

714-60 Mifare® ID Reader

With Selectable Outputs Data Sheet

Overview

The 714-60 OEM proximity reader consists of three parts: a potted unit containing the electronics and antenna, a front cover, and an optional spacer plate. A fixed 10 way color-coded cable protrudes from the back of the potted unit. The reader will read the unique ID from a Mifare® card and output the code in one of many user selectable formats. The unit also allows for user control of the three LED and sounder. A 6-way DIP switch under the front cover is used to select the required output format and LED operational modes.



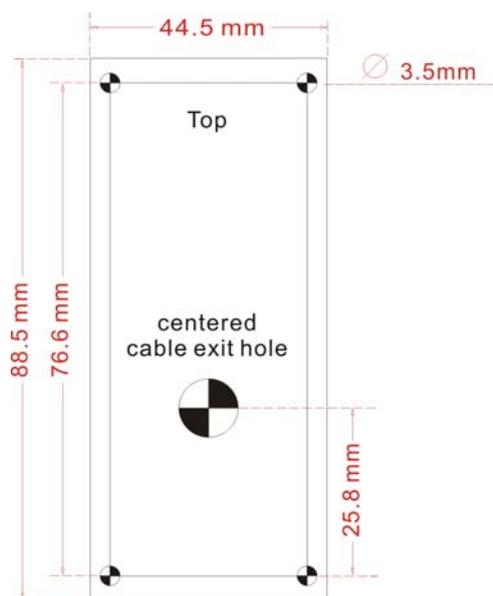
Specifications

- Power requirements: 5.0-13.6V dc. Current consumption is 100 mA typical.
- RF Frequency: 13.56MHz.
- Card types supported: Mifare® Std, Mifare® Ultralight, Mifare® DESFire.
- Contactless interface as per specification: ISO/IEC 14443 Type A.
- Output formats supported: Wiegand (44-bit, 34-bit, and 26-bit), Mag Stripe emulation, Clock/Data, RS232 (9600,n,8,1) EIA and TTL levels.
- Continuous (While tag in the field) or single transmission.
- Typical reading range: 50mm when input voltage is 12V. 30mm when input voltage is 5V.
- 3 LEDs (GREEN, RED, YELLOW).
- Sounder emits a 60ms beep at 4 kHz when a transponder is read. In addition sounder operates while SOUND input is pulled low.
- Operating temperature range: -20° C to +60° C.
- 10 way cable: 1m long.
- Weight: 90 grams.
- Dimensions: reader 89 x 45 x 16 mm. optional spacer plate 89 x 45 x 7 mm.

Physical Dimensions and Mounting Details

If the spacer plate is used the reader cable may be brought out of one of four exit points on the spacer: top, bottom, left or right. This enables the cable to be run on the surface of the wall.

If no spacer plate is used a minimum hole size of 6.5mm must be drilled in the wall at the cable exit position as shown above to allow the cable to exit perpendicular to the reader. The optional spacer plate may also be used when mounting the reader on a metal surface to reduce the negative effects of metal on the read range.



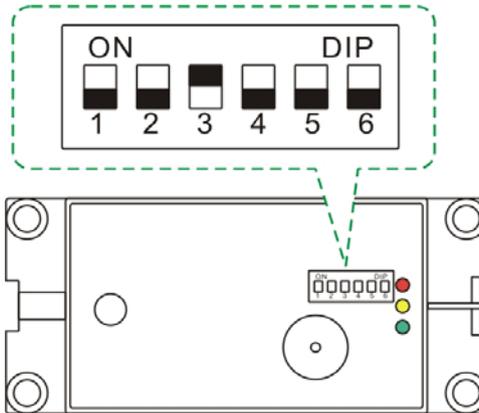
Connections

| Color | Name | Function |
|--------|----------------|------------------------------------------------------------------------------------------|
| GREY | PRESENT | Pulses low when an RFID tag is detected. It stays low while the module output is active. |
| WHITE | CLOCK/DATA0/TX | Outputs RFID tag code in selected format. |
| BROWN | DATA/DATA1 | Outputs RFID tag code in selected format. |
| YELLOW | YEL-LED | Controls Yellow LED in LED Mode 1. |
| ORANGE | RED-LED | Controls Red LED in LED Mode 1. |
| GREEN | GRN-LED | Controls Green LED in LED Mode 1 and both Red and Green LEDs in LED Mode2. |
| BLUE | SOUND | Controls Sounder. |
| PURPLE | RS-232 | RS-232 output. |
| RED | +VDC | Controls +5V - + 13.6V from power supply. |
| BLACK | 0V | Controls 0V from power supply. |

Note: LED and SOUND inputs are active low. The input is internally pulled high and may be pulled low by an open collector transistor or driven low by the output of a 5V CMOS or TTL gate. Low by an open collector transistor or driven low by the output of a 5V CMOS or TTL gate.

Output Mode Selection

The 6-way switch is used to select the output format and LED mode. The required setting is selected from the following tables:



(Wiegand – 26 bit, LED Mode2, Transmission Mode Single)

| SW1 | SW2 | SW3 | SW4 | Output Format |
|------------|------------|-----------|------------|---------------------------|
| ON | ON | ON | ON | Inhibit – turn off coil |
| ON | ON | ON | OFF | RS232 – 24bit |
| ON | ON | OFF | ON | RS232 – 32bit |
| ON | ON | OFF | OFF | RS232 – 56bit |
| ON | OFF | ON | ON | Unused |
| ON | OFF | ON | OFF | Unused |
| ON | OFF | OFF | ON | Unused |
| ON | OFF | OFF | OFF | Unused |
| OFF | ON | ON | ON | Fast Mag Stripe – 40 bit |
| OFF | ON | ON | OFF | Mag Stripe – 24 bit |
| OFF | ON | OFF | ON | Mag Stripe – 32 bit |
| OFF | ON | OFF | OFF | Mag Stripe – 40 bit |
| OFF | OFF | ON | ON | Basic Clock/Data – 56 bit |
| OFF | OFF | ON | OFF | Wiegand – 26 bit |
| OFF | OFF | OFF | ON | Wiegand – 34 bit |
| OFF | OFF | OFF | OFF | Wiegand – 44bit |

LED Mode Table

| Mode# | SW5 | LED Mode |
|-------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | ON | 3 Individual LEDs each controlled their own input |
| 2 | OFF | RED/GREEN with single control line (GRN-LED). When the GRN-LED input is floating or pulled high, the RED led is on and the GREEN led is off. When the GRN-LED input is pulled low (Connected to 0V) the GREEN led is on and the RED led is off. The YEELLOW led is always off. |

Note: In LED Mode 2, both RED and GREEN LEDs are controlled by the GRN-LED input. When the GRN-LED input is floating or pulled high, the RED led is on and the GREEN led is off. When the GRN-LED input is pulled low (connected to 0V) the GREEN led is on and the RED led is off. The YELLOW led is always off.

Continuous/Single Transmission Mode Table

| Mode | SW6 | Operation |
|------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Continuous | ON | While a tag is in the reader's field the reader will continuously transmit the code in the format chosen by DIP switches 1-4. The repetition period is dependent on the format chosen but varies between 65ms and 230ms. |
| Single | OFF | Single transmission when tag is brought into the field. Tag must be removed from field for at least 1 second before a read of this tag is possible again. |

Read range considerations

The read range of the reader increases as the input voltage increases.

RS232 Output modes

There are two RS232 outputs from the reader. The RS-232 wire (purple) outputs EIA voltage levels: -5V for a binary '1' state and +5V for a binary '0' state. This output is suitable to connect directly to the serial COM port of a PC. The TX wire (white) outputs TTL levels: +5V for a binary '1' state and 0V for a binary '0' state. This output is suitable to connect directly to the USART of a microprocessor. RS232 format data is outputted from both wires when the RS232 modes are selected.

The baud rate is 9600. Data format is 8 bits, no parity, and 1 stop bit.

The tag code is output in the following structure:

| | | | | |
|-----------|--------------|---------|---------|-----------|
| STX (02h) | DATA (ASCII) | CR(0Dh) | LF(0Ah) | ETX (03h) |
|-----------|--------------|---------|---------|-----------|

The DATA bytes vary according to the number of bits being output:

56 bit mode

DATA = 14 ASCII characters representing the hexadecimal ID number e.g. '01E24310B2F12A' (30 3145 32 34 33 31 30 42 32 46 31 32 41 hex).

32 bit mode

DATA = 10 ASCII characters representing the least significant 32 bits of the tag converted to a decimal number e.g. '0280162602' (30 32 38 30 31 36 32 36 30 32 hex)

24 bit mode

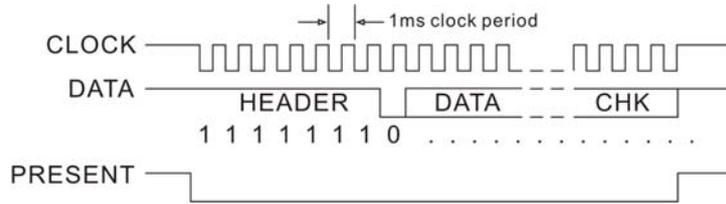
DATA = 8 ASCII characters representing the least significant 24 bits of the tag converted to a decimal number e.g. '11727146' (31 31 37 32 37 31 34 36 hex)

Clock/Data Mode

In this mode all 56 bits of the tag are clocked out with an eight bit header and an eight bit checksum.

| | | |
|-------------------|----------------|----------|
| Header (11111110) | Data (56 bits) | Checksum |
|-------------------|----------------|----------|

The header is hex FE. The data consists of 56 tag bits sent MSB first. The checksum is a byte addition of the 7 bytes of tag data e.g tag 00000410B2F12A has a checksum of 00+00+04+10+B2+F1+2A=E1.

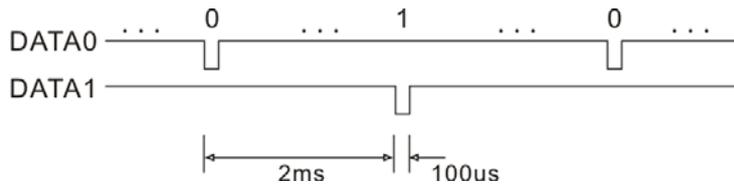


Data is set up on the falling edge of the clock and is stable on the rising edge of the clock.

Wiegand Output Modes

In this mode the tag code is pulsed out on DATA0 (white wire) and DATA1 (brown wire). Both are normally high. When a tag is presented to the reader 26/34/42 bits are transmitted in the following way:

A binary 1 is represented by a 100 us pulse low on DATA1. A binary 0 is represented by a 100 us pulse low on DATA0. There is a 2 ms inter bit delay.



44bit mode

44 pulses are transmitted:

- The first 40 bits are the least significant 40 bits of unique ID (MSB first).
- The last 4 bits are the LRC value of the 10 previous nibbles. The LRC is calculated by XORing each nibble. The MSB of the LRC is sent first.

34 bit mode

34 pulses are transmitted:

- The first bit is the even parity of tag bits 9-24.
- The least significant 32 bits of the unique ID (MSB first).
- The last bit is the odd parity of tag bits 25-40.

26 bit mode

26 pulses are transmitted:

- The first bit is the even parity of tag bits 17-28.
- The least significant 24 bits of the unique ID (MSB first).
- The last bit is the odd parity of tag bits 29-40.

Mag Stripe Modes

In this mode the decimal tag number is clocked out on CLOCK (white wire) and DATA (brown wire) at 100 characters per second. The format is standard as found on Track 2 of a magnetic card:

| | | | | | |
|---------------|----|------|----|-----|---------------|
| 10leading 0's | SS | DATA | ES | LRC | 5trailing 0's |
|---------------|----|------|----|-----|---------------|

SS = start sentinel (B hex).

ES = end sentinel (F hex).

LRC = longitudinal redundancy check.

DATA varies according to the number of bits selected:

40bit mode

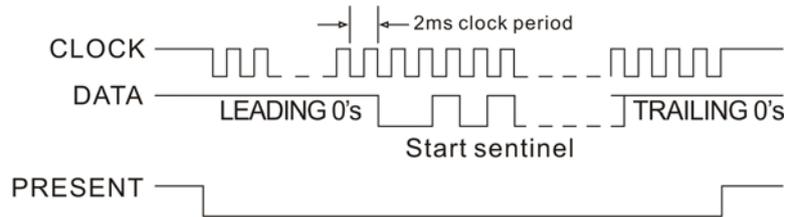
DATA = 13 decimal digits with leading zeros. The most significant decimal digit is transmitted first.

32 bit mode

DATA = 10 decimal digits with leading zeros. The most significant decimal digit is transmitted first.

24 bit mode

DATA = 8 decimal digits with leading zeros. The most significant decimal digit is transmitted first.



Each character is 5 bits long. The first four bits are the hex digit (0-F) least significant bit first. The fifth bit is an odd parity bit. A 0 is represented by a high level on the DATA wire and a 1 is represented by a low level on the DATA wire. Data is set up on the falling edge of the clock and is stable on the rising edge of the clock. The PRESENT output goes low for the duration of the transmission simulating the CARD PRESENT from a mag card reader.

Fast 40bit mode

This mode differs from the standard 40bit magstripe mode in the following ways:

- DATA=14 decimal digits with leading zeros.
- The clock period is 200us.
- 10 trailing 0's

All other aspects of this format are the same as the other magstripe formats.

Tuning the antenna

Under the front cover is a variable capacitor which may need to be adjusted to re-tune the antenna indifferent environments. To tune the antenna, switch SW6 on (continuous mode). Now put a card in the field and adjust the variable capacitor until the unit is beeping repeatedly(beep...beep...beep...beep...). The best tuning is when the gap between beeps is shortest.