AY-Dx9M Family

Indoor Multi-Format Readers
Installation and Programming Manual

Models:
AY-D09M
AY-D19M

ROSSLARE
SECURITY PRODUCTS

Table of Contents

List of Figures

List of Tables

Notice and Disclaimer

This manual's sole purpose is to assist installers and/or users in the safe and efficient installation and usage of the system and/or product, and/or software described herein.

BEFORE ATTEMPTING TO INSTALL AND/OR USE THE SYSTEM, THE INSTALLER AND THE USER MUST READ THIS MANUAL AND BECOME FAMILIAR WITH ALL SAFETY REQUIREMENTS AND OPERATING PROCEDURES.

- The system must not be used for purposes other than those for which it was designed.

- The use of the software associated with the system and/or product, if applicable, is subject to the terms of the license provided as part of the purchase documents.

- ROSSLARE exclusive warranty and liability is limited to the warranty and liability statement provided in an appendix at the end of this document.

- This manual describes the maximum configuration of the system with the maximum number of functions, including future options. Therefore, not all functions described in this manual may be available in the specific system and/or product configuration you purchased.

- Incorrect operation or installation, or failure of the user to effectively maintain the system, relieves the manufacturer (and seller) from all or any responsibility for consequent noncompliance, damage, or injury.

- The text, images and graphics contained in the manual are for the purpose of illustration and reference only.

- All data contained herein subject to change without prior notice.

- In no event shall manufacturer be liable for any special, direct, indirect, incidental, consequential, exemplary or punitive damages (including, without limitation, any and all damages from business interruption, loss of profits or revenue, cost of capital or loss of use of any property or capital or injury).

- All graphics in this manual are for reference only, some deviation between the image(s) and the actual product may occur.

- All wiring diagrams are intended for reference only, the photograph or graphic of the PCB(s) are intended for clearer illustration and understanding of the product and may differ from the actual PCB(s).

1.   Introduction

The AY-Dx9M series are programmable indoor readers that allow entry via a personal identification number (PIN) and/or by presenting a proximity card. The keypad can be programmed to output eight different data formats. The AY-D19M supports multiple proximity card formats to provide a high level of compatibility and connectivity with host controllers.

1.1   Reader/Controller Types

The two types of units described in this manual are:

	Keypad Type	PIN	Proximity
AY-D09M	Standard	✓	✗
AY-D19M	Standard	✓	✓

1.2   Key Features

- Built-in proximity card reader (125 kHz ASK modulation) (AY-D19M model only)
- Programmable Proximity Card Transmission Format (AY-D19M model only)
    - Clock & Data
    - Wiegand 26-Bit
    - Wiegand Card + PIN
- Built-in keypad for PIN code entry
- Programmable keypad transmission format
- Built-in case and back tamper
- Programmable Facility code
- Two tri-colored LEDs
- Internal buzzer provides audible interface feedback

- Comes with mounting template for easier installation
- Comes with installation kit that includes a security screw and a security screw tool

1.3   Box Content

Before beginning, verify that all of the following is in the box. If anything is missing, please report the discrepancy to your nearest Rosslare office.

- AY-Dx9M access control unit
- Installation kit
- Installation and operating instructions

1.4   Ancillary Equipment

Additional non-supplied equipment required:

- Compatible host controller
- Power supply – 5 to 16 VDC (from a regulated power supply)

Other Rosslare accessories can be found at Rosslare's website:

http://www.rosslaresecurity.com

2.   Technical Specifications

Electrical Characteristics	AY-D09M	AY-D19M
Power Supply Type	Linear type (recommended)	
Operating Voltage Range	5–16 VDC	
Maximum Input Current (not including attached devices)	Standby: 55 mA Max: 100 mA	
Card Read Distance*	N/A	80 mm (3.0 in.)
Proximity Card Modulation	N/A	• Wiegand 26-Bit, ASK at 125 kHz • Clock & Data, ASK at 125 kHz
Proximity Card Compatibility	N/A	All 26-Bit EM cards
Keypad Transmit Format	• Single Key, Wiegand 6-Bit (Rosslare Format) • Single Key, Wiegand 6-Bit with Nibble and Parity Bits • Single Key, Wiegand 8-Bit, Nibbles Complemented • 4 Keys Binary + Facility Code, Wiegand 26-Bit • 1 to 5 Keys + Facility Code, Wiegand 26-Bit • 6 Keys BCD and Parity Bits, Wiegand 26-Bit • Single Key, 3x4 Matrix Keypad • 1 to 8 Keys BCD, Clock & Data	
Tamper	Only with Rosslare controllers AC-015, AC-020, and AC-115	

*   Measured using a Rosslare proximity card or equivalent. Range also depends on electrical environment and proximity to metal.

Environmental Characteristics

Operating Temp. Range	-31°C to 63°C (-24°F to 145°F)	
Operating Humidity Range	0 to 95% (non-condensing)	
Dimensions	**AY-D09M**	**AY-D19M**
Length x Width x Depth	122 x 75 x 24 mm (4.8 x 3.0 x 0.9 in.)	
Weight	110 g (3.9 oz)	117 g (4.1 oz)

3.   Installation

> Note
>
> Installation of an RFID reader adjacent to metallic surfaces might alter the reader's specifications. To diminish this interference, use a plastic spacer when mounting the reader.

3.1   Mounting and Wiring the AY-Dx9M

The AY-Dx9M is designed to be easily mounted to a US Gang Box.

Before starting, select the location to mount the AY-Dx9M reader. This location should be at shoulder height.

To mount and wire the unit:

1.   Remove the Bezel screw (Figure 1).

Figure 1: AY-Dx9M Layout
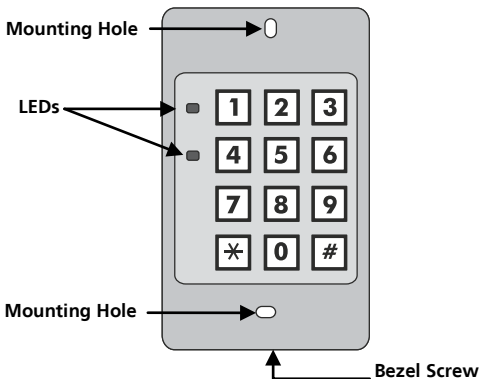
2.   Screw the reader onto a US Gang Box through the two mounting holes provided (Figure 1).

3. Pass the wires through the exit/entry holes and attach them to the reader's terminal blocks (Figure 2).

Figure 2: AY-Dx9M Wiring
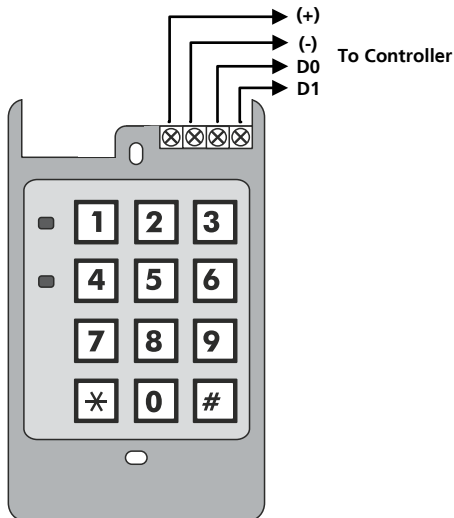
4. Replace the reader's bezel and replace the factory default screw with the security screw that is provided in the installation kit. A security screw tool is also provided in the installation kit.

4. Transmit Mode

When the AY-Dx9M is in Transmit mode, it is ready to receive data from a presented proximity card (AY-D19M only) or an entered PIN code.

When the reader is in Transmit mode, the Mode LED is red and the Program LED is off.

Mode ● ○ **Prog**
Red

When a proximity card or keyboard entry is being transmitted, the Mode LED flashes green.

Keyboard data can be sent via one of eight different keypad transmission formats (see Section 5.3).

For the AY-D19M model, proximity cards presented to the reader are always sent in Wiegand 26-Bit, Clock & Data, or Wiegand Card + PIN format formats (see Section 5.4).

5. Programming the AY-Dx9M

Programming the AY-Dx9M is done solely via the unit's keypad driven programming menu system. To reach the programming menu system, the AY-Dx9M must first be placed into Programming mode (see Section 5.1).

During the AY-Dx9M's manufacturing process, certain codes and settings are pre-programmed. These settings are the called the default factory settings.

Table 1 shows the names of all the AY-Dx9M menus.

Table 1: Programming Menus

Menu Description	Menu Number
Selecting Keypad Transmission Format	1
Single Key, Wiegand 6-Bit (Rosslare format)	
Single Key, Wiegand 6-Bit with Nibble + Parity Bits	
Single Key, Wiegand 8-Bit, Nibbles Complemented	
4 Keys Binary + Facility Code, Wiegand 26-Bit	
1 to 5 Keys + Facility code, Wiegand 26-Bit	
6 Keys BCD and Parity Bits, Wiegand 26-Bit	
Single Key, 3x4 Matrix Keypad	
1 to 8 Keys BCD, Clock & Data Single Key	
Selecting Proximity Card Transmission Format (AY-D19M model only)	2
Wiegand 26-Bit	
Clock & Data	
Wiegand Card + PIN	
Changing the Programming Code	3
Changing the Facility Code	4
Return to Factory Default Settings	0

5.1   Entering Programming Mode

To enter Programming mode:

1. Press **#** for 2 seconds.

    The Mode LED turns off and the
    Program LED turns red.

    Mode ◯ ● **Prog**
    Red

2. Enter your 4-digit Programming code.

    ? ? ? ?

    If the Programming code is valid, the
    Program LED turns green and the AY-
    Dx9M enters Programming mode.

    Mode ◯ ● **Prog**
    Green

> • The factory default Programming code is 1234.
> Note • If a Programming code is not entered within 30 seconds, the AY-
>   Dx9M returns to Transmit mode.

5.2   Exiting Programming Mode

To exit Programming mode at any time:

1. Press **#**.

    You hear a beep.

    The Program LED turns off and the
    Mode LED turns red.

    Mode ● ◯ **Prog**
    Red

    This indicates that the AY-Dx9M has returned to Transmit mode.

    Wrong entries may reset the reader back to Transmit mode.

    While in Programming mode, if no key is pressed for 30 seconds,
    the AY-Dx9M exits Programming mode and returns to Transmit
    mode.

5.3   Selecting Keypad Transmission Format

The AY-Dx9M has eight different keypad transmission selectable formats (see Section 5.3.1).

To select a keypad transmission format:

1. Enter Programming mode.

    Mode ◯ 🟢 **Prog**
    Green

2. Press **1** to enter Menu 1.

    1

3. The Mode LED turns red.

    Mode 🔴 🟢 **Prog**
    Red **Green**

    Enter the appropriate option number
    for the keypad transmission format that
    you wish to select.

    ?

    One beep is emitted on success.

    The system returns to Transmit mode.

    Mode 🔴 ◯ **Prog**
    Red

    If an incorrect option number is entered, a long beep is sounded.
    The reader returns to Transmit mode and the keypad transmission
    format remains unchanged.

> Note
> - Only one keypad transmission format can be active at any one time
> - When using the keypad transmission format "1 to 8 keys BCD,
>   Clock & Data" (Option 8), an additional input is required to specify
>   the number of keys in the PIN code.

5.3.1   Keypad Transmission Format Option Number

See Table 2 to determine the option number for the keypad transmission format you wish to select.

Table 2: Keypad Transmission Format

Keypad Transmission Format	Option Number
Single Key, Wiegand 6-Bit (Rosslare Format)	1*
Single Key, Wiegand 6-Bit with Nibble + Parity Bits	2
Single Key, Wiegand 8-Bit, Nibbles Complemented	3
4 Keys Binary + Facility code, Wiegand 26-Bit	4
1 to 5 Keys + Facility code, Wiegand 26-Bit	5
6 Keys BCD and Parity Bits, Wiegand 26-Bit	6
Single Key, 3x4 Matrix Keypad	7
1 to 8 Keys BCD, Clock & Data Single Key	8

* Option 1 is the default factory setting

More information on each of the different keypad transmission formats is available below and on the following pages.

5.3.1.1   Single Key, Wiegand 6-Bit (Rosslare Format)

Each key press immediately sends 4 bits with 2 parity bits added; even parity for the first 3 bits and odd parity for the last 3 bits.

```
0 = 1 1010 0     6 = 1 0110 0
1 = 0 0001 0     7 = 1 0111 1
2 = 0 0010 0     8 = 1 1000 1
3 = 0 0011 1     9 = 1 1001 0
4 = 1 0100 1     * = 1 1011 1 = "B" in Hexadecimal
5 = 1 0101 0     # = 0 1101 1 = "D" in Hexadecimal
```

5.3.1.2   Single Key, Wiegand 6-Bit, Nibble & Parities

Each key press immediately sends 4 bits with 2 parity bits added; even parity for the first 3 bits and odd parity for the last 3 bits.

```
0 = 0 0000 1     6 = 1 0110 0
1 = 0 0001 0     7 = 1 0111 1
2 = 0 0010 0     8 = 1 1000 1
3 = 0 0011 1     9 = 1 1001 0
4 = 1 0100 1     * = 1 1010 0 = "B" in Hexadecimal
5 = 1 0101 0     # = 1 1011 1 = "C" in Hexadecimal
```

5.3.1.3   Single Key, Wiegand 8-Bit, Nibbles Complemented

This option inverts the most significant bits in the message leaving the least 4 significant bits as Binary Coded Decimal (BCD) representation of the key. The host system receives an 8-bit message.

```
0 = 11110000     6 = 10010110
1 = 11100001     7 = 10000111
2 = 11010010     8 = 01111000
3 = 11000011     9 = 01101001
4 = 10110100     *= 01011010 = "A" in Hexadecimal
5 = 10100101     # = 01001011 = "B" in Hexadecimal
```

5.3.1.4   4 Keys Binary + Facility Code, Wiegand 26-Bit

This option buffers 4 keys and outputs keypad data with a three-digit Facility code like a standard 26-bit card output.

The Facility code is set in Programming Menu number four and can be in the range 000 to 255. The factory default setting for the Facility code is 000 (see Section 5.6).

The keypad PIN code must be 4 digits long and can range between 0000 and 9999. On the fourth key press of the 4-digit PIN code, the data is sent across the Wiegand data lines as binary data in the same format as a 26-bit card.

If ***** or **#** is pressed during PIN code entry, the keypad clears the PIN code entry buffer, generates a beep and is ready to receive a new 4-digit keypad PIN code.

If the entry of the 4-digit keypad PIN code is disrupted and no number key is pressed within 5 seconds, the keypad clears the PIN code entry buffer, generates a beep, and is ready to receive a new 4-digit keypad PIN code.

(EP) FFFF FFFF AAAA AAAA AAAA AAAA (OP)

Where: EP = Even parity for first 12 bits

OP = Odd parity for last 12 bits

F = 8-bit Facility code

A = 24-bit code generated from keyboard

5.3.1.5   1 to 5 Keys + Facility Code, Wiegand 26-Bit

This option buffers up to 5 keys and outputs keypad data with a Facility code like a 26-bit card output.

The Facility code is set in Programming Menu number four and can be in the range 000 to 254. The factory default setting for the Facility code is 000 (see Section 5.6).

The keypad PIN code can be one to five digits long and can range between 1 and 65,535. When entering a keypad PIN code that is less than 5 digits long, **#** must be pressed to signify the end of PIN code entry. For keypad PIN codes that are 5 digits long, on the fifth key press of the 5-digit PIN code, the data is sent across the Wiegand data lines as binary data in the same format as a 26-bit card.

If ***** or **#** is pressed during PIN code entry or a PIN code greater than 65,535 is entered, the keypad clears the PIN code entry buffer, generates a beep and is ready to receive a new 4-digit keypad PIN code.

If the entry of the 1- to 5-digit keypad PIN code is disrupted and a number key or **#** is not pressed within 5 seconds, the keypad clears the PIN code entry buffer, generates a medium length beep and is ready to receive a new 1 to 5-digit keypad PIN code.

(EP) FFFF FFFF AAAA AAAA AAAA AAAA (OP)

Where: EP = Even parity for first 12 bits

OP = Odd parity for last 12 bits

F = 8-bit Facility code

A = 24-bit code generated from keyboard

5.3.1.6 6 Keys BCD and Parity Bits, Wiegand 26-Bit

Sends buffer of 6 keys, adds parity and sends a 26-bit BCD message. Each key is a four bit equivalent of the decimal number.

The keypad PIN code must be 6 key presses long. On the sixth key press of the 6-digit PIN code, the data is sent across the Wiegand data lines as a BCD message.

If the entry of the 6-digit keypad PIN code is disrupted and a number key or **#** is not pressed within 5 seconds, the keypad clears the PIN code entry buffer, generates a medium length beep and is ready to receive a new 6-digit keypad PIN code.

(EP) AAAA BBBB CCCC DDDD EEEE FFFF (OP)

Where:

A = First key entered	D = Fourth key entered
B = Second key entered	E = Fifth key entered
C = Third key entered	F = Sixth key entered

5.3.1.7 Single Key, 3x4 Matrix Keypad (MD-P64)

This unique mode is intended to let the host controller scan the AY-Dx9M keypad while still keeping the proximity card readers Wiegand 26-Bit or Clock & Data formats active.

An optional interface board must be used between the AY-Dx9M and the host system. Each key press is immediately sent on DATA0 as an ASCII character at a baud rate of 9600 bits per second.

When a key is pressed, DATA1 is pulled "low" until the key is released at which point DATA1 is set to "high". This allows the controller to detect the duration of the key press.

The MD-P64 interface unit outputs the data received to 7 outputs emulating a keyboard. The interface unit does not affect any data that it receives from the proximity reader whether it is Wiegand 26-Bit or Clock & Data.

Key pressed = ASCII Value

0 = '0' (0x30 hex)	6 = '6' (0x36 hex)
1 = '1' (0x31 hex)	7 = '7' (0x37 hex)
2 = '2' (0x32 hex)	8 = '8' (0x38 hex)
3 = '3' (0x33 hex)	9 = '9' (0x39 hex)
4 = '4' (0x34 hex)	*= '*' (0x2A hex)
5 = '5' (0x35 hex)	# = '#' (0x23 hex)

5.3.1.8   1 to 8 Keys BCD, Clock & Data

Buffers up to 8 keys and outputs keypad data without a facility code like standard Clock and Data card output.

The keypad PIN code can be one to eight digits long. The PIN code length is selected while programming the reader for Option 8. The reader transmits the data when it receives the last key press of the PIN code. The data is sent across the two data output lines as binary data in Clock & Data format.

If ***** or **#** is pressed during PIN code entry, the keypad clears the PIN code entry buffer, generates a beep, and is ready to receive a new keypad PIN code.

If the entry of the keypad PIN code is disrupted and a number key or **#** is not pressed within 5 seconds, the keypad clears the PIN code entry buffer, generates a medium length beep and is ready to receive a new keypad PIN code.

5.4　Selecting Proximity Card Transmission Format (AY-D19M model only)

The AY-D19M has three different selectable proximity card transmission formats.

- Option 1 – Wiegand 26-Bit
- Option 2 – Clock & Data
- Option 3 – Wiegand Card + PIN

To select the Proximity Card transmission format:

1. Enter Programming mode.

   Mode ○　● **Prog**
   　　　　　Green

2. Press **2** to enter Menu 2.

   | 2 |

   The Mode LED turns green.

   Mode ●　● **Prog**
   　Green　**Green**

3. Enter the appropriate option number for the proximity card transmission format that you wish to select.

   | ? |

   One beep is emitted on success.

   Mode ●　○ **Prog**
   　Red

   The system returns to Transmit mode.

   If an incorrect option number is entered, the reader returns to Transmit mode and the keypad transmission format remains unchanged.

5.4.1　Wiegand Card + PIN Transmission Format

This unique mode is intended to let host controllers get card and keypad data simultaneously. This option overrules the selected keypad transmission format and sends the keypad data as described below.

After a card is presented to the AY-D19M, the program LED starts to flash in green to indicate that the unit is waiting for the PIN code. If the entry of 1- to 5-digit keypad PIN code is disturbed and no digit key or **#** key is pressed within 5 seconds, the keypad clears the card

buffer and the PIN code entry buffer, generates a medium length beep, and is ready to receive a new card.

The keypad PIN code can be one to five digits long in the range of 0 to 99,999. When entering a keypad PIN code, **#** must be pressed to signify the end of the PIN entry. When pressing **#**, the data is sent by the Wiegand data lines. If ***** is pressed, the keypad clears the card buffer and the PIN code entry buffer, generates a medium length beep, and is ready to receive a new card.

The AY-D19M outputs card data in Wiegand 26-Bit with the following keypad data:

Card Data: (EP) AAAA AAAA AAAA BBBB BBBB BBBB (OP)

Where: EP = Even parity for first 12 A bits

               OP = Odd parity for last 12 B bits

PIN data: (EP) 0000 AAAA BBBB CCCC DDDD EEEE (OP)

Where: A = First key entered

               B = Second key entered

               C = Third key entered

               D = Fourth key entered

               E = Fifth key entered

               EP = Even parity for first 12 bits

               OP = Odd parity for last 12 bits

If the PIN code is less than 5 digits, all the most significant nibbles are filled with 0.

Example:

(EP) 0000 0000 0000 0000 AAAA BBBB (OP)

Where: A = First key entered
         B = Second key entered
         EP = Even parity for first 12 bits
         OP = Odd parity for last 12 bits

5.5   Changing the Programming Code

To change the Programming code:

1. Enter Programming mode.

    Mode ○   ● **Prog**
                    Green

2. Press **3** to enter Menu 3.

    3

    The Mode LED flashes red.

    Mode ✹   ● **Prog**
           Red   **Green**

3. Enter the new 4-digit code you wish to set as the Programming code.

    ? **?** **?** **?**

    One beep is emitted on success.

    The system returns to Transmit mode.

    Mode ●   ○ **Prog**
           Red

> The Programming code cannot be erased; the code 0000 is not valid and does not erase the Programming code.

5.6   Changing the Facility Code

To change the Facility code:

1. Enter Programming mode.

    Mode ○   ● **Prog**
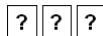   **Green**

2. Press **4** to enter Menu 4.

    4

    The Mode LED flashes orange.

    Mode ✹   ● **Prog**
         Orange Green

3. Enter the new 3-digit code you wish to set as the Facility code.

$$\boxed{?}\boxed{?}\boxed{?}$$

One beep is emitted on success.

The system returns to Transmit mode.

Mode ⬤ ◯ **Prog**
Red

Note

Facility codes can be in the range between 000 and 255.

5.7   Return to Factory Default Settings

⚠️ Warning

You must be very careful before using this command! Doing so erases the entire memory, which includes all user and special codes. In addition, all codes are returned to their factory default settings.

To return to factory default settings:

1. Enter Programming mode.

Mode ◯ ⬤ **Prog**
Green

2. Press **0** to enter Menu 0.

$$\boxed{0}$$

The Mode LED and the Program LED flash red.

Mode 🔴 🔴 **Prog**
Red   Red

3. Enter your 4-digit Programming code.

$$\boxed{?}\boxed{?}\boxed{?}\boxed{?}$$
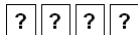
If the Programming code is valid, all memory is erased. You hear three beeps and the controller returns to Normal mode.

If the Programming code is invalid, you hear a long beep and the controller returns to Normal mode without erasing the memory of the controller

---

5.8 Replacing a lost Programming Code

In the event that the Programming code is forgotten, the AY-Dx9M may be reprogrammed in the field using the following instructions:

1. Remove power from the reader.
2. Activate the tamper by removing the reader from the wall or removing the reader's case.
3. Apply power to the reader.

You now have 10 seconds to enter Programming mode using the factory default Programming code 1234.

A.   Limited Warranty

The full ROSSLARE Limited Warranty Statement is available in the Quick Links section on the ROSSLARE website at www.rosslaresecurity.com.

Rosslare considers any use of this product as agreement to the Warranty Terms even if you do not review them.

AY-Dx9M

ROSSLARE
SECURITY PRODUCTS
www.rosslaresecurity.com

0706-0960178+02

CERT
ISO 9001
ISO 14001

• EN ISO 13485

RoHS
COMPLIANT

CE