MOTOROLA

Systems Solutions Group
8201 E. McDowell Road
Scottsdale, AZ 85252-1417

Exhibit 8 – Users Manual

Motorola M-Smart MultiPass™

13.56 MHz Smartcard

Access Control Reader

FCC ID: E9UMP1000

Model No. MP-1000

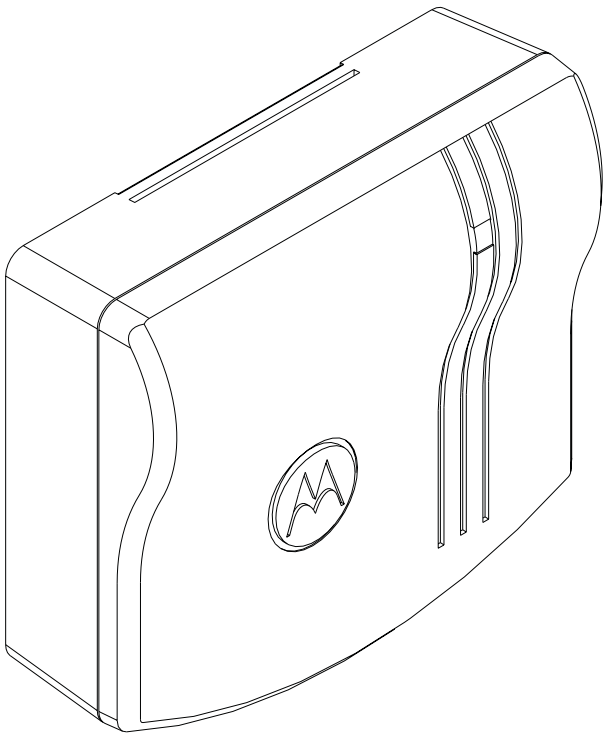
8.0 Multipass Users Manual

MOTOROLA

Worldwide Smartcard Solutions Division

M-Smart MultiPass™

Installation and Operation Manual



May 17, 2000

K01976-000 Rev. T1-06

CE

FCC Compliance: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CE Compliance: This product complies with the European Community Council Directive 89/336/EEC if the installer/user adheres to the instructions detailed in this manual. This product is in compliance with ETS 300 330 with the referenced standards EN 55022 (class B), EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, and EN 61000-4-6.

UL Recognition

To be defined.

Table of Contents

List of Figures

List of Tables

1.0 Product Specification

- Input Voltage: 9.0 VDC to 15 VDC
- Input Current/Power:
  - -Typical: Vin = 12.0 VDC 300 mA 3.6 W
  - -Maximum: Vin = 9.0 VDC 500 mA 4.5 W
- Power Supply:
  - -Recommendation: Regulated linear power supply
- Read Range[1]:
  - -With MV4000 Series Smart Card 2.0" (5.1 cm)
- Frequency:
  - -Exciter Field: 13.56 MHz
  - -Receive: 847.5 KHz
- Operating Temperature Range: -35° C to +65° C (-31° F to +149° F)
- Color: Black
- Material: UV resistant, PC/ABS (UL 94V0) plastic

  Weight (typical): 16.8 oz. (450 g)
- Dimensions: 4.6”H x 5.1”W x 1.8”D (11.7 x 13 x 4.6 cm)
- Output Formats: Wiegand and RS-232[2]
- Certification: UL-294 indoor and outdoor compliant, CE Mark, and FCC Class A Digital Device (Part 15) ID Numbers **TBD#**

1. Read range is stated in an undisturbed electrical environment, with card presented parallel to reader, and reader installed in accordance with Motorola instructions. Power supply, reader, and controller must be on the same ground, connected to earth.
2. Requires a Motorola TK-232 module to achieve standardized RS-232 levels.

2.0 Introduction

The M-Smart™ MultiPass reader is a modular, rugged, low power radio frequency reader designed for applications such as identification systems, security systems, and data collection. The M-Smart™ MultiPass reader mounts on any USA standard electrical single gang box or on any flat surface. The reader electronics module is completely enclosed as a sealed unit, making it both vandal and weather resistant.

The reader outputs data in either Wiegand or RS-232 formats, making it easy to upgrade an existing site to proximity using the wiring already in place.

2.1 Features

- Independently controlled audio tone and tri-color status LED.
- Snap-on module construction, enabling configuration at installation site.
- Mounting on standard single electrical box or on any flat surface.
- Indoor/outdoor operation.
- Attractive, contemporary styling.
- Compatible with ProxSmith™ ASP+ formats only.

2.1.1 Theory of Operation

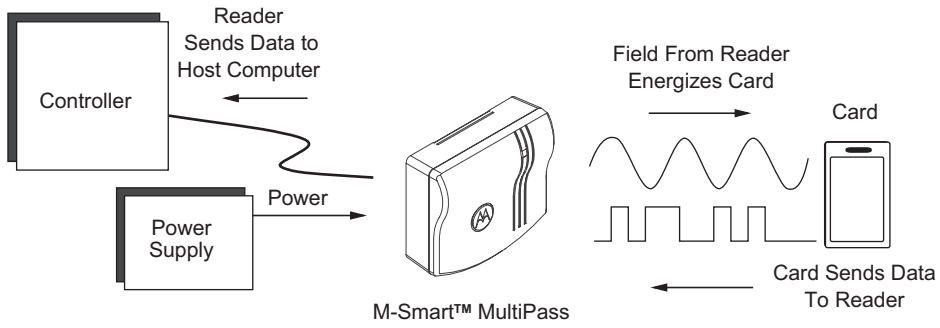


Figure 1 M-Smart™ MultiPass Block Diagram

When the reader is powered, a low-power radio frequency (RF) field is continuously transmitted by the reader (see Figure 1). When a card is presented within the field of the reader, the microchip, embedded in the card, is activated and transmits a unique identification (ID) number back to the M-Smart™ MultiPass reader. The reader decodes and converts this data to the pre-determined Wiegand or RS-232 compatible format and sends this code to an external controller through a data cable. With this information, the controller determines what action is to be taken as a response to the card presentation (e.g. open door).

2.2 Unpacking and Identifying Supplied Parts

Unpack the equipment and become familiar with the components. Figure 2 illustrates the contents of the package.

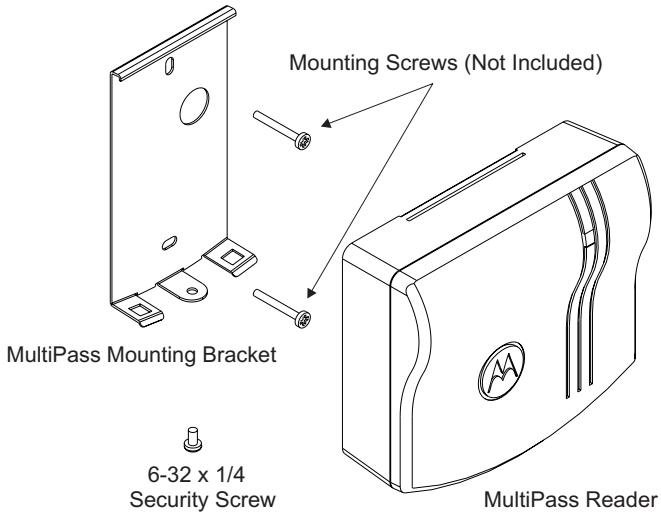


Figure 2 M-Smart™ MultiPass Package Components

2.3 Identifying the Reader Output Format

The reader output format is printed on the ID label (see Figure 3) which is attached to the reader module.

TBD

Figure 3 The Reader Label

3.0 Installation

Notice: The M-Smart™ MultiPass reader requires the use of linear, series pass, regulated power supplies. Use of other types of power supply can result in reduced read range. The use of switching power supplies is not recommended.

Do not use the reader's power supply for other equipment, particularly when operating switched inductive loads such as motor control relays and solenoids (i.e., magnetic locks, latch or strike). Doing so will affect the reader operation. Use a separate dedicated power supply for Motorola proximity readers.

Because this technology is based on radio frequency and because nearby environmental sources of electrical interference may affect the performance of the reader, below is a list of precautions that should be considered when installing or wiring the reader:

- **Metal affects radio signals. Do not cover the face of the reader with metal of any kind. Do not install the reader where metal is within 2" (5 cm) of sides and 12" (31 cm) in front of the reader.**
- **Reduce or eliminate unwanted signals from external sources.**
- **Do not place the reader wiring bundled in conduit with AC power cables,door lock power, or signal wiring.**
- **Maintain all reader wiring a minimum distance of 12" (30 cm) away from other wiring such as AC power, computer data wiring, telephone wiring, or wiring to electric locking devices, etc.**
- **Do not install the reader in areas where sources of broad spectrum EMI noise may be present. Examples of EMI broad spectrum noise producers are motors, pumps, generators, AC-DC converters, uninterruptable power supplies, AC switching relays, light dimmers, computer monitors, and CRTs.**

3.1 Mechanical Installation

3.1.1 Gang Box Mounting (Preferred Mounting Configuration)

The M-Smart™ MultiPass mounting bracket is designed to be mounted on a single metal gang box. Using two 6-32 screws, attach the mounting bracket to the gang box. Once the mounting bracket is screwed in place, snap on the reader as shown in Figure 4 . Be sure to install a security screw in the bottom of the reader to lock the reader in place. (**Note:** The customer may want to substitute the enclosed M2 x 3 Phillips head Security Screw with a screw of the same size and thread, but a non-standard head such as Spanner or Star to ensure that the unit cannot be easily removed from the mounting bracket.) For mechanical dimensions, cable and hole locations of the M-Smart™ MultiPass reader refer to section **10.0** (Mechanical Dimensions).

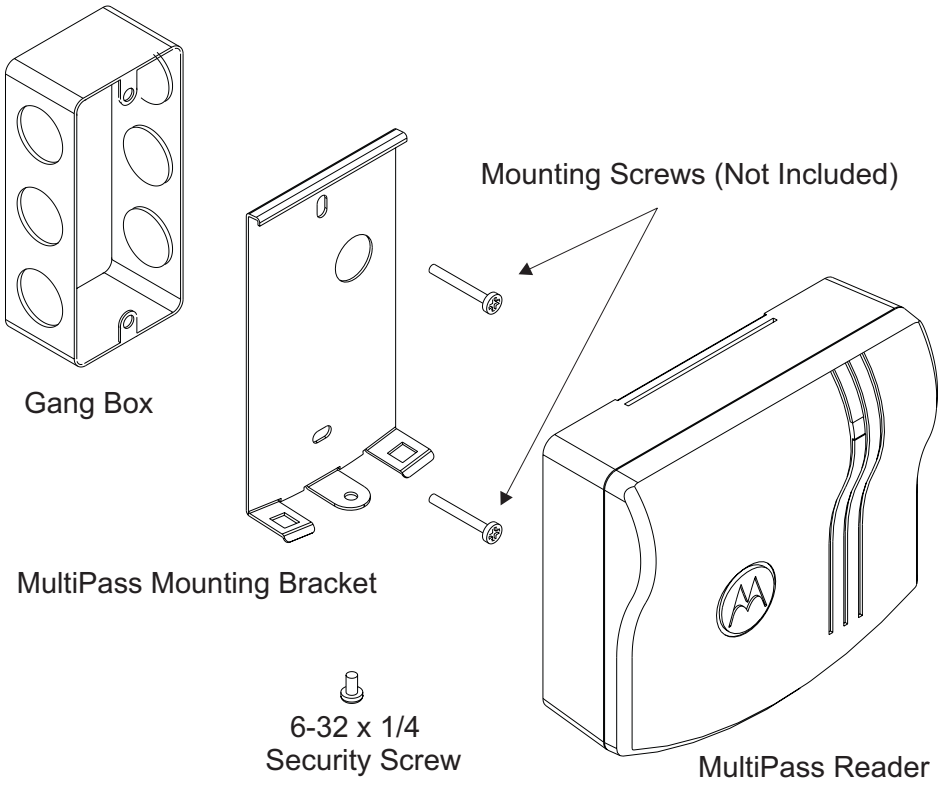


Figure 4 Gang Box Mounting

3.1.2 Wall Mounting

To mount the M-Smart™ MultiPass to a wall, drill a 0.375" hole for the reader cable. Place the mounting bracket against the wall then mark the location for the mounting holes. Drill the proper size mounting holes (for 6-32 screws) at the marked locations. Using the 6-32 screws, attach the mounting bracket to the mounting holes. Once the mounting bracket module is screwed in place, route the reader cable through the bracket and then snap the M-Smart™ MultiPass unit to the bracket as shown in Figure 5 Be sure to install a security screw in the bottom of the reader to lock the reader in place. (**Note:** The customer may wish to substitute a screw with a non-standard head such as Spanner or Star, for the Phillips screw included to ensure that the unit cannot be easily removed.) Route the reader cable to the controller. For mechanical dimensions, cable and hole locations of the M-Smart™ MultiPass reader refer to section **10.0** (Mechanical Dimensions).

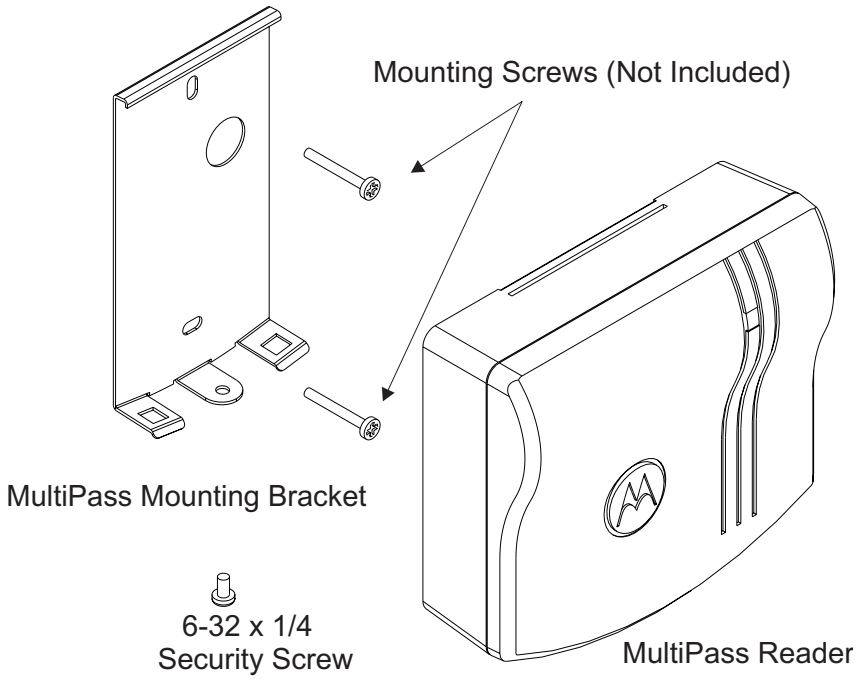


Figure 5 Wall Mounting

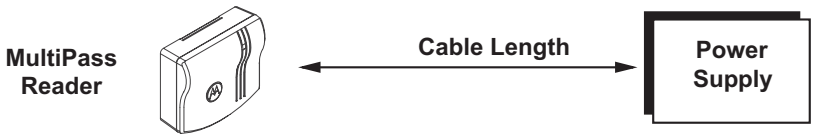
4.0 Power and Cabling

4.1 Power Supply Cable Types and Maximum Lengths

The M-Smart™ MultiPass reader requires a minimum voltage of 9.0 VDC at the reader. Voltage drops, caused by the cable resistance, can be compensated for by increasing the power supply voltage. In noisy environments, use shorter cable runs. The following are the recommended cable types and maximum cable lengths for cables connecting the power supply to the reader

DO NOT SET THE POWER SUPPLY VOLTAGE TO HIGHER THAN 15 VDC!

(DO NOT USE CABLES WITH GAUGES SMALLER THAN 22 AWG, AND ALL CABLES MUST MEET LOCAL AND NATIONAL BUILDING CODES.)

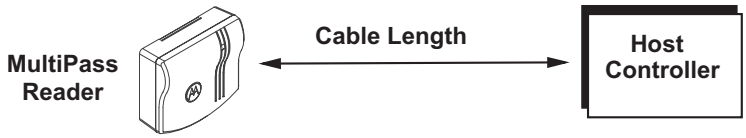


Cable Type	*Maximum Cable Length*
22 AWG (0.60 mm), three conductor with an overall foil shield, Alpha 5192 or equivalent.	250’ (76 m)
18 AWG (1.2 mm), two conductor, with an overall foil shield, Alpha 5386 or equivalent.	500’ (152 m)

Table 1. Power Cable Types and Lengths

4.2 Reader to Host Interface Cable Types and Lengths

Refer to the table below to determine the recommended maximum wire gauge and cable length between the M-Smart™ MultiPass reader and the host controller. Variation in distance requires different wire gauges with the assumption that the host and reader have the same ground potential. Because of system data termination differences, contact your system manufacturer for its exact requirements. Installation should be in accordance with National Electric Code ANSI/NFPA 70.



Cable Type	*Maximum Cable Length (Wiegand I/O)*
22 AWG (0.80 mm), six or eight conductor with an overall foil shield, Alpha 5196, 5198 or equivalent.	500’ (152 m)
18 AWG (1.2 mm), six or eight conductor with an overall foil shield, Alpha 5386, 5388 or equivalent.	500’ (152 m)

Table 2. MultiPass Reader Host Controller Cable Types and Lengths

Note: For RS-232 operation using the TK-232 Wiegand to RS-232 converter (Sold separately), the maximum cable length will be different. Refer to the TK-232 installation and operation guide for connections and cable lengths.

5.0 Earth Grounding

Connect the Power Supply and Controller directly to a common earth ground. A common earth ground can be established by driving a copper clad ground rod into the earth. If direct connection to a ground rod is not possible, connect the reader to an earth-grounded cold water metal pipe (do not connect to copper fire sprinkler system because it may have non-conductive couplings), or steel frames (building beams) that connect to earth.

Prevent ground loops by connecting the cable shield of the M-Smart™ MultiPass reader to the controller ground and the negative line of the power supply to one common earth ground point. Connecting different points to separate earth grounds may result in a ground loop. Ground loops may cause poor read range and communication errors between the host and the reader.

In a multiple reader installation, connect all readers to a single common earth ground reference point.

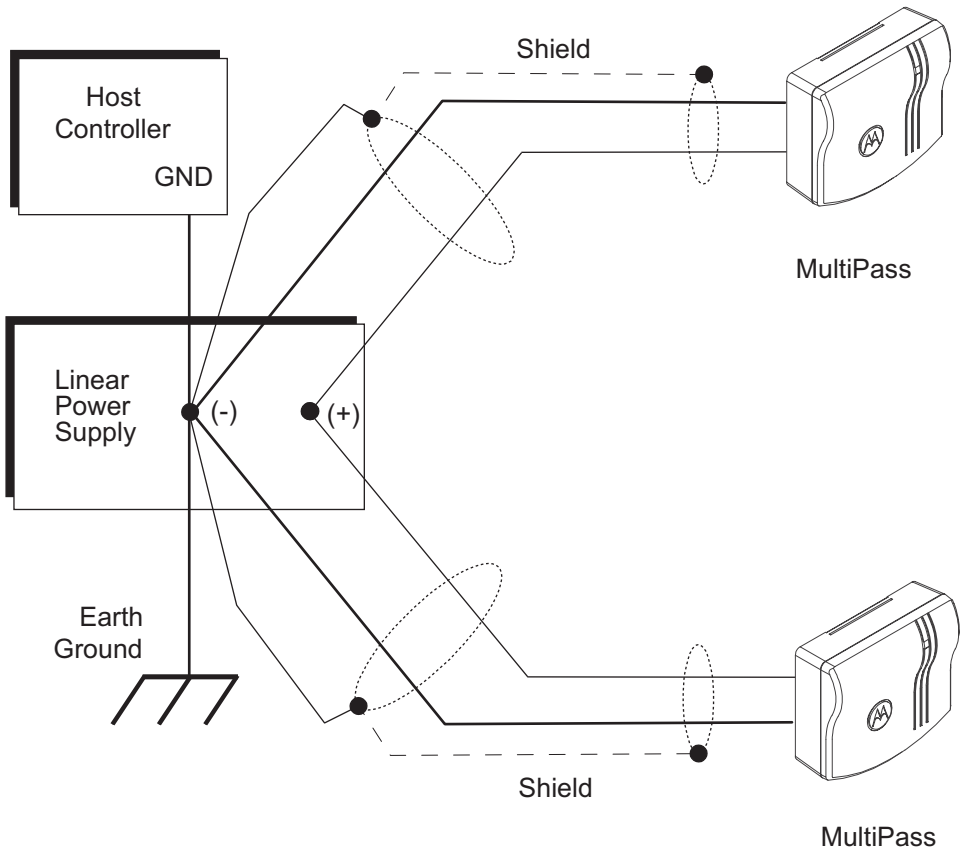


Figure 6 Grounding the Reader

6.0 Reader to Host Interface Wiring

Figure 7 shows all the possible interfaces. Chose the appropriate interface for your installation.

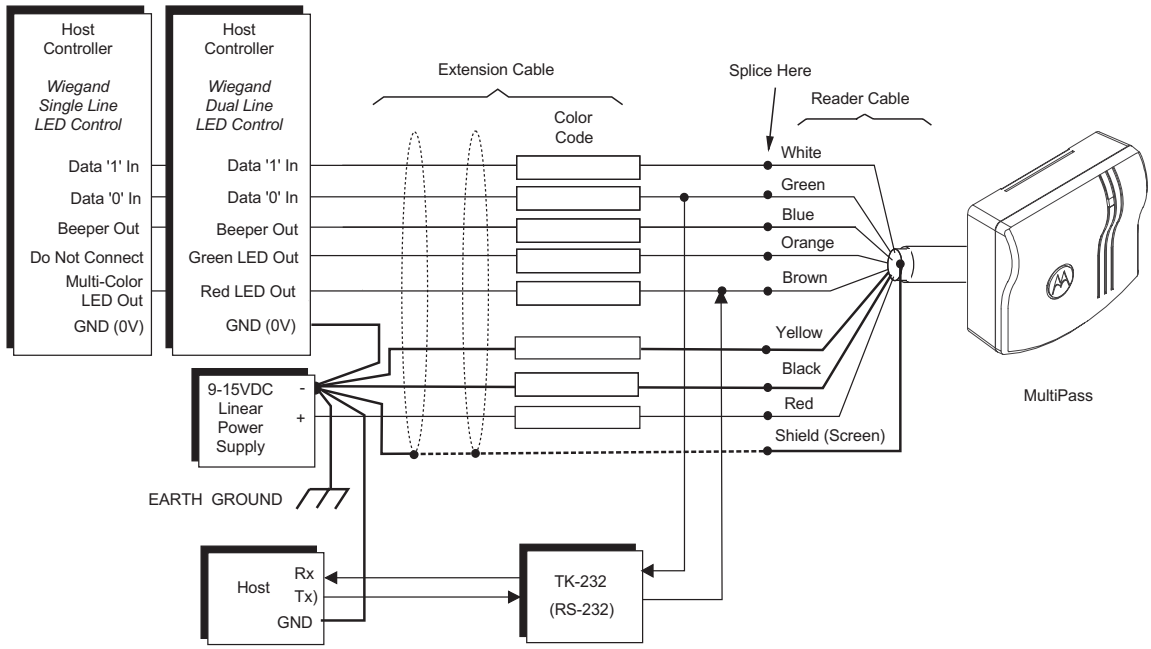


Figure 7 Reader to Host Interface Wiring

Notes:

- The system must have a single common earth ground point.
- For open collector (non-terminated output), consult your system manufacturer for correct cable length and type.
- The internal circuit configurations for the reader inputs and outputs are as shown below:

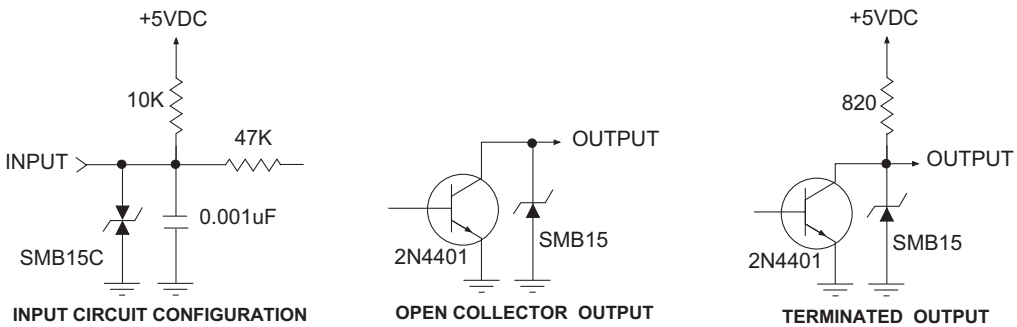


Figure 8 Reader Internal Circuit Input and Output Configurations

7.0 Operation

When power is applied to the M-Smart™ MultiPass it first performs an internal diagnostic to ensure proper operation. If it is functioning properly, the reader will flash the amber LED and beep twice. After this, the reader is ready to operate and you may present cards to the reader.

7.1 Presenting the Card

To obtain maximum read range, present the card to the M-Smart™ MultiPass reader as shown in Figure 9 . The Motorola logo on the front cover is the target for presenting the card. Keep the card parallel to the reader. Note that the card can be presened to the antenna at any angle within ± 15° from parallel of the reader, although the read range may be reduced.

If a valid card is presented, the LED and beeper will activate for a short period of time. This indicates to the user that the card was read and its data was sent to the controller, however, it does not indicate whether the access is valid or not. To read the same card again,remove the card away from the antenna and present it again.

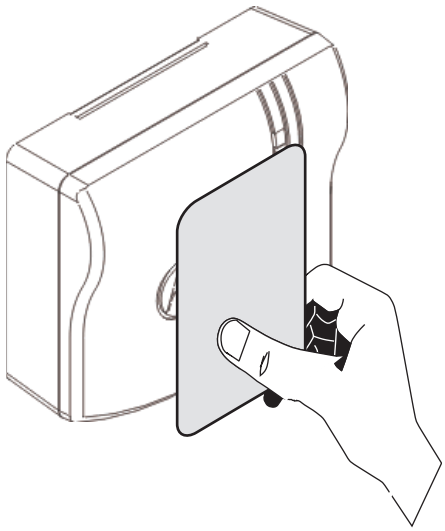


Figure 9 Presenting the Card

7.2 Data Output

The M-Smart™ MultiPass reader is capable of outputting either Wiegand or RS-232 (Requires TK-232 Module) formatted data. For further information please call technical support at (800) 646-3252. The specifics of the data (number of bits, bit encoding, encryption, etc.) is determined by the format of the card and the reader.

8.0 Controls and Indicators

8.1 Wiegand and RS-232 Single-Line Control LED Wiring

- There is no LED OFF state in this configuration. LED is red when the brown wire is high (above 2.2 VDC or not connected).
- Pull brown wire low to change LED color to green.
- Toggle brown line high-low at a rate of 100 Hz to 1 kHz, 50% duty cycle, to produce amber LED color.

8.2 Wiegand Dual-Line Control LED Wiring

- The LED is OFF when both brown and orange wires are high (above 2.2 VDC or not connected).
- Pull brown wire low to activate red LED.
- Pull orange wire low to activate green LED.
- Pull orange and brown wires low simultaneously to activate amber LED.

8.3 Audio Beeper Control

- The beeper will activate automatically when a valid card is read and its data is sent to the controller. The controller has the option to activate the beeper afterwards.
- Apply a logic low (below 0.2 VDC) to the blue wire to activate the beeper and to produce an audio tone. Apply a logic high (above 2.2 VDC, or no connect) to turn the beeper off.

9.0 Troubleshooting

If the reader does not function properly when installed according to instructions, please complete this form and fax it to (408) 434-7057 before calling (800) 646-3252 for technical assistance. International customers call (408)383-4000:

FAX

From: _____ **To:** Technical Support

Phone:_____ **Model:** MultiPass

Fax:_____ **Fax:** (408) 434-7057

Product S/N _____ **Date:**_____

Dead Reader

1. Is the reader wired according to instructions? o Yes o No
2. Is the recommended power supply being used? o Yes o No
3. Is the DC voltage correct? o Yes, _____volts o No
4. Is the DC current correct? o Yes _____ma o No
5. What is the cable length between the power supply and the reader? ____feet
6. Is the cable type according to specifications? o Yes o No

Short Read Range

1. Is the reader wired according to instructions? o Yes o No
2. Is earth ground connected according to instructions? o Yes o No
3. Is the cable shield connected according to instructions? o Yes o No
4. Is the recommended power supply being used? o Yes o No
5. Is the DC voltage correct? o Yes, _____volts o No
6. Is the DC current correct? o Yes _____ma o No
7. Is there a CRT (computer monitor) nearby? o Yes _____feet o No
8. Is the card presentation according to instructions? o Yes o No
9. What is the card tag number? Card model number:_____

Data Incorrect or Non-existent

1. At reader power up, did reader exhibit *SelfTest*™ ? o Yes o No
2. Upon card presentation, did reader exhibit *QuickFlash*™ ? o Yes o No
3. If you answered Yes to question 1 and 2, put the reader into line test mode
4. Is the reader wired according to instructions? o Yes o No
5. Is earth ground connected according to instructions? o Yes o No
6. Is the cable shield connected according to instructions? o Yes o No
7. Is the card presentation according to instructions o Yes o No
8. What is the reader format? Reader format:_____

10.0 Mechanical Dimensions

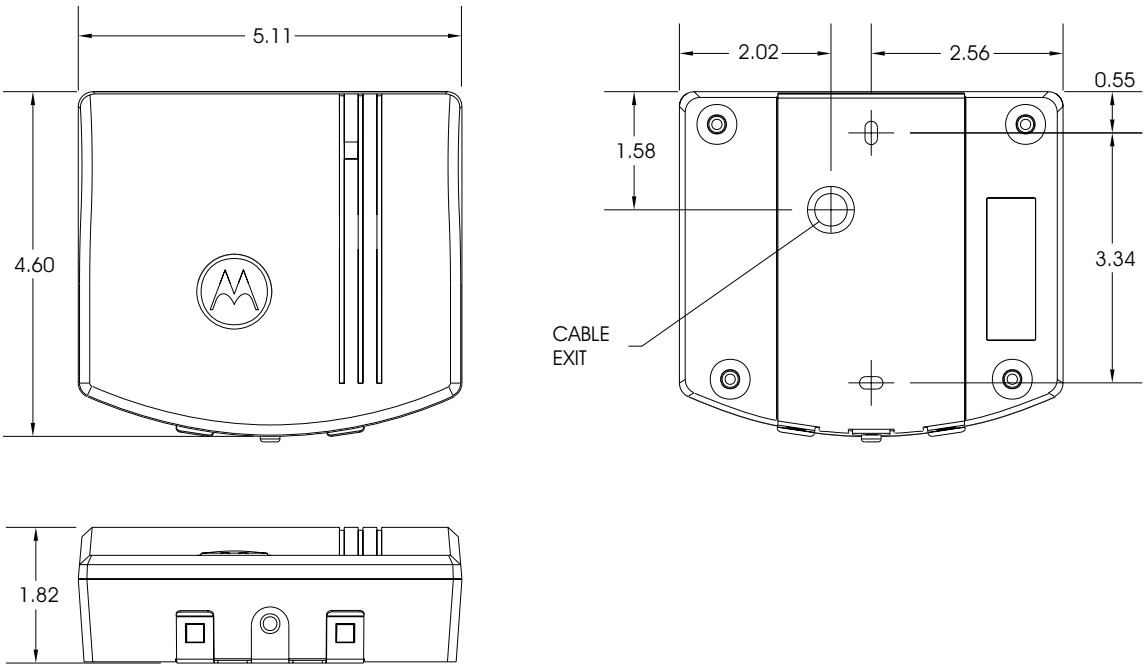


Figure 10 M-Smart™ MultiPass Mechanical Dimensions

10.1 RMA (Return Material Authorization)

Goods returned for repair, warranty or non-warranty, must have an assigned RMA (Return Material Authorization) number. Motorola shall issue an RMA number after the customer has provided Motorola with essential information about the reader such as the serial number, format etc. If exact duplicates of returned cards or tags are requested, the customer must provide Motorola with the exact format and ID numbers needed.

For readers returned and not covered by the warranty (due to age, misuse and/or damage), a quote for repairs will be issued, and no work will be performed until a valid purchase order is received. Readers left over 30 days without a repair authorization and a purchase order will be returned with evaluation charges and shipping costs applied.

10.2 Contacting Customer Support

Please answer all questions in section section 9.0 "Troubleshooting" and have your answers ready before you call the Technical support number listed below:

U.S.A. Office:
3041 Orchard Parkway
San Jose, CA 95134-2017
Tel (408) 383-4000, Main
Tel (800) 646-3252, Technical Support
Fax (408) 434-7057

European Office
Jays Close
Viables Industrial Estate
Basingstoke
Hants RG22 4PD
UK
Tel: +44 1256 358211
Fax: +44 1256 488144

Index