

User Manual

K-BUS® Switch Actuator with current detection, 4/8/12-Fold_V1.2

ARCD-04/16.1

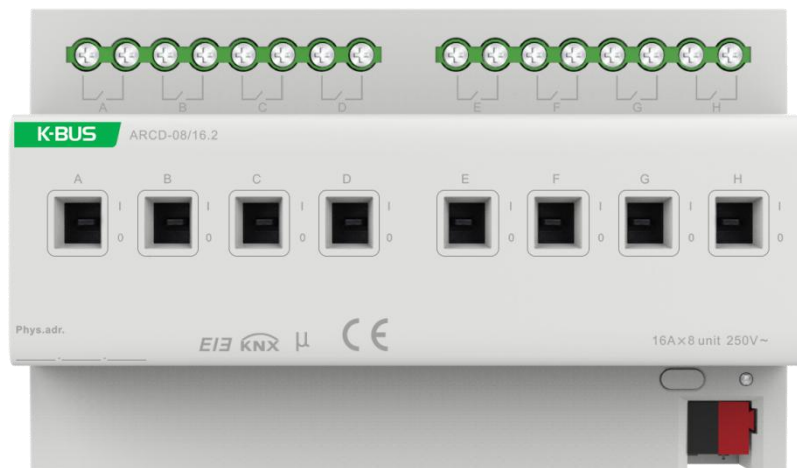
ARCD-08/16.1

ARCD-12/16.1

ARCD-04/16.2

ARCD-08/16.2

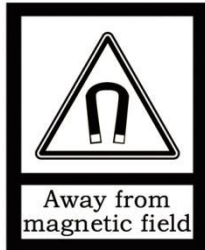
ARCD-12/16.2



KNX/EIB Home and Building Control System

Attentions

1. Please keep devices away from strong magnetic field, high temperature, wet environment;



2. Please do not fall the device to the ground or make them get hard impact;



3. Please do not use wet cloth or volatile reagent to wipe the device;



4. Please do not disassemble the devices.

Contents

Chapter 1 Summary	4
Chapter 2 Technical Data	5
2.1 ARCD-xx/16.1	5
2.2 ARCD-xx/16.2	7
Chapter 3 Dimension and Connection Diagram	9
3.1 Dimension	9
3.2 Connection Diagram	10
Chapter 4 Parameters Setting Description in the ETS	11
4.1 Overview	11
4.2 Parameter window "All General"	11
4.2.1 Parameter window "Total current"	15
4.3 Parameter window "Channel X"-Switch actuator	19
4.3.1 Parameter window "X: Time"	24
4.3.2 Parameter window "X: Preset"	29
4.3.3 Parameter window "X: Logic"	31
4.3.4 Parameter window "X: Scene"	33
4.3.5 Parameter window "X: Threshold"	34
4.3.6 Parameter window "X: Safety"	36
4.3.7 Parameter window "X: Forced"	37
4.3.8 Parameter window "X: Current"	38
4.4 Parameter window "Channel X"-Heating actuator	45
4.4.1 Parameter window "X: Monitoring"	49
4.4.2 Parameter window "X: Forced"	50
4.4.3 Parameter window "X: Regular"	51
4.4.4 Parameter window "X: Safety"	52
Chapter 5 Description of communication object	53
5.1 Communication object "Switch actuator"	53
5.1.1 Communication object "All General"	53
5.1.2 General communication object "Switch actuator"	54
5.1.3 Time function object of "Switch actuator"	54
5.1.4 Preset function object of "Switch actuator"	55
5.1.5 Logic function object of "Switch actuator"	56
5.1.6 Scene function object of "Switch actuator"	56
5.1.7 Threshold function object of "Switch actuator"	57
5.1.8 Forced function object "Switch actuator"	57
5.2 Communication object "Heating actuator"	58
5.2.1 General communication object "Heating actuator"	58
5.2.2 Monitoring function object of "Heating actuator"	59
5.2.3 Forced function object "Heating actuator"	59
5.2.4 Regular switch function object "Heating actuator"	59
5.3 Communication object "Total current"	60
5.4 Communication object "X: Current"	60
Chapter 6 Priority level description	62

Chapter 1 Summary

The Switch Actuators with current detection are mainly applied in building control system, connected to the BUS via EIB terminals and installed together with other devices on the bus to become a system. These switch actuators can be used to control the switch loads, such as:

- ✧ Lighting
- ✧ Heating control
- ✧ Signal devices

It is able to switch from 4 to 12 independent electrical AC loads or three-phase loads by the switch actuators with maximum output of 16A per output and manual switch, as well as visible switching status.

This manual provides you the detailed technical information about the Switch Actuators with current detection, not only the installation and programming details, but also the usage explanation in actual application.

The switch actuators are modular installation devices in proM design, which are easy to install in the distribution boards on 35mm mounting rails according to EN60715. The devices connect to EIB/KNX system via bus connection terminal, and connect to load by using screw terminals, as well as each output is controlled separately by EIB/KNX system.

The switch actuators are connected to the AC power supply directly instead of an extra voltage supply. It is able to use the Engineering Tool Software ETS (ETS4 or later) with a .knxprod file to allocate the physical address and set the parameters.

There are same following programming functions for each output:

- **Time function: on/off delay**
- **Staircase function with the warning and adjustable staircase lighting time**
- **Scene, preset control: 8bit/1bit**
- **Logic operation: AND, OR, XOR, gate function**
- **Status response**
- **Forced operation and safety function**
- **Threshold function setup**
- **Control of electric thermal valve function**
- **Selection of preferred status after bus voltage failure and recovery**
- **Current and Power measurement**
- **Report total current and total power of device**
- **Monitoring channel current and total current**
- **Switching counter**
- **Operation hours counter**

NOTE: ARCD-xx/16.1 and ARCD-xx/16.2 have the same software function, the difference is that the relays are different.

Chapter 2 Technical Data

2.1 ARCD-xx/16.1

Power supply	Operation voltage	21~30 V DC, via the KNX bus
	Current consumption, bus	< 12 mA
	Power consumption, bus	Max. 360 mW
Output	U _n rated voltage	250V AC(50~60Hz)
	I _n rated current	16A
	Load capacity	10A/140uF
	Max. switching current	20A/250V AC
	Max. leakage loss	2W(4-Fold)/ 4W(8-Fold)/ 8W(12-Fold)
	Current detection range	50mA~16A
	Min. detection load	15W
	Current detection accuracy	±5% and ±20mA
Output life expectancy	Mechanical endurance	>10 ⁶
	Electrical endurance	>10 ⁴
Output switching times	Operation period per output	40ms
	Delay times after switching on	20ms
	Delay times after switching off	20ms
Connections	KNX	Bus connection terminal (0.8mmΦ)
	Load output connection terminal	Screw terminal
Operation and display	Programming LED and button	For assignment of the physical address
	Green LED flashing	Indicate the application layer running normally
	Indication of the contact position	Close means the output is on
		Open means the output is off
Protection	IP20	to EN 60529

Safety class	II	to EN 61140
Temperature	Operation	-5 °C ~+ 45 °C
	Storage	-25 °C~+ 55 °C
	Transport	-25 °C ~+ 70 °C
Ambient	-Humidity	<93%, except dewing
Design	Modular DIN-Rail Component	35mm Din rail, modular installation
	Dimension / Weight	ARCD-04/16.1 : 72 x 90 x 64mm /0.3KG
		ARCD-08/16.1 : 144 x 90 x64mm /0.5KG
		ARCD-12/16.1 : 216 x 90 x 64mm /0.75KG

Electrical endurance

load	100,000 cycles	30,000 cycles
Incandescent lamp	1,250 W	2,500 W
Fluorescent lamp, not compensated	1,200 W	2,500 W
Fluorescent lamp, Parallel compensated	650 W/70 µF	1,300 W/140 µF
Fluorescent lamp, duo-combination	2×1,200 W	2×2,500 W
Halogen lamp (230 VAC)	1,200 W	2,500 W
Low-voltage halogen lamp with transformer	500 VA	500 VA
Mercury arc/sodium discharge lamp not compensated	1,000 W	2,000 W
Mercury arc/sodium discharge lamp parallel compensated	1,000 W/70 µF	2,000 W/140 µF
Dulux lamp, not compensated	800 W	1,600 W
Dulux lamp, parallel compensated	560 W/70 µF	1,100 W/140 µF

Note: The above load is only for single lamps. In the case of several lamps in parallel, the load will be reduced, although the power is unchanged, but the instantaneous impact of current will increase, and easy to make the relay contacts melted. In normal use, the maximum output current is preferably less than 10A for resistive load, and inductive load and capacitive load will be lower.

2.2 ARCD-xx/16.2

Power supply	Operation voltage	21~30 V DC, via the KNX bus
	Current consumption, bus	< 12 mA
	Power consumption, bus	Max. 360 mW
	Charging current / time	10mA/8.5s (4-Fold)
		9.7mA/16s (8-Fold)
		9.4mA/16.5s (12-Fold)
Output	U _n rated voltage	250V AC(50~60Hz)
	I _n rated current	20A
	Load capacity	16A/200uF
	Max. switching current	20A/250V AC
	Inrush current	500A/2ms
	Max. leakage loss	1.5W(4-Fold)/ 2.5W(8-Fold)/ 4W(12-Fold)
	Current detection range	50mA~16A
	Min. detection load	15W
	Current detection accuracy	±5% and ±20mA
Output life expectancy	Mechanical endurance	>10 ⁶
	Electrical endurance	>10 ⁴
Output switching times	Operation period per output	40ms
	Delay times after switching on	20ms
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Connections	KNX	Bus connection terminal (0.8mmΦ)
	Load output connection terminal	Screw terminal
Operation and display	Programming LED and button	For assignment of the physical address
	Green LED flashing	Indicate the application layer running normally
	Indication of the contact position	Close means the output is on Open means the output is off
Protection	IP20	to EN 60529

Safety class	II	to EN 61140
Temperature	Operation	-5 °C ~+ 45 °C
	Storage	-25 °C~+ 55 °C
	Transport	-25 °C ~+ 70 °C
Ambient	-Humidity	<93%, except dewing
Design	Modular DIN-Rail Component	35mm Din rail, modular installation
	Dimension / Weight	ARCD-04/16.2 : 72 x 90 x 64mm /0.3KG
		ARCD-08/16.2 : 144 x 90 x64mm /0.5KG
		ARCD-12/16.2 : 216 x 90 x 64mm /0.75KG

Ratings for each output contacts

load	Rating	Electrical life (cycles)
Resistive	250V, 16A	10 ⁵
1HP (8FLA/48LRA), Motor	250V, 1HP	6000
Tungsten	277V, 6A	6000
Standard Ballast	277V, 6A	6000
0.5HP (9.8FLA/58.8LRA), Motor	120V, 0.5HP	20000
Tungsten	120V, 15A	20000
Electronic Ballast	120V, 15A	20000
Standard Ballast	120V, 15A	6000

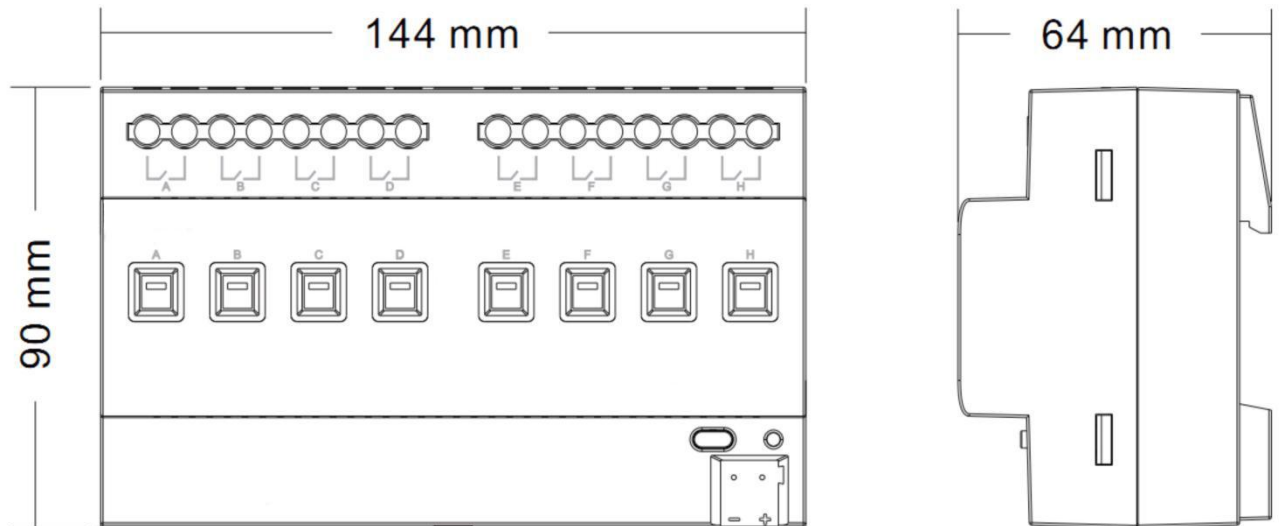
Note: The above load is only for single lamps. In the case of several lamps in parallel, the load will be reduced, although the power is unchanged, but the instantaneous impact of current will increase, and easy to make the relay contacts melted. In normal use, the maximum output current is preferably less than 16A for resistive load, and inductive load and capacitive load will be lower.

Application programs

Type	Max. number of communication objects	Max. number of group addresses	Max. number of associations
ARCD-xx/16.1 ARCD-xx/16.2	246	500	500

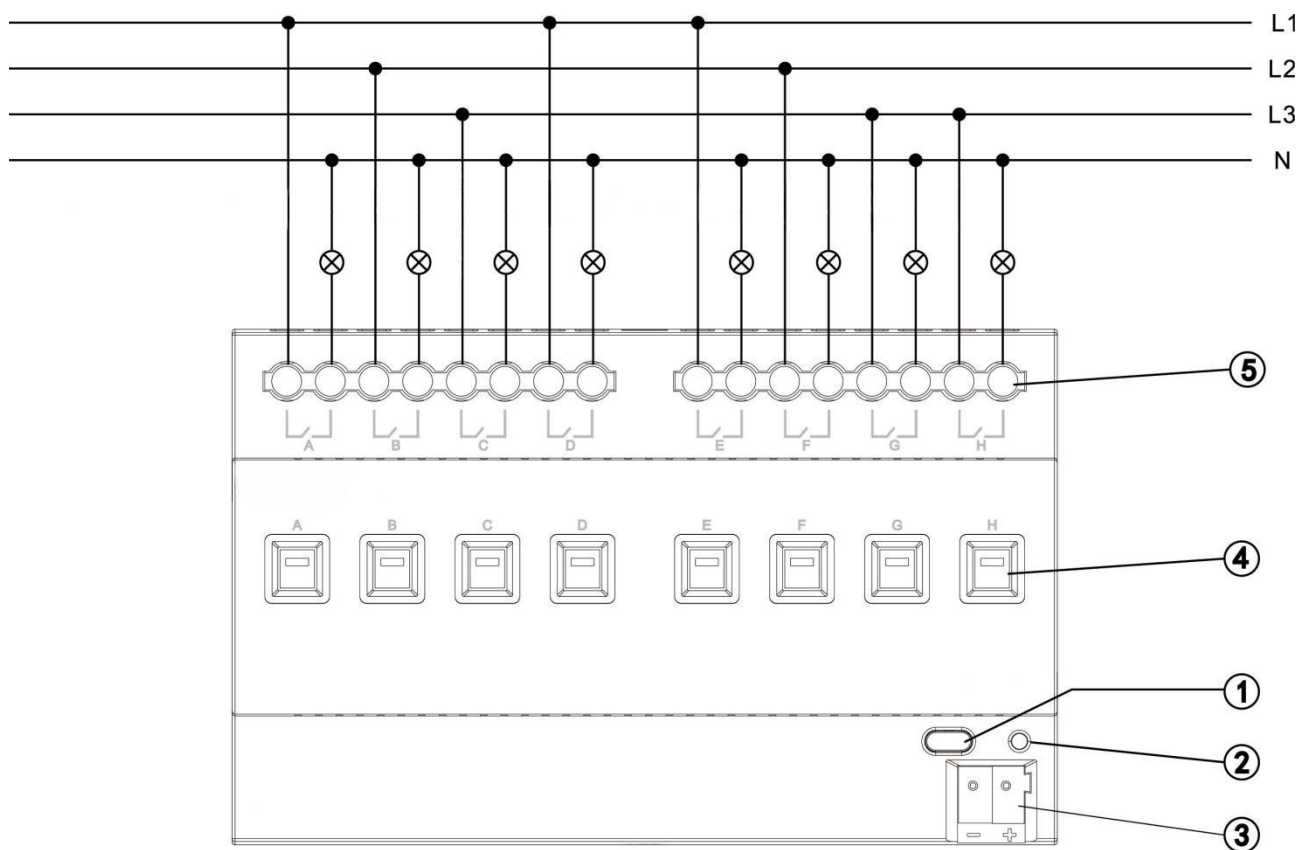
Chapter 3 Dimension and Connection Diagram

3.1 Dimension



(Take ARCD-08/16.2 as an example)

3.2 Connection Diagram



① Programming button

② Red LED for entering the physical address,

Green LED flashing for application layer running normally,

Green LED on for relay power is charging or delay when startup

③ KNX bus connection terminal

④ Manual operation switch control

⑤ Output, load terminal

Chapter 4 Parameters Setting Description in the ETS

4.1 Overview

Every output has two operation modes (main function):

① Switch actuator

It is used for normal switching, for instance lighting control, which uses the object "Switch" to control the output directly. Lots of additional functions such as timing, logical, safety functions are available to use. Application description can be found in below text.

② Heating actuator

In this function, the output is used to control the cooling/heating temperature. In some room, thermostat will send a control value out to switch the valve (e.g. 2-step control). Application description can be found in below text.

4.2 Parameter window "All General"

The parameter window "All General" will be shown in Fig. 4.1, here set product type and general parameters, general parameters apply to every output.

All General		Product type	4-Fold Output
Total current			
Channel A	Relay drive type	<input type="radio"/> Normal(apply to Ver.1&Ver.3) <input checked="" type="radio"/> Inverted(apply to Ver.2)	
Channel B	Operation delay after recovery of bus voltage(10..250s)	10	
Channel C	Sending cycle of "In operation" telegram (1..240s, 0=inactive)	0	
Channel D	Total current	<input type="radio"/> Inactive <input checked="" type="radio"/> Active	
	Enable safety priority function	<input type="radio"/> Disable <input checked="" type="radio"/> Enable	
	--Set safety priority 1:	Reset safety by object value "0"	
	Control period of safety priority 1 (1..240s,0=inactive)	0	
	--Set safety priority 2:	Inactive	
	Priority of safety operation	Priority of 2 is higher than that of 1	
	Note: Normal, object value of switch on/off	"1"=switch on; "0"=switch off Switch on=contact close ; Switch off=contact open	

Fig. 4.1 Parameter window "All General"

NOTE: “Switch on” mentioned below means the contact of the switch actuator is closed (output is on); “switch off” means the contact of the switch actuator is open (output is off)!

Parameter “Product type”

The parameter sets the product type of the Switch Actuator with current detection, and selects the option according to the type of product actually used. Options:

4-Fold Output	(apply to ARCD-04/16.1 & ARCD-04/16.2)
8-Fold Output	(apply to ARCD-08/16.1 & ARCD-08/16.2)
12-Fold output	(apply to ARCD-12/16.1 & ARCD-12/16.2)

Parameter “Relay drive type”

The parameter sets the relay drive type used by the product. The Switch Actuator with current detection has different hardware versions, and may use different relay drive types, so the drive type selection are increased. Options:

Normal (apply to Ver.1&Ver.3)

Inverted (apply to Ver.2)

Normal (apply to Ver.1&Ver.3): apply to the first version and the third version hardware, and the products ARCD-xx/16.1 belong to the first version, the products ARCD-xx/16.3 belong to the third version.

Inverted (apply to Ver.2): apply to the second version hardware, and the products ARCD-xx/16.2 belong to the second version.

Parameter “Operation delay after recovery of bus voltage (10...250s)”

The parameter determines the delay time to react after the bus voltage recovery (the delay time after electrified) to avoid the malfunction of the bus and 220V AC caused by the simultaneously working of various relays, excluding the initialization time (approx. 2 seconds) of the device.

Options: **10-250 s**

If there are other devices (e.g. monitor) require to read the communication target value of the relay during the delay time after power on, then this requirement will be recorded, and then reacted after the delay time is finished.

If the delay time is long enough, all contacts of the relay can work simultaneously.

NOTE: And considering that it will generate damage to the power system and bus if a lot of devices operate simultaneously after bus recovery , so it is suggested to set the different delay time to each device.

Parameter "Sending cycle of 'in operation' telegram (1...240s, 0 = inactive):"

The parameter determines the time interval to send the telegram which shows the actuator is working normally or not via the bus. With the setting "0", the actuator doesn't send the telegram; if the setting is not "0", a telegram with the value "1" will be sent cyclically according to the setting to the bus.

Options: **0...240s, 0=cyclical send inactive**

It is suggested to select the maximum time interval according to the application to keep the bus load as low as possible.

NOTE: It is starting to count the time after power up, instead of the operation delay after recovery of bus voltage.

Parameter "Total current"

The parameter sets whether the "Total current" function is activated. Options:

Inactive

Active

If select "Inactive", "Total current" function will not be active;

If select "Active", "Total current" function page will visible, setting interface as shown in fig. 4.2.

Parameter "Enable Safety priority function"

The parameter is used to set the enable status of the function "Safety priority". Options:

Enable

Disable

If "disable" is selected, it will not activate the function "Safety priority"; if "enable" is selected, 2 "Safety priority" will be activated.

Parameter "set safety priority x:", x = 1, 2

There are 2 "safety priorities" for selecting. It is available to define the trigger condition to each "Safe priority", and also enable the correspondent communication object "Safety Priority x" (x=1, 2). These objects are important to the entire relay when under the working mode "Switch Actuator" and "Dynamic regulating actuator", but each output can react differently depending on the received telegrams, whose reactions can be defined in the parameter window "X: Safety". Options:

Inactive

Reset safety by Object value "0"

Reset safety by Object value "1"

If the communication object "Safety Priority x" receives "0", the "Control period" of "the Safety Priority x" will be initiated with "Reset safety by Object value "0"; if the communication object "Safety Priority x" receives "1", the "Control period" of "the Safety Priority x" will be initiated with "Reset safety by Object value "1". This means, during the "Control period", if the object "Safety Priority x" receives no corresponding telegram, it will trigger "Safety Priority", and then the correspondent action will be initiated, which will be defined in the parameter window "X: Safety". When the setting is "inactive", it will not initiate any "Safety Priority".

Parameter "Control period of safety priority X, X=1,2 (1...240s, 0=inactive)"

This parameter is visible only if the parameter "Set safety priority x: ", x = 1, 2 is activated. If no telegram is received from the object "Safety Priority x (x=1, 2)" during this time period ("Control period", "Safety Priority x" is triggered.

When the object "Safety Priority x (x=1, 2)" is re-received, the "Safety Priority x" trigger is ended and the "Safety Priority x" timing ("Control period" is triggered) is reset. Options: **0... 240s**

If select "0", the corresponding "Safety Priority x" is not activated. However, in this configuration, the object can be activated, i.e. the object receives the opposite message as the configured reset telegram value, triggering the corresponding security state. This does not apply if the setting is not 0s.

"Safety priority" function should be monitored longer than twice the sensor's data-sending cycle to avoid an immediate alarm when individual signals occasionally fail.

Parameter "Control period of safety priority X, X=1,2 (1...240s, 0=inactive)"

This parameter for describing that priority of 2 is higher than that of 1.

4.2.1 Parameter window “Total current”

The parameter window “Total current” will be shown in Fig. 4.2, which applies to every output. The detected current of each channel can be added to the total current, the parameter window is the total current output configuration. Specific function parameters are described below.

All General	Object selection for the current measurement	Value in mA(DPT 7.012)
Total current	Send current value value after changes value	Not active
Channel A	Cyclic send	No active
Channel B	Monitoring exceedance of load	<input type="radio"/> Inactive <input checked="" type="radio"/> Active
Channel C	Factor for load monitoring(A)	1
Channel D	Hysteresis(%)	10
	Behavior at exceeding	Send no telegram
	Behavior at not exceeding	Send no telegram
	Send exceeding cyclical	No active
	Total power meter function(Wh/kWh)	<input type="radio"/> Inactive <input checked="" type="radio"/> Active
	Object selection for power meter	<input checked="" type="radio"/> Value in Wh(DPT 13.010) <input type="radio"/> Value in kWh(DPT 13.013)
	Sending object value	Only request
	Memory of all current detecting delete after download of application	<input checked="" type="radio"/> No <input type="radio"/> Yes

Fig. 4.2 Parameter window “Total current”

Parameter “Object selection for the current measurement”

The parameter is the selection of the sending object for the total current measurement. Options:

Value in mA(DPT 7.012)

Float Value in mA(DPT 9.021)

Value in A(DPT 14.019)

Value in kW(DPT 9.024)

“Value in mA” means output current in mA, integer data;

“Float Value in mA” means output current in mA, floating-point data;

“Value in A” means output current in A;

“Value in kW” means output power in kW.

--Parameter "Factor for conversion into theoretical wattage kW: Current value x Factor"

The Parameter is used to set voltage value to calculate the total power . Options: **100...250**

When parameter " Object selection for the current measurement " chosen " Value in kW(DPT 9.024)", this parameter visible, Total power =Total current*voltage.

Parameter "Send current value value after changes value "

Activation and adjustment of the sending of the current value at determined changes. Options:

Not active

1%

2%

...

70%

When the parameter chooses "10%", current is 1A. The current object value will be send when current larger than 1.1A ($1A + 1A * 10\%$) or less than 0.9A ($1A - 1A * 10\%$).

Parameter "Cyclic send "

Activation and adjustment of the sending of the current value at determined times. Options:

No active

10 Min

...

90 Min

120 Min

"No active": do not send current value.

"10 Min" send current object value every 10 minute, the same as other options.

Parameter "Monitoring exceedance of load "

This parameter is used to enable monitoring exceedance of load. Options:

Inactive

Active

"Inactive": disable monitoring exceedance of load; "Active": enable monitoring exceedance of load.

Parameter “Factor for load monitoring(A)”

This parameter setting the alarming current value. Minimum value as 1A, maximum value as 200A.

Options: **1...200**

Parameter “Hysteresis(%)”

This parameter adjusts of the hysteresis for avoiding to fast switching. Options: **10...100**

The hysteresis value is used to avoid to fast switching. E.g. “Factor for load monitoring” is set to 1A, “Hysteresis(%)” is set to 10%, then when current is larger than 1A, an alarm value will be send to the bus, when current is less than 0.9A ($1A \cdot (1-10\%)$) a not alarm value also will be send to the bus.

Parameter “Behavior at exceeding”

Adjustment of the behavior, when the measured value is out of the threshold value. Options:

Send no telegram

Send ON telegram

Send OFF telegram

“Send no telegram” do not send value;

“Send ON telegram” send “1” telegram;

“Send OFF telegram” send “0” telegram.

Parameter “Behavior at not exceeding”

Adjustment of the behavior, when the measured value is lower than the hysteresis value of the set current threshold (e.g $1A \cdot (1-10\%)$). Options:

Send no telegram

Send ON telegram

Send OFF telegram

“Send no telegram” do not send value;

“Send ON telegram” send “1” telegram;

“Send OFF telegram” send “0” telegram.

Parameter “Send exceeding cyclical”

Activation and adjustment of the time step for a cyclic sending. Options:

No active

10 Min

20 Min

...

120 Min

“No active” do not send value cyclically, “10Min” send object value every 10 minutes, the same as other options. And value can be also sent after change.

Parameter “Total power meter function (Wh/kWh)”

This parameter is used to enable total power meter function. Options:

Inactive

Active

“Inactive”: disable total power metering; “Active”: enable total power metering.

Parameter “Object selection for power meter”

Selection of the object value for the total power meter. Options:

Value in Wh(DPT 13.010)

Value in kWh(DPT 13.013)

The output unit is watt-hour when select “Value in Wh(DPT 13.010)”; the output unit is kilowatt-hour when select “Value in kWh(DPT 13.013)”.

Parameter “Sending object value”

This parameter setting whether the value shall be sent cyclic or only on request. Options:

Only request

Send cyclic 10 min

Send cyclic 30 min

Send cyclic 1 h

Send cyclic 3 h

Send cyclic 6 h

Send cyclic 12 h

Send cyclic 24 h

“Only request”: only for reading, do not send;

“Send cyclic 10 min”: send object value every 10 minutes, the same as other options.

Parameter “Memory of all power meters delete after download of application”

Setting whether to delete all power meters, switching times and power-on time of each channel.

Options:

No

Yes

“No”: when database downloading, do not delete all power meters, switching times and power-on time;

“Yes”: when database downloading, delete all power meters, switching times and power-on time.

4.3 Parameter window “Channel X”-Switch actuator

The parameter window “Channel X” is shown in Fig. 4.3. It works for all the outputs. “Channel X” or “X” mentioned below means any output of the switch actuator, which has the same parameter setup interface and communication objects.

All General	Work mode of the channel is	<input checked="" type="radio"/> Switch actuator <input type="radio"/> Heating actuator(without controller)
Channel A	If bus voltage recovery,contact is	Unchange
Channel B	If bus voltage fail,contact is	Unchange
Channel C	Object value of "switch" after bus voltage recovery	Not write
Channel D	Set the reply mode of switch status	Transmit after change
	Object value of switch status :	<input type="radio"/> 0=contact close ; 1=contact open <input checked="" type="radio"/> 0=contact open ; 1=contact close
	Contact position if tele. value is "1" ("0" is opposite of "1" if changed)	Close
	Special functions of Switch actuator mode is	<input checked="" type="radio"/> Inactive <input type="radio"/> Active

Fig. 4.3 Parameter window “Channel: X”

It is able to choose an operation mode and various functions for every output for the delay. The two operation mode and its corresponding functions are relative.

Parameter "Work mode of the channel"

This parameter is used to define the output mode. Options:

Switch Actuator

Heating actuator (without controller)

"Switch Actuator" is used in the normal switch control such as lighting. The outputs are controlled by various functions such as logic operation, timing function and safe function. More details can be found below.

Parameter "If bus voltage recovery, contact is"

The output can adopt a defined status on bus voltage recovery via this parameter. Options:

Unchange

Open

Close

As before bus voltage fail

When selecting "Unchange", the contact of the relay will remain the same as the last status before power off;

When selecting "Open", contact of the channel will be opened when the bus power on;

When selecting "Close", contact of the channel will be closed when the bus power on;

When selecting "As before bus voltage fail", contact position after voltage recovery is the same as that before power on.

NOTE: After finished application programming, all output channels will remain the same status.

Parameter "If bus voltage fail, contact is"

The output can adopt a defined status after the bus voltage failure via this parameter. Options:

Unchange

Open

Close

When selecting "Unchange", status of contact will remain the same as the last status before power off;

When selecting "Open", contact of the channel will be opened when the bus power off;

When selecting "Close", contact of the channel will be closed when the bus power off;

Parameter "Object Value of "Switch" after bus voltage recovery"

This parameter will be visible when enabling the logic function "input 0" to define the default value of the communication object "Switch, X" after bus voltage recovery, which can be "0" or "1". If selecting "not write", the value "0" is written into the object "Telegram Switch" and remains until this value is changed via the bus. Options:

Not write

To write with 0

To write with 1

After application programming or bus recovery, the object value is 0.

Parameter "Set the reply mode of switch status"

This parameter defines the status of the current switch status when the telegram is sent. Options:

No reply

Respond after read only

Transmit after change

If selecting "No reply", delay will not send any telegram;

If selecting "Respond after read only", the status telegram will not be sent out until receiving the status telegrams from other devices;

If selecting "Transmit after change", it will send the status automatically when there is any changes on the output.

The value ("0" or "1") of the communication object "Reply the switch status, x" and "Send the switch status, X" defines the current status of the relay, which can be set in the parameter "Object value of switch status:" (when selecting "Respond after read only" or "Transmit after change").

Parameter "Object value of switch status:"

Options:

0=contact close ; 1=contact open

0=contact open ; 1=contact close

This parameter will be visible when selecting "Respond after read only" or "Transmit after change" in

“Set the reply mode of switch status”. It means the contact of the relay will be closed when the value of the communication object “Reply the switch status, x” and “Send the switch status, X” is 0 when setting “0=contact close; 1=contact open”, while it is open when the value is “1”. It means the opposite with setting “0=contact open; 1=contact close”.

Parameter “Contact position if tele. Value is ‘1’ (‘0’ is opposite of ‘1’ if changed)”

This parameter defines the contact position when starting the switch, which will be triggered by the communication object “switch, X”. When enabling “input 0” in the logic function, it will use the communication object “switch, X” to modify the value of “input 0”, rather than triggering the switch operation. Options:

Unchange

Open

Close

The contact position stays the same with “Unchange”; it will be off with “Open”, and on with “Close”. When ending the operation, position will be reversed if it is changed after starting (for instant, selecting “open” or “close”), otherwise, it will remain the same.

NOTE: The parameter only works after receiving object “Switch x”, and defines the direction of the contact after receiving it. More details can be found in the below form:

Parameter	Switch X value=1	Switch X value=0
Unchange	Unchange	Unchange
Open	Contact open (OFF)	Contact close (ON)
Close	Contact close (ON)	Contact open (OFF)

Parameter “Special functions of Switch actuator mode is”

This parameter defines whether enable the special functions of the switch actuator. The parameter window “X: Function” will be seen with “active”, and able to set the special functions individually in Fig. 4.4. Enable or disable the special function in “X: Function”, seen in Fig. 4.5. Options:

Active

Inactive

All General	Work mode of the channel is	<input checked="" type="radio"/> Switch actuator <input type="radio"/> Heating actuator(without controller)
Channel A	If bus voltage recovery,contact is	Unchange ▼
A:Function	If bus voltage fail,contact is	Unchange ▼
Channel B	Object value of "switch" after bus voltage recovery	Not write ▼
Channel C	Set the reply mode of switch status	Respond after read only ▼
Channel D	Object value of switch status :	<input type="radio"/> 0=contact close ; 1=contact open <input checked="" type="radio"/> 0=contact open ; 1=contact close
	Contact position if tele. value is "1" ("0" is opposite of "1" if changed)	Close ▼
	Special functions of Switch actuator mode is	<input type="radio"/> Inactive <input checked="" type="radio"/> Active

Fig. 4.4 Starting parameter window "X: Function"

All General	Function of "time" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable
Channel A	Function of "preset" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable
A:Function	Function of "logic" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable
Channel B	Function of "scene" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable
Channel C	Function of "threshold" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable
Channel D	Function of "safety" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable
	Function of "forced" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable
	Function of "current" for switch is	<input checked="" type="radio"/> disable <input type="radio"/> enable

Fig. 4.5 Parameter window "X: Function"

4.3.1 Parameter window “X: Time”

This parameter window will become visible when selecting “enable” in the parameter “Function of ‘time’ for switch is” in the parameter window “X:Function”. See Fig. 4.6.

All General	The mode of time function	Delay switch ▼
Channel A	Delay for switch on : --(0...240 minutes)	0 ▲▼
A:Function	--(0...59 seconds)	0 ▲▼
A:Time	Delay for switch off : --(0...240 minutes)	0 ▲▼
Channel B	--(0...59 seconds)	0 ▲▼

Fig. 4.6 Parameter window “X: Time”

Parameter “The Mode Of Time function”

The parameter defines the type of the timing function setup. Options:

Delay switch

Staircase lighting

Flashing

4.3.1.1 Selection “Delay switch”

The parameter window of the time function in Fig. 4.6 will be shown when selecting “Delay switch”.

Parameter “Delay for switching on: (0...240 minutes)”

This parameter defines the stating time of the switch delay: minutes. Options: **0...240**

Parameter “Delay for switching on: (0...59 seconds)”

This parameter defines the starting time of the switch delay: seconds. Options: **0...59**

Parameter “Delay for switching off: (0...240 minutes)”

This parameter defines the closing time of the switch delay: minutes. Options: **0...240**

Parameter “Delay for switching off: (0...59 seconds)”

This parameter defines the closing time of the switch delay: seconds. Options: **0...59**

4.3.1.2 Selection “Staircase lighting”

The parameter window of the staircase lighting function in Fig. 4.7 will be visible when selecting “Staircase lighting” in the parameter “The mode of time function”.

All General	The mode of time function	Staircase lighting
Channel A	Duration of staircase lighting --(0...1000 minutes)	2
A:Function	--(0...59 seconds)	0
A:Time	Control mode of staircase lighting	Start with "0/1" , can not be stop
Channel B	During the lighting time, if receive the "Start" telegram,	<input checked="" type="radio"/> Restart duration of staircase lighting <input type="radio"/> Ignored the "start" telegram
Channel C	Warning mode for ending of staircase lighting	Nothing
Channel D	Modify the duration via object(0..60059s)	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Fig. 4.7 Parameter window “X: Time-Staircase lighting”

The staircase lighting function is switched on via the object “Output of staircase lighting”. And also it is available to program the value of “Output of staircase lighting”. The staircase lighting time starts when it is switched on and will be switched off immediately after the set time when there is no pre-alarm setting.

Parameter “Duration of staircase lighting-(0...1000 minutes)”

This parameter describes the duration time when switching on the staircase light function: minutes.

Options: **0...1000**

Parameter “Duration of staircase lighting-(0...59 second)”

This parameter describes the duration time when switching off the staircase light function: seconds.

Options: **0...59**

NOTE: If the minute is set to “0”, and the seconds is set to “0”, the staircase lighting will be disabled.

Parameter “Control mode of Staircase lighting”

This parameter defines the mode of the staircase lighting function. Options:

Start with “1”, OFF with “0”

Start with “1”, no action with “0”

Start with “0/1”, cannot be stopped

When selecting “Start with “1”, OFF with “0””, it will switch on the staircase lights with the value “1” received by the object “Output of staircase lighting”; it will switch off on by the value “0”.

When selecting “Start with “1”, no action with “0””, it will switch on the staircase lights with the value “1” received by the object “Output of staircase lighting” and no reaction with “0”.

When selecting “Start with “0/1”, cannot be stopped”, it will switch on the staircase lights either with “0” or “1” received by the object “Output of staircase lighting” but cannot end it by the object.

Parameter “During the lighting time, if receive the ‘start’ telegram”

Options:

Restart duration of staircase lighting

Ignored the “switch on” telegram

It will restart the staircase lights to redo the timing if receive the telegram of the object “Output of staircase lighting” when selecting “restart duration of staircase lighting” during the staircase lighting; while it will ignore the telegram with “Ignored the ‘switch on’ telegram”.

Parameter “Warning mode for ending of staircase lighting”

The parameter points out the alarm type when terminating the staircase lights, which will start the pre-alarm notice before switching off. This pre-alarm time is not included in the starting duration of the staircase. There will be no alarm if selecting “nothing”, as well as the lights is off before the pre-alarm time. Options:

Nothing

Via object

Flashing the channel output with OFF/ON

Via object & flashing the channel output

2 types of pre-alarm are provided:

--Via the communication object: set the value of the object “Warning of staircase” as “1” when starting alarming and then send it to the bus;

--Via the output flashing: control the output flashing (a short switch), and the duration is 1 second.

These 2 types can be used independently or together. It will be the type of “by the communication object” when it is “via object”, or the type of “by the lights flashing” with “flashing the channel output with OFF/ON”; as well as mixed type with “via object & flashing the channel output”.

Parameter "--The warning time for ending of staircase lighting (0...59s)"

The parameter is visible after selecting a pre-alarm type, and the duration of the pre-alarm: second.

Options: **0...59**

Parameter "Modify the duration via object (0...60059 seconds)"

It will activate the object "Duration of staircase" with 2 bytes when selecting "Enable" to modify the staircase lighting time, however it cannot modify the time with "disable". Options:

Disable

Enable

NOTE: If the values of telegram for modification the duration is "0", the staircase lighting will be disabled.

4.3.1.3 Selection "Flashing switch"

The parameter window in Fig. 4.8 "X: Time-flashing switch" will be shown up when selecting "flashing switch" in "The mode of time function".

All General	The mode of time function	Flashing switch
Channel A	Delay for switch on : --(0...240 minutes)	0
A:Function	--(0...59 seconds)	0
A:Time	Delay for switch off : --(0...240 minutes)	0
Channel B	--(0...59 seconds)	0
Channel C	Number of ON-impulses(1..255,0=no limited)	0
Channel D	Contact position after flashing	Unchange
	Control mode of flashing	Start with "1" , Stop with "0"

Fig. 4.8 Parameter window "X: Time-Flashing switch"

When the flashing function is activated, when the corresponding message is received, the system will start the flashing output. The blink switch interval can be set in the parameters "delay for switch on" and "delay for switch off". It will restart the flashing when receiving the relevant telegram by the object "Switch out with flashing", and define the contact position after flashing.

Parameter "Delay for switch ON: Min. (0...240), Sec. (1...59)"

The parameter defines the delayed time to switch on the output when flashing. Options:

0...240 minutes

0...59 seconds

NOTE: it will not be executed unless the time is lower than the relay threshold switch frequency. Since there will be not sufficient energy to do it because of the frequent relay switching, and it may cause the time delay. The same situation will happen after the bus voltage recovery.

Parameter "Delay for switch off: Min. (0...240), Sec. (0...59)"

The parameter defines the delayed time to switch off the output when flashing. Options:

0...240 minutes

0...59 seconds

NOTE: it will not be executed unless the time is lower than the relay threshold switch frequency. Since there will be not sufficient energy to do it because of the frequent relay switching, and it may cause time delay. The same situation will happen after the bus voltage recovery.

Parameter "Number of ON-impulses (1...255, 0=no limited)"

This parameter setting the flashing times. Options: **0...255**

NOTE: 0 means no limited!

Parameter "Contact position after flashing"

This parameter points out the relay contact position after flashing. Options:

Unchange

Open

Close

Parameter "The mode of control flashing"

The parameter states the mode of the flashing output. Options:

Start with "1", stop with "0"

Start with "0", stop with "1"

Start with “1/0”, can not be stopped

It will start flashing with “1” received by the object “Switch out with flashing” when selecting “Star with ‘1’, stop with ‘0’”; it will stop flashing with “0”.

It will start flashing with “0” received by the object “Switch out with flashing” when selecting “Star with ‘0’, stop with ‘1’”; it will stop flashing with “1”.

It will start flashing with either “1” or “0” received by the object “Switch out with flashing” when selecting “Star with ‘1/0’, cannot be stopped”; Under this circumstance it cannot terminate the flashing by sending the telegram until the preset ending time.

4.3.2 Parameter window “X: Preset”

This parameter window as shown in Fig. 4.9 when selecting “enable” in the parameter “Function of ‘preset’ for switch is” in the parameter window “X: Function”.

All General	Action for preset 1(object value=0)	None
Channel A	Action for preset 2(object value=1)	OFF
A:Function	Setting for preset via telegram is	<input checked="" type="radio"/> disable <input type="radio"/> enable
A:Preset		

Fig. 4.9 Parameter window “X: Preset”

It is able to not only recall the preset value, but also save the new value of the current switch status by the bus.

There are 2 objects to recall and save the preset value, and 2 optional preset values (preset 1 and preset 2). It means “preset 1” with “0”, and “preset 2” with “1”.

Parameter “Action for preset 1 (object value=0)”

This parameter defines the relay status when recalling the preset value 1 (that is when the object “Call preset 1/2” receives the telegram “0”) by setting the communication object “Call preset 1/2”.
Options:

None

ON

OFF

Parameter "Action for preset2 (object value=1)"

This parameter defines the relay status when recalling the preset value 2 (that is when the object "Call preset 1/2" receives the telegram "1") by setting the communication object "Call preset 1/2".

Options:

ON

OFF

Last position of contact

Setting of preset 1

When the action triggered by Preset 2 selects "last position of contact", it will be recovered to the last switch status every time recalling preset 2.

When the action triggered by Preset 2 selects "setting of preset 1", it will carry out the set parameters of the action triggered by preset 1 every time recalling preset 2.

Parameter "Setting for preset via telegram is"

It is used to set whether changing the preset value by the bus. It is allowable to change the value and enable the object "Set preset 1/2" at the same time when selecting "enable", which can save the current status as the new preset value. The current value is saved as new preset 1 when receiving the telegram "0"; as new preset 2 when "1". The current status will be saved in the new preset value if selecting "None" in "Action for preset 1 (object value=0)" and "Last position of contact" or "Setting of preset 1" in "Action for preset2 (object value=1)". Options:

Enable

Disable

Note: It will save the new preset value after bus voltage recovery.

4.3.3 Parameter window “X: Logic”

It will show up Fig. 4.10 when selecting “enable” in “Function of ‘logic’ for switch is” in Fig. 4.5.

All General	The input 0 (switch object) for logic is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Channel A	The input 1 of logic is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
A:Function	Function type between input0 and input1	AND
A:Logic	Result is inverted	<input checked="" type="radio"/> NO <input type="radio"/> YES
Channel B	Value of input 1 after bus voltage recovery :	"0"
Channel C	The input 2 of logic is	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
Channel D	Function type between input2 and input0/1	AND
	Result is inverted	<input checked="" type="radio"/> NO <input type="radio"/> YES
	Value of input 2 after bus voltage recovery :	"0"

Fig. 4.10 Parameter window “X: Logic”

There are 2 logic communication objects to decide the status of individual output, which are related to the “Switch, X”.

It will re-operate when receiving a new object value as the final output status (close the contact with “1”, open it with “0”). The values of the communication object “Input 1 of logic” makes logic operation with “Switch, X” firstly, and then the result after that will makes operations with the value of “Input 2 of logic”. This operation will ignore the objects which are unable, and continue to the next step with the ones who are enabled.

Parameter “The input 0 (switch object) for logic is”

This parameter is used to enable the function of logic operation of “input 0”, whose values are wrote by the object “Switch, X”. Options:

Disable

Enable

Parameter “The input x of Logical” (x = 1, 2)”

This parameter describes the status of the logic operation of the object “Input 1 of logic” or “Input 2 of logic”. Options:

Disable

Enable

Parameter "Function type between input 0 and input 1/ (input 2 and input 0/1) "

This parameter introduces the logical relationship of the logic operation, providing 3 standard logical operations (AND, OR, XOR) and a gate function.

Explanation for gate function: Gate function is equivalent to a door, if the door is open, then the previous logic result will can be output, if it is closed, there will be no influence to output. For example, the logic input 2 sets to Gate function and logic value 1, then the logic result of input 0 and input 1 can be output, if logic value of the input 2 is 0, the output will keep. Options:

AND

OR

XOR

Gate function

Parameter "Result is inverted"

This parameter defines whether negate the logical operation results. Negate it with "yes", don't with "no". Options:

No

Yes

Parameter "Value of input 1 after bus voltage recovery"

This parameter defines the default value of the object "Input x of logic (x=1, 2)" after bus voltage recovery. Options:

0

1

Value before power off

The value will be the one before power off after bus voltage recovery when selecting "value before power off". After application programming, the object value is 0.

Parameter "Value of input 2 after bus voltage recovery"

This parameter defines the default value of the object "Input x of logic (x=1, 2)" after bus voltage recovery. Options:

0

1

Unchange

The default logic value is 0 when selecting "Unchange" after bus voltage recovery or programming.

4.3.4 Parameter window “X: Scene”

The parameter window shown in Fig. 4.11 will burst out when selecting “enable” in “Function of ‘scene’ for switch is” in Fig. 4.5.

All General	1> channel is assigned to (1..64,0=no allocation)	0
Channel A	--Standard output value is	<input checked="" type="radio"/> OFF <input type="radio"/> ON
A:Function	2> channel is assigned to (1..64,0=no allocation)	0
A:Scene	--Standard output value is	<input checked="" type="radio"/> OFF <input type="radio"/> ON
Channel B	3> channel is assigned to (1..64,0=no allocation)	0
Channel C	--Standard output value is	<input checked="" type="radio"/> OFF <input type="radio"/> ON
Channel D	4> channel is assigned to (1..64,0=no allocation)	0
	--Standard output value is	<input checked="" type="radio"/> OFF <input type="radio"/> ON

Fig. 4.11 Parameter window “X: Scene”

Parameter “channel is assigned to (1...64 scene NO., 0=no allocation)”

It is able to allocate 64 different scene numbers to every output. There are 5 various scenes can be set per output. Options: **Scene 1...Scene 64, 0=no allocation**

Note: the valid scene numbers in the parameter setting options are 1-64. The actual corresponding telegram is 0..63.

Parameter “--Standard output value is”

This parameter defines the switch output status when recalling the scene. Options:

ON

OFF

4.3.5 Parameter window “X: Threshold”

The window in Fig. 4.12 will be shown up when selecting “enable” in the parameter “Function of ‘threshold’ for switch is” in Fig. 4.5.

All General	Threshold 1 value	80
Channel A	Threshold 2 value	200
A:Function	Change threshold 1 via object :	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
A:Threshold	Behaviour	<input checked="" type="radio"/> Without hysteresis <input type="radio"/> With hysteresis
Channel B	--If falling below lower threshold, contact position	Unchange
Channel C	--If lower < object value < upper, contact position	Unchange
Channel D	--If exceeding upper threshold, contact position	Unchange

Fig. 4.12 Parameter window “X: Threshold”

The object “Threshold input” of 1Byte is enabled when activating the threshold function. It will trigger the switch to make one operation if the value of the object “Threshold input” is lower or more than the default threshold. There are 2 individual thresholds are ready to use always and the “threshold 1 value” is set by the bus.

Parameter “Threshold 1 value” / “Threshold 2 value”

This parameter defines the value of threshold 1 and threshold 2. Options: **0...255**

Parameter “Change threshold 1 via object.”

This parameter defines whether change the threshold value by bus or not. Options:

Disable

Enable

It is able to start the object “Change Threshold value 1” by selecting “Enable”, and change the threshold 1 value by the bus; on the other hand, it cannot change the value with “Disable”. However it is not allowable to change the “threshold 2 value” by the bus.

Parameter “Threshold behaviour”

The parameter defines the hysteresis status of “threshold 1 value” and “threshold 2 value”. Option:

Without hysteresis

With hysteresis

The hysteresis can avoid the unnecessary behaviour caused by the input value if its value is between two threshold values.

Parameter "If falling below lower threshold, contact position", "If exceeding upper threshold contact position"

These parameters will be seen with "with hysteresis" in the parameter "Threshold behavior", which defines the action when the value of the object "Threshold input" is lower than the lowest threshold value or higher than the highest value. Options:

Unchange

Open

Close

Parameter "If falling below lower threshold, contact position", "If exceeding upper threshold contact position", "If lower < object value < upper, contact position"

These parameters are visible with "without hysteresis" in the parameter "Threshold behavior", which defines the relay action in the object "Threshold input". Options:

Unchange

Open

Close

4.3.6 Parameter window “X: Safety”

The window shown in Fig. 4.13 will be seen when selecting “enable” in the parameter “Function of ‘safety’ for switch is” in Fig. 4.5.

All General	Setting of safety	On parameter-window "All General"
Channel A	Contact position if safety priority 1	Unchange ▼
A:Function	Contact position if safety priority 2	Unchange ▼

A:Safety

Fig. 4.13 Parameter window “X: Safety”

Enable two “Safety Priority” (x=1, 2) in the parameter window “All General”, which define the relay’s contact position for every output individually. There are 2 safety priorities for every output and also the “Safety Priority 2” is prior to “Safety Priority 1”. It means when these 2 priorities are triggered at the same time, the contact position will follow the setup of “Safety Priority 2”.

Parameter “Contact position if Safety Priority x” (x=1, 2)

It defines the contact position after triggering “Safety Priority x” (x=1, 2). Options:

Unchange

Open

Close

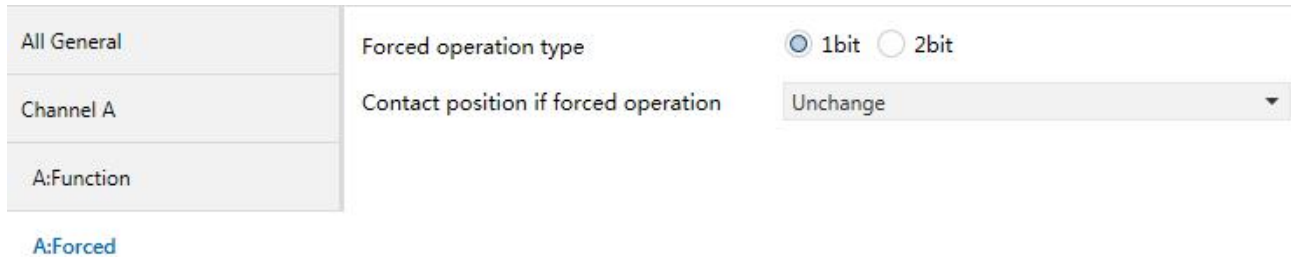
Unchange: the contact position is unchanged.

Open: the contact position is opened.

Close: the contact position is closed.

4.3.7 Parameter window “X: Forced”

The window of the function “forced” in Fig. 4.14 will be visible with “enable” in the parameter “Function of ‘forced’ for switch is” in Fig. 4.5.



The screenshot shows a software interface for configuring a switch actuator. On the left, there is a sidebar with a tree view containing 'All General', 'Channel A', and 'A:Function'. The 'A:Function' item is selected and highlighted in blue. The main area on the right displays two parameters: 'Forced operation type' with radio button options for '1bit' (selected) and '2bit', and 'Contact position if forced operation' with a dropdown menu currently showing 'Unchange'.

Fig. 4.14 Parameter window “X: Forced”

“Forced operation” will be used in some special situation such as emergency, and are activated by the object “Forced output” with the highest priority in the system, which means only “forced operation” are valid in this case.

Parameter “Forced operation type”

This parameter defines the data type of the force operation. Options:

1bit

2bit

Parameter “Contact position if forced operation”

This parameter is visible if the option “1bit” is set via the above parameter, which defines the contact position of the “forced operation”. Options:

Unchange

Open

Close

Unchange: the contact position is unchanged.

Open: the contact position is opened.

Close: the contact position is closed.

4.3.8 Parameter window “X: Current”

The window of the function “Current” in Fig. 4.15 will be visible with “enable” in the parameter “Function of “current” for switch is” in Fig. 4.5.

All General	Load type	Resistive
Channel A	Current correction(-1000..1000 mA)	0
A:Function	Factor for conversion into theoretical wattage kW: Current value x Factor	230
A:Current	Power meter function(Wh/kWh)	<input type="radio"/> Inactive <input checked="" type="radio"/> Active
Channel B	Object selection for power meter	<input checked="" type="radio"/> Value in Wh(DPT 13.010) <input type="radio"/> Value in kWh(DPT 13.013)
Channel C	Sending object value	Only request
Channel D	Object of current measurement	Value in mA(DPT 7.012)
	Add the channel to total current value	<input checked="" type="radio"/> Inactive <input type="radio"/> Active
	Send current value after changes value	Not active
	Cyclic send	No active
	Monitoring exceedance of load	<input checked="" type="radio"/> Inactive <input type="radio"/> Active
	Monitoring lower deviation of load	<input checked="" type="radio"/> Inactive <input type="radio"/> Active
	Counter function	<input checked="" type="radio"/> Inactive <input type="radio"/> Active

Fig. 4.15 Parameter window “X: Current”

Parameter “Load type”

The parameter sets the load type. Options:

Resistive

Inductive

Capacitive

NOTE: The option setting needs to match the actual load type. Otherwise, the output detection result will be greatly deviated from the actual one.

Parameter “Current correction (-1000..1000mA)”

The parameter is used to correct the deviation that occurs in current detection. Options:

-1000..1000mA

Parameter “Factor for conversion into theoretical wattage KW: Current value x Factor”

The Parameter is used to set voltage value to calculate each power. Options: **100...250**

The power of this circuit = current value * voltage value. If this option is 220V and the measured current value is 1a, then the power value of this circuit = 220V * 1A = 220W

Parameter “Power meter function(Wh/kWh)”

This parameter is used to enable Power meter function. Options:

Inactive

Active

"Inactive": disable the power calculation of this loop;

"active": enable the power calculation of this loop.

Parameter “Object selection for power meter”

Selection of the object value for the each power meter. Options:

Value in Wh(DPT 13.010)

Value in kWh(DPT 13.013)

The output unit is watthour when select “Value in Wh(DPT 13.010)”; the output unit is kilohour when select “Value in kWh(DPT 13.013)”.

Parameter “Sending object value”

Setting, whether the value shall be sent cyclic or only on request. Options:

Only request

Send cyclic 10 min

Send cyclic 30 min

Send cyclic 1 h

Send cyclic 3 h

Send cyclic 6 h

Send cyclic 12 h

Send cyclic 24 h

“Only request” Only for reading, do not actively send; “Send cyclic 10 min” send object value every 10 minutes, the same as other options.

Parameter "Object of current measurement"

The parameter is the selection of the sending object for each current measurement. Options:

Value in mA(DPT 7.012)

Float Value in mA(DPT 9.021)

Value in A(DPT 14.019)

Value in kW(DPT 9.024)

"Value in mA" means output current in mA, integer data;

"Float Value in mA" means output current in mA, floating-point data;

"Value in A" means output current in A;

"Value in kW" means output current in kW.

Parameter "Add the channel to total current value"

Adjusts, whether the channel shall be added to the total current measurement. Options:

Inactive

Active

Inactive: disable the power calculation of this loop;

Active: enable the power calculation of this loop.

Parameter "Send current value after changes value"

Activation and adjustment of the sending of the current value at determined changes. Options:

No active

1%

2%

...

70%

When the parameter chooses "10%", current is 1A. The current object value will be send when current larger than 1.1A ($1A + 1A \cdot 10\%$) or less than 0.9A ($1A - 1A \cdot 10\%$).

Parameter "Cyclic send"

Activation and adjustment of the sending of the current value at determined times. Options:

No active

10 Min

20 Min

...

120 Min

"No active" do not send current value cyclically. "10 Min" send current object value every 10 minute, the same as other options.

Parameter "Monitoring exceedance/lower deviation of load"

This parameter is used to enable monitoring exceedance/lower deviation of load. Options:

Inactive

Active

Inactive: disable current high/low threshold monitoring;

Active: enable current high/low threshold monitoring.

Parameter "Factor for load monitoring x100 mA"

This parameter adjusts the reference value for the monitoring of load. Options: **1...200**

Parameter "Hysteresis[%]"

This parameter adjusts of the hysteresis for avoiding to fast switching. Options: **10...100**

The hysteresis value is used to avoid to fast switching. E.g "Monitoring exceedance of load" is set to 1A, "Hysteresis(%)" is set to 10%, then when current is larger than 1A, an alarm value will be send to the bus, when current is less than 0.9A ($1A \cdot (1-10\%)$) a not alarm value also will be send to the bus. E.g "Monitoring lower deviation of load" is set to 1A, "Hysteresis(%)" is set to 10%, then when current is less than 1A, an alarm value will be send to the bus, when current is larger than 1.1A ($1A \cdot (1+10\%)$) a not alarm value also will be send to the bus.

Parameter "Behavior at exceeding/deviating"

Adjustment of the behavior, when the measured value is out of the adjusted range. Options:

Send no telegram

Send ON telegram

Send OFF telegram

"Send no telegram" do not send value;

"Send ON telegram" send "1" telegram;

"Send OFF telegram" send "0" telegram.

Parameter "Behavior at not exceeding/deviating"

Adjustment of the behavior, when the measured value is in the adjusted range. Options:

Send no telegram

Send ON telegram

Send OFF telegram

"Send no telegram" do not send value;

"Send ON telegram" send "1" telegram;

"Send OFF telegram" send "0" telegram.

Parameter "Send exceeding/falling below cyclical"

Activation and adjustment of the time step for a cyclic sending. Options:

No active

10 Min

20 Min

...

120 Min

"No active" do not send value cyclically, "10Min" send object value every 10 minutes, the same as other options.

Parameter “counter function”

This parameter is used to enable counter function. Options:

Inactive

Active

Inactive: disable the counting of switching times, power on time timing function;

Active: enable the counting of switching times, power on time timing function.

Parameter “Object of switch and operation hours counter”

This parameter is used to select data type of counter. Options:

2 byte Value

4 byte Value

2 byte value: indicates that the count value is 2 bytes;

4 byte value: indicates that the count value is 4 bytes.

Parameter “Switch count if”

Set the counting condition for switch count. Options:

Relay on

Current > 20mA

Current > 50mA

Current > 100mA

Current > 200mA

Current > 500mA

Current > 1 A

Current > 2 A

Current > 5 A

“Relay on” means when detecting a current flows through the switch, count for once, “Current > 20mA” means when current larger than 20mA, count for once, the same as other options.

Parameter "Hours count if"

Set the counting condition for operation hours count. Options:

Relay on

Current > 20mA

Current > 50mA

Current > 100mA

Current > 200mA

Current > 500mA

Current > 1 A

Current > 2 A

Current > 5 A

"Relay on" means when detecting a current flows through the switch, start calculation time, "Current > 20mA" means when current larger than 20mA, start calculation time, the same as other options.

Parameter "Send counter value in hours"

The parameter sets the period for sending the switch count and the operation hours count. And send the count value per hours. Options: **0-100**

"0" means do not send the period for sending the switch count and the operation hours count. "1-100" means 1 hours to 100 hours cyclically send the value.

When the parameter "Object of switch and operation hours counter" is set "2 byte", the operation hours unit is in hour (h), if set "4 byte", the unit is in second (s).

4.4 Parameter window “Channel X”-Heating actuator

The window of “Channel X-Heating actuator” in Fig. 4.16 will be visible with “Heating actuator (without controller)” in “Work mode of the channel”.

In the running mode of “Heating actuator”, it is used to control heating valve or temperature sensor to realize the temperature constancy in the room.

There are 2 options of control mode for every output: 1 bit control and 1 byte control. Under the 1bit mode, it will receive 1 bit command by the communication object “on-off of regulating”; under the 1byte mode, it will receive 1 byte command by the communication object “continuous of regulating”.

“0” means the valve is off, while “100%” is on. And 0~100% means during a cycle period, the valve will be on for x% of the period while off for the rest time.

All General	Work mode of the channel is	<input type="radio"/> Switch actuator <input checked="" type="radio"/> Heating actuator(without controller)
Channel A	Valve type	<input checked="" type="radio"/> Normal (de-energised closed) <input type="radio"/> Inverted (de-energised open)
Channel B	If bus voltage fail,contact is	Unchange
Channel C	If bus voltage recovery, valve position is	0%(OFF)
Channel D	PWM cycle time for continuous control (1...240 minutes)	3
	PWM cycle time for continuous control (0...59 seconds)	0
	Control telegram is received as	<input checked="" type="radio"/> 1 bit (on-off control) <input type="radio"/> 1 byte (continuous)
	Reply the status of contact state	Nothing
	Special functions of Heating actuator mode is	<input checked="" type="radio"/> Inactive <input type="radio"/> Active

Fig. 4.16 Parameter window “Channel: X-Heating actuator”

Parameter “Valve type”

This parameter sets the valve type for the connected valve. Options:

Normal (de-energised closed)

Inverted (de-energised open)

Normal (de-energised closed): is applicable to normally closed valve.

Inverted (de-energised open): is applicable to normally opened valve.

Parameter "If bus voltage fail, contact is"

This parameter defines the contact position when the bus power off. Options:

Unchange

Close

Open

Unchange: the contact position is unchanged when bus power off;

Open: the contact position is opened when bus power off;

Close: the contact position is closed when bus power off;

The above setting will be valid only when the power for relay drive is enough after the bus voltage off.

Parameter "If bus voltage recovery, valve position is"

This parameter for setting the action of the valve switch when the bus recovers power supply, and the action lasts until receiving the control command or entering the failure mode. Options:

0%.(OFF)

10% (26)

...

100% (ON)

Example 20%, PWM cycle is 100s (1 minute 40s), then the cycle of valve opening and closing action will be 20s for opening and 80s for closing.

Parameter "PWM cycle time for continuous control (1..240 minutes)" and "PWM cycle time for continuous control (0...59 seconds)"

The period of pulse width control (PWM) is set here. This value is in minutes and seconds. Options:

1..240 minutes

0...59 seconds

Note: in order to prolong the service life of relay and controlled equipment, the pulse period shall be set as long as possible.

In the 1 bit control mode, pulse width control (PWM) is only used to control the action of the driver when the driver is in fault, forced operation mode, safe operation mode and bus voltage is restored.

Parameter "Control telegram is received as"

The heating actuator can either be controlled via the 1 bit communication object Switch or the 1 byte communication object Control value (PWM). Options:

1 bit (on-off control)

1 byte (continuous)

In the control mode of "1bit", the function of the heating actuator is as the same as the common switch actuator: the thermostatic room controller control the output by the common switch command. During a malfunction when the control signal is not received by the room thermostat, the relay will undertake an autonomous PWM calculation. PWM cycle time is used for this purpose.

In the control mode of "1 byte", the sending value of the room thermostatic controller is from 0 to 255 (corresponding from 0% to 100%), which is so called "continuous-action control". 0% means the valve is closed and at 100% fully open. It will adjust the output control via pulse width modulation.

Note: under the dynamic regulation function, each time the telegram of continuous regulation is received, the channel will recalculate the duty cycle of the pulse according to the new control value, when the time is up, and perform the action.

Parameter "Reply the status of channel for continuous control"

It is visible when selecting "1 byte (continuous)" in the parameter "Control telegram is received as", which is used to report the status of the controlled valve, with 2 options according to the type of the controlled devices: 1 bit and 1 Byte. Options:

Nothing

Yes, 0% ="0", otherwise "1"(1 bit)

Yes, 0% ="1", otherwise "0"(1 bit)

Yes, continuous control value (1 byte)

Parameter "Reply the status of contact state"

This parameter sets whether the device reply the switch state of the contact. Options:

Nothing

Yes, "1"=contact close, "0"=contact open

Yes, "0"=contact close, "1"=contact open

Under the selecting of “Yes, ‘1’=contact close, ‘0’=contact open”, when there is some request from other devices, the object “Reply status of contact” will send “1” to other devices if the contact is closed; While if it is open, it will send “0” to the other devices.

It is quite the contrary when selecting “Yes, ‘0’=contact close, ‘1’=contact open”.

Parameter “Special functions of Heating actuator mode is”

This parameter defines whether enable the special functions of the Heating actuator. The parameter window “X: Function” will be seen with “active”, seen in Fig. 4.17. And able to set the special functions individually. Options:

Active

Inactive

All General	Function for monitoring is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
Channel A	Function of forced operation is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
A:Function	Function of regular switch is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
Channel B	Function of safety operation is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
	Function of "current" for switch is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Fig. 4.17 Parameter window “X: Function”

Parameter “Function for monitoring is”

Parameter “Function of forced operation is”

Parameter “Function of regular switch is”

Parameter “Function of safety operation is”

Parameter “Function of “current” for switch is”

Options:

Enable

Disable

The relevant setup interface will appear when selecting “enable”.

This will not be explained below for current detection. For details, please refer to Section 4.3.8. When the actuator is used for the electric valve control, the load is only applicable to the resistive load.

4.4.1 Parameter window “X: Monitoring”

The monitor function in Fig. 4.18 “X: Monitoring” will be shown when selecting “enable” in the function “function for monitoring is” in Fig. 4.17.

All General	Cyclic monitoring	60
Channel A	--in minutes (0...240 minutes)	
A:Function	--in seconds (0...59 seconds)	0
A:Monitor	Valve position during fault	Unchange
	Sending object "report fault" is	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Fig. 4.18 Parameter window “X: Monitoring”

Parameter “Cyclic monitoring---in minutes (0...240 minutes)”

---in seconds (0...59 seconds)”

This parameter defines the time that the relay monitors the telegram. Generally speaking, the room thermostat will send the control telegram to the switch actuator at specific intervals. If one or more of the consecutive telegram is omitted, this may indicate a communications fault or a room thermostat malfunction. During the set monitoring time, the switch actuator cannot receive the control telegram for the thermostat; the output will switch to the fault mode and trigger a position during fault. The fault mode ends as soon as a telegram is received as a control value. And the monitor time will also be recounted when receiving the new control telegram. Options:

0...240 minutes

0...59 seconds

Note: if this function is activated, the room thermostat must periodically send out control telegram. The monitoring time shall be greater than the interval time of control telegram sent by the controller.

Parameter “Valve position during fault”

This parameter defines the valve position that the switch actuator controls in fault mode. Options:

0 % (OFF)

10 % (26)

...

90 % (230)

100 % (ON)

Unchange

Unchange: the valve position is unchanged.

Parameter "sending object 'report fault' is"

This parameter sets whether to send telegram to report fault mode under fault mode. If enabled, when the device does not receive the control value within the monitoring time, it will send an error report, and this output will perform the dynamic action under the fault mode until it is interrupted by other operations. When the device receives the control value again, the monitoring time timing of this output starts again. Options:

Disable

Enable

The object "Report fault, regulating" will be activated when selecting "Enable". When the value of the communication object "Report fault, regulating" is "1", means that this output enters into the fault mode. When the value is "0", the output is not in the fault mode.

4.4.2 Parameter window "X: Forced"

The function "X: Forced" in Fig. 4.19 will be visible if selecting "enable" in the function "Function of forced operation is" in Fig. 4.17.

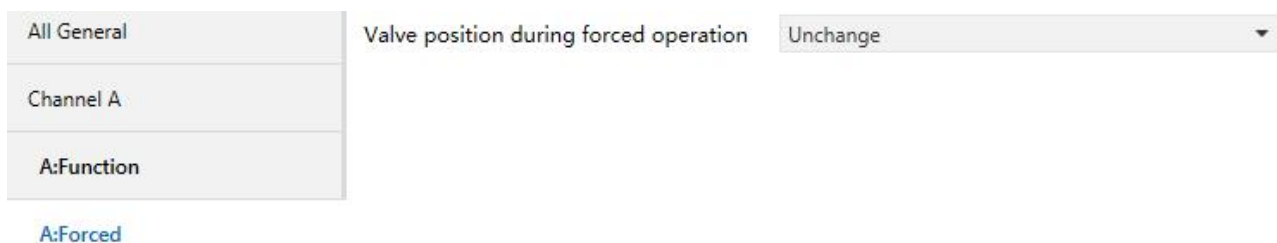


Fig. 4.19 Parameter window "X: Forced"

In the forced operation mode, the channel is forced to switch to the set position. The forced operation mode has the highest priority, all operations except forced operation will be ignored. This mode can be activated through the communication object "Forced operation, regulating" = "1" and ends when "Forced operation, regulating" = "0".

Parameter "Valve position during forced operation"

This parameter defines the valve position that is triggered by the actuator during the forced operation. Options:

0 % (OFF)

10 % (26)

...

90 % (230)

100 % (ON)

Unchange

Unchange: the valve position is unchanged.

When the forced operation is exited, the valve output is going back to the previous operation. For example, the valve position under the forced operation is 40%, and the previous operation is 60%. After exiting the forced operation, the valve output will return to the 60% valve position.

4.4.3 Parameter window “X: Regular”

The window of “X: Regular” in Fig. 4.20 will pop out when selecting “enable” in the parameter “Function of regular switch is” in Fig. 4.17.

All General	Time of switch regular in (0..255min)	10
Channel A	Automatic switch regularly	Disable
A:Function		
A:Regular		

Fig. 4.20 Parameter window “X: Regular”

This function can be used to avoid the device’s malfunction because of the dust deposits in the valve area, which plays a very important role when in the long unchange switch status. This function can be started by the object “Trigger switch regularly” or internally.

Parameter “Time of switch regular in minutes (0..255)”

This parameter defines the time span when the regular switch carry out one action, and whose unit is minute. Options: **0...255**

Parameter “Automatic switch regularly”

This parameter defines the time interval of starting the automatic regular switching. Options:

Disable

One times per day

One times per week

One times per month

It will start the time counting of the automatic regular switch function if there is no operation on the relays, and recount as long as the relays have operation.

4.4.4 Parameter window “X: Safety”

The parameter window “X: Safety” in Fig. 4.21 will pop out when selecting “enable” in the parameter “Function of safety operation is” in Fig. 4.17.

All General	Setting of safety	On parameter-window "All General"
Channel A	Valve position during safety 1 operation	Unchange ▼
A:Function	Valve position during safety 2 operation	Unchange ▼

A:Safety

Fig. 4.21 Parameter window “X: Safety”

There are 2 “Safety Priority x” (x=1,2) in the parameter window “All General”. The parameter defines the valve position triggered by the actuator during safety operation. There are 2 individual “Safety Priority x” (x=1,2) for every output, and “Safety Priority 2” is prior to “Safety Priority 1”. That is even if “Safety Priority 1” is triggered at the same time with “Safety Priority 2”, the contact position will follow the instruction of “Safety Priority 2”. The priority of the safe operation function is only lower to the forced operation function in the system.

Parameter “Valve position during safety X operation” (x=1,2)

This parameter defines the valve position that is triggered by the actuator during the safety operation. Options:

0 % (OFF)

10 % (26)

...

90 % (230)

100 % (ON)

Unchange

Unchange: the valve position is unchanged.

At the end of safety operation mode, the valve output status will return to the previous operation. For example, if the valve position is 40% under safe operation and 60% before operation, the valve output status will return to 60% after exiting safety operation.

Chapter 5 Description of communication object

5.1 Communication object “Switch actuator”

The communication object is a media that the bus talks to the other devices, that means only communication object can have the right to communicate to the bus. More details will be described below.

5.1.1 Communication object “All General”

There are 3 objects in “All General”, which plays important role in the regular switch actuator and the dynamic regulating switch. See in Fig. 5.1 and functions are shown in Table 5.1.

	Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
	1	General	In operation			1 bit	C	R	-	T	-	switch	Low
	2	General	safety priority 1			1 bit	C	-	W	-	U	enable	Low
	3	General	safety priority 2			1 bit	C	-	W	-	U	enable	Low

Fig. 5.1 Communication object “All General”

NOTE: “C” in “Flag” column in the below table means that the object has a normal link to the bus; “W” means the object value can be modified via the bus; “R” means the value of the object can be read via the bus; “T” means that a telegram is transmitted when the object value has been modified; “U” means that value response telegrams are interpreted as a write command, the value of the object is updated.

No.	Function	Object name	Data type	Flags	DPT
1	In operation	General	1bit	C,R,T	1.001 switch
This object is always enabled, used to send telegram “1” to the bus periodically to proof the device is under normal working condition.					
2	Safety Priority 1	General	1bit	C,W,U	1.003 enable
It is able to receive the 1bit telegram from the other devices (such as sensors and controllers and so on) and modify the running condition of the other devices by this object. The other devices will be judged as malfunction if this object doesn't receive the relevant telegram for a certain time (which will be defined in the window “All General”), and then it will trigger the set action of “Safety Priority 1” in “X: Safety”. The priority of “Safety Priority 1” is lower only to “Forced operation” and “Safety Priority 2”.					
3	Safety Priority 2	General	1bit	C,W,U	1.003 enable
This object has the same function as “Safety Priority 1”, but its priority level is secondary only to “Force”.					

Table 5.1 Communication object table “All General”

5.1.2 General communication object “Switch actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Output A	Send the switch status, A			1 bit	C	R	-	T	-	switch	Low
5	Output A	Switch, A			1 bit	C	-	W	-	-	switch	Low
4	Output A	Reply the switch status, A			1 bit	C	R	-	T	-	switch	Low

Fig. 5.2 General communication object per output

No.	Function	Object name	Date byte	Flags	DPT
4	Send the switch status, X	Output X	1bit	C,R,T	1.001 switch
<p>This object will be enabled when selecting “Transmit after change” in the parameter “Set the reply mode of switch status”, which will indicate the contact status (details will be defined by parameter “Object value of switch status” in “Channel X”).</p>					
4	Reply the switch status, X	Output X	1bit	C,R,T	1.001 switch
<p>This object will be enabled when selecting “Respond after read only” in the parameter “Set the reply mode of switch status”, which will indicate the contact status (details will be defined by parameter “Object value of switch status” in “Channel X”).</p>					
5	Switch, X	Output X	1bit	C,W	1.001 switch
<p>This object is used to trigger the switch operation. It will start the switch operation with “1”, and end with “0”.</p> <p>When enabling “input 0” in the logic function, the object “Switch, X” is used to modify the logic value of “input 0”, rather than trigger the switch operation.</p>					

Table 5.2 General communication table per output

5.1.3 Time function object of “Switch actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
6	Output A	Output of staircase lighting, A			1 bit	C	-	W	-	-	switch	Low
7	Output A	Switch time function, A			1 bit	C	-	W	-	-	enable	Low
8	Output A	Warning of staircase, A			1 bit	C	-	-	T	-	alarm	Low
9	Output A	Duration of staircase, A			2 bytes	C	R	W	-	-	time (s)	Low
6	Output A	Switch out with delay, A			1 bit	C	-	W	-	-	switch	Low
6	Output A	Switch out with flashing, A			1 bit	C	-	W	-	-	switch	Low

Fig. 5.3 “Switch Actuator” timing communication object for every output

No.	Function	Object name	Data type	Flags	DPT
6	Output of staircase lighting, X	Output X	1bit	C,W	1.001 switch
<p>It is used to switch on the staircase lighting by this object, which will be enabled when selecting “Staircase lighting” in the parameter “The mode of time function”.</p>					
6	Switch out with delay, X	Output X	1bit	C,W	1.001 switch
<p>It is used to switch on the time delay by this object, which will be enabled when selecting “Delay switch” in the parameter “The mode of time function”.</p>					

6	Switch out with flashing, X	Output X	1bit	C,W	1.001 switch
It is used to switch on the flash output by this object, which will be enabled when selecting “Flashing switch” in the parameter “The mode of time function”.					
7	Switch time function, X	Output X	1bit	C,W	1.003 enable
<p>This object will be started when enabling the time function which can be enabled by this object. It will enable the timing function when receiving the value “1”; time function will disable it when receiving “0”. If there is a time action is running before disable time function, the action will still continue to run completely. And the time Control telegram received during time function disable will be ignored.</p> <p>Enable is a default setting for the time function after bus voltage recovery.</p>					
8	Warning of staircase, X	Output X	1bit	C,T	1.005 alarm
It will be enable while selecting warning by this object in the parameter “Warning mode for ending of staircase”. It will send “1” to the bus when the alarm is starting.					
9	Duration of staircase, X	Output X	2byte	C,W,R	7.005 time (s)
This object will be enabled when selecting “enable” in the parameter “Modify the duration via object (0...60059 seconds)” to modify the duration of the staircase lighting.					

Table 5.3 Timing function communication table

5.1.4 Preset function object of “Switch actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
10	Output A	Call preset 1/2, A			1 bit	C	-	W	-	-	scene	Low
11	Output A	Store preset 1/2, A			1 bit	C	-	W	-	-	scene	Low

Fig. 5.4 Preset function communication object for every output of “Switch Actuator”

No.	Function	Object name	Data type	Flags	DPT
10	Call preset 1/2, X	Output X	1bit	C,W	1.022 scene
This object is used to call the preset value; call 1 with “0” and 2 with “1”					
11	Store preset 1/2, X	Output X	1bit	C,W	1.022 scene
It can be used to save the current switch status as the new preset value; save the new preset value 1 with “0” and 2 with “1”.					

Table 5.4 Preset communication objects

5.1.5 Logic function object of “Switch actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
12	Output A	Input 1 of logic , A			1 bit	C	-	W	-	-	boolean	Low
13	Output A	Input 2 of logic , A			1 bit	C	-	W	-	-	boolean	Low

Fig. 5.5 Logic function communication object for every output of “Switch Actuator”

No.	Function	Object name	Data type	Flags	DPT
12	Input 1 of logic, X	Output X	1bit	C,W	1.002 boolean
This object will be enabled when selecting “Enable” in the parameter “The input 1 of logic is”.					
13	Input 2 of logic, X	Output X	1bit	C,W	1.002 boolean
This object will be enabled when selecting “Enable” in the parameter “The input 2 of logic is”.					

Table 5.5 Logic function communication objects

5.1.6 Scene function object of “Switch actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
14	Output A	Scene handle, A			1 byte	C	-	W	-	-	scene control	Low

Fig. 5.6 Scene function communication object of “Switch Actuator”

No.	Function	Object name	Data type	Flags	DPT
14	Scene handle, X	Output X	1Byte	C,W	18.001 scene control
<p>It is able to recall or save the scene when sending an 8-bit command by this object, which will be enabled when enabling the scene function. The definition of the 8-bit command will be described below:</p> <p>Assuming an 8-bit command (binary coding) as: FXNNNNNN</p> <p style="padding-left: 40px;">F: recall the scene with “0”; save the scene with “1”;</p> <p style="padding-left: 40px;">X: 0</p> <p style="padding-left: 40px;">NNNNNN: scene number (1-64).</p> <p>1-64 in the parameter setup corresponds to the scene number 0-63 received by the communication object “Scene handle”. For example, scene 1 in the parameter setup has the same output result as scene 0 in the communication object “Scene handle”.</p>					

Table 5.6 Scene function communication object “Switch Actuator”

5.1.7 Threshold function object of “Switch actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
15	Output A	Change threshold 1, A			1 byte	C	-	W	-	-	counter pulses (0..2...Low	
16	Output A	Threshold input , A			1 byte	C	-	W	-	-	counter pulses (0..2...Low	

Fig. 5.7 Threshold function communication object “Switch Actuator”

No.	Function	Object name	Data type	Flags	DPT
15	Change threshold 1, X	Output X	1Byte	C,W	5.010 counter pulses
This object is used to change the value of the threshold 1.					
16	Threshold input, X	Output X	1Byte	C,W	5.010 counter pulses
This object is used to receive the threshold sent by other devices.					

Table 5.7 Threshold function communication object

5.1.8 Forced function object “Switch actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
17	Output A	Forced output , A			1 bit	C	-	W	-	-	enable	Low

Fig. 5.8 Forced function communication object “Switch Actuator”

No.	Function	Object name	Data type	Flags	DPT
17	Forced output, X	Output X	1bit	C,W	1.003 enable
This object will be started after enabling the forced function. Enable the forced function with “1”, and the other behaviors will be ignored except the forced function; enable the forced function with “0”.					

Table 5.8 Forced function communication objects

5.2 Communication object “Heating actuator”

5.2.1 General communication object “Heating actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Output A	Reply status of contact , A			1 bit	C	R	-	T	-	switch	Low
5	Output A	On-Off of regulating , A			1 bit	C	-	W	-	-	switch	Low
6	Output A	Status (continuous),1 bit , A			1 bit	C	R	-	T	-	switch	Low
14	Output A	Status (continuous),1 byte, A			1 byte	C	R	-	T	-	percentage (0..100%)	Low
15	Output A	Continuous of regulating , A			1 byte	C	-	W	-	-	percentage (0..100%)	Low

Fig. 5.9 General communication object “Heating actuator”

No.	Function	Object name	Data type	Flags	DPT
15	Continuous of regulating, X	Output X	1Byte	C,W	5.001 percentage
This object will be enabled when selecting “1byte (continues)” in the parameter “Control telegram is received as”, is used to receive the control command of 1Byte, with range from 0% to 100%: the valve will be off with “0%”, on with “100%”.					
5	On-Off of regulating, X	Output X	1bit	C,W	1.001 switch
This object will be enabled when selecting “1bit on-off control” in the parameter “Control telegram is received as”, to receive the command of 1bit: off with “0”; on with “1”.					
14	Status (continuous),1 byte, X	Output X	1Byte	C,R,T	5.001 percentage
This object will be enabled when selecting “yes, continues control value (1byte)” in the parameter “Reply the status of channel for continuous control”, indicating the running status of the current valve and the duty cycle of PWM.					
6	Status (continuous),1 bit , X	Output X	1bit	C,R,T	1.001 switch
This object will be enabled when selecting “yes, 0% =‘0’, otherwise ‘1’ (1 bit)” or “yes, 0% =‘1’, otherwise ‘0’ (1 bit)” in the parameter “Reply the status of channel for continuous control”, indicating the running status of the current valve. When selecting “yes, 0% =‘0’, otherwise ‘1’ (1 bit)”, the valve will be off with “0”, others with “1”; selecting “yes, 0% =‘1’, otherwise ‘0’ (1 bit)”, the valve will be off with “1”, others with “0”					
4	Reply status of contact, X	Output X	1bit	C,R,T	1.001 switch
This object will be enabled when selecting “‘1’= contact close; ‘0’=contact open” or “yes, ‘0’= contact close; ‘1’=contact open” in the parameter “Reply the status of contact state”; indicating the contact position of the current relay.					

Table 5.9 General communication objects “Heating actuator”

5.2.2 Monitoring function object of “Heating actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
8	Output A	Report fault, regulating, A			1 bit	C	R	-	T	-	alarm	Low

Fig. 5.10 Monitoring function communication object “Heating actuator”

No.	Function	Object name	Data type	Flags	DPT
8	Report fault, regulating, X	Output X	1bit	C,R,T	1.005 alarm
<p>This object is enabled when selecting “enable” in the parameter “sending object ‘report fault’ is”, used to check whether the room thermostat is under malfunction or not. It will go into the fault mode with “1”.</p>					

Table 5.10 Monitoring communication objects “Heating actuator”

5.2.3 Forced function object “Heating actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
17	Output A	Forced operation, regulating, A			1 bit	C	-	W	-	-	enable	Low

Fig. 5.11 Forced function communication object “Heating actuator”

No.	Function	Object name	Data byte	Flags	DPT
17	Forced operation, regulating, X	Output X	1bit	C,W	1.003 enable
<p>This object will be started when enabling the forced function. Start the forced mode with “1” and the other behaviors will be ignored; end the mode with “0”.</p>					

Table 5.11 Forced function communication object “Heating actuator”

5.2.4 Regular switch function object “Heating actuator”

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
11	Output A	Trigger switch regularly, A			1 bit	C	-	W	-	-	switch	Low

Fig. 5.12 Regular switch function communication object “Heating actuator”

No.	Function	Object name	Data type	Flags	DPT
11	Trigger switch regularly, X	Output X	1bit	C,W	1.001 switch
<p>This object will be visible when enabling the regular switch function, to trigger the regular switch. Send telegram “1” to turn on the regular switch, when the timing time is up to the end of the operation, return to the previous operation, or send telegram “0” to end the operation. The priority of the regular switch is higher than the normal operation, but lower than the safety and forced operation.</p>					

Table 5.12 Regular switch function communication objects “Heating actuator”

5.3 Communication object “Total current”

	Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
	172	Total current	Total active energy(Wh)			4 bytes	C	R	W	T	-	active energy (Wh)	Low
	173	Total current	Value of total current			2 bytes	C	R	-	T	-	current (mA)	Low
	174	Total current	Exceedance of total load			1 bit	C	R	W	T	-	switch	Low

Fig. 5.13 Communication object “Total current”

No.	Function	Object name	Data type	Flags	DPT
172	Total active energy (Wh/kWh)	Total current	4byte	C,R,W,T	13.010 active energy (Wh) 13.013 active energy (KWh)
<p>This communication object will display when the parameter "Total power meter function (Wh / kWh)" is selected "active" in the "Total Current" parameter page, through "Object selection for power meter" select a data type for transmitting the total power consumption value .It's used to send the total power consumption to the bus.</p>					
173	Value of total current	Total current	2byte 2byte 4byte 4byte	C,R,T	7.012 current (mA) 9.021 current (mA) float 14.019 electric current (A) 9.024 power (KW)
<p>This communication object is used to send the total current value or total power value, The data types can be set in the parameter "Object selection for the current measurement".</p>					
174	Exceedance of total load	Total current	1bit	C,R,T	1.001 switch
<p>This communication object is used to report the total current larger than the set threshold or not, the status value can be set in the parameter "Behavior at (not) exceeding".</p>					

Table 5.13 Communication object “Total current”

5.4 Communication object “X: Current”

	Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
	175	Current A	Current value(mA)			2 bytes	C	R	-	T	-	current (mA)	Low
	176	Current A	Exceedance of load			1 bit	C	R	-	T	-	switch	Low
	177	Current A	Lower deviation of load			1 bit	C	R	-	T	-	switch	Low
	178	Current A	Switch counter			2 bytes	C	R	W	T	-	pulses	Low
	179	Current A	Operation hours			2 bytes	C	R	W	T	-	time (h)	Low
	180	Current A	Active energy(Wh)			4 bytes	C	R	W	T	-	active energy (Wh)	Low
	178	Current A	Switch counter			4 bytes	C	R	W	T	-	counter pulses (unsigned)	Low
	179	Current A	Operation hours			4 bytes	C	R	W	T	-	time lag (s)	Low

Fig. 5.14 Communication object “X: Current”

No.	Function	Object name	Data type	Flags	DPT
175	Current value	Current X	2byte 2byte 4byte 4byte	C,R,T	7.012 current (mA) 9.021 current (mA) float 14.019 electric current (A) 9.024 power (KW)
This communication object is used to send the current value or power value of each channel, the data types can be set in the parameter "Object of current measurement".					
176	Exceedance of load	Current X	1bit	C,R,T	1.001 switch
This communication object is used to report each channel current larger than the set threshold or not, the status value can be set in the parameter "Behavior at (not) exceeding".					
177	Lower deviation of load	Current X	1bit	C,R,T	1.001 switch
This communication object is used to report each channel current lower than the set threshold or not, the status value can be set in the parameter "Behavior at (not) deviating".					
178	Switch counter	Current X	2byte 4byte	C,W,R,T	7.001 pulses 12.001 counter pulses
This communication object is used to report the numbers of switching, it displays when the parameter "Counter function" select "active", the data type of report value can be set in the parameter "Object of switch and hours counter".					
179	Operation hours	Current X	2byte 4byte	C,W,R,T	7.007 time (h) 13.100 time lag (s)
This communication object is used to report load working time, it displays when the parameter "Counter function" select "active", the data type of report value can be set in the parameter "Object of switch and operation hours counter".					
180	Active energy(Wh/kWh)	Current X	4byte	C,W,R,T	13.010 active energy (Wh) 13.013 active energy (KWh)
This communication object is used to report power value of each channel, it displays when the parameter "Object selection for power meter" select "active", the data type of report value can be set in the parameter "Power meter function (Wh / kWh)".					

Table 5.14 Communication object "x:Current"

Chapter 6 Priority level description

There are 5 priority levels for the whole system:

Switch actuator function: Forced > Safety Priority 2 > Safety Priority 1 > common switch / Time/ preset / logic / scene / threshold (from highest priority to lowest)

Heating actuator function: Forced > Safety Priority 2 > Safety Priority 1 > Regular switch - > monitoring operation / general operation

Only the higher priority behavior can interrupt the lower priority behavior.

General switch:

Forced operation

Safety priority 2

Safety priority 1

Switch

Channel special function switch: output of time/preset/logic/scene/threshold and other functions.

Dynamic adjustment:

Forced operation

Safety priority 2

Safety priority 1

Switch regularly

Monitoring/general operation: monitor/PWM, continue, on-off

NOTE:

After the higher priority is canceled, the device will check whether the lower priority is enabled, if enabled, the corresponding configuration will be preformed.

The device works in the switch actuator mode. If the Flash / Staircase / Delay time function is running before entering the high priority, then their time will continue to count during the high priority operation. Then after exit at the high priority, if the timing is still not over, the time function will continue to execute. And during high priority, the control telegrams of channel switches and special switches function from the bus are ignored.

The device works in the heating actuator mode. During the high-priority operation, the monitoring time of the monitor continues, and a fault report will be sent when the monitoring time has passed, but the operation during the fault cannot be performed, and it can only be performed after exiting the high-priority operation. And during the high-priority operation, the control telegram of the normal operation / regularly switch from the bus will be recorded, and the timing time for the regular switch is accounted, if the time has not passed after the high-priority operation ends, the regular switching operation will continue to be executed, if the time has elapsed, the regular switching operation will not be performed.