Product Manual

# ABB i-bus® KNX

## Analogue Actuator AA/S 4.1
## Analogue Actuator Module AAM/S 4.1

Intelligent Installation Systems

This manual describes the function of the Analogue Actuator AA/S 4.1
and the Analogue Actuator Module AAM/S 4.1 with the application program
“Analogue output 4-8f /1.3”.
Subject to changes and errors excepted.

**Exclusion of liability:**
Despite checking that the contents of this document match the hardware and software, deviations cannot be completely excluded. We therefore cannot accept any liability for this. Any necessary corrections will be inserted in new versions of the manual.

Please inform us of any suggested improvements.

# Contents

# 1 General

## 1.1 Product and functional overview

The analog actuator converts measuring data received via KNX telegrams into analog output signals. The analog output signals enable heating, ventilation and air conditioning units to adapt their output values to information received from the bus and thus to take part in control processes.

| | |
|---|---|
| Voltage signals: | 0 ... 1 V DC |
| | 0 ... 10 V DC |
| Current signals: | 0 ... 20 mA |
| | 4 ... 20 mA |

The Analogue Actuator features four analogue outputs which can be parameterised to a previously set format. Outputs which are not required can be switched off. The output signals can be forced controlled.

The number of analogue outputs can be increased to 8 using the Analogue Actuator Module AAM/S. When combined with the “Dimming” switch sensor function the Analogue Actuator and the Analogue Actuator Module can be used as an active control unit for dimming applications.

Note: The Analogue Actuator AA/S requires an external 24 V AC voltage supply for operation. This voltage supply can also simultaneously assume the supply of power to a connected Analogue Actuator Module AAM/S.

# 2 Device technology AA/S 4.1

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Fig. 1: AA/S 4.1

The Analogue Actuator converts measured data received via the KNX to analogue output signals. The device features four outputs. The analogue outputs can be used as current or voltage outputs with adjustable output signals. The number of analogue outputs can be increased to 8 using the Analogue Actuator Module AAM/S. The Analogue Actuator is a DIN rail device for installation in the distribution board. The connection to the KNX is established using a bus connection terminal. The device needs an external 24 V AC power supply.

## 2.1 Technical Data

| | | |
|---|---|---|
| **Power supply** | Operating voltage<br>Bus voltage<br>Current consumption device / KNX<br>Power consumption | 24 V AC ± 10 %<br>21 … 30 V DC via KNX<br>Max. 310 mA / < 10 mA<br>typ. 150 mW |
| **Outputs** | 4 analogue outputs A1…A4<br><br>Signal type<br><br><br>Output signal load | Extendable with Analogue Actuator Module AAM/S to 8 outputs<br>0…1 V DC 0…20 mA<br>0…10 V DC 4…20 mA<br>depending on parameterisation<br>Voltage signal: ≥ 1 kΩ<br>Current signal: ≤ 500 Ω |
| **Output current** | Voltage signal<br>Current signal | Max. 10 mA per channel<br>Max. 20 mA per channel |
| **Operating and display elements** | Device status display<br>Output signal A1…A4 display<br>Programming button and LED (red) | Status LED (3-colour: red, orange, green)<br>Status LED (yellow)<br>For assignment of the physical address |
| **Connections** | KNX<br>Analogue outputs A1…A4<br>24 V AC power supply<br><br><br><br>System connector, 6-pole | Bus connection terminal (black/red)<br>2 screw terminals per output/terminal<br>Conductor cross-section:<br>single-core: 0.50 – 4.0 mm²<br>stranded: 0.34 – 4.0 mm²<br>stranded: 0.14 – 2.5 mm²<br>Connection for max. 1 analogue actuator module |
| **Enclosure** | IP 20, EN 60 529 | |
| **Ambient temperature range** | Operation<br>Storage<br>Transport | – 5 °C ... + 45 °C<br>– 25 °C ... + 70 °C<br>– 25 °C ... + 70 °C |
| **Humidity** | Ambient/Storage/Transport | Max. 93 % rel. humidity, no condensation |
| **Design** | Modular installation device | |
| **Housing, colour** | Plastic housing, grey | |
| **Installation** | On 35 mm mounting rail | to DIN EN 50 022 |
| **Dimensions** | 90 x 72 x 69.5 mm (H x W x D) | |
| **Mounting depth / width** | 70 mm / 4 modules at 18 mm | |
| **Weight** | approx. 180 g | |
| **Mounting position** | as required | |
| **Approvals** | KNX to EN 50 090-1, -2 | |
| **CE mark** | in accordance with the EMC guideline and low voltage guideline | |

| Application program | Number communication objects | Max. number of group addresses | Max. number of associations |
|---|---|---|---|
| Analogue output 4-8f /1.3 | 58 | 200 | 200 |

Note: The programming requires Software Tool ETS2 V1.3 or higher.
If ETS3 is used a ".VD3" type file must be imported.
The application program is available in the ETS2 / ETS3 at ABB/output/analogue output.

### 2.1.1 Circuit diagram

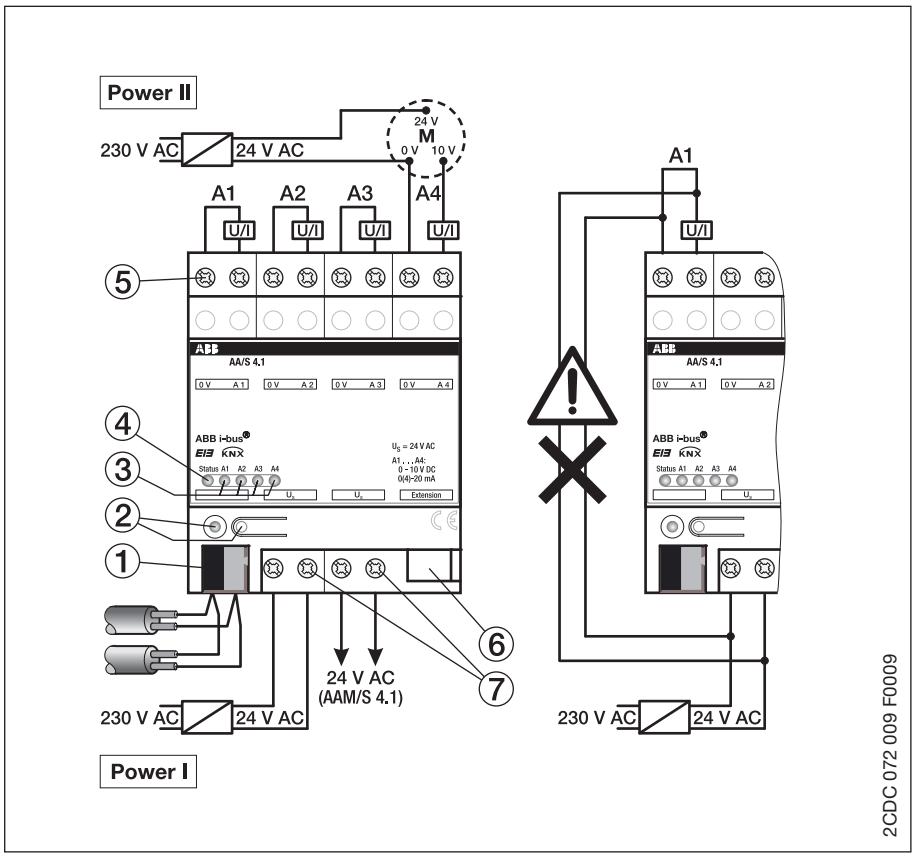


Fig. 2: Circuit diagram AA/S 4.1

**1** Bus connecting terminal
**2** Programming LED/button
**3** Status LED output A1…A4
**4** Status LED device
**5** Connection terminals A1…A4
**6** Connection for Analogue Actuator Module
**7** Connection terminal 24 V AC

### 2.1.2 Dimension drawing

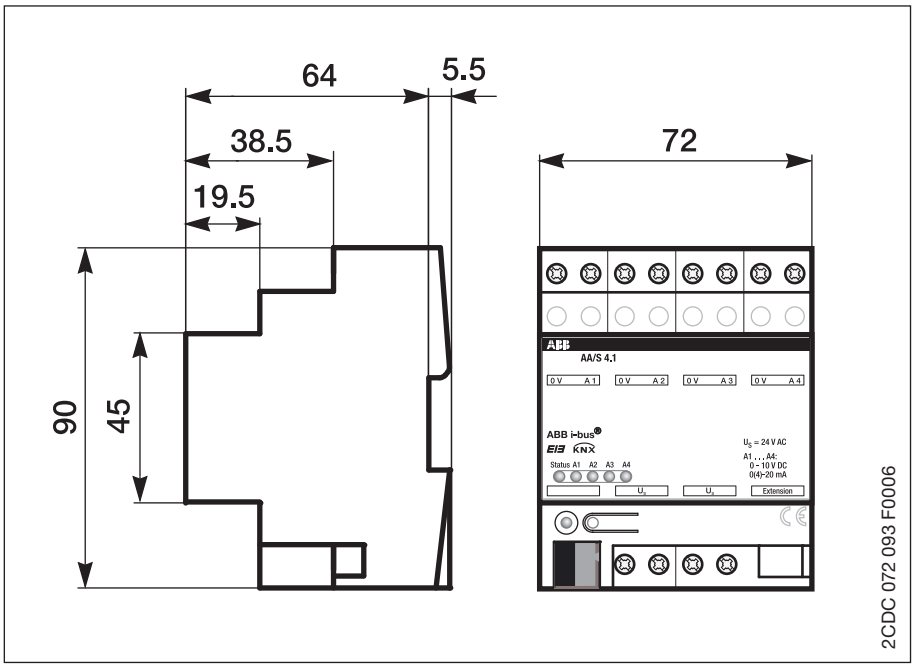


Fig. 3: Analogaktor AA/S 4.1

### 2.1.3 Installation

The connection to a max. of one Analogue Actuator Module is implemented via a 6-pole system connector (included with the Analogue Actuator Module).

- The 24 V AC supply voltage must not be used for supplying further components (e.g. motor drives for vantilation flaps) wich are controlled by the analogue outputs (risk of irreparable damage!).
- Do not connect electronic ballast's or electronic transformers with 1–10 V control input to the outputs!
- Do not connect external voltages to the outputs. Connected components must ensure safe separation from other voltages.
- The 0 V terminals must not be connected with the terminals of the same designation of an Analogue Actuator (risk of irreparable damage!).
- The 0 V terminals of outputs A5...A8 are internally connected.

# 3 Device technology AAM/S 4.1

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Fig. 4: AAM/S 4.1

The Analogue Actuator Module expands the Analogue Actuator AA/S 4.1 by four analogue outputs. The device converts measured data received via the KNX to analogue output signals. The analogue outputs can be used as current or voltage outputs with adjustable output signals.
The Analogue Actuator Module is a DIN rail device for installation in the distribution board. For operation the 24 V AC power supply can be carried out by AA/S 4.1.

## 3.1 Technical Data

| | | |
|---|---|---|
| **Power supply** | Operating voltage<br>Current consumption<br>Current consumption on system connector | 24 V AC ± 10 %<br>Max. 120 mA<br>Max. 6 mA |
| **Outputs** | 4 analogue outputs<br>Signal type<br><br><br><br>Output signal load | Outputs A5…A8<br>0 ... 1 V DC  0 ... 20 mA<br>0 ... 10 V DC  4 ... 20 mA<br>depending on parameterisation<br>Voltage signal: ≥ 1 kΩ<br>Current signal: ≤ 500 Ω |
| **Output current** | Voltage signal<br>Current signal | Max. 10 mA per channel<br>Max. 20 mA per channel |
| **Operating and display elements** | Device status display<br>Output signal A5…A8 display | Status LED (red)<br>Status LED (yellow) |
| **Connections** | Analogue outputs A5…A8<br>24 V AC power supply<br><br><br><br>System connector, 6-pole | 2 screw terminals per output/terminal<br>Conductor cross-section:<br>single-core:  0.50–4.0 mm²<br>stranded:  0.34–4.0 mm²<br>stranded:  0.14–2.5 mm²<br>Connection to analogue actuator |
| **Enclosure** | IP 20, EN 60 529 | |
| **Ambient temperature range** | Operation<br>Storage<br>Transport | – 5 °C ... + 45 °C<br>– 25 °C ... + 70 °C<br>– 25 °C ... + 70 °C |
| **Humidity** | Ambient/Storage/Transport | Max. 93 % relative humidity, no condensation |
| **Design** | Modular installation device | |
| **Housing, colour** | Plastic housing, grey | |
| **Installation** | On 35 mm mounting rail | to DIN EN 50 022 |
| **Dimensions** | 90 x 72 x 69.5 mm (H x W x D) | |
| **Mounting depth / width** | 70 mm / 4 modules at 18 mm | |
| **Weight** | approx. 150 g | |
| **Mounting position** | as required | |
| **Approvals** | KNX | |
| **CE mark** | in accordance with the EMC guideline and low voltage guideline | |

Note: Programming of the Analogue Actuator Module AAM/S 4.1 is implemented via the application of the Analogue Actuator AA/S 4.1. The programming requires Software Tool ETS2 V1.3 or higher. If ETS3 is used a ".VD3" type file must be imported. The application program is available in the ETS2 / ETS3 at ABB/output/analogue output.

### 3.1.1 Circuit diagram

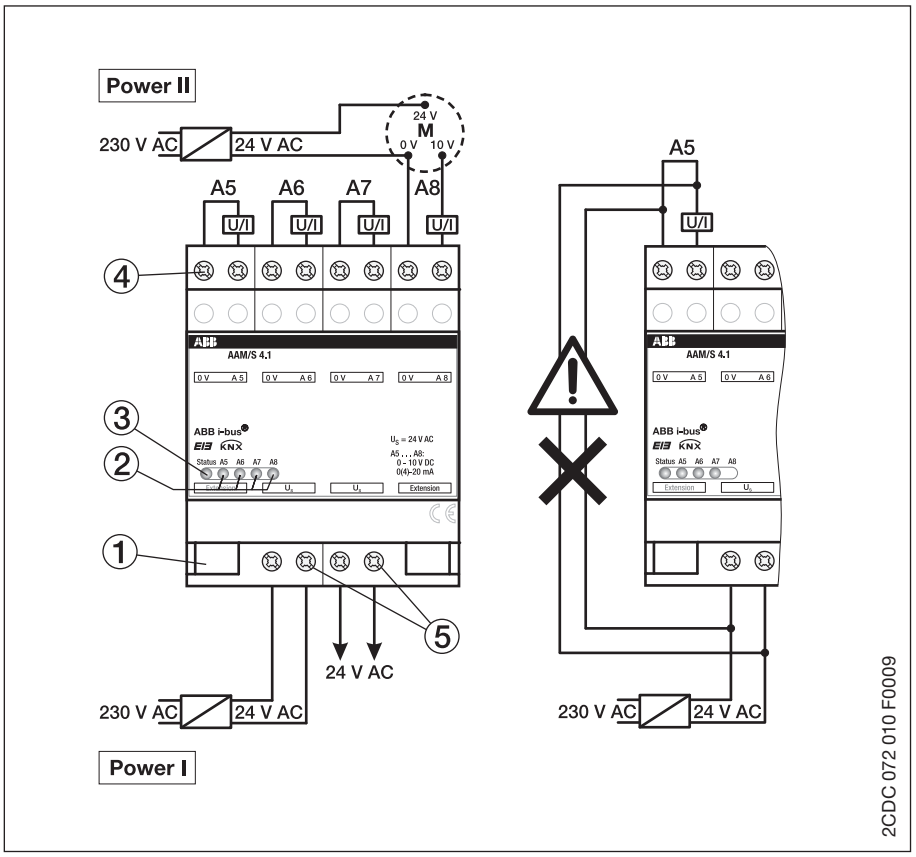


Fig. 5: Circuit diagram AAM/S 4.1

**1** Connection to analogue actuator
**2** Status LED output A5…A8
**3** Status LED device
**4** Connection terminals A5…A8
**5** Connection terminal 24 V AC

### 3.1.2 Dimension drawing

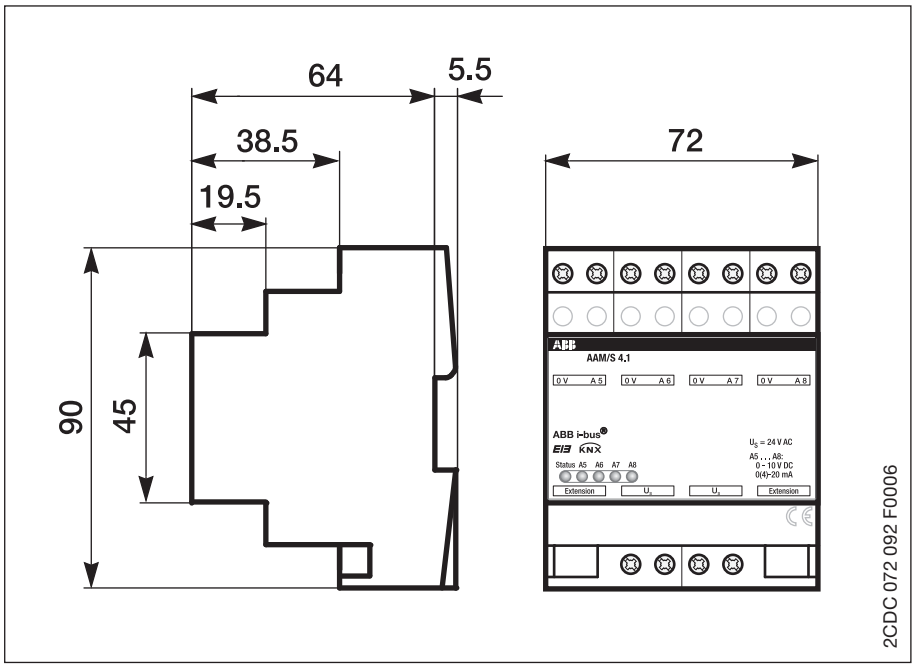


Fig. 6: Analogue Actuator Module AAM/S 4.1

### 3.1.3 Installation

The connection to the Analogue Actuator will by carried out via a 6-pole system connector (supplied with the Analogue Actuator Module).

A maximum of one Analogue Actuator Module can be connected.

An Analogue Actuator Module can be replaced while the system is in operation (disconnect voltage supply from module!). After the replacement, the Analogue Actuator makes a reset after approx. 25 s. This action reinitialises all outputs of the Analogue Actuator and resets them to their original state.

Removal or addition of modules without adapting the project and subsequent downloading into the Analogue Actuator is not permitted as this will result in system malfunctions.

- The 24 V AC supply voltage must not be used for supplying further components (e.g. motor drives for vantilation flaps) wich are controlled by the analogue outputs (risk of irreparable damage!).
- Do not connect electronic ballast's or electronic transformers with 1 – 10 V control input to the outputs!
- Do not connect external voltages to the outputs. Connected components must ensure safe separation from other voltages.
- The 0 V terminals must not be connected with the terminals of the same designation of an Analogue Actuator (risk of irreparable damage!).
- The 0 V terminals of outputs A5...A8 are internally connected.

# 4 Commissioning

## 4.1 Application program

The Analogue Actuator is used to convert physical values (2 Byte) or relative values (1 Byte) to analogue voltages (0 … 1 V, 0 … 10 V) or currents (0 … 20 mA, 4 … 20 mA). In this manner for example, components for cooling and air conditioning system such as valve drives for ventilation flaps or other devices can be integrated into the KNX system.

The outputs are deactivated (“no function”) in the default setting. The required voltage or current signal can be selected separately with the “Signal Output X” parameter. As soon as the output is activated the ETS indicates further parameters and communication objects. An active output features the communication object “Input value” and a communication object “Status”, and even further parameter communication objects which are dependent on its parameters.

Both the parameter pages “Output X 1/2” and “Output X 2/2” belong to every active output. The required input format (16 bit or 8 bit) and the behaviour after a reset are defined on the first of both parameter pages.

8-bit values can be used by a large number of KNX devices. They feature a limited resolution. 16-bit values feature a high resolution and ensure very flexible adaption to the respective system functions. However, they require more initial effort when setting the parameters.

The second parameter page enables the use of forced control objects with higher priorities, time monitoring of the input objects and setting of a dimming function using relative values (1-byte object).

## 4.2 Parameter window

In the following sections the individual parameter windows with their respective parameters are described in exact detail. Parameter values which are written in italics are default settings.

### 4.2.1 Parameter window “General”

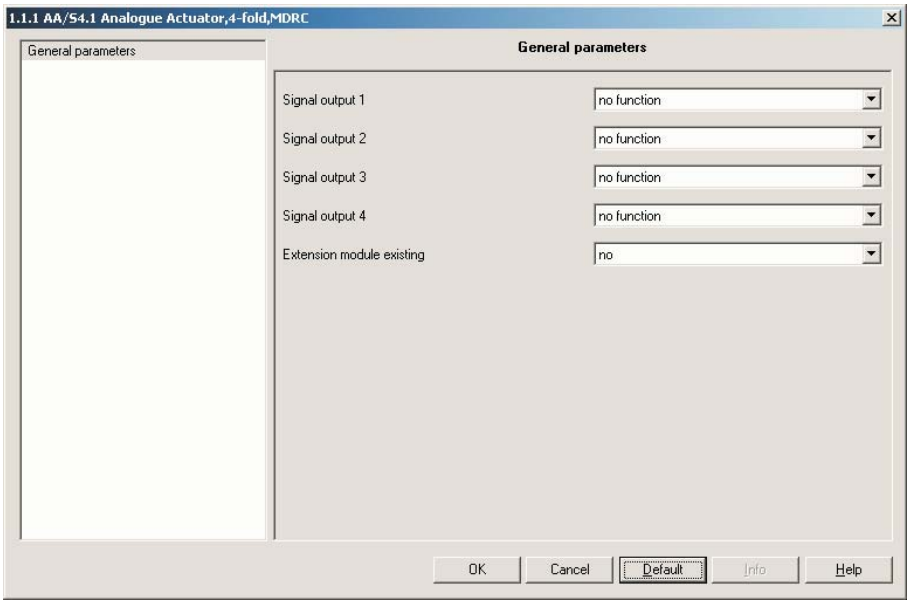


Fig. 7: “General” parameter window

**Signal output 1…4**
Options: – *no function*
– 0 … 10 V
– 0 … 1 V
– 0 … 20 mA
– 4 … 20 mA

Each output can be programmed as a voltage or current source. Outputs which are not required can be deactivated (no function). If the output is deactivated the corresponding communication objects and further parameters remain hidden. If the output is used two additional parameter pages are displayed (Output X 1/2 and Output X 2/2).

**Extension module existing**
Options: – *no*
– yes

*Yes*: The outputs 5–8 of the Analogue Actuator Module are displayed. They feature the same functionalities, parameters and objects as the Analogue Actuator.

### 4.2.2 Parameter window “Output X 1/2”

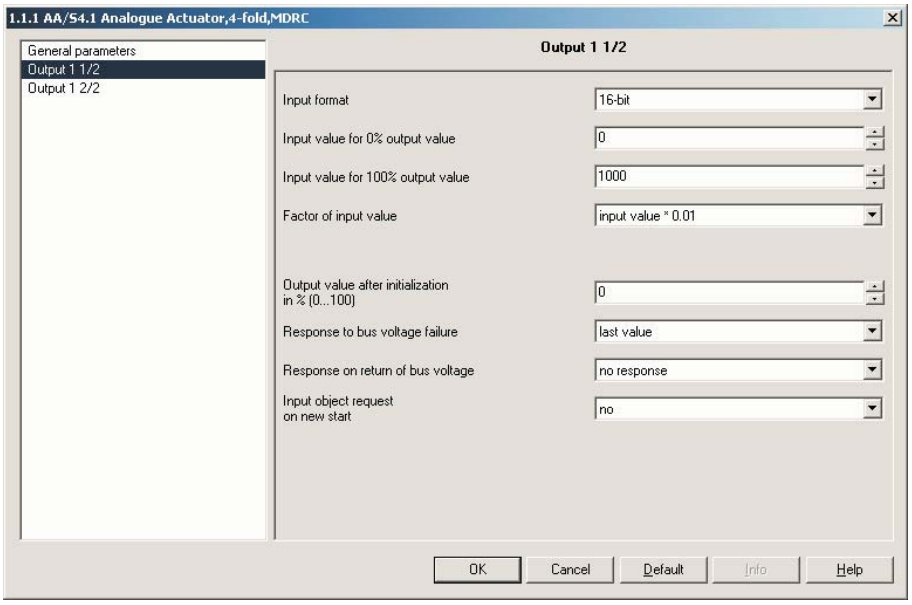


Fig. 8: Parameter window “Output X 1/2”

**Input format**
Options: – *16 Bit*
– 8 Bit

Different communication objects are displayed for the input values and the status output dependent on this parameter.

*8-bit:* In 8-bit mode the output features a 1-bit object and a 4-bit object. The input value range (0 or 255) is defined in this mode. The function of the output corresponds in this case with the KNX standard for dimming actuators.

If the 8-bit mode is set the parameter “Time between 2 of 255 dimming steps“ and “Response on reception of value” is displayed on the Output X 2/2 parameter window (see 4.2.3).

**Input value for 0 % output value**
**Input value for 100 % output value**
Options: – 32768…32767 *(0 or 1000)*

For setting the input value range for 0 % or 100 % output value with 16-bit input format.

If the 8-bit mode has been selected with the “Input format” parameter, the input value range is determined:

*Input value for 0 % output value 0*
*Input value for 100 % output value 255*

The function of the output corresponds in this case with the KNX standard for dimming actuators.

**Factor of input value**
Options: – *Input value * 0,01*
– Input value * 0,1
– Input value * 1
– Input value * 10
– Input value * 100

With the three parameters “Input value for 0 %”, “Input value for 100 %” and “Factor of input value” the output curve of the actuator can be matched to different input variables.

Both input values should be selected to ensure that the smallest possible factor can cover the required range to assure the best possible internal resolution.

**Output value after initialisation in %**
Options: – 0…100 *(0)*

Independent of the size of the input objects, the output value during an initialisation is defined with this parameter, for example after reprogramming or bus voltage failure.

**Response to bus voltage failure**
Options: – *last value*
– output value in %

If the supply voltage is present, the output can either retain the last value or set the output to a new value with a bus voltage failure.

*Output value in %:* If this option is selected the parameter “Output value in %” is displayed.

**Output value in %:**
Options: – 0…100 *(0)*

For setting the output value in % with bus voltage failure.

**Response on return of bus voltage**
Options: – *no response*
– state of initialization
– state as before bus voltage failure

When the bus voltage recovers the output can retain its current value, apply the set initialisation value or can restore the state as before bus voltage failure.

**Input object request on new start**
Options: – *no*
– yes

*Yes*: The output sends a read request to its sending group address. The value which has been received is then set as the output value.

### 4.2.3 Parameter window “Output X 2/2”

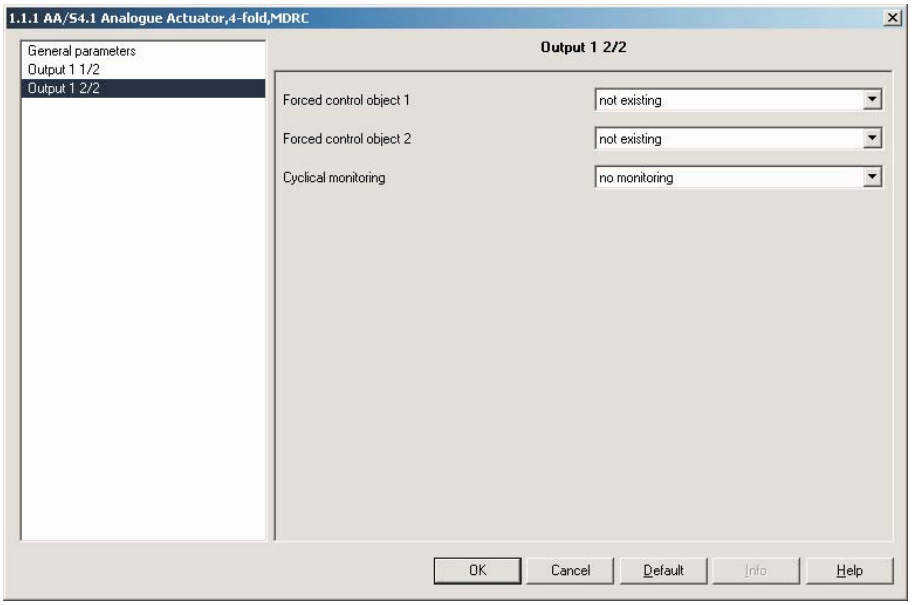


Fig. 9: Parameter window “Output X 2/2”

**Forced control object 1**
**Forced control object 2**
Options: – *not existing*
– forced control active at “1” telegram
– forced control active at “0” telegram

Both forced control objects enable the control of an output with a higher priority than the 1-byte or 2-byte input object.

If this parameter is set to “not existing” the ETS will not display the corresponding 1-bit object. If the object is used, this parameter will determine at which object value forced control is active. If the forced control object is deactivated, the output will assume the value in accordance with the “Input value” object.

If both forced control objects are active, forced control object 1 has the higher priority.

*Forced control active at 1 or 0 telegram:* The parameters “Output value in case of forced control 1 or 2 in %” are displayed.

**Output value with forced control 1 in %**
**Output value with forced control 2 in %**
Options: – 0...100 *(50)*

This parameter determines the output value if the corresponding forced control object is active.

**Cyclical monitoring**
Options: – *no monitoring*
– Input value
– Forced control
– Input value or forced control

The output can monitor the object “Input value” and / or the objects “Forced control” on a time basis.

If an input telegram is not received in the time defined in the connection, the output evaluates this as a fault. In this case the object “Alarm output …” can send a telegram with the value 1, and the output assumes the value which is set with the parameter “Output value after exceeding of the monitoring time in %”.

**Time factor for cyclical monitoring**
Options: 1...255 *(6)*

This parameter determines the monitoring time of the output together with the fixed time basis (basis = 10 s).

**Output value after exceeding of the monitoring time in %**
Options: 0…100 *(0)*

The output assumes the value parameterised here when the monitoring time is exceeded.

**Time between 2 of 255 dimming steps**
**Basis**
Options: – *10 ms*
– 100 ms
– 1 s

With this parameter the basis for the dimming speed which the output uses is determined in 8-bit mode, if it is controlled via the 4-bit object, or if the parameter “Response on reception of value” is set to the “dimming approach” and the output has received a new input value.

**Time between 2 of 255 dimming steps**
**Factor (1…255)**
Options: – 1…255 *(2*)

With this parameter the factor for the dimming speed which the output uses is determined in 8-bit mode, if it is controlled via the 4-bit object, or if the following parameter is set to the “dimming approach” and the output has received a new input value.

**Response on reception of value**
Options: – *direct approach*
– dimming approach

In dimming actuator mode the output can rapidly assume new 1-byte values or assume them via a dimming speed.

### 4.3 Communication object

#### 4.3.1 Communication objects AA/S 4.1, Output 1 – 4

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 0 | Input value output 1 | Analog output | 1 Byte | C | - | W | - |
| 1 | Input value output 2 | Analog output | 1 Byte | C | - | W | - |
| 2 | Input value output 3 | Analog output | 1 Byte | C | - | W | - |
| 3 | Input value output 4 | Analog output | 1 Byte | C | - | W | - |
| 4 | Status output 1 | Analog output | 1 Byte | C | R | - | T |
| 5 | Status output 2 | Analog output | 1 Byte | C | R | - | T |
| 6 | Status output 3 | Analog output | 1 Byte | C | R | - | T |
| 7 | Status output 4 | Analog output | 1 Byte | C | R | - | T |
| 8 | Forced control 1 output 1 | Analog output | 1 bit | C | - | W | - |
| 9 | Forced control 2 output 1 | Analog output | 1 bit | C | - | W | - |
| 10 | Forced control 1 output 2 | Analog output | 1 bit | C | - | W | - |
| 11 | Forced control 2 output 2 | Analog output | 1 bit | C | - | W | - |
| 12 | Forced control 1 output 3 | Analog output | 1 bit | C | - | W | - |
| 13 | Forced control 2 output 3 | Analog output | 1 bit | C | - | W | - |
| 14 | Forced control 1 output 4 | Analog output | 1 bit | C | - | W | - |
| 15 | Forced control 2 output 4 | Analog output | 1 bit | C | - | W | - |
| 16 | Switching output 1 | Analog output | 1 bit | C | - | W | - |
| 17 | Switching output 2 | Analog output | 1 bit | C | - | W | - |
| 18 | Switching output 3 | Analog output | 1 bit | C | - | W | - |
| 19 | Switching output 4 | Analog output | 1 bit | C | - | W | - |
| 20 | Dimming output 1 | Analog output | 4 bit | C | - | W | - |
| 21 | Dimming output 2 | Analog output | 4 bit | C | - | W | - |
| 22 | Dimming output 3 | Analog output | 4 bit | C | - | W | - |
| 23 | Dimming output 4 | Analog output | 4 bit | C | - | W | - |
| 24 | Alarm output 1 | Analog output | 1 bit | C | - | - | T |
| 25 | Alarm output 2 | Analog output | 1 bit | C | - | - | T |
| 26 | Alarm output 3 | Analog output | 1 bit | C | - | - | T |
| 27 | Alarm output 4 | Analog output | 1 bit | C | - | - | T |

Fig. 10: Communication objects Analogue Actuator AA/S 4.1

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **0-3** | **Analogue output** | **Input value output 1…4** | **1 Byte EIS 6 DPT 5.001**<br>**2 Byte EIS 5 DPT 9.0xx** | **C, W** |
| 1-byte or 2-byte objects with which the value of the output can be set. In 1-byte mode a new input value can be assumed rapidly or it is possible to dim to the value. The input object can be time monitored.<br>(see also object “Alarm Output …”) | | | | |
| **4-7** | **Analogue output** | **Status Output 1…4** | **1 Byte EIS 6 DPT 5.001**<br>**2 Byte EIS 5 DPT 9.0xx** | **C, R, T** |
| 1-byte object or 2-byte object for displaying the current output value. | | | | |

| | | | | |
|---|---|---|---|---|
| **8-15** | **Analogue output** | **Forced control 1/2<br>Output 1…4** | **1 Bit EIS 1<br>DPT 1.001** | **C, W** |
| 1-bit objects with which the output is forced to switch to a parameterised value. The output assumes the previous value when forced control is switched off.<br>If both forced control 1 and forced control 2 are active, forced control 1 has priority.<br>The forced control objects can be time monitored. (see also object “Alarm Output …”)<br>The object “Forced control …” of an output is only visible if the parameter “Forced control object …” is set to ”Forced control active with …”. | | | | |
| **16-19** | **Analogue output** | **Switching<br>Output 1…4** | **1 Bit EIS 1<br>DPT 1.001** | **C, W** |
| 1-bit objects, which are used to switch the output on (100 %) or off.<br>This object can only be associated for example with the 1-bit object of a dim switch. It is only available in 8-bit mode.<br>The switch object is not monitored if cyclic monitoring of the input value is active.<br>The objects “Switching” of an output is only visible if the parameter “Input format” is set to “8 Bit”. | | | | |
| **20-23** | **Analogue output** | **Dimming<br>Output 1…4** | **4 Bit EIS 2<br>DPT 3.007** | **C, W** |
| 4-bit object, to increase or decrease the output value continuously with a dim switch. The dim speed is adjustable.<br>According to the KNX standard “dimming on” is possible and “dimming off” is not possible.<br>The dim object is not monitored if cyclic monitoring of the input value is active.<br>The objects “Dimming” of an output is only visible if the parameter “Input format” is set to “8 Bit”. | | | | |
| **24-27** | **Analogue output** | **Alarm<br>Output 1…4** | **1 Bit EIS 1<br>DPT 1.005** | **C, T** |
| 1-bit object which is set if the output is overloaded in mode 0 … 1 V or 0 … 10 V (output current above 10 mA), or if the monitoring time with active cyclic monitoring of the communication objects “Input value” and / or “Force control …” has timed out. | | | | |

### 4.3.2 Communication objects AAM/S 4.1, Output 5 – 8

The communication objects 29–57 of the Extension module AAM/S 4.1 are only visible if the parameter “Extension module existing” is set to “Yes”.

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 29 | Input value output 5 | Extension module | 1 Byte | C | - | W | - |
| 30 | Input value output 6 | Extension module | 1 Byte | C | - | W | - |
| 31 | Input value output 7 | Extension module | 1 Byte | C | - | W | - |
| 32 | Input value output 8 | Extension module | 1 Byte | C | - | W | - |
| 33 | Status output 5 | Extension module | 1 Byte | C | R | - | T |
| 34 | Status output 6 | Extension module | 1 Byte | C | R | - | T |
| 35 | Status output 7 | Extension module | 1 Byte | C | R | - | T |
| 36 | Status output 8 | Extension module | 1 Byte | C | R | - | T |
| 37 | Forced control 1 output 5 | Extension module | 1 bit | C | - | W | - |
| 38 | Forced control 2 output 5 | Extension module | 1 bit | C | - | W | - |
| 39 | Forced control 1 output 6 | Extension module | 1 bit | C | - | W | - |
| 40 | Forced control 2 output 6 | Extension module | 1 bit | C | - | W | - |
| 41 | Forced control 1 output 7 | Extension module | 1 bit | C | - | W | - |
| 42 | Forced control 2 output 7 | Extension module | 1 bit | C | - | W | - |
| 43 | Forced control 1 output 8 | Extension module | 1 bit | C | - | W | - |
| 44 | Forced control 2 output 8 | Extension module | 1 bit | C | - | W | - |
| 45 | Switching output 5 | Extension module | 1 bit | C | - | W | - |
| 46 | Switching output 6 | Extension module | 1 bit | C | - | W | - |
| 47 | Switching output 7 | Extension module | 1 bit | C | - | W | - |
| 48 | Switching output 8 | Extension module | 1 bit | C | - | W | - |
| 49 | Dimming output 5 | Extension module | 4 bit | C | - | W | - |
| 50 | Dimming output 6 | Extension module | 4 bit | C | - | W | - |
| 51 | Dimming output 7 | Extension module | 4 bit | C | - | W | - |
| 52 | Dimming output 8 | Extension module | 4 bit | C | - | W | - |
| 53 | Alarm output 5 | Extension module | 1 bit | C | - | - | T |
| 54 | Alarm output 6 | Extension module | 1 bit | C | - | - | T |
| 55 | Alarm output 7 | Extension module | 1 bit | C | - | - | T |
| 56 | Alarm output 8 | Extension module | 1 bit | C | - | - | T |
| 57 | Alarm | Extension module | 1 bit | C | - | - | T |

Fig. 11: Communication objects Analogue Actuator Module AAM/S 4.1

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **29-32** | **Extension module** | **Input value output 5…8** | **1 Byte EIS 6 DPT 5.001**<br>**2 Byte EIS 5 DPT 9.0xx** | **C, W** |
| 1-byte or 2-byte objects with which the value of the output can be set. In 1-byte mode a new input value can be assumed rapidly or it is possible to dim to the value. The input object can be time monitored.<br>(see also object “Alarm Output …”) | | | | |
| **33-36** | **Extension module** | **Status Output 5…8** | **1 Byte EIS 6 DPT 5.001**<br>**2 Byte EIS 5 DPT 9.0xx** | **C, R, T** |
| 1-byte object or 2-byte object for displaying current output value. | | | | |

| | | | | |
|---|---|---|---|---|
| **37-44** | **Extension module** | **Forced control 1/2 Output 5…8** | **1 Bit EIS 1 DPT 1.001** | **C, W** |
| 1-bit objects with which the output is forced to switch to a parameterised value. The output assumes the previous value when forced control is switched off.<br>If both forced control 1 and forced control 2 are active, forced control 1 has priority.<br>The forced control objects can be time monitored. (see also object “Alarm Output …”)<br>The object “Forced control …” of an output is only visible if the parameter “Forced control object …” is set to ”Forced control active with …”. | | | | |
| **45-48** | **Extension module** | **Switching Output 5…8** | **1 Bit EIS 1 DPT 1.001** | **C, W** |
| 1-bit objects, which are used to switch the output on (100 %) or off.<br>This object can only be associated for example with the 1-bit object of a dim switch. It is only available in 8-bit mode.<br>The switch object is not monitored if cyclic monitoring of the input value is active.<br>The objects “Switching” of an output is only visible if the parameter “Input format” is set to “8 Bit”. | | | | |
| **49-52** | **Extension module** | **Dimming Output 5…8** | **4 Bit EIS 2 DPT 3.007** | **C, W** |
| 4-bit object, to increase or decrease the output value continuously with a dim switch. The dim speed is adjustable.<br>According to the KNX standard “dimming on” is possible and “dimming off” is not possible.<br>The dim object is not monitored if cyclic monitoring of the input value is active.<br>The objects “Dimming” of an output is only visible if the parameter “Input format” is set to “8 Bit”. | | | | |
| **53-56** | **Extension module** | **Alarm Output 5…8** | **1 Bit EIS 1 DPT 1.005** | **C, T** |
| 1-bit object which is set if the output is overloaded in mode 0 … 1 V or 0 … 10 V (output current above 10 mA), or if the monitoring time with active cyclic monitoring of the communication objects “Input value” and / or “Force control …” has timed out. | | | | |
| **57** | **Extension module** | **Alarm** | **1 Bit EIS 1 DPT 1.001** | **C, T** |
| 1-bit object which is set if the supply voltage (24 V AC) of the analogue actuator module fails.<br>Telegram value: “0”: power supply ok<br>“1”: failure of the power supply | | | | |

# 5 Planning and application

## 5.1 Status displays

After initial switch on the Analogue Actuator performs a scan (Status LED: “Orange / On”). As a new device is not pre-programmed in the factory, the Status LED subsequently switches to “Red / Flashes quickly”.

A connected extension module signals its operational readiness by switching its Status LED to “Quick flash”.

After a parameter download into the Analogue Actuator the Status LED switches to “Green / On”. The Analogue Actuator Module switches its Status LED off.

### 5.1.1 Analogue Actuator AA/S 4.1

The status display works only when the 24 V AC power supply and KNX bus voltage are present.

| Status LED device (3-colour) | | | |
|---|---|---|---|
| **red** | **orange** | **green** | **Status** |
| Off | – | – | No voltage supply |
| – | On | – | Module scan via Analogue Actuator |
| – | flashes quickly[2)] | – | Scan Analogue Actuator |
| flashes slowly[1)] | – | – | Undervoltage on module connection / short-circuit $U_s$ |
| flashes quickly[2)] | – | – | No project / parameterisation fault |
| – | – | flashes slowly[1)] | Module scan completed, engineering OK, address assignment (module) |
| – | – | flashes quickly[2)] | Parameter download in Analogue Actuator |
| – | – | On | Device status OK |

[1)] Flashes slowly = 1/s
[2)] Flashes quickly = 2/s

| Status LED Output A1…A4 (yellow) | Status |
|---|---|
| On | Output signal is higher than zero |
| Off | Output signal is equal to zero |

### 5.1.2 Analogue Actuator Module AAM/S 4.1

| Status LED device (red) | LED display during commissioning |
|---|---|
| On | Module is operational (self test ok) |
| flashes quickly[2)] | Module is currently being initialised |
| flashes slowly[1)] | Module is not programmed (in Analogue Actuator) |
| Off | Module is initialised and put into operation. Precondition: The LED must have switched off beforehand! |
| | **LED display in normal operation** |
| On | Module is not ready for operation (fault) |
| Off | Module is initialised and programmed. Precondition: The LED must have switched off beforehand! |

[1)] Flashes slowly = 1/s
[2)] Flashes quickly = 2/s

| Status LED Output A5…A8 (yellow) | Status |
|---|---|
| On | Output signal is higher than zero |
| Off | Output signal is equal to zero |

## 5.2 Use of 16-bit values

In the fewest of technical applications is the complete value range of the 2-byte floating point format actually fully utilised. At the same time there is a whole range of components which actually convert a general analogue variable such as voltage or current with their own conversion factor to different physical variables.

In order to enable a conversion which is as simple and general as possible, ETS indicates the three parameters when the input format of an output is set to “16 bit”. With these parameters the conversion of the input value from 2-byte floating comma format to the suitable output signal is implemented.

Both parameters “Input value for 0 % output value” and “Input value for 100 % output value” are set so that they cover the required value range as well as possible with the common parameter “Factor of input value”. In order to obtain the highest possible internal resolution a small factor should be selected.

**Examples**
The following parameters are recommended in order to receive a direct implementation of the input value in volts with an output signal of 0 … 10 V:

| | |
|---|---|
| Input value for 0 %: | 0 |
| Input value for 100 %: | 1000 |
| Input value factor: | 0.01 |

The following parameters are recommended in order to receive implementation of the input value in millivolts with an output signal of 0 … 10 V:

| | |
|---|---|
| Input value for 0 %: | 0 |
| Input value for 100 %: | 10000 |
| Input value factor: | 1 |

The following parameters are recommended for a flap drive which operates with an input voltage of 0 … 10 V and a mechanical operating angle of 0 … 90°, in order to directly utilise the angle:

| | |
|---|---|
| Input value for 0 %: | 0 |
| Input value for 100 %: | 9000 |
| Input value factor: | 0.01 |

The same conversion factor leads the actuator in the opposite direction for the “Status” communication object. The status object sends the new value with the following results:

- When the input value object receives a new value which differentiates from the current output value.
- If the output has received a new value, because a control with a higher priority has been activated or deactivated by a “forced control” object.
- If the output receives a new incoming telegram but does not execute it because a forced control is active.

**Example**
The output is set to 9 volts due to a forced control. The “Input value” object receives the value 5 volts. The value is not set due to the forced control. The status object reports back with the 9 volts value. The new input value of 5 volts is stored internally and set as soon as the forced control has ended. The status object reports the value of 5 volts.

- If the time for monitoring of the “Input value” and/or “Forced control” communication objects has timed out.

### 5.3 Use of 8-bit values

With the use of 8-bit values the parameters “Input value for 0 %”, “Input value for 100 %” and “Factor of the input value” are fixed and cannot be modified. Thus the communication objects “Input value” and “Status” correspond with data point type 5.001.

### 5.3.1 Dim actuator function

If the input object format is set to “8-bit”, the ETS indicates an additional 1-bit communication object and a 4-bit communication object for this output. The output enables control by every switch sensor with a dimming function with these objects.

The output can be switched on or off via the “Switching” 1-bit object. The output value assumes 100 % when switched on.

The output can be dimmed conform to data point type 3.007 via the 4-bit object. The dimming speed depends on both parameters “Time between 2 of 255 dimming steps, Basis” and “Time between 2 of 255 dimming steps, Factor”. The preset value for the range from 0 % to 100 % is about 5 seconds. The shortest time is about 2.5 seconds. The longest time is about 65,000 seconds (which is 1083 minutes or about 18 hours).

Depending on the parameter “Response on reception of value”, the output will assume a new value, which it receives via the 1-byte object immediately (“jump to”), or uses the same dimming speed as control via the 4-bit object (“dim to”).

If the output receives a new value to which it should dim, the status object will send a new value directly after receipt of the incoming telegram. When controlled via the 4-bit object the status object sends the new value after completion of the dimming process.

## 5.4 Forced control

Both in the 8-bit as well as the 16-bit mode every output features up to two 1-bit communication objects, which enable control with a higher priority. In order to use these objects the corresponding parameter must be set in the parameter “Forced control object …”. By default these parameters are set to “not available”. Accordingly, the ETS does not show these communication objects.

Forced control can be active if the object features either the value “1” or the value “0”. For the active state a fixed value is set with the parameter “Output value in case of forced control”. If the “Forced control” object is inactive, the output automatically assumes the value which corresponds with the “Input value” object.

If both “Forced control” objects are active, the object “Forced control 1” has an internal priority over the object “Forced control 2”.

## 5.5 Cyclical monitoring

In order to ensure that the control of an object does not fail, the actuator can implement timed monitoring of the input and/or forced control for each of its outputs. In 8-bit mode the communication objects “Switching” and “Dimming” are not monitored.

If this monitoring is activated, a time between 10 seconds and 2550 seconds (= 42.5 minutes) can be set. If none of the monitored communication objects receives a telegram within this time, the object assumes the value which can be set in the “Output value after exceeding of the monitoring time” parameter. Additionally, the output can issue a message with the communication object “Alarm Output …”.

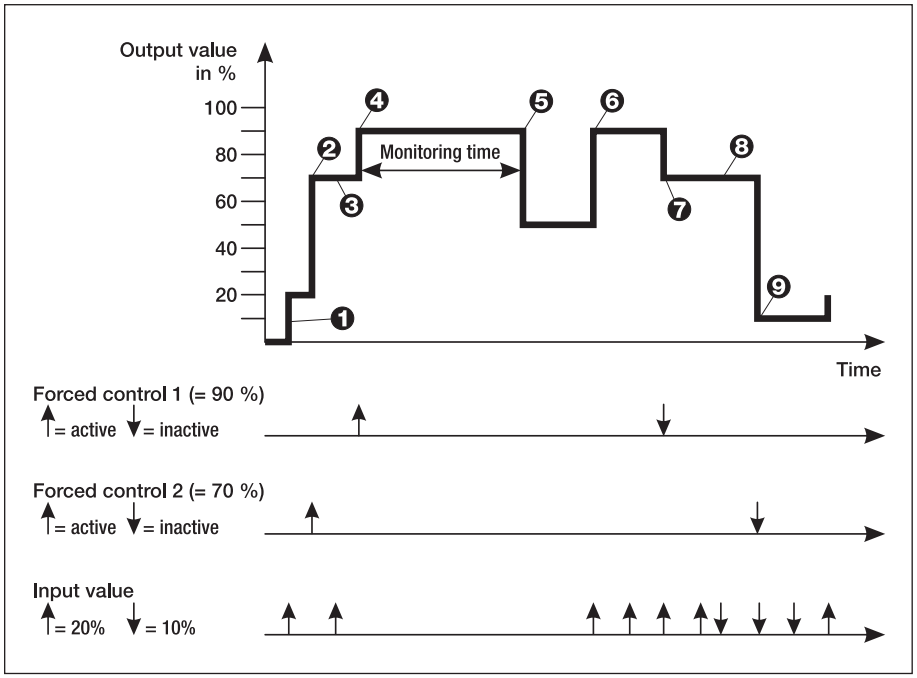


Fig. 12: Forced control and monitoring

Fig. 10 indicates the interaction between the communication objects “Input value” and “Forced control” in conjunction with monitoring. The arrows indicate the times for the telegrams.

❶ With inactive forced control the object “Input value” defines the state of the output.
❷ If “Forced control 2” becomes active, the output assumes the parameterised value (here: 70 %).
❸ Telegrams to the object “Input value” are not carried out. However, the value is stored internally.
❹ „Forced control 1“ has the higher priority after activation. (here: 90 %).
❺ If the monitoring time is exceed the output switches to the alarm state (here: 50 %).
❻ A further telegram to the object “Input value” ends the alarm state. “Forced control 1” is again active.
❼ With completion of “Forced control 1” the “Forced control 2” becomes active.
❽ Changes to the “Input value” object in the meantime are stored internally and not implemented.
❾ The internally stored input value is reactivated after forced control has ended.

## A.1 Ordering details

| **Short designation** | Designation | Order No. | **bbn 40 16779 EAN** | Price group | Unit weight 1 pc. [kg] | Pack unit [Pcs] |
|---|---|---|---|---|---|---|
| **AA/S 4.1** | Analogue Actuator, 4-fold, MDRC | 2CDG 120 005 R0011 | **65886 7** | 20 | 0.2 | 1 |
| **AAM/S 4.1** | Analogue Actuator Module, 4-fold, MDRC | 2CDG 120 006 R0011 | **65887 4** | 20 | 0.15 | 1 |

The information in this leaflet is subject to change without further notice.

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