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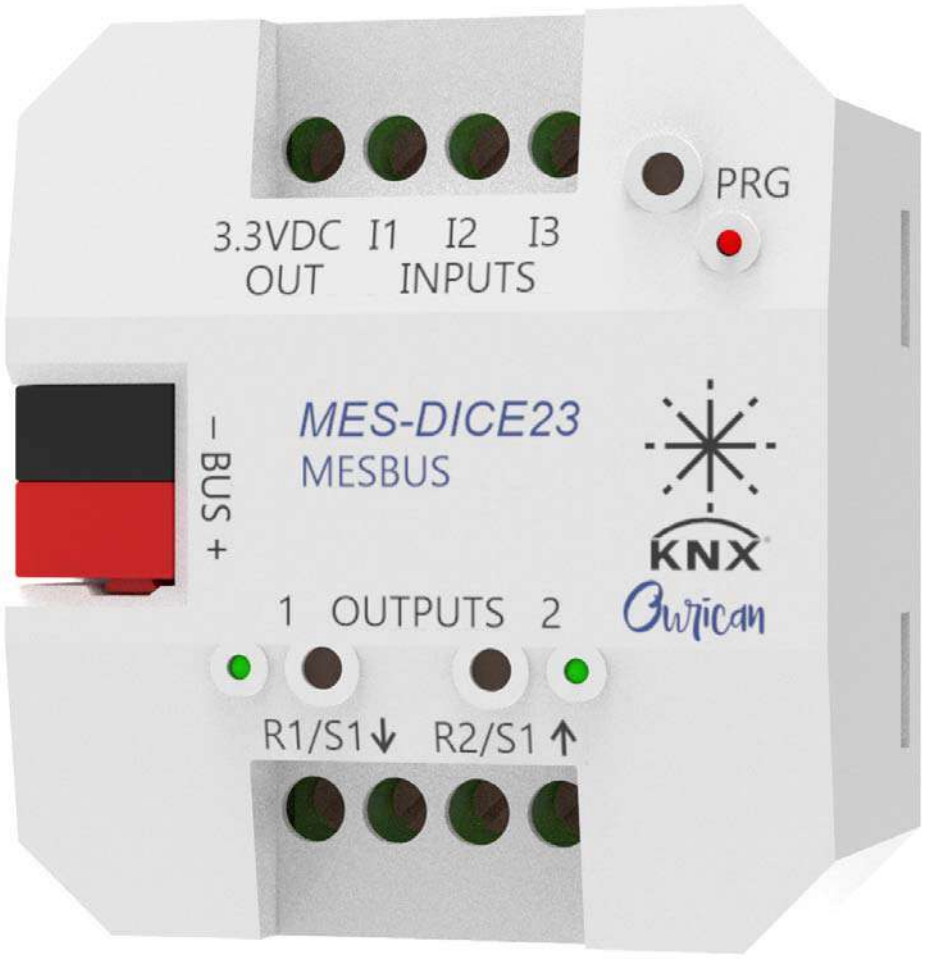
MES-DICE23 : KNX / MESBUS powered actuator with 2 channel multi-function outputs and 3 channel universal inputs



User Manual

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1. Introduction

1.1. Features

MES-DICE23 is a 2-channel multifunction actuator and 3-channel universal input. Designed to operate on the KNX / MESBUS bus, the actuator offers the following features:

- Power relay outputs for directly operating the loads.
- Driving 2 independent outputs or 1 shutter channel.
- Powered and addressed using the KNX or MESBUS bus.
- Provided with push buttons and LED indicators for individual outputs.
- Ability to run 10 scenes per output.
- Inbuilt timer and pulse function.
- Individual relay outputs, that allow load to be powered from different phases.
- 3 universal inputs settable as any of the following:
  - Digital input.
  - Temperature sensor.
  - Motion detector.
- Digital inputs suitable for Switching, Dimming, Shutter, Push Button, Scene control, 1 byte constant (percentage), and 1 byte constant (unsigned).
- Programmed via ETS software.
- Enhanced flexibility of application through 48 discrete logical functions.
- Saving of total data on failure of bus.
- Programming button with LED indicator.
- Mounted inside the wall back box and false ceiling.
- CE marked.

1.2. Application

MES-DICE23 is 2-channel multifunction actuator with 3-channel universal inputs for the KNX or MESBUS bus automation.

The actuator offers:

- 3 non-isolated analog or digital inputs for pushbuttons, switches, temperature sensors and motion sensors.
- 2 individual outputs and 1 shutter channel to drive loads such as:

- Lighting
- Shutter/Curtains
- Fans
- Air-conditioners
- Appliances

1.3. Appearance and features

MES-DICE23 is housed in a plastic enclosure of 50.5 mm length X 55.5 mm height X 34 mm depth. The terminals on the top edge of enclosure are the inputs and lower edge are the outputs.

The MES-DICE23 actuator accepts external digital or analog inputs. One of the these 4 terminals sources a 3.3 VDC supply for powering external push-buttons, switches, motion detector or a negative temperature coefficient (NTC) sensor for ambient temperature detection.

The bottom edge of MES-DICE23 actuator has 4 terminals for the 2 relay outputs. The 2 outputs are isolated from each other to individually drive 2 separate loads or together to drive a shutter motor.

1.3.1. Features

Table 1.1: Parts description, refer to the figures below

No.	Part	Function
1.	3.3 VDC	Terminal for 3.3 VDC supply to switches and sensors.
2.	Analog or digital inputs I1, I2, and I3	Terminals for inputs I1, I2, and I3.
3.	Relay outputs 1 and 2	Terminals for relay output 1 and relay output 2.
4.	Relay output LEDs	Green LED illuminates to reflect the output status.
5.	Manual output push buttons	Push button for toggling the output.
6.	KNX / MESBUS connector	Terminal for KNX / MESBUS bus.
7.	Programming button	Push button for initializing the programming mode.
8.	Programming LED	Red LED illuminates when the device is in the programing mode

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Table 1.1: Parts description, refer to the figures below (Continued)

No.	Part	Function
9.	Screw terminals	Screw terminals for connecting input wires.

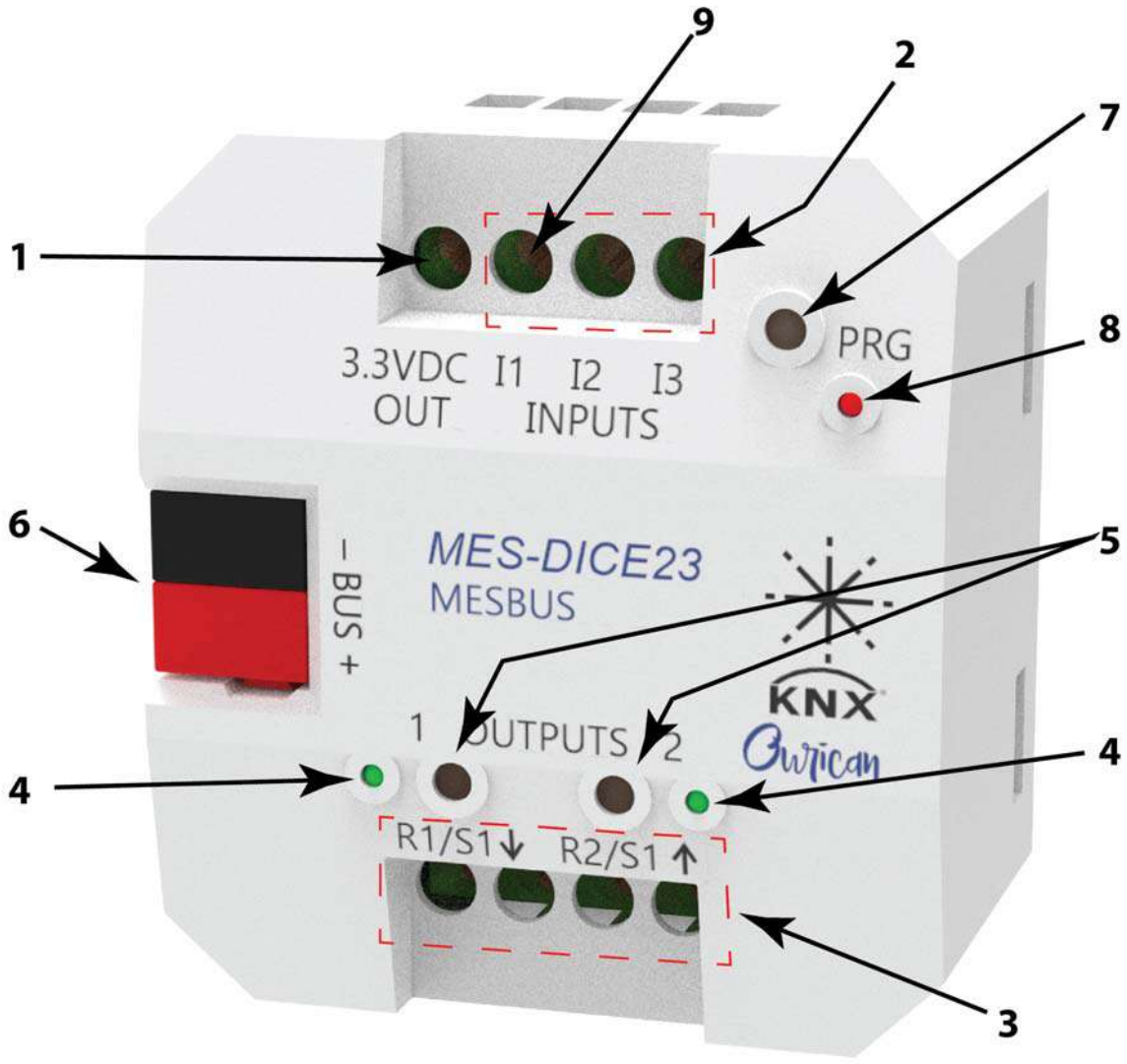

Figure 1-1: MES-DICE23

1.4. Connections

1.4.1. About connections

- MES-DICE23 uses the standard KNX connector for connecting to the KNX / MESBUS bus.
- MES-DICE23 is powered through the KNX / MESBUS bus. The device does not need a separate power supply. Ensure adequate wire thickness for connecting the input.

⚠ Caution

Connect the +3.3 Volts DC supply only to potential free external pushbuttons, switches, or sensors. To avoid electrical shock to the users or damage to the device, do not connect the + 3.3 V terminal to the KNX / MESBUS bus or any other potential.

⚠ Caution

Connect the KNX / MESBUS terminals only to the bus cables and to no other power supply or potential, or non-KNX / MESBUS compliant devices.

⚠ Caution

Isolate the supply from source, before commencing work on connections.

⚠ Caution

Danger of electrical shock to the users or damage to the device may occur if the actuator is connected to any other power supply or potential to the KNX / MESBUS terminals.

⚠ Caution

Only trained and qualified personnel should do the electrical wiring.

1.4.2. Connection procedure

1. Connect the KNX cables as per polarity indicated in connection diagram.

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2. Connect the **Black wire** to the **Black terminal**, and the **Red wire** to the **Red terminal**.

- Reversing the connection does not result in any damage.
- The MES-DICE23 will not operate with a reversed bus connection.

1.4.3. Connection diagrams

See the following diagrams for connecting the MES-DICE23 in various configurations.

"MES-DICE23 with input sensors" on page 11.

"MES-DICE23 with switching loads" on page 13.

"MES-DICE23 driving shutter motor load" on page 15.

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2. Connection Diagram for Input Sensors

This section explains the input sensor wiring of MES-DICE23.

2.1. Connection diagram

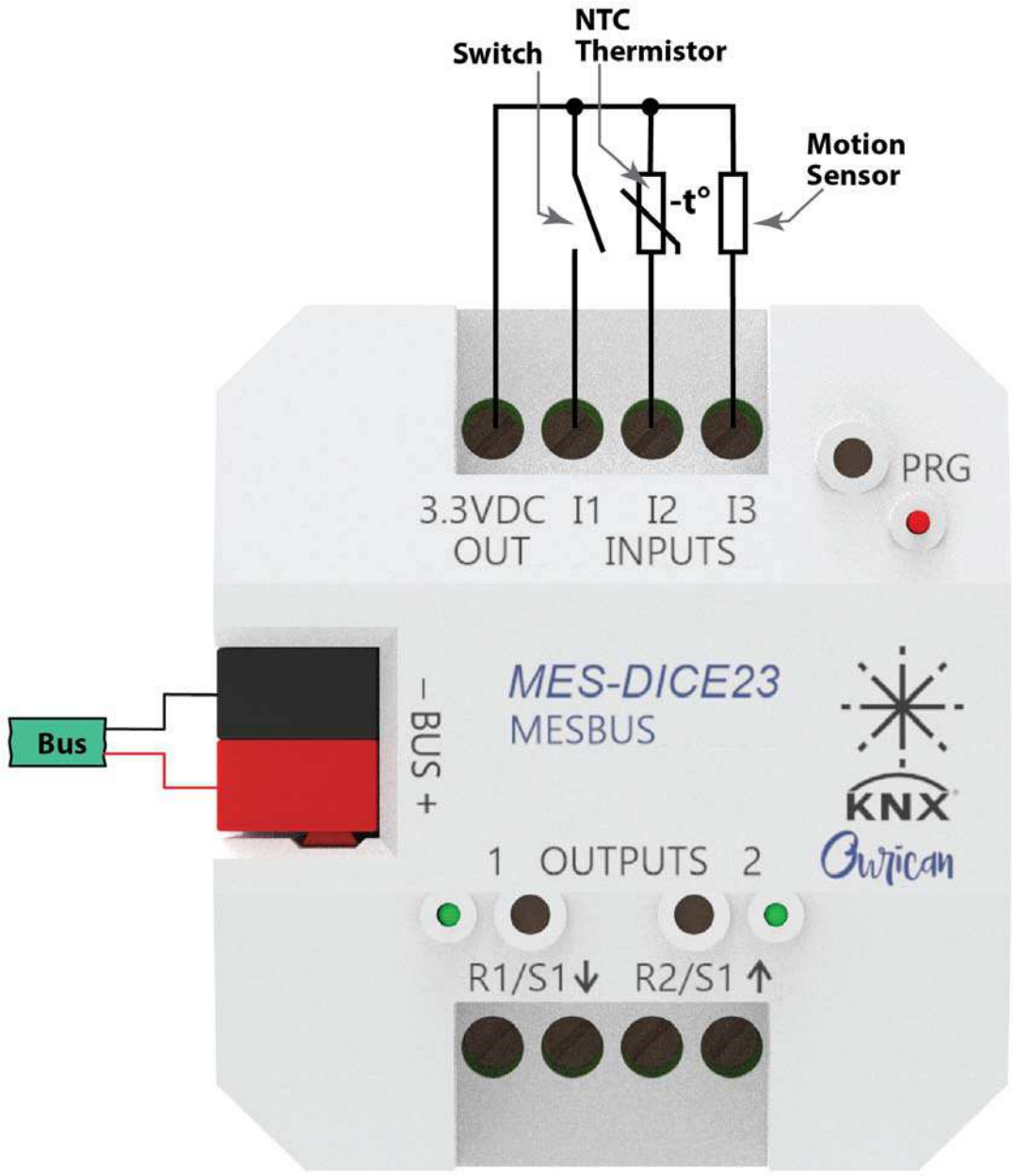

Figure 2-1: MES-DICE23 with input sensors

- Connect the input sensors to MES-DICE23 as shown in the *"MES-DICE23 with input sensors" on page 11*.

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3. Connection Diagram for Switching Loads

This section explains the wiring and usage of MES-DICE23 with switching loads. In this application, the MES-DICE23 drives any on/off single phase load such as lamps (LED, fluorescent, and similar), air-conditioners, appliances etc.

For driving heavy single-phase loads, you may connect different phases to each of the relay inputs and connect the load to individual channel outputs.

3.1. Connection diagram

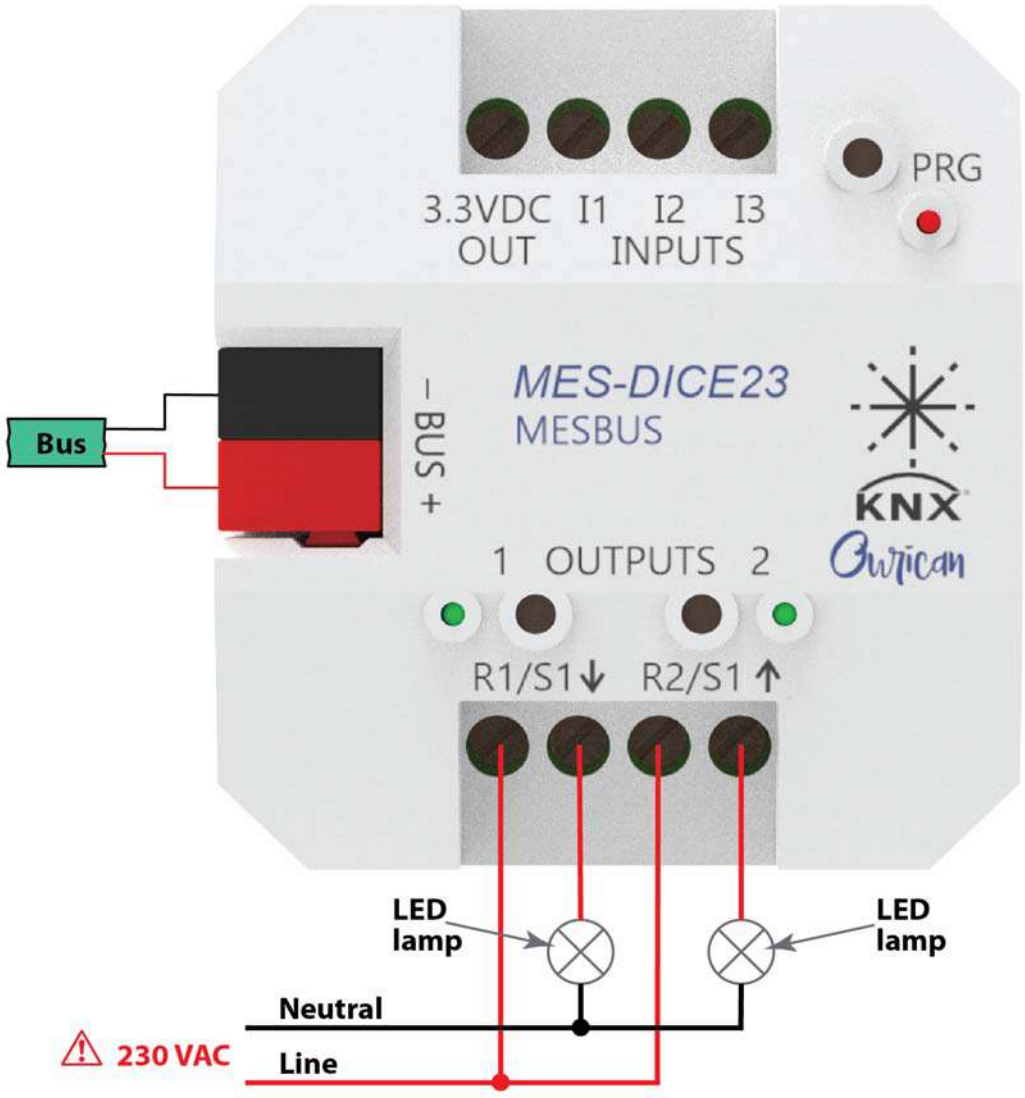

Figure 3-1: MES-DICE23 with switching loads

3.2. Manual operation

1. Connect the MES-DICE23 as shown in the *"MES-DICE23 with switching loads" on page 13*.
2. To manually switch the load on/off, press the push button of that channel to toggle the output.

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4. Connection Diagram for Shutter Load

This section explains the wiring and usage of MES-DICE23 with single-phase curtain motor load for shutter or curtain automation.

Note

The motor has connections for forward, reverse and common.

For driving the motor, connect the single-phase supply to both the relay inputs and motor's forward and reverse connections to the output of the two relays.

4.1. Connection diagram

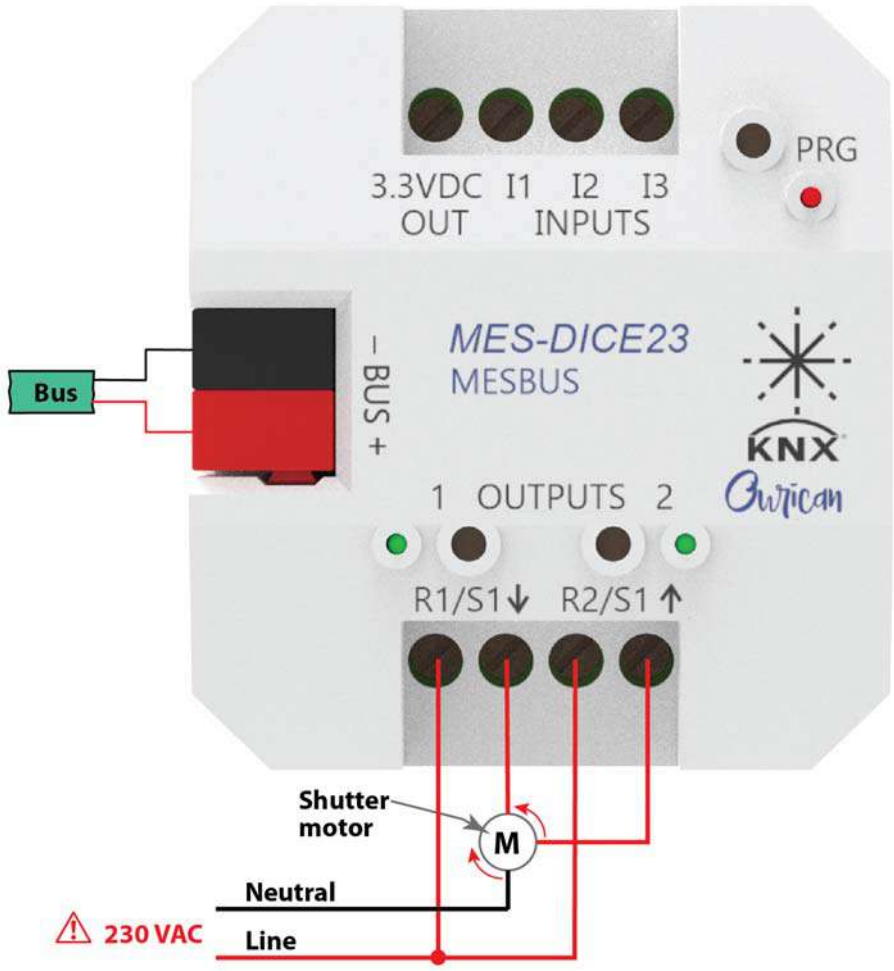

Figure 4-1: MES-DICE23 driving shutter motor load

4.2. Manual operation

1. Connect the MES-DICE23 as shown in the *"MES-DICE23 driving shutter motor load" on page 15*.

Note

A **long-press** refers to holding down the button for more than 2 seconds and then releasing. A **short-press** refers to a momentary operation of the button before releasing.

2. To manually operate the curtain motor in any direction, i.e. for opening or closing, long-press the push button of the respective channel on the MES-DICE23. The channel will automatically switch off after the rise and fall time as configured in the ETS software.
3. To stop the shutter at any desired position, short-press the push button of the respective channel. This will keep the shutter at a certain position.
4. When the shutter is moving down, the left LED will switch on during the set fall time, similarly, when the shutter is moving up, the right LED will switch on during the set rise time. When the shutter has ended its movement, both the LEDs will switch off.

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5. Configuration

5.1. Output configuration

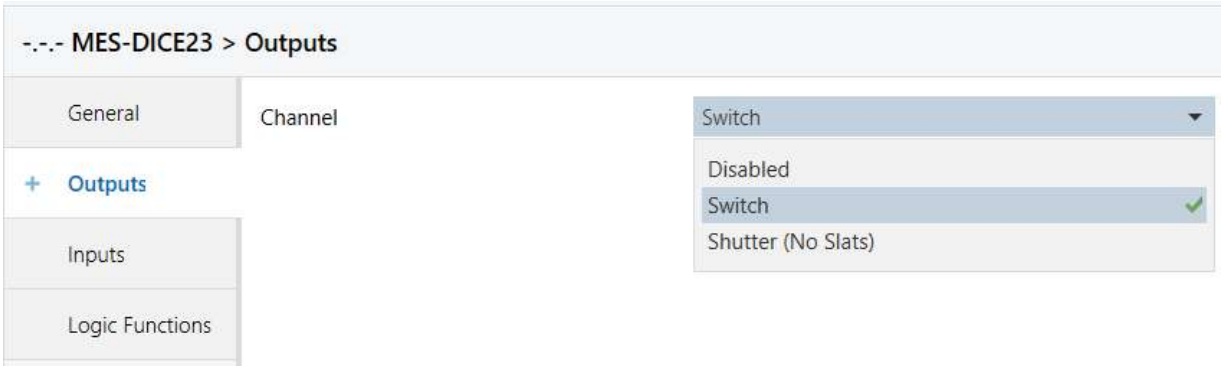

Figure 5-1: Output Channel Configuration

5.1.1. Configure for Switch application

The Switch channel has 2 functionalities:

- Switch
- Pulse function

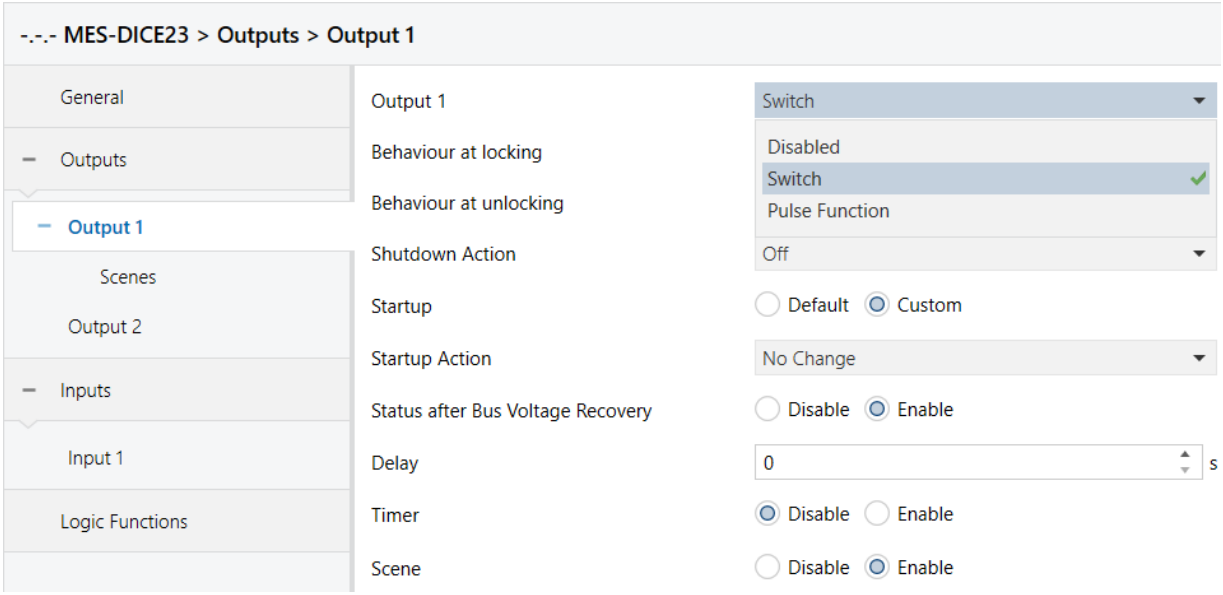

Figure 5-2: Configure the individual output channel

5.1.1.1. Start Up and Shutdown Action

This section sets the behavior of the relay outputs at start up (bus power up) and shutdown (bus power down). This **Start Up** and **Shutdown** behavior options are meant only for the **Switch** application.

1. Select the **Shutdown Action** drop-down menu to show the **Off, On** and **No Change** options.
2. Selecting the **Off** option at **Shutdown** will force relays to the switched-off position, while **On** option will force the relays to the on-position and **No Change** option will retain the relay's previously state after the device shuts down. See *"Options for Shutdown action" on page 18*.

Figure 5-3: Options for Shutdown action

3. **Start Up** menu offers the **Default** and **Custom** options.
4. In the **Default** option, relay will retain the last state after device is powered up and relay will switch off after downloading the ETS program.
5. In **Custom** option, the relay state can be changed to **On**, **Off**, or the last state after device is powered up and after downloading the ETS program.

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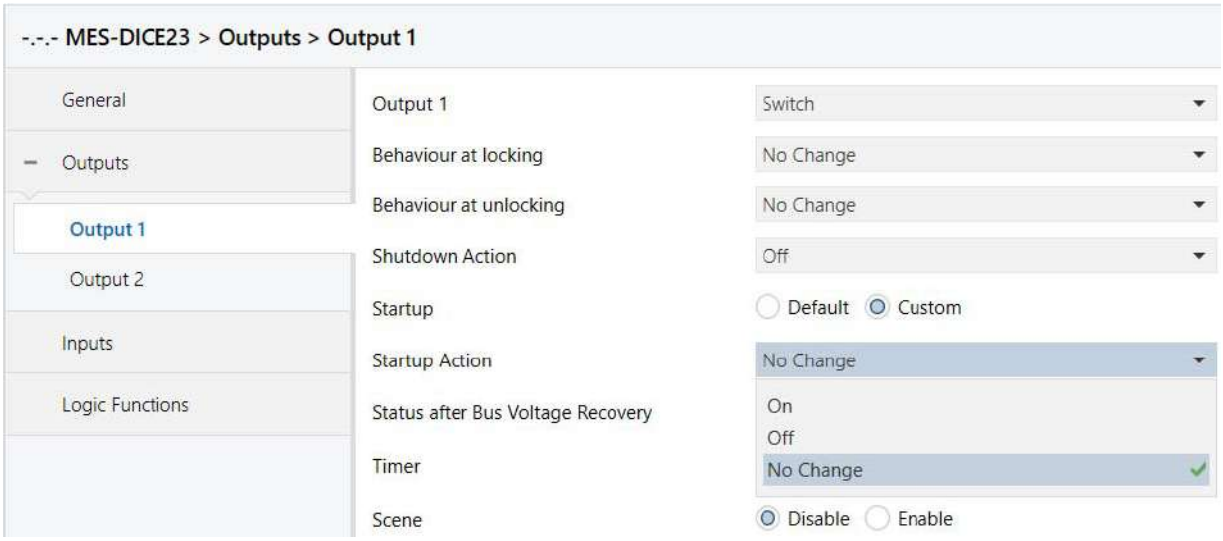

Figure 5-4: Options for Start Up action

5.1.1.2. Status after Bus Voltage Recovery Action

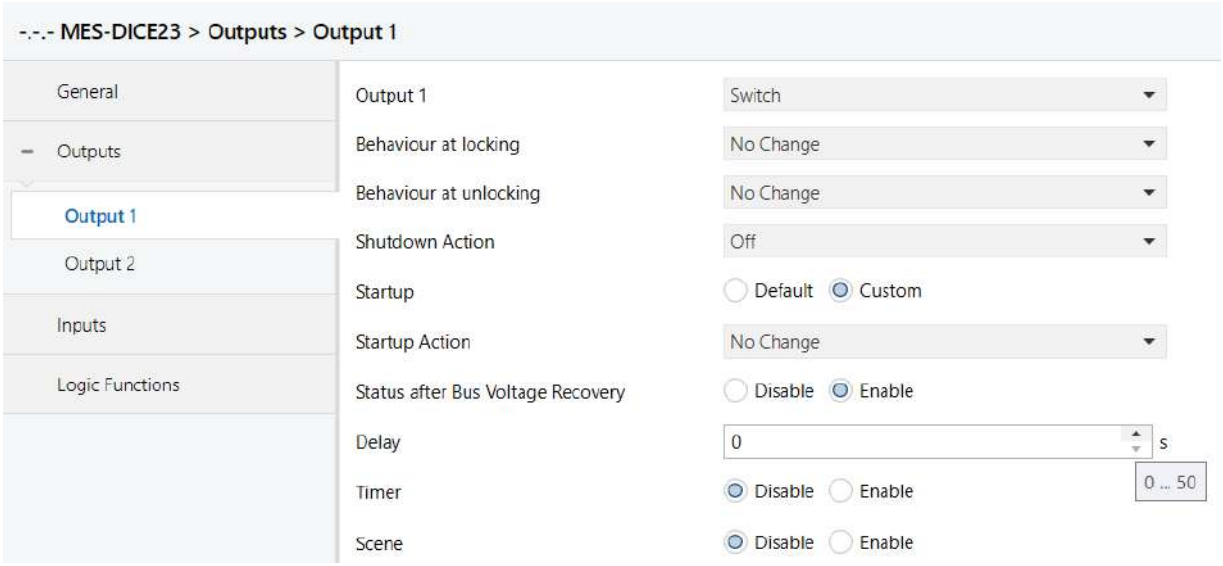

Figure 5-5: Options for Status after Bus Voltage Recovery action

This section sets the time for sending the status of relay output after power failure (bus power down) followed by power restoration (bus voltage recovery).

Enabling the **Status after Bus Voltage Recovery** menu reveals the **Delay** text box.

This delay sets the time duration in seconds after which the status will be sent on the bus.

- In the Delay text box, directly type the time in seconds (between 0 to 50 seconds) or click on the ▲/▼ symbols to increment /decrement the time.

5.1.1.3. Lock and Unlock for Switch output

This section sets the behavior of relay outputs when the MES-DICE23 device is locked or unlocked.

- In **Lock** state, the output will not change on receiving any command from On/Off, Scene or Push button.
- After locking, the relay state will change as defined in "**Behaviour at Locking**" parameter.
- After Unlocking, the relay state will change as defined in "**Behaviour at Unlocking**" parameter.

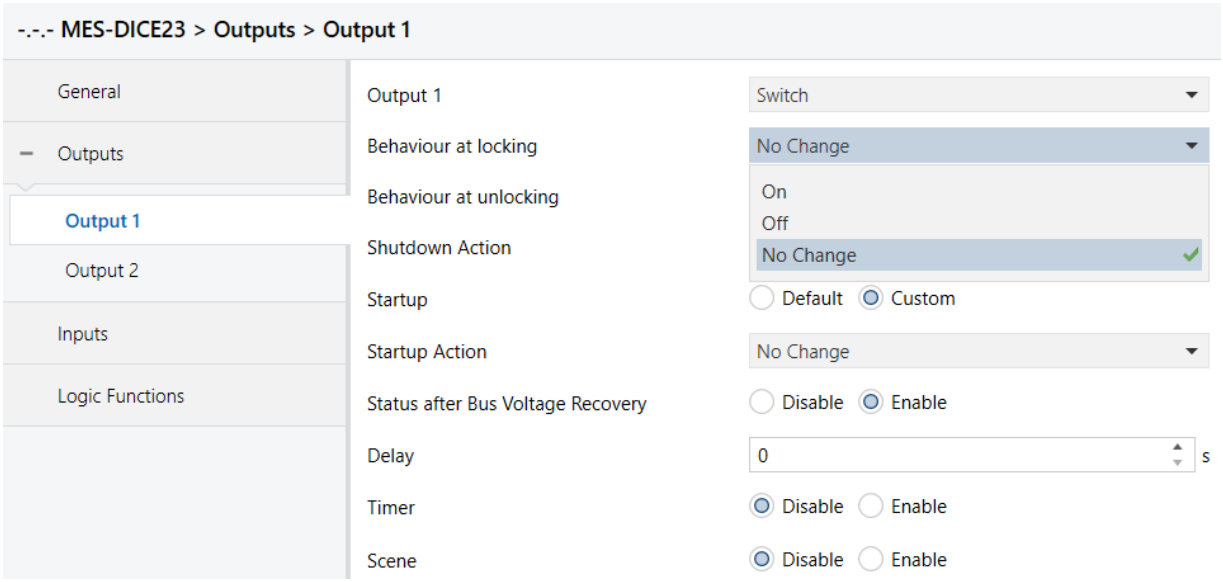

Figure 5-6: Options for Behaviour at Locking

- If the Lock is enabled and followed by a download of the ETS, the relays switch off and the Lock is disabled.
- If the output is in the Lock state, and KNX power fails, then the shutdown action occurs.
- After bus recovery, the output will remain in the Lock state. Also, startup action and Status after Bus Voltage Recovery will not occur.
- When the output is locked or unlocked, then status is sent on the bus once.

5.1.1.4. Timer function

The Timer function switches on or switches off the output after a preset time on receiving a 1 or 0 through the "TIMER" group object.

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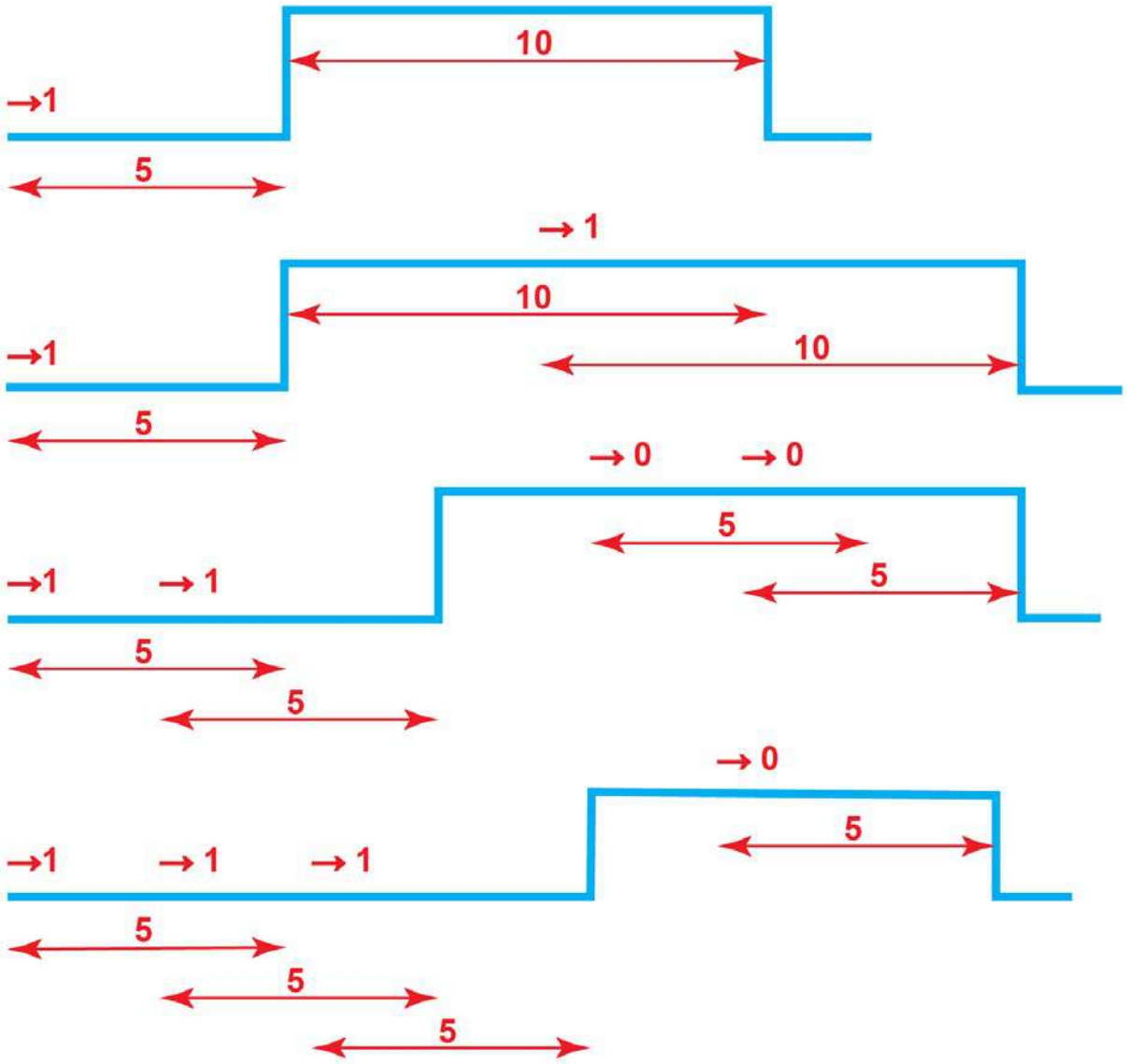

Figure 5-7: Timing diagram

The timer contains the following parameters:

- **Timer:** This timer function will work according to the parameters set in **ON Delay**, **OFF Delay** and **ON Duration**.
- **ON Delay:** This parameter sets the delay after which the ON action would activate. The delay triggers after receiving a 1 from a timer group object. The settable range of time is 0 to 3600 seconds or 0 to 1440 minutes.
- **OFF Delay:** This parameter sets the delay after which the OFF action would activate. The delay triggers after receiving a 0 from a timer group object. The settable range of time is 0 to 3600 seconds or 0 to 1440 minutes.

- **ON Duration**: This parameter defines the time duration for which relay will remain ON. If set to 0, the relay will remain ON indefinitely. The settable range of time is 0 to 3600 seconds or 0 to 1440 minutes.

Note

ON Delay, **OFF Delay** and **ON Duration** are available only when timer is activated through timer group.

Table 5.1: Timer logic

Output state	Received value	Action
Off	0	No Action
	1	Output switches ON after the "ON Delay" After the "ON Duration" it switches off.
On	0	Output switches OFF after the "OFF Delay"
	1	Output switches OFF after the "ON Duration"

Note

► A running "ON Delay" will restart every time a new 1 is received through timer group object.
► A running “OFF Delay” will restart every time a new 0 is received through timer group object.
► A running “On Duration” will restart every time a new 1 is received through the timer group object.
► The Timer action is cancelled when 1 or 0 is received through "ON/OFF" group object and push button.

Number	Name	Object Function	Descr	Group A	Length	C	R	W	T	U	Data Type	Priority
1	Output 1 On/Off	0 = Off, 1 = On			1 bit	C	-	W	T	-	switch	Low
2	Output 1 On/Off Status	0 = Off, 1 = On			1 bit	C	R	-	T	-	switch	Low
3	Output 1 Timer	0 = Stop, 1 = Start			1 bit	C	-	W	-	-	start/stop	Low
6	Output 1 Lock	0 = Unlock, 1 =...			1 bit	C	-	W	T	-	enable	Low

Figure 5-8: Group objects for timer

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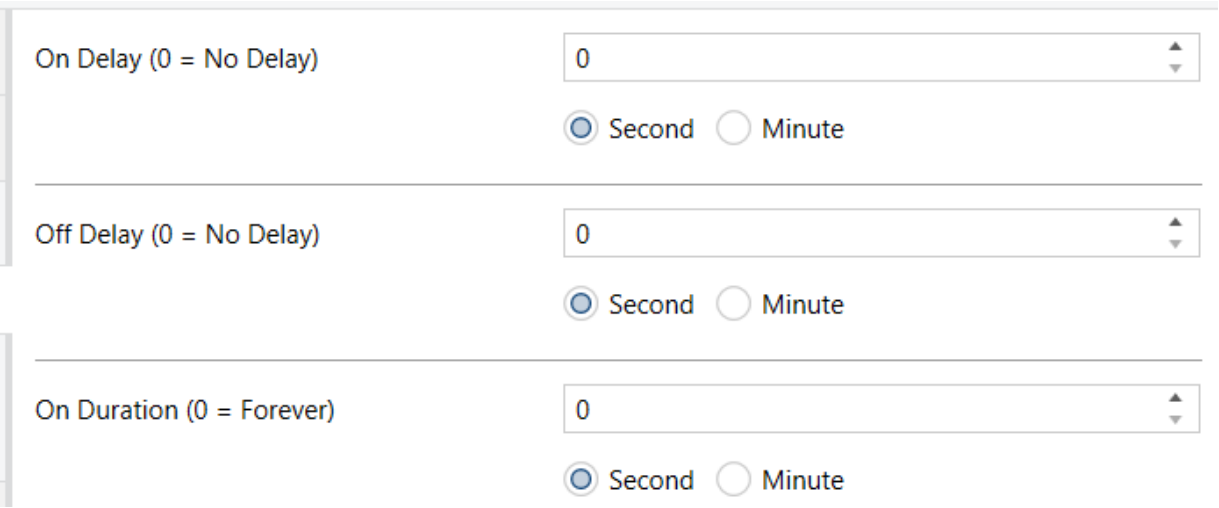

Figure 5-9: Timer Function

5.1.1.5. Pulse function

The Pulse function performs a continuous timed on and off sequence of the switch output when trigger is received through "**PULSE**" group object.

The Pulse function contains the following parameters:

- **Pulse time:** This parameter sets the length of each pulse after receiving the trigger through the "**PULSE**" group object.
- **Repeat Pulse Signal:** This setting enables or disables **Repetitions** and **Time for next pulse** parameters.
- **Repetitions:** This parameter sets the number of required pulses. If set to 0, the pulses will go on forever.
- **Time for next Pulse:** This parameter sets the duration between consecutive pulses.
- **Behaviour at Locking**: After locking, the relay state will be either off or there will be no change in the relay state as defined in "**Behaviour at Locking**" parameter. In the **Lock** State, the output will not change on receiving any command from pulse group object.
- **Behaviour at Unlocking**: After Unlocking, the relay state will be either Off or there will be no change in the relay state as defined in "**Behaviour at Unlocking**" parameter.

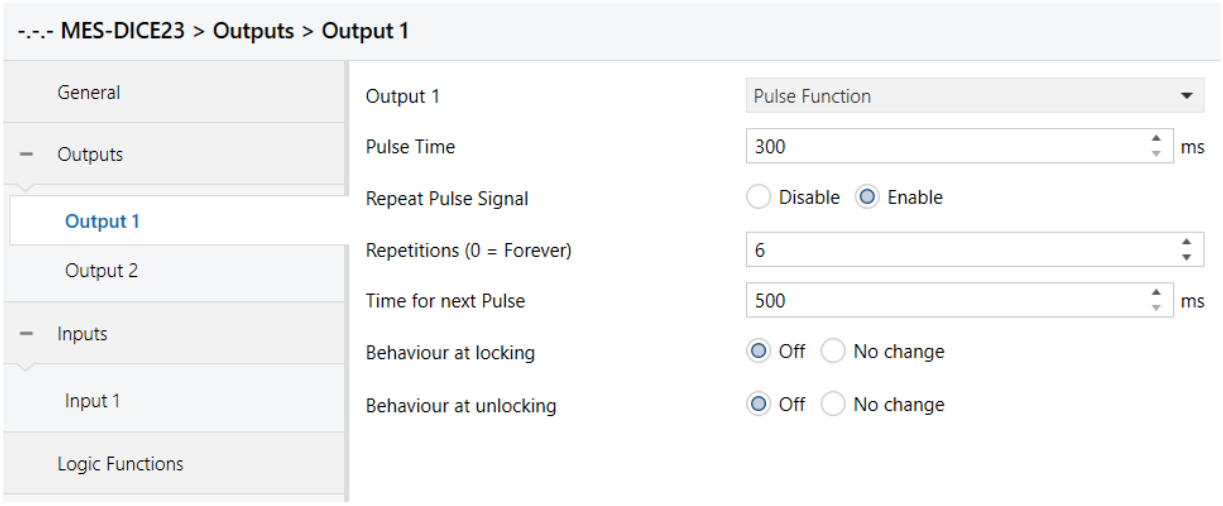

Figure 5-10: Enable the Pulse function

After enabling the Pulse function, view the Group Objects tab for the relevant group objects.

Number	Name	Object Function	Desc	Group A	Length	C	R	W	T	U	Data Type	Priority
2	Output 1 On/Off Status	0 = Off, 1 = On			1 bit	C	R	-	T	-	switch	Low
4	Output 1 Pulse	0 = Stop, 1 = Start			1 bit	C	-	W	-	-	start/stop	Low
6	Output 1 Lock	0 = Unlock, 1 =...			1 bit	C	-	W	T	-	enable	Low

Figure 5-11: Group Objects for Pulse functions

5.1.1.6. Scene configuration for Switch application

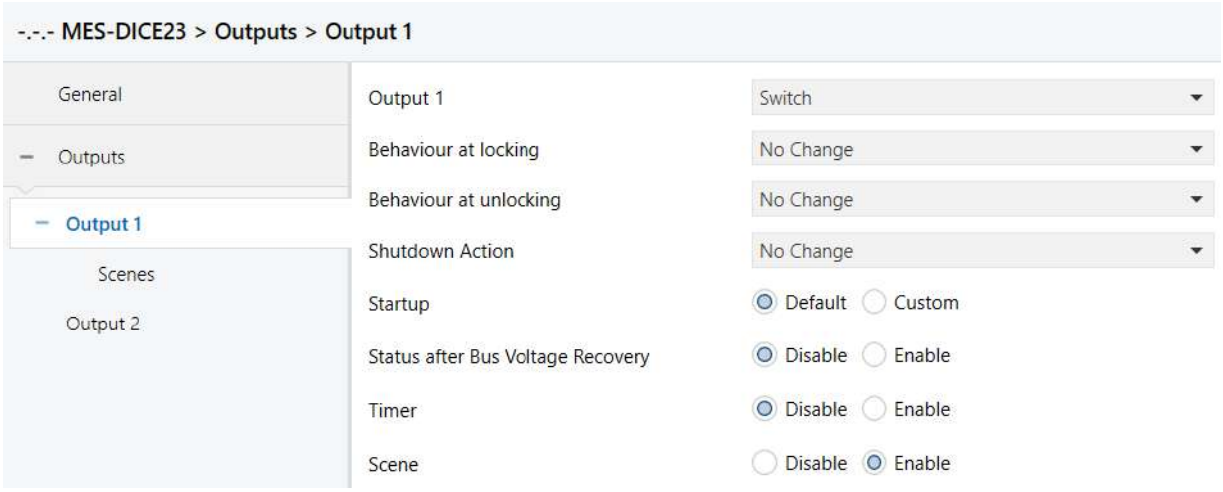

Figure 5-12: Enable the Scenes

Each channel has different **Group Object** for the **Scene** application. The **Scene Number** can vary from 1 to 64 (0 = disabled) and **Output State** can be either **On** or **Off**.

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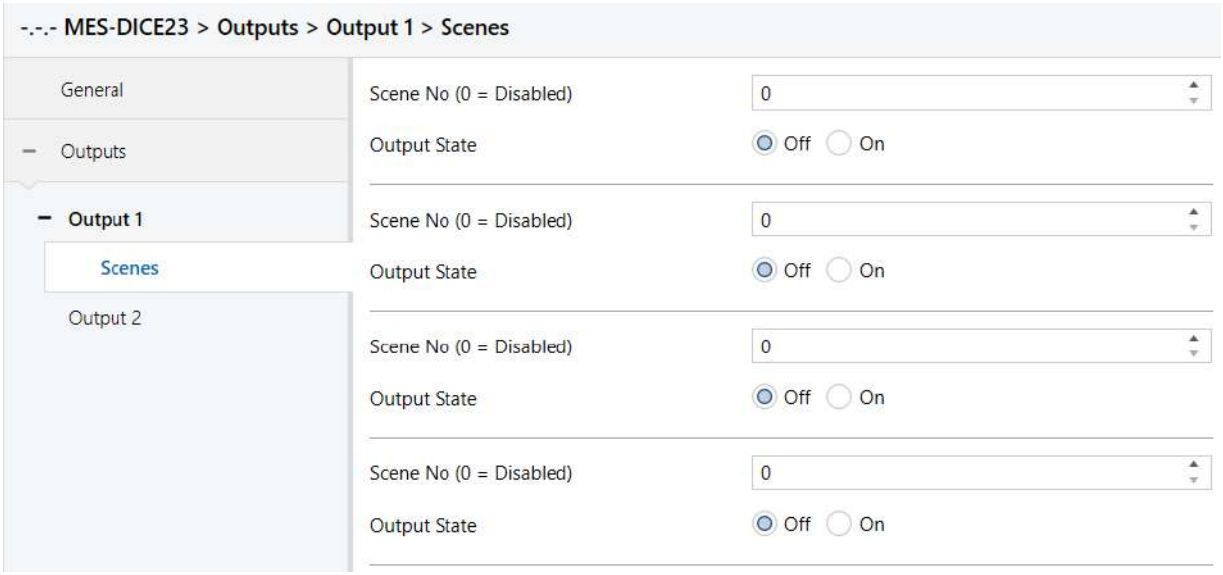

Figure 5-13: Expand the Scene menu

Number	Name	Object Function	Descr	Group A	Length	C	R	W	T	U	Data Type	Priority
1	Output 1 On/Off	0 = Off, 1 = On			1 bit	C	-	W	T	-	switch	Low
2	Output 1 On/Off Status	0 = Off, 1 = On			1 bit	C	R	-	T	-	switch	Low
5	Output 1 Scene	Scene (Run 1 - 64)			1 byte	C	-	W	T	-	scene number	Low
6	Output 1 Lock	0 = Unlock, 1 =...			1 bit	C	-	W	T	-	enable	Low

Figure 5-14: Group Objects for Scene

5.1.1.7. Group Objects for Switch

Table 5.2: Group Objects for Switch

Group object	Description of Group Objects	Definition
Output On/Off	0 = Off, 1 = On	Output switches On or Off.
Output On/Off Status	0 = Off, 1 = On	Feedback about the On/Off
Output Scene	1 to 64	Select scene number
Output Lock	0 = Unlock, 1 = Lock	Output Lock or Unlock

Number	Name	Object Function	Descr	Group A	Length	C	R	W	T	U	Data Type	Priority
1	Output 1 On/Off	0 = Off, 1 = On			1 bit	C	-	W	T	-	switch	Low
2	Output 1 On/Off Status	0 = Off, 1 = On			1 bit	C	R	-	T	-	switch	Low

Figure 5-15: Group Objects for switch output 1

5.1.2. Configure for Shutter application

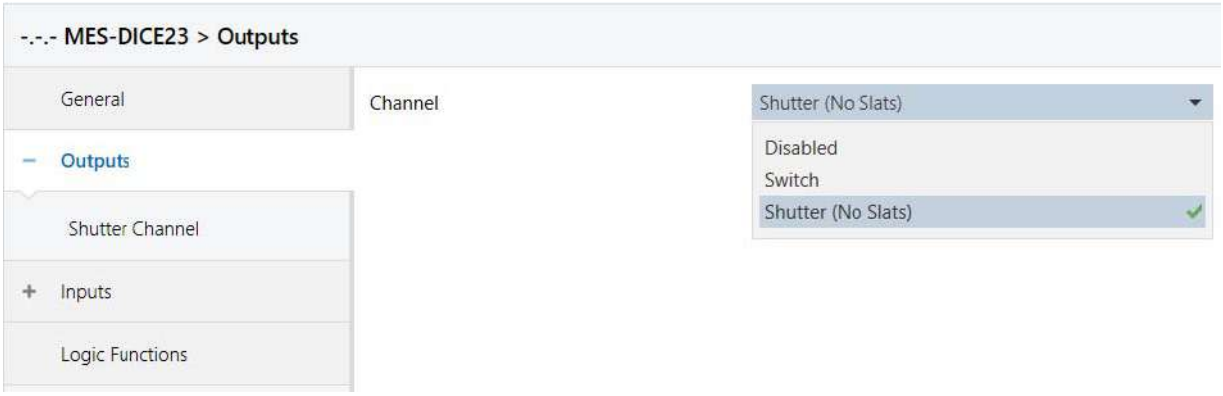

Figure 5-16: Enable the shutter application

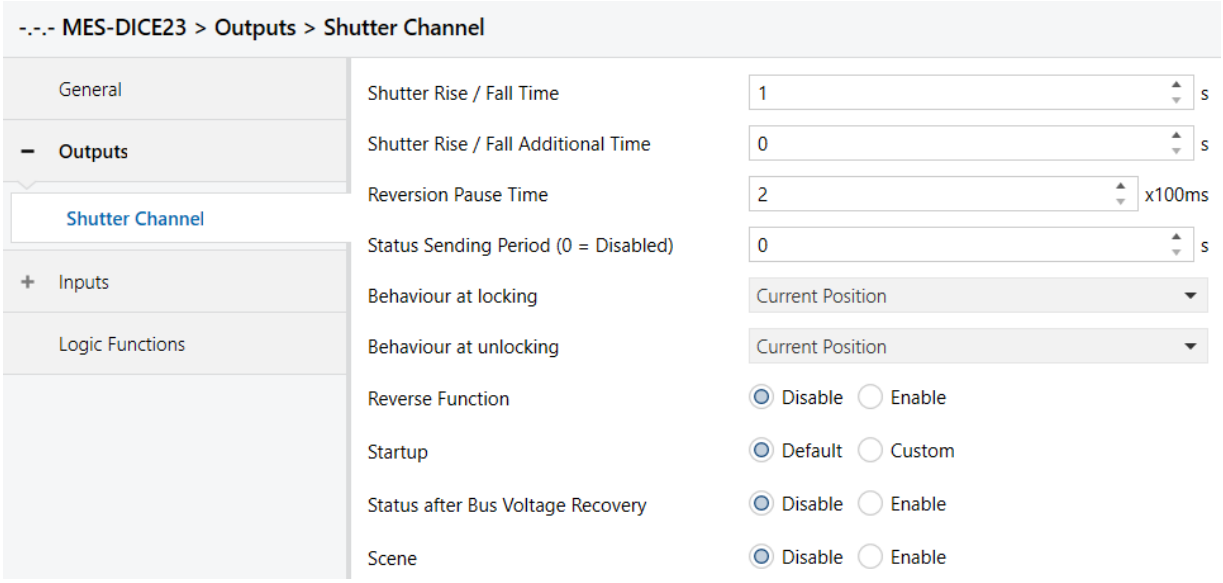

Figure 5-17: Expand the output for shutter application

5.1.2.1. Parameter description for shutter application

Set the following parameters for the shutter channel:

- **Shutter Rise/Fall Time** (0 to 255 seconds) sets time required for shutter to move from 0% to 100% or vice-versa.
- **Shutter Rise/Fall Additional Time** (0 to 100 seconds) sets the additional time that is needed to completely open (move up) or close (move down) the shutter. If the Down command is received after the shutter reaches 100%, the shutter motor will move down for the set additional time. An identical process would occur for the Up operation.

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- **Reversion Pause Time** (200 milliseconds to 5 seconds) sets the pause time between opposite direction command. For example, if the Up command was active and the Down command is sent, this pause will ensure that the curtain motor will come to rest before reversing its motion.
- **Status Sending Period** (0 to 100 seconds) sets the time after which the curtain's current status is sent on the bus while the shutter/curtain is moving. If set to 0, the status will not be sent when the curtain/shutter is moving. The status will be sent when the shutter/curtain reaches the final position.
- **Behavior at Locking/Unlocking** defines the shutter state after locking or unlocking the shutter.
- **Reverse Function** enables or disables the **Reverse Function** group object.
- **Start Up** option decides whether to perform **Default** or **Custom** action. In **Default** configuration, the actuator will be fully raised (at 0%) after ETS download and shutter position is retained after bus voltage recovery. In the Default configuration, the status is not sent on the bus. In the **Custom** configuration, the shutter will move as per Initial Position option. Also, in the **Custom** configuration, the status is sent on bus.
- **Initial Position** defines the position of the shutter after bus voltage recovery. The available options are **Current Position**, **Up**, **Down**, **Specific Position**.
  On selecting **Up**, shutter will move upwards till 0% and on selecting **Down**, shutter will move downwards till 100% after bus voltage recovery.
  On selecting **Specific Position**, the shutter will move to a specific position as configured in ETS.
  On selecting **Current Position**, the shutter will move to the last state after bus voltage recovery.
- **Status after Bus Voltage Recovery** sets the time (0 to 50 seconds) for sending the status after power restoration (bus voltage recovery).
- **Delay** sets the time (0 to 50 seconds) after which the shutter status is sent on the bus.
- **Scene** option enables the scene group object.

5.1.2.2. Lock and Unlock for Shutter output

This section sets the behavior of relay outputs when the MES-DICE23 device is locked or unlocked.

- In **Lock** state, the shutter position will not change on receiving any command like move, stop, direct position, scene or push button.
- **Behaviour at Locking** defines the state after activating the lock function. The available options are **Current Position, Up, Down and Specific Position**.
- **Behaviour at Unlocking** defines the state after activating the unlock function. The available options are **Current Position, Up, Down and Specific Position**.

- If the Lock is enabled and followed by an ETS download, then the relays will switch off, the shutter position will be at 0% (Up) and channel will be unlocked.

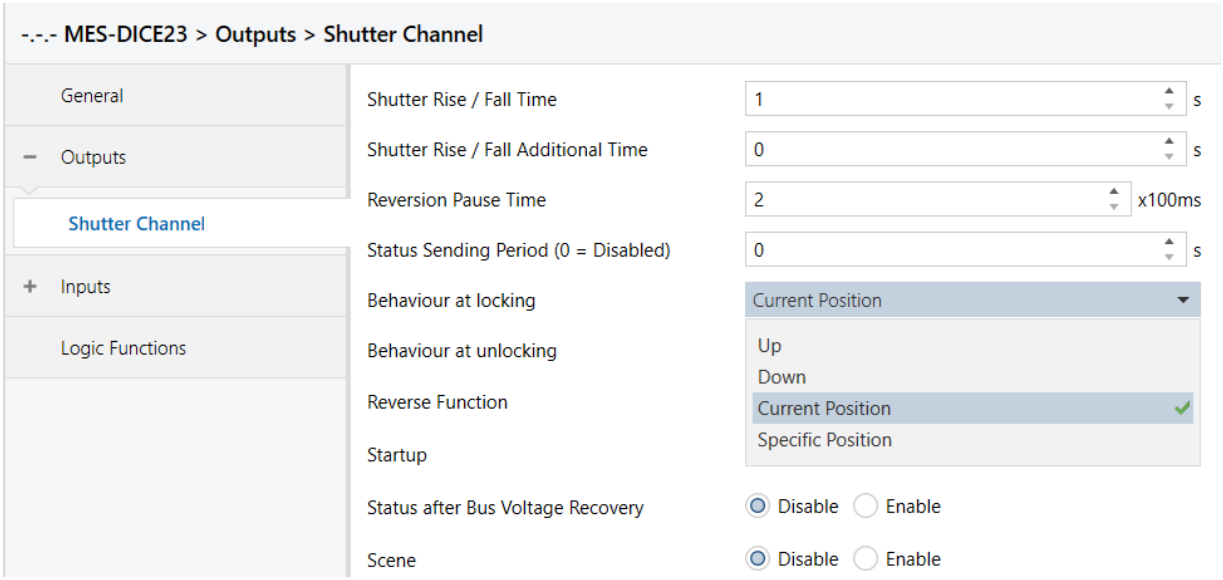

Figure 5-18: Options for Behaviour at Locking

- If the channel is in the Lock state, and KNX power fails, then after bus recovery, the channel will remain in the Lock state. Also, startup action and status after bus voltage recovery will not occur.
- When the channel is locked or unlocked, then shutter position is sent once on the bus.
- If Lock/Unlock command is received while the shutter is moving, the shutter will stop if "Behaviour at Lock/Unlock" is set to Current Position.
- If Lock/Unlock command is received while the shutter is moving, the shutter will move up to to 0%, down to 100% or specific position, if "Behaviour at Lock/ Unlock" is set to Up, Down or Specific Position respectively.

5.1.2.3. Scene Configuration for the shutter application

You can configure 10 scenes for each channel. Each channel has different group object for scene application. The scene number will vary from 1 to 64 (0 = disabled) and shutter position will vary from 0 to 100%.

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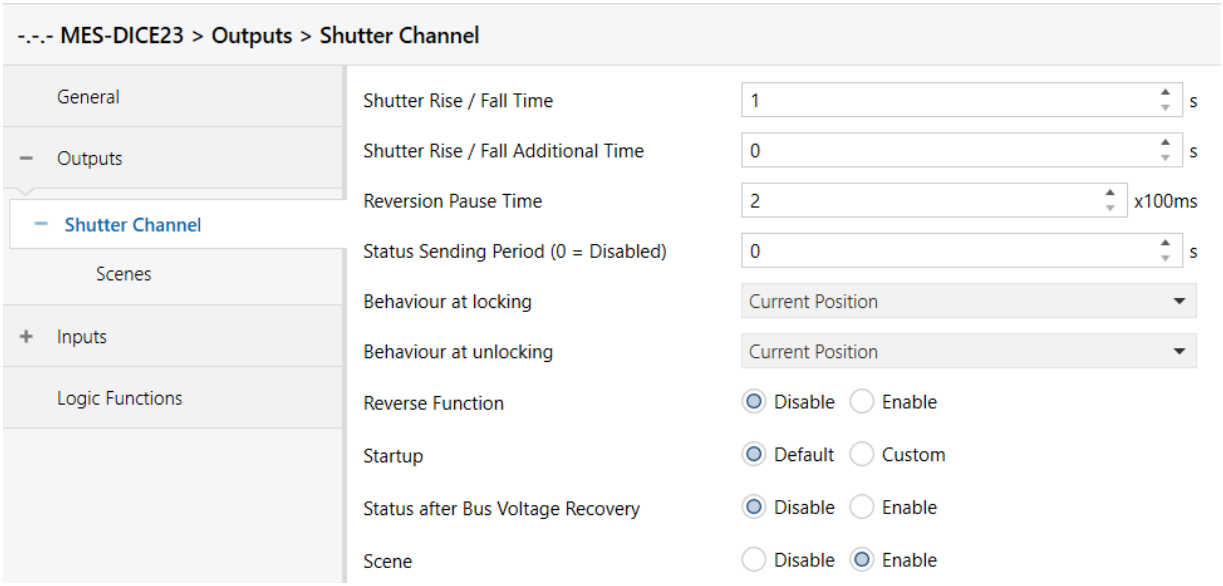

Figure 5-19: Enable Shutter Scene

Figure 5-20: Expand the Shutter Scenes sub-tab

Number	Name	Object Function	Descr	Group A	Length	C	R	W	T	U	Data Type	Priority
13	Shutter Move	0 = Up, 1 = Down			1 bit	C	-	W	T	-	up/down	Low
14	Shutter Stop	0 / 1 = Stop			1 bit	C	-	W	T	-	trigger	Low
15	Shutter Direct Position	0 to 100%			1 byte	C	-	W	T	-	percentage (0..100%)	Low
16	Shutter Position Status	0 to 100%			1 byte	C	R	-	T	-	percentage (0..100%)	Low
18	Shutter Scene	Scene (Run 1 - 64)			1 byte	C	-	W	T	-	scene number	Low
19	Shutter Lock	0 = Unlock, 1 =...			1 bit	C	-	W	T	-	enable	Low

Figure 5-21: Group Objects with Shutter Scene Enabled

5.1.2.4. Group objects for shutter

Number	Name	Object Function	Descr	Group A	Length	C	R	W	T	U	Data Type	Priority
13	Shutter Move	0 = Up, 1 = Down			1 bit	C	-	W	T	-	up/down	Low
14	Shutter Stop	0 / 1 = Stop			1 bit	C	-	W	T	-	trigger	Low
15	Shutter Direct Position	0 to 100%			1 byte	C	-	W	T	-	percentage (0..100%)	Low
16	Shutter Position Status	0 to 100%			1 byte	C	R	-	T	-	percentage (0..100%)	Low
19	Shutter Lock	0 = Unlock, 1 =...			1 bit	C	-	W	T	-	enable	Low

Figure 5-22: Group objects for shutter

Table 5.3: Group Objects for Shutter

Group Object	Description of Group Objects	Definition
Shutter Move	0=Up, 1=Down	Shutter moves up/open or down/close.
Shutter Stop	0/1 = Stop	Shutter stops.
Shutter Direct Position	0 to 100 %	Shutter will move to that specified position given in % in the duration as per rise/fall time.
Shutter Position Status	0 to 100 %	The real-time position feedback of the shutter while it is moving.
Reverse Function	0=Down, 1=Up	Shutter moves up or down.
Shutter Scene	1 to 64	Shutter scene number.
Shutter Lock	0 = Disable, 1 = Enable	Shutter Lock.

5.2. Input configuration

The input channel selection is divided into 3 parts

- Digital input
- Temperature sensor
- Motion sensor

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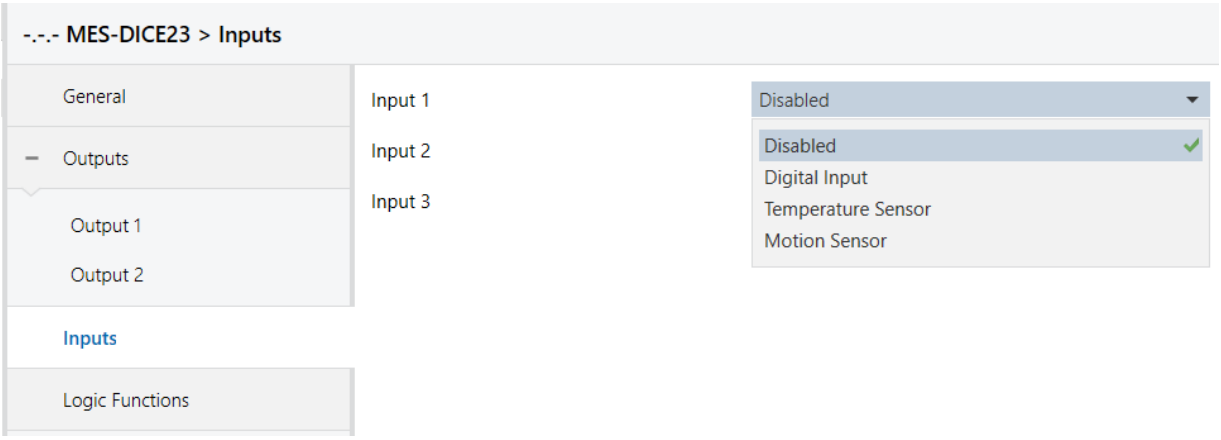

Figure 5-23: Input channel functionalities

5.2.1. Digital Input

Digital Input can perform the following functionalities:

- Push Button
- Switch
- Dimmer
- Shutter
- Scene
- 1-Byte Constant (Percentage)
- 1-Byte Constant (Unsigned)

5.2.1.1. Configure for Pushbutton

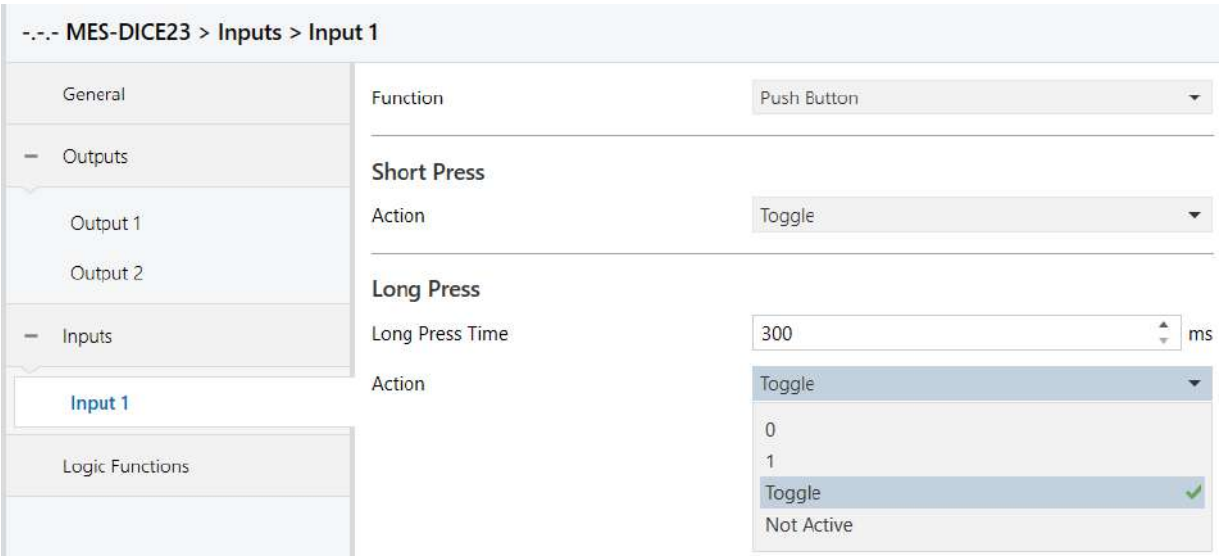

Figure 5-24: Configure pushbutton for Short Press

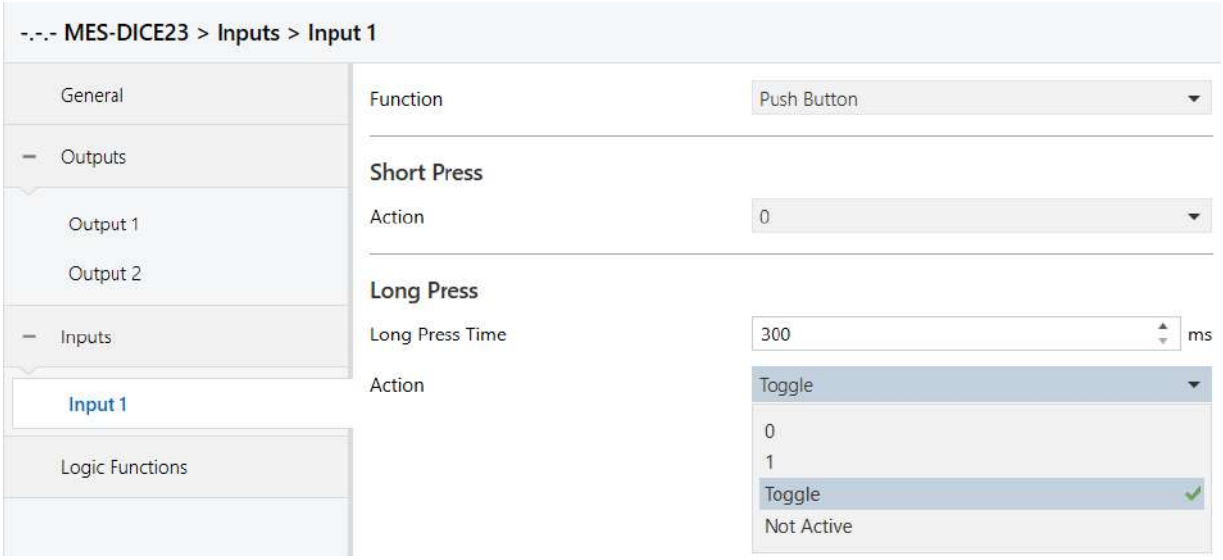

Figure 5-25: Configure pushbutton for Long Press

Table 5.4: Functionalities for pushbutton

	Value Selection	Function performed
Short Press	0	Send value 0 (OFF) on the KNX bus
	1	Send value 1 (ON) on the KNX bus
	Toggle	Send value 0/1 (Toggle) on the KNX bus
	Not Active	No action
Long Press	0	Value 0 (OFF) will be sent on KNX bus
	1	Value 1 (ON) will be sent on KNX bus
	Toggle	Value 0/1 (Toggle) will be sent on KNX bus
	Not Active	No action
Long Press Time	300 ms to 5000 ms	Debounce time for long press

5.2.1.2. Configure for Switch

- The switch action can be triggered on rising edge and falling edge.

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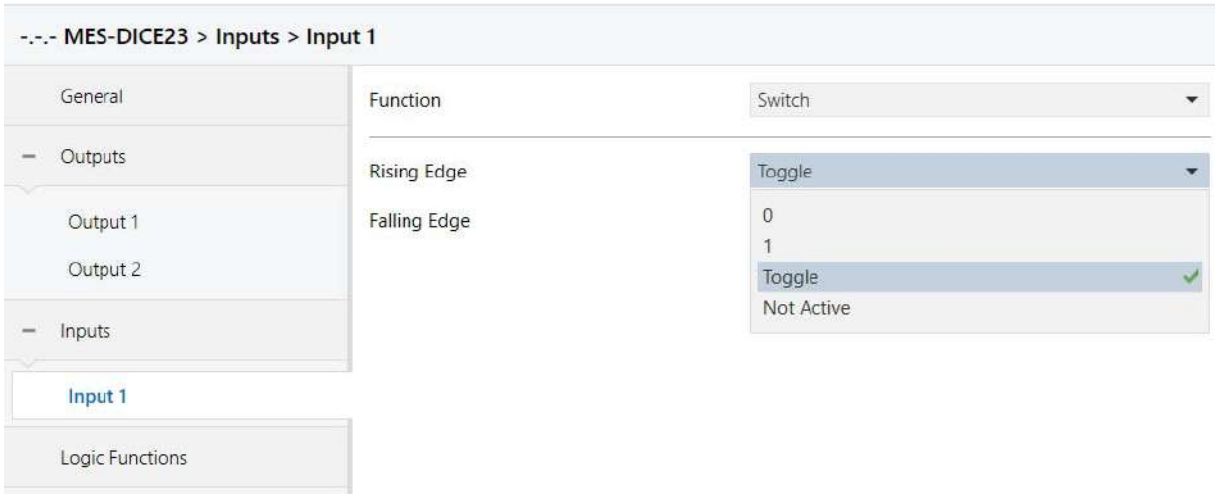

Figure 5-26: Configure switch for rising edge

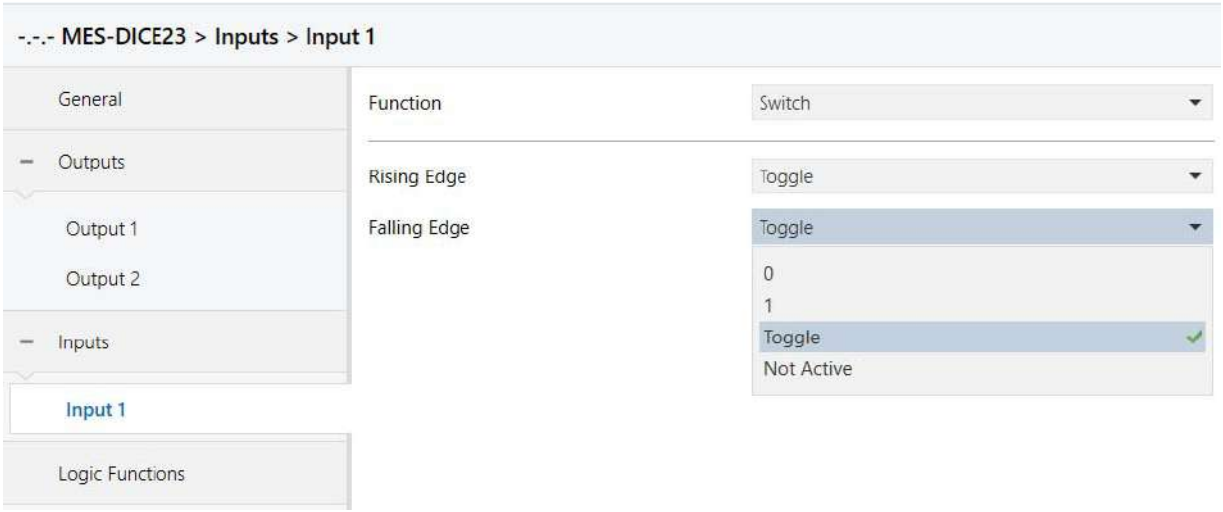

Figure 5-27: Configure switch for falling edge

Table 5.5: Functionalities of Switch

	Value Selection	Function performed
Rising Edge	0	Send Value 0 (OFF) on the KNX bus
	1	Send Value 1 (ON) on the KNX bus
	Toggle	Send Value 0/1 (Toggle) on the KNX bus
	Not Active	No action

Table 5.5: Functionalities of Switch (Continued)

Falling Edge	0	Send Value 0 (OFF) on the KNX bus
	1	Send Value 1 (ON) on the KNX bus
	Toggle	Send Value 0/1 (Toggle) on the KNX bus
	Not Active	No action

5.2.1.3. Configure for Dimmer

- For the Dimmer functionality, either a short press or long press triggers the action.
- Short press performs the On/Off action.
- Long press performs the dimming action.

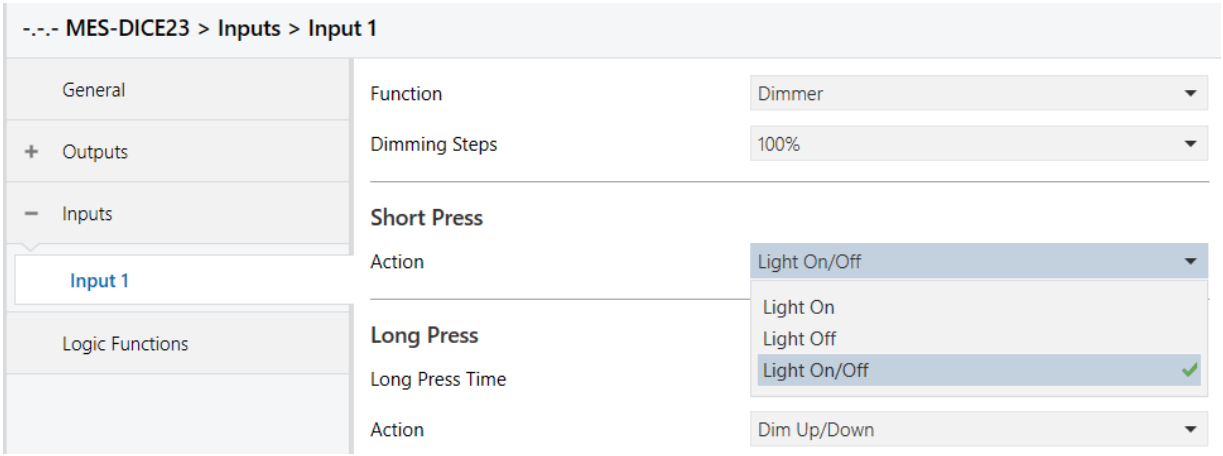

Figure 5-28: Configure dimmer for short press

- Every long press sends a 4-bit command to increase/decrease the light level by a dimming step. Configure this level through the parameter 'Dimming step.'
- The dimming function has a start-stop action. Pressing the button continuously sends the 'brighter or darker' command, until the button is released. After releasing the button, the controller sends a stop telegram, which stops the dimming process.
- The dimming status object gives the feedback of the current light level.

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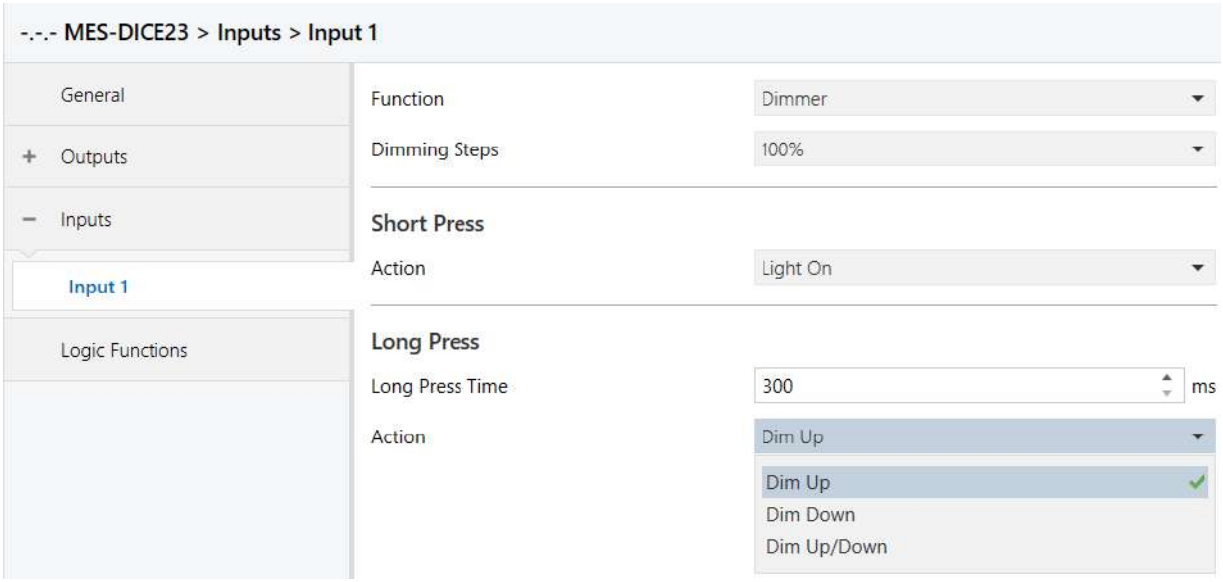

Figure 5-29: Configure dimmer for long press

Table 5.6: Functionalities of Dimmer

	Value Selection	Function Performed
Short Press	Light ON	Value 1 (ON) will be sent on KNX bus
	Light OFF	Value 0 (OFF) will be sent on KNX bus
	Light ON/OFF	Value 1/0 (Toggle) will be sent on KNX bus
Long Press	Dim Down	Darker command will be sent on KNX bus
	Dim Up	Brighter command will be sent on KNX bus
	Dim Up/ Dim Down	Brighter/Darker command will be sent on KNX bus
Long Press Time	300 ms to 5000 ms	Debounce time for long press

5.2.1.4. Configure Shutter

- The long press functionality moves the shutter up/down.
- The short press stops the up/down movement of the shutter before reaching the end position.

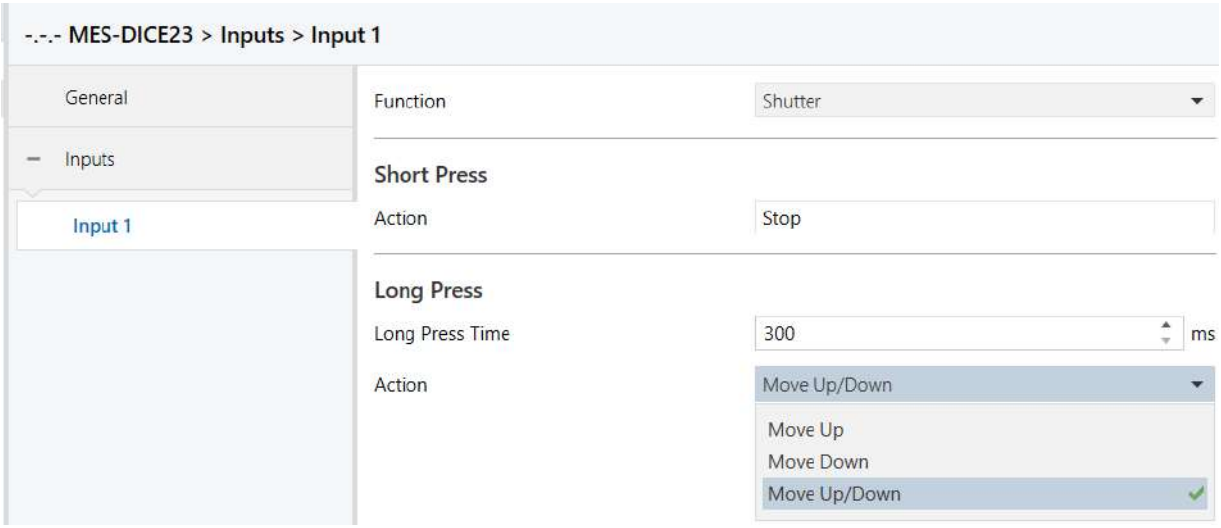

Figure 5-30: Configure shutter for long press

Table 5.7: Operation of the shutter

	Value Selection	Functions Performed
Short Press	Stop	Send Value 0 to stop the shutter
Long Press	Move Up	Send Value 0 to move the shutter
	Move Down	Send Value 1 to move the shutter
	Move Up / Move Down	Send Value 0/1 to move the shutter
Long Press Time	300 ms to 5000 ms	Debounce time for long press

5.2.1.5. Configure Scenes

- The scene function allows setting of the scene number.
- The scene numbers can be from 1 to 64.

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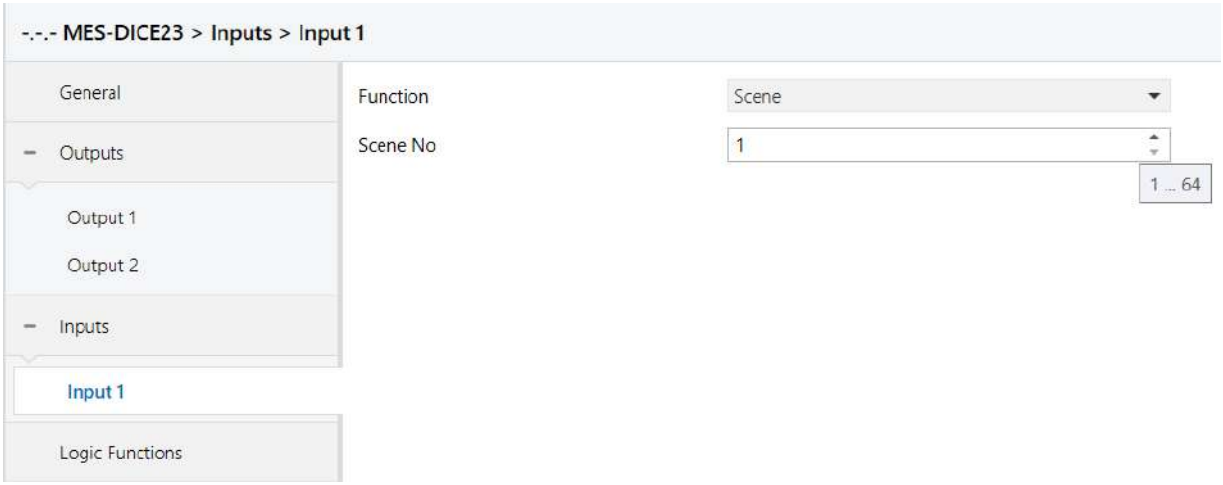

Figure 5-31: Configuration of a scene

5.2.1.6. Configure 1-Byte constant (percentage)

- The 1-Byte constant (percentage) sends percentage values (0-100%) on the KNX bus.
- The function has a single group object DI[x] Constant value (percentage).
- The value parameter is used to enter the percent value.

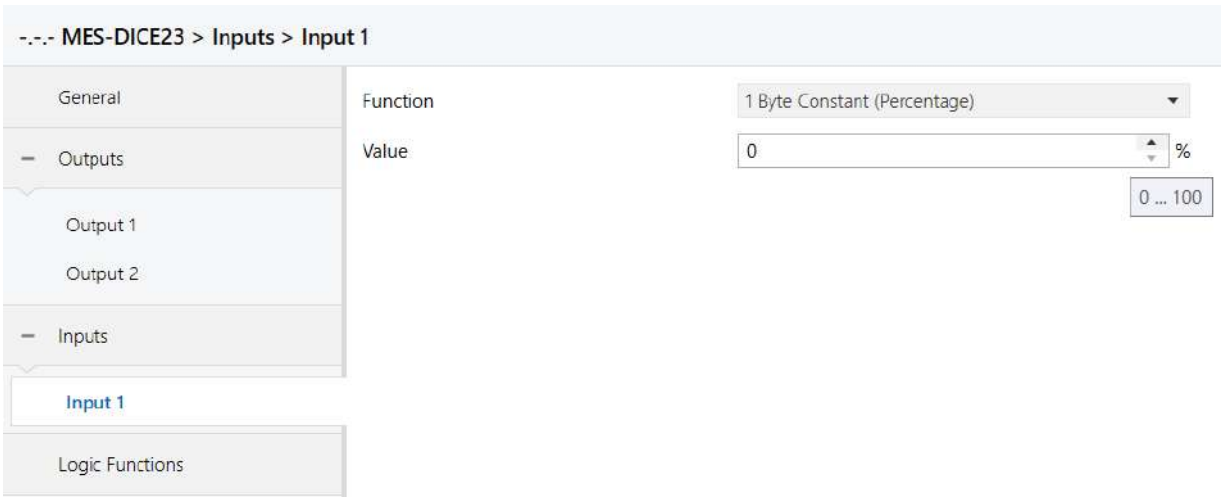

Figure 5-32: Operation of 1-Byte constant (percentage)

5.2.1.7. 1-Byte Constant (Unsigned):

- The 1-Byte constant (unsigned) sends the unsigned values (0-255) on the KNX bus.
- The function has a single group object DI[x] Constant value (integer).
- The value parameter is used to enter the unsigned value.

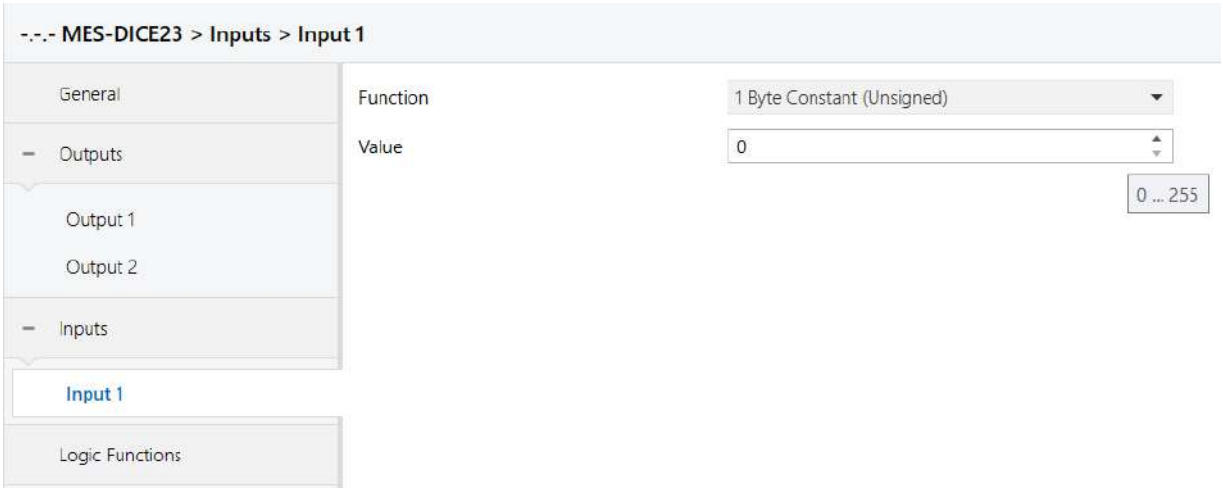

Figure 5-33: Operation of 1-Byte constant (unsigned)

5.2.2. Temperature sensor

Temperature sensor has the following parameters:

- Temperature calibration
- Temperature sending period
- Send with a temperature change

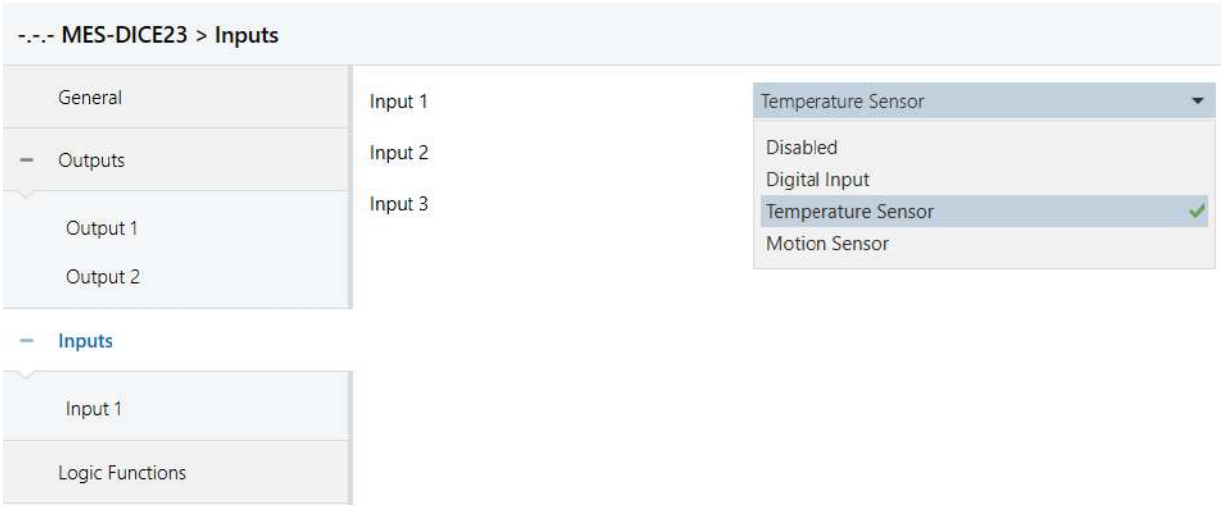

Figure 5-34: Enable the Temperature Sensor function

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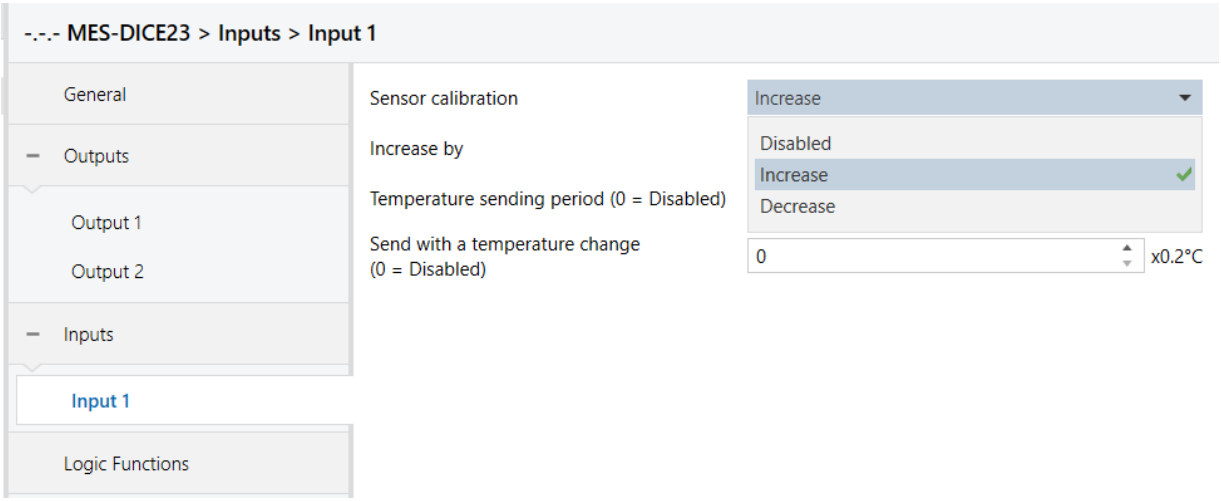

Figure 5-35: Temperature sensor setup

Table 5.8: Temperature function

Features	Range of value	Function performed
Sensor calibration	Disabled	Sensor calibration disabled
	Increase (0 – 255 x 0.2 degree Celsius)	Current temperature increases by value selection
	Decrease (0 – 255 x 0.2 degree Celsius)	Current temperature decreases by value selection
Temperature sending period	0 – 60 min	Continuous sending current temperature on bus after set period of time
Send with a temperature change	0 – 255 x 0.2-degree Celsius	The difference between current temperature and previous temperature is greater than value selection then temperature is sent on bus

5.2.3. Motion sensor

Motion sensor has following parameters:

- Configuration
- Activity Time
- Inactivity Time

- Data Type
- Value
- Delay

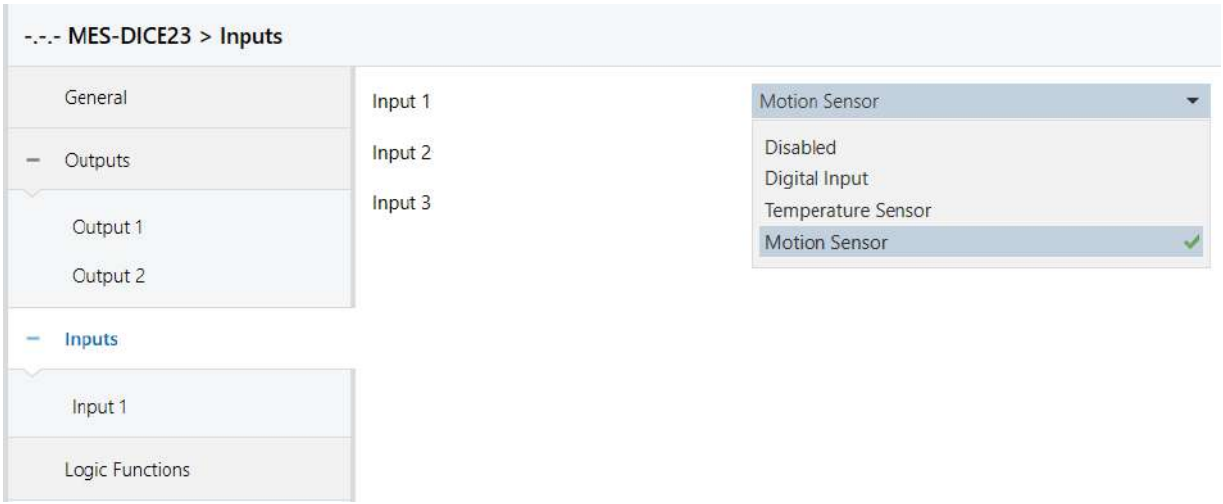

Figure 5-36: Enable the Motion Sensor function

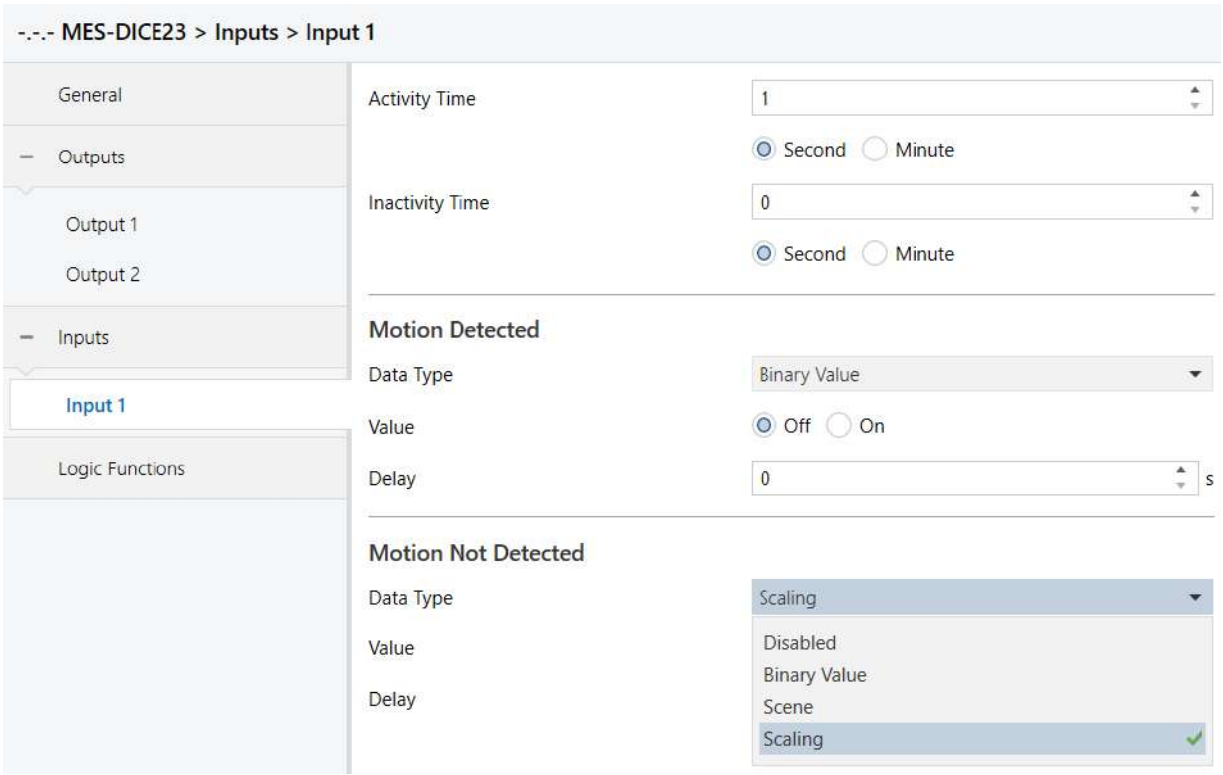

Figure 5-37: Motion sensor setup

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Table 5.9: Motion sensor function

Features	Range of value	Function performed
Activity Time	1 – 255 Seconds / 1 – 60 Minutes	Time to channel switches in Motion not detected state (refer below example for Activity Time)
Inactivity Time	1 – 255 Seconds / 1 – 60 Minutes	Time to channel remains inactive when it enters in Motion not detected state (refer below example for Inactivity Time)
Data Type	Disabled	No command will send on bus during motion detected and motion not detected
	Binary Value	Binary data i.e., (ON/OFF) command is sent on bus when motion is detected and not detected
	Scene	Scene number (1-64) is sent on bus when the motion is detected and not detected
	Scaling	1 byte value (0-100) % is sent on bus when the motion is detected and not detected
Delay	0 – 255 Seconds	Delay to send data type value when the motion is detected and not detected

5.2.3.1. Motion sensor timing

- At t1, the motion sensor detects activity and the channel switches to ‘motion detected’ state. The channel sends the command configured in ‘motion detected’ state.
- At t2, the motion sensor does not detect the activity. The channel remains in ‘motion detected’ state and start counting activity time (T1).
- From t2 to t3, the channel remains in the ‘motion detected’ state until the activity time end. This is the ‘Activity Time.’
- At the end of the Activity time (T1), the channel switches to ‘motion not detected’ state at t3. The channel sends the command configured in ‘motion not detected’ state followed by the start of the counting inactivity time (T2).
- At t4, the motion sensor detects activity once again to generate the ‘motion not detected’ state. The channel does not switch to ‘motion detected’ state until (Inactivity time T2) completes at t5.
- At t6, the motion sensor starts a new activity detection.

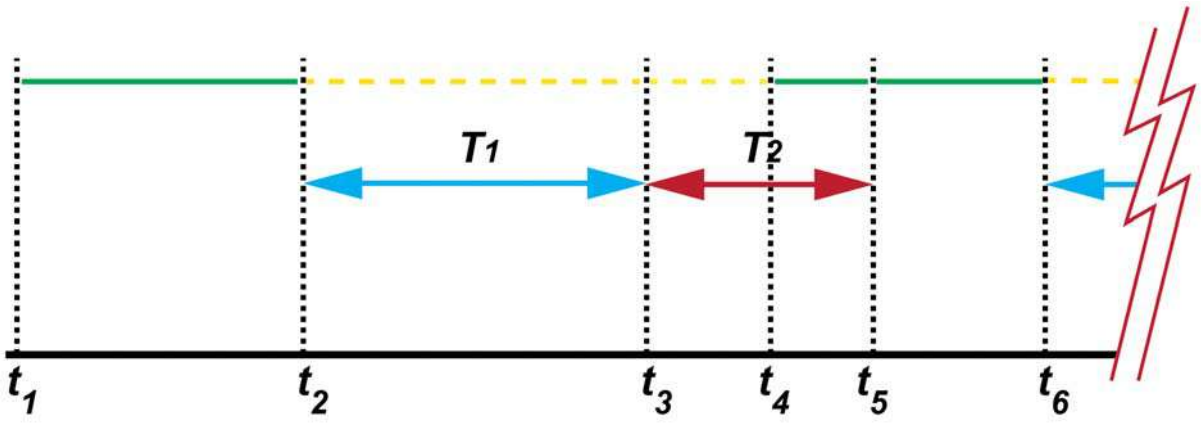

Figure 5-38: Motion detector activity time and inactivity time

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6. Logic Functions

6.1. Introduction to Logic Functions

The logic functions allow implementation of Boolean logic, comparison, and simple arithmetic without needing an external device or wiring. You can use a combination of logical functions to build the required interlocks and states.

6.1.1. List of Logical Function

For the truth table of logic gates *See paragraph 7. "Annexure 1 - Logic Gates" on page 49.*

Logical function	Number of inputs	Available functions
AND	2	6
OR	2	6
EXOR	2	6
NOT	1	10
ID (Identity)	1	5
Comparison Functions	2	5
Addition Functions	2	5
Subtraction Functions	2	5

6.1.2. Enable the Logic Functions

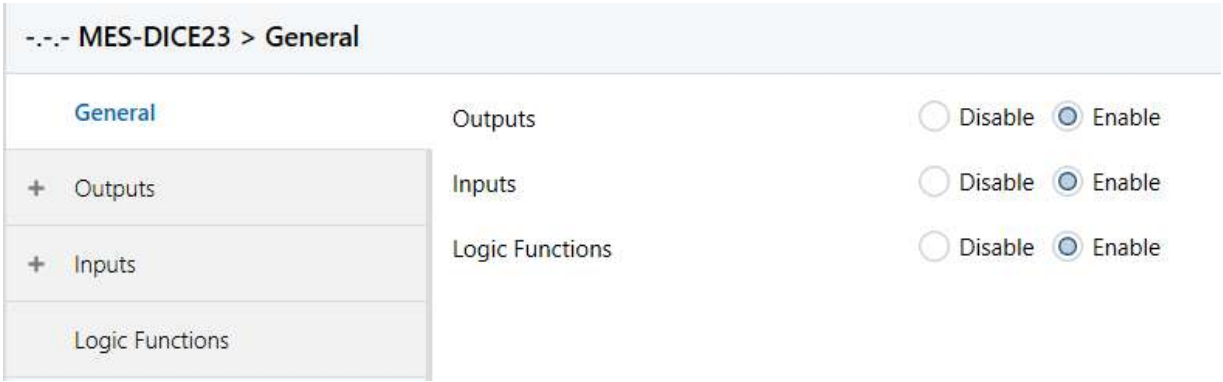

Figure 6-1: Enable Logic Functions

1. Under the **Parameters** tab, navigate to the **General** tab and enable **Logic Functions**.

   > > *The **Logic Function** menu shows. See "Expanded Logic Function menu" on page 44.*

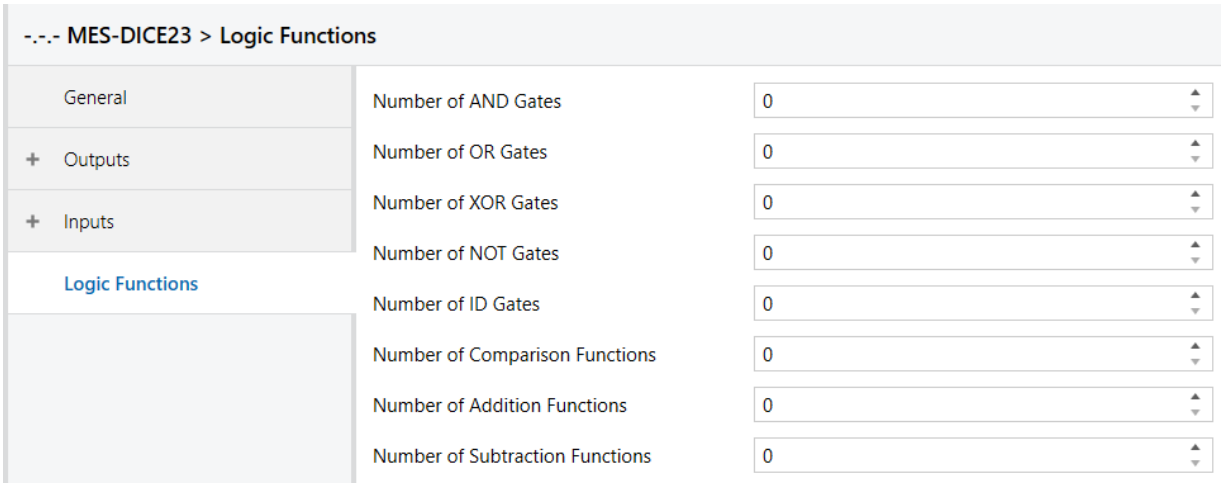

Figure 6-2: Expanded Logic Function menu

6.1.3. Group Objects for Logic Gates

1. Open the **Logic Function** page. See*"Expanded Logic Function menu" on page 44.*

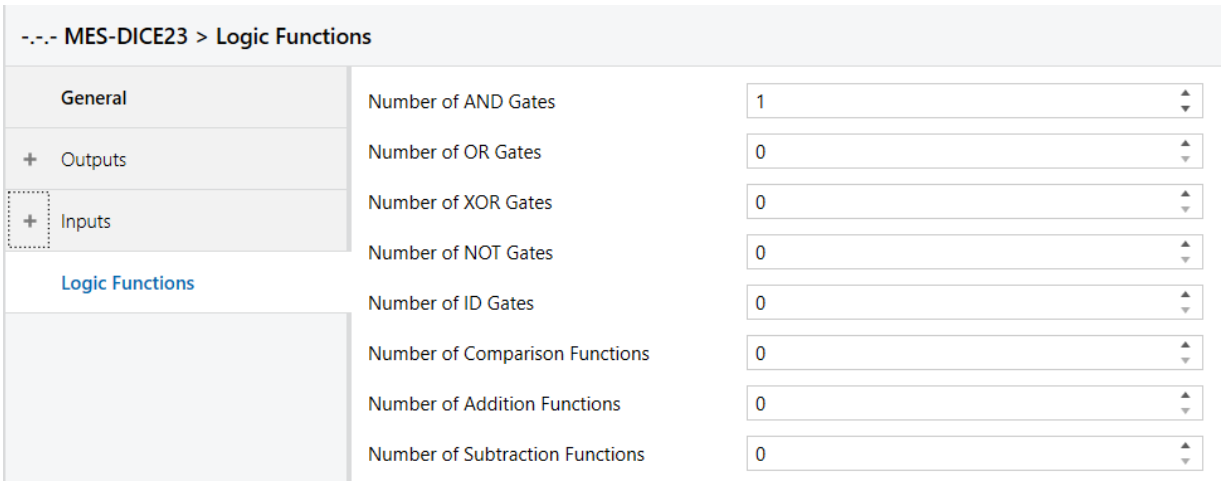

Figure 6-3: Adding Logic Functions

2. Enter the number of required logic gates (AND, OR, XOR, NOT, and ID), either by clicking the ▲▼ buttons or by entering the number. Refer to the list of Logic Functions and their available quantity under the paragraph *"List of Logical Function" on page 43*.
3. Increasing the number of logical gates enables the appropriate group objects under the **Group Objects** tab.

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Number	Name	Object Function	Descr	Group A	Length	C	R	W	T	U	Data Type	Priority
101	AND Operand 1	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
102	AND Operand 2	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
103	AND Result 1	1 - Bit Data Resul...			1 bit	C	R	-	T	-	switch	Low
121	OR Operand 1	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
122	OR Operand 2	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
123	OR Result 1	1 - Bit Data Resul...			1 bit	C	R	-	T	-	switch	Low
141	XOR Operand 1	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
142	XOR Operand 2	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
143	XOR Result 1	1 - Bit Data Resul...			1 bit	C	R	-	T	-	switch	Low
161	NOT Operand 1	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
162	NOT Result 1	1 - Bit Data Resul...			1 bit	C	R	-	T	-	switch	Low
181	ID Operand 1	1 - Bit Data Entry...			1 bit	C	-	W	T	-	switch	Low
182	ID Result 1	1 - Bit Data Resul...			1 bit	C	R	-	T	-	switch	Low

Figure 6-4: Group Objects for the Boolean Logic Functions

6.1.4. Group Objects for Comparison, Addition, or Subtraction

1. Enter the number of required comparison, addition, subtraction functions either by clicking the ▲ ▼ buttons or by entering the number. Refer to the list of Logic Functions and their available quantity at *"List of Logical Function" on page 43*.
2. View the Group Objects for the selected Comparison or Addition, or Subtraction function under the **Group Objects** tab.
3. View the sub-tab(s) for the Comparison or Addition, or Subtraction function under the **Parameters** tab.

Number	Name	Object Function	Descr	Group A	Length	C	R	W	T	U	Data Type	Priority
191	Compare Value 1	Data Entry (0 - 2...			1 byte	C	-	W	T	-	counter pulses (0..2...	Low
192	Compare Value 2	Data Entry (0 - 2...			1 byte	C	-	W	T	-	counter pulses (0..2...	Low
241	ADD Operand 1	Data Entry (0 - 2...			1 byte	C	-	W	T	-	counter pulses (0..2...	Low
242	ADD Operand 2	Data Entry (0 - 2...			1 byte	C	-	W	T	-	counter pulses (0..2...	Low
243	ADD Result 1	Result (0 - 255)			1 byte	C	R	-	T	-	counter pulses (0..2...	Low
256	SUB Operand 1	Data Entry (0 - 2...			1 byte	C	-	W	T	-	counter pulses (0..2...	Low
257	SUB Operand 2	Data Entry (0 - 2...			1 byte	C	-	W	T	-	counter pulses (0..2...	Low
258	SUB Result 1	Result (0 - 255)			1 byte	C	R	-	T	-	counter pulses (0..2...	Low

Figure 6-5: Group Objects for Comparison, Addition and Subtraction

6.1.4.1. Sub-tab for Comparison

1. Click on the Comparison [number] sub-menu under the **Parameters** tab.
2. For comparing the operand 1 with a constant value, enable **Compare with Constant Value** option. For comparing with a group object, disable the **Compare with Constant Value**.

3. As per the configuration of this window, a Comparison result shows a 0, 1, dimming value (0 to 100%), shutter position value (0 to 100%) or fan speed value (0, 20, 40, 60, 80, 100 %).
4. Enable **Compare with Constant Value [0 to 255], Dimming Value [0 to 100%], Shutter Position Value [0 to 100%], and Fan Speed Value [0, 20%, 40%, 60%, 80%, and 100%]** to open an additional text box for entry of a number or value.

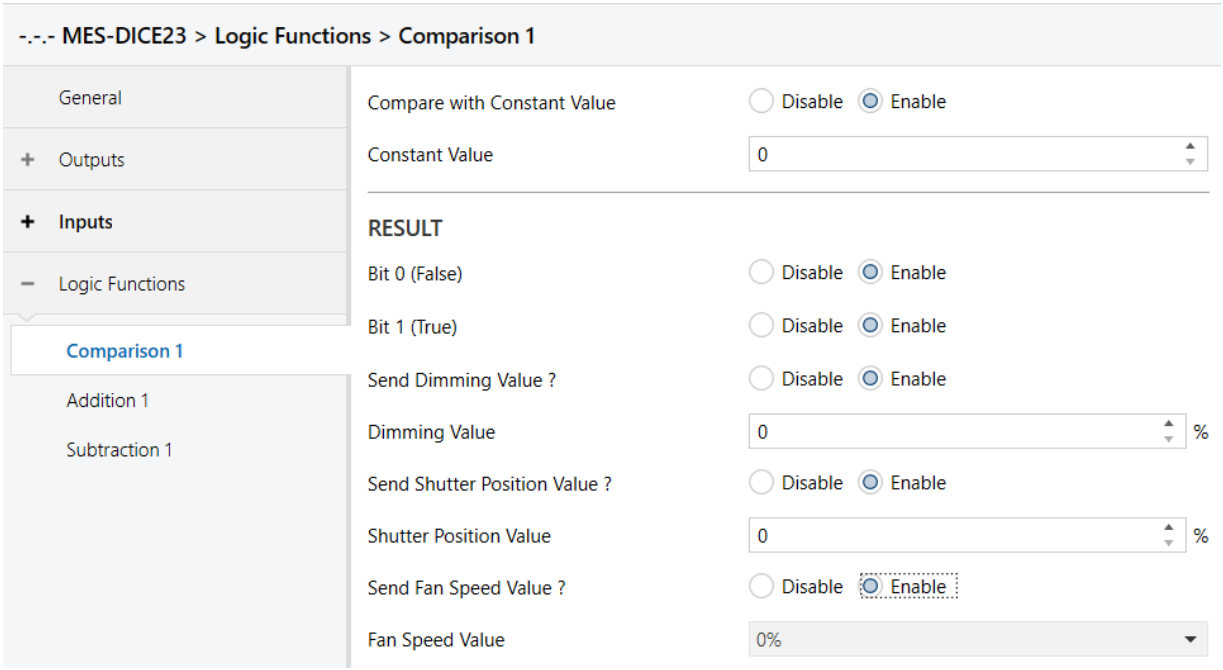

Figure 6-6: Sub-tab for Comparison with entry of values

6.1.4.2. Sub-tab for Addition and Subtraction

1. Click on the **Addition [number]** or **Subtraction [number]** sub-menu under the **Parameters** tab.
2. Select **Disable** for the **Add or Subtract with Constant Value** option to continue with **Addition** or **Subtraction** of two values using **Group Objects**.
3. Enable **Add with Constant Value** option to add the operand 1 with constant value. See *"Sub-tab for Addition with Add with Constant Value enabled" on page 47.*

> *An additional **Constant Value** text box shows.*
> *The **Group Objects** in the Group Objects tab show only one operand and the result.*

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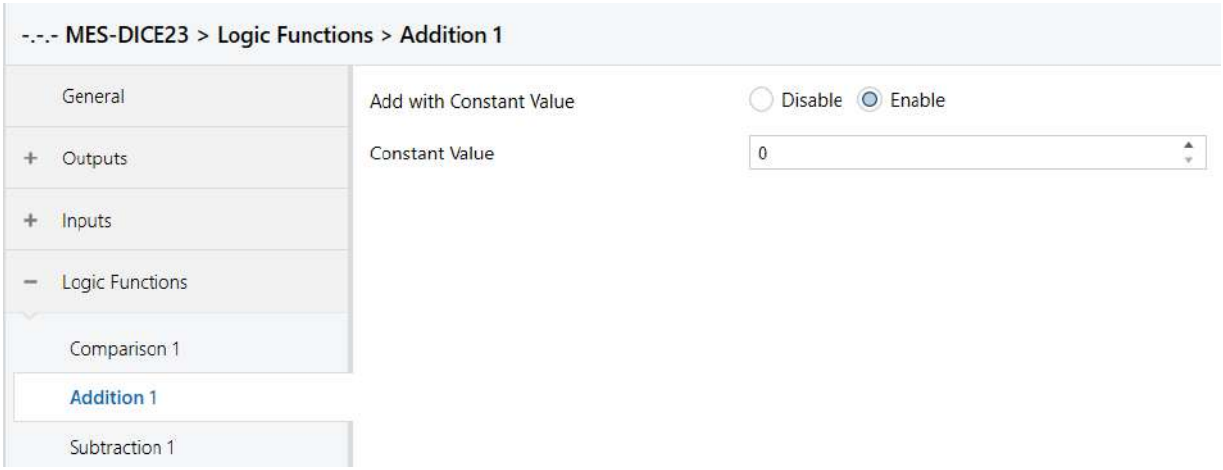

Figure 6-7: Sub-tab for Addition with Add with Constant Value enabled

4. Enter a value between **0 to 255** in the **Constant Value** text box.

> *This constant value will add to the value of the Operand 1.*

Note

The **Subtraction** function is similar to the **Addition** function.

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7. Annexure 1 - Logic Gates

7.1. Logic gates

MES-DICE23 offers the following Boolean logic gates:

- ID
- NOT
- AND
- OR
- XOR

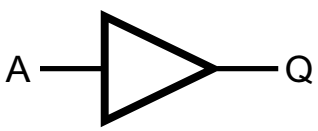
Other logic gates are created by cascading default logic gates:

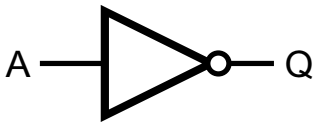
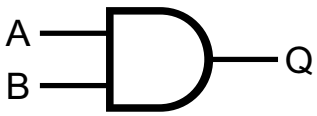
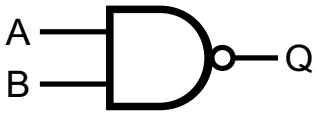
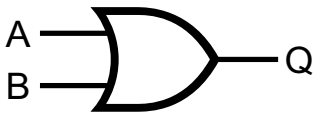
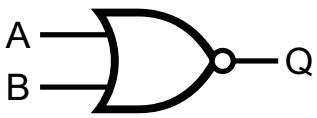
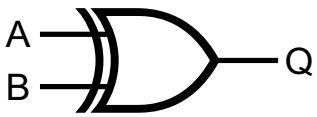
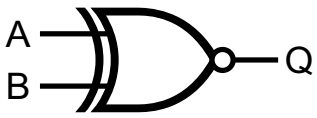
- NAND = AND + NOT
- NOR = OR + NOT
- XNOR = XOR + NOT

7.2. Truth table

Note

This is a generic truth table for the logic gates. Not all logic gates are directly available in the MES-DICE23 unit. However, they can be created by cascading several logical gates.
For single input gates [ID and NOT], A is the operand and Q is the output or result.
For double input gates [AND, NAND, OR, NOR, EXOR, and EXNOR], A is operand 1, B is operand 2, while Q is the output or result.

Type	Symbol	Boolean Algebra	Truth table	
			INPUT	OUTPUT
ID		A	A	Q
			0	0
			1	1

<table>
<tr><td>NOT</td><td> 
</td><td>$\bar{A}$</td><td colspan="3">INPUT / OUTPUT
A | Q
0 | 1
1 | 0</td></tr>
<tr><td>AND</td><td> 
</td><td>$A \cdot B$</td><td colspan="3">INPUT / OUTPUT
A | B | Q
0 | 0 | 0
0 | 1 | 0
1 | 0 | 0
1 | 1 | 1</td></tr>
<tr><td>NAND</td><td> 
</td><td>$\overline{A \cdot B}$</td><td colspan="3">INPUT / OUTPUT
A | B | Q
0 | 0 | 1
0 | 1 | 1
1 | 0 | 1
1 | 1 | 0</td></tr>
<tr><td>OR</td><td> 
</td><td>$A + B$</td><td colspan="3">INPUT / OUTPUT
A | B | Q
0 | 0 | 0
0 | 1 | 1
1 | 0 | 1
1 | 1 | 1</td></tr>
<tr><td>NOR</td><td> 
</td><td>$\overline{A + B}$</td><td colspan="3">INPUT / OUTPUT
A | B | Q
0 | 0 | 1
0 | 1 | 0
1 | 0 | 0
1 | 1 | 0</td></tr>
<tr><td>EXOR</td><td> 
</td><td>$A \oplus B$</td><td colspan="3">INPUT / OUTPUT
A | B | Q
0 | 0 | 0
0 | 1 | 1
1 | 0 | 1
1 | 1 | 0</td></tr>
<tr><td>EXNOR</td><td> 
</td><td>$\overline{A \oplus B}$</td><td colspan="3">INPUT / OUTPUT
A | B | Q
0 | 0 | 1
0 | 1 | 0
1 | 0 | 0
1 | 1 | 1</td></tr>
</table>

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8. Annexure 2 - Communication Objects

8.1. Digital Inputs communication objects

Table 8.1: Digital Inputs communication objects

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
21, 31, 41	1 Bit	I	C -WT -	1.001 switch	0	I[x] Short Press Off	Send 0
	1 Bit	I	C -WT -	1.001 switch	1	I[x] Short Press On	Send 1
	1 Bit	I	C -WT -	1.001 switch	0/1	I[x] Short Press On/Off	Send 0/1
	1 Bit	I	C-WT-	1.001 switch	0/1	I[x] Switch Edge	Send 0/1
	1 Bit	I	C -WT -	1.001 switch	1	I[x] Light On	Send 1
	1 Bit	I	C -WT -	1.001 switch	0	I[x] Light Off	Send 0
	1 Bit	I	C -WT -	1.001 switch	0/1	I[x] Light On/Off	Send 0/1
	1 Bit	I	C-WT-	1.001 switch	0	I[x] Move Up	Send 0
	1 Bit	I	C-WT-	1.001 switch	1	I[x] Move Down	Send 1
	1 Bit	I	C-WT-	1.001 switch	0/1	I[x] Move Up/Down	Send 0/1

Table 8.1: Digital Inputs communication objects (Continued)

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
22, 32, 42	4 bit	I	C-WT-	3.007 dimming control	0x0 (Stop)	I[x] Long Press Darker	Long Press Darker
					0x1 (Dec. by 100%)		
					0x7 (Dec. by 1%)		
					0x8 (Stop)		
					0x9 (Inc. by 100%)		
					0xF (Inc. by 1%)		
	4 bit	I	C-WT-	3.007 dimming control	0x0 (Stop)	I[x] Long Press Brighter	Long Press Brighter
					0x1 (Dec. by 100%)		
					0x7 (Dec. by 1%)		
					0x8 (Stop)		
					0x9 (Inc. by 100%)		
					0xF (Inc. by 1%)		
	4 bit	I	C-WT-	3.007 dimming control	0x0 (Stop)	I[x] Long Press Brighter/ Darker	Long Press Brighter/ Darker
					0x1 (Dec. by 100%)		
					0x7 (Dec. by 1%)		
					0x8 (Stop)		
					0x9 (Inc. by 100%)		
					0xF (Inc. by 1%)		

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Table 8.1: Digital Inputs communication objects (Continued)

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
23, 33, 43	1 Bit	I	C-WT-	1.017 trigger	0/1	I[x] Shutter Stop	Send 0/1
24, 34, 44	1 Byte	I	C-WT-	17.001 scene number	(1-64)	I[x] Scene	Scene (Run 1-64)
25, 35, 45	1 Byte	I	C-WT-	5.001 percentage (0...100%)	0-100%	I[x] Constant Value (percentage)	0-100%
	1 Byte	I	C-WT-	5.010 counter pulses (0...255)	0-255	I[x] Constant Value (integer)	0-255
26, 36, 46	1 Bit	I	C -WT -	1.001 switch	0/1	I[x] Long Press Off	Send 0
	1 Bit	I	C -WT -	1.001 switch	0/1	I[x] Long Press On	Send 1
	1 Bit	I	C -WT -	1.001 switch	0/1	I[x] Long Press On/Off	Send 0/1
27, 37, 47	1 Byte	I	C-WT-	5.001 percentage (0...100%)	0-100%	I[x] Dimming status	0-100%
	1 Byte	I	C-WT-	5.001 percentage (0...100%)	0-100%	I[x] Shutter status	0-100%

8.2. Temperature sensor communication objects

Table 8.2: Temperature sensor communication objects

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
65, 66, 67	2 Byte	O	C-T	9.001 temperature (°C)	5 – 70 degrees Celsius	I[x] Temperature sensor	Send current temperature

8.3. Motion sensor communication objects

Table 8.3: Motion sensor communication objects

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
51, 55, 61	1 bit	O	C-R-T	1.001 switch	0/1	I[x] On/Off	Send 0/1
52, 56, 62	1 Byte	O	C-R-T	17.001 scene number	(1-64)	I[x] Scene	Scene (Run 1-64)
53, 57, 63	1 Byte	I	C-R-T	5.001 percentage (0...100%)	0-100%	I[x] Constant Value (percentage)	0-100%
54, 58, 64	1 Bit	I	C-W--	1.003 enable	0 = Unlock, 1 = Lock	I[x] Lock	Lock channel

8.4. Output switch / Pulse function communication objects

Table 8.4: Output switch / Pulse function communication objects

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
1, 7	1 Bit	I	C-WT	1.001 switch	0/1	Output [x] On/Off	0 = Off, 1 = On
2, 8	1 Bit	O	C-R-T	1.001 switch	0/1	Output [x] On/Off Status	0 = Off, 1 = On
6, 12	1 Bit	I	C-WT	1.003 enable	0/1	Output [x] Lock	0 = Disable, 1 = Enable
3, 9	1 Bit	I	C-WT	1.010 start/stop	0/1	Output [x] Timer	0 = Stop, 1 = Start

Table 8.4: Output switch / Pulse function communication objects (Continued)

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
5, 11	1 Byte	I	C-WT	17.001 scene number	1 to 64	Switch Scenes	1 to 64
4, 10	1 Bit	I	C-W-	1.010 start/stop	0/1	Output [x] Pulse	0 = Stop, 1 = Start

8.5. Output shutter communication objects

Table 8.5: Output shutter communication objects

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
13	1 Bit	I	C-WT	1.008 move	0/1	Move	0 = Up, 1 = Down
14	1 Bit	I	C-WT	1.007 step	0/1	Stop	0/1 = Stop
15	1 Byte	I	C-WT	5.001 percentage	0 to 100	Direct Position	0 to 100 %
16	1 Byte	O	CR-T	5.001 percentage	0 to 100	Position Status	0 to 100 %
17	1 Bit	I	C-WT	1.008 move	0/1	Reverse Function	1 = Up, 0 = Down
18	1 Byte	I	C-WT	17.001 scene number	1 to 64	Shutter Scenes	1 to 64
19	1 Bit	I	C-WT	1.003 enable	Enable / Disable	Shutter Lock	0 = Disable, 1 = Enable

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8.6. Logic function communication objects

Table 8.6: Logic function communication objects

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
101, 102, 104, 105, 107, 108, 110, 111, 113, 114, 116, 117	1 Bit	I	C-WT	1.001 switch	0/1	AND operand	0 = Off, 1 = On
103, 106, 109, 112, 115, 118	1 Bit	O	CR-T	1.001 switch	0/1	AND Result	0 = Off, 1 = On
121, 122, 124, 125, 127, 128, 130, 131, 133, 134, 136, 137	1 Bit	I	C-WT	1.001 switch	0/1	OR operand	0 = Off, 1 = On
123, 126, 129, 132, 135, 138	1 Bit	O	CR-T	1.001 switch	0/1	OR Result	0 = Off, 1 = On
141, 142, 144, 145, 147, 148, 150, 151, 153, 154, 156, 157	1 Bit	I	C-WT	1.001 switch	0/1	XOR operand	0 = Off, 1 = On
143, 146, 149, 152, 155, 158	1 Bit	O	CR-T	1.001 switch	0/1	XOR Result	0 = Off, 1 = On
161, 163, 165, 167, 169, 171, 173, 175, 177, 179	1 Bit	I	C-WT	1.001 switch	0/1	NOT operand 1-10	0 = Off, 1 = On
162, 164, 166, 168, 170, 172, 174, 176, 178, 180	1 Bit	O	CR-T	1.001 switch	0/1	NOT result 1-10	0 = Off, 1 = On

Table 8.6: Logic function communication objects (Continued)

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
181, 183, 185, 187, 189	1 Bit	I	C-WT	1.001 switch	0/1	ID operand 1-5	0 = Off, 1 = On
182, 184, 186, 188, 190	1 Bit	O	CR-T	1.001 switch	0/1	ID result 1- 5	0 = Off, 1 = On
191, 201, 211, 221, 231	1 Byte	I	C-WT	5.010 counter pulses	(0...255)	Compare Value	0-255
192, 202, 212, 222, 232	1 Byte	I	C-WT	5.010 counter pulses	(0...255)	Compare Value	0-255
193, 203, 213, 223, 233	1 Bit	O	CR-T	1.001 switch	0	Result: Bit 0	0 = Off
194, 204, 214, 224, 234	1 Bit	O	CR-T	1.001 switch	1	Result: Bit 1	1 = On
195, 205, 215, 225, 235	1 Byte	O	CR-T	5.001 percentage	(0...100%)	Result: Dim	0-100%
196, 206, 216, 226, 236	1 Byte	O	CR-T	5.001 percentage	(0...100%)	Result: Shutter	0-100%
197, 207, 217, 227, 237	1 Byte	O	CR-T	5.001 percentage	(0...100%)	Result: Fanspeed	0%, 20%, 40%, 60%, 80%, 100%
241, 242, 244, 245, 247, 248, 250, 251, 253, 254	1 Byte	I	C-WT	5.010 counter pulses	(0...255)	ADD Operand	0-255

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Table 8.6: Logic function communication objects (Continued)

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
243, 246, 249, 252, 255	1 Byte	O	CR-T	5.010 counter pulses	(0...255)	ADD Result	0-255
256, 257, 259, 260, 262, 263, 265, 266, 268, 269	1 Byte	I	C-WT	5.010 counter pulses	(0...255)	SUB Operand	0-255
258, 261, 264, 267, 270	1 Byte	O	CR-T	5.010 counter pulses	(0...255)	SUB Result	0-255
101, 102, 104, 105, 107, 108, 110, 111, 113, 114, 116, 117	1 Bit	I	C-WT	1.001 switch	0/1	AND operand	0 = Off, 1 = On
103, 106, 109, 112, 115, 118	1 Bit	O	CR-T	1.001 switch	0/1	AND Result	0 = Off, 1 = On
121, 122, 124, 125, 127, 128, 130, 131, 133, 134, 136, 137	1 Bit	I	C-WT	1.001 switch	0/1	OR operand	0 = Off, 1 = On
123, 126, 129, 132, 135, 138	1 Bit	O	CR-T	1.001 switch	0/1	OR Result	0 = Off, 1 = On
141, 142, 144, 145, 147, 148, 150, 151, 153, 154, 156, 157	1 Bit	I	C-WT	1.001 switch	0/1	XOR operand	0 = Off, 1 = On
143, 146, 149, 152, 155, 158	1 Bit	O	CR-T	1.001 switch	0/1	XOR Result	0 = Off, 1 = On
161, 163, 165, 167, 169, 171, 173, 175, 177, 179	1 Bit	I	C-WT	1.001 switch	0/1	NOT operand	0 = Off, 1 = On

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Table 8.6: Logic function communication objects (Continued)

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
162, 164, 166, 168, 170, 172, 174, 176, 178, 180	1 Bit	O	CR-T	1.001 switch	0/1	NOT result	0 = Off, 1 = On

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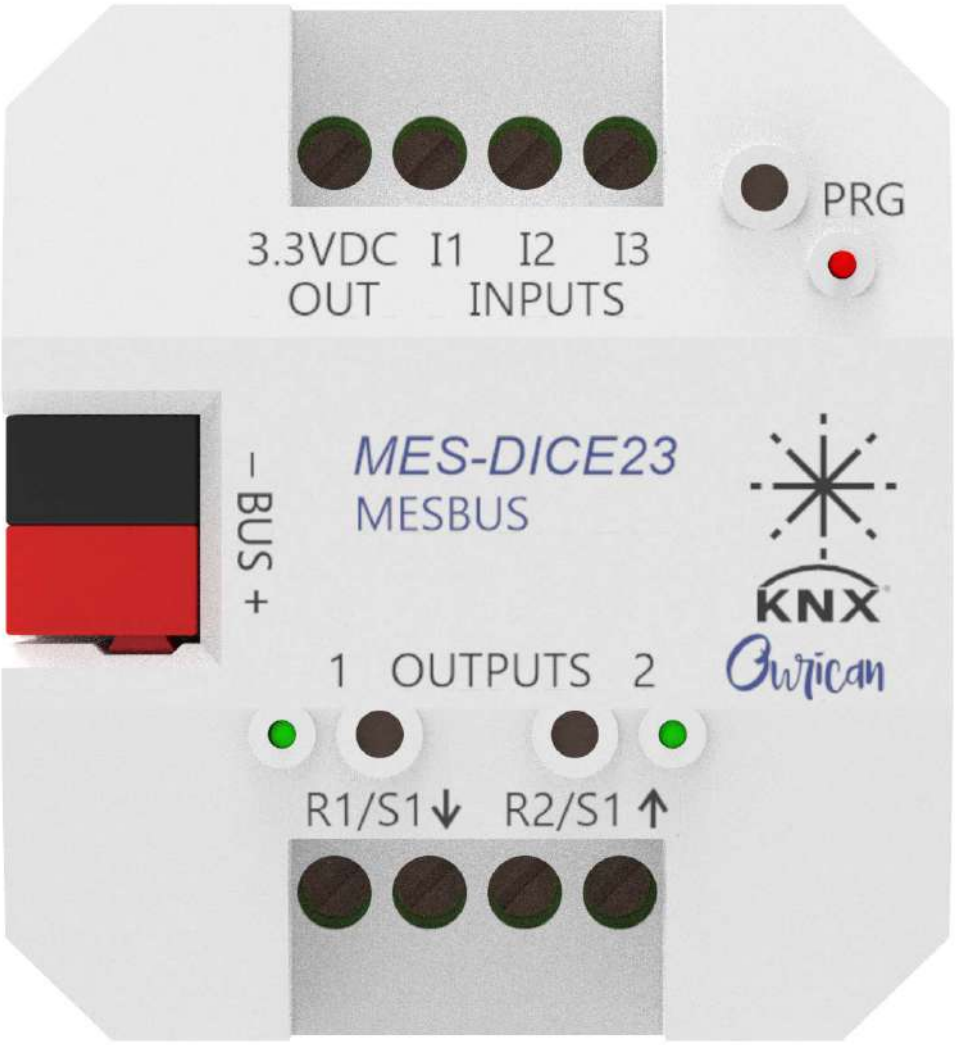

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