S2 Security Corporation NetBox™

Installation Guide

Version 2.0

UL Listing

UL 294 listing for the S2 NetBox™ is pending.

Note to Installers

Install according to national and local codes and use only UL listed equipment.

FCC Notice

The S2 NetBox™ complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the device is operated in a commercial environment. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense. The S2 NetBox™ complies with FCC Class B operation if a full loop ferrite bead (e.g. Fair Rite PN: 0443164151 or equivalent) is used on the external Ethernet cable.

CE Compliance

Compliance with CE Standards EN61000-4-3 and EN50130 requires that all wiring entering the S2 NetBox™ be run through properly grounded metal conduit. Compliance with CE Standard 61000-4-5 requires the use of a shielded Ethernet cable for any cable longer than 30 meters connecting to a local area network.

Disclaimer

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Note to Installers

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CAUTION!!!

OBSERVE STATIC ELECTRICITY PRECAUTIONS WHEN HANDLING AND INSTALLING S2 COMPONENTS. THESE COMPONENTS CAN BE DAMAGED BY STATIC DISCHARGE.

Preparing to Install

System Components

The S2 NetBox™ includes a Network Controller (S2NC), a Network Node (S2NN), and a variety of S2 Application Extension Blades.

For diagrams of the Controller and Node hardware see the "Testing and Troubleshooting" section starting on page 45.

The S2NC on-board software includes the S2 NetBox Application, the S2 Security Activity Database, a Linux® operating system and other software components. No PC server is required.

Up to 32 S2 Network Nodes may be connected to a network and controlled by a single S2NC.

Each S2NN handles communications to and from the S2NC and the power distribution to other application blades in the S2 NetBox. Each Node supports up to seven S2 Application Extension Blades in any combination.

There are 4 types of Application Extension Blades:

1. Access Blade: 2 Weigand reader interfaces, 4 supervised inputs, and 4 relay outputs.

2. Input Blade: 8 supervised inputs.

3. Output Blade: 8 relay outputs.

4. Temperature Blade: 8 temperature input points.

All S2 Application Extension Blades receive power and communications from the Node via the ribbon cable bus. The Node in turn communicates with the Network Controller over the on-board IP network.

Power Requirements

If AC power is supplied the NetBox requires 100-240V AC 50-60 Hz.

If DC power is supplied Controller/Node Blades must be powered with 12V DC at a minimum of 3 amps. Power should come from a separate circuit with its own breaker and an isolated ground

The S2 NetBox includes a DC power supply. The power supply can provide 12V DC at 5 amps.

Reader Power Available from the S2 NetBox
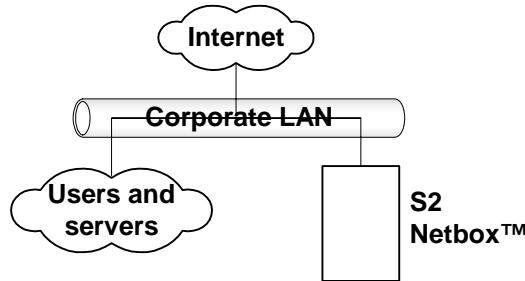
The total current that the S2 NetBox can provide to all readers is 2500 milliamps. Each Access Blade can supply up to a total of 400 milliamps at 12V DC to readers. For example, an Access Blade can supply 400 milliamps to one reader or 200 milliamps to each of two readers. If the readers require more current, or a different voltage, then a separate power supply must be used.

For example, many Wiegand-compatible proximity readers from HID require 200 milliamps or less. The Node can power twelve such readers directly (12x200=2400ma). Long range proximity readers may require more power. Refer to the reader manufacturer documentation for power specifications.

Other than readers, any non-S2 components in the system (such as magnetic locks) must have power provided separately.
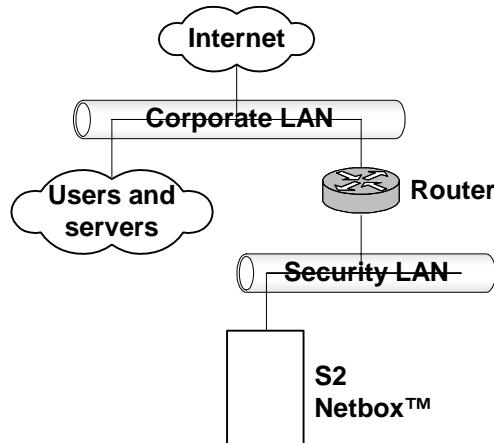
Topology Considerations

Issues to consider when selecting a topology for the S2NC and S2NN installation include simplicity, security, wiring requirements, bandwidth requirements, site distances, current network topology, and the number of security system resources to be wired.

The simplest topology for S2 installation.

The simplest topology, shown in the diagram above, will be the most common case for small systems. All users and network resources share the same LAN. This topology is somewhat less secure than the following example using a router.
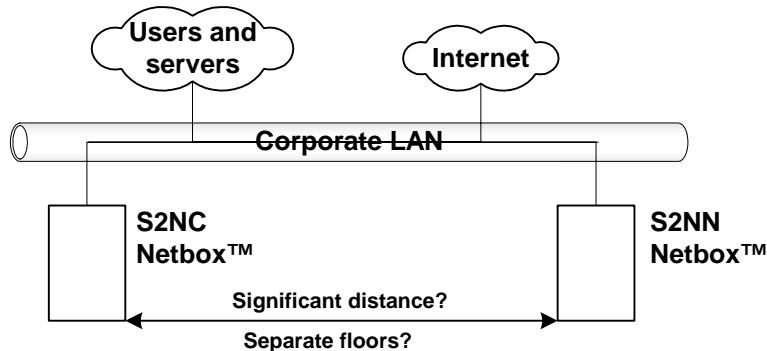
A router with a subnet for S2 installation.

The diagram above shows a somewhat more complicated but inherently more secure topology. In this case an inexpensive router is used to create a subnet for the security system. The advantages here are increased network security and decreased bandwidth requirements because the corporate LAN does not directly carry traffic between the S2NNs and the S2NC. The disadvantages include potentially increased wiring, complexity, and router configuration.

Node Installation Considerations

A node is an S2 NetBox without a Network Controller. It contains only a Node and application blades. Site layout and distance considerations play a role in deciding where and how many nodes may be required or desirable. For example:

- Reader wiring that exceeds 500 feet (152 meters) will require an additional node to reduce the wire lengths to less than that maximum.

- Input or output wiring that exceeds 2000 feet (610 meters), while uncommon, will require an additional node to reduce the wire lengths to less than that maximum.

- Need for system resources on another floor of a building may make an additional node desirable to simplify wiring.

- Need for system resources at opposite ends of a building, or in two separate buildings on one site, may make an additional node(s) desirable to simplify wiring.

Site layout or distances may make a node installation desirable.

In the diagram above it may be possible to install one S2 NetBox and wire all the system resources to it, but that may require running numerous wire lengths over considerable distances. It may be faster, easier, and less expensive to place an S2 Network Node at one end or floor of the site and wire all local system resources to it. Communication to the S2NC at the remote location can be handled by the local area network wiring already in place.

Note that while a minimum system co-locates the S2NC and a node in the same S2 NetBox, it is not necessary to do so.

Network Requirements

The S2NC is designed to work with Ethernet networks using TCP/IP. While it will operate on 10baseT networks, 100baseT is preferred. 100baseT may be required for good performance if IP cameras and/or digital video is used.

Get the following information from the network administrator.

Required Network Information Checklist

❑ DNS (Domain Name Server) IP address(es).

❑ Gateway IP address, if any.

❑ Subnet mask and IP addresses for the S2NC and nodes.

❑ Email relay server address or name.

❑ Email address name for the S2NC and setup on the email server to accept mail from the S2NC for relay.

❑ Domain account name and password for a server providing network attached storage (NAS).

❑ Network attached storage server name in UNC (Universal Naming Convention) format: \\domain name\\machine name\\share name.

❑ Network time server name(s) if the network has no Internet access. Pool.ntp.org is specified by default.

Browser Requirements

The S2 Security Application is designed to work with

- Internet Explorer Version 6.0 or higher
- Mozilla Firefox version 1.0.

Third Party Device Requirements

NOTE: Check the S2 web site (www.s2sys.com) for an updated list of supported devices, and software updates.

Readers

The S2 NetBox Access Control Blade supports card readers that use the Wiegand Reader Interface.

Cameras

The S2NC supports up to 16 cameras. IP video cameras may be connected directly to the network and driven by the S2NC. S2 NetBox release 2.0 works with the following camera models:

- Panasonic NM 100
- Panasonic NS 324
- Axis 2120
- Vivotek
- Sony SNC-DF40N/DF40P

Digital Video Recorder

S2 NetBox release 2.0 supports DVR integration and use with the following model:

- Dedicated Micros DS2
- Dedicated Micros DV-IP

Environmental Requirements

- Operating temperature range: 32° F to 120° F (0° C to 50° C).
- Operating relative humidity range: Up to 95% non-condensing.

Installation Overview Checklist

The following checklist presents all major steps required for the completion of an S2 NetBox Security System installation. The installation does not have to be done in this particular order. However, the checklist has been designed to present a logical order for the completion of all steps.

Installation Overview Checklist

❏ Preparation steps (page 5)

❏ Quick Start procedure (page 11)

❏ Install any required additional blades into the S2 NetBox (page 18)

❏ Installation of the I-button onto the Controller/Node Blade (page 20)

❏ Mount the S2 NetBox (page 17)

❏ Connect readers (page 24)

❏ Connect inputs (page 26)

❏ Connect outputs (page 30)

❏ Connect power to the S2 NetBox (page 21)

❏ Connect to the network (page 35)

❏ Set IP address and other TCP configuration information (page 36)

❏ Provide to the Customer the Installation Description and Support Info pages.

CAUTION!!! OBSERVE STATIC ELECTRICITY PRECAUTIONS WHEN HANDLING AND INSTALLING S2 NETBOX COMPONENTS. THESE COMPONENTS CAN BE DAMAGED BY STATIC DISCHARGE.

Static Precautions Checklist

❏ Discharge by touching a ground before handling components.

❏ Wear a grounded wrist strap or stand on a grounded mat.

❏ Limit movement to limit static buildup.

S2 NetBox Quick Start Guide

The purpose of this section: is to provide install technicians with an introductory setup guide that can be performed in minimal time.
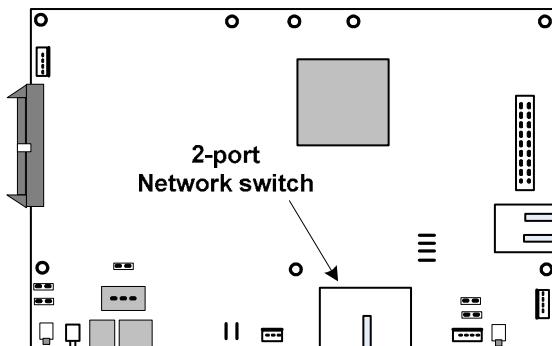
> **NOTE:** This section is not intended to substitute for the entire Installation Manual and the online Help system. It is intended only to quickly get your NetBox up and talking on the network and to setup basic access control.

Minimum system hardware required: An S2 NetBox with a Network Controller, a Network Node, an Access Blade, a Wiegand card reader, an access card, and a router with DHCP.

What you will need to know: Your test access card's format bit length and facility code.

Complete IP and Network Settings with Init Mode.

1. Setup a router with DHCP, set its address to 192.168.0.1, and connect it to your network.

2. Connect the router to one of the network ports on the Network Controller using a CAT 5 or better cable with an RJ-45 connector. If the network connection is functioning properly the Amber LED on the network switch will light and LED #5 on the Network Controller will light green. See the drawing below.

Network Controller/Node blade

3. Open a browser window on a computer connected to the router. The computer must have its network IP address set to 192.168.0.X, before you connect to the router.

4. In the browser address field enter 192.168.0.250. This is the Network Controller default IP address. The Init Mode page should now display.

5. In the **Network Controller Settings** section, the default values should work.

6. In the **Node IP Addressing Scheme** section, the default **Method** is **DHCP**. This should work.

7. In the **Time Settings** section, enter the current date and time.

8. In the **Initmode Settings** section select **No** from the drop-down. This ensures that Init mode will not redisplay when you reboot. You can redisplay the Init mode page at any time from the security application by selecting **Setup : Site Settings : Network Nodes** and click the link in the **Initmode Settings** section**.**
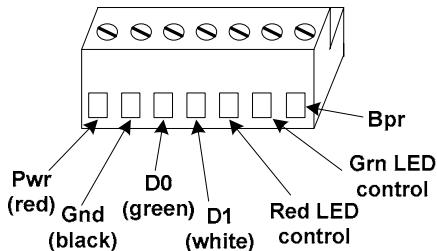
9. Click **Save**.

10. Click **Reboot**. The application may take several minutes to launch. Listen for the beep.

11. Open a browser window on a computer connected to the router and in the Address box enter the IP address that you set for the Network Controller.

12. At the Login page enter the **User name** "admin."

13. Enter the **Password** "admin."

14. Click **Go**. The security application will now display.

Configure and Enable the Node.

1. In the application select Setup : Site Settings : Network Nodes.

2. Select from the **Name** drop-down the node you wish to enable. In this Quick Start there should only be one node to choose.

3. Click the **Rename** link under the drop-down and enter a name that will help you to identify it, e.g. "Quick Start Node."

   NOTE: Do not change the **Unique Identifier** field.

4. Click to check the **Enabled** box to the right of the **Name** drop-down. This allows the communication of security data between the Network Controller and the Node.

5. Click **Save**.
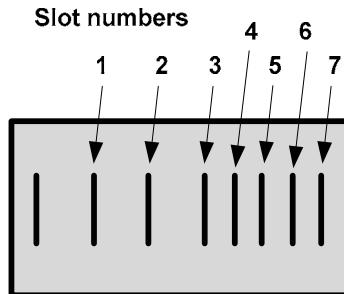
Wire and Setup a Reader.

1. Wire up one reader and connect it to one of the two reader connectors on the Access Blade in the NetBox. See the drawing below.
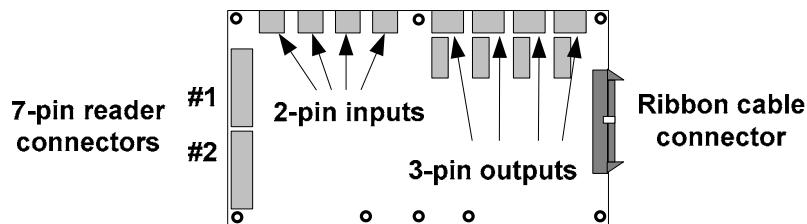
2. In the application select **Setup : Access Control : Readers**.

3. Enter a name for the reader in the **Name** text box, for example: "Quick Start reader."

4. Be sure that the **Enabled** checkbox to the right of the **Name** text box is checked.

5. Select "Quick Start node" from the **Network Node** drop-down list.

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6. Select from the **Expansion Slot** drop-down list the NetBox cabinet slot number of the Access Blade. See the drawing below.

Slot numbers

1   2   3   4   5   6   7

7. Select from the **Position** drop-down list the Access Blade connector position number that the reader is connected to. See the drawing below.

7-pin reader connectors   #1   #2

2-pin inputs

3-pin outputs

Ribbon cable connector

8. Click **Save**.

Setup a Lock Output.

Physically wiring a lock output is not necessary for purposes of this Quick Start. Software setup only will be sufficient. You will be able to determine if the output has fired by the click sound of the relay on the Access Blade after a valid card read.

1. Select Setup : Alarms : Outputs.

2. Enter a name for the output in the **Name** text box, for example: "Quick Start lock."

3. Be sure that the **Enabled** checkbox to the right of the **Name** text box is checked.

4. Select "Quick Start node" from the **Network Node** drop-down list.

5. Select from the **Expansion Slot** drop-down list the NetBox cabinet slot number of the Access Blade. See the drawing above.

6. Select from the **Position** drop-down list the Access Blade connector position number that the output is connected to. See the drawing above.

7. Click **Save**.

Setup a Portal.

1. Select Setup : Access Control : Portals.

2. Enter a name for the portal in the **Name** text box, for example: "Quick Start portal."

3. Select "Quick Start node" from the **Network Node** drop-down list.

4. Select "Quick Start lock" from the **Lock** drop-down list and enter the **Unlock** time in seconds.

5. Select "Quick Start reader" from the **Reader 1** drop-down list.

6. Click **Save**.

Enter a Card Format.

The Wiegand 26-bit format is in the system by default. Therefore, if you have a Wiegand 26-bit card you will only need to complete steps 1 and 5 by entering the correct facility code, and then click Save.

1. Select Setup : Access Control : Card Formats.

2. Click the **add** link under the **Name** drop down list.

3. Enter a **Name** for the card format you are creating. This is a required entry.

4. In the **Bit Length** text box enter the number of bits in this card format. This is a required entry. The number entered here determines the number of bit definition dropdowns provided below.

5. Check the card manufacturer documentation for the facility code of the card batch that you are using. Enter this **Facility Code** number in the text box.

6. If the number printed on the card is the same as the card ID number then check the **Hot Stamp # = Card ID** box.

7. **Bit definitions in card format**: For each bit in the card select from the dropdowns the function of the bit. **P** is for a parity bit. **F** is for a facility code bit. **N** is for a card number bit. The number of bit dropdowns will match the **Bit Length** entered above.

8. Click **Save**.

9. A dialog box with the following warning may appear: "Changing the Card Format may invalidate cards already entered into the system. Are you sure you want to continue?"

10. Click **OK**.

Setup an Access Level.

1. Select Setup : Access Control : Access Levels.

2. In the **Name** field enter a name for this new access level, for example "Quick Start access."

3. Be sure that the **Enabled** checkbox to the right of the **Name** text box is checked.

4. Select **Single reader** to assign and select "Quick Start reader" from the appropriate drop-down list.

5. Be sure that the default time specification, "Always," is selected from the **Time Spec** drop-down list.

6. Click **Save**.

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Add a Person

1. Select Administration : People : Add.

2. In the **Last Name** text box enter the name, "User."

3. In the **First Name** text box enter the name, "QuickStart."

4. **Activation Date/Time** defaults to today at 9:00 AM. This need not be changed for this Quick Start.

5. Click **Next.**

Issue a Card.

1. From the **Access Cards** list in the **Access Control** section select **<add new>**.

2. In the **Card Format** field select from the drop-down list the card type being issued.

3. Click the **Read Card** button in the **Access Control** section.

4. The **Issue Card** popup window will appear.

5. Select "Quick Start reader" from the **Reader** drop-down list in the popup window and click **Go**.

6. Swipe or pass the card by the reader and the electronically encoded number in the card will appear in the **Encoded #** field back in the application window.

7. From the **Access Levels Available** list in the **Access Control** section select the "Quick Start access" and click the right arrow button to move it into the **Selected** list.

8. Scroll down and click **Save**.

Display the Activity Log.

1. Select **Monitor : Activity Log**.

Swipe the Card through the Reader.

1. Pass the card across the reader.

2. Listen for the click of the output relay on the Access Blade. This indicates that the lock output has fired.

3. Check the **Activity Log** for a log entry of valid access. The most recent entry appears at the top of the list.

Results and Troubleshooting.
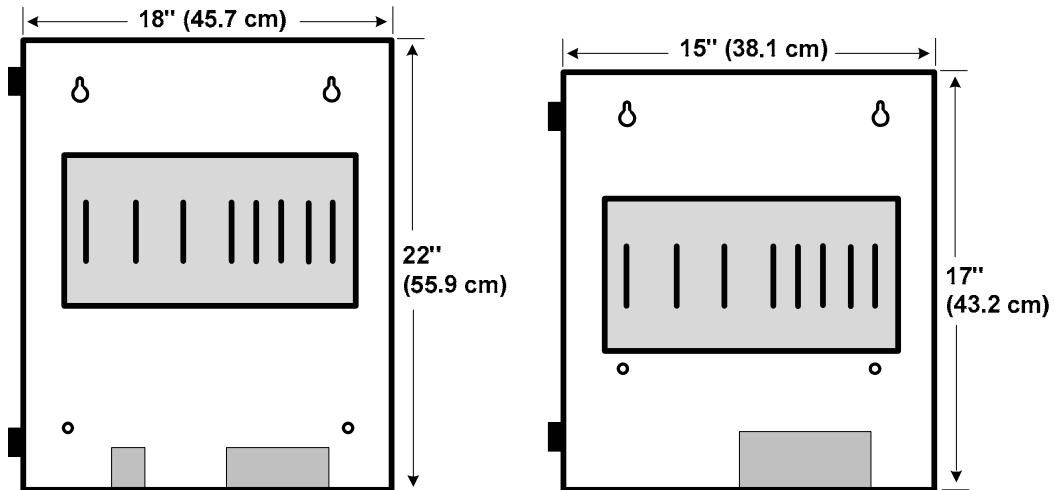
| Log Entry	What to do next…
Valid access at Quick Start portal QuickStart User	Congratulations. You have successfully set up the NetBox for access control. To complete a full installation at a customer site use the Installation Manual and Help system.
Invalid access … card bit mismatch	The access card used has a different bit format than the card format you entered. Correct the card format.
Invalid access … wrong location	Reader setup may be incorrect. Check the reader connector position number, and confirm that the reader is selected for the access level assigned to the cardholder.
Invalid access … not in local db	The access card was not successfully entered into the database.
<no log entry>	It is likely that the Network Controller and the Node are not communicating. Recheck the IP and network settings.

Installing the S2 NetBox and Nodes
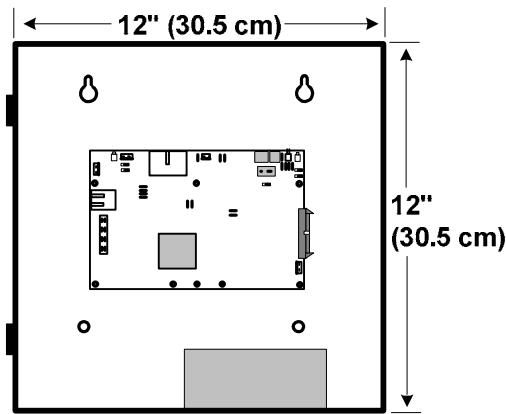
Mounting the S2 NetBox Cabinet

The S2 NetBox is available in several different cabinet sizes for both wall mounting and rack mounting.

Wall mount NetBox cabinets have four holes in the back of the cabinet for mounting to the wall as shown in the diagrams below.
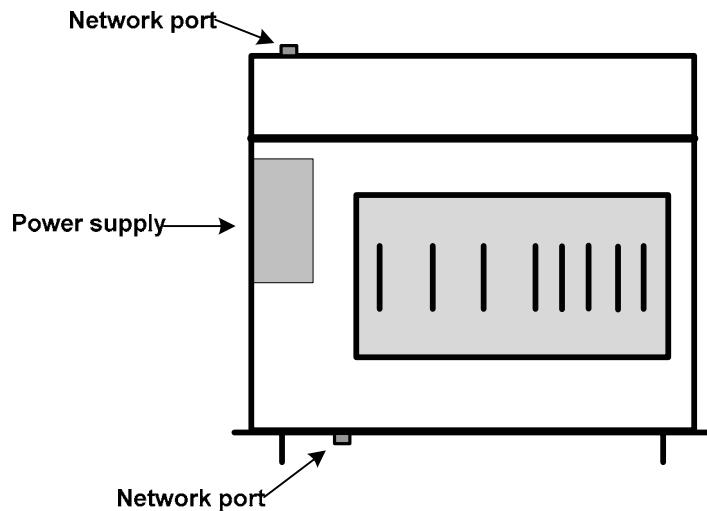
The S2 NetBox wall mount cabinets with slots for application blades.
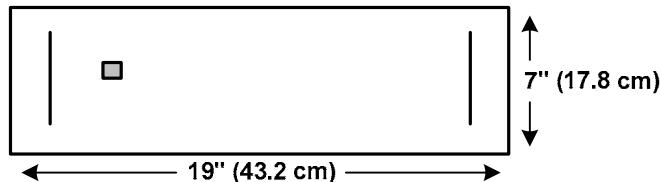
The S2 NetBox wall mount mini-cabinet with stacked application blades.

The two mounting holes near the top of the cabinet are keyholes and should be mounted first. The lower holes can then be drilled using the cabinet as a template.

Mounting hardware should be sufficient to hang a 25 pound (11.34 kg) load. Wall space required to fully open the cabinet doors is twice the width of the cabinet. The door opens from right to left as you face the cabinet. It is recommended that the cabinet be mounted in a location where the door can be fully opened.

The S2 NetBox 4U rack mount cabinet with slots for application blades, top view.
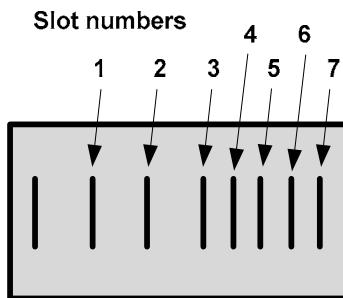
The S2 NetBox 4U rack mount cabinet, front view.

The S2 NetBox 4U rack mount cabinet fits a standard 19" rack. A rack mount rail kit is available. Assembly instructions are included in the rail kit.

Installing Additional Blades

The S2 NetBox cabinets have 8 slots in the aluminum chassis for installing blades except for the mini-cabinet which holds a stack of up to 3 blades. The leftmost slot is reserved for the Controller/Node Blade. The remaining slots can hold any combination of Access, Input, Output, and Temperature application blades and are numbered 1 through 7 as in the diagram below.
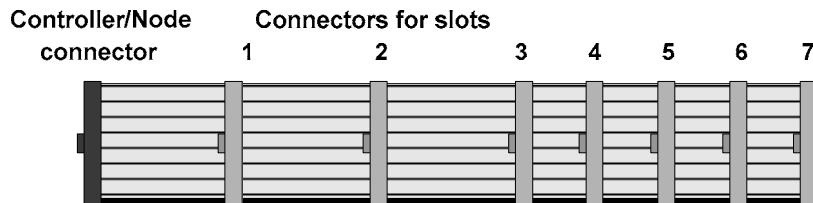
The S2 NetBox slot numbering.

The Node handles communications and power distribution to the application blades. Note that the slots are physical mounting points only. The electrical connection is made through the ribbon cable shown below. It is recommended that slots 1, 2, 3, 5, and 7 be used first. The spacing inside the S2 NetBox will be easier to work with. Slots 4 and 6 should be used only if more than five blades are required.

Slot and Position Numbers

Slot numbers are determined by the connector on the ribbon cable that is plugged into the blade. The ribbon cable (see diagram below) is a bus and a blade's place on the bus determines the slot number. You will see that it is possible to place a blade in physical slot 5 and yet attach ribbon cable connector 6 to the blade. If this occurs the blade will be seen by the Security Application in slot 6 on the bus.
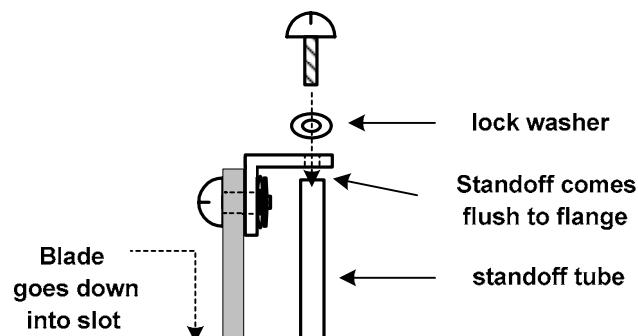

The S2 ribbon cable bus viewed from above.

Position numbers are determined by the connector position on the blade itself. See the sections below on Connecting Readers, Connecting Inputs, and Connecting Outputs.

CAUTION!!! MAKE SURE ALL POWER IS OFF BEFORE CONNECTING OR DISCONNECTING BLADES IN THE S2 NETBOX.

To install a slot mounted blade in the S2 NetBox:

1. Power down the S2 NetBox. To ensure that the S2 NetBox database is properly saved reboot the S2 NetBox and then power down. The reboot procedure includes saving the security database. Select **Setup : System Maintenance : Utility**.

2. Thread the standoff tube provided down onto the threaded post on the chassis next to the slot where you will insert the additional blade.

3. Be sure that you are grounded and insert the additional blade into the slot on the chassis with the ribbon cable connector toward the bottom of the S2 NetBox. See diagram below.

4. Place the lock washer provided over the top of the standoff and thread the screw provided through the flange and down into the top of the standoff and snugly down onto the lock washer. See diagram below.
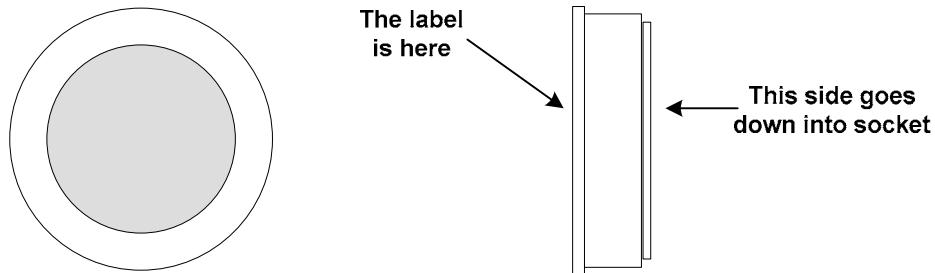
5. Connect the ribbon cable from the Node in the leftmost slot to the newly installed blade. The connector is polarized. Make sure that the center bump fits into the opening for it on the connector on the blade. Press the connector firmly into place until you hear the click of the extraction levers snapping into vertical position. You may have to press the extraction levers into full vertical position before you will hear the click.

6. Record on an S2 NetBox Installation Description Form (make a copy from Appendix D) the exact slot number and blade type.

Installing the I-button License

The Controller Blades ship with an I-button chip that is your software license. If you should need to swap out the Controller/Node Blade you will need to remove the I-button, and place it into the new blade. Use this procedure.
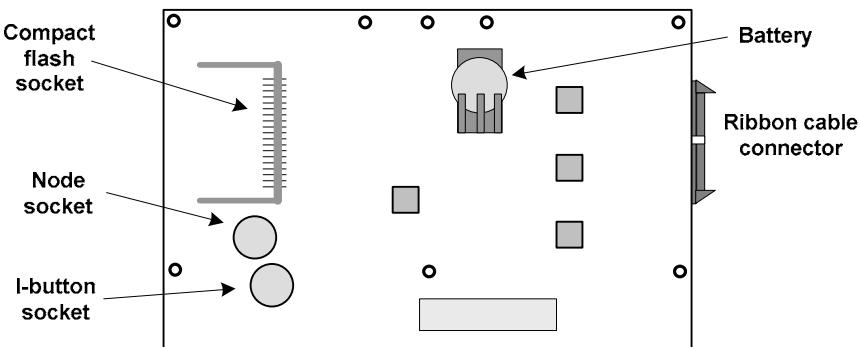
To remove and install the I-button licensing chip:

1. Be sure that there is no power to the NetBox and that you are grounded.

2. Remove the I-button from the I-button socket on the underside of the Controller/Node Blade by gently pulling back the retaining clips allowing the button to fall out.

The label is here

This side goes down into socket

The I-button licensing chip.

3. Insert the I-button into the I-button socket on the bottom side of the Controller/Node Blade.

Compact flash socket

Node socket

I-button socket

Battery

Ribbon cable connector

4. Be sure that the I-button is fully seated into the socket such that the retaining clips are over the rim and holding it in place.

Wiring a Battery

The S2 NetBox does not include a battery but one can be provided and mounted on the floor of the box. The battery specification is 12 VDC, minimum 3 amps (7 amp hours recommended) SLA (sealed lead acid). The battery cable has a 3-pin connector for the S2NC (with the center position empty) and two quick connectors for the battery terminal tabs. This cable is pre-installed inside the S2 NetBox cabinet.

CAUTION!!! DO NOT CONNECT THE BATTERY TERMINALS AND THE S2NC UNTIL POWER IS SUPPLIED TO THE S2 NETBOX.

The specified battery is not meant to function as a UPS but rather only to supply sufficient time to perform an orderly shutdown in case of power failure.

Do not connect a battery before external power is supplied. It will immediately power up the S2NC and begin to drain the limited battery power. Once external power is supplied you can connect the battery and it will charge at 12V via the connection with the S2NC.

Wiring Power to the S2 NetBox
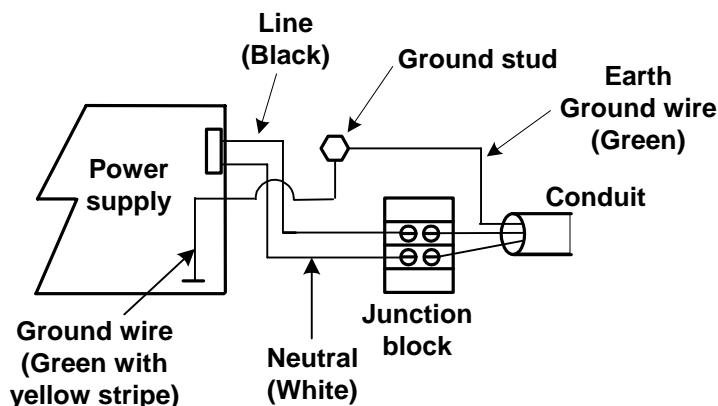
Wiring AC Power

If AC power is provided, the S2 NetBox must be powered with 100-240V AC 50-60 Hz. Power must come from a separate circuit with an isolated earth ground.

NOTE: The rack mount NetBox has a 3-pronged socket exposed on the back and need not be wired.

To wire AC power
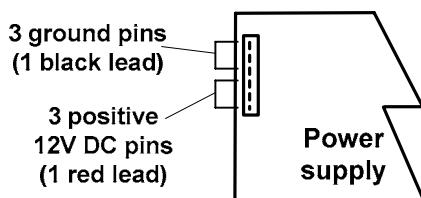
1. Make sure the AC power source is off and pull the wiring through a knockout in the S2 NetBox.

2. First connect the green earth ground wire to the ground stud on the bottom of the S2 NetBox. Then connect the ground wire from the S2 NetBox power supply (green with yellow stripe) to the ground stud.

Top view of wiring the S2 NetBox with AC power.
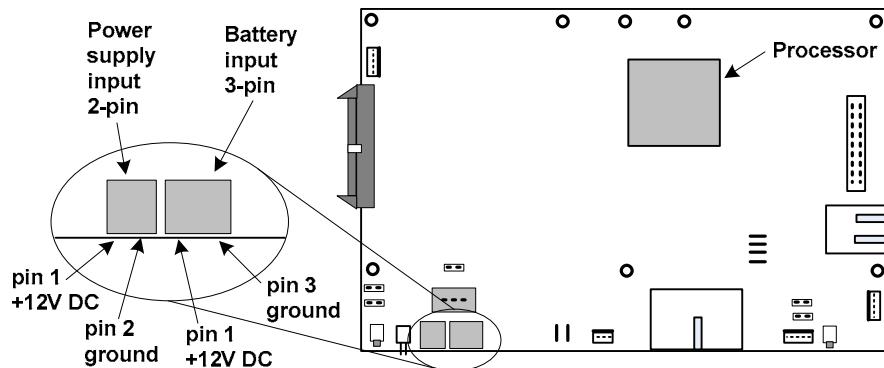
3. Remove the plastic cover from the junction block.

4. Connect the AC power to the two-position junction block. The hot wire from the AC power source must be connected to the same side of the junction block as the black wire from the S2 NetBox power supply. See the diagram above. The neutral or other hot wire must be connected to the same side of the junction block as the white wire from the S2 NetBox power supply.

5. The S2 NetBox power supply comes pre-wired to the Controller. The DC output side of the power supply has 6 pins. See diagram below. The 6-pin output is wired to a 2-pin connector, and connected to the 2-pin power supply input on the Controller. See diagrams further below.

The power supply outputs 12VDC up to 5 amps

6. If a battery is supplied plug the 3-pin battery power connector into the battery power input on the Controller/Node. See the diagrams below.

Controller/Node Blade DC and battery power connectors.

7. Replace the plastic cover onto the junction block to ensure that no hot leads are exposed.

8. Turn on power to the S2 NetBox and then push the quick connectors on the battery end of the battery cable firmly on to the battery terminal tabs. Connect the negative tab first, then the positive tab.
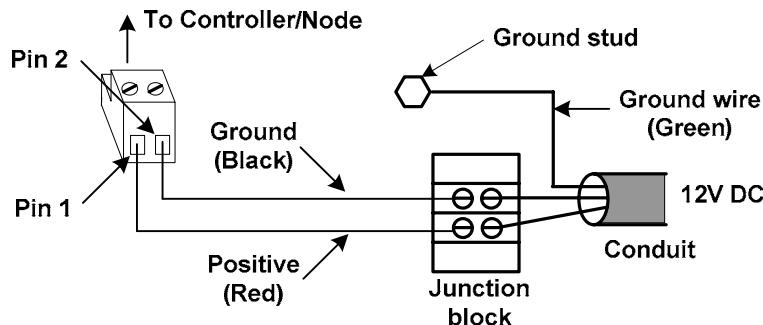
Wiring DC Power

If DC power is provided the S2 power supply must be bypassed and can be removed. Source power must come from a separate circuit with its own breaker and an isolated earth ground.

- The Controller/Node Blade must have 12V± DC at a minimum of 3 amps.
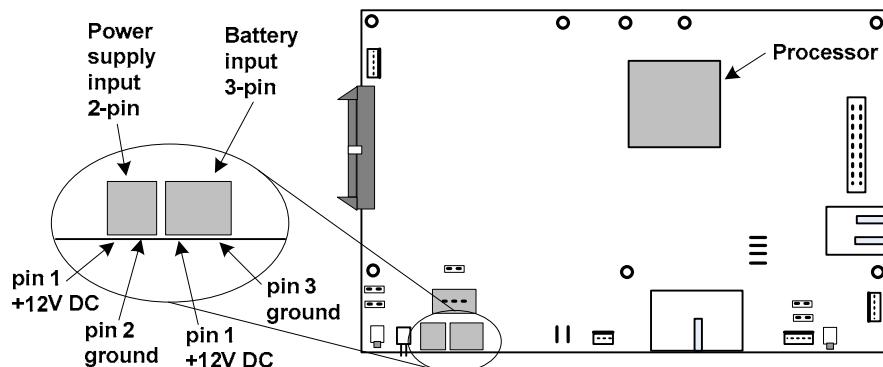
To wire DC power to Controller/Node blades

1. Ensure the DC power source is off and pull the wiring through a knockout in the NetBox.

2. Connect the green earth ground wire to the ground stud on the bottom of the NetBox.

3. Remove the plastic cover from the junction block.

4. Connect the red positive wire and the black ground wire to the junction block. See the diagram below.

Top view of wiring the S2 NetBox Controller/Node Blade with DC power.

5. From the junction block run a red positive wire to pin 1 of a two-pin connector plug. See the diagram above.

6. From the junction block run a black ground wire to pin 2 of a two-pin connector plug. See the diagram above.

7. Run the connector to the Controller/Node Blade, secure it with zip ties, and plug it into the power supply input. See the diagram below.
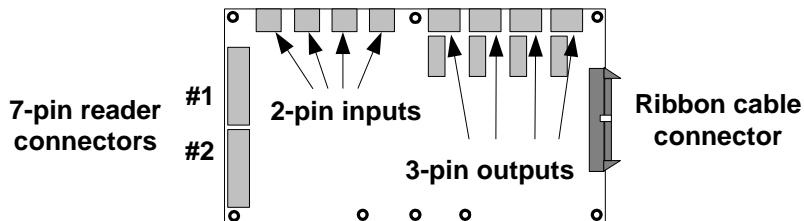
Series 2 Controller/Node blade DC and battery power connectors.

8. If a battery is provided plug the 3-pin battery power connector into the battery power input on the Controller/Node. See the diagram above.

9. Replace the plastic cover onto the junction block to ensure that no hot leads are exposed.

10. Turn on power to the S2 NetBox and then, if a battery is supplied, push the quick connectors of the battery cable onto the battery terminal tabs.

Connecting Readers

S2 Access blades have two 7-pin reader connectors mounted on the board as shown in the diagram below.

The S2 Access blade.

> **NOTE:** Each S2 Access Blade can supply a total of 400 milliamps of power for readers. If the reader(s) connected to the Access Blade draw more than 400 milliamps then external power must be supplied to these readers.

The color-coded wires from the reader wiring harness must be connected to the 7-pin connector provided as shown in the diagram below. The color-coding for Power (red), Ground (black), Data 0 (green), and Data 1 (white) is Security Industry Association (SIA) standard.

Reader Beeper control varies by manufacturer and model. Refer to the documentation provided by the reader manufacturer for details on your particular reader. Typically the reader will beep for the duration of a momentary unlock or until the door is opened. This occurs whether the door is unlocked by a valid card read or unlocked from the security application. If no beeper is desired, do not connect the beeper control wire.

Reader LED control varies by manufacturer and model. Some use two-wire LED control and some use one-wire control. Refer to the documentation provided by the reader manufacturer for details on your particular reader. S2 does not support control involving signal pulsing to change LED color.

The S2 Access blade has both red and green LED control connections. See the connector diagram in the procedure below.

The table below shows the state of the LED Control leads from the Access blade for each reader state. For Invalid Reads the leads are set for 2 seconds. For Valid Reads the leads are set until the door opens or times out.

Reader State	Red LED Control lead from the Access blade	Green LED Control lead from the Access blade
Normal	Low	Low
Invalid Read	Low	High
Valid Read	High	Low

The table below shows the LED display color in one-wire readers depending upon which lead from the Access blade is used for connecting the wire.

Reader State	LED one-wire control to Red LED Control lead	LED one-wire control to Green LED Control lead
Normal	Green	Green
Invalid Read	Green	Red
Valid Read	Red	Green

In a typical 2-wire reader the LED display would be as follows:
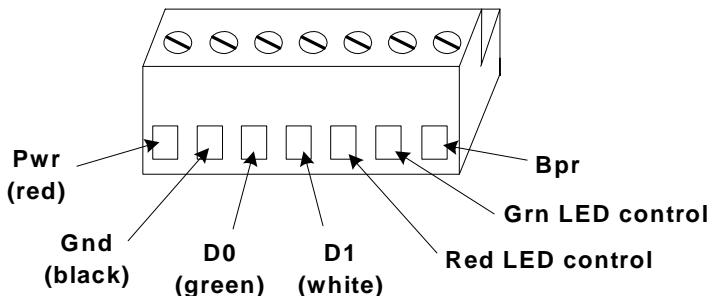
Reader State	LED Display
Normal	Yellow
Invalid Read	Red
Valid Read	Green

NOTE: LED display behavior for your particular reader may vary. Refer to the reader manufacturer documentation.

CAUTION!!! MAKE SURE ALL POWER IS OFF BEFORE CONNECTING READERS.

Wiring Readers

1. Power down the S2 NetBox. To ensure that the security database is properly saved use the System Shutdown utility. The shutdown procedure includes saving the security database. Select **Setup : System Maintenance : Utilities : System Shutdown**.

2. Click the **Shutdown Now** button.

3. Be sure that you are grounded and pull the wiring through a knockout in the S2 NetBox. Wire specification: Twisted, shielded 22 AWG Belden #9536 (6 conductor) or equivalent. Maximum distance: 500 feet (152 meters).

4. Connect the reader wires to the 7-pin reader connector provided as shown in the diagram below.
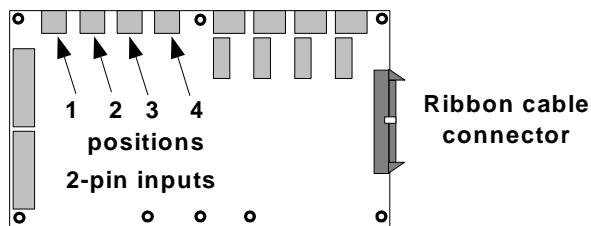

The 7-pin reader connector wiring. CAUTION! See reader manufacturer documentation for wire color for LEDs and Bpr (Beeper).

5. Be sure there is no power to the S2 NetBox and plug the connector into a reader position on the Access blade.

6. Record on an Access Blade Installation Description Form (make a copy from Appendix D) the exact position number for this particular reader.

Connecting Inputs
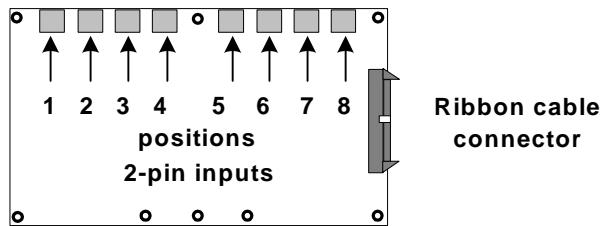
Inputs can be connected either to an Access blade or to an Input blade.

S2 Access blades have four male 2-pin input connectors mounted on the board as shown in the diagram below.
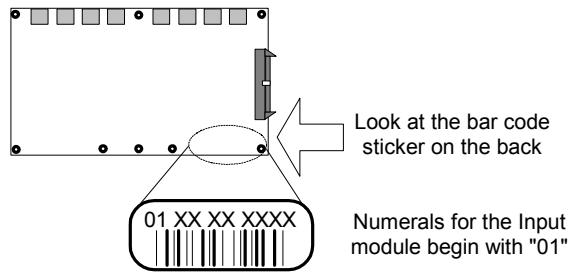
Positions 1, 2, 3, and 4 on the S2 Access blade are inputs 1, 2, 3, and 4.

S2 Input blades have eight (8) male 2-pin input connectors mounted on the board as shown in the diagram below.

The S2 Input blade.

Input blades and Temperature blades look very much alike. The numerals on the bar code sticker on the back of the Input blade begin with "01." Numerals on all Temperature blades begin with "08." See the diagram below.

How to identify Input blades vs. Temperature blades.

If more inputs are required beyond the four provided on the Access blade, or the eight provided on the Input blade then additional Access or Input blades can be installed in the S2 NetBox. To install additional blades see the section **"Installing Additional Blades"** on page 18.

CAUTION!!! MAKE SURE ALL POWER IS OFF BEFORE CONNECTING INPUTS.

Wiring Inputs

1. Power down the S2 NetBox. To ensure that the security database is properly saved use the System Shutdown utility. The shutdown procedure includes saving the security database. Select **Setup : System Maintenance : Utilities : System Shutdown**.

2. Click the **Shutdown Now** button.

3. Be sure that you are grounded and pull the wiring through a knockout in the S2 NetBox. Wire specification: Twisted, shielded 22 AWG Belden #9462 or equivalent. Maximum distance: 2000 feet (610 meters).

4. Connect the input wires to the 2-pin input connector provided.

5. Be sure there is no power to the S2 NetBox and plug the connector into an input position on an Access blade or an Input blade. These connectors are polarized and can only be inserted one way.

6. If you are connecting previously wired or previously installed inputs, determine the input supervision type: normally open (NO) or normally closed (NC), zero, one, or two resistors, single resistors in parallel or series. Note this on the Installation Description Form. You will need to know this for the software setup of the input. See **"Input Supervision Types"** below.
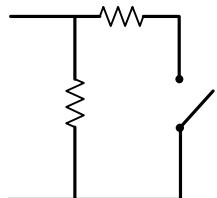
    NOTE: The S2 NetBox supports the use of 1k Ohm resistors only.

7. If you are installing the input device refer to the input device manual to determine if the device circuit is normally open (NO) or normally closed (NC). Select the input supervision type you want and wire the resistor(s) as shown in **"Input Supervision Types"** below.

8. Record on an Access or Input Blade Installation Description Form (make a copy from Appendix D) the exact position number and input supervision type for this particular input device.
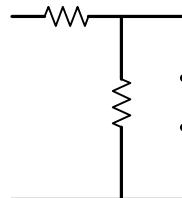
Input Supervision Types

NOTE: The S2 NetBox supports the use of 1k Ohm resistors only.

Dual Resistor
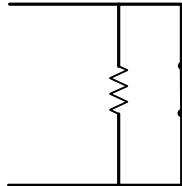
NO Dual Resistor   **NC Dual Resistor.**

The configuration of resistors shown above must be installed for supervised input resistance values to be properly read by the S2 NetBox. The four states of the Dual Resistor input circuits are read according to the values in the table below.

Input State	Resistance Values
Normal	1k Ohms
Alarm	0.5k Ohms or 2k Ohms

Short	0 Ohms
Open	No current (∞ Ohms)
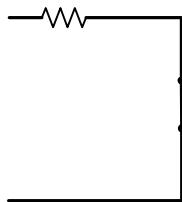
NC Parallel Resistor

The three states of the NC Parallel Resistor input circuits are read according to the values in the table below.

Input State	Resistance Values
Normal	0 Ohms
Alarm	1k Ohms
Open	No current (∞ Ohms)

NC Series Resistor

The two states of the NC Series Resistor input circuits are read according to the values in the table below.

| Input State	Resistance Values
Normal	1k Ohms
Alarm	No current (∞ Ohms)
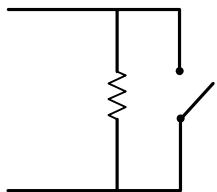
NC Unsupervised

The two states of the NC Unsupervised input circuits are read according to the values in the table below.

| Input State	Resistance Values
Normal	0 Ohms
Alarm	No current (∞ Ohms)
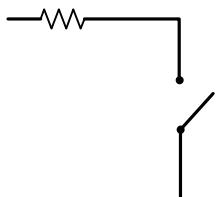
NO Parallel Resistor

The three states of the NO Parallel Resistor input circuits are read according to the values in the table below.

Input State	Resistance Values
Normal	1k Ohms
Alarm	0 Ohms
Open	No current (∞ Ohms)
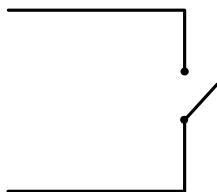
NO Series Resistor

The two states of the NC Series Resistor input circuits are read according to the values in the table below.

| Input State	Resistance Values
Normal	No current (∞ Ohms)
Alarm	1k Ohms

NO Unsupervised
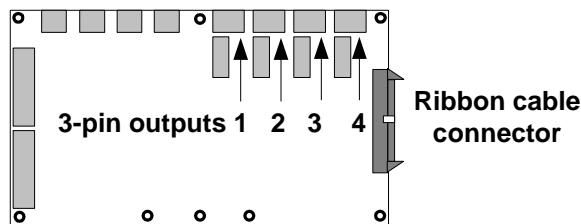
The two states of the NO Unsupervised input circuits are read according to the values in the table below.

| Input State	Resistance Values
Normal	No current (∞ Ohms)
Alarm	0 Ohms

Connecting Outputs

Outputs can be connected either to an Access blade or to an Output blade.
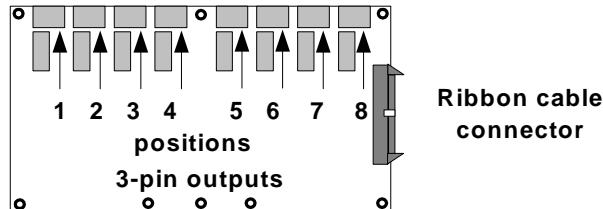
S2 Access blades have four 3-pin output connectors mounted on the board as shown in the diagram below.

3-pin outputs 1 2 3 4   Ribbon cable connector

NOTE: Output positions on the S2 Access blade are outputs number 1, 2, 3, and 4.

If more outputs are required beyond the four provided on the S2 Access blade then additional Access blades or Output blades can be installed in the S2 NetBox. To install additional blades see the section **"Installing Additional Blades"** on page 18.

S2 Output blades have eight (8) male 3-pin output connectors mounted on the board as shown in the diagram below. Outputs support any output devices that operate on the following maximum electrical ratings: 30 Volts DC or AC, 2.5 Amps inductive or 5.0 Amps non-inductive.

1 2 3 4   5 6 7 8   Ribbon cable connector
positions
3-pin outputs

The S2 Output blade.
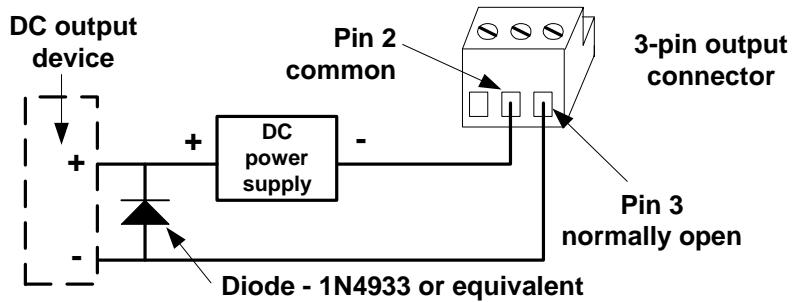
CAUTION!!! THE DIODES AND VARISTORS SHOWN BELOW MUST BE INSTALLED AS SHOWN. THEY ARE DESIGNED TO PROTECT THE OUTPUT CIRCUITS. FAILURE TO PROPERLY INSTALL THE DIODES OR VARISTORS MAY REDUCE THE RELAY CONTACT LIFE AND LEAD TO PREMATURE FAILURE!

CAUTION!!! MAKE SURE ALL POWER IS OFF BEFORE CONNECTING OUTPUTS.

Wiring Outputs
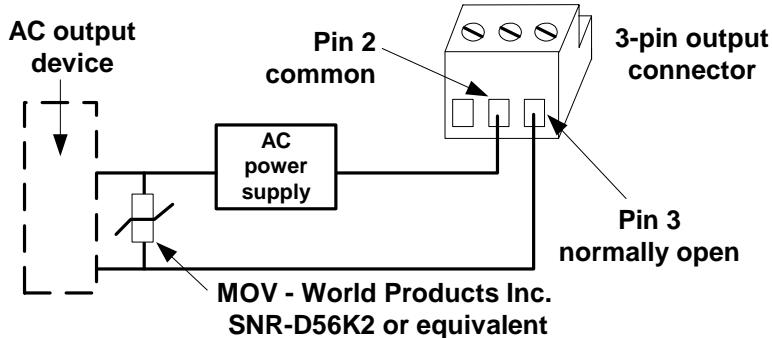
1. Power down the S2 NetBox. To ensure that the security database is properly saved use the System Shutdown utility. The shutdown procedure includes saving the security database. Select **Setup : System Maintenance : Utilities : System Shutdown**.

2. Click the **Shutdown Now** button.

3. Be sure that you are grounded and pull the wiring through a knockout in the S2 NetBox. Wire specification: Twisted, shielded 22 AWG Belden #9462 or equivalent. Maximum distance: 2000 feet (610 meters).

4. Refer to the output device manual to determine if the device is normally energized or normally not energized, and if it is DC or AC powered.

5. Connect the output wiring to the 3-pin output connector. Pin 1 is normally closed (NC). Pin 2 is common. Pin 3 is normally open (NO).

6. Be sure there is no power to the S2 NetBox and plug the connector into an output position on an Access blade or an Output blade. These connectors are polarized and can only be inserted one way.

7. If the output device is **DC powered and normally not energized** then install a diode (1N4933- 1 A, 50 V, Fast Recovery Diode or equivalent) in the circuit as shown in the diagram below.
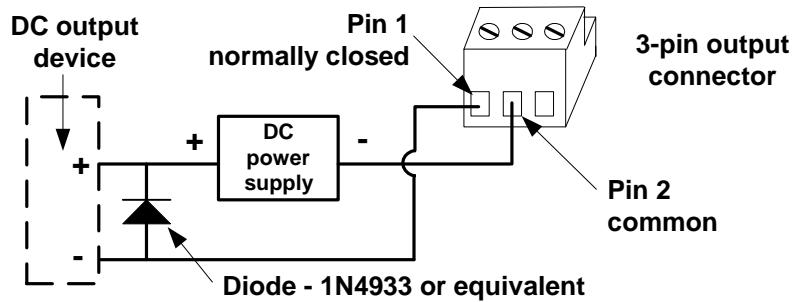
Typical wiring for a DC output device that is normally not energized.

8. If the output device is **AC powered and normally not energized** then install a varistor (40 VAC, 56 VDC, 10 A Surge, Radial Leaded Varistor or equivalent, e.g. World Products Inc. SNR-D56K2) in the circuit as shown in the diagram below.
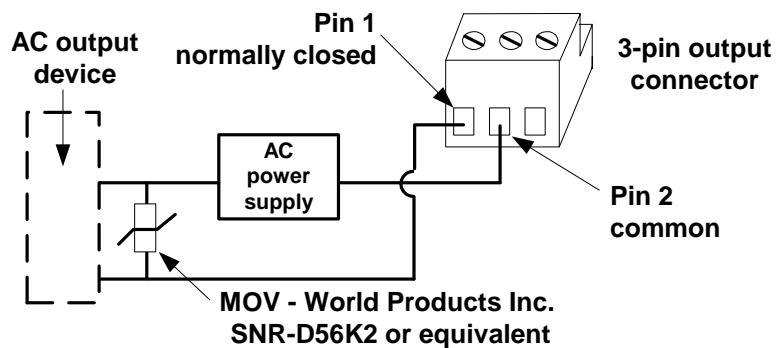
Typical wiring for an AC output device that is normally not energized.

9. If the output device is **DC powered and normally energized** then install a diode (1N4933- 1 A, 50 V, Fast Recovery Diode or equivalent) in the circuit as shown in the diagram below.

Typical wiring for a DC output device that is normally energized.

10. If the output device is **AC powered and normally energized** then install a varistor (40 VAC, 56 VDC, 10 A Surge, Radial Leaded Varistor or equivalent, e.g. World Products Inc. SNR-D56K2) in the circuit as shown in the diagram below.
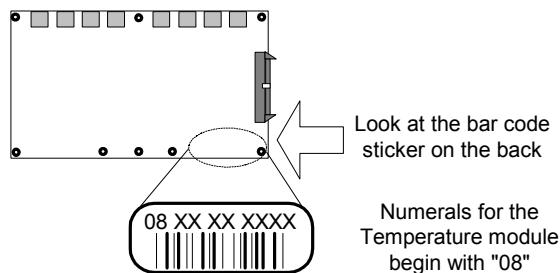
Typical wiring for an AC output device that is normally energized.

11. Record on an Access or Output Blade Installation Description Form (make a copy from Appendix D) the exact position number for this particular output device.

Connecting Temperature Sensors

Temperature sensors must be connected only to a Temperature blade. Temperature blades and Input blades look very much alike. The numerals on the bar code sticker on the back of the Temperature blade begin with "08." Numerals on all Input blades begin with "01."
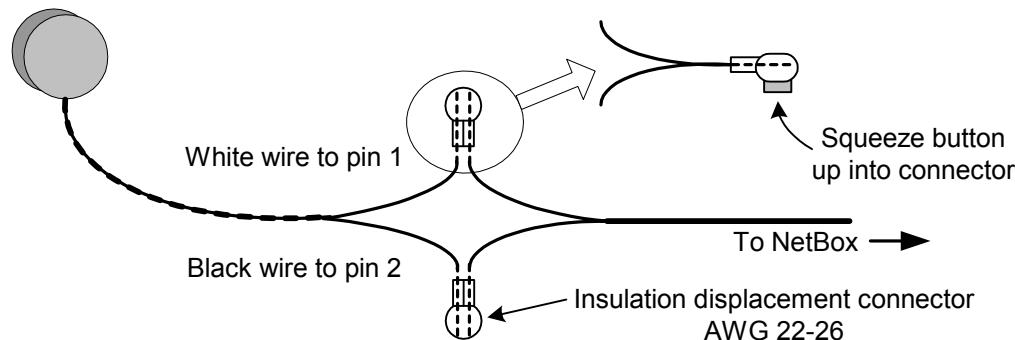
How to identify Temperature blades vs. Input blades.

CAUTION!!! MAKE SURE ALL POWER IS OFF BEFORE CONNECTING TEMPERATURE SENSORS.
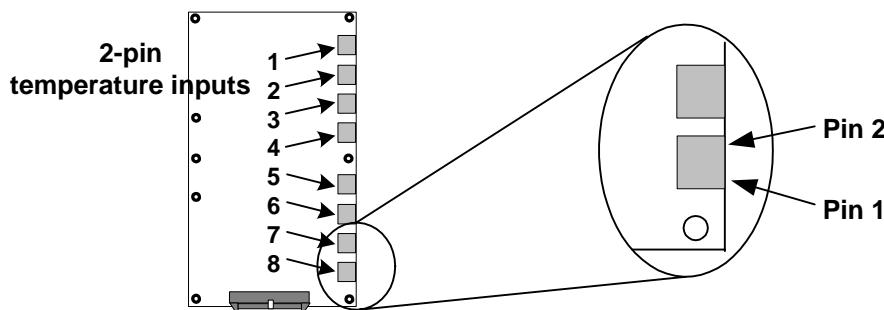
Wiring temperature sensors

1. Power down the S2 NetBox. To ensure that the security database is properly saved use the System Shutdown utility. The shutdown procedure includes saving the security database. Select **Setup : System Maintenance : Utilities : System Shutdown**.

2. Click the **Shutdown Now** button.

3. Using the locking insulation displacement connectors provided, connect the temperature sensor leads to a single twisted pair of wires in the cable. Place the white wire from the temperature sensor into one hole of a supplied connector and place the solid color wire of a single twisted pair from the cable into the other. The insulation need not be stripped. Ensure that the two wires remain fully seated in the connector and using pliers (or a similar tool) press down the raised button of the connector until it is flush with the body of the connector. Do the same with the black wire from the temperature sensor and the striped color wire of the same twisted pair from the cable. See the diagram below. A bit of non-conductive grease may squeeze out of the connector body. This is to make the connection water resistant. For distances up to 500 feet (152.4 meters) use Category 3 cable. For distances over 500 feet up to 1000 feet (304.8 meters) use Category 5 cable.

The S2 Temperature Sensor connected to the cable using the connectors provided.

4. Be sure that you are grounded and pull the cable through a knockout in the S2 NetBox. Connect the cable to a two pin temperature input connector. The cable lead from the white temperature sensor wire must connect to pin one, and the cable lead from the black temperature sensor wire must connect to pin two. See the diagram below.

The S2 Temperature blade has eight two-pin temperature inputs.

5. Record on a Temperature Blade Installation Description Form (make a copy from Appendix D) the exact position number for this particular temperature sensor.

Connecting Elevator Relay Outputs

The S2 NetBox can supply and be configured for one output per elevator per floor. These outputs will normally be connected to inputs on the elevator controller. Refer to the elevator manufacturer's documentation for specifics regarding access control for individual floors.

Refer also to **"Wiring Outputs"** starting on page 30.

CAUTION!!! MAKE SURE ALL POWER IS OFF BEFORE CONNECTING READERS, INPUTS, OUTPUTS, OR TEMPERATURE SENSORS.

Wiring Elevator Relay Outputs

1. Power down the S2 NetBox. To ensure that the security database is properly saved use the System Shutdown utility. The shutdown procedure includes saving the security database. Select **Setup : System Maintenance : Utilities : System Shutdown**.

2. Click the **Shutdown Now** button.

3. Be sure that you are grounded and pull the wiring through a knockout in the S2 NetBox. Wire specification: Twisted, shielded 22 AWG Belden #9462 or equivalent. Maximum distance: 2000 feet (610 meters).

4. Connect the output wiring to the 3-pin output connector. Pin 1 is normally closed (NC). Pin 2 is common. Pin 3 is normally open (NO).

5. Be sure there is no power to the S2 NetBox and plug the connector into an output position on an Access blade or an Output blade. These connectors are polarized and can only be inserted one way.

6. Connect the elevator controller inputs to the elevator controller module. Refer to the elevator manufacturer's documentation to determine proper wiring for access control inputs to the elevator controller module.

7. Record on an Access or Output Blade Installation Description Form (make a copy from Appendix D) the exact position number for this particular elevator floor output.
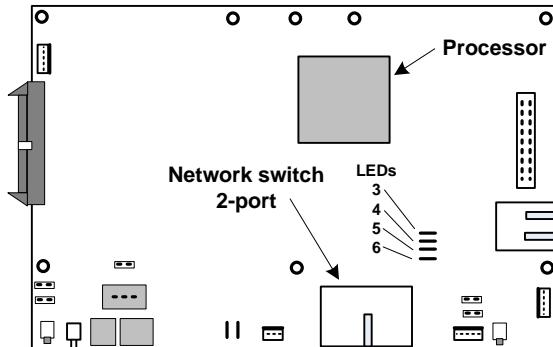
Connecting to the Network and Setting Initial Values

Now that you have completed the hardware installation you must use a browser (such as Internet Explorer™) to view the S2 NetBox Init Mode page and complete initial IP network and other settings and complete the network connection.

NOTE: The S2NC default IP address is 192.168.0.250. If that address already exists on the network do not connect to the network until you have changed the IP address. Use the procedure "**Setting the S2NC IP address by directly connecting a PC**" on page 36. See the network administrator for an available IP address.
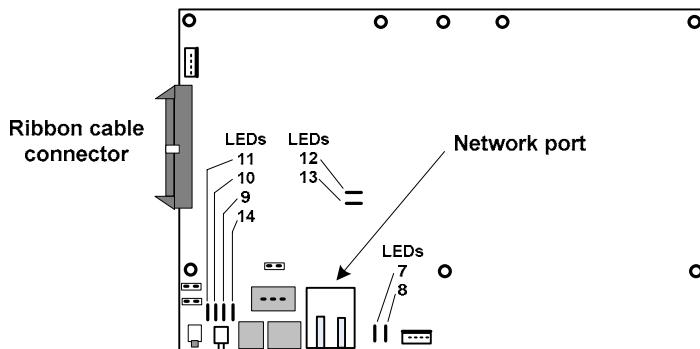
Wiring the network connection

1. Pull the Ethernet cable through a knockout in the S2 NetBox. Cable specification: CAT 5 or better with an RJ-45 connector wired straight through connecting to a network hub or switch.

2. Plug the RJ-45 connector into either of the 2 network switch ports on the Controller/Node Blade mounted in the leftmost slot in the NetBox cabinet. See the diagram below.

The Controller/Node blade has a 2-port network switch for network connections.

3. If the network connection is functioning properly the Amber LED on the network switch will light and LED #5 will light green. For specifics on Controller and Node LEDs see page 46.

The Node only blade has one network port.

4. If the NetBox you are installing is a Node only run the external cable directly to the Node, and plug the RJ-45 connector into the network port on the Node as shown in the diagram above.

Setting Initialization Values

This is a three step process:

- Display the Init Mode page.

- Complete the settings (with information from the network administrator).

- Save the settings and reboot.

Step one: use one of the following procedures to display the Init Mode page.

To view the S2 NetBox Init Mode page

1. Open a browser window on a computer connected to the network.

2. In the browser address field enter 192.168.0.250. This is the Controller's default IP address.

3. Init Mode page should now display. Complete initial IP network and other settings as explained below under DHCP, Time, and Email Settings.

If the Init Mode page does not display check the computer's IP address

1. In Windows™ select Settings : Control Panel : Network Connections.

2. Double click Local Area Connections and select the Support tab. Your computer must have an IP address of 192.168.0.x. (x must be a value from 0 to 254.) If your network connected computer does not have this IP address then check with the network administrator for appropriate IP addresses and use the procedure below to set the Controller IP address.

Setting the S2NC IP address by directly connecting a PC

1. Connect a laptop computer directly to the network switch on the Controller with an Ethernet cable. See page 45 for a diagram of the Controller/Node blade.

2. Use the network control panel to change the laptop IP address to an address on the 192.168.0.x network. (x must be a value from 0 to 254.) In Windows™ select Settings : Control Panel : Network Connections.

3. Double click the Local Area Connection.

4. Click the General tab Properties button to display the Local Area Connection Properties dialog.

5. Click the General tab and select Internet Protocol (TCP/IP).

6. Click the Properties button to display the Internet Protocol Properties dialog.

7. Click the General tab and select Use the following IP address.

8. Enter an IP address of 192.168.0.x and click OK. (x must be a value from 0 to 254.)

9. Click OK to dismiss the Local Area Connection Properties dialog.

10. Reboot the laptop, launch the browser, and in the browser address field enter 192.168.0.250

11. Init Mode page should now display. Complete the initial IP (network) settings as explained below.

Step two: Now that you have reached the Init Mode page complete the settings as explained below. These settings may require information from the network administrator.

Network Controller Settings

DHCP client?:

NO is the default and recommended setting. This ensures that the IP address given to the Controller is static. That is, it will not change.

Obtain from the Network Administrator:

- The static IP address to assign to the Network Controller.

- The appropriate Netmask.

- The Gateway IP address.

- DNS (Domain Name Server) IP addresses.

 Enter these addresses into the appropriate text boxes in this section.

If "DHCP Client?" is set to YES then the IP address of the S2NC will periodically change. In this case the network administrator must ensure that the IP address that is leased to the S2NC will have a consistent DNS name that is known to security application users. This requires an onsite DNS server because the DNS name is the only way that users can browse to the S2 Security Application if the IP address has changed.

In addition, if this is set to YES the other fields in this group will be grayed because the DHCP server will supply the IP data dynamically.

IP address:

If "DHCP client?" is set to YES then this field will be grayed.

See the network administrator for an appropriate IP address and enter it here.

The default value is 192.168.0.250. An IP address entered here is a static IP address. That is, it will not change.

Netmask:

If "DHCP client?" is set to YES then this field will be grayed.

See the network administrator for this netmask number and enter it here.

The default value is 255.255.255.0.

Gateway:

If "DHCP client?" is set to YES then this field will be grayed.

See the network administrator for this gateway IP address and enter it here.

The default value is 192.168.0.1. This is the address of the router that connects the S2NC to the rest of your network or to the Internet.

DNS 1:

If "DHCP client?" is set to YES then this field will be grayed.

See the network administrator for this DNS (Domain Name Server) IP address and enter it here.

The default value is 192.168.0.1.

DNS 2:

If "DHCP client?" is set to YES then this field will be grayed.

See the network administrator for this DNS (Domain Name Server) IP address and enter it here.

The default value is 192.168.0.1.

Node Addressing Settings

There are three ways for nodes to acquire their IP addresses. An existing DHCP server on the network can automatically assign IP addresses to nodes, you can set a static IP address for each node, or the network controller can serve IP addresses to any of its Nodes on the network.

Typically IP addressing is done by a customer's existing DHCP server. However, there may be cases where the Network Controller and its nodes are on a separate network, a separate subnet, or a network with no DHCP server. In other cases the network administrator may wish to specify IP addresses for the network controller and its nodes even when there is a DHCP server on the network. In any of these cases you may wish to have the Network Controller serve IP addresses to its nodes. See the CAUTION below.

Addressing Method:

- **DHCP**: This is the default setting. It allows an existing DHCP server on the network to automatically assign IP addresses to nodes.

  The Start address, Number of addresses, and Netmask fields will be grayed when DHCP is the addressing method.

- **Network Controller**: This setting enables the Network Controller to serve IP addresses to any of its Nodes on the network.

  CAUTION: While the NC's addressing method can exist alongside a standard DHCP server, care should be taken when specifying the valid address range for the NC so as not to conflict with the DHCP server's valid address range. Therefore, ensure that the network administrator agrees with setting this up and provides an accurate Start address, Number of addresses, and Netmask.

- **STATIC**: This setting requires that you set a static IP address for each node. You must ensure that the static address assigned to a node is not assigned to any other device on the network.

  The Start address, Number of addresses, and Netmask fields will be grayed when STATIC is the addressing method.

Setting a node to a static IP address

1. Make sure that the Microsoft™ .NET Framework v 1.1 is installed on the network connected pc you are working from. The .NET Framework Installer can be downloaded from the Microsoft website.

2. Run nnconfig.exe. This program is available on the Support page of the S2 web site for download (www.s2securitycorp.com). You will need a user name and password. Call S2 Support at (781) 237-4555.

NOTE: The pc running nnconfig.exe and the Node(s) you are configuring must be on the same subnet.

3. Nnconfig.exe listens for the node(s) multicast message and lists all nodes that it hears in the large list box. Allow nnconfig.exe several moments to discover the Network Node(s) that exist on the network.

4. The **Auto Discover NC** checkbox is checked by default. This instructs the nodes to auto-discover the network controller. If the NC is on a separate subnet from the node(s) uncheck the **Auto-Discover NC (multicast)** checkbox and enter the IP address of the network controller into the **NC IP Address** text box. The node(s) should now find the network controller.

5. If the network controller is on a remote subnet, routers and firewalls may not allow the node to connect with the network controller. In such a case it is necessary to open TCP Port 7262 to allow the node to connect to the network controller. Discuss this with the network administrator.

6. From the large list box, select the node you wish to assign a static IP address to.

7. From the **IP Address Method** drop-down select Static.

8. In the **IP Address** textbox enter the static IP address you will use for this node. Be sure to get this number from the Network Administrator.

9. In the **Netmask** and **Gateway** text boxes enter the netmask and gateway IP address for this node. Be sure to get these numbers from the Network Administrator.

10. Click **Save**. This node now has a static IP address that will not change.

Start address:

If "Addressing Method" is set to STATIC or DHCP this field will be grayed.

A value is entered here only if the Network Controller is the addressing method. Enter in this field the first valid IP address (in dot notation) in the available pool of addresses. Obtain this IP address from the network administrator.

Number of addresses:

If "Addressing Method" is set to STATIC or DHCP this field will be grayed.

A value is entered here only if the Network Controller is the addressing method. Enter in this field the number of IP addresses available in the local network pool of IP addresses. For example, a "Start address" of 192.168.0.15 with the "Number of addresses" set to 25 will have IP addresses of 192.168.0.15 through 192.168.0.39. Obtain this number from the network administrator.

Netmask:

If "Addressing Method" is set to STATIC or DHCP this field will be grayed.

A value is entered here only if the Network Controller is the addressing method. Enter in this field a subnet mask in dot notation. The default value is 255.255.255.0. Obtain this subnet mask from the network administrator.

Time Settings

Use of an NTP network time server ensures that the S2NC will be regularly synchronized with the exact time used by all other network resources. At least one time server must be designated for the S2NC to synchronize its own time. If no timeserver is available the S2NC clock may drift slightly over time.

NOTE: You can also manually set the time using this page. If you set the time manually be sure to set it to standard time, not daylight savings time. The Timezone setting will automatically adjust for daylight savings time (summer time).

Current S2NC Time:

This displays the current time of the S2NC clock.

Manually Set Date/Time:

If there will be no network timeserver available for the S2NC then select from the date and time dropdown lists to manually set the time for the S2NC.

If you set the time manually be sure to set it to standard time, not daylight savings time. The Timezone setting will automatically adjust for daylight savings time (Summer time).

Timeserver 1: <DNS host address name>

The default name in this field is pool.ntp.org. If the NetBox is installed on a network with Internet access then this default setting need not be changed.

NOTE: If there is no Internet access then:

- The network administrator must supply you with a local network timeserver name or the time will have to be manually set.

- If the time must be manually set then remove the timeserver name from this field or the network controller will spend several minutes searching for this server. Until this search times out you will not be able to continue completing the Init Mode settings.

Timeserver 2: <DNS host address name>

The default preset name in this field is pool.ntp.org.

Timeserver 3: <DNS host address name>

The default preset name in this field is pool.ntp.org.

Timezone: < >

Select from the dropdown list the appropriate timezone for your area.

The default preset value in this field is US/Eastern.

Email Settings

Email relay: <server address or name>

Enter the IP address or DNS name of the mail relay server. The network administrator can supply you with this address or name.

The mail server must be setup to allow open relay of email sent from the IP address of the S2NC. The network administrator can setup this relay.

From email address: <source address>

Enter an email sender name for the S2NC. Messages from the S2NC will display this source address in the "From" field.

The mail administrator should direct any email sent to this address to a security administrator.

Web Server Setting

Web Server Port:

See the network administrator for this number and enter it here. The default value in this field is 80.

Init Mode Setting

Init Mode:

Typically this value should be changed to NO.

If this value is left at YES then the Init Mode page will display after each boot of the S2NC. You can return to the Init Mode page from the security application by selecting Setup : Site Settings : Network Controller.

Step three: Now that you have completed the initial settings you must save them and reboot the system.

To save the IP settings and launch the security application

1. Click the **Save** button. The IP settings are saved.

2. Click the **Reboot** button to restart the S2 Security Application. This may take several minutes.

3. If the Init Mode page settings were completed with a directly connected computer (see above) instead of a network connected computer then you will have to reboot not only the security application but also the S2 Network Node. This is necessary because the Node will need to acquire a new valid IP address from the network DHCP server.

   - To reboot the Node log back in to the security application.

   - Select **Setup : Site Settings : Network Nodes** and click the **Reboot** button.

4. Open a browser window on a computer connected to the network and enter in the Address box the IP address that you set for the S2NC.

5. At the Login page enter the **User name** "admin."

6. Enter the **Password** "admin."

7. Click the **Go** button.

Using the Console Port to Obtain an IP Address

NOTE: This procedure will normally not be necessary unless the IP address of the S2NC is unknown.

You can obtain the IP address of the S2NC by using a terminal emulator to communicate with the S2NC via the console port.

1. Connect the console port on the S2NC to a serial port on a PC using a serial cable with a DB9 connector. For the location of the console port see the Controller/Node Blade diagram on page 45.

2. Set your terminal emulator to the following settings: BPS=115200, 8 data bits, no parity, 1 stop bit, no hardware flow control, no software flow control.

3. Login to the S2NC with the user name "admin" and the password "admin." (Use all lower case.)

4. The S2NC will report its current IP address and you can set a new IP address.

Information for Network Administrators

How Nodes and the Network Controller Use the Network

(Versions 1.4 and higher)

1. When a Node boots it initially selects for itself a temporary random IP address in the zeroconf address space (169.254.X.Y where X and Y are randomly selected).

2. The Node then multicasts for a Network Controller at 224.0.72.62 UDP port 7262, and presents its Unique Identifier (UID).

3. A Network Controller answers the multicast at 224.0.72.62 UDP port 7262 providing its own IP address and presents an addressing method for the Node. See "Setting Initialization Values" on page 36.

   - There are three IP addressing methods available:

     1. An existing DHCP server on the network can assign IP addresses.

     2. A Static IP address can be assigned using nnconfig.exe This program is available on the Support page of the S2 web site for download (www.s2securitycorp.com). You will need a user name and password. Call S2 Support at (781) 237-4555.

     3. The Network Controller can provide IP addresses to Nodes only from a specified address range.

4. Once a proper IP address for the Node is selected further communications between Node and Network Controller occur directly between their respective IP addresses using TCP port 7262.

5. The Network Controller may also require:

   - TCP Port 23 open for Telnet server access. This can be used for remote debugging. The Telnet Server is disabled by default.

   - TCP Port 3000 open for communication from video management system inputs.

- TCP Port 3306 open for MySQL report usage

Network Port Usage Table

(Versions 1.4 and higher)

TCP Port 80	Must be open to the Network Controller for Browsers to access the Security Application. This can be configured on a different port.
TCP Port 443	Must be open to the Network Controller for Browsers to access the Security Application using HTTPS (SSL). This can be configured on a different port.
TCP Port 7262	Must be open to the Network Controller for communications between the Controller and Nodes. Be sure that this port is open through routers and firewalls for any Nodes on different subnets from the Network Controller.
TCP Port 23	Must be opened to the Network Controller using a jumper on the Controller blade for Telnet access to the Controller.
TCP Port 3000	Must be open to the Network Controller for the Video Management System virtual inputs to communicate camera up/down and motion detection messages.
TCP Port 3306	Must be open to the Network Controller for MySQL report usage.
TCP Ports 20, 21	When using active FTP these ports must be open to the FTP server for FTP backups from the Network Controller. When using passive FTP port 20 will not be required. Ports must also be left open to the Network Controller for FTP server responses. The network administrator must set up these ports

Network Port Usage Table

(Up to version 1.3)

TCP Port 69	Must be open to the Network Controller for the on-board TFTP server to pass software updates to the Nodes. This port can be opened temporarily for updates and then closed again.

NOTE: If you are updating a system from version 1.3 or lower you will need to leave port 69 open until the software update is complete. Once your version is 1.4 or higher you can close port 69 as it will no longer be needed.

System Administration and Monitoring

System Administration and Monitoring are focused on day-to-day tasks of using, managing, and administering a site's security using the S2 Security Application. It does not involve installation and setup tasks.

The primary functions in System Administration are:

- monitoring cameras and floorplans.

- monitoring today's activity log.

- issuing access cards.

- entering people and personal information into the security database.

- reviewing system reports.

- making backups of the security database.
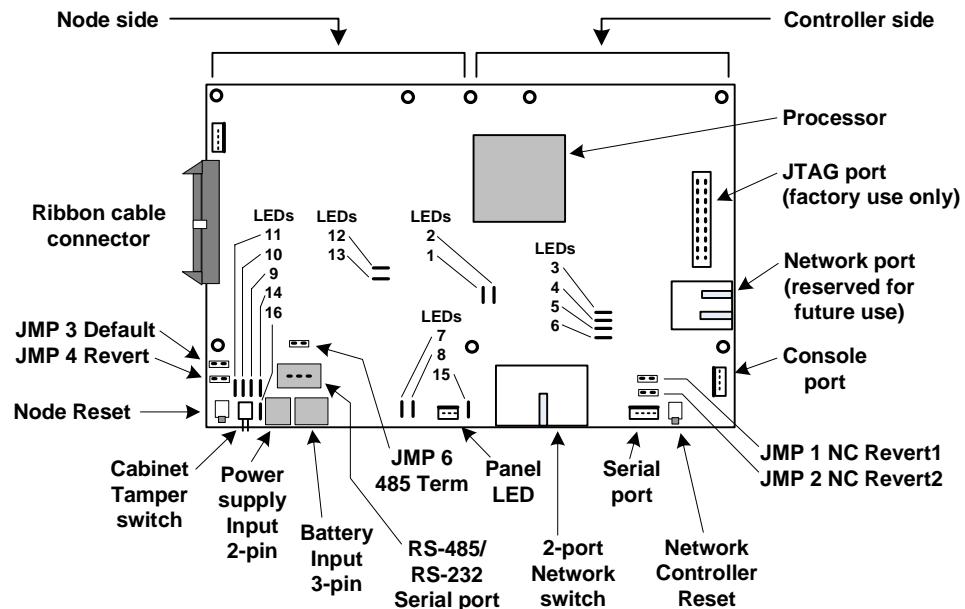
For procedures and information regarding these, and any other System Administration and Monitoring tasks, use the online Help system.

Testing and Troubleshooting
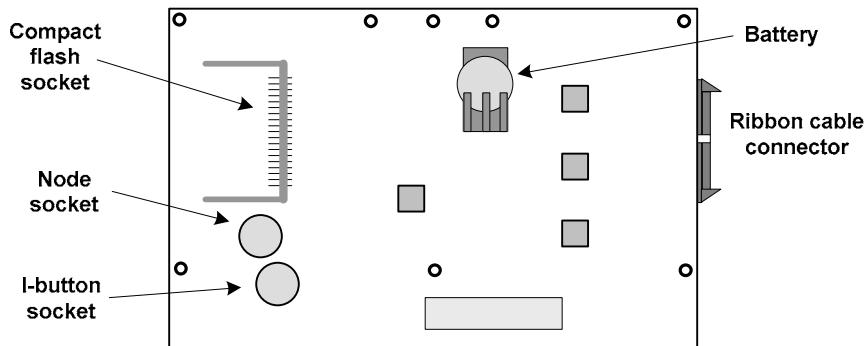
The Controller/Node Blade and LEDs

The Controller/Node blade is built in three different forms:

- Controller/Node blade
- Node-Only blade
- Controller-only blade

The Controller/Node blade top side.

The Controller/Node blade bottom side.

Network Controller LEDs

The right side of the Controller/Node blade contains the components for the Network Controller. It has 6 LEDs on the board and 2 LEDs on each network port.

|	
LED 1 NC to NN Activity	BLINKING RED means NC is communicating to the Node.
LED 2 NC to NN Speed	ON GREEN means 100 megabits per second. OFF means 10 megabits per second.
LED 3	Not used.
LED 4 NN	BLINKING GREEN: the blink count equals the node count. For example, 2 blinks means that 2 nodes are connected to the system.
LED 5 NTWRK	ON GREEN means network communication is functioning.
LED 6 SYS	BLINKING GREEN means the system is running.
Network Amber LED	ON means the network is connected.
Network Green LED	BLINKING means data activity on the port.

Network Node LEDs
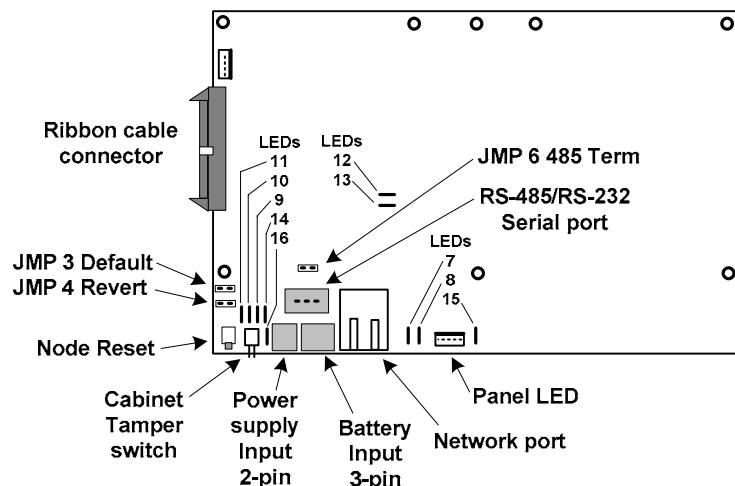
The left side of the Controller/Node blade contains the components for the Network Node. It has 10 LEDs.

|	
LED 7 I2C	RED, changes state when an application blade input or output occurs.
LED 8 RUN	ON GREEN means the co-processor is powered and initialized.
LED 9 ALRM	ON RED means there is an error condition.
LED 10 NC	RED means communication is active with the Network Controller.
LED 11 RUN	ON GREEN means the Node is powered and initialized.
LED 12 NN to NC Speed	ON GREEN means 100 megabits per second. OFF means 10 megabits per second. If the blade is a Node-Only, LED 12 is not used and the Network port Amber LED assumes this function. See below.
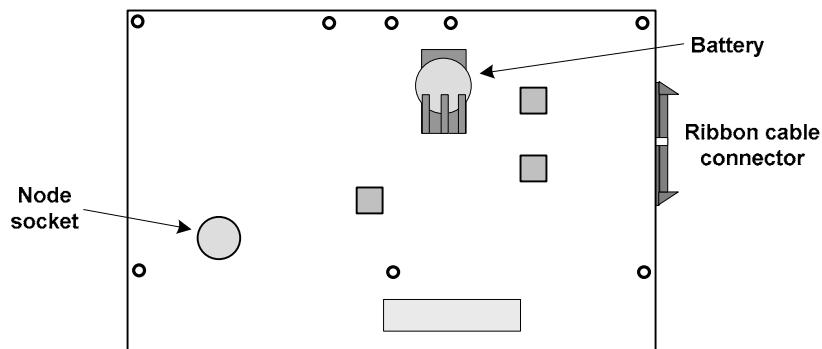
LED 13 NN to NC Activity	BLINKING RED means Node is communicating to the NC.
	If the blade is a Node-Only, LED 13 is not used and the Network port Green LED assumes this function. See below.
LED 14 SYST	Not used.
LED 15	Not used.
LED 16 PWR	ON GREEN means power is properly connected.
	ON RED means polarity on the power connector is reversed (incorrect). The Node will not function.
Network port Amber LED	ON means the network is connected.
Network port Green LED	BLINKING means data activity on the port.

The Node-Only Blade

The Node-Only blade is populated primarily on the left side (Node side). Note that the Node-Only implementation has a network port that is not present in the other versions of this blade. Note also that on the bottom side of this blade there is no I-button socket.
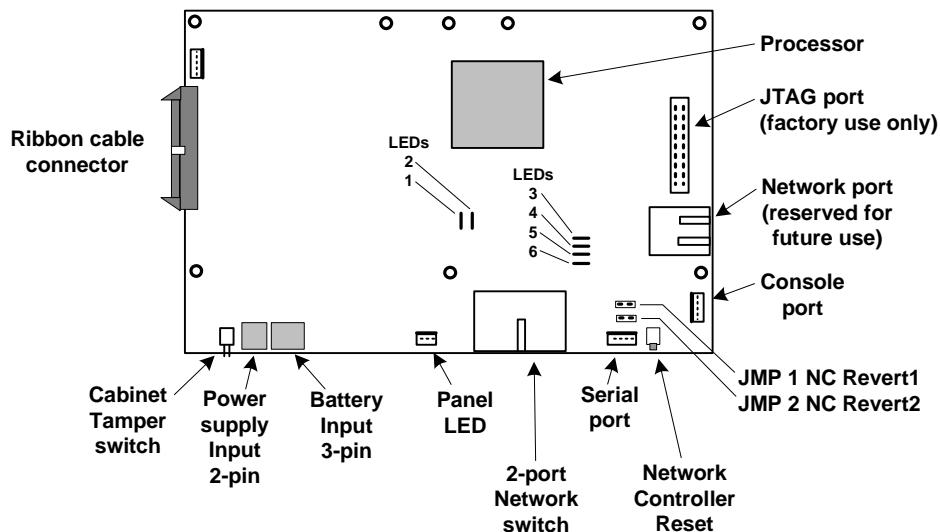

The Node-Only blade top side.
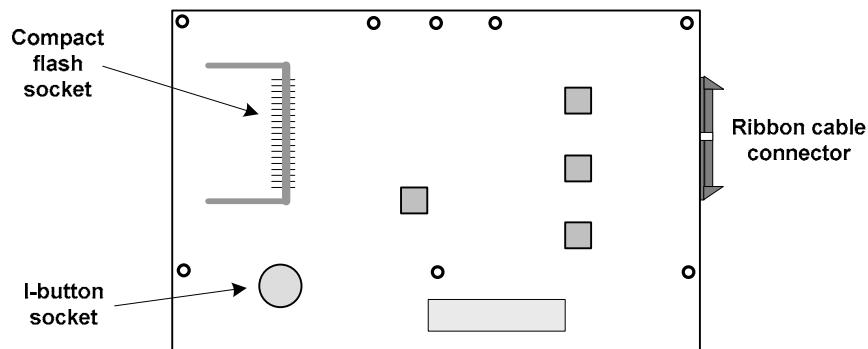
The Node-Only blade bottom side.

The Controller-Only Blade

The Controller-Only blade is populated primarily on the right side (Controller side). Note that the bottom of the Controller-Only blade has no battery mount.

**The Controller-Only blade top side.**
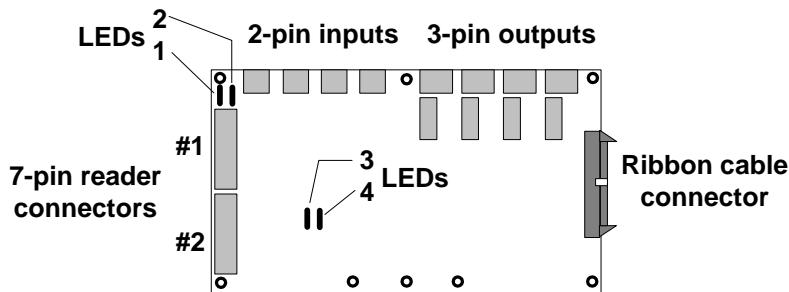
The Controller-Only blade bottom side.

Compact flash socket

I-button socket

Ribbon cable connector

The NetBox Cabinet Door LED

The front of the NetBox cabinet door has one LED. It is read as follows:

| Green steady	The network communication is functioning and external power is on.
Green flashing	The network communication is functioning and the NetBox is using battery power.
Red steady	The network communication is not functioning and external power is on.
Red flashing	The network communication is not functioning and the NetBox is using battery power.

Access Blade and LEDs
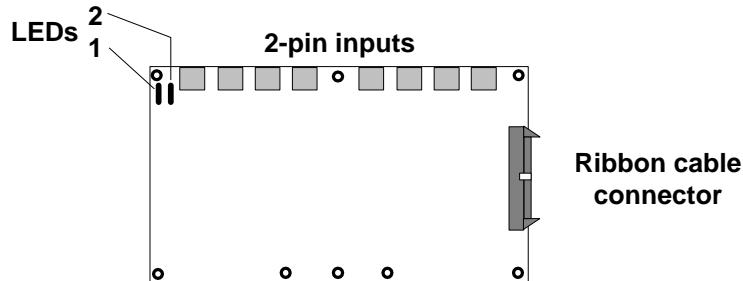
The S2 Access blade LED definitions are listed below.

Access Blade LEDs

The S2 Access Control blade has 4 LEDs on the board. They are read as follows:

LED #1 RUN	ON GREEN means the blade is powered and initialized.
LED #2 I2C	RED, changes state when input or output occurs.
LED #3 IN/RDR	Not assigned.
LED #4 OUT	Not assigned.

Input, Output, and Temperature Blade LEDs

The S2 Input blade LED definitions are listed below.

Input, Output, and Temperature Blade LEDs

These S2 Input, Output, and Temperature blades have 2 LEDs on the board. They are read as follows:

LED #1 RUN	ON GREEN means the blade is powered and initialized.
LED #2 I2C	ON RED, BLINKS OFF when the blade transmits a message to the Node.

Removing Blades

This procedure will normally only be necessary when swapping out a blade for service reasons.

CAUTION!!! MAKE SURE ALL POWER IS OFF BEFORE CONNECTING OR DISCONNECTING BLADES IN THE S2 NETBOX.

POWER DOWN THE S2 NETBOX USING THE SOFTWARE OR YOU MAY LOSE DATA FROM THE SECURITY DATABASE!

To remove a blade from the S2 NetBox:

1. Power down the S2 NetBox. To ensure that the security database is properly saved reboot the software and then power down. The reboot procedure includes saving the security database. Select **Setup : System Maintenance : Utilities : System Shutdown**.

2. Click the **Shutdown Now** button.

3. Be sure that you are grounded and remove all reader, output, and input connectors attached to the blade and label each with their connector position.

4. Unplug the ribbon cable by pushing outward on the two extraction levers. This will gently pry out the cable connector.

5. Unthread the screw from the top of the standoff and remove the screw and lock washer.

6. Remove the blade from the slot in the chassis.
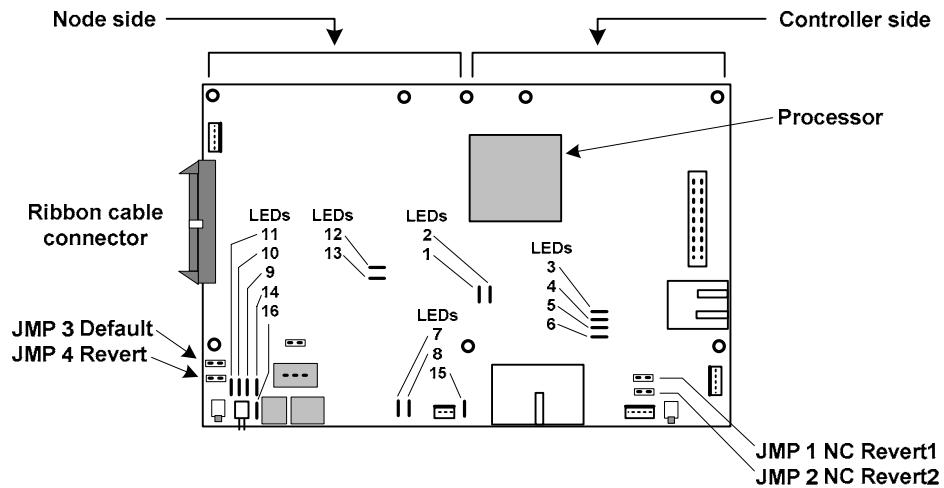
Resetting Initial Controller Login Settings

This procedure will normally not be necessary unless the IP address or login name and password are unknown. When this procedure is completed the items below are reset as indicated.

- The controller IP address is reset to 192.168.0.250.

- The netmask is reset to 255.255.255.0

- The controller web server port is reset to 80.

- The default Administrator's account is reset to: Username = "admin" Password = "admin."

- The interface language is reset to English.

To reset the network controller initial login settings:

1. Power down the S2 NetBox. To ensure that the security database is properly saved reboot the software and then power down. The reboot procedure includes saving the security database. Select **Setup : System Maintenance : Utilities : System Shutdown**.

2. Click the **Shutdown Now** button.

3. Place a jumper across the NC Revert1 jumper on the controller blade. See the diagram below.

Node side ———⌐   ⌐——— Controller side

Processor

Ribbon cable connector

LEDs 11 10 9 14 16

LEDs 12 13

LEDs 2 1

LEDs 3 4 5 6

LEDs 7 8 15

JMP 3 Default
JMP 4 Revert

JMP 1 NC Revert1
JMP 2 NC Revert2

4. Power up the S2 NetBox. First you should hear three beeps from the controller indicating that it has found the jumper. This is followed by two beeps indicating that the process is complete.

5. Power down the S2 NetBox and remove the jumper from NC Revert1.

6. Power up the S2 NetBox.

7. Point your browser at 192.168.0.250, and login using "admin" as the username and "admin" as the password.

Appendices

A. Hardware and Software Specifications

Check the S2 web site (www.s2sys.com) for updated specifications, lists of supported devices, and software updates.

Environmental Requirements

- Operating temperature range: 0° C to 50° C (32° F to 120° F).

- Operating relative humidity range: Up to 95% non-condensing.

Power Requirements

If AC power is provided the S2 NetBox must be powered with 90-250V AC 50-60 Hz. Power should come from a separate circuit with an isolated ground.

If DC power is provided directly to the Controller/Node Blade then it must have 12V± DC at a minimum of 3 amps.

Power the S2 NetBox Can Provide

The total power that the S2 NetBox can provide is 2500 milliamps.

Each Access blade can supply up to 400 milliamps to one reader or 200 milliamps each to two readers. If the readers require more amperage then a separate power supply must be used. Refer to the reader manufacturer documentation for power specifications on the readers.

Other than readers any non-S2 components in the system must have power provided separately.

Wiring Requirements and Specifications

Inputs and Outputs (including elevators): Twisted, shielded 22 AWG Belden #9462 or equivalent.

Maximum distance from input/output devices to the S2 NetBox: 2000 feet (610 meters).

Readers: Twisted, shielded 22 AWG Belden #9536 (6 conductor) or equivalent.

Maximum distance from a reader to the S2 NetBox: 500 feet (152 meters).

Temperature Sensors: Up to 500 feet (152 meters) twisted Category 3; Over 500 feet up to 1000 feet (305 meters) twisted Category 5.

Maximum distance from a temperature sensor to the S2 NetBox: 1000 feet (305 meters).

Diodes required for output devices that are DC powered: 1N4933- 1 A, 50 V, Fast Recovery Diode or equivalent.

Varistors (MOV) required for output devices that are AC powered: 40 VAC, 56 VDC, 10 A Surge, Radial Leaded Varistor or equivalent, e.g. World Products Inc. SNR-D56K2.

Resistors required for input devices: 1k Ohms.

Ethernet cable: CAT 5 cable or better with RJ-45 connector.

Readers

The S2 NetBox Access control blade supports card readers that use the Wiegand Reader Interface.

Cameras

The S2NC supports up to 32 cameras. IP video cameras may be connected directly to the network and driven by the S2NC. At this release the S2NC is tested to work with the following camera models:

- Panasonic NM 100
- Panasonic NS 324
- Axis 2120
- Axis 205
- Axis 206
- Vivotek
- Sony SNC-DF40N/DF40P
- Sony SNC-P1

Digital Video Recorder

S2 NetBox release 2.0 supports DVR integration and use with the following model:

- Dedicated Micros DS2
- Dedicated Micros DV-IP

Temperature Sensors

Operating Range: -55º C to 100º C (-67° F to 212° F)

Accuracy:	-1º/+5º C	from -55º C to -30º C	(-2º/+9º F from -67° F to -22° F)
	-1º/+3º C	from -30º C to 0º C	(-2º/+5º F from -22° F to 32° F)
	±0.5º C	from 0º C to 70º C	(±1º F from 32° F to 158° F)
	±1º C	from 70º C to 85º C	(±2º F from 158° F to 185° F)
	-2º/+1º C	from 85º C to 100º C	(-4º/+2º F from 185° F to 212° F)

Software Protocols and Standards

DBMS compatibility:	SQL, ODBC
Email support:	POP, SMTP
Encryption:	SSL, SHA-1
Network:	NTP, TCP/IP
Web:	HTTP, HTTPS, XML

Single Facility Capacities

Access control readers:	448 maximum, 140 certified
Access cards:	60,000
Alarm monitoring points:	500
Control point outputs:	500
Digital video cameras:	32
Intercom stations:	16
Temperature monitoring points:	500

B. Support Info

Installer Name

_____

Installing Dealership

    Company Name: _____

    Address: _____

            _____

Telephone Support and Service

    Support Number: _____

    Service Number: _____

NOTE TO INSTALLERS:

    PLEASE COMPLETE THIS PAGE AND MAKE A COPY FOR YOUR CUSTOMER!

C. Legal Notices and License Agreements

S2 End User License Agreement

IMPORTANT: THIS SOFTWARE END USER LICENSE AGREEMENT ("EULA") IS A LEGAL AGREEMENT BETWEEN YOU (EITHER AN INDIVIDUAL OR, IF PURCHASED OR OTHERWISE ACQUIRED BY OR FOR AN ENTITY, AN ENTITY) AND S2. READ IT CAREFULLY BEFORE USING THE SOFTWARE. IT PROVIDES A LICENSE TO USE THE SOFTWARE AND CONTAINS WARRANTY INFORMATION AND LIABILITY DISCLAIMERS. BY USING THE SOFTWARE, YOU ARE CONFIRMING YOUR ACCEPTANCE OF THE SOFTWARE AND AGREEING TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO BE BOUND BY THESE TERMS, THEN DO NOT USE THE SOFTWARE.

1. **Definitions**
   1. "S2" means S2 Security Corporation and its licensors, if any.
   2. "Software" means only the S2 software program(s) and third party software programs, in each case, included by S2 in the S2 NetBox, and may include corresponding documentation, associated media, printed materials, and online or electronic documentation, and all updates or upgrades of the above that are provided to you.

2. **License Grants**
   1. You may use the Software on an S2 NetBox; provided, however, that, notwithstanding anything contrary contained herein, you may not use the Software on any non-S2 product or device, including, but not limited to, mobile devices, internet appliances, set top boxes (STB), home automation systems or any other consumer electronics devices. You may upgrade the Software on an S2 NetBox following procedures authorized by S2.
   2. You agree that S2 may audit your use of the Software for compliance with these terms at any time, upon reasonable notice. In the event that such audit reveals any use of the Software by you other than in full compliance with the terms of this Agreement, you shall reimburse S2 for all reasonable expenses related to such audit in addition to any other liabilities you may incur as a result of such non-compliance.
   3. Your license rights under this EULA are non-exclusive.

3. **License Restrictions**
   1. You may not make or distribute copies of the Software, or electronically transfer the Software from an S2 NetBox to another S2 NetBox, computer or over a network.
   2. You may not alter, merge, modify, adapt or translate the Software, or decompile, reverse engineer, disassemble, or otherwise reduce the Software to a human-perceivable form.
   3. You may not sell, rent, lease, or sublicense the Software.
   4. You may not modify the Software or create derivative works based upon the Software.
   5. You may not export the Software into any country prohibited by the United States Export Administration Act and the regulations thereunder.
   6. In the event that you fail to comply with this EULA, S2 may terminate the license and you must stop using this Software and stop operating the S2 NetBox (with all other rights of both parties and all other provisions of this EULA surviving any such termination).
   7. You shall not use the Software to develop any software or other technology having the same primary function as the Software, including but not limited to using the Software in any development or test procedure that seeks to develop like software or other technology, to determine communications protocols used by the S2 NetBox or to determine if such software or other technology performs in a similar manner as the Software.

8. You may not extract any JavaScript from the Software and use it in some other application.

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11. Temperature Board Use Restrictions

WARNING: Not for use as the sole or primary method of measuring or tracking temperature in products and articles that could affect the health or safety of persons, plants, animals, or other living organisms, including but not limited to foods, beverages, pharmaceuticals, medications, blood and blood products, organs, flammable, and combustible products. User shall assure that other primary and redundant methods of testing and determining the handling methods, quality, and fitness of the articles and products should be implemented. Temperature tracking with this product is recommended only as a supplemental and redundant information source. User shall be responsible for proper use, storage, and calibration of this product.

Like all sensors, when exposed to contaminants and/or conditions toward the limits of the safe operating range, accuracy degradation can result (See Appendix A, Temperature Sensors)

12. General

This EULA shall be governed by the laws of Massachusetts, without giving effect to principles of conflict of laws. You hereby consent to the exclusive jurisdiction and venue of the Massachusetts courts sitting in Norfolk County, Massachusetts or the Federal District Court for the District of Massachusetts to resolve any disputes arising under this EULA. In each case this EULA shall be construed and enforced without regard to the United Nations Convention on the International Sale of Goods.

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GoAhead WebServer	http://webserver.goahead.com/webserver/license.htm
MySQL	http://www.mysql.com
Treeview	http://www.Treeview.net

D. Installation Description Forms

The following pages provide a place to document the specifics of the system installation.

Completion of these forms will enable:
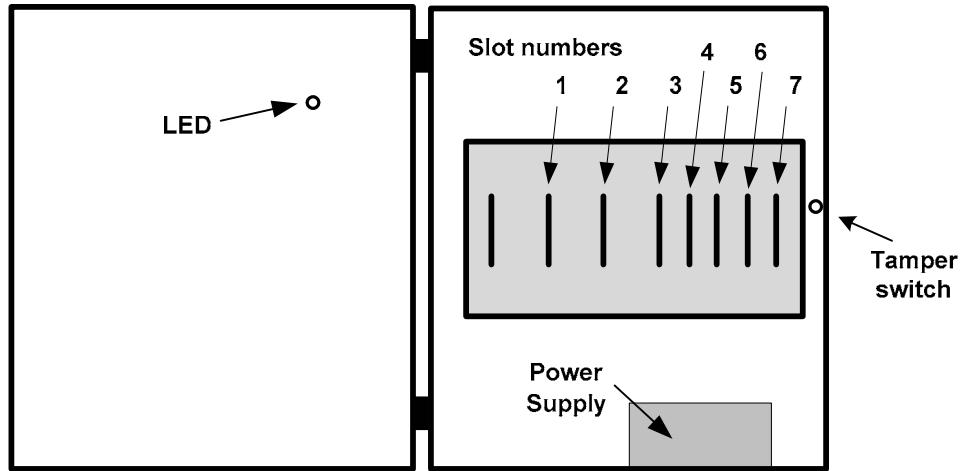
- Speedy entry of accurate configuration information when performing System Setup.

- Accurate and efficient troubleshooting and service.

- Easy addition of system resources at a later date.

- Technicians who were not involved in the system installation to quickly become knowledgeable about system specifics.

Copies of these pages may be made as needed.

One complete set of Installation Description Forms should be provided to the customer.

One complete set should be retained by the installer.

NetBox Wall-mount Installation Description Form
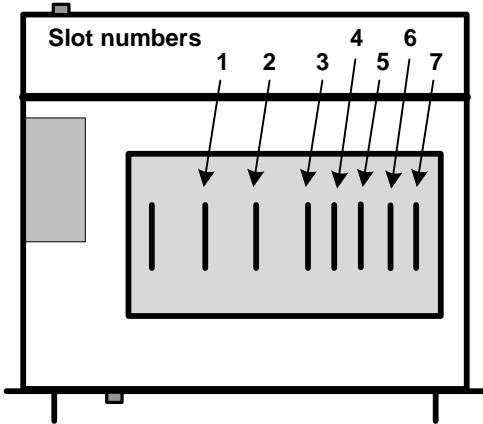
S2NC name and location: _____

### Circle the blade in each slot:

❏   Controller/Node   Node-only   Controller-only

❏ Slot #1   Access   Input   Output   Temperature

❏ Slot #2   Access   Input   Output   Temperature

❏ Slot #3   Access   Input   Output   Temperature

❏ Slot #4   Access   Input   Output   Temperature

❏ Slot #5   Access   Input   Output   Temperature

❏ Slot #6   Access   Input   Output   Temperature

❏ Slot #7   Access   Input   Output   Temperature

NOTE TO INSTALLERS:

   PLEASE COMPLETE THIS PAGE AND MAKE A COPY FOR YOUR CUSTOMER!

NetBox Rack-mount Installation Description Form
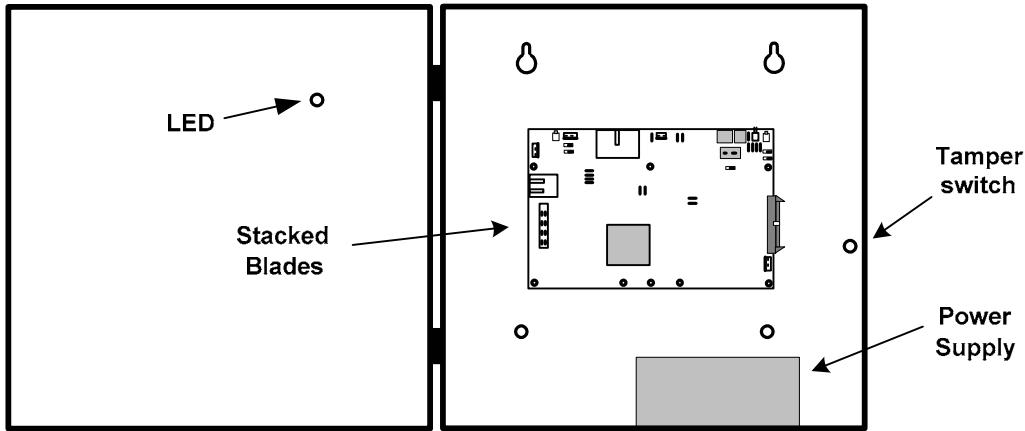
Slot numbers

Slot			

Slot numbers   1   2   3   4   5   6   7

S2NC name and location: _____

Circle the blade in each slot:

❑	Controller/Node	Node-only		Controller-only
❑ Slot #1	Access	Input	Output	Temperature
❑ Slot #2	Access	Input	Output	Temperature
❑ Slot #3	Access	Input	Output	Temperature
❑ Slot #4	Access	Input	Output	Temperature
❑ Slot #5	Access	Input	Output	Temperature
❑ Slot #6	Access	Input	Output	Temperature
❑ Slot #7	Access	Input	Output	Temperature
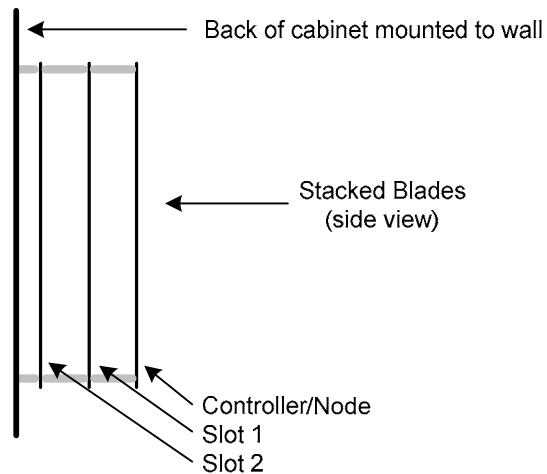
NOTE TO INSTALLERS:

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NetBox Mini-cabinet Installation Description Form

S2NC name and location: _____

Back of cabinet mounted to wall

Stacked Blades
(side view)

Controller/Node
Slot 1
Slot 2
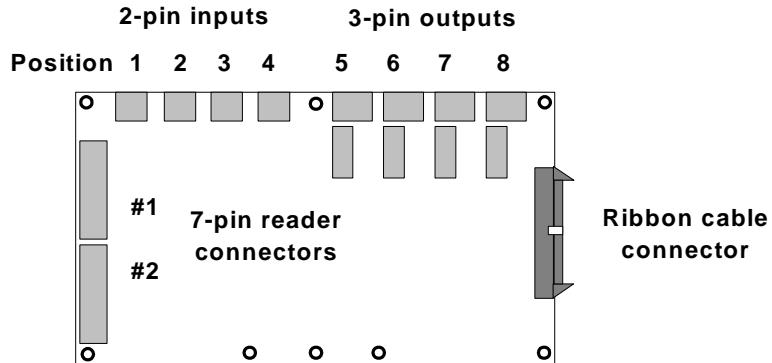
Circle the blade at each level:

❑	Controller/Node	Node-only	Controller-only
❑ Slot 1	Access	Input	Output	Temperature
❑ Slot 2	Access	Input	Output	Temperature

NOTE TO INSTALLERS:

PLEASE COMPLETE THIS PAGE AND MAKE A COPY FOR YOUR CUSTOMER!

S2 Access Blade Installation Description Form

S2 NetBox / Node / Slot location

_____

List the device connected to each reader, input, or output:
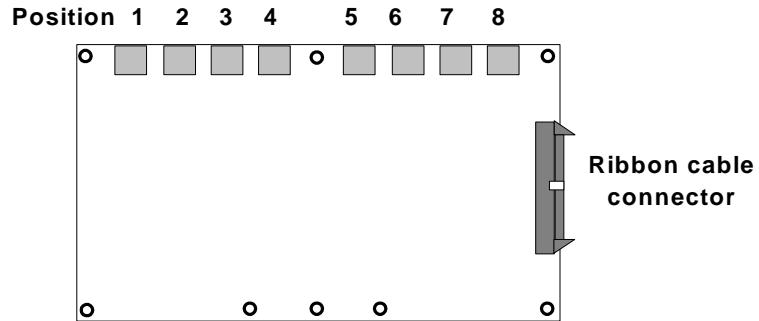
❑ Reader #1 _____

❑ Reader #2 _____

❑ Pos. 1 (Input #1) _____

❑ Pos. 2 (Input #2) _____

❑ Pos, 3 (Input #3) _____

❑ Pos. 4 (Input #4) _____

❑ Pos. 5 (Output #1) _____

❑ Pos. 6 (Output #2) _____

❑ Pos. 7 (Output #3) _____

❑ Pos. 8 (Output #4) _____

NOTE TO INSTALLERS:

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S2 Input Blade Installation Description Form

2-pin inputs
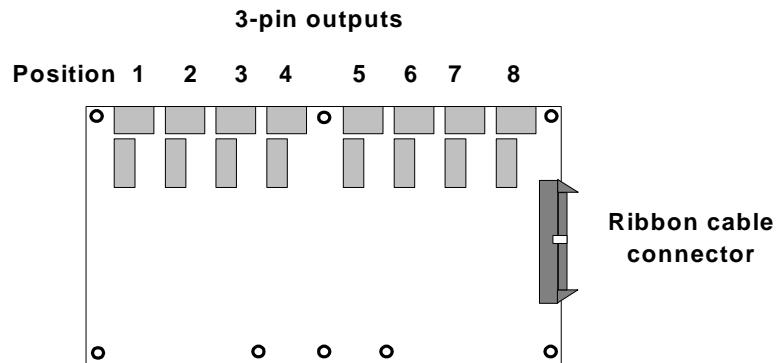
Position 1   2   3   4   5   6   7   8

Ribbon cable connector

S2 NetBox / Node / Slot location

_____

List the device connected to each input:

❑ Position/Input #1   _____

❑ Position/Input #2   _____

❑ Position/Input #3   _____

❑ Position/Input #4   _____

❑ Position/Input #5   _____

❑ Position/Input #6   _____

❑ Position/Input #7   _____

❑ Position/Input #8   _____

NOTE TO INSTALLERS:

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S2 Output Blade Installation Description Form

3-pin outputs

Position 1 2 3 4 5 6 7 8

Ribbon cable connector

S2 NetBox / Node / Slot location

_____

List the device connected to each output:

❏ Position/Output #1 _____

❏ Position/Output #2 _____

❏ Position/Output #3 _____

❏ Position/Output #4 _____

❏ Position/Output #5 _____

❏ Position/Output #6 _____

❏ Position/Output #7 _____

❏ Position/Output #8 _____
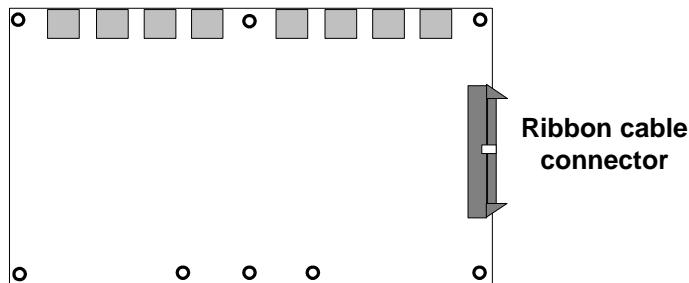
NOTE TO INSTALLERS:

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S2 Temperature Blade Installation Description Form

2-pin temperature inputs

Position 1   2   3   4   5   6   7   8

Ribbon cable connector

S2 NetBox / Node / Slot location

_____

List the device connected to each input:

❑ Position/Input #1 _____

❑ Position/Input #2 _____

❑ Position/Input #3 _____

❑ Position/Input #4 _____

❑ Position/Input #5 _____

❑ Position/Input #6 _____

❑ Position/Input #7 _____

❑ Position/Input #8 _____

NOTE TO INSTALLERS:

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