Access control panel

U-Prox IC E

(Elevator control)

Installation and programming manual

About this document

This manual covers installation, adjustment and use of U-Prox IC E (hereinafter panel) access control panel. Read this manual carefully prior to installing the system.

Characteristics, Intended use and parameters of the panel are described in the section "Summary". Section "Terms" provides an explanation of terms found in this document.

The look of the panel, the pins and the mode of work are described in the "Description section". Order of installation, adjustment of external devices and panel configuration are described in "Working with the device" section.

Attention! Read this manual carefully prior to installing the system.
Installation, adjustment and utilization of panel is allowed only to persons or organizations with the appropriate authority from the manufacturer

Technical support

To get warranty and technical support you can apply to authorized service centers, situated on the territory of countries, enlisted in the warranty card.

Warranty and technical support performed on the territory of the country, where the customer applied for warranty or free service.

Technical information is available on the system website

www.u-prox.com

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Brief description of the panel

U-Prox IC E control panel - a device designed to control access to stores of residential and business premises, including time of passage and events.

Panel operates U-Prox RM relay modules. U-Prox mini 485 proximity readers with RS485 interface or Wiegand proximity readers with U-Prox WRS485 interface convertor used for ID reading.

U-Prox IC E processes the information received from the readers and U-Prox RM inputs and activates relays, commutating the floor selection buttons of the elevator.

The network settings of the control panel programmed via a standard USB port (micro USB B).

The device is available in two versions.

U-Prox IC E supports power supply External 12V DC (+E, GND).

U-Prox IC E has advanced hardware capabilities and intellectual functions to control up to 4 U-Prox RM relay modules.

Thoroughly elaborated technical and design solutions, easy installation, communication over a computer Ethernet network, non-volatile memory and the clock, PoE power up ability, protecting the communication ports from short circuit, over-voltage and reverse polarity - all allows to use the panel to build a variety of Access Control Systems (ACS) - from the system for a small office to the clock house of a large enterprise.

Summary

- Power:
  - **External power supply**, 12V:
    - Current consumption max 150 mA @ 12V
    - Maximum voltage ripple 500 ma peak to peak
- One USB port for network settings configuring and firmware upgrade
- RS-485 interface for U-Prox RM relay modules, U-Prox WRS485 interface convertors and U-Prox Mini 485 readers connection
- Isolated Ethernet port, 10BASE-T/100BASE-TX
- Adjusted with U-Prox IP software. Supports automatic configuration for one-range network.
- Real-time clock
- Non-volatile memory:

Events	47 000
ID codes	32000

- Up to 32 floors control
- Up to 4 U-Prox RM relay modules connected

- One U-Prox WRS485 interface convertes or one U-Prox mini 485 reader
- Temperature range: 0 - +55 ^{0}C at 80% relative humidity.
- Maximum relative humidity 80% without condensation

Terms

Identifiers

In access control systems each user has a unique RF ID. Identifiers can take the form of a plastic card, key FOB etc.

Access point (AP)

Access point is a logical concept of the access control system implying control of passing through a door in one direction. It consists of reader, access control panel (or its part), door supervision devices (like door contact, RTE button etc.) and door locking device. In case of elevator control panel, access point is the floor selection button or the set of buttons, enabling person's access to the desired floors according to his access rights.

For instance, the turnstile with two-way passes has two Access points – one for entrance and the other one for exit, door of this type is called double-sided door. A door with a reader on one side has only one Access point – Entry point, and it is called single-sided door.

Downloading

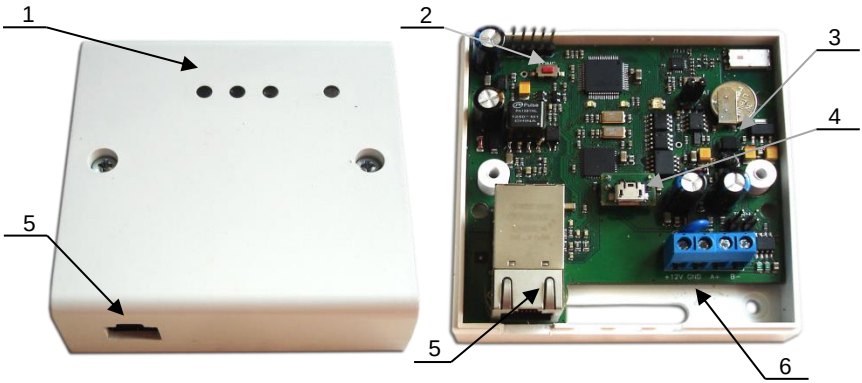
Control panel is to be downloaded after all parameters are set – modes of inputs, outputs, access rights and others. During downloading parameters are rewritten into access control panel.

Description and operation

Panel

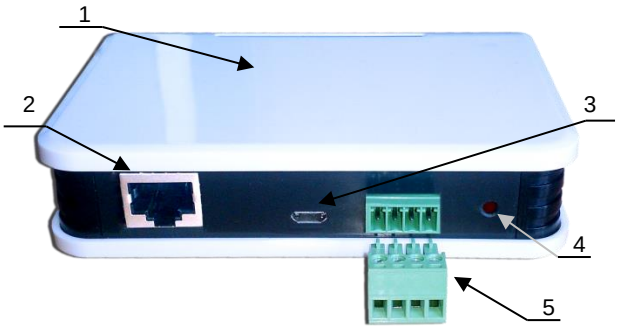
The device is available in several modifications.

The look of the control panel is shown in Fig. 1 (a and b)



1. *The Enclosure*
2. *Reset button*
3. *Panel board*
4. *Micro USB B port*
5. *Ethernet port*
6. *Connectors*

Figure 1a. U-Prox IC E modification 1



1. *The Enclosure*
2. *Ethernet port*
3. *Micro USB B port*
4. *Reset button*
5. *Connectors*

Figure 2b. U-Prox IC E modification 2

Location of jumpers and connectors on control panel board and their function is shown in Fig. 2 (a and b):

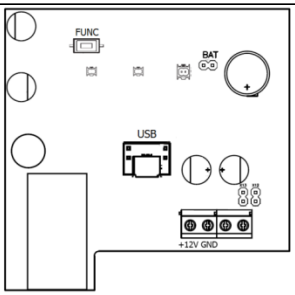


Figure 2a. U-Prox IC E board modification 1

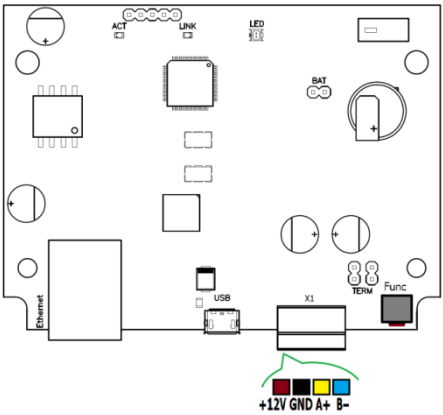


Figure 2b. U-Prox IC E board modification 2

Assignment of the panel contacts and indication

Contact	Name	Purpose
+12V	+12V	External 12V power supply connection
GND	GND	
A+	A+	RS 485 bus for reader, convertors and U-Prox RM relay modules connection
B+	B+	
USB Connector		
USB micro B	USB Connector	For network settings configuration and firmware upgrade
Jumper		
BAT	BAT	For memory and Real-Time Clock backup battery switch
TERM	TERM	RS 485 terminal resistor commutation
Button		
FUNK	FUNK	Service button

Light emitting diodes (LED)

LED's from left to right:

Link LED

- Ethernet cable is OK when lit

Act. LED:

- Frequent flashing means data exchange

LED – bi-color LED

- Red flashes 2 times per second – no connection to the ACS server
- Green flashes once per second – connection to the ACS server is OK

Reader's annunciation

The access modes indicated with LED's and buzzers of readers, connected via RS 485 bus (with U-Prox WRS485 interface convertor for Wiegand readers). Separate adjustment for each elevator control panel available. The default annunciation is in table below:

Operation mode	Reader annunciation
Normal mode	Red blinks once per second, no sound
PIN-code required	Red and green alters, no sound
Free pass (Fire mode)	Green and yellow alters, no sound
Blocking mode	Red and yellow alters, no sound
Alarm	Red lights continuously, no sound
Card enrollment	Green blinks once per second, no sound
Initiation	No lights, no sound
Download	Red lights continuously, no sound
PIN-code wait	Yellow blinks once per second, no sound
Access granted	Green lights continuously, no sound
Access denied	Red lights continuously, sounds continuously

Panel operation

Panels supplied unloaded with factory settings below in document. In this state, the bi-color LED on the panel flashes red twice per second. To make the panel work in access control system (ACS) you have to upload a network setting using the "Configurator" software and USB port or use the automatic adjustment mode.

Panel goes to the "Normal" mode after uploading the configuration.

To return to the factory settings use the command from the U-Prox software or with the routine described in Service Maintenance section.

"Normal" mode

This is the main mode of panel. In this mode the panel grants or denies access to RF ID owners. In “Normal" mode the readers blink red.

Using elevator buttons after passing RF ID

To use elevator buttons user enters contactless RF ID to the reader. If RF ID is registered and the passage granted, panel activates the relay modules’ outputs according to the user access rights and floor selection buttons’ loops switched on. The reader LED becomes green. User may select floor with button during adjusted time.

Using elevator buttons after passing RF ID and PIN entering

On entering enrolled RF ID, panel tests whether PIN code is required, and, if required, waits for entering PIN code. After entering the correct PIN code, panel activates the relay modules’ outputs according to the user access rights and floor selection buttons’ loops switched on. The reader LED becomes green. User may select floor with button during adjusted time.

Access denial upon entering RF ID

Access may be denied to RF ID owner due to the following reasons (the reader LED is red):

- Cards (RF IDs) and schedules are not loaded in the panel
- access control panel is in unloaded state
- card is not enrolled in the panel
- card term expired
- RF ID passed out of schedule
- entered RF ID is marked as lost or blocked
- the panel is in "Alarm" mode (LED is constantly on and red)
- the panel is in "Blocked" mode (LED flashes red and yellow)
- pass count is exhausted for the temporary card (visitor).

“Alarm” Mode

In "Alarm" operation mode the reader indicator is constantly red. Depending on the programmed functions panel goes into mode **"Alarm"** in case of opening of panel cover, entering RF ID recorded as lost and in case of RF ID matching attempt.

If panel is in “Alarm mode", use of floor selection buttons prohibited. One may activate floor selection button with U-Prox RM relay module input.

To exit from the "Alarm" mode pass the ID with "Disalarm" attribute or by command from the computer.

"Free Pass" Mode

There are circumstances when you need to open some of access points for free pass of people. For this case, the panel has "Free Pass" mode.

In "Free Pass" Mode LED of reader flashes green and yellow.

The access point goes into "Free Pass" Mode after the command of operator from the computer. The panel is in "Free Pass" mode until the command from the computer comes

As long as access point is in "Free Pass" mode, all floor buttons remained connected and the panel stores a log event "Access granted" on presentation of RF ID code regardless of the schedules, etc.

"Blocking" mode

If it is necessary to deny access to all or some floors for users of the system, the panel switches into "Blocking" mode. If panel in "Blocking" mode, the passage is granted only to owners of RF IDs with the sign "Security Service". One cannot unblock floor buttons with panel inputs.

In Mode "Blocking" LED is alternately flash red and yellow

Panel goes into "Blocking" mode after the operator command from the computer. Panel is in "Blocking" mode until the command from the computer.

RF ID properties (cards)

Code (RF ID card code)

Each card has a unique code which is set at the time of its manufacture. It consists of 10 hexadecimal digits.

PIN-code

Additional code is assigned to the card. It consists of no more than six decimal digits. It can be used together with readers that have a built-in keyboard.

Enter PIN code with the reader's keypad and press '#' key. Always enter PIN code AFTER the card pass. If PIN-code is correct, panel unlocks access point and grants access. Otherwise, panel generates a warning signal, and records "Invalid PIN-code" event into the log. Door remains closed.

Validity (of Card)

Card Validity expiration date

Alarm Cancel

Passing the card to door reader, when the door is in "Alarm" state, panel registers event "Alarm cancelled" and puts the door to Normal mode. If the card that has no right to cancel the "Alarm" is passed, the door will remain in the same state. Event "Access denied. Alarm Status" recorded into the log.

Security Service

Security Service mark gives the right of access to a blocked door.

On the ordinary card pass and door is in "Blocking" mode, "Access denied. Blocked state" event recoded and access denied. On card with attribute "Security Service" pass, the panel grants access and event "Access granted. Blocked state" registered.

VIP

Access right to pass always everywhere, except through blocked door.

VIP card may have any schedule, Antipassback and validity period but they NOT applied to it. The card may have PIN code. If the door is in "Blocked state", access is denied for RF ID with VIP attribute checked.

Communicator operation

U-Prox IC E panel operates automatically. After the download from the access control system server the data from the readers, U-Prox RM modules and U-Prox WRS485 convertors processed and access event messages are sent to the access control system server.

Panel Communicator operates in **notification** mode that means that data transmission to the access control system server is initiated on the access event.

U-Prox IC E panel connected to the computer network with wired Ethernet.

Both local enterprise computer network operation (see Fig.3) and **Internet network** (see Fig.3) operation via repeaters provided. This allows the distributed systems of any scale construction.

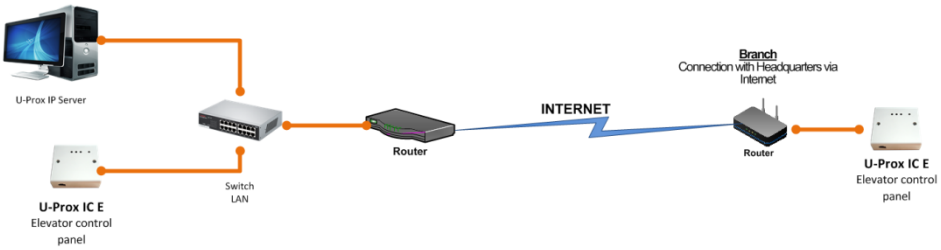


Figure 3. Network connection example

It is highly recommended to use VPN technology for computer network connecting central office with remote sites for additional security.
It is highly recommended to use routers with two different technology Internet access channels for redundancy.

Algorithm of working in LAN

1. If DHCP - obtaining IP address with the start of the access control panel.

2. Update of IP status of address (announcement and extension of reserved IP, if DHCP).
3. Determine accessibility of ACS server (IP or DNS name).
4. Periodic sending of test signals.
5. If there is, sending of events. Waiting for server commands.

Algorithm of operation on the Internet (local wire net)

1. If DHCP - obtaining of IP address within local network affiliate at panel launch.
2. Update of status of IP addresses (announcement and extension of reserved IP, if DHCP).
3. Determine possibility of access to the Internet (accessibility of given IP address of router).
4. Determine accessibility of ACS server (IP or DNS name).
5. Periodic sending of test signals.
6. If there is, send the events. Waiting for server commands.
7. Failure - transition to the second specified IP address of router.

System deployment

The use of the existing computer network infrastructure, standard network protocols (DHCP for instance) allowed to provide the “plug-and-play” principle. The mode of the automatic server address configuration in the panels eases the access system deployment significantly.

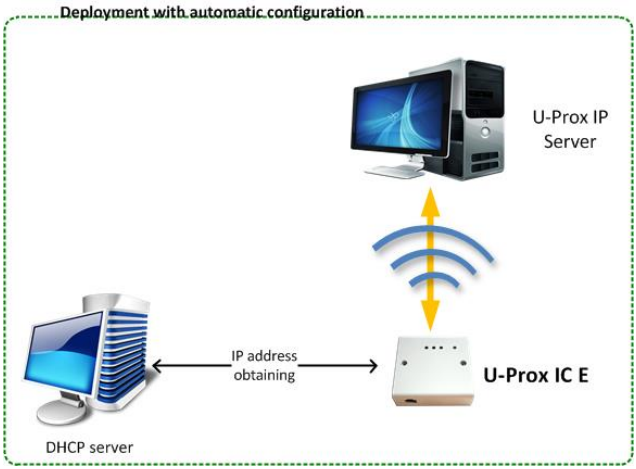


Figure 4. System deployment

The algorithms for operation on each step described below

Server addresses automatic configuration for U-Prox IC E

1. Panel checks for DHCP mode ON (panel address 0.0.0.0) or static IP

2. If DHCP mode is ON, the dynamic IP address obtain routine will start
3. The panel automatic configuration mode starts if the access control system IP address (IP or DNS name) is not set:
    a. Panel sends data packages announcing access control system server about itself as a new device in the local network

    > Despite it is broadcast announcement, it is limited with single range local network and active network equipment. That's why the IP addresses of the access control system server are to be set manually for networks with sophisticated topology.

    b. The system will warn operator after the receiving of the data package from the new panel. Operator must add panel to the system database (DB).
    c. After the panel added to the DB it receives the answer from the access control system server. The address of the access control system server recorded into the control panel and it stops to broadcast.
    d. Operator has to upload panel after its adjustment recorded into the DB. Panel becomes associated to the certain access control system server, eliminating panel control capture with another system.

    > Return panel to the factory settings to eliminate the panel association to the system

    e. In the case of access control system server IP address change panel will initiate the automatic configuration routine, but the data exchange will be possible with previously connected system only.

Interaction with elevator equipment

U-Prox WRS485 interface convertor connected to the U-Prox IC E control panel to provide the noise-resistant and long-range RS-485 interface to the reader, placed in elevator cabin.

To control the loops of the floor selection buttons up to four U-Prox RM relay modules connected to the U-Prox IC E control panel. The U-Prox RM relay terminals connected in series with buttons' terminals. Connect relay terminals in way that provides the floor selection buttons operation in case of U-Prox RM power failure. Z1…Z8 zone loops used for floor selection buttons state supervision and for buttons remote connection control. On pressing floor selection button U-Prox IC E generates message "Access granted to the floor."

Remotely allowing access to the floor

The inputs Z1-Z8 can be connected to a remote console placed on a guard post. On pressing floor selection button U-Prox IC E generates message "Access granted to the floor remotely"

Floor selection buttons unblock in an emergency

U-Prox RM relay modules have EMRG inputs. In normal state short the loop, connected to this input terminals, to the ground (GND terminal). On input loop break, module depowers all relays and all floor selection buttons become available.

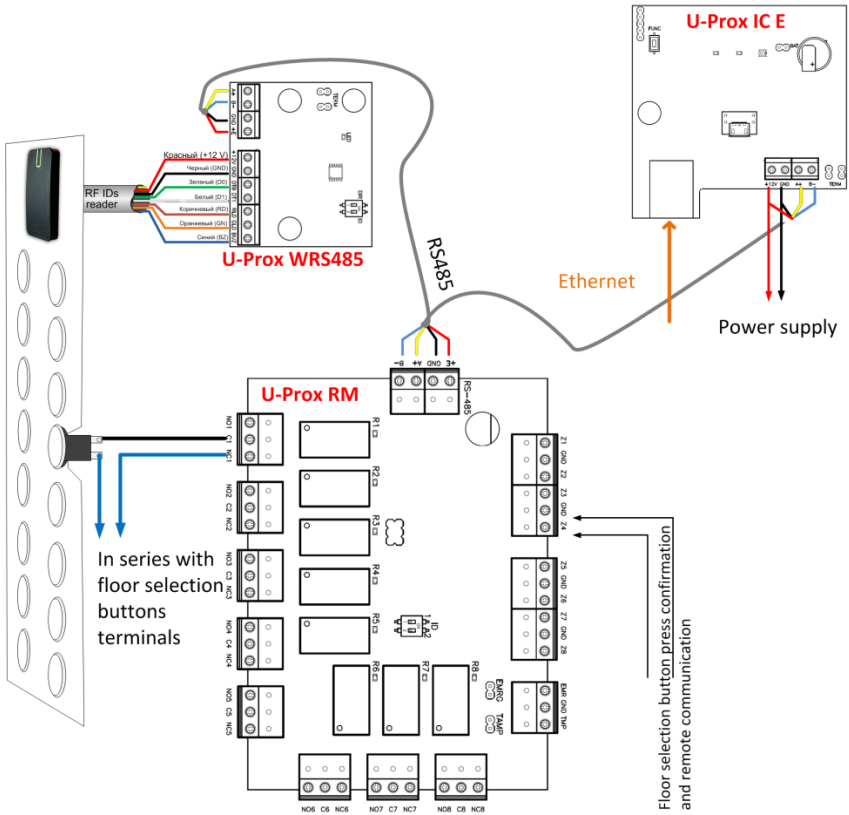


Figure 5. Connection schema

Zone loops supervised with 2.2 kOhm end-of-line resistors and have three states: Normal, Opened and Shorted.

When all zone loops are in Normal state module waits for relay activation command.

When one of zones opened, all relays, activated (de-energized) with previous command, de-activated.

When zone shorted, it means the remote activation command and module activates corresponding relay. If zones not used, terminate them with 2.2 kOhm end-of-line resistors.

Loop's connection examples show in Fig. 6

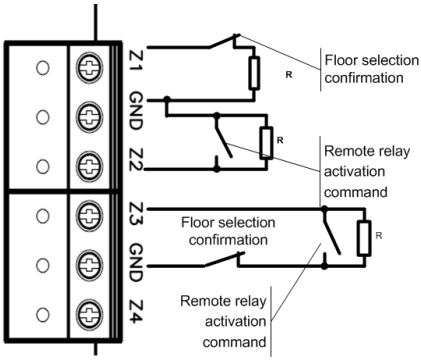


Figure 6. Loop's connection examples

How to work with the device

U-Prox IC L control panel shipped in the plastic enclosure without the power supply. Dimensions marked on the Fig. 7.

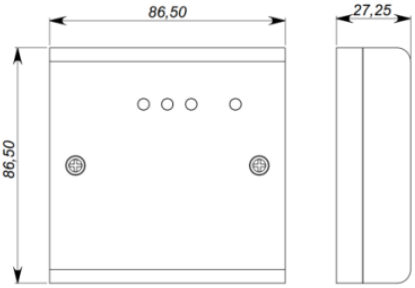


Figure. 7a. Dimensions, modification 1

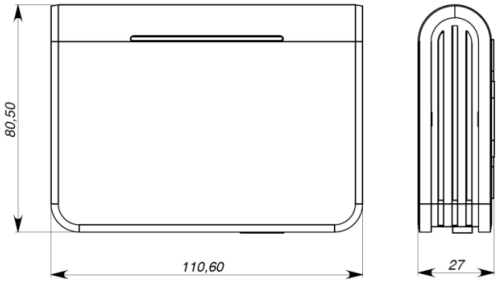


Figure. 7b. Dimensions, modification 2

Connection

1. Perform initial network setup of control panel (that specifies settings of network parameters) with utility "Configurator" via USB port before installation, if it is impossible to adjust them automatically
2. Prepare the place for installation mark and drill mounting holes (see **Mount recommendations**)
3. Perform Ethernet wiring

4. Perform power wiring if it is necessary
5. Install and fix the enclosure cover with screws
6. Connect the control panel in the U-Prox IP software (according to the software manual)
7. Download the control panel
8. The device is ready for operation

Mount recommendations

Place the control panel in the place, convenient for service.

To mount the control panel on the wall, perform actions:

Modifaction 1 (see Fig. 8a):

- Open the enclosure cover, remove the board and mark fixing holes using the enclosure bottom as template
- Pull the power wiring through the opening in the enclosure
- Fix the enclosure bottom
- Connect the power wiring

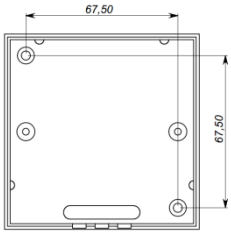


Figure 8a. Fixing holes marking, modification 1

Modifaction 2 (see Fig. 8b):

- Perform the marking of holes using the accompanying drawing;
- Fix the enclosure;
- Connect the wires

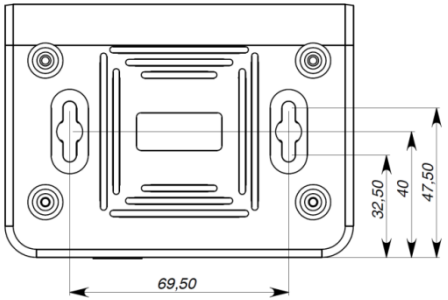


Figure 8b. Fixing holes marking, modification 2

Modules and interface convertors connection

Modules and interface convertors connected to the U-Prox IC E with RS-485 interface. The length of the RS-485 bus is up to 1200 m. On the utmost devices, connected to the RS-485 bus terminal resistors connected with TERM jumper as depicted on Fig.9.

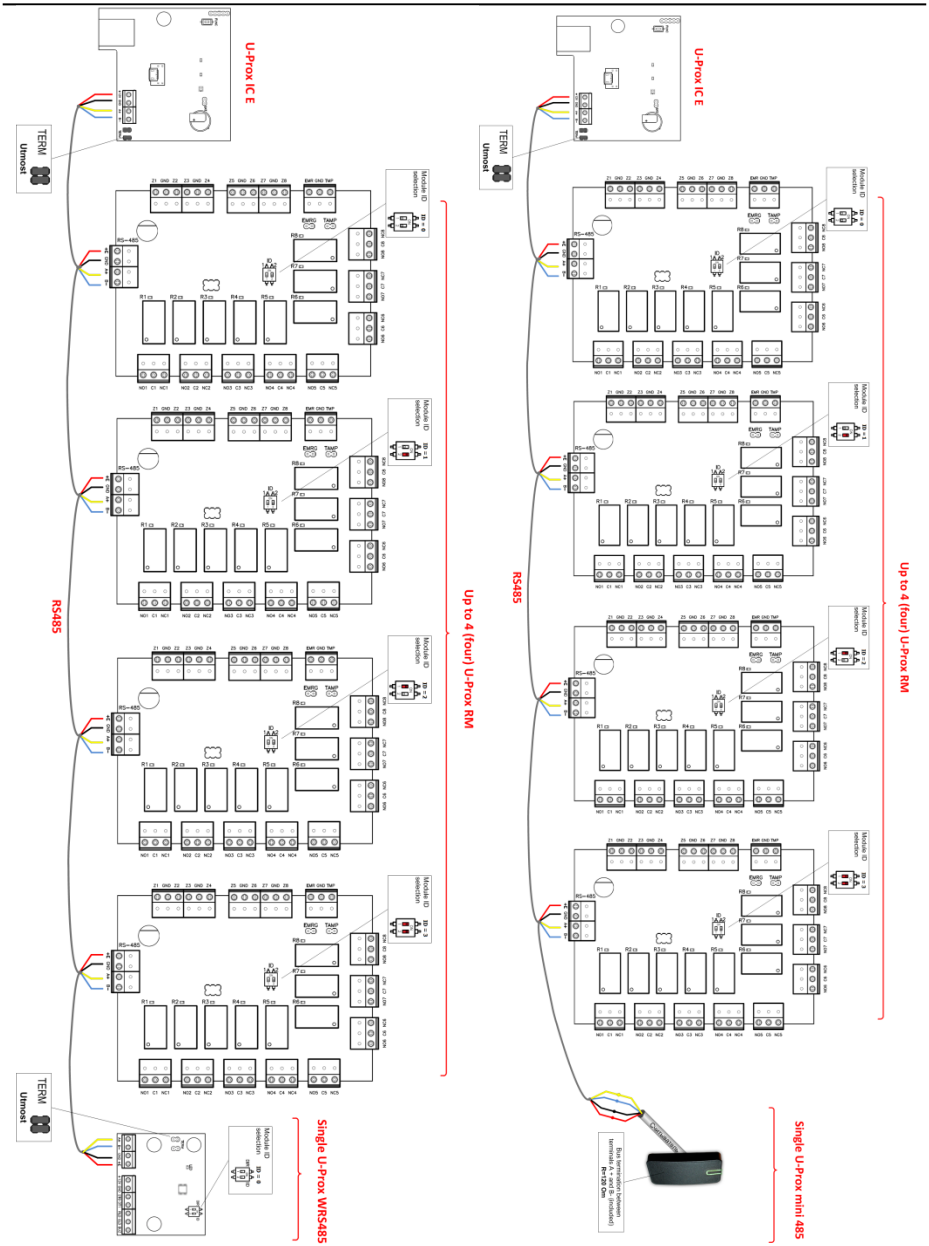


Figure 9. Control panel, relay modules, intrface convertors and reader connection on RS-485 bus

RS-485 connection recommendations

- **DO NOT** connect U-Prox RM relay modules as utmost on the RS-485 bus as they have no terminal resistors
- Set **DIFFERENT** ID's to U-Prox RM relay modules on single RS-485 bus
- **USE** or U-Prox WRS485 interface convertors or U-Prox mini 485 reader
- **Set 0 ID's** to U-Prox WRS485
- Set **SLAVE MODE** for U-Prox WRS485

Communication

U-Prox IC E uses wired computer network for connection to the access control system server. With computer program "Configurator" the adjustment of following parameters provided:

- static or dynamic (DHCP) IP address assign to the panel
- operation in the Internet network

The panel communicator operates in the **notification** mode that means that data transmission to the access control system server is initiated on the access event.

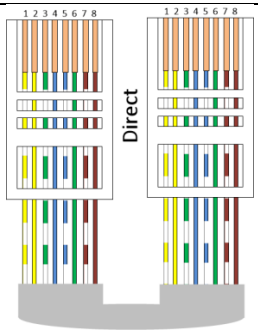
Operating in the computer network U-Prox IC E control panel provides encryption protection of the data and commands with 256 bit key, unique serial number supervision and communication channel supervision with periodical test messages.

Wired computer network

The Ethernet interface is used for panel connection into the computer network. The Ethernet cable must not exceed 100 meters without use of additional equipment. The data transmission speed is 100Mbit/sec.

The Ethernet connection examples are on the Fig.10.

Connector 1	Connector 2
Direct connection. Connection to switch or router	
1. white-yellow	1. white-yellow
2. yellow	2. yellow
3. white-green	3. white-green
4. blue	4. blue
5. white-blue	5. white-blue
6. green	6. green
7. white-brown	7. white-brown
8. brown	8. brown



Cross-over connection. Connection to computer	
1. white-yellow	1. white-green
2. yellow	2. green
3. white-green	3. white-yellow
4. blue	4. blue
5. white-blue	5. white-blue
6. green	6. yellow
7. white-brown	7. white-brown
8. brown	8. brown

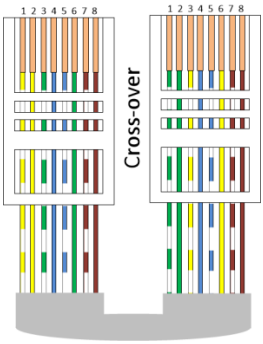


Figure 10. Ethernet wiring

To adjust panel communicator perform:

- Adjust panel network settings (don't adjust when use DHCP):
  - IP address
  - Subnet mask
  - Gateway (router) Internet 1 IP address (no need in local network)
  - Gateway (router) Internet 2 IP address (miscellaneous)
  - DNS server 1 IP address (if data send to the domain name)
  - DNS server 2 IP address (miscellaneous; if data send to the domain name)
- Adjust communication to the server (no need in automatic configuration mode):
  - Server 1 IP or DNS name
  - Access ports (write port and read port)
  - Test message frequency

Panel program order

Software	Actions
	1. Define desirable adjustment mode: automatic or manual
"Configurator" through the USB	2. Adjust initial settings if manual configuration used: a. Server settings: server IP address or server DNS name, access ports (write and read ports) Do not proceed paragraph b. if there is DHCP in the network b. Panel settings: panel IP address in the computer network, subnet mask, DNS server IP address, Internet gateway
U-Prox IP software	3. Panel connection and enrollment in access control system database (see U-Prox IP software instruction manual) 4. Panel adjustment with U-Prox IP software 5. Upload panel from U-Prox IP software

Service maintenance

Return to factory settings

To return to factory settings:

1. De-power control panel
2. Press and hold FUNC button
3. Supply power to control panel
4. Wait for 10 seconds, until LED diode lights and release FUNC button
5. LED diode will flash 6 times that means factory settings restored

Switching to programming mode

To put access control panel in programming mode do the following:

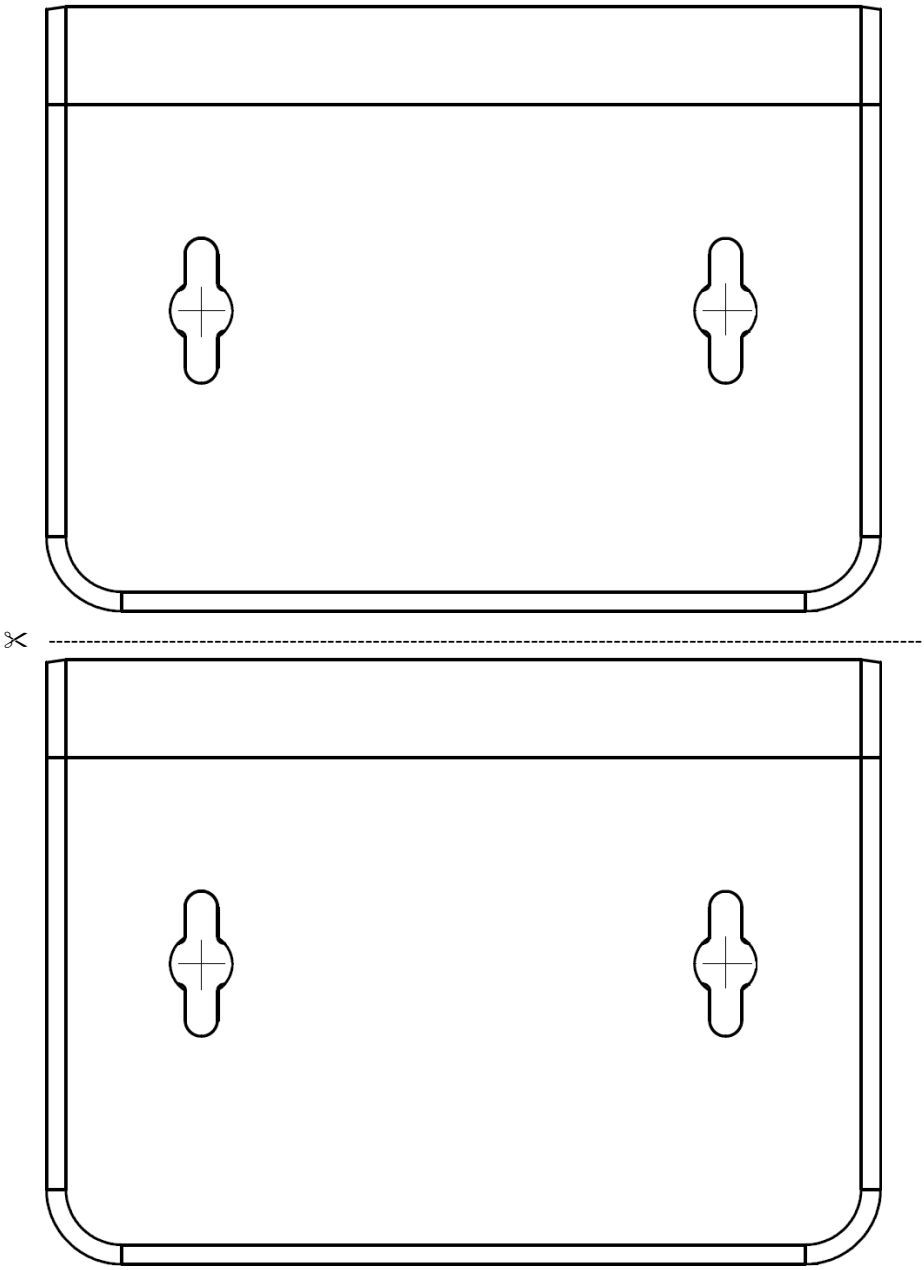
1. Connect cable to the USB and configure the device using the software "Configurator"

Replacing the device firmware

1. De-power the panel
2. Connect the notebook with USB cable to the panel
3. Using special software, do the replacement of panel firmware
4. After downloading the software to the access control panel WAIT for or 40-50 seconds. (If readers are connected wait for 6 short beeps)

Factory settings

Communicatior

Ethernet mode enabled, DHCP enabled (no device IP set), no ACS server set

Reference for device installation modification 2