auma®
Solutions for a world in motion

Actuator controls

AC 01.2/ACExC 01.2

Control

→ Parallel

Profibus

Modbus RTU

Modbus TCP/IP

Foundation Fieldbus

HART

Manual

Operation and setting

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

1. Safety instructions

1.1. Basic information on safety

Standards/directives

AUMA products are designed and manufactured in compliance with recognised standards and directives. This is certified in a Declaration of Incorporation and a EC Declaration of Conformity.

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: EN 60079 “Electrical apparatus for explosive gas atmospheres" –
  - Part 14: Electrical installations in hazardous areas (other than mines).
  - Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines).

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 exclusively by suitably qualified personnel having been 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 are responsible for respect and control of these regulations, standards, and laws.

Commissioning

Prior to commissioning, it is important to 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 the national regulations.

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

Any device modification requires the 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).

⚠ DANGER	**Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning could result in death or serious injury.**
⚠ WARNING	**Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.**
⚠ CAUTION	**Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning may result in minor or moderate injury. May also be used with property damage.**
NOTICE	**Potentially hazardous situation. Failure to observe this warning may result in property damage. Is not used for personal injury.**

Arrangement and typographic structure of the warnings

⚠ DANGER

Type of hazard and respective source!

Potential consequence(s) in case of non-observance (option)

→ Measures to avoid the danger

→ Further measure(s)

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)

✓ Important information before the next step. This symbol indicates what is required for the next step or what has to be prepared or observed.

M ▷ **Via the menu to parameter**

Describes the path within the menu to the parameter. By using the push buttons of the local controls you may quickly find the desired parameter in the display.

< > **Reference to other sections**

Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may easily be located.

2. Identification

2.1. Name plate

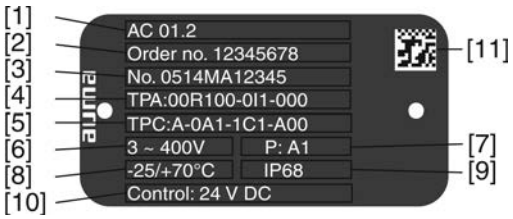
Each device is equipped with a name plate.

Figure 1: Arrangement of name plate

[1] Actuator controls name plate

Description of actuator controls name plate

Figure 2: Actuator controls name plate



[1] **Type designation**
[2] **Order number**
[3] **Serial number**
[4] Actuator terminal plan
[5] **Actuator controls terminal plan**
[6] Mains voltage
[7] **AUMA power class for switchgear**
[8] Permissible ambient temperature
[9] Enclosure protection
[10] **Control**
[11] **Data Matrix code**

Descriptions

Type designation

Type and size

These instructions apply to the following devices types and sizes:

Types: AC/ACExC = AUMATIC actuator controls

Size: 01.2

Versions: Intrusive and Non-Intrusive

Order number

The product can be identified using this number and the technical data as well as order-related data pertaining to the device can be requested.

Please always state this number for any product inquiries.

On the Internet at **http://www.auma.com**, we offer a service allowing authorised users to download order-related documents such as wiring diagrams and technical data (both in German and English), inspection certificates and the operation instructions when entering the order number.

Serial number

Table 1: Description of serial number (with example)

05	**14**	**MD12345**
Position 1+ 2: Assembly in week		
05	Week 05	
Position 3 +4 : Year of production		
	14	Year of production: 2014
All other positions		
		MD12345	Internal number for unambiguous product identification

Actuator controls terminal plan

Position 9 in the **TPA** wiring diagram: Position transmitter (actuator):

Control unit: electromechanical:

0 = Without position transmitter

A, B, J, K, L, N = Potentiometer

C, D, E, G, H, M, S = EWG/RWG (electronic position transmitter)

Control unit: electronic:

I = MWG (Magnetic limit and torque transmitter)

AUMA power class for switchgear

The switchgear used in the actuator controls (reversing contactors/thyristors) are classified according to AUMA power classes (e.g. A1, B1, ...). The power class defines the max. permissible rated power (of the motor) the switchgear has been designed for. The rated power (nominal power) of the actuator motor is indicated in kW on the motor name plate. For the assignment of the AUMA power classes to the nominal power of the motor types, refer to the separate electrical data sheets.

For switchgear without assignment to any power classes, the actuator controls name plate does not indicate the power class but the max. rated power in kW.

Control

Table 2: Control examples (indications on controls name plate)

Input signal	Description
24 V DC	Control voltage 24 V DC for OPEN - CLOSE control via digital inputs (OPEN, STOP, CLOSE)
115 V AC	Control voltage 115 V AC for OPEN - CLOSE control via digital inputs (OPEN, STOP, CLOSE)
0/4 – 20 mA	Input current for setpoint control via analog input

Data Matrix code

When registered as authorised user, you may use the **AUMA Support App** to scan the Data Matrix code and directly access the order-related product documents without having to enter order number or serial number.

Figure 3: Link to the App store:

2.2. Short description

Actuator controls

AUMATIC actuator controls are used to operate AUMA actuators and are supplied ready for use. The controls may be mounted directly to the actuator or separately on a wall bracket.

The functions of the AUMATIC 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 on site directly at the 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 the AUMA CDT software (accessories), using a computer (laptop or PC). The connection between computer and AUMATIC 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, actuator and controls housings do not have to be opened. For this purpose, the actuator is equipped with an MWG (magnetic limit and torque transmitter), also supplying analogue torque feedback signals/torque indication and analogue position feedback signals/position indication.

3. Operation

NOTICE

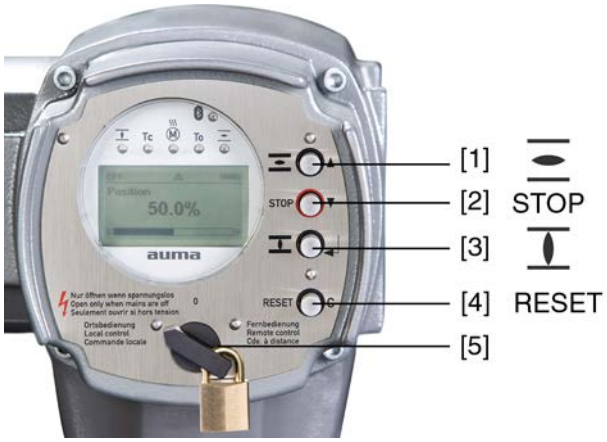
Valve damage due to incorrect basic setting!

→ Prior to electrical operation of the actuator, the basic settings i.e. type of seating, torque and limit switching have to be completed.

3.1. Local actuator operation

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

Figure 4: 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

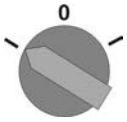
CAUTION

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

Danger of burns

→ Check surface temperature and wear protective gloves, if required.

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



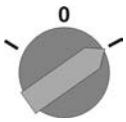
➥ The actuator can now be operated using the push buttons [1 – 3]:

- 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 - 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

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



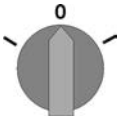
➥ Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE) or analogue setpoints (e.g. 0 – 20 mA).

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)

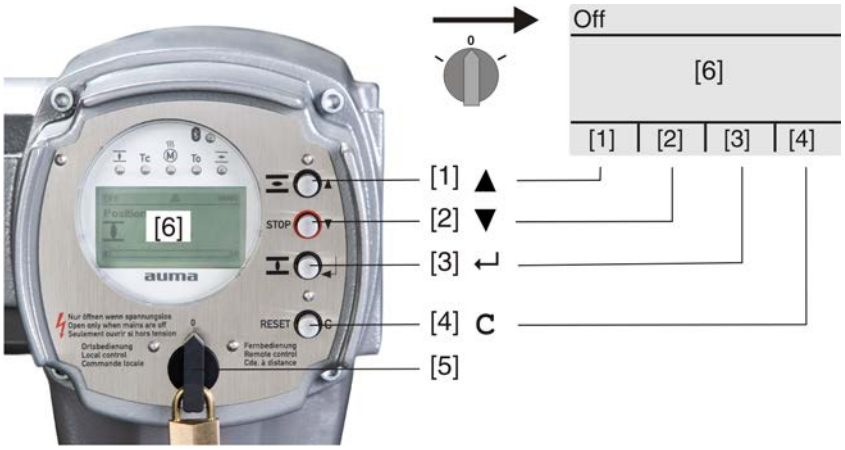
Menu navigation for display and setting is made via the push buttons [1 – 4] of the local controls.

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 5:



[1–4] Push buttons or navigation support
[5] Selector switch
[6] Display

Table 3: 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

Push buttons	Navigation support on display	Functions
[3] ↵	Ok	Confirm selection
	Save	Save
	Edit	Enter <Edit> menu
	Details	Display more details
[4] **C**	Setup	Enter Main menu
	Esc	Cancel process
		Return to previous display

Backlight

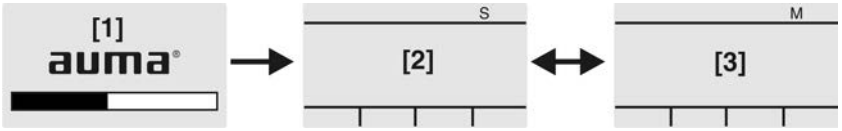
- The display is illuminated in white during normal operation. The backlight turns to red under fault conditions.
- The screen illumination is brighter when operating a push button. If no push button is operated for 60 seconds, the display will become dim again.

3.3.1. Menu layout and navigation

Groups

The indications on the display are divided into 3 groups:

Figure 6: Groups



[1] Startup menu
[2] Status menu
[3] Main menu

ID

Status menu and main menu are marked with an ID.

Figure 7: Marking with ID

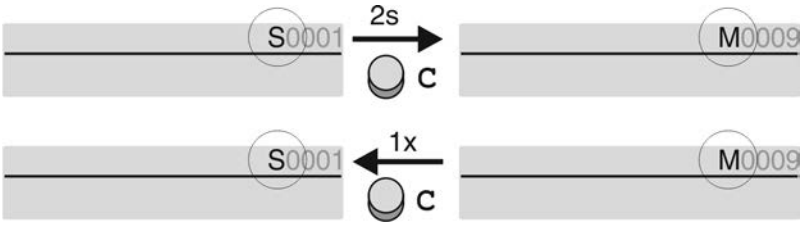
S ID starts with S = status menu
M ID starts with M = main menu

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 8: Select menu groups



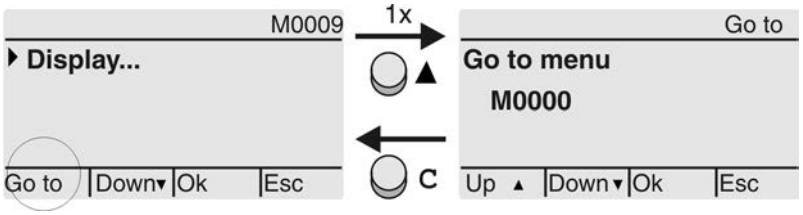
You return to the status menu if:

- 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 9: 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 10: 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 4: 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

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. Press ▲ Up ▲ to select a higher user level and press ↵ Ok to confirm.

➥ Display shows: 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 user level may be changed.

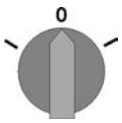
Example: The user is signed in as Specialist (4). This authorises him or her to modify the passwords between user levels (1) to (4).

M ▷ Device configuration M0053
Service functions M0222
Change passwords M0229

Menu point Service functions M0222 is only visible if user level has been set to Specialist (4) or higher.

Select main menu

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

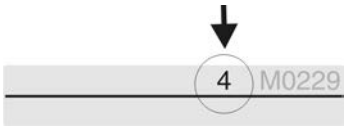


2. Press push button **C** Setup and hold it down for approx. 3 seconds.

➥ 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.

3.5. Language in the display

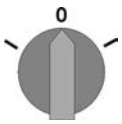
The AUMATIC display is multilingual.

3.5.1. Language change

M ▷ Display... M0009
Language M0049

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 language

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)

Language selection

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.

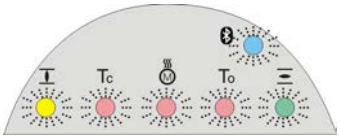
4. Indications

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 11: LED test



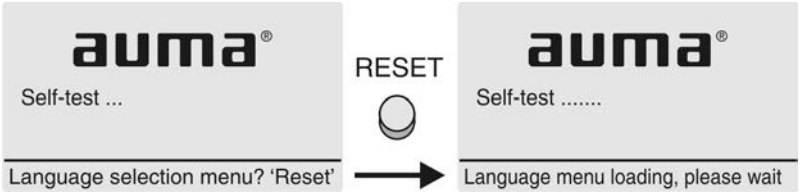
Language selection

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 [5] to position **0** (OFF).

Activate language selection:

1. Display indicates in the bottom row: Language selection menu? 'Reset'
2. Press push button **RESET** and hold it down until the following text is displayed in the bottom line: Language menu loading, please wait.

Figure 12: Self-test

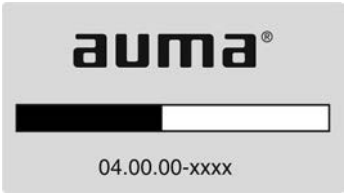


The language selection menu follows the startup menu.

Startup menu

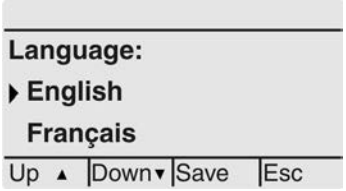
The current firmware version is displayed during the startup procedure:

Figure 13: Startup menu with firmware version: 04.00.00–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 14: Language selection



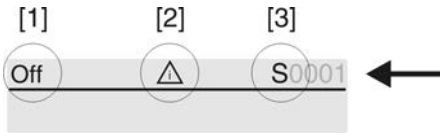
If no entry is made over a longer period of time (approx. 1 minute), the display automatically returns to the first status indication.

4.2. Indications in the display

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 15: 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 16: 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 indications from actuator and valve

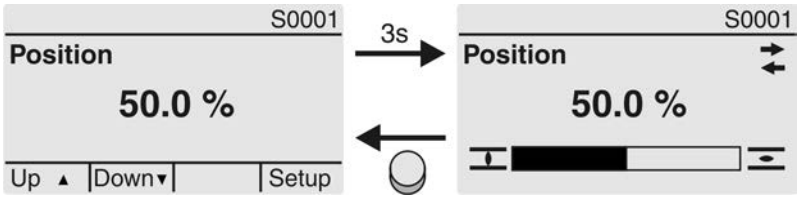
Display indications depend on the actuator version.

Valve position (S0001)

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

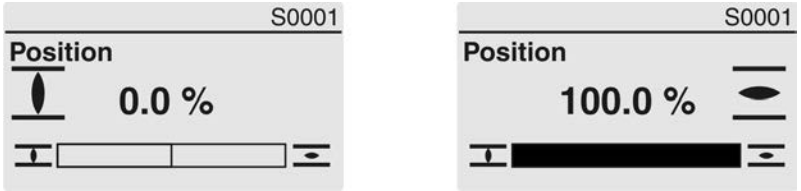
- S0001 on the display indicates the valve position in % of the travel.
- The bargraph display appears after approx. 3 seconds.
- When issuing an operation command, an arrow indicates the direction (OPEN/CLOSE).

Figure 17: Valve position and direction of operation



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

Figure 18: End position CLOSED/OPEN reached



0% Actuator is in end position CLOSED

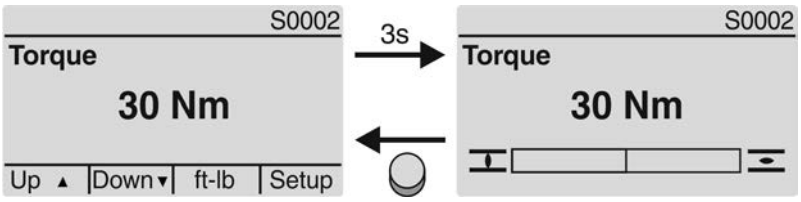
100% Actuator is in end position OPEN

Torque (S0002)

The indication is only available if the actuator is equipped with an MWG (magnetic limit and torque transmitter).

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

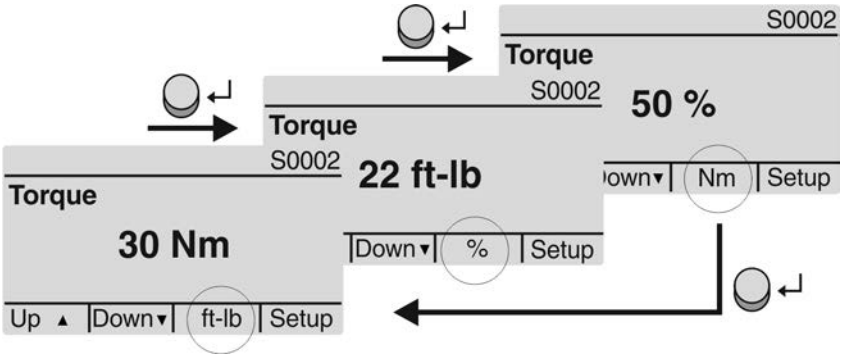
Figure 19: Torque



Select unit

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

Figure 20: Units of torque



Display in percent

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

Example: SA 07.6 with 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:

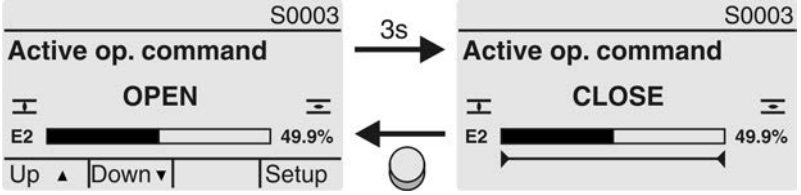
- active operation commands, like e.g.: Operation in direction CLOSE or in direction OPEN
- the actual value E2 as bargraph indication and as value between 0 and 100 %.
- for setpoint control (positioner): setpoint E1
- for stepping mode or for intermediate positions with operation profile: pivot points 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 bargraph display. The figure below shows the operation command in direction CLOSE.

Figure 21: Display for OPEN - CLOSE control



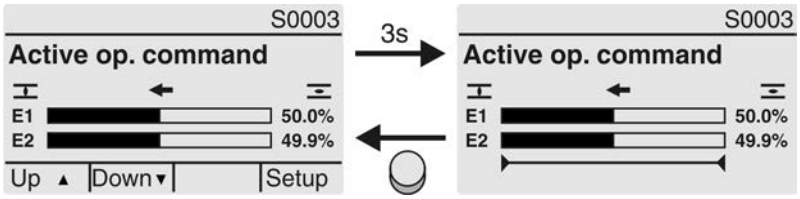
E2 Actual position value

Setpoint control

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

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

Figure 22: Indication for setpoint control (positioner)



E1 Position setpoint

E2 Actual position value

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

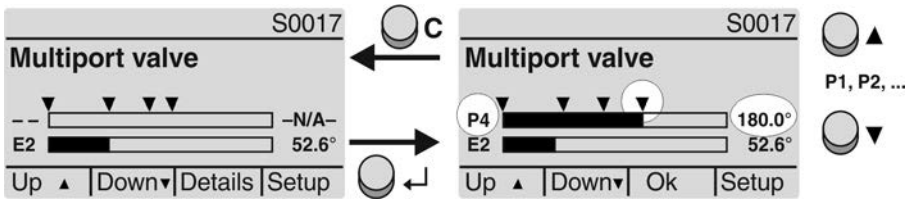
Table 5: Symbols along the pivot point axis

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	–

Multiport valve positions (S0017)

In case of active multiport valve function, the display S0017 indicates a second bargraph display with set positions (valve connections) above the actual position value E2. Positions (P1, P2, ...) are displayed with a black triangle ▼. Push buttons ▲▼ are used to select positions. Both positions and the actual position value E2 are displayed in degrees.

Figure 24: Status indication for multiport valve (example P4 = 180°)



P (P1, P2, ...) selected position (1, 2, ...)
(– –) no position selected

E2 Actual position value

4.2.2. Status indications according to AUMA classification

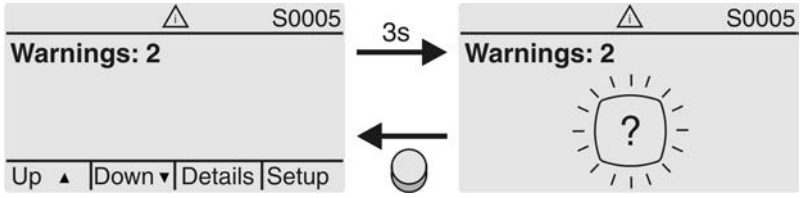
These indications are available if the parameter Diagnostic classific. M0539 is set to AUMA.

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 25: Warnings



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

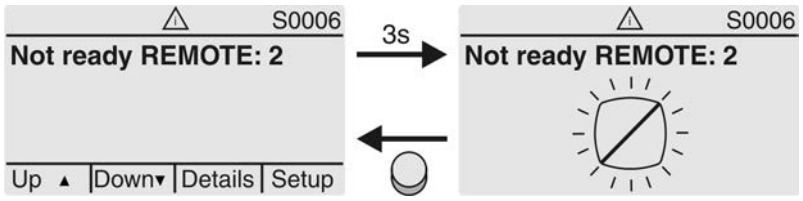
Not ready REMOTE (S0006)

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 26: Not ready REMOTE indications



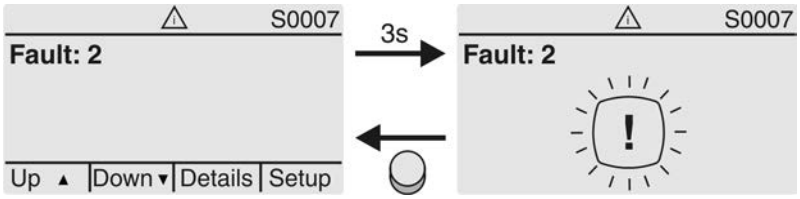
For further information, please also refer to <Corrective action>.

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 27: 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.

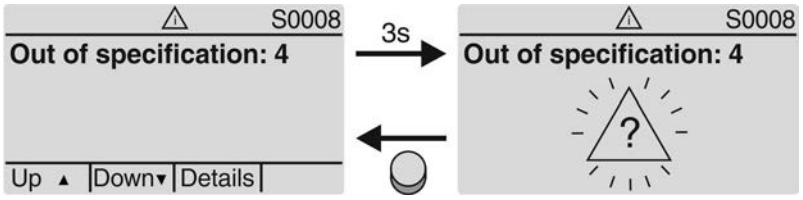
Out of Specification (S0008)

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 28: Out of specification



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

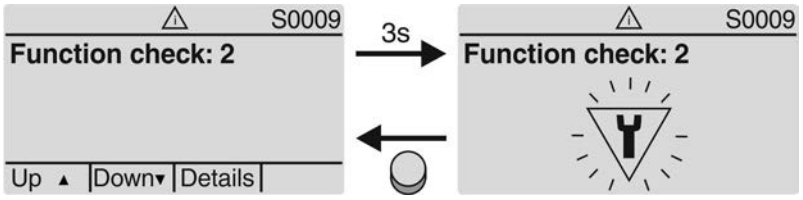
Function check (S0009)

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 29: Function check



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

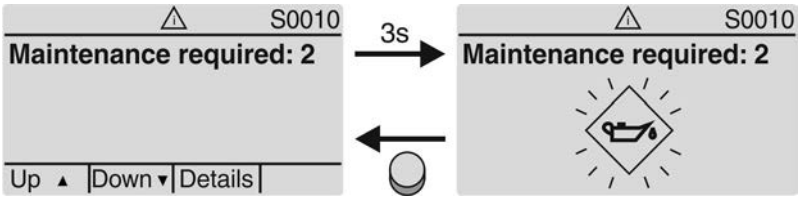
Maintenance required (S0010)

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 oil can after approx. 3 seconds

Figure 30: Maintenance required



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

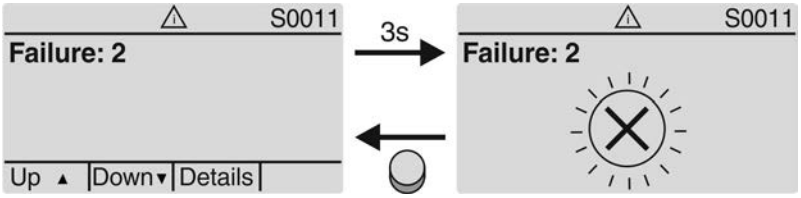
Failure (S0011)

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 31: Failure



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

4.3. Indication lights of local controls

Figure 32: 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

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

Defaut 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

— Option —

User level required to make changes: AUMA (6)

M ▷ Device configuration M0053
Local controls M0159

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

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

Default values:

Signal DOUT 1 = Fault
Signal DOUT 2 = End position CLOSED
Signal DOUT 3 = End position OPEN
Signal DOUT 4 = Selector sw. REMOTE
Signal DOUT 5 = Torque fault CLOSE
Signal DOUT 6 = Torque fault OPEN
Signal DOUT 7 = End position CLOSED
Signal DOUT 8 = End position OPEN
Signal DOUT 9 = Selector sw. REMOTE
Signal DOUT 10 = Torque fault CLOSE
Signal DOUT 11 = Torque fault OPEN
Signal DOUT 12 = Fault

Further setting values:

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

5.1.2. Coding the outputs

The output signals DOUT 1 – 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

Required user level: Specialist (4) or higher.

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

Default values for DOUT 1 – 12: High active

5.2. Configurable status signals

The signals described here are collective signals of various other signals which can be configured for specific users. For configuration, the individual signals can be selected from a list and activated (☑) or deactivated (☐) indivdually. The 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 <Fault signals and warnings> 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

Default values Failure (configurable)**:**

☑ = activated

☑ Fault (Cfg)

☑ Warning (Cfg)

☑ Not ready REMOTE (Cfg)

Default values Fault (Cfg)**:**

☑ = activated

☑ 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

Default values Warnings (Cfg)**:**

☑ = activated

☑ Config. warning

☑ Internal warning

☑ Wrn input AIN 1

☑ Wrn input AIN 2

☑ Wrn setpoint position

☑ Not used

☑ Maintenance required

Default values Not ready REMOTE (Cfg)**:**

☑ = activated

☑ Wrong oper. cmd

☑ Sel. sw. not REMOTE

☑ Service active

☑ Disabled

☑ EMCY stop active

☑ EMCY behav. active

☑ I/O interface

☑ Handwheel active

☑ FailState fieldbus

☑ Local STOP

☑ Interlock by-pass

☑ PVST active

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. The AC is equipped with up to two analogue outputs AOUT1 and AOUT2.

5.3.1. Assignment of analogue output 1

Designation in the wiring diagram: AOUT 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)).

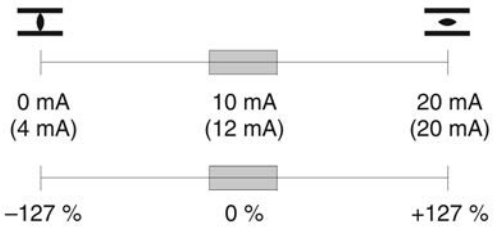
For torque seating, the end positions OPEN and CLOSED of the limit switching should be set as close as possible to the end positions of the valve to minimise the deviation of the feedback.

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 33: 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.

Speed target value — Actual speed value.

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.

5.3.3. Adjustment of analogue output 1

The initial values and end values of the signal range can be corrected by ± 1 mA.

Example: Parameter Signal range AOUT1 = 4 - 20 mA

The initial value (4 mA) can be adapted within a range of 3 mA to 5 mA.

The end value (20 mA) can be adapted within a range of 19 mA to 21 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: –100 ... 100 (– 1.00 to + 1.00 mA)

5.3.4. Assignment of analogue output 2

Designation in the wiring diagram: AOUT2.

Required user level: AUMA (6).

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.

5.3.6. Adjustment of analogue output 2

Initial values and end values of the signal range can be corrected by ± 1 mA

Example: Parameter Signal range AOUT1 = 4 - 20 mA

The initial value (4 mA) can be adapted within a range of 3 mA to 5 mA.

The end value (20 mA) can be adapted within a range of 19 mA to 21 mA.

Required user level: Specialist (4) or higer.

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: –100 ... 100 (–1.00 to +1.00 mA)

6. Operation

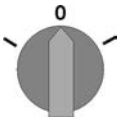
Different operation modes (states) are available. The current operation mode is indicated in the first line of the display:

Figure 34: 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).

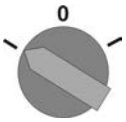


Characteristics

- 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).



Characteristics

- 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 M0076

Default value: OPEN and CLOSE

Setting values:

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

Actuator only runs in direction 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 STOP command or if end position CLOSED or an intermediate position CLOSE 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:

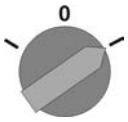
Direct reversal of operation is also possible without the STOP command. However, operation can be stopped at any time by the STOP command.

Information

Hold down push buttons (OPEN) or (CLOSE) for more than 2 seconds to activate self-retaining, press STOP to reset the operation mode to push-to-run operation.

6.3. Operation mode Remote

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



Characteristics

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

- Remote (parallel interface)
- Remote II (parallel interface, push button station)

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 actuator operation behaviour to binary operation commands (OPEN, STOP, CLOSE or CW, CCW), which control the actuator “from Remote” via I/O interface.

M ▷ Customer settings M0041
I/O interface M0015
Self-retaining Remote M0100
Self-retaining M01193
Self-retaining Remote II M0101

Default values:

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

Self-retaining Remote II = OPEN and CLOSE

Setting values for parameters, Self-retaining Remote M0100 **and** Self-retaining Remote II M0101**:**

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 STOP 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 the 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 the operation direction without STOP command is possible.

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

Setting values for parameter Self-retaining M01193 **(for Multiport Valve function):**

Off Push-to-run operation activated, self-retaining off:

The actuator will only be operated clockwise or counterclockwise as long as an operation command (CW or CCW) is present. The actuator stops if the operation command is cancelled.

CCW Counterclockwise (CCW) = self-retaining (clockwise = push-to-run operation):

After an operation command in CCW direction, 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 the specified MPV position has been reached.

CW Clockwise (CW) = self-retaining (counterclockwise = push-to-run operation):

After an operation command in CW direction, 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 the specified MPV position has been reached.

CW and CCW In both directions = self-retaining:

After an operation command (in CW or CCW direction), 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 an MPV position has been reached.

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

CW & CCW w/o STOP In both directions = self-retaining without stop:

Direct reversal of the operation direction without STOP command is possible.

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

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).

⚠ CAUTION

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

— Option —

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.
- Analogue operation commands (e.g. 0/4 – 20 mA) are immediately executed again.

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 the AUMA CDT service software is required. AUMA service uses this software (e.g. during commissioning or maintenance) to perform settings at the AUMATIC.

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 AUMATIC 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 CLOSE, the following can be set individually:

Limit seating

The 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 controls.

Figure 35: Limit seating

P Tripping position
[1] Overrun

Torque seating

The controls switch off the actuator in the end positions via torque switching.

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. As soon as the set tripping torque is reached, the controls automatically switch off the actuator.

In this context, the limit seating is used to signal that the limit switching will 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 must suit the valve.

→ Only change the setting with the consent of the valve manufacturer.

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

Default value: Limit

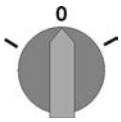
Setting values:

Limit Seating in end positions via limit switching.

Torque Seating in end positions via torque switching.

Select main menu

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 M0086 or M0087

➥ Display indicates: End position CLOSED

CLOSE or OPEN

4. Use ▲▼ Up ▲ Down ▼ to select:
   → ▸ End position CLOSED
   → ▸ End position OPEN

➥ The black triangle ▸ indicates the current selection.

5. Press ↵ Ok.

➥ Display indicates the current setting: Limit or Torque

➥ The bottom row of the display indicates either:

- Edit → continue with step 6
- Save → continue with step 10

6. Press ↵ Edit.

➥ Display indicates: ▸ Specialist (4)

Log on user

7. 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)

8. Press ↵ Ok.

➥ Display indicates: Password 0***

9. Enter password (→ enter password).

➥ The screen indicates the pre-set type of seating (▸ Limit or ▸ Torque) by means of a black triangle ▸.

Change settings

10. Select new setting ▲▼ Up ▲ Down ▼ resulting in the following significations:

➥ The symbols have the following meaning:

- black triangle: ▸ = current setting
- white triangle: ▹ = selection (not saved yet)

11. Confirm selection via ↵ Save.

➥ The setting for the type of seating is complete.

12. Back to step 4 (CLOSED or OPEN): Press ↵ Esc .

7.2. Torque switching

Conditions

MWG in actuator (Non-intrusive version).

For torque switches in the actuator (Intrusive version), the torque switching is set as described in the operation instructions.

Function

- 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 foot-pound 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.

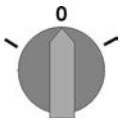
M ▷ Customer settings M0041
Torque switching M0013
Trip torque CLOSE M0088
Trip torque OPEN M0089

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 M0084.

➥ 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***

9. Enter password (→ enter password).

➥ Display shows the set value.

➥ The bottom row indicates: Edit Esc

10. Press ↵ Edit.

Change value

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

NOTICE

Valve damage at valve/gearbox due to incorrect setting!

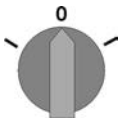
→ When setting with motor operation: Stop actuator **before** reaching end of travel (press push button **STOP**).

→ Allow for overrun when selecting limit seating.

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. Use ▲▼ Up ▲ Down ▼ to select:
   → ▸ 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 14
- Specialist (4) → continue with step 6

Log on user

6. Use ▲▼ Up ▲ Down ▼ to select a 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 level.

➥ 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 14

Set end position CLOSED CMD0009

9. Re-set end position CLOSED:

   9.1 For large strokes: Set selector switch in position **Local control** (LOCAL) and operate actuator in motor operation via push button ⤒ (CLOSED) in direction of the end position.
   Information: Stop actuator **before** reaching end of travel (press push button **STOP**) 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.

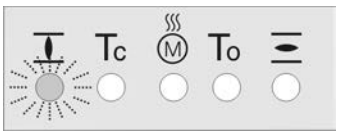
   9.5 Set selector switch to position **0** (OFF).

   ➥ Display indicates: Set end pos.CLOSED? Yes No

10. Press ↵ Yes to accept new end position setting.

➥ Display indicates: End pos. CLOSED set!

➥ The left LED is illuminated (standard version) and thus indicates that the end position CLOSED setting is complete.



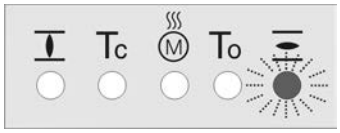
11. Make selection:
    → Edit → back to step 9: Set end position CLOSED "once again"
    → Esc → back to step 4; either set end position OPEN or exit the menu.

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 push button **STOP**) 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
13. Press ↵ Yes to accept new end position setting.

➥ Display indicates: End pos. OPEN set!

➥ The right LED is illuminated (standard version) and thus indicates that the end position setting is complete.



14. Make selection:
    → Edit → back to step 9: 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.

7.4. 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, target position) or other positions (e.g. pivot points) are indicated in percent of the travel on the AC 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 S0002, 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
Activation M1207

Default value: Function not active

Setting values:

Function not active — <Units of position> function deactivated.

Function active — <Units of position> function activated.

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

7.5.7. Process factor units

Process factors (e.g. process setpoint, actual process value...) are shown in percent of travel in the AC display (default setting). By activating the parameter Process factor, you may select other physical units instead of 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
Activation M1212

Default value: Function not active

Setting values:

Function not active — <Process factor units> deactivated.

Function active — <Process factor units> activated.

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

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
Activation 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

7.5.9. Analogue signal output units (AIN)

Activate signal output units (AIN)

Required user level: Specialist (4) or higher.

M ▷ Display... M0009
Units M1205
Signal outputs (AIN) M1221
Activation M1222

Default value: Function not active

Setting values:

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

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

Set max. value, scaling and unit

Required user level: Specialist (4) or higher.

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

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 AC 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 (pivot points)

— Option —

Conditions The actuator is equipped with a position transmitter.

Characteristics

- With the AC, up to 8 intermediate positions (pivot points) 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 (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 M041
Intermediate positions M0143
Signal behaviour M0266
Signal behaviour 1 M0269

Default value: No signal

Setting values:

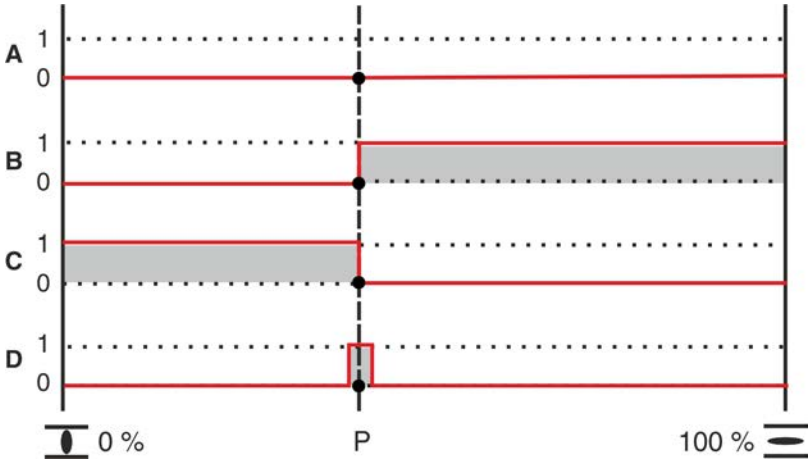
No signal — Behaviour **A:** "Off", intermediate position is not signalled.

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 36: 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.

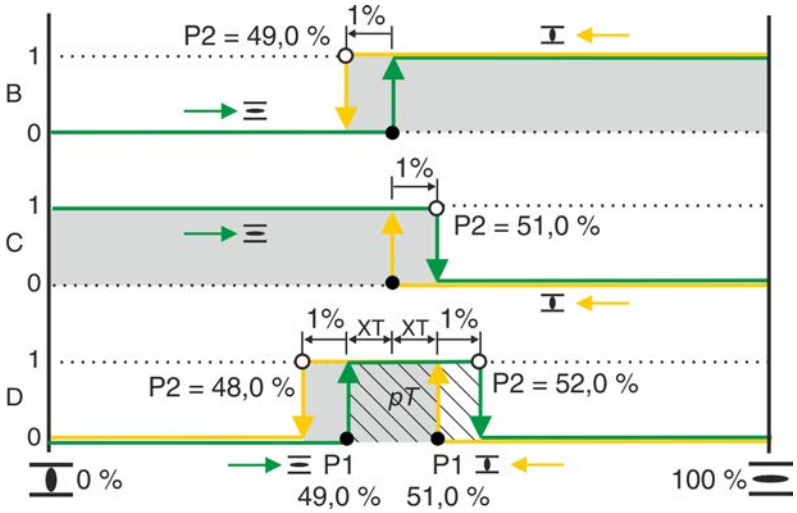
8.1.3. Hysteresis for intermediate positions: set

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 37: 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 M041
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 (Outer dead band M0148 parameter) determines pulse duration pT and influences **switch-on point** P1.

8.2. Operation profile (operation behaviour) for intermediate positions

— Option —

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 behaviour 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 the 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 the 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 the 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 interrupted 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.

Once a pivot point with the operation behaviour Off time in OPEN , Off time in CLOSED or Off time in OPEN & CL. is reached, the AC generates the Operation pause active indication during the off time.

Required user level: Specialist (4) or higher.

M ▷ Customer settings M041
Intermediate positions M0143
Off times M0268
Off time 1 M0285

Default values: 1 s

Setting ranges: 1 to 1,800 seconds

8.3. Two-wire control

— Option —

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

Characteristics — With the function <Two-wire control>, the actuator can be operated to end position OPEN or CLOSED via **a** 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)

— Option —

Conditions 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 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 the setpoint position E1 and the actual position value E2.
- If the status indication S0003 only shows the actual position value E2, OPEN - CLOSE control is active: 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: switch on or off

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).

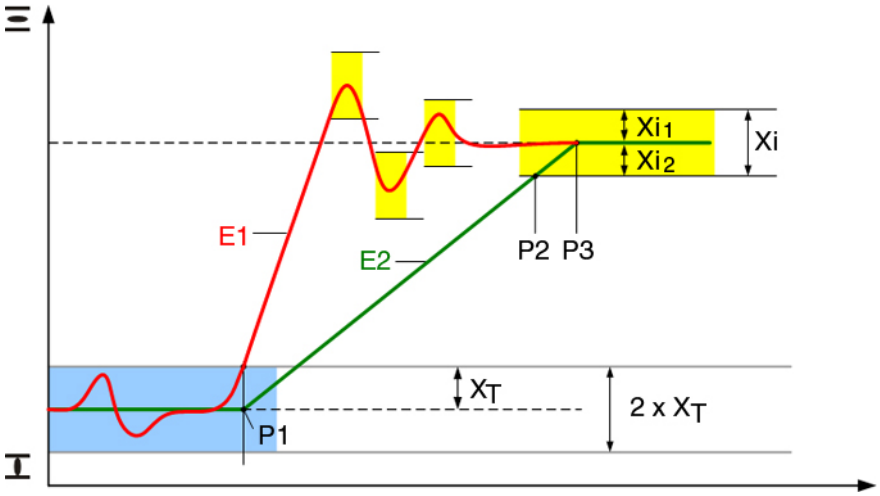
Due to the inertia of actuator and valve, the valve position changes only slightly after switching off the actuator (overrun). The positioner determines the resulting error

between setpoint and actual value for both directions and automatically adapts the inner dead bands Xi and therefore switching point P2.

On the basis of the determined inner dead bands Xi and the set hysteresis (parameters Positioner hyst. OPEN M0598 or Positioner 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 38: Positioner positioning behaviour



E1 Setpoint
E2 Actual value
P1 Switch-on point
P2 Switch-off point in OPEN direction
P3 Setpoint reached
X_T Max. error (outer dead band)
Xi_1 Overrun in direction OPEN (inner dead band OPEN)
Xi_2 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 CLOSED

Setting ranges: 0.0 – 10.0 % for dead band OPEN and CLOSED

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 nominal value is higher than the max. error variable determined by the outer dead band.

Manual setting is only possible if the adaptive behaviour, parameter Adaptive behaviour M0147 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: 0.5 s

Setting range: 0.2 – 60.0 s (seconds)

Information It must be ensured via the controls 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 M041
Positioner M0145
Positioner hyst. OPEN M0598
Positioner hyst. CLOSE M0599

Default values: 0.5 % for OPEN and CLOSED

Setting range: 0.0 % to 5.0 % of the 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 %

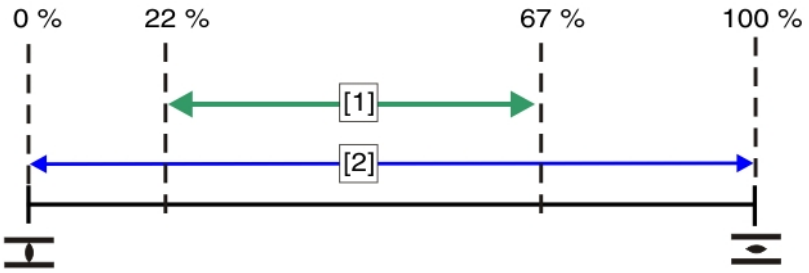
8.4.8. Setting range: limit

Travel 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 39: 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.

Set limits

M ▷ 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 travel

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 bypass. The actuator mounted on the bypass 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

— Option —

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:

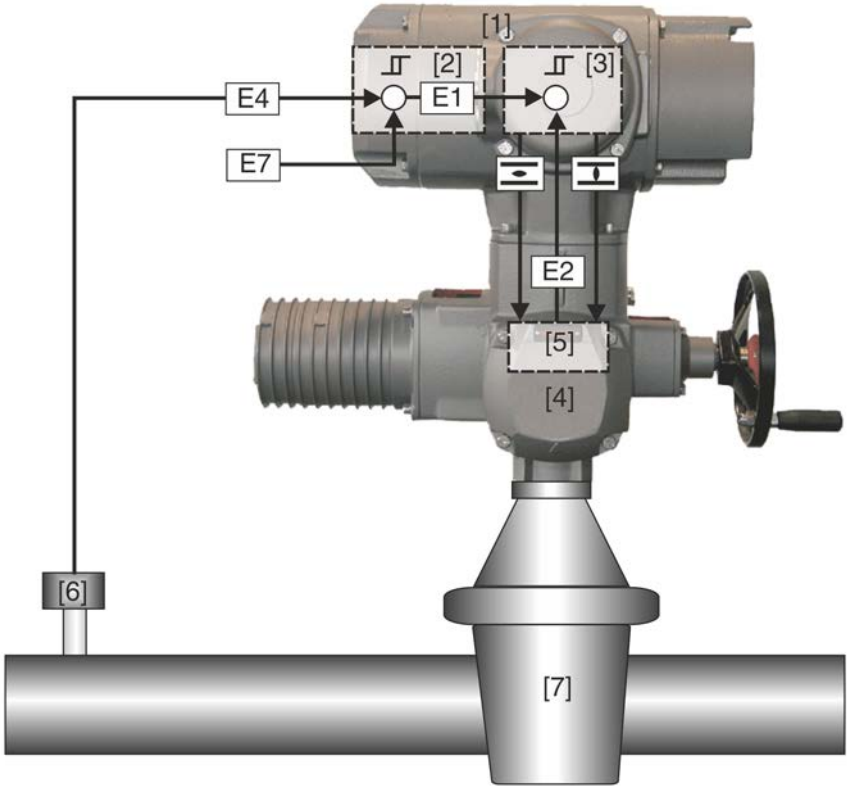
- Process controller enabled and activated.
- Operation mode Remote (Selector switch = position **Remote control**).

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 40: Process controller function



[1] AC 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.

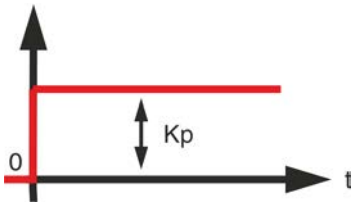
M ▷ Customer settings M0041
Process controller M0742
Modulating behaviour M0887

Default value: PI controller

Setting values:

P controller — P controller immediately reacts to a control deviation (i.e. actively) and amplifies the input signal (error variable) proportionally to the set amplification. Setting parameter: Proport. gain Kp M0744

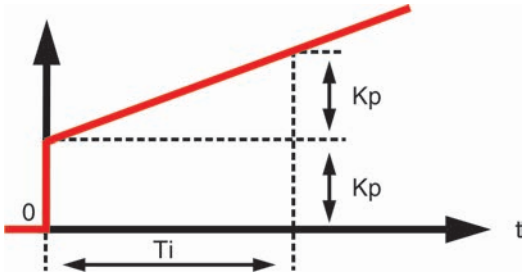
Figure 41: Step response of P controller



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 reacting to a control deviation 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 Ti M0745

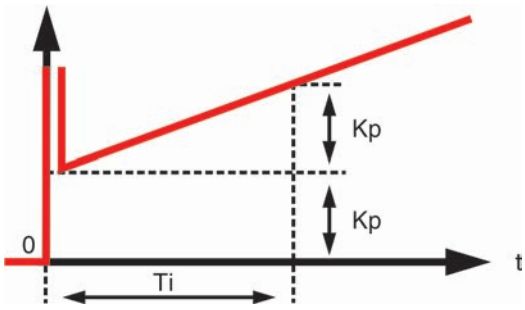
Figure 42: Step response of PI controller



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 control deviations with large output values. Parameter for setting the D fraction: Rate time Td M0746

Figure 43: 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, the actuator controls switch to the internal setpoint 1. Parameter Internal setpoint 1 M0749

Internal setpoint 2 — In case of process setpoint signal loss, the 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 PT controller, i.e. set the parameters as follows:
   - Proportional gain Kp = 1
   - Reset time Ti = 1,000 s
   - Rate time Td = 0
2. Double proportional gain Kp until the control loop starts to oscillate.
3. Reduce proportional gain Kp to 60 % of the set value.
4. Decrease reset time Ti until the error variable equals zero.

8.5.8. Proportional amplification Kp: 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 Kp 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 Kp M0744

Default value: 1.0

Setting range: 0.1 ... 10.0

8.5.9. Reset time Ti: 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 Ti in case of propensity for oscillation.
- Decrease Ti 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 Ti M0745

Default value: 1,000 s (seconds)

Setting range: 1 ... 1000 s

8.5.10. Rate time Td: 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 Td in case of propensity for oscillation.
- Initial value for actuators: 0 s

M ▷ Customer settings M0041
Process controller M0742
Rate time Td 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

— Option —

Conditions

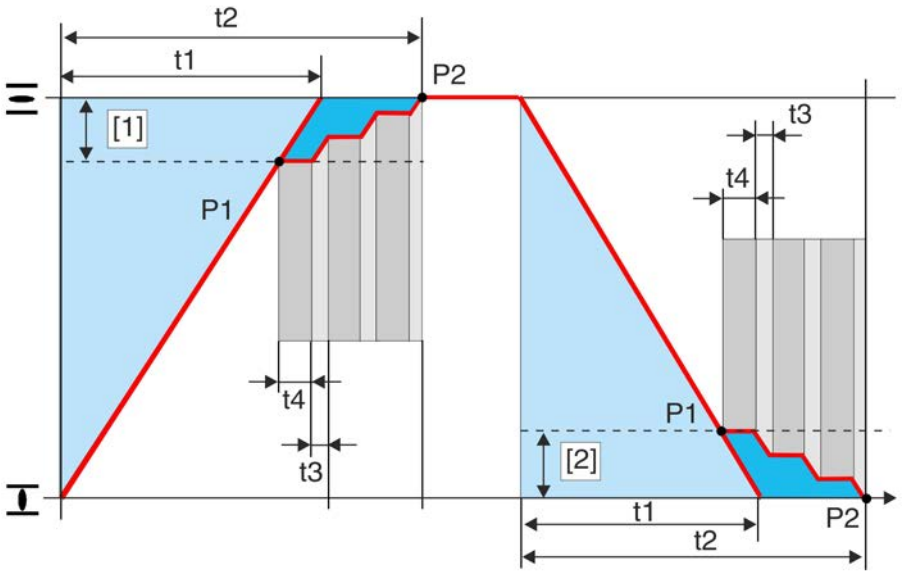
This function requires one of the following equipments within the actuator:

- MWG (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 44: 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: 5.0 s (for all on and off times)

Setting ranges: 1 ... 1,800 s (for all on and off times)

8.7. By-pass function

— Option —

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 a 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. Release 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.
- The by-pass valve can only be operated in direction CLOSE if the main valve is in end position CLOSED. However, it can always be operated in direction OPEN.

Figure 45: Function

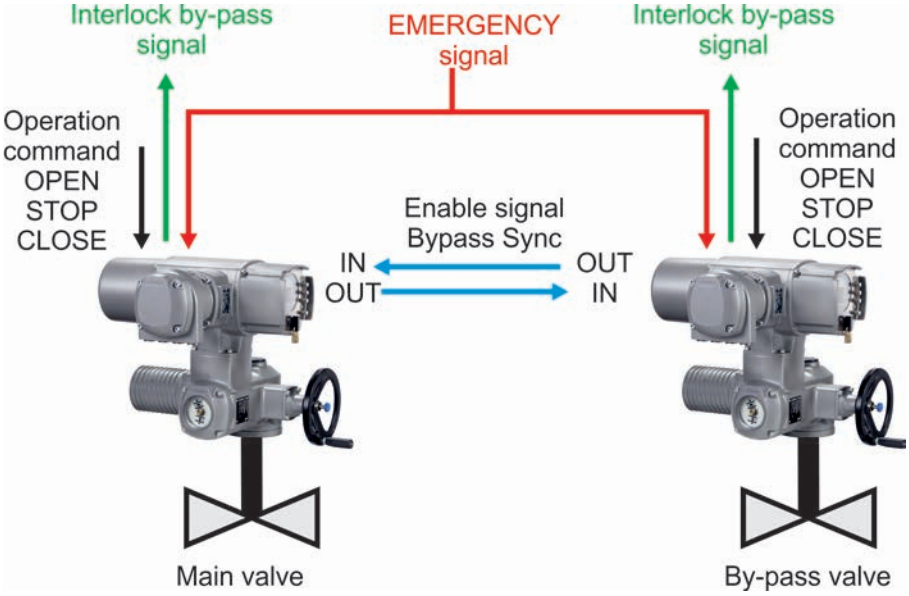


Table 7: Main valve reaction to by-pass valve position.

By-pass valve		**Main valve**
Position	**Sends enable signal Bypass Sync OUT**	**Release (available operation commands)**
End position OPEN	High level (Default: +24 V DC	in directions OPEN and CLOSE
other position than end position OPEN	Low level (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 8: By-pass valve reactions to main valve position

Main valve		By-pass valve
Position	**Sends enable signal Bypass Sync OUT**	**Release (available operation commands)**
End position CLOSED	High level (Standard: +24 V DC)	in directions OPEN or CLOSE
Other position than end position CLOSED	Low level (0 V DC or input open-circuit):	in direction OPEN only[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 characteristics as the <EMERGENCY behaviour> function with the following differences:

In an EMERGENCY situation, both 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:

Parameter: Signal DOUT 6 M0111

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

8.7.1. Bypass 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)

— Option —

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. Locking of the valve 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 in particular used for significant pressure differences (pressure relief) and safety-related systems (locking).

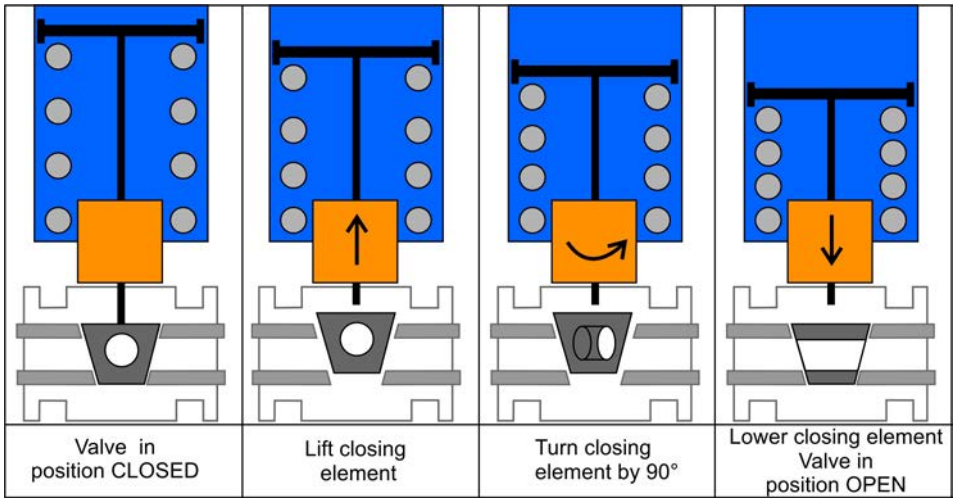
Requirements

- 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 master actuator (rotary movement) and slave actuator (stroke movement). However, only one actuator or actuator controls is "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.

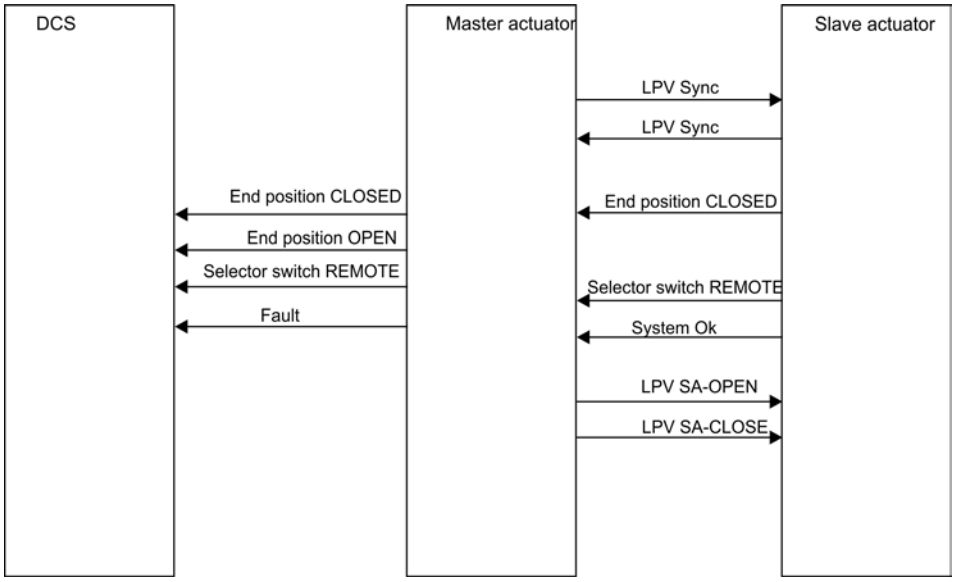
Figure 46: Schematic representation of the function of a Lift Plug Valve



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 47: 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 1 M0102), 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
LPV application 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 master LPV 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 slave LPV 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 opening or closing valve 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. Multiport valve function (operation to position)

— Option —

Application For valves not equipped with end stops (multi-turn) and with up to 12 ports (multiport valves)

Characteristics The multiport valve function allows to directly access a valve port (position) of a valve equipped with up to 12 ports without stopping at any other port (position). Example: Operation from position 2 to 4 without stopping at position 3.

In the operation mode Local, the set position are approached as directly as possible, i.e. the direction of rotation (clockwise or counterclockwise) depends on the current position of the valve.

In operation mode Remote, up to 10 positions can either be approached with a defined direction of rotation (counterclockwise or clockwise) or as directly as possible. The actuator then operates the valve with the defined direction of rotation or as directly as possible to the defined valve attachment, irrespective of the actuator position.

Information

- The multiport valve function is only permissible in combination with an AUMA actuator and an AUMA gearbox.
- The output speed at the output drive (of the gearbox) or the valve should not exceed approx. 0.3 rpm; otherwise positioning accuracy will decrease.

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.

8.9.1. Multiport valve function: activate

Required user level: Specialist (4) or higher.

M ▷ Device configuration M0053
Application functions M0178

Activation M0212
MPV function M1139

Default value: Function not active

Setting values:

Function not active — Function deactivated.

Function active — Function activated.

8.9.2. 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

8.9.3. 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 9: 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	

8.9.4. 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

8.9.5. 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 home port 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?

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:

Parameter: 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 5 M0127), the input is either High active or Low active. Default setting is High active.

8.9.6. 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 (MPV home port parameter).

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 360.0°

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°.

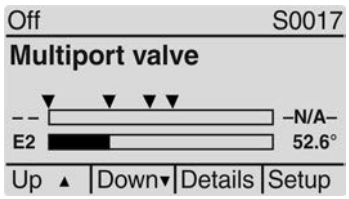
Position 1 = 0.0 (or 360°)
Position 2 = 45.0

Position 3 = 90.0
Position 4 = 135.0
Position 5 = 180.0
Position 6 = 225.0
Position 7 = 270.0
Position 8 = 315.0

8.9.7. 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>).

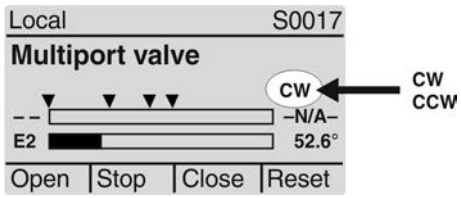
Figure 48: Status indication of multiport valve (selector switch in position OFF)



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)

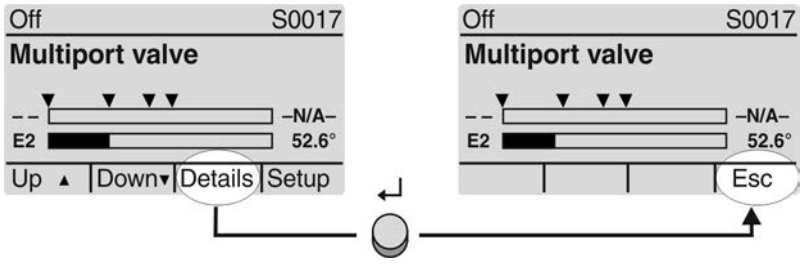


As a consequence, the valve can be operated into clockwise or counterclockwise direction (display shows CW or CCW)

Direct operation to a position:

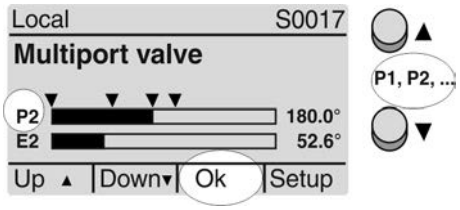
When selector switch is in position **0** (OFF), the function "Direct operation to a position via push buttons" is activated via Details (push button ↵) (display shows Esc).

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 ▲▼ and confirm selection via Ok (push button ↵).

→ The operation is issued as soon as push button Ok is pressed.

Symbol	
▼	Set positions (of valve ports)
P	(P1, P2, ...) selected position (1, 2, ...)
– – / –N/A–	No position has been selected.
E2	Actual position value

To interrupt an operation (triggered operation command):

→ Select "– – / –N/A–" during operation, and confirm via Ok (push button ↵). The actuator stops in its current position.

8.9.8. 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:

Parameter: Signal DIN 4 M0118 = Intermediate pos. 1

Setting values for digital inputs (DIN)	Operation behaviour for input control
Intermediate pos. 1 to Intermediate pos. 12	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 operation in clockwise direction (without stop at any position)
MPV DriveCCW	Actuator operation in counterclockwise direction (without stop at any position)

8.9.9. 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
Reduction ratio M1143

Default value: 0.00°

Setting range: 0.00 – 36.0° (degrees)

8.9.10. 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)

8.9.11. 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 Signal behaviour.

M ▷ Customer settings M0041
Multiport valve M1140
Signal behaviour M1147

Default value: No signal

Setting values:

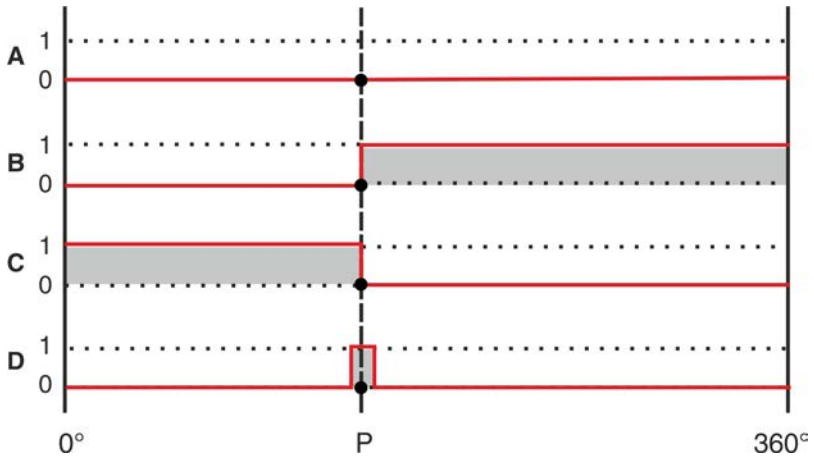
No signal — A: Signal behaviour Off. Position is not signalled.

C‾‾‾‾‾‾‾|_____O — B: Signal is active from reaching the position up to 360°.

C_____|‾‾‾‾‾O — C: Signal is active from 0° until the position is reached.

C_____|‾|_____O — 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.

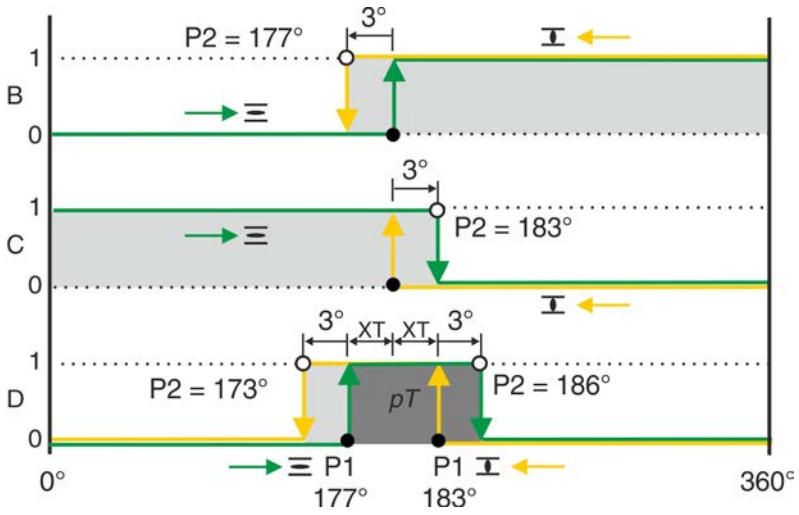
8.9.12. Hysteresis for signalling intermediate positions: set

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 10 intermediate positions

Setting range: 0.0° to 5.0° (degree)

8.10. Automatic deblocking

— Option —

Requirements

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

- MWG (Non-Intrusive version)
- 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)

For actuator controls in SIL version, we DISADVISE using the automatic deblocking function.

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).

Characteristics

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 AC controls signal a torque fault.

8.10.1. Automatic deblocking function: activate

Required user level: Specialist (4) or higher.

M ▷ Device configuration M0053
Application functions M0178
Activation M0212
MPV function M1679

Default value: Function not active

Setting values:

Function not active — Function deactivated.

Function active — Function activated.

8.10.2. Operation time for operation in opposite direction: set

The actuator controls remember the first seating position and operates 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)

8.10.3. 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

8.10.4. Tolerance range: set

Tolerance range (+/-) for original 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)

8.11. 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)

8.11.1. 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.

8.11.2. Heater on control unit (actuator)

Characteristics

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: On

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

8.11.3. 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.

Characteristics 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 value: 0.3 s seconds

Setting range: 0.1 … 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 behaviour initiation 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:

⚠ CAUTION

The actuator can start immediately when switching on!

Risk of personal injuries or damage to the valve.

→ Ensure that the signal set under parameter Failure beh. source M0385 is present when switching on.

→ Should the actuator start unexpectedly: Immediately set selector switch to position **Local control** (LOCAL) or **0** (OFF).

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

M ▷ Customer settings M0041
Failure behaviour M0378
Failure beh. source M0385

Default value: I/O interface

Setting values:

I/O interface — The failure behaviour is initiated in case of loss of setpoints.

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

For a setpoint range of 0 – 20 mA , monitoring is not possible.

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

The failure operation determines 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 predetermined position. Conditions:

- The function <Positioner> is activated.
- Parameter Failure beh. 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. Failure position: define

If the failure operation Approach position is set, the actuator moves to the 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: 3.0 s

Setting range: 0.0 ... 1,800.0 s seconds

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
EMERGENCY 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:

⚠ CAUTION

The actuator can start its 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.

→ Should the actuator start unexpectedly: Immediately set 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: Failure reaction EMCY EMCY failure source EMCY operation mode EMCY operation EMCY position

9.3.2. EMERGENCY failure behaviour

Required user level: Specialist (4) or higher.

M ▷ Customer settings M0041
EMCY behaviour M0198
Failure reaction EMCY 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: In case of a binary EMERGENCY input from +24 V DC to 0 V. This prevents the <EMERGENCY behaviour> from being initiated immediately once the AC is 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 has to have a high level before switching on the AC; otherwise <EMERGENCY behaviour> is initiated immediately after switching on.

For the setting Immediately active**:**

⚠ CAUTION

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 failure 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 performed.

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
EMCY behaviour
EMCY operation

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 predetermined position.

9.3.6. EMERGENCY position

If the EMERGENCY operation Approach EMCY pos. is set, the actuator moves to the EMERGENCY position entered here.

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

If the EMERGENCY operation Approach EMCY pos. is set, the actuator runs to the indicated EMERGENCY position of the multport 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 the EMERGENCY signal initiates an EMERGENCY operation, the torque switching 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 the EMERGENCY signal initiates an EMERGENCY operation, 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 thermoswitches 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 the EMERGENCY signal initiates an EMERGENCY operation, the 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 the EMERGENCY signal initiates an EMERGENCY operation, the set operation profile (operation behaviour) can be by-passed during this operation.

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 M0668

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: Specialist (4) 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. Enabling local controls

— Option —

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

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

Condition For the function <Enable local controls>, 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:

Parameter: 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.

9.5. Priority REMOTE

— Option —

Characteristics — 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:

Parameter: 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 functions (LOCAL, OFF) require 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, the actuator can be controlled from REMOTE and the controls indicate 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, the actuator can be controlled from REMOTE and the controls indicate the ∅ symbol in the status line of the display (menu S0001).

9.6. Interlock (enabling operation commands)

— Option —

Characteristics

- An operation command will only be executed if an additional release 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 CLOSE 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 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 Enable OPEN = **high level** (standard: +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. Failure source of Interlock enable signal: set

M ▷ Customer settings M0041
Interlock M0664
Interlock failure 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: Remote Remote 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

— Option —

Characteristics

- 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, and 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

— Option —

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 of the motor control (contactors or thyristors). Possibly present operation commands with self-retaining will be reset
- The indication in the top row of the display shows: EMCY stop

Figure 54: EMERGENCY stop button on the electrical connection

Information

- The EMERGENCY stop button is intended for operation in an emergency. For maintenance work, the mains supply of the AC has to be switched off and protected against accidental switching on.
- The EMERGENCY stop button is not available for the ACExC, but only for the weatherproof versions of the AC.

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)

— Option —

Characteristics

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
- Function <Positioner> activated.
- 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 :

Parameter: 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 is within the set stepping range. The initial position depends on the settings of the following parameters: PVST behaviour M0853, PVST stroke M0854

Information PVST can be stopped by sending a Reset command.

- 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: activate

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. 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.

9.9.3. 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.

9.9.4. 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 %

9.9.5. 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)

9.9.6. 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 Sekunden)

Setting range: 00:00,1 ... 15:00.0 min:s (minutes:seconds)

9.9.7. PVST reverse 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)

9.9.8. 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)

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.

The controls generate a fault indication if:

- the excessive torque occurs **between** end positions
- the excessive torque occurs **in** the end positions **and** limit seating is set.

The fault indication is shown in the display

- Status indications: 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

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 jammed 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.

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 ... 5.0 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.

10.2. Motor protection monitoring (thermal monitoring)

In order to protect against overheating and impermissibly high temperatures at the actuator, PTC thermistors or thermoswitches are embedded in the motor winding. The thermoswitch is tripped as soon as the max. permissible winding temperature has been reached.

The actuator is switched off and the following signals are given:

- LED 3 (motor protection trippped) on the local controls is illuminated.
- Status indication: S0007 Fault or S0011 Failure
  - Details: 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 signal.

In addition, the AC cyclically (once per day) checks the motor protection monitoring for its proper function. If this check fails, the 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 ACExC 01.2

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, 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 on time starts
- Status indications: S0005 or S0008
  - Details: Wrn on time running

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 M1231
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, the AC issues 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 55: 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
On time monitoring M0355

On time 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
On time monitoring M0355
Permissible starts/h M0357

Default value: 1,200 starts/h

Setting range: 1 ... 1,800 starts/h

Set permissible running time/h

M ▷ Customer settings M0041
On time monitoring M0355
Perm. running time/h 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 signalled (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.

Operation mode: activate

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 switched on. 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 AUMATIC monitors whether the actuator moves after 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 indications: S0005 Warnings or S0008 Out of specification
  - Details: Wrnn no reaction
- Status indications: 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 signal.

In case of operation from an intermediate position, reaction monitoring will only be performed if the actuator is equipped with a position feedback.

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

— Option —

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. Motion detector: activate

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

AC actuator controls monitor the following voltages and signals 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 thermoswitches 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 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 .
Monitoring functions 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 functions 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 AUMATIC monitors 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 functions 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 Monitor heat. system M0647 parameter 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.

On — 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

- Actuators of the type range SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2
- MWG position transmitter in actuator

Characteristics The controls verify whether sub-assemblies mounted in actuators and controls correspond to the desired version.

In case incorrect sub-assemblies are mounted or if sub-assemblies are missing the controls either send a warning or a fault signal.

For detailed information on this indication refer to <Fault signals and warnings> chapter.

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.

Characteristics The AUMATIC monitors phase L2. If phase L2 is missing for a certain time interval, the AUMATIC still can send and receive signals and generates a fault indication. Since the AUMATIC is supplied via phases L1 and L3, the two phases cannot be monitored. In case L1 or L3 fails, the AUMATIC is inoperable and the actuator stops.

Information In case of phase L2 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 torque is sufficient for valve operation, the missing phase L2 is only detected when switching off (e.g. in an end position) and the fault signal Phase fault is generated.

Configuration of the 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.

Characteristics Exchanging any two phase conductors in the 3-phase mains changes the direction of phase rotation. Should the phases L1, L2 and L3 be connected in the wrong sequence, this is detected and corrected by the AUMATIC, preventing the actuator from turning into the wrong 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. Activate functions

Via menu Activation 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.

Function	Menu	Enabling required
EMERGENCY behaviour	M0589	No
Timer CLOSE	M0156	No
Timer OPEN	M0206	No
Positioner	M0158	Yes
Operation profile	M0294	No
Process controller	M0741	Yes
Bluetooth	M0573	No
Enable LOCAL	M0631	Yes
Priority REMOTE	M0770	Yes
Auto change-over I/O	M0790	Yes
Interlock	M0663	Yes
PVST	M0851	Yes
By-pass function	M0941	Yes
LPV function	M1087	Yes
MPV function	M1139	Yes
Maintenance signals	M1136	No
Maintenance interval	M1137	No
Limit switch. via CDT	M1197	Yes
Automatic deblocking	M1677	Yes
Split range operation	M1650	No
Automatic deblocking	M1679	Yes
Com. eval. REMOTE	M1709	No

11.2. Enable functions

Via menu Enabling 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

Function	Menu and user level
Positioner	M0209 AUMA (6)
Process controller	M0338 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)
By-pass function	M0940 AUMA (6)

Function	Menu and user level
LPV function	M1088 AUMA (6)
MPV function	M1138 AUMA (6)
Limit switch. via CDT	M1198 AUMA (6)
Automatic deblocking	M1678 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. 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.

12.1. Direction of rotation

Characteristics

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 AUMATIC 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 is stored in the electronic device ID (parameter Wiring diagram actuator M0060). The ID has to be adapted to the new designation once the conversion is complete.
  - The actuator mounted to the 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).

12.2. Factory setting

The factory setting corresponds to the delivery state of the AUMATIC.

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.

12.3. 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

12.4. 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

12.5. 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

12.6. 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

12.7. 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 using AUMA CDT software on a laptop computer or PDA
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

12.8. Service software AUMA CDT (Bluetooth)

AUMA CDT is a user-friendly setting and operation program for AUMA actuator controls AC 01.2.

The connection between computer (PC, laptop, PDA) and local controls is established wireless via Bluetooth interface.

Activate 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 ▷ Diagnostic M0022
Bluetooth M0244
Device tag M0423
Bluetooth address M0422
Bluetooth add.partner M0576

13. Diagnostics

Diagnostics comprise information on the device and on device sub-assemblies for support during commissioning, maintenance or corrective action.

13.1. 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 10: Information on device identifications

Identification M0026			
Indication on display		**Description**	**User level required for modification**
Device designation M0072		AUMATIC device designation	Service (5)
Device tag M0070		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)
Controls M0028		Menu with information regarding identification of the AUMATIC	
	Order no. controls M0055	Order number of the AUMATIC	Service (5)
	Serial no. controls M0056	Serial number of AUMATIC	Service (5)
	Wiring diagram M0059	Wiring diagram number of AUMATIC	Service (5)
	Date of manufacture M0063	Date of manufacture of controls	Service (5)
Actuator M0029		Menu with information regarding identification of the actuator	
	Order no. actuator M0057	Order number of the actuator	Service (5)
	Serial no. actuator M0220	Works number of actuator	Service (5)
	Wiring diagram actuator M0060	Wiring diagram number of actuator	Service (5)

Table 11: 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))

13.2. Diagnostic Bluetooth connection

Menu is only visible if function Bluetooth M0573 is activated.

Required user level: Specialist (4) or higher.

M ▷ Diagnostic M0022
Bluetooth M0244

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Device tag	M0223	Information for actuator identification within the plant (e.g. KKS designation - Power Plant Classification system) (Can be changed for user level Specialist (4) and higher)
Bluetooth address	M0222	Bluetooth address (BD_ADDR) of controls
Bluetooth add.partner	M0576	Bluetooth address (BD_ADDR) of the Bluetooth partner

13.3. Diagnostic Interface

Required user level: Specialist (4) or higher.

M ▷ Diagnostic 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

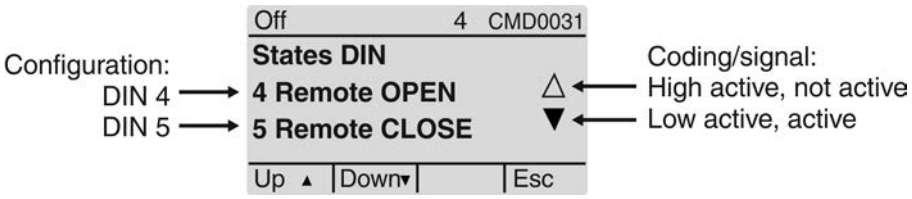
Diagnostics of digital inputs

For the digital inputs (DIN), both coding and signal states are indicated at the input by means of symbols.

Table 12: 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 56: 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

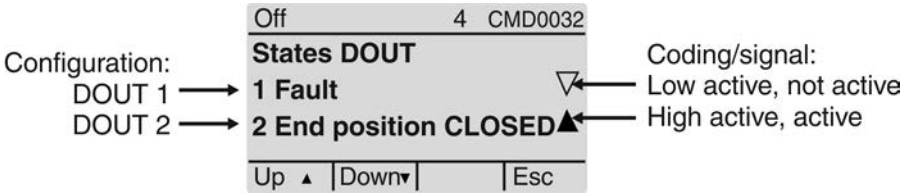
Diagnostic of digital outputs

For the digital outputs (DOUT), both coding and signal states are indicated at the output by means of symbols.

Table 13: 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 57: 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)

13.4. Diagnostic Position transmitter potentiometer

Menu is only visible if the actuator is equipped with potentiometer.

Required user level: Observer (1) or higher.

M ▷ Diagnostic M0022
Position transm. potent. M0831

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Low limit Uspan	M0832	Low limit setting of potentiometer signal range (monitoring the potentiometer span)
Volt.level diff. potent.	M0833	Current voltage level difference of the potentiometer.
Raw val. pos. OPEN	M0999	Raw value end position OPEN
Raw val. pos. CLOSED	M1001	Raw value end position CLOSED
Potent. raw value /mV	M1005	Potentiometer raw value /mV

13.5. 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 ▷ Diagnostic M0022
Position transm. RWG M0996

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Low limit RWG	M1010	Low limit setting of RWG signal for wire break monitoring
Raw val. pos. OPEN	M0997	Raw value end position OPEN
Raw val. pos. CLOSED	M0998	Raw value end position CLOSED
RWG raw value /mA	M1000	RWG raw value /mA

13.6. 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 ▷ Diagnostic M0022
Position transm. MWG M1006

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
Minimum stroke	M1007	Minimum stroke of MWG
Maximum stroke	M1012	Maximum stroke of MWG
Abs. end pos. OPEN	M1011	Absolute value in end position OPEN
Abs. end pos. CLOSED	M1008	Absolute value in end position CLOSED
Absolute value	M1009	Absolute value of MWG

13.7. Diagnostic positioner

Required user level: Specialist (4) or higher.

M ▷ Diagnostic 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	Setting the adaptive behaviour of the positioner
Setpoint position	M0622	Setpoint position
Actual position	M0623	Actual position
Outer dead b. OPEN	M0625	Outer dead band OPEN
Outer dead b. CLOSE	M1002	Outer dead band CLOSE
Inner dead b. OPEN	M1003	Inner dead band OPEN
Inner dead b. CLOSE	M1004	Inner dead band CLOSE

13.8. Diagnostic On time monitoring

Menu is only visible if on time monitoring (parameter On time monitoring M0573) is activated.

Required user level: Observer (1) or higher.

M ▷ Diagnostic M0022
On time monitoring M0593

The following states can be checked via diagnostics:

Parameters	Menu ID	Signification
On time/h	M0594	Current on time/h
Starts/h	M0595	Current starts/h

13.9. Diagnostic Process controller

Required user level: Specialist (4) or higher.

M ▷ Diagnostic 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	Process setpoint of PID controller
Actual process value	M0885	Actual process value of PID controller
Op. com. PID contr.	M0886	Calculated setpoint position for subordinate controller

13.10. 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 ▷ Diagnostic M0022
FO cables M0638

The following states can be checked via diagnostic:

Parameters	Menu ID	Signification
FQM FS ready	M1725	"FQM FS ready" active means that the FQM unit is ready to perform a fail safe operation
FQM FS diag. result	M1726	"FQM FS diag. result" active means that the diagnostic result of winding and blinker contact is indicated as faulty.
FQM fail safe end.pos.	M1727	FQM (fail safe) is in end position corresponding to the fail safe position (depending on the configuration, this can be OPEN or CLOSED)
FQM FS-PosOk	M1728	- "FQM FS-PosOk" active means, that constant force spring and toggle lever switch are both operation (the solenoid switch is being controlled).
FQM request	M1729	Fail safe function of FQM (fail safe) is requested. (ESD requested).
FQM timeout tension	M1730	"FQM timeout tension" active means, that the winding procedure was not completed within the permissible initialisation time of 2.5 minutes.

13.11. 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 AUMATIC to check the interface to the DCS and the correct behaviour of the DCS.

13.11.1. Actuator signals

By simulating the actuator signals, the signal behaviour of the AUMATIC to the DCS can be tested, for example, without having to connect the actuator.

Required user level: Service (5) or higher.

M ▷ Diagnostic 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.

13.11.2. 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 ▷ Diagnostic 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: 1 Fault

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

14. Plant 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.

14.1. 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 14: 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. tem. 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
Max. vibration	Maximum vibration of actuator
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.

14.2. Event report

The event report records system events and status signals. The event record can be exported to the external SD card or read via AUMA CDT software. This allows conclusions on previous actuator and valve operations, for example.

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 AUMATIC records system events such as operation commands or modifications on 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 AUMATIC records 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 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]

14.3. Characteristics

14.3.1. Torque-travel characteristic

Conditions
- Actuators with electronic control unit
- Actuator controls AC 01.2 (non-intrusive version) from firmware version 02.03.01

Characteristics Representation of torque requirement across complete travel (resolution of 0.1 %) During each travel, the 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

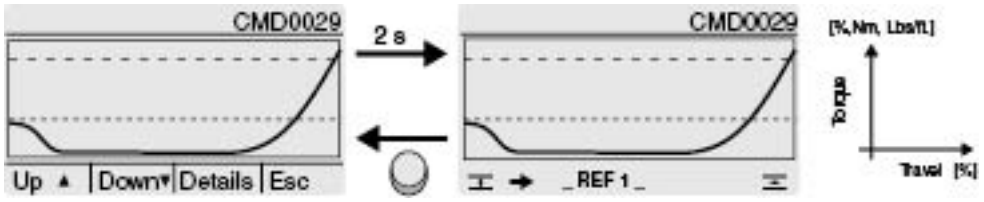
M ▷ Asset Management M1231
Characteristics M0313
Torque-travel M1229
Characteristics M0546

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 58: 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 characteristics (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

14.3.2. 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

Characteristics 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

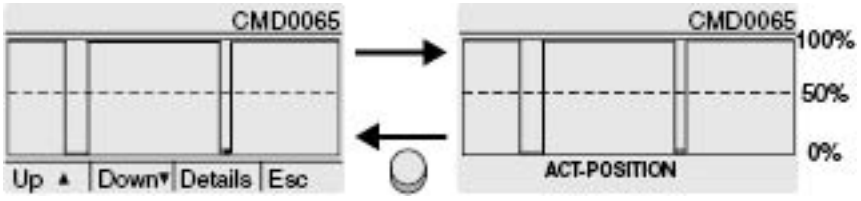
Each characteristic has a designation:

ACTUAL-POSITION = actual position

NOMINAL-POSITION = setpoint position (modulating actuators only)

Use push buttons ▲▼ Up ▲ Down ▼ to change between characteristics.

Figure 59: 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]

14.3.3. Temperature-time characteristic

Characteristics 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

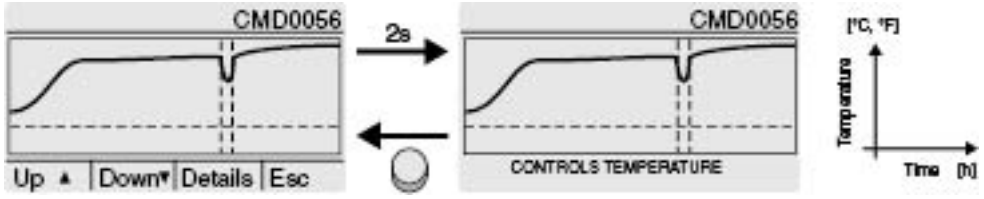
MWG TEMPERATURE = MWG temperature

MOTOR TEMPERATURE = temperature within the motor

GEAR TEMPERATURE = within the gear housing

Use push buttons ▲▼ Up ▲ Down ▼ to change between available characteristics.

Figure 60: Example of temperature-time (within the control unit)



- - - 0° line

¦ Recording interrupted e.g. due to power failure

AC 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

14.4. Histograms

14.4.1. Motor running time-position (histogram)

Conditions
- Actuators of the type range SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2

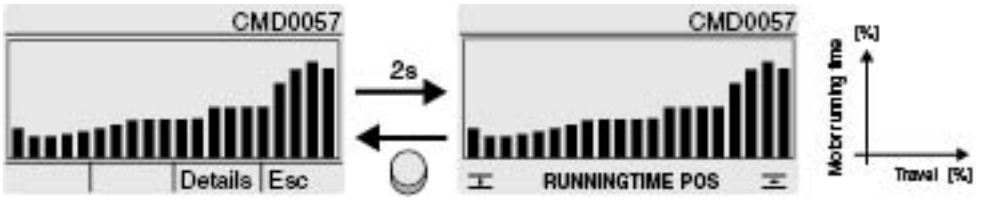
Characteristics The entire travel (from 0 – 100 %) is divided into 20 segments for recording the motor running time. When passing a segment, the counter, shown as bar graph, increments. The histogram is cyclically saved once a minute, in case a change has occurred.

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 run.time-position M0713

Figure 61: 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)

14.4.2. Motor running time-temperature (histogram)

Conditions
- MWG position transmitter in actuator
- Temperature sensor in the motor (option)

Characteristics 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.

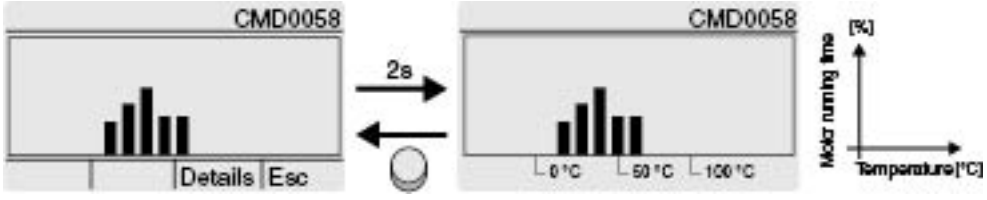
During each operation, the counter of the segment corresponding to the current motor temperature will be incremented. The result is shown in a bar chart. The histogram is cyclically saved once a minute, in case a change has occurred.

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 run.time-temp. M0715

Figure 62: 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)

14.4.3. Acceleration-frequency (histogram)

Conditions MWG position transmitter in actuator

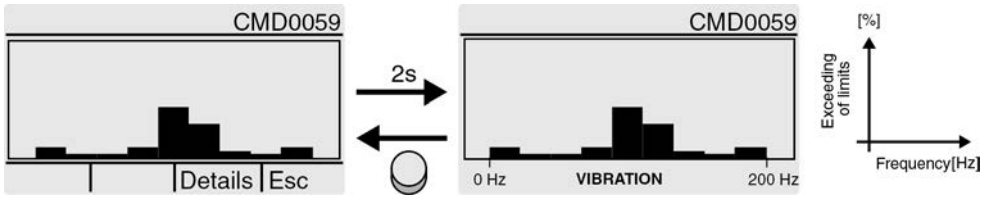
Characteristics The histogram show the percentage distribution of exceeded acceleration. Exceeding of the acceleration limits preset in the factory is recorded in ten different frequency ranges with 20 Hz each (0 – 20 Hz, ..., 180 – 200 Hz).

Application The histogram indicates the frequency range within which the actuator was exposed to vibration for example (e.g. vibration with the pipeline). Impermissibly high or persisting vibration can destroy components of the actuator.

Display acceleration-frequency

M ▷ Asset Management M1231
Histograms M0712
Acceleration-frequency M0716

Figure 63: Example of acceleration-frequency histogram



The following further information is saved with the histogram (can be requested via push button Details)

- Starting date: Date of first measurement
- Saving date: Date of last measurement
- Scaling: Y-axis (acceleration)

14.4.4. Motor running time-torque (histogram)

Conditions MWG position transmitter in actuator

Characteristics 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 %

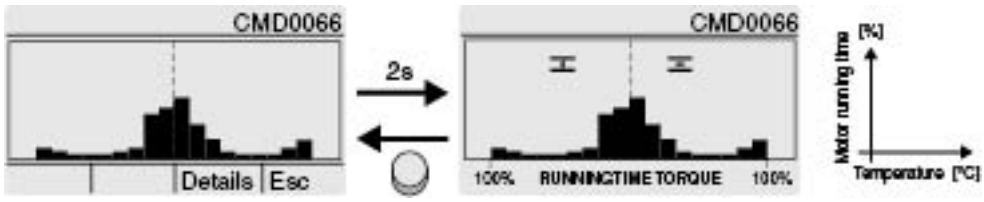
During each operation, the counter of the segment corresponding to the currently required torque will be incremented. The result is shown in a bar chart. The histogram is cyclically saved once a minute, in case a change has occurred.

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 run.time-torque M0830

Figure 64: 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:.

14.5. Maintenance (information and signals)

Characteristics

AC 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, 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/O-rings/lubricant/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> function

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:

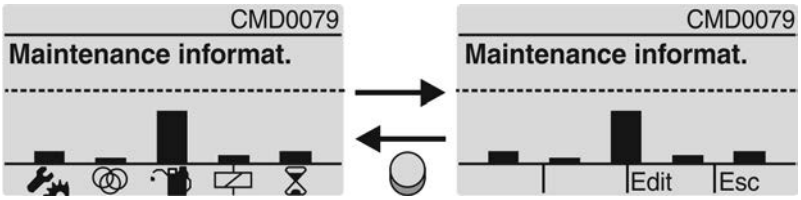
Function not active — <Maintenance interval> function deactivated.

Function active — <Maintenance interval> function activated.

Display maintenance information

M ▷ Maintenance signals M1231
Maintenance M1644
Maintenance informat. M1037

Figure 65: 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

Maintenance interval (adjustable)

Once a bar reaches the threshold (- - -), maintenance will be required.

Reset parameter

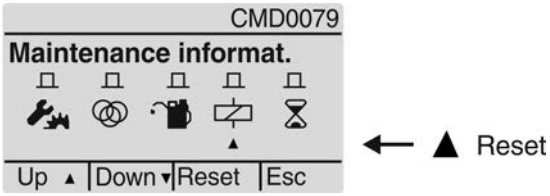
Once maintenance is complete, the parameter initiating the maintenance must be reset.

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 66:



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

View/set mechanics setting values

The lifetime of the mechanics depends on the number of starts of the actuator. If an MWG is installed in the actuator, the number of completed turns including torque present will also be accounted for.

Required user level: Service (5) or higher.

M ▷ Maintenance signals M1231
Maintenance M1644
Limit starts OPEN M1645
Limit starts CLOSE M1646
Limit turns OPEN M1647
Limit turns CLOSE M1648

14.6. 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

14.7. Device temperatures: display

Required user level: Specialist (4) or higher.

M ▷ Asset Management M1231
Device status M0592
Device temperatures M0524

Indications:

Temp. controls — Indication of current temperature in controls housing

Temp. control unit — Indication of current temperature in control unit of the actuator (actuator housing)

15. Corrective action

15.1. Primary fuses

The AUMATIC has to be opened to replace the primary fuses. For detailed information, refer to operation instructions for actuator.

15.2. 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.

Collective signals include further indications which can be displayed via the ↵ Details push button.

Table 15: 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 16: 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 on time running	Warning on time max. running time/h exceeded	• Check modulating behaviour of actuator. • Check parameter Perm. running time/h M0356, re-set if required.
Wrn on time starts	Warning on time max. number of motor starts (starts) exceeded	• Check modulating behaviour of actuator. • Check parameter Permissible starts/h M0357, re-set if required.
Failure behav. active	The failure behaviour is active since all required setpoints and actual values are incorrect.	Verify signals: • 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 of actuator setpoint position Possible causes: Input signal for setpoint = 0 (signal loss)	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. • Check valve. • Check parameter Perm.op. time, manual M0570.
Wrn controls temp.	Temperature within controls housing too high	Measure/reduce ambient temperature.
Wrn motor temp.	Temperature within motor winding too high	Check actuator sizing, correct accordingly.
Wrn gearbox temp.	Temperature within actuator gear housing too high	Check actuator sizing, correct accordingly.
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.
Wrnn no reaction	No actuator reaction to operation commands within the set reaction time.	• Check movement at actuator. • Check parameter Reaction time M0634.
Wrn FOC	Optical receiving signal (channel 1) incorrect (no or insufficient Rx receive level) or RS-485 format error (incorrect bit(s))	Check/repair FO cables.
Wrn FO cable budget	Warning: FO cable system reserve reached (critical or permissible Rx receive level)	Check/repair FO cables.

Indication on display	Description/cause	Remedy
Wrn FOC connection	Warning FO cable connection is not available.	Fit FO cable connection.
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.

Table 17: 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: • 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: • Issue operation command in direction CLOSE. • Set selector switch to position **Local control** (LOCAL) and reset fault indication via push button **RESET**.
Phase fault	• 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.

Indication on display	Description/cause	Remedy
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.	• Check mains voltage. • Check parameter Tripping time M0172, extend time frame if required.
Thermal fault	Motor protection tripped	• Cool down, wait. • If the fault indication display persists after cooling down: - 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.

Table 18: Not ready REMOTE and Function check (collective signal 04)

Indication on display	Description/cause	Remedy
Wrong oper. cmd	Collective signal 13: Possible causes: • Several operation commands (e.g. OPEN and CLOSE simultaneously, or OPEN and SETPOINT operation simultaneously) • A setpoint is present and the positioner is not active • For fieldbus: Setpoint exceeds 100.0 %	• 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 service software AUMA CDT.	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.	• 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.	• 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.

Table 19: Individual indications

Indication on display	Description/cause	Remedy
Config. warning (Collective signal 06)		
Wrn Setpoint Source	No setpoint source configured although an operation to a setpoint position is to be performed.	Configure analogue inputs AIN 1 or AIN 2, refer to <Input for setpoint position>
Wrn Dead bands	The inner dead band is larger than the outer deadband (the outer dead band is adapted to the inner dead band).	Check positioner setting.
Torque config. CLOSE	The set tripping torque for direction CLOSE is outside the permissible setting range.	Verify torque switching setting.

Indication on display	Description/cause	Remedy
Torque config. OPEN	The set tripping torque for direction OPEN is outside the permissible setting range.	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	Configuration of EMERGENCY behaviour is incorrect	Check configuration.
Config. operat. profile	Configuration of operation profile is incorrect.	Check configuration.
FO configuration	FO configuration is incorrect	Check configuration.
Heat.monitor.config.	Configuration of the heater monitoring is incorrect.	Check configuration.
Fail.beh. config.	Configuration of the failure behaviour is incorrect.	Check configuration.
Config. PID controller	Configuration of PID controller is incorrect	Check configuration.
Configuration error (Collective signal 11)		
IE MCM	Available version of the of 'MCM' (Motor Control and Monitoring) electronics sub-assembly does not correspond to target configuration.	Check hardware equipment/article number MCM.
IE PSO	Available version of the 'PSO' (Power Supply Options) electronics sub-assembly does not correspond to the target configuration	Check hardware equipment/article number PSO.
IE config. pos. transm.	Internal error of position transmitter configuration (for actual position recording)	Check hardware equipment/article number position transmitter.
IE parameter config.	Available configuration does not correspond to the target configuration.	Check position transmitter parameters.
Hydraulics fault (Collective signal 12)		
Oil level	Oil level too low	Check oil level.
Oil leakage	Oil leakage occurred	Check hydraulic system.
Motor running time	Permissible running time of the electric motor for hydraulic pump exceeded.	Check hydraulic system.
Pressure rise	Excessive pressure rise	Check hydraulic system.
Phase fault	• 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	• Cool down, wait. • If the fault indication display persists after cooling down: - 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	An incorrect operation command is available at I/O interface REMOTE1.	Correct operation command, i.e. delete and set anew.
Incorr. cmd REMOTE2	An incorrect operation command is available at I/O interface REMOTE2.	Correct operation command, i.e. delete and set anew.

Indication on display	Description/cause	Remedy
Command fieldbus	An incorrect operation command is available at the fieldbus interface.	Correct operation command.
Setpoint pos. disabled	Operation commands to setpoint positions are not available (function disabled)	Verify availability of function (Activation M0212 parameter)
Internal error (Collective signal 14)		
IE mot. prot. monitor	Motor protetction monitoring is defective	Check motor protection monitoring.
IE selector switch	Internal error selector switch defective	Replace selector switch.
IE phase monitoring	Internal error of 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 thermoswitches, to supply the internal actuator heater and, as an option, to generate the 115 V AC supply for the customer.	• Check power supply (level and wiring). • Check power supply unit.
IE output defective	Internal error output defective (switchgear control)	Check switchgear control.
IE position transmitter	Internal error position transmitter (for actual position recording)	Check actuator.
IE logic	Internal error of 'Logic' electronics sub-assembly	Check logic.
IE fieldbus	Internal error of 'Fieldbus' electronics sub-assembly	Check fieldbus interface.
IE MWG	Internal error of 'MWG' (Magnetic Limit and Torque Transmitter) electronics sub-assembly	Check MWG.
IE LC	Internal error of 'LC' (Local Controls) electronics sub-assembly	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	Calibration of MWG is incorrect	Check MWG.
IE version	Internal error, conflict of versions	Check device configuration.
IE EEPROM	Internal error EEPROM	Check device configuration.
IE parameter	Internal error parameter (error during parameter initialisation)	Check device configuration.
IE file access	Internal error file access	Check device configuration.
IE reserve backup	Error when accessing replacement parameters	Check device configuration.
IE registration	Internal error upon process data registration	Check device configuration.
IE startup FB	Internal error upon function block startup	Check device configuration.
IE startup sub-assy	Internal error upon electronics sub-assembly startup	Check device configuration.
IE LC exception	Error in the execution of LC firmware	Check device configuration.
IE logic exception	Error in the execution of logic firmware	Check device configuration.
IE MWG exception	Error in the execution of MWG firmware	Check device configuration.
IE bus exception	Error in the execution of fieldbus interface firmware	Check device configuration.
IE MWG end positions	Error when recording the end positions using the MWG	Check device configuration.
Internal warning (Collective signal 15)		
Wrn heater	Collective signal 15 (control unit)	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).

Indication on display	Description/cause	Remedy
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	Internal warning: Replacement parameters are used as no valid parameters are available (Remedy: Reboot controls/actuator)	Reboot AUMATIC.
Wrn ref.actual position	Actuator position feedback has not yet been referenced to the end positions.	Operate actuator fully in end positions OPEN and CLOSED.
Wrn range act.pos.	The current signal range of the position feedback is outside the permissible range.	Verify primary reduction gearing settings within the actuator.
Wrn sign.loss act.pos.	Loss of signal of the actuator position feedback signal	Check position feedback.
Wrn event mark	Wrn event mark (internal system warning)	Check system configuration.
Wrn Tm mark	Wrn Tm mark (internal system warning)	Check system configuration.
Hydraulics warning (Collective signal 17)		
Operat. pressure min	Pressure of hydraulic accumulator lower than the minimum value of the set accumulator pressure.	Check hydraulic system
Pump starts	Permissible number of starts of the hydraulic pump has been exceeded.	Check hydraulic system.
Oper. press. config.	Configuration of the accumulator pressure is incorrect.	Check hydraulic system.
Config. error REMOTE (Collective signal 22)		
IE I/O interface	Available version of 'I/O interface' electronics sub-assembly does not correspond to the target configuration.	• Check parameter I/O interface M0139. The setting must correspond to the wiring diagram. • Check wiring. • Check I/O interface.
IE remote interface	Configuration for function of Remote interface is incorrect.	Check configuration.
IE remote Prm Config	Configuration of Remote interface function is faulty.	Check configuration.

Table 20: Status texts in menu S0001

Indication on display	Description/cause	Remedy
Sensor failure	Hardware is either defective or not available: • 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 • 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	

16. Appendix

16.1. Selection overview for output contacts and indication lights (digital outputs DOUT)

Depending on the version, the AC is equipped with up to 12 output contacts (digital outputs).

Table 21:

Signal	Description
Not used	–
End position CLOSED	End position CLOSED reached Indication depends on the type of seating and means either • 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 • 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 is within max. 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.
Operation pause active	Actuator is in pause time of stepping mode
Start stepping mode	The actuator is within the set stepping range.

Signal	Description
Actuator running	Actuator is running (output drive is moving) Hard wired collective signal consisting of: • 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
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).
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: • 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

Signal	Description
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	FQM (fail safe) ready
FQM request	The fail safe function of the FQM (Fail safe) is active.
FQM end pos. open	FQM has reached end position OPEN at the output drive side.
FQM end pos. closed	FQM has reached end position CLOSED at the output drive side.

16.2. Selection overview of binary signals for digital inputs (DIN)

Depending on the version, the AC is 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 22:

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.
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

Signal	Description
MPV: CW Position 4	Clockwise approach of position 4
MPV: CCW Position 4	Counterclockwise approach of position 4
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
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

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