Inwall Room Temperature Unit

TM11B01KNX
TM11B11KNX
TM11B21KNX

Product Handbook

Product: **Inwall Room Temperature Unit**
Order Code: **TM11B01KNX – TM11B11KNX – TM11B21KNX**
Application Program ETS: **TM11B_1KNX Inwall Room Temperature Unit**

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➢ This handbook can be download freely from the website: *www.eelectron.com*

➢ **Exclusion of liability:**
Despite checking that the contents of this document match the hardware and software, deviations cannot be completely excluded. We therefore cannot accept any liability for this. Any necessary corrections will be incorporated into new versions of the manual.

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1. General Introduction

The Inwall Room Temperature unit TM11Bx1KNX is an EIB/KNX wall mounting device designed for HVAC applications in Home and Building installations (i.e. offices, hospitals, hotels, private houses, etc..).
The device is equipped with one binary input (potential free contact) for a general purpose usage and one binary output.
The LCD on the front side displays information about temperature, setpoint, fan coil speeds and operative status.
The control elements available on the front are four push buttons for setpoint , CO2 level,fan coil speed modification and status.

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2. Technical data

|		
Power Supply	Via bus EIB/KNX	• 21..30 V DC available from the bus
Inputs	Number Input Signal Voltage Input Signal Current (close contact)	• 1 (potential free) • Un = 12V • In = 1ma
Outputs relays	Number Output switching currents	• 1 • 30 VAC, 1A (AC1)
Control Elements	1 programming push button (back side) 1 push button to increase temperature setpoint, CO_2 level 1 push button to decrease temperature setpoint, CO_2 level 1 push button to change fan coil speed (OFF-S1-S2-S3-AUTO) 1 push button to change from standby and comfort status	
Display Elements	1 LED red (back) for ETS programming 1 LCD display B/W, size 43,5X43,5 mm	
Physical specifications and Dimensions	Housing Varnished Colours Dimensions Weight Installation	• plastic • Light Grey (TM11A01KNX), Dark Grey (TM11A11KNX) White (TM11A21KNX) • (WxHxD): 110 x 78 x 39,8mm • ca.65g • flash mounting in 2-3 modules or wall round box Ø60mm, 40mm deep
Electrical Safety	Pollution degree Protection class Safety class Overvoltage category	• 2 (according to EN 60664-1) • IP20 (according to EN 60529) • III (according to EN 61140) • III (according to EN 60664-1)
CE Mark and Certifications	CE EIB/KNX	• In accodance with EMC and Low Voltage guidelines • According to EN 50090-1-2
Order Code	TM11B01KNX – Varnished Light Grey TM11B11KNX – Varnished Dark Grey TM11B21KNX – Varnished White	•

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KNX

2.1   Wiring Diagram
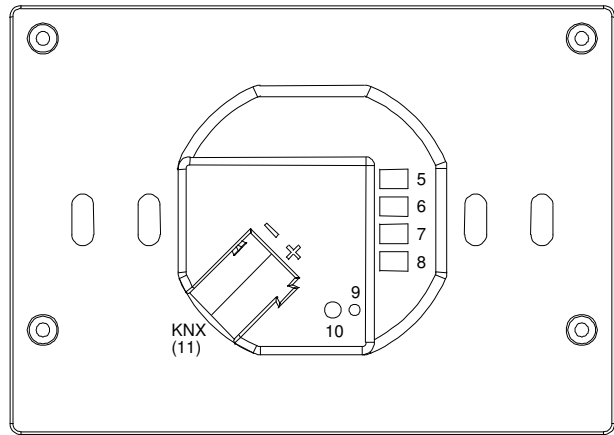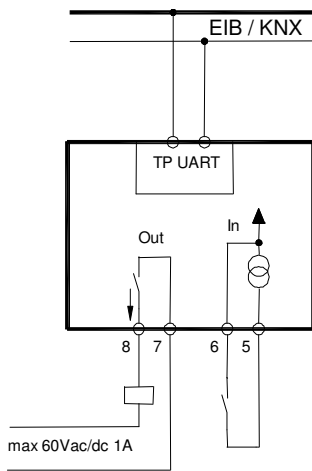
2.2   Operating and display elements

2.3   Dimension drawing

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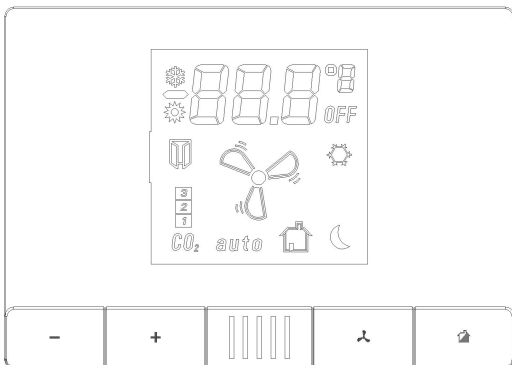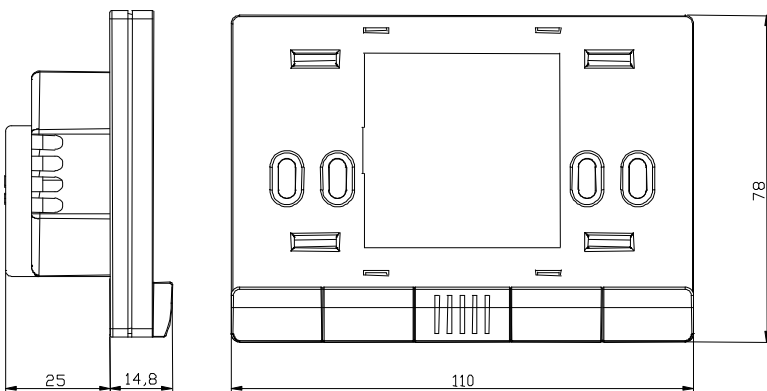
2.4   Mounting and wiring hints

The device may be used for permanent indoor installations in dry locations within wall boxes.

Requirements for installation

- The device must not be connected to 230V cables.
- The prevailing safety rules must be heeded.
- The device must be mounted and commissioned by an authorised installer.
- The applicable safety and accident prevention regulations must be observed.
- The device must not be opened. Any faulty devices should be returned to manufacturer.
- For planning and construction of electric installations, the relevant guidelines, regulations and standards of the respective country are to be considered.

Requirements for commissioning

- Connect each single KNX/EIB bus core inside the bus connection terminal block observing bus polarity .
- Slip the bus connection block into the guide slot placed on the front side of this device and press the block down to the stop.
- In order to commission the device, a PC with ETS2 version V1.3 or higher is required as well as an interface to the bus, e.g. via an RS232 interface or via a USB interface.
- The device configuration (KNX physical address assignment) is done by pressing the programming push button located on the front of the housing.

Supplied state

- The device is supplied with the physical address 15.15.255.
- It is therefore necessary to load parameters and group addresses during   commissioning. However the complete application program can be reloaded if required.
- The bus connection terminal block is included in the package.
- The instruction sheet is included in the package.

Maintenance

- The device is maintenance free.
- In case of damage during transportation or storage, no repairs may be carried out by external staff.
- When the device is opened the right to claim under guarantee expires.

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3. Product and functional overview

The inwall room temperature unit TM11B01KNX/TM11B11KNX/TM11B21KNX is an eib/knx wall mounting device designed for hvac applications in home and building installations (i.e. Offices, hospitals, hotels, private houses, etc..).
The device is equipped with one binary input (potential free contact) for any general purpose usage and one binary output relay for any general purpose usage.
The temperature is measured from internal NTC sensor.

In addition to the temperature, the thermostat allows send to the bus a Setpoint base and the relative user variation permitted.
Are present different icon on LCD :

- User inside the room (Comfort mode).
- User outside the room (Standby mode).
- Night Mode
- Antifreeze (frost protection).
- Window Status
- Heat Mode
- Cool Mode
- Auto Mode
- Manual Mode
- 3 Speed fancoil
- 3 CO_2 levels

The user, using dedicated push buttons placed in front of the thermostat, can modify the temperature setpoint, fancoil speeds, StandBy/Comfort status, CO_2 level and send a telegram on the bus for "Cleaned Room".
In case user changes the fancoil speed via a front push button the thermostat pass from automatic to manual functioning.

In the thermostat the following parameters can be configured:
Base Set Point (from 00.0°C to 45.0°C). The set point is normally fixed from the control/supervision centre. The client can vary the set point trough dedicated buttons. The variation can be executed in between limits fixed from ETS parameters (minimum and maximum).
Type of view on display, to view the temperature and the setpoint (real or offset) for 5 seconds when the relative push button are pressed, or only the setpoint (real or offset).
Max variation permitted of the setpoint from nothing to +/- 10 °C.
Cycling send of temperature and setpoint.
Temperature sensor adjust +/- 3 °C.
Display CO_2 level

On the display the following information are visualized (see Fig. 1):
The actual temperature read by the sensor on board or the one provided through the communication object.
Setpoint. the value is displayed in the LCD with XX.X°C format. It's possible to visualize the real setpoint (base setpoint + offset setpoint) or the offset setpoint. Using the Set point variation

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buttons, the value is varied in a range fixed with ETS. Pushing continuously a button, the value will initially vary of 0,1°C and will proportionally accelerate the variation speed.
Fan Coil Speed Visualisation. The value, from speed 1 to speed 3, is indicated by a specific icon on the display.
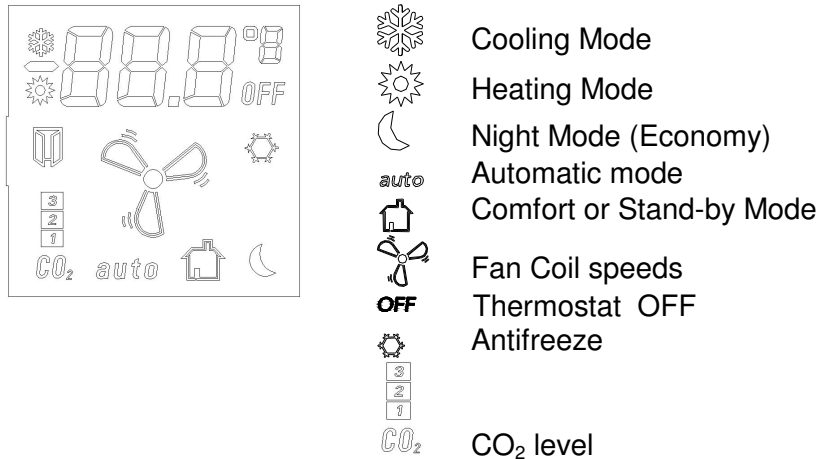Some icons concerning actual operative status.

❄	Cooling Mode
☀	Heating Mode
☾	Night Mode (Economy)
auto	Automatic mode
⌂	Comfort or Stand-by Mode
⚙	Fan Coil speeds
OFF	Thermostat OFF
❂	Antifreeze
3 2 1	
CO_2	CO_2 level

Fig. 1: Display and icons

The thermostat transmits to the KNX/EIB bus the following information:

Real/Offset Setpoint Value (also cyclically sent with time period setting)
Real Temperature (also cyclically sent with time period setting)
Objects for Speed in manual mode and fan status
Object for CO_2 level changed by user in manual mode

The physical address, group address and parameters are assigned and programmed with the ETS tool software. In order to commission the device, a PC with ETS2 version V1.3 or higher is required as well as an interface to the bus, e.g. via an RS232 interface or via a USB interface.

The device TM11B01KNX/TM11B11KNX/TM11B21KNX must be configured and loaded with the following application program: **TM11B_1KNX Inwall Room Temperaute Unit.**

With this application program the following functions can be parametrized and configured:

Application Program: TM11B_1KNX_Room Temperature Unit

- Max number of group addresses: 35
- Max number of group address associations: 32

General Configurations	• *Type of view on LCD*
	• *Display or not the window icon and relative value received for Icon On*
	• *Value for enable window icon*
	• *CO2 Control*
	• *Sending <Cleaned Room>*
	• *Value sending in <Cleaned Room>*

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Setpoint Configuration	• Sensor for measuring the actual temperature (Local or External) • Base Setpoint • Max variation permitted • Select setpoint value type for sending • Temperature sensor adjust • Cicling send of temperature • Cicling send of setpoint
Speed Configuration	Send value to room controller • Number of speed • The 3 step value in % for the 3 Step Receive value from room controller • Number of speed • The 3 step value in % for the 3 Step
CO2 Value Configuration	• The 3 Threshold in ppm x 10
Digital Input Configuration	• Switching states ON or OFF can be set depending on input pulse adge evalutation (rising or falling edge). • Cyclical sending option at adjustable intervals
Output Relay Configuration	• Normally open or closed contact setting • Normal or Timed OFF switching • Send relay status on contact release

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4. Parameters

4.1 Parameter window " General Configurations"
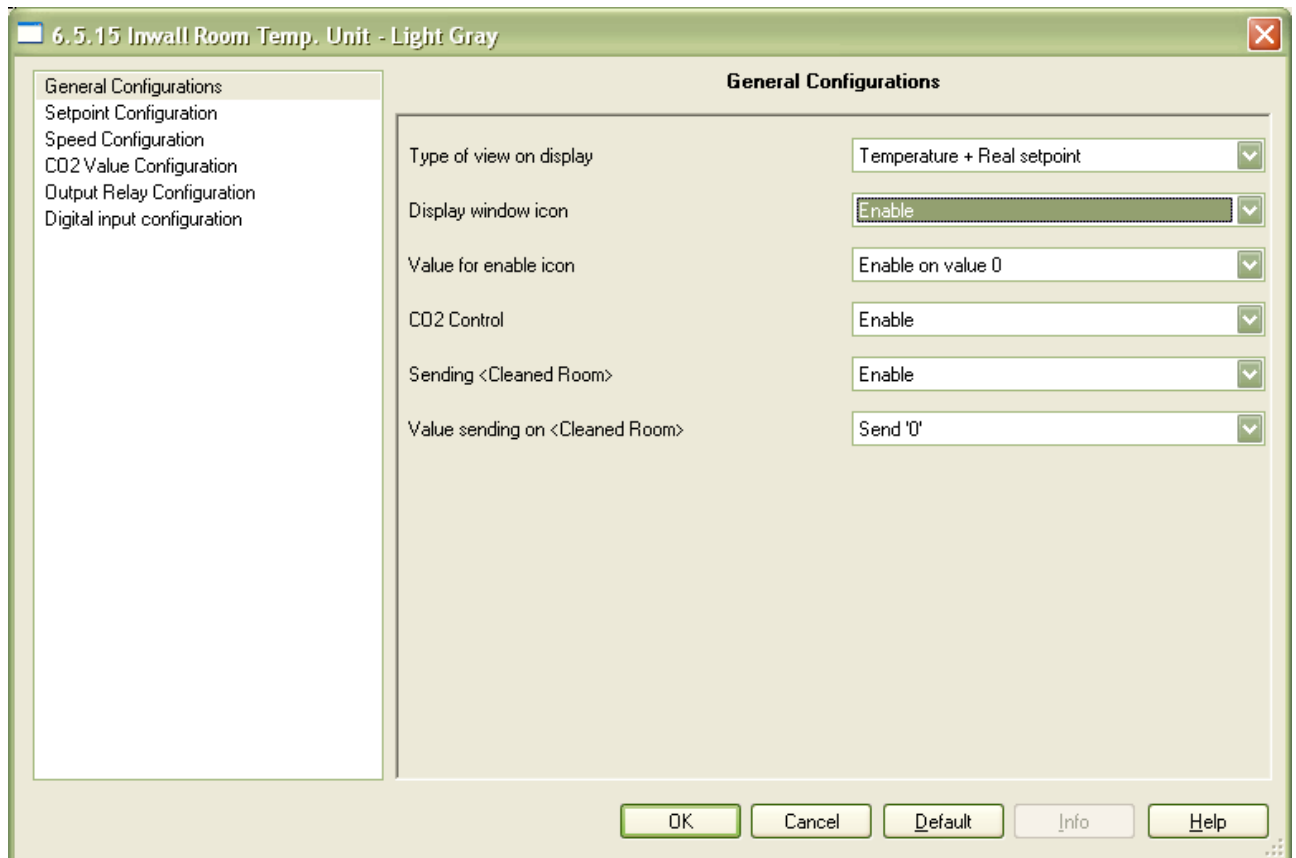
Fig. 2: Parameter window "General Configurations"

Type of view on display

Options:
Temperature + Real Setpoint
Temperature + Offset Setpoint
Only real setpoint
Only offset setpoint

Option "*Temperature + Real Setpoint":* permit to view always the real room temperature and, pushing the change setpoint buttons view for 5 seconds the real value of setpoint.
Option "*Temperature + Offset Setpoint":* permit to view always the real room temperature and, pushing the change setpoint buttons view for 5 seconds the offset value of setpoint.
Option "Only r*eal Setpoint":* for view on LCD always the real setpoint value.
Option "*Only offset Setpoint":* for view on LCD always the offset setpoint value.

Display Windows Icon

Options: *Disable*
             Enable

Option "*Disable*": the device does not display the icon

Option "Enable": the device control the icon in according with communication object "Value for enable icon"

Value for Enable Icon

Options: *Enable on value 0*
             Enable on value 1

Option "*Enable on value 0*": the device display icon when receive an 0

Option "*Enable on value 1*": the device display icon when receive an 1

CO2 Control Enable

Options: *Enable*
             Disable

Option "*Disable*": the device does not display the icon

Option "*Enable*": the device control the icon in according with threshold value

Sending < Cleaned Room >

Options: *Enable*
                  Disable

Option "*Disable":* the function < Cleaned Room > does not work.

Option "*Enable":*   pressing the 3rd and 4th button, a telegram is send on the bus according to "Value sending on <Cleaned Room> parameter.

Value sending on < Cleaned Room >

Options: *Send '0'*
                  Send '1'

Option "*Send 0":* a Knx 0 value is send on the bus.

Option "*Send 1":* a Knx 1 value is send on the bus.

4.2 Parameter Window "Setpoint Configuration"

This window allows parameter settings for temperature measurement and setpoint settings
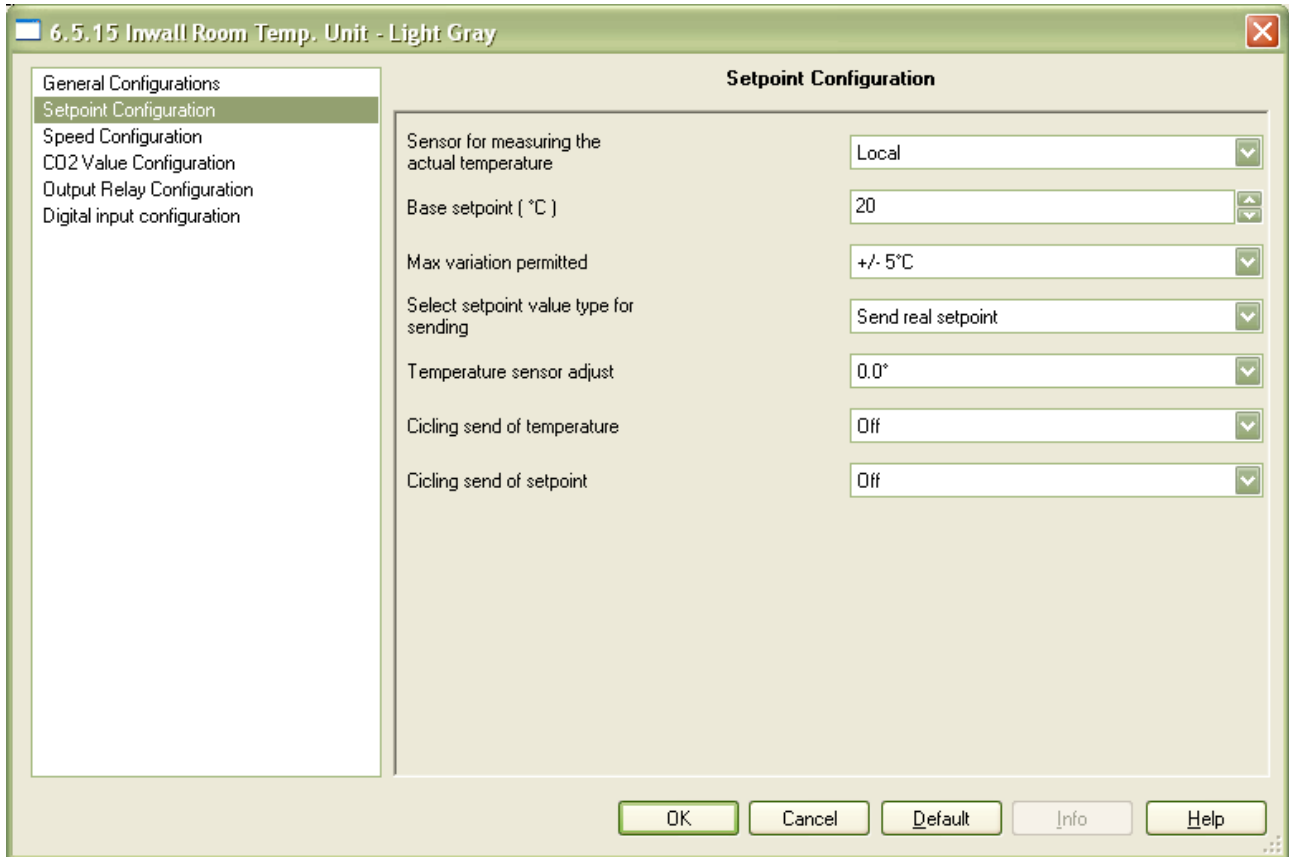

Fig. 3: Parameter Window "Setpoint Configuration"

Sensor for measuring the actual temperature

Options: *Local*
External, via Comm. Object

This parameter defines whether to use the sensor on board or external sensor.

Base Setpoint

Options: *0°C….+10°C….+20°C…..+45°C*

Base Setpoint

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Max variation permitted

Options: No Variation, *±1°C…..±5°C…..±10°C*

With this parameter the setpont range of variation allowed to the user, using the front push buttons, can be limited to a maximum of *±10°C.*

Note: the user setpoint variation is stored and maintained inside in case of power down

Select setpoint value type for sending

Options: <u>Send real setpoint</u>
                    Send offset setpoint

This parameter defines whether to send Real Setpoint (Base setpoint + user variation setpoint) or offset setpoint (user variation setpoint).

Temperature Sensor Adjust

Options: *-3°C….<u>0,0</u>…..+3°C*

This parameter can be useful when a temperature adjustment is required by the internal sensor (e.g. due to wrong or difficult installation). The adjustment should be set using an external professional temperature sensor in order to check the temperature variance that occurred.

Cycling Send of Temperature

Options: <u>*Off*</u>
                    1 Min
                    10 Min
                    30 Min
                    1 Hour

Option "*Off":* cyclical sending disabled

Option "*1Min".."1Hour":* enable actual temperature value via object "Temperature for Room Controller" to be sent cyclically every "1Min"…"1 Hour".

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Cycling Send of Setpoint

Options: *Off*
1 Min
10 Min
30 Min
1 Hour

Option "*Off*": cyclical actual setpoint sending not enabled.

Option "*1Min".."1 Hour*": enable actual setpoint cyclical sending every 1Min"…"1 Hour" with the communication object "Setpoint for room controller".

The actual setpoint value is the base setpoint setting ± last user's variation via front push buttons.

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4.3 Parameter Window "Speed configuration"

This window allows parameter settings for the 3 value % speed to send to room controller and the 3 value % associated to the 3 icon present on LCD display.
Is possible select how many speed view.

Fig. 4: Parameter Window "Setup Speed"
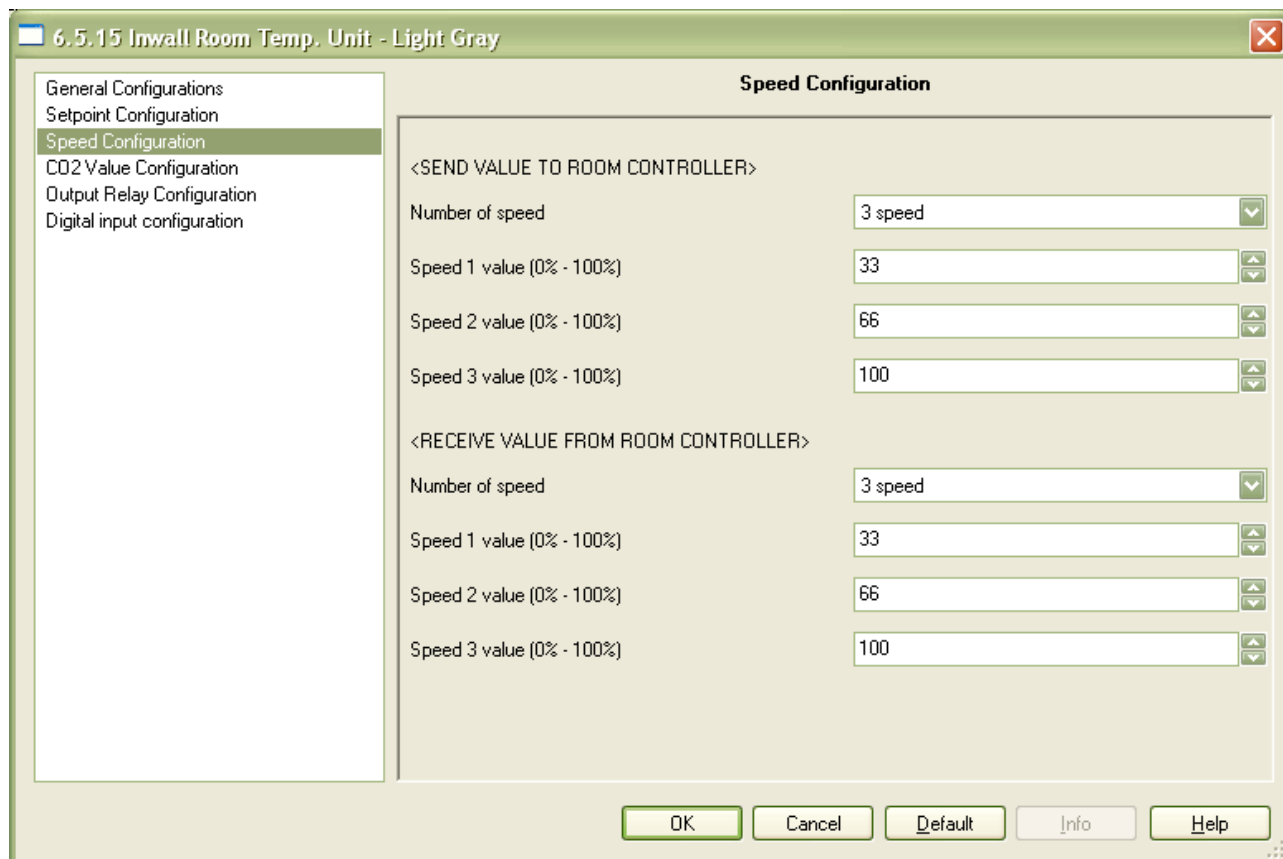
<SEND VALUE TO ROOM CONTROLLER>

Number of speed

        Options: *1 …. 3*

        Parameter to define how many value of speed post

Speed 1,2,3 value (0%-100%)

        Options: *0%….33%…..100%*

        Value for send Speed 1,2,3

<RECEIVE VALUE FROM ROOM CONTROLLER>

Number of speed

Options: *1 …. 3*

Parameter to define how many value of speed receive

Speed 1,2,3 value (0%-100%)

Options: *0%….<u>33%</u>…..100%*

Value for display fancoil icon 1,2,3

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4.4   Parameter Window "CO2 Value configuration"

This window allows setting parameters for CO_2 thresholds.
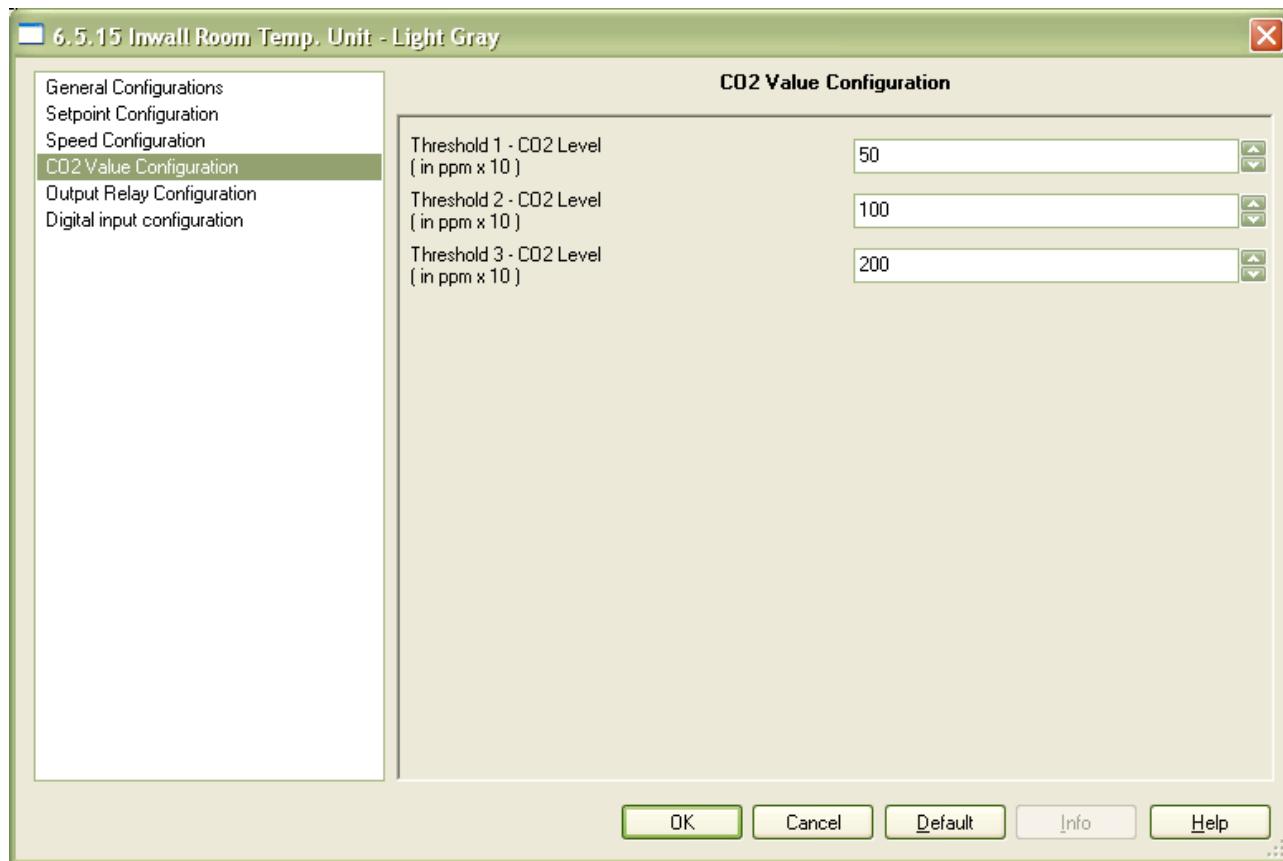

Fig. 5: Parameter Window "Setup CO2 value"

Threshold 1 - CO2 Level (in ppm x 10)

　　　　　Options:　　　*10….255*

　　　　　Value for display or send Threshold 1

Threshold 2 - CO2 Level (in ppm x 10)

　　　　　Options:　　　*10….255*

　　　　　Value for display or send Threshold 2

　　Note: *this value must be greater than value of Threshold 1*

Threshold 3 - CO2 Level (in ppm x 10)

Options: *10….255*

Value for display or send Threshold 3

Note: *this value must be greater than value of Threshold 2*

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4.5 Parameter Window "Digital Input Configuration"

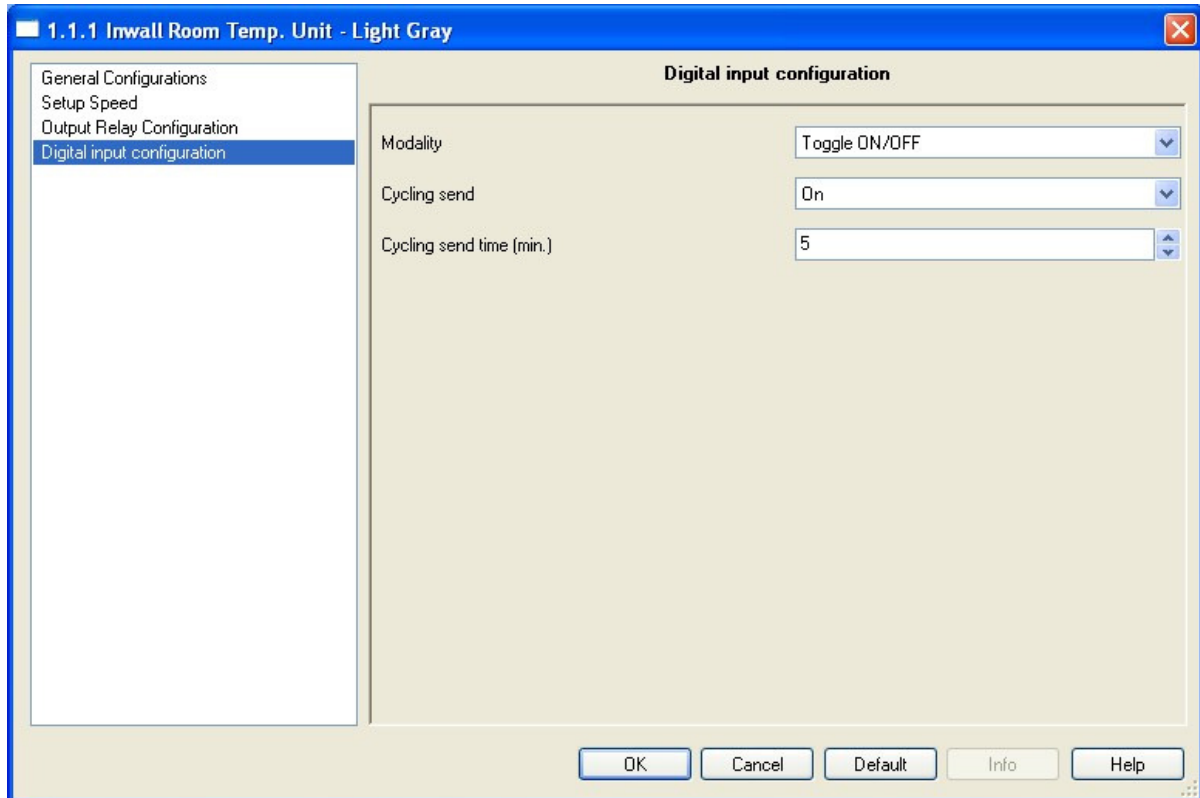This window allows setting parameters for binary input operating functions.

Fig. 6: Parameter window for "Input Configuration"

Modality

This parameter determines which switching values is written into the memory location of the communication object when the signal state changes at the input. A rising edge is when the signal state at the input changes from logic "0" to "1" while a falling edge is a change from logic "1" to "0".

Options:

Rising ON
Rising OFF
Falling ON
Falling OFF
Rising ON / Falling OFF
Rising OFF / Falling ON
<u>Toggle ON/OFF</u>
Toggle OFF/ON

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With this parameter we can program which status we need to send to the bus (ON/OFF; TOGGLE) when a rising or falling edge is detected in the input signal.

Behaviour:

"Rising On": A rising edge causes a logic "1" to be transferred to the communication object. A falling edge does not alter the object value.

"Rising Off": A rising edge causes a logic "0" to be transferred to the communication object. A falling edge does not alter the object value.

"Falling On": A falling edge causes a logic "1" to be transferred to the communication object. A rising edge does not alter the object value.

"Falling Off": A falling edge causes a logic "0" to be sent to the communication object. A rising edge does not alter the object value.

"Rising On, Falling Off": A rising edge causes a logic "1" to be transferred to the communication object. A falling edge causes a logic "0" to be sent.

"Rising Off, Falling On": A rising edge causes a logic "0" to be transferred to the communication object. A falling edge causes a logic "1" to be sent.

"Toggle ON/OFF": Each rising edge causes the object value to be inverted. This means that a logic "1" is sent to the communication object after the first rising edge. The next one sends a logic "0" and so on. A falling edge does not alter the object value.

"Toggle OFF/ON": Each falling edge causes the object value to be inverted. This means that a logic "1" is transferred to the communication object after the first falling edge. The next one sends a logic "0" and so on. A rising edge does not alter the object value.

The two parameters next remain the same as explained before (in this case the cyclical sending is concerned the 1 bit object "Digital Input").

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Cyclic Send

Options: *ON*
                      OFF

This parameter enable the cyclical sending of current value of the binary Input to the bus at a set interval with the object "Digital Input".

Cycling send time (min)

Options: *1…10…200*

The cyclic time for sending telegrams repeatedly on the bus with Input current value is specified here. The time units are minutes.

Note: *please see Input timing diagrams in "Application Notes".*

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![eelectron logo]

4.6 Parameter Window "Output Relay Configuration"

The output relay configuration is provided within this window.
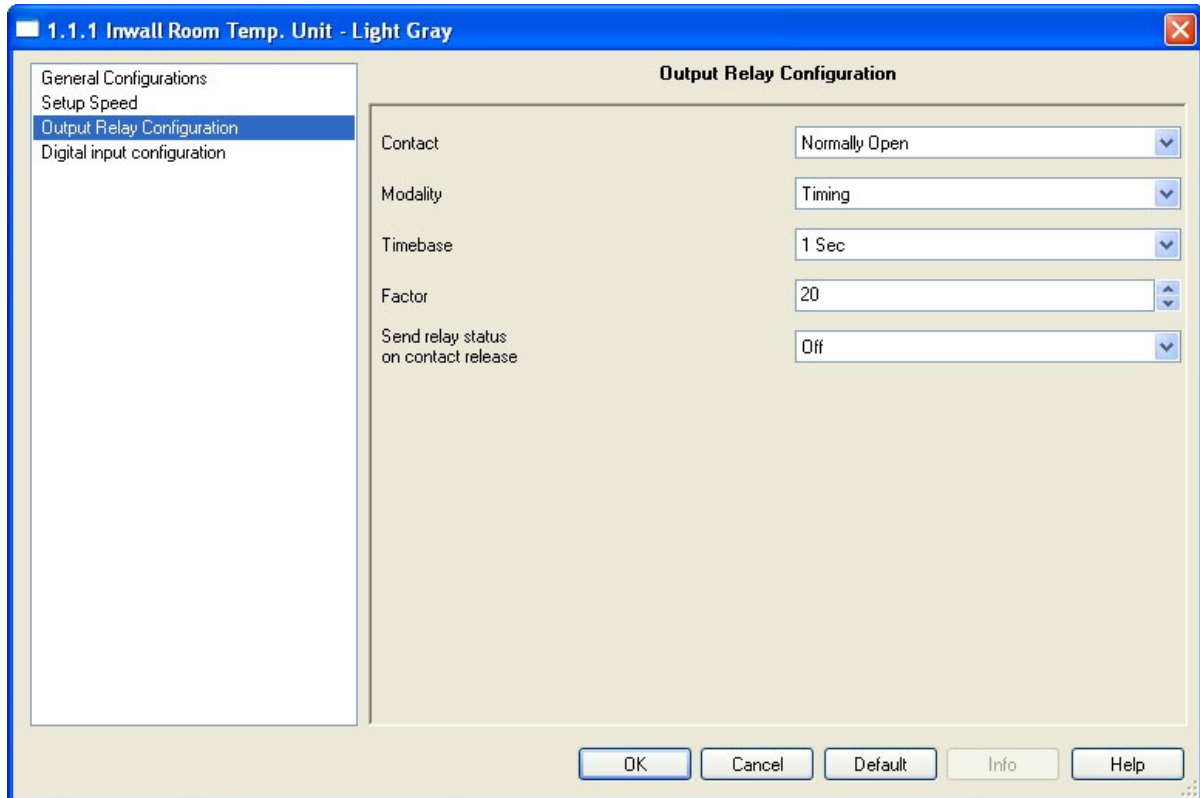

Fig. 7: Parameter Window "Output Relay Configuration"

Contact

Options: _Normally Open_
             Normally Close

Option "_Normally Open_":

Off telegram = contact open

On telegram = contact closed.

.   Option "_Normally Close_":

Off telegram = contact closed

On telegram = contact open.

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Modality

Option: *Normal*
Timing

Option "*On-Off*" : the output relay will be switched ON by sending an ON command and will be switched OFF buy sending an OFF command within the associated object "Output Relay".
The status of the relay contact is inverted by the parameter setting "Contact"= "Normally Close".

Option "*Timing"*: enable the time switch function (e.g. staircase lighting function).
When an On telegram is received via the output object, it is routed directly to the relay. The Off delay that has been assigned starts at the same time. Every further "1" (ON) that is received before the timer has elapsed, resets the delay and restarts it. Once the period has elapsed, a "0" is passed to the output. An Off telegram deletes the Off delay and is immediately routed to the output.

The time for the Off delay is set here. This is calculated from the selected base "TimeBase" multiplied by the factor "Factor" that is entered here:

T_{ON} = TimeBase x Factor

Note: An attempt should always be made to set the required time with the smallest possible base as the base that is selected here also simultaneously specifies the maximum timing error.

Time Base

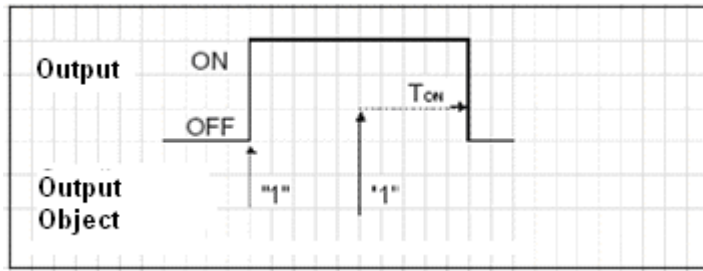Options: *250ms, 500ms, 1sec, 1min, 1hour*

Factor

Options: *1…2…255*

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Fig. 10: Timing switching function (e.g. "Staircase Lighting")

Note: *please see Outputs timing diagrams in "Application Notes".*

Send relay status on contact release

Options: *Disable*
                  Enable

This parameter permit to sending the status of relay on the bus when change your value

5. Communication Objects

The EIB/KNX communication objects provided within the application program "*TM11B_1KNX Inwall Room Temperature Unit*" are the following:

Number	Name	Object Function	Description	Group Addresses	Length	C	R	W	T	U
0	Display comfort mode	1.001 DPT_Switch			1 bit	C	-	W	T	-
1	Display standby mode	1.001 DPT_Switch			1 bit	C	-	W	T	-
2	Display night mode	1.001 DPT_Switch			1 bit	C	-	W	-	-
3	Display antifreeze mode	1.001 DPT_Switch			1 bit	C	-	W	-	-
4	Display Heat/Cool mode	1.001 DPT_Switch			2 Byte	C	-	W	-	-
5	Temperature to room controller	9.001 DPT_Value_Temp			2 Byte	C	-	-	T	-
6	Setpoint for room controller	9.001 DPT_Value_Temp			2 Byte	C	-	W	T	-
7	Speed for room controller	5.001 DPT_Scaling			1 Byte	C	-	W	T	-
8	Display speed icon	5.001 DPT_Scaling			1 Byte	C	-	W	T	-
9	Fancoil status	1.001 DPT_Switch			1 bit	C	R	W	T	-
10	Fancoil automatic mode	1.001 DPT_Switch			1 bit	C	-	W	T	-
11	Output relay	1.001 DPT_Switch			1 bit	C	R	W	T	-
12	Digital input	1.001 DPT_Switch			1 bit	C	R	-	T	-
13	Display window icon	1.001 DPT_Switch			1 bit	C	-	W	-	-
14	CO2 Threshold	9.008 DPT_Value_AirQuality			2 Byte	C	-	W	T	-
15	Cleaned Room	1.003 DPT_Enable			1 bit	C	R	-	T	-

Fig. 11:Communication Objects EIB/KNX provided with the application program (NB: some objects are visible only if enabled by specific parameter setting).).

Nr.	Function	Name	Type	Flag
0	On/Off	Display comfort mode	EIS1, 1bit DPT 1.001	C,R,W
After receiving the object from the bus, the thermostat display the comfort icon (when receiving 1) or standby icon (when receiving 0).				
1	On/Off	Display standby mode	EIS1, 1bit DPT 1.001	C,R,W
After receiving the object from the bus, the thermostat display the standby icon (when receiving 1).				
2	On/Off	Display night mode	EIS1, 1bit DPT 1.001	C,R,W
After receiving the object from the bus, the thermostat display the night icon (when receiving 1). Receiving a 0 display the StandBy icon.				

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Nr.	Function	Name	Type	Flag
3	On/Off	Display antifreeze mode	EIS1, 1 bit DPT 1.001	C,R,W
After receiving the object from the bus, the thermostat display the antifreeze icon (when receiving 1). . Receiving a 0 display the StandBy icon.				
4	Display Heat/Cool Mode	Display Heat/Cool Mode	EIS1, 1 bit DPT 1.001	C,R,W
With this object the value of received concerning the actual operating mode (Heat/Cool) permit to display the 2 icon Heat or Cool..The value 0 not display icon.				
5	Temperature to room controller/External Temperature	Temperature for room controller/External Temperature	EIS5, 2 byte DPT 9.001	C,R,T
Actual temperature is transmitted to the bus with this object. The temperature value is sent in case of temperature variation or, if enabled by the parameter, cyclically, but not for the external one.				
6	Setpoint for room controller	Setpoint for room controller	EIS5, 2 byte DPT 9.001	C,R,W,T
This object is used to set the setpoint base + guest variation via bus, normally by a centralized unit. This value is stored in a non volatile memory.				
7	Speed for room controller	Speed for room controller	EIS6, 1 byte DPT 5.001	C,R,T
This object is used to set the speed in % via bus when select manually velocity via push button.				
8	Display speed icon	Display speed icon	EIS6, 1 byte DPT 5.001	C,R,W
After receiving the object from the bus, the thermostat display the relative speed icons, depending ETS parameter.				
9	Fan Status	Fan Status	EIS1, 1bit DPT 1.001	C,W,T
After receiving the object from the bus, the thermostat display the Auto icon.				
10	Fancoil automatic mode	Fancoil automatic mode	EIS1, 1bit DPT 1.001	C,W,T
This object permit to control the fan status mode (Auto/Manu).When manual speed push button is pressed, send value on the bus.				

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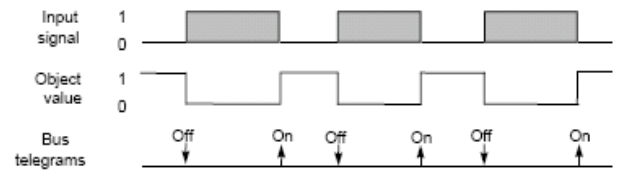| Nr.	Function	Name	Type	Flag
11	Output relay	Output relay	EIS1, 1bit DPT 1.001	C,R,W,T
	This object is used to control the internal output relay from the bus (e.g. from an external KNX sensor or push button) as a normal binary output channel			
12	Digital input	Digital input	EIS1, 1bit DPT 1.001	C,R,T
	This object is visible and transmits an ON/OFF signal regarding the input state to an external actuator (and/or to a visualization software).			
13	Display window icon	Display window icon	EIS1, 1bit DPT 1.001	C,R,W
	After receiving the object from the bus, the temperature unit display the window icon if is enable the work from ETS parameter.			
14	CO2 Threshold	CO2 Threshold	EIS6, 1byte DPT 5.010	C,R,W
	After receiving the object from the bus, the temperature unit display the CO2 icon according to setted thresholds, if enabled from ETS parameter.			
15	Cleaned Room	Cleaned Room	EIS1, 1bit DPT 1.003	C,R,W
	This object transmit an Enable/Disable signal when the user press 3rd e 4th button at the same time.			

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6. Application Notes

Examples of timing diagrams for Input

1. Configured with edge evaluation:
"rising On"

2. Configured with edge evaluation:
"rising Off"
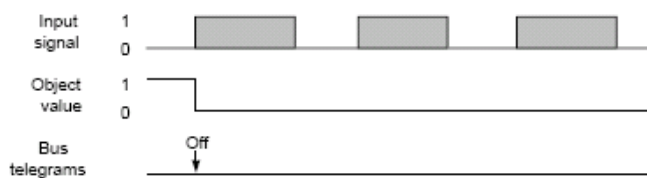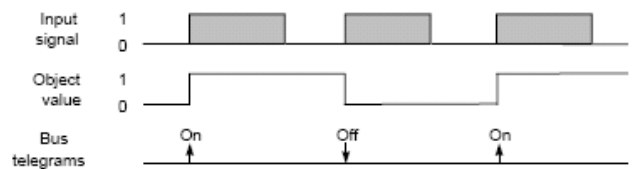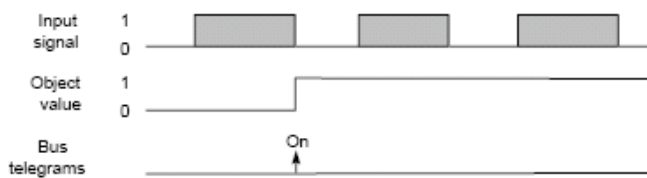

3. Configured with edge evaluation:
"falling On"

4. Configured with edge evaluation:
"falling Off"

6. Configured with edge evaluation:
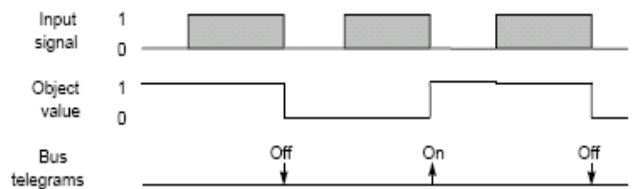"rising Off, falling On"

7. Configured with edge evaluation:
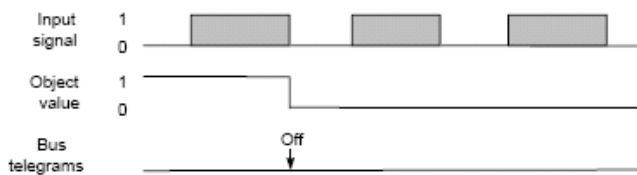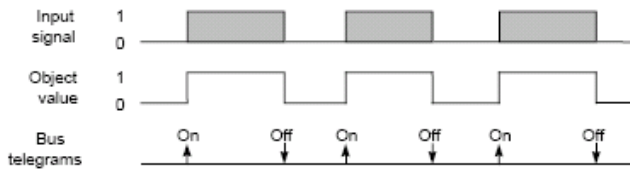"Toggle On Off"

8. Configured with edge evaluation:
"Toggle Off/On"

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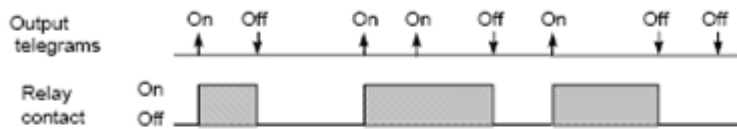
![eelectron logo]

5. Configured with edge evaluation:
"rising On, falling Off"

Examples of timing diagrams for Output

1. Switching

2. Switching with a time switch function

![KNX logo]