

SCP

INSTALLATION GUIDE



FCC Compliance

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THIS CLASS A DIGITAL APPARATUS MEETS ALL REQUIREMENTS OF THE CANADIAN INTERFERENCE-CAUSING EQUIPMENT REGULATIONS.

CET APPAREIL NUMÉRIQUE DE LA CLASSE A RÈSPECTE TOUTES LES EXIGENCES DU RÈGLEMENT SUR LE MATÉRIEL BROUILLER DU CANADA.

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SCP-2 Two Door Controller

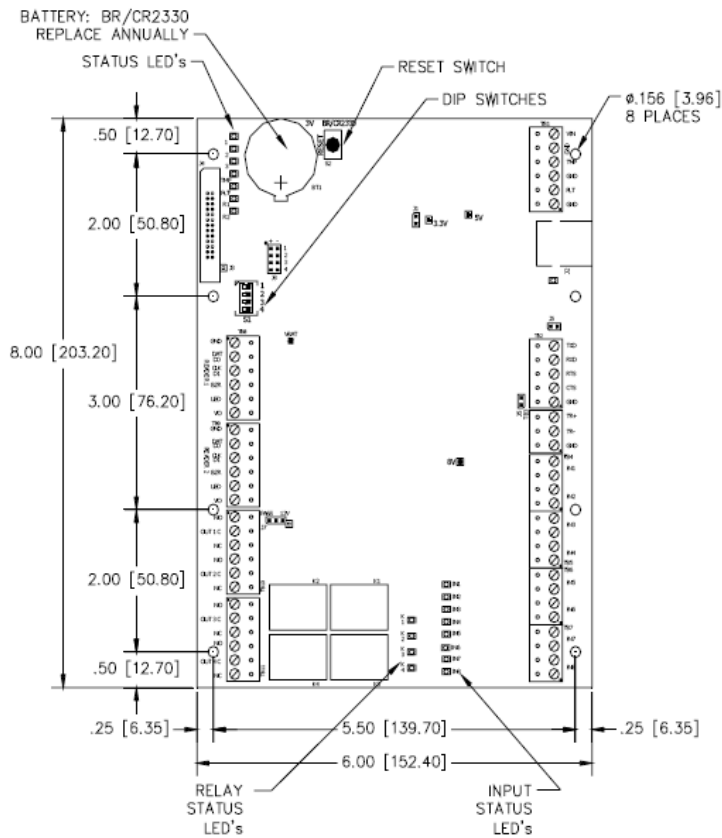
Installation and Specifications

General

The SCP-2 controller provides a single board solution for two-door control. The SCP-2 stores the database for the hardware configuration and cardholder database in nonvolatile memory. The event log buffer is stored in battery backed memory. Configuration data and event/status reports are exchanged with the host via port 0, 10-BaseT/100Base-TX Ethernet interface or port 1, RS-232 interface. Additional I/O devices can communicate via the sub-controller communication port, 2-wire RS-485.

Two physical barriers can be controlled by the SCP-2. Each reader port can accommodate a readhead that utilizes wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling standards, one or two wire LED controls, and buzzer control (one wire LED mode only). Four form-c relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 5A @ 30Vdc, dry contact configuration. Eight inputs are provided for monitoring the door contacts, exit push buttons and alarm contacts. The SCP-2 requires 12-24Vdc for power. It is recommended that the SCP-2 be mounted .25" minimum above any conductive surface.

SCP-2 Hardware



Wiring and Set-Up

CONNECTION		
TB1	Power Input	VIN: 12 to 24Vdc
		GND
	Cabinet Tamper Input	TMP
		GND
	Power Fault Input	FLT
		GND
TB2	Host Port 1	TXD (RS-232)
		RXD (RS-232)
		RTS (RS-232)
		CTS (RS-232)
		GND (RS-232)
TB3	SIO Port	TR+ (2-wire RS-485)
		TR- (2-wire RS-485)
		GND (2-wire RS-485)
TB4	Input 1	IN1
		IN1
	Input 2	IN2
		IN2
TB5	Input 3	IN3
		IN3
	Input 4	IN4
		IN4
TB6	Input 5	IN5
		IN5
	Input 6	IN6
		IN6
TB7	Input 7	IN7
		IN7
	Input 8	IN8
		IN8

CONNECTION			
TB8	Reader 1	GND: Ground	
		DAT/D0: Data/Data 0/TR-	
		CLK/D1: Clock/Data 1/TR+	
		BZR: Reader Buzzer	
		LED: Reader LED	
		VO: Reader Power	
TB9	Reader 2	GND: Ground	
		DAT/D0: Data/Data 0/TR-	
		CLK/D1: Clock/Data 1/TR+	
		BZR: Reader Buzzer	
		LED: Reader LED	
		VO: Reader Power	
TB10	Out 1	NO: Normally Open Contact	
		C: Common	
			NC: Normally Closed Contact
	Out 2	NO: Normally Open Contact	
C: Common			
		NC: Normally Closed Contact	
TB11	Out 3	NO: Normally Open Contact	
		C: Common	
			NC: Normally Closed Contact
	Out 4	NO: Normally Open Contact	
C: Common			
		NC: Normally Closed Contact	

Jumpers and Switches

The SCP-2 controller hardware is configured with a number of jumpers and 4 position DIP switches (S1). These jumpers/switches set the port interface, end of line termination, and operating mode configuration.

Please refer to the tables below for the settings:

JP1 through JP8 Jumpers:

JUMPERS	SET AT	DESCRIPTION
J1	N/A	Factory Use Only
J2	N/A	10base-T/100base-Tx Ethernet Connection (Port 0)
J3	N/A	Factory Use Only
J4	N/A	Factory Use Only
J5	OFF	Port 2 Rs-485 Eol Terminator is Off
	ON	Port 2 Rs-485 Eol Terminator is On
J6	N/A	Factory Use Only
J7		Reader Power Select *** See Note 1 ***
	12V	12Vdc at Reader Ports
	PASS	Vin "Pass Through" to Reader Ports
J8-1	N/A	Remote Status Led #1, See Note 2
J8-2	N/A	Remote Status Led #2, See Note 2
J8-3	N/A	Remote Status Led #3, See Note 2
J8-4	N/A	Remote Status Led #4, See Note 2

Note 1: The input power (VIN) must be 20Vdc minimum if the 12Vdc selection is to be used.

Note 2: Observe POLARITY connection to LED. External current limiting is not required.

S1 DIP Switch:

Set DIP switch as required.

S1-1	S1-2	S1-3	S1-4	SELECTION
OFF	OFF	OFF	OFF	Normal Operating Mode
ON	OFF	OFF	OFF	Configuration Through Port 1
OFF	ON	OFF	OFF	Undefined
ON	ON	OFF	OFF	Use Default TCP/IP Address: 192.168.0.251
				All Other Settings Undefined

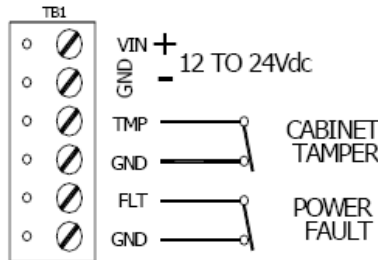
S2 resets SCP-2.

Input Power, Cabinet Tamper and UPS Fault Input Wiring

The SCP-2 requires 12-24Vdc power. Locate power source as close to the unit as possible. Connect power with minimum of 18AWG wire.

! Connect the GND signal to earth ground in **ONE LOCATION** within the system!
Multiple earth ground connections may cause ground loop problems and is not advised.
Observe POLARITY on 12-24Vdc input!

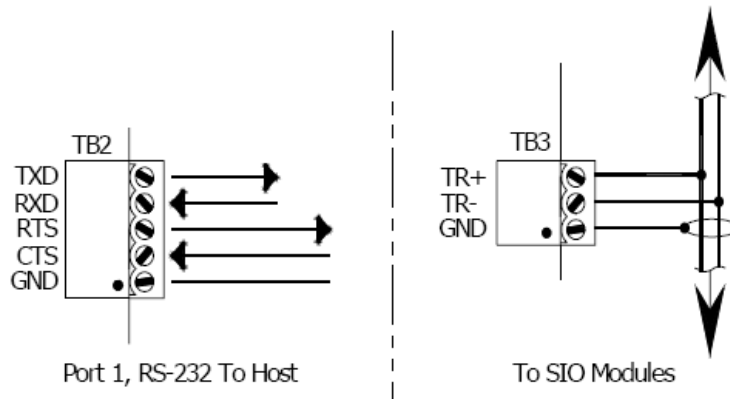
There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.



Communication Wiring

The SCP-2 controller communicates to the host via on-board 10-BaseT/100Base-TX Ethernet interface (port 0) and/or RS-232 interface (port 1). RS-232 interface is for direct one to one connection to a host computer port or via modem, 25 feet maximum. The sub-controller communication port (TB2) is a 2-wire RS-485 interface which can be used to connect additional I/O panels (sub-controllers). The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,200m). Use twisted pairs (minimum 24 AWG) with an overall shield for communication.

! **IMPORTANT NOTE!** Install the termination jumper **ONLY** on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel!

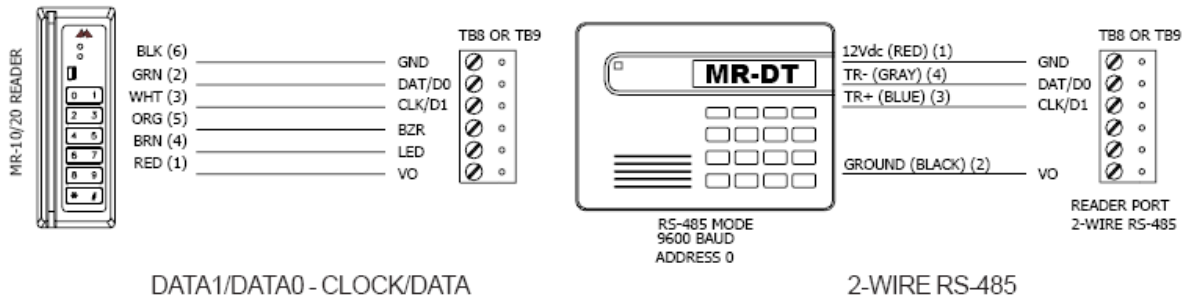


Reader Wiring

Each reader port supports wiegand, magnetic stripe, and 2-Wire RS-485 electrical interfaces. Voltage at the reader port (VO) is passed-through from the input voltage of the SCP-2 (TB1-VIN). Current is limited to 150mA for each reader port. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacturer specifications for cabling requirements. In the 2-wire LED mode the Buzzer output is used to drive the second LED. Reader port configuration is set via IS2000.

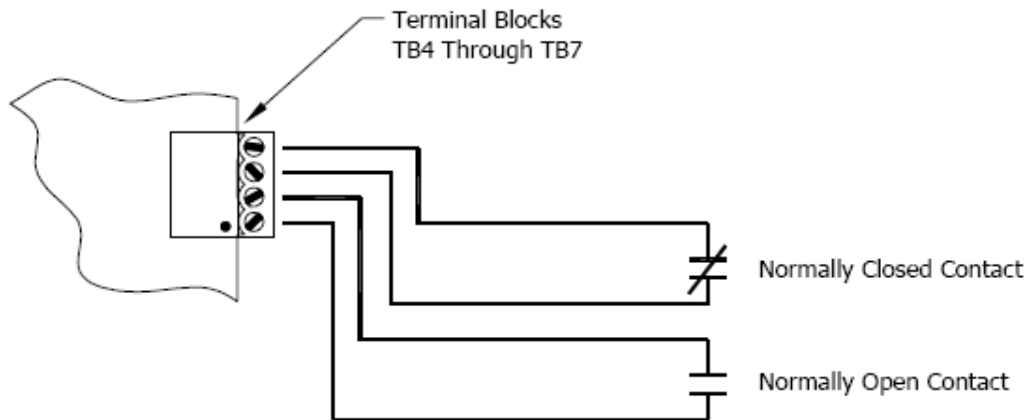
PASS 12V	READER POWER
<input type="checkbox"/>	12Vdc IS AVAILABLE ON READER PORTS (VIN \geq 20Vdc)
<input checked="" type="checkbox"/>	VIN POWER IS "PASSED THROUGH" TO READER PORTS

J7 - READER POWER SELECT



Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts.

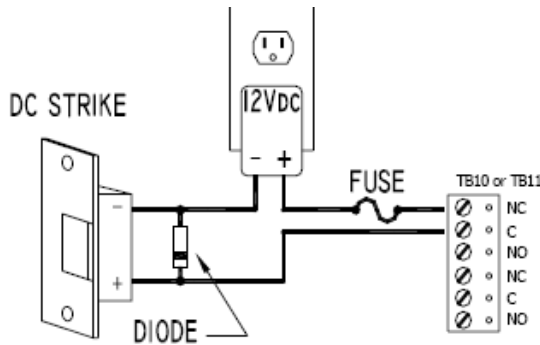


Relay Circuit Wiring

Four relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 5A @ 30Vdc, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a maglock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

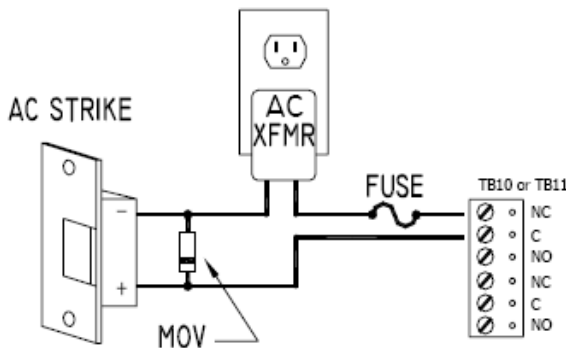
Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay.

Wire should be of sufficient gauge to avoid voltage loss.



Diode Selection:

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



MOV Selection:

Clamp voltage: 1.5x Vac RMS. For 24Vac strike, Panasonic ERZ-C07DK470 typical.

Memory and Real-Time Clock Backup Battery

The event log buffer and the real time clock are backed up by a 3V lithium battery. Without power being applied to the SCP-2, the battery will retain configurations and transactions for 3 months. This battery should be replaced **annually** to insure that proper backup function is maintained. Remove the insulator from the battery holder after installation. Battery type: BR2325, BR2330, or CR2330.

Status LEDs

Power-up: All LED's **OFF**.

Initialization: LED's are sequenced during initialization. If the sequence stops or repeats, contact technical support.

Running: After the above sequence, the LEDs have the following definitions:

LED	DESCRIPTION
1	Off-Line / On-Line and Battery Status Off-Line = 20% ON, On-Line = 80% ON Double Flash if Battery is Low
2	Primary Host Communication Activity (Serial Port 1)
3	Internal SIO Communication Activity
TMP	External SIO Communication Activity
FLT	Undefined
R1	Reader 1: Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data
R2	Reader 2: Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data
D16	Flashes with Host Communication (Ethernet Port 0)
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	OFF = No Link, ON = Good Link, Flashing = Ethernet Activity
IN1	Input IN1 Status: OFF = Inactive, ON = Active, Flash = Trouble
IN2	Input IN2 Status: OFF = Inactive, ON = Active, Flash = Trouble
IN3	Input IN3 Status: OFF = Inactive, ON = Active, Flash = Trouble
IN4	Input IN4 Status: OFF = Inactive, ON = Active, Flash = Trouble
IN5	Input IN5 Status: OFF = Inactive, ON = Active, Flash = Trouble
IN6	Input IN6 Status: OFF = Inactive, ON = Active, Flash = Trouble
IN7	Input IN7 Status: OFF = Inactive, ON = Active, Flash = Trouble
IN8	Input IN8 Status: OFF = Inactive, ON = Active, Flash = Trouble
K1	Relay K1: ON = Energized
K2	Relay K2: ON = Energized
K3	Relay K3: ON = Energized
K4	Relay K4: ON = Energized

Specifications

The interface is for use in low voltage, class 2 circuit only.

The installation of this device must comply with all local fire and electrical codes.

Primary Power	12-24Vdc \pm 10%, 500mA maximum (reader current not included) 12Vdc @ 250mA (plus reader current) nominal 24Vdc @ 150mA (plus reader current) nominal
Memory and Clock Backup Battery	3 Volt Lithium, type BR2325, BR2330 or CR2330
Host Communication	Ethernet: 10BaseT/100Base-TX, and RS-232 9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
Sub-Controller Communication	2-wire RS-485, 2,400 to 38,400 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
Inputs	2 dedicated for tamper and UPS fault monitoring. 8 for door position monitoring, request to exit or alarm contacts.
Relays	4, Form-C, 5A @ 30Vdc, resistive.
Reader Interface	
Reader Power (jumper selectable)	12Vdc \pm 10% regulated, current limited to 150mA for each reader. or 12 to 24Vdc \pm 10% (input voltage passed through) current limited to 150mA for each reader
Data Inputs	TTL compatible inputs, magstripe and wiegand standards supported. Maximum cable length: 500' (152m)
RS-485 Mode	9600 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 4000' (1,200m).
LED Output	TTL levels, high>3V, Low<0.5V, 5mA source/sink maximum.
Buzzer Output	TTL levels, high>3V, Low<0.5V, Low=Active, 5mA source/sink maximum.
Cable requirements	
Power	1 twisted pair, 18 AWG
Ethernet	CAT-5
RS-485	24AWG, 4,000ft (1,200m) maximum, twisted pair(s) with an overall shield.
RS-232	24AWG, 25ft (7.6m) maximum.
Alarm Input	1 twisted pair, 30 ohms maximum, typically 22 AWG @ 1000ft (300m).
Environmental	
Temperature	0 to 70 °C, operating, -55 to +85 °C, storage
Humidity	0 to 95% RHNC
Mechanical	
Dimension	8 in. (203.2mm) W x 6 in. (152.4mm) L x 1 in. (25mm) H
Weight	9 oz (255 gm) nominal, board only

Jumpers and Switches

Jumpers

The SCP-M hardware interface is configured using jumpers to set-up the port interface and end of line termination.

JUMPERS	SET AT	DESCRIPTION
J2	N/A	Factory use only
J3	N/A	Factory use only
J4	OFF	Port 2 RS-485 EOL Terminator is off
	ON	Port 2 RS-485 EOL Terminator is on
J5	OFF	Port 3 RS-485 EOL Terminator is off
	ON	Port 3 RS-485 EOL Terminator is on
J6	N/A	Lantronix Micro100 connection - Port 1
J7, J8, J9	232	Port 1 is RS-232
	485	Port 1 is RS-485
J10	OFF	Port 1 RS-485 EOL Terminator is off
	ON	Port 1 RS-485 EOL Terminator is on
J11	N/A	Factory use only
J12	N/A	Factory use only
J13	N/A	Factory use only
J14	N/A	Remote status LED # 1, see note 1
J15	N/A	Remote status LED # 2, see note 1
J16	N/A	Remote status LED # 3, see note 1
J17	N/A	Remote status LED # 4, see note 1

NOTE 1: Observe polarity connection to LED. External current limiting is not required.

DIP Switches

The four switches on S1 DIP switch configure the operating mode of the SCP-M. DIP switches are read on power-up except where noted. Pressing switch S2 causes the SCP-M to reset.

1	2	3	4	Definitions
OFF	OFF	X	OFF	Normal operating mode
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot.
OFF	ON	X	OFF	Use factory default communication parameters.
ON	ON	X	OFF	Use OEM default communication parameters. Contact system manufacture for details. See Bulk Erase below.
X	X	ON	X	Disable TLS secure link. Switch is read only when logging on.

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

Factory Default Communication Parameters

Network: static IP address = 192.168.0.251
 Communication address: 0
 Primary Host port: IP server, no encryption, port 3001.
 Alternate Host port: RS-232, 38400 baud, no encryption, no flow control.

Bulk Erase Configuration Memory

Use the bulk erase function to erase all configuration and cardholder databases. When power is applied with S1 switches set to 1 & 2 ON and 3 & 4 OFF, there is a 10-second window that if switch 1 or 2 is changed to the OFF position, memory is erased. The LEDs flash the following pattern when in the reset window: LED 1 & 2 and LED 3 & 4 flash alternately at .5 second rate. When erasing memory, LED 2 flashes at a 2 seconds rate.

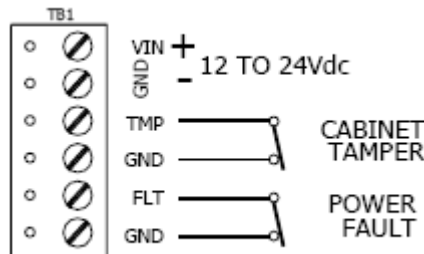
DO NOT CYCLE POWER.

Erasing memory takes approximately 60 seconds. LEDs 1 and 4 flash for 10 seconds after the memory has been erased, then the SCP-M will reboot.

Input Power, Cabinet Tamper and UPS Fault Input Wiring

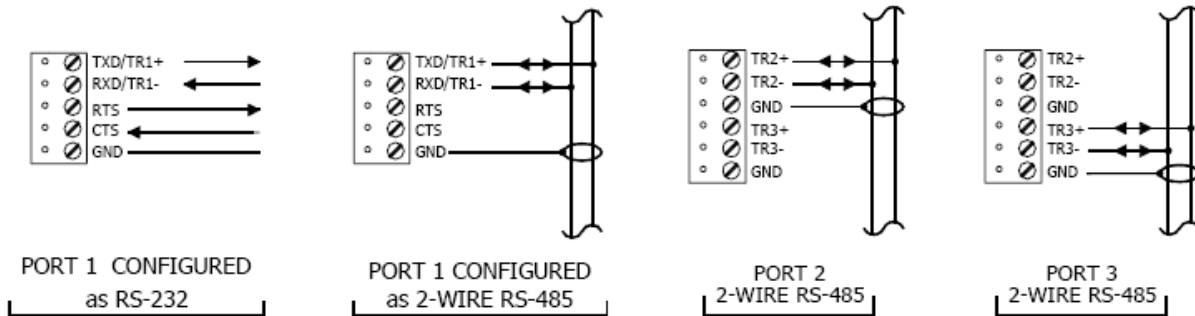
The SCP-M requires 12-24Vdc power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire. There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

! Connect the GND signal to earth ground in **ONE LOCATION** within the system!
 Multiple earth ground connections may cause ground loop problems and is not advised.
 Observe **POLARITY** on 12-24Vdc input!



Communication Wiring

The SCP-M communicates to the host via: on-board Ethernet 10-BaseT/100Base-TX port or on port 1. Port 1 may be configured as RS-232, 2-wire RS-485 or optional Lantronix Ethernet 10-BaseT/100Base-TX Micro100 interface. RS-232 interface is for direct one to one connection to a host computer port, or a modem. Ports 2 and 3 utilize 2-wire RS-485 interface. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,200 m). Use twisted pair (minimum 24 AWG) with shield for the communication with 120 ohm impedance. Install termination jumpers only on the units at each end of the communication line.



Memory Backup Battery

The static RAM and the real time clock device are powered by a lithium battery when input power is removed. This battery should 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 is erased. All configuration data must be re-downloaded. Battery type: BR2325, BR2330, or CR2330.

Status LEDs

Power-up: All LED's OFF.

Initialization: LED 1 through 6 are sequenced during initialization. LED 1, 3, and 5 are turned ON for approximately 4 seconds after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 3 seconds without a card database. Each 10,000 cards will add about 3 seconds to the application initialization. When LED 1 through 4 flash at the same time, data is being read from or written to flash memory, do not cycle power when in this state. If the sequence stops or repeats, perform one of the steps below.

1. Power-up and tag database as invalid
 - Remove input power to the SCP-M
 - Place an insulator under the battery clip, wait 5-10 seconds
 - Remove insulator
 - Reapply input power.

2. Power-up without loading database into RAM
 - Remove input power to the SCP-M
 - Set DIP to a default mode (in a default mode, the database is not loaded into RAM)
 - Reapply input power

3. Erase all of the configuration and databases (also erases card database for security reasons):

See procedure in DIP switches.

If clearing the memory does not correct the initialization problem, contact technical support.

Running

LED	DESCRIPTION
1	Off-Line / On-Line and Battery Status
	Off-Line = 20% ON, On-Line = 80% ON
	Double Flash if Battery is Low
2	Host Communication Activity (Ethernet or Serial Port 1)
3	Port 2 Communication Activity
4	Port 3 Communication Activity
5	Unassigned
6	Unassigned
D7	Host Communication (Ethernet Port 0)
YEL	On-board Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S (Yellow LED)
GRN	OFF = No Link, ON = Good Link (Green LED), Flashing = Ethernet Activity

Specifications

The processor is for use in low voltage, class 2 circuits only.

Primary power	12 to 24Vdc \pm 10%, 300mA maximum 12Vdc @ 240mA (325mA with Micro100) nominal 24Vdc @ 135mA (175mA with Micro100) nominal
Memory and Clock Backup	3 Volt Lithium, type BR2325, BR2330, CR2330
Ports	
Port 1	RS-232 or 2-wire RS-485: 9,600 to 115,200 bps, async
Port 2 & 3	2-wire RS-485: 2,400 to 38,400 bps, async
Inputs	2 non-supervised, dedicated for cabinet tamper and power fault monitoring
Cable requirements	
Power	1 twisted pair, 18 AWG
RS-485	24 AWG, 4,000ft (1,200m) maximum, twisted pair with shield. 120 Ohm
RS-232	24 AWG, 25ft (7.6m) maximum
Ethernet	Cat 5
Alarm input	1 twisted pair, 30 ohms maximum
Environmental	
Temperature	0 to 70°C, operating; -55 to +85°C, storage
Humidity	0 to 95% RHNC
Mechanical	
Dimension	5 in. (127mm) W x 6 in. (152.4mm) L x 1 in. (25mm) H
Weight	4.1 oz (115 gm) nominal
Lantronix NIC support	Standoff size - Diameter .125 inch x 7/16 inch long Richco, Inc. part number LMSP-7-01, 3 pieces (Not supplied)

Specification subject to change without notice.

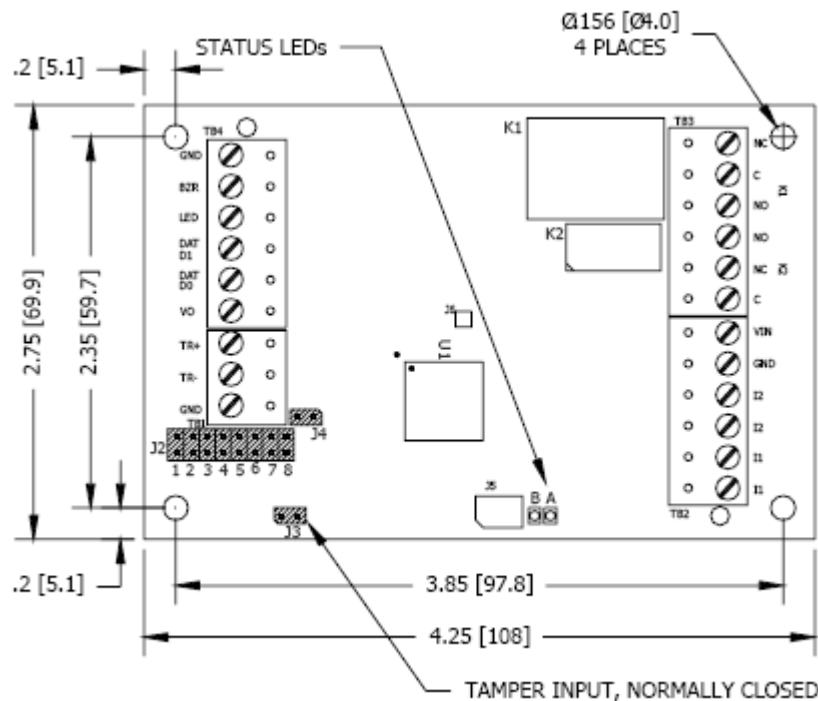
MR-50 Single Door Sub-Controller

Installation and Specifications

General

The MR-50 Single Door Sub-Controller provides a solution for interfacing to a TTL/wiegand/ RS-485 type reader and door hardware. The MR-50 can accept data from a reader with clock/data, wiegand signaling or 2-wire RS-485, provide a tri-stated LED control and buzzer control. Two form-C relay outputs may be used for strike control or alarm signaling. Two supervised inputs are provided for monitoring the door contact and exit push button. Communication to the interface is accomplished via a 2-wire RS-485 interface. The MR-50 requires 12 to 24Vdc for power.

MR-50 Hardware

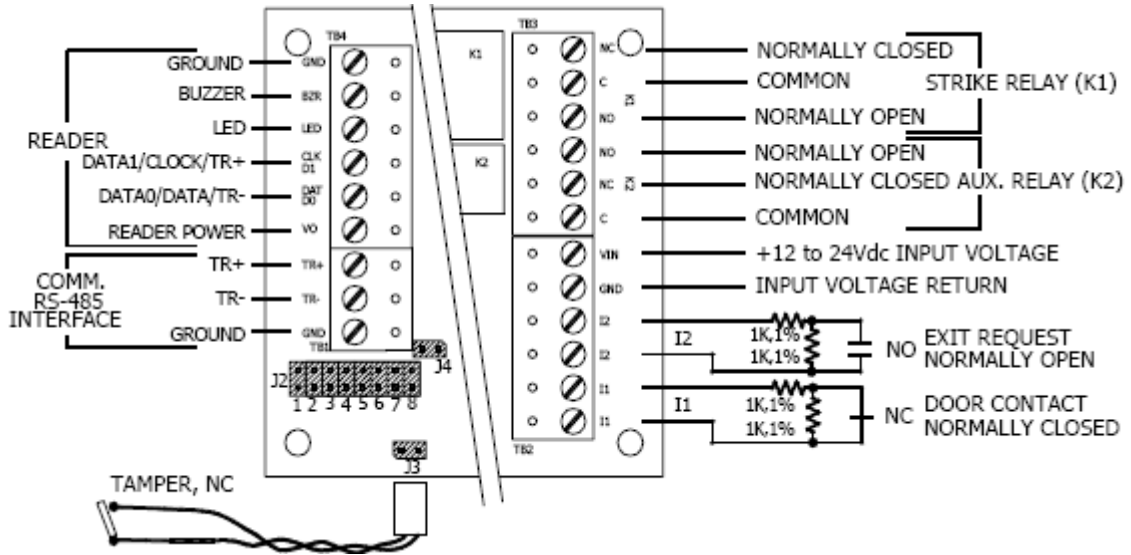


Power, Reader and Door Hardware Wiring

All interconnections to the interface are via quick-disconnect terminal blocks.

The MR-50 requires 12 to 24Vdc $\pm 10\%$ for power. The power source must be filtered. The input power is passed through to the reader terminal strip and is available for powering a reader. The MR-50 supports clock/data, wiegand or 2-wire RS-485 reader interface signaling. Two supervised

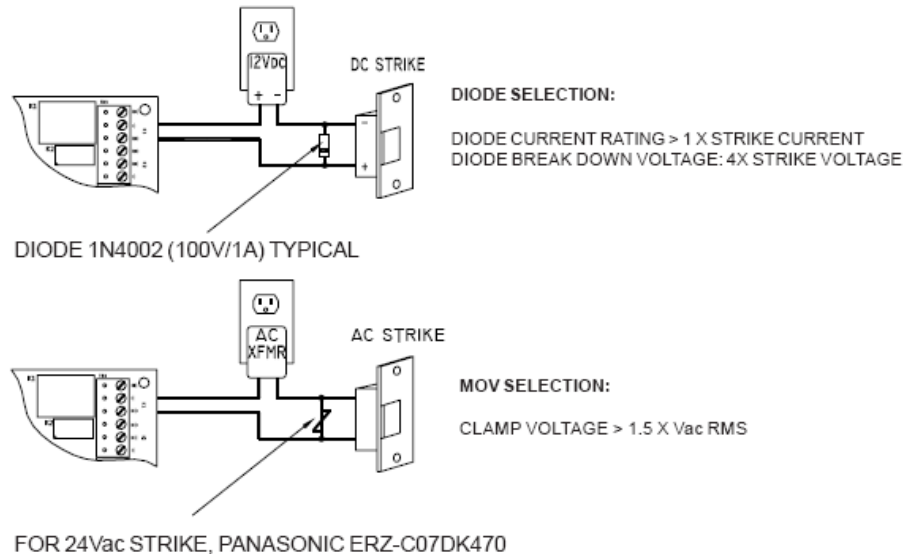
inputs are typically used for door contact and exit push button monitoring. End of line resistors are required for line supervision.



Two form-C relay contacts are provided for controlling door strike or other devices. The contact ratings are 5A for relay K1 and 1A for relay K2. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used.

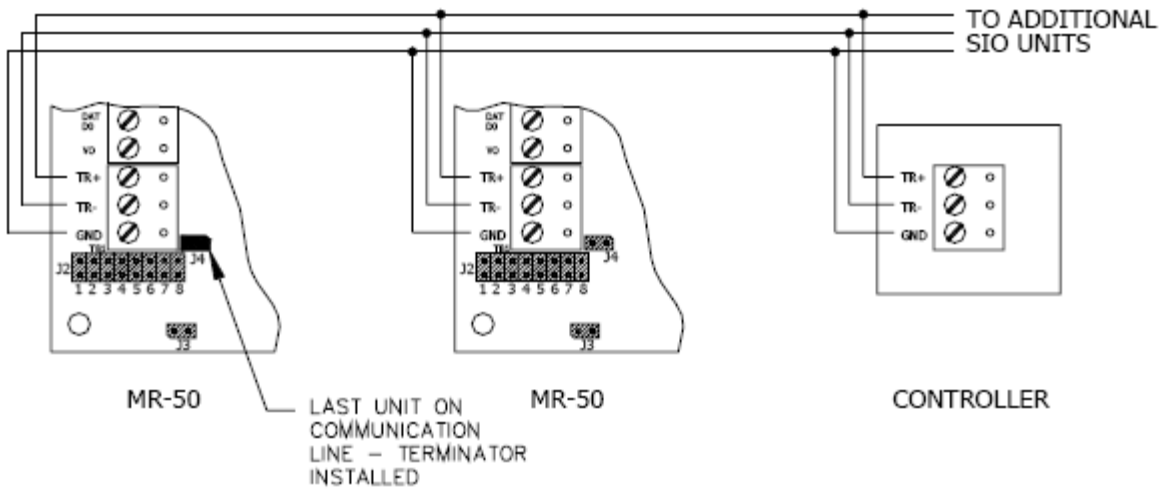
The following two circuits are recommended.

Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located far away.

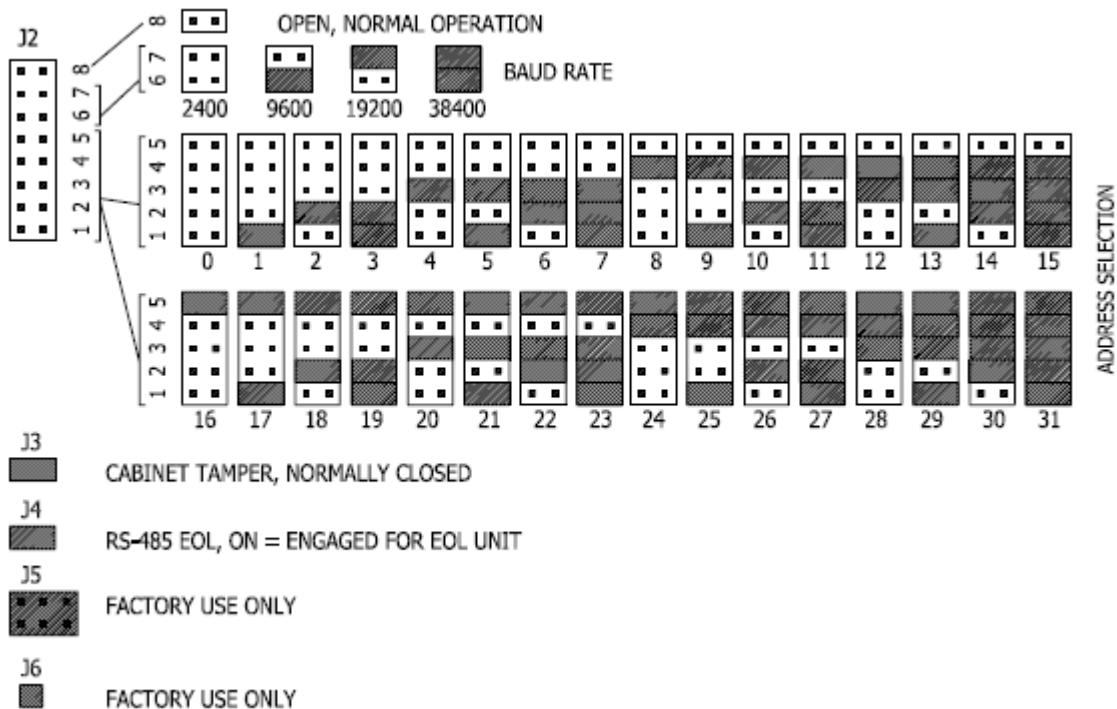


Communication to a Controller

The MR-50 communicates to an intelligent controller via a half duplex multi-drop RS-485 interface. The total cable length is limited to 4,000 feet (1,200 meters). Shielded cable of 24AWG with characteristic impedance of 120 ohm is specified for the RS-485 interface. The last device on each end of the communication line should have the terminator installed (set jumper J4 on).



Each Interface (MR-50, MR-52, etc.) must be configured to have a unique address and correct baud rate. The address and baud rate are selected by installing the specified jumpers.



Status LEDs

Power-up	All LED's OFF .
Initialization	Once power is applied, initialization of the module begins. The A LED is turned ON at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-50 is waiting for firmware to be down loaded.
Run time	After a successful initialization, the LEDs have the following meanings: A LED Heartbeat and On-Line Status: Off-line: 1 second rate, 20% ON On-line: 1 second rate, 80% ON B LED Sub-Controller Communication Port Status: Indicates communication activity on the sub-controller comm. port

Specifications

The Interface is for use in low voltage, class 2 circuits only.

Primary Power	12 to 24Vdc $\pm 10\%$, 150mA maximum (plus reader current) 12Vdc @ 110mA (plus reader current) nominal 24Vdc @ 60mA (plus reader current) nominal
Outputs	Form-C contacts: K1: 5A @ 28Vdc, K2: 1A @ 28Vdc
Inputs	2 supervised, End of Line resistors, 1k/1k ohm, 1% 1/4 watt std 1 unsupervised, dedicated for cabinet tamper
Reader Interface	
Reader power	12 to 24Vdc $\pm 10\%$ (input voltage passed through)
Reader LED output	TTL compatible, high > 3V, low < 0.5V, 5mA source/sink max.
Buzzer output	Open collector, 5Vdc open circuit maximum, 10mA sink max.
Reader data inputs	TTL compatible inputs or 2-wire RS-485
Communication	RS-485, 2-wire. 2400, 9600, 19200, or 38400bps
Cable Requirements	
Power	18AWG, 1 twisted pair
RS-485	24AWG, 120ohm impedance, twisted pair with shield, 4,000' (1,219 m) maximum
Alarm Inputs	1 twisted pair per input, 30 ohms maximum
Outputs	As required for the load
Reader data (TTL)	18AWG, 6 conductor, 500' (150m) maximum
Reader data (RS-485)	24AWG, 120 ohm impedance, twisted pair with shield, 4,000' (1,219 m) maximum
Mechanical	
Dimension	4.25" (108mm)W x 2.75" (70mm)L x 1" (25.4mm)H
Weight	4 oz. (120g) nominal
Environment	
Temperature	-55°C to +85°C, storage; -40°C to +75°C, operating
Humidity	10% to 95% RHNC

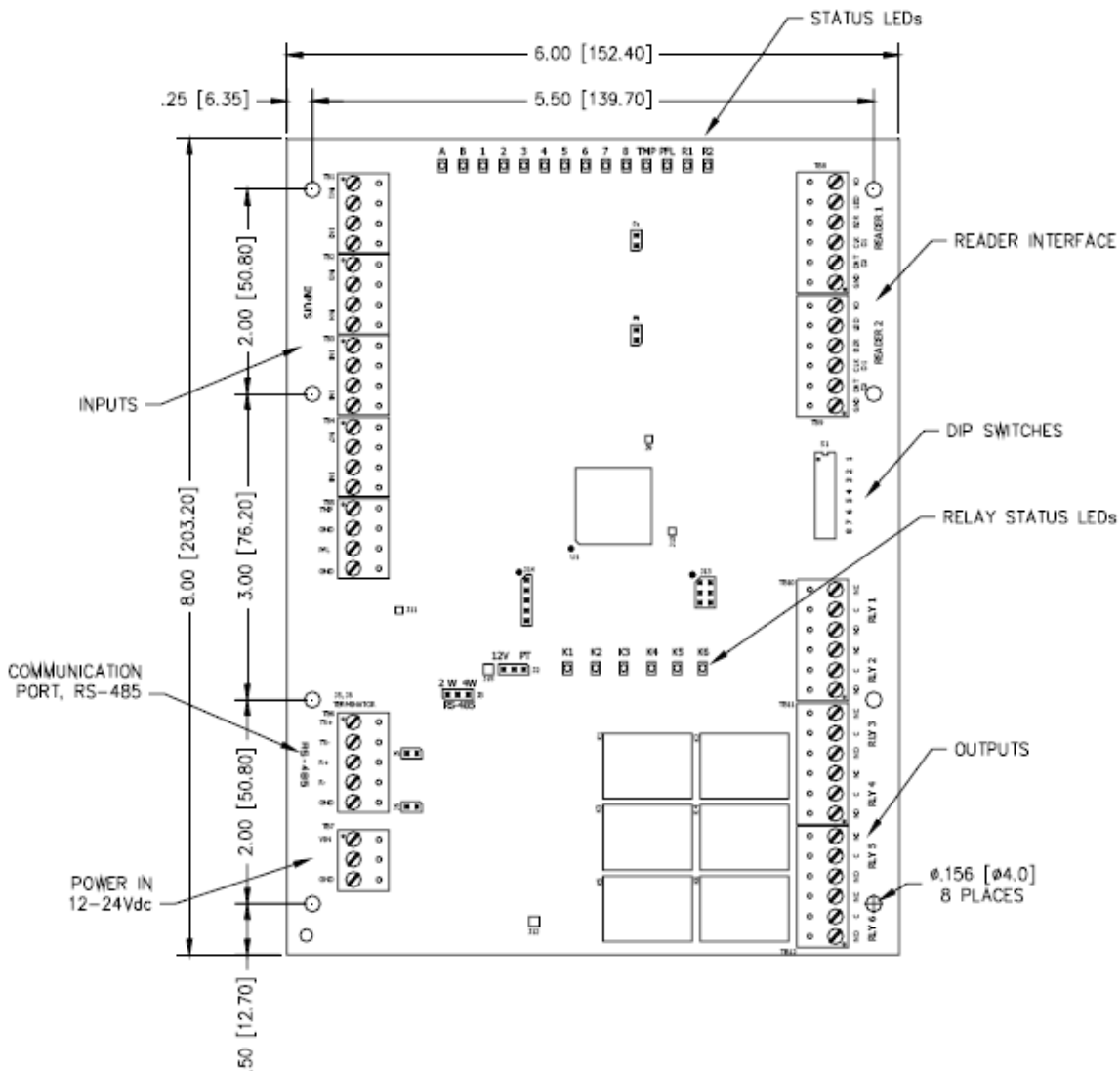
MR-52 Two Door Sub-Controller

Installation and Specifications

General

The MR-52 Two-Door Sub-Controller provides a solution when interfacing to TTL/wiegand type readers and door hardware is needed. The reader interface can accept data from the reader with clock/data or wiegand signaling, provide a tri-stated LED control and buzzer control. Six form-C relay outputs may be used for strike control or alarm signaling. Eight supervised inputs are provided for monitoring the door contact, exit push button and alarm contacts. Communication to the interface is accomplished via a 2-wire RS-485 interface. The interface requires either 12 to 24Vdc for power.

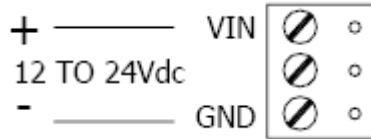
MR-52 Hardware



Power Wiring

The MR-52 accepts 12 to 24Vdc for power. Locate the power source as close to the MR-52 as possible. Make power connection with minimum of 18AWG wires.

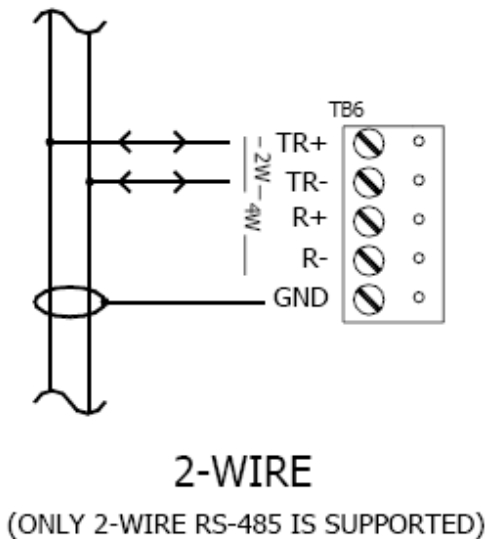
Observe POLARITY on VIN!



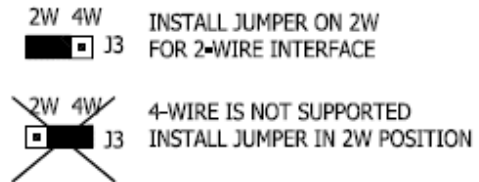
Communication Wiring

The MR-52 communicates to an intelligent controller via a 2-wire RS-485 interface. The MR-52 allows for multi-drop communication on a bus of up to 4,000 feet (1,200 m). Use twisted pair(s) (minimum 24AWG) with shield for communication. See specifications section.

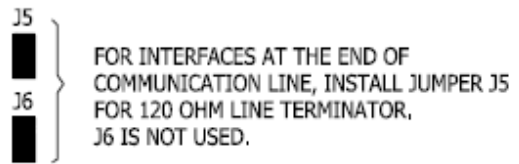
Install jumpers according to the selected configuration.



2-WIRE/4-WIRE SELECT



LINE TERMINATION



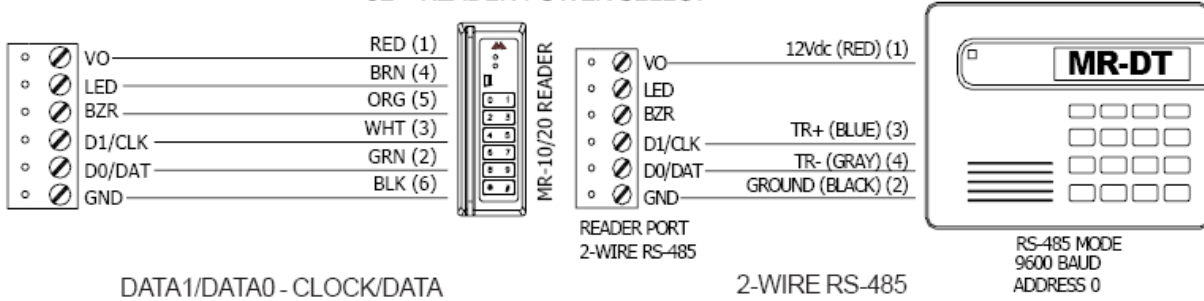
Reader Wiring

Each reader port supports a reader with TTL or RS-485 interface. Power to the reader is selectable: 12Vdc, or input voltage passed through (PT), 125mA maximum per reader port. This selection is made via jumper J2 and is made for both reader ports. For the selection of 12Vdc, the MR-52 must be powered by a 20Vdc minimum source. For readers requiring a different voltage or current capability, they must be powered separately.

To fully utilize each reader port, a 6-conductor cable (18AWG) is required when TTL signaling is used. RS-485 signaling requires two 2-conductor cables. One cable for power (18AWG) and one cable for communication (24AWG). Reader port configuration is set via IS2000.

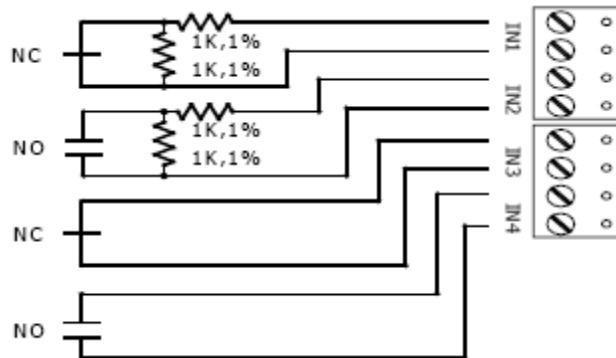
12V PT	READER POWER
	12Vdc IS AVAILABLE ON READER PORTS (VIN ≥ 20Vdc)
	VIN POWER IS "PASSED THROUGH" TO READER PORTS

J2 - READER POWER SELECT



Alarm Contact Wiring

Inputs 1 to 8 may be configured to use or not to use End-Of-Line (EOL) resistors, and for normally open or normally closed contacts. Input TMP is used for monitoring cabinet tamper and PFL input is used power failure monitoring. These two inputs are for contact closure monitoring only. They do not use EOL resistor(s). Input configuration is set via IS2000.



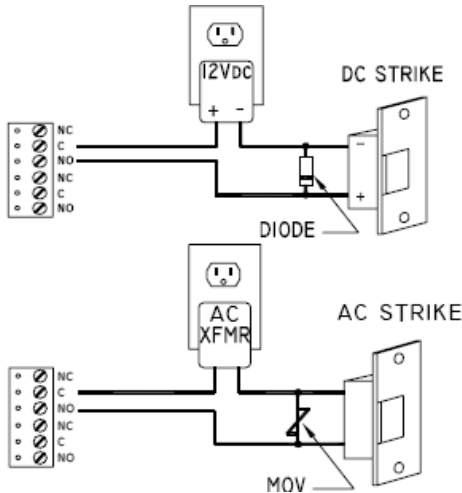
Control Output Wiring

Six form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used. The following two circuits are recommended.

Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.

Use sufficiently large gauge of wires for the load current as to avoid voltage loss.

The following two circuits are recommended.



DIODE SELECTION:

DIODE CURRENT RATING > 1 X STRIKE CURRENT
 DIODE BREAK DOWN VOLTAGE: 4X STRIKE VOLTAGE
 FOR 12Vdc or 24Vdc STRIKE, DIODE 1N4002 (100V /1A)
 TYPICAL

MOV SELECTION:

CLAMP VOLTAGE > 1.5 X Vac RMS
 FOR 24Vac STRIKE, PANASONIC ERZ-C07DK470 TYPICAL

Jumper and DIP Switch Usage

Jumper Settings

JUMPER	DESCRIPTION
J2	READER POWER SELECT 12V = 12Vdc AT READER PORTS. *** SEE NOTE BELOW *** PT = VIN 'PASSED THROUGH" TO READER PORTS
J3	2-WIRE/4-WIRE SELECT, INSTALL IN 2W POSITION ONLY
J5	RS-485 TERMINATION, INSTALL IN FIRST AND LAST UNITS ONLY
J6	FACTORY USE ONLY
J7	FACTORY USE ONLY
J8	FACTORY USE ONLY
J9	FACTORY USE ONLY
J10	FACTORY USE ONLY
J11	FACTORY USE ONLY
J12	FACTORY USE ONLY
J13	FACTORY USE ONLY
J14	FACTORY USE ONLY
J15	FACTORY USE ONLY

NOTE: The input power (VIN) must be 20Vdc minimum if the 12Vdc selection is to be used.

Dip Switch Settings

Switches 1 to 5 select the device address. Switch 6 to 7 select the communication baud rate. All other configuration settings are set via IS2000.

MR-52 S1 DIP Switch Settings								
S8	S7	S6	S5	S4	S3	S2	S1	Selection
			OFF	OFF	OFF	OFF	OFF	Address 0
			OFF	OFF	OFF	OFF	ON	Address 1
			OFF	OFF	OFF	ON	OFF	Address 2
			OFF	OFF	OFF	ON	ON	Address 3
			OFF	OFF	ON	OFF	OFF	Address 4
			OFF	OFF	ON	OFF	ON	Address 5
			OFF	OFF	ON	ON	OFF	Address 6
			OFF	OFF	ON	ON	ON	Address 7
			OFF	ON	OFF	OFF	OFF	Address 8
			OFF	ON	OFF	OFF	ON	Address 9
			OFF	ON	OFF	ON	OFF	Address 10
			OFF	ON	OFF	ON	ON	Address 11
			OFF	ON	ON	OFF	OFF	Address 12
			OFF	ON	ON	OFF	ON	Address 13
			OFF	ON	ON	ON	OFF	Address 14
			OFF	ON	ON	ON	ON	Address 15
			ON	OFF	OFF	OFF	OFF	Address 16
			ON	OFF	OFF	OFF	ON	Address 17
			ON	OFF	OFF	ON	OFF	Address 18
			ON	OFF	OFF	ON	ON	Address 19
			ON	OFF	ON	OFF	OFF	Address 20
			ON	OFF	ON	OFF	ON	Address 21
			ON	OFF	ON	ON	OFF	Address 22
			ON	OFF	ON	ON	ON	Address 23
			ON	ON	OFF	OFF	OFF	Address 24
			ON	ON	OFF	OFF	ON	Address 25
			ON	ON	OFF	ON	OFF	Address 26
			ON	ON	OFF	ON	ON	Address 27
			ON	ON	ON	OFF	OFF	Address 28
			ON	ON	ON	OFF	ON	Address 29
			ON	ON	ON	ON	OFF	Address 30
			ON	ON	ON	ON	ON	Address 31
	OFF	OFF						2400 BPS
	OFF	ON						9600 BPS
	ON	OFF						19200 BPS
	ON	ON						38400 BPS

Status LEDs

Power-up	All LED's OFF
Initialization	Once power is applied, initialization of the module begins.
The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-52 is waiting for firmware to be down loaded.	
When initialization is completed, LEDs A through R2 are briefly sequenced ON then OFF	
Run time	After the above sequence, the LEDs have the following meanings:
	A LED: Heartbeat and On-Line Status Off-line: 1 second rate, 20% ON On-line: 1 second rate, 80% ON
	B LED: Sub-Controller Communication Port Status Indicates communication activity on the sub-controller communication port
	1 LED: Input Status: IN1 2 LED: Input Status: IN2 3 LED: Input Status: IN3 4 LED: Input Status: IN4 5 LED: Input Status: IN5 6 LED: Input Status: IN6 7 LED: Input Status: IN7 8 LED: Input Status: IN8
	TMP: Cabinet Tamper PFL: Power Fault
Input in the inactive state	OFF (briefly flashes ON every 3 seconds)
Input in the active state	ON (briefly flashes OFF every 3 seconds)
Input in a trouble state	Rapid Flash
R1 reader port 1	
Clock/Data Mode	Flashes when data is received, either input
Data 0/Data 1 Mode	Flashes when data is received, either input
RS-485 Mode	Flashes when transmitting data
R2: reader port 2	
Clock/Data Mode	Flashes when data is received, either input
Data 0/Data 1 Mode	Flashes when data is received, either input
RS-485 Mode	Flashes when transmitting data
LED K1 through K6	Illuminates when output relay RLY 1 (K1) through RLY 6 (K6) is energized.

Specification

The Interface is for use in low voltage, class 2 circuits only.

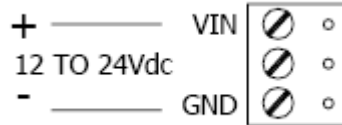
Primary power	12 to 24Vdc $\pm 10\%$, 550mA maximum (plus reader current) 12Vdc @ 450mA (plus reader current) nominal 24Vdc @ 270mA (plus reader current) nominal
Outputs	6 outputs, Form-C, 5A @ 28Vdc, resistive
Inputs	8 unsupervised/supervised, standard EOL: 1k/1k ohm, 1% 1/4 watt 2 unsupervised, dedicated for cabinet tamper and UPS fault monitoring
Reader interface	
Reader power (jumper selectable)	12Vdc $\pm 10\%$ regulated, 125mA maximum each reader or 12 to 24Vdc $\pm 10\%$ (input voltage passed through) 125mA maximum each reader
Reader LED output	TTL compatible, high > 3V, low < 0.5V, 5mA source/sink maximum
Reader buzzer output	Open collector, 5Vdc open circuit maximum, 10mA sink maximum
Reader data inputs	TTL compatible inputs or 2-wire RS-485
Communication	RS-485, 2-wire 2400, 9600, 19200 or 38400bps
Cable requirements	
Power	18AWG, 1 twisted pair
RS-485	24AWG, 120 ohm impedance, twisted pair with shield, 4,000' (1,200m) maximum
Alarm inputs	1 twisted pair per input, 30 ohms maximum
Outputs	As required for the load
Reader data (TTL)	6 conductors, 18AWG, 500 feet (150m) maximum
Reader data (RS-485)	24AWG, 120 ohm impedance, twisted pair with shield, 4,000' (1,200m) maximum
Mechanical	
Dimension	6" (152mm)W x 8" (203mm)L x 1" (25mm)H
Weight	11 oz. (312g) nominal
Environment	
Temperature	-55°C to +85°C, storage; 0°C to +70°C, operating
Humidity	0% to 95% RHNC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Power Wiring

The SI-16 accepts 12 to 24Vdc for power. Locate power source as close to the unit as possible. Connect power with minimum of 18AWGwires.

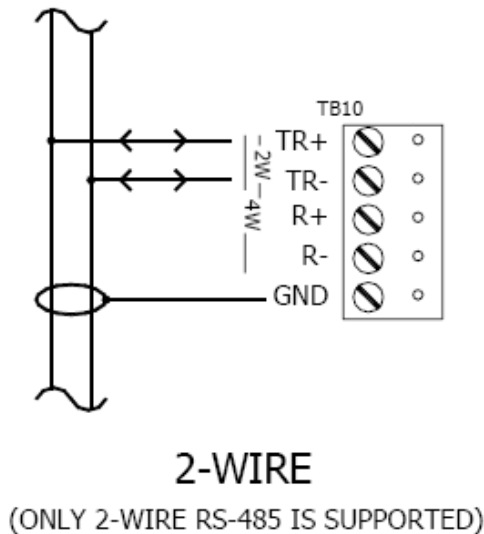
Observe POLARITY on VIN!



Communication Wiring

The SI-16 communicates to an intelligent controller via a 2-wire RS-485 interface. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,200 m). Shielded cable of 24AWG with characteristic impedance of 120 ohm is specified for the RS-485 interface. The last devices on each end of the cable should have the terminator installed (set jumper J1 on).

Install the following jumpers for the RS-485 interface according to the selected configuration:



2-WIRE/4-WIRE SELECT

2W 4W
 J3
 INSTALL JUMPER IN 2W POSITION FOR 2-WIRE INTERFACE

~~2W 4W~~
 J3
 4-WIRE IS NOT SUPPORTED
 INSTALL JUMPER IN 2W POSITION

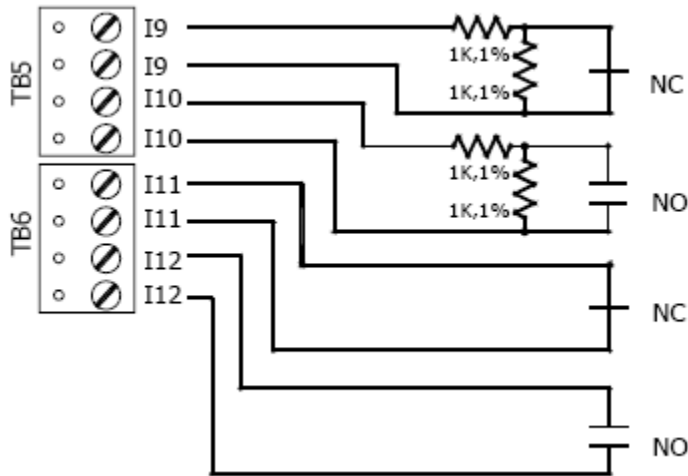
LINE TERMINATION

J1 }
 }
 J2 }
 }
 FOR DEVICES AT THE END OF THE COMMUNICATION LINE, INSTALL JUMPER J1 FOR 120 OHM LINE TERMINATION. J2 IS NOT USED.

Alarm Inputs Wiring

Inputs 1 to 16 may be configured to use or not use End Of Line (EOL) resistors and to use normally open or normally closed contacts. Input CT and input BA are used for monitoring cabinet tamper and power failure, respectively. These two inputs are for contact closure monitoring only, and do not use EOL resistor(s).

Input configuration is set via IS2000.



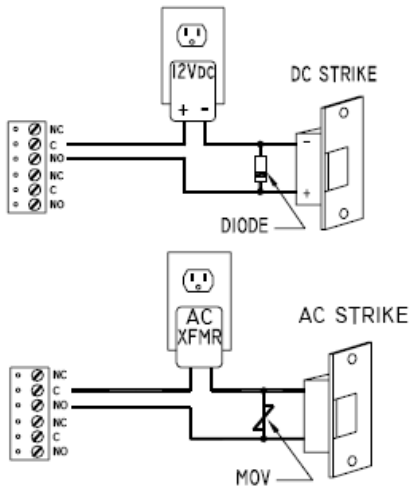
Relay Outputs

Two form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used.

Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.

Use sufficiently large gauge of wires for the load current as to avoid voltage loss.

The following two circuits are recommended.



DIODE SELECTION:

DIODE CURRENT RATING > 1 X STRIKE CURRENT
 DIODE BREAK DOWN VOLTAGE: 4X STRIKE VOLTAGE
 FOR 12Vdc or 24Vdc STRIKE, DIODE 1N4002 (100V /1A)
 TYPICAL

MOV SELECTION:

CLAMP VOLTAGE > 1.5 X Vac RMS
 FOR 24Vac STRIKE, PANASONIC ERZ-C07DK470 TYPICAL

Jumper and DIP Switch Usage

Jumper Settings

JUMPER	DESCRIPTION
J1	RS-485 TERMINATION, INSTALL IN FIRST AND LAST UNITS ONLY
J2	FACTORY USE ONLY
J3	2-WIRE/4-WIRE SELECT, INSTALL IN 2W POSITION ONLY
J4	FACTORY USE ONLY
J5	FACTORY USE ONLY
J6	FACTORY USE ONLY
J7	FACTORY USE ONLY
J8	FACTORY USE ONLY
J9	FACTORY USE ONLY

DIP Switch Settings

Switches 1 to 5 select the devices communication address. **Switches 6 and 7** select the communication baud rate. Communication on the RS-485 serial port is asynchronous, half-duplex with 1 start bit, 8 data bits and 1 stop bit.

SI-16 DIP Switch Settings								
S8	S7	S6	S5	S4	S3	S2	S1	Selection
			OFF	OFF	OFF	OFF	OFF	Address 0
			OFF	OFF	OFF	OFF	ON	Address 1
			OFF	OFF	OFF	ON	OFF	Address 2
			OFF	OFF	OFF	ON	ON	Address 3
			OFF	OFF	ON	OFF	OFF	Address 4
			OFF	OFF	ON	OFF	ON	Address 5
			OFF	OFF	ON	ON	OFF	Address 6
			OFF	OFF	ON	ON	ON	Address 7
			OFF	ON	OFF	OFF	OFF	Address 8
			OFF	ON	OFF	OFF	ON	Address 9
			OFF	ON	OFF	ON	OFF	Address 10
			OFF	ON	OFF	ON	ON	Address 11
			OFF	ON	ON	OFF	OFF	Address 12
			OFF	ON	ON	OFF	ON	Address 13
			OFF	ON	ON	ON	OFF	Address 14
			OFF	ON	ON	ON	ON	Address 15
			ON	OFF	OFF	OFF	OFF	Address 16
			ON	OFF	OFF	OFF	ON	Address 17
			ON	OFF	OFF	ON	OFF	Address 18
			ON	OFF	OFF	ON	ON	Address 19
			ON	OFF	ON	OFF	OFF	Address 20
			ON	OFF	ON	OFF	ON	Address 21
			ON	OFF	ON	ON	OFF	Address 22
			ON	OFF	ON	ON	ON	Address 23
			ON	ON	OFF	OFF	OFF	Address 24
			ON	ON	OFF	OFF	ON	Address 25
			ON	ON	OFF	ON	OFF	Address 26
			ON	ON	OFF	ON	ON	Address 27
			ON	ON	ON	OFF	OFF	Address 28
			ON	ON	ON	OFF	ON	Address 29
			ON	ON	ON	ON	OFF	Address 30
			ON	ON	ON	ON	ON	Address 31
	OFF	OFF						2400 BPS
	OFF	ON						9600 BPS
	ON	OFF						19200 BPS
	ON	ON						38400 BPS

Status LEDs

Power-up

All LED's **OFF**.

Initialization

Once power is applied, initialization of the module begins.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-16IN is waiting for firmware to be downloaded.

When initialization is completed, LEDs 1 through 16, CT and BA are briefly sequenced **ON** then **OFF**.

Run time

After the above sequence, the LEDs have the following meanings:

A LED Heartbeat and On-Line Status:

Off-line 1 second rate, 20% ON

On-line 1 second rate, 80% ON

B LED Sub-controller Communication Port Status:

Indicates communication activity on the sub-controller communication port

1 LED: Input Status: 1

2 LED: Input Status: 2

3 LED: Input Status: 3

4 LED: Input Status: 4

5 LED: Input Status: 5

6 LED: Input Status: 6

7 LED: Input Status: 7

8 LED: Input Status: 8

9 LED: Input Status: 9

10 LED: Input Status: 10

11 LED: Input Status: 11

12 LED: Input Status: 12

13 LED: Input Status: 13

14 LED: Input Status: 14

15 LED: Input Status: 15

16 LED: Input Status: 16

CT: Cabinet Tamper

BA: Power Fault

Input in the inactive state

Input in the active state

Input in a fault state

OFF (briefly flashes ON every 3 seconds)

ON (briefly flashes OFF every 3 seconds)

Rapid Flash

LED K1 and K2

Illuminates when output relay RLY 1 (K1) or RLY 2 (K2) is energized.

Specifications

The processor is for use in low voltage, class 2 circuit only.

Primary power	12 to 24Vdc \pm 10%, 350mA maximum 12Vdc @ 300mA nominal 24Vdc @ 220mA nominal
Outputs	2 outputs, Form-C, 5A @ 28Vdc, resistive
Inputs	16 unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, 1/4 watt 2 unsupervised, dedicated for cabinet tamper and UPS fault monitoring
Communication	RS-485, 2-wire. 2400, 9600, 19200 or 38400bps
Cable requirements	
Power	18 AWG, 1 twisted pair
RS-485	24AWG, 120 ohm impedance, twisted pair with shield, 4,000' (1,200m) maximum
Alarm inputs	1 twisted pair, 30 ohms maximum
Outputs	As required for the load
Mechanical	
Dimension	6" (152mm)W x 8" (203mm)L x 1" (25.4mm)H
Weight	9 oz. (250 g) nominal
Environmental	
Temperature	-55°C to +85°C, storage; 0°C to +70°C, operating
Humidity	0% to 95% RHNC

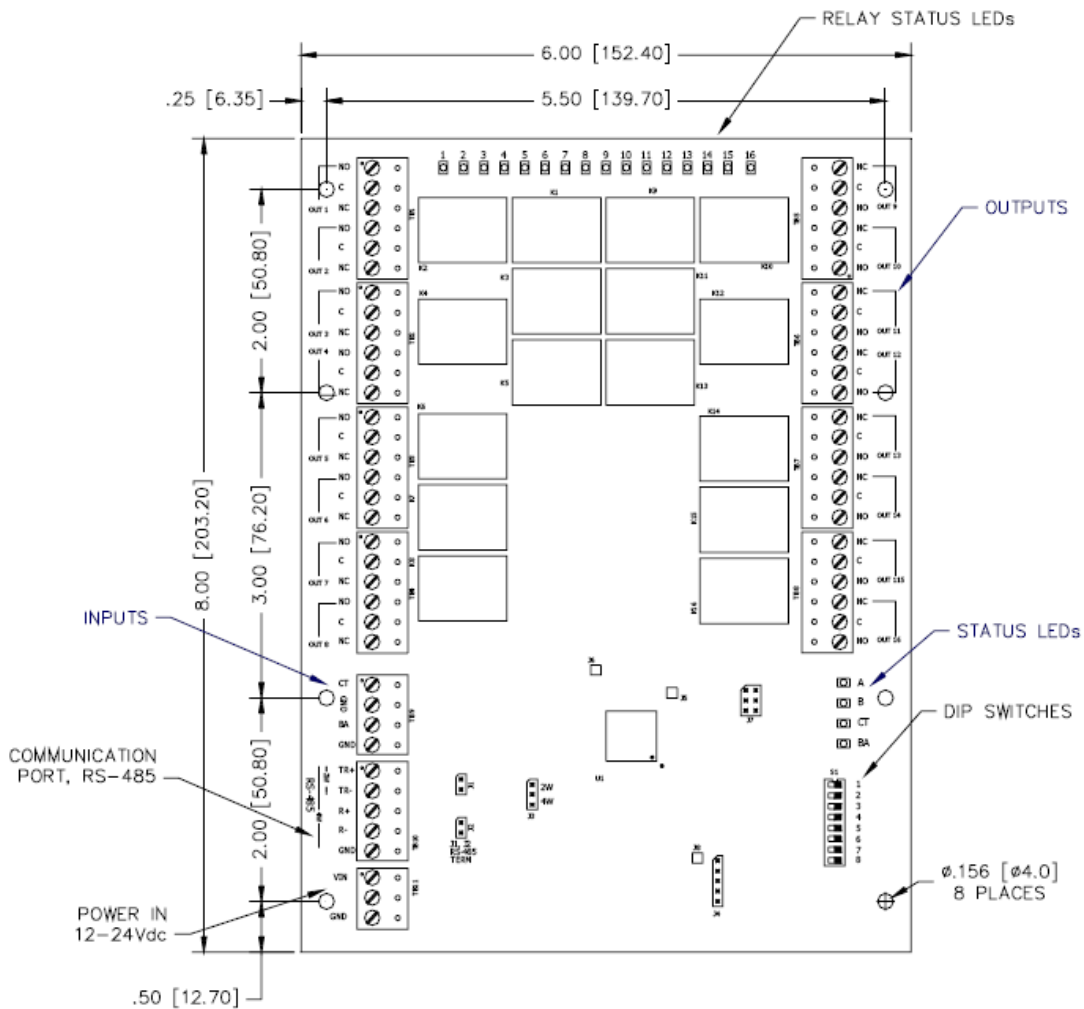
SO-16 16 Output Sub-Controller

Installation and Specifications

General

The SO-16, Sixteen Output Sub-Controller, provides a solution for output control. The sub-controller has 16 form-C contact relays for load switching. Additionally, 2 digital inputs are provided for tamper and power fault status monitoring. The sub-controller requires 12 to 24Vdc for power.

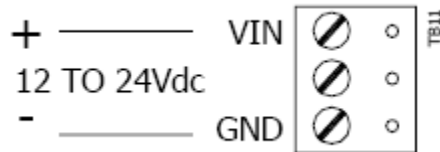
SO-16 Hardware



Power Wiring

The SO-16 accepts 12 to 24Vdc for power. Locate power source as closed to the unit as possible. Connect power with minimum of 18AWG wires.

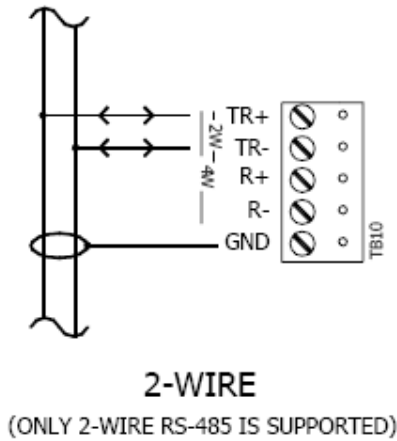
Observe POLARITY on VIN!



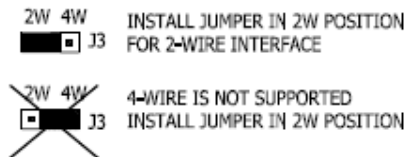
Communication Wiring

The SO-16 communicates to host via a RS-485 interface, which may be configured for either 2-wire or 4-wire operation. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,200m). Use twisted pair(s) (minimum 24 AWG) with shield for the communication.

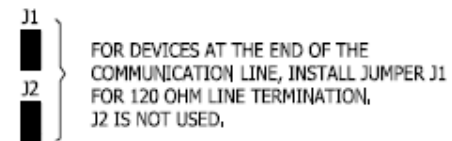
Install the following jumpers for the RS-485 interface according to the selected configuration.



2-WIRE/4-WIRE SELECT

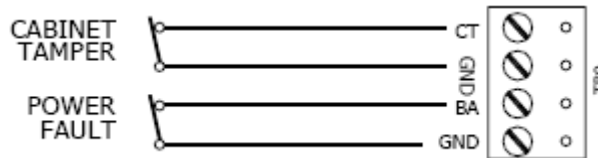


LINE TERMINATION



Inputs for Cabinet Tamper/Power Fault

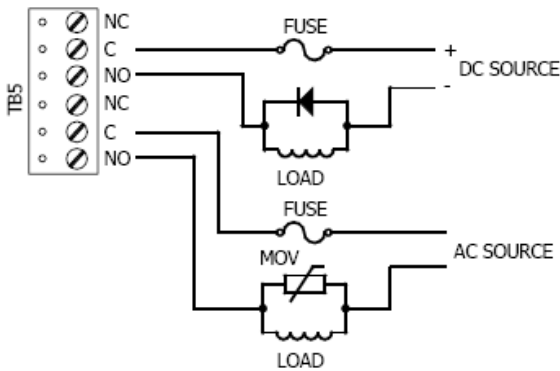
Input CT and input BA are used for monitoring cabinet tamper and power failure with normally closed contacts. These two inputs are for contact closure monitoring only, and do not use EOL resistor(s). If these inputs are not used, install a short piece of wire at the input to indicated safe condition.



Relay Outputs

The following diagram shows a typical use of the relay. A DC power source is recommended whenever possible. Transient clamping must be provided to protect the contacts and to reduce EMI emission.

Use sufficiently large wires for the load current to avoid voltage loss.



DIODE SELECTION:

DIODE CURRENT RATING > 1 X STRIKE CURRENT
 DIODE BREAK DOWN VOLTAGE: 4X STRIKE VOLTAGE
 FOR 12Vdc or 24Vdc STRIKE, DIODE 1N4002 (100V /1A)
 TYPICAL

MOV SELECTION:

CLAMP VOLTAGE > 1.5 X Vac RMS
 FOR 24Vac STRIKE, PANASONIC ERZ-C07DK470
 TYPICAL

Jumper and DIP Switch Usage

Jumper Settings

JUMPER	DESCRIPTION
J1	RS-485 TERMINATION, INSTALL IN FIRST AND LAST UNITS ONLY
J2	FACTORY USE ONLY
J3	2-WIRE/4-WIRE SELECT, INSTALL IN 2W POSITION ONLY
J4	FACTORY USE ONLY
J5	FACTORY USE ONLY
J6	FACTORY USE ONLY
J7	FACTORY USE ONLY
J8	FACTORY USE ONLY

Dip Switch Settings

Switches 1 to 5 select the devices communication address. Switches 6 and 7 select the communication baud rate. Communication on the RS-485 serial port is asynchronous, half-duplex with 1 start bit, 8 data bits and 1 stop bit.

SO-16 DIP Switch Settings								
S8	S7	S6	S5	S4	S3	S2	S1	Selection
			OFF	OFF	OFF	OFF	OFF	Address 0
			OFF	OFF	OFF	OFF	ON	Address 1
			OFF	OFF	OFF	ON	OFF	Address 2
			OFF	OFF	OFF	ON	ON	Address 3
			OFF	OFF	ON	OFF	OFF	Address 4
			OFF	OFF	ON	OFF	ON	Address 5
			OFF	OFF	ON	ON	OFF	Address 6
			OFF	OFF	ON	ON	ON	Address 7
			OFF	ON	OFF	OFF	OFF	Address 8
			OFF	ON	OFF	OFF	ON	Address 9
			OFF	ON	OFF	ON	OFF	Address 10
			OFF	ON	OFF	ON	ON	Address 11
			OFF	ON	ON	OFF	OFF	Address 12
			OFF	ON	ON	OFF	ON	Address 13
			OFF	ON	ON	ON	OFF	Address 14
			OFF	ON	ON	ON	ON	Address 15
			ON	OFF	OFF	OFF	OFF	Address 16
			ON	OFF	OFF	OFF	ON	Address 17
			ON	OFF	OFF	ON	OFF	Address 18
			ON	OFF	OFF	ON	ON	Address 19
			ON	OFF	ON	OFF	OFF	Address 20
			ON	OFF	ON	OFF	ON	Address 21
			ON	OFF	ON	ON	OFF	Address 22
			ON	OFF	ON	ON	ON	Address 23
			ON	ON	OFF	OFF	OFF	Address 24
			ON	ON	OFF	OFF	ON	Address 25
			ON	ON	OFF	ON	OFF	Address 26
			ON	ON	OFF	ON	ON	Address 27
			ON	ON	ON	OFF	OFF	Address 28
			ON	ON	ON	OFF	ON	Address 29
			ON	ON	ON	ON	OFF	Address 30
			ON	ON	ON	ON	ON	Address 31
	OFF	OFF						2400 BPS
	OFF	ON						9600 BPS
	ON	OFF						19200 BPS
	ON	ON						38400 BPS

Status LEDs

Power-up

All LED's **OFF**.

Initialization

Once power is applied, initialization of the module begins.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-16OUT is waiting for firmware to be down loaded.

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

Run time

After the above sequence, the LEDs have the following meanings:

A LED Heartbeat and On-Line Status:

Off-line: 1 second rate, 20% ON

On-line: 1 second rate, 80% ON

B LED Sub-controller Communication Port Status:

Indicates communication activity on the sub-controller communication port

CT: Cabinet Tamper

BA: Power Fault

Input in the inactive state

OFF (briefly flashes ON every 3 seconds)

Input in the active state

ON (briefly flashes OFF every 3 seconds)

LED 1 through 16

Illuminates when output relay OUT 1 (K1) through OUT 16 (K16) is energized.

Specifications

The SO-16 is for use in low voltage, class 2 circuits only.

Primary power	12 to 24Vdc \pm 10%, 1100mA maximum 12Vdc @ 850mA nominal 24Vdc @ 450mA nominal
Relay contacts	16 Form-C, 5A @ 28Vdc, resistive
Inputs	2 unsupervised, dedicated for cabinet tamper and UPS fault monitoring
Communication	RS-485, 2-wire. 2400, 9600, 19200 or 38400bps
Cable requirements	
Power	1 twisted pair, 18 AWG
RS-485	24AWG, 120 ohm impedance, twisted pair with shield, 4,000' (1,200m) maximum
Inputs	1 twisted pair, 30 ohms maximum
Outputs	As required for the load
Mechanical	
Dimension	6" (152mm)W x 8" (203mm)L x 1" (25.4mm)H
Weight	14 oz.(400 gm) nominal
Environmental	
Temperature	-55°C to +85°C, storage; 0°C, to +70°C, operating
Humidity	0% to 95% RHNC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Warranty

IMRON CORPORATION warrants to Reseller that for a period of eighteen (18) months the Hardware shall be free from defects in materials and workmanship and when (i) operated in a suitable environment as specified in the appropriate product description and (ii) properly maintained and operated, will perform in accordance with IMRON CORPORATION'S applicable published specifications. If an item of Hardware is found not to meet this standard during the warranty period, it will be repaired or, at the option of IMRON CORPORATION, replaced. IMRON CORPORATION'S warranty with respect to repaired or replaced Hardware or components thereof shall extend for the greater of (a) ninety (90) days after installation or (b) the unexpired portion of the warranty period for such Hardware.

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QUESTIONS OR COMMENTS

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