

Proximity EM Card Reader



AR-2802S & AR-2802A User Manual

TABLE OF CONTENTS

INTRODUCTION	3
SPECIFICATIONS	3
Package Contents	3
THE FRONT PANEL	4
Power Indicator (Blue)	4
Status Indicators	4
Card Reader Window	4
INSTALLATION	5
Installation Location	5
Precautions for Accidental Short Circuit	5
THE CONNECTION TERMINALS	6
(A)CONNECTION TERMINAL 1-6 FOR AR-2802S (STANDARD VERSION)	6
1 – 2 : 12-24V DC (Power Input Terminals)	6
3 : Data I/O Bus	6
4 – 5 : Tamper Switch	6
6 : LED Control Input Port	6
(B)ADDITIONAL CONNECTION TERMINAL 7-10 FOR AR-2802A (ADVANCED VERSION)	6
7 : Buzzer Control Input Port	6
8 : D0 Wiegand Data Output Port	7
9 : D1 Wiegand Data Output Port	7
10 : RS-232 (TX) Output Port	7
EXTERNAL CONNECTION OF WIEGAND AND RS-232	7
WIEGAND OUTPUT FORMATS (AR-2802A ONLY)	8
The Timing and Electrical Manner of The Wiegand Data Output	8
Wiegand Data 26-Bit, 34-Bit or 37-Bit Selection Jumper	8
1) 26-Bit Wiegand Data Output	8
2) 34-Bit Wiegand Data Output	8
3) 37-Bit Wiegand Data Output	8
The 26 Bit Wiegand Data Output From The EM Cards	9
RS-232 OUTPUT FORMAT (AR-2802A ONLY)	10
OPERATION	11
APPLICATION EXAMPLES	12
1) Works As Auxiliary Reader for The AR-2808	12
2) Works As Auxiliary Reader for The DK-2800 Series Keypads (2nd Generation or Above) in Stand Alone Mode	13
3) Works As Auxiliary Reader for The DK-2800 Series Server Keypads in Split-decoded Mode	14

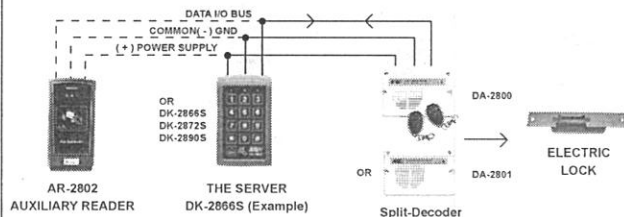
3) Auxiliary Reader for DK-2800 Split-Decoded Keypads (2nd Generation)

Description

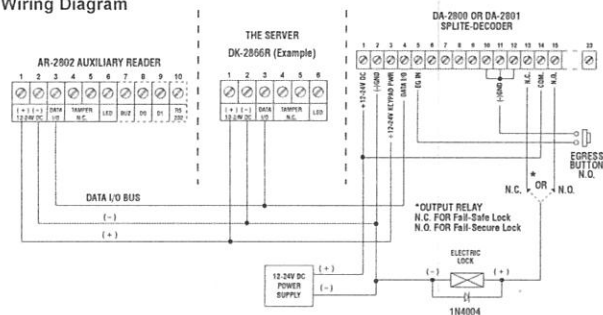
The auxiliary readers are also companion of the split-decoded keypads. Maximum 3 auxiliary readers can be connected in parallel with the Data I/O Bus of the DK-2800 server keypad for multi-station operation (compatible with all the server keypads in DK-2800 2nd generation family). The auxiliary readers work in the same manner like the server keypad in card reading.

A split-decoded keypad consists of one server keypad unit (DK-2866S/A, DK-2872S/A or DK-2890S) and one decoder unit (DA-2800 or DA-2801) in package. Split-decoded keypad provides high overall security with the decoder unit installing inside the house for all the input and output connections while the keypad unit is installed outside. The communications among the devices connecting with the Data I/O Bus are digital data managed by the server keypad. Sabotage on the outside keypad and reader can not make door open.

System Connection



Wiring Diagram



INTRODUCTION

AR-2802 is a proximity EM card reader. It is compatible with all the DK-2800 series keypads (2nd generation or above) and the access control reader AR-2808 in utilizing the self-contained Data I/O bus to set up a multi-station access control system. The advanced version also provides Wiegand data and RS-232 output for custom project development that works with access controller and / or computer.

- AR-2802S – Standard Version, Consists Data I/O Port
- AR-2802A – Advanced Version, Consists Data I/O Port, Wiegand Data & RS-232 Outputs

SPECIFICATIONS

- Operation Voltage: 12-24V DC Auto-adjust
- Operating Current: 80mA Maximum
- Operation Temperature: -20°C to +70°C
- Environmental Humidity: 5-95% Relative Humidity, Non-condensing
- Working Environment & Ingress Protection: Indoor or Outdoor, IP-55 Weatherproof
- Compatible User Cards: Standard 125KHz Proximity EM Cards and Keyfobs
- Data Communication Ports:
 - a) Data I/O Port – Compatible with the APO Keypads & Readers
 - b) Wiegand Output Port – 26-bit, 34-bit or 37-bit Standard Format, Selectable (Version A Only)
 - c) RS232 Output Port – Output Format at 9600bps (Version A Only)
- Tamper Switch: N.C. Dry Contact, 50mA/24VDC Maximum
- Dimensions: 60(W) X 120(H) X 25(D) mm
- Weight: 100g Net
- Housing: ABS Plastic

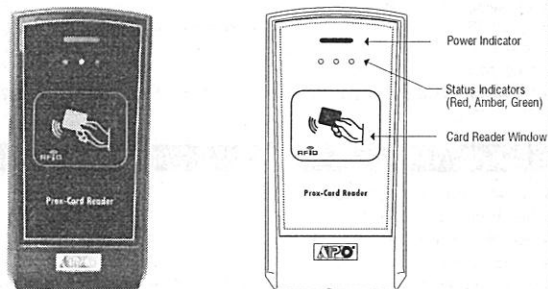
Specifications are subject to change for modification without notice

PACKAGE CONTENTS

- One AR-2802 Reader (S or A Version)
- Two EM Cards
- One Pack of Mounting Screws
- One User Manual

THE FRONT PANEL

AR2802 FRONT PANEL



• Power Indicator (Blue)

It is ON after the reader is powered.

• Status Indicators

Red – A normally OFF indicator, it is ON in system lock-up due to false trials or manual inhibition. It is flashing during the master keypad in inhibition pause period.

Amber – It is ON in standby and turns OFF momentarily when a valid card is read.

Green – An indicator controlled by external controller. It is prepared for free connection, e.g. such as a Wiegand feedback indicator. It turns ON momentarily when a valid card is read.

• Card Reader Window

A place gives best result for reading the EM cards.

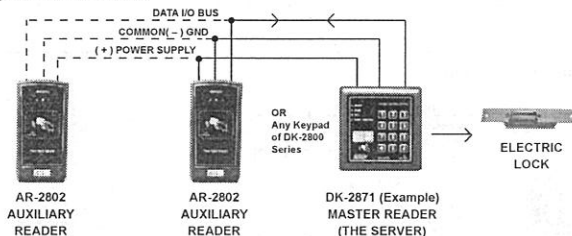
2) Auxiliary Reader for DK-2800 Keypads (2nd Generation)

Description

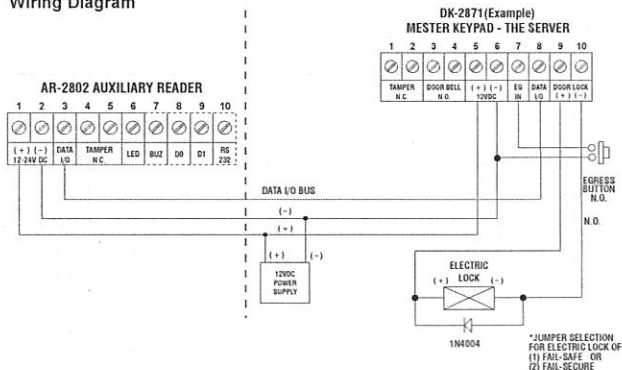
Maximum 3 auxiliary readers AR-2802 can be connected in parallel with the Data I/O Bus of the DK-2800 master keypad for multi-station operation (compatible with all the keypads in DK-2800 2nd generation family). The auxiliary readers work in the same manner like the master keypad in card reading. The master keypad is the server of the system in this example. It manages the data among the devices connected to the Data I/O Bus.

The auxiliary reader is even compatible with master keypads without reader (such as the DK-2831, DK-2851 and DK-2881 etc.). The auxiliary reader acts as EM card reader of the master keypad and the user cards can be programmed to the master keypad through it.

System Connection



Wiring Diagram



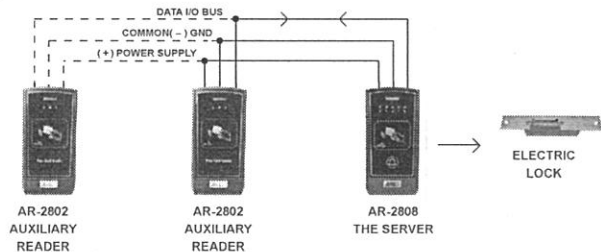
APPLICATION EXAMPLES

1) Auxiliary Reader for AR-2808

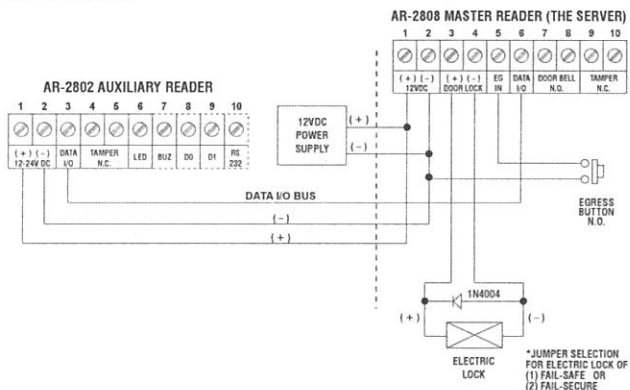
Description

Maximum 3 auxiliary readers AR-2802 can be connected in parallel with the Data I/O Bus of the AR2808 access control reader for multi-station operation. The auxiliary reader(s) works in the same manner like the master reader in card reading. The master reader is the server of the system in this example. It manages the data among the devices connected to the Data I/O Bus.

System Connection

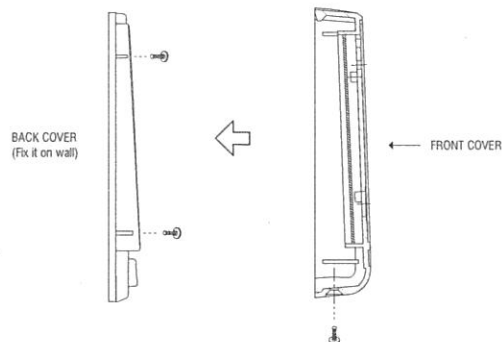


Wiring Diagram



INSTALLATION

AR-2802 ASSEMBLY



Installation Location

The EM Card works at the frequency of 125Khz. Installation precautions are necessary:

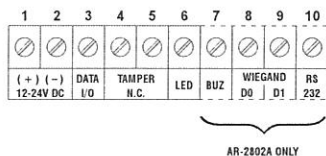
- Make sure the location has no strong low frequency electro-magnetic wave signals near it. Especially in the range of 100-200Khz.
- If more than one keypads/readers operating in the same frequency are installed closely, make sure that they are at least 60cm (2ft) apart from each other to reduce interference. Otherwise, the reading range may be reduced.

Precautions for Accidental Short Circuit

In the previous experience, most of the damages caused during installation are accidental touch of the components on the circuit board with the wire(s) carrying power. Always be patient and the following precautions are necessary:

- Study the manual thoroughly to become familiar with the system before the installation.
- Do Not apply power to any connection terminal of the reader during the installation.
- Check all the wirings carefully and confirm that they are correct before applying power to the reader for testing.

THE CONNECTION TERMINALS



(A) TERMINALS 1-6 FOR AR-2802S (STANDARD VERSION)

1 – 2 : 12-24V DC (Power Input Terminals)

Connect the (+) to a 12-24V DC power supply or in parallel with the power supply of the master keypad / reader. The (-) is the common grounding point of the system.

3 : Data I/O Bus

This is a data input-output bus compatible with the Data I/O bus of the DK-2800 keypads (the 2nd generation or above) and the AR-2808 access control reader. Connect the Data I/O buses of the reader(s) and keypad(s) in parallel.

4 – 5 : Tamper Switch

A Normally Closed (N.C.) dry contact while the reader is securely fixed on its back cover. The contact is open while the reader is separated from the back cover. Connect this N.C. terminal to the 24 hour protection zone of an alarm system to make alarm in sabotage if required.

6 : LED Control Input Port

The Amber indicator is 0V (-) active by connecting the input terminal to (-) ground. It provides visual feedback indication from the wiegand controller or the striking electric lock. It is for free connection.

(B) TERMINAL 7-10 FOR AR-2802A (ADVANCED VERSION)

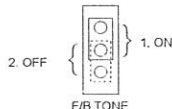
7 : Buzzer Control Input Port

The internal Wiegand buzzer is 0V (-) active by connecting the input terminal to (-) ground. It provides audible feedback indication from wiegand controller. Connect it to the output port of the controller.

Remark:

Self-generated Feedback Tone ON-OFF Jumper:

The self-generated feedback tone of the reader may confuse with the beeps feeding back from the controller in using Wiegand data. The self-generated beeps can be selected for ON-OFF with the jumper.



OPERATION

The auxiliary reader provides the output data faithfully from reading of an EM card. It uploads the acquired data to the Data I/O bus to set up a communication path with the master keypad or reader. The master keypad or reader interprets the data and executes the required function(s) accordingly.

The advanced version (version "A") auxiliary reader also gives Wiegand and RS-232 data simultaneously at separated output ports while it sends signal to the Data I/O bus.

Working with Master Keypad Via Data I/O Bus

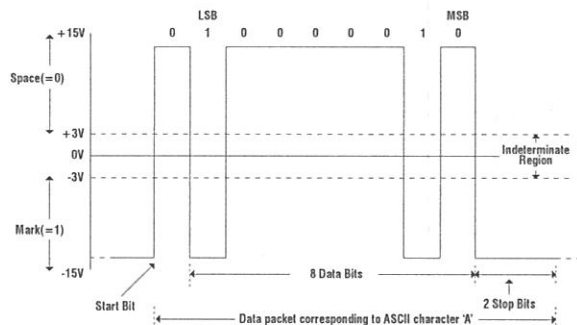
- Read the EM card. The card's ID will be sent to the master keypad or reader for verification.
- A valid user card (a registered card in the master) will be accepted. **Two beeps confirm successful.** The Green indicator turns ON and the Red indicator turns OFF for one second.
- An Invalid card (a card not registered in the master) will be rejected and **five beeps indicate unsuccessful.**

Working with Equipment via Wiegand and RS-232 Data (AR-2802A Only)

There is no audible feedback indication from the master keypad or reader if the reader only works with an access controller using Wiegand and/or RS-232 data. Leave the Data I/O port open if it is not used.

- Read the EM card. The card's ID in Wiegand and RS-232 data format will be sent to the access controller and the PC respectively.
- The Wiegand and RS-232 data outputs are not affected by the card that is valid or invalid in the master's registration. The reader sends the data out instantly if it is not a faulty card.
- The reader always gives 2 beeps to confirm a card is read. The Green indicator turns ON and the Red indicator turns OFF for one second during the data transmission.
- The on-board Wiegand LED and Buzzer are prepared for connecting with the access controller to get the visible and audible feedback indications. See terminals 6 & 7 for the connection details.

RS-232 OUTPUT FORMAT (AR-2802A ONLY)



Format	Start	Data	End	LRC
26 Bit	START(0x02H)	DATA(1-8 Char)	END(0x03H)	LRC
34 Bit	START(0x02H)	DATA(1-10 Char)	END(0x03H)	LRC
37 Bit	START(0x02H)	DATA(1-11 Char)	END(0x03H)	LRC

• Check the following settings:

Baud Rate: 9600bps
 Data Bit: 8
 Parity Bit: None
 Stop Bit: 1

• LRC:

This is the result of XOR operation of each byte from Start to End.

• NOTE:

The Maximum DATA length change from 8 to 11 characters according to the Wiegand Data Jumper selection.

8 : D0 Wiegand Data Output Port

This output port provides the D0 Wiegand data. Connect it to the D0 input port of the controller.

9 : D1 Wiegand Data Output Port

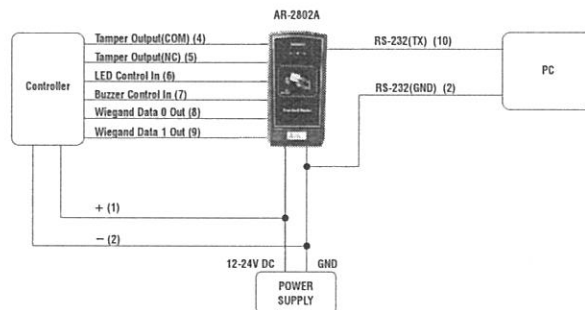
This output port provides the D1 Wiegand data. Connect it to the D1 input port of the controller.

10 : RS-232 (TX) Output Port

This is a standard RS-232 transmission output port. Connect it to the COM port of the PC. See following diagram for the details.

EXTERNAL CONNECTION OF WIEGAND AND RS-232

Wiring Diagram



Note:

RS-232 Connection — Connect to the COM port of the PC. (Connect pin 2 of the DB-9 connector to the terminal (10); connect the terminal (2) GND of the device to pin 5 of the DB-9 connector.)

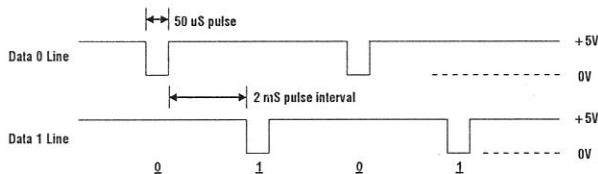
WIEGAND OUTPUT FORMATS (AR-2802A ONLY)

The Timing and Electrical Manner of The Wiegand Data Output

Wiegand is a common medium in the communication between readers and controller in access control. The Wiegand data from the keypad unit provides a level of compatibility for readers and controller that can be used by consultants in custom project development.

The Wiegand interface uses three wires, one of which is a **Common Ground** and two of which are data transmission wires called **DATA 0** and **DATA 1**. When no data is being sent both DATA 0 and DATA 1 are at high voltage. When a "0" is sent the DATA 0 is at low voltage while the DATA 1 stays at a high voltage. When a "1" is sent DATA 1 is at the low voltage while DATA 0 stays at the high voltage.

The high voltage level in the keypad unit is +5VDC to accommodate for long cable runs (approximate 500 feet) from it to the associated controller typically located in a secure closet.



Wiegand Data 26-Bit, 34-Bit or 37-Bit Selection Jumper

The Wiegand data output can be selected to 26-bit, 34-bit or 37-bit standard format with the jumper.

1) 26-Bit Wiegand Data Output

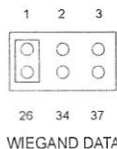
Bit 1 : Even Parity Bit (bit 2 – bit 13)
Bit 2 – Bit 25 : 24 Bit ID Number
Bit 26 : Odd Parity Bit (bit 14 – bit 25)

2) 34-Bit Wiegand Data Output

Bit 1 : Even Parity Bit (bit 2 – bit 17)
Bit 2 – Bit 33 : 32 Bit ID Number
Bit 34 : Odd Parity Bit (bit 18 – bit 33)

3) 37-Bit Wiegand Data Output

Bit 1 : Even Parity Bit (bit 2 – bit 19)
Bit 2 – Bit 36 : 35 Bit ID Number
Bit 37 : Odd Parity Bit (bit 20 – bit 36)



WIEGAND DATA

The 26 Bit Wiegand Data Output From The EM Cards

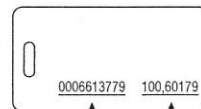
26-bit EM Card is the most popular one on the market. Almost all the controllers can use the 26-bit standard format.

A 26 bit Wiegand protocol for card reading has 1 first parity bit, 24 bits of the Card ID, and 1 stop bit for a total of 26 bits. The first parity bit is an **Even parity** bit calculated from the first 12 bits of the code and the trailing parity bit is an **Odd parity** bit from the last 12 bits. The data transmitted is in **Hex Binary codes**.

Each EM card or Keyfob is marked with a unique ID in Decimal Digits that is the code read by the reader. The EM Card is also marked with a "3 digit + 5 digit" code that are the site code and ID number arrangement of the Wiegand data.

EXAMPLE:

a) The Code Marked on One of The EM Cards:



The ID Code to be read for Wiegand Output The Site Code and the ID number

The Code in Decimal Number : 6 6 1 3 7 7 9

The Code 6 6 1 3 7 7 9 Equivalent to Hex Number : 6 4 E B 1 3

b) Each Hex Number Consists of 4 Bits, Total 26 Bits of Wiegand Data Output from Card Reading:

$$\begin{array}{ccccccc} & E & 6 & 4 & E & B & 1 & 3 & 0 \\ \uparrow & & & & & & & & \uparrow \\ \text{An Even Parity Bit of } 6 & 4 & E = 0 & & & & & & \text{An Odd Parity Bit of } B & 1 & 3 = 1 \end{array}$$

c) The 26 bits Wiegand Data Sending Out in Hex Binary from Reading The Card:

0 0 1 1 0 0 1 0 0 1 1 1 0 1 0 1 0 0 0 1 0 0 1 1 1

d) The Arrangement of The Site Code and ID Number of A 26-bit EM Card:

- Site Code: Bit 2 ~ 9 (000~255)
- ID Number: Bit 10 ~ 25 (00000 ~ 65,535)