

# Matrix III MF-I

## Mifare 13.56 MHz RFID reader

### with connection via iButton / Wiegand-26 protocols

# User Manual

## 1. OVERVIEW

Matrix III MF-I reader is used in Access Control Systems (ACS) to acquire codes from approached Mifare tokens (cards, key fobs, bracelets etc.) and transmit them to controllers via iButton (Dallas Touch Memory) or Wiegand protocols.

A distinctive feature of this model is the support of IronLogic Protected technology, which provides reliable protection against card cloning (more details on [www.ironlogic.me](http://www.ironlogic.me) website). To use Protected technology, in addition to a Matrix III MF-I reader, customers require: a Z-2 USB MF reader with special firmware, an IronLogic Object Card and clean Mifare cards or key fobs to create access cards.

## 2. SPECIFICATIONS

- Working frequency: .....13.56 MHz;
- Supported tokens type: .....Mifare Ultralight, Mifare Standard (Classic) 1K, 4K, Mifare ID;
- Card/key fobs reading distance: .....2...6 cm;
- Output protocols:..... iButton (Dallas Touch Memory), Wiegand;
- Line distance from controller:
  - using iButton (Dallas Touch Memory) protocol: .....up to 15 m;
  - using Wiegand protocol: .....up to 100 m;
- Card reading status indication: .....buzzer, bicoloured LED;
- Indication control: .....internal / external;
- Power supply voltage: .....12 V DC;
- Current in Card Standby mode: .....up to 40 mA;
- Dimensions: .....118 x 45 x 22 mm.

## 3. MOUNTING AND CONNECTION

The reader should be mounted on a flat surface, in a place allowing unimpeded token access to the reader.

To mount the Matrix III MF-I reader, perform the following operations:

1. Mark and drill the mounting holes (Fig. 2)
2. Connect the reader wires, as per Table 1.
3. Insulate the wire junction points.
4. Supply power to the device (the LED shines red).
5. Test proper device operation by approaching it with a token.
6. Mount the reader in the desired place and fix it with the supplied screws.
7. Snap on the decorative case and fix it with the supplied screw.

Note 1: When install two readers closer than 10 cm from one another, connect the SYNC wires (orange) on both readers to each other.

Note 2: Mount the device under ambient temperature no colder than  $-5^{\circ}\text{C}$ .

Note 3: To ensure proper operation at the specified distance between reader and controller, a CAT5e UTP cable must be used (see Fig.1).

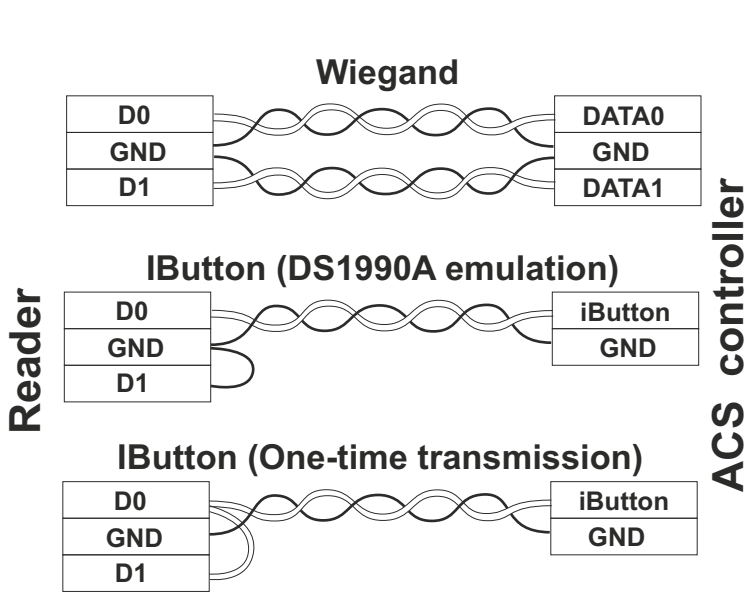


Fig. 1. Choosing the transmission protocol.

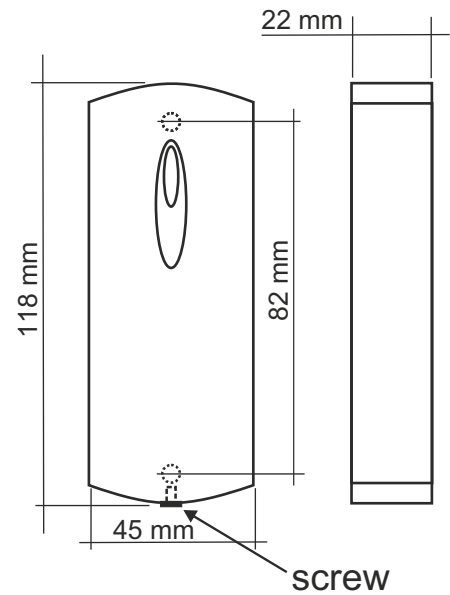


Fig. 2. Device Dimensions.

Table 1. Reader wires designation

Wire Colour	Wire Purpose
Red	+12 V (Power positive)
Black	GND – Common (Power negative)
White	DATA0
Brown	DATA1
Green	LED G – external indication control, green LED
Yellow	LED R – external indication control, red LED
Blue	BEEP – external indication control, buzzer
Orange	SYNC –synchronisation between readers
Black Jumper	Defines visual and audial control polarity

#### 4. OPERATION

Reader operation without external indication control:

1. When power is supplied and there's no card in the working zone, the LED shines red.
2. On card approach, its number is acquired. If done successfully, the LED turns green for a short time, then switches itself off, at the same time a short beep also sounds.
3. While the card remains within the reader working zone, the LED stays off.

External indication control for the buzzer and red/green colours of the LEDs is done by shorting the corresponding terminal (BEEP (blue), LED R (yellow), LED G (green)) to the common ground terminal (GND (black)).

External indication control can be used in parallel with internal indication control; by default, both the audial and visual indications are internally controlled. After external indication control signal has been activated for one of indication modes (for example, for the visual indication), that mode becomes externally controlled, while the other (in this example, the audial indication) remains under internal control.

## 5. PROTECTED MODE

In the Protected Mode, the reader provides reliable protection against unauthorised access. To initialise the Protected Mode, an IronLogic Object card containing a special key is used. This key is stored onto blank access cards using a Z-2 USB MF desktop reader with special firmware.

To store the special key to a Matrix III MF-I reader, touch it with an IronLogic Object card. From now on, the Matrix III MF-I will transmit to the controller only UIDs (serial numbers) of initialised access cards. This reader supports holding of up to 10 IronLogic Object cards at the same time. The first IronLogic Object card stored into the reader becomes its Master card. It allows storing other IronLogic Object cards and switching off the Protected Mode. Without this Master card, the reader cannot be reverted to initial, Unprotected mode.

### 5.1. Switching Between Protected and Unprotected Mode

From the factory, the reader arrives in Unprotected mode, transmitting to the controller the UIDs of all the access cards it could read.

#### 5.1.1. Entering Protected Mode.

- 1) On an unpowered reader, connect DATA0 (white) and LED R (yellow) terminals (See Fig.1).
- 2) Power on the reader.
- 3) If the LED is blinking red and a signal is sounding, the reader already is in Protected Mode.
- 4) If the LED is shining solid red, approach the reader with an IronLogic Object card. For 1 second, the reader changes LED colour to green and issues a beep. The Object card has now been stored into the reader and has become a Master card.
- 5) Power off the reader.

#### 5.1.2. Storing IronLogic Object Cards (Up to 10).

- 1) Ensure that the reader is powered on and operational.
- 2) Approach it with the Master card; the LED starts blinking red. Keep approaching the reader with more IronLogic Object Cards, with 16 s or less in between the cards. Each new card is acknowledged with a green LED flash.
- 3) To exit Storing Object Cards mode, either wait 16 s, or approach the reader again with the Master card.

#### 5.1.3. Leaving Protected Mode.

- 1) On an unpowered reader, connect DATA1 (brown) and LED R (yellow) terminals.
- 2) Power on the reader.
- 3) If the LED is blinking red and a signal is sounding, the reader already is in Unprotected mode.
- 4) If the LED is shining solid red, approach the reader with the Mastercard. For 1 second, the reader changes LED colour to green and issues a beep. All the Object cards stored into the reader will be erased, and the Unprotected mode will be activated.
- 5) Power off the reader.

## 6. CONFIGURATION

The controller interface parameters can be configured in any Protected Mode state. Initially, Wiegand transmission protocol is active. To select iButton protocol, connect DATA1 (brown) and GND (black) terminals. iButton (Dallas Touch Memory) is transmitted on DATA0 (white).

### 6.1. Parameter Numbers and Values

Parameter	Value	Description
1. Wiegand bit width	1 *	Wiegand 26 (3 bytes)
	2	Wiegand 34 (4 bytes)
	3	Wiegand 42 (5 bytes)
	4	Wiegand 50 (6 bytes)
2. iButton transmission bit width	1 *	iButton transmits <i>ALL</i> (up to 6) UID bytes (depending on the card UID).
	2	iButton transmits <i>ONLY</i> the number of bytes defined by Parameter 1
3. 7-byte UIDs encoding, 1...7 are byte numbers	1 *	iButton(123456) / Wiegand-26(123), like in CP-Z 2MF and Matrix III NET
	2	iButton(321765) / Wiegand-26(321), like in Matrix III RD-ALL
	3	iButton(234567) / Wiegand-26(234), transmission with 1 <sup>st</sup> byte skipped

Note: An asterisk (\*) next to values marks them as factory defaults.

### 6.2. Manual Parameter Setup

- 1) On the unpowered reader, connect the terminals: BEEP (blue) to DATA0 (white), and LED R (yellow) to GND (black).
- 2) Power on the reader.
- 3) Choosing parameter: the reader starts to beep in series, in sync with the LED flashing red. The number of these flashes corresponds to active parameter number (1...3). To select the parameter, when its number sounds, connect LED G (green) and GND (black) terminals. The reader will start indicating this parameter value.
- 4) Indicating parameter value is like indicating parameter number, but instead of LED flashing red, it flashes green. Parameter values indication begins with the current parameter value. To select the currently active parameter value: when it is sounding, connect LED G (green) and GND (black) terminals.
- 5) Power off the reader. To adjust another parameter, power on the reader again.

### 6.3. Configuration via RS-485

Configuration via an RS-485 link is done by **RdConf** software (see [www.ironlogic.me](http://www.ironlogic.me) website) and a **Z-397 Guard** connector.

- 1) Connect the reader to an RS-485 connector:
  - a. DATA0 (white) to A;
  - b. DATA1 (brown) to B;
  - c. GND (black) to G.
- 2) Connect BEEP (blue) to DATA0 (white) terminal.
- 3) Power on the reader.
- 4) Disconnect BEEP (blue) from DATA0 (white). RS-485 interface on the reader is now active until power off.
- 5) Launch the **RdConf** software, choose COM port of the converter, then configure the parameters.

## 7. OPERATING CONDITIONS

Ambient temperature: -30...40°C.

Humidity: ≤98% at 25°C.

When operating under non-recommended conditions, device parameters can deviate from specified values.

## 8. PACKAGE CONTENTS

-MATRIX III MF-I Reader: .....	1
-Plugs: .....	2
-Screws 3x30: .....	2
-Wall Plugs: .....	2

## 9. LIMITED WARRANTY

This Device is covered by limited warranty for 24 months.

The warranty becomes void, if:

- this Manual's guidelines are not followed;
- the device has suffered physical damage;
- the device has visible traces of exposure to moist and/or aggressive chemicals;
- the device circuits have visible traces of tampering by unauthorised parties.

Under this warranty, the Manufacturer shall repair the device or replace any broken parts as required, free of charge, in cases where the fault is caused by a Manufacturer's defect.

## 10. IRONLOGIC CONTACTS

### Headquarters:

RF Enabled ID Limited  
34 Ely Place, London, EC1N 6TD, UK  
E-mail: [marketing@rfenabled.com](mailto:marketing@rfenabled.com)

### Development and production:

AVS LLC  
7, Bobruiskaya street, Saint-Petersburg, 195009, Russian Federation  
E-mail: [marketing@rfenabled.com](mailto:marketing@rfenabled.com)  
Phone: +78122411853; +78125421185  
[www.ironlogic.ru](http://www.ironlogic.ru)

### Authorized representative in the European Union:

SIA IRONLOGIC  
79A, Slokas iela, LV-1007, Riga, Latvia  
E-mail: [info@ironlogic.lv](mailto:info@ironlogic.lv), [headstaff@ironlogic.lv](mailto:headstaff@ironlogic.lv)  
Phone: +37166181894; +37124422922  
[www.ironlogic.me](http://www.ironlogic.me)



The symbol of crossed-through waste bin on wheels means that the product must be disposed of at a 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.