# Dynamag MagneSafe Swipe Reader

# TECHNICAL REFERENCE MANUAL

**PART NUMBER 99875482-1**

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**MAGTEK®**

**REVISIONS**

| Rev Number | Date | Notes |
|---|---|---|
| 1.01 | 2 Feb 2010 | Intial release |
| 1.02 | 5/31/2011 | Changed product name from Centurion to Dynamag |

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## FCC WARNING STATEMENT

This equipment has been tested and was found to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation.

## FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## CANADIAN DOC STATEMENT

This digital apparatus does not exceed the Class B limits for radio noise from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Réglement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numériqué de la classe B est conformé à la norme NMB-003 du Canada.

## CE STANDARDS

Testing for compliance with CE requirements was performed by an independent laboratory. The unit under test was found compliant with standards established for Class B devices.

## UL/CSA

This product is recognized per Underwriter Laboratories and Canadian Underwriter Laboratories 1950.

## RoHS STATEMENT

When ordered as RoHS compliant, this product meets the Electrical and Electronic Equipment (EEE) Reduction of Hazardous Substances (RoHS) European Directive 2002/95/EC. The marking is clearly recognizable, either as written words like "Pb-free", "lead-free", or as another clear symbol (Pb) ).

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**Figure 1-1.  Dynamag MagneSafe Reader**

# SECTION 1.  FEATURES AND SPECIFICATIONS

MagTek's Dynamag, a secure card reader authenticator (SCRA), is a compact magnetic stripe card readers that conform to ISO standards.  In addition to reading multiple tracks of data from a card, the Readers also include MagnePrint technology.  The MagnePrint data will be included with the track data on each transaction.  In order to maximize card security, the Readers incorporate data encryption within the head to protect the card contents and MagnePrint information.  The Readers are compatible with any device having a host USB interface.  A card is read in the swipe readers by sliding it, stripe down, through the slot either forward or backward; in the insert reader, it is read by inserting with the stripe to the right or left depending on the head orientation.

An LED (Light Emitting Diode) indicator on the Reader cover provides the operator with continuous status of the Reader operations.

The readers conform to the USB HID (Human Interface Device) Class specification Version 1.1.  This allows host applications designed for most versions of Windows to easily communicate to the readers using standard Windows API calls that communicate to the reader through the HID driver that comes with Windows.

The Readers can be operated in two different modes:
- HID (herein referred to as "*HID* mode") and
- HID with Keyboard Emulation (herein referred to as "*KB* mode")

When operating in the HID mode, a reader will not use keyboard emulation.  It behaves like a vendor defined HID device so that a direct communication path can be established between the host application and the reader, without interference from other HID devices.

When configured for the Keyboard Emulation (KB) mode, a Reader emulates a USB HID United States keyboard or, optionally, any international keyboard using ALT ASCII code keypad key combinations or customizable key maps.  This allows host applications designed to acquire card data from keyboard input to seamlessly acquire the card data from the USB swipe reader.

*Caution*
*When in Keyboard Emulation mode, if another keyboard is connected to the same host as the reader and a key is pressed on the other keyboard while the reader is transmitting, then the data transmitted by the reader may get corrupted.*

When a card is swiped through the Reader, the track data and MagnePrint information will be TDEA (Triple Data Encryption Algorithm, aka, Triple DES) encrypted using DUKPT (Derived Unique Key Per Transaction) key management.  This method of key management uses a base derivation key to encrypt a key serial number that produces an initial encryption key which is injected into the Reader prior to deployment.  After each transaction, the encryption key is modified per the DUKPT algorithm so that each transaction uses a unique key.  Thus, the data will be encrypted with a different encryption key for each transaction.

## FEATURES

Major features of the Readers are as follows:

- Hardware Compatible with a PC or any computer or terminal having a USB interface
- Bi-directional card reading
- Reads encoded data that meets ANSI/ISO/AAMVA standards
- Reads up to three tracks of card data
- Secure Red/Green/Amber LED for status
- Compatible with USB specification
- Compatible with HID specification
- Can use standard Windows HID driver for communications; no third party device driver is required
- Programmable USB serial number descriptor
- Programmable USB Interrupt In Endpoint polling interval
- Programmable Keyboard Table to support alternate languages
- Non-volatile memory for property storage
- Detachable USB cable using standard USB Micro-B connector
- Supplies 54 byte MagnePrint™ value
- Contains a unique, non-changeable serial number which allows tracking each reader
- Encrypts all track data and the MagnePrint value
- Provides clear text confirmation data including card holder's name, expiration date, and a portion of the PAN as part of the Masked Track Data
- Mutual Authentication Mode for use with Magensa.net®

## HARDWARE CONFIGURATION

The hardware configuration is as follows:

| Part Number | I/O Type | Connector | Included Cable |
|---|---|---|---|
| 21073062 | USB Keyboard Emulation | USB micro-B | 6' USB-A |
| 21073075 | USB HID | USB micro-B | 6' USB-A |

## ACCESSORIES

The optional accessories are as follows:

| Part Number | Description |
|---|---|
| 21042806 | USB MSR Demo Program with Source Code (CD) |
| 21051543 | USB-A TO USB-Micro-B Black, 700mm Retractable Cable |
| 21051545 | USB-A TO USB-Micro-B Black, 1200mm Coiled Cable |
| 99510026 | USB MSR Demo Program with Source Code (WEB) |

## REFERENCE DOCUMENTS

MagTek Communication Reference Manual for USB MagneSafe V5 Readers (99875475)

Axelson, Jan. *USB Complete, Everything You Need to Develop Custom USB Peripherals*, 1999. Lakeview Research, 2209 Winnebago St., Madison WI 53704, 396pp., *http://www.lvr.com.*

*ANS X9.24-2004 Retail Financial Services Symmetric Key Management Part 1: Using Symmetric Techniques*

*USB Human Interface Device (HID) Class Specification Version 1.1.*

*Universal Serial Bus (USB): HID Usage Tables* Version 1.12 (1/21/2005)

*USB (Universal Serial Bus) Specification, Version 1.1*, Copyright© 1998 by Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, NEC Corporation.

USB Implementers Forum, Inc.*, www.usb.org*.

## SPECIFICATIONS

Table 1-2 lists the specifications for the USB MagneSafe Readers.

**Table 1-2.  Specifications**

| Reference Standards | ISO 7810 and ISO 7811/ AAMVA* |
|---|---|
| Power Input | 5V from USB bus |
| Message Format | ASCII |
| Card Speed | 6 to 60 ips (15.4 to 152.4 cm/s) |
| **ELECTRICAL** | |
| Current<br>     Normal Mode<br>     Suspend Mode | <br>100mA maximum<br>500uA maximum |
| **MECHANICAL** | |
| Dimensions | Length  3.92" (99.5mm)<br>Width    1.24" (31.6mm)<br>Height    1.20" (30.4mm) |
| Weight | 1.8 oz. (50 gr) – without cable |
| Cable length | 6 ft. |
| Connector | USB Type A plug |
| **ENVIRONMENTAL** | |
| Temperature | |
|      Operating | 0 °C to 70 °C (32 $^o$F to 158 $^o$F) |
|      Storage | -40 $^o$C to 70 $^o$C (-40 $^o$F to 158 $^o$F) |
| Humidity | |
|      Operating | 10% to 90% noncondensing |
|      Storage | 10% to 90% noncondensing |

\*  ISO (International Standards Organization) and AAMVA (American Association of Motor Vehicle Administrators).
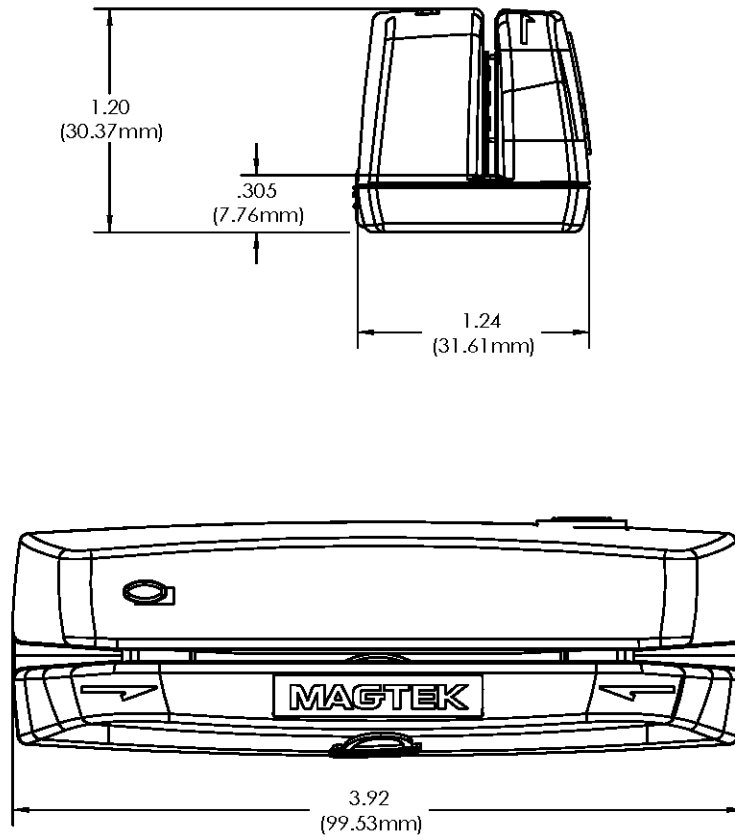
**Figure 1-2.  Dimensions for Dynamag**

# SECTION 2.  INSTALLATION

This section describes the cable connection, the Windows Plug and Play Setup, and the physical mounting of the unit.

## USB CONNECTION

Connect the USB cable or dongle for the wireless model to a USB port on the host.  The Reader, LED Indicator, and pin numbers for the 4-pin connector are shown in Figure 2-1.

Pin numbers and signal descriptions for the cable shown in the illustration are listed in Table 2-1.

**Table 2-1.  4-Pin Connector**

| Pin Number | Signal | Cable Color |
|:---:|:---:|:---:|
| 1 | VBUS | Red |
| 2 | - Data | White |
| 3 | +Data | Green |
| 4 | Ground | Black |

## WINDOWS PLUG AND PLAY SETUP

On hosts with the Windows operating system, the first time the reader is plugged into a specific USB port, Windows will pop up a dialog box, which will guide you through the process of installing a device driver for the reader.  After this process is completed once, Windows will no longer request this process as long as the reader is plugged into the same USB port.  The device driver that Windows will install for this reader is the driver used for HID devices and it is part of the Windows operating system.  When the dialog box pops up, follow the instructions given.

## MOUNTING

The Reader may be mounted with screws or fastening tape as described below.

1.    The Reader can be mounted on a surface in various ways:

   - By two screws through the surface attached to the bottom of the unit and running the cable on the top of the surface

   - By two screws through the surface attached to the bottom of the unit and by drilling a hole in the surface for the cable and running the cable through the hole

   - By attaching the unit to the surface with fastening tape and running the cable on the top of the surface

*Note*
*The two mounting inserts are 3mm diameter, 0.5mm pitch, 6.4mm*
*deep.  The length of the screws used depends on the mounting*
*surface thickness and the thickness of washers (if used).*
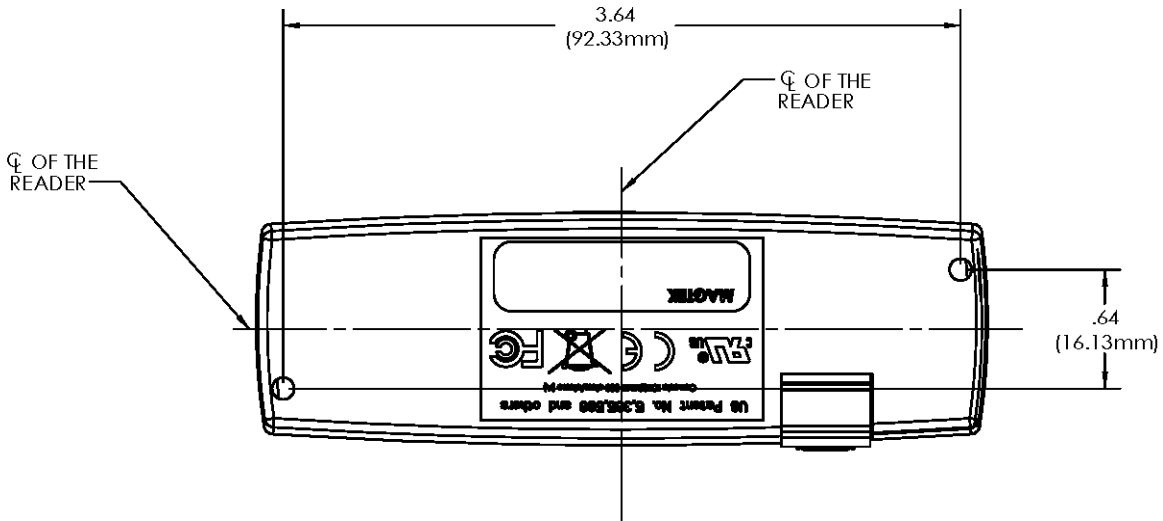


**Figure 2-1.  Mounting Hole Dimensions for Dynamag**

2.    Ensure the Reader is positioned on a flat, accessible surface with at least 4 inches
      clearance on either end for room to swipe a card.

      If fastening tape is to be used, clean the area that the Reader will be mounted on with
      isopropyl alcohol.  Remove the adhesive protective cover on the fastening tape, then
      position the Reader and push down firmly.

3.    Mount the Reader.

# SECTION 3.  OPERATION

**LED INDICATOR**

The reader has one LED on the reader body.

The LED indicator will be either off, red, green, or amber.  When the reader is not powered, the LED will be off.

When the reader is first plugged in, the LED will be solid amber.  After the reader is plugged in, the host will try to enumerate the reader.  Once the reader is enumerated the LED will turn solid green.

Solid green indicates that the reader is either awaiting Authentication (if configured to require Authentication), or armed to read (if configured to NOT require Authentication).

If enabled to operate with authentication (Security Level 4) and when the host completes Authentication successfully, the reader's LED will blink green; the reader is now armed to read a card.  If the host fails an Authentication sequence, the LED will turn solid red and stay red until either the host completes Authentication successfully or the reader is powered down.

When a card is being swiped, the LED will turn off temporarily until the swipe is completed.  If there are no errors after decoding the card data, then the LED will turn green for approximately two seconds to indicate a successful read.  The LED will remain solid green to indicate waiting for the next operation.  If there are any errors after decoding the card data, the LED will turn red for approximately two seconds to indicate that an error occurred and then turn solid green to indicate waiting for the next card swipe.  The retries can go on indefinitely until a good read.

Anytime the host puts the reader into suspend mode, the LED will turn off.  Once the host takes the reader out of suspend mode, the respective LED will return to solid green.  Authenticated mode is always ended by a USB suspend.

**CARD READ**

A card may be swiped through the reader slot when the LED is solid green or flashing green. The magnetic stripe must face toward the front of the reader (as indicated by the lock logo on the shiny stripe) and may be swiped in either direction.  If there is data encoded on the card, the reader will attempt to read the data, encrypt it, and then send the results to the host via a USB HID input report or, if in Keyboard Emulation mode, as if the data was being typed on a keyboard.  After the results are sent to the host, the reader will be ready to read the next card.