Matrix IV RF
UHF 433.92 MHz reader with connection via iButton (1-Wire) / Wiegand-26 / RS-485 protocols
User Manual

1. OVERVIEW.

Matrix-IV RF RFID reader is used in Access Control Systems (ACS) and can receive 433,92 MHz signals from radio key fobs and then transmit the decoded serial number (code) acquired from the key fob to the controller via iButton (Dallas Touch Memory) or Wiegand-26 protocols, or to a PC via RS-485 interface.

Reader features.
- Decoding the codes of radio key fobs working by KeeLoq and CAME (TOP432NA, TOP434NA) protocols.
- Adjustable receiver sensitivity allowing for adjustable radio key fobs reception distance.
- Decodes both fixed and dynamic part of KeeLoq code of IL-100 key fobs. This allows for blocking clone key fobs at the reader level, when operating in Anti-Clone mode.
(**Note: In Anti-Clone mode, the reader will work only with IL-100 key fobs**).
- Two output channels to receive key fobs codes, set up separately, allow for flexible ACS configuration. For example, one reader can be connected to two controllers, and codes from different radio key fob buttons would be transferred to different channels.
- SMA-F socket to connect an external 433,92 MHz antenna allows significantly extending the radio key fobs reception distance by connecting a directional antenna with SMA-M plug.
- RS-485 interface allows connecting the reader to a PC to acquire radio key fobs codes and to configure the reader parameters.

2. MOUNTING AND CONNECTION.

The reader should be mounted on a flat surface in a place protected from direct sunlight and precipitation.
To mount the reader, perform the following steps:
1. Mark and drill the mounting holes of the same size as the holes in the reader casing (see Figure 1).
2. Connect wires per the layout. Insulate the wire junctions.
3. Power on the reader and check its proper operation by pushing a button on the radio key fob.
4. Mount the reader and fix it in the desired place.

Note: To ensure operation at a specified distance from controller, you need to use a UTP cable (e.g. CAT 5e) see Figure 2.

- When connecting via iButton, one wire of the twisted pair is connected to GND, and another to DATA0.
- When connecting via Wiegand-26, two twisted pairs are needed; the first one is connected to GND and DATA0 and the second one is connected to GND and DATA1.
- When connecting via RS-485, one wire of the twisted pair is connected to A, and the other to B (see Figure 3).

Note: Reading distance may be reduced significantly when the reader is installed directly onto a metallic surface, or when there are many metal objects around the installation site.
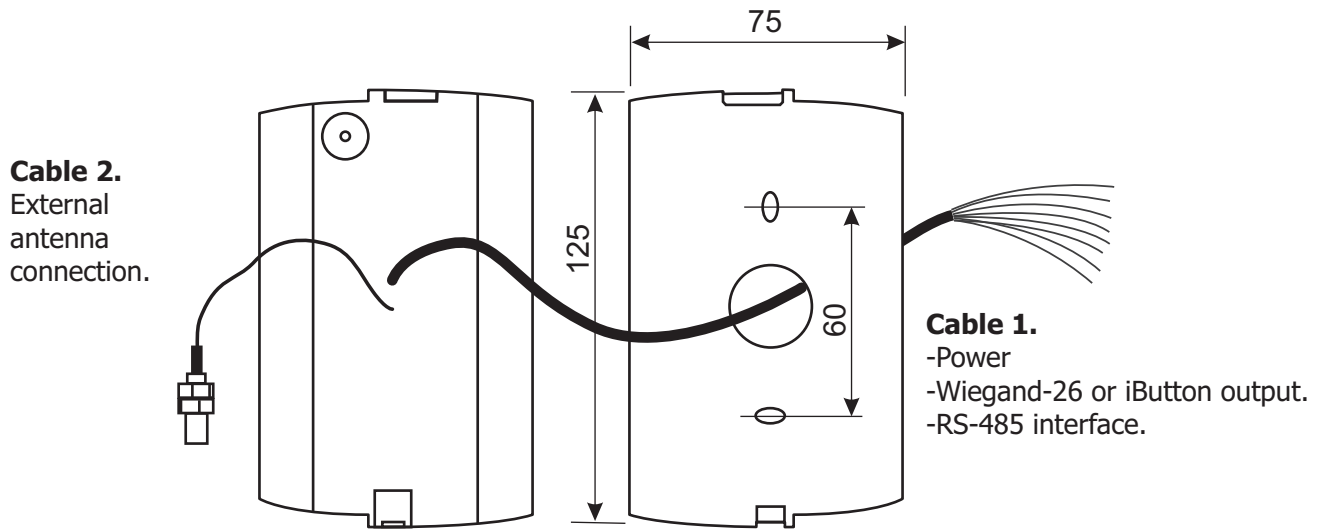
Fig.1

Cable 2. External antenna connection.

Cable 1.
- Power
- Wiegand-26 or iButton output.
- RS-485 interface.

Table 1. *Cable 1 wiring scheme.*

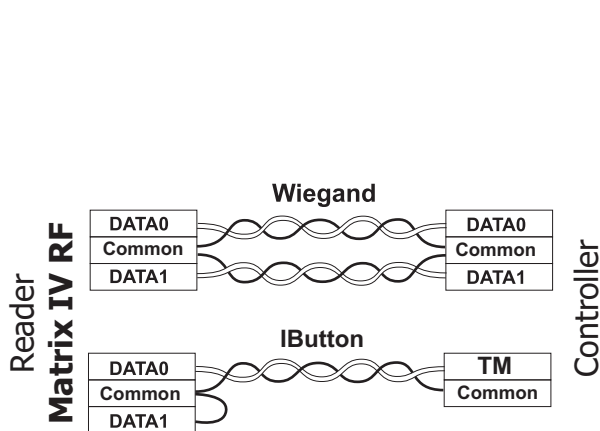| Wire Colour	Wiegand Connection	iButton Connection
Red	Power +12 24 V	
Black	Common (-)	
Brown	Channel 1 DATA0	Channel 1 iButton
White	Channel 1 DATA1	Common
Green	Channel 2 DATA0	Channel 2 iButton
Orange	Channel 2 DATA1	Common
Blue	RS-485 A	
Yellow	RS-485 B	

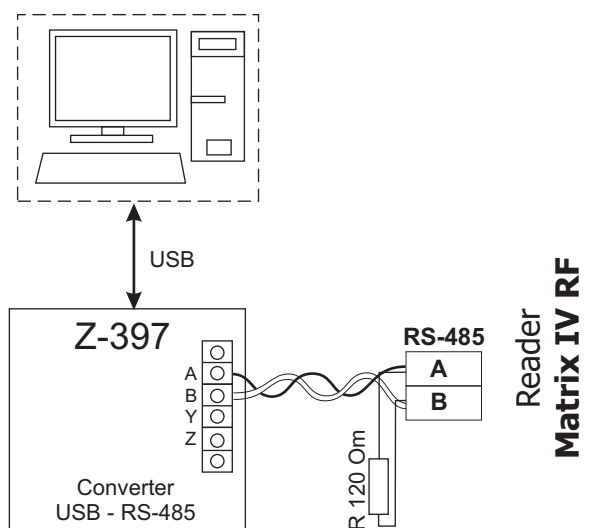**Рис.2** Connection, choosing channel transmission protocol.

Рис.3 Connection via RS-485.

3. OPERATION

The reader has two output channels for key fobs data transmission. For each channel, the following code transmission parameters values exist:

1) Accepted key fob types:
   a) All key fobs;
   b) IL-100 key fobs only (Anti-Clone mode)
   c) All key fobs except IL-100.

2) Buttons on the key fobs (1,2,3,4) which need to be pressed for key fob code to be transmitted into the channel.

3) Button pressed code:
   a) OFF only key fob code is transmitted;
   b) ON the code transmitted depends on the number of the button pressed.

Code transmission parameters is done by configuration software (MIVRFConfig at www.ironlogic.me) via RS-485 interface, using a Z-397 converter (USB 422/485 model). With this software, it's also possible to turn off the confirmation beeps on the reader.

Factory default parameter values are:

For Channel 1 IL-100 key fobs only, all buttons, the button code is transmitted alongside key fob code.

For Channel 2 All key fobs, all buttons, the button code is transmitted alongside key fob code.

When the reader is connected to the PC via RS-485 interface using Z-397 USB 422/485 converter, -- the reader transmits to the PC the following:
- Type of key fob: ("IRONLOGIC" (IL-100) / "UNKNOWN" (KeeLoq) / "CAME")
- Key fob code in Wiegand-26 parameter.

Serial port parameters required: baud rate 9600, data bits 8, parity None, stop bits 1, flow control None.

The Master key fob (IL-100), from the delivery package, is used to adjust radio link sensitivity and to reset the reader parameters to factory default values. No channels transmit the Master key fob code.

Radio link sensitivity adjustment:

Pressing the (picture) button on the Master key fob increases sensitivity, whereas the (picture) button decreases it.

Each button press is confirmed by the reader with a short beep; when adjustment limits are reached, a double beep is issued.

Reset to factory default values can be done:
- via Master key fob, by pressing two buttons at once;
- by connecting Channel 1 DATA0 wire (Brown) to Channel 2 DATA0 wire (Green) and powering on the reader.

After the factory default values are set, the reader waits for new Master key fob assignment for 15 s. During this time, the status indicator is flashing red and beeps are sounding. To assign a key fob as a new Master during that period, just press any of its buttons.

As a master fob I can be used only IL-100 fob.

If during 15 sec. the master fob isn't appointed, the reader passes into an operating mode with factory settings.

The key fob code acceptance is confirmed with sound feedback:
- One beep IL-100 key fob accepted
- Two beeps any other key fob accepted.
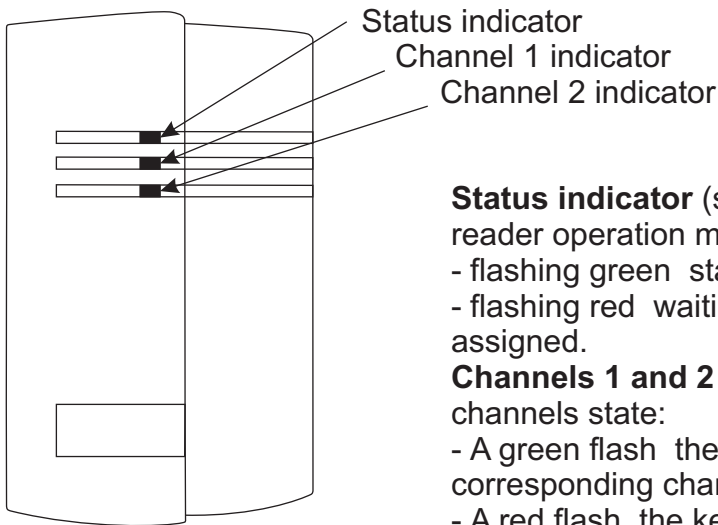
Status indicator (see Fig. 4) is used to display the current reader operation mode:
- flashing green standard working mode;
- flashing red waiting for the new Master key fob to be assigned.

Channels 1 and 2 indicators display the transmission channels state:
- A green flash the key fob code is accepted and transmitted to corresponding channel.
- A red flash the key fob code is accepted but not transmitted to corresponding channel: the button is not enabled.

Status indicator
Channel 1 indicator
Channel 2 indicator

Fig. 4

4. SPECIFICATIONS

Working frequency: ....433.92 MHz.
Supported key fob standards: ....KeeLoq, CAME.
Reading distance from Type IL-100 radio key fobs to a built-in antenna: ....up to 50 m. (subject to reception conditions variations).
Channels to transmit the code to controller: 2;
Channels to transmit the code to PC: ....1.
Output interfaces: ....iButton (Dallas Touch Memory), Wiegand-26, RS-485.
Socket for an external antenna: ....SMA-F standard.
Maximum line distance to the controller:
-Via iButton protocol: ....15 m,
-Via Wiegand-26: ....100 m,
-Via RS-485: ....1,200 m (Z-397 USB 422/485 converter use recommended).
Power supply voltage: ....12 24 V DC.
Consumption current (at 12 V): ....100 mA.
Operation mode indication: ....audial and visual.
Dimensions, mm: ....125 x 72 x 22.
Casing material: ....Plastic.
Weight: ....150 g.

5. OPERATING CONDITIONS

Ambient temperature: -30…40°C.
Humidity: Up to 80% at 25°C.

This device should be operated in absence of: atmospheric precipitation, direct sunlight, sand, dust and water condensation.
Device specifications may differ from described in this manual when operating under non-recommended conditions.

6. PACKAGE CONTENTS

MATRIX-IV RF RFID reader............................ 1
Type IL-100 radio key fob 1
Screws 3x30... 2
Wall plugs.. 2
Note: External antenna not included.

7. LIMITED WARRANTY

This device is covered by a limited warranty for 24 months from the date of sale.
The warranty becomes void if:
- This Manual is not followed;
- Device has physical damage;
- Device has visible traces of exposure to moisture and aggressive chemicals;
- Device circuits have visible traces of being tampered with by unauthorised parties.
Under active warranty, the Manufacturer will repair the device or replace any broken parts,
FREE of charge, if the fault is caused by manufacturing defect.

8. IRONLOGIC CONTACTS

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