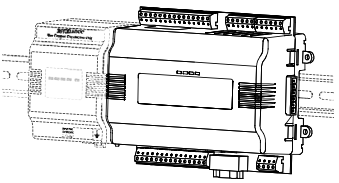
Honeywell

SEC-H-602 and SEC-H-616 Security Controller

INSTALLATION INSTRUCTIONS

This document covers the mounting and wiring of the WEBs-AX® Security Controller. It assumes that you are an engineer, technician, or service person who is performing access system design or installation. Instructions apply to the following models:



Models	Description
SEC-H-602	Security Controller base unit controller licensed for two (2) readers, referred to in this document as a "Security Controller."
SEC-H-616	Security Controller base unit controller licensed for 16 readers, referred to in this document as a "Security Controller."

NOTE: License expansion reader packs are available in eight (8) reader packs: part number SEC-8-RDR. Separate documents cover the mounting and wiring of expansion modules.

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31-00012-03

PRODUCT DESCRIPTION

The Security Controller (models SEC-H-602 and SEC-H-616) is an expandable, DIN rail-mountable, controller that provides an embedded access control and security alarm monitoring system. The controller hosts the WEBs-AX Security Application, allowing password-authorized users to access the system using a standard web browser. Once authenticated, a user can configure and administer the system. Apart from providing access control, features include graphical real-time display of data, calendar and scheduling functions, historical data logging, alarm monitoring, and event handling. For more details on features, see the data sheet for the WEBs-AX Security SEC-H-602, SEC-H-616 Product Suite Automation Solution Specification Datasheet. Form number 31-00011.

One or two rechargeable, sealed-lead-acid backup batteries allow system operation upon loss of primary power, for some duration. In addition, the Security Controller has a standard on-board NiMH battery to ensure its configuration is always retained. See “About the Backup Batteries” on page 24 for more information.

See the following sections for more details:

- “Onboard Security I/O”
- “Expansion Modules”
- “Option Cards”
- “WEBs-AX Security Enclosure”

Onboard Security I/O

The Security Controller provides standard onboard security I/O points, as follows:

- 2 card reader inputs (7-pin connectors, each can power a 12V Wiegand-type reader)
- 6 supervised inputs (4 allocated for usage with readers, 2 are general usage)
- 4 Form-C relay outputs (2 allocated for usage with readers, 2 are general usage)
- 3 digital inputs (unsupervised, for predefined system monitoring)

Additional security I/O points are achieved by adding expansion modules. A fully expanded Security Controller can support a total of 32 readers (using 15 SEC-H-R2R/U expansion modules). Or, other combinations are possible with fewer readers but more general usage I/O using SEC-H-RIO/U expansion modules. See “Expansion Modules” below.

Expansion Modules

Table 1 lists the currently available Security Controller expansion modules. Note that the Security Controller supports a maximum of 15 expansion modules, in *any combination* of SEC-H-R2R/U and SEC-H-RIO/U needed.

NOTE: The SEC-H-602 requires a license expansion pack to add any reader (SEC-H-R2R/U) module, if both readers inputs on the Security Controller are utilized. License expansion packs are in 8-reader packs: part SEC-8-RDR.

Table 1. Security Controller (SEC-H-602 and SEC-H-616) type expansion modules.

Model	Description	Notes
SEC-H-R2R/U	Remote 2 Reader Module DIN-mountable module that expands the door reader capacity by 2, with associated digital inputs and outputs.	Each SEC-H-R2R/U provides the following security points: • 2 - Reader ports (each 7-pin, to power a 12V Wiegand-type reader) • 4 - Supervised inputs (2 per reader). • 2 - Form-C relay outputs (1 per reader). • 2 - Digital inputs for cabinet tamper and low battery detection.
SEC-H-RIO/U	Remote I/O Module DIN-mountable module that expands capacity with 8 supervised inputs and 8 relay outputs.	Each SEC-H-RIO/U provides the following security points: • 8 - Supervised four-state inputs (open, closed, short, and cut). • 8 - Form-C relay outputs. • 2 - Digital inputs for cabinet tamper and low battery detection.

The Security Controller and its expansion modules all have end-mounted, 6-pin, connectors that support direct chaining of modules into assemblies. Connectors pass RS-485 communications and DC power (and battery backup) through connected modules. Also, you can mount expansion modules *remotely* from the Security Controller, and use the supplied 6-position terminal plugs to wire RS-485 and backup-battery[a] cabling between the Security Controller assembly and expansion module assemblies.

[a] If a remote expansion module is mounted in a Security Enclosure without an integral power supply (SEC-ENC-H-3/U, SEC-ENC-H-1NP/U, SEC-ENC-H-2NP/U), it needs 3-conductor "triad" cabling supplying 15Vdc power and either a backup battery (PS-, PS+, BB) from the security controller enclosure, or else a nearby third-party 12V dc battery backed power supply. See "Enclosure Power Supply" on page 23.

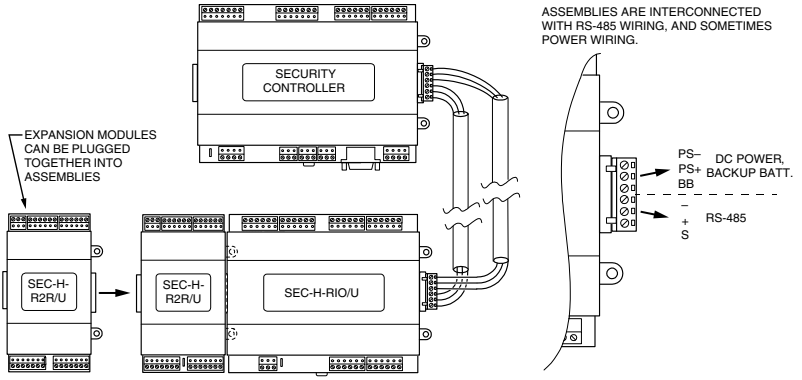


Fig. 1. Expansion modules are Remote 2 Reader (SEC-H-R2R/U), Remote I/O (SEC-H-RIO/U).

NOTE: Expansion modules can be plugged into, and removed from, a powered system without causing damage. However, this is generally not recommended—especially if the system is operational.

Option Cards

The Security Controller has two (2) option slots for on-board mounting of custom option cards. Each slot has a 30-pin connector on the Security Controller base board (see Fig. 4 on page 11). An option card typically provides additional communication ports.

⚠ WARNING

All power to the Security Controller must be OFF when installing or removing option cards, or damage will occur! Also, you must be very careful to plug an option card into its connector properly (pins aligned).
Install option cards *before* performing any other mounting or wiring of the Security Controller.

For installation details, refer to the installation sheet that accompanies the option card.

WEBs-AX Security Enclosure

The Security Controller and all expansion modules must be mounted in one or more WEBs-AX Security Enclosures. These enclosures have a pre-mounted DIN rail (or rails), and include a door with a key lock and tamper switch. Two models have an integral 30W 15Vdc power supply that powers the security controller and/or the expansion modules inside the enclosure.

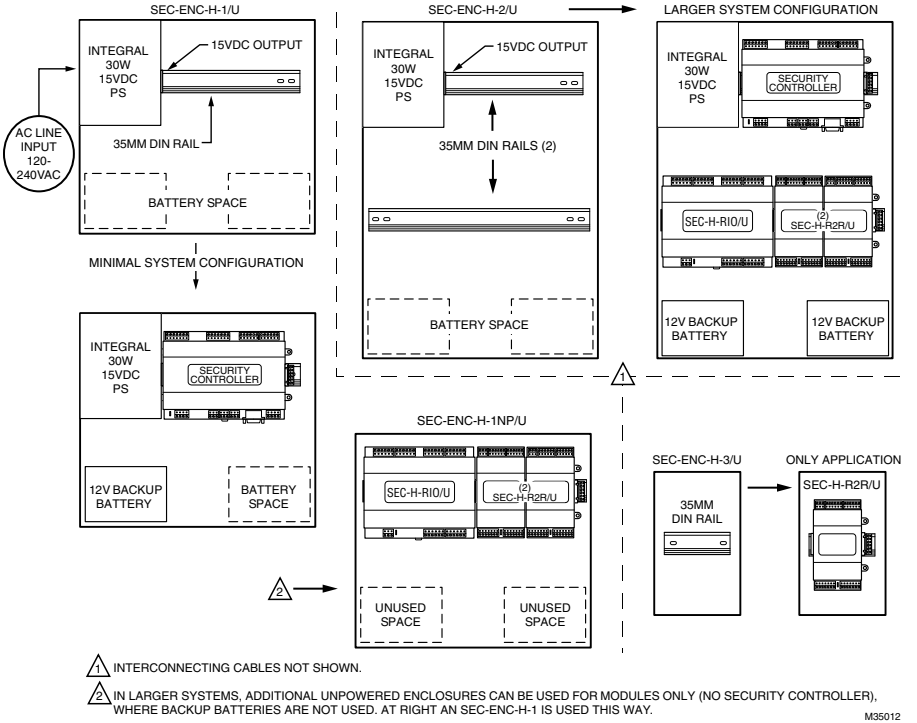


Fig. 2. Security Controller must be mounted in WEBs-AX Security Enclosure (model SEC-ENC-H-1/U or SEC-ENC-H-2/U).

As shown in Fig. 2, there are 3 different-sized WEBs-AX Security Enclosures available, including these models:

SEC-ENC-H-1/U: (Medium) For the Security Controller in the smallest job configuration, or where additional expansion modules are located remotely (in other Security Enclosures). It provides a single DIN rail and an integral 30W 15Vdc power supply to power the controller. The controller (or modules) plug directly into the power supply, see Fig. 2. Brackets at the bottom of the enclosure secure one or two rechargeable sealed lead-acid backup batteries; more unpowered Security Enclosures can be used to house additional expansion modules.

Another medium-sized enclosure *without* an integral power supply is also available, model **SEC-ENC-H-1NP/U**. It is used for expansion modules only (not the Security Controller), and it has room for one additional SEC-H-R2R/U module.

SEC-ENC-H-2/U: (Large) Used for the Security Controller in larger job configurations, it provides a DIN rail mount and an integral 30W 15Vdc power supply for the controller, and a second DIN rail for expansion modules—for example, up to four (4) SEC-H-R2R/U modules. The security controller plugs directly into the power supply, see Fig. 2. A supplied six-conductor wiring harness (not shown) provides power and RS-485 communications to expansion modules mounted on the lower DIN rail. Brackets at the bottom of the enclosure secure one or two rechargeable sealed lead-acid backup batteries (backup batteries used only if enclosure houses an Security Controller). In larger systems, more Security Enclosures can be used to house additional modules.

Another large-sized enclosure *without* the integral power supply is also available, model **SEC-ENC-H-2NP/U**. It is used for expansion modules only (not the Security Controller), and it has room for one additional SEC-H-R2R/U module.

SEC-ENC-H-3/U: (Small) Has a single DIN rail, and is used only for one SEC-H-R2R/U module—it has no integral power supply or backup battery area. See Fig. 2 When wiring back to the Security Controller, you must use a 3-conductor cable for power/battery backup (PS-, PS+, BB), in addition to RS-485 wiring.

Related Documentation

For more information on mounting and wiring a WEBs-AX Security system, refer to the following documents:

- Remote 2 Reader Module (SEC-H-R2R/U) Installation Instructions, Form number 95-7749
- Remote I/O Module (SEC-H-RIO/U) Installation Instructions, Form number 74-4060
- Medium (SEC-ENC-H-1/U, SEC-ENC-H-1NP/U) and Large (SEC-ENC-H-2/U, SEC-ENC-H-2NP/U) Security Enclosure Install Guide, Form number 95-7747
- Small (SEC-ENC-H-3/U) Security Enclosure Install Sheet, part number 95-7748

For details on software configuration for a fully functioning security system, refer to the following documents:

- WEBs-AX Enterprise Security Guide, Form number 74-4086

SYSTEM PLANNING

The following sections provide information necessary to plan a WEBs-AX Security System using a Security Controller. Because of the flexibility of the system architecture, a number of factors may be in play.

- "Basic Design Rules" on page 5
- "Estimating Power and Battery Requirements" on page 6
- "Voltage Drop Considerations" on page 7 and "Maximum Output Load Considerations" on page 8

Basic Design Rules

1. If more than one security controller is required for a project, an Enterprise Security server is necessary to provide management of the card holder database from a single user interface. The controller provides access control for 2 doors (one reader per door), plus additional I/O points. See "Onboard Security I/O" on page 2.
2. A maximum of 15 additional SEC-H-R2R/U (2 reader) modules and SEC-H-RIO/U (remote I/O) modules total, in any combination. Note that license expansion packs are required if a SEC-H-616 model using both the reader inputs plus over seven (7) 2 reader modules; or if a SEC-H-602 model using both the reader inputs, plus **any** 2 reader modules.
3. All expansion modules must be connected to the Security Controller on an RS-485 communications trunk, using a daisy chain topology. Also, each reader must be located within 500 feet of the reader input used. For related details, see "Connection Overview" on page 13.
4. Because readers are powered by the Security Controller and any SEC-H-R2R/U modules, system power requirements vary depending on the exact reader models used. Identify the power used/amps drawn by readers.
5. The Security Controller requires 15Vdc primary power—typically, this is supplied by the integral power supply of the required SEC-ENC-H-1/U or SEC-ENC-H-2/U model enclosure. Note that 15Vdc is required so that the Security Controller can keep its attached 12V backup battery(ies) trickle charged.
6. Expansion modules can be powered from 12–15Vdc—modules directly attached (in *same enclosure*) with the Security Controller use the enclosure's 15Vdc source and backup battery. On larger jobs, when installing additional SEC-ENC-H-1/U or SEC-ENC-H-2/U enclosures to house (remote) expansion modules, expansion modules are powered by the local (enclosure) power supply, where you can wire the backup battery supply from the enclosure with the Security Controller (at a *maximum of 2.5A load*). This method uses a single pair (2 twisted conductor) cable to connect terminals "PS-, "BB".

   If installing a non-powered enclosure (SEC-ENC-H-1NP/U, SEC-ENC-H-2NP/U, SEC-ENC-H-3/U) to house one or more expansion modules, you can either:
   - Wire a "triad" (3 twisted conductor) cable back to the Security Controller enclosure, for both 15Vdc power and battery backup (terminals "PS+, "PS-, "BB"). Be sure that the total load on the power supply is less than 2.5 Amps, and that the voltage drop across the wires is less than 3 Vdc so that the remote modules are powered by at least 12 Vdc.
   - Use a third-party, battery-backed, 12Vdc power supply to locally power the remote expansion modules. Monitor the battery fail and power fail contacts of the power supply using remote module digital inputs. See the expansion module installation documents for more details.
7. When the system is operating on backup battery (AC power lost scenario), system operation for a minimum of 4 hours is the intended goal. To achieve this, size the Backup Battery(ies) accordingly, using the section Estimating Power and Battery Requirements below.

Estimating Power and Battery Requirements

Table 2 provides example "worst case" power consumptions and minimum recommended Backup Battery capacity needed in a WEBs-AX Security system, by the Security Controller and possible expansion modules.

NOTE: The Security Controller, as well as SEC-H-R2R/U modules, *supply power* to connected Wiegand-type readers. Depending on the exact reader type and manufacturer, the power used will vary. Examples here use two reader models: one that draws 0.13A maximum, and another that draws 0.04A maximum. For best estimates, refer to the amp usage specifications of the readers that you will be using.

Maximum current ratings for reader-capable devices (Security Controller and SEC-H-R2R/U) are as follows:

Maximum peak current for both readers combined is 0.40A.

Maximum average current for both readers combined is 0.30A.

Estimates assume all on-board *relays* of devices are *energized*—not typically found in an actual application, but necessary for worst-case power usage calculations.

Door strike power is *not included*, nor is power for other loads switched by the Security Controller and its expansion modules. Door strikes and other loads should be always be powered by other sources.

Table 2. Amps/Watts, Recommended Minimum 12V SLA battery A-Hr capacities, for SEC-H-602 and modules.

Device	Max per System	Amps / W used @ 15Vdc (each)	12V Backup Battery (4 hours) min. recommended Ah (each)	Notes
Security Controller (0.13A readers)	1	0.67A / 10.0W	3.33 Ah	SEC-H-602 powers two readers, measured drawing 0.13A each.
Security Controller (0.04A readers)		0.48A / 7.2W	2.40 Ah	SEC-H-602 powers two readers, measured drawing 0.04A each.
SEC-H-R2R/U (0.13A readers)	15 in aggregate	0.33A / 5.0W	1.67 Ah	SEC-H-R2R/U powers two readers, measured drawing 0.13A each.
SEC-H-R2R/U (0.04A readers)		0.11A / 1.7W	0.56 Ah	SEC-H-R2R/U powers two readers, measured drawing 0.04A each.
SEC-H-RIO/U		0.40A / 6.0W	2.00 Ah	No reader inputs, but has 8 on-board relays.

Note that minimum Ah (Amp hour) figures for the backup battery were calculated using "80% capacity" (1.25 multiplier) due to either charge level or age. For example, each SEC-H-RIO/U (with all 8 relays energized) draws about 0.4A (6.0W at 15Vdc). When powered by the 12V backup battery, Ah is calculated as follows:

0.4A x 4 hours = 1.60Ah x 1.25 = 2.0Ah

To calculate the system (total) DC power supply requirements and minimum SLA backup battery capacity, add up the total watts (W) and minimum Amp hours (Ah), for all devices. Where *n* is number of modules:

- Min. power supply (W) = Security Controller W + (*n* x SEC-H-R2R/U W) + (*n* x SEC-H-RIO/U W) = **total W**
- Min. backup battery (Ah) = Security Controller Ah + (*n* x SEC-H-R2R/U Ah) + (*n* x SEC-H-RIO/U Ah) = **total Ah**

NOTE: Backup battery(ies) are often sized greater than the recommended minimum, for additional reserve.

A maximum 2.5A load is supported at the security controller's output terminals (PS-, PS+, BB), above which an *onboard fuse may blow.* See "Maximum Output Load Considerations" on page 8.

Power Estimate Examples

Two example estimates are provided here, as follows:

- System 1, 8 door readers
- System 2, 10 door readers

SYSTEM 1, 8 DOOR READERS
This system requires 8 door readers and additional IO points requiring one SEC-H-RIO/U module. Two readers attach to the Security Controller, the other 6 readers require 3 SEC-H-R2R/U modules (2 readers each). All readers draw 0.04A maximum, such that power/battery calculations (Table 2) factor this in.

- Min. power supply (W) = 7.2W + (3 x 1.7W) + (1 x 6.0W) = 7.2W + 5.1W + 6.0W = **18.3W**
- Min. backup battery (Ah) = 2.40Ah + (3 x 0.56Ah) + (1 x 2.0Ah) = 2.4Ah + 1.68Ah + 2.0Ah = **6.08Ah**

In this case, a single 30W Enclosure Power Supply provides ample reserve, and the equipment could be housed in two enclosures as follows:

- SEC-ENC-H-2/U (large): Security controller, one SEC-H-RIO/U module, two SEC-H-R2R/U modules.
- SEC-ENC-H-3/U (small): one SEC-H-R2R/U module.

The sealed lead acid Backup Battery in this case might be two 12V 7.0Ah types in parallel, providing 14.0Ah total. Between the two Security Enclosures, module assemblies are wired together using 3-conductors for power/backup battery ("PS-", "PS+", "BB").

SYSTEM 2, 10 DOOR READERS
The system requires 10 door readers and additional IO points requiring two SEC-H-RIO/U modules. Two readers attach to the Security Controller, the other 8 readers require 4 SEC-H-R2R/U modules (2 readers each). Readers draw 0.13A maximum, such that power/battery calculations (Table 2) factor this in.

- Total min. power supply (W) = 10.0W + (4 x 5.0W) + (2 x 6.0W) = 10.0W + 25.0W + 12.0W = **42.0W**
- Min. backup battery (Ah) = 3.33Ah + (4 x 1.67Ah) + (2 x 2.0Ah) = 3.33Ah + 6.68Ah + 4.0Ah = **14.01Ah**

Assuming that all equipment is located relatively nearby, it could be housed in two large enclosures. The security controller is powered by its integral power supply. The second enclosure is powered by a battery-backed 3rd party power supply.

- SEC-ENC-H-2/U A (large): Security controller, one SEC-H-RIO/U module, two SEC-H-R2R/U modules (26W).
- SEC-ENC-H-2/U B (large): One SEC-H-RIO/U, two SEC-H-R2R/U (16W).

NOTE: If the SEC-H-R2R/U and/or SEC-H-RIO/U expansion modules are mounted in *remote locations* from the Security Controller and its backup batteries, or if a large system with *multiple* local *power supplies*, additional factors apply. See the next sections "Voltage Drop Considerations" and "Maximum Output Load Considerations."

Voltage Drop Considerations

When using an Enclosure Power Supply and backup battery to power the Security Controller plus all expansion modules, and some modules are not mounted in the same enclosure with the Security Controller, you must be aware of voltage drops in the connecting "trunk power" cabling. Typically, this applies only if modules are located in different locations—that is, not in the same enclosure or in adjacent enclosures.

NOTE: The 15Vdc power supply and the backup battery(ies) charged by the Security Controller must always be located in the same Security Enclosure as the Security Controller.

Undersized selection of cabling can result in unacceptably high voltage drops, and expansion modules/attached readers may not operate correctly—especially during emergency (battery backup) operation.

The maximum allowable voltage drop due to wiring is 1.5V. This equates to the difference in voltage measured across the PS+ and PS- at the source SEC-ENC-H-1/U or SEC-ENC-H-2/U enclosure power supply, and the PS+ and PS- at the furthest non-powered Security Enclosure that houses an expansion module. Or, when powered by battery backup, the difference in voltage measured across the BB and PS- at the enclosure with the Security Controller, and the BB and PS- at the furthest WEBs-AX Security Enclosure.

Table 3 provides a voltage drop chart, showing voltage drops per 100 feet of paired wire of different gauges (AWG), at different load amps. Also see "Connection Overview" on page 13.

Table 3. Voltage Drop Per 100 Feet Run (30m) of Paired Wire.

Gauge (AWG)	Load Current						
	0.10A	0.25A	0.5A	1.0A	1.5A	2.0A	4.0A
10	0.020	0.05	0.10	0.20	0.30	0.40	0.80
12	0.032	0.08	0.16	0.32	0.48	0.64	1.27
14	0.050	0.13	0.25	0.50	0.75	1.01	2.02
16	0.080	0.20	0.40	0.80	1.20	1.60	3.20
18	0.127	0.32	0.64	1.27	1.91	2.54	5.08
20	0.202	0.50	1.01	2.02	3.03	4.03	8.07
22	0.320	0.80	1.60	3.20	4.80	6.40	12.81

See Table 2 for "worst case" amps used by SEC-H-R2R/U and SEC-H-RIO/U modules, using two different reader types (readers draw either 0.13A or 0.04A each).

For an example, consider in the previous System 2, 10 door readers, that two of the four SEC-H-R2R/U modules are mounted remotely in locations 500 feet (366m) away.

In this example, worst-case amps used by each remote SEC-H-R2R/U is 0.33A. Looking at Table 3 at the 0.25A column, a #16 AWG cable pair drops 0.20V per 100 feet, meaning a 500 foot run would drop slightly over 1V—this would be a good choice over an #18 AWG cable, which would drop over 2V (above the 1.5V maximum allowable drop).

Maximum Output Load Considerations

If the power or battery backup load connected to the security controller exceeds 2.5 A, soldered (unreplaceable) 2.5A fuse on the SEC-H-600/U controller will blow.

Therefore, large systems that are dependent on battery backup operation may need to have remote expansion modules mounted in *unpowered* Security Enclosures, where they are powered locally using approved third-party, battery-backed 12Vdc power supplies. Related wiring details are in the installation document for expansion modules; see “Related Documentation,” page 5.

PREPARATION

Unpack the Security Controller and inspect the contents of the package for damaged or missing components. If damaged, notify the appropriate carrier at once and return any damaged components for immediate repair or replacement. See “Returning a Defective Unit,” page 31. See the following sections below: “Included in this Package” and “Material and Tools Required.”

Included in this Package

Included in this package you should find the following items:

- A Security Controller base controller (SEC-H-602 or SEC-H-616).
- This document, *SEC-H-602 and SEC-H-616 Security Controller Installation Instructions,* Form number: 31-00012.
- A hardware bag containing the following items:
  - — Nine (9) pin-mount, screw-terminal connectors (two 7-position, two 6-position, two 4-position, three 3-position) for connection of security I/O points, sealed lead-acid backup battery. For more details, see “About Screw Terminal Connectors,” page 11.
  - — One (1) grounding wire, with quick-disconnect 0.187" female connector.
  - — 6 end-of-line resistor packs (four leads each) for installation at contacts wired to supervised inputs.
  - — One (1) 6-position screw terminal end-plug, for optional wiring of power, battery, and RS-485 communications to another chain of modules (*not* mounted in-line with the security controller).

Material and Tools Required

The following supplies and tools are required for installation:

- Medium or large sized WEBs-AX Security Enclosure, model SEC-ENC-H-1/U or SEC-ENC-H-2/U. See “WEBs-AX Security Enclosure,” page 4, for more details.
- Suitable tools and supplies for mounting enclosure, Security Controller and expansion modules, and for making all wiring terminations.

PRECAUTIONS

This document uses the following warning and caution conventions:

⚠ CAUTION

Cautions remind the reader to be careful. They alert readers to situations where there is a chance that the reader might perform an action that cannot be undone, might receive unexpected results, or might lose data. Cautions contain an explanation of why the action is potentially problematic.

⚠ WARNING

Warnings alert the reader to proceed with extreme care. They alert readers to situations where there is a chance that the reader might do something that can result in personal injury or equipment damage. Warnings contain an explanation of why the action is potentially dangerous.

Safety Precautions

The following items are warnings of a general nature relating to the installation and start-up of the Security Controller. Be sure to heed these warnings to prevent personal injury or equipment damage.

⚠ WARNING

The circuit powering the controller is from 120 to 240Vac at 50/60 Hz. Disconnect power before installation or servicing to prevent electrical shock or equipment damage.

Make all connections in accordance with national and local electrical codes. Use copper conductors only.

To reduce the risk of fire or electrical shock, install in a controlled environment relatively free of contaminants.

This device is only intended for use as a monitoring and control device. To prevent data loss or equipment damage, do not use it for any other purpose.

Static Discharge Precautions

Static charges produce voltages high enough to damage electronic components. The microprocessors and associated circuitry within a Security Controller are sensitive to static discharge. Follow these precautions when installing, servicing, or operating the system:

⚠ CAUTION

Work in a static-free area.

Discharge any static electricity you may have accumulated. Discharge static electricity by touching a known, securely grounded object.

Do not handle the printed circuit board (PCB) without proper protection against static discharge. Use a wrist strap when handling PCBs. The wrist strap clamp must be secured to earth ground.

MOUNTING

Mount the security controller in a WEBs-AX Security Enclosure (model SEC-ENC-H-1/U or SEC-ENC-H-2/U). This enclosure has an integral 30W power supply, either one or two pre-mounted DIN rails, a door with a key lock and tamper switch, and brackets to secure backup batteries.

The following general mounting information applies to a security controller:

- Environmental Requirements
- Physical Mounting

Environmental Requirements

Note the following requirements for the Security Controller mounting location:

- This product is intended for indoor use only. Do not expose the unit to ambient conditions outside of the range of 2ºC (35º F) to 50ºC (122º F) and relative humidity outside the range 5% to 95% non-condensing (pollution degree 1).
- The WEBs-AX Security Enclosure is designed to keep the unit within its required operating range considering a 20-watt dissipation by the controller.
- Do not mount the unit:
  - — in an area where excessive moisture, corrosive fumes, or explosive vapors are present.
  - — where vibration or shock is likely to occur.
  - — in a location subject to electrical noise. This includes the proximity of large electrical contractors, electrical machinery, welding equipment, and spark igniters.

Physical Mounting

The following information applies about physically mounting the unit.

- Before mounting the Security Controller, install Option Cards, (if any) in the unit. See “Removing and Replacing the Cover,” page 10. Refer also to the installation sheet that came with the option card.
- Mount inside a WEBs-AX Security Enclosure (see previous Note), onto the top 35mm wide DIN rail. Plug the Security Controller directly into the integral power supply.
- It is not necessary to remove the cover before mounting.

The following procedure provides step-by-step DIN rail mounting instructions for the Security Controller (see Fig. 3).

1. Position the Security Controller on the top DIN rail, tilting to hook DIN rail tabs over one edge of the DIN rail.
2. Use a screwdriver to pry down the plastic locking clip, and push down and in on the Security Controller, to force the locking clip to snap over the other edge of the DIN rail.
3. Slide the Security Controller along the DIN rail to connect its 6-position plug into power supply socket. On the right side of the controller, holes in the two plastic mounting tabs should be aligned with the tapped holes in the back of the enclosure.
4. Install supplied screws through the mounting tab holes into the enclosure holes, and tighten. If a medium-sized SEC-ENC-H-1/U enclosure, this is the last mounting step.
5. If a large SEC-ENC-H-2/U enclosure, clip all expansion modules onto the lower DIN rail in the same way, but do not secure yet.
6. Slide the left-most module to the far left, such that its locking-tab holes align with tapped holes in the enclosure, and secure with two supplied screws.
7. Slide the next expansion module into the left (secured) module, connecting the 6-position connectors between them firmly together, and secure with two supplied screws into its mounting tabs.
8. Repeat this for all items, until all are mounted on the lower DIN rail, firmly connected to each other, and secured with mounting tab screws. Connect the 6-wire plug harness between the Security Controller and the assembly of expansion modules on the lower DIN rail.

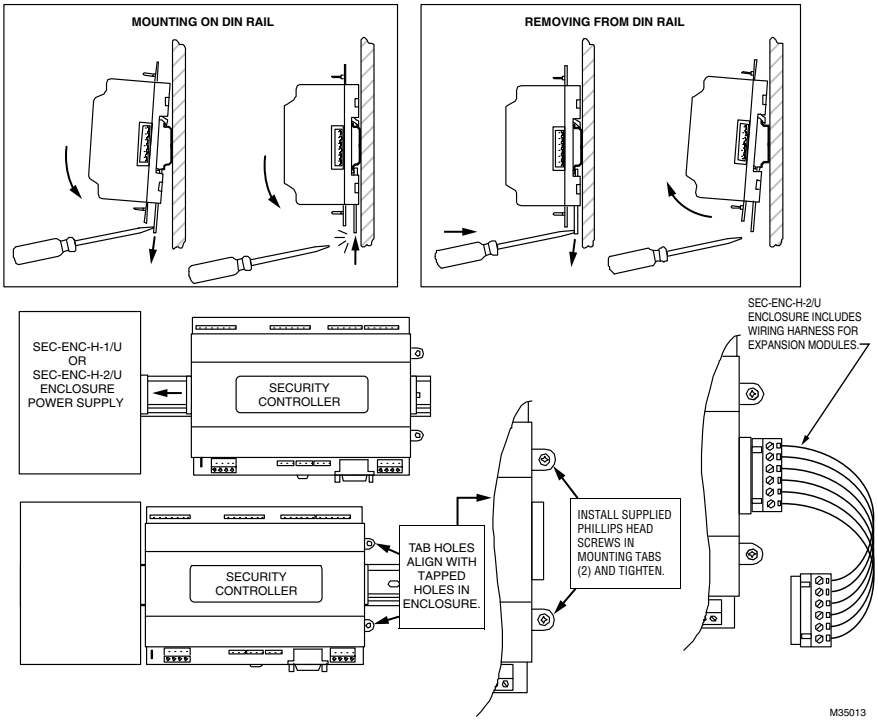


Fig. 3. Security Controller mounting details.

Removing and Replacing the Cover

You must remove the Security Controller cover to connect the NiMH battery (new unit), or to replace this battery, or to install any option boards. The cover snaps onto the base with four plastic tabs (two on each end).

To remove the cover, press in the four tabs on both ends of the unit, and lift the cover off.

NOTE: If expansion modules are plugged into the Security Controller, you may need to slide them away from the unit to get to the cover tabs.

To replace the cover, orient it so the cutout area for comm ports is correct, then push inwards to snap in place.

BOARD LAYOUT

Figure 4 shows the location of LEDs, option slots, and other features of the Security Controller, with cover removed. For a side view of communications ports and other features, see Fig. 13 on page 21.

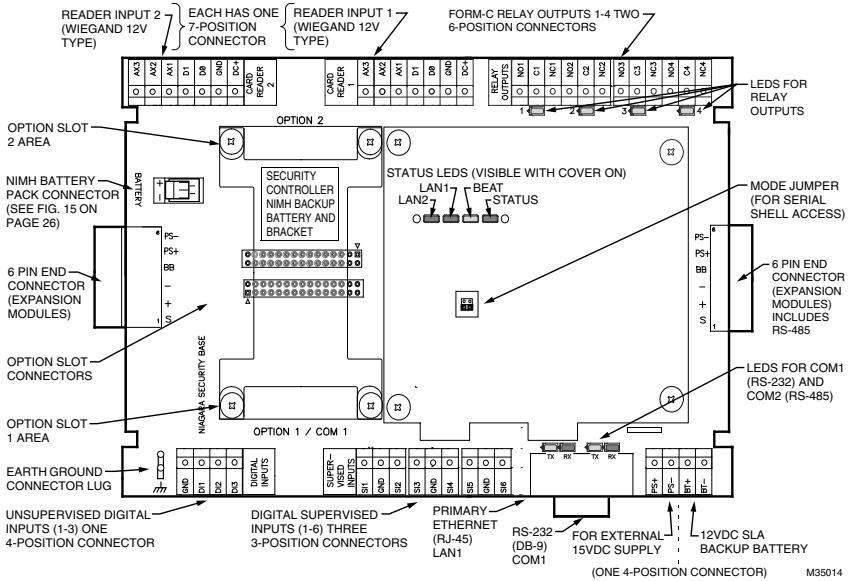


Fig. 4. Security Controller (SEC-H-602 or SEC-H-616) board layout details.

About Screw Terminal Connectors

Screw-terminal connectors are shipped loose in a separate hardware bag. If desired, you can make wiring terminations to connectors *before* installing on the Security Controller circuit board pins. Please note the following:

- When you install a connector onto the board pins, terminal labels (on the circuit board) are *covered*.
- Once installed, removal of larger connectors (readers, relay outputs) may be difficult, especially if wiring has been landed. Here, removal is recommended only if replacing the device.

In general, it may be easiest to wire to *loose* connectors (held next to pins), then install them after completing.

WIRING DETAILS

The following sections provide general wiring information:

- General Wiring Rules
- Connection Overview
- Grounding
- Cable Types and Lengths

General Wiring Rules

The authorized installation contractor should comply with the following rules:

- Obey all national, state, and local electrical and safety codes.
- Obtain any required permits and/or inspections. Contact the local fire marshal for assistance, if necessary.
- Connect the enclosure housing the Security Controller (enclosure model SEC-ENC-H-1/U or SEC-ENC-H-2/U) to the nearest earth ground.
- Use individually shielded pairs of cable only. All wiring must comply with local, state, and federal electrical codes and fire codes.

CAUTION
Do not run signal wiring in same conduit with AC power wiring.

- Neatly label cables at both ends.
  For example, label should include: Security Controller terminal #s/Device or Reader #.
- Neatly dress and tie or lace all wiring in a professional manner.
- Gather together and tape all unused conductors in multiple conductor cables.
- Ground all shield drain wires at the Security Controller enclosure, using crimp ring terminals fastened to internal grounding studs/screws or with external screws and star washers. See Figure 5.
  At the *other end* of shielded cables, *leave shield drain wires open*, either taping back or insulating to prevent electrical contact.

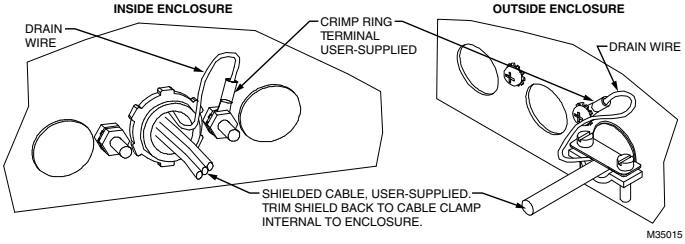


Fig. 5. Ground All Shielded Cable/Drain Wires at Enclosure, Either Internally (Left) or Outside (Right).

Connection Overview

See Fig. 4 on page 11 to locate connectors and other components on the Security Controller.
Make connections to the Security Controller in the following order.

1. Connect the earth grounding wire to a nearby earth grounding point. See “Grounding” below for details.
2. Connect wiring to door readers, door strikes, door switches, and any other security I/O to the Security Controller.
   See “Security I/O Wiring,” page 14.
3. If SEC-H-R2R/U and/or SEC-H-RIO/U expansion modules are installed, make similar security I/O connections to these devices. Refer to the appropriate mounting and wiring guide for complete details.
4. Connect communications cables. See “Communications Wiring,” page 21, for ports available on the Security Controller base unit.
5. Prepare power wiring (leave the unit powered off). See “Power Wiring,” page 23, for details.
6. Connect the backup battery to the Security Controller battery connector, and apply power to the unit. See “Connect the Backup Batteries,” page 23, and “Apply Power,” page 24.

Grounding

Connect the supplied earth grounding wire to the ground spade lug (0.187") on the Security Controller, and to a nearby earth ground (see Figure 6 below). Keep this wire as short as possible.

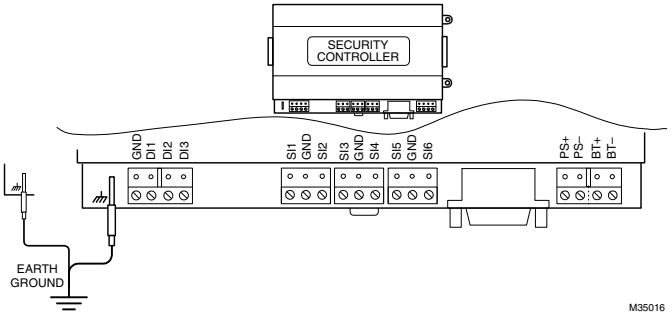


Fig. 6. Connect earth ground using supplied grounding wire to grounding lug.

In addition, connect the earth grounding lug of *each expansion module* to earth ground in the same manner.

Cable Types and Lengths

Recommended cable types and maximum lengths are as follows:

- RS-485 communications between the Security Controller and expansion modules, use a 24 AWG shielded, twisted pair communication cable with low capacitance (Belden #9501 or equivalent). Maximum length is 4000 feet (1220m).
- Reader Inputs use Belden #8725 (4-pair) or #8723 (2-pair) or equivalent. Maximum length 500 feet (152m).
- Supervised Inputs and Digital Inputs use a 22 AWG shielded, twisted pair cable control cable (Belden #9461 or equivalent). Maximum length 2000 feet (610m).
- Relay Outputs use 18 AWG unshielded instrumentation cable (Belden #9740 or equivalent), maximum length is 2000 feet (610m). Relay outputs are rated for a maximum load of 3.0A, 24 Vac/dc.
- If wiring to expansion modules in a non-powered Security Enclosure, “Trunk power” cabling (PS-, PS+, BB), using a “triad” type (3 conductor) shielded cable, such as Belden #1031A (14AWG), or equivalent. Maximum distances vary, see “Voltage Drop Considerations,” page 7.

SECURITY I/O WIRING

Security I/O wiring is covered in the following subsections:

- "Door Terminal Associations," page 14
- "Reader Input," page 15
- "Supervised Input," page 16
- "Relay Output," page 18
- "Digital Input," page 20

Door Terminal Associations

The security controller provides access control for two doors. For each door, the controller *allocates*:

- One Reader Input (for a Wiegand-type, 12V reader)
- Two Supervised Inputs: one for door switch monitor, one for REX (request-to-exit)
- One Relay Output: for door strike control.

A default convention is used for the logical association between reader inputs, supervised inputs, and relay outputs for each door, as shown in Table 4 below.

Table 4. Door mapping to security I/O terminal points.

Door	Reader Input	Supervised Input Terminals (with GND)		Relay Output Terminals
		Door Switch Monitor	Request to Exit (REX)	Door Lock
Door 1	Card Reader 1	SI1	SI2	1 (C1 and NO1, or NC1)
Door 2	Card Reader 2	SI3	SI4	2 (C2 and NO2, or NC2)

NOTE: Terminal associations shown in Table 4 also apply if wiring a SEC-H-R2R/U (2 reader) expansion module.

See the following sections below for more details:

- Example Door 1 Wiring
- Other Terminal Associations

Example Door 1 Wiring

Figure 7 shows a Security Controller wiring schematic for a door with an HID-type reader, normally-closed door contact, normally-closed exit (REX) device, and a fail-safe DC door strike (normally-closed control).

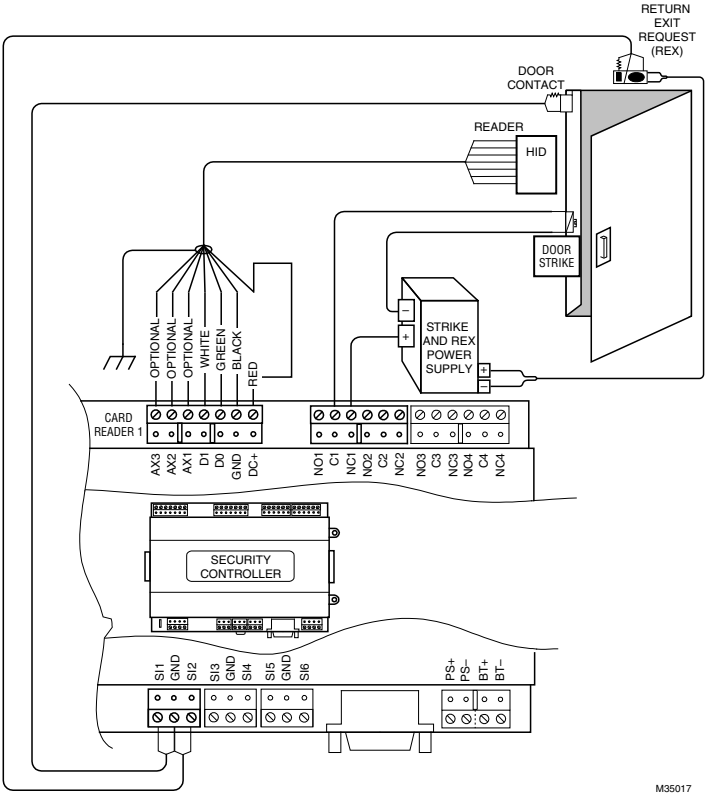


Fig. 7. Example Door 1 wiring (fail-safe).

Other Terminal Associations

In addition to the pre-allocated I/O for Door Terminal Associations, the Security Controller has the following terminals:

- Supervised Inputs 5 and 6 (SI5, SI6), for general usage. See “Supervised Input,” page 16.
- Relay Outputs 3 and 4, for general usage. See “Auxiliary Relay Output Wiring,” page 19.
- Three unsupervised Digital Inputs (DIs). See “Digital Input,” page 20.

Reader Input

The security controller has two door reader inputs, each supporting a Wiegand-type 12Vdc reader. Each reader input has a 7-position connector, on the circuit board labeled as Card Reader 2 and 1 (see Fig. 4 on page 11). Typical wiring is shown below in Fig. 8. Pinouts for each card reader connector are shown in Table 5.

NOTE: A door wired to a reader input has other I/O points, see “Door Terminal Associations,” page 14.

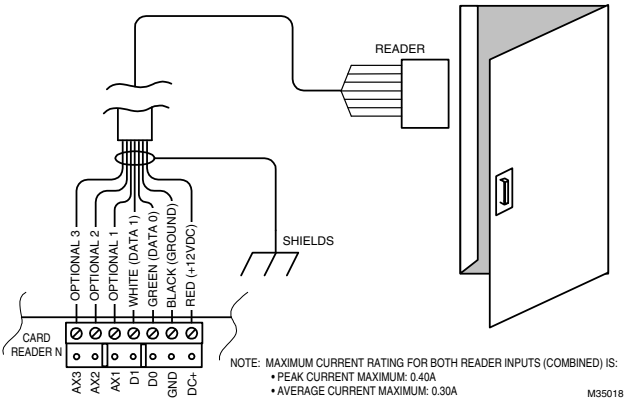


Fig. 8. Reader wiring to Security Controller.

Table 5. Pinouts for Card Reader Inputs

Terminal	Terminal Name	Terminal Notes	Typical cabling colors
DC+	+12Vdc to Reader	Always wire these four terminals to the corresponding reader terminals.	Typically Red wire.
GND	Ground		Typically Black wire.
D0	Reader Data 0		Typically Green wire.
D1	Reader Data 1		Typically White wire.
AX1	Auxiliary 1	Optional, wire to reader’s **Green LED control**	At reader, typically Orange wire.
AX2	Auxiliary 2	Optional, wire to reader’s **Red LED control**	At reader, typically Brown wire.
AX3	Auxiliary 3	Optional, wire to reader’s **Beeper control**	At reader, typically Blue or Yellow wire.

Reader Wiring Notes

- Mount the reader, referring to the specific manual for that reader for instructions.
- Use shielded, twisted-pair, cabling (Belden #8725 or #8723 or equivalent, as needed) to connect the reader to the Security Controller. Maximum cable distance is 500 feet (152m).
- Run this cabling from the reader to the Security Controller, bringing it through an appropriate knockout in the enclosure used. Allow sufficient slack cable for servicing.
- Tie all shield wires together, and connect to the designated grounding point at the enclosure. SeeFig. 5 on page 12.
- Place the appropriate wires in the appropriate screw terminals of the 7-position reader connector. Refer to the pinouts in Table 5 above for reader input designations. Figure 8 above lists typical wiring colors.

Supervised Input

The security controller has six (6) supervised inputs, located on three 3-position connectors next to the DB-9 connector (see Figure 9 below). Under each connector, terminals are labeled SI*n*, GND, SI*n*, for example: SI3, GND, SI4. This means when wiring, *two* conductors are typically landed to each GND terminal.

NOTE: Supervised inputs SI1 through SI4 are reserved for Door 1 and 2 usage. Supervised inputs SI5 and SI6 are available for general usage. For more details, see "Door Terminal Associations," page 14.

Each supervised input can monitor dry contacts, either normally-open (N.O.) or normally-closed (N.C.). One End-of-Line Resistor Pack is required at the monitored contacts for each input, for proper operation. Figure 9 shows wiring of supervised inputs S1 and SI2, which are reserved for Door 1 usage.

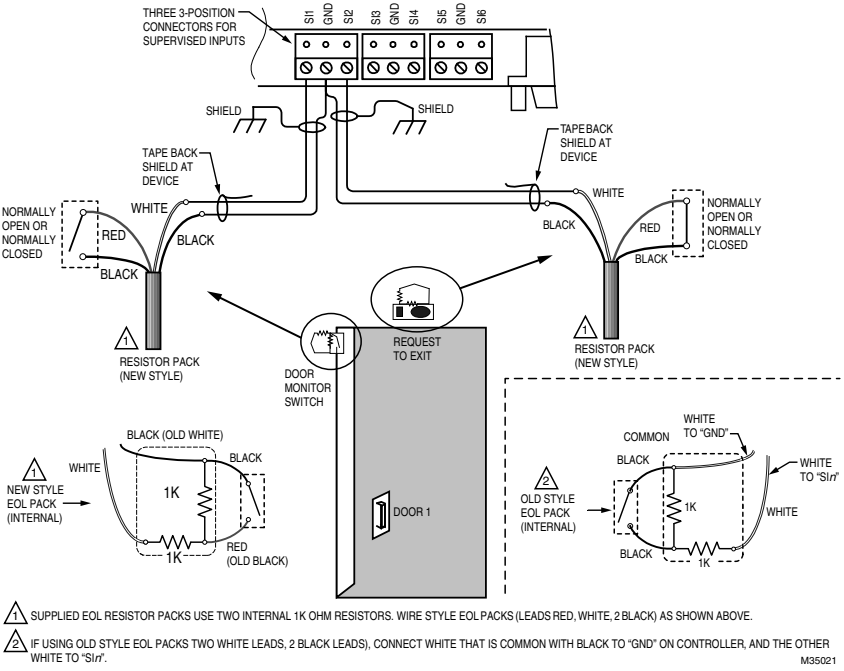


Fig. 9. Supervised input wiring to Security Controller.

End-of-Line Resistor Pack

You must install an end-of-line (EOL) resistor pack at the monitored device for proper operation of each input. Six (6) EOL resistor packs are shipped with each security controller. Each resistor pack has four leads:

- New style: One red, one white, two black leads. Wire as shown in Figure 9 above.
- Old style: Two white, two black leads. Wire black leads across contacts, and wire the white lead shown internally connected to the black lead (common) to the "GND" input, and the other white lead to the "SIn" input. See the detail in lower right of Figure 9.

Install each EOL resistor pack as close as possible to the actual monitored switch/contacts.

Supervised Input Wiring Notes

- The device monitored by a supervised input should have dry contacts (voltage free) as either a normally-open or normally-closed type switch. Mount the device per the vendor's instructions.
- Use shielded, twisted-pair, cabling to connect the device to the Security Controller. Maximum cable distance is 2000 feet (610m)
- Run this cabling from the device to the Security Controller, bringing it through an appropriate knockout in the enclosure used. Allow sufficient slack cable for servicing.
- At the device, connect the cable by installing one of the supplied 4-lead EOL resistor packs. Install this resistor pack as close as possible to the device's contacts.

Depending on **new** or **old style** EOL resistor pack, wire the EOL leads by color. See Fig. 9 on page 16.

— If a **new style** EOL pack, wire the red lead and either black lead across the monitored contacts, and wire the white lead to the "SI*n*" input, and the other black lead to the SI "GND" input.
— If an **old style** EOL pack, wire the black leads across the contacts, and wire the white lead shown internally connected to the black lead (common) to the "GND" input, and the other white lead to the "SIn" input. Note you can use a multi-meter to determine which of the two EOL pack white leads are common to one of the black leads.

Insulate the shield wire at the device by taping back or using shrink tubing.

- At the Security Controller, ground shield drain wires at the enclosure. See Fig. 5 on page 12.
- Connect the two conductors from the device's contacts to the appropriate SI*n* terminal and adjacent GND terminal. Note that inputs SI5 and SI6 are available for general usage, while the other SI inputs (SI1–SI4) are reserved for Door 1 and 2 usage.

About Supervised Input States

Although monitoring a digital (two-state) device, each supervised input has four possible states:

- Shorted—A "trouble" state, meaning shorted input—supervision resistors cannot be detected.
- Closed—A "normal" state, meaning contacts closed, with supervision resistor(s) detected.
- Open—A "normal" state, meaning contacts open, with supervision resistor(s) detected.
- Cut—A "trouble" state, meaning an open input—supervision resistors not detected.

Each supervised input tests for the current state using a simple voltage divider, using a (fixed) 1.5K ohm onboard pull-up resistor, and the resistance (R) value in ohms of the monitored device, where

Input %= R / (R + 1500)

0%–17% = 0 (shorted wires) to 300

17%–50% = 300 to 1500 (Closed)

50%–83% = 1500 to 7500 (Open)

83%–100% = 7500 to infinite (cut wires)

Relay Output

The security controller has four (4) Form-C relay outputs, each rated to switch 24VAC/DC loads up to 3A. Output terminals are located two 6-position connectors next to the card reader 2 input (see Fig. 4 on page 11). Terminals are labeled numerically 1 and 2 under one connector, and 3 and 4 under the other connector. Each has a NO*n*, C*n*, NC*n* terminal—for example NO3, C3, NC3 for relay output 3.

NOTE: Relay outputs 1 and 2 are reserved for Door 1 and Door 2 strike control, respectively. Relay outputs 3 and 4 are available for general usage. For more details, see "Door Terminal Associations," page 14.

Output Status LEDs

An LED status indicator for each relay output is located next to that output's C (common) terminal on the circuit board—when lit, that relay is energized. Therefore, a circuit wired through the normally open (NO*n*) terminal is On (closed) when the LED is lit, and Off (open) when the LED is not lit.

Door Strike Wiring

Typical "fail secure" door strike wiring, in this case for Door 1 using relay output 1, is shown in Figure 10 below.

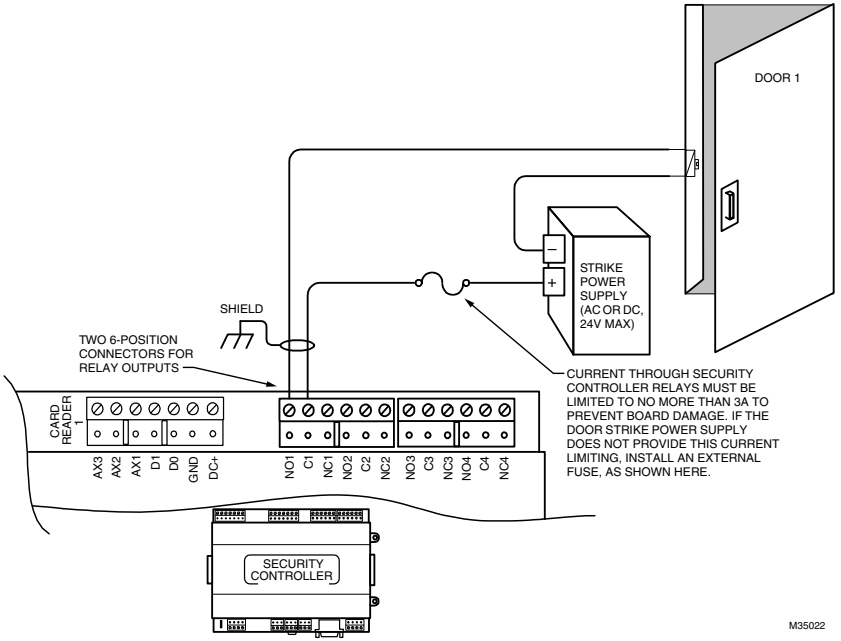


Fig. 10. Relay output wiring from Security Controller to door strike (fail-secure).

Auxiliary Relay Output Wiring

Relay outputs 3 and 4 are available for controlling an auxiliary device, such as a horn annunciator.

Figure 11 shows example wiring for controlling an output device.

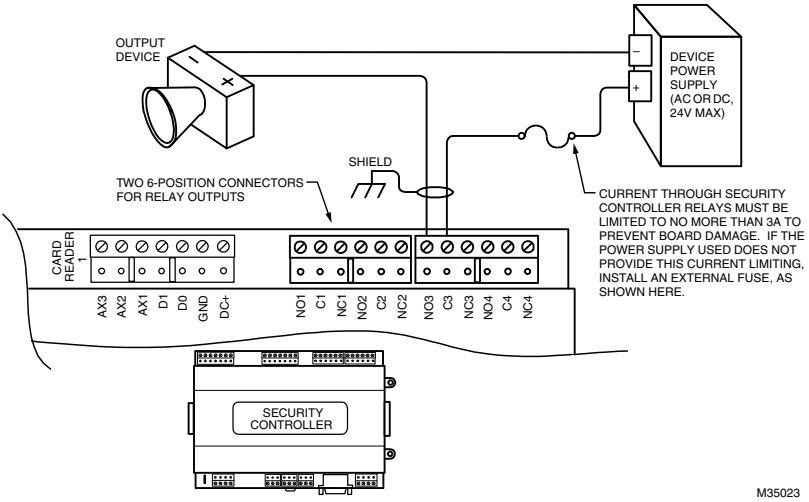


Fig. 11. Relay output wiring from Security Controller to an auxiliary device.

Relay Output Wiring Notes

- Install the door strike or auxiliary output device per the vendor's instructions.
- Use shielded, twisted-pair cabling to connect the circuit to the Security Controller. Maximum cable distance is 2000 feet (610m)
- Wire the door strike or auxiliary output device to the appropriate relay output on the Security Controller and to the power supply used to power the strike or device. Each relay output on the Security Controller has a common terminal (C), and normally open (NO) and normally closed (NC) terminal.
- At the Security Controller, ground shield wires to the designated grounding point at the enclosure. See Fig. 5 on page 12.

Digital Input

The security controller has three (3) digital inputs, located on a 4-position connector next to supervised input connector (see Fig. 4 on page 11). Under the connector, terminals are labeled GND, DI1, DI2, DI3. This means when wiring, as many as *three* conductors can be landed to the common GND terminal.

Each digital input can monitor dry contacts, either normally-open (N.O.) or normally-closed (N.C.). All three inputs are *unsupervised*—no end-of-line resistors are required. Figure 12 below shows example wiring to all three digital inputs of the security controller.

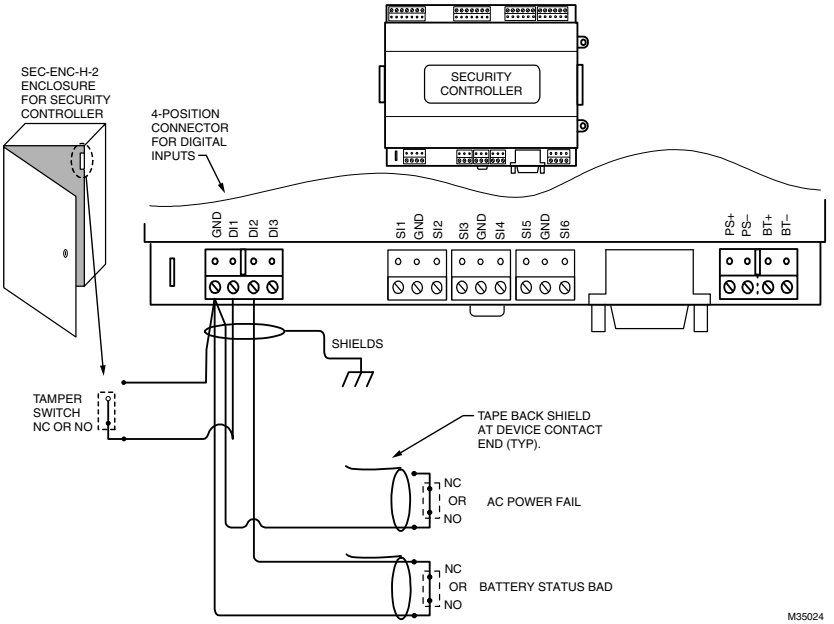


Fig. 12. Digital input wiring example to Security Controller.

NOTE: The WEBs-AX Security Application is pre-configured to support the following connections:

DI1 — Tamper switch (typically for enclosure door)

DI2 — Battery status bad (if contacts available)

DI3 — AC power fail (if contacts available)

Depending on the installation, not all DIs may require connection. In almost all cases, input DI1 is wired to the tamper switch of the WEBs-AX Security Enclosure housing the Security Controller.

Digital Input Wiring Notes

- The device monitored by a digital input should have dry contacts (voltage free) as either a normally-open or normally-closed type switch. Mount the device per the vendor's instructions.
- Use shielded, twisted-pair cabling to connect the device to the Security Controller. Maximum cable distance is 2000 feet (610m).
- Run this cabling from the device to the Security Controller, bringing it through an appropriate knockout in the enclosure used. Allow sufficient slack cable for servicing.
- At the device, connect its contacts to the cable pair, and insulate the shield wire by taping it back or using shrink tubing.
- At the Security Controller, ground shield wires to the designated grounding point at the enclosure. See Fig. 5 on page 12.
- Connect the two conductors from the device's contacts to the appropriate DI*n* terminal and common GND terminal. Note that the software expects DIs to monitor specific items—see Note on previous page.

COMMUNICATIONS WIRING

Connect communications wiring to the Security Controller using ports on the bottom of the unit (Fig. 4.), which include:

- Ethernet
- Serial

NOTE: Prior to connecting cables, provide strain relief for them to prevent damage to the controller.

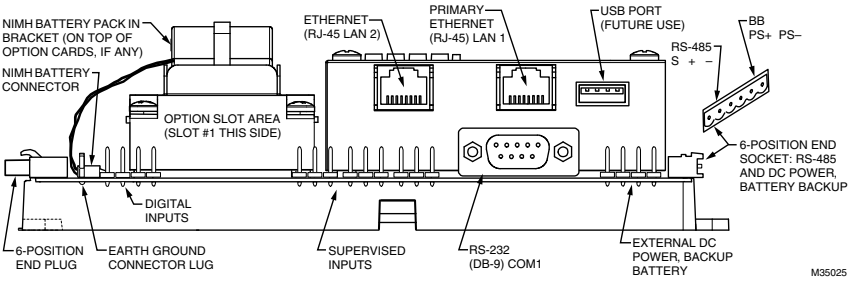


Fig. 13. Security Controller (SEC-H-602 or SEC-H-616) bottom side, cover removed.

Ethernet

Two, female 10/100-Mbit Ethernet connections are provided on the Security Controller. These are RJ-45 connectors labeled LAN2 and LAN1. Use a standard Ethernet patch cable for connecting to a hub or Ethernet switch. An activity LED for each Ethernet port is visible, and are labeled "LAN2" and "LAN1" on the cover.

NOTE: Typically, you *only use LAN1* (primary port). Do *not* use LAN2 as the primary port.

The default "factory-shipped" IP settings for the LAN1 port are IP address `192.168.1.120`, with a subnet mask of `255.255.255.0`. Refer to the *WEBs-AX Enterprise Security Guide* for details on changing IP address.

Serial

There are two serial ports on the security controller base unit. At the bottom of the board (see Fig. 13.), the DB-9 is an RS-232 port using an DB-9 plug (male) connector. At the ends of the unit, an RS-485 port "passes through" the unit using the lower 3 terminals of the 6-position connectors.

NOTE: A green "receive" LED and yellow "transmit" LED are provided for each serial port. These LEDs are located on the bottom board, next to each port connector (see Fig. 4 on page 11).

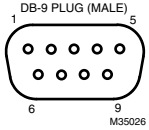
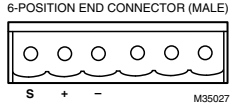
There is also a USB port on the top board. However, it is for future use only.

RS-232

An RS-232 serial port using a male DB-9 connector always operates as COM1. You can use standard DB-9 serial cables with this port. The Security Controller is a serial DTE device, requiring a "null modem" cable for connection to another DTE device, such as a PC. If connecting the Security Controller to a DCE device (modem, for example), a straight-through cable is used. The table below provides standard serial DB-9 pinouts.

NOTE: If a modem option card (NPB-MDM/U) is installed, this port becomes disabled—except if rebooted with the mode jumper (see Fig. 4 on page 11) in the "Serial Shell" position.

Table 6. Serial port (RS-232 and RS-485) pinouts.

Base RS-232 DB-9 Port (COM1)				Base RS-485 Port (COM2)
Pinout References	**Signal**		**DB-9 Plug Pin**	**Pinouts**
	DCD	Data carrier detect	1	
	RXD	Receive data	2	
	TXD	Transmit data	3	
	DTR	Data terminal ready	4	
	GND	Ground	5	
	DSR	Data set ready	6	
	RTS	Request to send	7	
	CTS	Clear to send	8	
	Not used on the Security Controller		9	

RS-485

An RS-485, optically isolated port is dedicated for communications to security expansion modules (SEC-H-R2R/U, SEC-H-RIO/U), and always operates as COM2. Wiring is not necessary to any modules that *directly* attach in-line with the Security Controller—the RS-485 signal passes through the 6-position end connectors.

If modules are not mounted in-line with the Security Controller, wire between the device assemblies using the 6-position end connector plugs. Use shielded 18-22AWG wiring (refer to the TIA/EIA-485 standard). As shown in Table 6 above, the screw terminals (from left-to-right) are shield, plus (+), and minus (–).

Wire in a continuous multidrop fashion, meaning "plus to plus," "minus to minus", and "shield to shield." Connect the shield to earth ground at one end only, such as at the Security Controller. See Fig. 14 on page 23 for example cabling.

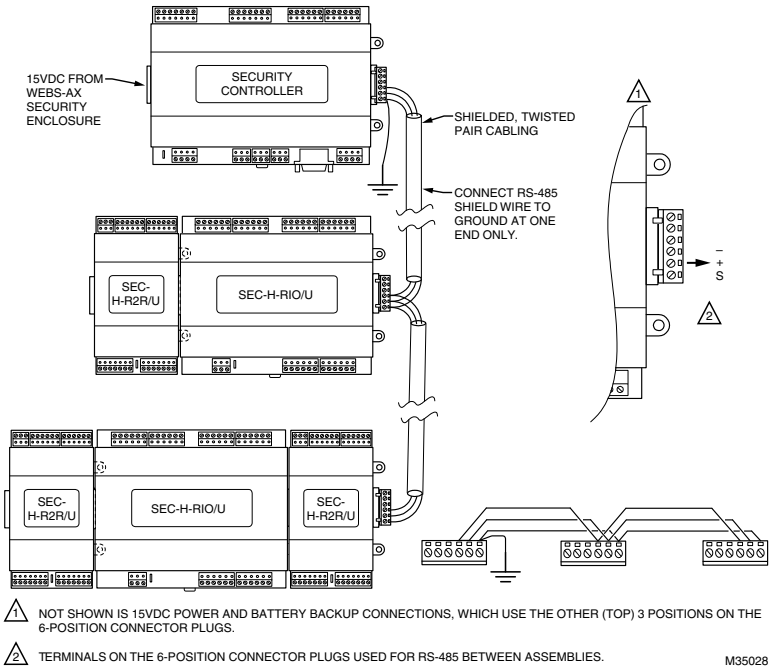


Fig. 14. RS-485 cabling between Security Controller and expansion modules not mounted in-line.

POWER WIRING

It is recommended that the Security Controller be powered by the approved NPB-PWR-UN-H/U, regulated 15Vdc power source. For related information, see "Estimating Power and Battery Requirements," page 6.

⚠ CAUTION

Door strike power, as well as power for other loads switched by the security controller and/or its expansion modules, should always be provided from a *different source*.

Do not apply power to the security controller until all other mounting and wiring is completed. See "Power Up and Initial Checkout," page 23.

Enclosure Power Supply

The integral power supply (NPB+PWR+UN+H/U) in a WEBs-AX Security Enclosure (SEC-ENC-H-1/U or SEC-ENC-H-2/U) provides 30W of regulated 15Vdc power to an Security Controller and its connected expansion modules, and is required for UL 294. Input voltage is 120Vac to 240Vac, single phase. You mount the Security Controller on the top DIN rail in the enclosure, where it connects into this power supply (see Fig. 3 on page 10). If an SEC-ENC-H-2/U enclosure, a provided 6-wire harness lets you connect expansion modules on the second (lower) DIN rail.

POWER UP AND INITIAL CHECKOUT

Ensure power wiring to the Security Controller is ready—see "Power Wiring," page 23. Refer to Fig. 4 on page 11 for the locations of the NiMH battery connector, status LEDs, and 4-position connector for 12V sealed lead acid backup battery(ies).

Following all mounting and wiring, perform the following:

1. Connect the Backup Batteries.
2. Apply Power.
3. Check the Status LEDs.

Connect the Backup Batteries

For background details, see "About the Backup Batteries," page 24. Make the following battery connections:

- Connect the NiMH Battery
- Connect the Backup Battery

Connect the NiMH Battery

With the cover removed from the Security Controller, locate the red and black wires coming from the NiMH battery pack, with 2-position connector plug. Insert the plug into the battery connector on the bottom board (near option slot 2 area), as shown in the figure below.

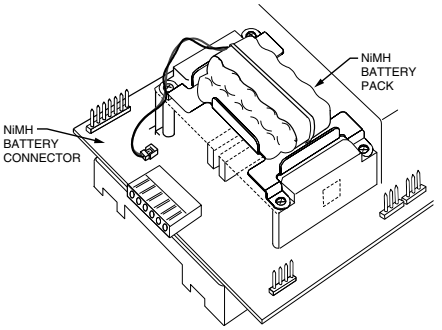


Fig. 15. NiMH battery connector on Security Controller bottom board.

This connector is keyed—you cannot insert it incorrectly. The red (positive) connection should be the furthest from the two 30-pin option board connectors. Replace the Security Controller cover after connecting the battery.

Connect the Backup Battery

Connect the 12V sealed lead-acid Backup Battery to the 4-position connector next to the DB-9 connector, on terminals BT+ and BT-. When the Security Controller is powered up, charging voltage is applied to the battery(ies).

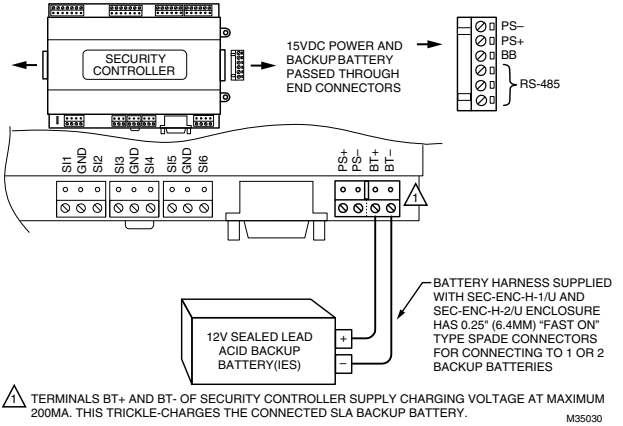


Fig. 16. Sealed lead-acid backup battery connection on Security Controller.

WARNING

A *maximum* 2.5 A load can be powered through the PS-, PS+, BB terminals on the Security Controller. A larger load will blow a soldered (unreplaceable) 2.5A fuse onboard the Security Controller.
See "Maximum Output Load Considerations" on page 8.

Apply Power

Apply power to the Security Controller by energizing its connected SEC-ENC-H-1/U or SEC-ENC-H-2/U enclosure power supply.

Check the Status LEDs

When power is applied, the green LED labeled "STATUS" will light. This indicates that the system is OK and that power is applied. Once the Security Controller boots, the yellow "BEAT" (heartbeat) LED will begin blinking, with a typical rate of about 1 Hz. Blinking should begin within 30 seconds after power is applied.

If after applying power, the STATUS LED goes out, or if the BEAT LED comes on (steady) and stays lit longer than two minutes, contact your Authorized Systems Distributor for technical assistance. Also see "Using Status LEDs," page 27.

About the Backup Batteries

The Security Controller has two different backup batteries:

- An external (sealed lead acid) Backup Battery (or batteries), and
- An onboard NiMH battery pack.

Both batteries are required for system operation during loss of primary power (15Vdc power supply). Station alarms are generated if either battery is uncharged or

unable to hold a sufficient charge, as well as whenever primary power is lost. You should always investigate any alarm related to backup batteries.

Backup Battery

The sealed lead-acid backup battery is an external, 12V, rechargeable battery (or multiple batteries) sized to operate the system during loss of primary power, for some duration. This includes the Security Controller, including power to attached readers and onboard relays, plus any "chained" expansion modules (and their attached readers and relays). For related details, see "Estimating Power and Battery Requirements," page 6.

NOTE: A maximum 2.5 A load can be powered through the PS-, PS+, BB terminals on the Security Controller. See "Maximum Output Load Considerations," page 8.

You connect the backup battery to the Security Controller using two terminals of a 4-position connector—see Fig. 16 on page 24. Whenever primary-powered, the Security Controller supplies a constant "trickle" charge to this battery, at 200mA maximum. At startup (boot), a test of the backup battery is performed, as well as a periodic test. A system alarm is generated if a battery test deems the backup battery to be bad.

Providing that the backup battery has tested good, upon loss of primary power the system operates from this backup battery power until the charge level of the onboard NiMH battery pack reaches 0. Note that both batteries discharge in parallel. However, as the sealed lead-acid backup battery capacity is much greater, the NiMH battery pack discharges much slower than if these backup battery(ies) were bad or not present.

NOTE: If the backup battery test was "bad," upon loss of primary power, the Security Controller performs an immediate shutdown, backing up data and powering off (including attached readers, expansion modules).

You should replace the sealed lead-acid backup battery(ies) approximately every three years, or more often if the unit is in a high temperature environment.

NiMH battery pack

A custom 10-cell NiMH (nickel metal hydride) battery pack is mounted onto the unit, under the cover—see Fig. 15 on page 24. This battery allows the Security Controller to continue station operation (only) through very short power bumps, meaning a few seconds in duration. If a longer outage, the NiMH battery provides enough run time for the unit to backup data and then shutdown. Typically, this process takes about one minute. Shutdown occurs automatically, after data is backed up to on-board flash memory.

Upon startup (boot), a test of the NiMH battery is performed. A system alarm is generated if the NiMH battery voltage level is found to be bad. A charge is also initiated upon startup, which lasts from 3 hours minimum, and can range up to 18 hours if the battery is completely discharged. During this NiMH battery charge period, neither the NiMH battery or the Backup Battery is tested. After the startup NiMH charge period, a periodic test of *both* batteries occurs, and the appropriate battery alarm is generated is either battery is found to be bad.

NOTE: If the last NiMH battery test was "bad," upon loss of primary power the Security Controller performs an immediate shutdown, backing up data and powering off (including attached readers, and expansion modules).

A NiMH battery characteristic is to lose charge if not left in charge mode (trickle charge). Leaving the battery unconnected, or in the unit powered off will cause the battery to fully discharge in a matter of weeks. Note that in the case of a new Security Controller, it ships from the factory with a completely discharged battery. Therefore, allow at least 18 hours for the battery to charge if it has not been in a powered unit.

You should replace the NiMH battery pack approximately every three years, or more often if the unit is in a high temperature environment. For more information on the use and replacement of the NiMH battery, refer to the "Required NiMH Battery Maintenance," page 28.

UL REQUIREMENTS

This section provides requirements for a UL 294 Listed system. Failure to install the Security Controller and its expansion modules in accordance with these instructions voids the listing mark of Underwriters Laboratories, Inc.

NOTE: This product is not Listed to UL 1076. For UL Listed systems, this product should not be programmed or configured for burglar alarm functions.

- Mounting and Wiring
- Compatible Readers
- Battery-backed Power Supplies

Mounting and Wiring

1. The Security Controller must be mounted in a WEBs-AX Security Enclosure, model SEC-ENC-H-1/U or SEC-ENC-H-2/U, which provides an integral 15Vdc power supply (NPB+PWR+UN+H/U) to power the unit. Expansion modules must also be mounted in WEBs-AX Security Enclosures, either (the same or different) enclosure, depending on number and location of expansion modules needed.
2. Enclosures must be mounted inside the secured area.
3. Grounding must be in accordance with Article 250 of the National Electrical Code.
4. Digital input DI1 of the SEC-H-602 must be wired to the door tamper switch of its enclosure. See Fig. 12 on page 20. If additional WEBs-AX Security Enclosures are used in the system, each door tamper switch must also be wired to DI1 of *one* of the contained expansion modules.
5. Only UL listed, 12V Wiegand-type readers can be used with the system.
6. Exit request input circuits and initiating devices must be contained within the secured area. Exit device circuits must be connected to UL listed switches or exit devices.
7. Door strike power must be provided from a UL listed burglar alarm system power supply. When required in accordance with NFPA 101, if the door strike circuit is arranged as fail secure (door remains locked upon loss of power), UL listed emergency panic hardware must be provided to allow exit from the secured area. A fail-safe configuration results in the door strike circuit unlocking in case of a power loss.
8. Audible signal appliance circuits, such as shown in Fig. 11 on page 19, are for supplementary use only.

Compatible Readers

Compatible Readers when used with the NPB+PWR+UN+H/U power supply are

- HID — Models 5355, **5365**, 5375, **5395**, **5455**, **6005**, **6100**, **6120**, 6125, 6130
- GE Security — Model **T-200**

Only readers shown **bolded** above are also approved for use with the UL listed Battery-backed Power Supplies listed in the next section.

This includes HID models 5365, 5395, 5455, 6005, 6100, 6120, and GE Security model T-200 (Reader Input rated 8.1–14 Vdc).

Battery-backed Power Supplies

The following third-party, battery-backed power supplies are UL approved for powering remote SEC-H-R2R/U and SEC-H-RIO/U expansion modules:

NOTE: Configure power supply for 12Vdc output operation.

Also see previous "Compatible Readers" section.

The Security Controller must be powered by the integral 15Vdc power supply (NPB+PWR+UN+H/U) in a WEBs-AX Security Enclosure, model SEC-ENC-H-1/U or SEC-ENC-H-2/U.

Honeywell http://www.honeywellpower.com/access.html	
Model	**Output**
HP300ULX	12/24Vdc 2.5A
HP400ULX	12/24Vdc 4.0A
HP600ULX	12/24Vdc 6.0A
HP300ULPD4CB	12/24Vdc 2.5A with Distribution PCB
HP400ULPD4CB	12/24Vdc 4.0A with Distribution PCB
HP600ULPD16CB	12/24Vdc 6.0A with Distribution PCB

AlarmSaf http://alarmsaf.com/	
Model	**Output**
CPS-200C-7-UL/CSA	12/24Vdc 2.5A
CPS-400C-UL/CSA	12/24Vdc 4.0A
CPS-600C-UL/CSA	12/24Vdc 6.0A
CPS-800C-UL/CSA	12/24Vdc 8.0A

For wiring details related to using third-party, battery-backed power supplies, refer to the installation document for either of the expansion modules. See "Related Documentation," page 5.

USING STATUS LEDS

The Security Controller includes several LEDs that can help determine the status of the unit. They are located in two places: the top of the controller (visible through the cover), and for relay outputs and serial ports, on the bottom board (visible with cover removed). From left-to-right these LEDs include:

- Ethernet Port LEDs
- Heartbeat LED
- Status LED
- Relay Output LEDs
- Serial Port LEDs

See Fig. 17 for the exact locations of all LEDs on the Security Controller.

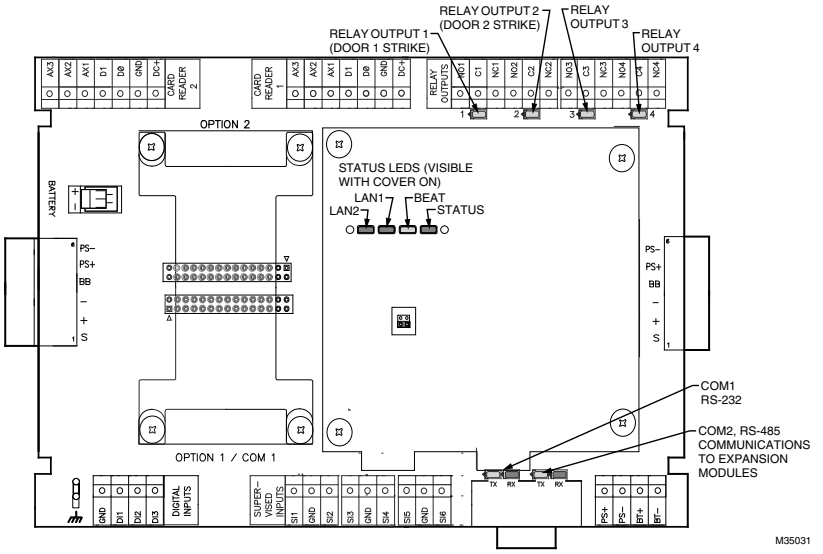


Fig. 17. LEDs on the Security Controller (cover removed).

Ethernet Port LEDs

Each Ethernet port (“LAN2”, “LAN1”) has one green LED, visible on the top cover.

A “LAN*x*” LED indicates activity on that port as follows:

- **Off**—No Ethernet link is made
- **On**—Ethernet link is present, but no activity on the LAN
- **Blinking**—Ethernet link is present with data activity on the LAN.

Heartbeat LED

The “BEAT” LED is located to the right of the Ethernet status LEDs, and is yellow. Under normal operation, this LED should blink about once per second. If the heartbeat LED stays *on constantly, does not light*, or blinks *very fast* (more than once per second), contact System Engineering for technical support.

Status LED

The “STATUS” LED is located to the right of the heartbeat (“BEAT”) LED, and is green. This LED provides a CPU machine status check, and should remain lit whenever the Security Controller is powered. If the STATUS LED *does not light* while power is applied, contact System Engineering for technical support.

Relay Output LEDs

Each of the four relay outputs has an LED, located near the “C” terminal on the *bottom* circuit board (see Fig. 17). Each relay output LED is lit whenever that relay is energized by the Security Controller. See “Relay Output,” page 18, for more details.

Serial Port LEDs

LEDs for the two serial ports are located on the Security Controller's *bottom* board, near the DB-9 connector (see Fig. 17). LEDs show the transmit and receive activity for the serial ports and optional modem.

- The **yellow** transmit LED indicates that the Security Controller is *sending* data out the serial port over a communications line to a connected device.
- The **green** receive LED indicates that the Security Controller is *receiving* data from a connected device.

These LEDs provide a fixed on-time when data is detected on the port. If these LEDs are on constantly, this indicates a problem with the communications channel, such as a shorted wire or reversed wiring.

NOTE: In normal operation, if expansion modules are installed (SEC-H-R2R/U, SEC-H-RIO/U) and the station is configured, the COM2 (RS-485) LEDs should continuously flash, approximately 3 times per second. This reflects the continuous polling of the expansion modules performed by the Security Controller.

MAINTAINING THE SECURITY CONTROLLER

This section provides information on the following topics:

- Cleaning
- Required NiMH Battery Maintenance
- Replacement Parts
- Replacing the Security Controller base assembly
- Returning a Defective Unit

Cleaning

If dust or metal filings are present inside the unit, clean with vacuum or compressed air. Otherwise, no cleaning inside the unit is required. Optionally, if the cover becomes dirty, you can wipe it with a damp cloth and mild detergent.

Required NiMH Battery Maintenance

NiMH battery life expectancy is a function of its discharge cycles (the number of discharges and their depth) and the ambient temperature of the battery during normal operation. In most applications, the battery should see relatively few discharges. Therefore, ambient temperature has more to do with determining the life expectancy of the battery than does any other factor. If the Security Controller is installed in a conditioned space, the NiMH battery should provide dependable service for approximately three years (average). In an environment where the operating temperature is higher (that is, 50ºC or 122ºF), you should only expect the battery to last approximately one year.

The NiMH battery in the Security Controller is fully discharged when factory shipped. Additionally, NiMH batteries lose charge over time if not kept trickle-charged (for more details, see "NiMH battery pack," page 25). Therefore, even a new unit (or replacement battery) will require up to 18 hours of powered operation before it can provide reliable backup power, meaning it is at full charge.

The Security Controller monitors both batteries, and periodically loads the NiMH battery to test its ability to maintain backup functions. Investigate any battery trouble message, and check the battery connections to the unit. Replace the battery as required. To order a new NiMH battery, see "Standard Replacement Parts," page 29.

Replacing the NiMH Battery

The replacement NPB-BATT battery is a complete assembly, that is a custom NiMH battery pack pre-attached to a battery bracket. See Fig. 15 on page 24.

⚠ CAUTION

Use only NiMH battery packs approved for use with the Security Controller.

To replace the NiMH battery pack, proceed as follows:

1. Backup the Security Controller's configuration to your PC, using the backup feature within the Security Appliance (or the appropriate NiagaraAX software tool).
2. Disconnect the sealed lead-acid Backup Battery.
3. Remove primary power from the Security Controller. The unit should power down after some period, which may range from several seconds to several minutes. Wait for LED activity to stop—all LEDs on the Security Controller should be off.

   NOTE: NiMH-powered shutdown on the 600 series security controller takes notably longer than with a security controller.

4. Remove the cover. See "Removing and Replacing the Cover," page 10.
5. Remove the old battery and bracket assembly by taking out the four screws holding it in place, setting the screws aside for later. Unplug the battery from the connector on the security controller.
6. Plug the battery connector plug of the *replacement battery pack* into the NiMH battery connector on the Security Controller. See "Connect the NiMH Battery," page 23.
7. Set the replacement battery/bracket assembly back over the option card slots, with the mounting holes aligned with the standoffs.
8. Place the four screws through the battery bracket, option cards blanking plates, and into the standoffs on the Security Controller base board. Using a screwdriver, hand tighten these screws.
9. Replace the cover.
10. Reconnect the sealed lead-acid backup battery.
11. Restore power to the Security Controller and verify normal operation.

REPLACEMENT PARTS

Servicing the Security Controller may call for replacement parts. There are three categories of parts:

- Non-replaceable Parts
- Standard Replacement Parts
- New Replacement Units

Non-replaceable Parts

Other than the parts listed in the replacement parts sections, there are no serviceable components on the base assembly.

Memory

Any addition, modification, or replacement of memory components requires software configuration and is not a field upgrade.

Fuse

The Security Controller contains a non-user replaceable fuse, soldered on the circuit board. This fuse provides protection from internal shorts or connection to incorrect power supplies. If the fuse circuitry is suspect, contact your Authorized Systems Distributor for technical support. See “Returning a Defective Unit,” page 31.

Standard Replacement Parts

Standard replacement parts are listed in Table 7 below and can be ordered from stock without restriction. Standard replacement parts cannot be returned for credit and should be disposed of in an appropriate manner.

Table 7. Standard replacement parts.

Part Number	Description
NPB-BATTERY/U	NiMH Battery Pack (with battery bracket)—see “Replacing the NiMH Battery,” page 28.
H10429/U	6-position (end mount) screw terminal connector plug (1), for expansion modules not mounted in-line.
H10717/U	Screw terminal connector, pin-mount, 7-position (2 used), for card reader inputs.
H10716/U	Screw terminal connector, pin-mount, 6-position (2 used), for relay outputs.
H10714/U	Screw terminal connector, pin-mount, 4-position (2 used), for digital inputs, power supply/SLA battery.
H10713/U	Screw terminal connector, pin-mount, 3-position (3 used), for supervised inputs.
H10747/U	4-lead resistor pack (has two internal 1K ohm resistors) for field installation at supervised contacts. One resistor pack required for each supervised input.

NOTE: Screws used for the Security Controller are standard #6-32 x 3/8" types, which you can obtain locally if lost.

New Replacement Units

To replace a faulty unit, order and install a *new* SEC-H-602 or SEC-H-616 Security Controller—please note that WEBs-AX Security series products do *not* have special “field replacement units,” or FRUs, with separate part numbers.

If the faulty security controller is *still in warranty*, you can receive credit by returning it to Tridium. Be sure to contact Tridium for a return authorization (RA) number before shipping an item for return credit. See “Returning a Defective Unit,” page 31, for more details.

NOTE: Before ordering a new security controller, it is strongly recommended that you contact your normal technical support resource to eliminate the possibility of a software issue or mis-configuration problem.

REPLACING THE SECURITY CONTROLLER BASE ASSEMBLY

⚠ CAUTION

Before handling circuit boards, discharge any accumulated static by touching the metal surface of the Security Controller. For details, see "Static Discharge Precautions," page 8.

To replace the Security Controller base assembly in the field, proceed as follows:

1. Using the backup feature within the Security Appliance (or the appropriate NiagaraAX software tool), back up the Security Controller's configuration to your PC.
2. Disconnect the Backup Battery.
3. Remove primary power to the Security Controller by de-energizing the SEC-ENC-H-1/U or SEC-ENC-H-2/U enclosure power supply. The unit should power down automatically.
4. Remove power to loads switched through its relay outputs, such as door strikes.
5. Note positions of all communications and other wiring cables going to the Security Controller. If necessary, label connectors to avoid mis-connection later, after the Security Controller is replaced.
6. Unplug all Ethernet, serial, modem, and security I/O connectors from the Security Controller.

   NOTE: Removal of the larger screw terminal connectors from the circuit board pins may require gentle prying between the connector and the circuit board. When removing, grasp the connector firmly at both ends, and pull out from the circuit board. See "About Screw Terminal Connectors," page 11.

7. Unplug the 6-position end-connector plug from the Security Controller, if present.
8. Remove the screws in the two mounting tabs, and slide the Security Controller away from the integral power supply of the SEC-ENC-H-1/U or SEC-ENC-H-2/U enclosure.
9. Remove the Security Controller from the DIN rail (see Fig. 3 on page 10).
10. Remove the cover from the old Security Controller (see "Removing and Replacing the Cover," page 10).
    Note the position of installed Option Cards, if any. You must transfer them to the replacement unit.
11. Remove the option cards from the old Security Controller and install them into the replacement Security Controller, if applicable.
12. Mount the replacement Security Controller on the DIN rail, plugging it into the enclosure's power supply. See Fig. 3 on page 10. Re-secure by fastening the screws into the two mounting tabs.
13. Reconnect the Grounding wire to the grounding connector lug.
14. Reinstall the other security I/O screw terminal connectors onto the appropriate circuit board pins, including the Reader Inputs, Supervised Inputs, Relay Outputs, and Digital Inputs.
15. Reconnect any Ethernet, serial, modem connections to the Security Controller.
16. Reconnect the 6-position end-connector plug into the Security Controller.
17. Restore power to loads switched through relay outputs, turn the devices back on, or reconnect power to them.
18. Reconnect the Backup Battery.
19. Restore power to the Security Controller.
    It should boot up as a new unit (see "Check the Status LEDs," page 24).
20. For software re-configuration details, see the *WEBs-AX Security User's Guide*.

RETURNING A DEFECTIVE UNIT

NOTE: If the defective unit is under warranty, please follow return instructions provided in this section.
If the unit is *out of warranty*, please discard it.

Do not return an out-of-warranty security controller to Tridium.

There is no "return for repair-and-return" service available for any of the WEBs-AX Security products.

For proper credit on an in-warranty unit, ship the defective unit to Tridium within 30 days.

Prior to returning the unit, contact one of the following Tridium offices to obtain a return authorization (RA) number and other instructions. Please provide:

- Product model
- Serial number
- Nature of the defect

United States

Phone: 804-254-7086, ext. 11

Return to:
Tridium, Inc.
2256 Dabney Road, Suite C
Richmond, VA 23230
Attn: Return Department RA# _____

Email for RMA: rma@tridium.com

Asia/Pacific

Phone: +65 6887 5154
Fax: +65 6887 5342
Mobile: +65 9665 6024

Address:
Tridium Asia Pacific Pte Ltd
17 Changi Business Park Central 1
Honeywell Building,
Singapore 486073
Attn: Mr Lim Hoon Chiat, Engineering Manager
RA# _____

Email for technical support:hclim@tridium.com

Sales:

Australia
Phone: +61 4 1264 4234
Fax:+61 7 5597 2334

Japan
Phone: +81 044 829 1750

CERTIFICATIONS

Installation

The control units and accessories are intended to be installed in accordance with the following:

1. The National Electrical Code, ANSI/NFPA 70.
2. Canadian Electrical Code, Part I.
3. Local Authority having Jurisdiction.

Underwriters Laboratories, Inc (UL) / Canadian Standards Association (CSA)

When installed in accordance with UL requirements, this equipment meets the following UL listing:

- UL 294 Access Control System Units
- CSA No. C22.2 No. 205 Signal Equipment

See “UL Requirements,” page 25, for more details.

Federal Communications Commission (FCC)

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference with radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case, users at their own expense will be required to take whatever measures may be required to correct the interference. Any unauthorized modification of this equipment may result in the revocation of the owner's authority to continue its operation.

Canadian Department of Communications (DOC)

- This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
- Cet appareil numerique de la classe A respecte toutes les exigencies du Reglement sur le material broilleur du Canada.

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