M5 Bridge Casi Retrofit Guide

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The DNA Fusion™ Access Control and Security Management System uses equipment that generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this installation manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the user will be required to correct the interference at the user's expense.

The DNA Fusion™ Access Control and Security Management System shall be installed in accordance with this installation manual and in accordance with the National Electric Code (N.E.C), ANSI and NFPA 70 Regulations and recommendations.

This manual has been written for DNA Fusion™ version 6.0 or higher

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Introduction 1

In This Chapter
√ Manual Overview √ M5 Bridge Overview √ M5 Hardware Conversion/Installation

This manual is designed to provide information on Micro/5 (M5) Casi Retrofit hardware products as well as installation and configuration instructions for each device.

How This Manual is Organized

Chapter 1, "Introduction," provides an overview of the M5 Bridge family and its conversion/installation steps.

Chapter 2, "M5-IC Bridge," covers wiring and configuration instructions for the M5-IC bridge controller.

Chapter 3, "M5 Reader Subcontrollers," outlines the various M5 reader subcontrollers.

Chapter 4, "M5 I/O Subcontrollers," provides information on M5 input and output subcontrollers.

Icons and Conventions Used in This Manual

The following icons call attention to useful or important information:

	This icon highlights time-saving hints, useful tips, and helpful shortcuts.
	This icon designates information that is important enough to keep filed in an easily accessible portion of your gray matter.
	If an action could damage the system, cost big bucks, lock the operator out of the system, or otherwise bring an end to civilization as we know it, it will be marked by this icon.

In addition to the icons above, this guide uses several typeface conventions to improve readability:

- Special: Indicates a specific item on the hardware device or in the software application.
- **Boldface**: Indicates an instruction or user action; bold text usually appears in numbered steps.

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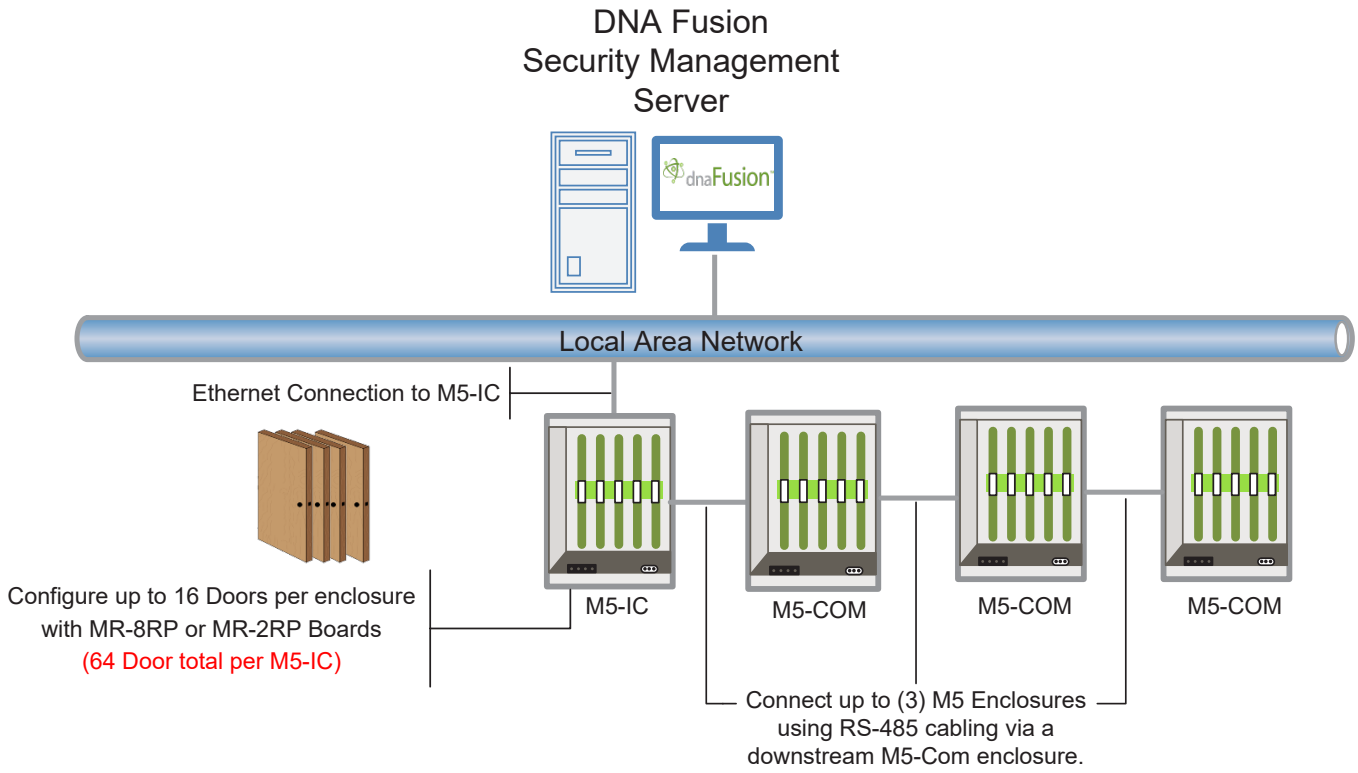
M5 Bridge Overview

The Micro/5 (M5) Bridge technology is designed to provide a screwdriver-less retrofit with existing M5 installations. Open Options offers one-for-one replacement boards that are capable of using the existing Micro/5 enclosures as well as existing power and wiring. Additionally, the M5 Bridge seamlessly integrates with the DNA Fusion access control software.



Conversion Steps

1. **Replace** the Casi boards with the M5 replacement boards.
2. **Configure** the IP address for the M5-IC bridge controller.
3. **Add** the new M5-IC controller to the DNA Fusion access control system.
4. **Configure** the new subcontrollers in DNA Fusion.

Default Settings

Each board ships with the following default configuration:

- DIP Switches: OFF
- Network: Static IP Address = 192.168.0.251
- Gateway Mask: 255.255.255.0
- Communication Address: 0
- Primary Host Port: IP Server, No Data Security, Port 3001
- Alternate Host Port: Disabled
- Login Name: admin
- Login Password: password

NOTES:

Configuring the M5 Hardware

Hardware Conversion

The installation process is streamlined via a simple board swap with existing Micro/5 boards. The existing M5 cages and wiring remain intact. See the table below for conversion part numbers.

Casi Part #	M5 Bridge Part #	Max. Per Enclosure	Description
PXN/PXN+ CPU Board	M5-IC	-	• Intelligent controller; manages downstream communication and power distribution • Supports up to 3 additional M5 enclosures via RS-485 interface to M5-COM boards
Power/Comm Board (PCB)	M5-COM	-	• Not a direct replacement • Used for downstream communication only
Micro/PX-2000	M5-2K	-	• 4-reader interface board • 10 unsupervised/supervised inputs and 8 Form C relays • 12 Vdc power supply to power readers and other devices
2RP	M5-2RP	4 (8 doors)	• 2-reader interface board • 4 unsupervised inputs and 6 outputs • Supports Weigand, magstripe, F/2F, and supervised F/2F readers
2SRP	M5-2SRP	4	• 2-reader interface board • 4 supervised inputs and 6 outputs • Supports Weigand, magstripe, F/2F, and supervised F/2F readers
8RP	M5-8RP	2 (16 doors)	• 8-reader interface board • 16 inputs and 8 outputs • Supports F/2F and supervised F/2F readers
20DI	M5-20IN	4	• 20-point digital input board • Supports supervised and unsupervised input circuits
16DO	M5-16DO	4	• 16-point digital output board for controlling external relays
16DOR	M5-16DOR	4	• 16-point digital output board • 8 Form C relays and 8 Form A relays with dry contacts

Replacement Part Table

The table below contains the Open Options replacement part numbers.

Casi Hardware Part #	Open Options Replacement Part #
Micro M5 or M300 Enclosure	Enclosures remain intact; no replacement required.
Micro M2000	Must replace with an Open Options SSP controller.
DirecDoor Micro	Must replace with an Option Options DController.
Power Communication Board (PCB)	Board is removed; not required for hardware conversion.
PXN/PXN+ CPU Board	Must be replaced with an M5-IC bridge controller.

Any additional hardware, such as reader subcontrollers, input points, and output points, require traditional Open Options hardware to be installed. This may include a combination of controllers and subcontrollers.

Hardware Installation

The M5 installation process includes removing the connectors from the Casi boards, pulling the boards from the enclosure, and replacing them with the corresponding M5 boards. The existing connectors are then reffitted and the power is reapplied, leaving all field devices untouched.

The M5-IC requires an Ethernet connection to securely communicate back to the DNA Fusion access control software.

1. **Power down** the Casi Rusco devices.
2. **Disconnect** the terminal connectors from the Casi Rusco board in the M5 enclosure.
3. **Slide** the Casi Rusco board out of the card slot.
4. **Install** the correct Open Options M5 Bridge board into the card slot.
   See tables on page 1-5 and 1-6 for part number conversion information.
5. **Connect** the Ethernet cable to the M5 Bridge panel.
6. **Assign** an IP address to the M5-IC bridge controller.
   See page 2-7 for more information.
7. **Reconnect** the terminal connectors.
8. **Power up** the devices.

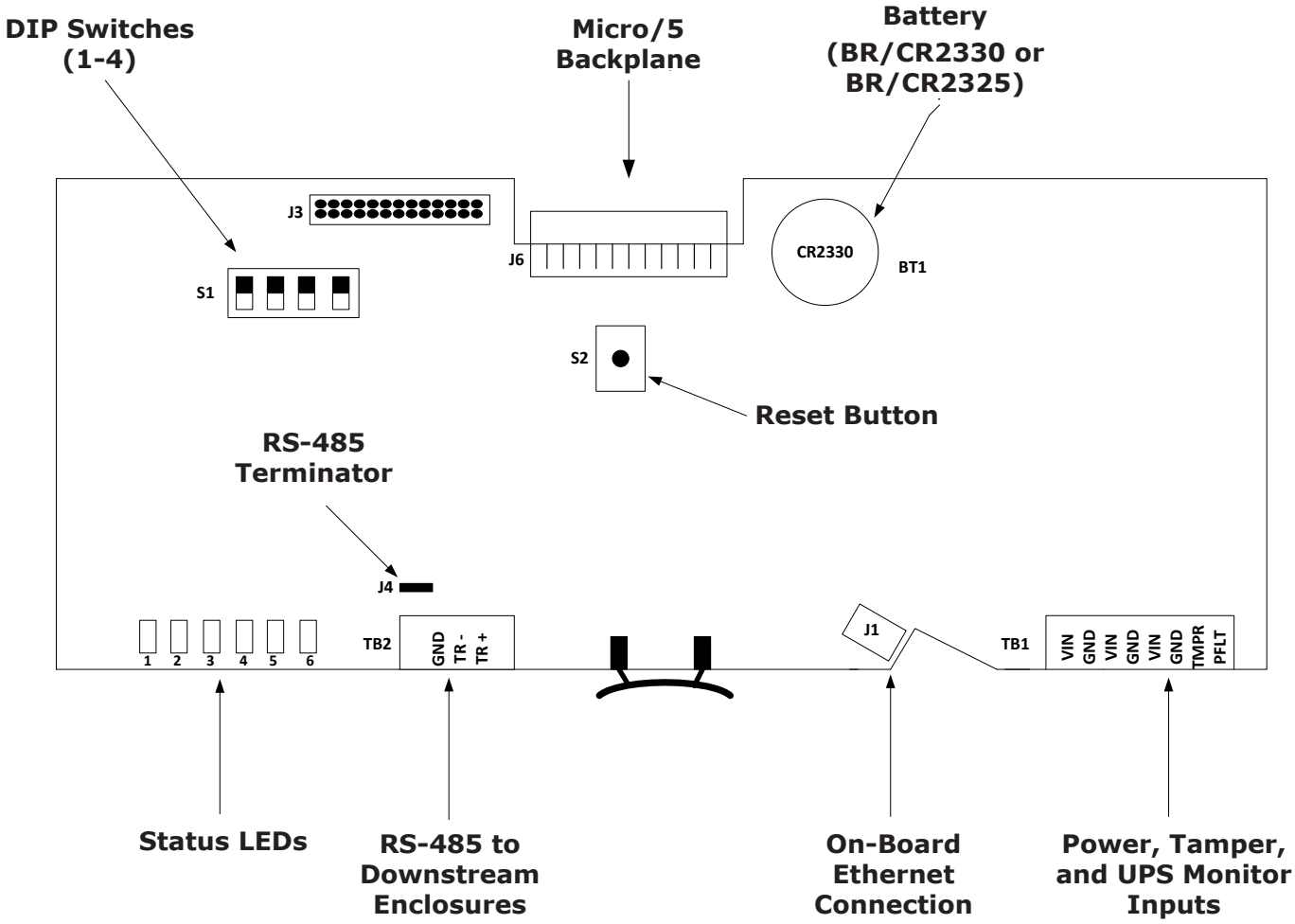
M5-IC Bridge 2

In This Chapter
√ M5-IC Bridge Controller √ M5 Hardware Conversion

M5-IC Bridge Controller

The M5-IC controller replaces the CPU board (PX, PXN, PXNplus) and the Power/Communication boards that are currently installed in the M5 enclosures. The IC board handles both the downstream communication and power distribution; it supports up to 64 readers.

Additionally, the Ethernet-enabled M5-IC is capable of monitoring up to three (3) additional M5 enclosures via an RS-485 data bus to M5-COM boards.

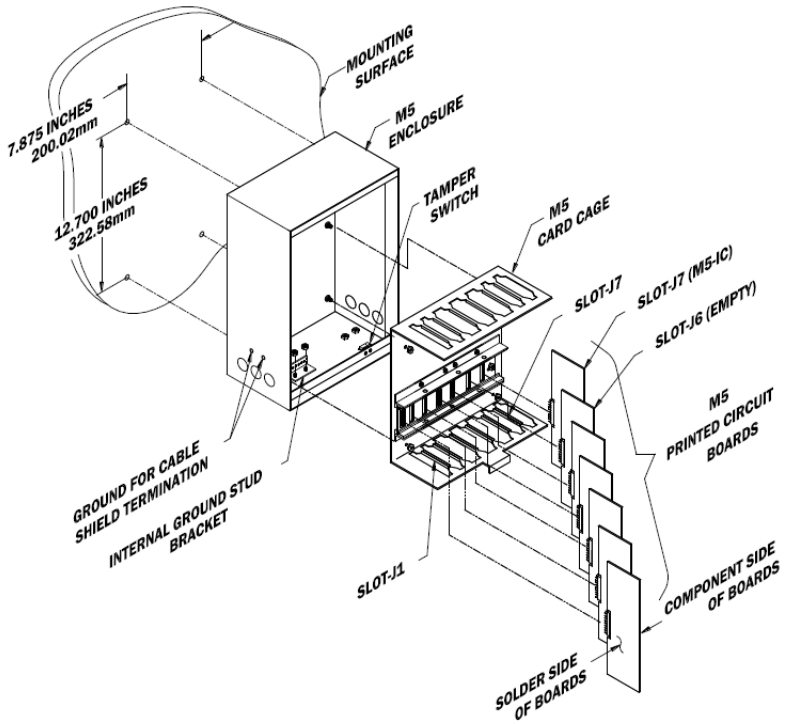


Installation

The M5-IC controller replaces existing M5 enclosure modules.

To install the M5-IC board:

1. **Remove** the existing M5 enclosure's Power/Communication board in Slot-J7.
2. **Insert** the Open Options M5-IC board in Slot-J7.
3. **Remove** the CPU board from Slot-J6.
   This slot will remain empty.

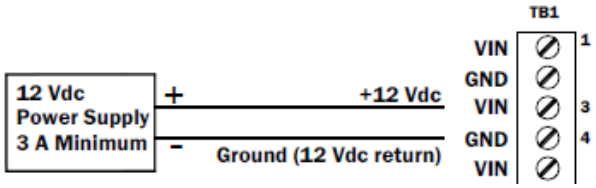


Power Supply

The M5-IC bridge controller requires 12 Vdc power, 3A minimum. However, depending on the system configuration, it may require a larger power supply.

The TB1 port includes three pairs of connections for power; all are in parallel. If needed, the other two pairs can supply power to the other I/O boards.

Connect the incoming +12 Vdc power to TB1-3 and connect GND to TB1-4 with minimum 18 AWG wire. Locate the power source as close to the unit as possible.



> *If multiple enclosures are configured in a single system, the grounding strap between the enclosure and terminal block TB1 on the M5-IC board must be removed in all locations except one. Multiple earth ground connections may cause group loop problems.*

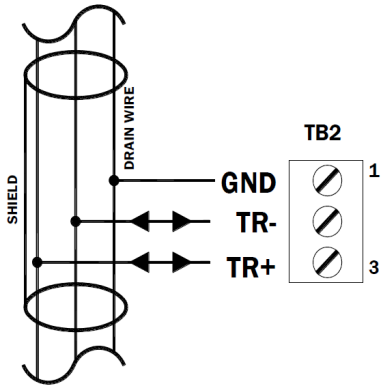
Host Communication Wiring

The M5-IC communicates to the host via the on-board Ethernet 10Base-T/100Base-TX Ethernet port. The alternate host communication port is an optional 10Base-T/100Base-TX Ethernet port using a Lantronix Micro125 interface daughter board or equivalent.

Downstream Communication Wiring

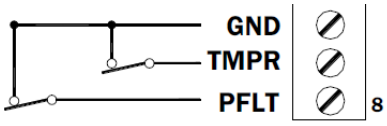
TB2 is a 2-wire RS-485 interface that communicates to downstream M5 enclosures. The interface allows multidrop communication on a single bus of up to 4,000 ft (1,200 m). Use shielded twisted-pair cable (minimum 24 AWG) with 120-ohm impedance.

Connect the TR+, TR-, and GND ports on TB2. Install termination jumper J4 on end-of-line devices only.



Alarm Inputs Wiring

Inputs TMPR and PFLT on TB1 are used to monitor the cabinet tamper and power fault with normally closed contacts. These two inputs only monitor whether a contact is Open or Closed; they do not require EOL resistors. If these inputs are not used, connect a shorting wire to the input.



Memory Backup Battery

A lithium backup battery powers the static RAM and real-time clock device when input power is interrupted. Open Options recommends that the battery be replaced annually. If the data in the static RAM is determined to be corrupt after power-up, all data—including flash memory—is considered invalid and will be erased. The event buffer is backed up by a 3V lithium battery, type BR/CR2325 or BR/CR2330.

Bulk Erase Configuration Memory

The bulk erase function erases all configuration and cardholder information. A bulk erase can be used to recover from a database corruption that causes the IC board to continuously reboot.

If clearing the memory does not correct the initialization problem, contact Open Options Technical Support.

1. **Set** DIP switches 1 & 2 to ON and 3 & 4 to OFF.
2. **Power up** the board and **set** either DIP switch 1 or 2 to the OFF position within a 10-second window.

   During the reset window, LEDs 1 & 2 and LEDs 3 & 4 flash alternately at a 0.5-second rate.

   When erasing the memory, LED 2 flashes at a 2-second rate. DO NOT CYCLE POWER. The process takes approximately 60 seconds. LEDs 1 & 4 flash for 10 seconds after the memory has been erased, and then the M5-IC will reboot.

Status LEDs

Initialization

LEDs 1 through 6 are sequenced during initialization. LEDs 1, 3, and 5 are turned ON for approximately 1.5 seconds after the hardware initialization has completed, and then the application code initializes. The time it takes to initialize depends on the size of the database (about 3 seconds without a card database). Each 10,000 cards adds about 3 seconds to the initialization process.

When LEDs 1 through 4 flash at the same time, data is being written to or read from flash memory. Do NOT cycle power during this state.

Running

Once initialization is complete, the LED lights on the M5-IC controller indicate the following status information:

LED	Description	Indicator
1	Connection / Battery Status	Offline = 200 ms ON / 800 ms OFF Online = 800 ms ON / 200 ms OFF Double Flash = Low Battery
2	Host Communication Activity	Fash Flash = Online 2 x 20 seconds = Not Connected to Panel 1 x 5 seconds = Polling Information from Driver; Host is Not Responding (Reset Panel)
3	Internal Communication Bus Activity	ON = Active OFF = Inactive
4	Downstream Communication Activity (TB2)	Fast Flash = Online Slow Flash = Offline (Download to Panel)
5	Unassigned	N/A
6		
YEL	On-Board Ethernet Speed	OFF = 10 Mbps ON = 100 Mbps (Yellow LED)
GRN	Ethernet Activity	OFF = No Link ON = Good Link (Green LED) Flashing = Ethernet Activity

Hardware Setup

The M5-IC hardware is configured via a termination jumper and four (4) DIP switches. These jumpers/switches determine the port interface, end-of-line (EOL) termination, and operating mode configuration. Refer to the following tables for more information.

Jumper Settings

The table below describes the jumper settings for the M5-IC board. These settings vary depending on the communication protocol used.

Jumper	Set At	Description
J4	ON	EOL Termination Used (120 ohms)
	OFF	NO EOL Termination

DIP Switch Settings

The M5-IC board contains two switch locations:

- S1 - Configures the operating mode (read on power-up); see table below.
- S2 - If pressed, resets the M5-IC controller.

Selection	S1	S2	S3	S4
Use normal operating mode.	OFF	OFF	OFF	OFF
After initialization, enable the default User Name (admin) and Password (password). Switch reads on-the-fly; no need to reboot.	ON	OFF	OFF	OFF
Use factory default communication parameters. See Default Settings on page 1-3.	OFF	ON	OFF	OFF
Prompt bulk erase mode during power-up. See Bulk Erase on page 2-4.	ON	ON	OFF	OFF
Disable TLS secure link; switch only reads when logging on.	OFF	OFF	ON	OFF
Enable auto-DHCP assignment; assigns a default IP address to the bridge controller.	ON	ON	ON	ON

All other DIP switch settings are unassigned and reserved for future use.

NOTES:

Assigning the M5-IC Controller's IP Address

To configure the M5-IC controller's initial settings, the operator must first establish communication with the controller using one of several methods: crossover cable, ZeroConfig tool, or web browser.

Crossover Cable

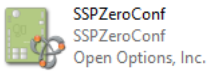
Prior to establishing an Ethernet connection, the operator can use a CAT 5 crossover cable to directly connect the M5-IC board to a computer and configure the initial settings. Connect the cable directly between the computer and controller, open a web browser, and enter the static IP address assigned to the controller.

ZeroConfig Tool

1. **Set** all DIP switches to the ON position and cycle power.

   This allows the board to receive a default DHCP IP address.

2. **Open** the SSP ZeroConfig application.

   Default location:

   32-bit OS - C:\Program Files\DNAFusion\Tools\ZeroConf\SSPZeroConf.exe

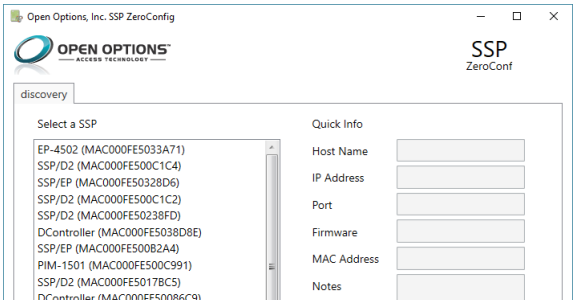
   64-bit OS - C:\Program Files (x86)\DNAFusion\Tools\ZeroConf\SSPZeroConf.exe

   The SSP ZeroConfig dialog appears.

3. **Select** the desired M5-IC by the unique MAC Address and **click** the Configure button.

   The MAC Address is located on the M5-IC and the box.

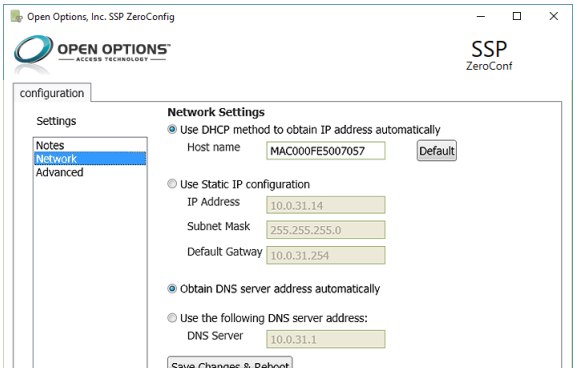
   The Configuration dialog for the selected component opens.



4. If desired, **enter** any Notes relevant to the hardware component and **click** the Save Changes button.

5. **Select** Network from the dialog menu.

   The Network Settings dialog appears.



6. **Select** Use Static IP Configuration and **enter** the IP Address, Subnet Mask, and Default Gateway information as well as the DNS Server Address.

   This information must be obtained from the customer.

7. **Click** the Save Changes & Reboot button to apply the configuration to the M5-IC.

8. If desired, **select** Advanced from the dialog menu to open the M5-IC's internal webpage.

   When Advanced is selected, ZeroConfig automatically creates a user and logs them into the internal webpage. See page 2-9 for more information on the internal webpage.

9. **Close** the SSP ZeroConfig dialog.

10. **Set** all DIP switches to the OFF position and **cycle** power.

    This places the board in the normal operating mode.

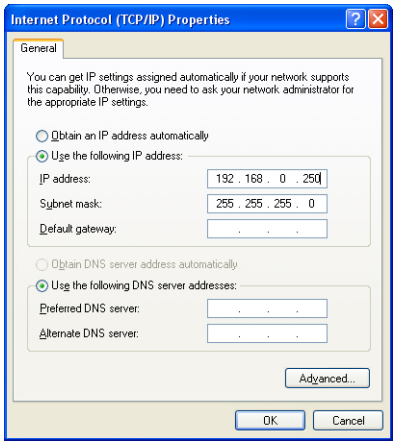
> *Operators can NOT assign an IP address in the 169.254.xxx.xxx range to a controller. This range is reserved for Automatic Private IP Addressing (APIPA). APIPA is used to assign an address when a device is configured for DHCP but DHCP servers are not available.*

> *If unable to access the* Configuration *dialog in* ZeroConfig*, use the controller's internal webpage to configure the IP address. See page 2-9 for more information.*

Alternate Configuration of the M5-IC

The M5-IC can also be configured through a web browser. To configure the controller, follow the directions below.

1. On the M5-IC, **set** DIP switch 2 to the ON position.
   The default IP address is set to 192.168.0.251.
2. From the Control Panel, **double-click** on Network Connections.
3. **Right-click** on the Local Area Connection option and **select** Properties.
   The Local Area Connection Properties dialog opens.
4. **Select** the Internet Protocol (TCP/IP) item and **click** the Properties button.
   The Internet Protocol (TCP/IP) Properties dialog opens.
5. **Select** the Use the Following IP Address radio button and **enter** the following information:
   IP Address: 192.168.0.250
6. **Click** OK to save the settings.
7. From the Start Menu, **select** Accessories / Command Prompt.
   The Command Prompt dialog opens.
8. At the prompt, **type** ping 192.168.0.251.
   If the M5-IC replies, continue to Step 9.
9. **Open** a web browser and **enter** the default controller address: 192.168.0.251.
   The Open Options Splash Screen appears.
10. On the M5-IC, **set** DIP switches 1 and 3 to the ON position.
11. **Click** the Click Here to Login link.
    The Login screen appears.
    If an error message regarding certificates appears, **click** the Proceed to Website option.
12. **Enter** the Username and Password and **click** the Login button.
    The Home page opens. See page 2-9 for information on the internal webpage.



> *The default username is "admin" and the default password is "password." Open Options recommends creating a new user and turning DIP switch* 1 OFF*.*

Internal Webpage

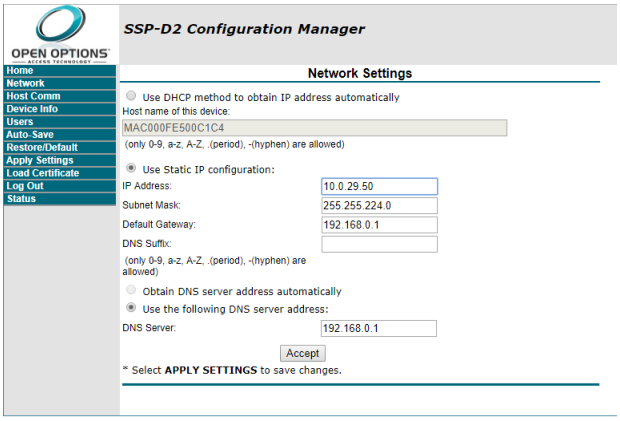
1. **Open** a web browser and **enter** the M5-IC's IP address in the address bar.
2. **Log in** using the default Username and Password.

   The Home screen of the Configuration Manager appears.

> *The default username is "admin" and the default password is "password." Open Options recommends creating a new user and turning DIP switch 1 OFF.*

3. **Select** Network from the menu.

   The Network Settings screen appears.



4. **Select** Use Static IP Configuration and **enter** the IP Address, Subnet Mask, and Default Gateway information.

   OR

   Select Use DHCP Method to Obtain IP Address Automatically and **enter** the Host Name.

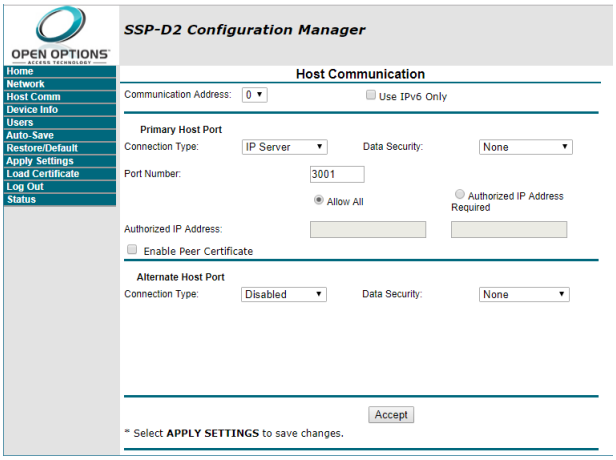
   By default, the host name consists of "MAC" followed by the numbers in the device's MAC address.

> *This information must be obtained from the customer.*

5. **Click** Accept.
6. If desired, **select** Host Comm from the menu.

   The Host Communication screen appears.

7. **Configure** the settings as needed and **click** Accept to apply the changes.



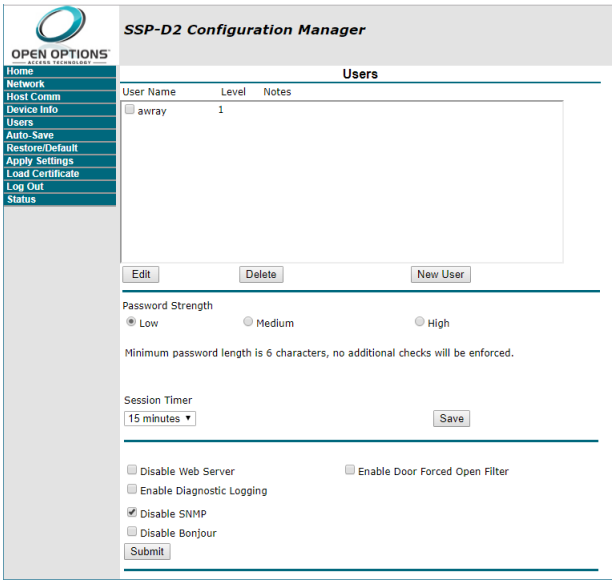
- Communication Address - Indentifies the address used to communicate with the controller. This setting must match the Physical Address in DNA Fusion.
  - IP Configuration - **Set** the address to 0.
  - Serial Configuration - **Set** a unique address number for the SSP controller.
- Connection Type - Specifies the type of connection.
  - IP Server - Standard TCP/IP.
  - IP Client - Panel can be set to automatically phone in to send transaction information. Requires the operator to create a trigger/macro combination in DNA Fusion.
- Data Security - If desired, **select** Password/AES encryption.
- Port Number - The default port is 3001.
- If the Connection Type is set to IP Server, the M5-IC controller can be configured to allow all IP addresses or only authorized IP addresses. This limits the IP addresses that can connect to port 3001. If used, **enter** the DNA server's IP address in the Authorized IP Address field.

8. If desired, **click** the Device Info option to view a summary of the settings.

   The Time and Product ID, as well as properties that have been configured (e.g. Firmware Version, Serial Number, Device Name, DIP Switches, etc.) is displayed.

9. **Select** Users from the menu.

   The Users screen appears.



10. If needed, **add** a new user:

    a. **Click** the New User button.

       The User Account dialog opens.

    b. **Select** an Account Level for the user.

    - 1 - Allows the user to view and edit all settings.
    - 2 - Allows the user to view, but not modify, the settings. Restricts access to the User and Restore/Default pages in the Configuration Manager.
    - 3 - Only allows the user to access the Device Info page.

    c. **Enter** a Username (4-10 characters) and a Password (6-10 characters) for the user.

    d. **Click** the Save button.

> *The* Username *and* Password *are both case-sensitive.*

11. **Configure** the settings and **click** Submit to apply any changes.

- Password Strength - Determines the password requirements.
  - Low - Minimum 6-character length.
  - Medium - Minimum 6-character length. Two of the Password Strength criteria must be met.
  - High - Minimum 8-character length. Three of the Password Strength criteria must be met. The password is checked to verify that it is not based on the username.
- Session Timer - Determines the web session timeout (Max. timer = 60 min)

If DIP switch 1 is ON, the following options will display in the Users screen:

- Disable Web Server - Closes port 80 and disables access to the configuration webpage. To re-enable the web server, **set** DIP switch 1 back to the ON position and **deselect** the Disable Web Server checkbox.
- Disable Bonjour - If checked, the ZeroConfig tool can NOT be used for configuration. Both the Disable Bonjour and Disable Web Server checkboxes must be unchecked in order to discover and configure the device.

12. If desired, **select** Auto-Save from the menu.

    The Auto-Save screen appears. **Click** the Save Settings button to save any changes.

- Startup Routine - Determines how the M5-IC will perform if changes are lost.
- Auto Save - If enabled, volatile memory is written to flash. The frequency of this action is specified in the Delay Before Save field.

13. If desired, **select** Restore/Default from the menu.

    The Restore Settings screen appears.

- Restore Default - Reloads the factory settings.
- Restore Current - Reloads the current operating settings.

14. If desired, **click** the Load Certificates button.
15. **Click** the Apply Settings button to save all changes made in the Network and Host Comm settings.
16. **Click** Log Out to exit the Configuration Manager.

Specifications

The M5-IC bridge controller is for use in low-voltage, Class 2 circuits only.

Primary Power:	*Voltage:*	12 Vdc ± 10%, 330 mA max. (does not include other I/O modules connected to the backplane)
	Current:	12 Vdc @ 250 mA (plus reader current) nominal 24 Vdc @ 150 mA (plus reader current) nominal
Memory/Clock Backup:		3V lithium, type BR/CR2325 or BR/CR2330
Ports:	*Primary Host:*	On-board 10Base-T/100Base-TX Ethernet
	Alternate Host:	Optional 10Base-T/100Base-TX Ethernet using a Lantronix Micro125 interface
	Internal:	Communication to M5 I/O boards: 9,600 to 115,200 bps, asynchronous
	External:	2-wire RS-485 interface to downstream M5 enclosures; 9,600 to 115,200 bps, asynchronous
Cable Requirements:	*Power:*	1 twisted pair, 18 AWG min.
	Ethernet:	CAT-5 min.
	RS-485:	4,000 ft (1,200 m)
	Alarm Input:	1 twisted pair, 30 ohms max. loop resistance
Mechanical:	*Dimensions:*	4.56” (115.8 mm) W x 10.25” (260.4 mm) L x 0.08” (20.3 mm) H
	Weight:	5.3 oz. (150 g) nominal
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

NOTES:

Configuring the Hardware in DNA Fusion

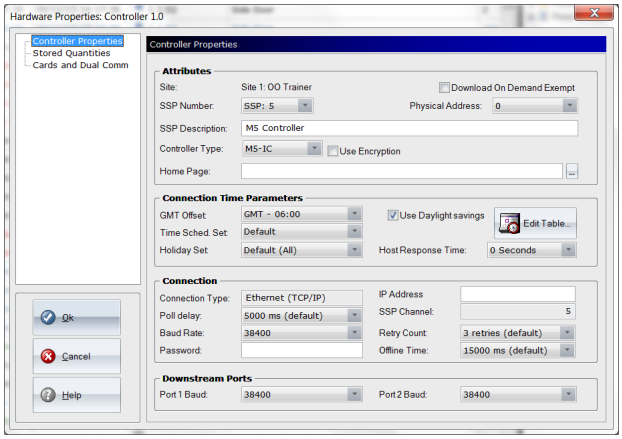
Once the hardware has been installed, it must be configured in the DNA Fusion access control system.

Setting Up the M5-IC Controller & Subcontrollers

1. **Log in** to DNA Fusion and **open** the Hardware Browser.
2. **Right-click** on the Site and **add** a new Ethernet Channel.

   For more information on Channel Properties, see page 8-46 in the DNA Fusion User Manual.
3. **Right-click** on the Channel and **select** Add SSP.

   The Controller Properties dialog appears.
4. **Enter** an SSP Description (typically location- or function-related).
5. **Select** M5-IC from the Controller Type drop-down list.

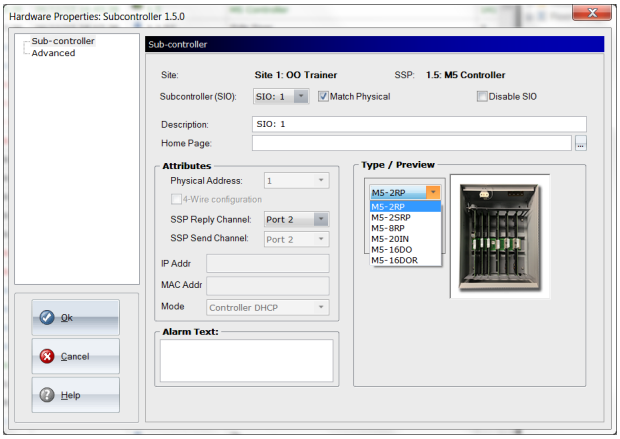


   For more information on Controller Properties, see page 8-47 in the DNA Fusion User Manual.
6. **Configure** the remaining controller options.
7. **Click** OK to save the settings.
8. **Right-click** on the M5-IC controller and **select** Add / Add Subcontroller.

   The Subcontroller Properties dialog opens.
9. **Enter** a Description for the subcontroller.
10. If Match Physical is checked, a Physical Address is not required.

    The system will match the board's DIP switch settings for the physical address. If Match Physical is unchecked, **select** a Physical Address from the drop-down menu.
11. **Select** the Type of subcontroller from the drop-down list.

    A Preview of the board will display.



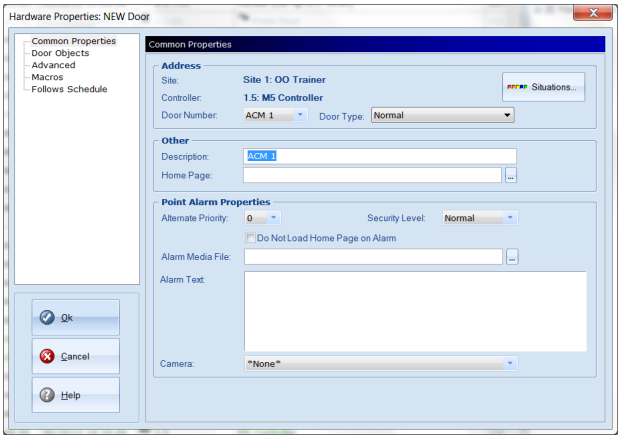
> *The M5-20IN will be split in two in the DNA Fusion application; each set of ten (10) inputs will be configured with two separate physical addresses. These two physical addresses must be consecutive.*

12. **Configure** the remaining subcontroller options.
13. **Click** OK to save the settings.

Creating Doors

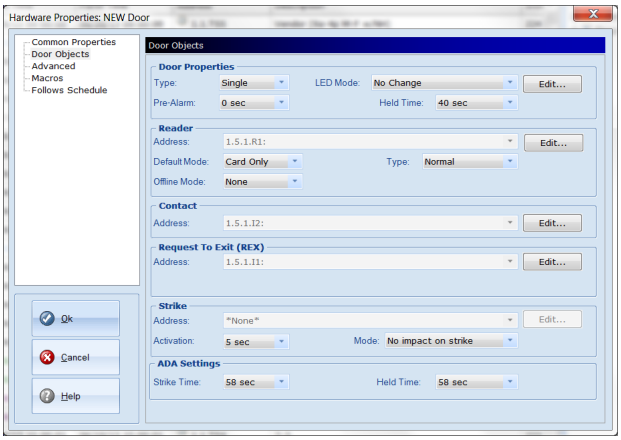
1. In the Hardware Browser, **expand** the M5 Subcontroller to locate a reader.
2. **Right-click** on the Reader and **select** Create M5 Door X from the menu.

   The New Door dialog opens.



3. **Enter** a Description.
4. If desired, **configure** the remaining properties in the Common Properties dialog per the descriptions on page 8-55 in the DNA Fusion User Manual.
5. **Select** Door Objects from the dialog menu.

   The Door Objects are auto-populated with the reader address as well as the addresses for the next set of available input points. See page 8-57 in the DNA Fusion User Manual for more information.



6. If desired, **configure** the Advanced and Macros dialogs.

   See pages 8-59 and 8-61 in the DNA Fusion User Manual for more information.
7. **Click** OK.

   The door is added to the Hardware Browser.
8. **Repeat** Steps 2 through 7 until all M5 doors are added.

M5 Reader Subcontrollers 3

In This Chapter
√ Installing & Configuring M5 Reader Subcontrollers √ M5-2RP Reader Board √ M5-2SRP Reader Board √ M5-8RP Reader Board √ M5-2K Reader Board

M5 Reader Subcontrollers

Open Options offers four (4) different M5 reader subcontroller models, ranging from two (2) to eight (8) reader interfaces.

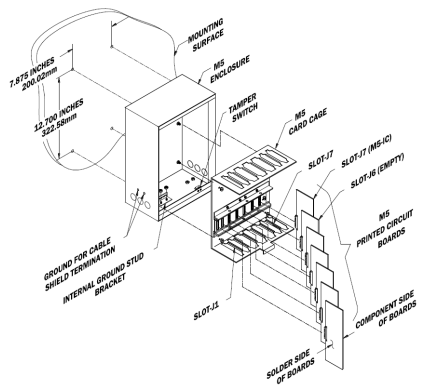
M5 Bridge Part #	Max. Per Enclosure	Description
M5-2RP	4 (8 doors)	• 2-reader interface board • 4 unsupervised inputs and 6 outputs • Supports Wiegand, magstripe, F/2F and supervised F/2F readers
M5-2SRP	4	• 2-reader interface board • 4 supervised inputs and 6 outputs • Supports Wiegand, magstripe, F/2F & supervised F/2F readers
M5-8RP	2 (16 Doors)	• 8-reader interface board • 16 inputs and 8 outputs • Supports F/2F & supervised F/2F readers
M5-2K	-	• 4-reader interface board • 10 unsupervised/supervised inputs and 8 Form C relays • 12 Vdc power supply to power readers and other devices

Installation

The M5 reader subcontrollers replace existing M5 enclosure modules.

To install the M5 subcontroller boards:

1. **Remove** the existing M5 subcontroller from the slot.
2. **Insert** the Open Options M5 subcontroller in the same slot.



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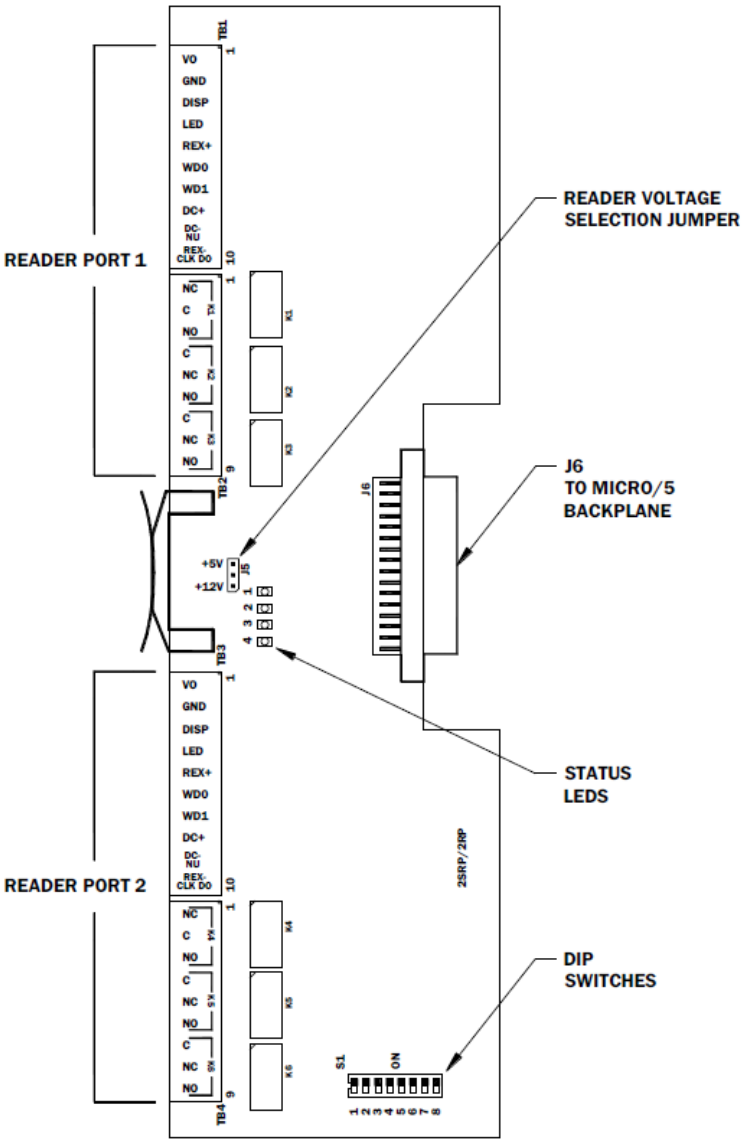
M5-2RP Reader Subcontroller

The Open Options M5-2RP board for the Micro/5 enclosure is part of the bridging hardware technology and provides two (2) reader interface ports. The 2RP board accepts data from readers with Clock/Data, Wiegand, F/2F, supervised F/2F signaling, and door hardware.

The M5-2RP subcontroller provides LED status, strike control, and 5 Vdc or 12 Vdc reader power. Both of the reader interface ports provide inputs for door position monitoring and requests-to-exit (REX). The M5-2RP board also contains three Form C relay outputs that are used for strike control, alarm contact shunting, and auxiliary device control for each reader.

The M5-IC bridge controller supplies power and communication to subcontrollers through the enclosure's backplane.



M5-2RP Board

NOTES:

Reader Configuration

The M5-2RP reader power is selectable via jumper J5 and can be set to provide either 5 Vdc or 12 Vdc @ 300 mA maximum per reader port. This setting affects both reader ports.

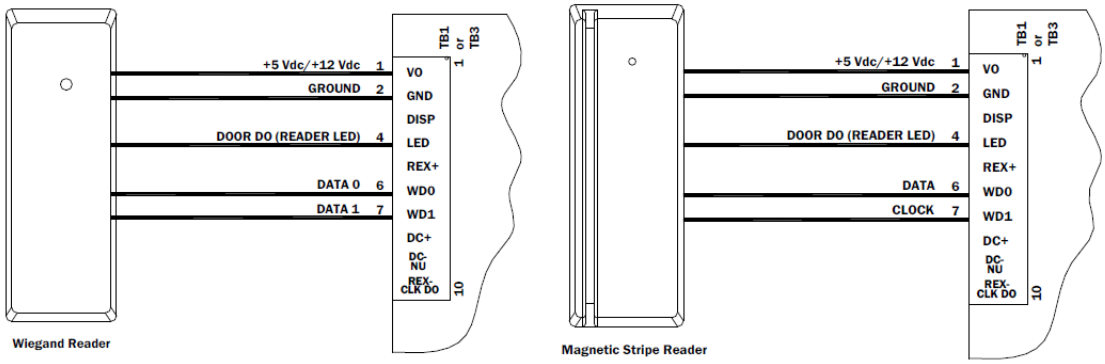
Readers that require a different voltage or current capability must be powered separately.

+5V +12V	
■ ▪	5 Vdc is available on both reader ports
▪ ■	12 Vdc is available on both reader ports

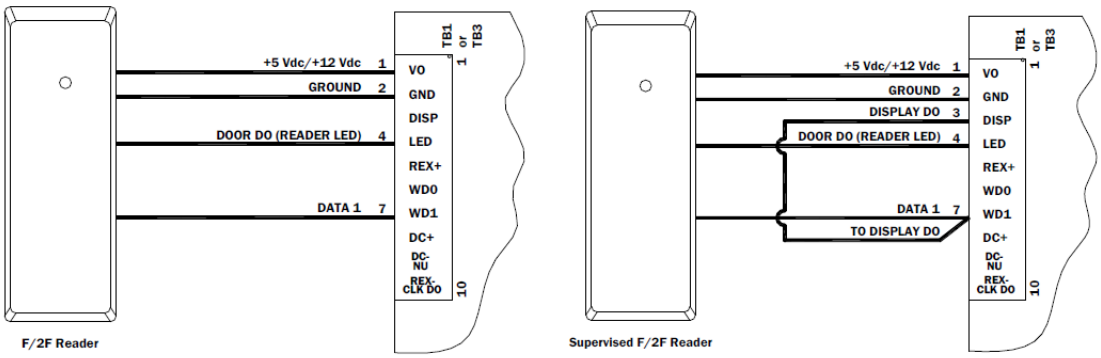
J5 - Reader Power Selection

Each reader port supports the following reader types: Clock/Data, Wiegand, F/2F, and supervised F/2F. Clock/Data and Wiegand readers require a shielded 5-conductor cable; F/2F and supervised F/2F readers require a shielded 4-conductor cable.

The reader port configuration must be defined via the DNA Fusion software.



Wiegand Reader **Magnetic Reader**



F/2F Reader **Supervised F/2F Reader**

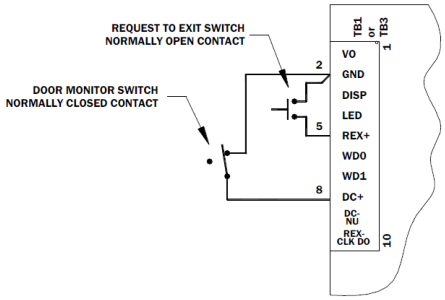
Door Position and REX Input Wiring

The M5-2RP contains four (4) unsupervised inputs; two per reader port for door contacts and request-to-exit (REX) devices. These inputs can be configured as Normally Open or Normally Closed contacts.

The door position and REX input points can be wired in several different configurations. Typically, the door position input uses the Normally Closed (NC) contact while the REX input uses the Normally Open (NO) contact.

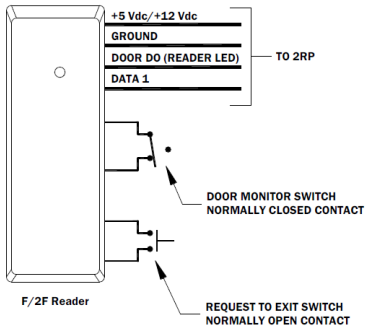
Unsupervised Inputs - Wired to 2RP Board

Unsupervised inputs are wired to TB1 for the first reader and TB3 for the second reader. End-of-line (EOL) resistors are not required.



Unsupervised Inputs - Wired to F/2F Reader

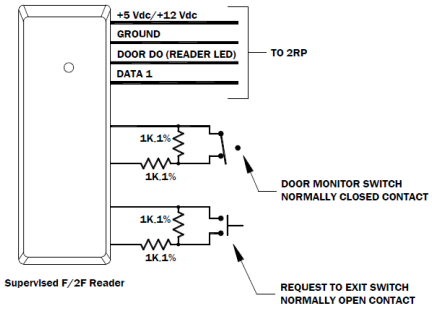
Unsupervised inputs for the door position monitor and REX switches are wired directly to the F/2F reader that is configured for two-state supervision. Refer to the reader's documentation for a description of wiring connections. End-of-line (EOL) resistors are not required.



Supervised Inputs - Wired to F/2F Reader

Supervised inputs for the door position monitor and REX switches are wired directly to the F/2F reader configured for four-state supervision. Refer to the reader's documentation for a description of wiring connections.

When the inputs are configured as supervised, the circuit will report Open and Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage. A supervised input circuit requires two resistors to facilitate proper reporting. The standard supervised circuit requires 1K ohm, 1% resistors and should be located as close to the sensor as possible.



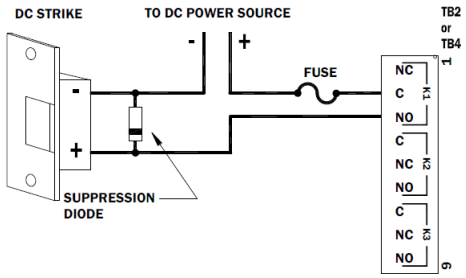
Door Strike Wiring (Internal Relays)

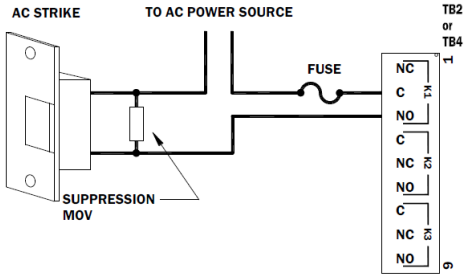
Each reader port contains three (3) Form C contact relays (located on TB2 and TB4) that provide the ability to control the door strike and other devices. The relay contact rating is 2 A @ 30 Vac/Vdc maximum.

Each relay contains a Common pole (C), Normally Open pole (NO), and Normally Closed pole (NC). When momentarily removing power to unlock the door, such as with a maglock, the NC and C poles are used. Check the local building code for proper egress door installation.

Load switching can cause abnormal contact wear and/or premature contact failure. Switching of inductive loads (strike) also causes electromagnetic interference (EMI), which may interfere with the normal operation of other equipment.

A contact protection circuit must be used to increase system reliability and minimize the risk of premature contact failure. Locate the protection circuit as close to the load as possible (within 12 inches or 30 centimeters). The circuit's effectiveness decreases if it is located farther away. Open Options recommends the following two circuits:





Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 Vdc or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical

MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

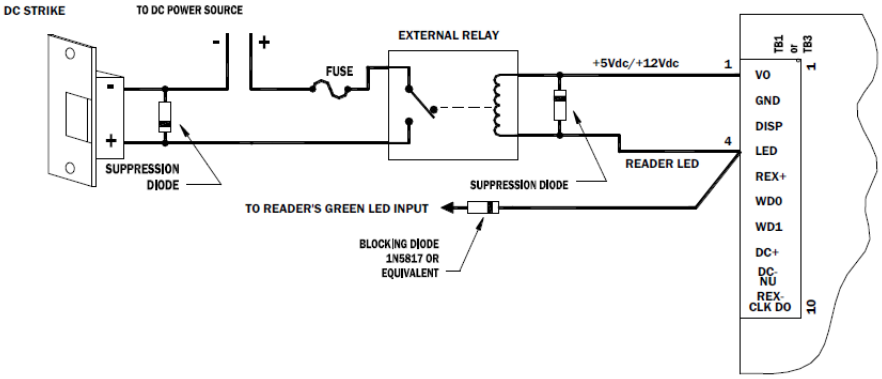
Relay Function	Terminal Block	Description
Reader 1 - Strike	TB2-1	Normally Closed (NC)
	TB2-2	Common (C)
	TB2-3	Normally Open (NO)
Reader 1 - Auxiliary	TB2-4	Common (C)
	TB2-5	Normally Closed (NC)
	TB2-6	Normally Open (NO)
Reader 1 - Shunt	TB2-7	Common (C)
	TB2-8	Normally Closed (NC)
	TB2-9	Normally Open (NO)
Reader 2 - Strike	TB4-1	Normally Closed (NC)
	TB4-2	Common (C)
	TB4-3	Normally Open (NO)
Reader 2 - Auxiliary	TB4-4	Common (C)
	TB4-5	Normally Closed (NC)
	TB4-6	Normally Open (NO)
Reader 2 - Shunt	TB4-7	Common (C)
	TB4-8	Normally Closed (NC)
	TB4-9	Normally Open (NO)

Door Strike Wiring (External Relay)

An external relay can be used to control the door strike instead of the on-board relays. The external relay is controlled by the LED reader output.

If the LED in the reader is driven by the LED connection on TB1-4 or TB3-4, a blocking diode must be added to the circuit. Open Options recommends using a Schottky barrier rectifier, type 1N5817 or equivalent (20 V @ 1 A).

> *The external relay's coil current must be restricted to 40 mA. A 5-volt relay coil resistance must be at least 125 ohms, while a 12-volt relay coil resistance must be at least 300 ohms.*



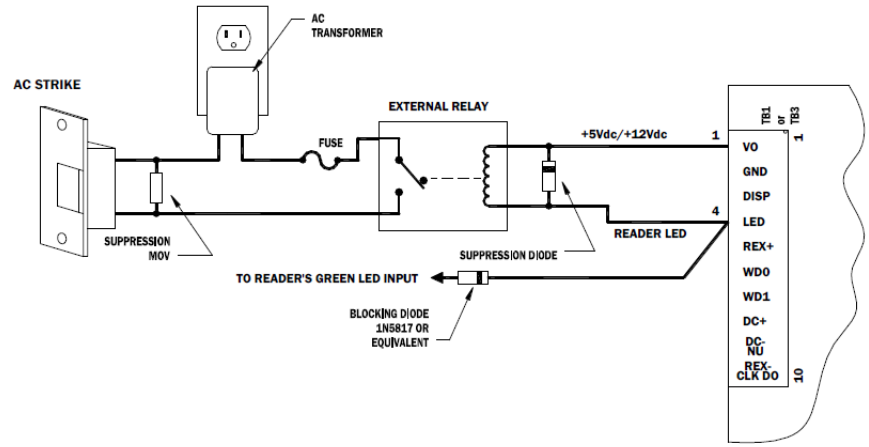
External Door Strike Relay - DC Strike

Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical



External Door Strike Relay - AC Strike

MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

DIP Switch Settings

Switches 1 through 5 determine the device address. Switches 6 and 7 determine the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are defined via the DNA Fusion software.

Selection	S1	S2	S3	S4	S5	S6	S7	S8
Address 0	OFF	OFF	OFF	OFF	OFF			
Address 1	ON	OFF	OFF	OFF	OFF			
Address 2	OFF	ON	OFF	OFF	OFF			
Address 3	ON	ON	OFF	OFF	OFF			
Address 4	OFF	OFF	ON	OFF	OFF			
Address 5	ON	OFF	ON	OFF	OFF			
Address 6	OFF	ON	ON	OFF	OFF			
Address 7	ON	ON	ON	OFF	OFF			
Address 8	OFF	OFF	OFF	ON	OFF			
Address 9	ON	OFF	OFF	ON	OFF			
Address 10	OFF	ON	OFF	ON	OFF			
Address 11	ON	ON	OFF	ON	OFF			
Address 12	OFF	OFF	ON	ON	OFF			
Address 13	ON	OFF	ON	ON	OFF			
Address 14	OFF	ON	ON	ON	OFF			
Address 15	ON	ON	ON	ON	OFF			
Address 16	OFF	OFF	OFF	OFF	ON			
Address 17	ON	OFF	OFF	OFF	ON			
Address 18	OFF	ON	OFF	OFF	ON			
Address 19	ON	ON	OFF	OFF	ON			
Address 20	OFF	OFF	ON	OFF	ON			
Address 21	ON	OFF	ON	OFF	ON			
Address 22	OFF	ON	ON	OFF	ON			
Address 23	ON	ON	ON	OFF	ON			
Address 24	OFF	OFF	OFF	ON	ON			
Address 25	ON	OFF	OFF	ON	ON			
Address 26	OFF	ON	OFF	ON	ON			
Address 27	ON	ON	OFF	ON	ON			
Address 28	OFF	OFF	ON	ON	ON			
Address 29	ON	OFF	ON	ON	ON			
Address 30	OFF	ON	ON	ON	ON			
Address 31	ON	ON	ON	ON	ON			
115,200 BPS						OFF	OFF	
9,600 BPS						ON	OFF	
19,200 BPS						OFF	ON	
38,400 BPS						ON	ON	
Non-Encrypted Communication								OFF
Encrypted Communication								ON

Jumper Settings

Jumper	Set At	Selected
J5	+5V	5 Vdc available at both reader ports
	+12V	12 Vdc available at both reader ports

Status LEDs

The LED lights on the M5-2RP subcontroller indicate the following status information.

LED	Description	Indicator
1	Connection Status	Offline = 200 ms ON / 800 ms OFF Online (Non-Encrypted) = 800 ms ON / 200 ms OFF Online (Encrypted) = 700 ms ON / 300 ms OFF
2	Subcontroller Communication Status	Indicates communication activity on the downstream communication port.
3	Reader Port 1 Status	Flashes when receiving data from the reader.
4	Reader Port 2 Status	Flashes when receiving data from the reader.

Specifications

The MR-2RP subcontroller is for use in low-voltage, Class 2 circuits only.

Primary Power (From M5-IC):	*Voltage:*	12 Vdc ± 10%, 155 mA max. (plus reader current)
Relay Outputs:		6 Form C, 2A @ 30 Vac/Vdc, resistive
Inputs:		4 unsupervised; two per reader port
Reader Power:		5 Vdc or 12 Vdc regulated (jumper selectable), 300 mA max.
Reader LED Output:	*External Relay:*	Open collector, 40 mA sink max.
Reader Data Inputs:		TTL-compatible inputs
Cable Requirements:	*Alarm Inputs:*	1 twisted pair per input, 22 AWG shielded, 30 ohms max. loop resistance
	Outputs:	As required for the load
	Reader Data:	Use shielded cables 5 Vdc: 18 AWG, 200 ft max., reader powered by 2RP board 12 Vdc: 20 AWG, 500 ft max., reader powered by 2RP board. The above specifications are based on the typical 12-volt reader drawing 125 mA. Reader power requirements vary between different models.
Mechanical:	*Dimensions:*	3.5” (88.9 mm) W x 10.25” (260.4 mm) L x 0.69” (17.5 mm) H
	Weight:	4.5 oz. (126 g) nominal
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

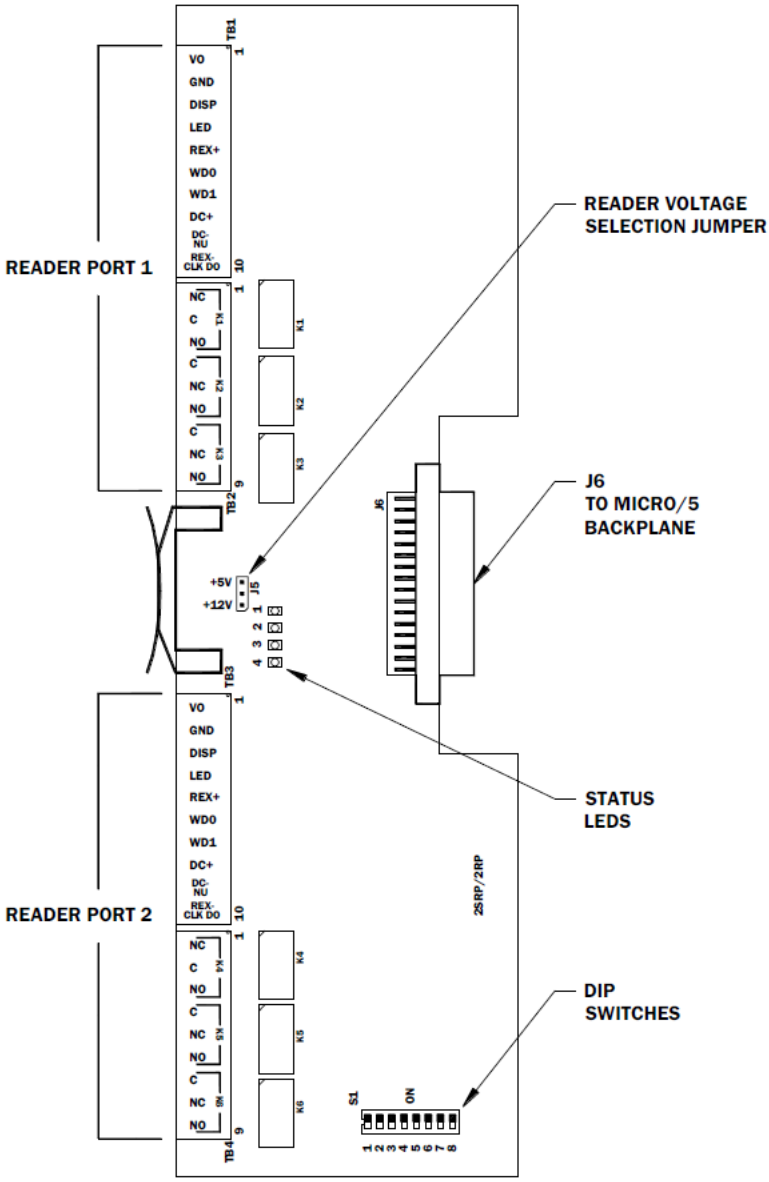
NOTES:

M5-2SRP Reader Subcontroller

The Open Options M5-2SRP board for the Micro/5 enclosure is part of the bridging hardware technology and provides two (2) reader interface ports. The 2SRP board accepts data from readers with Clock/Data, Wiegand, F/2F, supervised F/2F signaling, and door hardware.

The M5-2SRP subcontroller provides LED status, strike control, and 5 Vdc or 12 Vdc reader power. Both of the reader interface ports provide inputs for door position monitoring and requests-to-exit (REX). The M5-2SRP board also contains three (3) Form C relay outputs that are used for strike control, alarm contact shunting, and auxiliary device control for each reader.

The M5-IC bridge controller supplies power and communication to subcontrollers through the enclosure's backplane.



NOTES:

Reader Configuration

The M5-2RP reader power is selectable via jumper J5 and can be set to provide either 5 Vdc or 12 Vdc @ 300 mA maximum per reader port. This setting affects both reader ports.

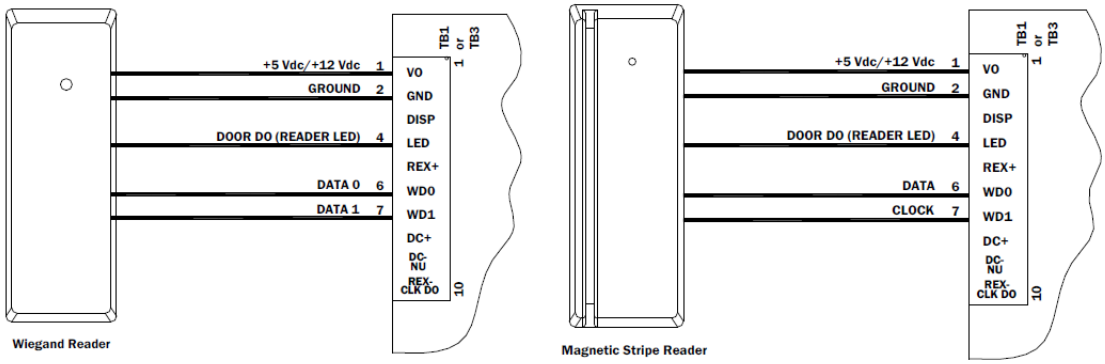
Readers that require a different voltage or current capability must be powered separately.

+5V +12V	
■ ▪	**5 Vdc is available on both reader ports**
▪ ■	**12 Vdc is available on both reader ports**

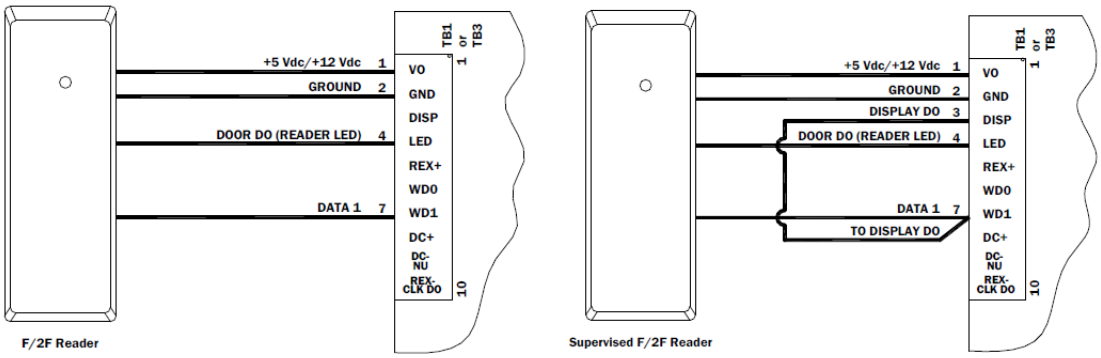
J5 - Reader Power Selection

Each reader port supports the following reader types: Clock/Data, Wiegand, F/2F, and supervised F/2F. Clock/Data and Wiegand readers require a shielded 5-conductor cable; F/2F and supervised F/2F readers require a shielded 4-conductor cable.

The reader port configuration must be defined via the DNA Fusion software.



Wiegand Reader **Magnetic Reader**



F/2F Reader **Supervised F/2F Reader**

NOTES:

Door Position & REX Input Wiring

The M5-2SRP contains four (4) supervised inputs, two per reader port for door contacts and request-to-exit (REX) devices. These inputs can be configured as Normally Open (NO) or Normally Closed (NC) contacts.

The door position and REX input points can be wired in several different configurations. Typically, the door position input uses the Normally Closed contact and the REX input uses the Normally Open contact.

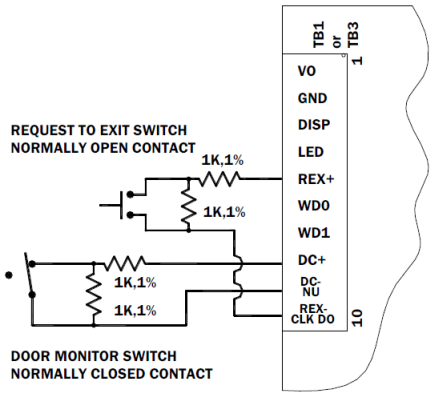
Supervised Inputs - Wired to the 2RP Board

Supervised inputs are wired to TB1 for the first reader and TB3 for the second reader. They do not require end-of-line (EOL) resistors.

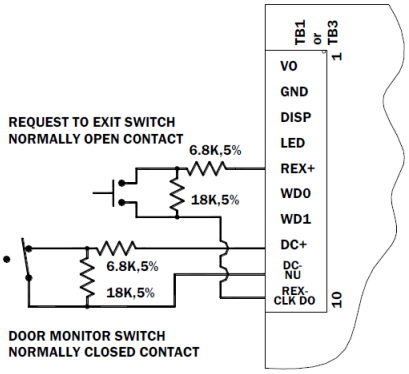
The 2SRP board supports two sets of EOL resistor pairs: two 1K ohm resistors or a 6.8K and 18K ohm resistor. The resistor pair must be installed as shown in the figures below. Locate the EOL resistors as close to the switch as possible to maximize the supervision's effectiveness.

In addition to monitoring whether a contact is Open or Closed, the 2SRP board also detects the following abnormal circuit conditions: Open Circuit, Shorted, Grounded, and Foreign Voltage.

> Grounded *and* Foreign Voltage *states are not required by UL 294 and therefore not verified by UL.*



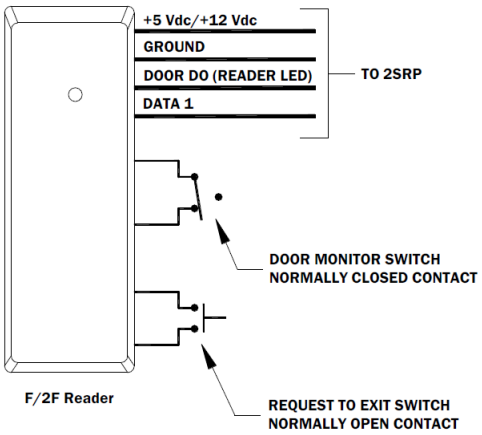
Supervised Input Wiring With 1K/1K EOL



Supervised Input Wiring With 6.8K/18K EOL

Unsupervised Inputs - Wired to the F/2F Reader

Unsupervised inputs for the door position monitor and REX switches are wired directly to the F/2F reader configured for two-state supervision: Open or Closed. These inputs do not require EOL resistors. For information of wiring connections, refer to the reader's documentation.

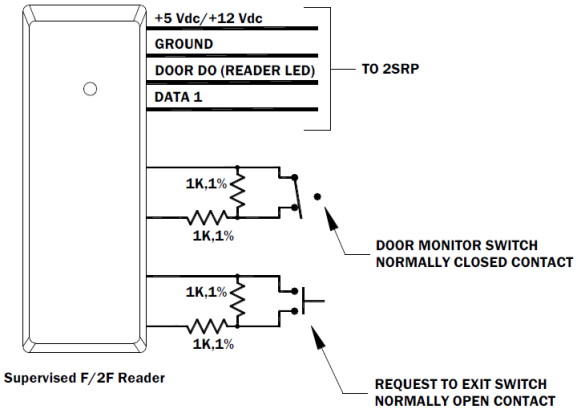


Unsupervised Input Wiring at F/2F Reader

Supervised Inputs - Wired to F/2F Reader

Supervised inputs for the door position monitor and REX switches are wired directly to the F/2F reader configured for four-state supervision. Refer to the reader's documentation for more information on wiring connections.

When the inputs are configured as supervised, the circuit will report Open and Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage. A supervised input circuit requires two resistors to facilitate proper reporting. The standard supervised circuit requires 1K ohm, 1% resistors and should be located as close to the sensor as possible.



Supervised Input Wiring at F/2F Reader

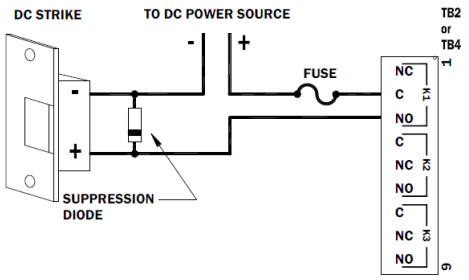
Door Strike Wiring (Internal Relays)

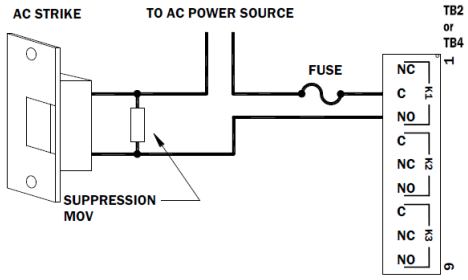
Each reader port contains three (3) Form C contact relays (located on TB2 and TB4) that provide the ability to control the door strike and other devices. The relay contact rating is 2 A @ 30 Vac/Vdc maximum.

Each relay contains a Common pole (C), Normally Open pole (NO), and Normally Closed pole (NC). When momentarily removing power to unlock the door, such as with a maglock, the NC and C poles are used. Check the local building code for proper egress door installation.

Load switching can cause abnormal contact wear and/or premature contact failure. Switching of inductive loads (strike) also causes electromagnetic interference (EMI), which may interfere with the normal operation of other equipment.

A contact protection circuit must be used to increase system reliability and minimize the risk of premature contact failure. Locate the protection circuit as close to the load as possible (within 12 inches or 30 centimeters). The circuit's effectiveness decreases if it is located farther away. Open Options recommends the following two circuits:





Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 Vdc or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical

MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

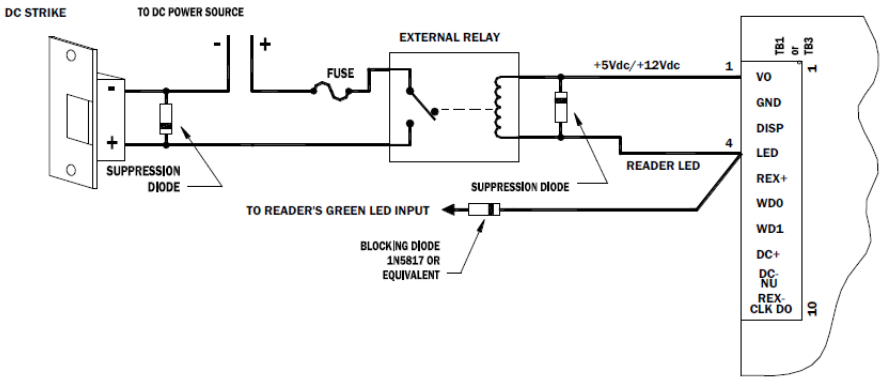
Relay Function	Terminal Block	Description
Reader 1 - Strike	TB2-1	Normally Closed (NC)
	TB2-2	Common (C)
	TB2-3	Normally Open (NO)
Reader 1 - Auxiliary	TB2-4	Common (C)
	TB2-5	Normally Closed (NC)
	TB2-6	Normally Open (NO)
Reader 1 - Shunt	TB2-7	Common (C)
	TB2-8	Normally Closed (NC)
	TB2-9	Normally Open (NO)
Reader 2 - Strike	TB4-1	Normally Closed (NC)
	TB4-2	Common (C)
	TB4-3	Normally Open (NO)
Reader 2 - Auxiliary	TB4-4	Common (C)
	TB4-5	Normally Closed (NC)
	TB4-6	Normally Open (NO)
Reader 2 - Shunt	TB4-7	Common (C)
	TB4-8	Normally Closed (NC)
	TB4-9	Normally Open (NO)

Door Strike Wiring (External Relay)

An external relay can be used to control the door strike instead of using the on-board relays. The external relay is controlled by the LED reader output.

If the LED in the reader is driven by the LED connection on TB1-4 or TB3-4, a blocking diode must be added to the circuit. Open Options recommends using a Schottky barrier rectifier, type 1N5817 or equivalent (20 V @ 1 A).

> *The external relay's coil current must be restricted to 40 mA. A 5-volt relay coil resistance must be at least 125 ohms, while a 12-volt relay coil resistance must be at least 300 ohms.*



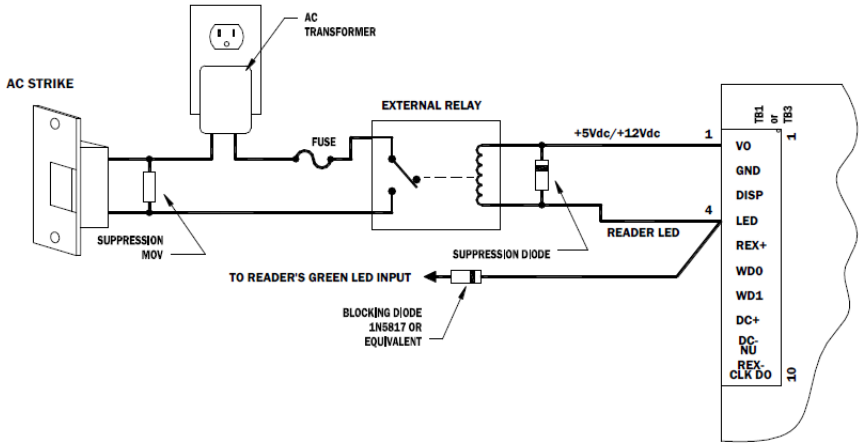
External Door Strike Relay - DC Strike

Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical



External Door Strike Relay - AC Strike

MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

DIP Switch Settings

Switches 1 through 5 determine the the device address. Switches 6 and 7 determine the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are defined via the DNA Fusion software.

Selection	S1	S2	S3	S4	S5	S6	S7	S8
Address 0	OFF	OFF	OFF	OFF	OFF			
Address 1	ON	OFF	OFF	OFF	OFF			
Address 2	OFF	ON	OFF	OFF	OFF			
Address 3	ON	ON	OFF	OFF	OFF			
Address 4	OFF	OFF	ON	OFF	OFF			
Address 5	ON	OFF	ON	OFF	OFF			
Address 6	OFF	ON	ON	OFF	OFF			
Address 7	ON	ON	ON	OFF	OFF			
Address 8	OFF	OFF	OFF	ON	OFF			
Address 9	ON	OFF	OFF	ON	OFF			
Address 10	OFF	ON	OFF	ON	OFF			
Address 11	ON	ON	OFF	ON	OFF			
Address 12	OFF	OFF	ON	ON	OFF			
Address 13	ON	OFF	ON	ON	OFF			
Address 14	OFF	ON	ON	ON	OFF			
Address 15	ON	ON	ON	ON	OFF			
Address 16	OFF	OFF	OFF	OFF	ON			
Address 17	ON	OFF	OFF	OFF	ON			
Address 18	OFF	ON	OFF	OFF	ON			
Address 19	ON	ON	OFF	OFF	ON			
Address 20	OFF	OFF	ON	OFF	ON			
Address 21	ON	OFF	ON	OFF	ON			
Address 22	OFF	ON	ON	OFF	ON			
Address 23	ON	ON	ON	OFF	ON			
Address 24	OFF	OFF	OFF	ON	ON			
Address 25	ON	OFF	OFF	ON	ON			
Address 26	OFF	ON	OFF	ON	ON			
Address 27	ON	ON	OFF	ON	ON			
Address 28	OFF	OFF	ON	ON	ON			
Address 29	ON	OFF	ON	ON	ON			
Address 30	OFF	ON	ON	ON	ON			
Address 31	ON	ON	ON	ON	ON			
115,200 BPS						OFF	OFF	
9,600 BPS						ON	OFF	
19,200 BPS						OFF	ON	
38,400 BPS						ON	ON	
Non-Encrypted Communication								OFF
Encrypted Communication								ON

Jumper Settings

Jumper	Set At	Selected
J5	+5V	5 Vdc available at both reader ports
	+12V	12 Vdc available at both reader ports

Status LEDs

The LED lights on the M5-2SRP subcontroller indicate the following status information.

LED	Description	Indicator
1	Connection Status	Offline = 200 ms ON / 800 ms OFF Online (Non-Encrypted) = 800 ms ON / 200 ms OFF Online (Encrypted) = 700 ms ON / 300 ms OFF
2	Subcontroller Communication Status	Indicates communication activity on the downstream communication port.
3	Reader Port 1 Status	Flashes when receiving data from the reader.
4	Reader Port 2 Status	Flashes when receiving data from the reader.

Specifications

The M5-2SRP is for use in low-voltage, Class 2 circuits only.

Primary Power (From M5-IC):	*Voltage:*	12 Vdc ± 10%, 155 mA max. (plus reader current)
Relay Outputs:		6 Form C, 2A @ 30 Vac/Vdc, resistive
Inputs:	*EOL Values:*	4 supervised, two per reader 1k/1k ohm, 1%, 1/4 watt OR 6.8k/18k ohm, 5%, 1/4 watt
Reader Power:		5 Vdc or 12 Vdc regulated (jumper selectable), 300 mA max.
Reader LED Output:	*External Relay:*	Open collector, 40 mA sink max.
Reader Data Inputs:		TTL-compatible inputs
Cable Requirements:	*Alarm Inputs:*	1 twisted pair per input, 22 AWG shielded, 30 ohms max. loop resistance
	Outputs:	As required for the load
	Reader Data:	Use shielded cables 5 Vdc: 18 AWG, 200 ft max., reader powered by 2SRP board 12 Vdc: 20 AWG, 500 ft max., reader powered by 2SRP board OR 18 AWG, 3000 ft max., reader powered locally The above specifications are based on the typical 12-volt reader drawing 125 mA. Reader power requirements vary between different models.
Mechanical:	*Dimensions:*	3.5” (88.9 mm) W x 10.25” (260.4 mm) L x 0.69” (17.5 mm) H
	Weight:	4.5 oz. (126 g) nominal
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

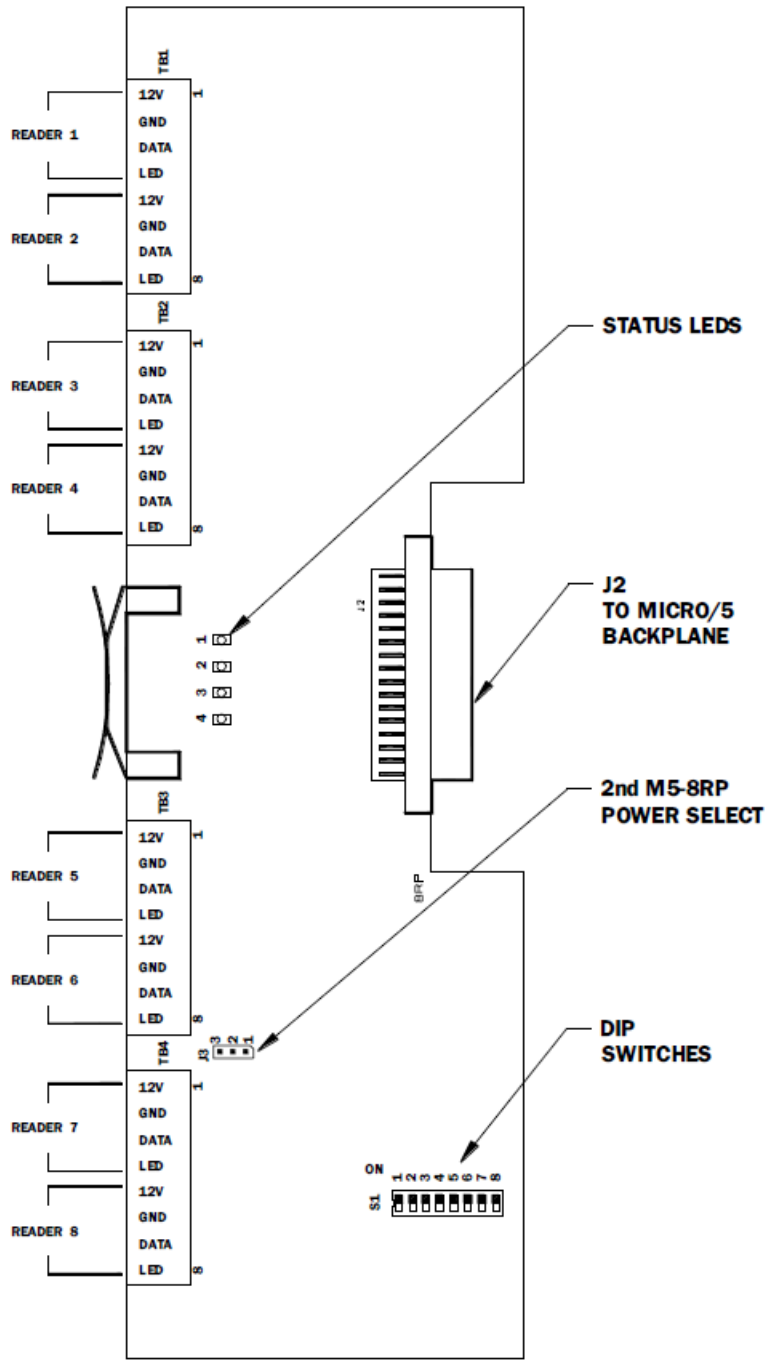
Specifications are subject to change without notice.

NOTES:

M5-8RP Reader Subcontroller

The Open Options M5-8RP board for the Micro/5 enclosure is part of the bridging hardware technology and provides eight (8) reader interface ports. The 8RP board only accepts data from readers with supervised F/2F signaling.

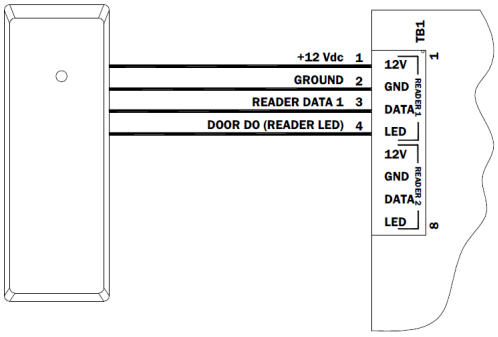
The door position and request-to-exit (REX) inputs are reported through the F/2F reader data line. The 8RP board also provides LED status, external strike relay control, and 12 Vdc reader power. The M5-IC controller supplies power and communication through the enclosure's backplane.



NOTES:

Reader Configuration

The reader ports on the M5-8RP board only support 12-volt, supervised F/2F readers. Supervised F/2F readers require a 4-conductor cable. The reader port configuration must be defined via the DNA Fusion software.

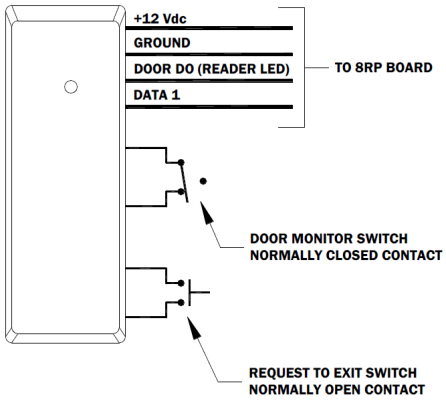


Door Position & REX Input Wiring

The door position monitor and REX switches are wired to the F/2F reader. Typically, the door position monitor uses the Normally Closed (NC) contact and the REX uses the Normally Open (NO) contact.

Unsupervised Inputs - Wired to F/2F Reader

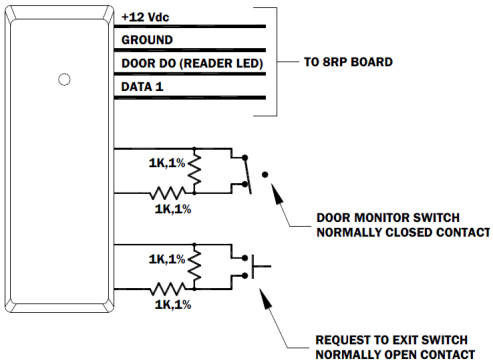
Unsupervised inputs for the door position monitor and REX switches are wired directly to the F/2F reader configured for two-state supervision. These inputs do not require end-of-line (EOL) resistors. Refer to the reader's documentation for wiring connection information.



Supervised Inputs - Wired to F/2F Reader

Supervised inputs for the door position monitor and REX switches are wired directly to the F/2F reader configured for four-state supervision. Refer to the reader's documentation for wiring connection information.

When the inputs are configured as supervised, the circuit will report Open and Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage. A supervised input circuit requires two resistors to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible.



Dual M5-8RP Board Configuration

If installing two 8RP boards, the second 8RP board must obtain additional power from the M5-IC bridge controller.

1. **Connect** TB1-1 (VIN) of the M5-IC to TB4-1 (12V) of the second 8RP board.
2. **Connect** TB1-2 (GND) of the M5-IC to TB4-2 (GND) of the second 8RP board using 18- or 20-gauge wire.
3. **Set** jumper J3 in positions 2 & 3 on the first 8RP board installed in the M5 enclosure.
4. **Set** jumper J3 in positions 1 & 2 on the second 8RP board installed in the M5 enclosure.

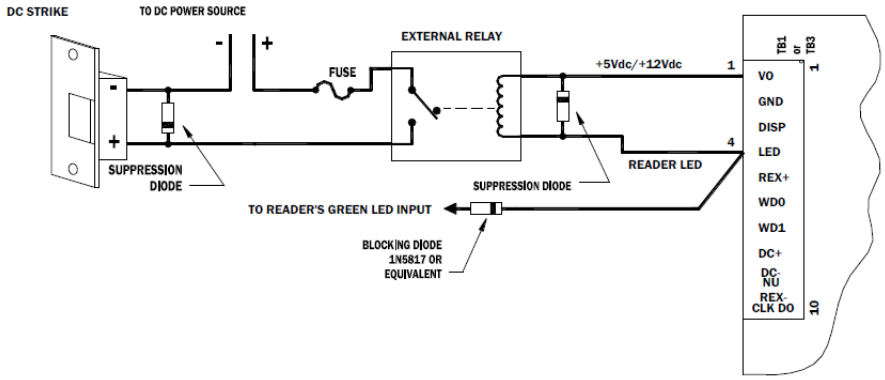
> *The* 12V *output for* Reader Port 7 *of the second 8RP board is not current-limited.*

Door Strike Wiring (External Relay)

The external relay is controlled by the LED reader output.

If the LED in the reader is driven by the LED connection on TB1-4 or TB3-4, a blocking diode must be added to the circuit. Open Options recommends using a Schottky barrier rectifier, type 1N5817 or equivalent (20 V @ 1 A).

> *The external relay's coil current must be restricted to 40 mA. A 5-volt relay coil resistance must be at least 125 ohms, while a 12-volt relay coil resistance must be at least 300 ohms.*



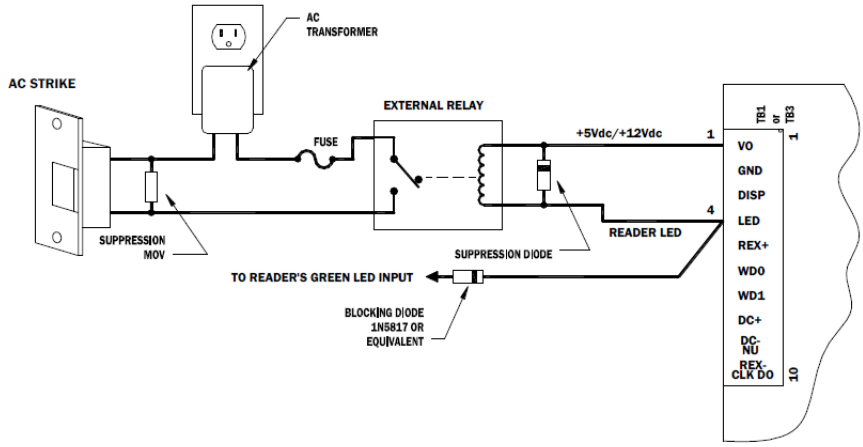
External Door Strike Relay - DC Strike

Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical



External Door Strike Relay - AC Strike

MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

DIP Switch Settings

Switches 1 through 5 determine the device address. Switches 6 and 7 select the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are defined via the DNA Fusion software.

Selection	S1	S2	S3	S4	S5	S6	S7	S8
Address 0	OFF	OFF	OFF	OFF	OFF			
Address 1	ON	OFF	OFF	OFF	OFF			
Address 2	OFF	ON	OFF	OFF	OFF			
Address 3	ON	ON	OFF	OFF	OFF			
Address 4	OFF	OFF	ON	OFF	OFF			
Address 5	ON	OFF	ON	OFF	OFF			
Address 6	OFF	ON	ON	OFF	OFF			
Address 7	ON	ON	ON	OFF	OFF			
Address 8	OFF	OFF	OFF	ON	OFF			
Address 9	ON	OFF	OFF	ON	OFF			
Address 10	OFF	ON	OFF	ON	OFF			
Address 11	ON	ON	OFF	ON	OFF			
Address 12	OFF	OFF	ON	ON	OFF			
Address 13	ON	OFF	ON	ON	OFF			
Address 14	OFF	ON	ON	ON	OFF			
Address 15	ON	ON	ON	ON	OFF			
Address 16	OFF	OFF	OFF	OFF	ON			
Address 17	ON	OFF	OFF	OFF	ON			
Address 18	OFF	ON	OFF	OFF	ON			
Address 19	ON	ON	OFF	OFF	ON			
Address 20	OFF	OFF	ON	OFF	ON			
Address 21	ON	OFF	ON	OFF	ON			
Address 22	OFF	ON	ON	OFF	ON			
Address 23	ON	ON	ON	OFF	ON			
Address 24	OFF	OFF	OFF	ON	ON			
Address 25	ON	OFF	OFF	ON	ON			
Address 26	OFF	ON	OFF	ON	ON			
Address 27	ON	ON	OFF	ON	ON			
Address 28	OFF	OFF	ON	ON	ON			
Address 29	ON	OFF	ON	ON	ON			
Address 30	OFF	ON	ON	ON	ON			
Address 31	ON	ON	ON	ON	ON			
115,200 BPS						OFF	OFF	
9,600 BPS						ON	OFF	
19,200 BPS						OFF	ON	
38,400 BPS						ON	ON	
Non-Encrypted Communication								OFF
Encrypted Communication								ON

Jumper Settings

Jumper	Set At	Description
J3	2 & 3	First M5-8RP board installed in the M5 enclosure.
	1 & 2	Second M5-8RP board installed in the M5 enclosure.

Status LEDs

The LED lights on the M5-8RP subcontroller indicate the following status information.

LED	Description	Indicator
1	Heartbeart / Online Status	Offline = 200 ms ON / 800 ms OFF Online (Non-Encrypted) = 800 ms ON / 200 ms OFF Online (Encrypted) = 700 ms ON / 300 ms OFF Waiting for Firmware Download = 100 ms ON / 100 ms OFF
2	Subcontroller Communication Status	Indicates communication activity on the downstream communication port.
3	Reader Port Status	Flashes when receiving data from any of the eight (8) readers.
4	Reader Acknowledgment	Flashes when supervised F/2F reader acknowledgment is sent on any of the eight (8) readers, indicating that a reader port is configured for supervised F/2F.

NOTES:

Specifications

The M5-8RP is for use in low-voltage, Class 2 circuits only.

Primary Power (From M5-IC):	*Voltage:*	12 Vdc ± 10%, 36 mA max. (plus reader current)
Reader Power:		12 Vdc, 300 mA max. per reader port
Reader LED Output:		Open collector, 40 mA sink max.
Communication:		9600, 19200, 38400, 155200 bps, asynchronous
Cable Requirements:	*Reader Data:*	Use shielded cables 20 AWG, 500 ft max., reader powered by M5-8RP board OR 18 AWG, 3000 ft max., reader powered locally The above specifications are based on a typical 12-volt reader drawing 125 mA. Reader power requirements vary between different models.
Mechanical:	*Dimensions:*	3.5” (88.9 mm) W x 10.25” (260.4 mm) L x 0.69” (17.5 mm) H
	Weight:	3.7 oz. (104 g) nominal
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

NOTES:

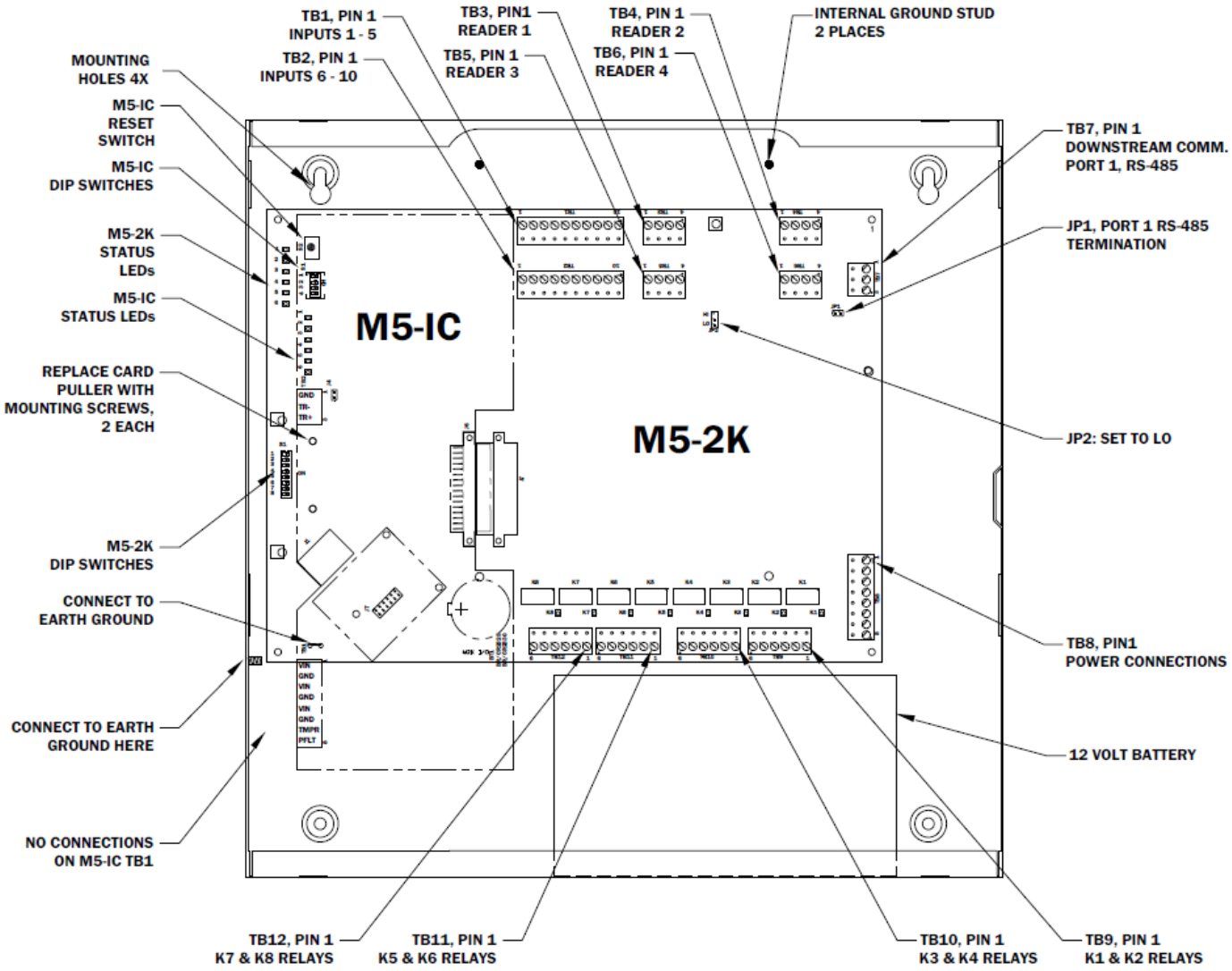
M5-2K Reader Subcontroller

The Open Options M5-2K board replaces the M2000 base for the Micro/PX-2000, Micro/PXN-2000, and MicroPXNplus® systems. It contains four (4) reader interface ports and accepts data from readers with both F/2F and supervised F/2F signaling as well as door hardware. The M5-2K board contains ten unsupervised/ supervised inputs, eight Form C contact relays, and a 12 Vdc power supply to power readers and other devices.

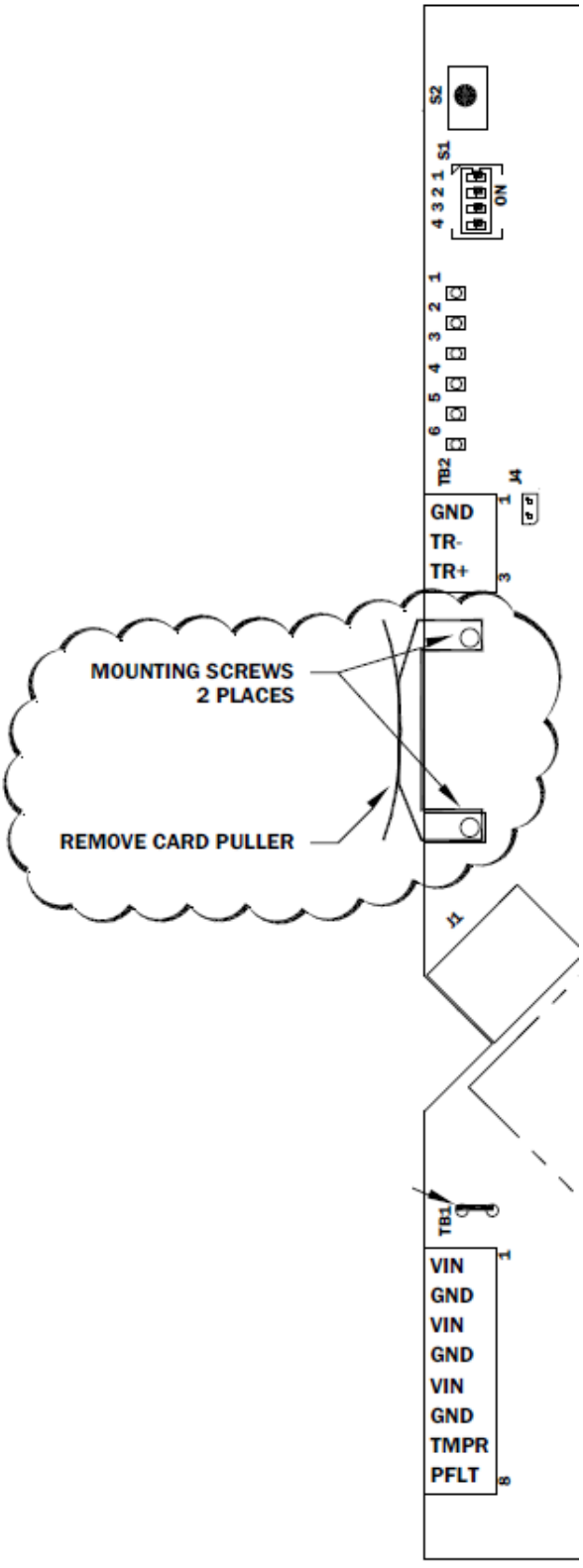
Installation

The M5-IC bridge controller mounts directly to the M5-2K board as illustrated below. If the M5-IC is mounted on the M5-2K board, it is powered by the M5-2K board's internal power supply.

An 18 Vac transformer supplies power to the M5-2K board. The M5-2K supports an optional 12-volt, 7 Ah rechargeable sealed lead-acid battery for UPS operation.



The card puller must be removed from the M5-IC before the controller can be mounted on the M5-2K board. Install two mounting screws in the holes made vacant from the card puller. See illustration on page 3-36.



For more information on the M5-IC board, see Chapter 2: M5-IC Bridge Controller.

Power Supply

Input power for the M5-2K/M5-IC assembly is provided by a wall mount 18 Vac transformer at 2.78 A (334 VA) connected to TB8-1 and TB8-2. The internal supply provides power to the M5-2K/M5-IC assembly and offers a charging current for a 12-volt, 7 Ah rechargeable battery.

A 12 Vdc output is also available on TB8-4 to power local devices (e.g., door strikes, annunciator devices, etc.) and downstream M5-2K enclosures.

The UPS 12-volt battery is connected to TB8-7 (+) and TB8-8 (-). An input dedicated for cabinet tamper monitoring is connected to TB8-5 and TB8-6 with the normal (safe) condition being a closed contact.

Terminal Block	Description
TB 8-1	18 Vac (DO NOT USE 24 Vac)
TB 8-2	18 Vac (DO NOT USE 24 Vac)
TB 8-3	GND
TB 8-4	+12 Vdc Output
TB 8-5	GND (Tamper Switch)
TB 8-6	Tamper Switch
TB 8-7	12 V Battery, Positive Terminal (+)
TB 8-8	12 V Battery, Negative Terminal (-)

> ***Do not use a 24 Vac transformer to power the M5-2K/M5-IC assembly. Wire should not be connected to*** TB1 ***on the M5-IC.***

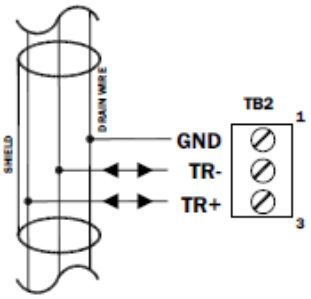
Ethernet Grounding

The grounding lug on the M5-IC, labeled "CGND" (located next to the Ethernet jack), must be connected to the chassis/earth ground stud on the M200 enclosure. Open Options recommends using a braided wire and creating the shortest connection possible.

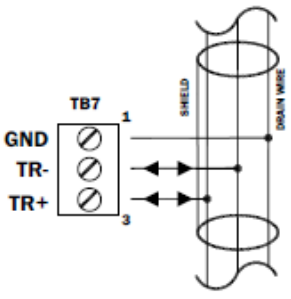
Communication Wiring

The M5-IC communicates to the M5-2K via a 2-wire RS-485 interface on downstream communication Port 1. This communication port also appears on TB7 of the M5-2K, which supports 31 additional downstream I/O devices.

If the M5-IC is mounted on the M5-2K, TB2 on the M5-IC becomes the 2-wire RS-485 downstream communication Port 2, which can communicate to an additional 32 downstream I/O devices.



2-Wire RS-485 Communication Port 2 (M5-IC)

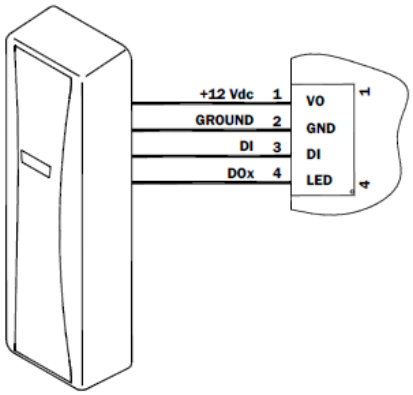


2-Wire RS-485 Communication Port 1 (M5-2K)

NOTES:

Reader Configuration

Each of the four (4) reader ports supports F/2F and supervised F/2F readers. Reader port configuration must be defined through the DNA Fusion software.



The following tables describe the terminal block connections for each M5-2K reader port.

TB3: Reader Port 1	
TB3-1	+12 Vdc
TB3-2	GND
TB3-3	DI
TB3-4	DO1

TB4: Reader Port 2	
TB4-1	+12 Vdc
TB4-2	GND
TB4-3	DI
TB4-4	DO1

TB5: Reader Port 3	
TB5-1	+12 Vdc
TB5-2	GND
TB5-3	DI
TB5-4	DO1

TB6: Reader Port 4	
TB6-1	+12 Vdc
TB6-2	GND
TB6-3	DI
TB6-4	DO1

Door Status Monitor and REX Input Wiring

The door status monitor and REX switches can be wired in one of two configurations, depending on the type of reader:

- Supervised F/2F readers: door contacts and REX inputs must be wired through the reader.
- F/2F readers: door contacts and REX inputs must be wired to the M5-2K inputs.

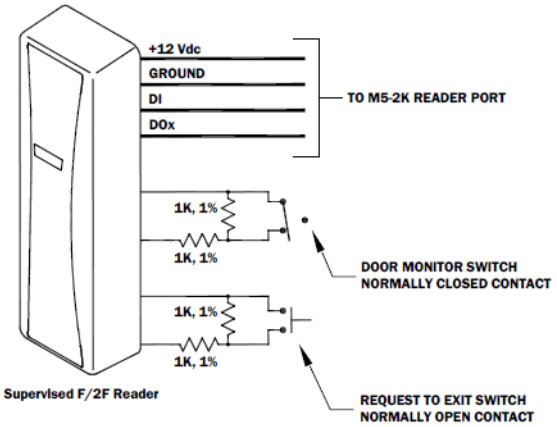
Typically, the door position monitor switch uses the Normally Closed contact while the REX uses the Normally Open contact. Some supervised F/2F readers support different switch configurations, which are defined in the host and downloaded to the M5-2K.

Supervised Inputs - Wired to Supervised F/2F Reader, 4-State Supervision

Supervised inputs for the door position monitor and REX switches are wired directly to the supervised F/2F reader configured for four-state supervision.

Refer to the reader manufacturer's documentation for wiring connection information.

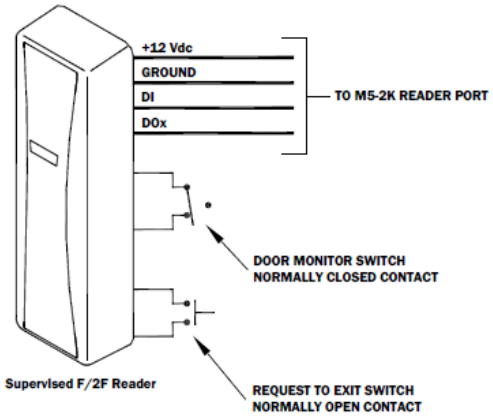
Typically, the EOL resistors are two 1K ohm, 1% resistors as shown in the figure below. The EOL resistors should be installed as close to the switch as possible.



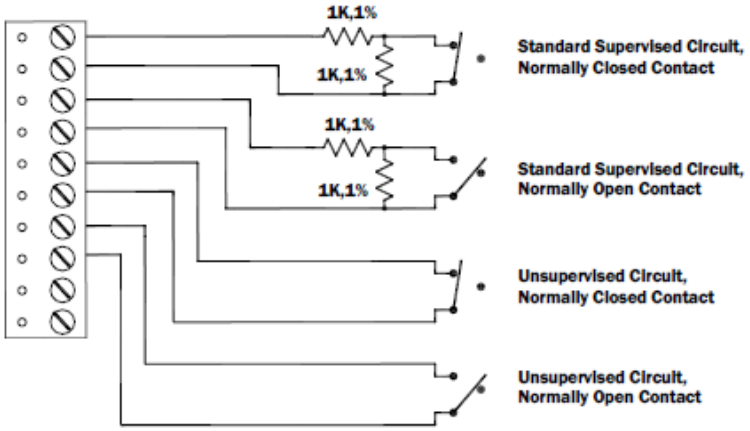
Unsupervised Inputs - Wired to Supervised F/2F Reader, 2-State Supervision

Unsupervised inputs for the door position monitor and REX switches are wired directly to a supervised F/2F reader configured for two-state supervision.

Refer to the reader manufacturer's documentation for wiring connection information. EOL resistors are not required.



Input Wiring



Typically, these inputs are used to monitor the door position, request-to-exit (REX), or general purpose alarm contacts. Input circuits can be configured as unsupervised or supervised. Unsupervised inputs will only report Open or Closed states.

When an input circuit is configured for supervision, the M5-2K board also monitors the following abnormal circuit conditions: Open Circuit, Shorted, Grounded, or Foreign Voltage*. A supervised input circuit requires two resistors to facilitate proper reporting.

The standard supervised circuit requires 1K ohm, 1% resistors and should be located as close to the sensor as possible. Custom end-of-line (EOL) resistances can be configured via DNA Fusion.

*Grounded and Foreign Voltage states are not UL 294 required and therefore not verified by UL.

Door position monitor and REX inputs must be wired to the M5-2K when using F/2F readers. EOL resistors are typically two 1K ohm resistors as shown below. The EOL resistors should be installed as close to the switch as possible.

TB1: Inputs 1-5	
TB1-1	DI 1
TB1-2	DI 1 RTN
TB1-3	DI 2
TB1-4	DI 2 RTN
TB1-5	DI 3
TB1-6	DI 3 RTN
TB1-7	DI 4
TB1-8	DI 4 RTN
TB1-9	DI 5
TB1-10	DI 5 RTN

TB2: Inputs 6-10	
TB2-1	DI 6
TB2-2	DI 6 RTN
TB2-3	DI 7
TB2-4	DI 7 RTN
TB2-5	DI 8
TB2-6	DI 8 RTN
TB2-7	DI 9
TB2-8	DI 9 RTN
TB2-9	DI 10
TB2-10	DI 10 RTN

Door Strike Wiring (Internal Relays)

The M5-2K board contains eight (8) Form C contact relays to control door strikes and other devices. The relays are rated at 2 A @ 30 Vac/Vdc maximum.

Excessive load switching can cause abnormal contact wear and premature contact failure. Inductive load (strike) switching causes electromagnetic interference (EMI), which may interfere with the normal operation of other equipment. To minimize premature contact failure and increase system reliability, use a contact protection circuit. Locate the protection circuit as close to the load as possible (12 inches or 30 centimeters maximum recommended).

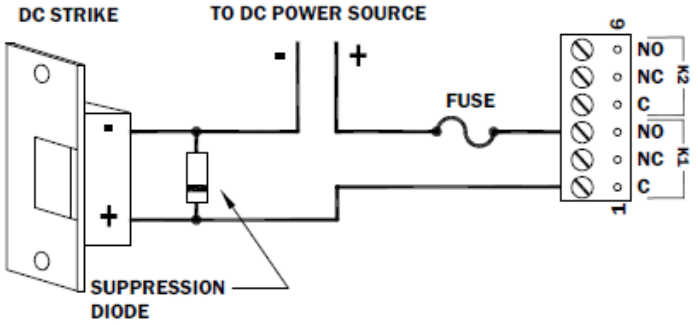
Use wire gauge sufficient for the load current to prevent voltage loss.

TB9: Relays K1 & K2	
TB9-1	K1 C
TB9-2	K1 NC
TB9-3	K1 NO
TB9-4	K2 C
TB9-5	K2 NC
TB9-6	K2 NO

TB10: Relays K3 & K4	
TB10-1	K3 C
TB10-2	K3 NC
TB10-3	K3 NO
TB10-4	K4 C
TB10-5	K4 NC
TB10-6	K4 NO

TB11: Relays K5 & K6	
TB11-1	K5 C
TB11-2	K5 NC
TB11-3	K5 NO
TB11-4	K6 C
TB11-5	K6 NC
TB11-6	K6 NO

TB12: Relays K7 & K8	
TB12-1	K7 C
TB12-2	K7 NC
TB12-3	K7 NO
TB12-4	K8 C
TB12-5	K8 NC
TB12-6	K8 NO



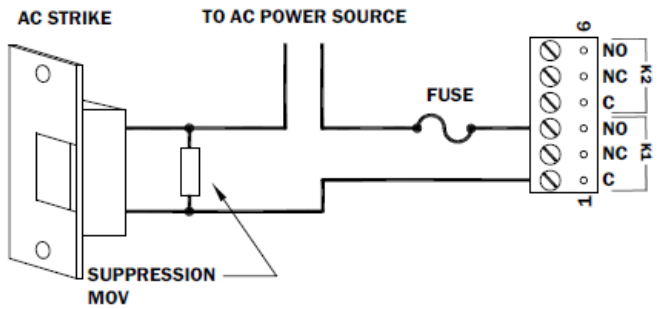
Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical

DC Door Strike Wiring - Internal Relay



MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

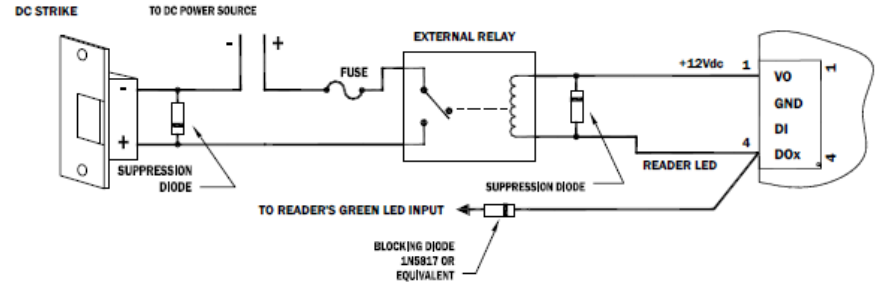
AC Door Strike Wiring - Internal Relay

Door Strike Wiring (External Relay)

An external relay can be used to control the door strike instead of the on-board relays. The external relay is controlled by the reader DOx output.

If the LED in the reader is driven by the DOx reader port signal, a blocking diode must be added to the circuit. The blocking diode should be a Schottky barrier rectifier, type 1N5817 or equivalent (20 V @ 1 A).

> *The external relay's coil current must be restricted to 40 mA. The coil resistance of a 12-volt relay must be at least 300 ohms.*



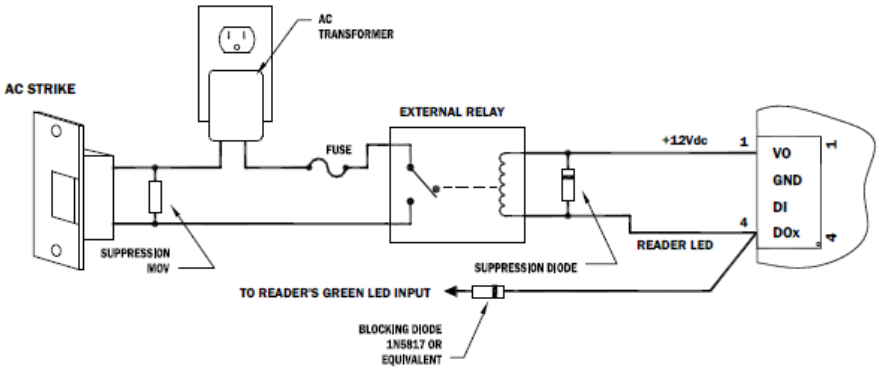
External Door Strike Relay - DC Strike

Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical



External Door Strike Relay - AC Strike

MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

> *The interface should only be used to control exits from areas where an alternative exit method is available. This product is not intended or rated for operation in life-critical control applications. Open Options is not liable under any circumstance for loss or damage caused by (or partially caused by) product malfunction or misuse. Open Options is not liable beyond the purchase price of the product.*

Status LEDs

The LED lights on the M5-2K assembly indicate the following status information.

LED	Description	Indicator
1	Heartbeat / Online Status	Offline = 1-second cycle, 200 ms ON / 800 ms OFF Online (Non-Encrypted) = 800 ms ON / 200 ms OFF Online (Encrypted) = 700 ms ON / 300 ms OFF Waiting for Firmware Download = 100 ms ON / 100 ms OFF
2	Subcontroller Communication Status	Indicates communication activity on the downstream communication port.
3	Reader Port 1-4 Status	Flashes when receiving data from the reader, including supervision acknowledged.
4		
5		
6		

Specifications

The M5-2K assembly is for use in low-voltage, Class 2 circuits only.

Primary Power:	*Voltage:*	18 Vac ± 15%, 2.5 A maximum
12 Vdc Output:		700 mA maximum
UPS Battery:		12-volt, 7 Ah rechargeable sealed lead acid, 1 each supported (Optional)
Relay Outputs:		8 outputs, Form C, 2 A @ 30 Vac/Vdc, resistive
Inputs:		10 unsupervised/supervised, standard EOL: 1k/1k ohm, 1/4 watt
Reader Interface:	*Power:*	12 Vdc, regulated, 300 mA max. per reader port
	DOx/External Relays:	Open collector, 40 mA sink max.
	Reader Data Inputs:	TTL-compatible inputs
Communication:		9600, 19200, 38400, 115200 bps, asynchronous
Cable Requirements:	*Reader Data:*	Use shielded cables
	Alarm Inputs:	20 AWG, 500-ft max., reader powered by M5-2K board
	Outputs:	As required by load
Mechanical:	*Dimensions:*	8.375” (212.7 mm) W x 11.375” (289.1 mm) L x 1.04” (26.5 mm) H without M5-IC or 1.27” (32.26 mm) with M5-IC
	Weight:	12.0 oz. (340.2 g) nominal without M5-IC or 17.3 oz. (491.0 g) with M5-IC
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

Excessive voltage drop on long cable runs may require a larger cable gauge or a local power source for the reader. Refer to the power specifications for the reader being installed.

NOTES:

Configuring the Hardware in DNA Fusion

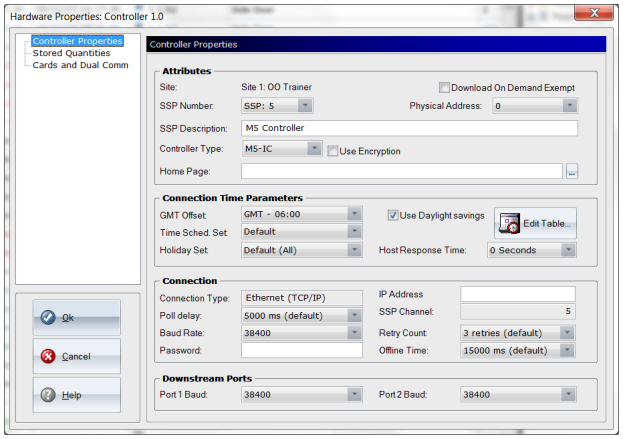
After the hardware has been installed, it must be configured in the DNA Fusion access control system.

Setting Up the M5-IC Controller & Subcontrollers

1. **Log in** to DNA Fusion and **open** the Hardware Browser.
2. **Right-click** on the Site and **add** a new Ethernet Channel.

   For more information on Channel Properties, see page 8-46 in the DNA Fusion User Manual.
3. **Right-click** on the Channel and **select** Add SSP.

   The Controller Properties dialog appears.
4. **Enter** an SSP Description (typically location- or function-related).
5. **Select** M5-IC from the Controller Type drop-down list.

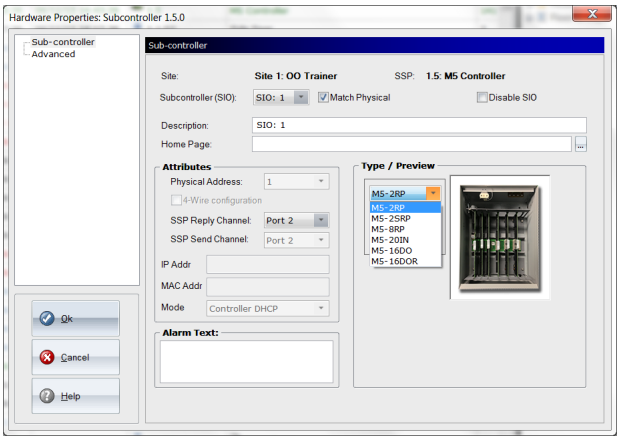


   For more information on Controller Properties, see page 8-47 in the DNA Fusion User Manual.
6. **Configure** the remaining controller options.
7. **Click** OK to save the settings.
8. **Right-click** on the M5-IC controller and **select** Add / Add Subcontroller.

   The Subcontroller Properties dialog opens.
9. **Enter** a Description for the subcontroller.
10. If Match Physical is checked, a Physical Address is not required.

    The system will match the board's DIP switch settings for the physical address. If Match Physical is unchecked, **select** a Physical Address from the drop-down menu.
11. **Select** the Type of subcontroller from the drop-down list.

    A Preview of the board will display.



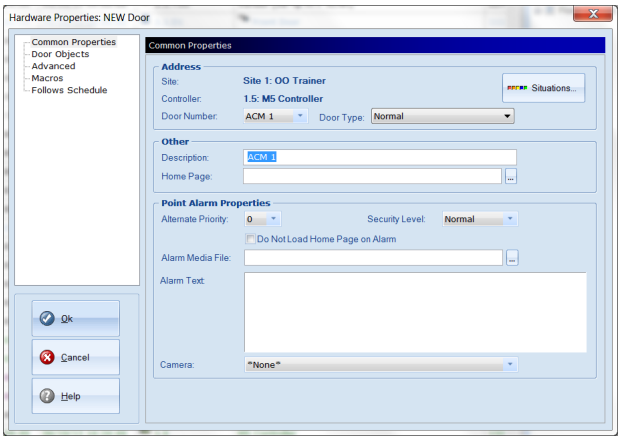
> *The M5-20IN will be split in two in the DNA Fusion application; each set of ten (10) inputs will be configured with two separate physical addresses. These two physical addresses must be consecutive.*

12. **Configure** the remaining subcontroller options.
13. **Click** OK to save the settings.

Creating Doors

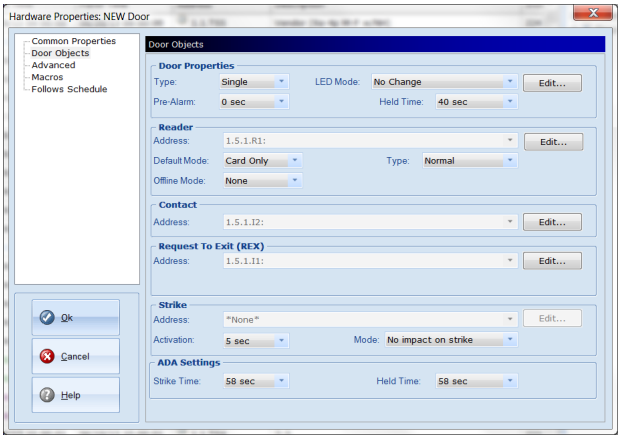
1. In the Hardware Browser, **expand** the M5 Subcontroller to locate a reader.
2. **Right-click** on the Reader and **select** Create M5 Door X from the context menu.

   The New Door dialog opens.



3. **Enter** a Description.
4. If desired, **configure** the remaining options in the Common Properties dialog per the descriptions on page 8-55 in the DNA Fusion User Manual.
5. **Select** Door Objects from the dialog menu.

   The Door Objects are auto-populated with the reader address as well as the addresses for the next set of available input points. See page 8-57 in the DNA Fusion User Manual for more information.



6. If desired, **configure** the Advanced and Macros dialogs.

   See pages 8-59 and 8-61 in the DNA Fusion User Manual for more information.
7. **Click** OK.

   The door is added to the Hardware Browser.
8. **Repeat** Steps 2 through 7 until all the M5 doors are added.

M5 I/O Subcontrollers

4

In This Chapter
√ Installing & Configuring M5 Reader Subcontrollers √ M5-20IN Subcontroller Board √ M5-16DO Subcontroller Board √ M5-16DOR Subcontroller Board

M5 Input/Output Subcontrollers

Open Options offers three (3) different M5 input/ouput subcontroller models, ranging from digital input to digital output interfaces.

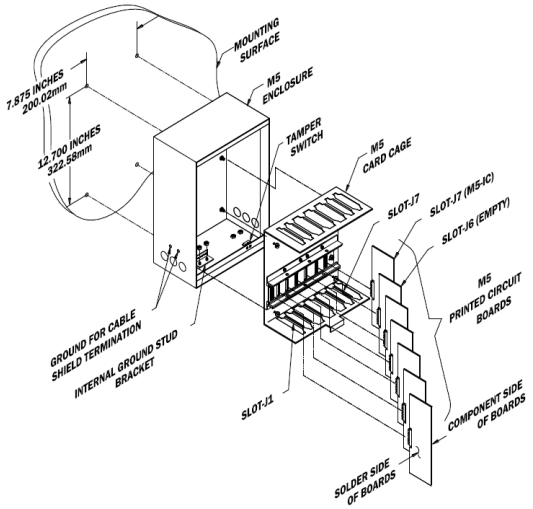
M5 Bridge Part #	Max. Per Enclosure	Description
M5-20IN	4	• 20-point digital input board • Supports supervised and unsupervised input circuits
M5-16DO	4	• 16-point digital output board for driving external relays
M5-16DOR	4	• 16-point digital output board • 8 Form C relays and 8 Form A relays with dry contacts

Installation

The M5 I/O subcontrollers replace existing M5 enclosure modules.

To install the M5 subcontroller boards:

1. **Remove** the existing M5 subcontroller from the slot.
2. **Insert** the Open Options M5 subcontroller board in the same slot.



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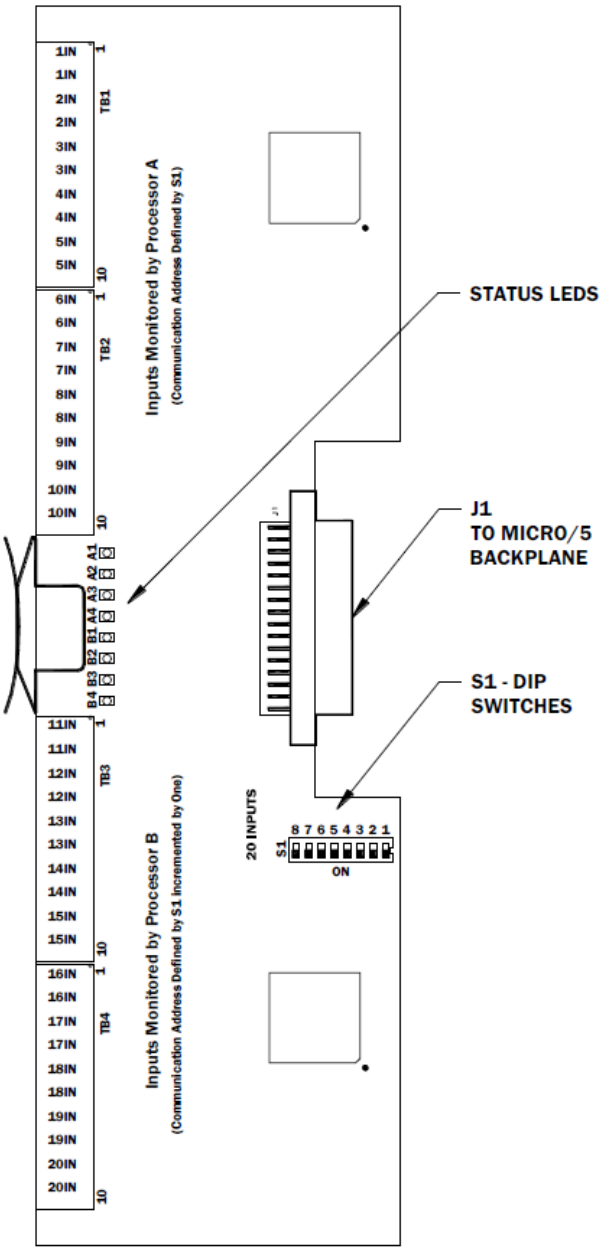
M5-20IN Input Subcontroller

The Open Options M5-20IN for the Micro/5 enclosure is part of the bridging hardware technology and provides 20 digital inputs for sensor monitoring. These inputs can be configured to support supervised or unsupervised alarm input circuits.

The 20IN board also includes two (2) processors; each processor monitors 10 input circuits. The first processor (A) monitors inputs 1IN through 10IN. The second processor (B) monitors inputs 11IN through 20IN. This board occupies two consecutive addresses on the communication bus.

Power and communication is supplied from the M5-IC controller board through the enclosure's backplane.



NOTES:

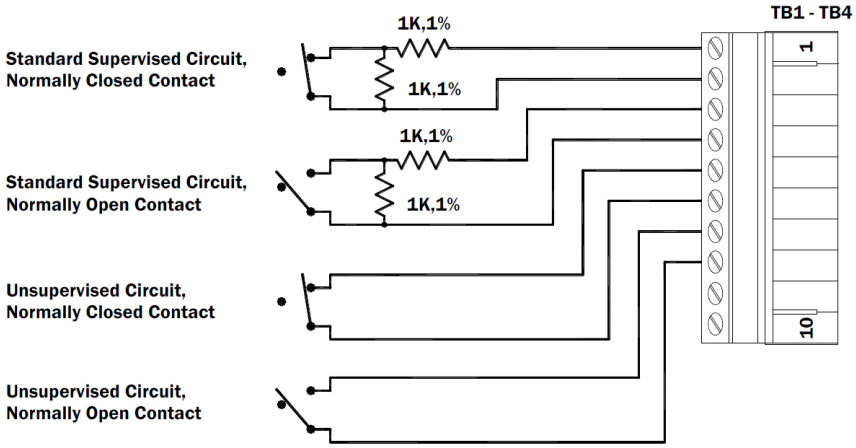
Alarm Input Wiring

The M5-20IN inputs are typically used to monitor the door position, request-to-exit (REX), or alarm contacts. The input circuits can be configured as unsupervised or supervised. If unsupervised, reporting only consists of Open or Closed states.

When the inputs are configured as supervised, the circuit will report Open and Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage. Grounded and Foreign Voltage states are not required by UL 294 and therefore not verified by UL.

A supervised input circuit requires two resistors to be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible.

The figure below illustrates a possible input circuit wiring scheme.



Input Configuration Examples for Terminal Blocks TB1 Through TB4

Status LEDs

The LED lights on the M5-20IN indicate the following status information:

LED	Description	Indicator
A1/B1	Connection Status	Offline = 200 ms ON / 800 ms OFF Online (Non-Encrypted) = 800 ms ON / 200 ms OFF Online (Encrypted) 4 flashes in 700 ms ON / 300 ms OFF Waiting for Firmware Download = 100 ms ON / 100 ms OFF
A2/B2	Subcontroller Communication Status	Indicates communication activity on the downstream communication port.
A3/B3	Not Used	OFF
A4/B4	Not Used	OFF

DIP Switch Settings

Switches 1 through 5 determine the communication address for the first processor (A). The second processor (B) is automatically assigned the next address value. Switches 6 and 7 determine the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are defined via the DNA Fusion software.

Selection	S1	S2	S3	S4	S5	S6	S7	S8
Address 0	OFF	OFF	OFF	OFF	OFF			
Address 1	ON	OFF	OFF	OFF	OFF			
Address 2	OFF	ON	OFF	OFF	OFF			
Address 3	ON	ON	OFF	OFF	OFF			
Address 4	OFF	OFF	ON	OFF	OFF			
Address 5	ON	OFF	ON	OFF	OFF			
Address 6	OFF	ON	ON	OFF	OFF			
Address 7	ON	ON	ON	OFF	OFF			
Address 8	OFF	OFF	OFF	ON	OFF			
Address 9	ON	OFF	OFF	ON	OFF			
Address 10	OFF	ON	OFF	ON	OFF			
Address 11	ON	ON	OFF	ON	OFF			
Address 12	OFF	OFF	ON	ON	OFF			
Address 13	ON	OFF	ON	ON	OFF			
Address 14	OFF	ON	ON	ON	OFF			
Address 15	ON	ON	ON	ON	OFF			
Address 16	OFF	OFF	OFF	OFF	ON			
Address 17	ON	OFF	OFF	OFF	ON			
Address 18	OFF	ON	OFF	OFF	ON			
Address 19	ON	ON	OFF	OFF	ON			
Address 20	OFF	OFF	ON	OFF	ON			
Address 21	ON	OFF	ON	OFF	ON			
Address 22	OFF	ON	ON	OFF	ON			
Address 23	ON	ON	ON	OFF	ON			
Address 24	OFF	OFF	OFF	ON	ON			
Address 25	ON	OFF	OFF	ON	ON			
Address 26	OFF	ON	OFF	ON	ON			
Address 27	ON	ON	OFF	ON	ON			
Address 28	OFF	OFF	ON	ON	ON			
Address 29	ON	OFF	ON	ON	ON			
Address 30	OFF	ON	ON	ON	ON			
Address 31 - DO NOT USE	ON	ON	ON	ON	ON			
115,200 BPS						OFF	OFF	
9,600 BPS						ON	OFF	
19,200 BPS						OFF	ON	
38,400 BPS						ON	ON	
Non-Encrypted Communication								OFF
Encrypted Communication								ON

Specifications

The M5-20IN subcontroller is for use in low-voltage, Class 2 circuits only.

Primary Power (From M5-IC):	*Voltage:*	12 Vdc ± 10%, 165 mA max.
Inputs:		20 supervised/unsupervised, standard EOL, 1k/1k ohm, 1%, 1/4 watt
Communication:		9600, 19200, 38400, or 115200 bps, asynchronous
Cable Requirements:	*Alarm Inputs:*	1 twisted pair per input, 22 AWG shielded, 30 ohms max. loop
Mechanical:	*Dimensions:*	3.5” (88.9 mm) W x 10.25” (260.4 mm) L x 0.69” (17.5 mm) H
	Weight:	4 oz. (113 g) nominal
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

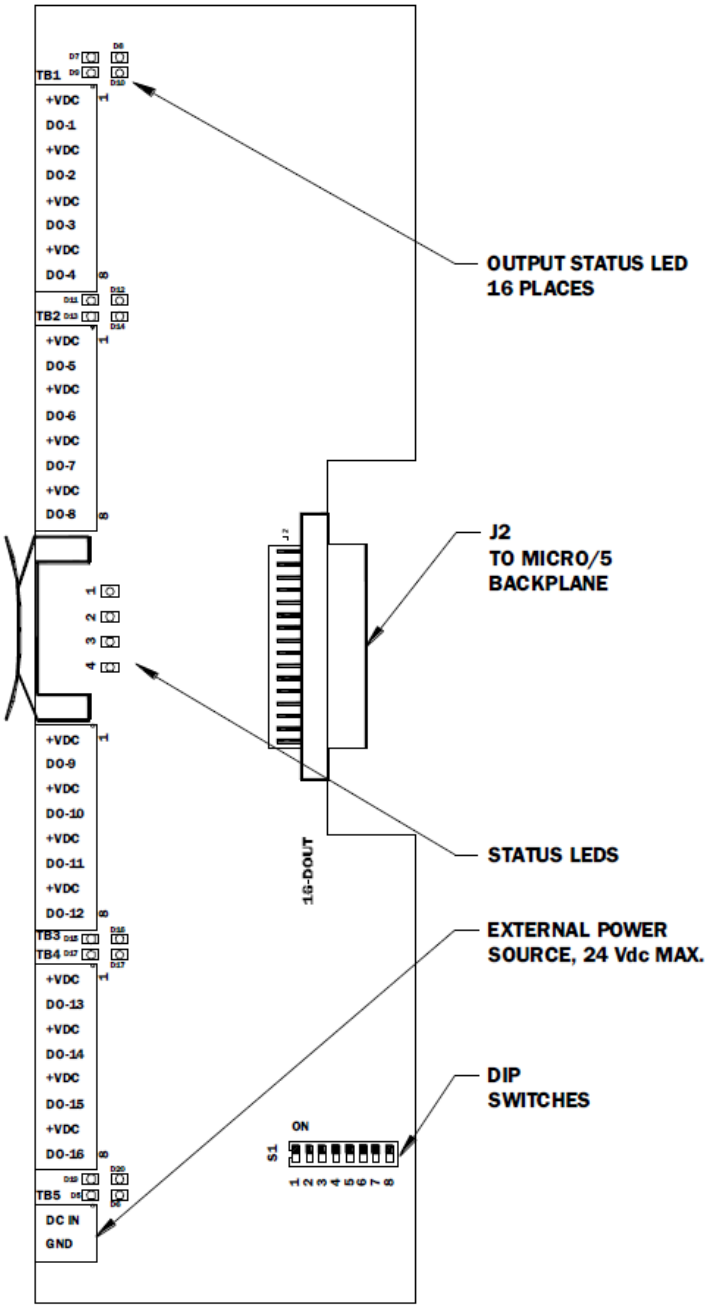
NOTES:

M5-16DO Digital Output Subcontroller

The Open Options M5-16DO for the Micro/5 enclosure is part of the bridging hardware technology and provides digital output control.

The 16DO board contains 16 open collector outputs rated at 40 mA maximum per output. An external DC power source is required for the digital outputs, 24 Vdc maximum. The external DC power source is common to all outputs.

The M5-IC bridge controller supplies power and communication through the enclosure's backplane.



NOTES:

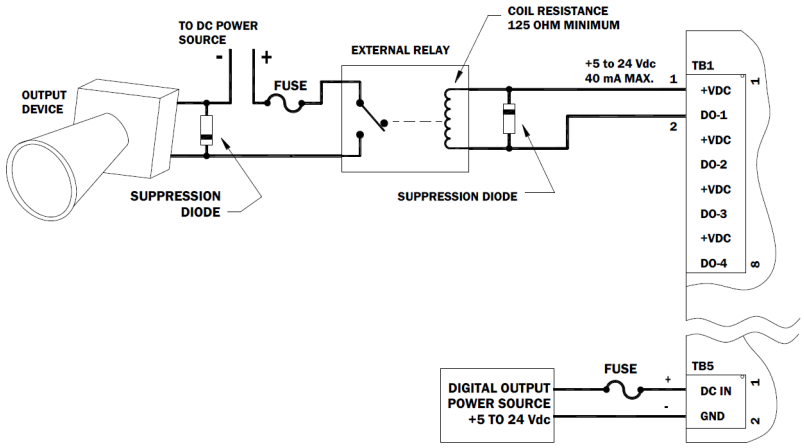
Control Output Wiring

The open-collector output drives an external relay, which in turn drives an output device.

Load switching can cause contacts to wear abnormally and may cause premature contact failure. Switching of inductive loads (strike) also causes electromagnetic interference (EMI) which may interfere with the normal operation of other equipment.

A contact protection circuit must be used to increase system reliability and to minimize the risk of premature contact failure. Locate the protection circuit as close to the load as possible (within 12 inches or 30 centimeters) to increase the circuit's effectiveness. Open Options recommends using a suppression diode to protect the circuit.

> *The external relay's coil current must be restricted to 40 mA. A 5-volt relay coil resistance must be at least 125 ohms, a 12-volt relay coil resistance must be at least 300 ohms, and a 24-volt relay coil resistance must be at least 600 ohms.*



M5-16DO Output Wiring

Suppression Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical

DIP Switch Settings

Switches 1 through 5 determine the device address. Switches 6 and 7 determine the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are defined via the DNA Fusion software.

Selection	S1	S2	S3	S4	S5	S6	S7	S8
Address 0	OFF	OFF	OFF	OFF	OFF			
Address 1	ON	OFF	OFF	OFF	OFF			
Address 2	OFF	ON	OFF	OFF	OFF			
Address 3	ON	ON	OFF	OFF	OFF			
Address 4	OFF	OFF	ON	OFF	OFF			
Address 5	ON	OFF	ON	OFF	OFF			
Address 6	OFF	ON	ON	OFF	OFF			
Address 7	ON	ON	ON	OFF	OFF			
Address 8	OFF	OFF	OFF	ON	OFF			
Address 9	ON	OFF	OFF	ON	OFF			
Address 10	OFF	ON	OFF	ON	OFF			
Address 11	ON	ON	OFF	ON	OFF			
Address 12	OFF	OFF	ON	ON	OFF			
Address 13	ON	OFF	ON	ON	OFF			
Address 14	OFF	ON	ON	ON	OFF			
Address 15	ON	ON	ON	ON	OFF			
Address 16	OFF	OFF	OFF	OFF	ON			
Address 17	ON	OFF	OFF	OFF	ON			
Address 18	OFF	ON	OFF	OFF	ON			
Address 19	ON	ON	OFF	OFF	ON			
Address 20	OFF	OFF	ON	OFF	ON			
Address 21	ON	OFF	ON	OFF	ON			
Address 22	OFF	ON	ON	OFF	ON			
Address 23	ON	ON	ON	OFF	ON			
Address 24	OFF	OFF	OFF	ON	ON			
Address 25	ON	OFF	OFF	ON	ON			
Address 26	OFF	ON	OFF	ON	ON			
Address 27	ON	ON	OFF	ON	ON			
Address 28	OFF	OFF	ON	ON	ON			
Address 29	ON	OFF	ON	ON	ON			
Address 30	OFF	ON	ON	ON	ON			
Address 31 - DO NOT USE	ON	ON	ON	ON	ON			
115,200 BPS						OFF	OFF	
9,600 BPS						ON	OFF	
19,200 BPS						OFF	ON	
38,400 BPS						ON	ON	
Non-Encrypted Communication								OFF
Encrypted Communication								ON

Status LEDs

The LED lights on the M5-16DO subcontroller indicate the following status information.

Processor Status LEDs

LED	Description	Indicator
1	Heartbeat / Online Status	Offline = 200 ms ON / 800 ms OFF Online (Non-Encrypted) = 800 ms ON / 200 ms OFF Online (Encrypted) = 4 flash cyles in 700 ms ON / 300 ms OFF Waiting for Firmware Download = 100 ms ON / 100 ms OFF
2	Subcontroller Communication Status	Indicates communication activity on the downstream communication port.
3	Reader Port 1 Status	Flashes when receiving data from the reader.
4	Reader Port 2 Status	Flashes when receiving data from the reader.

Output Status LEDs

The LED is lit when the output is energized.

Output Number	LED Circuit Designation	Output Number	LED Circuit Designation
1	D7	9	D15
2	D8	10	D16
3	D9	11	D17
4	D10	12	D18
5	D11	13	D19
6	D12	14	D20
7	D13	15	D5
8	D14	16	D6

NOTES:

Specifications

The M5-16DO subcontroller is for use in low-voltage, Class 2 circuits only.

Primary Power (From M5-IC):	*Voltage:*	12 Vdc ± 10%, 30 mA max.
Digital Output Power:		24 Vdc maximum, 640 mA maximum
Digital Outputs:		40 mA, maximum per output
Communication:		9600, 19200, 38400, 115200 bps, asynchronous
Cable Requirements:		As required for the load
Mechanical:	*Dimensions:*	3.5” (88.9 mm) W x 10.25” (260.4 mm) L x 0.69” (17.5 mm) H
	Weight:	3.7 oz. (105 g) nominal
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

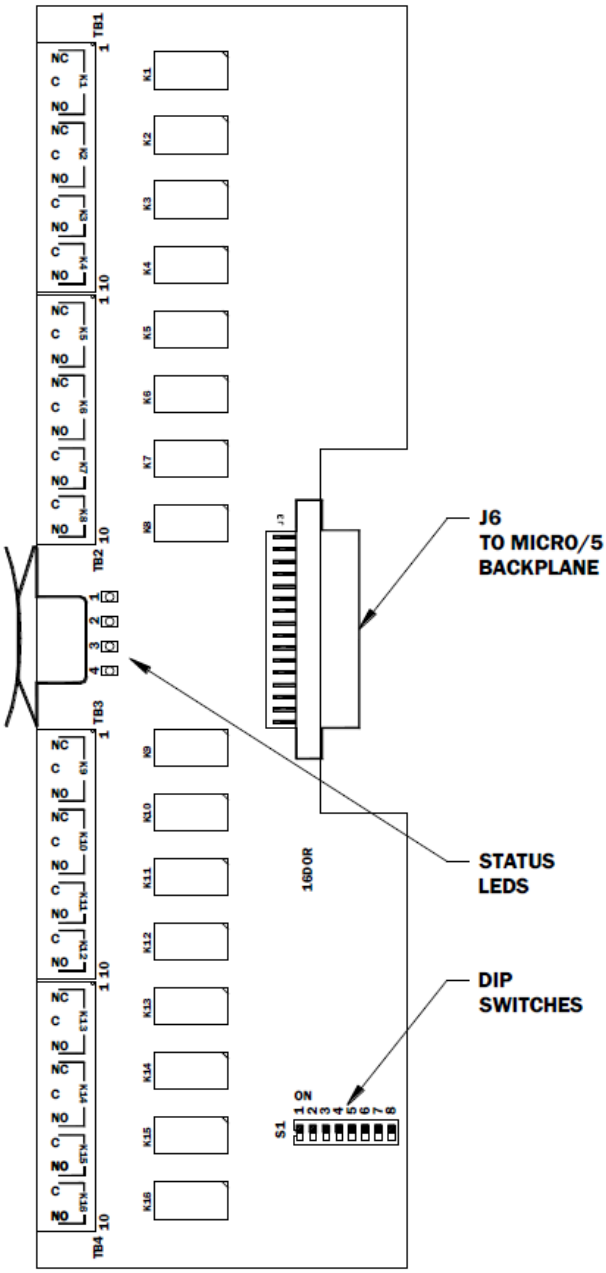
Specifications are subject to change without notice.

NOTES:

M5-16DOR Output Subcontroller Board

The Open Options M5-16DOR output board for the M5 enclosure is part of the bridging hardware technology and provides 16 relays for output control. The 16DOR board contains eight (8) Form C and eight (8) Form A contact relays, rated 2 A @ 30 Vac/Vdc maximum, dry contact configuration.

The M5-IC bridge controller supplies power and communication through the enclosure's backplane.



NOTES:

Control Output Wiring

Eight (8) Form C and eight (8) Form A contact relays control door lock mechanisms or alarm signaling devices. The relay contacts are rated at 2 A @ 30 Vac/Vdc, dry contact configuration.

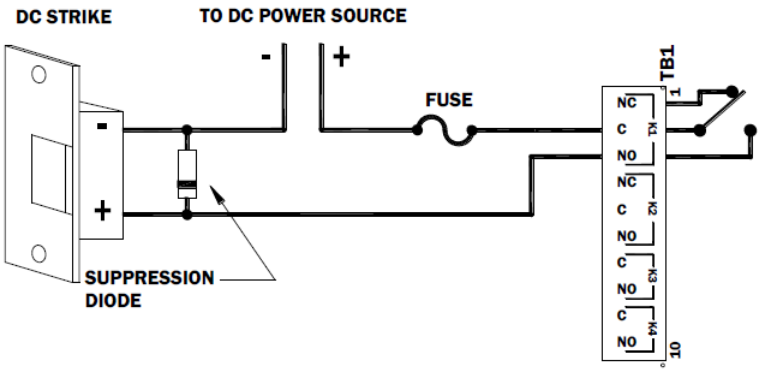
When controlling power to the door strike, the Normally Open (NO) and Common (C) poles are used. When momentarily removing power to unlock the door, as with a maglock, the Normally Closed (NC) and Common (C) poles are used.

If the relay does not have a Normally Closed pole, the relay must be configured by the host to be energized when in the locked state. Check local building codes for proper egress door installation.

Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes electromagnetic interference (EMI), which may interfere with the normal operation of other equipment.

A contact protection circuit must be used to increase system reliability and to minimize the risk of premature contact failure. Locate the protection circuit as close to the load as possible (within 12 inches or 30 centimeters); the circuit's effectiveness will decrease if it is located farther away. Use sufficient wire gauge for the load current to prevent voltage loss.

Open Options recommends the following two protection circuits:



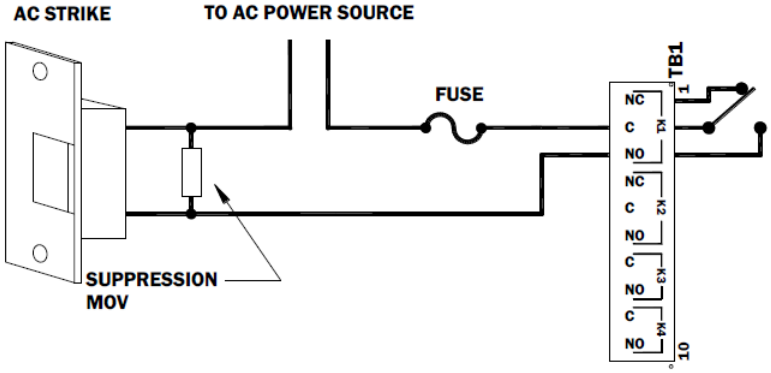
DC Door Strike Wiring

Suppression Diode Selection:

Diode Current Rating: > 1 x Strike Current

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical



AC Door Strike Wiring

MOV Selection:

Diode Current Rating: > 1.5 x Vacs RMS

Diode Breakdown Voltage: 4 x Strike Voltage

For 12 or 24 Vdc Strike: Diode 1N4002 (100V/1A) Typical

Relay Number	Terminal Block	Description
Relay 1 (K1)	TB1-1	Normally Closed (NC)
	TB1-2	Common (C)
	TB1-3	Normally Open (NO)
Relay 2 (K2)	TB1-4	Normally Closed (NC)
	TB1-5	Common (C)
	TB1-6	Normally Open (NO)
Relay 3 (K3)	TB1-7	Common (C)
	TB1-8	Normally Open (NO)
Relay 4 (K4)	TB1-9	Common (C)
	TB1-10	Normally Open (NO)
Relay 5 (K5)	TB2-1	Normally Closed (NC)
	TB2-2	Common (C)
	TB2-3	Normally Open (NO)
Relay 6 (K6)	TB2-4	Normally Closed (NC)
	TB2-5	Common (C)
	TB2-6	Normally Open (NO)
Relay 7 (K7)	TB2-7	Common (C)
	TB2-8	Normally Open (NO)
Relay 8 (K8)	TB2-9	Common (C)
	TB2-10	Normally Open (NO)
Relay 9 (K9)	TB3-1	Normally Closed (NC)
	TB3-2	Common (C)
	TB3-3	Normally Open (NO)
Relay 10 (K10)	TB3-4	Normally Closed (NC)
	TB3-5	Common (C)
	TB3-6	Normally Open (NO)
Relay 11 (K11)	TB3-7	Common (C)
	TB3-8	Normally Open (NO)
Relay 12 (K12)	TB3-9	Common (C)
	TB3-10	Normally Open (NO)
Relay 13 (K13)	TB4-1	Normally Closed (NC)
	TB4-2	Common (C)
	TB4-3	Normally Open (NO)
Relay 14 (K14)	TB4-4	Normally Closed (NC)
	TB4-5	Common (C)
	TB4-6	Normally Open (NO)
Relay 15 (K15)	TB4-7	Common (C)
	TB4-8	Normally Open (NO)
Relay 16 (K16)	TB4-9	Common (C)
	TB4-10	Normally Open (NO)

DIP Switch Settings

Switches 1 through 5 determine the device address. Switches 6 and 7 determine the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are defined via the DNA Fusion software.

Selection	S1	S2	S3	S4	S5	S6	S7	S8
Address 0	OFF	OFF	OFF	OFF	OFF			
Address 1	ON	OFF	OFF	OFF	OFF			
Address 2	OFF	ON	OFF	OFF	OFF			
Address 3	ON	ON	OFF	OFF	OFF			
Address 4	OFF	OFF	ON	OFF	OFF			
Address 5	ON	OFF	ON	OFF	OFF			
Address 6	OFF	ON	ON	OFF	OFF			
Address 7	ON	ON	ON	OFF	OFF			
Address 8	OFF	OFF	OFF	ON	OFF			
Address 9	ON	OFF	OFF	ON	OFF			
Address 10	OFF	ON	OFF	ON	OFF			
Address 11	ON	ON	OFF	ON	OFF			
Address 12	OFF	OFF	ON	ON	OFF			
Address 13	ON	OFF	ON	ON	OFF			
Address 14	OFF	ON	ON	ON	OFF			
Address 15	ON	ON	ON	ON	OFF			
Address 16	OFF	OFF	OFF	OFF	ON			
Address 17	ON	OFF	OFF	OFF	ON			
Address 18	OFF	ON	OFF	OFF	ON			
Address 19	ON	ON	OFF	OFF	ON			
Address 20	OFF	OFF	ON	OFF	ON			
Address 21	ON	OFF	ON	OFF	ON			
Address 22	OFF	ON	ON	OFF	ON			
Address 23	ON	ON	ON	OFF	ON			
Address 24	OFF	OFF	OFF	ON	ON			
Address 25	ON	OFF	OFF	ON	ON			
Address 26	OFF	ON	OFF	ON	ON			
Address 27	ON	ON	OFF	ON	ON			
Address 28	OFF	OFF	ON	ON	ON			
Address 29	ON	OFF	ON	ON	ON			
Address 30	OFF	ON	ON	ON	ON			
Address 31 - DO NOT USE	ON	ON	ON	ON	ON			
115,200 BPS						OFF	OFF	
9,600 BPS						ON	OFF	
19,200 BPS						OFF	ON	
38,400 BPS						ON	ON	
Non-Encrypted Communication								OFF
Encrypted Communication								ON

Status LEDs

The LED lights on the M5-16DOR indicate the following status information.

LED	Description	Indicator
1	Heartbeat / Online Status	Offline = 200 ms ON / 800 ms OFF Online (Non-Encrypted) = 800 ms ON / 200 ms OFF Online (Encrypted) = 4 flash cycles in 700 ms ON / 300 ms OFF Waiting for Firmware Download = 100 ms ON / 100 ms OFF
2	Subcontroller Communication Status	Indicates communication activity on the downstream communication port.
3	Not Used	OFF
4	Not Used	OFF

Specifications

The M5-16DOR is for use in low-voltage, Class 2 circuits only.

Primary Power:	*Voltage:*	12 Vdc ± 10%, 300 mA maximum
Relay Contacts:	*Form-C:*	8 Form C, 2 A @ 30 Vac/Vdc, resistive
	Form-A:	8 Form A, 2 A @ 30 Vac/Vdc, resistive
Communication:		9600, 19200, 38400, 115200 bps, asynchronous
Cable Requirements:		As required for the load
Mechanical:	*Dimensions:*	3.5” (88.9 mm) W x 10.25” (260.4 mm) L x 0.5” (17.5 mm) H
	Weight:	5 oz. (144 g) nominal
Environmental:	*Temperature:*	-55 to 85 °C, storage / 0 to 70 °C, operating
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

NOTES:

Configuring the Hardware in DNA Fusion

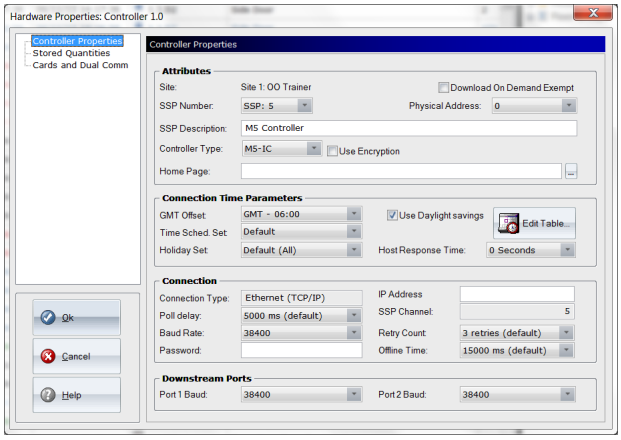
Once the hardware has been installed, it must be configured in the DNA Fusion access control system.

Setting Up the M5-IC Controller & Subcontrollers

1. **Log in** to DNA Fusion and open the Hardware Browser.
2. **Right-click** on the Site and **add** a new Ethernet Channel.

   For more information on Channel Properties, see page 8-46 in the DNA Fusion User Manual.
3. **Right-click** on the Channel and **select** Add SSP.

   The Controller Properties dialog appears.
4. **Enter** an SSP Description (typically location- or function-related).
5. **Select** M5-IC from the Controller Type drop-down list.

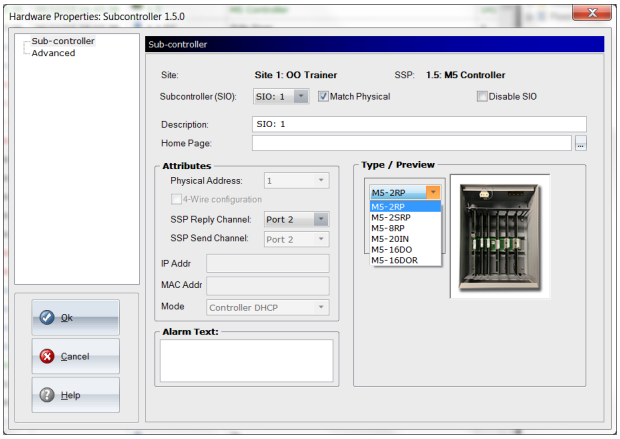


   For more information on Controller Properties, see page 8-47 in the DNA Fusion User Manual.
6. **Configure** the remaining controller options.
7. **Click** OK to save the settings.
8. **Right-click** on the M5-IC controller and **select** Add / Add Subcontroller.

   The Subcontroller Properties dialog opens.
9. **Enter** a Description for the subcontroller.
10. If Match Physical is checked, a Physical Address is not required.

    The system will match the board's DIP switch settings for the physical address. If Match Physical is unchecked, a Physical Address must be selected.
11. **Select** the Type of subcontroller from the drop-down list.

    A Preview of the board will display.



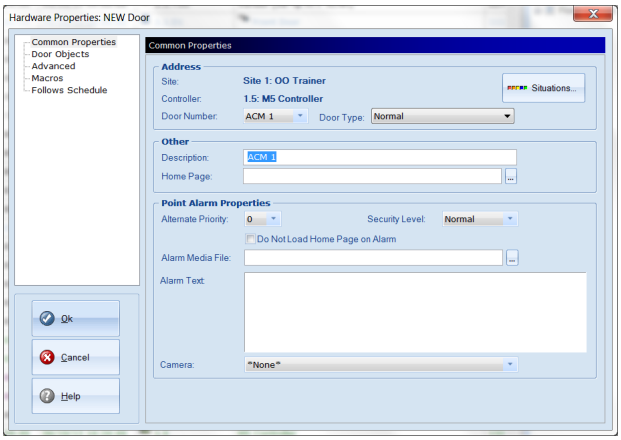
> *The M5-20IN will be split in two in the DNA Fusion application; each set of ten (10) inputs will be configured with two separate physical addresses. These two physical addresses must be consecutive.*

12. **Configure** the remaining subcontroller options.
13. **Click** OK to save the settings.

Creating Doors

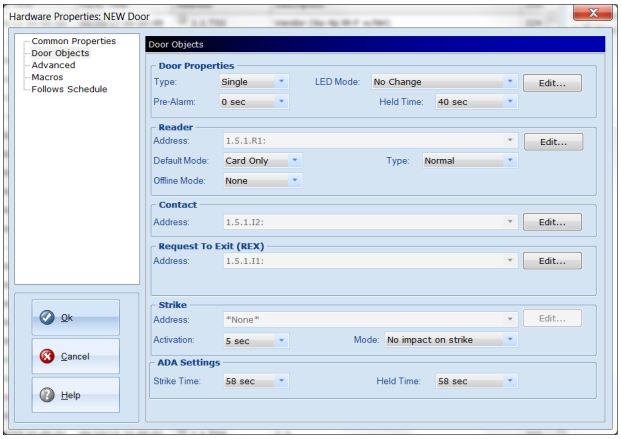
1. In the Hardware Browser, **expand** the M5 Subcontroller to locate a reader and **right-click** on the Reader.
2. **Select** Create M5 Door X.

   The New Door dialog opens.



3. **Enter** a Description.
4. If desired, **configure** the other options in the Common Properties dialog per the descriptions on page 8-55 in the DNA Fusion User Manual.
5. **Select** Door Objects from the dialog menu.

   The Door Objects are auto-populated with the reader address as well as the addresses for the next set of available input points. See page 8-57 in the DNA Fusion User Manual for more information.



6. If desired, **configure** the Advanced and Macros dialogs.

   See pages 8-59 and 8-61 in the DNA Fusion User Manual for more information.
7. **Click** OK.

   The door is added to the Hardware Browser.
8. **Repeat** Steps 2 through 7 until all M5 doors are added.

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