
PVST stroke M0854

Default value: 10.0 %

Setting range: 0.0 ... 100.0 %

9.9.6. PVST monitoring time: set

The actuator remains in the current position if the test could not be completed within the pre-set time.

M ▷ Customer settings M0041
PVST M0852
PVST monitoring M0855

Default value: 01:00.0 min:s (1 minute)

Setting range: 00:01.0 ... 50:00.0 min:s (minutes:seconds)

9.9.7. PVST operating time: set

During operating time controlled PVST execution (parameter PVST operation mode M0889 = End position test), this parameter determines the permissible PVST operating time.

M ▷ Customer settings M0041
PVST M0852
PVST operating time M0890

Default value: 00:02.0 min:s (2 seconds)

Setting range: 00:00.1 ... 15:00.0 min:s (minutes:seconds)

9.9.8. PVST reversing time: set

Waiting time during PVST prior to returning to initial position.

M ▷ Customer settings M0041
PVST M0852
PVST reversing time M0891

Default value: 00:02.0 min:s (2 seconds)

Setting range: 00:00.1 ... 15:00.0 min:s (minutes:seconds)

9.9.9. PVST reminder

If this function is active, a signal is generated if no PVST was executed during the reminder period.

Activate reminder

Required user level: Specialist (4) or higher.

- M ▷ Customer settings M0041
 - PVST M0852
 - PVST reminder M0892

Default value: Function not active

Setting values:

- Function not active Reminder not activated.
- Function active Reminder activated.

Set reminder period

- M ▷ Customer settings M0041
 - PVST M0852
 - PVST reminder period M0893

Default value: 0 d

Setting range: 0 ... 65535 d (days)

9.10. Bluetooth interface can be activated and deactivated

Behaviour of the Bluetooth interface of the actuator controls can be set.

- M ▷ Device configuration M0053
 - Application functions M0178
 - Activation M0212
 - M0573

Information The last menu only exists for configuration via local controls. For AUMA CDT and AUMA Assistant App, the parameter is already available for configuration in the Activation menu.

The parameter may have the following values:

- 0 Switched off (CDT & App)
 - Off (local controls)
- 1 Switched on (CDT & App)
 - On (local controls)
- 2 I/O or fieldbus
- 3 Selector switch position OFF (CDT & App)
 - Selector switch OFF (local controls)

The Bluetooth interface is permanently switched off for parameter value "0". To establish a connection is not possible.

The Bluetooth interface is permanently switched on and ready for reception for parameter value "1". A connection can be established at any time.

The parameter values "2" and "3" will be explained hereafter.

Activation/deactivation via I/O, fieldbus or selector switch position OFF

The Bluetooth interface can have three different states:

- BT_OFF** The Bluetooth interface is deactivated. To establish a connection via a master is not possible. The Bluetooth LED (blue) of the local controls is switched off.
- BT_READY** The Bluetooth interface is activated and waits for connection by a master. The Bluetooth LED (blue) of the local controls is blinking.
- BT_CONNECTED** The Bluetooth interface is connected to a master. The Bluetooth LED is permanently illuminated.

Properties of the input signals:

- The inputs are edge triggered.
- The Bluetooth interface is activated by rising edge.
- The Bluetooth interface is deactivated by falling edge.

Information For details on the process representation, please refer to <Manual (Device integration Fieldbus) AC .2/ACV .2 actuator controls>.

If the parameter corresponds to the value “2” or “3”, the Bluetooth interface is in status “BT_OFF” when switching on the actuator controls.

By activating the Bluetooth interface, the status will change from “BT_OFF” to “BT_READY”. The duration for the interface to remain in status “BT_READY” depends on the selected parameter value.

Parameter value 2 – fieldbus or I/O

The Bluetooth interface remains in the “BT_READY” status until a connection is established. Exception: In case a master was already connected, the status will change to “BT_OFF” once the set time is exceeded.

Parameter value 3 – selector switch position OFF

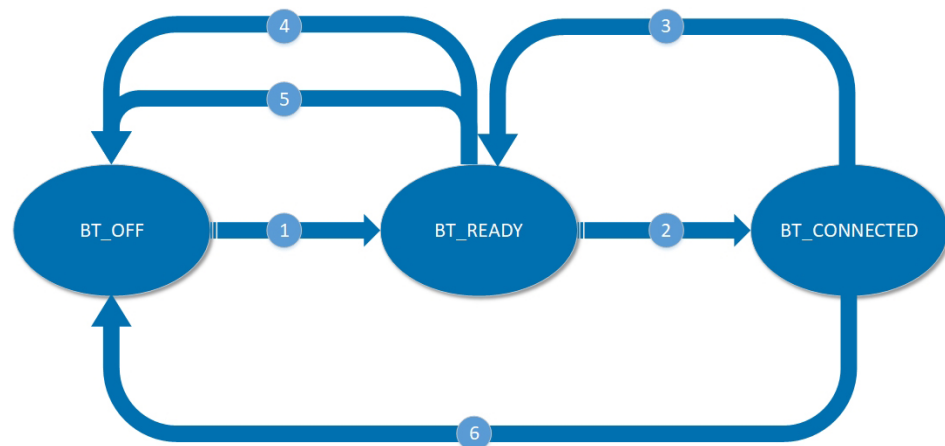
The Bluetooth interface remains in the “BT_READY” status until the set time is exceeded. Once the set time is exceeded, the status will change to “BT_OFF”.

If a Bluetooth master tries to connect within the set time, the connection will be established. The interface will then change to status “BT_CONNECTED”.

- Generally, the status is always signalled either via fieldbus or via I/O interface.
- The Bluetooth interface may at any time be interrupted via the fieldbus or the I/O interface. The status will then directly change to “BT_OFF”.
- Deactivation via the selector switch is not possible.

The following graphic chart describes the overall behaviour of the Bluetooth interface:

Figure 46: Behaviour of the Bluetooth interface



- [1] Activation of the Bluetooth interface via I/O or fieldbus (value 2) or via the selector switch position OFF (value 3)
- [2] Establishment of connection by Bluetooth master
- [3] Separation of the connection by the master
- [4] Abort by the DCS
- [5] Timeout
- [6] Abort by the DCS

When changing the parameter value, the Bluetooth interface behaviour pattern in states “BT_READY” and “BT_OFF” is as follows:

Table 12: Change of parameter value

Current parameter value	Current status	New parameter value	New status
0 (switched off)	BT_OFF	1 (switched on)	BT_READY
0 (switched off)	BT_OFF	2 (fieldbus or I/O)	BT_OFF
0 (switched off)	BT_OFF	3 (selector switch position OFF)	BT_OFF
1 (switched on)	BT_READY	0 (switched off)	BT_OFF
1 (switched on)	BT_READY	2 (fieldbus or I/O)	BT_OFF
1 (switched on)	BT_READY	3 (selector switch position OFF)	BT_OFF
2 (fieldbus or I/O)	BT_READY or BT_OFF	0 (switched off)	BT_OFF
2 (fieldbus or I/O)	BT_READY or BT_OFF	1 (switched on)	BT_READY
2 (fieldbus or I/O)	BT_READY or BT_OFF	3 (selector switch position OFF)	BT_OFF
3 (selector switch position OFF)	BT_READY or BT_OFF	0 (switched off)	BT_OFF
3 (selector switch position OFF)	BT_READY or BT_OFF	1 (switched on)	BT_READY
3 (selector switch position OFF)	BT_READY or BT_OFF	2 (fieldbus or I/O)	BT_OFF

If the Bluetooth interface is in the status “BT_CONNECTED”, a change of parameter value does not cause a status change. In order to change the status, the master must interrupt the connection or the connection must be interrupted otherwise:

Table 13: Status change for disconnect or abort

Current parameter value	Current status	Cause	New status
0 (switched off)	BT_CONNECTED	Disconnect by master	BT_OFF
0 (switched off)	BT_CONNECTED	Abort by DCS	BT_OFF
1 (switched on)	BT_CONNECTED	Disconnect by master	BT_READY
1 (switched on)	BT_CONNECTED	Abort by DCS	BT_CONNECTED
2 (fieldbus or I/O)	BT_CONNECTED	Disconnect by master	BT_READY (until timeout)
2 (fieldbus or I/O)	BT_CONNECTED	Abort by DCS	BT_OFF
3 (selector switch position OFF)	BT_CONNECTED	Disconnect by master	BT_READY (until timeout)
3 (selector switch position OFF)	BT_CONNECTED	Abort by DCS	BT_OFF

Timeout for Bluetooth activation

The time during during which the Bluetooth interface remains in status “BT_READY” after activating via “selector switch position OFF” or after the connection abort by the Bluetooth master, can be set via a parameter .

- M ▷ **Device configuration** M0053
- Bluetooth interface** M2235
- M2234

Information The last menu only exists for configuration via local controls. For AUMA CDT and AUMA Assistant App, the parameter is already available for configuration in the **Bluetooth interface** menu.

Default value: 180 [s]

Setting range: [60 ... 300] [s]

10. Monitoring functions

Definition The monitoring functions signal a warning or a fault as soon as a certain value is outside the permissible range. Faults generally cause an actuator shutdown.

10.1. Torque monitoring

Torque monitoring has the following functions:

- Valve overload protection against excessive torques (leads to switching off)
- Torque warning before overload protection tripping (only in combination with electronic control unit in the actuator)

Overload protection

Once the overload protection trips (torque exceeds set tripping torque), the actuator is stopped.

Actuator controls generate a fault indication if:

- Excessive torque occurs **between** end positions
- Excessive torque occurs **in** the end positions **and** limit seating is set.

The fault indication is shown in the display

- Status indication: **S0007 Fault** or **S0011 Failure**
 - Details: **Torque fault CLOSE** or **Torque fault OPEN**

The fault has to be acknowledged before the operation can be resumed:

1. Either by an operation command in the opposite direction.
 - For **Torque fault CLOSE**: Operation command in direction **OPEN**
 - For **Torque fault OPEN**: Operation command in direction **CLOSE**
2. Or, in case the torque applied is lower than the preset tripping torque after tripping:
 - via the **RESET** push button in selector switch position **Local control (LOCAL)**.

Depending on the version, tripping torques for overload protection are either set via switches in the actuator or via software parameters in the controls. For the settings, refer to <Torque switching> chapter.

Torque warning

Requirements Actuator with electronic control unit (MWG) .

The torque warning can be used e.g. for self-monitoring or for anticipating maintenance requirements.

- M ▷** **Customer settings** **M0041**
Torque switching **M0013**
Wrn torque CLOSE **M0769**
Wrn torque OPEN **M0768**

Default value: **80 %**

Setting range: **20 ... 100 %** of the set nominal torque

When exceeding the set limit values, the actuator is not stopped, however, the controls generate a warning signal:

- Status indications: **S0005 Warnings** or **S0008 Out of specification**
 - Details: **Torque wrn CLOSE** or **Torque wrn OPEN**

10.1.1. Torque by-pass

By means of the torque by-pass, the torque monitoring is deactivated for a defined (short) time. During this interval, the full actuator torque may be used, for example, to release the actuator from a blocked end position or any other jammed position.

NOTICE

Valve damage due to excessive torque!

→ Only apply torque by-pass with the consent of the valve manufacturer.

Torque by-pass: activate

- M ▷ Customer settings M0041
- Torque switching M0013
- Torque by-pass M0092

Default value: Function not active

Setting values:

Function active The torque by-pass is activated.

Function not active The torque by-pass is deactivated.

Time interval for torque by-pass

During the time interval set here, the torque monitoring is deactivated.

- M ▷ Customer settings M0041
- Torque switching M0013
- Torque by-pass [s] M0205

Default value: 0.0 s

Setting range: 0.0 ... 10.0 s seconds

Information If torque by-pass is activated, the interval should be longer than the set time period for reversing prevention time to ensure torque by-pass will also be effective in the event of reversal of operation.

10.1.2. Torque limitation of torque by-pass

For activated torque by-pass, the torque monitoring (parameter Torque by-pass M0092) is deactivated for a defined (short) time. By activating the torque limitation, torque monitoring will be activated again, but not in relation to the set tripping torque but in relation to a torque peak which can be set separately via this function.

Condition Electronic control unit with MWG in the actuator (non-intrusive version).

Activate torque limitation

- M ▷ Customer settings M0041
- Torque switching M0013
- Torque limitation M1805

Default value: Function not active

Setting values:

Function active The torque limitation of the torque by-pass is activated.

The actuator will be stopped during the by-pass interval and a torque fault will be generated once the permitted torque peak has been exceeded.

Function not active The torque limitation of the torque by-pass is deactivated.

There is no torque monitoring. During the by-pass interval, no torque fault will be generated.

Set torque peak

- M ▷ Customer settings M0041
- Torque switching M0013
- Torque peak [%] M1806

Default value: 120 %

Setting range: 100 ... 150 % (in relation to the set tripping torque)

10.2. Motor protection monitoring (thermal monitoring)

In order to protect against overheating and impermissibly high surface temperatures at the actuator, PTC thermistors or thermostiches are embedded in the motor winding. Motor protection trips as soon as the max. permissible winding temperature has been reached.

The actuator is switched off and the following fault signals are issued:

- LED 3 (factory setting: motor protection tripped) on the local controls is illuminated.
- Status indications **S0007 Fault** or **S0011 Failure** display a fault. The fault **Details** is displayed when selecting **Thermal fault**.

The motor has to cool down before the operation can be resumed.

Depending on the parameter setting (motor protection behaviour), the fault signal is either automatically reset or the fault signal has to be acknowledged manually.

Manual acknowledgement can be made:

- In selector switch position **Local control** (LOCAL) via push button **RESET**.
- In selector switch position **Remote control** (REMOTE) via a digital (I/O interface) with the RESET command if a digital input is configured for **RESET** signal.

In addition, the actuator controls cyclically (once per month) check the motor protection monitoring for its proper function. If this check fails, the actuator controls generate the fault indication: **IE mot. prot. monitor**

Motor protection behaviour

Required user level: **AUMA (6)**.

- M ▷ **Device configuration M0053**
Actuator M0168
Motor prot. mode M0169

Default values:

Non-explosion-proof actuators = **Auto**

Explosion-proof actuators = **Reset**

Setting values:

Auto Automatic reset after the motor has cooled down.
 Not possible for explosion-proof version.

Reset Manual reset.

Once the motor has cooled down, the fault has to be acknowledged (reset) manually as described above.

If required the thermal overload relay has to be reset manually. To this end, remove the cover on the back of actuator controls and operate the reset button on the thermal overload relay.

10.3. Type of duty monitoring (motor starts and running time)

This function monitors the permissible type of duty (e.g. S2 - 15 min) of the actuator.

For this, actuator controls monitor possible excess of

- Permissible motor starts (cycles) per hour
- Permissible running time (on-time) per hour

If any of these values has been exceeded, the actuator will however not be stopped, but the following warning signals are issued.

- Status indications: **S0005** or **S0008**
 - Details: **Wrn op.mode starts**
- Status indications: **S0005** or **S0008**
 - Details: **Wrn op.mode run time**

The warning signals will automatically be cleared if the permissible motor starts per second or the permissible running time per hour are no longer reached.

The operational info logger records the number of excesses (warnings) as well as the number of motor starts and motor running times.

- M ▷ **Asset Management M01231**
 - Operational info M0177
 - Operational info M0188

On time warning 1 M0325 contains total number of all on time warnings.

On time warning 2 M0326 contains maximum duration of on time warning

Example: Due to excess of defined starts/h or defined running time/h, AC issue in total 4 on time warnings: two for 5 min, once for 10 min, once for 17 min. Afterwards the operating data counters contain the following values:

On time warning 1 M0325 = 37 min = total of all periods (5+5+10+17 min)

On time warning 2 M0326 = 17 min = longest period

Figure 47: Example



- [1] Running time/h
- [2] Starts/h
- [3] On time warning

Activate on time monitoring

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
 - Duty type monitoring M0355
 - Duty type monitoring M0358

Default value: Function not active

Setting values:

Function not active Function <On-time monitoring> deactivated.

Function active Function <On-time monitoring> activated.

Set permissible starts/h

- M ▷ **Customer settings M0041**
 - Duty type monitoring M0355
 - Permissible starts M0357

Default value: 1,200 starts/h

Setting range: 1 ... 1,800 starts/h

Set permissible running time/h

- M ▷ **Customer settings M0041**
 - Duty type monitoring M0355
 - Perm. run time M0356

Default value: 15 min (minutes)

Setting range: 10 ... 60 min (minutes)

10.4. Operating time monitoring

This function allows the monitoring of the operating time of the actuator. If the actuator needs longer than the set time to move from end position OPEN to end position CLOSED, a warning is issued (the actuator is not stopped):

- Status indication **S0005 Warnings**
- Details: **Op. time warning**

The warning indication is automatically cleared once a new operation command is executed.

When the actuator moves from an intermediate position to an end position, the set monitoring time for the whole stroke is assigned in relation to the remaining stroke/travel.

Activate operation mode

Required access level: **Specialist (4)** or higher.

- M ▷** **Customer settings M0041**
Oper. time monitoring **M0568**
Operation mode **M0569**

Default value: **Off**

Setting values:

- Off** The operating time monitoring is switched off
- Manual** The operating time monitoring is activated. The permissible operation time is set via parameter **Perm.op. time, manual M0570**.

Set permissible operating time manually

Required user level: **Specialist (4)** or higher.

- M ▷** **Customer settings M0041**
Oper. time monitoring **M0568**
Perm.op. time, manual **M0570**

Default value: **15:00.0 min:s** (15 minutes)

Setting range: **00:00.0 ... 59:59.9 min:s** (minutes:seconds)

Display operating times

Operating times can be displayed via Asset Management. Refer to <Display operating times>

10.5. Reaction monitoring

The actuator controls monitor whether the actuator moves after receiving an operation command.

If no reaction is recorded at the output drive of the actuator within a set time, either a warning or a fault signal is generated depending on the setting:

- Status indication: **S0005 Warnings** or **S0008 Out of specification**
- Details: **Wrn no reaction**
- Status indication: **S0007 Fault** or **S0011 Failure**
- Details: **Fault no reaction**

In the event of a fault signal, the fault has to be acknowledged to be able to resume the operation. The acknowledgement is made:

- In selector switch position **Local control** (LOCAL) via push button **RESET**.
- In selector switch position **Remote control** (REMOTE) via a digital (I/O interface) with the **RESET** command if a digital input is configured for **RESET** signal.

In case of operation from an intermediate position, reaction monitoring will only be performed if the actuator is equipped with position feedback function.

Activate switching off for reaction time error

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
 - Reaction monitoring** M0632
 - Actuator behaviour** M0633

Default value: No cut-off

Setting values:

- No cut-off** The reaction monitoring only issues a warning.
- Cut-off** The reaction monitoring issues a fault signal, the actuator is stopped.

Set reaction time

- M ▷ **Customer settings** M0041
 - Reaction monitoring** M0632
 - Reaction time** M0634

Default value: 15.0 s

Setting range: 15.0 ... 300.0 seconds (0 seconds up to 5 minutes)

10.6. Motion detector

- Requirements** Position transmitter in the actuator.
- Characteristics** The motion detector checks whether the actuator moves even without operation command (e.g. in manual operation or if there is no self-retaining).
Controls identify motion if the actuator moves more than the pre-set travel difference within the predefined recording time. Controls signal: **Output drive rotates**
- Information** Parameters for motion detection have a direct impact on reaction monitoring.

10.6.1. Activate motion detector

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
 - Motion detector** M0676
 - Motion detector** M0675

Default value: Function active

Setting values:

- Function not active** Monitoring is deactivated.
- Function active** Monitoring is activated.

10.6.2. Detection time dt

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
 - Motion detector** M0676
 - Detect. time dt** M0677
 - Detect. time dt (MWG)** M0681

Default values:

Detect. time dt (for potentiometer/EWG/RWG within actuator) = 00:05.0 min:s (5 seconds)

Detect. time dt (MWG) (for MWG within actuator) = 00:00.5 min:s (0.5 seconds)

Setting ranges:

Detect. time dt = 00:01.0 ... 30:00.0 min:s (minutes:seconds)

Detect. time dt (MWG) = 00:00.1 ... 00:02.0 min:s (minutes:seconds)

10.6.3. Travel difference dx

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
Motion detector M0676
Travel diff. dx M0678
Travel diff. dx (MWG) M0679

Default values:

Travel diff. dx (for potentiometer/EWG/RWG within actuator) = **1.0 %**

Travel diff. dx (MWG) (for MWG within actuator) = **3** (increments)

Setting ranges:

Travel diff. dx = **1.0 ... 10.0 %**

Travel diff. dx (MWG) = **2 ... 20** (increments)

10.6.4. Delay time

Delay time of the signal: **Handwheel oper.**

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings** M0041
Motion detector M0676
Delay time M0764

Default value: **6.000 s** (seconds)

Setting range: **0.001 ... 65.535 s**

10.7. Monitoring of electronics power supply

Actuator controls monitor the following voltages and signal a warning (refer to <Fault signals and warnings> chapter):

- Auxiliary voltage 24 V DC, e.g for supplying the control inputs
- Voltage 24 V AC for controlling the reversing contactors, for thermostats and heater within the actuator and for generating the 115 V AC auxiliary voltage for the customer (option)
- Internal 24 V DC power supply of the electronics components (within the actuator controls and in the actuator)
- External 24 V DC supply of the electronics (option)

Activate monitoring of auxiliary voltage 24 V DC

Required user level: **Specialist (4)**.

- M ▷ **Device configuration** M0053
Monitoring function M0645
Monitor 24 V DC cust. M0650

Default value: **Function not active**

Setting values:

Function not active Monitoring is deactivated.

- On** Monitoring is activated. Should the auxiliary voltage 24 V DC for supplying the control inputs fail, a warning will be issued.

Activate monitoring of external supply 24 V DC

Required user level: **Specialist (4)**.

- M ▷ **Device configuration** M0053
Monitoring function M0645
Monitor 24 V DC ext. M0649

Default value: Function not active

Setting values:

Function not active Monitoring is deactivated.

On Monitoring is activated. Should the external supply 24 V DC fail, a warning will be issued.

10.8. Temperature monitoring

Characteristics If the respective sensors are installed in the devices, the actuator controls monitor different temperatures.

If certain temperature limits are exceeded or fallen short of, the controls either send a warning or a fault signal.

- Conditions:**
- For temperature within the control unit of the actuator: MWG (magnetic limit and torque transmitter)
 - For motor temperature: additionally temperature sensor (PT 100) in the motor
 - For gear housing temperature: additionally temperature sensor (PT 100) in the gearing

Information Current device temperatures can also be displayed. Refer to <Display device temperatures>.

10.9. Heater system/heater monitoring

The heater system within the actuator controls housing and the heater on the control unit (within the switch compartment of the actuator) can be monitored. If the monitoring is activated the following warning will be generated if the heater system or the heater (circuit = interrupted) fails:

- In the display of the local controls, status indication **S0005 Warnings**
- Details: **Internal warning Wrn heater**

For further information on the heater system and the heater refer to separate <Heater system and heater> chapter.

Activate heater system monitoring

Heater system monitoring monitors all connected heaters for failure.

Required user level: **Specialist (4)**.

- M ▷ **Device configuration M0053**
Monitoring function M00645
Monitor heat. system M0647

Default value: Function not active

Setting values:

Function not active Heater monitoring is deactivated.

Function active Heater monitoring is activated.

Activate heater control unit monitoring

Information If a heater system is installed within the actuator controls, heater monitoring is not activated/deactivated via this parameter, but via parameter **Monitor heat. system M0647** of the heater system.

Required user level: **Specialist (4)**.

- M ▷ **Device configuration M0053**
Actuator M0168
Heater monitor M0646

Default value: Function not active

Setting values:

Function not active	Heater monitoring is deactivated.
Function active	Heater monitoring is activated. If the heater fails, a warning will be issued.
Information	Monitoring can only be made once the heater is activated (parameter Heater control unit).

Set reaction time for heater monitoring

Heater monitoring will only respond once a fault persists longer than the set monitoring time. Short-time faults occurring for less than the set monitoring time are not signalled as warning.

Required user level: **AUMA (6)**.

- M ▷** **Device configuration M0053**
Actuator M0168
Heating sys. mon. time M0859

Default value: 300.0 seconds

Setting range: 60 ... 3600 seconds (1 minute to 1 hour)

10.10. Verification of sub-assemblies

Conditions	<ul style="list-style-type: none"> Actuators with electronic control unit
Characteristics	<p>The controls verify whether sub-assemblies mounted in actuators and controls correspond to the desired version.</p> <p>In case incorrect sub-assemblies are mounted or if sub-assemblies are missing the controls either send a warning or a fault signal.</p> <p>For detailed information on this indication refer to <Fault signals and warnings> chapter.</p>

10.11. Phase failure monitoring

Conditions:	Phase failure monitoring is only valid for connections to 3-phase AC power supplies. For versions with 1-phase AC or DC, phase failure monitoring is not possible.
Properties	The actuator controls monitor phase L2. If phase L2 is missing for a certain time interval, the actuator controls can still send and receive signals and generate a fault indication. Since the actuator controls are supplied via phases L1 and L3, the two phases cannot be monitored. In case L1 or L3 fails, the actuator controls are inoperable and the actuator stops.
Information	In case of L2 phase loss during motor operation, this does not necessarily lead to an immediate standstill of the actuator. The reason is that the rotating motor generates the missing phase itself. This leads, however, to a reduction of the motor output torque. If the applied torque is sufficient for valve operation, the missing phase L2 is only detected when switching off (e.g. in an end position) and the Phase fault fault signal is generated as a consequence.

Configuration of tripping time

Required user level: **Specialist (4)** or higher.

- M ▷** **Device configuration M0053**
Phase monitoring M0170
Tripping time M0172

Default value: 10.0 s

Setting range: 1.0 – 300.0 s

Information	Faults in supply voltage (e.g. voltage drops) do not generate a fault signal during the adjustable tripping time.
--------------------	---

10.12. Phase sequence detection and correction of the direction of rotation

Conditions: The phase sequence detection is only valid for connections to 3-phase AC power supplies. For versions with 1-phase AC or DC, phase sequence detection is not possible.

Properties Exchanging any two phase conductors in the 3-phase mains changes the direction of phase rotation. Should phases L1, L2 and L3 be connected in the wrong sequence, this is detected and corrected by the AUMATIC: This prevents the actuator to rotate in the incorrect direction.

Activate phase sequence detection and correction of direction of rotation

M ▷ **Device configuration** M0053
 Phase monitoring M0170
 Adapt rotary dir. M0171

Default value: Function active

Setting values:

Function active Function <Phase sequence detection and correction of direction of rotation> is activated.

Function not active Phase sequence detection and correction of direction of rotation is deactivated.

11. Functions: activate and enable

11.1. Functions: activate

Via **Activation** menu **M0212**, functions can be switched on (activated) or off (deactivated).

Required user level for enabling/disabling: **Specialist (4)** or higher.

- M ▷ **Device configuration** **M0053**
- Application functions** **M0178**
- Activation** **M0212**

Information Some functions require enabling. Only enabled functions are visible and can be activated or deactivated.

Table 14:

Function	Menu	Enabling required
EMCY behaviour	M0589	No
Timer CLOSE	M0156	No
Timer OPEN	M0206	No
Positioner	M0158	Yes
Operation profile	M0294	No
Bluetooth	M0573	No
Enable LOCAL	M0631	Yes
Priority REMOTE	M0770	Yes
Auto change-over I/O	M0790	Yes
Interlock	M0663	Yes
Torque wrn	M0796	No
PVST	M0851	Yes
Maintenance signals	M1136	No
Maintenance interval	M1137	No
Maintenance reminder	M1884	No
Limit sw. via CDT/App	M1197	Yes
Split range operation	M1650	No
Mean value curves	M1890	No
Com. eval. REMOTE	M1709	No

11.2. Functions: enable

Via **Enabling** menu **M0179**, optional functions can be enabled or disabled.

This menu is visible in the display from user level **Specialist (4)**.

- M ▷ **Device configuration** **M0053**
- Application functions** **M0178**
- Enabling** **M0179**

Table 15:

Function	Menu and user level
Positioner	M0209 AUMA (6)
Enable LOCAL	M0630 AUMA (6)
Priority REMOTE	M0771 AUMA (6)
Auto change-over I/O	M0789 AUMA (6)
Interlock	M0661 AUMA (6)
PVST	M0856 AUMA (6)
Limit sw. via CDT/App	M1198 AUMA (6)

Information In user level **Specialist (4)**, an additional activation password (depending on the serial number) is required for enabling the function. The activation password can only be assigned and generated by the AUMA service.

12. Product variants

12.1. Multiport valve

- The multiport valve function is considered as **product variant** and must be activated in the factory. Only for an activated multiport valve function will the respective parameters be available for setting in the actuator controls menu.
- Properties** The multiport valve function allows to directly access a valve port of a valve equipped with several ports without stopping at any other port. Example: Operation from position 2 to 4 without stopping at position 3.
- In operation mode Local, up to 16 positions can be approached. Operation mode Remote allows the function “next position” also up to 16 positions.
- Depending on the setting, the actuator will either operate the valve at a defined direction of rotation (counterclockwise or clockwise) or as quickly as possible (irrespective of the actuator position) to the specified valve port.

Procedure for commissioning a multiport valve

1. Set/check multiport valve parameters:
(generally, they are set in the factory prior to delivery)
 - Actuator type
 - Gear reduction ratio
 - Number of ports (positions)
 - Configuration of digital inputs
2. Define/check positions (of valve ports).
3. Set/check signal behaviour of positions.
4. Set home port (zero position).
5. Approach positions.
6. If required, perform/correct multiport valve parameter settings like inertia, dead band, backlash compensation and hysteresis.
7. If further multiport valve parameters were set: Reset the homeport and re-set parameters as required.

12.1.1. Actuator type: set/check

The actuator type is set in the factory but can be modified at a later date.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
 Multiport valve M1140
 Actuator type M1142

Default value: Actuator type set in the factory

Setting ranges: Selection list of all AUMA actuators

12.1.2. Gear reduction ratio: set/check

The reduction ratio of the gear stage of the actuator mounted to the valve gearbox must be set here. To facilitate adjustment, a selection table of supported gearboxes is available.

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
 Multiport valve M1140
 Reduction ratio M1143

Default values: **GS50.3**

Setting values:

Table 16: Selection of gearboxes supported by AUMA

Sizes GS 50.3 – GS 125.3	Sizes GS160.3 – GS 250.3
GS50.3	GS160.3
GS63.3	GS160.3/GZ160.3(4:1)
GS80.3	GS160.3/GZ160.3(8:1)
GS100.3	GS200.3
GS100.3/VZ2.3	GS200.3/GZ200.3(4:1)
GS100.3/VZ3.3	GS200.3/GZ200.3(8:1)
GS100.3/VZ4.3	GS250.3
GS125.3	GS250.3/GZ250.3(4:1)
GS125.3/VZ2.3	GS250.3/GZ250.3(8:1)
GS125.3/VZ3.3	
GS125.3/VZ4.3	

12.1.3. Number of ports (positions)

Number of valve ports (positions)

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
 Multiport valve M1140
 Number of ports M1141

Default value: 8

Setting range: 0 to 12

12.1.4. Home port (zero position): set

The home port is the zero position (0° or 360° of one turn) and is consequently the starting point for all other intermediate positions.

Information Set the gear reduction ratio (parameter **Reduction ratio M1143**) and the actuator type (parameter **Actuator type M1142**) prior to setting the home port.

- Set home port**
1. Position multiport valve to zero position either via manual operation (handweel) or via motor operation (via push buttons of local controls)
 2. In a next step, confirm this position (with **Yes**) as homeport via parameter **MPV home port M1162**.
 As an alternative, the home port position can also be confirmed via a signal at a digital input. To this end, a digital input has to be available and configured.

Set home port (zero position) via parameter

Required user level: **Specialist (4)** or higher.


- M ▷ **Customer settings M0041**
 Multiport valve M1140
 MPV home port M1162
 Set?

Successful homeport setting is visualised by a black circle on the actuator controls display: ●.

Reset homeport (zero point)

Required user level: **Specialist (4)** or higher.

- M ▷ **Customer settings M0041**
 Multiport valve M1140
 Reset MPV homeport M2863
 Reset?

Successful resetting of the homeport is shown by a white circle with a black line on the actuator controls display: .

Configuration of digital input

Required user level: **Specialist (4)**.

- M ▷ **Device configuration M0053**
 - I/O interface M0139**
 - Digital inputs M0116**

Example Use input DIN 5 for “Set home port” signal:

Parameters: **Signal DIN 5 M0122**

Setting value: **MPV set home pos.** (wiring diagram designation: Home port)

Information The logic for the digital inputs may be inverted. Depending on the parameter setting (e.g. **Coding DIN 5M0127**), the input is either **High active** or **Low active**. Default setting is **High active**.

12.1.5. Positions (of valve ports): define/check

Each position can be set to any value between 0° and 360° (one full turn of the valve).

Information Prior to setting the positions, the home port must be defined (parameter **MPV home port**).

This corresponds to the zero position of the valve (0° or 360° of one full valve turn as well as 0 % or 100 % of position feedback).

The positions of the valve ports have to be set afterwards.

- M ▷ **Customer settings M0041**
 - Multiport valve M1140**
 - MPV positions M1149**

Setting ranges: 0.0 to 359.9°

Default values: 0.0° (for all positions)

If desired, positions can be preset in the factory.

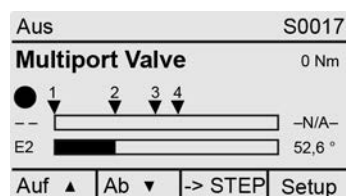
Example configuration for a multiport valve comprising 8 ports: All 8 positions are evenly spread across 360°.

- Position 1** = 0.0 (bzw. 359,9°)
- Position 2** = 45.0
- Position 3** = 90.0
- Position 4** = 135.0
- Position 5** = 180.0
- Position 6** = 225.0
- Position 7** = 270.0
- Position 8** = 315.0

12.1.6. Operate to position via push buttons of the local controls

To operate to a position via push buttons of the local controls, status indication **S0017** must be shown (refer to <Indications in the display>).

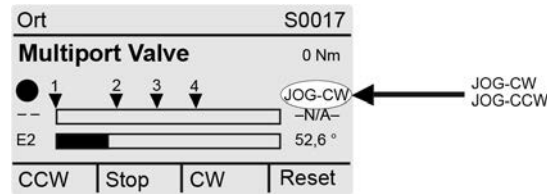
Figure 48: Status indication of multiport valve (selector switch in position OFF)



Operation in clockwise or counterclockwise direction:

When changing the selector switch to position **Local control** (LOCAL), the display changes:

Figure 49: Status indication of multiport valve (selector switch in position LOCAL)

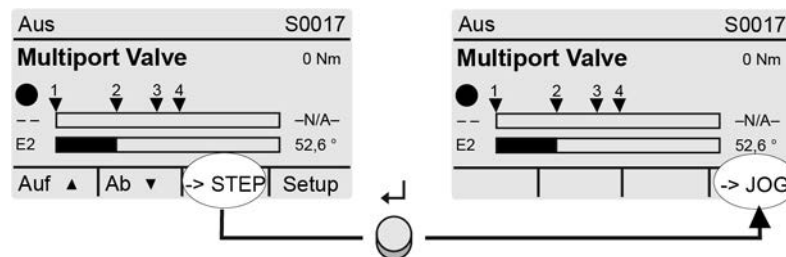


As a consequence, the valve can be operated into clockwise or counterclockwise direction (display shows CW or CCW)

Direct operation to a position:

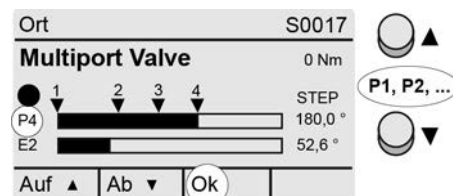
When selector switch is in position **0** (OFF), the function “Direct operation to a position via push buttons” is activated via **->STEP** (push button \blacktriangleleft) (display shows **->JOG**).

Figure 50: Status indication of multiport valve (selector switch in position OFF)



When changing the selector switch to position **Local control** (LOCAL), the display changes for selection of the desired position:

Figure 51: Status indication of multiport valve (selector switch in position LOCAL)



Select the desired position (P1, P2, ...) via push buttons \blacktriangle \blacktriangledown and confirm selection via **Ok** (push button \blacktriangleleft).

→ The operation is issued as soon as push button **Ok** is pressed.

Symbol	
\blacktriangledown	Set positions (of valve ports)
P	(P1, P2, ...) selected position (1, 2, ...)
-- / -N/A-	No position has been selected.
E2	Actual position value
●	Homeport (zero point) set
○	No homeport (zero point) has been set

To interrupt an operation (triggered operation command):

→ Select “-- / -N/A-” during operation and confirm via **Ok** (push button \blacktriangleleft). The actuator stops in its current position.

12.1.7. Operate to position from Remote

For direct operation to position from remote, make sure that selector switch position **Remote control** (REMOTE) is selected.

Operation to position via digital inputs

An input (DIN) must be configured for each position (valve port).

Configuration of digital inputs

Required user level: Specialist (4) or higher.

- M ▷ Device configuration M0053
 - I/O interface M0139
 - Digital inputs M0116

Example DIN4 input to operate to position 1 selecting the shortest path:

Parameters: Signal DIN 4 M0118 = Intermediate pos. 1

Setting values for digital inputs (DIN)	Operation behaviour for input control
Intermediate pos. 1 to Intermediate pos. 16	Operation to defined position while selecting the shortest path
MPV: CW Position 1 to MPV: CW Position 10	Operation to defined position in clockwise direction
MPV: CCW Position 1 to MPV: CCW Position 10	Operation to defined position in counterclockwise direction
MPV DriveCW	Actuator operates in clockwise direction (without stop at any position).
MPV DriveCCW	Actuator operation in counterclockwise direction (without stop at any position).

Command “Next position”

Required user level: Specialist (4) or higher.

A digital input is used to select the desired operation to the next port including the direction of operation. Thus, up to 16 ports can be approached in both directions, even without fieldbus connection with only 2 inputs.

- Device configuration M0053
 - I/O interface M0139
 - Digital inputs M0116

Example Parameter Signal DIN 1 M0117:

- Next position CW = clockwise
- Next position CCW = counterclockwise

Self-retaining when leaving the factory in both direction (cw and ccw).

12.1.8. Dead band

The dead band prevents operation to a new setpoint position within a specified band.

Required user level: Specialist (4) or higher.

- M ▷ Customer settings M0041
 - Multiport valve M1140
 - Dead band M1145

Default value: 0.00°

Setting range: 0.00 – 36.0° (degrees)

12.1.9. Correction of inertia

Due to reaction times and inertia, each Multiport valve has a specific inertia. This can be compensated by inertia correction.

Required user level: Specialist (4) or higher.

- M ▷ Customer settings M0041
 - Multiport valve M1140
 - Overrun M1656

Default value: 0.00°

Setting range: 0.00° – 10.0° (degrees)

12.1.10. Backlash compensation

Adjustable backlash compensation of the overall system including valve coupling.
Required user level: Specialist (4) or higher.

- M ▷ Customer settings M0041
 - Multiport valve M1140
 - Backlash comp. M1146

Default value: 0.00°

Setting range: 0.00 – 36.0° (degrees)

12.1.11. Signalling behaviour of positions: set/check

Reaching of a point (valve port) can be signalled:

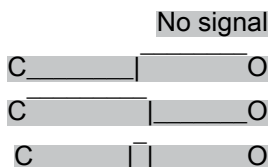
- via indication lights (LEDs) of the local controls or (refer to chapters <Indications> <Indication lights>)
- via output contacts (refer to chapters <Indications> <Assignment of outputs>)

Signal behaviour, this means the signal behaviour upon reaching a position, is set via parameter MPV sign. beh. 1.

- M ▷ Customer settings M0041
 - Multiport valve M1140
 - MPV sign. beh. 1 M1147

Default value: No signal

Setting values:



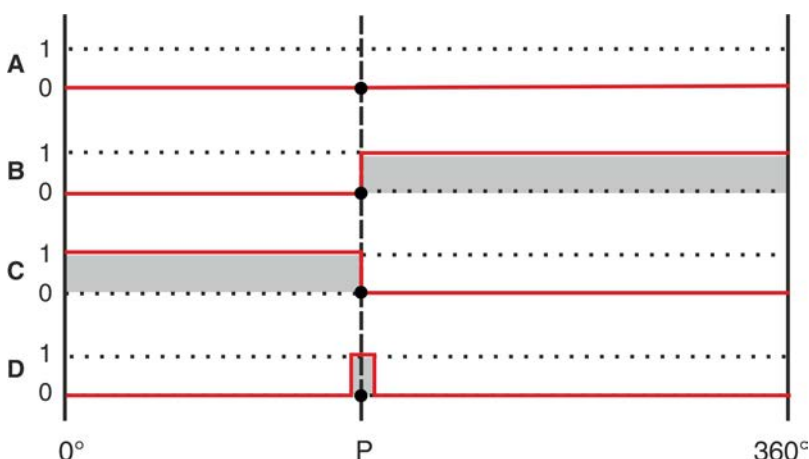
A: Signal behaviour Off. Position is not signalled.

B: Signal is active from reaching the position up to 360°.

C: Signal is active from 0° until the position is reached.

D: When passing the position, a pulse signal is issued. The pulse range (range +/- around the pivot point) depends on the set hysteresis.

Figure 52: Signal behaviour of positions



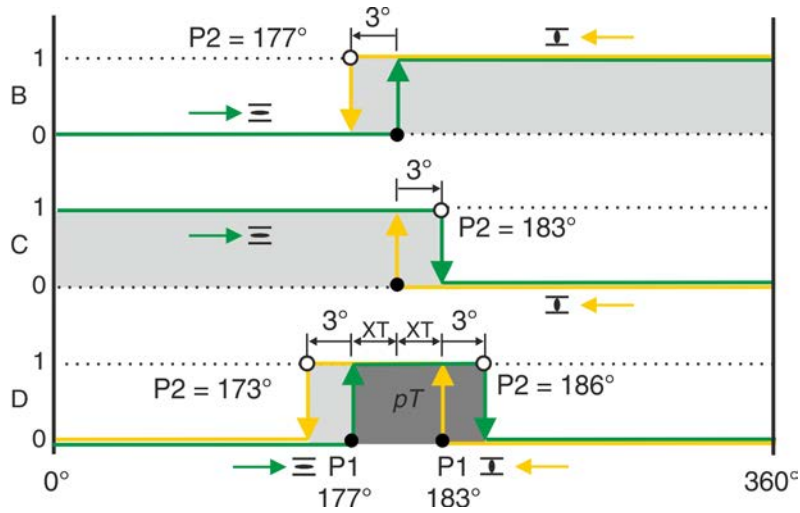
Information The set signal behaviour is valid for all positions.

12.1.12. Hysteresis for signalling intermediate positions: set

The hysteresis determines the tripping point.

- Example** Parameter Position 4 M1153 is set to 180° (50 % of the travel).
Parameter Hysteresis M1148 is set to 3.0°.

Figure 53: Switching behaviour for signalling behaviours B, C, D and hysteresis 3.0°.



- P1 Switch-on point (●)
- P2 Switch-off point (○)
- pT Pulse duration = 2 times XT + hysteresis

Required user level: AUMA (6).

- M ▷ Customer settings M0041
- Multiport valve M1140
- Hysteresis M1148

Default values: 0.5° for all 16 intermediate positions

Setting range: 0.0° to 5.0° (degree)

13. Service functions

The functions described here may only be changed by the AUMA service or by authorised and trained personnel.

Menu item **Service functions** is only visible, if user level **Specialist (4)** or higher is selected.

13.1. Direction of rotation

Properties This function allows changing the direction of rotation for actuator with 3-phase AC motors.

The direction of rotation indicates the direction into which the drive shaft rotates around its own axis. The view is on the top of the actuator. Distinction is made between clockwise and counterclockwise rotation.

- Information**
- When changing from clockwise closing to counterclockwise closing or vice versa, only the direction of rotation of the motor is changed. The change-over requires further action:
 - The wiring diagram designation is marked on the actuator controls name plate. In case of a change, a new name plate with the new wiring diagram number has to be requested from AUMA.
 - The wiring diagram number of the actuator is stored in the electronic device ID (parameter **Wiring diag. actuator M0060**). The ID has to be adapted to the new designation once conversion is complete.
 - The actuator mounted to the actuator controls must be configured for the set direction of rotation. Subsequent conversion from clockwise closing to counterclockwise closing is possible using an AUMA conversion kit.

Parameters and instructions for setting

Setting the direction of rotation using parameters is only possible for actuators with electronic control unit/MWG (Non-intrusive version).

NOTICE

Valve damage due to incorrect direction of rotation!

→ For 3-phase AC motors, the rotation direction of the actuator must match the rotation direction of the valve.

Required user level: **AUMA (6)**.

M ▷ **Device configuration M0053**
Actuator M0168
Closing rotation M0176

Default value: **Clockwise rotation**

Setting values:

Clockwise rotation The motor is controlled with a clockwise rotating field with the following sequence: L1-U1, L2-U2, L3-U3 (clockwise closing).

Counterclockwise rot. The motor is controlled with a counterclockwise rotating field with the following sequence: L1-U3, L2-U2, L3-U1 (counterclockwise closing).

13.2. Factory setting

The factory setting corresponds to the delivery state of the actuator controls.

When converting the controls e.g. by the AUMA service, a new factory setting can be generated to adapt the modified configuration.

Former factory settings can be restored.

Generate new factory setting

Required user level: **Service (5)** or higher.

- M ▷ **Device configuration** M0053
 Service functions M0222
 Create factory settings M0225

Generates new factory settings by accepting the current settings.

Restore factory setting

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 Service functions M0222
 Reset factory settings M0226

Resets the current settings to factory settings.

13.3. Languages: reload

If texts are changed or if a new display language is available, the language file can be updated from the external data carrier (SD card).

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 Service functions M0222
 Reload languages M0227

13.4. Data export

During data export the data is saved from the device to an external data carrier (SD card).

Export data

Comprehensive export of all data (parameters, operation data and event protocol).
 Operation data is device-specific data.

Required user level: **Service (5)** or higher.

- M ▷ **Device configuration** M0053
 Service functions M0222
 Export all data M0223

Export parameters

Export of all parameters. No operation data is transmitted.

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 Service functions M0222
 Export all parameters M0297

Export event report

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 Service functions M0222
 Export event report M0298

13.5. Data import

During data import, the data is transmitted to the controls from an external data carrier (SD card).

Import parameters

Import of all parameters. Operating data is not overwritten.

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 - Service functions** M0222
 - Import all parameters** M0311

13.6. Actual configuration: accept

When retrofitting controls, sub-assemblies are replaced by new sub-assemblies with different functions.

Example: Replacing the PSU (different voltage).

If the controls detect a modified sub-assembly during start up, the following fault signal is generated: **Configuration error**

Accept current actual configuration

Accept new actual configuration as target configuration.

Required user level: **AUMA (6)**.

- M ▷ **Device configuration** M0053
 - Service functions** M0222
 - Accept actual config.** M0590

13.7. Firmware update

A firmware update is required in the following cases:

- Upgrade with new functions
- Corrective actions

A firmware update can be performed in the following ways:

1. via Bluetooth connection with AUMA CDT software
2. via an SD card (card slot in local controls)

Firmware version

The firmware version can be displayed via the following menu:

- M ▷ **Device ID** M0021
 - Version** M0062
 - Firmware** M0077

Firmware update via SD card

The menu **Update firmware** is only displayed if an SD card has engaged in the card slot of the local controls.

Required access level: **Service (5)** or higher.

- M ▷ **Device configuration** M0053
 - Service functions** M0222
 - Update firmware** M0564

13.8. Service software

Using the **AUMA CDT** software for Windows-based computers (notebooks or tablets) and the **AUMA Assistant App** for Android-based devices, actuator data can be uploaded and read, settings can be modified and stored. The connection between computer and AUMA actuator is established wireless via Bluetooth interface. With the **AUMA Cloud**, we provide an interactive platform to collect and assess e.g. detailed device data of all actuators within a plant.

AUMA CDT



AUMA CDT is a user-friendly setting and operation program for AUMA actuators controls.

Connection between computer (notebook, tablet) and actuator controls is wireless via Bluetooth interface.

AUMA CDT software can be downloaded free of charge from our website www.auma.com.

AUMA Cloud



The AUMA Cloud is the driving element of the digital AUMA world, acting as interactive platform for efficient maintenance of AUMA actuators at moderate cost. The AUMA Cloud collects all device data of all actuators within one site and provides a clear overview at a glance. Detailed analysis provides valuable information on potential maintenance requirements. Additional functions foster smooth asset management.

AUMA Assistant App



The AUMA Assistant App is available on Google Play Store for free download.

Figure 54: Link to Google Play Store



Activate/deactivate Bluetooth

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
- Application functions** M0178
- Activation** M0212
- Bluetooth** M0573

Default value: Function active

Setting values:

Function not active

Function deactivated.

Function active

Function activated. If the connection is active, the blue LED on the local controls is illuminated.

Addresses and device tag

Required user level: **Specialist (4)** or higher.

- M ▷ **Diagnostics** M0022
- Bluetooth** M0244
- Device tag** M0423
- Bluetooth address** M0422
- Bluetooth add.partner** M0576

14. Diagnostics

Diagnostics comprise information on the device and on device sub-assemblies for support during commissioning, maintenance or corrective action.

14.1. Electronic device ID

The electronic device ID provides information about the order data (important for enquiries with the factory).

- M ▷ **Device ID M0021**
- Identification M0026**
- Version M0062**

Information on device identifications can be modified with the appropriate rights (user level).

Table 17: Information on device identifications

Identification M0026		
Indication on display	Description	User level required for modification
Device designation M0072	Device designation of the actuator controls	Service (5)
Device tag M0072	Device ID for identification within the plant marking (e.g. KKS (Power Plant Classification System))	Specialist (4)
Project name M0068	Project name of the plant	Specialist (4)
Actuator controls M0028		
Order no. controls M0055	Order number of the actuator controls	Service (5)
Serial no. controls M0056	Serial number of the actuator controls	Service (5)
Wiring diagram M0059	Wiring diagram number of the actuator controls	Service (5)
Date of manufacture M0063	Date of manufacture of controls	Service (5)
Actuator M0029		
Order no. actuator M0057	Order number of the actuator	Service (5)
Serial no. actuator M0220	Serial number of the actuator	Service (5)
Wiring diag. actuator M0060	Wiring diagram number of the actuator	Service (5)

Table 18: Information on device version

Version M0062	
Indication on display	Description
Firmware M0077	Firmware version
Language M0565	Language version
Details Firmware M0515	Menu with further items for requesting the current image file versions of current sub-assemblies (only visible for user level AUMA (6))
Hardware art. no. M0684	Menu with further items for requesting the hardware article number of the actual sub-assemblies (only visible for user level AUMA (6))

14.2. Bluetooth connection diagnostic

Menu is only visible if function **Bluetooth M0573** is activated.

Required user level: **Specialist (4)** or higher.

M ▷ **Diagnostics M0022**
Bluetooth M0244

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Device tag	M0223	Device tag (Can be changed for user level Specialist (4) and higher)
Bluetooth address	M0222	Bluetooth address
Bluetooth add.partner	M0576	Bluetooth add.partner

14.3. Diagnostic Interface

Required user level: Specialist (4) or higher.

M ▷ **Diagnostics M0022**
Interface M0239

The following states can be checked via the menu:

Parameters	Menu ID	Signification
States DIN	M0245	Shows configuration, coding and state of the input signals.
States AIN 1	M0246	Shows configuration and current value at analogue input 1.
States AIN 2	M0583	Shows configuration and current value at analogue input 2.
States DOUT	M0247	Shows configuration, coding and state of the output signals.
States AOUT 1	M0248	Shows configuration and current value at analogue output 1.
States AOUT 2	M0584	Shows configuration and current value at analogue output 2.
Interface status	M0730	Status of the interface

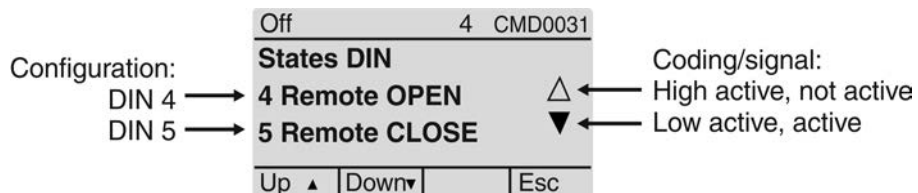
Diagnostics of digital inputs

For the digital inputs (DIN), both coding and signal states are indicated at the input by means of symbols.

Table 19: Symbol explanation

Symbol	Code	Signal (command)	Input state
△	High active	Not active	Low level = 0 V or input open
▲	High active	Active	High level = Default: +24 V DC
▽	Low active	Not active	High level = Default: +24 V DC
▼	Low active	Active	Low level = 0 V or input open

Figure 55: Example of DIN 4 and DIN 5



- Configuration:
 - DIN 4: Operation command OPEN
 - DIN 5: Operation command for EMERGENCY behaviour
- Coding:
 - DIN 4: High active (Triangle pointing in upward direction)
 - DIN 5: Low active (Triangle pointing in downward direction)

- Signal state at input:
 - DIN 4: Not active (triangle not filled in)
Low level = 0 V = No operation command in direction OPEN
 - DIN 5: Active (triangle is black)
Low level = 0 V = EMERGENCY operation command is available

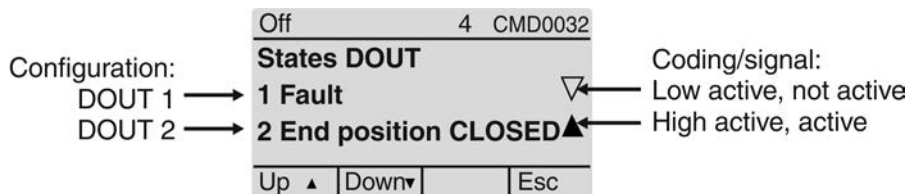
Diagnostic of digital outputs

For the digital outputs (DOUt), both coding and signal states are indicated at the output by means of symbols.

Table 20: Symbol explanation

Symbol	Code	Signal (indication)	State output (output contact)
△	High active	Not active	Low = 0 (output contact not operated)
▲	High active	Active	High = 1 (output contact operated)
▽	Low active	Not active	High = 1 (output contact operated)
▼	Low active	Active	Low = 0 (output contact not operated)

Figure 56: Example of DOUt 1 and DOUt 2



- Configuration:
 - DOUt 1: Indication: Fault has occurred.
 - DOUt 2: Indication: End position CLOSED reached
- Coding:
 - DOUt 1: **Low active** (Triangle pointing in downward direction)
 - DOUt 2: **High active** (Triangle pointing in upward direction)
- Signal state at output:
 - DOUt 1: Not active (triangle not filled in)
High level = +24 V DC = no indication (no fault available)
 - DOUt 2: Active (triangle is black)
High level = +24 V DC = indication (end position CLOSED reached)

14.4. Position transmitter and potentiometer diagnostic

Menu is only visible if the actuator is equipped with a potentiometer.

Required user level: **Observer (1)** or higher.

M▷ **Diagnostics M0022**
Position transm. potent. M0831

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Low limit Uspan	M0832	Low limit Uspan
Volt.level diff. potent.	M0833	Volt.level diff. potent.
Raw val. pos. OPEN	M0999	Raw val. pos. OPEN
Raw val. pos. CLOSED	M1001	Raw val. pos. CLOSED
Potent. raw value /mV	M1005	Potent. raw value /mV

14.5. Diagnostic Position transmitter RWG

Menu is only visible if the actuator is equipped with electronic position transmitter (RWG).

Required user level: **Observer (1)** or higher.

- M ▷ **Diagnostics M0022**
Position transm. RWG M0996

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Low limit RWG	M1010	
Raw val. pos. OPEN	M0997	
Raw val. pos. CLOSED	M0998	
RWG raw value /mA	M1000	

14.6. Diagnostic Position transmitter MWG

Menu is only visible if the actuator is equipped with magnetic limit and torque transmitter (MWG).

Required user level: **Observer (1)** or higher.

- M ▷ **Diagnostics M0022**
Position transm. MWG M1006

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Minimum stroke	M1007	
Maximum stroke	M1012	
Abs. end pos. OPEN	M1011	
Abs. end pos. CLOSED	M1008	
Absolute value	M1009	

14.7. Diagnostic Positioner

Required user level: **Specialist (4)** or higher.

- M ▷ **Diagnostics M0022**
Positioner M0613

Menu M0613 is only visible if function **Positioner M0158** is activated.

The following states can be checked via diagnostic:

Parameters	Menu ID	Bedeutung
Adaptive behaviour	M0626	
Setpoint position	M0622	
Actual position	M0623	
Outer dead b. OPEN	M0625	
Outer dead b. CLOSE	M1002	
Inner dead b. OPEN	M1003	
Inner dead b. CLOSE	M1004	

14.8. Diagnostic On time monitoring

Menu is only visible if on time monitoring (parameter **Duty type monitoring M0573**) is activated.

Required user level: **Observer (1)** or higher.

- M ▷ **Diagnostics M0022**
Operation mode M0593

The following states can be checked via diagnostics:

Parameters	Menu ID	Signification
On time	M0594	
No. mot. starts/h	M0595	

14.9. Diagnostic Process controller

Required user level: **Specialist (4)** or higher.

- M ▷ **Diagnostics M0022**
Process controller M0883

Menu **M0883** is only visible if function **Process controller M0741** is activated.

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Process setpoint	M0884	
Actual process value	M0885	
Op. com. PID contr.	M0886	

14.10. Diagnostic FQM (fail safe)

The menu will only be visible if a fail safe unit (FQM) is connected to the actuator.

Required user level: **Observer (1)** or higher.

- M ▷ **Diagnostics M0022**
FQM M1724

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
FQM FS ready	M1725	
FQM FS diag. result	M1726	
FQM fail safe end.pos.	M1727	
FQM FS-PosOk	M1728	
FQM FS-ESD request	M1729	
FQM timeout winding	M1730	

14.11. Simulation (inspection and test function)

The service personnel or the commissioning engineer can use this simulation function to simulate the operation and failure behaviour of the actuator or the actuator controls to check the interface to the DCS and the correct behaviour of the DCS.

14.11.1. Actuator signals

By simulating the actuator signals, the signal behaviour of the actuator controls to the DCS can be tested, for example, without having to connect the actuator.

Required user level: **Specialist (4)** or higher.

- M ▷ **Diagnostics M0022**
Simulation M0023
Actuator signals M0024

Simulation values:

- End position OPEN** End position OPEN reached.
 - End position CLOSED** End position CLOSED reached.
 - Torque fault OPEN** Torque in direction OPEN reached.
 - Torque fault CLOSE** Torque in direction CLOSE reached.
 - Thermal fault** Motor protection tripped (thermal fault)
- The simulation is activated and deactivated by push button **OK**.
A loop on the display indicates that the simulation is active.

14.11.2. Interface signals

By simulating the interface signals, the signal behaviour of the AUMATIC to the DCS can be tested, for example, without having to connect the actuator.

Required access level: **Specialist (4)** or higher.

M ▶ **Diagnostics** M0022
Simulation M0023
Signals DOUT M0025
Signals AOUT 1 M0413
Signals AOUT 2 M0585

Signals for simulating digital outputs:

Only the assigned outputs are displayed.

Numbers **1, 2, 3, ...** indicate the digital output.

Example: **1Fault**

Indication **Fault** is assigned to digital output 1 (parameter **Signal DOUT 1** M0109).

Simulation is activated and deactivated by push button **OK**.

Triangles indicate the activation:

Triangle pointing in upward direction: Output is coded high active.	
▲	High active (voltage is present, e.g. + 24 V DC)
△	High active (voltage is not present)
Triangle pointing in downward direction: Output is coded low active.	
▼	Low active (voltage is not present)
▽	Low active (voltage is present, e.g. + 24 V DC)

Signals for simulating analogue outputs:

Signals AOUT 1 Simulation of output signal **Actual position**, setting range: **0 ... 20 mA**

Signals AOUT 2 Simulation of output signal **Torque**, setting range: **0 ... 20 mA**

15. Asset Management

The Asset Management function provides information (operational data, signals, reports and characteristics), which can be used within an asset management system but also generally for support during commissioning, maintenance or corrective action.

15.1. Operating data

Operating data provides details e.g. about the running time, the number of starts, number of torque faults etc.

The analysis of this data provides valuable information regarding the optimization of both actuator and valve. When using this information purposefully, actuator and valve will be carefully operated, e.g. through appropriate parameter setting. In case of faults, the logging of operating data allows for quick fault diagnostic.

View the operating data

Two counters are available, a lifetime counter and a resettable counter.

- M ▶ **Asset Management M1231**
 - Operational info M0177
 - Operational info total M0183
 - Operational info M0188

Description of the indications:

Operational info total = Lifetime counter

Operational info = Counter can be reset to 0

Table 21: Operating data

Indication on display	Description
Motor running time	Motor running time
Motor starts	Number of motor starts (starts)
No. thermal faults	Number of thermal faults (motor protection)
Torque fault CLOSE	Number of torque faults in direction CLOSE
Torque fault OPEN	Number of torque faults in direction OPEN
Limit trip CLOSED	Number of limit switch trippings in direction CLOSE
Limit trip OPEN	Number of limit switch trippings in direction OPEN
Torque trip CLOSE	Number of torque switch trippings in direction CLOSE
Torque trip OPEN	Number of torque switch trippings in direction OPEN
On time warning 1	Total of all time intervals during which a start/run warning was signalled.
On time warning 2	Max. time interval during which a start/run warning was signalled.
No. system starts	Total of AUMATIC system starts
Max. temp. controls	Maximum temperature of the controls
Min. temp. controls	Minimum temperature of the controls
Max. temp. MWG	Maximum temperature of the MWG
Min. temp. MWG	Minimum temperature of the MWG
Operating hours	Operating hours counter: Number of hours during which controls are supplied with power

Reset operating data

Required user level: **Specialist (4)** or higher.

- M ▶ **Asset Management M1231**
 - Operational info M0177
 - Reset operation. info M0197

The entries in the operating data logging can be reset (deleted) via this menu.

15.2. Event report

The event report records system events and status signals. The event report can be exported to the external SD card or read via AUMA CDT software or the AUMA Assistant App. This allows e.g. comparisons of previous operations of actuator and valve.

Information Since the events are recorded with a time-stamp, date and time (parameter **Date and time M0221**) should be properly set.

Event filter for system events

The actuator controls record system events such as operation commands or modifications of the parameter settings. A filter is used to define the system events to be recorded in the event report.

Required user level: **AUMA (6)**.

M ▷ **Asset Management M1231**
Event report **M0195**
System event filter **M0334**

An event is recorded (i.e. filter is active) if a black dot is placed behind the value displayed.

Events which can be recorded:

Commands All operation commands recognised as valid and executed are recorded. The command source of the operation command is also recorded.

Parameterization All modifications of parameter settings are also recorded. Both former and new value are recorded.

Enable processes The enabling of a function is recorded.

System events All important system events are recorded. These include: System start, change of date, downloads, modifications of the event filter, resetting of operating data and switching on the mains voltage.

Event filter for status indications

The actuator controls record status indications such as faults, errors, warnings or Actuator is in end position CLOSED/OPEN. A filter is used to define the status indications to be recorded in the event report.

Required user level: **AUMA (6)**.

M ▷ **Asset Management M1231**
Event report **M0195**
Event filter for Events **M0333**

An event is recorded (i.e. filter is active) if a black dot is placed behind the value displayed.

Events which can be recorded:

The events which can be selected here are described in the <Faults and warnings> chapter.

File size of event report

The file size of the event report can be modified to record more or less events as desired. If the file is full, the oldest events will be overwritten so that the latest and current events are recorded.

Required user level: **AUMA (6)**.

M ▷ **Asset Management M1231**
Event report **M0195**
File size event. rep. **M0330**

Default value: **548** [kByte]

Setting range: 1 ... 1,024 [kByte]

With the maximum setting range of 1,024 kbyte, at least 20,000 events can be stored.

Information Some events are stored in a sector which cannot be overwritten. This includes, for example, modifications of the parameter setting, enabling of functions and certain special functions.

Number of events in the buffer

The events are first stored into an internal RAM. From this buffer, they are written to the event report after the set report cycle. The number of events in the buffer can be set here.

Information In case of power failure, the events in the buffer will be lost.

Required user level: AUMA (6).

M ▷ **Asset Management M1231**
Event report M0195
Buffer size M0332

Default value: 50 [events]

Setting range: 10 ... 100 [events]

Save interval

The event report is updated and saved at a defined cycle. This cycle (save interval) can be reduced or extended

Required user level: AUMA (6).

M ▷ **Asset Management M1231**
Event report M0195
Save interval M0331

Default value: 50,000

Setting range: 1,000 ... 65,535 [ms]

15.3. Characteristics

15.3.1. Torque-travel characteristic

- Conditions**
- Electric actuators with electronic control unit
 - Actuator controls (non-intrusive version) from firmware version 02.03.01

Properties Representation of torque requirement across complete travel (resolution of 0.1 %) During each travel, actuator controls continuously record the torques applied.

Application When comparing two characteristics (current characteristic with archived characteristic), the wear within the valve or the actuator can be assessed.

Display torque-travel characteristics

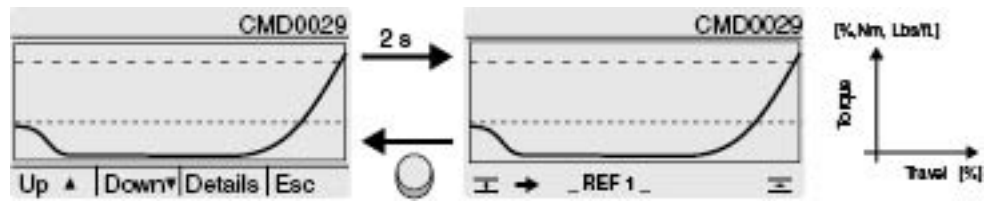
M ▷ **Asset Management M1231**
Characteristics M0313
Torque-travel M1229
Characteristics M0546

3 characteristics with two diagrams each (direction OPEN and direction CLOSE) are displayed while the arrow indicates the operation direction diagram.

Each characteristic has a designation (e.g. REF 1), which can be changed.

Use push buttons ▲▼ Up ▲Down ▼ to change between characteristics.

Figure 57: Example of torque-time characteristic



- Set tripping torque
- Min. adjustable tripping torque
- ⌘ ← Diagram for direction CLOSE
- ⌘ → Diagram for direction OPEN

The displayed characteristics are records which were previously saved.

The following further information is saved with the characteristic (can be requested via push button **Details**)

- **Saving date:** Time of last torque measurement
- **Starting date:** Time of first torque measurement
- **Scaling:** Y-axis (torque)
- **Tripping torque:** Set torque in direction OPEN/CLOSE
- **Min tripping torque:** Min. adjustable tripping torque
- **Max. value:** Max. measured torque value
- **Mean value:** Calculated mean value

Characteristics recording procedure

1. Reset characteristic (clear buffer)
2. Change characteristic designation
3. Record characteristic: Perform operation (e.g. CLOSE-OPEN-CLOSE)
4. Save characteristic

Reset characteristic

This parameter is used to reset the data in the buffer (RAM).

Required user level: **Specialist (4)** or higher.

- M ▷ **Asset Management M1231**
- Characteristics M0313
- Torque-travel M1229
- Reset characteristic M0656

After resetting the buffer, new characteristics can be recorded and saved.

Change characteristic designation

Each of the three characteristics can be named with an additional 20 characters.

Required user level: **Specialist (4)** or higher.

- M ▷ **Asset Management M1231**
- Characteristics M0313
- Torque-travel M1229
- Tag torque-position 1 M0658
- Tag torque-position 2 M0659
- Tag torque-position 3 M0660

Record characteristic: Perform operation (e.g. CLOSE-OPEN-CLOSE)

Set selector switch to position **Local control (LOCAL)** or **Remote control (REMOTE)** to record the characteristic.

Save characteristics

3 characteristics can be saved.

Each characteristic consists of two charts (direction OPEN and direction CLOSE).
When saving, data is transferred from the buffer (RAM) to the read-only memory (ROM).

Required user level: Specialist (4) or higher.

- M ▷ Asset Management M1231
 - Characteristics M0313
 - Torque-travel M1229
 - Save characteristic 1 M0652
 - Save characteristic 2 M0653
 - Save characteristic 3 M0654

15.3.2. Position-time characteristic

- Conditions**
 - Actuator of the type range SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2
 - MWG position transmitter in actuator
- Properties** During recording, the current position, for modulating actuators also the setpoint position, within an adjustable time interval (between 1 second and 1 hour).
- Application** By assessing the position-time characteristics, the control behaviour can be assessed or insights on the use of the actuator can be gained.

Display position-time characteristics

- M ▷ Asset Management M1231
 - Characteristics M0313
 - Position-time M0806

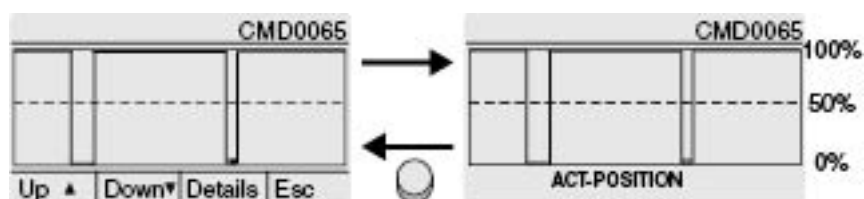
Each characteristic has a designation:

ACTUAL-POSITION = actual position

NOMINAL-POSITION = setpoint position (modulating actuators only)

Use push buttons ▲▼ Up ▲Down ▼ to change between characteristics.

Figure 58: Example of position-time characteristic



--- 50 % (position between OPEN = 100 % and CLOSED = 0 %)

The following further information is saved with the characteristic (can be requested via push button **Details**).

- **Saving date:** Time of last position measurement
- **Starting date:** Time of first position measurement
- **Scaling:** Y-axis (position)

Set resolution (time interval)

Actuator controls records 10,000 measured values. Set resolution of e.g. approx. 1 second (parameter **Interval position-time** = 1 [s]) results in a recording time of 2.7 hours (10 000 seconds). Once this value has been exceeded, the former positions will be overwritten (ring buffer)

Required user level: Specialist (4) or higher.

- M ▷ Asset Management M1231

Characteristics M0313
Interval position-time M0805

Default value: 10 [s]

Setting values: 1 ... 3600 [s]

15.3.3. Temperature-time characteristic

- Properties** Up to four temperature-time characteristics can be recorded unless the devices are fitted with suitable sensors.
- Conditions**
- For recording the temperature within the control unit: MWG (magnetic limit and torque transmitter)
 - For recording the temperature within the motor: additionally temperature sensor (PT 100) in the motor
 - For recording the temperature within the gear housing: additionally temperature sensor (PT 100) in the gearing
- Application** Evaluation of the temperature-time characteristics allows to gain knowledge about the service conditions (ambient temperatures) of the actuator.

Display temperature-time characteristic

M ▷ **Asset Management** M1231
Characteristics M0313
Temperature-time M0714

Up to four characteristics are shown in the display.

CONTROLS TEMPERATURE = temperature within the control unit

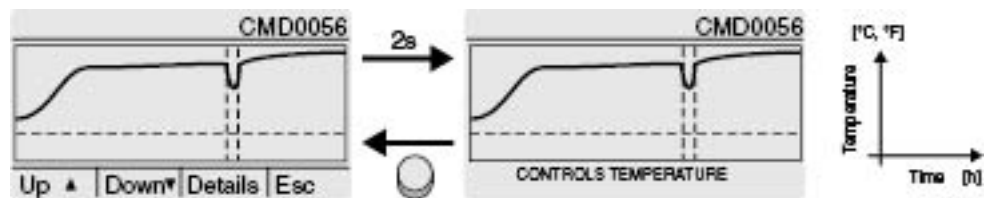
MWG TEMPERATURE = MWG temperature

MOTOR TEMPERATURE = temperature within the motor

GEAR TEMPERATURE = within the gear housing

Use push buttons ▲▼ Up ▲Down ▼ to change between available characteristics.

Figure 59: Example of temperature-time (within the control unit)



- - - 0° line

| Recording interrupted e.g. due to power failure

The actuator controls display shows temperature evolution during one week. AUMA CDT software reads out the evolution during an entire year.

The following further information is saved with the characteristic (can be requested via push button **Details**)

- **Saving date:** Time of last temperature measurement
- **Starting date:** Time of first temperature measurement
- **Scaling:** Y-axis (temperature)
- **Min. value:** Minimum measured value
- **Max. value:** Maximum measured value

15.4. Histograms

15.4.1. Motor running time-position (histogram)

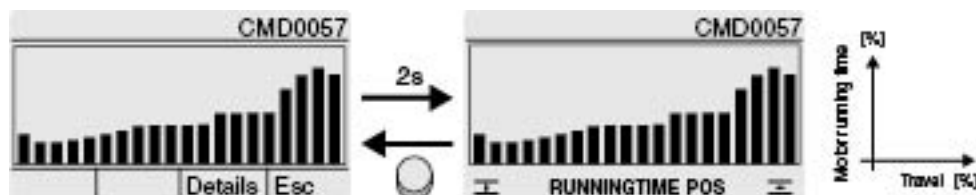
- Conditions**
- Actuators of the type range SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2

- Properties** The entire travel (from 0 – 100 %) is divided into 20 segments for recording the motor running time. When passing a segment, the counter, shown as bar graph, increments. The histogram is cyclically saved once a minute, in case a change has occurred.
- Application** The motor running time position histogram shows the travel range within which the actuator is predominantly operated. This allows to draw conclusions for the sizing of the valve.

Display motor running time-position

- M ▷ **Asset Management M1231**
Histograms M0712
Motor RunTime-Position M0713

Figure 60: Example of a motor running time position histogram



The following detailed information is saved with the histogram (may be called up via push buttons **Details**)

- **Starting date:** date of first running time measurement
- **Saving date:** date of last running time measurement
- **Scaling:** Y-axis (motor running time)

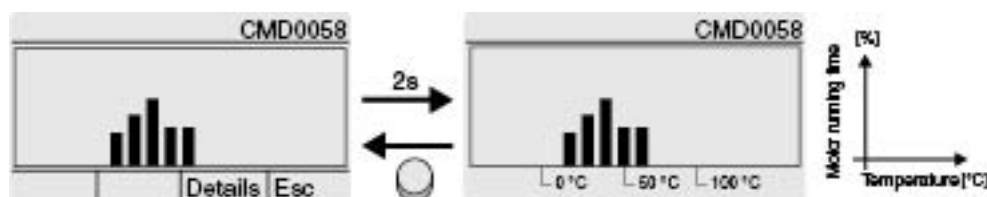
15.4.2. Motor running time-temperature (histogram)

- Conditions**
- MWG position transmitter in actuator
 - Temperature sensor in the motor (option)
- Properties** The motor temperature is divided into the following segments:
 < -20°C to -10°C, > -10°C to 0°C, > 0°C to 10°C, ..., 120°C to 130°C, > 130°C to 140°C, > 140°C.
- During each operation, the counter of the segment corresponding to the current motor temperature will be incremented. The result is shown in a bar chart. The histogram is cyclically saved once a minute in case of change.
- Application** The histogram indicates the ambient conditions (temperatures) at which the actuator motor was predominantly operated.

Display motor running time-temperature

- M ▷ **Asset Management M1231**
Histograms M0712
Motor RunTime-Temp. M0715

Figure 61: Example of motor running time - motor temperature histogram



The following further information is saved with the histogram (can be requested via push button **Details**)

- **Starting date:** Date of first running time measurement
- **Saving date:** Date of last running time measurement
- **Scaling:** Y-axis (motor running time)

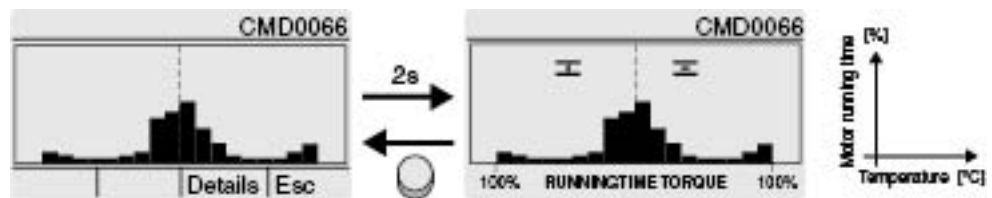
15.4.3. Motor running time-torque (histogram)

- Conditions** MWG position transmitter in actuator
- Properties** The torque scale is divided into the following segments for both directions (OPEN/CLOSE):
 from 0 – 30 %
 from 30 – 110 % (8 segments with a width of 10 % each)
 more than 110 %
 During each operation, the counter of the segment corresponding to the currently required torque will be incremented. The result is shown in a bar chart. The histogram is cyclically saved once a minute, in case a change has occurred.
- Application** The motor running time-torque histogram indicates the actuator load during service life.

Display motor running time-torque

- M ▷ **Asset Management M1231**
Histograms M0712
Motor TunTime-Torque M0830

Figure 62: Example of motor running time-torque histogram



The following further information is saved with the histogram (can be requested via push button Details)

- **Starting date:**
- **Saving date:**
- **Scaling:**

15.5. Maintenance (information and signals)

- Properties** Actuator controls monitor various parameters set in the factory which have an impact on the wear of the actuator. Once one of these parameters exceeds a determined limit, the actuator controls generate a signal:
 - Status indication: **S0005 Warnings** (AUMA category)
 - Details: **Maintenance required**
 - Status indication: **S0010 Maintenance required** (NAMUR category)
 - Details: shows the parameter(s) for which the limit was exceeded, causing the **Maintenance required** signal.

Apart from the parameter monitoring preset in the factory (MT lifetime mechanics/seals/lubricant/reversing contactors), a fixed maintenance interval can additionally be configured, triggering the same signal when exceeding the configured time.

The current maintenance status of the monitored parameters is represented in a bar chart.

Once maintenance is complete, the parameter initiating maintenance must be reset to zero.

- Application** Maintenance on demand, i.e. the function can be used to perform maintenance depending on the intensity and load of the actuator.

Activate maintenance signals

Required user level: **Specialist (4)** or higher.

- M ▷ **Device configuration** M0053
 Application functions M0178
 Activation M0212
 Maintenance signals M1136
Default value: Function not active
Setting values:
 Function not active <Maintenance signals> function deactivated.
 Function active <Maintenance signals> function activated.

Activate maintenance interval

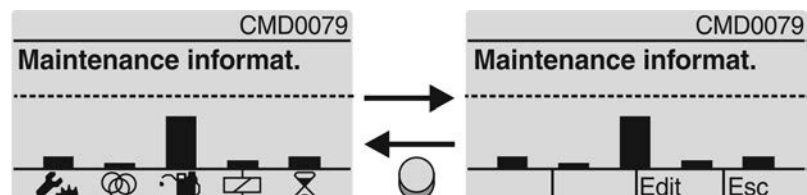
Required user level: Specialist (4) or higher.

- M ▷ **Device configuration** M0053
 Application functions M0178
 Activation M0212
 Maintenance interval M1137
Default value: Function not active
Setting values:
 Function not active <Maintenance interval> function deactivated.
 Function active <Maintenance interval> function activated.

Display maintenance information

- M ▷ **Maintenance signals** M1231
 Maintenance M1644
 Maintenance informat. M1037

Figure 63: Example of bar chart



The bar charts indicates the current consumption of the following lifetime accounts:

- Lifetime mechanics
- Lifetime seals (O-rings)
- Lifetime lubricants
- Lifetime contactors (only for actuator controls which are not provided with variable speed function)
- Maintenance interval (adjustable)

Once a bar reaches the threshold (- - -), maintenance will be required.

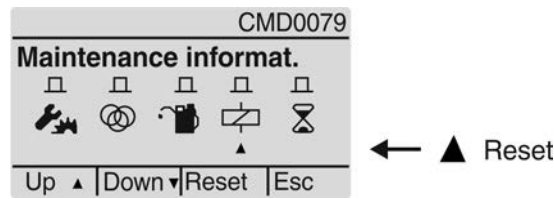
Reset parameter

Once maintenance is complete, the parameter initiating the request must be reset. Starting from **Maintenance informat. M1037** indication, you can change via **Edit** to the reset mode.

Required user level: Specialist (4) or higher.

- M ▷ **Device configuration** M0053
 Application functions M0178
 Activation M0212

Figure 64:



Use push buttons **Up ▲** **Down ▼** to select the desired parameter. The arrow below the symbols shows the selected parameter. Pressing push button **Reset** resets the lifetime account of the selected parameter to zero.

Set maintenance interval

Parameters for setting a defined maintenance interval. Once the set time has elapsed, a maintenance signal is issued.

Required user level: **Specialist (4)** or higher.

- M ▷ **Maintenance signals M1231**
 - Maintenance M1644**
 - Maintenance interval M1233**

Default value: 10 years

Setting range: 1 month... 10 years

15.6. Operating times display

Characteristics The actuator controls automatically determine the operating time for an operation between two end positions. For both directions (from OPEN to CLOSE and from CLOSE to OPEN), the last determined value is saved within a parameter.

Application Operating time measurement indicated how an actuator installed in plant or a combination of actuator/gearbox/valve behave with regard to inertia without performing an operation and measuring the time manually.

Display measured operating times

- M ▷ **Asset Management M1231**
 - Operating time M1232**
 - Operating time CLOSE M1234**
 - Operating time OPEN M1235**

Indications:

Operating time CLOSE Indicates the measured operating time for the last operation in direction CLOSE

Operating time OPEN Indicates the measured operating time for the last operation in direction OPEN

15.7. Device temperature display

Required user level: **Specialist (4)** or higher.

- M ▷ **Asset Management M1231**
 - Device temperatures M0524**

Indications:

Temp. controls Indication of current temperature in actuator controls housing

Temp. control unit Indication of current temperature in control unit of the actuator (actuator housing)

16. Corrective action

16.1. Primary fuses

The actuator controls have to be opened to exchange the primary fuses. For detailed information, refer to operation instructions for actuator.

16.2. Fault indications and warning indications

Faults interrupt or prevent the electrical actuator operation. In the event of a fault, the display backlight is red.

Warnings have no influence on the electrical actuator operation. They only serve for information purposes. The display remains white.

Collective signals include further indications. They can be displayed via the **Details** push button. The display remains white.

Table 22:

Faults and warnings via status indications in the display		
Indication on display	Description/cause	Remedy
S0001	Instead of the valve position, a status text is displayed.	For a description of the status texts, refer to <Status texts in Menu S0001>.
S0005 Warnings	Collective signal 02: Indicates the number of active warnings.	For indicated value > 0: Press push button Details . For details, refer to <Warnings and Out of specification> table.
S0006 Not ready REMOTE	Collective signal 04: Indicates the number of active signals.	For indicated value > 0: Press push button Details . For details, refer to <Not ready REMOTE and Function check> table.
S0007 Fault	Collective signal 03: Indicates the number of active faults. The actuator cannot be operated.	For indicated value > 0: Press push button Details to display a list of detailed indications. For details, refer to <Faults and Failure> table.
S0008 Out of specification	Collective signal 07: Indication according to NAMUR recommendation NE 107 Actuator is operated outside the normal operation conditions.	For indicated value > 0: Press push button Details . For details, refer to <Warnings and Out of specification> table.
S0009 Function check	Collective signal 08: Indication according to NAMUR recommendation NE 107 The actuator is being worked on; output signals are temporarily invalid.	For indicated value > 0: Press push button Details . For details, refer to <Not ready REMOTE and Function check> table.
S0010 Maintenance required	Collective signal 09: Indication according to NAMUR recommendation NE 107 Recommendation to perform maintenance.	For indicated value > 0: Press push button Details to display a list of detailed indications.
S0011 Failure	Collective signal 10: Indication according to NAMUR recommendation NE 107 Actuator function failure, output signals are invalid	For indicated value > 0: Press push button Details to display a list of detailed indications. For details, refer to <Faults and Failure> table.

Table 23:


Warnings and Out of specification		
Indication on display	Description/cause	Remedy
Config. warning	Collective signal 06: Possible cause: Configuration setting is incorrect. The device can still be operated with restrictions.	Press push button  Details to display a list of individual indications. For a description of the individual signals, refer to <Individual signals> table/ Config. warning (collective signal 06).
Internal warning	Collective signal 15: Device warnings The device can still be operated with restrictions.	Press push button  Details to display a list of individual indications. For a description of the individual signals, refer to <Individual signals> table/ Internal warning (collective signal 15).
24 V DC external	The external 24 V DC voltage supply of the controls has exceeded the power supply limits.	Check 24 V DC voltage supply.
Wrn op.mode run time	Warning on time max. running time/h exceeded	<ul style="list-style-type: none"> • Check modulating behaviour of actuator. • Check parameter Perm. run time M0356, re-set if required.
Wrn op.mode starts	Warning on time max. number of motor starts (starts) exceeded	<ul style="list-style-type: none"> • Check modulating behaviour of actuator. • Check parameter Permissible starts M0357, re-set if required.
Failure behav. active	The failure behaviour is active since all required setpoints and actual values are incorrect.	Verify signals: <ul style="list-style-type: none"> • Setpoint E1 • Actual value E2 • Actual process value E4
Wrn input AIN 1	Warning: Loss of signal analogue input 1	Check wiring.
Wrn input AIN 2	Warning: Loss of signal analogue input 2	Check wiring.
Wrn setpoint position	Warning: Loss of signal setpoint position Possible causes: For an adjusted setpoint range of e.g. 4 – 20 mA, the input signal is 0 (signal loss). For a setpoint range of 0 – 20 mA , monitoring is not possible.	Check setpoint signal.
Op. time warning	The set time (parameter Perm.op. time, manual M0570) has been exceeded. The preset operating time is exceeded for a complete travel from end position OPEN to end position CLOSED.	The warning indications are automatically cleared once a new operation command is executed. <ul style="list-style-type: none"> • Check valve. • Check parameter Perm.op. time, manual M0570.
Wrn controls temp.	Temperature within controls housing too high.	Measure/reduce ambient temperature.
Time not set	Real time clock has not yet been set.	Set time.
RTC voltage	Voltage of the RTC button cell is too low.	Replace button cell.
PVST fault	Partial Valve Stroke Test (PVST) could not be successfully completed.	Check actuator (PVST settings).
PVST abort	Partial Valve Stroke Test (PVST) was aborted or could not be started.	Perform RESET or restart PVST.
Wrn no reaction	No actuator reaction to operation commands within the set reaction time.	<ul style="list-style-type: none"> • Check movement at actuator. • Check parameter Reaction time M0634.
Torque wrn OPEN	Limit value for torque warning in direction OPEN exceeded.	Check parameter Wrn torque OPEN M0768 , re-set if required.
Torque wrn CLOSE	Limit value for torque warning in direction CLOSE exceeded.	Check parameter Wrn torque CLOSE M0769 , re-set if required.
SIL fault ¹⁾	SIL sub-assembly fault has occurred.	Refer to separate Manual Functional Safety.
PVST required	Execution of PVST (Partial Valve Stroke Tests) is required.	
Maintenance required	Maintenance is required.	

1) For actuators controls in SIL version

Table 24:


Faults and Failure		
Indication on display	Description/cause	Remedy
Configuration error	Collective signal 11: Configuration error has occurred.	Press push button Details to display a list of individual indications. For a description of the individual signals, refer to <Individual signals> table/ Configuration error (collective signal 11).
Config. error REMOTE	Collective signal 22: Configuration error has occurred.	Press push button Details to display a list of individual indications. For a description of the individual signals, refer to <Individual signals> table/ Config. error REMOTE (collective signal 22).
Internal error	Collective signal 14: Internal error has occurred.	AUMA service Press push button Details to display a list of individual indications. For a description of the individual signals, refer to <Individual signals> table/ Internal error (collective signal 14).
Torque fault CLOSE	Torque fault in direction CLOSE	Perform one of the following measures: <ul style="list-style-type: none"> Issue operation command in direction OPEN. Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET.
Torque fault OPEN	Torque fault in direction OPEN	Perform one of the following measures: <ul style="list-style-type: none"> Issue operation command in direction CLOSE. Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET.
Phase fault	<ul style="list-style-type: none"> When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing. 	Test/connect phases.
Incorrect phase seq	The phase conductors L1, L2 and L3 are connected in the wrong sequence. Only applicable if connected to a 3-ph AC system.	Correct the sequence of the phase conductors L1, L2 and L3 by exchanging two phases.
Mains quality	Due to insufficient mains quality, the controls cannot detect the phase sequence (sequence of phase conductors L1, L2 and L3) within the pre-set time frame provided for monitoring.	<ul style="list-style-type: none"> Check mains voltage. For 3-phase/1-phase AC current, the permissible variation of the mains voltage is $\pm 10\%$ (option $\pm 30\%$). The permissible variation of the mains voltage is $\pm 5\%$ Check parameter Tripping time M0172, extend time frame if required.
Thermal fault	Motor protection tripped	<ul style="list-style-type: none"> Cool down, wait. If the fault indication display persists after cooling down: <ul style="list-style-type: none"> Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET. Check fuses.
Fault no reaction	No actuator reaction to operation commands within the set reaction time.	Check movement at actuator.
Poti Out of Range	Potentiometer is outside the permissible range.	Check device configuration: Parameter Low limit Uspar M0832 must be less than parameter Volt.level diff. potent. M0833 .
LPV not ready ¹⁾	LPV: Lift Plug Valve function The master actuator signals a fault	
Wrn input AIN 1	Loss of signal analogue input 1	Check wiring.

Corrective action

Faults and Failure		
Indication on display	Description/cause	Remedy
Wrn input AIN 2	Loss of signal analogue input 2	Check wiring.
Incorrect rotary direct.	Contrary to the configured direction of rotation and the active operation command, the motor turns into the wrong direction.	Check operation command control. For 3-phase AC current mains, activate phase monitoring (parameter Adapt rotary dir. M0171). Check device configuration setting (parameter Closing rotation M0176). To delete the fault indication: Disconnect actuator controls from the mains and perform reboot.
FQM collective fault ²⁾	Collective signal 25:	Press push button  Details to display a list of individual indications. For a description of the individual signals, refer to <Individual signals> table/ Configuration error (collective signal 11).

- 1) For lift plug valve product variant
2) For actuators equipped with fail safe unit

Table 25:

Not ready REMOTE and Function check (collective signal 04)		
Indication on display	Description/cause	Remedy
Wrong oper. cmd	Collective signal 13: Possible causes: <ul style="list-style-type: none"> Several operation commands (e.g. OPEN and CLOSE simultaneously, or OPEN and SET-POINT operation simultaneously) A setpoint is present and the positioner is not active 	<ul style="list-style-type: none"> Check operation commands (reset/clear all operation commands and send one operation command only). Set parameter Positioner to Function active. Check setpoint. Press push button  Details to display a list of individual indications. For details, refer to <Individual indications> table.
Sel. sw. not REMOTE	Selector switch is not in position REMOTE.	Set selector switch to position REMOTE.
Service active	Operation via service interface (Bluetooth) and AUMA CDT service software.	Exit service software.
Disabled	Actuator is in operation mode Disabled.	Check setting and status of function <Local controls enable>.
EMCY stop active	The EMERGENCY stop switch has been operated. The motor control power supply (contactors or thyristors) is disconnected.	<ul style="list-style-type: none"> Enable EMERGENCY stop switch. Reset EMERGENCY stop state by means of Reset command.
EMCY behav. active	Operation mode EMERGENCY is active (EMERGENCY signal was sent). 0 V are applied at the EMERGENCY input.	<ul style="list-style-type: none"> Detect cause for EMERGENCY signal. Verify failure source. Apply +24 V DC at EMERGENCY input.
I/O interface	The actuator is controlled via the I/O interface (parallel).	Check I/O interface.
Handwheel active	Manual operation is activated.	Start motor operation.
Interlock	An interlock is active.	Check interlock signal.
Interlock by-pass	By-pass function is interlocked.	Check states of main and by-pass valve.
PVST active	Partial Valve Stroke Test (PVST) is active.	Wait until PVST function is complete.
SIL function active ¹⁾	SIL function is active	

- 1) For actuators controls in SIL version

Table 26:

Individual indications	
Indication on display	Remedy
Config. warning (Collective signal 06)	
Wrn Setpoint Source	Configure analogue inputs AIN 1 or AIN 2, refer to <Input for setpoint position>
Wrn dead bands	Check positioner setting.
Torque config. CLOSE	Verify torque switching setting.

Individual indications	
Indication on display	Remedy
Torque config. OPEN	Verify torque switching setting.
DIN 1 configuration – DIN 10 configuration	Signal assignment for the indicated digital input (DIN 1 – DIN 10) is incorrect. Reconfigure digital input.
Configuration EMCY	Check configuration.
Config. operat. profile	Check configuration.
FO configuration	Check configuration.
Heat.monitor.config.	Check configuration.
Fail.beh. config.	Check configuration.
Config. PID controller	Check configuration.
Configuration error (Collective signal 11)	
IE MCM	Check hardware equipment/article number MCM.
IE PSO	Check hardware equipment/article number PSO.
IE config. pos. transm.	Check hardware equipment/article number position transmitter.
IE parameter config.	Check position transmitter parameters.
IE FQM	The configuration for the FQM (fail safe) unit is invalid.
Configuration FUP	The configuration for the function plan is invalid. Check configuration.
MPV and CW closing	Multiport valve and clockwise closing.
Hydraulics fault (Collective signal 12)	
Phase fault	<ul style="list-style-type: none"> When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing. Test/connect phases.
Incorrect phase seq	The phase conductors L1, L2 and L3 are connected in the wrong sequence. Only applicable if connected to a 3-ph AC system. Correct the sequence of the phase conductors L1, L2 and L3 by exchanging two phases.
Thermal fault	Motor protection tripped <ul style="list-style-type: none"> Cool down, wait. If the fault indication display persists after cooling down: <ul style="list-style-type: none"> Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET. Check fuses.
Wrong oper. cmd (Collective signal 13)	
Incorr. cmd REMOTE1	Correct operation command, i.e. delete and set anew.
Incorr. cmd REMOTE2	Correct operation command, i.e. delete and set anew.
Command fieldbus	Correct operation command.
Setpoint pos. disabled	Verify availability of function (parameter Activation M0212)
Internal error (Collective signal 14)	
IE mot. prot. monitor	Check motor protection monitoring.
IE selector switch	Replace selector switch.
IE phase monitoring	Check power supply.
IE 24 V AC	Internal error: The internal 24 V AC voltage supply of the controls has exceeded the power supply limits. The 24 V AC voltage supply is used to control the reversing contactors, to assess the thermostiches, to supply the internal actuator heater and, as an option, to generate the 115 V AC supply for the customer. <ul style="list-style-type: none"> Check power supply (level and wiring). Check power supply unit.

Corrective action

Individual indications	
Indication on display	Remedy
IE output defective	Check switchgear control.
IE position transmitter	Check actuator.
IE logic	Check logic.
IE fieldbus	Check fieldbus interface.
IE MWG	Check MWG.
IE LC	Check local controls.
IE Hall 1 calibration – IE Hall 5 calibration	Internal error: Calibration of Hall sensor 1 – 5 of the MWG is incorrect. Check MWG.
IE MWG calibration	Check MWG.
IE version	Check device configuration.
IE EEPROM	Check device configuration.
IE parameter	Check device configuration.
IE file access	Check device configuration.
IE reserve backup	Check device configuration.
IE registration	Check device configuration.
IE startup FB	Check device configuration.
IE startup sub-assy	Check device configuration.
IE LC exception	Check device configuration.
IE logic exception	Check device configuration.
IE MWG exception	Check device configuration.
IE bus exception	Check device configuration.
IE MWG end positions	Check device configuration.
Internal warning (Collective signal 15)	
Wrn heater	Check heater.
24 V DC customer	The 24 V DC customer auxiliary supply to control the digital inputs has failed. Check 24 V DC inputs (DIN).
24 V DC internal	The internal 24 V DC power supply of the controls used to provide the electronics components (sub-assemblies within the AC 01.2 controls and in the actuator) has exceeded the power supply limits . Check internal 24 V DC voltage supply.
Wrn res. data in use	Reboot AUMATIC.
Wrn ref.actual position	Operate actuator fully in end positions OPEN and CLOSED.
Wrn range act.pos.	Verify primary reduction gearing settings within the actuator.
Wrn sign.loss act.pos.	Check position feedback.
Wrn event mark	Check system configuration.
Wrn Tm mark	Check system configuration.
Config. error REMOTE (Collective signal 22)	
IE I/O interface	<ul style="list-style-type: none"> • Check I/O interface M0139 parameter. The setting must correspond to the wiring diagram. • Check wiring. • Check I/O interface.
IE remote interface	Check configuration.
IE remote Prm Config	Check configuration.
FQM collective fault (Collective signal 25)	
FQM FS diag. result	The result of the diagnostics via winding and blinker transmitter switch is available as fault.
FQM timeout winding	Winding was not completed within the permissible initialisation time of 2.5 minutes.
FQM timeout limit	The end position switch was not active within the permissible waiting time of 10 seconds.

Individual indications	
Indication on display	Remedy
FQM fault temp.-volt.	The permissible tolerance range for the room temperature or the voltage range of the respective FQM unit was fallen short of or exceeded or the permissible tolerance range for 24 V DC at ESD input was fallen short of or exceeded for a period of minimum 1 second.
FQM fail safe fit	The signal is generated if one of the following conditions applies: <ul style="list-style-type: none"> • FQM FS-ESD request not active AND FQM timeout winding or FQM timeout limit or FQM timeout motor active • FQM FS-ESD request not active AND FQM FS ready active AND FQM FS-PosOk not active • FQM FS-ESD request not active AND FQM FS ready not active AND FQM FS-PosOk active • FQM FS-ESD request not active AND FQM fail safe ini. executed AND (FQM FS-PosOk not active OR FQM FS ready not active) • FQM FS-ESD request active AND FQM FS ready active
FQM timeout motor	The electric motor does not rotate during an initialisation operation.

Table 27:

Status texts in menu S0001		
Indication on display	Description/cause	Remedy
Sensor failure	Hardware is either defective or not available: <ul style="list-style-type: none"> • for potentiometer, RWG, EWG = signal loss • for MWG = calibration active or Hall sensor defective 	Check or replace hardware.
Not referenced	For potentiometer, RWG, EWG: end positions not set	Set end positions and perform reference operation.
Calibration	Calibration active	
Out of range	Outside the value range <ul style="list-style-type: none"> • for potentiometer = insufficient stroke between the set end positions • for RWG, EWG = end position OPEN = end position CLOSED • for MWG = excessive stroke between the set end positions 	Set valid stroke.
Invalid command	Invalid command	
Replacement value	Substitute value	
PCB failure	Sub-assembly failure	
Commlost	Communication between MWG and logic is interrupted. Possible causes: problem with contacts	AUMA service Replace MWG

17. Appendix

17.1. Selection overview for output contacts and indication lights (digital outputs DOUT)

Depending on the version, the actuator controls are equipped with up to 12 output contacts (digital outputs).

Table 28:

Signal	Description
Not used	–
End position CLOSED	End position CLOSED reached Indication depends on the type of seating and means either <ul style="list-style-type: none"> • limit seating, end position CLOSED reached, or • torque seating, end position CLOSED reached
End position OPEN	End position OPEN reached Indication depends on the type of seating and means either <ul style="list-style-type: none"> • limit seating, end position OPEN reached, or • torque seating, end position OPEN reached
End p. CLOSED, blink	End position CLOSED reached or intermediate position reached (The intermediate position is only indicated if parameter Signal interm. pos. M0167 = OPEN/CLOSED = On.) Signal blinking: Actuator runs in direction CLOSE.
End p. OPEN, blink	End position OPEN reached or intermediate position reached. (The intermediate position is only indicated if parameter Signal interm. pos. M0167 = OPEN/CLOSED = On.) Signal blinking: Actuator runs in direction OPEN.
Setpoint pos.reached	The position setpoint is within maximum error variable (outer dead band).
Running CLOSE	Actuator runs in direction CLOSE.
Running OPEN	Actuator runs in direction OPEN.
Selector sw. LOCAL	Selector switch is in position LOCAL.
Selector sw. REMOTE	Selector switch is in position REMOTE.
Selector sw. OFF	Selector switch is in position OFF.
Limit switch CLOSED	Limit switch operated in direction CLOSE
Limit switch OPEN	Limit switch operated in direction OPEN
Torque sw. CLOSED	Torque in direction CLOSE exceeded
Torque sw. OPEN	Torque in direction OPEN exceeded
NAMUR failure	Collective signal 10: Indication according to NAMUR recommendation NE 107 Actuator function failure, output signals are invalid.
NAMUR funct. check	Collective signal 08: Indication according to NAMUR recommendation NE 107 The actuator is being worked on; output signals are temporarily invalid.
NAMUR out of spec.	Collective signal 07: Indication according to NAMUR recommendation NE 107 Difference between setpoint and actual value is too important (exceeding the normal operation conditions).
NAMUR mainten. req.	Collective signal 09: Indication according to NAMUR recommendation NE 107 Recommendation to perform maintenance.
Fault	Collective signal 03: Contains the result of a disjunction (OR operation) of all faults.
Warning	Collective signal 02: Contains the result of an OR disjunction of all warnings.
Not ready REMOTE	Collective signal 04: Contains the result of a disjunction (OR-operation) of the signals, forming the "Not ready REMOTE" group. The actuator cannot be operated from REMOTE. The actuator can only be operated via the local controls.

Signal	Description
Fault (configurable)	<p>Collective signal 19: This signal can be configured (parameter Fault (Cfg) M0880) and comprises a combination of the following signals:</p> <ul style="list-style-type: none"> • Configuration error • Config. error REMOTE • Internal error • Torque fault CLOSE • Torque fault OPEN • Phase fault • Incorrect phase seq • Mains quality • Thermal fault • Fault no reaction • Wrn input AIN 1 • Wrn input AIN 2 • Incorrect rotary direct. • DMF fault OPEN • DMF fault CLOSE • FQM collective fault
Warnings (Cgg)	<p>Collective signal 20: This signal can be configured (parameter Warnings (Cfg) M0881) and comprises a combination of the following signals:</p> <ul style="list-style-type: none"> • Config. warning • Internal warning • 24 V DC external • Wrn op.mode run time • Wrn op.mode starts • Failure behav. active • Wrn input AIN 1 • Wrn input AIN 2 • Wrn setpoint position • Op. time warning • Wrn controls temp. • Time not set • RTC voltage • PVST fault • PVST abort • Wrn no reaction • Wrn FOC • Wrn FO cable budget • Wrn FOC connection • Torque wrn OPEN • Torque wrn CLOSE • SIL fault • PVST required • Maintenance required • FQM fail safe flt • Speed reduction • AUMA warning 2

Signal	Description
Not ready REM (Cfg)	Collective signal 21: This signal can be configured (parameter Not ready REMOTE (Cfg) M0882) and comprises a combination of the following signals: <ul style="list-style-type: none"> • Wrong oper. cmd • Sel. sw. not REMOTE • Service active • EMCY stop active • EMCY behav. active • I/O interface • Handwheel active • FailState fieldbus • Local STOP • Interlock • Interlock by-pass • PVST active • SIL function active • FQM fail safe act. • FQM fail safe ini.
Operation pause active	Actuator is in pause time of stepping mode.
Start stepping mode	The actuator is within the set stepping range.
Actuator running	Actuator is running (output drive is moving). Hard wired collective signal consisting of: <ul style="list-style-type: none"> • Running LOCAL • Running REMOTE • Handwheel oper.
Running LOCAL	Output drive rotates due to operation command from LOCAL.
Running REMOTE	Output drive rotates due to operation command from REMOTE.
Handwheel oper.	Output drive rotates without electric operation command.
In intermediate pos.	The actuator is in an intermediate position e.g. neither in end position OPEN nor in end position CLOSED.
Intermediate pos. 1	Intermediate position 1 reached
Intermediate pos. 2	Intermediate position 2 reached
Intermediate pos. 3	Intermediate position 3 reached
Intermediate pos. 4	Intermediate position 4 reached
Intermediate pos. 5	Intermediate position 5 reached
Intermediate pos. 6	Intermediate position 6 reached
Intermediate pos. 7	Intermediate position 7 reached
Intermediate pos. 8	Intermediate position 8 reached
Intermediate pos. 9	Intermediate position 9 reached
Intermediate pos. 10	Intermediate position 10 reached
Intermediate pos. 11	Intermediate position 11 reached
Intermediate pos. 12	Intermediate position 12 reached
Intermediate pos. 13	Intermediate position 13 reached
Intermediate pos. 14	Intermediate position 14 reached
Intermediate pos. 15	Intermediate position 15 reached
Intermediate pos. 16	Intermediate position 16 reached
Input DIN 1	A high signal (+24 V DC) is present at digital input 1.
Input DIN 2	A high signal (+24 V DC) is present at digital input 2.
Input DIN 3	A high signal (+24 V DC) is present at digital input 3.
Input DIN 4	A high signal (+24 V DC) is present at digital input 4.
Input DIN 5	A high signal (+24 V DC) is present at digital input 5.
Input DIN 6	A high signal (+24 V DC) is present at digital input 6.
EMCY stop active	Operation mode EMERGENCY stop is active (EMERGENCY stop button has been pressed).

Signal	Description
Torque fault CLOSE	Torque fault in direction CLOSE
Torque fault OPEN	Torque fault in direction OPEN
Torque fault	Torque fault in directions CLOSE or OPEN
Thermal fault	Motor protection tripped
Phase fault	One phase missing
Handwheel active	Manual operation is active (handwheel is engaged); optional signal.
PVST active	Partial Valve Stroke Test (PVST) is active.
PVST fault	Partial Valve Stroke Test (PVST) could not be successfully completed.
PVST abort	Partial Valve Stroke Test (PVST) was aborted or could not be started. Remedy: Perform RESET or restart PVST.
Failure (configurable)	This signal can be configured (parameter Failure (configurable) M0879) and comprises a combination of the following signals which can also be configured: <ul style="list-style-type: none"> • Fault (Cfg) M0880 • Warnings (Cfg) M0881 • Not ready REMOTE (Cfg) M0882
Interlock Remote	Function Interlock is active for operation mode REMOTE.
Interlock Local	Function Interlock is active for operation mode Local.
Interlock OPEN	Interlock OPEN is active (enable signal for operation commands in direction OPEN available).
Interlock CLOSE	Interlock CLOSED is active (enable signal for operation commands in direction CLOSE available).
Interlock	The operation mode Interlock is active.
Bypass Sync Out	<By-pass function> enable for operation commands of main or by-pass valves is active.
Interlock by-pass	Operation command executed without enable signal Bypass Sync Out .
Safe ESD	Safe ESD function (Emergency Shut Down) is active.
Safe Stop	Safe STOP function is active.
SIL fault	A SIL fault has occurred (collective signal).
SIL function active	A SIL function is active. Collective signal of both states, Safe ESD or Safe STOP.
System ok	The actuator is switched on and no fault is present
Torque wrn OPEN	
Torque wrn CLOSE	
LPV Sync Out	LPV (Lift Plug Valve) synchronisation signal. Master or slave actuator are in an end position.
LPV SA-OPEN	Operation command in direction OPEN from the master actuator to the slave actuator (SA).
LPV SA-CLOSE	Operation command in direction CLOSE from the master actuator to the slave actuator (SA).
PVST required	(PVST) Partial Valve Stroke Test should be executed
FQM FS ready	The constant force spring is wound, the FQM is ready for fail safe operation.
FQM FS-ESD request	The FQM (fail safe) fail safe function is requested (ESD requested).
FQM end pos. OP	FQM has reached end position OPEN at the output drive side.
FQM end pos. CL	FQM has reached end position CLOSED at the output drive side.
FQM FS diag. result	The result of the diagnostics via winding switch is available as fault.
FQM timeout winding	Winding was not completed within the permissible initialisation time of 2.5 minutes.
FQM timeout limit	The end position switch was not active within the permissible waiting time of 10 seconds.
FQM fault temp.-volt.	The permissible tolerance range for the internal temperature or the voltage range of the respective FQM unit was fallen short of or exceeded or the permissible tolerance range for 24 V DC at ESD input was fallen short of or exceeded for a duration of minimum 1 second.
FQM fail safe fit	The signal is generated if one of the following conditions applies: <ul style="list-style-type: none"> • FQM FS-ESD request not active AND FQM timeout winding or FQM timeout limit or FQM timeout motor active • FQM FS-ESD request not active AND FQM FS ready active AND FQM FS-PosOk not active • FQM FS-ESD request not active AND FQM FS ready not active AND FQM FS-PosOk active • FQM FS-ESD request not active AND FQM fail safe ini. executed AND (FQM FS-PosOk not active OR FQM FS ready not active) • FQM FS-ESD request active AND FQM FS ready active

Signal	Description
FQM timeout motor	The electric motor does not rotate during an initialisation operation.
Maintenance reminder	This signal will be activated if at least on the lifetime accounts (in %) has passed the activation threshold configured for this signal. This signal can be configured (parameter Maintenance required M0871) and comprises a combination of the following signals: <ul style="list-style-type: none"> • Mainten. mechanics • LPV SA-CLOSE • Mainten. lubricant • Mainten. contactors • Mainten. interval
MPV/LPV pos. reached	MPV (Multiport Valve)/LPV (Lift Plug Valve) position reached.
Disabled	The operation via the push buttons on the local controls is disabled.
Runs_OP/CL+blinker	The actuators runs while the indication light for the respective direction of operation (OPEN/CLOSE) is blinking simultaneously at local controls.

17.2. Selection list of binary signals for digital inputs (DIN)

Depending on the version, the actuator controls are equipped with up to 10 digital inputs.

The inputs are designed for binary signals (standard input level: +24 V DC) and can be used, for example, to receive operation commands OPEN, STOP, CLOSE, to control intermediate positions or for the EMERGENCY signal.

Configuration of digital inputs

Required user level: **Specialist (4)**.

- M ▶** **Device configuration M0053**
I/O interface M0139
Digital inputs M0116

Table 29:

Signal	Description
Not used	Input not assigned
MODE	Change-over between OPEN - CLOSE control and setpoint control
OPEN	Operation command OPEN
CLOSE	Operation command CLOSE
STOP	Operation command STOP
RESET	Reset fault signal
I/O interface	Change-over between fieldbus interface and parallel interface
OPEN / CLOSE	Operation command OPEN/CLOSE for two-wire control
EMERGENCY	Operation mode for EMERGENCY behaviour
Intermediate pos. 1	Operation command: Run to intermediate position 1.
Intermediate pos. 2	Operation command: Run to intermediate position 2.
Intermediate pos. 3	Operation command: Run to intermediate position 3.
Intermediate pos. 4	Operation command: Run to intermediate position 4.
Intermediate pos. 5	Operation command: Run to intermediate position 5.
Intermediate pos. 6	Operation command: Run to intermediate position 6.
Intermediate pos. 7	Operation command: Run to intermediate position 7.
Intermediate pos. 8	Operation command: Run to intermediate position 8.
Intermediate pos. 9	Operation command: Run to intermediate position 9.
Intermediate pos. 10	Operation command: Run to intermediate position 10.
Intermediate pos. 11	Operation command: Run to intermediate position 11.
Intermediate pos. 12	Operation command: Run to intermediate position 12.
Intermediate pos. 13	Operation command: Run to intermediate position 13.

Signal	Description
Intermediate pos. 14	Operation command: Run to intermediate position 14.
Intermediate pos. 15	Operation command: Run to intermediate position 15.
Intermediate pos. 16	Operation command: Run to intermediate position 16.
MPV: CW Position 1	Clockwise approach of position 1
MPV: CCW Position 1	Counterclockwise approach of position 1
MPV: CW Position 2	Clockwise approach of position 2
MPV: CCW Position 2	Counterclockwise approach of position 2
MPV: CW Position 3	Clockwise approach of position 3
MPV: CCW Position 3	Counterclockwise approach of position 3
MPV: CW Position 4	Clockwise approach of position 4
MPV: CCW Position 4	Counterclockwise approach of position 4
MPV: CW Position 5	Approach position 5 clockwise
MPV: CCW Position 5	Approach position 5 counterclockwise
MPV: CW Position 6	Approach position 6 clockwise
MPV: CCW Position 6	Approach position 6 counterclockwise
MPV: CW Position 7	Approach position 7 clockwise
MPV: CCW Position 7	Approach position 7 counterclockwise
MPV: CW Position 8	Approach position 8 clockwise
MPV: CCW Position 8	Approach position 8 counterclockwise
MPV: CW Position 9	Approach position 9 clockwise
MPV: CCW Position 9	Approach position 9 counterclockwise
MPV: CW Position 10	Approach position 10 clockwise
MPV: CCW Position 10	Approach position 10 counterclockwise
MPV: CW Position 11	Approach position 11 clockwise
MPV: CCW Position 11	Approach position 11 counterclockwise
MPV: CW Position 12	Approach position 12 clockwise
MPV: CCW Position 12	Approach position 12 counterclockwise
MPV: CW Position 13	Approach position 13 clockwise
MPV: CCW Position 13	Approach position 13 counterclockwise
MPV: CW Position 14	Approach position 14 clockwise
MPV: CCW Position 14	Approach position 14 counterclockwise
MPV: CW Position 15	Approach position 15 clockwise
MPV: CCW Position 15	Approach position 15 counterclockwise
MPV: CW Position 16	Approach position 16 clockwise
MPV: CCW Position 16	Approach position 16 counterclockwise
MPV DriveCW	Clockwise actuator operation
MPV DriveCCW	Counterclockwise actuator operation
Input DIN 1	Signal for controlling output contact
Input DIN 2	Signal for controlling output contact
Input DIN 3	Signal for controlling output contact
Input DIN 4	Signal for controlling output contact
Enable Local	Enables the selector switch function (LOCAL/OFF) on the local controls
Enable OPEN	Interlock: Enables operation command in direction OPEN
Enable CLOSE	Interlock: Enables operation command in direction CLOSE
PID internal setpoint 2	Internal PID setpoint
Remote2_active	Activation of operation mode Remote II
Remote2_OPEN	Operation command OPEN in operation mode Remote II
Remote_2_CLOSE	Operation command CLOSE in operation mode Remote II

Signal	Description
Remote2_STOP	Operation command STOP in operation mode Remote II
Execute PVST	PVST is executed
Bypass Sync In	Enable signal for <By-pass function>
LPV Sync In	Enable signal for LPV function (synchronisation)
LPV end position CL	LPV slave actuator has reached end position CLOSED
LPV sel.sw.Remote	Selector switch of LPV slave actuator is in position REMOTE
LPV system ok	LPV slave actuator is ready for operation
PID setpoint I/O	Change-over of process controller setpoint source between fieldbus interface and I/O interface
PID act. value I/O	Change-over of process controller actual value source between fieldbus interface and I/O interface
RelOPENandCLOSE	Enable signal OPEN/CLOSE

Index

A

Activate/deactivate heater	68
Activate functions	98
Actual configuration	109
Actual value - indication on display	19
Actual value source - process controller	59
Actuator controls heater system	68
Actuator operation from remote	11
Actuator type (MPV)	100
Adaptive behaviour	49
Analogue output 1	26
Analogue output 1 adjustment	27
Analogue output 1 signal range	27
Analogue output 2	28
Analogue output 2 adjustment	28
Analogue output 2 signal range	28
Analogue outputs	26
Analogue signals	26
Appendix	134
Application functions	45
AUMA Assistant App	110
AUMA Cloud	110
Automatic deblocking	66

B

Backlash compensation (MPV)	105
Basic settings	32
Behaviour	81
Binary input signals	138
Bluetooth	110
Bluetooth diagnostic	111
Bluetooth interface	85
By-pass function	61

C

CDT	109, 110
Change-over between OPEN - CLOSE control and setpoint control	52
Characteristics	119, 119, 121, 122
Closing fully/opening fully	51
Commissioning	8
Commissioning (indications on display)	17
Configurable signals	25
Contrast	44
Control	30
Controller behaviour (process controller)	55
Correction of inertia (MPV)	104
Correction of the direction of rotation	97
Corrective action	127
Cycles	90

D

Data export	108
Data import	108
Date	40
Date format	40
Deactivate heater monitoring within actuator controls	95
Dead band	50, 50
Dead band (MPV)	104
Dead time	51
Delay time	72
Delay time <EMERGENCY operation>	77
Device temperatures	126
Diagnostic Interface	112
Diagnostics	111
Digital inputs	138, 138
Digital inputs (diagnostics)	112
Digital outputs	25
Digital outputs (diagnostics)	112
Direct display via ID	13
Direction of rotation	97, 107
Direction of rotation:	107
Directives	8
Display (indications)	17
Display formats	40
Display operating time	126
Down time	96

E		I	
Electronic device ID	111	Incorrect entry	15
Electronics monitoring power supply	94	Indication light colour	23
EMERGENCY behaviour	72	Indication lights	23
EMERGENCY operation	72, 74	Indications	17
EMERGENCY stop	31	Indications on display	17
Enable functions	98	Interface (diagnostics)	112
Enable operation commands	79	Interlock:	79
Enabling local controls	77	Interlock: by-pass	76
End position seating	32	Interlock behaviour	80
End position tolerance	51	Intermediate position indication via LEDs	23
Enforce REMOTE control	78	Intermediate positions	45
Error - indication on display	18	Internal process setpoint	57
Error variable	50	Intrusive	10
Event report	118	Inverse operation	57
F		L	
Factory setting	107	Language in the display	16
Fail safe (diagnostic)	115	LEDs (indication lights)	23
Failure behaviour	70	Lift Plug Valve	63
Failure functions	70	Limit seating	32
Failure - indication on display	22	Limit setting range	51
Failure operation	70	Limit switching	35
Failure position	71	Local actuator operation	11
Failure source (EMERGENCY operation)	74	Local control	11
Failure source (failure operation)	70	Local controls	11
Failure source (Interlock)	80	Local setting	12
Fault - indication on display	21	Local Stop	81
Fault signal - configurable	25	Local stop: by-pass	76
Firmware update	109	Loss of process setpoint	57
Firmware version	109	Loss of signal	70, 71
FQM (diagnostics)	115	Loss of signal process setpoint	57
Function check - indication on display	21	LPV	63
Functions: activate/enable	98	M	
Fuses	127	Main menu	13
G		Maintenance	9
Gear reduction ratio	100	Maintenance required - indication on display	22
H		Maintenance signals	124
Heater	95	Menu navigation	12
Heater in switch compartment	68	MODE	52
Heater monitoring	95	Monitoring functions	88
Heater monitoring time	96	Motion detector	93
Heater on control unit	68	Motor heater	69
Heater system	95	Motor protection. by-pass	75
Heater system monitoring	95	Motor protection behaviour	90
Histogram	122, 123, 124	Motor protection monitoring	90, 90
Histograms	122	Motor running time position histogram	122
Home port	101	Motor running time-temperature (histogram)	123
		Motor running time-torque (histogram)	124
		Motor starts	90
		MWG (diagnostic)	114

N		P	
Non-Intrusive	10	Partial Valve Stroke Test	82
Not ready REMOTE - indication on display	21	Password	14
Number format	41, 41	Password change	15
Number of ports (positions)	101	Password entry	14
O		Permissible operation time	92
Off time	48, 60	Permissible starts/h	91
On time	60, 90	Phase failure monitoring	96
On time monitoring (diagnostics)	114	Phase sequence detection	97
OPEN - CLOSE control (Remote OPEN - CLOSE)	52	Plant Asset Management	117
Operating data	117	Positioner	49
Operating the actuator from local controls	11	Positioner (diagnostic)	114
Operation	8, 11, 29	Positioner - indication on display	19
Operation commands - indications on display	19	Positions (pivot points)	45
Operation profile	47	Position-time characteristic	121
Operation profile: by-pass	76	Position transmitter (diagnostic)	113
Operation time monitoring	92	Position unit	41
Out of specification - indication on display	21	Potentiometer (diagnostic)	113
Output contacts	25	Primary fuses	127
Output signals	25	Priority REMOTE	78
Overload protection	88	Process controller	54
Overrun	50	Process controller (diagnostics)	115
		Process factor unit	42
		Process setpoint – loss	57
		Product variants	100
		Proportional amplification Kp	58
		Protective measures	8
		Push-to-run operation	11
		Push-to-run operation local	29
		Push-to-run operation Remote	30
		PVST	82
		Q	
		Qualification of staff	8
		R	
		Rate time Td	58
		Reaction monitoring	92
		Reaction time	93
		Reaction time, permissible	93
		Reaction time of heater monitoring	96
		Remote actuator operation	11
		Reset time Tn	58
		Reversing prevention time	70
		Running time	90
		Running time (motor)	122, 123, 124
		RWG (diagnostic)	113

S		T	
Safety instructions	8	Target configuration	109
Safety instructions/warnings	8	Temperature (motor)	123
Selection overview for output contacts and indication lights	134	Temperature indication	126
Selector switch functions	77	Temperature monitoring	95
Self-retaining	11	Temperature-time characteristic	122
Self-retaining local	29	Temperature unit	41
Self-retaining Remote	30	Thermal monitoring	90
Service	31	Time	40
Service functions	107	Timeout	15
Setpoint control (Remote SETPOINT)	52	Torque (histogram)	124
Setpoint - indication on display	19	Torque by-pass	88, 88
Setpoint source - process controller	56	Torque - indication on display	19
Signal behaviour (multiport valve)	105	Torque limitation	89
Signal loss	71	Torque monitoring	88
Signal output units (AOUT)	43	Torque seating	32
Signals	25	Torque switching	33, 34
Signals (analogue)	26	Torque switching: by-pass	75
Signals - configurable	25	Torque-travel characteristic	119
Simulation	115	Torque unit	41
Source (PVST)	83	Torque warning	88
Split Range operation	53	Two-wire control	48
Standards	8	Type of seating for end positions	32
Start of stepping mode	60		
Status menu	13	U	
Status signals	25	User level	14
Status signals - configurable	25		
Stepping mode	59	V	
Stepping mode: by-pass	76	Valve position - indication on display	18
Stop step	60	Verification of sub-assemblies	96
Switching off for reaction time error	93		
		W	
		Warnings - indication on display	20
		Working value units (AIN)	43

Parameter index

	85, 85, 87, 87		
0			
0/4 mA (initial value)	28		
2			
20 mA (final value)	28		
24 V DC customer	132		
24 V DC external	128		
24 V DC internal	132		
A			
Abs. end pos. CLOSED	114		
Abs. end pos. OPEN	114		
Absolute value	114		
Accept actual config.	109		
Activation	85, 85		
Actual position	26, 114		
Actual process value	115		
Actuator behaviour	93		
Actuator type	100		
Adapt rotary dir.	97		
Adjustment AOUT 1	27		
Adjustment AOUT 2	28		
B			
Backlash comp.	105		
Bluetooth add.partner	110, 112		
Bluetooth address	110, 112		
Buffer size	119		
By-pass application	63		
By-pass Interlock	76		
By-pass Local STOP	76		
By-pass operat.profile	76		
By-pass timer	76		
By-pass torque	75		
C			
Calibration	133		
Change passwords	15		
Closing rotation	107		
Coding DOUT 1	25		
Colour ind.light 1	24		
Colour ind.light 2	24		
Colour ind.light 3	24		
Colour ind.light 4	24		
Colour ind.light 5	24		
Command fieldbus	131		
Commlost	133		
Config. error REMOTE	129, 129, 132		
Config. operat. profile	131		
Config. PID controller	131		
Config. warning	128, 128, 130		
Configuration EMCY	131		
Configuration error	129, 129, 130, 131		
Configuration FUP	131		
Create factory settings	108		
D			
Date and time		40	
Dead band CLOSE		50	
Dead band OPEN		50	
Deblocking attempts		67	
Delay MA direct.CLOSE		66	
Delay MA direct.OPEN		66	
Delay SA direct.CLOSE		66	
Detect. time dt		93	
Detect. time dt (MWG)		93	
Device ID		111	
Device tag		110, 112	
DIN 1 configuration		131	
Disabled		130	
Duty type monitoring		91	
E			
EMCY behav. active		130	
EMCY behaviour		73	
EMCY fail.reac.		73	
EMCY operation		74	
EMCY operation mode		74	
EMCY position		75	
EMCY position MPV		75	
EMCY source		74	
EMCY stop active		130	
End position CLOSED		32	
End position OPEN		32	
End stepping CLOSE		60	
End stepping OPEN		60	
Event filter for Events		118	
Export all data		108	
Export all parameters		108	
Export event report		108	

F

Fail.beh. config.	131
Fail.pos.OPEN CLOSE	71
Failure	127
Failure (configurable)	26
Failure behav. active	128
Failure position MPV	72
Fault	127
Fault (Cfg)	26
Fault no reaction	129
File size event. rep.	118
Firmware	109
FO configuration	131
FQM	115
FQM collective fault	130, 132
FQM fail safe end.pos.	115
FQM fail safe flt	133
FQM fault temp.-volt.	133
FQM FS diag. result	115, 132
FQM FS-ESD request	115
FQM FS-PosOk	115
FQM FS ready	115
FQM timeout limit	132
FQM timeout motor	133
FQM timeout winding	115, 132
Function check	127

H

Handwheel active	130
Heat.monitor.config.	131
Heater control unit	68
Heater monitor	95
Heating sys. mon. time	96
High limit AIN 1	53
High limit target value	54
Hydraulics fault	131
Hysteresis	46, 106
Hysteresis 1	47

I					
I/O interface	130			Interval position-time	122
Identification	111			Invalid command	133
IE 24 V AC	131			L	
IE bus exception	132			Language	16
IE config. pos. transm.	131			Limit CLOSE	52
IE EEPROM	132			Limit OPEN	52
IE fieldbus	132			Local STOP	81
IE file access	132			Low limit AIN 1	53
IE FQM	131			Low limit RWG	114
IE Hall 1 calibration	132			Low limit target value	54
IE Hall 5 calibration	132			Low limit Uspan	113
IE I/O interface	132			LPV function	65
IE LC	132			LPV not ready	129
IE LC exception	132			M	
IE logic	132			Mains quality	129
IE logic exception	132			Maintenance interval	125, 126
IE MCM	131			Maintenance required	127, 128
IE mot. prot. monitor	131			Max. value at 100.0 %	42, 43, 43, 44
IE MWG	132			Maximum stroke	114
IE MWG calibration	132			Minimum stroke	114
IE MWG end positions	132			Modulating behaviour	56
IE MWG exception	132			Monitor 24 V DC cust.	94
IE output defective	132			Monitor 24 V DC ext.	94
IE parameter	132			Monitor heat. system	95
IE parameter config.	131			MPV and CW closing	131
IE phase monitoring	131			MPV home port	101
IE position transmitter	132			MPV sign. beh. 1	105
IE PSO	131			N	
IE registration	132			No. mot. starts/h	114
IE remote interface	132			Not ready REMOTE	127
IE remote Prm Config	132			Not ready REMOTE (Cfg)	26
IE reserve backup	132			Not referenced	133
IE selector switch	131			Number of ports	101
IE startup FB	132			O	
IE startup sub-assy	132			Off time 1	48
IE version	132			Off time CLOSE	60
Import all parameters	109			Off time OPEN	60
Incorr. cmd REMOTE1	131			Off times	48
Incorr. cmd REMOTE2	131			On time CLOSE	60
Incorrect phase seq	129, 131			On time OPEN	60
Incorrect rotary direct.	130			On time warning 1	91
Indicat. light 5 (right)	23			On time warning 2	91
Indication light 1 (left)	23			Op. com. PID contr.	115
Indication light 2	23			Op. time warning	128
Indication light 3	23			Oper. mode Interlock	80
Indication light 4	23			Oper. time monitoring	92, 92
Inner dead b. CLOSE	114			Oper. time opposite	67
Inner dead b. OPEN	114			Operating time	126
Input AIN 1	27			Operational info	117, 117, 117
Input AIN 2	27			Operational info total	117
Input of setpoint position	53			Operation behaviour	47
Interface	112			Operation behaviour 1	47
Interface status	112			Operation mode	92, 114
Interlock	80, 130			Outer dead b. CLOSE	114
Interlock by-pass	130			Outer dead b. OPEN	114
Interlock source	80			Outer dead band	51
Internal error	129, 129, 131				
Internal warning	128, 128, 132				

Out of range	133	S	
Out of specification	127	Save interval	119
P		Scaling	42, 43, 43, 44
PCB failure	133	Sel. master/slave act.	65
Perm.op. time, manual	92	Sel. sw. not REMOTE	130
Perm. run time	91	Self-retaining Local	29
Permissible starts	91	Sensor failure	133
Phase fault	129, 131	Service active	130
Phase monitoring	96	Set end pos. CLOSED?	35, 38
Pivot point 1	45	Set end pos. OPEN?	35, 38
Posit. hyst. CLOSE	51	Setpoint pos. disabled	131
Posit. hyst. OPEN	51	Setpoint position	114
Position	42, 42	Setpoint position - input	53
Position activation	42	Sig. outp. activ. (AOUT)	43
Position-time	121	Signal AIN 1	53
Position transm. MWG	114	Signal AIN 2	53
Position transm. potent.	113	Signal AOUT 1	26
Position transm. RWG	114	Signal AOUT 2	28
Potent. raw value /mV	113	Signal behaviour	45
Poti Out of Range	129	Signal behaviour 1	45
Proc. var. activation	42	Signal DOUT 1	25, 116
Process factor	42, 43	Signal interm. pos.	23
Process setpoint	115	Signal loss beh.	70
PVST abort	128	Signal outputs (AOUT)	43, 44
PVST active	130	Signal range AOUT1	27
PVST behaviour	84	Signal range AOUT2	28
PVST fault	128	SIL fault	128
PVST monitoring	84	SIL function active	130
PVST operating time	84	Source	71
PVST operation mode	83	Split range operation	54
PVST reminder	85	Start stepping CLOSE	60
PVST reminder period	85	Start stepping OPEN	60
PVST required	128	States AIN 1	112
PVST reversing time	84	States AIN 2	112
PVST source	83	States AOUT 1	112
PVST stroke	84	States AOUT 2	112
R		States DIN	112
Raw val. pos. CLOSED	113, 114	States DOUT	112
Raw val. pos. OPEN	113, 114	Step mode CLOSE	60
Reduction ratio	100	Step mode OPEN	60
Reload languages	108	Switchgear	70
Replacement value	133	System event filter	118
Reset characteristic	120		
Reset factory settings	108		
Reset MPV homeport	101		
Reset operation. info	117		
Revers. prevent. time	70		
RTC voltage	128		
Running dir. Interlock	81		
RWG raw value /mA	114		

T

Temp. ctrls norm. ‰	27
Temp. ctrl unit norm ‰	27
Temperature-time	122
Thermal by-pass	75
Thermal fault	129, 131
Time format	41
Time not set	128
Timer CLOSE	60
Timer OPEN	60
Tolerance CLOSE	51
Tolerance OPEN	51
Tolerance range	68
Torque	26
Torque by-pass [s]	89
Torque config. CLOSE	130
Torque config. OPEN	131
Torque fault CLOSE	129
Torque fault OPEN	129
Torque peak [%]	89
Torque-travel	119, 120, 120, 121
Torque wrn CLOSE	128
Torque wrn OPEN	128
Travel diff. dx	94
Travel diff. dx (MWG)	94
Tripping time	96
Trip torque CLOSE	34
Trip torque OPEN	34
Type of seating	32

U

Unit	42, 43, 43, 44
Units	42, 42, 42, 43, 43, 43, 43, 44
Update firmware	109

V

Version	111
Volt.level diff. potent.	113

W

Warnings	127
Warnings (Cfg)	26
Work. val. activ. (AIN)	43
Working values (AIN)	43, 43
Wrn controls temp.	128
Wrn dead bands	130
Wrn event mark	132
Wrn heater	132
Wrn input AIN 1	128, 129
Wrn input AIN 2	128, 130
Wrn no reaction	128
Wrn op.mode run time	128
Wrn op.mode starts	128
Wrn range act.pos.	132
Wrn ref.actual position	132
Wrn res. data in use	132
Wrn setpoint position	128
Wrn Setpoint Source	130
Wrn sign.loss act.pos.	132
Wrn Tm mark	132
Wrn torque CLOSE	88
Wrn torque OPEN	88
Wrong oper. cmd	130, 131

auma[®]

Solutions for a world in motion

AUMA Riester GmbH & Co. KG

P.O. Box 1362

DE 79373 Muellheim

Tel +49 7631 809 - 0

Fax +49 7631 809 - 1250

info@auma.com

www.auma.com

Y004.735/003/en/1.20