Eelecta Homepads

PB40BxxKNX
PB40CxxKNX
PB80AxxKNX
PB80BxxKNX

Product Handbook

Product: **PB40BxxKNX – PB40CxxKNX – PB80AxxKNX – PB80BxxKNX**
Description: **EELECTA HOMEPADS**

Document
Version**:** **1.1**
Date: **09/01/2012**

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➢ **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 newer versions of this manual.

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1. General Introduction

This manual is intended to be used by installers and describes functions and parameters of the devices PB40BxxKNX, PB40CxxKNX, PB80AxxKNX, PB80BxxKNX and how is possible to change settings and configurations using ETS software tool.

2. Product and functional overview

Homepads are designed to be installed in Home and Building installations (i.e. offices, hotels, private houses, etc...).
Eelecta® pushbutton range of KNX devices is divided in 4 different models based on the number of switch, input and temperature sensors provided with the device.

Scheme of Eelecta® pushbutton range:

CODE	SWITCH	INPUTS	TEMPERATURE SENSOR
PB40BxxKNX	4	NO	NO
PB40CxxKNX	4	4	YES
PB80AxxKNX	8	NO	YES
PB80BxxKNX	8	4	NO

Product has 4 (8) push buttons which can be configured to manage lights, dimmers, shutters, etc; and 4 inputs (where present) on the backside to interface free potential contacts (for example sensors, traditional buttons, etc.)
It has 5 white led in the front side, each led freely configurable by ETS and two versions have a temperature sensor included which can be configured as a room thermostat

Push button / Input main functions:

- 1 bit commands: load activation / deactivation commands (ON/OFF/TOGGLE) with short press or with differentiation of long and short press
- 1 byte commands.
- Sending of long action telegrams on the same address of short action or on a different group address
- Cyclic sendings
- Sequences (3 commands mixing 1bit/1byte objects) with different group addresses
- Edges for 1 bit / 1 Byte / sequences (for inputs only)
- Dimmer management (with single or double push-button)
- Blind / Roller Shutter management (with single or double push-button)
- Scene management
- LED driving as independent channel (ON/OFF / BLINKING / PWM (pwm for led 5 only))

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3. General Parameter Configuration

3.1. Parameters

KNX PARAMETER	SETTINGS	
Input debounce time	20 ms	80 ms 150 ms
	40 ms	100 ms 200 ms

This parameter refers to 4 input channels present on PB40CxxKNX and PB80BxxKNX.

When a button connected to the input is pressed it is possible to have the contact opened or closed more than once before fixing into a stable position; this can be caused by a rapid succession of bounces between mechanicals contacts.

For this reason it is important to determine a correct value of the parameter "debounce time" to avoid these bounces could be taken by the device as input switching.

How this parameter works: after the device has detected a change of status for an input channel, it waits for a time equal to the time set as "debounce time" before updating the value of the corresponding data point. The input signal is not evaluated during this time.

This parameters affects all 4 device input channels (where present)

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KNX PARAMETER	SETTINGS
Delay on Power-up (5-15 sec)	5 ÷ 15 seconds
Through this parameter is possible to set the delay of transmission of telegrams after a power on by selecting the time by which the device is allowed to send telegrams. In large systems after a power failure or shutdown this delay avoids to generate excessive traffic on the bus, causing slow performance or a transmission block. If there are different devices that require sending telegrams on the bus after a reset, these delays must be programmed to prevent traffic congestion during the initialization phase. The input detection and the values of objects are updated accordingly at the end of the transmission delay time At the end of ETS programming the device behaves like after a power on.	
Minimum time long press buttons	0,3 sec 0,4 sec 0,5 sec 0,8 sec 1 sec 1,2 sec 1,5 sec 2 sec 3 sec 5 sec 8 sec 10 sec
Determines how long must be a press to be considered long; if shorter than the selected value the press will be considered short. This is for the frontal push buttons.	
Minimum time long press inputs	Same values as previous parameter
This is for the inputs on the back side.	
Temperature sensor function	▪ Temperature sensor ▪ Thermostat
If the temperature sensor is present (PB40CxxKNX and PB80AxxKNX) it is possible to select if the function should be "Temperature Sensor": measures and sends temperature on the bus "Thermostat" : controls different types of actuators regulating heating and cooling	
Disable button object	▪ Inactive ▪ Disable buttons ▪ Disable buttons and inputs
This parameter, if active, show a communication object which permits to enable/disable the operations of frontal push button and inputs, this is useful for cleaning or maintenance in order to avoid to send unwanted telegrams.	
Initial value for disable button object	▪ Enabled ▪ Disable
Here is possible to set the value of the enable/disable object after power on.	

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4. Channels Configuration

It's possible to configure two channels or two inputs to work together by selecting the value "combined" in "Channel Configuration" page.
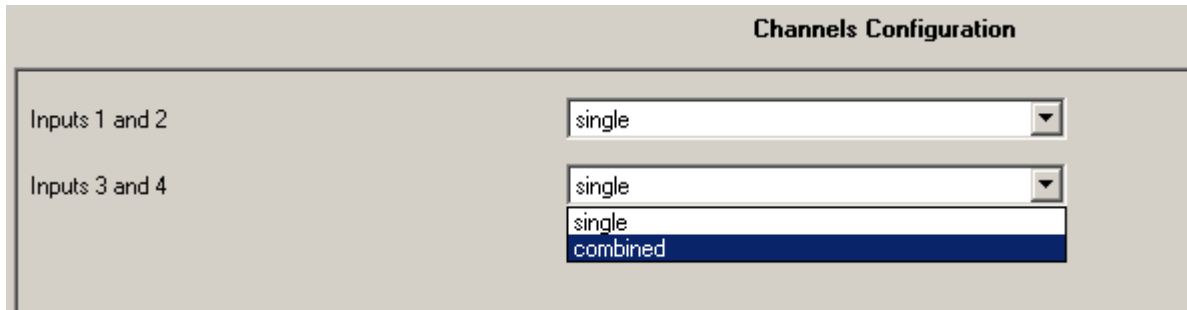
This function is present when device has inputs (PB40CxxKNX or PB80BxxKNX) or when it has 8 push buttons (PB80AxxKNX or PB80BxxKNX).
When value "combined" is selected the function programmable for 2 channels/inputs are:

- Dimming
- Shutter / blind management

And the channels linked together are:
- CH1 / CH5   (for PB80AxxKNX or PB80BxxKNX)
- CH2 / CH6   (for PB80AxxKNX or PB80BxxKNX)
- CH3 / CH7   (for PB80AxxKNX or PB80BxxKNX)
- CH4 / CH8   (for PB80AxxKNX or PB80BxxKNX)
- INPUT 1 / INPUT 2   (for PB40CxxKNX or PB80BxxKNX)
- INPUT 3 / INPUT 4   (for PB40CxxKNX or PB80BxxKNX)
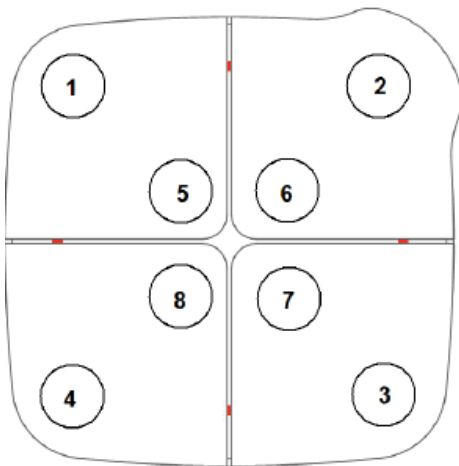
Inputs:
1. Input N° 4
2. Common
3. Input N° 3
4. Common
5. Common
6. Input N° 2
7. Common
8. Input N° 1

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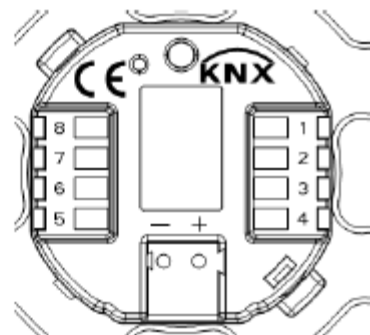
5. Channel / Input <x> Configuration

For each of the 8 input channels, present on the device, the selections are made through a configuration page.

Every single channel or input can be configured to perform one of the following functions:
- Activation on press (activation on edge - **for inputs only**)
- Activation on short and long press
- Dimming
- Shutter and blinds
- Scene
- Command in sequence (on short and long press)
- Command in sequence (on edge) – **for inputs only**

KNX PARAMETER	SETTINGS
Function	- Activation on press - Activation on short and long press - Dimming - Shutter and blinds - Scene - Command in sequence (short/long press) - Command in sequence (on edge) – **for inputs only**
- Activation on press (edge for inputs) - Activation on short and long press - Dimming - Shutter and Blind - Scene - Command in sequence (short /long press) - Command in sequence (edge)	see paragraph **5.1 - Activation on press/edge** see paragraph **5.2-Activation short/ long press** see paragraph **5.3 - Dimming** see paragraph **5.4 - Shutter and Blind** see paragraph **5.5 - Scene Management** see paragraph **5.6 - Command in sequence** see paragraph **5.6 - Command in sequence**

5.2. Activation on press / edge

The "Activation on edge " allows you to configure the sending of telegrams when the state of the contact switch from open to close and vice versa.
You can set to send a telegram with different values associated with different edges, or decide to send commands only one of the two fronts

"Activation on press" is the same as "Activation on edge " ; it differs because on frontal push button only the press action is detected and not the release action.

With the "Activation of the edge" selection device can also be configured to send periodic messages with repetition period.

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KNX PARAMETER	SETTINGS
Mode sending telegrams	• Immediate on open/close & cyclic on open • Immediate on open/close & cyclic on close • Immediate & cyclic on open/close

Note 1:
When periodical sending is enabled for one of the two edges switching in the state where "no telegram" is associated causes the periodic sending stop.

Note 2:
If you want to handle both instant sending and periodic sending on only one of two fronts without performing an action on the other, for this edge of input you must select the option "no telegram".

Note 3:
If you connect an input to a wind, rain or frost sensor with dry contact output you should probably set the parameter "mode sending telegrams" as " Immediate & cyclic on open/close" in order to have the periodic sending of telegrams . (Check telegrams and time expected from the actuator controlled by the sensor).

Feedback object	▪ Enabled ▪ Disable

Can be used when push button is set as "1 bit – Toggle" in order to have always the status of actuator updated.

5.3. Activation short/ long press

The difference duration between short and long press is defined by the generic parameter "Minimum time for long press buttons" for push buttons and "Minimum time for long press inputs" for inputs . The parameter is unique and applicable to all buttons/inputs configured in the short and prolonged activation. You can set to send a telegrams with different values on short and long press or decide to send commands only on one of this events.

T_{PL} = MINIMUM TIME FOR LONG PRESS

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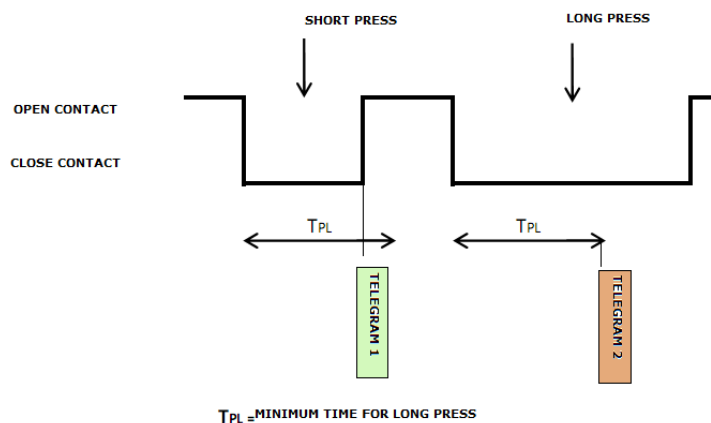
When contact is closed and the debounce time is over then counting time to contact closure starts; if the contact is opened again (note that debounce time is considered also in contact opening) before time exceeds TPL time, device executes the command associated with the event of "short press" and if, on the contrary, TPL timeout expires and contact is still closed then the command associated with the event of "long press" is executed.

The parameters and mode of transmission of telegrams can be managed through "activation on long and short press" are the same set with the configuration "Activation of press (edge)" to the exclusion of the function of cyclic sending that is not provided here.

5.4. Input: Dimming

Through the dimming function it's possible to control a light dimmer using short & long press of a push button connected to the input channel (for rear inputs) or a push button in the front of device.

Each channel uses 2 communication objects:
- 1 bit dimension for ON /OFF command associated to short press operation
- 4 bit dimension for brightness regulation associated to long press operation

5.5. Input: Shutter and Blind

Through the Shutter and Blind function it's possible to control Roller Shutters or Blinds using short & long press of a push button connected to the input channel .(for rear inputs) or a push button in the front of device.

Each input uses 2 communication objects:

- 1 bit dimension for STEP /STOP command associated to short press operation
- 1 bit dimension for UP / DOWN command associated to long press operation

5.6. Input: Scene Management

Function	Scene
Scene number (0-63)	0
Store scene on long press	Enabled
Enable learn scene object	Enabled

In this configuration page it's possible to set the input channel for scene management: learn and recall scene commands.
These different behaviour (recall and learn) are performed through two different actions (short and long press) of a push button connected to the input channel.(for rear inputs) or a push button in the front of device.

Learn scene on long press action is enabled by a parameter.

KNX PARAMETER	SETTINGS
Scene Number	Number of the scene: 0 ÷ 63
This parameter sets the value of the scene you intend to learn / recall (one per channel). Remember that output devices (i.e. actuators, etc.) generally can manage several scenes, each identified by a value (that varies from 0 to 63); therefore is important to set this parameter correctly and matching the number set on the actuators.	
Store scene on long press	• Disable • Enable
If disable, long press action is ignored and no telegram is sent to the bus; if enable on long press action a learn scene telegram is sent to the bus.	
Enable learn scene object	• Disable • Enable
If this parameter is enabled you have a communication object (size = 1 bit). When this object receives a telegram "1" then the function associated to the long press of the button (send the telegram storage scenario) is enabled, when it receives a a telegram "0" the command associated with the long press is not sent.	

5.7. Commands in sequence

The function allows you to associate to short and long press, sequence of different commands on the bus.
For inputs this function is available for short and long press or for edges evaluation.
The sequence consists of 2 or 3 commands which can each be sized as 1 bit or 1 byte.
Once defined the number of elements in the sequence (2 or 3) and their size (1-bit / 1 byte), you can associate different commands to each element of the sequence or decide to send commands only on one of the two events.
The waiting time between a command and the next is fixed in 1second.
Each object communication can be connected to a different group address.

For example it is possible to define a sequence:

Command	Dimension	Command on short press (edge)	Command on long press (edge)
A	1 bit	ON (to actuators)	OFF (to actuators)
B	1 byte	100% (to a dimmer)	0% (to a dimmer)
C	1 byte	COMFORT (to a thermostat)	ECONOMY (to a thermostat)

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6. Temperature Sensor Function

The temperature probe present in some versions of the device allows a reading of the temperature in a range from 0 °C to +45 °C with resolution 0.1 °C.

KNX PARAMETER	SETTINGS	
Temperature sensor calibration	-1,4°C ÷ +1.5°C with resolution o,1°C	
It's 'possible to add an offset to the temperature value measured by the probe before it is sent on the bus or made available for reading.		
Temperature cyclic sending	• Disable • Enable	
It's 'possible to enable the periodic sending of measured temperature value, if this option is disabled, reading can be done only on read-request.		
Sending interval	1 min	30 min
	5 min	1 h
	10 min	12 h
	15 min	24 h
If you enable the periodic sending the sending interval is set by this parameter.		
Enable threshold T1 (low)	• Disable • Enable	
You can also enable two thresholds for temperature and, for each thresholds, send a telegram of attention (of size 1 bit) whenever the measured temperature exceeds or falls below the threshold. For each threshold can be set whether to send the telegram "1" when the measured temperature "T" exceeds the threshold temperature "Tx" and then send the telegram "0" when the measured temperature "T" becomes less than the threshold temperature "Tx "or vice versa		
Enable threshold T2 (high)	• Disable • Enable	
See description of parameter "***Enable threshold T1 (low)***".		
Value threshold T1	0°C ÷ +45°C	
Value threshold T2	0°C ÷ +45°C	
Telegram to send when T < T1	• Telegram "0" • Telegram "1"	
Telegram to send when T > T2	• Telegram "0" • Telegram "1"	
Object enable for Trigger 1 and 2	• Hide • Show	
It's 'possible to enable/disable the remote temperature sensor with a communication object. When this object is enabled and receives a telegram "1" the temperature probe is active and sends trigger telegrams according to thresholds T1 and T2 values; otherwise only temperature value is periodically sent.		
Initial value enable object	• 0 • 1	
Allows to initialize enable object as active (1) or inactive (0) after power on, reset or download.		

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7. Thermostat Function

The temperature sensor can be configured as a thermostat to control the temperature of a room or area by driving heating or cooling equipment / air conditioning fan coils / valves or through commands on / off to heating /cooling elements such as radiators, heat pumps, split, etc. ..
The thermostat controls temperature in a range from 0 ° C to + 45 ° C with 0.1 ° resolution.

7.1. Target Setpoint Settings

The control setpoint can be changed by bus in two different ways, via one of these objects:
- HVAC Mode
- SETPOINT Mode

The right policy to adopt depend from the device that acts as a master, a time thermostat, a control panel or a SW supervisor. Here the list of object for changing the active mode or setpoint value by bus.

SETPOINT MODE object

When "Thermostat control mode" parameter is selected with the value SETPOINT MODE, object HVAC Mode is no longer visible.
Each time the thermostat receives a value on object SETPOINT MODE (2 byte size), it is used as setpoint for temperature control.

HVAC MODE object

Using the object HVAC MODE (1 byte size), you can set the thermostat in one of the following modes: OFF; ECONOMY; STANDBY; COMFORT; each mode is associated with a setpoint set by a ETS parameter.
OFF mode is associate to setpoint antifreeze in heating mode and high temperature protection in cooling mode.

SETPOINT ADJUSTMENT object

The object SETPOINT ADJUSTMENT allows you to temporarily change the setpoint value used by the thermostat applying an offset to the current value.
If the thermostat is operating in "HVAC MODE" the offset value is applied from the time of receipt of a valid telegram on object SETPOINT ADJUSTMENT until this value does not change, even in case of change of the active mode (Comfort and Standby only); this does not happen with regard to Economy mode and Building Protection: in this modes the value of object SETPOINT ADJUSTMENT is forced to 0.
Similarly, if the thermostat is operating in SETPOINT MODE the offset value is applied also when the setpoint value received on this object changes.

COMFORT object

COMFORT object (1 bit size) is visible only when "Thermostat control mode" parameter is selected with the value HVAC MODE.
When a telegram "1" is received thermostat goes in COMFORT mode (it applies for both heating and cooling), on receipt of a telegram "0", thermostat returns to the mode set by HVAC MODE object.

WINDOW CONTACT object

This object, if enabled, has higher priority than HVAC MODE, SETPOINT MODE, COMFORT objects.
When a telegram is received ("0" or "1") on the communication object WINDOW CONTACT thermostat enters a power saving mode:

• OFF (if running in HVAC MODE)
• Setpoint antifreeze / high temperature protection (if running in SETPOINT MODE)

If the telegram received indicates that the window is opened thermostat change its mode or setpoint after 1 minute from the reception of the telegram.
When it receive a telegram corresponding to state "window closed" it restores the previous mode, always with a delay of 1 minute . The value of SETPOINT ADJUSTMENT is always restored.
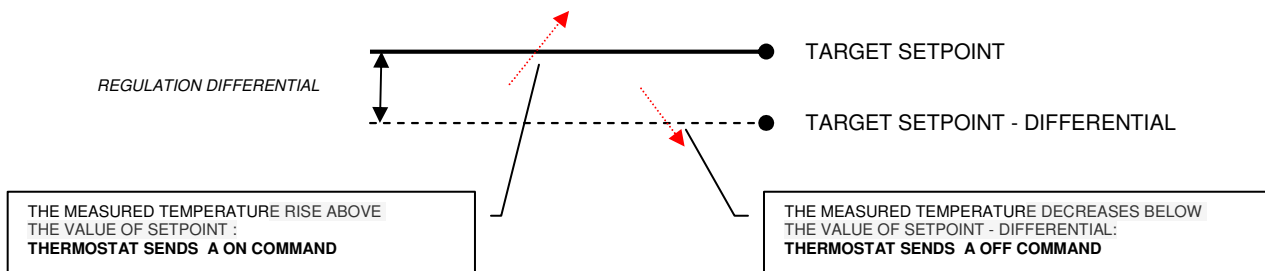
7.2. Control algorithms

7.2.1. Two points on/off

Control algorithm "2 points on / off" is used to control heating or cooling elements that can be controlled by switching on and off of the same elements, radiators, underfloor heating with on-off valves, boilers, etc. ..
When the thermostat switches to "winter mode" (heat mode) sends a off command on object ON/OFF COOLING and operates the control only through the object ON/OFF HEATING (the object ON/OFF COOLING is therefore not updated anymore until it returns in "cooling mode").
Therefore in the transition from " winter" to "summer" mode sends a off command on ON/OFF HEATING commands and activates the control through the object ON/OFF COOLING.

on/off control in heating mode:
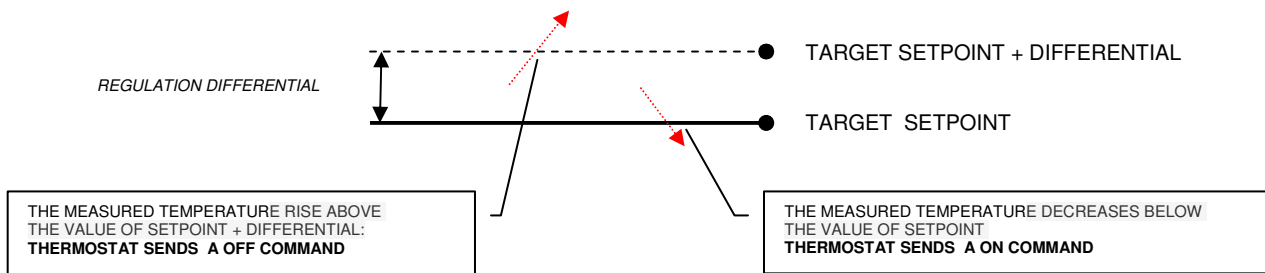
on/off control in cooling mode:

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7.2.1. On/off with pwm control

On/off with PWM control is an algorithm that reduces the effects of hysteresis around the set point value by adjusting the controls on the values ranging from 0% to 100% where 0% means "control off" and 100% means "maximum control action".
Once a cycle time is defined the thermostat sets the actuator to ON for a fraction of the cycle time and OFF for the remaining part. Driving the actuator with the control value of 80% means that it is active (ie, ON) for 80% of cycle time and OFF for the remaining 20%.

KNX PARAMETER	SETTINGS
Cycle time (TCp)	10, 20, 30, 60 min
It defines the time interval over which share the on and off part of the control	
Proportional band (Bp)	0.8, 1.2, 1.6, 2.0 ℃
The proportional band BP is a range of temperatures between "Setpoint" and "Setpoint-Bp" in heating mode and between "Setpoint" and "Setpoint+Bp" in cooling mode ,within this interval, the thermostat controls the temperature using the proportional algorithm; outside It drives actuator always in ON or OFF. When temperature is inside this range device wait the end of the cycle time before calculating the duty cycle of the next cycle. When temperature is outside of this range : below "Setpoint-Bp" in heating mode or above "Setpoint+Bp" in cooling mode it starts a new cycle as soon as temperature enters the Bp	

PWM control in heating:

PWM control in cooling:

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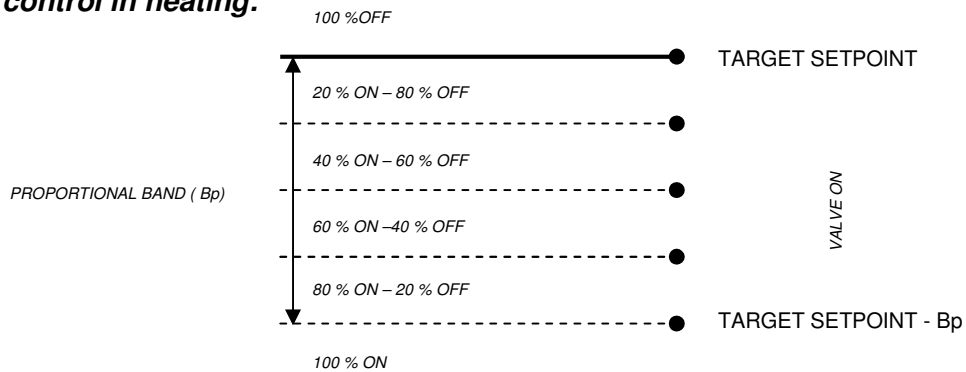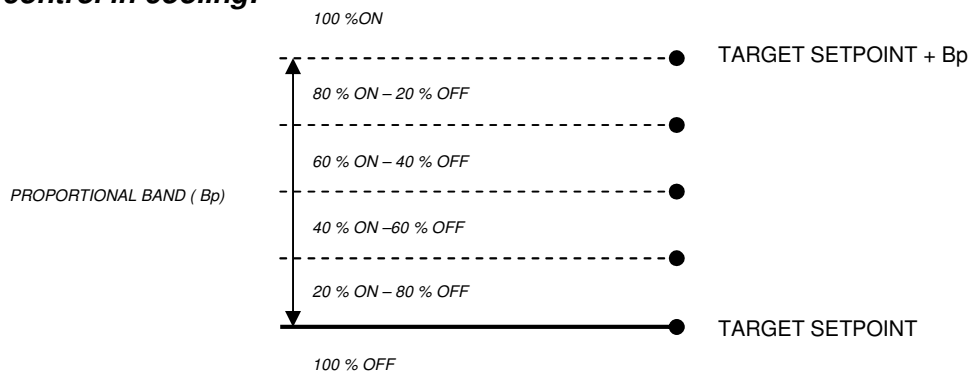
7.2.1. Fan coil on/off

Fan coil is a device that controls the flow of cool or heating liquid driving a valve (2-pipe fan coil) or two valves (4-pipe fan coil).
Liquid exchanges heat/cool with the environment through a ventilation system controlled by a fan. The fan is driven by an engine that typically has 3 windings that can be enabled at 3 distinct speeds.
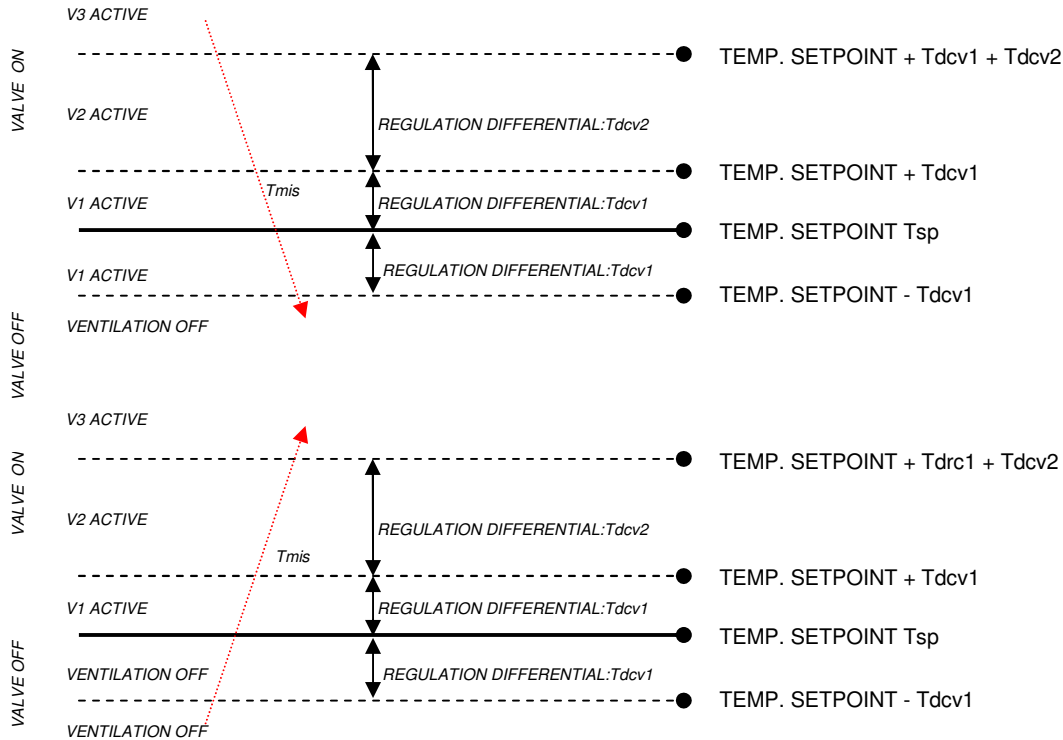
Control logic for a 3 speed fan coil in heating:
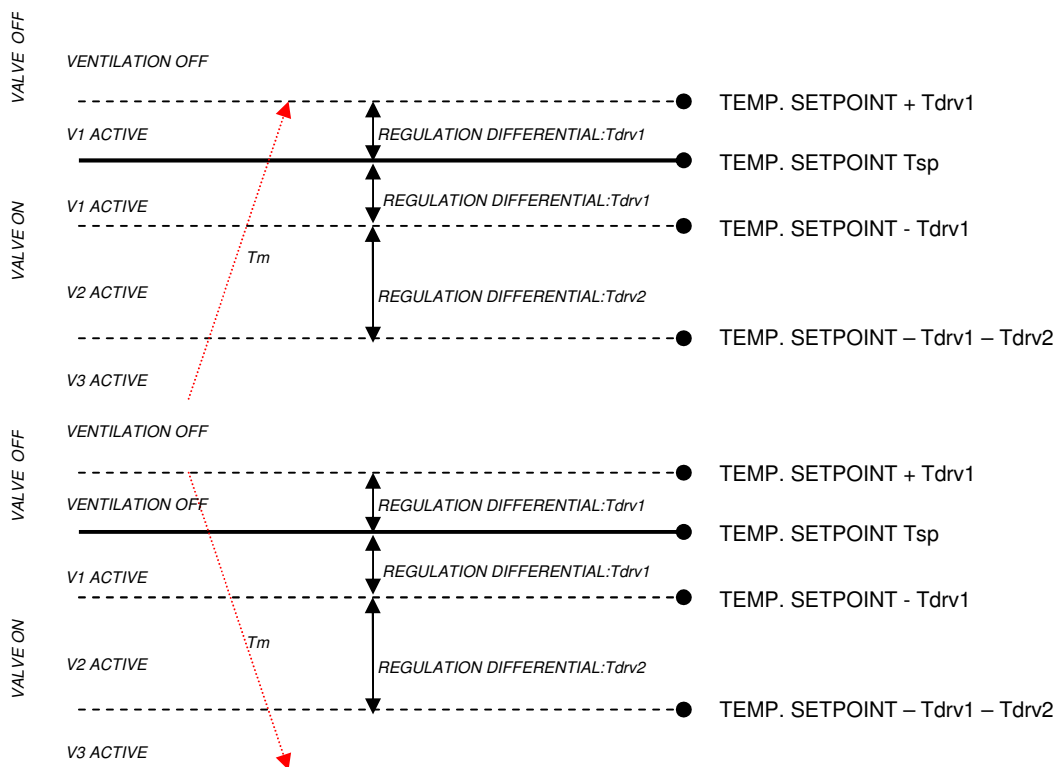
Where:
- T_{sp} : Target setpoint temperature
- T_{drv1} : regulation differential in heating mode for V1 Speed
- T_{drv2} : regulation differential in heating mode for V2 Speed
- T_m : Actual measured temperature

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Control logic for a 3 speed fan coil in cooling:

Where:
- T_{sp} : Target setpoint temperature
- T_{dcv1} : regulation differential in cooling mode for V1 Speed
- T_{dcv2} : regulation differential in cooling mode for V2 Speed
- Tm   : Actual measured temperature

7.2.1. Fan coil control % (or generic continuous control)

Logic and parameters are the same used in On/off with PWM control mode; the difference is that now the proprotional value is sent to the bus via a 1 byte object format as a % value from 0% to 100%.

This mode is useful to control fan coils (selecting 2 or 4 pipes) or generic proportional actuators as valve drivers only linking the 1 byte communication object and avoiding to link the valve objects.

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