
# ABB i-bus® KNX
# Electronic Switch Actuator ES/S 4.1.2.1
# Product Manual

Power and productivity
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## Contents

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# 1 General

The Electronic Switch Actuator ES/S 4.1.2.1 is a modular installation device with a module width of 4 space units in Pro*M* Design for installation in the distribution board. The device features four semiconductor outputs for control of thermoelectric valve drives (e.g. TSA/K) for room temperature control in heating and cooling systems. The power supply for the valve drives can be 24…230 V AC/DC.

The connection to the ABB i-bus® is established using the front side bus connection terminal.

The assignment of the physical addresses as well as the parameterization is carried out with Engineering Tool Software ETS from version ETS3.0f or higher.

## 1.1 Using the product manual

This manual provides you with detailed technical information relating to the function, installation and programming of the ABB i-bus® KNX Electronic Switch Actuator ES/S 4.1.2.1.
The application of the device is described using examples.

This manual is divided into the following sections:

| | |
|---|---|
| Chapter 1 | General |
| Chapter 2 | Device technology |
| Chapter 3 | Commissioning |
| Chapter 4 | Planning and application |
| Chapter A | Appendix |

### 1.1.1 Note

Notes and safety instructions are represented as follows in this product manual:

| **Note** |
| --- |
| Tips for usage and operation |

| **Examples** |
| --- |
| Application examples, installation examples, programming examples |

| **Important** |
| --- |
| These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury. |

| **Caution** |
| --- |
| These safety instructions are used if there is a danger of damage with inappropriate use. |

| **Danger** |
| --- |
| These safety instructions are used if there is a danger for life and limb with inappropriate use. |

| **Danger** |
| --- |
| These safety instructions are used if there is a danger to life with inappropriate use. |

# 2 Device technology

## 2.1 ES/S 4.1.2.1

2CDC 071 022 S0010

The Electronic Switch Actuator ES/S 4.1.2.1 is a modular installation device in Pro *M* design. The device features four semiconductor outputs for control of thermoelectric valve drives in heating and cooling systems. The outputs can be operated with either DC or AC voltage (24…230 V AC/DC).

Each output is short-circuit and overload protected. The outputs can be directly controlled using the manual pushbuttons. The LEDs on the front of the device signal the status of the outputs.

## 2.2 Technical data

| | | |
|---|---|---|
| **Supply** | Bus voltage | 21…32 V DC |
| | Current consumption, bus | < 12 mA |
| | Leakage loss, bus | Maximum 250 mW |
| | Leakage loss per device at max. load | Maximum 4 W |
| **Outputs** | 4 semiconductor outputs | Non-isolated, short-circuit proofed |
| | Rated voltage $U_n$ | 24…230 V AC/DC +/-10%, 50/60 Hz<br>Separate supply of the outputs is possible<br>Example: A+B 230 V AC, C+D 24 V DC |
| | Rated current $I_n$ per output | 1 A resistive load at $T_{amb}$ up to 45 °C |
| | Inrush current per output | 8 A for max. 1 second at $T_{amb}$ 20 °C |
| | Number of thermoelectric valve drives per output | The number of connectible valve drives per output is dependent on the maximum inrush current (8 A) or continuous current (1 A) of the output. They may not be exceeded when several valve drives are connected in parallel. Observe the technical data for the valve drive. |
| **Connections** | KNX | Via bus connection terminals |
| | 4 x outputs A…D,<br>2 x supply $U_n$ for 2 outputs each | Using universal head screw terminals<br>0.2... 4 mm² finely stranded, 2 x 0.2…2.5 mm², 0.2... 6 mm² single core, 2 x 0.2…4 mm² |
| **Operating and display elements** | Button/LED *Programming* | For assignment of the physical address |
| | Button *Manual operation* and<br>LED *Manual operation* | To switch to manual mode |
| | Button *ON/OFF* and LED *Status* per output | For control of the output and display of the status |
| | Button *Reset* and LED *Fault* per output | For reset and indication of a fault |
| **Enclosure** | IP 20 | To EN 60 529 |
| **Safety class** | II | To EN 61 140 |

| | | |
|---|---|---|
| **Isolation category** | Overvoltage category | III to EN 60 664-1 |
| | Pollution degree | 2 to EN 60 664-1 |
| **KNX safety extra low voltage** | SELV 30 V DC | |
| **Temperature range** | Operation | -5 °C…+45 °C |
| | Storage | -25 °C…+55 °C |
| | Transport | -25 °C…+70 °C |
| **Ambient conditions** | Maximum air humidity | 93 %, no condensation allowed |
| **Design** | Modular installation device (MDRC) | Modular installation device, Pro *M* |
| | Dimensions | 90 x 72 x 64.5 mm (H x W x D) |
| | Mounting width in space units | 4 modules at 18 mm |
| | Mounting depth | 64.5 mm |
| **Installation** | On 35 mm mounting rail | To EN 60 715 |
| **Mounting position** | As required | |
| **Weight** | Approx. 0.2 kg | |
| **Housing/colour** | Plastic housing, grey | |
| **Approvals** | KNX to EN 50 090-1, -2 | Certification |
| **CE mark** | In accordance with the EMC guideline and low voltage guideline | |

| **Application program** | **Maximum number of communication objects** | **Max. number of group addresses** | **Max. number of associations** |
|---|---|---|---|
| Switching Valve Drive 4f 1A/1.2 | 48 | 254 | 254 |

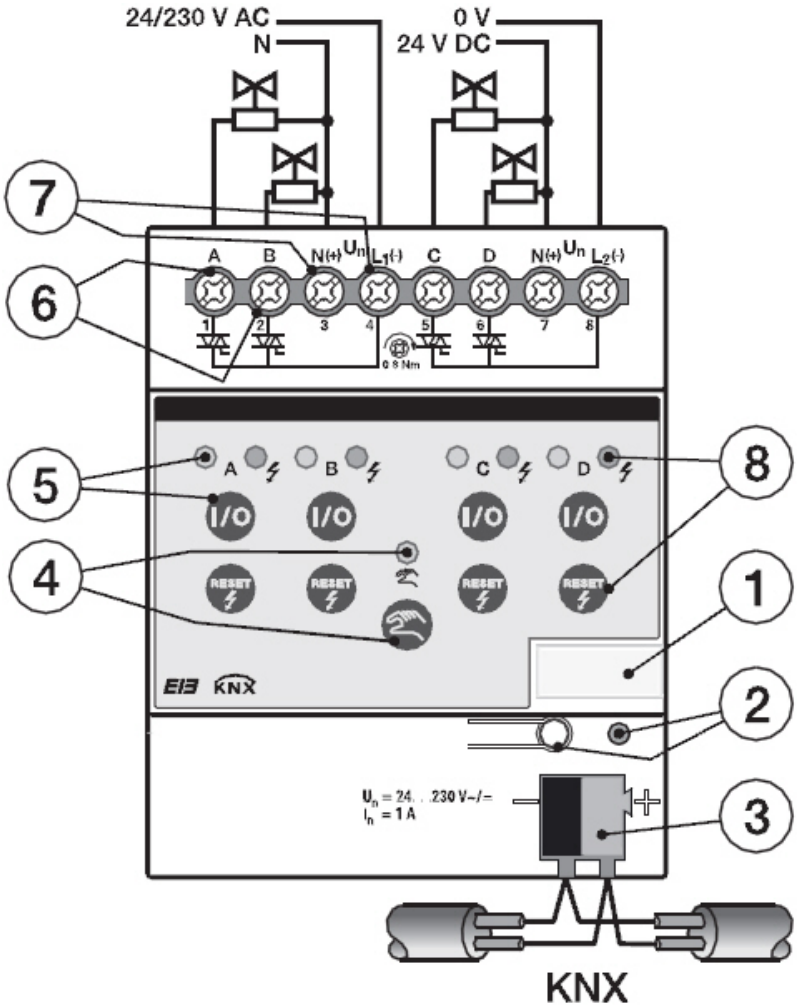
**Note**

ETS from version ETS3.0f or higher is required for programming.
A *.VD3 or higher type file must be imported.

The application program is available in the ETS3 at *ABB/Heating/Ventilation/Air conditioning/Valve Drive Actuator*.

The device does not support the closing function of a KNX device in the ETS. If you inhibit access to all devices of the project with a *BCU code*, it has no effect on this device.
Reading out data and programming is still possible.

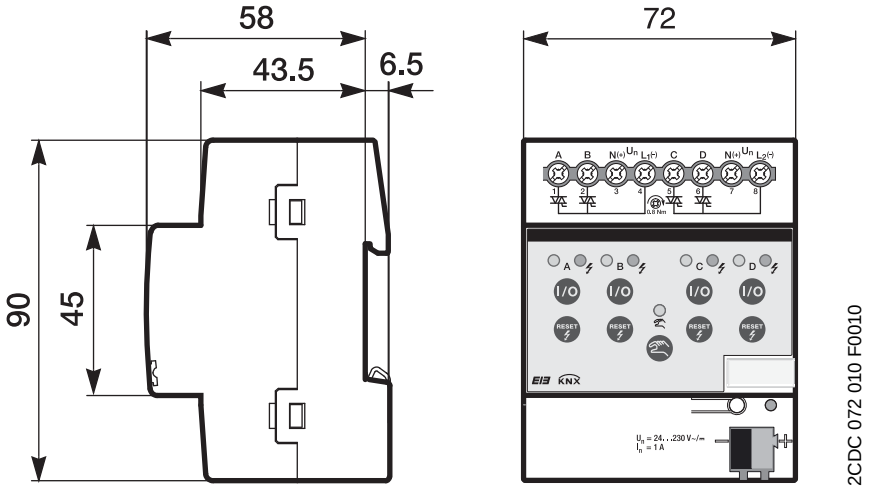
## 2.3 Circuit diagram (Example)




**1** Label carrier
**2** Button/LED *Programming*
**3** Bus connection terminal
**4** Button *Manual operation* and LED *Manual operation*
**5** Button *ON/OFF* and LED *Status* A (for every output)
**6** 4 output terminals A…D
**7** 2 terminals each L(-), N(+) for outputs A+B, C+D
**8** Button *Reset* and LED *Fault* (for each output)

| **Note** |
| --- |
| The outputs (A/B or C/D) can be operated with different mains voltage $U_n$. |

## 2.4 Dimension drawing

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## 2.5 Assembly and installation

The ABB i-bus® Electronic Switch Actuator ES/S 4.1.2.1 is a modular installation device for quick installation in the distribution board on 35 mm mounting rails to EN 60 715.

The mounting position can be selected as required.

The connection to the bus is implemented using the supplied bus connection terminal.

If bus voltage is not yet available at the time of commissioning, the device can be supplied with power for operation of the manual pushbuttons using the Power Supply NTI/Z.

Accessibility of the devices for the purpose of operation, testing, visual inspection, maintenance and repair must be provided compliant to VDE 0100-520).

### Commissioning requirements

In order to commission the device, a PC with ETS and an interface, e.g. USB or IP, are required.

The device is ready for operation after connection to the bus voltage.
For supplying the connected load the mains voltage (24…230 V AC/DC) must be applied.

The installation and commissioning may only be carried out by qualified electrical specialists. The appropriate norms, guidelines, regulations and specifications should be observed when planning and setting up electrical installations.

- Protect the device from damp, dirt and damage during transport, storage and operation.
- Only operate the device within the specified technical data limits!
- The device should only be operated in an enclosed housing (distribution board)!

**Danger**

In order to avoid dangerous touch voltages, which originate through feedback from differing phase conductors, all-pole disconnection must be observed when extending or modifying the electrical connections.

### Manual operation

The device incorporates manual operating features. The outputs can be directly controlled using the manual pushbuttons in manual operation.

The manual control keys may not be operated with pointed or sharp-edged objects, e.g. screwdrivers or pens.
This may damage the keypad.

### Supplied state

The device is supplied with the physical address 15.15.255.
The application program is pre-installed. It is therefore only necessary to load group addresses and parameters during commissioning.

However, the complete application program can be reloaded if required. The entire application program is loaded after a change of the application program, after a discontinued download or after discharge of the device. The process takes significantly longer than loading parameters and group addresses.

### Assignment of the physical address

The assignment and programming of the physical address is carried out in the ETS.

The device features a button *programming* for assignment of the physical device address. The red LED *programming* lights up after the button *programming* has been pushed. It switches off as soon as the ETS has assigned the physical address or the button *programming* is pressed again.

### Cleaning

If devices become dirty, they can be cleaned using a dry cloth. Should a dry cloth not remove the dirt, the device can be cleaned using a slightly damp cloth and soap solution. Corrosive agents or solutions should never be used.

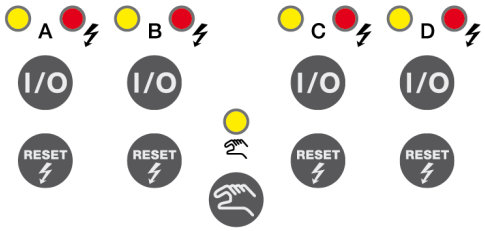
### Maintenance

The device is maintenance-free. No repairs should be carried out by unauthorised personnel if damage occurs, e.g. during transport and/or storage. The warranty expires if the device is opened.

## 2.6 Manual operation

### General

The outputs can be directly controlled using the manual pushbuttons in manual operation.




Accordingly, the wiring of the loads connected to the outputs can be verified during commissioning. You can, for example, ensure that the connected valve drives open or close the valves correctly. If bus voltage is not yet available at the time of commissioning, the device can be supplied with power for manual operation using the Power Supply NTI/Z.

**Caution**

The manual pushbuttons may not be operated with pointed or sharp-edged objects, e.g. screwdrivers or pens.
This may damage the keypad.

### Supplied state

Manual operation is enabled by default in the supplied state. The device is in KNX mode after connection to the bus. The yellow LED is off. All LEDs for the outputs indicate the actual state.
The buttons for the outputs are non-functional.

You toggle between manual mode and KNX mode by pressing button .

### Activation of manual operation

The pushbuttons can be activated and deactivated by the button *Manual operation* . To activate, button must be pressed until the yellow LED lights continuously (prerequisite: Manual operation is enabled in the application program). The LED flashes during switchover. If manual operation is activated, the current set value of the respective output is retained and the yellow LEDs on the outputs indicate the current status (ON/OFF). A target position which may not have yet been achieved is approached. The outputs can now only be operated via the manual pushbuttons. The first button push switches on the output if the control value = 0. If the control value > 0, the output is switched off. Every subsequent button push toggles the output.

**Note**

Manual operation can be inhibited via the KNX using communication object *Enable/block manual operation* (No. 2). In this case, it is not possible to change over to manual operation using button *Manual operation*.
The block can be removed by sending a telegram with the value 0 on the communication object (No. 2). The block is also removed after a download and bus voltage recovery.

| **Important** |
| --- |
| Should *Manual operation* be activated, it has the highest priority. Active functions, e.g. blocking, forced operation and purging are interrupted and values of the characteristic correction curve are not considered, when the orginial state is changed in the manual operation using the button I/O.<br><br>Manual operation is inactive after bus voltage recovery, download or reset. |

### Function of the pushbuttons and LEDs per output

| Button/LED | Function |
|---|---|
|  | For switching on or off manual operation. If manual operation is enabled via the application program, this button can be used to toggle between manual operation and KNX operation. For this purpose, the button must be pressed until the yellow LED lights up continuously. The device can now only be operated via the manual pushbuttons. To switch to KNX mode, the button must be pushed until the yellow LED switches off. Now the device is in KNX mode again. |
|  | *On:* Manual operation<br>*Flashing:* Switchover process<br>*Off:* KNX operation |
|  | For switching on or off the output. A connected valve drive opens or closes the valve. |
|  | *On:* Switch state = on (control value > 0)<br>*Off:* Switch state = off (control value = 0)<br>*Slow flashing (1 Hz):* Output disabled (only in KNX mode)<br>*Fast flashing (5 Hz):* Forced operation active (only in KNX mode) |
|  | For resetting a fault (short-circuit or overload) on the output, provided that the fault has been rectified beforehand. The *Reset* button must be pushed until the red LED switches off for this purpose. A short-circuit or an overload block the output until the fault is rectified and reset with the *Reset* button |
|  | *Continuous on:* Supply voltage absent. The LED switches off as soon as the supplied voltage is applied.<br>*Off:* Normal operation<br>*Slow flashing (1 Hz):* Overload<br>*Fast flashing (5 Hz):* Short-circuit |

### Telegram processing with active manual operation

Incoming telegrams will continue to be received and saved during active manual operation. After manual operation is deactivated the device will update.
If a telegram with the value "1" is received via *Enable/block manual operation*, active manual operation is deactivated and then blocked. Manual operation can no longer by activated by the manual operation button.

### Switch off of manual operation

Press button  until the yellow LED  no longer lights.
If manual operation is deactivated, the outputs are updated and the LEDs indicate the current state.

# 3 Commissioning

## 3.1 Overview

The application program *Switching Valve Drive 4f 1A/1.2* is available for the Electronic Switch Actuator. Programming requires ETS3 or higher.

### 3.1.1 Conversion of previous application programs

For ABB i-bus® KNX devices from ETS3 or higher, it is possible to assume the parameter settings and group addresses from earlier application program versions.

For the market launch of the Electronic Switch Actuator, there is no previous version of the application program currently available. However, the conversion program can still be useful to transfer the parameterization settings and group addresses of one device to another of the same type.

#### 3.1.1.1 Procedure

- Import the current VD3 file into ETS3 and add a product with the current application program to the project.
- After you have parameterized a device, you can transfer the settings to a second device. For this purpose, the devices must already be available in the ETS project.
- Right click on the product and select *Convert* in the context menu for this purpose.


- Subsequently the required settings are undertaken in the dialog *Convert*.
- Finally, exchange the physical address and delete the old device.

Should you wish to only copy individual channels within a device, use the function Copy and exchange, page 16.

### 3.1.2 Copy and exchange parameter settings

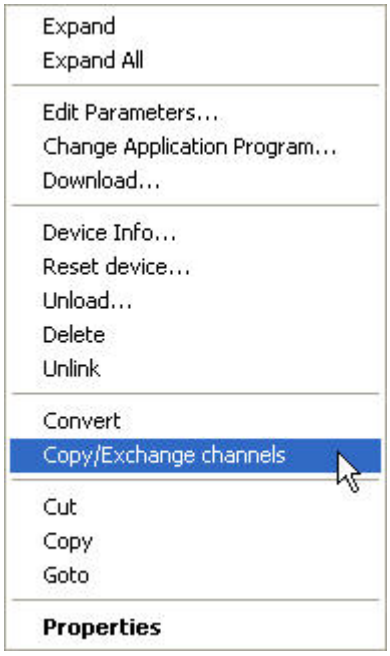
Parameterization of devices can take a lot of time depending on the complexity of the application program and the number of device inputs/outputs. To keep the commissioning work to the minimum possible, using the function *Copy/exchange channels*, parameter settings of an input/output can be copied or exchanged with freely selectable inputs/outputs. Optionally, the group addresses can be retained, copied or deleted in the target input/output.

The copy function for inputs/outputs is particularly useful with devices having the same parameter settings for several outputs, inputs or groups. For example, lamps in a room are frequently controlled in an identical manner. In this case, the parameter settings from input/output X can be copied to all other inputs/outputs or to a special input/output of the device. Thus the parameters for this input/output must not be set separately, which significantly shortens the commissioning time.

The exchange of parameter settings is useful, e.g. should the inputs/outputs be swapped when wiring the terminals. The parameter settings of the incorrectly wired inputs/outputs can be simply exchanged saving the requirement for time-consuming rewiring.

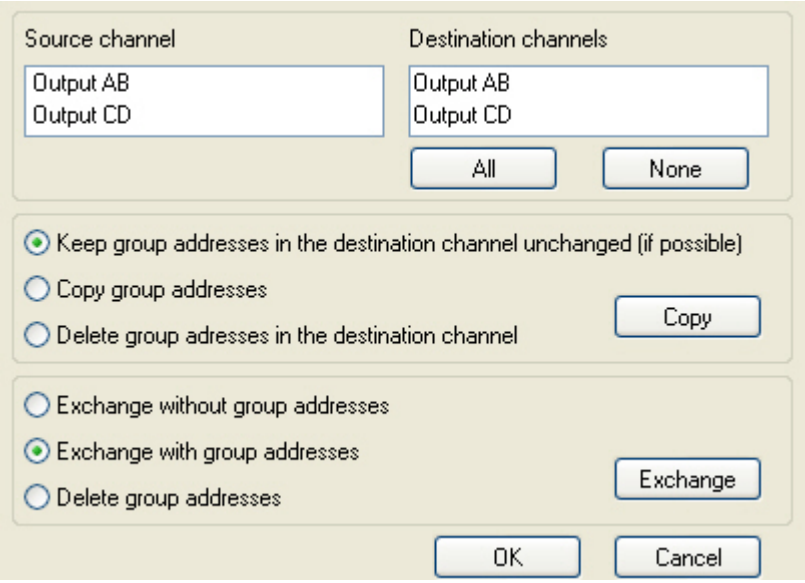
#### 3.1.2.1 Procedure

- Import the current VD3 file into ETS3 and add a device with the current application program to the project.
- Click with the right mouse button on the device, whose inputs/outputs you wish to copy or exchange, and select the context menu *Copy/Exchange channels*.




- Subsequently the required settings are undertaken in the dialog *Copy/Exchange channels*.

### 3.1.2.2 Dialog Copy/Exchange channels




At the top left, you will see the source channel selection window for marking the source channel. Beside it you will find a selection window for marking the target channels.

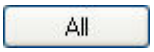
**Source channel**

With the selection of the source channel, you define which parameter settings should be copied or exchanged. The outputs for the ES/S are internally linked to each other in pairs because of the design of the application, so that parameter settings and group addresses can only be copied or exchanged in pairs.

**Target channels**

With the selection of the target channels, you define which channel/channels are to assume the parameter settings of the source channel.

- For the function *Exchange*, only one target output pair (e.g. output CD) can be selected at a time.
- For the function *Copy*, different target channels can be selected simultaneously. For this purpose, press the Ctrl key and mark the required channels with the mouse cursor, e.g. output CD.




With this button, you select **all** available target channels, e.g. output AB…CD.


Reset the selection of the target channels with this button.

**Copy**

The following options can be selected before copying the parameter settings:

- Leave the group addresses unchanged (if possible) in the target channel
- Copy group addresses
- Delete group addresses in the target channel


With this button, you copy the settings of the source channel into the target channel or channels.

**Exchange**

The following options can be selected before exchanging the parameter settings:

- Retain group addresses
- Exchange group addresses
- Deleten group addresses


With this button, exchange the settings of the source channel with the target channel.


Confirm your selection with this button, and the window closes.


Using this button, the window closes without accepting the changes.

## 3.2 Parameters

The parameterization of the Electronic Switch Actuator is implemented using the Engineering Tool Software ETS from version ETS3.0f or higher.
The application program is available in the ETS3 at
*ABB/Heating/Ventilation/Air conditioning/Electronic Switch Actuator.*

The following chapter describes the parameters of the ES/S 4.1.2.1 using the parameter windows. The parameter window features a dynamic structure, so that further parameters or communication objects may be enabled depending on the parameterization and the function of the outputs.

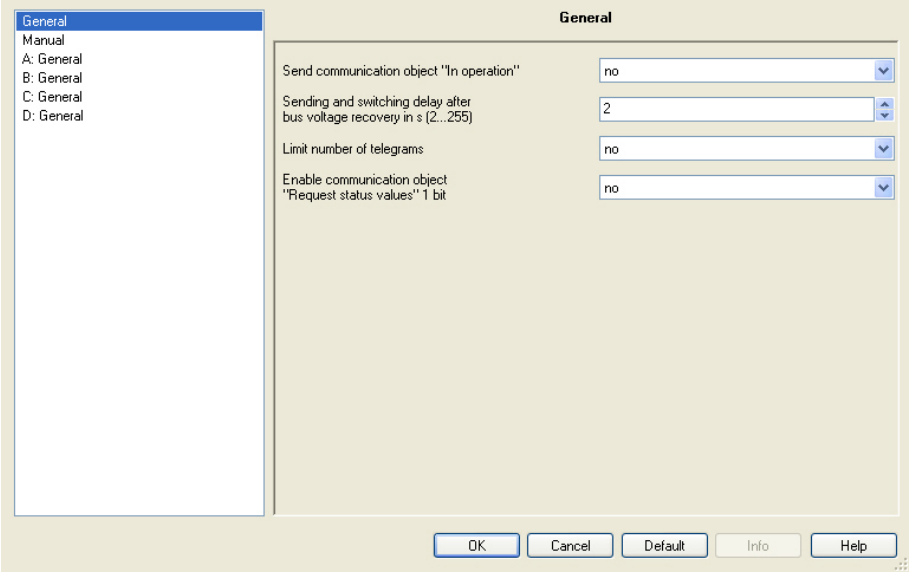
The default values of the parameters are underlined, e.g.:

Options: yes
no

| **Note** |
| --- |
| However, as the functions for all outputs are identical, only the functions of output A will be described in the following. |

### 3.2.1 Parameter window *General*

In the parameter window *General*, parameters are defined that determine the overall behaviour of the device.




**Send communication object “In operation”**

Options: no
send value 0 cyclically
send value 1 cyclically

The communication object *In operation*, page 41, indicates the correct function of the device on the bus. This cyclic telegram can be monitored by an external device. If a telegram is not received, the device may be defective, or the bus cable to the transmitting device may be interrupted.

| **Notes** |
| --- |
| After bus voltage recovery, the communication object is sent after the set sending and switching delay. |

- *no*: The communication object *In operation* is not enabled.
- *send value 0/1 cyclically:* The communication object *In Operation* is sent cyclically on the KNX.
  An additional parameter is displayed:

  **Sending cycle time in s [1…65,535]**

  Options: 1...60...65,535

  Here the time interval, at which the *In operation* communication object cyclically sends a telegram, is set.

**Sending and switching delay after bus voltage recovery in s (2…255)**

Options: 2…255

Only telegrams are received during the sending and switching delay. The telegrams are not processed however, and the outputs remain unchanged. No telegrams are sent on the bus.

Telegrams can be sent after the sending and switching delay. The state of the outputs is set to correspond to the parameterization or the communication object values.

If communication objects are read during the sending and switching delay, e.g. by a visualisation system, these read requests are stored, and a response is sent, after the send and switching delay has been completed.

An initialisation time of about two seconds is included in the delay time. The initialisation time is the time that the processor requires to be functional.

**How does the device behave with bus voltage recovery?**

After bus voltage recovery, the device always waits for the sending delay time to elapse before sending telegrams on the bus.

**Limit number of telegrams**

Options: no
yes

The load on the bus generated by the device can be limited with the limitation on the number of telegrams sent. This limit relates to all telegrams sent by the device.

- *yes:* The following parameters are displayed:

  **Max. number of sent telegrams in s [1…255]**

  Options: 1…20…255

  **in Period**

  Options: 50 ms/100 ms…1 s…30 s/1 min

  These parameters set the number of telegrams, which can be sent by the device within a period. The telegrams are sent as quickly as possible at the start of a period.

**Enable communication object "Request status values" 1 bit**

Options: no
yes

Via this communication object, all status messages (*Status of manual operation, Fault control value, Status control value, Status valve purge*) can be requested simultaneously, provided that they have been parameterized with the option *always* and *after a change or request*. If a telegram with the value 0 or 1 (depending on the parameterization) is received on this communication object, the *Status bytes*, page 48, of the outputs are also sent.

- *yes:* The 1 bit communication object *Request status values*, page 41, is displayed.
  An additional parameter is displayed:

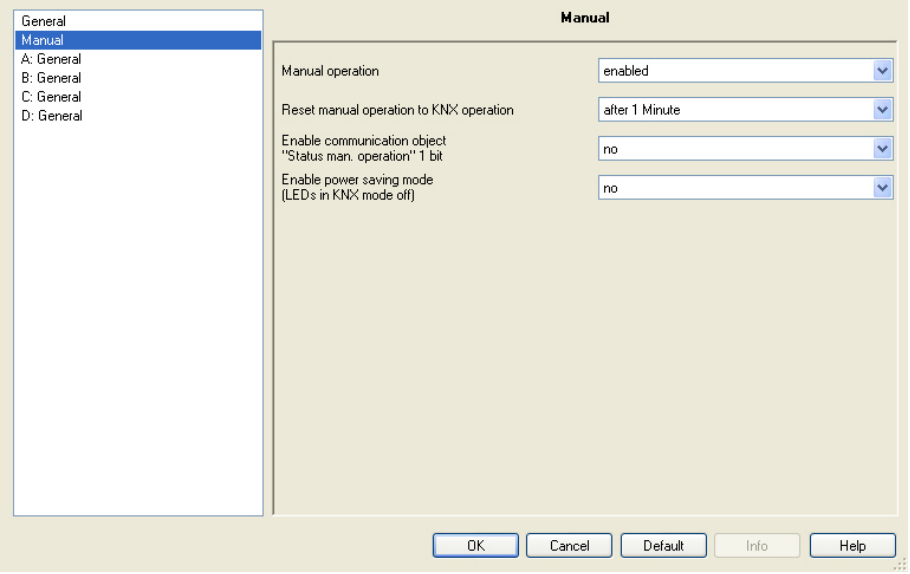
  **Request with object value**

  Options: 0
  1
  0 or 1

  - *0:* Sending status messages is requested with the value 0.
  - *1:* Sending status messages is requested with the value 1.
  - *0 or 1:* Sending of the status messages is requested with the values 0 or 1.

### 3.2.2 Parameter window *Manual*

In the parameter window *Manual*, all the settings for manual operation can be made.




For a detailed description of manual operation see *Manual operation*, page 11.

**Manual operation**

Options: enable/disable via communication object
enabled
disabled

This parameter defines if the switch over between the operating states *manual operation* and *KNX operation* is enabled or disabled via the button on the device.

- *enable/disable via communication object*:
  The communication object *Enable* block manual operation, page 41, is displayed. Manual operation can be enabled or disabled via the bus with this communication object.

  Telegram value 0 = button enabled
  1 = button disabled

- *enabled:* With this selection, the outputs can be directly controlled using the manual pushbuttons.
- *disabled:* With this selection, manual operation is disabled. The outputs can no longer be operated via the manual pushbuttons.

**Reset manual operation to KNX operation**

Options: no
after 1/3/10/30 minute(s)

This parameter determines how long manual operation remains activated or after how long switch over to KNX mode occurs. It is displayed when the parameter option *enable/disable via communication object* or *enable* are selected.

- *no:* Manual operation remains activated until it is deactivated again using the manual operation button or using the communication objects.
- *after X minutes:* Manual operation remains activated after the last operation of the button until the parameterized time has timed out or it is deactivated again using the manual operation button .

**Enable communication object "Status man. operation" 1 bit**

Options: no
yes

• *yes:* The parameters *Send object values* and the communication object *Status man. operation*, page 42, appears:

**Send object value**

Options: no, update only
after a change
after request
after a change or request

- *no, update only:* The status is updated but not sent (the status can be read via the communication object).
- *after a change:* The status is sent after a change.
- *after request:* The status is sent after a request.
- *after a change or request:* The status is sent after a change or a request.

**Enable power saving mode**
**(LEDs in KNX mode off)**

Options: no
after 1/3/10/30 minute(s)

This function determines whether the yellow LEDs for manual operation in KNX mode should be switched off after a parameterized time. The device and the outputs are still controlled via the bus, however, the current status of the outputs are not displayed via the yellow LEDs.

If there is a fault on an output, the LED *Fault* of the corresponding output will light or flash, even if power saving mode has been activated. The fault can be reset using the button *Reset*, even if manual operation is inhibited.

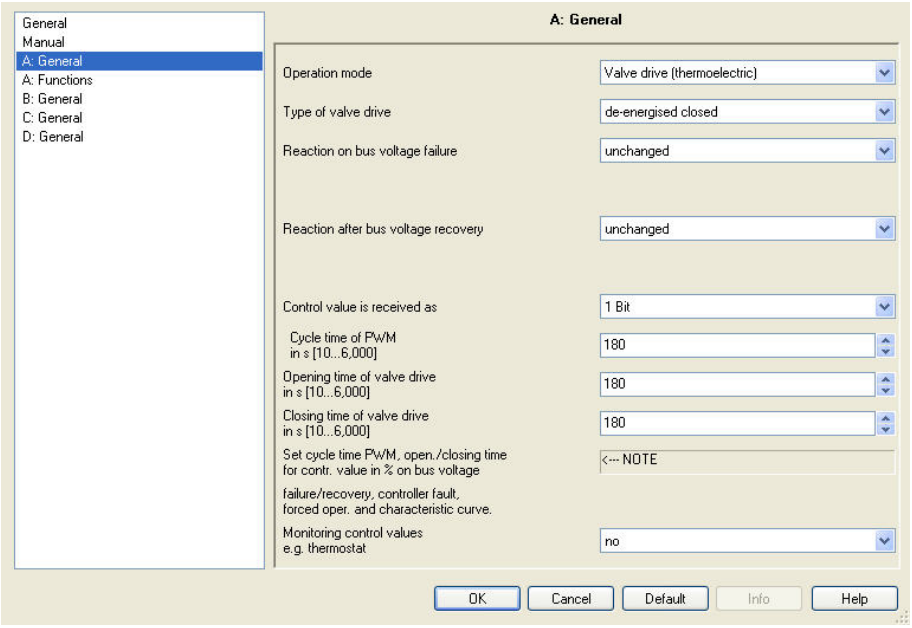
When any button is pressed, the power saving mode is interrupted and the status of the outputs is shown, even if manual operation is inhibited. If no other button is pressed, the power saving mode is reactivated after the parameterized time and the LEDs switch off.

- *after 1/3/10/30 minute(s)* The power saving mode is activated after the time parameterized here. The power saving mode is interrupted with the following actions, and the status of the outputs is displayed:
  - Switchover to KNX mode
  - Interruption of power saving mode by pressing a button
  - Programming, download or ETS reset

### 3.2.3 Parameter window *A: General* Selection: Valve drive

In this parameter window, the general settings for output A are undertaken. The following described parameters are shown if in parameter window *A: General* the *Valve drive (thermoelectric)* mode has been selected.

| **Note** |
| --- |
| However, as the functions for all outputs are identical, only the functions of output A will be described. |




**Operation mode**

Options: none
Valve drive (thermoelectric)

- *none:* The output is deactivated with this selection.

| **Note** |
| --- |
| The outputs can however be operated via the manual pushbuttons in the default delivery state.<br><br>After the first download, the outputs, for which the option *none* has been set, can no longer be operated via the manual pushbuttons. |

- *Valve drive (thermoelectric)* This mode is used for the control of thermoelectric valve drives, e.g. TSA/K. With this option selected, the following communication objects as well as the following parameters for control of valve drives are shown:
  - Control value
  - Overload/short-circuit current
  - Reset error message
  - Mains voltage failure
  - Status byte

**Type of valve drive**

Options: de-energised closed
de-energised opened

The type of control for the thermoelectric valve drive is set with this parameter.

| **Note** |
| --- |
| **De-energised closed valve drives (NC)**<br>If no current flows in the valve drive, the valve is closed.<br>If current flows in the valve drive, the valve opens.<br>**De-energised opened valve drives (NO)**<br>If no current flows in the valve drive, the valve opens.<br>If current flows in the valve drive, the valve then closes. |

**Reaction on bus voltage failure**

Options: unchanged
select

Using this parameter, the reaction of the output at bus voltage failure is set.

- *unchanged:* The output and the valve drive remain in the same position as before bus voltage failure. The control value received last is set.
- *select:* An additional parameter is displayed:

  **Control value in % [0...100]**

  Options: 0…100

  Using this parameter, the control level of the output at bus voltage failure is set in percent.

  If the control value is received via a 1 bit value, a value must be entered in the parameter *Cycle time of PWM*, page 30. This value is used as the basis for calculation of the output control at bus voltage failure in %.

| Note |
| --- |
| **Control value in %**<br>The actual valve setting in % may diverge from the set value for control in % depending on the ambient conditions (room temperature, valve drive used, water pressure in the heating/cooling system, valve, …).<br>The set value in the parameter *Control value in %* is based on the parameter *Cycle time of PWM*. The output is controlled accordingly depending on the setting.<br>Example parameter settings:<br>*Control value in % [0...100]:* 70 %<br>*Cycle time of the PWM in s [10...6,000]* 60 s<br>With these settings, the output switches ON for 42 s and OFF for 18 s (60 s x 0.70 = 42 s).<br>**Quick heat up/cool down**<br>An additional time is determined that is dependent on the change in the control value and the closing and opening times of the valve drive. This additional time extends the switch on and off duration after a change in the control value. Accordingly, the new control value is achieved quickly. |

**Reaction after bus voltage recovery**

Options: unchanged
select

Using this parameter, the reaction of the output at bus voltage recovery is set.

- *unchanged:* The last control value received before bus voltage failure is set. This also applies if a function with a higher priority, e.g. Block, was active before bus voltage failure.
  If a value for control in % at bus voltage failure is predefined, this will be reactivated at bus voltage recovery.
- *select:* An additional parameter is displayed:

  **Control value in % [0...100]**

  Options: 0…100

  Using this parameter, the control level of the output at bus voltage recovery is set in percent.

If the control value is received via a 1 bit value, a value must be entered in the parameter *Cycle time of PWM* page 30. This value is used as the basis for calculation of the output control at bus voltage recovery in %

**Control value is received as**

Options: 1 bit
1 byte

This parameter defines how the sent control value is received by the thermostat. Depending on the selection made, the communication object for the Control value, page 43, (1 bit or 1 byte) is displayed.

- *1 bit:* The control value is sent by the thermostat as a PWM signal or a two-step signal (ON/OFF). The parameter for setting the PWM-cycle time is displayed.
  PWM = pulse width modulation.

| Note |
| --- |
| **Pulse width modulation**<br>With pulse width modulation, the valve is operated as with 2-point control exclusively in the positions fully opened and fully closed. In contrast to a 2-point control, the position is not controlled via limit values, but rather by calculated control values similar to continuous control.<br>The control value is fixed for a timed cycle and recalculated for the switch on duration of the output. The control value 20 % at a cycle time of 15 minutes, for example, will be recalculated for a switch on duration of three minutes.<br>The control value 50 % results in a switch on duration of 7.5 minutes.<br>Using pulse width modulation, a relatively exact control of the temperature can be achieved without high levels of overshoot. Simple, attractively-priced thermoelectric valve drives can be used. |

- *1 byte:* The control value is sent by the thermostat as a continuous positioning telegram (0…255).

| Note |
| --- |
| **1 byte control**<br>For 1 byte control, a value of 0…255 (corresponds to 0 %…100 %) is preset by the room thermostat. This process is also known as *continuous control*. At 0 % the output switches off (the valve is closed), at 100 % the output switches on (the valve is fully opened). |

Further parameters are displayed if the option *1 byte* is selected:

**Convert control value to**

Options: PWM-Signal
ON/OFF-Signal

This parameter determines how the received control value (0…255) can be processed. The control value can be converted to a PWM signal or an ON/OFF signal.

- *PWM-Signal:* With this option, the continuous control value is converted to a PWM signal. The parameter for entering the PWM-cycle time is displayed.

- *ON/OFF-Signal:* With this option, the continuous control value is converted to an ON/OFF signal from a defined parameterized value. The parameter for entering the threshold value is displayed.

**ON at control value greater or equal [1...255]**

Options: 1…255

The output switches ON continuously if the value parameterised here is greater than or equal to the received control value. If a control value that is less than the parameterized value is received, the output switches OFF.

**Cycle time of PWM in s [10...6,000]**

Options: 10…180…6,000

For setting the cycle time for pulse width modulation.

If the control value is received via a 1 bit value, this parameter serves as the basis for calculation of the control of the output with

- Bus voltage failure/recovery
- Forced operation
- Fault of the control value (control fault)
- Characteristic curve correction

**Opening time of valve drive in s [10...6,000]**

Options: 10…180…6,000

Using this parameter, the time which the connected valve drive requires for a complete motion (from closed = 0 % to fully opened = 100 %) is set.

**Closing time of valve drive in s [10...6,000]**

Options: 10…180…6,000

Using this parameter, the time which the connected valve drive requires for a complete motion (from opened = 100 % to fully closed = 0 %) is set.

| **Note** |
| --- |
| The closing and opening times should be taken from the technical data of the valve drive or should be determined during set-up and commissioning. The ABB i-bus® Valve Drives of types TSA/K 230.1 and TSA/K 24.1 have closing and opening times of about three minutes.<br><br>The ABB i-bus® Valve Drives of types TSA/K 230.1 and TSA/K 24.1 (version de-energised closed / NC) in the default delivered state are opened by the First-Open function. Accordingly, heating operation is enabled during the building stage, even when the electrical wiring and engineering of the individual room control is not yet implemented. When setting up at a later stage, the First-Open function is automatically enabled, after operating voltage has been applied (for longer than 6 minutes). The valve drive is ready to function. |

**Monitoring control values e.g. thermostat**

Options: no
yes

This function is used, e.g. for monitoring cyclic sending of the control value of the thermostat. The absence of a control value (e.g. due to malfunction of the thermostat) can cause a previously parameterized control value to be used to continue with heating and cooling operation on an emergency basis.

- *yes:* The communication object *Fault control value*, page 45, is enabled. Further parameters are displayed:

  **Monitoring time in s [30…65,535]**

  Options: 30…120…65,535

  With this parameter, the time used to monitor the telegrams on the input control values is set: Communication objects *Control value, switch 1 bit* or *Control value, continuous (PWM) 1 byte*.

  If a setting variable is not received within the parameterized time, a malfunction or a defective thermostat is the cause.

  The reaction of the output to a control value not received can be defined in the following parameters.

  **Send object value\ (Object "Fault control value" 1 bit)**

  Options: no, update only
  after a change
  after request
  after a change or request

  - *no, update only*: The status is updated but not sent.
  - *after a change:* The status is sent after a change.
  - *after request:* The status is sent after a request.
  - *after a change or request:* The status is sent after a change or a request.

  **Control value after control fault in % [0…100]**

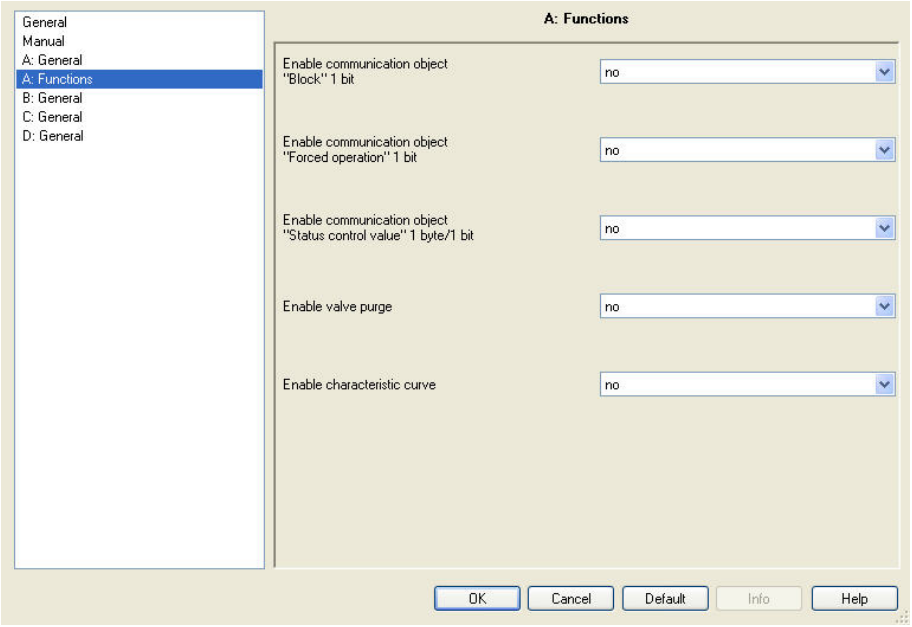
  Options: 0…30…100

  The value for the control of the output in percent is determined here, when the control value is not displayed.

  If the control value is received via a 1 bit value, a value must be entered in the parameter *Cycle time of PWM*, page 30. This value is used as the basis for calculation of the output control at control fault in %.

### 3.2.4 Parameter window *A: Functions*

In parameter window *A: Functions*, various functions for each output can be activated.




**Enable communication object "Block" 1 bit**

Options: no
yes

- *yes:* The 1 bit communication object *Block*, page 46, is enabled. An additional parameter is displayed:

  **Block on object value**

  Options: 1
  0

  Here you set the value of the communication object used to block the output.

**Enable communication object "Forced operation" 1 bit**

Options: no
yes

- *yes:* The 1 bit communication object *Forced operation*, page 46, is enabled. Using forced operation, the operation of the output is inhibited and the output assumes a defined state.
  With option *yes*, the following parameters become visible:

  **Forced operation on object value**

  Options: 1
  0

  Here you set the value of the communication object used to forcibly operate the output.

**Control value on forced operation in %[0…100]**

Options: 0…30…100

Here the control value is defined that the output should assume at forced operation.

If the control value is received via a 1 bit value, a value must be entered in the parameter *Cycle time of PWM*, page 30. This value is used as the basis for calculation of the output control at forced operation in %.

**Enable communication object "Status control value" 1 byte/1 bit**

Options: no
1 bit
1 byte

The control status of the output is sent via this communication object.

- *1 bit:* The communication object *Status control value*, page 47, (1 bit) and the following parameters are displayed:

  **Send object value**

  Options: no, update only
  after a change
  after request
  after a change or request

  - *no, update only:* The status is updated but not sent.
  - *after a change:* The status is sent after a change.
  - *after request:* The status is sent after a request.
  - *after a change or request:* The status is sent after a change or a request.

  **Object value at control value > 0**

  Options: 1
  0

  If the object value is greater than 0, a telegram with the value 1 or 0 can be sent via this parameter.

- *1 byte:* The communication object *Status control value*, page 47, (1 byte) and the following parameters are displayed:

**Send object value**

Options: no, update only
after a change
after request
after a change or request

- *no, update only:* The status is updated but not sent.
- *after a change:* The status is sent after a change.
- *after request:* The status is sent after a request.
- *after a change or request:* The status is sent after a change or a request.

**Enable valve purge**

Options: no
yes

- *yes:* The 1 bit communication object *Trigger valve purge*, page 45, is displayed.

| **Note** |
| --- |
| If purging is interrupted by a higher Priority, page 52, e.g. Forced operation, the higher priority will be undertaken. If the interruption duration is longer than the period of valve purge, the valve purge will no longer be executed, after the higher priority has been rescinded.<br>The control for valve purging is always the control value 100 %.<br>A correspondingly matched correction curve is taken into consideration. |

With option *yes*, the following parameters become visible:

**Enable communication object "Status valve purge" 1 bit**

Options: no
yes

The status of the valve purge is visible via this communication object.

- *yes:* The 1 bit communication object *Status valve purge*, page 46, and a further parameter are displayed:

  **Send object value**

  Options: no, update only
  after a change
  after request
  after a change or request

  - *no, update only*: The status is updated but not sent.
  - *after a change:* The status is sent after a change.
  - *after request:* The status is sent after a request.
  - *after a change or request:* The status is sent after a change or a request.

**Duration of valve purge in min. [1…255]**

Options: 1…<u>10</u>…255

With this parameter, you set the length, for which the valve is to be purged. The valve is fully opened during a valve purge. When the time for duration of valve purge has elapsed, the last control value received is set.

**Automatic valve purge**

Options: <u>no</u>
yes

- *yes:* The following parameters are displayed:

  **Purge cycle in weeks [1…12]**

  Options: 1…<u>6</u>…12

  The internal automatic purge timer starts directly after a download. The time is reset each time it is downloaded.

  The time is reset as soon as purging is completed. This can occur either through automatic purging or via the communication object *Trigger valve purge*.

| **Note** |
| --- |
| Purging can also be triggered via the bus using the communication object *Trigger valve purge*. |
| After bus voltage recovery and download, the automatic purging cycle is restarted. The time before bus voltage failure is not considered. |
| The purging cycle will automatically restart if *Purge cycle in weeks* [1…12] is changed after the download. |

  **Reset purge cycle from control value in % [1...99]**

  Options: 1…<u>99</u>

  Hereby the purge cycle from the set control value is reset.

| **Note** |
| --- |
| The purging cycle time is restarted if automatic valve purge has been activated at start-up of the device.<br><br>The purging cycle time will be restarted at the end of the actual purging period. The parameterized period of valve purging is included here.<br><br>The entry of the opening time for the valve drive must be considered when entering the period for valve purge.<br><br>The purging cycle with an active automatic valve purge is reset and restarted if:<br><br>• A manual valve purge is triggered via the communication object *Trigger valve purge.*<br><br>• A parameterized value is received on the communication object *Control value* (*Reset purge cycle from control value in % [1...99]*). |

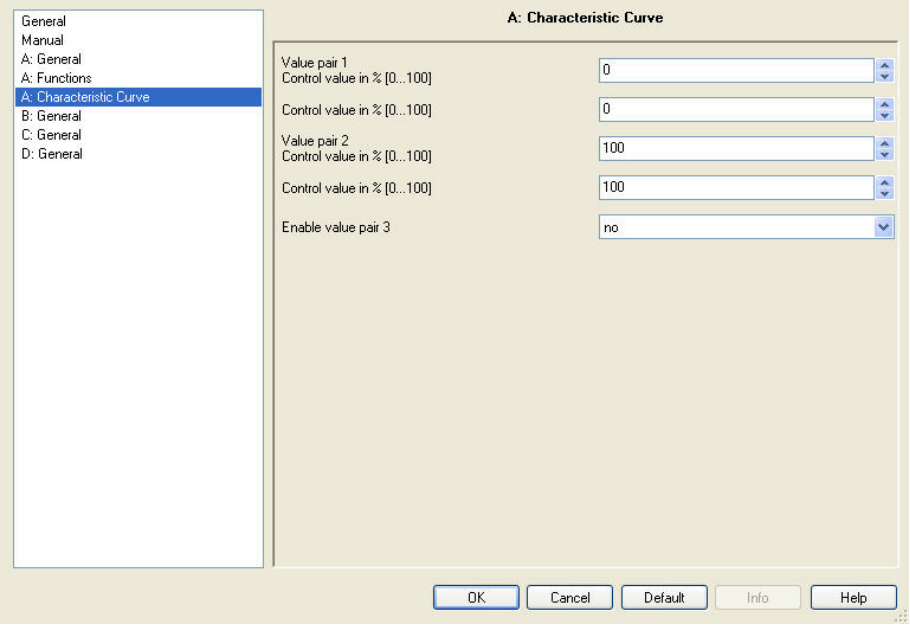
**Enable characteristic curve**

Options: no
yes

- *yes:* The parameter window *Characteristic Curve* is displayed.

### 3.2.4.1 Parameter window *A: Characteristic curve*

The parameter window *Characteristic Curve* is displayed if in parameter window *Functions*, the parameter *Enable characteristic curve* has been selected with the option *yes*.




In this parameter window, an adaptation of the valve drive to the valve that is employed can be undertaken using the characteristic curve correction. A characteristic correction optimizes the control behaviour of the system if required.

| **Important** |
| --- |
| A characteristic correction should only be undertaken in exceptional cases, and extensive knowledge in heating, air-conditioning and ventilation systems is a prerequisite. |

The following must be considered with the characteristic curve correction:

- The value pairs can be entered in any sequence. They are sorted in ascending order of the control value in the device and intermediate values are interpolated.
- If no value pair is assigned to the “control value 0 %”, the first value pair is always applied for the control values from 0 up to the first value pair.
- If no value pair is assigned to the “control value 100 %”, the last value pair is always applied for the control values from the last value pair up to 100%.
- The parameter Cycle time of PWM page 30 provides a basis for calculating the control of the outputs for the characteristic curve correction, also when operating with the control value over 1-Bit-value.

## Caution

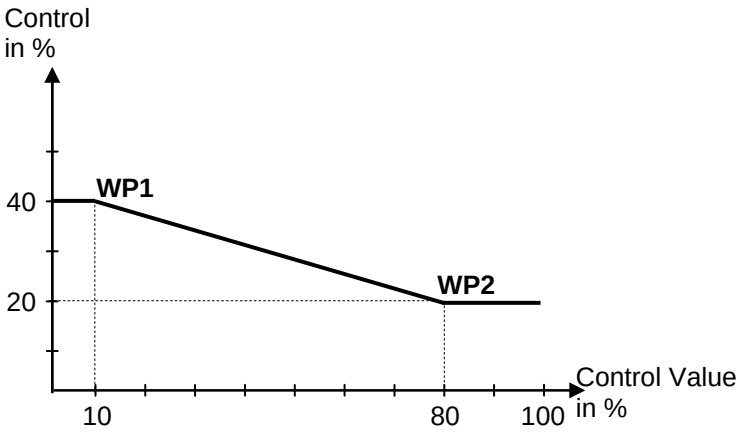
Value pairs with the same control value can cause a non-defined characteristic curve. This fact must be considered during parameteization.

Example:

| **Value pair 1 (VP1)** | | **Value pair 2 (VP2)** | |
|---|---|---|---|
| Control value in % [0…100] | 10 | Control value in % [0…100] | 80 |
| Control in % [0…100] | 40 | Control in % [0…100] | 20 |

Implemented characteristic curve correction:

| Control value | Control |
|---|---|
| 0…10 % | 40 % |
| | |
| 20 % | 37 % |
| 30 % | 34 % |
| 40 % | 31 % |
| 50 % | 29 % |
| 60 % | 26 % |
| 70 % | 23 % |
| | |
| 80…100 % | 20 % |



**Value pair 1**
**Control value in % [0...100]**
Options: 0…100

**Control value in % [0...100]**
Options: 0…100

**Value pair 2**
**Control value in % [0...100]**
Options: 0…100

**Control value in % [0...100]**
Options: 0…100

The possibility of activating other value pairs allows different curve characteristics to be realised.

A total of four value pairs can be set.

**Enable value pair 3**
Options: no
yes

- *yes:* Value pair 4 appears:

  **Value pair 3**
  **Control value in % [0...100]**
  Options: 0…50…100

  **Control value in % [0...100]**
  Options: 0…50…100

  **Enable value pair 4**
  Options: no
  yes

  - *yes:* Value pair 4 appears:

    **Value pair 4**
    **Control value in % [0...100]**
    Options: 0…50…100

    **Control value in % [0...100]**
    Options: 0…50…100

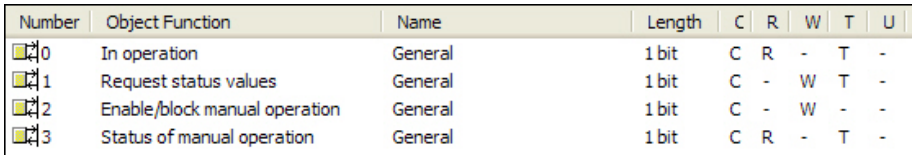
## 3.3 Communication objects

### 3.3.1 Brief overview of the communication objects

| CO* No. | Function | Name | Data Point Type (DPT) | Length | Flags | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | C | R | W | T | A |
| 0 | In operation | General | DPT 1.002 | 1 bit | x | x | | x | |
| 1 | Request status values | General | DPT 1.017 | 1 bit | x | | x | x | |
| 2 | Enable/ block manual operation | General | DPT 1.002 | 1 bit | x | | x | | |
| 3 | Status manual Operation | General | DPT 1.003 | 1 bit | x | x | | x | |
| 10 | Control value, switch | Output A | DPT 1.017 | 1 bit | x | | x | | |
| | Control value, continuous (PWM) | Output A | DPT 5.001 | 1 byte | x | | x | | |
| 11 | Overload/short circuit | Output A | DPT 1.005 | 1 bit | x | x | | x | |
| 12 | Reset error message | Output A | DPT 1.005 | 1 bit | x | | x | x | |
| 13 | Mains voltage failure | Output A | DPT 1.001 | 1 bit | x | x | | x | |
| 15 | Fault control value | Output A | DPT 1.005 | 1 bit | x | x | | x | |
| 16 | Trigger valve purge | Output A | DPT 1.017 | 1 bit | x | | x | | |
| 17 | Status valve purge | Output A | DPT 1.003 | 1 bit | x | x | | x | |
| 18 | Block | Output A | DPT 1.003 | 1 bit | x | | x | | |
| 19 | Forced operation | Output A | DPT 1.003 | 1 bit | x | | x | | |
| 21 | Status control value | Output A | DPT 5.001 | 1 byte | x | x | | x | |
| | Status control value | Output A | DPT 1.001 | 1 bit | x | x | | x | |
| 26 | Status byte | Output A | NON-DPT | 1 byte | x | x | | x | |
| 30… 46 | Output B, the same CO as output A | B: see output A | | | | | | | |
| 50… 66 | Output C, the same CO as output A | C: see output A | | | | | | | |
| 70… 86 | Output D, the same CO as output A | D: see output A | | | | | | | |

* CO = communication object

### 3.3.2 Communication objects
***General***



| Number | Object Function | Name | Length | C | R | W | T | U |
|---|---|---|---|---|---|---|---|---|
| 0 | In operation | General | 1 bit | C | R | - | T | - |
| 1 | Request status values | General | 1 bit | C | - | W | T | - |
| 2 | Enable/block manual operation | General | 1 bit | C | - | W | - | - |
| 3 | Status of manual operation | General | 1 bit | C | R | - | T | - |

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **0** | **In operation** | **General** | **1 bit**<br>**DPT 1.002** | C, R, T |

In order to regularly monitor the operation of the Electronic Switch Actuator, an *In operation* telegram can be sent cyclically on the bus.
The communication object is enabled if in the parameter *Send communication object "In operation"* in the parameter window *General*, page 20, has been selected with the option *yes*.

In the parameter window *General*, you can parameterize if a telegram with the value 1 or 0 is sent cyclically.

Telegram value: 0/1= system operational

| | | | | |
|---|---|---|---|---|
| **1** | **Request status values** | **General** | **1 bit**<br>**DPT 1.017** | **C, R, T** |

If a telegram with the value 0 or 1 (depending on the parameterization) is received on the communication object, for all outputs the status byte is sent as well as all other status values or communication objects programmed with the option *after request* or *after a change or request*.

- Status manual Operation
- Fault control value
- Status control value
- Status valve purge

Telegram value: 1/0 = Request status values

| | | | | |
|---|---|---|---|---|
| **2** | **Enable/ block manual operation** | **General** | **1 bit**<br>**DPT 1.003** | **C, W** |

The *Manual operation*, page 11, of the device is enabled or blocked via this communication object.

| **Note** |
|---|
| If this communication object is assigned to a group address, the manual operation is blocked after each download, ETS reset or bus voltage recovery.<br>If this communication object is not assigned with a group address, manual operation is enabled. |

If the communication object has the value 0, manual operation can be activated using this button on the device.

Telegram value: 0 = manual operation enabled
1 = manual operation disabled (KNX mode)

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **3** | **Status manual Operation** | **General** | **1 bit**<br>**DPT 1.003** | **C, R, T** |
| On this communication object, the device sends information on whether manual operation is activated or whether the device is controlled via the bus.<br>The status is sent if<br>- a request is received via the communication object *Request status values* and the parameter *after request* or *after a change or request* is present.<br>- the value of the communication object has changed and the parameter *after a change* or *after change or request* is present.<br>- a read request is carried out on this communication object.<br>Telegram value: 0 = manual operation inactive (KNX mode)<br>1 = manual operation activated | | | | |
| **4…9** | | | | |
| Not assigned. | | | | |

### 3.3.3 Communication objects *Output A* Operation mode *Valve drive (thermoelectric)*

**Note**

However, as the functions for all outputs are identical, only the functions of output A will be described.

| Number | Object Function | Name | Length | C | R | W | T | U |
|---|---|---|---|---|---|---|---|---|
| 10 | Control value, continuous (PWM | Output A | 1 Byte | C | - | W | - | - |
| 10 | Control value, switch 1 bit | Output A | 1 bit | C | - | W | - | - |
| 11 | Overload/short circuit | Output A | 1 bit | C | R | - | T | - |
| 12 | Reset error message | Output A | 1 bit | C | - | W | T | - |
| 13 | Mains voltage failure | Output A | 1 bit | C | R | - | T | - |
| 15 | Fault control value | Output A | 1 bit | C | R | - | T | - |
| 16 | Trigger valve purge | Output A | 1 bit | C | - | W | - | - |
| 17 | Status valve purge | Output A | 1 bit | C | R | - | T | - |
| 18 | Block | Output A | 1 bit | C | - | W | - | - |
| 19 | Forced operation | Output A | 1 bit | C | - | W | - | - |
| 21 | Status control value | Output A | 1 bit | C | R | - | T | - |
| 21 | Status control value | Output A | 1 Byte | C | R | - | T | - |
| 26 | Status byte | Output A | 1 Byte | C | R | - | T | - |

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **10** | **Control value, switch 1 bit** | **Output A** | **1 bit**<br>**DPT 1.001** | **C, W** |

This communication object is always displayed. Using the parameter *Control will be received as* in parameter window *A: General*, page 26, control can toggle between 1 bit and 1 byte control.

1 bit: The ES/S receives the ON or OFF telegrams from the thermostat.

| | |
|---|---|
| Telegram value | 0 = OFF<br>1 = ON |

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **10** | **Control value, continuous (PWM) 1 byte** | **Output A** | **1 byte**<br>**DPT 5.001** | **C, W** |

This communication object is always displayed. Using the parameter *Control will be received as* in parameter window *A: General*, page 26, control can toggle between 1 bit and 1 byte control.

1 byte: The communication object value [0…255] determines the variable mark-to-space ratio of the valve drive. The output switches OFF with communication object value 0 (valve drive closes); at communication object value 255, the output switches continuously ON (valve drive opens completely).

| | |
|---|---|
| Telegram value | 0 = OFF (valve drive closed)<br>x = intermediate values<br>255 = ON (valve drive opened) |

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **11** | **Overload/short circuit** | **Output A** | **1 bit**<br>**DPT 1.005** | **C, R, T** |
| If there is a fault on an output, e.g. due to a short-circuit or an overload, the red *Error* LED of the corresponding output will flash. At the same time, the communication object *Overload/short circuit* sends a telegram with the value 1. After the fault has been rectified, the fault is reset with the *Reset* button and the communication object has the value 0. If the fault still persists, the LED will flash again and the communication object has the value 1.<br>The communication object is always displayed<br>As an alternative to the *Reset* button, the fault can be reset via communication object *Reset error message* with a telegram with the value 1.<br>Telegram value: 0 = no fault on output A<br>1 = fault on output A | | | | |
| **12** | **Reset error message** | **Output A** | **1 bit**<br>**DPT 1.015** | **C, W, T** |
| Using this communication object, an error message such as an *Overload/short circuit,* red *Error* LED flashing on the device is reset. A reset is only successful after an error has been rectified and is no longer present.<br>The red *Error* LED switches off after a successful reset.<br>There is no reaction should the value 1 be received during correct operation.<br>If this communication object has not been assigned with a group address, the error can only be reset when the device is restarted. Alternatively, an error message can be reset via the *Reset* button on the device.<br>Telegram value: 0 = no function<br>1 = reset error message | | | | |
| **13** | **Mains voltage failure** | **Output A** | **1 bit**<br>**DPT 1.005** | **C, R, T** |
| The failure of the mains voltage supply is sent via this communication object. If the communication object has the value 1, the output is switched off and the red LED on the output lights, even if the output has not been parameterized.<br>Telegram value: 0 = mains voltage OK<br>1 = mains voltage failure | | | | |
| **14** | | | | |
| Not assigned. | | | | |

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **15** | **Fault control value** | **Output A** | **1 bit**<br>**DPT 1.005** | **C, R, T** |

This communication object is enabled if in parameter window A: General, page 26, the parameter *Monitoring control values e.g. thermostat* has been selected with the option *yes*.

This communication object indicates a possible fault in the room thermostat. The communication objects *Control value, switch* or *Control value, continuous (PWM)* can be cyclically monitored. Should the control value not be received by the transmitting thermostat within a parameterizable time, a telegram with the value 1 is sent.
The communication object value is sent – depending on the parameterization – after a change and/or on request via the communication object *Request status values*.

Telegram value: 0 = no fault
1 = fault

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **16** | **Trigger valve purge** | **Output A** | **1 bit**<br>**DPT 1.003** | **C, W** |

The valve purge is triggered using this communication object.

Telegram value: 0 = end valve purge, valve is closed
1 = start valve purge, valve is opened

The purging cycle time is restarted if automatic valve purge has been activated at start-up of the device.

The purging cycle time will be restarted at the end of the actual purging period. The parameterized valve purging duration is included here.

If the valve purge currently active is interrupted by a manual valve purge or a set value that achieves the parameterized purge value, the purge cycle time is restarted.

If the active purge duration was less than the parameterized purge duration, this will not be taken into consideration. In this case, the actual purge cycle time is shorter in duration as the active purge duration.

**Note**

A valve purge, which was not executed because of higher priorities, won't be executed any more.

The following functions are executed with telegram value 0.

- A valve purge currently underway is interrupted.
- A valve purge not undertaken due to a higher priority will no longer be undertaken.
- The purge cycle with automatic valve purge will be restarted.

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **17** | **Status valve purge** | **Output A** | **1 bit**<br>**DPT 1.003** | **C, R, T** |

The status of the valve purge is visible via this communication object.

The status is sent if

- a request is received via the communication object *Request status values* and the parameter *after request* or *after a change or request* is present.
- the value of the communication object has changed and the parameter *after a change* or *after change or request* is present.
- a read request is carried out on this communication object.

Telegram value: 0 = valve purge not active
1 = valve purge active

| **Note** |
|---|
| The status is displayed as soon as a valve purge has been activated.<br>The status remains active, even when the valve purge has been interrupted, e.g. by a priority. |

| | | | | |
|---|---|---|---|---|
| **18** | **Block** | **Output A** | **1 bit**<br>**DPT 1.003** | **C, W** |

The output is inhibited (blocked) and the current control value is retained via this communication object. Blocking of the output is implemented in accordance with the Priorities, page 52. Implementation of a control value that may not have yet been achieved will be completed. Telegrams are still received during the block. The telegram last received is carried out after the block is removed.

Telegram value: 0 = output not blocked
1 = output blocked

| | | | | |
|---|---|---|---|---|
| **19** | **Forced operation** | **Output A** | **1 bit**<br>**DPT 1.003** | **C, W** |

This communication object sets the output in a defined state and blocks it. If a telegram with the value 1 is received, forced operation is activated and the output implements the programmed control value in %. Telegrams are still received during the forced operation. If the value 0 is received, forced operation ends. The telegram last received is carried out after forced operation has ended.

Telegram value: 0 = end forced operation
1 = start forced operation

| | | | | |
|---|---|---|---|---|
| **20** | | | | |

Not assigned.

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **21** | **Status control value 1 byte** | **Output A** | **1 byte DPT 5.001** | **C, R, T** |

This communication object is enabled in parameter window *A: Functions*, page 32, via parameter *Enable communication object "Status control value"* with the option *1 byte*.

The control status of the output is sent via this communication object. Hereby, the limit position that the valve should assume is transferred.
The LED of the corresponding output indicates the same value as the status.

The status is sent if

- a request is received via the communication object *Request status values* and the parameter *after request* or *after a change or request* is present.
- the value of the communication object has changed and the parameter *after a change* or *after change or request* is present.
- a read request is carried out on this communication object.

Telegram value: 0…255 = control value is displayed directly as a figure value
at 0 = LED (yellow) off
at > 0 = LED (yellow) on

If in parameter window *General* under parameter *Control value is received as* the option *1 bit* is selected, the following applies for the communication object *Status control value 1 byte*:

Telegram value: 0 = control value 0; control equal to zero; LED (yellow) off
255 = control value 1; control not equal to zero; LED (yellow) on

| | | | | |
|---|---|---|---|---|
| **21** | **Status control value 1 bit** | **Output A** | **1 bit DPT 1.011** | **C, R, T** |

This communication object is enabled in parameter window *A: Functions*, page 32, via parameter *Enable communication object "Status control value"* with the option bit.

The control status of the output is sent via this communication object. Hereby, the limit position that the valve should assume is transferred.
The LEDs of the corresponding outputs indicate the same value as the status.

The status is sent if

- a request is received via the communication object *Request status values* and the parameter *after request* or *after a change or request* is present.
- the value of the communication object has changed and the parameter *after a change* or *after change or request* is present.
- a read request is carried out on this communication object.

Telegram value: 0 = control equal to zero; LED (yellow) off
1 = control not equal to zero; LED (yellow) on

| | | | | |
|---|---|---|---|---|
| **22… 25** | | | | |

Not assigned.

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **26** | **Status byte** | **Output A** | **1 byte (NON DPT)** | **C, R, T** |

Using the status byte, status information for diagnostic purposes can be read for each output.
The current status or communication object value is sent after a request by the communication object *Request status values*. The communication object is always displayed as soon as an operating mode has been selected.

The value of the status byte can be decoded using the Code table, page 54.

Bit 0: Control value > 0

Telegram value 0: Control value = 0
Telegram value 1: Control value > 0

Bit 1: Short-circuit

Telegram value 0: No short-circuit
Telegram value 1: Short-circuit

Bit 2: Overcurrent (> 1 A)

Telegram value 0: No overcurrent
Telegram value 1: Overcurrent

Bit 3: Not used

Bit 4: Mains voltage failure*

Telegram value 0: No failure
Telegram value 1: Failure

Bit 5: Manual operation active

Telegram value 0: Manual operation inactive
Telegram value 1: Manual operation active

Bit 6: Forced operation active

Telegram value 0: Forced operation inactive
Telegram value 1: Forced operation active

Bit 7: Blocking active

Telegram value 0: Blocking inactive
Telegram value 1: Blocking active

* If the DC voltage is connected with reverse polarity, bit no. 4 has the value 1.

# 4 Planning and application

Application examples and practical tips on the top of temperature control etc. can be found in the *Application manual Heating/Ventilation/Air-Conditioning* at www.abb.de/knx.

## 4.1 Bus voltage recovery

**General**

- The behaviour at bus voltage failure can be parameterized. The corresponding object values are set. For exceptions see Table, page 51.
- Time-dependent functions are non-functional and must be restarted, e.g. valve purge.
- Status communication objects are sent as long as the option *after a change* or *after a change or request* has been set.
- The sending delay is only active at bus voltage recovery!
- A bus voltage failure < 5 seconds is a reset and does not lead to defined behaviour after bus voltage recovery.
- Forced operation is re-established and executed as a priority. All other priorities, e.g. blocking and valve purge are reset.

**Control of valve drives**

- The purge cycle restarts (if activated).
- The value parameterized for bus voltage recovery is set with the control value priority and will be replaced if a new control value is received.

## 4.2 ETS reset

**What is an ETS reset?**

Generally an ETS reset is defined as a reset of the device via the ETS. The ETS Reset is initiated in the ETS3 under the menu point *Commissioning* with the function *Reset device*. This stops the user program and it is restarted. This means that all states set beforehand are lost. The device is reset to the original state (control value 0 % and timer are restarted).

### 4.3 Download (DL)

The object value of the control value remains unchanged with a download. During the download, the output behaves just as it would at bus voltage recovery. After the download, the switch position remains unchanged and only changes with the next switch command. Timers will not operate and must be restarted. Status values of the control values are updated and sent.

| Note |
| --- |
| After a download with a change, the parameter complies in behaviour toa reset of the device in the ETS.<br>If a download of the application is again undertaken (full download) after a full discharge, the behaviour is the same as after a reset.<br>After the application is removed or after an interrupted download, manual operation no longer functions. |

### 4.4 Bus voltage failure

After the switch state is set with bus voltage failure, the Electronic Switch Actuator remains functional until the bus voltage recovers.

## 4.5 Behaviour with bus voltage failure, recovery, download and ETS reset

| Behaviour | At bus voltage failure | At bus voltage recovery | At download (DL) | At ETS reset |
|---|---|---|---|---|
| **Output control** | Parameterized default position is set with bus voltage failure | Parameterized default position is set with bus voltage failure | Control with the communication object value before download | Off |
| **Monitoring control value** | Monitoring inactive | Monitoring time will be restarted | Monitoring time will be restarted. Communication object value unchanged | Monitoring time will be restarted. Communication object value is reset |
| **Forced operation** | Forced operation is ended. Parameterized default position is set with bus voltage failure | Active, provided that forced operation was also active before bus voltage failure | Inactive, communication object value is reset | Inactive, communication object value is reset |
| **Block** | Blocking is ended. Parameterized default position is set with bus voltage failure | Inactive, communication object value is reset | Inactive, communication object value is reset | Inactive, communication object value is reset |
| **Valve purge** | Valve purge is ended. Parameterized default position is set with bus voltage failure | Valve purge is inactive. Communication object *Status valve purge* = 0. Injection cycle time restarts (provided that automatic valve purging is activated) | Valve purge is inactive. Communication object *Status valve purge* = 0. Injection cycle time restarts (provided that automatic valve purging is activated) | Valve purge is inactive. Communication object *Status valve purge* = 0. Injection cycle time restarts (provided that automatic valve purging is activated) |
| **Manual operation** | Manual operation is ended. Parameterized default position is set with bus voltage failure | Inactive | Inactive | Inactive |
| **Power saving mode** (LEDs off in KNX mode) | All LEDs are off | Power saving mode is activated after a parameterized time | Power saving mode is activated after a parameterized time | Power saving mode is activated after a parameterized time |

## 4.6 Priorities

The priorities for telegram processing are defined as follow:

1. Overload/short circuit
2. Bus voltage failure/recovery
3. Manual operation
4. Block
5. Forced operation
6. Valve purge
7. Control value after control fault
8. Control values (1 bit/1 byte)

| Note |
| --- |
| 1 corresponds to the highest priority. |

# A Appendix

## A.1 Scope of delivery

The Electronic Switch Actuator is supplied together with the following components. Please check the items received using the following list.

- 1 x ES/S 4.1.2.1, Electronic Switch Actuator, 4-fold, 1A, MDRC
- 1 x installation and operating instructions
- 1 x bus connection terminal (red/black)
- 1 x label carrier

## A.2 Code table Status byte

| Bit No. | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| 8 bit value | Hexadecimal | Block active | Forced operation active | Enable/ Operation active | Mains voltage failure | not assigned | Overcurrent (>1A) | Short circuit | Control value > 0 |
| 0 | 00 | | | | | | | | |
| 1 | 01 | | | | | | | | ■ |
| 2 | 02 | | | | | | | ■ | |
| 3 | 03 | | | | | | | ■ | ■ |
| 4 | 04 | | | | | | ■ | | |
| 5 | 05 | | | | | | ■ | | ■ |
| 6 | 06 | | | | | | ■ | ■ | |
| 7 | 07 | | | | | | ■ | ■ | ■ |
| 8 | 08 | | | | | ■ | | | |
| 9 | 09 | | | | | ■ | | | ■ |
| 10 | 0A | | | | | ■ | | ■ | |
| 11 | 0B | | | | | ■ | | ■ | ■ |
| 12 | 0C | | | | | ■ | ■ | | |
| 13 | 0D | | | | | ■ | ■ | | ■ |
| 14 | 0E | | | | | ■ | ■ | ■ | |
| 15 | 0F | | | | | ■ | ■ | ■ | ■ |
| 16 | 10 | | | | ■ | | | | |
| 17 | 11 | | | | ■ | | | | ■ |
| 18 | 12 | | | | ■ | | | ■ | |
| 19 | 13 | | | | ■ | | | ■ | ■ |
| 20 | 14 | | | | ■ | | ■ | | |
| 21 | 15 | | | | ■ | | ■ | | ■ |
| 22 | 16 | | | | ■ | | ■ | ■ | |
| 23 | 17 | | | | ■ | | ■ | ■ | ■ |
| 24 | 18 | | | | ■ | ■ | | | |
| 25 | 19 | | | | ■ | ■ | | | ■ |
| 26 | 1A | | | | ■ | ■ | | ■ | |
| 27 | 1B | | | | ■ | ■ | | ■ | ■ |
| 28 | 1C | | | | ■ | ■ | ■ | | |
| 29 | 1D | | | | ■ | ■ | ■ | | ■ |
| 30 | 1E | | | | ■ | ■ | ■ | ■ | |
| 31 | 1F | | | | ■ | ■ | ■ | ■ | ■ |
| 32 | 20 | | | ■ | | | | | |
| 33 | 21 | | | ■ | | | | | ■ |
| 34 | 22 | | | ■ | | | | ■ | |
| 35 | 23 | | | ■ | | | | ■ | ■ |
| 36 | 24 | | | ■ | | | ■ | | |
| 37 | 25 | | | ■ | | | ■ | | ■ |
| 38 | 26 | | | ■ | | | ■ | ■ | |
| 39 | 27 | | | ■ | | | ■ | ■ | ■ |
| 40 | 28 | | | ■ | | ■ | | | |
| 41 | 29 | | | ■ | | ■ | | | ■ |
| 42 | 2A | | | ■ | | ■ | | ■ | |
| 43 | 2B | | | ■ | | ■ | | ■ | ■ |
| 44 | 2C | | | ■ | | ■ | ■ | | |
| 45 | 2D | | | ■ | | ■ | ■ | | ■ |
| 46 | 2E | | | ■ | | ■ | ■ | ■ | |
| 47 | 2F | | | ■ | | ■ | ■ | ■ | ■ |
| 48 | 30 | | | ■ | ■ | | | | |
| 49 | 31 | | | ■ | ■ | | | | ■ |
| 50 | 32 | | | ■ | ■ | | | ■ | |
| 51 | 33 | | | ■ | ■ | | | ■ | ■ |
| 52 | 34 | | | ■ | ■ | | ■ | | |
| 53 | 35 | | | ■ | ■ | | ■ | | ■ |
| 54 | 36 | | | ■ | ■ | | ■ | ■ | |
| 55 | 37 | | | ■ | ■ | | ■ | ■ | ■ |
| 56 | 38 | | | ■ | ■ | ■ | | | |
| 57 | 39 | | | ■ | ■ | ■ | | | ■ |
| 58 | 3A | | | ■ | ■ | ■ | | ■ | |
| 59 | 3B | | | ■ | ■ | ■ | | ■ | ■ |
| 60 | 3C | | | ■ | ■ | ■ | ■ | | |
| 61 | 3D | | | ■ | ■ | ■ | ■ | | ■ |
| 62 | 3E | | | ■ | ■ | ■ | ■ | ■ | |
| 63 | 3F | | | ■ | ■ | ■ | ■ | ■ | ■ |
| 64 | 40 | | ■ | | | | | | |
| 65 | 41 | | ■ | | | | | | ■ |
| 66 | 42 | | ■ | | | | | ■ | |
| 67 | 43 | | ■ | | | | | ■ | ■ |
| 68 | 44 | | ■ | | | | ■ | | |
| 69 | 45 | | ■ | | | | ■ | | ■ |
| 70 | 46 | | ■ | | | | ■ | ■ | |
| 71 | 47 | | ■ | | | | ■ | ■ | ■ |
| 72 | 48 | | ■ | | | ■ | | | |
| 73 | 49 | | ■ | | | ■ | | | ■ |
| 74 | 4A | | ■ | | | ■ | | ■ | |
| 75 | 4B | | ■ | | | ■ | | ■ | ■ |
| 76 | 4C | | ■ | | | ■ | ■ | | |
| 77 | 4D | | ■ | | | ■ | ■ | | ■ |
| 78 | 4E | | ■ | | | ■ | ■ | ■ | |
| 79 | 4F | | ■ | | | ■ | ■ | ■ | ■ |
| 80 | 50 | | ■ | | ■ | | | | |
| 81 | 51 | | ■ | | ■ | | | | ■ |
| 82 | 52 | | ■ | | ■ | | | ■ | |
| 83 | 53 | | ■ | | ■ | | | ■ | ■ |
| 84 | 54 | | ■ | | ■ | | ■ | | |
| 85 | 55 | | | | ■ | | ■ | | ■ |

| Bit No. | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| 8 bit value | Hexadecimal | Block active | Forced operation active | Enable/ Operation active | Mains voltage failure | not assigned | Overcurrent (>1A) | Short circuit | Control value > 0 |
| 86 | 56 | | ■ | | ■ | | ■ | ■ | |
| 87 | 57 | | ■ | | ■ | | ■ | ■ | ■ |
| 88 | 58 | | ■ | | ■ | ■ | | | |
| 89 | 59 | | ■ | | ■ | ■ | | | ■ |
| 90 | 5A | | ■ | | ■ | ■ | | ■ | |
| 91 | 5B | | ■ | | ■ | ■ | | ■ | ■ |
| 92 | 5C | | ■ | | ■ | ■ | ■ | | |
| 93 | 5D | | ■ | | ■ | ■ | ■ | | ■ |
| 94 | 5E | | ■ | | ■ | ■ | ■ | ■ | |
| 95 | 5F | | ■ | | ■ | ■ | ■ | ■ | ■ |
| 96 | 60 | | ■ | ■ | | | | | |
| 97 | 61 | | ■ | ■ | | | | | ■ |
| 98 | 62 | | ■ | ■ | | | | ■ | |
| 99 | 63 | | ■ | ■ | | | | ■ | ■ |
| 100 | 64 | | ■ | ■ | | | ■ | | |
| 101 | 65 | | ■ | ■ | | | ■ | | ■ |
| 102 | 66 | | ■ | ■ | | | ■ | ■ | |
| 103 | 67 | | ■ | ■ | | | ■ | ■ | ■ |
| 104 | 68 | | ■ | ■ | | ■ | | | |
| 105 | 69 | | ■ | ■ | | ■ | | | ■ |
| 106 | 6A | | ■ | ■ | | ■ | | ■ | |
| 107 | 6B | | ■ | ■ | | ■ | | ■ | ■ |
| 108 | 6C | | ■ | ■ | | ■ | ■ | | |
| 109 | 6D | | ■ | ■ | | ■ | ■ | | ■ |
| 110 | 6E | | ■ | ■ | | ■ | ■ | ■ | |
| 111 | 6F | | ■ | ■ | | ■ | ■ | ■ | ■ |
| 112 | 70 | | ■ | ■ | ■ | | | | |
| 113 | 71 | | ■ | ■ | ■ | | | | ■ |
| 114 | 72 | | ■ | ■ | ■ | | | ■ | |
| 115 | 73 | | ■ | ■ | ■ | | | ■ | ■ |
| 116 | 74 | | ■ | ■ | ■ | | ■ | | |
| 117 | 75 | | ■ | ■ | ■ | | ■ | | ■ |
| 118 | 76 | | ■ | ■ | ■ | | ■ | ■ | |
| 119 | 77 | | ■ | ■ | ■ | | ■ | ■ | ■ |
| 120 | 78 | | ■ | ■ | ■ | ■ | | | |
| 121 | 79 | | ■ | ■ | ■ | ■ | | | ■ |
| 122 | 7A | | ■ | ■ | ■ | ■ | | ■ | |
| 123 | 7B | | ■ | ■ | ■ | ■ | | ■ | ■ |
| 124 | 7C | | ■ | ■ | ■ | ■ | ■ | | |
| 125 | 7D | | ■ | ■ | ■ | ■ | ■ | | ■ |
| 126 | 7E | | ■ | ■ | ■ | ■ | ■ | ■ | |
| 127 | 7F | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 128 | 80 | ■ | | | | | | | |
| 129 | 81 | ■ | | | | | | | ■ |
| 130 | 82 | ■ | | | | | | ■ | |
| 131 | 83 | ■ | | | | | | ■ | ■ |
| 132 | 84 | ■ | | | | | ■ | | |
| 133 | 85 | ■ | | | | | ■ | | ■ |
| 134 | 86 | ■ | | | | | ■ | ■ | |
| 135 | 87 | ■ | | | | | ■ | ■ | ■ |
| 136 | 88 | ■ | | | | ■ | | | |
| 137 | 89 | ■ | | | | ■ | | | ■ |
| 138 | 8A | ■ | | | | ■ | | ■ | |
| 139 | 8B | ■ | | | | ■ | | ■ | ■ |
| 140 | 8C | ■ | | | | ■ | ■ | | |
| 141 | 8D | ■ | | | | ■ | ■ | | ■ |
| 142 | 8E | ■ | | | | ■ | ■ | ■ | |
| 143 | 8F | ■ | | | | ■ | ■ | ■ | ■ |
| 144 | 90 | ■ | | | ■ | | | | |
| 145 | 91 | ■ | | | ■ | | | | ■ |
| 146 | 92 | ■ | | | ■ | | | ■ | |
| 147 | 93 | ■ | | | ■ | | | ■ | ■ |
| 148 | 94 | ■ | | | ■ | | ■ | | |
| 149 | 95 | ■ | | | ■ | | ■ | | ■ |
| 150 | 96 | ■ | | | ■ | | ■ | ■ | |
| 151 | 97 | ■ | | | ■ | | ■ | ■ | ■ |
| 152 | 98 | ■ | | | ■ | ■ | | | |
| 153 | 99 | ■ | | | ■ | ■ | | | ■ |
| 154 | 9A | ■ | | | ■ | ■ | | ■ | |
| 155 | 9B | ■ | | | ■ | ■ | | ■ | ■ |
| 156 | 9C | ■ | | | ■ | ■ | ■ | | |
| 157 | 9D | ■ | | | ■ | ■ | ■ | | ■ |
| 158 | 9E | ■ | | | ■ | ■ | ■ | ■ | |
| 159 | 9F | ■ | | | ■ | ■ | ■ | ■ | ■ |
| 160 | A0 | ■ | | ■ | | | | | |
| 161 | A1 | ■ | | ■ | | | | | ■ |
| 162 | A2 | ■ | | ■ | | | | ■ | |
| 163 | A3 | ■ | | ■ | | | | ■ | ■ |
| 164 | A4 | ■ | | ■ | | | ■ | | |
| 165 | A5 | ■ | | ■ | | | ■ | | ■ |
| 166 | A6 | ■ | | ■ | | | ■ | ■ | |
| 167 | A7 | ■ | | ■ | | | ■ | ■ | ■ |
| 168 | A8 | ■ | | ■ | | ■ | | | |
| 169 | A9 | ■ | | ■ | | ■ | | | ■ |
| 170 | AA | ■ | | ■ | | ■ | | ■ | |
| 171 | AB | ■ | | ■ | | ■ | | ■ | ■ |

| Bit No. | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| 8 bit value | Hexadecimal | Block active | Forced operation active | Enable/ Operation active | Mains voltage failure | not assigned | Overcurrent (>1A) | Short circuit | Control value > 0 |
| 172 | AC | ■ | | ■ | | ■ | ■ | | |
| 173 | AD | ■ | | ■ | | ■ | ■ | | ■ |
| 174 | AE | ■ | | ■ | | ■ | ■ | ■ | |
| 175 | AF | ■ | | ■ | | ■ | ■ | ■ | ■ |
| 176 | B0 | ■ | | ■ | ■ | | | | |
| 177 | B1 | ■ | | ■ | ■ | | | | ■ |
| 178 | B2 | ■ | | ■ | ■ | | | ■ | |
| 179 | B3 | ■ | | ■ | ■ | | | ■ | ■ |
| 180 | B4 | ■ | | ■ | ■ | | ■ | | |
| 181 | B5 | ■ | | ■ | ■ | | ■ | | ■ |
| 182 | B6 | ■ | | ■ | ■ | | ■ | ■ | |
| 183 | B7 | ■ | | ■ | ■ | | ■ | ■ | ■ |
| 184 | B8 | ■ | | ■ | ■ | ■ | | | |
| 185 | B9 | ■ | | ■ | ■ | ■ | | | ■ |
| 186 | BA | ■ | | ■ | ■ | ■ | | ■ | |
| 187 | BB | ■ | | ■ | ■ | ■ | | ■ | ■ |
| 188 | BC | ■ | | ■ | ■ | ■ | ■ | | |
| 189 | BD | ■ | | ■ | ■ | ■ | ■ | | ■ |
| 190 | BE | ■ | | ■ | ■ | ■ | ■ | ■ | |
| 191 | BF | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| 192 | C0 | ■ | ■ | | | | | | |
| 193 | C1 | ■ | ■ | | | | | | ■ |
| 194 | C2 | ■ | ■ | | | | | ■ | |
| 195 | C3 | ■ | ■ | | | | | ■ | ■ |
| 196 | C4 | ■ | ■ | | | | ■ | | |
| 197 | C5 | ■ | ■ | | | | ■ | | ■ |
| 198 | C6 | ■ | ■ | | | | ■ | ■ | |
| 199 | C7 | ■ | ■ | | | | ■ | ■ | ■ |
| 200 | C8 | ■ | ■ | | | ■ | | | |
| 201 | C9 | ■ | ■ | | | ■ | | | ■ |
| 202 | CA | ■ | ■ | | | ■ | | ■ | |
| 203 | CB | ■ | ■ | | | ■ | | ■ | ■ |
| 204 | CC | ■ | ■ | | | ■ | ■ | | |
| 205 | CD | ■ | ■ | | | ■ | ■ | | ■ |
| 206 | CE | ■ | ■ | | | ■ | ■ | ■ | |
| 207 | CF | ■ | ■ | | | ■ | ■ | ■ | ■ |
| 208 | D0 | ■ | ■ | | ■ | | | | |
| 209 | D1 | ■ | ■ | | ■ | | | | ■ |
| 210 | D2 | ■ | ■ | | ■ | | | ■ | |
| 211 | D3 | ■ | ■ | | ■ | | | ■ | ■ |
| 212 | D4 | ■ | ■ | | ■ | | ■ | | |
| 213 | D5 | ■ | ■ | | ■ | | ■ | | ■ |
| 214 | D6 | ■ | ■ | | ■ | | ■ | ■ | |
| 215 | D7 | ■ | ■ | | ■ | | ■ | ■ | ■ |
| 216 | D8 | ■ | ■ | | ■ | ■ | | | |
| 217 | D9 | ■ | ■ | | ■ | ■ | | | ■ |
| 218 | DA | ■ | ■ | | ■ | ■ | | ■ | |
| 219 | DB | ■ | ■ | | ■ | ■ | | ■ | ■ |
| 220 | DC | ■ | ■ | | ■ | ■ | ■ | | |
| 221 | DD | ■ | ■ | | ■ | ■ | ■ | | ■ |
| 222 | DE | ■ | ■ | | ■ | ■ | ■ | ■ | |
| 223 | DF | ■ | ■ | | ■ | ■ | ■ | ■ | ■ |
| 224 | E0 | ■ | ■ | ■ | | | | | |
| 225 | E1 | ■ | ■ | ■ | | | | | ■ |
| 226 | E2 | ■ | ■ | ■ | | | | ■ | |
| 227 | E3 | ■ | ■ | ■ | | | | ■ | ■ |
| 228 | E4 | ■ | ■ | ■ | | | ■ | | |
| 229 | E5 | ■ | ■ | ■ | | | ■ | | ■ |
| 230 | E6 | ■ | ■ | ■ | | | ■ | ■ | |
| 231 | E7 | ■ | ■ | ■ | | | ■ | ■ | ■ |
| 232 | E8 | ■ | ■ | ■ | | ■ | | | |
| 233 | E9 | ■ | ■ | ■ | | ■ | | | ■ |
| 234 | EA | ■ | ■ | ■ | | ■ | | ■ | |
| 235 | EB | ■ | ■ | ■ | | ■ | | ■ | ■ |
| 236 | EC | ■ | ■ | ■ | | ■ | ■ | | |
| 237 | ED | ■ | ■ | ■ | | ■ | ■ | | ■ |
| 238 | EE | ■ | ■ | ■ | | ■ | ■ | ■ | |
| 239 | EF | ■ | ■ | ■ | | ■ | ■ | ■ | ■ |
| 240 | F0 | ■ | ■ | ■ | ■ | | | | |
| 241 | F1 | ■ | ■ | ■ | ■ | | | | ■ |
| 242 | F2 | ■ | ■ | ■ | ■ | | | ■ | |
| 243 | F3 | ■ | ■ | ■ | ■ | | | ■ | ■ |
| 244 | F4 | ■ | ■ | ■ | ■ | | ■ | | |
| 245 | F5 | ■ | ■ | ■ | ■ | | ■ | | ■ |
| 246 | F6 | ■ | ■ | ■ | ■ | | ■ | ■ | |
| 247 | F7 | ■ | ■ | ■ | ■ | | ■ | ■ | ■ |
| 248 | F8 | ■ | ■ | ■ | ■ | ■ | | | |
| 249 | F9 | ■ | ■ | ■ | ■ | ■ | | | ■ |
| 250 | FA | ■ | ■ | ■ | ■ | ■ | | ■ | |
| 251 | FB | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| 252 | FC | ■ | ■ | ■ | ■ | ■ | ■ | | |
| 253 | FD | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
| 254 | FE | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| 255 | FF | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

■ = applicable/active

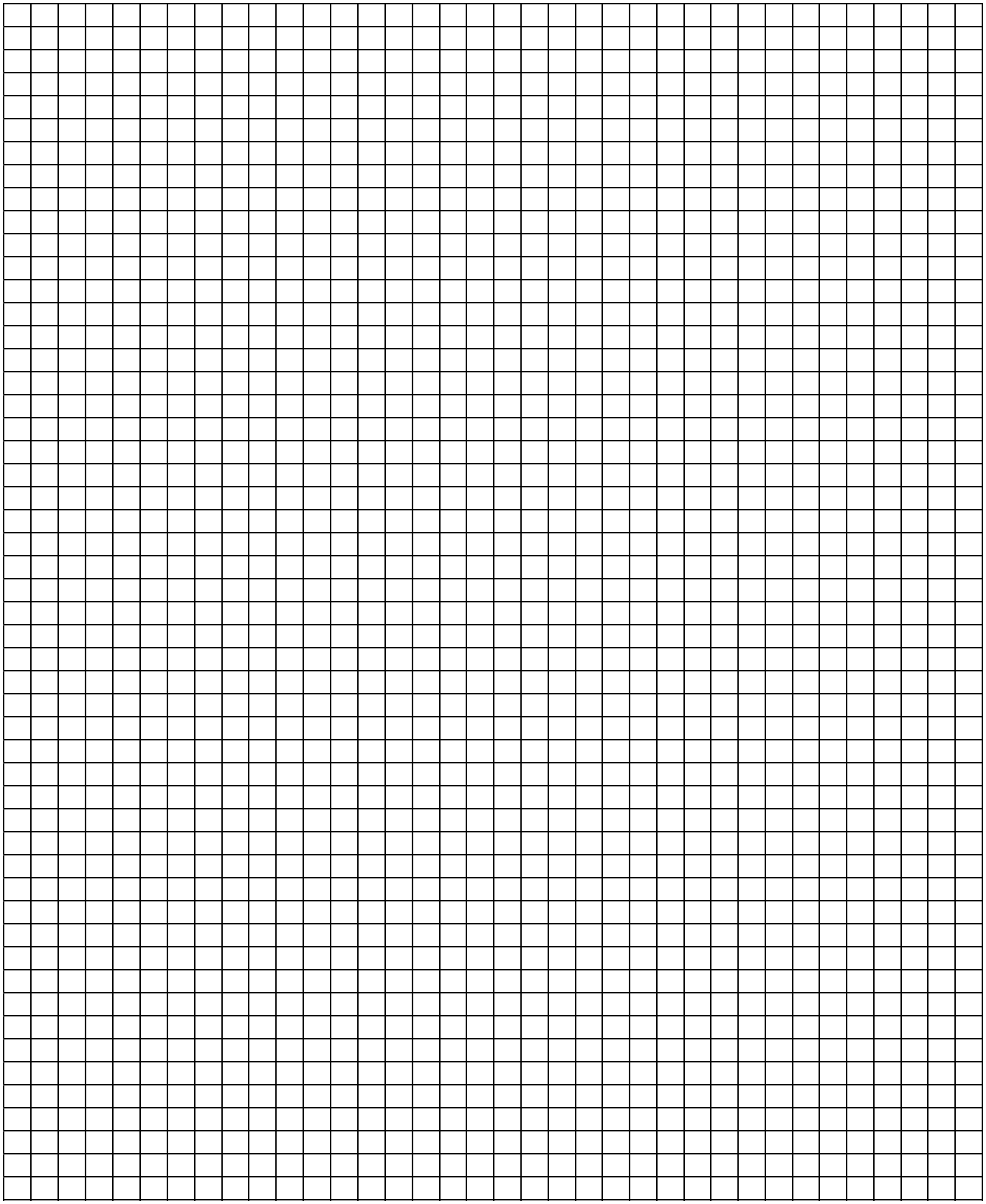
## A.3 Ordering information

| Short description | Description | Order code | bbn 40 16779 EAN | Price group | Weight 1 pcs [kg] | Packaging [pc.] |
|---|---|---|---|---|---|---|
| **ES/S 4.1.2.1** | Electronic Switch Actuator, 4-fold, 1 A, MDRC | 2CDG 110 058 R0011 | **6 72061** | P2 | 0.25 | 1 |

## A.4 Accessories

| Short description | Description | Order code | bbn 40 16779 EAN | Price group | Weight 1 pcs [kg] | Packaging [pc.] |
|---|---|---|---|---|---|---|
| **TSA/K 230.1** | Thermoelectric Valve Drive, 230 V, Normally Closed | 2CDG 110 007 R0011 | **65299 5** | 20 | 0.1 | 1 |
| **TSA/K 230.1** | Thermoelectric Valve Drive, 24 V, Normally Closed | 2CDG 110 008 R0011 | **65300 8** | 20 | 0.1 | 1 |
| **VA/Z 10.1** | Valve Adapter (M30 x 1.5) for Dumser, Chronatherm, Vescal, KaMo | 2CDG 110 009 R0011 | **65319 0** | 20 | 0.01 | 1 |
| **VA/Z 50.1** | Valve Adapter (M30 x 1.5) for Honeywell, Reich, Cazzaniga, Landis & Gyr. MNG | 2CDG 110 010 R0011 | **65320 6** | 20 | 0.01 | 1 |
| **VA/Z 78.1** | Valve Adapter (Flange) for Danfoss RA | 2CDG 110 011 R0011 | **65321 3** | 20 | 0.01 | 1 |
| **VA/Z 80.1** | Valve Adapter (M30 x 1.5) for Heimeier, Herb, Onda, Schlösser (from 93), Oventrop | 2CDG 110 012 R0011 | **65322 0** | 20 | 0.01 | 1 |

### A.5 Notes



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Order number 2CDC 508 090 D0201 (09.10)

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