ABB i-bus® KNX
Fan Coil Actuators FCA/S
Product Manual

Power and productivity
for a better world™

ABB i-bus® KNX
Contents

1 General

Fans, also referred to as blower convectors or Fan Coil units, are used for distributed heating and cooling applications. They are installed in rooms and powered via central heating and cooling systems. Using fans, room temperature can be quickly adjusted to suit individual preferences.

Fan Coil Actuators switch multi-level fans with up to three fan speeds via floating contacts. Three inputs are available, for monitoring of a window contact and the dew point or for connecting temperature sensors. An additional contact is possible, for example, for control of an electric heater.

Fan Coil Actuators vary in the way they control the valves.

The Fan Coil Actuators FCA/S 1.1.x.2 have two outputs for control of motor power operated or thermal heating and cooling valves.

The Fan Coil Actuators FCA/S 1.2.x.2 have two outputs for control of analog heating and cooling valves.

1.1 Using the product manual

This manual provides detailed technical information on the function, installation and programming of the ABB i-bus® KNX device. The application is explained using examples.

This manual is divided into the following chapters:

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

1.1.1 Notes

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.

Attention
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 to life and limb with inappropriate use.

⚠ ⚡ **Danger**
These safety instructions are used if there is an extreme danger to life with inappropriate use.

1.2 Product and functional overview

The Fan Coil Actuators FCA/S control a single-phase fan with up to three fan speeds via a step or changeover control. In the operation mode *Changeover*, the actuators ensure that no two fan speeds can be switched on simultaneously. An additional programmable switch-over delay is provided for this purpose. Three-phase drives are not supported. The output can be used for control of an electrical load. Manual operation of the device is possible in the variants FCA/S 1.1.2.2 and FCA/S 1.2.2.2.

Fan Coil Actuators control motor power operated, thermal or analog heating and cooling valves, as well as multi-level fans, via the outputs.

Three inputs are available, e.g. as signaling contacts for window contact and dew point monitoring or as temperature inputs. The scanning voltage for the inputs is provided by the device.

The devices are modular installation devices in Pro *M* design with 6-module widths for installation in a distribution board. Connection to the ABB i-bus® KNX is via the front bus connection terminal. The devices require no auxiliary voltage. The assignment of the physical address, as well as the setting of parameters, is carried out with Engineering Tool Software ETS.

Product name description:

Abbreviation	**Description**		
F	Fan		
C	Coil		
A	Actuator		
/S	MDRC		
x.	1	=	1-fold
x.	1	=	Electronic Valve Drives (PWM)
	2	=	Analog Valve Drives (0…10 V)
x.	1	=	Without manual operation
	2	=	With manual operation
x	x	=	Version number x = 1, 2, etc.

1.2.1 Product overview

	FCA/S 1.1.1.2	**FCA/S 1.1.2.2**	**FCA/S 1.2.1.2**	**FCA/S 1.2.2.2**
Operation				
Manual operation	-	x	-	x
Inputs				
Contact scanning or temperature sensor	x	x	x	x
Outputs				
Switching contact 6 A or fan	x	x	x	x
Switching contact 16 A (10 AX)	x	-	x	-
Switching contact 20 AX	-	x	-	x
Electronic 0.5 A	x	x	-	-
Analog 0…10 V	-	-	x	x

With manual operation, the E button activates the device at fan speed 1. The speed can then be increased to fan speed 2 and fan speed 3 by pressing buttons F and G respectively. To decrease the speed, the buttons must be pressed in the reverse order. Only then can the device be deactivated by pressing button E.

1.2.2 Functional overview

	FCA/S 1.1.1.2	FCA/S 1.1.2.2	FCA/S 1.2.1.2	FCA/S 1.2.2.2
Inputs	**3**	**3**	**3**	**3**
Switch sensor, e.g. window contact	1	1	1	1
Value/forced operation, e.g. operating mode	1	1	1	1
Temperature sensor, e.g. exhaust temperature	1	1	1	1
Outputs 6 A switch	**3**	**3**	**3**	**3**
3-speed fan or	1	1	1	1
2-speed fan or	1	1	1	1
1-speed fan or	1	1	1	1
3 individual outputs	3	3	3	3
Outputs 16 A (10 AX) switch	**1**	**-**	**1**	**-**
Electrical auxiliary heater	1	-	1	-
Outputs 20 AX switch	**-**	**1**	**-**	**1**
Electrical auxiliary heater	-	1	-	1
Outputs electronic 0.5 A	**4**	**4**	**-**	**-**
Thermoelectric Valve Drives (PWM)	4	4	-	-
Motor-Driven Valve Drives (3-point)	2	2	-	-
Outputs analog 0...10 V	**-**	**-**	**2**	**2**
Analogue Valve Drives	-	-	2	2

1.2.3 Integration in the i-bus® Tool

The device possesses an interface to the i-bus® Tool.

The i-bus® Tool can be used to read out data and test functions on the connected device.

In addition, sensor data can be simulated for test purposes. If there is no communication, no output values (measured values, thresholds) can be sent to the bus, even if they were simulated using the i-bus® Tool. The output values are still sent to the bus if cyclical sending is selected.

The i-bus® tool can be used to define temperature values via the communication object, so that the KNX system can be tested during commissioning without the need to connect a temperature sensor.

The i-bus® Tool can be downloaded for free from our website (*www.abb.com/knx).*

ETS is not required for the Software Tool. However, Falcon Runtime (version 1.6 or higher and version 1.8 or higher for Windows 7) must be installed to set up a connection between the PC and KNX.

A description of the functions can be found in the online help of the i-bus® Tool.

2 Device technology

2.1 Fan Coil Actuator FCA/S 1.1.1.2, PWM, MDRC

2CDC071001S0015

The device is a modular installation device (MDRC) in Pro *M* design. It is intended for installation in distribution boards on 35 mm mounting rails. The assignment of the physical addresses as well as the parameterization is carried out with ETS.

The device is powered via the ABB i-bus® KNX and requires no additional auxiliary voltage supply. The device is ready for operation after connecting the bus voltage.

2.1.1 Technical data

Supply	Bus voltage	21…32 V DC
	Current consumption, bus	< 12 mA
	Leakage loss, bus	Maximum 250 mW
	Leakage loss, device	Maximum 3.05 W*
*The maximum power consumption of the device results from the following specifications:	KNX connection	0.25 W
	Relay 16 A	1.0 W
	Relay 6 A	0.6 W
	Electronic outputs	1.2 W
Connections	KNX	Via bus connection terminal
	Inputs/Outputs	Via screw terminals
Connection terminals	Screw terminal	Screw terminal with universal head (PZ 1)
		0.2…4 mm² stranded, 2 x (0.2…2.5 mm²)
		0.2…6 mm² single core, 2 x (0.2…4 mm²)
	Ferrules without/with plastic sleeves	Without: 0.25…2.5 mm²
		With: 0.25…4 mm²
	TWIN ferrules	0.5…2.5 mm²
		Contact pin length min. 10 mm
	Tightening torque	Maximum 0.6 Nm
	Grid	6.35

ABB i-bus® KNX
Device technology

Operating and display elements	Button/LED ○ ●	For assignment of the physical address
	Button ⊗/, LED ●	For toggling between manual operation/ operation via ABB i-bus® KNX and displays
Protection	IP 20	To DIN EN 60 529
Protection class	II	To DIN EN 61 140
Isolation category	Overvoltage category	III to DIN EN 60 664-1
	Pollution degree	II to DIN EN 60 664-1
KNX safety extra low voltage	SELV 24 V DC	
Temperature range	Operation	-5 °C…+45 °C
	Transport	-25…+70 °C
	Storage	-25…+55 °C
	Temperatures exceeding +45 °C reduce the service life!	
Ambient conditions	Maximum air humidity	93 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro*M*
	Dimensions	108 x 90 x 64.5 mm (H x W x D)
	Mounting width in space units	6x 18 mm modules
	Mounting depth	64.5 mm
Mounting	On 35 mm mounting rail	To DIN EN 60 715
Installation position	Any	
Weight	0.3 kg	
Housing/color	Plastic housing, gray	
Approvals	KNX to EN 50 090-1, -2	Certification
CE mark	In accordance with the EMC guideline and low voltage guideline	

Device type	Application	Maximum number of communication objects	Maximum number of group addresses	Maximum number of assignments
FCA/S 1.1.1.2	Fan Coil Actuator PWM/...*	70	254	255

* … = Current version number of the application. **Please refer to the software information on our website for this purpose.**

> **Note**
>
> ETS and the current version of the device application are required for programming.
>
> The current version of the application is available on the Internet for download at *www.abb.com/knx*. After import into ETS it appears in the *Catalogs* window under *Manufacturers/ABB/Heating, Ventilation, Air Conditioning/Fan Coil Actuator PWM*.
>
> The device does not support the locking function of a KNX device in ETS. If you use a *BCU code* to inhibit access to all the project devices, this has no effect on this device. Data can still be read and programmed.

2.1.2 Outputs, valve (thermoelectric, PWM)

Rated values	Quantity	4, non-isolated, short-circuit proofed
	U_n rated voltage	24…230 V AC (50/60 Hz)
	I_n rated current (per output pair)	0.5 A
	Continuous current	0.5 A resistive load at T_u up to 20 °C
		0.3 A resistive load at T_u up to 60 °C
	Starting current	Maximum 1.6 A, 10 s at T_u up to 60 °C
		T_u = ambient temperature
	Minimum load	0.5 VA per PWM output

2.1.3 Outputs, valve (motor-driven, 3-point)

Rated values	Quantity	2, non-isolated, short-circuit proofed
	U_n rated voltage	24…230 V AC (50/60 Hz)
	I_n rated current (per output pair)	0.5 A
	Continuous current	0.5 A resistive load at T_u up to 20 °C
		0.3 A resistive load at T_u up to 60 °C
	Starting current	Maximum 1.6 A, 10 s at T_u up to 60 °C
		T_u = ambient temperature
	Minimum load	0.5 VA per PWM output

2.1.4 Inputs

Rated values	Quantity	3
Contact scanning		Floating
	Scanning current	1 mA
	Scanning voltage	10 V
Resistance		PT100 2-conductor technology,
		PT1000 2-conductor technology,
		A selection of KT/KTY 1,000/2,000, user defined
	Resolution, accuracy and tolerances	See next page
Cable length	Between sensor and device input	Maximum 30 m, simple

2.1.5 Resolution, accuracy and tolerances

Please note that the tolerances of the sensors which are used will need to be added to the listed values.

With sensors based on resistance measurement, it is also necessary to consider the cable error.

In the supplied state of the device, the stated accuracies will not be initially achieved. After initial commissioning, the device performs an autonomous calibration of the analogue measurement circuit. This calibration takes about an hour and is performed in the background. It is undertaken regardless of whether or not the device is parameterized and is independent of the connected sensors. The normal function of the device is not affected. After calibration has been completed, the calibration values which have been determined will be stored in the non-volatile memory. Thereafter, the device will achieve this level of accuracy every time it is switched on. If the calibration is interrupted by programming or bus voltage failure, it will recommence every time it is restarted. The ongoing calibration is displayed in the status byte by a 1 in bit 4.

2.1.6 Resistance signals

Sensor signal	**Resolution**	**Accuracy at 25 °C T_u*3**	**Accuracy at 0…50 °C T_u*3**	**Accuracy at -20…70 °C T_u*3**	**Remark**
PT100*4	0.01 ohm	±0.15 ohm	±0.2 ohm	±0.25 ohm	0.1 ohm = 0.25 °C
PT1000*4	0.1 ohm	±1.5 ohms	±2.0 ohms	±2.5 ohms	1 ohm = 0.25 °C
KT/KTY 1,000*4	1 ohm	±2.5 ohms	±3.0 ohms	±3.5 ohms	1 ohm = 0.125 °C/at 25 °C
KT/KTY 2,000*4	1 ohm	±5 ohms	±6.0 ohms	±7.0 ohms	1 ohm = 0.064 °C/at 25 °C

*3 in addition to current measured value at ambient temperature (T_u)

*4 incl. cable and sensor errors

PT100

The PT100 is precise and exchangeable but subject to faults in the cables (cable resistance and heating of the cables). A terminal resistance of just 200 milliohms causes a temperature error of 0.5 °C.

PT1000

The PT1000 responds just like the PT100, but the influences of cable errors are lower by a factor of 10. Use of this sensor is preferred.

KT/KTY

The KT/KTY has a low level of accuracy, can only be exchanged under certain circumstances and can only be used for very simple applications.

Please note that there are different tolerance classes for the sensors in the versions PT100 and PT1000.

The table indicates the individual classes according to IEC 60 751 (date: 2008):

Description	Tolerance
Class AA	0.10 °C + (0.0017 x t)
Class A	0.15 °C + (0.002 x t)
Class B	0.30 °C + (0.005 x t)
Class C	0.60 °C + (0.01 x t)

t = Current temperature

Example for class B:

At 100 °C, the deviations of the measurement value are reliable up to ± 0.8 °C

2.1.7 Fan, rated current 6 A

Rated values	Number	3 contacts
	U_{n1} rated voltage	250/440 V AC (50/60 Hz)
	I_{n1} rated current (per output)	6 A
Switching currents	AC3* operation (cos φ = 0.45) to DIN EN 60 947-4-1	6 A/230 V
	AC1* operation (cos φ = 0.8) to DIN EN 60 947-4-1	6 A/230 V
	Fluorescent lighting load to DIN EN 60 669-1	6 A/250 V (35 µF)[1]
	Minimum switching capacity	20 mA/5 V 10 mA/12 V 7 mA/24 V
	DC current switching capacity (resistive load)	6 A/24 V=
Service life	Mechanical service life	> 10^7
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/cos φ = 0.8)	> 10^5
	AC3* (240 V/cos φ = 0.45)	> 1.5 x 10^4
	AC5a* (240 V/cos φ = 0.45)	> 1.5 x 10^4
Switching times[2])	Maximum relay position change per output and minute if only one relay is switched.	2,683

[1] The maximum inrush current peak may not be exceeded.

[2] The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds. Typical delay of the relay is approx. 20 ms.

***What do the terms AC1, AC3 and AC5a mean?**

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 – Non-inductive or slightly inductive load, resistive furnaces (relates to switching of ohmic/resistive loads)

AC3 – Squirrel-cage motors: starting, switching off motors during running (relates to (inductive) motor load)

AC5a – Switching of electric discharge lamps

These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

2.1.8 Fan, lamp load 6 A

Lamps	Incandescent lamp load	1,200 W
Fluorescent lamps T5/T8	Uncompensated	800 W
	Parallel compensated	300 W
	DUO circuit	350 W
Low-voltage halogen lamps	Inductive transformer	800 W
	Electronic transformer	1,000 W
	Halogen lamps 230 V	1,000 W
Dulux lamp	Uncompensated	800 W
	Parallel compensated	800 W
Mercury-vapor lamp	Uncompensated	1,000 W
	Parallel compensated	800 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	200 A
	Maximum peak inrush current I_p (250 µs)	160 A
	Maximum peak inrush current I_p (600 µs)	100 A
Number of electronic ballasts (T5/T8, single element)[1)]	18 W (ABB EVG 1 x 18 SF)	10
	24 W (ABB EVG-T5 1 x 24 CY)	10
	36 W (ABB EVG 1 x 36 CF)	7
	58 W (ABB EVG 1 x 58 CF)	5
	80 W (Helvar EL 1 x 80 SC)	3

[1)] For multiple element lamps or other types, the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

2.1.9 Output, rated current 16 A

Rated values	Quantity	1
	U_{n2} rated voltage	250/440 V AC (50/60 Hz)
	I_{n2} rated current	16 A
Switching currents	AC3* operation (cos φ = 0.45) to DIN EN 60 947-4-1	8 A/230 V
	AC1* operation (cos φ = 0.8) to DIN EN 60 947-4-1	16 A/230 V
	Fluorescent lighting load AX to EN 60 669-1	16 A/250 V (70 µF)[1)]
	Minimum switching capacity	100 mA/12 V
		100 mA/24 V
	DC current switching capacity (resistive load)	16 A/24 V=
Service life	Mechanical service life	> 3 x 10^6
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/cos φ = 0.8)	> 10^5
Switching times[2)]	Maximum relay position change per output and minute if only one relay is switched.	313

[1)] The maximum inrush current peak may not be exceeded.

[2)] The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds. Typical delay of the relay is approx. 20 ms.

***What do the terms AC1, AC3 and AC5a mean?**

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 –	Non-inductive or slightly inductive load, resistive furnaces (relates to switching of ohmic/resistive loads)
AC3 –	Squirrel-cage motors: starting, switching off motors during running (relates to (inductive) motor load)
AC5a –	Switching of electric discharge lamps

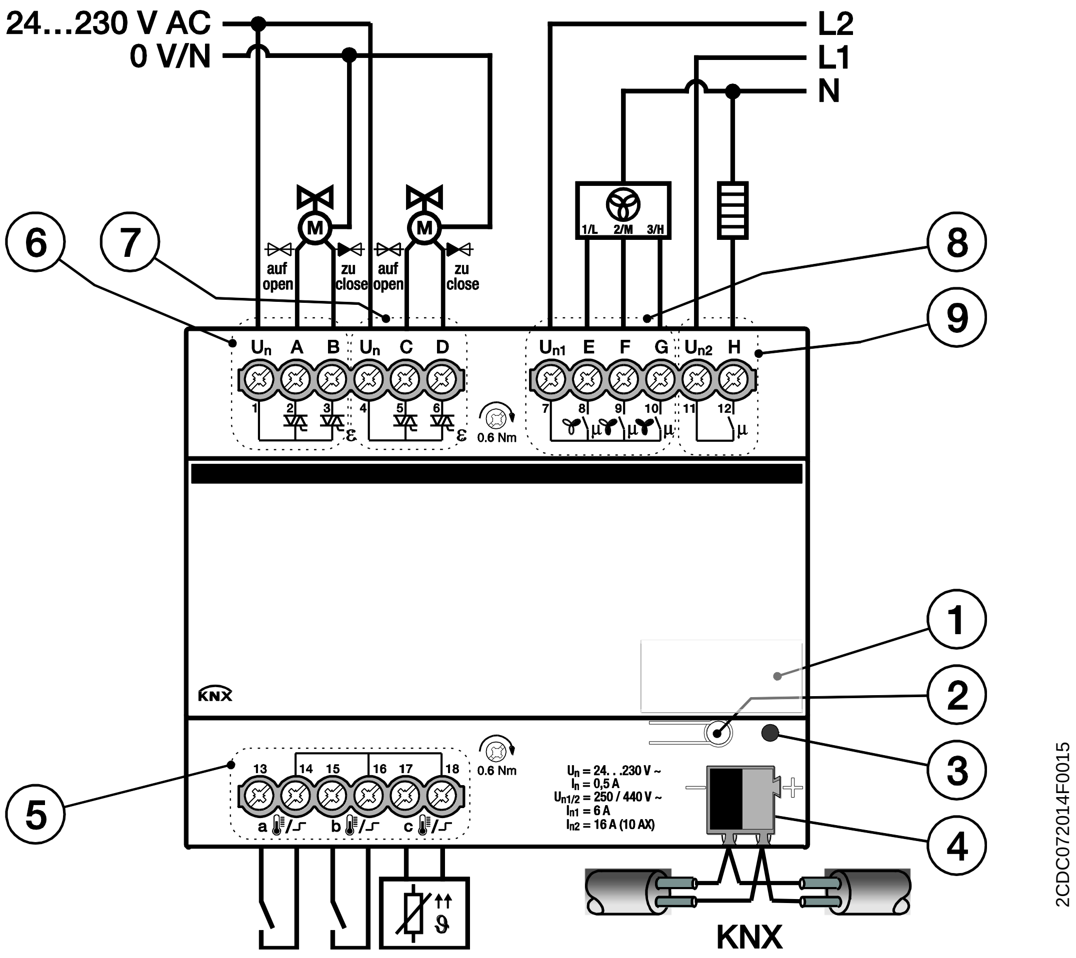
These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

2.1.10 Output, lamp load 16 A

Lamps	Incandescent lamp load	2,500 W
Fluorescent lamps T5/T8	Uncompensated	2,500 W
	Parallel compensated	1,500 W
	DUO circuit	1,500 W
Low-voltage halogen lamps	Inductive transformer	1,200 W
	Electronic transformer	1,500 W
	Halogen lamps 230 V	2,500 W
Dulux lamp	Uncompensated	1,100 W
	Parallel compensated	1,100 W
Mercury-vapor lamp	Uncompensated	2,000 W
	Parallel compensated	2,000 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	400 A
	Maximum peak inrush current I_p (250 µs)	320 A
	Maximum peak inrush current I_p (600 µs)	200 A
Number of electronic ballasts (T5/T8, single element)1)	18 W (ABB EVG 1 x 18 SF)	23
	24 W (ABB EVG-T5 1 x 24 CY)	23
	36 W (ABB EVG 1 x 36 CF)	14
	58 W (ABB EVG 1 x 58 CF)	11
	80 W (Helvar EL 1 x 80 SC)	10

1) For multiple element lamps or other types the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

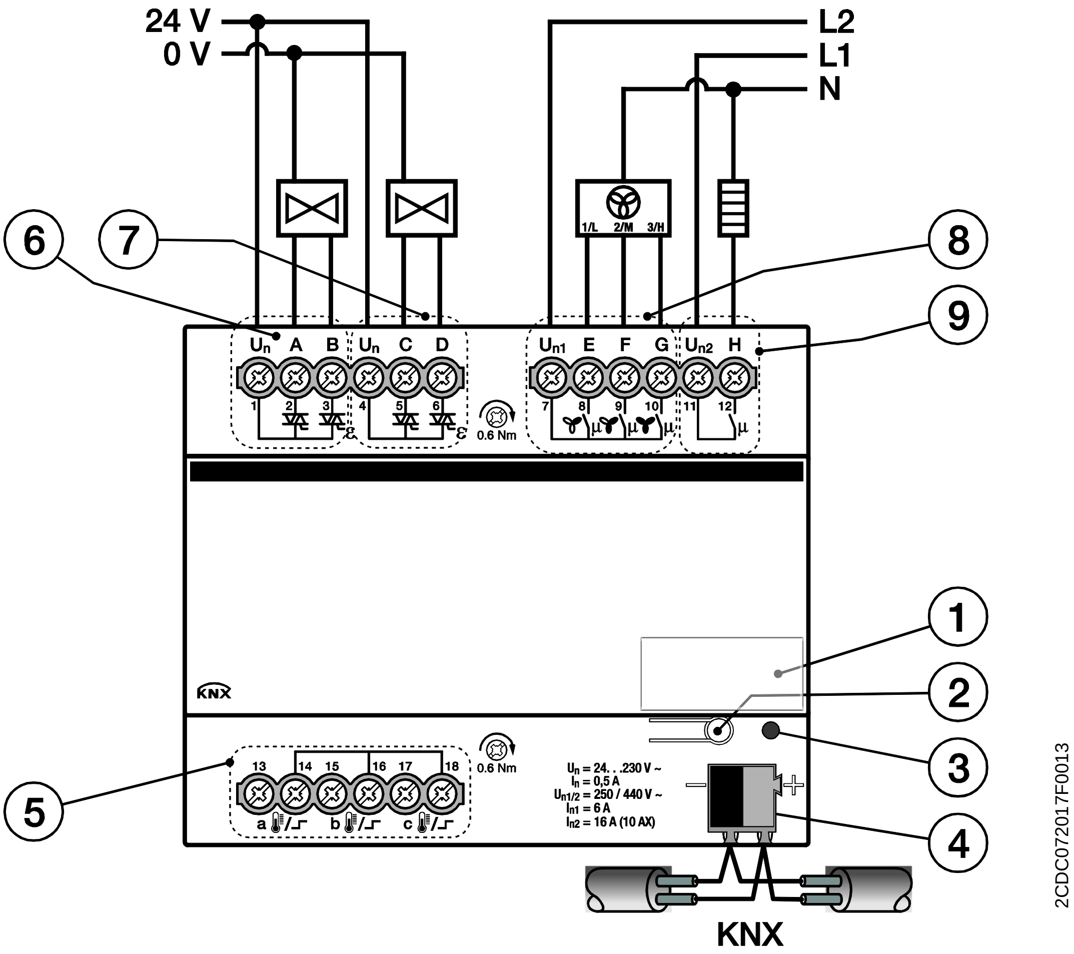
2.1.11 Connection schematic (thermoelectric, PWM)



FCA/S 1.1.1.2

1 Label carrier
2 *Programming* button
3 *Programming* LED ● (red)
4 Bus connection terminal
5 Inputs a, b, c
6 Valve V1 (e.g. heating)
7 Valve V2 (e.g. cooling)
8 Fan
9 Output H

2.1.12 Connection schematic (motor-driven, 3-point)



FCA/S 1.1.1.2

1 Label carrier

2 *Programming* button

3 *Programming* LED ● (red)

4 Bus connection terminal

5 Inputs a, b, c

6 Valve V1 (e.g. heating)

7 Valve V2 (e.g. cooling)

8 Fan

9 Output H

All outputs can be controlled independently.

The following table provides an overview of the functions possible with the outputs of the Fan Coil Actuator and the application:

Functions of the output	**A**	**B**	**C**	**D**
General				
- Overload	■		■	
- Parallel operation	■	free	■	free
Valve drives allocated to the Fan Coil unit				
- Thermoelectric (PWM)	■	■	■	■
- 1 control value/1 valve	■	free	free	free
- 2 control values/1 valve	■	free	free	free
- 2 control values/2 valves	■	free	■	free
Setting facilities for valve drives				
- Thermoelectric (PWM)				
- Separate heating/cooling	■	■	■	■
- Direction	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE
- Motor-driven (3-point)				
- Separate heating/cooling	■		■	
- Direction	OPEN	CLOSE	OPEN	CLOSE

■ = Function is supported

- = Function is not supported

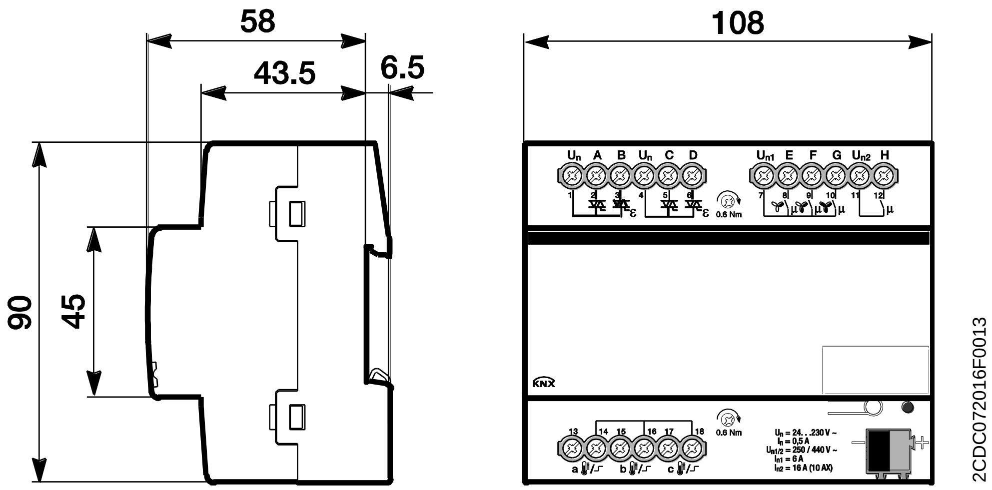
free = Is available and can be used separately

Functions of the output	**E**	**F**	**G**	**H**
Switch function				
Normally closed/Normally open contact	■	■	■	■
Time				
Staircase lighting	■	■	■	■
Fan				
Level	1	2	3	-

■ = Function is supported

- = Function is not supported

2.1.13 Dimension drawing



2.2 Fan Coil Actuator FCA/S 1.1.2.2, PWM, MDRC

2CDC071002S0015

The device is a modular installation device (MDRC) in Pro *M* design. It is intended for installation in distribution boards on 35 mm mounting rails. The assignment of the physical addresses as well as the parameterization is carried out with ETS.

The device is powered via the ABB i-bus® KNX and requires no additional auxiliary voltage supply. The device is ready for operation after connecting the bus voltage.

2.2.1 Technical data

Supply	Bus voltage	21…32 V DC
	Current consumption, bus	< 12 mA
	Leakage loss, bus	Maximum 250 mW
	Leakage loss, device	Maximum 3.05 W*
*The maximum power consumption of the device results from the following specifications:	KNX connection	0.25 W
	Relay 16 A	1.0 W
	Relay 6 A	0.6 W
	Electronic outputs	1.2 W
Connections	KNX	Via bus connection terminal
	Inputs/Outputs	Via screw terminals
Connection terminals	Screw terminal	Screw terminal with universal head (PZ 1)
		0.2…4 mm^2 stranded, 2 x (0.2…2.5 mm^2)
		0.2…6 mm^2 single core, 2 x (0.2…4 mm^2)
	Ferrules without/with plastic sleeves	Without: 0.25…2.5 mm^2
		With: 0.25…4 mm^2
	TWIN ferrules	0.5…2.5 mm^2
		Contact pin length min. 10 mm
	Tightening torque	Maximum 0.6 Nm
	Grid	6.35

Operating and display elements	Button/LED ⊸ ●	For assignment of the physical address
	Button ✋/LED ●	For toggling between manual operation/ operation via ABB i-bus® KNX and displays
	Button *output H* / switch H	For switching and display
	Fan speed button E, F, G	For switching the individual fan speeds
	LED E, F, G	For display of fan speed 1, 2, 3
	Buttons A, B, C, D	For opening/closing the valve
	LED A, B, C, D	For displaying the valve position
	Button ⓐ/LED ●	For switching and display
	Button ⓑ/LED ●	For switching and display
	Button ⓒ/LED ●	For switching and display
Protection	IP 20	To DIN EN 60 529
Protection class	II	To DIN EN 61 140
Isolation category	Overvoltage category	III to DIN EN 60 664-1
	Pollution degree	II to DIN EN 60 664-1
KNX safety extra low voltage	SELV 24 V DC	
Temperature range	Operation	-5 °C…+45 °C
	Transport	-25…+70 °C
	Storage	-25…+55 °C
	Temperatures exceeding +45 °C reduce the service life!	
Ambient conditions	Maximum air humidity	93 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro*M*
	Dimensions	108 x 90 x 64.5 mm (H x W x D)
	Mounting width in space units	6x 18 mm modules
	Mounting depth	64.5 mm
Mounting	On 35 mm mounting rail	To DIN EN 60 715
Installation position	Any	
Weight	0.3 kg	
Housing/color	Plastic housing, gray	
Approvals	KNX to EN 50 090-1, -2	Certification
CE mark	In accordance with the EMC guideline and low voltage guideline	

Device type	Application	Maximum number of communication objects	Maximum number of group addresses	Maximum number of assignments
FCA/S 1.1.2.2	Fan Coil Actuator PWM M/...*	70	254	255

* … = Current version number of the application. **Please refer to the software information on our website for this purpose.**

Note

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

The current version of the application is available on the Internet for download at *www.abb.com/knx*. After import into ETS it appears in the *Catalogs* window under *Manufacturers/ABB/Heating, Ventilation, Air Conditioning/Fan Coil Actuator PWM*.

The device does not support the locking function of a KNX device in ETS. If you use a *BCU code* to inhibit access to all the project devices, this has no effect on this device. Data can still be read and programmed.

2.2.2 Outputs, valve (thermoelectric, PWM)

Rated values	Quantity	4, non-isolated, short-circuit proofed
	U_n rated voltage	24…230 V AC (50/60 Hz)
	I_n rated current (per output pair)	0.5 A
	Continuous current	0.5 A resistive load at T_u up to 20 °C
		0.3 A resistive load at T_u up to 60 °C
	Starting current	Maximum 1.6 A, 10 s at T_u up to 60 °C
		T_u = ambient temperature
	Minimum load	0.5 VA per PWM output

2.2.3 Outputs, valve (motor-driven, 3-point)

Rated values	Quantity	2, non-isolated, short-circuit proofed
	U_n rated voltage	24…230 V AC (50/60 Hz)
	I_n rated current (per output pair)	0.5 A
	Continuous current	0.5 A resistive load at T_u up to 20 °C
		0.3 A resistive load at T_u up to 60 °C
	Starting current	Maximum 1.6 A, 10 s at T_u up to 60 °C
		T_u = ambient temperature
	Minimum load	0.5 VA per PWM output

2.2.4 Inputs

Rated values	Quantity	3
Contact scanning		Floating
	Scanning current	1 mA
	Scanning voltage	10 V
Resistance		0…1,000 ohms,
		PT100 2-conductor technology,
		PT1000 2-conductor technology,
		A selection of KT/KTY 1,000/2,000, user defined
	Resolution, accuracy and tolerances	See next page
Cable length	Between sensor and device input	Maximum 30 m, simple

2.2.5 Resolution, accuracy and tolerances

Please note that the tolerances of the sensors which are used will need to be added to the listed values.

With sensors based on resistance measurement, it is also necessary to consider the cable error.

In the supplied state of the device, the stated accuracies will not be initially achieved. After initial commissioning, the device performs an autonomous calibration of the analogue measurement circuit. This calibration takes about an hour and is performed in the background. It is undertaken regardless of whether or not the device is parameterized and is independent of the connected sensors. The normal function of the device is not affected. After calibration has been completed, the calibration values which have been determined will be stored in the non-volatile memory. Thereafter, the device will achieve this level of accuracy every time it is switched on. If the calibration is interrupted by programming or bus voltage failure, it will recommence every time it is restarted. The ongoing calibration is displayed in the status byte by a 1 in bit 4.

2.2.6 Resistance signals

Sensor signal	**Resolution**	**Accuracy at 25 °C T_u*3**	**Accuracy at 0…50 °C T_u*3**	**Accuracy at -20…70 °C T_u*3**	**Remark**
0...1,000 ohms	0.1 ohm	±1.0 ohm	±1.5 ohms	±2 ohms	
PT100*4	0.01 ohm	±0.15 ohm	±0.2 ohm	±0.25 ohm	0.1 ohm = 0.25 °C
PT1000*4	0.1 ohm	±1.5 ohms	±2.0 ohms	±2.5 ohms	1 ohm = 0.25 °C
KT/KTY 1000*4	1 ohm	±2.5 ohms	±3.0 ohms	±3.5 ohms	1 ohm = 0.125 °C/at 25 °C
KT/KTY 2000*4	1 ohm	±5 ohms	±6.0 ohms	±7.0 ohms	1 ohm = 0.064 °C/at 25 °C

*3 in addition to current measured value at ambient temperature (T_u)

*4 incl. cable and sensor errors

PT100

The PT100 is precise and exchangeable but subject to faults in the cables (cable resistance and heating of the cables). A terminal resistance of just 200 milliohms causes a temperature error of 0.5 °C.

PT1000

The PT1000 responds just like the PT100, but the influences of cable errors are lower by a factor of 10. Use of this sensor is preferred.

KT/KTY

The KT/KTY has a low level of accuracy, can only be exchanged under certain circumstances and can only be used for very simple applications.

Please note that there are different tolerance classes for the sensors in the versions PT100 and PT1000.

The table indicates the individual classes according to IEC 60 751 (date: 2008):

Description	Tolerance
Class AA	0.10 °C + (0.0017 x t)
Class A	0.15 °C + (0.002 x t)
Class B	0.30 °C + (0.005 x t)
Class C	0.60 °C + (0.01 x t)
t = Current temperature	

Example for class B:

At 100 °C, the deviations of the measurement value are reliable up to ± 0.8 °C

2.2.7 Fan, rated current 6 A

Rated values	Number	3 contacts
	U_{n1} rated voltage	250/440 V AC (50/60 Hz)
	I_{n1} rated current (per output)	6 A
Switching currents	AC3* operation (cos φ = 0.45) to DIN EN 60 947-4-1	6 A/230 V
	AC1* operation (cos φ = 0.8) to DIN EN 60 947-4-1	6 A/230 V
	Fluorescent lighting load to DIN EN 60 669-1	6 A/250 V (35 µF)[1]
	Minimum switching capacity	20 mA/5 V
		10 mA/12 V
		7 mA/24 V
	DC current switching capacity (resistive load)	6 A/24 V=
Service life	Mechanical service life	> 10^7
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/cos φ = 0.8)	> 10^5
	AC3* (240 V/cos φ = 0.45)	> 1.5 x 10^4
	AC5a* (240 V/cos φ = 0.45)	> 1.5 x 10^4
Switching times[2])	Maximum relay position change per output and minute if only one relay is switched.	2,683

[1] The maximum inrush current peak may not be exceeded.

[2] The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds.
Typical delay of the relay is approx. 20 ms.

***What do the terms AC1, AC3 and AC5a mean?**

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 – Non-inductive or slightly inductive load, resistive furnaces (relates to switching of ohmic/resistive loads)

AC3 – Squirrel-cage motors: starting, switching off motors during running (relates to (inductive) motor load)

AC5a – Switching of electric discharge lamps

These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

2.2.8 Fan, lamp load 6 A

Lamps	Incandescent lamp load	1,200 W
Fluorescent lamps T5/T8	Uncompensated	800 W
	Parallel compensated	300 W
	DUO circuit	350 W
Low-voltage halogen lamps	Inductive transformer	800 W
	Electronic transformer	1,000 W
	Halogen lamps 230 V	1,000 W
Dulux lamp	Uncompensated	800 W
	Parallel compensated	800 W
Mercury-vapor lamp	Uncompensated	1,000 W
	Parallel compensated	800 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	200 A
	Maximum peak inrush current I_p (250 µs)	160 A
	Maximum peak inrush current I_p (600 µs)	100 A
Number of electronic ballasts (T5/T8, single element)1)	18 W (ABB EVG 1 x 18 SF)	10
	24 W (ABB EVG-T5 1 x 24 CY)	10
	36 W (ABB EVG 1 x 36 CF)	7
	58 W (ABB EVG 1 x 58 CF)	5
	80 W (Helvar EL 1 x 80 SC)	3

1) For multiple element lamps or other types, the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

2.2.9 Output, rated current 20 AX

Rated values	Quantity	1
	U_{n2} rated voltage	250/440 V AC (50/60 Hz)
	I_{n2} rated current	20 A
Switching currents	AC3* operation (cos φ = 0.45) to DIN EN 60 947-4-1	16 A/230 V
	AC1* operation (cos φ = 0.8) to DIN EN 60 947-4-1	20 A/230 V
	Fluorescent lighting load AX to DIN EN 60 669-1	20 A/250 V (140 μF)1)
	Minimum switching capacity	100 mA/12 V
		100 mA/24 V
	DC current switching capacity (resistive load)	20 A/24 V=
Service life	Mechanical service life	> 10^6
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/cos φ = 0.8)	> 10^5
	AC3* (240 V/cos φ = 0.45)	> 3 x 10^4
	AC5a (240 V/cos φ = 0.45)	> 3 x 10^4
Switching times2)	Maximum relay position change per output and minute if only one relay is switched.	93

1) The maximum inrush current peak may not be exceeded.

2) The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds.
Typical delay of the relay is approx. 20 ms.

***What do the terms AC1, AC3 and AC5a mean?**

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 –	Non-inductive or slightly inductive loads, resistive furnaces (relates to switching of ohmic/resistive loads)
AC3 –	Squirrel-cage motors: Starting, switching off motors during running (relates to (inductive) motor load)
AC5a –	Switching of electric discharge lamps

These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

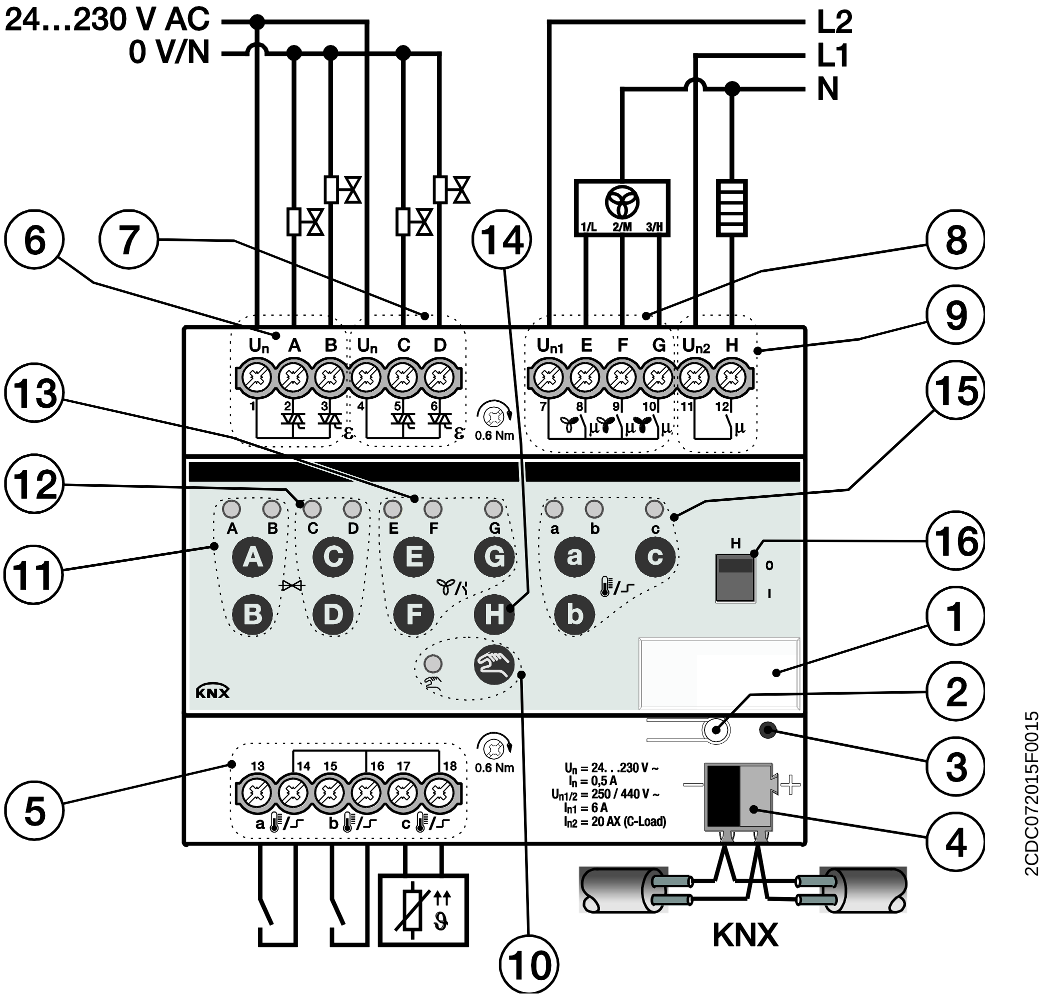
2.2.10 Output, lamp load 20 AX

Lamps	Incandescent lamp load	3,680 W
Fluorescent lamps T5/T8	Uncompensated	3,680 W
	Parallel compensated	2,500 W
	DUO circuit	3,680 W
Low-voltage halogen lamps	Inductive transformer	2,000 W
	Electronic transformer	2,500 W
	Halogen lamps 230 V	3,680 W
Dulux lamp	Uncompensated	3,680 W
	Parallel compensated	3,000 W
Mercury-vapor lamp	Uncompensated	3,680 W
	Parallel compensated	3,680 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	600 A
	Maximum peak inrush current I_p (250 µs)	480 A
	Maximum peak inrush current I_p (600 µs)	300 A
Number of electronic ballasts (T5/T8, single element)1)	18 W (ABB EVG 1 x 18 SF)	26 2)
	24 W (ABB EVG-T5 1 x 24 CY)	26 2)
	36 W (ABB EVG 1 x 36 CF)	22
	58 W (ABB EVG 1 x 58 CF)	12 2)
	80 W (Helvar EL 1 x 80 SC)	10 2)

1) For multiple element lamps or other types, the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

2) Limited by protection with B16 automatic circuit-breaker.

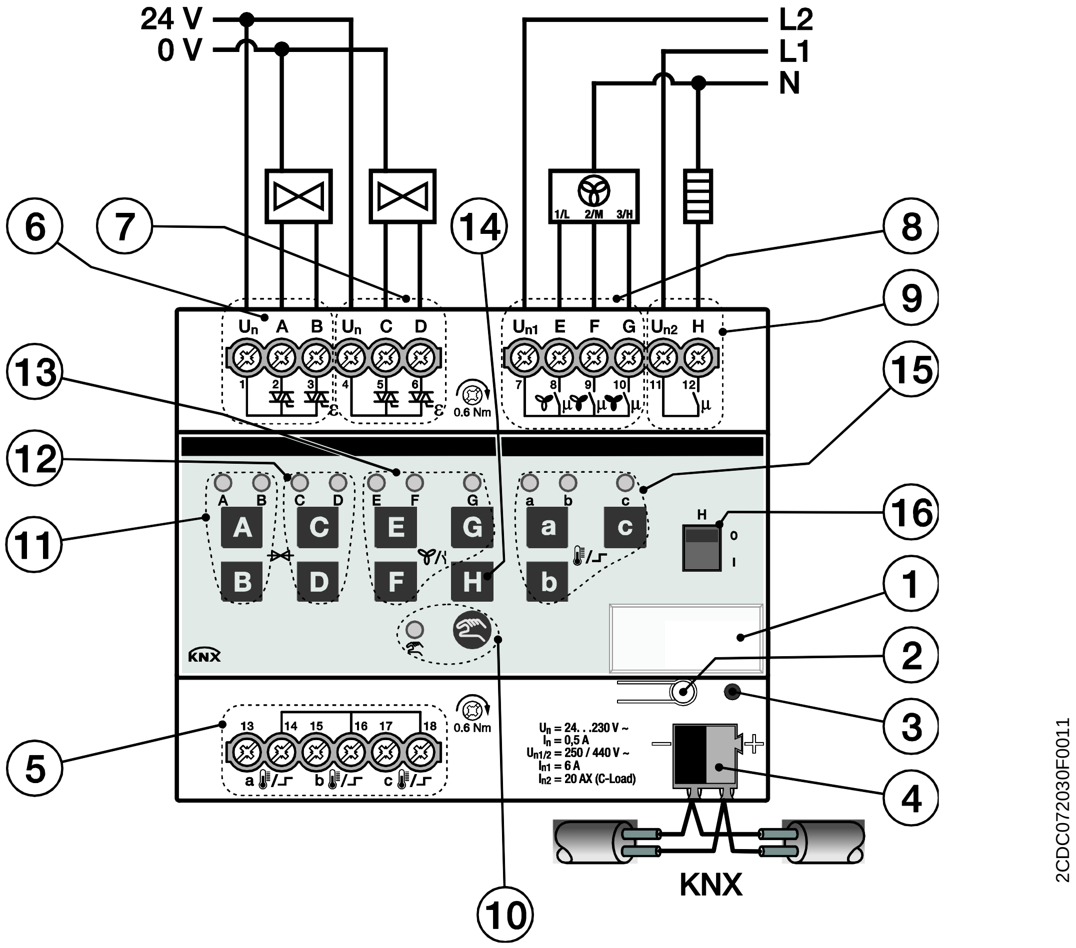
2.2.11 Connection schematic (thermoelectric, PWM)



FCA/S 1.1.2.2

1	Label carrier	9	Output H
2	*Programming* button	10	*Manual operation* button/LED ● (yellow)
3	*Programming* LED ● (red)	11	Valve output A/B buttons/LEDs (e.g. heating) (yellow)
4	Bus connection terminal	12	Valve output C/D buttons/LEDs (e.g. cooling) (yellow)
5	Inputs a, b, c	13	Output E, F, G button/LEDs fan speed 1, 2, 3 (yellow)
6	Valve output A/B (e.g. heating)	14	Output H button
7	Valve output C/D (e.g. cooling)	15	Inputs a, b, c buttons/LEDs (yellow)
8	Fan	16	Output H display

2.2.12 Connection schematic (motor-driven, 3-point)



FCA/S 1.1.1.2

1 Label carrier

2 *Programming* button

3 *Programming* LED ● (red)

4 Bus connection terminal

5 Inputs a, b, c

6 Valve V1 (e.g. heating)

7 Valve V2 (e.g. cooling)

8 Fan

9 Output H

All outputs can be controlled independently of one another.

The following table provides an overview of the functions possible with the outputs of the Fan Coil Actuator and the application:

Functions of the output	A	B	C	D
General				
- Overload	■		■	
- Parallel operation	■	free	■	free
Valve drives allocated to the Fan Coil unit				
- Thermoelectric (PWM)	■	■	■	■
- 1 control value/1 valve	■	free	free	free
- 2 control values/1 valve	■	free	free	free
- 2 control values/2 valves	■	free	■	free
Setting facilities for valve drives				
- Thermoelectric (PWM)				
- Separate heating/cooling	■	■	■	■
- Direction	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE
- Motor-driven (3-point)				
- Separate heating/cooling	■		■	
- Direction	OPEN	CLOSE	OPEN	CLOSE

■ = Function is supported

\- = Function is not supported

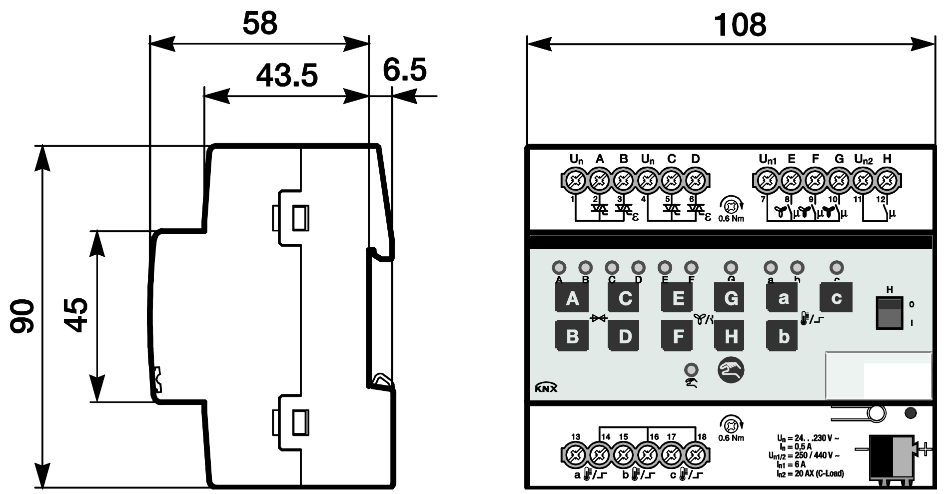
free = Is available and can be used separately

Functions of the output	E	F	G	H
Switch function				
Normally closed/ Normally open contact	■	■	■	■
Time				
Staircase lighting	■	■	■	■
Fan				
Level	1	2	3	-

■ = Function is supported

- = Function is not supported

2.2.13 Dimension drawing



2.3 Fan Coil Actuator FCA/S 1.2.1.2, 0-10V, MDRC

2CDC071003S0015

The device is a modular installation device (MDRC) in Pro *M* design. It is intended for installation in distribution boards on 35 mm mounting rails. The assignment of the physical addresses as well as the parameterization is carried out with ETS.

The device is powered via the ABB i-bus® KNX and requires no additional auxiliary voltage supply. The device is ready for operation after connecting the bus voltage.

2.3.1 Technical data

Supply	Bus voltage	21…32 V DC
	Current consumption, bus	< 12 mA
	Leakage loss, bus	Maximum 250 mW
	Leakage loss, device	Maximum 2 W*
*The maximum power consumption of the device results from the following specifications:	KNX connection	0.25 W
	Relay 16 A	1.0 W
	Relay 6 A	0.6 W
	Analog outputs	0.15W
Connections	KNX	Via bus connection terminal
	Inputs/Outputs	Via screw terminals
Connection terminals	Screw terminal	Screw terminal with universal head (PZ 1)
		0.2…4 mm² stranded, 2 x (0.2…2.5 mm²)
		0.2…6 mm² single core, 2 x (0.2…4 mm²)
	Ferrules without/with plastic sleeves	Without: 0.25…2.5 mm²
		With: 0.25…4 mm²
	TWIN ferrules	0.5…2.5 mm²
		Contact pin length min. 10 mm
	Tightening torque	Maximum 0.6 Nm
	Grid	6.35

ABB i-bus® KNX
Device technology

Operating and display elements	Button/LED ○ ●	For assignment of the physical address
	Button ●/, LED ●	For toggling between manual operation/ operation via ABB i-bus® KNX and displays
Protection	IP 20	To DIN EN 60 529
Protection class	II	To DIN EN 61 140
Isolation category	Overvoltage category	III to DIN EN 60 664-1
	Pollution degree	II to DIN EN 60 664-1
KNX safety extra low voltage	SELV 24 V DC	
Temperature range	Operation	-5 °C…+45 °C
	Transport	-25…+70 °C
	Storage	-25…+55 °C
	Temperatures exceeding +45 °C reduce the service life!	
Ambient conditions	Maximum air humidity	93 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro*M*
	Dimensions	108 x 90 x 64.5 mm (H x W x D)
	Mounting width in space units	6 x 18 mm modules
	Mounting depth	64.5 mm
Mounting	On 35 mm mounting rail	To DIN EN 60 715
Installation position	Any	
Weight	0.3 kg	
Housing/color	Plastic housing, gray	
Approvals	KNX to EN 50 090-1, -2	Certification
CE mark	In accordance with the EMC guideline and low voltage guideline	

Device type	Application	Maximum number of communication objects	Maximum number of group addresses	Maximum number of assignments
FCA/S 1.2.1.2	Fan Coil Actuator 0-10V/...*	70	254	255

* … = Current version number of the application. **Please refer to the software information on our website for this purpose.**

Note

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

The current version of the application is available on the Internet for download at *www.abb.com/knx*. After import into ETS it appears in the *Catalogs* window under *Manufacturers/ABB/Heating, Ventilation, Air Conditioning/Fan Coil Actuator 0-10V*.

The device does not support the locking function of a KNX device in ETS. If you use a *BCU code* to inhibit access to all the project devices, this has no effect on this device. Data can still be read and programmed.

2.3.2 Outputs, valve V1/2, analog

Rated values	Quantity	2, non-isolated, short-circuit proofed
	Control signal	0…10 V DC
	Signal type	Analog
	Output load	> 10 kohms
	Output tolerance	± 10%
	Current limitation	Up to 1.5 mA

2.3.3 Inputs

Rated values	Quantity	3
Contact scanning		Floating
	Scanning current	1 mA
	Scanning voltage	10 V
Resistance		PT100 2-conductor technology,
		PT1000 2-conductor technology,
		A selection of KT/KTY 1,000/2,000, user defined
	Resolution, accuracy and tolerances	See next page
Cable length	Between sensor and device input	Maximum 30 m, simple

2.3.4 Resolution, accuracy and tolerances

Please note that the tolerances of the sensors which are used will need to be added to the listed values.

With sensors based on resistance measurement, it is also necessary to consider the cable error.

In the supplied state of the device, the stated accuracies will not be initially achieved. After initial commissioning, the device performs an autonomous calibration of the analogue measurement circuit. This calibration takes about an hour and is performed in the background. It is undertaken regardless of whether or not the device is parameterized and is independent of the connected sensors. The normal function of the device is not affected. After calibration has been completed, the calibration values which have been determined will be stored in the non-volatile memory. Thereafter, the device will achieve this level of accuracy every time it is switched on. If the calibration is interrupted by programming or bus voltage failure, it will recommence every time it is restarted. The ongoing calibration is displayed in the status byte by a 1 in bit 4.

2.3.5 Resistance signals

Sensor signal	**Resolution**	**Accuracy at 25 °C T_u*^{3}**	**Accuracy at 0…50 °C T_u*^{3}**	**Accuracy at -20…70 °C T_u*^{3}**	**Remark**
PT100*^{4}	0.01 ohm	±0.15 ohm	±0.2 ohm	±0.25 ohm	0.1 ohm = 0.25 °C
PT1000*^{4}	0.1 ohm	±1.5 ohms	±2.0 ohms	±2.5 ohms	1 ohm = 0.25 °C
KT/KTY 1000*^{4}	1 ohm	±2.5 ohms	±3.0 ohms	±3.5 ohms	1 ohm = 0.125 °C/at 25 °C
KT/KTY 2000*^{4}	1 ohm	±5 ohms	±6.0 ohms	±7.0 ohms	1 ohm = 0.064 °C/at 25 °C

*^{3} in addition to current measured value at ambient temperature (T_u)

*^{4} incl. cable and sensor errors

PT100

The PT100 is precise and exchangeable but subject to faults in the cables (cable resistance and heating of the cables). A terminal resistance of just 200 milliohms causes a temperature error of 0.5 °C.

PT1000

The PT1000 responds just like the PT100, but the influences of cable errors are lower by a factor of 10. Use of this sensor is preferred.

KT/KTY

The KT/KTY has a low level of accuracy, can only be exchanged under certain circumstances and can only be used for very simple applications.

Please note that there are different tolerance classes for the sensors in the versions PT100 and PT1000.

The table indicates the individual classes according to IEC 60 751 (date: 2008):

Description	Tolerance
Class AA	0.10 °C + (0.0017 x t)
Class A	0.15 °C + (0.002 x t)
Class B	0.30 °C + (0.005 x t)
Class C	0.60 °C + (0.01 x t)
t = Current temperature	

Example for class B:

At 100 °C, the deviations of the measurement value are reliable up to ± 0.8 °C

2.3.6 Fan, rated current 6 A

Rated values	Number	3 contacts
	U_{n1} rated voltage	250/440 V AC (50/60 Hz)
	I_{n1} rated current (per output)	6 A
Switching currents	AC3* operation (cos φ = 0.45) to DIN EN 60 947-4-1	6 A/230 V
	AC1* operation (cos φ = 0.8) to DIN EN 60 947-4-1	6 A/230 V
	Fluorescent lighting load to DIN EN 60 669-1	6 A/250 V (35 µF)$^{1)}$
	Minimum switching capacity	20 mA/5 V 10 mA/12 V 7 mA/24 V
	DC current switching capacity (resistive load)	6 A/24 V=
Service life	Mechanical service life	> 10^7
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/cos φ = 0.8)	> 10^5
	AC3* (240 V/cos φ = 0.45)	> 1.5 x 10^4
	AC5a* (240 V/cos φ = 0.45)	> 1.5 x 10^4
Switching times$^{2)}$	Maximum relay position change per output and minute if only one relay is switched.	2,683

1) The maximum inrush current peak may not be exceeded.

2) The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds. Typical delay of the relay is approx. 20 ms.

***What do the terms AC1, AC3 and AC5a mean?**

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 – Non-inductive or slightly inductive load, resistive furnaces (relates to switching of ohmic/resistive loads)

AC3 – Squirrel-cage motors: starting, switching off motors during running (relates to (inductive) motor load)

AC5a – Switching of electric discharge lamps

These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

2.3.7 Fan, lamp load 6 A

Lamps	Incandescent lamp load	1,200 W
Fluorescent lamps T5/T8	Uncompensated	800 W
	Parallel compensated	300 W
	DUO circuit	350 W
Low-voltage halogen lamps	Inductive transformer	800 W
	Electronic transformer	1,000 W
	Halogen lamps 230 V	1,000 W
Dulux lamp	Uncompensated	800 W
	Parallel compensated	800 W
Mercury-vapor lamp	Uncompensated	1,000 W
	Parallel compensated	800 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	200 A
	Maximum peak inrush current I_p (250 µs)	160 A
	Maximum peak inrush current I_p (600 µs)	100 A
Number of electronic ballasts (T5/T8, single element)[1)]	18 W (ABB EVG 1 x 18 SF)	10
	24 W (ABB EVG-T5 1 x 24 CY)	10
	36 W (ABB EVG 1 x 36 CF)	7
	58 W (ABB EVG 1 x 58 CF)	5
	80 W (Helvar EL 1 x 80 SC)	3

[1)] For multiple element lamps or other types, the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

2.3.8 Output, rated current 16 A

Rated values	Quantity	1
	U_{n2} rated voltage	250/440 V AC (50/60 Hz)
	I_{n2} rated current	16 A
Switching currents	AC3* operation (cos φ = 0.45) to DIN EN 60 947-4-1	8 A/230 V
	AC1* operation (cos φ = 0.8) to DIN EN 60 947-4-1	16 A/230 V
	Fluorescent lighting load AX to EN 60 669-1	16 A/250 V (70 µF)1)
	Minimum switching capacity	100 mA/12 V
		100 mA/24 V
	DC current switching capacity (resistive load)	16 A/24 V=
Service life	Mechanical service life	> 3 x 10^6
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/cos $\varphi = 0.8$)	> 10^5
Switching times2)	Maximum relay position change per output and minute if only one relay is switched.	313

1) The maximum inrush current peak may not be exceeded.

2) The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds. Typical delay of the relay is approx. 20 ms.

*What do the terms AC1, AC3 and AC5a mean?

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 –	Non-inductive or slightly inductive loads, resistive furnaces (relates to switching of ohmic/resistive loads)
AC3 –	Squirrel-cage motors: Starting, switching off motors during running (relates to (inductive) motor load)
AC5a –	Switching of electric discharge lamps

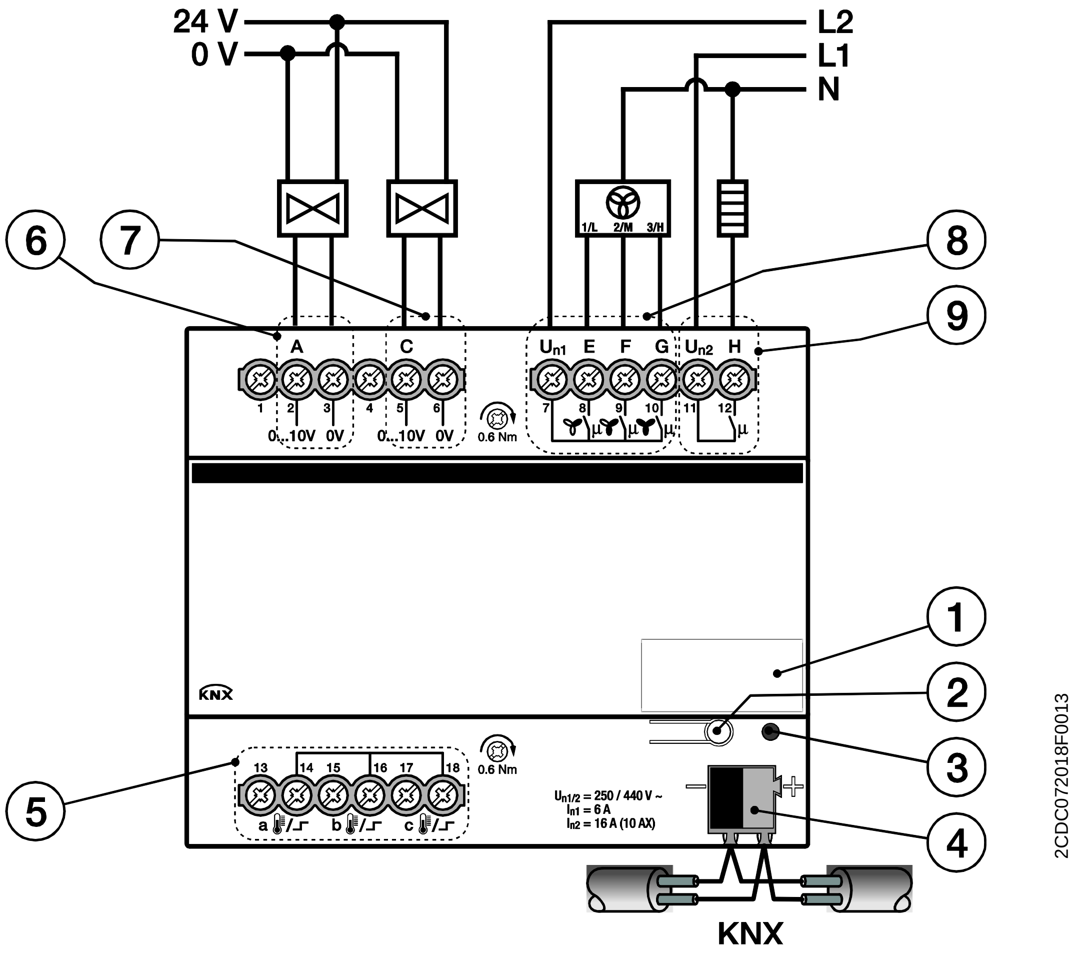
These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

2.3.9 Output, lamp load 16 A

Lamps	Incandescent lamp load	2,500 W
Fluorescent lamps T5/T8	Uncompensated	2,500 W
	Parallel compensated	1,500 W
	DUO circuit	1,500 W
Low-voltage halogen lamps	Inductive transformer	1,200 W
	Electronic transformer	1,500 W
	Halogen lamps 230 V	2,500 W
Dulux lamp	Uncompensated	1,100 W
	Parallel compensated	1,100 W
Mercury-vapor lamp	Uncompensated	2,000 W
	Parallel compensated	2,000 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	400 A
	Maximum peak inrush current I_p (250 µs)	320 A
	Maximum peak inrush current I_p (600 µs)	200 A
Number of electronic ballasts (T5/T8, single element)1)	18 W (ABB EVG 1 x 18 SF)	23
	24 W (ABB EVG-T5 1 x 24 CY)	23
	36 W (ABB EVG 1 x 36 CF)	14
	58 W (ABB EVG 1 x 58 CF)	11
	80 W (Helvar EL 1 x 80 SC)	10

1) For multiple element lamps or other types the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

2.3.10 Connection schematic



FCA/S 1.2.1.2

1 Label carrier

2 *Programming* button

3 *Programming* LED ● (red)

4 Bus connection terminal

5 Inputs a, b, c

6 Valve V1 (e.g. heating)

7 Valve V2 (e.g. cooling)

8 Fan

9 Output H

Note

Terminals 1 and 4 on the FCA/S 1.2.1.2 are not used internally.

All outputs can be controlled independently of one another.

The following table provides an overview of the functions possible with the outputs of the Fan Coil Actuator and the application:

Functions of the output	**A**		**C**	
General				
- Overload	■		■	
- Parallel operation	■		■	
Valve drives allocated to the Fan Coil unit				
- Analog (0…10 V)	■		■	
- 1 control value/1 valve	■		free	
- 2 control values/1 valve	■		free	
- 2 control values/2 valves	■		■	
Setting facilities for valve drives				
- Analog (0…10 V)				
- Separate heating/cooling	■		■	
- Direction	OPEN/CLOSE		OPEN/CLOSE	

■ = Function is supported

\- = Function is not supported

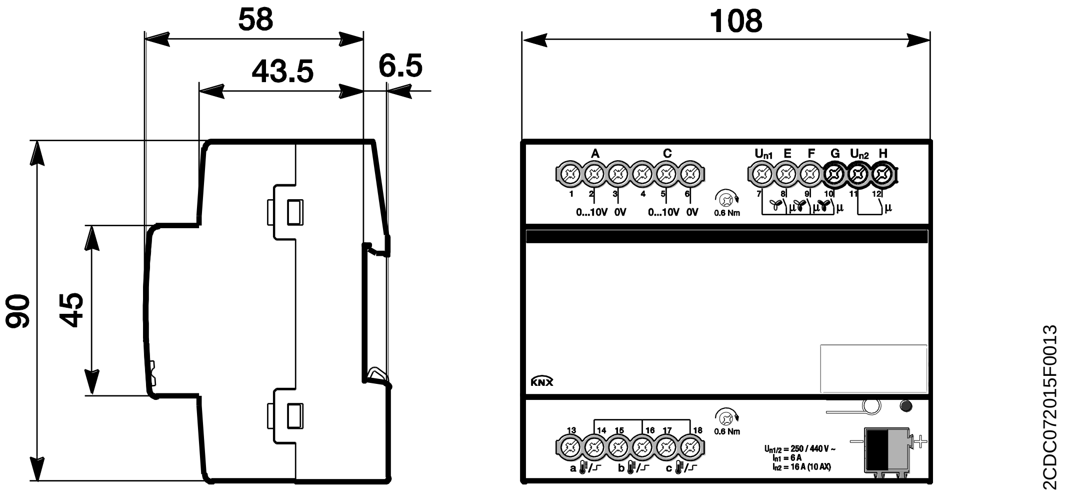
free = Is available and can be used separately

Functions of the output	**E**	**F**	**G**	**H**
Switch function				
Normally closed/Normally open contact	■	■	■	■
Time				
Staircase lighting	■	■	■	■
Fan				
Level	1	2	3	-

■ = Function is supported

\- = Function is not supported

2.3.11 Dimension drawing



2.4 Fan Coil Actuator FCA/S 1.2.2.2, 0-10V, MDRC

2CDC071004S0015

The device is a modular installation device (MDRC) in Pro *M* design. It is intended for installation in distribution boards on 35 mm mounting rails. The assignment of the physical addresses as well as the parameterization is carried out with ETS.

The device is powered via the ABB i-bus® KNX and requires no additional auxiliary voltage supply. The device is ready for operation after connecting the bus voltage.

2.4.1 Technical data

Supply	Bus voltage	21…32 V DC
	Current consumption, bus	< 12 mA
	Leakage loss, bus	Maximum 250 mW
	Leakage loss, device	Maximum 2 W*
*The maximum power consumption of the device results from the following specifications:	KNX connection	0.25 W
	Relay 16 A	1.0 W
	Relay 6 A	0.6 W
	Analog outputs	0.15W
Connections	KNX	Via bus connection terminal
	Inputs/Outputs	Via screw terminals
Connection terminals	Screw terminal	Screw terminal with universal head (PZ 1)
		0.2…4 mm² stranded, 2 x (0.2…2.5 mm²)
		0.2…6 mm² single core, 2 x (0.2…4 mm²)
	Ferrules without/with plastic sleeves	Without: 0.25…2.5 mm²
		With: 0.25…4 mm²
	TWIN ferrules	0.5…2.5 mm²
		Contact pin length min. 10 mm
	Tightening torque	Maximum 0.6 Nm
	Grid	6.35

ABB i-bus® KNX
Device technology

Operating and display elements	Button/LED ⊂⊃ ●	For assignment of the physical address
	Button ✋/LED ○	For toggling between manual operation/ operation via ABB i-bus® KNX and displays
	Button *output H* / switch H	For switching and display
	Fan speed button E, F, G	For switching the individual fan speeds
	LED E, F, G	For display of fan speed 1, 2, 3
	Buttons *A, C*	For opening/closing the valve
	LED *A, C*	For displaying the valve position
	Button ⓐ/LED ○	For switching and display
	Button ⓑ/LED ○	For switching and display
	Button ⓒ/LED ○	For switching and display
Protection	IP 20	To DIN EN 60 529
Protection class	II	To DIN EN 61 140
Isolation category	Overvoltage category	III to DIN EN 60 664-1
	Pollution degree	II to DIN EN 60 664-1
KNX safety extra low voltage	SELV 24 V DC	
Temperature range	Operation	-5 °C…+45 °C
	Transport	-25…+70 °C
	Storage	-25…+55 °C
	Temperatures exceeding +45 °C reduce the service life!	
Ambient conditions	Maximum air humidity	93 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro*M*
	Dimensions	108 x 90 x 64.5 mm (H x W x D)
	Mounting width in space units	6x 18 mm modules
	Mounting depth	64.5 mm
Mounting	On 35 mm mounting rail	To DIN EN 60 715
Installation position	Any	
Weight	0.3 kg	
Housing/color	Plastic housing, gray	
Approvals	KNX to EN 50 090-1, -2	Certification
CE mark	In accordance with the EMC guideline and low voltage guideline	

Device type	Application	Maximum number of communication objects	Maximum number of group addresses	Maximum number of assignments
FCA/S 1.2.2.2	Fan Coil Actuator 0-10V M/...*	70	254	255

* … = Current version number of the application. **Please refer to the software information on our website for this purpose.**

Note
ETS and the current version of the device application are required for programming. The current version of the application is available on the Internet for download at *www.abb.com/knx*. After import into ETS it appears in the *Catalogs* window under *Manufacturers/ABB/Heating, Ventilation, Air Conditioning/Fan Coil Actuator 0-10V*. The device does not support the locking function of a KNX device in ETS. If you use a *BCU code* to inhibit access to all the project devices, this has no effect on this device. Data can still be read and programmed.

2.4.2 Outputs, valve V1/2, analog

Rated values	Quantity	2, non-isolated, short-circuit proofed
	Control signal	0…10 V DC
	Signal type	Analog
	Output load	> 10 kohms
	Output tolerance	± 10%
	Current limitation	Up to 1.5 mA

2.4.3 Inputs

Rated values	Quantity	3
Contact scanning		Floating
	Scanning current	1 mA
	Scanning voltage	10 V
Resistance		0…1,000 ohms,
		PT100 2-conductor technology,
		PT1000 2-conductor technology,
		A selection of KT/KTY 1,000/2,000, user defined
	Resolution, accuracy and tolerances	See next page
Cable length	Between sensor and device input	Maximum 30 m, simple

2.4.4 Resolution, accuracy and tolerances

Please note that the tolerances of the sensors which are used will need to be added to the listed values.

With sensors based on resistance measurement, it is also necessary to consider the cable error.

In the supplied state of the device, the stated accuracies will not be initially achieved. After initial commissioning, the device performs an autonomous calibration of the analogue measurement circuit. This calibration takes about an hour and is performed in the background. It is undertaken regardless of whether or not the device is parameterized and is independent of the connected sensors. The normal function of the device is not affected. After calibration has been completed, the calibration values which have been determined will be stored in the non-volatile memory. Thereafter, the device will achieve this level of accuracy every time it is switched on. If the calibration is interrupted by programming or bus voltage failure, it will recommence every time it is restarted. The ongoing calibration is displayed in the status byte by a 1 in bit 4.

2.4.5 Resistance signals

Sensor signal	Resolution	Accuracy at 25 °C T_u*[3]	Accuracy at 0…50 °C T_u*[3]	Accuracy at -20…70 °C T_u*[3]	Remark
0...1,000 ohms	0.1 ohm	±1.0 ohm	±1.5 ohms	±2 ohms	
PT100*[4]	0.01 ohm	±0.15 ohm	±0.2 ohm	±0.25 ohm	0.1 ohm = 0.25 °C
PT1000*[4]	0.1 ohm	±1.5 ohms	±2.0 ohms	±2.5 ohms	1 ohm = 0.25 °C
KT/KTY 1000*[4]	1 ohm	±2.5 ohms	±3.0 ohms	±3.5 ohms	1 ohm = 0.125 °C/at 25 °C
KT/KTY 2000*[4]	1 ohm	±5 ohms	±6.0 ohms	±7.0 ohms	1 ohm = 0.064 °C/at 25 °C

*[3] in addition to current measured value at ambient temperature (T_u)

*[4] incl. cable and sensor errors

PT100

The PT100 is precise and exchangeable but subject to faults in the cables (cable resistance and heating of the cables). A terminal resistance of just 200 milliohms causes a temperature error of 0.5 °C.

PT1000

The PT1000 responds just like the PT100, but the influences of cable errors are lower by a factor of 10. Use of this sensor is preferred.

KT/KTY

The KT/KTY has a low level of accuracy, can only be exchanged under certain circumstances and can only be used for very simple applications.

Please note that there are different tolerance classes for the sensors in the versions PT100 and PT1000.

The table indicates the individual classes according to IEC 60 751 (date: 2008):

Description	Tolerance
Class AA	0.10 °C + (0.0017 x t)
Class A	0.15 °C + (0.002 x t)
Class B	0.30 °C + (0.005 x t)
Class C	0.60 °C + (0.01 x t)
t = Current temperature	

Example for class B:

At 100 °C, the deviations of the measurement value are reliable up to ± 0.8 °C

2.4.6 Fan, rated current 6 A

Rated values	Number	3 contacts
	U_{n1} rated voltage	250/440 V AC (50/60 Hz)
	I_{n1} rated current (per output)	6 A
Switching currents	AC3* operation (cos φ = 0.45) to DIN EN 60 947-4-1	6 A/230 V
	AC1* operation (cos φ = 0.8) to DIN EN 60 947-4-1	6 A/230 V
	Fluorescent lighting load to DIN EN 60 669-1	6 A/250 V (35 µF)1)
	Minimum switching capacity	20 mA/5 V
		10 mA/12 V
		7 mA/24 V
	DC current switching capacity (resistive load)	6 A/24 V=
Service life	Mechanical service life	> 10^7
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/cos φ = 0.8)	> 10^5
	AC3* (240 V/cos φ = 0.45)	> 1.5×10^4
	AC5a* (240 V/cos φ = 0.45)	> 1.5×10^4
Switching times2)	Maximum relay position change per output and minute if only one relay is switched.	2,683

1) The maximum inrush current peak may not be exceeded.

2) The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds. Typical delay of the relay is approx. 20 ms.

***What do the terms AC1, AC3 and AC5a mean?**

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 – Non-inductive or slightly inductive load, resistive furnaces (relates to switching of ohmic/resistive loads)

AC3 – Squirrel-cage motors: starting, switching off motors during running (relates to (inductive) motor load)

AC5a – Switching of electric discharge lamps

These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

2.4.7 Fan, lamp load 6 A

Lamps	Incandescent lamp load	1,200 W
Fluorescent lamps T5/T8	Uncompensated	800 W
	Parallel compensated	300 W
	DUO circuit	350 W
Low-voltage halogen lamps	Inductive transformer	800 W
	Electronic transformer	1,000 W
	Halogen lamps 230 V	1,000 W
Dulux lamp	Uncompensated	800 W
	Parallel compensated	800 W
Mercury-vapor lamp	Uncompensated	1,000 W
	Parallel compensated	800 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	200 A
	Maximum peak inrush current I_p (250 µs)	160 A
	Maximum peak inrush current I_p (600 µs)	100 A
Number of electronic ballasts (T5/T8, single element)1)	18 W (ABB EVG 1 x 18 SF)	10
	24 W (ABB EVG-T5 1 x 24 CY)	10
	36 W (ABB EVG 1 x 36 CF)	7
	58 W (ABB EVG 1 x 58 CF)	5
	80 W (Helvar EL 1 x 80 SC)	3

1) For multiple element lamps or other types, the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

2.4.8 Output, rated current 20 AX

Rated values	Quantity	1
	U_{n2} rated voltage	250/440 V AC (50/60 Hz)
	I_{n2} rated current	20 A
Switching currents	AC3* operation ($\cos \varphi = 0.45$) to DIN EN 60 947-4-1	16 A/230 V
	AC1* operation ($\cos \varphi = 0.8$) to DIN EN 60 947-4-1	20 A/230 V
	Fluorescent lighting load AX to DIN EN 60 669-1	20 A/250 V (140 µF)[1]
	Minimum switching capacity	100 mA/12 V
		100 mA/24 V
	DC current switching capacity (resistive load)	20 A/24 V=
Service life	Mechanical service life	$> 10^6$
	Electronic endurance of switching contacts to DIN IEC 60 947-4-1	
	AC1* (240 V/$\cos \varphi = 0.8$)	$> 10^5$
	AC3* (240 V/$\cos \varphi = 0.45$)	$> 3 \times 10^4$
	AC5a (240 V/$\cos \varphi = 0.45$)	$> 3 \times 10^4$
Switching times[2]	Maximum relay position change per output and minute if only one relay is switched.	93

[1] The maximum inrush current peak may not be exceeded.

[2] The specifications apply only after the bus voltage has been applied to the device for at least 10 seconds. Typical delay of the relay is approx. 20 ms.

***What do the terms AC1, AC3 and AC5a mean?**

In intelligent installation systems, different switching capacities and performance specifications that are dependent on the special applications have become established in domestic and industrial installations. These performance specifications are rooted in the respective national and international standards. The tests are defined to simulate typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential).

Specifications AC1 and AC3 are switching performance specifications which have become established in the industrial field.

Typical application:

AC1 –	Non-inductive or slightly inductive load, resistive furnaces (relates to switching of ohmic/resistive loads)
AC3 –	Squirrel-cage motors: starting, switching off motors during running (relates to (inductive) motor load)
AC5a –	Switching of electric discharge lamps

These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. The standard describes starters and/or contactors that were originally used primarily in industrial applications.

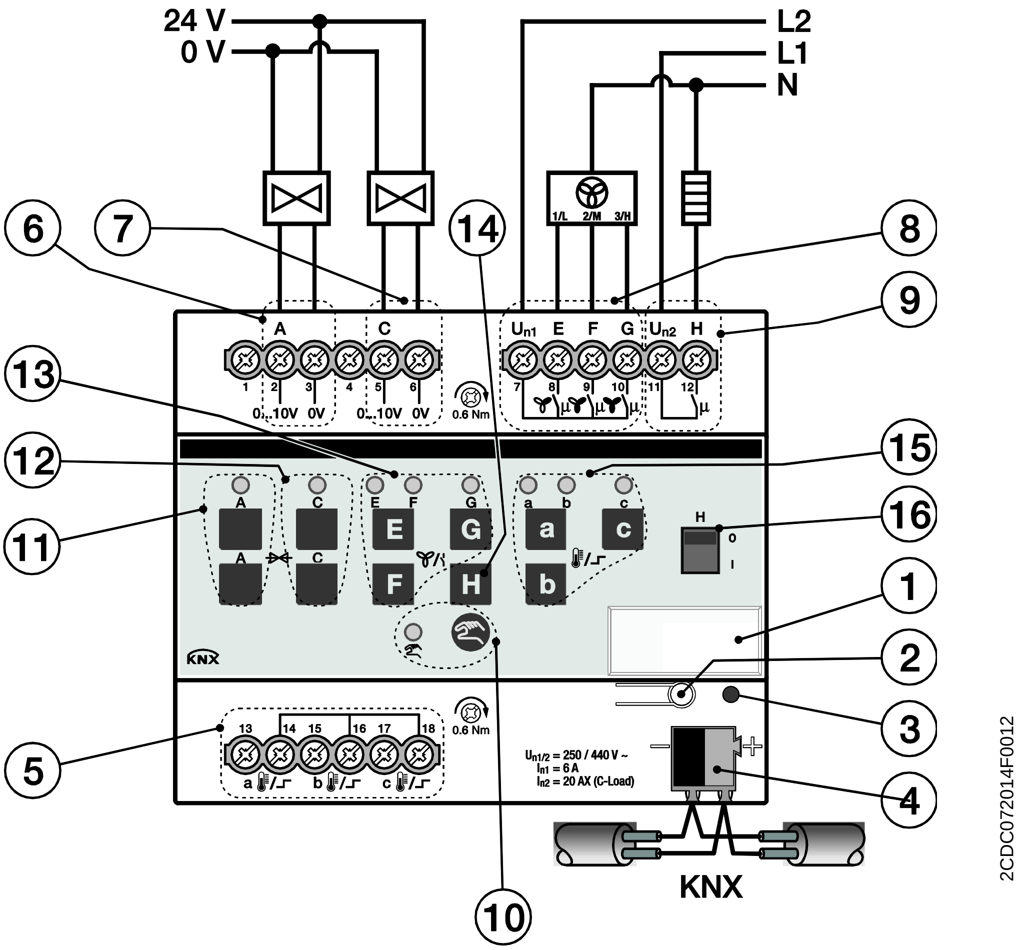
2.4.9 Output, lamp load 20 AX

Lamps	Incandescent lamp load	3,680 W
Fluorescent lamps T5/T8	Uncompensated	3,680 W
	Parallel compensated	2,500 W
	DUO circuit	3,680 W
Low-voltage halogen lamps	Inductive transformer	2,000 W
	Electronic transformer	2,500 W
	Halogen lamps 230 V	3,680 W
Dulux lamp	Uncompensated	3,680 W
	Parallel compensated	3,000 W
Mercury-vapor lamp	Uncompensated	3,680 W
	Parallel compensated	3,680 W
Switching capacity (switching contact)	Maximum peak inrush current I_p (150 µs)	600 A
	Maximum peak inrush current I_p (250 µs)	480 A
	Maximum peak inrush current I_p (600 µs)	300 A
Number of electronic ballasts (T5/T8, single element)1)	18 W (ABB EVG 1 x 18 SF)	26 2)
	24 W (ABB EVG-T5 1 x 24 CY)	26 2)
	36 W (ABB EVG 1 x 36 CF)	22
	58 W (ABB EVG 1 x 58 CF)	12 2)
	80 W (Helvar EL 1 x 80 SC)	10 2)

1) For multiple element lamps or other types, the number of electronic ballasts must be determined using the peak inrush current of the ballasts.

2) Limited by protection with B16 automatic circuit-breaker.

2.4.10 Connection schematic



FCA/S 1.2.2.2

1	Label carrier
2	*Programming* button
3	*Programming* LED ● (red)
4	Bus connection terminal
5	Inputs a, b, c
6	Valve output A (e.g. heating)
7	Valve output C (e.g. cooling)
8	Fan
9	Output H
10	*Manual operation* button/LED ● (yellow)
11	Valve output A buttons/LEDs (e.g. heating) (yellow)
12	Valve output C buttons/LEDs (e.g. cooling) (yellow)
13	Button/LEDs fan speed 1, 2, 3 (yellow)
14	Output H button
15	Inputs a, b, c buttons/LEDs (yellow)
16	Output H display

Note

Terminals 1 and 4 on the FCA/S 1.2.2.2 are not used internally.

All outputs can be controlled independently of one another.

The following table provides an overview of the functions possible with the outputs of the Fan Coil Actuator and the application:

Functions of the output	**A**		**C**	
General				
- Overload	■		■	
- Parallel operation	■		■	
Valve drives allocated to the Fan Coil unit				
- Analog (0…10 V)	■		■	
- 1 control value/1 valve	■		free	
- 2 control values/1 valve	■		free	
- 2 control values/2 valves	■		■	
Setting facilities for valve drives				
- Analog (0…10 V)				
- Separate heating/cooling	■		■	
- Direction	OPEN/CLOSE		OPEN/CLOSE	

■ = Function is supported

- = Function is not supported

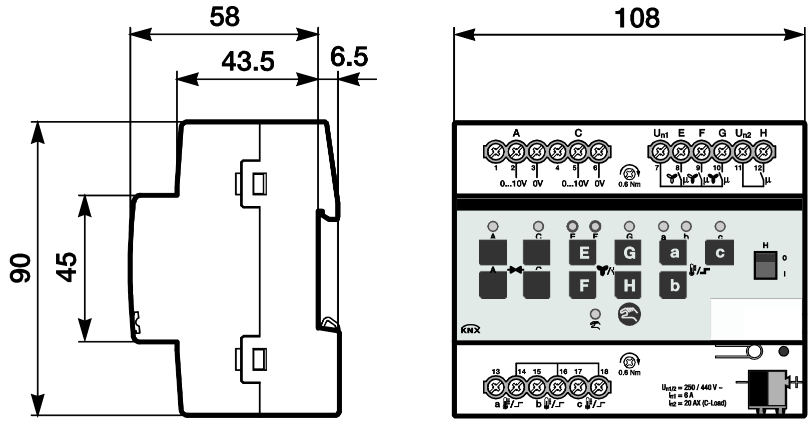
free = Is available and can be used separately

Functions of the output	**E**	**F**	**G**	**H**
Switch function				
Normally closed/Normally open contact	■	■	■	■
Time				
Staircase lighting	■	■	■	■
Fan				
Level	1	2	3	-

■ = Function is supported

- = Function is not supported

2.4.11 Dimension drawing



2CDC072015F0012

2.5 Mounting and installation

The device is a modular installation device for quick installation in distribution boards on 35 mm mounting rails to DIN EN 60 715.

The installation 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.

The device is ready for operation after connection to the bus voltage.

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

Commissioning requirement

In order to commission the device, a PC with ETS as well as a connection to the ABB i-bus®, e.g. via a KNX interface, is required.

The device is ready for operation after connection to the bus voltage. No additional auxiliary voltage is required.

Important
The maximum permissible current of a KNX line must not be exceeded. During planning and installation ensure that the KNX line is correctly dimensioned. The device features a maximum current consumption of 12 mA.

Mounting and commissioning may only be carried out by electrical specialists. The appropriate standards, directives, regulations and specifications for the appropriate 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!
- 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**
To avoid dangerous touch voltages which originate through feedback from differing phase conductors, all poles must be disconnected 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 is pre-installed.

The complete application can be reloaded if required. Downloads may take longer after a change of application or a discharge.

Assignment of the physical address

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

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

Download reaction

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

The voltage supply to the device must be switched off before 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. In the event of damage, repairs should only be carried out by an authorized person (e.g. during transport or storage).

2.6 Manual operation

Function of manual operation

Manual operation facilitates on-site operation of the device. Manual operation is enabled as standard and can be switched on and off using the *Manual operation* button.

Switching on manual operation:

> Press the button until the yellow LED lights continuously.

Switching off manual operation:

> Press the button briefly. The yellow LED continues to flash for 2 seconds.

After connection to the KNX, an ETS download or ETS reset, the device is in *KNX operation*. The LED is off. All LEDs indicate the current state.

Note
If *Manual operation* is generally disabled or disabled via communication object *Enable manual operation*, the LED flashes during the button push. A switchover from KNX operation to the *Manual operation* mode does not occur.

Note
If manual operation is activated, the current fan speed remains set and can only be operated manually. Here any limitations, forced operations and programmed dwell times are not considered. If manual operation is deactivated, the fan sets to a speed to which it would also be set without manual operation, e.g. via the value of the communication objects. The setting occurs with the parameterized dwell times.

2.6.1 Display elements

Indicator LEDs are located on the front of the device.

All LEDs *Output X* indicate the current 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 *Flashing:* Changeover to Manual operation.	*On:* The device is in Manual operation *Flashing*: Changeover to KNX operation.
● **Output A** **(Output B)**	*On*: Control ≠ 0 *Off:* Control = 0 *Flashing*: Both LEDs (A+B or C+D) of an output flash in the event of overload/short circuit (frequency 4.8 Hz). *Flashing*: Both LEDs (A+B or C+D) of an output flash quickly simultaneously in the event of an adjustment (frequency 1.2 Hz). With a state change the new state is immediately indicated.	
● **Output C** **(Output D)**		
● **Output E...G**	As switch actuator: *0*: Contact open *1:* Contact closed As fan: *On:* E: Fan speed 1; F: Fan speed 2; G: Fan speed 3 *Off:* Fan is off.	
 **Output H**	*0*: Contact open *1:* Contact closed	
● **a** **Input a…c**	Send as switch sensor and value: *On:* Input closed *Off:* Input open	

2.6.2 Operating controls

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

The reaction of the operating elements is described in the following table, according to the operating states, *KNX operation* and *Manual operation*:

Button	KNX operation	Manual operation
Manual operation	*Long button push ≥ 1.5 sec.*: Switch to *Manual operation*, provided that *Manual operation* is not blocked by a parameter setting. *Short button push ≤ 1.5 sec.:* LED flashes and switches off again. The device is in *KNX operation*.	*Long button push ≥ 1.5 sec.:* Changeover to *KNX operation*. The inputs are scanned again. In this way, the input states are updated. Resetting the *Manual operation* to *KNX operation* can also be completed within a parameterized time depending on the parameterization.
A … **D** **Output A…D**	**Valve drive, motor-driven (3-point) and valve drive, thermoelectric (PWM)** A fault, e.g. due to an overload/short circuit, is indicated on the device by flashing (frequency 4.8 Hz) of the corresponding LED (A+B or C+D).	*Short button push ≤ 1.5 sec.:* The reaction of the buttons depends on the mode of operation: **Valve drive, motor-driven (3-point):** Output: A and C: *Open/STOP* *First operation point:* *Press:* Valve from 0...100%, then STOP => OPEN *Release:* No reaction *Output: B and D: Close/STOP* *Next operation point:* *Press:* Valve from 100...0%, then STOP => CLOSED *Release:* No reaction *Long button push ≥ 1.5 sec.:* No function A characteristic curve adjustment is undertaken, if it is parameterized. **Valve drive, thermoelectric (PWM):** Output: A, B, C or D: *Open/close* *First operation point:* *Press:* Valve from 0...100%, then STOP => OPEN *Release:* No reaction *Next operation point:* *Press:* Valve from 100...0%, then STOP => CLOSED *Release:* No reaction *Long button push ≥ 1.5 sec.:* No function A characteristic curve adjustment is undertaken, if it is parameterized.
B or **D**		Long button push (> 2s) on one of the buttons B or D triggers a valve reference movement
⬆ **Output A** **(Output C)**	**Valve drive, analog (0...10 V):** A fault, e.g. due to an overload/short circuit, is indicated on the device by flashing (frequency 4.8 Hz) of the corresponding LED.	**Valve drive, analog (0...10 V):** *Short button push ≤ 1.5 sec.:* *Press:* Valve from 0...100%, then STOP => OPEN *Release:* No function *Long button push ≥ 1.5 sec.:* No function A characteristic curve adjustment is undertaken, if it is parameterized.
⬇ **Output A** **(Output C)**		**Valve drive, analog (0...10 V):** *Short button push ≤ 1.5 sec.:* *Press:* Valve from 100...0%, then STOP => CLOSED *Release:* No function *Long button push ≥ 1.5 sec.:* No function A characteristic curve adjustment is undertaken, if it is parameterized.

Button	KNX operation	Manual operation
E … G **Output E...G**	No reaction	*Short button push ≤ 1.5 sec.:* As switch actuator: *Press:* ON <-> OFF As fan: *Press:* ON Switching can only be performed in the following order: "E" => fan speed 1 "F" => fan speed 2 "G" => fan speed 3 To switch off, switch in the reverse order back to button "E", and then press this button again. *Long button push ≥ 1.5 sec.:* No function
H **Output H**	No reaction	*Short button push ≤ 1.5 sec.:* *Press:* ON *Release:* OFF *Long button push ≥ 1.5 sec.:* No function
a … c **Input a…c**	No reaction	*Short button push ≤ 1.5 sec.:* As "Switch sensor" and "Send value": *Switch:* With every actuation, the states of the input and the LED are changed. *Button:* Press button => input closed, LED on Release button => input opened, LED off As temperature sensor: Button has no function. LEDs are switched off.

3 Commissioning

3.1 Overview

The application *Fan Coil Actuator PWM/2* is available for the Fan Coil Actuator FCA/S 1.1.1.2.

The application *Fan Coil Actuator 0-10V/2* is available for the Fan Coil Actuator FCA/S 1.2.1.2.

The application *Fan Coil Actuator PWM M/2* is available for the Fan Coil Actuator FCA/S 1.1.2.2.

The application *Fan Coil Actuator 0-10V M2* is available for the Fan Coil Actuator FCA/S 1.2.2.2.

Programming requires the ETS.

For use of the i-bus® Tool, see: Integration in the i-bus® Tool, pg. 9.

The following functions are available:

Additional output	For control of auxiliary electrical heating, e.g. in the winter ⇔ summer transition phase.
Fan	A three-speed fan is controlled alternately with a two-way connection or with speed switching.
FCA/S 1.1.x.2: electronic	Valve drives are controlled. Control occurs via PWM or 3-point. The outputs are protected against short circuit.
FCA/S 1.2.x.2: analog	Valve drives are controlled. Control occurs via an analog control signal of 0...10 V. The outputs are protected against short circuit.
Inputs	There are four inputs available. These are used to monitor or connect the window contact, condensation (dew point), detectors or temperature sensors, for example.

The 6 A outputs are available for Fan Coil applications.

Attention

Improper switching will destroy the fan motors.

Follow the technical data for the fan, e.g. speed or switching function.

For further information see: Parameter window E, F, G: Fan (Multi-level), p. 126.

The Fan Coil Actuator features a relay in each output, which is mechanically independent of the other outputs. Switching noises cannot be avoided due to the mechanical nature of the design.

The installation location of the Fan Coil Actuator can either be centrally in an electrical distribution board, or distributed in a Fan Coil unit. Usually, the Fan Coil Actuator is used in conjunction with a room thermostat for an individual room temperature control system. The room thermostat sends a control variable which is used to control the fan stages via the Fan Coil Actuator.

Fan Coil controls

- Fan with three fan speeds
- With changeover or step control
- 1 control value/1 valve
- 2 control values/1 valve
- 2 control values/1 valve/ with switching object
- 2 control values/2 valves
- 2 control values/2 valves/ with switching object

For further information, see: Planning and application, page 237

Configuration design types

A Fan Coil unit can be configured as a compact device or a modular installation device:

- *Compact devices:* These are supplied with enclosures and are available as self-contained units or for wall or ceiling mounting.
- *Built-in devices:* These have no enclosures and are mounted in the wall, in the ceiling or in the floor. The air is blown into the room through a grille.

Air supply

Fan Coil units are available as recirculation or as mixed air devices.

- *Recirculation devices*: The room air is directed past heat exchangers by the fans.
- *Mixed air devices:* The room air is mixed with fresh air. The mixing ratio between recirculated and fresh air can usually be adjusted.

3.1.1 Functions of the inputs

The following table provides an overview of the functions possible with the inputs of the Fan Coil Actuator and the application:

Functions of the inputs	a	b	c
Switch sensor	■	■	■
Value/forced operation	■	■	■
PT100 temperature sensor	■	■	■
PT1000 temperature sensor	■	■	■
KT/KTY temperature sensor	■	■	■
KT/KTY temperature sensor (user-defined)	■	■	■

■ = Function is supported

3.1.2 Output functions

The following table provides an overview of the functions possible with the outputs of the Fan Coil Actuator and the application:

Functions of the output	A	B	C	D
General				
- Overload	■		■	
- Parallel operation	■	free	■	free
Valve drives allocated to the Fan Coil unit				
- Thermoelectric (PWM)	■	■	■	■
- 1 control value/1 valve	■	free	free	free
- 2 control values/1 valve	■	free	free	free
- 2 control values/2 valves	■	free	■	free
- Analog (0…10 V)	■	-	■	-
- 1 control value/1 valve	■	-	free	-
- 2 control values/1 valve	■	-	free	-
- 2 control values/2 valves	■	-	■	-
Setting facilities for valve drives				
- Thermoelectric (PWM)				
- Separate heating/cooling	■	■	■	■
- Direction	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE
- Motor-driven (3-point)				
- Separate heating/cooling	■		■	
- Direction	OPEN	CLOSE	OPEN	CLOSE
- Analog (0…10 V)				
- Separate heating/cooling	■		■	
- Direction	OPEN/CLOSE		OPEN/CLOSE	

■ = Function is supported

- = Function is not supported

free = Is available and can be used separately

Functions of the output	E	F	G	H
Switch function				
Normally closed/Normally open contact	■	■	■	■
Time				
Staircase lighting	■	■	■	■
Fan				
Level	1	2	3	-

■ = Function is supported

- = Function is not supported

3.2 Parameters

The ETS Engineering Tool Software is used for parameterizing the device.

The application appears in ETS in the *Catalogs* window under *Manufacturers/ABB/Heating, Ventilation, Air Conditioning/Fan Coil Actuator 1-fold*.

The following chapters describe the parameters of the device using the parameter windows. Parameter windows are structured dynamically so that further parameters may be enabled depending on the parameterization and function of the outputs.

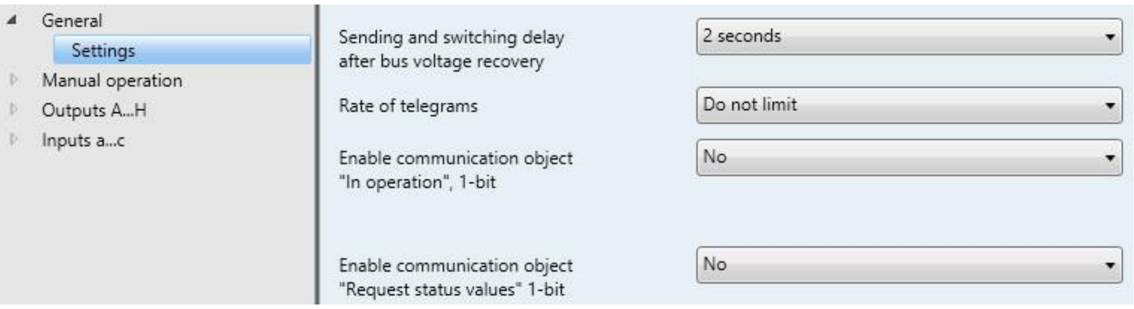
The default values of the parameters are underlined, e.g.:

Options: Yes
<u>No</u>

Note
For screen shots, the application of the FCA/S 1.1.2.2 (with PWM and manual operation) is used representatively for all devices.

3.2.1 Parameter window *General – Settings*

Settings of higher-level parameters:



Sending and switching delay after bus voltage recovery: 2 seconds

Rate of telegrams: Do not limit

Enable communication object "In operation", 1-bit: No

Enable communication object "Request status values" 1-bit: No

**Sending and switching delay
after bus voltage recovery**

Options: 2/3/5/10/30/60 seconds
2/3/4 minutes

During the sending and switching delay, telegrams are only received. The telegrams are not processed, however, and the outputs remain unchanged. No telegrams are sent via the bus.

After the sending and switching delay, telegrams are sent and the state of the outputs is set to correspond with the parameterization or the communication object values.

If communication objects are read out via the bus during the sending and switching delay, e.g. by a visualization 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 initialization time is the time that the processor requires to be ready to function.

How does the device react on bus voltage recovery?

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

Note
The set switching delay does not act on the valve outputs!

Rate of telegrams

Options:	Do not limit 1/2/3/5/10/20 telegram(s)/second 0.05/0.1/0.2/0.3/0.5 seconds/telegram

Using this parameter, the bus load generated by the device can be limited.

- *1/2/3/5/10/20 telegram(s)/second*: X telegrams per second are sent.
- *0.05/0.1/0./0.3/0.5 seconds/telegram:* A telegram is sent every x seconds.

Enable communication object
"In operation", 1-bit

Options:	No Send value 0 cyclically Send value 1 cyclically

The communication object *In operation* indicates that the device on the bus is working properly. This cyclic telegram can be monitored by an external device.

- *Send value 0/value 1 cyclically*: The value 0 or 1 is sent cyclically and the 1-bit communication object *In operation* is enabled.

Dependent parameter:

Telegram is repeated every

Options:	Every second Every 2/3/5/10/30/60 seconds Every 2/3/5/10/30/60 minutes Every 2/3/5/10/12 hours

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

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*: The 1-bit communication object *Request status values* is enabled.

  Dependent parameter:

  Request with object value

Options:	0 1 0 or 1

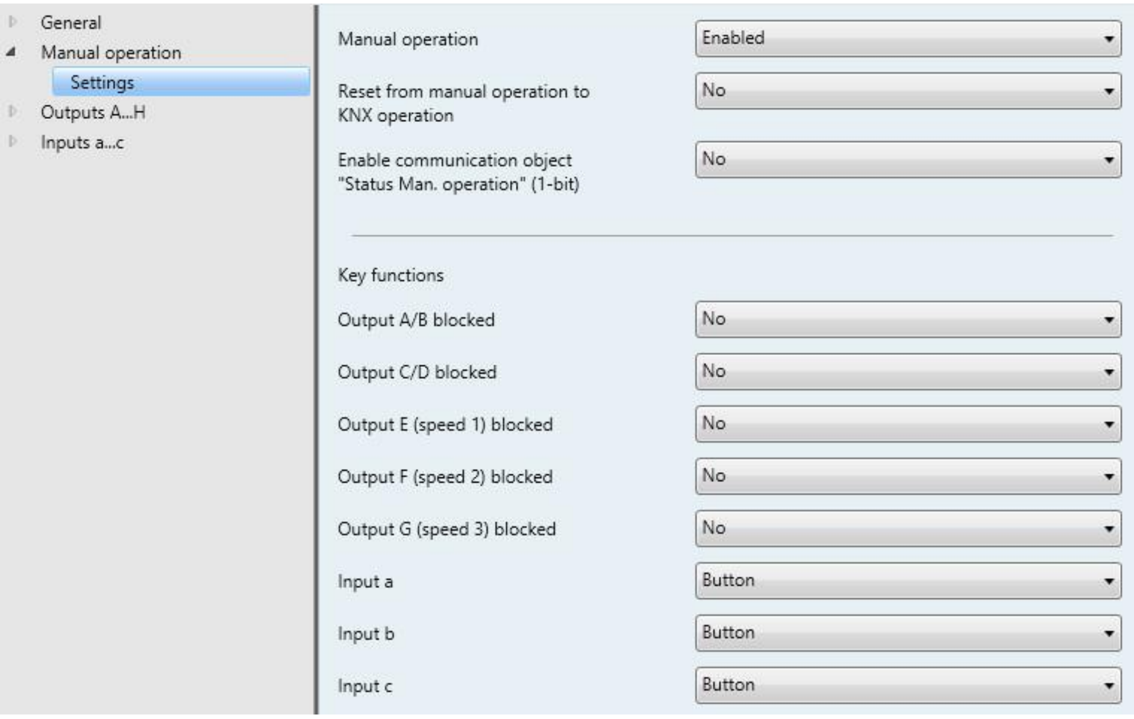
  - *0*: Sending status messages is requested with the value 0.
  - *1*: Sending status messages is requested with the value 1.
  - *0 or 1*: Sending status messages is requested with the values 0 or 1.

Note
If the option *Yes* has been selected for the parameter *Enable communication object "Request status values" 1-bit,* the communication objects no. 4, 18, 28, 38 and 48 are sent immediately. For all other status objects, e.g. for the fan, it is also possible to use parameters to set the time when each of them is to be sent to the bus.

3.2.2 Parameter window *Manual operation – Settings*

Note
This parameter window is only visible for devices with manual operation.

Settings for manual operation:



Manual operation	Enabled
Reset from manual operation to KNX operation	No
Enable communication object "Status Man. operation" (1-bit)	No
Key functions	
Output A/B blocked	No
Output C/D blocked	No
Output E (speed 1) blocked	No
Output F (speed 2) blocked	No
Output G (speed 3) blocked	No
Input a	Button
Input b	Button
Input c	Button

Manual operation

Options:	Disabled <u>Enabled</u> Enable/disable via comm. object

This parameter defines if the switchover between the operating states *Manual operation* and *KNX operation* is possible via the button ☞ on the device or via a communication object.

For further information see: [Manual operation](#), p. 63

Note
The manual operation overwrites the input states.

- *Enabled:* The operating states *Manual operation* and *KNX operation* can be toggled via button ✋.
- *Enable/disable via communication object:* The communication object *Block manual operation* - General appears.

Telegram value: 0 = Enable ✋ button
1 = Block ✋ button

- *Blocked:* Manual operation is generally disabled

Reset from manual operation to KNX operation

Options: No
Yes

This parameter determines whether, after pressing the button ✋, the device will remain in *Manual operation* or will be reset back to KNX operation.

- *Yes:* The device is reset to KNX operation.

Dependent parameter:

Time for automatic reset to KNX operation in s [1...65,535]

Options: 1…30…65,535

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

The device remains in *Manual operation* after the last button push until either button ✋ is pushed 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 Man. operation* is enabled.

  Dependent parameter:

  Send object value

  Options: No, update only
  On change
  After request
  After a change or request

  - *No, update only*: The status is updated but not sent.
  - *On change*: The status is sent when a change occurs.
  - *After request*: The status is sent when a request occurs.
  - *After a change or request*: The status is sent on a change or a request.

For further information see: Manual operation, p. 63

Function of the buttons:

Output A/B blocked

Output C/D blocked

Fan speed 1 output E blocked

Fan speed 2 output F blocked

Fan speed 3 output G blocked

Input a, b, c

Note
The functions *Fan speed x output x blocked* only appear if the option *Enabled as fan* has been selected for the parameter *Outputs EFG* in the parameter window *Enable output E...H*.

Input a, b and c

Options: Disabled
Switch
<u>Button</u>

With this parameter, the button can be disabled or programmed as a switch or push button.

- *Disabled:*

  Button disabled

  LEDs not functioning
- *Switch:* With every actuation, the states of the input and the LED are changed.
- *Button:*

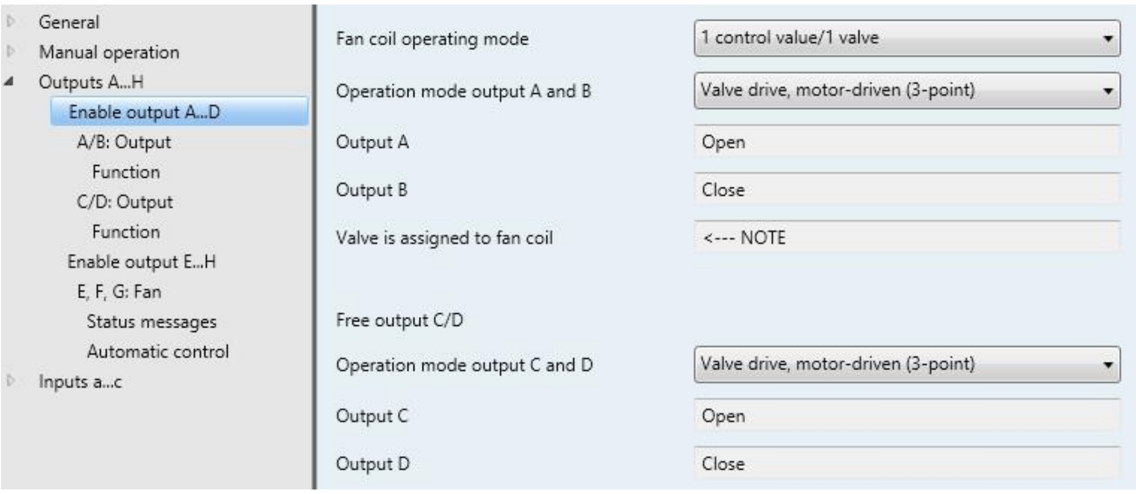
  Press button => input closed, LED on

  Release button => input opened, LED off

3.2.3 Parameter window *Outputs A...H*

3.2.3.1 Parameter window *Enable output A...D*

In this parameter window, outputs A...D are enabled.



Fan coil operating mode	1 control value/1 valve
Operation mode output A and B	Valve drive, motor-driven (3-point)
Output A	Open
Output B	Close
Valve is assigned to fan coil	<--- NOTE
Free output C/D	
Operation mode output C and D	Valve drive, motor-driven (3-point)
Output C	Open
Output D	Close

Fan coil operating mode

Options:	<u>1 control value/1 valve</u> 2 control values/1 valve 2 control values/1 valve/ with switching object 2 control values/2 valves 2 control values/2 valves/ with switching object

This parameter determines how the control value is processed.

Note
In the option *2 control values/2 valves* (with or without switching object), one valve must be parameterized as a heating valve and the other valve as a cooling valve, according to the installation conditions.

3.2.3.1.1 Description of the Fan Coil operating modes with valve drive, thermoelectric (PWM)

Control values overview

Functions of the output	A	B	C	D
General				
- Overload	■		■	
- Parallel operation	■	free	■	free
Valve drives allocated to the Fan Coil unit				
- Thermoelectric (PWM)	■	■	■	■
- 1 control value/1 valve	■	free	free	free
- 2 control values/1 valve	■	free	free	free
- 2 control values/2 valves	■	free	■	free
Setting facilities for valve drives				
- Thermoelectric (PWM)				
- Separate heating/cooling	■	■	■	■
- Direction	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE	OPEN/CLOSE

■ = Control value functions
- = Control value does not function

Valves independently usable

If the option *Enabled as switch actuators* is selected in the parameter window *Enable output E...H*, the outputs A, B, C and D can be used independently.
The individual communication objects appear. The control value is connected to the outputs via group addresses.

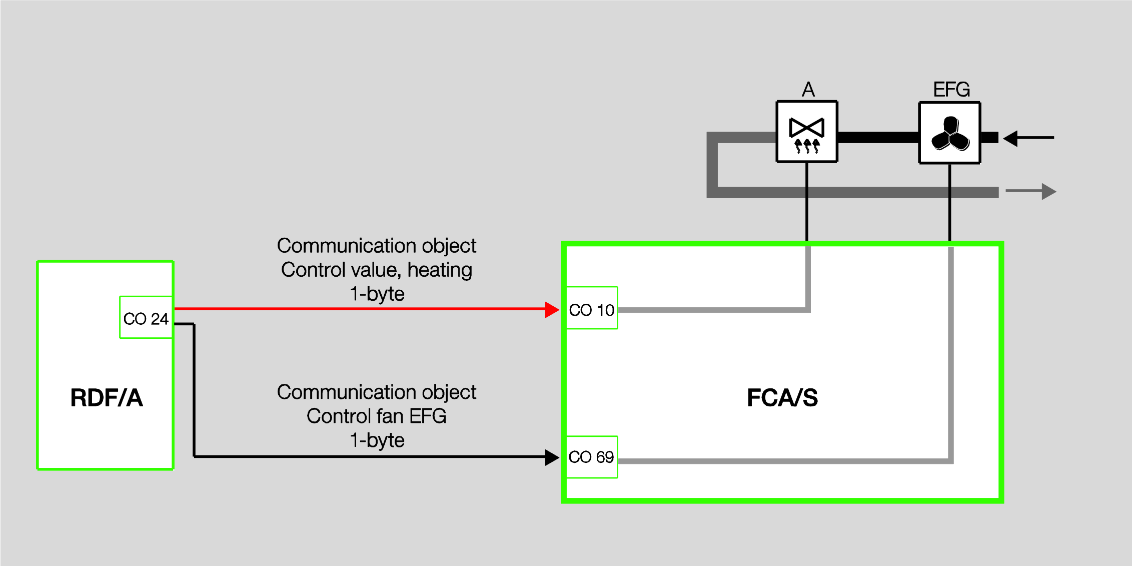
	Output A	Output B	Output C	Output D	Fan EFG
Valves					
Freely parameterizable	■	■	■	■	As switch actuators

■ = Control value functions
- = Control value does not function

Fan Coil operating mode: 1 control value/1 valve

What does the option control value input *"1 control value/1 valve"* mean?

Example: Heating valve and three-speed fan



Control value processing in the device

	Output A	Output B	Output C	Output D
Control value input				
1 control value/1 valve	■	-	-	-

■ = Control value functions
- = Control value does not function

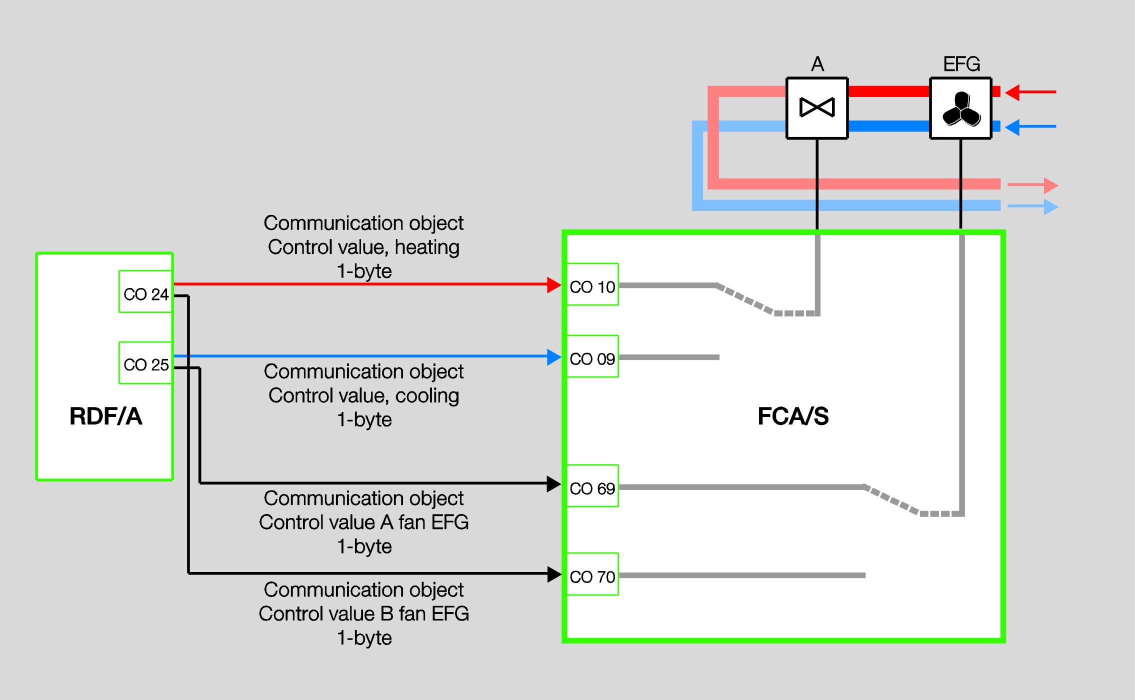
If the option *1 control value/1 valve* is selected, the control value heating will operate on output A.

The control value fan EFG operates on the outputs E, F and G. To ensure perfect functioning of the Fan Coil, the control value fan EFG is connected with the control value heating.

Fan Coil operating mode: 2 control values/1 valve

What does the option control value input *"2 control values/1 valve"* mean?

Example: Valve and three-speed fan



Control value processing in the device

	Output A	Output B	Output C	Output D
Control value input				
2 control values/1 valve	■	-	-	-

■ = Control value functions
- = Control value does not function

If the option *2 control values/1 valve* is selected, the control values will operate on output A.

The two control values, heating and cooling, are compared internally and the larger value operates on output A (valve).

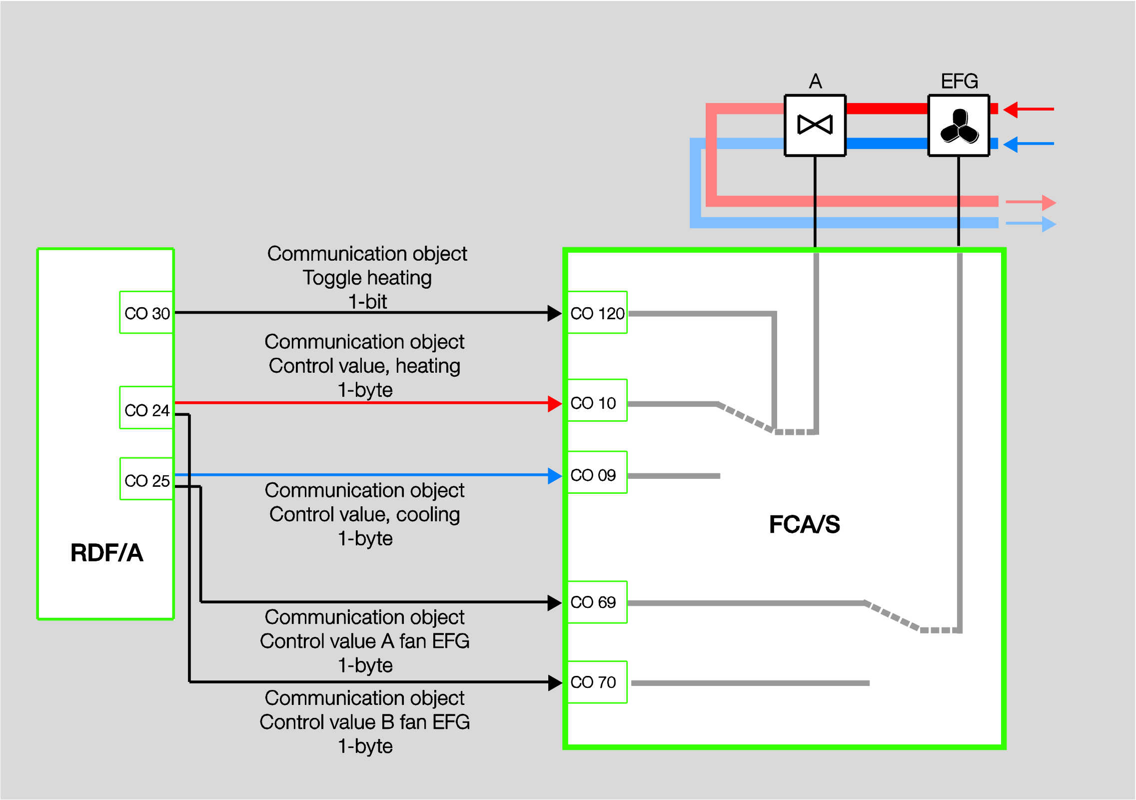
The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

Fan Coil operating mode: 2 control values/1 valve / with switching object

What does the option control value input: *"2 control values/1 valve / with switching object"* mean?

Example: Valve and three-speed fan



Control value processing in the device

	Output A	Output B	Output C	Output D
Control value input				
2 control values/1 valve/ with switching object	■	-	-	-

■ = Control value functions
- = Control value does not function

If the option *2 control values/1 valve / with switching object* is selected, the control values will operate on output A.

Which of the two control values operates on outputs A and C is decided via the communication object "Toggle heating".

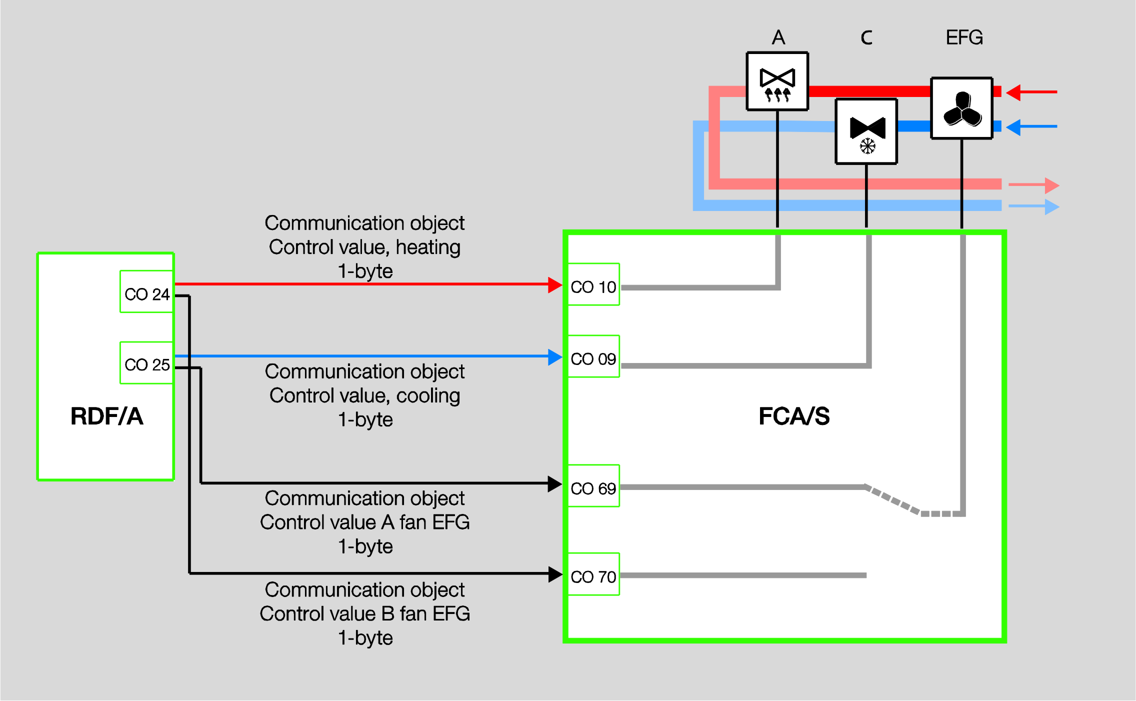
The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

Fan Coil operating mode: 2 control values / 2 valves

What does the option control value input *"2 control values / 2 valves"* mean?

Example: 2 valves and three-speed fan



Control value processing in the device

	Output A	Output B	Output C	Output D
Control value input				
2 control values/2 valves	■	-	■	-

■ = Control value functions
- = Control value does not function

If the option *2 control values/2 valves* is selected, the control values will operate directly on output C.

The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

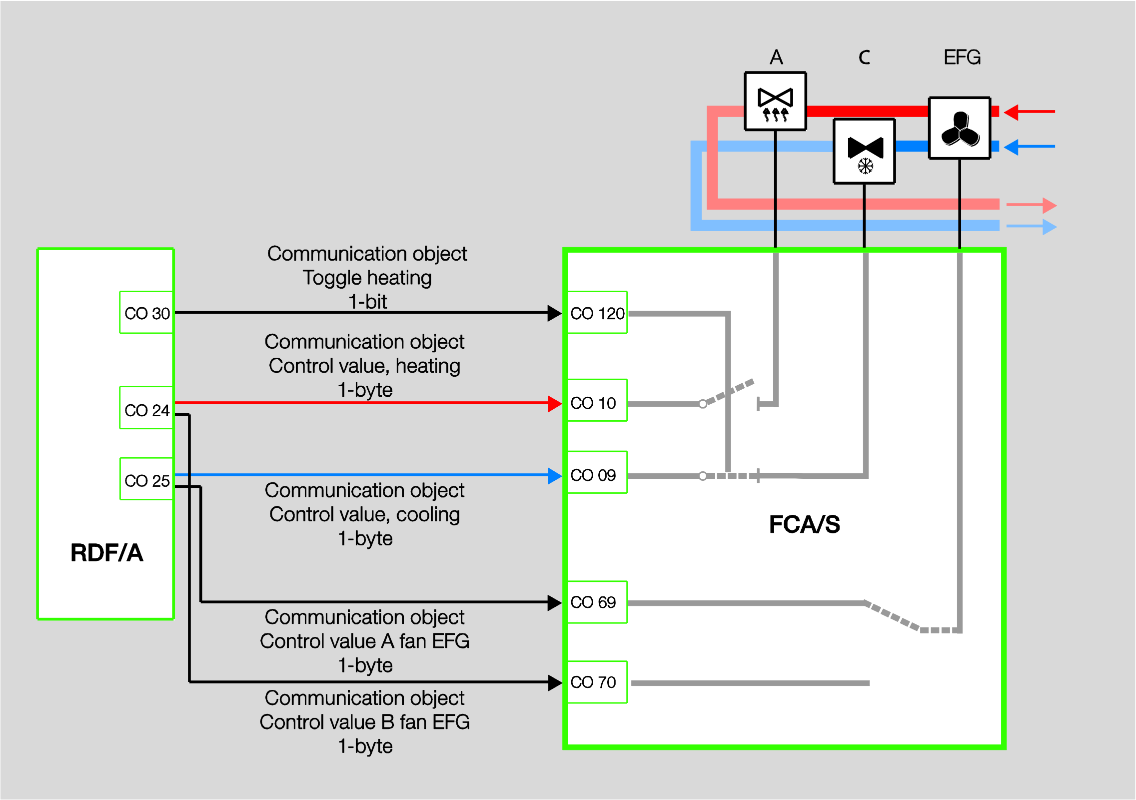
Note

In the option *2 control values/2 valves* (with or without switching object), one valve must be parameterized as a heating valve and the other valve as a cooling valve, according to the installation conditions.

Fan Coil operating mode: 2 control values/2 valves / with switching object

What does the option control value input: *"2 control values/2 valves / with switching object"* mean?

Example: 2 valves and three-speed fan



Control value processing in the device

	Output A	Output B	Output C	Output D
Control value input				
2 control values/2 valves/ with switching object	■	-	■	-

■ = Control value functions
- = Control value does not function

If the option *2 control values/2 valves / with switching object* is selected, the control values will operate directly on output C.

Which of the two control values operates on outputs A and C is decided via the communication object "Toggle heating".

The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

Note

In the option *2 control values/2 valves* (with or without switching object), one valve must be parameterized as a heating valve and the other valve as a cooling valve, according to the installation conditions.

3.2.3.1.2 Description of the Fan Coil operation modes with valve drive, motor-driven (3-point) and analog

Control values overview

Functions of the output	A	B	C	D
General				
- Overload	■		■	
- Parallel operation	■	free	■	free
Valve drives allocated to the Fan Coil unit				
- Analog (0…10 V)	■	-	■	-
- 1 control value/1 valve	■	-	free	-
- 2 control values/1 valve	■	-	free	-
- 2 control values/2 valves	■	-	■	-
Setting facilities for valve drives				
- Motor-driven (3-point)				
- Separate heating/cooling	■		■	
- Direction	OPEN	CLOSE	OPEN	CLOSE
- Analog (0…10 V)				
- Separate heating/cooling	■		■	
- Direction	OPEN/CLOSE		OPEN/CLOSE	

■ = Control value functions
\- = Control value does not function

Valves independently usable

If the option *Enabled as switch actuators* is selected in the parameter window *Enable output E...H*, the outputs A, B, C and D can be used independently.
The individual communication objects appear. The control value is connected to the outputs via group addresses.

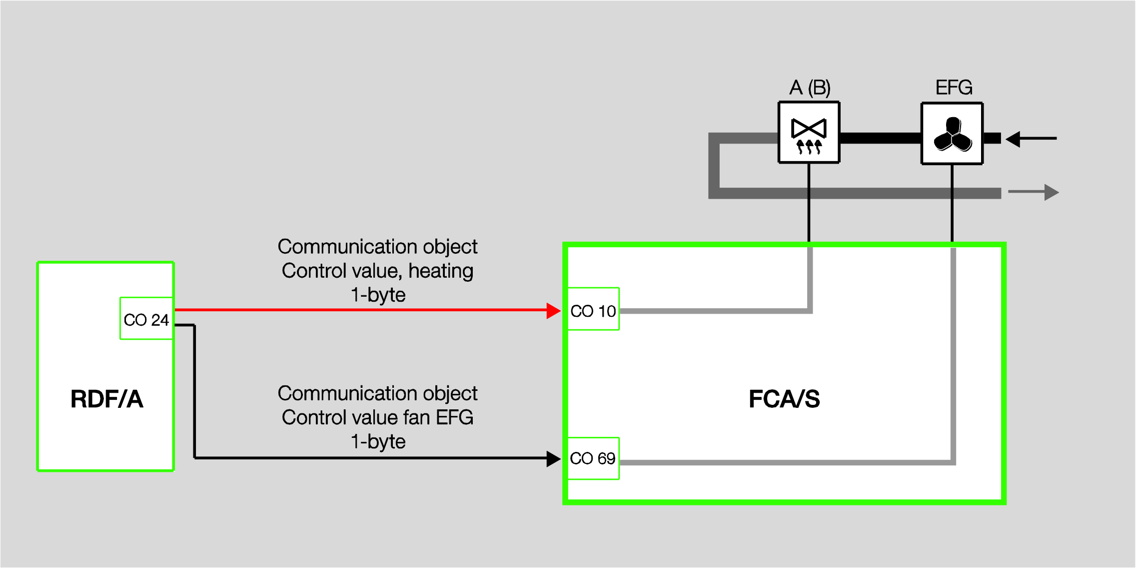
	Output A	Output B	Output C	Output D	Fan EFG
Valves					
Freely parameterizable	■	■	■	■	As switch actuators

■ = Control value functions
\- = Control value does not function

Fan Coil operating mode: 1 control value/1 valve

What does the option control value input *"1 control value/1 valve"* mean?

Example: Heating valve and three-speed fan



Control value processing in the device

Analog:

	Output A	Output C
Control value input		
1 control value/1 valve	■	-

Motor-driven (3-point):

	Output A/B	Output C/D
Control value input		
1 control value/1 valve	■	-

■ = Control value functions
- = Control value does not function

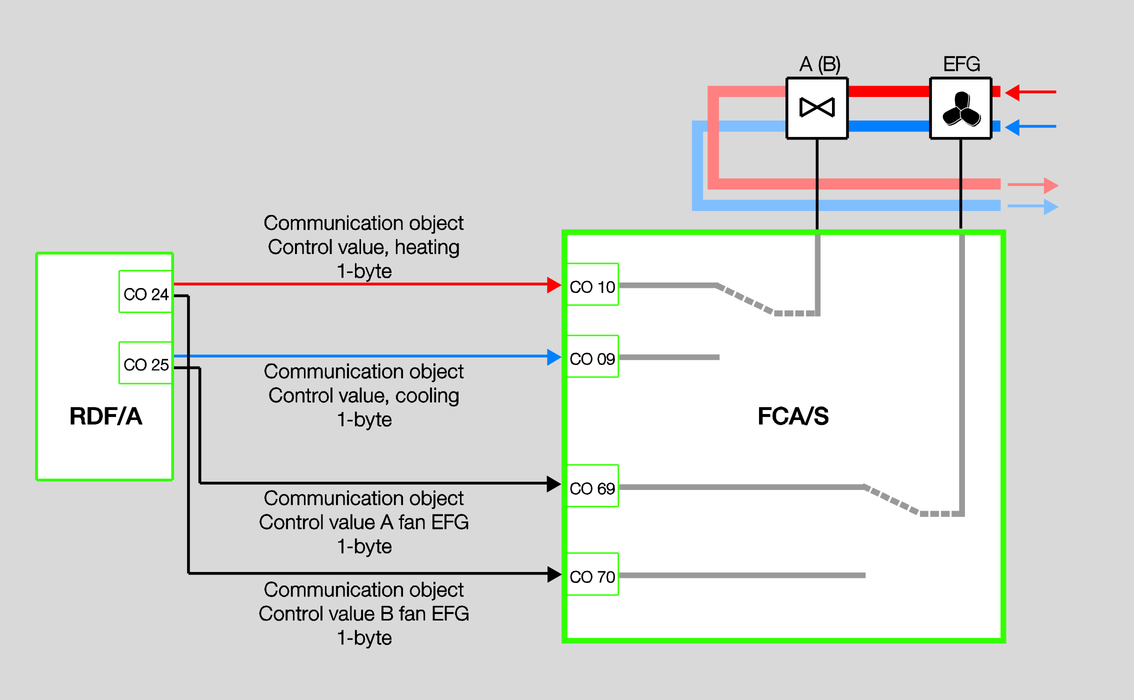
If the option *1 control value/1 valve* is selected, the control value heating will operate on output A (B).

The control value fan EFG operates on the outputs E, F and G. To ensure perfect functioning of the Fan Coil, the control value fan EFG is connected with the control value heating.

Fan Coil operating mode: 2 control values/1 valve

What does the option control value input *"2 control values/1 valve"* mean?

Example: Valve and three-speed fan



Control value processing in the device

Analog:

	Output A	Output C
Control value input		
2 control values/1 valve	■	-

Motor-driven (3-point):

	Output A/B	Output C/D
Control value input		
2 control values/1 valve	■	-

■ = Control value functions
- = Control value does not function

If the option *2 control values/1 valve* is selected, the control values will operate on output A (B).

The two control values, heating and cooling, are compared internally and the larger value operates on output A or B (valve).

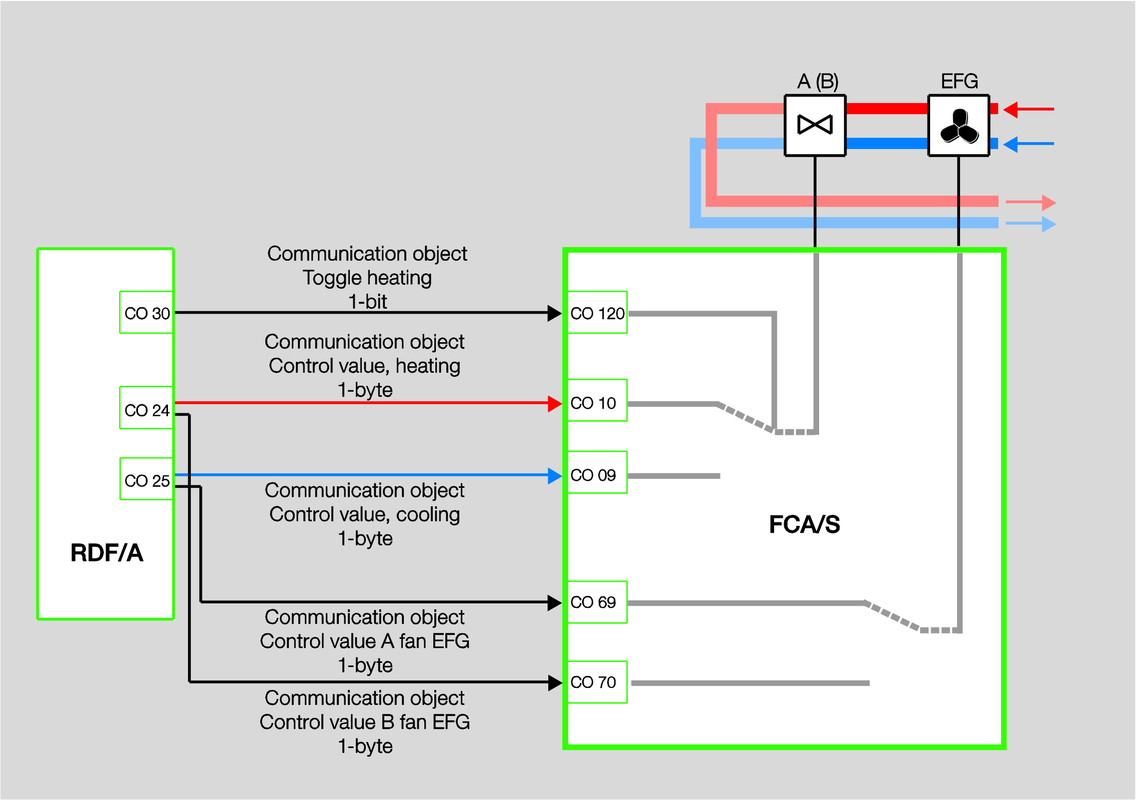
The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

Fan Coil operating mode: 2 control values/1 valve / with switching object

What does the option control value input: *"2 control values/1 valve / with switching object"* mean?

Example: Valve and three-speed fan



Control value processing in the device

Analog:

	Output A	**Output C**
Control value input		
2 control values/ 1 valve/ with switching object	■	-

Motor-driven (3-point):

	Output A/B	**Output C/D**
Control value input		
2 control values/ 1 valve/ with switching object	■	-

■ = Control value functions
- = Control value does not function

If the option *2 control values/1 valve / with switching object* is selected, the control values will operate on output A (B).

Which of the two control values operates on outputs A and C is decided via the communication object "Toggle heating".

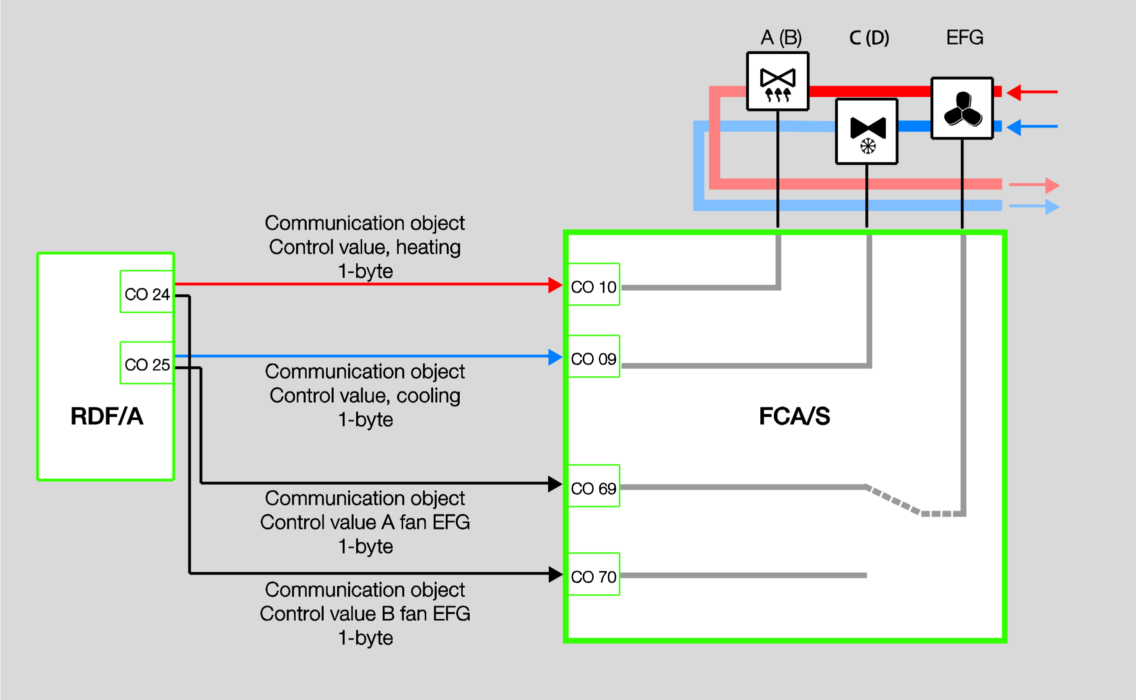
The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

Fan Coil operating mode: 2 control values / 2 valves

What does the option control value input *"2 control values / 2 valves"* mean?

Example: 2 valves and three-speed fan



Control value processing in the device

Analog:

	Output A	Output C
Control value input		
2 control values/2 valves	■	■

Motor-driven (3-point):

	Output A/B	Output C/D
Control value input		
2 control values/2 valves	■	■

■ = Control value functions
- = Control value does not function

If the option *2 control values/2 valves* is selected, the control values will operate directly on output A (B) and output C (D).

Which of the two control values operates on outputs A and C is decided via the communication object "Toggle heating".

The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

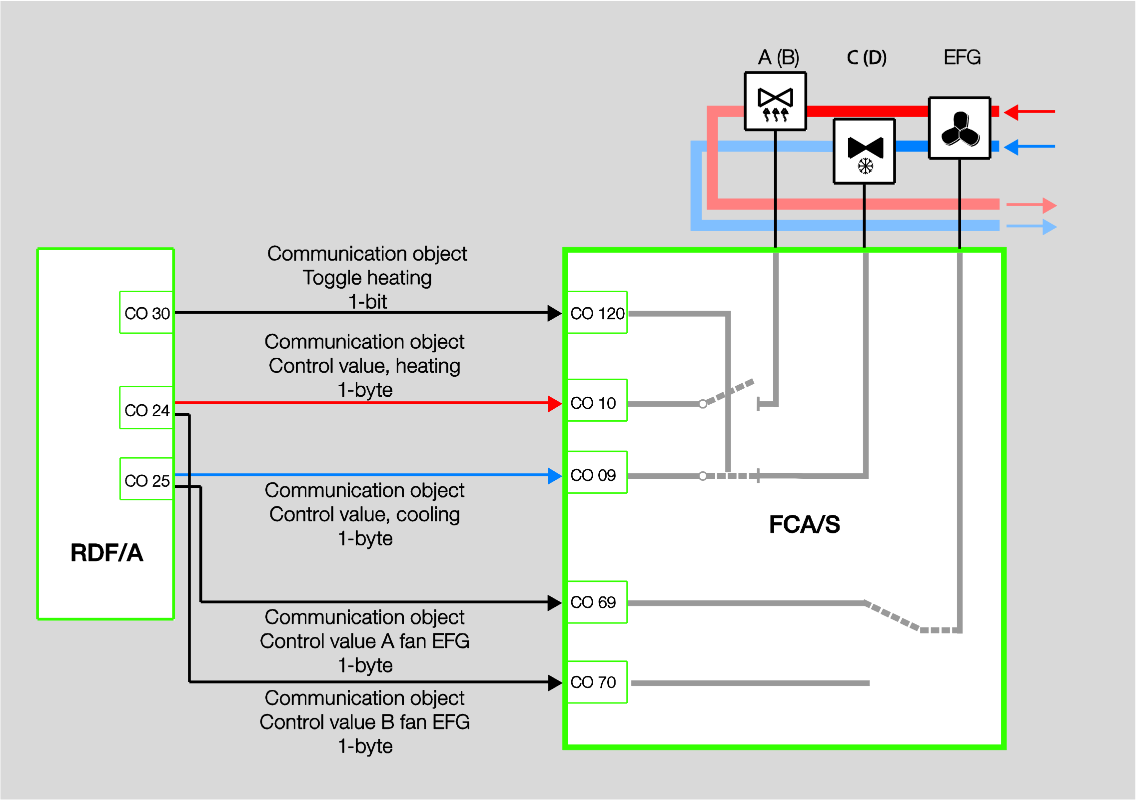
To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

Note
In the option *2 control values/2 valves* (with or without switching object), one valve must be parameterized as a heating valve and the other valve as a cooling valve, according to the installation conditions.

Fan Coil operating mode: 2 control values/2 valves / with switching object

What does the option control value input: *"2 control values/2 valves / with switching object"* mean?

Example: 2 valves and three-speed fan



Control value processing in the device

Analog:

	Output A	Output C
Control value input		
2 control values/ 2 valves/ with switching object	■	■

Motor-driven (3-point):

	Output A/B	Output C/D
Control value input		
2 control values/ 2 valves/ with switching object	■	■

■ = Control value functions
- = Control value does not function

If the option *2 control values/2 valves / with switching object* is selected, the control values will operate directly on output A (B) and output C (D).

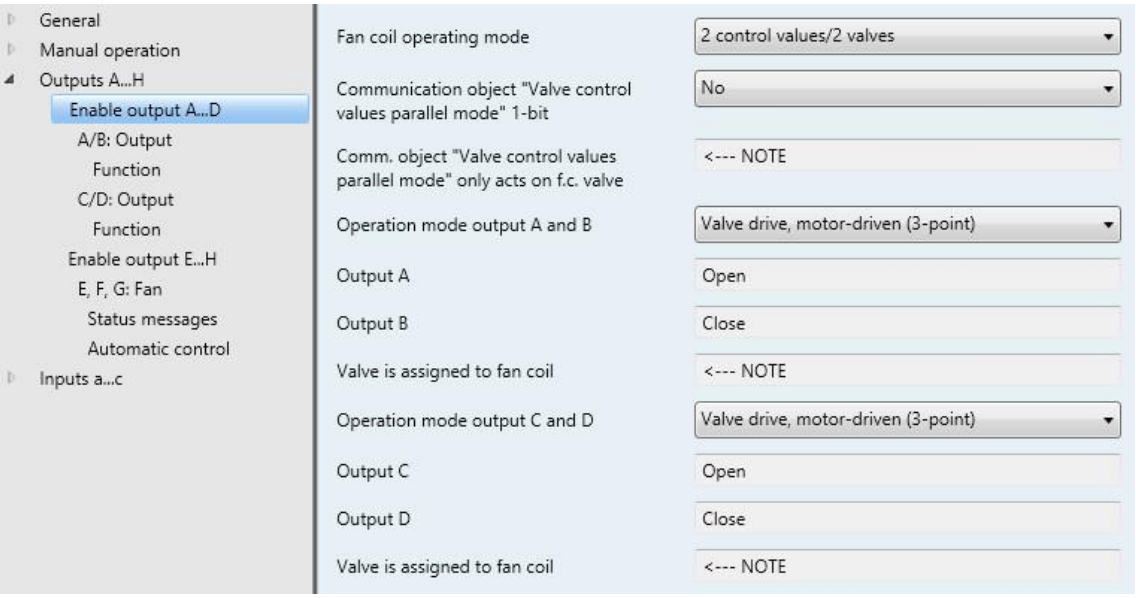
Which of the two control values operates on outputs A and C is decided via the communication object "Toggle heating".

The type of the two fans EFG control values A and B is set in the application. In this example, "Number of control value inputs" is parameterized to 2 and the reaction to "Largest value".

To ensure correct operation of the Fan Coil, the fan EFG control value A is connected with the control value cooling and the fan EFG control value B with the control value heating.

Note
In the option *2 control values/2 valves* (with or without switching object), one valve must be parameterized as a heating valve and the other valve as a cooling valve, according to the installation conditions.

Note
If the options with 2 valves are selected, parallel mode can be enabled via the communication object *Valve control values parallel mode*.



Fan coil operating mode: 2 control values/2 valves
Communication object "Valve control values parallel mode" 1-bit: No
Comm. object "Valve control values parallel mode" only acts on f.c. valve: <--- NOTE
Operation mode output A and B: Valve drive, motor-driven (3-point)
Output A: Open
Output B: Close
Valve is assigned to fan coil: <--- NOTE
Operation mode output C and D: Valve drive, motor-driven (3-point)
Output C: Open
Output D: Close
Valve is assigned to fan coil: <--- NOTE

Communication object "Valve control values parallel mode" 1-bit

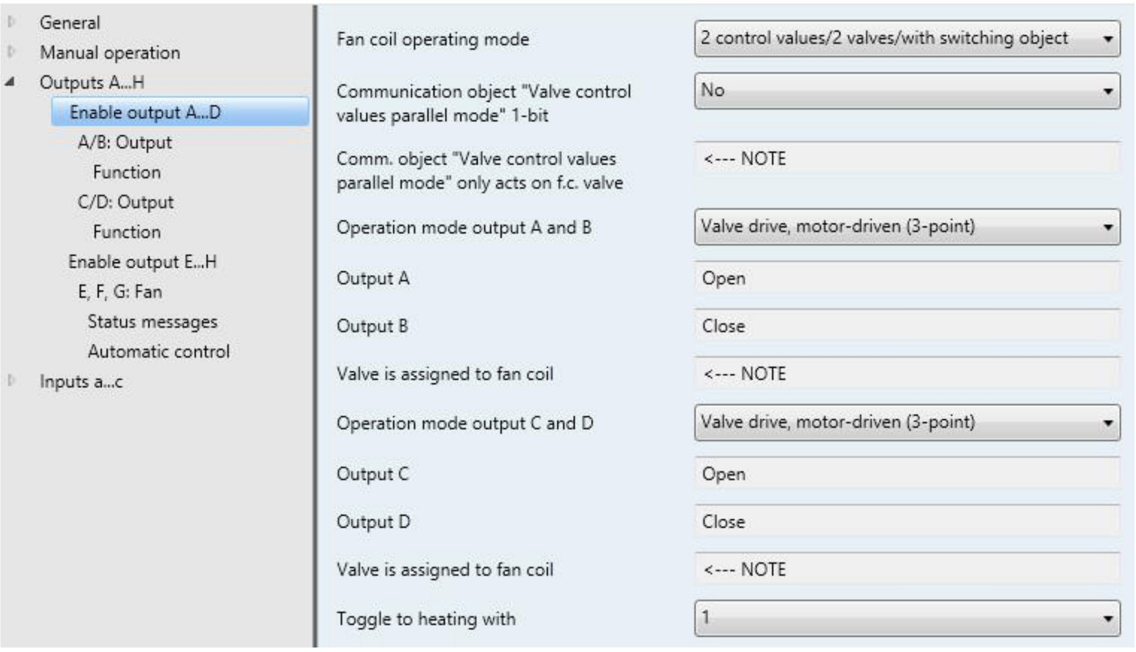
Options: No
Yes

- *Yes:* The 1-bit communication object *Valve control values parallel operation* is enabled.

Note
Communication object "Valve control values parallel mode" only operates on Fan Coil valves.

Note
If an operation mode with 2 control values and 1 valve is selected for the Fan Coil, an additional communication object (no. 9) is enabled that is set for cooling and is as follows, depending on the operation mode of the outputs: 2nd control value, cooling, continuous (PWM) 2nd control value, cooling, continuous (3-point) 2nd control value, cooling, analog (0...10 V)

Note
If the options with switching object are selected, an additional parameter *Toggle to heating with* will appear



Fan coil operating mode: 2 control values/2 valves/with switching object

Communication object "Valve control values parallel mode" 1-bit: No

Comm. object "Valve control values parallel mode" only acts on f.c. valve: <--- NOTE

Operation mode output A and B: Valve drive, motor-driven (3-point)

Output A: Open

Output B: Close

Valve is assigned to fan coil: <--- NOTE

Operation mode output C and D: Valve drive, motor-driven (3-point)

Output C: Open

Output D: Close

Valve is assigned to fan coil: <--- NOTE

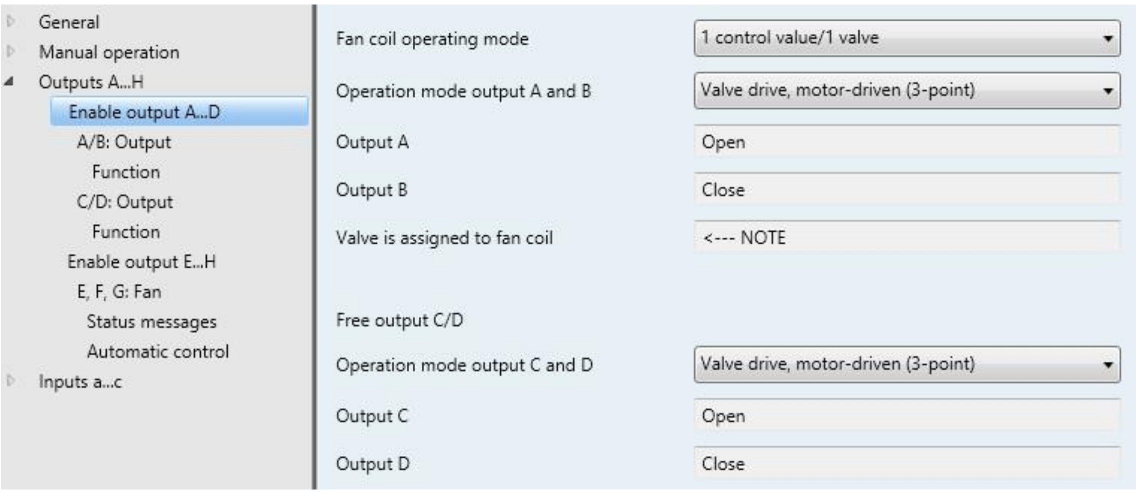
Toggle to heating with: 1

Toggle to heating with

Options:	0
	<u>1</u>

- *0:* A telegram with the value 0 switches.
- *1:* A telegram with the value 1 switches.

Parameter window *Enable output A...D* – Fan Coil Actuator, PWM



Fan coil operating mode: 1 control value/1 valve
Operation mode output A and B: Valve drive, motor-driven (3-point)
Output A: Open
Output B: Close
Valve is assigned to fan coil: <--- NOTE
Free output C/D
Operation mode output C and D: Valve drive, motor-driven (3-point)
Output C: Open
Output D: Close

Operation mode output A and B

Options:	Individual <u>Valve drive, motor-driven (3-point)</u>

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

- *Individual:* With this setting, the operation modes of outputs A and B are set individually from one another.

  Dependent parameters:

  Output A

  Output B

Options:	<u>Disabled</u> Valve drive, thermoelectric (PWM)

  This parameter defines the individual operation mode of the output.

  - *Disabled:* No operation mode selected.
  - *Valve drive, thermoelectric (PWM):* The parameter (window) and communication objects for the operation mode *Valve drive, thermoelectric (PWM)* 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

Operation mode output C and D

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

- This parameter determines whether the operation modes of outputs C and D can be parameterized individually or whether the outputs are operated in operation mode *Valve drive, motor-driven (3-point).* The outputs are linked to one another in pairs in this operation mode. Outputs C and D control the contacts Open/Close of the valve drive for opening/closing the valve.
- *Individual:* With this setting, the operation modes of outputs C and D are set individually from one another.

  Dependent parameters:

  Output C

  Output D

Options:	Disabled
	Valve drive, thermoelectric (PWM)

  This parameter defines the individual operation mode of the output.

  - *Disabled:* No operation mode selected.
  - *Valve drive, thermoelectric (PWM):* The parameter (window) and communication objects for the operation mode *Valve drive, thermoelectric (PWM)* 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.

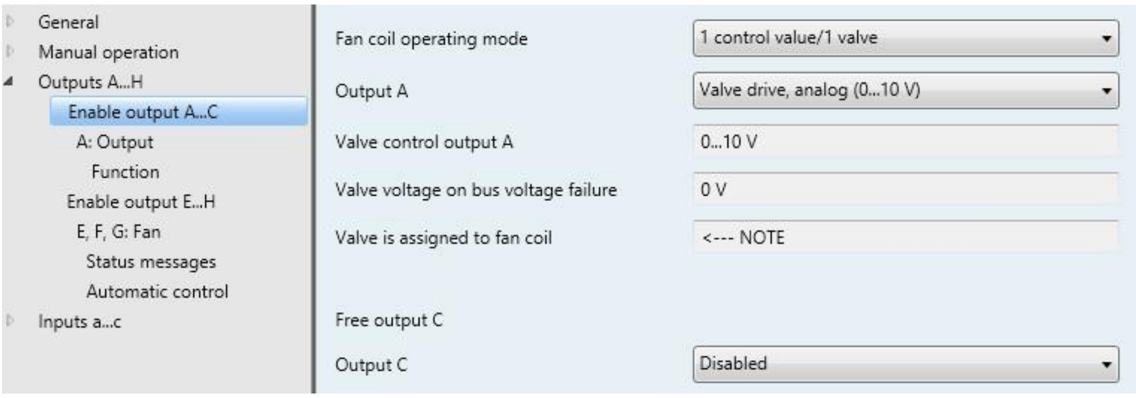
  Output C
  Open

  Output D
  Close

Assignment of the valves

Note
Outputs A and C are automatically assigned via the selection in the parameter *Fan Coil operating mode*.

Parameter window *Enable output A...D* – Fan Coil Actuator, 0...10 V



Fan coil operating mode: 1 control value/1 valve

Output A: Valve drive, analog (0...10 V)

Valve control output A: 0...10 V

Valve voltage on bus voltage failure: 0 V

Valve is assigned to fan coil: <--- NOTE

Free output C

Output C: Disabled

Output A

Options:	Disabled Valve drive, analog (0...10 V)

This parameter defines the individual operation mode of the output.

- *Disabled:* No operation mode selected.
- *Valve drive, analog (0...10 V):* The parameter (window) and communication objects for the operation mode *Valve drive, analog (0...10 V)* are enabled.

  Valve control output A

  0…10 V

  Valve voltage on bus voltage failure

  0 volts

This also applies for output C.

Assignment of the valves

Note
Outputs A and C are automatically assigned via the selection in the parameter *Fan Coil operating mode*.

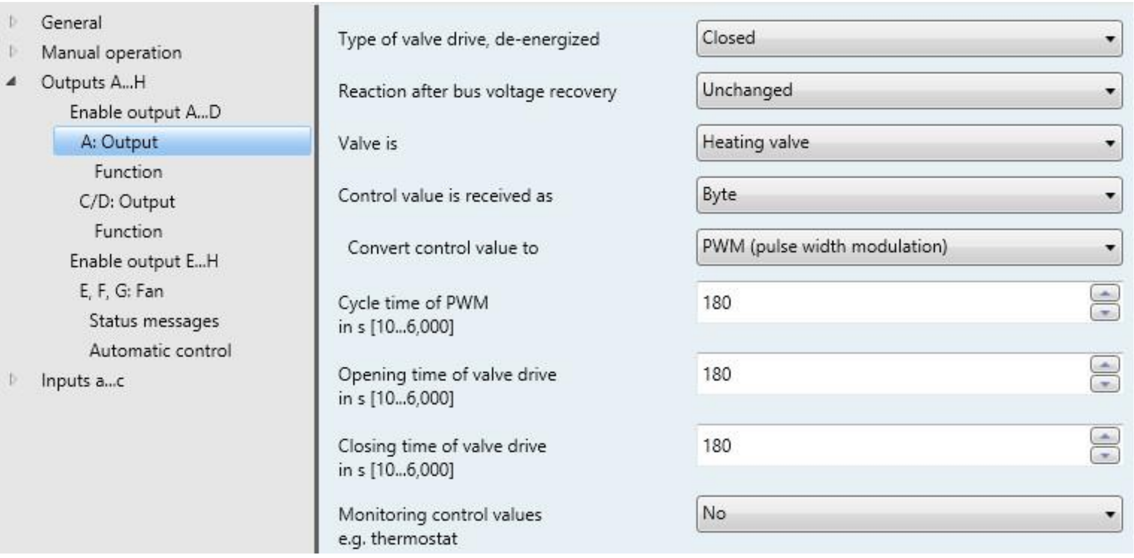
3.2.3.2 Parameter window *A: Output* (Valve drive, thermoelectric (PWM))

All settings for the output A/B as valve drive, thermoelectric (PWM) are made in this parameter window.

Note
This parameter window is visible for the products FCA/S 1.1.1.2 and FCA/S 1.1.2.2.

These parameters appear if the option *Valve drive, thermoelectric (PWM)* has been selected for the output.

For further information see: Pulse width modulation (PWM), p. 249.



Type of valve drive, de-energized: Closed
Reaction after bus voltage recovery: Unchanged
Valve is: Heating valve
Control value is received as: Byte
Convert control value to: PWM (pulse width modulation)
Cycle time of PWM in s [10...6,000]: 180
Opening time of valve drive in s [10...6,000]: 180
Closing time of valve drive in s [10...6,000]: 180
Monitoring control values e.g. thermostat: No

Type of valve drive, de-energized

Options: Closed
Open

This parameter determines the function of the valve drive.

Note
De-energized 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-energized 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 after bus voltage recovery

Options: Unchanged
Select

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

- *Unchanged:* The last valve control is restored.
- *Select:* A value is determined. Active priorities override the parameterized control.

  Dependent parameter:

  Control value in % [0...100]

  Options: 0…100

  This parameter determines the control of the output after bus voltage recovery in %.

Note

If the control value is received via a 1 bit value, a value must be entered in the parameter *Cycle time of PWM in s [10…6,000]*. This value is used as the basis for calculation of the output control at bus voltage recovery in %.

Note

Control value in %

The actual valve setting in % may diverge from the set value for control in % depending on the ambient conditions, e.g. room temperature, valve drive used, water pressure in the heating/cooling system, valve, etc.

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.

Valve is

Options:	Heating valve Cooling valve

This parameter determines whether the valve is defined as a heating valve or cooling valve.

Note
In the option *2 control values/2 valves* (with or without switching object), one valve must be parameterized as a heating valve and the other valve as a cooling valve, according to the installation conditions.

Control value is received as

Options:	Byte Bit

This parameter defines how the sent control value is received by the room thermostat. Depending on the selection, the communication object for the Control value, page 211 (1 bit or 1 byte) is displayed.

- *1-bit:* The control value is sent by the room 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).

The following message appears:

Set cycle time PWM, open/closing time
for contr. value of valve drive in %

At recovery, controller fault,
forced oper. and characteristic curve

← Note

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 the calculated control value, 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. Simple thermoelectric valve drives can be used.

- *1-byte:* The control value is sent by the room 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).

Selection of option *1-byte:*

Dependent parameter:

Convert control value to

Options: PWM (pulse width modulation)
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 parameter for entering the threshold value is displayed.

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

Options: 1…100

The output switches ON 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 switches OFF.

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

Options: 10…180…6,000

For setting the cycle time for the pulse width modulation.

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

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

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

Options: 10…180…6,000

With this parameter, a time is set in seconds that the connected valve requires to move from position 0% (valve closed) to position 100% (valve fully open).

Note
The time should be taken from the technical data of the valve, and it corresponds with the total runtime.

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

Options: 10…180…6,000

With this parameter, a time is set in seconds that the connected valve requires to move from position 100% (valve open) to position 0% (valve fully closed).

Note
The time should be taken from the technical data of the valve, and it corresponds with the total runtime.

Monitoring control values
e.g. thermostat

Options: No
Yes

This parameter is activated for monitoring cyclic sending of the control value, e.g. of the room 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 Control value, page 211, is enabled.

  Dependent parameters:

  Monitoring time
  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*, *ON/OFF*, if the option *Bit* has been selected for the parameter *Control value is received as*, or *Control value, continuous (PWM) 1*, if the option *Byte* has been selected for the parameter *Control value is received as.*

  If a control value is not received within the parameterized time, a malfunction or a defective room 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
  "Control value fault"

  Options: No, update only
  On change
  After request
  After a change or request

  - *No, update only*: The object value is updated but not sent.
  - *On change*: The object value is sent when a change occurs.
  - *After request*: The object value is sent when a request occurs.
  - *After a change or request*: The object value is sent when a change or request occurs.

Control value after control fault

Options: No
Yes

This parameter defines the control value with a control fault.

- *No:* No control value is set.
- *Yes:* A value is set.

Dependent parameter:

Control value in % [0...100]

Options: 0…100

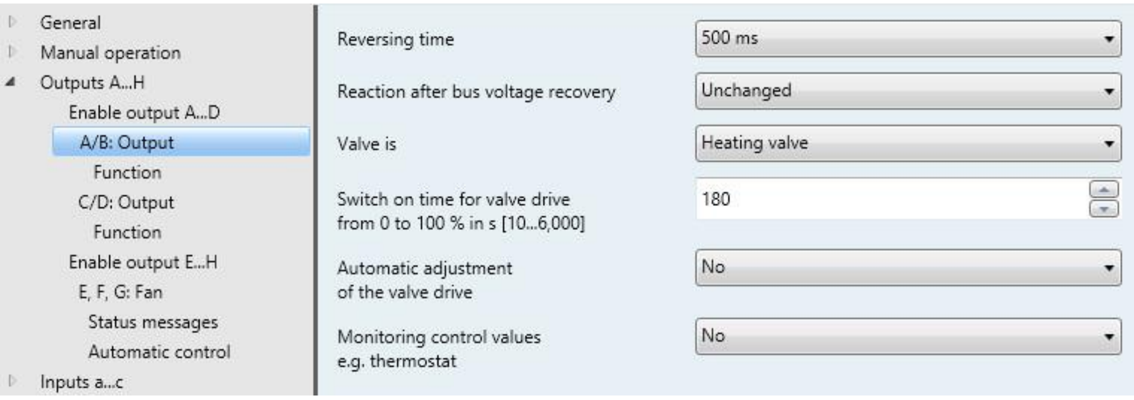
This parameter determines the control value in percent used to control the output in the event of a control fault.

3.2.3.3 Parameter window *AB: Output* (valve drive, motor-driven (3-point))

All settings for the output A/B as valve drive, motor-driven (3-point) are made in this parameter window.

Note
This parameter window is visible for the products FCA/S 1.1.1.2 and FCA/S 1.1.2.2.

These parameters appear if the option *Valve drive, motor-driven (3-point)* has been selected for the outputs.



Reversing time: 500 ms

Reaction after bus voltage recovery: Unchanged

Valve is: Heating valve

Switch on time for valve drive from 0 to 100 % in s [10...6,000]: 180

Automatic adjustment of the valve drive: No

Monitoring control values e.g. thermostat: No

Reversing time

Options: 100, 300, <u>500</u>, 700, 1,000 ms

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

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

Reaction after bus voltage recovery

Options: Unchanged
Select

This parameter determines the reaction of the output at bus voltage recovery. After bus voltage recovery, a Reference adjustment of the valve drive is always carried out. After this, the current control value is controlled.

- *Unchanged:* The last valve control is restored.
- *Select:* A value is determined. Active priorities override the parameterized control.

  Dependent parameter:

  Control value in % [0...100]

  Options: 0…100

  This parameter determines the control of the output after bus voltage recovery in %.

Valve is

Options: Heating valve
Cooling valve

This parameter determines whether the valve is defined as a heating valve or cooling valve.

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 switches on 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: <u>No</u>
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.

Selection of option *Yes:*

Dependent parameter:

Number of changes until adjustment

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/reference adjustment

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

If the parameterized number of valve controls is reached, 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 value, based on the last control value (at least 1 second, no more than 60 seconds). 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 push (>2s) on one of the buttons B or D triggers a valve reference movement for the valves

Reaction on control value 0%

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 value, but not for longer than 1 minute.

Monitoring control values e.g. thermostat

Options: No
Yes

This parameter is activated for monitoring cyclic sending of the control value, e.g. of the room 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 Control value, page 211, is enabled.

  Dependent parameters:

  Monitoring time 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, cont. (3-point).*

  If a control value is not received within the parameterized time, a malfunction or a defective room 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 "Control value fault"

  Options: No, update only
  On change
  After request
  After a change or request

  - *No, update only*: The object value is updated but not sent.
  - *On change*: The object value is sent when a change occurs.
  - *After request*: The object value is sent when a request occurs.
  - *After a change or request*: The object value is sent when a change or request occurs.

Control value after control fault

Options: No
Yes

This parameter defines the control value with a control fault.

- *No:* No control value is set.
- *Yes:* A value is set.

Dependent parameter:

Control value in % [0...100]

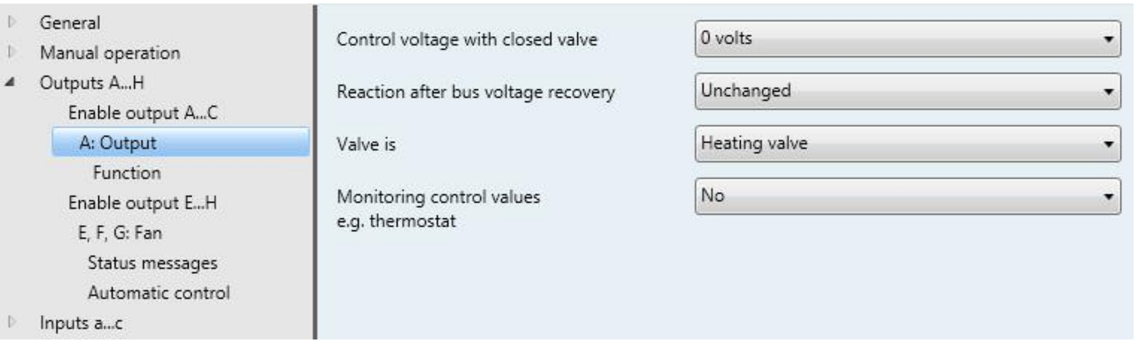
Options: 0…100

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

3.2.3.4 Parameter window *A: Output* (valve drive, analog (0...10 V))

All settings for Valve drive analog (0...10 V) are made in this window.

Note
This parameter window is visible for the products FCA/S 1.2.1.2 and FCA/S 1.2.2.2.



Control voltage with closed valve	0 volts
Reaction after bus voltage recovery	Unchanged
Valve is	Heating valve
Monitoring control values e.g. thermostat	No

Control voltage with closed valve

Options:	<u>0 volts</u> 10 volts

This parameter determines the function of the valve drive.

Note
De-energized 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-energized 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 after bus voltage recovery

Options:	Unchanged <u>Select</u>

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

- *Unchanged:* The last valve control is restored.
- *Select:* A value is determined. Active priorities override the parameterized control.

  Dependent parameter:

  Control value in % [0...100]

Options:	<u>0</u>…100

  This parameter determines the control of the output after bus voltage recovery in %.

Valve is

Options: Heating valve
Cooling valve

This parameter determines whether the valve is defined as a heating valve or cooling valve.

Monitoring control values e.g. thermostat

Options: No
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 Control value, page 211, is enabled.

  Dependent parameters:

  Monitoring time 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 valu*e, *ON/OFF*, if the option *Bit* has been selected for the parameter *Control value is received as*, or *Control value, continuous (PWM) 1*, if the option *Byte* has been selected for the parameter *Control value is received as.*

  If a control value is not received within the parameterized time, a malfunction or a defective room 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 "Control value fault"

  Options: No, update only
  On change
  After request
  After a change or request

  - *No, update only*: The object value is updated but not sent.
  - *On change*: The object value is sent when a change occurs.
  - *After request*: The object value is sent when a request occurs.
  - *After a change or request*: The object value is sent when a change or request occurs.

Control value after control fault

Options: <u>No</u>
Yes

This parameter defines the control value with a control fault.

- *No:* No control value is set.
- *Yes:* A value is set.

  Dependent parameter:

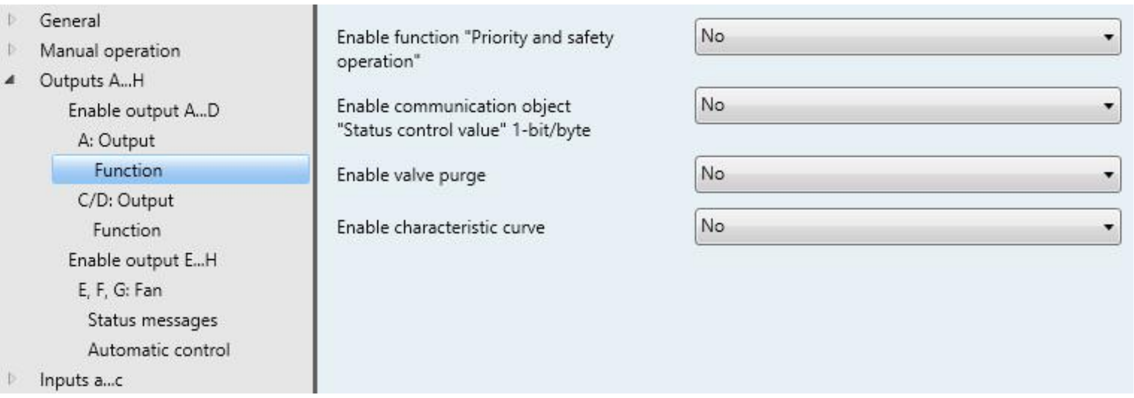
  Control value in % [0...100]

  Options: <u>0</u>…100

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

3.2.3.5 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)*, *Valve drive, motor-driven (3-point)* and *Valve drive, analog (0...10 V)*.



Enable function "Priority and safety operation": No
Enable communication object "Status control value" 1-bit/byte: No
Enable valve purge: No
Enable characteristic curve: No

Enable function "Priority and safety operation"

Options: No
Yes

- *Yes:* The Parameter window Security, page 119, is enabled.

Enable communication object "Status Control value" 1-bit/byte

Options: No
Yes

This parameter enables 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. 212, is enabled.

  Dependent parameters:

Send object value

Options: No, update only
<u>On change</u>
After request
After a change or request

- *No, update only*: The object value is updated but not sent.
- *On change*: The object value is sent when a change occurs.
- *After request*: The object value is sent when a request occurs.
- *After a change or request*: The object value is sent when a change or request occurs.

Data type 1-bit/byte

Options: Bit
<u>Byte</u>

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: <u>0</u>
  1

  If the object value at control is greater than 0, a 1-bit 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 Activate purge, page 213, is enabled.

Note
If purging is interrupted by higher priorities, 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.

Selection of option *Yes:*

Dependent parameters:

Enable communication object "Status valve purge" 1-bit

Options: No
Yes

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

- *Yes:* The 1-bit communication object Status Valve purge, page 214, is enabled.

  Dependent parameter:

  Send object value

  Options: No, update only
  On change
  After request
  After a change or request

  - *No, update only*: The object value is updated but not sent.
  - *On change*: The object value is sent when a change occurs.
  - *After request*: The object value is sent when a request occurs.
  - *After a change or request*: The object value is sent when a change or request occurs.

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

Options: 1…10…255

This parameter defines the time duration for the valve purge. During 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

Selection of option *Yes:*

Dependent parameters:

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 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…<u>99</u>

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 *Activate purge*. • The parameterized value (under *Reset purge cycle from...*) is exceeded. The purging cycle is only restarted once the parameterized value is reached or exceeded.

Enable characteristic curve

Options: <u>No</u>
Yes

- *Yes:* The Parameter window Characteristic curve, page 121, is enabled.

3.2.3.5.1 Parameter window *Security*

The function *Security* is identical for operation modes *Valve drive, thermoelectric (PWM)*, *Valve drive, motor-driven (3-point)* and *Valve drive, analog (0...10 V).* The parameter window is enabled if the parameter *Enable function "Priority and safety operation"* is selected with the option *Yes* in the Parameter window Function, page 115.

Safety priority 1 Inactive
Safety priority 2 Inactive
Safety priority 3 Inactive

Safety priority 1

Safety priority 2

Safety priority 3

Options:	<u>Inactive</u> Block Forced operation

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

- *Forced operation:* The communication object *Priority*, Forced operation* 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.
- *Block:* The communication object *Priority*, Block* 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. An operation is not possible until after the block is rescinded.

* Priority = Priority 1, 2 or 3.

Dependent parameters:

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

Options: 0…100

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: 0
1

- 0/1: 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 *Security*. 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 *Security* set beforehand – is forcibly operated or blocked. If the communication object *Priority*, Forced operation* or *Priority*, Block* receives a telegram that does not correspond with the value set under *Trigger with object value*, the monitoring time 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*, Forced operation" after download

Object value "Priority*,Block" after download

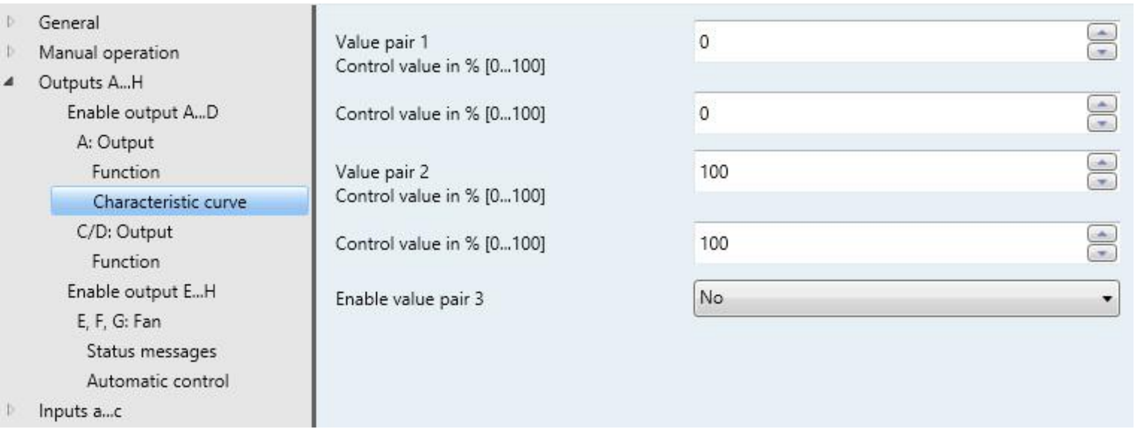
Options: Unchanged
0
1

- *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).

* Priority = Priority 1, 2 or 3.

3.2.3.5.2 Parameter window *Characteristic curve*

The characteristic curve is identical for operation modes *Valve drive, thermoelectric (PWM)*, *Valve drive, motor-driven (3-point)* and *Valve drive, analog (0...10 V)*. The parameter window is enabled if the parameter *Enable characteristic cur*ve has been selected with the option *Yes* in the Parameter window Function, page 115.



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

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

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

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

Enable value pair 3: No

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

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

The following must be considered with the characteristic curve adjustment:

- 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 the PWM*, see Parameter window A: Output (Valve drive, thermoelectric (PWM)), page 99ff., serves as the basis for calculation of controlling the output for characteristic curve adjustment, even if the characteristic curve is processed via a 1-bit value. This parameter is only available in operation mode *Valve drive, thermoelectric (PWM)*.

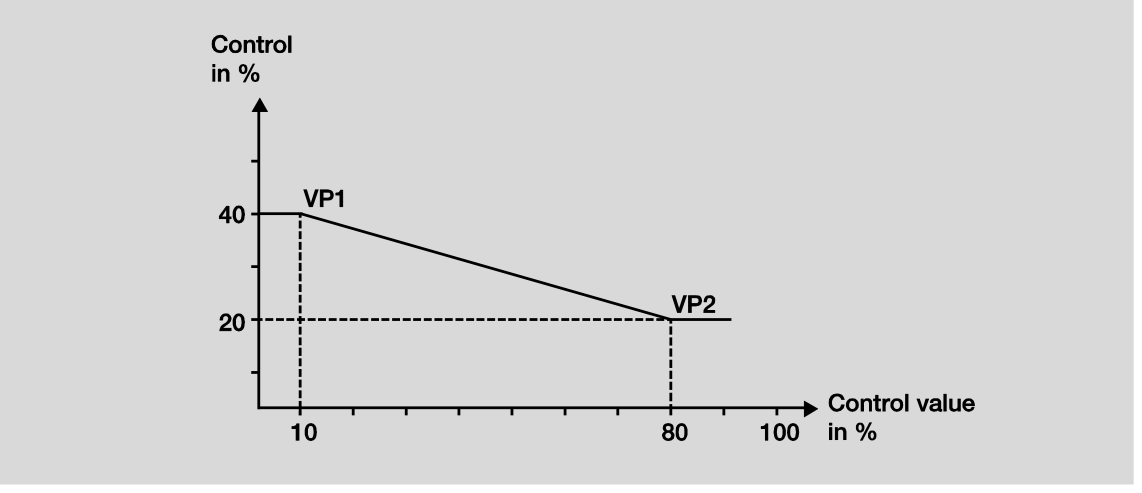
Note
Value pairs with the same control value can cause a non-defined characteristic curve. This fact must be considered during parameterization.

For example:

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

Implemented characteristic curve:

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



Value pair x
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 realized.

A total of four value pairs can be set.

Attention

A parameterization of the value pair with the same control value leads to an undefined state and should be strictly avoided. Otherwise it can lead to destruction of the HVAC system.

3.2.3.6 Parameter window *Output B, C, D*

The setting options of valve outputs B, C and D or C/D do not differentiate from those of output A or A/B.

The descriptions of the parameter setting options and the adjustable communication objects for outputs B, C and D or C/D are described in Parameter window A: Output (Valve drive, thermoelectric (PWM)), page 99 ff., Parameter window AB: Output (valve drive, motor-driven (3-point)), page 106 ff. and Parameter window A: Output (valve drive, analog (0...10 V)), page 111ff.

3.2.3.7 Parameter window *Enable output E...H*

Outputs E F G: Enabled as fan

Output H: Block

Outputs E F G

Options: Enabled as switch actuators
Enabled as fan

Outputs E, F and G can be programmed as switch actuators and as fans.

- *Enabled as switch actuators*: Outputs E, F and G appear as individual parameters and can be enabled individually.

Output E

Output F

Output G

Options: Block
Enabled

- *Block:* Output E, F, G is blocked/hidden. No communication objects are visible.
- *Enabled:* The parameter window *E, F, G: Output* appears. Dependent communication objects become visible.

All parameters and their settings for the outputs E, F, G do not differentiate from those of output H, see Parameter window H: Output, page 163.

- *Enable as fan:* The parameter window *E, F, G Fan* appears.

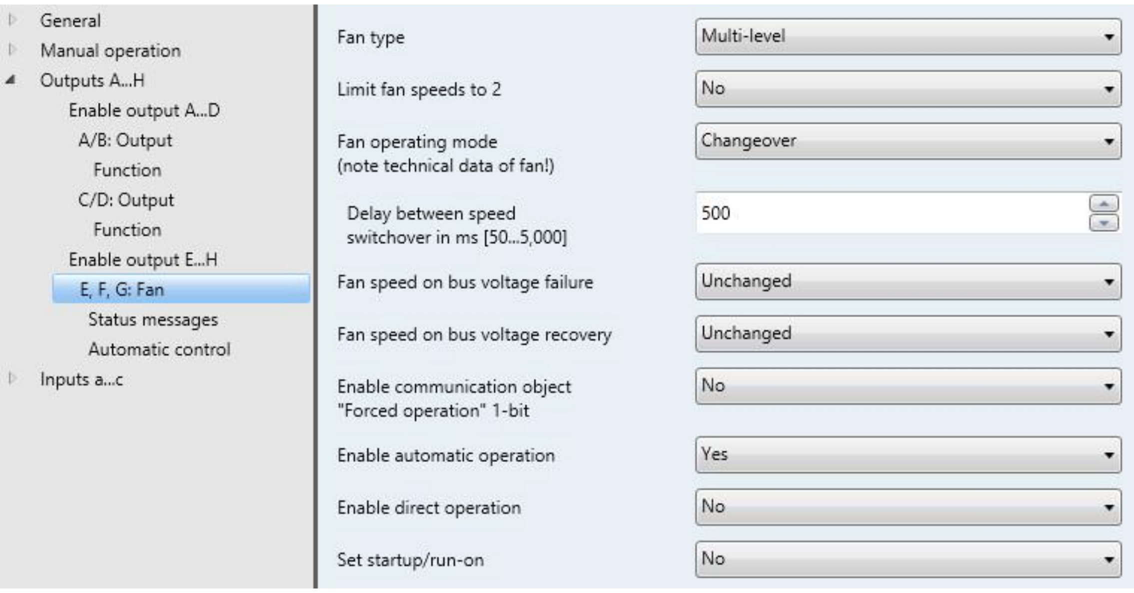
Output H

Options: Block
Enabled

- *Block:* Output H is blocked/hidden. No communication objects are visible.
- *Enabled:* The parameter window *H: Output* appears. Dependent communication objects become visible.

3.2.3.8 Parameter window *E, F, G: Fan* (Multi-level)

All settings for the *Multi-level fan* are made in this parameter window.



Fan type	Multi-level
Limit fan speeds to 2	No
Fan operating mode (note technical data of fan!)	Changeover
Delay between speed switchover in ms [50...5,000]	500
Fan speed on bus voltage failure	Unchanged
Fan speed on bus voltage recovery	Unchanged
Enable communication object "Forced operation" 1-bit	No
Enable automatic operation	Yes
Enable direct operation	No
Set startup/run-on	No

Fan type

Options:	<u>Multi-level</u> One-level

This parameter defines the fan type which is to be controlled.

- *Multi-level*: Controls a fan with up to three speeds.
- *One-level*: Controls a fan with one speed.

Limit fan speeds to 2

Options:	<u>No</u> Yes

The fan speeds can be limited to two here. The following settings are the same as those for a three-speed fan, except that they apply only to two speeds.

- *No*: A three-speed fan is controlled.
- *Yes:* A two-speed fan is controlled via fan speeds 1 and 2. Fan speed 3 is non-functional.

Fan operating mode
(note technical data of fan!)

Options:	<u>Changeover</u> Step switch

Control of the fan is set with this parameter. The mode of fan control should be taken from the technical data of the fan.

How does changeover switching work?

With changeover switch control, only the corresponding output of the assigned fan speed is switched on.

The delay time between the speed switchover and a minimum dwell time can be parameterized. The latter is only active in automatic operation.

How does step switching work?

With step switch control, it is impossible for the fan to switch on erratically or suddenly. The individual fan speeds are activated consecutively (outputs switched on) until the required fan speed is reached.

The parameterized delay time between two fan speeds has the effect that the current fan speed must be switched on for at least this time before the next speed is switched on. The parameterized minimum dwell time has the same effect as a changeover switch, i.e. it is only active in automatic mode and is added to the switchover delay.

- *Changeover:* Selection of option *Changeover:*

  Dependent parameter:

  Delay between speed
  switchover in ms [50...5,000]

  Options: 50…<u>500</u>…5,000

  A switchover delay can be programmed with this parameter. This time is a fan-specific factor and it is always taken into account.

Fan speed on bus voltage failure

Options:	<u>Unchanged</u> OFF

- *Unchanged*: The fan's speeds remain unchanged.
- *OFF*: The fan is switched off.

Fan speed on bus voltage recovery

Options: Unchanged
OFF
1
2
3

- *Unchanged*: The fan's speeds remain unchanged.
- *OFF*: The fan is switched off.
- *1, 2 or 3*: The fan switches to fan speed 1, 2 or 3.

Attention

The device is supplied ex-works with a default setting (factory default). This ensures that the fan setting is switched off when the bus voltage is applied to the relay for the first time. Thus, damage to the device due to unintentional switch on during transport, e.g. due to vibration, is avoided.

It is advisable to apply a bus voltage before connecting the fan in order to assign it a defined switch state. This eliminates the possibility of an incorrect contact setting destroying the fan.

Enable communication object "Forced operation" 1-bit

Options: No
Yes

Through forced operation, for example, recirculation, valve OFF and fan ON can be implemented.

- *Yes*: The 1-bit *Forced operation* communication object is enabled.

  Dependent parameters:

Forced operation on object value

Options: <u>0</u>
1

- *0*: Forced operation is activated by a telegram with value 0.
- *1*: Forced operation is activated by a telegram with value 1.

Note
During forced operation the settings set in *Automatic control* are ignored. Automatic control is updated after forced operation has been rescinded.

Important
Forced operation remains active until: • the complementary set values are sent. • the assignment is changed; • the fan type is changed. Forced operation is not deactivated by a download of the application, in which the fan type and the respective group addresses are retained. Forced operation is reset if an ETS reset has occurred.

Limitation on forced operation

Options:	<u>3, 2, 1, OFF</u> Unchanged OFF 1 1, OFF 2 2, 1 2, 1, OFF 3 3, 2 3, 2, 1

This parameter sets which fan speed is set, or may not be over/undershot, when forced operation is active.

- *No limitation active:* Everything is possible.
- *Unchanged*: The state is retained.
- *OFF*: Off
- *1*: Limited to speed 1.*
- *1, OFF*: limited to speed 1 and off.
- *2*: Limited to speed 2.*
- *2, 1*: limited to speeds 2 and 1.
- *1, OFF*: limited to speed 1 and off.
- *3*: Limited to speed 3.*
- *3, 2*: limited to speeds 3 and 2.
- *3, 2, 1*: limited to speeds 3, 2 and 1.

*** The control value is ignored.**

Enable automatic operation

Options:	No <u>Yes</u>

- *Yes: Automatic operation* is enabled. Furthermore the Parameter window Automatic control, page 135 appears.

Enable direct operation

Options:	<u>No</u> Yes

- *Yes: Direct operation* is enabled. Furthermore the Parameter window Direct operation, page 144 appears.

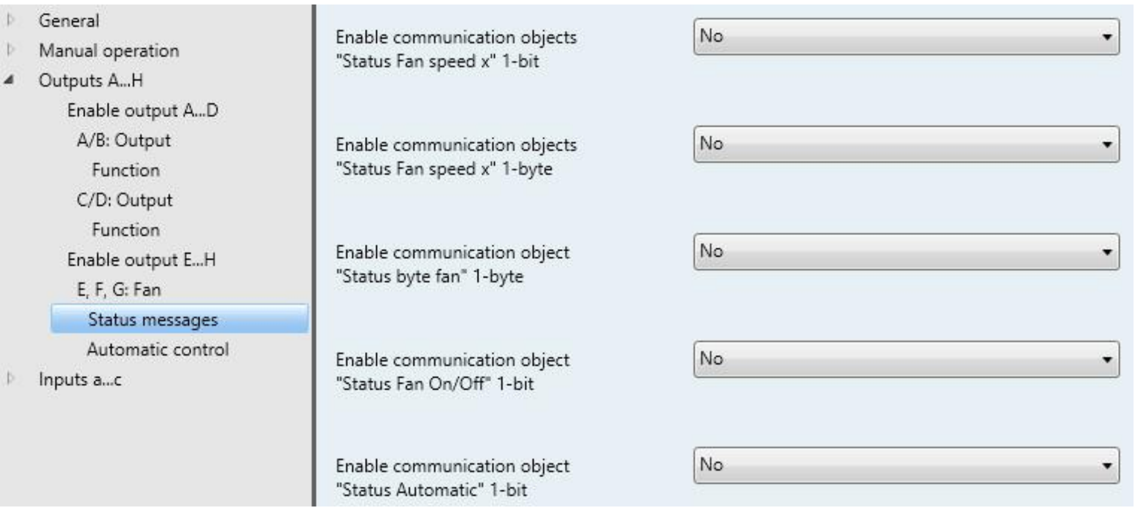
Set startup/run-on

Options:	<u>No</u> Yes

- *Yes:* The function *Set startup/run-on* is enabled and the Parameter window Startup/Run-on, page 146 appears.

3.2.3.9 Parameter window *Status messages* (Multi-level)

This is the parameter window where status messages are defined.



Enable communication objects "Status Fan speed x" 1-bit: No

Enable communication objects "Status Fan speed x" 1-byte: No

Enable communication object "Status byte fan" 1-byte: No

Enable communication object "Status Fan On/Off" 1-bit: No

Enable communication object "Status Automatic" 1-bit: No

Enable communication objects
"Status Fan speed x" 1-bit

Options: No
Yes

The setting of a fan speed is displayed via these communication objects. You can parameterize whether or not the status of a current or required fan speed is displayed.

- *Yes*: Three 1 bit communication objects, *Status Fan speed x* (x = 1...3) are enabled.

  Dependent parameters:

  Meaning

  Options: Current fan speed
  Required fan speed

  This parameter defines which status – *Current fan speed* or *Required fan speed* – is displayed.

What is current fan speed?

The *Current fan speed* is the speed at which the fan is actually operating.

What is required fan speed?

The *Required fan speed* is the fan speed which has to be reached, e.g. when the transition and dwell times have elapsed.

Note
The limitations are included in this observation, i.e. if a limitation allows only fan speed 2, the fan is operating at fan speed 2, and, for example, a telegram to switch up is received, the required fan speed remains at 2, as fan speed 3 cannot be reached due to the limitation.

Send object values

Options:	No, update only On change After request After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

Enable communication object "Status Fan speed" 1-byte

Options: <u>No</u>
Yes

This status byte defines the figure value of the fan speed.

This display can be differentiated from *Required fan speed* by selecting *Current fan speed*. Initially, the switchover times, dwell times and start-up phase must be completed before the required fan speed is reached.

- *Yes*: The communication object *Status Fan speed* is enabled.

  Dependent parameters:

  Meaning 1 byte

  Options: Current fan speed
  <u>Required fan speed</u>

  This parameter defines which status – *Current fan speed* or *Required fan speed* – is displayed.

  What is current fan speed?

  The *Current fan speed* is the speed at which the fan is actually operating.

  What is required fan speed?

  The *Required fan speed* is the fan speed which has to be reached, e.g. when the transition and dwell times have elapsed.

Note
The limitations are included in this observation, i.e. if a limitation allows only fan speed 2, the fan is operating at fan speed 2, and, for example, a telegram to switch up is received, the required fan speed remains at 2, as fan speed 3 cannot be reached due to the limitation.

Send object value

Options: No, update only
<u>On change</u>
After request
After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

**Enable communication object
"Status byte fan" 1-byte**

Options:	No Yes

From this status byte, the states heating, cooling, automatic, forced operation and the four limitations are indicated directly via a 1 bit coding.

For further information see: Status byte fan, p. 258

- *Yes*: The communication object *Status byte fan* is enabled.

  Dependent parameter:

  Send object value

Options:	No, update only On change After request After a change or request

  - *No, update only*: The status is updated but not sent.
  - *On change*: The status is sent when a change occurs.
  - *After request*: The status is sent when a request occurs.
  - *After a change or request*: The status is sent on a change or a request.

Enable communication object
"Status Fan On/Off" 1-bit

Options: <u>No</u>
Yes

This parameter enables the communication object *Status Fan ON/OFF*.

Some fans initially need an ON telegram before they are set to a fan speed from the OFF state. This ON telegram has effect on a main switch which has to be switched on. This requirement can be implemented with any switch output controlled via the *Status Fan* communication object. The corresponding communication object *Switch* of the switch actuator should be connected with the *Status Fan* communication object.

Selection of option *Yes:*

Dependent parameter:

Send object value

Options: No, update only
<u>On change</u>
After request
After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

The following parameter only becomes visible if the option *Yes* has been selected in the *Enable automatic operation* parameter in the *Fan* parameter window.

Enable communication object
"Status Automatic" 1-bit

Options: <u>No</u>
Yes

This parameter enables the communication object *Status Automatic*.

Telegram value: 1 = Automatic operation active

0 = Automatic operation inactive

Selection of option *Yes:*

Dependent parameter:

Send object value

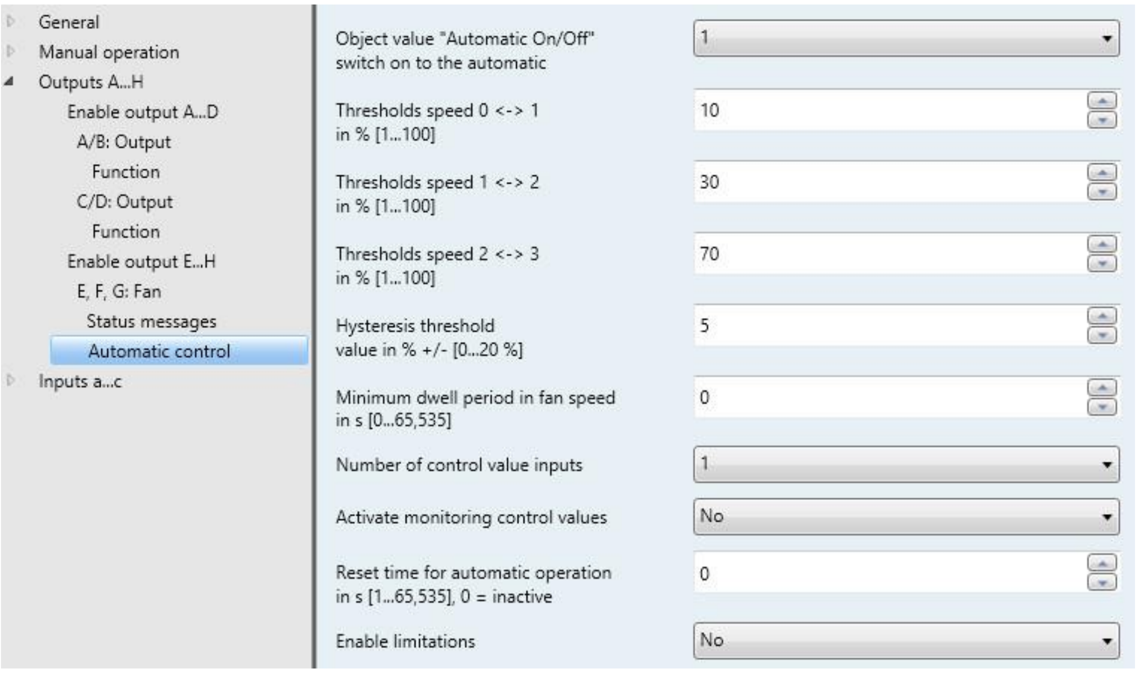
Options: <u>No, update only</u>
On change
After request
After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

3.2.3.10 Parameter window *Automatic control* (Multi-level)

This parameter window is visible if the option *Yes* has been selected for the parameter *Enable automatic operation* in the Parameter window E, F, G: Fan (Multi-level), page 126.

This is the parameter window where you define the threshold values for switchover of the fan speed. You can also enable limitations here.



Object value "Automatic On/Off" switch on to the automatic: 1

Thresholds speed 0 <-> 1 in % [1...100]: 10

Thresholds speed 1 <-> 2 in % [1...100]: 30

Thresholds speed 2 <-> 3 in % [1...100]: 70

Hysteresis threshold value in % +/- [0...20 %]: 5

Minimum dwell period in fan speed in s [0...65,535]: 0

Number of control value inputs: 1

Activate monitoring control values: No

Reset time for automatic operation in s [1...65,535], 0 = inactive: 0

Enable limitations: No

Important
The device evaluates threshold values in ascending order, i.e. first it checks the threshold value for *Off -> Fan speed 1*, then *Fan speed 1 -> Fan speed 2*, and so on. Proper functionality is only assured if the threshold value for *OFF -> Fan speed 1* is less than that for *Fan speed 1 -> Fan speed 2* and this is less than *Fan speed 2 -> Fan speed 3*, etc.

**Object value "Automatic On/Off"
switch on to the automatic**

Options: <u>1</u>
0

This parameter defines how the device should react to a telegram.

- *1*: Automatic is activated by a telegram with value 1.
- *0*: Automatic is activated by a telegram with value 0.

Threshold value 0 <-> 1 in % [1...100]

Options: 1…<u>10</u>…100

Here the threshold value, at which switch on of fan speed 1 occurs, is set. If the value in the communication object *Control value* is greater than or equal to the parameterized threshold value, fan speed 1 is switched on. If the value is smaller, then it is switched off.

Threshold value 1 <-> 2 in % [1...100]

Options: 1…<u>30</u>…100

This sets the threshold value at which switchover to fan speed 2 occurs. If the value in the communication object *Control value* is greater than or equal to the parameterized threshold value, switchover to fan speed 3 occurs.

Threshold value 2 <-> 3 in % [1...100]

Options: 1…<u>70</u>…100

This sets the threshold value at which switchover to fan speed 3 occurs. If the value in the communication object *Control value Heating* or *Control value Cooling* is greater than or equal to the parameterized threshold value, switchover to fan speed 3 occurs.

Hysteresis threshold value in % +/- [0...20 %]

Options: 0…<u>5</u>…20

This sets a hysteresis at which switchover to the next fan speed occurs. The hysteresis applies for all three threshold values.

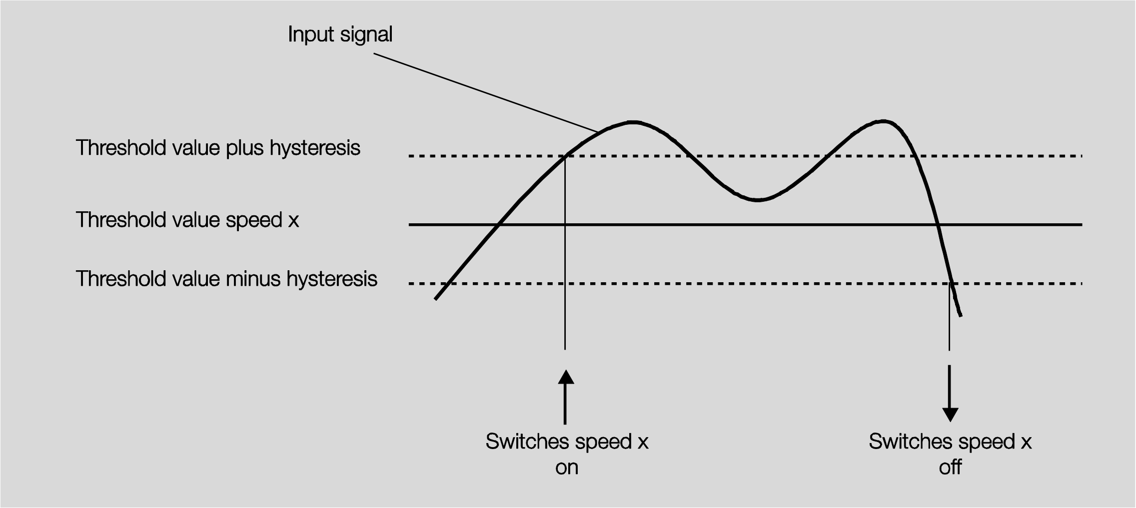
The setting 0 causes immediate switching without hysteresis.

The entered percentage value is directly added to or subtracted from the percentage value of *Threshold value speed x*. The result is a new upper or lower threshold value.

Switch threshold top (switch on) = threshold value + hysteresis

Switch threshold bottom (switch off) = threshold value - hysteresis

Example: Three-speed fan, fan control with hysteresis



Using hysteresis avoids continual switching between the fan speeds caused by fluctuating input signals around the threshold value.

Important

How does the fan react if the switch thresholds overlap as a result of using hysteresis?

1) Hysteresis defines the speed at which the speed change occurs.

2) If the speed transition occurs, the new speed is determined using the control value and the set switch thresholds. The hysteresis is not taken into account.

Control values are rounded to whole percentages by the device.

3) A control variable with the value 0 always results in speed 0.

An example:

Parameterized: Threshold value OFF <-> speed 1 = 10 %

Threshold value speed 1 <-> speed 2 = 20 %

Threshold value speed 2 <-> speed 3 = 30 %

Hysteresis 15 %

Behavior when ascending from speed 0:

- Speed 0 transition at 25 % (≥ 10 % + hysteresis).
- The new speed is 2 (25 % is between 20 % and 30 %).
- Accordingly, speed 1 is omitted.

Behavior when descending from speed 3:

- Speed 3 transition at 14 % (< 30 % – hysteresis).
- The new speed is 1 (15 % is between 10 % and 20 %).
- Accordingly, speed 2 is omitted.

Minimum dwell period in fan speed in s [0...65,535]

Options: 0…65,535

This parameter defines the dwell time for a fan speed of the fan until it switches to the next higher or lower fan speed. The input is made in seconds.

A setting of 0 means instant switching. Minimum relay switching times can be found in Technical data, page 11 ff.

The dwell time is only taken into account in automatic operation.

Number of control value inputs

Options: 1
2

This parameter defines the number of control value inputs (communication objects) for automatic operation.

- *1*: There is only one *Control value* communication object.
- 2: There are two communication objects – *Control value A* and *Control value B.*

  Dependent parameter:

  Select by...

  Options: Communication object "Toggle control value A/B"
  Largest value

  This parameter sets how the blower actuator selects which control value (A or B) to use.

  - *Communication object "Toggle control value A/B":* The control value to use is selected via the communication object.
  - *Largest value:* The largest control value is always selected. If the values are equal (but not zero), the input which was the latest to receive a value is selected.

Activate monitoring control values

Options: No
Yes

This parameter sets the monitoring for the control value input(s). Any remaining telegrams on the communication object(s) are detected.

- *No*: Control value monitoring is deactivated.
- *Yes*: Control value monitoring is activated.

Dependent parameters:

Monitoring time in s [30…65,535]

Options: 30...120...65,535

This parameter sets the maximum time allowed between two control value telegrams. An error is reported if this time is exceeded.

Note
The monitoring time should be at least twice as long as the cyclical transmission time of the control value, so that the absence of a signal, e.g. due to a high bus load, does not immediately trigger an error.

Where there are two control value inputs, the following additional parameter appears:

Function of monitoring

Options: Monitoring current control values
Monitoring active and inactive control values

This parameter determines the scope of monitoring.

- *Monitoring current control values*: Only the currently selected control value input is monitored for incoming telegram continuity. After a switchover (via *Communication object "Toggle control value A/B*" or *Largest value*), monitoring restarts.
- *Monitoring active and inactive control values*: Both control value inputs are always monitored independently of each other. An error is reported if an object's time is exceeded.

Note
The fault is reset if **both** control values are received within the monitoring time.

Send object value

Options:	No, update only On change After request After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

Set control value during fault

Options:	No Yes

This parameter sets the reaction in the event of an error.

Selection of option *Yes:*

Dependent parameter:

Control value in % [0...100]

Options: 0...30...100

This parameter sets what percentage to use for the control value in the event of an error.

Reset time for automatic operation in s [1...65,535], 0 = inactive

Options:	0 1…65,535

This parameter determines after which time the automatic operation is reset.

- *0:* If 0 is selected, automatic operation is not reset.
- *1...65,535:* If a time from a value of 1 is set, automatic operation is reset after the given time.

Note
A change of the parameter value will only become active after the next deactivation of automatic operation by a direct communication object.

Enable limitations

Options: No
Yes

Selection of option *Yes:*

Dependent parameter:

Limitation 1

Limitation 2

Limitation 3

Limitation 4

Options: 3, 2, 1, OFF
Unchanged
OFF
1
1, OFF
2
2, 1
2, 1, OFF
3
3, 2
3, 2, 1

This parameter sets which fan speed is set, or may not be over/undershot, when forced operation is active.

- *No limitation active:* Everything is possible.
- *Unchanged*: The state is retained.
- *OFF*: Off
- *1*: Limited to speed 1.*
- *1, OFF*: limited to speed 1 and off.
- *2*: Limited to speed 2.*
- *2, 1*: limited to speeds 2 and 1.
- *1, OFF*: limited to speed 1 and off.
- *3*: Limited to speed 3.*
- *3, 2*: limited to speeds 3 and 2.
- *3, 2, 1*: limited to speeds 3, 2 and 1.

*** The control value is ignored.**

This function defines fan speed ranges (limitations) which may not be over/undershot.

Four limitations are available. They can be used, for example, for the control of various operating modes, e.g. frost/heat protection, comfort, night shut down and standby. In normal cases, the room thermostat takes these operating modes into account in its control variable for the actuator.

Important
The parameterized start-up behavior which is a technical characteristic of the fan has a higher priority than a limitation, i.e. if a limitation is activated in fan speed 2 and start-up behavior is parameterized with fan speed 3, the following behavior will result: The fan is in the OFF state and receives a control signal for fan speed 1. First it goes to speed 3 (start-up speed), then 2, which is specified via the limitation. Due to the limitation, the actual required fan speed 1 will not be reached.

- The sequence of the displayed parameters corresponds with their priorities, i.e. the parameter with the highest priority has limitation 1 followed by limitations 2, 3 and 4.

Note
The fault operation, e.g. with a malfunction of the room thermostat, has a lower priority than the fan limitation, i.e. if fan speed is limited during a thermostat malfunction, only the upper or the lower limit of the fan limitation can be set at maximum.

When you exit automatic control, e.g. by a manual action, limitations 1 to 4 are inactive.

The set limitations are reactivated when automatic mode is reactivated.

The following points apply for limitations:

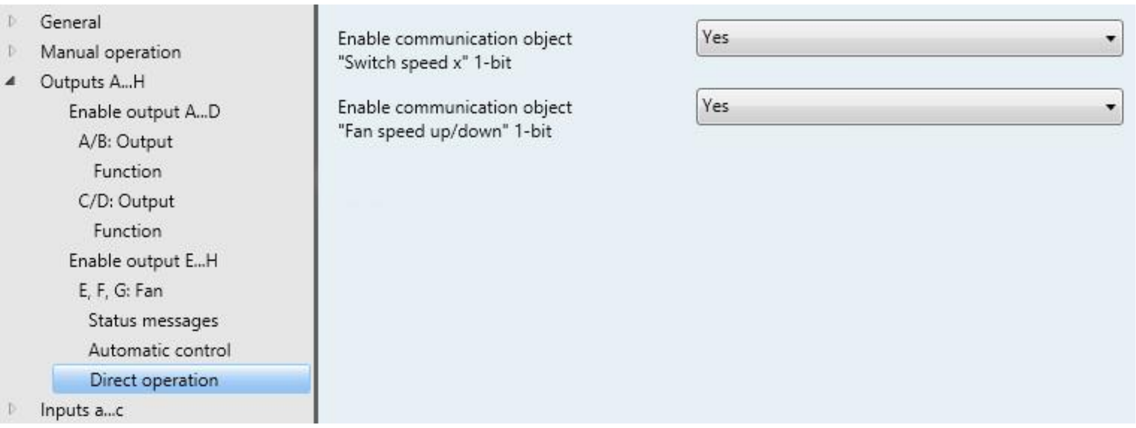
- The fan speed and valve position can be parameterized independently.
- The limitation need not necessarily apply to one fan speed only. It can also encompass another range of the fan speeds, i.e. only certain fan speeds can be set if the limitation is active. In this way, a limited control is also possible.
- The limitation is activated if a telegram with the value 1 is received on the communication object *Limitation*. The limitation is deactivated if a telegram with the value 0 is received on the communication object *Limitation*. A manual action ends automatic operation.
- If a limitation is activated, the product switches to the parameterized fan speed regardless of the control value. If another fan speed or a speed outside the "limitation range" is set when the limitation is activated, then the required speed or the limit speed of the range is set.
- After switch off of the limitations, the fan speed and the communication objects for valve control are recalculated and executed. This means that during limitation, the product operates normally in the background, the outputs are not changed and implementation only occurs once limitation ends.

Each of the four limitations used to limit the fan speeds has the same parameters.

Important
They are prioritized according to the listed sequence. The highest priority is assigned to limitation 1, e.g. Frost/Heat protection; the lowest priority is assigned to limitation 4, e.g. standby operation.

3.2.3.11 Parameter window *Direct operation* (Multi-level)

This parameter window is visible if the option *Yes* has been selected for the parameter *Enable direct operation* in the Parameter window E, F, G: Fan (Multi-level), page 126.



Enable communication object "Switch speed x" 1-bit: Yes

Enable communication object "Fan speed up/down" 1-bit: Yes

Enable communication objects
"Switch speed x" 1-bit

Options:	<u>Yes</u>
	No

- *Yes:* Three 1-bit communication objects *Speed 1*, *Speed 2* and *Speed 3* are enabled.

The product receives a setting telegram via these communication objects.

Telegram value:	1 = Fan speed x is switched on
	0 = Fan speed x is switched off

If several ON/OFF telegrams are received consecutively in a short period of time at various *Fan speed 1...3* communication objects, the value last received will be the one used to control the fan. An OFF telegram to one of the three communication objects *Fan speed 1...3* switches the fan off.

Important
Forced operation remains valid and is taken into account. The parameterized minimum fan speed dwell time for automatic control is ignored during manual operation. Accordingly, an immediate reaction to manual operation is detected. The delay time with speed switchover remains active to protect the fan.

Enable communication object
"Fan speed up/down" 1-bit

Options:	Yes No

- *Yes*: A 1 bit *Fan speed up/down* communication object is enabled.

Telegram value:	1 = A fan speed is switched UP 0 = A fan speed is switched DOWN

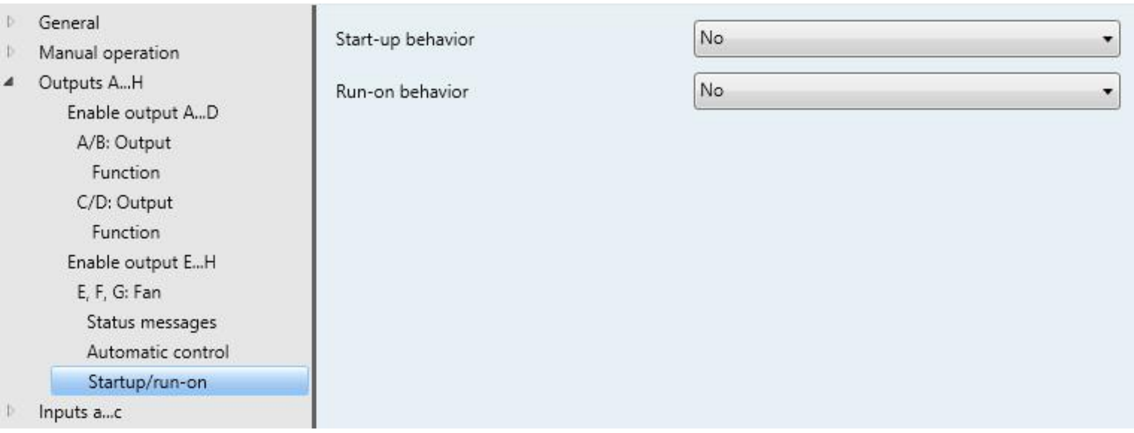
If the maximum fan speed is reached and a further telegram with the value 1 is received, the speed will remain as it is.

Important
Forced operation remains valid and is taken into account. The parameterized minimum fan speed dwell time for automatic control is ignored during manual operation. Accordingly, an immediate reaction to manual operation is detected. The delay time with speed switchover remains active to protect the fan.

With multiple manual UP or DOWN switching, the required speed will be increased or reduced by a speed step. This is feasible until the maximum or minimum possible speed is reached. Further UP or DOWN telegrams are ignored and not executed. Each new switching telegram initiates a new calculation of the target speed. This means that the target speed can be changed by switching telegrams until the target speed is achieved.

3.2.3.12 Parameter window *Startup/Run-on*

This parameter window is visible if the option *Yes* has been selected in the parameter *Set startup/run-on* in Parameter window E, F, G: Fan (Multi-level), page 126.



Start-up behavior: No

Run-on behavior: No

Start-up behavior

Options: <u>No</u>
Yes

This parameter enables the fan to start from the OFF state with a defined fan speed. This fan speed is immediately applied.

In order to guarantee a safe start of the fan motor, it can be useful to start the fan motor first with a higher fan speed. Thus a higher torque for the startup phase of the fan is achieved.

Note
However, with a step switch, the previous fan speeds are switched on consecutively. With the changeover switch the fan speed is switched on right away.

The delay between the switchover of two fan speeds (contact change) is taken into account.

The dwell times, which are taken into account in automatic operation, are inactive and will only be taken into account after the start-up phase.

The start-up behavior is a technical characteristic of the fan. For this reason, this behavior has a higher priority than an active limitation or forced operation.

Selection of option *Yes:*

Dependent parameters:

Switch on over fan speed

Options: 1/2/<u>3</u>

Here you set which speed the fan uses to start from the OFF state.

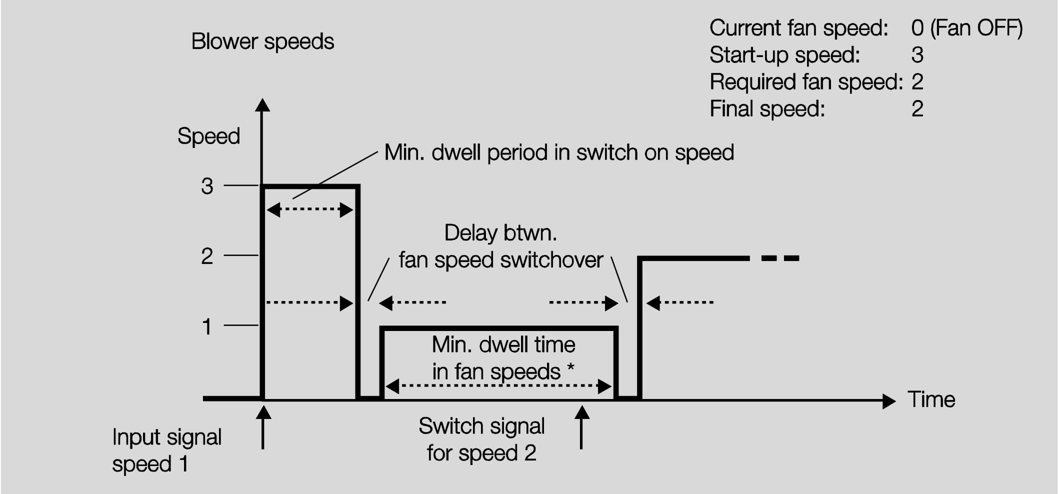
Minimum dwell period in switch on fan stage in s [1...65,535]

Options: 1…<u>5</u>…65,535

This parameter defines the minimum dwell time for one of the switch on speeds.

Example: Start-up behavior of a three-speed fan

The illustration shows the reaction in automatic operation with the option *Switch on over fan speed 3*, if the fan receives the telegram from the OFF state to set *Fan speed 1*.



*** The parameter *Minimum dwell period in fan speed in s [0…65,535]* in the parameter window *Automatic operation* is only active and programmable, if the option *Yes* has been selected in the *Enable automatic operation* parameter. In the parameter window *Fan*, you can find the parameter *Enable automatic operation*.**

Important
Forced operation remains valid and is taken into account. The parameterized minimum fan speed dwell time for automatic control is ignored during manual operation. Accordingly, an immediate reaction to manual operation is detected. The delay time with speed switchover remains active to protect the fan.

Run-on behavior

Options:	No Yes

This parameter activates a run-on for the fan. If the fan changes to a lower speed, it remains in the previous speed for the parameterized run-on time and only then reduces the speed by one level.

If the fan goes through several speed changes, run-on times are executed successively, adding on those times.

A run-on time of 0 seconds means that run-on is deactivated.

Run-on is executed regardless of where the speed change originates (automatic operation, direct operation, manual procedure, fan switch off).

Selection of option *Yes:*

Dependent parameters:

Run-on times speed 3 in s [0...65,535]

Options: 0…20…65,535

Run-on times speed 2 in s [0...65,535]

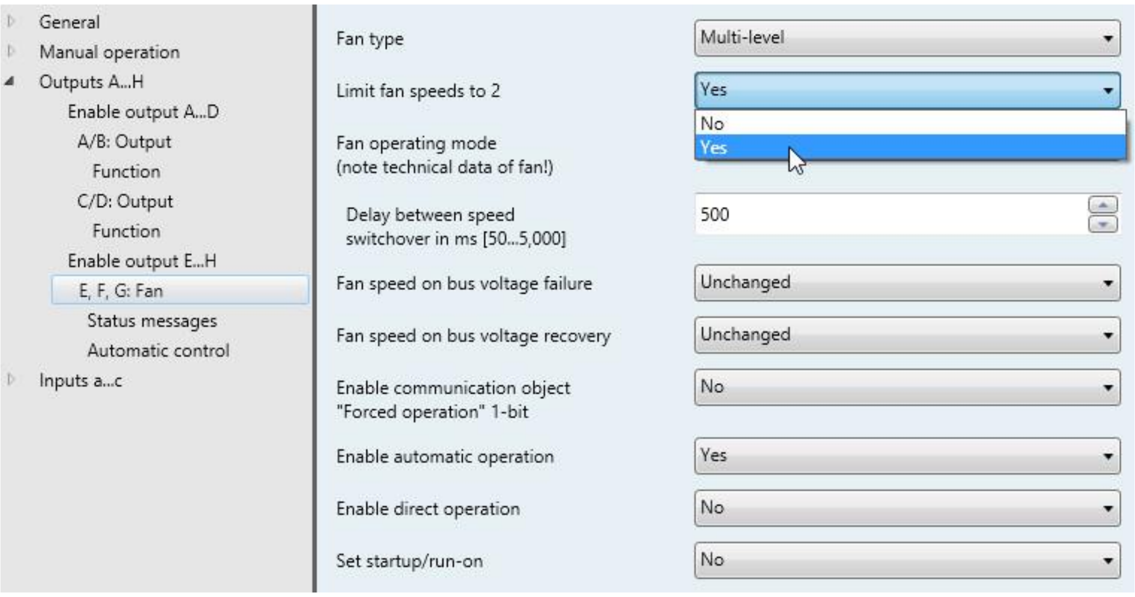
Options: 0…20…65,535

Run-on times speed 1 in s [0...65,535]

Options: 0…20…65,535

3.2.3.13 Parameter window *E, F, G: Fan* (Two-level)

All settings for the *two-level fan* are made in this parameter window.



Fan type	Multi-level
Limit fan speeds to 2	Yes
Fan operating mode (note technical data of fan!)	
Delay between speed switchover in ms [50...5,000]	500
Fan speed on bus voltage failure	Unchanged
Fan speed on bus voltage recovery	Unchanged
Enable communication object "Forced operation" 1-bit	No
Enable automatic operation	Yes
Enable direct operation	No
Set startup/run-on	No

If you wish to use the device for controlling a two-level fan, set the parameters as follows:

- In the parameter window *E, F, G: Fan*, select the *Multi-level* option in the *Fan type* parameter.
- Select *Yes* in the *Limit fan speeds to 2* parameter.

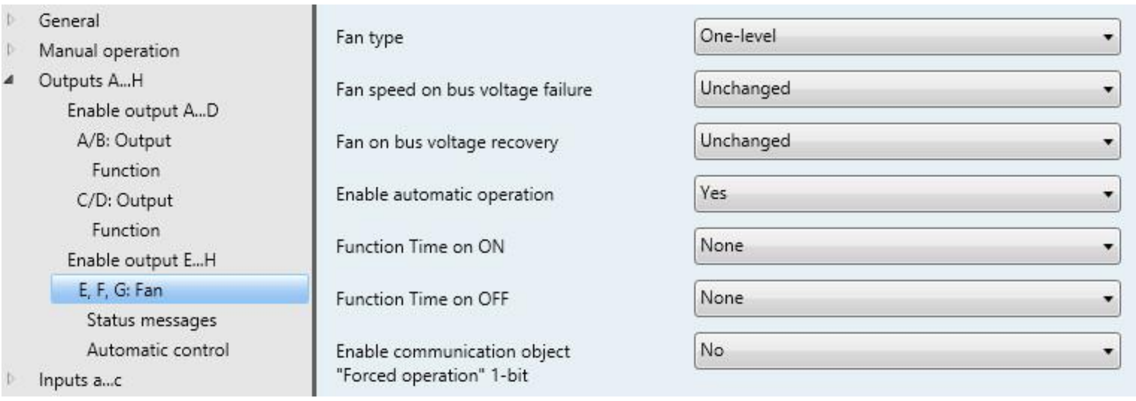
Now a two-speed fan is controlled via fan speeds 1 and 2.

Fan speed 3 with all its parameters and options is now non-functional.

Note
Further parameters and their settings options are described in Parameter window E, F, G: Fan (Multi-level), page 126.

3.2.3.14 Parameter window *E, F, G: Fan* (One-level)

All settings for the *one-level fan* are made in this parameter window.



Fan type: One-level

Fan speed on bus voltage failure: Unchanged

Fan on bus voltage recovery: Unchanged

Enable automatic operation: Yes

Function Time on ON: None

Function Time on OFF: None

Enable communication object "Forced operation" 1-bit: No

Fan type

Options:	<u>Multi-level</u> One-level

This parameter sets which type of fan is to be controlled.

To control a fan with up to three speeds select the *Multi-level* option.

To control a single-speed fan, select the *One-level* option.

Fan speed on bus voltage failure

Options:	<u>Unchanged</u> OFF

The reaction of the fan on bus voltage failure is defined here.

- *Unchanged*: The fan speed remains the same.
- *OFF*: The fan is switched off.

Fan speed on bus voltage recovery

Options: Unchanged
OFF
ON

The reaction of the fan on bus voltage recovery is defined here.

- *Unchanged*: The fan speed remains the same.
- *OFF*: The fan is switched off.
- *ON*: The fan is switched on.

Attention

The device is supplied ex-works with a default setting (factory default). This ensures that the fan setting is switched off when the bus voltage is applied to the relay for the first time. Thus, damage to the device due to unintentional switch on during transport, e.g. due to vibration, is avoided.

It is advisable to apply a bus voltage before connecting the fan in order to assign it a defined switch state. This eliminates the possibility of an incorrect contact setting destroying the fan.

Enable automatic operation

Options: No
Yes

- *Yes:* The *Automatic operation* is enabled. Furthermore the Parameter window Automatic control (One-level), page 155 appears.

Function Time on ON

Options: None
Switching delay
Minimum time

This defines the *Time* function on Fan ON.

- *None*: No *Time* function is executed.
- *Switching delay*: The fan is switched on after this delay.
- *Minimum time*: The fan remains ON for at least this time.

Selection of option *Switching delay:*

Dependent parameter:

Time in s [1…65,535 x 0.1]

Options: 1…20…65,535

The fan is switched on after this delay.

Selection of option *Minimum time:*

Dependent parameter:

Time in s [1…65,535]

Options: 1…20…65,535

The fan remains ON for at least this time.

Function Time on OFF

Options: <u>None</u>
Switching delay
Minimum time

This defines the *Time* function on Fan OFF.

- *None*: No *Time* function is executed.
- *Switching delay*: The fan is switched off after this delay.
- *Minimum time*: The fan remains OFF for at least this time.

Selection of option *Switching delay:*

Dependent parameter:

Time in s [1…65,535 x 0.1]

Options: 1…<u>20</u>…65,535

The fan is switched off after this delay.

Selection of option *Minimum time:*

Dependent parameter:

Time in s [1…65,535]

Options: 1…<u>20</u>…65,535

The fan remains OFF for at least this time.

Enable communication object "Forced operation" 1-bit

Options: <u>No</u>
Yes

- *Yes*: A 1 bit *Forced operation* communication object is enabled.

Dependent parameters:

Forced operation on object value

Options: <u>0</u>
1

- *0*: Forced operation is activated by a telegram with value 0.
- *1*: Forced operation is activated by a telegram with value 1.

Reaction on forced operation

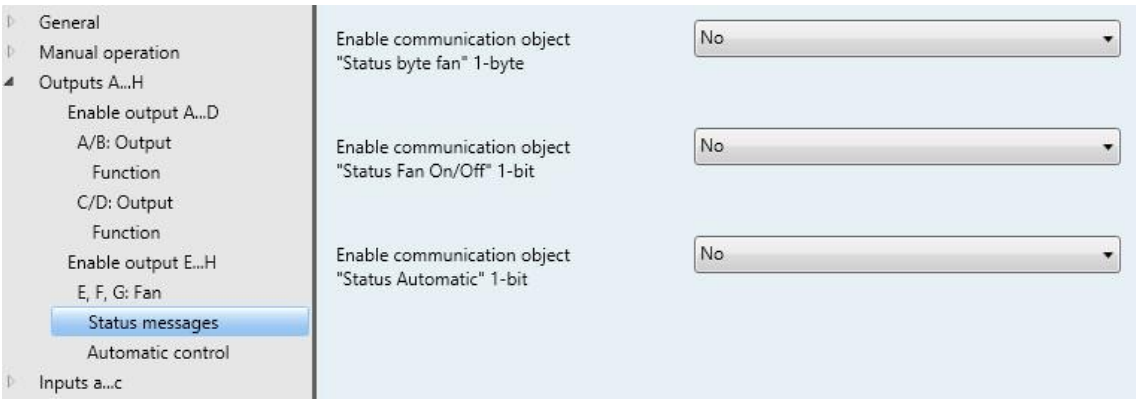
Options: Unchanged
OFF
<u>ON</u>

This parameter defines how the fan should respond to a forced operation.

3.2.3.15 Parameter window *Status messages* (single speed)

This is the parameter window where *status messages* are defined.

This parameter window is visible when the option *Enable as fan* is selected for the parameter *Outputs E, F, G* in Parameter window Enable output E...H, page 125.



Enable communication object "Status byte fan" 1-byte: No

Enable communication object "Status Fan On/Off" 1-bit: No

Enable communication object "Status Automatic" 1-bit: No

Enable communication object
"Status byte fan" 1-byte

Options:	No
	Yes

From this status byte the states control values A or C, automatic, forced operation and the four limitations are indicated directly via a 1-bit coding.

For further information see: Status byte fan, page 258

- *Yes*: The communication object *Status byte fan* is enabled.

  Dependent parameter:

  Send object value

Options:	No, update only
	On change
	After request
	After a change or request

  - *No, update only*: The status is updated but not sent.
  - *On change*: The status is sent when a change occurs.
  - *After request*: The status is sent when a request occurs.
  - *After a change or request*: The status is sent on a change or a request.

Enable communication object
"Status Fan On/Off" 1-bit

Options:	No Yes

This parameter enables the communication object *Status Fan ON/OFF*.

Some fans initially require an ON telegram before they are set to a fan speed from the OFF state. This ON telegram has effect on a main switch which has to be switched on. This requirement can be implemented with any switch output controlled via the *Status Fan* communication object. The corresponding communication object *Switch* of the switch actuator should be connected with the *Status Fan* communication object.

Selection of option *Yes:*

Dependent parameter:

Send object value

Options:	No, update only On change After request After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

The following parameter is only visible if the option *Yes* has been selected in the *Enable automatic operation* parameter in the *Fan* parameter window.

Enable communication object
"Status Automatic" 1-bit

Options:	No Yes

This parameter enables the communication object *Status Automatic*.

Telegram value:	1 = Automatic operation active 0 = Automatic operation inactive

Selection of option *Yes:*

Dependent parameter:

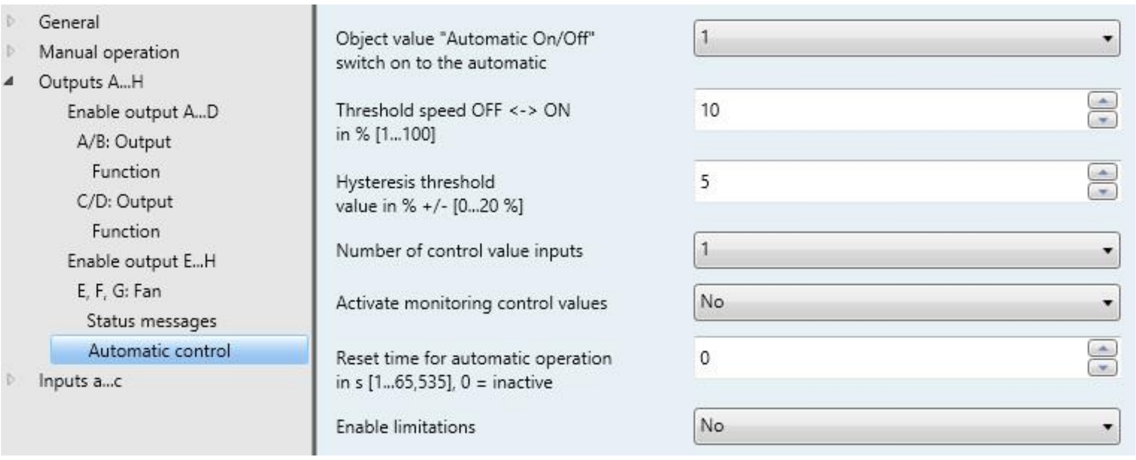
Send object value

Options:	No, update only On change After request After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

3.2.3.16 Parameter window *Automatic control* (One-level)

This parameter window is visible if the option *Yes* has been selected for the parameter *Enable automatic operation* in the Parameter window E, F, G: Fan (One-level), page 150.



Object value "Automatic On/Off" switch on to the automatic: 1

Threshold speed OFF <-> ON in % [1...100]: 10

Hysteresis threshold value in % +/- [0...20 %]: 5

Number of control value inputs: 1

Activate monitoring control values: No

Reset time for automatic operation in s [1...65,535], 0 = inactive: 0

Enable limitations: No

This is the parameter window where you define the threshold values for switchover of the fan speed. You can also enable limitations here.

**Object value "Automatic On/Off"
switch on to the automatic**

Options: 1
0

This parameter defines how the device should react to a telegram.

- *1*: Automatic is activated by a telegram with value 1.
- *0*: Automatic is activated by a telegram with value 0.

**Threshold value OFF <-> ON
in % [1...100]**

Options: 1…10…100

This defines the threshold value at which switch on occurs. If the value in the control value communication object is greater than or equal to the parameterized threshold value, it is switched on. If the value is less, it is switched off.

Hysteresis threshold value in % +/- [0...20 %]

Options: 0…5…20

This sets a hysteresis at which switchover to the next fan speed occurs.

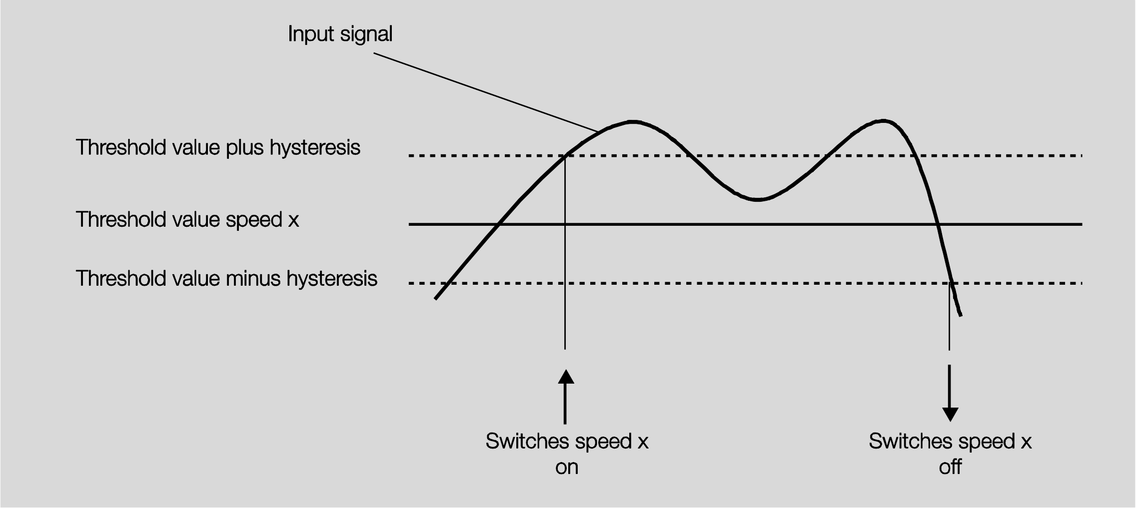
The setting 0 causes immediate switching without hysteresis.

The entered percentage value is directly added to or subtracted from the percentage value of *Threshold value speed x*. The result is a new upper or lower threshold value.

Switch threshold top (switch on) = threshold value + hysteresis

Switch threshold bottom (switch off) = threshold value - hysteresis

Example, a three speed fan, hysteresis with fan control



Using hysteresis, a continuous switching between the fan speeds around the threshold value with deviating input signals can be avoided.

Number of control value inputs

Options: 1
2

This parameter defines the number of control value inputs (communication objects) for automatic operation.

- *1*: There is only one *Control value* communication object.
- 2: There are two communication objects – *Control value A* and *Control value B.*

Dependent parameter:

Select by...

Options: Communication object "Toggle control value A/B"
Largest value

This parameter sets how the blower actuator selects which control value (A or B) to use.

- *Communication object "Toggle control value A/B":* The control value to use is selected via the communication object.
- *Largest value:* The largest control value is always selected. If the values are equal (but not zero), the input which was the latest to receive a value is selected.

Activate monitoring control values

Options: No
Yes

This parameter sets the monitoring for the control value input(s). Any remaining telegrams on the communication object(s) are detected.

- *No*: Control value monitoring is deactivated.
- *Yes*: Control value monitoring is activated.

Dependent parameters:

Monitoring time in s [30…65,535]

Options: 30...120...65,535

This parameter sets the maximum time allowed between two control value telegrams. An error is reported if this time is exceeded.

Note
The monitoring time should be at least twice as long as the cyclical transmission time of the control value, so that the absence of a signal, e.g. due to a high bus load, does not immediately trigger an error.

Where there are two control value inputs, the following additional parameter appears:

Function of monitoring

Options: Monitoring current control values
Monitoring active and inactive control values

This parameter determines the scope of monitoring.

- *Monitoring current control values*: Only the currently selected control value input is monitored for incoming telegram continuity. After a switchover (via *Communication object "Toggle control value A/B*" or *Largest value*), monitoring restarts.
- *Monitoring active and inactive control values*: Both control value inputs are always monitored independently of each other. An error is reported if an object's time is exceeded.

Note
The fault is reset if **both** control values are received within the monitoring time.

Send object value

Options: No, update only
On change
After request
After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

Set control value during fault

Options: No
Yes

This parameter sets the reaction in the event of an error.

Selection of option *Yes:*

Dependent parameter:

Control value in % [0...100]

Options: 0...30...100

This parameter sets what percentage to use for the control value in the event of an error.

Reset time for automatic operation in s [1...65,535], 0 = inactive

Options: 0
1…65,535

This parameter determines after which time the automatic operation is reset.

- *0:* If 0 is selected, automatic operation is not reset.
- *1...65,535:* If a time from a value of 1 is set, automatic operation is reset after the given time.

Note
A change of the parameter value will only become active after the next deactivation of automatic operation by a direct communication object.

Enable limitations

Options:	No Yes

Selection of option *Yes:*

Dependent parameter:

Limitation 1

Limitation 2

Limitation 3

Limitation 4

Options:	3, 2, 1, OFF Unchanged OFF 1 1, OFF 2 2, 1 2, 1, OFF 3 3, 2 3, 2, 1

This parameter sets which fan speed is set, or may not be over/undershot, when forced operation is active.

- *No limitation active:* Everything is possible.
- *Unchanged*: The state is retained.
- *OFF*: Off
- *1*: Limited to speed 1.*
- *1, OFF*: limited to speed 1 and off.
- *2*: Limited to speed 2.*
- *2, 1*: limited to speeds 2 and 1.
- *1, OFF*: limited to speed 1 and off.
- *3*: Limited to speed 3.*
- *3, 2*: limited to speeds 3 and 2.
- *3, 2, 1*: limited to speeds 3, 2 and 1.

*** The control value is ignored.**

This function defines fan speed ranges (limitations) which may not be over/undershot.

Four limitations are available. They can be used, for example, for the control of various operating modes, e.g. frost/heat protection, comfort, night shut down and standby. In normal cases, the room thermostat takes these operating modes into account in its control variable for the actuator.

Important
The parameterized start-up behavior which is a technical characteristic of the fan has a higher priority than a limitation, i.e. if a limitation is activated in fan speed 2 and start-up behavior is parameterized with fan speed 3, the following behavior will result: The fan is in the OFF state and receives a control signal for fan speed 1. First it goes to speed 3 (start-up speed), then 2, which is specified via the limitation. Due to the limitation, the actual required fan speed 1 will not be reached.

- The sequence of the displayed parameters corresponds with their priorities, i.e. the parameter with the highest priority has limitation 1 followed by limitations 2, 3 and 4.

Note
The fault operation, e.g. with a malfunction of the room thermostat, has a lower priority than the fan limitation, i.e. if fan speed is limited during a thermostat malfunction, only the upper or the lower limit of the fan limitation can be set at maximum.

When you exit automatic control, e.g. by a manual action, limitations 1 to 4 are inactive.

The set limitations are reactivated when automatic mode is reactivated.

The following points apply for limitations:

- The fan speed and valve position can be parameterized independently.
- The limitation need not necessarily apply to one fan speed only. It can also encompass another range of the fan speeds, i.e. only certain fan speeds can be set if the limitation is active. In this way, a limited control is also possible.
- The limitation is activated if a telegram with the value 1 is received on the communication object *Limitation*. The limitation is deactivated if a telegram with the value 0 is received on the communication object *Limitation*. A manual action ends automatic operation.
- If a limitation is activated, the product switches to the parameterized fan speed regardless of the control value. If another fan speed or a speed outside the "limitation range" is set when the limitation is activated, then the required speed or the limit speed of the range is set.
- After switch off of the limitations, the fan speed and the communication objects for valve control are recalculated and executed. This means that during limitation, the product operates normally in the background, the outputs are not changed and implementation only occurs once limitation ends.

Each of the four limitations used to limit the fan speeds has the same parameters.

Important
They are prioritized according to the listed sequence. The highest priority is assigned to limitation 1, e.g. Frost/Heat protection; the lowest priority is assigned to limitation 4, e.g. standby operation.

3.2.3.17 Parameter window *E, F, G: Output (switch actuators)*

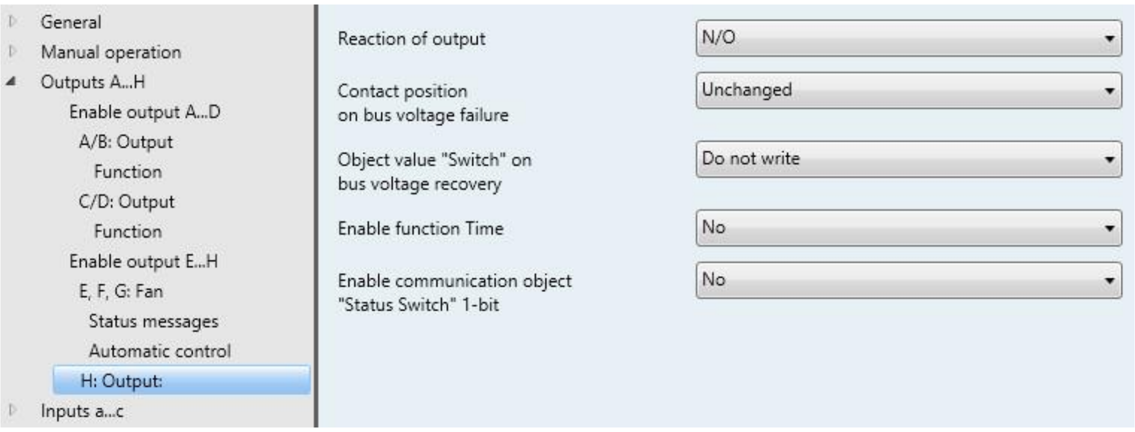
The setting options of valve outputs E, F and G do not differentiate from those of output H.

The descriptions of the parameters and communication objects for outputs E, F and G are described in Parameter window H: Output, page 163.

3.2.3.18 Parameter window *H: Output*

All settings for output H are made in this parameter window.

This parameter window is visible if the *Output H* has been enabled in the Parameter window Enable output E...H, page 125.



Reaction of output: N/O

Contact position on bus voltage failure: Unchanged

Object value "Switch" on bus voltage recovery: Do not write

Enable function Time: No

Enable communication object "Status Switch" 1-bit: No

Reaction of output

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

This parameter sets whether the output operates as a *normally closed contact* or *normally open contact*.

- *Normally opened contact*: An ON telegram (1) closes the contact, and an OFF telegram (0) opens the contact.
- *Normally closed contact*: An ON telegram (1) opens the contact, and an OFF telegram (0) closes the contact.

Contact position on bus voltage failure

Options: <u>Unchanged</u>
Open
Closed

The output can adopt a defined state on bus voltage failure (BVF) using this parameter.

- *Open:* The contact is opened with bus voltage failure.
- *Closed:* The contact is closed with bus voltage failure.
- *Unchanged:* No change of the contact setting.

Note
Take note of the reaction on bus voltage failure, recovery and download.

Object value "Switch" on bus voltage recovery

Options:	Do not write Write with "0" Write with "1"

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

- *Don't 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 undefined. For this reason, the communication object *Switch* is written with 0 and the contact is open.

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

Note
Take note of the reaction on bus voltage failure, recovery and download. The device draws the energy for switching the contact from the bus. After bus voltage is applied, it takes about ten seconds before sufficient energy is available to switch all contacts simultaneously. Depending on the transmission and switching delay on bus voltage recovery set in the *General* parameter window, the individual outputs will only assume the desired contact position after this time. If a shorter time is set, the device will only switch the first contact when sufficient energy is stored in the device, in order to ensure that enough energy is available to immediately bring all outputs safely to the required position if there is another bus voltage failure.

Enable function Time

Options:	No Yes

- *No*: The parameter window remains disabled and invisible.
- *Yes*: The - *Time* parameter window appears.

After the *Time* function has been enabled, the parameter window - *Time* is enabled. Further settings are undertaken there.

Note
For a more precise description of the function, see Communication objects Output H, page 228 ff.

Enable communication object "Status Switch" 1-bit

Options:	No Yes

Selection of option *Yes.*

Dependent parameters:

Send object value

Options:	No, update only On change After request After a change or request

- *No, update only*: The status is updated but not sent.
- *On change*: The status is sent when a change occurs.
- *After request*: The status is sent when a request occurs.
- *After a change or request*: The status is sent on a change or a request.

Object value of contact position

Options:	1 = Closed, 0 = Open 0 = Closed, 1 = Open

This parameter defines the communication object value of the switch status (*Status switch*).

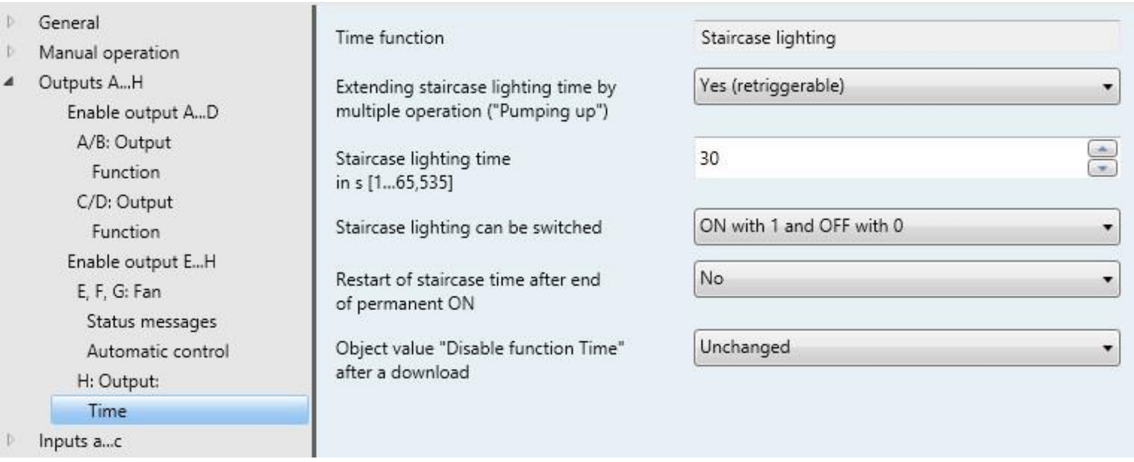
- *1 = Closed, 0 = Open:* A closed contact is represented by communication object value 1 and an open contact is represented by the value 0.
- *0 = Closed, 1 = Open:* A closed contact is represented by communication object value 0 and an open contact is represented by the value 1.

Note
The contact position and thus the switch status can be the result of a series of priorities and links.

3.2.3.18.1 Parameter window *Time*

All settings for the *Time: Staircase lighting* function are made in this parameter window.

This parameter window is visible if the parameter *Enable function Time* has been enabled in the Parameter window H: Output, page 163.



Time function: Staircase lighting

Extending staircase lighting time by multiple operation ("Pumping up"): Yes (retriggerable)

Staircase lighting time in s [1...65,535]: 30

Staircase lighting can be switched: ON with 1 and OFF with 0

Restart of staircase time after end of permanent ON: No

Object value "Disable function Time" after a download: Unchanged

Explanations of the time functions and sequences can be found in Planning and application, page 237 ff. Please also observe the Function diagram, page 245, from which the switching and timing priorities originate.

Time function

Staircase lighting

- *Staircase lighting*: The value that switches the staircase lighting on and off can be parameterized. The staircase lighting time starts when the function is switched on. It is switched off immediately after the staircase lighting time ends.

Extending staircase lighting time 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. This is possible by repeated actuation of the push button (“pumping up“) until the maximum parameterized number of retriggering operations is reached. The maximum time can be set to 1, 2, 3, 4 or 5 times the staircase lighting time.

Let's say the staircase lighting time has been extended by "pumping up" to the maximum time. If some of the time has already elapsed, the staircase lighting time can be re-extended to the maximum time by "pumping up" again. However, the parameterized maximum time may not be exceeded.

- *No (not retriggerable)*: The receipt of an ON telegram is ignored. The staircase lighting time continues unmodified to completion.
- *Yes (retriggerable)*: New ON telegrams reset the staircase lighting time 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*: New ON telegrams extend the staircase lighting time by 2/3/4/5 times.

Staircase lighting time in s [1…65,535]

Options: 1…30…65,535

The staircase lighting defines how long the contact is closed – provided that the output is programmed as a normally open contact – and how long the light remains on after an ON telegram. The input is made in seconds.

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 poss.

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

- *ON with 0 or 1, switch OFF not poss.*: The function *Staircase lighting* is switched on independently of the value of the incoming telegram. Premature switch off is not possible.

Restart of staircase time after end of permanent ON

Options: <u>No</u>
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 Permanent ON is controlled via the *Permanent ON* communication object value. 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.

Object value "Disable function Time" after a download

Options: <u>Unchanged</u>
0 = Enable function Time
1 = Disable function Time

This parameter defines how the parameter function *Time* should behave after bus voltage recovery. With a telegram to the communication object *Disable function time*, the function *Time* can be disabled.

- Unchanged: The function *Time* can continue unchanged.

Note
The state of the *Time* function is stored with bus voltage failure and continues unchanged after bus voltage recovery.

- *0 = Enable function Time:* The *Time* function is enabled by a telegram with the value 0.

Note
If the staircase lighting is disabled when the function *Time* is operational, the light will stay at ON until it is switched to OFF manually.

- *1 = Disable function Time*: The *Time* function is disabled by a telegram with the value 1.

Note
Enabling is only possible via the communication object *Disable function Time*.

How does the staircase lighting react on bus voltage failure?

Reaction in the event of bus voltage failure is specified by the parameter *Reaction on bus voltage failure* in parameter window *H: Output.*

How does the staircase lighting react on bus voltage recovery?

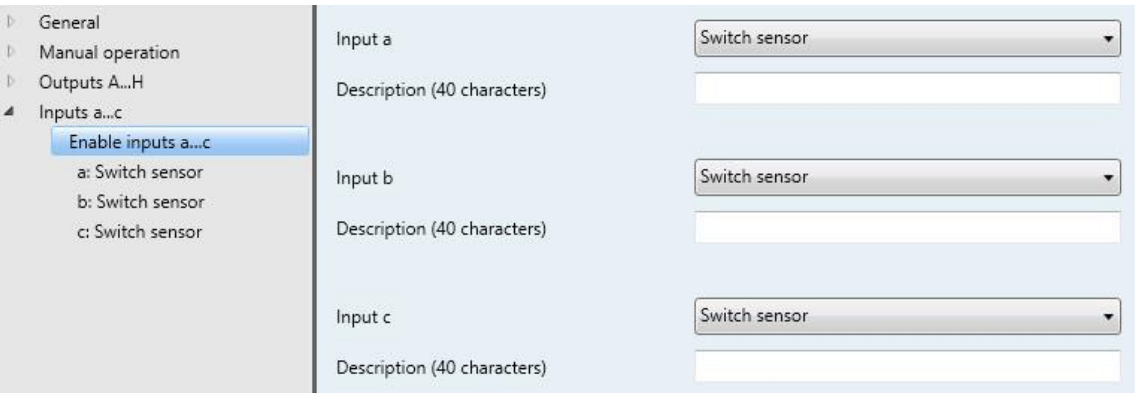
Reaction on bus voltage recovery is defined by two conditions.

1. By the communication object *Disable function time*. If staircase lighting is disabled after bus voltage recovery, it can only be switched on or off via the communication object *Switch*.
2. By the parameterization of the communication object *Switch*. Whether the light is switched on or off on bus voltage recovery depends on the settings of *Switch*.

3.2.4 Parameter window *Enable inputs a…c*

3.2.4.1 Parameter window *Enable inputs a…c*

Settings for enabling and description of inputs a...c:



Input a: Switch sensor
Description (40 characters)
Input b: Switch sensor
Description (40 characters)
Input c: Switch sensor
Description (40 characters)

Note
In the following, the setting possibilities of inputs a…c are explained using input a as an example. The setting possibilities are identical for all inputs.

Input a

Input b

Input c

Options: <u>Disabled</u>
Switch sensor
Value/forced operation
PT100 2-cond. technology [-50…+150 °C]
PT1000 2-cond. technology [-50…+150 °C]
KTY [-50…+150 °C]

The operating mode of the input is set with this parameter. The respective parameter window *a: xxx* also becomes visible with the selection of an operating mode.

Description (40 characters)

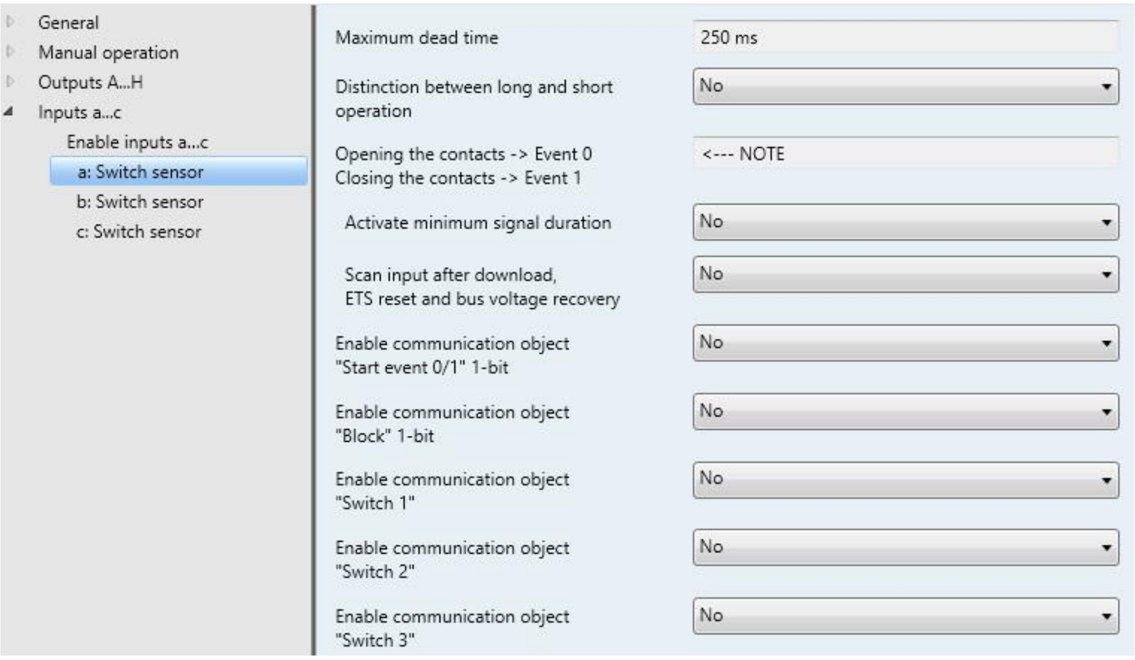
With this parameter, it is possible to enter a text of up to 40 characters in length for identification in the ETS.

Note
The text which is entered is used to provide help, in order to obtain an overview of the inputs when they are fully assigned and to indicate the function assigned to the input. The text is purely for informative purposes and has no further function.

3.2.4.2 Parameter window *a: Switch sensor*

This parameter window is visible if the option *Switch sensor* has been enabled for the parameter *Input a* in the Parameter window Enable inputs a…c, page 170.

Note
The device features several inputs. However, as the functions for all inputs are identical, only the functions of input a will be described.



Maximum dead time	250 ms
Distinction between long and short operation	No
Opening the contacts -> Event 0 Closing the contacts -> Event 1	<--- NOTE
Activate minimum signal duration	No
Scan input after download, ETS reset and bus voltage recovery	No
Enable communication object "Start event 0/1" 1-bit	No
Enable communication object "Block" 1-bit	No
Enable communication object "Switch 1"	No
Enable communication object "Switch 2"	No
Enable communication object "Switch 3"	No

Maximum dead time

This parameter is fixed to a preset 250 ms.

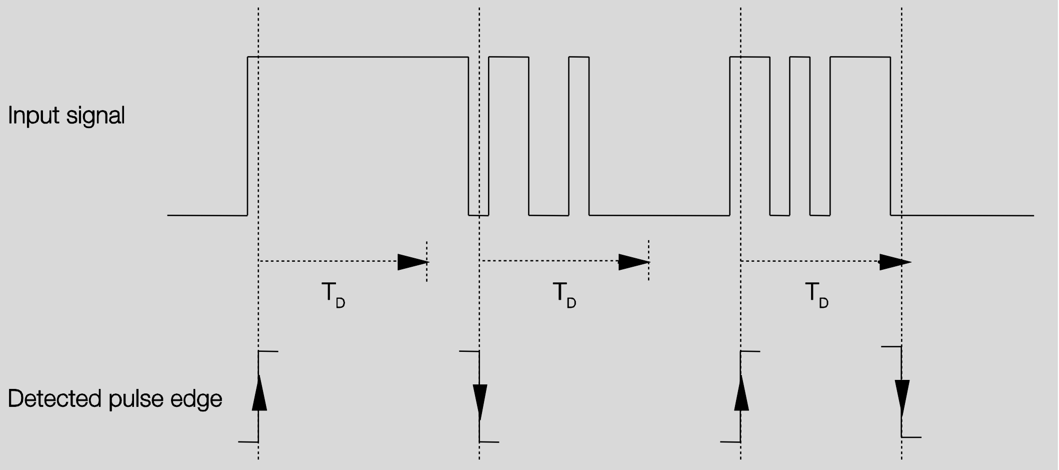
The maximum dead time prevents unwanted multiple operations of the input, e.g. due to bouncing of the contact.

What is the maximum dead time?

An edge change at the input is assessed with a maximum dead time (delay) value of 250 ms. This time may vary from 0 ms to 250 ms.

Note
No further bouncing is possible.

Example: Maximum dead time of the input signal for a detected edge:



After detection of an edge on the input, further edges are ignored for the maximum dead time T_D.

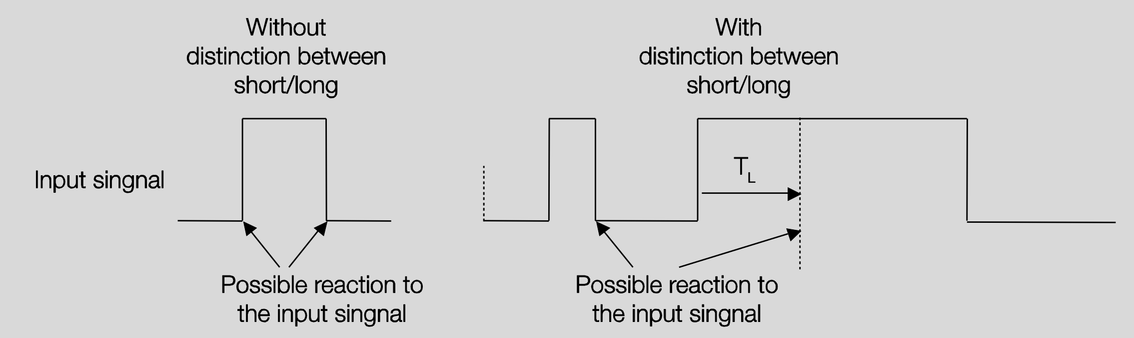
Distinction between long and short operation

Options: No
Yes

Using this parameter, you set if the input differentiates between short and long operation.

- *Yes:* After opening/closing the contact, it must first of all be ascertained if a short or long operation has occurred here. Only thereafter will a possible reaction be triggered.

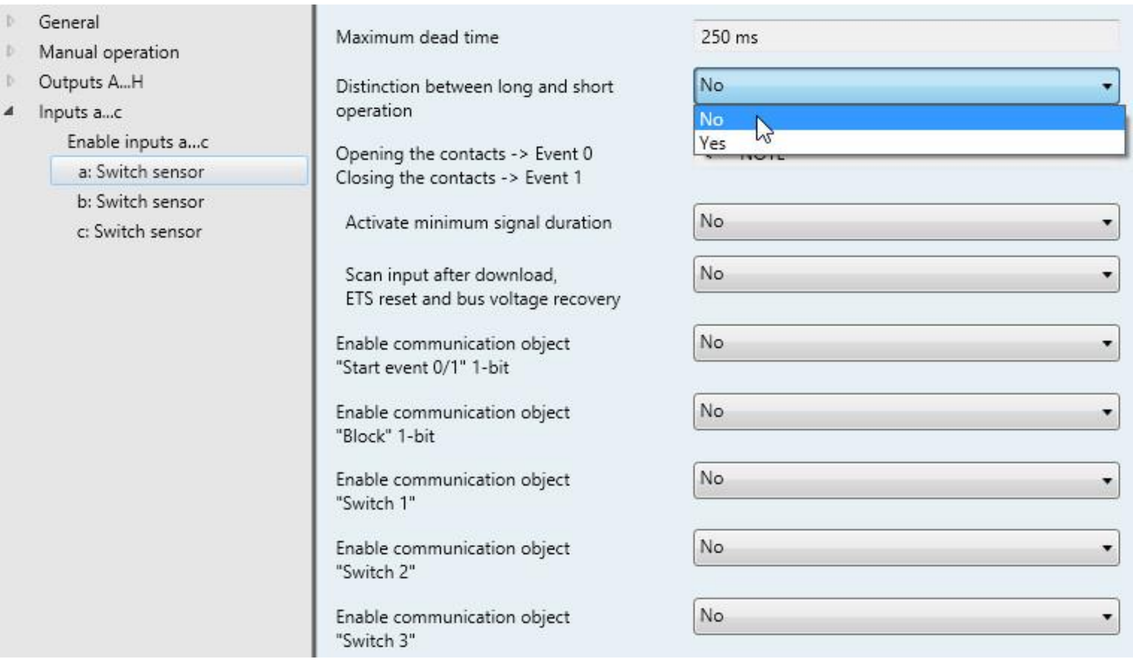
The following table shows the function in detail:



T_L is the time duration from where a long operation is detected.

3.2.4.2.1 Parameter *Distinction between long and short operation – No*

If the option *No* has been selected with the parameter *Distinction between long and short operation*, the following parameters appear in Parameter window a: Switch sensor, page 171:



Maximum dead time: 250 ms
Distinction between long and short operation: No
Opening the contacts -> Event 0
Closing the contacts -> Event 1
Activate minimum signal duration: No
Scan input after download, ETS reset and bus voltage recovery: No
Enable communication object "Start event 0/1" 1-bit: No
Enable communication object "Block" 1-bit: No
Enable communication object "Switch 1": No
Enable communication object "Switch 2": No
Enable communication object "Switch 3": No

Opening the contacts -> Event 0
Closing the contacts -> Event 1
<––– NOTE

Activate minimum signal duration

Options: No
Yes

Selection *Yes:*

Dependent parameters:

On closing the contact
in [0...65,535] X 0.1 s

Options: 0…10…65,535

On opening the contact
in [0…65,535] x 0.1 s

Options: 0…10…65,535

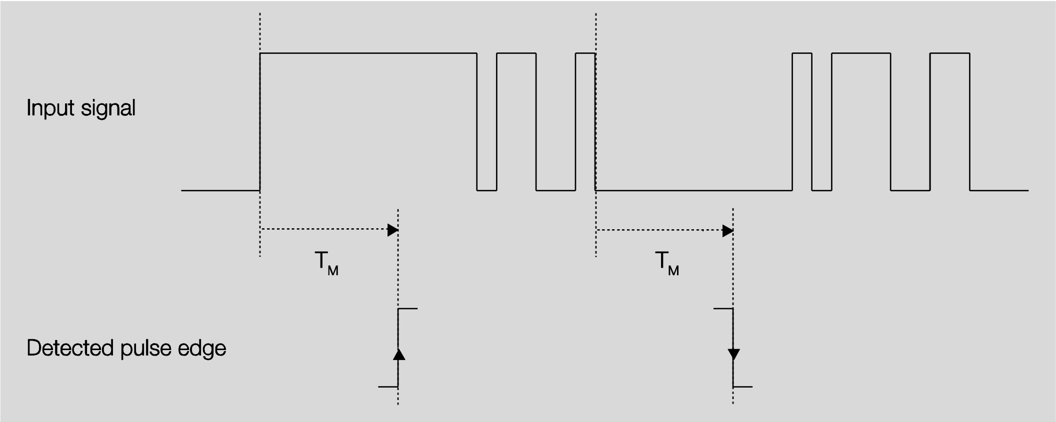
What is the minimum signal duration?

In contrast to the maximum dead time, a telegram is only sent after the minimum signal duration has elapsed.

The individual functions are:

If an edge is detected on the input, the minimum signal duration will commence. No telegram is sent on the bus at this time. The signal on the input is observed within the minimum signal duration. If a further edge appears at the input during the minimum signal duration, it will be interpreted as a new operation, and the minimum signal duration restarts. If no further edges occur after the start of the minimum signal duration, a telegram is sent on the bus, after the minimum signal duration has timed out.

Example: Minimum signal duration of the input signal for a detected edge:



In only two cases do no further edge changes occur within the minimum signal duration T_M after a change of edge. For this reason, only both of these are detected as valid.

Note
The minimum signal duration is not considered after a download and/or ETS reset.

**Scan input after download,
ETS reset and bus voltage recovery**

Options: No
Yes

- *No:* The object value is not scanned after a download, ETS reset and bus voltage recovery.
- *Yes:* The object value is scanned after a download, ETS reset and bus voltage recovery.

Dependent parameter:

Inactive wait state after bus voltage recovery in s [0…65,535]

Options: 0…65,535

Here the waiting time after a bus voltage recovery is set. After the waiting time has elapsed the state on the input terminals is scanned. The input reacts as if the state on the input terminals has just changed.

Note
The inactive waiting time does not add to the actual, adjustable sending delay time. This can be set separately.

**Enable communication objects
"Start event 0/1" 1-bit**

Options: Yes
No

- *Yes:* The 1-bit communication object *Start event 0/1* is enabled. As a result, the same events, such as those of the push button/switch connected to the binary input, can also be triggered by the receipt of a telegram on the communication object *Start event 0/1*.

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

Options: No
Yes

- *Yes*: The 1-bit block communication object *Block* is enabled. This can be used to disable the input.

Notes
If the input is disabled and the option *Send cyclically* is set, the last state is still sent regardless of the block. The option *Block* still blocks the physical input, sending continues internally. Should the internal block with this input not be permitted, this communication object has no effect on the respective input.

Enable communication object "Switch 1"

Options: <u>No</u>
Yes

- Yes: The communication object *Switch 1* appears.

  Dependent parameters:

  Reaction on event 0

  Options: <u>No edge evaluation</u>
  ON
  OFF
  Toggle
  Terminate cyclic transmission

  Reaction on event 1

  Options: <u>No edge evaluation</u>
  ON
  OFF
  Toggle
  Terminate cyclic transmission

  The reaction of the communication object is determined here. If the option *Yes* has been selected with the parameter *Distinction between long and short operation*, the reaction occurs with a short or long operation. With the option *No*, it occurs with each edge change.

Important
If the option *Terminate cyclic transmission* is set, it is important to note that this is only effective if the option Yes has only been selected in the parameter *Send cyclically*.

Internal connection

Options:	No Output E Output F Output G Output H

With this parameter, a direct connection of the binary input with an output can be established. With this connection, no assignment of the group address is necessary.

- *Output E...H:* The communication object *Switch* of the output is updated together with the communication object *Switch 1* of the input.

Attention

If an internal connection with an output is selected, and at the same time the reaction to an event is parameterized with toggle, the communication object *Switch 1* of the input is updated with the inverted value of the communication object *Status Switch* of the output.

Ensure that the communication object *Status Switch* of the output is enabled. The settings *normally closed contact/normally open contact* and *Invert status* should be parameterized, so that a toggle function is possible.

Send cyclically

Options:	No Yes

What is cyclic sending?

Cyclic transmission enables the communication object *Switch* to send automatically at a fixed interval. If cyclic transmission is only carried out for a specific object value (ON or OFF), this condition refers to the value of the communication object. It is therefore possible in principle to start cyclic transmission by sending a value to the communication object *Switch*. As this behavior is unwanted, the flags *Write* and *Update* of the communication object are deleted in the preliminary setting, so that they cannot be changed via the bus. If this functionality is required irrespectively, these flags should be set accordingly. When the communication object *Switch* changes and after bus recovery (after the sending delay time has elapsed), the communication object value is sent immediately on the bus, and the sending cycle time restarts.

Selection *Yes:*

Dependent parameters:

Telegram is repeated every

Options:	Every second Every 2/3/5/10/30/60 seconds Every 2/3/5/10/30/60 minutes Every 2/3/5/10/12 hours

The sending cycle time describes the time used between two cyclically sent telegrams.

On object value

Options:	0 1 0 or 1

- *1:* The communication object value is sent cyclically with 1.
- *0:* The communication object value is sent cyclically with 0.
- *0 or 1:* The communication object values 0 or 1 are sent cyclically.

Enable communication object "Switch 2"

"Switch 3"

Options: <u>No</u>
Yes

- *Yes:* The communication object *Switch 2/3* becomes visible.

  Dependent parameters:

  Reaction on event 0

  Options: <u>No edge evaluation</u>
  ON
  OFF
  Toggle
  Terminate cyclic transmission

  Reaction on event 1

  Options: <u>No edge evaluation</u>
  ON
  OFF
  Toggle
  Terminate cyclic transmission

  The reaction of the communication object is determined here. If the option *Yes* has been selected with the parameter *Distinction between long and short operation*, the reaction occurs with a short or long operation. With the option *No*, it occurs with each edge change.

  Internal connection

  Options: <u>No</u>
  Output E
  Output F
  Output G
  Output H

  With this parameter, a direct connection of the input with an output can be established. With this connection, no assignment of the group address is necessary.

  - *Output E...H:* The communication object *Switch* of the output is updated together with the communication object *Switch 2/3* of the input.

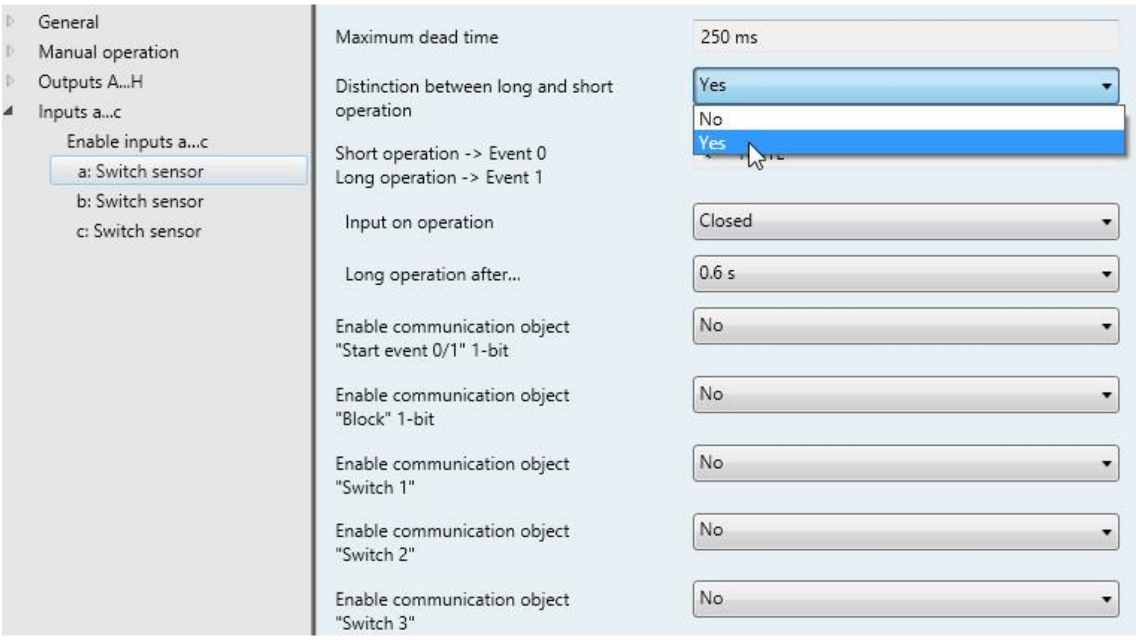
Attention

If an internal connection with an output is selected, and at the same time the reaction to an event is parameterized with toggle, the communication object *Switch 2/3* of the input is updated with the inverted value of the communication object *Status Switch* of the output.

Ensure that the communication object *Status Switch* of the output is enabled. The settings *normally closed contact/normally open contact* and *Invert status* should be parameterized, so that a toggle function is possible.

3.2.4.2.2 Parameter *Distinction between long and short operation – Yes*

If the option *Yes* is selected with the parameter *Distinction between long and short operation*, the following parameters appear in the Parameter window a: Switch sensor, page 171:



Maximum dead time: 250 ms
Distinction between long and short operation: Yes
Short operation -> Event 0
Long operation -> Event 1
Input on operation: Closed
Long operation after...: 0.6 s
Enable communication object "Start event 0/1" 1-bit: No
Enable communication object "Block" 1-bit: No
Enable communication object "Switch 1": No
Enable communication object "Switch 2": No
Enable communication object "Switch 3": No

Short operation -> Event 0
Long operation -> Event 1
<--- NOTE

Input on operation

Options: Open
Closed

- *Open:* The input is opened with actuation.
- *Closed:* The input is closed with actuation.

If a normally open contact is connected to the input, the option C*losed* should be selected; on a normally closed contact the option O*pen* should be selected.

Long operation after …

Options: 0.6/0.8 s
1/1.2/1.5 s
2/3/4/5/6/7/8/9/10 s

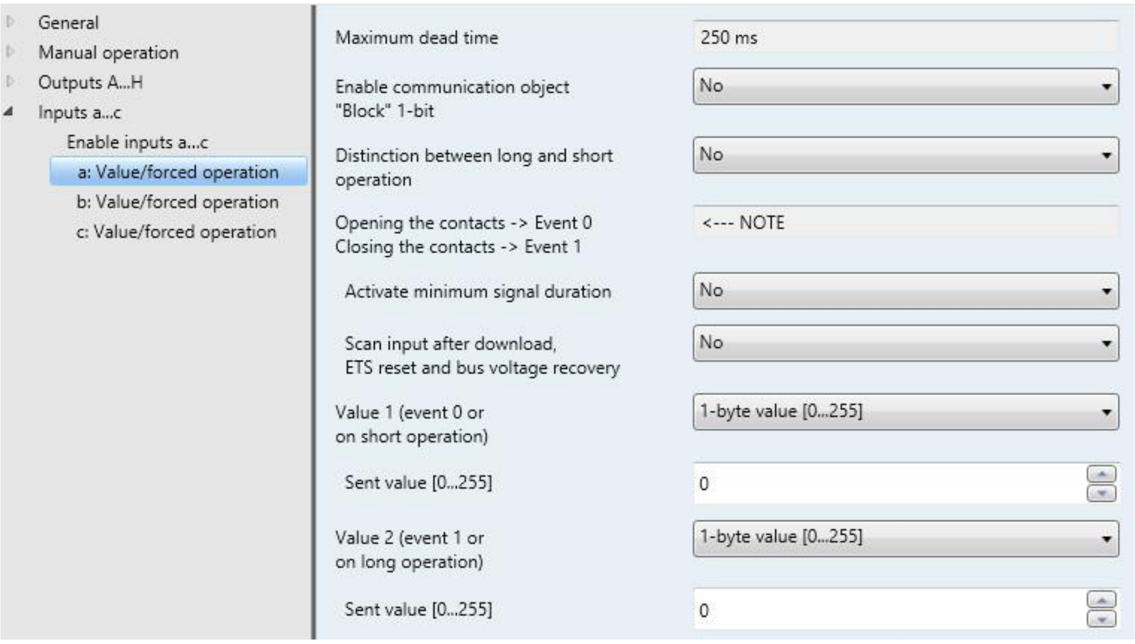
Here the time period T_L, after which an operation is considered a “long” operation, is defined.

Note
The remaining parameter descriptions can be found in Parameter Distinction between long and short operation – No, page 173.

3.2.4.3 Parameter window *a: Value/forced operation*

This operating mode allows the sending of values of any data types.

This parameter window is visible if the option *Value/forced operation* is selected in the parameter *Input A* in the Parameter window Enable inputs a…c, page 170.



Maximum dead time: 250 ms
Enable communication object "Block" 1-bit: No
Distinction between long and short operation: No
Opening the contacts -> Event 0
Closing the contacts -> Event 1: <--- NOTE
Activate minimum signal duration: No
Scan input after download, ETS reset and bus voltage recovery: No
Value 1 (event 0 or on short operation): 1-byte value [0...255]
Sent value [0...255]: 0
Value 2 (event 1 or on long operation): 1-byte value [0...255]
Sent value [0...255]: 0

Maximum dead time

This parameter is fixed to a preset 250 ms.

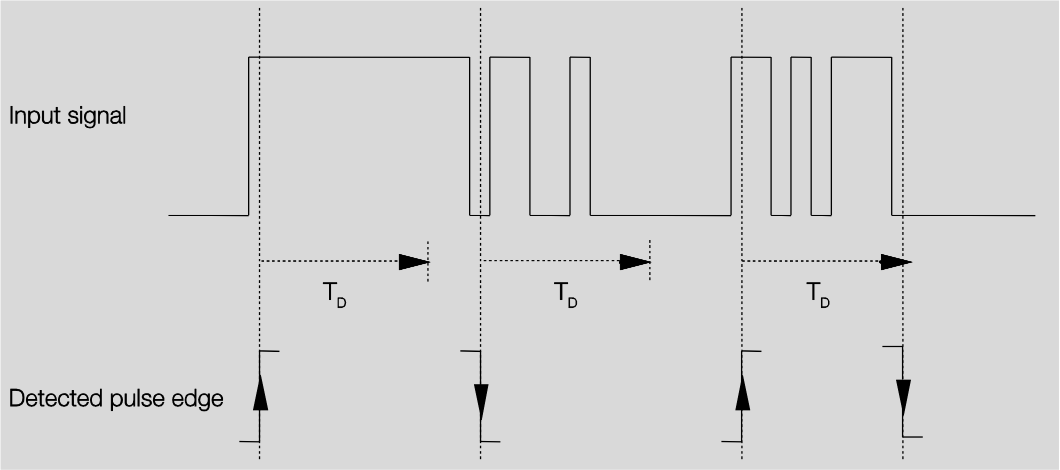
The maximum dead time prevents unwanted multiple operations of the input, e.g. due to bouncing of the contact.

What is the maximum dead time?

An edge change at the input is assessed with a maximum dead time (delay) value of 250 ms. This time may vary from 0 ms to 250 ms.

Note
No further bouncing is possible.

Example: Maximum dead time of the input signal for a detected edge:



After detection of an edge on the input, further edges are ignored for the maximum dead time T_D.

Enable communication object "Block" 1-bit

Options:	No Yes

- *Yes*: The 1-bit block communication object *Block* is enabled. This can be used to disable the input.

Notes
If the input is disabled and the option *Send cyclically* is set, the last state is still sent regardless of the block. The option *Block* still blocks the physical input, sending continues internally.

Distinction between long and short operation

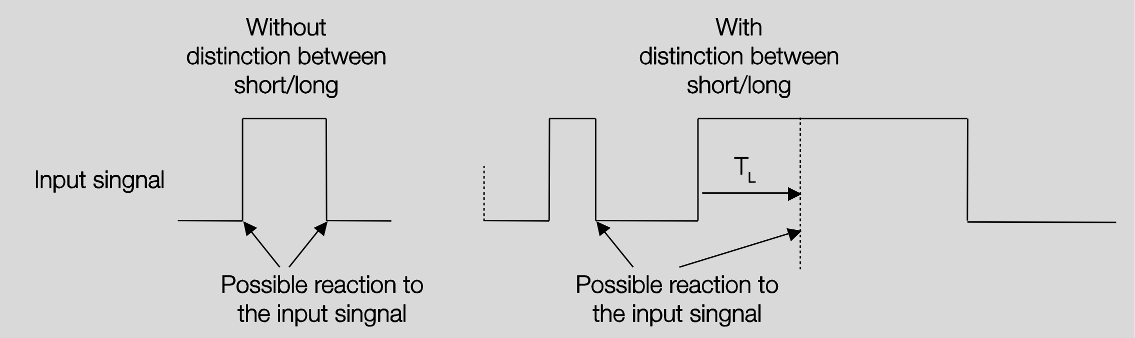
Options: <u>No</u>
Yes

Using this parameter, you set if the input differentiates between short and long operation.

- *Yes:* After opening/closing the contact, it must first of all be ascertained if a short or long operation has occurred here. Only thereafter will a possible reaction be triggered.

Note
With Distinction between long and short operation, two communication objects are visible for each input. One communication object only transmits during short operation, the other communication object only during a long operation.

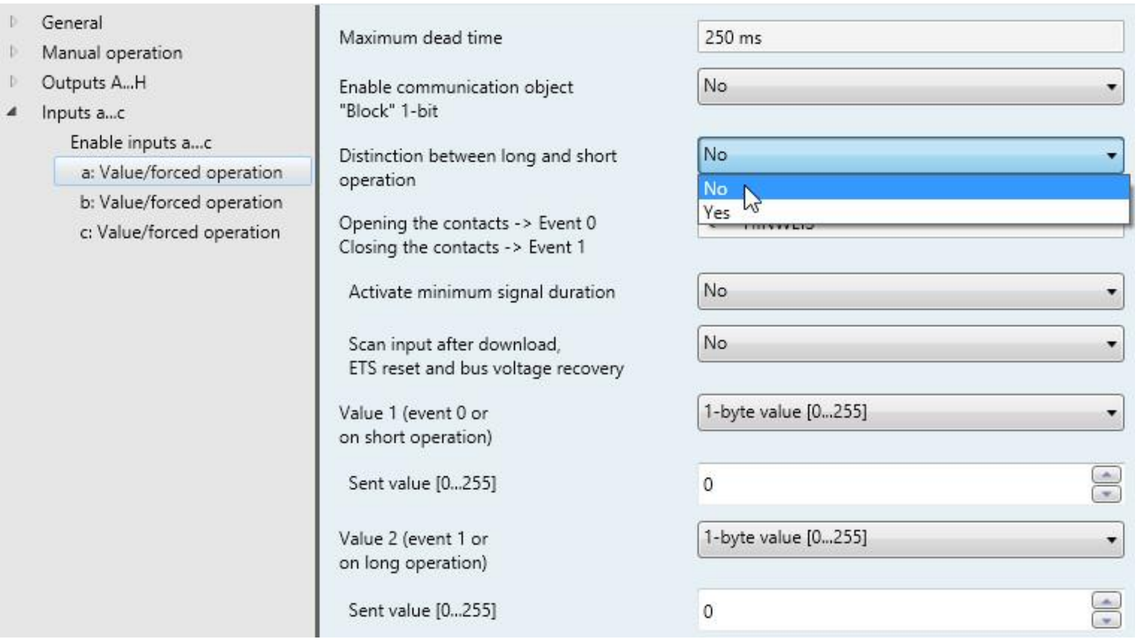
The following table shows the function in detail:



T_L is the time duration from where a long operation is detected.

3.2.4.3.1 Parameter *Distinction between long and short operation – No*

If the option *No* has been selected with the parameter *Distinction between long and short operation*, the following parameters appear in Parameter window a: Value/forced operation, page 181:



Maximum dead time: 250 ms

Enable communication object "Block" 1-bit: No

Distinction between long and short operation: No

Opening the contacts -> Event 0
Closing the contacts -> Event 1

Activate minimum signal duration: No

Scan input after download, ETS reset and bus voltage recovery: No

Value 1 (event 0 or on short operation): 1-byte value [0...255]

Sent value [0...255]: 0

Value 2 (event 1 or on long operation): 1-byte value [0...255]

Sent value [0...255]: 0

Opening the contacts -> Event 0
Closing the contacts -> Event 1

<--- NOTE

Activate minimum signal duration

Options:	No Yes

Selection *Yes:*

Dependent parameters:

On closing the contact
in [0...65,535] X 0.1 s

Options: 0…10…65,535

On opening the contact
in [0…65,535] x 0.1 s

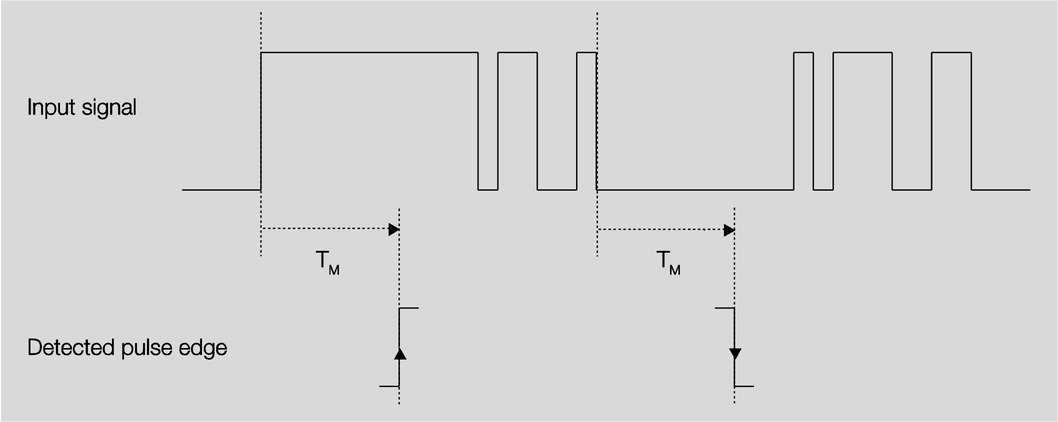
Options: 0…10…65,535

What is the minimum signal duration?

In contrast to the maximum dead time, a telegram is only sent after the minimum signal duration has elapsed. The individual functions are:

If an edge is detected on the input, the minimum signal duration will commence. No telegram is sent on the bus at this time. The signal on the input is observed within the minimum signal duration. If a further edge appears at the input during the minimum signal duration, it will be interpreted as a new operation, and the minimum signal duration restarts. If no further edges occur after the start of the minimum signal duration, a telegram is sent on the bus, after the minimum signal duration has timed out.

Example: Minimum signal duration of the input signal for a detected edge:



In only two cases do no further edge changes occur within the minimum signal duration T_M after a change of edge. For this reason, only both of these are detected as valid.

Note
The minimum signal duration is not considered after a download and/or ETS reset.

**Scan input after download,
ETS reset and bus voltage recovery**

Options: No
Yes

- *No:* The object value is not scanned after a download, ETS reset and bus voltage recovery.
- *Yes:* The object value is scanned after a download, ETS reset and bus voltage recovery.

The following parameter appears:

**Inactive wait state after bus voltage
recovery in s [0…65,535]**

Options: 0…65,535

Here the waiting time after a bus voltage recovery is set. After the waiting time has elapsed the state on the input terminals is scanned. The input reacts as if the state on the input terminals has just changed.

Note
The inactive waiting time does not add to the actual, adjustable sending delay time. This can be set separately.

Value 1 (event 0 or on short operation)

Options: Do not send
1-bit value [0/1]
2-bit value (forced operation)
1-byte value [-128...127]
1-byte value [0...255]
1-byte value (8-bit scene)
2-byte value [-32,768...32,767]
2-byte value [0...65,535]
2-byte value (floating point)
4-byte value (floating point)
3-byte value (time of day/weekday)
4-byte value [-2147483648...2147483647]
4-byte value [0...4294967295]

This parameter serves for defining the data type which is sent when the contact is actuated.

Note
With the setting 2-byte value (floating point), rounding off errors can occur, meaning that the value sent to the bus may not correspond precisely to the set value. If a high degree of precision is required, select the option 4-byte value (floating point).

Depending on the selection made in the parameter *Value 1*, different parameters will appear. All parameters are described in the following:

Sent value [X]

Options: ON/OFF/TOGGLE
0/1
-128…0…127
0…255
-32,768…0…32,767
0…65,535
-100…0…100
-2147483648…0…2147483647
0…4294967295

This parameter defines the value which is sent on operation. The value range is dependent on the set data type of the value X.

Sent value (forced operation)

Options: ON, activate forced operation
OFF, activate forced operation
Disable forced operation

This parameter defines the value which is sent on operation.

In the following table, the Forced operation function is explained:

Bit 1	Bit 0	Access	Description
0	0	Enabled	The communication object *Switch* of the actuator is enabled by the binary input. The assigned sensor can control the actuator via the *Switch* communication object. The binary input does not control the actuator. Bit 0 of the value of the *Forced operation* communication object is not evaluated. The *Forced operation* communication object sends a telegram with the group addresses of the *Forced operation* communication object and the status of the *Switch* communication object with every state change of the *Switch* communication object.
0	1	Enabled	
1	0	Off	The communication object *Switch* of the actuator is disabled by the binary input. The assigned sensor cannot control the actuator via the *Switch* communication object. The binary input controls the actuator via the *Switch* communication object. The actuator is switched off. Bit 0 of the value of the *Forced operation* communication object is evaluated.
1	1	On	The communication object *Switch* of the actuator is disabled by the binary input. The assigned sensor cannot control the actuator via the *Switch* communication object. The binary input controls the actuator via the *Forced operation* communication object. The actuator is switched on.

8-bit scene [1…64]

Options: 1…64

This parameter defines the scene number, which is sent on actuation.

Recall/store scene

Options: Recall
Save

This parameter defines whether the scene is to be recalled or stored.

Hour [0...23]

Options: 0…23

Minute [0...59]

Options: 0…59

Seconds [0…59]

Options: 0…59

With these parameters, the hours, minutes and seconds are set which are to be send when actuated.

Weekday [1 = Mo, 2..6, 7 = Su]

Options: 0 = No day
1 = Monday
2 = Tuesday
3 = Wednesday
4 = Thursday
5 = Friday
6 = Saturday
7 = Sunday

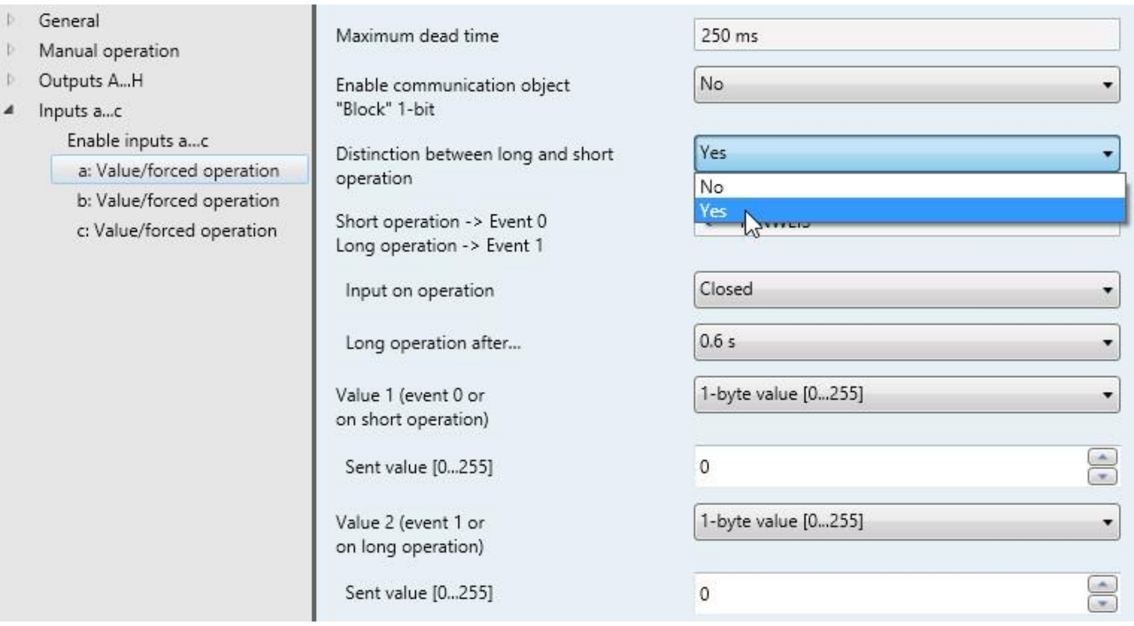
Using these parameters, the weekday sent on actuation is set.

Value 2 (event 1 or on long operation)

Note
The options and parameter descriptions of the parameter *Value 2* correspond with those of parameter *Value 1.*

3.2.4.3.2 Parameter *Distinction between long and short operation – Yes*

If the option *Yes* is selected with the parameter *Distinction between long and short operation*, the following parameters appear:



Maximum dead time: 250 ms

Enable communication object "Block" 1-bit: No

Distinction between long and short operation: Yes

Short operation -> Event 0
Long operation -> Event 1

Input on operation: Closed

Long operation after...: 0.6 s

Value 1 (event 0 or on short operation): 1-byte value [0...255]

Sent value [0...255]: 0

Value 2 (event 1 or on long operation): 1-byte value [0...255]

Sent value [0...255]: 0

Short operation -> Event 0
Long operation -> Event 1
<––– NOTE

Note

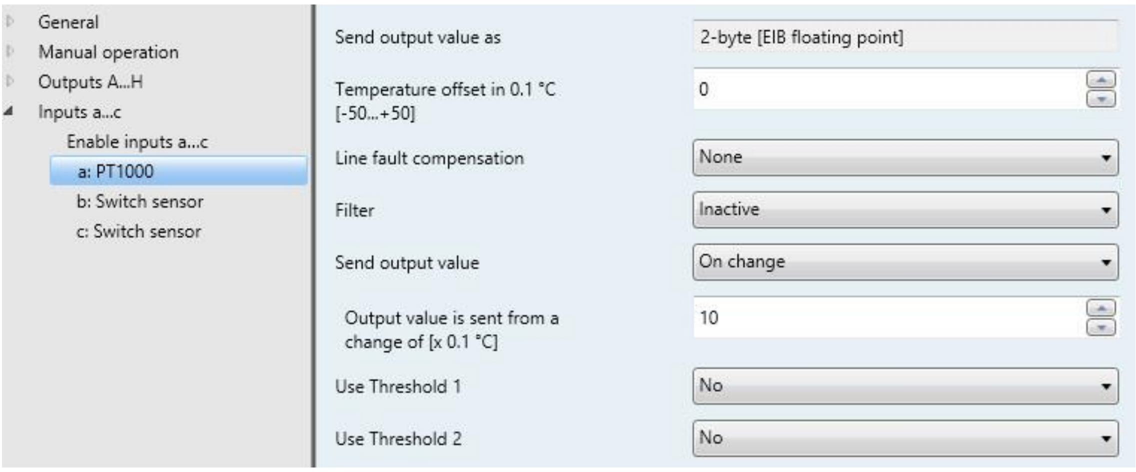
The remaining parameter descriptions can be found in the chapter Parameter Distinction between long and short operation – No, page 184.

3.2.4.4 Parameter window *a: PT100, PT1000 and KTY*

3.2.4.4.1 Parameter window a: PT100/PT1000

This operating mode allows the sending of temperature values.

This parameter window is visible if one of the options *PT100* or *PT1000* is selected in the parameter *Input a* in the Parameter window Enable inputs a…c, page 170.



Send output value as: 2-byte [EIB floating point]
Temperature offset in 0.1 °C [-50...+50]: 0
Line fault compensation: None
Filter: Inactive
Send output value: On change
Output value is sent from a change of [x 0.1 °C]: 10
Use Threshold 1: No
Use Threshold 2: No

The *Sensor output* is set with these parameters. The data can be found in the sensor manufacturer's technical documentation.

Send output value as

This parameter is fixed to *2-byte [EIB floating point]*.

What is the output value?

The Analogue Input records a sensor measured value, converts it according to the set parameters and sends it on the bus. This sent value is designated as the output value.

Temperature offset in 0.1 °C
[-50...+50]

Options:	-50...0...+50

A maximum offset of ±5 °C can be added to the recorded temperature with this parameter.

Line fault compensation

Options:	None Via cable length Via cable resistance

This parameter is used for setting the line fault compensation.

Selection of options *Via cable length* and *Via cable resistance*: For a description, see chapter Line fault compensation Via cable length:, page 197 and chapter Line fault compensation Via cable resistance, page 198.

Filter

Options:	Inactive Low (mean value over 4 measurements) Medium (mean value over 16 measurements) High (mean value over 64 measurements)

This parameter is used for setting a filter (floating mean value filter). This can be used to set the output value as a mean value using three different options.

- *Inactive*: Filter is not active
- *Low*: Mean output value over 4 measurements
- *Medium*: Mean output value over 16 measurements
- *High*: Mean output value over 64 measurements

Important
By use of the filter the output value is “smoothed” via the mean value and is available for further processing. The filter thus has immediate effects on the thresholds and calculation values. The higher the degree of the filtering applied, the smoother the result. This means that the changes to the output values become slower. Example: An erratic change of the sensor signal with the setting *Medium* will take 16 seconds until the output value is through.

Send output value

Options: On request
<u>On change</u>
Cyclically
On change and cyclically

This parameter defines how the output value should be sent.

- *On request:* The output value is sent on request.

The *Request output value – Input a* communication object appears.

As soon as a 1 is received at this communication object, the current output value is sent once to the communication object *Output value – Input a*.

- *On change*: The output value is sent when a change occurs.
- *Cyclically*: The output value is sent cyclically.
- *On change and cyclically*: The output value is sent cyclically when a change occurs.

Selection of options *On change, cyclically* and *On change and cyclically*:

Dependent parameters:

Output value is sent from a change of [x 0.1 °C]

Options: 1…<u>10</u>...200

This parameter defines from which temperature change the output value should be sent.

- *10:* The output value is sent after a change of 1 °C.

Output value is sent

Options: Every second
Every 2/3/5/10/30/60 seconds
Every 2/3/5/10/30/60 minutes
Every 2/3/5/10/12 hours

- The interval for cyclical sending is set with this additional parameter.

Use Threshold 1

Options: <u>No</u>
Yes

- *No:* The parameter window remains disabled and invisible.
- *Yes:* The *Threshold 1* parameter window appears.

After the *Threshold* function has been enabled, the parameter window *a: Threshold 1* is enabled. Further settings can be made here, e.g. setting the hysteresis and thresholds. If *Yes* is selected, the communication object *Threshold 1 - Input a* appears.

Use Threshold 2

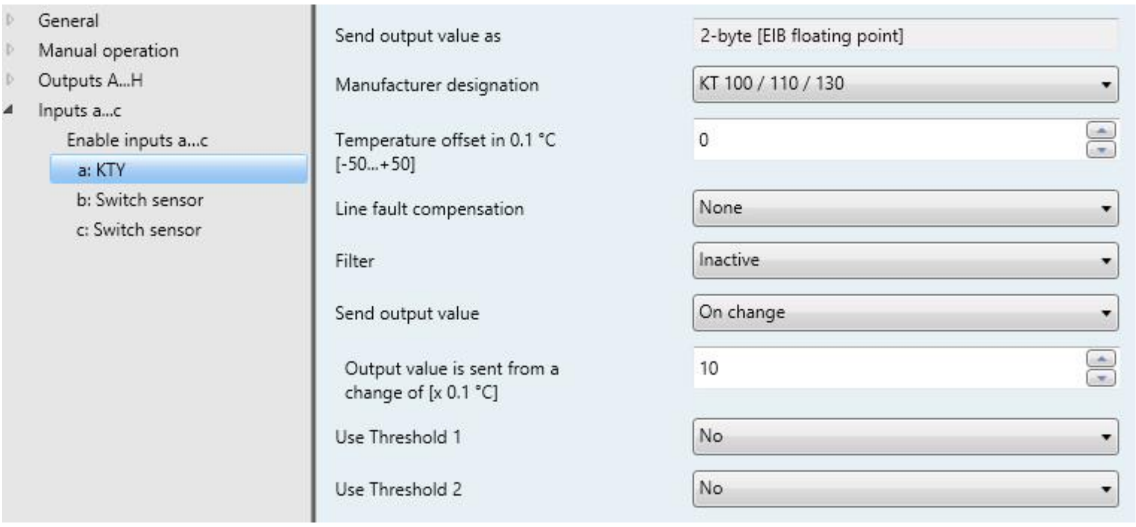
Options: <u>No</u>
Yes

- *No:* The parameter window remains disabled and invisible.
- *Yes:* The *Threshold 2* parameter window appears.

After the *Threshold* function has been enabled, the parameter window *a: Threshold 2* is enabled. Further settings can be made here, e.g. setting the hysteresis and thresholds. If *Yes* is selected, the communication object *Threshold 2 - Input a* appears.

3.2.4.4.2 Parameter options for KTY

This parameter window is visible if the option *KTY* is selected in the parameter *Input a* in the Parameter window Enable inputs a…c, page 170.



Send output value as	2-byte [EIB floating point]
Manufacturer designation	KT 100 / 110 / 130
Temperature offset in 0.1 °C [-50...+50]	0
Line fault compensation	None
Filter	Inactive
Send output value	On change
Output value is sent from a change of [x 0.1 °C]	10
Use Threshold 1	No
Use Threshold 2	No

Manufacturer designation

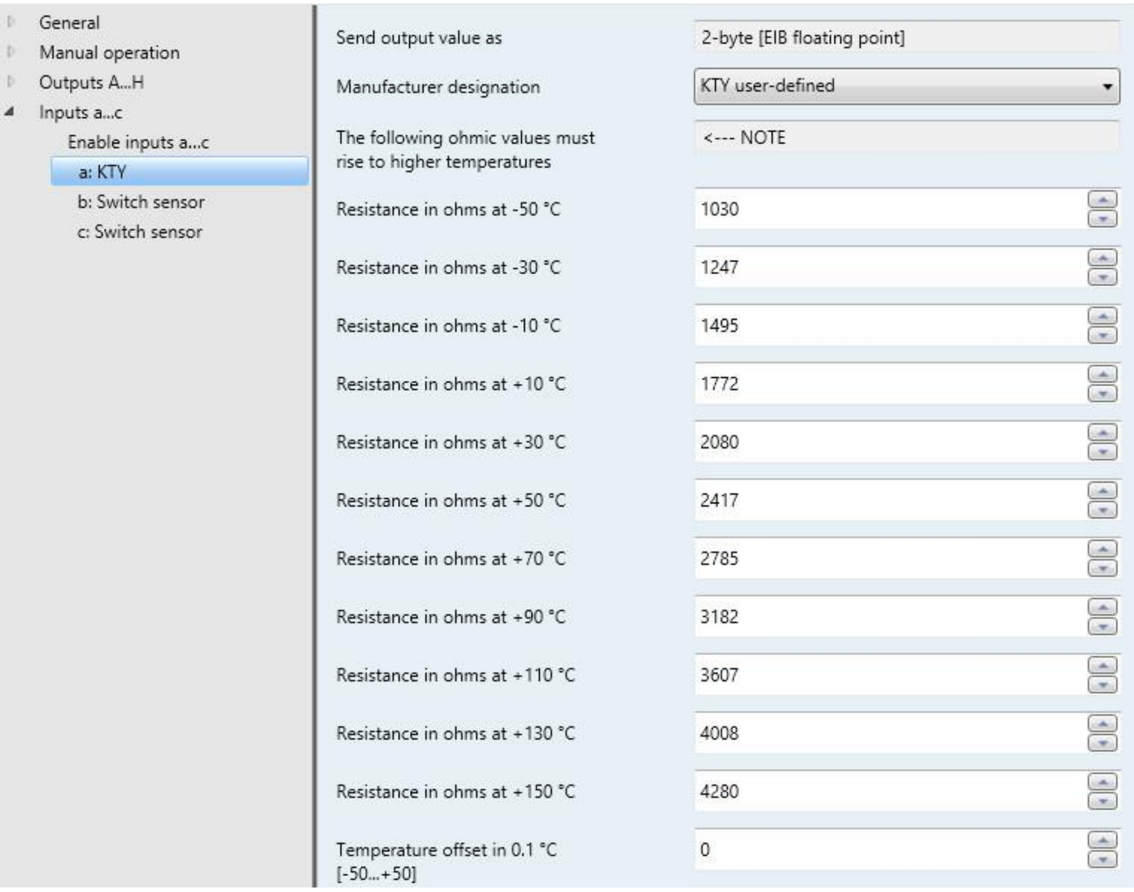
Options: <u>KT 100 / 110 / 130</u>
KT 210 / 230
KTY 10-5 / 11-5 / 13-5
KTY 10-6 / 10-62 / 11-6 / 13-6 / 16-6 / 19-6
KTY 10-7 / 11-7 / 13-7
KTY 21-5 / 23-5
KTY 21-6 / 23-6
KTY 21-7 / 23-7
KTY 81-110 / 81-120 / 81-150
KTY 82-110 / 82-120 / 82-150
KTY 81-121 / 82-121
KTY 81-122 / 82-122
KTY 81-151 / 82-151
KTY 81-152 / 82-152
KTY 81-210 / 81-220 / 81-250
KTY 82-210 / 82-220 / 82-250
KTY 81-221 / 82-221
KTY 81-222 / 82-222
KTY 81-251 / 82-251
KTY 81-252 / 82-252
KTY 83-110 / 83-120 / 83-150
KTY 83-121
KTY 83-122
KTY 83-151
User-defined

For selection of a predefined KTY sensor

Note

If a KTY sensor which is not in the list is used, the option *KTY user-defined* can be used to enter its characteristic (see following page).

KTY user-defined



Send output value as	2-byte [EIB floating point]
Manufacturer designation	KTY user-defined
The following ohmic values must rise to higher temperatures	<--- NOTE
Resistance in ohms at -50 °C	1030
Resistance in ohms at -30 °C	1247
Resistance in ohms at -10 °C	1495
Resistance in ohms at +10 °C	1772
Resistance in ohms at +30 °C	2080
Resistance in ohms at +50 °C	2417
Resistance in ohms at +70 °C	2785
Resistance in ohms at +90 °C	3182
Resistance in ohms at +110 °C	3607
Resistance in ohms at +130 °C	4008
Resistance in ohms at +150 °C	4280
Temperature offset in 0.1 °C [-50...+50]	0

The following ohmic values must rise to higher temperatures

<- Note

To ensure correct functioning of the Analogue Input with respect to the user-defined entries, the ohm (resistance) values as visible for the preset values must be in ascending order.

An incorrect entry can lead to unrealistic output values!

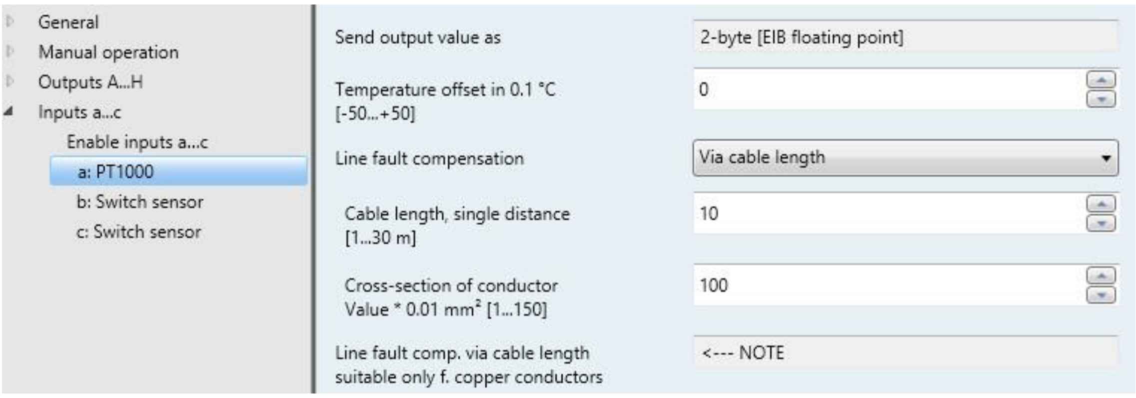
Resistance in ohms at -50…+150 °C

Options: 0…<u>1,030</u>…<u>4,280</u>…5,600

A resistance characteristic can be entered via these 11 parameters. The data can be found in the sensor manufacturer's technical documentation.

Note
The description of the further parameters can be found in the description [Parameter window a: PT100, PT1000](), page 191.

3.2.4.4.3 Line fault compensation *Via cable length*:



Send output value as: 2-byte [EIB floating point]

Temperature offset in 0.1 °C [-50...+50]: 0

Line fault compensation: Via cable length

Cable length, single distance [1...30 m]: 10

Cross-section of conductor Value * 0.01 mm² [1...150]: 100

Line fault comp. via cable length suitable only f. copper conductors: <--- NOTE

Cable length, single distance
[1...30 m]

Options: 1...<u>10</u>...30

For setting the single cable length of the connected temperature sensor.

Important
The maximum cable length permitted between the sensor and device input is 30 m.

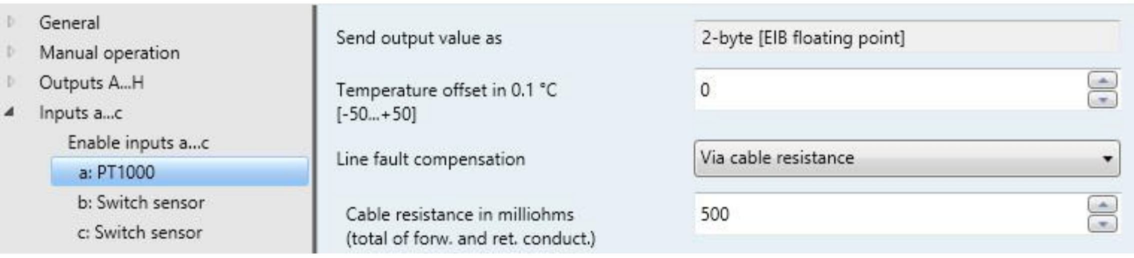
Cross-section of conductor
Value * 0.01 mm^2 [1...150]

Options: 1...<u>100</u>...150 (150 = 1.5 mm^2)

The cross-section of the conductor to which the temperature sensor is connected is entered using this parameter.

Important
Line fault compensation via cable length is only suitable for copper conductors.

3.2.4.4.4 Line fault compensation V*ia cable resistance*



Send output value as: 2-byte [EIB floating point]

Temperature offset in 0.1 °C [-50...+50]: 0

Line fault compensation: Via cable resistance

Cable resistance in milliohms (total of forw. and ret. conduct.): 500

Cable resistance in milliohms
(total of forw. and ret. conduct.)

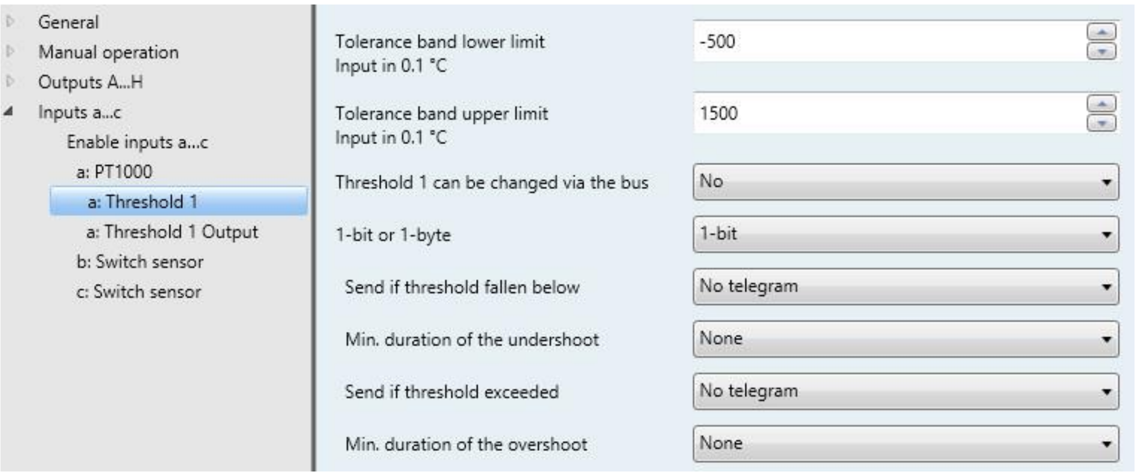
Options: 0...<u>500</u>...10,000

Using this parameter the level of cable resistance of the connected temperature sensor is set.

Important
In order to correctly measure the cable resistance, the conductors must be shorted together at the end of the cable and should not be connected to the Analogue Input.

3.2.4.4.5 Parameter window *a: Threshold 1*

The following details also apply to *Threshold 2*.



Tolerance band lower limit Input in 0.1 °C: -500

Tolerance band upper limit Input in 0.1 °C: 1500

Threshold 1 can be changed via the bus: No

1-bit or 1-byte: 1-bit

Send if threshold fallen below: No telegram

Min. duration of the undershoot: None

Send if threshold exceeded: No telegram

Min. duration of the overshoot: None

Tolerance band lower limit
Input in 0.1 °C

Options: <u>-500</u>…1500

Tolerance band upper limit
Input in 0.1 °C

Options: -500…<u>1500</u>

The upper and lower limits of the tolerance band are set via these two parameters.

The entry is made in steps of 0.1 °C, i.e. an entry of 1500 means 150 °C.

Threshold 1 can be changed via the bus

Options:	No <u>Yes</u>

This parameter specifies whether the limits can be changed via the bus.

- *Yes:* The following communication objects appear:

  Modify – Input a Threshold 1 lower limit

  Modify – Input a Threshold 1 upper limit.

Important
The value formats of these communication objects are the same as the format set in parameter window *a: PT100/PT1000* or *KTY*, under the parameter *Send output value as*.

1-bit or 1-byte

Options:	<u>1-bit</u> 1-byte [0...+255]

Selection of option *1-bit:*

Dependent parameters:

Send if threshold fallen below

Send if threshold exceeded

Options:	<u>No telegram</u> ON telegram OFF telegram

- *No telegram:* No reaction occurs.
- *ON telegram:* A telegram with the value 1 is sent.
- *OFF telegram:* A telegram with the value 0 is sent.

Min. duration of the undershoot

Min. duration of the overshoot

Options:	<u>None</u> 5/10/30/60 seconds 2/3/5/10/30/60 minutes 2/3/5/10/12/24 hours

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegrams are sent.

Selection of option *1-byte [0...+255]:*

Dependent parameters:

Send if Threshold fallen below [0...+255]

Send if Threshold exceeded [0...+255]

Options: 0...255

A value of 0 to 255 can be entered in single steps.

Min. duration of the undershoot

Min. duration of the overshoot

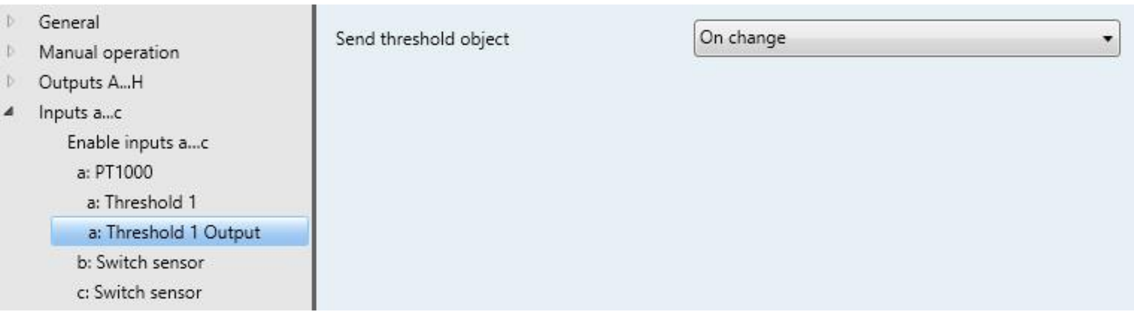
Options: None
5/10/30/60 seconds
2/3/5/10/30/60 minutes
2/3/5/10/12/24 hours

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

3.2.4.4.6 Parameter window *a: Threshold 1 Output*

The details in the following also apply to *a: Threshold 2 Output.*



Send threshold object: On change

Send threshold object

Options:	On change On change and cyclically

This parameter is used to specify the send behavior of the threshold object.

- *On change*: The threshold object is sent when a change occurs.
- *On change and cyclically:* The threshold object is sent cyclically when a change occurs. The threshold object is sent cyclically until the value falls below or exceeds the other limit.

  Dependent parameters:

  Cycle time if lower threshold fallen below

  Cycle time if upper threshold exceeded

Options:	None 5/10/30/60 seconds 2/3/5/10/30/60 minutes 2/3/5/10/12/24 hours

  These two parameters are used to define the point at which cyclical sending should take place after an undershoot of the lower limit or an overshoot of the upper limit.

3.3 Communication objects

3.3.1 Summary of communication objects

No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	S	T	U
0	In operation	General	1.002	1-bit	x	x		x	
1	Request status values	General	1.017	1-bit	x		x	x	
2	Block manual operation	General	1.003	1-bit	x		x		
3	Status Manual operation	General	1.003	1-bit	x	x		x	
4	Status byte	General	Non DPT	1-byte	x	x		x	
5	Fault (overload/short-circuit)	Output A Output A/B	1.005	1-bit	x	x		x	
6	Reset malfunction	Output A Output A/B	1.015	1-bit	x		x	x	
7	Fault (overload/short-circuit)	Output C Output C/D	1.005	1-bit	x	x		x	
8	Reset malfunction	Output C Output C/D	1.015	1-bit	x		x	x	
9	2nd control value, cooling, continuous (PWM)	Output A Output A/B	5.001	1-byte	x	x			
	2nd control value, cooling, continuous (3-point)	Output A Output A/B	5.001	1-byte	x	x			
	2nd control value, cooling, analog (0...10 V)	Output A	5.001	1-byte	x	x			
10	Control value, heating, ON/OFF	Output A	1.001	1-bit	x		x		
	Control value, heating, continuous (PWM)	Output A	5.001	1-byte	x		x		
	Control value, heating, continuous (3-point)	Output A/B	5.001	1-byte	x		x		
	Control value, heating, analog (0...10 V)	Output A	5.001	1-byte	x		x		
11	Status Control value	Output A Output A/B	5.001	1-byte	x	x		x	
	Status Control value	Output A Output A/B	1.011	1-bit	x	x		x	
12	Fault control value	Output A Output A/B	1.005	1-bit	x	x		x	
13	Activate purge	Output A Output A/B	1.003	1-bit	x		x		
14	Status Valve purge	Output A Output A/B	1.003	1-bit	x	x		x	
15	Priority 1, Forced operation	Output A Output A/B	1.001	1-bit	x		x		
	Priority 1, Block	Output A Output A/B	1.001	1-bit	x		x		
16	Priority 2, Forced operation	Output A Output A/B	1.001	1-bit	x		x		
	Priority 2, Block	Output A Output A/B	1.001	1-bit	x		x		
17	Priority 3, Forced operation	Output A Output A/B	1.001	1-bit	x		x		
	Priority 3, Block	Output A Output A/B	1.001	1-bit	x		x		
18	Status byte	Output A Output A/B	Non DPT	1-byte	x	x		x	
19	Not assigned								

No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	S	T	U
20…29	Output B CO as for output A								
30…39	Output C CO as for output A								
40…49	Output D CO as for output A								

No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	S	T	U
50	Switch	Output E	1.001	1-bit	x		x		
51	Switch speed 1	Fan EFG (Multi-level)	1.001	1-bit	x		x		
	Switch	Fan EFG (One-level)	1.001	1-bit	x		x		
	Permanent on	Output E	1.003	1-bit	x		x		
52	Switch speed 2	Fan EFG (Multi-level)	1.001	1-bit	x		x		
	Disable function Time	Output E	1.003	1-bit	x		x		
53	Switch speed 3	Fan EFG (Multi-level)	1.001	1-bit	x		x		
	Status Switch	Output E	1.001	1-bit	x	x		x	
54	Fan speed up/down	Fan EFG (Multi-level)	1.007	1-bit	x		x		
55	Status Fan ON/OFF	Fan EFG	1.001	1-bit	x	x		x	
56	Status Fan speed	Fan EFG (Multi-level)	5.010	1-byte	x	x		x	
57	Status Fan speed 1	Fan EFG (Multi-level)	1.001	1-bit	x	x		x	
58	Status Fan speed 2	Fan EFG (Multi-level)	1.001	1-bit	x	x		x	
59	Status Fan speed 3	Fan EFG (Multi-level)	1.001	1-bit	x	x		x	
60	Switch	Output F	1.001	1-bit	x		x		
	Run-on	Fan EFG (Multi-level)	1.003	1-bit	x		x		
61	Limitation 1	Fan EFG	1.003	1-bit	x		x		
	Permanent on	Output F	1.003	1-bit	x		x		
62	Limitation 2	Fan EFG	1.003	1-bit	x		x		
	Disable function Time	Output F	1.003	1-bit	x		x		
63	Limitation 3	Fan EFG	1.003	1-bit	x		x		
	Status Switch	Output F	1.001	1-bit	x	x		x	
64	Limitation 4	Fan EFG	1.003	1-bit	x		x		
65	Forced operation	Fan EFG	1.003	1-bit	x		x		
66	Automatic ON/OFF	Fan EFG	1.003	1-bit	x		x		
67	Status Automatic	Fan EFG	1.003	1-bit	x	x		x	
68	Status byte fan	Fan EFG	Non DPT	1-byte	x	x		x	
69	Control value A	Fan EFG (2 control values)	5.010	1-byte	x		x		
	Control value	Fan EFG (only 1 control value)	5.010	1-byte	x		x		
70	Control value B	Fan EFG (2 control values)	5.010	1-byte	x		x		
	Switch	Output G	1.001	1-bit	x		x		
71	Toggle control value A/B	Fan EFG (2 control values)	1.001	1-bit	x		x		
	Permanent on	Output G	1.003	1-bit	x		x		
72	Fault control value	Fan EFG	1.005	1-bit	x	x		x	
	Disable function Time	Output G	1.003	1-bit	x		x		
73	Status Switch	Output G	1.001	1-bit	x	x		x	
74…79	Not assigned								

No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	S	T	U
80	Switch	Output H	1.001	1-bit	x		x		
81	Permanent on	Output H	1.003	1-bit	x		x		
82	Disable function Time	Output H	1.003	1-bit	x		x		
83	Status Switch	Output H	1.001	1-bit	x	x		x	
84…89	Not assigned								
90	Block	Input a: Switch sensor	1.003	1-bit	x		x		
		Input a: Value/forced operation	1.003	1-bit	x		x		
	Output value	Input a: Temperature sensor	9.001	2-byte	x	x		x	
91	Switch 1	Input a: Switch sensor	1.001	1-bit	x		x	x	
	Value 1	Input a: Value/forced operation	Variable		x			x	
	Request output value	Input a: Temperature sensor	1.009	1-bit	x		x		
92	Switch 2	Input a: Switch sensor	1.001	1-bit	x		x	x	
	Value 2	Input a: Value/forced operation	Variable		x			x	
	Measured value out of range	Input a: Temperature sensor	1.001	1-bit	x	x		x	
93	Switch 3	Input a: Switch sensor	1.001	1-bit	x		x	x	
	Threshold 1	Input a: Temperature sensor	Variable		x	x		x	
94	Start event 0/1	Input a: Switch sensor	1.001	1-bit	x		x		
	Change Threshold 1 lower limit	Input a: Temperature sensor	Variable		x	x	x		
95	Change Threshold 1 upper limit	Input a: Temperature sensor	Variable		x	x	x		
96	Threshold 2	Input a: Temperature sensor	Variable		x	x		x	
97	Change Threshold 2 lower limit	Input a: Temperature sensor	Variable		x	x	x		
98	Change Threshold 2 upper limit	Input a: Temperature sensor	Variable		x	x	x		
99	Not assigned								
100…109	Input b The same CO as Input a								
110…119	Input c The same CO as Input a								
120	Toggle heating	General	1.100	1-bit	x		x		
121	Valve control values parallel mode	General	1.100	1-bit	x		x		

3.3.2 Communication objects *General*

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>**0**</td><td>**In operation**</td><td>**General**</td><td>**1-bit**
DPT 1.002</td><td>**C, R, T**</td></tr>
<tr><td colspan="5">The communication object is enabled if the parameter *Enable communication object "In operation" 1-bit* has been selected with the option *Send value 0/1 cyclically* in Parameter window General – Settings, page 71.
In order to regularly monitor the presence of the device on the KNX, an in-operation monitoring telegram is sent cyclically on the bus.
As long as the communication object is activated, it sends a programmable 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*</td></tr>
<tr><td>**1**</td><td>**Request status values**</td><td>**General**</td><td>**1-bit**
DPT 1.017</td><td>**C, W, T**</td></tr>
<tr><td colspan="5">This communication object is enabled if the option *Yes* has been selected for the parameter *Enable communication object "Request status values" 1-bit* in the Parameter window General – Settings, page 71.
If the communication object receives a telegram with the value x (x = 0; 1; 0 or 1), all *Status* communication objects are sent on the bus, as long as these have not been programmed with the option *On change*, *After request* or *After a change or request*.
Option x = 1 produces the following function:
Telegram value: 1 = All status messages are sent.
0 = No reaction</td></tr>
<tr><td>**2**</td><td>**Block manual operation**</td><td>**General**</td><td>**1-bit**
DPT 1.003</td><td>**C, W**</td></tr>
<tr><td colspan="5">This communication object is enabled if the option *Enable/disable via comm. object* has been selected for the parameter *Manual operation* in the Parameter window Manual operation – Settings, page 74.
Using this communication object the Manual operation is enabled or disabled.
Using the value 0, 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 blocked on the device.
Telegram value: 1 = ● button enabled
0 = ● button disabled</td></tr>
<tr><td>**3**</td><td>**Status Manual operation**</td><td>**General**</td><td>**1-bit**
DPT 1.003</td><td>**C, R, T**</td></tr>
<tr><td colspan="5">The communication object is enabled if the option *Yes* has been selected for the parameter *Enable communication object "Status Man. operation" (1-bit)* in the Parameter window Manual operation – Settings, page 74.
This communication object indicates whether manual operation is activated.
The Status Manual operation is sent *On change*, *After request* or *After a change and request* as programmed.
Telegram value: 0 = Manual operation not active
1 = Manual operation active</td></tr>
</table>

No.	Function	Communication object name	Data type	Flags
4	**Status byte**	**General**	**1-byte** **none DPT**	**C, R, T**

The status byte reflects the current state of the input.

Bit sequence 76543210

Bit 7: Heating or cooling mode (only in fan coil valves)
0: Cooling mode
1: Heating mode

Bit 6: Not assigned
Always 0

Bit 5: Not assigned
Always 0

Bit 4: Status of internal calibration
0: Calibration completed
1: Calibration running

Bit 3: Communication
0: Communication is OK
1: Communication is disrupted

Note

In the event of a fault "Internal communication fault", no values are sent if the option *After request* is selected

Bit 2: Status Input c Measured value out of range
0: In range
1: Out of range

Bit 1: Status Input b Measured value out of range
0: In range
1: Out of range

Bit 0: Status Input a Measured value out of range
0: In range
1: Out of range

If the option *Yes* has been selected for the parameter *Enable communication object "Request status values" 1-bit,* the communication objects no. 4, 18, 28, 38 and 48 are sent immediately. For all other status objects, e.g. for the fan, it is also possible to use parameters to set the time when each of them is to be sent to the bus.

For further information see: Status byte General, p. 256

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>5</td><td>Fault (overload/short-circuit)</td><td>Output A
Output A/B</td><td>1-bit
DPT 1.005</td><td>C, R, T</td></tr>
<tr><td colspan="5">If there is a fault on an output, e.g. due to a short-circuit or overload, the LED A and B will flash. The communication object <i>Fault (overload/short-circuit)</i> simultaneously sends a telegram with the value 1.
In the event of a fault on output A and/or B, these two outputs are switched off.
After the fault has been fixed, the fault is reset via the communication object <i>Reset malfunction</i> and the communication object hast the value 0.
If the fault still persists, the LED will flash again, and the communication object has the value 1.
Note
Signaling via LED occurs only for the devices FCA/S 1.1.2.2 and FCA/S 1.2.2.2.
The communication object is always visible.
Telegram value: 0 = No fault on the output.
1 = Fault on the output.</td></tr>
<tr><td>6</td><td>Reset malfunction</td><td>Output A
Output A/B</td><td>1-bit
DPT 1.015</td><td>C, W, T</td></tr>
<tr><td colspan="5">A fault is reset via this communication object, e.g. short-circuit/overload LED flashes on the device.
Note
Signaling via LED occurs only for the devices FCA/S 1.1.2.2 and FCA/S 1.2.2.2.
A reset is only successful if the fault has been repaired and is no longer present.
The LED turns off after it is successfully reset.
There is no reaction should the value 1 be received during correct operation.
If this communication object has not been assigned with a group address, the fault can only be reset when the device is restarted.
The communication object is always visible.
Telegram value: 0 = No function
1 = Reset malfunction</td></tr>
<tr><td>7</td><td>Fault (overload/short-circuit)</td><td>Output C
Output C/D</td><td>1-bit
DPT 1.005</td><td>C, R, T</td></tr>
<tr><td colspan="5">See communication object 5</td></tr>
<tr><td>8</td><td>Reset malfunction</td><td>Output C
Output C/D</td><td>1-bit
DPT 1.015</td><td>C, W, T</td></tr>
<tr><td colspan="5">See communication object 6</td></tr>
</table>

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>9</td><td>2nd control value, cooling, continuous (PWM)</td><td>Output A</td><td>1-byte
DPT 5.001</td><td>C, R</td></tr>
<tr><td colspan="5">This communication object is enabled if in the Parameter window Enable output A...D, page 78, a fan coil operation mode with 2 control values and 1 valve has been selected, along with the operating mode <i>Valve drive, thermoelectric (PWM).</i> In addition, the parameter <i>Control value is received as</i> in the Parameter window A: Output (Valve drive, thermoelectric (PWM)), page 99, must be parameterized with the option <i>Byte</i>.
The 2nd control value is set fixed to cooling.
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)</td></tr>
<tr><td>9</td><td>2nd control value, cooling, continuous (3-point)</td><td>Output A/B</td><td>1-byte
DPT 5.001</td><td>C, R</td></tr>
<tr><td colspan="5">This communication object is enabled if a fan coil operating mode with 2 control values and 1 valve, and the operating mode <i>Valve drive, motor-driven (3-point)</i> have been selected in the Parameter window Enable output A...D, page 78.
The 2nd control value is set fixed to cooling.
The communication object value [0…255] determines the control value of the valve drive.
If the communication object value is 0, the output switches OFF (voltage 0 V).
If the communication object value is 255, the output switches ON permanently (full voltage).
Telegram value: 0 = OFF (valve drive closed)
x = Intermediate values
255 = ON (valve drive opened)</td></tr>
<tr><td>9</td><td>2nd control value, cooling, analog (0...10 V)</td><td>Output A</td><td>1-byte
DPT 5.001</td><td>C, R</td></tr>
<tr><td colspan="5">See communication object 9 <i>2nd control value, cooling, continuous (3-point)</i></td></tr>
</table>

3.3.3 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 and A/B will be described.

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>10</td><td>Control value, heating, ON/OFF</td><td>Output A</td><td>1-bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the operating mode <i>Valve drive, thermoelectric (PWM)</i> is selected in the Parameter window Enable output A...D, page 78, and the parameter <i>Control value is received as</i> is parameterized with the option <i>Bit</i> in the Parameter window A: Output (Valve drive, thermoelectric (PWM)), page 99.
Telegram value: 0 = OFF
1 = ON</td></tr>
<tr><td>10</td><td>Control value, heating, continuous (PWM)</td><td>Output A</td><td>1-byte
DPT 5.001</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the operation mode <i>Valve drive, thermoelectric (PWM)</i> is selected in Parameter window Enable output A...D, page 78, and the parameter <i>Control value is received as</i> is selected with the option <i>Byte</i> in the Parameter window A: Output (Valve drive, thermoelectric (PWM)), page 99.
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)</td></tr>
<tr><td>10</td><td>Control value, heating, continuous (3-point)</td><td>Output A/B</td><td>1-byte
DPT 5.001</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the operating mode <i>Valve drive, motor-driven (3-point)</i> has been selected in Parameter window Enable output A...D, page 78.
The communication object value [0…255] determines the control value of the valve drive.
If the communication object value is 0, the output switches OFF (voltage 0 V).
If the communication object value is 255, the output switches ON permanently (full voltage).
Telegram value: 0 = OFF (valve drive closed)
x = Intermediate values
255 = ON (valve drive opened)</td></tr>
<tr><td>10</td><td>Control value, heating, analog (0...10 V)</td><td>Output A</td><td>1-byte
DPT 5.001</td><td>C, W</td></tr>
<tr><td colspan="5">See communication object 10 <i>Control value, heating, continuous (3-point)</i></td></tr>
</table>

No.	Function	Communication object name	Data type	Flags
11	**Status Control value**	**Output A** **Output A/B**	**1-byte** **DPT 5.001**	**C, R, T**

This communication object is enabled in the Parameter window Function on page 115, via the parameter *Enable communication object "Status Control value"* with the option *Yes* and has been selected in parameter *Data type* via the option *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 object is not sent in the event of 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.

Note

Signaling via LED occurs only for the devices FCA/S 1.1.2.2 and FCA/S 1.2.2.2.

The status is sent if:

- a request is received via the communication object *Request status values* and the parameter is set to *After request* or *After a change or request*.
- the value of the communication object has changed and the parameter is set to *After request* or *After a change or 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

No.	Function	Communication object name	Data type	Flags
11	**Status Control value**	**Output A** **Output A/B**	**1-bit** **DPT 1.011**	**C, R, T**

This communication object is enabled in Parameter window Function on page 115, via the parameter *Enable communication object "Status Control value"* with the option *Yes* and has been selected in parameter *Data type* via the option *Byte*.

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 values* and the parameter is set to *After request* or *After a change or request*.
- the value of the communication object has changed and the parameter is set to *After request* or *After a change or 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

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>12</td><td>Fault control value</td><td>Output A
Output A/B</td><td>1-bit
DPT 1.005</td><td>C, R, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Monitoring control values e.g. thermostat</i> with the option <i>Yes</i> is selected in Parameter window A: Output (Valve drive, thermoelectric (PWM)), page 99.
This communication object indicates a possible fault in conjunction with the room thermostat. The communication objects <i>Control value, heating, ON/OFF</i> or <i>Control value, heating, continuous (PWM)</i> can be cyclically monitored. Should the control value not be received by the transmitting room thermostat within a parameterizable time, a telegram with the value 1 is sent.
The communication object value is sent via the communication object <i>Request status values</i> depending on the parameterization, on a change and/or request.
Telegram value: 0 = No fault
1 = Fault</td></tr>
<tr><td>13</td><td>Activate purge</td><td>Output A
Output A/B</td><td>1-bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled in Parameter window Function, page 115, via the parameter <i>Enable valve purge</i> with the option <i>Yes</i>. This communication object triggers the valve purge.
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 undertaken due to a higher priority will no longer be undertaken.
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.</td></tr>
</table>

<table>
<tr><th>No.</th><th>Function</th><th>Communication object name</th><th>Data type</th><th>Flags</th></tr>
<tr><td>14</td><td>Status Valve purge</td><td>Output A
Output A/B</td><td>1-bit
DPT 1.003</td><td>C, R, T</td></tr>
<tr><td colspan="5">
<p>This communication object is enabled in Parameter window Function on page 115, via the parameter <i>Enable valve purge</i> and the communication object <i>Status valve purge 1-bit</i> with the option <i>Yes</i>. The status of the valve purge is displayed via this communication object.</p>
<p>The status is sent if:</p>

a request is received via the communication object <i>Request status values</i> and the parameter is set to <i>After request</i> or <i>After a change or request</i>.
the value of the communication object has changed and the parameter is set to <i>After request</i> or <i>After a change or request</i>.
a read request is carried out on this communication object.

<p>Telegram value: 0 = Valve purge inactive
1 = Valve purge active</p>
<p>Note</p>
<p>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.</p>
</td></tr>
<tr><td>15</td><td>Priority 1, Forced operation</td><td>Output A
Output A/B</td><td>1-bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">
<p>This communication object is enabled if the parameter <i>Safety priority 1</i> with the option <i>Forced operation</i> i(1-bit-object) is enabled in the Parameter window Security, page 119.</p>
<p>If a telegram with the value 1 or 0 is received (can be parameterized), the output is forcibly operated and the operation is blocked.</p>
<p>The reaction of the output with an active forced operation is set in parameter <i>Control value on forced operation in % [0…100]</i>.</p>
<p>Telegram value: 1/0 = Forced operation</p>
</td></tr>
<tr><td>15</td><td>Priority 1, Block</td><td>Output A
Output A/B</td><td>1-bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">
<p>This communication object is enabled if the parameter <i>Safety priority 1</i> with the option <i>Block</i> is enabled in the Parameter window Security, page 119.</p>
<p>If a telegram with the value 1 or 0 is received (can be parameterized), the output remains in its current position and the operation is blocked.</p>
<p>Telegram value: 1/0 = Block</p>
</td></tr>
<tr><td>16</td><td>Priority 2, Forced operation
Priority 2, Block</td><td>Output A
Output A/B
Output A
Output A/B</td><td>1 bit
DPT 1.001
1 bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">See communication object 15</td></tr>
<tr><td>17</td><td>Priority 3, Forced operation
Priority 3, Block</td><td>Output A
Output A/B
Output A
Output A/B</td><td>1 bit
DPT 1.001
1 bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">See communication object 15</td></tr>
</table>

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>18</td><td>Status byte</td><td>Output A
Output A/B</td><td>1-byte
non DPT</td><td>C, R, T</td></tr>
<tr><td colspan="5">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 <i>Request status values</i>. The communication object is always visible.
Telegram value:

Bit sequence 76543210
Bit 7: Not assigned
Always 0
Bit 6: Not assigned
Always 0
Bit 5: Not assigned
Always 0
Bit 4: Overload/short circuit current
0: No overload/short-circuit
1: Overload/short circuit current
Bit 3: Manual operation active
0: Manual operation inactive
1: Manual operation active
Bit 2: Safety priority 1, 2, 3 (forced operation or block)
0: None active
1: At least one active
Bit 1: Purging
0: No valve purge
1: Valve purge active
Bit 0: Status output/control value > 0
0: Control value = 0 / output = OFF
1: Control value = 0 / output = ON

For further information see: Status byte outputs A, B, C, D, p. 257</td></tr>
<tr><td>19</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
<tr><td>20…29</td><td></td><td>Output B</td><td></td><td></td></tr>
<tr><td colspan="5">Communication objects for output B
See communication objects 10...19, output A</td></tr>
<tr><td>30…39</td><td></td><td>Output C</td><td></td><td></td></tr>
<tr><td colspan="5">Communication objects for output C
See communication objects 10...19, output A</td></tr>
<tr><td>40…49</td><td></td><td>Output D</td><td></td><td></td></tr>
<tr><td colspan="5">Communication objects for output D
See communication objects 10...19, output A</td></tr>
</table>

3.3.4 Communication objects *Fan E, F, G*

Note
All three fan speeds can also be individually parameterized as outputs E, F and G. See Communication objects Switch actuators E, page 227, Communication objects Output F, page 227 and Communication objects Output G, and 227 for descriptions of the communication objects. The settings options are described in Parameter window Enable output E...H, page 125.

3.3.4.1 Communication objects *Fan Multi-level*

No.	Function	Communication object name	Data type	Flags
50				
not assigned				
51	**Switch speed 1**	**Fan E, F, G**	**1 bit** **DPT 1.001**	**C, W**
This communication object is enabled if the parameter *Enable direct operation* with the option *Yes* in the Parameter window E, F, G: Fan (Multi-level), page 126, and the parameter *Enable communication object "Status Fan speed x" 1-bit* with the option *Yes* is selected in Parameter window Direct operation (Multi-level), page 144. Via the 1-bit communication object the device can receive a control value for fan speed 1. Limitations through forced operation or one of the four limitations 1…4 are retained. Automatic operation is disabled. Communication object *Automatic ON/OFF* reactivates automatic operation. If several ON telegrams are received consecutively in a short period of time at various *Switch speed x* (x = 1...3) communication objects, the value last received is the one that will control the fan. An OFF telegram to one of the three communication objects *Switch speed x* (x = 1...3) switches the fan off. Telegram value: 0 = Fan OFF 1 = Fan ON in speed 1				
52	**Switch speed 2**			
See communication object 51				
53	**Switch speed 3**			
See communication object 51				

No.	Function	Communication object name	Data type	Flags
54	**Fan speed up/down**	**Fan E, F, G**	**1 bit** **DPT 1.007**	**C, W**

This communication object is enabled if the parameter *Enable direct operation* is selected with the option *Yes* in the Parameter window E, F, G: Fan (Multi-level), page 126, and the parameter *Enable communication object "Fan speed up/down" 1-bit* is selected with the option *Yes* in the Parameter window Direct operation (Multi-level), page 144.

With this communication object, the fan can be switched one fan speed further up or down via a 1 bit telegram. Switching (up/down) is determined by the telegram value.

With multiple manual up or down switching, the required speed will be increased or reduced by a speed step. This is feasible until the maximum or minimum possible speed is reached. The parameterized limitations are taken into account here. Further up or down telegrams are ignored and not executed. Each new switching telegram initiates a recalculation of the required speed.

Telegram value: 0 = Switch fan speed DOWN
1 = Switch fan speed up

No.	Function	Communication object name	Data type	Flags
55	**Status Fan ON/OFF**	**Fan E, F, G**	**1 bit** **DPT 1.001**	**C, T**

This communication object is enabled if the parameter *Enable communication object "Status fan ON/OFF" 1-bit* with the option *Yes* is selected in the Parameter window Status messages (Multi-level), page 131.

The communication object receives the communication object value 1 (ON), if at least one fan speed is not equal to zero (OFF). The value of the communication object is sent if not equal to zero. This communication object thus defines the status of the fan, whether it is switched on or off.

Telegram value: 0 = OFF
1 = ON

Note

Some fans require an ON telegram before you set a fan speed. Using the communication object *Status fan ON/OFF*, the fan can, for example, be switched on centrally with a switch actuator via the main switch.

No.	Function	Communication object name	Data type	Flags
56	**Status Fan speed**	**Fan E, F, G**	**1-byte** **DPT 5.010**	**C, R, T**

This communication object is enabled if the parameter *Enable communication object "Status Fan speed" 1-byte* with the option *Yes* is selected in the Parameter window Status messages (Multi-level), page 131.

You can parameterize whether the communication object value is updated only, or sent on the bus after a change or on request. It is possible to parameterize whether the actual or required speed is displayed with the status communication object.

This communication object allows you, for example, to display the fan speed as a figure value.

The following telegram values apply for the 1 byte communication object:

Figure value	**Hexadecimal**	**Binary value bit 76543210**	**Fan speed**
0	00	00000000	0 (OFF)
1	01	00000001	Fan speed 1
2	02	00000010	Fan speed 2
3	03	00000011	Fan speed 3

<table>
<tr><th>No.</th><th>Function</th><th>Communication object name</th><th>Data type</th><th>Flags</th></tr>
<tr><td>57</td><td>Status Fan speed 1</td><td>Fan E, F, G</td><td>1-bit
DPT 1.001</td><td>C, R, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable communication object "Status Fan speed x" 1-bit</i> with the option <i>Yes</i> is selected in the Parameter window Status messages (Multi-level), page 131.
You can parameterize whether the communication object value is updated but not sent, sent on request, or only sent when changed.
You can also parameterize whether the status should indicate a current fan speed or a required fan speed. This communication object allows you to display the fan speed in a visualization or to indicate it on a display.
Telegram value: 0 = Fan speed OFF
1 = Fan speed ON</td></tr>
<tr><td>58</td><td>Status Fan speed 2</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 57</td></tr>
<tr><td>59</td><td>Status Fan speed 3</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 57</td></tr>
<tr><td>60</td><td>Run-on</td><td>Fan E, F, G</td><td>1 bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if run-on behavior is enabled in the Parameter window Startup/Run-on, page 146.
If run-on behavior is enabled, it will be activated after an ETS reset or by an ON telegram on this communication object.
Telegram value: 0 = Run-on disabled
1 = Run-on enabled</td></tr>
<tr><td>61</td><td>Limitation 1</td><td>Fan E, F, G</td><td>1 bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable limitations</i> with the option <i>Yes</i> is enabled in the Parameter window Automatic control (Multi-level), page 136.
Note
Limitation 1 is only active in automatic operation.
The limitation 1 is active if a telegram with the value 1 is received on the communication object <i>Limitation 1</i>. The <i>Limitation 1</i> is deactivated if a telegram with the value 0 is received on the communication object <i>Limitation 1</i>.
When Limitation 1 is activated, the fan can only assume the fan speed or speed range as set in the parameter <i>Limitation 1</i>.
Telegram value: 0 = Limitation x inactive
1 = Limitation x active</td></tr>
<tr><td>62</td><td>Limitation 2</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 61</td></tr>
<tr><td>63</td><td>Limitation 3</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 61</td></tr>
<tr><td>64</td><td>Limitation 4</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 61</td></tr>
</table>

<table>
<tr><th>No.</th><th>Function</th><th>Communication object name</th><th>Data type</th><th>Flags</th></tr>
<tr><td>65</td><td>Forced operation</td><td>Fan E, F, G</td><td>1 bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable communication object "Forced operation" 1-bit</i> with the option <i>Yes</i> is selected in the Parameter window E, F, G: Fan (Multi-level), page 126.
If a forced operation is activated, the device switches to forced operation regardless of the control value and its parameterized Limitation 1...4.
Telegram value: 0 = No forced operation
1 = Forced operation</td></tr>
<tr><td>66</td><td>Automatic ON/OFF</td><td>Fan E, F, G</td><td>1 bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Automatic operation</i> is enabled in the Parameter window E, F, G: Fan (Multi-level), page 126.
If automatic operation is enabled, it will be activated after a download, an ETS reset or by an ON telegram on this communication object.
Automatic mode is switched off if a telegram is received on a "manual communication object".
Manual communication objects are:
• Fan: Fan speed switch
• Fan: Switch speed x (x = 1, 2 or 3)
• Fan: Fan speed up/down
• Fan: Limitation x (x = 1, 2, 3 or 4)
During forced operation, automatic mode remains active but operates only within the allowed limits.
If the value 1 is set in the parameter:
Telegram value: 0 = Automatic operation OFF
1 = Automatic operation ON
If the value 0 is set in the parameter:
Telegram value: 0 = Automatic operation ON
1 = Automatic operation OFF</td></tr>
<tr><td>67</td><td>Status Automatic</td><td>Fan E, F, G</td><td>1-bit
DPT 1.003</td><td>C, R, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable communication object "Status Automatic" 1-bit</i> with the option <i>Yes</i> is selected in the Parameter window Status messages (Multi-level), page 131.
You can parameterize whether the communication object value is updated but not sent, sent on request, or only sent when changed.
The communication object indicates the status of automatic operation.
Telegram value: 0 = Inactive
1 = Activated</td></tr>
</table>

No.	Function	Communication object name	Data type	Flags
68	**Status byte fan**	**Fan E, F, G**	**1-byte** **Non DPT**	**C, R, T**

This communication object is enabled if the parameter *Enable communication object "Status byte fan" 1-byte* with the option *Yes* is selected in the Parameter window Status messages (Multi-level), page 131.

The operating state of the fan can be displayed or sent on the bus via this communication object. You can parameterize whether the communication object value is updated but not sent, sent on request, or only sent when changed.

Telegram values:

Bit sequence 76543210

Bit 7: Forced operation
- 0: Inactive
- 1: Active

Bit 6: Limitation 1
- 0: Inactive
- 1: Active

Bit 5: Limitation 2
- 0: Inactive
- 1: Active

Bit 4: Limitation 3
- 0: Inactive
- 1: Active

Bit 3: Limitation 4
- 0: Inactive
- 1: Active

Bit 2: Thermostat fault
- 0: Inactive
- 1: Active

Bit 1: Automatic
- 0: Inactive
- 1: Active

Bit 0: Control value
- 0: Control value A
- 1: Control value C

For further information see: Status byte fan, p. 258

<table>
<tr><th>No.</th><th>Function</th><th>Communication object name</th><th>Data type</th><th>Flags</th></tr>
<tr><td>69</td><td>Control value A
(if 2 control values) or
Control value
(if only 1 control value)</td><td>Fan E, F, G</td><td>1-byte
DPT 5.010</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Automatic operation</i> is enabled in the Parameter window E, F, G: Fan (Multi-level), page 126.
Using this communication object, the control value for automatic operation is predefined as a 1-byte value [0...255].</td></tr>
<tr><td>70</td><td>Control value B
(if 2 control values)</td><td>Fan E, F, G</td><td>1-byte
DPT 5.010</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if automatic operation is enabled in the Parameter window E, F, G: Fan (Multi-level), page 126 and two inputs have been activated by the parameter <i>Number of control value inputs</i> in the Parameter window Automatic control (Multi-level), page 136.
Using this communication object the second control value for automatic operation is predefined as a 1 byte value [0...255].</td></tr>
<tr><td>71</td><td>Toggle control value A/B
(if 2 control values)</td><td>Fan E, F, G</td><td>1-bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if two communication objects have been activated for the control values (control value A and control value B) in the Parameter window Automatic control (Multi-level), page 136, and they should be selected via a communication object.</td></tr>
<tr><td>72</td><td>Fault control value</td><td>Fan E, F, G</td><td>1-bit
DPT 1.005</td><td>C, R, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Activate monitoring control values</i> with the option <i>Yes</i> is selected in the Parameter window Automatic control (Multi-level), page 136.
This communication object displays control value faults.
The blower actuator uses the <i>Fault control value</i> communication object to report a fault and then reacts according to the parameterization for faults.
Telegram value: 0 = No fault
1 = Fault
Note
If no value is sent to the communication object <i>Control value A, Control value B</i> or <i>Control Value</i> for a set time, a sender fault is assumed. If the communication object <i>Toggle control value A/B</i> receives a value, the monitoring time is started.</td></tr>
<tr><td>73…79</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
</table>

3.3.4.2 Communication objects *Fan One-level*

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>50</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
<tr><td>51</td><td>Switch</td><td>Fan E, F, G</td><td>1 bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Fan type</i> with the option <i>One-level</i> is selected in the Parameter window E, F, G: Fan (One-level), page 150.
The fan can be switched on or off with this 1 bit communication object.
Limitations through forced operation or one of the four limitations 1…4 are retained. Automatic operation is disabled. Communication object <i>Automatic ON/OFF</i> reactivates automatic operation.
If several ON telegrams with the value 1 are received, the last value received will be the one used to control the fan. An OFF command switches the fan off.
Telegram value: 0 = Fan OFF
1 = Fan ON</td></tr>
<tr><td>52…54</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
<tr><td>55</td><td>Status Fan ON/OFF</td><td>Fan E, F, G</td><td>1 bit
DPT 1.001</td><td>C, R, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable communication object "Status fan ON/OFF" 1-bit</i> with the option <i>Yes</i> is selected in the Parameter window Status messages (single speed), page 153.
The communication object receives the communication object value 1 (ON), if the fan speed is not equal to zero (OFF). The value of the communication object is updated and sent when the fan speed is changed.
This communication object thus defines the status of the fan, whether it is switched on or off. It can also be used for control of a main switch for the fan.
Telegram value: 0 = OFF
1 = ON
Note
Some fans require an ON telegram before you set a fan speed. Using the communication object <i>Status fan ON/OFF</i>, the fan can, for example, be switched on centrally with a switch actuator via the main switch.</td></tr>
<tr><td>56…60</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
</table>

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>**61**</td><td>**Limitation 1**</td><td>**Fan E, F, G**</td><td>**1 bit**
DPT 1.003</td><td>**C, W**</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter *Enable limitations* is selected with the option *Yes* in the Parameter window Automatic control (One-level), page 155.
Note
Limitation 1 is only active in automatic operation.
The limitation 1 is active if a telegram with the value 1 is received on the communication object *Limitation 1*. The *Limitation 1* is deactivated if a telegram with the value 0 is received on the communication object *Limitation 1*.
When *Limitation 1* is activated, the fan can only assume the fan speed or speed range which has been set in the parameter window *Limitation 1*.
Telegram value: 0 = Limitation x inactive
1 = Limitation x active</td></tr>
<tr><td>**62**</td><td>**Limitation 2**</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 61</td></tr>
<tr><td>**63**</td><td>**Limitation 3**</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 61</td></tr>
<tr><td>**64**</td><td>**Limitation 4**</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 61</td></tr>
<tr><td>**65**</td><td>**Forced operation**</td><td>**Fan E, F, G**</td><td>**1 bit**
DPT 1.003</td><td>**C, W**</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter *Enable communication object "Forced operation" 1-bit* with the option *Yes* is selected in the Parameter window E, F, G: Fan (One-level), page 150.
If a forced operation is activated, the device switches to forced operation regardless of the control value and its parameterized Limitation 1...4.
Telegram value: 0 = No forced operation
1 = Forced operation</td></tr>
</table>

<table>
<tr><th>No.</th><th>Function</th><th>Communication object name</th><th>Data type</th><th>Flags</th></tr>
<tr><td>**66**</td><td>**Automatic ON/OFF**</td><td>**Fan E, F, G**</td><td>**1 bit**
DPT 1.003</td><td>**C, W**</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter *Enable automatic operation* with the option *Yes* is selected in the Parameter window E, F, G: Fan (One-level), page 150.
If automatic mode is enabled, it will be activated on this communication object with the value 1 after a download, ETS reset or via a telegram. Automatic mode is switched off if a signal is received on a “manual communication object”.
Manual communication objects are:
• *Fan: Fan speed switch*
• *Fan: Switch speed x (x = 1, 2 or 3)*
• *Fan: Fan speed up/down*
• *Fan: Limitation x (x = 1, 2, 3 or 4)*
During one of the four limitations or forced operation, automatic mode remains active but operates only within the allowed limits.
If the value 1 is set in the parameter:
Telegram value: 0 = Automatic operation OFF
1 = Automatic operation ON
If the value 0 is set in the parameter:
Telegram value: 0 = Automatic operation ON
1 = Automatic operation OFF</td></tr>
<tr><td>**67**</td><td>**Status Automatic**</td><td>**Fan E, F, G**</td><td>**1 bit**
DPT 1.003</td><td>**C, R, W**</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter *Enable communication object "Status Automatic" 1-bit* with the option *Yes* is selected in the Parameter window Status messages (single speed), page 153.
You can parameterize whether the communication object value is updated but not sent, sent on request, or only sent when changed.
The communication object indicates the status of automatic operation.
Telegram value: 0 = Inactive
1 = Activated</td></tr>
</table>

No.	Function	Communication object name	Data type	Flags
68	**Status byte fan**	**Fan E, F, G**	**1-byte** **Non DPT**	**C, R, T**

This communication object is enabled if the parameter *Enable communication object "Status byte fan" 1-byte* with the option *Yes* is selected in the Parameter window Status messages (single speed), page 153.

The operating state of the fan can be displayed or sent on the bus via this communication object. You can parameterize whether the communication object value is updated but not sent, sent on request, or only sent when changed.

Telegram values:

Bit sequence 76543210

- Bit 7: Forced operation
  - 0: Inactive
  - 1: Active
- Bit 6: Limitation 1
  - 0: Inactive
  - 1: Active
- Bit 5: Limitation 2
  - 0: Inactive
  - 1: Active
- Bit 4: Limitation 3
  - 0: Inactive
  - 1: Active
- Bit 3: Limitation 4
  - 0: Inactive
  - 1: Active
- Bit 2: Thermostat fault
  - 0: Inactive
  - 1: Active
- Bit 1: Automatic
  - 0: Inactive
  - 1: Active
- Bit 0: Control value
  - 0: Control value A
  - 1: Control value C

For further information see: Status byte fan, p. 258

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>69</td><td>Control value A
(if 2 control values) or
Control value
(if only 1 control value)</td><td>Fan E, F, G</td><td>1-byte
DPT 5.010</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the automatic operation is enabled in the Parameter window E, F, G: Fan (One-level), page 150.
Using this communication object the control value for automatic operation is predefined as a 1 byte value [0...255].</td></tr>
<tr><td>70</td><td>Control value B
(if 2 control values)</td><td>Fan E, F, G</td><td>1-byte
DPT 5.010</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if automatic operation is enabled in the Parameter window E, F, G: Fan (One-level), page 150 and two inputs have been activated by the parameter <i>Number of control value inputs</i> in the Parameter window Automatic control (One-level), page 155.
Using this communication object the second control value for automatic operation is predefined as a 1 byte value [0...255].</td></tr>
<tr><td>71</td><td>Toggle control value A/B
(if 2 control values)</td><td>Fan E, F, G</td><td>1-bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if two communication objects have been activated for the control values (control value A and control value B) in the Parameter window Automatic control (One-level), page 155, and they should be selected via a communication object.</td></tr>
<tr><td>72</td><td>Fault control value</td><td>Fan E, F, G</td><td>1-bit
DPT 1.005</td><td>C, R, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Activate monitoring control values</i> with the option <i>Yes</i> is selected in the Parameter window Automatic control (One-level), page 155.
This communication object displays control value faults.
The blower actuator uses the <i>Fault control value</i> communication object to report a fault and then reacts according to the parameterization for faults.
Telegram value: 0 = No fault
1 = Fault
Note
If no value is sent to the communication object <i>Control value A, Control value B</i> or <i>Control Value</i> for a set time, a sender fault is assumed. If the communication object <i>Toggle control value A/B</i> receives a value, the monitoring time is started.</td></tr>
<tr><td>73…79</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
</table>

3.3.4.3 Communication objects *Switch actuators* E, F, G

Note
If the outputs E, F and G are enabled as switch actuators, the parameters and options correspond to those of output H, see Communication objects Output H, page 228.

Communication objects *Output E*

No.	Function	Communication object name	Data type	Flags
50…53		**Output E**		
Communication objects for output E See communication objects 80...83, output H				

Communication objects *Output F*

No.	Function	Communication object name	Data type	Flags
60…63		**Output F**		
Communication objects for output F See communication objects 80...83, output H				

Communication objects *Output G*

No.	Function	Communication object name	Data type	Flags
70…73		**Output G**		
Communication objects for output G See communication objects 80...83, output H				

3.3.4.4 Communication objects *Output H*

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>80</td><td>Switch</td><td>Output H</td><td>1 bit
DPT 1.001</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Output H</i> is enabled in the Parameter window Enable output E...H, page 125.
This communication object is used for switching the output ON/OFF. The device receives a switch telegram via the communication object <i>Switch</i>.
N/O:
Telegram value: 1 = Switch ON
0 = Switch OFF
N/C:
Telegram value: 1 = Switch OFF
0 = Switch ON</td></tr>
<tr><td>81</td><td>Permanent on</td><td>Output H</td><td>1-bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable function Time</i> is selected with the option <i>Yes</i> in the Parameter window H: Output, page 163.
The output can be forcibly switched on with this communication object.
If the communication object receives a telegram with the value 1, the output is switched on regardless of the value of the communication object <i>Switch</i> and remains switched on until the communication object <i>Permanent ON</i> has the value 0. When the permanent ON state ends, the state of the communication object <i>Switch</i> 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. When permanent ON ends, the contact position which would result without the permanent ON function becomes active. For the <i>Staircase lighting</i> function the reaction after permanent ON is parameterized in Parameter window Time, page 166.
This communication object can be used, for example, to allow service or maintenance and cleaning personnel to initiate a permanent ON. The device receives a switch telegram via the switch object.
Permanent ON becomes inactive after a download or bus voltage recovery.
Telegram value: 1 = Activates permanent ON mode
0 = Deactivates permanent ON mode</td></tr>
<tr><td>82</td><td>Disable function Time</td><td>Output H</td><td>1 bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable function Time</i> is selected with the option <i>Yes</i> in the Parameter window H: Output, page 163.
The communication object value can be determined after a bus voltage recovery in the Parameter window Time, page 166, using the parameter <i>Object value "Disable function Time" after a download</i>.
With the Time function disabled, the output can only be switched on or off; the <i>Staircase lighting</i> function is not triggered.
Telegram value: 0 = Staircase light disabled
1 = Staircase lighting enabled

The contact position at the time of disabling and enabling is retained and will only be changed with the next switch telegram to communication object <i>Switch</i>.</td></tr>
<tr><td>83</td><td>Status Switch</td><td>Output H</td><td>1 bit
DPT 1.001</td><td>C, R, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable communication object "Status Switch" 1-bit</i> with the option <i>Yes</i> is selected in the Parameter window H: Output, page 163.
You can parameterize whether the communication object value <i>No, update only</i>, <i>On change, On request</i> or <i>After a change or request</i> is sent on the bus. The communication object value directly indicates the current contact position of the switching relay.
The status value can be inverted.
Telegram value: 1 = Relay ON or OFF depending on the parameterization
0 = Relay OFF or ON depending on the parameterization</td></tr>
</table>

3.3.5 Communication objects *Inputs a…c*

The communication objects of all Inputs do not differentiate from one another and are explained using *Input a*.

The descriptions of the parameter setting options of *Inputs a…c* are described in Parameter window Enable inputs a…c, page 170.

The communication objects *Input a* have the nos. 90…99.

The communication objects *Input b* have the nos. 100…109.

The communication objects *Input c* have the nos. 110…119.

3.3.5.1 Communication objects *Switch sensor*

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>90</td><td>Block</td><td>Input a: Switch sensor</td><td>1 bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Enable communication object "Block" 1-bit</i> with the option <i>Yes</i> is selected in the Parameter window a: Switch sensor, page 171.
Using the communication object <i>Block</i>, the input can be blocked or enabled. With activated communication object <i>Block</i> the inputs are blocked.
Note
When the input is blocked there is fundamentally no reaction to a signal change on the input, but:
• Waiting for a long button operation or a minimum signal duration is suspended.
• Parameterized <i>Send cyclically</i> is not interrupted.
• The description of the communication object <i>Switch x</i> is still possible.
If the input state changed during the blocked phase, this leads to immediate sending of the new communication object value after enabling. If the input state remains the same during the blocking phase, the communication object value is not sent.
Telegram value: 0 = Enable input a
1 = Block input a</td></tr>
<tr><td>91</td><td>Switch 1</td><td>Input a: Switch sensor</td><td>1 bit
DPT 1.001</td><td>C, W, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Input a</i> is selected with the option <i>Switch sensor</i> in the Parameter window Enable inputs a…c, page 170.
In accordance with the parameter setting, this communication object can be set to <i>ON</i>, <i>OFF</i>, <i>Toggle</i>, <i>Terminate cyclic transmission</i> or <i>No edge evaluation</i> via actuation of the input. With toggle, the previous value, e.g. 1, is toggled directly to the value 0. The communication object can be sent cyclically, e.g. for lifesign monitoring of the sensor.
Note
The communication object can be written to externally. Thus cyclic sending is interrupted or may not be possible depending on the parameter setting.
No further communication objects are visible with the setting.
Telegram value: 0 = OFF
1 = ON</td></tr>
<tr><td>92</td><td>Switch 2</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 91</td></tr>
<tr><td>93</td><td>Switch 3</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 91</td></tr>
</table>

94	**Start event 0/1**	**Input a: Switch sensor**	**1-bit** **DPT 1.001**	**C, W**
This communication object is enabled if the parameter *Enable communication object "Start event 0/1" 1-bit* with the option *Yes* is selected in the Parameter window a: Switch sensor, page 171. The 1-bit communication object *Start event 0/1* is enabled. As a result, the same events, except those of the push button/switch connected to the binary input, can also be triggered by the receipt of a telegram on the communication object *Start event 0/1*. Telegram value: 0 = Start event 0 1 = Start event 1				
95…99				
Not assigned				
100…119				
Input b, c				

3.3.5.2 Communication objects *Value/forced operation*

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>90</td><td>Block</td><td>Input a:
Value / forced operation</td><td>1 bit
DPT 1.003</td><td>C, W</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Input a</i> is selected with the option <i>Value/forced operation</i> in the Parameter window Enable inputs a…c, page 170 and the parameter <i>Enable communication object "Block" 1-bit</i> is then selected with the option <i>Yes</i> in the Parameter window a: Value/forced operation, page 181.
Using the communication object <i>Block</i>, the input can be blocked or enabled. With activated communication object <i>Block</i> the inputs are blocked.

Note
When the input is blocked there is fundamentally no reaction to a signal change, but:
• Waiting for a long button operation or a minimum signal duration is suspended.
• The parameter setting <i>8-bit scene</i> ends saving.
• Communication objects continue to be updated and sent if necessary.
When enabling an input, a change of the signal states (as opposed to before the block) leads to immediate processing, e.g.:
• The minimum actuation or detection of a long/short button push starts.
• Communication objects send their current value if necessary.

Telegram value: 0 = Enable input a
1 = Block input a</td></tr>
<tr><td>91</td><td>Value 1</td><td>Input a:
Value / forced operation</td><td>DPT variable</td><td>C, T</td></tr>
<tr><td colspan="5">This communication object is enabled if the parameter <i>Input a</i> with the option <i>Value/forced operation</i> is enabled in the Parameter window Enable inputs a…c, page 170.
This communication object sends a value on the bus with short operation when opening or closing the contact. The value and data type can be freely set in the parameters.

<table>
<tr><td>1 bit value [0/1]</td><td>EIS 1</td><td>DPT 1.001 switch telegram</td></tr>
<tr><td>2 bit value [0…3]</td><td>EIS 8</td><td>DPT 2.001 forced operation</td></tr>
<tr><td>1-byte value [-128...127]</td><td>EIS 14</td><td>DPT 6.010 value</td></tr>
<tr><td>1-byte value [0...255]</td><td>EIS 6</td><td>DPT 5.010 value</td></tr>
<tr><td>1-byte value (8-bit scene)</td><td>EIS 6</td><td>DPT 18.001 control scene</td></tr>
<tr><td>2-byte value [-32,768...32,767]</td><td>EIS 10</td><td>DPT 8.001 value</td></tr>
<tr><td>2-byte value [0...65,535]</td><td>EIS 10</td><td>DPT 7.001 value</td></tr>
<tr><td>2 byte value [EIB floating point]</td><td>EIS 5</td><td>DPT 9.001 temperature</td></tr>
<tr><td>3 byte value [time of day, weekday]</td><td>EIS 3</td><td>DPT 10.001 time of day, weekday</td></tr>
<tr><td>4-byte value [0...4294967295]</td><td>EIS 11</td><td>DPT 12.001 value</td></tr>
<tr><td>4-byte value [-2147483648...2147483647]</td><td>EIS 11</td><td>DPT 13.001 value</td></tr>
</table></td></tr>
<tr><td>92</td><td>Value 2</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 91</td></tr>
<tr><td>93…99</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
<tr><td>100…119</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Input b, c</td></tr>
</table>

3.3.5.3 Communication objects *Temperature sensor*

No.	Function	Communication object name	Data type	Flags
90	**Output value**	**Input a: Temperature sensor**	**2-byte** **DPT 9.001**	**C, R, T**

This communication object is used to send the output value to the bus.

The output value can be
sent as a 2-byte value [EIB floating point] EIS 5 DPT 9.001.

What is sent at an undershoot or overshoot of 10 %?

Up to an overshoot of 10 % the measured value is shown and sent. Applies for both the upper and lower limits. Furthermore, the measured value continues to be sent as a *Measured value +10 %*.

The following must be observed, particularly with the lower limit:

This only applies if the lower limit of 0 is different. If the lower limit is 0, it is not possible to determine an undershoot.

91	**Request output value**	**Input a: Temperature sensor**	**2-bit** **DPT 1.009**	**C, W**

This communication object appears if the output value *On request* is to be sent.

If a 1 is received at this communication object, the current output value is sent once from the communication object *Output value – Input a*.

92	**Measured value out of range**	**Input a: Temperature sensor**	**1-bit** **DPT 1.001**	**C, W**

Telegram value: 1 = Measured value out of range
0 = Measured value in range

The communication object can be used to check the short-circuit detection of the sensor. The check is repeated with every measurement.

When is the value of the communication object sent?

Measured value out of range is sent if the measured value exceeds the lower or upper limit by more than 5 %.

The following must be observed, particularly with the lower limit:

This only applies if the lower limit of 0 is different. If the lower limit is 0, it is not possible to determine an undershoot.

Behavior with PT100 or PT1000?

The following applies with the calculation of the maximum and minimum output values with the PT100/1000:

The lowest measurable resistance with the PT100 is about 80 ohms (with the PT1000 800 ohms) and corresponds to about -50 °C.

The highest measurable resistance with the PT100 is about 157 ohms (with the PT1000 1,570 ohms) and corresponds to about +150 °C.

> **Important**
>
> The programmable feeder line resistance is subtracted from the measured resistance. Thereafter, a programmable temperature offset is added.
>
> Depending on the programming of the feeder line resistances and the temperature offset, different minimum and maximum values result.
>
> If the sensor goes open circuit, the highest possible positive temperature value in °C is sent. If the sensor goes short circuit, the lowest possible negative temperature value in °C is sent. The sent temperature values are dependent, for example, on the temperature sensor used, on the line error, ambient temperatures, etc.

Behavior with a floating contact?

The communication object has no function with the selection.

<table>
<tr><td>No.</td><td>Function</td><td>Communication object name</td><td>Data type</td><td>Flags</td></tr>
<tr><td>93</td><td>Threshold 1</td><td>Input a: Temperature sensor</td><td>Variable
DPT variable</td><td>C, R, T</td></tr>
<tr><td colspan="5">As soon as the set threshold value is exceeded or below the limit, it is possible to send a
1-bit value [0/1] EIS 1 DPT 1.001
1-byte value [0...+255] EIS 6 DPT 5.001

The object value depends on the data type of the threshold object (1-bit, 1-byte). The parameter can be found in the Parameter window a: Threshold 1, page 199.</td></tr>
<tr><td>94</td><td>Change Threshold 1 lower limit</td><td>Input a: Temperature sensor</td><td>Variable
DPT variable</td><td>C, R, T</td></tr>
<tr><td>95</td><td>Change Threshold 1 upper limit</td><td>Input a: Temperature sensor</td><td>Variable
DPT variable</td><td>C, R, T</td></tr>
<tr><td colspan="5">The upper and lower limits of threshold 1 can be changed via the bus.
The data type of these communication objects depends on the set data type of the communication object <i>Output value – Input a</i>.

Important
The lower limit should be selected to be lower than the upper limit.</td></tr>
<tr><td>96</td><td>Threshold 2</td><td>Input a: Temperature sensor</td><td></td><td></td></tr>
<tr><td colspan="5">See communication object 93</td></tr>
<tr><td>97</td><td>Change Threshold 2 lower limit</td><td>Input a: Temperature sensor</td><td>Variable
DPT variable</td><td>C, R, T</td></tr>
<tr><td colspan="5">See communication object 94</td></tr>
<tr><td>98</td><td>Change Threshold 2 upper limit</td><td>Input a: Temperature sensor</td><td>Variable
DPT variable</td><td>C, R, T</td></tr>
<tr><td colspan="5">See communication object 95</td></tr>
<tr><td>99</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Not assigned</td></tr>
<tr><td>100…119</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Input b, c</td></tr>
</table>

3.3.5.4 Communication objects Heating/Cooling

120	**Toggle heating**	**General**	**1-bit** **DPT 1.100**	**C, W**
If a fan coil operating mode with switching object is selected in the Parameter window Enable output A...D, page 78, the parameter *Toggle to heating* with will appear. Depending on the selection, the communication object *Toggle heating* decides whether to use heating or cooling mode. Telegram value: 0 = Heating 1 = Cooling				
121	**Valve control values parallel mode**	**General**	**1-bit** **DPT 1.100**	**C, W**
If a fan coil operating mode with 2 control values and 2 valves is selected in the Parameter window Enable output A...D, page 78, the parameter *Enable communication object "Valve control values parallel mode" 1-bit* will appear. If the option *Yes* is selected here, both valves can move evenly, e.g. both to 50%. If the communication object is switched off again, the previous state will be restored. Telegram value: 0 = No function 1 = Parallel mode				

4 Planning and application

In this chapter you will find some tips and application examples for practical use of the device.

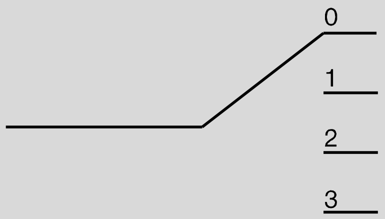
Application examples and practical tips on the topic of temperature control, valve drives, characteristic curve correction etc., can be found in the Application manual *Heating/Ventilation/Air-Conditioning* at www.abb.com/knx.

4.1 Fan output

In this section, the function charts and application explanations for the fan outputs are explained.

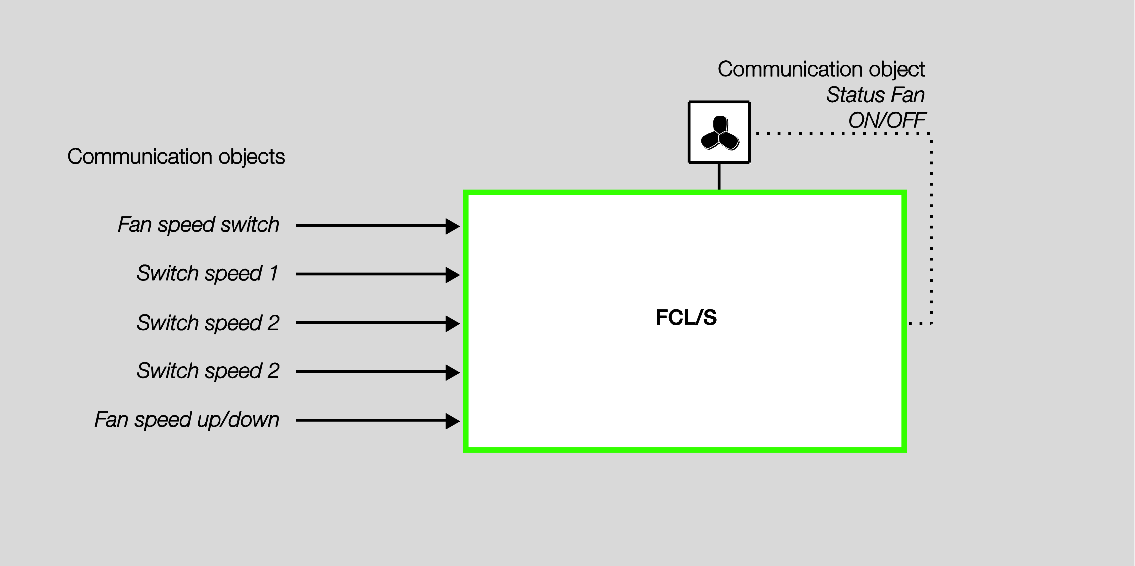
4.1.1 Fan operation

In fan operation a single phase fan, blower or convector can be controlled. In combination with a valve control 2, 3 or 4 pipe system can be implemented. Fans are controlled via a three-stage speed controller. For this purpose, three windings are tapped off the fan motor. The resulting fan speed is dependent on the tapping selected. It must be ensured that two contacts are not switched on simultaneously. For control purposes, at least one three-stage changeover switch with zero position is usually used. This switch is mapped with a group of outputs in the device.



Three-speed changeover switch

The device is controlled in accordance with the following schematic principle:



With three *Fan stage x switch* (x = 1, 2, or 3) communication objects that are independent of each other, the fan stages are controlled via the outputs of the Fan Coil Actuator.

Alternatively, the fan control can be implemented via a 1-byte communication object *Switch speed* or via the communication object *Fan speed up/down*.

Some ventilation controls require an additional central switch on mechanism (main switch) in addition to the speed switch. Another output of the device may be used for this. The output must be linked to the communication object *Status Fan ON/OFF*. This will switch on the main switch if at least one fan speed is set. If the fan is OFF (*Status Fan ON/OFF* = *0*), the main switch is also switched off.

4.1.1.1 Fan with changeover switch

Fans are usually controlled with a changeover switch.

The following control table results for a three-stage fan, which simulates the device with a group of switch outputs:

	Terminal 8	Terminal 9	Terminal 10
OFF	0	0	0
Fan speed 1	1	0	0
Fan speed 2	0	1	0
Fan speed 3	0	0	1

4.1.1.2 Fan with step switch

In some cases, the fan is controlled via a step switch. The following control table results for a three-stage fan, which simulates the device with its outputs:

	Terminal 8	Terminal 9	Terminal 10
OFF	0	0	0
Fan speed 1	1	0	0
Fan speed 2	1	1	0
Fan speed 3	1	1	1

The step switch cannot be switched on rapidly. If, for example, fan speed 3 is to be switched on from the OFF state, fan speeds 1 and 2 must be controlled with the associated dwell times first.

4.1.2 Automatic control

With automatic fan control a fan drive is connected directly to the device and switched via three floating contacts. A single-speed, two-speed or three-speed fan can be connected.

The fan speed is set automatically depending on the control value. For example, the following control value ranges can be programmed for the corresponding fan speeds:

Control value	Fan speed
0…9%	0 (fan off)
10…39%	1
40…69%	2
70…100%	3

Important
The device is purely an actuator, which does not have a controller for a room thermostat (thermostat).

Control of the room temperature is implemented using a room thermostat which generally detects the room temperature. The device primarily controls a fan and valves. In addition to manual control via the communication objects *Fan speed x*, *Fan speed switch* or *Fan speed UP/DOWN*, the device can also operate in automatic mode together with a room thermostat. Communication objects *Control value Heating*, *Control value Cooling* or when operating with just a single input variable, the communication object *Control value Heating/Cooling*, are available.

The automatic mode is enabled in the parameter window *Fan* with the parameter *Enable automatic operation*. Depending on the HVAC system, this is set in the parameter window *Control input* and the control value communication objects are enabled.

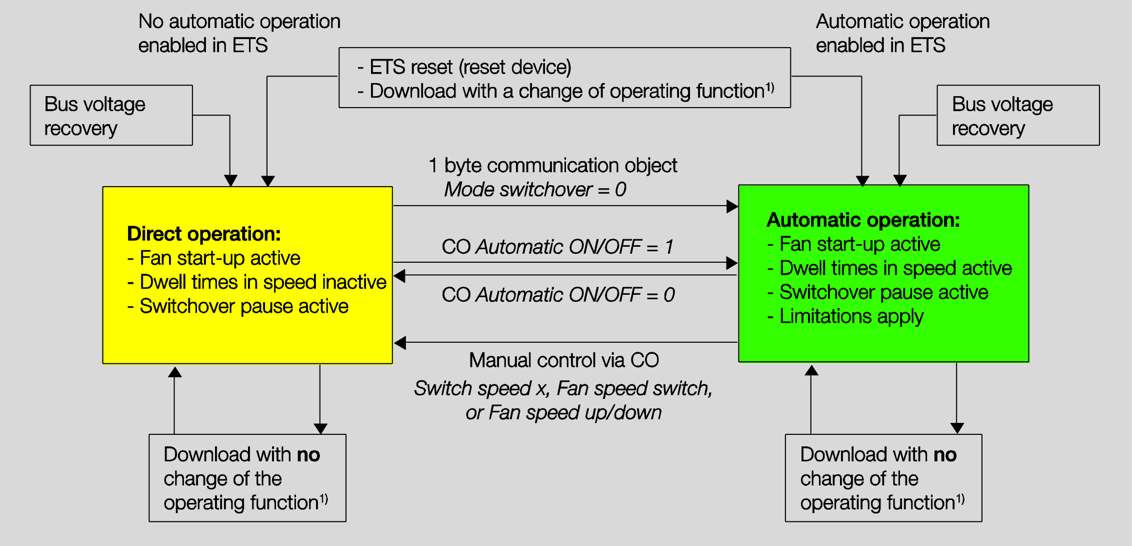
An automatic operation parameterized in the ETS only becomes active after the first download.

Automatic mode is switched off either by a manual setting command via the communication objects *Speed x*, *Fan speed switch* or *Fan speed up/down*, or if a telegram with the value 0 is received via the communication object *Automatic ON/OFF*.

The automatic operation can be reactivated by the communication object *Automatic ON/OFF* or activated with the 1-byte communication object *Toggle limitation*.

Activating one of the four limitations or forced operation does not end automatic operation. By using a range limit (several fan stages are permissible), a limited automatic control with several fan stages (speeds) is possible.

The following functional diagram shows the relationship between automatic and manual operation of the device.



[1] An operating function be applied by changing the control value inputs A/B, switching the number of fan speeds, or speed switchover (by changeover switch or by changing the parameters of the control values).

4.1.3 Direct operation

With direct fan control via the ABB i-bus® KNX, a fan drive is connected directly to the device and switched via three floating contacts. A single-speed, two-speed or three-speed fan can be connected.

The device sets the fan speed in accordance with a value received via the ABB i-bus®. The value is received as a 1 byte value.

1 byte value	Hexadecimal	Binary value bit 76543210	Fan speed
0	00	00000000	0 (OFF)
1	01	00000001	Fan speed 1
2	02	00000010	Fan speed 2
3	03	00000011	Fan speed 3
>3	>03	>00000011	Values greater than 3 are ignored

4.1.4 Switchover between automatic and direct operation

The device can be switched between automatic operation and direct operation. The changeover to manual fan control is implemented via a 1 bit value. The fan speed is switched in accordance with the 1 byte value received.

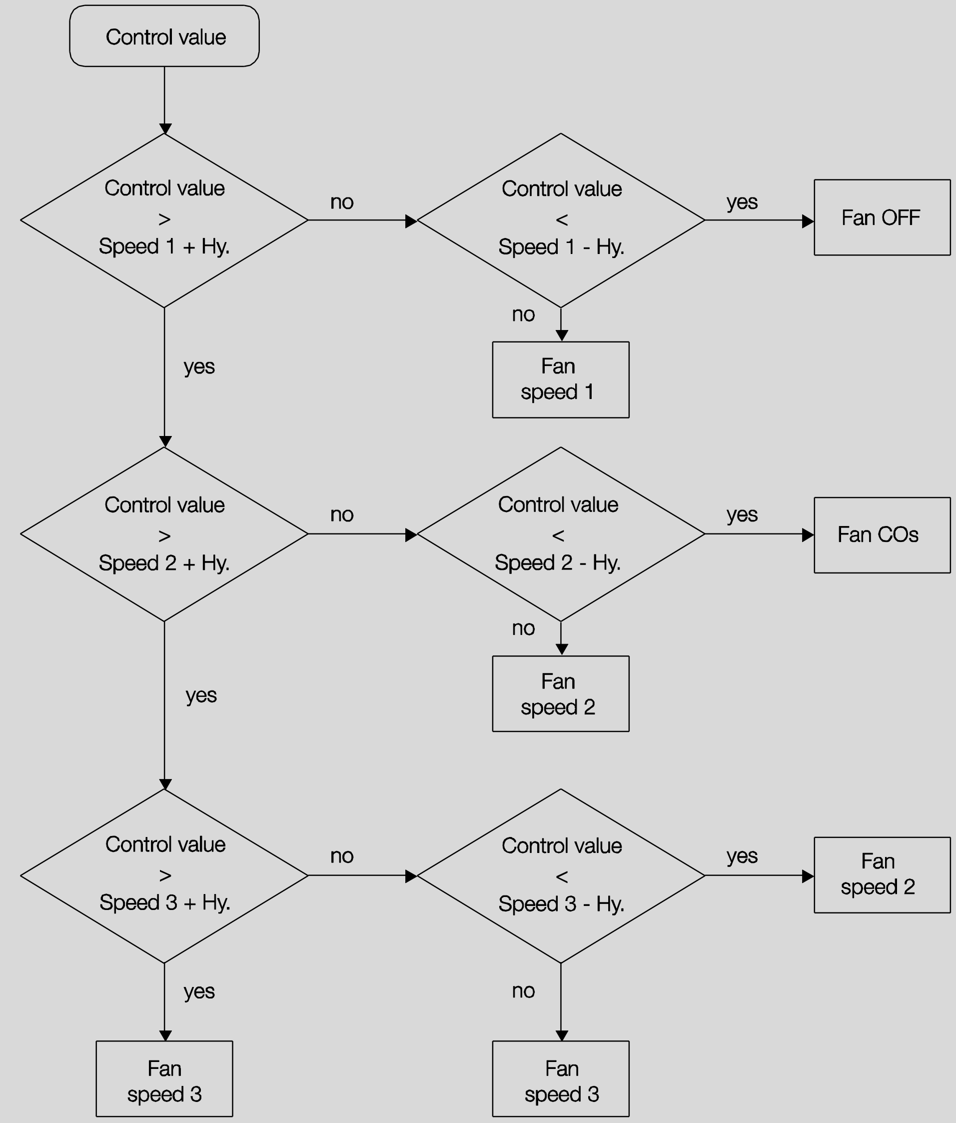
Fan control is changed back to automatic operation if a 1 is received on the respective communication object.

The current status of automatic operation is fed-back via a 1 bit value.

4.1.5 Speed switching logic

The following illustration shows the speed changeover logic for the device depending on the control values and the parameterized threshold values and hysteresis values.

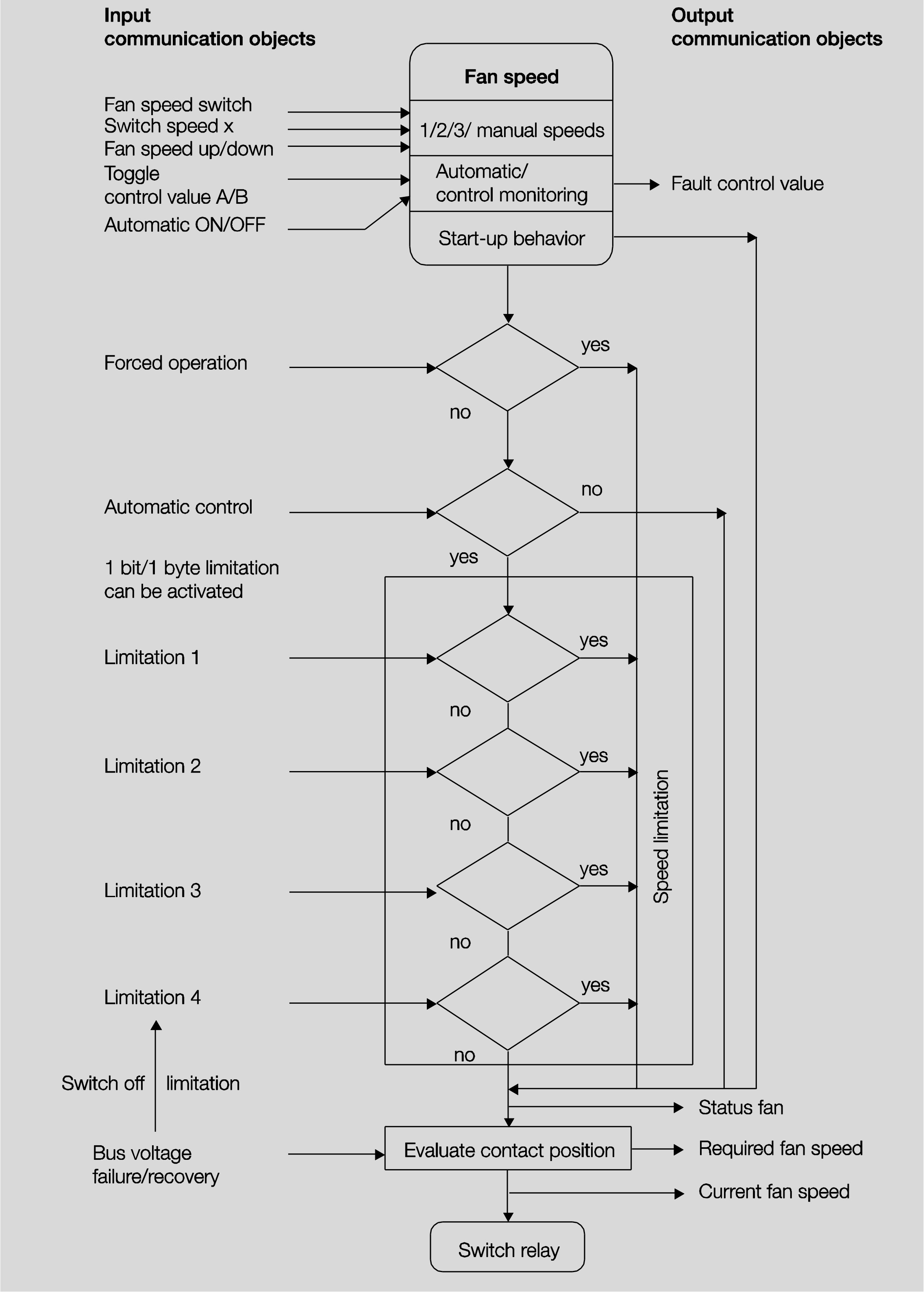
The diagram relates to a three-speed fan without parameterized fan limitations. The fan limitations are only relevant after the fan speed has been determined and do not change the flow chart.



Hy. = Hysteresis
Speed x - hysteresis < 0 % results in a setting of speed x - hysteresis = 1 %
Speed x + hysteresis < 100 % results in a setting of speed x + hysteresis = 99 %

4.1.6 Fan operation functional diagram

The following illustration indicates the sequence in which the fan control functions are processed. Communication objects, which lead to the same box, have the same priority and are processed in the sequence in which the telegrams are received.

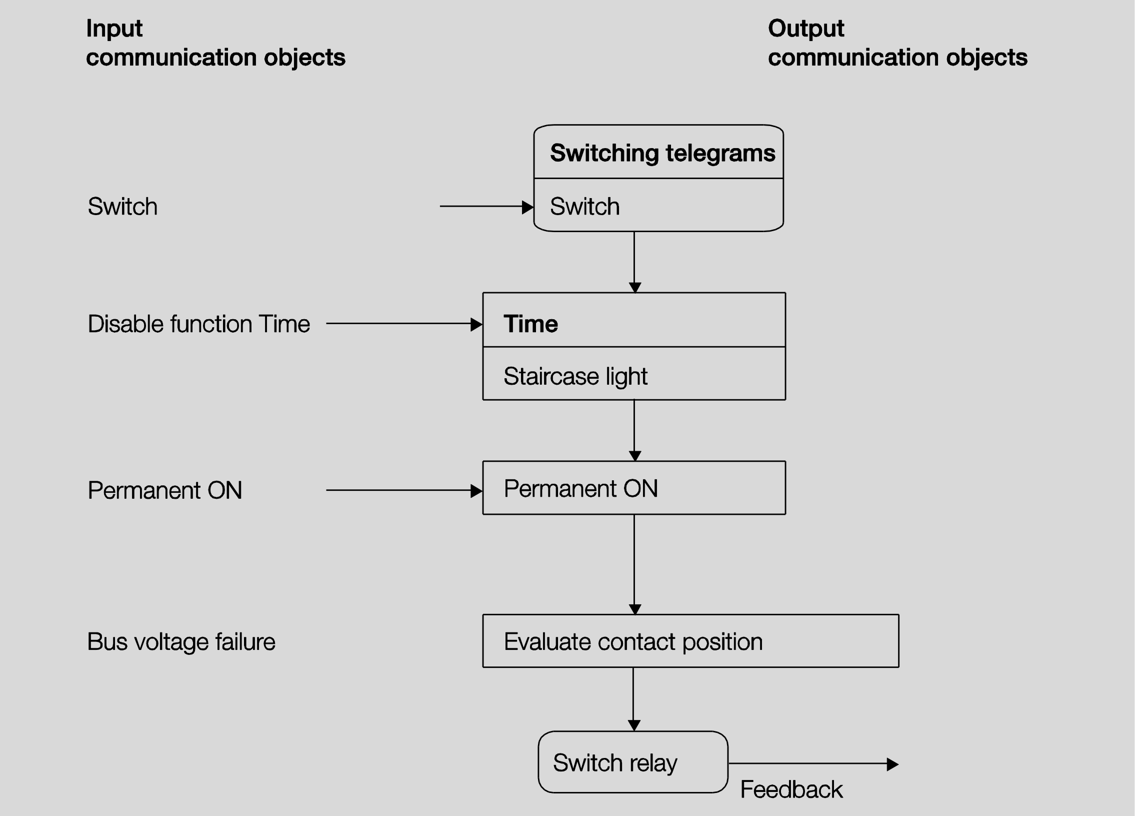


4.2 Switch output

In this section, the function diagrams and application explanations for the switch outputs are explained.

4.2.1 Function diagram

The following illustration indicates the sequence in which the functions are processed. Communication objects which lead to the same box have the same priority and are processed in the sequence in which the telegrams are received.



Note
When the communication object *Switch* receives a telegram, the result of that telegram serves as an input signal for the *Time* function. If that function is not disabled, a corresponding switch signal is generated. Subsequently, the switching action is only dependent on the state of the bus voltage. The relay is switched if a switching action allows it.

4.2.2 *Time* function

The *Time* function 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 *Time* function is disabled.

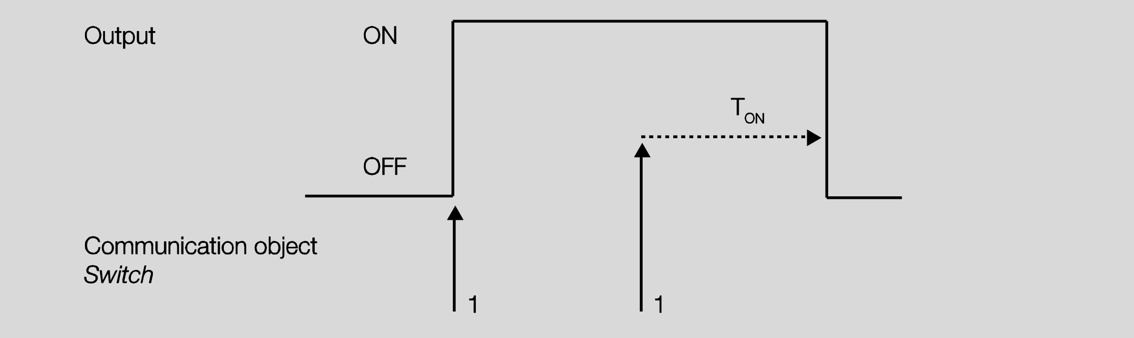
The following functions can be undertaken using the *Time* function:

- Staircase lighting

You can switch, for example, between functions, e.g. function *Staircase lighting* (night time operation) and normal ON/OFF switch function (daytime operation).

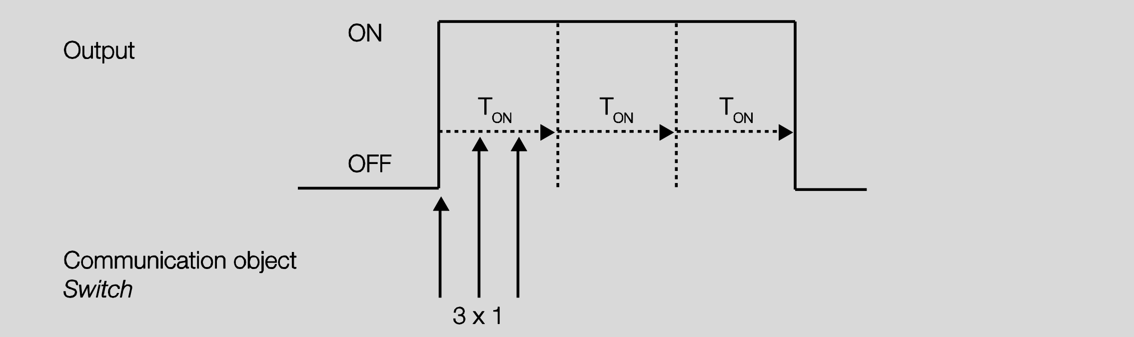
4.2.2.1 Staircase lighting

After the staircase lighting time T_{ON} has elapsed, the output switches off automatic. For every telegram with the value 1, the staircase lighting time restarts, unless the parameter *Extending staircase lighting by multiple operation ("Pumping up")* in the Parameter window Time, page 166, is set to *No (not retriggerable).*



The reaction is the basic reaction of the *Staircase lighting* function.

Via “pumping up” – actuation of the push button several times in succession – the user can adapt the staircase lighting to 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.

4.3 Valve drives, valves and controller

4.3.1 Electromotor Valve Drives

Electromotor Valve Drives open and close valves via a small electric motor. Electromotor valve drives are offered as proportional or as 2 or 3-way valve drives.

Proportional valve drives are controlled via an analogue signal, e.g. 0…10 V. They can be controlled with the device. 2 or 3-point valve drives are controlled via switching of the supply voltage.

2-point valve drives are controlled via the telegrams OPEN and CLOSE. The valve can only be completely open or completely closed. 2-point valves are controlled via a 2-point control or pulse width modulation (PWM). 2-point valve drives which require 2-point control cannot be controlled with the device.

The device does not support the control of electric motor 3-point valve drives. These are normally connected via three connection cables to the device: Neutral conductor, switched phase to OPEN, switched phase for CLOSE. Using 3-point control value drives, the valve can be opened by any desired percentage and the position can be retained over an extended period. If the valve does not move, no voltage is applied to the motor.

The valve is opened wide enough to allow the exact quantity of hot or cold water to flow that is required to bring the heat exchanger to the required temperature. Thus the valve is controlled via the valve opening (0…100%). The control usually used in most cases is continuous control.

4.3.2 Electrothermal Valve Drives

Electrothermal Valve Drives are adjusted due to heat expansion of a material caused by a flow of electric current. Electrothermal Valve Drives are controlled by pulse width modulation. The device does not support the control of Electrothermal Valve Drives via pulse width modulation.

Electrothermal Valve Drives are offered in the *de-energized closed* and *de-energized opened* variants. Depending on the variant, the valve is opened when voltage is applied and closed when no voltage is applied, or vice versa.

Electrothermal Valve Drives are connected via two connection cables to the device.

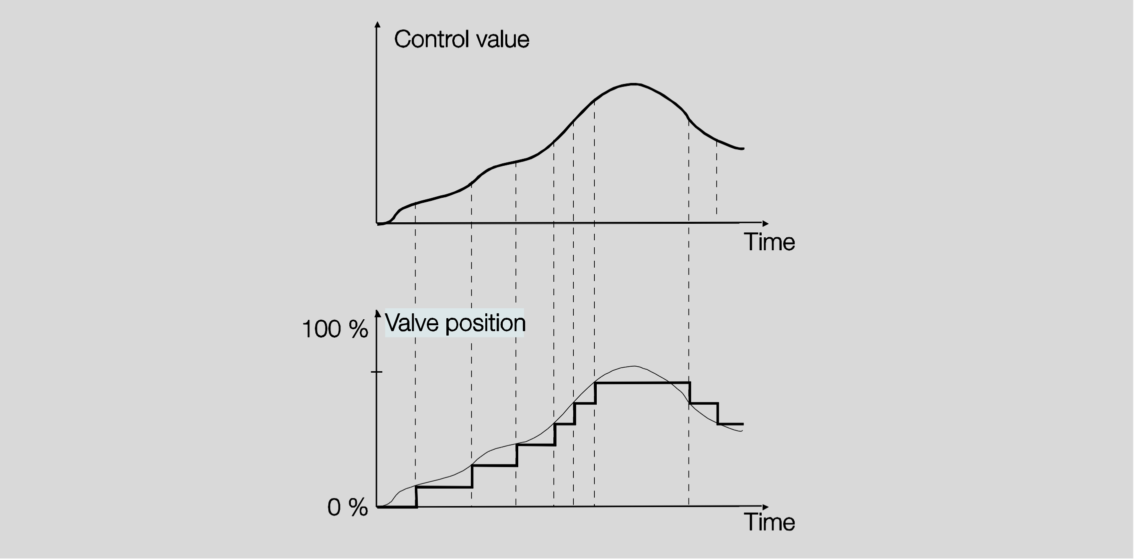
4.3.3 Control types

The following control types are commonly used for the control of valves in heating, air-conditioning and ventilation applications.

- Continuous control
- Pulse width modulation (PWM)
- Pulse width modulation – calculation

4.3.3.1 Continuous control

With continuous control, a control value is calculated based, on the target temperature and the actual temperature, and is used to optimally set the temperature. The valve is brought to a position, which complies with the calculated control value. With this method the valve can be fully opened, fully closed and even positioned in every intermediate position.



Continuous control is the most precise form of temperature control. At the same time, the positioning frequency of the valve drive can be kept low. Continuous control can be implemented with the device for electro-motor 3-point valve drives. This is implemented via a 1 byte control.

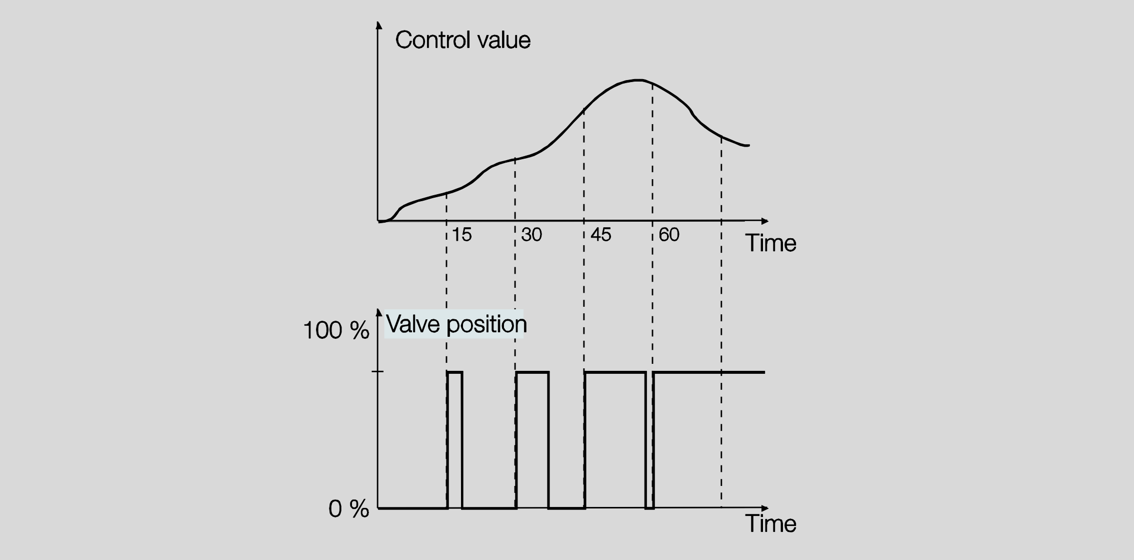
What is a 1 byte control?

For 1 byte control, a value of 0…255 (corresponds to 0%…100%) is preset by the room thermostat. At 0 %, for example, the valve is closed and at 100% it is fully opened.

4.3.3.2 Pulse width modulation (PWM)

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 in the duration for valve opening. The control value 20% at a cycle time of 15 minutes, for example, will be recalculated for a valve opening time of three minutes. The control value 50% results in a valve opening time of 7.5 minutes.



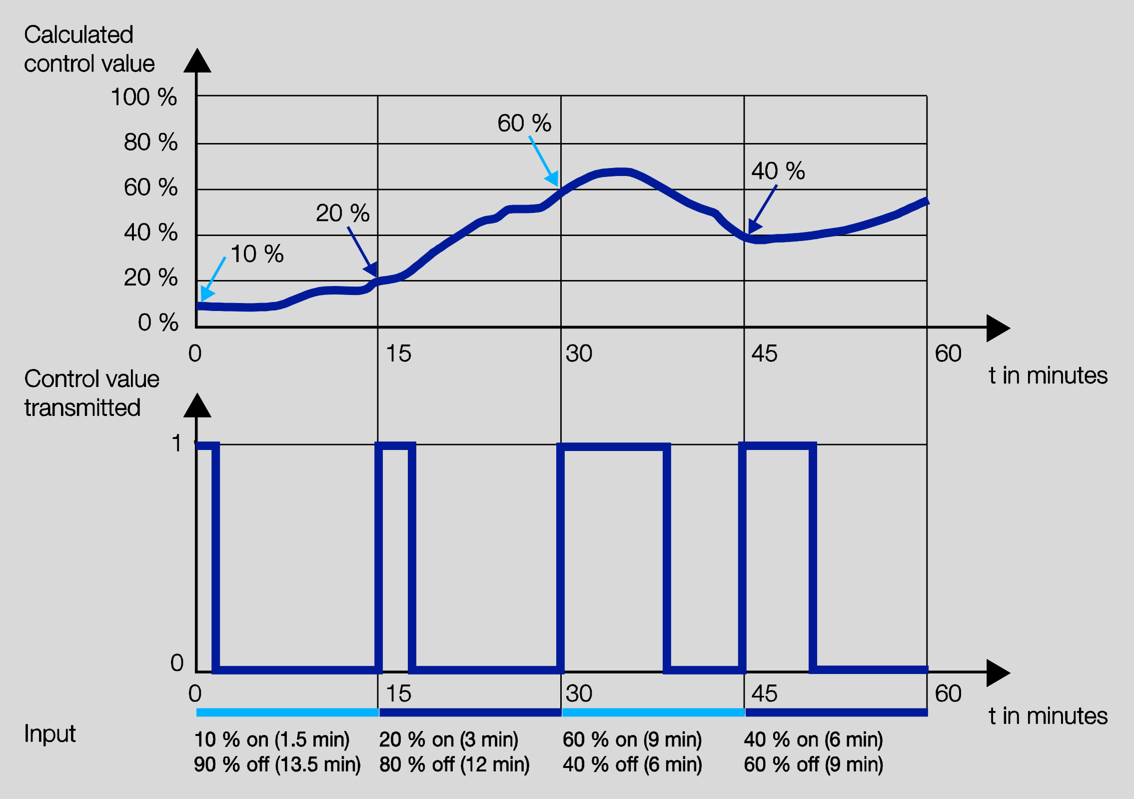
With pulse width modulation, a relatively accurate setting of the temperature can be achieved without any resulting overshoots. Simple control values can be used. The positioning frequency of the control value is relatively high.

Pulse width modulation can be used with the device in conjunction with Electromotor or Electrothermal Valve Drives.

For example:

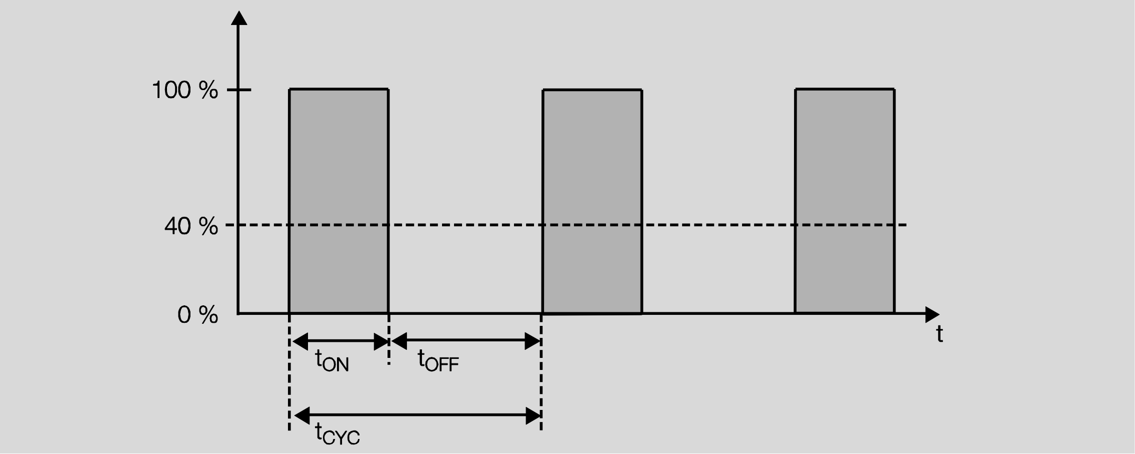
When the device receives a 1 byte control value (continuous control) as an input signal, this value together with the parameterized cycle time from a PWM calculation is converted into a signal for a 2-point control (ON-OFF-ON).

With PWM control, the received control value (0...100%) calculated in the control algorithm is converted to a pulse width modulation. The conversion is based on a constant cycle time. If the device for example, receives a control value of 20%, then for a cycle time of 15 minutes the valve will be opened for three minutes (20% of 15 minutes) and closed for 12 minutes (80% of 15 minutes).



4.3.3.3 Pulse width modulation – calculation

With pulse width modulation, control is implemented by a variable mark-space ratio.



During the time t_{ON} the valve is opened and during the time t_{OFF} it is closed.
On account of t_{ON} = 0.4 x t_{CYC} the valve is set to about 40 % on. t_{CYC} is the so-called PWM cycle time for continuous control.

4.4 Reaction on bus voltage failure, recovery, download and ETS reset

The way in which the device reacts on bus voltage failure or recovery, download and ETS reset are described below.

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

4.4.1 Bus voltage recovery

Fan or switch actuator reaction to bus voltage failure can be set.

4.4.2 Bus voltage recovery

- A fan speed value can be predefined for bus voltage recovery. In *Switch actuator* mode, the communication object *Switch* can be written with 0, 1 or *not* written.
- Status communication objects are sent provided that the option *Only after changing* or *After a change or request* has been set.
- The sending delay is only active at bus voltage recovery!

4.4.3 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 triggered in the ETS under the menu item *Commissioning* with the function *Reset device*. This stops and restarts the application.

4.4.4 Download

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

Note
After a download with a change, the parameter reacts as if there has been an ETS reset. If the application is downloaded again (full download) after a full discharge, the reaction is the same as after an ETS reset. After the application is removed or after an interrupted download, the device no longer functions.

4.5 Priorities

Fan

The priorities for telegram processing are defined as follows:

1. Bus voltage failure
2. Forced operation
3. Direct operation
4. Limitation of automatic operation
5. Malfunction of automatic operation
6. Control value automatic operation
7. Bus voltage recovery

Switch Actuator

The priorities for telegram processing are defined as follows:

1. Bus voltage failure
2. Function *Time* (*Staircase lighting)*
3. Switching telegrams
4. Bus voltage recovery

Output A, B, C and D

The priorities for telegram processing are defined as follows:

1. Manual operation, if active
2. Parameterized valve position after bus voltage recovery
3. Communication object *Block*
4. Communication object *Forced operation*
5. Valve Purge
6. Control values

Note
1 corresponds with the highest priority.

A Appendix

A.1 Scope of delivery

The Fan Coil Actuator is supplied together with the following components. The delivered items should be checked against the list below.

- 1 x Fan Coil Actuator, alternatively:

  FCA/S 1.1.1.2 Fan Coil Actuator, PWM, MDRC

  FCA/S 1.2.1.2 Fan Coil Actuator, 0-10V, MDRC

  FCA/S 1.1.2.2 Fan Coil Actuator PWM, Manual Operation, MDRC

  FCA/S 1.2.2.2 Fan Coil Actuator, 0-10V, Manual Operation, MDRC

- 1 x installation and operating instructions
- 1 x bus connection terminal (red/black)

A.2 Status byte General

Bit No.		7	6	5	4	3	2	1	0
8-bit value	Hexadecimal	Heating or cooling mode	Not assigned	Not assigned	Status of internal calibration	Communication	Status Input c Measured value out of range	Status Input b Measured value out of range	Status Input a Measured value out of range
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		■■		■		■		■
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	■		■		■		■	■
172	A/C	■		■		■	■		
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	RC	■	■	■	■	■		■	■
252	FC	■	■	■	■	■	■		
253	FD	■	■	■	■	■	■		■
254	FE	■	■	■	■	■	■	■	
255	FF	■	■	■	■	■	■	■	■

■ = applicable

A.3 Status byte outputs A, B, C, D

Bit No.		7	6	5	4	3	2	1	0
8-bit value	Hexadecimal	Not assigned	Not assigned	Not assigned	Overload/short circuit current	Manual operation active	Safety priority 1, 2, 3	Purging	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		■■		■		■		■
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	■		■		■		■	■
172	A/C	■		■		■	■		
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	RC	■	■	■	■	■		■	■
252	FC	■	■	■	■	■	■		
253	FD	■	■	■	■	■	■		■
254	FE	■	■	■	■	■	■	■	
255	FF	■	■	■	■	■	■	■	■

■ = applicable

A.4 Status byte fan

Bit No.		7	6	5	4	3	2	1	0
8-bit value	Hexadecimal	Forced operation	Limitation 1	Limitation 2	Limitation 3	Limitation 4	Thermostat fault	Automatic	Control value
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		■■		■		■		■
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	■		■		■		■	■
172	A/C	■		■		■	■		
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	RC	■	■	■	■	■		■	■
252	FC	■	■	■	■	■	■		
253	FD	■	■	■	■	■	■		■
254	FE	■	■	■	■	■	■	■	
255	FF	■	■	■	■	■	■	■	■

■ = applicable

A.5 Order details

Short description	**Description**	**Order No.**	**bbn 40 16779 EAN**	**Weight 1 pc [kg]**	**Packaging [pcs.]**
FCA/S 1.1.1.2	Fan Coil Actuator, PWM, MDRC	2CDG110195R0011	**942195**	0.1	1
FCA/S 1.1.2.2	Fan Coil Actuator, PWM, Manual Operation, MDRC	2CDG110194R0011	**942188**	0.1	1
FCA/S 1.2.1.2	Fan Coil Actuator, 0-10V, MDRC	2CDG110196R0011	**942225**	0.1	1
FCA/S 1.2.2.2	Fan Coil Actuator, 0-10V, Manual Operation, MDRC	2CDG110193R0011	**942171**	0.1	1

A.6 Notes

Contact Us

ABB STOTZ-KONTAKT GmbH
Eppelheimer Straße 82
69123 Heidelberg, Germany
Phone: +49 (0)6221 701 607
Fax: +49 (0)6221 701 724
e-mail: knx.marketing@de.abb.com

Further information and local contacts:
www.abb.com/knx

Note:
We reserve the right to make technical changes or modify the contents of this document without prior notice.
The agreed properties are definitive for any orders placed. ABB AG shall not be liable for any consequences arising from errors or incomplete information in this document.

Publication number 2CDC508134D0202 (06.15)

Power and productivity
for a better world™