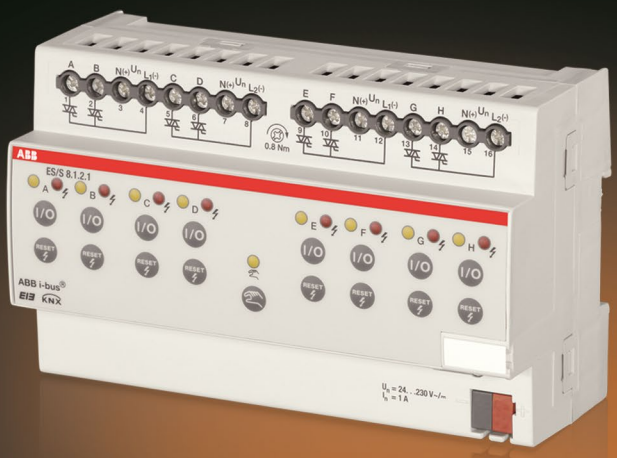

ABB i-bus® KNX
Electronic Switch Actuator ES/S X.1.2.1
Product Manual

Power and productivity
for a better world™

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1 General

The Electronic Switch Actuators ES/S X.1.2.1 are modular installation devices with a module width of 4 space units or 8 space units in Pro *M*-Design for installation in distribution boards. The devices feature semiconductor outputs for control of electro-thermal valve drives, e.g. TSA/K, or electro-motor actuator drives, for example, for room temperature control in heating and cooling systems. Furthermore, the devices are ideal for noiseless and wear-free switching of any loads, e.g. lamps. The device requires a 24…230 V AC/DC power supply. The connection to the ABB i-bus® KNX 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.

1.1 Using the product manual

This manual provides you with detailed technical information relating to the function, installation and programming of the Electronic Switch Actuators ES/S X.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 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 as soon as there is danger of a malfunction without risk of damage or injury.

 **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

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ES/S 4.1.2.1

The Electronic Switch Actuators ES/S x.1.2.1 are modular installation devices in Pro *M*-Design. The devices feature 4 or 8 semiconductor outputs for control of electro-thermal valve drives, e.g. TSA/K, and electro-motor 3-point actuator drives, for example, for room temperature control. Furthermore, the devices are ideal for noiseless and wear-free switching of any loads, e.g. lamps. The outputs can be operated with either DC or AC voltage (24…230 V AC/DC).

The outputs can be combined as required, so that, e.g. output A controls electro-thermal valve drives, output B switches the lighting and outputs C and D control electro-motor actuator drives.

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

2.1 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 %, 45…65 Hz
		Separate supply of the outputs is possible. For example, A + B with 230 V AC, C + D with 24 V DC
	Rated current In per output	1 A resistive load at T_u up to 45 °C
	Inrush current per output	8 A for max. 1 second at T_u 20 °C
	Number of electro-thermal 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. It 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
	Outputs A…X, supply U_n	Via universal head screw terminals
		0.2…4 mm^2 stranded, 2 x 0.2…2.5 mm^2,
		0.2…6 mm^2 solid, 2 x 0.2…4 mm^2
Operating and display elements	Button/LED Programming	For assignment of the physical address
	Button *Manual operation* and	To switch to manual mode
	LED *Manual operation*	
	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	II to EN 60 664-1
KNX safety extra low voltage	SELV 30 V DC	
Temperature range		To EN 50 491
	Operation	-5 °C…+45 °C
	Storage	-25 °C…+55 °C
	Transport	-25 °C…+70 °C
Ambient conditions	Maximum air humidity	To EN 50 491
		95 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro *M*
	Dimensions	ES/S 4.1.2.1: 90 x 72 x 64.5 mm (H x W x D)
		ES/S 8.1.2.1: 90 x 144 x 64.5 mm (H x W x D)
	Mounting width in space units	ES/S 4.1.2.1: 4 modules at 18 mm
		ES/S 8.1.2.1: 8 modules at 18 mm
	Mounting depth	64.5 mm
Installation	On 35 mm mounting rail	To EN 60 715
Mounting position	As required	
Weight (without batteries)	ES/S 4.1.2.1	0.25 kg
	ES/S 8.1.2.1	0.38 kg
Housing/colour	Plastic housing, grey	
Approvals	KNX to EN 50 090-1, -2, EN 60 669-1, EN 50 428	Certification
CE mark	In accordance with the EMC guideline and low voltage guideline	

Application program	**Maximum number of communication objects**	**Maximum number of group addresses**	**Maximum number of associations**
Switching Valve Drive 4f 1A/…*	76	254	254
Switching Valve Drive 8f 1A/…*	148	254	254

* … = current version number of the application program.

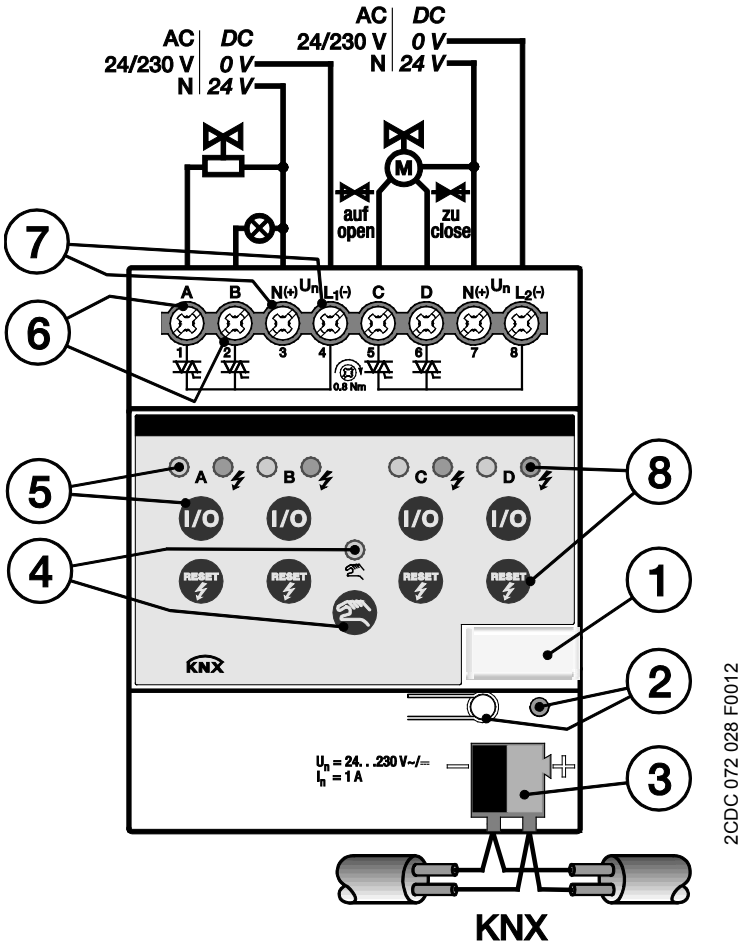
Note

The ETS and the current version of the device application program are required for programming.

The current application program can be found with the respective software information for download on the Internet at *www.abb.com/knx*. After import it is available in the ETS under *ABB/Heating, Ventilation, Air conditioning/Electronic switch actuator*.

The device does not support the locking 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. Data can still be read and programmed.

2.2 Circuit diagram ES/S 4.1.2.1 (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)

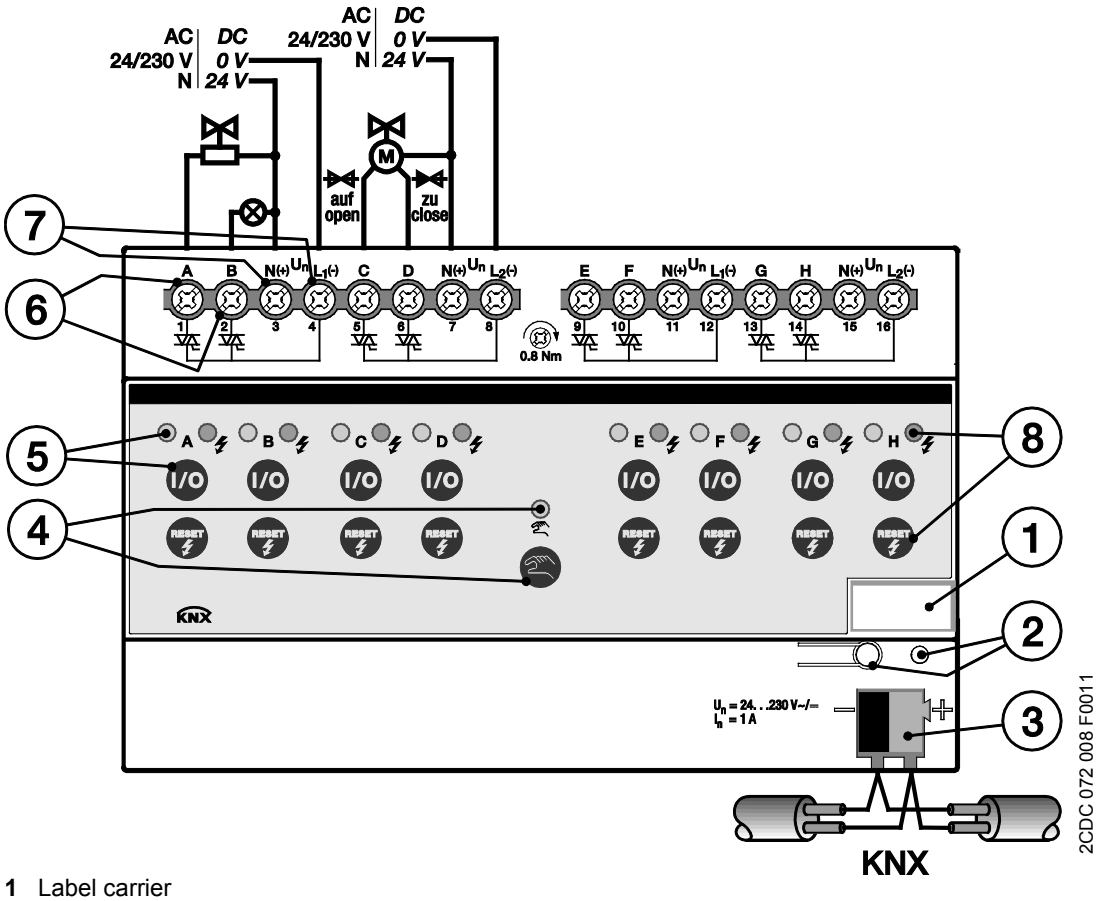
6 4 output terminals A…D

7 2 terminals each L(-), N(+) for outputs A + B, C + D

8 Button *Reset* and LED *Fault* (for every output)

Note
The outputs (A + B and C + D) can be operated in pairs with different supply voltages U_n.

2.3 Circuit diagram ES/S 8.1.2.1 (Example)



1 Label carrier

2 Button/LED *Programming*

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8 Button *Reset* and LED *Fault* (for every output)

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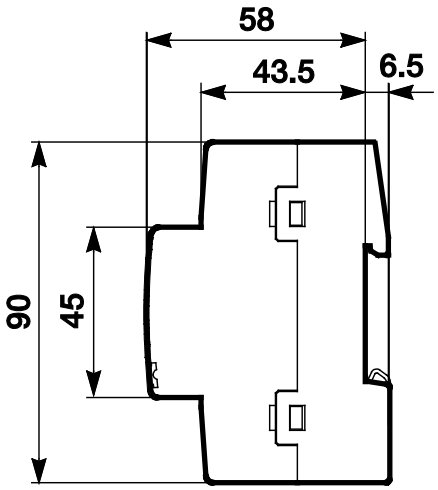
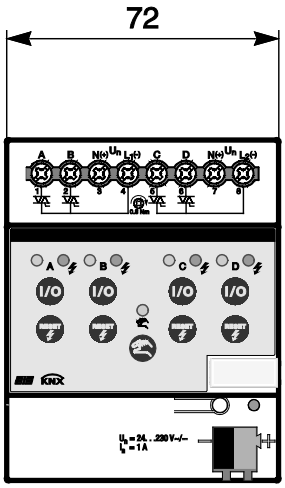
The outputs (A + B, C + D, E + F and G + H) can be operated in pairs with different supply voltages U_n.

2.4 Dimension drawings





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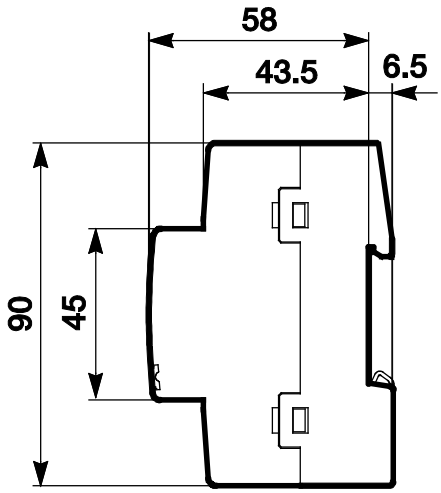
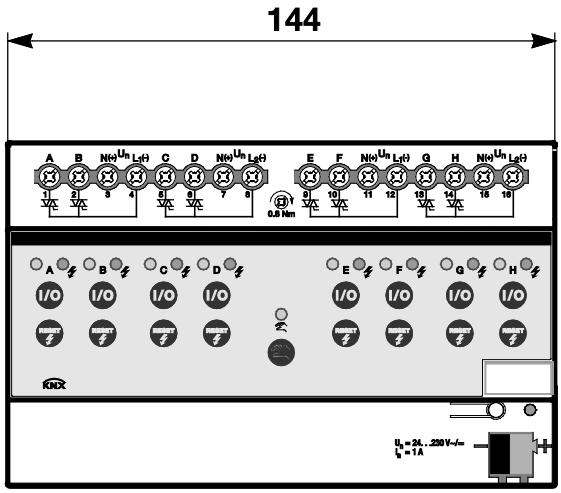
ES/S 4.1.2.1





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ES/S 8.1.2.1

2.5 Assembly and installation

The device 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 electrical connection is implemented using screw terminals. The connection to the bus is implemented using the supplied bus connection terminal. The terminal assignment is located on the housing.

If bus voltage is not yet available at the time of commissioning, the device can be supplied with power for manual operation of the buttons on the front of the device 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. A supply voltage (24…230 V AC/DC) must be applied to provide power to the connected loads.

The installation and commissioning may only be carried out by electrical specialists. The appropriate norms, guidelines, regulations and specifications for your country should be observed when planning and setting up electrical installations and security systems for intrusion and fire detection.

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)!

The voltage supply to the device must be switched off, before mounting work is performed.

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. Special device functions can be undertaken using the operating keys on the foil keypad.

The foil keypad 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. A longer downtime may result if the application program is changed or after a discharge.

Assignment of the physical address

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

Button on the device is pressed to assign the physical address. The red LED ● lights up. It switches off, as soon as the ETS has assigned the physical address or the button has been pressed again.

Download response

Depending on the PC, which is used, the progress bar for the download may take up to one and a half minutes, before it appears, due to the complexity of the device.

Cleaning

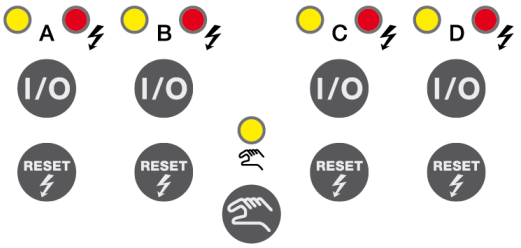
If devices become dirty, they can be cleaned using a dry cloth or a cloth dampened with a soapy solution. Corrosive agents or solutions should never be used.

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.

2.6 Manual operation

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



Operation and display elements ES/S 4.1.2.1

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

Function of manual operation

Manual operation facilitates on-location operation of the ES/S. It can be switched on or off via button .

Switch on of manual operation:

Press button until the yellow LED lights continuously.

Manual operation is activated on a channel by channel basis after pressing the corresponding button .

Switch off of manual operation:

Press buton until the yellow LED LED switches off. The LED continues to flash for 2 seconds.

After connection to the KNX, after a download or ETS reset, the ES/S is in *KNX operation*. The LED is off. All LEDs indicate their current state.

Note

If *Manual operation* is generally disabled or disabled via communication object *Block manual operation*, the LED flashes during the button push.

A switchover from *KNX operation* to the *Manual operation* mode does not occur.

Supplied state

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

Using button you may toggle between *Manual operation* and *KNX operation*.

In the default delivery state, the outputs are mutually interlocked in pairs (A + B, C + D,…) with active manual operation (operation mode *Valve drive, motor-driven (3-point)*). Every time the buttons are pressed, the corresponding outputs and LEDs toggle their state.

Example: If output C was switched on, this will be switched off by actuating button of partner output D and output D is switched on.

In operation mode *Valve drive, motor-driven (3-point)*, the outputs A, C, E, G open the valve and the outputs B, D, F, H close the valve.

Note
After initial programming of the device, the buttons will respond in accordance with the parameterized operation mode. If operation mode *Valve drive, motor-driven (3-point)* has been programmed, you switch the outputs after pressing the button for the duration of the parameterized opening or closing time.

Activation of manual operation

If manual operation is activated, the current control 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 buttons.

Note
Manual operation can be inhibited via the KNX using communication object *Block manual operation* (No. 2). In this case, it is not possible to change over to manual operation using button . The inhibit (block) is removed by a telegram with the value 0 to the communication object (no. 2). After bus voltage recovery, manual operation re-assumes the state it had before bus voltage failure. The behaviour after download is programmable.

Important
Should *Manual operation* be activated, it has the highest priority. As soon as the output state is modified in manual mode via button active functions, such as blocking, forced operation and valve purge, are interrupted and values of the characteristic curve are not considered.

Telegram processing with active manual operation

Incoming telegrams will continue to be received and saved in active manual operation. After manual operation is deactivated, the device will update.

2.6.1 Display elements

Indicator LEDs are located on the front of the ES/S.

All LEDs *Output X* indicate the actual state. In *KNX operation* the LED is off.

The response of the display elements is described in the following table:

LED	KNX operation	Manual operation
Manual operation	*Off:* The device is in KNX operation *Flashes (for about 3 seconds.):* Changeover to *Manual operation*. *Flashes continuously:* Button is actuated during the time when *Manual operation* is blocked. The LED switches off when released.	*On:* The device is in *Manual operation* *Flashes (for about 3 seconds):* Changeover to *KNX operation*.
Fault	*On:* Supply voltage absent. The LED switches off, as soon as the supply voltage is applied. *Off:* Normal operation, no fault. *Slow flashing (1 Hz):* Overload *Fast flashing (4.8 Hz*): Short-circuit	
A **Output A…X**[1]	*On:* Switch state = on *Off:* Switch state = off *Slow flashing:* Active PWM > 0 % and < 100 % [only in operation mode *Valve drive, thermoelectric (PWM)]* *Slow flashing:* Both LEDs of an output pair flash quickly simultaneously with an adjustment [only in operation mode *Valve drive, motor-driven (3-point)]*	

[1] For ES/S 4.1.2.1: X = D, for ES/S 8.1.2.1: X = H

2.6.2 Operating controls

Buttons for manual operation are located on the front of the device.

The behaviour of the operating controls is dependent on the operating states *KNX operation* and *Manual operation* and is described in the following table:

Button	KNX operation	Manual operation
 **Manual operation**	*Long button operation (about 3 sec.):* Switch to *Manual operation* provided that *Manual operation* is not blocked by a parameter setting. *Short button push:* LED flashes and switches off again. The device is once again in *KNX operation*.	*Long button operation (about 3 sec.):* Changeover to *KNX operation*. The inputs are queried again, and the input states are updated accordingly. The reset of the *Manual operation* to *KNX operation* can be undertaken via parameter *Automatic reset of manual operation to KNX operation* within a parameterized time as well.
 **ON/OFF**	No reaction	For switching on or off the output. A connected valve drive opens or closes a valve. The reaction of the button depends on the mode of operation: **Valve drive, motor-driven (3-point):** Output A, C, E[2], G[2]: Open/stop Output B, D, F[2], H[2]: Close/stop **Valve drive, thermoelectric (PWM) and switch actuator:** Output A…X[1]: Open/close or ON/OFF
 **Reset**	The button can always be operated, even if manual operation has not been activated. It is used for resetting a fault (short-circuit or overload) on the output, provided that the fault has been rectified beforehand. The button must be pushed until the red LED switches off. A short-circuit or an overload block the output until the fault is rectified and reset with button . **Reaction of the button in operation mode *Valve drive, motor-driven (3-point)*:** - A reference adjustment is undertaken after a fault has been remedied. - *Long button operation (> 2 sec.):* Triggers a reference adjustment.	

1 For ES/S 4.1.2.1: X = D, for ES/S 8.1.2.1: X = H

2 This output is only available in the ES/S 8.1.2.1.

3 Commissioning

The parameterization of the Electronic Switch Actuator is implemented using the application program *Switching Valve Drive xf* 1A and the Engineering Tool Software ETS.

3.1 Overview

The following table provides an overview of the functions that are possible with the ES/S and the application program *Switching Valve Drive xf 1A*.

Properties	**ES/S 4.1.2.1**	**ES/S 8.1.2.1**
Type of installation	MDRC	MDRC
Number of outputs	4	8
Module width (space units)	4	8
I_n rated current (A)	1 A	1 A
Manual operation		
Switch on and off of the outputs (device front)	■	■
Fault acknowledgement (device front)	■	■

■ = property applies

Parameterization options *General*	**ES/S 4.1.2.1**	**ES/S 8.1.2.1**
Cyclic monitoring telegram (In operation)	■	■
Limit number of telegrams	■	■
Request status values via 1 bit communication object	■	■
Functions operation mode *Valve drive, thermoelectric/motor-driven*		
Control value	■	■
Status	■	■
Control value after control fault	■	■
Valve purge	■	■
Characteristic curve correction	■	■
Safety settings	■	■
Functions operation mode *Switch actuator*		
Time: Staircase lighting, delay, flashing	■	■
8 bit scene	■	■
Logical functions	■	■
Safety settings	■	■
Threshold values	■	■

■ = property applies

3.1.1 Conversion of previous application program versions

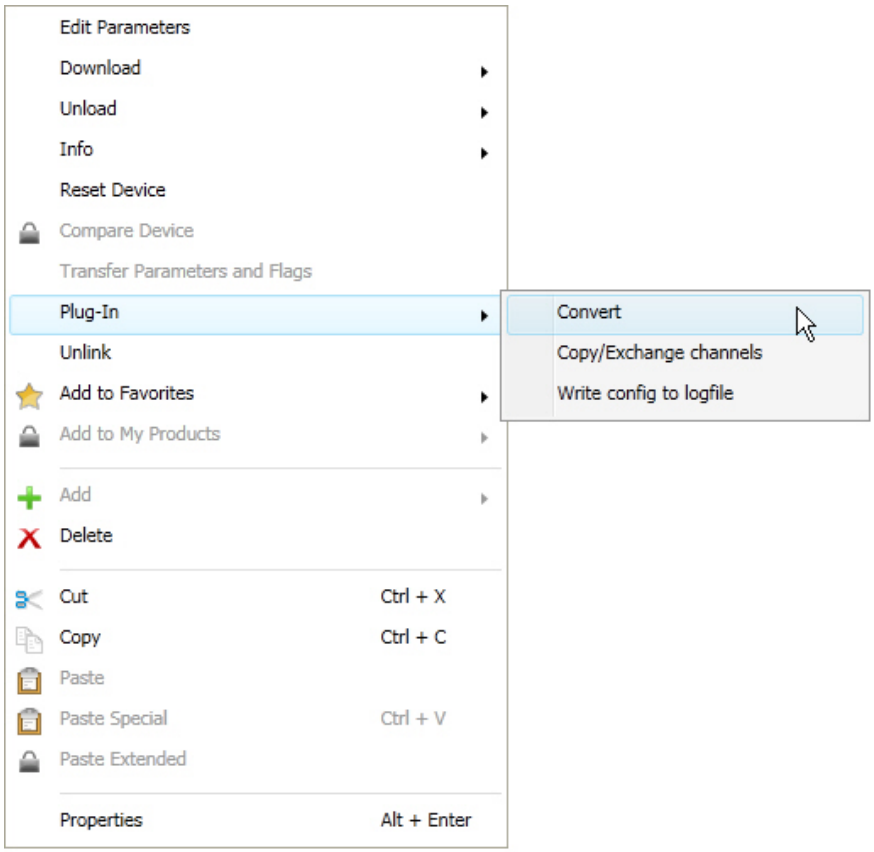
For ABB i-bus® KNX devices from ETS3 or higher, it is possible to assume the parameter settings and group addresses from earlier application program versions.

Furthermore, conversion can be applied to transfer the existing parameterization of a device to another device.

Note
When the term “channels” is used in the ETS, inputs and/or outputs are meant. In order to ensure that the ETS language generally applies for as many ABB i-bus® devices as possible, the term channels is used here.

3.1.1.1 Conversion procedure

- Import the current application program into the ETS.
- Insert the required device into the project.
- Right click on the product and select *Plug-in* > *Convert* in the context menu.



- Thereafter undertake the required settings in the *Convert* dialog.
- Finally, exchange the physical address and delete the old device.

Should you wish to only copy individual channels within a device, use the function Copying and exchanging parameter settings, page 20.

3.1.2 Copying and exchanging parameter settings

Parameterization of devices can take a lot of time depending on the complexity of the application 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 output can be copied or exchanged with freely selectable outputs. Optionally, the group addresses can be retained, copied or deleted in the target input/output.

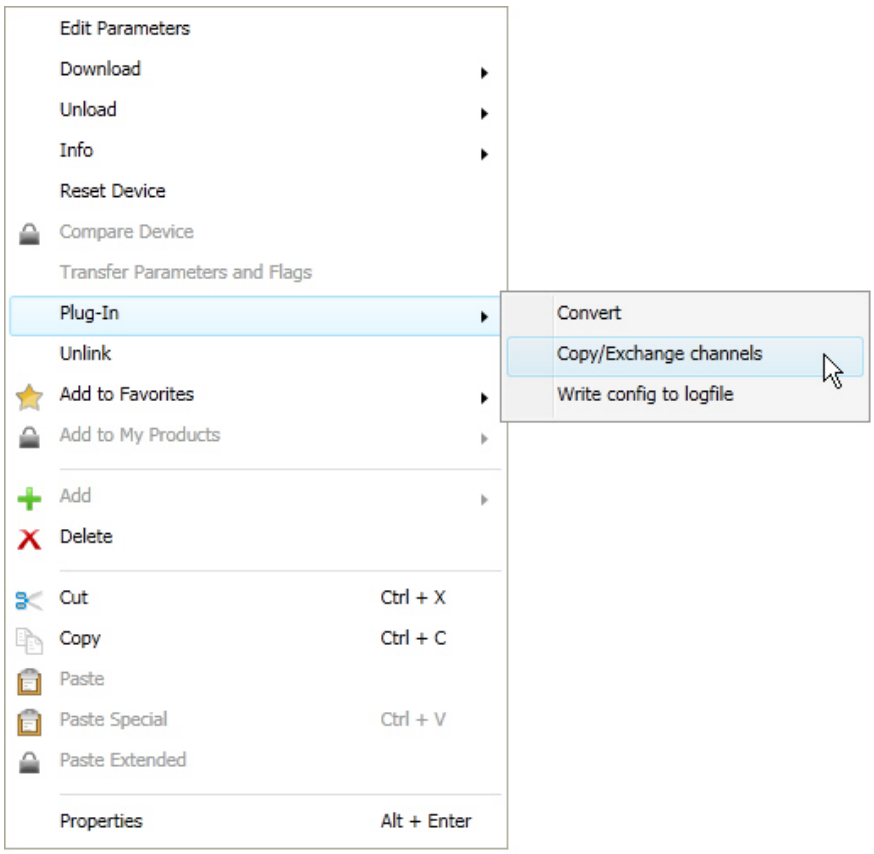
Note
When the term “channels” is used in the ETS, inputs and/or outputs are meant. In order to ensure that the ETS language generally applies for as many ABB i-bus® devices as possible, the term channels is used here.

The copy function for inputs/outputs is particularly useful with devices having the same parameter settings for several outputs, inputs or groups. For example, lighting in a room is 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.

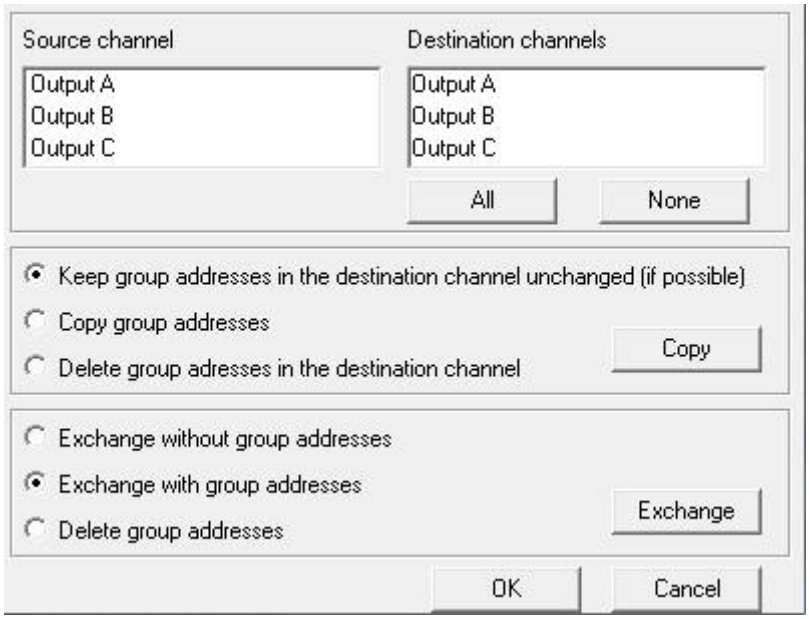
3.1.2.1 Procedure for copy and exchange

- Click with the right mouse button on the product, whose outputs you wish to copy or exchange, and select the context menu *Plug-in* > *Copy/exchange channels*.



Thereafter, undertake the required settings in the *Copy/exchange channels* dialog.

3.1.2.2 Copy/exchange channel dialog



Note
Channels can only be copied in pairs with the ES/S x.1.2.1 (e.g. A+B, C+D etc.).

At the top left, you will see the *Source channel* selection window for marking the source channel. Beside is located the selection window for the target channel or channels for marking the target channel or channels.

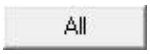
Source channel

With the selection of the source channel, you define which parameter settings should be copied or exchanged. Only one source channel can be selected at a time.

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 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. channels B and C.



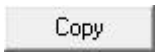
With this button, you select **all** available target channels, e.g. A…D.

Reset the selection of the target channel 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, 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
- Delete 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. The application program can be found in the ETS at *ABB/Heating, Cooling, Air Conditioning/Electronic Switch Actuator*.

The following chapter describes the parameters of the ES/S x.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.

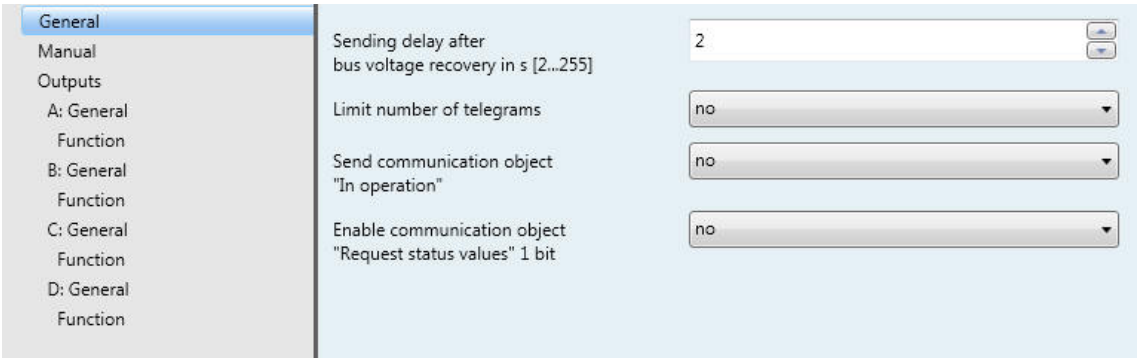
The default values of the parameters are underlined, e.g.:

Options: yes
no

Note
Should the device have several channels with identical parameters and functions, they will only be explained on the basis of one channel.

3.2.1 Parameter window *General*

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



Sending delay after
bus voltage recovery in s [2...255]

Options: 2…255

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

After the sending and switching delay time, telegrams are sent and 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 sending and switching delay has been completed.

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

How does the device behave with bus voltage recovery?

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

Limit number of telegrams

Options: no
yes

This parameter limits the generated KNX load. This limit relates to all telegrams sent by the device.

- *yes:* The following parameters appear:

  Max. number of sent telegrams [1...255]

  Options: 1…20…255

  in period

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

  This parameter defines the number of telegrams sent by the device within a period. The telegrams are sent as quickly as possible at the start of a period.

  Note

  The device counts the number of telegrams sent within a parameterized period. As soon as the maximum number of sent telegrams is reached, no further telegrams are sent on the KNX until the end of the period. A new period commences at the end of the previous period. The telegram counter is reset to zero, and sending of telegrams is allowed again. The current communication object value is always sent at the time of transmission.

  The first period (break time) is not predefined exactly. The period can be between zero seconds and the parameterized time. The subsequent sending times correspond with the parameterized time.

  Example:

  Maximum number of sent telegrams = 5, in period = 5 s. 20 telegrams are ready to be sent. The device immediately sends 5 telegrams. The next 5 telegrams are sent after maximum 5 seconds. From this point, a further 5 telegrams are sent on the KNX every 5 seconds.

Send communication object "In operation"

Options: no
send value 0 cyclically
send value 1 cyclically

The communication object In operation, page 76, indicates the presence 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.

- *no:* The communication object *In operation* is not enabled.
- *send value 0/1 cyclically:* The communication object *In operation* (No. 0) is sent cyclically on the KNX. The following parameter appears:

  Sending cycle time in s [1...65,535]

  Options: 1…60…65,535

  Here the time interval, at which the communication object *In operation* (No. 0) cyclically sends a telegram, is set.

Note
After bus voltage recovery, the communication object sends its value after the set sending and switching delay time.

Enable communication object "Request status values" 1 bit

Options: no
yes

Via this communication object, all status messages can be requested, provided that they have been parameterized with the option *after a change or request*.

- yes: A 1 bit communication object *Request status values* is enabled. The following parameter appears:

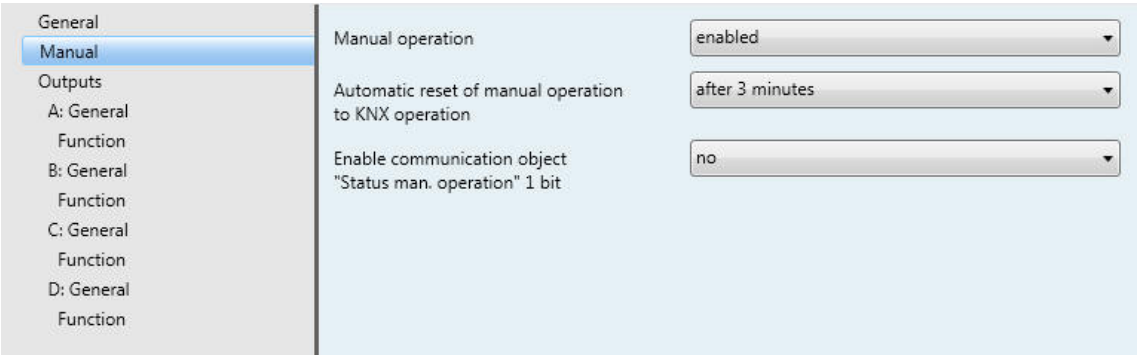
  Request with object value

  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 this parameter window, all the settings for manual operation can be made.



Manual operation

Options: enabled
Block via communication object
disabled

This parameter defines if the switch over between the operating states *Manual operation* and *KNX operation* is generally enabled/blocked via button on the ES/S or enabled/blocked via a communication object.

- *Enabled:* The operating states *Manual operation* and *KNX operation* can be toggled via button .
- *Block via communication object:* The communication object *Block manual operation* – (No. 2) appears.

  Telegram value 0 = enable button
  1 = block button

- *blocked:* Manual operation is generally disabled.

The following parameter appears with selection *Block via communication object*:

Object value "Block manual operation" after download

Options: unchanged
0
1

This parameter defines the value of the communication object *Block manual operation* after a download.

- *unchanged:* The communication object *Block manual operation* has the same value as before the download.
- *0:* Manual operation is enabled. The communication object *Block manual operation* has the value 0.
- *1:* Manual operation is disabled. The communication object *Block manual operation* has the value 1.

Note
At bus voltage recovery, the communication object *Block manual operation* has the same value as before bus voltage failure. With an ETS reset, the value of the communication object *Block manual operation* is set to 0.

Automatic reset of manual operation to KNX operation

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

This parameter determines how long, after pressing button , the device will remain in *Manual operation*.

- *no:* The device remains in *Manual operation* until the button is actuated again.
- *after 1/3/10/30 minute(s):* The device remains in *Manual operation* after the last button push, until either button is actuated again or the programmed time has timed out.

Enable communication object "Status man. operation" 1 bit

Options: no
yes

- *yes:* The 1 bit communication object *Status manual operation* (No. 3) is enabled. The following parameter appears:

  Send object value

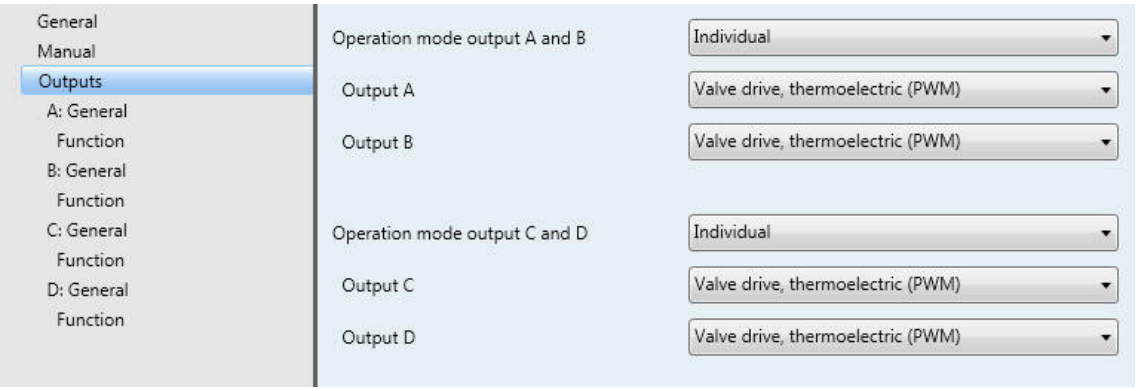
  Options: no, update only
  after a change
  on request
  after a change or on request

  - *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.

For further information see: Manual operation, page 12

3.2.3 Parameter window *Outputs*

The operation modes of the outputs are parameterized in this parameter window.



Note
The outputs of the ES/S can be used individually or in pairs as motor-driven valve drives (3-point). The functions and setting options are the same for all outputs or output pairs. The following explanations are made for output X for individual parameterization and output X + Y for parameterization in pairs.

Operation mode output X and Y

Options: individual
Valve drive, motor-driven (3-point)

This parameter determines whether the operation modes of outputs X/Y can be parameterized individually or whether the outputs are to be operated in operation mode *Valve drive, motor-driven (3-point)*. The outputs are linked to one another in pairs in this operation mode. Outputs X/Y control the contacts OPEN/CLOSE of the valve drive for opening/closing the valve.

- *individual:* With this setting, the operation modes of outputs X and Y are set individually from one another. The parameter *Output X/Y* appears:

  Output X
  Output Y

  Options: none
  Valve drive, thermoelectric (PWM)
  Switch actuator

  This parameter defines the individual operation mode of the output.

  - *none:* No operation mode selected.
  - *Valve drive, thermoelectric (PWM):* The parameter (window) and communication objects for the operation mode *Valve drive, thermoelectric (PWM)* are enabled.
  - *Switch actuator:* The parameter (window) and communication objects for the operation mode *Switch actuator* are enabled.

- *Valve drive, motor-driven (3-point):* The parameter (window) and communication objects for the operation mode *Valve drive, motor-driven (3-point)* are enabled.

  Output A

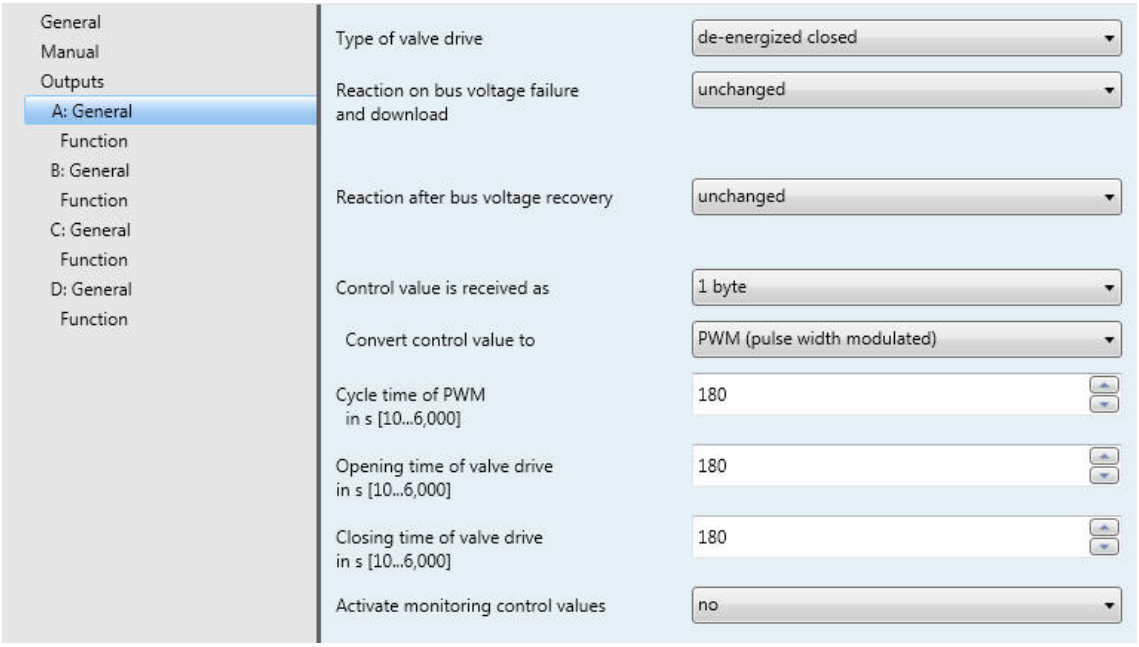
  Open

  Output B

  Close

3.2.4 Parameter window *X: General* operation mode: *Valve drive, thermoelectric (PWM)*

In this parameter window, the general settings for operation mode *Valve drive, thermoelectric (PWM)* are made. This operation mode is used for the control of thermoelectric valve drives, e.g. TSA/K (24 V or 230 V). The following parameters described appear if in parameter window *Outputs* the operation mode *Valve drive, thermoelectric (PWM)* has been selected for an output.



Type of valve drive

Options: de-energised closed
de-energised opened

This parameter defines the additional functions of the thermoelectric valve drive output.

Note
De-energised closed valve drives (N.C.) If no current flows in the valve drive, the valve is closed. If current flows in the valve drive, the valve opens. **De-energised opened valve drives (N.O.)** If no current flows in the valve drive, the valve opens. If current flows in the valve drive, the valve then closes.

Reaction on bus voltage failure

Options: unchanged
select

This parameter determines the response of the output with a bus voltage failure.

- *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:* The following parameter appears:

  Control value in % [0...100]

  Options: 0…30…100

  This parameter determines the response of the output with a bus voltage failure as a percentage.

  If the control value is received via a 1 bit value, a value must be entered in parameter *Cycle time of PWM*, page 35. This value is used as the basis for calculation of the output control at bus voltage failure in %.

  Note

  Control value in %

  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, …).

  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.

  Example parameter settings:

Control value in % [0...100]	70 %
Cycle time of PWM in s [10...6,000]:	60 s

  With these settings, the output switches ON for 42 s and OFF for 18 s (60 s x 0.7 = 42 s).

  Quick heat up/cool down

  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

This parameter determines the response of the output at bus voltage recovery.

- *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:* The following parameter appears:

  Control value in % [0...100]

  Options: 0…30…100

  This parameter determines the response of the output after bus voltage failure as a percentage.

  If the control value is received via a 1 bit value, a value must be entered in parameter *Cycle time of PWM*, page 35. 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 byte
1 bit

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* (1 bit/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 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. 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. The control value 50 % results in a switch on duration of 7.5 minutes. Using pulse width modulation, a relatively exact control of the temperature is achieved without high levels of overshoot. In this way, simple, attractively-priced thermoelectric control valves can be used.

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

Note
1 byte control 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 (pulse width modulated)
OPEN/CLOSE 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 (pulse width modulated):* With this option, the continuous control value is converted to a PWM signal. The parameter for entering the PWM-cycle time is displayed.
- *OPEN/CLOSE signal:* With this option, the continuous control value is converted to an OPEN or CLOSE signal from a defined parameterized value. The following parameters appear.

  OPEN at control value greater or equal in % [1...100]

  Options: 1…255

  The output opens continuously if the value parameterized 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 closes.

Cycle time of PWM in s [10…6,000]

Options: 10…180…10,000

This parameter defines 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) and
- Characteristic curve correction.

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

Options: 10…<u>180</u>…6,000

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

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

Options: 10…<u>180</u>…6,000

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

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® KNX valve drives of types TSA/K 230.1 and TSA/K 24.1 have closing and opening times of about three minutes. 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 when de-energized. 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 unlocked after operating voltage has been applied (for longer than 6 minutes). The valve drive is ready to function.

Activate monitoring control values

Options: <u>no</u>
yes

This parameter is activated for monitoring cyclic sending of the control value, e.g. of the thermostat. The reaction to the absence of a control value is defined in monitoring of the control value. This ensures emergency operation.

- *yes:* The communication object *Fault control value* is enabled. The following parameters appear:

**Control period
in s [30...65,535]**

Options: 30…120…65,535

This parameter sets the time used to monitor the telegrams on the input control values: Communication objects *Control value, switch 1 bit* or *Control value, cont. (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 "Control value fault" 1 bit)**

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

Options: unchanged
select

This parameter defines the control value with a control fault.

- *unchanged:* The last control value received remains set.
- *select:* The following parameter appears:

  Control value in % [0...100]

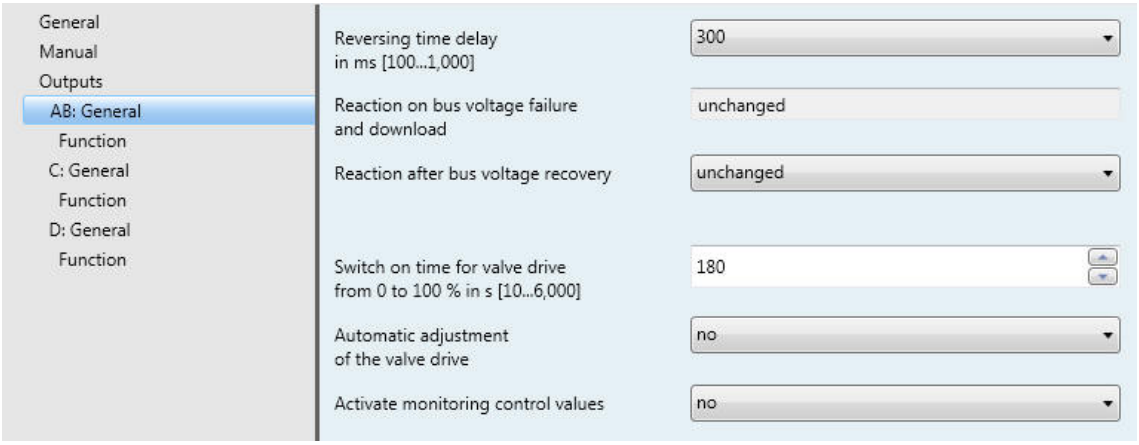
  Options: 0…30…100

  This parameter determines the control value in percent used to control the output in the event of a control fault.

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

3.2.5 Parameter window *XY: General* General operation mode: Valve drive, motor-driven (3-point)

In this parameter window, the general settings for operation mode *Valve drive, motor-driven (3-point)* are made. This operation mode is used for control of motor-driven valve actuators. The following parameters described appear if in parameter window *Outputs* the operation mode *Valve drive, motor-driven (3-point)* has been selected.



Reversing time delay in s [100...1,000]

Options: 100, 300, 500, 700, 1,000

This parameter defines the reversing delay time of the valve drive.

Note
The technical data of the valve drive must be observed!

Reaction on bus voltage failure

Unchanged

The valve remains unchanged in its position with a bus voltage failure.

Reaction after bus voltage recovery

Options: unchanged
select

This parameter determines the response of the output at bus voltage recovery. After bus voltage recovers, a reference adjustment of the valve drive is carried out. Thereafter, current control value is controlled.

- *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.
- *select:* The following parameter appears:

  Control value in % [0...100]

  Options: 0…100

  This parameter determines the response of the output after bus voltage failure as a percentage.

Switch on time for valve drive from 0 to 100 % in s [10...6,000]

Options: 10…180…6,000

This parameter sets the time that the output requires to move the valve drive or the valve from 0 % (closed) to position 100 % (fully opened).

The time required should be taken from the technical data of the valve.

Automatic adjustment of the valve drive

Options: no
yes

If the control value 0 % is only rarely achieved in ongoing operation, this can lead to inaccuracies in positioning control. This parameter activates automatic adjustment to move the valve drive in a defined manner to the 0 % position. This serves as the basis for position adjustment.

- *yes:* The following parameter appears:

Number of valve controls up to adjustment [1...65,535]

Options: 30…<u>500</u>…65,535

This parameter determines the number of valve controls that are to be triggered after automatic adjustment.

Note

Automatic adjustment

The adjustment counter is incremented by 1 at the end of a drive adjustment.

If the parameterized number of valve controls is exceeded, the reference adjustment is started. The closed position (independent of the characteristic curve) is then exceeded by 5 % of the parameterized switch on time for the control valve (min 1 s, max 60 s.). This function cannot be interrupted! Thereafter, the currently calculated valve position is approached, and the adjustment counter is set to zero.

The following events trigger a reference adjustment.

- Bus voltage recovery
- ETS reset
- Download
- Reset of a remedied fault (via button or via communication object *Reset fault*)
- Long button operation (>2s) on one of the buttons of the output pair

Reaction on control value 0 %

With every control with a control value of 0 %, the valve drive (independent of the characteristic curve) is fully closed.

The closed position (independent of the characteristic curve) is then exceeded by 5 % of the parameterized switch on time for the control valve, but not for longer than 1 minute.

Activate monitoring control values

Options: <u>no</u>
yes

This parameter is activated for monitoring cyclic sending of the control value, e.g. of the thermostat. The reaction to the absence of a control value is defined in monitoring of the control value. This ensures emergency operation.

- *yes:* The communication object *Fault control value*, page 78, is enabled. The following parameters appear:

**Control period
in s [30...65,535]**

Options: 30…120…65,535

This parameter sets the time used to monitor the telegrams on the input control values: Communication objects *Control value, switch 1 bit* or *Control value, cont. (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 "Control value fault" 1 bit)**

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

Options: unchanged
select

This parameter defines the control value with a control fault.

- *unchanged:* The last control value received remains set.
- *select:* The following parameter appears:

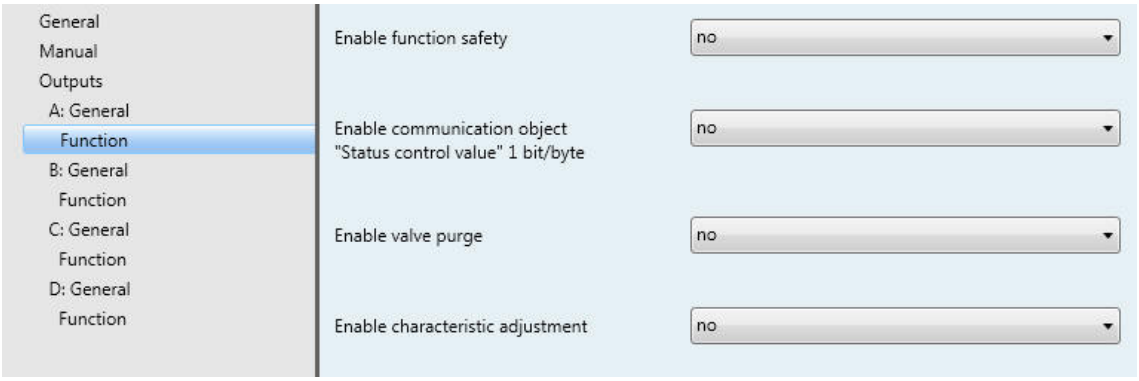
  Control value in % [0...100]

  Options: 0…30…100

  This parameter determines the control value in percent used to control the output in the event of a control fault.

3.2.5.1 Parameter window *Function*

In this parameter window, various functions for each output can be activated. The functions are identical for the operation modes *Valve drive, thermoelectric (PWM)* and *Valve drive, motor-driven (3-point)*.



Enable function safety

Options: no
yes

- *yes:* The Parameter window Safety, page 46, is enabled.

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

Options: no
yes

This parameter is enabled by the communication object *Status control value*. The control status of the output is sent via this communication object.

- *yes:* The communication object Status control value, page 77, is enabled. The following parameters appear:

  Send object value

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

Data type

Options: 1 bit
1 byte

This parameter defines the data type of the communication object *Status control value*.

- 1 bit: The following parameter appears:

  Object value with control > 0

  Options: 1
  0

  If the object value at control is greater than 0, a telegram is sent using the value defined here.

- *1 byte:* The status of the control is sent via a 1 byte telegram.

Enable valve purge

Options: no
yes

- *yes:* The 1 bit communication object *Trigger valve purge*, page 78, is enabled.

Note
If purging is interrupted by a higher priority, e.g. forced operation, the higher priority action is carried out. 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. The control for valve purging is always the control value 100 %. A correspondingly matched correction curve is taken into consideration.

With option *yes*, the following parameters appear:

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 79, is enabled.

Send object value

Options: no, update only
<u>after a change</u>
on request
after a change or on 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

This parameter defines the time duration for the valve purge. In this time, the valve is fully opened. When the time has elapsed, the state before the purge is re-established.

Note
The opening time of the valve drive must be considered when entering the purge time.

Automatic valve purge

Options: <u>no</u>
yes

- *yes:* The following parameters appear:

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 with 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 automatic purging cycle will be restarted if *Purge cycle in weeks [1…12]* is changed after the download.

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

Options: 1…99

Hereby, the purge cycle is reset to the set control value if it is exceeded.

Note
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 period of valve purging is included here. The entry of the opening time for the valve drive must be considered when entering the period for valve purge. The purging cycle with an active automatic valve purge is reset and restarted if: • A manual valve purge is triggered via the communication object *Trigger valve purge*. • The value set in the parameter *Reset purge cycle* from… is exceeded. The purging cycle is only restarted as soon as the parameterized value is reached or exceeded.

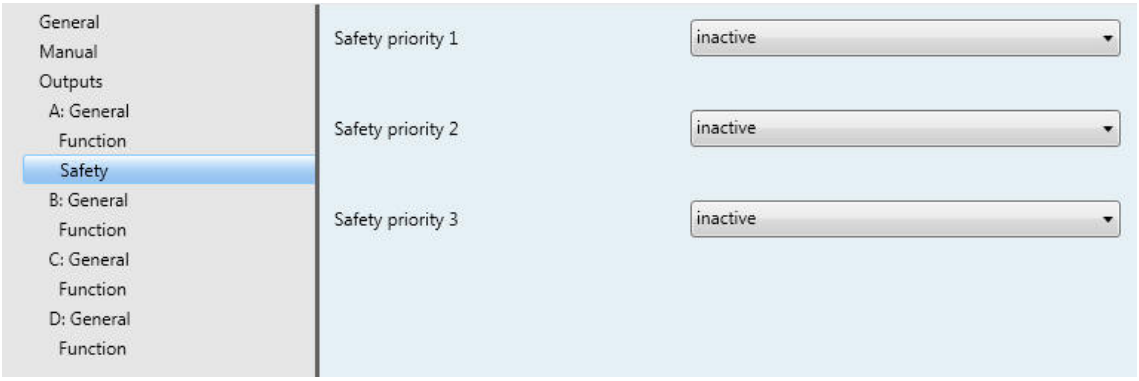
Enable characteristic adjustment

Options: no
yes

- *yes:* The Parameter window Characteristic curve, page 48, is enabled.

3.2.5.1.1 Parameter window *Safety*

The function *Safety* is identical for operation modes *Valve drive, thermoelectric (PWM)* and *Valve drive, motor-driven (3-point).* The parameter window is enabled if in Parameter window Function, page 42, the parameter *Enable function safety* is selected with option *yes*.



Safety priority 1

Safety priority 2

Safety priority 3

Options: inactive
Forced operation
Block

For each of the three priority stages (1 = highest; 3 = lowest priority), the output can be forcibly operated or blocked with activated function *Safety*.

- *Forced operation:* The communication object Priority x, Forced operation, page 83, is enabled. Using forced operation, the operation of the output is blocked and the output assumes a defined state. An operation is not possible until after forced operation is rescinded. The following parameters appear.
- *Block:* The communication object Priority x, Block, page 83, is enabled. During blocking, the output remains in its present state and is blocked. A higher priority interrupts the block. When the higher priority is rescinded, the value of the higher priority is retained on the output. Eine Bedienung ist bis nach Rücknahme der Sperre nicht möglich. The following parameters appear:

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

Options: 0…50…1000

With active forced operation, the output is controlled with the control value defined here, and the operation is blocked.

Note
This parameter is only enabled with forced operation. All the following parameters are enabled and identical for the function *Forced operation* as well as *Block*.

Trigger with object value

Options: 1
0

- *1/0:* Forced operation or blocking is triggered when a telegram with the value set here is received.

**Control period in seconds
[1...65,535, 0 = inactive]**

Options: 0…65,535

This parameter defines the cyclic monitoring time of the function *Safety*. Here the receipt of a telegram from a device that sends cyclically is monitored. If a telegram is not received within the parameterized time, the output − depending on the function *Safety* set beforehand – is forcibly operated or blocked. If the communication object *Priority x, Forced operation* or *Priority x, Block* receives a telegram that does not correspond with the value set under *Trigger with object value*, the control period is reset and restarted.

- *0:* Cyclical monitoring is deactivated.

Note
The monitoring time should be at least twice as large as the cyclic transmission time of the sensor. Ensuring that if a signal is absent, e.g. due to a high bus load, the function *Safety* (Alarm) is not immediately triggered.

**Object value "Priority x, Forced operation"
after download**

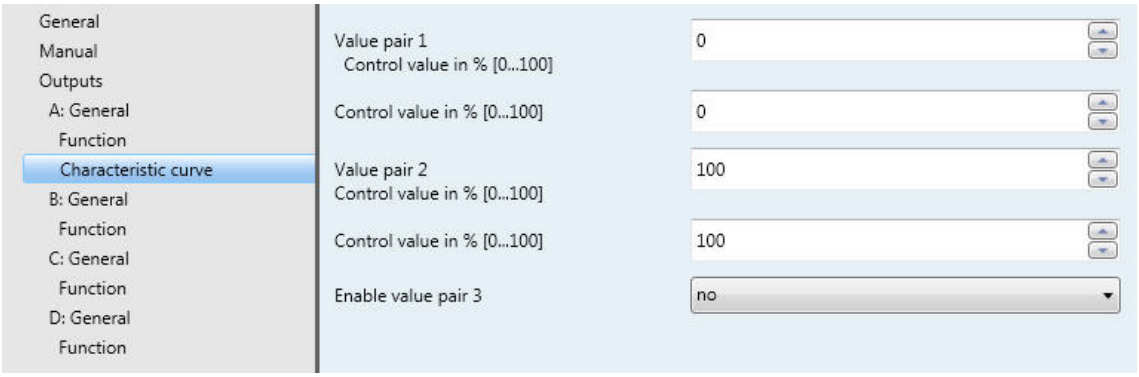
**Object value "Priority x, Block"
after download**

Options: unchanged
0
1

- *unchanged:* After a download, the communication object has the same value as before a download.
- *1/0:* After a download, the parameterized function (*Forced operation* or *Block*) is activated (value = 1) or deactivated (value = 0).

3.2.5.1.2 Parameter window *Characteristic curve*

The characteristic curve is identical for the operation modes *Valve drive, thermoelectric (PWM)* and *Valve drive, motor-driven (3-point)*. The parameter window is enabled if in Parameter window Function, page 42, the parameter *Enable characteristic adjustment* is 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 curve correction should only be undertaken in exceptional circumstances and requires extensive knowledge in the areas of heating, air-conditioning and ventilation.

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 has been entered for the control value 0 %, the valve position of the first value pair applies for all control from 0 to the first value pair.
- If no value pair has been entered for the control value 100 %, the control values from the last value pair up to 100 % applies for the last value pair.
- The parameter Cycle time of PWM, page 35, serves as the basis for calculation of controlling the output for characteristic curve correction, even if the characteristic curve is processed via a 1 bit value. This parameter is only available in operation mode *Valve drive, thermoelectric (PWM)*.

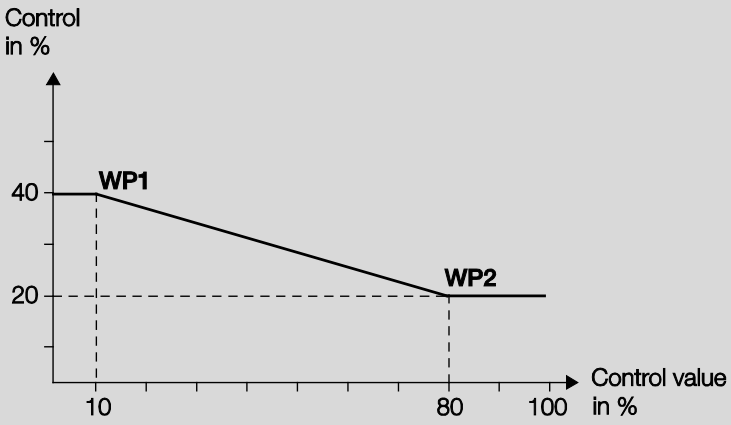
Note
Value pairs with the same control value can cause a non-defined characteristic curve. This fact must be considered during parameterization.

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 3 is enabled:

  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

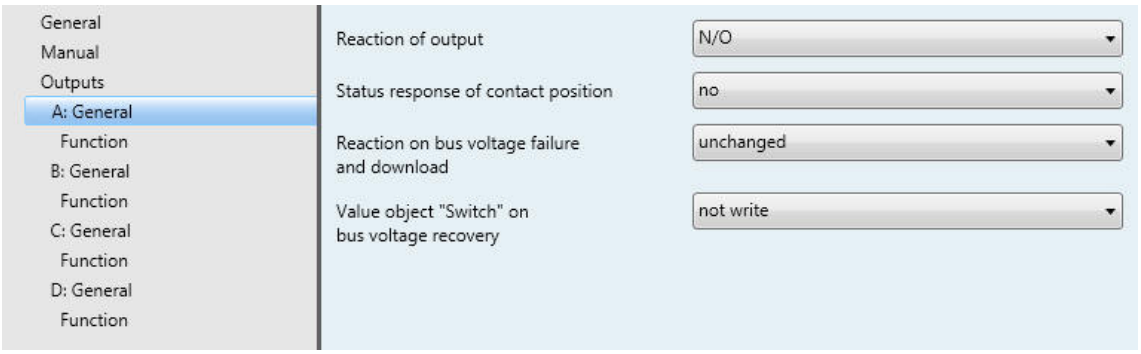
  - *yes:* Value pair 4 appears:

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

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

3.2.6 Parameter window *X: General,* operation mode *Switch actuator*

The operation mode *Switch actuator* serves normal switching purposes, e.g. lighting. The output is controlled via functions *Logic*, *Time* and *Safety*. The input signal for the function is received via communication object *Switch*. The ES/S executes the function independently and controls the output accordingly. The comprehensive range of additional functions available are described in this chapter.



Reaction of output

Options: N/C
<u>N/O</u>

This parameter determines whether the output operates as an *N/C (normall closed)* or *N/O (normally opened)* contact.

- *N/O:* An ON telegram (1) closes the contact, and an OFF telegram (0) opens the contact.
- *N/C:* An ON telegram (1) opens the contact, and an OFF telegram (0) closes the contact.

Status response of contact position

Options: <u>no</u>
yes, via object "Status Switch"

- *yes, via object "Status Switch":* The communication object *Status switch* to feedback the switch state is enabled. The following parameter appears:

  Send object value

  Options: no, update only
  <u>after a change</u>
  on request
  after a change or on 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.

Inverted

Options: no: 0 = open, 1 = closed
yes: 0 = closed, 1 = open

- *no: 0 = open, 1 = closed:* The value 1 is written with ON and the value 0 is written with OFF in the communication object *Status switch.*
- *yes: 0 = closed, 1 = open:* The value 0 is written with ON and the value 1 is written with OFF in the communication object *Status switch*.

Reaction on bus voltage failure

Options: contact open
contact closed
contact unchanged

This parameter determines the response of the output with a bus voltage failure.

- *Contact open:* The output is OFF.
- *Contact closed:* The output is ON.
- *Contact unchanged:* The output retains the last state before bus voltage failure.

Value object "Switch" on bus voltage recovery

Options: not write
write with 0
write with 1

This parameter determines the response of the communication object *Switch* after a bus voltage recovery. As standard the communication object *Switch* receives the value 0.

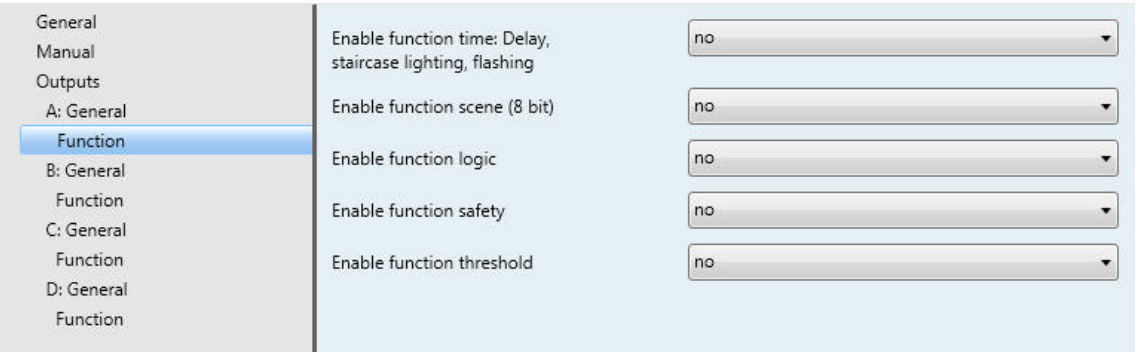
- *not write:* After bus voltage recovery, the value 0 is retained in the communication object *Switch*. The switch state is not re-determined

Note
Before the very first download (device fresh from the factory), the value before bus voltage failure is not defined. For this reason, the communication object *Switch* is written with 0 and the contact is opened.

- *write with 0:* The communication object *Switch* is written with a 0 at bus voltage recovery. The contact position is redefined and set in dependence on the set device parameterization.
- *write with 1:* The communication object *Switch* is written with a 1 at bus voltage recovery. The contact position is redefined and set in dependence on the set device parameterization.

3.2.6.1 Parameter window *Function*

The response of the output is determined in this parameter window. Various functions can be enabled that in turn enable further parameter windows for setting of the functions.



Enable function time: Delay, staircase lighting, flashing

Options: no
yes

- *no:* The parameter window *Time* is not enabled for the output.
- *yes:* The parameter window *Time* as well as the communication object *Disable function time* is enabled. Using this communication object, the function *Time* can be enabled (telegram with value 0) or disabled (telegram with value 1) via the bus. As long as the function *Time* is disabled, the output can only be switched on and off without delay via the communication object *Switch*. The following parameter appears.

  "Disable function time" after download

  Options: unchanged
  1 = disable function time
  0 = enable function time

  - *unchanged:* After a download, the communication object has the same value as before a download.
  - *1 = disable function time:* The function *Time* is disabled by a telegram with the value 1.
  - *0 = disable function time:* The function *Time* is disabled by a telegram with the value 0.

Enable function scene (8 bit)

Enable function logic

Enable function safety

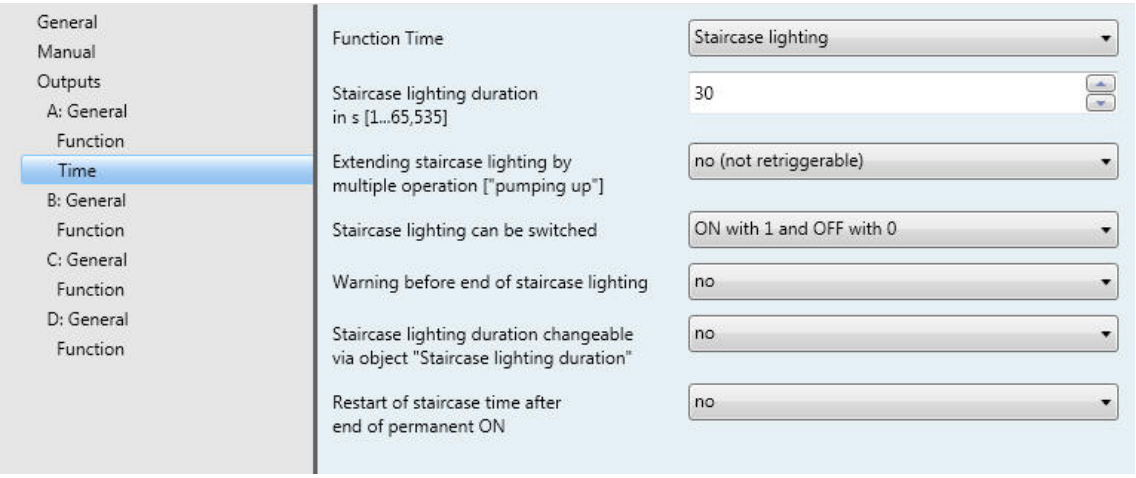
Enable function threshold

Options: no
yes

- *no:* The parameter window for the selected function is not enabled.
- *yes:* The parameter window, and if appropriate, the communication objects of the selected function are enabled.

3.2.6.1.1 Parameter window *Time*

In this parameter window, all settings for the function *Time* are undertaken: *Switching ON and OFF delay, Staircase lighting* and *Flashing*. The parameter window is enabled if in Parameter window Function, page 53, the parameter *Enable function time* is selected with the optiopn *yes*.



Function Time

Options: Staircase lighting
Delay for Switching ON and OFF
Flashing

This parameter defines the type of function *Time* for each output.

- *Staircase lighting:* The value, with which the staircase lighting is switched on and off, can be parameterized. The staircase lighting time is started when the function is activated. It is switched off immediately, after the staircase lighting time has been completed.

Note
With communication object *Disable function time*, the function *Time* can be disabled.

- *Delay for switching ON and OFF:* The output can be switched on or off with a delay via this function.
- *Flashing:* The output starts to flash, as soon as the parameterized value is received in the communication object *Switch*. The flashing period can be adjusted via the parameterized time duration for ON or OFF. The output is switched on at the start of the flashing period. When a new value is received on the communication object *Switch*, the flashing period will recommence. The state of the output after flashing can be programmed. The communication object *Status switch* indicates the current switch state during flashing.

The following parameter appears with the selection *Staircase lighting*:

Staircase lighting duration in s [1...65,535]

Options: 1…300…65,535

The staircase lighting time defines how long the contact is closed and how long the light remains on after an ON telegram. The input is made in seconds. The staircase lighting time may extend depending on the value set in the parameter *Warning before end of staircase lighting*.

Extending staircase lighting by multiple operation ("pumping up")

Options: no (not retriggerable)
yes (retriggerable)
up to max. 2 x staircase lighting time
up to max. 3 x staircase lighting time
up to max. 4 x staircase lighting time
up to max. 5 x staircase lighting time

If a further ON telegram is received during the staircase lighting time sequence, the remaining staircase lighting time can be extended by a further period. This is possible by repeated operation of the push button ("pumping up"), until the maximum programmed number of retriggering operations is reached. The maximum time can be set to 1, 2, 3, 4 or 5-fold time of the staircase lighting time.

The staircase lighting time is extended by "Pumping up" to the maximum time. If some of the time has already timed out, the staircase lighting time can again be extended to the maximum time by "pumping up". The parameterized maximum time may not however be exceeded.

- *no:* The receipt of a further ON telegram is ignored. The staircase lighting time continues without modification to completion.
- *yes (retriggerable):* The staircase lighting time is reset each time by a renewed ON telegram and starts to count again. This process can be repeated as often as desired using this selection.
- *up to max. 2/3/4/5 x staircase lighting time:* The staircase lighting time is extended by the 2/3/4/5-fold staircase lighting time with a renewed ON telegram.

Staircase lighting can be switched

Options: ON with 1 and OFF with 0
ON with 1 no action with 0
ON with 0 or 1, switch OFF not possible

This parameter defines the telegram value used for switching the staircase lighting on and off prematurely.

- *ON with 1 and OFF with 0: The function Staircase lighting is switched on when a telegram with the value 1 is received and switched off with the value 0.*
- *ON with 0 or 1, switch OFF not possible:* The function *Staircase lighting* is switched on independently of the value of the incoming telegram. Premature switch off is not possible.
- *ON with 1 no action with 0:* The function *Staircase lighting* starts with the receipt of a telegram with the value 1. There is no reaction if the value 0 is received.

Warning before end of staircase lighting

Options: no
<u>via object</u>
via quick switching OFF - ON
via object and switching OFF - ON

Before the staircase lighting time times out, the user can be informed of the imminent switch off of the lighting by a warning. If the warning time is not equal to 0, the staircase lighting time is extended by the warning time. The warning time is not modified by the “pumping up” action.

- *no:* A warning is not given. The staircase lighting switches off immediately after the staircase lighting time.

There are two types of warning:

1. The communication object *Staircase lighting warning* is set to the value 1 at the commencement of warning time and remains set until the warning time has elapsed. The communication object can be used, for example, to switch a warning light.
2. Switching the output (briefly OFF and ON again).

Both possibilities can be set together or separately from one another. The time duration between the OFF and ON process is about 1 second. If the warning time is not equal to 0, the staircase lighting time is extended by the warning time. If the staircase lighting is ended prematurely, e.g. by a switching telegram, no warning is given.

Warning time in sec. [0...65,535] add to duration of staircase lighting

Options: 0…<u>45</u>…65,535

This parameter is visible if a warning is parameterized before the staircase lighting time ends. The warning time must be entered in seconds. The staircase lighting time is extended by the warning time. The warning is triggered at the start of the warning time.

The warning time is not modified by “pumping up”.

Staircase lighting duration changeable via object "Staircase lighting duration"

Options: <u>no</u>
yes

- *no:* No modification of the staircase lighting time is possible via the bus.
- *yes:* A 2 byte *Staircase lighting duration* communication object is enabled. The staircase lighting time can be changed via the bus here. The value defines the staircase lighting time in seconds. The function *Staircase lightning*, which has already commenced, is completed. A change of the staircase lighting time is used the next time it is accessed. The following parameter appears:

Object value "Staircase lighting duration" after download

Options: unchanged
Parameterized staircase lighting time

This parameter is visible if the duration of staircase lighting should be changed via the communication object.

- *unchanged:* The set communication object value is retained after download.
- *Parameterized staircase lighting time:* After the download, the set time in parameter *Staircase lighting duration* is accepted as the communication object value.

How does the staircase lighting behave with bus voltage failure?

The behaviour at bus voltage failure is determined by the parameter *Reaction on bus voltage failure* in Parameter window X: General, operation mode Switch actuator, page 51.

How does the staircase light behave with bus voltage recovery?

The behaviour at bus voltage recovery is defined by two conditions.

1. By the communication object *Disable function time*: If the staircase lighting is blocked after bus voltage recovery, the staircase lighting can only be switched on or off via the communication object *Switch*.
2. Using the parameterization of the communication object *Switch*: Whether the staircase lighting is switched on or off with bus voltage recovery depends on the programming of the communication object *Switch*.

Restart of staircase time after end of permanent ON

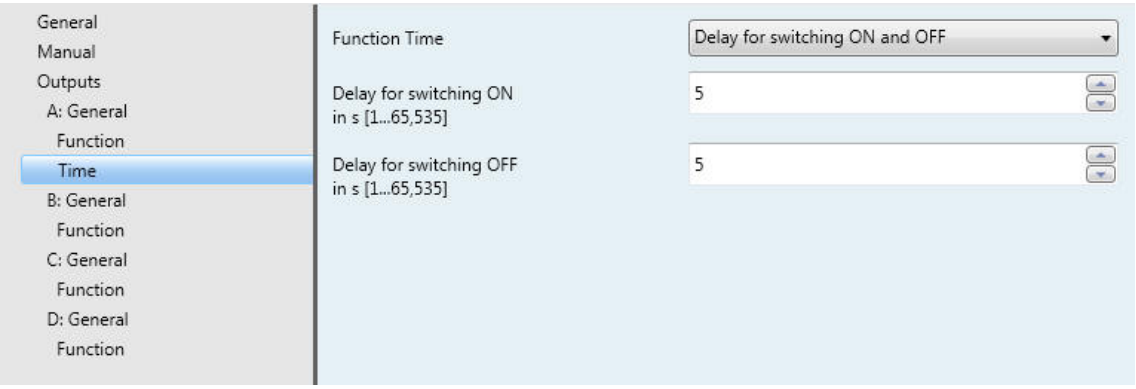
Options: no
yes

- *no:* The lighting switches off if *Permanent ON* is ended.
- *yes:* The lighting remains on and the staircase lighting time restarts.

The function of continuously ON is controlled via the communication object *Permanent ON*. If the communication object receives a telegram with the value 1, the output is switched ON regardless of the value of the communication object *Switch* and remains switched on, until the communication object *Permanent ON* has the value 0.

Note
Permanent ON only switches ON and “masks” the other functions. This means that the other functions, e.g. Staircase lighting time or “Pumping up”, continue to run in the background but do not initiate a reaction. After the end of permanent ON, the switching state, which would result without the permanent ON function, becomes active.

The following parameters appear with *Delay for switching ON and OFF*:



The output can be switched on or off with a delay via this function. Explanations for the on and off delay can be found in chapter Delay for Switching ON and OFF, page 90. You will also find a timing diagram as well as explanations on the effect of various ON and OFF telegrams in combination with the switching ON and OFF delay.

Delay for switching ON
in s [1…65,535]

Options: 1…5…65,535

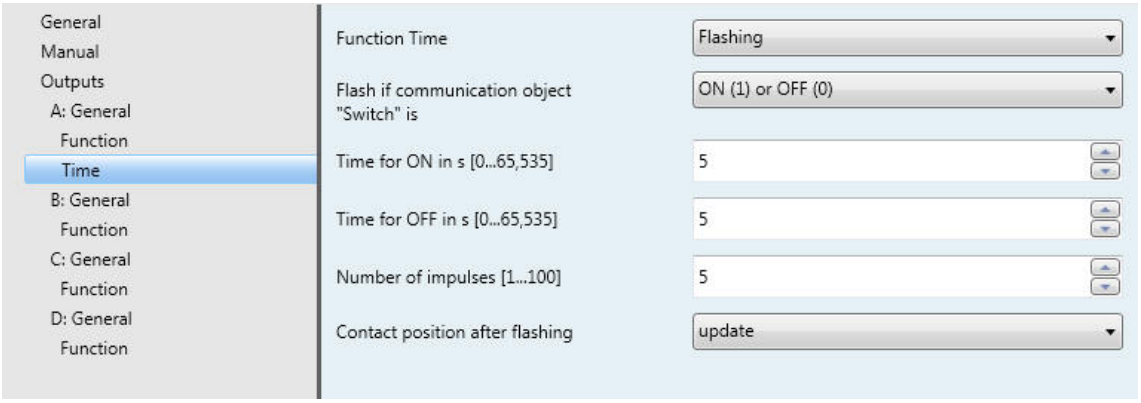
Here you set the time by which an ON telegram is delayed after switch on.

Delay for switching OFF
in s [1…65,535]

Options: 1…5…65,535

Here you set the time by which switch OFF is delayed after a switch OFF telegram.

The following parameter appears with the selection *Flashing*:



The output starts to flash as soon as the parameterized value is received in the communication object *Switch*. The flashing period can be adjusted via the parameterized time duration for ON or OFF. The output is switched on at the start of the flashing period. The state of the output after flashing can be programmed. The communication object *Status switch* indicates the current switch state during flashing.

Note
With a telegram to the communication object *Disable function time*, the function *Flashing* can be disabled. The parameterization for this purpose is implemented in Parameter window Function, page 53, with the parameter *"Disable function time"* after download.

Flashing if communication object "Switch" is

Options: ON (1)
OFF (0)
ON (1) or OFF (0)

Here you set the value of the communication object *Switch* at which the output flashes. Flashing is not retriggerable.

- *ON (1):* Flashing starts when a telegram with the value 1 is received on the communication object *Switch*. A telegram with the value 0 ends flashing.
- *OFF (0):* Flashing starts when a telegram with the value 0 is received on the communication object *Switch*. A telegram with the value 1 ends flashing.
- *ON (1) or OFF (0):* A telegram with the value 1 or 0 triggers flashing. Suspension of flashing is not possible in this case.

Time for ON in s [0…65,535]

Options: 0….5…65,535

This time for ON defines how long the output is switched ON during a flashing period. The smallest value is 1 second.

Time for OFF in s [0…65,535]

Options: 0….5…65,535

This time for OFF defines how long the output is switched ON during a flashing period. The smallest value is 1 second.

Number of impulses [1…100]

Options: 1…5…100

This parameter defines the maximum number of pulses.

Contact position after flashing

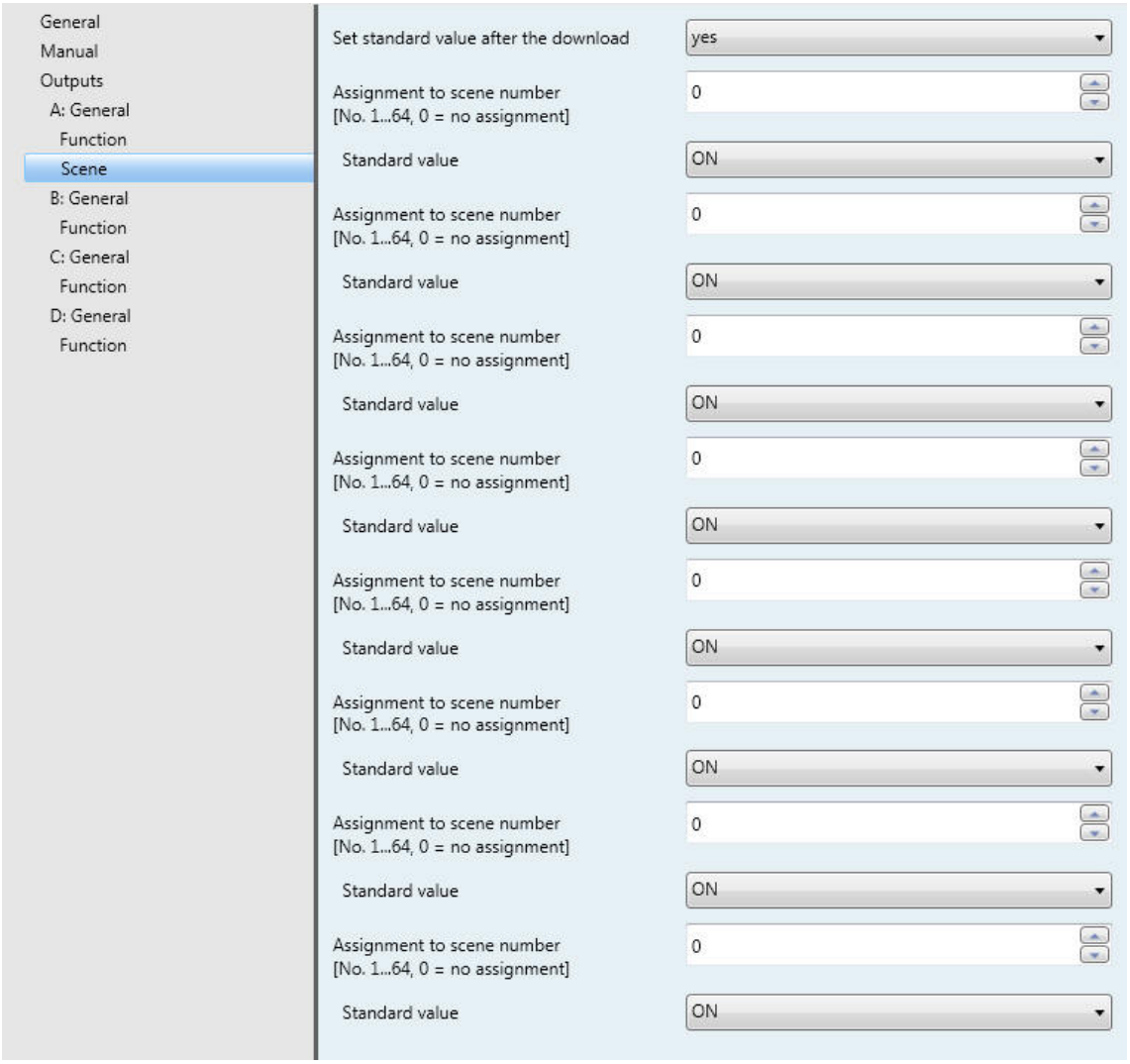
Options: ON
OFF
update

This parameter defines the state that the parameter should assume after flashing.

- *ON:* The output is switched on after flashing.
- *OFF:* The output is switched off after flashing.
- *update:* The output assumes the switching state which it had before flashing was activated.

3.2.6.1.2 Parameter window *Scene*

In this parameter window, all settings for *Scenes 1…8* are made. The parameter window is enabled if in Parameter window Function, page 53, the parameter *Enable function scene (8 bit)* is selected with the option *yes*



Set standard value after the download

Options: no
yes

With this parameter it is possible to not overwrite the scene values set via the bus during a download and to protect them.

- *no:* The standard values are not set after a download.
- *yes:* The standard values are set after a download.

Assignment to scene number
[No. 1…64, 0 = no assignment]

Options: 0…64

Using the function *Scene*, up to 64 scenes are managed using just a single group address. With this group address, all slaves integrated into a scene are linked via a 1 byte communication object. The following information is contained in a telegram:

- Number of the scene (1…64) as well as
- Telegram: Call scene or store scene.

The output can be integrated in up to 8 scenes. So for example, the scene can be switched on in the morning and switched off in the evening, or the output can be integrated into light scenes.

Standard value

Options: ON
OFF

By storing a scene, the user has the opportunity to change the programmed value stored in the ETS. After a bus voltage failure, the value saved via the KNX is retained.

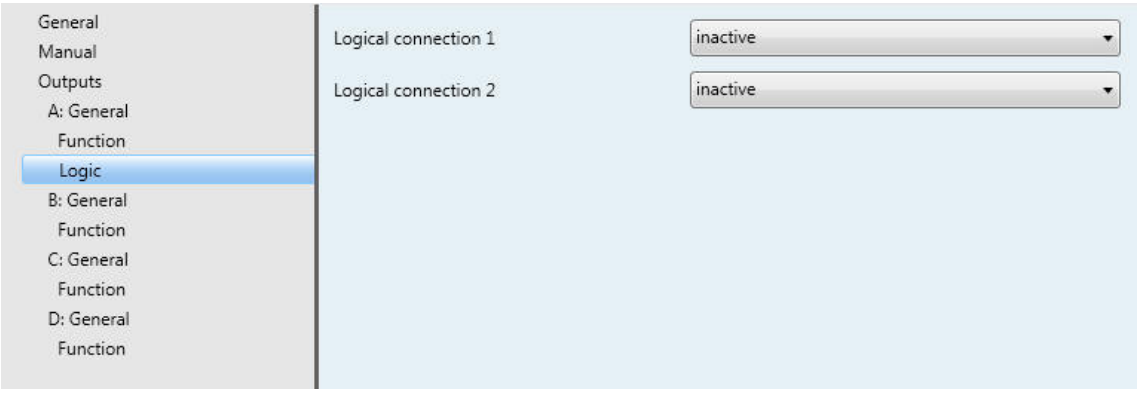
- *ON:* The output is switched on with a scene recall.
- *OFF:* The output is switched off with a scene recall.

Note
When a scene is recalled: • the function *Time* is restarted and • the *logical connections* are re-evaluated.

For further information see: Communication objects operation mode Switch actuator, page 80, and Code table Scene (8 bit), DPT 18.001, page 103

3.2.6.1.3 Parameter window *Logic*

In this parameter window, all settings for the function *Enable function Logic* are undertaken. The parameter window is enabled if in Parameter window Function, page 53, the parameter *Enable function logic* has been selected with option *yes*.



The function *Enable function logic* provides up to two logic objects for each output, which can be logically linked with the communication object *Switch*.

The logic is always re-calculated when a communication object value is received. Hereby, the communication object *Logical connection 1* is first of all evaluated with the communication object *Switch.* The result is then logically linked with the communication object *Logical connection 2*.

For further information see: Function Logic, page 92.

Logical connection 1

Options: inactive
active

With these parameters, the communication object *Logical connection 1* is enabled.

- *active:* The following parameters appear:

  Function of object "Logical connection 1"

  Options: AND
  OR
  XOR
  GATE

  The logical function of the communication object *Logical connection 1* is determined with the switch telegram. All three standard operations (AND, OR, XOR) are possible. Furthermore, the GATE operation can be used to inhibit switch commands.

  A further parameter appears if GATE is selected with the parameter *Function of object "Logical connection 1":*

Gate disabled, if object value "Logical connection 1" is

Options: 1
0

This parameter defines the value at which communication object *Logical connection 1* disables the GATE.

Disabling of the gate means that the telegrams received on the communication object *Switch* are ignored. As long as the GATE is activated, the value that was sent last to the input of the GATE remains on the output. After a gate is blocked, the value that was on the output before the block remains on the output of the gate.

After the gate is enabled, this value will be retained until a new value is received.

Result is inverted

Options: no
yes

- *no:* There is no inversion.
- *yes:* The result of the logical connection is inverted.

Object value "Logical connection 1" after ETS reset

Options: 1
0

This parameter defines the value allocated to the communication object *Logical connection 1* after an ETS reset.

Object value "Logical connection 1" after download

Options: unchanged
as after ETS reset

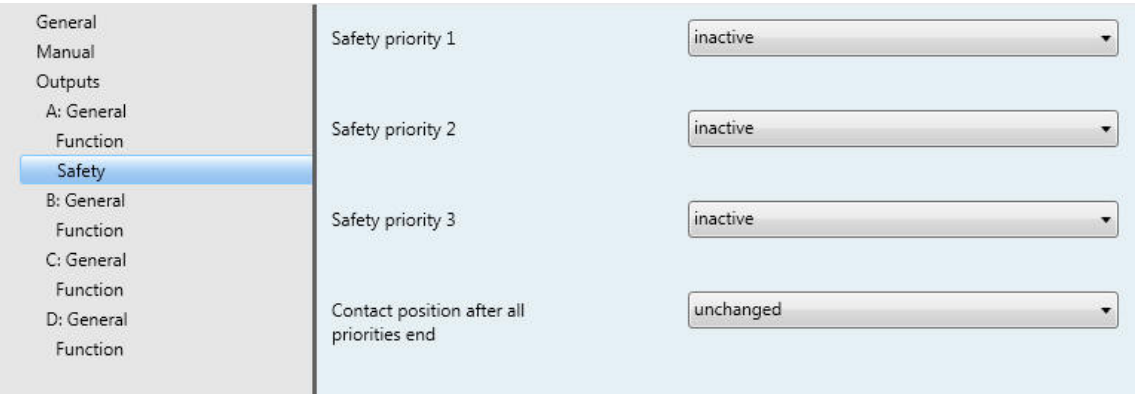
- *unchanged:* The communication object value remains unchanged as before a download.
- *as after ETS reset*: The set communication object value as in parameter Object value *"Logical Connection 1" after ETS reset* is used

Logical connection 2

The same programming options exist as those for parameter *Logical connection 1*.

3.2.6.1.4 Parameter window *Safety*

This parameter window is enabled if in Parameter window Function, page 42, the parameter *Enable function safety* is selected with option *yes*.



Safety priority 1

Safety priority 2

Safety priority 3

Options: inactive
Forced operation (1 bit)
Forced operation (2 bit)
Block

For each of the three priority stages (1 = highest; 3 = lowest priority), the output can be forcibly operated or blocked with activated function *Safety*.

- *Forced operation (1 bit):* The 1 bit communication object Priority X, Forced operation, page 83, is enabled. The operation of the output is blocked via the forced operation. The output assumes a defined state. An operation is not possible until after forced operation is rescinded. The following parameters appear:

  Contact position if forced operation

  Options: ON
  OFF

  With active forced operation, the output is switched ON or OFF and the operation is blocked.

  Trigger with object value

  Options: 1
  0

  - *1/0:* Forced operation is triggered when a telegram with the value set here is received.

Control period in seconds
[1...65,535, 0 = inactive]

Options: 0…65,535

This parameter defines the cyclic monitoring time of the function *Safety*. Here the receipt of a telegram from a device that sends cyclically is monitored. If a telegram is not received within the parameterized time, the output − depending on the safety function set beforehand – is forcibly operated or blocked. If the communication object *Priority x, Forced operation* or *Priority x, Block* receives a telegram that does not correspond with the value set under *Trigger with object value*, the control period is reset and restarted.

- *0:* Cyclical monitoring is deactivated.

Note
The monitoring time should be at least twice as large as the cyclic transmission time of the sensor. The absence of a signal, e.g. due to a high bus load, the function *Safety* (Alarm) is not immediately triggered.

Object value "Priority x, Forced operation" after download

Options: unchanged
0
1

- *unchanged:* After a download, the communication object has the same value as before a download.
- *1/0:* After a download, the parameterized function (*Forced operation* or *Block*) is activated (value = 1) or deactivated (value = 0).

- *Forced operation (2 bit):* The 2 bit communication object Priority x, Forced operation, page 83, is enabled. The operation of the output is blocked via the forced operation. The output assumes a defined state. An operation is not possible until after forced operation is rescinded. The value of the telegram sent via the 2 bit communication object determines the switch position (see the table). The following parameters appear.

Value	Bit 1	Bit 0	State	Description
0	0	0	Free	If the communication object *Forced operation* receives a telegram with the value 0 (binary 00) or 1 (binary 01), the output is enabled and can be actuated via different communication objects.
1	0	1	Free	
2	1	0	Forced OFF	If the communication object *Forced operation* receives a telegram with the value 2 (binary 10), the output is switched off and remains disabled until forced operation is again switched off. Actuation via another communication object is not possible as long as the forced operation is activated.
3	1	1	Forced ON	If the communication object *Forced operation* receives a telegram with the value 3 (binary 11), the output is switched on and remains disabled until forced operation is again switched off. Actuation via another communication object is not possible as long as the forced operation is activated.

Control period in seconds
[1...65,535, 0 = inactive]

Options: 0…65,535

This parameter defines the cyclic monitoring time of the function *Safety*. Here the receipt of a telegram from a device that sends cyclically is monitored. If a telegram is not received within the parameterized time, the output − depending on the safety function set beforehand – is forcibly operated or blocked. If the communication object *Priority x, Forced operation* or *Priority x, Block* receives a telegram that does not correspond with the value set under *Trigger with object value*, the control period is reset and restarted.

- *0:* Cyclical monitoring is deactivated.

Note
The monitoring time should be at least twice as large as the cyclic transmission time of the sensor. So that absence of a signal, e.g. due to a high bus load, the function *Safety* (Alarm) is not immediately triggered.

Object value "Priority x, Forced operation"
after download

Options: unchanged
0 = inactive
2 = OFF
3 = ON

- *unchanged:* After a download, the communication object has the same value as before a download.
- *0 = inactive:* Forced operation is switched off, and the output behaves in the same way as with parameter *Behaviour at end of safety*.
- *2 = OFF:* The communication object *Forced operation* is written with the value 2, and the output is switched off.
- *3 = ON:* The communication object *Forced operation* is written with the value 3, and the output is switched on.

- *Block:* The communication object Priority x, Block, page 83, is enabled. During blocking, the output remains in its present state and is blocked. An operation is not possible until after the block is rescinded. The following parameters appear::

Trigger with object value

Options: 1
0

- *1/0:* Forced operation is triggered when a telegram with the value set here is received.

Control period in seconds
[1...65,535, 0 = inactive]

Options: 0…65,535

This parameter defines the cyclic monitoring time of the function *Safety*. Here the receipt of a telegram from a device that sends cyclically is monitored. If a telegram is not received within the parameterized time, the output − depending on the safety function set beforehand – is forcibly operated or blocked. If the communication object *Priority x, Forced operation* or *Priority x, Block* receives a telegram that does not correspond with the value set under *Trigger with object value*, the control period is reset and restarted.

- *0:* Cyclical monitoring is deactivated.

Note
The monitoring time should be at least twice as large as the cyclic transmission time of the sensor. So that absence of a signal, e.g. due to a high bus load, the function *Safety* (Alarm) is not immediately triggered.

Object value "Priority x, Block"
after download

Options: unchanged
0
1

- *unchanged:* After a download, the communication object has the same value as before a download.
- *1/0:* After a download, the parameterized function (*Forced operation* or *Block*) is activated (value = 1) or deactivated (value = 0).

Contact position after all
priorities end

Options: unchanged
update
select

- *unchanged:* The contact position is retained during forced operation or safety priority. The contact position only changes when a new telegram is received.
- *update:* The device continues to receive telegrams during active safety. The last telegram received is executed after safety is rescinded
- *select:* The following parameter appears:

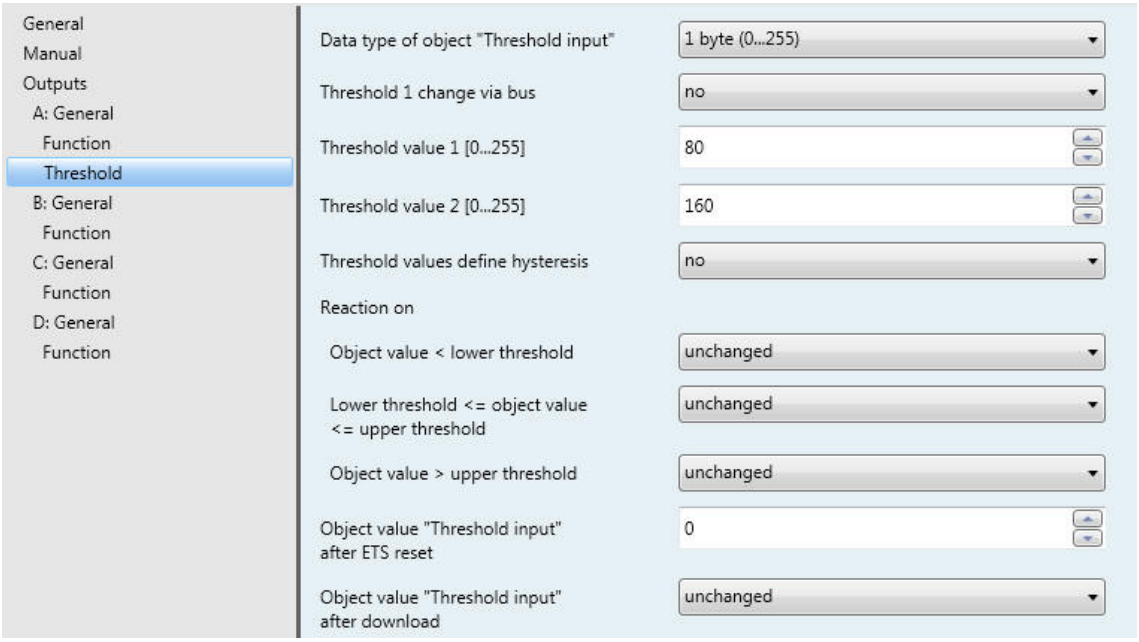
Value

Options: ON
OFF

- *ON:* If the output is parameterized as a normally open contact, the contact closes and the output switches ON. If the output is parameterized (inverted) as a normally closed contact, the contact closes and the output switches OFF.
- *OFF:* If the output is parameterized as a normally open contact, the contact opens and the output switches OFF. If the output is parameterized (inverted) as a normally closed contact, the contact closes and the output switches ON.

3.2.6.1.5 Parameter window *Threshold*

In this parameter window, all settings for the function *Threshold* are undertaken. The parameter window is enabled if in Parameter window Function, page 53, the parameter *Enable function threshold* is selected with the option yes.



The function *Threshold* facilitates the evaluation of a 1 byte or 2 byte communication object *Threshold input*. A switching action can be triggered as soon as the value of the communication object undershoots or overshoots a threshold value. Two independent threshold values are available. Threshold 1 can be modified via the bus.

For further information see: Function Threshold, page 94

When the function *Threshold* is active, the switch actuator continues to receive switching telegrams. In this way, the contact position defined by the function *Threshold* can be modified.

The function *Threshold* generates a switching telegram as soon as a new threshold telegram is received and a new switching condition exists simultaneously due to undershoot or overshoot of the switching criterion.

Data type of object "Threshold input"

Options: 1 byte (0…255)
2 byte (0...65,635)

This parameter defines the data type of the threshold input that is received via the communication object *Threshold input*. A selection can be made between a 1 byte integer value and a 2 byte counter value.

Threshold 1 change via bus

Options: no
yes

This parameter defines whether threshold value 1 can or cannot be modified via the bus.

- *yes:* The communication object *Set threshold 1* can be modified via the bus. This can be a 1 byte or 2 byte communication object depending on the parameterization of the threshold input. The following parameter appears:

  Overwrite object value after download

  Options: no
  yes

  With this parameter, it is possible to not overwrite the thresholds set via the bus during a download and to protect them.

  - *no:* Do not overwrite communication object *Set threshold 1* with a download.
  - *yes:* Overwrite communication object *Set threshold 1* with a download.

With selection *Data type "Threshold input" 1 byte*:

Threshold value 1 [0...255]

Options: 0…80…255

Threshold value 2 [0...255]

Options: 0…160…255

With selection Data type “Threshold input” 2 byte:

Threshold value 1 [0...65,535]

Options: 0…20,000…65,535

Threshold value 2 [0...65,535]

Options: 0…40,000…65,535

Threshold values define hysteresis

Options: no
yes

This parameter defines whether Threshold values 1 and 2 should be interpreted as hysteresis limits. The hysteresis can reduce continuous threshold value messages if the input value fluctuates around one of the threshold values.

For further information see: Function Threshold, page 94

- *yes:* The following parameters appear:

Reaction on

Falling below lower threshold

Exceeding upper threshold

Options: unchanged
ON
OFF

This parameter determines the switching state of the output dependent on the value of the communication object, if the value of the communication object *Threshold input* exceeds the upper or lower threshold.

A reaction only occurs if the communication object value was previously smaller or larger than Threshold 1 or Threshold 2.

For further information see: Function Threshold, page 94

- *no:* The following parameters appear:

Reaction on

Object value < lower threshold

Lower threshold <= object value <= upper threshold

Object value > upper threshold

Options: unchanged
ON
OFF

This parameter determines the switch state of the output (ON, OFF, unchanged) in dependence on the threshold value (the value of the communication object).

Object value "Threshold input"
after ETS reset

The value range is dependent on the selection made in the parameter *Data type of object "Threshold input"*.

1 byte (0…255):
Options: 0…255

2 byte (0…65,535):
Options: 0…65,535

This parameter determines the value of the communication object *Threshold input* after an ETS reset. The threshold evaluation is undertaken after an ETS reset here with the parameterized threshold value.

Object value "Threshold input"
after download

Options: unchanged
as after ETS reset

- *unchanged:* The object value remains unchanged as before a download.
- *as after ETS reset:* The set object value as in parameter *Object value "Threshold input" after ETS reset* is assumed.

3.3 Communication objects

3.3.1 Short overview of the communication objects

CO* No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	W	T	A
	Device general								
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	Block manual operation	General	DPT 1.003	1 bit	x		x		
3	Status manual operation	General	DPT 1.003	1 bit	x	x		x	
	Operation mode valve drive, thermoelectric/motor-driven								
10	Control value, switch[1]	Output A	DPT 1.001	1 bit	x		x		
	Control value, cont. (PWM)	Output A	DPT 5.001	1 byte	x		x		
11	Status control value	Output A	DPT 5.001	1 byte	x	x		x	
	Status control value	Output A	DPT 1.011	1 bit	x	x		x	
12	Fault control value	Output A	DPT 1.005	1 bit	x	x		x	
13	Trigger valve purge	Output A	DPT 1.003	1 bit	x		x		
14	Status valve purge	Output A	DPT 1.003	1 bit	x	x		x	
	Operation mode Switch actuator								
10	Switch	Output A	DPT 1.001	1 bit	x		x		
11	Status switch	Output A	DPT 1.001	1 byte	x	x		x	
12	Permanent ON	Output A	DPT 1.001	1 bit	x		x		
13	Disable function time	Output A	DPT 1.003	1 bit	x		x		
14	Staircase lighting duration	Output A	DPT 7.005	1 bit	x	x	x		
15	Staircase lighting warning	Output A	DPT 1.005	1 byte	x			x	
16	8 bit scene	Output A	DPT 18.001	1 bit	x		x		
17	Logical connection 1	Output A	DPT 1.002	1 bit	x		x		
18	Logical connection 2	Output A	DPT 1.002	1 bit	x		x		
19	Threshold	Output A	DPT 5.001	1 byte	x		x		
	Threshold	Output A	DPT 7.001	2 byte	x		x		
20	Set threshold 1	Output A	DPT 5.001	1 byte	x		x		
	Set threshold 1	Output A	DPT 7.001	2 byte	x		x		
	Output general								
22	P1, Forced operation	Output A	DPT 1.003	1 bit	x		x		
	P1, forced operation[2]	Output A	DPT 2.001	2 bit	x		x		
	P1, Block	Output A	DPT 1.003	1 bit	x		x		
23	P2, Forced operation	Output A	DPT 1.003	1 bit	x		x		
	P2, Forced operation[2]	Output A	DPT 2.001	2 bit	x		x		
	P2, Block	Output A	DPT 1.003	1 bit	x		x		
24	P3, Forced operation	Output A	DPT 1.003	1 bit	x		x		
	P3, Forced operation[2]	Output A	DPT 2.001	2 bit	x		x		
	P3, Block	Output A	DPT 1.003	1 bit	x		x		
26	Status byte	Output A	NON-DPT	1 byte	x	x		x	
27	Fault (overload/short-circuit)	Output A	DPT 1.005	1 bit	x	x		x	
28	Reset fault	Output A	DPT 1.015	1 bit	x		x	x	
29	Supply voltage failure	Output A	DPT 1.005	1 bit	x	x		x	

CO* No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	W	T	A
30… 49	Output B, the same CO as output A	B: see output A							
50… 69	Output C, the same CO as output A	C: see output A							
70… 89	Output D, the same CO as output A	D: see output A							
90… 109	Output E, the same CO as output A	E: see output A							
110… 129	Output F, the same CO as output A	F: see output A							
130… 149	Output G, the same CO as output A	G: see output A							
150… 179	Output H, the same CO as output A	H: see output A							

* CO = communication object

[1] only available in operation mode Valve drive, thermoelectric (PWM)

[2] only available in operation mode *Switch actuator*

3.3.2 Communication objects *General*

No.	Function	Object name	Data type	Flags
0	**In operation**	**General**	**1 bit** **DPT 1.002**	**C, R, T**
This communication object is enabled when in Parameter window General, page 24, the parameter *Send communication object "In operation"* has been selected with the option *send value 0 cyclically* or *send value 1 cyclically*. In order to regularly monitor the presence of the ES/S on the ABB i-bus® KNX, an In operation monitoring telegram can be sent cyclically on the bus. As long as the communication object is activated, it sends an in operation telegram. Telegram value 1 = system in operation with option *send value 1 cyclically* 0 = system in operation with option *send value 0 cyclically*				
1	**Request status values**	**General**	**1 bit** **DPT 1.017**	**C, W, T**
This communication object is enabled if in Parameter window General, page 24, the parameter *Enable communication object "Request status values" 1 bit* has been selected with the option *yes*. If a telegram with the value x (x = 0/1/0 or 1) is received in the communication object, all status objects are sent on the bus, as long as these have not been programmed with the option after a change or request. The following function results for the option x = 1: Telegram value: 1 = All status messages parameterized with option after a change or on request are sent. 0 = no reaction.				
2	**Block manual operation**	**General**	**1 bit** **DPT 1.003**	**C, W**
Using this communication object the *Manual operation* is blocked or enabled. Using the value 1, the button is blocked on the device. If the device is in *Manual operation*, it toggles immediately to *KNX operation*. Using the value 0, the button is enabled on the device. Telegram value: 0 = button enabled 1 = button blocked				
3	**Status manual operation**	**General**	**1 bit** **DPT 1.003**	**C, R, T**
This communication object indicates whether manual operation is activated. Telegram value: 0 = manual operation not active 1 = manual operation active The status of manual operation is sent after a change, after request or after a change and request as programmed.				
4…9				
Not assigned.				

3.3.2.1 Communication objects *Valve drive, thermoelectric (PWM)* and *motor-driven (3-point)*

Note

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

No.	Function	Object name	Data type	Flags
10	**Control value**	**Output A**	**1 bit** **DPT 1.001**	**C, W**

This communication object is enabled if in Parameter window Outputs, page 30, the operation mode *Valve drive, thermoelectric (PWM)* is selected and in Parameter window X: General operation mode: Valve drive, thermoelectric (PWM), page 32, the parameter *Control value is received* as has been parameterized with the option *1 bit*.

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

Telegram value 0 = OFF
1 = ON

10	**Control value, cont. (PWM)**	**Output A**	**1 byte** **DPT 5.001**	**C, W**

This communication object is enabled if in Parameter window Outputs, page 30, the operation mode *Valve drive, thermoelectric (PWM)* is selected and in Parameter window X: General operation mode: Valve drive, thermoelectric (PWM), page 32, the parameter *Control value is received* as has been parameterized with the option *1 bit*.

The communication object value [0…255] determines the variable mark-to-space ratio of the valve drive. With communication object value 0 the output switches OFF (valve is closed with normally closed valve drive). With communication object value 255 the output switches ON permanently (valve is fully open with normally open valve drive).

Telegram value 0 = OFF (valve drive closed)
x = intermediate values
255 = ON (valve drive opened)

11	**Status control value**	**Output A**	**1 byte** **DPT 5.001**	**C, R, T**

This communication object is enabled in Parameter window Function, page 42, via the parameter *Enable communication object "Status control value"* with the option *yes* and has been selected in parameter *Data type* via 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 communication object is not sent on a short circuit, overload, failure of the supply voltage and reference adjustment (only in operation mode *Valve drive, motor-driven (3-point)*).

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 value* and the parameter is set to *on request* or *after a change or on request*.
- the value of the communication object has changed and the parameter is set to *on request* or *after a change or on request*.
- a read request is carried out on this communication object.

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

If in Parameter window X: General operation mode: Valve drive, thermoelectric (PWM), page 32, under parameter *Control value is received* as the option *1 bit* is selected, the following applies for communication object *Status control value* (1 byte):

Telegram value: 0 = setpoint 0; LED (yellow) off
255 = setpoint 1; LED (yellow) on

No.	Function	Object name	Data type	Flags
11	**Status control value**	**Output A**	**1 bit** **DPT 1.011**	**C, R, T**

This communication object is enabled in Parameter window Function, page 42, via the parameter *Enable communication object "Status control value"* with the option *yes* and has been selected in parameter *Data type* via the option *1 bit*.

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

The LEDs of the corresponding outputs indicates the same value as the status.

The status is sent if:

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

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

No.	Function	Object name	Data type	Flags
12	**Fault control value**	**Output A**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is enabled if in Parameter window X: General operation mode: Valve drive, thermoelectric (PWM), page 32, the parameter *Activate monitoring control values* is selected with option *yes*.

This communication object indicates a possible fault in conjunction with the thermostat. The communication objects *Control value, switch 1 bit* or *Control value, cont. (PWM) 1 byte* 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 via the communication object *Request status values* depending on the parameterization, on a change and/or request.

Telegram value 0 = no fault
1 = fault

No.	Function	Object name	Data type	Flags
13	**Trigger valve purge**	**Output A**	**1 bit** **DPT 1.003**	**C, W**

This communication object is enabled in Parameter window Function, page 42, via the parameter *Enable valve purge* with the option *yes*. The valve purge is triggered using this communication object.

Telegram value: 0 = end valve purge, valve will be closed
1 = start valve purge, valve will be 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 a valve purge currently underway is interrupted by a manual valve purge or a control value, which reached the parameterized purge value, the purge cycle time is restarted. If the active purge duration was less that the parameterized purge duration, this will not be taken into consideration. In this case, the actual purge cycle time is shorter in duration by the active purge duration.

Note

A valve purge not executed due to a higher priority will no longer be carried out.

The following functions are executed with telegram value 0.

- A valve purge currently under way is interrupted.
- The purge cycle with automatic valve purging will be restarted.

No.	Function	Object name	Data type	Flags
14	**Status valve purge**	**Output A**	**1 bit** **DPT 1.003**	**C, R, T**

This communication object is enabled in Parameter window Function, page 42, via parameter *Enable valve purge* and communication object *Status valve purge* 1 bit with the option *yes*. 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 value* and the parameter is set to *on request* or *after a change or on request*.
- the value of the communication object has changed and the parameter is set to *on request* or *after a change or on request*.
- a read request is carried out on this communication object.

Telegram value: 0 = valve purge inactive
1 = valve purge active

Note

The status is displayed as soon as a valve purge has been activated. The status remains active, even when the valve purge has been interrupted, e.g. by a priority.

3.3.2.2 Communication objects operation mode *Switch actuator*

No.	Function	Object name	Data type	Flags
10	**Switch**	**Output A**	**1 bit** **DPT 1.001**	**C, W**
This communication object is used for switching of the output ON/OFF. The device receives a switch telegram via a switch communication object. Output is normally open: Telegram value 1 = switch ON 0 = switch OFF Output is normally closed: Telegram value 1 = switch OFF 0 = switch ON				
11	**Status switch**	**Output A**	**1 bit** **DPT 1.001**	**C, R, T**
The communication object is enabled if in Parameter window X: General, operation mode Switch actuator, page 51, for the parameter *Status response of contact position* the option *yes, via object "Status Switch",* has been selected. The status value can be inverted. Telegram value 1 = contact closed or opened (depending on the parameterization) 0 = contact closed or opened (depending on the parameterization)				
12	**Permanent ON**	**Output A**	**1 byte** **DPT 1.001**	**C, W**
This communication object is enabled if in Parameter window Function, page 53, the parameter *Enable function time* is selected with option *yes*. With this communication object, the output can be forcibly switched on. If the communication object is assigned with the value 1, the output is switched on irrespective of the value of the object *Switch* and remains switched on, until the communication object *Permanent ON* has the value 0. After ending the permanent ON state, the state of the communication object *Switch* is used. Permanent ON only switches ON and “masks” the other functions. This means that the other functions (e.g. staircase lighting) continue to run in the background but do not initiate a switching action. After the end of permanent ON, the switching state, which would result without the permanent ON function, becomes active. For the function *Staircase lighting,* the response after Permanent ON is parameterized in Parameter window Time, page 54. Telegram value 1 = activates permanent ON mode 0 = deactivates permanent ON mode				
13	**Disable function time**	**Output A**	**1 bit** **DPT 1.003**	**C, W**
This communication object is enabled if in Parameter window Function, page 53, the parameter *Enable function time* is selected with option *yes*. With the blocked function *Time*, the output can only be switched on or off, the functions *Staircase lighting*, *Delay* and *Flashing* are not triggered. Telegram value 1 = disable function time 0 = enable function time				

No.	Function	Object name	Data type	Flags
14	**Staircase lighting duration**	**Output A**	**2 byte** **DPT 7.005**	**C, R, W**
This communication object is enabled if in Parameter window Time, page 54, the parameter *Staircase lighting duration changeable via object "Staircase lighting duration"* is selected with option *yes*. The duration of staircase lighting is set here. The time is defined in seconds.				
15	**Staircase lighting warning**	**Output A**	**1 bit** **DPT 1.005**	**C, T**
This communication object is enabled if in Parameter window Time, page 54, the function *Staircase lighting* and in parameter *Warning before end of staircase lighting,* an option has been selected.				
16	**8 bit scene**	**Output A**	**1 byte** **DPT 18.001**	**C, W**

This communication object is enabled if in Parameter window Function, page 53, the parameter *Enable function scene (8 bit)* is selected with option *yes*.

Using this 8 bit communication object, a scene telegram can be received using a coded telegram. The telegram contains the number of the respective scene as well as the information if the scene is to be called, or if the current switch state is to be assigned to the scene.

Telegram format (1 byte):

MXSSSSSS
(MSB) (LSB)

M: 0 – scene is called
1 – scene is stored (if allowed)

X: not used

S: Number of the scene (1…64: 00000000 … 00111111)

KNX 1 byte telegram value		Meaning
Decimal	Hexadecimal	
00	00h	Call scene 1
01	01h	Call scene 2
02	02h	Call scene 3
…	…	…
63	3Fh	Call scene 64
128	80h	Store scene 1
129	81h	Store scene 2
130	82h	Store scene 3
…	…	…
191	AFh	Store scene 64

No.	Function	Object name	Data type	Flags
17	**Logical connection 1**	**Output A**	**1 bit** **DPT 1.002**	**C, W**
This communication object is enabled if in Parameter window Function, page 53, the parameter *Enable function logic* is selected with option *yes*. Using this communication object, the output of the first of two logic objects can be assigned. The logical connection is defined in Parameter window Logic, page 63. Initially the switch object is then logically linked with the communication object *Logical connection 1*. The result is logically linked with the communication object *Logical connection 2*. **Note** The values of the communication objects *Logical connection 1/2* are stored at bus voltage failure. The values are set again after a bus voltage recovery If values are not assigned for communication objects *Logical connection 1/2*, they will be deactivated.				
18	**Logical connection 1**	**Output A**	**1 bit** **DPT 1.002**	**C, W**
See communication object 17.				
19	**Threshold**	**Output A**	**1 byte** **DPT 5.001** **2 byte** **DPT 7.001**	**C, W**
This communication object is enabled if in Parameter window Function, page 53, the parameter *Enable function threshold* is selected with option *yes*. Depending on the selection made in Parameter window Threshold, page 70, a 1 byte (integer value) or 2 byte communication object is enabled. A switching action can be executed if the parameterized threshold is exceeded.				
20	**Set threshold 1**	**Output A**	**1 byte** **DPT 5.001** **2 byte** **DPT 7.001**	**C, W**
This communication object is enabled if the selection in Parameter window Threshold, page 70, the parameter *Threshold 1 change via bus* has been selected with the option *yes*. Depending on the selection made a 1 byte (integer value) or 2 byte communication object is enabled. If the communication object *Set threshold* is enabled, the threshold value can be modified via the bus.				

3.3.2.3 Communication objects *Output X: General*

No.	Function	Object name	Data type	Flags
22	**P1, Forced operation**	**Output A**	**1 bit** **DPT 1.003**	**C, W**
This communication object is enabled if in Parameter window Safety, page 65, the parameter *Safety priority 1* has been selected with the option *Forced operation (1 bit)*. If a telegram with the value 1 or 0 is received (can be paramaterized), the output is forcibly operated and the operation is blocked. Operation mode *Switch actuator*: The response of the output with an active forced operation is set in parameter *Contact position if forced operation*. Operation mode *Control valve:* The response of the output with an active forced operation is set in parameter *Control value on forced operation in %*. Telegram value 1/0 = forced operation				
22	**P1, Forced operation**	**Output A**	**2 bit** **DPT 2.001**	**C, W**
The 2 bit communication object forced operation is only available in the operation mode *Switch actuator*. This communication object is enabled if in Parameter window Safety, page 65, the parameter *Safety priority 1* has been selected with the option *Forced operation (2 bit)*. If a telegram with the corresponding value is received via this communication object, the output is forcibly operated and the operation is set. The value of the communication object directly defines the forced position of the contact: Telegram value 0 or 1 = The output is not forcibly operated 2 = The output is forcibly switched OFF 3 = The output is forcibly switched ON				
22	**P1, Block**	**Output A**	**1 bit** **DPT 1.003**	**C, W**
This communication object is enabled if in Parameter window Safety, page 65, the parameter *Safety priority 1* has been selected with the option *Block*. If a telegram with the value 1 or 0 is received (can be paramaterized), the output remains in its current position and the operation is blocked. Telegram value 1/0 = block				
23	**P2, Forced operation** **P2, Forced operation** **P2, Block**	**Output A** **Output A** **Output A**	**1 bit** **DPT 1.003** **2 bit** **DPT 2.001** **1 bit** **DPT 1.003**	**C, W**
See communication object 22.				

No.	Function	Object name	Data type	Flags
24	**P3, Forced operation** **P3, Forced operation** **P3, Block**	**Output A** **Output A** **Output A**	**1 bit** **DPT 1.003** **2 bit** **DPT 2.001** **1 bit** **DPT 1.003**	**C, W**
See communication object 22.				
26	**Status byte**	**Output A**	**1 byte** **non DPT**	**C, R, T**

This is a diagnostics byte for the output. The value of the communication object is sent when a telegram is received on the communication object *Request status values*. The communication object is always visible.

The value of the status byte can be decoded via the Code table Status byte, page 102.

Telegram value:

Bit 0: Status output/control value > 0
0 = Control value = 0 / Output = OFF
1 = Control value = 0 / Output = ON

Bit 1: Valve purge
0 = no valve purge
1 = valve purge active

Bit 2: Safety priority 1, 2, 3 (forced operation or block)
0 = none active
1 = at least one active

Bit 3: Manual operation active
0 = manual operation inactive
1 = manual operation active

Bit 4: Not assigned

Bit 5: Overload
0 = no overload
1 = overload

Bit 6: Short-circuit
0 = no short-circuit
1 = short-circuit

Bit 7: Undervoltage or voltage failure (supply voltage)
0 = inactive
1 = active

No.	Function	Object name	Data type	Flags
27	**Fault (overload/short-circuit)**	**Output A**	**1 bit** **DPT 1.005**	**C, R, T**
If there is a fault on an output, e.g. due to a short-circuit or overload, the red LED of the corresponding output will flash. At the same time, the communication object *Fault (overload/short-circuit)* sends a telegram with the value 1. After the fault has been fixed, button is used to reset the fault and the communication object has the value 0. Should a fault still be present, the LED will flash again and the communication object has the value 1. The communication object is always visible Alternatively to button, the fault can be reset by a telegram with the value 1 via communication object *Reset fault*. Telegram value: 0 = no fault on the output. 1 = fault on the output.				
28	**Reset fault**	**Output A**	**1 bit** **DPT 1.015**	**C, W, T**
A fault is reset via this communication object, e.g. short-circuit/overload red LED flashes on the device. A reset is only successful if the fault has been repaired and is no longer present. The red LED turns off after it is successfully reset. There is no reaction should the value 1 be received during correct operation. If a group address has not been assigned to this communication object, the fault can be reset either by a restart of the device or via button on the device. The communication object is always visible. Telegram value: 0 = no function 1 = reset fault				
29	**Supply voltage failure**	**Output A**	**1 bit** **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 up. If the supply voltage fails, the red LED lights up even if the output has not been parameterized. The communication object is always visible. Telegram value: 0 = supply voltage OK 1 = supply voltage failure				

4 Planning and Application

4.1 Operation mode *Control valve*

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

4.2 Operation mode *Switch actuator*

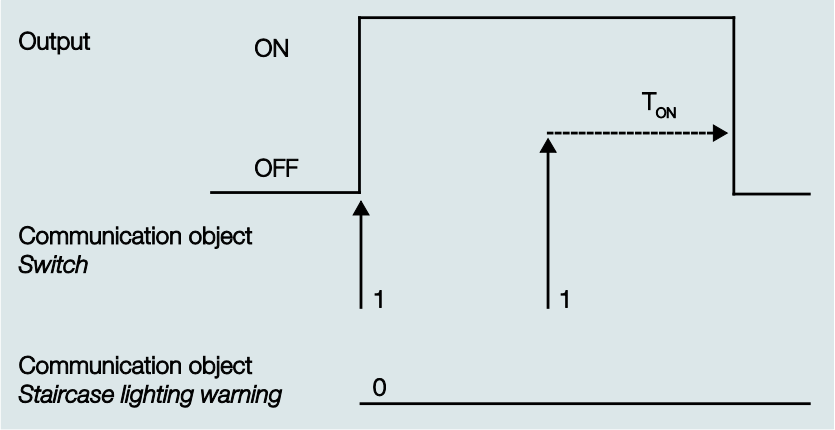
4.2.1 Function *Time*

The function *Time* can be enabled (value 0) and disabled (value 1) via the bus (1 bit communication object *Disable function time*). The output operates without a delay, as long as the function *Time* is disabled. Different functions can be realised using the function *Time*:

- Staircase lighting
- Delay for Switching ON and OFF
- Flashing

4.2.1.1 Staircase lighting

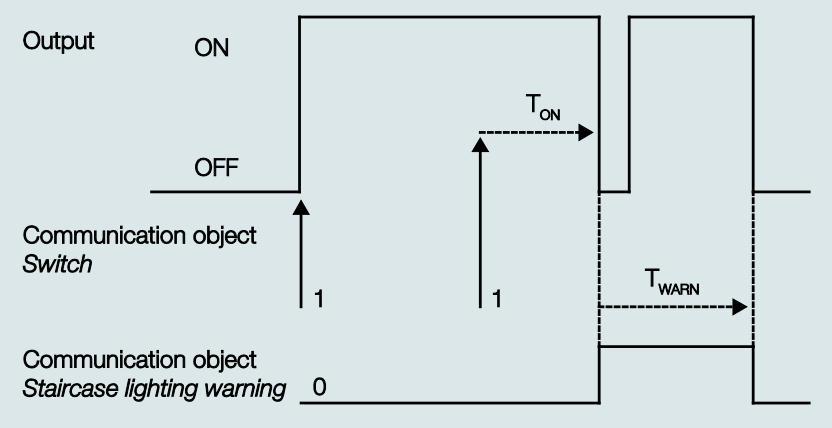
After the staircase lighting time T_{ON}, the output switches off automatically. For every telegram with the value 1, the time restarts (retrigger function), except if the parameter *Extending staircase lighting by multiple operation ("pumping up")* on Parameter window Time, page 54, is set to *no (not retriggerable)*.



This corresponds with the basic response of the function *Staircase lighting*, as long as a warning is not parameterized.

Warning

An additional warning function enables the user to be warned in good time before the staircase lighting time elapses. It can be carried out by switching the output on/off briefly or by sending a communication object.

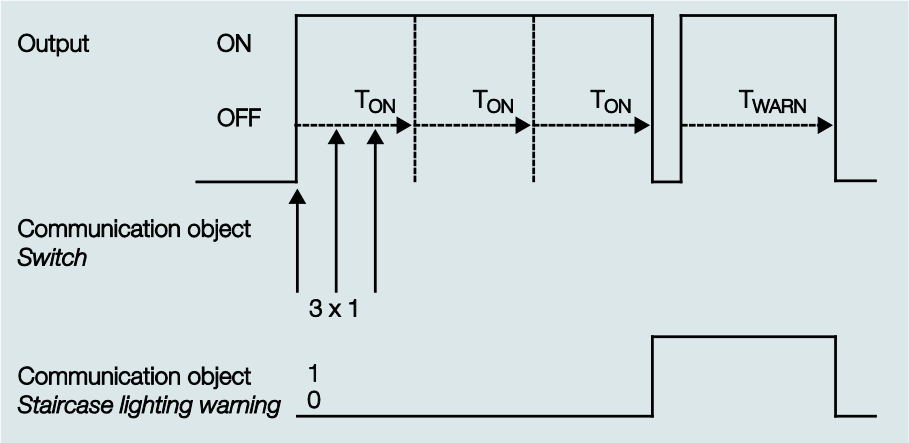


The warning time T_{WARN} extends the ON phase. At the start of the warning time, the output can be briefly switched on and off and/or the communication object *Warning stair lighting* can be written with a value 1. The output is switched off briefly for the period T_{WARN}, before the staircase lighting time T_{ON} elapses and the communication object *Warning stair lighting* is sent. As a result, for example, half of the lighting is switched off and a LED is switched on as a warning.

The entire staircase lighting time, in which the staircase lighting is on, corresponds with the time period T_{ON} plus T_{WARN}.

Retriggering

Via “pumping up”, that is actuation of the push button several time in succession, the user can adapt the staircase lighting to their current needs. The maximum duration of the staircase lighting time can be set in the parameters.



If the device receives a further ON telegram when the staircase lighting is switched on, the staircase lighting time is added to the remaining period.

The warning time does not change due to "Pumping up" and is added to the extended (x-fold T_{ON}) ON time.

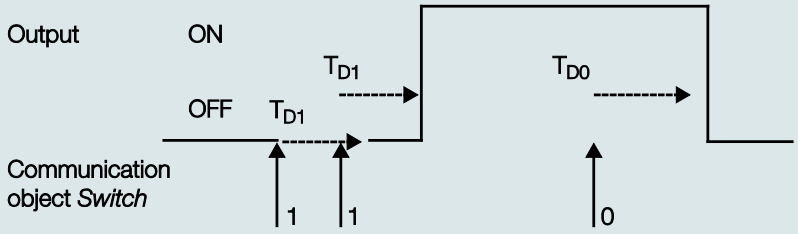
Application examples:

- Lighting control in stairwells
- Monitoring of telegrams

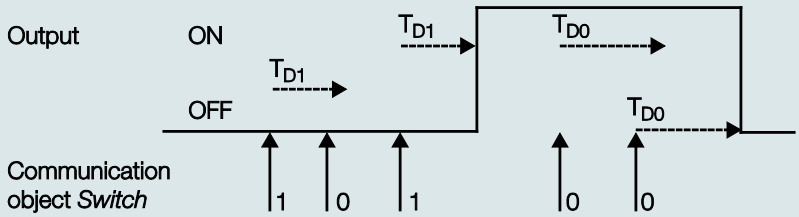
4.2.1.2 Delay for Switching ON and OFF

The switching ON and OFF delay delays switch on or switch off of the output.

Example 1:



Example 2:



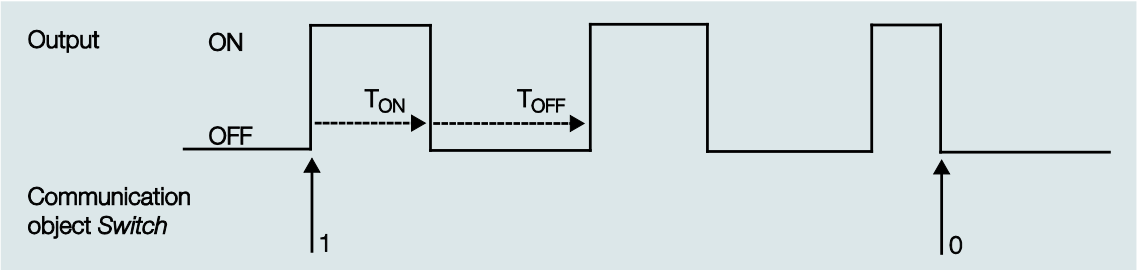
The delay time T_{D1} or T_{D0} starts after a switch telegram, and after it has timed out, the output executes the switch telegram.

If a new ON telegram with the value 1 is received during the switch on delay, the time of the switch on delay starts again. The same applies to switch off for the switch off delay. If a new OFF telegram with the value 0 is received during the switch off delay, the time for the switch off delay starts again.

Note
If the device receives an OFF telegram during the switch on delay T_{D1}, an ON telegram is disregarded.

4.2.1.3 Flashing

The output can flash when the output is switched on and off periodically.



The switch on time (T_{ON}) and switch off time (T_{OFF}) during flashing can be programmed.

Note
The contact life of the contacts should be considered and can be found in the technical data. A limitation of the number of switching operations with the parameter *Number of impulses* may be useful. Furthermore, a delay in the switching sequence is possible, caused by the limited availability of switching energy with very frequent switching. The possible number of switching operations should be considered.

4.2.2 Function *Scene*

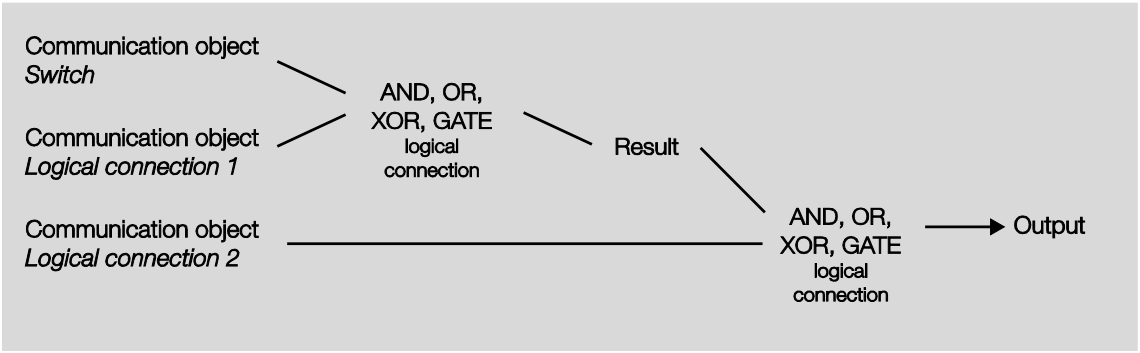
With the scene using 8 bits, the button issues the ES/S with the instruction to call a scene. The scene is not stored in the button but rather in the ES/S. All devices are addressed using the same group address. It is thus sufficient to send a single telegram to recall the scene.

For further information see: Parameter window Scene, page 61, and communication object 8 bit scene (No. 16), page 81, and Code table Scene (8 bit), DPT 18.001, page 103

Benefits
The function *Scene* with ABB i-bus® devices offers the following decisive advantage: All settings to be undertaken in a scene are stored in the device. Therefore, they must not be sent via the KNX with a scene recall, and only a figure value, which has been assigned to this scene, is necessary. This considerably reduces the load on the bus and prevents unnecessary telegram traffic on the KNX.

4.2.3 Function *Logic*

With the function *Logic*, it is possible to connect the switching of the output with certain conditions. Two connection objects are available:



Hereby, the communication object *Logical connection 1* is first of all evaluated with the communication object *Switch.* The result is then logically linked with the communication object *Logical connection 2*.

The following functions *Logic* are possible:

Values of the communication objects						Explanations
Logical function	**Switch**	**Connection 1**	**Result**	**Connection 2**	**Output**	
AND	0	0	0	0	0	The result is 1 if both input values are 1. The output is 1 if both input values are 1.
	0	1	0	1	0	
	1	0	0	0	0	
	1	1	1	1	1	
OR	0	0	0	0	0	The result is 1 if one of both input values is 1.
	0	1	1	1	1	
	1	0	1	0	1	
	1	1	1	1	1	
XOR	0	0	0	0	0	The result is 1 when both input values have a different value.
	0	1	1	1	0	
	1	0	1	0	1	
	1	1	0	1	1	
GATE	0	disabled	-	disabled		The communication object (CO) *Switch* is only allowed through if the GATE (connection) is open. Otherwise, the receipt of the CO *Switch* is ignored.
	0	enabled	0	enabled	0	
	1	disabled	-	disabled		
	1	enabled	1	enabled	1	

The function *Logic* is always re-calculated when a communication object value is received.

Example GATE
The GATE logic is programmed, so that a disable is implemented as soon as the communication object *Logical connection x* receives a 0.
The output of the logical connection is 0.
The communication object *Logical connection 1* receives a 0, i.e. the GATE blocks.
The communication object *Switch* receives 0, 1, 0, 1. The output of the logic operation always remains 0.
The communication object *Logical connection x* receives a 1, i.e. the GATE is enabled if it is set in the parameters.
The output of the logical connection is recalculated.

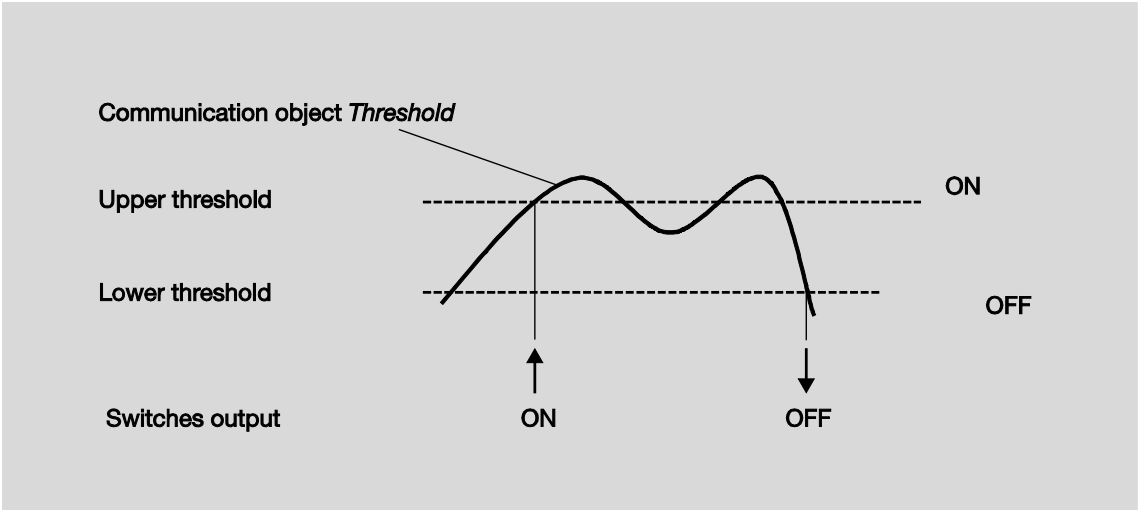
4.2.4 Function *Safety*

Three separate communication objects with the priorities 1 = high to 3 = low are available for this function. The output can be forcibly operated or blocked, as selected, for every one of these priority stages. The output is put into the programmable state and operation is blocked. After the function safety has been rescinded, the response of the output can be parameterized.

4.2.5 Function *Threshold*

The function *Threshold* monitors a 1 byte or 2 byte value. As soon as a threshold is undershot or overshot, the output can be switched. The threshold values can be interpreted as hysteresis values:

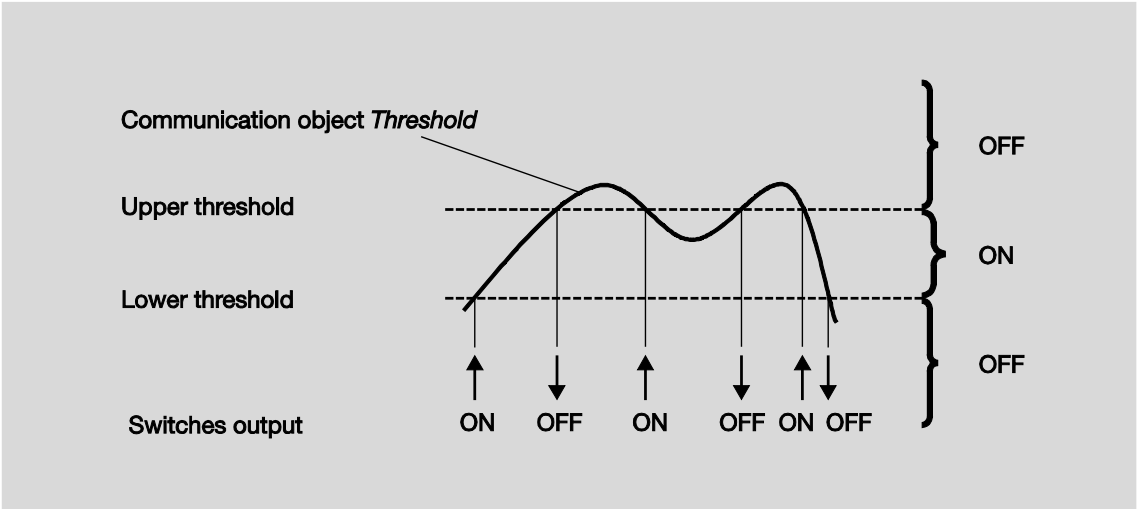
Threshold values are hysteresis values:



When the value exceeds the upper threshold or falls below the lower threshold, the output is switched.

Note
If the communication object *Threshold* receives a value that does not overshoot or undershoot the old value, a switching action is not triggered. During the function *Threshold*, the ES/S can continue to receive telegrams, which can trigger a switching action. The communication object *Switch* as well as the functions *Scene* and *Threshold* have equal priority and are executed accordingly as a telegram is received.

Threshold values are not hysteresis values:



The output is switched when any threshold is undershot or overshot.

Note
If the communication object *Threshold* receives a value that does not overshoot or undershoot the old value, a switching action is not triggered.

4.3 Reaction at bus voltage failure, recovery, download and ETS reset

In the following, the response at bus voltage failure or recovery, download and ETS reset are described.

Important
For system reasons, the device switches the outputs OFF for about 1 second after bus voltage recovery, download or ETS reset. The response is the same after overload, short-circuit and supply voltage recovery. Switch off is not taken into consideration in the status objects. After switch off, the outputs assume the current state.

4.3.1 Bus voltage failure

Note
The response of the outputs at bus voltage failure can be parameterized to be dependent on the set operation mode. This response also applies during a download.

In operation mode *Valve drive, thermoelectric (PWM)* and in operation mode *Switch actuator*, the reaction at operating voltage failure can be set.

In operation mode Valve drive, motor-driven (3-point), the output remains in its present position.

Manual operation is not possible during a bus voltage failure.

4.3.2 Bus voltage recovery

- At bus voltage recovery in operation mode *Valve drive*, a value for control in % can be predefined. In operation mode *Switch actuator*, the communication object *Switch* can be written with 0, 1 or not written.
- Status communication objects are sent provided that the option *after a change* or *after a change or on request* have been set.
- The send delay is only active at bus voltage recovery!
- The safety functions re re-established and undertaken as a matter of priority. All other priorities, e.g. valve purge and fault of the control value 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.

4.3.3 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 ETS under the menu item *Commissioning* with the function *Reset device*. This stops the application program and it is restarted.

4.3.4 Download

During the download, the output behaves just as it would at bus voltage failure.

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

4.3.5 Tabular overview of bus voltage recovery, download and ETS reset

Device general

Reaction	at bus voltage recovery	Download	After ETS reset, full download and application update
Manual operation	Inactive	Inactive	Inactive
Block manual operation	Dependent on the parameter settings	Dependent on the parameter settings	Dependent on the parameter settings
Send delay	Yes (can be parameterized)	None	None
Object "In operation"	Sends after send delay. Cycle time commences after initialization.	Cycle time commences after initialization.	Cycle time commences after initialization.

Output: Operation mode valve drive, thermoelectric (PWM) and motor-driven (3-point)

Reaction	At bus voltage recovery	After download	After ETS reset, full download and application update
Status byte	Error bits are reset and set again if necessary	Error bits are reset and set again if necessary	Error bits are reset and set again if necessary
Control of output, control values	Can be parameterized	Unchanged	0 %
Monitoring control value	Monitoring time will be restarted. Fault of the control value is reset	Monitoring time will be restarted. Fault of the control value is reset	Monitoring time will be restarted. Fault of the control value is reset
Function safety, safety functions priority 1/2/3 (forced operation, block)	As before bus voltage failure Monitoring time will be restarted.	Can be parameterized Monitoring time will be restarted.	Inactive Monitoring time will be restarted.
Automatic valve purging	Valve purge is inactive. Purge cycle time is interrupted by bus voltage failure and continued after bus voltage recovery	Valve purge is inactive. Purge cycle time is interrupted during download and continued after download	Valve purge is inactive. Purge cycle time restarts.
Reference adjustment [only with operation mode Valve drive, motor-driven (3-point)]	The reference adjustment is triggered and cannot be interrupted. The control values are updated thereafter.		

Operation mode Switch actuator

Reaction	Bus voltage recovery	After download	After ETS reset, full download and application update
Status byte	Error bits are reset and set again if necessary	Error bits are reset and set again if necessary	Error bits are reset and set again if necessary
Object value Switch	Can be parameterized	Unchanged	0
Function Time **(enable or block)**	As before bus voltage failure	Can be parameterized via object value “Disable function time” If the object has not been assigned to a group address, the function Time is enabled.	Enabled
Staircase lighting duration	Is interrupted by bus voltage failure and continued after bus voltage recovery if necessary	Is interrupted by download and continued after download if necessary	Inactive
Flashing	Is interrupted by bus voltage failure and continued after bus voltage recovery if necessary	Is interrupted by download and continued after download if necessary	Inactive
Accept standard values for scenes	no	Can be parameterized	yes
Object value "Logical connection 1/2”	As before bus voltage failure	Can be parameterized	**Can be parameterized**
Function safety, safety functions priority 1/2/3 (forced operation, block)	As before bus voltage failure Monitoring time will be restarted.	Can be parameterized Monitoring time will be restarted.	Inactive Monitoring time will be restarted.
Function threshold			
Accept standard value for threshold 1	no	Can be parameterized	yes
Object value **Threshold input**	As before bus voltage failure	Can be parameterized	Can be parameterized

4.4 Priorities

Operation modes Valve drive, motor-driven (3-point) and thermoelectric (PWM)

The priorities for telegram processing are defined as follows:

1. Bus voltage failure
2. Reference adjustment (only in operation mode *Valve drive, motor-driven (3-point)*)
3. Manual operation
4. Safety functions (Forced operation/block)
5. Valve purge
6. Control fault
7. Control values (1 bit/1 byte)
8. Bus voltage recovery

Operation mode Switch actuator

The priorities for telegram processing are defined as follows:

1. Bus voltage failure
2. Manual operation
3. Safety functions (Forced operation/block)
4. Permanent ON
5. Function *Time (Staircase lighting, On and OFF delay, Flashing)*
6. Function *Logic*
7. Switching telegrams (switch, scene, threshold)
8. Bus voltage recovery

Note
1 corresponds with 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 x.1.2.1, Electronic Switch Actuator, x-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	Undervoltage/ Voltage failure	Short-circuit	Overload	Not used	Manual operation active	Safety priority 1, 2 or 3 active	Valve purge active	Status output/ 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	Undervoltage/ Voltage failure	Short-circuit	Overload	Not used	Manual operation active	Safety priority 1, 2 or 3 active	Valve purge active	Status output/ 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	Undervoltage/ Voltage failure	Short-circuit	Overload	Not used	Manual operation active	Safety priority 1, 2 or 3 active	Valve purge active	Status output/ 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	■	■	■	■	■	■	■	■

empty = value 0, ■ = value 1, applicable

A.3 Code table *Scene (8 bit),* DPT 18.001

The following table indicates the telegram code for an 8 bit scene in hexadecimal and binary code with the first 64 scenes. Normally when retrieving or storing a scene, an 8 bit value must be sent.

Bit no.		7	6	5	4	3	2	1	0		
8 bit value	Hexadecimal	Recall 0 Save 1	Not defined	Binary code	Binary code	Binary code	Binary code	Binary code	Binary code	Scene number	Recall R Save S No reaction –
0	00	0								1	R
1	01	0							■	2	R
2	02	0						■		3	R
3	03	0						■	■	4	R
4	04	0					■			5	R
5	05	0					■		■	6	R
6	06	0					■	■		7	R
7	07	0					■	■	■	8	R
8	08	0				■				9	R
9	09	0				■			■	10	R
10	0A	0				■		■		11	R
11	0B	0				■		■	■	12	R
12	0C	0				■	■			13	R
13	0D	0				■	■		■	14	R
14	0E	0				■	■	■		15	R
15	0F	0				■	■	■	■	16	R
16	10	0			■					17	R
17	11	0			■				■	18	R
18	12	0			■			■		19	R
19	13	0			■			■	■	20	R
20	14	0			■		■			21	R
21	15	0			■		■		■	22	R
22	16	0			■		■	■		23	R
23	17	0			■		■	■	■	24	R
24	18	0			■	■				25	R
25	19	0			■	■			■	26	R
26	1A	0			■	■		■		27	R
27	1B	0			■	■		■	■	28	R
28	1C	0			■	■	■			29	R
29	1D	0			■	■	■		■	30	R
30	1E	0			■	■	■	■		31	R
31	1F	0			■	■	■	■	■	32	R
32	20	0		■						33	R
33	21	0		■					■	34	R
34	22	0		■				■		35	R
35	23	0		■				■	■	36	R
36	24	0		■			■			37	R
37	25	0		■			■		■	38	R
38	26	0		■			■	■		39	R
39	27	0		■			■	■	■	40	R
40	28	0		■		■				41	R
41	29	0		■		■			■	42	R
42	2A	0		■		■		■		43	R
43	2B	0		■		■		■	■	44	R
44	2C	0		■		■	■			45	R
45	2D	0		■		■	■		■	46	R
46	2E	0		■		■	■	■		47	R
47	2F	0		■		■	■	■	■	48	R
48	30	0		■	■					49	R
49	31	0		■	■				■	50	R
50	32	0		■	■			■		51	R
51	33	0		■	■			■	■	52	R
52	34	0		■	■		■			53	R
53	35	0		■	■		■		■	54	R
54	36	0		■	■		■	■		55	R
55	37	0		■	■		■	■	■	56	R
56	38	0		■	■	■				57	R
57	39	0		■	■	■			■	58	R
58	3A	0		■	■	■		■		59	R
59	3B	0		■	■	■		■	■	60	R
60	3C	0		■	■	■	■			61	R
61	3D	0		■	■	■	■		■	62	R
62	3E	0		■	■	■	■	■		63	R
63	3F	0		■	■	■	■	■	■	64	R

Bit no.		7	6	5	4	3	2	1	0		
8 bit value	Hexadecimal	Recall 0 Save 1	Not defined	Binary code	Binary code	Binary code	Binary code	Binary code	Binary code	Scene number	Recall R Save S No reaction –
128	80	1								1	S
129	81	1							■	2	S
130	82	1						■		3	S
131	83	1						■	■	4	S
132	84	1					■			5	S
133	85	1					■		■	6	S
134	86	1					■	■		7	S
135	87	1					■	■	■	8	S
136	88	1				■				9	S
137	89	1				■			■	10	S
138	8A	1				■		■		11	S
139	8B	1				■		■	■	12	S
140	8C	1				■	■			13	S
141	8D	1				■	■		■	14	S
142	8E	1				■	■	■		15	S
143	8F	1				■	■	■	■	16	S
144	90	1			■					17	S
145	91	1			■				■	18	S
146	92	1			■			■		19	S
147	93	1			■			■	■	20	S
148	94	1			■		■			21	S
149	95	1			■		■		■	22	S
150	96	1			■		■	■		23	S
151	97	1			■		■	■	■	24	S
152	98	1			■	■				25	S
153	99	1			■	■			■	26	S
154	9A	1			■	■		■		27	S
155	9B	1			■	■		■	■	28	S
156	9C	1			■	■	■			29	S
157	9D	1			■	■	■		■	30	S
158	9E	1			■	■	■	■		31	S
159	9F	1			■	■	■	■	■	32	S
160	A0	1		■						33	S
161	A1	1		■					■	34	S
162	A2	1		■				■		35	S
163	A3	1		■				■	■	36	S
164	A4	1		■			■			37	S
165	A5	1		■			■		■	38	S
166	A6	1		■			■	■		39	S
167	A7	1		■			■	■	■	40	S
168	A8	1		■		■				41	S
169	A9	1		■		■			■	42	S
170	AA	1		■		■		■		43	S
171	AB	1		■		■		■	■	44	S
172	AC	1		■		■	■			45	S
173	AD	1		■		■	■		■	46	S
174	AE	1		■		■	■	■		47	S
175	AF	1		■		■	■	■	■	48	S
176	B0	1		■	■					49	S
177	B1	1		■	■				■	50	S
178	B2	1		■	■			■		51	S
179	B3	1		■	■			■	■	52	S
180	B4	1		■	■		■			53	S
181	B5	1		■	■		■		■	54	S
182	B6	1		■	■		■	■		55	S
183	B7	1		■	■		■	■	■	56	S
184	B8	1		■	■	■				57	S
185	B9	1		■	■	■			■	58	S
186	BA	1		■	■	■		■		59	S
187	BB	1		■	■	■		■	■	60	S
188	BC	1		■	■	■	■			61	S
189	BD	1		■	■	■	■		■	62	S
190	BE	1		■	■	■	■	■		63	S
191	BF	1		■	■	■	■	■	■	64	S

empty = value 0

■ = value 1, applicable

A.4 Ordering information

Device type	Product name	Order code	bbn 40 16779 EAN	Price group	Weight 1 pc. [kg]	Pack unit [Pcs]
ES/S 4.1.2.1	Electronic Switch Actuator, 4-fold, 1 A, MDRC	2CDG 110 058 R0011	**67206 1**	P2	0.25	1
ES/S 8.1.2.1	Electronic Switch Actuator, 8-fold, 1 A, MDRC	2CDG 110 058 R0011	**67207 8**	P2	0.38	1

A.5 Accessories

Device type	Product name	Order code	bbn 40 16779 EAN	Price group	Weight 1 pc. [kg]	Pack unit [Pcs]
TSA/K 230.1	Electrothermal Valve Drive, 230 V, Normally Closed	2CDG 110 007 R0011	**65299 5**	P3	0.1	1
TSA/K 230.1	Electrothermal Valve Drive, 24 V, Normally Closed	2CDG 110 008 R0011	**65300 8**	P3	0.1	1
VA/Z 10.1	Valve Adapter (M30 x 1.5) for Dumser, Chronatherm, Vescal, KaMo	2CDG 110 009 R0011	**65319 0**	P3	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**	P3	0.01	1
VA/Z 78.1	Valve Adapter (Flange) for Danfoss RA	2CDG 110 011 R0011	**65321 3**	P3	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**	P3	0.01	1

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