# SEM-DSC PowerSeries Dual Path - Installation Guide

Alarm.com's Dual Path System Enhancement Module (SEM) can be used with DSC PowerSeries PC1616, PC1832, and PC1864 panels to enable wireless reporting of alarms and other system events using the wireless cellular network and optional Broadband Ethernet. The SEM is intended to be used as the primary communication path for all alarm signaling to the central monitoring station. The wireless alarm signaling and routing service is operated by Alarm.com. The SEM also features integrated support for Alarm.com's home automation services with built-in Z-Wave capabilities.

SYSTEM ENHANCEMENT MODULE

WIRE AND FUSE   SCREWS   WALL ANCHORS

ETHERNET DONGLE
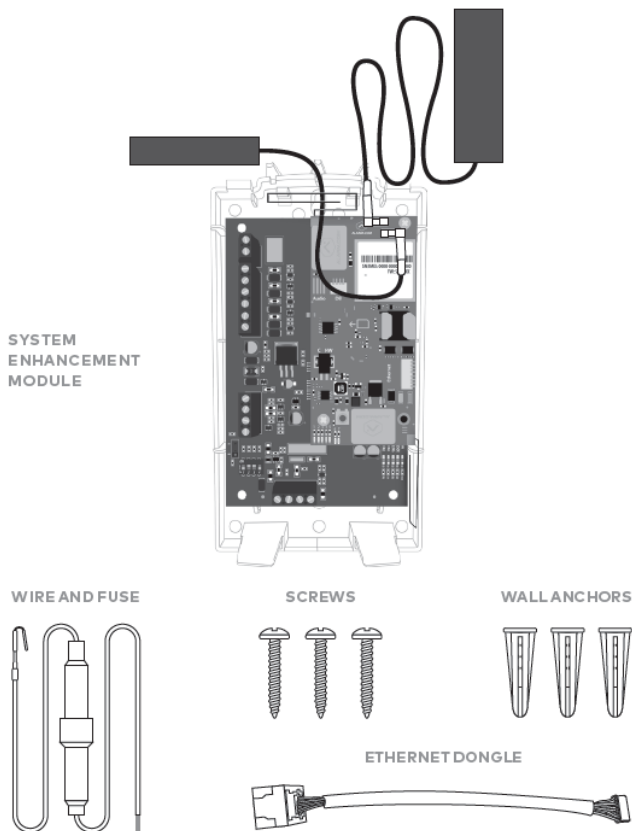
Tools and supplies needed

- Small blade screwdriver and Phillips screwdriver
- Drill and bits for screws and/or wall anchors
- Four-conductor, 22-gauge or larger stranded wire
- Alpha keypad

Alarm.com strongly recommends installing an alpha keypad with at least 32 zones to ensure the "Communication Failure" trouble condition is displayed to the user. See FAQs on page 16 for more information.

Verify panel compatibility

The SEM is compatible with PowerSeries PC1616, PC1832, and PC1864 firmware version 4.2 or newer.
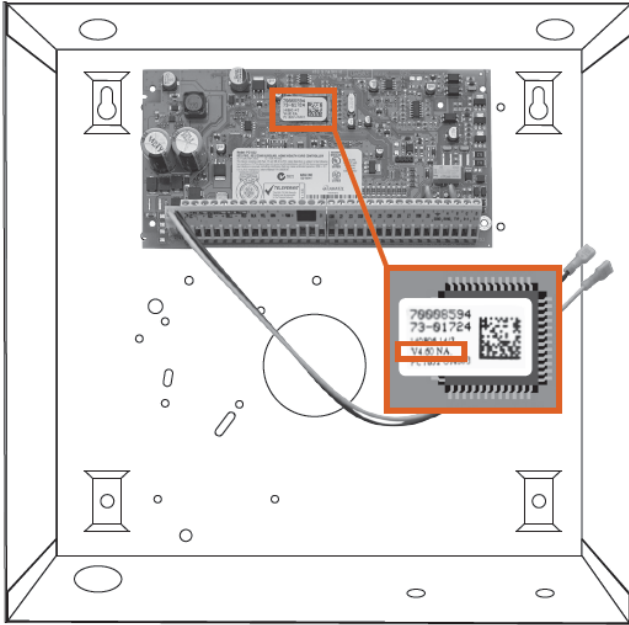
Create an account

Before installing the SEM, first create a new Alarm.com customer account. We recommend creating the account at least 24 hours prior to installation. This will ensure that the SEM is activated prior to installation. To create an account, go to the Alarm.com Dealer Website or MobileTech and login. You will need the following information to create the account:

- Customer Address
- Customer Phone Number
- Customer E-mail
- Preferred Login Name for the Customer
- Alarm.com Module Serial Number
- Existing Panel Installer Code

During the "Create New Customer" process, you will be prompted to enter the current Installer Code on the panel. Alarm.com will use this code to access panel programming and read information stored on the panel.
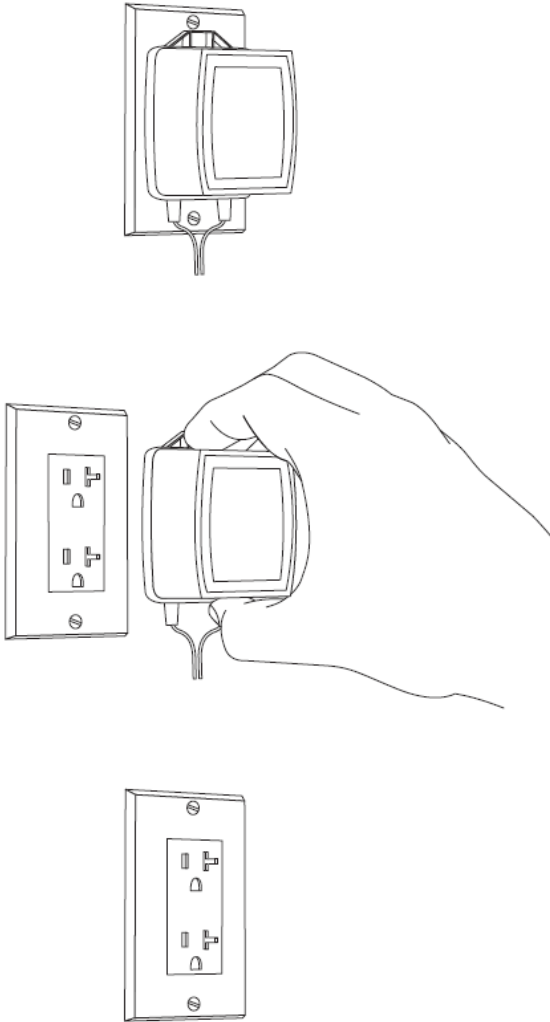
At the end of the "Create New Customer" process, you will be able to print or email a Welcome Letter for the customer, which includes login information for the Alarm.com Customer Website.

Disconnect power from the panel

Prior to disconnecting power from the panel, first verify that the panel is disarmed.

Next, remove panel AC power and disconnect the backup battery.

Caution: This is necessary to prevent damaging the panel or module while making wiring connections.

Mount the SEM

Caution: You must be free of static electricity before handling electronic components. Touch a grounded metal surface before touching
the circuit board.

Press down on the bottom tabs of the enclosure cover to remove it and set it aside.

Carefully remove the SEM circuit board by depressing the interior bottom tab.

Place the SEM back plate on the wall at the desired mounting location and mark the three mounting holes as shown below.
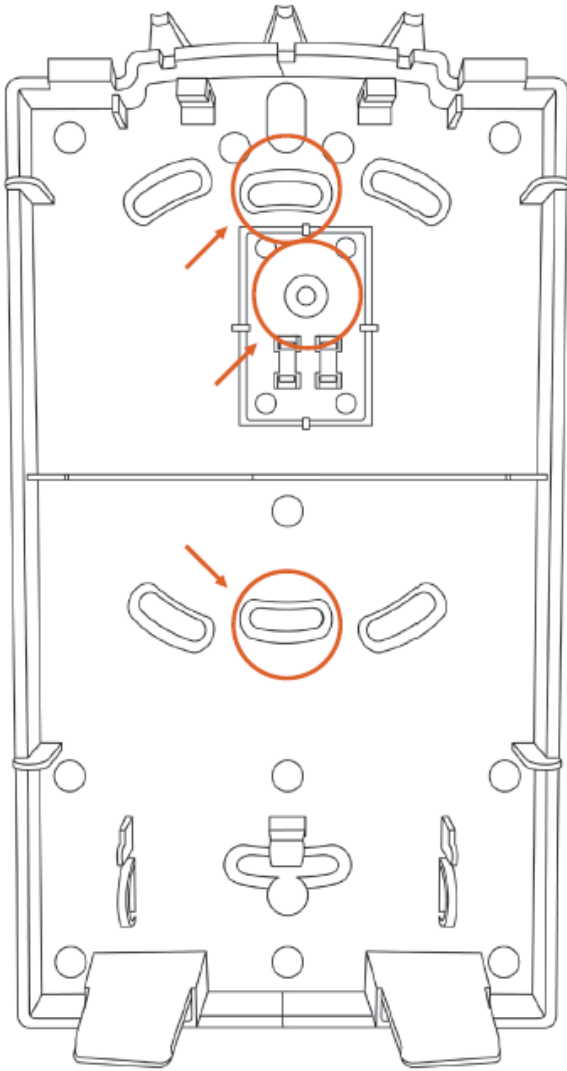
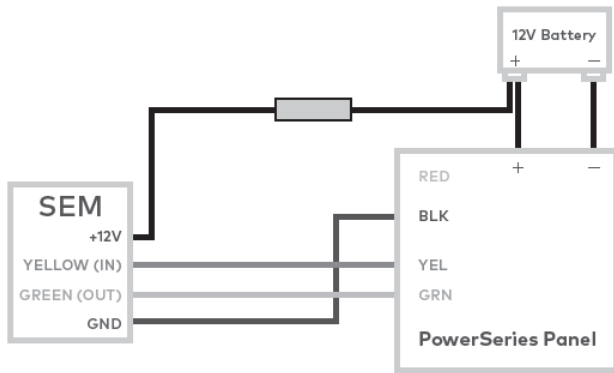Set the back plate aside and drill holes at the mounting locations.

Use wall anchors where studs are not present and secure the back plate to the wall with the enclosed screws.

Insert the SEM circuit board back into the back plate.

Wire the SEM to the panel

Caution: Verify panel AC power is removed and the backup battery is disconnected.

- Connect panel terminal SEM GND to BLK.
- Connect panel terminal YELLOW (IN) to YEL.
- Connect panel terminal GREEN (OUT) to GRN.
- Use the included red cable with the two prong battery connector to connect the battery to both the SEM and the panel. For a power limited circuit, ensure the fuse is inside the PowerSeries panel.

Once wiring is complete, route the antenna(s) outside of the enclosure, away from the SEM, and replace the enclosure cover. Please note that the antenna(s) should be routed through the second and third channel openings at the top of the enclosure (see below).
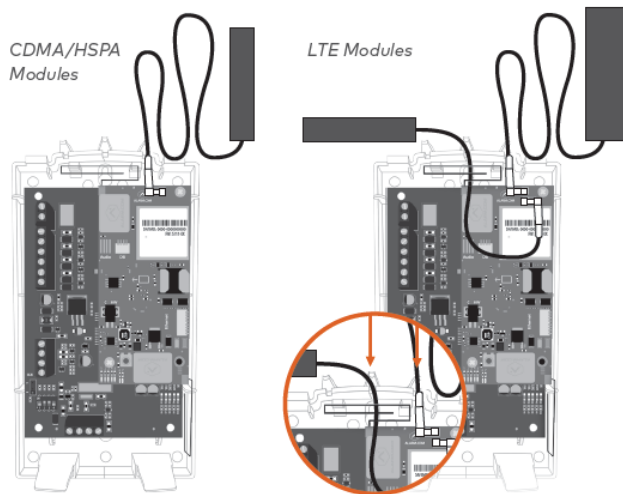
Dual path(Optional)

For Broadband Ethernet, connect the provided Ethernet Dongle to the connector on the SEM.

Connect the Ethernet cable to the provided Ethernet Dongle.

Power up the panel

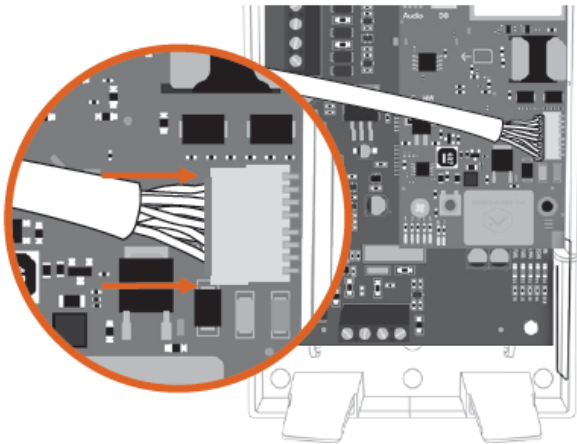Connect the backup battery and restore AC power to the panel. For the SEM to interact with the existing zones on the system, it must read them from the PowerSeries panel. The SEM will do a "zone scan" to read this information.

ZONE SCAN

~10 minutes

Do not touch the panel or keypad.

The zone scan will automatically begin within one minute after the panel is powered up and should take between 5 and 15 minutes, depending on the number of partitions and zones on the system. Do not touch the panel, keypad, or SEM at this time.

The zone scan is complete when the green and yellow lights on the keypad remain solid. If you press any buttons on the keypad during the zone scan, the message "system unavailable" will display on the screen. The date and time will show on the screen when the zone scan is complete.

Important: If the system was previously communicating over a phone line, we recommend Disabling Telco Line Monitoring (Section 15, Option 7) and Removing the Phone Numbers (Section 301-303).

Broadcast Sensor Names

For the SEM to be able to read the sensor names stored on the panel and display them on Alarm.com, you must broadcast the sensor names stored on the keypads. This should be done for every install with an LCD keypad and is necessary even if there is only one keypad on the system.

Broadcast sensor names by selecting the following:

[*] + [8] + [Installer Code] + [*]
to enter LCD programming.

From LCD programming, go to field 998
and press [*] to broadcast sensor names.

Note: Once broadcasted, sensor names will be updated on the Dealer Site and MobileTech. If the sensor names are not updated, please request the sensor names by selecting "Request Sensor Names" on the Dealer Site or MobileTech.

Add & Delete Z-Wave Devices

Please visit the Dealer Website Support Center for a complete explanation of Z-Wave communication, Z-Wave signal strength, and additional installation resources.

Alarm.com will not recognize any Z-Wave devices previously learned into the panel. These devices will need to be deleted from the previous Z-Wave network and added to the SEM for the customer to use Alarm.com's home automation services (e.g. automation control via customer website, app, and intelligent automation rules).

Important: If the customer is on a different interactive platform, we recommend having them log in to that site and taking screenshots of notifications, rules, and home automation device names for reference later.

Adding Z-Wave devices

Using the Dealer Website or MobileTech is strongly recommended.

Using MobileTech

1. Move all Z-Wave devices to their final location on the property.
2. Open MobileTech and select the customer.
3. Navigate to the Equipment List screen.
4. Select emPower Management.
5. Select Add Z-Wave Devices.
6. Wait for the bolded message: Checking for new devices on the network.
7. Trigger a device to add it to the network.
8. When a device is added successfully, it will show up on this screen following a 30 second delay.
9. Continue triggering devices. You may add several devices to the network without re-entering Add Mode.

Using the Dealer Website

1. Move all Z-Wave devices to their final location on the property.
2. Navigate to the Equipment page on the Dealer Website.
3. Click the emPower Devices tab.

4. Click Add Z-Wave Devices.

5. Wait for the bolded message: Checking for new devices on the network.

6. Trigger a device to add it to the network.

7. When a device is added successfully, it will show up on this screen following a 30 second delay.

8. Continue triggering devices. You may add several devices to the network without re-entering Add Mode.

Using the SEM

1. Press and hold Z-Wave button on the Alarm.com module.

2. Release the button once LED L5 flashes in groups of four. L2 will also flash.

3. Trigger a device to add it to the network.

4. When a device is added successfully, L5 will illuminate solid.

5. You will need to re-enter Add Mode before triggering the next device.

Note: If you can't add a device to the network, you may need to delete the device's current network data using the device deletion process before you can add it to the new network (some devices come from the factory with network data).

Deleting Z-Wave Devices

Using the Dealer Website or MobileTech is strongly recommended.

Using MobileTech

1. Open MobileTech and select the customer.

2. Navigate to the Equipment List screen.

3. Select emPower Management.

4. Select Delete Z-Wave Devices.

5. Wait for the bolded message: Checking for deleted devices on the network.

6. Trigger a device to delete it from the network.

7. When a device is deleted successfully and its network data is erased, it will show up on this screen following a 30 second delay.

8. Continue triggering devices. You may delete several devices from the network without re-entering Delete Mode.

Using the Dealer Website

1. Navigate to the Equipment page.

2. Click the emPower Devices tab.

3. Click Delete Z-Wave Devices.

4. Wait for the bolded message: Checking for deleted devices on the network.

5. Trigger a device to delete it from the network.

6. When a device is deleted successfully and its network data is erased, it will show up on this screen following a 30 second delay.

7. Continue triggering devices. You may delete several devices from the network without re-entering Delete Mode.

Using the SEM

1. Press and hold the Z-Wave button on the Alarm.com module.
2. Release the button once LED L5 flashes in groups of two. L2 will also flash.
3. Press and hold the Z-Wave button on the module a second time.
4. Release the Z-Wave button once LED L5 flashes in groups of two.
5. Trigger a device to erase its network data and delete it from the network.
6. When a device is deleted successfully, L5 will illuminate solid.
7. You will need to re-enter Delete Mode before triggering the next device.

LEDs

The Alarm.com Module LEDs can be used to indicate communication errors, panel communication, network communication, and signal strength.

System Enhancement Module (SEM)
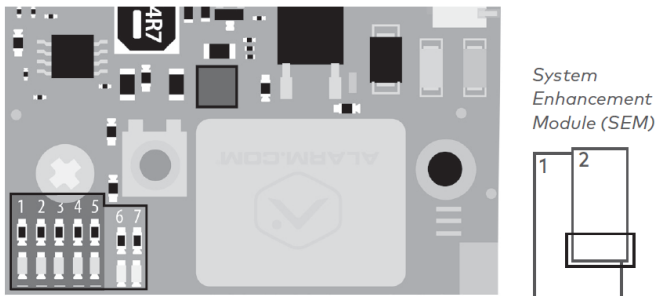
BOTTOM OF ALARM.COM MODULE

LED function

L1 Error LED	L1 will flash 1 to 8 times in a four-second interval to indicate specific error conditions such as a network error, panel communication error, or radio error.
L2 Panel communication LED	L2 flashes every time a data packet is received from the panel.
L3 Cellular communication LED	L3 flashes every time a data packet is received from the cellular radio.
L4 Cellular signal level LED	L4 flashes 0 to 5 times indicating the cellular signal strength, or toggles on/of f when communicating with the Alarm.com servers.

L5 Z-Wave Error LED	Visit the Dealer Website Support Resources for additional Z-Wave installation resources.
L6	Reserved for future use.
L7	Reserved for future use.

LED L1 (Red)

L1 flashes when an error is encountered. The number of flashes indicates the error number. If there are two or more errors at the same time, the errors will flash one after the other. The LED will stay off for at least four seconds between errors.

LED L1 error descriptions and solutions

Number of flashes	Description
1	Alarm.com module cannot communicate with the panel. Perform a power cycle on the panel. If the error persists lift the Alarm.com module out of the SEM circuit board and re-insert it, while power is disconnected from the system.
2 then 4	The Alarm.com module provisioning process could not be completed. If the error persists, power cycle the system, then contact Technical Support.
2 then 5	The Alarm.com module provisioning process could not be completed because the module is currently roaming off the carrier's primary network.
3	The Alarm.com module is trying to register on the cellular network. If it persists for more than a few minutes, the module is having problems registering. Check L4 for signal level. If signal level is lower than 2 bars, change the panel's location or use a remote antenna option.
4	The Alarm.com module is registered on the cellular network but could not connect with Alarm.com. Contact Alarm.com Technical Support.
5	The radio on the module is not working correctly. If this persists for more than a few minutes the module may need to be replaced. This error is extremely rare, so please verify that the module is flashing 5 times.

Number of flashes	Description
6	This indicates an error only if it persists for more than a minute. Otherwise, it's an indication that the module is resolving an unusual condition regarding communication with the cellular network.
7	The SEM is unable to access panel programming. Check panel wiring and Installer Code.
8	If this error persists, the account may have been set up incorrectly. Check that the serial number being used matches the serial number used to create the account. If the serial numbers are the same, contact Technical Support.

LED L2 (Yellow)

L2 flashes with every communication between the SEM and the panel. The normal pattern calls for a series of quick flashes every two seconds when the Alarm.com module is in Idle mode or four seconds in PowerSave mode. See Alarm.com Module States (modes) for an explanation of the
three modes.

L2 also occasionally flashes in patterns to indicate Z-Wave status, when the SEM is being used to add or remove Z-Wave devices.

LED L3 (Green or Yellow)

L3 flashes with every communication between the SEM and its radio unit in Idle mode, and with every communication with Alarm.com in Connected mode. In PowerSave mode, this LED flashes in unison with LED L2.

LED L4 (Green or Yellow)

L4 indicates the cellular signal level as a number of flashes (0 to 5 bars). The number of bars may not correspond to the number of bars shown on your cell phone. A level of 5 bars is obtained only in the strongest signal conditions. Signal level is updated every ten seconds if it fluctuates,
or every 30 seconds if it is fairly stable.

If LED L4 is continuously flashing, the module provisioning process is in progress. LED L4 will begin flashing to indicate signal level as soon as the provisioning process is complete.

If LED L4 is not flashing, this means one of the following:

- The Alarm.com module is in PowerSave mode
- The Alarm.com module just powered up
- There is no cellular coverage in the area

In Connected mode, LED L4 toggles on and off.

Important: Alarm.com recommends a steady signal level of two or higher for proper operation of the SEM.

LED L5 (Yellow)

L5 indicates Z-Wave errors. If you can't add a device to the network, try deleting the device and re-adding it to the network. Contact Alarm.com Technical Support with additional issues.

ALARM.COM MODULE STATES (MODES)

There are three Alarm.com module states (modes).

Idle Mode

In Idle mode, the AC power is up, the battery level is greater than 11.5 volts, and the SEM is not currently connected to the Alarm.com servers. This is normal for the SEM and is the most common state.

L1	Flashes errors, if any
L2	Communication with panel
L3	Communication with radio unit
L4	Signal level (0 to 5 bars)
L5	Flashes errors, if any

PowerSave Mode

In PowerSave mode, the module just powered up, AC power is down, or battery level is less than 11.5 volts. The radio part of the SEM draws 10 mA in PowerSave mode. It is fully functional and will go into Connected mode as soon as a signal needs to be sent. Performing an Alarm.coml phone test will switch the module into Idle mode and update the signal level reading.

L1	Inactive
L2	Communication with panel
L3	Same flashing pattern as L2
L4	Inactive
L5	Inactive

Connected Mode

In Connected mode, the SEM is connected to the Alarm.com servers and reported an alarm or other condition. The module stays in Connected mode for at least six minutes after the last message is exchanged. Entering Installer programming will cause the SEM to go into Idle mode.

L1	Flashes errors, if any
L2	Communication with panel
L3	Communication with Alarm.com
L4	Alternates two seconds on, then two seconds off
L5	Inactive

FREQUENTLY ASKED QUESTIONS

Will the customer be notified if the panel fails to communicate with Alarm.com?

Yes, the SEM will automatically use the last available zone on the panel to display this information. The zone will be named "Communication Failure" and will be displayed on the keypad as if it were an open zone.

Important: There needs to be one available keypad slot for the SEM and a keypad should never be enrolled in the same slot as the SEM. The SEM will use the highest available slot at install.

How should I choose the best location to install the SEM?

- Check the signal strength before choosing a final location. Perform a walking signal strength test by powering the SEM using the battery directly (connect the GND and +12V terminals). After two minutes, cellular signal level LED L4 will flash between one and five times to indicate the signal strength (where five is the strongest signal). Alarm.com recommends a signal level of two or higher for proper operation of the SEM.
- Avoid mounting the SEM in areas with excessive metal or electrical wiring, such as furnace or utility rooms.
- Mount the module near an outside wall, preferably on an upper level.
- Do not mount the SEM inside of the panel's metal box. Doing so will negatively impact Z-Wave performance.
- For homes or businesses located in canyons or with hills nearby, it may be necessary to place the antenna higher in the building.
- If the SEM location requires a longer power cable, splice the provided power wire with the fuse to your wire and leave the fuse inside the PowerSeries panel enclosure.

Why do I need to enter the Installer Code during account creation?

The Installer Code entered during account creation (see Step 2) will be used to access and read the zones currently learned into the panel. The Installer Code can be changed after the zone scan is complete.

How do I initiate or test communication between the SEM and Alarm.com?

Perform an Alarm.com phone test by pressing [#] + [9] + [8] + [7] + [*]. This phone test will not be viewable on the keypad, but can be verified on the Dealer Website or MobileTech Event History.

How do I get the SEM and Alarm.com to read the sensor names already assigned on the panel?

For the SEM to be able to read the sensor names stored on the panel and display them on Alarm.com, you must broadcast the sensor names stored on the keypads (see Step 7).

Does the SEM support 6-digit user codes?

The SEM does not support 6-digit user codes.

Does the SEM support multiple partitions?

Yes, the SEM comes with multiple partition support, including the ability to arm and disarm partitions using the Mobile App or Customer Website. Sensors must be enrolled and given partition access on the panel before partitions are displayed on the Dealer Site, MobileTech, Customer Website or Mobile App.

Can zones be enrolled in multiple partitions?

Zones should only be enrolled in a singe partition. Zones in multiple partitions are not supported by the SEM.

Is the SEM compatible with DLS?

DLS is not supported. The SEM cannot be used as a DLS communicator. DLS panel programming changes via another communication pathway (PC Link, POTS, etc.) will not be captured by the SEM until the system is power cycled.

Do I need to change any programming settings for the SEM to work?

No, there aren't any required settings that need to be changed. However, we do recommend changing the following settings if the system was previously communicating over the phone line.

- Disable Telco Line Monitoring (section 15, option 7)
- Remove the phone numbers (section 301-303)

Does the SEM support reporting multiple alarms on a single zone (swinger shutdown)?

The SEM will only report one instance of each alarm per alarm event regardless of the settings specified on the panel. The SEM does not
support reporting multiple alarms on a single zone.

Can I can add and delete sensors remotely?

Yes, sensors can be added, changed, or deleted using MobileTech or AirFX on the Dealer Website.

Are the additional terminals on the SEM circuit board used or needed for the install?

No, these terminals are for future development. Please disregard the relay, zone, ring and tip terminals on the SEM circuit board.

Does the SEM support Cross Zones?

No, the SEM does not support the Cross Zone attribute. The SEM will not report the Cross Zone event to the central station.

Are both communication pathways (cellular and Broadband) required?

We recommend using both the cellular and Broadband connection.

However, the SEM will communicate with only one signaling path.

Troubleshooting

The Equipment List is empty on the Dealer Website or MobileTech

If the Equipment List is not showing on the Dealer Website or MobileTech and the SEM failed to do a zone scan when initially powered on, verify that:

- All wiring is correct
- The Installer Code is synced (if the Installer Code is out of sync you can change it to a new, unique code locally at the panel)
- The panel is disarmed, and Request an Equipment List on the Dealer Website or power cycle the panel

None of the LEDs on the SEM are ON

Remove power from the panel and verify that all wiring is correct.

My keypad will occasionally display "System Unavailable"

The keypad may display "System Unavailable" for brief moments while interacting with the SEM. This is normal and expected behavior.

Specifications

Compatibility	DSC PowerSeries PC1616, PC1832, and PC1864 version 4.2 or newer.

Power Requirements	12 V nominal, 130 mA (continuous) 2000 mA (instantaneous peaks) maximum (from panel battery)
Cellular Network	Dual Band CDMA (3G), Dual Band HSPA (3G), or Dual Band 4G LTE
Panel Interfaces	Three keypad bus connections 12V power and ground to panel battery
Alarm.com Module Indicators	One module/panel communication status LED, one module power LED, one automation LED, three wireless communication status LEDs
SEM Circuit Board Indicators	One LAN LED, one processor LED, one COMM fail LED
Operating Temperature	32 to 120°F (0 to 49°C)
Storage Temperature	-30 to 140°F (-34 to 60°C)
Humidity	90% relative humidity non-condensing
Enclosure Dimensions	(L x W x D) 7.5 x 4.25 x 1.5 in. (19.05 x 11.43 x 3.81 cm)
Enclosure Color	White
Case Material	High-impact, ABS plastic
Listings	FCC part 15, Verizon Certified

Additional resources

Academy Enroll in the System Enhancement Module (SEM) 201 - PowerSeries course today! For more information on accessing Academy Training, see How can I access the Training Center on the Dealer Website?.