# 717-53 MIFARE® ID Reader

# Switchbox Mount

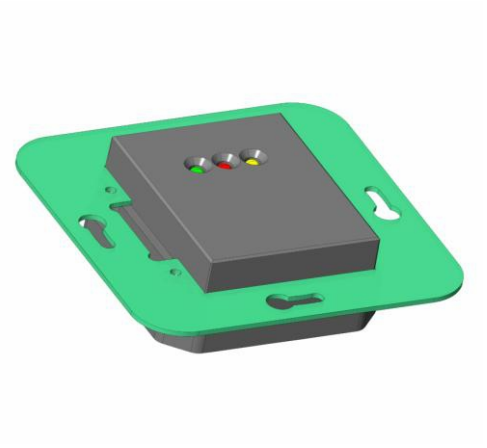
# Data Sheet

## Overview

The 717-53 Mifare reader is a fully potted unit containing all the electronics required to read the unique ID from a MIFARE® card and output the code in one of several formats. The format is selected on a 6-way DIP switch on the back of the unit.

A 10-way pull-off connector on the back of the unit is provided to connect the unit to a controller.

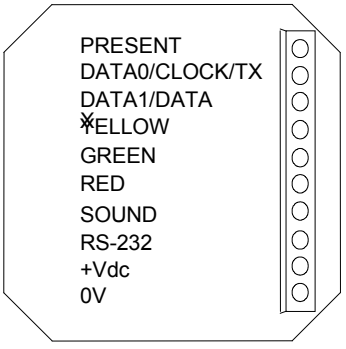
The unit also allows for user control of all three LEDs and the sounder.



## Specifications

- Power requirements: 5.0-13.6V dc. Current consumption is 110 mA typical.
- RF Frequency: 13.56 MHz.
- Card types supported: mifare® Std, mifare® Ultralight, mifare® DESFire, mifare® Plus S/X. , NTAG2XX
- Contactless interface as per specification: ISO/IEC 14443 Type A.
- Output formats: 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
- 3 LEDs (GREEN, RED, YELLOW).
- Sounder emits a 50ms beep at 4 kHz when a transponder is read. In addition sounder operates while BEEP input is pulled low.
- Operating temperature range: -20 °C to +60 °C.
- Weight: 90 grams.
- Housing - ABS plastic - potted IP65.
- Dimensions: 48 mm x 48 mm x 37mm (excluding mounting plate)
- Suitable for installation into a 55mm switchbox.

## Connections



The table below details the function of each connection:

| Name | Function |
|---|---|
| PRESENT | Pulses low when an RFID tag is detected. It stays low while the module output is active. |
| DATA0/CLOCK/TX | Outputs RFID tag code in selected format. |
| DATA1/DATA | Outputs RFID tag code in selected format. |
| YELLOW | Controls Yellow LED in LED Mode 1. |
| GREEN | Controls Green LED in LED Mode 1 and both Red and Green LEDs in LED Mode 2. |
| RED | Controls Red LED in LED Mode 1. |
| SOUND | Controls Sounder |
| RS-232 | RS-232 output |
| +Vdc | Connect +5V - +13.6V from power supply. |
| 0V | Connect 0V from power supply. |

Note: The YELLOW, GREEN, RED and BEEP 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.

## 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:

### Output Format Table

| SW 1 | SW 2 | SW 3 | SW 4 | Output Format |
|---|---|---|---|---|
| ON | ON | ON | ON | Inhibit - turn off coil |
| ON | ON | ON | OFF | RS232 - 24 bit |
| ON | ON | OFF | ON | RS232 - 32 bit |
| ON | ON | OFF | OFF | RS232 - 56 bit |
| ON | OFF | ON | ON | *Unused* |
| ON | OFF | ON | OFF | *Unused* |
| ON | OFF | OFF | ON | *Unused* |
| ON | OFF | OFF | OFF | Gen-Scan clock/data - 32 bit |
| 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 - 44 bit |

### LED Mode Table

| Mode # | SW 5 | LED Mode |
|---|---|---|
| 1 | ON | 3 Individual LEDs each controlled by their own input |
| 2 | OFF | RED/GREEN with single control line (GRN-LED) |

Note

1. In LED Mode 2, both RED and GREEN leds are controlled by the GREEN input. When the GREEN input is floating or pulled high, the RED led is on and the GREEN led is off. When the GRN 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 | SW 6 | 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. |

## RS232 Output modes

There are two RS232 outputs from the reader. The RS-232 connection 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 connection 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 connections 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 31 45 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

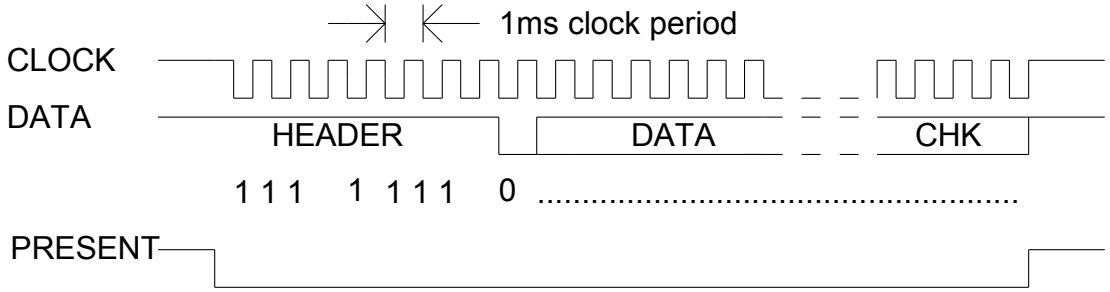
DATA = 8 ASCII characters representing the least significant 24 bits of the tag converted to a decimal number e.g. „11727146‟ (31 31 37 32 37 31 34 36 hex)

## 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.

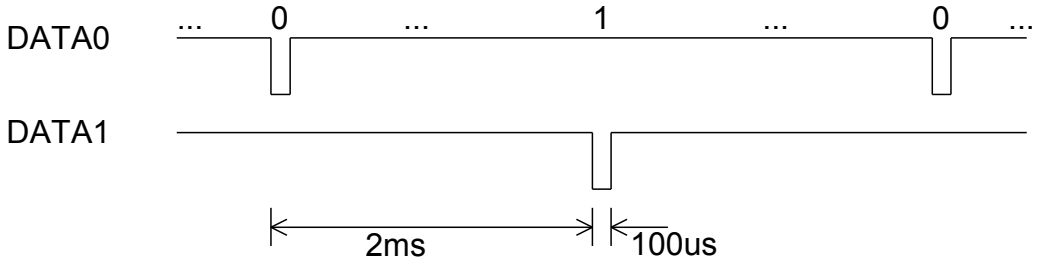



Data is set up on the falling edge of the clock and is stable on the rising edge of the clock.

## Wiegand Output Modes

In this mode the tag code is pulsed out on DATA0 and DATA1. 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.




### 44 bit 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 and DATA at 100 characters per second. The format is standard as found on Track 2 of a magnetic card:

| 10 leading 0"s | SS | DATA | ES | LRC | 5 trailing 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:

### 40 bit mode

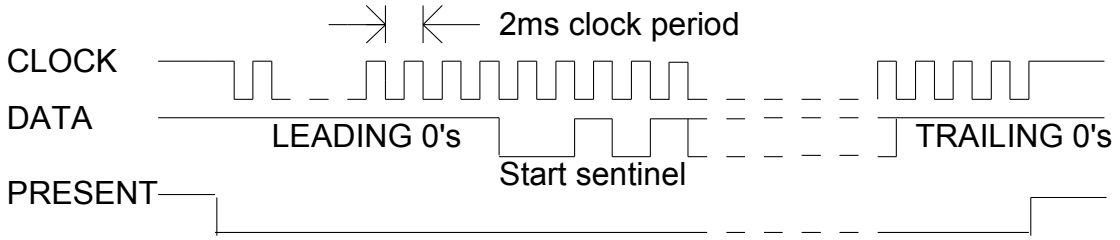
DATA = 13 decimal digits with leading zeros. The most significant decimal digit is transmitted first.

### 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 connection and a 1 is represented by a low level on the DATA connection. 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 40 bit 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.

### Gen-Scan mode

In this mode the decimal 32 bit tag number is clocked out on CLOCK and DATA:

| 20 leading 0"s | SS | DATA | CHK | SEP | ES | LRC |
|---|---|---|---|---|---|---|

SS = start sentinel (B hex).
SEP = separator (D hex).
ES = end sentinel (F hex).
LRC = longitudinal redundancy check.
DATA consists of 18 decimal digits with leading zeros. The most significant decimal digit is transmitted first.
CHK is a check digit derived from the DATA using the "modulus-10" algorithm.

Clock period = 1.5 ms. Data is clocked on the falling edge of the clock. The data is set up 500us before the falling edge of the clock, and returns to a high level on the rising edge of the clock.

## Tuning the antenna

Under the front cover is a variable capacitor which normally should not need to be adjusted. It has been set at the factory. Should the antenna need to be adjusted, 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.