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TOUCH YOUR WORLD

BX-E-R12xxx

Doory

Numeric keypad for access control
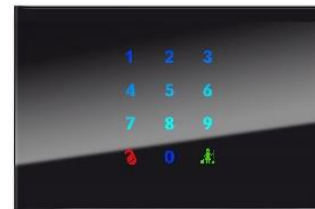
Rev.	Date	Description	Editor
01	23/11/2023	1st Release	F. Melandri P. Zambelli

KNX

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Glossary

- CO: communication object
- Datapoint: type of data; see KNX standard documentation
- LED: light emitting diode
- Msg: message

1 Introduction

BX-E-R12xxx (Doory) is KNX Blumotix keypad dedicated to access control.

From a physical point of view, this device is made to be mounted on normal recessed boxes (type 503) and also on round/square boxes (diameter 60 mm).
Since the front panel of the keypad is rectangular, two versions of the device are available with horizontal or vertical orientation; the customer can choose the model at his discretion.
The keypad includes a glass front with 13 capacitive keys, one of these can be dedicated to an additional command or the activation of a doorbell. The keypad is also equipped with a proximity sensor, two separate illuminations of the body of the device on the high sides-low and right-left; in addition, there is an independent backlight of 12 keys (numeric and symbolic).
The glass front can be customized with colors, writings and drawings on specific customer request.

With regard to functionality and parameterization, the keypad manages an access control logic with memorization of numeric codes directly on the device. A smartphone app is available for storing and erasing codes.
All the standard functions typical of hotel services can be managed by this keypad and there is also a logic of room energy management.
These functions are particularly suitable in accommodation, tourist and hotel facilities.
The base lighting, the proximity sensor, the numerical keys, the buttons dedicated to specific functions and the LEDs that illuminate them are configurable and manageable in various modes depending on the type of application required.

2 General Information

2.1 Wall mounting

As mentioned, the device can be mounted on normal rectangular recessed boxes and also on round/square ones. With the vertical version installed on 503 box, it is necessary to wall the box by directing it vertically.
The installation takes place by removing the glass front, fixing with screws (specific screws: self-tapping, cylindrical head, cross, 3.5x25 DIN7981 UNI6954) the body of the device to the slots offered by the recessed boxes.

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Keypad power is provided exclusively via KNX bus; no other electrical connections are required.

2.2 First activation

Once the keypad body is fixed to the built-in box, it is advisable to program the KNX physical address with the ETS software; then proceed with the KNX bus that will power the device. The KNX programming button is located both on the back of the keypad (accessible through a hole in the rear plug) and on the front (more convenient as it is accessible even with the keypad body already fixed to the built-in box). The activation of the KNX programming mode is indicated both by a red LED visible on the rear cap, and by the simultaneous lighting of the LED keys at the 4 corners of the front (buttons 1, 3, F1, F3 horizontally; 1, 4, F1, F2 vertically).
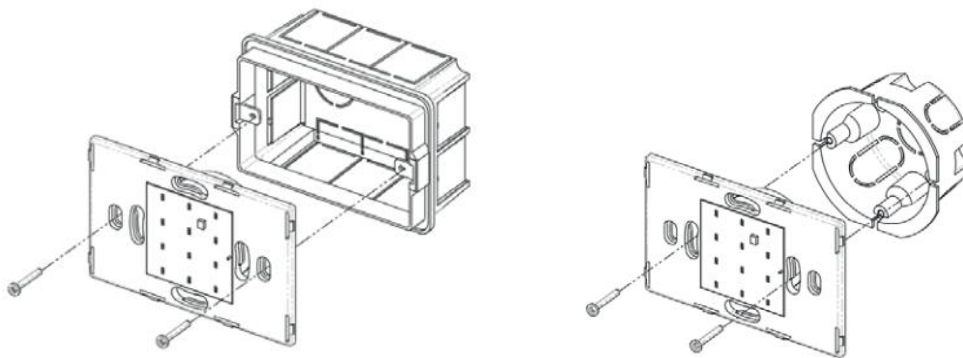
Once the programming of the KNX physical address is ready, it is possible to mount the glass front of the keypad. Any changes to the device configuration parameters will also be possible without removing the cover.
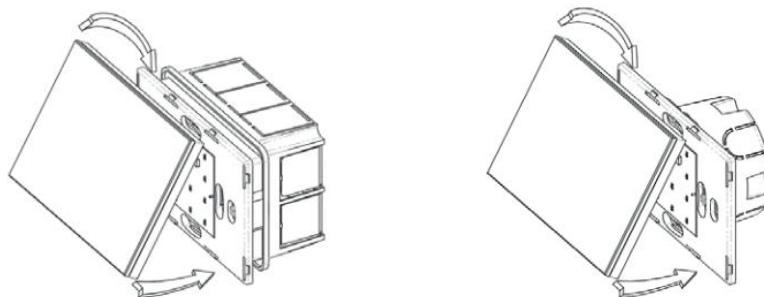
2.3 Keys layout

The following pictures show the layout of the keys in the two horizontal and vertical variants: the numeric keys (0-9), which are dedicated to the input of the code by the

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user; the symbolic keys (indicated with F1 and F2) and optionally, the thirteenth key (F3).
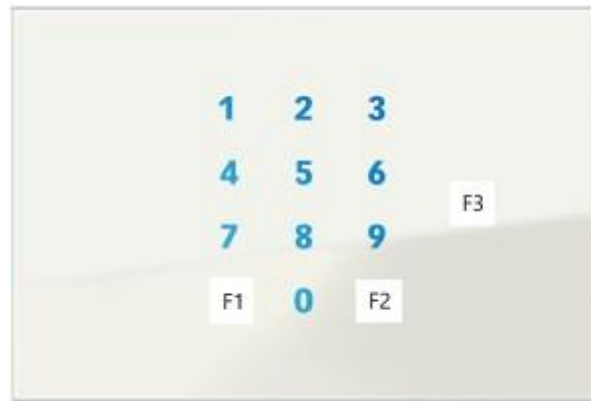
Below are some examples of custom horizontal and vertical graphics with numeric keys, function keys, logos and drawings.

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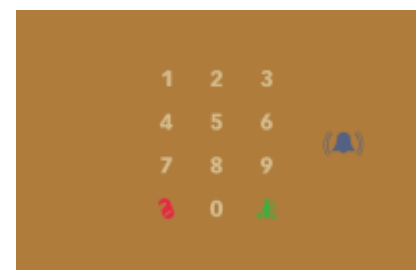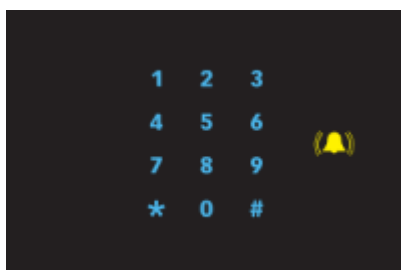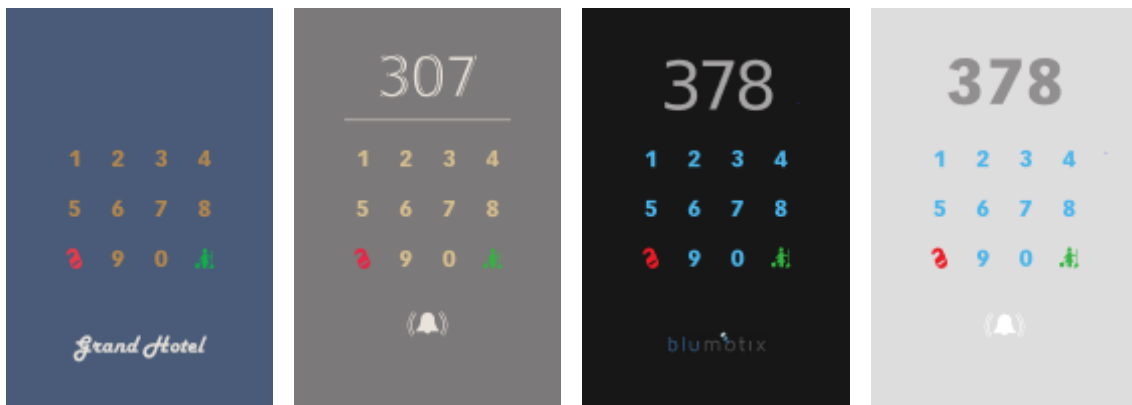
3 Setup

The ETS database supplied with BX-E-R12xxx keypad allows the complete configuration of all the available functions through the modification of the parameters and the use of the offered communication objects.

3.1 General settings

The first section is called "General settings". Below is an analysis of the parameters and functions described in this section.

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1.2.1 BX-E-R12xxx - DOORY > General settings

3.1.1 Keypad style

This parameter allows to choose the orientation of the device. It must reflect the device that has to be installed. The possible choices are horizontal or vertical.

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Keypad style   ○ Vertical   ● Horizontal

Keypad style   ● Vertical   ○ Horizontal

3.1.2 Beep on key press

It enables or disables sound generation at the touch of a key on the keypad.

Beep on key press   ○ Disable   ● Enable

The mode set by this parameter can be changed by writing the corresponding CO 2 setting; the new value will be returned by the status CO 3.

- CO value = 1: sound enabled.
- CO value= 0: sound disabled.
-

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| | 2 | Keypad | Enable/disable beep on touch | 1 bit | C - W - - | switch |
| | 3 | Keypad | Enable beep on touch status | 1 bit | C R - T - | switch |

3.1.3 Proximity sensor

The keypad can detect the approach of a hand to the front cover; this is possible thanks to the proximity sensor integrated in the device.

The proximity detection allows some features such as the automatic activation of the backlight of the keys or the keypad base. It is also possible to send a dedicated message on the KNX bus when the sensor is engaged.

The proximity sensor parameters are explained below.

Proximity sensor	◯ Disable ⦿ Enable
Sensitivity	Medium ▼
Activation message type	Approach 1, removal 0 ▼
Hold time to send	1 sec ▼

In addition to the parameter that enables the sensor, we have the possibility to select the detection sensitivity that develops in a range of about 5 to 10 cm (5 cm low sensitivity; 10 cm high sensitivity).

The parameter "Activation message type" enables the sending on the bus of a dedicated CO when the sensor is engaged for at least the time interval set in the parameter "Hold time to send".

| | 0 | Keypad | Proximity sensor | 1 bit | C R - T - | switch |

The value of the sent message can be:
- "Disable": no message is sent (CO not visible).
- "Approach 0, removal 1": with sensor occupied for hold time, message 0 is sent; with not occupied sensor, message 1 is sent.
- "Approach 1, removal 0": as described above, but with message values reversed.

- "Toggle approaching": it alternatively sends 1 and 0 when the sensor is occupied for at least the set time.

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3.1.4 Send message of pressed keys

Send message of pressed keys   ○ No ● Yes

If set to "Yes", it enables the ability to send a message on the bus with each number key pressed. The value of the CO corresponds to the numerical value of the button (0-9).

| 4 | Keypad | Numeric key pressed | 1 byte | C R - T - | counter pulses (0..255) |

If in the parameter section "Function keys", the F2 key has been chosen as confirmation to validate the access code entered, then an additional CO will be available that will be transmitted on the bus with value 1 at the press of the button (see paragraph 3.3).

| 5 | Keypad | Confirm key pressed | 1 bit | C R - T - | boolean |

3.2 Online Presence

This section provides some useful parameters to control the smooth operation of the device by a supervisor. Since this device is dedicated to access control, it may be necessary to constantly monitor the operation of the keypad. The parameters managed are illustrated in the following figure.

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1.2.1 BX-E-R12xxx - DOORY > General settings > Online presence

- General settings

  Online presence

  Function keys

  Function lights

  Numeric keys

  Backlight

- Access control

- Room energy control

Online presence

Enable alive msg reception	○ No ◉ Yes
Timeout (sec)	10
Enable alive msg transmission	○ No ◉ Yes
Interval (sec)	10
Enable keypad ID transmission	○ No ◉ Yes
Keypad ID	123456
Interval (sec)	30

3.2.1 Enable alive msg reception

This parameter enables the keypad to receive, within a certain time interval, a specific message of online presence of a supervisor device. Basically, the keypad claims to receive periodically, from the KNX bus, a message of value 1, on the CO 8 "Remote request". The time interval between one reception and the next should not exceed the value of the "Timeout" parameter.

If the supervisor cyclically sends the value 1, within the timeout, then the CO 9 "Remote request reply" will assume the value 0 of correct operation; if instead the supervisor stops sending or exceeds the timeout interval, the CO 9 "Remote request reply" will signal error by sending value 1 on the bus.

8	Online	Remote request	1 bit	C R W - -	boolean
9	Online	Remote request reply	1 bit	C R - T -	boolean

3.2.2 Enable alive msg transmission

This parameter enables the keypad to send a message of value 1 cyclically to the bus. The sending period is specified by the "Interval" parameter. This function can be used by a possible supervisor device to make sure that the Doory keypad and the data bus are working correctly.

10	Online	Transmit presence	1 bit	C R - T -	boolean

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3.2.3 Enable keypad ID transmission

This parameter enables the keypad to cyclically send a message containing a 6-digit (0-999999) identification number to the bus, which the user can specify in the "Keypad ID" parameter. The sending period is set in the "Interval" parameter.

11	Online	Transmit ID	4 bytes	C R - T -	counter pulses (unsigned)

3.3 Function keys

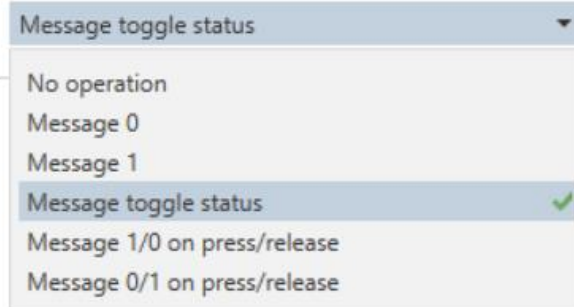These parameters affect the function keys named F1, F2, F3.

3.3.1 F1/F3 key

The F1 and F3 keys can be used to send general messages on the bus. The value of the command CO that has to be sent when the button is pressed is configured by selecting an item of the parameter "Function".

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F3 key

Function   Message toggle status   ▼

No operation
Message 0
Message 1
Message toggle status   ✓
Message 1/0 on press/release
Message 0/1 on press/release

If "Message toggle status" is selected, an additional state CO is enabled whose value is first read, then reversed and finally sent to the command CO.

35	Key F3	Command	1 bit	C	R	-	T	-	switch
36	Key F3	Status	1 bit	C	-	W	-	-	switch

3.3.2 F2 Key

The F2 key can be used in two different ways.

- In order to use a confirmation key in the access code input procedure after the numeric keys, F2 key can be used for this purpose; the parameter must be set as below.

F2 key

Access code validation WITHOUT pressing F2 button   ● No   ○ Yes

- In order to make the validation phase automatic (without pressing any confirmation button) in the access code input procedure, then F2 key can be used for general purpose as already shown for F1/F3 (section 3.3.1).

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F2 key

Access code validation WITHOUT pressing F2 button ○ No ◉ Yes

Code entry auto reset interval   20 sec ▼

Function   Message toggle status ▼

No operation
Message 0
Message 1
Message toggle status ✔
Message 1/0 on press/release
Message 0/1 on press/release

F3 key

Function

The use of F2 in general mode (command and status CO) also makes the parameter "Code entry auto reset interval" appear.

The validation of the inserted code will happen automatically when the number of digits selected for the length of the code are typed (paragraph 3.7.2), so the parameter "Code entry auto reset interval" represents a security: after this time interval, the digits typed and stored temporarily by the keypad are removed from the memory, so now the keypad it again waiting for the first digit of the code.

This prevents a user from entering a part of the code and leaving the operation pending; after some time, another user could continue the entry, ignoring that they had already been previously entered other digits.

3.4 Function lights

These parameters affect the LED lights that illuminate F1 and F2 function keys. The F3 function button does not provide lighting.

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Both light indications have the parameter of enabling the "Hotel mode"; based on the selected value, these will be the following behaviours:

3.4.1 Hotel mode disabled

By selecting "No", the light of the function key will be managed in the same way as the numeric key lights (paragraph 3.5).

3.4.2 Hotel mode enabled

By selecting "Yes", the light of the function key is controlled by the dedicated communication object; the keypad will return the status controlled on another specific CO.

41	Light F2	Set	1 bit	C - W - -	switch
42	Light F2	Status	1 bit	C R - T -	switch

In this last case, the parameters "Level when inactive" and "Level when active" are available and allow to specify the brightness level of the LED to be set when the command CO is written by the KNX bus respectively with the values 0 and 1.

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3.5 Numeric keys

The light mode of the numeric keys is defined by the parameters on this page of the ETS library. The possible modes of operation are: "On when touch" or "Follows the msg value".

3.5.1 On when touch

It represents an automatic operation of the LEDs of the numeric keys light. In fact, lighting, shutdown and the relative levels of light intensity will be governed by the proximity sensor. In this case, the proximity sensor must be enabled (section 3.1.3).

"Standby level" sets the light intensity level of the numeric keys when none of them is pressed and when the proximity sensor is not occupied.

"Proximity level" is the light intensity when no button is pressed but the proximity sensor is occupied; for example, a hand is present in the sensor's range of action.

When the proximity sensor switches from occupied to not occupied (released), the parameter "Released proximity light off delay" represents the delay in the transition from light level "Proximity level" to "Standby level" of the numeric keys LEDs.
"Touch level" sets the light intensity level of the pressed number key.
When the key switches from pressed to released, the parameter "Released key light off delay" represents the delay in the passage from intensity "Touch level" to intensity "Proximity level" of the LED of the numeric key.

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3.5.2 Follows the msg value

In this mode, the light indications corresponding to the numeric keys do not depend on the operation of the proximity sensor, but are governed exclusively by communication objects dedicated to this purpose.

A CO is available for each key that sets the key light on or off.

17	Key light 1	On/off		1 bit	C	-	W	-	-	switch
18	Key light 2	On/off		1 bit	C	-	W	-	-	switch
19	Key light 3	On/off		1 bit	C	-	W	-	-	switch
20	Key light 4	On/off		1 bit	C	-	W	-	-	switch
21	Key light 5	On/off		1 bit	C	-	W	-	-	switch
22	Key light 6	On/off		1 bit	C	-	W	-	-	switch
23	Key light 7	On/off		1 bit	C	-	W	-	-	switch
24	Key light 8	On/off		1 bit	C	-	W	-	-	switch
25	Key light 9	On/off		1 bit	C	-	W	-	-	switch
26	Key light F1	On/off		1 bit	C	-	W	-	-	switch
27	Key light 0	On/off		1 bit	C	-	W	-	-	switch

The parameters "Standby level" and "Touch level" represent the light intensities set when the CO corresponding to the button takes the values 0 (off) and 1 (on) respectively.

Numeric keys

Light mode	⚪ On when touch 🔘 Follows the msg value
Standby level	Off ▼
Touch level	Maximum ▼

3.6 Backlight

The backlight of the keypad allows to spread a light through the transparent plastic base of the device. The diffused light on the 4 sides is reflected on the wall where the device is mounted, creating an attractive lighting effect.

BX-E-R12xxx differentiates the backlight, its parameters and communication objects into two distinct groups: "Backlight 1" and "Backlight 2". In fact, it is possible to manage the light of the top/bottom and left/right sides separately; both offer the same control options.

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All the 3 modes provide the setting of the brightness levels corresponding to the inactive state and the active state of the backlight (1 and 2); see the parameters "Level when inactive" and "Level when active".

Level when active	Maximum ▼
	Off
	Low
	Middle
	High
	Maximum ✔
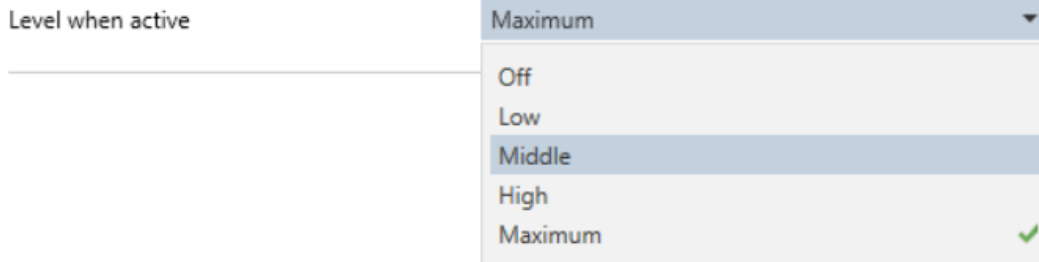
Similarly, all the 3 modes allow to control the backlight also through a communication object that override the default behaviour set in the parameter "Mode".

13	Backlight	Set On/Off 1	1 bit	C - W - -	switch
14	Backlight	Set On/Off 2	1 bit	C - W - -	switch

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1.2.1 BX-E-R12xxx - DOORY > Impostazioni generali > Retroilluminazione

- Impostazioni generali
  - Presenza online
  - Tasti funzione
  - Luci funzione
  - Tasti numerici
  - **Retroilluminazione**
- + Controllo accessi
- + Controllo energia camera

Retroilluminazione 1

Modalità	Automatica ▼
Timeout (sec)	5 ▲▼
Livello quando inattiva	Off ▼
Livello quando attiva	Massimo ▼

Retroilluminazione 2

Modalità	Sempre attiva ▼
Livello quando inattiva	Off ▼
Livello quando attiva	Massimo ▼

3.6.1 Mode: Always off

The lighting is normally inactive. It is possible to still control it using the CO shown above.

3.6.2 Mode: Always on

Lighting is normally on. It is possible still control it using the CO shown above.

3.6.3 Mode: Automatic

Represents the automatic operation of the backlight. In this case, lighting occurs when the proximity sensor is occupied. The shutdown will occur automatically after the proximity sensor has been released and kept free for the time indicated by the parameter "Timeout".
This mode of operation requires the proximity sensor to be enabled (paragraph 3.1.3).

3.7 Access control

The keypad provides access management through the user's insertion of a numeric code of 4 or 6 digits; it is not necessary to use other accessories such as keys or magnetic cards. Note that the validation of the code is managed directly on the keypad, in fact the device is able to store up to 1000 numeric codes.
The access control system can be integrated with the BMS BX-NEMO software, interfaced with the main hotel management systems on the market, that allows the

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supervision and management of the facilities of the accommodation and all accesses via smartphone, tablet or traditional pc.

Doory and KRIM apps allow to manage the check-in and check-out operations from smartphone/tablet, renew and update the access codes when new guests arrive and whenever necessary.
It is also possible to force a door to open in case of loss of the code; the manager can do it from the phone by just pushing one button of the app.

3.7.1 Default access status at startup

When switching on the device or at the end of a download of the ETS application program, the device outputs the KNX access messages enabled or disabled based on the setting of this parameter.

The number and value of output messages depends on the "Output commands" configuration (section 3.7.7).

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3.7.2 Number of digits in the code

It sets the number of digits that form the numeric access codes.

Number of digits in the code   ⦿ 4   ◯ 6

3.7.3 Delete all access codes at next ETS download

The keypad keeps all codes saved (up to 1000) in its internal memory. This parameter allows to set the download behaviour of the ETS application program; it is possible to keep the previously stored codes or delete them. In case of deletion, a warning message pops up to warn of the danger of the operation.

Delete all access codes at next ETS download ◯ No ⦿ Yes

> ℹ WARNING! All the access codes, previously stored, will be deleted at next application download.

3.7.4 Acoustic/Visual feedback for access attempt

When the user enters a numeric code for access, the outcome of the operation can be signaled by the device with a sound (acoustic return) and with a flashing of the backlight (visual return) of the keypad base. With this parameter it is possible to choose whether or not to enable the two feedbacks.

Acoustic feedback for access attempt   ◯ No ⦿ Yes

Visual feedback for access attempt   ◯ No ⦿ Yes

The sound and flashing are different depending on the outcome of the access.
With wrong code (access denied), three short and rapid sounds and flashes are generated (0.2 sec).
With correct code (access allowed), a single sound and long interval flashing (1.5 sec) is generated.

3.7.5 Alarm for incorrect codes entered

This is a security measure that limits the number of login attempts with incorrect code.

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Alarm for incorrect codes entered   ○ No ● Yes

This measure prevents the user from continuing to enter invalid access codes, hoping to find a valid one sooner or later. An alarm is reported through a communication object if the conditions defined by the parameters described below occur. The alarm can be cancelled with another communication object.

"Number of incorrect codes" is the number of incorrect code entries allowed before the alarm is reported. The device maintains an internal counter of the number of incorrect attempts made by the user.

"Counter reset time": after this specific interval of time (time starts since the last insertion of incorrect code), the internal counter of the attempts is reset. This function prevents the alarm from being issued when attempts are made at a distance of time from each other. With the values of the parameters, indicated in figure, if the wrong attempts are performed at intervals of 4 minutes from each other, the alarm will never be issued because the counter is reset every 3 minutes (180 sec).
If this parameter is set to zero, the counter is never reset. If only one incorrect code per day is entered, the alarm will be issued on the fifth day.

"Wait interval for valid code" from the insertion of the first incorrect code, the system waits for this specific time interval before triggering the alarm. Only the insertion of a correct code, within this time, avoids the emission of the alarm.
If this parameter is set to zero, the described control is not executed.

1.2.1 BX-E-R12xxx - DOORY > Access control > Invalid codes alarm

General settings	Invalid codes alarm	
— Access control		
Invalid codes alarm	Number of incorrect codes	5
Output commands	Counter reset time (sec; 0 = no reset)	180
	Wait interval for valid code (0 = no alarm)	60
+ Room energy control	Alarm msg value	○ 0 ● 1
	Reset alarm msg value	○ 0 ● 1

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"Alarm msg value" specifies the value of the CO transmitted on the KNX bus to signal the alarm for incorrect codes.

70	Codes	Alarm for incorrect codes entered	1 bit	C R - T -	alarm

"Reset alarm msg value" specifies the CO value required to cancel the alarm condition.

71	Codes	Reset incorrect codes alarm	1 bit	C - W - -	reset

3.7.6 Enable DPT16.001 (14 bytes) to store/delete code

The communication objects enabled by this parameter are used to save and delete access codes in the internal memory of the keypad.

52	Codici	Richiesta salva	14 bytes	C - W - -	Character String (ISO 8859-1)
53	Codici	Richiesta cancella	14 bytes	C - W - -	Character String (ISO 8859-1)

The value of these objects is string type with a maximum extension of 14 bytes: these messages can be written at most with 14 numeric characters.

Since the access codes are 4 or 6 digit formats, it is possible to specify from which position of the 14 bytes string the code to be saved or deleted starts; for this it is possible to use the parameter "Code start position in DPT16.001".

Enable DPT16.001 (14 bytes) to store/delete code	○ No ● Yes
Code start position in DPT16.001	1

For example, having set the 6-digit code length (paragraph 3.7.2) and the position in that parameter to 5, the values in CO 52 and 53 must have the following format:

<div align="center">"xxxx123456xxxx"</div>

Where "123456" represents the numeric code, while the characters "x" are not significant and are therefore ignored by the system.

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Another example, with the 4-digit code length (paragraph X.X.X) and the position in the above parameter at 1, the values in CO 52 and 53 must have the following format:

"1234xxxxxxxxxx"

Writing CO 52 stores the code in the memory, unless it is already present. Writing CO 53 erases the code from memory, only if it is present.

As a result of writing CO 52 or 53, there will always be a keypad response on CO 58 (paragraph 3.7.8).

The user can use either these COs or others, with different format (datapoint) that perform the same function (paragraph3.7.8); the choice depends only on the type of need of the user and the final application.

3.7.7 Output commands

This page defines messages and communication objects to the KNX bus related to access control management. The typing of access codes by the user and the consequent validity check of the same are translated by the device into KNX messages.

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Each access attempt by the user, can trigger the sending of up to 4 messages on the bus simultaneously.

Messages can be of different types ("Access msg type X"); the 1-bit type ("DPT1.003 - Enable") also allows time management of the message.

The output messages are differentiable depending on whether the code entered is valid or not ("Activation msg", "Deactivation msg").

By setting "Send access msg cyclically", it is possible to periodically send on the bus the result of the last access attempt.

Here is an example of CO for the 4 output commands:

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80	Access	Out 1 - DPT 1.003 - Enable	1 bit	C R - T -	enable
85	Access	Out 2 - DPT 5.001 - Send value 0-100 %	1 byte	C R - T -	percentage (0..100%)
86	Access	Out 3 - DPT 17.001 - Scenario	1 byte	C R - T -	scene number
87	Access	Out 4 - DPT 20.102 - HVAC Mode	1 byte	C R - T -	HVAC mode

3.7.8 Communication objects for access codes management

In addition to the communication objects that depend on the configuration of the parameters described above, there are also CO always available for access control management.

54	Codes	Store request	4 bytes	C - W - -	entrance access
55	Codes	Delete request	4 bytes	C - W - -	entrance access
58	Codes	Store/delete request result	4 bytes	C R - T -	entrance access
60	Codes	Number request	1 byte	C R W - -	counter pulses (0..255)
61	Codes	Number reply	2 bytes	C R - T -	pulses
64	Codes	Erase request all	1 bit	C R W - -	boolean
65	Codes	Out of space	1 bit	C R - T -	boolean
68	Codes	Request by index	2 bytes	C R W - -	pulses
69	Codes	Reply by index	4 bytes	C R - T -	entrance access
76	Access	Simulation	4 bytes	C R W - -	entrance access
78	Access	Try result	4 bytes	C R - T -	entrance access

CO 54 e 55 – Store/Delete request

They are used to save and delete access codes in the internal memory of the keypad (same function as CO 52 and 53, paragraph 3.7.6).
The 4 bytes format is type DPT15.000 "entrance access"; the values to be written are in hexadecimal format; example of values to be attributed to these CO:

<div align="center">0x12, 0x34, 0x56, 0x00</div>

Length 6 digits, code 123456, the last byte is not significant.

<div align="center">0x12, 0x34, 0x00, 0x00</div>

Length 4 digits, code 1234, the last byte is not significant.

By writing CO 54, the code will be stored, unless it is already present.
By writing CO 55, the code will be erased from memory only if it is present.
As a result of writing CO 54 or 55, there will always be response from the keypad on the CO 58.

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In the first 3 bytes, the answer contains (2 bytes if 4-digit code) the code that is the object of the command. Then, in case of trying a storage:

- if the storage is successful, the response contains flags D=1 and P=1
- if the storage fails, the answer contains the flag E=1

in case of attempting a cancellation:

- if the cancellation is successful, the answer contains the flag P=1
- if the cancellation is unsuccessful, the answer contains the flag E=1

Below, the description of the DPT15.000 directly from the documentation of the KNX standard.

Format:	4 octets: $U_4U_4U_4U_4U_4U_4B_4N_4$			
octet nr.	4 MSB	3	2	1 LSB
field names	D_6 D_5	D_4 D_3	D_2 D_1	E P D C Index
encoding	UUUUUUUU	UUUUUUUU	UUUUUUUU	b b b b N N N N
Encoding:	$D_6, D_5, D_4, D_3, D_2, D_1$:	binary encoded value		
	N:	binary encoded value		
	E, P, D, C:	See below		
Unit:	Not applicable.			
Resol.:	Not applicable.			
PDT:	PDT_GENERIC_04			

Datapoint Types

ID:	Name:	Use:
15.000	DPT_Access_Data	FB

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Field	Description	Encoding	Range
$D_6, D_5, D_4,$ D_3, D_2, D_1	digit x (1…6) of access identification code. Only a card or key number should be used. System number, version number, country code, etc are not necessary. Ciphered access information code should be possible in principle. If 24 bits are not necessary, the most significant positions shall be set to zero.	Values binary encoded.	[0 … 9]
E	Detection error	0 = no error 1 = reading of access information code was not successful).	{0,1}
P	Permission (informs about the access decision made by the controlling device)	0 = not accepted 1 = accepted	{0,1}
D	Read direction (e.g. of badge) If not used (e.g. electronic key) set to zero.	0 = left to right 1 = right to left	{0,1}
C	Encryption of access information.	0 = no 1 = yes	{0,1}
Index	Index of access identification code (future use)	Value binary encoded.	[0 … 15]

Codifica DPT 15.000

CO 58 – Store/delete request result

It represents the message emitted by the keypad as a result of writing or deleting an access code using the communication objects described above (CO 52, 53, 54, 55). It is useful for any supervision software that manage the list of access codes and take care of storing and deleting these codes in the keypad. This CO is in DPT15.000 format.

CO 60 e 61 – Number request/reply

CO 60 is a 1-byte message that asks the keypad for information about the amount of managed codes.

The answer from the device to the interrogation happens on the CO 61, that has dimension 2 bytes.

The values expected in writing/reading are:

- CO60 = 1 <-> CO61 = number of access codes currently stored in memory
- CO60 = 2 <-> CO61 = number of codes available for storage
- CO60 = 3 <-> CO61 = total number of codes managed by the device (1000)

CO 64 – Erase request all

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If written with value 1, it requires the deletion of all access codes stored in the keypad.

CO 65 – Out of space

It reports the out of memory space for access codes. If the device emits the value 1 on this CO, it means that no other codes can be stored.

It can be issued as a result of storage or cancellation commands and is always issued when the device is switched on and at the end of the ETS application download.

After storing the last available code, this object is notified with a value of 1 to indicate that there is no more memory available.

On this object the value 0 is notified when a code or all the memory is deleted and it is possible again to store new codes.

CO 68 – Request by index

CO 68 is a 2 bytes message that asks the keypad for information about a specific code memory location. The value written in this CO must be between 0 (index of the first valid position) and the maximum number of codes that can be stored, minus 1 (999). The answer to writing will be on CO 69.

CO 69 – Reply by index

It represents the response to CO 68 in DPT15.000 format.

If a code exists in that location, then it will be returned in the first 3 bytes (2 bytes if 4-digit code) and the flags D=1 and P=1 will be set.

Conversely, if in that location there is no code, the first 3 bytes will be set to 0 and the flag E=1 will be set.

CO 76 – Simulation

This communication object allows to send an access code from the bus to attempt access. is like simulating the user entering the code digits on the keypad.

The data structure is always DPT15.000, where in the first 3 bytes (2 bytes if 4-digit code) the access code must be inserted and in the fourth byte the flag P=1 must be set.

CO 78 – Try result

Every time someone tries to access it by entering a code in the keypad (even writing on CO 76), this communication object will notify the result of the operation; the

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data format is DPT15.000: in the first 3 bytes will be transcribed the code that is being used to try to access. If access is successful, the P flag will be set to 1. If access fails, all flags will be 0.
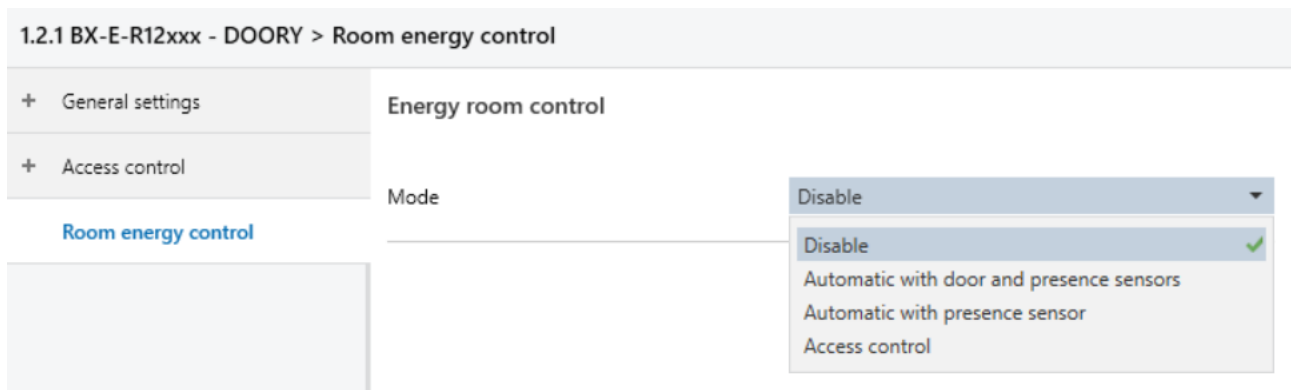
3.8 Room energy control

The keypad includes the management of the detachment/ automatic connection of the energy of the room; this functionality is normally used in hotel rooms and accommodation facilities.

The function is configurable in different modes, depending on the installation needs. The result of signal processing and integration with other configuration parameters allow to control an actuator (typically relay) that interrupts/connects the energy of the room automatically. With this same logic, it is possible to send other commands to enable/disable room utilities, scenario selection, HVAC mode, thermoregulation.

3.8.1 Mode

Parameterization is different depending on the selected operation mode

The three possibilities are:
1 – "Automatic with door and presence sensors"
2 – "Automatic with presence sensor"
3 – "Access control"

Mode 1 – "Automatic with door and presence sensors"

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It involves the use of a sensor or microswitch that signals the closing of the door of the room (signals the guest's exit from the room) and a PIR sensor that detects the actual presence of people in the room (the guest enters or is present in the room).

When the system detects the guest's exit from the room and does not detect any presence in it, it triggers a timer at the end of which it will disconnect the energy.

If a presence is detected in the room, during the timing, the process is interrupted and the energy will be maintained.

With energy already detached, detection of a presence will trigger an energy hang-up command.

Note that the management works by considering the signal fronts of the door and PIR sensors; the messages related to the output sensor and the presence sensor must first be activated and then return to the resting state to obtain a proper functioning of the logic.

1.2.1 BX-E-R12xxx - DOORY > Room energy control

Energy room control

+ General settings	
+ Access control	Mode — Automatic with door and presence sensors ▼
− **Room energy control**	
Output commands	Energy output at startup — On ▼

Force output msg ○ Disable ◉ Enable

Msg polarity ○ Active when 0 ◉ Active when 1

Energy detachment time

minutes 0

seconds 30

Detachment time modification msg ○ No ◉ Yes

Exit sensor msg polarity ○ Active when 0 ◉ Active when 1

Presence sensor inhibition time

ℹ This value will be internally limited to the "Energy detachment time"

minutes 0

seconds 3

Presence sensor msg polarity ○ Active when 0 ◉ Active when 1

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Mode 2 – "Automatic with presence sensor"

It involves the use of a single PIR sensor that detects the presence of people in the room. When it fails to detect a presence in the room, it starts a timing at the end of which the device will send the disconnection command energy.

If a presence is detected in the room, during the timing, the process is interrupted and the energy will be maintained.

With energy already detached, detection of a presence will trigger an energy hang-up command.

Note that the management works by considering the PIR sensor signal fronts; the sensor-related messages must first be activated and then return to a resting state to achieve proper logic operation.

Mode 3 – "Access control"

It does not provide signals from external sensors but the release/re-coupling of the energy of the room depends on the management of the access codes; in particular we will have the following two conditions:

- Input of a valid access code by the user = power activation
- Erasing valid access code from memory = power off

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Below the description of the parameters, some will not be significant in certain modes.

3.8.2 Energy output at startup

When the device is switched on or the application is downloaded from the ETS software, the energy status is defined by sending messages configured on the "Output commands" page to the KNX bus. The state of the energy can be decided by this parameter:

"Off" = power off, sending deactivation messages
"On" = active energy, sending activation messages
"Previous state" = energy as before shutdown or ETS download.

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"Sync to presence sensor" = the bus requires to read the PIR sensor status; the energy is set according to this. This option is not provided in the "Access control" mode.

3.8.3 Force output msg

It enable the presence of CO 95: by writing it, it is possible to force the state of the energy on or off without considering the logic and the sensors.

Force output msg	⚪ Disable ⚫ Enable
Msg polarity	⚪ Active when 0 ⚫ Active when 1

In the parameter "Msg polarity" it is possible to specify the activation and deactivation value to be assigned to the CO.

95	Energy room	Force output	1 bit	C - W - -	switch

3.8.4 Energy detachment time

In mode 1 - "Automatic with door and presence sensors", it represents the time interval between the user's output (micro-door event) and the actual energy detachment.
In mode 2 - "Automatic with presence sensor", it represents the interval of time of waiting between the detection of the absence of the guest (free PIR) and the effective detachment of the energy.

Energy detachment time

minutes	0
seconds	30

3.8.5 Detachment time modification msg

It enables the presence of CO 96 and 97 modification and feedback of the time of disconnection energy.

Detachment time modification msg	⚪ No ⚫ Yes

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The value of the parameter "Energy detachment time" can be overwritten with CO 96; the new value is returned on CO 97.

96	Energy room	Set detachment time	2 bytes	C - W - -	time (s)
97	Energy room	Detachment time status	2 bytes	C R - T -	time (s)

3.8.6 Exit sensor msg polarity

Only available in mode 1 - "Automatic with door and presence sensors", it defines the active front of the sensor signal that detects the opening and closing of the room door.

Exit sensor msg polarity   ○ Active when 0   ● Active when 1

3.8.7 Presence sensor inhibition time

Only available in mode 1 - "Automatic with door and presence sensors". The time interval in which the system ignores the possible activation of the presence sensor.

Presence sensor inhibition time

ⓘ This value will be internally limited to the "Energy detachment time"

minutes	0
seconds	3

When the guest leaves the room, it starts the timer for the energy detachment; also the time inhibition is counted starting from the event exit.
During this interval, any activation of the PIR presence sensor will not be considered and then the process will proceed by detaching the energy at the end of the disconnect timer.
The PIR activations that will ensure that the energy is not detached are the ones that occur after the inhibition interval and before the disconnection timer expires.

3.8.8 Presence sensor msg polarity

Available in mode 1 and 2, it defines the active front of the PIR sensor signal that detects the presence of a guest in the room.

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Presence sensor msg polarity   ⦿ Active when 0 ⊙ Active when 1

3.8.9 Sensor communication objects

Depending on the mode of operation, it may be present or absent.

The CO 90, a keypad input available only in mode 1, must be written with the status of the sensor that detects the opening and closing of the room door.

90	Energy room	Exit sensor	1 bit	C - W - -	window/door

The CO 91, a keypad input available only in mode 1 and 2, must be written with the status of the sensor that detects the presence of people in the room.

91	Energy room	Presence sensor	1 bit	C - W - -	occupancy

3.8.10 Output commands

All power management modes have a parameter page that defines messages and communication objects to the KNX bus. The processing of the events and signals described for the three modes are translated by the device into KNX messages that will control the energy through actuator devices.

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1.2.1 BX-E-R12xxx - DOORY > Room energy control > Output commands

+ General settings

+ Access control

− Room energy control

    Output commands

Output commands

Send output msg cyclically	No ▼

Output msg type 1	DPT 5.010 - Send value 0-255 ▼

Activation msg	○ No ● Yes
Value	1

Deactivation msg	○ No ● Yes
Value	11

Output msg type 2	DPT 17.001 - Scenario ▼

Activation msg	○ No ● Yes
Value	2

Deactivation msg	○ No ● Yes
Value	12

Output msg type 3	DPT 20.102 - HVAC mode ▼

Activation msg	○ No ● Yes
Value	Comfort ▼

Deactivation msg	○ No ● Yes

Each power activation and deactivation event can trigger up to 4 messages on the bus simultaneously.

Messages can be of different types ("Output msg type X"); the type datapoint 1 bit ("DPT1.003 - Enable") also provides time management of the message.

The output messages are differentiated depending on whether the energy is switched on or off ("Activation msg", "Deactivation msg").

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By setting "Send output msg cyclically", it is possible to periodically send the result of the last event on the bus.

Here is an example of CO for 4 output commands:

104	Energy room	Out 1 - DPT 5.010 - Send value 0-255	1 byte	C R - T -	counter pulses (0..255)
105	Energy room	Out 2 - DPT 17.001 - Scenario	1 byte	C R - T -	scene number
106	Energy room	Out 3 - DPT 20.102 - HVAC Mode	1 byte	C R - T -	HVAC mode
107	Energy room	Out 4 - DPT 5.001 - Send value 0-100 %	1 byte	C R - T -	percentage (0..100%)