OPEN OPTIONS®
ACCESS TECHNOLOGY

System Hardware Manual

The DNA Fusion™ Access Control Software and SSP™ Security System Processor use equipment that generates, uses, and radiates radio frequency energy. If not installed and deployed in accordance with the guidelines of this installation manual, they may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the user will be required to correct the interference at their own expense.

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

Publish Date: August 27, 2020
Manual Number: HW-8.1

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Introduction 1

In This Chapter

√ Manual Overview
√ Hardware Overview
√ Hardware Installation Guidelines

This manual is designed to introduce the Open Options hardware as well as provide wiring and configuration information for each device. For information regarding legacy products, refer to the Legacy Hardware Manual.

How This Manual is Organized

Chapter 1, "Introduction," provides an overview of the system hardware and installation guidelines.

Chapter 2, "Controllers," describes the SSP Series controllers and their configuration requirements.

Chapter 3, "Reader Modules," covers the RSC Series reader modules and their configuration requirements.

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

Chapter 5, "Multiplexers," describes the OptoHub and CI-8 communication multiplexers.

Chapter 6, "Power Distribution," includes information regarding the various power distribution options.

Chapter 7, "Allegion Locks," instructs the user how to connect Allegion AD Series locks and HandKey readers.

Chapter 8, "Specialty Products," highlights specialty hardware products offered by Open Options.

Chapter 9, "Integrated Products," contains configuration instructions for integrated products.

Appendix A, "Technical Drawings," includes wiring diagrams and dimensions for common field applications.

Appendix B, "UL Compliance," outlines the UL compliance requirements for Open Options products.

Appendix C, "Legacy Migration," explains how to replace legacy controllers with current models.

Icons and Conventions Used in This Manual

The following icons call attention to useful or important information:

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

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

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

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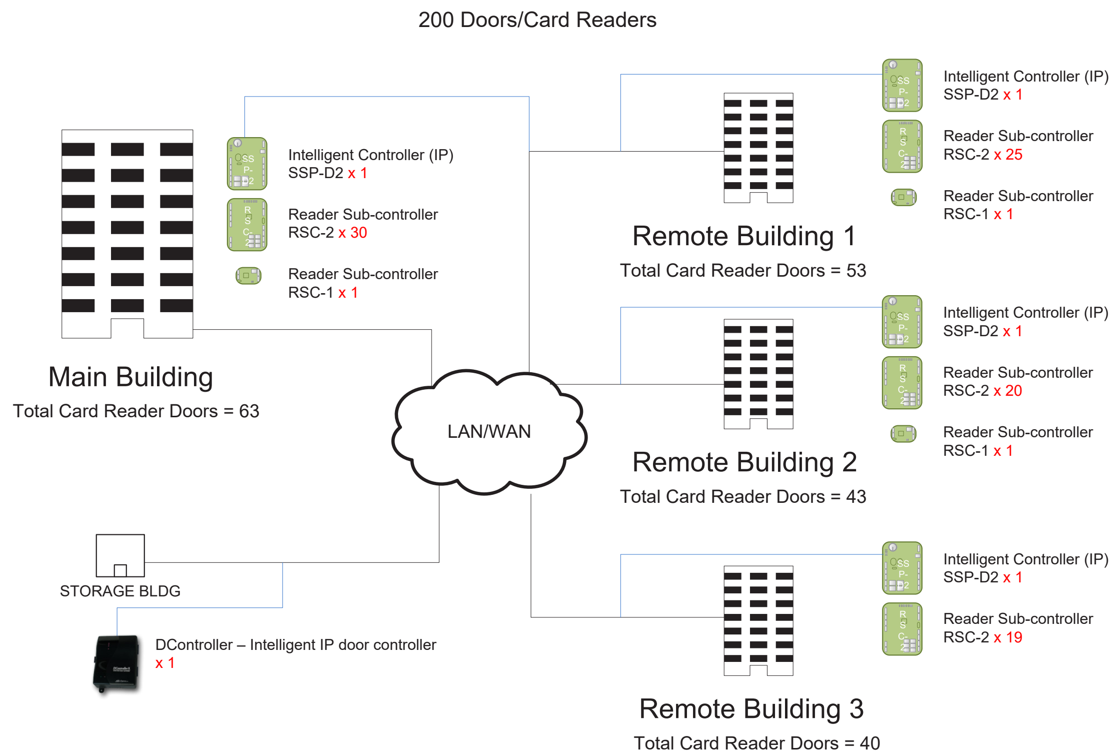
Hardware Overview

SSP Controllers

The SSP is an intelligent controller that runs on embedded Linux. The controller functions as the brain of the Open Options hardware platform. The access control software, known as DNA Fusion, loads application-specific settings into the controller to control and monitor the access control system. The SSP contains the intelligence and decision-making capabilities necessary to maintain complete functionality when disconnected from the host computer.

The SSP Series hardware is currently available in six models: the SSP-EP, SSP-D2, SSP-LX, NController, DController, and MP02. Each panel, with the exception of the SSP-EP and NController, has different port and memory configurations to suit a variety of customer application requirements. Most installations use the first serial port on the SSP for host communication. The host port supports direct or multidrop serial communications with baud rates up to 38,400. A TCP/IP interface is available for network operations that use standard network-interface hardware. All five models are capable of using Ethernet via on-board RJ45 connectors.

Equipment Layout across TCP/IP Network



Subcontroller Panels

Serial Input and Output (SIO) panels, or subcontrollers, collect data and interface to external field devices. These panels are connected to SSP controllers via “downstream” communication ports. The communication link, known as a channel, is established by using an Ethernet or multidrop RS-485 interface. Each channel is capable of communicating up to 4,000 feet (roughly 1,200 meters).

External devices are connected to the subcontrollers to provide additional flexibility when installing the hardware. Subcontrollers are available in seven primary models: the RSC-1, RSC-2, NSC-100, NSC-200, RSC-DT, ISC-16, and OSC-16. However, different subcontrollers may be used for integrated products. The number of input, output, and reader ports varies with each subcontroller.

The DNA Fusion software defines the physical nature of the input/output points and how to use them. The system operator can configure input points as Normally Open or Normally Closed, and Supervised or Unsupervised. DNA Fusion is also used to configure the reader properties for attached readers.

Subcontrollers interface to many of the common devices in the access control industry. The specific parameters for each device are configured through DNA Fusion.

NOTES:

Installation Guidelines

Hardware products operate with various power sources and communicate through a variety of interfaces. Understanding the power requirements and communication interfaces as well as their characteristics and limitations will ensure a successful installation. The installation and operation of Open Options hardware products will not prohibit the free exit granted by other emergency systems.

Power Supply

All current Open Options hardware products can use a DC power source. Connect the GND signal to earth ground at one location within the system.

> **!** *Multiple ground connections may cause ground loop problems and is not advised.*

Power Requirements

When planning a system, it is important to understand the power requirements of each hardware device as well as the actual output of the power supplies being used.

If multiple devices are expected to share a common power supply, proper care must be exercised to avoid excess voltage loss through the power-transmitting wires. Voltage loss can lead to intermittent communication problems when devices are consuming more power than the power supply is able to provide. When choosing a power supply, make sure the system will never max out its electrical load. As a safety precaution, always use at least a 25% overage factor when sizing the power supply.

When designing a system, install the power supply as close to the equipment as possible. The farther the power supply is placed from the equipment, the larger the wire gauge (diameter) must be to ensure adequate current is supplied to the hardware. Be sure to select the appropriate wire size for the distance between the power source and the equipment.

Unsupervised Inputs

Unsupervised alarm inputs sense whether a contact is open or closed. Configuration via DNA Fusion allows open circuits to be programmed as an alarm condition. Open contacts should result in terminal voltages of 3.5 to 5 Vdc. Closed contact terminal voltage should be between 0 and 0.8 Vdc.

Supervised Inputs

Several Open Options hardware products provide contact supervision. If an alarm input is supervised, an end-of-line (EOL) terminator must be installed for the monitored contact. When supervised inputs are configured, the circuit will report open and closed states as well as open circuit, shorted, grounded, and foreign voltage.

All alarm inputs require twisted-pair wires. Connect Normally Closed (NC) contacts in series and connect Normally Open (NO) contacts in parallel.

The installer must add two resistors to the supervised input circuit in order to facilitate proper reporting. The standard supervised circuit requires 1K Ohm 1% resistors, and should be located as close as possible to the sensor.

State	Alarm N/C	Alarm N/O
Normal	1K ± 25%	2K ± 25%
Alarm	2K ± 25%	1K ± 25%
Fault - Line Short	0-50	0-50
Fault - Line Open	15K	15K
Fault - Foreign Voltage	50-750 1250-1500 2500-15K	50-750 1250-1500 2500-15K

Reader Data Input

Reader data input is a digital signal using either a Wiegand or Clock/Data signaling method. It interfaces to reader signals DATA 1/DATA 0 and produces a nominal signal swing of 0 to 5 volts.

Relay Outputs

Various Open Options hardware products provide Form C relay contacts. These are dry contacts that are capable of switching signals as well as higher current loads. Each board has different relay contact ratings.

RS-485 Communication

RS-485 is a TIA/EIA protocol that defines a standard electrical interface for multidrop communication on bus wiring schemes. RS-485 interface allows multiple devices to communicate over a single cable and transfer data at high speeds over long distances (up to 4,000 feet).

RS-485 Wiring

Open Options hardware products use a 2-wire RS-485 interface between devices. The total length of the communication cable must not exceed 4,000 feet (1,219 meters) for 24 AWG wire size per leg of the communication tree.

Device-to-Device Connection

RS-485 communication cables should be installed in the form of a daisy chain. Do NOT connect devices via star topology unless using the Open Options OptoHub™ or CI-8 board.

Cable Termination

The RS-485 interface uses a balance of differential transmitters/receivers to reject common mode noise. RS-485 must be terminated at both ends of the RS-485 line. Terminating the line increases communication reliability by minimizing the signal reflection and external noise coupling. The installer should determine which device is at the end of the communication line.

Two methods can be used for end-of-line (EOL) termination:

- Termination from the Host to the SSP – The documentation for each hardware device will indicate how the termination should be configured.
- Termination from the SSP to Downstream Subcontrollers – Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each Open Options hardware device. Refer to the section of this manual for the specific board in question.

Mounting

Most board dimensions are 6 x 8 inches and contain mounting holes along the long edges. For smaller modules, only four of the mounting holes are used; the last two holes need support standoffs, which come installed from the factory.

System Start-Up

The system should never be wired and powered up all at once. Open Options recommends the following procedure:

1. **Verify** that the power supply is NOT applied to any system device.
2. **Check** all wiring and device switch settings.
3. **Disconnect** all devices from the RS-485 communication line and/or Ethernet port.
4. **Verify** that the Reader Power Select jumper is in the correct power setting before applying power to the board.
5. **Power up** the controller and **verify** that it is working properly.
6. **Configure** the controller in DNA Fusion and **verify** that it is online.

   See page 3-9 in the Technical Installation Manual for more information.
7. **Connect** one port of the RS-485 communication line or Ethernet port to the controller.
8. **Power up** the subcontroller and **verify** that it is working properly.
9. **Connect** the subcontroller to the RS-485 line and/or Ethernet port.
10. **Configure** the subcontroller in DNA Fusion and bring it online with the controller.

    See page 3-17 in the Technical Installation Manual for more information.
11. **Verify** all functions of the subcontroller device.
12. **Repeat** steps 7-10 for each additional subcontroller.

Firmware Updates

Open Options provides the current firmware version with the DNA Fusion software. The firmware, which acts as a middleman between the hardware and software, is automatically installed during the initial DNA Fusion installation. Each subsequent software release will include the most recent firmware version.

For best system performance results, update the firmware when:

- Installing a new system
- Upgrading to a new DNA Fusion version
- Adding a new controller
- Replacing a controller
- Connecting to a controller for the first time

See page 20-13 in the *DNA Fusion User Manual* for instructions on updating the controllers and page 3-20 in the *Technical Installation Manual* for information on upgrading subcontroller firmware.

Baud Rates

The table below provides the various baud rates for Series 3 controllers and subcontrollers.

Controller /Subcontroller	9600	19200	38400	115200
SSP-LX	Supported	Supported	Supported	Supported
SSP-D2	Supported	Supported	Supported	Supported
DController	Supported	Supported	Supported	Supported
NController	Supported	Supported	Supported	Supported
MP02	Supported	Supported	Supported	Supported
RSC-1	Supported	Supported	Supported	Supported
RSC-2	Supported	Supported	Supported	Supported
NSC-100 (Series 2)	Supported	Supported	Supported	Not Supported
NSC-200	Supported	Supported	Supported	Supported

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Controllers 2

In This Chapter
√ SSP-EP
√ SSP-D2
√ SSP-LX
√ DController
√ NController
√ MP02

SSP Series Controllers

The SSP Series controllers are designed with power, performance, and flexibility in mind. At the heart of the field hardware, the controller performs all intelligent decisions and provides real-time processing for the subcontroller(s) connected to it. It also provides battery-backed memory to store the configuration data, cardholder database, and event buffer information.

> **!** *Replace the controller's 3V lithium battery annually.*

The SSP Series includes six (6) controller models:

- SSP-EP (Ethernet Panel) - Supports up to 64 subcontrollers (or 32 NSC-200s) for a total of 64 doors/readers; includes an on-board Ethernet connection.
- SSP-D2 (2 Door) - Supports up to 32 subcontrollers (or 32 NSC-200s) for a total of 64 doors/readers; includes an on-board Ethernet connection and one (1) on-board subcontroller.
- SSP-LX - Supports up to 64 subcontrollers (or 32 NSC-200s) for a total of 64 doors/readers; includes an on-board Ethernet connection and one (1) on-board subcontroller. The SSP-LX features an embedded Linux operating system to enable third-party software applications, extensive communications support, and heightened IT security.
- DController (1 Door) - Supports up to 16 NSC-200 (or up to 8 traditional RS-485 devices) for a total of 17 doors/readers (including the 2 on-board readers); includes an on-board Ethernet connection and one (1) on-board subcontroller. The DController is capable of using Power over Ethernet (PoE and PoE+).
- NController (Network) - Supports up to 64 subcontrollers (or 16 NSC-100) for a total of 64 doors/readers. The NController is rack-mounted, connects directly to a 10/100 network, and contains 15 MB RAM memory.
- MP02 (2 Doors) - Supports 64 subcontrollers for a total of 64 doors/readers; includes 2 on-board reader ports and on-board Ethernet connection.

SSP Series Controllers

SSP-EP **SSP-D2** **SSP-LX** **DController** **NController** **MP02**

Ports

The SSP Series has a dedicated host port for communication to the host that supports a micro USB (2.0) or RS-485 serial communication protocol as well as Ethernet 10/100. The RS-485 interface can be a 2-wire or 4-wire configuration. The host port is used to communicate configuration data and event/status reports.

Additional 2-wire RS-485 ports are used to communicate to downstream devices (subcontrollers). If a 4-wire port is required, two separate 2-wire ports can be combined into a single 4-wire port.

Best Practices

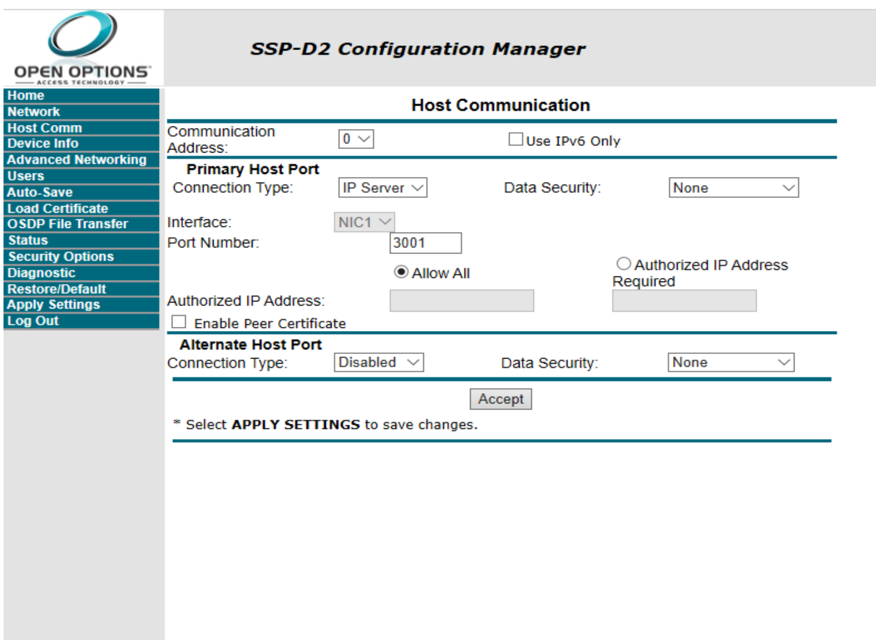
The following guidelines provide a more secure environment for the access control system's controllers:

1. The IP addresses assigned to the controllers should be inaccessible from the Internet. A firewall or private security VLAN is recommended.
2. **Create** a login (username and password) for the controller during installation.

> *The username and password are case-sensitive.*

3. After configuration is complete, **set** DIP switch 1 to OFF.
4. **Set** a Static IP Address for the server.
5. **Configure** the Authorized IP Address feature in the controller's Configuration Manager.

   See page 2-5 for more information.



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

> *For more information on maximizing controller security, see the Open Options Hardening Guide.*

Assigning the Controller's IP Address

To configure the controller's initial settings, such as the IP address, the operator must first establish communication with the controller using one of five methods:

- Direct Connect
- MercZeroConf Tool
- Internal Webpage
- Installation Assistant Utility (IAU)
- ZeroConfig Tool

Direct Connect

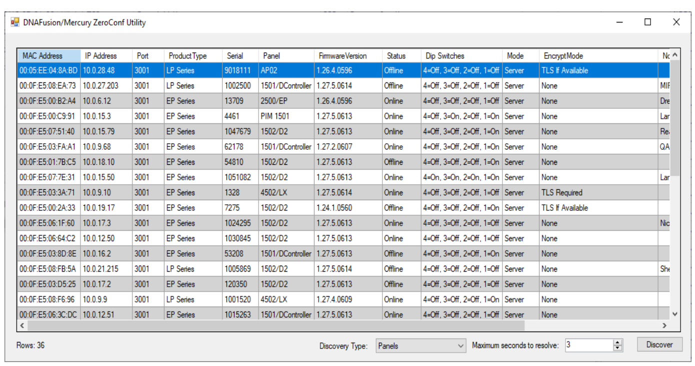
Prior to establishing an Ethernet connection, the operator can use a Ethernet cable to directly connect the controller board to a computer and configure the initial settings. Connect the cable directly to the computer and controller, open a web browser, and enter the static IP address assigned to the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

Verify the computers IP address is within the same range of the hardware default 192.168.0.251. If not, set the computer's IP range to a 192.168.0.X range.

MercZeroConf

The MercZeroConf is a tool that is used to discover controllers or network subcontrollers within a system. The MercZeroConf can be accessed once DNA Fusion is installed along with other discovery tools. This tool does not allow the user to change any of the information displayed in the utility. After clicking the Discover button, the utility displays network information regarding the Panels and Subcontrollers in the system. That information includes the following:

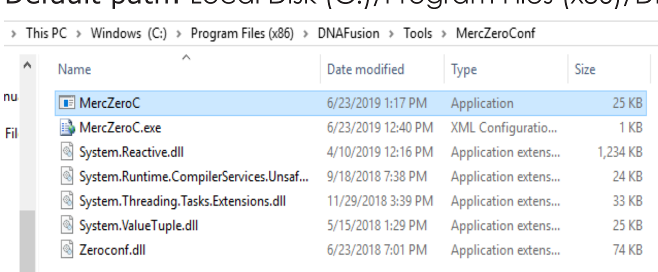
- MAC Address
- IP Address
- Port
- Product Type
- Product Type
- Serial
- Panel
- Firmware Version
- Status
- DIP Switches
- Mode
- Encrypt Mode
- Notes
- OEM Code



Clicking on any discovered panel in the MercZeroConf tool will open that panel's Internal Webpage. The Discovery Type drop-down allows the user to switch between discovering controllers and subcontrollers. Network subcontrollers (NSC-200) are the only type of subcontroller that can be discovered using this tool. The tool can also be located in the Built-In Tools menu in DNA Fusion.

1. **Locate** the MercZeroConf folder.

   Default path: Local Disk (C:)/Program Files (x86)/DNAFusion/Tools/MercZeroConf.



2. **Double-click** on the MercZeroC application.
   The MercZeroConf tool opens.
3. **Select** the Discovery Type.
4. **Click** the Discover button.
5. **Click** on a Panel / Subcontroller.

> *To open the panel's Internal Webpage via the MAC address, double-click the panel's MAC address. The webpage's URL will contain the panel's MAC address, as oppose to the IP Address.*

6. Continue to Internal Webpage on page 2-4.

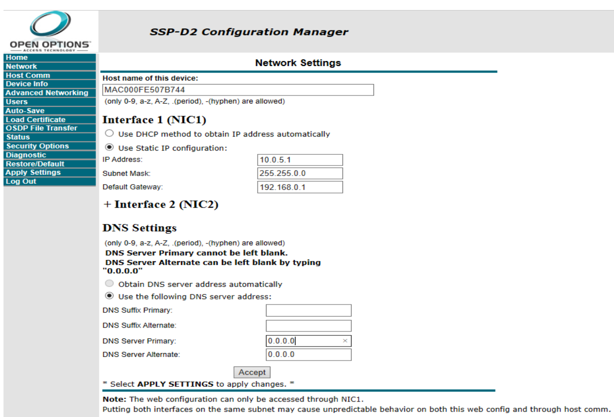
> *The Subcontroller Discovery Type will only located network subcontrollers (NSC-200).*

Internal Webpage

1. **Open** a web browser and **enter** the controller's IP address in the address bar.
2. **Log in** using the default Username and Password.
   The Home screen of the Configuration Manager appears.

> *The default username is "admin" and the default password is "password." Open Options recommends creating a new user and turning DIP switch 1 OFF. For the MP02, press the Tamper Button 2 times.*

3. **Select** Network from the menu.
   The Network Settings screen appears.



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

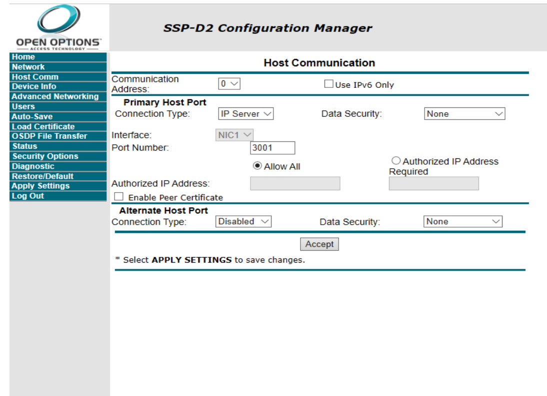
> *This information must be obtained from the customer.*

   OR

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

   By default, the host name consists of "MAC" followed by the numbers in the device's MAC address. The MAC Address can be located on the board.
5. **Click** Accept.
6. If desired, **select** Host Comm from the menu.
   The Host Communication screen appears.

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



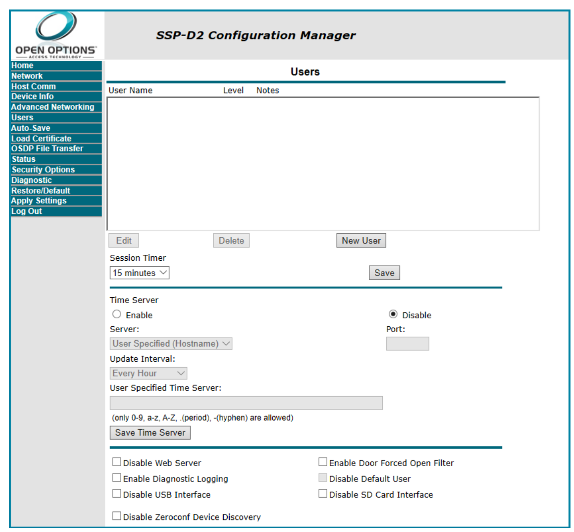
- Communication Address - Identifies the address used to communicate with the controller. This setting must match the Physical Address field in DNA Fusion.
  - IP Configuration - **Set** the address to 0.
  - Serial Configuration - **Set** a unique address number for the SSP controller.
- Use IPv6 Only - Uses an IPv6 address.
- Connection Type - Specifies the type of connection.
  - IP Server - Standard TCP/IP.
  - IP Client - Panel can be set to automatically phone in to send transaction information. Requires the operator to create a trigger/macro combination in DNA Fusion.
- Data Security - If desired, **select** Password/AES encryption.
- Port Number - Default is 3001.
- If the Connection Type is set to IP Server, the controller can be configured to allow all IP addresses or only authorized IP addresses. This limits the IP addresses that can connect to the 3001 port. If used, **enter** the DNA server's IP address in the Authorized IP Address field.

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

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

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

   The Users screen appears.



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

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

    The User Account dialog opens.

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

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

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

    d. **Click** the Save button.

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

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

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

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

- Disable Web Server - Closes port 80 and disables access to the configuration webpage. To re-enable the web server, set DIP switch 1 back to the ON position and deselect the Disable Web Server checkbox.

- Disable Bonjour - If checked, the ZeroConfig tool can NOT be used for configuration. Both the Disable Bonjour and Disable Web Server checkboxes must be unchecked in order to discover and configure the device.

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

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

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

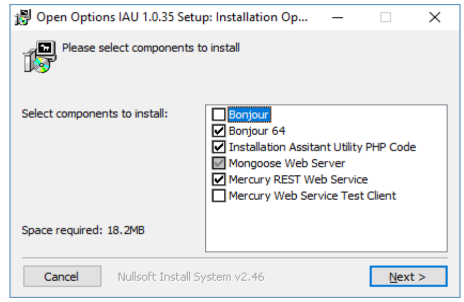
13. If desired, **select** Restore/Default from the menu.

    The Restore Settings screen appears.

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

14. **Click** the Apply Settings button to save all changes made in the Network and Host Comm settings.
15. **Click** Log Out to exit the Configuration Manager.

Installation Assistant Utility (IAU) Installation



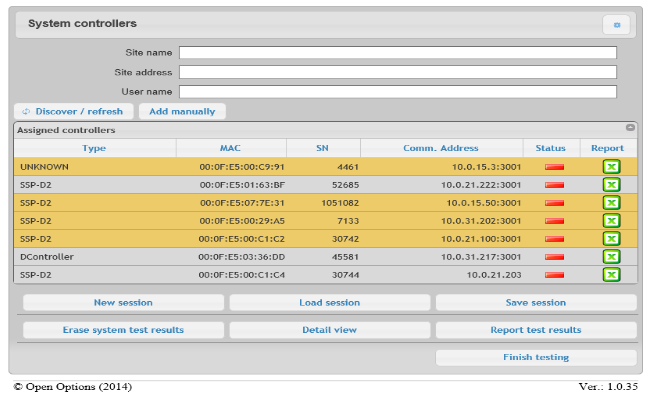
1. **Locate** the IAU folder.
2. **Follow** path: Local Disk (C:)/Program Files (x86)/DNAFusion/Tools/IAU.
3. **Install** the IAU.
4. During the IAU setup, **check** the Bonjour 64 component.
5. **Click** install to open the Bonjour Installer or click Browse to select a destination to download the installer.

Configuration:

1. Once IAU setup is complete, **click** Close and **open** Internet Explorer.
2. **Type** localhost in the URL.

   The Installation Assistant Utility webpage opens.

   At the top of the IAU main page, the installer can add a Site name, a Site address, and a User name.



> *Any testing done BEFORE entering a User name will not show in the Verified by column of the report.*

3. To connect to the controller, **click** your selection from the discovery list or manually add it by clicking Add manually.

   A progress bar will appear showing the connection progress before bringing you to the controller's webpage.

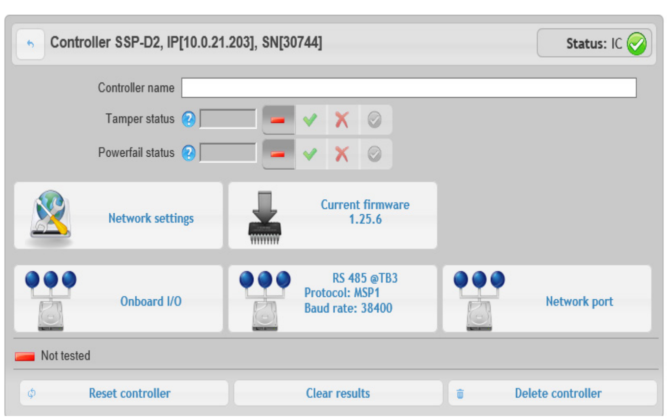
   Click the Discover/refresh button if a recently assigned controller is not shown in the Assigned controllers list.

> *All controllers must have DIP switch 1 set as well as no other active connections in order to successfully connect.*

Manually Adding a Controller:

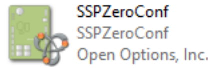
1. On the Installation Assistant Utility webpage, **click** on the Add manually button.
2. **Click** on the Type: drop-down menu and **select** the correct controller type.
3. **Enter** the controllers MAC address.
4. **Enter** the controllers IP address or Host
5. **Click** Add to add the controller to the Assigned controllers list.

Multiple objects can be verified through the IAU tool. Selecting Network settings will redirect to the controller's internal webpage. See page 2-4 for information about the Internal Webpage.

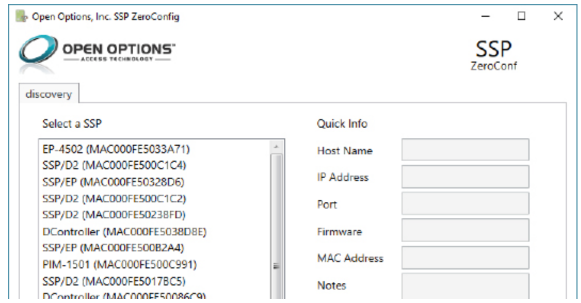


ZeroConfig Tool

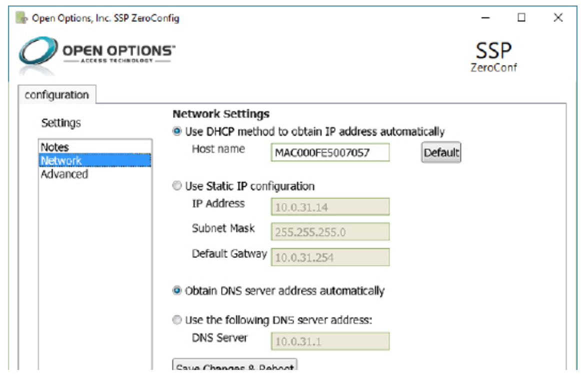
1. **Set** all DIP switches to the ON position and **cycle** power.
   This allows the board to receive a default DHCP IP address.
2. **Open** the SSPZeroConf application.



   Default location:
   32-bit OS - C:\Program Files\DNAFusion\Tools\ZeroConf\SSPZeroConf.exe
   64-bit OS - C:\Program Files (x86)\DNAFusion\Tools\ZeroConf\SSPZeroConf.exe
   The SSP ZeroConfig dialog appears.



3. **Select** the desired Controller by the unique MAC Address and **click** the Configure button.
   The MAC Address is located on the controller and the box.
   The Configuration dialog for the selected controller opens.
4. If desired, **enter** any Notes relevant to the hardware component and **click** the Save Changes button.
5. **Select** Network from the dialog menu.
   The Network Settings screen appears.



6. **Select** Use Static IP Configuration and **enter** the IP Address, Subnet Mask, and Default Gateway information as well as the DNS Server Address.
   This information must be obtained from the customer.
7. **Click** the Save Changes & Reboot button to apply the configuration to the controller.
   If desired, **select** Advanced from the dialog menu to open the controller's internal webpage and configure additional settings.
   When Advanced is selected, ZeroConfig automatically creates a user and logs them in to the internal webpage. See page 2-4 for more information on the internal webpage.
8. **Close** the SSP ZeroConfig dialog.
9. **Set** all DIP switches to the OFF position and cycle power.
   This places the board in the normal operating mode.

> *If unable to access the* Configuration *dialog in* ZeroConfig*, use the controller's internal webpage to configure the IP address. See page 2-4 for more information.*

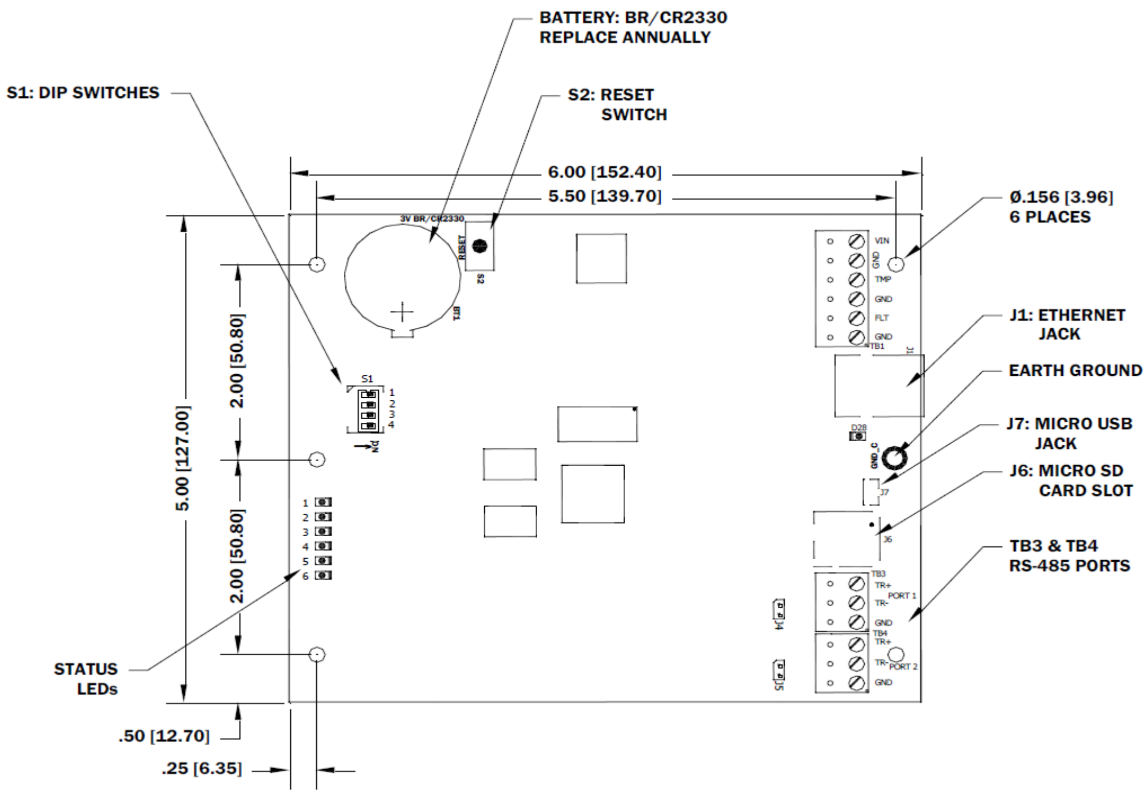
> *Operators can NOT assign an IP address in the 169.254.xxx.xxx range to a controller. This range is reserved for Automatic Private IP Addressing (APIPA). APIPA is used to assign an address when a device is configured for DHCP but DHCP servers are not available.*

SSP-EP Controller

The SSP-EP controller provides processing for up to 64 downstream SIO devices (max. 64 readers/doors) capable of functioning independently without intervention from the host once programmed.

The SSP-EP uses an on board 10-BaseT/100Base-TX Ethernet port (J1) to communicate with cloud or server-based hosts. Host communication is also allowed through the micro USB (2.0) jack (J7) with an optional micro USB-to-Ethernet adapter. The SSP-EP requires 12 to 24 Vdc for power. Subcontroller connections require a 2-wire RS-485 multi-drop communication bus and connect using Port 1 and Port 2.

The SSP-EP should be mounted at least 0.25" above any conductive surface.



Installation

To install the SSP-EP controller:

1. If required, **mount** the SSP-EP in an Open Options or Life Safety Power enclosure.
2. **Wire** the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
3. **Wire** the server communication.
4. **Wire** the subcontroller communication.
5. **Wire** the power input.
6. **Remove** the plastic safety strip from the backup battery.
7. **Configure** the jumper and DIP switch settings. See page 2-13 for more information.
8. **Set** the board for the desired initial IP addressing mode.
9. **Configure** the network and port settings using any of the IP addressing tool. See pages 2-3 for more information.

Default Settings

Each SSP-EP board ships with the following default configuration:

- DIP Switches: OFF
- IP Addressing: DHCP
- Network: Static IP Addressing = 192.168.0.251
- DNS Name: “MAC” followed by the 12-character MAC address
- Physical Address: 0
- Encryption: TLS (if Available)
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Subnet Mask: 255.255.0.0
- Alternate Host Port: Disabled
- Login Name: admin
- Login Password: password

The username and password are case-sensitive.

Security

When installing the SSP-EP ensure that the installation is done in a secure matter.

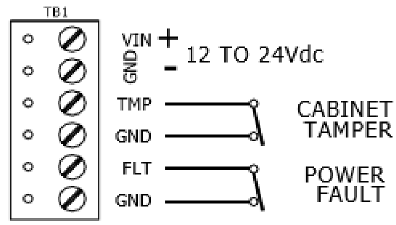
The installation process requires adding a user account(s) to the web configuration. Open Options recommends creating a user account with a secure password. Dip switches are positioned OFF for a normal operating setting.

The SSP-EP is shipped with a default login account. To enable the default login, move DIP switch 1 from OFF to ON. The default login will be available for five (5) minutes once enabled. As a result, it’s important that at least one user account is defined and the DIP switches on the SSP-EP are set to OFF before the controller is commissioned. Open Options highly recommends not to configure the SSP-EP with an IP address that is accessible form the public internet.

Options are available in the Configuration Manager for disabling SNMP, Zeroconfig, as well as the web configuration module. Additionally, data encryption can also be enabled over the host communication port. See the Open Options Hardening Guide for more information on security.

Power Supply

The SSP-EP controller accepts 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 TB1 using a minimum of 18 AWG wires.



Connect the GND *signal to earth ground at one location in the system. Multiple earth ground connections may cause ground loop problems and is not advised.*

Alarm Inputs Wiring

Inputs TMP and FLT on TB1 are used for monitoring the cabinet tamper and power failure with normally closed (NC) contacts. The inputs are unsupervised and do not require EOL resistors. If these inputs are not used, connect the shorting wire that came attached to the input during shipment.

Host Communication Wiring

The SSP-EP communicates to the host in one of two ways:

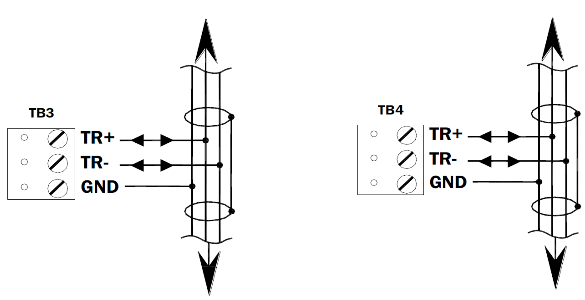
- 10Base-T/100Base-TX Ethernet Port
- Micro USB port (2.0) with an optional micro USB-to-Ethernet adapter

Downstream Communication Wiring

Ports 1 and 2 on the SSP-EP controller require a 2-wire RS-485 interface. This type of interface allows multidrop communication on a single bus of up to 4,000 ft (1,219 m). Use twisted pairs (min. 24 AWG) with shield and 120 ohm impedance.

Termination jumpers should ONLY be installed on the devices at the end of the line; see page 2-12 for jumper settings.

Wire the TR+, TR-, and GND connections on Ports 1 and 2.



Memory Backup Battery

The lithium battery, type BR2330 or CR2330, serves two purposes: it powers the controller's static RAM and real-time clock device when input power is interrupted, and it backs up the event buffer. The battery should be replaced annually. If the data in the static RAM is corrupted, all data—including flash memory—is considered invalid and is permanently erased.

Bulk Erase Configuration Memory

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

- Erase all configuration and cardholder database (sanitize board, less third party applications).
- Update OEM default parameters after OEM code has been changed.
- Recover from database corruption causing the SSP-EP board to continuously reboot.

The bulk erase function erases all configuration and cardholder databases.

1. **Set** DIP switches 1 and 2 to ON.
2. **Set** DIP switches 3 and 4 to OFF.
3. **Power up** the SSP-EP.

   LED 1 is on for 15 seconds while the SSP-EP boots up.
4. **Set** DIP switch 1 or 2 to OFF within a 10-second window.

   During the reset window, LEDs 1 & 2 and LEDs 3 & 4 flash alternately at a 0.5-second rate. When erasing memory, LED 2 flashes at a 2-second rate. DO NOT CYCLE POWER. The process may take 5 to 10 minutes to complete. LEDs 1 and 4 flash for 10 seconds after the memory has been erased, and then the SSP-EP will reboot.

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

DO NOT CYCLE POWER during bulk erase process. Process may take up to 10 minutes.

Hardware Setup

The SSP-EP controller hardware is configured with a number of jumpers and a set of four (4) DIP switches. These jumpers/switches determine the port interface, end-of-line termination, and operating mode settings. Refer to the following tables for more information.

Jumper Settings

The table below describes the jumper settings for the SSP-EP. These settings vary depending on the communication protocol used.

Jumper(s)	Set at	Description
J1	N/A	10-BaseT/100Base-TX Ethernet Port
J2,J3	N/A	Factory Use Only
J4	OFF	Port 1 RS-485 EOL Terminator is OFF
	ON	Port 1 RS-485 EOL Terminator is ON
J5	OFF	Port 2 RS-485 EOL Terminator is OFF
	ON	Port 2 RS-485 EOL Terminator is ON
J6	N/A	MicroSD Card
J7	N/A	USB Port (2.0)

DIP Switch Settings

The SSP-EP has two DIP switch locations:

- S1 – Configures the operating mode; see table below.
- S2 – If pressed, resets the controller.

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 settings (see page 2-10).	OFF	ON	OFF	OFF
Use OEM default communication settings. See Bulk Erase on page 2-12.	ON	ON	OFF	OFF
Bulk Erase prompt Mode. See Bulk Erase on page 2-12.	ON	ON	OFF	OFF
The SSP-EP (LP) reports and functions like a SSP-EP (EP). The setting is used only when the host software is not updated to the LP product line.	OFF	OFF	OFF	ON

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

Terminal Block Connections

The table below describes the terminal blocks for the SSP-EP.

Terminal Block	Description	Connection
TB 1-1	Power Input	VIN
TB 1-2	Power Input	GND
TB 1-3	Cabinet Tamper	TMP
TB 1-4	Cabinet Tamper	GND
TB 1-5	Power Fault	FLT
TB 1-6	Power Fault	GND
TB 2	Not Used	N/A
TB 3-1	Downstream Communication (Port 1)	TR+
TB 3-2	Downstream Communication (Port 1)	TR-
TB 3-3	Downstream Communication (Port 1)	GND
TB 4-1	Downstream Communication (Port 2)	TR+
TB 4-2	Downstream Communication (Port 2)	TR-
TB 4-3	Downstream Communication (Port 2)	GND

Status LEDs

Power Up

All LEDs are OFF.

Initialization

LEDs 1 through 6 are sequenced during initialization.

LED 1 in ON for 15 seconds. Then LED’s 2 through 6 are flashed once at the beginning of initialization. LED’s 3 and 4 are ON for approximately one (1) second 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 one (1) seconds without a card database. Every 10,000 cards adds about two (2) seconds to the application initialization. When LEDs 1 through 4 flash simultaneously, data is being read from or written to flash memory. Do NOT cycle power during this state. If the sequence stops or repeats, perform one of the following steps:

- Power up and tag database as invalid
    1. **Remove** power to the SSP-EP and **place** an insulator under the battery clip.
    2. **Wait** 5-10 seconds, **remove** the insulator, and **reapply** input power.
- Power up without loading the database into RAM
    1. **Remove** input power to the SSP-EP.
    2. **Set** the DIP switches to default mode.

       In default mode, the database is not loaded into RAM; see page 2-13 for DIP switch settings.
    3. **Reapply** power.
- Erase all configuration and database information (also erases card database for security reasons)
    1. **Perform** a bulk erase using the steps on page 2-12.

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

Running

LED	Description	Indicator
1	Online/Offline and Battery Status	Online = 80% ON, Offline = 20% ON Double Flash = Low Battery
2	Host Communication Activity (Serial Port 1)	Flashing = Host Activity
3	Port 1 Communication Activity	Flashing = Port Activity
4	Port 2 Communication Activity	Flashing = Port Activity
5	Unassigned	N/A
6		
D28	Host Communication Activity (Ethernet Port 0)	Flashing = Host Activity
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

Specifications

The SSP-EP is for use in low-voltage, Class 2 circuits only. Installation must comply with all fire and electrical codes.

Primary Power:	*Voltage:*	12 to 24 Vdc ± 10%, 250 mA max. (USB current not available)
	Current:	12 Vdc @ 240 mA (325 mA w/ CoBox Micro) nominal 24 Vdc @ 135 mA (175 mA w/ CoBox Micro) nominal
Memory and Clock Backup:		3 V Lithium, type BR2330 or CR2330
Ports:	*Primary (Ethernet) Port 0:*	10/100 Base-T Ethernet high-speed port
	Micro USB Port:	5 Vdc, 500 mA max. (add 270 mA to primary power current)
	Downstream Ports 1 & 2:	2 each: 2-wire RS-485: 2,400 to 115,200 bps, async., half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:		2 unsupervised, dedicated for cabinet tamper and power fault monitoring
Wire Requirements:	*Power:*	1 twisted pair, 16 to 18 AWG
	RS-485:	24 AWG, 4,000 ft (1,219 m) max., twisted pair w/ shield; 120 Ohm
	Ethernet:	Category 5e cabling minimum
	Alarm Input:	1 twisted pair, 30 ohms max.
MicroSD Card:	*Format:*	microSD or microSDHC: 2 GB to 8 GB
Mechanical:	*Dimension:*	5” (127 mm) W x 6” (152.4 mm) L x 1” (25 mm) H
	Weight:	4.1 oz (115 g) nominal
Environmental:	*Temperature:*	0 to 70 °C, operating -55 to +85 °C, storage
	Humidity:	5 to 95% RHNC
UL294, 6th Edition Performance Levels	*Standby Power:*	Level: I
	Endurance:	Level: IV
	Line Security:	Level: I
	Destructive:	Level: I

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.

Category 5e cabling is the minimum performance category recommended.

NOTES:

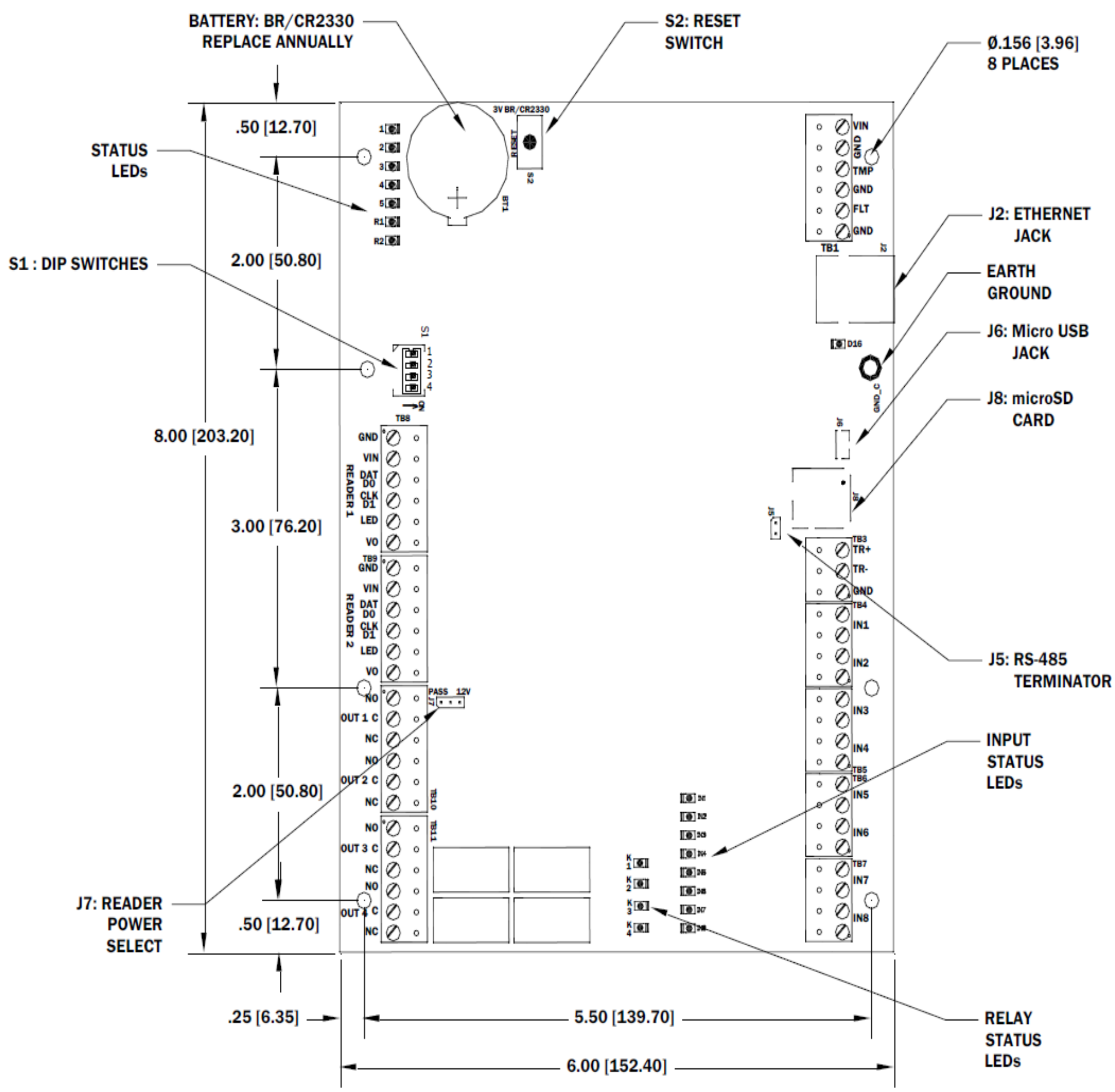
SSP-D2 Controller

The multi-port SSP-D2 is dual card reader panel for controlling two doors and managing up to 64 readers. The SSP-D2 is capable of performing numerous access control applications without host intervention. The SSP-D2 supports OSDP, OSDP Secure Channel, keypads, biometric readers, Wiegand, clock and data, magnetic stripe, F/2F and supervised F/2F reader, technologies.

The SSP-D2 communicates with the host via on-board 10-BaseT/100Base-TX Ethernet port or the micro USB port (2.0) with an optional micro USB to Ethernet adapter.

Each reader port (Reader 1 and Reader 2) can accommodate a reader that utilizes TTL (D1/D0, Clock/Data), standard or supervised F/2F, or 2-wire RS-485 device signalling and also provides tri-state LED control, and buzzer control (one wire LED mode only). Four (4) Form-C relay outputs (TB10 and TB11) may be used for door strike control or alarm signalling. Eight (8) inputs circuits (TB3 Through TB7) may be configured as unsupervised or supervised.

The SSP-D2 should be mounted at least 0.25" above any conductive surface.



Installation

To install the SSP-D2 controller:

1. If required, **mount** the SSP-D2 in an Open Options or Life Safety Power enclosure.
2. **Wire** the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
3. **Wire** the server communication.
4. If applicable, **wire** the subcontroller communication.
5. If applicable, **wire** the on-board readers.
6. **Wire** the input circuit.
7. **Wire** the relay circuit.
8. **Wire** the power input.
9. **Remove** the plastic safety strip from the backup battery.
10. **Configure** the jumper and DIP switch settings. See page 2-23 for more information.
11. **Set** the board for the desired initial IP addressing mode.
12. **Configure** the network and port settings using the network addressing tools provided.
    See pages 2-3 for more information

Default Settings

Each SSP-D2 board ships with the following default configuration:

- DIP Switches: OFF
- IP Addressing: DHCP
- Network: Static IP Addressing = 192.168.0.251
- DNS Name: “MAC” followed by the 12-character MAC address
- Physical Address: 0
- Encryption: TLS (if available)
- Default Gateway: 192.168.0.251
- DNS Server: 192.168.0.1
- Subnet Mask: 255.255.0.0
- Alternate Host Port: Disabled
- Login Name: admin
- Login Password: password

> ⓘ *The username and password are case-sensitive.*

Security

When installing the SSP-D2 ensure that the installation is done in a secure matter.

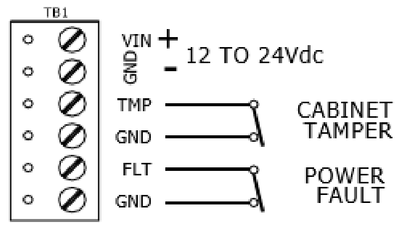
The installation process requires adding a user account(s) to the web configuration. Open Options recommends creating a user account with a secure password. Dip switches are positioned OFF for a normal operating setting.

The SSP-D2 is shipped with a default login account. To enable the default login, move DIP switch 1 from OFF to ON. The default login will be available for five (5) minutes once enabled. As a result, it’s important that at least one user account is defined and the DIP switches on the SSP-D2 are set to OFF before the controller is commissioned. Open Options highly recommends not to configure the SSP-D2 with an IP address that is accessible form the public internet.

Options are available in the Configuration Manager for disabling SNMP, Zeroconfig, as well as the web configuration module. Additionally, data encryption can also be enabled over the host communication port.

Power Supply

The SSP-D2 controller accepts 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 TB1 using a minimum of 18 AWG wires.



> *Connect the GND signal to earth ground at one location in the system. Multiple earth ground connections may cause ground loop problems and is not advised.*

Alarm Inputs Wiring

Inputs TMP and FLT on TB1 are used for monitoring the cabinet tamper and power failure with normally closed (NC) contacts. The inputs are unsupervised and do not require EOL resistors. If these inputs are not used, connect the shorting wire that came attached to the input during shipment.

Host Communication Wiring

The SSP-D2 communicates to the host in one of two ways:

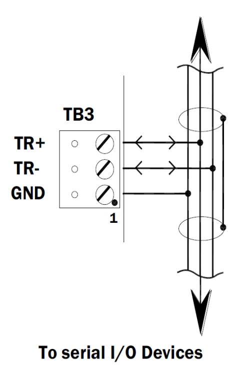
- 10Base-T/100Bast-TX Ethernet Port
- Micro USB (2.0) Port with optional micro USB-to-Ethernet adapter

Downstream Communication Wiring

Terminal Block 3 (TB3) on the SSP-D2 requires a 2-wire RS-485 interface to connect to downstream subcontrollers. The interface allows for multi-drop communication on a single bus of up to 4,000 ft (1,219 m). Use twisted pairs (min. 24 AWG) with shield for communinication. The J5 termination jumper should only be installed on the devices at the end of the line (see page 2-23 for jumper settings).

Wire the TR+, TR-, and GND connections on TB3 as illustrated above.

> *Install the termination jumper (J5) ONLY on the panels 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 a reader with TTL (D1/D0, Clock and Data), F/2F (standard or supervised) or 2-wire RS-485 signalling (OSDP). Power to the reader is configured via J7 jumper. See page 2-23 for Jumper Settings.

If 12V is selected, the VIN must be greater than 20 Vdc. If PASS if selected, power is passed through from the input voltage of the SSP-D2 (VIN on TB1) and is current limited to 150mA for each reader port.

> *Readers that require a different voltage or have high current requirements should be powered separately.*

The TB8 and TB9 reader ports are 6-wire interfaces that include a buzzer control wire (BZR) and an LED control wire (LED). Refer to the manufacturer specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Use DNA Fusion to configure the reader port settings. See page 3-41 in the Technical Installation Manual for more information.

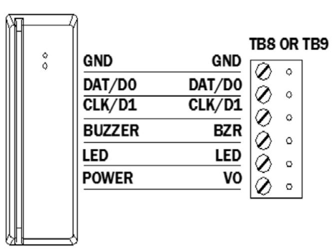
To fully utilize each report port:

- TTL signalling requires a 6-conductor cable (18 AWG).
- F/2F signalling requires a 4-conductor cable, shielded.
- RS-485 signalling requires two 2-conductor cable for power (18 AWG) and one cable for communication (24 AWG, with drain wire and shield).

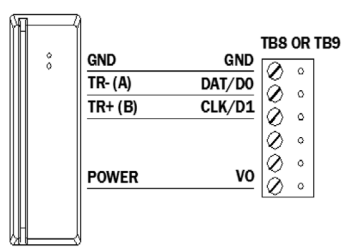
> *If input voltage to the SSP-D2 is 12 Vdc, jumper J7 MUST be in the PASS position.*

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

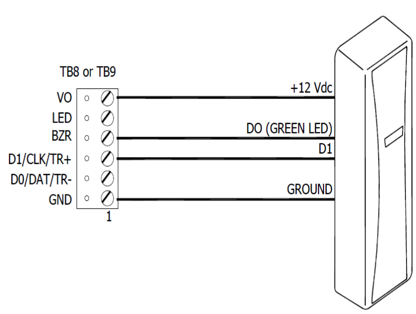
J7 – Reader Power Select



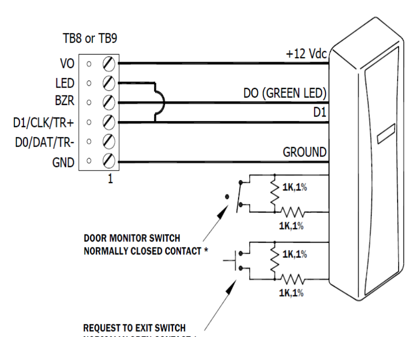
Typical D1/D0 or Clock/Data Reader



Typical 2-wire RS-485 Device (OSDP Reader for Example)



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader

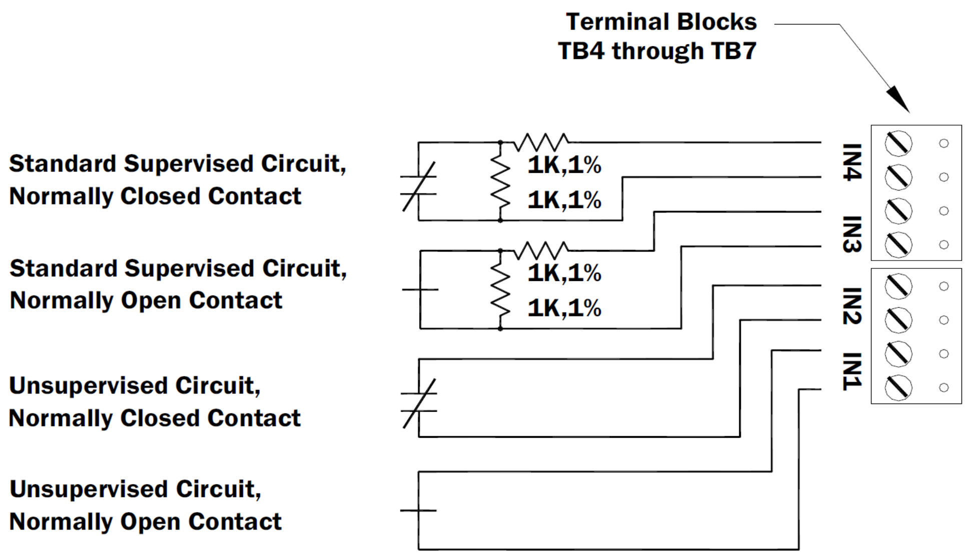
Input Circuit Wiring

The SSP-D2 controller contains eight (8) inputs that are used to monitor the door position, request-to-exit (REX), and/or alarm contacts. Connect the alarm inputs (IN1-IN8) on terminal blocks TB4 through TB7 using twisted-pair cables.

Input circuits can be configured as supervised or unsupervised. When unsupervised, reporting is limited to Open and Closed states. However, when supervised, the input circuit will report not only Open and Closed states, but also Open Circuit, Shorted, Grounded, and Foreign Voltage. Use DNA Fusion to configure the input settings. See page 3-43 in the Technical Installation Manual for more information.

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

If supervised inputs are used, the installer must add two resistors to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k Ohm, 1% resistors and should be located as close to the input as possible.

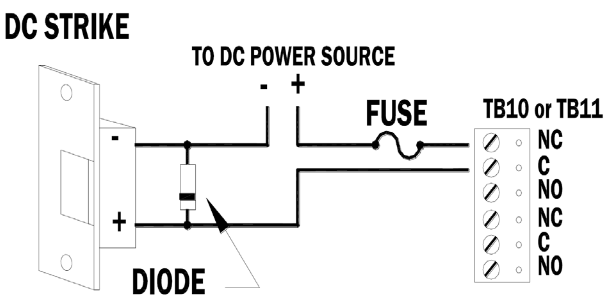


Relay Circuit Wiring

Four (4) relays with Form-C contacts, located on TB10 and TB11, provide the ability to control door lock mechanisms, alarm signals, and other output devices. The relay contacts are rated at 5 A @ 30 Vdc for Normally Open (NO) and 3 A @ 30 Vdc for Normally Closed (NC), dry contact configuration.

Each relay consists of three poles: Common (C), Normally Open (NO), and Normally Closed (NC). When controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When power is momentarily removed to unlock a door, such 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 may generate feedback to the relay circuit that causes damage and/or premature relay failure. For this reason, Open Options recommends using a diode.



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

Memory Backup Battery

The SSP-D2's static RAM and real-time clock are backed up by a lithium battery when input power is interrupted. The battery (type BR2330 or CR2330) should be replaced annually. If the data in the static RAM is corrupted, all data—including flash memory—is considered invalid and is permanently erased. All configuration data must then be re-downloaded.

Bulk Erase Configuration Memory

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

- Erase all configuration and cardholder database (sanitized board, less third party applications).
- Update OEM default parameters after OEM code has been changed.
- Recover from data corruption causing SSP-D2 board continuously reboot.

The bulk erase function erases all configuration and cardholder databases.

1. **Set** DIP switches 1 and 2 to ON.
2. **Set** DIP switches 3 and 4 to OFF.
3. **Power up** the SSP-D2. LED 1 is on for 15 seconds while the SSP-D2 boots up.
4. **Set** DIP switch 1 or 2 to OFF within a 10-second window.

   During the reset window, LEDs 1 & 2 and LEDs 3 & 4 flash alternately at a 0.5-second rate. When erasing memory, LED 2 flashes at a 2-second rate. DO NOT CYCLE POWER. The process may take 5 to 10 minutes to complete. LEDs 1 and 4 flash for 10 seconds after the memory has been erased, and then the SSP-D2 will reboot.

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

DO NOT CYCLE POWER during the bulk erase process. Process may take up to 10 minutes.

Hardware Setup

The SSP-D2 controller hardware is configured with a number of jumpers and a set of four (4) DIP switches. These jumpers/switches determine the port interface, end-of-line termination, and operating mode settings. Refer to the following tables for more information.

Jumper Settings

The table below describes the jumper settings for the SSP-D2.

Jumper(s)	Set at	Description
J1	N/A	Factory Use Only
J2	N/A	10Base-T/100Base-TX Ethernet Connection
J3, 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	Micro USB Port (2.0)
J7	12V	12 Vdc at Reader Ports (must be <20 Vdc)
	PASS	VIN “Passed Through” to Reader Ports
J8	N/A	MicroSD Card

Install jumper J7 in the 12 V position ONLY if the input voltage (VIN) is greater than 20 Vdc. Failure to do so may damage the reader or the SSP-D2.

DIP Switch Settings

The SSP-D2 has two DIP switch locations:

- S1 - Configures the operating mode; see table below.
- S2 - If pressed, resets the controller.

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 settings (see page 2-18).	OFF	ON	OFF	OFF
Use OEM default communication settings. See Bulk Erase on page 2-22.	ON	ON	OFF	OFF
Bulk erase prompt mode at power up. See page 2-22 for information about Bulk Erase.	ON	ON	OFF	OFF
The SSP-D2 (LP) reports and functions like a SSP-D2 (EP). The setting is used only when the host software is not updated to the LP product line.	OFF	OFF	OFF	ON

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

Terminal Block Connections

The table below describes the terminal blocks for the SSP-D2.

Terminal Block	Description	Connection
TB 1-1	Power Input	VIN
TB 1-2		GND
TB 1-3	Cabinet Tamper	TMP
TB 1-4		GND
TB 1-5	Power Fault	FLT
TB 1-6		GND
TB2	Not Used	N/A
TB 3-1	Downstream Communication (2-wire RS-485)	TR+
TB 3-2		TR-
TB 3-3		GND
TB 4-1	Input 1	IN1
TB 4-2		IN1
TB 4-3	Input 2	IN2
TB 4-4		IN2
TB 5-1	Input 3	IN3
TB 5-2		IN3
TB 5-3	Input 4	IN4
TB 5-4		IN4
TB 6-1	Input 5	IN5
TB 6-2		IN5
TB 6-3	Input 6	IN6
TB 6-4		IN6
TB 7-1	Input 7	IN7
TB 7-2		IN7
TB 7-3	Input 8	IN8
TB 7-4		IN8
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
TB 10-1	Output Relay 1	NO
TB 10-2		C
TB 10-3		NC

Terminal Block	Description	Connection
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

Status LEDs

Power Up

All LEDs are OFF.

Initialization

After power is applied, LED 1 is ON for about 15 seconds. LEDs 3-6, R1, R2, and IN1-IN8 are sequenced during initalization.

LEDs 3 and 4 are turned ON for approximately one (1) second 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 one (1) second without a card database. Every 10,000 cards adds about two (2) seconds to the application initialization. When LEDs 1, 2, 3, and 4 flash simultaneously, data is being read from or written to flash memory. Do NOT cycle power during this state.

If the sequence stops or repeats, perform one of the steps listed on page 2-14.

Running

LED	Description	Indicator
1	Online/Offline and Battery Status	Online = 80% ON, Offline = 20% ON Double Flash = Low Battery
2	Host Communication Activity (Ethernet or micro USB port)	Flashing = Host Activity
3	Internal Subcontroller Communication	Flashing = SIO Activity
4	External Subcontroller Communication	Flashing = SIO Activity
5	Unassigned	N/A
R1	Reader 1: Clock/Data or D1/D0 Mode	Flashing = Data Received
	Reader 1: F/2F Mode	Flashes when Data/Acknowledgment is Received
	Reader 1: RS-485 Mode	Flashing = Transmitting Data

LED	Description	Indicator
R2	Reader 2: Clock/Data or D1/0 Mode	Flashing = Data Received
	Reader 2: RS-485 Mode	Flashing = Transmitting Data
	Reader 2: F/2F Mode	Flashes when Data/Acknowledgment is Received
D16	Host Communication Activity (Ethernet Port 0)	Flashing = Host Activity
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
IN1-IN8	Input Status (1-8)	ON = Active, OFF = Inactive Flashing = Trouble
K1-K4	Relay Status (1-4)	ON = Energized

Specifications

The SSP-D2 is for use in low-voltage, Class 2 circuits only. The installation of the controller must comply with fire and electrical codes.

Power:	*Primary Power:*	12 to 24 Vdc ± 10%, 500 mA max. (reader and USB port current not included)
	Reader Ports:	600 mA maximum (add 600 mA to primary power current)
	Micro USB Port:	5 Vdc, 500 mA maximum (add 270 mA to primary power current)
Memory and Clock Backup:		3V Lithium, BR2330 or CR2330
Ports:	*Primary (Ethernet) Port 0:*	10Base-T/100Base-TX Ethernet high-speed port
	Micro USB Port (2.0):	optional adapter: plugable model USB2-OTGE100
	Downstream Port:	2-wire RS-485: 2,400 to 115,200 bps, async., half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
Inputs:		2 unsupervised, dedicated for cabinet tamper and power fault monitoring 8 unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, 1/4 watt
Outputs:	*Normally Open (NO) Contact:*	5 A @ 30 Vdc resistive
	Normally Closed (NC) Contact:	3 A @ 30 Vdc resistive
MicroSD Card	*Format:*	microSD or microSDHC: 2 GB to 8 GB
Reader Interface:	*Reader Power: (jumper selectable)*	12 Vdc ± 10% regulated (input voltage (VIN) must be greater than 20 Vdc) or 12 to 24 Vdc ± 10% (input voltage passed through); current limited to 300 mA for each reader
	Data Inputs:	TTL-compatible inputs, F/2F, or 2-wire RS-485 standards supported.
	RS-485 Mode:	9,600 to 115,200 bps, async., half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Max. cable length: 2000 ft (609.6 m)
	LED Output:	TTL levels, high > 3 V, low < 0.5 V, 5 mA source/ sink max.
	Buzzer Output:	Open collector, 12 Vdc open circuit maximum, 40 mA sink maximum
Wire Requirements:	*Power and Relays:*	1 twisted pair, 16 to 18 AWG
	RS-485:	SIO device port: 1 twisted pair, shielded, 120 ohm, 24 AWG, 4,000 ft (1,219 m) max. Reader port: 1 twisted pair, shielded, 120 ohm, 24 AWG, 2000 ft (1,219 m) max.
	Ethernet:	CAT-5e, minimum
	Alarm Input:	1 twisted pair, 30 ohms max.

Data Memory:		6 MB standard
Mechanical:	*Dimension:*	8” (203.2 mm) W x 6” (152.4 mm) L x 1” (25 mm) H
	Weight:	9 oz (255 g) nominal, board only
Environmental:	*Temperature:*	0 to 70 °C, operating -55 to +85 °C, storage
	Humidity:	5 to 95% RHNC
UL294, 6th Edition Performance Levels	*Standby Power:*	Level: I
	Endurance:	Level: IV
	Line Security:	Level: I
	Destructive Attack:	Level: I

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.

Category 5e cabling is the minimum performance category recommended.

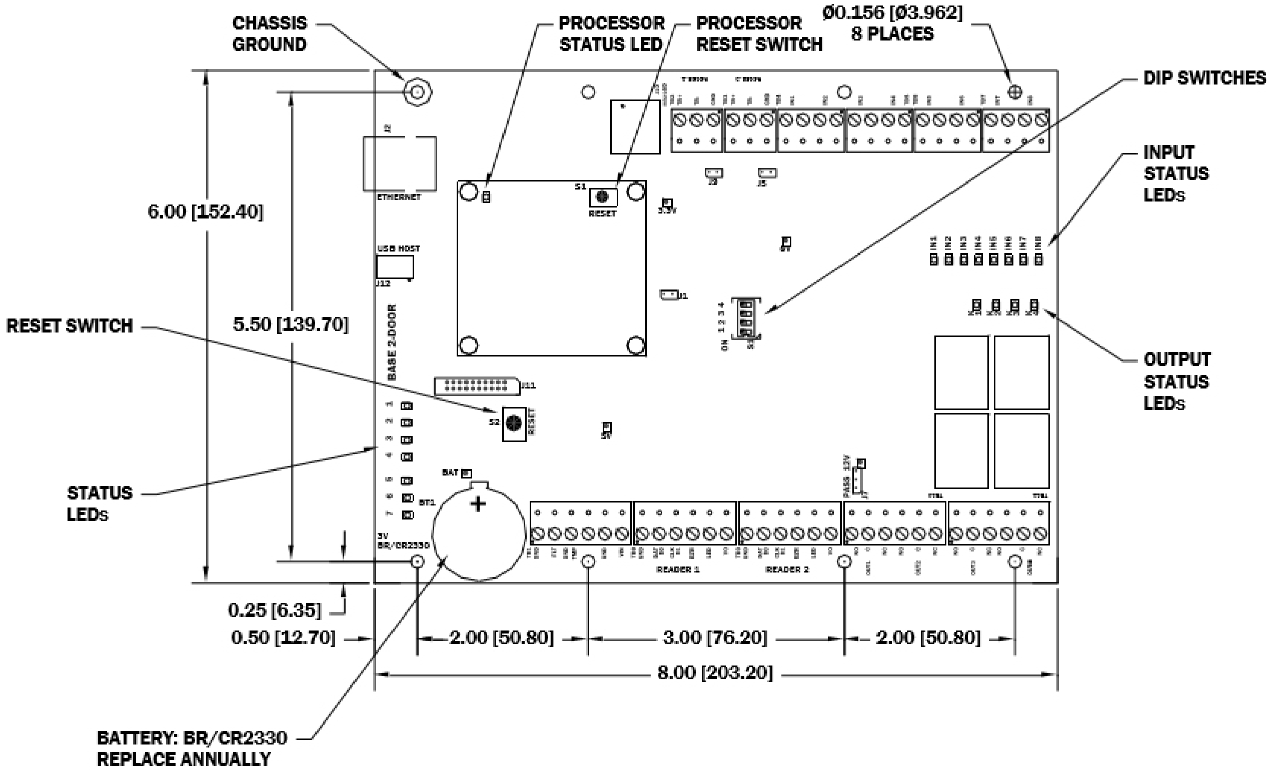
SSP-LX Controller

The SSP-LX is a high-performance intelligent controller compatible with DNA Fusion version 6.5 and above. It is scalable to 64 downstream SIO devices (max. 64 readers/doors) and supports large card populations with a storage capacity of up to two million cardholders and 50,000 event transactions. The SSP-LX features an embedded Linux operating system to enable third-party applications, extensive communications support, and heightened IT security capabilities. It also complies with the BACnet standard to support future development for building automation and control systems, e.g. HVAC, lighting, etc.

The SSP-LX communicates to the host via the on-board 10Base-T/100Base-TX Ethernet port. Two ports (TB2 and TB3) are available for connecting to downstream devices via a 2-wire RS-485 interface.

Each reader port (TB8 and TB9) can accommodate a read-head that uses Wiegand, magnetic stripe, or 2-wire RS-485 electrical signalling standards. Both ports also provide tri-state LED control and buzzer control (1-wire LED mode only). Four (4) Form-C relay outputs can be used for strike control or alarm signalling. The relay contacts are rated at 5 A @ 30 Vdc, dry contact configuration. Eight inputs (TB4-TB7) are available for monitoring the door contacts, request-to-exit (REX), and alarm contacts.

The SSP-LX should be mounted at least 0.25” above any conductive surface.



Installation

To install the SSP-LX controller:

1. If required, **mount** the SSP-LX in an Open Options or Life Safety Power enclosure.
2. **Wire** the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
3. **Wire** the server communication.
4. If applicable, **wire** the subcontroller communication and on-board readers.
5. **Wire** the input and relay circuits.
6. **Wire** the power input.
7. **Remove** the plastic safety strip from the backup battery.
8. **Configure** the jumper and DIP switch settings. See page 2-33 and 2-34 for more information.
9. **Configure** the controller’s initial IP address and network settings. See page 2-3 for more information.

Default Settings

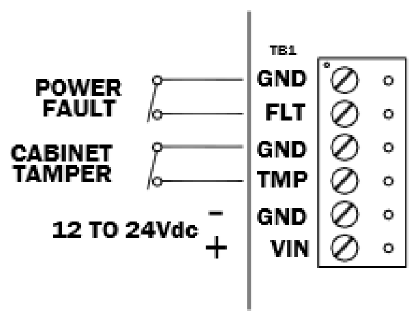
Each SSP-LX board ships with the following default configuration:

- DIP Switches: OFF
- IP Addressing: DHCP
- Network: Static IP Addressing = 192.168.0.251
- DNS Name: "MAC" followed by the 12-character MAC address
- Physical Address: 0
- Serial Port Settings: No flow control
- Encryption: None
- Baud Rate: 38400
- Login Name: admin
- Login Password: password

The username and password are case-sensitive.

Power Supply

The SSP-LX controller accepts 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 TB1 using a minimum of 18 AWG wires.



Connect the GND signal to earth ground at one location in the system. Multiple earth ground connections may cause ground loop problems and is not advised.

Alarm Inputs Wiring

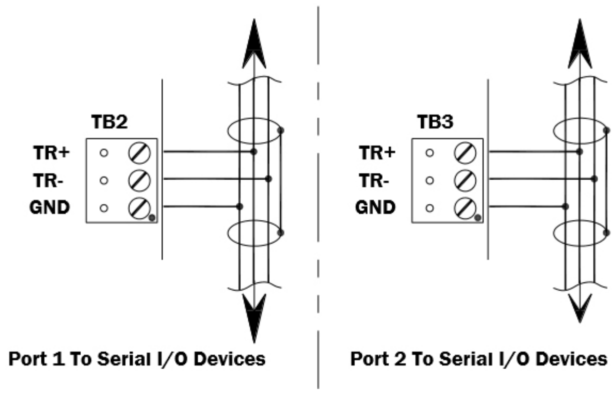
Inputs TMP and FLT on TB1 are used for monitoring the cabinet tamper and power failure with normally closed (NC) contacts. The inputs are unsupervised and do not require EOL resistors. If these inputs are not used, connect the shorting wire that came attached to the input during shipment.

Communication Wiring

The SSP-LX controller communicates to the host via the on-board 10Base-T/100Base-TX Ethernet port.

Ports 1 and 2 (TB2 and TB3) require a 2-wire RS-485 interface to connect to downstream subcontrollers. The interface allows multidrop communication on a single bus of up to 4,000 ft (1,219 m). Use 1 twisted-pair with drain wire and shield, 120 ohm impedance, and minimum 24 AWG for communication. The J5 and J9 termination jumpers should only be installed on the devices at the end of the line (see page 2-33 for jumper settings).

Wire the TR+, TR-, and GND connections on TB2 and TB3 as illustrated below.



> *Install the termination jumpers ONLY on the panels 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. Power to the reader is configured via the J7 jumper (see page 2-33 for more information).

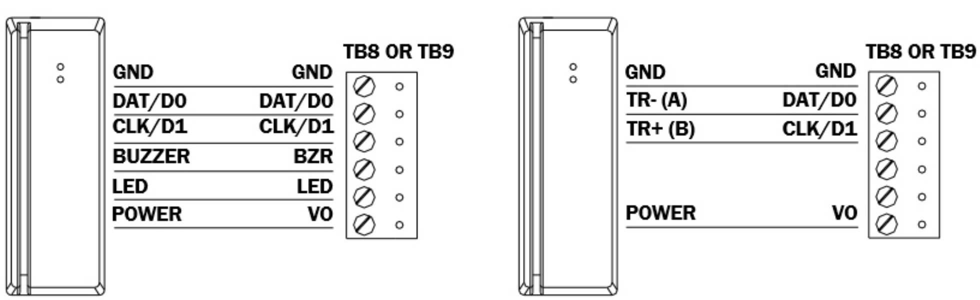
If 12V is selected, the VIN must be greater than 20 Vdc. If PASS is selected, power is passed through from the input voltage of the SSP-LX (VIN on TB1) and is current limited to 180 mA for each reader port.

> *Readers that require a different voltage or have high current requirements should be powered separately.*

The TB8 and TB9 reader ports are 6-wire interfaces that include a buzzer control wire (BZR) and an LED control wire (LED). Refer to the manufacturer specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Use DNA Fusion to configure the reader port settings. See page 3-41 in the Technical Installation Manual for more information.

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

J7 - READER POWER SELECT



Data1/Data0 - Clock/Data Reader

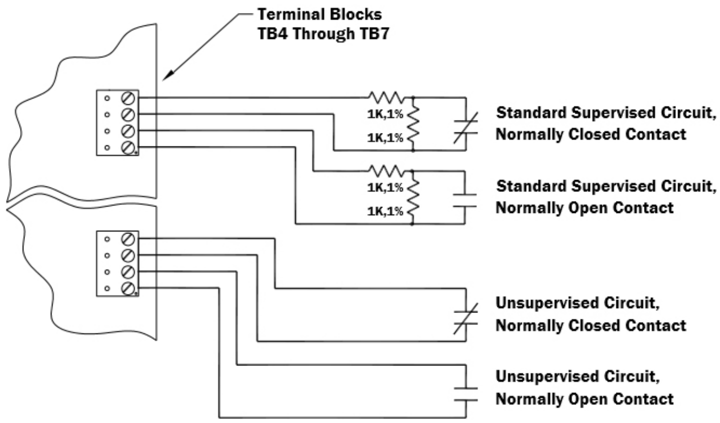
2-wire RS-485 Device

Input Circuit Wiring

The SSP-LX controller contains eight (8) inputs that are used to monitor the door position, request-to-exit (REX), and/or alarm contacts. Connect the alarm inputs (IN1-IN8) on terminal blocks TB4 through TB7 using twisted-pair cables.

Input circuits can be configured as supervised or unsupervised. When unsupervised, reporting is limited to two (2) states: Open or Closed. When supervised, the input circuit reports six (6) states: Open, Closed, Open Circuit, Shorted, Grounded, and Foreign Voltage. Use DNA Fusion to configure the input settings. See page 8-75 in the DNA Fusion User Manual for more information.

If supervised inputs are used, the installer must add two resistors to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k Ohm, 1% resistors and should be located as close to the sensor as possible.

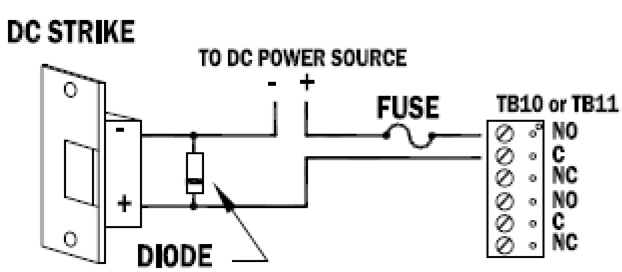


Relay Circuit Wiring

Four (4) relays with Form-C contacts, located on TB10 and TB11, provide the ability to control door lock mechanisms, alarm signals, and other output devices. The relay contacts are rated at 5 A @ 30 Vdc, dry contact configuration.

Each relay consists of three poles: Common (C), Normally Open (NO), and Normally Closed (NC). When controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When power is momentarily removed to unlock a door, such 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 may generate feedback to the relay circuit that causes damage and/or premature relay failure. For this reason, Open Options recommends using a diode to protect the relay. See details below.*



<u>Diode Selection:</u>

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

Memory Backup Battery

The SSP-LX's static RAM and real-time clock are backed up by a lithium battery when input power is interrupted. The battery (type BR2325 or BR/CR2330) should be replaced annually. If the data in the static RAM is corrupted, all data (including flash memory) is considered invalid and is permanently erased. All configuration data must then be re-downloaded.

Bulk Erase Configuration Memory

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

- Erase all configuration and cardholder databases (sanitize board).
- Update OEM default parameters after OEM code has been changed.
- Recover from database corruption causing the SSP-LX board to continuously reboot.

To perform a bulk erase:

1. **Set** DIP switches 1 and 2 to ON.
2. **Set** DIP switches 3 and 4 to OFF.
3. **Power up** the SSP-LX. LED 1 is on for 15 seconds while the SSP-LX boots up.
4. **Set** DIP switch 1 or 2 to OFF within a 10-second window.

   During the reset window, LEDs 1 & 2 and LEDs 3 & 4 flash alternately at a 0.5-second rate. When erasing memory, LED 2 flashes at a 2-second rate. DO NOT CYCLE POWER. The process may take 5 to 10 minutes to complete. LEDs 1 and 4 will flash for 8 seconds after the memory has been erased. The SSP-LX will reboot 8 seconds after LEDs 1 and 4 stop flashing (no LEDS are on during this time).

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

DO NOT CYLCE POWER during the bulk erase process. Process may last up to 10 minutes.

Hardware Setup

The SSP-LX controller hardware is configured through a number of jumpers and a set of four (4) DIP switches. These jumpers/switches determine the port interface, end-of-line termination, and operating mode settings. Refer to the following tables for more information.

Jumper Settings

The table below describes the jumper settings for the SSP-LX.

Jumper(s)	Set at	Description
J1	N/A	Factory Use Only
J2	N/A	10Base-T/100Base-TX Ethernet Connection (Port 0)
J5	OFF	Port 2 RS-485 EOL Terminator is OFF
	ON	Port 2 RS-485 EOL Terminator is ON
J7	12V	12 Vdc at Reader Ports*
	PASS	VIN “Passed Through” to Reader Ports
J8	N/A	Processor Connection to Base Board
J9	OFF	Port 1 RS-485 EOL Terminator is OFF
	ON	Port 1 RS-485 EOL Terminator is ON
J10	N/A	MicroSD - Not Supported
J11	N/A	Factory Use Only
J12	N/A	USB - Not Supported
JP3	ON	Located on Processor Board; Factory Use Only - Must be installed

*The input power (VIN) must be a minimum of 20 Vdc if 12V is selected.

DIP Switch Settings

The SSP-LX has two DIP switch locations:

- S1 - Configures the operating mode; see table below.
- S2 - If pressed, resets the controller.

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 settings (see page 2-30).	OFF	ON	OFF	OFF
Use OEM default communication settings. See Bulk Erase on page 2-33.	ON	ON	OFF	OFF
Disable TLS secure link; switch is only read when logging on.	OFF	OFF	ON	OFF
Enable auto DHCP assignment; assigns a default IP address to the controller.	ON	ON	ON	ON

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

Terminal Block Connections

The table below describes the terminal blocks for the SSP-LX.

Terminal Block	Description	Connection
TB 1-1	Power Fault	GND
TB 1-2		FLT
TB 1-3	Cabinet Tamper	GND
TB 1-4		TMP
TB 1-5	Power Fault	GND
TB 1-6		VIN
TB 2-1	Downstream Communication (Port 1)	TR+
TB 2-2		TR-
TB 2-3		GND
TB 3-1	Downstream Communication (Port 2)	TR+
TB 3-2		TR-
TB 3-2		GND
TB 4-1	Input 1	IN1
TB 4-2		IN1
TB 4-3	Input 2	IN2
TB 4-4		IN2
TB 5-1	Input 3	IN3
TB 5-2		IN3
TB 5-3	Input 4	IN4
TB 5-4		IN4
TB 6-1	Input 5	IN5
TB 6-2		IN5

Terminal Block	Description	Connection
TB 6-3	Input 6	IN6
TB 6-4		IN6
TB 7-1	Input 7	IN7
TB 7-2		IN7
TB 7-3	Input 8	IN8
TB 7-4		IN8
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
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

Status LEDs

Power Up

All LEDs are OFF.

Initialization

LEDs 1-7 and IN1-IN8 flash once at the start of the initalization.

LED 4 is turned ON for approximately one (1) second 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 three (3) seconds without a card database. Every 10,000 cards adds about three (3) seconds to the application initialization. When LEDs 1, 2, 3, and 4 flash simultaneously, data is being read from or written to flash memory. Do NOT cycle power during this state.

If the sequence stops or repeats, perform one of the steps listed on page 2-14.

Running

LED	Description	Indicator
1	Online/Offline and Battery Status	Online = 80% ON, Offline = 20% ON Double Flash = Low Battery
2	Host Communication Activity (Ethernet Port 0)	Flashing = Host Activity
3	On-board Sucontroller Communication	Flashing = SIO Activity
4	Downstream Port 1 Communication	Flashing = Port 1 Activity
5	Downstream Port 2 Communication	Flashing = Port 2 Activity
6	Reader 1: Clock/Data or D1/D0 Mode	Flashing = Data Received
	Reader 1: RS-485 Mode	Flashing = Transmitting Data
7	Reader 2: Clock/Data or D1/0 Mode	Flashing = Data Received
	Reader 2: RS-485 Mode	Flashing = Transmitting Data
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

Specifications

The SSP-LX is for use in low voltage, Class 2 circuits only. The installation of the controller must comply with fire and electrical codes.

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

> *Category 5e cabling is the minimum performance category recommended.*

Primary Power:	*Voltage/Current:*	12 to 24 Vdc ± 10%, 500 mA max. (reader current not included)
Memory and Clock Backup:		3 V Lithium, type BR2325, BR2330, CR2330
Ports:	*Ethernet Port 0:*	10Base-T/100Base-TX Ethernet high-speed port
	Downstream Ports 1 & 2:	2-wire RS-485: 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:		2 unsupervised, dedicated for cabinet tamper and power fault monitoring 8 supervised, dedicated for door position monitoring, request-to-exit, and alarm contacts
Outputs:		4, Form-C, 5 A @ 30 Vdc, resistive
Reader Interface:	*Reader Power: (jumper selectable)*	12 Vdc ± 10% regulated or 12 to 24 Vdc ± 10% (input voltage passed through); current limited to 180 mA for each reader
	Data Inputs:	TTL-compatible inputs, magstripe and Wiegand standards supported. Max. cable lengh: 500 ft (152 m)
	RS-485 Mode:	9,600 to 38,400 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Max. cable length: 2000 ft (609.6 m)
	LED Output:	TTL levels, high > 3 V, low < 0.5 V, 5 mA source/sink max.
	Buzzer Output:	TTL levels, high > 3 V, low < 0.5 V, Low = Active, 5 mA source/sink max.
Wire Requirements:	*Power:*	1 twisted pair, 18 to 16 AWG
	RS-485:	SIO Ports: 1 twisted pair w/ drain wire and shield, 120 ohm impedance, 24 AWG, 4,000 ft (1,219 m) max. Reader Ports: 1 twisted pair with drain wire and shield, 120 ohm impedance, 24 AWG, 2,000 ft (609.6 m) max.
	TTL Reader:	22 to 16 AWG, depending on length and requirements, shielded
	Ethernet:	CAT-5e, minimum
	Alarm Input:	1 twisted pair, 30 ohms max., typically 22 AWG @ 1000 ft (304.8 m)
Data Memory:		96 MB standard

Mechanical:	*Dimension:*	8” (203.2 mm) W x 6” (152.4 mm) L x 0.78” (20mm) H
	Weight:	10.65 oz (302 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.

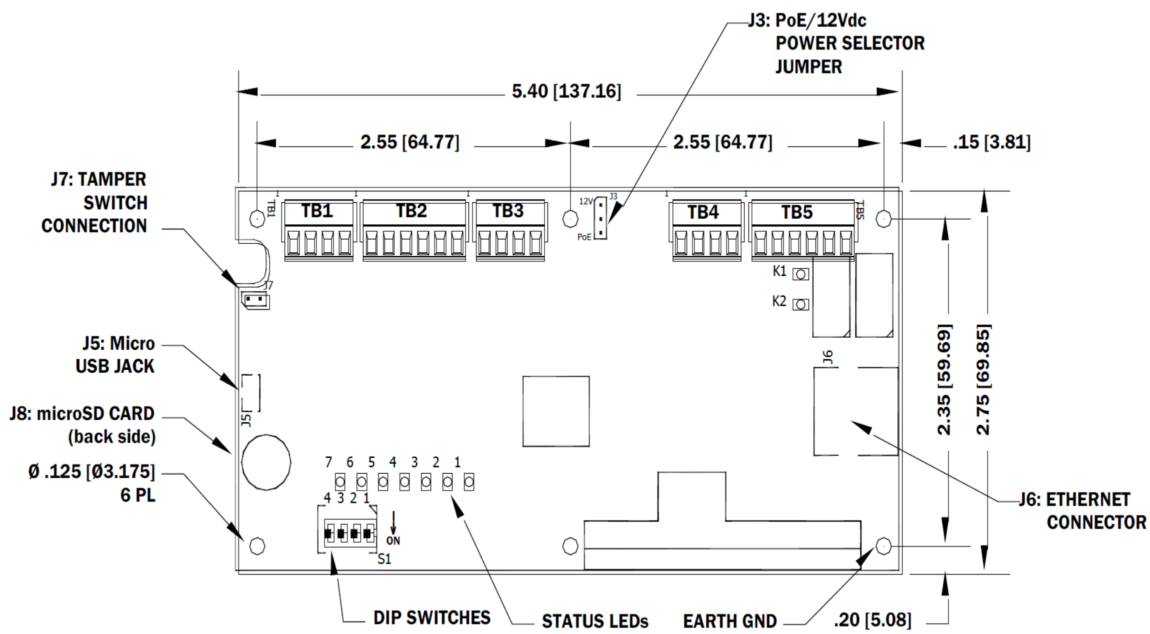
DController

The DController is PoE-capable (PoE or PoE+) controller that provides support for up to 8 directly connected SIO devices or up to 16 external devices (NSC-100s or RS-485 SIOs) for a total of 17 readers (including the on-board reader). The DController includes two (2) on-board reader ports capable of supporting OSDP Secure Channel, keypads, biometric readers, Wiegand, clock and data magnetic stripe, F/F2, and supervised F/F2 that provide control for one (1) ACM in a single or paired reader configuration, as well as an on-board 10Base-T/100Base-TX Ethernet port for upstream communication.

If using an NSC-100 or NSC-200, it must be on the same subnet as the DController.

The DController, which accepts either Power over Ethernet (PoE) or an external 12 Vdc power supply, is capable of storing 240,000 cardholders and up to 50,000 offline events. System configuration and cardholder information are stored in flash memory, while event log buffer information is stored in battery-backed memory.

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



The first reader port can accommodate a reader that uses TTL (D1/D0, Clock/Data), F/F2, or 2-wire RS-485 device signalling (OSDP readers, for example), also provides tri-state LED control, and buzzer control (one wire LED mode only). This reader port can utilize multiple 2-wire RS-485 multi-drop devices such as up to two (2) OSDP readers or up to eight (8) remote serial I/O devices. The second reader port also accommadates a reader that uses TTL (D1/D0, Clock/Data), or F/2F signalling and provides tri-state LED control, and buzzer control.

Two (2) Form-C relay outputs can be used for strike control or alarm signaling. The relay contacts are rated at 2 A @ 30 Vdc, dry contact configuration. Two (2) inputs are provided for monitoring the door contacts, requests-to-exit, or alarm contacts.

Installation

The DController is an enclosed panel with a mounting footprint that matches the enclosures of the NSC-200.

To install the DController:

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.

   An optional set screw can be installed bottom of the enclosure, above the slot as added security.
2. **Mount** the DController in the desired location.

   The DController is suitable for indoor installations only. Outdoor installations should be placed inside a NEMA enclosure rated for the particular environment.
3. If applicable, **wire** the subcontroller communication and on-board readers and door components.
4. **Connect** the Ethernet cable to the Ethernet jack on the DController.
5. If applicable, **wire** the subcontroller communication.
6. If needed, **wire** the power supply to the unit.
7. After wiring the DController, **Feed** the wires through the strain relief connectors and **tighten** the sealing nut to secure cables.
8. **Configure** the IP address using the addressing tools provided on page 2-3.

Default Settings

Each DController ships with the following default configuration:

- DIP Switches: OFF
- IP Addressing: DHCP
- Network: Static IP Addressing = 192.168.0.251
- DNS Name: “MAC” followed by the 12-character MAC address
- Physical Address: 0
- Encryption: TLS (if available)
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Subnet Mask: 255.255.0.0
- Alternate Host Port: Disabled
- Login Name: admin
- Login Password: password

> *The username and password are case-sensitive.*

Security

When installing the DController ensure that the installation is done in a secure matter.

The user accounts to the web configuration should be created with secure passwords upon installation. Verify that all DIP switches are in the OFF position to for the normal operating mode.

The DController is shipped with a default login account. To enable the default login, move DIP switch 1 from OFF to ON. The default login will be available for five (5) minutes once enabled. As a result, it’s important that at least one user account is defined and the DIP switches on the DController are set to OFF before the controller is commissioned. Open Options highly recommends not to configure the DController with an IP address that is accessible from the public internet.

To further enhance security, options are available to disable SNMP, Zeroconfig discovery, as well as the web configuration module. Additionally, data encryption can also be enabled over the host communication port. For more information about securing hardware, see the Open Options Hardening Guide.

Power Supply

There are two means of powering the DController via Power-over-Ethernet (PoE / PoE+) or a local 12 V power supply. Jumper 3 (J3) must be moved to match the power option. Powering the DController using a local 12 V power supply is completed by wiring the power supply to the VIN and GND terminals on the terminal block 4 (TB 4).

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

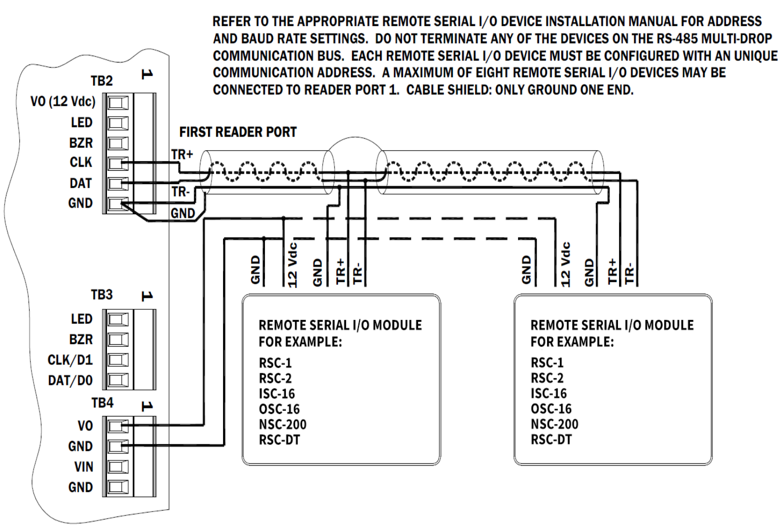
The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG.

Host Communication Wiring

The DController communicates to the host computer via the on-board 10-BaseT/100Base-TX Ethernet interface (J6). Connect the network cable to the Ethernet connection on the DController.

Downstream Communication Wiring

The first reader port (TB 2) is used to establish communication between the DController and downstream RS-485 subcontroller(s). The DController supports up to eight (8) 2-wire RS remote serial I/O devices using MSP1 protocol or two (2) OSDP readers.

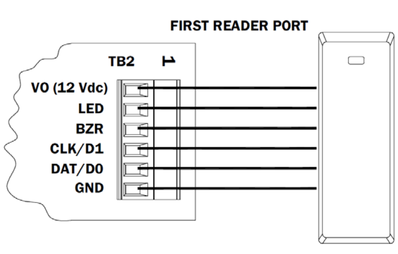


Reader Port 1 - Remote Serial I/O Devices using MSP1 Protocol (2-Wire RS485)

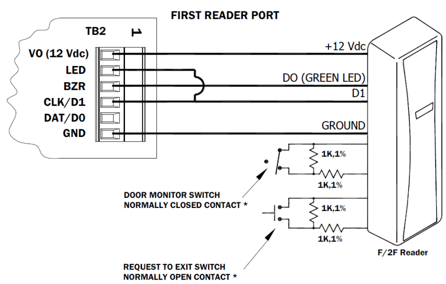
Reader Communication Wiring

Reader Port 1 Wiring

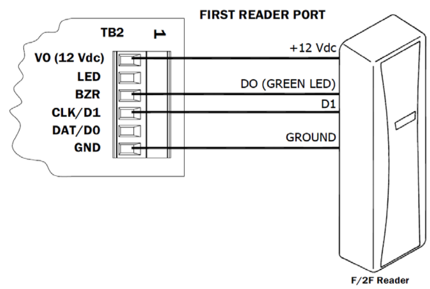
Reader Port 1 (TB 2) supports TTL (D1/D0, Clock/Data), F/F2, or 2-wire RS-485 device signaling (Example: OSDP readers) as wells as tri-state LED control and buzzer control (one-wire LED mode only). Power to the first reader port requires 12 Vdc at 300 mA maximum.



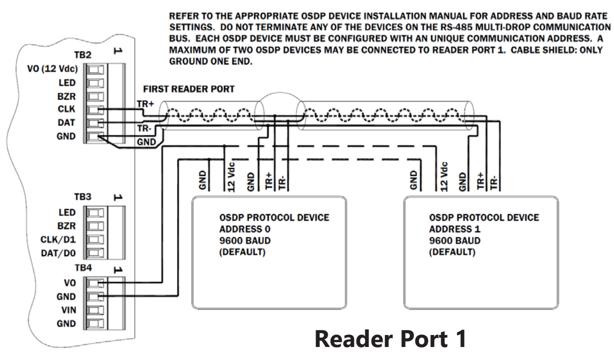
Reader Port 1
Typical D1/D0 or Clock/Data Reader



Reader Port 1
Typical Supervised F/2F Reader



Reader Port 1
Typical Unsupervised F/2F Reader

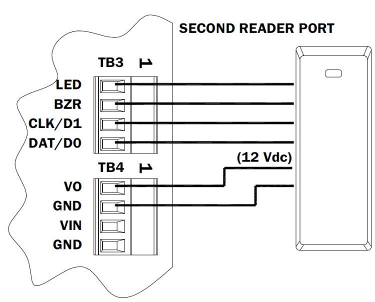


Reader Port 1
OSDP Protocol Devices (2-wire RS-485)

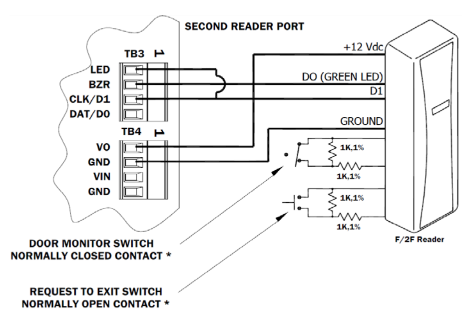
> **!** *When powering remote devices form the DController, be cautious not to exceed the maximum current limit. See* Specifications *for more information*

Reader Port 2 Wiring

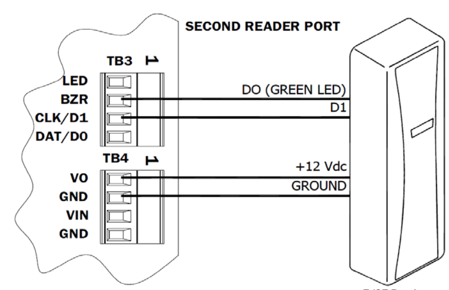
Reader Port 2 (TB 3) supports TTL (D1/D0, Clock/Data), F/F2 as well as tri-state LED control and buzzer control (one-wire only). Power is established via the 12 Vdc auxiliary power supply output (TB 4).



Reader Port 2
Typical D1/D0 or Clock/Data Reader



Reader Port 2
Typical Supervised F/2F Reader



Reader Port 2
Typical D1/D0 or Clock/Data Reader

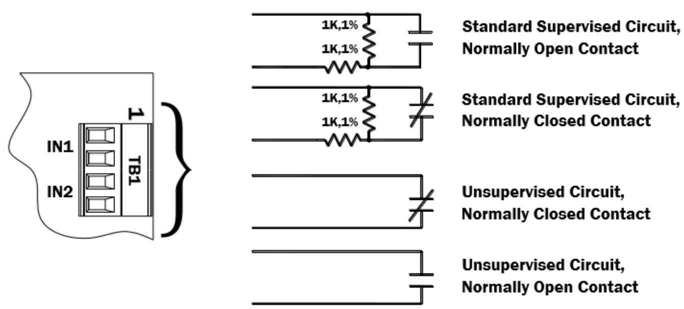
In the 2-wire LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set in DNA Fusion. If two (2) OSDP devices are used, Reader Port 2 will **NOT** support a third reader. If only one (1) OSDP devices is configured, then Reader Port 2 is available for a second reader. The maximum cable length is 2,000 ft. (610m). Do not terminate any RS-485 devices connected to Reader Port 1.

Input Circuit Wiring

The DController contains two (2) inputs, which are located on the IN1 and IN2. Typically, these inputs are used to monitor door position, request-to-exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When configured as unsupervised, reporting consists of only the open and closed states. When configured supervised, reporting also includes open circuit, shorted, grounded, and foreign voltage. A supervised input circuit requires two (2) 1k ohm, 1% resistors installed to facilitate proper reporting. The resistors should be located as close to the sensor as possible. Custom end-of-line (EOL) resistances may be configured in DNA Fusion.

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

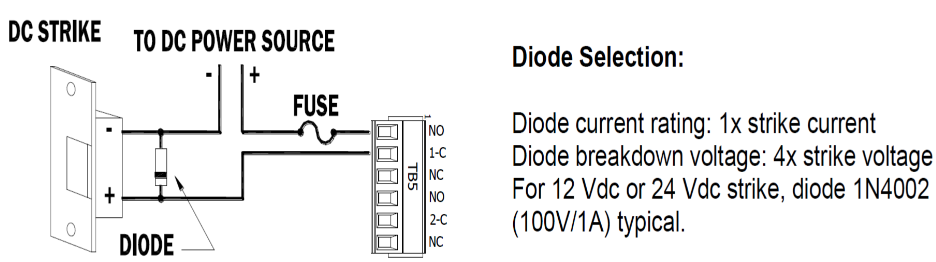
The input circuit wiring configurations shown are supported, but may not be typical:



Relay Circuit Wiring

The DController contains two (2) Form-C contact relay outputs to control door lock mechanisms and alarm signaling devices. The relay contacts are rated at 2 A @ 30 Vdc, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO), and a Normally Closed pole (NC). When controlling the delivery of power to the door strike, the NO and C poles are used; when momentarily removing power to unlock the door, as with a maglock, the NC and C 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 relay failure. For this reason, Open Options recommends using either a diode or MOV to protect the relay.



Memory Backup Battery

The DController's static RAM (SRAM) is backed up by a rechargeable battery when input power is removed or interrupted. The battery retains the data for approximately three (3) days. If the data in the SRAM is corrupted, all data (including flash memory) is erased. All configuration data must then be re-downloaded to the controller.

Bulk Erase Configuration Memory

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

- Erase all configuration and cardholder database (sanitize board).
- Update OEM default parameters after OEM code has been changed.
- Recovered from database corruption causing the DController to continuously reboot.

The bulk erase function erases all configuration and cardholder databases.

1. **Set** DIP switches 1 & 2 to ON.
2. **Set** DIP switches 3 & 4 to OFF.
3. **Power up** the DController, LED 1 will be on for about 15 seconds while the Dcontroller boots up.
4. **Set** DIP switch 1 or 2 to OFF within a 10-second window.

   During the reset window, LEDs 1 & 2 and LEDs 3 & 4 flash alternately at a 0.5-second rate. When erasing memory, LED 2 flashes at a 2-second rate. DO NOT CYCLE POWER. The process may take up to 5 to 10 minutes to complete. LEDs 1 and 4 flash for 10 seconds after the memory has been erased, and then the DController will reboot.

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

DO NOT CYCLE POWER during the bulk erase process. Process my take up to 10 minutes.

Hardware Setup

Jumpers and DIP switches set up the DController's port interface, end-of-line termination, and operating mode configuration. Refer to the following tables for more information.

Jumper Settings

The table below describes the jumper settings for the DController board.

Jumpers	Set At	Selected
J1	N/A	Factory Use Only
J2	N/A	Factory Use Only (A, B, & C pads)
J3	PoE	DController is powered from the Ethernet connection (fully compliant to IEEE 802.3af)
	12V	DController is powered from an external 12 Vdc power source connected to TB4-3 (VIN) and TB4-4 (GND)
J4	N/A	Factory Use Only
J5	N/A	Micro USB Port (2.0)
J6	N/A	10Base-T/100Base-TX Ethernet Connection
J7		Cabinet Tamper: Normally Open Switch
J8	N/A	MicroSD Card

DIP Switch Settings

The DController's DIP switch S1 configures the operating mode. See table below for more information.

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 settings (see page 2-40).	OFF	ON	OFF	OFF
Use OEM default communication settings. See Bulk Erase on page 2-44.	ON	ON	OFF	OFF
Bulk erase prompt mode at power up. See Bulk Erase on page 2-44.	ON	ON	OFF	OFF
The DController (LP) reports and functions like a DController (EP). The setting is used only when DNA Fusion has not been updated. Contact Technical Support for more information.	OFF	OFF	OFF	ON

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

Terminal Block Connections

The table below describes the terminal blocks for the DController.

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	Downstream and Reader Communication (Reader Port 1)	VO
TB 2-2		LED
TB 2-3		BZR
TB 2-4		CLK/TR+
TB 2-5		DAT/TR-
TB 2-6		GND
TB 3-1	Reader Communication (Reader Port 2)	LED
TB 3-2		BZR
TB 3-3		CLK/DATA 1
TB 3-4		DAT/DATA 0
TB 4-1	Auxillary Power Output	VO
TB 4-2	Auxillary Ground	GND
TB 4-3	Power Input (12 Vdc)	VIN
TB 4-4	Power Ground Input	GND
TB 5-1	Relay Output 1	NO
TB 5-2		1-C
TB 5-3		NC
TB 5-4	Relay Output 2	NO
TB 5-5		2-C
TB 5-6		NC

Terminal Block 2-4 and 2-5 are utilized connections for downstream RS-485 communication.

Status LEDs

Power Up

All LEDs are OFF.

Initialization

LEDs 1 through 6 are sequenced during initialization.

LED 1 in ON for 15 seconds. Then LED's 2 through 6 are flashed once at the beginning of initialization. LED's 3 and 4 ON for approximately one (1) second 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 one (1) seconds without a card database. Every 10,000 cards adds about two (2) seconds to the application initialization. When LEDs 1 through 4 flash simultaneously, data is being read from or written to flash memory. Do NOT cycle power during this state. If the sequence stops or repeats, perform one of the following steps:

- Power up and tag database as invalid
    1. **Remove** power to the DController and **place** an insulator under the battery clip.
    2. **Wait** 5-10 seconds, **remove** the insulator, and **reapply** input power.
- Power up without loading the database into RAM
    1. **Remove** input power to the DController.
    2. **Set** the DIP switches to default mode.

       In default mode, the database is not loaded into RAM; see page 2-40 for information.
    3. **Reapply** power.
- Erase all configuration and database information (also erases card database for security reasons)
    1. **Perform** a bulk erase using the steps on page 2-44.

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

Running

After initialization is complete, the LEDs indicate the following information.

LED	Description	Indicator
1	Online/Offline and Battery Status	Online = 80% ON, Offline = 20% ON Double Flash = Low Battery
2	Host Communication Activity	Flashing = Host Activity
3	Readers (Combined) Reader 1 Activity	Clock/Data or D1/D0 Mode = Flashes when data is received on either port
		RS-485 = Flashes when data is transmitted on either port
		F/2F Mode=Flashes when Data/Acknowledgment is received
4	Input Status (IN1)	ON = Active, OFF = Inactive Slow Flash = Polling, Fast Flash = Trouble
5	Input Status (IN2)	ON = Active, OFF = Inactive Slow Flash = Polling, Fast Flash = Trouble
6	Cabinet Tamper	
7	Reserved for Future Use	Not Used
D9	Relay K1	ON = Energized
D10	Relay K2	ON = Energized
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

Specifications

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

Power Input*:	*PoE:*	12.95 W, Class 3, compliant with IEE 802.3af
	PoE+:	25 W, Class 3, compliant with IEE 802.3at
	Power Supply:	12 Vdc ± 10%, 1.8 A maximum
Power Output:	*PoE: Voltage/Current*	12 Vdc @ 650 mA, including reader and AUX output
	PoE+or External 12 Vdc: Voltage/Current	12 Vdc @ 1.25 A including reaer and AUX output
Host Communication:	*Ethernet:*	10Base-T/100Base-TX
	MicroUSB (2.0) with optional adapter:	Pluggable model USB2-OTGE100
Inputs:		2 unsupervised/supervised, programmable end-of-line resistors, 1k/2k ohm, 1% 1/4 W watt standard, and dedicated tamper input
Output Relays:		2 outputs, Form-C contacts: 2 A @ 30 Vdc
Backup Battery		SRAM Rechargeable battery
MicroSD Card	*Format:*	MicroSD or microSDHC; 2 GB to 8 GB
Reader Interface:	*Reader Power:*	12 Vdc ± 10% or local power supply (12 Vdc); PTC limited 300 mA max.
	Reader Data Inputs:	Two TTL reader ports OR one 2-wire RS-485 reader port capable of supporting two readers
	RS-485 Mode:	9600 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Max. cable length = 4000’ (1,219 m)
	LED Output:	TTL-compatible, high > 3 V, low < 0.5 V, 5 mA source/ sink maximum
	Buzzer Output:	Open collector, 12 Vdc open circuit max., 40 mA sink max.
Wire Requirements:	*Power:*	1 twisted pair, 18 AWG min.
	Ethernet:	CAT-5e min.
	Alarm Input:	1 twisted pair per input, 30 ohm max. loop resistance
	Outputs:	As required for the load
	Reader Data (TTL):	18 AWG, 6-conductor with shield, 500 ft (152 m) max.
	Reader Data (RS-485)	24 AWG, 120 ohm impedance, twisted pair with shield, 2000 ft (610 m) max.
	Reader Data (F/F2)	18 AWG, 4-conductor with shield, 500 ft (152 m) max.
Data Memory:		6 MB standard

Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	5 to 95% RHNC
Mechanical:	*Dimension:*	2.75” L (70 mm) x 5.50” W (140 mm) x 0.96” H (24 mm) without bracket, 3.63” L (70 mm) x 5.50” W (140 mm) x 1.33” H (24 mm) with bracket
	Weight:	3.6 oz. (360 g) without bracket 4.43 oz. (125.5 g) with bracket
UL294, 6th Edition Performance Levels	*Standby Power:*	Level: I
	Endurance:	Level: IV
	Line Security:	Level: I
	Destructive Attack:	Level: I

Specifications are subject to change without notice.

PoE power is to be supplied by a listed ITE or Access Control System Unit (ALVY), power limited, PoE+ injector or PoE+ Ethernet switch providing 42.5 - 57 Vdc, 25.5 W for maximum power.

UL Listing Requirements

When installing a UL-listed system, consider the following requirements:

1. **Power** the devices from a UL-294 listed power source. Do not use PoE to supply the power.
2. **Provide** a standby power source.
3. **Ensure** that portal-locking devices and electromagnetic locks comply with all UL-294 requirements.
4. **Evaluate** the equipment for use in a Pollution Degree 2 environment.
5. **Install** the equipment in accordance with national and local electrical codes.
   The installer should be a qualified technician.
6. **Install** the equipment in an indoor location.

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

Category 5e cabling is the minimum performance category recommended.

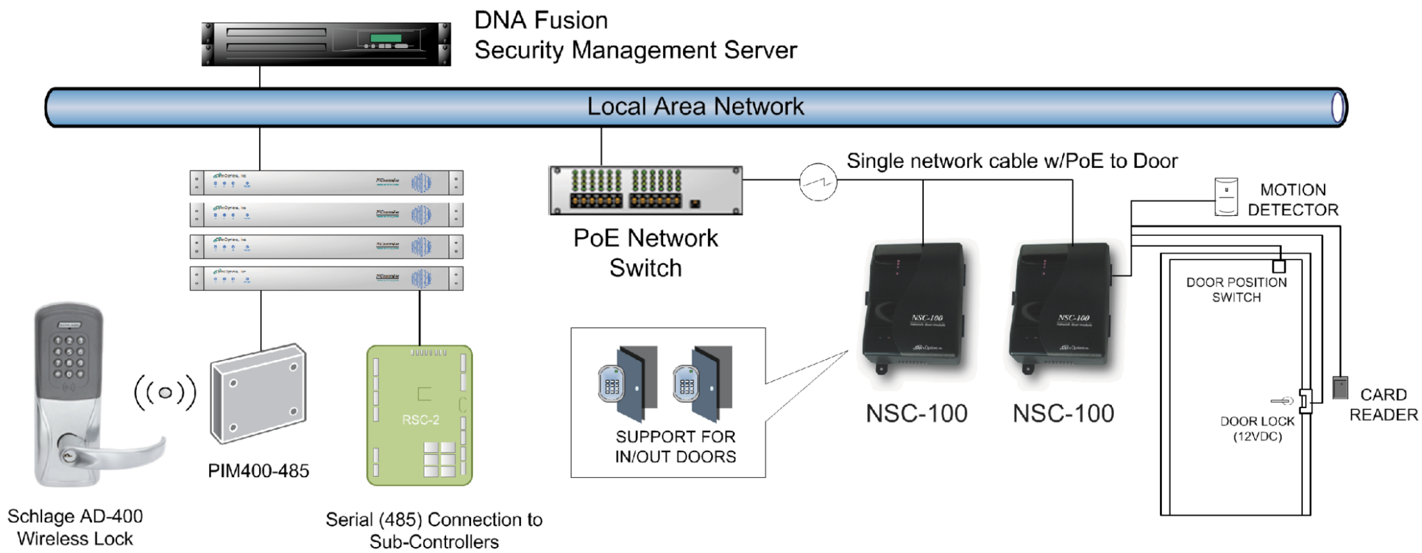
Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294/B.

NController

The NController is a standard rack-mount network controller. It provides intelligent support for up to 32 NSC-100 network door controllers for up to 64 doors, as well as traditional Open Options reader and I/O subcontrollers. The NController contains 15 MB standard on-board RAM, and plugs into any 10/100 network with a standard Ethernet jack for TCP/IP host communication.

Additionally, the NController features a serial output for direct communication to the Schlage AD-400 Series wireless locks via the PIM400-485 interface. It can also communicate directly to the AD-300 Series wired locks.

> *The NController uses an SSP-EP board. Operators in DNA Fusion will need to select* SSP-EP *in the* Controller Properties *dialog when adding an NController to the system.*



Installation

To install the NController:

1. **Mount** the NController in one (1) unit of rack space.

   The NController is only suitable for indoor installations; outdoor installations must be placed inside a NEMA enclosure rated for the particular environment.
2. **Connect** the NController to the host via Ethernet.
3. **Configure** and **connect** any RS-485 devices, such as subcontrollers or AD-300 locks.
4. **Connect** the power supply to the NController.
5. **Configure** the NController's IP address.

   See page 2-3 for more information.

UL Listing Requirements

When installing a UL-listed system, consider the following requirements:

1. **Power** the devices from a UL-294 listed power source. Do not use PoE to supply the power.
2. **Provide** a standby power source.
3. **Ensure** that portal-locking devices and electromagnetic locks comply with all UL-294 requirements.
4. **Evaluate** the equipment for use in a Pollution Degree 2 environment.
5. **Install** the equipment in accordance with national and local electrical codes. The installer should be a qualified technician.
6. **Install** the equipment in an indoor location.

Default Settings

Each SSP-EP board ships with the following default configuration:

- DIP Switches: OFF
- IP Addressing: DHCP
- Network: Static IP Addressing = 192.168.0.251
- DNS Name: "MAC" followed by the 12-character MAC address
- Physical Address: 0
- Encryption: TLS (if available)
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Subnet Mask: 255.255.0.0
- Alternate Host Port: disabled
- Login Name: admin
- Login Password: password

> *The username and password are case-sensitive.*

Security

When installing the NController ensure that the installation is done in a secure matter.

The installation process requires adding a user account(s) to the web configuration. Open Options recommends creating a user account with a secure password. Dip switches are positioned OFF for a normal operating setting.

The SSP-EP is shipped with a default login account. To enable the default login, move DIP switch 1 from OFF to ON. The default login will be available for five (5) minutes once enabled. As a result, it's important that at least one user account is defined and the DIP switches on the NController are set to OFF before the controller is commissioned. Open Options highly recommends not to configure the NController with an IP address that is accessible from the public internet.

Options are available in the Configuration Manager for disabling SNMP, Zeroconfig, as well as the web configuration module. Additionally, data encryption can also be enabled over the host communication port.

Host Communication

The NController communicates to the host via a direct connection to a 10/100 network. Connect a standard Ethernet cable to the NController using the RJ-45 port labeled Ethernet.

Subcontroller Wiring

The NController communicates to subcontrollers via an RS-485 interface on the internal board's downstream Port 2. Use twisted-pair cables (min. 24 AWG) between the NController's DB-9 connection (labeled RS-485 above) and the subcontroller's RS-485 port. Termination jumpers should only be installed on end-of-line devices. If an additional downstream port is required, Port 3 on the internal board can be wired using the TR+, TR-, and GND connections.

The following table describes the wiring connections between the DB-9 and subcontroller.

DB-9	SIO
8	TR+
7	TR-
6	GND

A power supply is needed to power the subcontrollers and door hardware.

Bulk Erase Configuration Memory

The Bulk erase function can be used for board sanitation, Updating OEM parameters, or recovering database corruption causing the board to continuously reboot.

The bulk erase function erases all configuration and cardholder databases.

1. **Set** DIP switches 1 and 2 to ON.
2. **Set** DIP switches 3 and 4 to OFF.
3. **Power up** the SSP-EP. LED 1 is on for 15 seconds while the SSP-EP boots up.
4. **Set** DIP switch 1 or 2 to OFF within a 10-second window.

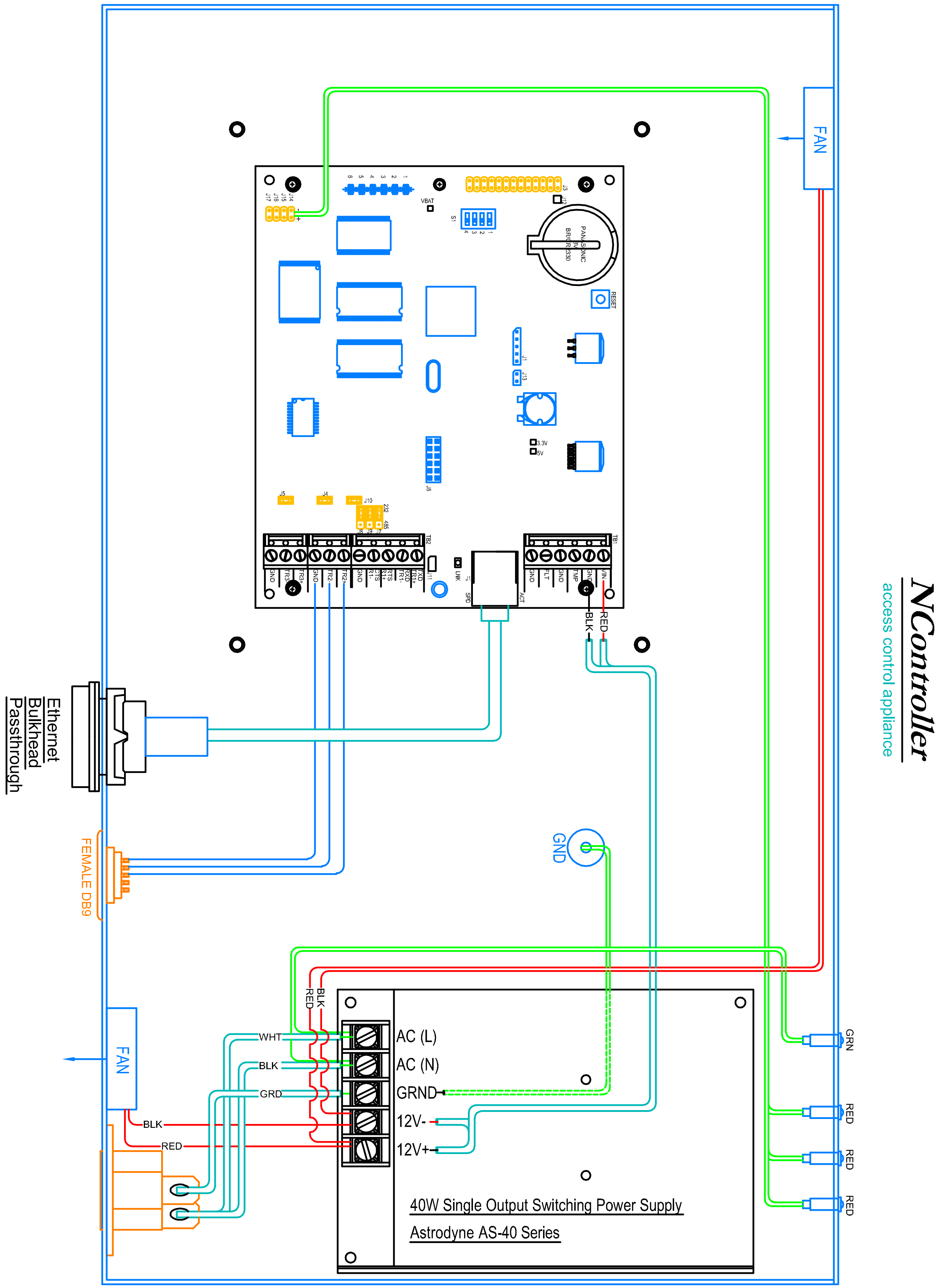
   During the reset window, LEDs 1 & 2 and LEDs 3 & 4 flash alternately at a 0.5-second rate. When erasing memory, LED 1 flashes at a 2-second rate. DO NOT CYCLE POWER. The process may take 5 to 10 minutes to complete. LEDs 1 and 4 flash for 10 seconds after the memory has been erased, and then the SSP-EP will reboot.

DO NOT CYCLE POWER during the bulk erase process. Process may take up to 10 minutes.

Status LEDs

The table below describes the indicator lights located on the NController.

LED	Indicator	State
A	Online/Offline and Battery Status	Online = 80% ON, Offline = 20% ON Double Flash = low Battery
B	Host Communication Activity	Flashing=Host Activity (Ethernet)
C	Port Communication Activity	Flashing=Port Activity


NController
access control appliance
FAN
FAN
Ethernet
Bulkhead
Passthrough
FEMALE DB9
GND
RED
BLK
AC (L)
AC (N)
GRND
12V-
12V+
WHT
BLK
GRD
BLK
RED
BLK
RED
GRN
RED
RED
RED
40W Single Output Switching Power Supply
Astrodyne AS-40 Series

Hardware Setup

The NController hardware is configured with a number of jumpers and a set of four (4) switches. These jumpers/switches set up the port interface, end-of-line termination, and operating mode configuration. Refer to the following tables for more information.

Jumper Settings

The table below describes the jumper settings for the NController. These settings vary depending on the communication protocol used.

Jumper(s)	Set at	Description
J1	N/A	10-BaseT/100Base-TX Ethernet port
J2, J3	N/A	Factory Use Only
J4	OFF	Port 1 RS-485 EOL Terminator is OFF
	ON	Port 1 RS-485 EOL Terminator is ON
J5	OFF	Port 2 RS-485 EOL Terminator is OFF
	ON	Port 2 RS-485 EOL Terminator is ON
J6	N/A	MicroSD Card
J7	N/A	USB Port (2.0)

DIP Switch Settings

The NController has two DIP switch locations:

- S1 – Configures the operating mode; see table below.
- S2 – If pressed, resets the controller.

A manual reset button is located on the back of the NController unit.

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 settings (see page 2-50).	OFF	ON	OFF	OFF
Use OEM default communication settings. See Bulk Erase on page 2-51.	ON	ON	OFF	OFF
Bulk Erase prompt mode. See Bulk Erase on 2-51.	ON	ON	OFF	OFF
The SSP-EP (LP) board reports and functions like a SSP-EP (EP) board. The setting is used only when the host software is not updated to the LP product line.	OFF	OFF	OFF	ON

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

NOTES:

Specifications

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

Primary Power:		Standard Computer Power Cord Universal AC Input (85-264 Vac) Typical AC Current 1.2 A/115 Vac, 0.6 A/230 Vac
Inputs:	*IN Port:*	Connection from NController Master Unit
	RJ45:	8 optically isolated outputs (RS-485) to subcontrollers
Wire Requirements:	*RS-485:*	24 AWG, 4,000 ft (1,219 m) max., twisted pair w/ shield; 120 ohm impedance
Data Memory:		15 MB standard
Mechanical:	*Dimension:*	19” (482.6 mm) W x 18 3/8” (476.25 mm) L x 1 3/4” (44.4 mm) H
	Weight:	4.7 lbs (2.13 km) nominal
Environmental:	*Temperature:*	0 to +70 °C, operating -55 to +85 °C, storage
	Humidity:	20 to 95% RHNC

Specifications are subject to change without notice.

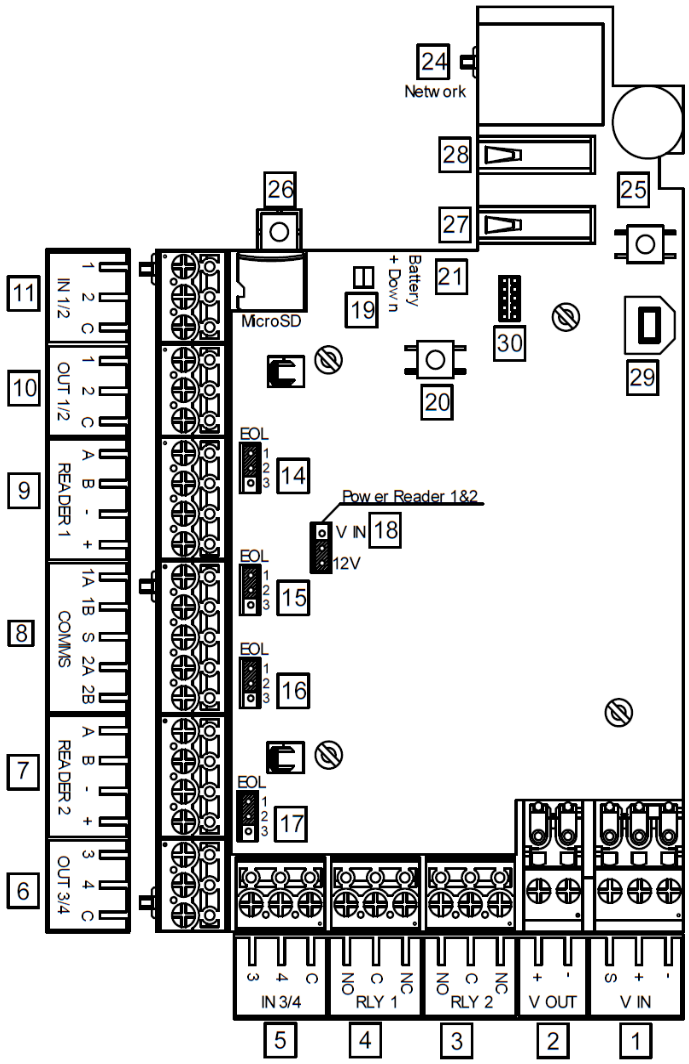
This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.

NOTES:

MP02 Controller

The MP02 is an intelligent controller that is capable of decision making, event reporting, and database storage. The MP02 is supports comunications to subcontrollers, allowing support for up to 64 doors/readers. The MP02 communicates with the host via on-board 10Base-TX Ethernet Port.

The MP02's two reader interface allows support for two openings. Both reader ports support readers that utilize TTL (D1/D0, Clock/Data), F/2F or 2-wire RS-485 electrical signalling (IE: OSDP readers). The controller also provides reader LED control (one-wire LED mode only). Two Form-C Relay outputs may be used for door strike control and alarm signalling. Four programmable inputs are provided for monitoring the door contracts, exit push buttons, and alarm contacts.



Installation

To install the MP02 controller:

1. If required, **mount** the MP02 in an Open Options or Life Safety Power enclosure.
2. **Wire** the network communication.
3. If applicable, **wire** the subcontroller communication
4. **Wire** on-board readers.
5. **Wire** the input and relay circuits.
6. **Wire** the power input.
7. **Configure** jumper settings. See page 2-63.
8. **Configure** the controller's initial IP address and network settings. See page 2-3 for more information.

Default Settings

Each MP02 board ships with the following default configuration.

- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address
- Physical Address: 0
- Data Security: TLS (if available), port 3001
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Subnet Mask: 255.255.0.0
- Default Username: admin
- Default Password: password

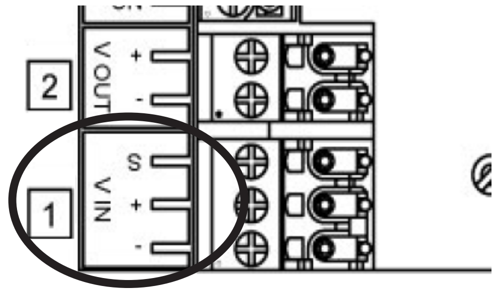
Security

When installing the MP02, ensure that the controller is installed in a secure manner. Upon installation, the user accounts to the web configuration page should be created with secure passwords. The MP02 is shipped with a default login account that is enabled when holding down the reset button (20). The default login user name and password will be available for five minutes once enabled. Ensure that at least one user account is defined. Open Options does not recommend configuring the IP address for the public intranet.

Power Supply

The MP02 requires 12 to 24 Vdc power. Local power source must be in close proximity to the MP02. A minimum of 18 AWG wire is recommended to connect the power supply to the controller. Connect the GND signal to the earth ground, to one location within the system.

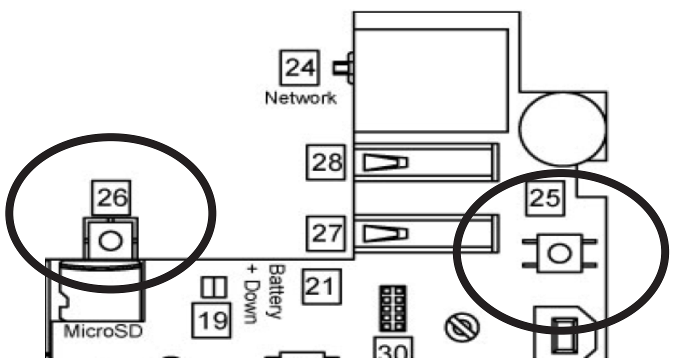
> *Multiple earth ground connections may cause loop problems and is not advised. Observe polarity on 12-24 Vdc input.*



POWER INPUT (1)		
V IN	Ground	-
	Input Voltage	+
	Shield (connect to chassis ground)	S

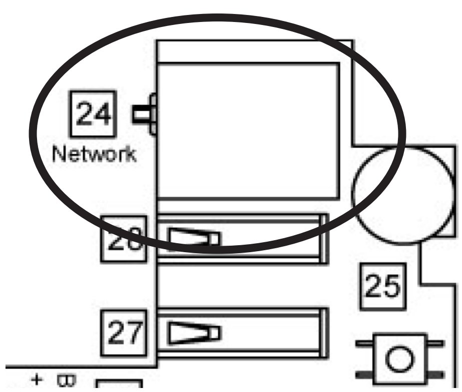
Alarm Inputs

There are two dedicated buttons for cabinet tamper monitoring. One tamper button (26) is located underneath the board that is meant to monitor the removal of the board from an enclosure. The second tamper button (25) is located adjacent to the USB ports (27 and 28) and is used for monitoring the when the enclosure is open.



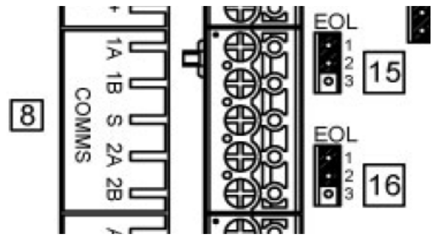
Host Communication Wiring

The MP02 controller communicates to the host via the on-board Ethernet 10-BaseT/100Base-Tx port (24).



Downstream Communication Wiring

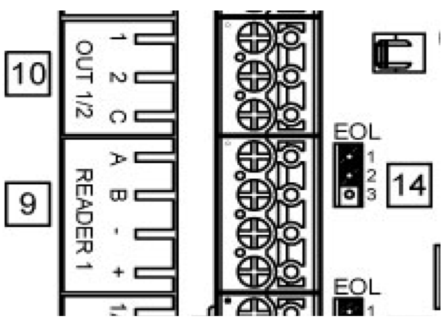
The RS-485 Communication port (8) is located between the Reader 1 port and the Reader 2 port. Channels 1A and 1B, and 2A and 2B, are 2-wire RS-485 interfaces that are used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair, shielded cable, 120 ohm impedance, 18 AWG, 4,000 (1,219 m) maximum for communication.

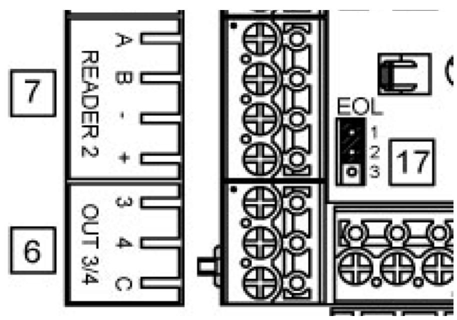


Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the operation channel.

Reader Wiring

Reader 1 port (9) and Reader 2 port (7) support readers with D1/D0, Clock/Data, or 2-wire RS-485 signaling. Reader port configuration is set in DNA Fusion.

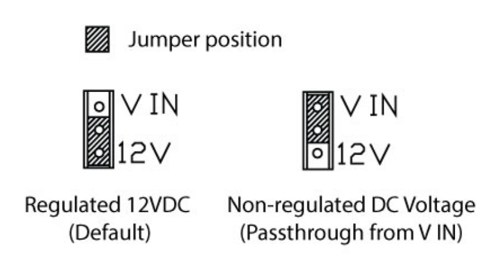




Power to the reader is selectable (18) by moving the jumper to 12V or V IN. If 12V is selected, input voltage must be greater than 20 Vdc to deliver voltage to the reader. If the jumper is set to V IN, input voltage is "passed-through" to the reader. Readers that require different voltage requirements should be powered separately. See reader manufacture specifications for cabling requirements. Do NOT terminate any RS-485 devices connected to the reader port.

Install jumper in the 12V position ***ONLY*** *if the input voltage is greater than 20 Vdc. Serious damage to the reader or the MP02 can occur if this jumper is set incorrectly. Check reader's manufacturer's voltage requirements.*

[18] - READER POWER VOLTAGE SELECTOR	
10-24VDC reader output voltage based on input voltage (V IN) and jumper 18 settings.	
12V	Regulated 12VDC to reader (Default) Minimum 20 VDC is required to be connected to the MP02 at [1] V IN in order to properly supply regulated 12VDC to reader
V IN	Non-regulated DC Voltage passed to reader DC Voltage connected to the MP02 at [1] V IN is not regulated and passed through to the reader



Reader Termination (14 & 17) jumpers are located next to the next to each reader port (9 & 7). Reader ports 1 and 2 will operate using CLK/Data or D0/D1 if the jumper is removed.

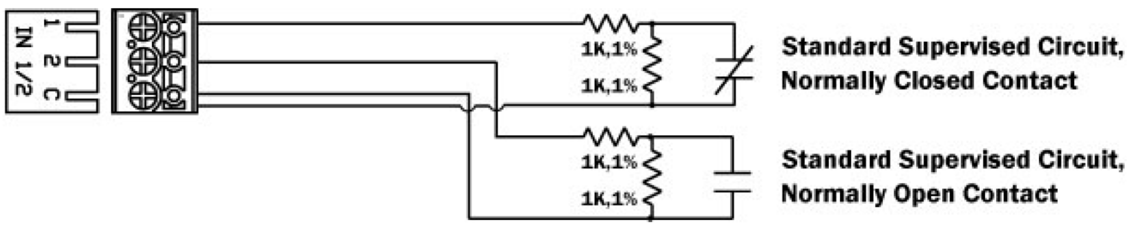
[14] & [17] - READER TERMINATION	
All EOL jumpers shown in default position Jumper on pins 1 & 2 will work as CLK/Data or D0/D1 with jumpers removed.	
[14]	Reader 1 termination settings
[17]	Reader 2 termination settings

Input Circuit Wiring

There are four inputs (11 and 5) that are used to monitor door position, REX (request to exit), or contact alarms. Input circuits can be configured to report as unsupervised or supervised. When unsupervised, reporting consists the open and close states of the door. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded, and foreign voltage. A supervised input circuit requires two resistors added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via DNA Fusion.

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

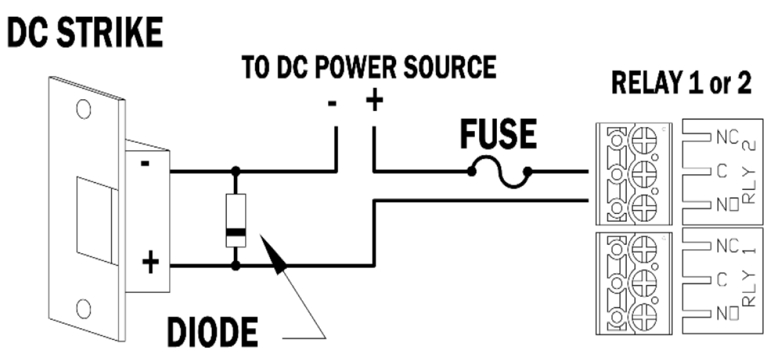
The input circuit wiring configurations shown are supported, but may not be typical:



Relay Circuit Wiring

Two relays (3 and 4) with Form-C contacts (dry) are provided for controlling door lock mechanisms or alarm signalling. Each relay has Common pole (C), a Normally Open pole (NO), and a Normally Closed pole (NC). When controlling the delivery of the power to the door strike, the Normally Open and Common poles are typically used. When momentarily removing power to unlock the door, as maglock, the Normally Closed and Common poles are typically used. Check with local building codes for proper egress door installation.

The door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay plus affect the operation of the MP02. For this reason, a diode is recommended to protect the relay. See page 2-65 for wire gauge information.



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

Memory Backup Battery

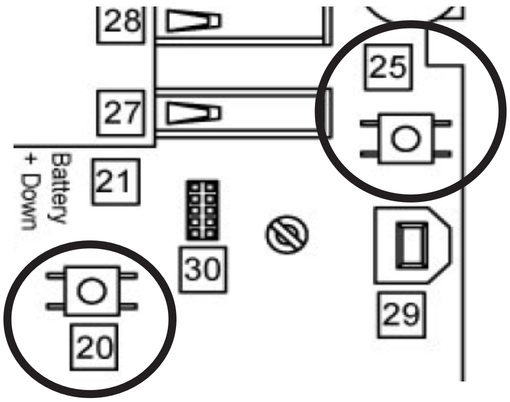
The static RAM and clock are backed up by a lithium battery when input power is removed. Open Options recommends replacing the battery annually. Remove the battery from the holder (21) and replace with a BR/CR2032 type battery.

Factory Reset

The Reset Button (20) on the MP02 is used for rebooting and powering down. The Tamper Button (25) is used with the Reset Button to perform default resets.

1. **Press** and **hold** the Tamper Button (25) and **press** Reset Button (20) 3 times. A one second beep follows.

   The MP02 defaults to DHCP if the network has a DHCP server, and will assign the MP02 an IP address. If the network doesn't have a DHCP server, the IP address will use a 169.XXX.X.XX IP range. See page 2-3 for configuring an IP address.



Reset to Default Settings

1. Using the MercZeroConfig tool, **locate** the MP02.
2. **Double-click** on the MP02.

   The Configuration Manger opens.

   - If needed**, press** the Tamper Button (25) two times to enable the default username and password.
3. Once logged in, **select** the Restore/Default tab.
4. **Select** the Restore Default button.

Controller Restart

To reset the board, **press** and **hold** the Reset Button (20) until the short beeps begin and continue to hold until after 10 short beeps followed by 2 long beeps. The controller will shut down and reboot. The configured network settings will be retained on reboot.

Controller Shutdown

Press and **hold** the Reset Button (20) until a short sequence of beeps begin and continue to hold until after 10 short beeps followed by 2 long beeps. The controller will power down. The configured network settings will remain unchanged on restart.

Hardware Setup

The MP02 controller is configured with multiple jumpers. The jumpers determine the interface of the ports and end-of-line termination (EOL). There are additional features on the MP02 that are reserved for future use.

Jumper and Port Settings

See MP02 diagram on page 2-57 for the location of the jumpers and ports.

Jumper(s)	Set At	Description
Reader Power Select (18)	12V	12 Vdc at Reader ports
	V IN	Power is "Passed through" to reader
Reader Termination (14 & 17)	1 & 2	Default Position
	2 & 3	EOL Termination
RS-485 Termination (15 & 16)	1 & 2	Default Position
	2 & 3	EOL Termination
Ethernet Connection (24)	N/A	10Base-T/100Base Ethernet Connection
USB Ports (27, 28, 29)	N/A	Reserved for future use
Console / Debugging Port (30)	Manufacturer Use Only	Used for debug and / or monitoring status of the MP02 controller

Terminal Block Connections

See MP02 diagram on page 2-57 for the location of the each terminal Block.

Terminal Block	Description	Connection(s)
V IN (1)	Ground	-
	Input Voltage	+
	SHIELD (connected to Chassis ground)	S
V OUT (2)	Ground	-
	Output Voltage	+
RLY 1 (4)	Normally Closed	NC
	Common	C
	Normally Open	NO
RLY 2 (3)	Normally Closed	NC
	Common	C
	Normally Open	NO
IN 1/2 (11)	Common	C
	Host-Defined Input 2	2
	Host-Defined Input 1	1
IN 3/4 (5)	Common	C
	Host-Defined Input 4	4
	Host-Defined Input 3	3
Reader 1 Port (9)	(CLK) DATA 0/GPI01	A
	(CLK) DATA 1/GPI02	B
	Ground	-
	Power	+

Terminal Block	Description	Connection(s)
OUT 1/2 (10)	Green LED	1
	Not Used	2
	Not Used	C
Reader 2 Port (7)	(CLK) DATA 0/GPI01	A
	(CLK) DATA 1/GPI02	B
	Ground	-
	Power	+
OUT 3/4 (6)	Green LED	1
	Not Used	2
	Not Used	C
RS-485 Communication (8)	Channel 1 - RS-485	1A
	Channel 1 - RS-485	1B
	Common Signal Ground	S
	Channel 2 - RS-485	2A
	Channel 2 - RS-485	2B

Status LED

The Status LED (19) indicates power to the board as well as host communications.

Additional Components

Component	Description
Reset Button (20)	Used to reset the controller or to revert to default settings. See page 6 for more information.
Tamper Button (25)	Used to alert if cabinet door is opened. May require additional connection
Underside Tamper Button (26)	Located underneath the board. Alerts if the board is removed from the mounted location or enclosure.

Specifications

The MP02 controller is used in low voltage, Class 2 circuits only. The installation of the MP02 must comply with fire and electrical codes.

Primary Power:	*Primary Power:*	12 to 24 Vdc ±, 560 mA max
	Current:	260 mA without on-board readers connected.
	Reader Ports:	180 mA per reader port
Memory and Clock backup:		3 V Lithium, type BR/CR2032
Ports:	*Primary (Ethernet) Port:*	10Base T/100Base-TX
	Downstream Port:	Two each: 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:		Four unsupervised/supervised, standard EOL: 1K/1K ohm, 1%, 1/4 watt
Outputs:		2 relays, Form-C with dry contacts: 2 A @ 30 Vdc resistive
Reader Interface:	*Reader Power: (jumper selectable)*	12 Vdc ± 10% regulated, 180 mA max each reader (input voltage (1) must be greater than 20 Vdc) or 12 to 24 Vdc ± 10% (input voltage (1) passed through), 180 mA max
	Data Inputs:	TTL compatible or 2-wire RS-485
	RS-485 Mode:	9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2,000 ft (609.6 m)
	LED Output:	TTL levels, high > 3 V, Low < .5 V, 5 mA source/sink max
Wire Requirements:	*Power and Relays:*	1 twisted pair, 18 to 16 AWG
	Ethernet:	CAT-5 min
	Reader Data (TTL):	6-conductor, 18 AWG. 120 ohm impedance, shielded, 2,000 ft (1,219 m) max
	Reader Data (RS-485):	1 twisted pair, shielded. 24 AWG, 4,000 ft (1,219 m) max
	RS-485 I/O Devices:	1 twisted pair, shielded. 120 ohm impedance, 24 AWG, 4,000 ft (1,219 m) max
	Alarm Input:	1 twisted pair, 30 ohms max, typically 22 AWG @ 1,000 ft (304.8 m)
Mechanical:	*Dimension:*	3.5” (89 mm) W x 6” (152.4 mm) L x 0.75” (19 mm) H
	Weight:	4.8 oz (136 g) nominal, board only
Environmental:	*Temperature:*	-40 to 55 C
	Humidity:	0 to 95% RHNC

Specifications are subject to change without notice.

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SSP Series Controller Comparison

The following table provides a comparison overview for the SSP Series controllers.

Controller Type	Memory	Cardholder Capacity	# of Sub-Controllers	# of Doors/ Readers	# of NSC-200s	Host Ports	RS-485 Ports
SSP-EP	15 MB	600,000	64 (0-31 & 0-31)	64	32	2	2
SSP-D2	6 MB	240,000	32 (0-31)	2 On-Board / 64 Total	32	1	1
SSP-LX	96 MB	2,000,000	64 (0-31 & 0-31)	2 On-Board / 64 Total	32	1	2
DController	6 MB	240,000	8 (RS-485)	1 On-Board / 17 Total	16	1	1
NController	15 MB	600,000	64	64	32	2	1
MP02	16 MB	600,000	64	2 On-board / 32 Total	32	1	2

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Reader Modules 3

In This Chapter

- √ RSC-1
- √ RSC-2
- √ NSC-100
- √ NSC-200
- √ RSC-DT

Reader Subcontrollers

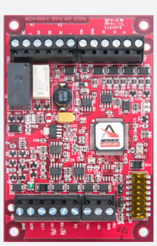
Reader subcontrollers provide the interface between door devices and SSP Series controllers. The RSC Series subcontrollers support a multitude of reader technologies and provide I/O support for door devices, e.g. requests-to-exit (REX) and door contacts.

Open Options offers five (5) reader modules:

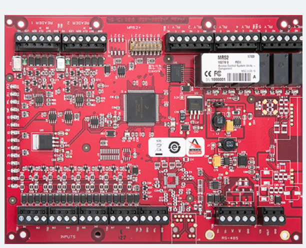
- RSC-1 - A single-reader interface dedicated to individual door monitoring; provides 2 programmable input circuits and 2 relay outputs. The RSC-1 supports OSDP, OSDP Secure Channel, FICAM government profiles, keypads, biometric readers, Wiegand, clock and data, magnetic stripe, F/2F, and supervised F/2F technologies.
- RSC-2 - A dual-reader interface dedicated for two-door monitoring; provides 8 programmable input circuits and 6 relay outputs. The RSC-2 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.
- NSC-100 - A network-connected, PoE-capable reader interface dedicated to one door with single or paired readers; provides 4 programmable input circuits and 2 relay outputs. (Series 2)
- NSC-200 - 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)
- RSC-DT - A 32-character LCD display terminal with a 16-position keypad and reader port. The RSC-DT supports magnetic stripe, Wiegand, and proximity readers.

The RSC-1, RSC-2, and NSC-200 described in this manual are Series 3 models. For information on previous models, refer to the Legacy Hardware Manual.

Reader Subcontrollers



RSC-1



RSC-2

NSC-100

NSC-200

RSC-DT

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 one (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.

OSDP Reader Configuration

The OSDP reader-to-subcontroller wiring connection are explained in the tables below. The tables include connections for the RSC-1, RSC-2, NSC-100, and NSC-200. The OSDP Reader column is labeled with common wire terminals found on OSDP readers. Connect the OSDP reader with the adjacent subcontroller Connection column.

RSC-1 OSDP Configuration

Wiring configuration for OSDP readers communicating with a RSC-1 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

RSC-2 OSDP Configuration

The wiring configuration for OSDP readers communicating with a RSC-2 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

NSC-100

The wiring configuration for OSDP readers communicating to a NSC-100 is shown in the table below.

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

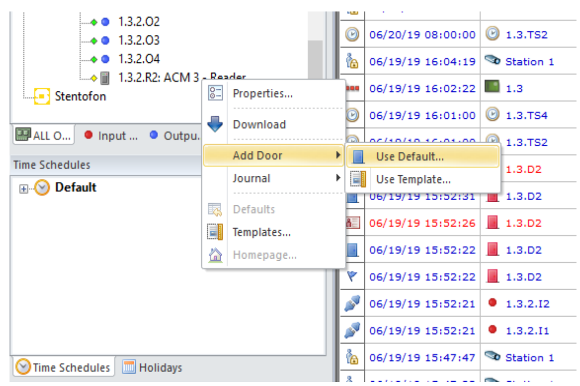
NSC-200

The wiring configuration for OSDP reader communicating to a NSC-200 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 page 3-41 Technical installation Manual.

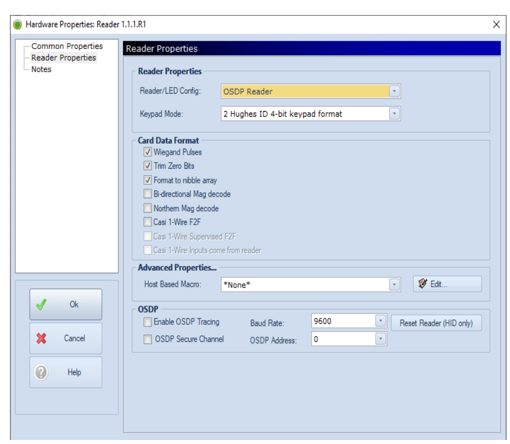


1. **Right-click** on the added OSDP reader.
2. **Select** Add Door / Use Default.

   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.*



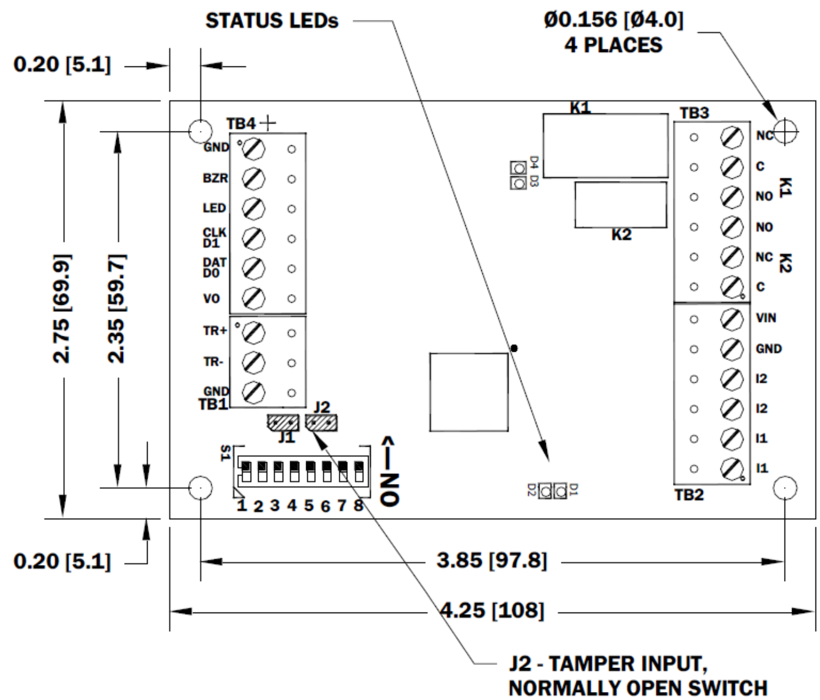
NOTES:

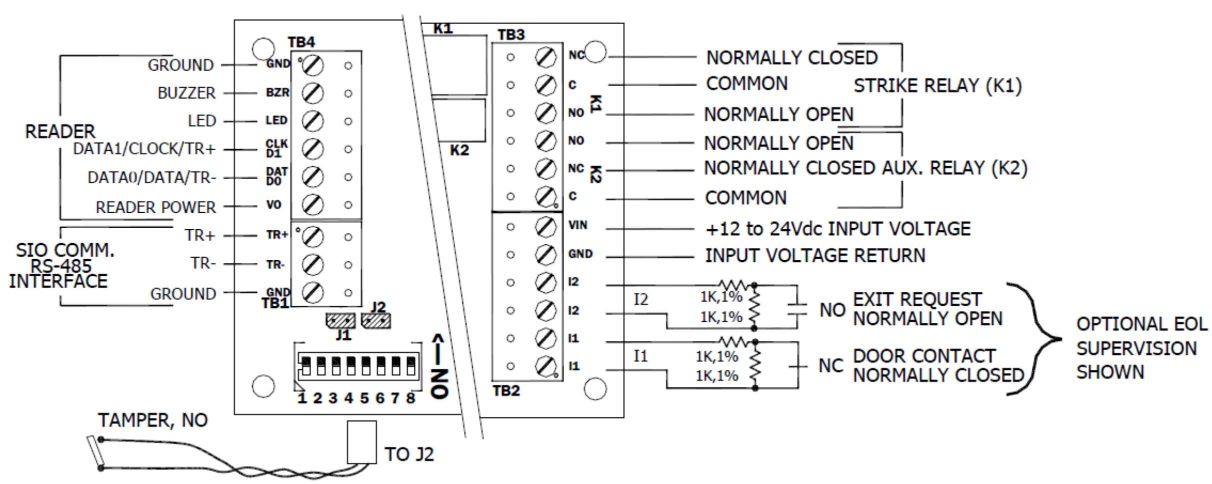
RSC-1 Single-Reader Interface

The Series 3 RSC-1 is a single-reader interface panel dedicated to individual door monitoring. It contains two (2) Form C relay outputs to control door strikes and signal alarms as well as a two (2) inputs to monitor the door contact and request-to-exit (REX) devices. Input circuits can be configured as unsupervised or supervised. The RSC-1 communicates upstream to the SSP controller via 2-wire RS-485 interface.

The RSC-1 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 RSC-1 in a standard 2- or 3-gang junction enclosure (not provided).





Installation

To install the RSC-1 subcontroller:

1. If required, **mount** the RSC-1 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 page 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 RSC-1 board ships with the following default configuration:

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

Power Supply

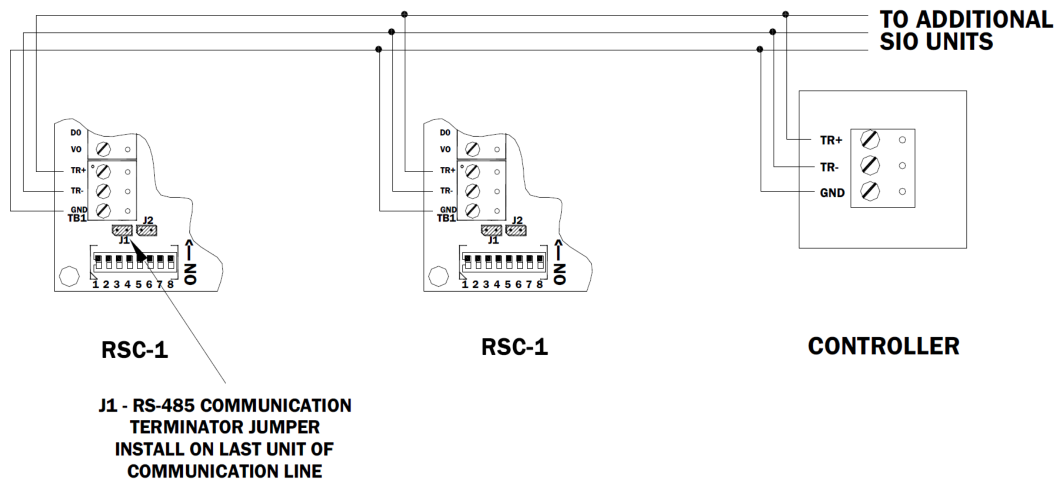
The RSC-1 subcontroller requires a filtered 12 to 24 Vdc ± 10% power supply. The input power is passed through to the reader interface to power the reader. Readers with different voltage requirements must be powered separately. The reader power output terminal, TB4-6 (VO), is not current limited.

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

Upstream Communication Wiring

The RSC-1 communicates to Port 1 on the SSP 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.

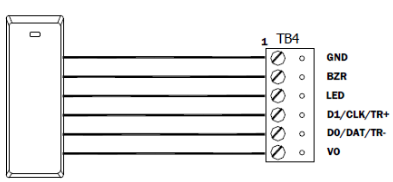
Wire the TR+, TR-, and GND connections on TB1 using 24 AWG shielded cable with a characteristic impedance of 120 ohms.



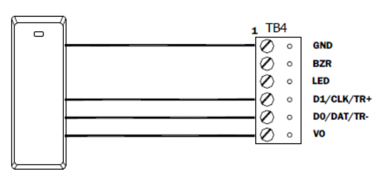
Reader Wiring

The TB4 port on the RSC-1 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.

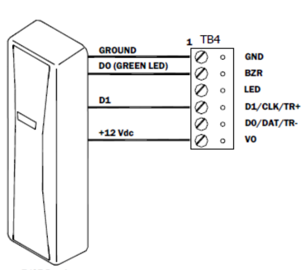


Typical D1/D0 or Clock/Data Reader

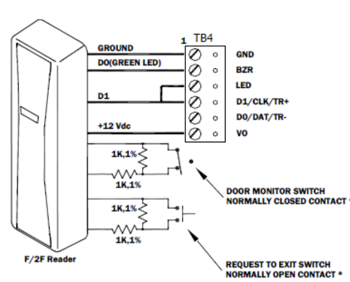


Typical RS-485 Device

* 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 RSC-1 contains two (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.

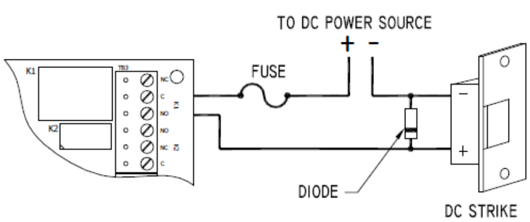
Inputs can be configured as supervised or unsupervised. If the input is unsupervised, the only states that will be reported are Open or Closed. When the inputs are configured as supervised, the circuit will report Open or Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage.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

Two (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 RSC-1, 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 page 3-33 in the Technical Installation Manual for more information.

Hardware Setup

DIP Switch Settings

The RSC-1 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 RSC-1 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 RSC-1 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 RSC-1 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.

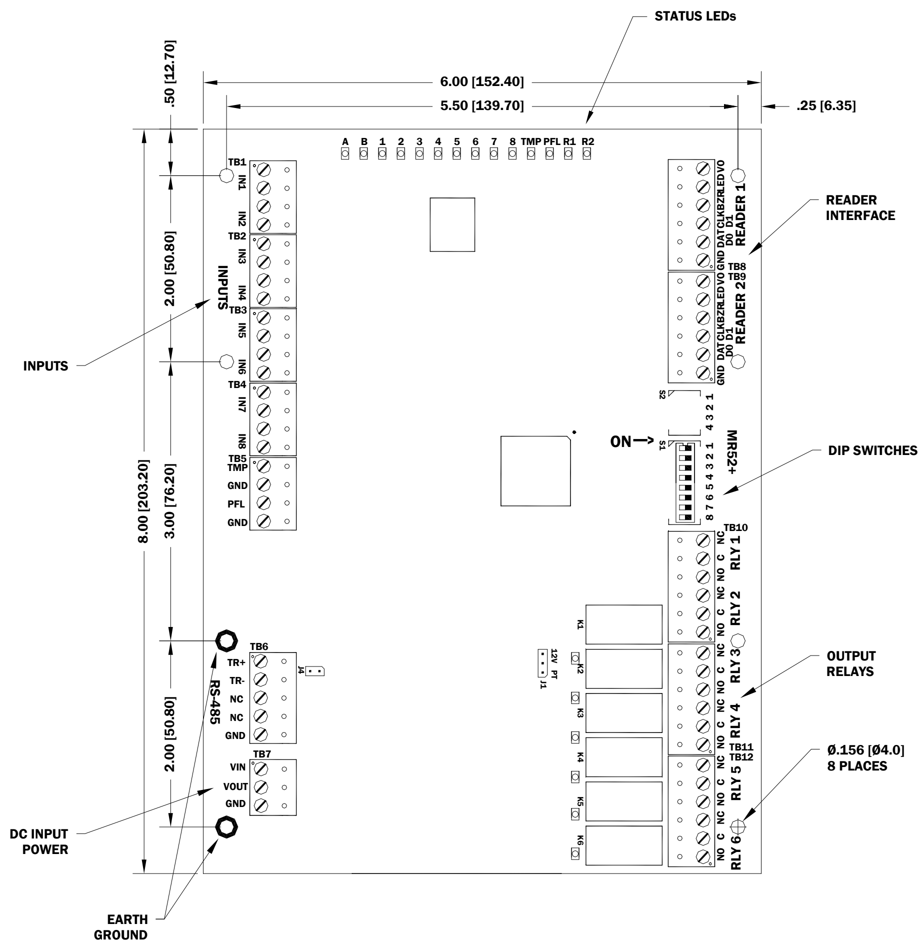
NOTES:

RSC-2 Dual-Reader Interface

The Series 3 RSC-2 is a dual-reader interface panel dedicated to monitoring two doors. It contains six (6) Form C relay outputs to control door strikes and signal alarms as well as eight (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 RSC-2 communicates upstream to the SSP controller via 2-wire RS-485 interface.

The RSC-2 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 RSC-2 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 RSC-2 subcontroller:

1. If required, **mount** the RSC-2 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 page 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

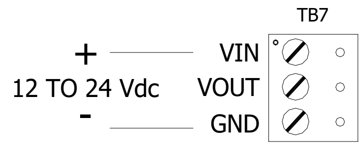
Each RSC-2 board ships with the following default configuration:

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

Power Supply

The RSC-2 subcontroller requires a filtered 12 to 24 Vdc ± 10% power supply. Locate the power source as close to the RSC-2 as possible.

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

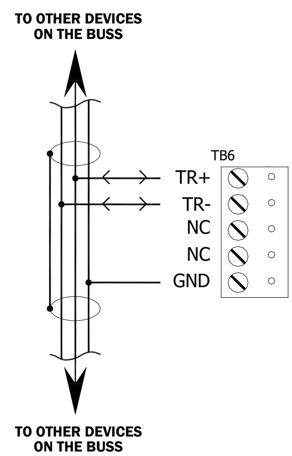


> **!** *Observe polarity on* VIN*; the* VOUT *terminal on* TB7 *is the same as* VIN*.*

Upstream Communication Wiring

The RSC-2 communicates to Port 1 on the SSP 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 page 3-19 for jumper settings.

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

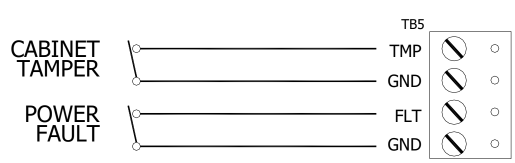


2-WIRE RS-485
(ONLY 2-WIRE RS-485 IS SUPPORTED)

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 RSC-2, 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 page 3-33 in the *Technical Installation Manual* for more information.

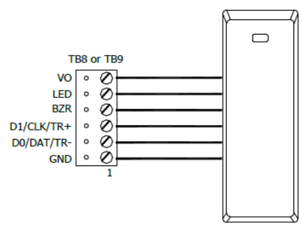
Reader Wiring

The TB8 and TB9 ports on the RSC-2 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.

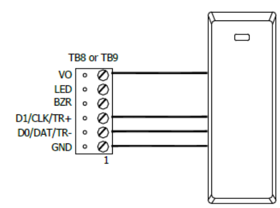
Reader power is selectable: 12 Vdc (VIN MUST be greater than 20 Vdc) or input voltage (VIN) is passed through (PT), 300 mA maximum per reader port. Readers that require a different voltage or have high current requirements must be powered separately.

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

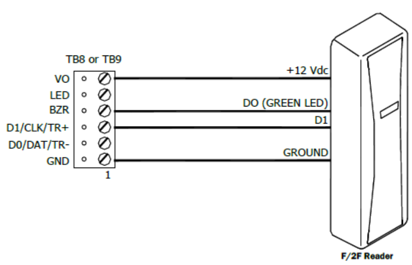
Refer to the card reader's documentation to verify proper wiring connections. TTL signaling requires a 6-conductor cable (18 AWG). RS-485 signaling requires two separate 2-conductor cables: one for power (18 AWG) and one for communication (24 AWG). F/2F signaling requires a 4-conductor cable. Configure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



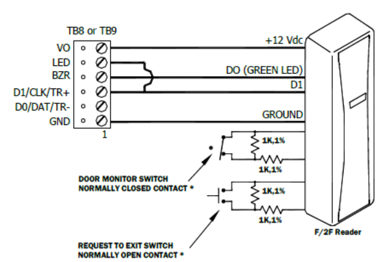
Typical D1/D0 – Clock/Data Reader



Typical 2-Wire RS-485 Device



Typical Unsupervised F/2F Reader

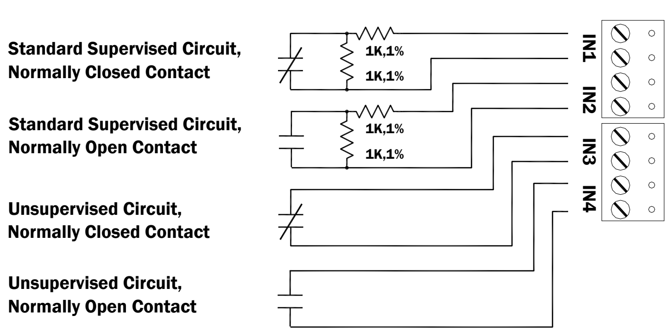


Typical Supervised F/2F Reader

Input Circuit Wiring

The RSC-2 contains eight (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.

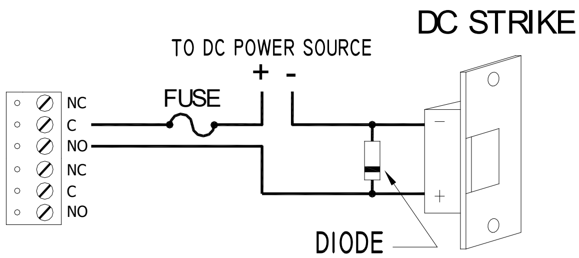
Inputs can be configured as supervised or unsupervised. If the input is unsupervised, the only states that will be reported are Open or Closed. When the inputs are configured as supervised, the circuit will report Open or Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage.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

Six (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 RSC-1 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 1.38.1, 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 RSC-2.

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 RSC-2.

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 RSC-2 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:

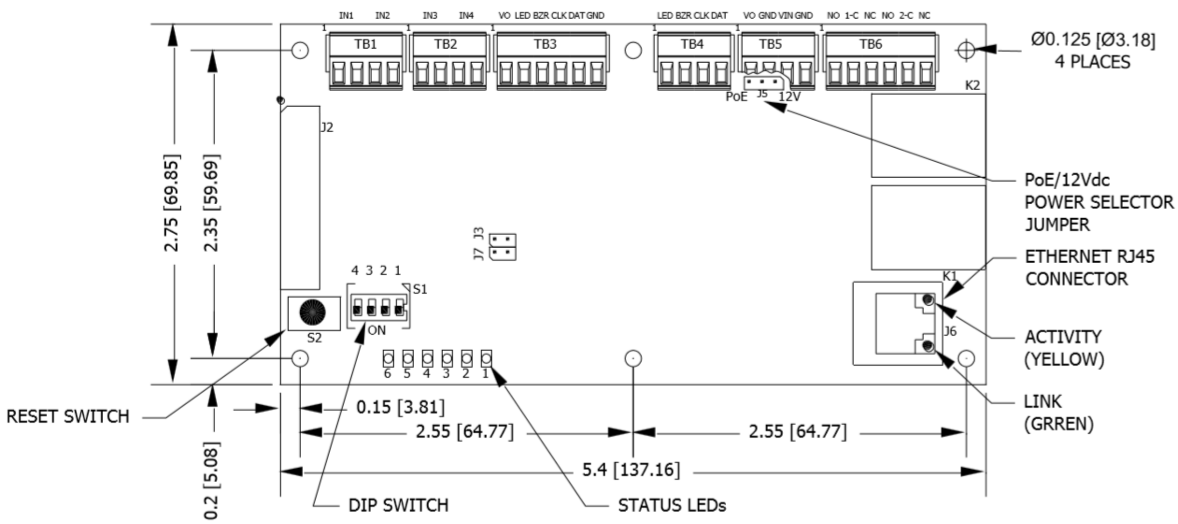
NSC-100

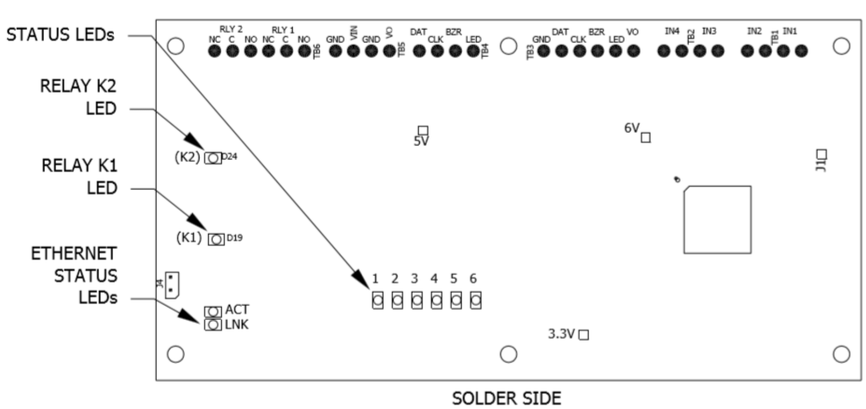
The NSC-100 is a network-connected, PoE-capable reader interface that provides a one-board solution to configure a single door (ACM) with paired readers. It provides the interface between local devices at the door and SSP controllers on the local area network (LAN). The NSC-100 is housed in a plenum-rated enclosure.

Controller Type	Maximum # of NSC-100s
SSP-EP	32
SSP-D2	32
SSP-LX	32
DController	16
NController	32

The NSC-100 connects directly to the network with a standard RJ45 connection and provides two reader ports that support one ACM in a single or paired reader configuration. The first reader port can accommodate a read-head that uses Wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling; one- or two-wire LED modes, and buzzer control (one-wire LED mode only). The second reader port can accommodate a read-head that uses Wiegand or magnetic stripe signaling, one- or two-wire LED modes, and buzzer control (one-wire LED mode only).

> *For UL installations, the Power Sourcing Equipment (PSE) such as a PoE enabled network switch and/or PoE power injectors must be UL Listed under UL-294B. For more information on UL requirements, see page 3-24.*





Installation

To install the NSC-100 subcontroller:

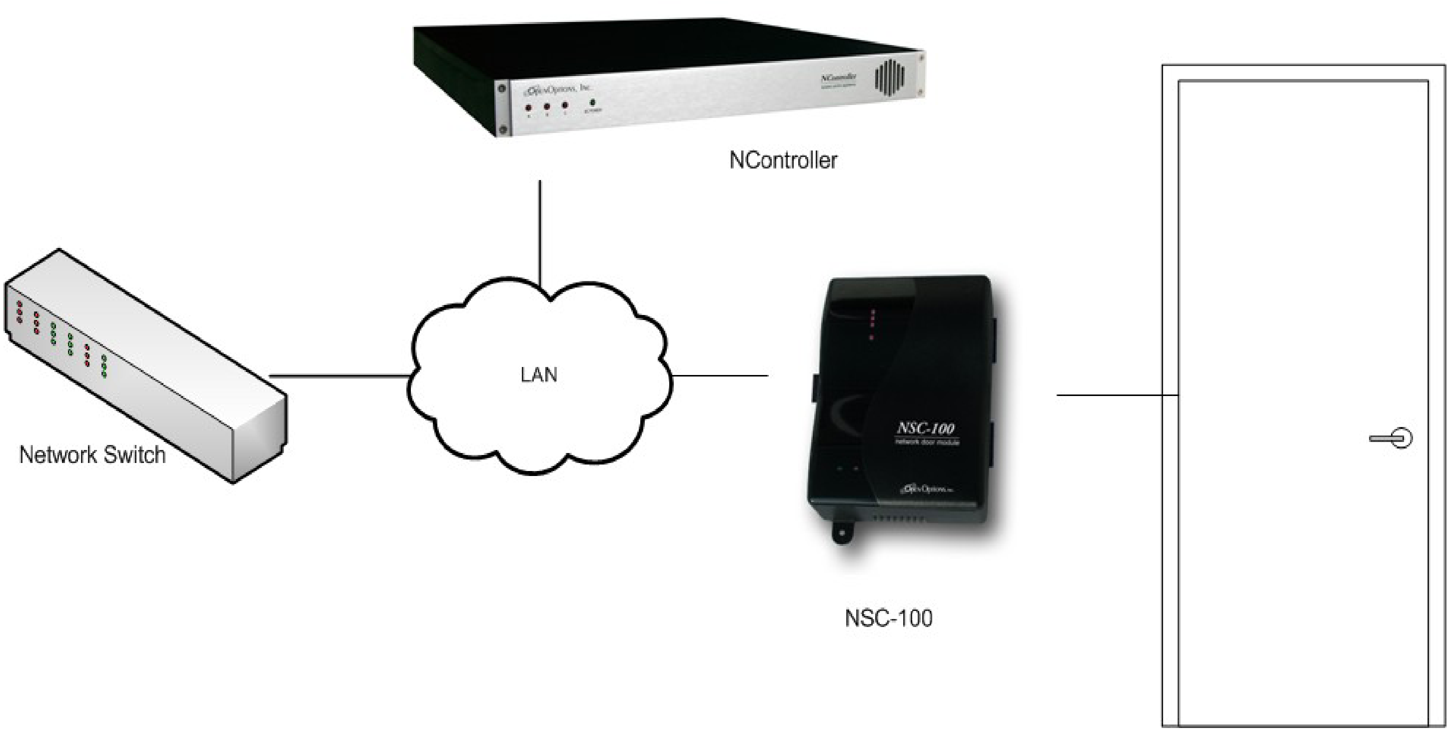
1. To remove the enclosure, **press down** on the latch on top of the enclosure and **gently press** a screwdriver or small tool into the slot on the bottom of the enclosure.
2. **Mount** the NSC-100 in the desired location.

   The NSC-100 is only suitable for indoor installations. Outdoor installations should be placed inside a NEMA enclosure rated for the particular environment.
3. **Connect** the input wires to the NSC-100.
4. **Wire** the inputs to the door hardware.
5. **Wire** the relay outputs.
6. **Wire** the downstream interface for card readers and/or keypads.
7. **Connect** the Ethernet cable to the Ethernet jack on the NSC-100.
8. If needed, **wire** the power supply to the unit.
9. After wiring the NSC-100, **Feed** the wires through the strain relief connectors and **tighten** the sealing nut to secure cables.
10. **Configure** the IP address. See page 3-33

UL Listing Requirements

When installing a UL-listed system, consider the following requirements:

1. **Power** the devices from a UL-294B listed power source.
2. **Provide** a standby power source.
3. **Ensure** that portal-locking devices and electromagnetic locks comply with all UL-294B requirements.
4. **Evaluate** the equipment for use in a Pollution Degree 2 environment.
5. **Install** the equipment in accordance with national and local electrical codes. The installer should be a qualified technician.



Power Supply

The NSC-100 accepts Power over Ethernet (PoE) or an external 12 Vdc power supply. This setting is configured via the J5 jumper; see page 3-29 for more information. The NSC-100 hardware will ship pre-configured for PoE (unless External Power is specified when ordering) and will be ready to install.

> *The network switch that connects to the NSC-100 must be configured for full power and 10 Mbps only.*

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

If using an external power supply, locate the power source as close to the unit as possible and connect the power supply to the VIN (TB 5-3) and GND (TB 5-4) terminals.

> *Connect the* GND *signal to earth ground at one location in the system. Multiple earth ground connections may cause ground loop problems and is not advised.*

Upstream Communication Wiring

The NSC-100 communicates to the controller via the on-board 10Base-T/100Base-TX Ethernet interface (J6). Connect the network cable to the Ethernet port on the NSC-100.

Reader Wiring

Reader Port 1 (TB3) supports TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 electrical interfaces. Reader Port 2 (TB4) supports TTL (D1/D0, Clock/Data) or F/2F electrical interfaces.

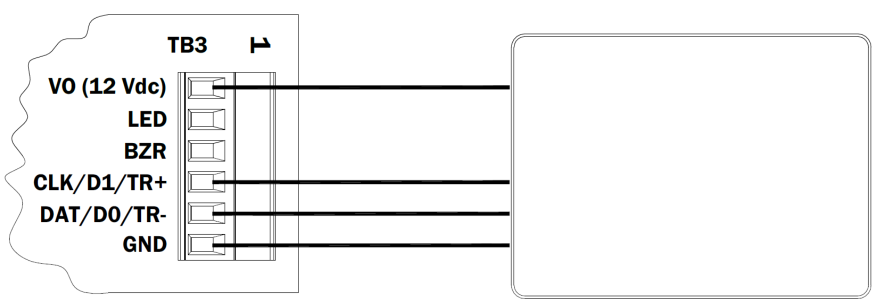
Power to the first reader port is 12 Vdc and is current limited to 180 mA. The second reader may be powered from the auxiliary power supply output (TB5).

Readers that require a different voltage or require high currents should be powered separately. Refer to the manufacturer specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Configure the reader ports via DNA Fusion.

Typical Reader Connection

The diagram below shows the typical wiring connection for RS-485 devices. See page 3-29 for Terminal Block Connections.

FIRST READER PORT

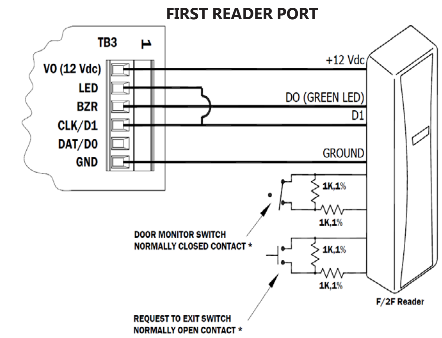


Reader Port 1 Typical 2-wire RS-485 Device

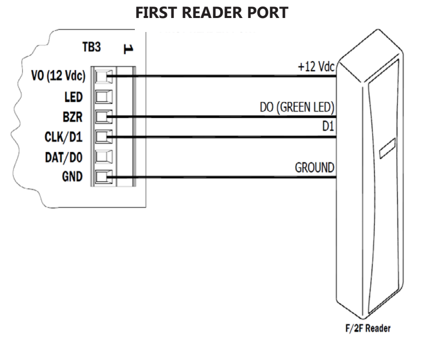
> For best results, the communication wiring should not exceed 1,000 feet. Use twisted pairs (min. 24 AWG) with shield.

Paired 1st and 2nd Reader Diagrams

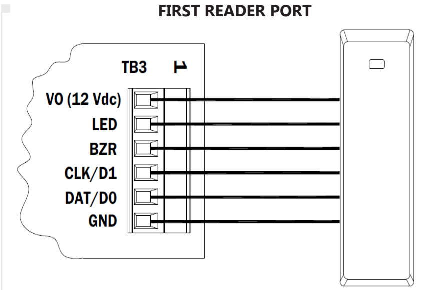
The diagrams below shows the paired reader connections for one (1) door using Reader Port 1 and Reader Port 2.



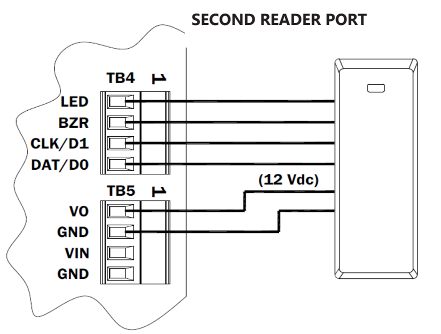
Reader Port 1
Typical Supervised F/2F Reader



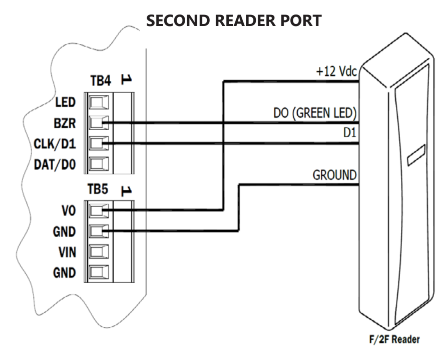
Reader Port 1
Typical Unsupervised F/2F Reader



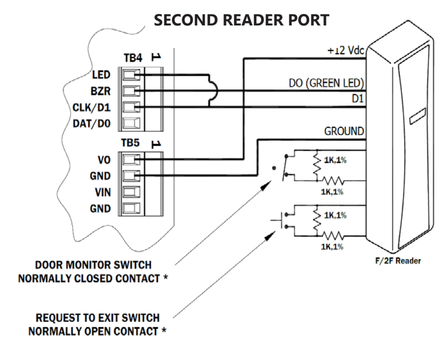
Reader Port 1
Typical D1/D0 or Clock/Data Reader



Reader Port 2
Typical D1/D0 or Clock/Data Reader

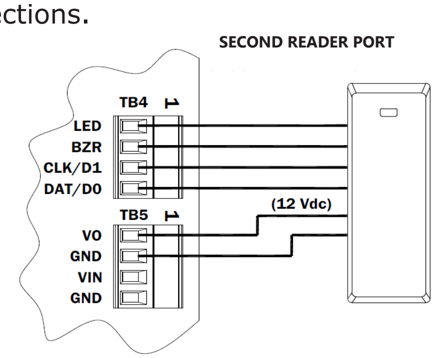


Reader Port 2
Typical Supervised F/2F Reader



Reader Port 2
Typical Unsupervised F/2F Reader

If Reader Port 1 was used to power the NSC-100 use Reader Port 2 for the primary reader at the door. See page 3-29 for Terminal Block Connections.



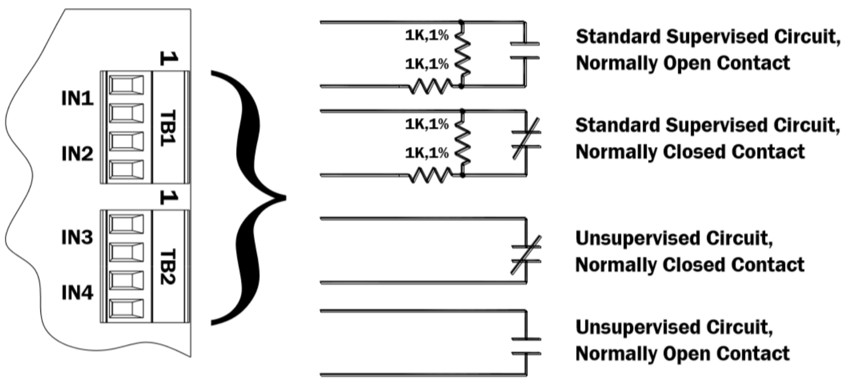
Reader Port 2
Typical D1/D0 or Clock/Data Reader

> When powering any remote devices by the NSC-100, care must be taken not exceed the maximum current available. Cable gauge must also be evaluated. See page 3-35 for wire specifications.

Input Circuit Wiring

The NSC-100 contains four (4) inputs that are typically used to monitor the door contacts, request-to-exit (REX) devices, and alarm contacts. Wiring the inputs to IN1 and IN2 on TB1 or on IN3 and IN4 on TB2. Input properties are configured via DNA Fusion.

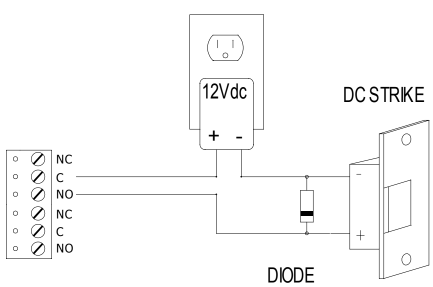
Inputs can be configured as supervised or unsupervised. If the input is unsupervised, the only states that will be reported are Open or Closed. When the inputs are configured as supervised, the circuit will report Open or Closed states as well as Open Circuit, Shorted, Grounded, and Foreign Voltage.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

Two (2) Form C relay contacts are provided on TB6 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 relay contacts are rated 5 A @ 30 Vac/dc. 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 or metal oxide varistor (MOV) for protection.

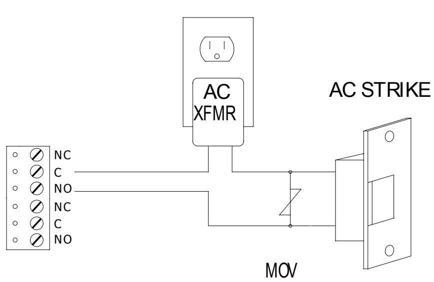


Diode Selection:

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



MOV Selection:

Clamp Voltage: > 1.5 x Vacs RMS

For 24 Vdc Strike: Panasonic ERZ-C07DK470 Typical

It's possible for the NSC-100 to provide power for a 12 Vdc door strike providing the maximum current is not exceeded. See page 3-35 for Specifications.

NOTES:

Hardware Setup

DIP Switch Settings

The NSC-100 contains a set of four (4) DIP switches to determine the IP addressing mode. See page 3-33 for instructions on configuring each mode.

Addressing Mode	1	2	3	4
Controller DHCP	OFF	OFF	OFF	OFF
Public DHCP	ON	OFF	OFF	OFF
Static IP	OFF	ON	OFF	OFF
Static IP Programming Mode	ON	ON	OFF	OFF
Controller DHCP	ON	ON	ON	ON

All other DIP switch settings are reserved for future use.

Jumper Settings

Jumper	Set At	Selected
J1	N/A	Factory Use Only
J2	N/A	Factory Use Only
J3	N/A	Factory Use Only
J4	N/A	Factory Use Only
J5	PoE	Powered via Ethernet connection (IEEE 802.3af compliant)
	12V	Powered from an external 12 Vdc power source connected to TB5-3 (VIN) and TB5-4 (GND)
J6	N/A	Ethernet connection with PoE support
J7	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	Reader 1	VO
TB 3-2		LED
TB 3-3		BZR
TB 3-4		CLK
TB 3-5		DAT
TB 3-6		GND
TB 4-1	Reader 2	LED
TB 4-2		BZR
TB 4-3		CLK
TB 4-4		DAT

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

Power for Reader 2 must come from V OUT (VO/GND).

Status LEDs

Initialization

When power is applied, LEDs 2 through 6 are sequenced ON then OFF.

Waiting for IP Address Mode

When the initalization sequence is complete, the NSC-100 goes into the "Waiting for IP Address" mode if the DIP switches are set to the Controller DHCP or Public DHCP addressing modes.

LED	Description	Indicator
1	Online Status	Offline = 0.2 sec ON, 0.8 sec OFF Waiting for Firmware Download = 0.1 sec ON, 0.1 sec OFF
2	Waiting for IP Address	0.5 second ON, 0.5 second OFF

Running

After the NSC-100 has received an IP address, the LEDs are in the normal run mode. If communication is lost and the NSC-100's DIP switches are set to the Controller DHCP or Public DHCP addressing modes, the NSC-100 reverts back to the "Waiting for IP Address" mode.

LED	Description	Indicator
1	Online Status	Online (Encryption Disabled) = 0.8 sec ON, 0.2 sec OFF Online (Ecryption Enabled) = 4 pulses, 0.1 sec ON, 0.1 sec OFF per second Offline = 0.2 sec ON, 0.8 sec OFF (Static IP Addressing Mode Only) Waiting for Firmware Download = 0.1 sec ON, 0.1 sec OFF
2	Host Communication	Flashes when there is host communication (approx. every 5 seconds)
3	Communication Status	Flashes when data is received from either reader/ downstream devices
4	Input 1 Status	Inactive = OFF Active = ON Flashing = Trouble
5	Input 2 Status	
6	Input 3 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

NOTES:

Setting the IP Address

Select the desired IP addressing method and **set** the DIP switches on the NSC-100. See page 3-29 for more information.

- Controller DHCP - The NSC-100's MAC address is automatically assigned an IP address from the controller and the embedded DHCP server loads the IP address into the NSC-100. The NSC-100 and the controller must be in the same subnet and cannot be isolated by network switches.

> *For Controller DHCP, DHCP reservations for IP and MAC address on the network must be in place before bringing the NSC-100 online.*

- Public DHCP - The NSC-100's MAC address is automatically assigned an IP address from the public DHCP server and the embedded DHCP server loads the IP address into the NSC-100.

> *For Public DHCP, ensure that the server has available IP addresses are in the server's DHCP range.*

- Static IP Address - The NSC-100 will be assigned a static IP address.

The NSC-100's IP addressing method is determined by the DIP switch settings.

> *Operators can NOT assign an IP address in the 169.254.xxx.xxx range to an NSC-100. This range is reserved for Automatic Private IP Addressing (APIPA). APIPA is used to assign an address when a device is configured for DHCP but DHCP servers are not available.*

The following software and firmware is required.

- NSC-100 Application Firmware: 1.4.2 or above
- NSC-100 Loader Firmware: 1.1.11 or above
  - Required to support firmware downloads if using the Public DHCP or Static IP Addressing modes
- Controller Firmware: 1.14.7.0282 or above

> *Verify that the controller's DIP switches are set to the normal operating mode by setting all the DIP switches to the* OFF *position.*

Controller DHCP

1. **Set** the NSC-100's DIP switches to the following configuration and **cycle** power to the unit.

Selection	1	2	3	4
Controller DHCP	OFF	OFF	OFF	OFF

The NSC-100 will obtain the IP address from the controller.

> *If using the* Controller DHCP *method, the NSC-100 and the controller must be in the same subnet and cannot be isolated by network switches.*

Public DHCP

In the Public DHCP mode, a DNS Server must be available on the network to resolve the NSC-100 network device name into an IP address.

1. **Set** the NSC-100's DIP switches to the following configuration and **cycle** power to the unit.

Selection	1	2	3	4
Public DHCP	ON	OFF	OFF	OFF

The NSC-100's network device name will be "MAC" followed by the 12-character MAC address.

> *If using the* Public DHCP *method, the controller must be configured to use DHCP for the IP address.*

Static IP Address

The MR51e Address Configuration Tool will locate all NSC-100's that are currently in programming mode (must be running firmware version 1.4.3 or above).

1. **Set** the NSC-100's DIP switches to the following configuration to enable Static IP Addressing mode and cycle power to the unit.

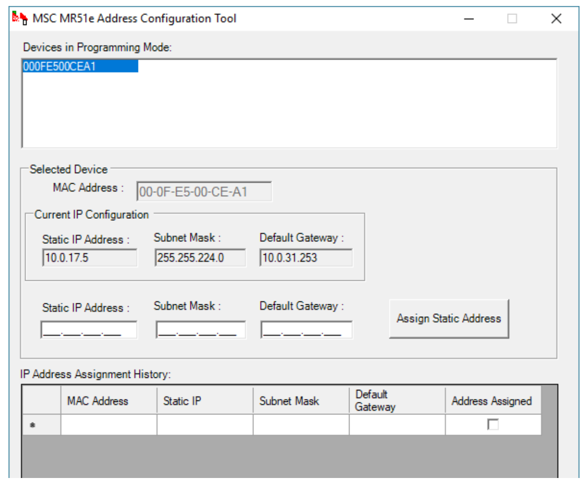
Selection	1	2	3	4
Static IP Programming Mode	ON	ON	OFF	OFF

2. **Open** the MR51e Address Configuration Tool.

   Default location:

   - 32-bit OS — C:\Program Files\DNA Fusion\Tools\MR51eAddressTool.exe
   - 64-bit OS — C:\Program Files (x86)\DNA Fusion\Tools\MR51e Address Tool.exe

3. **Select** the desired NSC-100 from the Devices in Programming Mode list.
4. **Verify** the Static IP Address, Subnet Mask, and Default Gateway information.



5. **Click** the Assign Static Address button.
6. Once the NSC-100's IP address is programmed, **set** the NSC-100's DIP switches to the following configuration.

Selection	1	2	3	4
Static IP Address	OFF	ON	OFF	OFF

7. **Power cycle** the NSC-100 or **press** the S2 reset button on the NSC-100.

   If the IP address was successfully assigned to the NSC-100, it will display the device's information in the Current IP Configuration and IP Address Assignment History sections.

If using the Static IP Address *method, the NSC-100 and the controller must be in the same subnet and can not be isolated by network switches.*

Specifications

The NSC-100 should be used in low-voltage, Class 2 circuits only. The installation of this controller 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.*

> *Category 5e cabling is the minimum performance category recommended.*

Power Input:	*PoE:**	12.95 W, compliant with IEEE 802.3af
	External Power Supply:	12 Vdc ± 10%, 900 mA maximum
Power Output:		12 Vdc @ 650 mA max. (reader and AUX outputs combined)
Inputs:		4 unsupervised/supervised, EOL resistors, 1k/2k ohm, 1% 1/4 watt standard
Outputs:		2 Form C relay contacts, 5 A @ 30 Vac/dc
Reader Interface:	*Reader Power:*	12 Vdc @ 150 mA max
	Reader LED Output:	TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink max.
	Buzzer Output:	Open collector, 5 Vdc open circuit max., 10 mA sink max.
	Reader Data Inputs:	TTL compatible inputs or 2-wire RS-485
	RS-485 Mode:	9600 bps, async., half-duplex, 1 start bit, 8 data bits, and 1 stop bit; max. cable length 4000 ft.
Wire Requirements:	*Communication:*	Ethernet, Cat 5e minimum
	Power:	18 AWG, shielded, 1 twisted pair
	Alarm Inputs:	1 twisted pair, shielded, per input, 30 ohm max.
	Reader Data (TTL):	18 AWG, shielded, 6 conductors, 500 ft (152 m) max.
	Reader Data (RS-485):	24 AWG, 120 ohm impedance, twisted pair with shield and drain wire, 2000 ft (609.6 m) max.
Mechanical:	*Dimension:*	5.5” (140 mm) W x 2.75” (70 mm) L x 0.96” (24 mm) H without bracket
	Weight:	4.2 oz (120 g) without bracket
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	10 to 95% RHNC

** For UL installations, the Power Sourcing Equipment (PSE) such as a PoE enabled network switch and/or PoE power injectors must be UL Listed under UL-294B.*

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.*

NOTES:

NSC-200

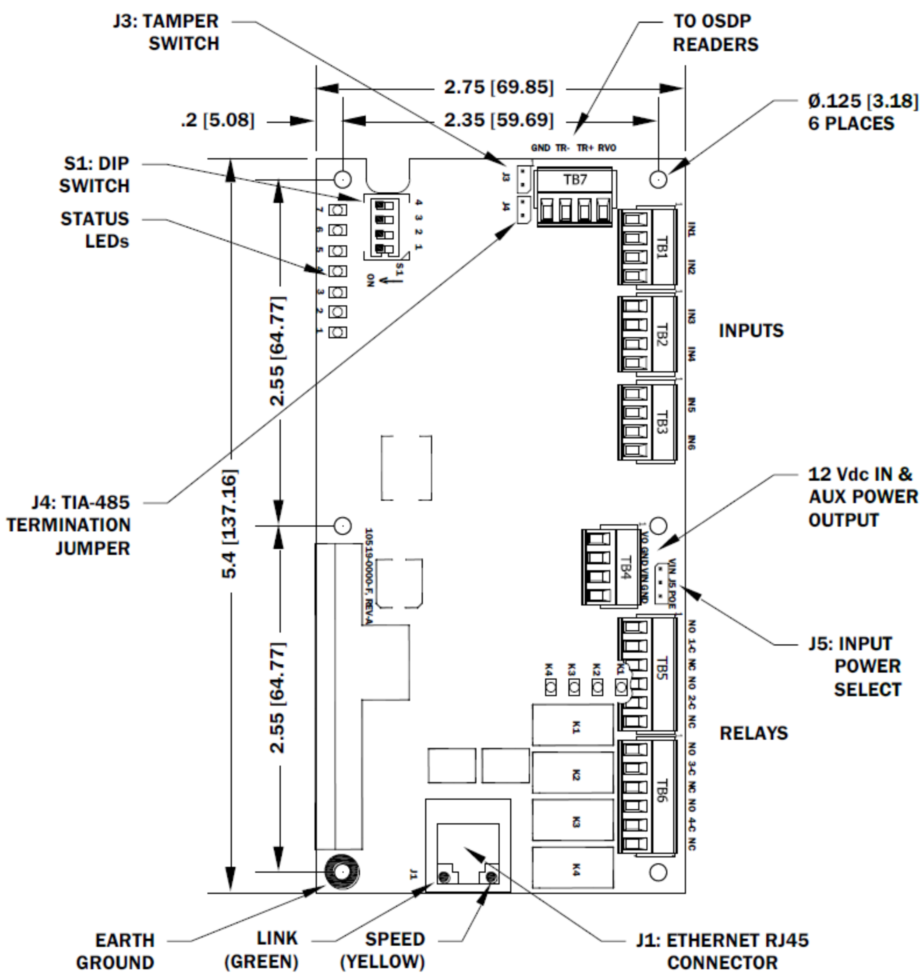
The NSC-200 is a network-connected, PoE-capable reader interface to control two doors (ACMs) using OSDP readers. It supports up to four (4) OSDP readers configured as paired or alternate readers. The NSC-200 is housed in a plenum rated case.

Controller Type	NSC-200s Supported
SSP-EP	32
SSP-D2	32
SSP-LX	32
DController	15 or 16
NController	32

The NSC-200 only supports OSDP readers.

The NSC-200 connects directly to the network with a standard RJ45 Ethernet connection and provides one (1) serial 2-wire RS-485 port to communicate to the readers. Four (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. Six (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 NSC-200 is an enclosed network controller.

To install the NSC-200 subcontroller:

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 NSC-200 in the desired location.

   The NSC-200 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 page 3-39).
7. **Connect** the Ethernet cable to the Ethernet jack on the NSC-200.
8. If needed, **wire** the power supply to the unit.
9. After wiring the NSC-200, **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 page 2-3.

Default Settings

Each NSC-200 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

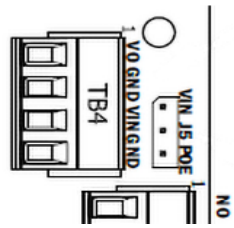
The NSC-200 must be installed in a secured environment. User accounts made in the web configuration (Configuration Manager) must be created with a strong password. All of the DIP switches should be in the OFF position to ensure a normal operating mode. The NSC-200 is shipped from the manufacturer with a default login that is available for five (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 NSC-200 is commissioned. Open Options recommends not configuring the NSC-200 with an IP address accessible from the public internet.

The NSC-200 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 NSC-200 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 page 3-43 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 NSC-200 communicates to the controller via the on-board 10Base T/100Base-TX Ethernet interface (J1). Connect network cable to the Ethernet port on the NSC-200. It is **NOT** recommended to connect the NSC-200 to a public Intranet.

OSDP Reader Wiring

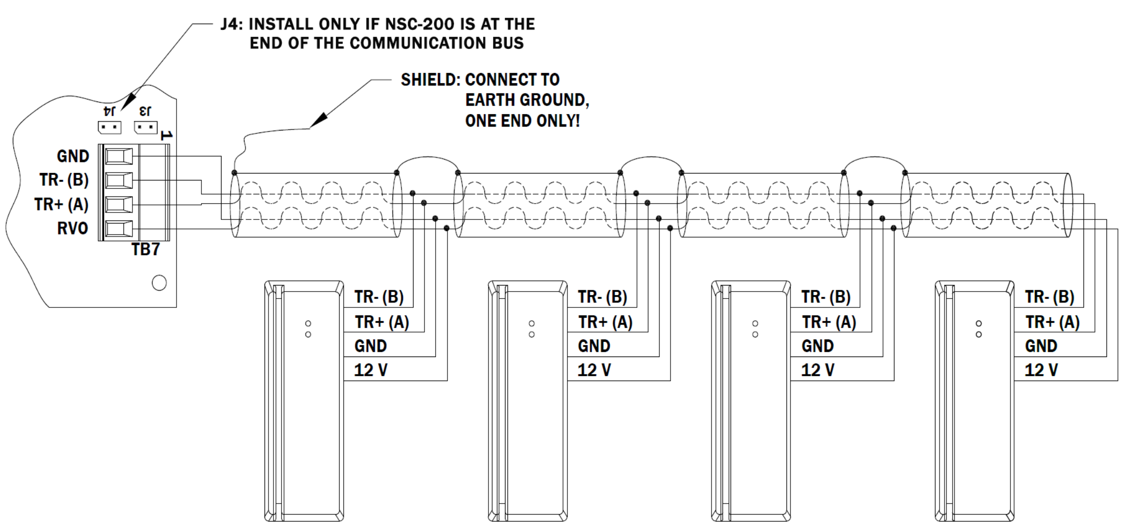
The reader port (TB7) has a 2-wire RS-485 OSDP communication bus connections and 12 Vdc to power the OSDP readers. The 12 Vdc output is limited to a .5 A maximum. The NSC-200 supports up to four (4) OSDP readers using 2-pair cable for data and power. If the 2-pair cable is ineffective in supporting the voltage/ current requirements, a 1-pair cable that meets the requirements must be used for power. See page 3-45 for information on cable requirements.

> *When powering any device(s) by the NSC-200 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 NSC-200 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 two (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

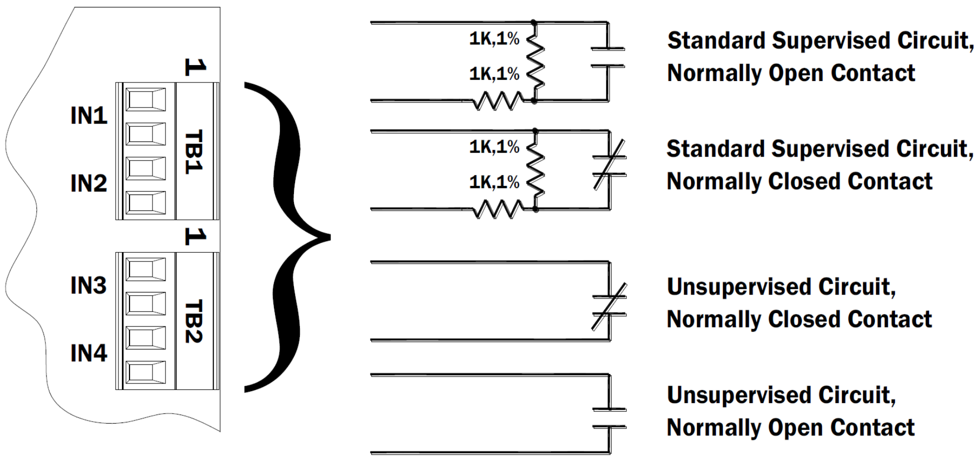
Input Circuit Wiring

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:

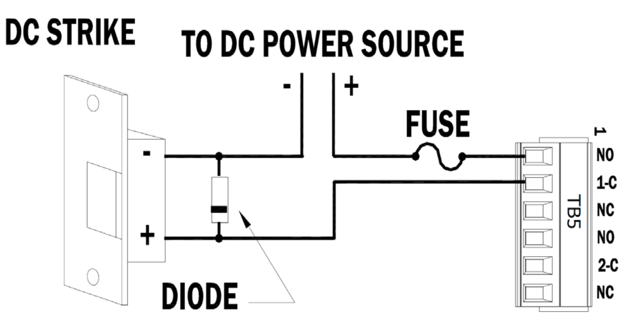


Relay Circuit Wiring

The Four (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 NSC-200 to provide power for a 12 Vdc door strike providing the maximum current is not exceeded. See page 3-45 for specifications.*



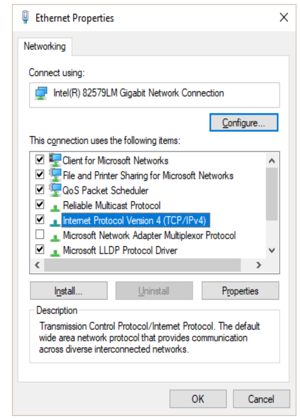
Diode Selection:

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 NSC-200 requires an IP address to be configured. There are two (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 NSC-200.

Direct Connect

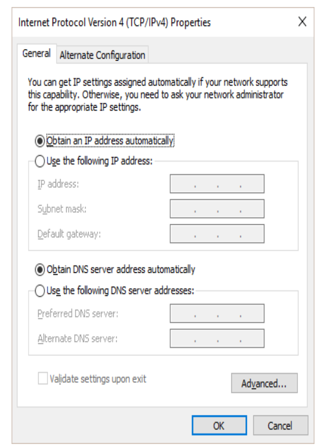


Verify that the computer's IP address is within range of the network device. If the computer is not in range of the NSC-200's IP address (Default: 192.168.0.251), changing the IP range of the computer is required to configure the NSC-200.

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

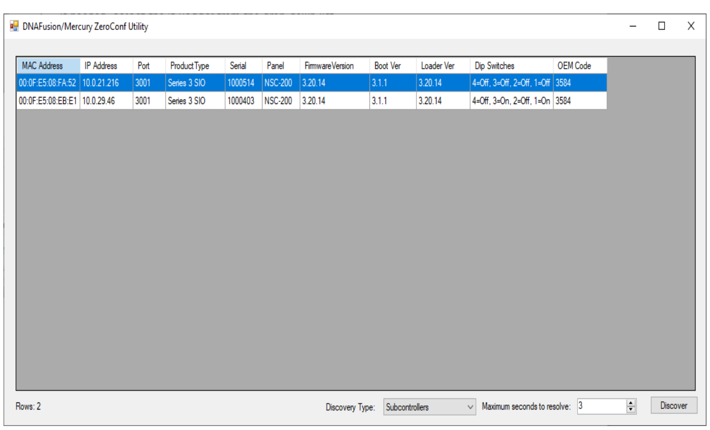
   See page 3-38 for information on Default Settings.
7. **Select** Ok.



MercZeroConf

To discover the desired NSC-200.

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 NSC-200.
   The NSC-200 Configuration Manager opens.
5. **Configure** the IP address.
   See page 3-42 for information on IP configuration.

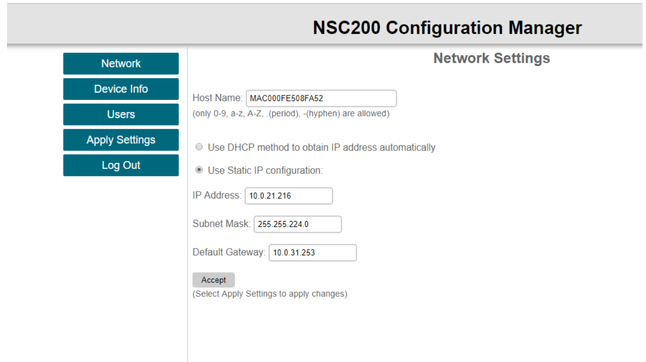
Setting the IP Address

Configure the IP address of the NSC-200 to a predetermined static IP address on the network.

1. **Open** an internet browser (use Internet Explorer for the best result).
2. **Type** the NSC-200'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 NSC-200 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 NSC-200. 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 NSC-200 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 NSC-200 will reboot.

Hardware Setup

DIP Switch Settings

The NSC-200 contains a set of four (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 page 3-38).	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 NSC-200 is at the end of the communication bus.
J5	PoE	NSC-200 powered from the Ethernet connection
	12V	NSC-200 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 NSC-200 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 NSC-200 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.

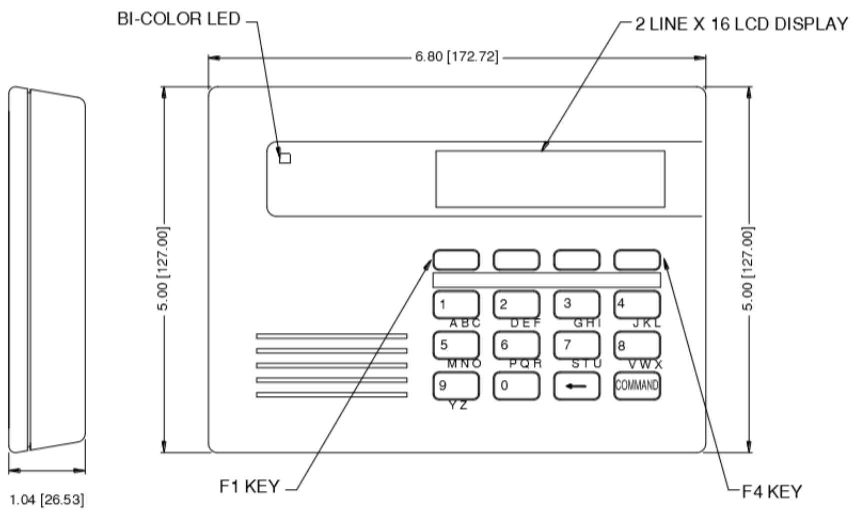
Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294/B.

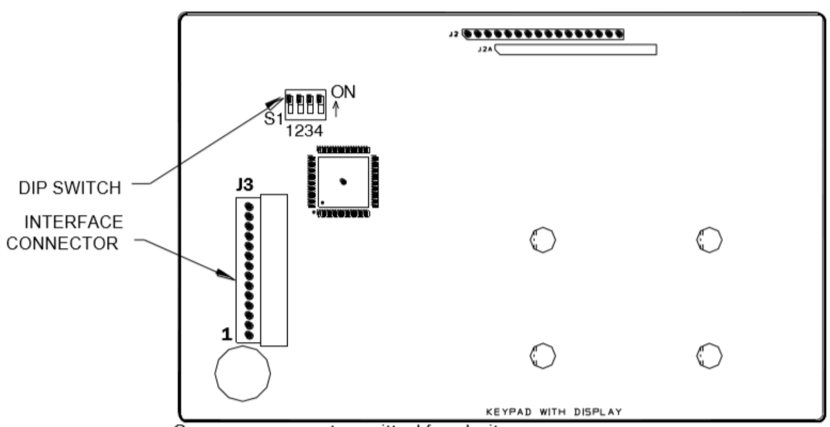
Category 5e cabling is the minimum performance category recommended.

RSC-DT Display Terminal

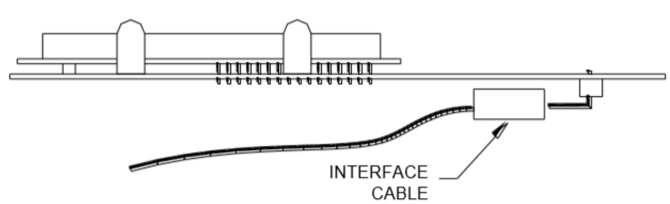
The RSC-DT display terminal integrates a 32-character LED display, a 16-position keypad, and a reader port into a single device. It also includes a 2-wire RS-485 port for direct connection to the access control system.

The backlit display provides a clear view of system information even in challenging conditions. The keypad provides the standard numeric keys along with four (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 RSC-DT 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 page 3-50 for more information.





Some components omitted for clarity



Installation

To install the RSC-DT, follow the steps below:

1. **Plug in** the connector to the pin block.
2. Set the Comm Address.
   See page 3-50 for information about Software Configuration.
3. If applicable, **wire** the on-board reader.
4. **Connect** the power supply.
5. **Configure** the keypad.

NOTES:

Power Supply

The RSC-DT 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.

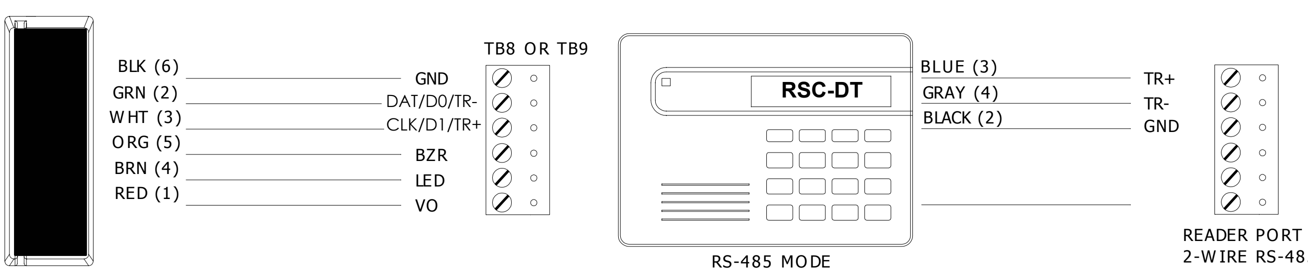
The RSC-DT communicates to the controller via a half-duplex, multidrop RS-485 interface. The total cable length is limited to 4,000 feet (1,219 m). Use 24 AWG cable with shield and characteristic impedance of 120 ohm for the RS-485 interface.

The RSC-DT 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 RSC-DT 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 RSC-DT 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 RSC-DT 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 RSC-DT 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 SSP 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 RSC-DT 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
RSC-1	1	2 (REX & Door Position)	2 (1 Small Relay)	Up to 115,200 bps	12 to 24 Vdc	1 (Cabinet)
RSC-2	2	8	6	Up to 115,200 bps	12 to 24 Vdc	2 (Power/ Cabinet)
NSC-100	2 (Paired Doors)	4	2	Up to 38,400 bps	PoE or 12 Vdc Power Supply	0
NSC-200	4 (OSDP Only)	6	4	Up to 38,400 bps	PoE/PoE+ or 12 Vdc Power supply	0
RSC-DT	2 (1 Keypad & 1 Reader)	0	0	Up to 38,400 bps	12 Vdc	0

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I/O Subcontrollers 4

In This Chapter
√ ISC-16 √ OSC-16

I/O Subcontrollers

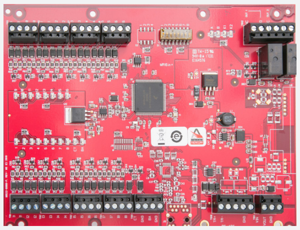
Input/output subcontrollers provide a wide range of application options within the open architecture system; they can be clustered or distributed to best suit each installation environment.

Open Options offers two I/O subcontrollers:

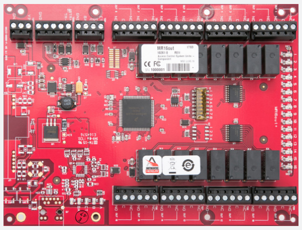
- ISC-16 - A multi-device interface panel dedicated to point control and monitoring; supports 16 programmable input circuits and 2 programmable relay outputs. The ISC-16 is the ideal choice for monitoring high concentrations of inputs combined with low output control requirements.
- OSC-16 - A multi-device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

The ISC-16 and OSC-16 described in this manual are Series 3 models. For information on previous models, refer to the Legacy Hardware Manual.

Input/Output Subcontrollers



ISC-16



OSC-16

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 one (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.

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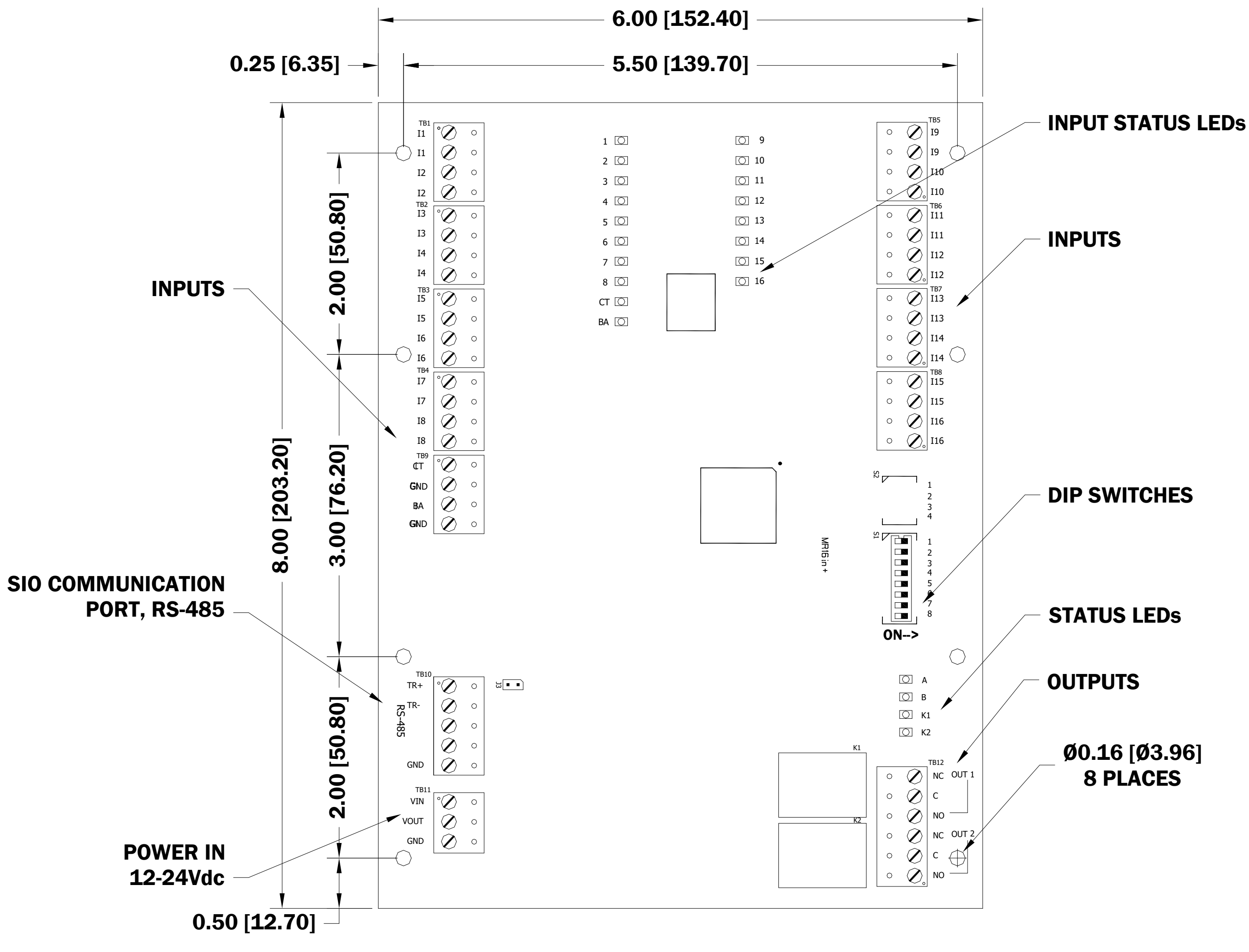
ISC-16 Input Subcontroller

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

The ISC-16 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 ISC-16 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.

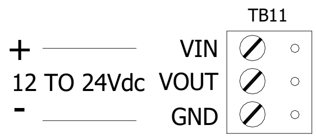
Default Settings

Each ISC-16 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 ISC-16 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.

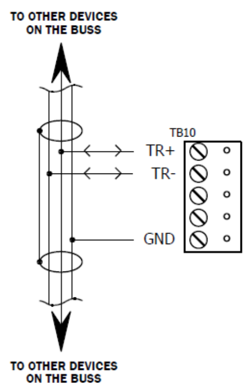


> *Observe polarity on* VIN*; the* VOUT *terminal on* TB11 *is the same as* VIN*.*

Upstream Communication Wiring

The ISC-16 communicates to the intelligent controller (SSP) 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 page 4-8 for jumper settings.

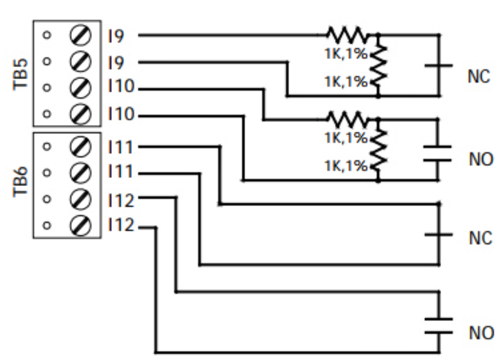


2-WIRE RS-485
(ONLY 2-WIRE RS-485 IS SUPPORTED)

Input Circuit Wiring

The ISC-16 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).

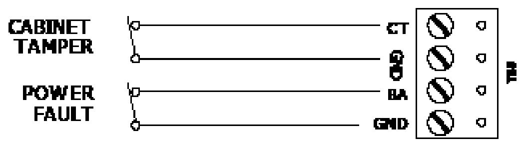
Inputs can be configured as supervised or unsupervised. Supervised inputs require two end-of-line (EOL) resistors in order to facilitate proper reporting. The standard supervised circuit uses 1K ohm, 1% resistors and should be located as close to the sensor as possible. For more information on supervised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

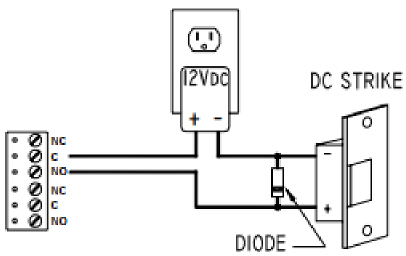


Relay Circuit Wiring

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 OSC-16 board may be needed in addition to the ISC-16.

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

Hardware Setup

The ISC-16 contains an end-of-line termination jumper and a set of eight (8) DIP switches.

DIP Switch Settings

Switches 1 through 5 determine the ISC-16'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 ISC-16.

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 ISC-16.

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 ISC-16 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:

<table>
<tr><th>LED</th><th>Indicator</th><th>State</th></tr>
<tr><td>A</td><td>Online Status (Heartbeat)</td><td>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</td></tr>
<tr><td>B</td><td>SIO Communication Port Status</td><td>ON = Downstream Communication Activity</td></tr>
<tr><td>CT</td><td>Cabinet Tamper</td><td rowspan="2">OFF = Inactive (briefly flashes ON every 3 seconds)
ON = Active (briefly flashes OFF every 3 seconds)
Rapid Flash = Fault</td></tr>
<tr><td>BA</td><td>Power Fault</td></tr>
<tr><td>1-16</td><td>Input I1-I16 Status</td><td>OFF = Inactive (briefly flashes ON every 3 seconds)
ON = Active (briefly flashes OFF every 3 seconds)
Rapid Flash = Fault</td></tr>
<tr><td>K1-K2</td><td>Output 1-2 Status</td><td>ON = Energized</td></tr>
</table>

NOTES:

Specifications

The ISC-16 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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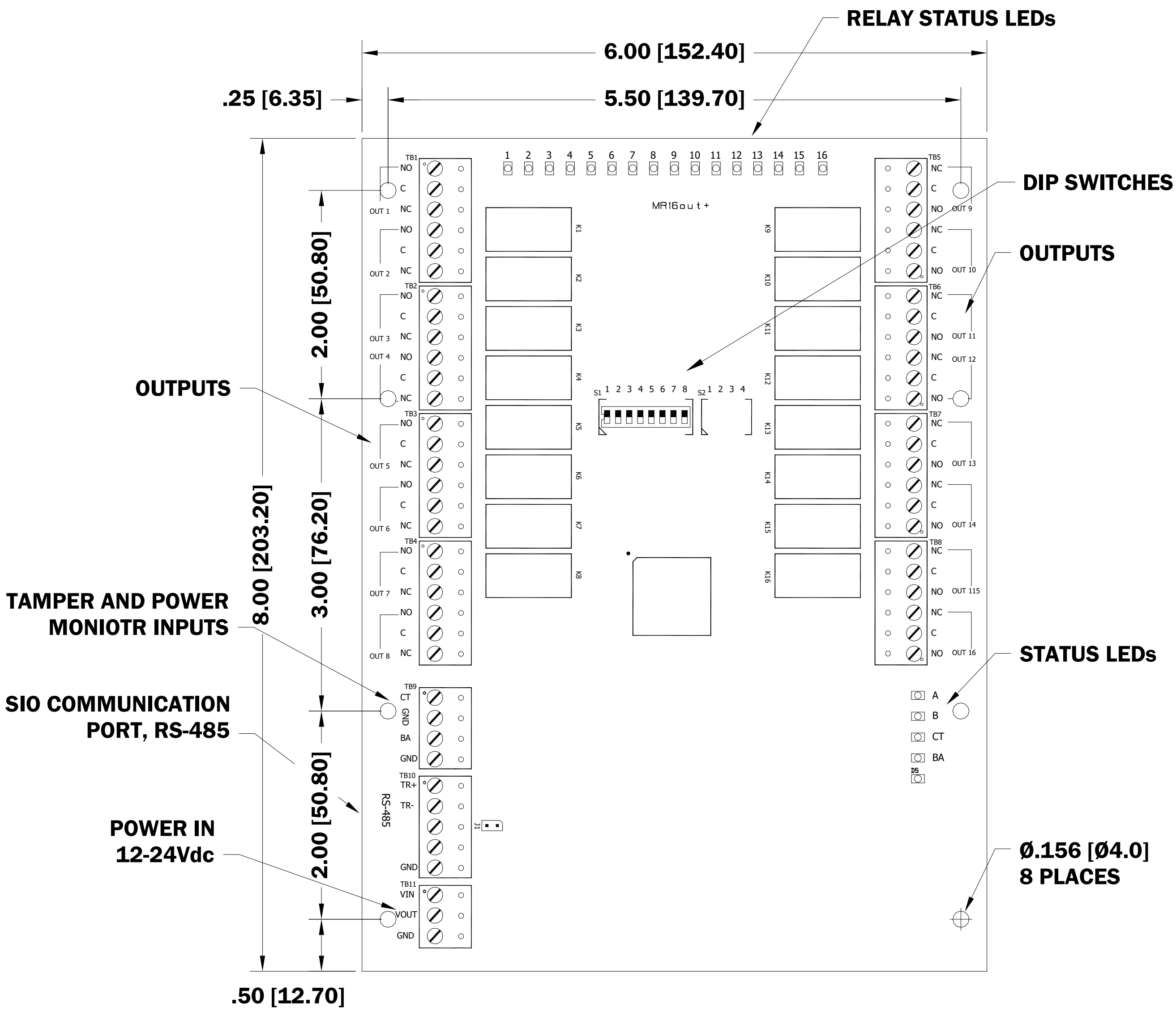
OSC-16 Output Subcontroller

The Series 3 OSC-16 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 OSC-16 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 OSC-16 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.

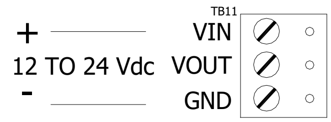
Default Settings

Each OSC-16 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 OSC-16 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.

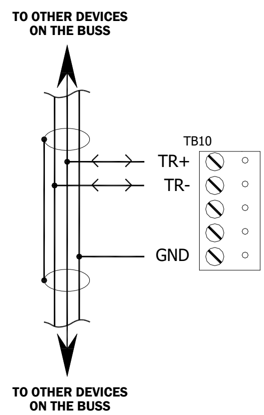


Observe polarity on VIN*; the* VOUT *terminal on* TB11 *is the same as* VIN*.*

Upstream Communication Wiring

The OSC-16 communicates to the intelligent controller (SSP) 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.

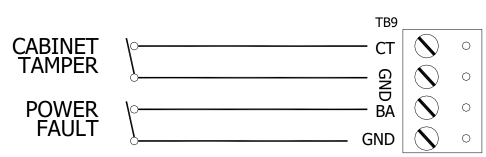
Connect the TR+, TR-, and GND ports on TB10 using twisted-pair cables (min. 24 AWG) with shield and 120 ohm impedance. The J1 termination jumper should only be installed on devices at the end of the RS-485 line. See page 4-18 for jumper settings.



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 ISC-16 board may be needed in addition to the OSC-16.

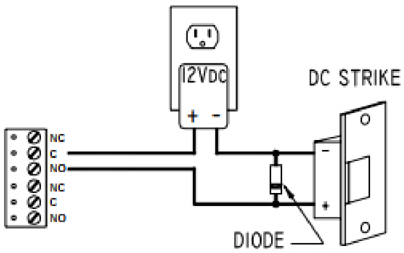
To use this feature, DNA Fusion must be configured for elevators. See page 3-33 in the Technical Installation Manual for more information.

Relay Outputs

Sixteen (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.



<u>Diode Selection:</u>

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 OSC-16 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 OSC-16 contains an end-of-line termination jumper and a set of eight (8) DIP switches.

DIP Switch Settings

Switches 1 through 5 determine the OSC-16'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 OSC-16.

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 OSC-16.

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 OSC-16 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
ISC-16	16	2	Up to 115,200	12 to 24 Vdc	2 (Cabinet/Power)
OSC-16	0	16	Up to 115,200	12 to 24 Vdc	2 (Cabinet/Power)

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Multiplexers 5

In This Chapter

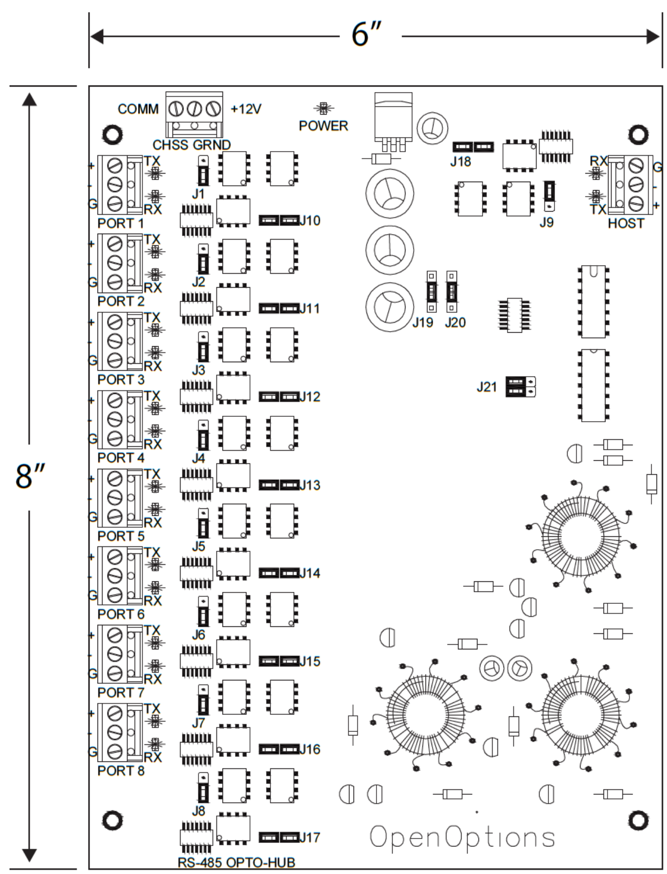
√ OptoHub
√ CI-8
√ Communication Diagram

RS-485 communication multiplexers provide a star topology wiring scheme to easily install and troubleshoot downstream devices.

OptoHub

The OptoHub is the ideal solution for almost any application. In addition to providing a star topology wiring scheme, it also optically isolates each communication port, thereby adding an extra layer of protection and safeguarding the overall integrity of the entire system. The isolation eliminates common problems associated with ground potential that often exist in retrofit applications.

By incorporating star topology, the OptoHub expands a single RS-485 communication channel into eight (8) separate 2-wire RS-485 channels.



Installation

To install the OptoHub:

1. If required, **mount** the OptoHub in an Open Options or Life Safety Power enclosure.
2. **Wire** the upstream host communication.
3. **Wire** the downstream communication.

Default Settings

Each OptoHub board ships with the following default configuration:

- Termination: None
- Baud Rate: 38400

Power Supply

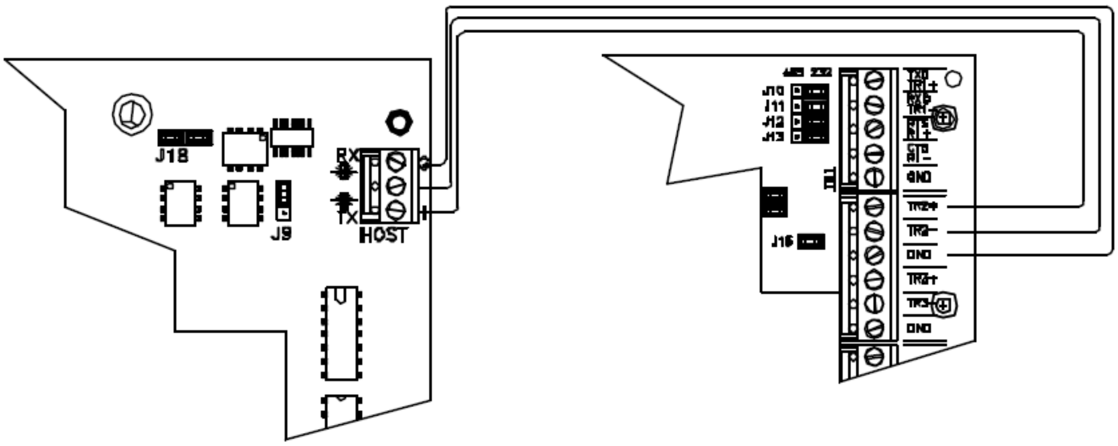
The OptoHub accepts a 12 Vdc ± 15% power source for its power input. The power source should be installed as close to the OptoHub as possible.

Wire the power input at the top of the OptoHub board by connecting the +DC, NC, and GND ports with a minimum 18 AWG twisted-pair cable.

Host Communication Wiring

The upstream host port, located on the right side of the OptoHub board, can be configured as RS-232 or RS-485 by installing the corresponding jumpers (refer to the Jumper Settings table on page 5-4).

Connect the TR+, TR-, and GND ports on the terminal block labeled HOST. The diagram below illustrates the wiring scheme from the SIO port on the SSP controller to the host port on the OptoHub.

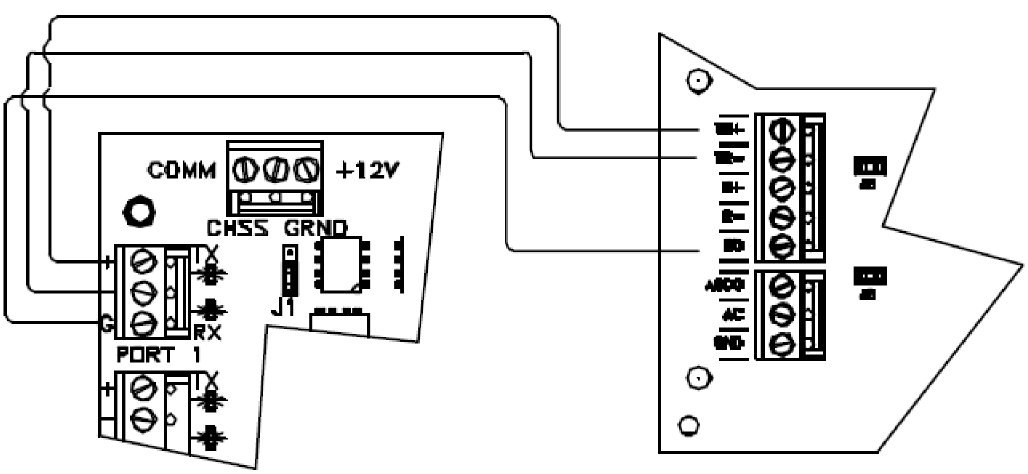


OptoHub **SSP Controller**

Downstream Communication Wiring

The downstream ports (Port 1 through Port 8) are individually isolated for power and data communication. Each port has an option for termination as well as a jumper for disabling the receiving leg of the communication channel to preserve the integrity of the bus. All downstream ports are 2-wire RS-485 (+, -) with a connection for signal ground (G).

Connect the TR+, TR-, and GND wires on Ports 1-8. The diagram below illustrates the wiring scheme from Port 1 on the OptoHub to the communication port on an RSC-2 subcontroller. This wiring scheme is consistent for all downstream ports on the OptoHub and all Open Options subcontrollers.



OptoHub **RSC-2**

Jumper Settings

Use the jumpers on the OptoHub to configure various options on the board. These jumpers enable or disable RX on each port, set RS-485 termination on ports, adjust the baud rate (timing), and configure the host port for RS-232 or RS-485. A physical address is not associated with the OptoHub.

The jumper settings for the OptoHub are described in the table below, and page 5-1 illustrates the physical location of the jumpers in relation to the board.

Jumper(s)	Set At	Selected
J1-J9	TOP	Port RX is Enabled (Factory Default)
	BOTTOM	Port RX is Disabled
J10-J18	ON	RS-485 Termination is ON
	OFF	RS-485 Termination is OFF
J19, J20	TOP	9.6 Kbps
	CENTER	115 Kbps
	BOTTOM	38.4 Kbps
	OFF	230 Kbps
J21	RIGHT	Host Port is RS-232* (J18 must be OFF)
	LEFT	Host Port is RS-485

*Recommended setting (even when communicating to SIO devices at 38.4 Kbps)

Terminal Block Connections

The table below describes the terminal blocks for the OptoHub.

Terminal Block	Description	Connections
Host	Host Communication Port	GND
		TR-
		TR+
Common	Power Input	CHSS
		GRND
Port 1-8	Downstream Communication Ports	TR+
		TR-
		GND

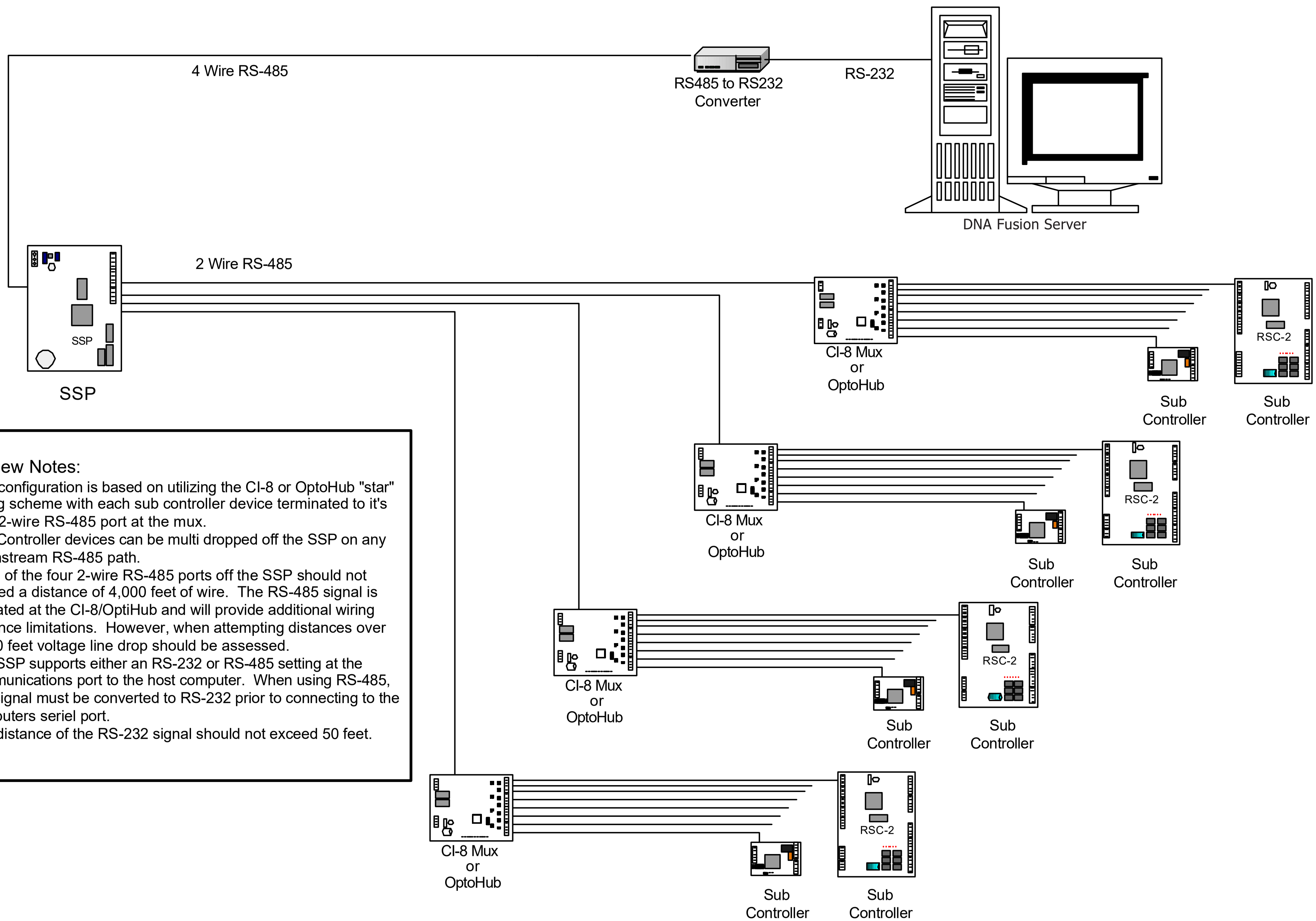
Specifications

Primary Power:	*Voltage:*	12 Vdc ± 15%
	Current:	300 mA max.
Interfaces:	*Host Port:*	RS-232*/RS-485, jumper selectable
	Ports 1-8:	RS-485, transmit/receive
Wire Requirements:	*Power:*	1 twisted pair, 18 AWG min.
	RS-485:	4,000’ (1,200 m) max., 24 AWG min.
	RS-232:	25’ (7.6 m) max., 24 AWG min.
Mechanical:	*Dimensions:*	6” (152 mm) W x 8” (203 mm) L x 1” (25 mm) H
	Weight:	10 oz. (290 g) nominal
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	0 to 95% RHNC

Specifications are subject to change without notice.

*The RS-232 functionality has NOT been evaluated by UL.

Typical SSP to Host Communication Diagram When Using Standard Copper Based Wire Communications



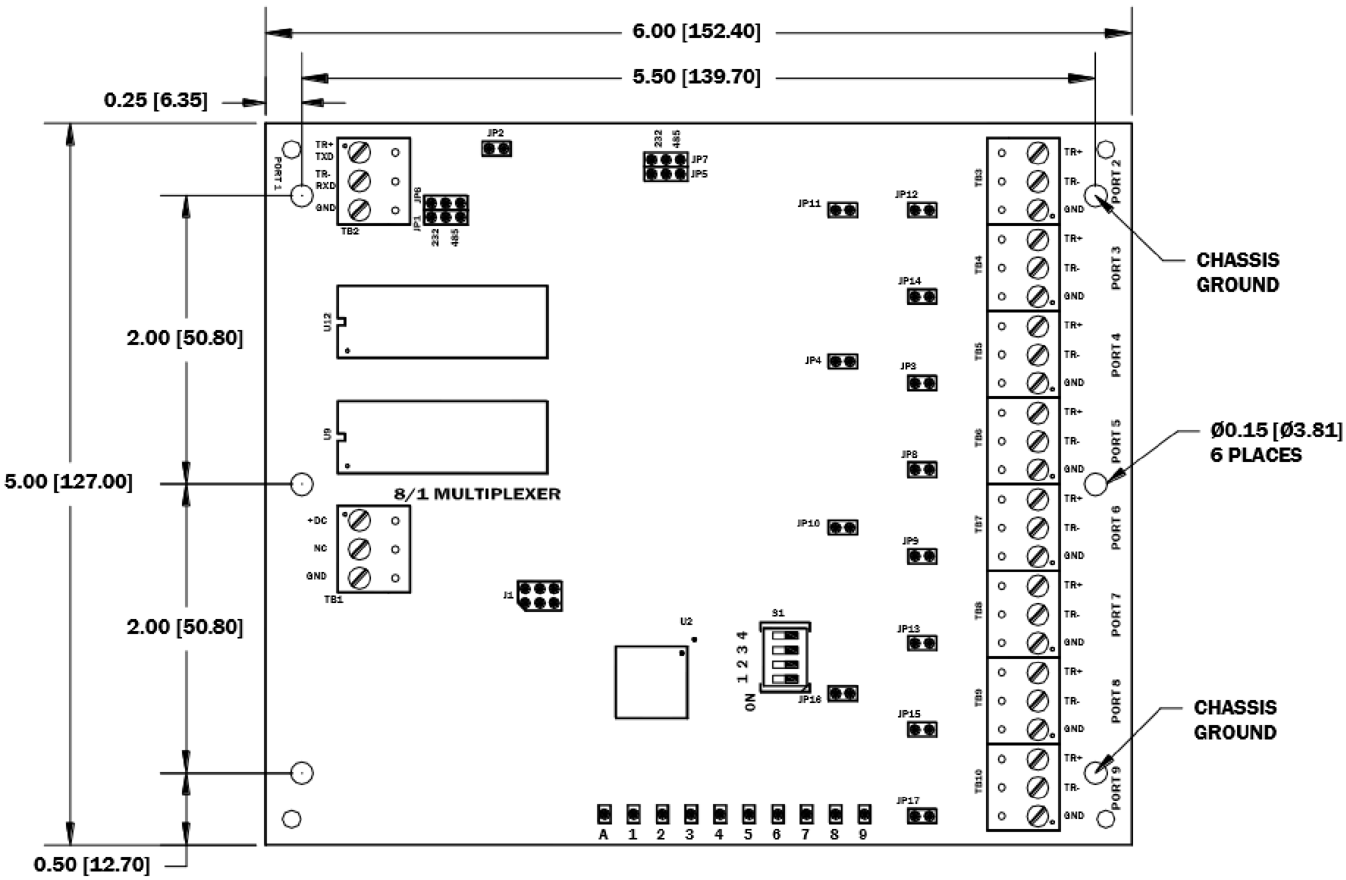
Overview Notes:

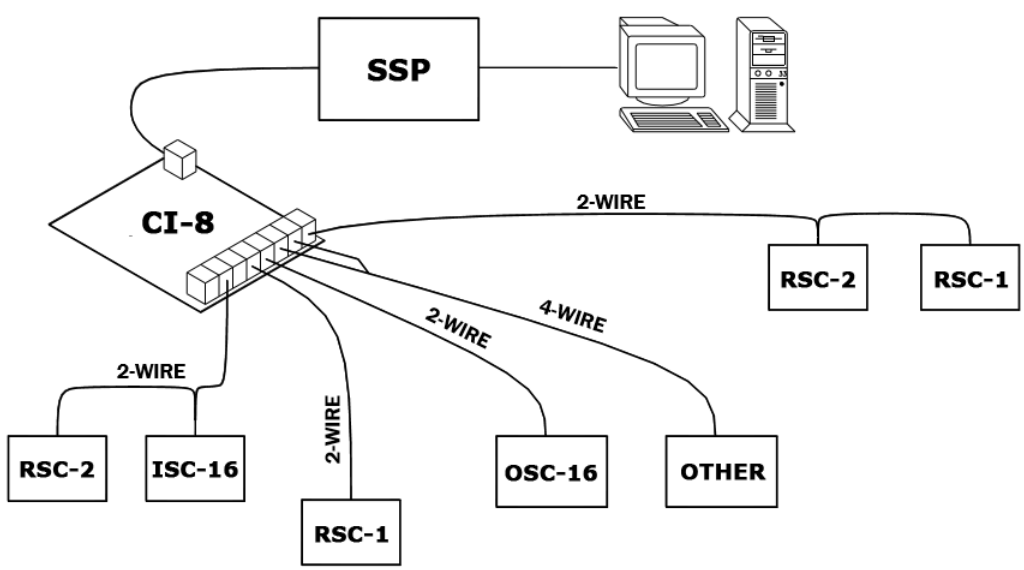
1. This configuration is based on utilizing the CI-8 or OptoHub "star" wiring scheme with each sub controller device terminated to it's own 2-wire RS-485 port at the mux.
2. Sub Controller devices can be multi dropped off the SSP on any downstream RS-485 path.
3. Each of the four 2-wire RS-485 ports off the SSP should not exceed a distance of 4,000 feet of wire. The RS-485 signal is repeated at the CI-8/OptiHub and will provide additional wiring distance limitations. However, when attempting distances over 4,000 feet voltage line drop should be assessed.
4. The SSP supports either an RS-232 or RS-485 setting at the communications port to the host computer. When using RS-485, this signal must be converted to RS-232 prior to connecting to the computers seriel port.
5. The distance of the RS-232 signal should not exceed 50 feet.

CI-8 Multiplexer

The CI-8 multiplexer provides a star topology and is an excellent choice for distributing RS-485 communication to downstream devices where there is little to no danger of ground potential. It allows an SSP to expand a single communication port to eight 2-wire or four 4-wire RS-485 channels. All nine 2-wire channels on the multiplexer are universal in regard to master/slave devices.

The CI-8 interfaces upstream with the SSP controller via RS-232 or RS-485; it interfaces downstream with RS-485 devices (RSC-1, RSC-2, OSC-16, ISC-16) on Ports 2 through 9. Each downstream port can connect to a maximum of eight devices.





Installation

1. If required, **mount** the CI-8 in an Open Options or Life Safety Power enclosure.
2. **Wire** the upstream host communication.
3. **Wire** the downstream communication ports.
4. **Wire** the power input.

Default Settings

Each CI-8 board ships with the following default configuration:

- Termination: None
- Baud Rate: 38400

Power Supply

The CI-8 accepts a 12 Vdc ± 15% power source for its power input. The power source should be installed as close to the CI-8 unit as possible.

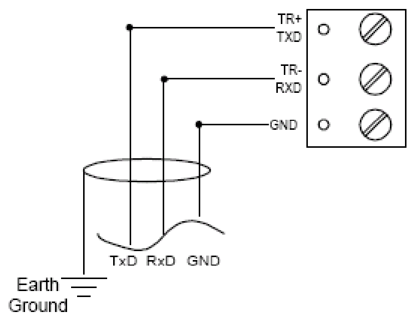
Wire the power input on TB1 by connecting the +DC, NC, and GND ports with a minimum 18 AWG twisted-pair cable.

Host Communication Wiring

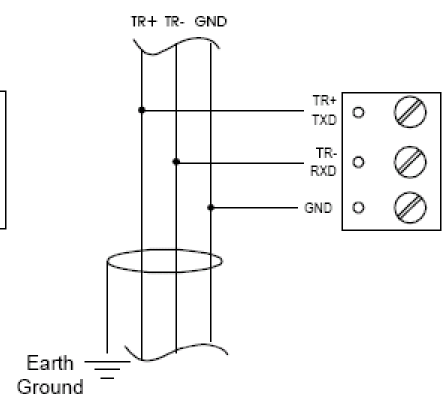
The electrical interface for Port 1 is jumper selectable as RS-232 or RS-485. The CI-8 multiplexer can communicate to one of the SSP controller's downstream ports using 2-wire RS-485 (recommended) or RS-232 to RS-485 converters.

Each downstream port on the host controller can support up to four (4) CI-8 multiplexers within a 1000-ft radius. The controllers are capable of supporting other addressable devices (such as the ISC-16, OSC-16, RSC-1, and RSC-2) on the same port as the CI-8; however, the same distance limitation applies.

2-Wire RS-232



2-Wire RS-485



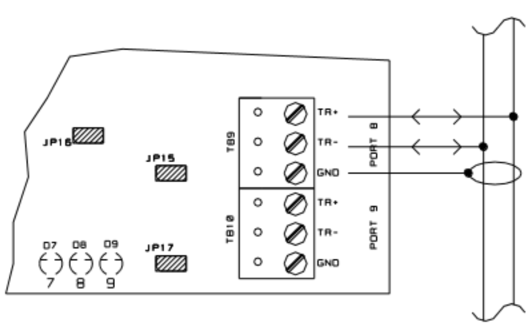
> *If the CI-8 is located at the end of the RS-485 line, an RS-485 terminator is required.*

Downstream Communication Wiring

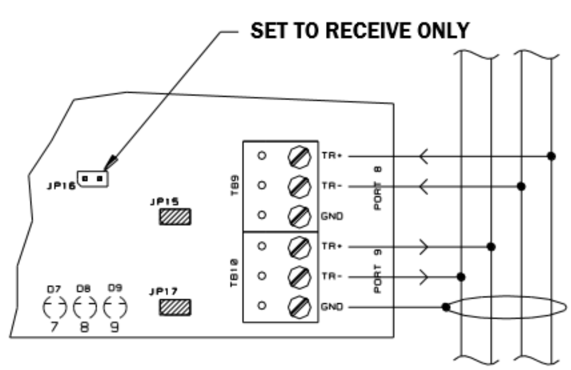
The CI-8 multiplexer implements star topology that is capable of eight (8) downstream directions in a 2-wire RS-485 interface or four (4) downstream directions in a 4-wire RS-485 interface. Each configuration supports up to eight (8) RS-485 devices (RSC-1, RSC-2, ISC-16, or ISC-16) at a maximum wire distance of 4,000 feet.

Ports 2, 4, 6, and 8 can be individually configured as receive-only channels. To set a port as receive-only, remove the corresponding jumper (see Jumper Settings on page 5-11). A 4-wire RS-485 channel can be created by pairing a receive-only channel with another channel.

The following diagram illustrates the typical wiring scheme for a 2-wire and 4-wire RS-485 configuration.



2-WIRE



4-WIRE

NOTES:

DIP Switch Settings

Switches 1 through 4 determine the communication baud rate. A physical address is not associated with the CI-8.

Selection	S1	S2	S3	S4
300 bps	OFF	OFF	OFF	OFF
1,200 bps	ON	OFF	OFF	OFF
2,400 bps	OFF	ON	OFF	OFF
4,800 bps	ON	ON	OFF	OFF
9,600 bps	OFF	OFF	ON	OFF
19,200 bps	ON	OFF	ON	OFF
19,200/38,400 bps	ON	OFF	ON	OFF
34,800 bps	ON	ON	ON	OFF

Jumper Settings

The jumpers on the CI-8 are used to configure various settings on the board.

Jumper(s)	Set At	Selection
JP1, JP5-JP7	232	Port 1 is RS-232
	485	Port 1 is RS-485
JP11	OFF	Port 2 is Receive Only for 4-wire RS-485
	ON	Port 2 is 2-wire RS-485
JP4	OFF	Port 4 is Receive Only for 4-wire RS-485
	ON	Port 4 is 2-wire RS-485
JP10	OFF	Port 6 is Receive Only for 4-wire RS-485
	ON	Port 6 is 2-wire RS-485
JP16	OFF	Port 8 is Receive Only for 4-wire RS-485
	ON	Port 8 is 2-wire RS-485
JP2	ON/OFF	Port 1 RS-485 Termination - DO NOT USE
JP12	ON/OFF	Port 2 RS-485 Termination
JP14	ON/OFF	Port 3 RS-485 Termination
JP3	ON/OFF	Port 4 RS-485 Termination
JP8	ON/OFF	Port 5 RS-485 Termination
JP9	ON/OFF	Port 6 RS-485 Termination
JP13	ON/OFF	Port 7 RS-485 Termination
JP15	ON/OFF	Port 8 RS-485 Termination
JP17	ON/OFF	Port 9 RS-485 Termination

Install the termination jumpers ONLY on panels at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel.

It is recommended that the JP2 *termination jumper not be installed; remove all other termination jumpers on the boards connected to this communication bus.*

Terminal Block Connections

The table below describes the terminal blocks for the CI-8.

Terminal Block	Description	Connections
TB1	Power Input	+DC
		NC
		GND
TB2	Host Port 1	TR+ (TXD)
		TR- (RXD)
		GND
TB3-TB10	Downstream Ports 2-9	TR+
		TR-
		GND

Status LEDs

The status LEDs on the CI-8 board indicate the following information:

LED	Indicator	State
A	Power/CPU (Heartbeat)	Flashing = Normal Steady On = Firmware Problem (Reset Panel) Off = No Power
1	Host Communication Activity (Port 1)	Flashing = Host Activity
2-9	Downstream Communication Activity (Ports 2-9)	Flashing = Port Activity

Specifications

Primary Power:	*Voltage:*	12 to 24 Vdc ± 10%
	Current:	200 mA max.
Interfaces:	*Host Port 1:*	RS-232/RS-485, jumper selectable
	Port 3, 5, 7, 9:	RS-485, transmit/receive
	Port 2, 4, 6, 8:	RS-485, transmit/receive or receive only
Wire Requirements:	*Power:*	1 twisted pair, 18 AWG min.
	RS-485:	24 AWG, 4,000 ft (1,200 m) max., twisted pair(s) with shield
	RS-232:	24 AWG, 50 ft (15 m) max.
Mechanical:	*Dimensions:*	5” (127 mm) L x 6” (15.2 mm) W x 1” (25 mm) H
	Weight:	4 oz. (180 g) nominal
Environmental:	*Temperature:*	0 to 70 °C, operating / -55 to +85 °C, storage
	Humidity:	0 to 95% RHNC

Specifications are subject to change without notice.

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Power Distribution 6

In This Chapter
√ ESD SPS-20 Power Supply √ ESD SPS-10 Power Supply √ AQS 1210 Power Supply √ PDD-8PCI Power Distribution √ PDB-8C1R

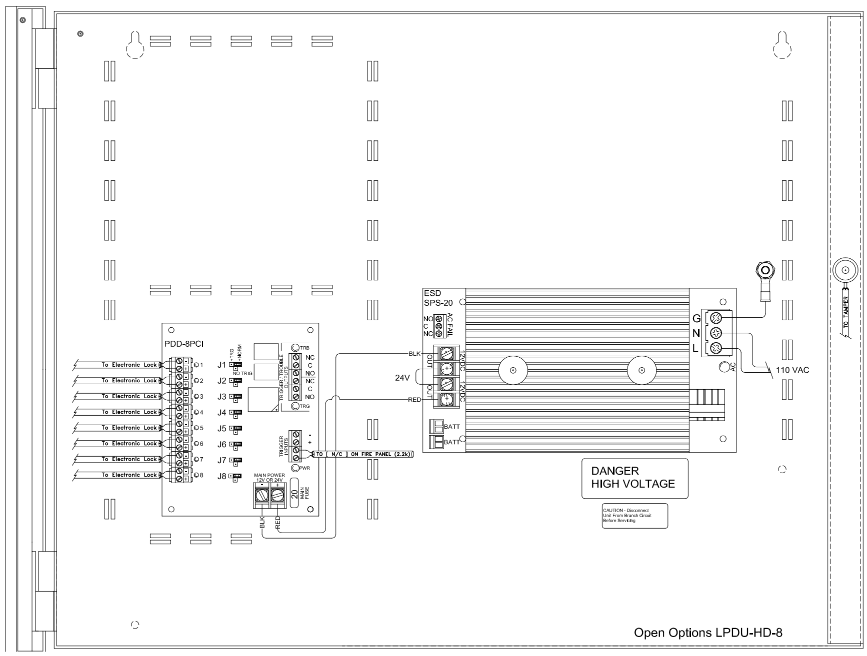
The Open Options Power Distribution Unit (PDU) is an enclosure assembly that delivers consistent, power-limited DC voltage to a wide range of field devices and equipment. It is comprised of a supervised power supply (SPS-20, SPS-10 or the AQS 1210) and power distribution device (PDD-8PCI or PDB-8C1R). The PDU offers a choice of 8 or 16 power outputs as well as a choice of 12 or 24 Vdc power supply.

The PDU accepts 110/240 volts of AC power. The 12 Vdc battery charger and supplied cables provide an uninterrupted power supply when connected to standby batteries (not included).

General Installation Guidelines

The following guidelines are best practices for installing a PDU:

- The PDU is intended for indoor installations only.
- AC mains can be connected to the flying leads provided with the PDU; however, the ground lead must be connected directly to the grounding lug, as splices are not permitted on ground bonding leads.
- All electrical connections must be made in accordance with NFPA 70, National Electrical Code (NEC).
- Power-limited cabling must be kept separate from AC mains.
- The tamper switch should be connected to an input on the access control system to provide tamper detection.
- The relay output may be used in a similar manner to indicate a power supply malfunction to the system.



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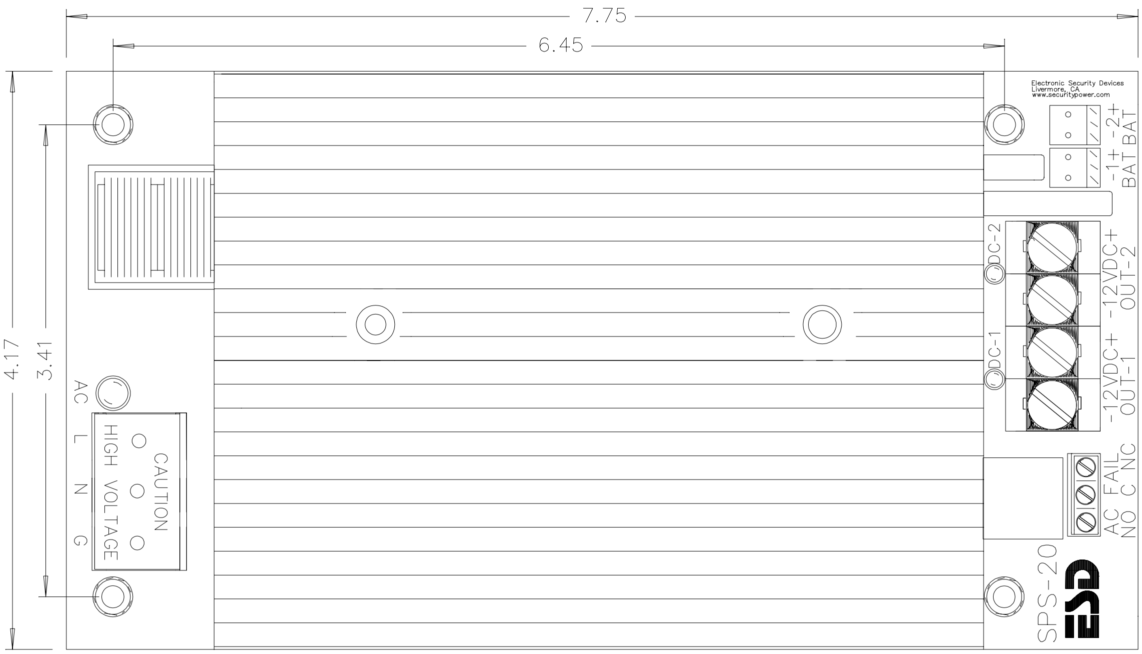
ESD SPS-20 Power Supply

The SPS-20* supervised power supply with battery charger consists of two high-powered, fully isolated, and independent power supplies, Each power supply (OUT-1 and OUT-2) is a nominal 12 Vdc at 10 amps with 12 V lead acid battery charger. The outputs can be used as separate isolated 12 Vdc power supplies, or they can be connected in parallel or series to provide 12 Vdc, 24 Vdc, or both.



Height from base of PCB to Top of Heat Sink: 2.79”

* This board is a UL-recognized component.

AC Input

The SPS-20’s AC input terminal is marked High Voltage Line (L), Neutral (N), and Ground (G). The G terminal must connect to earth ground.

The terminal block and AC LED are mounted within a high-voltage barrier. The terminal block is self-clamping and accepts wires from 12 AWG to 18 AWG. The green LED adjacent to the terminals is ON when AC power is applied.

The AC input default is 120 Vac. The SPS-20 can be provisioned for 240 Vac when ordered, or the PCB trace on the bottom of the board labeled “CUT 240” can be cut. Once cut, the board can not be reprovisioned for 120 Vac.

> **!** *Do NOT apply 240 Vac when the SPS-20 is set for 120 Vac; this will damage the unit and void the warranty.*

AC Status Relay

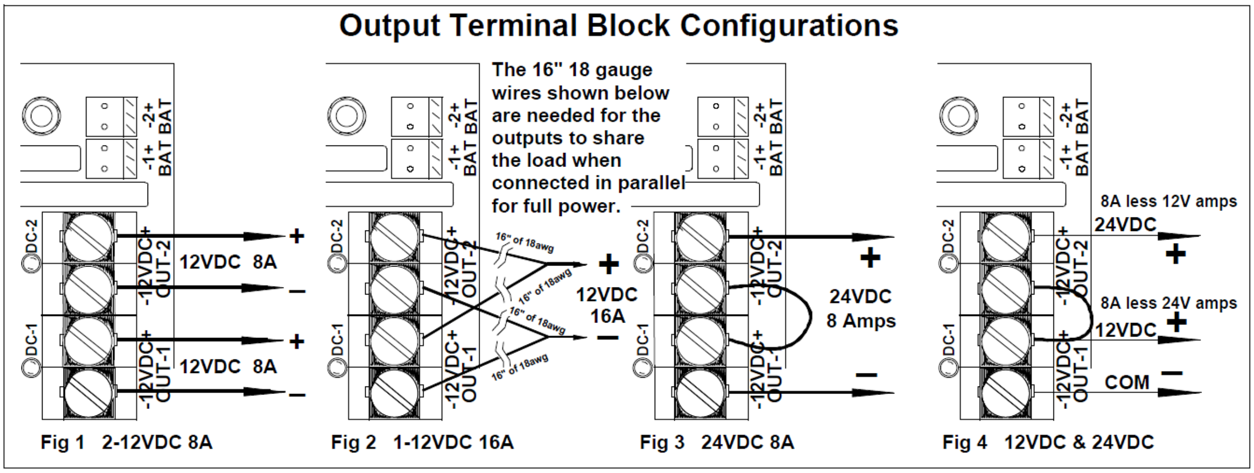
Power trouble terminals are marked NO (Normally Open), C (Common), and NC (Normally Closed). The normal relay position indicates that the output power is in the normal range and the relay is energized. The contacts are rated for up to 120 volts and 2 A resistive load.

DC Outputs

The SPS-20's DC output terminals, marked DC-1 and DC-2, have a continuous rating of 12 Vdc at 8 amps per output. The red LED adjacent to the terminal block is ON when output voltage is present.

When outputs 1 and 2 are connected in parallel, the output is 13.75 Vdc at 20 amps. When outputs 1 and 2 are connected in series, the output is 27.5 Vdc at 10 amps. Because each output is independently regulated, additional current may be drawn from the 12 V output 1 while simultaneously using the 24 Vdc output. The 12 V current must be subtracted from the 10 amps available on the 24 Vdc.

The figures below illustrate the configuration options for DC outputs.



> *Do not use series or parallel connections for the batteries or prior to circuit breaker protection. Connections should be made at the outputs as shown above. If you are connecting parallel jumpers (figure 2), the jumpers must be 16" of 18 AWG wires to add a little resistance so both outputs can share the load.*

Battery Standby

Two 12" battery cable assemblies are provided. These assemblies plug from the SPS-20 to the battery by connecting the red (+) 12 Vdc and the black (-) negative.

In standby mode, each battery is limited to 8 amps of continuous current. When both outputs are connected in parallel and the standby current will be greater than 8 amps, two batteries must be used: one connected to the battery 1 terminal and one connected to the battery 2 terminal.

> *Paralleling cables on the batteries (*BAT 1/BAT 2*) will not double the current.*

Battery Selection

The table below provides typical standby times (in hours) for various loads and batteries. The table works for either 12 Vdc or 24 Vdc. Use the table below to determine the correct battery size.

Total Output Amps	4 Ah Battery Standby	7 Ah Battery Standby	12 Ah Battery Standby	24 Ah Battery Standby	40 Ah Battery Standby
.5 A	5.5 Hrs	12 Hrs	20 Hrs	40 Hrs	65 Hrs
1 A	2.5 Hrs	5 Hrs	9 Hrs	19 Hrs	32 Hrs
1.3 A	2 Hrs	4 Hrs	7.2 Hrs	15.5 Hrs	24 Hrs
2 A	1 Hrs	2 Hrs	5 Hrs	10 Hrs	15 Hrs
3 A	.5 Hrs	1 Hrs	3 Hrs	6 Hrs	9.5 Hrs
4 A	.5 Hrs	.8 Hrs	2 Hrs	4 Hrs	8 Hrs
5 A	N/A	.6 Hrs	1.4 Hrs	3 Hrs	7 Hrs
6 A	N/A	.4 Hrs	1 Hrs	2 Hrs	4 Hrs

* Approximate battery standby time with a reserve of 3 amps for 5 minutes of alarms.

Maintenance

The power supply and standby batteries should be tested at least once a year.

1. **Verify** that the LEDs are in the normal state.

   AC Input LED = ON (Green)

   DC Output 1 & 2 LEDs = ON (Red)

2. **Check** the output voltage with a normal load.

   DC Output 1 & 2 = Between 13.60 and 13.80 Vdc

3. **Disconnect** the AC input.

   AC Input LED = OFF

   DC Output 1 & 2 LEDs = ON

4. **Verify** that DC Outputs 1 & 2 have a reading above 12 Vdc.

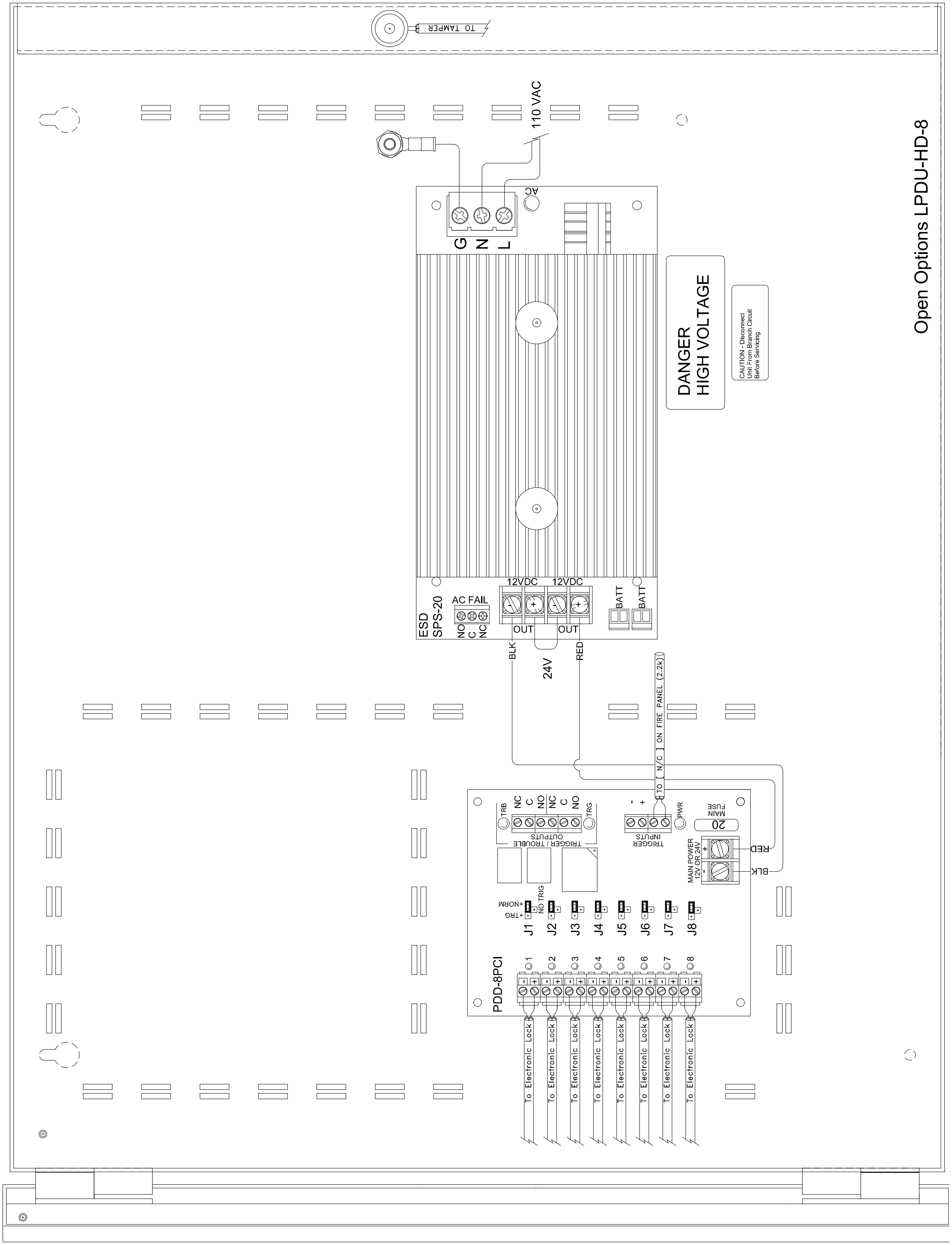
   This step verifies that the standby batteries are operational. Sealed, lead acid batteries typically have a 3- to 5-year lifespan.

5. **Reapply** AC power and **verify** that the AC LED is ON.

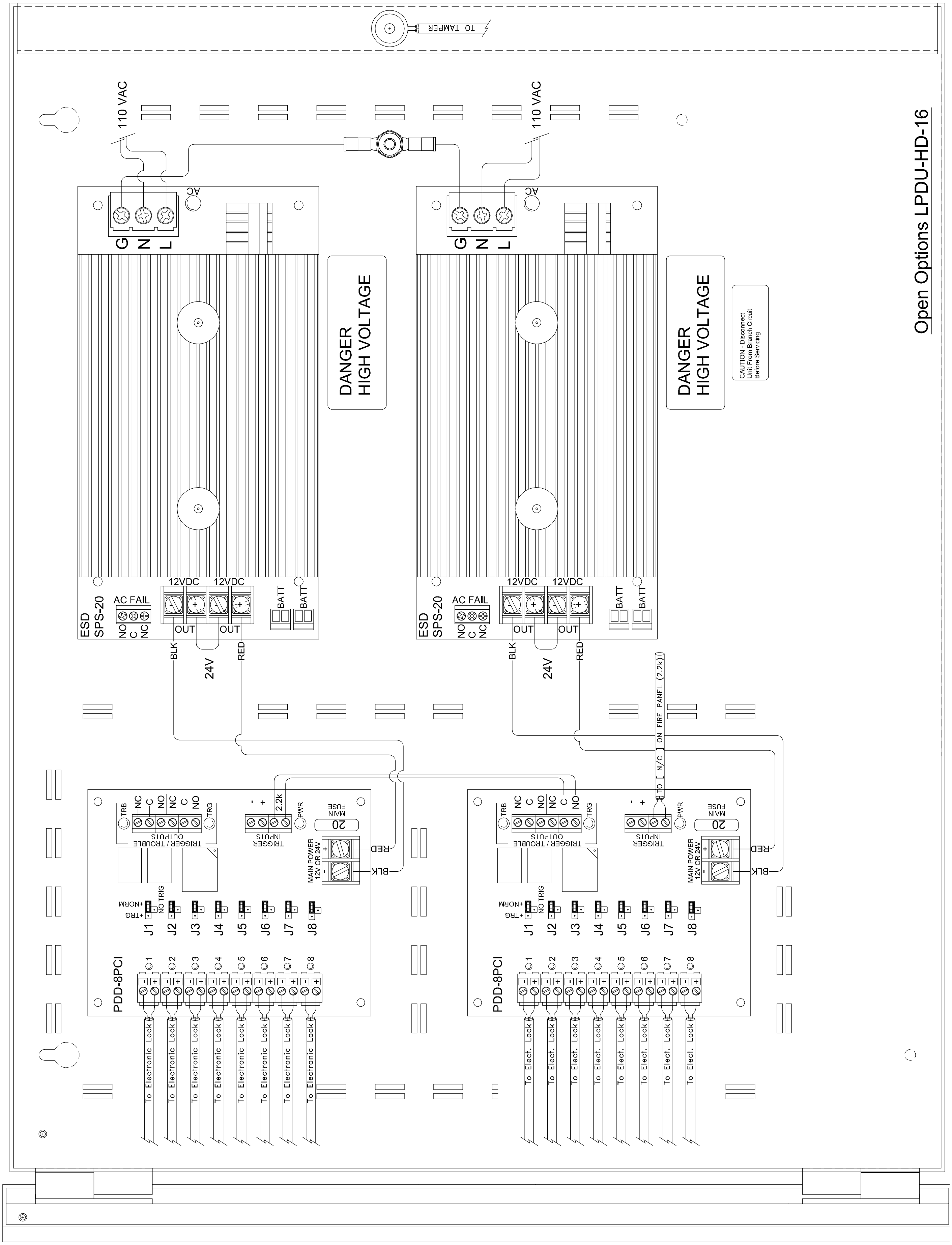
Status LEDs

The status LEDs on the SPS-20 indicate the following information:

LED	Indicator	State
AC	Green LED (Next to AC input terminal strip)	ON = AC applied OFF w/ AC power = Catastrophic failure
DC	Red LED (Adjacent to each output pair)	ON = Output voltage is present



Open Options LPDU-HD-8
TO TAMPER
110 VAC
AC
G
N
L
DANGER
HIGH VOLTAGE
CAUTION - Disconnect
Unit From Branch Circuit
Before Servicing
ESD
SPS-20
AC FAIL
NO
C
NC
12VDC
OUT
BATT
BLK
RED
24V
TO N/C ON FIRE PANEL (2.2k)
PDD-8PCI
TRB
TRG
OUTPUTS
TRIGGER / TROUBLE
TRIGGER
INPUTS
PWR
MAIN
FUSE
20
MAIN POWER
12V OR 24V
+TRG
+NORM
NO TRIG
J1
J2
J3
J4
J5
J6
J7
J8
To Electronic Lock


Open Options LPDU-HD-16
TO TAMPER
110 VAC
110 VAC
G N L
AC
DANGER
HIGH VOLTAGE
DANGER
HIGH VOLTAGE
CAUTION - Disconnect
Unit From Branch Circuit
Before Servicing
ESD
SPS-20
AC FAIL
NO C NC
12VDC 12VDC
OUT OUT
BATT BATT
BLK
RED
24V
TO [N/C] ON FIRE PANEL (2.2k)
PDD-8PCI
TRB
TRG
NC C NO NC C NO
TRIGGER / TROUBLE OUTPUTS
TRIGGER INPUTS
2.2k
PWR
MAIN FUSE
20
MAIN POWER 12V OR 24V
RED
BLK
+TRG +NORM
NO TRIG
J1 J2 J3 J4 J5 J6 J7 J8
1 2 3 4 5 6 7 8
To Electronic Lock
To Elect. Lock

NOTES:

Specifications

The SPS-20 interface is for use in low-voltage, Class 2 circuits only.

AC Input:	*120 Vac:*	90-132 Vac / 47-63 Hz / 400 W
	240 Vac:	133-250 Vac / 47-63 Hz / 400 W
DC Outputs:	*Continuous:*	12 Vdc @ 8 A each
	Typical Output:	13.72 Vdc each
	Individual:	12 Vdc @ 10 A max.
	Parallel:	13.75 Vdc @ 20 A max.
	Series:	27.5 Vdc @ 10 A max.
AC Status Output:	*AC Fail "C" Contacts*	2 A/120 Vac
Battery:	*Lead Acid:*	12 V, 4 Ah-100 Ah
	Recharge 1 & 2:	13.72 Vdc @ 2 A max.
	Recharge 1 & 2 PTC:	1.04 A
	Discharge 1 & 2 PTC:	8 A
	Reverse Hookup Protection:	Yes
Mechanical:	*Dimensions:*	7.75" L x 4.17" W x 3.23 H (height includes 7/16" standoffs)
	Weight:	2.4 lbs
Environmental:	*Temperature:*	-30 to 130 °C, operating -60 to 190 °C, storage

Specifications are subject to change without notice.

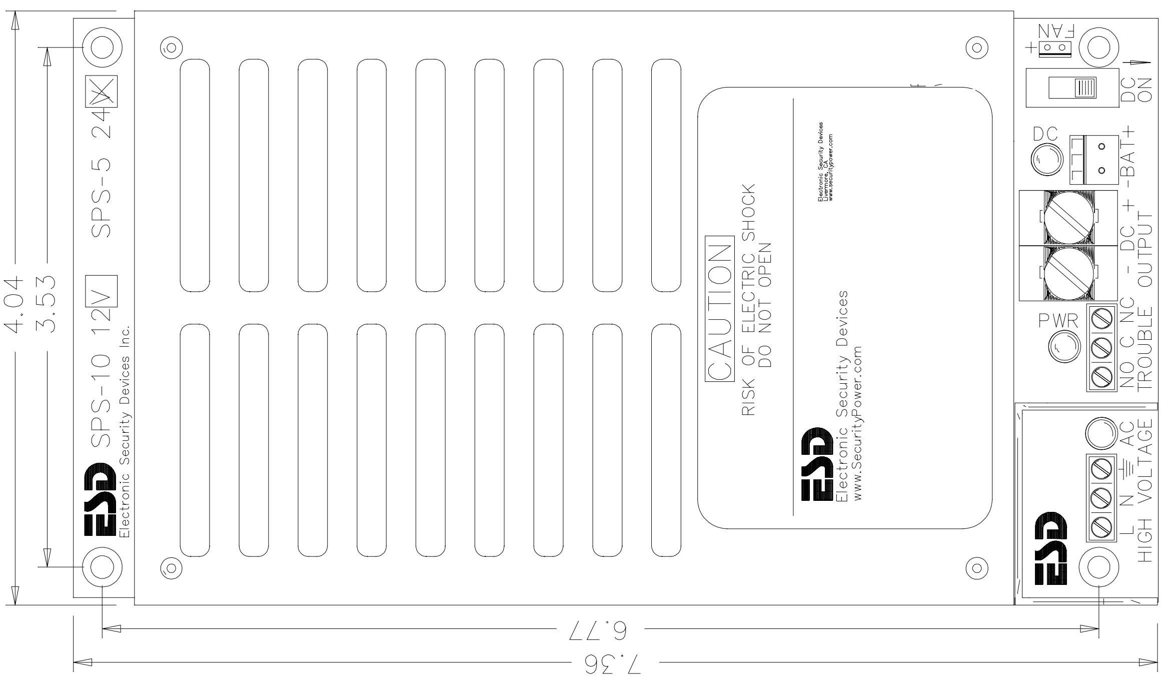
NOTES:

ESD SPS-10 Power Supply

The SPS-10 is a heavy-duty, low-frequency, offline switching power supply with a battery charger and power supervision. The SPS-10 output is nominal 12 Vdc at 10 amps with a 12 V lead acid battery charger. The power supply uses a very low switching frequency of 23 KHz. This, coupled with extensive filtering, provides a balance of super clean power and efficiency. The low-frequency design also eliminates interference problems with card readers and can be used wherever a linear power supply is required.

The SPS-10 is self-contained with a universal line input of 85 to 264 Vac. It becomes an uninterruptible power supply when a stand-by battery is connected with the supplied cables. The cables have a special power-limiting circuit that allows the batteries to float charge across the output without lock-up or chirping on and off. The battery is protected with an automatic resetting circuit breaker, a diode for overcurrent, and accidental reversed battery connections.

There is no switchover or voltage drop when power fails. Standby batteries can be any capacity between 4 and 40 amp hours. The precise output voltage provides longer battery life. The SPS-10 is rated for 8 amps continuous current with 2 amps reserved for charging the battery(s).



AC Input

The SPS-10's AC input terminal is marked High Voltage Line (L), Neutral (N), and Ground (G). The G terminal must connect to earth ground.

The terminal block and AC LED are mounted within a high-voltage barrier. The terminal block is self-clamping and accepts wires from 12 AWG to 18 AWG. The green LED adjacent to the terminal is ON when AC power is applied.

Power Supervision

The SPS-10 includes a battery cutoff relay and a separate power trouble alarm relay. The battery cutoff relay removes the battery from the load when the battery reaches its service limit. This prevents damage to the battery from deep discharge*. The power trouble alarm relay, a Form C contact, can be used to signal a buzzer and/or other signaling device. The relay is normally energized for fail-safe operation.

The power trouble terminal is marked NO (Normally Open), C (Common), and NC (Normally Closed). The normal relay position indicates that the output power is in the normal range and the relay is energized. The contacts are rated for up to 2 A resistive load and 120 volts.

A service switch is provided to disable the power output. When the switch is turned off, the power supply is electronically disabled and the battery cutoff relay is de-energized to remove battery power from the output terminal.

*A typical gel cell battery will need to be replaced if left in deep discharge for more than a couple of days.

DC Outputs

The SPS-10's DC output terminal is marked -DC+ and has a continuous rating of 12 Vdc at 8 amps, reserving 2 amps for battery charging. The terminal block is self-clamping and accepts wires from 10 AWG to 24 AWG. The red LED adjacent to the terminal is ON when output voltage is present.

The SPS-10 output is not Class 2 power-limited. The DC output is fed to a PD-10 fuse board. The spacing of power-limited wires to non-power limited wires must be kept at a minimum of 0.25".

Battery Standby

The battery connector, a .156" 2-position header with lock, is marked -BAT+. A 12" battery cable assembly is provided. The assembly connects the SPS-10 to the battery by connecting the red (+) 12 Vdc and the black (-) negative.

The battery charger is precision set to float charge to 12 V or 24 V sealed or wet lead acid batteries. The amp hour capacity must be between 4 Ah to 40 Ah.

Battery Selection

The table below provides typical standby times (in hours) for various loads and batteries. Use the table below to determine the correct battery size.

Total Output Amps	4 Ah Battery Standby	7 Ah Battery Standby	12 Ah Battery Standby	24 Ah Battery Standby	40 Ah Battery Standby
.5 A	6.5 Hrs	13.2 Hrs	23.5 Hrs	47.5 Hrs	79.5 Hrs
1 A	3 Hrs	6.3 Hrs	11.7 Hrs	23.7 Hrs	39.7 Hrs
2 A	1.3 Hrs	2.5 Hrs	5.5 Hrs	11.2 Hrs	19.7 Hrs
3 A	.7 Hrs	1.5 Hrs	3.6 Hrs	7.2 Hrs	13 Hrs
4 A	.5 Hrs	1 Hrs	2.3 Hrs	5 Hrs	9.6 Hrs
5 A	N/A	.8 Hrs	1.7 Hrs	3.7 Hrs	7.4 Hrs
6 A	N/A	.6 Hrs	1.3 Hrs	3 Hrs	5.5 Hrs
7 A	N/A	N/A	1.1 Hrs	2.2 Hrs	4.4 Hrs
8 A	N/A	N/A	.8 Hrs	1.8 Hrs	3.4 Hrs

* Approximate battery standby time with a reserve of 3 amps for 5 minutes of alarms.

Maintenance

The power supply and standby battery(s) should be tested at least once a year.

1. **Verify** that the LEDs are in the normal state.

   AC Input LED = ON (Green)

   DC Output LED = ON (Red)

2. **Check** the output voltage with a normal load.

   DC Output = Between 13.60 and 13.85 Vdc

   This ensures power voltage to float charge batteries.

3. **Disconnect** the AC input.

   AC Input LED = OFF

   DC Output LED = ON

4. **Verify** that the DC Output has a reading above 12 Vdc.

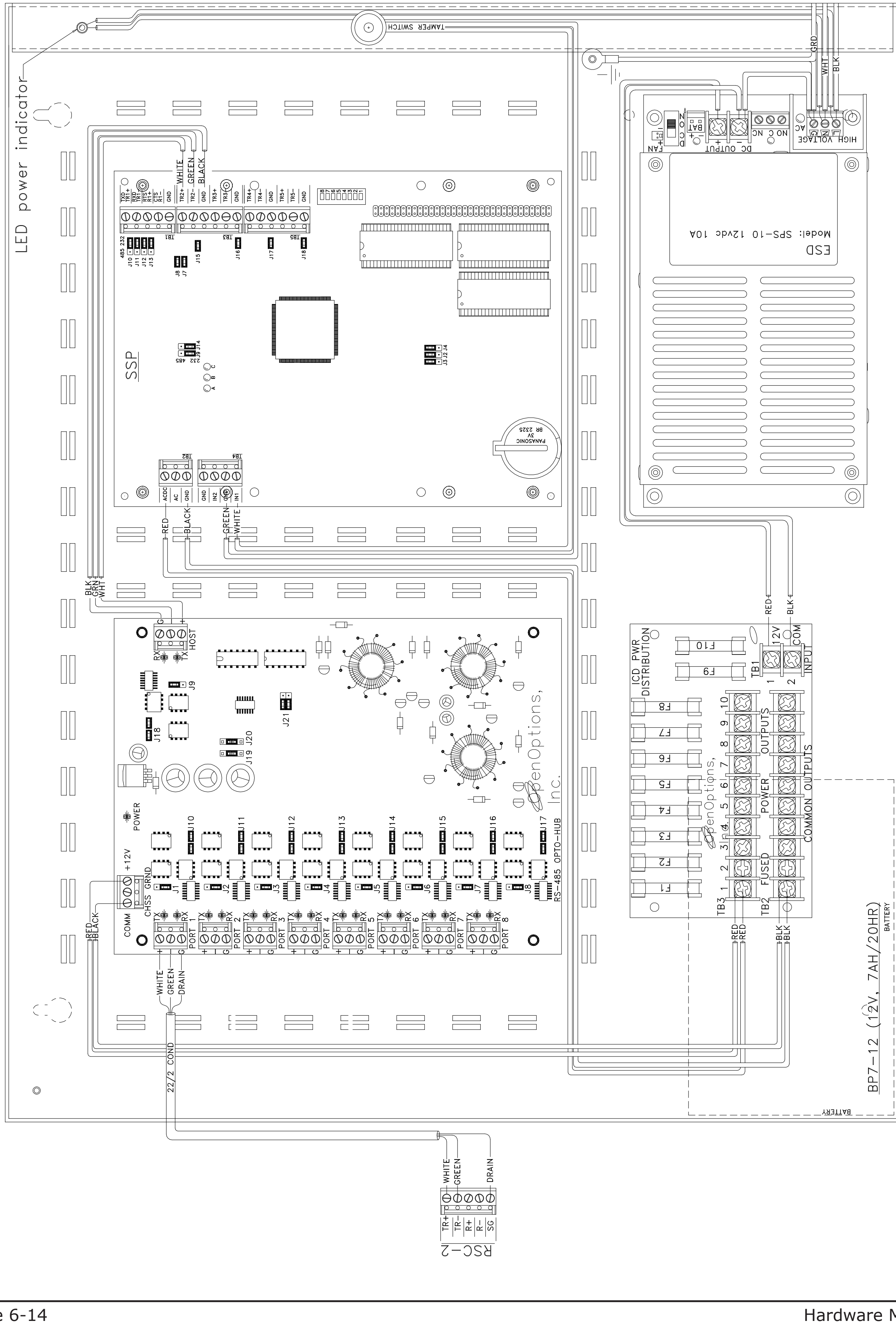
   This step verifies that the standby batteries are operational. Sealed, lead acid batteries typically have a 3- to 5- year lifespan.

5. **Reapply** AC power and **verify** that the AC LED is ON.

Status LEDs

The status LEDs on the SPS-10 indicate the following information:

LED	Indicator	State
AC	Green LED (Next to AC input terminal strip)	ON = AC applied OFF w/ AC power = Catastrophic failure
DC	Red LED (Adjacent to each output pair)	ON = Output voltage is present


LED power indicator
TAMPER SWITCH
SSP
WHITE
GREEN
BLACK
RED
BLK
GRN
WHT
GRD
ESD
Model: SPS-10 12vdc 10A
DC OUTPUT
HIGH VOLTAGE
AC
FAN
ICD PWR DISTRIBUTION
INPUT
12V
COM
TB1
TB2
TB3
FUSED POWER OUTPUTS
COMMON OUTPUTS
BP7-12 (12V, 7AH/20HR)
BATTERY
HOST
RS-485 OPTO-HUB
POWER
COMM
CHSS GRND
+12V
PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
PORT 7
PORT 8
DRAIN
22/2 COND
RSC-2
TR+
TR-
R+
R-
SG

Specifications

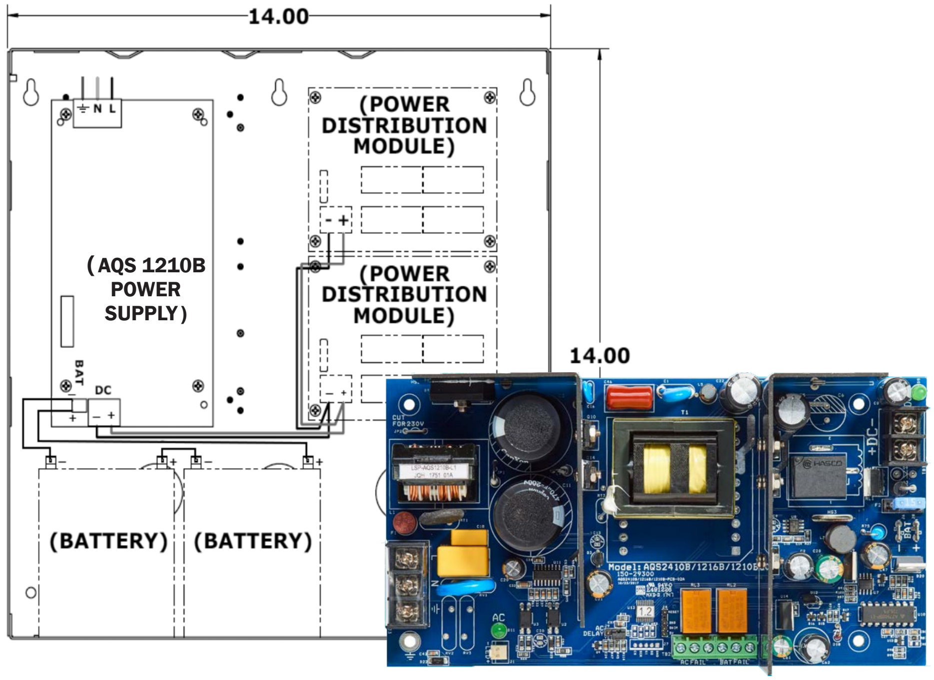
The SPS-10 is for use in low-voltage, Class 2 circuits only.

AC Input:		85-264 Vac / 47-63 Hz / 220 W max.
DC Outputs:	*Nominal:*	12 Vdc
	Continuous:	8 amps
	Typical:	13.75 Vdc
Trouble Output:	*AC Fail "C" Contacts:*	2 A/120 Vac
Battery:	*Cutoff Voltage:*	9.8 Vdc
Mechanical:	*Dimensions:*	7.40" H x 3.94" W x 2.5" D
	Weight:	1.6 lbs
Environmental:	*Temperature:*	-30 to 120 °C, operating -60 to 190 °C, storage

NOTES:

AQS 1210 Power Supply

The AQS 1210 power supply is a heavy-duty, self-contained, efficient, clean, offline, switching power supplies, with linear-type performance. The AQS 1210 has a dedicated lead acid battery charger that maintains maximum battery life while providing power for access control devices. The AQS 1210 are exceptional during brownout conditions, capable of operating at 85% of nominal voltage.



AC Input

The AQS's 1210's AC inputs are marked High Voltage Line (L), Neutral (N), and Ground (⏚). The ⏚ terminal must connect to earth ground. The green LED adjacent to the -LED+ terminal is ON when AC power is applied. The terminal block accepts up to 12 AWG wires.

The AC input default is 120 Vac. The AQS 1210 can be provisioned for 240 Vac when ordered, or the PCB trace at the top of the board is labeled "CUT FOR 240V" can be cut. Once cut, the board can not be reprovisioned for 120 Vac.

> ❗ *Do NOT apply 240 Vac when the AQS 1210 is set for 120 Vac; this will damage the unit and void the warranty.*

AC Status Relay

Power trouble terminals are marked NO (Normally Open), C (Common), and NC (Normally Closed). The normal position indicates that the output is in normal range and the relay is energized. The contacts are rated for up to 3 A, 30 Vdc, 240 Vac.

DC Output

The AQS 1210 DC output terminal is a one (1) output, two (2) pin terminal block , labeled -DC+. the AQS 1210 has a continuous current rating of 12 Vdc at 10 amps. A green LED adjacent to the terminal block is ON when a output voltage is present. Nominal output voltage should read 12 Vdc, 12.5 Vdc is typical for output voltage.

> ⓘ *There is a 10 second delay for initial turn on.*

> ⓘ *Current overload and thermal shutdown will auto-restart without removing the load.*

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Battery Standby

The battery connector is a 2 spade terminal block marked -Bat+. A 12 inch battery cable assembly is provided to plug the modules on the battery connector: red (+) and black (-) negative.

> *To avoid a spark, AC MUST be applied before connecting the battery cable to the battery.*

The battery charger is precision set to float charge 12 V or 24 V sealed or wet lead acid batteries.

> *Battery Cutoff Relay is normally energized for fail-safe operations.*

Maintenance

The power supply and standby batteries should be tested at least once a year as follows.

1. **Verify** that the LEDs are in the normal state.

   AC Input LED = ON (Green)

   DC Output LED = ON (Red)

2. **Check** the output voltage with a normal load (assure proper voltage to float charge batteries).

   DC Output = between 13.6 and 13.8 Vdc

3. **Disconnect** the AC input.

   AC Input LED = OFF

   DC Output LED = ON

4. **Verify** that the DC output has a reading over 12.0 Vdc for 12 V.

   This step verifies that the stanby batteries are operational. Sealed lead, acid batteries have a typical life of 3 to 5 years. Make sure to mark batteries with the date they are installed.

5. **Reapply** AC power and verify that the AC LED is ON.

UL Compliance

For UL 294 compliance when using an 8 output PDB boards with fire trigger, the Fire Alarm disconnect wire length must be less than 98.5 ft (30 m).

ULC-S318 compliance requires that the power supply battery fail line must be connected to and monitored by a control panel trouble zone. AQS series uses a standard power supply enclosure, not an attack proof enclosure. As such, they should not be used to power to a mercantile bell.

When using a battery that is not housed inside the power supply enclosure, the battery leads require protection from the enclosure via the use of conduit. For UL compliance the enclosure used must be listed to the categories Listed above and shall have sufficient space to house the standby batteries.

All power supplies are required to have a minimum of a 48 hour recharge period to provide standby power of a minimum 4 hours 15 minutes of alarm under full load conditions. Standby power has been evaluated in accordance with UL 1076 proprietary burglar alarm systems.

UL verified ambient operating temperature is between +32F to +122F (-20C to 50C). The operating temperature is not evaluated for outdoor use.

Status LEDs

The status LEDs on the AQS 1210 indicate the following information.

LED	Indicator	State
AC	Green LED	ON = AC applied OFF w/ AC power = Failure
Trouble Normal	Green/Amber LED	Green = Normal Amber = Trouble
DC	Red LED	ON = Output voltage is present

Specifications

Power Supplies should be installed in accordance with electrical and building codes.

AC Input:	120 / 240 Vac:	456 W
	Frequency:	50-60 Hz
	Fuse Rating:	12 A / 32 Atm
DC Output:	Continuous Current Ratings:	10 A
	Nominal Voltage:	12 Vdc
	Typical Voltage:	12.5 Vdc
	Range with Rated Load:	12.5 Vdc
	UL Recorded Range for battery Compatibility:	9.8-13.2 Vdc
	Load Regulation No Load Max (no battery):	+/- 0.2%
	Curent Overload Short Circuit Protection:	Yes
	Thermal Runaway Protection:	Yes
	Power Limited Output:	Yes
	LED Indicator:	Green
AC Status Output Relay:	AC Status Output Relays:	3 Pin terminal block
	AC Fail “C” Contacts Rating:	30 Vdc, 240 Vdc, 3 A, resistive load only
Battery:	Charging:	2 spade terminal block marked “-Bat+”
	Battery Type:	12 V / 24 V, 4 Ah-40 Ah
	UL Elevated battery:	120 Ah
	Recharge:	1.5 A max
	Average Recharging Current:	1 A
	PTC Self-resetting circuit breaker:	2 A
	Reverse Hookup Protection:	Yes, 500 mA PTC
	LED Indicator:	Red
	Max. Charge Voltage (No Load):	13.6 Vdc
	Cutoff Internal Relay Contacts:	30 Vdc, 240 Vac, 3 A, resistive load
	Low Battery Cutoff:	9 Vdc
Mechanical:	Module Dimensions:	7.75” L x 4.125” W x 2.94” H (height includes 1/2” min standoffs
Environmental:	Temperature:	4 F to 122 F (-20 C to 50 C)
	UL Verified Temperature Range:	32 F to 122 F (0 C to 49 C), not evaluated for outdoor use
UL Approvals:	UL 294 6th Edition:	Listed
	Line Security:	1
	Endurance Test Level:	1
	Attack Test Level:	1
	Battery Standby Level:	4
	UL 603:	Listed
	ULC-S318:	Listed
	ULC-S533:	Listed

Specification are subject to change without notice.

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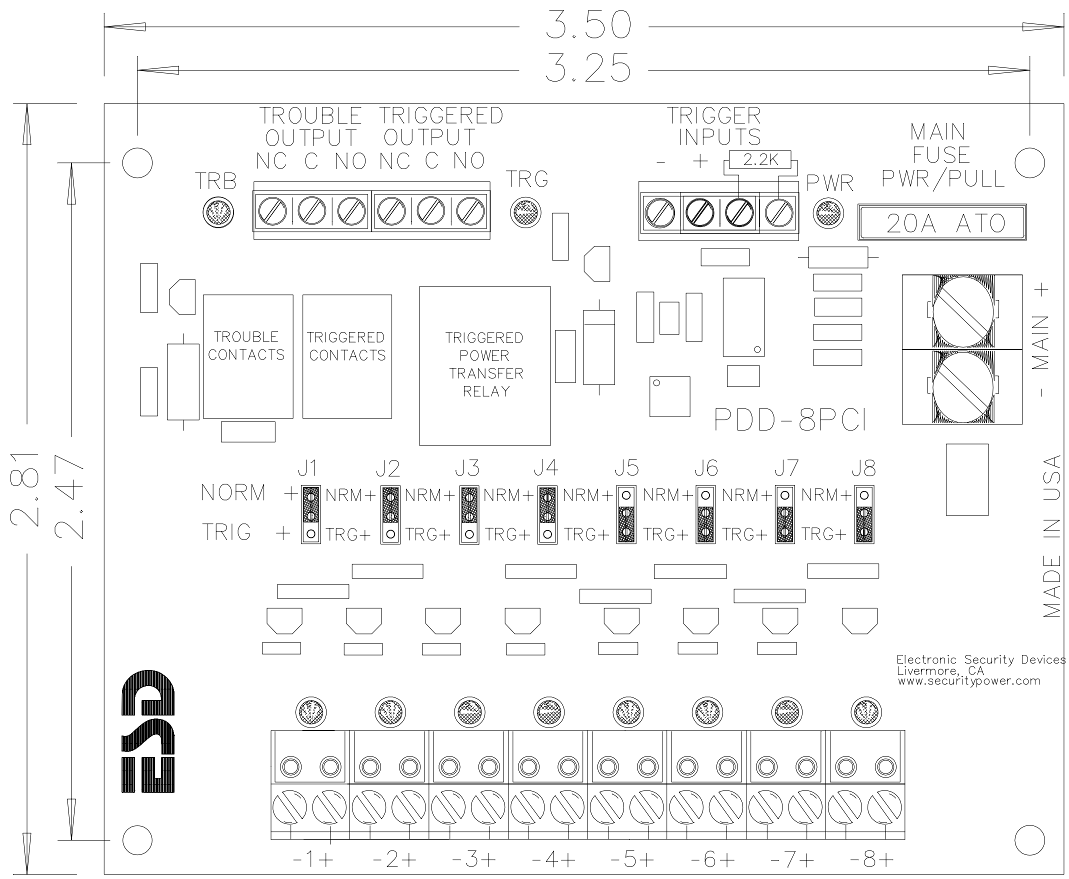
PDD-8PCI Power Distribution

The PDD-8PCI* power distribution control interface converts a main, non-power limited DC power source to eight (8) Class 2 power-limited outputs that can be controlled by a Fire Alarm Control Panel (FACP). Each output (J1-J8) can be set to turn ON, turn OFF, or disabled always ON when triggered by the panel. The FACP or other control system can interface to the PDD-8PCI with one or both supervised trigger inputs. One trigger is activated with a reverse polarity voltage from an FACP. This trigger is fully isolated with an optical isolator. The other trigger is a 2.2K end-of line (EOL) resistor input that accepts a Normally Open (NO) or Normally Closed (NC) switch.

When triggered, the Trigger Transfer Relay removes power from the NORM + buss and transfers it to the TRIG + buss. Jumpers J1-J8 determine the buss to which each output is connected. The triggered Form C contacts also drop off normal when triggered, and the red LED (TRG) turns ON. These contacts can be used to provide feedback to the system.

The Trouble Form C Relay drops off normal if any one of the PTC circuit breakers is tripped, or if the main power/fuse is lost. The green LED (TRB) is ON during normal operation and turns OFF when trouble is detected. All three relays are fail-safe and energized in the normal condition. Each output (1-8) has a green LED that is ON when the associated output is energized.



* This board is a UL-recognized component.

NOTES:

DC Power Input

The main DC power input is labeled -MAIN+. The input voltage will be the voltage on the output. Power limiting is not required. If the DC input is not power-limited, the non-power limited wires must maintain a minimum distance of 1/4” from the power-limited outputs. Input wires should be sized appropriately for the total load. The -MAIN+ terminal block can accept multiple wires ranging from 10 AWG to 24 AWG. Input wiring and power must be suitable for the total output load.

Observe polarity for 11-30 Vdc.

Triggered Outputs

Triggerable Outputs

The PDD-8PCI’s triggerable outputs are marked -1+ through -8+. Each of these paired output terminal blocks can be unplugged for easy service. The outputs are Class 2 power-limited and are rated at 1.25 amps continuous duty. Each output is protected by a PTC circuit breaker. If a PTC is tripped, the load must be unplugged or removed for up to one minute to allow the PTC to cool and reset. Jumpers J1-J8 determine whether these outputs are normally ON or OFF. The output terminal blocks accept 14 to 26 AWG wire.

Triggered Output

Three Form C relay contacts drop off normal when triggered. These contacts are marked NC (Normally Closed), C (Closed), and NO (Normally Open). The terminal block accepts 14 to 26 AWG wire.

Trouble Output

The PDD-8PCI contains three Form C relay contacts that drop off normal when there is Trouble. The normal state is energized with no fault. If one of the output PTC circuit breakers trips—or the main power is lost—the Trouble Output contacts will drop off normal to trouble.

Trigger Inputs

End-of-Line Resistor

When the 2.2K EOL resistor changes by more than 50% due to an open or a short, the trigger is activated. If this trigger is not used, leave the 2.2K EOL resistor on the terminals to keep this trigger in a normal state.

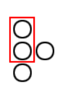
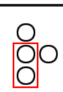
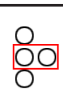
DC Input

The Trigger DC Input is marked - and +. A DC voltage between 11 and 30 Vdc applied to this terminal with the indicated polarity will activate the trigger. This input is fully isolated with an optical isolating relay. The input terminal block accepts 14-26 AWG wire. The minimum input voltage for this trigger is 20% less than the main input supply voltage.

Jumper Settings

Jumpers J1 through J8 set the following options for outputs 1-8.

On four-pin models, setting the jumper on the two middle pins in a horizontal position will disable the trigger; the associated output will permanently remain ON.

Jumper Setting	Trigger Normal	Trigger Active
	ON	OFF
	OFF	ON
	ON	ON

Status LEDs

The status LEDs on the PDD-8PCI indicate the following information:

LED	Indicator	State
TRB	Trouble (Green LED)	ON = Normal operation
		OFF = Trouble fault (one or more outputs have a tripped PTC circuit breaker, blown main fuse, or lost power)
TRG	Trigger (Red LED)	ON = Activated trigger
		OFF = Deactivated trigger
PWR	Power (Green LED)	ON = Power
		OFF = No input power or blown main fuse
L1-L8	Output (Green LED)	ON = Active output
		OFF = Inactive output

Installation and Setup

1. **Set** jumpers J1 through J8. See page 6-25 for more information.
2. **Connect** security devices to the proper outputs for the above jumper settings.
3. **Connect** the Trigger Input.
4. To trigger the PDD-8PCI from a Normally Open or Normally Closed switch, **open** or **short** the EOL resistor as shown in the diagram below.

   If this trigger is not used, leave the EOL resistor connected so this input will not trigger, allowing the voltage trigger input to be operational.
5. If applicable, **connect** the Triggered Output contacts.

   These contacts can connect to auxiliary devices to indicate that the unit is triggered.
6. **Connect** the Trouble Output contacts.

   NC means Normally Closed in the normal, energized condition. C and NC will open when trouble is detected.

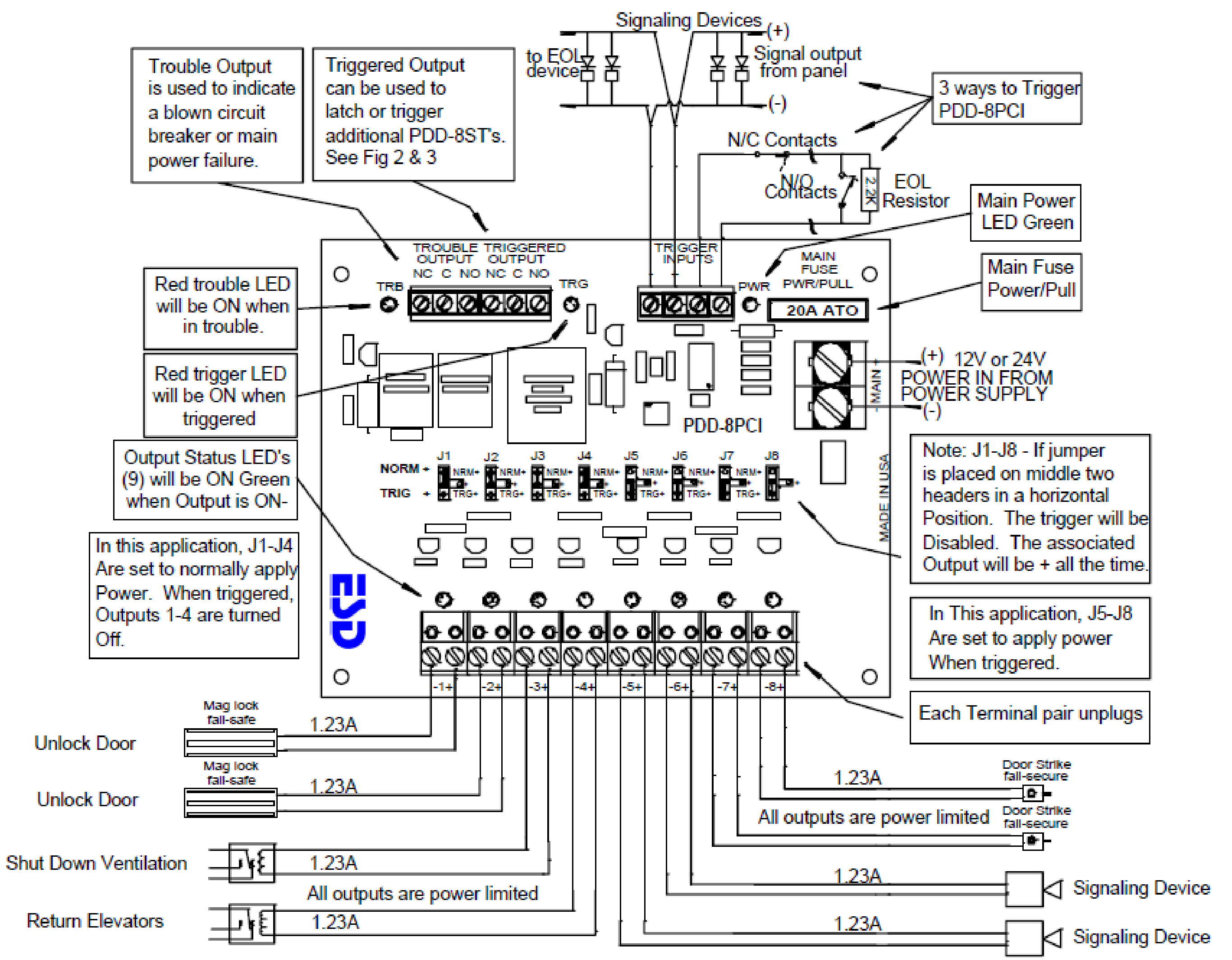


Fig. 2 - Latching Application with N/O Manual Reset.
In this application, the Triggered Output contacts are fed back to
The Trigger Input, latching the trigger until reset with the N/O contacts.

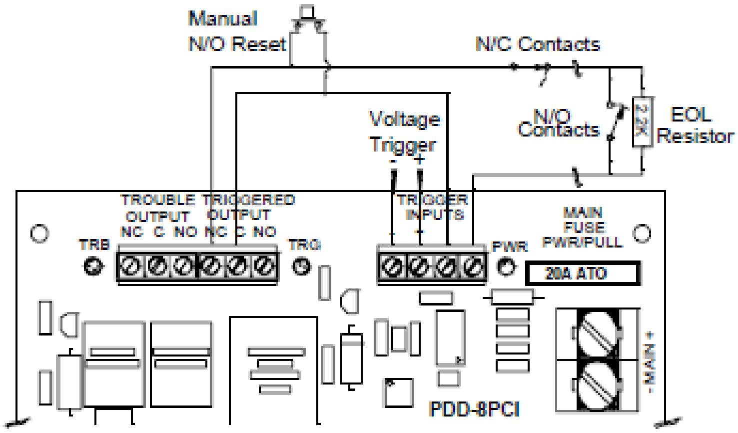


Fig. 3 - Latching Application with N/C Manual Reset.
In this application, the Triggered Output contacts are fed back to
the Trigger Input, latching the trigger until reset with the N/C contacts.

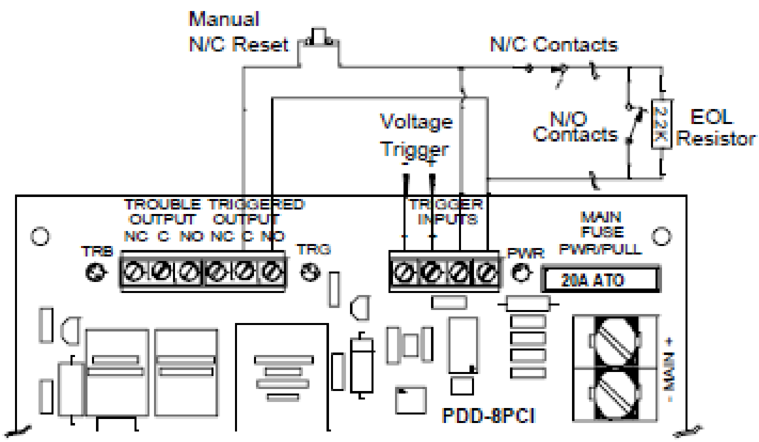
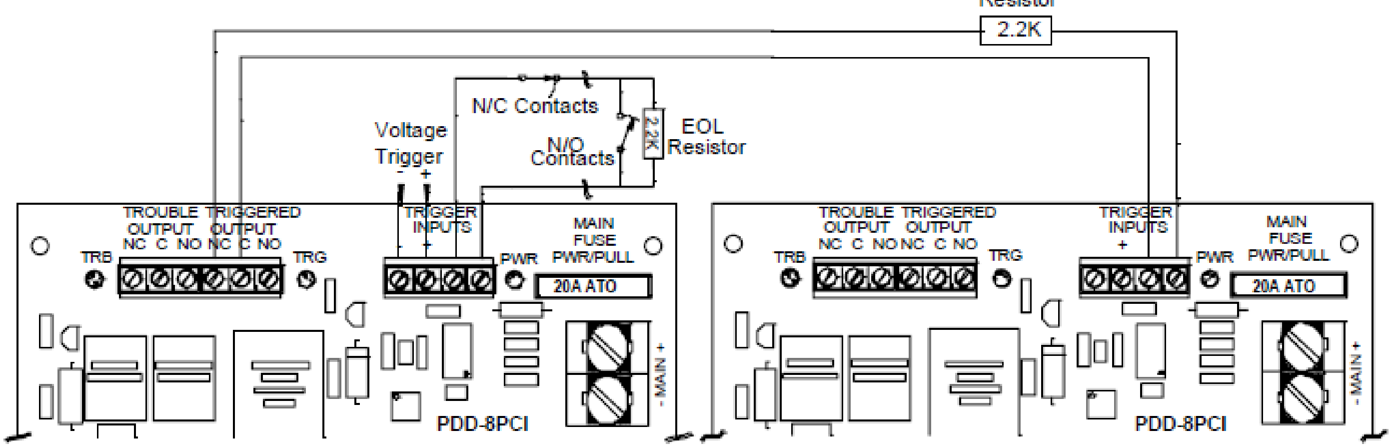


Fig. 4 - Triggering multiple PDD-8PCI's. Non Latching.
In this application, when the 1rst unit is Triggered, it's Triggered Ouput is connected to the
2nd unit's N/O trigger input. You can daisy chain as many units as you wish like this.



Specifications

Input Voltage:	*Current, Typical w/ No Output Load:*	11-28 Vdc, 90-160 mA
Outputs 1-8:	*Continuous:*	1.23 amps each
Trouble Output:	*Form C Contacts:*	2 A, 120 Vac / 1 A, 220 Vac
Triggered Output:	*Formc C Contacts:*	2 A, 120 Vac / 1 A, 220 Vac
Transfer Relay Contacts:		15 amps
Voltage Trigger:		20% < Input min., 30 Vdc max.
Voltage Trigger Isolation:		Optical
EOL Trigger:		Trip ± 50% of 2.2 K ohms

Specifications are subject to change without notice.

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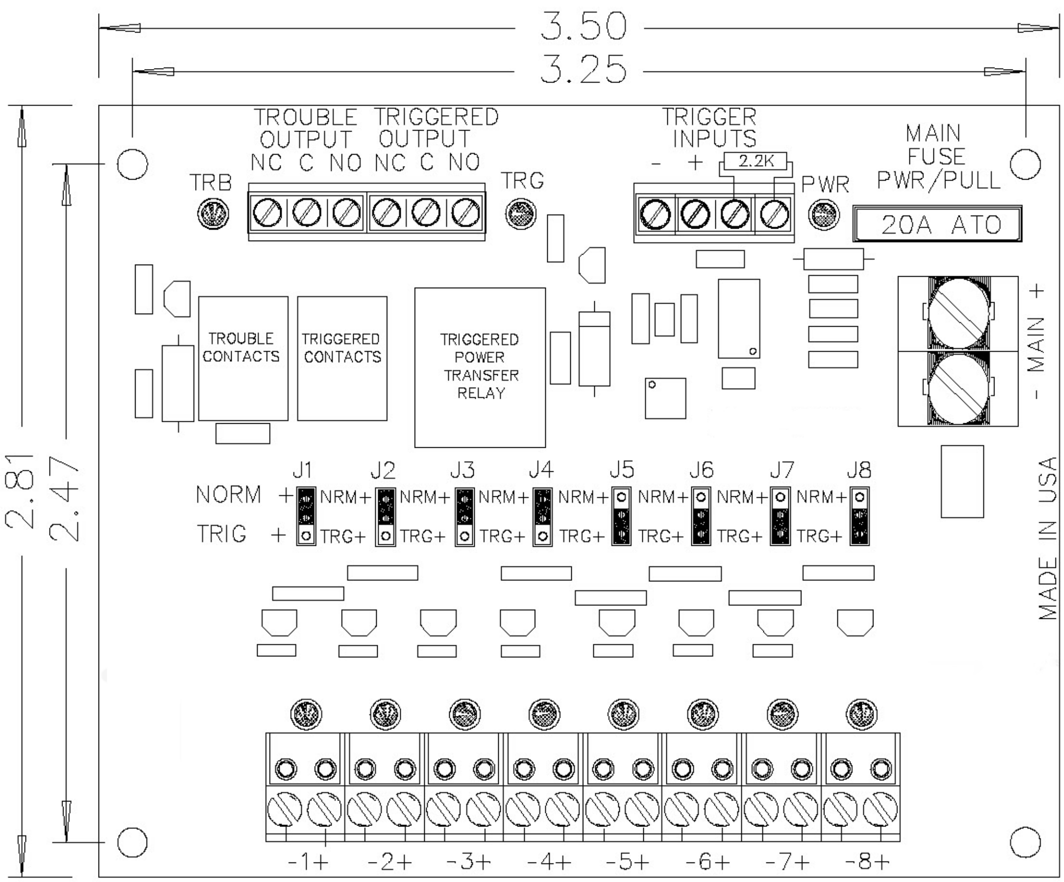
PDB-8C1R DC Power Distribution

The PDB-8C1R DC Power Distribution control interface converts a main, non-power limited DC power source to eight (8) Class 2 power-limited outputs that can be controlled by a Fire Alarm Control Panel (FACP). Each output (J1-J8) can be set to ON, turn OFF, or disabled always ON when triggered by the panel. The FACP or other control systems can interface to the PDC-8C1R with one or both supervised trigger inputs. One trigger is activated with a reverse polarity voltage from an FACP. This trigger is fullly isolated with an optical isolator. The other trigger is a 2.2K end-of-line (EOL) resistor input that accepts a Normally Open (NO) or Normally Closed (NC) switch.

When triggered, the Trigger Transfer Relay removes power for the NORM+ bus and transfers it to the TRIG+ bus. Jumpers J1-J8 determines which bus each output is connected to. These contacts can be used to daisy chain other PDB-8C1R, latch, or provide feedback to a system.

The Trouble Form-C Relay drops off Normal if any one of the PTC circuit breakers is tripped, or main power / fuse is lost. The Green (TRB) LED is ON during normal operation.



* This board is a UL-recognized component

NOTES:

DC Power Input

The main DC power input is labeled -MAIN+. The input voltage will be the voltage on the output. Power limiting is not required. If the DC input is not power-limited, the non-power limited wires must maintain a minimum distance of 1/4” from the power-limited outputs. Input wiress should be sized appropriately for the total load.

Triggered Outputs

Triggerable Outputs

The PDC-8C1R’s triggerable outputs are marked -1+ through -8+. Each of these paired output terminal blocks can be unplugged for easy service. The outputs are Class 2 power limited and are rated at 1.23 amps continuous duty. Each output is protected by a PTC circuit breaker. If a PTC is tripped, the load must be unplugged or removed for up to one minute to allow the PTC to cool and reset. Jumpers J1-J8 determine whether these outputs are normally ON or OFF. The output terminal blocks accepts 14 to 28 AWG wire.

Triggered Output

Three Form-C relay contacts drop off normal when triggered. These contacts are marked NC (Normally Closed), C (Closed), and NO (Normally Closed). The terminal block accepts 14 to 28 AWG wire.

Troubled Outputs

The PDB-8C1R contains three Form-C relays. The normal state is energized with no fault. If one of the output PTC circuit breakers trips, or the main power is lost, the Trouble Output contacts will change from normal to trouble.

Trigger Inputs

End-of-Line Resistor

When the 2.2K EOL resistor changes by more than 50% due to an open or a short, the trigger is activated. If this trigger is not used, leave the 2.2K EOL resistor on the terminals to keep this trigger in a normal state.

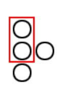
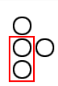
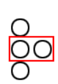
DC Input

The Trigger DC Input is marked - and +. A DC voltage between 12 and 28 Vdc applied to this terminal with the indicated polarity will activate the trigger. This input is fully isolated with an optical isolating relay. The input terminal block accepts 14-28 AWG wire. The minimum input voltage for this trigger is 20% less than the main input supply voltage.

Jumper Settings

Jumpers J1 through J8 set the following options for outputs 1-8.

> *On Four-pin models, setting the jumper on the two middle pins in a horizontal position will disable the trigger; the associated output will permanently remain ON.*

Jumper Settings	Trigger Normal	Trigger Active
	ON	OFF
	OFF	ON
	ON	ON

Status LEDs

The status LEDs on the PDB-8C1R indicate the following information:

LED	Indicator	State
TRB	Trouble (Green LED)	ON = Normal operation
		OFF = Trouble fault (one or more outputs have tripped PTC circuit breaker, blown main fuse, or lost power)
TRG	Trigger (Red LED)	ON = Activted trigger
		OFF = Deactivated trigger
PWR	Power (Green LED)	ON = Power
		OFF = No input power or blown main fuse
L1-L8	Output (Green LED)	ON = Active output
		OFF = Inactive output

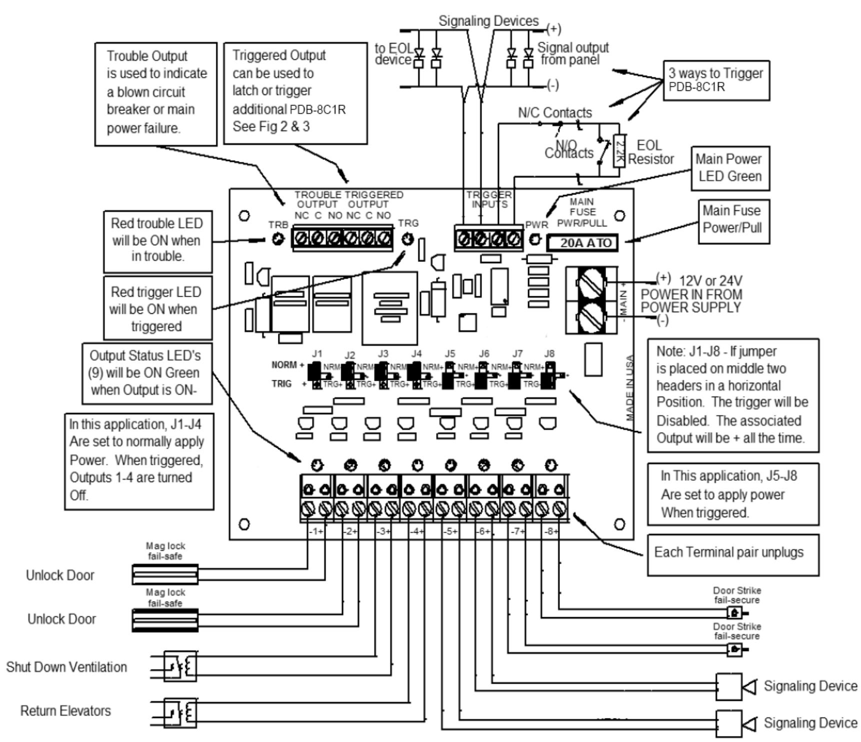
Installation and Setup

1. **Set** jumpers J1 through J8. See page 6-33 for more information.
2. **Connect** security devices to the proper outputs for the above jumper settings.
3. **Connect** the Trigger Input.
4. To trigger the PDB-8C1R from a Normally Open or Normally Closed switch, **open** or **short** the EOL resistor as shown below.

   If this trigger is not used, leave the EOL resistor connected so this input will not trigger, allowing the voltage trigger input to be operational.
5. If applicable, **connect** the Triggered Output contacts.

   These contacts can be connected to auxiliary devices to indicate that the unit is triggered.
6. **Connect** the Trouble Output contacts.

   NC means Normally Closed in the normal, energized condition. C and NC will open when trouble is detected.



Specifications

Input Voltage:	Current, Typical w/ No Output Load:	12-28 Vdc (Nominal 12-24), 149-211 mA
Output Voltage:		11.4 - 28 Vdc
Output 1-8:	Continuous:	1 A or 2 A per output based on model, 10 A maximum
Terminal Block Ratings:	Input:	5mm spacing 14-28 AWG
	Output:	5mm spacing 14-28 AWG
Main Fuse Rating:		15A for 2A variant, 10A for 1A variant
Main Fuse Type:		mini-ATO
Trouble Output:	Form C Contacts:	3 A, 30 Vac / 3 A, 120 Vac
Triggered Output:	Form C Contacts:	3 A, 30 Vac / 3 A, 120 Vac
Transfer Relay Contacts:		10 A for 2 amp variant / 8 A for 1 A variant
Voltage Trigger:		< 20% input min., 30 Vdc max.
Voltage Trigger Isolation:		Optical
EOL Trigger:		Trips +/- 50% of 2.2kΩ
Ambient Operating Temperature:		+32 to 120F (0 to 49C)
UL 294 - Access Control System Unit:	Line Security:	Level I
	Endurance:	Level IV
	Standby Power:	Level I
	Attack Test:	Level I

Specifications are subject to change without notice.

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Allegion Locks 7

In This Chapter
√ AD-400 Series Networked Wireless Locks √ AD-300 Series Networked Wired Locks √ HandKey II Biometric Reader

Allegion Locks

The AD Series electronic locks from Allegion® are designed to provide greater flexibility, functionality, and compatibility with existing access control systems. The series' modular design allows the locks to be customized to fit the needs of current and future field applications.

Open Options partners with Allegion to offer a complete door solution using one of two lock configurations: hardwired (AD-300) and/or wireless (AD-400). With their open-architecture platform, the AD Series locks can be seamlessly integrated into new and existing DNA Fusion access control systems.

AD-400 Networked Wireless Locks

The Allegion AD-400 is an open-architecture Wireless Access Point Module (WAPM) designed to interface with third-party panels via a PIM400-485 device.

See pages 7-3 through 7-22 for installation information.

AD-300 Networked Wired Locks

The Allegion AD-300 is an open-architecture product designed to interface with access control panels that use the RS-485 protocol.

See pages 7-23 through 7-34 for installation information.

HandKey II Biometric Reader

The HandKey II (HK-II) is Allegion Biometrics's fourth-generation biometric access control HandReader. The HandReader records and stores the three-dimensional shape of the human hand for comparison and identity verification. Upon verification, the HandReader transmits the Open Options card data (e.g. card formats) to an access control system.

The Allegion HK-II communicates with the Open Options SSP Series controllers via the Biometric Reader Interface Gateway (GTWY-B). See page 7-35 through 7-45 for more information.

> *To simplify installation, the AD Series combines all the hardware components required at the door—the electronic lock, credential reader, request-to-exit, door sensors, etc.—into a single, integrated product.*

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AD-400 Wireless System

Wireless access solutions provide the benefits of access control without the wires. Unlike traditional wired openings that take several days to install, wireless access solutions can be installed in a fraction of the time.

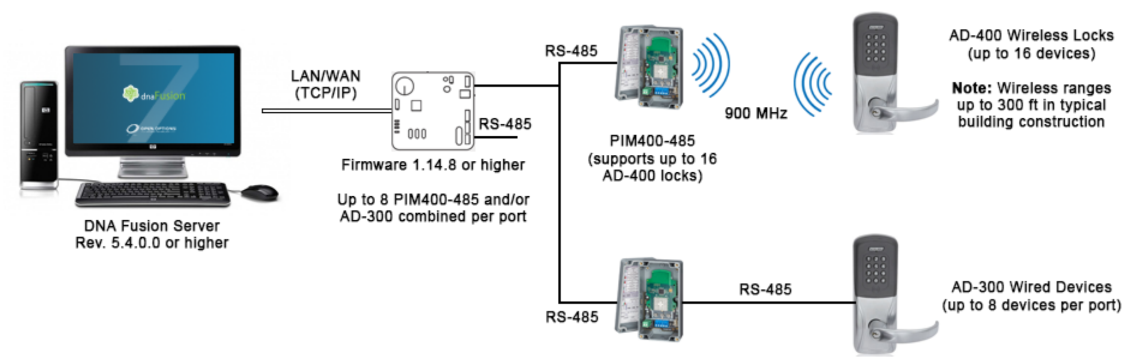
High-secure spread-spectrum transmissions encode signals using 128-bit keys.

A wireless access system contains two (2) different types of modules:

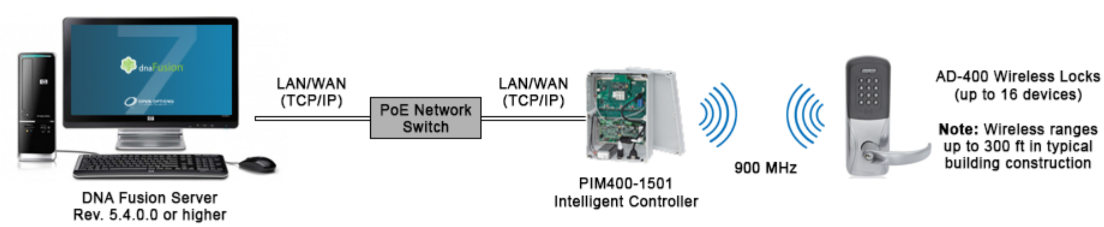
- Panel Interface Module (PIM)
- Wireless Access Point Module (WAPM)

The following diagrams illustrate wireless lock configurations using a PIM400-485 or PIM400-1501.

AD-400 Wireless with PIM 400-485



AD-400 Wireless with PIM 400-1501



Configuration Types

The AD-400 wireless locks can be configured with a PIM400-485 or a PIM400-1501. For information on using a PIM400-485 with a Wireless Gateway, see the Legacy Hardware Manual.

PIM400-485

The PIM400-485 interfaces with the SSP-EP, DController, and NController via a wired RS-485 connection, and it receives card data via RF bitstreams from the AD-400 wireless lock. The PIM400-485 receives authorization to unlock or open an ACM from the SSP controller; then, it transmits the command to the linked AD-400 lock.

One PIM supports up to 16 AD-400 locks in many combinations. However, if wiring to an SSP-D2 or legacy controller, only one PIM can be used per wireless reader gateway.

PIM400-1501

The PIM400-1501 combines the strength of the wireless PIM400-485 with the customized functionality of the DController to provide an IP-addressable access control solution for up to 16 AD wireless devices. The PIM400-1501 is pre-wired with external RJ-45 and USB connections.

The device supports Power over Ethernet (PoE) or a 12 Vdc power supply. It also has the capacity to store 240,000 cardholders and 50,000 audit events.

Installation Overview

Location Placement

The PIM400-485 and PIM400-1501 communicate to the AD-400(s) using radio frequency (RF) signals, which are diminished by walls, distance, metal objects, and other barriers. Consider the following factors when installing the PIM400.

- Mount the PIM400 within 200 horizontal feet (61 meters) of each AD-400 wireless lock. Communication may be possible up to 1000 feet (305 meters) if clear line-of-sight is available in the building construction.
- Do NOT mount the AD-400(s) and the PIM400 on separate floors; this may diminish the signal and device funtionality.
- Do NOT mount the PIM400 on a metal surface. Keep the PIM at least one inch away from any metal in all directions.
- The signal will not pass through metal walls or metal mesh inside the walls (stucco). Use a remote antenna module located outside the room when necessary.
- Moving vehicles will interrupt the signal; if vehicles may temporarily block the signal, reduce the placement distance by half.
- For optimal communication, mount the PIM400 so that the antenna is vertical.

> *Locations and wiring methods must be in accordance with the National Electrical Code (NEC), ANSI/NFPA 70.*

Pre-Installation Test

Once the locations for the PIM400 and AD-400(s) have been determined, test the performance prior to permanent installation.

1. Temporarily **mount** the AD-400(s) to the access control point (door, gate, etc.) as close as possible to its exact mounting location. Do NOT connect the power yet.
2. Temporarily **mount** the PIM400 as close to the exact mounting location and orientation as possible.
3. **Verify** that the antenna is in the horizontal position.
4. **Power** the PIM400 with a 12 or 24 Vdc power supply capable of delivering 250 mA.

   See Powering the PIM400-485/1501 instructions on page 7-5 or 7-13.
5. **Connect** the Handheld Device (HHD) with the Schlage Utility Software (SUS) to the PIM400.

   See Programming the PIM400-485/1501 instructions on page 7-6 or 7-14.
6. **Verify** that the access point is closed, then **install** the batteries or **connect** a 12 to 24 Vdc power supply to the AD-400(s).

   Each power supply must be capable of delivering 250 mA.
7. **Place** the AD-400(s) into Link Mode.

   See Linking the PIM400-485/1501 to an AD-400 Lock instructions on page 7-7 or 7-14.

> *The green LED on the AD-400(s) will flash to indicate that it has successfully linked to the PIM400. If linking is unsuccessful, move the PIM six to ten inches in any direction (up, down, sideways) and repeat Step 7 until all AD-400s link successfully.*

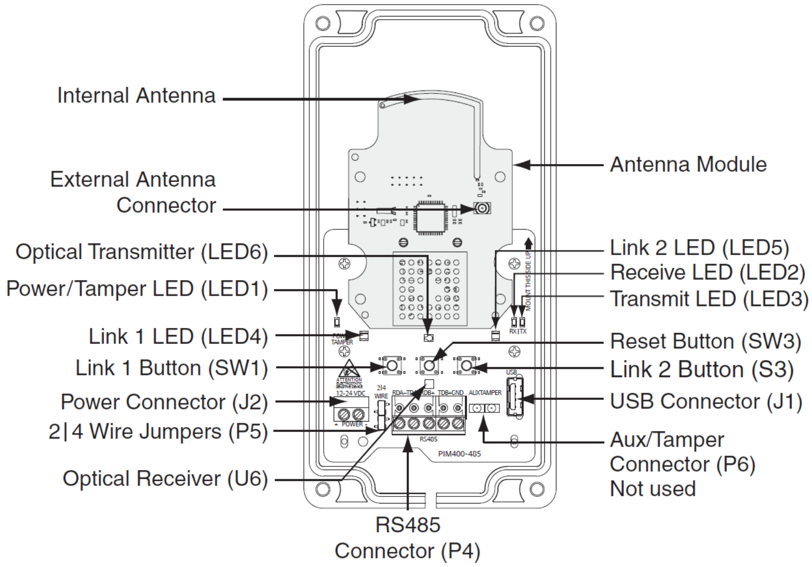
Installation

Once the PIM400 is successfully linked to the AD-400(s), proceed with permanently installing the components. See the Allegion PIM400-485/1501 User Guide for more information on drill holes and mounting procedures.

> *Avoid routing the wires near the internal antenna and the tamper detection mechanism. Improper wire routing may reduce RF performance and/or prevent tamper detection. Wire routing inside the enclosure should be as short as possible.*

PIM400-485

Each PIM400-485 is capable of communicating with a maximum of 16 AD-400 wireless locks and 64 doors (ACMs). The PIM and lock use 900 MHz spread-spectrum RF technology to communicate.



PIM400-485 (Version 2)

> *The diagram above illustrates Version 2 of the PIM400-485. For Version 1 configuration information, refer to the Legacy Hardware Manual.*

Powering the PIM400-485

The PIM400-485 accepts a UL 294 power supply capable of sourcing at least 250 mA at 12 or 24 Vdc. Locate the power source as close to the PIM400-485 as possible. Connect the power supply with a minimum of 18 AWG wire and a maximum 1000-ft run length. Power input is non-polarized.

Connector	Signal
J2	12 to 24 Vdc (+)
	DC Ground (-)

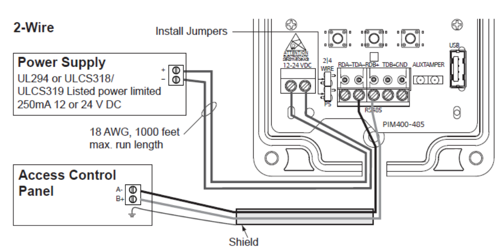
> *Connect a battery backup to the PIM-400 to prevent information from being lost if the power is interrupted.*

Connecting the PIM400-485 to the SSP-EP

The PIM400-485 communicates to the SSP-EP via a 2-wire RS-485 interface on the P4 terminal block. The PIM will connect to the SSP-EP on either of the controller's RS-485 downstream ports (Ports 2 and 3). Use twisted pair(s) (min. 24 AWG) with shield for communication.

1. **Set** the jumper on the SSP-EP to OFF for the downstream port connected to the PIM400-485.
2. **Connect** the PIM400-485 to the SSP-EP on Port 2 or 3 using the following table:

SSP-EP	PIM400-485	Description
TR+	RDA- (P4-1)	Receive Data (-)
TR-	RDB+ (P4-3)	Receive Data (+)
GND	GND (P4-5)	Ground



3. **Remove** the EOL Termination Jumper from the SSP-EP.
4. **Connect** the Handheld Device (HHD) with the Schlage Utility Software (SUS) to the PIM.

   The PIM is placed into Link Mode. Continue to Programming the PIM400-485 on page 7-6.

Connecting the PIM400-485 to the DController

The PIM400-485 communciates with the DController via 2 wire RS-485 interface by wiring the PIM400-485 to the first reader port (TB2) of the DController.

1. **Connect** the PIM400-485 to the DController using the following table.

> For best results, the communication wiring should not exceed 1,000 feet. Use twisted pairs (min. 24 AWG) with shield.

DController	PIM400-485	Description
DAT	RDA- (P4-1)	Receive Data (-)
CLK	RDB+ (P4-3)	Receive Data (+)
GND	GND (P4-5)	Ground

2. **Connect** the Handheld Device (HHD) with the Schlage Utility Software to the PIM400.

   The PIM is set to Link Mode. Continue to Programming the PIM400-485 instructions below.

Connecting the PIM400-485 to the NController

The PIM400-485 communicates to the NController via the DB-9 connector. Use twisted pair(s) (min. 24 AWG) with shield for communication.

1. **Connect** the PIM400-485 to the NController using the following table.

   Use twisted pairs (min. 24 AWG) between the NController's DB-9 connection and the PIM's RS-485 connection. Install termination jumpers on end-of-line devices only.

DB-9	PIM	Description
8	RDA- (P4-1)	Receive Data (-)
7	RDB+ (P4-3)	Receive Data (+)
6	GND (P4-5)	Signal Ground

2. **Connect** the Handheld Device (HHD) with the Schlage Utility Software to the PIM400.

   The PIM is set to Link Mode. Continue to Programming the PIM400-485 instructions below.

RS-485 Downstream Connection

If multiple PIM400-485s will share the same downstream port with other RS-485 devices, the PIMs must be addressed in consecutive order (e.g. Physical Address 1-10 for PIMs and 11-20 for other RS-485 devices). The same concept applies when configuring doors within the DNA Fusion software.

Programming the PIM400-485

To program the PIM400-485, the Handheld Device (HHD) must be coupled with the PIM device. See page 25 in the Schlage Utility Software Guide for more information.

1. **Verify** that the PIM400-485 is wired to the controller.
2. **Connect** the HHD to the PIM400-485 using the supplied USB cable.
3. **Log in** to the Schlage Utility Software (SUS) as a Manager.

   The PIM400-485 appears at the bottom.
4. **Select** Device Options.
5. **Select** PIM Properties.
6. From the Edit tab, **enter** a Unique ID (Address).

   This information will be used when configuring the PIM in the DNA Fusion software (Physical Address).
7. **Enter** the Low Door and High Door numbers to match the number of locks that will be linked.

   Each PIM must have a unique set of door numbers (maximum of 16 per PIM400-485).

   Example: SSP-EP Controller

   - PIM400-485 #1: Low Door = 0 / High Door = 5

- PIM400-485 #2: Low Door = 6 / High Door = 10

When the doors are programmed in DNA Fusion, they will be ACM 1-10. Doors must be added in order of low to high from PIM #1 to PIM #2.

8. If the reader mode will be set via DNA Fusion, **enable** the Wakeup on Radio feature.

   See page 7-19 for more information.

9. **Continue** to Linking the PIM400-485 to an AD-400 Lock on page 7-7.

Linking the PIM400-485 to an AD-400 Lock

The Schlage Utility Software (SUS) is used to place the PIM into Link Mode. For more information on the SUS, refer to the Schlage Utility Software User Guide.

> *Ensure that no other PIM400s are in* Link Mode *during this process; only one AD-400 can be linked at a time.*

1. With the PIM400 connected to the Handheld Device (HHD), **select** Device Options.
2. **Select** the PIM Properties option, then **select** the Link tab.
3. **Select** the Door Number from the drop-down list.

   The PIM400 will stay in Link Mode for up to 30 minutes.
4. **Open** the AD-400 door and **hold down** the inside lever to create a Request-to-Exit (REX) condition.
5. While holding the lever, **present** a card to the reader or, if using a keypad reader, **press** the “#” key.
6. **Hold** the lever down until the AD-400’s Schlage button starts to blink red.
7. **Release** the inside lever.

   If successful, the Schlage button will blink green and the beeper will sound. If the link fails, the button will blink red three (3) times and five (5) short beeps will sound.

   The linked door will appear in the SUS and the PIM400-485 will automatically exit the Link Mode.
8. **Repeat** steps 1-7 to link all remaining AD-400 locks to the PIM400-485.

Adding the PIM400-485 in DNA Fusion

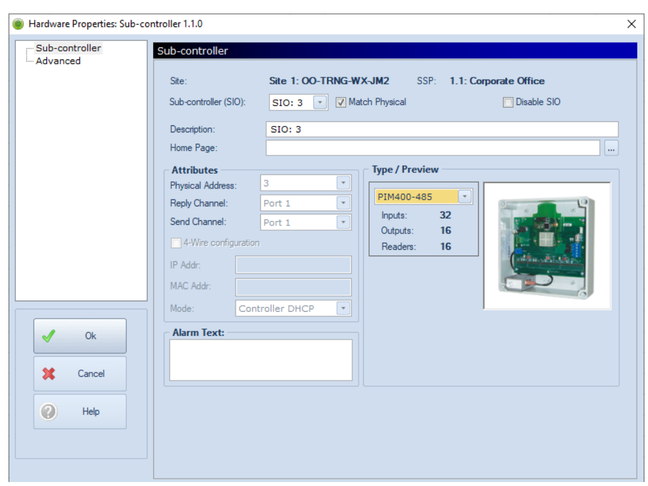
1. **Launch** DNA Fusion.
2. **Right-click** on the Controller (SSP-EP, DController, or NController) that is attached to the PIM400-485 and **select** Properties.

   The Controller Properties dialog opens.
3. In the Downstream Ports section, **set** the Baud Rate to 9600 for the port attached to the PIM400-485.
4. **Click** OK to save the settings.
5. **Right-click** on the Controller in the Hardware Browser and **select** Add / Add Subcontroller.

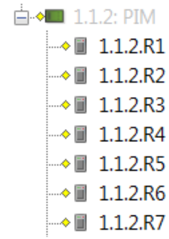
   The Subcontroller Properties dialog opens.
6. **Select** PIM400-485 from the Type / Preview drop-down.
7. **Verify** that the Physical Address (set in Step 6 of Programming the PIM400-485) and the SSP Relay Channel are correct.

   If needed, change the address and/or port to the correct settings.
8. **Click** OK to add the subcontroller to the system.

   The PIM Subcontroller appears in the Hardware Browser.



Configuring the Doors



It is important to configure the PIM400-485 objects in a sequential order. Program the first reader, output, and inputs until all doors linked the the PIM are programmed.

1. In the Hardware Browser, **expand** the PIM Subcontroller and **locate** the first Reader.
2. **Right-click** on the Reader and **select** Add Door / Use Default.

   The NEW Door dialog opens.
3. **Verify** that each door is assigned a reader, door contact, REX, and strike.
4. **Continue** adding doors in order (1-15) until all doors are configured.

Status LEDs

LED	Description	Indicator
1	Power/Tamper Status	Solid Green = Power Applied Flashing Green = Tamper Detected
2 & 3	SSP Communication Status (Receive/Transmit)	Continuous Flash = Communication Activity
4 & 5	AD Lock Communication Status (Link 1/Link 2)	Link 1 (LED 4) Blinking = AD Lock is assigned an odd number Link 2 (LED 5) Blinking = AD Lock is assigned an even number

Jumper Settings

Jumper(s)	Set At	Description
P5	Both ON	RS-485 Port (P4) is 2-Wire Interface
	Both OFF	RS-485 Port (P4) is 4-Wire Interface

Wiring Connections

PIM Connector	PIM Signal	SSP Signal	Description
J1			USB Connector
J2	+	12 or 24 Vdc	Power Input
	-	DC Ground	
P4	RDA-	Receive Data (-)	RS-485 Communication Port 2-wire: Install both 2|4 jumpers (P5) 4-wire: Remove both 2|4 jumpers (P5)
	TDA-	Transmit Data (-)	
	RDB+	Receive Data (+)	
	TDB+	Transmit Data (+)	
	GND	Signal Ground	
P6			Aux/Tamper Connector (Not Used)

Buttons

Switch	Component	Description
SW3	Reset Button	If pressed, resets the PIM400-485.

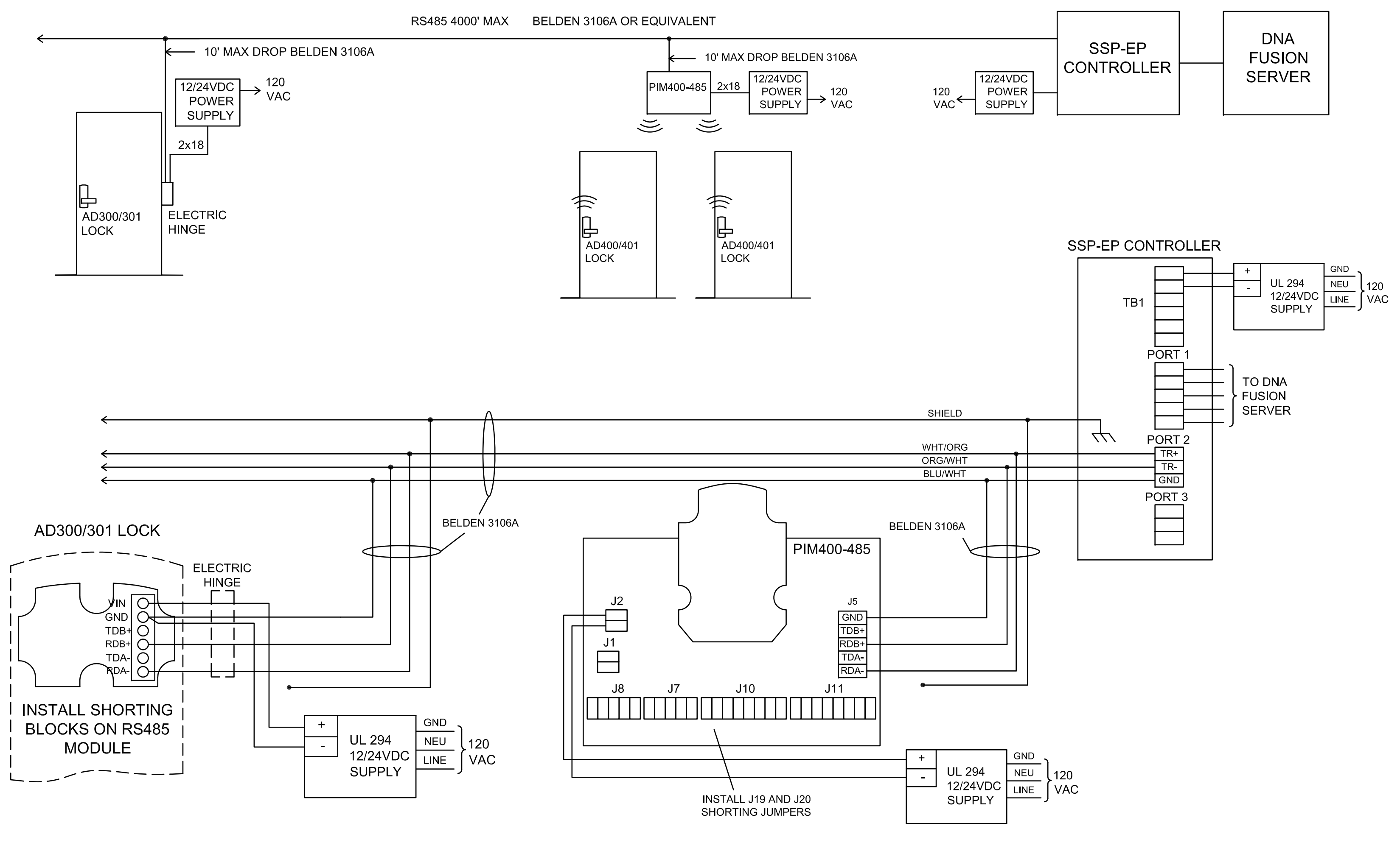
Factory Default Reset

If the PIM400-485 is reset to factory default settings, all configuration information will be deleted.

1. **Press** and **hold** the Link 1 and Link 2 buttons for about three (3) seconds.
   The red LEDs next to the Link buttons will flash while configuration takes place.
2. **Release** the Link buttons.
   The green LEDs next to the Link buttons will flash three (3) times when configuration is complete.

NOTES:

SSP-EP with AD-400 & PIM400-485



NOTES:
1) ALL LOW VOLTAGE WIRING TO BE STANDARD, MULTI-CONDUCTOR COLOR CODED WITHOUT SPLICES.

2) WIRING TO CONFORM TO APPLICABLE NATIONAL, STATE AND LOCAL ELECTRICAL CODES.

3) REFER TO SPECIFIC PRODUCT INSTALLATION INSTRUCTIONS FOR SPESCIFIC WIRING REQUIREMENTS.

4) THIS DRAWING IS FOR GRAPHICAL REPRESENTATION OF PRODUCTS DETAILED IN THE HARDWARE SET ONLY.

5) * CONDUCTOR COUNT TO BE DETERMINED BY ACCESS CONTROL PANEL PROVIDER.

OPERATION:

SSP-EP SUPPORTS TWO RS485 DATA LINES WITH UP TO EIGHT EITHER AD300/301 OR PIM400-485 COMBINED PER PORT AND A MAXIMUM OF SIXTY-FOUR READERS PER SSP-EP SPREAD ACROSS A MAXIMUM OF SIXTEEN PIM400-485 AND AD300/301 COMBINED.

SSP-EP PORT 1 CONNECTS DNA FUSION SERVER TO SSP-EP AND PORTS 2 AND 3 ARE RS485 DATA LINES.

EARTH GROUND SHIELD ON BELDEN 3106A CABLE AT SSP-EP CONTROLLER ONLY.

UL 294 POWER SUPPLIES USED SHOULD NOT BOND EARTH GROUND TO SIGNAL GROUND.

IF PLENUM RATED CABLE IS REQUIRED USE BELDEN 82842 OR EQUIVALENT.

WIRING SHOWN REFLECTS WIRING FROM SSP-EP TO PIM400-485 AND AD300/301 ONLY. ADDITIONAL WIRING WILL BE REQUIRED THAT IS NOT BE SHOWN HERE.

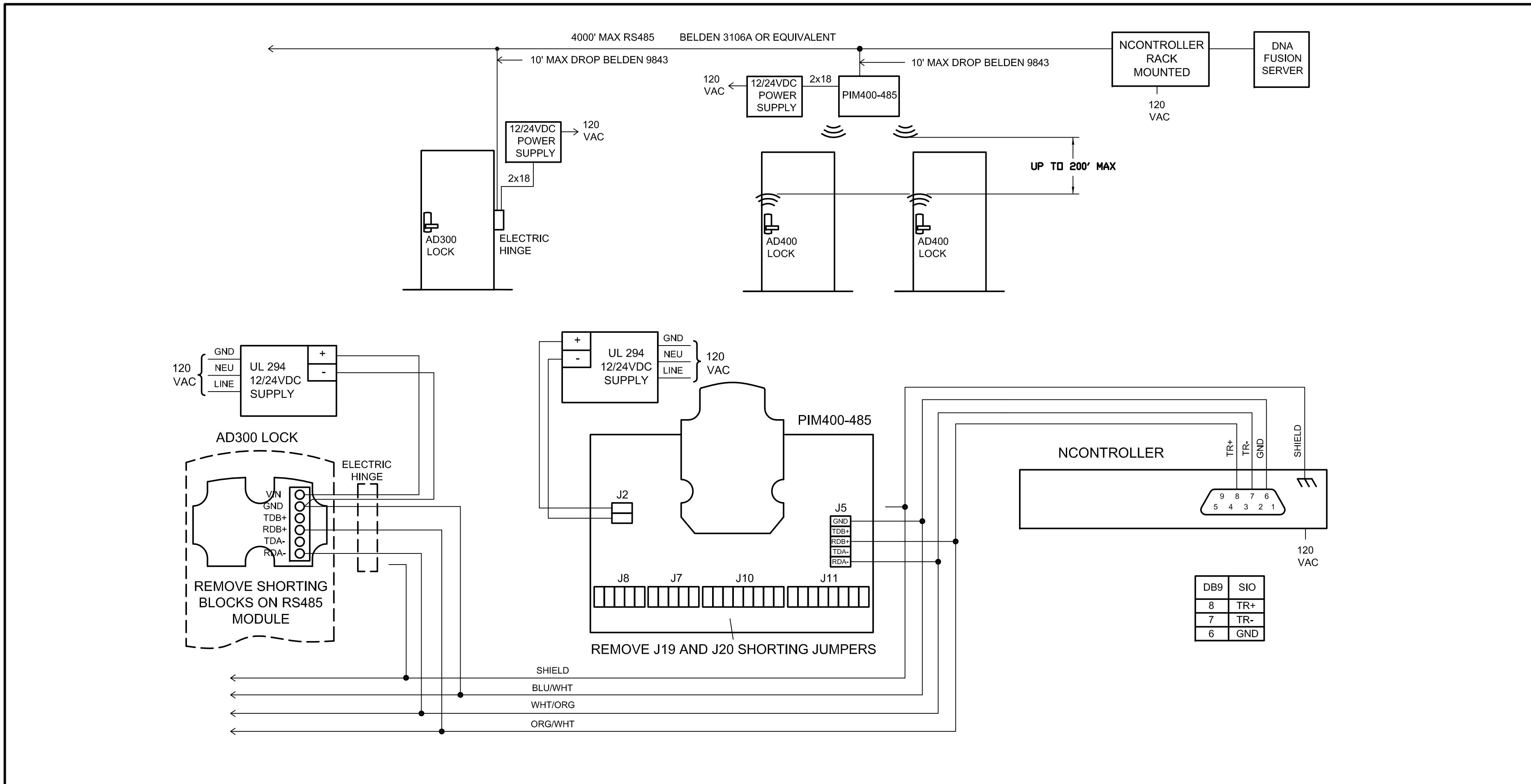
NOTE: CONFIGURATION HAS NOT BEEN TESTED BY ALLEGION BUT HAS BEEN REVIEWED AND APPROVED BY OPEN OPTIONS.

DATE DRAWN: 09-12-11	REVISION DATE: 11-05-13	APPROVED BY: WILLIAM MURPHEY 06/11/13	copyright 2013	DWG NO: 912114-5 OPENOP; DRAWN/CHECKED BY: BRENDA DOVE 08/01/12	REV E

TITLE: OPEN OPTIONS DNA FUSION SSP-EP AND AD300/301 OR PIM400-485 AD400/401

109600

NController with AD-400 & PIM400-485



DB9	SIO
8	TR+
7	TR-
6	GND

NOTES:
1) ALL LOW VOLTAGE WIRING TO BE STANDARD, MULTI-CONDUCTOR COLOR CODED WITHOUT SPLICES.

2) WIRING TO CONFORM TO APPLICABLE NATIONAL, STATE AND LOCAL ELECTRICAL CODES.

3) REFER TO SPECIFIC PRODUCT INSTALLATION INSTRUCTIONS FOR SPESCIFIC WIRING REQUIREMENTS.

4) THIS DRAWING IS FOR GRAPHICAL REPRESENTATION OF PRODUCTS DETAILED IN THE HARDWARE SET ONLY.

5) * CONDUCTOR COUNT TO BE DETERMINED BY ACCESS CONTROL PANEL PROVIDER.

OPERATION: OPEN OPTIONS DNA FUSION NCONTROLLER IS A RACK MOUNTED CONTROLLER THAT SUPPORTS UP TO SIXTY-FOUR TOTAL AD LOCKS DIVIDED ACROSS UP TO SIXTEEN DIRECT WIRED AD300 OR PIM400-485 SUPPORTING UP TO SIXTEEN AD400 EACH MAX.

EARTH GROUND SHIELD ON BELDEN 3106A RS485 LINE AT ONE LOCATION ONLY.

IF PLENUM RATED CABLE IS REQUIRED USE BELDEN 88102 OR EQUIVALENT.

UL 294 POWER SUPPLIES USED SHOULD NOT BOND EARTH GROUND TO SIGNAL GROUND.

WIRING SHOWN REFLECTS CONNECTION FROM DNA FUSION NCONTROLLER TO PIM400-485 AND AD300 ONLY. ADDITIONAL WIRING WILL BE REQUIRED THAT IS NOT SHOWN HERE.

NOTE: CONFIGURATION HAS NOT BEEN TESTED BY ALLEGION BUT HAS BEEN REVIEWED AND APPROVED BY OPEN OPTIONS.

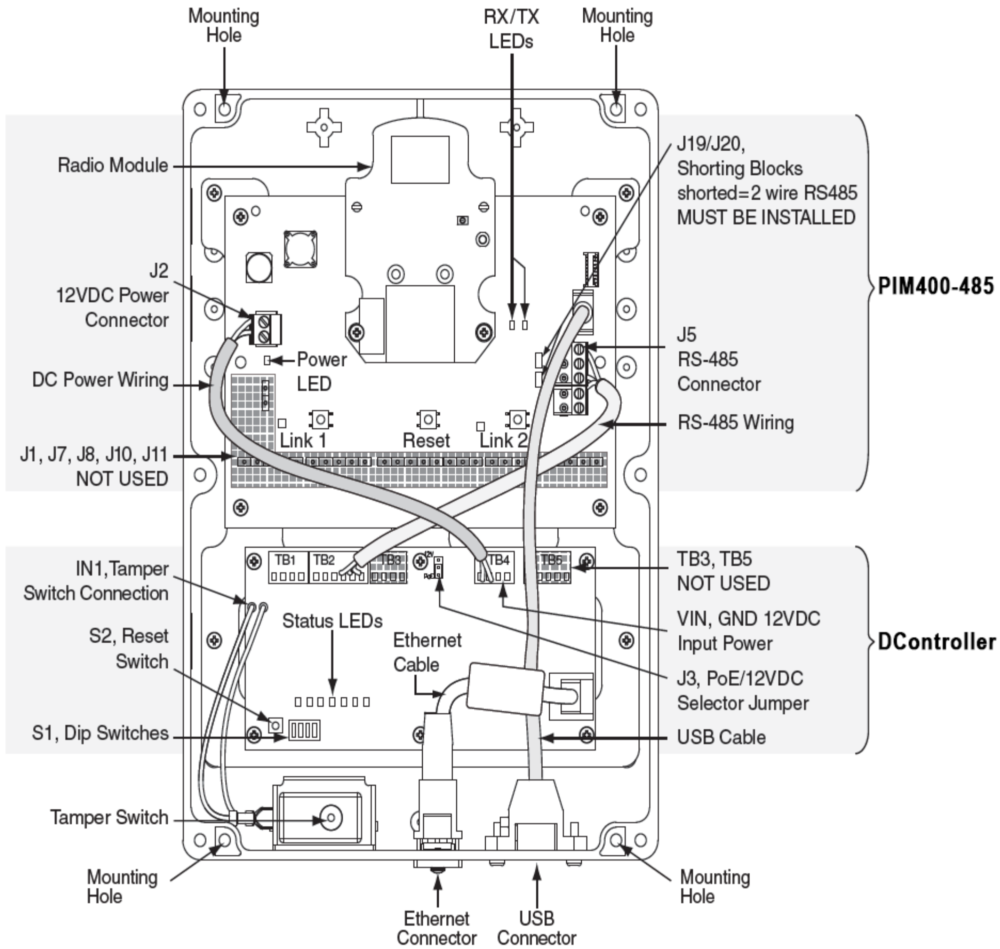
TITLE: OPEN OPTIONS DNA FUSION NCONTROLLER WITH PIM400-485 AND AD300

DATE DRAWN:	REVISION DATE:	APPROVED BY:	108997	DWG NO: 10141111-1 OPENOP	REV
10-14-11	08-28-14	WILLIAM MURPHY 11/04/11		DRAWN/CHECKED BY: BRENDA DOVE 09/21/11	D

PIM400-1501

The PIM400-1501 intelligent controller combines the PIM400-485 (Version 1) and DController boards into a single product. It can be centrally managed by an IP network connection, which allows it to communicate over an existing network without the need for additional wiring requirements such as RS-232 or RS-485 cables. The PIM400-1501 is capable of managing a combination of AD-400 locksets, WPR400 portable readers, and WRI400 reader interfaces.

The PIM400-1501 is pre-wired with external RJ-45 and USB connections. To further simplify installation, the device can receive either Power over Ethernet (PoE) or a 12 Vdc power supply.



Powering the PIM400-1501

The PIM400-1501 accepts either PoE or a UL 294 Listed 12 Vdc power supply ± 10% 900 mA maximum. If using an external power supply, locate the power source as close to the PIM400-1501 as possible. Power connections should be made with a minimum of 18 AWG wire on the PIM's J2 connector.

> **!** *Connect a battery backup to the PIM400-1501 to prevent information from being lost if the power is interrupted.*

Connecting the PIM400-1501 to DNA Fusion

The PIM400-1501 communicates to DNA Fusion via the RJ-45 connector.

1. **Connect** the RJ-45 cable to the PIM400-1501.

   The green LED on the Ethernet port will light up when connected to a live network.

2. **Connect** the opposite RJ-45 connector to the network.
3. **Continue** to Assigning an IP Address to the PIM400-1501 on page 7-14.

Assigning an IP Address to the PIM400-1501

After the PIM is connected to the network, it must be assigned an IP address using the ZeroConfig or the MercZeroConf tool. The device will be displayed as an MSC Server. See page 2-3 for more information on the hardware discovery tools.

1. **Verify** that the PIM400-1501 is connected to the network.
2. **Set** DIP Switch 2 to the ON position and all other DIP switches to OFF.
3. **Open** the MercZeroConf tool and **locate** the PIM400-1501 using the MAC address.
4. **Double-click** on the PIM400-1501.

   The Configuration screen opens.
5. **Select** Network from the dialog menu.

   The Network Properties dialog opens.
6. **Select** the Use Static IP Configuration option and **enter** the IP Address, Subnet Mask, Default Gateway, and DNS Server Address information.
7. **Click** the Save Changes & Reboot button to apply the IP configuration to the controller.

   The PIM400-1501 reboots.
8. **Set** DIP Switch 1 to the ON position and all other DIP switches to the OFF position.
9. **Cycle** power to the PIM.

Programming the PIM400-1501

In order to program the PIM400-1501, it must be coupled with the Handheld Device (HHD) via the Schlage Utility Software (SUS). When the SUS is connected to the PIM400-1501, it interrupts the RS-485 communication between the PIM400-485 and DNA Fusion. The PIM400-1501 cannot control door access during this time.

1. **Plug** the HHD into the PIM1501-400 using the supplied USB cable.
2. **Log in** to the Schlage Utility Software (SUS) as a Manager.
   The PIM400-1501 appears at the bottom as a PIM400-485 RSI.
3. **Select** Device Options.
4. **Select** PIM Properties.
5. From the Edit tab, **enter** the RS-485 Address.

   This information will be used when configuring the PIM in the DNA Fusion software (Physical Address).
6. If needed, **enter** the Low Door and High Door numbers to match the number of locks to be linked.

   Each PIM must have a unique set of door numbers.
7. **Enable** the Wakeup on Radio feature.
   See page 7-19 for information on setting up the Wakeup On Radio feature.
8. **Continue** to Linking the PIM400-1501 to an AD-400 Lock instructions below.

Linking the PIM400-1501 to an AD-400 Lock

The Schlage Utility Software (SUS) is used to place the PIM into Link Mode. For more information on the SUS, refer to the Schlage Utility Software User Guide.

1. With the PIM400 connected to the Handheld Device (HHD), **select** Device Options.
2. **Select** the PIM Properties option, then **select** the Link tab.
3. **Select** the Door Number from the drop-down list.

   The PIM400 will stay in the link mode for up to 30 minutes.
4. **Open** the AD-400 door and **hold down** the inside lever to create a Request-to-Exit (REX) condition.
5. While holding the lever, **present** a card to the reader or, if using a keypad reader, **press** the "#" key.
6. **Hold** the lever down until the AD-400's Schlage button starts to blink red.
7. **Release** the inside lever.

   If successful, the Schlage button will blink green and the beeper will sound. If the link fails, the button will blink red three (3) times and five (5) short beeps will sound.

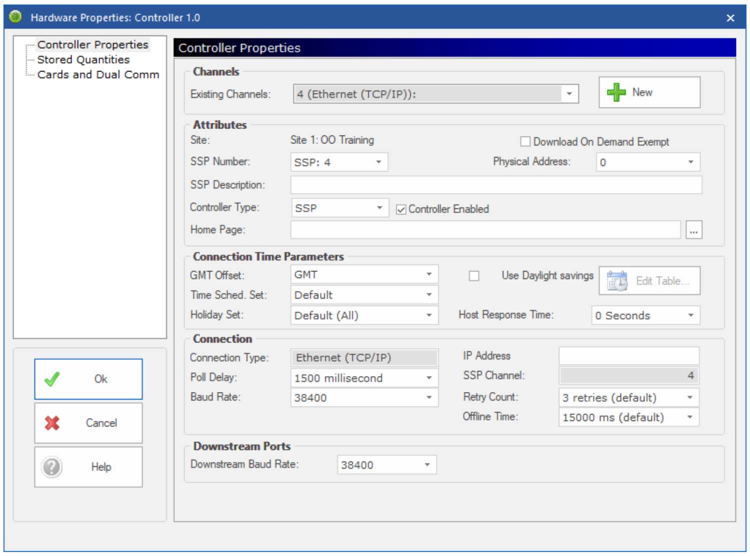
   The linked door will appear in the SUS and the PIM400 will automatically exit the Link Mode.
8. **Repeat** steps 1-7 to link all remaining AD-400 locks to the PIM400-1501.

Adding the PIM400-1501 to DNA Fusion

1. **Launch** DNAFusion.
2. From the Hardware Browser, **right-click** on the Site and **select** Add Channel.

   The Add Channel dialog appears.
3. **Configure** a TCP/IP channel and **click** OK.
4. **Right-click** on the Channel and **select** Add SSP.

   The Controller Properties dialog opens.



5. **Select** PIM400-1501 from the Controller Type drop-down.
6. **Enter** the IP Address of the PIM.
7. **Configure** the remaining properties as needed.
8. **Click** OK to save the settings.

   The PIM400-1501 appears in the Hardware Browser; **expand** the PIM400-1501 object to view the PIM400-485 subcontroller.

Adding the AD-400 Lock Doors

It is important to configure the PIM400-485 objects in a sequential order. Program the first reader, output, and inputs until all doors linked the PIM are programmed.

Identify a reader, door contact, REX, and strike for each AD-400 lock.

1. In the Hardware Browser, **expand** the PIM Subcontroller and **locate** the first Reader.
2. **Right-click** on the Reader and **select** Add Door / Use Default.

   The NEW Door dialog opens.
3. **Verify** that each door is assigned a reader, door contact, REX, and strike.
4. **Continue** adding doors in sequential order (1-15) until all doors are configured.

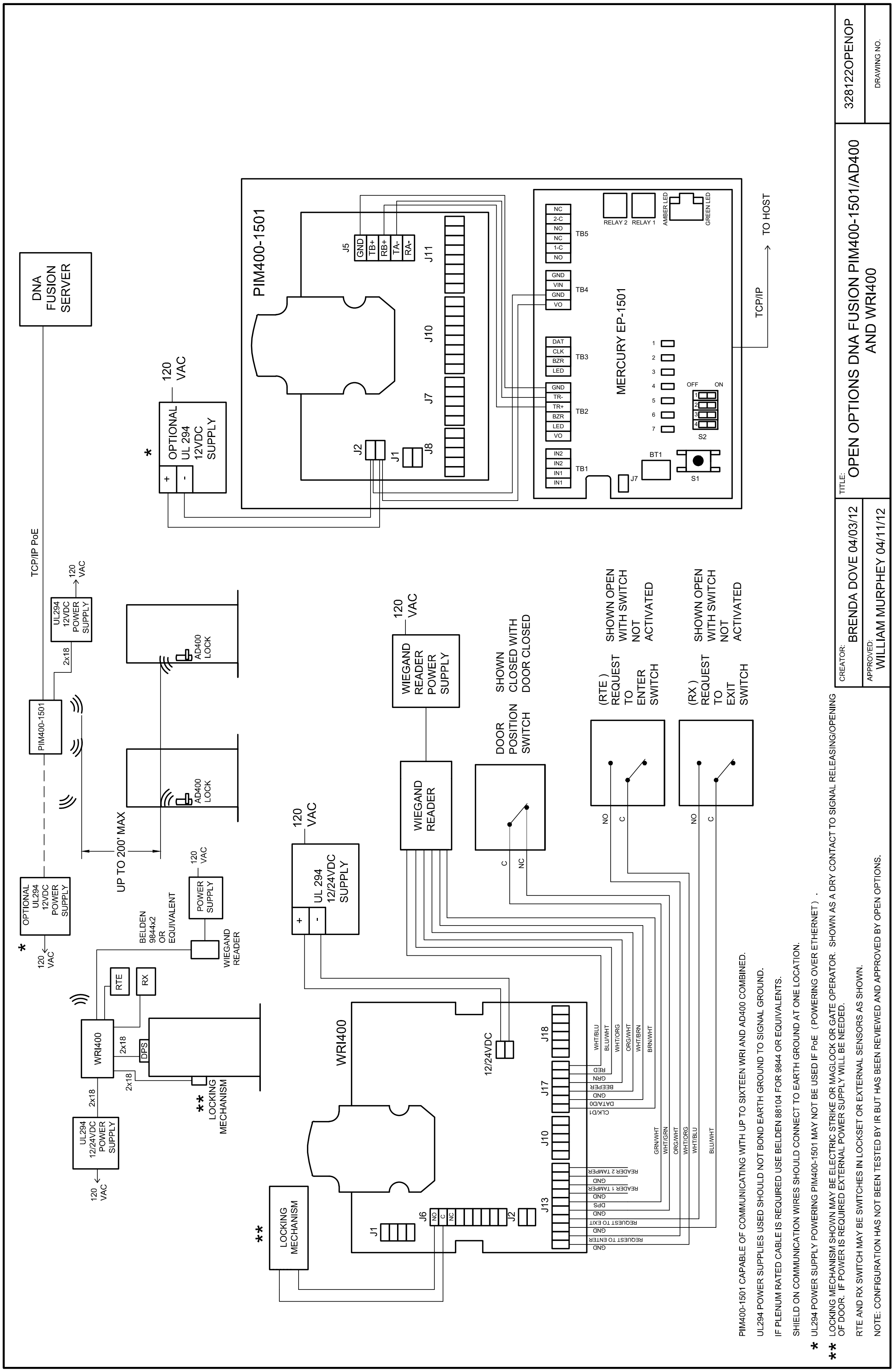
> **Verify** *that no other PIM400s are in* Link Mode *during this process; only one AD-400 can be linked at a time.*

5. **Configure** the Door Properties and **click** OK.

   Each door is added to the Hardware Browser.

> *Additional inputs and outputs are not available. The PIM400-1501 does not support wall-mount readers, AD-300s, or additional PIM400s.*

PIM400-1501 with AD-400 Connection



DIP Switch Settings

The four DIP switches on S1 configure the operating mode of the PIM400-1501 processor. DIP switches are read on power-up except where noted. Pressing the S2 button causes the DController portion of the PIM400-1501 to reset. The PIM400-485 portion has a separate reset button.

Description	S1	S2	S3	S4
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
Factory Default Network Connection Parameters • Network: Static IP Address = 192.168.0.251 • Subnet Mask: 255.255.0.0 • Default Gateway: 192.168.0.1 • DNS Server: 192.168.0.1 • Host Port: IP Server, No Encryption, Port 3001 • Communication Address: 0	OFF	ON	OFF	OFF
OEM Default Communication Parameters With the Schlage OEM code, the network connection parameters are set by DHCP. The DHCP host name is "MAC" followed by the 12-digit MAC address of the device (e.g., MACxxxxxxxxxxxx). If a different OEM code besides Schlage is loaded into the PIM400-1501, the OEM default communication parameters may be different than DHCP.	ON	ON	OFF	OFF
Disable TLS secure link; switch is only read when logging on.	OFF	OFF	ON	OFF
Enable auto DHCP assignment; assigns a default IP address to the controller.	ON	ON	ON	ON

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

Status LEDs

DController		
LED	**Description**	**Indicator**
1	Online/Offline and Battery Status	Online = 80% ON, Offline = 20% ON Double Flash = Low Battery
2	Host Communication Activity	Flashing = Host Activity
3	Readers (Combined) Reader 1 Activity	Clock/Data or D1/D0 Mode = Flashes when data is received on either port
		RS-485 = Flashes when data is transmitted on either port
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

Status LEDs (Cont.)

PIM400-485*		
LED	**Description**	**Indicator**
D3	Power/Tamper Status	Solid GREEN = Power Applied
1	Link 1 Status	Alternating RED/GREEN Flashing = Link Mode More GREEN Flashing than RED = Strong Wireless Link More RED Flashing than GREEN = Weak Wireless Link LED 1: RED Flashing = Communicating with Even # AD400 Lock LED 2: RED Flashing = Communicating with Odd # AD400 Lock
2	Link 2 Status	
D4/D5	Data Transmit/Receive (RX/TX)	RX and TX Flashing = RS-485 Communication with DController / USB Communication with HHD RX and TX Alternating Flash = Coupling Mode

*The PIM400-1501 uses Version 1 of the PIM400-485. See page 7-8 for Version 2 status LEDs.

Reset/Coupling/Bulk Erase

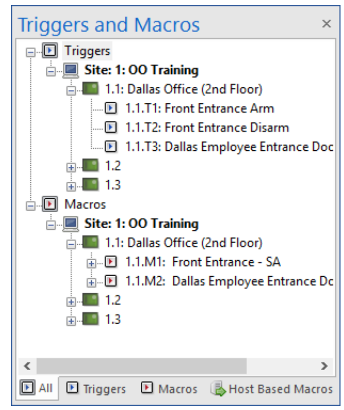
Setting	Description
Factory Default Reset	**Press** and **hold** the LINK1 and LINK2 buttons for three (3) seconds and **release**.
Coupling	**Press** and **hold** the LINK1 button, then **press** the LINK2 button three (3) times.
Bulk Erase Configuration Memory	With power OFF, **set** DIP switches 1 & 2 to ON and 3 & 4 to OFF. **Apply** power and change DIP switch 1 or 2 to OFF within ten (10) seconds.

Wakeup on Radio Feature

The Wakeup on Radio feature allows the DNA Fusion operator to momentarily unlock an AD-400 door.

1. With the HHD plugged into the PIM, **open** the Schlage Utility Software (SUS), **click** on Device Options and **select** PIM Properties.
2. **Click** the Edit tab and **verify** that the Wakeup feature is set to Enabled.
3. **Enable** the Dynamic Channel Switching feature and **click** the Save option to save the PIM settings.
4. **Close** the SUS and **disconnect** the HHD from the PIM.
5. **Launch** DNA Fusion and **click** the Triggers & Macros button on the Standard Toolbar.

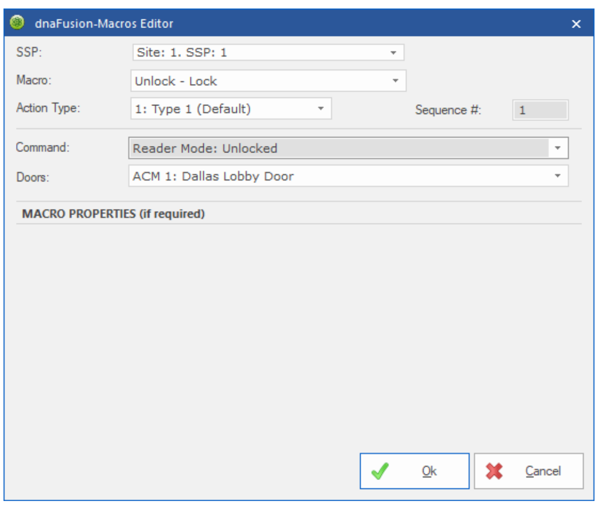
   The Triggers & Macros Browser opens.

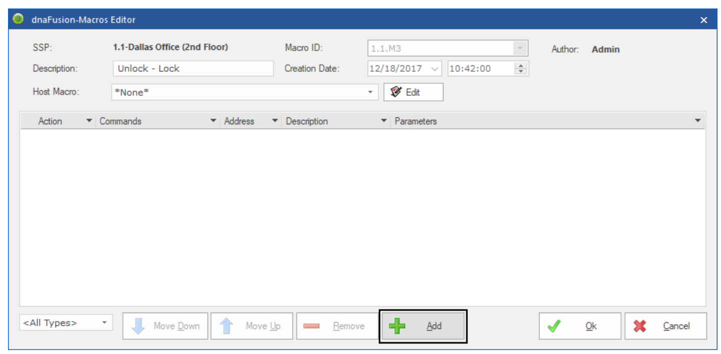


6. **Expand** the Macros option to the desired Controller.
7. **Right-click** on the Controller and **select** Add Macro from the context menu.

   The Macros Editor dialog opens.
8. **Enter** a Description and **click** the OK button.
9. **Right-click** on the Macro created in Step 8 and **select** Add Command.

   The Macros Editor dialog appears.
10. From the Command drop-down, **select** Reader Mode: Unlocked.
11. **Select** the desired door from the ACM drop-down list and **click** OK to save the macro command.





Alternatively, ***double-click*** *on the* Macro *created in Step 8 to open the* Macros Editor *dialog and* ***click*** *the* Add *button to add the* Macro Command(s)*.*

12. **Right-click** on the Macro created in Step 8 and **select** Add Command.
13. From the Command drop-down, **select** TM: Delay Command.
14. **Select** or **enter** a Delay time and **click** OK to save the command.
15. **Add** another Macro Command and **select** Reader Mode: Card Only (or the default door mode).
16. **Click** OK to save the command.
17. **Create** a Trigger to fire the macro. For more information, see Chapter 10 in the DNA Fusion User Manual.

    The door release type determines the Trigger Event. If an input point will be used, **select** MP: Monitor Point Active.

The Cabinet Tamper *input on the PIM must be in a* Secure *state in order for the* Wakeup on Radio *feature to work properly. If the PIM is in a* Tamper *state, the* Wakeup *feature will not function properly.*

NOTES:

Specifications

The AD-400 interface is for use in low-voltage, Class 2 circuits only.

Electrical:	*Voltage:*	12 to 24 Vdc @ 250 mA max. / 1,000’ max.
RS-485 Comm Cable:		4,000’ (1,200 m) max., 24 AWG min.

Specifications are subject to change without notice.

For more information on the PIM-400 or AD-400, visit the following webpage:

https://us.allegion.com/en/home/products/brands/schlage.html

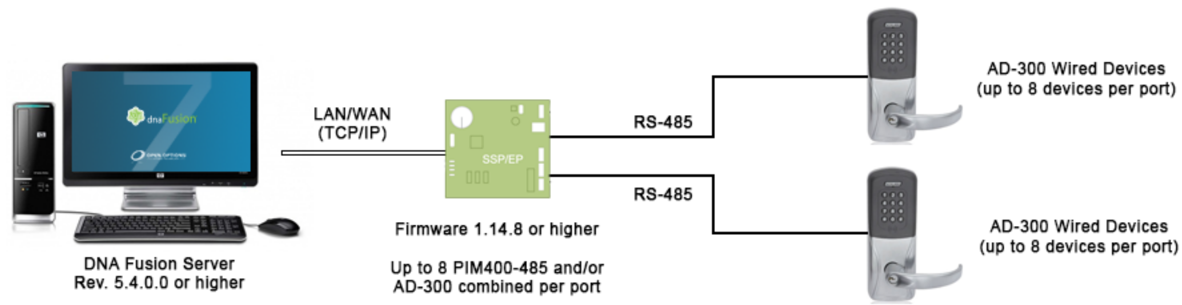
NOTES:

AD-300 Hardwired System

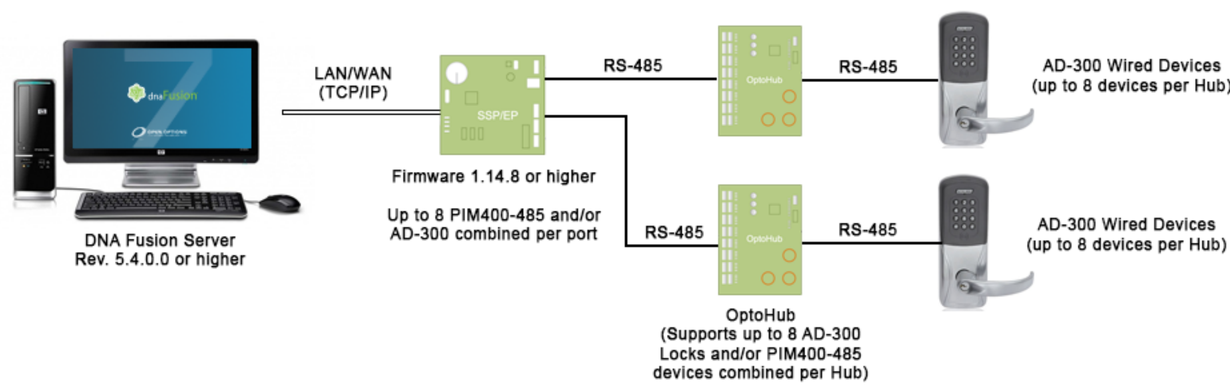
The AD-300 hardwired networked lock integrates with the Open Options SSP-EP and NController products and provides instant control of the access control system. A maximum of 16 AD-300 locks (8 per port) can be added to each controller.

The OptoHub, an eight-port optically isolated multiplexer, can be used with the SSP-EP to provide a star configuration for communications.

AD-300 Hardwired with RS-485 Multidrop



AD-300 Hardwired with RS-485 OptoHub in Star Configuration



Configuration Types

The AD-300 locks can be connected to the DNA Fusion access control system by wiring them directly to the SSP-EP or NController.

SSP-EP

The AD-300 locks are wired directly to the RS-485 downstream ports on the SSP-EP, and are programmed individually using the Schlage Handheld Device (HHD). See page 7-25 for more information.

NController

The AD-300 locks are wired directly to the DB-9 connection on the NController, and are programmed individually using the Schlage Handheld Device (HHD). See page 7-27 for more information.

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SSP-EP to AD-300 Lock Installation

The AD-300 locks are wired directly to the downstream ports on the SSP-EP and are programmed individually using the Handheld Device (HHD).

Communicating with the AD-300

1. **Install** the AD-300 lock.

   For more information, see the installation guide that was provided with the lock, or visit www.allegion.com/us (see Support > Schlage Electronics > Electronic Locks Technical Library).
2. **Verify** that the power supply is properly connected.
3. **Test** the lock for proper mechanical and electronic operation.

   See the Schlage AD-300 User Guide for more information.
4. **Connect** the lock to the SSP-EP.

   See the wiring instructions below.
5. **Configure** the lock using the Schlage Handheld Device (HHD).

   See the Schlage Utility Software User Guide for more information.

Connecting the AD-300 to the SSP-EP

1. **Remove** the End-of-Line (EOL) Termination jumper from the SSP-EP.
2. In DNA Fusion, **set** the SSP-EP's Baud Rate to 9,600 for the downstream port(s) connected to the AD-300 lock(s).

   See Adding the AD-300 Locks to DNA Fusion on page 7-26.

Wiring a Lock to the SSP-EP

Use shielded twisted-pair cables (min. 24 AWG) to connect the AD lock(s) to the SSP-EP on Ports 2 and/or 3. The table below describes the wiring connections.

SSP-EP	AD-300	Description
TR+	TDB-	Transmit Data (+)
TR-	TDB+	Transmit Data (-)
GND	GND	Signal Ground

When the lock is added to DNA Fusion, the selected port must match the configured port. Ports configured for Allegion locks will NOT communicate with Mercury subcontrollers.

Powering the AD-300 Lock

The AD-300 must be used with a UL 294 Listed power supply capable of sourcing at least 250 mA @ 12 or 24 Vdc. Use twisted pairs (min. 18 AWG) for communication.

Connect the AD Lock to a power supply using the connections in the table below.

Power Supply	AD Lock
+	VIN
GND	GND

See the Schlage AD-300 User Guide for more information.

Programming the AD-300 Locks

In order to program the locks, the Handheld Device (HHD) must be coupled with the AD-300 lock. See page 19 in the SUS User Guide for more information.

1. **Verify** the wiring from the controller to the AD-300 lock.
2. **Plug** the HHD into the AD-300 using the supplied USB cable.
3. **Log in** to the Schlage Utility Software (SUS) as a Manager.
4. To begin the linking process, **press** the Schlage button on the AD-300 lock twice.

   The AD-300 will appear at the bottom of the screen.
5. **Select** Device Options.
6. **Select** Lock Properties.

   For setting definitions, see pages 26 through 28 in the SUS User Guide.
7. From the Edit tab, **select** a Unique RS-485 Address.

   This information will be used when configuring the PIM in the DNA Fusion software (Physical Address).
8. **Click** the Save button.
9. **Select** the Reader tab and make any necessary changes.
10. **Click** the Save button.
11. **Continue** to Adding the AD-300 Locks to DNA Fusion section below.

Adding the AD-300 Locks to DNA Fusion

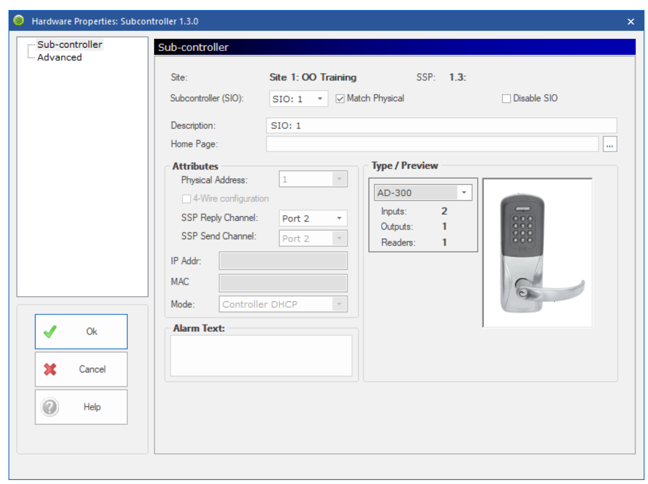
After all the AD-300 locks have been programmed, they must be added to the DNA Fusion system.

1. **Launch** DNA Fusion.
2. **Right-click** on the SSP-EP that is attached to the AD-300 lock(s) and **select** Properties.

   The Controller Properties dialog opens.
3. In the Downstream Ports section, **set** the Baud Rate to 9600 for the port(s) attached to the AD-300 lock(s).
4. **Click** OK to save the settings.
5. **Right-click** on the Controller in the Hardware Browser and **select** Add / Add Subcontroller.

   The Subcontroller Properties dialog opens.
6. **Select** AD-300 from the Type / Preview drop-down.
7. **Verify** that the Physical Address (set in Step 7 - Programming the AD-300 Locks) and the SSP Reply Channel are correct. If needed, change the address and/or port to the correct setting(s).
8. **Click** OK to add the subcontroller to the system.

   The AD-300 lock appears in the Hardware Browser.



Configuring the Doors

1. In the Hardware Browser, **expand** the AD-300 Subcontroller object.
2. **Right-click** on the Reader and **select** Add Door / Use Default.

   The NEW Door dialog opens.
3. **Configure** the Door Properties and **click** OK.

   The door is added to the DNA Fusion system.

NController to AD-300 Lock Installation

The AD-300 locks are wired directly to the DB-9 connection on the NController and are programmed individually using the Handheld Device (HHD).

Communicating with the AD-300

1. **Install** the AD-300 lock.

   For more information, see the installation guide that was provided with the lock, or visit www.allegion.com/us (see Support > Schlage Electronics > Electronic Locks Technical Library).
2. **Verify** that the power supply is properly connected.
3. **Test** the lock for proper mechanical and electronic operation.

   See the Schlage AD-300 User Guide for more information.
4. **Connect** the lock to the NController.

   See the wiring instructions below.
5. **Configure** the lock using the Schlage Handheld Device (HHD).

   See the Schlage Utility Software User Guide for more information.

A power supply is required to power the subcontrollers and door hardware.

Wiring the Lock to the NController

Use shielded twisted-pair cables (min. 24 AWG) to connect the AD lock(s) to the NController's female DB-9 connection. The table below describes the wiring connections.

DB-9	AD-300	Description
8	TDB+	Transmit Data (+)
7	TDB-	Transmit Data (-)
6	GND	Signal Ground

When the lock is added to DNA Fusion, the selected port must match the configured port. Ports configured for Allegion locks will NOT communicate with Mercury subcontrollers.

Powering the AD-300 Lock

The AD-300 must be powered by a UL 294 Listed power supply capable of sourcing at least 250 mA @ 12 or 24 Vdc. Use twisted pairs (min. 18 AWG) for communication.

Connect the AD Lock to a power supply as described in the table below.

Power Supply	AD Lock
+	VIN
GND	GND

See the Schlage AD-300 User Guide for more information.

Programming the AD-300 Locks

In order to program the locks, the Handheld Device (HHD) must be coupled with the AD-300 lock. See page 19 in the SUS User Guide for more information.

1. **Verify** the wiring from the controller to the AD-300 lock.
2. **Plug** the HHD into the AD-300 using the supplied USB cable.
3. **Log in** to the Schlage Utility Software (SUS) as a Manager.
4. To begin the linking process, **press** the Schlage button on the AD-300 lock twice.

   The AD-300 will appear at the bottom of the screen.
5. **Select** Device Options.
6. **Select** Lock Properties.

   For setting definitions, see pages 26 through 28 in the SUS User Guide.
7. From the Edit tab, **select** a Unique RS-485 Address.

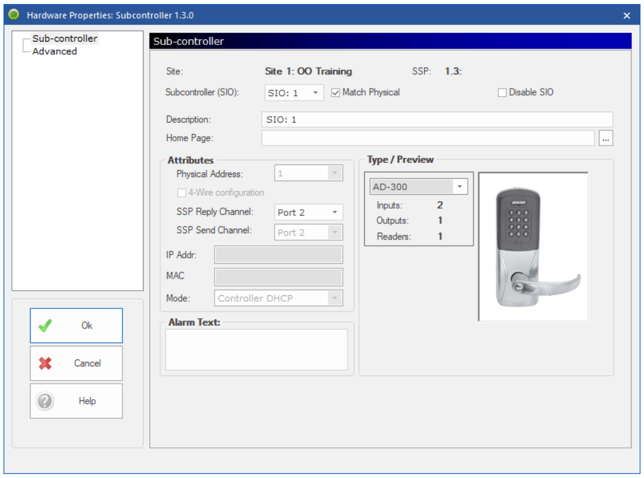
   This information will be used when configuring the PIM in the DNA Fusion software (Physical Address).
8. **Click** the Save button.
9. **Select** the Reader tab and make any necessary changes.
10. **Click** the Save button.
11. **Continue** to Adding the AD-300 Locks to DNA Fusion section below.

Adding the AD-300 Locks to DNA Fusion

After all the AD-300 locks have been programmed, they must be added to the DNA Fusion system.

1. **Launch** DNA Fusion.
2. **Right-click** on the SSP-EP attached to the AD-300 lock(s) and **select** Properties.

   The Controller Properties dialog opens.
3. In the Downstream Ports section, **set** the Baud Rate to 9600 for the port(s) attached to the AD-300 lock(s).



4. **Click** OK to save the settings.
5. **Right-click** on the Controller in the Hardware Browser and **select** Add / Add Subcontroller.

   The Subcontroller Properties dialog opens.
6. **Select** AD-300 from the Type / Preview drop-down.
7. **Verify** that the Physical Address (set in Step 7 - Programming the AD-300 locks) and the SSP Reply Channel are correct. If needed, change the address and/or port to the correct settings.
8. **Click** OK to add the subcontroller to the system.

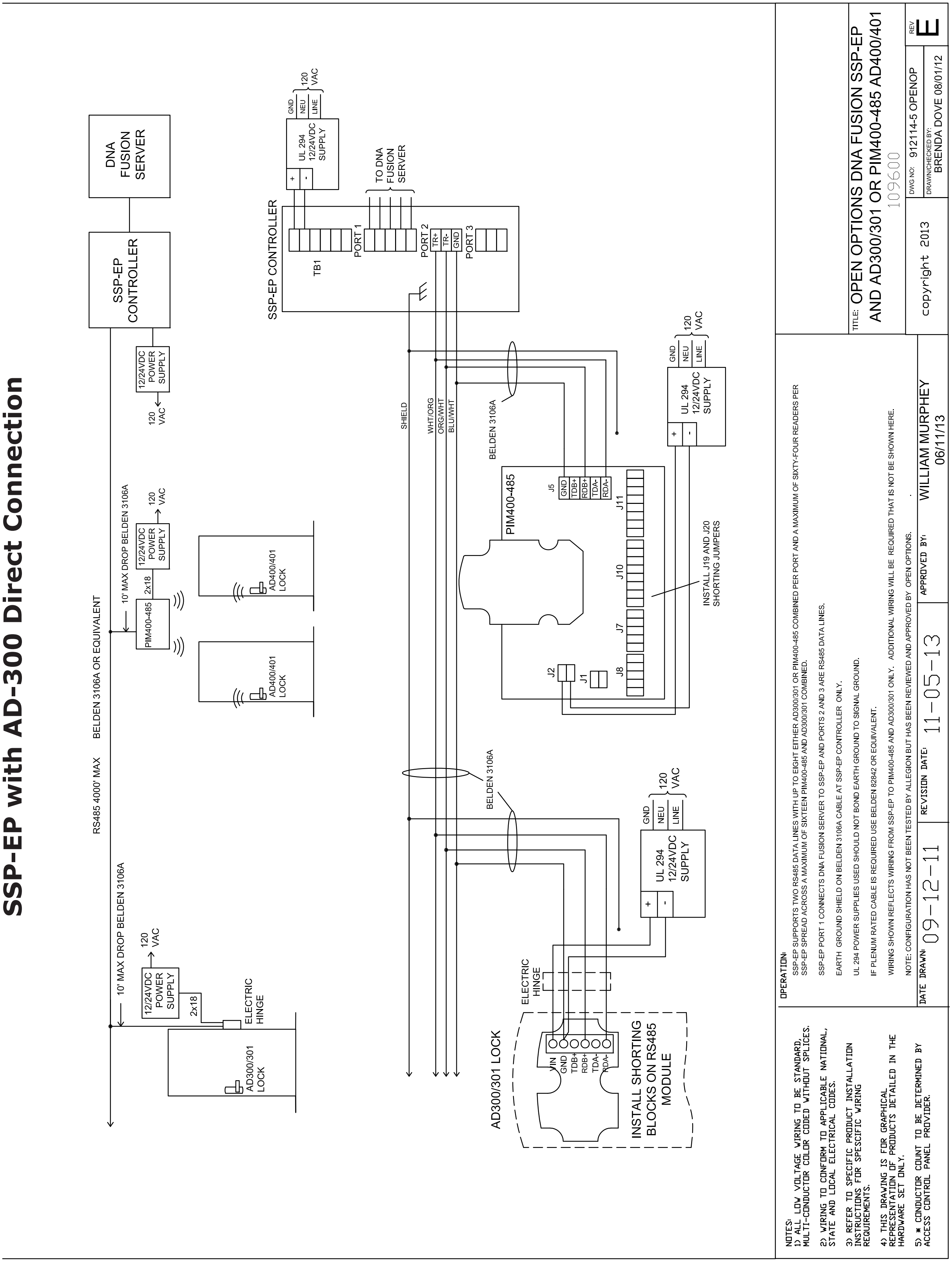
   The AD-300 lock appears in the Hardware Browser.

Configuring the Doors

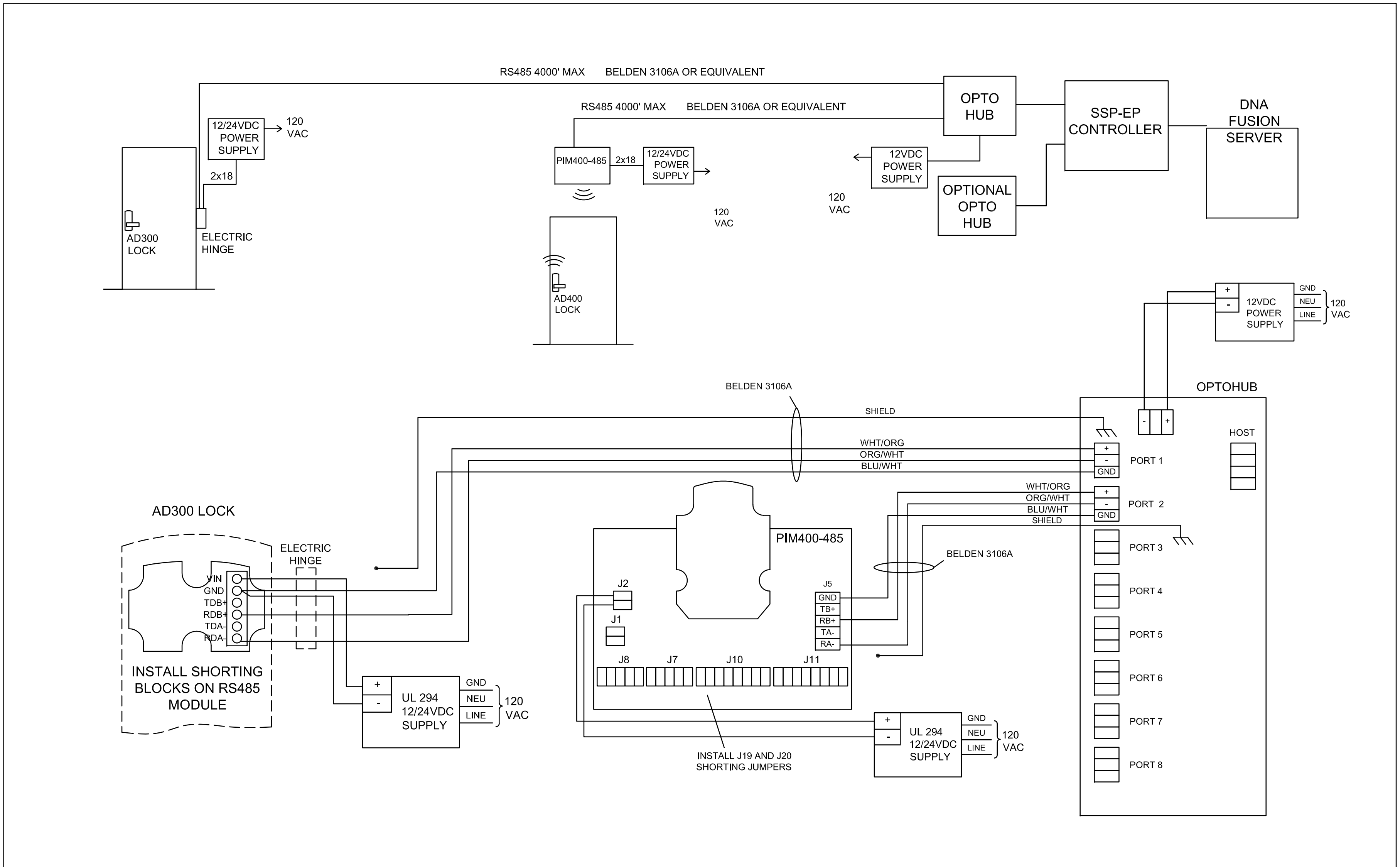
1. In the Hardware Browser, **expand** the AD-300 Subcontroller object.
2. **Right-click** on the Reader and **select** Add Door / Use Default.

   The NEW Door dialog opens.
3. **Configure** the Door Properties and **click** OK.

   The door is added to the DNA Fusion system.


SSP-EP with AD-300 Direct Connection
DNA FUSION SERVER
SSP-EP CONTROLLER
12/24VDC POWER SUPPLY
120 VAC
RS485 4000' MAX
BELDEN 3106A OR EQUIVALENT
10' MAX DROP BELDEN 3106A
PIM400-485
2x18
AD400/401 LOCK
ELECTRIC HINGE
AD300/301 LOCK
SSP-EP CONTROLLER
UL 294 12/24VDC SUPPLY
GND NEU LINE
TO DNA FUSION SERVER
TB1
PORT 1
PORT 2
TR+ TR- GND
PORT 3
SHIELD
WHT/ORG
ORG/WHT
BLU/WHT
BELDEN 3106A
J5
GND TDB+ RDB+ TDA- RDA-
J11 J10 J7 J8 J2 J1
INSTALL J19 AND J20 SHORTING JUMPERS
VIN GND TDB+ RDB+ TDA- RDA-
INSTALL SHORTING BLOCKS ON RS485 MODULE
NOTES:
1) ALL LOW VOLTAGE WIRING TO BE STANDARD, MULTI-CONDUCTOR COLOR CODED WITHOUT SPLICES.
2) WIRING TO CONFORM TO APPLICABLE NATIONAL, STATE AND LOCAL ELECTRICAL CODES.
3) REFER TO SPECIFIC PRODUCT INSTALLATION INSTRUCTIONS FOR SPESCIFIC WIRING REQUIREMENTS.
4) THIS DRAWING IS FOR GRAPHICAL REPRESENTATION OF PRODUCTS DETAILED IN THE HARDWARE SET ONLY.
5) * CONDUCTOR COUNT TO BE DETERMINED BY ACCESS CONTROL PANEL PROVIDER.
OPERATION:
SSP-EP SUPPORTS TWO RS485 DATA LINES WITH UP TO EIGHT EITHER AD300/301 OR PIM400-485 COMBINED PER PORT AND A MAXIMUM OF SIXTY-FOUR READERS PER SSP-EP SPREAD ACROSS A MAXIMUM OF SIXTEEN PIM400-485 AND AD300/301 COMBINED.
SSP-EP PORT 1 CONNECTS DNA FUSION SERVER TO SSP-EP AND PORTS 2 AND 3 ARE RS485 DATA LINES.
EARTH GROUND SHIELD ON BELDEN 3106A CABLE AT SSP-EP CONTROLLER ONLY.
UL 294 POWER SUPPLIES USED SHOULD NOT BOND EARTH GROUND TO SIGNAL GROUND.
IF PLENUM RATED CABLE IS REQUIRED USE BELDEN 82842 OR EQUIVALENT.
WIRING SHOWN REFLECTS WIRING FROM SSP-EP TO PIM400-485 AND AD300/301 ONLY. ADDITIONAL WIRING WILL BE REQUIRED THAT IS NOT BE SHOWN HERE.
NOTE: CONFIGURATION HAS NOT BEEN TESTED BY ALLEGION BUT HAS BEEN REVIEWED AND APPROVED BY OPEN OPTIONS.
DATE DRAWN: 09-12-11
REVISION DATE: 11-05-13
APPROVED BY: WILLIAM MURPHEY 06/11/13
TITLE: OPEN OPTIONS DNA FUSION SSP-EP AND AD300/301 OR PIM400-485 AD400/401
copyright 2013
109600
DWG NO: 912114-5 OPENOP
DRAWN/CHECKED BY: BRENDA DOVE 08/01/12
REV E

SSP-EP with OptoHub and AD-300 Direct Connection



NOTES:
1) ALL LOW VOLTAGE WIRING TO BE STANDARD, MULTI-CONDUCTOR COLOR CODED WITHOUT SPLICES.

2) WIRING TO CONFORM TO APPLICABLE NATIONAL, STATE AND LOCAL ELECTRICAL CODES.

3) REFER TO SPECIFIC PRODUCT INSTALLATION INSTRUCTIONS FOR SPESCIFIC WIRING REQUIREMENTS.

4) THIS DRAWING IS FOR GRAPHICAL REPRESENTATION OF PRODUCTS DETAILED IN THE HARDWARE SET ONLY.

5) * CONDUCTOR COUNT TO BE DETERMINED BY ACCESS CONTROL PANEL PROVIDER.

OPERATION:
EACH OPTO HUB SUPPORTS UP TO EIGHT AD300 LOCKS EACH OR A MAXIMUM TOTAL OF SIXTEEN AD300 LOCKS OR PIM400-485 PER SSP-EP.

WIRING SHOWN REFLECTS WIRING FROM OPTOHUB TO AD300 AND PIM400-485 ONLY. ADDITIONAL WIRING WILL BE REQUIRED THAT IS NOT BE SHOWN HERE.

EARTH GROUND SHIELD ON BELDEN 3106A AT OPTOHUB ONLY.

UL294 POWER SUPPLIES USED SHOULD NOT BOND EARTH GROUND TO SIGNAL GROUND.

IF PLENUM RATED CABLE IS REQUIRED USE BELDEN 82842 OR EQUIVALENT.

NOTE: CONFIGURATION HAS NOT BEEN TESTED BY ALLEGION BUT HAS BEEN REVIEWED AND APPROVED BY OPEN OPTIONS.

DATE DRAWN:	REVISION DATE:	APPROVED BY:
09-21-11	11-07-13	WILLIAM MURPHY 11/04/11

TITLE: OPEN OPTIONS DNA FUSION SSP-EP OPTO HUB AND AD300

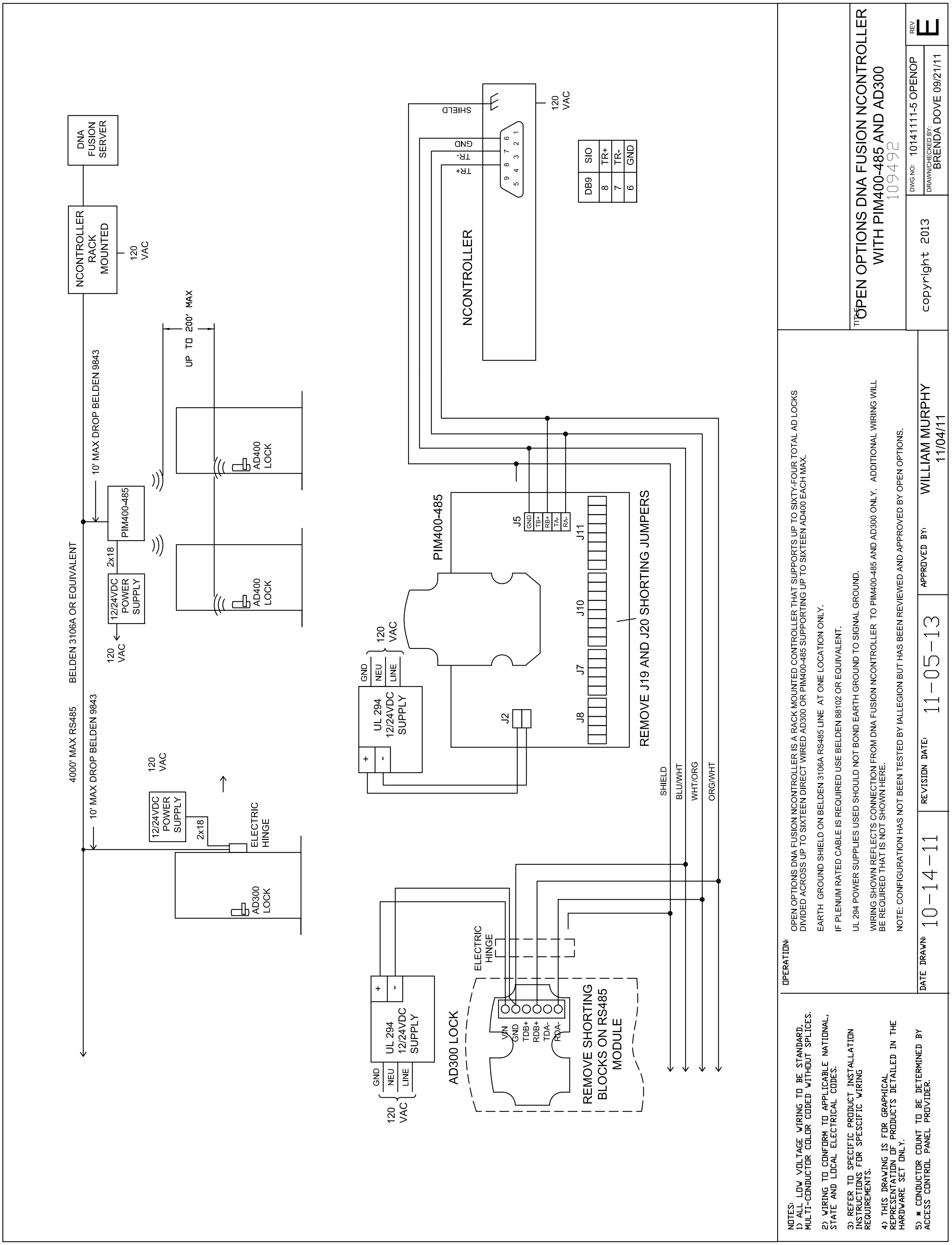
109494

DWG NO: 912115-5 OPENOP

DRAWN/CHECKED BY: BRENDA DOVE 09/21/11

REV E

SSP-EP with PIM400-485 and AD-300 Direct Connection



NOTES:

Specifications

The AD-300 interface is for use in low-voltage, Class 2 circuits only.

Electrical:	*Voltage:*	12 to 24 Vdc @ 250 mA max. / 1,000’ max.
RS-485 Comm Cable:		4,000’ (1,200 m) max., 24 AWG min.

Specifications are subject to change without notice.

For more information on the AD-300 series, visit the following webpage:

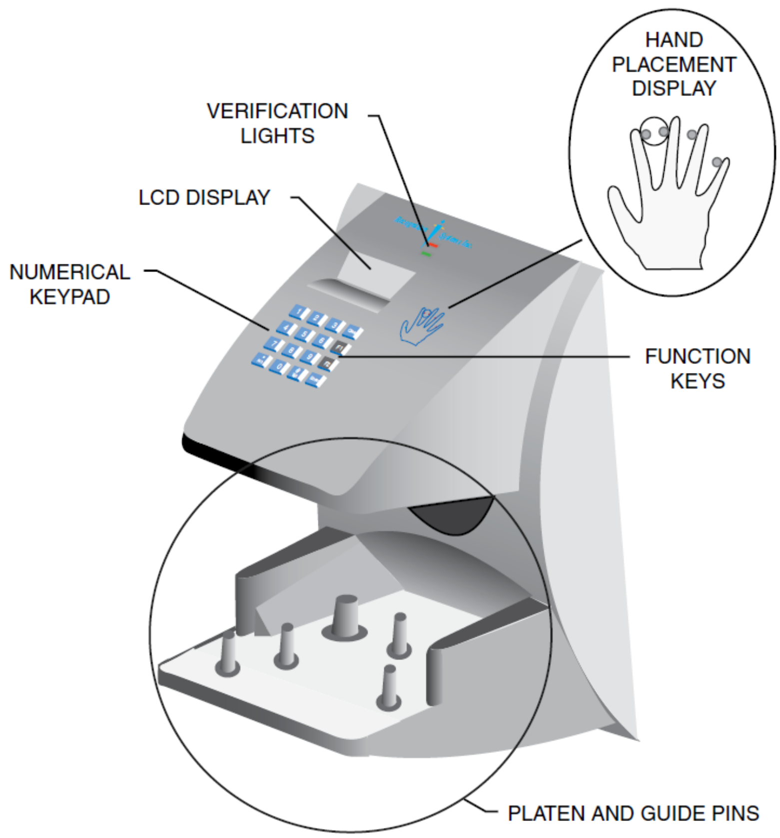
https://us.allegion.com/en/home/products/brands/schlage.html

NOTES:

HandKey II Reader

The HandKey II (HK-II) system, also referred to as a HandReader, records and stores the three-dimensional shape of the human hand for comparison and identity verification. To gain access, the user enters his or her ID number on the HandReader's keypad or uses an external card reader. The HandReader prompts the user to place their hand on the reader's platen and then compares the hand to the user's unique template. If the images match, the user's ID number is sent to DNA Fusion for processing.

The HK-II system interfaces with DNA Fusion through the Biometric Reader Interface Gateway (GTWY-B). DNA Fusion allows the operator to configure any HandKey II Biometric Reader to be an Enrollment terminal via checkbox selection. The HandReader communicates to the DNA Fusion system through an SSP-EP or SSP-D2 controller combined with the GTWY-B. Up to eight (8) HK-II readers can be linked per GTWY-B. The HK-II units are linked to the RSC-1 and RSC-2 boards via DNA Fusion.



The HandKey II is UL Listed as a standalone unit only (i.e. the card reader function has not been evaluated by UL). It not been tested for UL 294 in an outdoor configuration.

Setup Order

When setting up the HandReader, programming and operations should be performed in a specific order. See the Schlage HK-II Terminal User Guide for more information.

1. **Install** and **configure** the DNA Fusion server.

   See the Technical Installation Manual for more information.

2. **Install** the DNA Fusion client that will serve as the Biometric Enrollment Workstation.
3. If required, **wire** the designated HandKey II Reader to the Enrollment Workstation.

   See page 7-36 for more information.

4. **Install** the Biometric Reader Interface Gateway (GTWY-B) and the remaining HK-II units.
5. **Configure** and **program** the hardware within DNA Fusion.
6. **Enroll** the cardholders' biometric templates.

Configuring the HandKey II Readers and the GTWY-B

Connecting the HandKey II Enrollment Reader

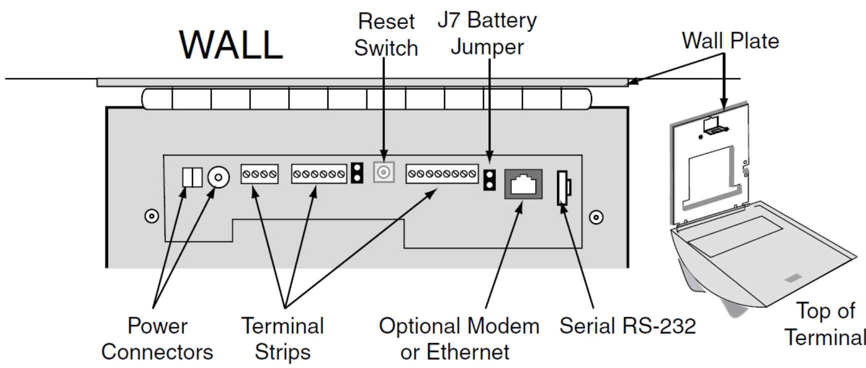
At least one (1) RSI reader must be configured as an enrollment reader to capture a cardholder's biometric information. The enrollment reader should be connected directly to the enrollment workstation via an RS-232 or RJ-45 interface. The enrollment reader does not need to be wired to the GTWY-B.

1. **Connect** PINs 1 and 2 on the power terminal.

   OR

   Connect the barrel jack J12.

   The HandReader requires 12 to 24 Vdc (600 mA) or 12 to 24 Vac (7 watts).



2. **Connect** the HandReader to the enrollment workstation.
   - If connecting the HandReader via RS-232, use the following table to wire the DB-9 pinout:

PIN	SIGNAL	DB-9 PIN
1	GND	5
2	TXD	3
3	RXD	2

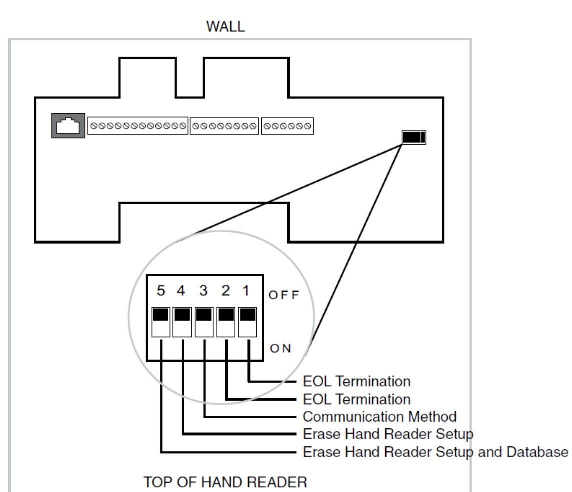
   - If connecting the HandReader via RJ-45, connect the Ethernet cable to the optional Ethernet port.

3. For Version F1 HandKey units, **set** the five (5) RSI DIP switches to the OFF position.

   To reset the default configuration, **set** DIP switches 4 and 5 to the ON position and **power up** the unit.

4. After five (5) seconds, **set** the DIP switches to the OFF position and **cycle** the unit's power. If the DIP switches are left in the ON position, all configuration information will be lost.

> *Version F3 HandKey units do not have DIP switches.*



Configuring the HandKey II Reader for Enrollment

1. With the HK-II OFF, **press** the Reset button on the back of the unit.
2. **Turn** the unit ON, **wait** five (5) seconds, and **release** the Reset button.

   The LCD screen will display the following message:

   RESET: 1. SETUP

   9. ALL
3. **Press** 1 to select the Setup option.
4. **Press** the Clear and Enter keys simultaneously to enter a command menu.

   ENTER PASSWORD will appear on the display.
5. **Press** 2 and ENTER to access the Setup menu.

   The Setup menu contains twelve (12) commands that set the basic operating parameters for the HandReader.

   # YES: **Enter** the command shown on the display.

   * NO: **Step** to the next command in the menu.

   CLEAR: **Exit** the command menu (pressing any numeric key also exits the command menu). To completely exit the command from a sub-menu, **press** the Clear key multiple times.
6. If needed, **press** YES to set the language or NO to move to the next menu item.

   The default language is English.
7. **Press** YES to enter the Date Format menu.
8. **Press** NO to scroll through the Date Format options; when the desired format is displayed, **press** YES to select the format.
9. **Press** NO to move to the Time and Date menu.
10. **Press** YES to enter the Time and Date menu.
11. **Use** the buttons on the HK-II unit to define the parameters; **press** ENTER to move to the next parameter or **press** CLEAR to delete an entry.

    The date is set in the following format:

    - Month (MM) - January = 01, incrementing to December = 12
    - Day (DD) - 01 through 31
    - Year (YY) - Enter the last two digits of the current year (e.g. 2001 = 01)

    Time is kept using a 24-hour clock. The time is set in the following format:

    - Hour (HH) - 00 to 23
    - Minute (MM) - 00 to 59
12. **Press** NO to move through the following menus: Set Address, Set ID Length, Set Facility, and Aux Out Control.

    These command menus are not used for the enrollment unit.
13. **Press** YES to enter the Set Reader Mode menu.
14. If needed, **press** NO to pass the TO MASTER option and/or **press** YES to select the TO REMOTE option. If an address prompt is displayed, **enter** 0.

    The unit will display the configured Reader Mode on the Ready screen (Default mode = Remote).

    A pair of double-dashes surrounds the "READY" text for Master Readers:

    = READY =

    TIME DATE

    A pair of single-dashes surrounds the "READY" text for Remote Readers:

    - READY -

    TIME DATE
15. **Press** NO to continue to the Set Serial menu.

16. **Press** YES to enter the Set Serial menu.
17. **Press** YES to select the desired option or NO to move the next selection.

    The Select Baud Rate option appears.

    If the HandReader uses an Ethernet connection, the TCP/IP address, gateway, and host bit parameters are set instead of the baud rate.
18. **Press** NO to scroll through the Baud Rate selections and **press** YES to select the desired option.

    The recommended Baud Rate is 28.8 Kbps; however, the Baud Rate should be set to match the software setting.
19. **Press** NO to scroll to the RS-232 menu.
20. If needed, **press** YES to select the option to use RS-232 for 1-Host.

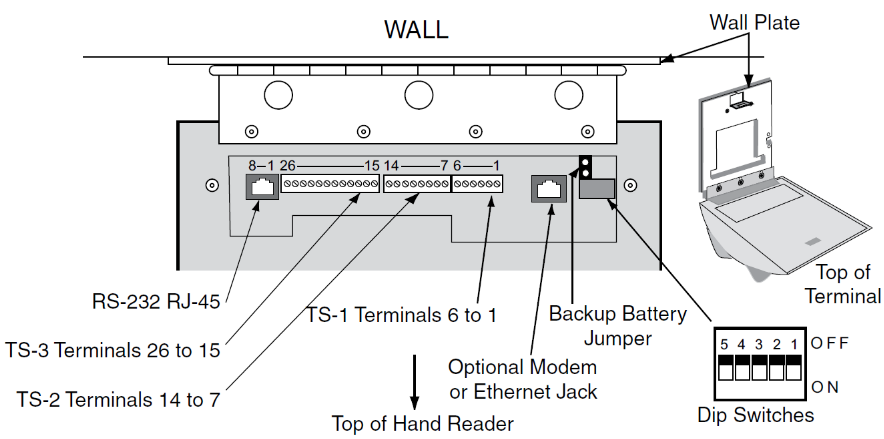
    Once the selection is made, the display returns to the Set Serial menu.
21. **Press** CLEAR to exit the menu.

Wiring the HandKey II Reader(s) to the GTWY-B

Up to eight (8) HK-II units can be wired to the Biometric Reader Interface Gateway (GTWY-B).

1. **Connect** the GTWY-B board to the SSP controller as follows:

GTWY-B Terminal Block	SSP Controller
TXD/TR+	TR+
RXD/TR-	TR-
GND	GND



2. **Connect** the HK-II unit to the GTWY-B board as follows:

HK-II Terminal Block	GTWY-B Terminal Block
15	TR-
16	TR+
4	GND

3. **Jumper** PIN 15 to PIN 17 on the HK-II reader.
4. **Jumper** PIN 16 to PIN 18 on the HK-II reader.
5. **Set** the EOL Termination Jumper on the SSP Controller.
6. **Verify** that jumpers J3, J4, J5, J6, and J9 are set to RS-485.
7. **Power** the GTWY-B board.

Configuring the HandKey II Reader for Biometric Verification

To configure the HandReader for biometric verification of cardholder information:

1. From the Default Configuration menu, **press** the Enter key to enter the Command Mode.

   ENTER PASSWORD appears on the screen.

2. **Press** 2 and Enter to access the Setup menu.

   The Setup menu contains twelve (12) commands that set the basic operating parameters for the HandReader.

   # YES: **Enter** the command shown on the display.

   * NO: **Step** to the next command in the menu.

   CLEAR: **Exit** the command menu (pressing any numeric key also exits the command menu). To completely exit the command from a sub-menu, **press** the Clear key multiple times.

3. If needed, **press** YES to set the language or NO to move to the next menu item.

   The default language is English.

   If YES is selected, **press** the NO key to move through the language options. When the desired language is displayed, **press** YES. **Press** NO to move to the next menu.

4. **Press** YES to enter the Date Format menu.

5. **Press** NO to scroll through the Date Format options; when the desired format is displayed, **press** YES to select the format.

6. **Press** NO to move to the Time and Date menu.

7. **Press** YES to enter the Time and Date menu.

8. **Use** the buttons on the HK-II unit to define the parameters; **press** ENTER to move to the next parameter or **press** CLEAR to delete an entry.

   The date is set in the following format:

   - Month (MM) - January = 01, incrementing to December = 12
   - Day (DD) - 01 through 31
   - Year (YY) - Enter the last two digits of the current year (e.g. 2001 = 01)

   Time is kept using a 24-hour clock. The time is set in the following format:

   - Hour (HH) - 00 to 23
   - Minute (MM) - 00 to 59

9. **Press** YES to enter the Set Address menu.

   The current address appears on the display. The Set Address command designates a unique address for each HK-II reader in a network.

   For proper operation, each HandReader in the network must have a unique address. Addresses 0 to 254 are available—address 255 is reserved for the master HandReader in a network.

   > *When HK-II units reside on the same GTWY-B, each unit requires a unique address.*

10. **Enter** a Unique Address and **press** ENTER.

    The display returns to the Set Address menu.

11. **Press** NO to move to the next menu.

12. **Press** NO to move through the following menus: Set ID Length, Output Mode, Set Facility, Lock/Shunt Time, and Set Aux Out Control.

    These menu options are not used for verification units.

13. If needed, **select** NO to pass the TO MASTER option and/or **press** YES to select the TO REMOTE option. If an address prompt is displayed, enter 0.

    The unit will display the configured Reader Mode on the Ready screen (Default mode = Remote).

A pair of double-dashes surrounds the "READY" text for Master Readers:

= READY =

TIME DATE

A pair of single-dashes surrounds the "READY" text for Remote Readers:

- READY -

TIME DATE

14. **Press** NO to continue to the Set Serial menu.
15. **Press** YES to enter the Set Serial menu.
16. **Press** YES to select the RS-485/RS-422 option.

    The Select Baud Rate option appears.

    If the HandReader uses an Ethernet connection, the TCP/IP address, gateway, and host bit parameters are set instead of the baud rate.
17. **Press** NO to scroll through the Baud Rate selections and **press** YES to select the desired option.

    The recommended Baud Rate is 19.2 Kbps; however, the Baud Rate should be set to match the software setting.

    The Set Serial menu reappears.
18. **Press** CLEAR to exit the menu.

Configuring the HandKey II Reader in DNA Fusion

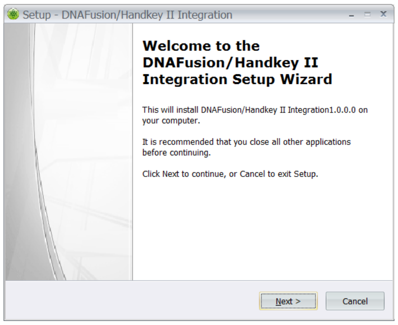
The HandKey II integration is supported in DNA Fusion version 6.0 and above.

Installing the HandKey II Support Files

The HandKey II Support Files must be run on the DNA Fusion Server. This process registers the COM object used to communicate with the biometric readers. The files can be obtained from Open Options Technical Support.

1. **Run** the DNAHandkeySetup installation file.

   The Welcome dialog appears.



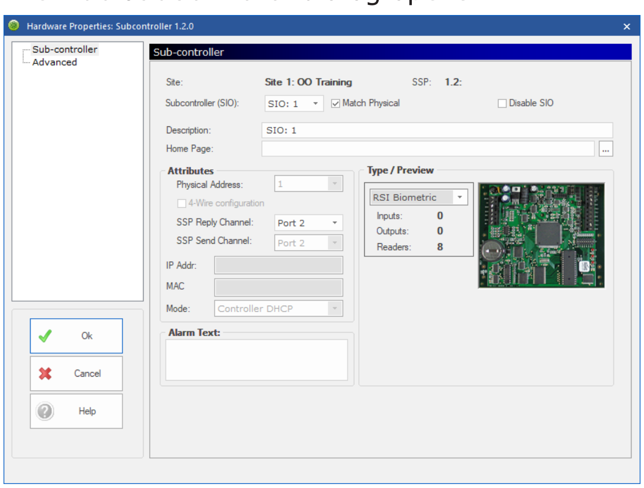
2. **Click** the Next button to start the installation process.

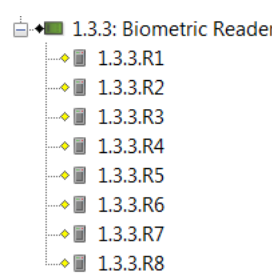
   The Ready to Install screen appears.
3. **Click** Install to execute the setup.
4. When the installation is complete, **click** Finish.
5. If DNA Fusion was open during the installation, **restart** the application.

Setting Up the Biometric Unit in DNA Fusion

1. **Launch** DNAFusion.
2. **Right-click** on the SSP-EP or SSP-D2 that is wired to the GTWY-B (RSI Biometric) and **select** Add / Add Subcontroller.

   The Add Subcontroller dialog opens.





3. **Enter** a Description.
4. **Select** GTWY from the Type drop-down and **click** OK.

   The GTWY is added to the Hardware Browser with eight (8) readers.

> *Each reader must be configured as a* Secondary Reader *for the door. See page 7-42 for more information on adding the biometric reader to a door.*

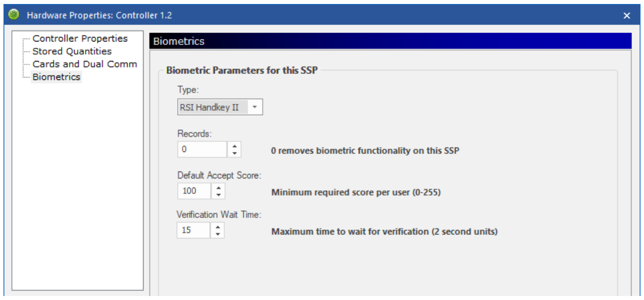
5. **Right-click** on the Controller associated with the Biometric Reader and **select** Properties.

   The Controller Properties dialog opens.

6. **Select** Biometrics from the dialog menu.

   The Biometrics screen appears.

> *The* Biometrics *menu option is only available if an* RSI Gateway *is added to the controller.*



7. **Set** the Records field to 1,000 or a value greater than the total number of cardholders.

   If this value is left at 0, no records will be downloaded to the panel.

8. If desired, **change** the Default Accept Score value (0-255).

   This value represents the minimum required score per user.

9. **Click** OK to save the settings.

> *Verify that the* Allow Biometric Enrollment *and* Allow Removal of Biometric Templates *options are selected for the* Admin *operator profile. For more information on operator profiles, see Chapter 4 in the DNA Fusion User Manual.*

Associating a Biometric Reader to a Door

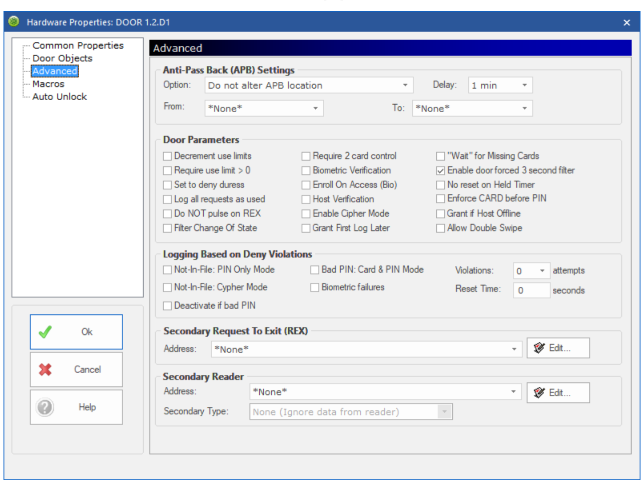
Once the HK-II unit is added in DNA Fusion, the biometric readers can be configured as a Secondary Reader for a door.

1. **Double-click** on the desired door or add a new door to the DNA Fusion system.

   The Door Properties dialog opens.

2. **Select** Advanced from the dialog menu.

   The Advanced screen appears.



3. **Select** the desired Biometric Reader from the Secondary Reader Address drop-down.
4. **Select** RSI HandKey-II Biometric Reader from the Secondary Type drop-down.
5. In the Door Parameters section, **check** Biometric Verification.
6. **Click** OK to save the settings.

Configuring the Biometric Enrollment Workstation

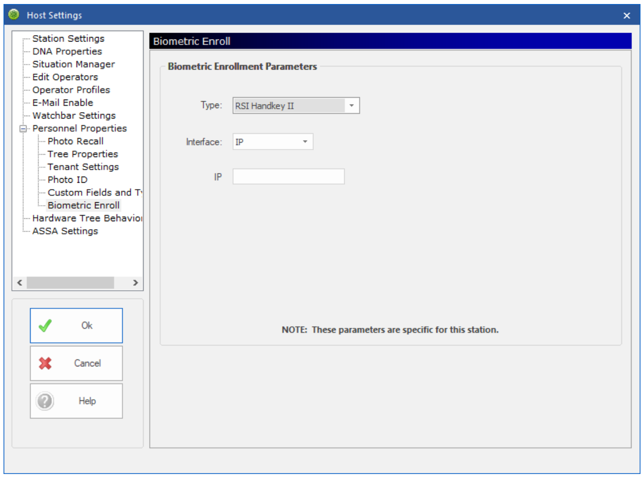
These settings are specific to the DNA Fusion enrollment workstation.

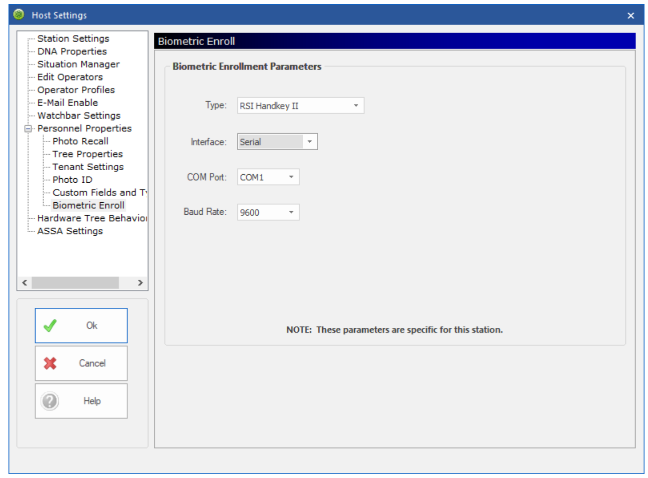
1. **Click** the DNA Properties button on the Standard Toolbar.

   The Host Settings dialog opens.

2. **Expand** the Personnel Properties option and **select** Biometric Enroll.

   The Biometric Enroll screen appears. This option only appears after the HK-II Support Files have been installed.





3. **Select** the Interface type from the drop-down.

   This option depends on the installation of the HK-II units.

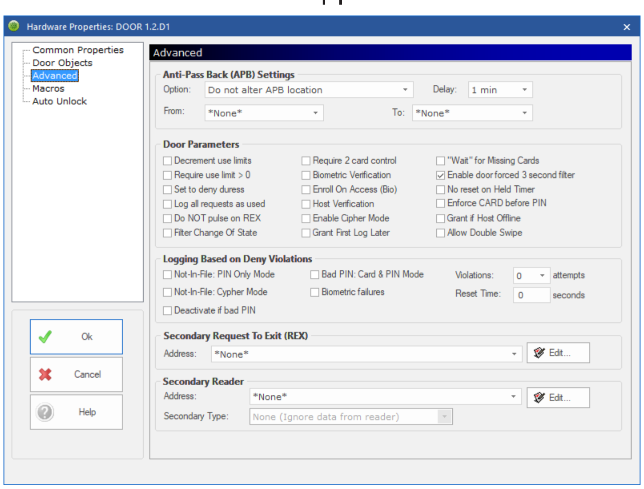
   - IP - **Enter** the IP Address of the enrollment reader.
   - Serial - **Select** the COM Port and Baud Rate for the HK-II reader. The baud rate should match the setting on the HK-II. See page 7-40 for more information.

4. **Click** OK to save the settings.

5. In the Hardware Browser, **double-click** on the desired door to open the Door Properties dialog.

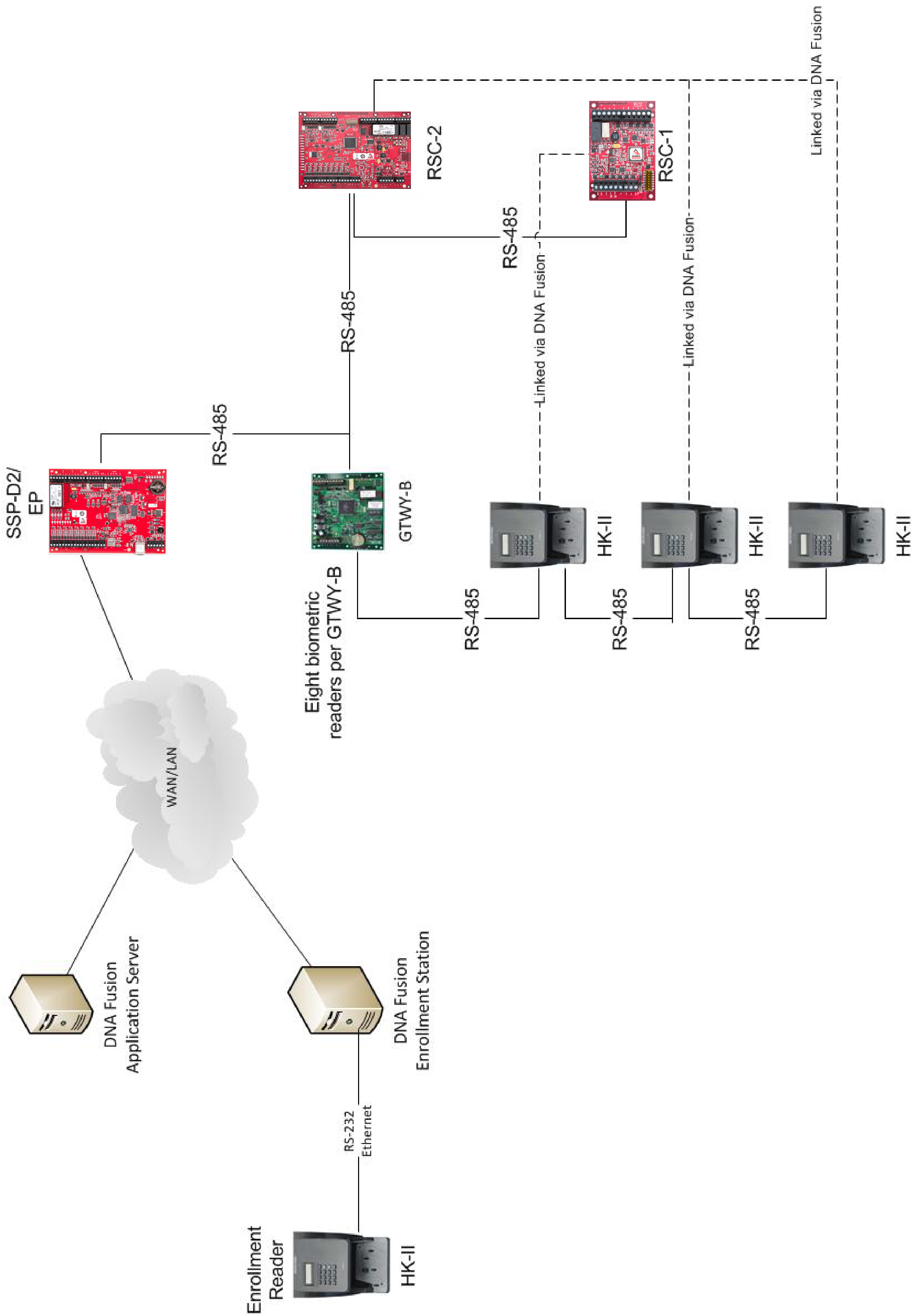
6. **Select** Advanced from the dialog menu.

   The Advanced screen appears.



7. In the Door Parameters section, **check** the Enroll On Access (Bio) option.

8. **Click** OK to save the settings.



SSP-D2/ EP
RS-485
RS-485
RSC-2
RS-485
RSC-1
Linked via DNA Fusion
Linked via DNA Fusion
Linked via DNA Fusion
GTWY-B
Eight biometric readers per GTWY-B
RS-485
RS-485
RS-485
HK-II
HK-II
HK-II
WAN/LAN
DNA Fusion Application Server
DNA Fusion Enrollment Station
RS-232
Ethernet
Enrollment Reader
HK-II

Enrolling Cardholders in DNA Fusion

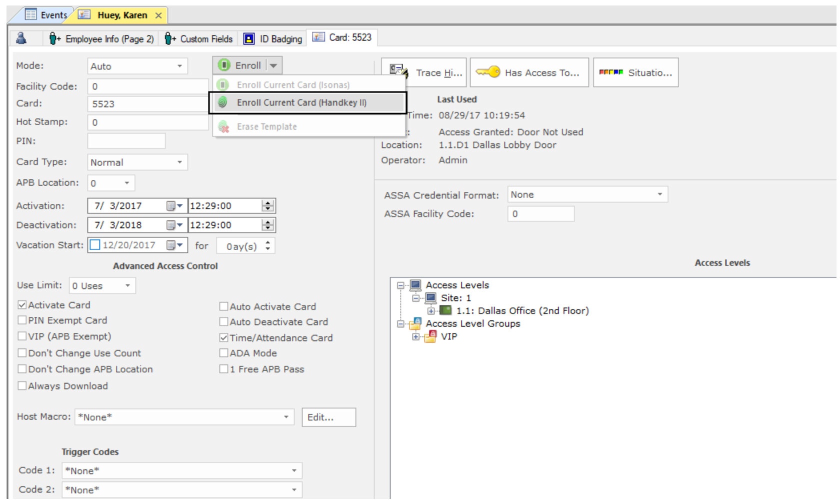
Cardholders must be registered in DNA Fusion in order to associate the card with the hand template.

1. **Open** the Personnel Browser.
2. **Right-click** on the All Cardholders header and **select** Add New Cardholder.

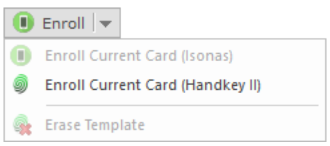
   OR

   Right-click on an existing cardholder and **select** Properties.

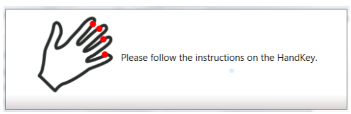
   A Personnel Record opens.



3. **Complete** the desired fields.
4. **Select** the Card tab.
5. **Enter** the Card Number.
6. **Right-click** in the Personnel Record and **select** Update.
7. **Select** Enroll Current Card (HandKey II) from the Enroll drop-down.



The enrollment process begins.



8. **Follow** the instructions on the HandReader.

   The cardholder must present their hand on the reader's platen three (3) times.

   An Enrolled Successfully message appears when the process is complete. If the enrollment steps are not completed, an Enrollment Failed message will appear; **close** the dialog and **repeat** steps 7 and 8.
9. **Assign** the desired Access Levels to the cardholder.

   For more information, see Chapter 6: Access Levels in the DNA Fusion User Manual.
10. **Right-click** in the Personnel Record and **select** Update.
11. **Close** the Personnel Record.

    For more information on cardholders, see Chapter 7 in the DNA Fusion User Manual.

Erasing a Cardholder's Template

1. From the Personnel Browser, **open** an existing Personnel Record.
2. **Select** the Card tab.
3. **Click** the Enroll drop-down and **select** the Erase Template option.

   A confirmation dialog appears.
4. **Click** Yes to delete the card's biometric template.

NOTES:

Specifications

The HandKey II reader is for use in low-voltage, Class 2 circuits only.

Power:	12 to 24 Vdc or 12 to 24 Vac, 50-60 Hz, 7 watts
Communications:	RS-232, RS-422 (4-wire), RS-485 (2-wire) Optional Ethernet or Modem
Auxiliary Outputs:	3 user-definable (open collector, 5 Vdc present, sinks to ground, 100 mA max.)
Auxiliary Inputs:	2 inputs (open collector, 5 Vdc present, sinks to ground, 100 mA max.)
Wire Requirements:	2 twisted-pairs, shielded, 22 AWG or larger
Mechanical:	8.85” W x 11.65 H x 8.55” D 6 lbs (2.7 kg) nominal
Environmental:	Operating: 32 °F to 113 °F (0 °C to 45 °C) Relative Humidity: 20% to 80% NC Non-Operating (Storage): 14 °F to 140 °F (-10 °C to 60 °C) Relative Humidity: 5% to 85% NC

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Specialty Products 8

In This Chapter
√ Mantrap √ HID Time & Text Reader

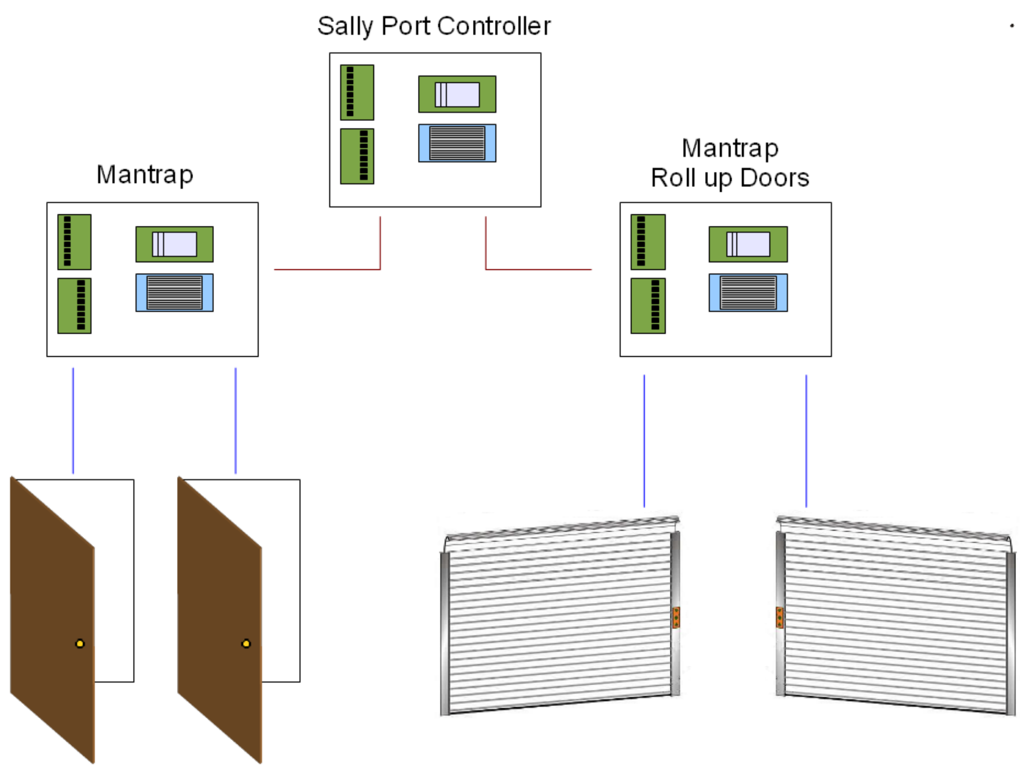
Open Options Mantrap

The Open Options mantrap, which is based on reliable, industry-standard PLC technology, provides a secure holding area between a set of interconnected doors by allowing only one connected door to be open at a time. Data from door hardware as well as status information is reported back to the access control system. The mantrap is pre-programmed to simplify installation; once the hardware and power are connected, the unit is ready to go.

A single mantrap unit is capable of controlling two (2) doors, and additional units can be slaved together to control up to six (6) doors. Each unit includes the following components:

- Eight (8) buffered inputs and eight (8) buffered outputs
- A 24-volt power supply capable of supplying power to the door locks controlled by the unit
- Inputs and outputs that can be used on the PLC unit without buffer boards

Manual override inputs unlock or inhibit connected doors with the push of a button. An input for an anti-tailgating device on each door is also included.



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Wiring Connections

The mantrap is connected between the subcontroller on the access control system and the door hardware (lock, REX, and DSM). Only the reader is connected directly to the subcontroller.

When mounted correctly, the PLC (white box) will be located in the upper right corner of the unit. The two boards on the left side of the unit are used to buffer inputs and outputs from the PLC. The board at the top left of the unit is for outputs, while the board at the bottom left of the unit is for inputs. The input board is inverted compared to the output board (placing input 1 on bottom and input 8 on top); use caution when wiring the inputs.

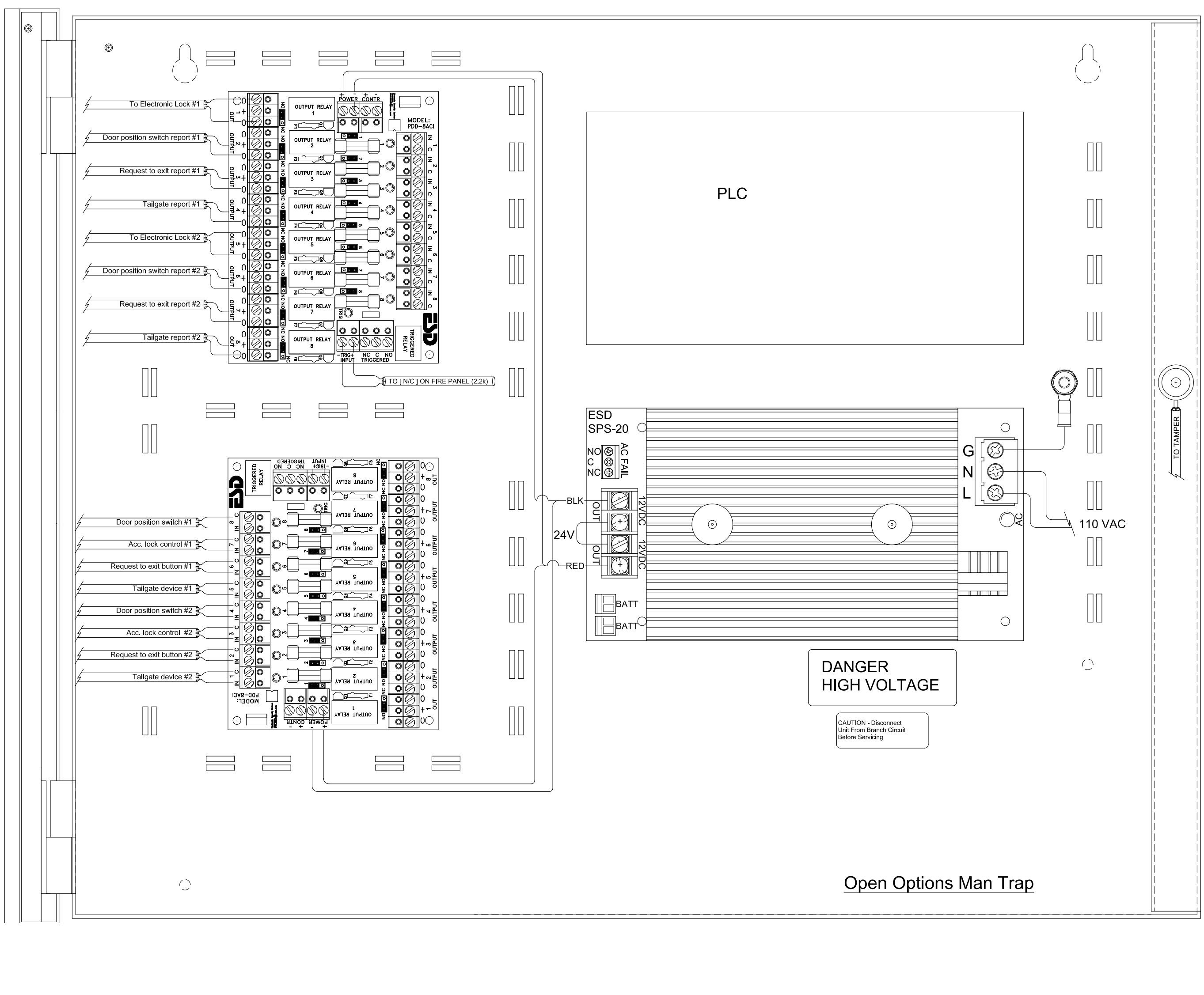
Some connections must be wired directly to the PLC. Inputs on the PLC body are located on the side closest to the power supply or on the PLC add-on module labeled DC. IN. Outputs on the PLC body are located on the top or side farthest from the power supply or on the PLC add-on module labeled RY. OUT.

Wiring connections should be made with twisted-pair cables unless specified otherwise. All connections should be made while the unit is de-energized.

The output board is configured for a 24 V output. To reconfigure for dry contacts, remove the fuses on the output board and set the FT/FTD jumper to FTD for outputs 2, 3, 6, and 7.

All fuses on the input board must be left in place. Set the FT/FTD jumper to FTD for all inputs. All input points require a closed circuit to activate.

If connecting multiple units, the 0 Vdc reference must be connected between the units to establish a common reference voltage.



NOTES:

Inputs and Outputs

The mantrap unit includes eight (8) buffered inputs and eight (8) buffered outputs. The buffered outputs can provide power if the fuse is installed. If the fuses are removed, the buffered outputs become dry contacts.

Buffered Inputs

Input #	Description
I8	Door 1 Position Sensor (Door Switch)
I7	Door 1 Unlock Request from Access Control System
I6	Door 1 Request-to-Exit
I5	Door 1 Tailgate Sensor
I4	Door 2 Position Sensor (Door Switch)
I3	Door 2 Unlock Request from Access Control System
I2	Door 2 Request-to-Exit
I1	Door 2 Tailgate Sensor

The input board is inverted, so I8 is located at the top.

Buffered Outputs

Output #	Description	Connection
O1	Door 1 Lock Control Signal	Use to Control Lock Power
O2	Door 1 Position Signal	To Access Control Input for Door Switch
O3	Door 1 REX Report	To Access Control Input for Request-to-Exit
O4	Door 1 Tailgate Report	To Access Control Input for Tailgate Report
O5	Door 2 Lock Control Signal	Use to Control Lock Power
O6	Door 2 Position Report	To Access Control Input for Door Switch
O7	Door 2 REX Report	To Access Control Input for Request-to-Exit
O8	Door 2 Tailgate Report	To Access Control Input for Tailgate Report / Lock Control for Latch Mode

PLC Inputs

The PLC inputs are located on the side of the PLC main body closest to the power supply.

Input #	Description	Connection
I0002	Bypass All Doors	Apply 24 Vdc to Unlock All Connected Doors
I0004	Slave Ready (Unit 1)	Normally Jumpered with +24 Vdc for 2-Door System
I0005	Slave Ready (Unit 2)	Normally Jumpered with +24 Vdc for 2-Door System
I0006	Slave Ready (Unit 3)	Normally Jumpered with +24 Vdc for 2-Door System
I0012	Slave Mode	
I0014	Latch Mode Reset	
I0015	Latch Mode Enable	

PLC Outputs

The PLC Outputs are located on the side of the PLC main body farthest from the power supply.

Output #	Description	Connection
Q0004	System Ready	Active When System is Ready to Use
Q0005	System Ready	Active When System is Ready to Use
Q0006	System Ready	Active When System is Ready to Use
Q0007	Latch Mode Indicator	Active When Latch Mode is Active
Q0010	Bypass Report	
Q0011	General Alarm	

Latch Mode

Latch Mode prevents Door 1 from opening a second time until one of the following conditions is met:

- Door 2 is opened and closed
- An external reset signal is received (+24 Vdc applied to PLC Input I0014)

To enable Latch Mode, apply +24 Vdc to PLC input I0015. If enabled, opening Door 1 will activate the latch mode; the buffered output O8 and PLC output Q0007 will become active.

Slave Mode

Slave Mode is used when the unit is part of a larger system. It is activated by applying +24 Vdc to PLC input I0012.

Bypass All Doors Mode

When PLC input I0002 is activated, the unit will allow any door to be opened. If client activation of the Bypass All Doors Mode is required, the bypass signal should be connected to an output on the access control system. When the output is activated, it will allow the PLC-assigned doors to be bypassed.

Bypass Report

This output is activated when the unit receives a Bypass All Doors signal on PLC input I0002. The bypass report should be connected to an input on the access control system to log the activation of the Bypass All Doors mode.

General Alarm

The General Alarm output is activated if a tailgate signal is received on buffered inputs I1 or I5.

Rollup Door Units

Rollup door units monitor a rollup door's safety devices (photo beams or vehicle loops) and prevent closure on a person or vehicle. It is critical that the safety device be installed to prevent a vehicle from sitting in the entry/exit without activating the safety device.

The output point on the access control system for the rollup door manual control station readers will directly control the ground for the respective manual controls. In an emergency lockdown scenario, the vend signals for the rollup doors will be blocked.

HID Time & Text Reader

The HID Time & Text Reader includes an LCD screen and function keys for real-time user feedback, further expanding system versatility at the door.

Wiring the Reader

1. **Wire** the reader using the table below.

   The P1 terminal block is used for power and reader control, while the P2 terminal block is used for communication.

TERMINAL	PIN #	DESCRIPTION
P1 (Power/Reader Control)	1	Beeper Input
	2	Green (GRN) LED Input
	3	Ground (RTN)
	4	+VDC
	5	Shield*
	6	Red LED Input
	7	Hold Input
P2 (Communication)	7	General Purpose Input/Output 1 (RS232-T/RS485-A/HADP-OSDP-A/USB-5V/UART-T)
	6	General Purpose Input/Output 2 (RS232-R/RS485-B/HADP-OSDP-B/USB-D+/UART-R)
	5	Open Collector Output**
	4	Wiegand Data 1 / Clock
	3	Wiegand Data 0 / Data
	2	General Purpose Input/Output 3 (RS485-Z/USB-D-)
	1	General Purpose Input/Output 4 (RS485-Y)

*Drain wire can be the "data return" line when a separate power supply is used.

**Tamper output; when activated, the output syncs to ground (default).

2. **Wire** P2-7 (GPIO1) to Data 0 on the SIO board.
3. **Wire** P2-6 (GPIO2) to Data 1 on the SIO board.

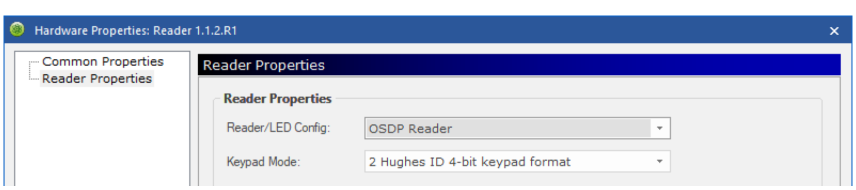
Configuring the Reader in DNA Fusion

To set up the HID Reader in DNA Fusion:

1. From the Hardware Browser, **create** a new door.

   See 3-21 in the Technical Installation Manual for more information.
2. **Expand** the Door object and **double-click** on the desired Reader.

   The Reader Properties dialog opens.
3. **Select** Reader Properties from the dialog menu.
4. In the Reader Properties section, **select** OSDP Reader from the Reader/LED Config drop-down.



5. **Click** OK.

   For information on sending text to the reader, see page 8-8.

Sending Text to the Reader

1. From the Standard Toolbar, **click** the Triggers & Macros button.

   The Triggers & Macros Browser appears.

2. **Expand** the Macros header to the desired Controller object.

3. **Right-click** on the desired Controller and **select** Add Macro.

   The Macros Editor dialog opens.

4. **Enter** a Description and **click** OK.

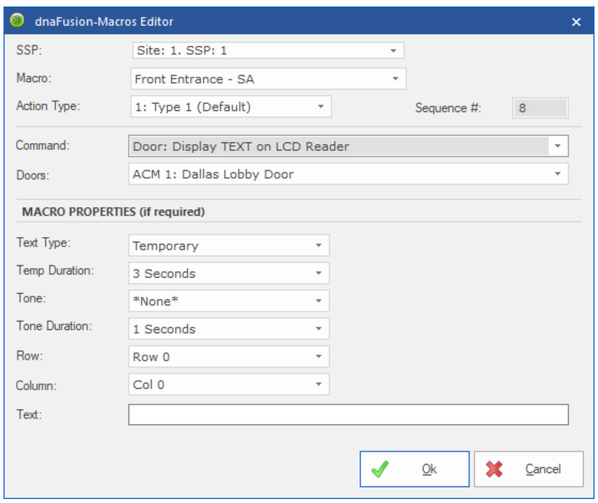
5. **Right-click** on the newly created Macro and **select** Add Command.

   The Macros Editor dialog opens.

> *Alternatively,* ***click*** *the* Add *button in the* Macros Editor *from Step 3 to complete this step.*

6. From the Command drop-down, **select** Door: Display TEXT on LCD Reader.

   A list of Macro Properties menus appears in the dialog.



7. **Select** the ACM that is linked to the HID reader from the Doors drop-down.

8. From the Text Type drop-down, **select** the applicable option.

   - Temporary - Allows the operator to display the defined text for up to 31 seconds. If selected, **set** the Temp Duration time.
   - Permanent - Displays the defined text permanently on the HID reader.

9. **Verify** that the Row and Column fields are set to Row 0 and Col 0, respectively.

   This selection will display the defined text in the top row of the reader; the time will display on the bottom row.

10. **Enter** the desired display text in the Text field.

11. **Click** OK to save the Macro.

12. In the Triggers & Macros Browser, **expand** the Triggers header to the desired Controller object.

13. **Right-click** on the Controller and **select** Add Trigger.

    The Triggers Editor dialog opens.

14. **Enter** a Description and **select** the desired Trigger Event from the drop-down list.

15. **Configure** the remaining Trigger Detail fields based on the selected Trigger Event.

16. From the Macro ID drop-down, **select** the macro created in Steps 3-11.

17. **Click** OK to save the settings.

Integrated Products 9

In This Chapter
√ Tridium Building Controls √ Salto Router √ Aperio Hub

Integrated Products

Open Options' DNA Fusion access control software is capable of integrating to a number of different product solutions, including:

- Tridium Building Controls – The DNA Fusion system and Tridium building control integration enables communication between building automation and security functions. The JACE-600™ panel adds 16 virtual output points from the Tridium unit into DNA Fusion. One (1) JACE device can be connected per SSP controller.
- Salto Router – The Salto Sallis integration offers a seamless interface to the DNA Fusion access control system by allowing a single controller to manage and control up to 32 doors.
- Aperio Hub – Aperio is a new technology developed by ASSA ABLOY to upgrade mechanical doors and wirelessly connect them to the Open Options DNA Fusion access control system. Up to 64 Aperio Hubs can be connected per controller.

For all other integrations, refer to the product's individual integration manual.

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Tridium Building Controls

The DNA Fusion access control system and Tridium building control integration enables communication between building automation and security functions. The bi-directional integration allows the system operator to build a virtual JACE-600™ panel in DNA Fusion. The JACE-600 is a compact, embedded controller/server platform that makes it possible to control and manage external devices over the Internet and present real-time information to DNA Fusion operators. Sixteen (16) virtual output points are automatically added to each JACE panel, which allows operators to control the panel(s) from within the DNA Fusion software.

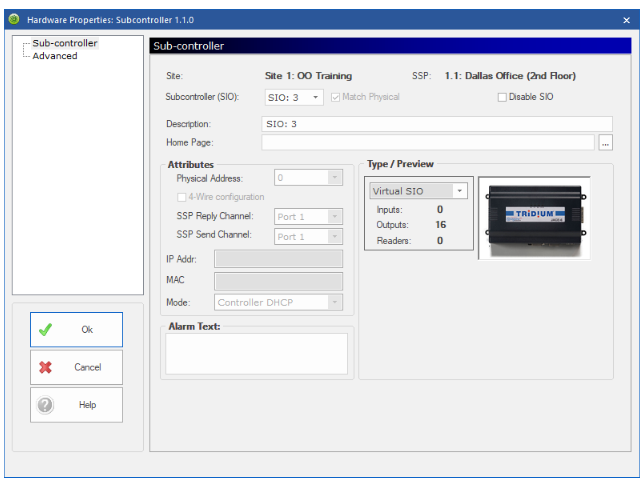
One (1) JACE device can be connected per SSP controller. The interface uses PSIA standard protocol and TCP/IP network connection. For more information on this interface, see Chapter 8: Hardware Features in the DNA Fusion User Manual.

The Tridium firmware must be updated to the latest version in order for the integration to operate successfully.

To integrate the JACE-600 controller:

1. **Install** the JACE-600.
2. **Configure** the field devices.
3. **Open** the DNA Fusion application.
4. From the Hardware Browser, **right-click** on the desired Controller and **select** Add / Add Subcontroller.

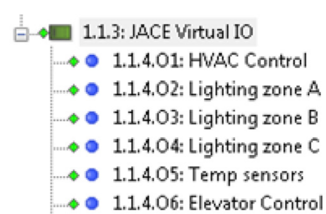
   The Subcontroller Properties dialog opens.



5. **Enter** a Description.
6. **Select** the Virtual SIO option from the Type drop-down.

   An image of the Tridium JACE-600 appears in the Preview window.
7. **Click** OK.

   DNA Fusion will automatically discover the Tridium unit, which will then populate under the selected controller in the Hardware Browser.



8. **Double-click** on the desired output.

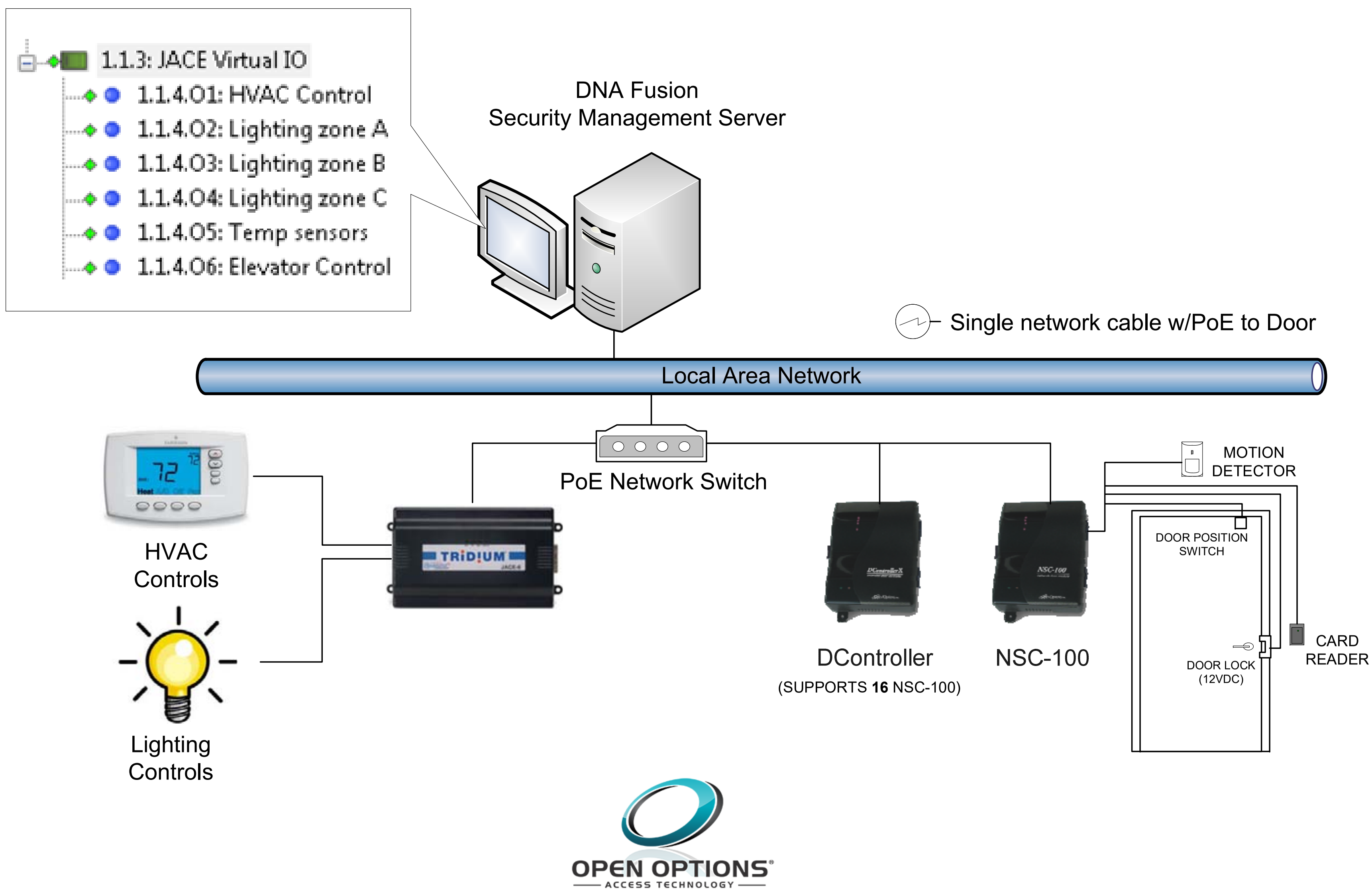
   The Output Point Properties dialog opens. See page 8-75 in the DNA Fusion User Manual for more information.
9. **Enter** a Description and **click** OK.

   The description appears next to the output.

By implementing the Triggers *and* Macros *features, the Tridium unit can report state changes for the outputs in DNA Fusion and then affect changes on the Tridium unit. For more information, see Chapter 10 in the DNA Fusion User Manual.*

DNA Fusion with Tridium Interface

System Diagram



Salto Sallis Router

The Salto Sallis wireless platform integrates seamlessly with the Open Options DNA Fusion access control system. The Salto Router and associated nodes function as a bridge between DNA Fusion and Salto's RF locks, allowing doors to be controlled remotely and wirelessly from the DNA Fusion application.

The SSP-EP, SSP-D2, and DController with firmware version 1.17.3 or higher support the Salto Sallis integration. The controller communicates to one Salto Router per downstream port via RS-485 interface, and supports up to 16 Salto locks. The Salto Router communicates to the locks through Salto Nodes. Each node can communicate with up to 16 locks at a maximum distance of 10-15 meters (30-45 feet).

> **!** *The SSP-EP communicates with specific Salto routers that have been designed to work with the Open Options hardware. If the wrong router device is used, an offline message appears for the subcontroller.*

When a cardholder badges at a Sallis lock, the lock sends the relevant information to the Salto Node. The Salto Router directs the node's information back to the controller, which then verifies the cardholder's access rights. The result is sent back to the lock through the integrated infrastructure, which grants or denies cardholder access based on that information.

The integration process includes two (2) steps:

- Hardware Setup - Wire the RS-485 communication from the controller to the Salto Router.
- DNA Fusion Integration - After the hardware is connected, add the Salto Router to DNA Fusion, build doors from the readers associated with the router, and build inputs and outputs from the Salto Nodes.

Wiring the SSP Controller to the Salto Router

The Salto Router communicates to the controller through a 2-wire RS-485 interface. If using a DController, the Reader 1 port can be configured as an RS-485 connection. Use twisted pair(s) (min. 24 AWG) with shield for communication.

1. **Connect** the Salto Router to the SSP-EP on Port 2 or 3.

   OR

   Connect the Salto Router to the SSP-D2 on Port 2.

   OR

   Connect the Salto Router to the DController on Reader Port 1.

   See the tables below for wiring connections.

SSP-EP/D2	Salto Router
VIN	V+ (12/24 Vdc)
GND	GND
TR+	A
TR-	B

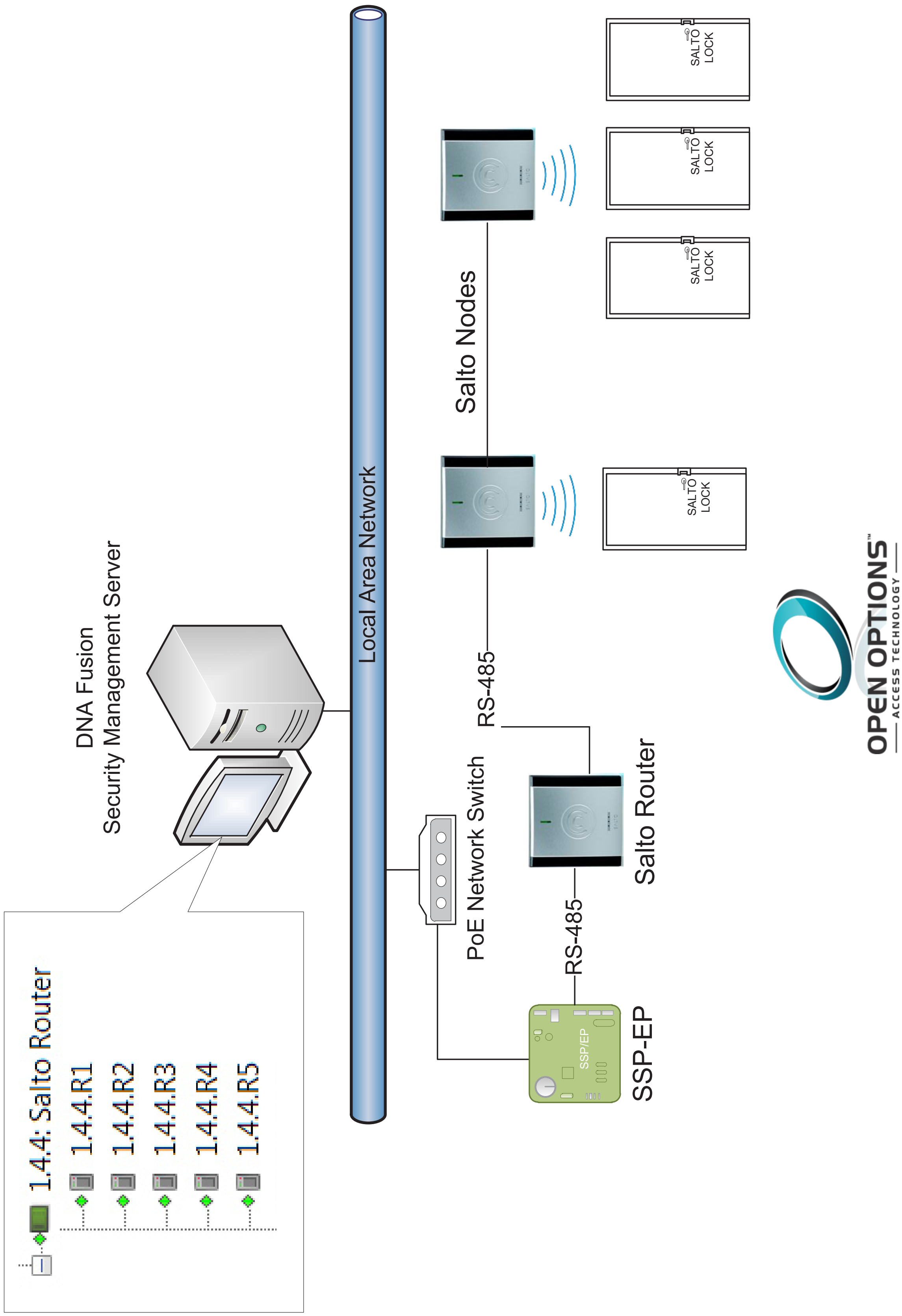
DController	Salto Router
VO (Red/Yellow)	V+ (12/24 Vdc)
GND (Black)	GND
DAT/D0 (Green)	A
CLK/D1 (White)	B

   The Salto Router and Nodes are powered via the V+ (12/24 Vdc) connection.

   The router has a current consumption of 75 mA, and each node has a current consumption of 45 mA.

DNA Fusion with Salto Sallis Interface

System Diagram

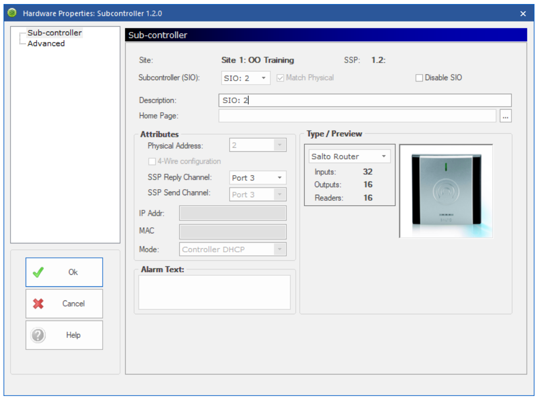


Adding the Salto Router to DNA Fusion

After the Salto Router has been wired to the controller, it must be added to the DNA Fusion system.

1. **Launch** DNA Fusion.
2. From the Hardware Browser, **right-click** on the Controller that is wired to the Salto Router and **select** Add / Add Subcontroller.

   The Subcontroller Properties dialog appears.



3. **Enter** a Description.
4. **Select** the Salto Router option from the Type drop-down.

   An image of the Salto Router appears in the Preview window.
5. **Verify** that the SSP Reply Channel is correct. If needed, **change** the port to the correct settings.
6. **Click** OK to add the subcontroller to the system.

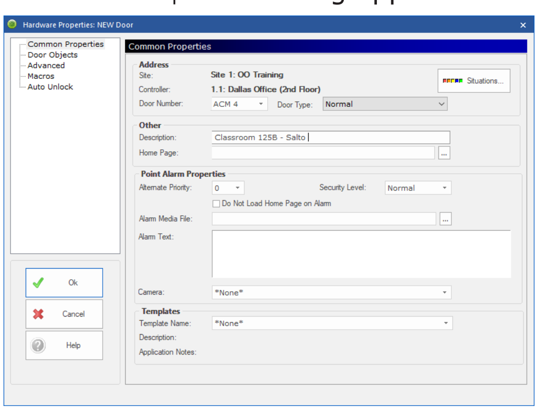
   The Salto Router appears in the Hardware Browser.

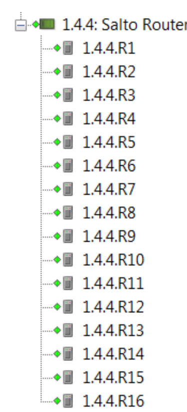
Configuring the Salto Doors

Each Salto Node contains two inputs and one output. The first input is the door contact, the second input is the request-to-exit (REX), and the single output is used for the door strike. Program the first reader, output, and inputs in sequence until all of the doors are configured.

1. In the Hardware Browser, **expand** the Salto Router subcontroller object and **locate** the first Reader.
2. **Right-click** on the Reader and **select** Add Door / Create Salto Door.

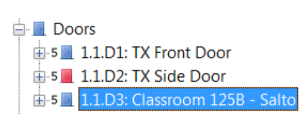
   The Door Properties dialog appears.





3. **Enter** a Description for the door.
4. **Select** Door Objects from the dialog menu.

   The door contact, REX, and strike will default to the next node's inputs and outputs, and the fields will be grayed out. **Continue** adding doors in sequence (1-16) until all doors are configured.
5. **Click** OK to save the changes and add the door.



   The door appears under the Doors object in the Hardware Browser.

   For more information on adding doors or configuring door properties, see pages 3-21 through 3-32 in the Technical Installation Manual.

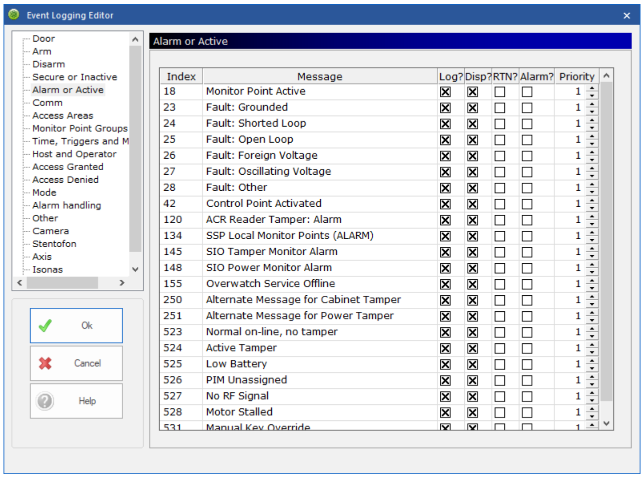
Alarm Logging

DNA Fusion operators can configure the system to generate an alarm when a problem with the node or lock exists.

1. **Select** DNA / Administrative / Alarms and Events / Logging from the Main Menu.

   The Event Logging Editor dialog opens.

2. **Select** Alarm or Active from the dialog menu.



3. If desired, **check** the Alarm box for the following items:

   - 120 - ACR Reader Tamper: Alarm

     The RTN condition is already selected under the Secure or Inactive category.

   - 525 - Low Battery

     Currently, there is not an RTN condition for Low Battery; alarms must be dismissed.

   - 527 - No RF Signal

     Currently, there is not an RTN condition for No RF Signal; alarms must be dismissed.

Door Behavior

Door Opened/Closed

The Salto locks do not report Door Opened or Door Closed events. The door is configured to log all access granted requests as Door Used, and DNA Fusion automatically assumes that the door was used after a valid Access Granted event.

> *Since the Salto locks do not report* Door Opened *or* Door Closed *events, Open Options does not recommend using this solution in applications where these events are required. This includes strict anti-passback, two-card control, mantraps, etc.*

Door Held

The Salto locks will report a Door Held event if the door is held open longer than 40 seconds after the door was initially opened. A Door Closed event will be reported once the door is closed. Since Salto locks do not report Door Open or Door Closed events, they cannot be used when a Pre-Alarm event is required.

Door Forced

The Door Forced event will report to DNA Fusion if the door is forced open. If the door is forced multiple times within ten (10) seconds, only the first occurrence will be reported to DNA Fusion.

Request to Exit

If the REX is used multiple times within ten (10) seconds, only the first occurrence will be reported to DNA Fusion.

Aperio Hub Integration

The Aperio RS-485 Communication Hub functions as a bridge between Aperio-enabled locks and the DNA Fusion access control system, allowing DNA Fusion operators to control the Aperio lock from the software.

The SSP-EP, SSP-D2, and DController with firmware version 1.17.3 or higher support the Aperio Hub integration. The controllers support RS-485 communication to 15 Aperio Hubs per downstream port. The Aperio Hub communicates directly with Aperio-enabled locks via an encrypted 2.46-Hz wireless link. Each Aperio Hub includes 8 readers, 24 inputs, and 8 outputs.

When a cardholder presents a card to an Aperio lock, the credential information is sent wirelessly to the Aperio Hub. The hub then routes the information to the controller, which verifies the access rights. The resulting decision is communicated back to the Aperio Hub, which either grants or denies access.

The integration process includes two (2) steps:

- Hardware Setup - Wire the RS-485 communication from the controller to the Aperio Hub.
- DNA Fusion Integration - After the hardware is connected, add the Aperio Hub to DNA Fusion and build doors in sequence from the readers, inputs, and outputs associated with the Aperio Hub.

Aperio Hardware Setup

Connecting the Aperio Hub to the Controller

The Aperio Hub communicates to the SSP controller via a 2-wire RS-485 connection on the controller's downstream RS-485 ports. Use twisted pair(s) (min. 24 AWG) with shield for communication.

The RS-485 bus consists of a twisted-pair cable with a characteristic impedance of between 90 and 120 ohm. The maximum bus length is 3,281 feet (1000 m). A maximum of 16 units, including the DNA Fusion access control system, can be connected to the same bus. If using more than one Aperio Hub, the hubs should be connected in a daisy chain.

1. **Connect** the Aperio Hub to the SSP-EP on Port 2 or 3 or the SSP-D2 on Port 2.

   OR

   Connect the Aperio Hub to the DController on Reader Port 1.

   See the table below for wiring connections.

SSP-EP/D2	Aperio Hub
VIN	8-24 VDC
GND	GND
TR+	A
TR-	B

DController	Aperio Hub
VO (Red/Yellow)	8-24 VDC
GND (Black)	GND
DAT/D0 (Green)	A
CLK/D1 (White)	B

Addressing the Aperio Hub

1. **Set** the Physical Address for the Aperio Hub to a unique number via DIP switches 1 through 4.*

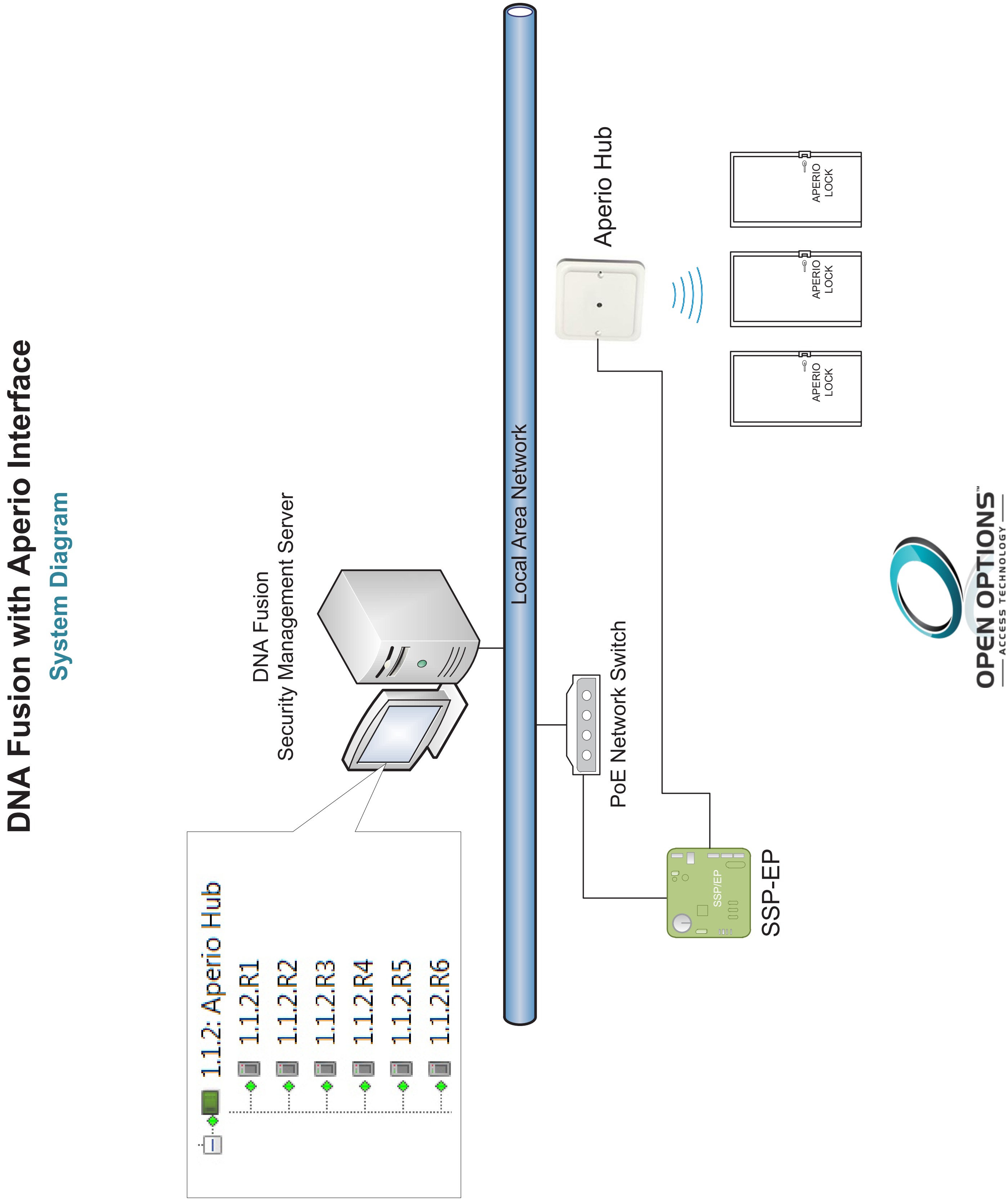
   Each Aperio Hub connected to the same RS-485 bus must have a unique address. This information is used to integrate the hub with DNA Fusion.

Address	A0	A1	A2	A3	Address	A0	A1	A2	A3
0	Do NOT use Address 0.				**8**	OFF	OFF	OFF	ON
1	ON	OFF	OFF	OFF	**9**	ON	OFF	OFF	ON
2	OFF	ON	OFF	OFF	**10**	OFF	ON	OFF	ON
3	ON	ON	OFF	OFF	**11**	ON	ON	OFF	ON
4	OFF	OFF	ON	OFF	**12**	OFF	OFF	ON	ON
5	ON	OFF	ON	OFF	**13**	ON	OFF	ON	ON
6	OFF	ON	ON	OFF	**14**	OFF	ON	ON	ON
7	ON	ON	ON	OFF	**15**	ON	ON	ON	ON

* See the Aperio Hub Installation Manual for more information on DIP switch settings.

End-of-Line Termination

Termination jumpers should be used only on the devices at the end of the RS-485 bus. To terminate the Aperio Hub at the end of the bus, set DIP switch 8 to the ON position. For all other hubs in the chain, set DIP switch 8 to the OFF position. Refer to the correct controller section for documentation on terminating the controller.

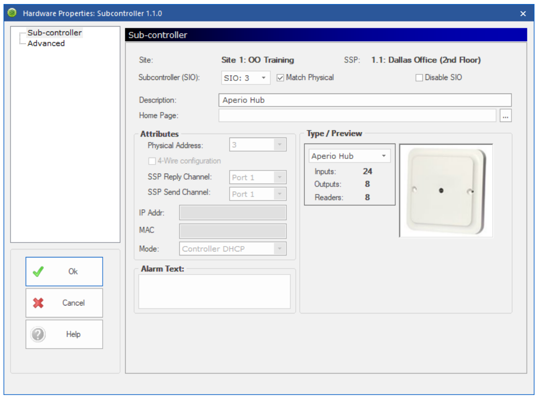


Adding the Aperio Hub to DNA Fusion

After the Salto Router has been wired to the controller, it must be added to DNA Fusion.

1. **Launch** DNA Fusion.
2. **Right-click** on the Controller that is wired to the Aperio Hub and **select** Add / Add Subcontroller.

   The Add Subcontroller dialog appears.



3. **Enter** a Description.
4. **Select** the Aperio Hub option from the Type drop-down.

   An image of the Aperio Hub appears in the Preview window.
5. **Verify** that the SSP Reply Channel is correct. If needed, change the port to the correct settings.
6. **Click** OK to add the subcontroller to the system.

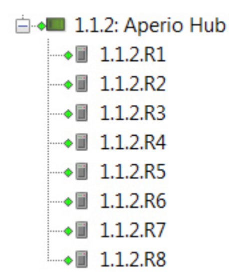
   The Aperio Hub appears in the Hardware Browser.

Configuring the Aperio Doors

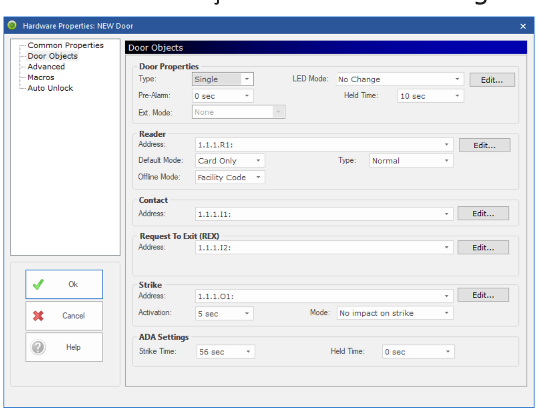
Each Aperio Hub has 8 readers, 24 inputs, and 8 outputs. The first input is the door contact, the second input is the request-to-exit (REX), and the single output is used for the door strike. Program the first reader, output, and inputs until each door is configured.

1. In the Hardware Browser, **expand** the Aperio Hub subcontroller and **locate** the first Reader.
2. **Right-click** on the Reader and **select** Add Door / Create Aperio Door.

   The Door Properties dialog appears.



3. **Enter** a Description for the door.
4. **Select** Door Objects from the dialog menu.



5. **Click** OK to save the changes and add the door.

   The Aperio Door appears under the Doors object in the Hardware Browser.

   For more information on adding doors or door properties, see pages 3-21 through 3-32 in the Technical Installation Manual.

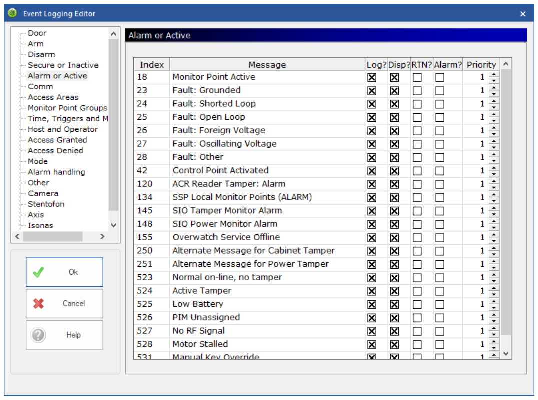
Alarm Logging

DNA Fusion operators can configure the system to generate an alarm when a problem with the node or lock exists.

1. **Select** DNA / Administrative / Alarms and Events / Logging from the Main Menu.

   The Event Logging Editor dialog opens.

2. **Select** Alarm or Active from the dialog menu.



3. If desired, **check** the Alarm box for the following items:

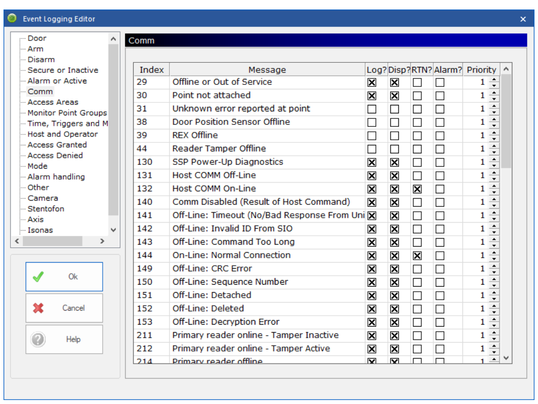
   - 120 - ACR Reader Tamper: Alarm

     The RTN condition is already is already selected under the Secure or Inactive category.

   - 525 - Low Battery

     Currently, there is no RTN condition for Low Battery; alarms must be dismissed.

4. **Select** Comm from the dialog menu.



5. If desired, **check** the Alarm box for the following.

   - 540 - Lock Offline with Aperio Hub

     Currently, there is no RTN condition for Lock Offline with Aperio Hub; alarms must be dismissed.

   - 541 - Radio Disturbance (Aperio)

     Currently, there is no RTN condition for Radio Disturbance (Aperio); alarms must be dismissed.

   - 542 - Jammed (Aperio)

     Currently, there is no RTN condition for Jammed (Aperio); alarms must be dismissed.

   - 543 - Lock Not Paired with Hub (Aperio)

     Currently, there is no RTN condition for Lock Not Paired with Hub (Aperio); alarms must be dismissed.

6. **Click** OK to save the settings.

> *Only one alarm state can be reported by the Aperio Hub, so the condition with the highest priority will be reported. The priority ordering is as follows:* 540, 120, 542, 525, 541, *and* 543. *If a lower priority condition occurs, it will not be reported until the higher priority alarm condition is resolved.*

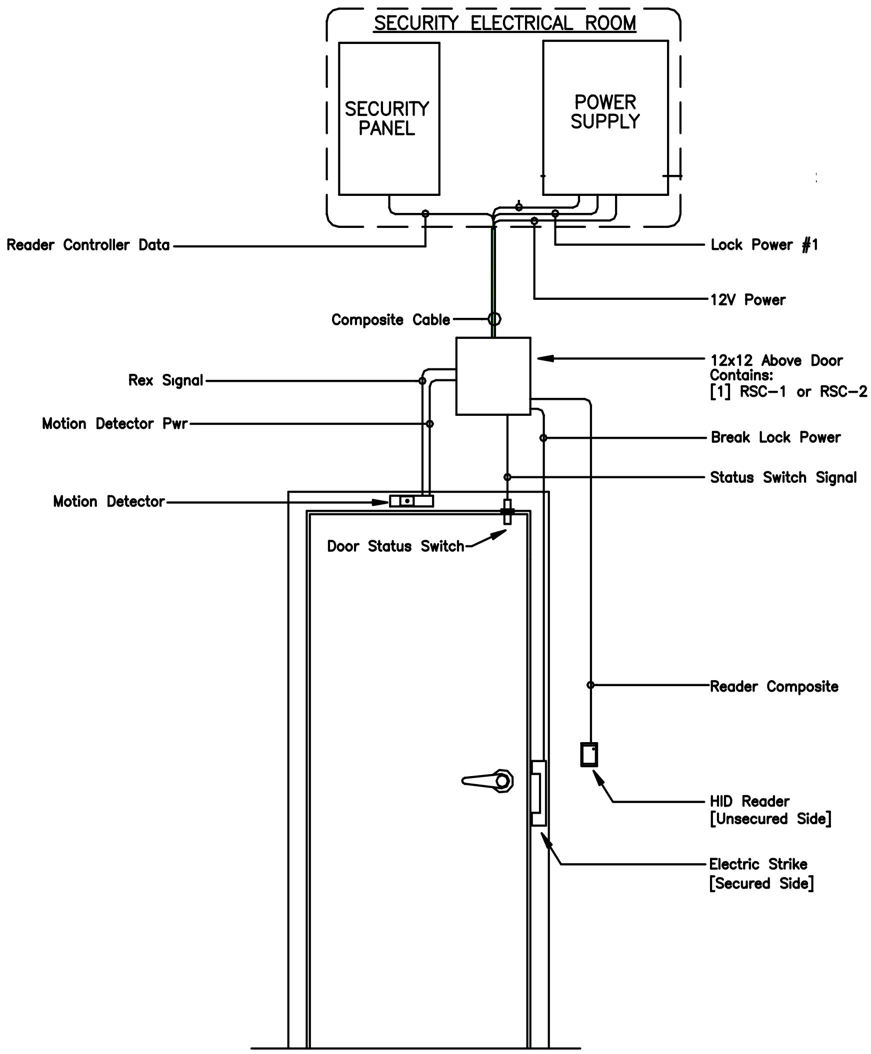
Technical Drawings A

In This Chapter
√ Door Drawings √ Board Dimension Drawings √ Enclosure Drawings

This section provides technical illustrations to help implement a variety of field applications. It includes several common field applications as well as the physical dimensions of the Open Options hardware.

A key is provided to open all Open Options or Life Safety Power enclosures. All enclosures have a Grade 1 IP4X and IK04 rating. Enclosures for the NSC-100, NSC-200, and DController are opened by pressing down on the latch on top of the enclosure and pressing gently into the slot with a screwdriver (included when purchasing either the NSC-100, NSC-200, or DController) or a small tool into the slot on at the bottom of the enclosure.

Typical Single Reader Door with RSC Above Door



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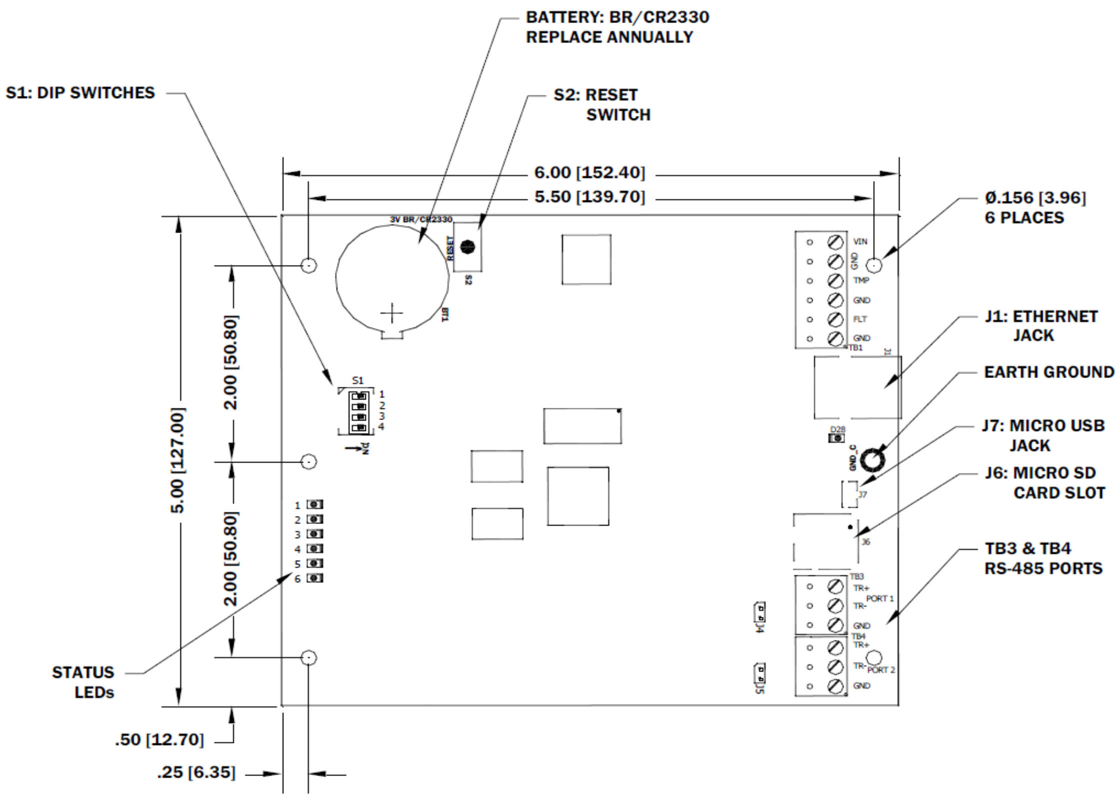
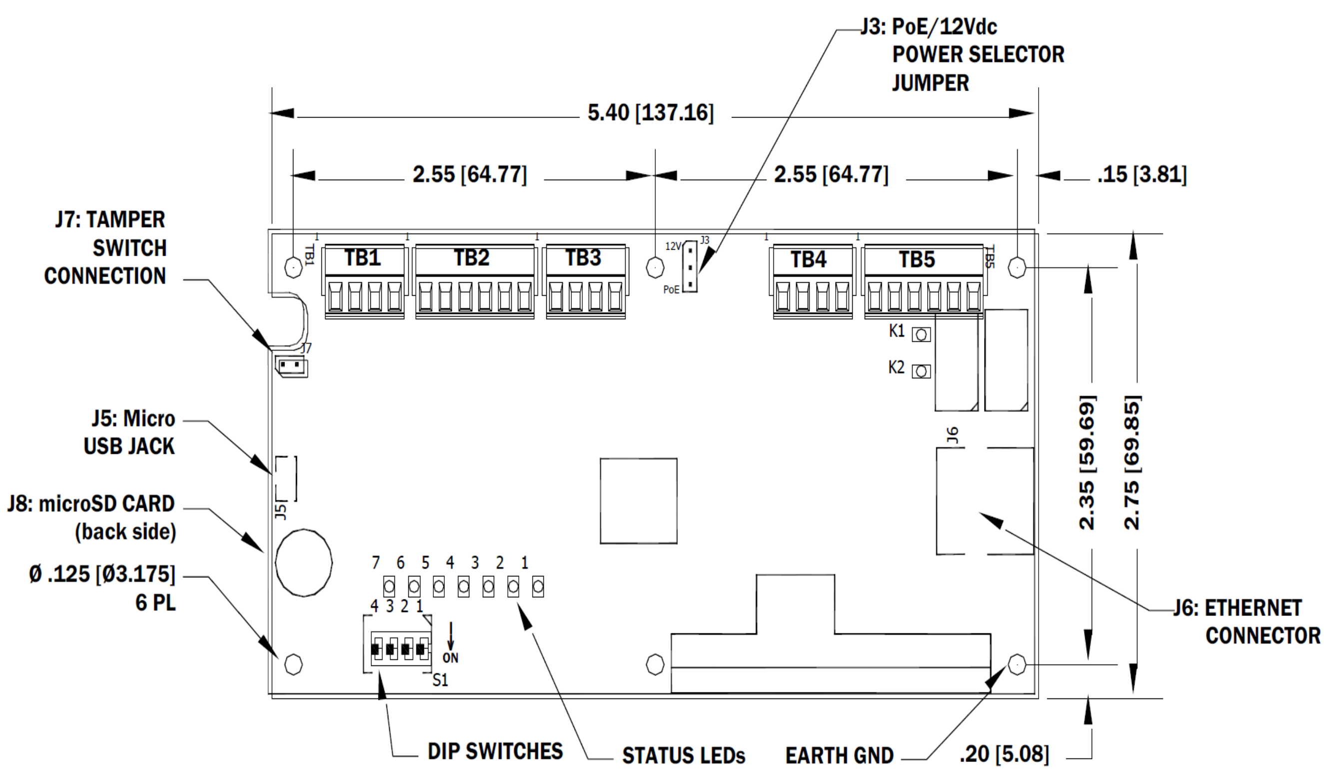
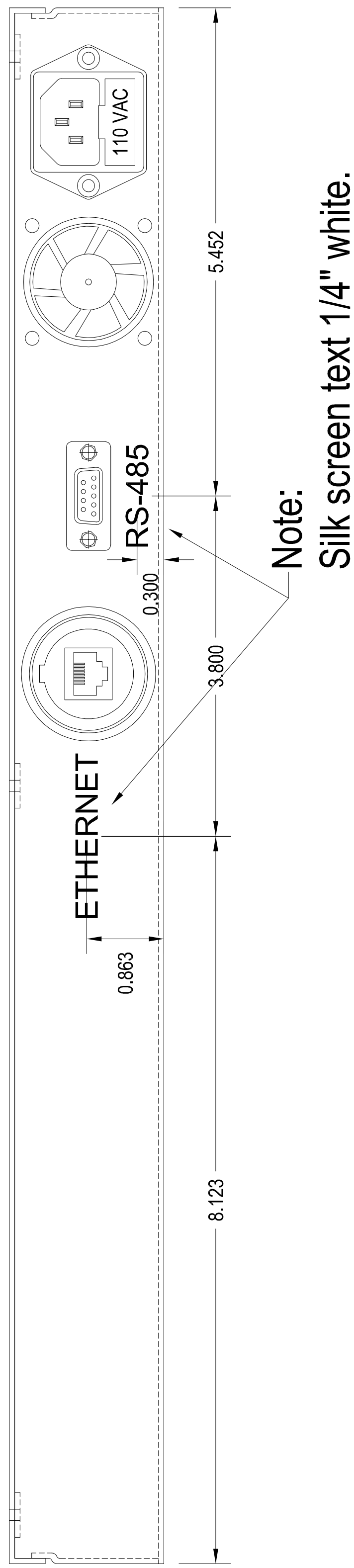
SSP-EP



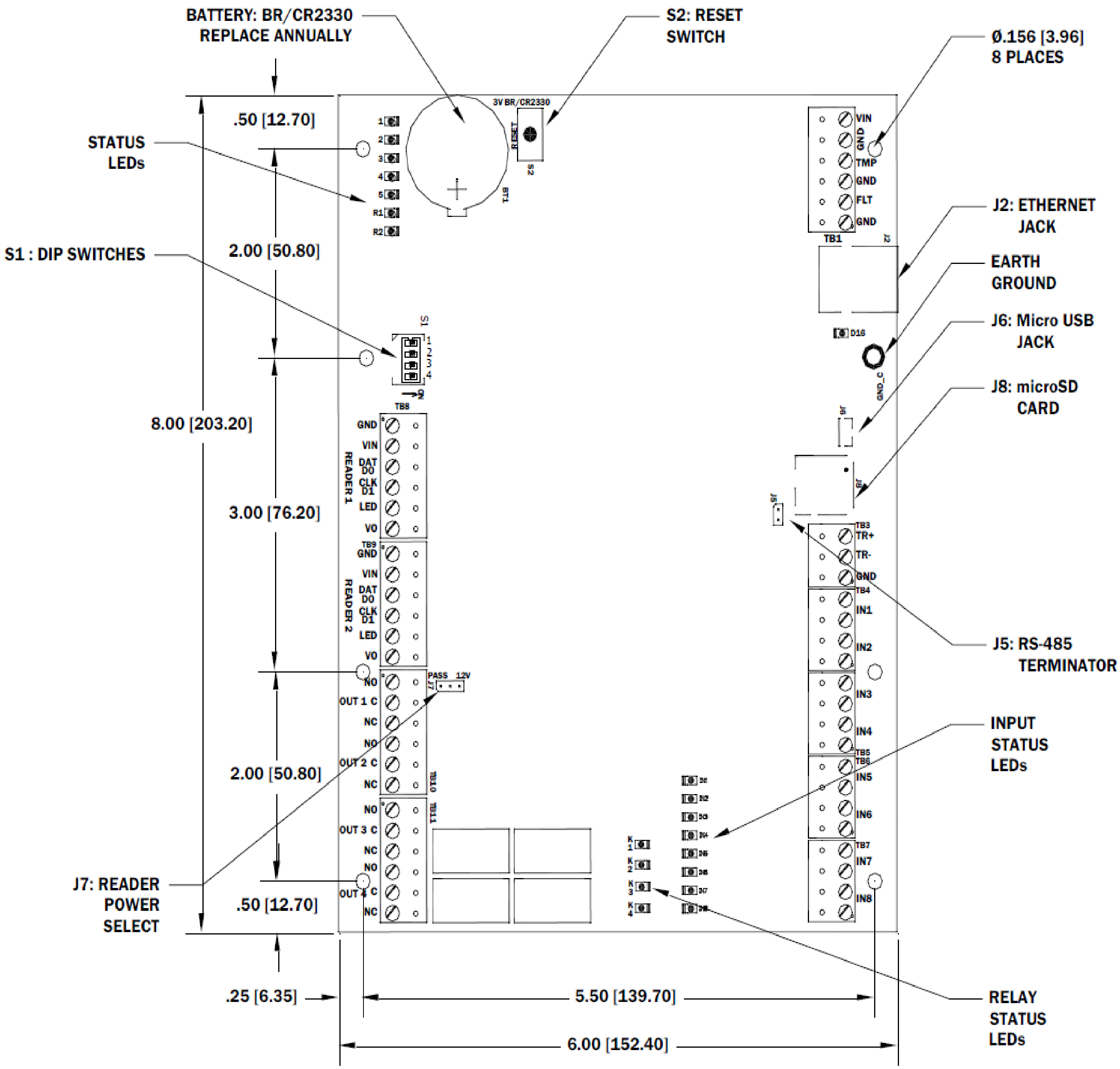
DController



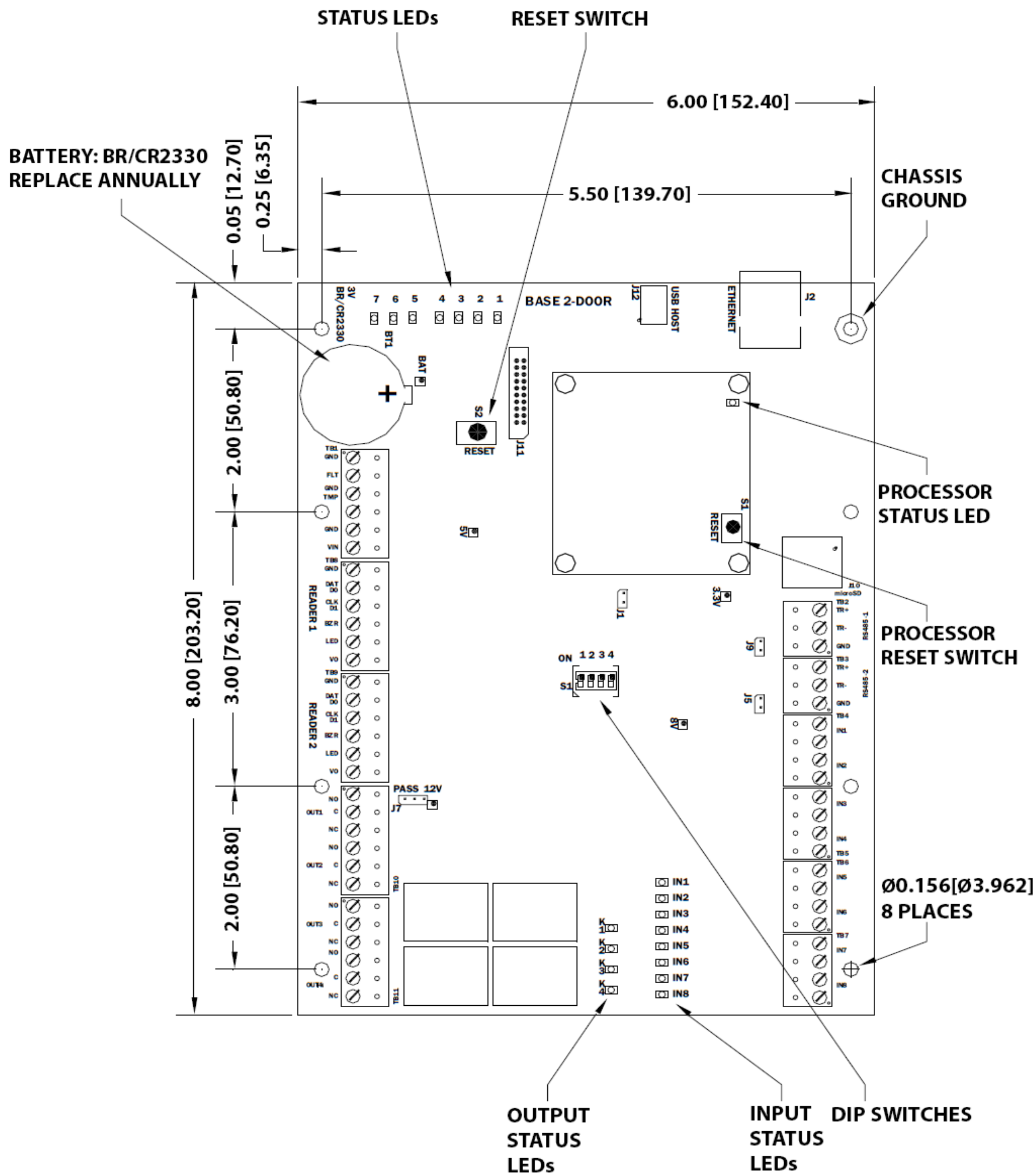
NController



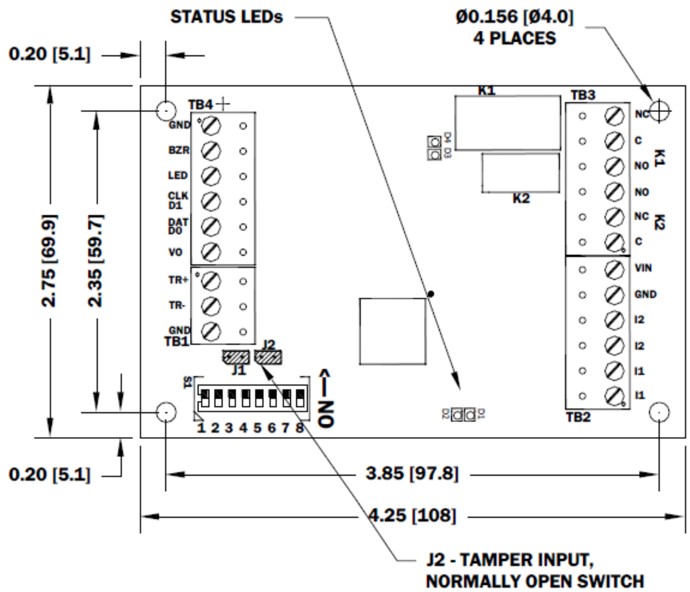
SSP-D2


BATTERY: BR/CR2330
REPLACE ANNUALLY
S2: RESET
SWITCH
Ø.156 [3.96]
8 PLACES
STATUS
LEDs
S1 : DIP SWITCHES
J2: ETHERNET
JACK
EARTH
GROUND
J6: Micro USB
JACK
J8: microSD
CARD
J5: RS-485
TERMINATOR
INPUT
STATUS
LEDs
J7: READER
POWER
SELECT
RELAY
STATUS
LEDs
.50 [12.70]
2.00 [50.80]
8.00 [203.20]
3.00 [76.20]
2.00 [50.80]
.50 [12.70]
.25 [6.35]
5.50 [139.70]
6.00 [152.40]
VIN
GND
TMP
GND
FLT
GND
TB1
GND
VIN
DAT
DO
CLK
D1
LED
VO
READER 1
READER 2
OUT 1
OUT 2
OUT 3
OUT 4
NO
C
NC
PASS
12V
TR+
TR-
IN1
IN2
IN3
IN4
IN5
IN6
IN7
IN8

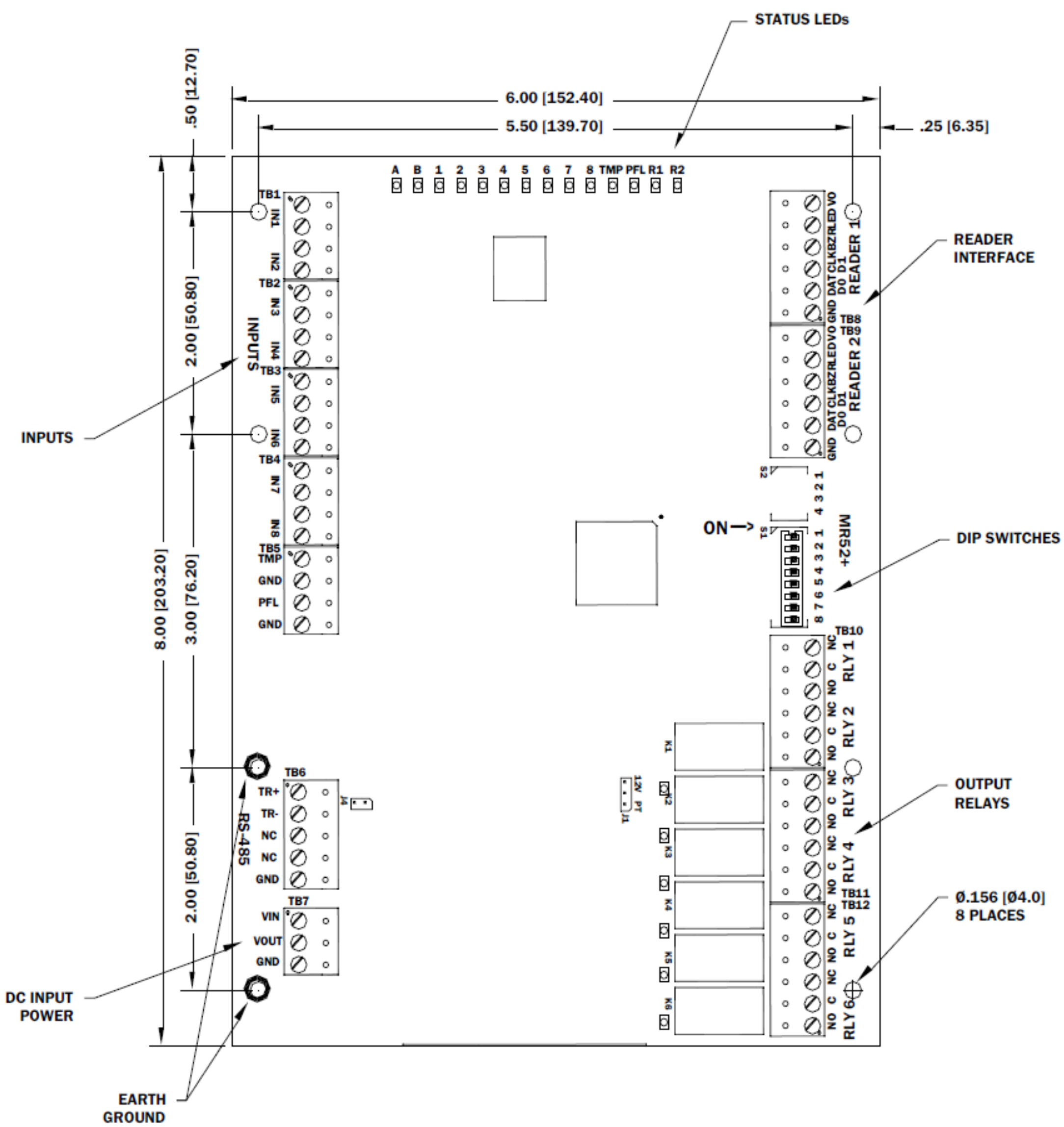
SSP-LX


STATUS LEDs
RESET SWITCH
6.00 [152.40]
BATTERY: BR/CR2330
REPLACE ANNUALLY
0.05 [12.70]
0.25 [6.35]
5.50 [139.70]
CHASSIS
GROUND
BASE 2-DOOR
USB HOST
ETHERNET
RESET
PROCESSOR
STATUS LED
PROCESSOR
RESET SWITCH
8.00 [203.20]
2.00 [50.80]
3.00 [76.20]
2.00 [50.80]
READER 1
READER 2
Ø0.156[Ø3.962]
8 PLACES
OUTPUT
STATUS
LEDs
INPUT
STATUS
LEDs
DIP SWITCHES

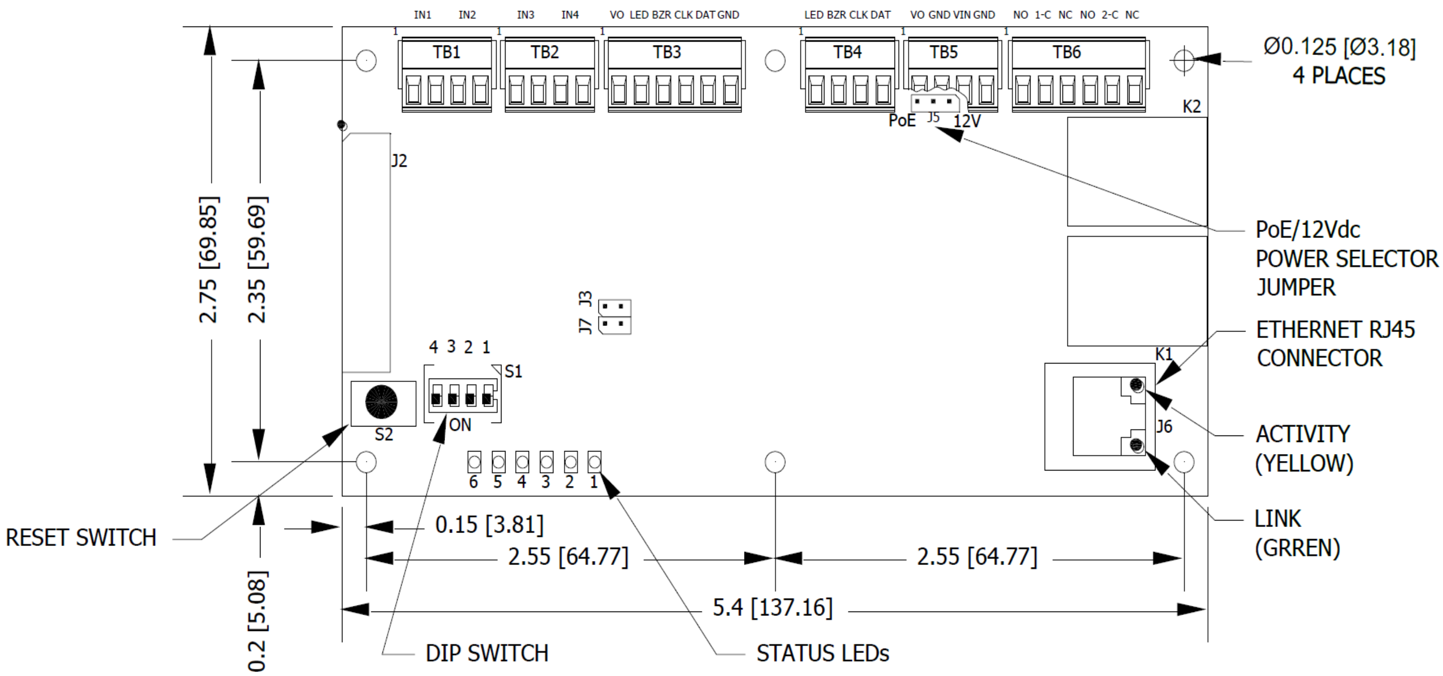
RSC-1

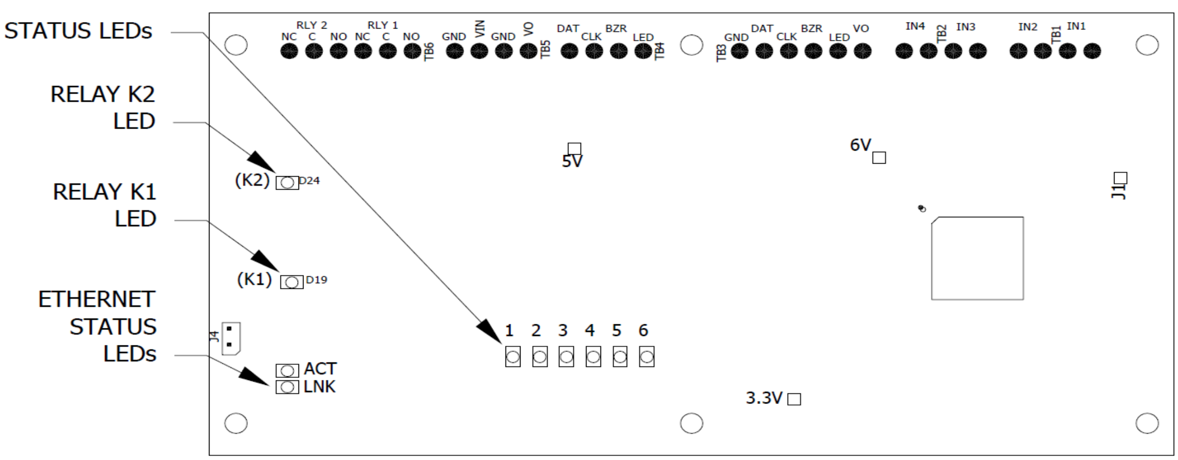

STATUS LEDs
Ø0.156 [Ø4.0]
4 PLACES
0.20 [5.1]
2.75 [69.9]
2.35 [59.7]
0.20 [5.1]
3.85 [97.8]
4.25 [108]
J2 - TAMPER INPUT,
NORMALLY OPEN SWITCH
TB4
GND
BZR
LED
CLK D1
DAT D0
VO
TR+
TR-
GND
TB1
J1
J2
S1
ON
K1
K2
TB3
TB2
NC
C
NO
VIN
I2
I1

RSC-2


STATUS LEDs
6.00 [152.40]
5.50 [139.70]
.25 [6.35]
.50 [12.70]
2.00 [50.80]
8.00 [203.20]
3.00 [76.20]
2.00 [50.80]
A B 1 2 3 4 5 6 7 8 TMP PFL R1 R2
READER INTERFACE
INPUTS
DIP SWITCHES
OUTPUT RELAYS
Ø.156 [Ø4.0]
8 PLACES
DC INPUT POWER
EARTH GROUND
RS-485
MR52+
ON
READER 1
READER 2
RLY 1
RLY 2
RLY 3
RLY 4
RLY 5
RLY 6
TB1
TB2
TB3
TB4
TB5
TB6
TB7
TB8
TB9
TB10
TB11
TB12
TMP
GND
PFL
TR+
TR-
NC
VIN
VOUT

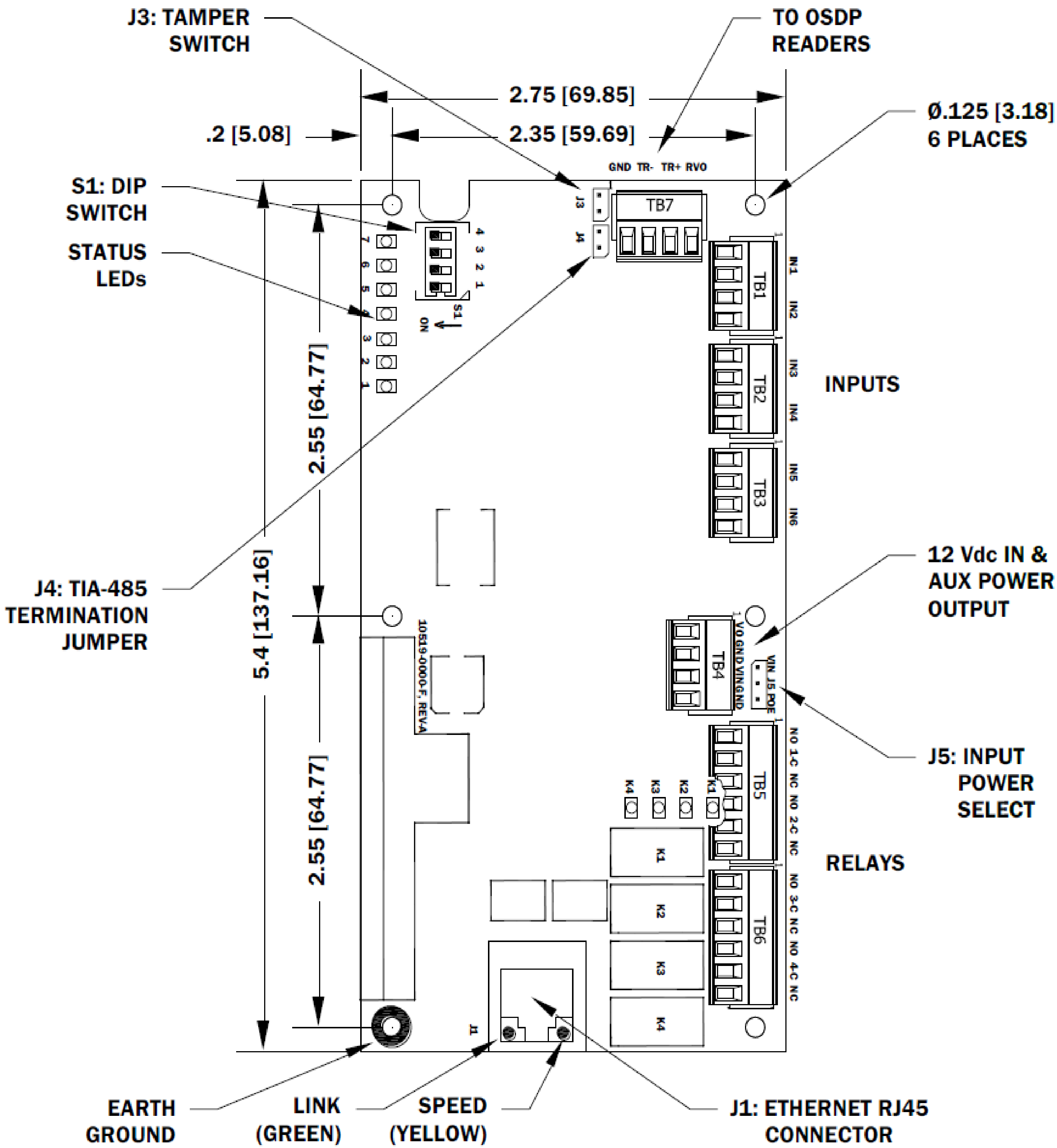
NSC-100





SOLDER SIDE

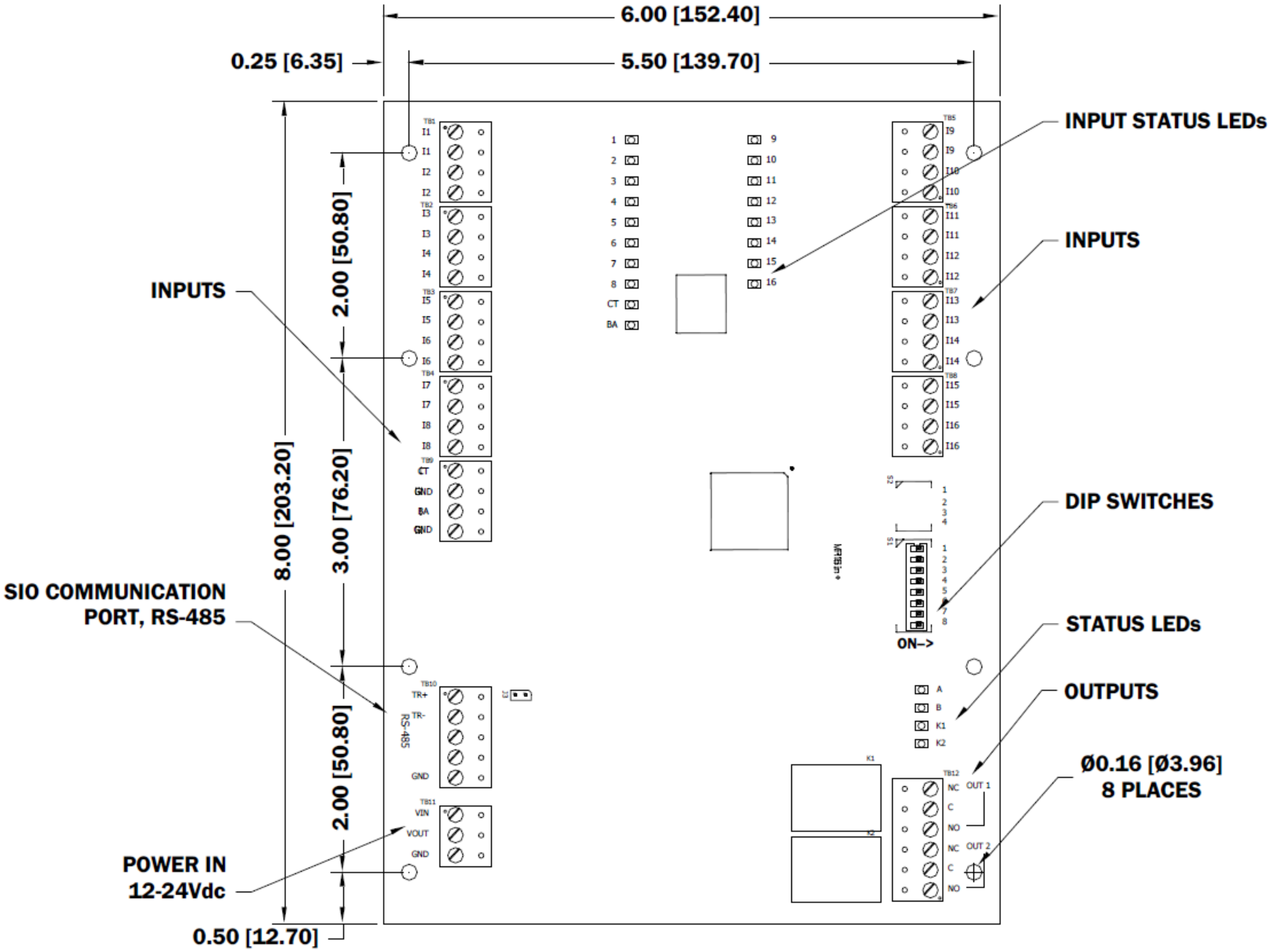
NSC-200



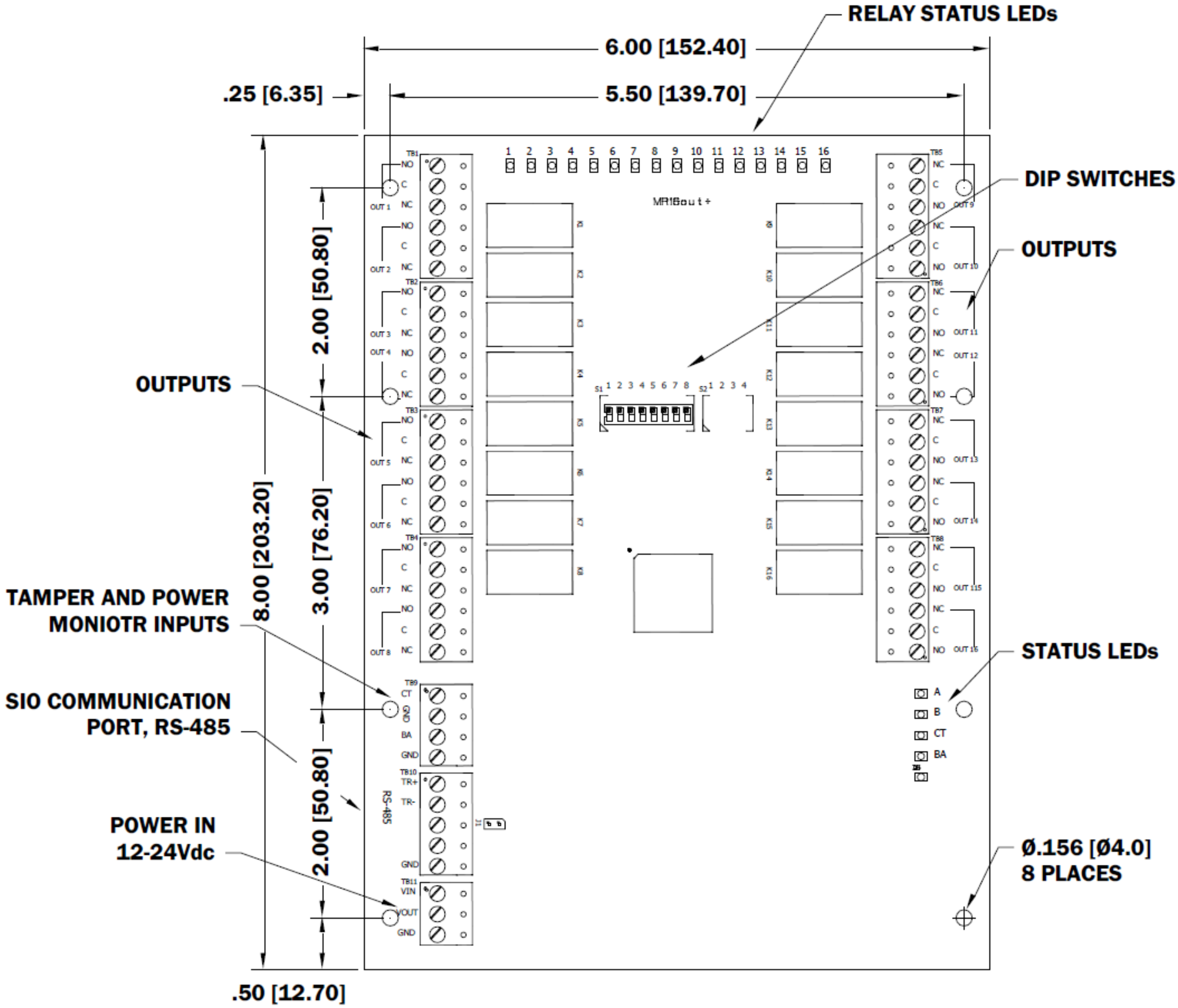
J3: TAMPER SWITCH
TO OSDP READERS
2.75 [69.85]
.2 [5.08]
2.35 [59.69]
Ø.125 [3.18] 6 PLACES
GND TR- TR+ RVO
S1: DIP SWITCH
STATUS LEDs
TB7
J3
J4
TB1
TB2
TB3
IN1
IN2
IN3
IN4
IN5
IN6
INPUTS
2.55 [64.77]
5.4 [137.16]
J4: TIA-485 TERMINATION JUMPER
12 Vdc IN & AUX POWER OUTPUT
TB4
VO GND VIN GND
VIN J5 POE
J5: INPUT POWER SELECT
10519-0000-F, REV-A
TB5
TB6
K1
K2
K3
K4
NO 1-C NC NO 2-C NC
NO 3-C NC NO 4-C NC
RELAYS
2.55 [64.77]
J1
EARTH GROUND
LINK (GREEN)
SPEED (YELLOW)
J1: ETHERNET RJ45 CONNECTOR

NOTES:

ISC-16

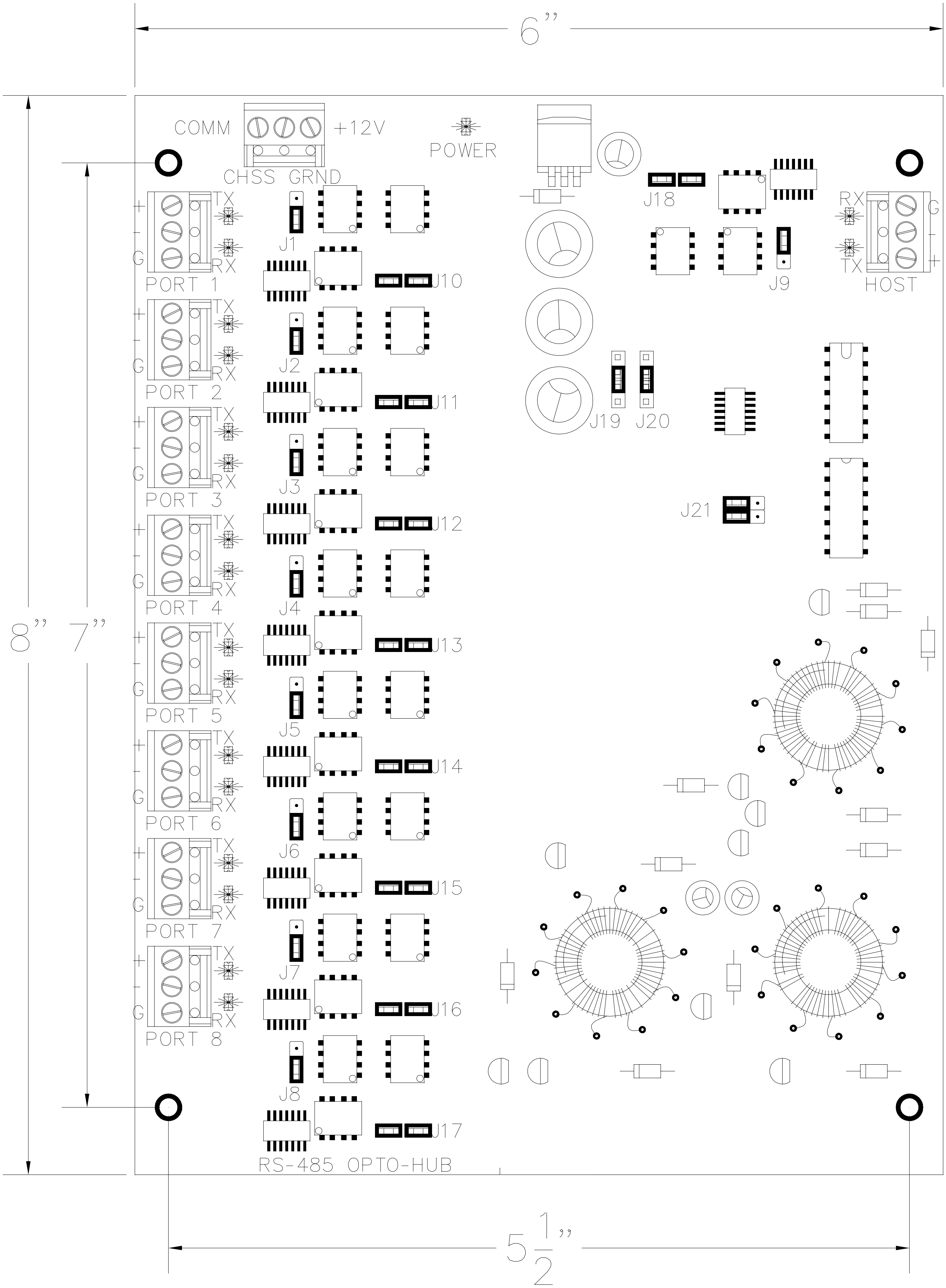

6.00 [152.40]
5.50 [139.70]
0.25 [6.35]
INPUT STATUS LEDs
INPUTS
INPUTS
2.00 [50.80]
8.00 [203.20]
3.00 [76.20]
DIP SWITCHES
SIO COMMUNICATION PORT, RS-485
STATUS LEDs
OUTPUTS
Ø0.16 [Ø3.96] 8 PLACES
2.00 [50.80]
POWER IN 12-24Vdc
0.50 [12.70]
ON->
RS-485
TR+
TR-
GND
VIN
VOUT
CT
BA
NC
C
NO
OUT 1
OUT 2

OSC-16

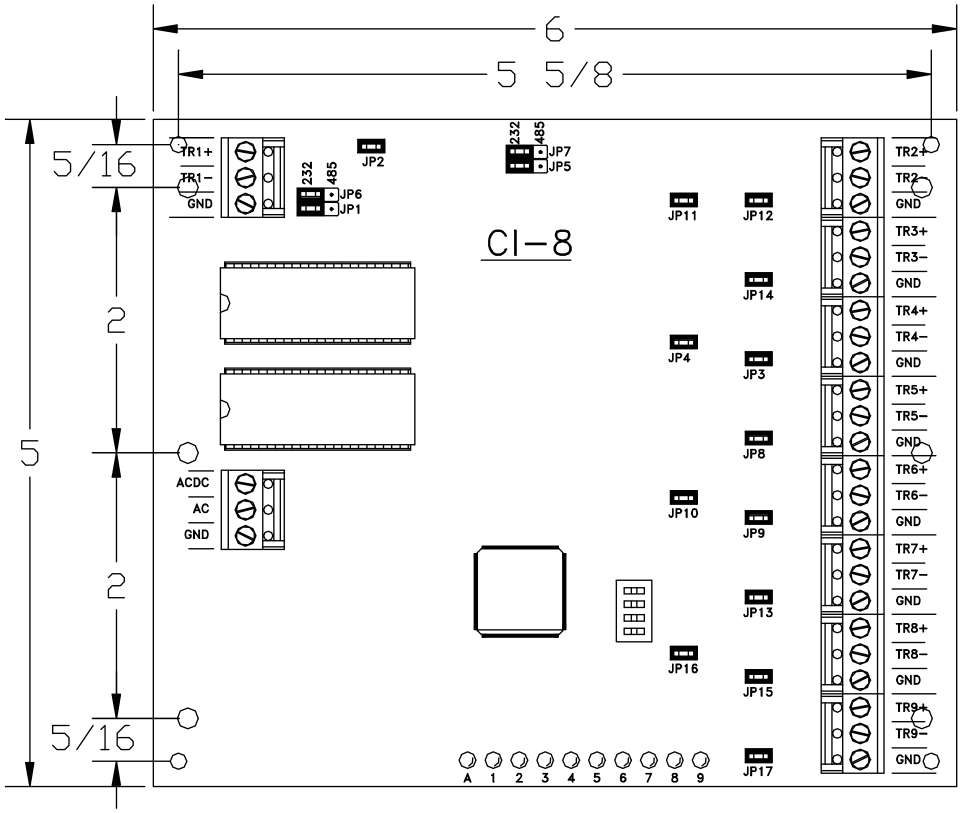


RELAY STATUS LEDs
6.00 [152.40]
5.50 [139.70]
.25 [6.35]
DIP SWITCHES
OUTPUTS
OUTPUTS
2.00 [50.80]
8.00 [203.20]
3.00 [76.20]
TAMPER AND POWER
MONIOTR INPUTS
SIO COMMUNICATION
PORT, RS-485
2.00 [50.80]
POWER IN
12-24Vdc
STATUS LEDs
Ø.156 [Ø4.0]
8 PLACES
.50 [12.70]

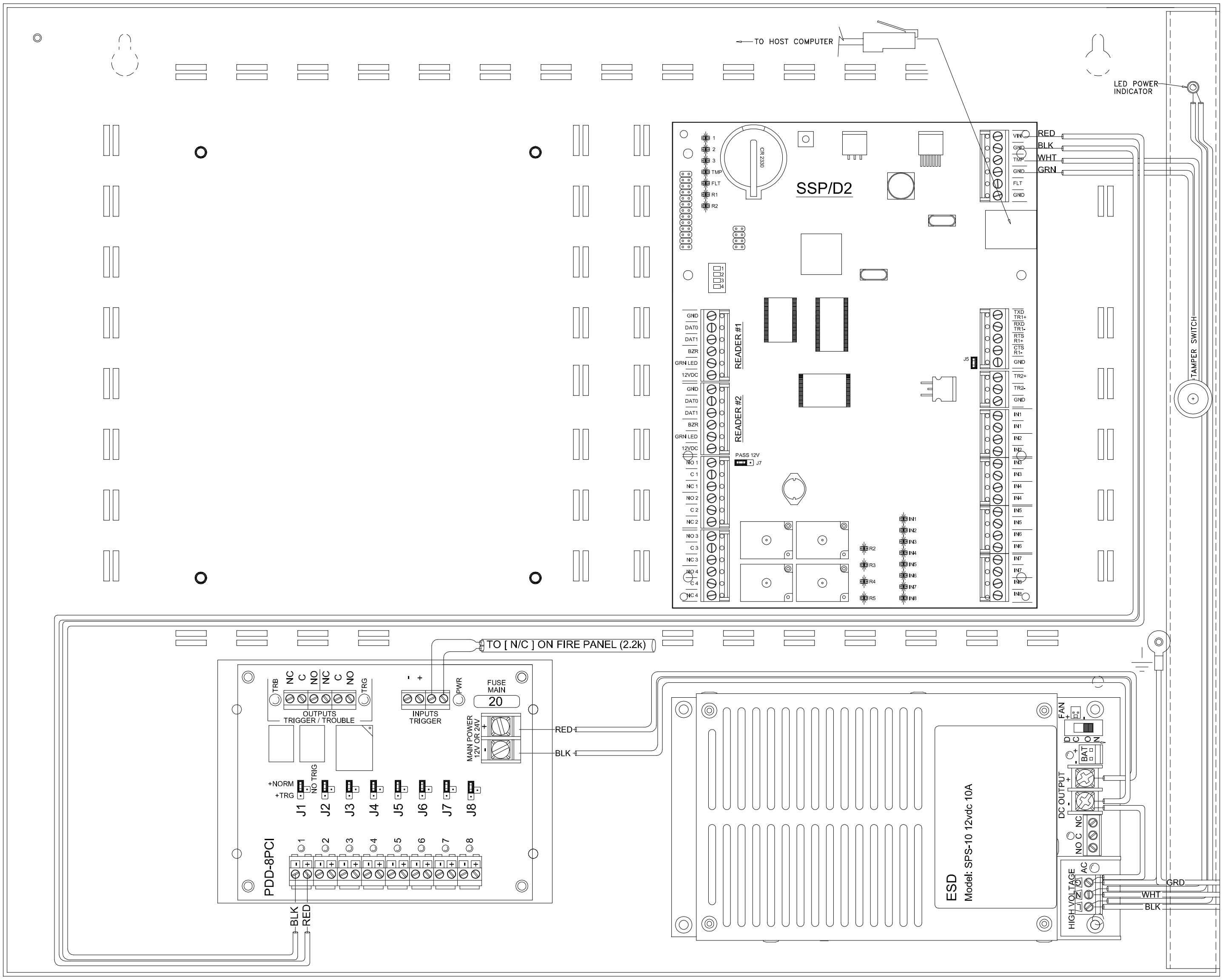
OptoHub


6"
8"
7"
5 1/2"
COMM
+12V
CHSS GRND
POWER
J18
J9
RX
TX
G
HOST
TX
RX
G
PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
PORT 7
PORT 8
J1
J2
J3
J4
J5
J6
J7
J8
J10
J11
J12
J13
J14
J15
J16
J17
J19
J20
J21
RS-485 OPTO-HUB

CI-8 Multiplexer

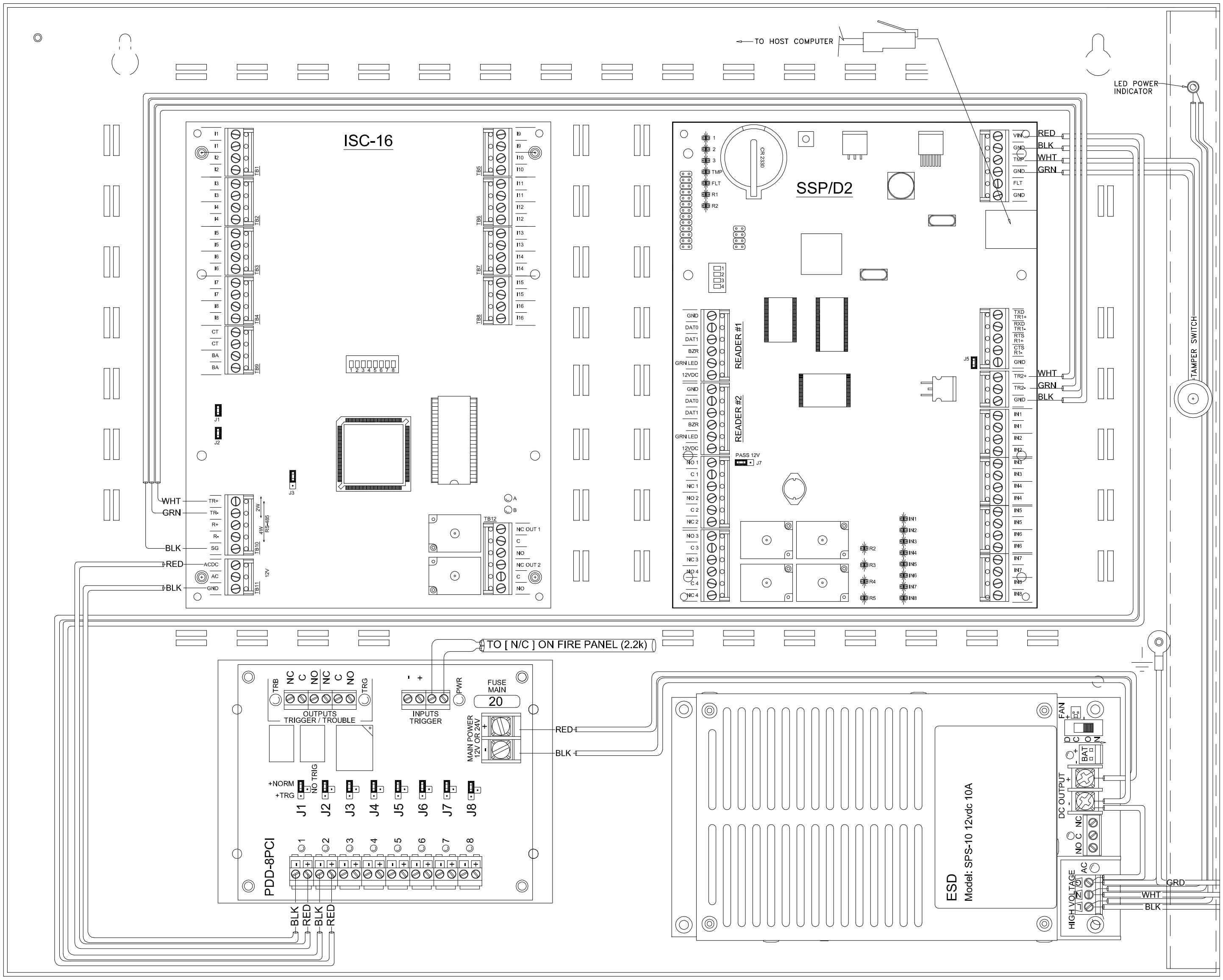


E2 / SSP-D2

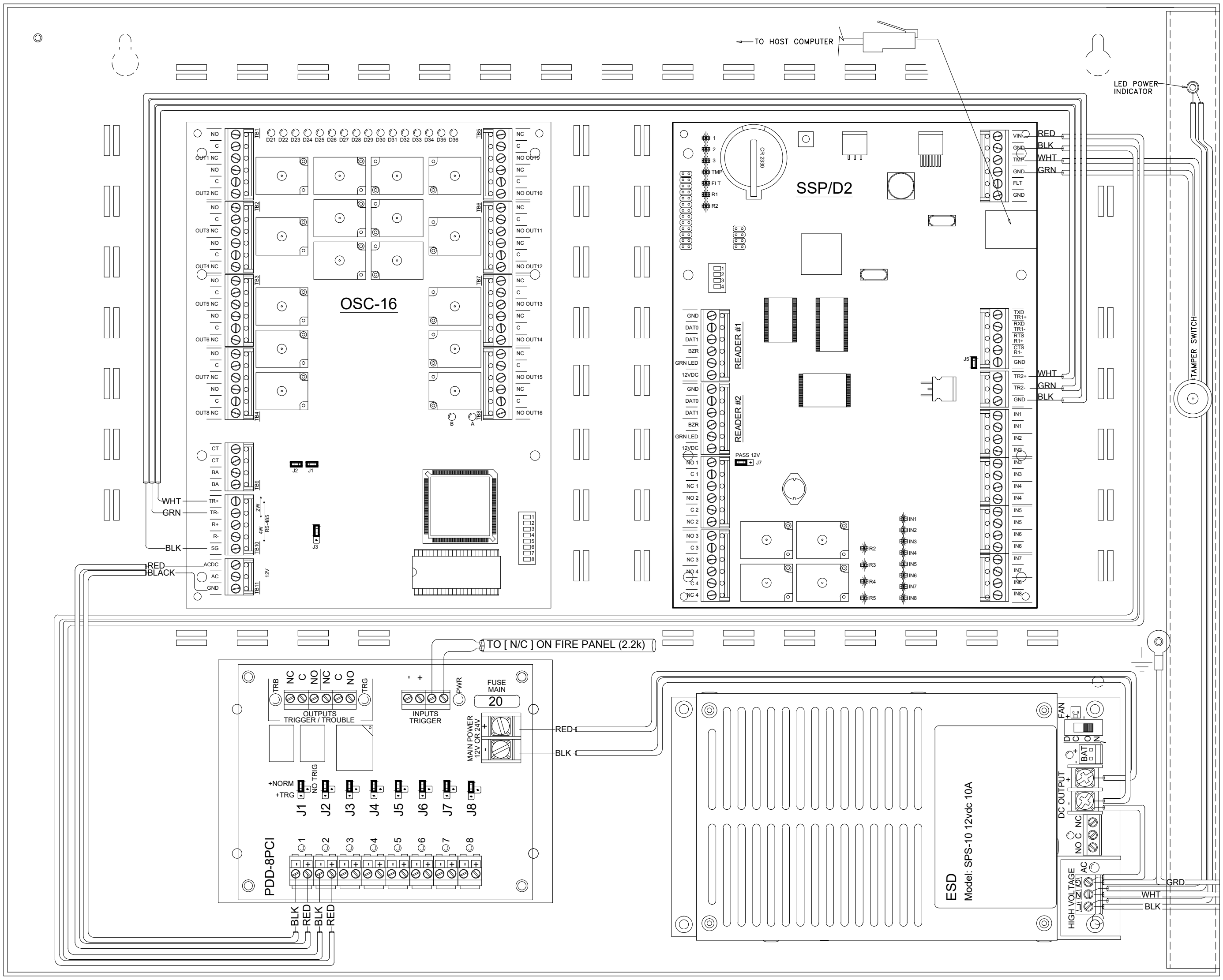


TO HOST COMPUTER
LED POWER INDICATOR
SSP/D2
READER #1
READER #2
TAMPER SWITCH
TO [N/C] ON FIRE PANEL (2.2k)
OUTPUTS TRIGGER / TROUBLE
INPUTS TRIGGER
FUSE MAIN
20
MAIN POWER 12V OR 24V
PDD-8PCI
RED
BLK
WHT
GRN
GRD
ESD
Model: SPS-10 12vdc 10A
DC OUTPUT
HIGH VOLTAGE

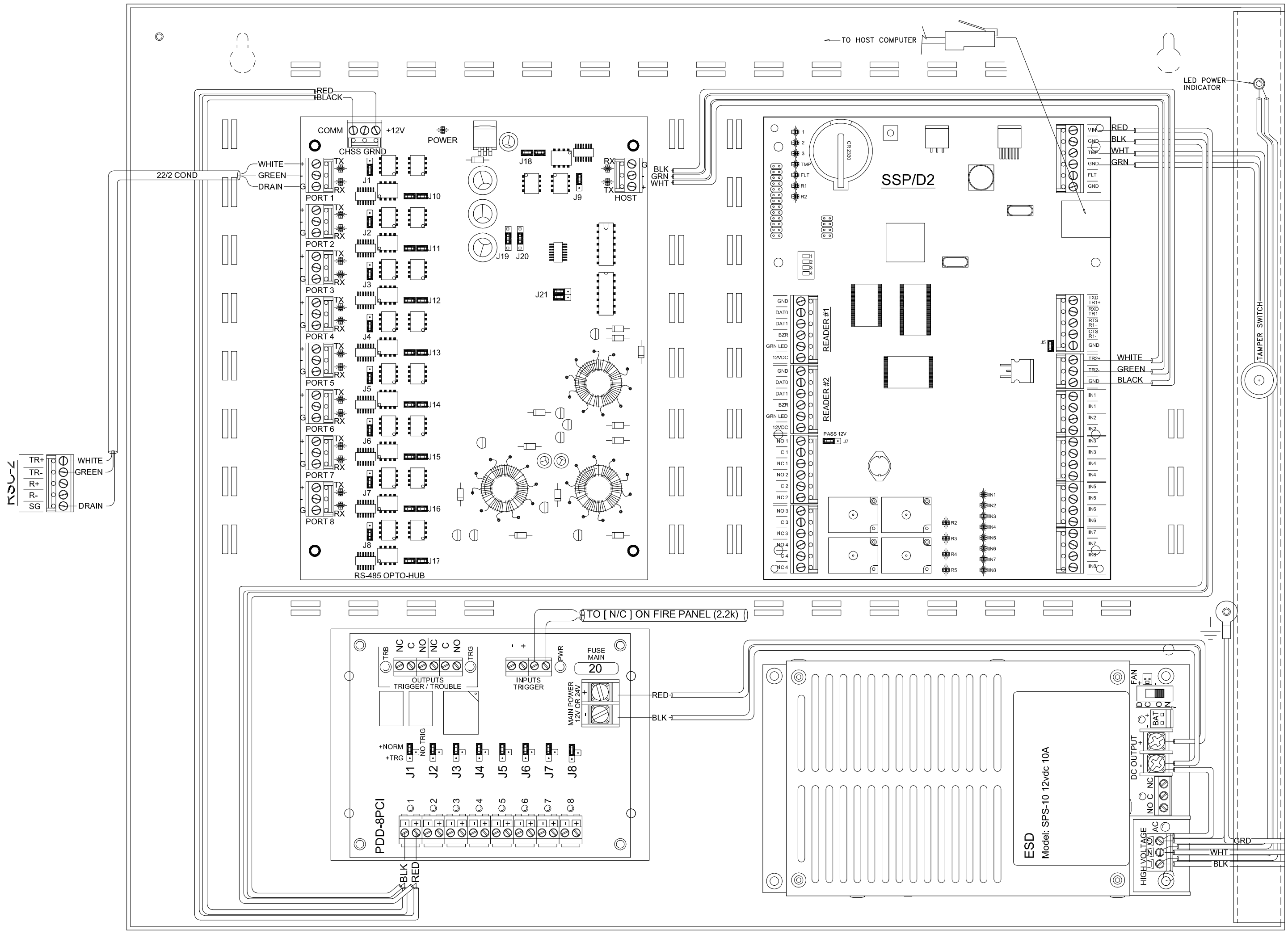
E2 / SSP-D2 / ISC-16



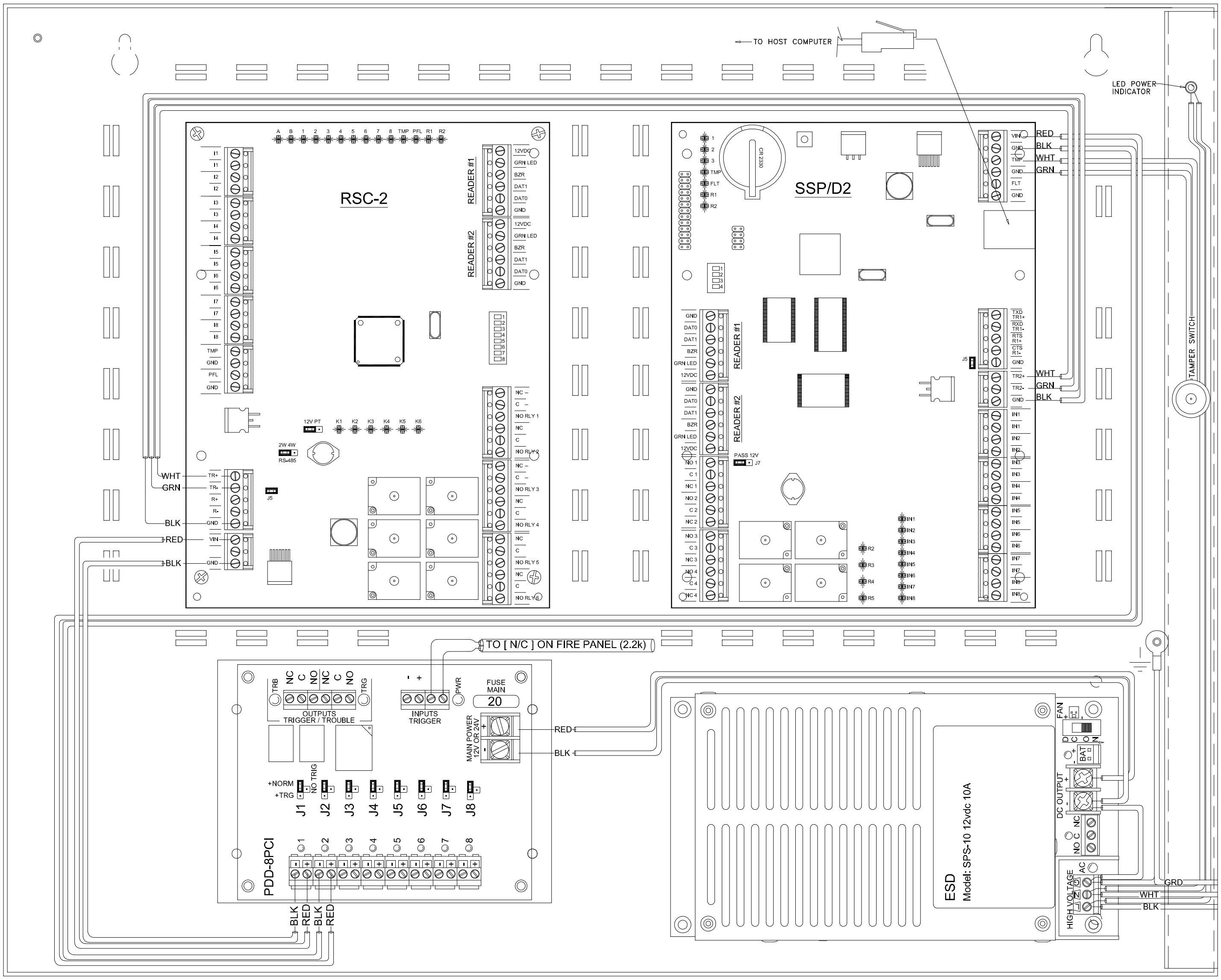
E2 / SSP-D2 / OSC-16



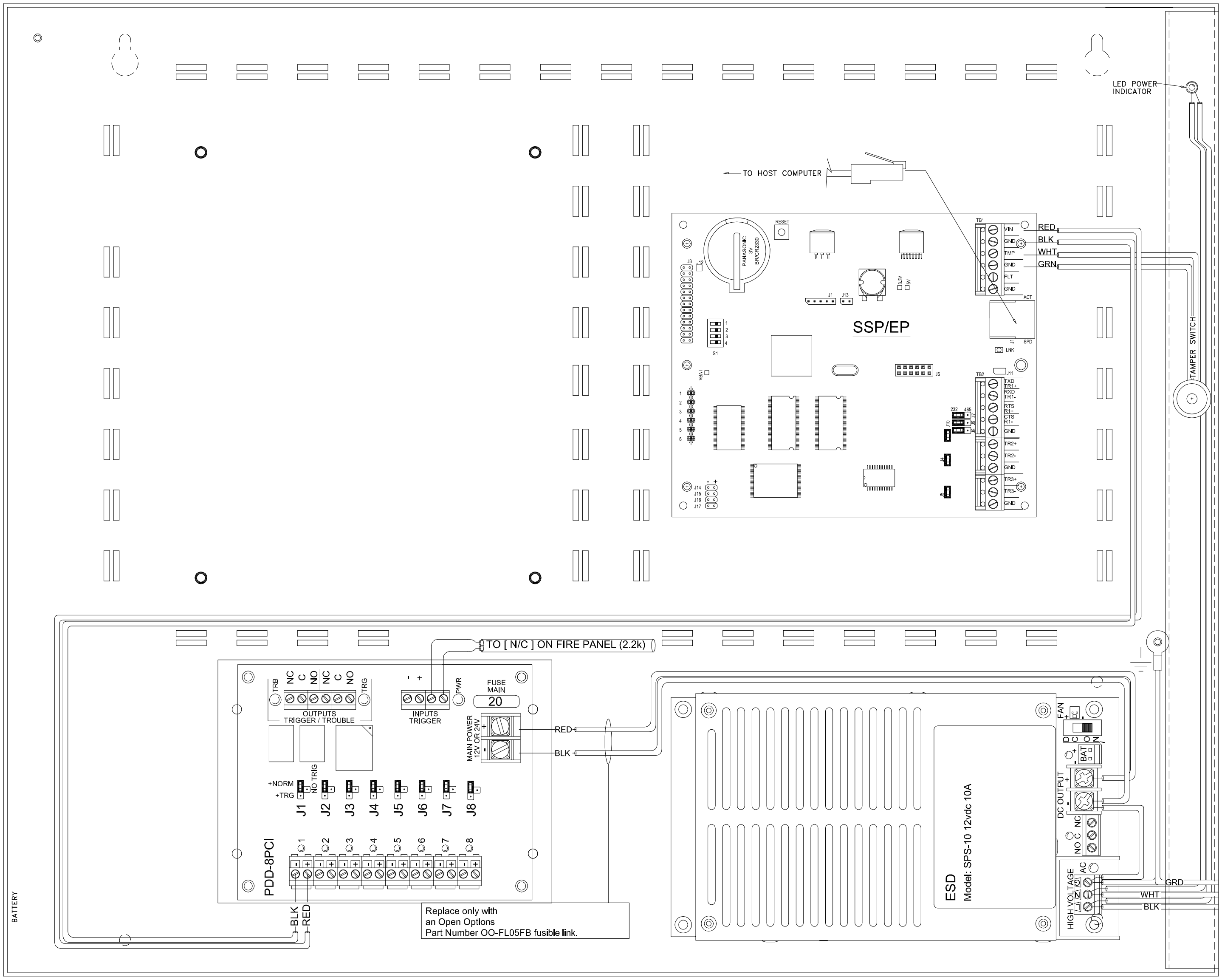
E2 / SSP-D2 / OptoHub



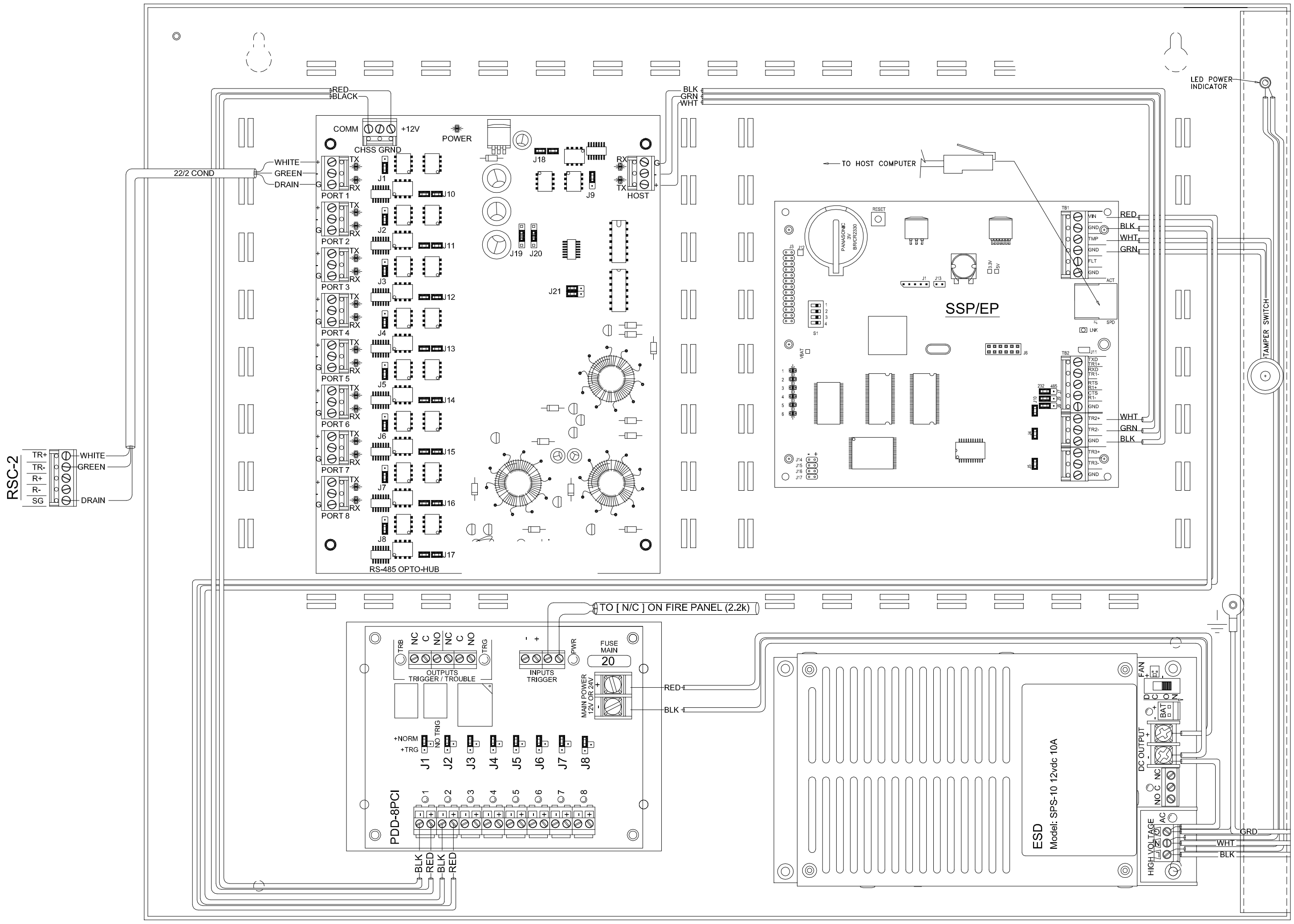
E2 / SSP-D2 / RSC-2



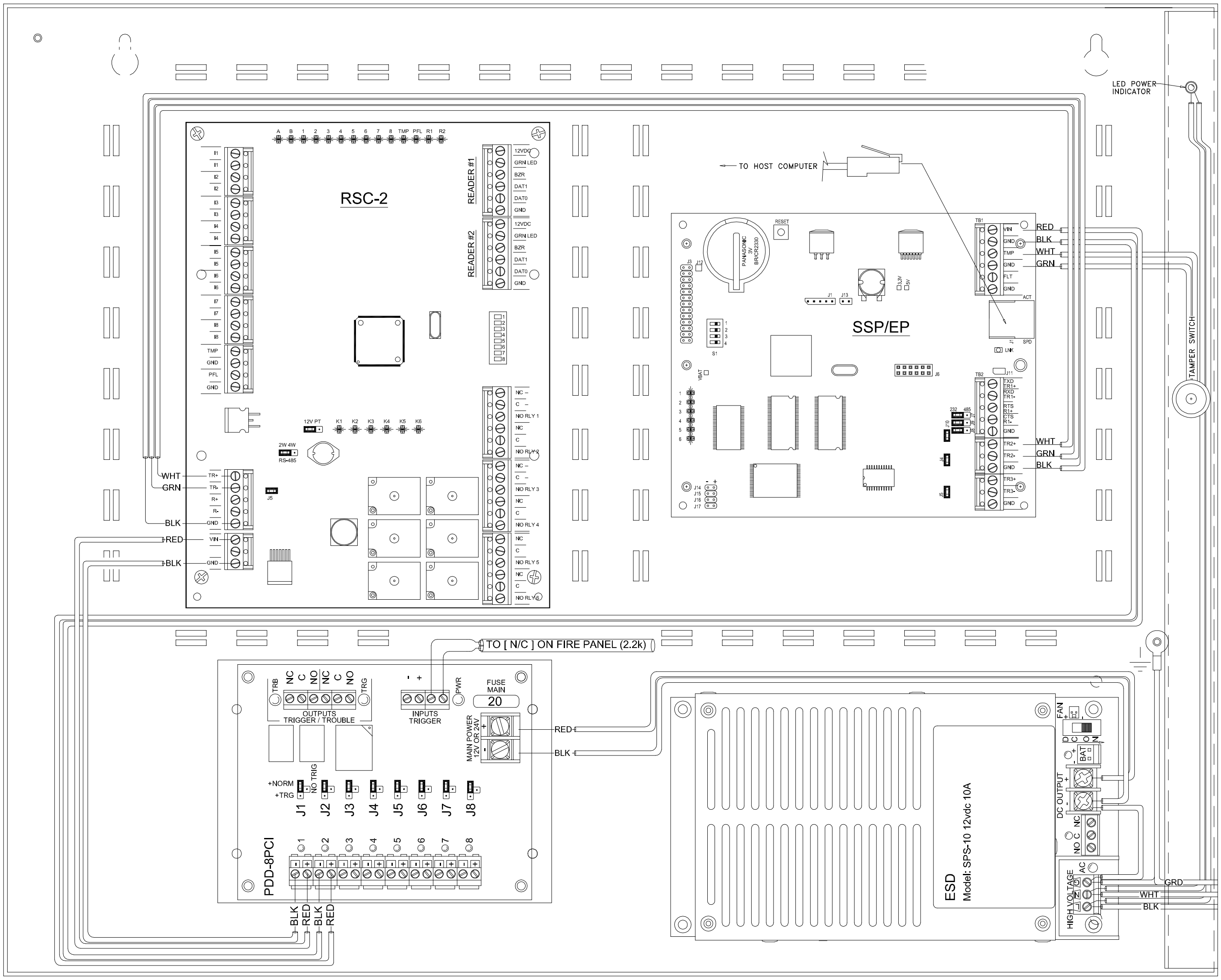
E2 / SSP-EP


LED POWER INDICATOR
TO HOST COMPUTER
SSP/EP
RED
BLK
WHT
GRN
TAMPER SWITCH
TO [N/C] ON FIRE PANEL (2.2k)
OUTPUTS TRIGGER / TROUBLE
INPUTS TRIGGER
FUSE MAIN
20
MAIN POWER 12V OR 24V
+NORM
+TRG
NO TRIG
J1
J2
J3
J4
J5
J6
J7
J8
PDD-8PCI
BLK
RED
BATTERY
Replace only with
an Open Options
Part Number OO-FL05FB fusible link.
ESD
Model: SPS-10 12vdc 10A
FAN
BAT
DC OUTPUT
HIGH VOLTAGE
GRD
WHT
BLK

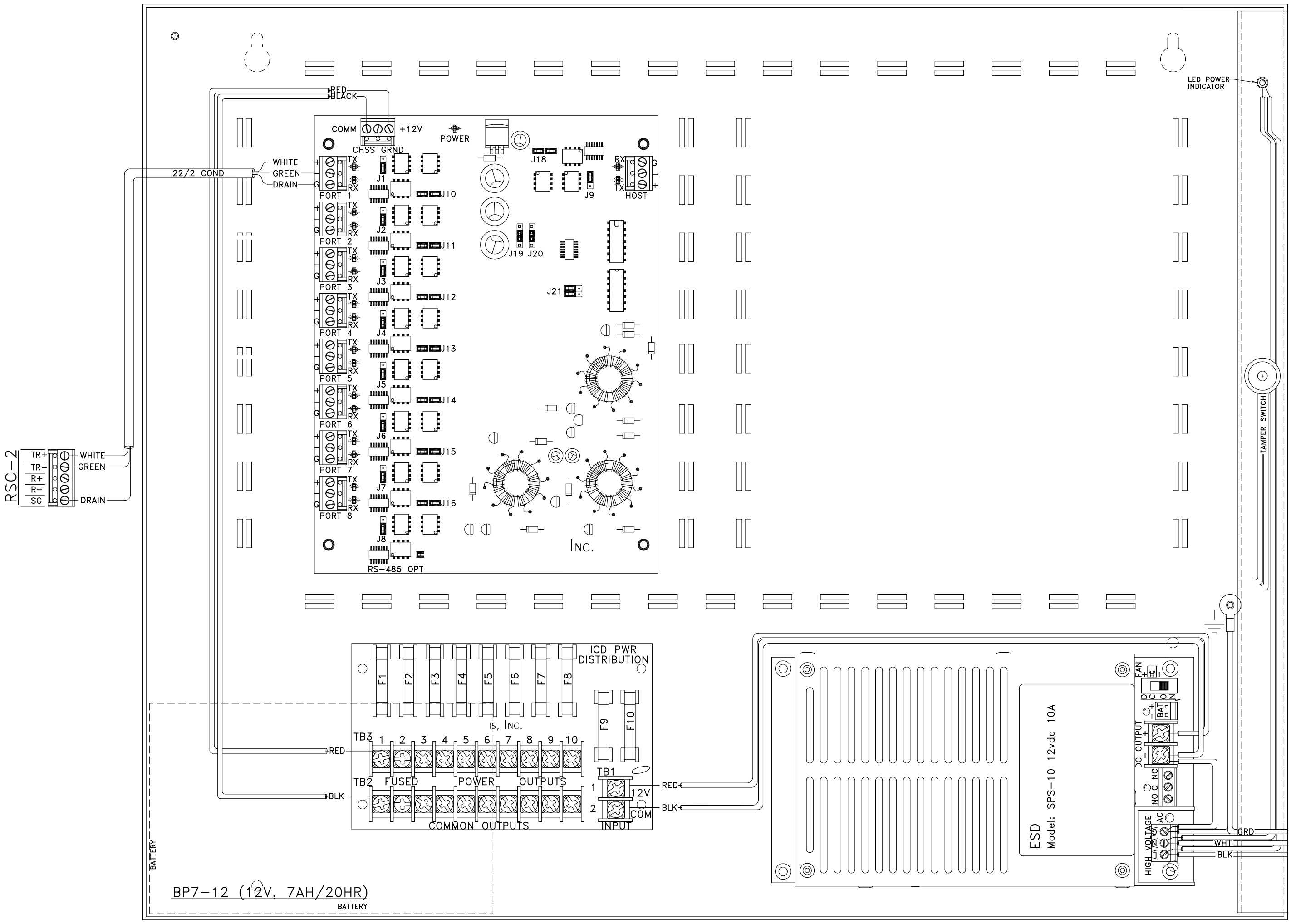
E2 / SSP-EP / OptoHub



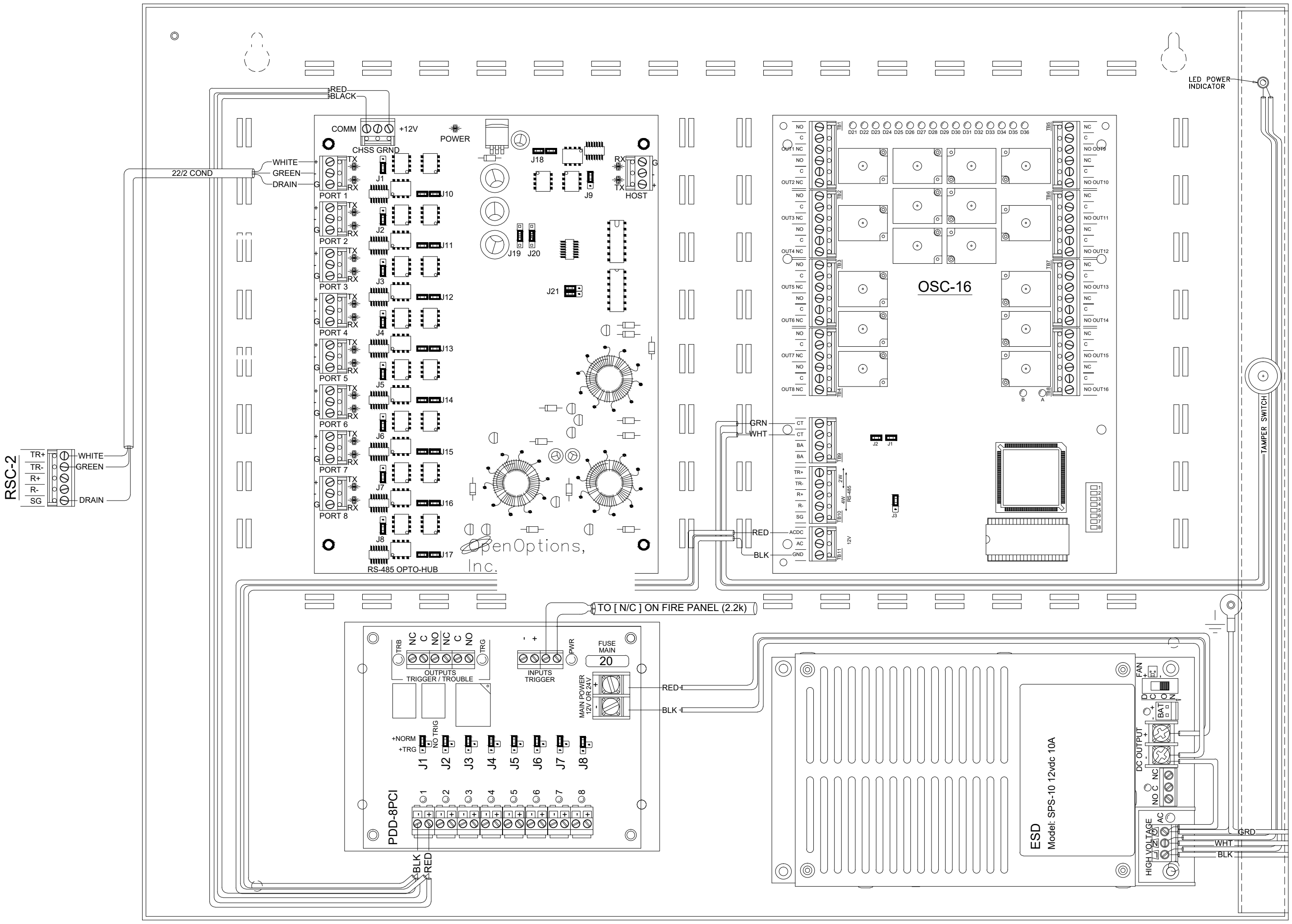
E2 / SSP-EP / RSC-2



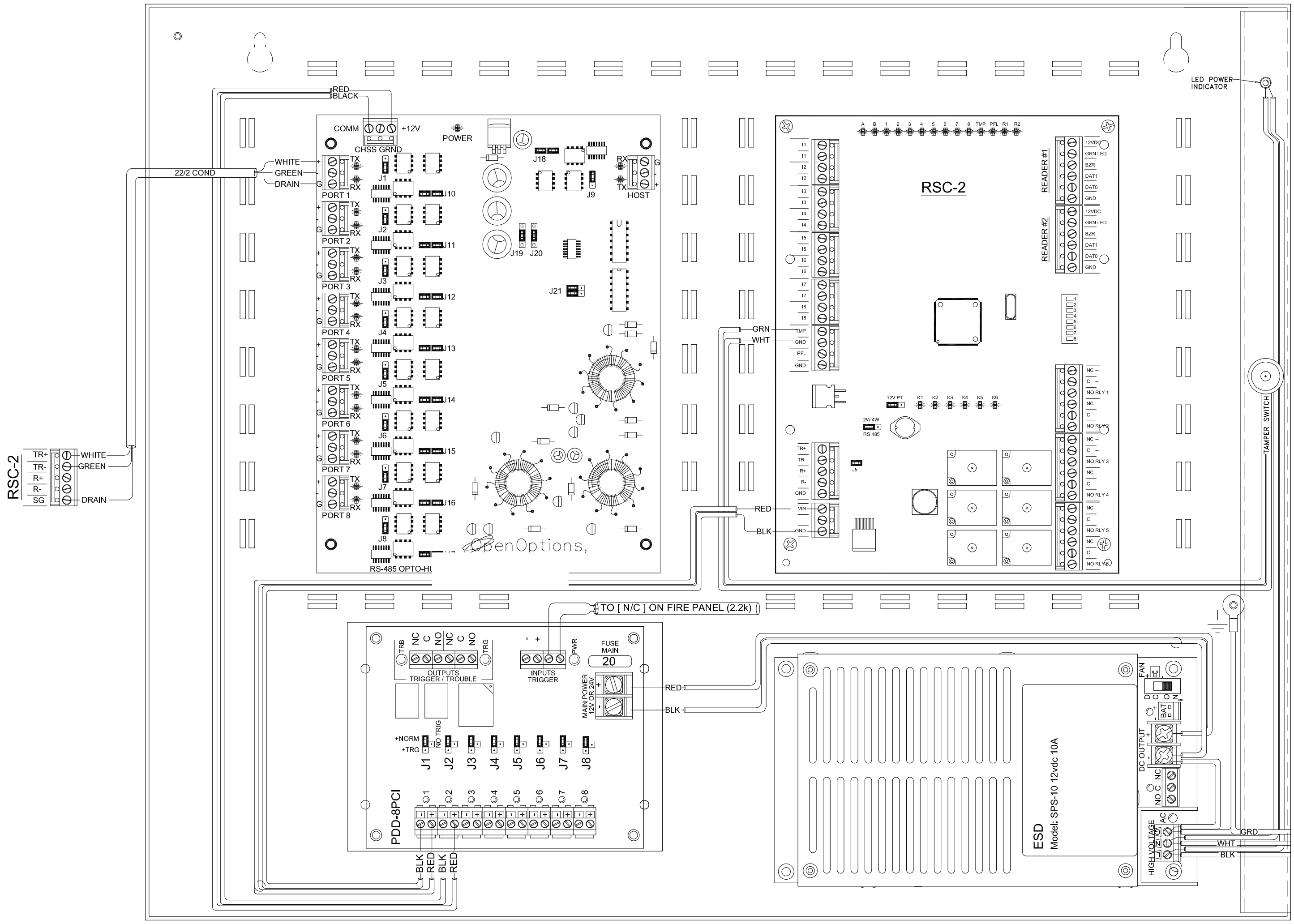
E2 / OptoHub


RSC-2
TR+
TR-
R+
R-
SG
WHITE
GREEN
DRAIN
22/2 COND
RED
BLACK
COMM
+12V
CHSS GRND
POWER
PORT 1
PORT 2
PORT 3
PORT 4
PORT 5
PORT 6
PORT 7
PORT 8
RS-485 OPT
HOST
LED POWER INDICATOR
TAMPER SWITCH
ICD PWR DISTRIBUTION
TB3
TB2
FUSED POWER OUTPUTS
COMMON OUTPUTS
TB1
12V
COM
INPUT
BP7-12 (12V, 7AH/20HR)
BATTERY
ESD
Model: SPS-10 12vdc 10A
DC OUTPUT
HIGH VOLTAGE
GRD
WHT
BLK

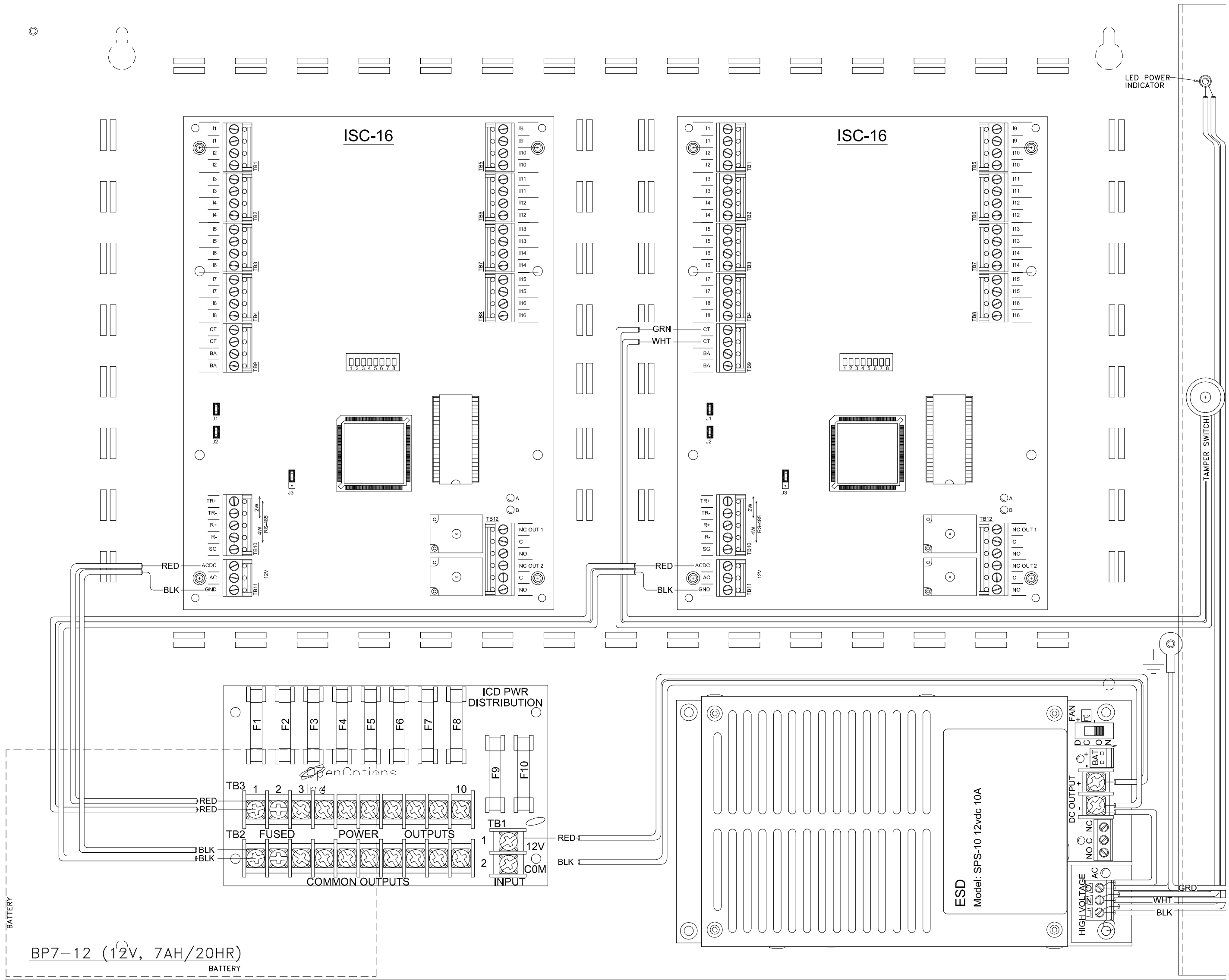
E2 / OptoHub / OSC-16



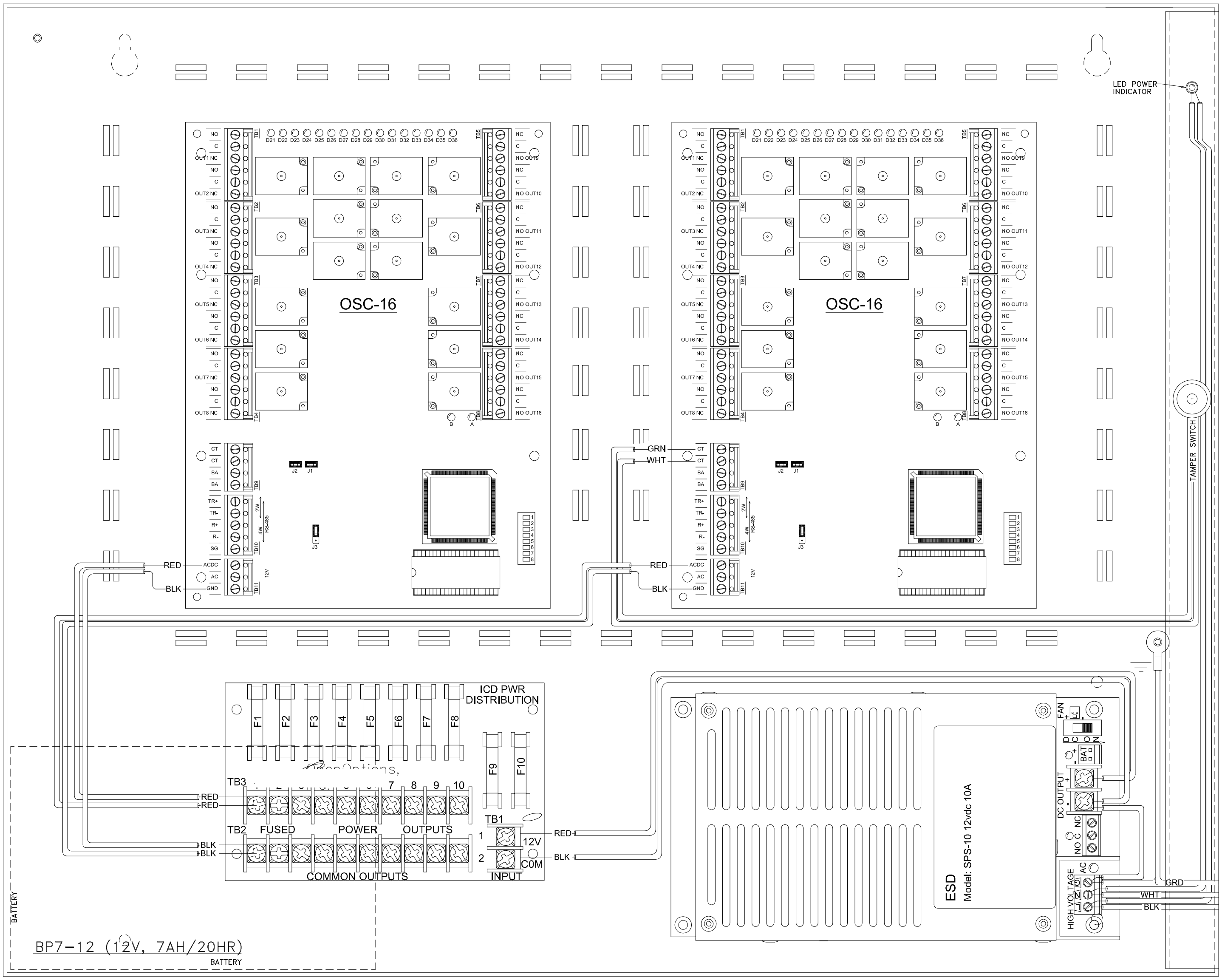
E2 / OptoHub / RSC-2



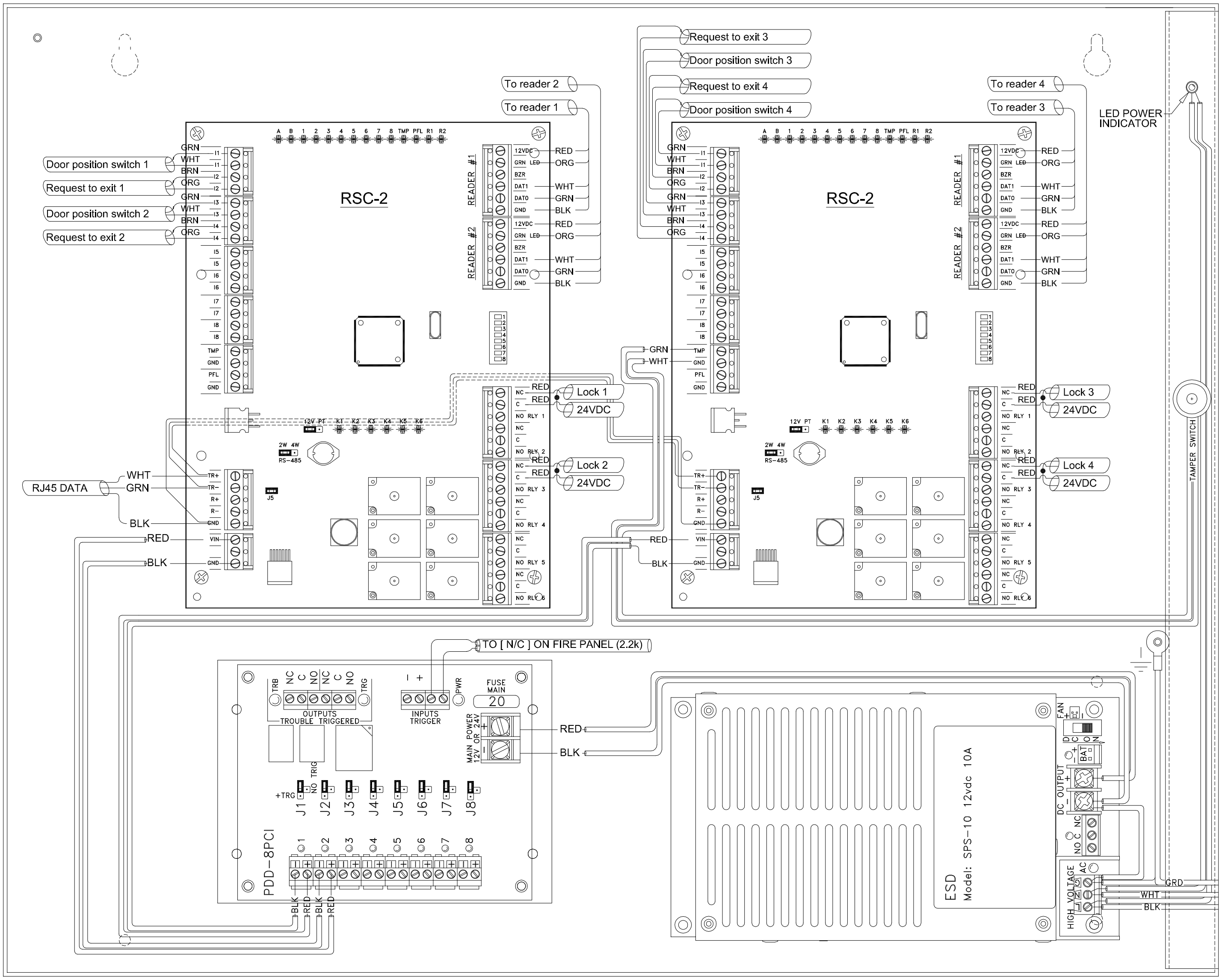
E2 / ISC-16 / ISC-16



E2 / OSC-16 / OSC-16

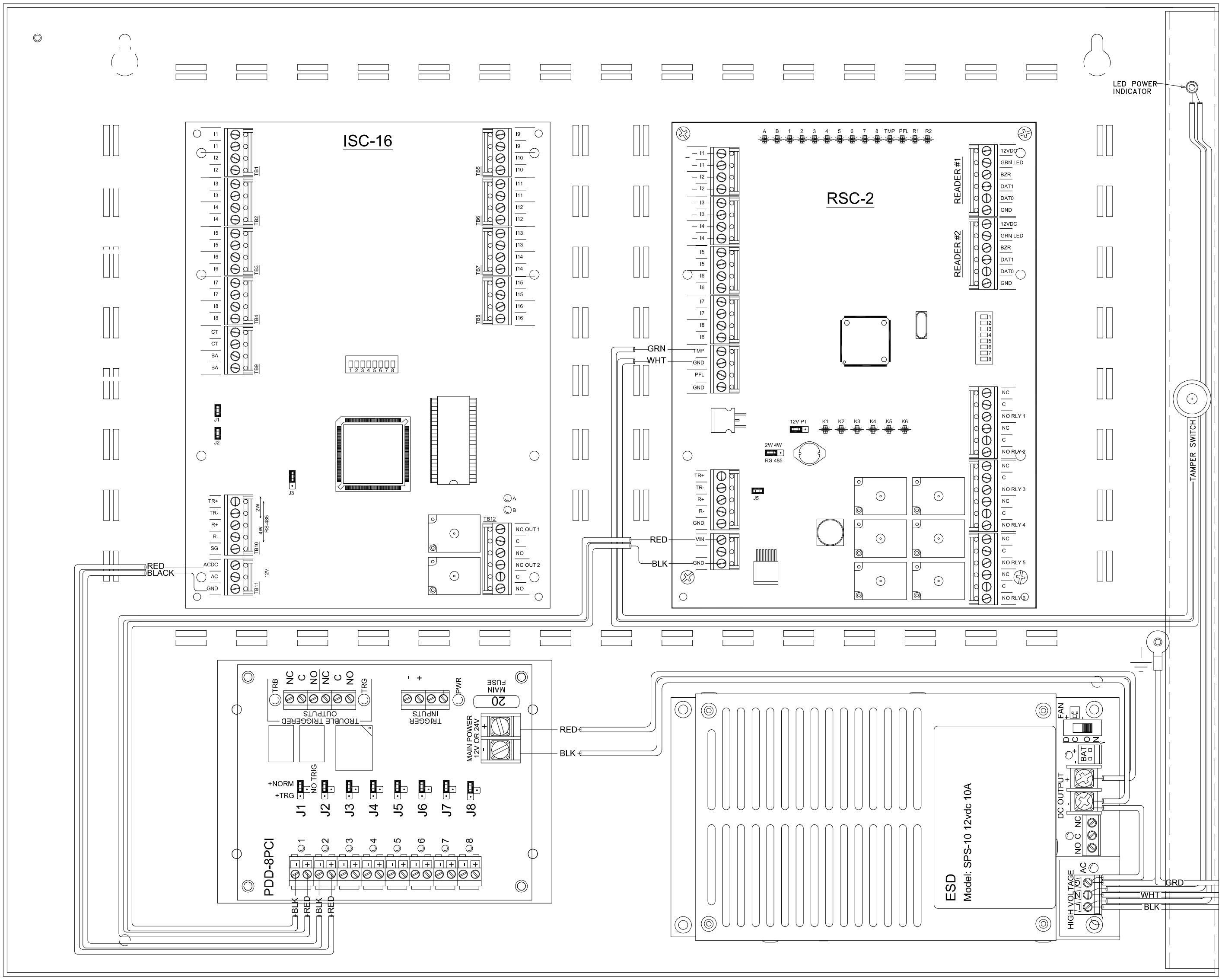


E2 / RSC-2 / RSC-2

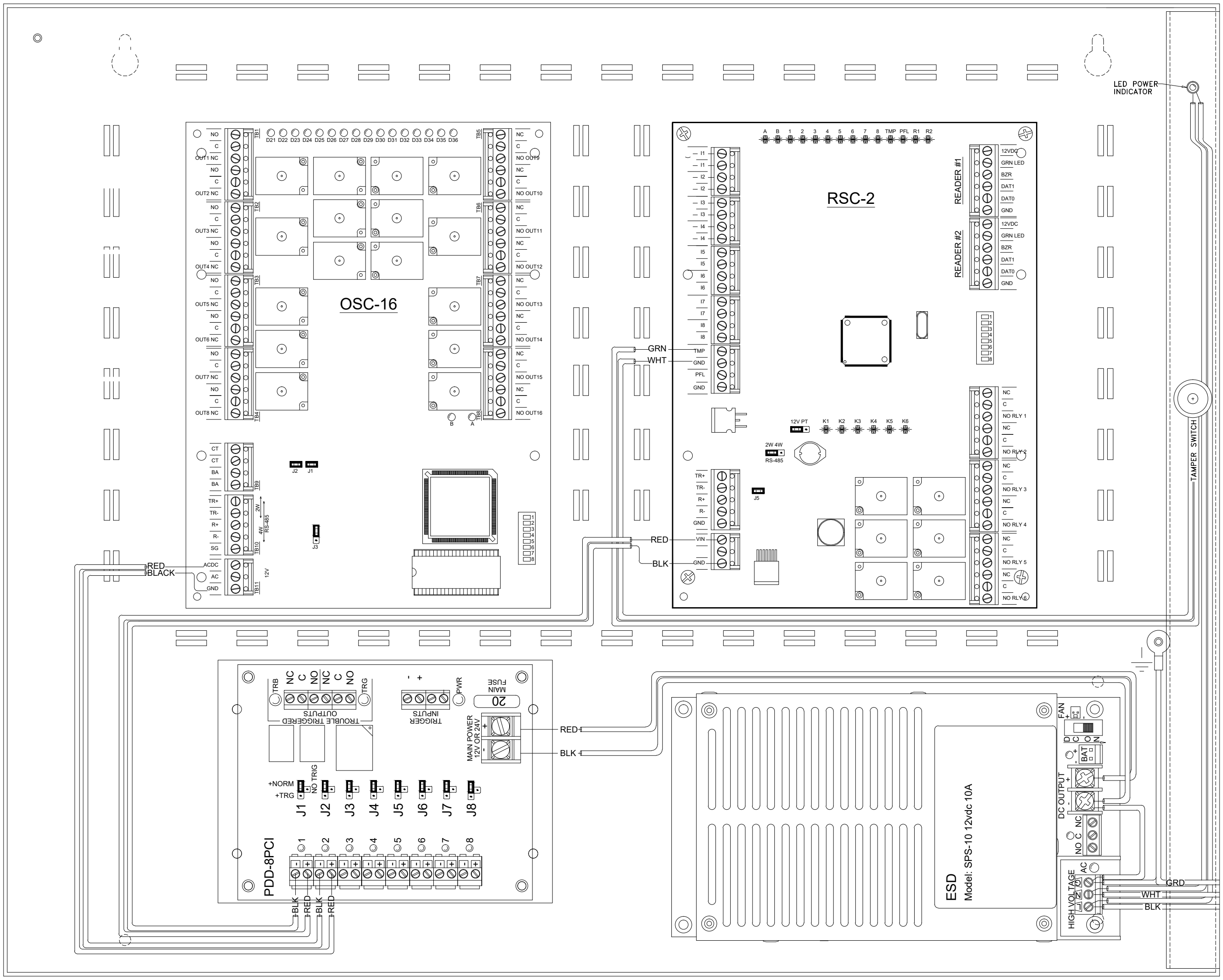


Request to exit 3
Door position switch 3
Request to exit 4
Door position switch 4
To reader 2
To reader 1
To reader 4
To reader 3
LED POWER INDICATOR
RSC-2
RSC-2
Door position switch 1
Request to exit 1
Door position switch 2
Request to exit 2
READER #1
READER #2
Lock 1
24VDC
Lock 2
24VDC
Lock 3
24VDC
Lock 4
24VDC
RJ45 DATA
TAMPER SWITCH
TO [N/C] ON FIRE PANEL (2.2k)
PDD-8PCI
OUTPUTS
TROUBLE TRIGGERED
INPUTS
TRIGGER
FUSE MAIN
20
MAIN POWER 12V OR 24V
ESD
Model: SPS-10 12vdc 10A
DC OUTPUT
HIGH VOLTAGE AC
GRD
WHT
BLK

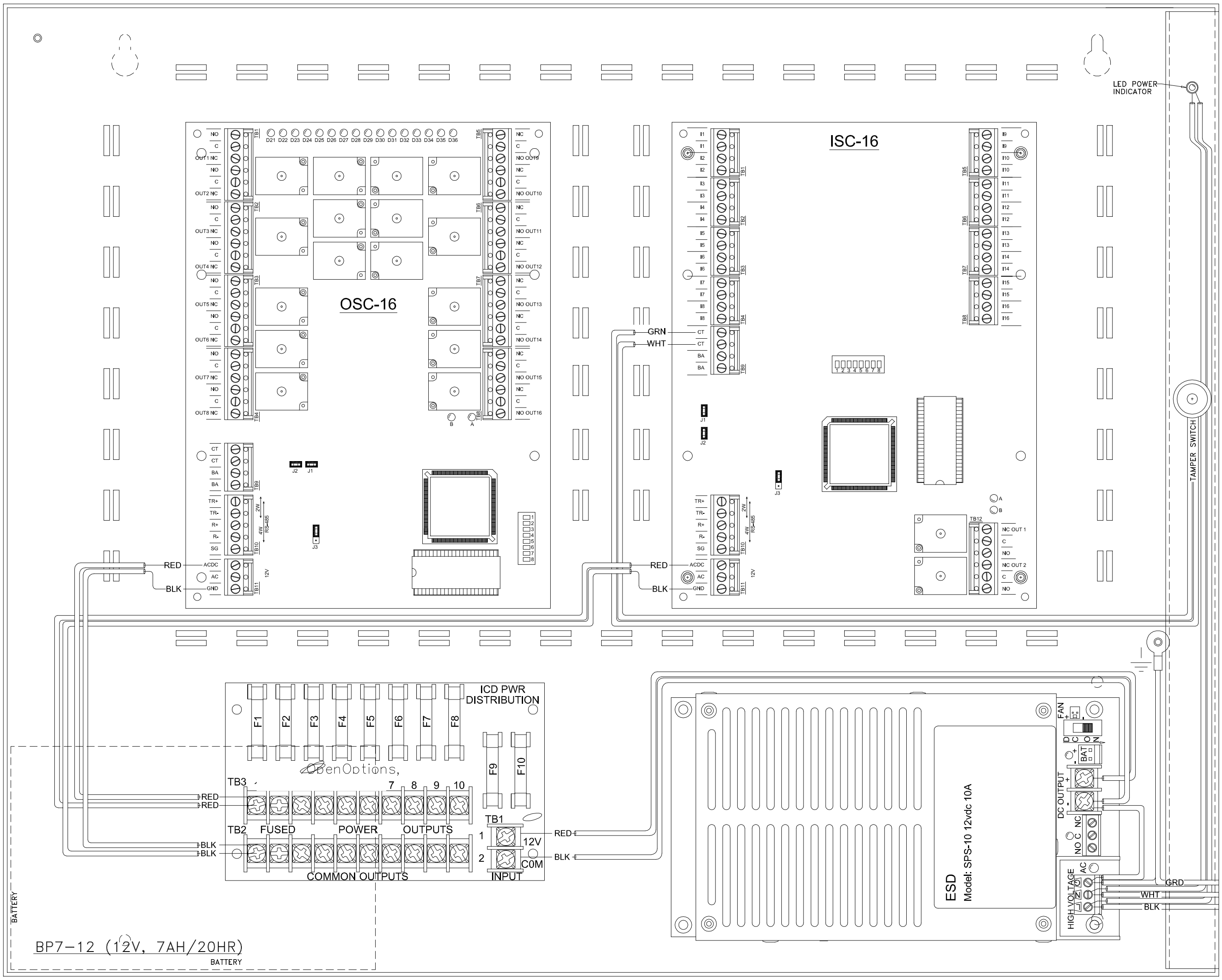
E2 / RSC-2 / ISC-16



E2 / RSC-2 / OSC-16

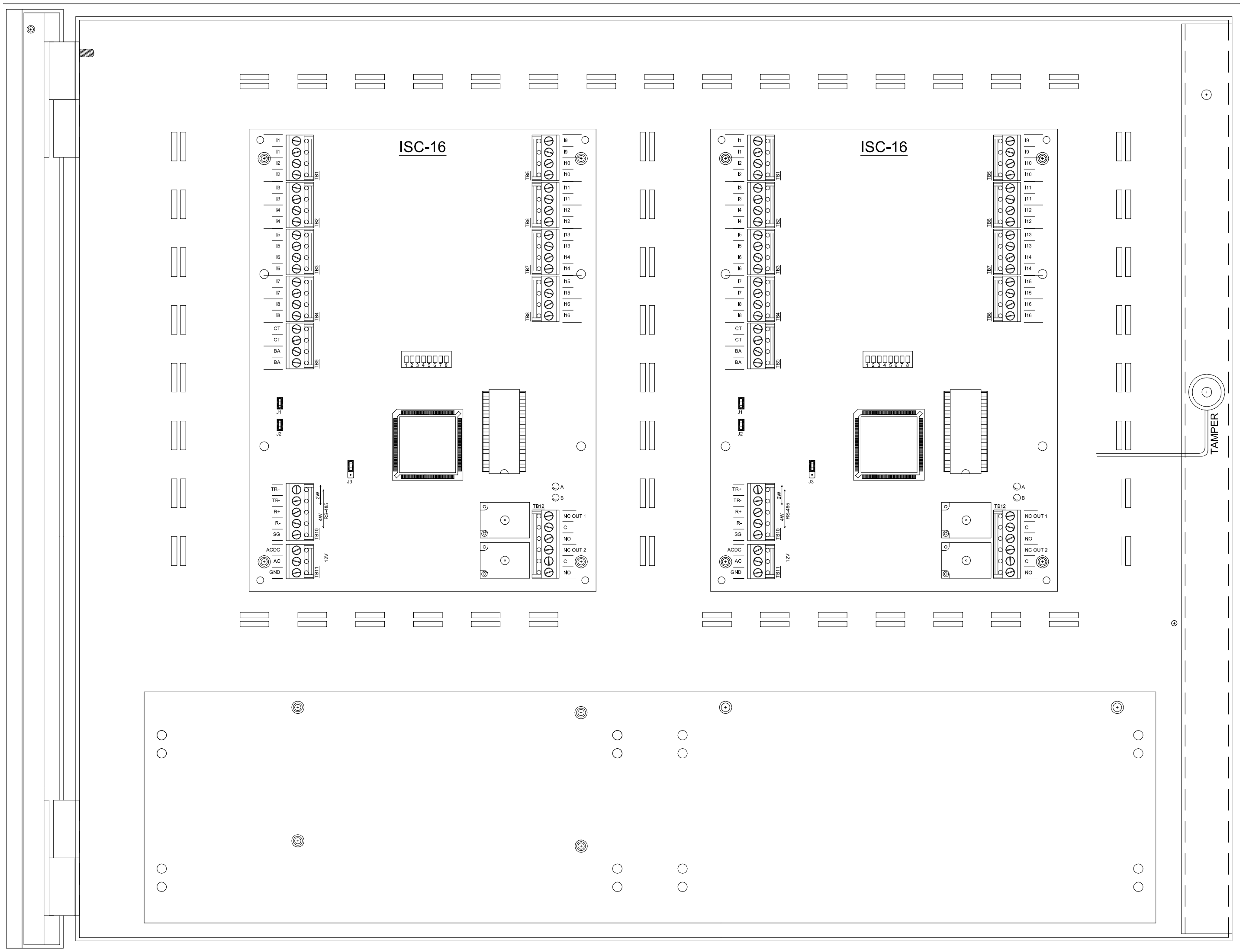


E2 / ISC-16 / OSC-16

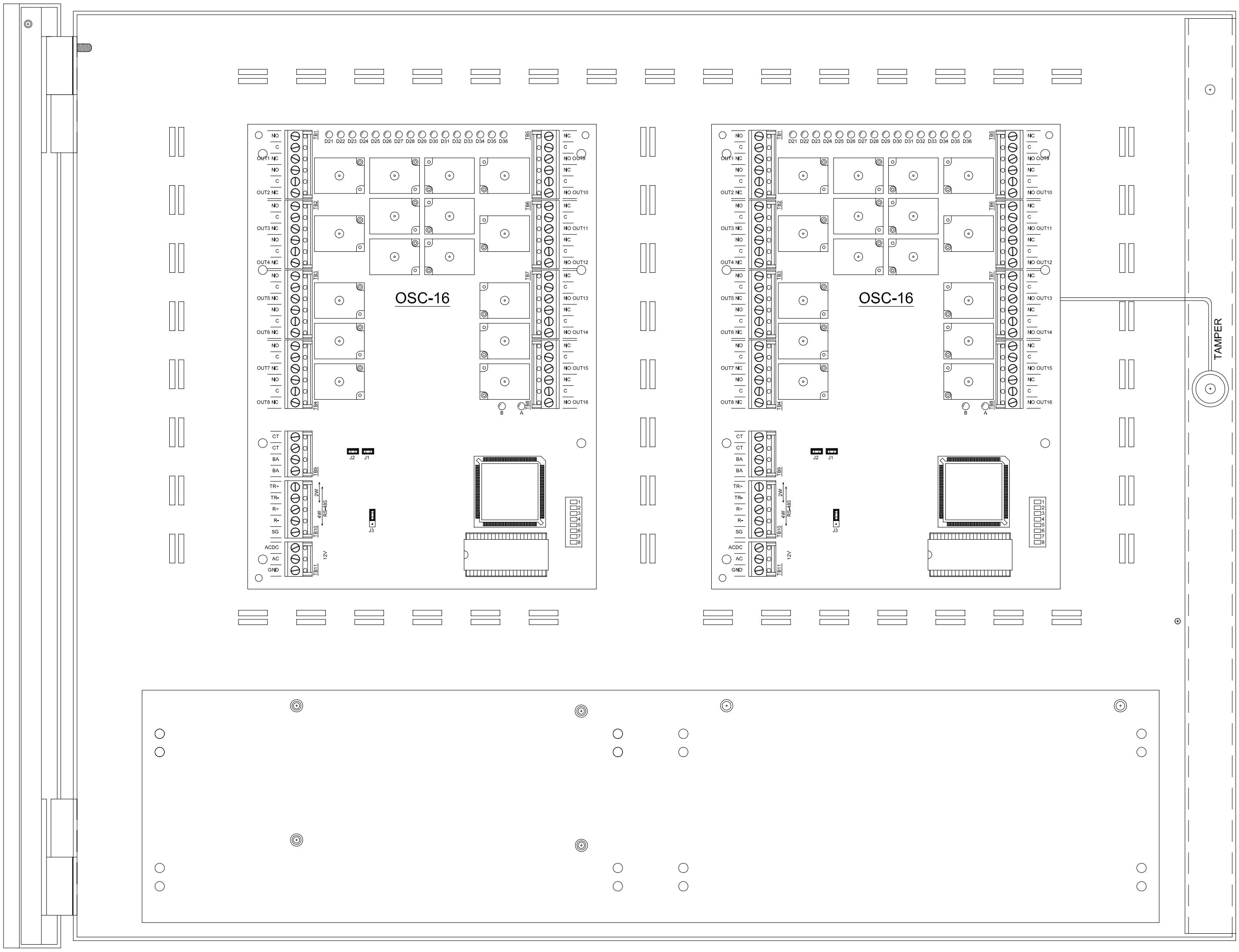


NOTES:

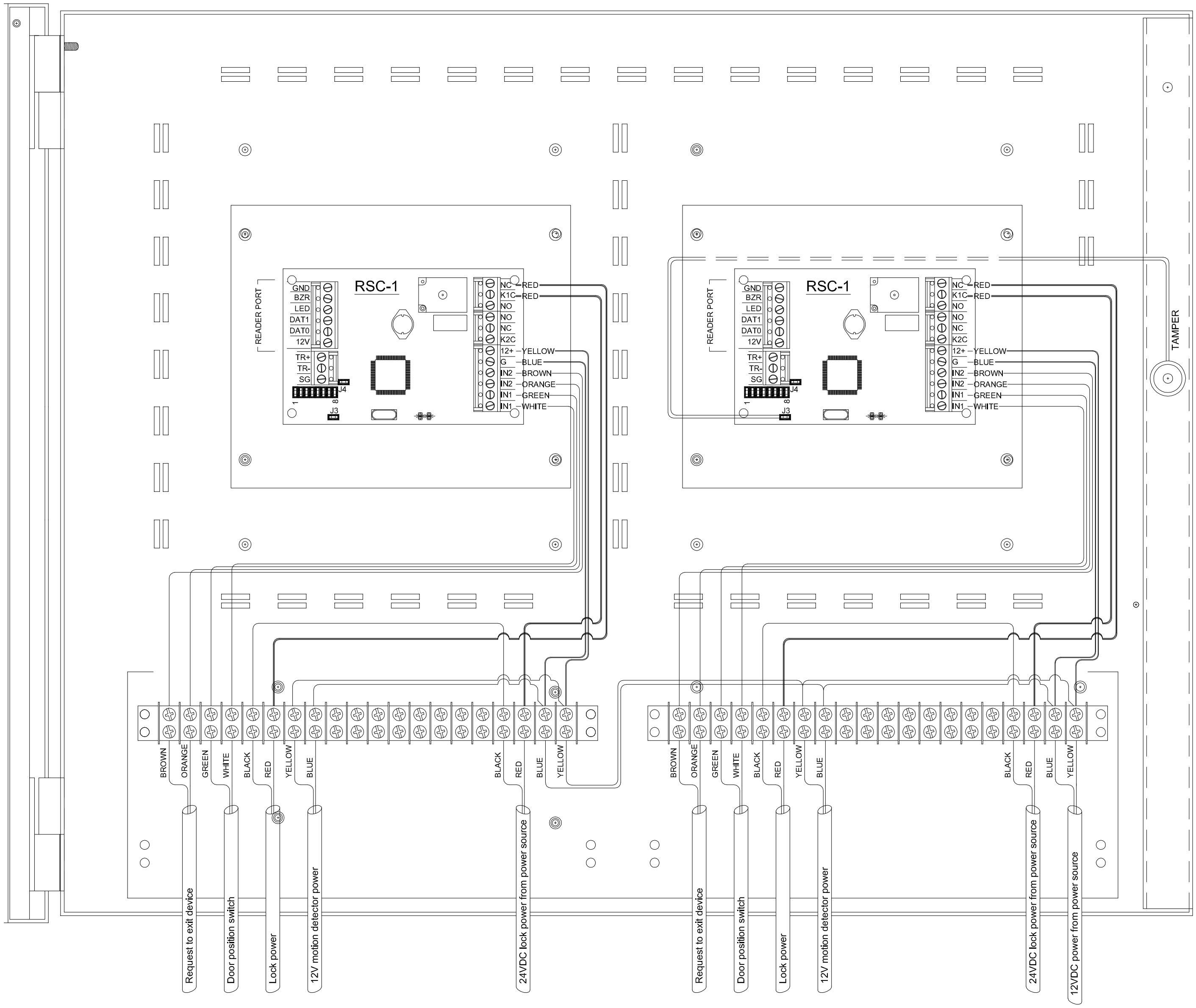
E3 / ISC-16 / ISC-16



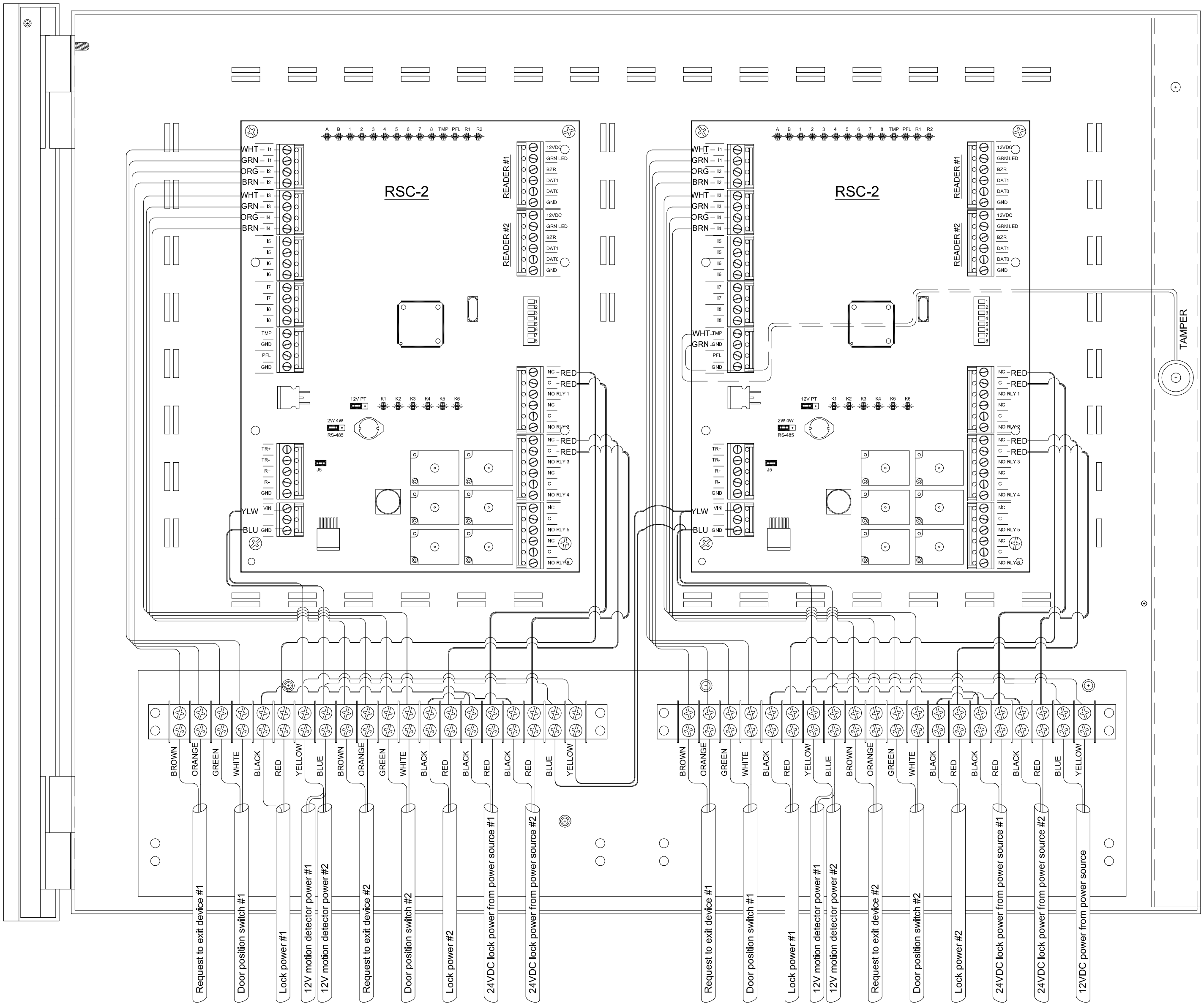
E3 / OSC-16 / OSC-16



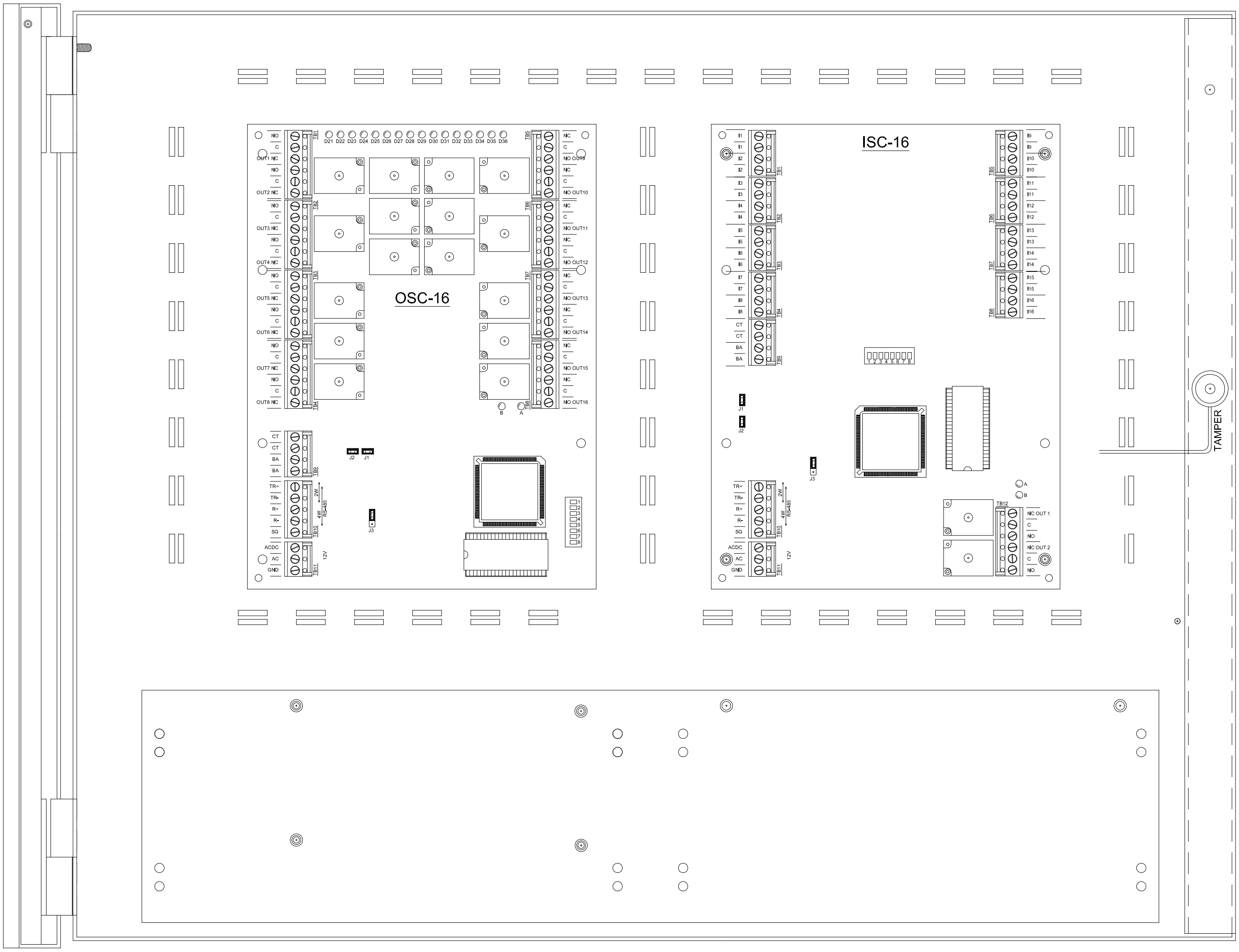
E3 / RSC-1 / RSC-1


RSC-1
RSC-1
READER PORT
READER PORT
GND
BZR
LED
DAT1
DAT0
12V
TR+
TR-
SG
J4
J3
NC
K1C
NO
NO
NC
K2C
12+
G
IN2
IN2
IN1
IN1
RED
RED
YELLOW
BLUE
BROWN
ORANGE
GREEN
WHITE
TAMPER
BROWN
ORANGE
GREEN
WHITE
BLACK
RED
YELLOW
BLUE
BLACK
RED
BLUE
YELLOW
Request to exit device
Door position switch
Lock power
12V motion detector power
24VDC lock power from power source
12VDC power from power source

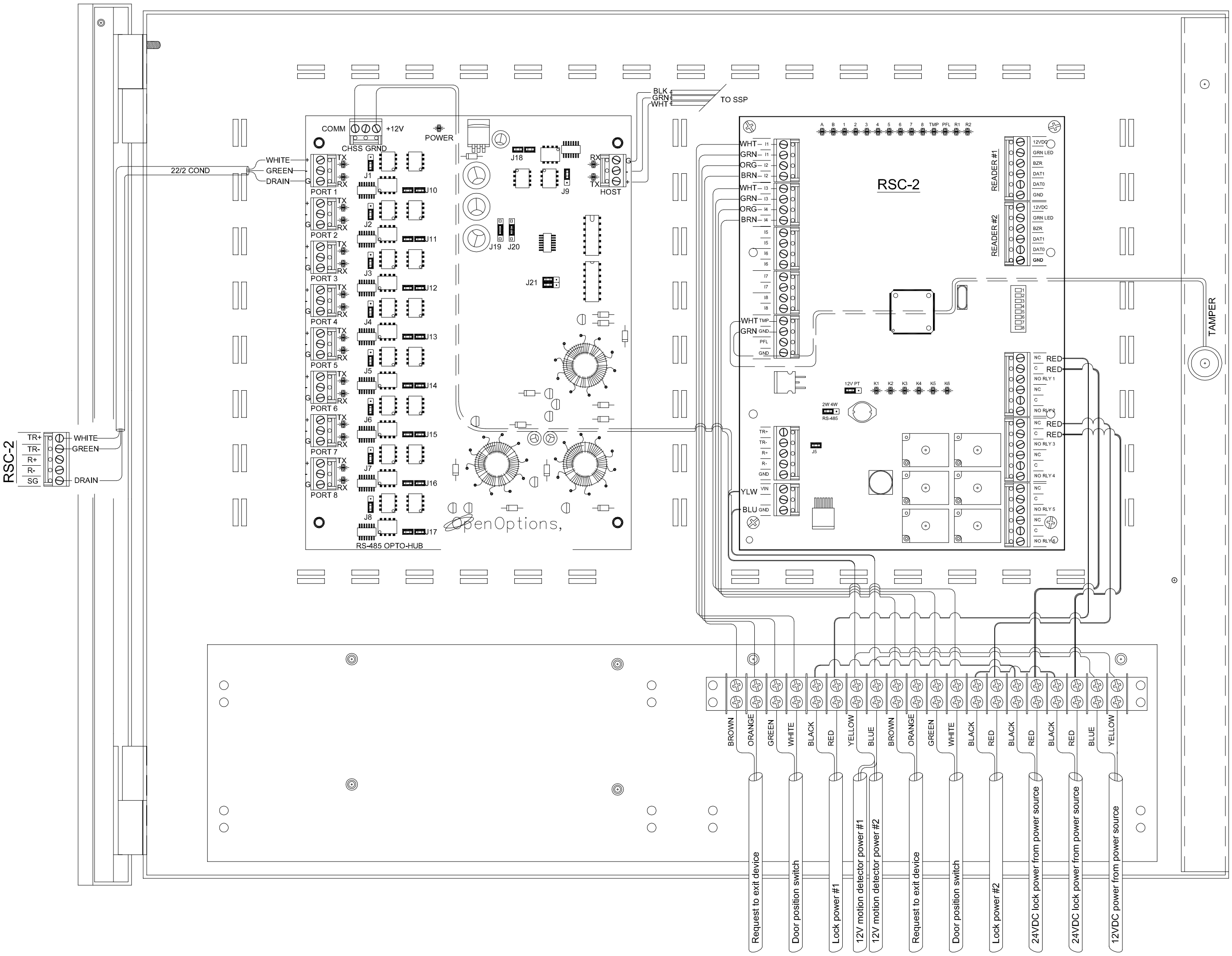
E3 / RSC-2 / RSC-2


RSC-2
RSC-2
READER #1
READER #2
TAMPER
WHT
GRN
ORG
BRN
YLW
BLU
RED
BROWN
ORANGE
GREEN
WHITE
BLACK
RED
YELLOW
BLUE
Request to exit device #1
Door position switch #1
Lock power #1
12V motion detector power #1
12V motion detector power #2
Request to exit device #2
Door position switch #2
Lock power #2
24VDC lock power from power source #1
24VDC lock power from power source #2
12VDC power from power source

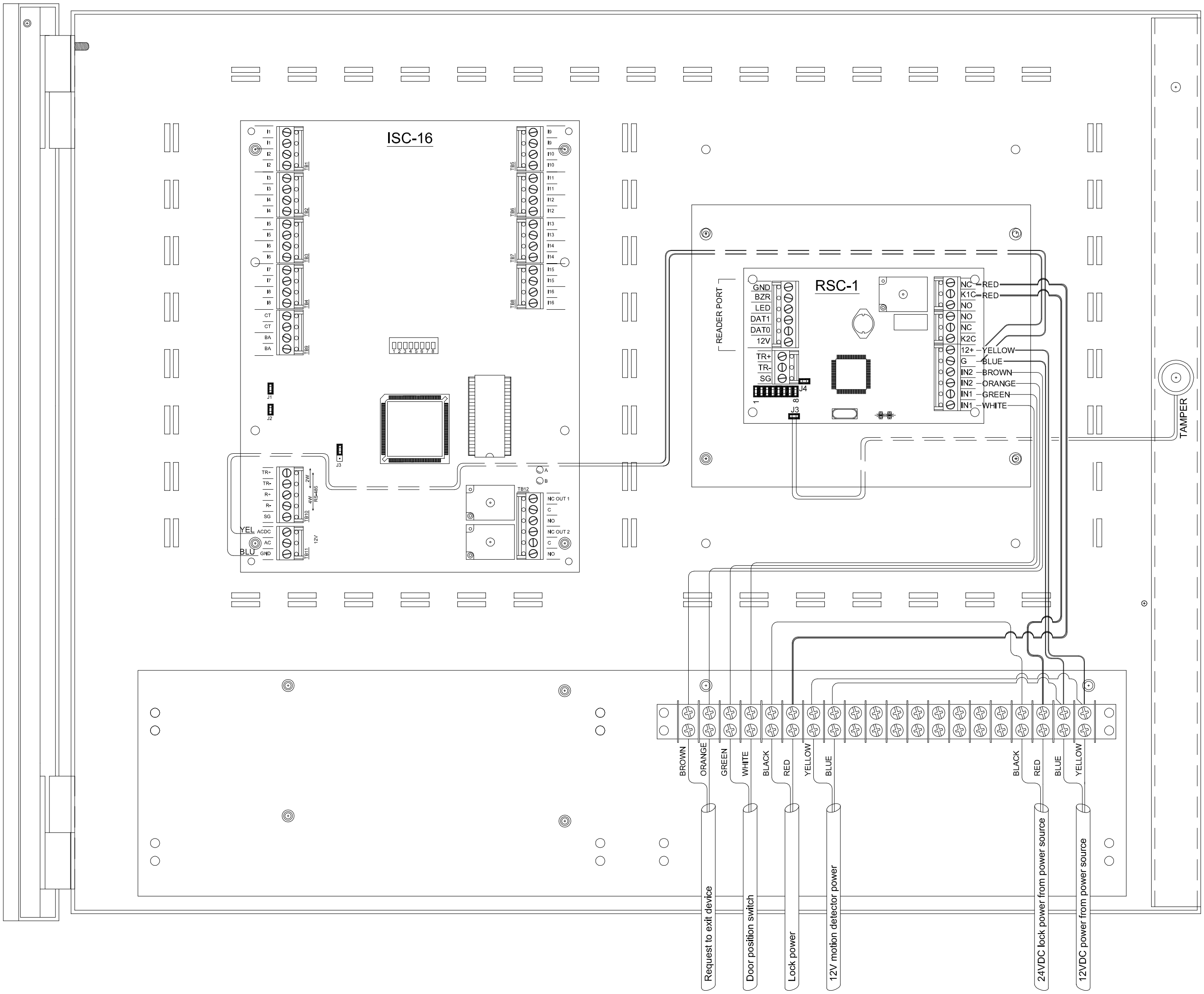
E3 / ISC-16 / OSC-16



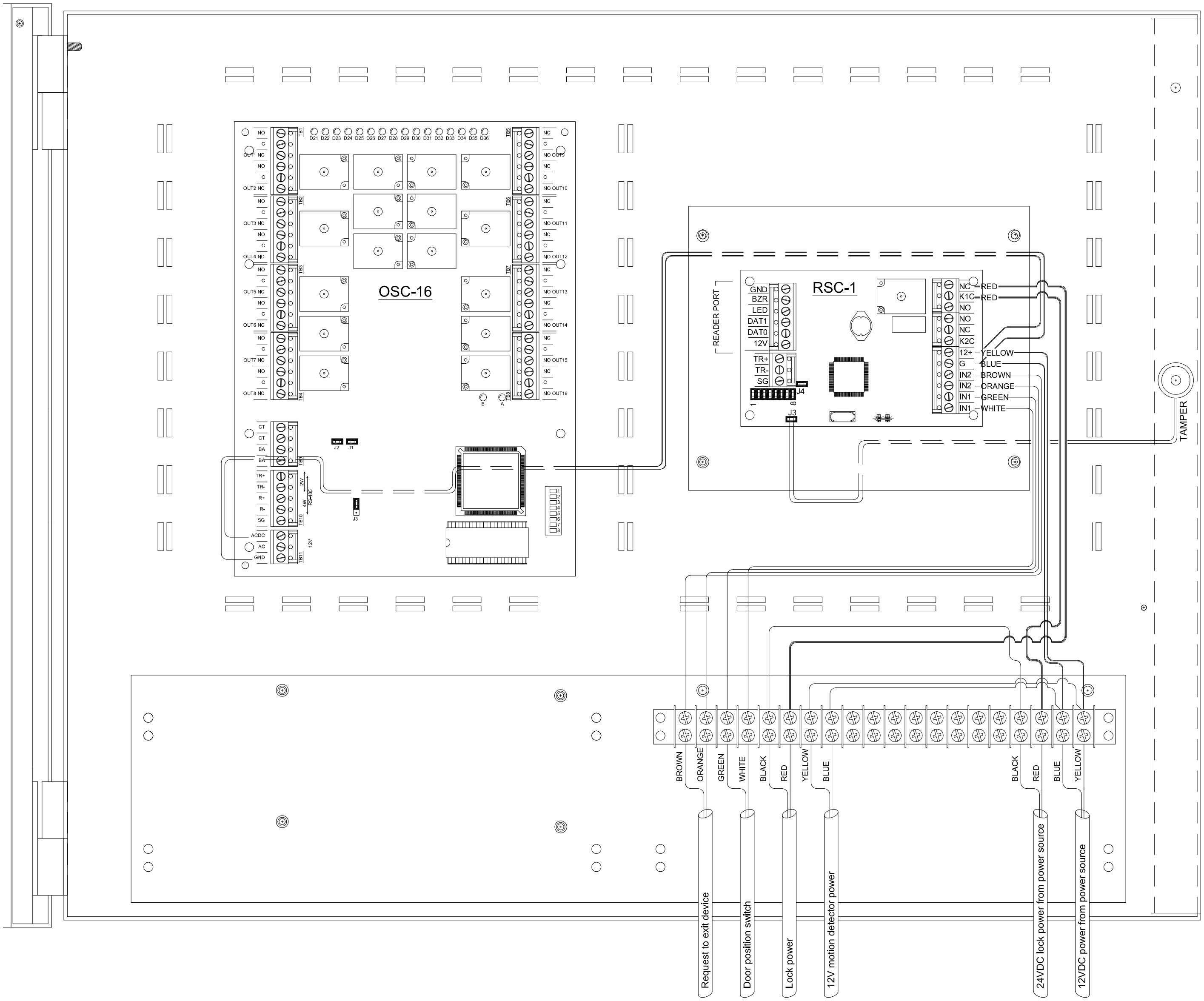
E3 / OptoHub / RSC-2



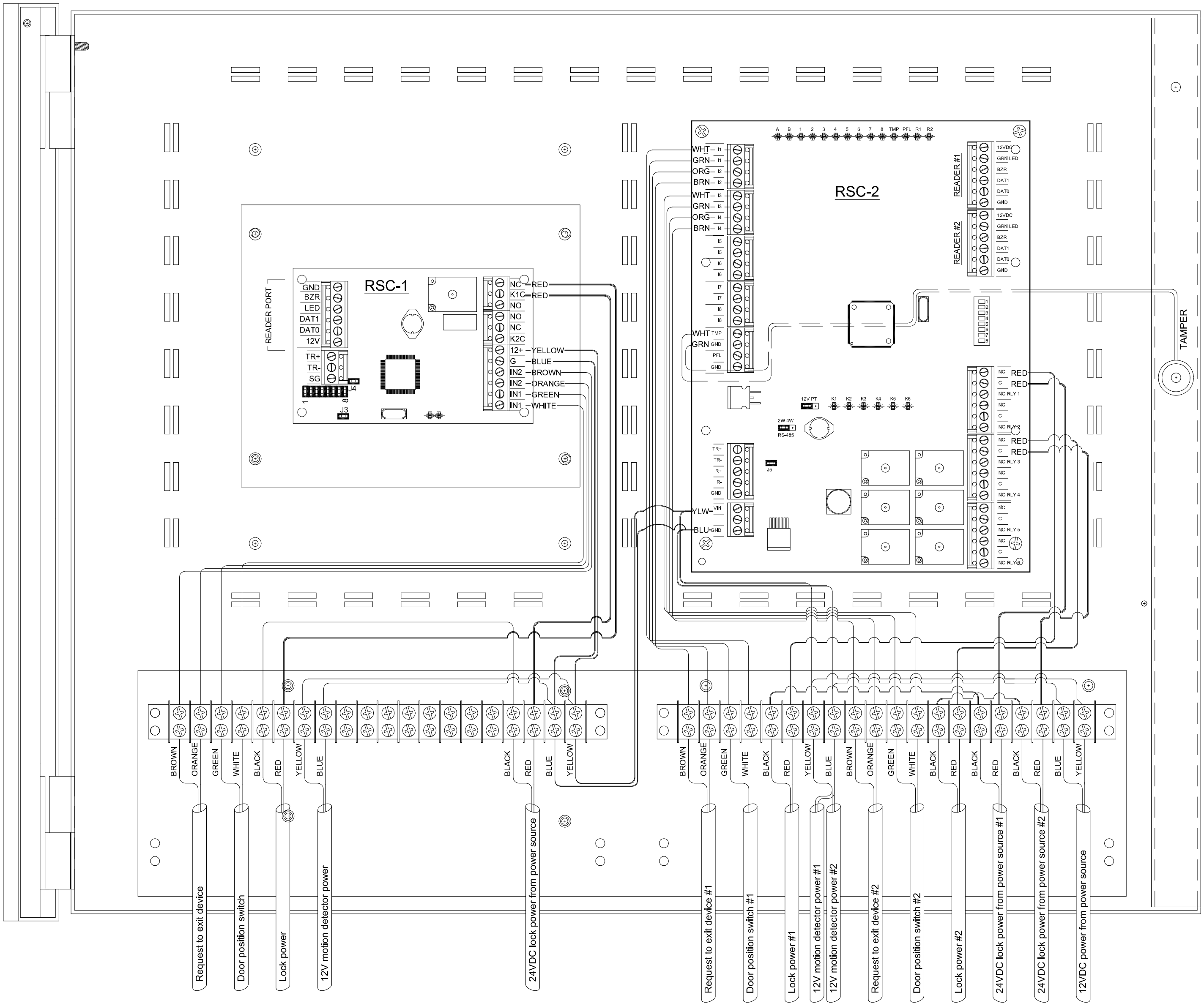
E3 / RSC-1 / ISC-16



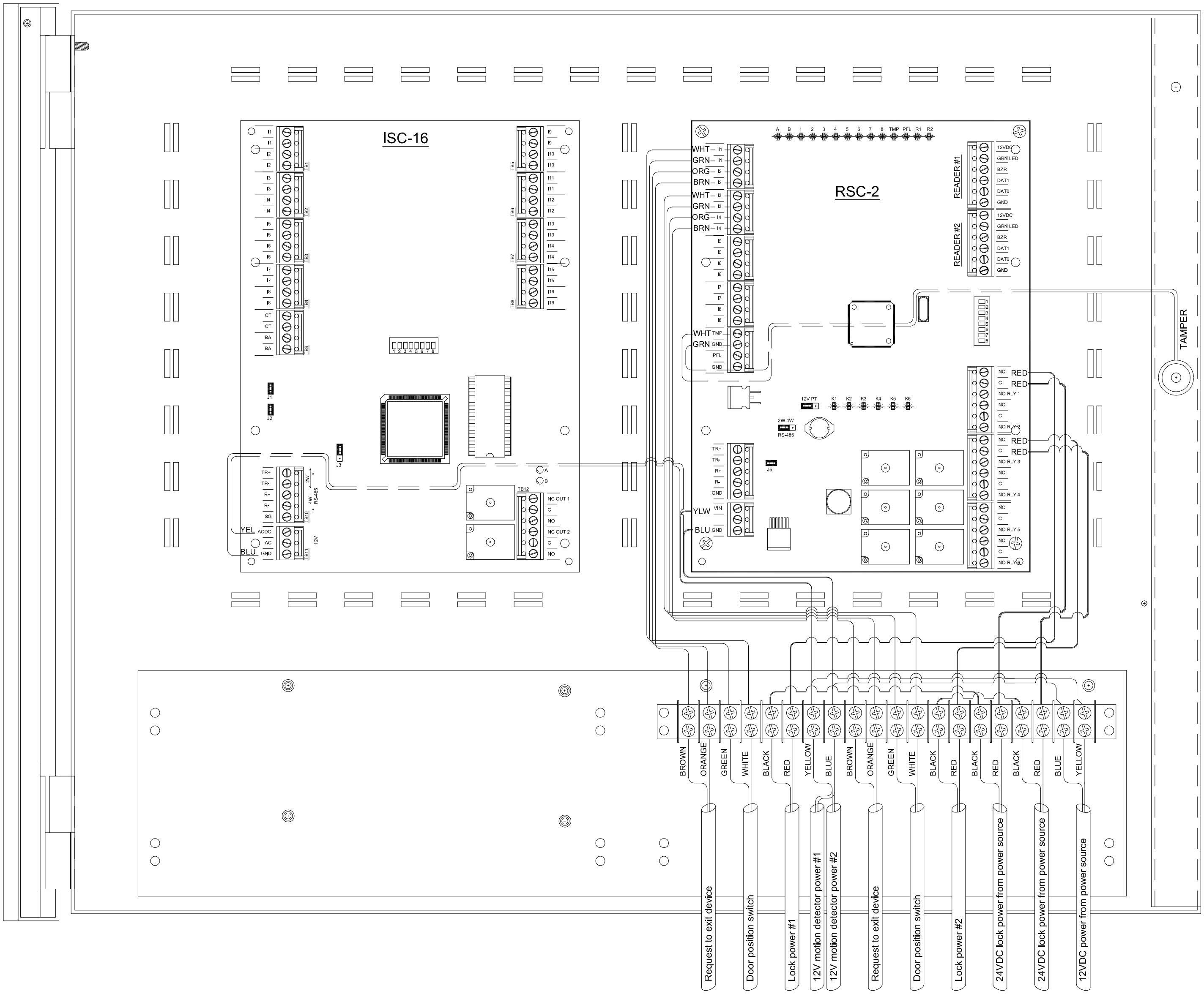
E3 / RSC-1 / OSC-16



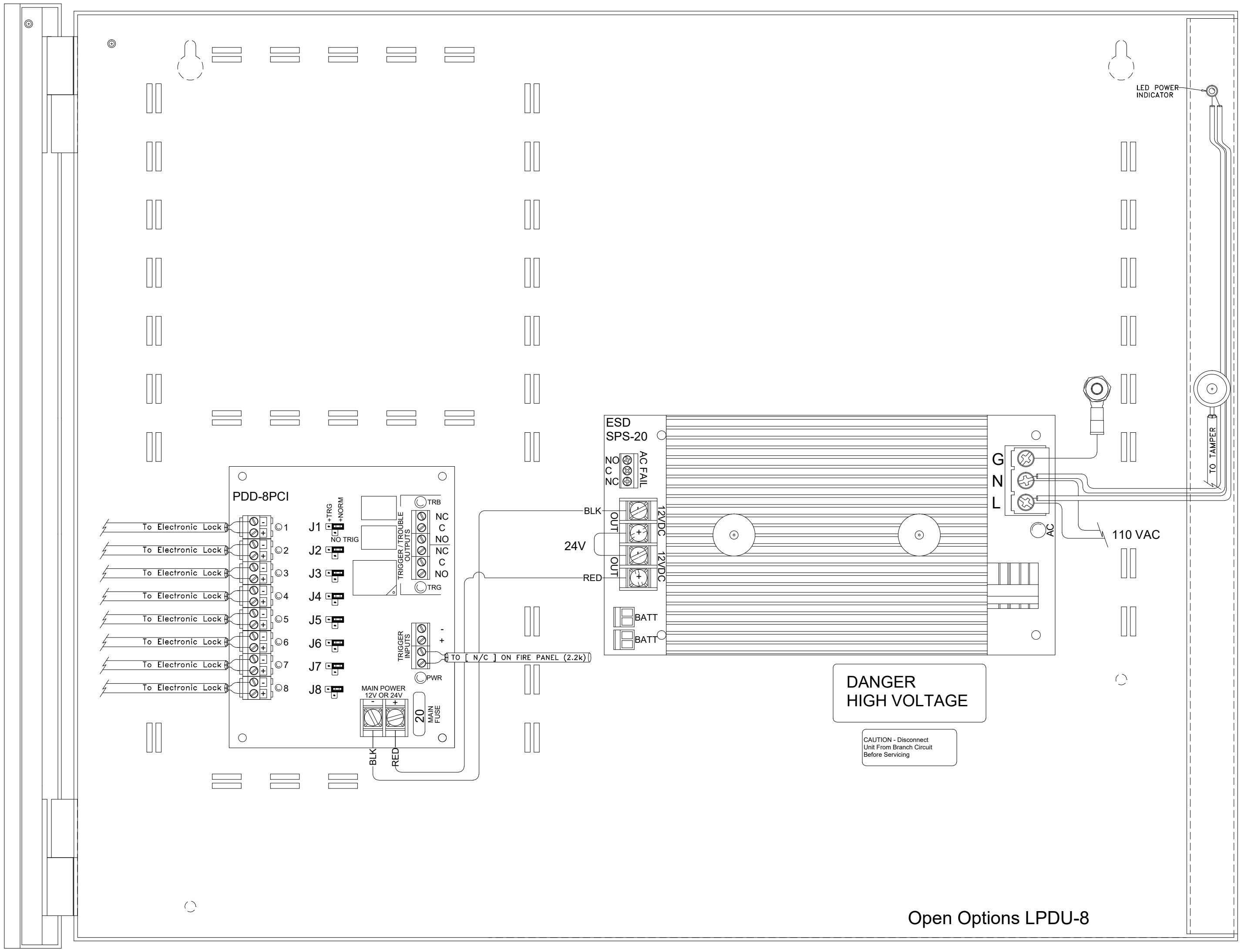
E3 / RSC-1 / RSC-2


RSC-1
RSC-2
READER PORT
GND
BZR
LED
DAT1
DAT0
12V
TR+
TR-
SG
J4
J3
NC
K1C
NO
NO
NC
K2C
12+
G
IN2
IN2
IN1
IN1
RED
RED
YELLOW
BLUE
BROWN
ORANGE
GREEN
WHITE
WHT
GRN
ORG
BRN
YLW
BLU
READER #1
READER #2
12VDC
GRN LED
BZR
DAT1
DAT0
GND
TAMPER
RLY 1
RLY 2
RLY 3
RLY 4
RLY 5
RLY 6
RS-485
2W 4W
12V PT
J5
Request to exit device
Door position switch
Lock power
12V motion detector power
24VDC lock power from power source
Request to exit device #1
Door position switch #1
Lock power #1
12V motion detector power #1
12V motion detector power #2
Request to exit device #2
Door position switch #2
Lock power #2
24VDC lock power from power source #1
24VDC lock power from power source #2
12VDC power from power source

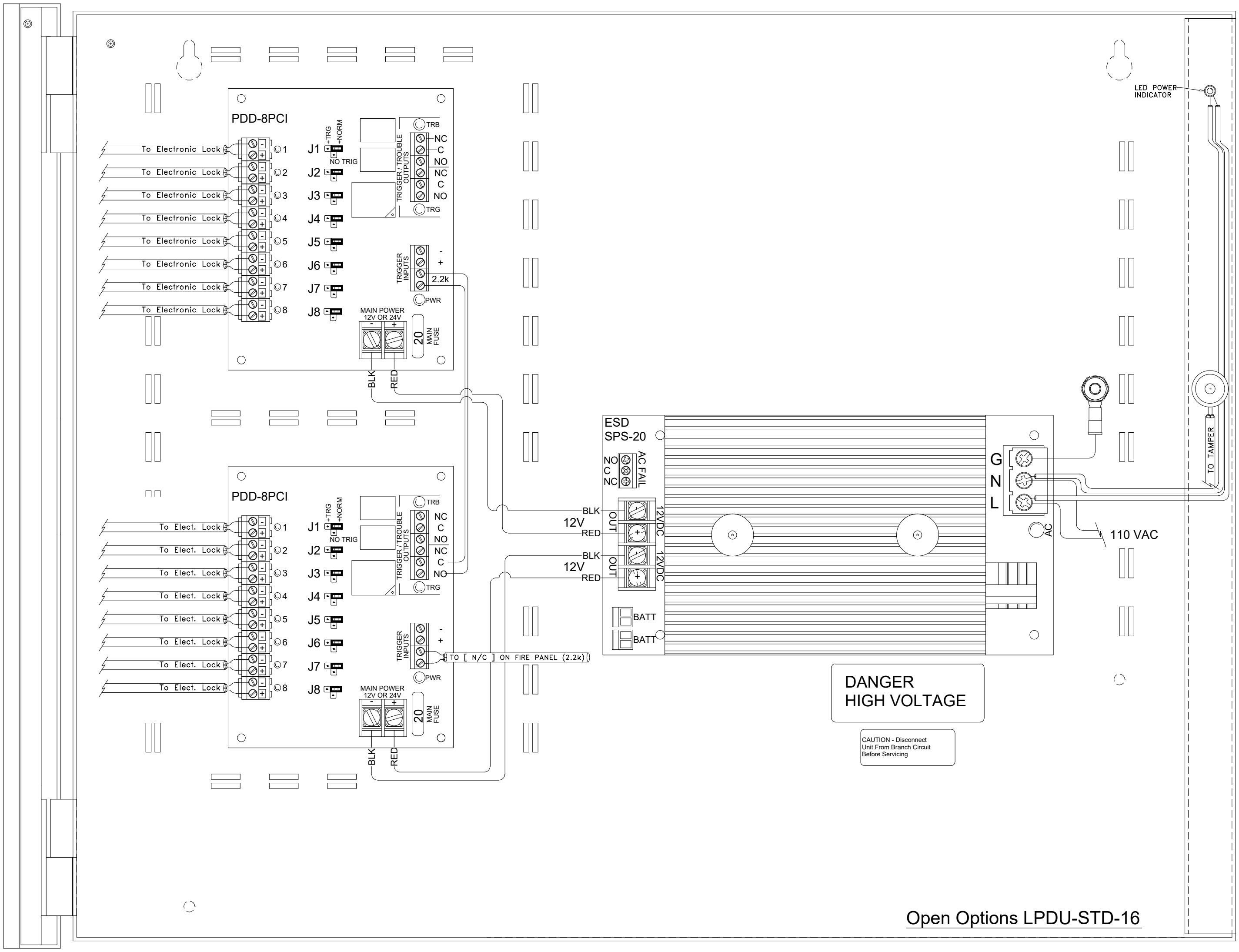
E3 / RSC-2 / ISC-16



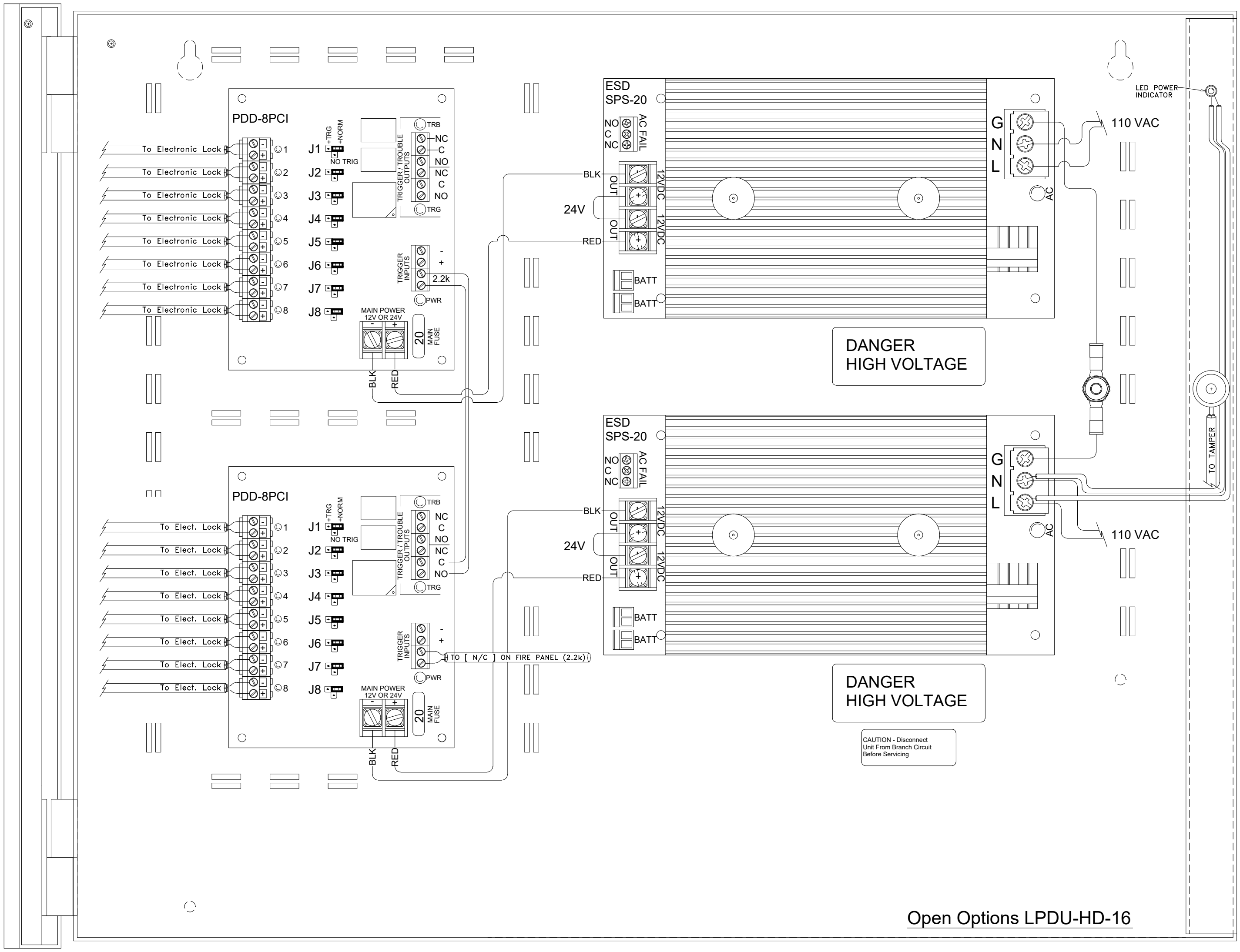
OO-LPDU-STD-8


LED POWER INDICATOR
TO TAMPER
ESD
SPS-20
NO
C
NC
AC FAIL
G
N
L
AC
110 VAC
BLK
RED
OUT
12VDC
24V
BATT
BATT
PDD-8PCI
To Electronic Lock
J1
J2
J3
J4
J5
J6
J7
J8
+TRG
+NORM
NO TRIG
TRB
TRG
NC
C
NO
TRIGGER / TROUBLE OUTPUTS
TRIGGER INPUTS
PWR
TO N/C ON FIRE PANEL (2.2k)
MAIN POWER 12V OR 24V
20
MAIN FUSE
DANGER
HIGH VOLTAGE
CAUTION - Disconnect Unit From Branch Circuit Before Servicing
Open Options LPDU-8

OO-LPDU-STD-16

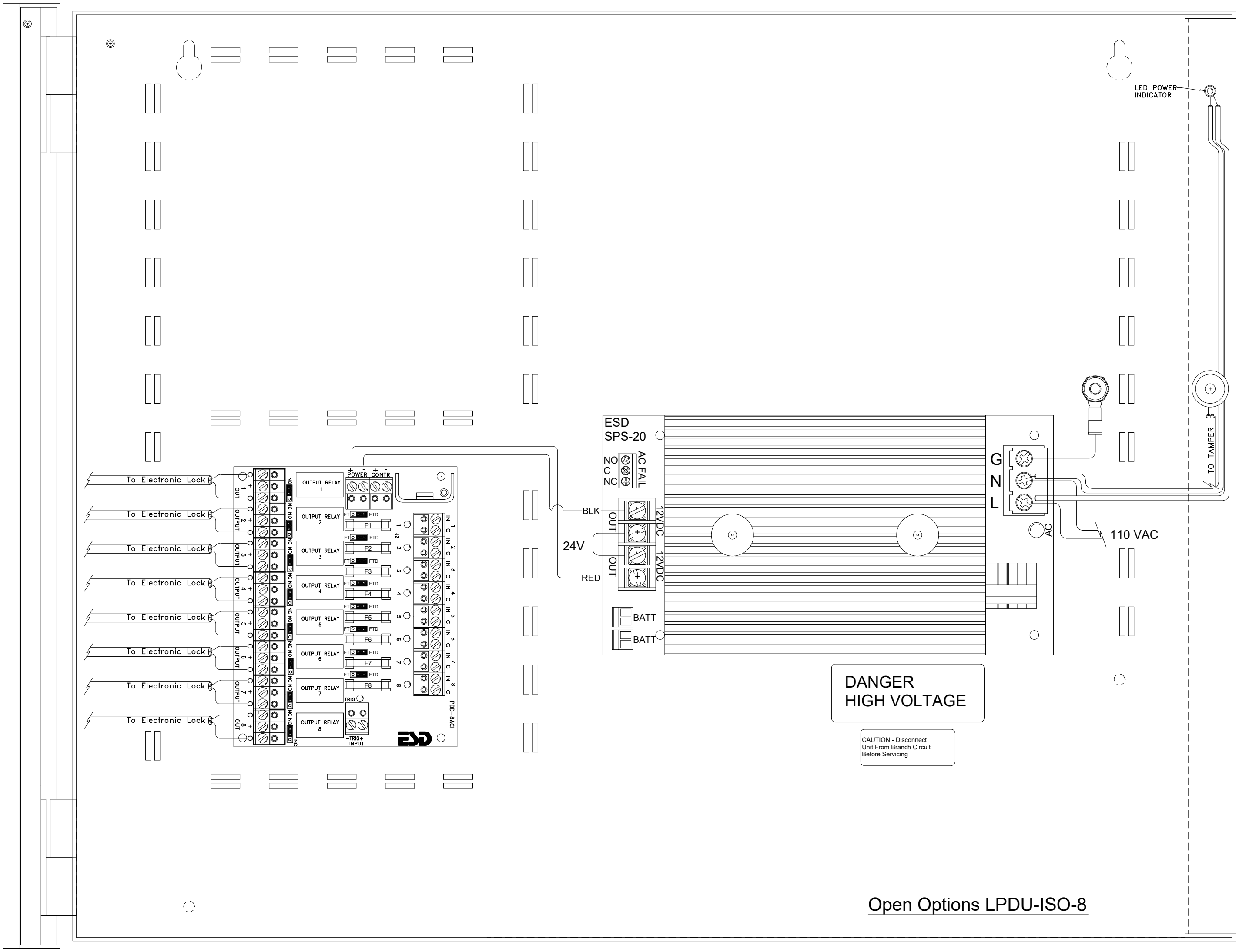


OO-LPDU-HD-16

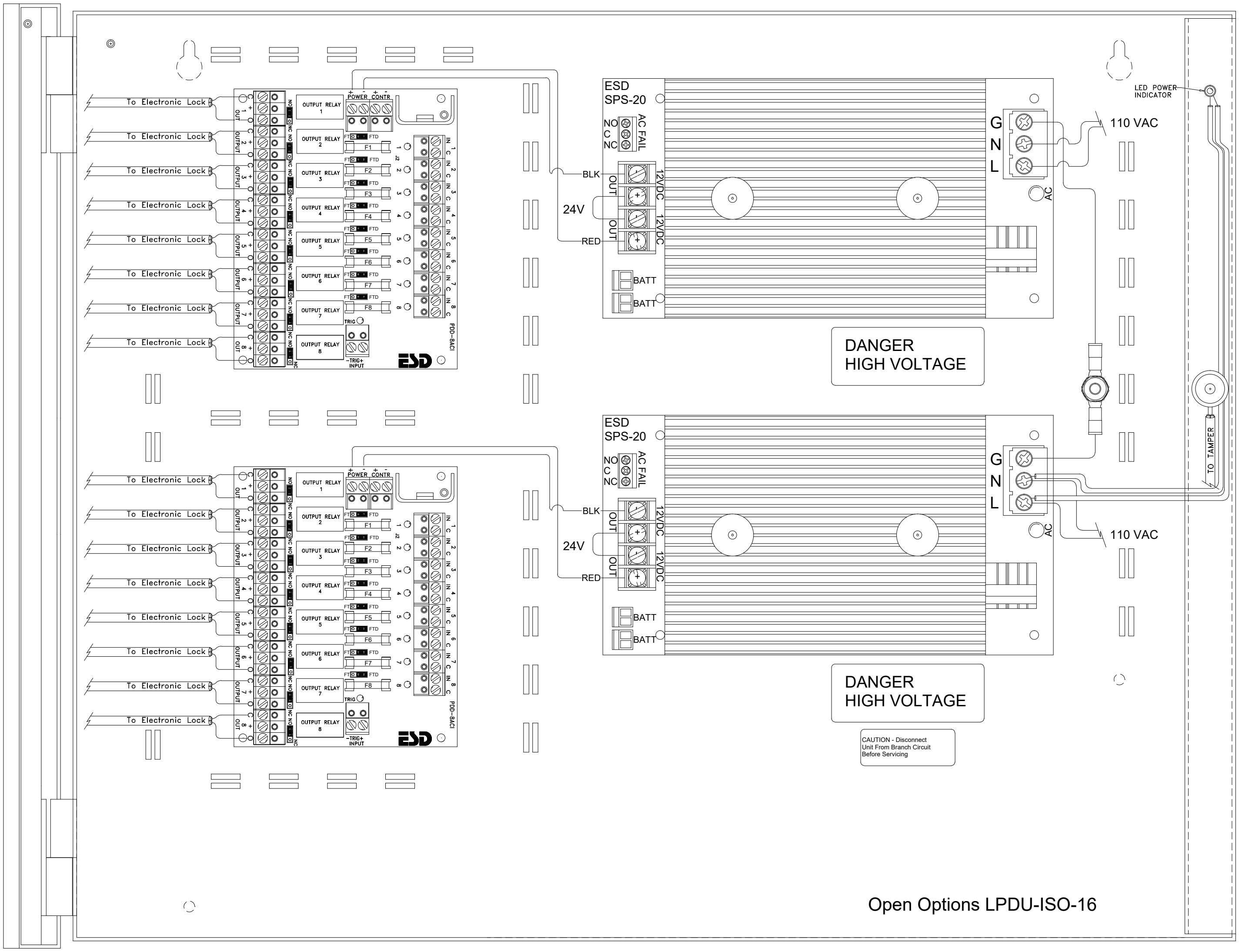


OO-LPDU-HD-16
02-23-2007

OO-LPDU-ISO-8


LED POWER INDICATOR
TO TAMPER
To Electronic Lock
OUTPUT RELAY
POWER
CONTR
ESD
SPS-20
NO
C
NC
AC FAIL
BLK
24V
RED
OUT
12VDC
BATT
G
N
L
AC
110 VAC
DANGER
HIGH VOLTAGE
CAUTION - Disconnect
Unit From Branch Circuit
Before Servicing
Open Options LPDU-ISO-8

OO-LPDU-ISO-16



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UL Compliance

B

In This Chapter	
√	UL Compliance Statement
√	UL Canada Compliance Statement

This section of the manual is intended to outline the UL compliance requirements for Open Options products. The information below is subject to change without notice.

UL Compliance Statement

The wiring from the power supply output to the power distribution board (10-fuse board) in the E2-SSPE-OR is a fusible link; it must not be replaced with anything other than the Open Options part number OO-FL05FB (fusible link).

This system is UL 294 Listed as a standalone system.

Low and High (AC mains) voltages must be routed via separate openings in the enclosure.

The following models are UL-recognized components:

- SSP
- SSP-D2
- SSP-EP
- SSP-C
- SSP-E
- RSC-1
- RSC-2
- OSC-16
- ISC-16
- OptoHub
- CI-8
- PDD-8PCI
- NController
- DController
- NSC-100
- NSC-200
- RSC-DT

The following models have not been investigated by UL for compliance:

- PDU

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UL Canada Compliance Statement

This system is ULC Listed as a standalone system. It is the responsibility of the installing party to ensure that all components meet CAN/ULC-60839-11-1:2016 requirements.

In order to maintain ULC compliance, egress devices must follow ULC-S533 and ULC-CAN4-S104 standards.

Portal locking devices must be tamper resistant in compliance with ULC-60839-11-1:2016, section 7.3.1. If a mechanical lock is incorporated in the portal-locking device, the mechanical lock must be compliant with CAN/CGSB-69 and ULC S-328.

If an electric strike will be used, only continuous duty rated strikes can be installed. If an electromagnetic lock is used, door position sensors must be installed to monitor the door status.

If the power supply will be located in the enclosure, the fire alarm override and fire alarm function must operate independently of the enclosure. If a standalone power supply will be used to power portal-locking devices, the power supply must comply with all CAN/ULC-60839-11-1:2016 requirements.

Device ratings higher than 30VAC RMS or 42.5 VDC must incorporate a standard conduit knockout for wire entry and shall comply with Canadian Electric Code. Low and High (AC mains) voltages must be routed via separate openings in the enclosure.

Any system that will be powered from a commercial power supply must have a standby power source for a period of 30 minutes. Upon restoration of an extended power failure, the batteries must be recharged to 85% of rated capacity within 24 hours. If the standby power source does not have rechargeable batteries, provisions should be made to test the condition of the batteries.

Controllers and other components must have a standby power source that will support full load for a period of 30 minutes.

When the referenced hardware is connected to the DNA Fusion Access Control System it provides secured access for the configured objects.

The following models are ULC-recognized components:

- SSP-EP
- SSP-D2
- NController
- DController
- NSC-100
- RSC-1
- RSC-2
- ISC-16
- OSC-16
- NSC-200

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Legacy Migration C

In This Chapter
√ Replacing Legacy Controllers

Replacing Legacy Controllers

Open Options' legacy controllers—the SSP, SSP-C, and SSP-E—must be replaced with a current model such as the SSP-EP or SSP-D2. The installer/operator must exercise caution when promoting a system's legacy controllers, as this action will affect the current system's wiring and physical addresses. For example, the SSP and SSP-E both contain four (4) downstream RS-485 ports while the SSP-D2 and SSP-EP only contain one (1) and two (2) ports, respectively. It is important to take the appropriate steps to prevent duplicate addressing and/or incorrect port designations.

The process for replacing a legacy controller can be divided into four (4) steps:

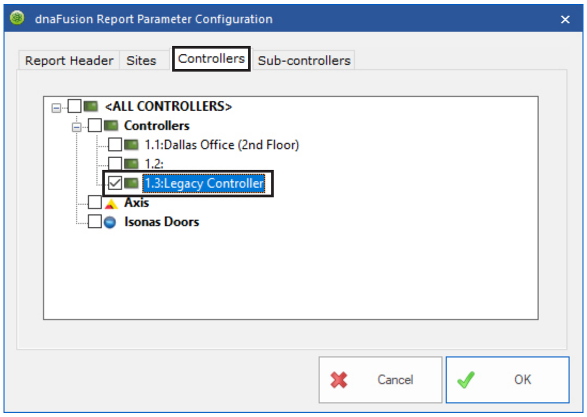
- Generate a Subcontroller Report
- Configure the DIP Switches
- Designate the SIO Port and Physical Address
- Promote the Legacy Controller

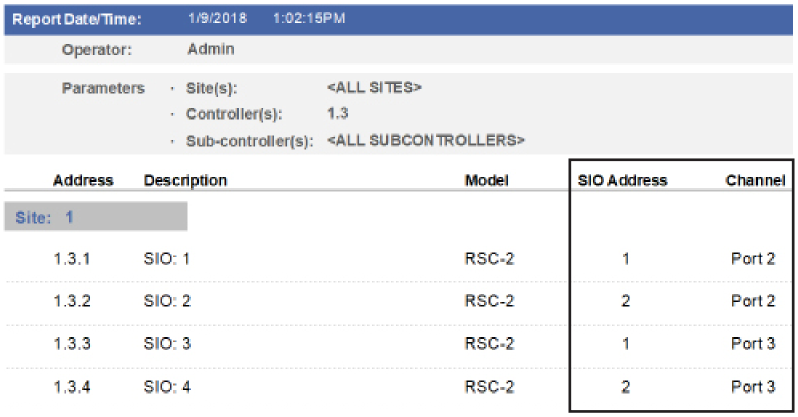
Generating a Subcontroller Report

The Reports feature in DNA Fusion can be used to identify which subcontroller(s) must be changed (i.e., the SSP Reply Channel and/or Physical Address fields) before promoting a legacy controller to a newer model.

1. From the Main Menu, **select** Reports / Hardware Settings / Subcontrollers (SIO).

   The Report Parameter Configuration dialog appears.





Report Date/Time: 1/9/2018 1:02:15PM
Operator: Admin
Parameters · Site(s): <ALL SITES>
· Controller(s): 1.3
· Sub-controller(s): <ALL SUBCONTROLLERS>

Address	Description	Model	SIO Address	Channel
Site: 1				
1.3.1	SIO: 1	RSC-2	1	Port 2
1.3.2	SIO: 2	RSC-2	2	Port 2
1.3.3	SIO: 3	RSC-2	1	Port 3
1.3.4	SIO: 4	RSC-2	2	Port 3

2. **Select** the Controllers parameter and **uncheck** the All Controllers box.
3. **Expand** the Controllers item and **select** the legacy controller(s) to show in the report.
4. **Click** OK.

   The report appears in the data window. This information can be used to identify the SSP Reply Channel and Physical Address fields that must be updated in the Subcontroller Properties prior to promoting the legacy controller(s).

Configuring the DIP Switches

The RSC-1, RSC-2, ISC-16, and OSC-16 contain a set of eight (8) DIP switches. Use switches 1 through 5 to configure each subcontroller's physical address (0-31). No two subcontrollers can share the same address on a single controller. See the table below for DIP switch settings.

> *Switches 6 and 7 determine the communication baud rate. Switch 8 is not used and should remain in the OFF position.*

Selection	S1	S2	S3	S4	S5	Selection	S1	S2	S3	S4	S5
Address 0	OFF	OFF	OFF	OFF	OFF	**Address 16**	OFF	OFF	OFF	OFF	ON
Address 1	ON	OFF	OFF	OFF	OFF	**Address 17**	ON	OFF	OFF	OFF	ON
Address 2	OFF	ON	OFF	OFF	OFF	**Address 18**	OFF	ON	OFF	OFF	ON
Address 3	ON	ON	OFF	OFF	OFF	**Address 19**	ON	ON	OFF	OFF	ON
Address 4	OFF	OFF	ON	OFF	OFF	**Address 20**	OFF	OFF	ON	OFF	ON
Address 5	ON	OFF	ON	OFF	OFF	**Address 21**	ON	OFF	ON	OFF	ON
Address 6	OFF	ON	ON	OFF	OFF	**Address 22**	OFF	ON	ON	OFF	ON
Address 7	ON	ON	ON	OFF	OFF	**Address 23**	ON	ON	ON	OFF	ON
Address 8	OFF	OFF	OFF	ON	OFF	**Address 24**	OFF	OFF	OFF	ON	ON
Address 9	ON	OFF	OFF	ON	OFF	**Address 25**	ON	OFF	OFF	ON	ON
Address 10	OFF	ON	OFF	ON	OFF	**Address 26**	OFF	ON	OFF	ON	ON
Address 11	ON	ON	OFF	ON	OFF	**Address 27**	ON	ON	OFF	ON	ON
Address 12	OFF	OFF	ON	ON	OFF	**Address 28**	OFF	OFF	ON	ON	ON
Address 13	ON	OFF	ON	ON	OFF	**Address 29**	ON	OFF	ON	ON	ON
Address 14	OFF	ON	ON	ON	OFF	**Address 30**	OFF	ON	ON	ON	ON
Address 15	ON	ON	ON	ON	OFF	**Address 31**	ON	ON	ON	ON	ON

NSC-100 DIP Switches

The following table describes the DIP switch settings used to configure an NSC-100's addressing mode. For more information, see Chapter 3: Reader Modules.

Selection / Mode	S1	S2	S3	S4
Controller DHCP	OFF	OFF	OFF	OFF
Public DHCP	ON	OFF	OFF	OFF
Enable Static IP Addressing	ON	ON	OFF	OFF
Assign Static IP Address	OFF	ON	OFF	OFF

Designate the SIO Port and Physical Address

Prior to promoting the legacy controller to a newer model, the operator must reconfigure the ports and addresses for each subcontroller in DNA Fusion.

1. In the Hardware Browser, **right-click** on the Legacy Controller and **select** Controller Commands / Disconnect.

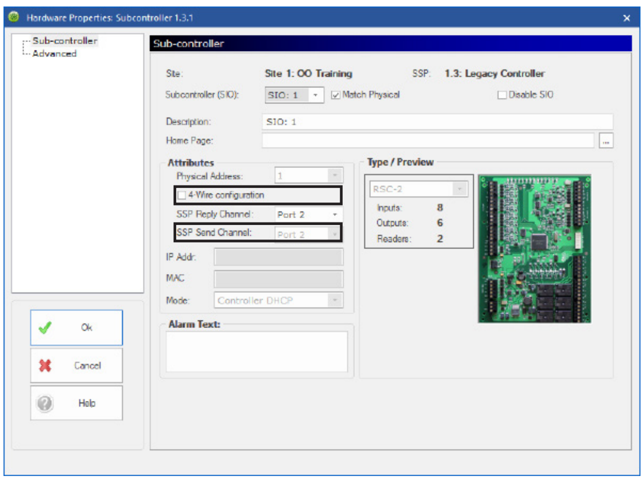
   Repeat this step for each legacy controller.

2. In the Hardware Browser, **right-click** on the Subcontroller object under the legacy controller and **select** Properties.

   The Subcontroller Properties dialog opens.

3. In the Attributes section, **update** the SSP Reply Channel and Physical Address fields based on the information generated in the report on page C-1.

> *Do NOT create duplicate addresses on the new ports. Keep in mind that the SSP-D2 only contains one (1) RS-485 port and the SSP-EP contains two (2) RS-485 ports.*



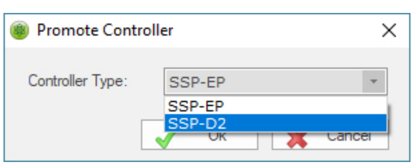
4. **Click** OK to save the settings.
5. **Repeat** steps 1-3 for all subcontrollers as needed.

Promote the Legacy Controller

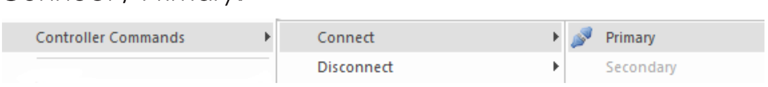
Once the SSP Reply Channels and Physical Addresses have been designated for the subcontrollers, the legacy controller can be promoted to the replacement model (i.e., the SSP-D2 or SSP-EP).

1. In the Hardware Browser, **right-click** on the Legacy Controller and **select** Promote SSP.

   The Promote Controller dialog opens.

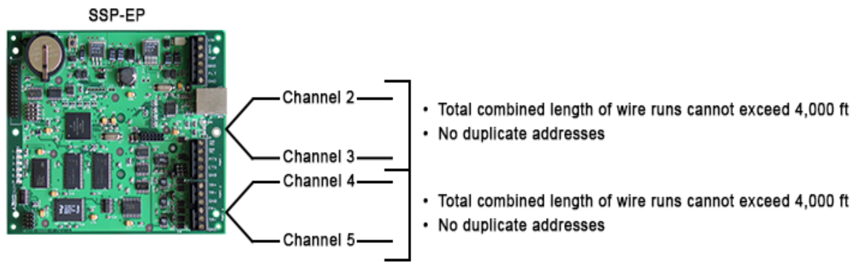


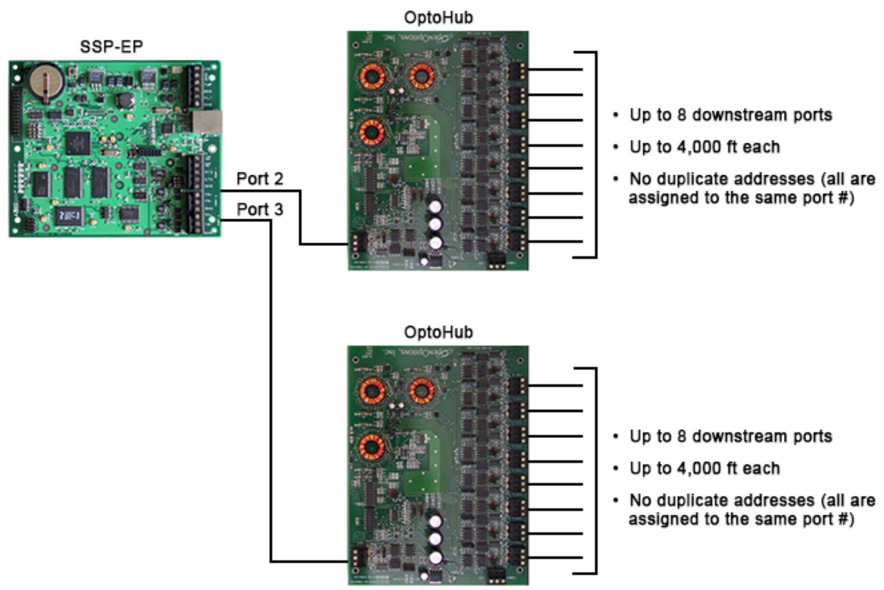
2. **Select** the Controller Type from the drop-down and **click** OK.
3. Assuming that the new controller has been programmed with the same IP address as the legacy controller, **right-click** on the promoted controller in the Hardware Browser and **select** Controller Commands / Connect / Primary.

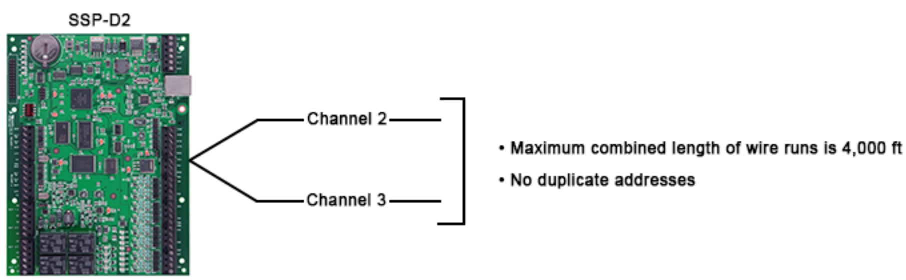


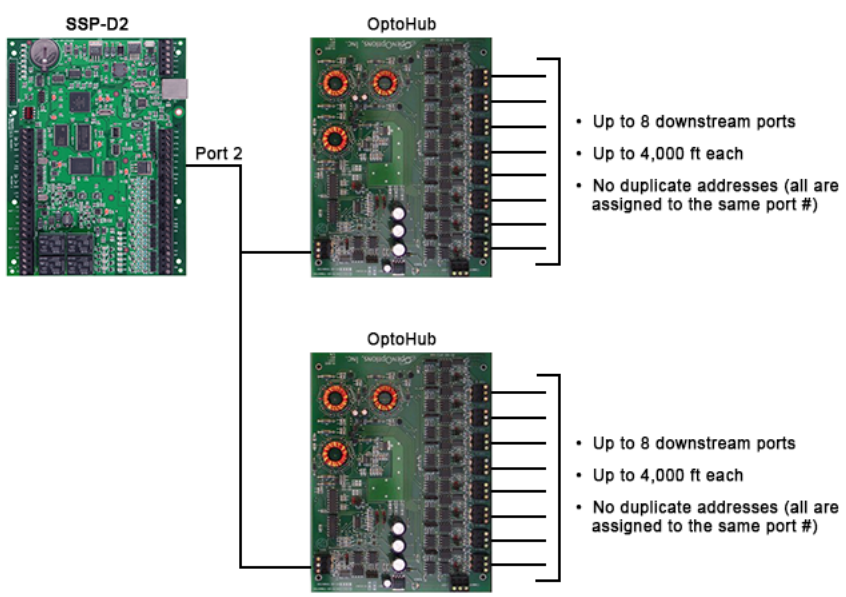
> *Open Options recommends reloading the firmware to the new controller and initiating a* Download All.

Valid Configurations









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