Technical Manual

SATION Switch Actuator

SATION Technologies

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Content

1. Overview

1.1 Device Overview

This manual refers to the following devices:

- **SATION-SW0001.2010** Switch Actuator 1ch,230V AC,20A, With current detection
- **SATION-SW0004.2010** Switch Actuator 4ch,230V AC,20A, With current detection
- **SATION-SW0006.2010** Switch Actuator 6ch,230V AC,20A, With current detection
- **SATION-SW0008.2010** Switch Actuator 8ch,230V AC,20A, With current detection
- **SATION-SW0012.2010** Switch Actuator12ch,230V AC,20A, With current detection

- **SATION-SW0001.1611** Switch Actuator 1ch,230V AC,16A, With current detection
- **SATION-SW0004.1611** Switch Actuator 4ch,230V AC,16A, With current detection
- **SATION-SW0006.1611** Switch Actuator 6ch,230V AC,16A, With current detection
- **SATION-SW0008.1611** Switch Actuator 8ch,230V AC,16A, With current detection
- **SATION-SW0012.1611** Switch Actuator 12ch,230V AC,16A, With current detection
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- **SATION-SW0002.1001** Switch Actuator 2ch,230V AC,10A, Without current detection
- **SATION-SW0004.1001** Switch Actuator 4ch,230V AC,10A, Without current detection
- **SATION-SW0006.1001** Switch Actuator 6ch,230V AC,10A, Without current detection
- **SATION-SW0008.1001** Switch Actuator 8ch,230V AC,10A, Without current detection
- **SATION-SW0012.1001** Switch Actuator 12ch,230V AC,10A, Without current detection

- **SATION-SW0004.1601** Switch Actuator 4ch,230V AC,16A, Without current detection
- **SATION-SW0006.1601** Switch Actuator 6ch,230V AC,16A, Without current detection
- **SATION-SW0008.1601** Switch Actuator 8ch,230V AC,16A, Without current detection
- **SATION-SW0012.1601** Switch Actuator12ch,230V AC,16A, Without current detection

1.2 Function

The following functions are applicable to each channel (see the table below). The number of channels depends on the product design, such as 1, 2, 4, 8 and 12 channels. Channels can be set in three different states:

- Prohibit

  Channel does not work, channel related objects are not visible in ETS.

- Switch

  The channel works in the switch mode and has a variety of parameters to control the switch processing mode.

- Hallway

  The channel works in the corridor lighting mode, which is different from the switch mode in that the channel will automatically close after a set time.

1.2.1 Function Preview

Functional group	Function
Group address	User set it by yourself
Reset action	Action in case of power failure
	Action on power.
	Start wait time.
Relay mode	Normally open / normally closed
Switching function	switch
	General control
Timing function	Open delay
	Closing delay
Hallway lighting function	Lighting time
	Early warning function
	Manual closing
	Re trigger enable
Advanced functions	locking
	Logic (and / or)
Scene function	Each channel has 8 scenes to choose from.
State function	feedback
Current detection function	Channel independent current detection
	error message
	Total current detection
Working timing function	Working time timer
	Countdown timer

picture 1

2. Communication object

2.1 Common objects of each channel

The following figure shows the common objects of each channel, which can be enabled by corresponding parameters. Each channel occupies 18 numbers, but not all numbers will assign objects. The first channel occupies numbers 0-17, the second occupies numbers 8-35, and so on. The objects used in the design project need to be assigned group addresses :

The following figure shows some objects of channel A and B. channel a is selected as a general switch with logic and locking function. Channel B is selected as corridor lighting with locking function:

Number	Name	Object Function	Description	Group Addresses	Leng...	C	R	W	T	U
0	Channel A	Switch On/Off			1 bit	C	-	W	-	-
2	Channel A	Block			1 bit	C	-	W	-	-
4	Channel A	Scene			1 Byte	C	-	W	-	-
5	Channel A	Status			1 bit	C	R	-	T	-
6	Channel A	Logic 1			1 bit	C	-	W	-	-
7	Channel A	Logic 2			1 bit	C	-	W	-	-
9	Channel B	Staircase			1 bit	C	-	W	-	-
10	Channel B	Block			1 bit	C	-	W	-	-
13	Channel B	Status			1 bit	C	R	-	T	-
96	Central Function	Switch On/Off			1 bit	C	-	W	-	-

The following table shows the functions that can be selected when a channel is selected as a switch function :

NO.	Function	Usage	Data Type	
0	switch	Open / close channel	DPT 1.001	Input, write
2	locking	Lockout channel	DPT 1.001	Input, write
4	scene	Transfer the selected scene	DPT 18.001	Input, write
5	status	Return state	DPT 1.001	Output, read
6	logic 1	display when active	DPT 1.001	Input, write
7	logic2	display when active	DPT 1.001	Input, write
+18	Next channel			

picture 2: "switch"

The following table shows the functions that can be selected when a channel is selected as hallway function :

NO.	Function	Usage	Date Tupe	
1	hallway	Stair lighting on / off	DPT 1.001	Input, write
2	locking	Lockout channel	DPT 1.001	Input, write
5	status	Return state	DPT 1.001	Output, read
+18	Next channel			

picture 3: "hallway"

2.2 General Control Object

The general control object is valid at any time. There is only one in the whole project. The number is related to the number of channels. The communication to the main control object will be valid for all channels that have enabled the main control function.

NO.	Function	Usage	Data Type	
	General control function	Number depends on product design	DPT 1.001	Input, write

picture 4: Global function object

2.3 Current Detection Object

The following figure shows the objects related to current detection:

NO.	Function	Usage	Data Type	
8	Response operating hours	Calculate the actual working time	DPT 7.007	
8	Time to the next service	Calculate time to next service	DPT 7.007	Output, read
9	Reset operating hours	Reset working time timer	DPT 1.001	Input, write
9	Reset service	Reset next service timer	DPT 1.001	Input write
10	Service required	Service request	DPT 1.001	Output, read
11	Current value	Actual current value	DPT 7.02/ DPT 9.021/ DPT 14.019/ DPT 9.024	Output, read
12	Exceedance of load	Overload	DPT1.001	Output, read
13	Lower deviation of load	Low load	DPT 1.001	Output, read
14	Fault current	Current error	DPT 1.001	Output, read
14	Loadfaulty	Load error	DPT 1.001	Output, read
14	Fault current/Load faulty	Current / load error	DPT 1.001	Output, read
+18	**next channel**			
76/148	Value of total current	Total current of all channels	DPT 9.021/ DPT 14.019/ DPT 9.024	Output read
77/149	Exceedance of total current	Total current overload	DPT 1.001	

picture 5: Current detection related objects

2.4 Default Value Of Communication Object

The following figure shows the default values for communication objects :

default setting									
NO.	Name	Object function	length	priority	C	R	W	T	U
0	channel A	On / off	1 status	Low	X		X		
1	channel A	hallway	1 status	Low	X		X		
2	channel A	locking	1 status	Low	X		X		
4	channel A	scene	1 status	Low	X		X		
5	channel A	state	1 status	Low	X	X		X	
6	channel A	logic 1	1 status	Low	X		X		
7	channel A	logic 2	1 status	Low	X		X		
8	channel A	Working time count	2 byte	Low	X	X		X	
8	channel A	Next service time	2 byte	Low	X	X		X	
9	channel A	Reset working count	1 status	Low	X		X		
9	channel A	Reset next service time	1 status	Low	X		X		
10	channel A	service request	1 status	Low	X	X		X	
+18	Next channel								
78/150	Global function	On / off	1 status	Low	X		X		

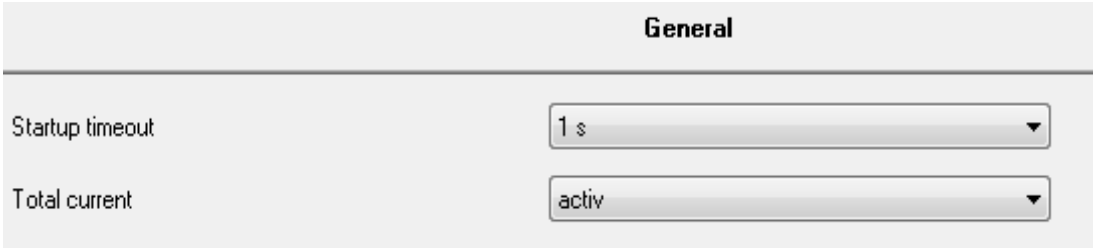
picture6: Object defaults

From the above figure, you can understand the default value of the communication object. According to the needs, its priority and communication flag can be modified. The meaning of each flag is: c-communication, r-read, w-write, t-transmission, u-update.

3. ETS Available Parameters

3.1 General Settings

The following figure shows the global parameters:



picture 1: General Settings

The parameter "startup timeout" is used to adjust the waiting time of power on startup. Before the waiting timeout, all communication commands are invalid.

The following table describes the parameter value ranges:

Parameter name	dynamic range [default value]	Remarks
Startup timeout	1-60s [1s]	The application function is valid only after the device waits for the time set by this parameter.

Picture 2: General settings

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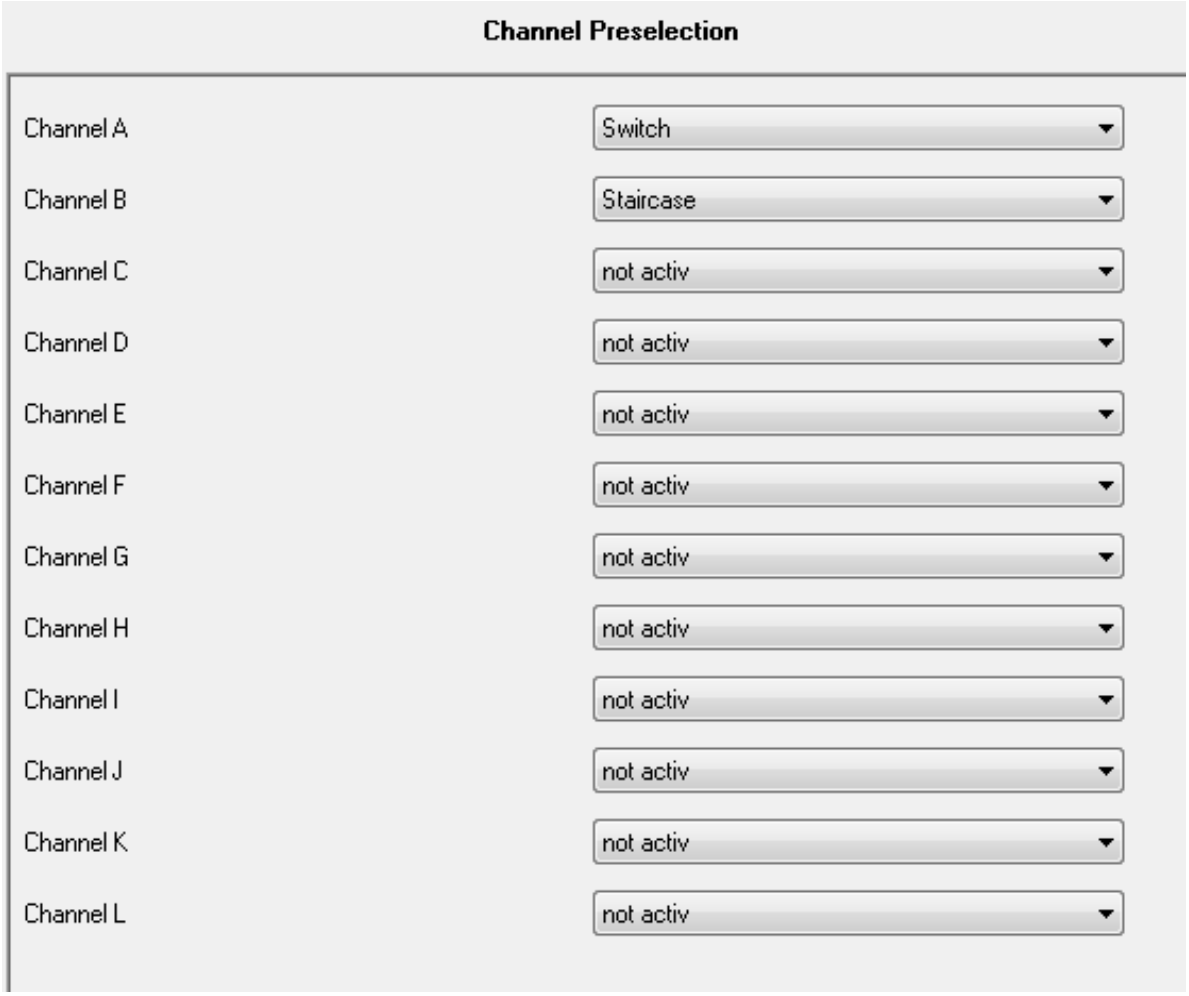
3.2 Channel Selection

The following figure shows the channel selection menu:



picture 3:channel selection

There are three different modes to choose from. Different modes have corresponding parameters. The selection mode "not active" indicates that the channel is forbidden, and the parameters of the corresponding channel will not be visible .

The following figure shows the optional modes for each channel:

ETS-Name	dynamic range [default value]	Remarks
Channel A-[O]	▪ **not active** ▪ Switch ▪ Staircase	Channel mode

Picture4: channel

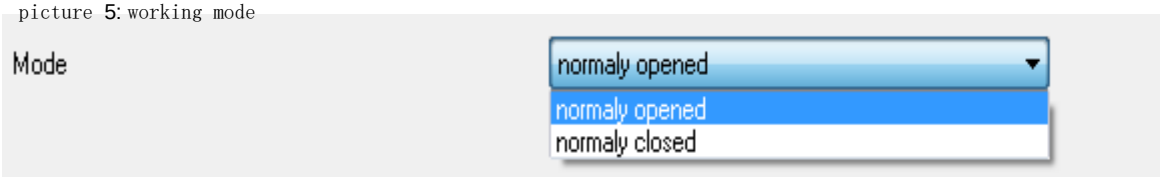
3.3 General Parameters

The following parameters are used for both the switch function of the channel and the stair function.

Relay Operation Mode

The following figure shows the options for this parameter:

picture 5: working mode



The following table describes the range of this parameter:

ETS- Name	dynamic range [default value]	Remarks
Mode	▪ **normallyopened** ▪ normally closed	Relay mode

picture 6: working mode

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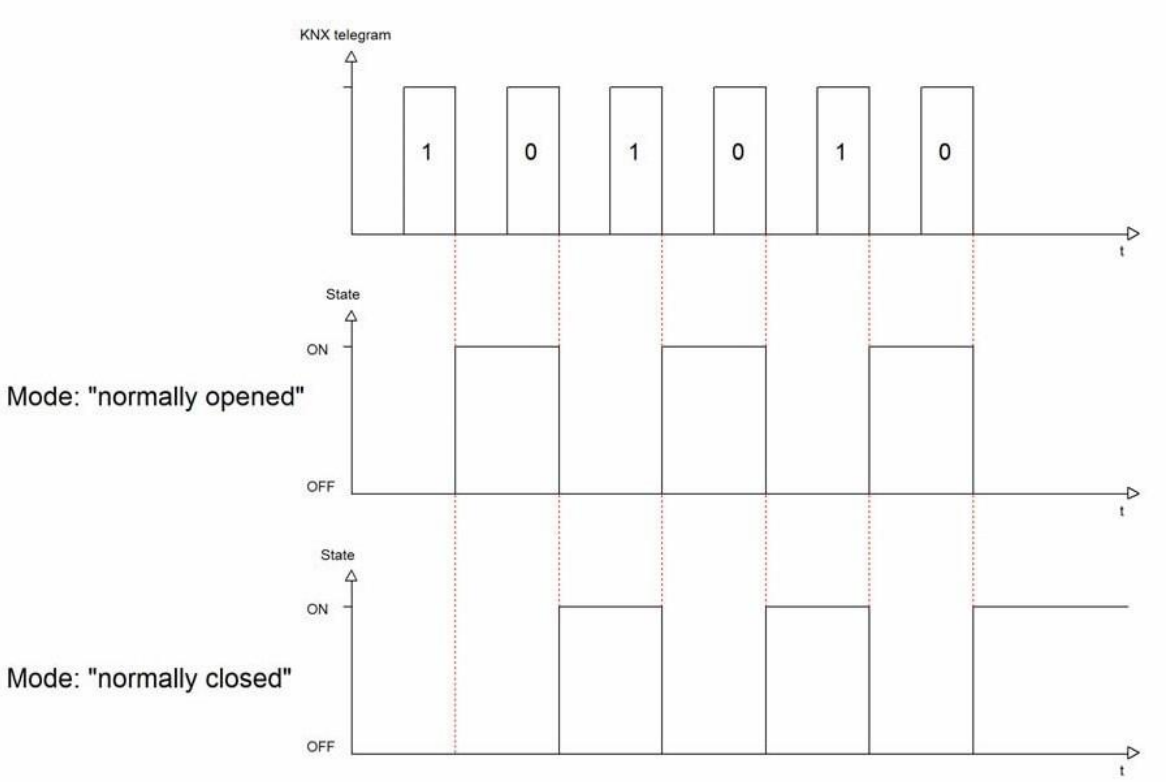
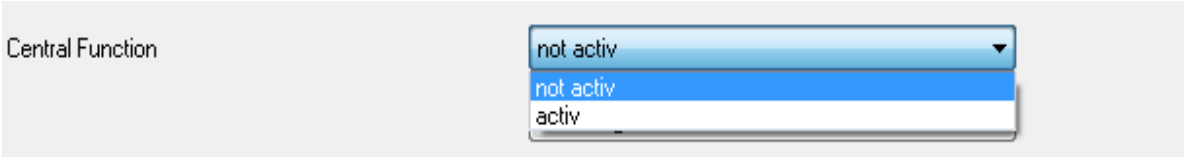
The following figure shows the action of the relay in the normally open and normally closed modes, and the signal message is alternating 1,0.



4. Main Control Function

The following figure shows the options of the main control function:



Picture 8: Global function

The following table shows the global function parameter range:

Name	dynamic range [default value]	Remarks
Central function	▪ **not active** ▪ active	Enable / disable the main control function of the corresponding channel

Picture 9: Global function

Each channel can independently enable ("active") / disable ("not active") the main control function. When sending a message to the main control object, all channels that enable the main control function will switch according to the message content, and the delay set by the delay parameter is equally effective. The use of the main control function can make the engineering design easier, Because multiple channels only need to send a message at the same time can respond.

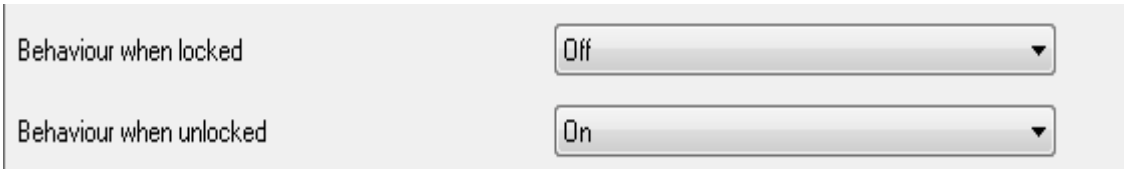
The following table describes the global control objects：

NO.	Name	Length	Usage
	Central function	1 Bit	The number of objects controlled depends on the number of channels

Picture 11: Global control object

5. Locking / Unlocking Behavior

The following figure is a screenshot of the lock and unlock options in ETS:



picture 12： Blocking function

The following table is the options for lock and unlock parameters:

Name	dynamic range **[default value]**	Remarks
Behavior when locked Behavior when unlocked	▪ On ▪ Off ▪ **no change**	Set actions when blocking and non blocking

pictur 13: Behavior of locking and unlocking

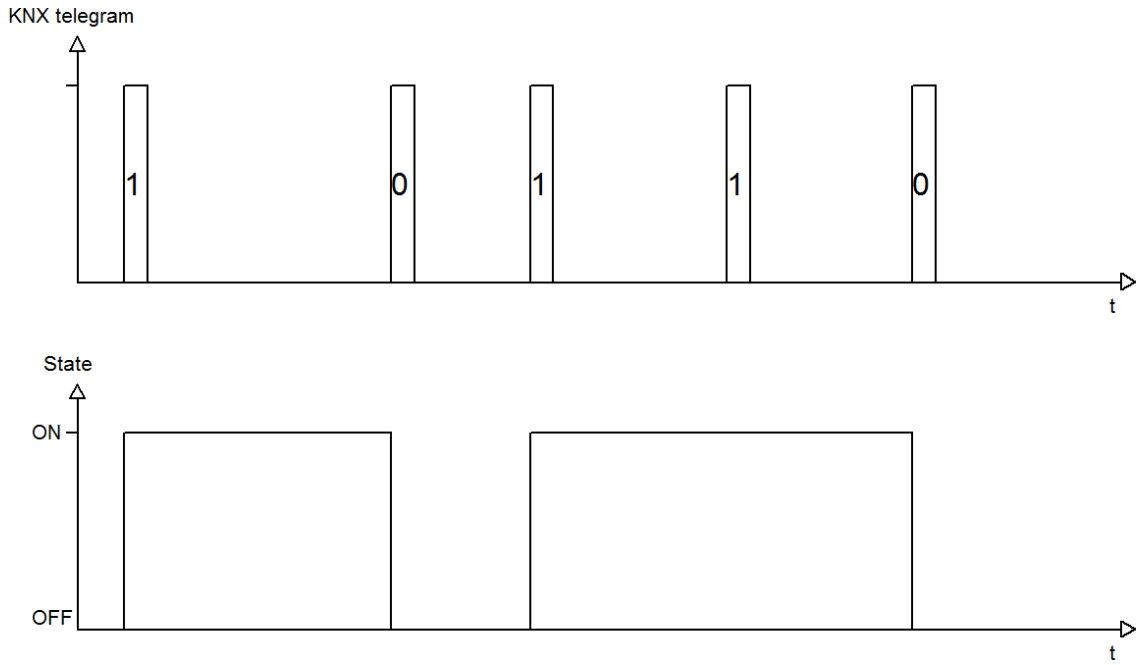
The function of locking and unlocking can be enabled and disabled by sending message 1 or 0 to the corresponding object. The parameter "behavior when locked" is used to define the action of the relay when the channel is locked. There are three options: "on", "off", "no change". The same option is also applicable to the parameter "behavior when unlocked".

The following table describes locking / unlocking objects:

NO.	**Name**	**Length**	**Usage**
2	Block	1 Bit	blocks the channel

Picture 13: Lock / unlock objects

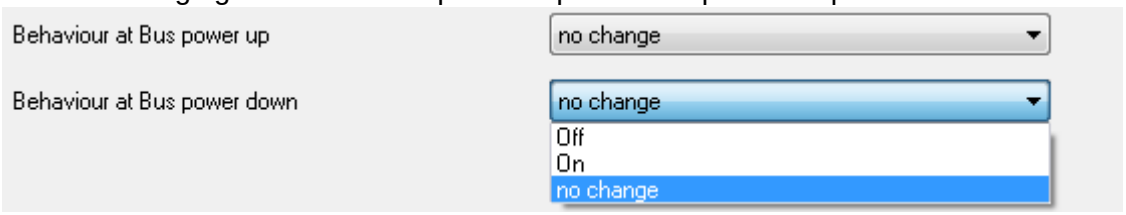
The following figure shows the action state of the relay when locking and unlocking. The specific action is specified by the parameters "behavior when locked" and "behavior when unlocked":



Message value corresponding relationship:

5.1 Power On / Power Off Behavior

The following figure shows the options of power on / power off parameters in ETS:



Picture14: Power on / power off behavior

The following table describes the range of options for power on / power off parameters:

ETS-Name	dynamic range **[default value]**	Remarks
Behavior at bus power up/ Behavior at bus power down	▪ On ▪ Off ▪ **no change**	Set the behavior of the channel when the device is powered on / off

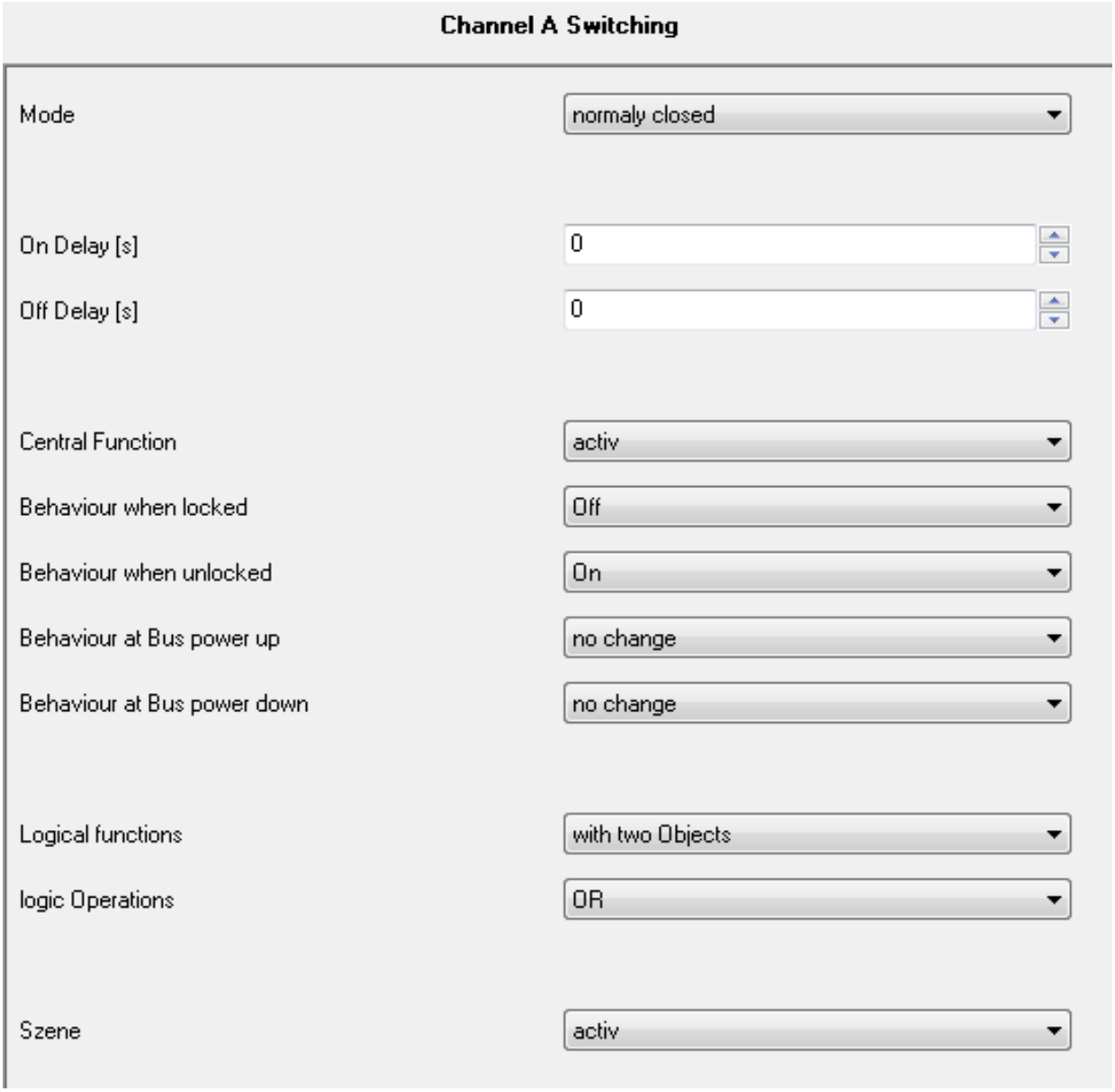
picture15: Power on / power off behavior

When the device is powered on or powered off, each channel can move to a specified state (option on, off) or keep the current state unchanged (option no change). Considering that the control channel state cannot continue after the bus is powered off, the designer should carefully consider the setting of this parameter.

5.2 Switch Output

Some of the following parameters are only available when the channel is selected as the switch mode.

When channel a is selected as the switch function, a submenu called "channel a switch" will appear. The following is a screenshot of the submenu:



picture 16: Switch output

The following table describes the parameters available when the channel is a switch function:

Name	dynamic range [**default value**]	Remarks
Mode	▪ **normallyopened** ▪ normally closed	Channel operation mode.
On-Delay	0…30000 sec [0=no delay]	Wait delay before opening the relay.
Off-Delay	0…30000 sec [0=no delay]]	Wait time delay before closing the relay.
Central function	▪ **not active** ▪ active	Activate the global control function of the channel.
Behavior when locked	▪ Off ▪ On ▪ **no change**	Specifies the action when the channel is locked.
Behavior when unlocked	▪ Off ▪ On ▪ **no change**	Specifies the action to unlock the channel.
Behavior at bus power down	▪ Off ▪ On ▪ **no change**	Specifies the action when the bus is powered down.
Behavior at bus power up	▪ Off ▪ On ▪ **no change**	Specifies the action when the bus is powered on.
Logic function	▪ **not active** ▪ with one object ▪ withtwo objects	Enable / disable logic function.
Logic operation	▪ **And** ▪ Or	Select logical operations and / or.
Scene	▪ **not active** ▪ active	Activate scene function.

picture16: Switch output

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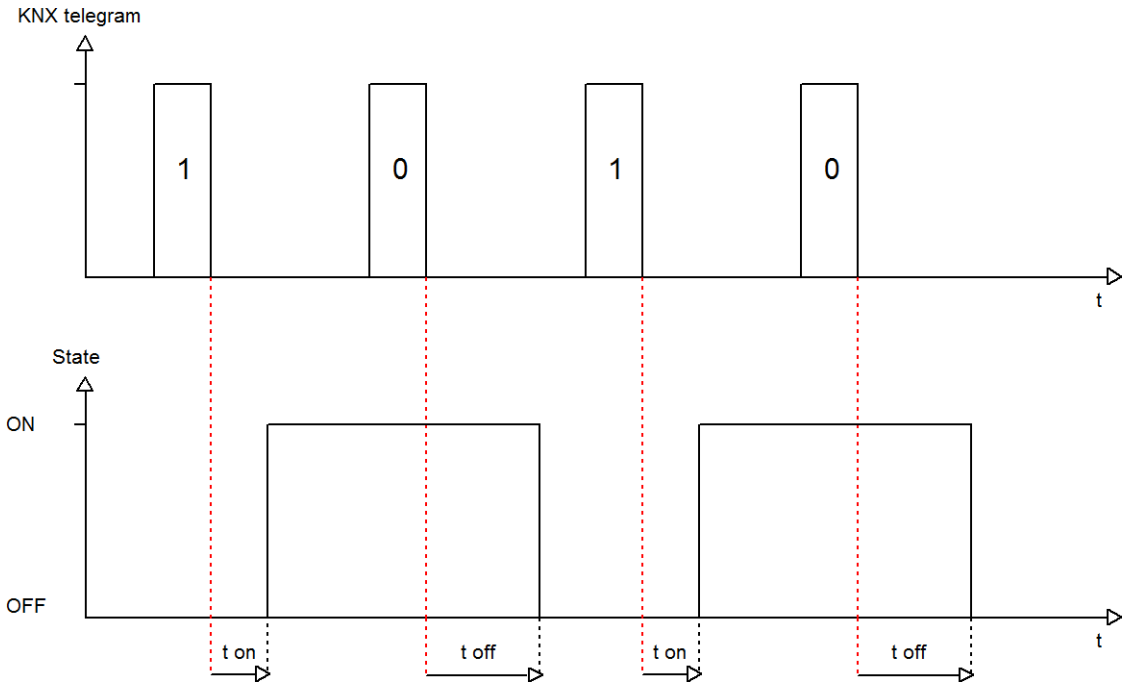
5.3 On / Off Delay

The following figure shows the setup options in ETS:

picture 17: on/off delay

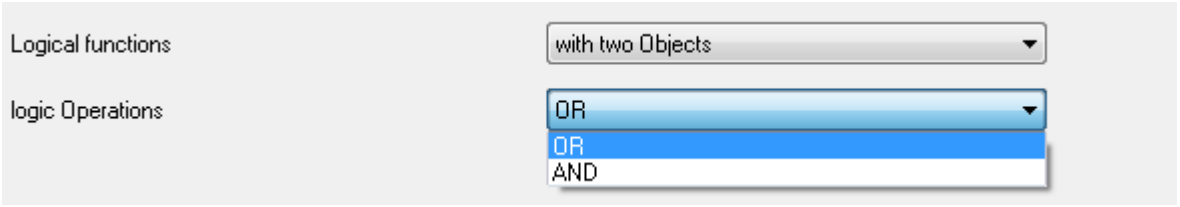
After the channel receives the opening message, it will delay the time specified by the parameter "on delay", and then it will actually execute the opening action. The principle of parameter "off delay". Same as this, it only means closing delay.

The following figure describes the function of two parameters:



6. Logic Function

The following figure shows the options in ETS:



picture 17: logic function

Logical function has two logical objects that can be enabled, and you can choose and operation or or or operation. When enabling and operation, the value of logical object will be "and" with the value of channel object. When the result is 1, the open action will be executed. When enabling or operation, the value of logical object will be with the value of channel object.

Perform the or operation. Whenever an object has a value of 1, the open action will be performed.

The following table describes two logical objects:

NO.	Name	Length	Usage
6	Logicao objects 1	1 unit	When only one logical object is enabled, the object is used
7	Logical objects 2	1 unit	When two logical objects are enabled, the object is used

picture 18: logical objects

Depending on the enabled logical object, only one or two logical objects are valid.

The following table describes the relationships of logical objects:

And operation				**Or operation**		
logical 1	Logical 2	Channel on/off		logical 1	Logical 2	Channel on/off
0	0	No		0	0	No
0	1	No		0	1	Yes
1	0	No		1	0	Yes
1	1	Yes		1	1	Yes

picture 18 : logical objects

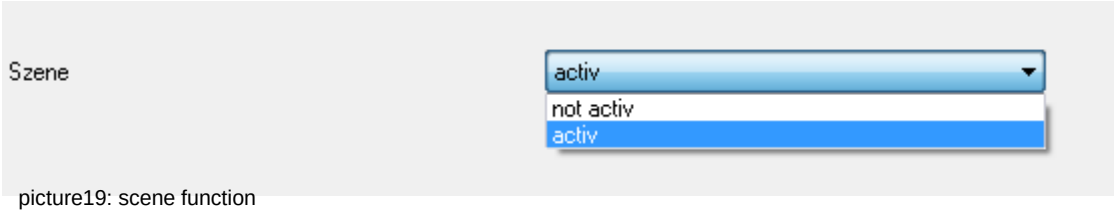
7. Scene Function

When there are different functions (such as lighting on, dimming, louver fan) that need to be processed at the same time, usually you have to send a message to each object separately to complete the function. However, with the scene function, this can be greatly simplified. Generally, you only need to send a message to call a certain scene to complete all the above functions. For example, Scene 1 corresponds to the opening of channel a, dimming of channel B respectively, For the louver fan of channel C, you only need to call Scene 1 through the corresponding group address. Then, the light of channel a will be turned on, the light of channel B will be turned to a certain brightness, and the louver fan of channel C will be turned to a certain position. Of course, this implies a condition that the scene objects of three channels should be associated to the same group address to achieve the above functions.

Each channel can independently enable / disable the scene function, and each channel has 8 scenes available for use. The scene also has the learning function, and the scene learning function of each channel can independently enable / disable. If the learning function of a scene is enabled and called, the value of the called scene will be updated to the value of the current channel.

The value of the scene object is 1 byte long.

The following figure shows the options of scene function in ETS:



picture19: scene function

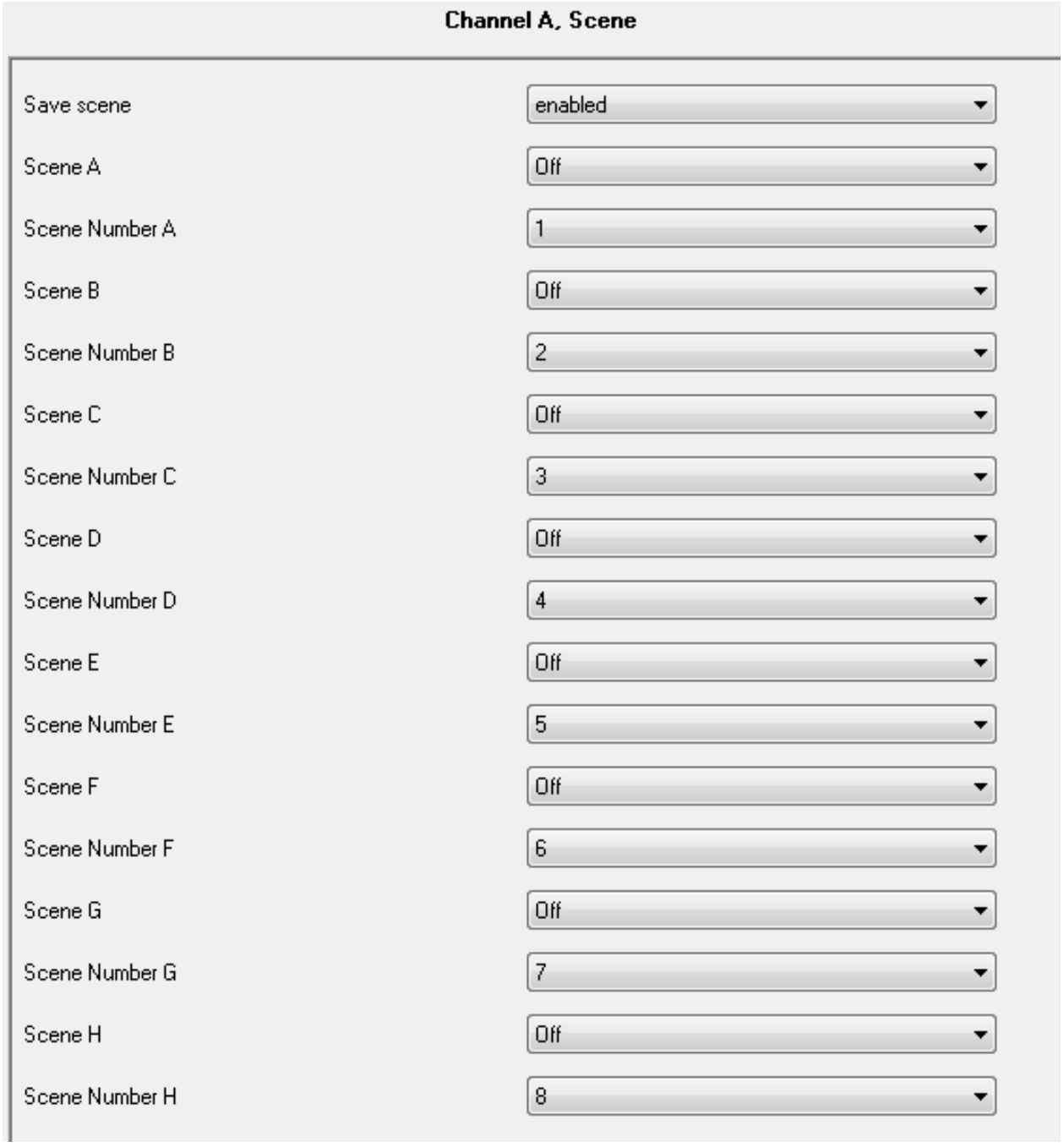
The following table describes the related scene objects:

No.	Name	Length	Usage
4	Scene	1 Byte	Call of the scene

Picture20: scene objects

For calling a scene, you only need to send the scene value to the corresponding object. The scene number range is 1-64, but the actual sending value must be 0-63.

Each channel has 8 scene options, and the scene selection range of each option is 1-64.



picture 21: scene options

The following table describes the value selection for the scene :

ETS-Name	dynamic range **[Default value]**	Remarks
Save scene	▪ **Disabled** ▪ enabled	Enable / disable learning
Scene A	▪ **Off** ▪ On	Activation scenario A
Scene number A	1-64 [1]	Scene number; call value = scene number -1
Scene B	▪ **Off** ▪ On	Activation scenario B
Scene number B	1-64 [1]	Scene number; call value = scene number -1
Scene C	▪ **Off** ▪ On	Activation scenario C
Scene number C	1-64 [1]	Scene number; call value = scene number -1
Scene D	▪ **Off** ▪ On	Activation scenario D
Scene number D	1-64 [1]	Scene number; call value = scene number -1
Scene E	▪ **Off** ▪ On	Activation scenario E
Scene number E	1-64 [1]	Scene number; call value = scene number -1
Scene F	▪ **Off** ▪ On	Activation scenario F
Scene number F	1-64 [1]	Scene number; call value = scene number -1
Scene G	▪ **Off** ▪ On	Activation scenario G
Scene number G	1-64 [1]	Scene number; call value = scene number -1
Scene H	▪ **Off** ▪ On	Activation scenario H
Scene number H	1-64 [1]	Scene number; call value = scene number -1

Picture 22 : Scene parameters

In order to call the scene or save a new value to the scene, you must send a call or Save command to the corresponding scene object:

scene	call		Preservation	
	十六	Dez.	Hex.	Dez.
1	0x00	0	0x80	128
2	0x01	1	0x81	129
3	0x02	2	0x82	130
4	0x03	3	0x83	131
5	0x04	4	0x84	132
6	0x05	5	0x85	133
7	0x06	6	0x86	134
8	0x07	7	0x87	135
9	0x08	8	0x88	136
10	0x09	9	0x89	137
11	0x0A	10	0x8A	138
12	0x0B	11	0x8B	139
13	0x0C	12	0x8C	140
14	0x0D	13	0x8D	141
15	0x0E	14	0x8E	142
16	0x0F	15	0x8F	143
17	0x10	16	0x90	144
18	0x11	17	0x91	145
19	0x12	18	0x92	146
20	0x13	19	0x93	147
21	0x14	20	0x94	148
22	0x15	21	0x95	149
23	0x16	22	0x96	150
24	0x17	23	0x97	151
25	0x18	24	0x98	152
26	0x19	25	0x99	153
27	0x1A	26	0x9A	154
28	0x1B	27	0x9B	155
29	0x1C	28	0x9C	156
30	0x1D	29	0x9D	157
31	0x1E	30	0x9E	158
32	0x1F	31	0x9F	159

Picture22 :call and save

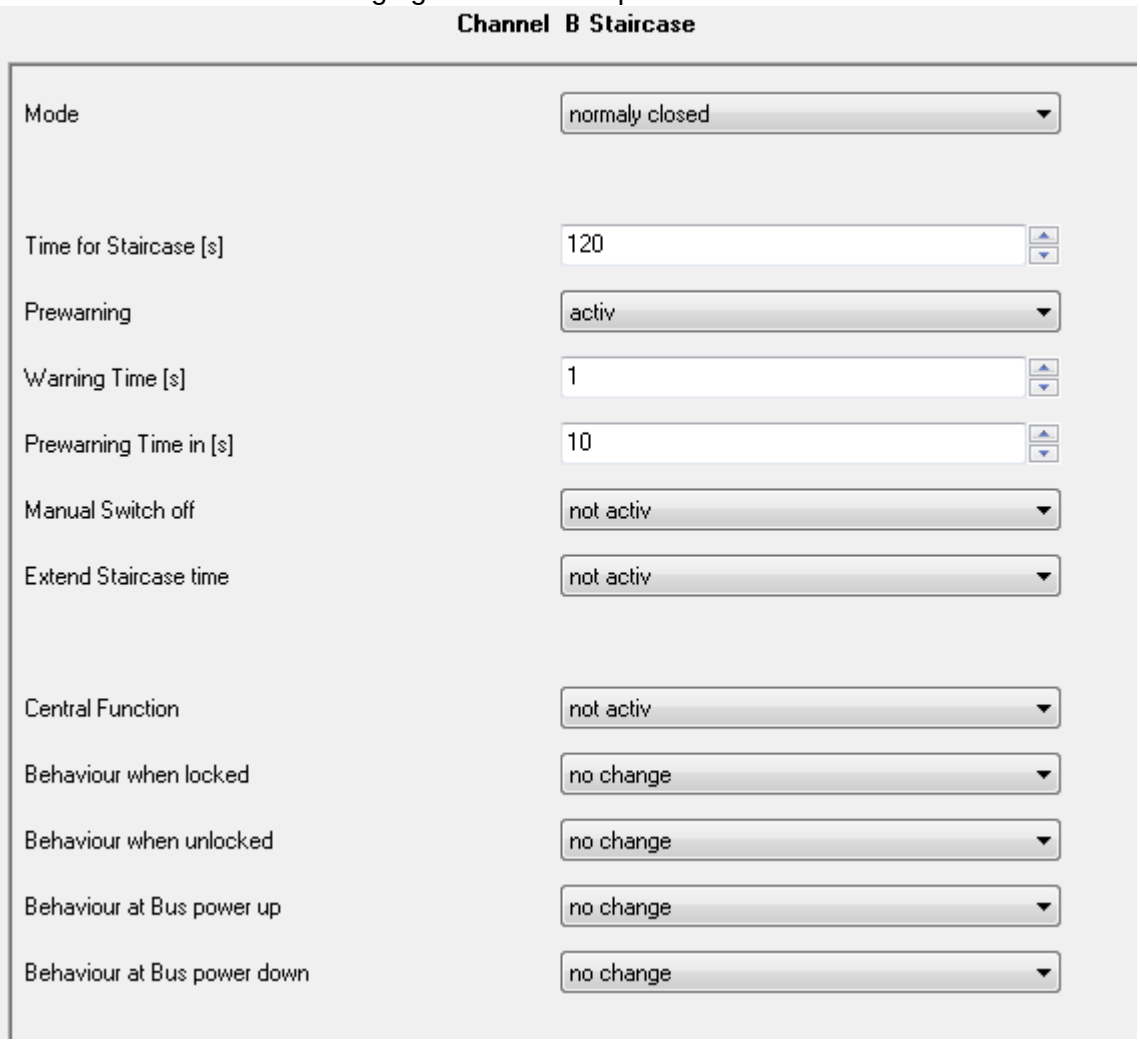
8. Crridor Lghting

The following parameters are only useful when a channel is selected as a corridor lighting feature.

8.1 Overview

When a channel is selected as the corridor lighting function, corresponding submenu will appear to set the parameters.

The following figure shows the parameters that can be set:



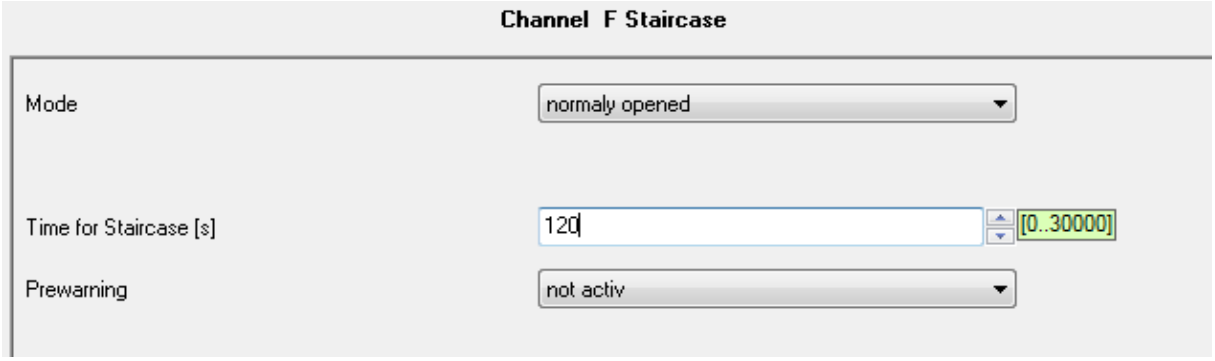
Picture 23 : corridor lighting

The following table describes all the parameters that can be used for corridor lighting:

Name	dynamic range **[Default value]**	Remarks
Mode	**normallyopened** normally closed	Channel mode selection
Time for staircase [s]	0…65535 sec [120 sec]	Duration of illumination
Prewarning	**not active** active	Activate alert function
Warning time [s]	0…65535 sec [120 sec]	Warning duration
Prewarning time [s]	0…65535 sec [120 sec]	Reopen duration
Manual switching off	**not active** active	Enable to turn off lighting manually
Extend staircase time	**not active** active	Enable continuous lighting function (when lighting is on,f the switch on command is received again, the lighting time will be continued
Central function	**not active** active	Activate global control function
Behavior when locked	Off On **no change**	Action when the control channel is locked
Behavior when unlocked	Off On **no change**	Action when unlocking the control channel
Behavior at bus power down	Off On **no change**	Control action in case of power failure
Behavior at bus power up	Off On **no change**	Control the action when power on

Picture 23 : Corridor function parameters

The following figure shows the lighting time options:



Picture 24 : Corridor lighting time

The difference between corridor lighting and room lighting is that it will turn off automatically after lighting for a period of time. The parameter "time for staircase" is used to set the lighting time. More other functions will be described later.

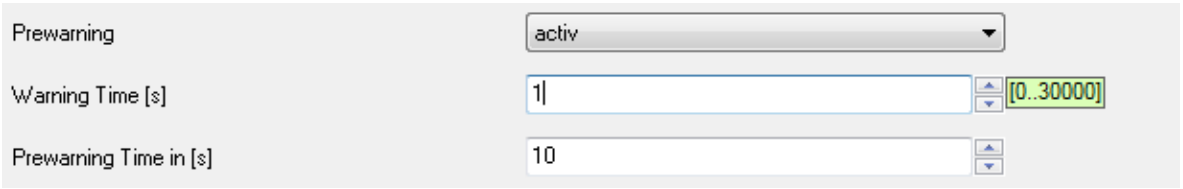
The following table describes the communication objects that control corridor lighting:

No.	Name	Length	Usage
1	Staircase	1 unit	Corridor control call object

Picture 25 : Corridor lighting objects

8.2 early warning and warning

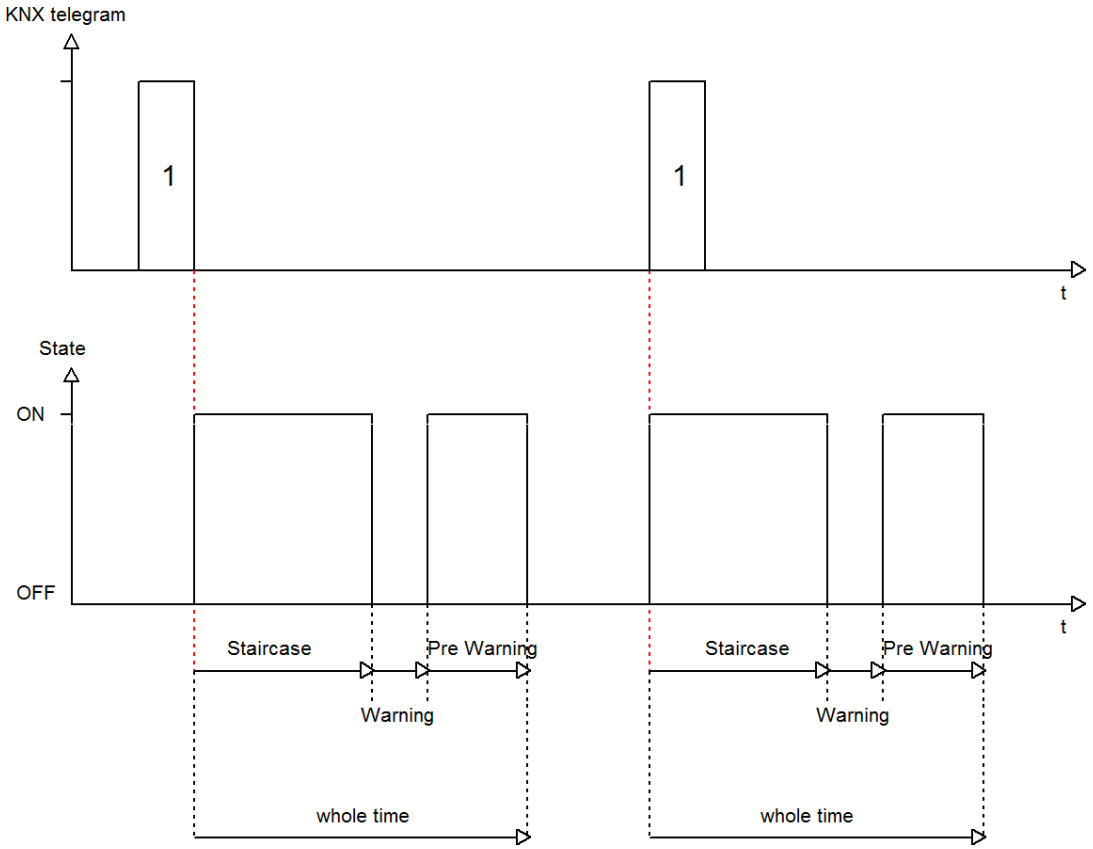
The following figure shows the warning and warning parameters:



Picture 26 : Warning and warning parameters

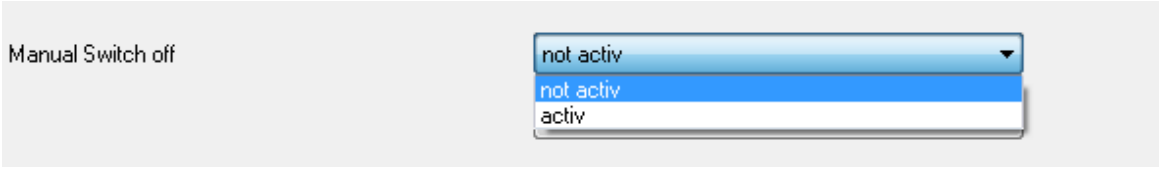
The warning function can be enabled by setting the parameter "prewarning" to "active".
The parameter "warningtime" sets the time when the lamp is turned off for a short time, usually 1-3 seconds. The short-time turn off of the lamp can be used to inform that the lamp will be turned off soon. The parameter "prewarning time" sets the duration when the lamp is turned on again, and then the lamp will be turned off.

The whole control process of the lamp consists of three parts, which can be illustrated in the following figure:



8.3 Manual Closing

The figure below shows the manual shutdown parameters:

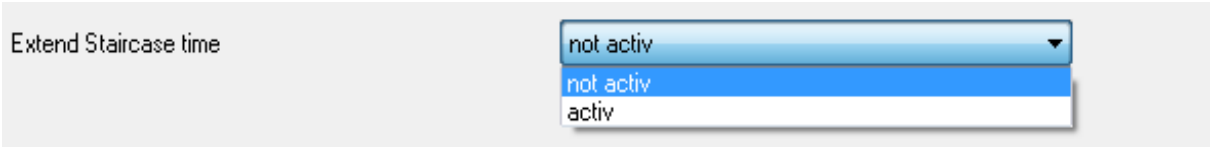


Picture 27 :manual closing

If the manual close function is enabled, the channel can be closed manually without waiting for it to close automatically.

9. Continuation Function

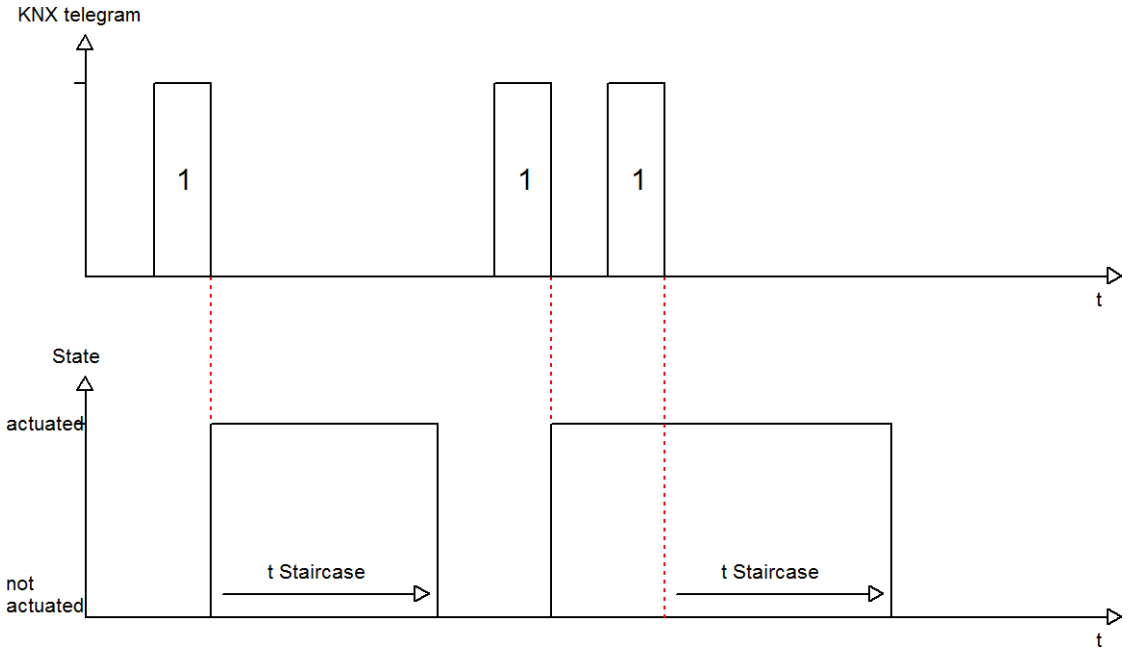
The following figure shows the continuation parameters:



Picture 28 : Duration

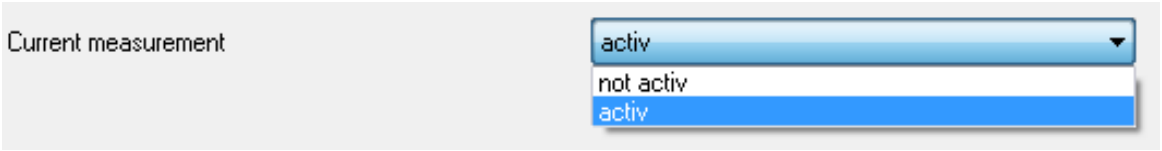
If the continuation function is activated, during the channel opening, if the opening peration is triggered again, the channel will be re timed, otherwise, the re triggering command is invalid.

The following figure illustrates the re triggering mechanism :



9.1 Current Detection

The current detection function of each channel must be activated by corresponding parameters:



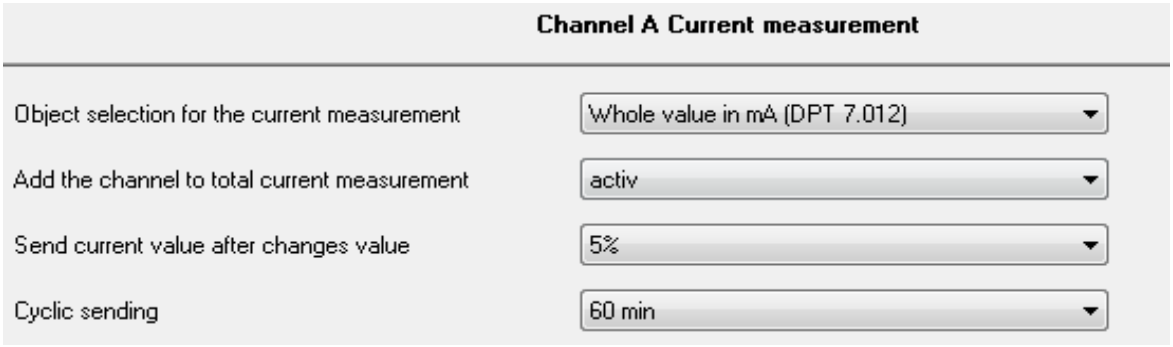
Picture 29 : Activate current detection

If the current detection function is activated, a new submenu will appear in which various parameters can be selected.

Note: current detection parameters are only valid for products with current detection function. This part of parameters can be ignored for products without current detection.

9.1.1 regular settings

The following figure shows the current measurement parameters:



Picture 30 : General setting of current detection

The following table shows the parameters used for current detection:

ETS - Name	dynamic range **[Default value]**	Remarks
Object selection for the current measurement	▪ **Whole value in mA** ▪ Floating value in mA ▪ Value in A	Select object value type
Add the channel to total current measurement	**not active** active	Select whether the channel current value is added to the total current value
Send actual value after changes value	not active, 1% - 75% **[not active]**	Activate / set current range to send message
Cyclic sending	▪ **not active** ▪ 15min ▪ 30min ▪ 60min ▪ 90min ▪ 120min	Activate / set the interval of sending message

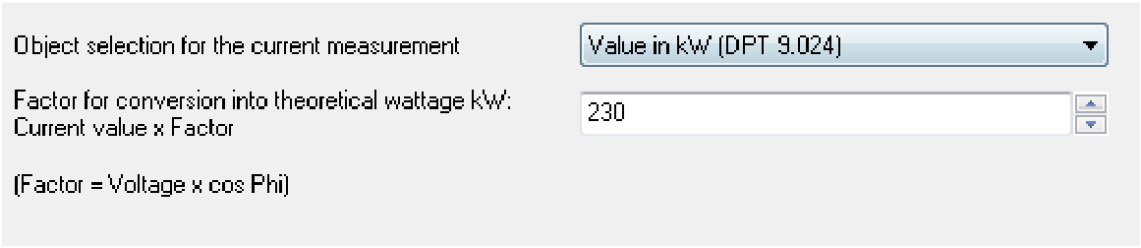
Picture 31 :regulai settings

For each channel, the value type of its current transmitting object is optional. The accuracy of current measurement depends on the selected object type.

There are three types of precision:

- **Whole value in mA**
  The current value is in milliamperes and only integer values are sent
- **Floating value in mA**
  The current value is in milliamperes and is sent as a floating point number
- **Value in A**
  The current value is in ampere and sent in floating-point number.

:



Picture 32 : Power calculation

The power value of the channel is just an approximate multiplication calculation.

More parameters can be used for the current detection function. For example, you can set the sending conditions. Send the current value after the current changes more than a certain ratio, or send at a fixed interval.

The following table shows the current value sending object:

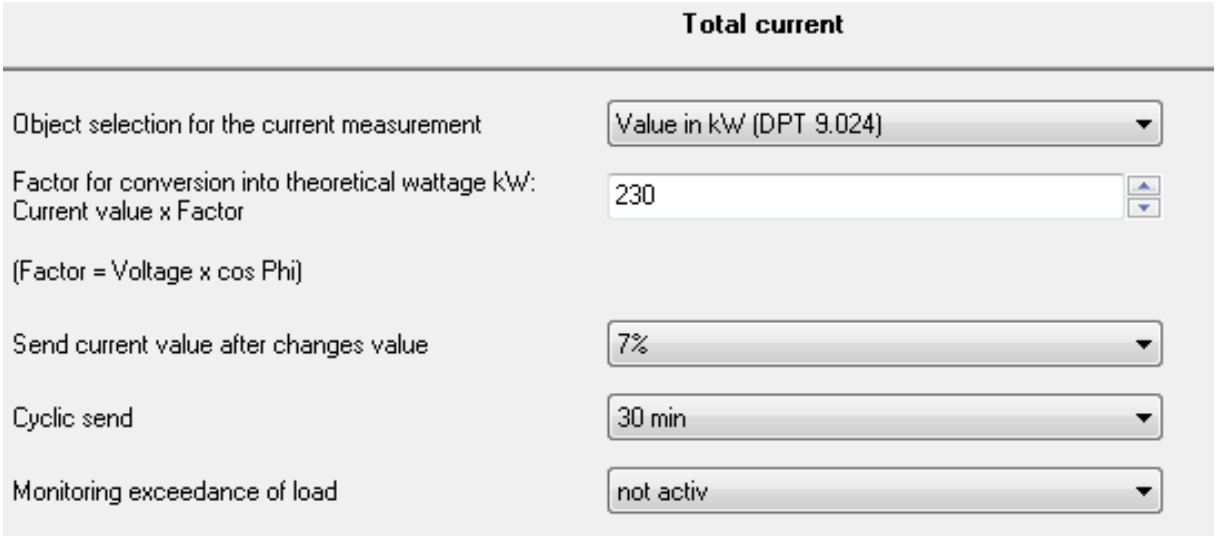
Number	Name	Length	Usage
11	Current value	2/4 Byte	Real-time current value of the send channel.

Picture 33; Current detection communication object

9.1.2 total current measurement

The measurement of the total current can be activated in the submenu "general" (see 4.1). Each channel can choose whether to add its current to the total current.

The following figure shows the parameters for the total current measurement:



Picture 34 : Total current

The following table describes the parameter settings related to the total current:

ETS - Name	dynamic range **[Default value]**	Remarks
Object selection for the current measurement	**Floating value in mA** Value in A Value in kW	Select object value type
Send actual value after changes value	not active, 1% - 75% **[not active]**	Select whether the channel current value is added to the total current value
Cyclic sending	▪ **not active** ▪ 15min ▪ 30min ▪ 60min ▪ 90min ▪ 120min	Activate / set current range to send message Activate / set the interval of sending message
Monitoring exceedance of load	**not active** active	Activate overload monitoring

Picture35 : Total current

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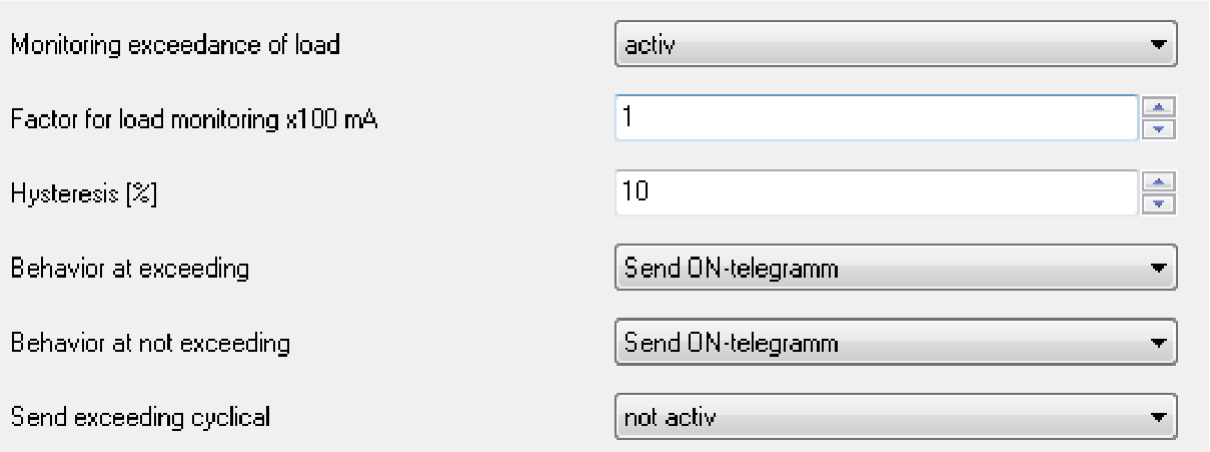
The type of object used to transmit the total current is also optional, but there is a setting option "whole value in Ma" missing. See Chapter "4.6.1 general settings" for details.
The transmission condition of the total current can also be set to transmit when the current changes more than a certain ratio or at a fixed interval .
The following table describes the objects related to the total current:

NO.	Function	Length	Usage
78/ 148	Value of total current	2/4 Byte	Send the current value of the whole equipment
79/149	Exceedanceoftotal current	1 Bit	Send service request in case of current overload

Picture 36 Total current communication object

9.1.3 Monitoring Overload

The total current only has overload monitoring function, not low load monitoring function.
The following figure shows the parameters related to the total current monitoring:



picture 37: Overload / low load monitoring

The following table describes the monitoring related parameters:

ETS - Name	dynamic range **[Default value]**	Remarks
Factor for load monitoring x100mA	1 - 200 **[1]**	Set overload monitoring reference value
Hysteresis %	10 - 100 **[10]**	Set delay response value
Behavior at exceeding/deviating	▪ **Send no telegram** ▪ Send On - telegram ▪ Send Off - telegram	Set behavior when overloaded
Behavior at not exceeding/deviating	▪ **Send no telegram** ▪ Send On - telegram ▪ Send Off - telegram	Behavior when returning to normal
Send exceeding/deviating cyclical	▪ **not active** ▪ 15min ▪ 30min ▪ 60min ▪ 90min ▪ 120min	Activate cycle sending function

picture 38: Overload monitoring

The reference value of overload monitoring can be set by the parameter "factor for load monitoring". The reference value is multiplied by 100mA by default. Therefore, the actual settable range is 0,1a to 20A. The parameter "hysteresis" is used as the reference value to judge the current return to normal, which can prevent rapid switching operation. For overload, this value must be subtracted from the reference value. For low load, This value must be added to the reference value. However, this value is only used to judge when the current returns to normal. Therefore, for a given value of 10% and a reference value of 1a, the following calculation can explain the working principle:

Overload judgment: when the current reaches 1a, an overload message will be sent; when the current is lower than 0.9A, a message will be sent to return to normal.

Low load judgment: when the current reaches 1, a low load message will be sent; when the current is higher than 1.1a, a message will be sent to return to normal.

The sending conditions of related communication objects can be set as "send no telegram", "send on telegram" or "send off telegram". It can also be set as periodic transmission.

The following table describes the related communication objects:

NO.	**Function**	**Length**	**Usage**
12	Exceedance of load	1 Bit	Send overload message
13	Lower deviation of load	1 Bit	Send low load message

picture 39: Overload / low load communication object

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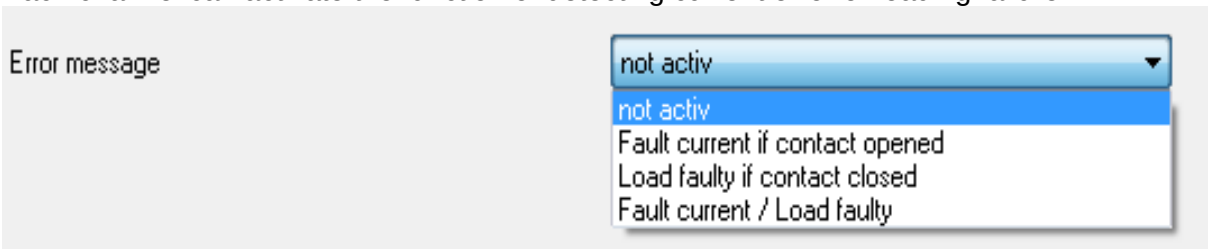
9.2 Fault Current / Loading Failure

Each channel can activate the function of detecting current error or loading failure:



Picture 40: error message

The following describes:

ETS-Name	dynamic range **[Default value]**	Remarks
Error message	▪ **not active** ▪ Fault current is contact opened ▪ Load faulty if contact closed	Information type options
Switching threshold	▪ **20mA** ▪ 50mA ▪ 100mA ▪ 200mA ▪ 500mA ▪ 1A	Set reference value For current error, overload service will be sent. for load errors, low load service will be sent

Picture 41: Current error / load error

The current error or load error function can be activated, or both.
When the channel is open, if the current is greater than the reference value, it is a current error
When the channel is closed, if the current is less than the reference value, it is a load error.
As long as one of the error functions is enabled and the conditions are met, a message with a value of 1 is sent.

The following table describes the parameters related to error messages:

NO.	**Function**	**Length**	**Usage**
14	Loadfaulty	1 Bit	Send load error message
14	Fault current	1 Bit	Send current error message
14	Fault current/Load faulty	1 Bit	Send load error or current error message

Picture 42 :Error message object

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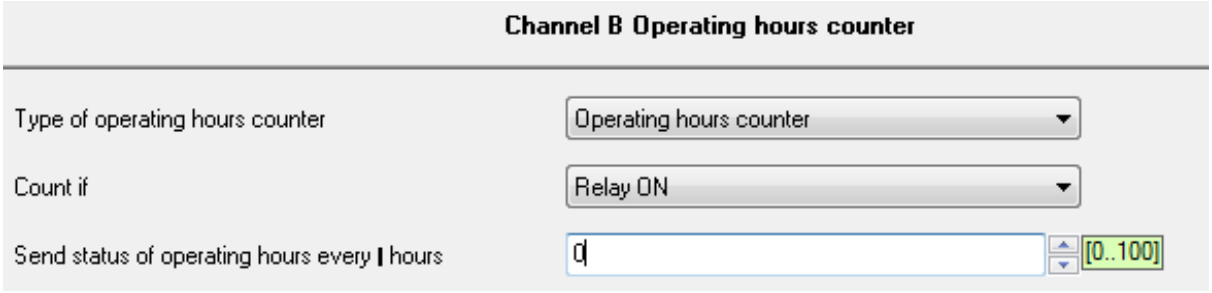
10. Working Time

The work timer can be used to count the accumulated time of channel work, and can also be used to count down the remaining time from the next service request.

10.1 Working Time Timer

The following figure shows the relevant parameters of the working timer:



Picture 43 : working time timer

The following table describes the parameter selection range of the working timer:

Name	dynamic range **[Default value]**	Remarks
Type of operating hours counter	**Operating hours counter**	Select timing mode
Count if	▪ **Relay ON**	Select timing conditions
Send status of operating hours every … hours	0 - 100 **[0h]**	Set the time interval for automatic return of timing value, 0 is forbidden.

Picture 44 : Working timer

The timer can be set to start counting when the channel is on or when the current is greater than a certain value.

Object "response operating hours" can return the timing value. When its parameter value is set to 0, the function is disabled. Object "reset operating hours" is used to reset the timing value.

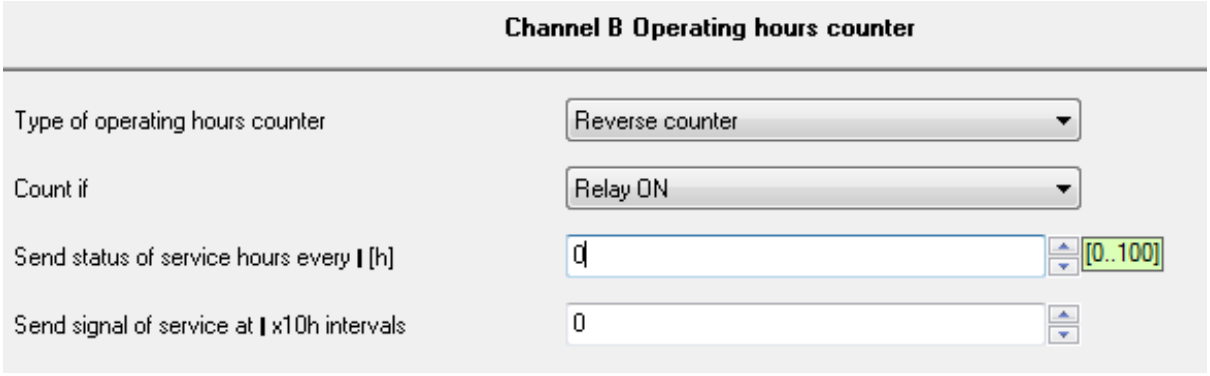
The following table describes the related timing objects:

NO.	Name	Length	Usage
8	Response operating hours	2 Byte	Send timing value
9	Reset operating hours	1 Bit	Set the timing value to 0

Picture 45: Timing object

10.2 Countdown Timer

The following figure shows the parameters related to the countdown:



Picture46: Countdown function

The following table describes the countdown related parameter setting options:

ETS - Name	dynamic range **[Default value]**	Remarks
Type of operating hours counter	**Reverse counter**	Countdown mode
Count if	**Relay ON** Current >20mA Current >50mA Current >100mA Current >200mA Current >500mA Current >1A Current >2A Current >5A	Timing condition
Send status of service hours every … [h]	0 - 100 **[0h]**	Set sending status message cycle
Send signal of service at …x10h intervals	0 - 250 **[0h]**	Set service request cycle

Picture47: Countdown function

The countdown timer can calculate the remaining time from the next service. The parameter "send signal of service at" is used to set the interval time for sending service requests. When it is set to 0, it means that the function is disabled.

Parameter "send status of service hours every..." It is used to set the cycle time of sending status service. When it is set to 0, this function is disabled.

The following table describes the objects related to the countdown:

NO.	Function	Length	Usage
8	Time to the next service	2 Byte	Time left before next service
9	Reset service	1 Bit	Reset time to set value
10	Service required	1 Bit	Request a service

Picture 48: Countdown object