EAE KNX MULTI INPUT OUTPUT

Product Order Nr: 48026

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1. General Features

The KNX Multi Input/output MIO1616 provides multiple connections for push buttons and signal lamps for building functions in one device. It has 16 input channels and 16 output channels.

- 16 input channels provide following function list;

  - Switch / push button input
  - Dimmer control
  - Control of shutter/blinds
  - Value
  - Scene control
  - Counter for count pulse

- 16 output channels provide LED lamp switching
- Does not require an external power supply.

All features can be used separately or together. Please consider that those features will be processed depending on priority. Bus voltage fail/return behavior can be set via ETS configuration.

2. Device Technology

2.1. Device Peripherals

1. Input-Output Diagram

2. Physical address label

3. Programming button

4. Programming LED

5. KNX Power
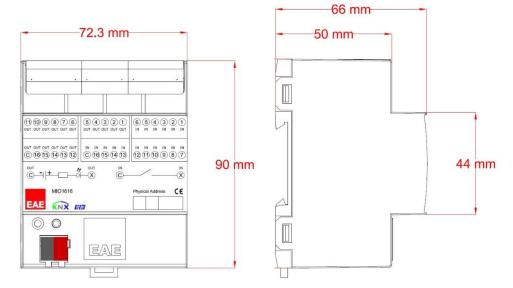
2.2. Technical Data

Type of protection	IP20	EN 60 529
Safety class	II	EN 61 140
Power supply:	Voltage	21V… 30V DC, via the KNX bus
	Current draw from bus voltage	10mA
Inputs	Number	16 inputs
	Maximum cable length	<200 m
Input	Scanning voltage	5V DC
	Input current	0.5 mA
	Maximum cable length	< 200 m
Outputs	Number	16 outputs
	Maximum cable length	< 100 m
	Max current load	400mA
Operating elements	LED (red) and button	For physical address
Connections	Input /Output	Plug-in screw-type terminal
	KNX	Bus connect terminal
Temperature range	Ambient	-5° C + 45° C
	Storage	-25° C + 55° C
Humidity	max. air humidity	95 % no moisture condensation
Dimensions		65,5 x W x 89mm
	Width W in mm	72 mm
	Width W in units (18 mm modules)	4 modules
Weight	0.15 kg	
Box	Plastic, polycarbonate, colour grey	
CE	In accordance with the EMC guideline and low voltage directives.	

NOTE: Device default physical address is 15.15.255. In order to configure Universal Dimming Actuator, ETS application file ".knxprod" is needed. It's possible to download the file on EAE Technology website. ETS is required for programming the device. Parameter settings and related group addresses can be changed by ETS. Learn more by reading ETS help file.

2.3. Scale Drawings

3. Communication Object Table

No	Name	Function	DP Type	Length	Flags
0	General	In operation	1.002	1 bit	CRT
1		Disable	1.003		CW
2	Input 1	Switch	1.001	1 bit	CWT
3		Switch - long	1.001		CWT
6		Disable	1.003		CW
7	Input 2	Switch	1.001	1 bit	CWT
8		Switch - long	1.001		CWT
11		Disable	1.003		CW
12	Input 3	Switch	1.001	1 bit	CWT
13		Switch - long	1.001		CWT
16		Disable	1.003		CW
17	Input 4	Switch	1.001	1 bit	CWT
18		Switch - long	1.001		CWT
21		Disable	1.003		CW
22	Input 5	Switch	1.001	1 bit	CWT
23		Switch - long	1.001		CWT
26		Disable	1.003		CW
27	Input 6	Switch	1.001	1 bit	CWT
28		Switch - long	1.001		CWT
31		Disable	1.003		CW
32	Input 7	Switch	1.001	1 bit	CWT
33		Switch - long	1.001		CWT
36		Disable	1.003		CW
37	Input 8	Switch	1.001	1 bit	CWT
38		Switch - long	1.001		CWT
41		Disable	1.003		CW
42	Input 9	Switch	1.001	1 bit	CWT
43		Switch - long	1.001		CWT
46		Disable	1.003		CW
47	Input 10	Switch	1.001	1 bit	CWT
48		Switch - long	1.001		CWT
51		Disable	1.003		CW
52	Input 11	Switch	1.001	1 bit	CWT
53		Switch - long	1.001		CWT
56		Disable	1.003		CW
57	Input 12	Switch	1.001	1 bit	CWT
58		Switch - long	1.001		CWT
61		Disable	1.003		CW
62	Input 13	Switch	1.001	1 bit	CWT
63		Switch - long	1.001		CWT

No	Name	Function	DP Type	Length	Flags
66	Input 14	Disable	1.003	1 bit	CW
67		Switch	1.001		CWT
68		Switch - long	1.001		CWT
71	Input 15	Disable	1.003	1 bit	CW
72		Switch	1.001		CWT
73		Switch - long	1.001		CWT
76	Input 16	Disable	1.003	1 bit	CW
77		Switch	1.001		CWT
78		Switch - long	1.001		CWT
81	Output 1	Switching	1.001	1 bit	CW
82		Flashing			CW
83		Switch, priority			CW
84		Telegr. Status/ ackn.			CT
85	Output 2	Switching	1.001	1 bit	CW
86		Flashing			CW
87		Switch, priority			CW
88		Telegr. Status/ ackn.			CT
89	Output 3	Switching	1.001	1 bit	CW
90		Flashing			CW
91		Switch, priority			CW
92		Telegr. Status/ ackn.			CT
93	Output 4	Switching	1.001	1 bit	CW
94		Flashing			CW
95		Switch, priority			CW
96		Telegr. Status/ ackn.			CT
97	Output 5	Switching	1.001	1 bit	CW
98		Flashing			CW
99		Switch, priority			CW
100		Telegr. Status/ ackn.			CT
101	Output 6	Switching	1.001	1 bit	CW
102		Flashing			CW
103		Switch, priority			CW
104		Telegr. Status/ ackn.			CT
105	Output 7	Switching	1.001	1 bit	CW
106		Flashing			CW
107		Switch, priority			CW
108		Telegr. Status/ ackn.			CT
109	Output 8	Switching	1.001	1 bit	CW
110		Flashing			CW
111		Switch, priority			CW
112		Telegr. Status/ ackn.			CT

No	Name	Function	DP Type	Length	Flags
113	Output 9	Switching	1.001	1 bit	CW
114		Flashing			CW
115		Switch, priority			CW
116		Telegr. Status/ ackn.			CT
117	Output 10	Switching	1.001	1 bit	CW
118		Flashing			CW
119		Switch, priority			CW
120		Telegr. Status/ ackn.			CT
121	Output 11	Switching	1.001	1 bit	CW
122		Flashing			CW
123		Switch, priority			CW
124		Telegr. Status/ ackn.			CT
125	Output 12	Switching	1.001	1 bit	CW
126		Flashing			CW
127		Switch, priority			CW
128		Telegr. Status/ ackn.			CT
129	Output 13	Switching	1.001	1 bit	CW
130		Flashing			CW
131		Switch, priority			CW
132		Telegr. Status/ ackn.			CT
133	Output 14	Switching	1.001	1 bit	CW
134		Flashing			CW
135		Switch, priority			CW
136		Telegr. Status/ ackn.			CT
137	Output 15	Switching	1.001	1 bit	CW
138		Flashing			CW
139		Switch, priority			CW
140		Telegr. Status/ ackn.			CT
141	Output 16	Switching	1.001	1 bit	CW
142		Flashing			CW
143		Switch, priority			CW
144		Telegr. Status/ ackn.			CT

4. Parameters

4.1. General Parameters

4.1.1. In Operation

Enable sending In operation	***no***
	yes

This object can be used to report that device is still alive and connected the KNX bus line. Telegram value is selectable as "0" or "1".

If the parameter selected yes;

In Operation sending period (hh:mm:ss)	*00:00:01…**00:00:10**…18:12:15*

This parameter determines the "In operation" info sending period. In operation telegram will be sent at the end of the period.

Bit value	*0*
	1

This parameter defines the "In Operation" sending object value.

4.1.2. Telegram Limiting

Enable telegram limiting	no
	*yes

This parameter is used to limit the telegram sending in a period. If the parameter is selected "yes"; *Telegram limit count* and *Telegram limit period duration parameters* are visible.

Telegram limit count	1…***10**…255

Max number of telegrams per period, can be sent freely.

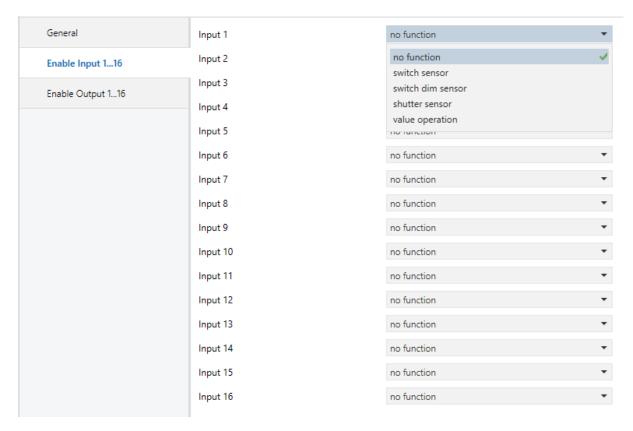NOTE: If the value of the object cannot send in the time of period, the object value will be buffered for the next period time. The buffered object value can be updated when the object value is updated.

Telegram limit period	***50ms**
	100ms
	200ms
	500ms
	1s
	2s
	5s
	10s
	30s
	1min

The limit period can be adjusted via this parameter.

4.2. Enable Input 1…16

Input 1…16   ***no function***
                                                switch sensor
                                                switch dim sensor
                                                shutter sensor
                                                value operation

This parameter is used to select input function.

- This parameter is selected "switch sensor"

Distinction between short/long operation and cyclical sending.

- This parameter is selected "switch dim sensor"

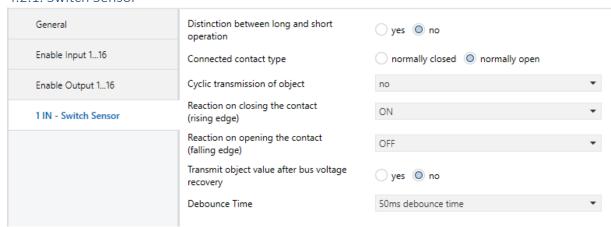Start-stop dimming and stepwise dimming are possible.

- This parameter is selected "shutter sensor"

For movement/louvre adjustment of a blind or a shutter.

- This parameter is selected "value operation"

It is possible to send different values or data point types.

4.2.1. Switch Sensor

General	Distinction between long and short operation	◯ yes ◉ no
Enable Input 1...16	Connected contact type	◯ normally closed ◉ normally open
Enable Output 1...16	Cyclic transmission of object	no ▾
1 IN - Switch Sensor	Reaction on closing the contact (rising edge)	ON ▾
	Reaction on opening the contact (falling edge)	OFF ▾
	Transmit object value after bus voltage recovery	◯ yes ◉ no
	Debounce Time	50ms debounce time ▾

This function is used, for binary inputs to which a switch or a push button is attached, to send a switching telegram (ON, OFF or TOGGLE) as a reaction to a rising and / or falling signal edge at this input. It has only 1 bit communication objects.

Debounce: Bouncing is the tendency of any two metal contacts in an electronic device to generate multiple signals as the contacts close or open; debouncing is any kind of hardware device or software that ensures that only a single signal will be acted upon for a single opening or closing of a contact.

A similar effect takes place when a switch made using a metal contact is opened. The usual solution is a debouncing device or software that ensures that only one digital signal can be registered within the space of a given time (usually milliseconds).

Short/Long Press: Distinguishing short from long presses is about measuring the pulse length. The event is no longer emitted upon pressing the button, but upon releasing it. This can affect the feeling of responsiveness.

The picture of this step shows a long press and short press timing, with a long press threshold of Tl periods. The button press longer than Td period but shorter than Tl period this mean is short pressed occurs.

Distinction between long and short operation	*yes* **no*

If the parameter is set no, the input will be evaluated normally on every edge of the input signal. Yes is selected. There is a delay after opening/closing the contact to determine whether there is a short or long operation.

Connected contact type	*normally closed* **normally open*

This parameter is visible if there is distinction between short and long operation. The contact type of the push button attached to the channel is adjusted here.

Cyclic transmission of object	**no* *"switch" = OFF* *"switch" = ON* *always*

This parameter is visible if there is no distinction between short and long actuation. This parameter determines if and when a switching value is sent cyclically via the corresponding communication object.

Reaction on closing the contact *(rising edge)*	*ON*
	OFF
	TOGGLE
	no reaction

This parameter is visible if there is no distinction between short and long actuation. This parameter determines the switching value to be sent when the contact is closed.

Reaction on opening the contact *(falling edge)*	ON
	OFF
	TOGGLE
	no reaction

This parameter is visible if there is no distinction between short and long operation. This parameter determines the switching value to be sent when the contact is open.

Telegram is repeated every(transmission cycle time): base	100ms
	1s
	10s
	1min
	10min

This parameter determines the desired cycle time.

Period time: Base x Factor

Factor	2…*30*…255

Select time factor, between [2…255]

Reaction on short operation	*ON*
	OFF
	TOGGLE
	no reaction

This parameter is visible if there is distinction between short and long operation. This parameter determines the switching value to be sent when the contact is short press.

Reaction on long operation	ON
	OFF
	TOGGLE
	no reaction

This parameter is visible if there is distinction between short and long operation. This parameter determines the switching value to be sent when the contact is long press.

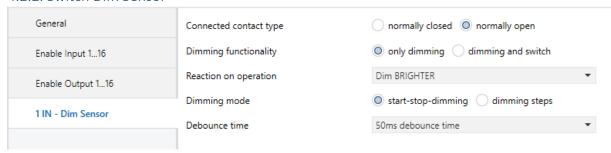| *Number of object for short/long operation*	*1 object*
	2 object

This parameter is visible if there is distinction between short and long operation. Further communication object can be released by the option 2 communication objects.

Debounce time	*10ms*…50ms…150ms

Debounce uses the input, which means checking twice in a short period of time to make sure it's definitely pressed.

4.2.2. Switch Dim Sensor

General	Connected contact type	◯ normally closed ◉ normally open
Enable Input 1...16	Dimming functionality	◉ only dimming ◯ dimming and switch
Enable Output 1...16	Reaction on operation	Dim BRIGHTER ▾
1 IN - Dim Sensor	Dimming mode	◉ start-stop-dimming ◯ dimming steps
	Debounce time	50ms debounce time ▾

You can use the corresponding input to switch the light on or off or dim it. When dimming, dimming up or dimming down is carried out via the 4 bit dimming object; the parameters for the dimming steps can be set. In addition, you can also transmit the corresponding dimming step cyclically for a period of time that can be set as required.

> **Connected contact type**   *normally closed*
> ***normally open**

The contact type of the push button attached to the channel is adjusted here.

> **Dimming functionality**   *Dimming and switching*
> ***Only dimming**

- This parameter is select "Dimming and switching";

If the dimming actuator was switched on by a short push button action, then it is dimmed brighter/darker by the first long push button action.

- This parameter is select "Only dimming";

The advantage of the "Only dimming" function is that no distinction is between short and long actuation. It is not necessary to wait for a long actuation.

> **Reaction on short operation**   *ON*
> *OFF*
> ***TOGGLE**
> *no reaction*

This parameter is visible if there is selected "Dimming and switching" operation.

When the push button is pressed briefly the value currently stored in the switching object. An ON or OFF telegram is only generated when the push button is released. (Falling edge)

> **Reaction on long operation**   ***Dim BRIGHTER**
> *Dim DARKER*
> *Dim BRIGHTER/DARKER*

With the long push button action, the light becomes brighter or darker depending on the object value and the last controlled dimming direction.

A long operation changes the value of the object "Dimming".

> **Long operation after**   ***0,3s…10s**

This parameter is visible if the parameter value is set "Dimming and switching". Long press period is select here.

Dimming mode   ****start-Stop dim***
                                                  dimming steps

- "Start- Stop dim": It starts the dimming process with a telegram BRIGHTER or DARKER. In addition, button releases than STOP-dimming telegram sends. Cyclic sending telegram is not necessary in this case.
- "Dimming steps": The dimming telegram is sent cyclically during a long operation. STOP telegram sends at the end of operation.

Brightness change on every sent telegram   *%100…***%6,25…%1,56***

This parameter is only visible with the "Dimming steps" options. This parameter is cyclically sent with every dim telegram.

Transmission cycle time: *0,3s…***0,5s…10s***
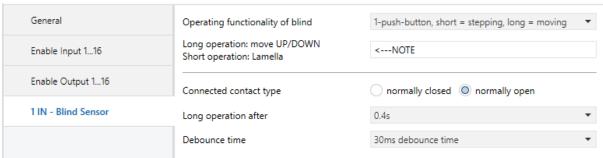***Telegram is repeated every***

This parameter is only visible with the "Dimming steps" options. The cycle time for sending corresponds with the time interval between two telegrams during cyclical sending.

Debounce time   *10ms…***50ms…150ms***

Debounce uses the input, which means checking twice in a short period to make sure it is definitely pressed.

4.2.3. Shutter/Blind Sensor

General	Operating functionality of blind	1-push-button, short = stepping, long = moving ▼
Enable Input 1…16	Long operation: move UP/DOWN Short operation: Lamella	<---NOTE
Enable Output 1…16		
	Connected contact type	○ normally closed ◉ normally open
1 IN - Blind Sensor	Long operation after	0.4s ▼
	Debounce time	30ms debounce time ▼

The dual surface shutter function triggers shutter actuators, which can adjustment shutter and blind. You can rise the shutter/adjust the lamella using a single key and lower the shutter/adjust the lamella using a second key surface blind operation. Every shutter actuator controls with a 0-signal the up movement and a 1-signal down movement.

Operating functionality of the blind   ****1 push-button, short=stepping, long=moving***
                                                  1 push-button, short=moving, long=stepping
                                                  1 push-button-operation, moving
                                                  1 switch-operation, moving
                                                  2 push-button, standard
                                                  2 switch-operation, moving
                                                  2 push-button, moving
                                                  2 push-button, stepping

Description is below the table.

- **1 button, short=stepping, long=moving**

    Short operation   Stop / lamella adjustment
                       The stop/lamella adjustment object is for the adjustment opposite direction to the last movement of the lamella. In additional it stops a running movement of the shutter.

Long operation   Shutter up / Shutter down
                          Long press is opposite direction to the last movement for moving the
                          shutter up or down.

- **1 button, short= moving, long= stepping**

Short operation   Shutter up / Shutter down
                          Long press is for moving the shutter up or down.
Long operation   Stop / lamella adjustment
                          The stop/lamella adjustment object is for the adjustment opposite
                          direction to the last movement of the lamella. In additional it stops a
                          running movement of the shutter. Long press detects than stop/lamella
                          adj. communication object sends periodically.

- **1 button operation, moving**

On operation   This property is for moving only shutters up or down. Each press this
                          commands send sequence;
                          ->Move UP → Stop/lamella adj. UP→
                            Move DOWN → Stop/ lamella DOWN

- **1 switch operation, moving**

Start of operation   This property is for moving only shutters up or down.
                          While button is pressing, operation is continuing. This action is opposite
                          direction to the last movement for moving the shutter up or down.
End of operation   When button releases, operation stop.
                          Stop/ Lamella adj. command is send than movement stopped.

With below functions, you must set the parameters for a second key (second input) with the
corresponding settings for the shutter movement in the opposite direction.

- **2 button, standard**

Short operation   Stop / lamella adjustment
                          The stop/lamella adjustment object is adjustment of the lamella UP or
                          DOWN. In additional it stops a running movement of the shutter.
Long operation   This action is for moving the chosen direction shutter. Movement
                          direction is choosing on parameter move up or moves down.

- **2 switch operation, moving(shutter)**

Start of operation   This property is for moving only shutters up or down.
                          While button is pressing, operation is continuing. This action is moving
                          the shutter "move up" or "move down".
End of operation   When button releases, operation stop.
                          "Stop/ Lamella adj. UP" or "Stop/ Lamella adj. DOWN" command is
                          send than movement stopped.
                          You should use the property with two switches.

- **2 switch operation, moving(shutter)**

On operation   The property object "Shutter" is choose and performs the up- and
                          down-movement of the shutter.

The direction of movement depends to the parameters. When the button pressed firstly, than shutter move in direction that it was programmed. Second time button is pressed shutter stop command is sent such as STOP/Lamella adj. UP or STOP/Lamella adj. DOWN.

1) Shutter MOVE UP -> STOP/Lamella UP
2) Shutter MOVE DOWN -> STOP/Lamella DOWN

- **2 button, stepping**

On operation   Stop / lamella adjustment
The stop/lamella adjustment object is adjustment of the lamella UP or DOWN. Lamella move direction chooses on the parameters.

Connected contact type	*normally closed*
	normally open

The contact type of the push button attached to the channel is adjusted here.

Reaction on short operation	***STOP/lamella UP***
	STOP/lamella DOWN

This parameter is visible if there is distinction between short and long operation.

Stop/step lamella adjustment parameter. This parameter object stops shutter movement.

Reaction on long operation	*MOVE UP*
	MOVE DOWN

Distinction between short and long;

This parameter use for choose shutter movement direction.

Long operation after	*0,3s…**0,4s…**10s*

Distinction between short and long;

Long press time period is select here.

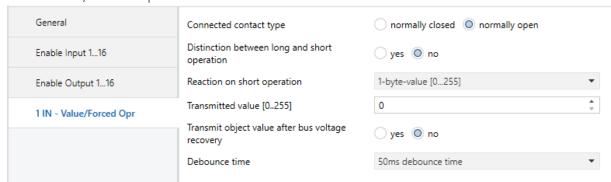| *Telegr. STOP/lamella adj. is repeated every*	*0,3sn…**0,4s…**10sn*

Only visible *1 push-button, short=moving,*

This parameter we choose each sending stop/lamella telegram-sending period. Lamella adjustment cyclically.

Debounce time	*10ms…**50ms…**150ms*

Debounce uses the input, which means checking twice in a short period of time to make sure it's definitely pressed.

4.2.4. Value/Forced Operation

General	Connected contact type	○ normally closed ◉ normally open
Enable Input 1...16	Distinction between long and short operation	○ yes ◉ no
Enable Output 1...16	Reaction on short operation	1-byte-value [0...255] ▾
1 IN - Value/Forced Opr	Transmitted value [0..255]	0 ⇕
	Transmit object value after bus voltage recovery	○ yes ◉ no
	Debounce time	50ms debounce time ▾

You can use these value/forced functions to parameterize different object actions. You can transmit one or two objects short or long press status sequence, and select the size of the objects required (1 bit, 2-bit priority control, 1 byte, 2 byte or 4 byte) as needed. This enables you to parameterize a large number of application options. You can enter two values and set whether and how they are to be transmitted short or long.

Connected contact type   *normally closed*
                                        normally open
The contact type of the push button attached to the channel is adjusted here.

Distinction between long and short   *yes*
operation   ***no***
If the parameter is set no, the input will be evaluated normally on every edge of the input signal.

Yes is selected. There is a delay after opening/closing the contact to determine whether there is a short or long operation.

Reaction on operation   *no reaction*
                                         1-bit value
                                         2-bit value (forced operation)
                                         1 byte value [0…255]
                                         2 byte [-32768…32767]
                                         2 byte [0…65535]
                                         4 byte (floating point)
                                         4 byte value [0…4294967295]
This parameter is visible no distinction short/long operation;

This parameter determines the data type.

When button is pressed, this type of data sent KNX line with the communication object.

Reaction on short operation   *no reaction*
                                         1-bit value
                                         2-bit value (forced operation)
                                         1 byte value [0…255]
                                         2 byte [-32768…32767]
                                         2 byte [0…65535]
                                         4 byte (floating point)
                                         4 byte value [0…4294967295]
This parameter is visible distinction short/long operation; when button is pressed, this value sends KNX line on the communication object.

Transmitted value	****Dependent on the selection made at reaction on operation.***

Short press value or on operation value is enter here.

Reaction on long operation	*no reaction*
	1-bit value
	2-bit value (forced operation)
	*1 byte value [0…255]
	2 byte [-32768…32767]
	2 byte [0…65535]
	4 byte (floating point)
	4 byte value [0…4294967295]

This parameter is visible distinction short/long operation;

This parameter determines the data type.

When button is pressed, this type of data sent KNX line with the communication object.

Transmitted value (long press)	**** Dependent on the selection made at reaction on operation.***

This parameter is visible distinction short/long operation;

Short press value or on operation value is enter here.

Long operation after:	****250ms***
Time base	*1s*
	10s
	1min
	10min

This parameter is visible distinction short/long operation;

This parameter determines the desired long press time.

Period time: Base x Factor

Factor	*1…***4**…255*

Select time factor, between [1…255]

Transmit object value after bus voltage recovery.	*yes*
	*no

This parameter is visible no distinction short/long operation;

In the event of power supply failure to the electronics, the value (if this can be changed via a communication object) is permanently stored in a memory protected against data loss in the event of voltage failure. They are transferred from this memory into the working memory on bus voltage recovery.

Debounce time	*10ms…***50ms**…150ms*

Debounce uses the input, which means checking twice in a short period of time to make sure it's definitely pressed.
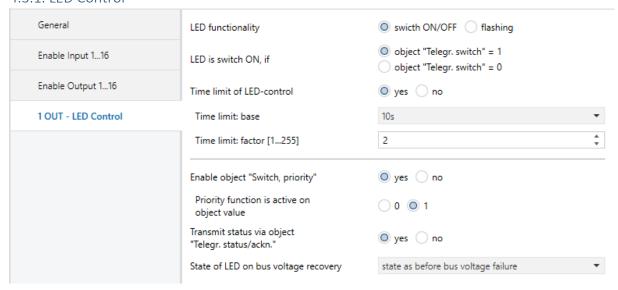
4.3. Enable Output

Output 1…16   *no function*

                                             LED control

Desired output count (up to 16) can be selected via this parameter.

4.3.1. LED Control

General	LED functionality	⊙ swicth ON/OFF ◯ flashing
Enable Input 1...16	LED is switch ON, if	⊙ object "Telegr. switch" = 1 ◯ object "Telegr. switch" = 0
Enable Output 1...16	Time limit of LED-control	⊙ yes ◯ no
1 OUT - LED Control	Time limit: base	10s ▼
	Time limit: factor [1...255]	2 ▲▼
	Enable object "Switch, priority"	⊙ yes ◯ no
	Priority function is active on object value	◯ 0 ⊙ 1
	Transmit status via object "Telegr. status/ackn."	⊙ yes ◯ no
	State of LED on bus voltage recovery	state as before bus voltage failure ▼

LED functionality   ***switch ON/OFF***
                                             flashing
This parameter is used to select driving type of LEDs.

LED is switch ON, if   ***object "Telegr. switch" = 1***
                                             object "Telegr. switch" = 0
This parameter is used to select the group object value for switching ON for the relevant output.

Time limit of LED-control   ***yes***
                                             no
This parameter is used to activate/deactivate the Automatic Switch OFF for the relevant output.

Time limit: base   *1s, **10s**, 1min, 10min, 1h*
This parameter defines the base time for Automatic Switch OFF.

Time limit: factor [1…255]   *1…**2**…255*
This parameter value will be multiplied with the base time. Then, the summed value will be applied for Automatic Switch OFF for the relevant output.

Enable object "Switch, priority"   ***yes***
                                             no
This parameter is used to activate/deactivate the Priority control for the relevant output.

Priority function is active on obj. value   *0*
                                             1
This parameter defines the value for Priority Control to activate.

Transmit status via object	***yes**
"Telegr. status/ackn"	no

This parameter is used to activate status object for the relevant output.

State of LED on bus voltage	no
recovery	ON
	OFF
	***state as before bus voltage failure**

This parameter is used to select the state of the output after bus voltage recovery.

If **LED functionality** is selected as **flashing**, following parameters will be shown below.

LED flashes, if	***object "LED flashing" = 1**
	object "LED flashing" = 0

This parameter is used to select the group object value to flashing for the relevant output.

LED is switch ON for	0.2s, ***1s**, 60s

This parameter determines the LED ON period for flashing.

LED is switched OFF for	0.2s, ***1s**, 60s

This parameter determines the LED OFF period for flashing.