Subcontrollers 3

In This Chapter

Reader Subcontrollers

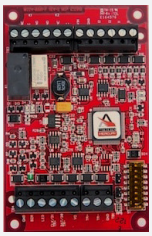
Reader subcontrollers provide the interface between door devices and LP Series controllers. The MR Series subcontrollers support a multitude of reader technologies and provide I/O support for door devices, e.g. requests-to-exit (REX) and door contacts.

Open Options offers 5 reader Subcontroller modules:

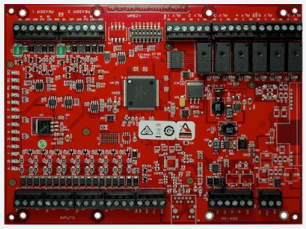
- MR50-S3 - A single-reader interface dedicated to individual door monitoring; provides 2 programmable input circuits and 2 relay outputs. The MR50-S3 supports OSDP, OSDP Secure Channel, FICAM government profiles, keypads, biometric readers, Wiegand, clock and data, magnetic stripe, F/2F, and supervised F/2F technologies.
- MR52-S3 - A dual-reader interface dedicated for two-door monitoring; provides 8 programmable input circuits and 6 relay outputs. The MR52-S3 supports OSDP, OSDP Secure Channel, FICAM government profiles, keypads, biometric readers, Wiegand, clock and data, magnetic stripe, F/2F, and supervised F/2F reader technologies.
- MR62e - A network-connected, PoE-capable (PoE+) OSDP reader interface that provides control for up to two doors; provides six input monitor points and four control relays. (Series 3)
- MRDT - A 32-character LCD display terminal with a 16-position keypad and reader port. The MRDT supports magnetic stripe, Wiegand, and proximity readers. MRDT was previously the RSC-DT.

The MR50-S3, MR52-S3, and MR62e described in this manual are Series 3 models. For information on previous models, refer to the Legacy Hardware Manual.

Reader Subcontrollers



MR50-S3



MR52-S3

MR62e

MRDT

Enhanced Features

The new generation of Series 3 reader subcontrollers offers several enhanced features and improvements:

- Improved processor with increased memory
- Full support for OSDP, OSDP Secure Channel, and FICAM protocol
- Embedded crypto memory chip to secure and encrypt on-board sensitive data
- Backward compatibility with and seamless upgrades for existing Series 1 & 2 deployments

> *The major firmware version for Series 3 modules is increased from 1 to 3; the subcontrollers use firmware 3.2x.xx and above. This firmware can only be applied to Series 3 modules; likewise, the Series 3 devices will not accept Series 2 firmware.*

OSDP Reader Configuration

The OSDP reader-to-subcontroller wiring connection are explained in the tables below. The tables include connections for the MR50-S3, MR52-S3, MR51e, and MR62e. The OSDP Reader column is labeled with common wire terminals found on OSDP readers. Connect the OSDP reader with the adjacent subcontroller Connection column.

MR50-S3 OSDP Configuration

Wiring configuration for OSDP readers communicating with a MR50-S3 are shown in the table below.

Terminal Block	Description	Connection	OSDP Reader
TB 4-1	Reader Port	GND	GND
TB 4-2		BZR	
TB 4-3		LED	
TB 4-4		CLK/D1	GPI01
TB 4-5		DAT/D0	GPI02
TB 4-6		VO	+VDC

MR52-S3 OSDP Configuration

The wiring configuration for OSDP readers communicating with a MR52-S3 are shown in the table below.

Terminal Block	Description	Connections	OSDP Reader
TB 8-1	Reader Port 1	GND	GND
TB 8-2		DAT/D0	GPI02
TB 8-3		CLK/D1	GPI01
TB 8-4		BZR	
TB 8-5		LED	
TB 8-6		VO	+VDC

Terminal Block	Description	Connection	OSDP Reader
TB 9-1	Reader Port 2	GND	GND
TB 9-2		DAT/D0	GPI02
TB 9-3		CLK/D1	GPI01
TB 9-4		BZR	
TB 9-5		LED	
TB 9-6		VO	+VDC

MR62e

The wiring configuration for OSDP reader communicating to a MR62e is shown in the table below.

Terminal Block	Description	Connection	OSDP Reader
TB 7-1	OSDP Reader Port	GND	GND
TB 7-2		TR-	GPI02
TB 7-3		TR+	GPI01
TB 7-4		RVO	+VDC

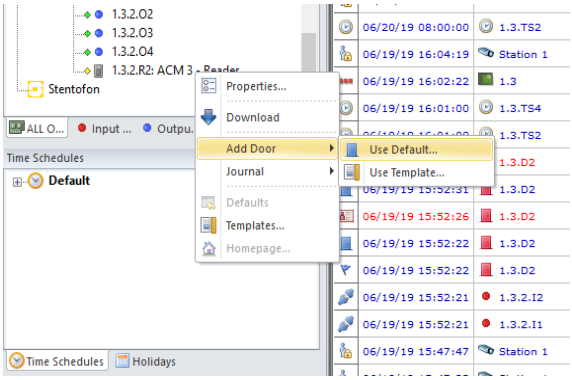
Configuring OSDP Readers in DNA Fusion

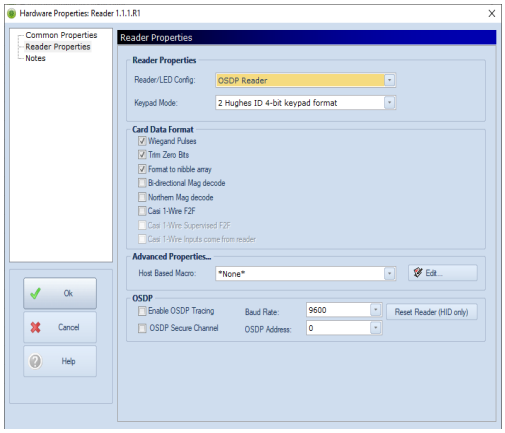
When adding a door in DNA Fusion, locate the Reader Properties and ensure that the Reader/LED Config is set to OSDP Reader. For more information on Reader Properties see ***Pg. 3-41*** Technical installation Manual.

1. **Right-click** on the added OSDP reader.
2. **Select** Add Door / Use Default.

   Hardware Properties window opens.
3. **Select** Door Objects.
4. In the Reader section of Door Objects, **click** on the Edit button.
5. **Select** Reader Properties.

   The Reader Properties panel opens.
6. **Click** the Reader/LED Config: drop-down and **select** OSDP Reader.
7. **Click** OK to close the Reader Properties panel.
8. **Click** OK to download the changes.





> *Match subcontroller Baud rate to OSDP device. Default baud rate is 9600.*

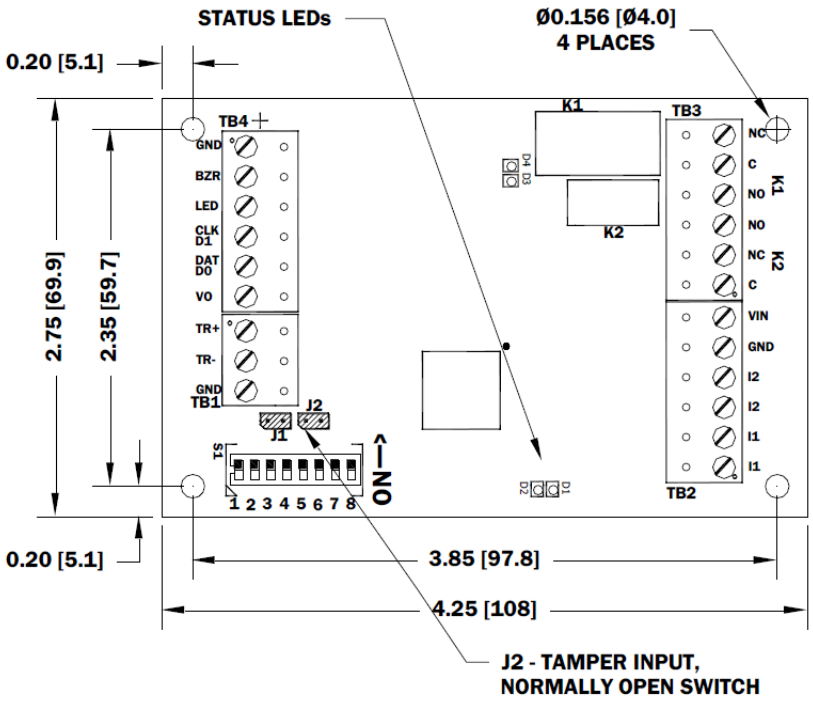
NOTES:

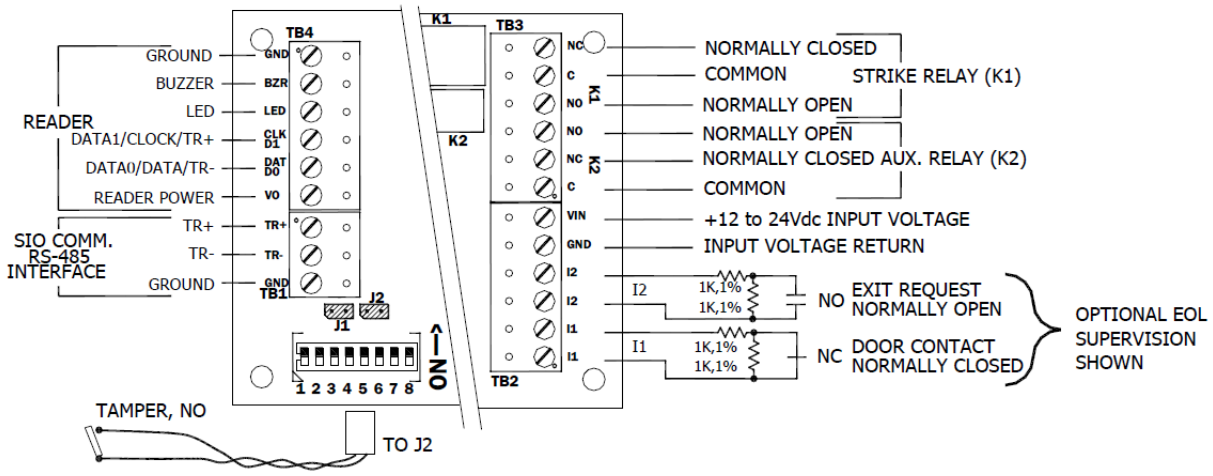
MR50-S3 Single-Reader Interface

The Series 3 MR50-S3 is a single-reader interface panel dedicated to individual door monitoring. It contains 2 Form C relay outputs to control door strikes and signal alarms as well as a 2 inputs to monitor the door contact and request-to-exit (REX) devices. Input circuits can be configured as unsupervised or supervised. The MR50-S3 communicates upstream to the LP controller via 2-wire RS-485 interface.

The MR50-S3 supports OSDP, OSDP Secure Channel, FICAM government profiles, keypads, biometric readers, Wiegand, clock and data, magnetic stripe, F/2F, and supervised F/2F reader technologies. It also provides tri-state LED control and buzzer control.

For best results, mount the MR50-S3 in a standard 2- or 3-gang junction enclosure (not provided).





Installation

To install the MR50-S3 subcontroller:

1. If required, **mount** the MR50-S3 in an Open Options or Life Safety Power enclosure.
2. **Set** the physical address utilizing DIP switch 1-5. Physical address must be unique. See Pg. 3-9 for DIP switch settings.
3. **Wire** the supervised alarm inputs.
4. **Wire** the controller communication.
5. If required, **connect** the cabinet tamper jumper (J2).
6. **Wire** the power input.
7. **Wire** the relay outputs.
8. **Wire** the downstream interface for card readers and/or keypads.

Default Settings

Each MR50-S3 board ships with the following default configuration:

- DIP Switches: OFF
- Physical Address: 0
- Serial Port Settings: No flow control
- Baud Rate: 38400

Power Supply

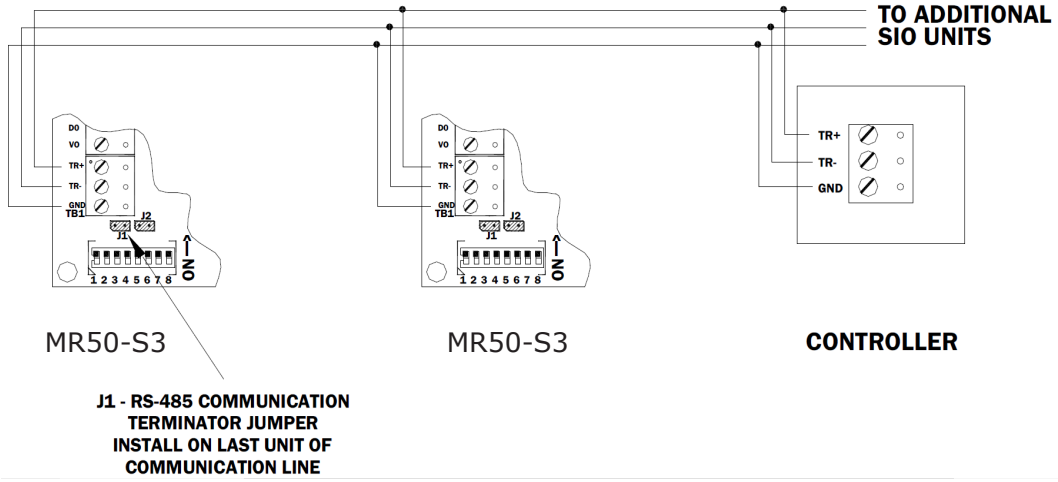
The MR50-S3 subcontroller requires a filtered 12 to 24 Vdc ± 10% power supply. The input power is passed through to the reader interface to power the reader. Readers with different voltage requirements must be powered separately. The reader power output terminal, TB4-6 (VO), is not current limited.

Wire the VIN and GND inputs on TB2 with a minimum of 18 AWG twisted-pair cable.

Upstream Communication Wiring

The MR50-S3 communicates to Port 1 on the LP controller via 2-wire, multidrop RS-485 interface. The total cable length is limited to 4,000 feet (1,219 meters) from end to end. Install the termination jumper (J1) on the first and last devices of the RS-485 communication line.

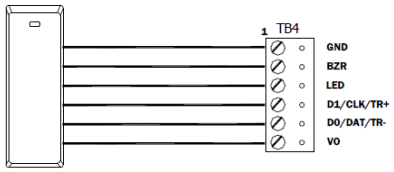
Wire the TR+, TR-, and GND connections on TB1 using 24 AWG shielded cable with a characteristic impedance of 120 ohms.



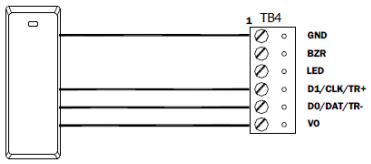
Reader Wiring

The TB4 port on the MR50-S3 is a six-wire interface that includes buzzer control and LED control wiring connections. It supports a reader with TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 signaling. In a 2-wire LED mode, the buzzer output is used to drive the second LED.

Refer to the card reader's documentation to verify proper wiring connections. TTL signaling requires a 6-conductor cable (18 AWG). RS-485 signaling requires two separate 2-conductor cables: one for power (18 AWG) and one for communication (24 AWG). Configure the reader port settings in DNA Fusion.

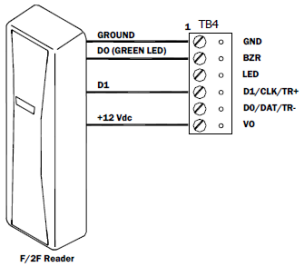


Typical D1/D0 or Clock/Data Reader

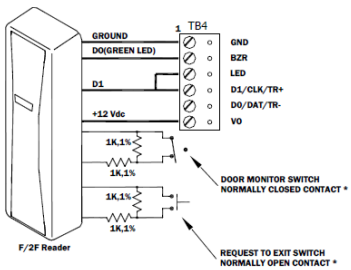


Typical RS-485 Device

* Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader

Input Circuit Wiring

The MR50-S3 contains 2 inputs that are typically used to monitor the door contact and request-to-exit (REX) device. Connect the I1 and I2 alarm inputs on TB2 using twisted-pair cables. Input properties are configured via DNA Fusion.

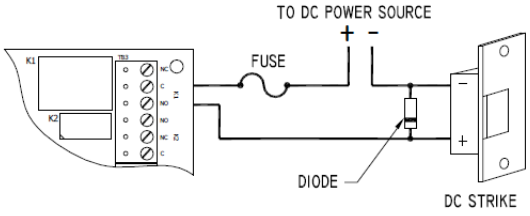
Inputs can be configured as supervised or unsupervised. If the input is unsupervised, the only states that will be reported are Open or Closed. When the inputs are configured as supervised, the circuit will report Open or Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage. 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. End-of-line resistors are required for line supervision.

Relay Circuit Wiring

2 Form C relay contacts are provided on TB3 to control the door strike and/or other output devices. Each relay has a Common pole (C), a Normally Open pole (NO), and a Normally Closed pole (NC). The K1 is rated 5A for the normally open contact and 3A for the normally closed contact. The K2 relay contact is rated 1A. When momentarily removing power to unlock the door, as with a maglock, the Normally Closed and Common poles are used. Check the local building code for proper egress door installation.

Load switching can cause abnormal contact wear as well as 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) to increase effectiveness. Open Options recommends using a diode for protection.



Typical DC Door Strike Wiring

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

Cabinet Tamper

Jumper J2 is used to configure the cabinet tamper. When the jumper is ON, the cabinet tamper is bypassed; when the jumper is OFF, wiring is required in order for the tamper to work. If this input is not used, install the jumper and pigtail that ship with the board.

Elevator Control

The Open Options system is capable of supporting elevator control for up to 128 floors. In addition to the MR50-S3, an input and/or output board may be needed to control access to elevator floors.

To implement elevator control, DNA Fusion must be configured for elevators. See ***Pg. 3-33*** in the Technical Installation Manual for more information.

Hardware Setup

DIP Switch Settings

The MR50-S3 provides a set of eight (8) DIP switches. Switches 1 through 5 select the physical address. Switches 6 and 7 determine the communication baud rate. Switch 8 enables encrypted communication.

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

*For firmware versions prior to 1.39.1, this setting is 2,400 BPS.

**For firmware versions prior to 1.39.1, DIP switch 8 is not defined; set to the OFF position.

Terminal Block Connections

The following table describes the terminal block connections for Series 3 MR50-S3 subcontrollers.

Terminal Block	Description	Connection
TB 1-1	Upstream Communication Port (SIO to Host Controller)	TR+
TB 1-2		TR-
TB 1-3		GND
TB 2-1	Power Input	VIN
TB 2-2		GND
TB 2-3	Input Ports	I2
TB 2-4		I2
TB 2-5		I1
TB 2-6		I1
TB 3-1	Relay Ports	NC
TB 3-2		C
TB 3-3		NO
TB 3-4		NO
TB 3-5		NC
TB 3-6		C
TB 4-1	Reader Port	GND
TB 4-2		BZR
TB 4-3		LED
TB 4-4		CLK/D1
TB 4-5		DAT/D0
TB 4-6		VO

Status LEDs

Power Up

All LEDs are OFF.

Initialization

Once power is applied, initialization for the MR50-S3 begins. LED D1 is turned ON at the start of initialization.

Running

After a successful initialization, the LEDs indicate the following states:

LED	Indicator	State
D1	Online Status (Heartbeat)	Online (Non-encrypted communication) = 80% ON, 20% OFF, 1-second rate Online (Encrypted communication) = 0.1 sec ON/OFF (7 flashes total), 0.3 sec OFF Offline = 20% ON, 80% OFF, 1-second rate Error = 0.1 sec ON, 0.1 sec OFF; firmware download required
D2	SIO Communication Port Status	ON = Downstream Communication Activity

Specifications

The MR50-S3 is for use in low-voltage, Class 2 circuits only. The installation of this subcontroller must comply with fire and electrical code.

Primary Power:	*Voltage:*	12 to 24 Vdc ± 10%, 150 mA max. (plus reader current)
Inputs:		2 unsupervised/supervised, EOL resistors, 1k ohm, 1%, 1/4 watt 1 unsupervised, dedicated for cabinet tamper
Outputs:	*Relay K1:*	Normally open (NO) contact: 5 A @ 30 Vdc resistive Normally closed (NC) contact: 3 A @ 30 Vdc resistive
	Relay K2:	1 A @ 30 Vdc resistive
Communication:	*Upstream Port:*	2-wire RS-485: 9600, 19200, 38400, or 115200 bps
Wire Requirements:	*Power:*	1 twisted pair, 18 AWG
	RS-485:	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 4,000 ft (1,219 m) max.
	Alarm Inputs:	1 twisted pair, shielded, per input, 30 ohms max.
	Outputs:	As required for the load
	Reader Data (TTL):	6-conductor, 18 AWG, shielded 500 ft (150 m) max.
	Reader Data (F/2F):	4-conductor, 18 AWG, shielded 500 ft (150 m) max.
	Reader Data (RS-485):	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 2,000 ft (610 m) max.
Mechanical:	*Dimension:*	4.25” (108 mm) W x 2.75 in (70 mm) L x 1 in (25.4 mm) H
	Weight:	4 oz (120 g) nominal
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.

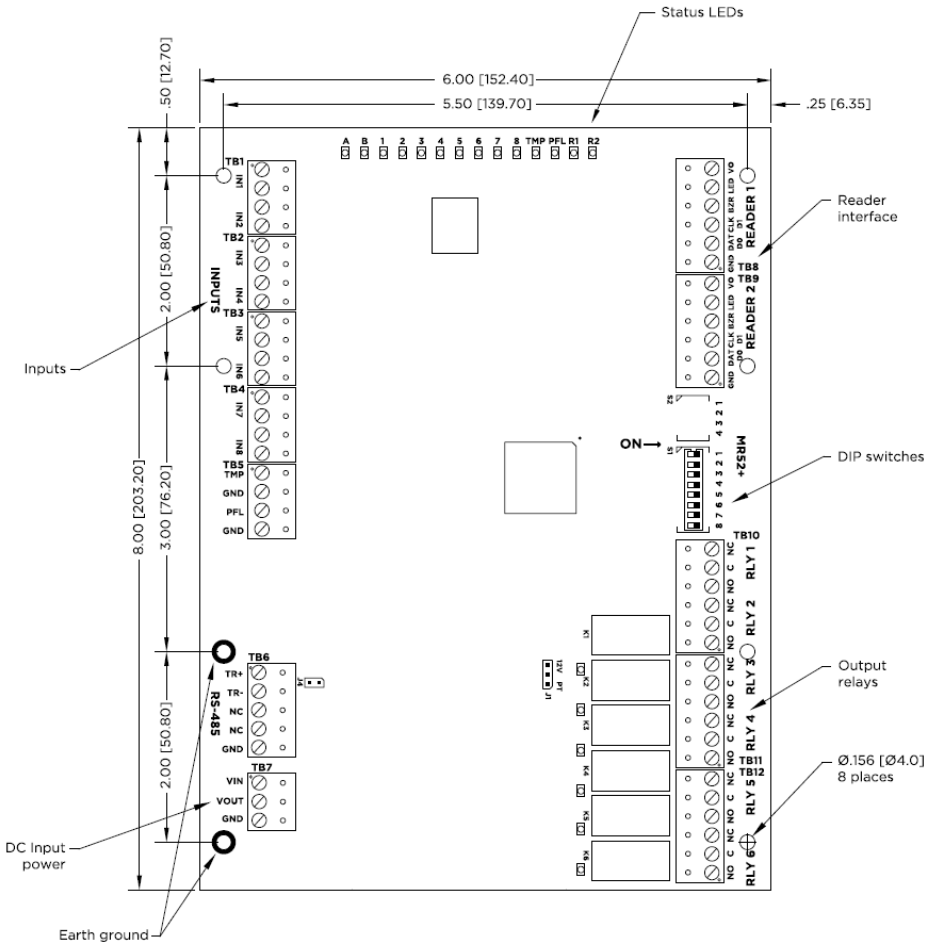
NOTES:

MR52-S3 Dual-Reader Interface

The Series 3 MR52-S3 is a dual-reader interface panel dedicated to monitoring two doors. It contains 6 Form C relay outputs to control door strikes and signal alarms as well as 8 inputs to monitor the door contact, request-to-exit (REX) devices, and alarm contacts. Input circuits can be configured as unsupervised or supervised. The MR52-S3 communicates upstream to the LP controller via 2-wire RS-485 interface.

The MR52-S3 supports OSDP, OSDP Secure Channel, FICAM government profiles, keypads, biometric readers, Wiegand, clock and data, magnetic stripe, F/2F, and supervised F/2F reader technologies. It also provides tri-state LED control and buzzer control.

The MR52-S3 is 6 x 8 inches in size with mounting holes along the longer edges that can be used to secure the interface to an enclosure.



Installation

To install the MR52-S3 subcontroller:

1. If required, **mount** the MR52-S3 in an Open Options or Life Safety Power enclosure.
2. **Set** the physical address utilizing DIP switch 1-5. Physical address must be unique.
   See Pg. 3-18 for DIP switch settings.
3. **Wire** the supervised alarm inputs.
4. **Wire** the controller communication.
5. If required, **wire** the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
6. **Wire** the power input.
7. **Wire** the relay outputs.
8. **Wire** the downstream interface for card readers and/or keypads.

Default Settings

Each MR52-S3 board ships with the following default configuration:

- DIP Switches: ON
- Physical Address: 0
- Serial Port Settings: No flow control
- Baud Rate: 38400

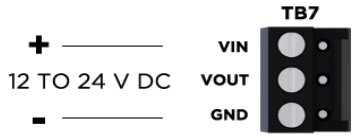
This Area Intentionally Left Blank

End Blank Area

Power Supply

The MR52-S3 subcontroller requires a filtered 12 to 24 Vdc ± 10% power supply. Locate the power source as close to the MR52-S3 as possible.

Wire the VIN and GND inputs on TB7 with a minimum of 18 AWG twisted-pair cable.

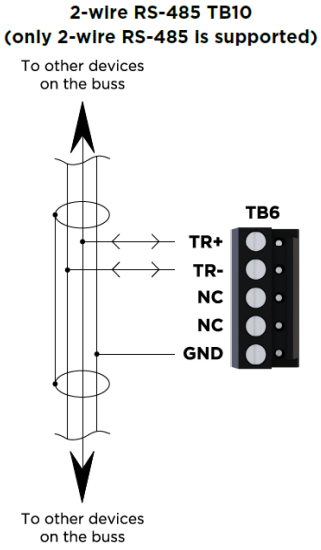


> *Observe polarity on* VIN*; the* VOUT *terminal on* TB7 *is the same as* VIN*.*

Upstream Communication Wiring

The MR52-S3 communicates to Port 1 on the LP controller via 2-wire, multidrop RS-485 interface. The total cable length is limited to 4,000 feet (1,219 meters) from end to end. Install the termination jumper (J4) on the first and last devices of the RS-485 communication line. See Pg. 3-19 for jumper settings.

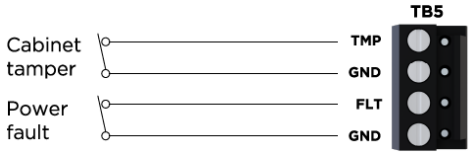
Wire the TR+, TR-, and GND connections on TB6 using 24 AWG with drain wire and shield.



Alarm Inputs Wiring

Connect inputs TMP and PFL on TB5 with twisted-pair cables to monitor the cabinet tamper and power failure. These two inputs are only used to monitor contact closure and do not require EOL resistors.

If neither input is used, install the jumper and pigtail that ships with the board.



Elevator Control

The Open Options system is capable of supporting elevator control for up to 128 floors. In addition to the MR52-S3, an input and/or output board may be needed to control access to elevator floors.

To implement elevator control, DNA Fusion must be configured for elevators. See ***Pg. 3-33*** in the Technical Installation Manual for more information.

Reader Wiring

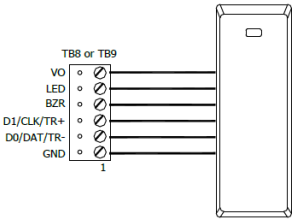
The TB8 and TB9 ports on the MR52-S3 are six-wire interfaces that include buzzer control and LED control wiring connections. Each reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 signaling. In a 2-wire LED mode, the buzzer output is used to drive the second LED.

Reader power is selectable: 12 Vdc (VIN MUST be greater than 20 Vdc) or input voltage (VIN) is passed through (PT), 300 mA maximum per reader port. Readers that require a different voltage or have high current requirements must be powered separately.

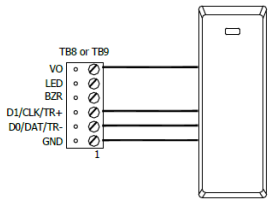
J1 – Reader port power select

12V PT	Reader power
	12 V DC is available on reader ports (VIN > 20 V DC)
	VIN power is "Passed Through" to reader ports

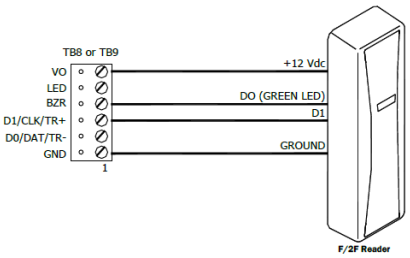
Refer to the card reader's documentation to verify proper wiring connections. TTL signaling requires a 6-conductor cable (18 AWG). RS-485 signaling requires two separate 2-conductor cables: one for power (18 AWG) and one for communication (24 AWG). F/2F signaling requires a 4-conductor cable. Configure the reader port settings in DNA Fusion.



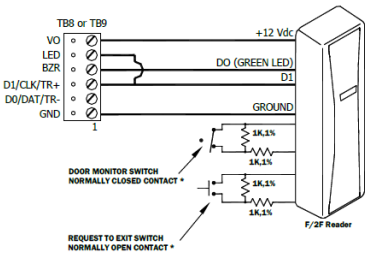
Typical D1/D0 – Clock/Data Reader



Typical 2-Wire RS-485 Device



Typical Unsupervised F/2F Reader

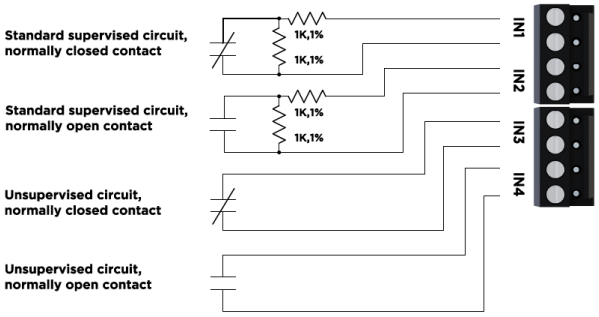


Typical Supervised F/2F Reader

Input Circuit Wiring

The MR52-S3 contains 8 inputs that are typically used to monitor the door contacts, request-to-exit (REX) devices, and alarm contacts. Connect the IN1 through IN8 inputs on TB1 through TB4 using twisted-pair cables. Input properties are configured via DNA Fusion.

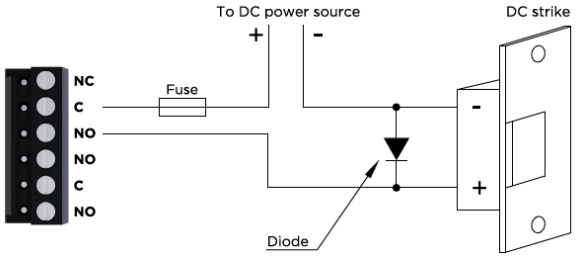
Inputs can be configured as supervised or unsupervised. If the input is unsupervised, the only states that will be reported are Open or Closed. When the inputs are configured as supervised, the circuit will report Open or Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage. 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. End-of-line resistors are required for line supervision.



Relay Circuit Wiring

6 Form C relay contacts are provided on TB10 through TB12 to control the door strikes and/or other output devices. Each relay has a Common pole (C), a Normally Open pole (NO), and a Normally Closed pole (NC). The normally open contacts are rated 5A and the normally closed contacts are rated 3A. When momentarily removing power to unlock the door, as with a maglock, the Normally Closed and Common poles are used. Check the local building code for proper egress door installation.

Load switching can cause abnormal contact wear as well as 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) to increase effectiveness. Open Options recommends using a diode for protection.



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

Status LEDs

Power Up

All LEDs are OFF.

Initialization

Once power is applied, initialization begins. LEDs A through R2 are briefly sequenced ON then OFF.

Running

LED	Indicator	State
A	Online Status (Heartbeat)	Online (Non-encrypted communication) = 80% ON, 20% OFF, 1-second rate Online (Encrypted communication) = 0.1 sec ON/OFF (7 flashes total), 0.3 sec OFF Offline = 20% ON, 80% OFF, 1-second rate Error = 0.1 sec ON, 0.1 sec OFF; firmware download required
B	SIO Communication Port Status	ON = Downstream Communication Activity
1-8	Input IN1-IN8 Status	OFF = Inactive (briefly flashes ON every 3 seconds) ON = Active (briefly flashes OFF every 3 seconds) Rapid Flash = Fault
TMP	Cabinet Tamper	OFF = Inactive (briefly flashes ON every 3 seconds) ON = Active (briefly flashes OFF every 3 seconds) Rapid Flash = Fault
PFL	Power Fault	
R1-R2	Reader Port 1-2 Status	Clock/Data Mode = Flashes when data is received D1/D0 Mode = Flashes when data is received RS-485 Mode = Flashes when transmitting data F/2F Mode = Flashes when data/acknowledgement is received
K1-K6	Relay Output 1-6 Status	ON = Energized

Hardware Setup

DIP Switch Settings

The MR50-S3 provides a set of 8 DIP switches. Switches 1 through 5 select the physical address. Switches 6 and 7 determine the communication baud rate. Switch 8 enables encrypted communication.

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

*For firmware versions prior to 1.38.1, this setting is 2,400 BPS.

**For firmware versions prior to 1.38.1, DIP switch 8 is not defined; set to the OFF position.

Jumper Settings

The table below describes the jumper settings for the MR52-S3.

Jumper	Set At	Description
J1	12V	12 Vdc at Reader Ports*
	PT	VIN "Passed Through" to Reader Ports
J4	OFF	RS-485 EOL Terminator is OFF
	ON	RS-485 EOL Terminator is ON

All other jumpers are factory use only.

Terminal Block Connections

The table below describes the terminal block connections for the MR52-S3.

Terminal Block	Description	Connections	
TB 1-1	Input 1	IN1	IN1
TB 1-2	Input 2	IN2	IN2
TB 2-1	Input 3	IN3	IN3
TB 2-2	Input 4	IN4	IN4
TB 3-1	Input 5	IN5	IN5
TB 3-2	Input 6	IN6	IN6
TB 4-1	Input 7	IN7	IN7
TB 4-2	Input 8	IN8	IN8
TB 5-1	Cabinet Tamper	TMP	
TB 5-2		GND	
TB 5-3	Power Fault	PFL	
TB 5-4		GND	
TB 6-1	Upstream Communication Port (SIO to Host Controller)	TR+	
TB 6-2		TR-	
TB 6-3		GND	
TB 7-1	Power Input	VIN	
TB 7-2		VOUT	
TB 7-3		GND	
TB 8-1	Reader 1	GND	
TB 8-2		DAT/D0	
TB 8-3		CLK/D1	
TB 8-4		BZR	
TB 8-5		LED	
TB 8-6		VO	
TB 9-1	Reader 2	GND	
TB 9-2		DAT/D0	
TB 9-3		CLK/D1	
TB 9-4		BZR	
TB 9-5		LED	
TB 9-6		VO	

Terminal Block	Description	Connections
TB 10-1	Output Relay 1	NO
TB 10-2		C
TB 10-3		NC
TB 10-4	Output Relay 2	NO
TB 10-5		C
TB 10-6		NC
TB 11-1	Output Relay 3	NO
TB 11-2		C
TB 11-3		NC
TB 11-4	Output Relay 4	NO
TB 11-5		C
TB 11-6		NC
TB 12-1	Output Relay 5	NO
TB 12-2		C
TB 12-3		NC
TB 12-4	Output Relay 6	NO
TB 12-5		C
TB 12-6		NC

Specifications

The MR52-S3 is for use in low-voltage, Class 2 circuits only. The installation of this subcontroller must comply with fire and electrical code.

Primary Power:	*Voltage:*	12 to 24 Vdc ± 10%, 550 mA max. (reader current not included)
Inputs:		8 unsupervised/supervised, EOL resistors, 1k ohm, 1%, 1/4 watt 2 unsupervised, dedicated for cabinet tamper
Outputs:		6 Form C relays: Normally open (NO) contact: 5 A @ 30 Vdc resistive Normally closed (NC) contact: 3 A @ 30 Vdc resistive
Communication:	*Upstream Port:*	2-wire RS-485: 9600, 19200, 38400, or 115200 bps
Reader Interface:	*Power:*	12 Vdc ± 10% regulated, 300 mA max. each reader or 12 to 24 Vdc ± 10% (input voltage passed through), 300 mA max. each reader
	Data Inputs:	TTL compatible, F/2F or 2-wire RS-485
	LED Output:	TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink max.
	Buzzer Output:	Open collector, 12 Vdc open circuit max., 40 mA sink max.
Wire Requirements:	*Power:*	1 twisted pair, 18 AWG, shielded
	RS-485:	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 4,000 ft (1,219 m) max.
	Alarm Inputs:	1 twisted pair per input, shielded, 30 ohms max.
	Outputs:	As required for the load
	Reader Data (TTL):	6-conductor, 18 AWG, shielded, 500 ft (150 m) max.
	Reader Data (F/2F):	4-conductor, 18 AWG, shielded, 500 ft (150 m) max.
	Reader Data (RS-485):	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 2,000 ft (610 m) max.
Mechanical:	*Dimension:*	6” (152 mm) W x 8 in (203 mm) L x 1 in (25 mm) H
	Weight:	11 oz (312 g) nominal
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.

NOTES:

MR62e

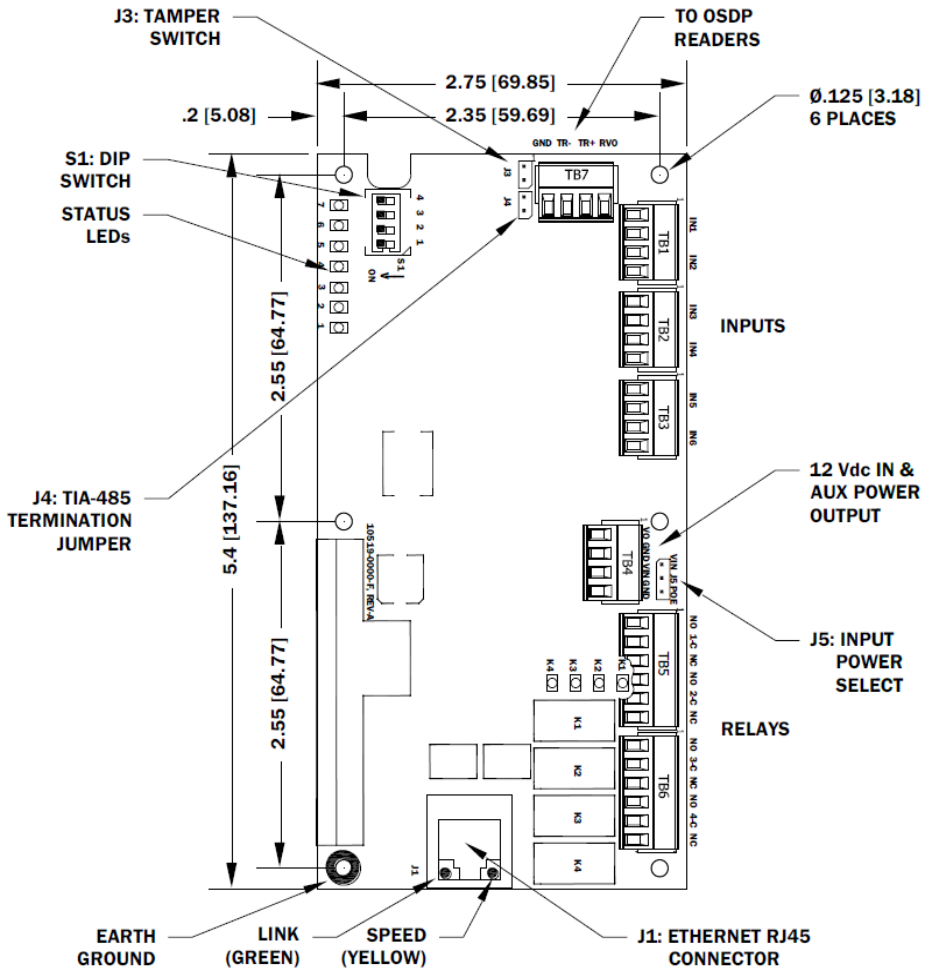
The MR62e is a network-connected, PoE-capable reader interface to control two doors (ACMs) using OSDP readers. It supports up to 4 OSDP readers configured as paired or alternate readers. The MR62e is housed in a plenum rated case.

Controller Type	MR62e's Supported
LP2500	32
LP1502	32
LP4502	32
LP1501	15 or 16

The MR62e only supports OSDP readers.

The MR62e connects directly to the network with a standard RJ45 Ethernet connection and provides 1 serial 2-wire RS-485 port to communicate to the readers. 4 Form C relay outputs can be used to control door strikes and signal alarms. The relay contacts are rated 2 A @ 30 Vdc, dry contact configuration. 6 inputs are provided to monitor the door contacts, request-to-exit (REX) buttons, and alarm contacts. The inputs can be configured as supervised or unsupervised.

For UL installations, the power sourcing equipment such as PoE/PoE+ enabled network switches and/or PoE/PoE+ power injectors must be UL Listed under UL 294B.



Installation

The MR62e is an enclosed network controller within the NSC-200 offered by ACRE.

To install the MR62e in the NSC-200 subcontroller enclosure follow the instructions below:

1. To remove the enclosure, **press down** on the latch on top of the enclosure and **gently press** a screwdriver or small tool into the slot on the bottom of the enclosure.
2. **Mount** the MR62e in the desired location or within the NSC-200 housing.

   The NSC-200 enclosure is only suitable for indoor installations. Outdoor installations should be placed inside a NEMA enclosure, rated for the particular environment.
3. **Attach** door hardware wires into the input terminal blocks.
4. **Wire** Output relays.
5. **Wire** a OSDP reader to the reader port (TB7).
6. If needed, **wire** any additional OSDP readers using a daisy chain to the reader port (see Pg. 3-25).
7. **Connect** the Ethernet cable to the Ethernet jack on the MR62e.
8. If needed, **wire** the power supply to the unit.
9. After wiring the MR62e, **Feed** the wires through the strain relief connectors and **tighten** the sealing nut to secure cables.
10. **Configure** the IP address using the addressing tools provided on Pg. 2-3.

Default Settings

Each MR62e board is ships with the following default settings:

- DIP Switches: OFF
- Static IP: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- Login Username: admin
- Login Password: password

Security

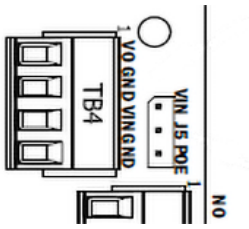
The MR62e must be installed in a secured environment. User accounts made in the web configuration (Configuration Manager) must be created with a strong password. All of the DIP switches should be in the OFF position to ensure a normal operating mode. The MR62e is shipped from the manufacturer with a default login that is available for 5 minutes when DIP switch 1 is moved from the OFF position to the ON position. Therefore, defining at least one user account is important as well as ensuring that all DIP switches are moved to the OFF position before the MR62e is commissioned. Open Options recommends not configuring the MR62e with an IP address accessible from the public internet.

The MR62e has options to further enhance network security by allowing the user to disable the Zeroconfig discovery, as well as the web configuration module itself. See the Open Options Hardening Guide for more information.

Power Supply

The MR62e accepts Power over Ethernet (PoE or PoE+). An external 12 Vdc power supply on terminal block 4 (VIN and GND) is also accepted. This setting is configured via the Jumper 5 (J5). See Pg. 3-29 for Jumper Settings.

> *The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG.*



Upstream Communication Wiring

The MR62e communicates to the controller via the on-board 10Base T/100Base-TX Ethernet interface (J1). Connect network cable to the Ethernet port on the MR62e. It is **NOT** recommended to connect the MR62e to a public Intranet.

OSDP Reader Wiring

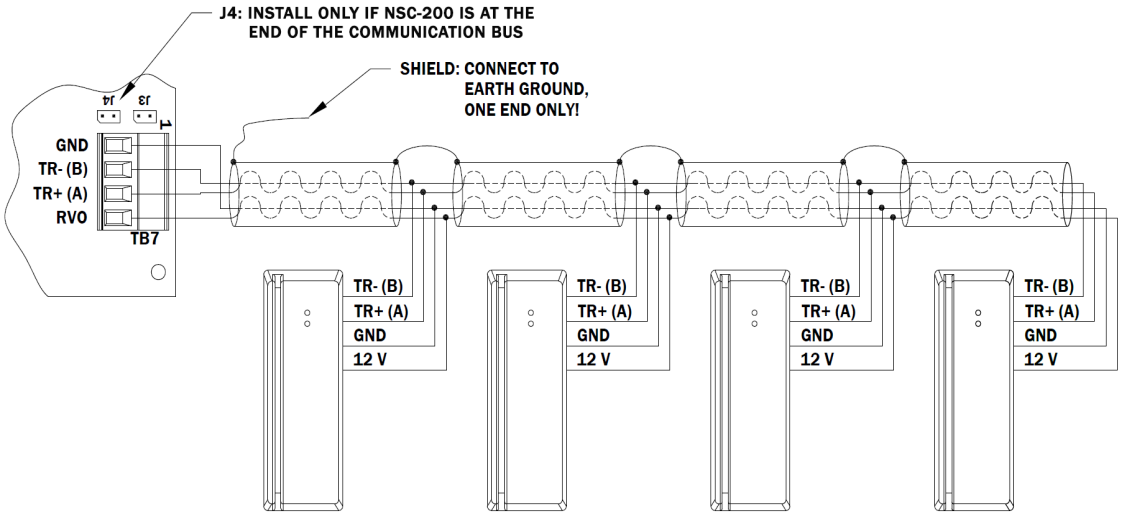
The reader port (TB7) has a 2-wire RS-485 OSDP communication bus connections and 12 Vdc to power the OSDP readers. The 12 Vdc output is limited to a .5 A maximum. The MR62e supports up to 4 OSDP readers using 2-pair cable for data and power. If the 2-pair cable is ineffective in supporting the voltage/current requirements, a 1-pair cable that meets the requirements must be used for power. See Pg. 3-31 for information on cable requirements.

> *When powering any device(s) by the MR62e make sure not to exceed the maximum current available. Cable gauge must also be evaluated.*

The RS-485 termination jumper (J4) is only connected when the MR62e is at the end of the communication bus. Only devices at the end of the communication bus are terminated.

> *Never install the termination jumper to more than 2 devices on the communication bus.*

> *For multiple OSDP reader installations: Be sure to install each reader individually. Wire and assign a unique address to the first reader. Then, disconnect the first reader and wire the second reader and assign a unique address. If needed, apply these steps to the next OSDP readers.*



Typical OSDP Reader Wiring

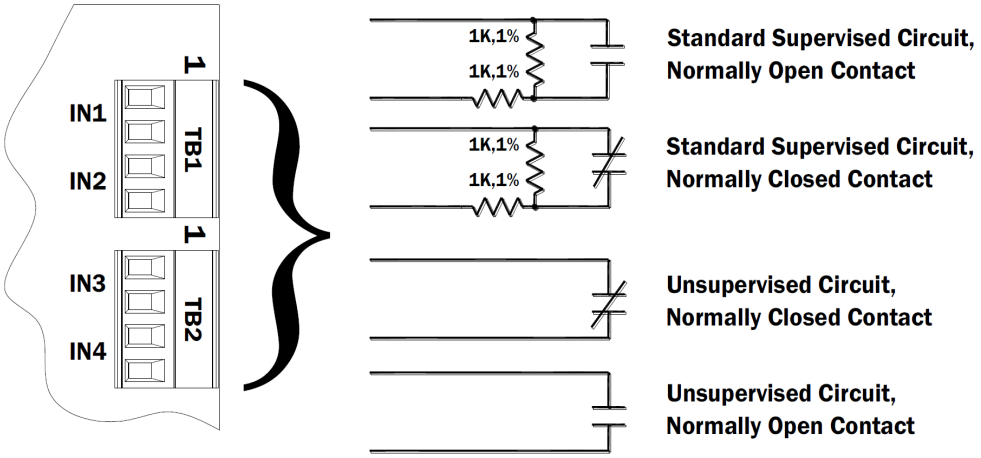
Input Circuit Wiring

Inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states.

When configured as unsupervised, the input circuit will report not only open and closed, but open circuit, shorted, grounded, and foreign voltage. A supervised input circuit requires 2 resistors to be placed to enable the circuit to report properly. The standard supervised input circuit requires a 1K ohm, 1% resistors and should be loacted as close to the sensor as possible. End of the line (EOL) resistances may be configured via the host software.

> *Grounded and foreign voltage states are not a requirement of IL 294 and therefore not verified by UL.*

The input circuit wiring that are shown are supported, but may not be typical:

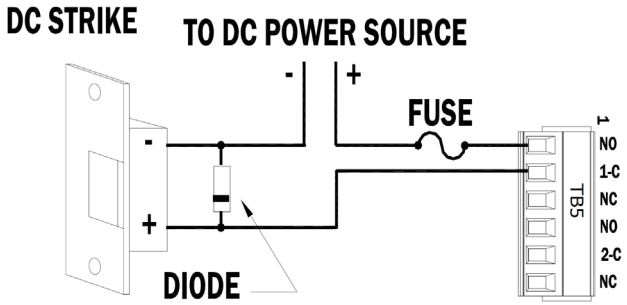


Relay Circuit Wiring

The 4 Form-C contact relays are provided for controlling door lock mechanisms or alarm signalling. The relay contacts are rated 2 A @ 30 Vdc. resistive and are in a dry contact configuration. When you are controlling the delivery of power to the door strike, the normally Open and Common poles are used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, a diode must be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

> *It is possible for the MR62e to provide power for a 12 Vdc door strike providing the maximum current is not exceeded. See Pg. 3-31 for specifications.*



Diode Selection:

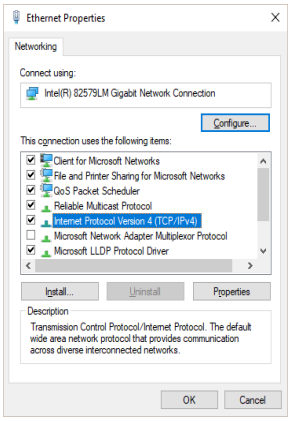
Diode current rating: 1x strike count
Diode breakdown voltage: 4x strike voltage
For 12 Vdc or 24 Vdc strike, diode 1N4002 (100V/1A) typical.

Configuring the IP Address

The MR62e requires an IP address to be configured. There are 2 options for configuring the IP address. The MercZeroConf tool is available for discovering the network panels on a system. The Direct Connect method is used when the computer is not in range of the MR62e.

Direct Connect

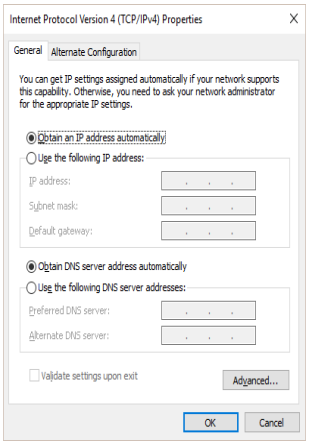
Verify that the computer's IP address is within range of the network device. If the computer is not in range of the MR62e's IP address (Default: 192.168.0.251), changing the IP range of the computer is required to configure the MR62e.



To change the computers IP range:

1. **Locate** the Network and Sharing Center.
2. **Click** on the Change adapter settings option.
3. **Right-click** on Ethernet and **select** Properties.
4. **Highlight** Internet Protocol Version 4 (TCP/IPv4) and **click** Properties.
   The Internet Protocol Version 4 (TCP/IPv4) Properties window opens.
5. **Select** Use the following IP Address.
6. In the IP address field, **enter** the default network settings needed to connect to the controller.
   - **Enter** the IP address (range: 192.168.0.xxx).
   - **Enter** Subnet Mask: 255.255.0.0
   - **Enter** Default Gateway: 192.168.0.1

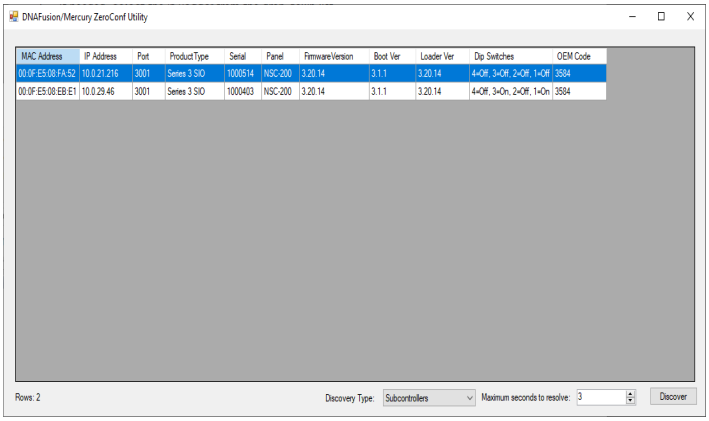
   See Pg. 3-24 for information on Default Settings.
7. **Select** Ok.



MercZeroConf

To discover the desired MR62e.

1. **Open** the MercZeroConf file and double-click on the MercZeroC application.
   Default the path: Window (C:) / Program Files (x86) / DNAFusion / Tools / MercZeroC.
2. **Click** on the Discovery Type drop-down menu and **select** subcontrollers.
3. **Click** the Discover button.

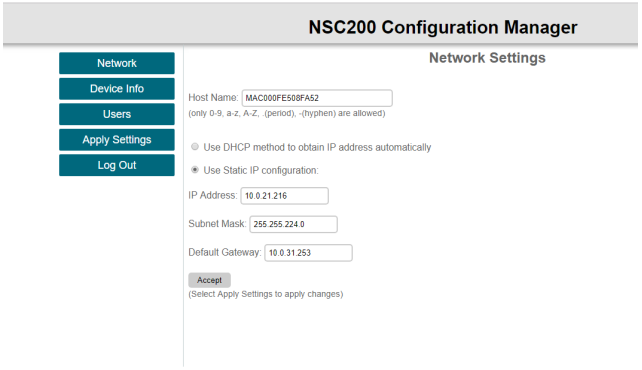


4. **Double-click** on the desired MR62e.
   The MR62e Configuration Manager opens.
5. **Configure** the IP address.
   See Pg. 3-28 for information on IP configuration.

Setting the IP Address

Configure the IP address of the MR62e to a predetermined static IP address on the network.

1. **Open** an internet browser (use Internet Explorer for the best result).
2. **Type** the MR62e's default IP address (192.168.0.251) in the URL and **press** Enter.
   A page displays that the site is not secured.
3. **Select** Advanced and proceed to the website.
   NSC200 Configuration Manager page opens.
4. **Set** DIP switch 1 to ON.
5. **Enter** default username and password in the field provided (Username: admin / Password: password).
6. In Network Settings, **change** the IP Address, Subnet Mask, and Default Gateway to match the original computer network settings.



Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration, set MR62e to OEM setting (sanitizing board).
- Restore to OEM default parameters.

Do not remove power during following steps:

1. **Set** DIP switches 1 & 2 ON and 3 & 4 OFF.
2. **Apply** power to the MR62e. LED's 1 & 2 and 3 & 4 flash alternatively for .5 seconds.
3. 10 seconds after power is applied, **set** switches 1 or 2 OFF.
   If switches 1 or 2 are not changed to OFF. The MR62e will power up using the OEM default settings.
   LEDs 1 and 2 alternatively flash at a .5 second rate while the memory is being erased.
   LED 1 will be on for about 3 to 5 seconds after the memory is erased, then the MR62e will reboot.

Hardware Setup

DIP Switch Settings

The MR62e contains a set of 4 DIP switches to determine the IP addressing mode.

Description	1	2	3	4
Use normal operating mode.	OFF	OFF	OFF	OFF
After initialization, enable default User Name (admin) and Password (password). Switch is read on the fly; no need to reboot.	ON	OFF	OFF	OFF
Use Factory default communication setting (see Pg. 3-28).	OFF	ON	OFF	OFF
Use OEM default communication settings. See Bulk Erase.	ON	ON	OFF	OFF
Bulk Erase prompt mode at power up. See Bulk Erase.	ON	ON	OFF	OFF

Jumper Settings

Jumper	Set At	Selected
J1	N/A	Ethernet Connection with PoE/PoE+ support
J2	N/A	Factory Use Only
J3	N/A	Tamper Switch (normally open contact)
J4	N/A	RS-485 Termination, install only if the MR62e is at the end of the communication bus.
J5	PoE	MR62e powered from the Ethernet connection
	12V	MR62e powered from the external 12 Vdc power source connected to the VIN (TB 4-3) and the GND (TB 4-4)
J6-J13	N/A	Factory Use Only

Terminal Block Connections

Terminal Block	Description	Connection
TB 1-1	Input 1	IN1
TB 1-2		IN1
TB 1-3	Input 2	IN2
TB 1-4		IN2
TB 2-1	Input 3	IN3
TB 2-2		IN3
TB 2-3	Input 4	IN4
TB 2-4		IN4
TB 3-1	Input 5	IN5
TB 3-2		IN5
TB 3-3	Input 6	IN6
TB 3-4		IN6
TB 4-1	Auxiliary Output Power (12 Vdc)	VO
TB 4-2		GND
TB 4-3	Primary Input Power (External 12 Vdc Supply)	VIN
TB 4-4		GND
TB 5-1	Output Relay (K1)	NO
TB 5-2		1-C
TB 5-3		NC
TB 5-4	Output Relay (K2)	NO
TB 5-5		2-C
TB 5-6		NC
TB 6-1	Output Relay (K3)	NO
TB 6-2		3-C
TB 6-3		NC

Terminal Block	Description	Connection
TB 6-4	Output Relay (K4)	NO
TB 6-5		4-C
TB 6-6		NC
TB 7-1	OSDP Readers (2-wire RS-485)	GND
TB 7-2		TR-
TB 7-3		TR+
TB 7-4		RVO

Status LEDs

Initialization

When power is applied, LED 1 then LEDs 2-7 turn ON. Then OFF in sequence.

Running

The table below describes the meaning of the LED's while the MR62e is running.

LED	Description	Indicator
1	Online Status	Online = 4 pulses per second; 0.1 sec ON, 0.1 sec OFF, 0.3 sec OFF Offline = 0.2 sec ON, 0.8 sec OFF Waiting for Firmware Download = 0.1 sec ON, 0.1 sec OFF
2	Input 1 Status	Inactive = OFF Active = ON Flashing = Trouble
3	Input 2 Status	
4	Input 3 Status	
5	Input 4 Status	
6	Input 5 Status	
7	Input 6 Status	
YEL	On-Board Ethernet Speed (Yellow LED)	OFF = 10 Mbs, ON = 100 Mbs
GRN	On-Board Ethernet Activity (Green LED)	OFF= No Link, ON = Good Link Flashing = Ethernet Activity

If an input is defined, every three (3) seconds the LED is pulsed to its opposite state for 0.1 second, otherwise, the LED will remain off.

Specifications

The MR62e should be used in low-voltage, Class 2 circuit only. The installation of this subcontroller must comply with fire and electrical code.

> *This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.*

Power Input:	*PoE:****	12.95 W, compliant with IEEE 802.3af
	*PoE+:****	25.00 W, complaint with IEEE 802.3at
	External Power Supply:	12 Vdc ± 10%, 1.7 A max.
Power Output:	*PoE:*	VO and RVO, combined: 12 Vdc @ .66 A max.
	*PoE+/External Power Supply:**	VO 12 Vdc @ 1 A max., RVO, 12 Vdc @ .5 A
Inputs:		6 unsupervised/supervised, EOL resistors, 1k/2k ohm, 1% 1/4 watt standard
Outputs:		4 Form C relay contacts, 2 A @ 30 Vdc
Reader Interface:	*Reader Power:*	12 Vdc @ .5 A max (RVO)
	Communication:	2-wire RS-485, OSDP protocol, 4 devices max.
Wire Requirements:	*Communication:*	Ethernet, Cat 5 minimum
	Power:	18 AWG, 1 twisted pair
	Alarm Inputs:	1 twisted pair per input, 30 ohm max.
	Reader Power:	18 AWG, type of cable(s) and gauge determined by length and voltage/current requirements. Local power source may be required.
	Reader Data (RS-485):	2 twisted pair, shielded, 24 AWG, 120 ohm impedance, 4,000 ft (1220 m) max.
	Reader Data (RS-485/ Power):	2 twisted pair, shielded, 24 AWG, 120 ohm impedance, 4,000 ft (1220 m) max.
Mechanical:	*Dimension:*	5.5” (140 mm) W x 2.75” (70 mm) L x 0.96” (24 mm) H without bracket
	Weight:	4 oz (112 g) without bracket
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	10 to 95% RHNC

UL294, 6th Edition Performance Levels	*Stanby Power:*	Level: I
	Endurance:	Level: IV
	Line Security:	Level: I
	Destructive Attack:	Level: I

***** *For UL, the Power Sourcing Equipment (PSE) such as a PoE/PoE+ enabled network switch and/or PoE/PoE+ power injectors must be UL Listed under UL294B.*

Specifications are subject to change without notice.

Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294/B.

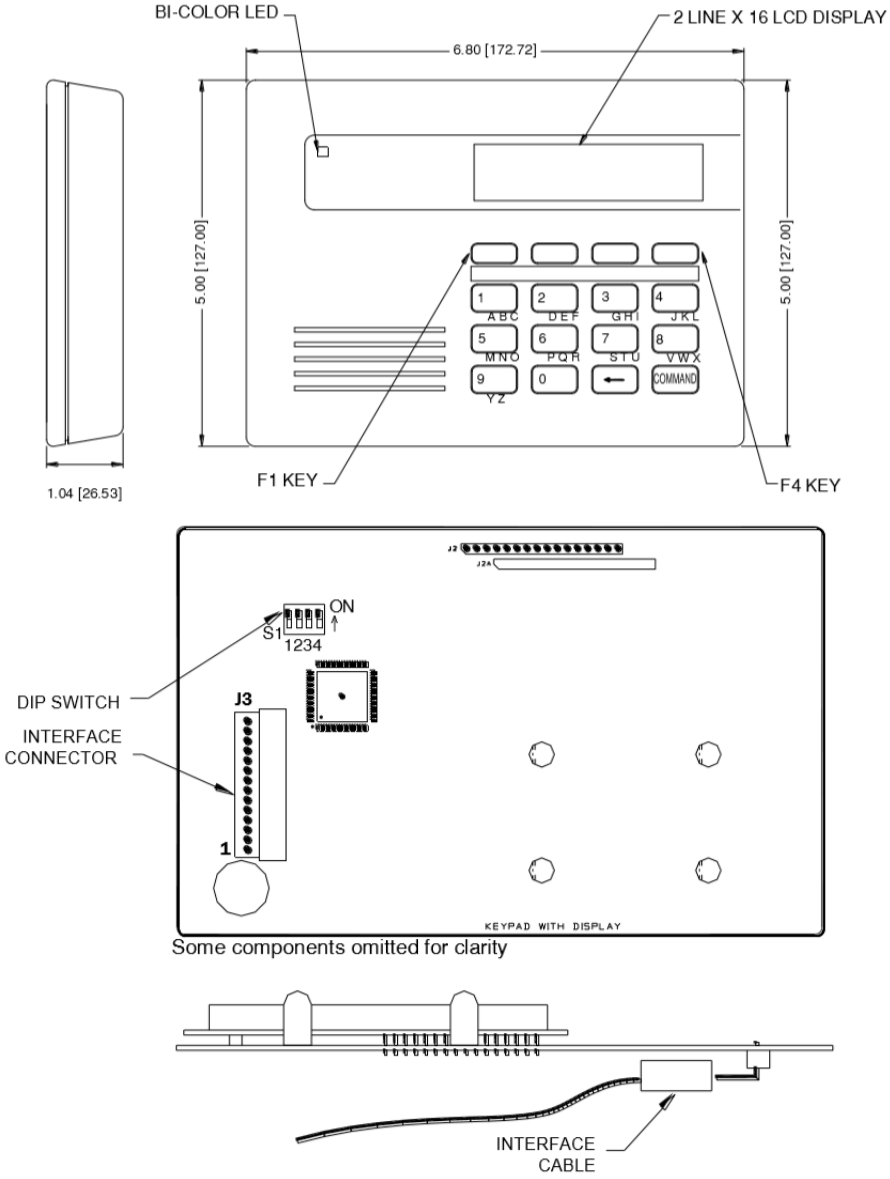
Category 5e cabling is the minimum performance category recommended.

NOTES:

MRDT Display Terminal

The MRDT display terminal integrates a 32-character LED display, a 16-position keypad, and a reader port into a single device. It also includes a 2-wire RS-485 port for direct connection to the access control system.

The backlit display provides a clear view of system information even in challenging conditions. The keypad provides the standard numeric keys along with 4 function keys that can be used to select options from the display. The external reader port supports magnetic stripe, Wiegand, and proximity readers. The MRDT requires 12 Vdc power. All signal lines are protected from electrostatic discharge (ESD). The keypad is used to configure the device via a series of menus; see Pg. 3-36 for more information.



Installation

To install the MRDT, follow the steps below:

1. **Plug in** the connector to the pin block.
2. Set the Comm Address.
   See Pg. 3-36 for information about Software Configuration.
3. If applicable, **wire** the on-board reader.
4. **Connect** the power supply.
5. **Configure** the keypad.

Power Supply

The MRDT requires a 12 Vdc ±15% filtered power source.

> *Do NOT use the AC transformer to directly power the terminal.*

Communication Wiring

When wiring to the J3 interface connector, line up the red wire with pin 1 and the black wire with pin 14.

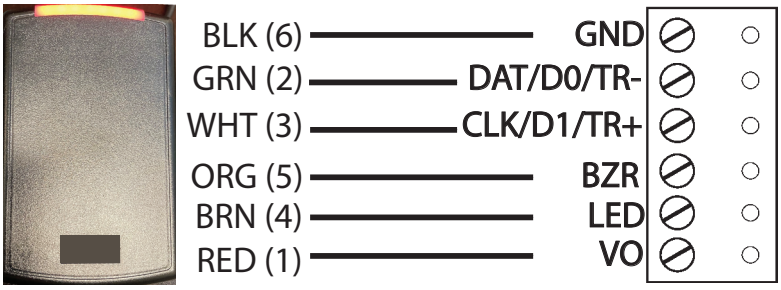
The MRDT communicates to the controller via a half-duplex, multidrop RS-485 interface. The total cable length is limited to 4,000 feet (1,219 m). Use 24 AWG cable with shield and characteristic impedance of 120 ohm for the RS-485 interface.

The MRDT supports a standard reader connection. The external reader is connected to J3 pins 9 through 14. Reader power can be passed through from the 12 Vdc input power. The MRDT supports D1/D0 and Clock/Data signaling as well as LED and buzzer control. The reader port configuration is set via DNA Fusion.

The table below describes the pin connections and signals for the Interface Connector (J3):

Pin #	Wire Color	Signal Description
1	Red	12 Vdc IN
2	Black	Ground
3	Blue	RS-485 TR+
4	Grey	RS-485 TR-
5	Green	Not Used
6	White	Not Used
7	Brown	Not Used
8	Orange	Not Used
9	Red	12 Vdc Pass Through to Reader
10	Green	Reader Data (or Data 0)
11	White	Reader Clock (or Data 1)
12	Brown	Reader LED
13	Orange	Reader Buzzer
14	Black	Ground

> *If using door inputs and outputs, the MRDT should be configured as an Alternate Reader when programmed into DNA Fusion.*



DIP Switch Settings

Switch 1 determines the RS-485 termination setting. Switch 2 selects the communication baud rate. Switch 3 selects the software configuration setting. Switch 4 is not used on this interface and should remain in the OFF position.

Display text settings are configured via the DNA Fusion software. For more information, see Chapter 12: Secured Areas in the DNA Fusion User Manual.

Selection	S1	S2	S3	S4
No Termination	OFF			
120 ohm Termination	ON			
Use Software Configuration		OFF		
Force RS-485, 38,400 Baud, and Address 31		ON		
Allow Software Configuration at Startup			OFF	
Disable Software Configuration at Startup			ON	
Not Used				OFF

If the MRDT is the first or last device on the RS-485 bus, DIP switch 1 must be set to the ON position to enable EOL termination. EOL termination is required for proper operation.

To restrict the ability to change the configuration during power-up, set DIP switch 3 to the ON position.

Software Configuration

The MRDT is configured during startup via the keypad. When power is applied, the screen will flash the following message: "Press Two Keys for Setup." If two keys are pressed simultaneously, the Setup screen will appear.

Selections include:

Selection	Description
Baud Rate:	This selection must match the baud rate of the LP controller.
Comm Address:	The communication address must be set to a unique value between 0-31.
Backlight:	00 = Always Off 99 = Always On 01-98 = Number of seconds the backlight will remain on after no activity.
LED:	Sets the LED drive type to match the reader connected to the on-board reader port. 1-Wire: Standard 1-wire interface (High = Red, Low = Green) 2-Wire: BRN wire controls red LED (High = Off, Low = On), ORG wire controls green LED (High = Off, Low = On), No Buzzer 2-Wire/Special: Corresponds to Dorado LED control.

Specifications

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

Primary Power:	*Voltage:*	12 Vdc ±15% (must be filtered)
	Current:	175 mA max. (terminal only, does not include external reader)
Communication:	*RS-485 Serial Port:*	4,000’ (1,219 m) max., 22 or 24 AWG min., 120 ohm impedance, shielded
	RS-485 Reader Port:	2,000’ (610 m) max., 22 or 24 AWG min., 120 ohm impedance, shielded
	TTL:	500’ (152 m) max., 18 AWG min., shielded
Reader Port:	*Power:*	Pass Through
	Interface:	Clock/Data or Data 1/Data 0
	LED Control:	2-wire or 1-wire bi-color
	Buzzer Control:	Available only in 1-wire LED control mode
Mechanical:	*Dimensions:*	6.75” (172 mm) W x 5.0” (127 mm) L x 1.0” (25 mm) H
	Weight:	14 oz. (400 g) nominal
Environmental:	*Temperature:*	-20 to +70 °C, storage / 0 to +50 °C, operating
	Humidity:	10% to 95% RHNC

This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.

NOTES:

Reader Subcontroller Comparison

The table below provides comparison information for the various reader subcontrollers.

Type	# of Readers	# of Inputs	# of Outputs	Speed	Power	Tamper
MR50-S3	1	2 (REX & Door Position)	2 (1 Small Relay)	Up to 115,200 bps	12 to 24 Vdc	1 (Cabinet)
MR52-S3	2	8	6	Up to 115,200 bps	12 to 24 Vdc	2 (Power/ Cabinet)
MR62e	4 (OSDP Only)	6	4	Up to 38,400 bps	PoE/PoE+ or 12 Vdc Power supply	0
MRDT	2 (1 Keypad & 1 Reader)	0	0	Up to 38,400 bps	12 Vdc	0

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I/O Subcontrollers

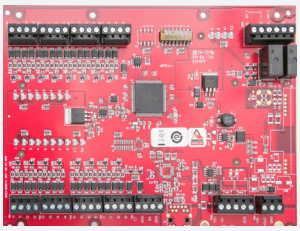
Input/output subcontrollers provide a wide range of application options within the open architecture system; they can be clustered or distributed to best suit each installation environment.

Open Options offers two I/O subcontrollers:

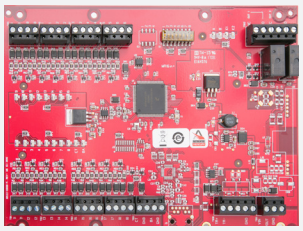
- MR16IN-S3 - A multi-device interface panel dedicated to point control and monitoring; supports 16 programmable input circuits and 2 programmable relay outputs. The MR16IN-S3 is the ideal choice for monitoring high concentrations of inputs combined with low output control requirements.
- MR16OUT-S3 - A multi-device interface panel dedicated to point control and monitoring; supports 16 programmable output circuits using Form C relay contacts. The MR16OUT-S3 is the ideal choice for monitoring high concentrations of output devices.

The MR16IN and MR16OUT described in this manual are Series 3 models. For information on previous models, refer to the Legacy Hardware Manual.

S3 Input/Output Subcontrollers



MR16IN



MR16OUT

Enhanced Features

The new generation of Series 3 I/O subcontrollers offers several enhanced features and improvements:

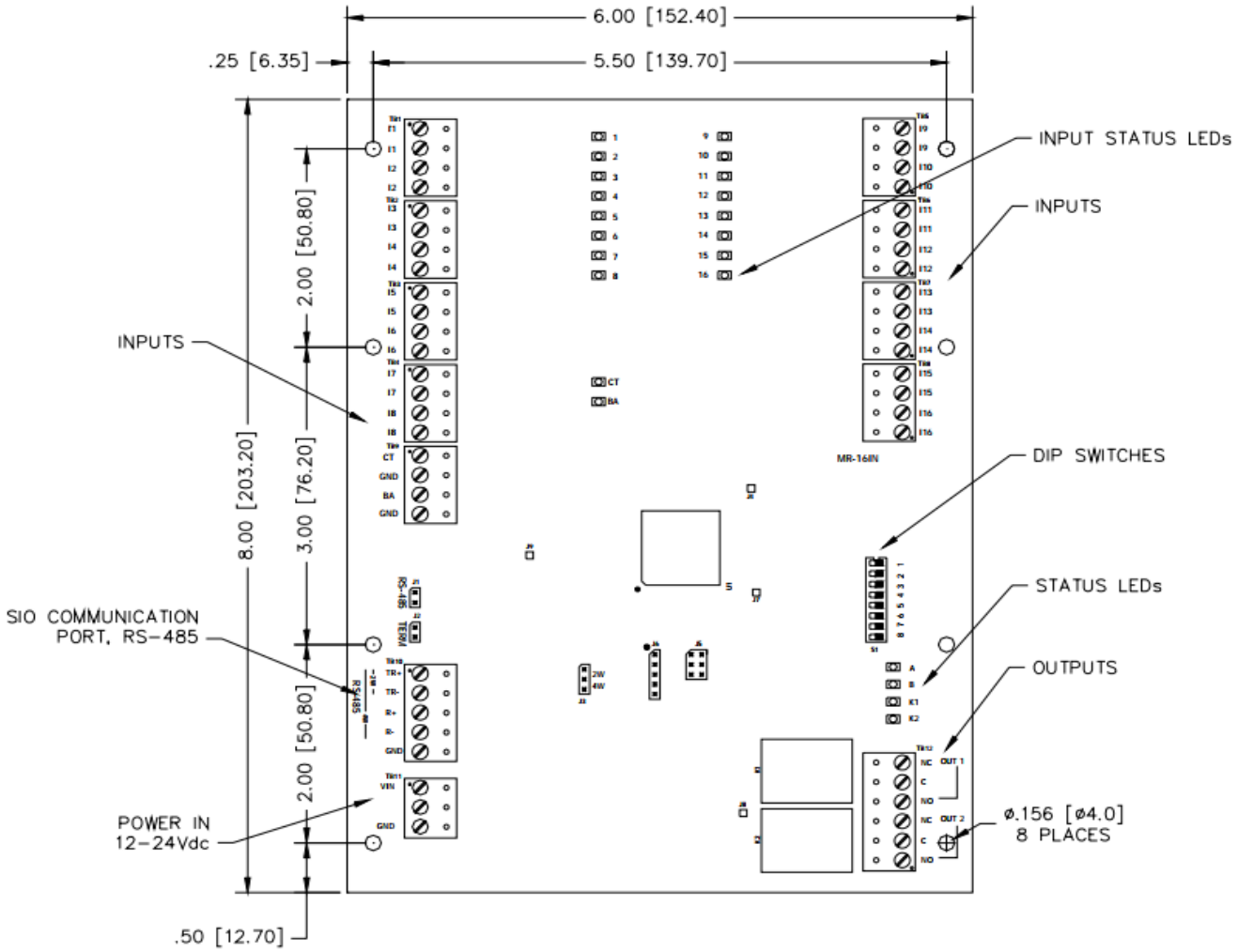
- Improved processor
- Increased memory
- Embedded crypto memory chip to secure and encrypt on-board sensitive data
- Backward compatibility and seamless upgrades for existing Series 1 & 2 deployments

The major firmware version for Series 3 modules is increased from 1 to three (3); the subcontrollers use firmware 3.2x.xx and above. This firmware can only be applied to Series 3 modules; likewise, the Series 3 devices will not accept Series 2 firmware.

MR16IN-S3 Input Subcontroller

The Series 3 MR16IN-S3 delivers a cost-effective and flexible means of expanding general input and alarm monitoring capability. With 16 programmable inputs and 2 relay outputs, the MR16IN-S3 is the ideal solution when it comes to I/O expansion.

The MR16IN-S3 provides sensor monitoring and output control for system integrators in security and access control applications. The subcontroller has 16 input circuits for supervised contact monitoring and 2 Form C relay contacts for load switching. Additionally, it contains 2 digital inputs that are used for cabinet tamper and power fault monitoring.



Installation

To install the MR16IN-S3 subcontroller:

1. If required, **mount** the subcontroller in an Open Options or Life Safety Power enclosure.
2. **Set** the Physical address using DIP switches 1-5.
3. **Wire** the supervised alarm inputs.
4. If needed, **wire** the relay outputs.
5. **Wire** the upstream controller communication.
6. If required, **wire** the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
7. **Wire** the power input.

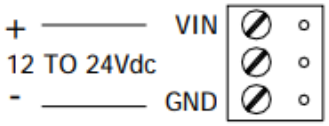
Default Settings

Each MR16IN-S3 board ships with the following default configuration:

- DIP Switches: OFF
- Physical Address: 0
- Serial Port Settings: No flow control
- Encryption: None
- Baud Rate: 38400

Power Supply

The MR16IN-S3 subcontroller requires a 12 to 24 Vdc power supply. Install the power source as close to the unit as possible and connect the VIN and GND ports on TB11 using a minimum of 18 AWG wires.

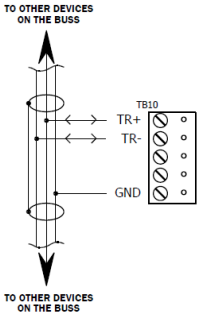


> *Observe polarity on* VIN*; the* VOUT *terminal on* TB11 *is the same as* VIN*.*

Upstream Communication Wiring

The MR16IN-S3 communicates to the intelligent controller (LP) via a 2-wire RS-485 interface. The interface allows multidrop communication on a single bus of up to 4,000 ft (1,200 m). Communication on the RS-485 serial port is asynchronous and half-duplex; it uses 1 start bit, 8 data bits, and 1 stop bit.

Connect the TR+, TR-, and GND ports on TB10 using twisted-pair cables (min. 24 AWG) with shield and 120 ohm impedance. The J3 termination jumper should only be installed on devices at the end of the RS-485 line. See Pg. 3-46 for jumper settings.

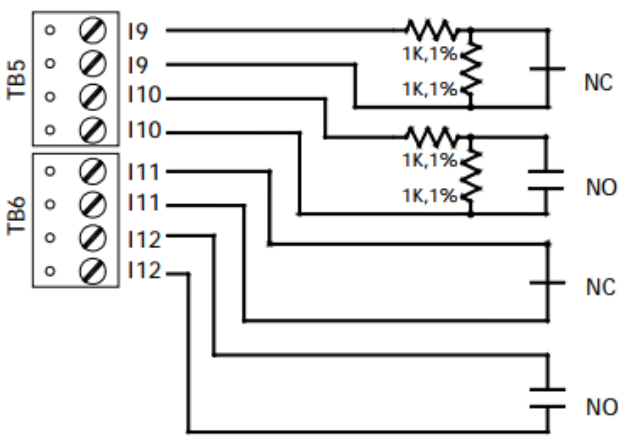


2-WIRE RS-485
(ONLY 2-WIRE RS-485 IS SUPPORTED)

Input Circuit Wiring

The MR16IN-S3 contains 16 inputs that can be used for door contacts, request-to-exit devices, alarm signals, and elevator floor control. Connect the alarm inputs (I1-I16) on TB1 through TB8 using twisted-pair cables (min. 24 AWG).

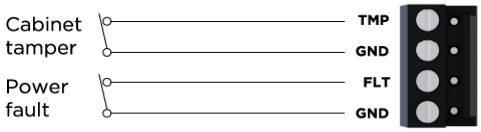
Inputs can be configured as supervised or unsupervised. Supervised inputs require two end-of-line (EOL) resistors in order to facilitate proper reporting. The standard supervised circuit uses 1K ohm, 1% resistors and should be located as close to the sensor as possible. For more information on supervised and unsupervised inputs, see Pg. 1-5.



Alarm Inputs Wiring

Connect inputs CT and BA on TB9 with twisted-pair cables to monitor cabinet tamper and power failure. These two inputs are only used to monitor contact closure and do not require EOL resistors.

If neither input is used, install the jumper and pigtail that ships with the board.

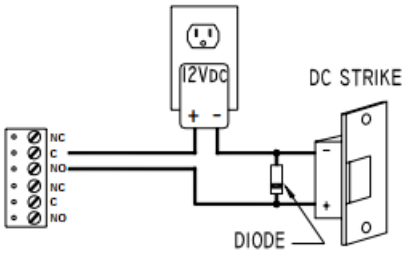


Relay Circuit Wiring

Two Form C contact relays, located on TB12, provide the ability to control door strikes and other devices. Each relay contains a Common pole (C), Normally Open pole (NO), and Normally Closed pole (NC).

Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes electromagnetic interference (EMI) that may interfere with normal operation of other equipment. A contact protection circuit must be used to increase system reliability and minimize the risk of premature contact failure. Use sufficient wire gauge for the load current to prevent voltage loss.

Open Options recommends using a diode to protect the relay circuit. Locate the diode as close to the load as possible (within 12 inches), as the effectiveness of the circuit will decrease if located farther away.



Diode Selection:

Diode current rating: 1 x strike count

Diode breakdown voltage: 4 x strike voltage

For 12 Vdc or 24 Vdc strike, diode 1N4002 (100 V/1 A) typical

Elevator Control

The Open Options system is capable of supporting elevator control for up to 128 floors. Depending on the configuration, a reader board and an MR16OUT-S3 board may be needed in addition to the MR16IN-S3.

To use this feature, DNA Fusion must be configured for elevators. See ***Pg. 3-33*** in the Technical Installation Manual for more information.

Hardware Setup

The MR16IN-S3 contains an end-of-line termination jumper and a set of 8 DIP switches.

DIP Switch Settings

Switches 1 through 5 determine the MR16IN-S3's physical address (0-31). Switches 6 and 7 select the communication baud rate. Switch 8 enables encrypted communication.

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

*For firmware versions prior to 1.30.1, this setting is 2,400 BPS.

**For firmware versions prior to 1.30.1, DIP switch 8 is not defined and should be set to the OFF position.

Jumper Settings

The table below describes the jumper settings for the MR16IN-S3.

Jumper(s)	Description
J3	RS-485 termination; install on end-of-line devices only.

All other jumpers are factory use only.

Terminal Block Connections

The table below describes the terminal block connections for the MR16IN-S3.

Terminal Block	Description	Connections	
TB 1-1	Input 1	I1	I1
TB 1-2	Input 2	I2	I2
TB 2-1	Input 3	I3	I3
TB 2-2	Input 4	I4	I4
TB 3-1	Input 5	I5	I5
TB 3-2	Input 6	I6	I6
TB 4-1	Input 7	I7	I7
TB 4-2	Input 8	I8	I8
TB 5-1	Input 9	I9	I9
TB 5-2	Input 10	I10	I10
TB 6-1	Input 11	I11	I11
TB 6-2	Input 12	I12	I12
TB 7-1	Input 13	I13	I13
TB 7-2	Input 14	I14	I14
TB 8-1	Input 15	I15	I15
TB 8-2	Input 16	I16	I16
TB 9-1	Cabinet Tamper	CT	
TB 9-2		GND	
TB 9-3	Power Fault	BA	
TB 9-4		GND	
TB 10-1	Host Communication (Port 1 - RS-485)	TR+	
TB 10-2		TR-	
TB 10-3		GND	
TB 11-1	Power Input	VIN	
TB 11-2		VOUT	
TB 11-3		GND	
TB 12-1	Output 1	NC	
TB 12-2		C	
TB 12-3		NO	
TB 12-4	Output 2	NC	
TB 12-5		C	
TB 12-6		NO	

Status LEDs

Power Up

All LEDs are OFF.

Initialization

Once power is applied, initialization for the MR16IN-S3 begins.

LED A is turned on at the beginning of the initialization. If the application program cannot be run, LED A will flash at a rapid rate; this indicates that firmware needs to be downloaded. If the sequence stops or repeats, contact Open Options Technical Support.

When initialization is complete, LEDs 1 through 16, CT, BA, A, and B are briefly sequenced ON then OFF.

Running

After the above sequence, the LEDs indicate the following states:

LED	Indicator	State
A	Online Status (Heartbeat)	Online (Non-encrypted communication) = 80% ON, 1-second rate Online (Encrypted communication) = 0.1 sec ON/OFF (7 flashes total), 0.3 sec OFF Offline = 20% ON, 1-second rate Error = 0.1 sec ON, 0.1 sec OFF
B	SIO Communication Port Status	ON = Downstream Communication Activity
CT	Cabinet Tamper	OFF = Inactive (briefly flashes ON every 3 seconds) ON = Active (briefly flashes OFF every 3 seconds) Rapid Flash = Fault
BA	Power Fault	
1-16	Input I1-I16 Status	OFF = Inactive (briefly flashes ON every 3 seconds) ON = Active (briefly flashes OFF every 3 seconds) Rapid Flash = Fault
K1-K2	Output 1-2 Status	ON = Energized

NOTES:

Specifications

The MR16IN-S3 is for use in low-voltage, Class 2 circuits only.

Primary Power:	*Voltage:*	12 to 24 Vdc ± 10%, 350 mA max.
Inputs:		16 supervised, EOL resistors, 1k ohm, 1%, 1/4 watt 2 unsupervised, dedicated for power fault and cabinet tamper
Outputs:		2 Form C relays: Normally open (NO) contact: 5 A @ 30 Vdc resistive Normally closed (NC) contact: 3 A @ 30 Vdc resistive
Communication:	*Upstream Port:*	2-wire RS-485: 9600, 19200, 38400, or 115200 bps
Wire Requirements:	*Power:*	18 AWG, 1 twisted pair
	RS-485:	24 AWG, 120 ohm impedance, twisted pair with drain wire and shield, 4,000’ (1,200 m) max.
	Alarm Inputs:	1 twisted pair, 30 ohms max.
	Outputs:	As required for the load
Mechanical:	*Dimension:*	6” (152 mm) W x 8” (203 mm) L x 1” (25.4 mm) H
	Weight:	9 oz. (250 g) nominal
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

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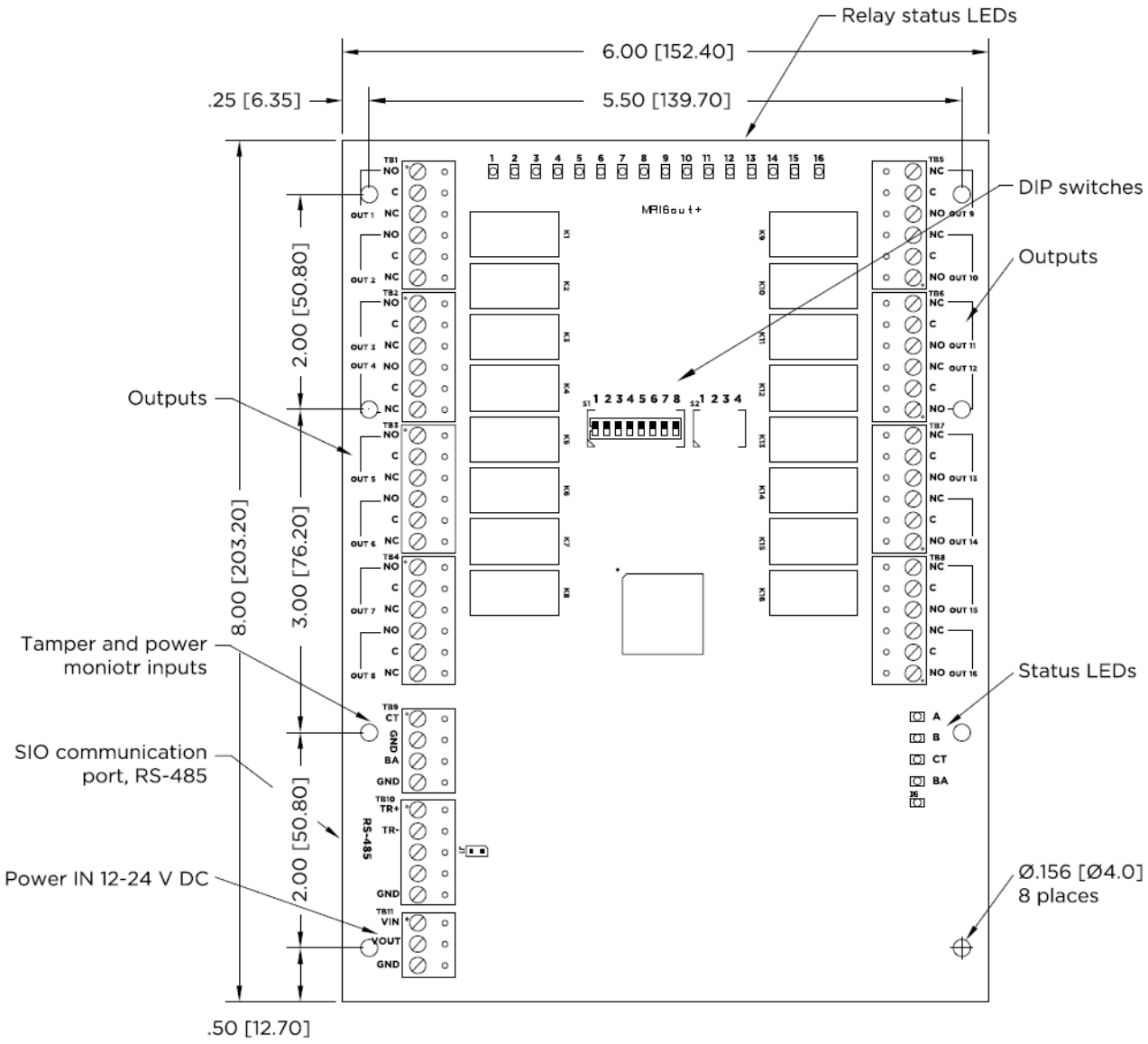
MR16OUT-S3 Output Subcontroller

The Series 3 MR16OUT-S3 is the ideal solution when expanding the output capability of a system. The 16 programmable relay outputs can be used for general facility control such as lighting, energy management, and door/elevator control.

The MR16OUT-S3 provides output controls for system integrators in security/access control and other applications. It contains 16 Form C relay contacts for load switching as well as two digital inputs for monitoring the cabinet tamper and power status. The processor requires 12 to 24 Vdc for power.



Installation

To install the MR16OUT-S3 subcontroller:

1. If required, **mount** the subcontroller in an Open Options of Life Safety Power enclosure.
2. **Set** the physical address using DIP switches 1-5.
3. **Wire** the relay outputs.
4. **Wire** the upstream controller communication.
5. If required, **wire** the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
6. **Wire** the power input.

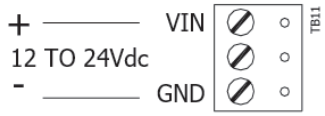
Default Settings

Each MR16OUT-S3 board ships with the following default configuration:

- DIP Switches: OFF
- Physical Address: 0
- Serial Port Settings: No flow control
- Encryption: None
- Baud Rate: 38400

Power Supply

The MR16OUT-S3 subcontroller requires a 12 to 24 Vdc power supply. Install the power source as close to the unit as possible and connect the VIN and GND ports on TB11 using a minimum of 18 AWG wires.

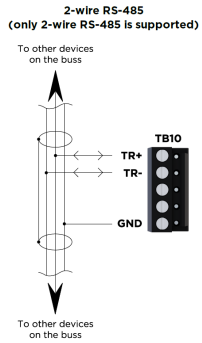


> *Observe polarity on* VIN*; the* VOUT *terminal on* TB11 *is the same as* VIN*.*

Upstream Communication Wiring

The MR16OUT-S3 communicates to the intelligent controller (LP) via a 2-wire RS-485 interface. The interface allows multidrop communication on a single bus of up to 4,000 ft (1,200 m). Communication on the RS-485 serial port is asynchronous and half-duplex; it uses 1 start bit, 8 data bits, and 1 stop bit.

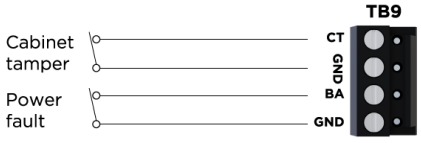
Connect the TR+, TR-, and GND ports on TB10 using twisted-pair cables (min. 24 AWG) with shield and 120 ohm impedance. The J1 termination jumper should only be installed on devices at the end of the RS-485 line. See Pg. 3-55 for jumper settings.



Alarm Inputs Wiring

Connect inputs CT and BA on TB9 with twisted-pair cables to monitor the cabinet tamper and power failure. These two inputs are only used to monitor contact closure and do not require EOL resistors.

If neither input is used, install the jumper and pigtail that ships with the board.



Elevator Control

The Open Options system is capable of supporting elevator control for up to 128 floors. Depending on the configuration, a reader board and an MR16IN-S3 board may be needed in addition to the MR16OUT-S3.

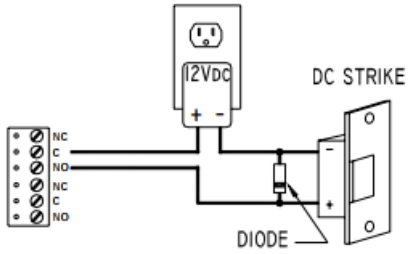
To use this feature, DNA Fusion must be configured for elevators. See ***Pg. 3-33*** in the Technical Installation Manual for more information.

Relay Outputs

16 Form C contact relays, located on TB1 through TB8, provide the ability to control door strikes and other devices. The relays are rated at 5 A @ 30 Vdc, dry contact configuration. Each relay contains a Common pole (C), Normally Open pole (NO), and Normally Closed pole (NC).

Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes electromagnetic interference (EMI) that may interfere with normal operation of other equipment. A contact protection circuit must be used to increase system reliability and minimize the risk of premature contact failure. Use sufficient wire gauge for the load current to prevent voltage loss.

Open Options recommends using a diode to protect the relay circuit. Locate the diode as close to the load as possible (within 12 inches), as the effectiveness of the circuit will decrease if located farther away.



Diode Selection:

Diode current rating: 1 x strike count

Diode breakdown voltage: 4 x strike voltage

For 12 Vdc or 24 Vdc strike, diode 1N4002 (100 V/1 A) typical

Status LEDs

Power Up

All LEDs are OFF.

Initialization

Once power is applied, initialization for the MR16OUT-S3 begins.

LED A is turned on at the beginning of the initialization. If the application program cannot be run, LED A will flash at a rapid rate; this indicates that firmware needs to be downloaded. If the sequence stops or repeats, contact Open Options Technical Support.

When initialization is complete, LEDs A, B, CT, and BA are briefly sequenced ON then OFF.

Running

After the above sequence, the LEDs indicate the following states:

LED	Description	Indicator
A	Online Status (Heartbeat)	Online (Non-encrypted communication) = 80% ON, 1-second rate Online (Encrypted communication) = 0.1 sec ON/OFF (7 flashes total), 0.3 sec OFF Offline = 20% ON, 1-second rate Error = 0.1 sec ON, 0.1 sec OFF
B	SIO Communication Port Status	ON = Downstream Communication Activity
CT	Cabinet Tamper	OFF = Inactive (briefly flashes ON every 3 seconds) ON = Active (briefly flashes OFF every 3 seconds) Rapid Flash = Fault
BA	Power Fault	
1-16	Output Relay Status (OUT 1 - OUT 16)	ON= Energized

Hardware Setup

The MR16OUT-S3 contains an end-of-line termination jumper and a set of 8 DIP switches.

DIP Switch Settings

Switches 1 through 5 determine the MR16OUT-S3's physical address (0-31). Switches 6 and 7 select the communication baud rate. Switch 8 enables encrypted communication.

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

*For firmware versions prior to 1.30.1, this setting is 2,400 BPS.

**For firmware versions prior to 1.30.1, DIP switch 8 is not defined and should be set to the OFF position.

Jumper Settings

The table below describes the jumper settings for the MR16OUT-S3.

Jumper(s)	Description
J1	RS-485 termination; install on end-of-line devices only.

Terminal Block Connections

The table below describes the terminal block connections for the MR16OUT-S3.

Terminal Block	Description	Connections		
TB 1-1	Output 1	NO	C	NC
TB 1-2	Output 2	NO	C	NC
TB 2-1	Output 3	NO	C	NC
TB 2-2	Output 4	NO	C	NC
TB 3-1	Output 5	NO	C	NC
TB 3-2	Output 6	NO	C	NC
TB 4-1	Output 7	NO	C	NC
TB 4-2	Output 8	NO	C	NC
TB 5-1	Output 9	NC	C	NO
TB 5-2	Output 10	NC	C	NO
TB 6-1	Output 11	NC	C	NO
TB 6-2	Output 12	NC	C	NO
TB 7-1	Output 13	NC	C	NO
TB 7-2	Output 14	NC	C	NO
TB 8-1	Output 15	NC	C	NO
TB 8-2	Output 16	NC	C	NO
TB 9-1	Cabinet Tamper	CT		
TB 9-2		GND		
TB 9-3	Power Fault	BA		
TB 9-4		GND		
TB 10-1	Host Communication (Port 1 - RS-485)	TR+		
TB 10-2		TR-		
TB 10-3		GND		
TB 11-1	Power Input	VIN		
TB 11-2		VOUT		
TB 11-3		GND		

Specifications

The MR16OUT-S3 is for use in low-voltage, Class 2 circuits only.

Primary Power:	*Voltage:*	12 to 24 Vdc ± 10%, 1100 mA max.
Outputs:		16 Form C relays: Normally open (NO) contact: 5 A @ 30 Vdc resistive Normally closed (NC) contact: 3 A @ 30 Vdc resistive
Inputs:		2 unsupervised, dedicated for cabinet tamper and power fault monitoring
Communication:	*Upstream Port:*	2-wire RS-485: 9600, 19200, 38400, or 115200 bps
Wire Requirements:	*Power:*	18 AWG, 1 twisted pair
	RS-485:	24 AWG, 120 ohm impedance, twisted pair with drain wire and shield, 4,000’ (1,200 m) max.
	Alarm Inputs:	1 twisted pair, 30 ohms max.
	Outputs:	As required for the load
Mechanical:	*Dimension:*	6” (152 mm) W x 8” (203 mm) L x 1” (25.4 mm) H
	Weight:	14 oz. (400 g) nominal
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	5 to 95% RHNC

Specifications are subject to change without notice.

NOTES:

I/O Subcontroller Comparison

The following table provides comparison information for the I/O subcontrollers.

Type	Inputs	Ouputs	Speed	Power	Tampers
MR16IN-S3	16	2	Up to 115,200	12 to 24 Vdc	2 (Cabinet/Power)
MR16OUT-S3	0	16	Up to 115,200	12 to 24 Vdc	2 (Cabinet/Power)

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