Elevator Controller U-PROX IC E

Installation and Operation Manual

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About This Document

This manual describes the procedure for installing, connecting, and operating the elevator controller of the U-PROX IC E access control system (hereinafter "the controller"). Before installing the controller, carefully study this manual.

The controller's specifications and parameters are described in the **Specifications** section. The **Terms** section provides explanations of the terms used in this document.

The external appearance of the controller, along with a description of its contacts and operating modes, is given in the **Description and Operation** section. The installation and configuration procedures are described in the **Operating Procedure with the Device** section.

Attention! Before mounting and connecting the controller, carefully study this manual. Installation and connection of the controller are permitted only by persons or organizations authorized by the manufacturer.

Training and Technical Support

Training courses covering the installation and use of the U-PROX IC E controller are conducted by Limited Liability Company Integrated Technical Vision. For additional information, contact the company at:

Phone: +38 (091) 481-01-69

E-mail: support@u-prox.systems

Telegram: https://t.me/u_prox_support_bot

Technical support for all U-PROX products is provided during business hours. This support is intended for trained specialists. End users should contact their dealers or installers before reaching out directly to Limited Liability Company Integrated Technical Vision.

Technical information is available at: www.u-prox.systems

Certification

Limited Liability Company Integrated Technical Vision certifies that the U-PROX IC E controller meets the applicable electromagnetic compatibility and RoHS directives. The original Declaration of Conformity is available on the website under the Certificates section.

Contents

- Wired Computer Network (Ethernet)
- Controller Programming Procedure
- Service and Maintenance
- Factory Reset
- Switching to Programming Mode
- Firmware Update
- Factory Settings
- Maintenance and Repair
- Warranty Obligations

Controller Description

The U-PROX IC E controller is a device designed for managing access to building floors. Its actuators are the U-PROX RM relay expansion modules. For identification, U-PROX WRS485 modules with connected Wiegand readers or U-PROX SE series readers are used.

U-PROX IC E processes information from the readers, from the inputs of the U-PROX RM module, and activates the permitted relays on the module to control the signaling lines on the elevator floor panel.

The controller includes a function for programming network settings and updating its firmware via a standard USB port (micro USB B).

Purpose of the Device

The U-PROX IC E controller is intended for use in access control and management systems (ACS) of various scales—from small office systems to the access systems of large enterprises. In an ACS, controllers are networked together via a computer network.

Specifications

Power Supply: External 12V source
Current Consumption: Not more than 150 mA at 12V
DC Ripple: Not more than 500 mV
Ethernet Port: With galvanic isolation, 10BASE-T/100BASE-TXE
RS-485 Port: For connecting expansion modules
USB Port: One micro USB B port for network configuration and firmware updates
Configuration: Full configuration via ACS software over a computer network; auto-configuration available in a peer-to-peer network
Real-time Clock

Non-volatile Memory: Supports 32,000 identifiers and 47,000 events
Maximum Floors: 64
U-PROX RM Module: Up to 8 modules (each with 8 relays)
U-PROX WRS485 Module: 1
U-PROX SE Series Readers: 1

Terms

Identifiers: In access control systems, each user has an identifier with a unique code. Identifiers may be in the form of plastic cards, key fobs, etc.

Reader: A device used to read identifier codes, connected to the ACS controller.

PIN Code: If readers have an integrated keypad, a code entered on the keypad (typically called a PIN) may serve as an identifier or as a supplement to a card or key fob. After presenting a card, the reader waits for the PIN to be entered.

Door: The point of access where control is directly performed (e.g., door, turnstile, access portal equipped with the necessary control devices).

Access Point: See Door.

Passage Time Interval: When a door contact is violated, the access point enters "Alarm" mode; however, an alarm is not triggered if the contact is broken during the predetermined passage time interval. This interval starts when the controller permits access and ends when the door contact is broken and then restored.

Attempt to Guess an Identifier: The controller features a function that triggers an alarm mode if an unregistered identifier is presented repeatedly. A correct presentation resets the counter.

Schedules: When setting user access rights, time and date intervals during which access is permitted are specified. Up to 250 time intervals can be stored, which can be combined into up to 250 weekly schedules. Additionally, up to 250 special holiday dates can be set.

Time Zones: A time zone is a component of a schedule that organizes time intervals and links them with access rights. It is used for verifying access permissions and user authorization.

Loading: After programming the controller parameters, the configuration must be loaded (transferred from the computer to the controller).

Description and Operation

Controller Device

The external appearance of the U-PROX IC E controller is shown in Figure 1.

Figure 1. External Appearance of U-PROX IC E

The layout of jumpers, buttons, and connectors on the controller board is shown in Figure 2.

Figure 2. Controller Board Layout

Function of the Controller's Contacts, Jumpers, and Buttons

Name	Function
+12V	Connection for external power supply
GND	Ground
A+	RS-485 bus for connecting expansion modules
USB Port (micro B)	Used for initial network configuration and firmware updates
Jumper BAT	Enables the backup battery for clock and memory support
FUNC Button	Service button for factory reset
Jumpers TERM	Sets termination resistors for the RS-485 bus

Audio-visual Indication of the Controller

The controller's indicator LEDs (from left to right) are as follows:

- **Link LED:** Lit when the Ethernet cable is properly connected.
- **Act LED:** Blinks rapidly when data exchange is in progress.
- **Bi-color LED (LED):**
    - **Normal mode:** Red – two short pulses per second indicate no connection to the ACS server; Green – one short pulse per second indicates a normal connection.
    - **Bootloader mode:** Rapid red blinking indicates the device is loading.

Audio-visual Indication of Connected Readers

Access mode indication is performed by readers connected via the RS-485 bus (using U-PROX WRS485, for example). Each controller's indication can be individually configured via the ACS software. The default indications are as follows:

Mode	Reader Indication
Normal mode	No sound; red blink once per second

PIN Code Control Enabled	No sound; red-green blink once per second
Free Passage	No sound; green-yellow blink once per second
Lockout	No sound; red-yellow blink once per second
Alarm	No sound; continuous red light
Card Registration	No sound; green blink once per second
Initialization	No sound; no light indication
Loading	No sound; continuous red light
Waiting for PIN Input	No sound; yellow blink once per second
Access Granted	No sound; continuous green light
Access Denied	Continuous sound; continuous red light

Controller Operation

Controllers are shipped in an un-loaded (factory default) state. In this state, the bi-color LED blinks red twice per second. To operate the controller in an ACS, network settings must be loaded using the "Configurator" software or via auto-configuration.

Once configured, the controller enters "Normal" mode.

The controller can be reset to the un-loaded state either by a computer command or by the procedure described in the **Service and Maintenance** section.

"Normal" Mode

"Normal" mode is the primary operating mode in which the controller grants or denies access based on presented identifiers.

Access on Identifier Presentation: To gain access to a floor, a user presents a contactless identifier to a reader. If the identifier is registered, the controller, via the relays of the U-PROX RM modules, activates the corresponding elevator floor buttons for which access is allowed.

Access on Identifier and PIN Code Presentation: After presenting a registered identifier, the controller checks if a PIN code is required. If so, it enters a waiting state for PIN entry. Upon correct PIN input, the actuator is activated.

Access Denial: Access may be denied if:

- The controller is in an un-loaded state,
- The card is not registered,
- The card's validity period has expired,

- Access is currently prohibited by schedule or day of the week,
- There is an attempt of repeated passage when the anti-passback function is enabled,
- An identifier marked as lost or blocked is presented,
- The controller is in "Alarm" mode,
- The controller is in "Lockout" mode,
- The activation time for a temporary card has not yet begun,
- The passage counter for a temporary (visitor) card is exhausted.

"Alarm" Mode

The access point enters "Alarm" mode when the controller's case is opened, when an identifier marked as lost is presented, or when an unregistered identifier is repeatedly attempted (if the function is enabled). In "Alarm" mode, access is blocked. To cancel the alarm mode, either present an identifier marked for "Alarm Cancellation" or issue a command from the computer.

"Free Passage" Mode

In some emergency situations (e.g., fire, earthquake), it is necessary to open doors (either all or a subset) for free passage. In this case, the controller enters "Free Passage" mode by command from the computer. While in "Free Passage" mode, the floor selection buttons are not blocked; the controller logs all identifier presentations and code entries as "Access Granted," regardless of anti-passback or schedule restrictions. This is used to monitor personnel presence during emergencies.

"Lockout" Mode

If a situation arises requiring that all doors be locked for all users, the controller enters "Lockout" mode. In this mode, access to a floor is granted only to identifiers with the "Security Service" attribute. When a normal card is presented, the event "Access Denied – Lockout" is logged. Only a card with the "Security Service" attribute will allow access and log "Access Granted – Lockout."

Properties of Identifiers (Cards)

Code (Electronic Card Code): Each card has a unique code assigned during manufacturing, containing 6 to 16 hexadecimal digits.

PIN Code: A supplementary code for the card consisting of exactly six decimal digits. When a card is presented, the built-in keypad prompts for the PIN; if the correct PIN is entered (followed by the "#" key), the U-PROX RM modules' relays activate the elevator buttons corresponding to allowed floors. Otherwise, a warning is issued and the event "Incorrect PIN" is logged.

Validity Period: The expiration date of the card.

Alarm Cancellation: When a card with the alarm cancellation right is presented at an access point in alarm mode, the controller logs "Alarm Cancelled" and resets the door to normal mode. If a card without this right is presented, the alarm remains active and "Access Denied – Alarm" is logged.

Security Service: Grants the right to access locked doors. In Lockout mode, only cards with the "Security Service" attribute are allowed access.

VIP: Grants unconditional access except when the device is in Lockout mode. Such cards may be assigned any schedule, are not subject to anti-passback or validity restrictions, and may include a PIN code.

Operation of the Communicator

The U-PROX IC E controller operates automatically. After its configuration is loaded from the server, it processes data from the connected readers (via RS-485 and U-PROX RM modules), applies the access rules for presented cards, and sends access event notifications to the ACS server.

The communicator works in notification mode, meaning that whenever an event (access, zone violation) occurs, data is immediately transmitted to the ACS server.

The U-PROX IC E controller can be connected to a computer network via a wired Ethernet connection, allowing it to operate both within the local network and via the Internet (see Figure 3).

Figure 3. Example Network Configuration

For added security when networking a central office and branch offices, VPN technology is recommended, along with routers featuring dual, heterogeneous Internet channels for redundancy.

System Deployment

The use of existing network infrastructure and standard protocols (e.g., DHCP) enables the "plug-and-play" principle. Auto-configuration of the ACS server address in the devices greatly simplifies system deployment.

System Deployment Procedure: (See Figure 4)

Figure 4. System Deployment

1. Upon power-up, the controller checks whether DHCP is enabled (device IP is 0.0.0.0) or if it has obtained a static IP address.
2. If DHCP is enabled, the dynamic IP address assignment procedure is initiated.
3. If the ACS server address (IP or DNS) is not set, the controller enters auto-configuration mode:
   - The device broadcasts data packets announcing itself as a new device on the local network.
   - This broadcast is limited to the peer-to-peer local network and active networking equipment; for complex networks, the ACS server IP must be set manually.
   - When a packet from a new device is received, the system operator is alerted and must add the device to the database.
   - After the device is added, it receives a response from the ACS server, stores the server address in its settings, and stops broadcasting.
   - If the server address changes, the device will auto-configure again, but communication will only be possible with the ACS to which it is bound.
4. To unbind the controller from an ACS, reset it to factory settings.

Interaction with Elevator Equipment

The U-PROX IC E controller connects to elevator equipment via the RS-485 bus using expansion modules (U-PROX RM and U-PROX WRS485) or via U-PROX SE series readers. Typically, the reader is mounted in the elevator cab.

The relay outputs of the U-PROX RM module are connected to the elevator floor selection buttons. In the de-energized state, the U-PROX RM module allows the buttons to operate.

Cables (from inputs Z1–Z8) can be connected to provide feedback from the elevator automation to detect when a floor button is pressed. If such feedback is used, a message "Floor Access Granted" is generated after the button is pressed.

Remote Floor Access Provision

Remote control cables (connected to inputs Z1–Z8) can be used to provide remote access—for example, from a security post. When the floor button is pressed at the security post, a message "Floor Opened by Button" is generated.

Emergency Unlocking of the Elevator Control Panel

Each relay module is equipped with an EMRG input. Normally, the cable connected to this input should be short-circuited to ground (GND). If the cable is broken, the elevator control module disconnects and full access to the floor selection panel is restored, allowing a user to select any floor without presenting an identifier.

Figure 5. Connection Diagram

Connecting Expansion Modules via the RS-485 Bus

The RS-485 interface is used to connect expansion modules to the U-PROX IC E controller. The RS-485 bus can extend up to 1200 meters without additional equipment. Termination resistors must be enabled on the first and last devices on the bus by setting the termination jumpers (see Figure 6).

When connecting expansion modules:

- U-PROX RM modules cannot be connected at the ends of the RS-485 bus since they lack termination jumpers.
- Each U-PROX RM module must have a unique ID set via its DIP switches (range 0 to 7).
- You may use a U-PROX WRS485 module (with an attached Wiegand reader) or a U-PROX mini 485 reader.
- Set the ID of the U-PROX WRS485 module to 0 via its DIP switch.
- Set the operating mode of the U-PROX WRS485 module to "slave" by switching the DIR (No.1) to the "OFF" position.

Figure 6. Connection of the Controller and Expansion Modules to the Data Bus

Communication

For communication with the ACS server, the U-PROX IC E controller can use a wired computer network. The device can be configured either via auto-configuration or manually using the "Configurator" software on a PC.

Proper configuration ensures:

- Assignment of a static or dynamic (DHCP) IP address to the device;
- Operation with the ACS server using an IP or DNS address;
- Internet connectivity, with redundancy provided by a secondary router if necessary.

The controller's communicator works in notification mode – when an event (access or zone violation) occurs, data is sent to the ACS server.

Additionally, the controller protects against unauthorized access by encrypting data packets with a 256-bit key, verifying its unique serial number, and monitoring the communication channel with periodic test signals.

Wired Computer Network (Ethernet)

The Ethernet interface is used to connect system components into a network. Ethernet cables without additional equipment can run up to 100 meters while providing data transfer speeds of up to 100 Mbps.

Figure 7. Examples of Ethernet Cable Connections

Two examples are provided: direct crimping for connection to a switch or router, and crossover wiring for connection to a computer.

- **Direct Crimping:**
    1. White-yellow – white-yellow
    2. Yellow – yellow
    3. White-green – white-green
    4. Blue – blue
    5. White-blue – white-blue
    6. Green – green
    7. White-brown – white-brown
    8. Brown – brown
- **Crossover Wiring:**
    1. White-yellow – white-green
    2. Yellow – green
    3. White-green – white-yellow
    4. Blue – blue
    5. White-blue – white-blue
    6. Green – yellow
    7. White-brown – white-brown
    8. Brown – brown

During Ethernet configuration, set the following parameters (if DHCP is not used):

- Device IP address
- Subnet mask
- Gateway IP address (for Internet 1, optionally for local networks)
- Gateway IP address for Internet 2 (optional)
- Primary DNS server IP (if domain name resolution is used)
- Secondary DNS server IP (optional)

Additionally, configure communication with the ACS server (if auto-configuration is not used):

- ACS server IP or DNS address
- Access ports (read and write ports)
- Frequency of test signal transmissions for channel monitoring

Controller Programming Procedure

Software: Use the "Configurator" software via the USB port to program the controller.

Procedure:

1. Determine the configuration mode: auto-configuration or manual.
2. If manual configuration is selected, enter the initial network parameters:
   - Server settings: IP or DNS address of the ACS server, access ports (read/write)
   - If DHCP is available, some steps may be skipped.
   - Device settings: IP address, subnet mask, DNS, gateway, etc.
3. Connect and register the controller using the ACS software (refer to the ACS manual).
4. After the configuration is formed and loaded from the ACS software, the device is ready for operation.

Service and Maintenance

Factory Reset

To reset the controller to factory settings, follow these steps:

1. Disconnect the controller's power supply.
2. Press and hold the FUNC button.
3. Reconnect the power supply.
4. Wait 10 seconds until the LED lights red, then release the FUNC button.
5. The LED will flash red 6 times to indicate that the factory reset is complete.

Switching to Programming Mode

To put the controller into programming mode, simply connect it to a computer via the USB cable and then configure it using the "Configurator" software.

Firmware Update

1. Connect the USB cable first to the computer, then to the controller.
2. Using the designated firmware update software, perform the firmware update.
3. After the firmware is loaded, wait 25–30 seconds before disconnecting; the controller will then be ready for operation.

Factory Settings

The factory settings are as follows:

- DHCP enabled (no static IP assigned)
- No ACS server address specified (auto-configuration enabled)

Maintenance and Repair

Warranty and post-warranty service for U-PROX IC E controllers is provided only by persons or organizations authorized by the manufacturer.

Warranty Obligations

The manufacturer guarantees that the U-PROX IC E controller conforms to the parameters described in this manual, provided that storage and operating conditions comply with the instructions herein.

Storage Warranty: 6 months from the date of manufacture.

Operational Warranty: 12 months from the date the device is put into service.

Device supply, personnel training, installation, commissioning, and warranty service for the U-PROX IC E controller are provided by the manufacturer or by authorized organizations.

If a defect due to the manufacturer is detected, the authorized organization will remedy it within 10 days of notification.

If commissioning is performed by an unauthorized organization, the consumer forfeits warranty service.

Warranty repairs will not be performed if the device fails due to improper connection, non-compliance with this manual, mechanical damage, or force majeure.

The manufacturer reserves the right to make design changes that do not affect the main technical characteristics or reliability of the product.