

SIEMENS



5WG1568-1AB81

24-fold Room actuator

Application Guide

Table of contents

1	Functions	3
2	Commissioning	6
3	Parameters and communication objects	7
3.1	"General" parameters.....	7
3.2	"Channel function" parameters	9
3.3	Switch output -- Switch actuator	11
3.3.1	"Switch actuator: Output X" parameters.....	11
3.3.2	"Ox: Time" parameters	13
3.3.3	"Ox: Logic" parameters	16
3.3.4	"Ox: Scene" parameters	18
3.3.5	"Ox: Forced" parameters	19
3.3.6	"Ox: Operation hours counter" parameters	20
3.3.7	Switch output -- Switch actuator communication objects	20
3.4	Switch output --Heating actuator (without controller) parameters	22
3.4.1	Switch output -- Heating actuator (without controller) communication objects.....	26
3.5	Solar protection AC.....	27
3.5.1	"Curtain X: Venetian Blind" parameter	27
3.5.2	"Curtain X: Shutter"	37
3.5.3	Solar protection (AC) communication objects	37
3.6	Solar protection DC output.....	40
3.7	Fan control.....	41
3.7.1	"Fan type -- One level" parameters.....	41
3.7.2	"Fan type -- Multi-level" parameters.....	47
3.7.3	Fan control communication objects	56
3.8	Valve control	58
3.8.1	"Vx: Heating/Cooling" parameters	61
3.8.2	Valve output communication objects.....	69
4	Appendix	70
4.1	Cyber security disclaimer	70

1 Functions

Function Switching On/Off - 24 switching outputs

Connect electrical loads, e.g., lighting, sockets, and heating controls. The switch output has max. 24 channels, each output is relay-controlled and switched electronically.

- One switch output assigns one output channel
- Direct operation of switching
- Assignment of each switching channel to the central control function
- Contact position after bus voltage recovery
- Contact position after bus voltage failure
- Contact position after download
- Setting object value Switching after bus voltage recovery (logic)
- Status message switching status
- Inversion of the switching status
- Time function per channel: Switch-on delay, switch-off delay, flashing, staircase function
- Logic function per channel: 2 logic gates per output (AND, OR, XOR, Gate)
- Scene control per channel: Channel assignment in up to 8 scenes with up to 64 scene numbers, open or closed output value setting
- Forced control per channel: Via control type 1-bit or 2-bit
- Operating hours counter per channel: For recording the switch-on time of the relay
- Control of thermal actuators (without controller) via 1-bit or 1-byte control values, with control value monitoring and forced control

Solar protection control function for AC 230 V drives - 12 solar protection channels

- One solar protection channel requires 2 outputs
- Direct operation of the solar protection for each channel
- Operating modes: Blind or shutter control
- Motor type setting: AC 230 V motor or potential-free contacts (pulse duration setting)
- Assignment of each solar protection channel to the central control function
- Manual operation, 1-bit as movement commands or via 1 byte as position commands
- Position after bus voltage recovery
- Position after bus voltage failure
- Position after reference movement
- Slat position after reaching the lower end position
- Manual control of the blind/shutter height below the end position
- Status message of the blind or slat position, 1 byte
- Setting the moving times or slat adjustment times, blind settings
- Automatic operation, automatic sun shading
- Scene control per solar protection channel: Channel assignment in up to 8 scenes with up to 64 scene numbers, setting blind position or slat position
- 2 override functions, alarms (wind, rain, frost...) with different priorities

Solar protection control function for DC drives - 2 solar protection channels

- One solar protection channel requires 4 outputs, pole switching
- Direct operation of the solar protection for each channel
- Operating modes: Blind or shutter control
- Assignment of each solar protection channel to the central control function
- Manual operation, 1-bit as movement commands or via 1 byte as position commands
- Position after bus voltage recovery
- Position after bus voltage failure

- Position after reference movement
- Slat position after reaching the lower end position
- Manual control of the blind/shutter height below the end position
- Status message of the blind or slat position, 1 byte
- Setting the moving times or slat adjustment times, blind settings
- Automatic operation, automatic sun shading
- Scene control per sun shading channel: Channel assignment in up to 8 scenes with up to 64 scene numbers, setting blind position or slat position
- 2 override functions, alarms (wind, rain, frost...) with different priorities

Heating/cooling function in 2-pipe system - 12 valve outputs

- Two relay outputs are required for valve control (3-point valve)
- Control via a control value for heating/cooling (2-pipe system), external controller required
- Adjustable for heating-only mode, cooling-only mode, heating and cooling mode
- Direct operation of the valve control
- Control value monitoring with failure message and an emergency response if the control value is missing
- Control via switching commands On/Off (two-point control), continuous control commands (continuous control → PWM → 2-point valves) or 3-point control (open/close → 3-point valves)
- Setting valve direction of action (NO/NC)
- Valve position after bus voltage recovery
- Valve position after bus voltage failure
- Setting a valve reversal time for 3-point valves
- Setting a valve opening time for 3-point valves
- Automatic adjustment of the valve position for 3-point valves
- Adaptation of the valve characteristic curve for 3-point control
- Valve status feedback
- Automatic or manual valve flushing
- Deactivation of the heating or cooling process via bus

Heating/cooling function in the 4-pipe system - 6 valve outputs for heating, 6 valve outputs for cooling

- Two relay outputs are required for heating valve control (3-point valve)
- Two relay outputs are required for cooling valve control (3-point valve)
- Control via two separate control values for heating and cooling (4-pipe system), external controller required
- Direct operation of the valve actuators
- Control value monitoring with failure message and an emergency response if the control value is missing
- Control via switching commands On/Off (two-point control), continuous control commands (continuous control → PWM → 2-point valves) or 3-point control (opening / closing → 3-point valves)
- Setting valve direction of action (NC/NO)
- Valve position after bus voltage recovery
- Valve position after bus voltage failure
- Setting a valve reversal time for 3-point valves
- Setting a valve opening time for 3-point valves
- Automatic adjustment of the valve position for 3-point valves
- Adaptation of the valve characteristic curve for 3-point control
- Valve status feedback
- Automatic or manual valve flushing
- Deactivation of the heating or cooling process via bus

Fan controller - 6 multi-level fan systems

- Fan controller can be connected to a single-phase fan
- Selection of 1-speed, 2-speed or 3-speed fan
- A relay output is required for each fan stage
- Setting of up to 3 fan stages and fan speeds
- Direct operation of fan speeds
- Operating modes: Switching between the fan stages with delay time (switchover mode) or step switching
- Fan speed on bus voltage recovery
- Fan speed on bus voltage failure
- Manual operation via 1-bit or 1-byte objects
- Forced control via 1-bit control type, fan only runs at rotation speed in permissible range, with the highest priority
- Automatic mode with threshold value setting and control via up to two control variables
- Control value monitoring with failure message and an emergency response if the control value is missing
- Fan status feedback
- Automatic mode feedback
- Fan speed feedback

2 Commissioning

Commissioning the device

1. Switch on the KNX bus voltage and connect the actuator to the KNX bus via the black/red KNX bus terminal block
2. Wait approx. 2...3 s, the device is initialized, and all relays are opened
3. Connect the load circuits
4. Test of the installation
 - Direct operation in delivery state: Only one relay per pair (1/2, 3/4, 5/6, 7/8...) can be closed! The configured relay states cannot be saved after restart.
5. Load physical address and application program
 - For switched loads, configure the outputs as switching
 - For Venetian blind operation, configure the outputs as solar protection AC/curtain DC
 - For Fan operations, configure the outputs as fan control
 - To control thermal or motorized valve actuators, configure the outputs as Heating/Cooling/2-pipe outputs or valve control (4-pipe)
 - Press the programming button, the programming LED lights up in red
 - Load physical address and application program using the ETS
 - After successful download, the programming LED flashes green in KNX bus mode
 - Direct operation after commissioning with the ETS (downloading the ETS database): All outputs function as per the parameterization with the ETS. The configured relay states are saved after restart.

3 Parameters and communication objects

This chapter introduces how ETS configures the device by setting the parameters. It also introduces the associated communication objects.

Communication objects communicate with other devices via bus:

- Max. communication objects: 532
- Max. group addresses: 1000
- Max. associations: 1000

The number and kind of visible objects vary. At no time, all objects are simultaneously available.

Note:

In "Flag" column of the communication objects:

- "C": Enables communications on the object
- "W": Writes value of object from the bus
- "R": Other devices can read the value of the object
- "T": The object can transmit
- "U": Updates the value of the object

Note:

For direct operation:

- If database is not loaded, the direct operation is for testing the installation. The configured relay states cannot be saved after restart. Only one channel in each channel pair (1&2...23&24) can be set to On. For example, if channel 1 is set to On, channel 2 is forced to Off.
- If database is loaded, relay works as per configuration in database and the configured relay states are saved after restart.

3.1 "General" parameters

"General" sets some general parameters for each function block.

General	Operation delay after power voltage recovery (5...250s)	5
Channel function	Sending cycle of 'In operation' telegram [1..240s, 0=inactive]	1
	Limit number of send telegram	<input type="radio"/> NO <input checked="" type="radio"/> Yes
	Period	100ms
	Max.number tele.within a period [1..255]	100
	Central control for switch function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	Central control for curtain function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	Direct operation	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Direct to Bus operation by	<input type="radio"/> Only long press <input checked="" type="radio"/> Both long press and automatic
	Delay time [10..6000]s	10

Name	Description	Range
Operation delay after power voltage recovery (5...250 s)	<p>Defines operation delay after KNX bus voltage recovery. Operation is executed (device can send telegrams to bus) until delay ends. During the delay, any manual operations is recorded and the last triggered operation is executed after delay time reaches. During the delay, the telegrams received from the bus are also recorded and executed after the delay ends.</p> <p>The delay time does not include device initialization time. After the bus voltage is restored, the initialization time is around 3s. The operation delay is calculated after device initialization.</p> <p>Note: During the delay (period for no operation output), programming LED is constant green; LED flashes when operation is permitted.</p>	5...250 s
Sending cycle of "In operation" telegram [1...240, 0=inactive] s	<p>Sets the time interval for sending telegrams to bus to indicate the module is operational. "0" is selected, the object "In operation" does not send telegrams. None-zero (1...240s) is selected, the object "In operation" sends a telegram, as per the set interval and with value "1" to the bus.</p> <p>Increasing the interval reduces bus load.</p> <p>Note: The time interval is calculated after bus voltage recovery and not related to the operation delay after power voltage recovery on the bus.</p>	0...240 s 0 = inactive (cyclic sending prohibited)
Limit number of send telegram	<p>Sets the telegram number sent from the device to the bus, mainly to reduce the bus load.</p> <p>The limitation is only for the transmission behavior of object "In operation".</p>	Yes No

The following parameters display only when "Yes" is selected.

	Period	<p>Limits the monitoring time of sent telegrams.</p> <p>After the bus voltage is restored and ending of the device initialization time and the operation delay, the monitoring time starts and counts the sent telegrams. If the allowed maximum telegram number reaches, no more telegrams are sent on the bus until set monitor time ends.</p> <p>New monitor period and telegram counter start after this monitor time ends. Unsent telegrams (max. 40 telegrams can be cached) in previous monitor period are sent in adjacent period and only one of the duplicated telegrams is sent.</p> <p>Note: This parameter affects only the telegrams sent to the bus and not the performed operations.</p>	100 ms 500 ms ... 10 min
	Max. number tele. within a period [1...255]	<p>Sets the max. number of telegrams sent during monitor period.</p> <p>Note: This parameter affects only the messages sent to the bus and not the performed operations.</p>	1...255
Central control for switch function	<p>Sets whether centralized control of the switch is enabled or disabled.</p> <p>When enabled, the object "Central control for all of switch" is visible. All channels with enabled centralized control are controlled by the object and switch can be controlled together.</p>	Disable Enable	
Central control for curtain function	<p>Sets whether centralized control of the solar protection is enabled or disabled.</p> <p>When enabled, the objects "Central control for Up/Down" and "Central control for Slat/Stop" are visible. All channels with centralized control are controlled by the object and the curtain position, angle of the slat or the operation stopping can be controlled together.</p>	Disable Enable	
Direct operation	Enables or disables direct operations.	Disable Enable	
The following parameters display when "Enable" is selected.			

Name	Description	Range
{	Direct to Bus operation by Sets the way switch from direct to bus operations. <ul style="list-style-type: none">• Only long press: Switch to direct operation or back to automatic via long pressing (1 s) the direct/auto switch button.• Both long press and automatic: Switch to direct operation or back to bus operation via long pressing the direct/bus operation switch button. Or via time delay, automatically back to bus operation state from direct, i.e., in the direct operation state, if there is no direct operation for a period, automatically back to the bus operation state.	Only long press Both long press and automatic
The following parameter displays when "Both long press and automatic delay time" is selected.		
{	Delay time [10...6000] s Sets the delay time from direct operation to bus operation.	10...6000

3.2 "Channel function" parameters

"Channel function" sets the channel function.

Channel function: Switch on/off, solar protection (AC or DC drive), fan or valve. The occupied channels are different as per functions. If CH15&16 are set to "disable", option "Curtain DC" of CH17...24 is visible.

The functions are always assigned to the relay outputs in blocks: Outputs 1...4, Outputs 5...8, Outputs 9...12, Outputs 13...16, Outputs 17...20 and Outputs 21...24. The different functions that can be selected require a different number of outputs. The switching function always uses one relay output. The solar protection function with AC drives always requires two relay outputs. One for the UP and one for the DOWN function. For valve control, the number of outputs depends on the valve type (2-point or 3-point valve) and the heating/cooling system (2-pipe system or 4-pipe system). In a 2-pipe system, one output (ON/OFF) is required for a 2-point valve and two outputs (OPEN/CLOSE/STOP) for 3-point valves. In a 4-pipe system, two outputs are required for the two 2-point valves or four outputs for the two 3-point valves. The number of outputs (1...3) for the fan control depends on the number of fan stages. The solar protection function with DC drives requires four relay outputs due to pole switching. For reasons of electrical safety, 230 V connections must not be used near low voltage connections. For this reason, only terminals 17...20 or 21...24 can be used when using DC drives. Terminals 15 and 16 must not be used in this case.

If outputs 15 & 16 are set to "disable", option "Solar protection DC" of outputs 17...24 is visible.

NOTICE



For reasons of electrical safety, safety distances must be considered when connecting 230 V loads in combination with SELV/FELV voltage (DC drives): When using DC drives, only terminals 17 to 20 and 21 to 24 must be used. Terminals 15 and 16 must not be used in this case. See also wiring diagram and ETS database entry!

General	Product select	24-Fold
Channel function	Output 1--4 config as	Switch/Solar protection AC/Heating/Cooling/2-pipe
Curtain 2	Output 1 & 2 function	Switch
C2: Drive	Output 1	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
C2: Automatic	Output 2	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
C2: Scene	Output 3 & 4 function	Curtain AC
C2: Safety	Curtain 2 output is fixed for	Output 3(Up/Open) & Output 4(Down/Close)
	Output 5--8 config as	Disable
	Output 9--12 config as	Disable
	Output 13--16 config as	Disable
	Output 17--20 config as	Disable
	Output 21--24 config as	Disable

Name	Description	Range
Product select	Notes the used product.	24-Fold
Output 1~4 config as Output 5~8 config as Output 9~12 config as Output 13~16 config as	Sets the channel function.	Disable (not used) Switch/Solar protection AC/Heating/Cooling/2-pipe Fan control Valve control (4-pipe)
Output 17~20 config as Output 21~24 config as	Sets the channel function.	Disable (not used) Switch/Solar protection AC/Heating/Cooling/2-pipe Solar protection DC Fan control Valve control (4-pipe)

The following table describes the output of (1... 4).

Output 1...4	Switch/Solar protection AC/Heating/Cooling/2-pipe			Fan control	Valve control (4-pipe)
	Switch	Solar protection AC	Heating/Cooling/2-pipe		
Output 1	Output 1	Curtain 1	Valve 1 (Output 1&2, if 3point, open and close)	Fan 1: fan speed 1	Valve 1: Heat (Output 1&2, if 3point, open and close)
Output 2	Output 2			Fan 1: fan speed 2	
Output 3	Output 3	Curtain 2	Valve 2 (Output 3&4, if 3point, open and close)	Fan 1: fan speed 3	Valve 1: Cool (Output 3&4, if 3point, open and close)
Output 4	Output 4				

In the above table: One switch output uses one channel. One solar protection output (AC) uses two channels and DC uses four channels. The channel used by fan as per different fan speed. The channel used by valve as per HVAC operating mode and valve type. E.g., 1 or 2 channels for heating/cooling/2-pipe, but 2 or 4 channels for 4-pipe.

For Fan control, if some outputs are not in use, they can be used for switch as per parameter setting.

Details are as follows:

Name	Description	Range
Curtain 1 output is fixed for	Defines the channel of curtain 1 (AC) is fixed as output 1 & output 2. Output 1 for curtain up/open and 2 for down/close.	Output 1(Up/Open)&Output 2(Down/Close)
External DC+ input External DC- input Output driver	Defines the wiring of solar protection DC. Positive terminal connects to outputs 17&19, negative to outputs 18&20 and output drive to Un.	Output 17&Output 19 Output 18&Output 20 Un
Fan 1 output is fixed for	Defines output 1 for 1-speed fan, outputs 1&2 for 2-speed fan and outputs 1, 2, 3 for 3-speed fan.	1level: 1 2level: 1&2 3level: 1&2&3
If Fan 1 set to 1 or 2 level, output 3&4 as switch output	Note: If the fan type is 1-speed or 2-speed, output 3 and output 4 can be used for switch output.	

The following two parameters display when 4-pipe is selected. Defines channels for 4-pipe system:

{	Heat output for 4-pipe valve 1 is Output 1	Defines the heating channel of valve 1 is output 1, i.e., for 2-wire, one end of the valve connects to output 1 and the other to Un for power supply. For 3-wire, output channels are output 1&2, i.e., two ends of the valve connect to output 1&2 and the other to Un for power supply.	Output 1&2, if 3 point, open and close
	Cool output for 4-pipe valve 1 is Output 3	Defines the cooling channel of valve 1 is output 3, i.e., for 2-wire, one end of the valve connects to output 3 and the other to output Un for power supply. For 3-wire, output channels are output 3&4, i.e., two ends of the valve connect to output 3&4 and the other to Un for power supply.	Output 3&4, if 3 point, open and close

Name	Description	Range
Valve 1 output is fixed for Output 1	This parameter displays when heating only, cooling only or 2-pipe is selected. Defines valve output channel. For 2-wire, output channel is output 1, i.e., one end the valve connects to output 1, the other to Un for power supply. For 3-wire, output channels are output 1&2, i.e., two ends of the valve connect to output 1&2 and the other to Un for power supply.	Output 1&2, if 3 point, open and close

3.3 Switch output -- Switch actuator

The priority of switch actuator control:

Initialization (after parameter downloaded) → direct operation (long press the direct button to switch to direct operation, and the button of the channel is in operation) → forced operation → manual bus operation

The following applies:

1. The direct operation has the highest priority. If the forced operation is activated, the state returns to the forced after exiting direct operation;
2. If the time function is running and the channel has direct operations, the unfinished time function interrupts and does not continue;
3. Under direct operation, any received telegrams are invalid and is not recorded.

3.3.1 "Switch actuator: Output X" parameters

"Switch actuator: Output X" parameters are set for the entire channel of the relay. In addition to normally used switch functions, it also can set system power-up, switch status report, etc.

General	Work mode of the channel is	<input checked="" type="radio"/> Switch actuator <input type="radio"/> Heating actuator(without controller)
Channel function	Central function of channel	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Output 1	If bus recovery, contact is	Unchange
O1: Function	If bus failure, contact is	Unchange
O1: Time	After downloading, contact is	<input checked="" type="radio"/> Open <input type="radio"/> As bus recovery
O1: Logic	Object value of "switch" after bus recovery	<input checked="" type="radio"/> 0 <input type="radio"/> 1
O1: Scene	Set the reply mode of switch status	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Object value of switch status	<input type="radio"/> 0=contact close;1=contact open <input checked="" type="radio"/> 1=contact close;0=contact open
	Contact position if tele.value is "1" ("0" is opposite of "1" if changed)	<input type="radio"/> Open <input checked="" type="radio"/> Close
	Special function of channel	<input type="radio"/> Disable <input checked="" type="radio"/> Enable

Name	Description	Range
Work mode of the channel is	Sets the work mode of the channel. <ul style="list-style-type: none"> • "Switch Actuator" mode is for common switch controls, such as lighting. • "Heating actuator (without controller)" mode is mainly for heating valve control. For parameters and applications, see Switch output --Heating actuator (without controller) parameters [→ 22]. 	Switch actuator Heating actuator (without controller)
Central function of channel	Sets whether centralized control of the channel is enabled or disabled. If enabled, the channel is controlled by the object "Central control for all switch".	Disable Enable

Name	Description	Range
If bus recovery, contact is	<p>Set the position of the relay contacts when the device is powered via bus.</p> <ul style="list-style-type: none"> When "Unchange" is selected, the relay contacts are not change; When "Open" is selected, the relay contacts are open; When "Close" is selected, the relay contacts are closed; When "As before as bus fail" is selected, the relay contacts same as the position before the bus power failure. 	Unchange Open Close As before as bus fail
If bus failure, contact is	<p>Sets the position of the relay contacts when the bus power fails.</p> <ul style="list-style-type: none"> When "Unchange" is selected, the relay contacts are not change; When "Open" is selected, the relay contacts are open; When "Close" is selected, the relay contacts are closed. 	Unchange Open Close
After downloading, contact is	<p>Sets the position of the relay contacts after the application is programmed.</p> <ul style="list-style-type: none"> When "Open" is selected, the relay contacts are open; When "As bus recovery" is selected, the relay contacts position as per the setting of the parameter "If bus recovery, contact is". 	Open As bus recovery
Object value of "switch" after bus recovery	This parameter is used when the logic function "input 0" is enabled. It sets the initial value ("0" or "1") of the object "Switch" for the channel when the bus power restores.	0 1
Set the reply mode of switch status	<p>Sets the conditions that the device sends telegram to report the present delay switch status. Two options are available.</p> <ul style="list-style-type: none"> When "Respond after read only" is selected, the object "switch status" sends the present switch status to the bus only if the device receives a request from other bus device or reads request of the switch status from bus. When "Respond after change" is selected, the object "switch status" immediately sends telegram to bus to report the status if the channel switch status changes. 	Respond after read only Respond after change
Object value of switch status	<p>Indicates the relay contact status.</p> <ul style="list-style-type: none"> Setting "switch status" to "0 = contact close" indicates the relay contact is closed, and "1=contact open" indicates the relay contact is open. Setting "1 = contact close; 0=contact open" stands for opposite meaning. <p>Note: After programming or system reset, if the switch status is determined, the object "switch status" sends status telegram to the bus; otherwise, do not send.</p>	0 = contact close; 1 = contact open 1 = contact close; 0 = contact open
Contact position if tele. value is "1" ("0" is opposite of "1" if changed)	<p>Defines the position of the channel contacts when the switch is turned on. The switch operation is triggered by object "switch". When "input 0" is enabled in logic function, the object "switch" is not used to trigger switch operation, but to modify the logical value of "input 0".</p> <ul style="list-style-type: none"> When "Open" is selected, the channel contact position is open. Telegram "1" is for open, and "0" for closed. When "Close" is selected, the channel contact position is closed,. Telegram "1" is for closed and "0" for open. <p>Note: When the logic function input 0 is enabled, the object "switch" is used as the input of "input 0", and the normal switch operation is invalid.</p>	Open Close

Name	Description	Range
Special function of channel	The main switch to enable the special functions of the channel. When "Enable" is selected, the parameter setting of "Ox:Function" displays and all special functions of the channel in this interface can be enabled or disabled individually.	Disable Enable

3.3.2 "Ox: Time" parameters

"Ox: Time" displays when the parameter "Function of time" in "Ox: Function" is set to "Enable".

At same time, the object "Enable time function" is visible and disables the time function. After the time function is disabled, the operation before disabling continues to execute until finished. E.g., if the delay is enabled, the operation is disabled during the delay period. The open operation will still be executed after the delay reaches.

Delay

General	Type of time function	Delay
Channel function	Delay for switch on: --(0...240min)	0
Output 1	--(0...59s)	0
O1: Function	Delay for switch off: --(0...240min)	0
O1: Time	--(0...59s)	0
O1: Logic		
O1: Scene		

Flashing

General	Type of time function	Flashing
Channel function	Delay for switch on: --(0...240min)	0
Output 1	--(0...59s)	0
O1: Function	Delay for switch off: --(0...240min)	0
O1: Time	--(0...59s)	0
O1: Logic	Number of ON-impluses (1...255,0=no limited)	0
O1: Scene	Contact position after flashing	Unchange
	Control mode of flashing	Start with "1", Stop with "0"

Staircase

General	Type of time function	Staircase
Channel function	Duration of staircase lighting: --(0...1000min)	1
Output 1	--(0...59s)	0
O1: Function	Control mode of staircase lighting	Start with "1", Stop with "0"
O1: Time	During the lighting time, if receive the "start" telegram	Restart duration of staircase lighting

Name	Description	Range
Type of time function	<p>Sets the mode of time function. Three options are available.</p> <ul style="list-style-type: none"> When "Delay" is selected, the object "Delay function" enables the delay function. When "Flashing" is selected, this function facilitate the aging of the lamp. The object "Flashing function" enables "Flashing". The flashing interval can be set via parameters "Delay for switch on" and "Delay for switch off". During the flashing, when the object receives a telegram that can turn on the flashing output again, the flashing output starts again. After flashing output completion, the contact position can be set via parameter. When "Staircase" is selected, the staircase function is enabled via object "Staircase function". The value of the staircase light turns on and the duration of the staircase light are set via parameter. 	<p>Delay Flashing Staircase</p>
The following parameters display only when "Delay" is selected.		
	Delay for switch on: -- (0...240min) / --(0...59 s)	<p>Sets the delay time for turning on the switch. When the object receives a control command, the switch is turned on after set delay time.</p>
	Delay for switch off: (0...240 min) / --(0...59 s)	<p>Sets the delay time for turning off the switch. When the subject receives a control command, the switch is turned off after set delay time. During the delay period, if a re-trigger command is received, time starts over.</p>
The following parameters display only when "Flashing" is selected.		
	Delay for switch on: -- (0...240min) / --(0...59 s)	<p>Defines the duration of switch on when flashing output. Important: Only switching frequencies below the relay limit executes. Because the frequent switchover may cause that relay does not have enough energy to operate. And may cause an operation delay. This can also happen after the bus voltage restore.</p>
	Delay for switch off: (0...240 min) / --(0...59 s)	<p>Defines the duration of switch off when flashing output. Important: Only switching frequencies below the relay limit executes. Because the frequent switchover may cause that relay does not have enough energy to operate. And may cause an operation delay. This can also happen after the bus voltage restore.</p>
	Number of ON-implused (1...255, 0=no limited)	Sets the times of flash on/off: 1... 255, 0 is unlimited. On/off is counted as one flashing output.
	Contact position after flashing	Sets the position of the relay contacts after the flashing output completion.
	Control mode of flashing	<p>Sets the way that the flashing output turn on.</p> <ul style="list-style-type: none"> When "Start with '1', Stop with '0'" is selected, value "1" enables the output and "0" stops. The stop position is determined by the previous parameter. When "Start with '0', Stop with '1'" is selected, value "0" enables the output and "1" stops. The stop position is determined by the previous parameter. When "Start with '0/1', can not be stop" is selected, value "0" or "1" can enable the output. In this case, the flashing output cannot be terminated via telegram value unless it is interrupted by another operation or waiting for finishing.
		<p>Start with "1", Stop with "0" Start with "0", Stop with "1" Start with "0/1", can not be stop</p>

Name	Description	Range
The following parameters display only when "Staircase" is selected.		
Duration of staircase lighting: -- (0...1000min) / --(0...59 s)	Sets the duration of the staircase lighting when the staircase light is turned on.	0...1000 min 0...59 s
Control mode of staircase lighting	<p>Sets the way to turn on/off the staircase light and select the appropriate control mode as per required.</p> <ul style="list-style-type: none"> When "Start with '1', Stop with '0'" is selected, value "1" turns on the lighting; "0" stops the timing of the staircase lighting duration, and the contact position remains in the present state until changed by other operations. When "Start with '1', no reaction with '0'" is selected, value "1" turns on the lighting and "0" without reaction. When "Start with '0/1', can not be stop" is selected, the staircase lighting can be turned on regardless of the value of "0" or "1". But communication object cannot ends the lighting, unless the staircase lighting duration ends or interrupted by other operations. When "Start with '1', OFF with '0'" is selected, value "1" turns on the lighting and "0" turns off the lighting. 	Start with "1", Stop with "0" Start with "1", no reaction with "0" Start with "0/1", can not be stop Start with "1", OFF with "0"
During the lighting time, if receive the "start" telegram	<p>Sets different timing method during staircase lighting.</p> <ul style="list-style-type: none"> When "Restart duration of staircase lighting" is selected, if object "Staircase function" receives the telegram of staircase lighting again during the lighting duration, the lighting restarts and the duration restarts again. When "Extend duration time" is selected, if the object "Staircase function" receives the telegram of turning on the staircase lighting again during the lighting duration, the duration will be extended cumulatively based on the present time. For example, if the duration is set to 60 seconds and the present timer is 20 seconds. After receiving a startup telegram, the lighting time is 40+60=100 seconds. The staircase lighting will be automatically turned off after 100 seconds. If multiple start telegrams are received consecutively, the time accumulates until the maximum time limitation reaches. When "Ignore the 'start' telegram" is selected, the telegram value received by the object "Staircase function" is ignored during staircase lighting. 	Restart duration of staircase lighting Extend duration time Ignore the "start" telegram

3.3.3 "Ox: Logic" parameters

"Ox: Logic" logic function parameter setting interface in "Ox: Function" is visible when parameter "Function of "logic" is selected as "Enable".

The logic operation function provides two communication objects to determine each channel output. These two objects are associated with the communication object "Switch".

After receiving the value of a logical communication object, the logic operation function does logical operation again. The result of the logic operation is as the switching state (when the result is "1", the channel contact is closed, and "0", the channel contact is open). The object "Logic 1" value is logically calculated with the object "Switch" value, and then with object "Logic 2" value. If a logical operation object is not enabled, ignore the object and the corresponding logical operation, and directly take the enabled part for the next operation.

General	Enable input 0	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Channel function	Input 0 reverse	<input checked="" type="radio"/> NO <input type="radio"/> YES
Output 1	The input 1 of logic	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
O1: Function	Logic function type	AND
O1: Time	Input 1 reverse	<input checked="" type="radio"/> NO <input type="radio"/> YES
O1: Logic	Result reverse	<input checked="" type="radio"/> NO <input type="radio"/> YES
O1: Scene	Value of input1 after bus recovery	0
	The input 2 of logic	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Logic function type	AND
	Input 2 reverse	<input checked="" type="radio"/> NO <input type="radio"/> YES
	Result reverse	<input checked="" type="radio"/> NO <input type="radio"/> YES
	Value of input2 after bus recovery	<input checked="" type="radio"/> 0 <input type="radio"/> 1

Name	Description	Range
Enable input 0	Sets whether to enable "input 0" to participate in logical operations. The logical value of "input 0" is entered via object "Switch". The parameters of "Input 0" are slightly different in the case of enabled and disabled. All the logical function parameters are described as below. There are fewer parameters when disabled.	Disable Enable
Input 0 reverse Input 1 reverse Input 2 reverse	Sets whether to invert the value of Input 0/1/2. "yes" to invert them, then perform the logical operation, and "no" to not invert.	No Yes
The input 1 of logic The input 2 of logic	Enables logical inputs 1 or 2, and related communication object "Logic 1" or "Logic 2" is visible.	Disable Enable
Logic function type *)	Sets the logical relationship of the logical operation. Three standard logical operations (AND, OR, XOR) and a "GATE" function are available. The application process of the "GATE" function is the condition of next logic, i.e., enabling flag of the previous logic. If the enabling flag of next logic is "1", the previous logical condition can be used as the result of the operation. If Input 1 value is 1, Input 0 value can be used as the result of the operation. If Input 2 value is 1, the value of Input 1 or Input0/Input1 can also be used as the result of the operation.	AND OR XOR GATE
Result reverse	Sets whether to invert the result of the logical operation. "yes" to invert the result of the logical operation, and "no" to not invert.	No Yes

Name	Description	Range
Value of input 1 after bus recovery	Defines the default logic value of the object "Logic 1" after the bus voltage restore. "1", "0", or "Value before power off" is available.	0 1 Value before power off
Value of input 2 after bus recovery	Defines the default logic value of the object "Logic 2" after the bus voltage restore. "1" or "0" is available.	0 1

Note:

*) The following results are possible:

Functions	Object values					Description
	Input0 (Switch)	Input1	Result of Input 0/1	Input2	Output	
AND	0	0	0	0	0	The result is 1 only if both input values are 1.
	0	1	0	1	0	
	1	0	0	0	0	
	1	1	1	1	1	
OR	0	0	0	0	0	If each of the two input values is 1, the result is 1.
	0	1	1	1	1	
	1	0	1	0	1	
	1	1	1	1	1	
XOR	0	0	0	0	0	When the two input values are different, the result is 1.
	0	1	1	1	0	
	1	0	1	0	1	
	1	1	0	1	1	
GATE	0	Closed	0	Closed	0	When the GATE is open (open "1"), the value of the logical value or the logical operation is allowed, otherwise it is ignored and not be saved.
	0	Open		Open		
	1	Closed		Closed		
	1	Open		Open		

Note:

1. The object "Input 1" value is logically calculated with the object "Switch" value. And then the result is logically calculated with the object "Input 2" value and the calculation result are used as the final output.
2. If an input is not enabled, it is ignored.
3. If the logical result is inverted, firstly invert, and then perform next operation.
4. For GATE function, when the GATE is open, the signal can pass through, otherwise it is ignored. For example, when the GATE to Input1 is closed, the logical value of Input0 is ignored, and the output is directly determined by Input2.

3.3.4 "Ox: Scene" parameters

"Ox: Scene" parameters display when the parameter "Function of "Scene" in "Ox: Function" is selected as "Enable". A total of 8 scenes can be set.

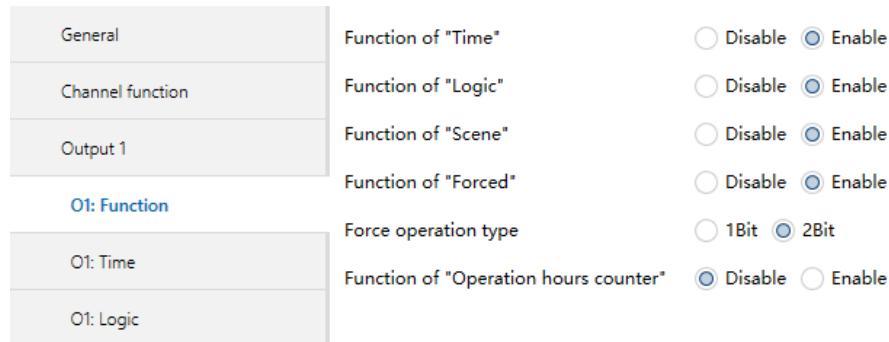
General	Overwrite scene stored values during download	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Channel function	1> channel is assigned to (1...64,0=no assignment)	0
Output 1	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close
O1: Function	2> channel is assigned to (1...64,0=no assignment)	0
O1: Time	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close
O1: Logic	3> channel is assigned to (1...64,0=no assignment)	0
O1: Scene	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close
	4> channel is assigned to (1...64,0=no assignment)	0
	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close
	5> channel is assigned to (1...64,0=no assignment)	0
	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close
	6> channel is assigned to (1...64,0=no assignment)	0
	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close
	7> channel is assigned to (1...64,0=no assignment)	0
	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close
	8> channel is assigned to (1...64,0=no assignment)	0
	Standard output value is	<input checked="" type="radio"/> Open <input type="radio"/> Close

Name	Description	Range
Overwrite scene stored values during download	Sets whether to enable override saved scene values during application downloads. <ul style="list-style-type: none"> Disable: Disables. During the application download, the saved scene values are not overwritten by the parameterized scene. When the scene is triggered, the previously saved scene is still enabled until replaced by a new stored scene. Enable: Enable. During the application download, the saved scene values are not overwritten by the parameterized scene. When the scene is triggered, the parameterized scene is still used until replaced by a new stored scene. 	Disable Enable
Channel is assigned to (1...64, 0= no assignment)	Each output can be assigned 64 different scene numbers. Each output can be set up to 8 different scenes at the same time. Note: Scenes No.1...64 correspond to telegram values 0...63. When bus voltage is restored again, the saved new scene values are not reset.	Scene 1... Scene 64 0 = no assignment
Standard output value is	Sets the output state of the channel when the scene is triggered.	Open Close

3.3.5 "Ox: Forced" parameters

"Ox: Forced" parameters display when the parameter "Function of "Forced"" in "Ox: Function" is selected as "Enable"

"Function of "Forced"" is activated by the object "Forced output" and the forced function is used in some special cases. For example, in the event of an emergency, the forced function has the highest priority in the system, that is, when the forced function is activated, other actions will be ignored.



Name	Description	Range
Force operation type	<p>Sets the data type of the object enabling forced function.</p> <ul style="list-style-type: none"> When "1 bit" is selected, the object "Forced output" receives telegram "1" to enable forced function and "0" to cancel. When "2 bit" is selected, the object "Forced output" receives telegrams to perform operations as below table: <p>The value of the object "Forced output, X"</p> <p>00b (0), 01b (1) 10b (2) 11b (3)</p>	<p>1 bit 2 bit</p>
	Actions performed	Cancel the forced function, other actions are available.
	OFF	
	ON	
Contact position if forced operation	<p>This parameter is visible when the object data type is "1 bit" and sets the contact position of the channel output when the forced function is activated.</p> <ul style="list-style-type: none"> Unchange: The position of the delay contact does not change; Open: The relay contact position is open; Close: The relay contact position is closed. <p>Forced functions have the highest priority, and all other actions are ignored during the forced operation. During the forced operation, the received telegrams are ignored.</p>	<p>Unchange Open Close</p>

3.3.6 "Ox: Operation hours counter" parameters

"Ox: Operation hours counter" parameters display when the parameter "Function of "Operation hours counter"" in "Ox: Function" is selected as "Enable". Records the duration of relay-on.

General	Function of "Time"	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Channel function	Function of "Logic"	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Output 1	Function of "Scene"	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
O1: Function	Function of "Forced"	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
O1: Time	Function of "Operation hours counter"	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
O1: Logic	Object datatype of "Operation hours counter"	<input type="radio"/> 2 byte Value in h(DPT7.007) <input checked="" type="radio"/> 4 byte Value in s(DPT13.100)
O1: Scene	Cyclically send counter value in h[0...100] (0 = not send,only for reading)	0 <input type="button" value="▼"/>

Name	Description	Range
Object datatype of "Operation hours counter"	Sets the data type of time that records the loop output. <ul style="list-style-type: none"> The "2 byte Value in h (DPT 7.007)" indicates that the count value is 2 bytes; The "4 byte Value in s (DPT 13.100)" indicates that the count value is 4 bytes. 	2 byte Value in h (DPT 7.007) 4 byte Value in s (DPT 13.100)
Cyclically send counter value in h [0...100] (0 = not send, only for reading)	Sets the time interval that the power-up time is sent periodically. "0" indicates that the power-up time is not sent periodically, and "1...100" indicates the power-up time is sent once from 1 to 100 hours. When the parameter "Object of switch and operation hours counter" is set to 2 bytes, operation time is measured in hours and in s when set to 4 bytes.	0...100

3.3.7 Switch output -- Switch actuator communication objects

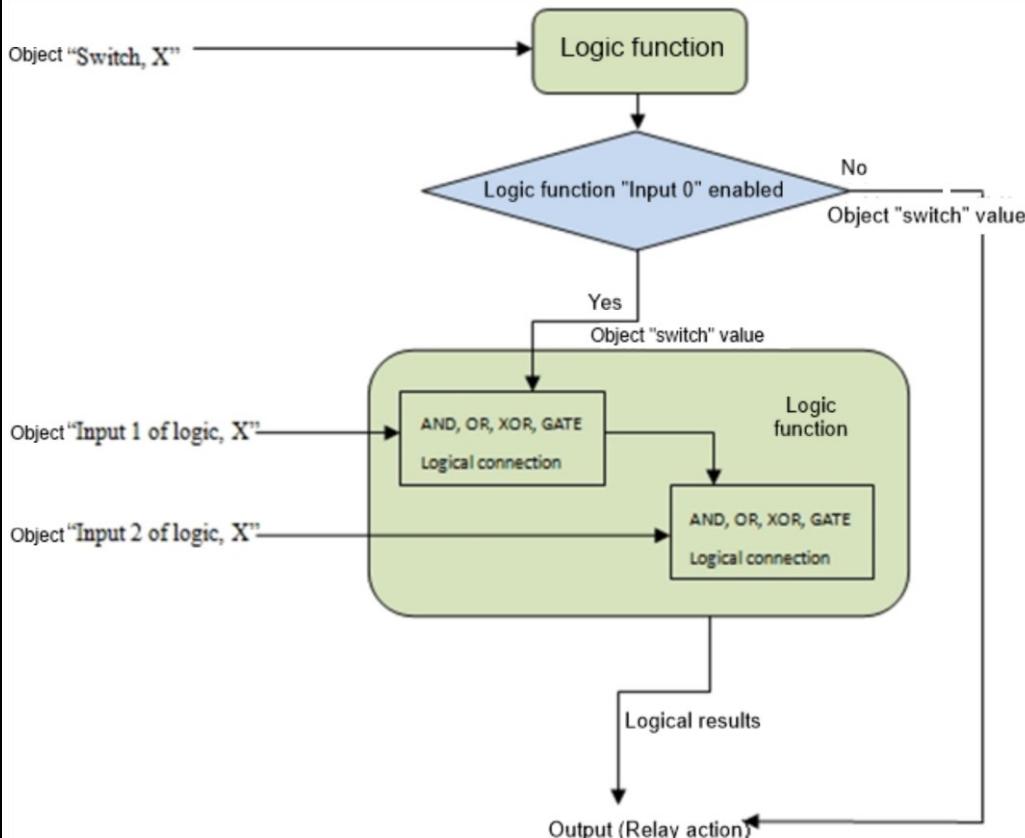
Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
211	General	Central control for all switch			1 bit	C	-	W	-	-	switch	Low
212	Output 1	Switch			1 bit	C	-	W	-	-	switch	Low
213	Output 1	Switch status			1 bit	C	R	-	T	-	switch	Low
214	Output 1	Enable time function			1 bit	C	-	W	-	-	enable	Low
215	Output 1	Delay function			1 bit	C	-	W	-	-	switch	Low
216	Output 1	Operation hours counter			4 bytes	C	R	W	T	U	time lag (s)	Low
217	Output 1	Scene			1 byte	C	-	W	-	-	scene control	Low
218	Output 1	Forced output			1 bit	C	-	W	-	-	enable	Low
219	Output 1	Logic 1			1 bit	C	-	W	-	-	boolean	Low
220	Output 1	Logic 2			1 bit	C	-	W	-	-	boolean	Low
218	General	In operation			1 bit	C	-	-	T	-	switch	Low
215	Output 1	Flashing function			1 bit	C	-	W	-	-	switch	Low
215	Output 1	Staircase function			1 bit	C	-	W	-	-	switch	Low
218	Output 1	Forced output			2 bit	C	-	W	-	-	switch control	Low

No.	Name	Object function	Length	Flag	Data type
218	General	In operation	1 bit	CT	1.001 DPT_Switch
Periodically sends the telegram "1" to the bus to indicate that the device functions properly and this object is always enabled.					
1	General	Central control for all switch	1 bit	CW	1.001 DPT_Switch
Centralized controls switching outputs. The output can be centrally controlled only when the switching output channel of centralized control is enabled. 0 – off 1 – on					

No.	Name	Object function	Length	Flag	Data type
2	Output X	Switch	1 bit	CW	1.001 DPT_Switch

Triggers the switch operation.

When "Input 0" is enabled in the logic function, the object "Switch, X" cannot directly trigger the switch operation. The switch operation is affected by the logic function. For details, see the following flowchart:



3	Output X	Switch status	1 bit	CRT	1.001 DPT_Switch
---	----------	---------------	-------	-----	------------------

The value of this object (as defined by the parameter "Object value of switch status: ") can directly indicate the status of the relay contacts.

- When "Respond after read only" is selected, this object sends the present switch state to the bus only when the device receives a request from the bus to read the switch state of that channel;
- When "Respond after change" is selected, this object immediately sends the present switching state to the bus when the channel switching state changes.

4	Output X	Enable time function	1 bit	CW	1.003 DPT_Enable
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The object is enabled when the time function is enabled, and the time function can be disabled by this object. When telegram value "1" is received, the time function is enabled and "0" to disable. But the operation before the disabling is executed continuously, and the time control command received during the disabling is ignored.

When the time function is enabled, the time function is on by default when the bus voltage restores.

5	Output X	Delay function	1 bit	CW	1.001 DPT_Switch
---	----------	----------------	-------	----	------------------

Turns on time delay switch. It displays when parameter "Type of time function" is selected as "Delay".

5	Output X	Flashing function	1 bit	CW	1.001 DPT_Switch
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Turns on flashing switch. It displays when parameter "Type of time function" is selected as "Flashing".

5	Output X	Staircase function	1 bit	CW	1.001 DPT_Switch
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Turns on staircase light function. It displays when parameter "Type of time function" is selected as "Staircase".

6	Output X	Operation hours counter	2 byte 4 byte	CRWT U	7.007 DPT_TimePeriodHrs 13.100 DPT_LongDeltaTimeSe
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Reports the power-up time of the load on this circuit. It displays when parameter "Function of "Operation hours counter" is selected as "Enable". The data type can be selected via "Object datatype of "Operation hours counter". The unit of the 2 byte is in hour and 4 byte is in seconds.

No.	Name	Object function	Length	Flag	Data type																						
7	Output X	Scene	1 byte	CW	18.001 DPT_SceneControl																						
Sends an 8-bit command to invoke or store the scene. It displays only when the scene function is enabled. The meaning of the 8-bit command is described in detail as below.																											
Set an 8 bit command (binary encoded): FXNNNNNN																											
<ul style="list-style-type: none"> • F: "0" triggers the scene, and "1" saves the scene. • X: Reserved (0); • NNNNNN: Scene number (0... 63). 																											
The parameter setting option is 1...64, the scene telegram received by the object "Scene" corresponds to 0...63. If scene 1 is set in the parameter, the object "Scene" receives scene telegram 0. As follows:																											
<table border="1"> <thead> <tr> <th>The object telegram value</th><th>Description</th></tr> </thead> <tbody> <tr> <td>0</td><td>Recall scene 1</td></tr> <tr> <td>1</td><td>, Recall scene 2</td></tr> <tr> <td>2</td><td>, Recall scene 3</td></tr> <tr> <td>...</td><td>....</td></tr> <tr> <td>63</td><td>Recall scene 64</td></tr> <tr> <td>128</td><td>Save scene 1</td></tr> <tr> <td>129</td><td>: Save scene 2</td></tr> <tr> <td>130</td><td>: Save scene 3</td></tr> <tr> <td>...</td><td>....</td></tr> <tr> <td>191</td><td>Save scene 64</td></tr> </tbody> </table>						The object telegram value	Description	0	Recall scene 1	1	, Recall scene 2	2	, Recall scene 3	63	Recall scene 64	128	Save scene 1	129	: Save scene 2	130	: Save scene 3	191	Save scene 64
The object telegram value	Description																										
0	Recall scene 1																										
1	, Recall scene 2																										
2	, Recall scene 3																										
...																										
63	Recall scene 64																										
128	Save scene 1																										
129	: Save scene 2																										
130	: Save scene 3																										
...																										
191	Save scene 64																										
8	Output X	Forced output	1 bit 2 bit	CW	1.003 DPT_Enable 2.001 DPT_Switch control																						
Enabled when the forced function is enabled.																											
<ul style="list-style-type: none"> • When 1 bit is selected, telegram value "1" to enable forced function and ignores other actions except the forced operation; telegram value "0" to end the forced operation. The contact position during forced operation is determined by the parameters. • When 2 bits is selected, telegram value "3" to forcibly close the contact and telegram value "2" to forcibly open the contact. Telegram "1" or "0" to cancel the enforcement mode. 																											
9	Output X	Logic 1	1 bit	CW	1.002 DPT_Bool																						
Used for the logical input of input 1. Displays when parameter "The input 1 of logic" is selected as "Enable".																											
10	Output X	Logic 2	1 bit	CW	1.002 DPT_Bool																						
Used for the logical input of input 2. Displays when parameter "The input 2 of logic" is selected as "Enable".																											

3.4 Switch output --Heating actuator (without controller) parameters

The following parameters display when parameter "Work mode of the channel is" selected as "Heating actuator (without controller)". Under this operation mode, the device usually controls electric heating valve. A thermostat or temperature sensor controls the device operation to achieve constant room temperature.

Each output has two types of control commands — 1 bit and 1 byte. For 1 bit, object "On-off control value" is used to receive control telegram, and for 1 byte, object "Control value (Continuous)" receives control telegram.

In the control command, "0%/OFF" indicates the valve is closed, and "100%/ON" indicates the valve is open. The medium value of 0...100% indicates that the valve is open for x% of the time in a cycle and closed for the rest of the time.

Operations priority in the heating actuator control:

Initialization (after parameters downloaded) → direct operation (long press the direct operation button to switch to direct operation, and the button of the channel has an operation) → forced operation → manual bus operation or fault operation

The following are available:

1. During direct operation, the received control value and forced operation command are invalid, but the fault monitoring continues, and the control value can also reset the fault monitoring cycle. After exiting the direct operation, device acts as per the present fault state. If no fault, present state is kept until a new control command is received. If a forced operation was previously executed, it returns to the forced operation state. After exiting forced operation, act as per the present control value or fault state;
2. When the force mode ends, the valve output state returns to the present control value or fault state. During the forced operation, the received manual bus operation telegram is recorded.

1 bit (on-off control or PWM)

General	Work mode of the channel is	<input type="radio"/> Switch actuator <input checked="" type="radio"/> Heating actuator(without controller)
Channel function	Valve type	<input type="radio"/> Normal (de-energised closed) <input checked="" type="radio"/> Inverted (de-energised open)
Output 1	If bus failure, contact is	Unchange
	If bus recovery, valve position	0%[Closed]
Output 2	PWM cycle time for continuous [60..65535]s	120
Output 3	Control telegram is received as	<input type="radio"/> 1bit (on-off control or PWM) <input type="radio"/> 1byte (Continuous)
Output 4	Reply the status for contact	Yes, 0=contact close; 1=contact open
	Function for monitoring is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Cyclic monitoring of thermostat [0..65535]	120
	Valve position during fault	0%[Closed]
	Send object "Report fault" is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Function of forced operation is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Valve position during forced operation	20%[51]

1 byte (Continuous)

General	Work mode of the channel is	<input type="radio"/> Switch actuator <input checked="" type="radio"/> Heating actuator(without controller)
Channel function	Valve type	<input type="radio"/> Normal (de-energised closed) <input checked="" type="radio"/> Inverted (de-energised open)
Output 1	If bus failure, contact is	Unchange
	If bus recovery, valve position	0%[Closed]
	PWM cycle time for continuous [60..65535]s	120
	Control telegram is received as	<input type="radio"/> 1bit (on-off control or PWM) <input checked="" type="radio"/> 1byte (Continuous)
	Reply the status for continuous control	Yes, continuous control value (1byte)
	Reply the status for contact	Yes, 1=contact close; 0=contact open
	Function for monitoring is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Cyclic monitoring of thermostat [0..65535]	120
	Valve position during fault	0%[Closed]
	Send object "Report fault" is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Function of forced operation is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Valve position during forced operation	20%[51]

Name	Description	Range
Valve type	Sets the type of valve switch. For on/off valves, "Normal (de-energized closed)" is for normally closed on/off valves, and "Inverted (de-energized open)" for normally open on/off valves.	Normal (de-energized closed) Inverted (de-energized open)

Name	Description	Range
If bus failure, contact is	<p>Sets the position of the relay contacts when the bus power fails.</p> <ul style="list-style-type: none"> When "Unchange" is selected, the relay contacts are not change; When "Open" is selected, the relay contacts are open; When "Close" is selected, the relay contacts are closed. <p>When the bus voltage fails, the above settings can only be performed if the relay has enough energy.</p>	Unchange Open Close
If bus recovery, valve position	<p>Sets on/off state of the valve when the bus voltage restores. The state remains until receiving control command or entering fault mode.</p> <p>For example, when 20% is set, if the PWM cycle is 100 s (1 minute 40 s), then the valve on/off cycle is 20 s on and 80 s off.</p>	0% [Closed] 10% [26] 20% [51] ... 90% [203] 100% [Open]
PWM cycle time for continuous [60...65535]s	<p>Sets the period for pulse width modulation (PWM).</p> <p>Note: To prolong the service life of the relay and the controlled equipment, the pulse cycle should be set as long as possible.</p> <p>For 1 bit control, pulse width modulation (PWM) only controls the driver operation in the event of a fault, forced operation mode, and bus voltage recovery.</p>	60...65535
Control telegram is received as	<p>Sets the telegram type driving the valve control.</p> <ul style="list-style-type: none"> For "1-bit" control, the valve control likes the normal on-off control: the room thermostat controls the output of the valve by means of a switch command. When the thermostat fails and the output does not receive a control signal, the valve automatically performs PWM action as per the valve position set under the fault. The PWM cycle time set by the channel is used for this purpose. For "1byte" control, the room thermostat sends control values in the range of 0...255 (corresponding to 0...100%). This process is also known as "continuous-action control". The valve is closed at 0%, fully open at 100%. If the value is in the range of 0...100 %, the channel adjusts the output via pulse duty cycle. <p>Note: In the dynamic adjustment function, each time a continuously adjusted telegram is received, the channel recalculates the duty cycle of the pulse as per the new control value. When the time ends, it performs as per the new control value.</p>	1bit (on-off control or PWM) 1byte (Continuous)
The following parameter displays only when "1byte (Continuous)" is selected.		
{	Reply the status for continuous control	<p>Sets whether to report the status of the controlled valve. Two types are available, 1 bit and 1 byte, depending on the type of controlled device.</p>
		No reply Yes, 0% = 0, otherwise "1" (1 bit) Yes, 0% = 1, otherwise "0" (1 bit) Yes, continuous control value (1 byte)

Name	Description	Range
Reply the status for contact	<p>Sets whether the device reverts to the on/off state of the contacts.</p> <ul style="list-style-type: none"> When setting "No reply", the object does not revert to the contact status; When setting "0=contact close; 1=contact open", object "status of contact" value "0" indicates the relay contact is closed, and the value "1" indicates open. When setting "1=contact close; 0=contact open" indicates the opposite. <p>Note: After programming or system reset, if the switching state is determined, the object "status of contact" sends a status telegram to the bus; otherwise, not send.</p>	No reply Yes, 0 = contact close; 1 = contact open Yes, 1 = contact close; 0 = contact open
Function for monitoring is	Sets whether to enable the function of monitoring control values.	Disable Enable
The following parameters display only when "Enable" is selected.		
	<p>Cyclic monitoring of thermostat [0...65535]s</p> <p>Sets the time that the device monitors the control telegrams from the thermostat. Generally, device receives the control telegram of the room thermostat at certain intervals. If one or more adjacent control telegrams are not received, this function can indicate communication error or thermostat malfunction. If no control telegram from the thermostat is received within the time set by this parameter, the device automatically starts the fault mode. The fault mode ends when the device receives the control telegram again. Each time a control telegram is received, the monitoring time counts again.</p> <p>Note: If this function is activated, the room thermostat must periodically send control telegrams. The monitoring time should be greater than the interval that the controller sends control telegrams.</p>	0...65535
	<p>Valve position during fault</p> <p>Sets the valve position in the fault mode, and the valve opens/closes as per the PWM cycle.</p> <p>For example, if the PWM cycle is 100 s (1 minute 40 s), then the valve on/off cycle is 20 s on and 80 s off. If "Unchange" is selected, the valve position does not change.</p>	0% [Closed] 10% [26] ... 100% [Open] Unchange
	<p>Send object "Report fault" is</p> <p>Sets whether to send telegram to report the fault in the fault mode. If enabled, when the device does not receive a control value within the monitoring time, an error report is sent. This channel performs dynamic actions in the fault mode until interrupted by other operations. If receiving control value again, the monitoring time recounts.</p> <p>Object "Report fault" is activated when "Enable" is selected. When the object value is "1", it indicates the channel is in fault mode, and "0" indicates not in fault mode.</p>	Disable Enable
Function of forced operation is	Sets whether to enable the forced operation function.	Disable Enable

Name	Description	Range
The following parameter displays only when "Enable" is selected.		
{	<p>Valve position during forced operation</p> <p>Sets the valve position under forced operation. The valve opens/closes as per the PWM cycle.</p> <p>If "Unchange" is selected, the valve position does not change.</p> <p>When the force mode ends, the valve output state returns to the previous operation. For example, if the valve position is 40% under forced operation and 60% in previous operation, the valve output state returns to 60% after exiting the forced operation.</p> <p>During the forced operation, the monitoring time continues, and an error report will be sent when the monitoring time is up. But the action under the fault cannot be executed and can only be executed after exiting the forced operation.</p> <p>During the forced operation, the received control telegram of the manual operation is recorded.</p>	0% [Closed] 10% [26] ... 100% [Open] Unchange

3.4.1 Switch output -- Heating actuator (without controller) communication objects

1 bit (on-off control or PWM)

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
2	Output 1	On-off control value			1 bit	C	-	W	-	-	switch	Low
3	Output 1	Status of contact			1 bit	C	R	-	T	-	switch	Low
7	Output 1	Report fault			1 bit	C	R	-	T	-	alarm	Low
8	Output 1	Forced output			1 bit	C	-	W	-	-	enable	Low

1 byte (Continuous)

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
3	Output 1	Status of contact			1 bit	C	R	-	T	-	switch	Low
5	Output 1	Control value(Continuous)			1 byte	C	-	W	-	-	percentage (0..100%)	Low
6	Output 1	Status of continuous, 1byte			1 byte	C	R	-	T	-	percentage (0..100%)	Low
7	Output 1	Report fault			1 bit	C	R	-	T	-	alarm	Low
8	Output 1	Forced output			1 bit	C	-	W	-	-	enable	Low
4	Output 1	Status of continuous, 1bit			1 bit	C	R	-	T	-	switch	Low

No.	Name	Object function	Length	Flag	Data type
2	Output X	On-off control value	1 bit	CW	1.001 DPT_Switch

Receives a 1 bit control command.

When parameter "Valve type" is set to:

- "Normal (de-energised closed)", the object value "0" to close, and "1" to open
- "Inverted (de-energised closed)", the object value "1" to close, and "0" to open

This communication object displays when the parameter "Control telegram is received as" is set to "1 bit (on-off control or PWM)".

3	Output X	Status of contact	1 bit	CRT	1.001 DPT_Switch
---	----------	-------------------	-------	-----	------------------

This communication object is enabled when the parameter "Reply the status for contact" is set to "Yes, 1 = contact close; 0 = contact open" or "Yes,0 = contact close ; 1 = contact open". Indicates the present relay contact position.

5	Output X	Control value (Continuous)	1 byte	CW	5.001 DPT_Scaling
---	----------	----------------------------	--------	----	-------------------

Receives 1 byte control command. This communication object displays when the parameter "Control telegram is received as" is set to "1 byte (Continuous)". The object value range is 0... 100%. If value "0%" received, the valve is closed; value "100%" received, the valve is fully open.

4	Output X	Status of continuous, 1bit	1 bit	CRT	1.001 DPT_Switch
---	----------	----------------------------	-------	-----	------------------

This communication object is enabled when the parameter "Reply the status for continuous control" is set to "Yes,0% = 0, otherwise "1" (1bit)" or "Yes,0% = 1, otherwise "0" (1bit)". The object indicates present value operating status.

- If "Yes, 0% = 0, otherwise "1" (1 bit)" is selected, the telegram value "0" indicates valve is closed, otherwise value is "1".
- If "Yes, 0% = 1, otherwise "0" (1 bit)" is selected, the telegram value "1" indicates valve is closed, otherwise value is "0".

6	Output X	Status of continuous, 1byte	1 byte	CRT	5.001 DPT_Scaling
---	----------	-----------------------------	--------	-----	-------------------

This communication object is enabled when the parameter "Reply the status for continuous control" is set to "Yes, continues control value (1byte)". The object indicates the present valve operating status and can know the duty cycle setting value for pulse width modulation (PWM).

No.	Name	Object function	Length	Flag	Data type
7	Output X	Report fault	1 bit	CRT	1.005 DPT_Alarm
This communication object is enabled when the monitoring feature is enabled and the parameter "Send object "Report fault" is" is selected as "Enable". Indicates if the room thermostat malfunctions, value "1" indicates a failure mode and "0" means exiting the failure mode.					
8	Output X	Forced output	1 bit	CW	1.003 DPT_Enable
Enabled when the forced function is enabled. When the logical value of 1 is received, the device ignores other actions except for the force mode and ends the force mode after receiving the logical value of 0. The valve position during force mode is defined by the parameters. After exiting the forced operation, the valve position returns to the previous control state.					

3.5 Solar protection AC

Operation priority in solar protection control:

Initialization (after parameters downloaded) → direct operation (long press the direct operation button to switch to direct operation, and the button of the channel has operation) → safety 2 → safety 1 → direct or manual bus operation or automatic bus operation

The following are available:

1. Any common operation command including curtain movement can exit the automatic bus operation;
2. During the direct operation, the received trigger value or reset value from automatic bus operation or safety operation is recorded. When exiting the direct operation, the action will be executed as per the priority. After exiting all actions, returns to manual bus operation or automatic bus operation.
3. When exiting the direct operation, if there is no priority operation and need return to manual bus operation or automatic bus operation, the output state remains unchanged until new control command is received;
4. In the case of direct or safe operation activation, the automatic bus operation cannot be automatically activated, and the duration of automatic bus operation activation will not be timed until exiting direct and safe operation. (In direct or safe operation, the timing will be interrupted and continues after exiting the direct or safety.)

The curtain (AC) output has up to 12 output channels. Since each output is assigned the same parameters and communication object, take one channel as an example.

3.5.1 "Curtain X: Venetian Blind" parameter

"Curtain X: Venetian Blind" sets the general parameters of the curtain output.

General	Config channel function as	<input checked="" type="radio"/> Venetian Blind <input type="radio"/> Shutter
Channel function	Motor type	AC-motor
Curtain 1	If bus recovery, position is	Unchange
	If bus failure, position is	Unchange
C1: Drive	After reference movement, position is	Disable
C1: Automatic	Position of slat after arriving on lower end position	1
C1: Scene	When blind is under end position, up/down object function is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
C1: Safety	Set response mode for position	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
Curtain 2	Central function of channel	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Name	Description	Range
Config channel function as	<p>Sets the channel operation mode, and two operation modes are available. Different operation modes correspond to different parameters and communication objects.</p> <ul style="list-style-type: none"> When option "Venetian Blind" is selected, working mode is venetian blind operation mode, i.e., can operate blinds with slats. When option "Shutter" is selected, it works similarly as the "Venetian Blind" mode, except that it cannot adjust the slats. 	Venetian Blind Shutter
Motor type	<p>Sets blinded drive type.</p> <ul style="list-style-type: none"> "AC-motor" is suitable for 230 V AC drives. 	AC-motor
If bus recovery, position is	<p>Sets the action that the channel shutter performs after the device is reset on the bus.</p> <ul style="list-style-type: none"> When "Unchange" is selected, the channel's blinds remain in present state when the bus is powered up; When "Up" is selected, the channel's shutter runs to the highest position when the bus is powered up; When "Down" is selected, the channel's shutter runs to the lowest position when the bus is powered up; When "Stop" is selected, channel's blinds stop if they are moving when the bus is powered up. <p>After programming, all output contacts disconnect.</p> <p>Note: After programming or resetting, if the shutter actuator cannot determine the position state of the present output, then the object "position state" value will be 50% and will not be sent to the bus. And the status telegram will be sent to the bus only after the position is determined.</p> <p>After programming, if the blinds need to be positioned clearly, the blinds firstly run to the top or bottom (moving to the extreme position in the direction close to the target position) to perform a full run to determine the present position, and then move to the target position. That is, only when the shutter performs a full run, it can be clearly positioned.</p>	Unchange Up Down Stop
If bus failure, position is	<p>Sets the action that the channel shutter performs when bus power fails.</p> <ul style="list-style-type: none"> When "Unchange" is selected, the channel's blinds remain in their present state when bus power fails; When "Up" is selected, the channel's shutter runs to the highest position when bus power fails; When "Down" is selected, the shutter of the channel runs to the lowest position when bus power fails; When "Stop" is selected, channel's blinds stop if they are running when bus power fails. <p>Note: If the curtain is running when power fails and users want to perform a reverse operation after the power fails. Then the reverse operation will not be executed, and the curtain remains the operating state. Because the blind needs to stop first to perform a reverse operation, but there is no time to do all these operations after the power is off. If the action is stop after the power failure, it will be executed.</p>	Unchange Up Down Stop

Name	Description	Range
After reference movement, position is	<p>Specifies how the blind actuator behaves when performing a reference movement.</p> <ul style="list-style-type: none"> When "Disable" is selected, reference movement is not activated. If "No reaction" is selected, when object "reference movement" receives telegram "0" the shutter runs to the top; telegram "1" to the bottom. If "Move to saved position" is selected, when object receives telegram "1" the shutter runs to the bottom and then returns to the original position, and telegram "0" to the top and then returns to the original position. <p>During the blind movement, the actuator continuously monitors blind position, as well as the slat's angle. For long time use, the detected location maybe a little inaccurate due to temperature changes and aging. Therefore, when using the upper and lower limit positions of the blind actuator, present blind position should be clearly defined. The upper or lower limit position of the blind updates inside the blind actuator each time.</p> <p>If, in manual bus operation, the limit position does not reach, a reference movement may be triggered via a bus telegram to move shutter to the top or bottom. Depending on the parameter settings, the shutter may remain in the reference position after moving or move to the original position.</p>	Disable No reaction Move to saved position
Position of slat after arriving on lower end position	<p>After the shutter moves to the lowest position, the shutter angle can be defined by this parameter.</p> <p>For example, if "40%" is selected, the slat's angle will be adjusted to 40% when the object "Move UP/DOWN" receives the telegram "1".</p> <p>Note: Currently, this parameter only affects the down action (for functional parameter to set "down") except safe operation and the percentage control method.</p>	0%/10%.../90%/1
When blind is under end position, up/down object function is	<p>Defines whether the curtain can also be moved by object "Move UP/DOWN" when the curtain reaches the top/bottom end.</p> <ul style="list-style-type: none"> When "Disable" is selected, curtain cannot be moved. When "Enable" is selected, curtain can move and the moving time is full time. 	Disable Enable
Set response mode for position	<p>Defines feedback method of the position state.</p> <ul style="list-style-type: none"> If "Respond after read only" is selected, object "Position status 0...100%/Slat status 0...100%" sends the present shutter position to bus only when the device receives the read demand from other devices or bus; If "Respond after change" is selected, object "Position status 0...100%/Slat status 0...100%" immediately sends telegram to bus to report present shutter position status when shutter position changes. 	Respond after read only Respond after change
Central function of channel	<p>Sets whether centralized control of the channel is enabled or disabled.</p> <p>When enabled, the channel is controlled by the centralized control objects "Central control for Up/Down" and "Central control for Slat/Stop".</p>	Disable Enable

3.5.1.1 "Cx: Drive" parameters

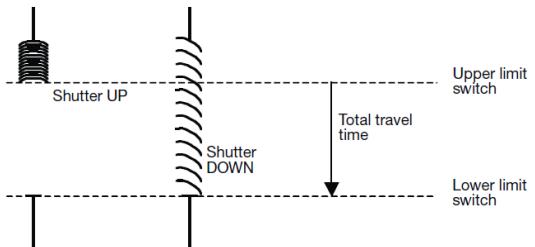
"Cx: "Drive" sets the parameters associated with the drive of venetian blind and shutter. The present blind position can be estimated based on running and total moving time. The present slat angle can be estimated based on the angle adjustment and total moving time of slat. Also, the start delay and pause time are needed when changing direction can be set here. Technical parameters and moving time of different shutter drives differ. Therefore, before using the shutter, it is necessary to understand technical parameters and set exactly and correctly.

Venetian Blind (with slats)

General	Total moving time [20..50000]* 0.1s	600
Channel function	Delay time from switch-on to moving [0..200] *10ms	0
Curtain 1	Duration of Slat adjustment [10...250]*10ms	20
C1: Drive	Total moving time of Slat 0-100 % in [10..250]*10ms	100
C1: Automatic	Pause on change in direction [5...255]*20ms	50
C1: Scene	Additional moving time in upward direction [0..255]*0.1s	0
C1: Safety		

Shutter (without slats)

General	Total moving time [20..50000]* 0.1s	600
Channel function	Delay time from switch-on to moving [0..200] *10ms	0
Curtain 1	Pause on change in direction [5...255]*20ms	50
C1: Drive	Additional moving time in upward direction [0..255]*0.1s	0
C1: Automatic		
C1: Scene		
C1: Safety		

Name	Description	Range
Total moving time [20...50000]* 0.1s	<p>Sets the time for the total blinds moving.</p> <p>The total moving time is the time that shutter moves from the highest position to the lowest (as shown in the figure below). When the shutter actuator receives a command to move up or down, the shutter moves as per required until receiving a stop moving command or turns off the motor via limitation switch until moving to the highest or lowest position. If the shutter is closed by the motor, the corresponding output of the connected actuator remains closed and the output connection disconnects only after the set total moving time for the movement passes.</p>  <p>Note: The present shutter position during operation is estimated by the total moving time of the movement. It is important to measure and set the total moving time as precisely as possible, especially in the case of the use of "Move Positioning" and "Status Recovery". Therefore, present shutter position can be accurately calculated.</p>	20...50000

Name	Description	Range
Delay time from switch-on to moving [0...200]*10ms	Sets the delay time for the curtain/blind startup, i.e., buffer time of the motor startup. The setting of this parameter should be in conjunction with the technical characteristics of the curtain startup.	0...200
Duration of Slat adjustment [10...250]*10ms	Sets the slat angle adjustment time, i.e., when receiving a command to adjust the angle up or down, the time of slat angle adjustment. The shorter the time, the more accurate the angle adjustment. When the shutter moves upwards, the slat angle is usually open. If the shutter goes down, the slat angle closes first, and then the shutter moves downwards. If the shutter rises again, the slat angle opens first and then moves upwards. (as below)	10...250
Total moving time of Slat 0-100 % in [10...250]*10ms	Sets the total moving time required to adjust the slat angle from a fully closed to a fully open. Present slat angle during the slat angle adjustment is determined by this parameter. Therefore, it is important to measure and set the total moving time of the slat adjustment as precisely as possible, especially in the case of "slat angle positioning" and "status recovery", so that the present position of the slat can be accurately calculated. When the slat angle is adjusted by object "Slat adj./Stop", the maximum number of times the slat angle adjusted from fully closed to fully open = total moving time / one adjustment time. One adjustment time is set by the parameter "Duration of Slat adjustment [10...250]*10ms". The shorter the value is set, the bigger adjustment number and the more accurate angle.	10...250
Pause on change in direction [5...255]*20ms	Sets the pause time when the direction of movement or angle adjustment changes. The pause time in the event of change of direction needs to be in conjunction with the technical information provided by the drive manufacturer to get an appropriate value. The pause can prevent the damage to blinds drive when unplanned direction change and can extend the drive life.	5...255
Additional moving time in upward direction [0...255]*0.1s	Sets the additional moving time when the curtain moves up to the limit position. If the target position is not the top, the moving time does not need to increase. If the blinds need to move to a target position after reaching to the top position 0%, for example during a reference movement, the additional moving time is needed. Note: The limit position means the curtain position is at 0%, and if this position reaches, the moving time of the upward movement increases.	0...255

3.5.1.2 "Cx: Automatic" parameters

"Cx: Automatic" sets automatic functions and solar protection operations. The blind actuator locates the blind position as per the light intensity acquired by the illuminance sensor. For example, when the sun is very weak or there is no light penetrating the window, the blinds/curtains can be raised to let as much light into the room as possible. If there is strong sunlight outside the window, lower the blinds/curtains and adjust the angle of the blinds so that direct light cannot penetrate the room. While the blinds are partially open to allow some diffuse light to enter the room.

General	Function automatic	<input type="radio"/> Inactive <input checked="" type="radio"/> Active
Channel function	Object value of 'Enable auto. control' after bus voltage recovery	<input checked="" type="radio"/> 0'(Disable auto. control) <input type="radio"/> 1'(Enable auto.control)
Curtain 1	Automatically enable for auto.control	<input type="radio"/> NO <input checked="" type="radio"/> Yes
C1: Drive	Enable auto. control after [10...6000min]	10
C1: Automatic	Sun protection	
C1: Scene	Position if sun = 1 (sun is shining)	Down
C1: Safety	Delay time on sun = 1 [0...65,535s]	10
	Position if sun = 0 (sun not shining)	Down
	Delay time on sun = 0 [0...65,535s]	10

Name	Description	Range
Function automatic	<p>Sets whether to activate the automatic control operation, i.e. the automatic solar protection function.</p> <p>When "Active" is selected, the following parameters and objects "Enable auto. control", "Sun operation", "Sun: blind/shutter position 0...100%" and "Sun: slat adj.0.. 100%" display.</p> <p>If the object "Enable auto. control" receives the value "1!", the operation of the shutter switches to automatic operation. If the "Enable auto. control" object receives the value "0" or the user sends a direct movement command (e.g. up/down, movement to a specific position), automatic mode is ended. Saving a scene does not end automatic operation.</p> <p>Manual and automatic operations have the same priority, but can't happen at the same time.</p> <p>Note: After the end of automatic operation or after the duration of automatic activation has expired (see parameter "Enable auto. Control after [10... 6000min]") the value "1" must be received again via the "Enable auto. control" object in order to reactivate automatic operation.</p>	Inactive Active

Name	Description	Range
The following parameters displays only when "Active" is selected.		
{	<p>Object value of 'Enable auto. control' after bus voltage recovery</p> <ul style="list-style-type: none"> When "0" is selected, the initial value of object "Enable auto. control" is 0, indicating that automatic operation is disabled after bus voltage recovery. When "1" is selected, the initial value of object "Enable auto. control" is 1, indicating that automatic operation is enabled after bus voltage recovery. 	"0" (Disable auto. control) "1" (Enable auto. control)
	Automatically enable for auto. control	Defines whether a automatic operation can be automatically reactivated after exiting via manual operation or object "Enable auto. control".
The following parameter displays only when "Yes" is selected.		
{	<p>Enable auto. control after [10...6000min]</p> <p>Defines the duration that automatic operation can be reactivated after exiting by a manual operation or an object. If the automatic operation is interrupted by object "Enable auto. control" or a manual operation within this time, the duration of the automatic activation will re-time.</p> <p>Note: Direct operations have the highest priority and then security actions. In the case of manual and safe operation activation, automatic operations cannot be automatically activated until manual and security operations are canceled. And the duration of automatic activation starts timing.</p>	10...6000 m
"Sun protection"		
Position if sun = 1 (sun is shining)	<p>Sets the shutter position during sun shining, i.e., the position shutter moves when object "Sun operation" receives the telegram "1", and the solar protection is activated at the same time.</p> <ul style="list-style-type: none"> If "No reaction" is selected, when object "Sun operation" receives telegram "1", it retains present operating state. If "Receive 1 byte value" is selected, when object "Sun operation" receives telegram "1", the shutter position is determined by value received via "Sun: blind/shutter position 0...100%" and "Sun: slat adj. 0...100%". After bus restore or programming, when two object values are uncertain, the default value is "130" (51%). Shutter position can be determined only when objects receive a value. The received value is saved in any operating state, including in a higher priority protection operating state. 	No reaction Up Down Stop Receive 1 byte value
Delay time on sun = 1 [0...65535s]	Sets the delay time, i.e., when object "Sun operation" receives the telegram "1", the time that the blind actuator to delay the execution of the operation. It mainly prevents the frequent operation of blind actuator due to light fluctuations, that may damage the device and affect the service life of the shutter motor.	0...65535 s
Position if sun= 0 (sun not shining)	Defines the shutter position and solar protection cancellation when object "Sun operation" receives the telegram "0".	No reaction Up Down Stop Receive 1 byte value

Name	Description	Range
Delay time on sun= 0 [0...65535s]	<p>Sets the delay time, i.e., when object "Sun operation" receives the telegram "0", the time that the blind actuator to delay the execution of the operation. It mainly prevents the frequent operation of blind actuator due to light fluctuations, that may damage the device and affect the service life of the shutter motor.</p> <p>A simple automatic solar protection system is as follows:</p> <pre> graph LR Sensor[Brightness sensor] --> AC[Automatic control activated] AC -- "1" --> PS1["Position for sun = 1"] AC -- "0" --> PS0["Position for sun = 0"] PS1 --> DP[Direct positioning via UP/DOWN or movement into position] DS[Automatic control deactivated] -- "0" --> DP </pre> <p>The illuminance sensor acquires external light intensity, and the buttons can be connected to a universal interface or other control switches on the bus.</p> <p>With the second switch of the button, the user can specify whether to activate the automatic sun protection function, or by manually controlling the blind. If the automatic sun protection is activated by the switch, the blind will automatically move until the automatic sun protection is disabled by the same switch, or the user sends a direct movement command (up/down, or move to a certain position) and the automatic function is disabled.</p> <p>The blind actuator receives a telegram from the illuminance sensor to inform user if there is direct light outside the window. Once the adjustable delay passes, the actuator adjusts the blinds as per the set position.</p>	0...65535 s

3.5.1.3 "Cx: Scene" parameters

"Cx: Scene" sets the main scene. Each output can be set max. 8 scenes at the same time, and different scenes can define different shutter positions and slat angles.

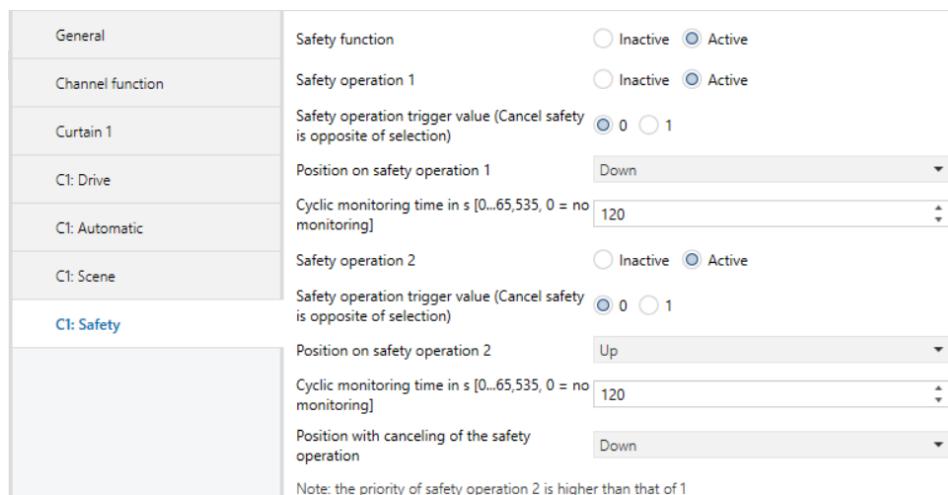
General	Function scene	<input type="radio"/> Inactive <input checked="" type="radio"/> Active
Channel function	Overwrite scene stored values during download	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Curtain 1	1> channel is assigned to (1...64, 0=no assignment)	0 <input type="button" value="▲"/> <input type="button" value="▼"/>
C1: Drive	Shutter position: 0-100% (0%=top,100% =bottom)	0 <input type="button" value="▲"/> <input type="button" value="▼"/>
C1: Automatic	2> channel is assigned to (1...64, 0=no assignment)	0 <input type="button" value="▲"/> <input type="button" value="▼"/>
C1: Scene	Shutter position: 0-100% (0%=top,100% =bottom)	0 <input type="button" value="▲"/> <input type="button" value="▼"/>
C1: Safety	3> channel is assigned to (1...64, 0=no assignment)	0 <input type="button" value="▲"/> <input type="button" value="▼"/>
	Shutter position: 0-100% (0%=top,100% =bottom)	0 <input type="button" value="▲"/> <input type="button" value="▼"/>
	4> channel is assigned to (1...64, 0=no assignment)	0 <input type="button" value="▲"/> <input type="button" value="▼"/>

Name	Description	Range
Overwrite scene stored values during download	<p>Sets whether to enable override saved scene values during application downloads.</p> <ul style="list-style-type: none"> • Disable: Disables During the application download, the saved scene values are not overwritten by the parameterized scene. And when the scene is triggered, the previously saved scene is still enabled until replaced by a new stored scene. • Enable: Enables. During the application download, the saved scene values are overwritten by the parameterized scene. And when the scene is triggered, the parameterized scene is used until replaced by a new stored scene. 	Disable Enable
Channel is assigned to (1...64, 0= no assignment)	<p>Each output can be set up to 8 different scenes at the same time and the scene number can be selected in the range of 1...64.</p> <p>Note: The valid scene number in the parameter setting option is 1...64, and the corresponding telegram is 0...63. When bus power fails, the new scene is saved. When it is powered on again, the new scene is called.</p>	Scene 1...Scene 64 0 = no assignment
Shutter position: 0...100% (0%=top,100%=bottom) Blind position: 0... 100% (0%=top,100%=bottom)	Sets the shutter position when the scene is called.	0... 100% 0% = top 100% = bottom
Slat position: 0...100% (0%=open,100%=close)	Sets the slat angle position of the slat when the scene is called.	0... 100% 0% = opened 100% = closed

3.5.1.4 "Cx: Safety" parameters

"Cx: Safety" sets the safe operation function of the blind.

In this interface, the shutter is set to perform the action when the safe operation function of each output is triggered. The settings of each channel are independent and do not affect each other.



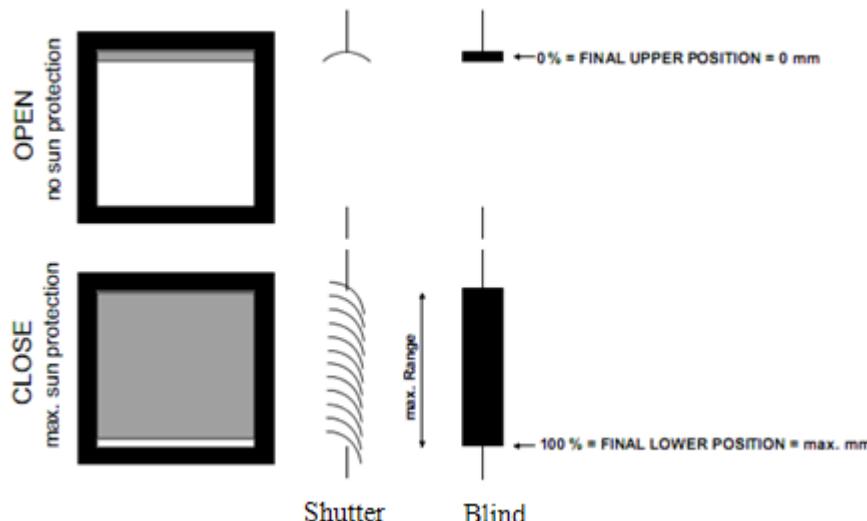
Name	Description	Range
Safety operation 1 Safety operation 2	<p>Sets whether to activate the safety operation function of the blind.</p> <ul style="list-style-type: none"> • When "Inactive" is selected, the security operation function is not activated; • If "Active" is selected, the security operation function is activated. 	Inactive Active

Name	Description	Range
The following parameters displays only when "Active" is selected. The conditions for triggering the safety operation function can be set, and the corresponding communication object "Safety operation 1/2" is enabled.		
Safety operation trigger value (Cancel safety is opposite of selection)	<p>Sets the trigger value for the safety operation function of the blind.</p> <ul style="list-style-type: none"> If the telegram is set to "0", when object "Safety operation 1/2" receives a telegram with a logical value "0", the security operation is triggered, and when the telegram "1" is received, the security operation is canceled and the monitoring period of the security operation will be reset. If the telegram is set to "1", when object "Safety operation 1/2" receives a telegram with a logical value of "1", the security operation is triggered, and when the telegram "0" is received, the security operation is canceled and the monitoring period of the security operation will be reset. 	0 1
Position on safety operation 1 Position on safety operation 2	Sets the action that the shutter performs after the safety action is triggered.	Unchange Up Down Stop
Cyclic monitoring time in s [0...65,535, 0 = no monitoring]	<p>Sets the monitoring period of the safe operation. To prevent the omission of the sensing signal when the bus is busy, the monitoring period should be at least twice the sensor's cyclic telegram cycle. For else, it may cause the blinds/curtains to move to the safe operation position unexpectedly. If the parameter value is set to "0", it indicates the monitoring of the security operation is not activated, and it can be directly controlled by safety operation object.</p> <p>If object "Safety operation 1/2" does not receive a telegram canceling the safety operation within the set monitoring time, the safety operation of the blind/curtain is triggered. And the blind/curtain performs the operation after the safety operation is triggered.</p>	0...65535
Position with canceling of the safety operation	<p>Sets the action that the shutter performs after the safe operation is canceled.</p> <p>This action will be executed only if the safety operation is entered, the cancel command is executed, and all the safety operations on the channel have been canceled.</p> <p>The safety operation of the blinds/shades has higher priority than other functions. If the safety operation of one output is activated, other operations on that output will be disabled, and priority of safety 2 is higher than safety 1.</p>	Unchange Up Down Stop

3.5.2 "Curtain X: Shutter"

The "Shutter" operation mode of the blind actuator is similar to that of the "Venetian Blind" mode in terms of parameters and communication objects, and the functions are similar. The difference is that there is no function to adjust the slat angle in the "Shutter" mode. The "Shutter" mode only involves the curtain movement without slats.

The difference between "Shutter" and "Venetian Blind" is as follows:



The "Shutter" operation mode is not described here. For functions, see operation mode (except the slat adjustment function) described in "Curtain X: Venetian Blind" parameter [→ 27].

3.5.3 Solar protection (AC) communication objects

The output communication objects of curtain AC and curtain DC are basically similar, so taking curtain AC output objects as an example.

Numb	Name	Object Function	Des Group	Length	C	R	W	T	U	Data Type	Priority
2	Curtain 1	Move UP/DOWN		1 bit	C	-	W	-	-	up/down	Low
3	Curtain 1	Slat adj/stop		1 bit	C	-	W	-	-	step	Low
4	Curtain 1	Reference movement		1 bit	C	-	W	-	-	up/down	Low
5	Curtain 1	Move to position 0..100%		1 byte	C	-	W	-	-	percentage (0..100%)	Low
6	Curtain 1	Slat position 0..100%		1 byte	C	-	W	-	-	percentage (0..100%)	Low
7	Curtain 1	Scene		1 byte	C	-	W	-	-	scene control	Low
8	Curtain 1	Position status 0..100%		1 byte	C	R	-	T	-	percentage (0..100%)	Low
9	Curtain 1	Slat status 0..100%		1 byte	C	R	-	T	-	percentage (0..100%)	Low
10	Curtain 1	Sun operation		1 bit	C	-	W	-	-	switch	Low
11	Curtain 1	Enable auto.control		1 bit	C	-	W	-	-	enable	Low
12	Curtain 1	Sun:blind position 0..100%		1 byte	C	-	W	-	-	percentage (0..100%)	Low
13	Curtain 1	Sunslat adj..100%		1 byte	C	-	W	-	-	percentage (0..100%)	Low
14	Curtain 1	Safety operation 1		1 bit	C	-	W	-	-	alarm	Low
15	Curtain 1	Safety operation 2		1 bit	C	-	W	-	-	alarm	Low
16	Curtain 1	Status of operation		1 byte	C	R	-	T	-	-	Low
531	General	Central control for Up/Down		1 bit	C	-	W	-	-	up/down	Low
532	General	Central control for Slat/Stop		1 bit	C	-	W	-	-	step	Low

No.	Name	Object function	Length	Flag	Data type
531	General	Central control for Up/Down	1 bit	CW	1.008 DPT_UpDown
Used for centralized control of curtain position, only if the curtain output channel of centralized control is enabled. Telegram '0' – Shutter moves up / Curtain opens Telegram '1' – Shutter moves down / Curtain closes					
532	General	Central control for Slat/Stop	1 bit	CW	1.007 DPT_Step
Used for centralized control to stop curtain movement or adjust the angle of the slat, only if the curtain output channel of centralized control is enabled. Telegram '0' – Stop/Adjust the slat upwards Telegram '1' – Stop/adjust the slat downward					

No.	Name	Object function	Length	Flag	Data type																					
2	Curtain X	Move UP/DOWN	1 bit	CW	1.008 DPT_UpDown																					
If object receives the telegram "0", the blind/curtain moves upwards, and if telegram "1", the blind/curtain moves downward. Telegram '0' – Shutter moves up / Curtain opens Telegram '1' – Shutter moves down / Curtain closes																										
3	Curtain X	Slat adj./stop Stop	1 bit	CW	1.007 DPT_Step																					
If the shutter is in movement, the operation stops when the object receives a telegram "0" or "1". Venetian Blind operation mode: If the shutter is not running, when the object receives the telegram "0", adjusts the slat angle upwards, and telegram "1", adjusts the slat angle downwards. Shutter operation mode: If the curtain is not running, the object does not perform any operation when receiving any telegrams. Telegram '0' – Stop/Adjust the slat upwards Telegram '1' – Stop/adjust the slat downward When the slat is adjusted to the limit position and the adjustment demands continues, the adjustment telegram is ignored.																										
4	Curtain X	Reference movement	1 bit	CW	1.008 DPT_UpDown																					
When the parameter "After reference movement, Position is" is not set to "disable", the object is enabled and is used to make a reference movement of the blind/shade to ensure accurate blind/shade position. For more information, see "Curtain X: Venetian Blind" parameter [→ 27]. Telegram '0' – the blind/curtain moves to the top and then to the target position Telegram '1' – the blind/curtain moves to the bottom and then to the target position																										
5	Curtain X	Move to position 0...100 %	1 byte	CW	5.001 DPT_Scaling																					
If the object receives a telegram, the blind/curtain moves to the corresponding value position. In "Venetian Blind" operation mode, the slat position does not change, i.e. after moving to the target position, the slat position is adjusted to the previous. Unless the object "Slat position 0...100%" receives a telegram, the slat position is located accordingly as per this telegram value. Telegram '0%' – move to top – middle Telegram '100%' – move to bottom																										
6	Curtain X	Slat position 0...100 %	1 byte	CW	5.001 DPT_Scaling																					
This object is visible only in the "Venetian Blind" operation mode and if object receives a telegram, the slat locates accordingly as per this telegram value. Telegram '0%' – the slat angle is fully open – middle position Telegram '100%' – the slat is completely closed																										
7	Curtain X	Scene	1 byte	CW	18.001 DPT_SceneControl																					
An 8-bit command can be sent via this communication object to recall or store the scene of the blind actuator. The meaning of the 8-bit command is described in detail as below. Set an 8-bit command (binary encoded): FXNNNNNN <ul style="list-style-type: none"> • F: "0" triggers the scene, and "1" saves the scene. • X: 0; • NNNNNN: Scene number (0... 63). The parameter setting option is 1...64, the scene telegram received by the object "Scene" corresponds to 0...63. If scene 1 is set in the parameter, the object "Scene" receives scene telegram 0. As follows:																										
<table border="1"> <thead> <tr> <th>The object telegram value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Recall scene 1</td> </tr> <tr> <td>1</td> <td>, Recall scene 2</td> </tr> <tr> <td>2</td> <td>, Recall scene 3</td> </tr> <tr> <td>...</td> <td>.....</td> </tr> <tr> <td>63</td> <td>Recall scene 64</td> </tr> <tr> <td>128</td> <td>Save scene 1</td> </tr> <tr> <td>129</td> <td>: Save scene 2</td> </tr> <tr> <td>130</td> <td>: Save scene 3</td> </tr> <tr> <td>...</td> <td>.....</td> </tr> <tr> <td>191</td> <td>Save scene 64</td> </tr> </tbody> </table>	The object telegram value	Description	0	Recall scene 1	1	, Recall scene 2	2	, Recall scene 3	63	Recall scene 64	128	Save scene 1	129	: Save scene 2	130	: Save scene 3	191	Save scene 64				
The object telegram value	Description																									
0	Recall scene 1																									
1	, Recall scene 2																									
2	, Recall scene 3																									
...																									
63	Recall scene 64																									
128	Save scene 1																									
129	: Save scene 2																									
130	: Save scene 3																									
...																									
191	Save scene 64																									

No.	Name	Object function	Length	Flag	Data type
8	Curtain X	Position status 0...100 %	1 byte	CRT	5.001 DPT_Scaling
Sends the blind/curtain position. Immediately sends this position to the bus when the blind/curtain moves to the target position. Telegram '0%' – top – middle Telegram '100%' – bottom					
9	Curtain X	Slat status 0...100 %	1 byte	CRT	5.001 DPT_Scaling
This object is visible only in the "Venetian Blind" operation mode. Sends the slat position. Immediately sends the position to bus when the slat moves to the target position. Telegram '0%' – the slat is fully open – middle position Telegram '100%' – the slat is completely closed					
10	Curtain X	Sun operation	1 bit	CW	1.001 DPT_Switch
When object receives the telegram "0" or "1", the shutter moves to a predefined position. For details, see "Cx: Automatic" parameters [→ 32].					
11	Curtain X	Enable auto.control	1 bit	CW	1.003 DPT_Enable
Disable and enable automatic operations. When telegram "0" is received, exiting automatic operations and telegram "1" to enable automatic operations. Telegram "0" – Exit the automatic operation Telegram "1" – Enable the automatic operation					
12	Curtain X	Sun: blind position 0...100 % Sun: shutter position 0...100 %	1 byte	CW	5.001 DPT_Scaling
In automatic operation, if the object receives a telegram, the blind/curtain moves to the corresponding value position. In the "Venetian Blind" operation mode, the slat position does not change, unless the object "Sun:slat adj. 0... 100%" receives a telegram. The slat position is located accordingly as per object "Sun:slat adj. 0... 100%" value. Telegram '0%' – move to top – middle Telegram '100%' – move to bottom					
13	Curtain X	Sun: slat adj. 0...100%	1 byte	CW	5.001 DPT_Scaling
In automatic operation, the object is visible only in the "Venetian Blind" operation mode. If the object receives a telegram, the slat locates accordingly as per this telegram value. Telegram '0%' – the slat is fully open – middle position Telegram '100%' – the slat is completely closed					
14/15	Curtain X	Safety operation 1 Safety operation 2	1 bit	CW	1.005 DPT_Alarm
Receives the cyclic telegram from sensor. (0 or 1 depends on parameter setting) If the value of canceling the safe operation is "1", when the object can receive the telegram "1" from the sensor during the monitoring period, it means that no abnormality occurs at this time, and the monitoring period is reset. If the object does not receive this telegram during the monitoring cycle, the actuator considers the sensor to be faulty. It immediately performs a safe operation after the monitoring cycle ends and moves the shutter to a safe position. Safety operation 2 has higher priority than safety operation 1.					
16	Curtain X	Status of operation	1 byte	CRT	No DPT
Sends the present operating state of the blind/curtain output, and only one operation can be activated at a time. When the operation changes, the object sends a telegram. The definition of an 8-bit instruction as below: Telegram "0" – Manual operation Telegram "1" – Direct operation (button operation) Telegram "2" – automatic operation (solar protection) Telegram "3" – Safety operation 1 Telegram "4" – Safety operation 2 Other values are not used.					

3.6 Solar protection DC output

NOTICE



For reasons of electrical safety, safety distances must be considered when connecting 230 V loads in combination with SELV/FELV voltage (DC drives): When using DC drives, only terminals 17 to 20 and 21 to 24 must be used. Terminals 15 and 16 must not be used in this case. See also wiring diagram and ETS database entry!

There is no motor selection for the AC drive either. There is only the information line "Motor type": AC motor. The parameter function of the curtain (DC) output is not described here, see Solar protection AC [→ 27].

General	Config channel function as	<input checked="" type="radio"/> Venetian Blind <input type="radio"/> Shutter
Channel function	If bus recovery, position is	Unchange
Curtain DC 5	If bus failure, position is	Up
DC5: Drive	After reference movement, position is	Move to saved position
DC5: Automatic	Position of slat after arriving on lower end position	1
DC5: Scene	When blind is under end position, up/down object function is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
DC5: Safety	Set response mode for position	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Central function of channel	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Operation priority in solar protection control:

Initialization (after parameters downloaded) → direct operation (long press the direct operation button to switch to direct operation, and the button of the channel has operation) → safety 2 → safety 1 → manual bus operation or automatic bus operation

The following are available:

1. Any common operation command including curtain movement can exit the automatic bus operation;
2. During the direct operation, the received trigger value or reset value of automatic bus operation and safety operation is recorded. When exiting the direct operation, the action will be executed as per the priority. After exiting all actions, returns to manual bus operation or automatic bus operation.
3. When exiting the direct operation, if there is no priority operation, the output state remains unchanged until the control command is received during returning to the manual bus operation or automatic bus operation;
4. In the case of direct and safety operation activation, the automatic bus operation cannot be automatically activated, and the duration of automatic bus operation activation will not be timed until exiting direct and safe operation. (In direct or safe operation, the timing will be interrupted and continues after exiting the direct or safety operation.)

3.7 Fan control

Up to 6 output channels for the fan output. As the parameters and communication objects assigned to each output are same, take one-channel output as an example.

Priority of various operations in the fan control:

Initialization (after parameters downloaded) → direct operation (long press the direct operation button to switch to direct operation, and the button of the channel has an operation) → manual bus operation or automatic bus operation

The following are available:

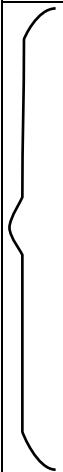
1. The direct operation is mainly used for on-site emergency or commissioning, so the technical characteristics of the fan such as fan start speed, delay/minimum operating time, conversion time, etc. are not considered, but directly outputs the response;
2. A direct operation can exit the automatic bus operation. The automatic bus operation cannot be activated again until exiting direct operation. For one-level fans, forced operation can also exit automatic bus operation, while for multi-level fans, it only limits the fan speed within permissible range.
3. During direct operation, the received mandatory commands are recorded, so are the control values for automatic bus operations.

3.7.1 "Fan type -- One level" parameters

"Fan type -- One level" sets the parameters of the level 1 fan.

General	Fan type	<input checked="" type="radio"/> One level <input type="radio"/> Multi-level
Channel function	When bus failure,Fan speed is	Unchange
Fan 1	When bus recovery, fan speed is	Unchange
	After downloading,fan speed is	OFF
F1: Status	Forced operation function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Output 3	Forced operation on object value	<input type="radio"/> 0=Force/1=Cancel <input checked="" type="radio"/> 1=Force/0=Cancel
Output 4	Behaviour on Forced operation	Unchange
	Auto. operation function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Time mode for function ON	Switch Delay
	Delay time[1..65535]*0.1s	10
	Time mode for function OFF	Switch Delay
	Delay time[1..65535]*0.1s	10

Name	Description	Range
Fan type	Defines the controlled fan type. <ul style="list-style-type: none"> • One level: Controls the fan with the one-level speed; • Multi-level: Control max. 3 level speeds, 2 or 3 can be selected. 	One level Multi-level
When bus failure, Fan speed is	Sets the fan execution when the bus power fails.	Unchange OFF ON

Name	Description	Range
When bus recovery, fan speed is	<p>Defines the fan execution after the bus voltage restores.</p> <ul style="list-style-type: none"> • Unchange: The state does not change; • OFF: The fan is turned off; • ON: The fan is turned on; • As before as bus fail: The state before the bus power failure. <p>Note: Before connecting the fan, to acquire a defined fan-on state, it is recommended to connect the bus voltage first to avoid damage to the fan due to incorrect connection.</p>	Unchange OFF ON As before as bus fail
After downloading, fan speed is	Indicates that the fan will be turned off after the application programming is completed.	OFF
Forced operation function	<p>Defines whether to enable forced operation function.</p> <p>Sets the activation value and action of the forced operation. If "Enable" is selected, object "Forced operation" is visible.</p>	Disable Enable
The following parameters display only when "Enable" is selected.		
	Forced operation on object value	<p>Sets the telegram value to activate the forced operation.</p> <ul style="list-style-type: none"> • 0=Force/1=Cancel: When object "Forced operation" receives telegram "0", it activates the forced operation and telegram "1" to cancel the forced operation. • 1=Force/0=Cancel: When object "Forced operation" receives telegram "1", it activates the forced operation and telegram "0" to cancel the forced operation.
	Behaviour on Forced operation	<p>Defines the fan operation when a forced operation is performed.</p> <ul style="list-style-type: none"> • Unchange: The fan speed retains; • OFF: The fan is turned off; • ON: The fan is turned on. <p>Forced operation has the second highest priority, but is also affected by the minimum operating time and delay switch set by the parameters below.</p>
Auto. operation function	<p>Enables the fan automatic operation.</p> <p>Enable: For more information about the parameters, see "Fx: Automatic" parameters [→ 43] At the same time, the following parameters also affect automatic operation, such as delay switch and minimum operating time.</p>	Disable Enable
Time mode for function ON	<p>Defines the fan running time.</p> <ul style="list-style-type: none"> • None: Execute immediately after receiving the fan-on control command; • Switch delay: The ON action after the reset is also turned on with a delay when the fan is turned on. The delay time is set by parameter "Delay time [1..65535]*0.1 s". If object "Fan speed" receives continuous telegram "1", delay time is calculated based on real condition not from the time receiving last telegram. <p>Note: The ON action after the reset also need consider about this delay time. The fan should not be turned on until delay completes.</p> <ul style="list-style-type: none"> • Minimum time: The minimum fan running time. The fan cannot be turned off until running time ends. The minimum running time is set by the parameter "Minimum time[1..65535] s". If a fan-off telegram is received during the minimum running time, users need to wait until this period ends before off the fan. 	None Switch delay Minimum time
The following parameters display only when "Minimum time" is selected.		
	Delay time 1...65535]*0.1s	Defines the time that the fan turns on with a delay.
	Minimum time [1...65535]s	Defines the minimum running time after the fan is turned on.

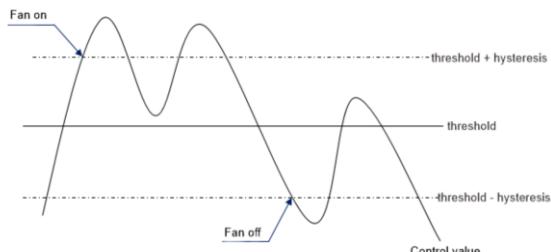
Name	Description	Range
Time mode for function OFF	Defines the fan shutdown time. <ul style="list-style-type: none"> None: Execute immediately after receiving the control command to turn off the fan; Switch delay: The OFF action after the reset is also turned off with a delay when the fan is turned off. The delay time is set by parameter "Delay time [1..65535]*0.1 s"; Minimum time: The minimum fan-off time. The fan cannot be turned off until off time ends. The minimum off time is set by the parameter "Minimum time[1..65535] s". If a fan-on telegram is received during the minimum off time, users need to wait until this period ends before on the fan. Note: The OFF action after the reset also needs consider about this minimum time. 	None Switch delay Minimum time
The following parameters display only when "Minimum time" is selected.		
{	Delay time 1...65535]*0.1s	Defines the time that the fan turns off with a delay.
	Minimum time [1...65535]s	Defines the minimum time that the fan is turned off.

3.7.1.1 "Fx: Automatic" parameters

"Fx: Automatic" sets automatic operation of one-level fan speed and can define threshold. It is visible when "Auto operation function" is selected as "Enable". Under "Automatic", the control value of fan speed comes from bus. One or two control values can be set in the function parameters. For example, in the fan coil unit control system, the fan control needs to set only one control value for heating only or cooling only. If there is heating and cooling in the system, it is recommended to set two control values.

Manual operations and automatic operations cannot occur at the same time, i.e., after activating a automatic operation via object "Automatic function", if there are other operations (such as manual operation, forced operation, direct operation), the automatic operation will be exited automatically. The automatic operation needs to be activated via object "Automatic function" and object "Status Automatic" will report whether the automatic operation status is active or not.

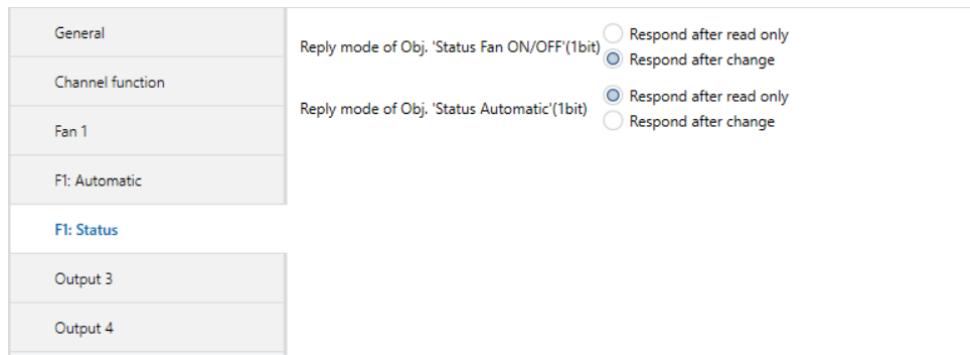
General	Auto. operation on object value	<input type="radio"/> 0=Auto/1=Cancel <input checked="" type="radio"/> 1=auto / 0=cancel
Channel function	State of Auto.operation after startup	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Fan 1	Automatically enable auto.operation	<input type="radio"/> NO <input checked="" type="radio"/> Yes
F1: Automatic	Enable auto.operation after in [10..6000]min	100
F1: Status	Threshold value OFF<->ON [1..100]%	30
Output 3	Hysteresis threshold value in +/- [0..50]%	10
Output 4	Number of control value	<input checked="" type="radio"/> 1 <input type="radio"/> 2
	Monitoring control value	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Monitoring period of control value [10..65535]s	120
	Reply mode of Obj.'Control value fault'	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Control value after fault occurs [0..100]%	0

Name	Description	Range
Auto. operation on object value	Sets the telegram value to activate the automatic operation. <ul style="list-style-type: none"> 0=Auto/1=Cancel: When object "automatic function" receives a telegram "0", the automatic operation is activated, and telegram "1" to exit the automatic operation. 1=Auto/0=Cancel: When object "automatic function" receives a telegram "1", the automatic operation is activated, and telegram "0" to exit the automatic operation. 	0=Auto/1=Cancel 1=Auto/0=Cancel
State of Auto. operation after startup	Sets whether to enable automatic operations when the device starts. <ul style="list-style-type: none"> Disable: After the device start, automatic operations are disabled by default. Enable: After the device start, automatic operations are enabled by default. 	Disable Enable
Automatically enable auto. operation	Specifies whether to enable the auto-enable feature for automatic operations. When the automatic operation is withdrawn from the manual operation and there is not any operations, it is automatically back to automatic operation after the time set by parameter "Enable auto.operation after in[10..6000]min" ends.	No Yes
The following parameter displays only when "Yes" is selected.		
{ Enable auto.operation after [10...6000]min	Sets the time for automatic return from manual operation to automatic operation.	10...6000
Threshold value 0FF<-->ON [1...100]%	Defines the threshold. Fan can change its operating state based on threshold range of control value. The object "Control value" determines control value. <ul style="list-style-type: none"> If the control value is greater than or equal to the threshold set by the parameter, the fan is turned on; If the control value is less than this threshold, the fan is turned off. 	1...100
Hysteresis threshold value in +/-[0...50]%	Sets the hysteresis value of the threshold, which prevents the unexpected fan movement when the control value fluctuates around the threshold. If it is 0, there is no hysteresis. Once the control value is out of the threshold, the fan is turned on or off immediately. If the hysteresis is 10 and the threshold is 50, then the upper threshold is 60 (threshold + hysteresis) and the lower threshold is 40 (threshold - hysteresis). When the control value is between 40...60, there is no fan operation and it retains the previous state. Only when it is less than 40, fan turns off, and greater than or equal to 60, the fan turns on. As shown in the figure below: 	0...50

Name	Description	Range
The following parameters are related to the fan speed control values		
Number of control value	<p>Sets the number of fan speed control values under "Auto".</p> <ul style="list-style-type: none"> 1 control value: Only one control value can control the fan speed. Generally suitable for heating/cooling only, or 2-pipe fan coil unit control systems; 2 control values: There are two control values to control the fan speed. Generally suitable for fan coil unit control systems supporting both heating and cooling. 	1: 1 control value 2: 2 control values
When "2" is selected, the following parameters display.		
Select by	<p>Sets changeover way for control values.</p> <ul style="list-style-type: none"> Latest value: the fan controls the speed based on the latest control value received from the bus; Control value with switching object: If this option is selected, the object "Switching control value1/2" is visible, which is used to switch the control value of fan speed. Telegram 0 corresponding to control value 1 and 1 corresponding to control value 2. <p>Note: When this option is selected, after the automatic operation is activated, the received control value is valid only if the enabled control value is confirmed as 1 or 2. The receiving control value is not responded to until the control value is explicit. The value received by the object "Switching control value 1/2" is also recorded when the automatic operation is not activated.</p> <p>After exiting automatic operation, the (valid) control value received from the bus is recorded. The fan speed operates as per the latest control value or fault control value when the automatic operation is activated again. The effective control value is the value currently in use. If it is control value 1, then control value 2 is invalid.</p>	Latest value Control value with switching object
Monitoring control value	Sets whether to enable monitoring of external control values.	No Yes
The following parameters display when "Yes" is selected.		
Monitoring period of control value [10...65535]s	Sets the period for monitoring the external control value. If the control value is not received within this period, the external controller is considered to have an error, and the fan output follows the control value set via the next parameter.	10...65535 s
Reply mode of Obj."Control value fault"	<p>Defines how feedback is provided when an external control value is incorrect.</p> <ul style="list-style-type: none"> Respond after read only: The object "Control value fault" sends the present state to the bus only when the device receives the state read from another bus device or bus; Respond after change: When the fault state changes or the device receives a request to read the state, the object "Control value fault" immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change
Control value after fault occurs [0...100]%	In the event of an error in external controller, fan output follows the control value set via this parameter.	0... 100%

3.7.1.2 "Fx: Status" parameters

"Fx: Status" sets the status information of the fan operation.



Name	Description	Range
Reply mode of Obj. "Status Fan ON/OFF" (1bit)	<p>Defines how the fan operating status feedback is provided.</p> <ul style="list-style-type: none"> • Respond after read only: Only when the device receives the reading of the fan operating status from other bus devices or buses, the object "Status Fan ON/OFF" sends the present fan operating status to the bus; • Respond after change: When the fan operating status changes or the device receives a request to read the state, the "Status Fan ON/OFF" object immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change
Reply mode of Obj. "Status Automatic" (1bit)	<p>This parameter is visible when the automatic operation is enabled and defines how the automatic operation status is responded.</p> <p>The object "Status Automatic" sends telegram "1" to indicate that the automatic operation is activated, and telegram "0" indicates exiting automatic operation.</p> <ul style="list-style-type: none"> • Respond after read only: The object "Status Automatic" sends the present state of the automatic operation to the bus only when the device receives a request from another bus device or bus to read the state; • Respond after change: When the state of a automatic operation changes or the device receives a request to read the state, the object "Status Automatic" immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change

3.7.2 "Fan type -- Multi-level" parameters

"Fan type -- Multi-level" sets the parameters of the multi-level fan speed.

The parameter settings of the fan speed 2 and fan speed 3 are the same. When the fan speed is limited to 2, the parameter value set for speed 3 will be same as speed 2, the output fan speed is the same as 2.

In the case of multi-level fan speed, it is necessary to consider not only the fan startup characteristics, but also the operation mode, it is a changeover switch, a step switch, etc. The parameters can be set correctly only if understanding the fan technical characteristics well.

General	Fan type	<input type="radio"/> One level <input checked="" type="radio"/> Multi-level
Channel function	Fan speeds on 2 limit	<input type="radio"/> NO <input checked="" type="radio"/> YES
Fan 1	Fan operation mode	<input checked="" type="radio"/> Changover switch <input type="radio"/> Step switch
F1: Status	Delay between fan speed switch[50..5000] ms	500
Output 3	When bus failure, Fan speed is	Unchange
Output 4	When bus recovery, fan speed is	Unchange
	After downloading, fan speed is	OFF
	Object value for fan speed	
	Object value for Fan speed 1	33
	Object value for Fan speed 2	67
	Object value for Fan speed 3	100
	Forced operation function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Forced operation on object value	<input type="radio"/> 0=Force/1=Cancel <input checked="" type="radio"/> 1=Force/0=Cancel
	Limitation on forced operation	Unchange
	Auto. operation function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	Obj. "Switch speed x" 1bit function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	Delay time for function OFF[0..65535]*0.1s	0
	Starting characteristic of fan	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Switch on over fan speed	1
	Minimum time in switch[1..65535]s	10

Name	Description	Range
Fan type	Defines the controlled fan type. <ul style="list-style-type: none"> • One level: Controls the fan with the one-level speed; • Multi-level: Control max. 3 level speeds, 2 or 3 can be selected. 	One level Multi-level
The following parameter displays only when "Multi-level" is selected.		
{}	Fan speeds on 2 limit Decides whether to enable 2-speed fan or 3-speed fan. <ul style="list-style-type: none"> • No: Controls 3-speed fan; • Yes: The maximum fan speed can only reach level 2, even if the parameter is set to level 3. Object of 3-speed will be ignored. <p>Note: When the fan speed is limited to level 2, if the fan speed after power failure or reset is set to 3, it will not be executed, i.e. it remains in the present state.</p>	No Yes

Name	Description	Range
Fan operation mode	<p>Defines fan operating mode which needs to be considered in conjunction with the fan technical characteristics.</p> <ul style="list-style-type: none"> • Changeover switch: Under this operating mode, the delay time of fan speed conversion can be set via next parameter. This control type can switch the fan speed to any level, such as from the first level to the third level. But in any case, only one of the three outputs is in use. • Step switch: Under this operating mode, a 3-speed fan speed is equal to combination of 3 1-speed fan. For example, for fan speed 3, all three channels have output at the same time (such as Output 1&2&3), and for fan speed 2, two channels have output at the same time (such as Output 1&2). <p>Note: This parameter must be considered in conjunction with the fan technical parameters.</p>	Changeover switch Step switch
The following parameter displays only when "Changeover switch" is selected.		
{ Delay between fan speed switch [50...5000]*ms	<p>Defines the changeover delay, which is a specific element of the fan and needs to be considered in any case.</p> <p>When a fan speed changeover telegram is received, the target fan speed is executed only after the delay has elapsed.</p> <p>If the device receives a new fan speed during the delay, the delay will not be recounted, but the last received fan speed will be executed.</p>	50...5000
When bus failure, Fan speed is	<p>Notes the fan operation when the bus power fails.</p> <ul style="list-style-type: none"> • OFF: Turn off the fan; • 1, 2 or 3: The fan is turned on as 1-/2-/3-speed. <p>Note: If the fan is limited as 2-speed and the parameter is selected as 3, the fan speed after the power failure retains the one before the power failure.</p>	Unchange OFF 1 2 3
When bus recovery, fan speed is	<p>Defines the fan operation after bus voltage restore.</p> <ul style="list-style-type: none"> • OFF: Turn off the fan; • 1, 2 or 3: The fan is turned on as 1-/2-/3-speed. • As before as bus fail: The fan speed is the one before bus power failure. <p>Note: To obtain a defined fan speed, it is recommended to connect the bus voltage before connecting the fan, to avoid damaging the fan due to incorrect connection. If the fan is limited as 2-speed and the parameter is selected as 3, the fan speed does not change after the power restore.</p>	Unchange OFF 1 2 3 As before as bus fail
After downloading, fan speed is	Indicates turning off the fan after the application programming.	OFF
Object value for fan speed		
Object value for Fan speed 1/2/3	<p>Defines fan speed switching point and present fan speed is from object "Fan speed--1 byte".</p> <p>By default, the object value "0" means fan speed Off.</p>	1...100 %
Forced operation function	Defines whether to enable forced operation function. If "Enable" is selected, 1-bit object "Forced Operation" is visible, which is used to set the activation value of the forced operation and the actions that can be performed under the forced operation.	Disable Enable

Name	Description	Range
The following parameters display only when "Enable" is selected.		
	<p>Forced operation on object value</p> <p>Sets the telegram value to activate the forced operation.</p> <ul style="list-style-type: none"> • 0=Force/1=Cancel: When object "Forced operation" receives telegram "0", it activates the forced operation and telegram "1" to cancel the forced operation. • 1=Force/0=Cancel: When object "Forced operation" receives telegram "1", it activates the forced operation and telegram "0" to cancel the forced operation. <p>Note: During forced operation, the minimum running time for the fan speed under automatic operation still needs to be considered, except startup fan speed, which has its own minimum running time. After a bus reset or programming, the forced operation is not activated by default.</p>	0=Force/1=Cancel 1=Force/0=Cancel
	<p>Limitation on forced operation</p> <p>Defines the speed that fan can operate under forced operation.</p> <ul style="list-style-type: none"> • Unchange: The fan speed remains unchanged and retains the present operating state; • 1: Only 1-speed fan; • 1, off: only 1-speed fan and turn off the fan; • 2: Only 2-speed fan; • 2, 1: Only 1-speed and 2-speed fans; • 2, 1, off: only 1-speed and 2-speed fans and turn off the fan; • 3: Only 3-speed fan; • 3, 2: Only 2-speed and 3-speed fans; • 3, 2, 1: Only 1-speed, 2-speed and 3-speed fans; • Off: Only turn off the fan. <p>Note: In the case of forced operation activation, if the present fan speed is not within the permissible range, the fan speed will be switched to the fan speed (within the permissible range) close to the present fan speed. For example, the present fan speed is 1 and the permissible fan speed is 2 and 3, when the forced operation is activated, the fan speed automatically switches to 2. If the fan speed is manually adjusted to 1, the running fan speed will also be 2. In another case, if the present fan speed is 0, the permissible fan speed is 1, 2, 3, and the startup fan speed is 3, when the forced operation is activated, the fan starts at fan speed 3 and then automatically switches to fan speed 1. If the present fan speed is 2 and the permissible fan speed is 1, 2, when the forced operation is activated, a telegram with fan speed 0 is received, the fan speed switches to 1. In this case, the fan speed switches to the fan speed close to the target fan speed.</p>	Unchange 1 1, off 2 2, 1 2, 1, off 3 3, 2 3, 2, 1 Off
Auto. operation function	<p>Enables the fan automatic operation.</p> <p>Enable: For more information about the parameters, see "Fx: Automatic" parameters [→ 52]</p>	Disable Enable

Name	Description	Range
Obj. "Switch speed x" 1bit function	<p>Controls the fan speed.</p> <p>Enable: Three 1-bit objects "Fan speed 1", "Fan speed 2" and "Fan speed 3" are visible.</p> <p>When the object receives telegram "1", the fan speed is turned on, and any of the three objects receives the telegram 0 , then the fan is turned off.</p> <p>If three objects receive multiple ON/OFF telegrams in a short period of time, the fan speed is controlled by the last telegram value.</p> <p>Note: In manual operation mode, the minimum running time set by the parameters in automatic operation will be ignored. As a result, the response to direct action can be detected timely.</p> <p>To protect the fan, the delay time for the fan speed changeover is still effective. At the same time, when the forced operation is activated, the fan speed that are permissible under the forced operation should be considered.</p>	Disable Enable
Delay time for function OFF [0...65535]*0.1s	<p>Defines the delayed fan-off time. For example, if the present fan speed is 1 and the fan OFF control telegram is received, the fan retains the present fan speed and start the delay counting, and then turns off after the period defined by this parameter.</p> <p>Note: When the fan is running in automatic mode, this parameter is only available when the parameter "Minimum time in fan speed [0... 65535]s" is 0.</p>	0...65535
Starting characteristic of fan	<p>Defines the fan start-up characteristics, which is also a fan technical characteristic. Generally, to ensure the safe startup of the fan motor, when the fan is turned on, it is better to turn on the fan motor at a higher fan speed, so that the fan motor can obtain a higher torque during the start-up stage.</p> <p>Note: Since the start-up characteristic is a fan technical feature, the start-up behavior has a higher priority than the forced operation.</p> <p>If the fan itself does not have a start-up characteristic, users can select "Disable" regardless of related parameters.</p> <p>For example, if the startup fan speed is 3, and the fan speed allowed by the forced operation is 2, which is currently in the OFF state. When a control telegram with 1-speed fan is received, the fan will be turned on at 3-speed and then turn to 2-speed. The required 1-speed will not run due to the forced operation limit.</p> <p>For the step switch type of fan, the startup characteristics are different. The fan usually continuously turns on fan speed, while the changeover switch type of fan directly turns on fan speed. Therefore, when defining the parameters of the start-up characteristics, it is also necessary to consider fan switch type.</p> <p>The minimum dwell time for fan speed switching in automatic mode is considered only after the start-up phase, during start-up phase it is not activated. The minimum fan-on time during the start-up phase can be set separately.</p>	Disable Enable

Name	Description	Range
The following parameters display when "Enable" is selected.		
	<p>Switch on over fan speed</p> <p>Sets the fan speed used for the fan starting from the OFF state.</p> <p>When controlling fan with 2-speed, if the fan speed is set to 3, the fan will automatically start with 2-speed.</p> <p>However, to ensure fan manual operation, when setting these parameters related to fan characteristics, it is recommended to understand the fan characteristics. Setting these parameters as per fan characteristics to avoid fan damage.</p>	1/2/3
	<p>Minimum time in switch [1...65535]s</p> <p>Defines the minimum dwell time for a certain fan-on speed during the start-up phase.</p> <p>When the fan is turned on, it starts with start-up fan speed and then switches to the target fan speed after dwell time. The target fan speed can be speed after reset or triggered by other operations.</p> <p>During the start-up phase, the delay time between the two fan speeds should also be considered.</p> <p>For example: Start-up features for a 3-speed fan</p> <p>Assuming that the present fan state is off, the start-up fan speed is level 3, the target fan speed is level 1, and the final fan speed is level 2, shown as following figure:</p> <p>The above figure shows that if the fan is currently off, it will start "3-speed" after receiving a telegram of "1-speed". Then it switches the fan speed after the minimum dwell time of start-up fan speed ends. The fan speed changeover needs a delay time (this is a fan technical character parameter protecting the fan). After the delay, it switches to the target fan speed "1-speed". During the operation of "1-speed", if the fan receives a "2-speed" telegram, need to check whether the automatic operation mode has been activated or not. If yes, the minimum dwell time of fan operation should be considered. If it is a direct operation, the minimum dwell time should not be considered. And after delay time, fan runs at "2-speed".</p>	1...65535

3.7.2.1 "Fx: Automatic" parameters

"Fx: Automatic" parameters are visible when "Auto. operation function" is selected as "Enable".

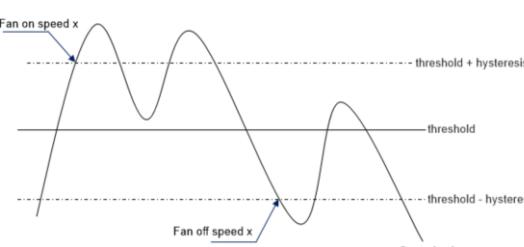
Sets the automatic operation of multi-stage fan speeds and defines thresholds. Under automatic operation, the fan speed control value comes from the bus. And the fan speed is determined as per the threshold range of the control value.

General	Auto. operation on object value	<input type="radio"/> 0=Auto/1=Cancel <input checked="" type="radio"/> 1=auto / 0=cancel
Channel function	State of Auto.operation after startup	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
Fan 1	Automatically enable auto.operation	<input type="radio"/> NO <input checked="" type="radio"/> Yes
F1: Automatic	Enable auto.operation after in [10..6000]min	100
F1: Status	Threshold value OFF<->speed 1 [1..100)%	30
Output 3	Threshold value speed 1<->speed 2 [1..100)%	60
Output 4	Threshold value speed 2<->speed 3 [1..100)%	80
	Hysteresis threshold value in +/- [0..50)%	10
	Minimum time in fan speed [0..65535]s	10
	Number of control value	<input checked="" type="radio"/> 1 <input type="radio"/> 2
	Monitoring control value	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Name	Description	Range
Auto. operation on object value	Sets the telegram value to activate the automatic operation. <ul style="list-style-type: none"> 0=Auto/1=Cancel: When object "automatic function" receives a telegram "0", the automatic operation is activated, and telegram "1" to exit the automatic operation. 1=Auto/0=Cancel: When object "automatic function" receives a telegram "1", the automatic operation is activated, and telegram "0" to exit the automatic operation. 	0=Auto/1=Cancel 1=Auto/0=Cancel
State of Auto. operation after startup	Sets whether to enable automatic operations when the device starts. <ul style="list-style-type: none"> Disable: After the device start, automatic operations are disabled by default. Enable: After the device start, automatic operations are enabled by default. 	Disable Enable
Automatically enable auto. operation	Specifies whether to enable the auto-enable feature for automatic operations. When the automatic operation is withdrawn from the manual operation and there is not any operations, it is automatically back to automatic operation after the time set by parameter "Enable auto.operation after in[10..6000]min" ends.	No Yes

The following parameter displays only when "Yes" is selected.

{	Enable auto.operation after [10...6000]min	Sets the time for automatic return from manual operation to automatic operation.	10...6000
Threshold value OFF<->speed 1 [1...100)%	Defines the threshold for off the fan and 1-speed. <ul style="list-style-type: none"> If the control value is greater than or equal to the threshold set by this parameter, the operating speed is 1; If the control value is less than this threshold, the fan is turned off. Note: The fan determines the on/off or speed of the fan as per the threshold range of the control value. The parameters "Threshold value speed 1<->speed 2 [1...100)%" and "Threshold value speed 2<->speed 3 [1...100)%" are similar.	1...100%	

Name	Description	Range
Threshold value speed 1<-->speed 2 [1...100]%	Defines the threshold of fan speed switching to 2-speed. If the control value is greater than or equal to the set threshold, speed is 2.	1... 100%
Threshold value speed 2<-->speed 3 [1...100]%	Defines the threshold of fan speed switching to 3-speed. If the control value is greater than or equal to the set threshold, speed is 3. The controller evaluates these thresholds in ascending order, i.e., OFF <-> fan speed 1 threshold, fan speed 1 <-> fan speed 2 threshold, then fan speed 2 <-> fan speed 3 threshold. The correctness of the function execution is only guaranteed in this case: OFF <-> fan speed 1 threshold is less than fan speed 1 <-> fan speed 2 threshold, fan speed 1 <-> fan speed 2 threshold is less than fan speed 2 <-> fan speed 3 threshold.	1... 100%
Hysteresis threshold value in +/-[0...50]%	Sets the hysteresis value of the threshold, which prevents the unexpected fan movement when the control value fluctuates around the threshold. If it is 0, there is no hysteresis. Once the control value is out of the threshold, the fan is turned on and off immediately. If the hysteresis is 10 and the threshold is 50, then the upper threshold is 60 (threshold + hysteresis) and the lower threshold is 40 (threshold - hysteresis). When the control value is between 40...60, there is no fan operation and it retains the previous state. Only when it is less than 40 or greater than (or equal to) 60, the fan operating state changes. As shown in the figure below:  Note: With hysteresis enabled, if there is an overlap of thresholds, fan operation is specified as follows: 1. The hysteresis determines the switching point of fan speed; 2. If a fan speed changes, the new fan speed is determined by the control value and the threshold, regardless of the hysteresis; For example (1): OFF <-> the threshold of fan speed 1 is 10% fan speed 1 <-> the threshold of fan speed 2 is 20% fan speed 2 <-> the threshold of fan speed 3 is 30% hysteresis is 15% The fan speed behavior when it drops from 3-speed: The fan speed 3 changes when control value is 14% (<30%-15%) and the new fan speed will be 1 (As 14% is between 10% and 20%, no need to consider about hysteresis). Therefore, fan speed 2 is ignored. For example (2): OFF <-> the threshold of fan speed 1 is 10% fan speed 1 <-> the threshold of fan speed 2 is 40% fan speed 2 <-> the threshold of fan speed 3 is 70% hysteresis is 15% The fan speed behavior when it drops from 3-speed: The fan speed 3 changes when control value is 64% (<70%-5%). If the received control value is 39%, the new fan speed is 1 (because 39% is between 10% and 40%, no need to consider about hysteresis). Therefore, fan speed 2 is ignored. 3. In any case, fan will be off when control value is 0.	0...50

Name	Description	Range
Minimum time in fan speed [0...65535]s	<p>Defines the dwell time before present fan speed switches to a higher or lower one, i.e. the minimum fan operating time.</p> <p>User cannot switch to different fan speed until the minimum time ends. But if present fan speed has been running long enough, fan speed can quickly switch.</p> <p>0: means no delay in switching.</p> <p>Note: The dwell time set by this parameter is only available in automatic mode.</p> <p>The minimum operating time should be considered for each fan speed in automatic mode, including off and the fan speed in automatic operation changes step by step.</p> <p>For example, if the present fan speed is 1 and the target fan speed is 3, the fan speed changes from 1 to 2 and then to 3. Each fan speed changes after running more than the minimum time.</p> <p>The start-up fan speed does not need to consider about the minimum running time, because it has own minimum running time.</p> <p>If the minimum time is set to 0, switch directly to the target fan speed, and the fan speed change is no longer step-by-step.</p>	0...65535

For information about the fan speed control values, see "Fx: Automatic" parameters [→ 43]:

3.7.2.2 "Fx: Status" parameters

"Fx: Status" sets running status information of the fan with multi-level fan speed.

General	Reply mode of Obj. 'Status Fan ON/OFF'(1bit)	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
Channel function	Reply mode of Obj. 'Status Automatic'(1bit)	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
Fan 1	Reply mode of Obj. 'Status fan speed x'(1bit)	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
F1: Automatic	Reply mode of Obj. 'Status fan speed'(1byte)	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
F1: Status	Status feedback for fan speed	
Output 3	Status value for fan speed 1	33
Output 4	Status value for fan speed 2	67
	Status value for fan speed 3	100

Name	Description	Range
Reply mode of Obj. "Status Fan ON/OFF" (1bit)	<p>Defines how the fan switching status is responded.</p> <ul style="list-style-type: none"> • Respond after read only: Only when the device receives the reading of the fan switch status from other bus devices or buses, the object "Status Fan ON/OFF" sends the present fan switch status to the bus; • Respond after change: When the fan switch status changes or the device receives a request to read the state, the object "Status Fan ON/OFF" immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change

Name	Description	Range
Reply mode of Obj."Status Automatic" (1bit)	<p>This parameter is visible when the automatic operation is enabled and defines how the automatic operation status is responded.</p> <p>The object "Status Automatic" sends telegram "1" to indicate that the automatic operation is activated, and telegram "0" indicates automatic operation mode is inactivated.</p> <ul style="list-style-type: none"> • Respond after read only: The object "Status Automatic" sends the present state of the automatic operation to the bus only when the device receives a request from another bus device or bus to read the status; • Respond after change: When the state of a automatic operation changes or the device receives a request to read the state, the object "Status Automatic" immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change
Reply mode of Obj. "Status Fan speed x" (1bit)	<p>Defines how the fan speed state is responded. Three 1-bit objects, "Status Fan speed 1", "Status Fan speed 2", and "Status Fan speed 3", are used to feedback the status of each fan speed.</p> <ul style="list-style-type: none"> • Respond after read only: The object sends the state to the bus only when the device receives a request from another bus device or bus to read the status; • Respond after change: When the state changes or the device receives a request to read the state, the object immediately sends a telegram to the bus to report the state. 	Respond after read only Respond after change
Reply mode of Obj. "Status Fan speed " (1byte)	<p>Sets the feedback method of the present running fan speed status. The object is "Status Fan speed" and data type "1 byte", the output status value of each fan speed is defined by the next parameter.</p> <ul style="list-style-type: none"> • Respond after read only: The object sends the state to the bus only when the device receives a request from another bus device or bus to read the status; • Respond after change: When the state changes or the device receives a request to read the state, the object immediately sends a telegram to the bus to report the state. 	Respond after read only Respond after change
Status feedback for fan speed		
Status feedback for fan speed	Sets the status feedback value for each fan speed. The fan-off status value is 0.	1...100 %

3.7.3 Fan control communication objects

Fan control _One level

Numb	Name	Object Function	Def Group	Length	C	R	W	T	U	Data Type	Priority
219	Fan 1	Fan speed		1 bit	C	-	W	-	-	switch	Low
223	Fan 1	Status Fan ON/OFF		1 bit	C	R	-	T	-	switch	Low
228	Fan 1	Automatic function		1 bit	C	-	W	-	-	enable	Low
229	Fan 1	Status Automatic		1 bit	C	R	-	T	-	enable	Low
230	Fan 1	Forced operation		1 bit	C	-	W	-	-	enable	Low
231	Fan 1	Control value 1		1 byte	C	-	W	-	-	percentage (0..100%)	Low
232	Fan 1	Control value 2		1 byte	C	-	W	-	-	percentage (0..100%)	Low
233	Fan 1	Switching control value 1/2		1 bit	C	-	W	-	-	switch	Low
234	Fan 1	Control value fault		1 bit	C	R	-	T	-	alarm	Low

Fan control _Multi-level

Numb	Name	Object Function	Def Group	Length	C	R	W	T	U	Data Type	Priority
219	Fan 1	Fan speed		1 byte	C	-	W	-	-	percentage (0..100%)	Low
220	Fan 1	Fan speed 1		1 bit	C	-	W	-	-	switch	Low
221	Fan 1	Fan speed 2		1 bit	C	-	W	-	-	switch	Low
222	Fan 1	Fan speed 3		1 bit	C	-	W	-	-	switch	Low
223	Fan 1	Status Fan ON/OFF		1 bit	C	R	-	T	-	switch	Low
224	Fan 1	Status Fan speed		1 byte	C	R	-	T	-	counter pulses (0..255)	Low
225	Fan 1	Status Fan speed 1		1 bit	C	R	-	T	-	switch	Low
226	Fan 1	Status Fan speed 2		1 bit	C	R	-	T	-	switch	Low
227	Fan 1	Status Fan speed 3		1 bit	C	R	-	T	-	switch	Low
228	Fan 1	Automatic function		1 bit	C	-	W	-	-	enable	Low
229	Fan 1	Status Automatic		1 bit	C	R	-	T	-	enable	Low
230	Fan 1	Forced operation		1 bit	C	-	W	-	-	enable	Low
231	Fan 1	Control value 1		1 byte	C	-	W	-	-	percentage (0..100%)	Low
232	Fan 1	Control value 2		1 byte	C	-	W	-	-	percentage (0..100%)	Low
233	Fan 1	Switching control value 1/2		1 bit	C	-	W	-	-	switch	Low
234	Fan 1	Control value fault		1 bit	C	R	-	T	-	alarm	Low

No.	Name	Object function	Length	Flag	Data type
219	Fan X	Fan speed	1 bit 1 byte	CW	1.001 DPT_Switch 5.001 DPT_Scaling

For 1-speed fan with object type 1 bit, it is used to turn on/off the fan.

Telegram "0" - Fan off

Telegram "1" - Fan on

For multi-level fan with object type "1 byte", it is used to turn on and off each fan speed. Only one fan speed is on at a time, and when turning on a new fan speed, the fan start-up characteristics needs to be considered. The object value corresponding to each fan speed is defined by the parameters. The telegram value will be 1...255 and 0 means fan off.

220	Fan X	Fan speed 1	1 bit	CW	1.001 DPT_Switch
221		Fan speed 2			
222		Fan speed 3			

This object is available for multi-level fan.

Turns on the fan speed 1. If the object of the fan speed 1...3 receives several ON telegrams in a short period of time, then the turned-on fan speed is based on the last received telegram.

As soon as one object of fan speed of 1...3 receives an OFF telegram, the fan is off.

223	Fan X	Status Fan ON/OFF	1 bit	CRT	1.001 DPT_Switch
-----	-------	-------------------	-------	-----	------------------

Sends the fan switching status to the bus. If there is fan speed, the fan is on.

Telegram "0" - Fan off

Telegram "1" - Fan on

224	Fan X	Status Fan speed	1 byte	CRT	5.001 DPT_Scaling
-----	-------	------------------	--------	-----	-------------------

This object is available for multi-level fan.

Sends the currently running fan speed to the bus. The telegram value corresponding to each fan speed is specified by the parameter "Status value for Fan speed 1/2/ 3". Telegram 0 indicates fan off.

225	Fan X	Status Fan speed 1	1 bit	CRT	1.001 DPT_Switch
226		Status Fan speed 2			
227		Status Fan speed 3			

This object is available for multi-level fan.

Sends fan running status to bus.

Telegram "0" - fan speed OFF

Telegram "1" - fan speed ON

No.	Name	Object function	Length	Flag	Data type
228	Fan X	Automatic function	1 bit	CW	1.003 DPT_Enable
Activates the automatic operation. After bus reset or programming, whether the automatic operation is activated or not is determined by parameters. Automatic operation can be withdrawn by the manual operation. In automatic operation, for multi-level fan speeds, if the forced operation is activated, the automatic operation is still activated. But the permissible fan operating state is determined by the forced operation, following the fan speed under the forced operation. For one-level fan speed, automatic operation can be withdrawn by the forced operation.					
<ul style="list-style-type: none"> ● Parameter option "0=Auto/1=Cancel": <ul style="list-style-type: none"> – Telegram "0" – the automatic operation is activated – Telegram "1" – Exit the automatic operation ● Parameter option "1=Auto/0=Cancel": <ul style="list-style-type: none"> – Telegram "0" – Exit the automatic operation – Telegram "1" – the automatic operation is activated ● Manual operations can be triggered by: <ul style="list-style-type: none"> – Object 219: Fan X -- Fan speed – Objects 220...222: Fan X-- Fan speed x (x=1,2,3) 					
229	Fan X	Status Automatic	1 bit	CRT	1.003 DPT_Enable
Sends the automatic operation status to bus. Telegram "0" – automatic operation is not activated Telegram "1" – automatic operation has been activated					
230	Fan X	Forced operation	1 bit	CW	1.003 DPT_Enable
Activates the forced operation. When forced operation is activated, the permissible fan speed is set by the parameter "Limitation on forced operation".					
<ul style="list-style-type: none"> ● Parameter option "0=Force/1=Cancel": <ul style="list-style-type: none"> – Telegram "0" – Activate the forced operation – Telegram "1" - Cancel the forced operation ● Parameter option "1=Force/0=Cancel": <ul style="list-style-type: none"> – Telegram "1" – Activate the forced operation – Telegram "0" - Cancel the forced operation 					
231	Fan X	Control value/Control value 1	1 byte	CW	5.001 DPT_Scaling
232		Control value 2			
In automatic operation, "Control value" is visible when the number of control value is 1. And "Control value is 1/2" will be visible when the number of control value is 2. Receive control values from bus. Fan output will be calculated based on the defined threshold and the control value.					
233	Fan X	Switching control value 1/2	1 bit	CW	1.001 DPT_Switch
When the number of control values is set to 2 and "select by" is set to "control value with switching object", this object is visible and used to select control values. Telegram "0" – Control value 1 Telegram "1" – Control value 2					
234	Fan X	Control value fault	1 bit	CRT	1.005 DPT_Alarm
During the monitoring time, when the device does not receive a control value from an external controller, this object reports a control value error. Once the control value is received, the error status is released. Telegram "0" – No Error Telegram "1" – Error occurs					

3.8 Valve control

The valve control consists of heating, cooling, 2-pipe system and 4-pipe system. Their parameters are basically similar, except the occupied output channels. Heating only, cooling only or 2-pipe system occupies max.2 output channels, while 4-pipe system occupies max. 4 output channels. Therefore, heating, cooling, 2-pipe valve system can be configured with max. 12 output channels, while 4-pipe valve system can be configured with max. 6 output channels.

Channel function--type of system

General	Product select	24-Fold
Channel function	Output 1~4 config as	Switch/Solar protection AC/Heating/Cooling/2-pipe
Valve 1 General	Output 1 & 2 function	Heating/Cooling/2-pipe
V1: Heating/Cooling	Valve 1 output is fixed for Output 1	Output 1 & 2,if 3point,open and close
Curtain 2	Curtain 2 output is fixed for	Curtain AC
C2: Drive	Output 5~8 config as	Output 3(Up/Open) & Output 4(Down/Close)
C2: Automatic	Output 9~12 config as	Disable
C2: Scene	Output 13~16 config as	Disable
C2: Safety	Output 17~20 config as	Disable
	Output 21~24 config as	Disable
General	Product select	24-Fold
Channel function	Output 1~4 config as	Valve control(4-pipe)
4-Pipe Valve 1 General	Heat output for 4-pipe valve 1 is Output 1	Output1&2,if 3point,open and close
4-pipe V1: Heating	Cool output for 4-pipe valve 1 is Output 3	Output3&4,if 3point,open and close
4-pipe V1: Cooling	Output 5~8 config as	Disable
	Output 9~12 config as	Disable
	Output 13~16 config as	Disable
	Output 17~20 config as	Disable
	Output 21~24 config as	Disable

Valve X General-- Heating

General	HVAC control mode	Heating
Channel function	Monitoring control value	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Valve 1 General	Monitoring period of control value [10..65535]s	60
V1: Heating	Reply mode of Obj."Control value fault"	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Control value after fault occurs[0..100]%	0

Valve X General-- Cooling

General	HVAC control mode	Cooling
Channel function	Monitoring control value	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Valve 1 General	Monitoring period of control value [10..65535]s	60
V1: Cooling	Reply mode of Obj."Control value fault"	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Control value after fault occurs[0..100]%	0

Valve X General-- Heating and Cooling (2-pipes)

General	HVAC control mode	Heating and Cooling
Channel function	HVAC System	2 pipes system
Valve 1 General	Monitoring control value	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
V1: Heating/Cooling	Monitoring period of control value [10..65535]s	60
	Reply mode of Obj."Control value fault"	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Control value after fault occurs[0..100]%	0

4-Pipe Valve X General-- Heating and Cooling (4-pipes)

General	HVAC control mode	Heating and Cooling
Channel function	HVAC System	4 pipes system
	Number of control value	2 control value
4-Pipe Valve 1 General	Monitoring control value	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
4-pipe V1: Heating	Monitoring period of control value [10...65535]s	60
4-pipe V1: Cooling	Reply mode of Obj."Control value fault"	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Control value after fault occurs[0..100]%	0

Name	Description	Range
HVAC control mode	Sets the HVAC control mode. <ul style="list-style-type: none"> • Heating: Only heating is used; • Cooling: Only cooling is used; • Heating and cooling: Heating and cooling is used. 	Heating Cooling Heating and Cooling
HVAC System	This parameter is visible when a 2-pipe valve system or a 4-pipe valve system is selected and is used to indicate the HVAC system, i.e., the pipe type of inlet and outlet water in the system. <ul style="list-style-type: none"> • 2 pipes system: For 2-pipe system, heating and cooling share one inlet and outlet pipe, i.e., both hot and cold water are controlled by a common valve; • 4 pipes system: For 4-pipe system, heating and cooling have own inlet and outlet pipes requiring two valves to control the inlet and outlet of hot & cold water respectively. 	
Number of control value	This parameter is visible when the 4-pipe valve system is selected. Indicates that there are two control values for 4-pipe, one for heating valve and one for cooling valve.	2 control value
Monitoring control value	Sets whether to enable monitoring of control values.	Disable Enable

The following parameters display only when "Enable" is selected.

	Monitoring period of control value [10...65535]s	Sets the period for monitoring the external control value. If the control value is not received within this period, the external controller is considered to have an error, and the valve output follows the control value set via the next parameter.	10...65535 s
	Reply mode of Obj."Control value fault"	Defines how feedback is provided when an external control value is incorrect. <ul style="list-style-type: none"> • Respond after read only: The object "Control value fault" sends the present state to the bus only when the device receives the state read from another bus device or bus; • Respond after change: When the fault state changes or the device receives a request to read the state, the object "Control value fault" immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change
	Control value after fault occurs [0...100]%	In the event of an error in external controller, valve output follows the control value set via this parameter. If the valve is on/off type, the valve is open when the control value is set to > 0% and closed when the control value is set to 0%.	0... 100%

The following is a supplementary description of the pipe system (this product is suitable for 2-pipe and 4-pipe systems):

In daily life, the heating/cooling system can be divided into 2 pipes, 3 pipes and 4 pipes as per the inlet and outlet pipes of hot and cold water.

For 2-pipe system, cold and hot water share a set of inlet and outlet water systems. Cooling when the water pipe is flowing with cold water, and heating with hot water. Therefore, it cannot cool and heat at the same time.

Wiring in 2-pipe system: Only one valve is needed to control the flow of hot or cold water.

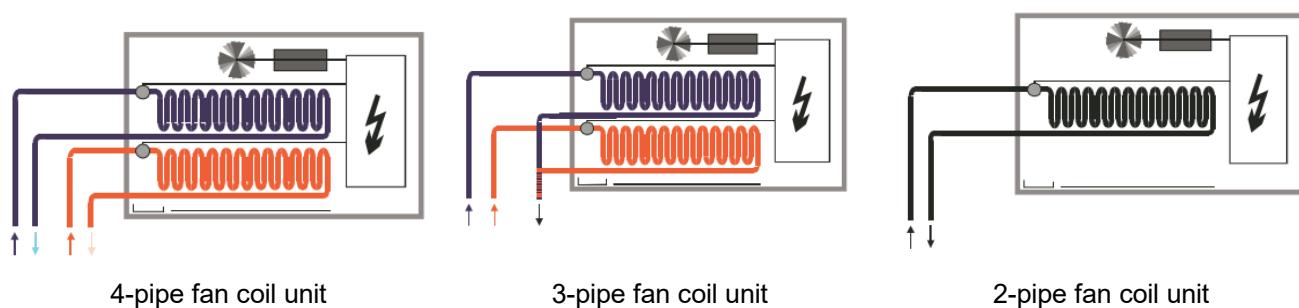
In many applications, 2-pipe systems are mostly used for cooling, and heating is achieved by other commonly used heaters.

4-pipe system is somewhat similar, 3-pipe system has one pipe input system for hot and one pipe input system for cold water, but shares one output pipe. Therefore, it cannot heat and cool at the same time.

For 4-pipe system, it has two sets of inlet and outlet water systems, which can provide both cold and hot water at the same time.

However, there is a SPST (single pole single throw) switch in the fan, only one can be applied at the same time for heating and cooling.

Wiring in 4-pipe system: The cooling/heating valve are commonly connected to the output terminal of the equipment to control the flow of cold and hot water.



The priority of valve control

Initialization (after parameter download) → direct operation → cleaning function → automatic valve adjustment (only 3point, open and close) → prohibition of valve operation → fault monitoring or manual operation (manual operation is triggered by the object "Control value, Cool/Heat")

The following applies:

1. In the fault monitoring mode, if the valve is disabled, the fault monitoring continues, and the monitoring result can be sent to bus. But the fault action cannot be performed until there is no higher priority action. The fault state will be reset when the control value is received, and the monitoring cycle restarts.
2. During the purge process, when a higher priority operation (such as direct operation) interrupts it, the process ends. The purge action will not continue after direct operation ends.
3. The curve correction adjustment of the valve takes effect on the control values under fault monitoring mode and direct operation mode, and the valve position will be adjusted based on the corrected value (only for 3-point, open and close valve).
4. When entering direct operation, if there is no button operation, the action will not be executed, and the original action behavior continues. If the valve is currently closed, an operation on button will open valves (limited by the maximum valve position). If the currently valve is open, the button operation closes valve (0%). During direct operation, the commands of control values, valve purge, and valve prohibition are invalid, but fault monitoring continues, and control values can still reset the fault monitoring cycle. After exiting the direct operation, device acts as per the present fault state. If no fault, present action will be kept until a new control demand received.

5. The heating/cooling mode can only be switched by control value or direct operation. Due to the high priority of the purge function, it is not limited by the control mode, i.e. the heating valve purge function can be triggered in cooling mode, and vice versa. If the cooling purge is currently being performed, cleaning of heating cannot be operated until the cleaning of the cooling is completed. But the control mode does not change, it is still cooling mode. If a control value of another mode is received during cleaning, the control mode status switches immediately. But the action cannot be executed as per the present control value until the cleaning is completed.
6. In the same control mode, if multiple operations occur within a period, the operation is processed as per the priority order. The operation with the lower priority is processed after operation with the higher priority is canceled. For example, when the "valve purge", "valve disable" and "direct operation" are enabled at same time, after "purge" is canceled, the valve is back to "valve disable" state as per the priority, i.e. the valve will be disabled. If the valve is enabled again, it will act as per present control value or fault state.

The following points apply to valve automatic adjustment (if enabled):

1. If the valve automatic adjustment is interrupted by direct operation or purge operation, it performs again after these two operations end.
2. Valve automatic adjustment affects valve prohibition, fault action and control value action. When the number of valve adjustments reach the configured maximum number for adjustments, the moving time of the valve will increase. So the valve must be repositioned before it runs to the target position.
3. Regardless of the control command (e.g., direct operation, cleaning, disabling valve control, etc.), the number of adjustments increases after the adjustment stops. And the number of adjustments will be reset to 1 after the auto adjustment has been performed.
4. During valve automatic adjustment, if a new control value is received, the valve does not run to the new target position until the automatic adjustment execution (positioning) is completed.

3.8.1 "Vx: Heating/Cooling" parameters

"Vx:Heating" and "Vx: "Cooling" parameters set the control mode and related parameters of the heating and cooling valves. Different valve types are suitable for different control modes. When setting control mode, the valve type needs to be considered. (The control mode and related parameters of the valves under 2-pipe valve and 4-pipe valve system are similar.)

Vx: Heating

General	Valve control mode	2 state-ON/OFF
Channel function	Valve type	<input checked="" type="radio"/> Normal(de-energised closed) <input type="radio"/> Inverted(de-energised open)
Valve 1 General	If bus recovery, valve position	<input checked="" type="radio"/> Unchange <input type="radio"/> Close valve
V1: Heating	If bus failure, valve position	<input checked="" type="radio"/> Unchange <input type="radio"/> Close valve
	Reply mode for valve status	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Valve purge function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	"Disable heating" object function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Vx: Cooling

General	Valve control mode	2 state-ON/OFF
Channel function	Valve type	<input checked="" type="radio"/> Normal(de-energised closed) <input type="radio"/> Inverted(de-energised open)
Valve 1 General	If bus recovery, valve position	<input checked="" type="radio"/> Unchange <input type="radio"/> Close valve
V1: Cooling	If bus failure, valve position	<input checked="" type="radio"/> Unchange <input type="radio"/> Close valve
	Reply mode for valve status	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Valve purge function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	"Disable cooling" object function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Name	Description	Range
Valve control mode	Sets the valve type for control. <ul style="list-style-type: none"> • 2 state-ON/OFF: 2 state-ON/OFF control mode is suitable for ordinary on-off valves. The output switches as per the received on-off demand; • Continuous, PWM: In PWM continuous control mode, the valve switches outputs periodically as per the control value received; • 3 point, open and close: The control type is suitable for actuating three-wire valves. The valve opening is controlled as per the valve control value. 	2 state-ON/OFF Continuous, PWM 3 point, open and close

The following sections take the heating valve parameter interface as an example to describe the parameter settings of three different modes, and the cooling valve is similar.

3.8.1.1 "2 state-ON/OFF" parameters

General	Valve control mode	2 state-ON/OFF
Channel function	Valve type	<input checked="" type="radio"/> Normal(de-energised closed) <input type="radio"/> Inverted(de-energised open)
Valve 1 General	If bus recovery, valve position	<input checked="" type="radio"/> Unchange <input type="radio"/> Close valve
V1: Heating	If bus failure, valve position	<input checked="" type="radio"/> Unchange <input type="radio"/> Close valve
	Reply mode for valve status	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Valve purge function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Duration of valve purge time[1..255]min	10
	Automatic valve purge	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Purge Cycle in weeks[1..12]	1
	Reply mode for valve purge status(1bit)	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	"Disable heating" object function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
	Trigger object value	<input checked="" type="radio"/> 0=Disable/1=Enable <input type="radio"/> 1=Disable/0=Enable

Name	Description	Range
Valve type	Sets the direction of the valve switch. For on/off valves, "Normal (de-energized closed)" is suitable for normally closed on/off valves and "Inverted (de-energized open)" for normally open on/off valves.	Normal (de-energized closed) Inverted(de-energized open)

Name	Description	Range
If bus recovery, valve position	Sets the valve position after the bus voltage reset. <ul style="list-style-type: none"> Unchange: After the bus voltage failure, the valve state remains unchanged; Close valve: The valve is closed. 	Unchange Close valve
If bus failure, valve position	Sets the valve position after the bus voltage failure. <ul style="list-style-type: none"> Unchange: After the bus voltage failure, the valve state remains unchanged; Close valve: The valve is closed. <p>Note: After application programming, the valve state is closed by default.</p>	Unchange Close valve
Reply mode for valve status	Defines how the valve status responds. <ul style="list-style-type: none"> Respond after read only: The object "Valve status, Heat/Cool" sends the present state to the bus only when the device receives the state read from another bus device or bus. Respond after change: When the state changes or the device receives a request to read the state, the object "Valve status, Heat/Cool" immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change
Valve purge function	Enable: 1-bit object "Trigger valve purge, Heat/Cool" is visible and is used to trigger the valve cleaning operation.	Disable Enable
The following parameters display only when "Enable" is selected.		
Duration of valve purge time [1...255] min	Sets the duration of the valve cleaning, during which the valve is fully open. When this period ends, the pre-cleaning state is re-established. Note: If heating/cooling operations are prohibited during cleaning, cleaning continues. That is, during the cleaning period, both the prohibition telegram and the valve control telegram are recorded and updated after the cleaning is completed.	1...255 min
	Automatic valve purge	This parameter is visible when the valve cleaning function is enabled. Enable: Enables automatic valve cleaning
The following parameters display only when "Enable" is selected.		
Purge Cycle in weeks [1...12]	Defines the cycle of valve automatic cleaning, measured in weeks. It counts starting from device power-on, and after the timer arrives, the cleaning operation is triggered. Once the cleaning is complete, the time is reset, either automatically or triggered by object. Note: Direct operations have the highest priority, and cleaning is in second level. If the cleaning time is not up and the cleaning process is manually interrupted, the cleaning will be exited and not continue after the manual operation canceled.	1...12
	Reply mode for valve purge status (1bit)	This parameter is visible when the valve cleaning function is enabled and defines how the valve cleaning status is responded. <ul style="list-style-type: none"> Respond after read only: The object "Valve purge status, Heat/Cool" sends the present state to the bus only when the device receives the state read from another bus device or bus; Respond after change: When the state changes or the device receives a request to read the state, the "Valve purge status, Heat/Cool" object immediately sends a telegram to the bus to report the status.
"Disable heating/cooling" object function	Enable: 1-bit object "Disable, Heat/Cool" is visible and can be used to disable heating/cooling operations	Disable Enable

Name	Description	Range
The following parameters displays only when "Enable" is selected.		
{ Trigger object value	<p>Sets the telegram value used to prohibit heating/cooling operations.</p> <ul style="list-style-type: none"> • 0=Disable/1=Enable: When Disable, Heat/Cool receives a telegram value of 0, the heating/cooling operation is disabled, and when 1 is received, it is reactivated. • 1=Disable/0=Enable: When object "Disable, Heat/Cool" receives the telegram "1", heating/cooling is disabled, and "0" to be reactivated. <p>Note: When the operation is disabled, the valve position is immediately adjusted back to the off state. When enabled again, the valve status is updated as per present control value. During the prohibition period, the received control telegrams are recorded and fault monitoring continues.</p>	0=Disable/1=Enable 1=Disable/0=Enable

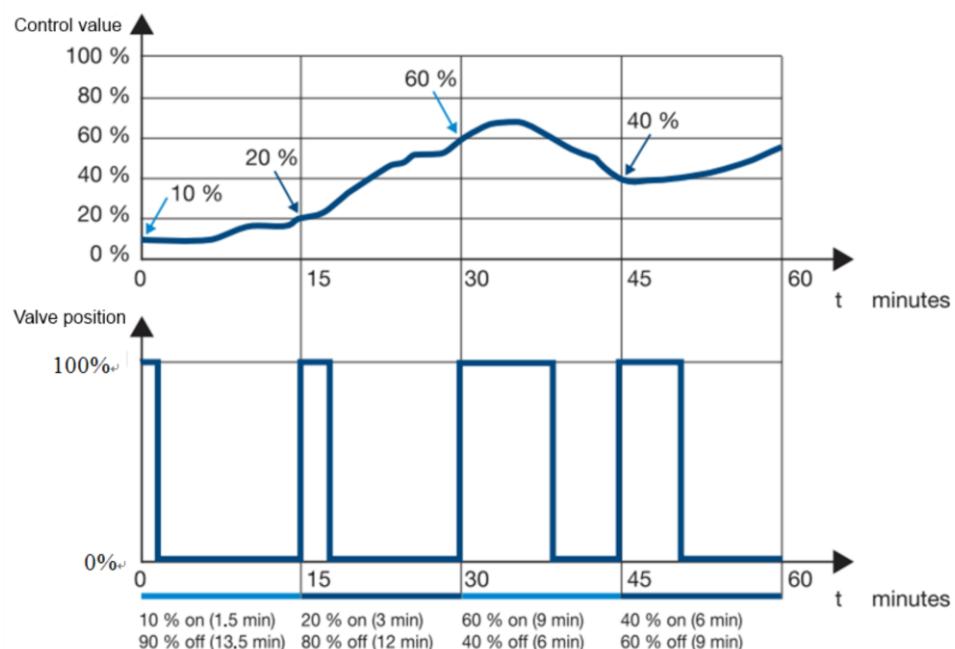
The purge function and disabling valve control function are similar in each control mode, and the following two control modes will not be described repeatedly.

3.8.1.2 "Continuous, PWM" parameters

This control mode is suitable for actuating two-wire valves.

There are only two states for the control mode, "fully open" and "fully closed". The valve is cyclically switched on and off as per the control value and PWM cycle, for example, if the control value is 20% and the PWM cycle is 15 min, the valve will be open for 3 min and closed for 12 min. When the control value is 60%, the valve will be open for 9 min and closed for 6 min. The control value is evaluated by the thermostat or sensor for the present temperature and set temperature, and then sent to this device.

The schematic diagram of valve adjustment is as follows:



This control mode is used for relatively accurate temperature control without temperature overshoot, and supports the use of simple, low-cost control valves, such as those that can be combined with electric valve actuators, with relatively high switching frequencies.

This control mode parameter interface is similar to that of "2state-ON/OFF", and the same parameters will not be repeated here. The difference is that the PWM switching cycle can be set, as follows:

Name	Description	Range
PWM cycle time [10...6000]s	Sets the period for PWM control. The higher the value, the less often the valve is opened and closed, and conversely, the smaller the value, the more often the valve is opened and closed.	10...6000 s

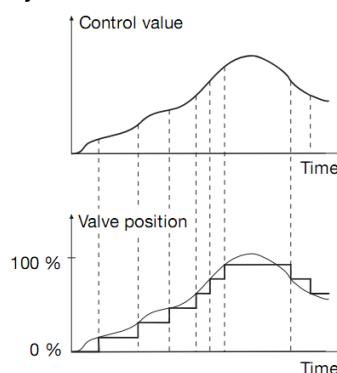
For Continuous, PWM valves, different switches, the status feedback information is as follows:

Valve on/off type	Description
Normal (de-energized closed)	When the valve relay is opened, the object "Valve status, Heat/Cool" sends the telegram "0". When valve relay is closed, the telegram "1" is sent.
Inverted (de-energized open)	When the valve relay is closed, the object "Valve status, Heat/Cool" sends the telegram "0", and when there is no present (relay opened), the telegram "1" is sent.

3.8.1.3 "3 point, open and close" parameters

General	Valve control mode	3 point, open and close
Channel function	Observe reseversing time	400ms
Valve 1 General	If bus failure, valve position	Unchange
V1: Heating/Cooling	If bus recovery, valve position	<input checked="" type="radio"/> Unchange <input type="radio"/> Close valve
	Valve control time 0%->100%[50..6000]s	100
	Automatic adjust valve position	<input type="radio"/> NO <input checked="" type="radio"/> YES
	Number of valve control up to adjust [1..65535]	200
	Correct Valve characteristic curve	<input type="radio"/> NO <input checked="" type="radio"/> YES
	Min. controller value for closed valve [0..100]%	0
	Max. controller value for fully opened valve[0..100]%	100
	Lower valve position for opening [0..100]%	0
	Upper valve position for opening [0..100]%	100
	Reply mode for valve status	<input type="radio"/> Respond after read only <input checked="" type="radio"/> Respond after change
	Object type of valve status	<input type="radio"/> 1bit <input checked="" type="radio"/> 1byte
	Valve purge function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	"Disable heating/cooling" object function	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

This control mode is suitable for driving a three-wire valve, and the valve is controlled as per the control value received by the object, which can achieve "fully open", "fully closed" or opening the valve to a certain position. This control mode is the most accurate control mode, and the opening and closing frequency of the valve is also very low. For example, if the control value is 20%, the valve stops the output when it reaches 20%. The schematic diagram of valve adjustment is as follows:



Name	Description	Range
Observe reseversing time	Sets the amount of time the valve is paused while the steering is running, which is beneficial for protecting the valve. Steering pause time is a valve technical feature that should be considered in any operation and parameter setting.	100 ms 200 ms ... 1 s 1.2 s 1.5 s
If bus failure, valve position	Notes that the valve position remains in its previous state after the system voltage fails.	Unchange
If bus recovery, valve position	Sets the valve position after the system voltage reset. <ul style="list-style-type: none"> • Unchange: The default state of power-on is maintained after the system voltage restore; • Close valve: The valve is closed. <p>Note: After the parameter is downloaded, it is not treated as a system reset. The valve position is adjusted to 0%, only when it is adjusted to 0%, the valve position can be determined and the next step can be carried out. In this control mode, the timing of the automatic purge function starts when the valve position is determined.</p>	Unchange Close valve
Valve Control Time 0%-->100% [50...6000]s	Sets the time that takes for the valve from a fully closed state to a fully open, i.e. the total moving time. If the moving time set for this parameter is 180 s, the present valve position is 20%, and the target position is 60%, then the moving time of the valve from 20% → 60% takes 72 s. The setting of this parameter requires reference to the valve technical characteristics.	50...6000 s
Automatic adjust valve position	Sets whether to enable the valve's auto-adjustment function. The automatic valve adjustment function mainly corrects the valve position, because after many adjustments, the valve cannot be fully closed or fully opened due to various reasons, such as temperature, device aging, etc., so it needs to be repositioned via this function.	Yes No
The following parameter displays only when "Yes" is selected.		

Name	Description	Range										
	<p>Number of valve control up to adjust [1...65535]</p> <p>Sets how many times the valve has been adjusted, and then performs an automatic adjustment, i.e. the valve position is adjusted to 0%, and the position is reset, it requires a longer moving time.</p> <p>If the setting is 100 times, when the valve is adjusted 100 times, that is, at the 101st adjustment, if the valve is adjusted in the open direction, there is no automatic adjustment. If the valve is adjusted in the closed direction, an automatic adjustment will be made, the valve will be adjusted to the 0% position, and then to the target position. For example, if the valve position is 50% for the 100th and 60% for the 101st, the valve will not be automatically adjusted until a reverse adjustment command is received. If the 101st is 40%, the valve will be automatically adjusted once, running to 0% and then to the target position of 40%. The time of automatic adjustment extends the total moving time by 5%, that is, the moving time + the total moving time × 5%, and the total moving time × 5% must be less than or equal to 1 min. When greater than 1 min, take 1 min.</p> <p>When the automatic adjustment is performed, the number of times is recounted. When the valve adjustment is stopped, the count is increased once (the positioning adjustment after parameter downloaded is not counted in the number of times). In the process of performing automatic adjustment, if a control value is received, it is not executed until the end of the automatic adjustment. If there is a higher priority operation, it is not executed until the end of the higher priority operation.</p> <p>The setting of this parameter requires reference to the valve technical characteristics.</p>	1...65535										
Correct Valve characteristic curve	Sets whether to enable characteristic curve adjustment for the valve.	Yes No										
The following parameters display only when "Yes" is selected.												
	<p>Min. controller value for closed valve [0...100]%</p> <p>Max. controller value for fully opened valve [0...100]%</p> <p>Lower valve position for opening [0...100]%</p> <p>Upper valve position for opening [0...100]%</p>	<p>Sets the lower limit control value of the valve characteristic curve.</p> <p>Sets the upper limit control value for the valve characteristic curve.</p> <p>Sets the lower limit of the valve position.</p> <p>Sets the upper limit of the valve position.</p>	<p>0...100 %</p> <p>0...100 %</p> <p>0...100 %</p> <p>0...100 %</p>									
<p>Taking a valve with the valve interface relay as an example, if the lower limit of the control value is set to 10%, the lower limit of the valve is set to 20%, the upper limit of the control value is set to 70%, and the upper limit of the valve is set to 80%, then there is an output characteristic curve as shown in the following figure:</p> <table border="1"> <caption>Data points from the graph</caption> <thead> <tr> <th>Control value (%)</th> <th>Travel time (%)</th> </tr> </thead> <tbody> <tr> <td>0%</td> <td>0%</td> </tr> <tr> <td>Lower limit</td> <td>0%</td> </tr> <tr> <td>Upper limit</td> <td>Upper limit</td> </tr> <tr> <td>100%</td> <td>100%</td> </tr> </tbody> </table>			Control value (%)	Travel time (%)	0%	0%	Lower limit	0%	Upper limit	Upper limit	100%	100%
Control value (%)	Travel time (%)											
0%	0%											
Lower limit	0%											
Upper limit	Upper limit											
100%	100%											

Name	Description	Range
Reply mode for valve status	Defines how the valve status responds. <ul style="list-style-type: none"> • Respond after read only: The object "Valve status, Heat/Cool" sends the present state to the bus only if the device receives the state read from another bus device or bus. • Respond after change: When the state changes or the device receives a request to read the state, the object "Valve status, Heat/Cool" immediately sends a telegram to the bus to report the status. 	Respond after read only Respond after change
Object type of valve status	Sets the object type for valve position status feedback. <ul style="list-style-type: none"> • 1 bit: The next parameter is visible, and a 1-bit object "Valve status, Heat/Cool" is visible, which is used to feedback the valve opening and closing status. • 1 byte: 1 byte object "Valve status, Heat/Cool" is visible and is used to feedback the valve position status. 	1 bit 1 byte
The following parameter displays only when "1 bit" is selected.		
{ Object value with valve position >0	This parameter is used to feedback the opening and closing status of the valve. With option "1", the object "Valve status, Heat/Cool" sends the telegram "1". When the valve position is greater than 0, object sends telegram "1", when the valve position is 0, it sends "0" and vice versa.	0 1

3.8.2 Valve output communication objects

The description of the communication object for the valve output is based on 4-pipe valve system.

Numb	Name	Object Function	Des	Group	Length	C	R	W	T	U	Data Type	Priority
315	4-pipe Valve 1	Heat/Cool mode status			1 bit	C	R	-	T	-	cooling/heating	Low
316	4-pipe Valve 1	Control value fault			1 bit	C	R	-	T	-	alarm	Low
317	4-pipe Valve 1	Disable,Heat			1 bit	C	-	W	-	-	enable	Low
318	4-pipe Valve 1	Control value, Heat			1 byte	C	-	W	-	-	percentage (0..100%)	Low
319	4-pipe Valve 1	Valve status, Heat			1 bit	C	R	-	T	-	switch	Low
320	4-pipe Valve 1	Trigger valve purge, Heat			1 bit	C	-	W	-	-	enable	Low
321	4-pipe Valve 1	Valve purge status, Heat			1 bit	C	R	-	T	-	enable	Low
322	4-pipe Valve 1	Disable,Cool			1 bit	C	-	W	-	-	enable	Low
323	4-pipe Valve 1	Control value, Cool			1 bit	C	-	W	-	-	switch	Low
324	4-pipe Valve 1	Valve status, Cool			1 bit	C	R	-	T	-	switch	Low
325	4-pipe Valve 1	Trigger valve purge, Cool			1 bit	C	-	W	-	-	enable	Low
326	4-pipe Valve 1	Valve purge status, Cool			1 bit	C	R	-	T	-	enable	Low

No.	Name	Object function	Length	Flag	Data type
315	4-pipe Valve X	Heat/Cool mode status	1 bit	CRT	1.100 DPT_Heat/Cool
This object is used to feedback the heating/cooling status of the present valve output, which is sent to the bus when it changes. Telegram "0" - Cooling Telegram "1" - Heating					
316	4-pipe Valve X	Control value fault	1 bit	CRT	1.005 DPT_Alarm
When the device is unable to receive a control value from an external controller during the monitoring time, this object reports an error control value. Once the control value is received, the error status is released. Telegram "0" – No Error Telegram "1" – Error occurs					
317	4-pipe Valve X	Disable, Heat/Cool	1 bit	CW	1.003 DPT_Enable
322					
Via this object, the heating/cooling valve can be disabled or enabled. When disabled, the valve position is immediately adjusted back to 0% (closed state), and when enabled again, the valve operation is controlled as per the present control value.					
318	4-pipe Valve X	Control value, Heat/Cool	1 byte	CW	5.001 DPT_Scaling
323			1 bit		1.001 DPT_Switch
Receives valve control values from other controllers. In a 2-pipe system, the heating and cooling valves share an object (318) to receive valve control values. This control value can be 1 bit or 1 byte, depending on the type of valve control mode.					
319	4-pipe Valve X	Valve status, Heat/Cool	1 byte	CRT	5.001 DPT_Scaling
324			1 bit		1.001 DPT_Switch
Indicates the opening or closing state or position state of the valve, and the object type is determined by the parameter setting.					
320	4-pipe Valve X	Trigger valve purge, Heat/Cool	1 bit	CW	1.003 DPT_Enable
325					
Trigger valve cleaning function. During cleaning, the valve is fully opened. Telegram "0" – Cleaning ends. Telegram "1" – Cleaning is triggered.					
321	4-pipe Valve X	Valve purge status, Heat/Cool	1 bit	CRT	1.003 DPT_Enable
326					
Indicates the cleaning status of the valve. As soon as the cleaning function is activated, its status is immediately indicated. Telegram "0" – The cleaning function is not activated. Telegram "1" – The cleaning function is activated					

4 Appendix

4.1 Cyber security disclaimer

Siemens provides a portfolio of products, solutions, systems and services that includes security functions that support the secure operation of plants, systems, machines and networks. In the field of Building Technologies, this includes building automation and control, fire safety, security management as well as physical security systems. In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art security concept. Siemens' portfolio only forms one element of such a concept.

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Issued by
Siemens Switzerland Ltd
Smart Infrastructure
Global Headquarters
Theilerstrasse 1a
CH-6300 Zug
+41 58 724 2424
www.siemens.com/buildingtechnologies