ModKB: Module for PIN code access control

ModKB module has been specially developed for the connection to third-party numerical keypads using WIEGAND standard protocol.

ModKB module interfaces, through MCP XT controller, to the well tested CONTATTO world, thus integrating it with an easy to use PIN code based access control system. The main features are the following:

- 2 generic CONTATTO inputs
- 1 relay output for electrical door lock control
- 2 LED outputs for OK and NOK codes
- WIEGAND 32 or 26 protocol (SITE code and PIN)
- programmable pulse duration on door lock relay
- "SITE code" management for keypad identification
- PIN code management
- up to 30 different PIN codes can be defined and stored
- for each PIN it is possible to define the days of the week during which the access is granted
- for each PIN it is possible to define up to 2 time slots during which the access is granted (provided that the access occurs during one of the allowed days)
- the module takes 1 input address reporting on the bus the entered PIN code, the status of the generic inputs and other information for diagnostic
- the module takes 1 optional output address allowing to separately lock each one of the 30 PIN codes and to drive the relay

ModKB module features a 12-way removable terminal block for the connection to the keypad (not provided), to the generic inputs and to the LEDs reporting the granted or denied access information. The normally opened contact of the internal relay of ModKB is available on a separated 2-way removable terminal block, allowing the connection to the electrical door lock or similar devices.

An additional 5-way removable terminal block allows the connection to the CONTATTO bus.

ModKB module housing is a reduced-height 3 modules box for DIN rail mounting.

Operation

ModKB module allows the access control through the entering by the user, on a keypad, of one of the 30 codes previously stored in the module.

ModKB is compatible with keypads having serial WIEGAND protocol; the data transmitted by the keypad is made by the SITE code (identifying the keypad) and the PIN code. The SITE code is a 16-bit number for WIEGAND 32 and it is a 8-bit number for WIEGAND 26; in both cases the PIN code is a 16-bit number.

The SITE code must be set in the keypad during the setting up of the plant using the procedure defined by the manufacturer of the keypad.

Since the PIN code is a 16-bit number, then it will be in the range 00001 e 65535.

The module can be set to recognize up to 30 different PIN codes, for instance each one related to different categories of personnel; if the entered code corresponds to one of the stored 30 ones, ModKB will check if the access has been required in a allowed day and in an allowed time slot. The time slots that can be set for each PIN code are two and, once set, they are valid for each allowed day of the week.

All evaluations for deciding if the entered PIN code is valid will be fully executed by ModKB module; the control of the electrical door lock (or similar devices) will be also automatically performed by the module itself.

In this way, the CONTATTO MCP XT controller does not need any specific programming, thus drastically reducing the times needed for the development and the setting up of the access control system. In this way, therefore, the operation of the access control system is guaranteed also in case of temporary failure of the bus.

It is however possible to set ModKB module in order to it does not take autonomous decisions, thus leaving the management of the access to MCP XT controller or to the supervisor of the system; in this case ModKB module will be limited to transmit on the bus the entered OIN code.

Address programming

ModKB module takes one 4-channel / 16-bit input address ; as option, one 1-channel / 16-bit output address can be activated in order to executed some commands as will be described in the following.

The input and output addresses are equal each one to the other, so only a base address is needed; this one must be assigned by FXPRO programmer.

Digital inputs

ModKB module features 2 CONTATTO generic digital inputs, which can be therefore used for the connection to potential-free contacts supplied by the module itself.

These two inputs can be separately configured both for NO and NC logic during the setting up.

Installation

The wiring diagram in Figure 1 shows the connection to be executed between ModKB module and the bus, the keypad, the electrical door lock, the input contacts and the optional LEDs. For details about the connection of the third party keypad refer to the manufacturer technical sheet.

ModKB module features a green LED near to the bus terminal lock, lighted when the module is properly supplied.

The contacts connected to the inputs in Figure 1 are NO type only to give an example, being possible to configure each input according to the desired NO/NC logic (see in the following pages of this manual).

The following table gives some hints about the section of the wires to be used for the connections and the suggested maximum length.

Connection	Suggested wire
Bus	4 x 2.5 mmq not shielded
Inputs	0.5 mmq, MAX 25mt
LEDs	0.22 mmq, MAX 25mt
Door lock	0.5 mmq
Keypad	5 x 0.5mmq, MAX 15mt

Method for the access control

The access control is based on the entering of a PIN code through the keypad.

The check of the entered PIN code, executed by ModKB module, is performed according to the rules described in the following.

The PIN codes to be enabled (up to 30) can be freely defined during the setting up and transferred to the memory of ModKB through the CONTATTO bus.

The first 8 or 16 bits (depending WIEGAND 26 or 32 respectively has been chosen) transmitted by the keypad corresponds to the SITE code set on the keypad itself; this code uniquely identifies the keypad connected to a given ModKB module. The next transmitted 16 bits corresponds to the entered PIN code, thus making a number in the range 00001 to 65535.

ModKB module features a non-volatile memory containing 30 blocks of information, each one related to a different PIN code that must be granted; the same SITE code set in the keypad must be stored in the ModKB memory too.

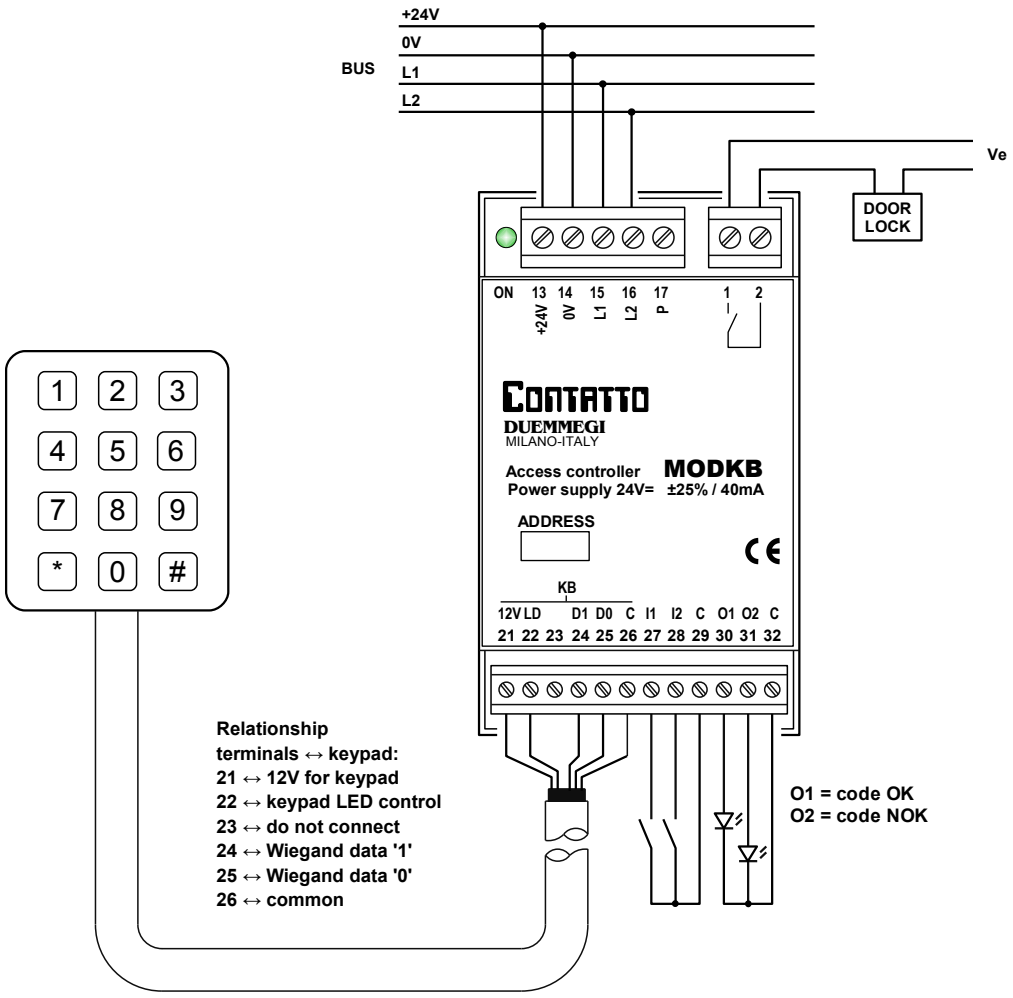


Figure 1: Connection diagram

When the ModKB receives a message from the keyboard, it verifies that the SITE code is correct, then verifies that the entered PIN code is one of those stored; if everything matches, before allowing access, ModKB module also evaluates the following parameters related to that PIN:

- the day of the week when the access is allowed
- the two time slots when the access is allowed

If all the listed conditions have satisfied, then the ModKB module generates a pulse on the relay in order to activate the electrical door lock or other similar device.

Moreover, whether those conditions have been satisfied or not, ModKB will send on the bus some information related to the recognized PIN as described below.

Information from and to ModKB module

ModKB module takes, inside the CONTATTO system, one input and one (optional) output address with the same value.
The output address, if it is not needed, can be disabled during the setting up.

Input section

The input address provides four 16-bit channels, used as described in the following.

Input channel 1: digital inputs

Point	Description
1	Generic input 1 status (1=activated)
2	Generic input 2 status (1=activated)
3	-
4	-
5	-
6	-
7	-
8	-
9	Wrong SITE code
10	Wrong PIN code
11	Access denied for not allowed day of the week
12	Access denied for not allowed time slot
13	-
14	-
15	-
16	-

The **points 1 and 2** report the status of the two generic inputs of ModKB module. The logic of the contacts connected to these inputs depends on the NC/NO configuration which has been chosen, during the setting up, for each one of them. If the input has been configured as NC, then the status on the bus will be 1 when the contact is opened; if the input has been instead configured as NO, the the status will be 1 when the contact is closed.

The **points 9÷12** will be activated when ModKB module denies the access for one of the reasons described above. The information related to these points remains for the time set in the configuration panel of ModKB (Code Permanence, 5 seconds typical value).

Input channel 2: entered code

This channel shows the last PIN code typed on the keypad; this code remains in this channel for the set time (Code Permanence) then it returns to zero.

Input channel 3 and 4: valid PIN codes

These channels report 30 mutually exclusive points, each one corresponding to the occurred recognition of one of the 30 PIN code set in ModKB. The point related to the last valid entered code remains active for the set time (Code Permanence), then it returns to zero.

Point	CH3	CH4
1	PIN 1 OK	PIN 17 OK
2	PIN 2 OK	PIN 18 OK
3	PIN 3 OK	PIN 19 OK
4	PIN 4 OK	PIN 20 OK
5	PIN 5 OK	PIN 21 OK
6	PIN 6 OK	PIN 22 OK
7	PIN 7 OK	PIN 23 OK
8	PIN 8 OK	PIN 24 OK
9	PIN 9 OK	PIN 25 OK
10	PIN 10 OK	PIN 26 OK
11	PIN 11 OK	PIN 27 OK
12	PIN 12 OK	PIN 28 OK
13	PIN 13 OK	PIN 29 OK
14	PIN 14 OK	PIN 30 OK
15	PIN 15 OK	-
16	PIN 16 OK	-

Output section

On the output address, if it has been enabled during the ModKB setting up, four 16-bit channels are available; the following tables shows the arrangement:

Point	CH1	CH2	CH3	CH4
1	Relay pulse	-	PIN 1 lock	PIN 17 lock
2	-	-	PIN 2 lock	PIN 18 lock
3	-	-	PIN 3 lock	PIN 19 lock
4	-	-	PIN 4 lock	PIN 20 lock
5	-	-	PIN 5 lock	PIN 21 lock
6	-	-	PIN 6 lock	PIN 22 lock
7	-	-	PIN 7 lock	PIN 23 lock
8	-	-	PIN 8 lock	PIN 24 lock
9	-	-	PIN 9 lock	PIN 25 lock
10	-	-	PIN 10 lock	PIN 26 lock
11	-	-	PIN 11 lock	PIN 27 lock
12	-	-	PIN 12 lock	PIN 28 lock
13	-	-	PIN 13 lock	PIN 29 lock
14	-	-	PIN 14 lock	PIN 30 lock
15	-	-	PIN 15 lock	ALL lock
16	-	-	PIN 16 lock	-

Activating the **point 1** of CH1, ModKB module generates a pulse on the internal relay, whose duration can be fixed during the setting up; only one pulse will be generated even if the output point 1 remains in active status or less.

The channel 2 is not used. Channel 3 and 4 report 30 digital points which, when activated, deny the access to the related PIN code. The point 15 of CH4, when activated, denies the access to any PIN codes.

Configuration of ModKB module

This paragraph describes the configuration of ModKB module, allowing to adapt its operation according to the requests of the specific application, and to enter the PIN codes s that must allow the access.

For the configuration of ModKB module, MCP IDE program for MCP XT has to be used. The configuration of the module is performed through the CONTATTO bus.

Note: *ModKB module can work only if the MCP XT controller has been installed; the configuration and the programming of MCP XT requires the software package MCP IDE.*

All ModKB modules installed in the plant must be declared in the MCP XT configuration, specifying the addresses as in the following example (where the output address has been supposed enabled):

```
MODKB = ( I100, O100 )
MODKB = ( I101, O101 )
MODKB = ( I102, O102 )
... ... ... ...
```

After having transferred a program to MCP XT containing at least the addresses of installed ModKB modules, the second step is the setting of the operating parameters.

From the menu of MCP IDE select Programming, Modules Configuration and then ModKB.

The window shown in Figure 2 will appear, where:

Module Address: this is the address of ModKB module to be configured.

Enable Output Address: this option enables the output address, thus allowing the execution of commands to the ModKB as described in the paragraph “Output section”.

Pulse Length (msec): it is the duration of the pulse generated on the internal relay of ModKB for driving the electrical door lock or similar devices. This duration can be defined at 100msec steps; the maximum allowed value is 25500, that means 25.5 seconds.

Code Permanence: it is the time, in seconds, during which the information remain in the input section; the maximum allowed value is 255 seconds.

SITE code: it is the code set in the keypad and it is a number in the range 0 to 255 for WIEGAND 26 keypad, or 0 to 65535 for WIEGAND 32 keypad (for the procedure to set this code refer to the documentation of the keypad).

N.C. Inputs: allows to choose the logic for each on e of the two available inputs. If an input has been configured as NC, then the status on the bus will be 1 when the contact is opened; if the input has been instead configured as NO, the the status will be 1 when the contact is closed.

The table in the bottom side of the configuration window shown in Figure 2 allows to define the PIN codes and other related parameters.

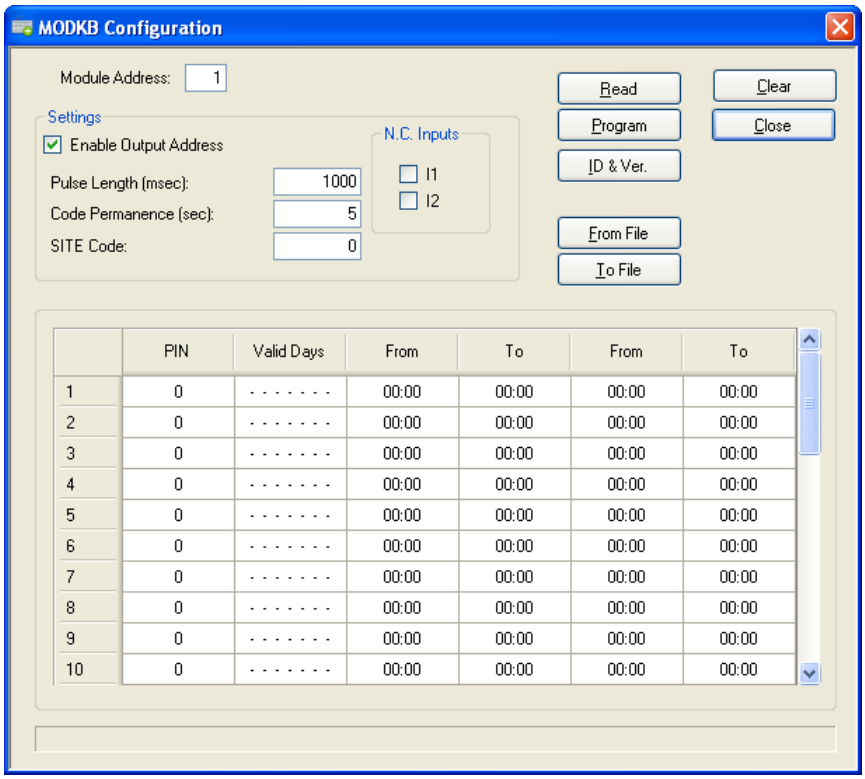
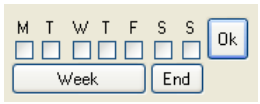


Figure 2: ModKB configuration panel

The first column report a progressive number (1 to 30) related to each one of the possible PIN code; the other columns have the following menaning:

PIN: it is the PIN code that, entered by the keypad, must grant the access. This code must be a number in the range 1 to 65535 (the code 0 means "not used").

Valid Days: these are the days of the week during which the access is allowed. Double clicking with the mouse in the cell, the panel shown at this right side will appear, where the allowed days can be selected (Monday to Sunday). The two buttons under the days of the week allow to select and deselect all the related days. The button OK confirms the executed selection.



From.....To: in this two columns, the time slot during which the access is allowed has to be chosen. Double clicking with the mouse in these cells, the panel shown at this right side will appear, allowing to choose the time with 15 minutes resolution. Enter the desired time in the cell on the bottom left side, then select the minutes clicking on one of the 4 points. The button on the bottom side allows to confirm the executed selection.

The columns related to the times are 4 because 2 time slots are allowed for each PIN.

To enable the access over all 24 hours, enter the character – both in the column From and in the column To for at least one of the two time slots, like in the following example:

From	To	From	To
- : -	- : -	- : -	- : -

To disable one of the two time slots, enter equal values for the start time and for the end time (typically 00:00); In the following example the access is allowed from 10:00 to 14:00:

Dalle	Alle	Dalle	Alle
10:00	14:00	00:00	00:00

Note that, in the following example, the access is allowed over all 24h:

From	To	From	To
10:00	14:00	- : -	- : -

Time slots across the midnight are also allowed as in the following example, where the access is allowed from 22:00 of Saturday to 3:00 of Sunday:

Valid Days	From	To	From	To
- - - - - S -	22:00	03:00	00:00	00:00

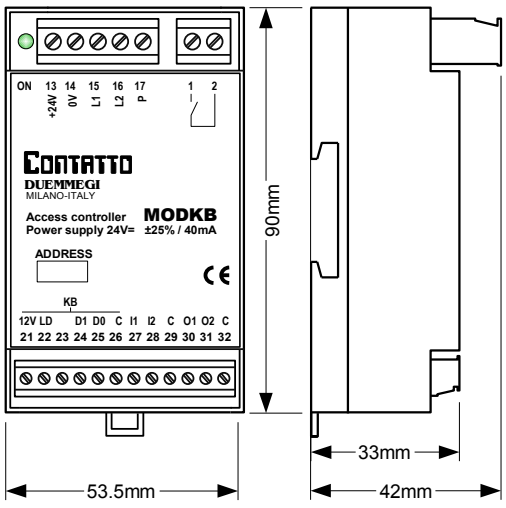
The buttons in ModKB configuration window have the following meaning:

- **Read**: read the current settings from ModKB module and show them in the window
- **Program**: transfer the settings shown in the window to ModKB module
- **ID & Ver.**: report the firmware version of connected ModKB module
- **From File** and **To File**: respectively to open a file containing the settings of a ModKB module and to save in a file the settings shown in the window (the file has .KB extension)
- **Clear**: clear the table
- **Close**: close the ModKB configuration window

Technical characteristics

Power supply ModKB	24V ⎓ ± 25% SELV
Power supply for the keypad	12V ⎓ 50mA MAX provided by ModKB
Total current consumption (ModKB only)	50mA TYP at 24V ⎓
Serial protocol for keypad	WIEGAND 26 and WIEGAND 32 with automatic detection
Digital Inputs	2, for potential free contacts
Current for each digital IN	4mA (with closed contact) TYP
Threshold voltage on dig. IN	8V ⎓ TYP
Number of LED outputs	2 (code OK and NOK)
Current for each LED output	3.5mA internally limited
Number of relay outputs	1
MAX rating for NO contact	5A, 0÷250V~ resistive load 1A, 0÷250V~ inductive load 3A, 0÷30V ⎓ resistive load
Minimum load on NO contact of the relay	1.2W (100mA at 12V⎓)
Operating temperature	-10 ÷ +50 °C
Storage temperature	-30 ÷ +85 °C
Protection degree (both ModKB and TPR/T)	IP20

Outline dimensions



Correct disposal of this product

(Waste Electrical & Electronic Equipment)
(Applicable in the European Union and other European countries with separate collection systems). This marking on the product, accessories or literature indicates that the product should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

Installation and use restrictions

Standards and regulations

The design and the setting up of electrical systems must be performed according to the relevant standards, guidelines, specifications and regulations of the relevant country. The installation, configuration and programming of the devices must be carried out by trained personnel.

The installation and the wiring of the bus line and the related devices must be performed according to the recommendations of the manufacturers (reported on the specific data sheet of the product) and according to the applicable standards.

All the relevant safety regulations, e.g. accident prevention regulations, law on technical work equipment, must also be observed.

Safety instructions

Protect the unit against moisture, dirt and any kind of damage during transport, storage and operation. Do not operate the unit outside the specified technical data.

Never open the housing. If not otherwise specified, install in closed housing (e.g. distribution cabinet). Earth the unit at the terminals provided, if existing, for this purpose. Do not obstruct cooling of the units. Keep out of the reach of children.

Setting up

The physical address assignment and the setting of parameters (if any) must be performed by the specific softwares provided together the device or by the specific programmer. For the first installation of the device proceed according to the following guidelines:

- Check that any voltage supplying the plant has been removed
- Assign the address to module (if any)
- Install and wire the device according to the schematic diagrams on the specific data sheet of the product
- Only then switch on the 230Vac supplying the bus power supply and the other related circuits

Applied standards

This device complies with the essential requirements of the following directives:

2004/108/CE (EMC)

2006/95/CE (Low Voltage)

2002/95/CE (RoHS)

Note

Technical characteristics and this data sheet are subject to change without notice.