KNX

Switching/Blind

Actuator

Reference Manual

4/2 Channels Switching/Blind Actuator	WRKT4504E-XXX
8/4 Channels Switching/Blind Actuator	WRKT4508J-XXX
12/6 Channels Switching/Blind Actuator	WRKT4512J-XXX

V 1.0

Panasonic

Contents

1 Functional Characteristic

The switching/blind actuator is a freely configurable relay unit. The basic usage areas are on/off switching for lightning systems and blind/shutter mechanisms (awnings, blinds, shutters and various sun and visibility protection devices) used in homes, theaters and all other buildings. The module can be configurable per one channel according to usage mechanism. One channel can be configured for on/off or blind/shutter mechanism. The module have the switching capacity of 16A with high-inrush current capability.

Each channel of these switching actuators has a LED which indicates its switching status and a manual switch with the settings ON/OFF for switch actuator and UP/DOWN for blind actuators. A mains connection is required for operation of the manual switches, but the bus voltage does not need to be present.

Features which can be adjusted via parameter settings including the basic functions of "Switching", "On/Off Delay", "Pulse", "Staircase" for switching actuator and "Blind", "Shutter" for blind actuator. In addition, the following can be parameterized for each channel: Input logic, type of contact (NC/NO) and participation in central commands such as continuous ON, continuous OFF, central switching and access/recall scene for switching actuators and central up/down for blind/shutter actuators. 3 safety objects (Safety1, Safety2 and Safety3) can be used to drive sun and visibility protection devices to a defined position (e.g. during a storm or when it is raining).
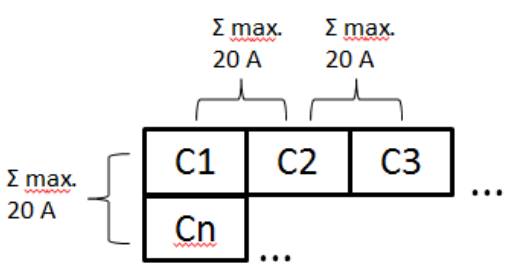
Features of the switching actuators

- Manual control for each channel.
- Status LED for each channel.
- High switching capacity (16A with high-inrush current capacity).
- 4 different channel functions can be selected:
  - *Switching*
  - *ON/OFF Delay*
  - *Pulse function*
  - *Staircase light timer with switch-off pre-warning.*
- Possible integration of the channels into a maximum of 8 scenes.
- Adjustable response to bus failure and restoration of the bus/mains power.
- Logical functions.

Features of the blind/shutter actuators

- On-site operation possible on the device (e.g. for installation testing), drives also possible without a bus voltage.
- LED output status indicators.
- Central UP/DOWN object.
- 3 safety objects and function.
- Possible integration of the channels into a maximum of 8 scenes.
- Flexible reaction to safety telegrams: individually adjustable for each drive for start and end of the safety status.
- Adjustable response to bus failure and restoration of the bus / mains power.

2 Technical Data

KNX Medium	TP1
Mode of commissioning	S-Mode
KNX supply	21-32 V DC
Mains supply	110 / 230 V AC
Mains frequency	50 / 60 Hz
Installation type	DIN rail
Mounting width	12/6 Channels – 144mm (8 modules) 8/4 Channels – 144mm (8 modules) 4/2 Channels– 72mm (4 modules)
Ambient temperature	-5 C …+45 C
Storage temperature	-25 C … +55 C
Transportation temperature	-25 C … +70 C
Connection	
KNX	KNX bus terminal
Mains and outputs	Screw terminals
Max. cable cross section	**Single wire:** 1.5 mm2 to 4mm2 or 2 x 1.5 mm2 to 2x2.5 mm² **Stranded wire without ferrule:** 0.75...4 mm² **Stranded wire with ferrule:** 0.5mm2 to 2.5mm2
Output contact type	NO , potential-free µ-contact, monostable
Switching Voltage AC	0-230 V AC $\pm$10%, 50/60Hz
Switching capacity at 230V AC	16A cos = 1 3A cos = 0.6
Current load rating per device	
4/2 Channels	Sum of C1…C4 maximum 40A
8/4 Channels	Sum of C1…C8 maximum 80A
12/6 Channels	Sum of C1…C12 maximum 120A
Overall load current rating of neighbouring outputs	Max 20A

Loads per output	
Resistive load	3680 W
Capasitive load	max. 21uF at 16A
Motors (shutter or fan)	600W
Max. inrush current	80 A / 20 ms
Lamp Loads	
Incandecent / Halogen load	2000 W
230 V halogen lamps	1800 W
LV halogen lamps with Tronic transformers	800 W
LV halogen lamps with inductive transformers	800 VA
Fluorescent lamp load (conventional) parallel-corrected	2 x 58 W (7 µF), 3 x 36 W (4,5 µF), max. 120 W (14 µF)
Fluorescent lamp load (conventional) not corrected	14 x 58 W, 20 x 36 W, max. 1000 VA
Fluorescent lamp (EB - Electronic ballast)	3 x 36 W, 2 x 58 W, max. 120 W
Energy saving lamps	6 x 7 W, 4 x 11 W, 2 x 15 W, 2 x 20 W, 2 x 23 W

3 Before Operation

3.1 Connection

Every output (C1, C2, C3 …..) can be used separately for switching or for blind/shutter control in pair. (C1-C2, C3-C4…….). Belobe figure shows possible connections.
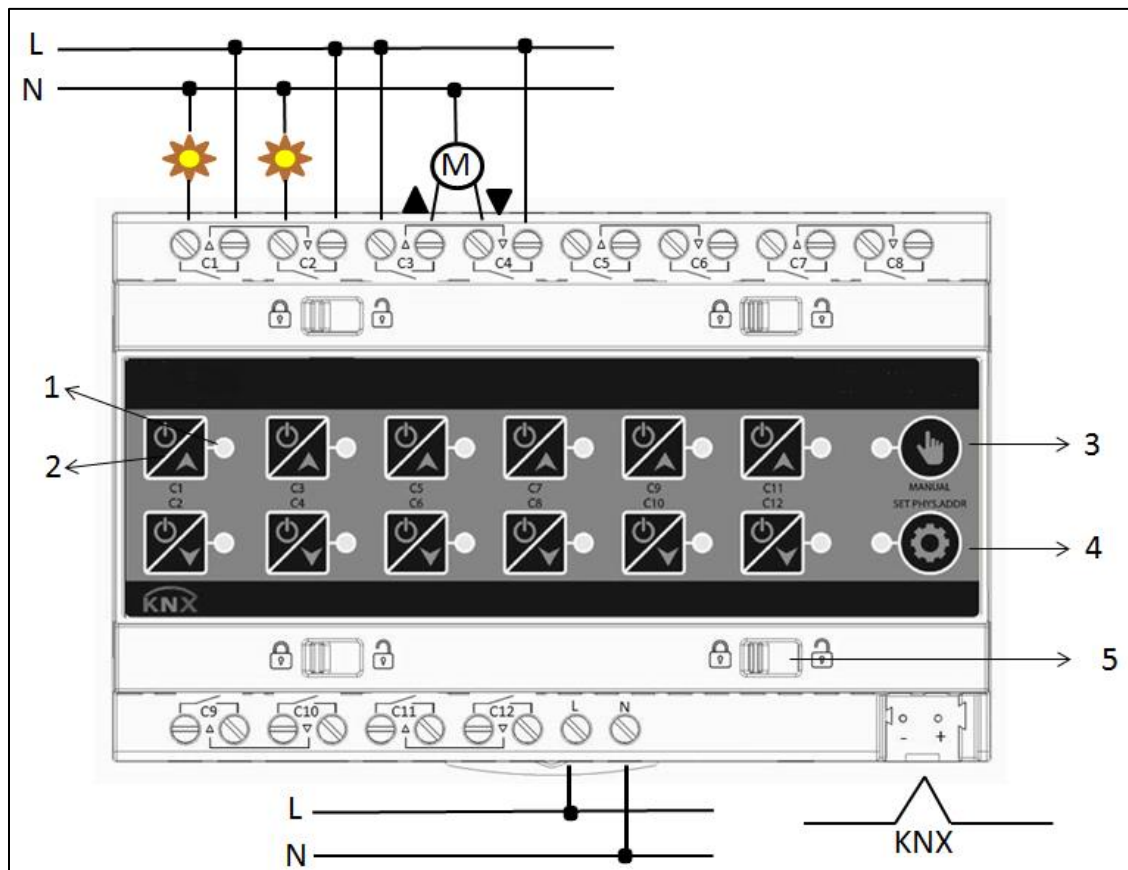
1. **Status leds for output channels:** When led is on the output channel is on. When led is off output channel is off.
   - Channel ON = Relay contact is CLOSE
   - Channel OFF = Relay contact is OPEN
2. **Control button for output channels:** Allows control output channels manually.
3. **Manual button and led:**   When led is on only manual control is allowed. Device does not response to bus commands.
4. **Set physical address button and led:** KNX programming button and led.
5. **Lock for upper and lower modules:** The device consists of two parts. Lower part which has relays and upper part which runs application. KNX application is loaded to upper part of the device. Upper part can be removed with unlock all switches (5).

3.2 Device behaviour after ETS download

Switchin Function: If output channel is configured as switching after ETS download related channel will be off. Status led will also be off. If manual control is activated from ETS output channels can be controlled via control buttons on device.

Blind/Shutter Function: If output channel pair is configured as Blind/Shutter after ETS download related channels will be off. Status leds will also be off.   Blind/Shutter will stay on current possion. If manual control is activated from ETS output channels can be controlled via control buttons on device.   For blind/shutter configuration after ETS download device don't know exact position of the blind/shutter so device does not send feedback or respond to down comments until move to the upper position.

Attention: After ETS download all blind/shutter configured channels must be moved to upper position.

3.3 Device behaviour after bus failer

This can be configured from ETS for every channel. Switchin and blind/shutter configuration has different behaviour options.

3.4 Device behaviour after mains failer

After main failure all output channels will be off.

3.5 Device behaviout after main or bus recovery

This can be configured from ETS for every channel. Switchin and blind/shutter configuration has different behaviour options.

4 Application Program

4.1 Switching

4.1.1 Communication objects

Obj. No	Object name	Function	Size	Datapoint type	Flags				
					C	R	W	T	U
0	Channel 1 Switching	Switch On/off	1 Bit	[1.1] DPT_Switch	✔	✔	✔		✔
1	Channel 1 Switching	Feedback	1 Bit	[1.1] DPT_Switch	✔	✔		✔	✔
2	Channel 1 Logic	OR, AND, Lock, Override	1 Bit	[1.1] DPT_Switch	✔	✔	✔		✔
3-8	Channel 1 reserved objects								
9-107	Objects for other channels. See below table.								
108	Access/Save Scene	Switching and Blind/Shutter	1 Bit	[18.1] DPT_SceneControl	✔	✔	✔		✔
109	Central continuous ON	Switch On/off	1 Bit	[1.1] DPT_Switch	✔	✔	✔		✔
110	Central continuous OFF	Switch On/off	1 Bit	[1.1] DPT_Switch	✔	✔	✔		✔
111	Central Switching	Switch On/off	1 Bit	[1.1] DPT_Switch	✔	✔	✔		✔
112	Centralized Feedback	Switching	2 Bytes	[27.1] DPT_CombinedInfoOnOff	✔			✔	✔

	12 Ch Switching Act.											
	8 Ch Switching Act.											
	4 Ch Switching Act.											
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12
Channel x Switching, Switch On/Off	0	9	18	27	36	45	54	63	72	81	90	99
Channel x Switching, Feedback	1	10	19	28	37	46	55	64	73	82	91	100
Channel x Logic, OR-AND-Lock- Override	2	11	20	29	38	47	56	65	74	83	92	101
Channel x reserved	3 4 5 6 7 8	12 13 14 15 16 17	21 22 23 24 25 26	30 31 32 33 34 35	39 40 41 42 43 44	48 49 50 51 52 53	57 58 59 60 61 62	66 67 68 69 70 71	75 76 77 78 79 80	84 85 86 87 88 89	93 94 95 96 97 98	102 103 104 105 106 107

- **Object 0 "Switch ON/OFF"**

This object is the actual input object for each channel of the module. It is a 1-bit object for controlling one output .

- **Object 1 "Feedback"**

This is a 1-bit output object of each channel of the module. This object returns the switching status of the channel.

- **Object 2 "Or" / "And" / "Lock" / "Override"**

This is a 1-bit object for the input of the logic operation of an output. Any of them appears according to logic function parameter on the channel paramater page.

- **Object 108 "Access/Save scene"**

This object can be used to save and subsequently recall "Scenes". The save process stores the status of the channel, regardless of how the status was brought about (e.g. via switching commands, central objects or the manual switches). The saved status is re-established when it is recalled. Each channel can participate in a maximum of 8 scenes.

- **Object 109 "Central continuous ON"**

This object is a central object. It can be configured to be effective on all channels. If this object is set to "1" then all of the channels "participating" in this object are switched on. If this object is set to "0" then it has no effect on the channels, but the participating channels return back to their last switching states.

- **Object 110 " Central continuous OFF"**

This object is a central object. It can be configured to be effective on all channels. If this object is set to "1" then all of the channels "participating" in this object are switched off. If this object is set to "0" then it has no effect on the channels, but the participating channels return back to their last switching states.

- **Object 111 "Central Switching"**

This object is a central object. It can be configured to be effective on all channels. If a "1" or "0" is sent to this object then this is the same as if a "1" or "0" is sent to the switching objects of the channels (Object 0, Object 5, Object 10 ...). The same functionality could also be achieved by connecting all switching objects to the same group as that of this object. Accordingly, using this object saves time during the assignment of the group addresses and also saves on the number of assignments.

- **Object 116 "Centralized feedback"**

This object is 4-byte object for reading all channel switching states of the switching modul. The centralized feedback function groups the switching states of all outputs together in only one telegram. Byte1 and Byte2 contains the switching states (S bits) of the corresponding channels. Byte3 and Byte4 contains the masking bits (M btis) that specify if there is such an output on the actuator by its value "1".

31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	16	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Byte-4							**Byte-3**									**Byte-2**								**Byte-1**							

For example, object value format for 8-channel switching actuator: "00 FF 00 0x", x = switching states

4.1.2 Parameters

Each channel has its own parameter page. For each channel only one function configuration can be set. Possible functions include:

- Switching
- On/Off Delay
- Pulse
- Staircase light timer with pre-warning function

Depending on the function, the parameters listed below may change. The detailed functions are explained after the function parameters.

4.1.2.1 Parameters on "Switching General" page

Name	Values	Description
Feedback cycle time	2min, 3min, **5min,** 10min, 15min 20min, 30min, 45min, 60min	This parameter specifies the cycle time of feedback object of each channel. The channel sends its own state cyclically to the bus according to selected value.
Use centralized feedback	**No** Yes, only on change Yes, cyclical and on change	Centralized feedback is a 4byte object that sends the states of all channel to the bus. With these parameter values the feedback type can be specified.
Cycle time for centralized feedback	2min, 3min, **5min,** 10min, 15min 20min, 30min, 45min, 60min	This parameter specifies the cycle time of central feedback of all channel.
Use manual control buttons	No **Yes**	This parameter specifies whether the manual buttons will be used or not for all Switching channels.

4.1.2.2 Switching Function

Basic functionality: If the Function parameter is switching, then the channel is used for switching function.

Name	Values	Description
Function	**Switching** On/Off Delay Pulse Staircase light timer with prewarning function	This function specifies the function type of the channel. There are four type of selection function for each channel.
Type of contact	**Normally open** Normally close	This parameter sets the contact position of each channel at startup (i.e when mains voltage applied to the module)
Input logic	**None** OR AND Lock	**None:** The channel is not included any logic operation. **Or:** If the switching object or the linking object is "1" then the channel is "ON". Both the switching object and the linking object must be "0" at the same time for channel "OFF" position. **And:** If the switching object and the linking object are set to "1" then the channel is ON. **Lock:** If the linking object is set to "1" then the channel is OFF then no switch-on is possible via the switching object. If the linking object is set to "0" then the contact is in the position according to the switching object.
Participation in central switching	**No: in no central object** Yes: in all central object Only in central continuous on Only in central continuous off Only in central switching Only central switching and continuous on Only central switching and continuous off Central continuous on and central continuous off	Defines which central objects the channel responds to. The central objects have the following priority: If continuous ON is set to "1" then the channel is switched on regardless of the other objects. If continuous ON is set to "0" and continuous OFF is set to "1" then the channel is switched off regardless of the other objects. Central switching does not take priority over the switching object – the last command to be sent applies. The manual switches on the device take priority over all bus commands.

Name	Values	Description
Sending feedback	**No** Yes,only on change,non-inverted Yes,cyclical and on change, non-inverted Yes,only on change,inverted Yes,cyclical and on change, inverted	This parameter sets whether the channel status will be sent to the bus or not. If yes, the feedback type can be set according to the values. The cycle time can be set from the General page.
Behaviour at bus failure	**Unchanged** ON OFF	If the bus voltage has failed, then the channel adopts the status defined here. The same applies to a complete or partial download of the application.
Behaviour at mains voltage or bus recovery	**Like before failure** ON OFF	After restoration of the mains supply or restoration of the bus supply with the mains voltage present, the channels revert to the status defined here.
Scene1 reacts to **(from Scene1 to Scene8)**	**No scene number** Scene number1 [1…64]	These parameters sets the included scenes for each of 8 scene according to activation number. For each scene (from scene1 to scene8), there are 64 selection number from scene number 1 to scene number 64. The scene parameters are active only when the Function parameter is "Switching" and the input logic pararmeter is "None".
Switching state in Scene 1 **(from Scene1 to Scene8)**	ON **OFF**	This parameter sets the switching state when the Scene1 is called. **(from Scene1 to Scene8)**
Permit teach in Scene1 **(from Scene1 to Scene8)**	**No** Yes	This parameter specifies permission for Scene 1 saving after downloading from ETS. **(from Scene1 to Scene8)**

4.1.2.3 On/Off Delay Function and Parameters

Basic functionality: If the Function parameter is On/Off Delay, then the channel works for On/Off delay function. If the channel is switched off and a "1" is sent to the switching object then the switch-on delay time starts. The switch-on takes place once the switch-on delay time has elapsed. If the channel is switched on and a "0" is sent to the switching object then the switch-off delay time starts. The switch-off takes place once the switch-off delay has elapsed. If while a delay time is running the inverse status is sent then the delay time stops. There is then no switchover. If while a delay time is running the same status is sent again then this has no effect on the current delay time.

Name	Values	Description
Function	Switch **On/Off Delay** Pulse Staircase light timer with prewarning function	This function specifies the function type of the channel. There are four type of selection function for each channel.
Time base for On/Off delay	**1 sec** 10 sec 30 sec 1 min	This parameter defines the time base for switch-off time delay and switch-on time delay. The selected value will be multiplied by switch-off time delay factor and switch-on time delay factor for setting the delay times.
Factor for switching on delay (0...255 x timebase)	[0...**5**...255]	This parameter defines the switch-on delay time in conjuction with "Time base for On Off delay" parameter. Switch-on time delay = time base*factor
Factor for switching off delay (0...255 x timebase)	[0...**5**...255]	This parameter defines the switch-off delay time in conjuction with "Time base for On Off delay" parameter. Switch-off time delay = time base*factor
Input logic	**None** Or And Lock	**None:** The channel has the function described at the beginning. **Or:** If the switching object or linking object is set to "1" then a switch-on is performed after the switch-on delay time. If both of objects are set to "0" then a switch-off is performed after the switch-off delay time. **AND:** If the switching object and the linking object are set to "1" then the channel is ON after switch-on time delay. If one of these object is set to "0" then the channel is OFF after switch-off time delay. **Lock:** If the linking object is set to "1" the channel is OFF and then no switch-on is possible via the switching object. If the linking object is set to "0" then the channel has the function described at the beginning.

Name	Values	Description
Participation in central switching	**No: in no central object** Yes: in all central object Only in central continuous On Only in central continuous Off Only in central switching Only central switching and continuous On Only central switching and continuous Off Central continuous On and central continuous Off	Defines which central objects the channel responds to. The central objects have the following priority: If continuous ON is set to "1" then the channel is switched on regardless of the other objects. If continuous ON is set to "0" and continuous OFF is set to "1" then the channel is switched off regardless of the other objects. Central switching does not take priority over the switching object – the last command to be sent applies. The manual switches on the device take priority over all bus commands.
Sending feedback	**No** Yes,only on change,non-inverted Yes,cyclical and on change, non-inverted Yes,only on change,inverted Yes,cyclical and on change, inverted	This parameter sets whether the channel status will be sent to the bus or not. If yes, the feedback type can be set according to the values. The cycle time can be set from the General page.
Behaviour at bus failure	**Unchanged** ON OFF	If the bus voltage has failed, then the channel adopts the status defined here. The same applies to a complete or partial download of the application.
Behaviour at mains voltage or bus recovery	**Like before failure** ON OFF	After restoration of the mains supply or restoration of the bus supply with the mains voltage present, the channels revert to the status defined here.

4.1.2.4 Pulse Function and Parameters

Basic functionality: If the Function parameter is Pulse, then the channel works for Pulse function.
A "1" on the switching object switches the channel ON for the duration of a pulse length. If a "1" is sent again during this switch-on phase then the channel remains switched on for the duration of a further pulse length. If a "0" is sent during this switch-on phase then the channel switches off immediately.

Name	Values	Description
Function	Switching On/Off Delay **Pulse** Staircase light timer with prewarning function	This function specifies the function type of the channel. There are four type of selection function for each channel.
Type of contact	**Normally open** Normally close	This parameter sets the contact position of each channel at startup (i.e when mains voltage applied to the module)
Time base for pulse length	**1 sec** 10 sec 30 sec 1min	This parameter value is multiplied with the "pulse length factor" parameter for defining the total pulse length time.
Factor for pulse length (1..255 x timebase)	[1…**5**…255]	Defines the total pulse length time with "time base for pulse length" parameter. Pulse length = time base* factor
Input logic	**None** Lock And Override	**None:** The channel only reacts to the switching object in the way described at the beginning. **Lock:** If the linking object is set to "1" then no pulse can be started. The linking object has no meaning for pulses which are already running(i.e. if it is started , it accomplishes the pulse time, OFF and disable the channel). **And:** If the linking object is set to "0" then no pulse can be started. The linking object has no meaning for pulses which are already running. (i.e. if it is started , it accomplishes the pulse time) **Override:** If the linking object is set to "1" then the channel is switched on regardless of the switching object. Any waiting pulses are deleted during an override.

Name	Values	Description
Participation in central switching	**No; in no central object** Yes; in all central object Only in central continuous on Only in central continuous off Only in central switching Only central switching and continuous on Only central switching and continuous off Central continuous on and central continuous off	Defines which central objects the channel responds to. The central objects have the following priority: If continuous ON is set to "1" then the channel is switched on regardless of the other objects. If continuous ON is set to "0" and continuous OFF is set to "1" then the channel is switched off regardless of the other objects. Central switching does not take priority over the switching object – the last command to be sent applies. The manual switches on the device take priority over all bus commands.
Sending feedback	**No** Yes, only on change, non-inverted Yes, cyclical and on change, non-inverted Yes, only on change, inverted Yes, cyclical and on change, inverted	This parameter sets whether the channel status will be sent to the bus or not. If yes, the feedback type can be set according to the values. The cycle time can be set from the General page.
Behaviour at bus failure	**Unchanged** ON OFF	If the bus voltage has failed, then the channel adopts the status defined here. The same applies to a complete or partial download of the application.
Behaviour at mains voltage or bus recovery	**OFF** Start pulse	After restoration of the mains supply or restoration of the bus supply with the mains voltage present, the channels revert to the status defined here.

4.1.2.5 Staircase light timer with pre-warning Function and Parameters

Basic functionality: A "1" on the switching object switches the channel on for the duration of the staircase light time. If another "1" is sent during this switch-on time then a further staircase light time is added to the staircase light time which is already running. If a "0" is sent during this switch-on phase then the channel switches off after a 30-second pre-warning. The light flickers briefly at the start of the pre-warning period.

Name	Values	Description
Function	Switching On/Off Delay Pulse **Staircase light timer with prewarning function**	This function specifies the function type of the channel. There are four type of selection function for each channel.
Time base for staircase time	**1 sec.** 10 sec. 30 sec. 1 min.	This parameter value is multiplied by the "factor for staircase light time" parameter for defining the staircase light time.
Factor for staircase light time (1..255 x timebase)	[1…**5**…255]	Defines the staircase light time together with the "time base for staircase time". Staircase light time = basis * factor
Howmany pulse max. add	[1, **2**, …40]	This parameter value defines the maximum number of pulses to be added to the actual staircase light time. For ex. if its value is 10, during staircase ligth time if more than 10 extra pulses are added, only 10 extra pulses will process.
Input logic	**None** Lock And Override	**None:** The channel only reacts to the switching object in the way described at the beginning. **Lock:** If the linking object is set to "1" then no staircase lighting can be started. The linking object has no meaning for staircase lighting times which are already running. **And:** If the linking object is set to "0" then no staircase lighting can be started. For starting both linking object and switching objects must be "1". The linking object has no meaning for staircase lighting times which are already running. **Override:** If the linking object is set to "1" then the channel is switched on regardless of the switching object. Any waiting staircase lighting times are deleted during an override.

Name	Values	Description
Participation in central switching	**No; in no central object** Yes; in all central object Only in central continuous on Only in central continuous off Only in central switching Only central switching and continuous on Only central switching and continuous off Central continuous on and central continuous off	Defines which central objects the channel responds to. The central objects have the following priority: If continuous ON is set to "1" then the channel is switched on regardless of the other objects. If continuous ON is set to "0" and continuous OFF is set to "1" then the channel is switched off regardless of the other objects. Central switching does not take priority over the switching object – the last command to be sent applies. The manual switches on the device take priority over all bus commands.
Sending feedback	**No** Yes, only on change, non-inverted Yes, cyclical and on change, non-inverted Yes, only on change, inverted Yes, cyclical and on change, inverted	This parameter sets whether the channel status will be sent to the bus or not. If yes, the feedback type can be set according to the values. The cycle time can be set from the General page.
Behaviour at bus failure	**Unchanged** ON OFF	If the bus voltage has failed, then the channel adopts the status defined here. The same applies to a complete or partial download of the application.
Behaviour at mains voltage or bus recovery	**OFF** Start pulse	After restoration of the mains supply or restoration of the bus supply with the mains voltage present, the channels revert to the status defined here.

4.1.3 Switching Function Details

In this section all functions are explained as detailed format. The basic 4 functions ("Switching", "On/Off Delay", "Pulse", "Staircase") are grouped seperately with their own parameters.

4.1.3.1 Function : Switching

- **Input logic "OR":** If the switching object or the linking object is set to "1" then the channel is switched on. Both the switching object and the linking object must be "0" at the same time in order to make the channel switched off.

- **Input logic "AND":** If the switching object and the linking object are set to "1" then the channel is switched on. If one of them is set to "0" then the channel is switched off. The update sequence of the objects is not important.

- **Input logic "Lock":** If the linking object is set to "1" then the channel is switched off then no switch-on is possible via the switching object. If the linking object is set to "0" then the channel is in position according to the switch object (if the switch object is set to "0" while the channel is in lock position and if the lock object is set to "0" then the channel saves the switched off position).

- **Scenes:** The scenes are only activatable for Switch function and if the Input logic is None. There are 8 scene parameters for one channel. Each of 8-scenes are called by the selected scene number from 1 to 64. The switching state parameter specifies the behaviour of the channel when the related scene is called. (After installed from ETS, the behaviour for scene number can be changed if the Permit teach in parameter is "YES"). The Permit teach in parameter specifies whether the related scene can be saved or not when the save scene command is called.

Scene 1 reacts to	scene number 1
Switching state in scene 1	ON
Permit teach in	Yes

.
.

Scene 8 reacts to	scene number 8
Switching state in scene 8	ON
Permit teach in	No

4.1.3.2 Function : On/Off Delay

If the channel is switched off and a "1" is sent to the switching object then the switch-on delay time starts. The switch-on takes place once the switch-on delay time has elapsed. If the channel is switched on and a "0" is sent to the switching object then the switch-off delay time starts. The switch-off takes place once the switch-off delay has elapsed. If while a delay time is running and if the inverse status is sent then the delay time stops. There is then no switchover. If while a delay time is running the same status is sent again then this has no effect on the current delay time.

- **Input logic "OR":** If the switching object or the linking object is set to "1" then the channel is switched on after the switch-on delay time. If both of objects are set to "0" then the channel is switched off after the switch-off delay time.

- **Input logic "AND":** If the switching object and the linking object is set to "1" then the channel is switched on after the switch-on delay time. The update sequence of both objects is not important. If one of objects is set to "0" then the channel is switched off after the switch-off delay time.

- **Input logic "Lock":** If the linking object is set to "1" then the channel is switched off after the switch-off delay time. From now the channel can not be switched on as far as the linking object is set to "0". If the linking object is set to "0", then the channel is switched on after the switch-on delay time if the switch object is stil "1". If the switch object is set to "0" while the channel is on lock position, the channel will not be switched on after the linking object is set to "0".

4.1.3.3 Function : Pulse

When the switch object is set to "1", then the channel is switched on for the duration of a pulse length. If a "1" is sent again during this switch-on phase, then the channel remains switched-on and the pulse time starts again. If the switch object is set to "0" during pulse time, the channel is switched off immediately and the pulse time ends.

- **Input logic "Override":** If the linking object is set to "1" then the channel is switched on regardless of the switching object. From now on the channel can not be switched off until the linking object is set to "0". If the linking object is set to "1" during pulse time, the processing pulse time is deleted.

- **Input logic "AND":** If the switch object and the linking object is set to "1" at the same time, then the channel is switched on for the duration of the pulse length. Update sequence is important for the pulse function. For switching the channel on, first the linking object must be set to "1" and after that the switch object can switch the channel on if it is set to "1". For switching the channel off the switch object must be set to "0" only. The channel is not switched off by setting the linking object to "0" during the pulse length.

- **Input logic "Lock":** If the linking object is set to "1" then the channel can not be switched on. For switching the channel on, the linking object must be set to "0". During the pulse time, if the linking object is set to "1", the pulse time is not affected, it accomplishes the working procedure and the channel is switched off after the pulse time.

4.1.3.4 Function : Staircase light timer with pre-warning

When the switch object is set to "1", the channel is switched on for the duration of the staircase light time. After the staircase light time, the channel is switched off for a flicker time (200 ms) and it is switched on again for the duration of the 30-seconds pre-warning period. At the end of the pre-warning, the channel is switched off. If another "1" is sent to switch object during the staircase ligth time period, then a further staircase light time is added to the staircase light time which is already running. The maximum added pulse quantity is specified by the "Howmany pulse max. Add" parameter. During the staircase light time period, if the switch object is set to "0" then the channel flickers and the pre-warning time period (30 seconds) starts for the channel. During the pre-warning period, if the switch object is set to "1" then the staircase ligth time restarts.

- **Input logic "Override":** If the linking object is set to "1", the channel is switched on and from now on the channel can not be switched off, until the linking object is set to "0". During override position, if the linking object is set to "0", then the channel flickers and the pre-warning period starts. At the end of the pre-warning period the channel is switched off. During the staircase ligth time period or pre-warning period, if the linking object is set to "1", then the override status starts again.

- **Input logic "AND":** If the switch object and the linking object is set to "1" at the same time, then the channel is switched on and the staircase function starts. Update sequence is important for the staircase function. For switching the channel on, first the linking object must be set to "1" and after that the switch object can switch the channel on if it is set to "1". By setting the linking object to "0" does not effect the channel(i.e. the channel does not flickers and the pre-warning does not start).

- **Input logic "Lock":** If the linking object is set to "1" then the channel is on lock position, so it can not be switched on until the linking object is set to "0". During the staircase light time period (or pre-warning period), if the linking object is set to "1" then the channel status will be lock position and the staircase function accomplishes its own procedure with pre-warning time period. At the end of the pre-warning the channel is switched off and it can not be switched on again until the linking object set to "0". When the channel is on lock position during the staircase function, if the switch object is set to "0" , the channel does not respond this command because of the lock status.

4.1.3.5 Central Switching:

With the central switching, the behaviour of the channels is identical with 'normal' activation via the "Switching" object. If the central switch object is set to "1", the channels which are participated to central switching are switched on and if it is set to "0" the participated channels are switched off. For participating a channel to central switch function, this must be specified by the "Participation in central switch" parameter.

4.1.3.6 Central Continuous ON:

Central continuous ON object is prior to all other objects. This means that if the central continuous ON object is set to "1" the channels which are participated to central continuous on function are switched on regardless of all other objects (switch object, central switch object, linking objects…etc). If the central continuous on object is set to "1", the participated channels stay continuously ON position and they can not be swithed off until this object is set to "0".

4.1.3.7 Central Continuous OFF:

Central continuous OFF object is prior to all other objects. This means that if the central continuous OFF object is set to "1" the channels which are participated to central continuous off function are switched off regardless of all other objects (switch object, central switch object, linking objects…etc). If the central continuous on object is set to "1", the participated channels stay continuously OFF position and they can not be swithed on until this object is set to "0". The important point is Central continuous On object is prior to Central continuous Off object. This means if both of objects are set to "1" at the same time, the participated channels are switched on continuously.

4.1.3.8 Feedback Function

Feedback object is a 1bit object that sends the channel status to bus. It says to bus the channel status. For ON position it sends "1" and for OFF position it sends "0" to bus. Each channel has to be participated to feedback function from the "Sending feedback" parameter. There are five possible selections in this parameter:

- **No :** Do not use feedback.
- **Yes, only on change, non-inverted:** Use feedback only when the channel status is changed and send the channel status as non-inverted format.
- **Yes, cyclical and on change, non-inverted :** Use feedback when the channel status is changed and cyclical and send the channel status as non-inverted format.
- **Yes, only on change, inverted:** Use feedback only when the channel status is changed and send the channel status as non-inverted format.
- **Yes, cyclical and on change, inverted:** Use feedback when the channel status is changed and cyclical and send the channel status as non-inverted format.

The feedback cycle time can be set from Switch General page. If any of cycle feedback selection is selected for each channel, the channel status is sent cyclically for cycle time. For the status format, if any inverted selection is selected, the channel status is inverted and sent to bus.

4.1.3.9 Centralized Feedback Function

Centralized feedback function can be activated from Switch General page. The centralized feedback object is a 4-byte object that stores the channel number and their status. The first 2-byte shows the channel status as "1" (ON) or "0" (OFF). The second 2-byte shows howmany channel exits on the switch module as "1" (EXIST) or "0" (NON-EXIST).

.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Byte-4								**Byte-3**								**Byte-2**								**Byte-1**							

Byte-1 and Byte-2 show the channel status and Byte-3 and Byte-4 show the channel number in the module.

4.1.3.10 Bus Failure Function

When the bus voltage fails there are three possible selections that the channel can handle:
- Unchanged: The channel status does not change.
- ON: The channel is switched on.
- OFF: The channel is switched off.

4.1.3.11 Bus or Mains Voltage Recovery Function

The bus voltage or mains voltage recovers the possible selections are grouped into two group:
- For Switch and On/Off Delay Functions:
  - Like before failure: The channel status gets back to position that before failure.
  - ON: The channel is switched on.
  - OFF: The channel is switched off.

- For Pulse and Staircase Functions:
  - OFF: The channel is switched off.
  - Start pulse: The channel function is started according to the function selection (i.e. if the channel function is Pulse then the pulse function starts, or if the channel function is staircase then the staircase function starts).

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4.1.3.12   Contact Type

The contact type function can be used for "Switch" and "Pulse" functions. For type of contact of the outputs there are two possible selections:

- Normally open
- Normally close

The default parameter value for outputs is Normally open. For this configuration the switching output contacts remains opened if the bobin is not energized. In other words, the channel contacts are closed when a switch command of "1" is sent to switch object. For normally close configuration, this status works vice versa. If a switch command of "1" is sent to switch object the contacts are opened.

For all functions (switching, logical, central.etc) if the Normally close configuration is selected, the channel works inversely as before it works for Normally open configuration. In other words, what if the channel position is when the normally open configuration is selected then its position will be the changed inversely in the same function.

Example: Pulse function

- Normally open configuration: The channel is switched ON for pulse length time and it is switched OFF at the end of pulse length.
- Normally close configuration: The channel is switched OFF for pulse length time and it is switched ON at the end of pulse length.

4.2 Blind/ Shutter

4.2.1 Communication Objects

Obj. No	Object name	Function	Size	Datapoint type	Flags C	R	W	T	U
0	Channel 1/2 Up/Down	Up/Down	1 Bit	[1.8] DPT_UpDown	✔	✔	✔		✔
1	Channel 1/2 Step/Stop	Step/Stop	1 Bit	[1.7] DPT_Step	✔	✔	✔		✔
2	Channel 1/2 Height	%Height	1 Byte	[5.1] DPT_Scaling	✔	✔	✔		✔
3	Channel 1/2 Slat	%Slat	1 Byte	[5.1] DPT_Scaling	✔	✔	✔		✔
4	Channel 1/2 Height/Slat Lock	Lock %height and %slat	1 Bit	[1.3] DPT_Enable	✔	✔	✔		✔
5	Channel 1/2 Height Feedback	Height feedback	1 Byte	[5.1] DPT_Scaling	✔	✔		✔	✔
6	Channel 1/2 Slat Feedback	Slat feedback	1 Byte	[5.1] DPT_Scaling	✔	✔		✔	✔
7-17	Channel 1/2 reserved objects								
18-107	Objects for other channels. See below table.								
112	Central Up/Down	Blind / Shutter	1 Bit	[1.8] DPT_UpDown	✔	✔	✔		✔
113 114 115	Safety 1 Safety 2 Safety 3	Blind / Shutter	1 Bit	[1.5] DPT_Alarm	✔	✔	✔		✔

	6 Ch blind Act.					
	4 Ch Blind Act.					
	2 Ch Blind Act.					
	CH 1/2	CH 3/4	CH 5/6	CH 7/8	CH9/10	CH 11/12
Channel x/y Up/Down	0	18	36	54	72	90
Channel x/y Step/Stop	1	19	37	55	73	91
Channel x/y Height	2	20	38	56	74	92
Channel x/y Slat	3	21	39	57	75	93
Channel x/y Height/Slat Lock	4	22	40	58	76	94
Channel x/y Height Feedback	5	23	41	59	77	95
Channel x/y Slat Feedback	6	24	42	60	78	96
Channel x/y reserved	7 -17	25 - 35	43 -53	61 - 71	79-89	97-107

- **Object 0 "Up/Down"**

Raise the blind/shutter with "0" and lower it with "1".

- **Object 1 "Step/Stop"**

If the drive is moving it is stopped when a Step/Stop telegram is received. If the drive is stationary at this point then a short slat turn (step) is performed on blinds. With the other drive types the current position is adjusted up or down depending on the specified step direction. The direction of the step is determined from whether a "0" or "1" is sent to the object. If the configured number of steps for a complete turn has already been reached then no step is performed.

- **Object 2 "%Heigth"**

This raises/lowers the shutter/blind to a certain height. The setpoint value is expressed in %.
0% = upper end position and 100% = lower end position.
If the target position is too close (i.e. within the turning time of the slats) then the command is suppressed.

- **Object 3 "%Slat"**

Specification of a particular slat turn in %.

- **Object 4 "Lock %Heigth and %Slat"**

A "1" on this object blocks the functions Drive 1 Height and Drive 1 Slat. This function is used to prevent the blind from being adjusted due to external influences, and to thus maintain a preferred blind slat position. The Up/Down function (object 0) remains active.

- **Object5 "Height feedback"**
This object sends height level of the blind/shutter to the bus.

- **Object6 "Slat feedback"**
This object sends slat level of the blind/shutter to the bus.

- **Object 108 "Access/Save scene"**
This object can be used to save and call the current height and slat position of the channels configured for it.

- **Object 112 "Central Up/Down"**
This object can be used to control all drives which are configured for it.
For example, all of the shutters on one facade can be raised or lowered at the same time at the push of a button.
0 = raise
1 = lower

- **Objects 113,114,115 "Safety 1,2,3"**
The safety objects allow a specific response of the drives to particular situations with a high priority.

Example:
A safety object is linked to a wind sensor. A drive to which a textile sun protection device is connected is configured to react to this safety object. The operating status is normal as long as a "0" is present. In the event of a storm, the wind sensor sends a "1" to the safety object, and the sun protection is immediately moved to the configured safety position.

Notes:
1. A safety object must only be actuated by one device, as otherwise conflicting commands could cancel each other out.
2. When interrogating the safety objects, e.g. via the ETS function "Read value": If the status "Safety on" has resulted from the cyclic monitoring then the object value remains "0".
3. After download, the status of the safety objects must be updated.

4.2.2 Parameters

4.2.2.1 Parameters on "Blind General" Page

Name	Value	Descriptions
Feedback cycle time	2min 3min **5min** 10min 15min 20min 30min 45min 60min	This parameter specifies the cycle time of Height and Slat feedback objects of each channel. The channel sends its own height and slat level clically to the bus according to selected value.
Safety status control	**Without cyclic monitoring** With cyclic monitoring (10 min.) With cyclic monitoring (20 min.) With cyclic monitoring (60 min.)	The actuator monitors whether at least 1 safety telegram is received within the configured time period. If the relevant safety telegram fails it adopts the safety status. The monitoring time is set to twice the value of the send time of the safety telegrams. The objects are monitored independently of each other. The monitoring time applies to all 3 objects.
Blind Slat 0% position assignment	**0% position for lowering** 0% position for ascending	Input of the starting position for the calculations of the slat turn.
Use manual control buttons	No **Yes**	The manual control with keypad is enabled or disabled with this parameter.
Delay at inversion of direction	**0.5 sec.** 1.25 sec.	This parameter defines the pause time required at inversion of direction. This setting depends on the information supplied by the manufacturer of the drive.

4.2.2.2 Blind/Shutter Mechanism Parameters

For blind mechanism, the "Venetian Blind" must be selected and for shutter mechanism, the "Roller Shutter" must be selected from the "Mode of operation" parameter on the Channel page.

Name		Value	Description
Mode of operation		Venetian Blind **Roller Shutter**	This parameter specifies the blind mechanism.
Complete runtime "Up" 5 ... 500 [x 1sec.]		[5…**50**… 500]	Enter the measured runtime for ascending (in **seconds)**.
Venetian Blind	Complete slat turn 40 ... 250 [x10ms]	[40…**200**…250]	Enter the measured turn time of the slats in increments of 10ms. 100 = 100 x 10ms = 1s
	Number of steps for a complete turn [x steps]	[3…**5**…12] steps	This specifies the number of individual steps a complete slat turn is to be divided into (3 to 12).
	Send slat feedback	**No** Yes,only on change Yes,cyclical and on change	This parameter sets whether the blind/shutter slat level will be sent to the bus sor not. If yes, the feedback type can be set according to the values. The cycle time can be set from the General page.
Roller Shutter	Object step duration for step/stop [x sec.]	[**1**..20] sec.	This specifies whether or not it should be possible to adjust the drive in small steps, and it also specifies the duration of a single step.
	Fabric stretching times 0…59 [x sec.]	[**0**…59] sec.	The fabric stretching function permits 'smoothing' the fabric of an awning tight after lowering. See Figure on. "0" value disable this function.
Send heignt feedback		**No** Yes,only on change Yes,cyclical and on change	This parameter sets whether the blind/shutter height level will be sent to the bus or not. If yes, the feedback type can be set according to the values. The cycle time can be set from the General page.

Name	Value	Description
Response with safety: Start/End	**Safety ineffective** Upper end position / unchanged Upper end position/ current object value[%] Upper end position/same as before safety Lower end position/ unchanged Lower end position/ current object value[%] Lower end position/same as before safety	Behaviour of the curtain on activation and cancelling of the "Safety"status. "current object value [%]" means that if safety status ends, the blind adjusts itself according to %heigth and %slat object values. **Note:** It does not make any sense to use the setting "Current object value [%]" when using the object "Comfort Automatic".
Assignment to safety objects	**Safety1** Safety2 Safety3 Safety1 and Safety2 Safety1 and Safety3 Safety2 and Safety3 Safety1, Safety2 and Safety3	This parameter defines whether the output responds to a wind alarm and to which of the alarms.
Participation in central UP/DOWN object	**No** Yes	This parameter defines whether the channel is participated in central up/down function or not.
Response on bus failure	**Unchanged** Upper Final Position Lower Final Position	After a bus failure (provided the mains supply is present) the drive can be driven to a preferred position (e.g. "Open shutter").
Response to restoration of bus and mains voltage	**Unchanged** Upper Final Position Lower Final Position	After restoration of the bus and mains the drive can be driven to a preferred position (e.g. "Open shutter") .
Scene1 reacts to **(from Scene1 to Scene8)**	**No scene number**	These parameters sets the included scenes for each of 8 scene according to activation

| Name	Value	Description
	Scene number1 [1...64]	number. For each scene (from scene1 to scene8), there are 64 selection number from scene number 1 to scene number 64.
Blind position in Scene 1 [%] **(from Scene1 to Scene8)**	[**0**..100]	This parameter sets the switching state when the Scene1 is called. **(from Scene1 to Scene8)**
Permit teach in Scene1 **(from Scene1 to Scene8)**	**No** Yes	This parameter specifies permission for Scene 1 saving after downloading from ETS. **(from Scene1 to Scene8)**

4.2.3 Shutter/ Blind Function Details

4.2.3.1 Types of Mechanisms

There are two basic blind mechanisms.

- Venetian blind (jalousie, i.e.blind with slats)
- Shutter roller (roller blinds, awnings)

A Venetian blind (or venetian blind) has horizontal slats, one above another. They are suspended by strips of cloth called tapes, or by cords, by which all slats in unison can be rotated through nearly 180 degrees. In this drive mode, the slats are directly adjusted by way of mechanical linkage when the height of the blind is changed. The actuator assumes that the slats are completely closed when the blind moves downwards and similarly, the actuator assumes that the slats are completely open when the blind moves upwards, or vice versa. This is dependent of the blind driving type mechanism.
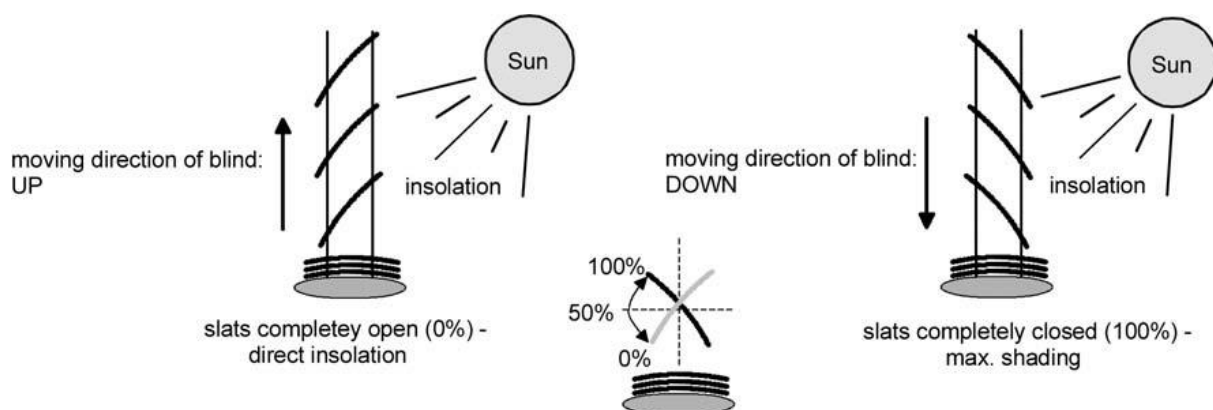
Complete runtime up parameter specifies how long the blind travels from lower end point to upper end point. In some cases the extension time can be used additionally with the complete runtime. The extension time can be set from Extension time parameter from Blind general page.

4.2.3.2 Upward/Downward Travel Control

If the up/down object is set to "0" the blind travels for upward, and if it is set to "1" the blind travels for downward. While travelling, if the step/stop object is updated ("1" or "0") the blind stops travelling. The blind channel must save and know its blind heigth level when it is stopped so that accomplishes its next command according to the heigth level. For example if the blind travels upward for 3 seconds and it is stopped, then it can travel downward for 3 seconds. At the lower end position the blind can not travel to downwards even if any downward command is sent to blind channel. At the upper end position, if any upward command is sent to up/down object, the blind travels upward for 1 second only.

4.2.3.3 Step Travel Control (Venetian Blind)

Step control is used for adjusting the slat position for venetian blinds. One step time can be set from Complete slat turn parameter and Number of steps parameter. The calculation for one step time;

One step time = Complete slat turn parameter / Number of steps parameter

Slats are adjusted everytime a step command is sent to the step/stop object. In other words, when "0" or "1" is sent to the step stop object, blind travels for one step time according to the value sent to the step/stop object. If "1" is sent to step/stop object, the blind travels downward for one step time and if "0" is sent to step/stop object, then the blind travels upward for one step time. Blind slats positions can be adjusted for the blind level of between the lower end position and the complete slat turn time value. During travel, after the complete slat turn time, slat positions remains constant.

4.2.3.4 Step Travel Control (Roller Shutter)

The step control is different for Roller Shutters. Total step number from lower end position to upper end position must be calculated. Step number calculation is done by complete runtime parameter and Object step duration parameter;

Step number = Complete runtime / Object step duration

When a step command is sent to shutter channel, the shutter travels one step for Object step duration according to the step value that is sent to step/stop object. If "0" is sent to step/stop object, the shutter goes one step for upward direction and if "1" is sent to step/stop object, the shutter goes one step for downward direction. During step travel, the shutter can be stopped by any stop command.

4.2.3.5 %Height Control

%Height control function is used for adjusting the blind height level for a percent value. For this aim %height object is used. A value between 0% and 100% can be sent to this object. When a percent value is sent to this object, the blind height level that the blind must reach is calculated according to the complete runtime. The percent adjustment example has been shown below (The blind is at the lower end position):

- Complete runtime = 10 seconds
- The value that has been sent to %height object is %50 (128 byte value)
- The time that the blind must travels is 5 seconds (10 seconds / 2)

For controlling the %height level of the blind channel, i.e for using the %height control function, the Lock %height and %slat object must be "0". If "1" is sent to this object, then this function can not be used.

4.2.3.6 %Slat Control (Venetian Blind)

%Slat control function is used for venetian blind mechanisms for adjusting the slat positions. For adjusting the slat positions, %slat object is used. When a value between 0% and 100% is sent to %slat object, the slats position are adjusted according to the value. When a value is sent, the blind travels for percent value of the complete slat turn parameter value. An example for slat adjusting is given below (The blind is at the lower end position):

- Complete slat turn = 2000 ms
- The value that has been sent to %slat object is %25 (64 byte value)
- The time that the blind must travel is 500 ms (2000ms / 4)

For controlling the %slat level of the blind channel, i.e for using the %slat control function, the Lock %height and %slat object must be "0". If "1" is sent to this object, then this function can not be used.

4.2.3.7 Fabric Stretching Function (Awning)

Fabric material can be used with some awning mechanisms. This type of mechanisms may be damaged when reached the lower end position because of over stretch. The fabric-stretching function permits stretching the fabric of an awning tight after lowering. The fab-ric-stretching function can also be used with shutters to re-open the slits of the shutter curtain after a downward movement into the lower end position. If activated in the ETS parameters, fabric stretching is executed during each downward travel after stopping. The curtain is then 'stretched' by moving it briefly in the opposite travel direction. Fabric-stretching is never effected in upward travel movements.
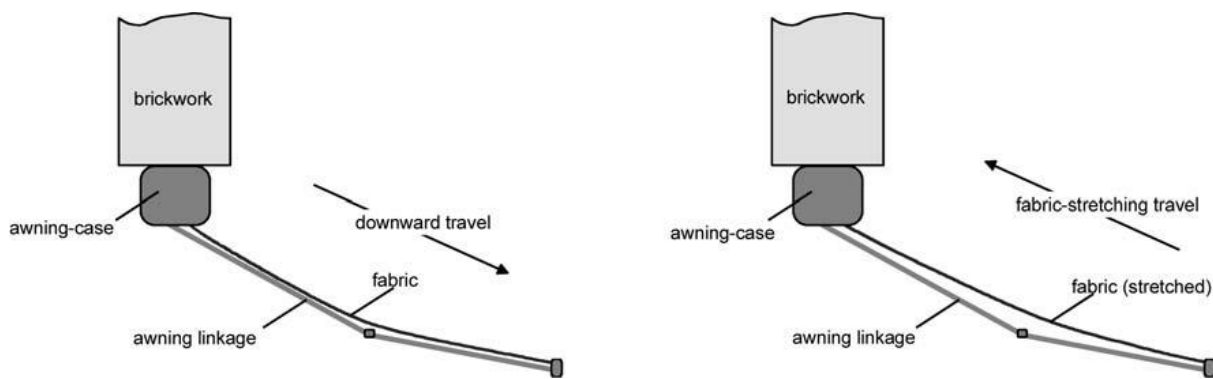
4.2.3.8 Central Up/Down Control Function

The blind or shutter updown controlling can be realized with central up/down function. The important point here is every blind or shutter channel must be participated in central up/down function by "Participation in central up/down object" parameter. Central up/down object is used for up/down control of blind/shutter. The basic mission is the same as the up/down object. If "0" is sent to this object the participated blinds travel for upward direction and if "1" is sent to this object, the participated blinds travel for downward direction.

4.2.3.9 Scene Function

There are 8 scene parameters for one blind/shutter channel. Each of 8-scenes are called by the selected scene number from 1 to 64. The Blind position parameter specifies the height level of blind when the related scene is called. (After installed from ETS, the behaviour for scene number can be changed if the Permit teach in parameter is "YES"). The Permit teach in parameter specifies whether the related scene can be saved or not when the save scene command is called.

If a scene in which the channel is participating is taught in via the scene object, the current height of the blind is saved. It does not matter whether the position was reached via the buttons or via a bus

telegram. If a scene in which the channel is participating is called via the scene object, the drive will adopt the previously saved height position. Channels not participating in the scenes are not affected by this.

Scene1 reacts to	scene number 1
Blind position in Scene1 [%]	50
Permit teach in	Yes

.
.

Scene8 reacts to	scene number 8
Blind position in Scene8 [%]	0
Permit teach in	No

If a value between "1" and "64" is sent to Access/save scene object, this means that the participated blind channels are recalling for the scene number that has been sent. The blind will travel to the level of the scene number that is specified in Blind position in Scene [%] parameter.

If a value between "127" and "192" is sent to Access/save scene object, this means that the participated blind level will be saved for the scene number that has been sent. For saving, the scene number saving must be permitted by Permit teach in parameter.

4.2.3.10   Safety Functions

The actuator can handle up to three different safety functions with three Safety objects (Saftey1, Safety2 and Safety3). Each safety function has of its own communication object so that the functions can be activated or deactivated independently. The safety functions can be used to protect blinds, shutters or awnings on several building facades from winds, gusts, rains or frosts. The telegram polarity of the safety objects is fixed: "0" = no alarm / "1" = alarm. As a rule the communication objects of the safety function are controlled by weather stations that use sensors to record temperature, wind speed and rain.

Each blind/shutter channel can be configured and participated by "Response with safety" and "Assignment to safety objects" parameters for safety functions. Response with safety parameter

specifies in which safety function the blind/shutter participated. The possible selections for safety start / safety end;

- Safety ineffective
- Upper end position/unchanged
- Upper end position/current object value[%]
- Upper end position/same as before safety
- Lower end position/unchanged
- Lower end position/current object value[%]
- Lower end position/same as before safety

The possible selections for safety objects that will be used for safety start and safety en:

- Safety1
- Safety2
- Safety3
- Safety1+Safety2
- Safety1+Safety3
- Safety2+Safety3
- Safety1+Safety2+Safety3

For safety start there are two possible selections: Upper end position and Lower end position. If the selected safety object (or objects) is set to "1" the blind travels for Upper end position or Lower end position according to the selection.

For safety end there are three possible selections: Unchanged, Current object value and Same as before safety. If unchanged is selected, the blind channel does not change its position. The current object value [%] means that the blind travels to the level of the last %height object value.

4.2.3.11   Bus Failure Function

The behaviour of the blind/shutter channel can be specified when the bus voltage fails. There are three possible selections for bus failure situation:

- Unchanged: The blind/shutter channel does not respond the bus failure.
- Upper Final Position: The blind/shutter travels to the upper end position.
- Lower Final Position: The blind/shutter travels to the lower end position.

4.2.3.12   Bus or Mains Voltage Recovery Function

The behaviour of the blind/shutter channel can be specified when the bus voltage or mains voltage recovers. There are three possible selections for recovery situations:

- Unchanged: The blind/shutter channel does not respond the bus or mains voltage recovers.
- Upper Final Position: The blind/shutter travels to the upper end position.
- Lower Final Position: The blind/shutter travels to the lower end position.

4.2.3.13   Feedback Functions

For blind and shutter channels there are two types of feedback functions depending on the blind mechanism:
- Height level feedback function
- Slat level feedback function

Slat level feedback function is available for Venetian Blind mechanisms because of their slats. Height level feedback function is available for both venetian blinds and roller shutters.

Slat and Height feedback objects are 1byte objects that sends the blind height level and slat level to bus. Each channel has to be participated to feedback functions from the "Send slat feedback" and "Send height feedback" parameters. There are three possible selections in these parameters:

- **No :** Do not use feedback.
- **Yes, only on change:** Use feedback only when the blind level is changed and send the blind level to the bus.
- **Yes, cyclical and on change:** Use feedback when the blind level is changed and cyclical and send the blind level to the bus . The cycle time can be set from Blind General parameter page.

Conversion of percentages to hexadecimal and decimal values

Percentage value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Hexadecimal	00	1A	33	4D	66	80	99	B3	CC	E6	FF
Decimal	00	26	51	77	102	128	153	179	204	230	255