

# MULTI-DISCIPLINE READERS

## Amano Multi-discipline Readers INSTALLATION MANUAL

### SPECIFICATIONS

Read Capability .....	Slim Tags, Omega Tags, Amano Trinary Tags, FeliCa Tags, MIFARE® Tags, HID 125 kHz Tags and HID iCLASS.	
	NOTE: <i>HID is a registered trademark of HID Global Corporation (an ASSA ABLOY Group Brand).</i>	
Working Environment .....	Designed to work in an indoor or outdoor environment similar to IP54. The Multi-discipline Readers are therefore sealed (potted) against water.	
Input Voltage Rating .....	8 V DC to 14 V DC, polarity sensitive.	
Power Requirements	Current (mA)	Power (W)
Supply Voltage 12 V DC all	130	1.56
Indicators on.....		
Wiegand Bus		
Electrical Interface.....	'0' and '1' Data streams.	
Data Format .....	Tag information: 44-bit or 26-bit Wiegand. Key information: 26-bit Wiegand only.	
Inputs		
Quantity.....	4.	
Type .....	Dry Contact.	
Function .....	Operation of the Buzzer, LED and Scanner Inhibit.	
Buzzer .....	4 kHz piezo-electric single volume, single tone.	
Status Indicators		
Status LED .....	Tri-colored Red, Green or Amber (Default) (externally visible).	

**Optical Anti-tamper** ..... Open Collector Output on Purple Line.  
GND reference on Gray Line.

*NOTE: In OEM applications, connect the Purple and Gray wires to a Dry Contact Input. On Amano Systems, it is unnecessary to connect these lines as the Software handles the Anti-tamper.*

**MDK900 model only**

**Keypad**..... 12 Alphanumeric keys.  
**Keypad Durability** ..... Maximum 200 000 key presses.  
**PIN-codes** ..... 5 Digit codes in the range 00000 to 65535.  
4 Digit codes in the range 0000# to 9999#.

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# INSTALLATION INFORMATION

## Accessories

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Find the following when unpacking the Multi-discipline Reader:

- Either an Amano (MDR) Multi-discipline Reader (MDR900-5-0-AC-XX) housed in a Polycarbonate and 304 Stainless Steel housing. The Multi-discipline Reader consists of a Front Cover and a Backing Plate. The Backing Plate is attached with 4 clips.
- Or an Amano (MDK) Multi-discipline Keypad Reader (MDK900-5-0-AC-XX) housed in a Polycarbonate and 304 Stainless Steel housing. The Multi-discipline Reader consists of a Front Cover and a Backing Plate. The Backing Plate is attached with 4 clips.
- One 2-Way Programming Pin.
- A Front Cover Removal Tool.
- An extra Serial Number Label.

## General

Remember the following when installing the Multi-discipline Readers:

### Maximum Data Communications Distance

Install the Multi-discipline Readers no further than 150 m (164 yd) from the Host unit. The cable individual conductor cross-sectional area should not be less than  $0.2 \text{ mm}^2$  ( $0.0003 \text{ in}^2$ ).

### Distance between Multi-discipline Readers

To avoid mutual interference, install the Multi-discipline Readers no closer than 500 mm (20 in) apart.

## Mounting the Multi-discipline Readers

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**CAUTION:** Do NOT attach the Front Cover to the Backing Plate prior to mounting.

**CAUTION:** Ensure that you set the Multi-discipline Reader's Output Mode BEFORE attaching the Front Cover to the Backing Plate. See page 9 for more information.

**CAUTION:** Make certain that you mount the Readers on a vibration-free surface.

Select the mounting position of the Multi-discipline Readers, considering accessibility, routing of wires and visibility of the externally visible LED.

Secure the Multi-discipline Readers to the mounting surface, using four suitable screws and wall plugs, nuts and bolts or rivets.

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# ELECTRICAL CONNECTIONS

## Connecting the Multi-discipline Reader

Figure 1 to Figure 5 show typical connections for the Multi-discipline Reader.

**NOTE:** Connection details remain the same for Amano (MDK) Multi-discipline Keypad Reader.

**NOTE:** The ideal cable distance between the Amano iTRT and its Multi-discipline Reader **MUST NOT** exceed 150 m (164 yd).

Amano (MDR)  
Multi-Discipline Reader  
Reader 1 connections



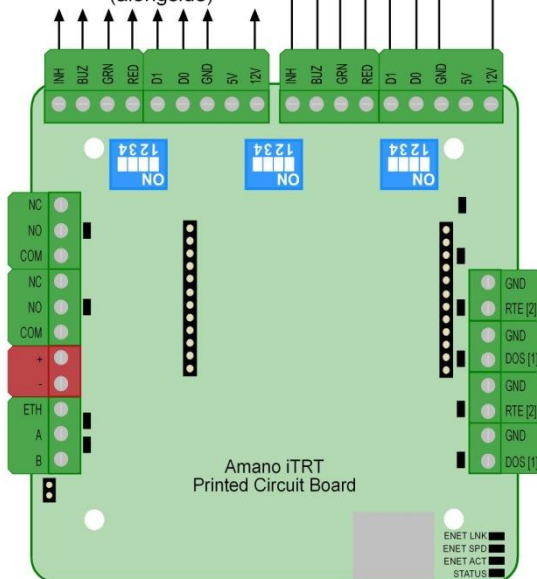
Red  
Black  
Green  
White  
Brown  
Orange  
Yellow  
Blue

Using either READER 1 SELECT  
or READER 2 SELECT set  
the DIP-switches as follows:

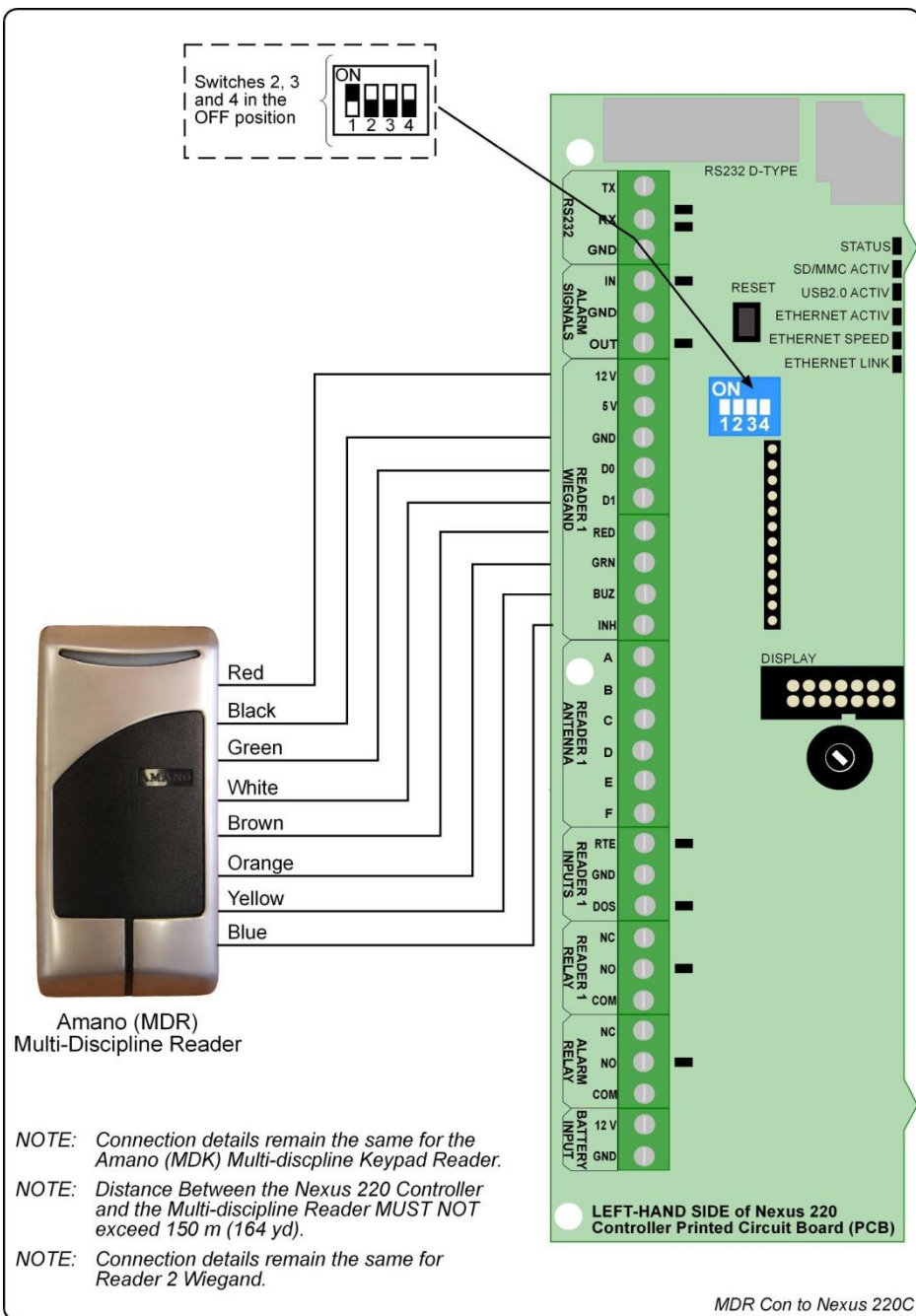


All switches in the  
OFF position

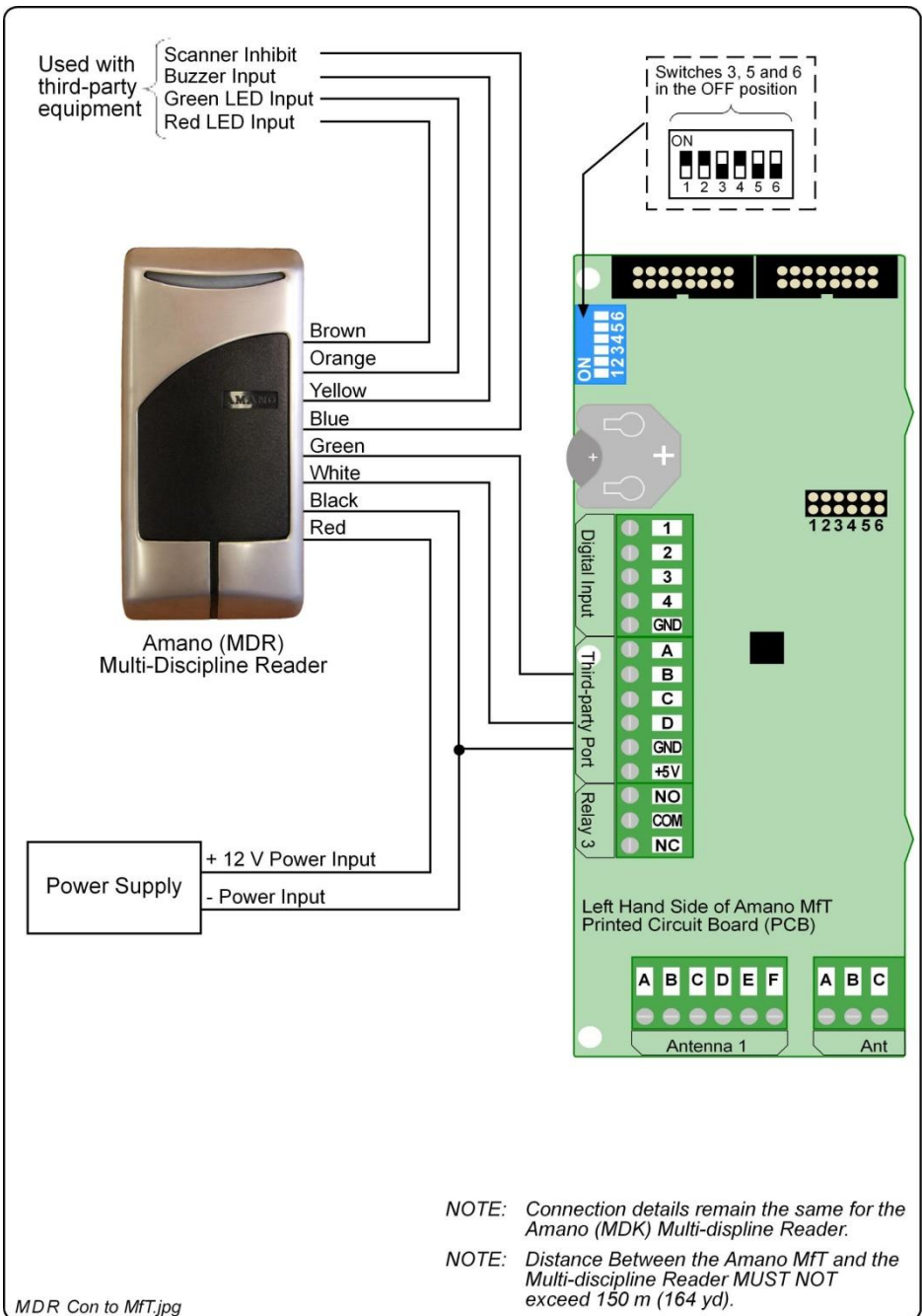
For Reader 2 connections,  
see Reader 1 connections  
(alongside)



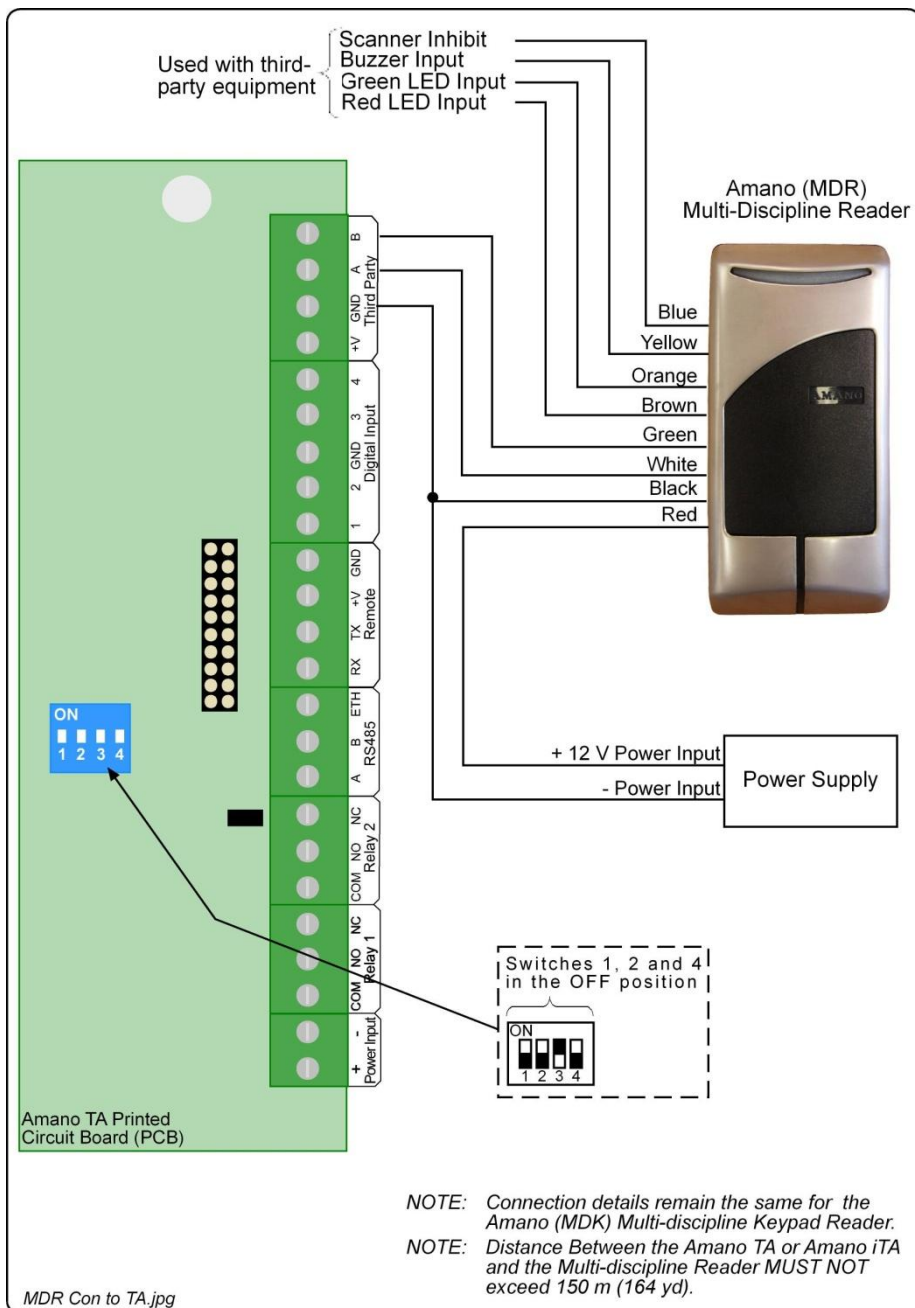
**Figure 1: Multi-discipline Reader Connected to the Amano iTRT**



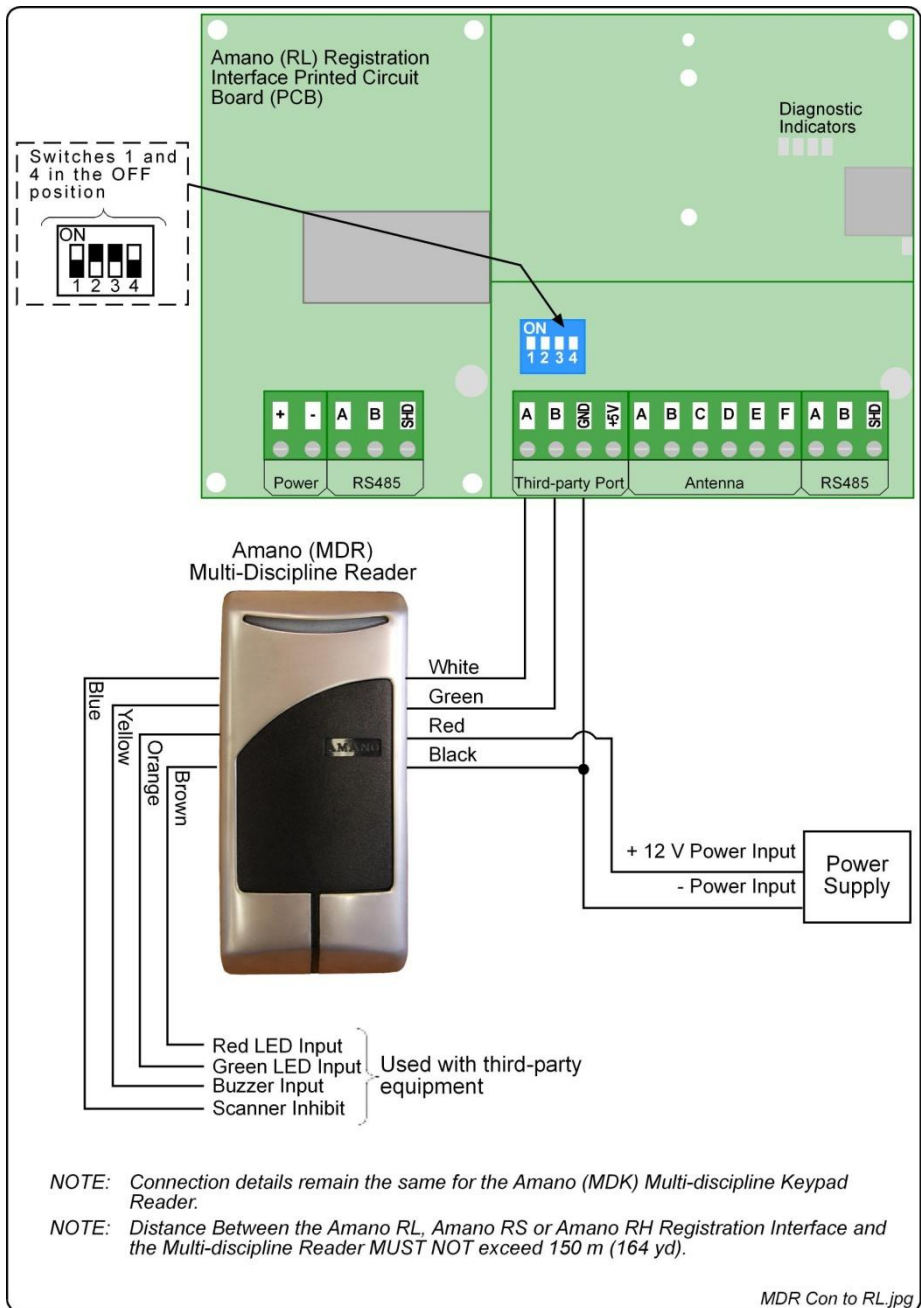
**Figure 2: Multi-discipline Reader Connected to the Nexus 220 Controller**



**Figure 3: Multi-discipline Reader Connected to the Amano Mft**



**Figure 4: Multi-discipline Reader Connected to the Amano TA or Amano iTA**



**Figure 5: Multi-discipline Reader Connected to the Amano RL (Amano RS and Amano RH)**



## Configuring the Tag Frequency Mode

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The Multi-discipline Readers offer three different Tag Frequency Modes. To select the Tag Frequency Mode, do the following:

1. Power up the Reader. On power up, you have 5 seconds in which to set the Tag Frequency Mode.
2. Present a Tag that matches your chosen Tag Frequency Mode:
  - Mode 1 (125 kHz): If you present a 125 kHz Tag for the full 5-second period, the Reader will only read 125 kHz Tags.
  - Mode 2 (13.56 MHz): If you present a 13.56 MHz Tag for the full 5-second period, the Reader will only read 13.56 MHz Tags.
  - Mode 3 (125 kHz and 13.56 MHz): If you present a 125 kHz Tag for 2 seconds followed by a 13.56 MHz Tag for 2 seconds, the Reader will read both 125 kHz and 13.56 MHz Tags. This is the default mode.

**NOTE:** *If you do not present a Tag within the 5-second period, the Reader uses the last known Tag Frequency Mode.*

## Setting the Output Mode (OEM Use Only)

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The Multi-discipline Readers offer four different Output Mode Combinations. Select the Output Mode by doing the following:

1. On the back of the Multi-discipline Reader, locate and bridge the two stand-alone Pins using the 2-Way Programming Pin supplied.
2. Power up the unit, the number of beeps indicates the selected Output Mode:
  - Mode 1 (1 Beep): 26-bit, HID Normal.
  - Mode 2 (2 Beeps): 44-bit, HID Normal (Default).
  - Mode 3 (3 Beeps): 26-bit, HID Raw.
  - Mode 4 (4 Beeps): 44-bit, HID Raw.

**NOTE:** *The 26-bit and the 44-bit refer to the output format of EMM and Amano Trinary Tags. HID Tags output in either normal or 45-bit raw mode.*

3. Remove the 2-Way Programming Pins once the mode is selected.
4. Clip the Front Cover onto the Backing Plate.

## Wiegand 44-bit Protocol

Tags are reported using Wiegand 44-bit Protocol. An “EMM” Tag has an 8-bit User Code and a 32-bit Serial Number.

These are reported as follows:

- The 8-bit User Code is reported in bits 1 to 8 of the Protocol.
- The 32-bit Serial Number is reported in bits 9 to 40 of the Protocol.
- Bits 41 to 44 of the Protocol are the exclusive OR of the preceding 40 bits taken 4 at a time.

## Wiegand 26-bit Protocol

Key Codes are reported as a 24-bit code consisting of an 8-bit Facility (or Site) Code, and a 16-bit binary representation of the Key Code.

The following format is used:

- Bit 1 is the even parity over the first 13 bits.
- Bits 2 to 9 are the 8-bit Facility Code for Key Codes.
- Bits 10 to 25 are the 16-bit Key Code.
- Bit 26 is the odd parity over the last 13 bits.

## HID Normal

The number of bits to output is determined from the information in the tag and will vary between tags. The 26-bit or 44-bit selection does not impact on HID Tags.

## HID Raw

In this Mode, the entire raw 45-bit HID Tag is output.

## Keypad Model Settings (MDK900 only)

The 12-button Keypad is used to enter 5-digit PIN-codes in the range 00000 to 65535. Wiegand protocol constraints disallow PIN-codes from 65536 to 99999. In this case the Status LED turns Red and the Buzzer activates for 2 seconds.

The Reader can accept 1 to 4-digit PIN-codes by pressing the Hash Key (#) after you have entered the PIN-code.

Errors made while entering the PIN-code can be corrected by pressing the Star Key (\*) followed by the correct PIN-code.

- PIN code up to 5 digits with programmable facility code, output in 26-bit format.
- Fixed length buffered keys from 1 – 11 output in hexadecimal format with optional parity.

**NOTE:** The output of the PIN-code keypad information is in 26-bit Wiegand format.

## Fixed Length Key Output Mode

Once the specified number of keys are pressed, all the buffered keys are output in hexadecimal format:

Key	Output
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000

Key	Output
9	1001
*	1010
#	1011

**Table 1: Fixed Length Key Output Mode**

### Setting the Fixed Length Mode

The number of keys to be buffered and the parity option in the Fixed Length Mode is set as follows:

1. Press and hold down key '2' for 3 seconds. The Status LED enters a fast flash Mode and emits a long beep.
2. Enter a 3 digit number followed by the Hash Key (#). The first 2 digits specify the key buffer length and must be in the range 00 to 11 (eleven). The third digit must be a '0' where there is no parity and '1' where parity is added.

*NOTE: If '00' is entered for the key buffer length then the Key Mode reverts to PIN Mode.*

3. On acceptance of the setting the Status LED changes to Green.
4. If the settings are rejected the Status LED changes to Red.

### Single Key 8-bit Burst Mode

To select this mode, specify the Fixed Length Buffered Mode to be "018". This mode reports each single key press as 8-bit code. Use Single Key 8-bit Burst Mode when using Multi-discipline Readers in PAC Mode or TAG+PIN Mode.

Key	Output
0	11110000
1	11100001
2	11010010
3	11000011
4	10110100
5	10100101
6	10010110
7	10000111
8	01111000
9	01101001
*	01011010
#	01001011

**Table 2: Single Key 8-bit Burst Mode**

### Setting Single Key 8-bit Burst Mode

1. Press and hold down key '2' until the Reader beeps continuously.
2. Enter '018' and finish by pressing the Hash Key (#).

3. On acceptance of the change, the Status LED will change to Green.
4. If the change is rejected the Status LED will change to Red.

### **Entering a Facility Code**

A Facility Code only applies when PIN-codes are used. It is reported as part of the Wiegand code and can be used to link a set of Multi-discipline Readers to a particular Site.

A Facility Code can be entered into the Reader's memory. To set the Facility Code, do the following:

1. Press and hold down key '1' for 3 seconds. The Status LED will enter a fast flash Amber Mode.
2. Enter the Facility Code in the range 0 to 255 and finish by pressing the Hash Key (#).
3. On acceptance of the Facility Code the Status LED will briefly change to Green and the Buzzer will sound.
4. If the Facility Code is rejected the Status LED will change to Red for a longer period and the Buzzer will sound.

### **Power-on Self-test**

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The Power-on Self-test tests the RAM and Flash Checksums.

If any parameter in the Self-test fails, the Multi-discipline Reader emits a continuous beep for 2 seconds.

When the Multi-discipline Reader passes the Self-test, it emits two short beeps, each 200 ms in duration, separated by a 200 ms inter-beep pause.

When the Multi-discipline Reader is connected, check that the Status LED is illuminated Red (steady). This will confirm that the connection is correct and working.

### **Serial Number Label**

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1. Once the Multi-discipline Reader is installed, sketch a rough site plan.
2. Attach the Multi-discipline Reader's loose Serial Number Label and the Terminal or Controller's Fixed Address Label, to the sketched site plan in the position of the Multi-discipline Reader.

The Multi-discipline Reader does not have its own Fixed Address. When connected to a Terminal or Controller the Multi-discipline Reader is assigned one of the available Fixed Addresses.

The Serial Number Label identifies the type of Multi-discipline Reader, and the Fixed Address Label (shipped with the Terminal or Controller) identifies the Fixed Addresses. Both these labels should be attached to the site plan to assist in identifying the hardware once an Auto-ID is performed.

## **GUARANTEE OR WARRANTY**

This product conforms to our Guarantee or Warranty details placed on our Web Site, to read further please go to [www.amano.com](http://www.amano.com).

## USER NOTES

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This manual is applicable to the Amano Multi-discipline Readers,  
MDR900-5-0-AC-06 and MDK900-5-0-AC-06.  
(The last two digits of the Amano stock code indicate the issue status of the product).

MDR300-0-0-AC-02

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