

Dynamag Duo

Secure Card Reader Authenticator Installation and Operation Manual



August 2017

Manual Part Number: D998200203-10

REGISTERED TO ISO 9001:2008

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Table 0-1 - Revisions

Rev Number	Date	Notes
10	Aug 24, 2017	Initial Release

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FCC WARNING STATEMENT

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 to an outlet on a different circuit than the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

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.

CUR/UR

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

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 numérique 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 (^(PD)).

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1 Introduction

1.1 About Dynamag Duo

MagTek's Dynamag Duo, a secure card reader authenticator (SCRA), is a compact magnetic stripe card reader that conforms to ISO standards. In addition to reading multiple tracks of data from either side of a card, the device also includes MagnePrint technology. MagnePrint data is included with the track data on each transaction. The devices are compatible with any host with a USB interface. Cardholders can swipe their cards in either direction, facing either way.

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

The device conforms to the USB HID (Human Interface Device) Class specification Version 1.1, making it forward-compatible with subsequent USB HID hosts and hubs. This allows host applications designed for most versions of Windows to easily communicate to the device using native platform SDKs.

The device 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 HID mode, the device behaves like a vendor-defined HID device so the host software can communicate directly with the device, without interference from other HID devices.

When set to Keyboard Emulation (KB) mode, the device emulates a USB HID United States keyboard by default, or can be configured to use any international keyboard mapping using ALT ASCII code keypad key combinations or customizable key maps. This allows host software designed to acquire card data from keyboard input to seamlessly acquire card data from the device.

NOTICE

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

When a cardholder swipes a card, the device encrypts track data and MagnePrint information with the TDEA (Triple Data Encryption Algorithm, aka, Triple DES) 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 device prior to deployment. After each transaction, the encryption key is modified per the DUKPT algorithm so each transaction uses a unique key.

Major features of Dynamag Duo 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 device
- 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®

1.2 About Part Numbers / Configurations

Available models of the device are as follows:

Part Number	I/О Туре	Connector
21073086	USB HID or USB KB	Integrated 3.5 ft. USB-A cable

1.3 About Dynamag Duo Components

The major components of Dynamag Duo are shown in Figure 1-1.



Figure 1-1 – Dynamag Duo Major Components

1.4 About Terminology

In this document, Dynamag Duo is referred to as the **device**. It is designed to be connected to a **host**, which is a piece of general-purpose electronic equipment which can send commands and data to, and receive data from, the device. Host types include PC computers/laptops, tablets, and smartphones. Generally, the host must have **software** installed that communicates with the device and is capable of processing transactions. During a transaction, the host and its software interact with the **operator**, such as a cashier or bank teller, while the device interacts with the **cardholder**.

1.5 About Solution Planning

A smooth deployment of a Dynamag Duo solution requires some up-front planning and decision-making:

- Determine the overall **functional requirements** and desired **user experience** of the solution the device will be integrated into.
- Determine what **documentation** and **training** will be required from solution design to deployment.
- Determine what type of **host** the device will connect to. This will generally be a computer with a USB port. When planning, include any additional support or devices required by the host, such as physical locations, mounting, and power connections.
- Determine what **software** will be installed on the host and how it will be configured. Software can include operating system, transaction processing software, security software, and so on. Include any additional support required by the software, such as network connections.
- Select which **connection type** the solution will use. The device connects physically via USB and can present itself as a vendor-defined HID device or an emulated keyboard.
- Determine how the device should be **configured**, and specify that when you order devices. MagTek or your reseller can advise. For deep detail about configuration options and how they affect device behavior, see *D998200176 DYNAMAG / MAGNESAFE V5 INTELLIHEAD USB / MAGNESAFE V5 READERS USB PROGRAMMER'S MANUAL (COMMANDS)*.
- Determine how the device will be physically **presented** to the cardholder (orientation, mounting location, and so on). When planning placement, be sure to consider cable routes and distances. For example, the mounting location should be within reasonable USB cabling distance from the host.
- Determine how the device will be **branded**. For example, whether it will include additional trade dress / user guidance decals.
- Determine how the solution design will integrate the device electrically (see section 2 Electrical Integration for details).
- Determine how the solution design will integrate the device mechanically (see section **3 Mechanical Integration** for details).
- Determine how the solution design will be **tested** and, if appropriate, how it will be **certified**.

2 Electrical Integration

2.1 About the USB Connector

The USB cable provides the device with power and bidirectional communication with a USB-capable host. It terminates with a standard USB Type A plug compatible with the vast majority of USB hosts and hubs. The cable provides the only ground for the device; none of the device's exposed mechanical features, such as the mounting screw holes, are connected to the device's electrical components.

Programmers should see section **7 Developing Custom Software** for cross-references to programming tools and documentation for communicating through the port.

3 Mechanical Integration

The device is designed to be mounted to a fixed surface. Consider the following when planning and designing the mechanical aspects of the solution:

- From device delivery through assembly, shipping, installation, usage, and maintenance, the device must not be exposed to conditions outside the ratings in **Appendix A Technical Specifications**.
- If the device is exposed to cold temperatures, adjust it to warmer temperatures gradually to avoid condensation, which can interfere with the operation of the device or cause permanent damage.
- The device does not contain any user-serviceable parts. Disassembling or modifying the device will void the manufacturer warranty.
- Solution training should direct assemblers, operators, and maintenance personnel to use a clean, dry cloth to clean the device. Do not use chemicals or solvents.



• Overall dimensions of the device are shown in **Figure 3-1**.

Figure 3-1 - Dynamag Duo Mechanical Dimensions in Inches [mm]

- The device can be oriented either horizontally or vertically.
- The device must be positioned on a flat, accessible surface with at least 4 inches clearance on either end for room to swipe a card.
- The mount surface must have a hole to that can accommodate the device's USB cable, and must be large enough for the USB connector to fit through during installation / replacement.
- The device incorporates drain holes, shown in **Figure 1-1**. Drainage requirements are as follows:
 - The drain holes must not be obstructed.
 - The device must be oriented with the drain holes on the bottom.
- The device is designed to be mounted using mounting tape or M3.5 size screws through the mount surface. Figure 3-2 provides detailed dimensions of mounting screw hole locations and sizes. The mounting screw holes are not connected to the electrical system and needn't be grounded.

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Figure 3-2 - Dynamag Duo Mounting Hole Locations and Sizes

- On request, MagTek can provide a 3D model of the device's envelope to assist with the mechanical portion of solution design. MagTek strongly recommends building prototypes with actual devices before finalizing the solution design.
- If the solution includes an optional PCI PIN Entry Device or other peripherals, consider how the peripherals will be mounted relative to the device.
- The device operates on low power, so no special cooling should be necessary.
- MagTek strongly recommends testing solution designs before deployment, to make sure they meet all requirements (e.g., functional, legal, security, certification, safety).

4 Installation

Installing Dynamag Duo is a straightforward process: The acquirer configures the Certificate Authority, public keys, and other settings before deployment; end users need only set up a host with appropriate software, configure the software, and connect the device to the host. This section provides general information about solutions that incorporate Dynamag Duo, including host software, connecting the device, and using the device.

4.1 About Host Software

In any solution, Dynamag Duo is connected to a host, which must have software installed that knows how to communicate with the device, and which is capable of performing actions intended to be carried out when a cardholder swipes a card. Some connection types also require installation of device drivers.

To set up the necessary drivers, see the connection-specific "How To" sections below. To set up the host software to work with the device, follow the installation and configuration instructions provided by the vendor of the host or the host software.

4.2 About Power

Dynamag Duo is powered by the USB port. This requires the host to provide a fully-powered USB 1.1 connection or greater. The device does not contain an internal battery.

Additional details about the device's electrical characteristics are provided in **Appendix A Technical Specifications**.

4.3 About Connecting Dynamag Duo to a Host

To connect Dynamag Duo to a host computer using the USB port, follow these steps:

- 1) Connect the USB cable to the host computer's USB port.
- 2) Power on the host computer.
- 3) Depending on the host operating system and the device's configuration, the operating system may display setup status or instructions as it installs the appropriate device driver. After this process is completed once, the operating system should no longer launch this process, provided the device is always connected to the same USB port on the host.
- 4) On the host, install and configure the host software you intend to use with Dynamag Duo (if you do not yet have that software, you can use *MTNETDemo.exe* included in *99510132 Dynamag / DynaMAX / eDynamo / uDynamo / aDynamo / mDynamo .NET SDK for Windows*, available from MagTek.com, to perform simple tests):
 - a) Make sure the host software is configured to look for the device on the proper connection type.
 - b) Make sure the host software knows which device(s) it should interface with.
 - c) Make sure the host software is configured to properly interpret incoming data from the device. For direct USB connections, Dynamag Duo may be configured to transmit data either as a vendor-defined HID device or as an emulated keyboard.
- 5) Use the host software to test swiping a card.

4.4 How to Mount Dynamag Duo

Dynamag Duo is designed and tested to operate as a surface-mounted device. It can be mounted in various ways:

- Using two screws through the surface attached to the bottom of the device, drilling a hole in the surface for the cable, and running the cable through the hole. Mounting may or may not include washers or a gasket, depending on solution requirements.
- Using fastening tape on the surface and running the cable on the top of the surface.
- Mounted to a custom, solution-specific mounting plate on the surface. The custom plate may or may not include a gasket, washers, or other hardware, depending on solution requirements.

Screw mounting requires 2 ea. M3.5 metric screws. The length of the screws depends on the solution design, including the thickness of the mounting surface and any washers or gaskets.

To mount the device with fastening tape:

- 1) Thoroughly clean the installation surface with isopropyl alcohol.
- 2) Remove the adhesive protective cover on the fastening tape
- 3) Position the device carefully
- 4) Push the device down firmly, then move gently back and forth while pressing down to fully seat the adhesive.

Further details about creating mount designs are provided in section **3 Mechanical Integration**.

5 Operation

5.1 About the General Status LED

Dynamag Duo's **General Status LED** provides feedback to the operator and cardholder about the internal state of the device (see **Figure 1-1**). **Table 5-1** shows how to interpret the colors and flashing patterns of the General Status LED.

Color	Flashing Patt	ern	Meaning
Off	Off		The device is not powered, or the host has put the device into Suspend mode.
Green	Steady On		If the device is configured to require authentication (Security Level 4), the device is waiting for authentication. After authentication is established it will slowly blink green, or will turn steady red if authentication fails.
		l	authentication, the device is ready to read a card.
Green	Two Second Blink	<u></u>	A cardholder has swiped a card, and the device has successfully decoded the swiped card.
Green	Slow Blinking	Ц	If configured to require authentication (Security Level 4), authentication has been established, and the device is ready to read a card.
Amber	Steady On		When the device is first turned on, the LED is solid amber while the host enumerates it.
Red	Steady On		If the device is configured to require authentication (Security Level 4), authentication has failed. Make sure you are connecting to the correct host, check the authentication configuration on the host, and power cycle the device.
			updating the firmware. On completion, the device will reset and the LED will turn off briefly.
Red	Two Seconds On	<u></u>	Device has failed to decode data on a swiped card. Try the swipe again.

Table 5-1	- General	Status	LED	Meaning
		~~~~~		

#### 5.2 About the Buzzer

In addition to the General Status LED, the device incorporates a buzzer. After a cardholder swipes a card, the device will emit two short 2 kHz buzzes for a good read, or one buzz for a bad read, prompting the cardholder to try the swipe again.

#### 5.3 Card Reading

Before use, make sure Dynamag Duo is connected to a power source (see section **4.2 About Power**) and is connected to a host (see section **4.3 About Connecting Dynamag Duo to a Host**).

Generally the host will always keep a connection open to the device, and the device indicates it is ready for a swipe (or host command by keeping the General Status LED green.

When the General Status LED indicates the device is ready for a swipe (see section **5.1 About the General Status LED**), cardholders can swipe magnetic stripe cards in either direction, with the magnetic stripe facing either side of the device, provided the magnetic stripe is inside the device's MSR rail. They must swipe in the range of speeds specified in **Appendix A**.

After a swipe, the operator may monitor the device's response by using the host software or by watching the General Status LED. See section **5.1 About the General Status LED** for assistance interpreting the device's LED patterns in response to a swipe.

If there is data encoded on the card, the device 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 device will be ready to read the next card.



Figure 5-1 - Swiping a Card Through Dynamag Duo

### 6 Maintenance

Periodic cleaning of Dynamag Duo's exterior may be required. To clean the outside of the device, wipe it down with a soft, damp, lint-free cloth and then wipe it dry.

## 

To avoid damaging the read head, only clean the card path with approved cleaning cards. DO NOT use liquid cleaning products or insert any other objects into the device.

## 7 Developing Custom Software

Custom software uses the same underlying device command set regardless of how the device is configured, but the messages passed between the host software and the device may be wrapped differently depending on the device's configuration. The following sections give high-level information about communicating with the device in various software development frameworks, and provide pointers to select API references and sample code.

#### 7.1 USB-Based Custom Software

MagTek produces software development kits (SDKs) with API libraries that provide higher-level functions wrapped around **USB HID** communication protocols. These libraries simplify the development of custom applications that use Dynamag Duo, and include an SDK for the Microsoft .NET Framework, and an SDK for non-managed Windows executable images, such as exe or DLL files, and include:

- 99510132 DYNAMAG / DYNAMAX / EDYNAMO / UDYNAMO / ADYNAMO / MDYNAMO .NET SDK FOR WINDOWS
- 99510133 DYNAMAG / DYNAMAX / EDYNAMO / MDYNAMO SDK FOR WINDOWS

In addition to the SDK API libraries, custom software on any operating system can communicate directly with the device using the operating system's native USB libraries and protocols. For details, see D998200176 DYNAMAG / MAGNESAFE V5 INTELLIHEAD USB / MAGNESAFE V5 READERS USB PROGRAMMER'S MANUAL (COMMANDS).

If the solution involves developing a point-of-sale (POS) application for Windows, you might also consider using the service objects for .NET POS (UPOS 1.12), available from Microsoft.

#### 7.2 For More Information

For more information about developing custom applications that integrate with Dynamag Duo, see the MagTek web site or contact your reseller or MagTek Support Services.

Appendix A	<b>Technical Specifications</b>
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Dynamag Duo Technical Specifications				
Reference Standards and Certifications				
ISO 7810 ISO 7811 AAMVA Encryption: TDEA (3DES)-CBC using DUKPT Universal Serial Bus Specification 1.1 Identification Cards Financial Transaction Cards (ISO 7813) IPC-A-610 Class II Assembly FCC Title 47 Part 15 Class B CE Level B EMC CE Safety UR/CUR UL Recognized California Proposition 65 (California) EU Directive Waste Electrical and Electronic Equipment (WEEE) EU Directive Restriction of Hazardous Substances (RoHS)				
Physical Characteristics				
Dimensions (L x W x H):	4.95 in. L x 2.06 in. W x 1.50 in. H (125.7mm L x 52.1mm W x 38.1mm H)			
Weight	5 oz. (140g)			
Supported Mounting Options:	Vertical or horizontal Surface mounted with screws Surface mounted with mounting tape Surface mounted with custom plate			
Card Read Characteristics				
Magnetic Stripe Reader:	Bidirectional dual-head 3-track magnetic stripe reader (MSR) with MagnePrint			
Magnetic Stripe Decoding:	Financial (ISO Type B), AAMVA, or Other			
Acceptable Swipe Speeds:	6 to 60 inches per second (15.4 to 152.4 cm/s)			
Smart Card Reader:	None			
User Interface Characteristics				
Status Indicators:	General Status LED (Red/Green/Amber)			
Display Type:	Not Applicable			
Display Size (viewable area):	Not Applicable			
Display Resolution:	Not Applicable			
Keypad:	Not Applicable			

Dynamag Duo Technical Specifications			
Security Characteristics			
Ingress Protection:	Not Applicable		
Code Protection:	Authenticated uploads. The device will only download firmware from a host that has authenticated itself with the device's key.		
Eavesdrop Protection:	Not Applicable		
Electrical Characteristics			
Power Inputs:	USB powered via integrated USB cable		
Battery Type:	None		
Battery Capacity:	Not Applicable		
Battery Charge Time:	Not Applicable		
Battery Time, Airplane Mode:	Not Applicable		
Battery Time, Transactions:	Not Applicable		
Cable Length:	3.5 ft. (42 in. / 1.07m)		
Voltage Requirements:	5 VDC on USB power		
Maximum Current Draw:	< 100 mA		
Data Storage:	Not Applicable		
	Connection Characteristics		
Wired Connection Types:	USB with vendor-defined Human Interface Device (HID) data format USB with keyboard emulation data format		
Wireless Connection Types:	None		
Wireless Range:	Not Applicable		
Wireless Frequency:	Not Applicable		
	Software Characteristics		
Tested Operating System(s):	Windows 7, Windows 8.1, Windows 10		
Environmental Tolerance			
Operating Temperature:	32°F to 113°F (0°C to 45°C)		
Operating Relative Humidity:	10% to 90% without condensation		
Storage Temperature:	$-4^{\circ}F$ to $140^{\circ}F$ ( $-20^{\circ}C$ to $60^{\circ}C$ )		
Storage Relative Humidity:	10% to 90% without condensation		
Operating Altitude:	0 ft. to 10,000 ft. (0 to 3048m)		

Dynamag Duo Technical Specifications		
Storage Altitude:	0 ft. to 50,000 ft. (0 to 15240m)	
Vibration Resistance:	Not Applicable	
Shock Resistance:	Not Applicable	
Reliability		
Shelf Life:	Minimum 5 years	
Magnetic Read Head Life:	1,000,000 card swipes	
ICC Read Head Life:	N/A	
Battery Shelf Life:	N/A	
Battery Cycle Life:	N/A	