MATRIX V

EM Marine 125KHz RFID / UHF 433.92 MHz reader with connection via iButton (1-Wire) / Wiegand-26 / RS-485 protocols

User Manual

1. OVERVIEW

Matrix V reader is used in Access Control Systems (ACS) to:
- read the serial numbers of various EM-Marine tokens (cards, key fobs etc.) operating on 125 kHz frequency,
- accept the radio signals of KeeLoq tokens operating at 433,92 MHz frequency,
- transmit the acquired information to the controller using iButton (Dallas Touch Memory), Wiegand-26 or RS-485 standard.

2. SPECIAL FEATURES

Improved EM-Marine cards reading distance up to 50 cm.
Ability to read the codes off the radio key fobs based on HCS-300 chip, operating using KeeLoq standard on 433,92 MHz frequency.
Reader casing is moisture-proof.
RS-485 output allowing to connect the reader to a remote PC via Z-397 series converter across very large distances (up to 1,200 m).
Each reader has a unique serial number required during its firmware update by the user.

3. MOUNTING AND CONNECTION

The reader should be mounted on a flat surface protected from direct sunlight and precipitation, allowing for easy access by a proximity card.
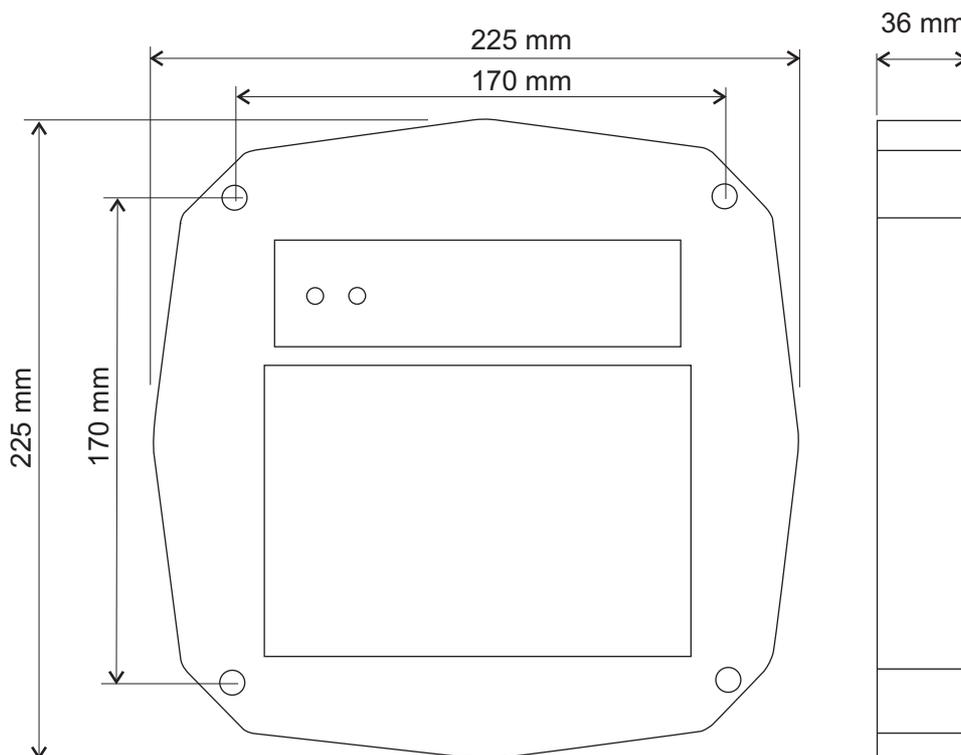

Figure 1. *Dimensions.*

To mount a MATRIX V reader perform the following steps:
- Mark and drill the mounting holes of the same size as the holes in the reader casing; (Figure 1);
- Connect the wires per Figures 2, 3, 4, 5.
- Insulate the junction points.
- Power on the reader and verify its proper operation by approaching it with a card or pressing a key fob button.
Note 1: Before turning on the reader, please ensure that no other cards on 125 kHz working frequency are present in the working zone!
- Install the reader at its designated place and fix it.
Note 2: Do not install readers within 50 cm from each other!
Note 3: To ensure proper operation over line distances closer to specification limits, use a UTP cable (e.g. CAT 5e). It should be connected as follows:
- When connecting via iButton: one wire from the twisted pair is connected to GND and the other one to DATA0;
- When connecting via Wiegand-26: first twisted pair connects between GND and DATA0, second one - between GND and DATA1. (Figure 3).
- When connecting via RS-485: one wire from the twisted pair is connected to Input A, and the other to Input B (Figure 4).
Note 4: When mounting on a metal surface, the actual maximum reading distance may turn out to be much lower than specified. To enable better reading distance, please place a layer of dielectric material (such as plywood), at least 2 cm thick, under the reader.

4. OPERATION

When the reader is powered on, it requires 3…5 s to initialise itself (indicated by both red and green LEDs being lit). Afterwards, the lone solid red LED indicates that the reader is ready.
The reader has internal and external control of audial and visual indication.
When indication control is internal:
- No card in working area: solid red LED;
- Card enters the working area: a green flash and a short buzz;
- Card remains in the working area: no indication.

External indication control is turned on when a signal from controller is detected on any of the indication control inputs. External control is performed by connecting the control wire to common wire.
When a token's serial number is read, the green LED will always light up and a 100 ms buzz will sound.
The acquired token serial number is transmitted to DATA1 and DATA0 outputs when working via iButton or Wiegand-26, depending on a chosen transmission protocol (Figure 4), or to "Input A" and "Input B" when RS-485 is used (Figure 5).

When the reader is connected to a PC by RS-485 protocol via Z-397 series converter, the card standard and Wiegand-26 serial number are displayed in HyperTerminal window.
For that, HyperTerminal needs to be set up to work with the reader as the serial port using the following parameters: Baud Rate: 9600, Data Bits: 8, Parity: None, Stop Bits: 1, Flow control: None.
To display the device's serial number on the screen, press "I" button on PC keyboard.

Jumper needs to be cut to disable the reader sound.

Cable 1 (7 wires):
- provides power for the device;
- provides iButton (Dallas TM) and Wiegand-26 outputs;
- used for external LED and sound control.

Cable 2 (4 wires): provides RS-485 output.
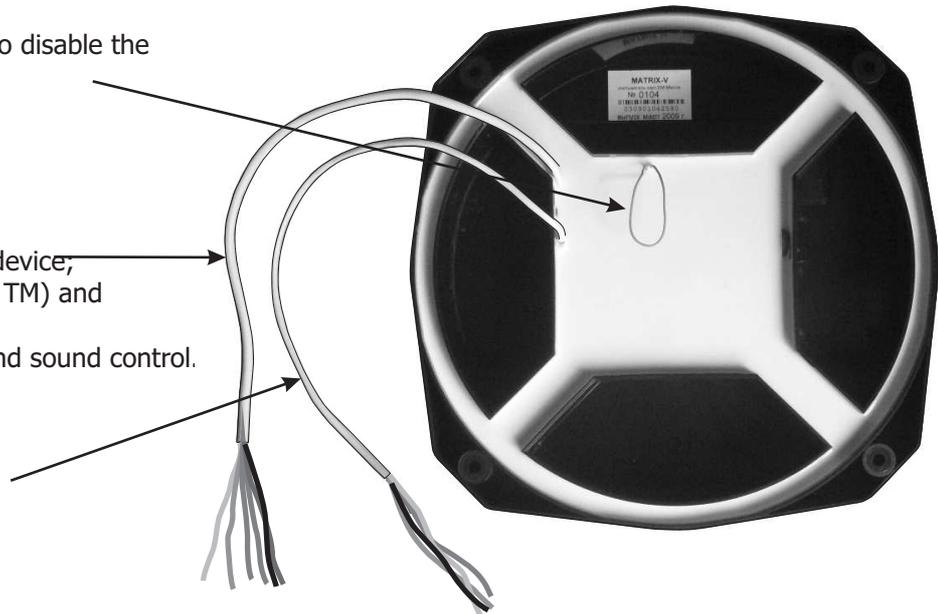
Figure 2. Reader back view.

Cable 1 Layout: Connection to Controller

Wire Colour	Wire Purpose
Red	+12 V DC
Black	Common (-)
Brown	DATA1
White	DATA 0
Green	External control, green LED
Yellow	External control, red LED
Blue	External control, buzzer

Cable 2 Layout: Connection to PC, RS-485

Wire Colour	Wire Purpose	
Black	Input A	Converter connection
Blue	Input B	
Red	Output A	External 120 Ohm resistive load,
Yellow	Output B	or next device in chain.

Figure 3. Wires purpose.

Reader MATRIX V

Wiegand

DATA0		DATA0
Common		Common
DATA1		DATA1

iButton (DS1990A emulation)

DATA0		TM
Common		Common
DATA1	

iButton (One-time transmission)

DATA0		TM
Common		Common
DATA1	

ACS controller
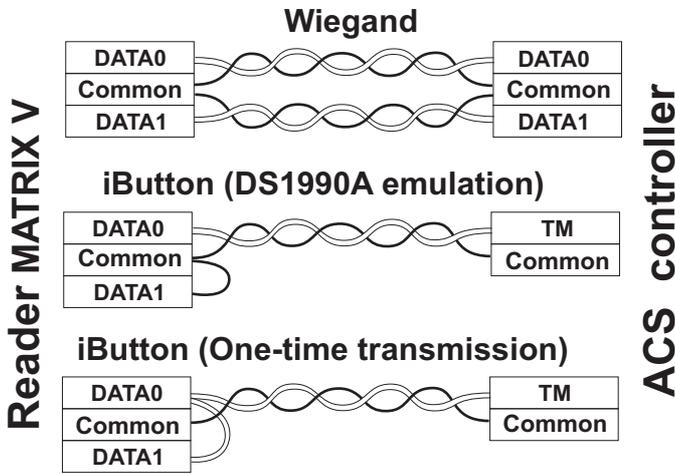
Figure 4. Choosing the transmission protocol

Reader MATRIX V

USB

Z-397

Converter

A
B
Y
Z

RS-485

| A input |
| B input |
| A output |
| B output |

R
120 Om
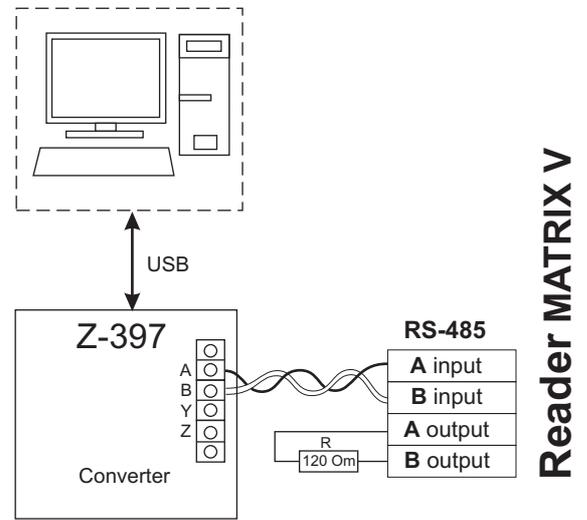
Figure 5. Connection scheme via RS-485.

5. SPECIFICATIONS

Working frequencies: ....125 kHz; 433,92 Mhz;
Supported token types: ....EM-Marine, 433,92 MHz radio key fobs;
Maximum reading distance:
- For EM-Marine cards: ....50 cm (with IL-05ELR cards);
- Radio key fobs: ....5 m (with IL-100 radio key fobs);
Output protocols: ....iButton (Dallas Touch Memory), Wiegand-26, RS-485;
Maximum line distance to controller by protocol:
- iButton ....15 m;
- Wiegand-26 ....100 m;
- RS-485 ....1,200 m. (Z-397 Series converter use recommended);
Operation mode indication:...Audial and Visual;
External indication control: ....present for both Audial and Visual;
Power supply voltage: ....12 V DC;
Maximum consumption current: ....500 mA;
Dimensions, mm: ....225 x 225 x 36;
Casing material: ....Plastic;
Weight: ....1.10 kg.

6. PACKAGE CONTENTS

MATRIX V RFID Reader 1
IL-05ELR EM-Marine card 1
IL-100 Radio Key Fob 1

7. OPERATING CONDITIONS

Ambient temperature: -30°C…40°C
Humidity: Not exceeding 80% at 25°C
The reader should not be operated where the following exists: atmospheric precipitation, direct sunlight, sand, dust and moisture condensation.
Reader specifications may not fully be as specified, when operating under non-recommended conditions.

8. 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.

9. IRONLOGIC CONTACTS

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The symbol of crossed-throught waste bin on wheels means that the product must be disposed of at f separate collection point. This also applies to the product and all accessories marked with this symbol. Products labeled as such must not be disposed of with normal household waste, but should be taken to a collection point for recycling electrical and electronic equipment. Recycling helps to reduce the consumption of raw materials, thus protecting the environment.