Introduction

This manual is intended to guide ETC Service Technicians through the process of upgrading existing Sensor rack installations to Sensor+ racks with an CEM+ control module. This manual covers SR6, SR12, SR24 and SR48 permanent installation dimming racks.

If you have questions about the retrofit process that are not answered in this manual, please contact ETC Technical Services.

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Warnings and Notice Conventions

These symbols are used in Sensor documentation to alert you to danger or important information:

**Note:** Notes are helpful hints and information that is supplemental to the main text.

**CAUTION:** A Caution statement indicates situations where there may be undefined or unwanted consequences of an action, potential for data loss or an equipment problem.

**WARNING:** A Warning statement indicates situations where damage may occur, people may be harmed, or there are serious or dangerous consequences of an action.

**WARNING:** RISK OF ELECTRIC SHOCK! This warning statement indicates situations where there is a risk of electric shock.
Safety

Please note the following safety warnings before use:

- Disconnect power from the racks before all maintenance.

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WARNING: Dimmer racks without an accessible power disconnect device cannot be serviced safely.

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Overview of this Manual

Reference this manual throughout the retrofit procedure.

- Preparation, page 5 - before you open the rack.
- Remove the Old, page 5 - labeling and remove the existing equipment.
- Install the New Backplane, page 9 - transfer the wiring and install new components.
- Change out the AF Cards (if present), page 10 - remove the existing Advanced Feature cards and install the new ones.
- Change out the Beacon PCB, page 10 - replace the beacon pcb with the new one.
- Verify the Retrofit, page 11 - put the dimmers back in the rack and power up the rack.
- Configure the CEM+, page 11 - put a configuration in the CEM+.
- Finishing Touches, page 11 - replace rack stickers and the acrylic beacon in the door.
- Quick Reference Sheet, page 13 - is an illustrated overview of the retrofit procedure.

When viewing this document in electronic form (pdf file) with Adobe Acrobat Reader, blue italicized text followed by a page number such as “Overview of this Manual, page 2” is a link within the document. If you click on the link, it will jump to that section or topic.
The table below lists the parts and components needed to retrofit a Sensor rack up to a Sensor+ rack with a CEM+. Each part is listed to reflect the different quantities for the different kits and types of racks.

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<th>Parts/Components</th>
<th>ETC Part Number</th>
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<th>SR24 7150K1003</th>
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## Parts/Components

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## Required Tools

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- 3/8" Socket
- Diagonal wire cutter
- Permanent marker
- Heat shrink gun
Section 2
The Retrofit

Preparation

Step 1: Use Sensor Configuration Editor and a SLTA to download and save the current Sensor configuration out of racks for later reference.
Step 2: Turn off main power to the rack(s).
Step 3: Pull the modules out of the rack. Note and document the module’s order/positioning in the rack for proper insertion and configuration later.
Step 4: Use a digital voltmeter and verify that power is off by checking voltages for all combinations between the phase bars, neutral and ground.

Remove the Old

Step 1: Mark the edge connector of each dimmer output ribbon cable (1, 2, 3 & 4) as illustrated below in the hexagons. There may be stickers on the ribbon cables already, however these refer to cable length and not dimmer outputs. They should not be used as a reference to these instructions.

Step 2: Document and/or label each wire that is currently landed on the J2 edge connector.
Step 3: Unscrew the dimmer output edge connectors from the backplane metal.
Step 4: Carefully feed the dimmer output ribbon cables through the backplane.
Step 5: Examine each ribbon cable for any nicks or cuts due to backplane scrapes.
Step 6: Unscrew the power edge connector (J1). Remove it from the back plane by sliding it out of the notch in the rack and carefully pushing it through the backplane metal. This connector will be used in the upgrade.
Step 7: Unscrew the backplane metal from the rack. (One screw in each side upper-corner - two screws total.) Discard these screws. Replacement screws with thread locker are provided (ETC Part# HW377).

Note: The order/layout of the dimmer output edge connectors is different on the CEM+ backplane.
Step 8: Push the backplane towards the back of the rack to free the backplane side tabs
Step 9: Bend the sides into the center (out of the sides of the rack).
Step 10: Slide backplane metal forward in order to allow easier working space while removing data terminations.

Data and Power Terminations

Note: There are two different connectors available for CEM+ data terminations. One is for stranded wire as found in Belden 9729 and contains screw terminals (ETC Part# J3407- included with the kits). The other style is an IDC connector (ETC Part# J3409 - an additional line item) for solid-core wire such as Category 5 cabling.

Step 1: Transfer all wire groups (except those designated as ETCLink) to the new connectors one at a time. Clip tie-wraps as needed to free wires from the old backplane. See Quick Reference Sheet, page 13 for detailed data wiring instructions and pin-outs.
   a: In most cases stranded wire has been used for the data terminations. If so, land the DMX wiring on the new connectors in the same manner as they were on the old backplane (physically landed on the same connector and no need to use the DMX Thru connector).
   b: If Category 5 type cabling is used, use IDC connectors and land the rack-to-rack jumper connections on the separate DMX Thru connector on the backplane (J15).

Caution: If using the IDC connector for Cat5 solid-core wiring, you must start with clean wire ends (clip the old punched end. Re-punching the old ends could result with an intermittent or failed connection.

Step 2: If present, cap the ETCLink wiring.
   a: Clip the bare ends.
   b: Cap the ends of the wires with the provided UL recognized heat shrink and a heatgun.
   c: Wire-tie the wires back to the cable.
   d: Secure the cabling to the side or back of the rack with tie mounts and wire ties.

Note: Complete removal of the ETCLink wiring may not be possible, and isn't necessary if properly capped as described in Step 2.

Step 3: Finish removing the old backplane metalwork. Discard the old backplane.
Step 4: Clip the first wire-tie behind the existing J1 power connector to give the harness more room to move while you work.
Step 5: Install the power adapter harness to edge connector (straight thru PCB) to old power connector (match the wire colors).

Step 6: Secure the power connectors together with provided 4"-wire-ties. Clip wire tie ends for neatness.

Step 7: Center the provided 4 1/2" x 1/2" dia. heat shrink tubing over the power harness connectors (leaving at least 1 1/4" past each connector) and heat shrink it with a heat shrink gun.

Step 8: Secure the power harness to the rack:

- **SR6, SR12 & SR24 racks**
  a: Use a pair of sticky-back tie mounts and wire ties to secure the power harness to the rear or left side of the rack. The new power connector should be facing out of the rack (near where the old harness used to be installed) and the power harness needs to be kept back from the phase bars.

- **SR48 racks only.**
  a: Remove the screw near the bottom of B phase bar that connects the red sense wire to the phase bar.
  b: Use a 3/8" socket to remove the five bolts holding the B phase bar in place and push the phase bar towards the center of the rack. You only need enough room to mount the power harness. Do not remove the power feeder.
  c: Using a couple sticky-back tie-mounts, mount the power harness to the left side of the rack (see detail below). The new power connector should be facing out of the rack (near where the old harness used to be installed) and the power harness needs to be kept back from the phase bars.
d: Use a 3/8" socket to re-install the B phase bar with the five bolts.
e: Re-attach the red sense wire to the B phase bar with the previously used screw.

Step 9: Identify the different dimmer output ribbon cable transition cards. An SR6 and SR12 will only have a single “lower” card.

Step 10: Mate the transition cards with the ribbon cable edge connectors as indicated below. Secure the ribbon cable connectors to the transition cards with wire ties. The tie wrap binding needs to be on the top for an Upper board and on the bottom for a Lower board for clearance. Clip wire tie ends for neatness.

Note: There are two different types. An “upper” card and a “lower” card. The PCB card is marked for both the type and which side is up when installed.

Step 11: Terminate the Ethernet cable with the provided Ethernet Termination Kit (ETC Part# 4101A2003). Follow the wire preparation and termination instructions included with the kit.
Install the New Backplane

Step 1: Set the DMX termination switches. Termination should be turned on for the last physical rack in the DMX daisy-chain (No DMX wiring goes back out for that port.) The switches and their location are shown here.

Step 2: Bend one arm of the backplane metal in towards the opposite arm (about 30 deg).

Step 3: Insert the backplane metal on an angle. Then straighten it once it is past the face of the rack. Push it into the rack far enough that it stays in place, but leave yourself some room to make the power and data connections.

Step 4: Make the power and data connections on the backplane.
   a: Dimmer output ribbon cables/transition cards. The order/layout is not the same as on the old backplane. See the illustration below. Make sure the proper side is facing up on each connector and that each connector is fully seated.
   b: Power harness (Look at the pin shapes for proper orientation. It will only fit one way.)
   c: DMX connections. (The wires come out the top on both styles of connectors.)
   d: Beacon connector (The wires come out the top.)
   e: Use the 1’ Cat5 Ethernet cable to connect the biscuit box to the backplane. (Not shown on the drawing below for clarity.)

- In an SR6, SR12 and SR24, use the double-stick tape (on the box) to secure the biscuit box to the bottom of the rack behind the backplane.
- In an SR48, use the double-stick tape (on the box) to secure the biscuit box to the bottom of the backplane.

Step 5: Push the backplane the rest of the way into the rack. Be careful of the power and data connections you just made. Don’t let any of the wiring become stressed or get pinched.
Step 6: Insert tabs in the side of the rack.

Step 7: With the tabs fully inserted in the sides of the rack, pull the backplane towards the front of the rack to line up the screw holes in the upper side corners to line up.

Step 8: Install one screw with a sleeve in each side upper-corner of the backplane.

**Note:** You cannot use the old screws without the additional shoulder-sleeve as they will block the CEM+ from being fully inserted.

### Change out the AF Cards (if present)

Step 1: Remove the old AF cards (pull the plastic tabs)

Step 2: Address the new AF cards (mini-switches) as shown below.

Step 3: Install the cards in the slots. Make sure they are completely and securely seated. Card #1 at the top, down to 4 at the bottom for SR48. (SR6, SR12 & SR24 have fewer cards. Always start with #1 at the top.)

### Change out the Beacon PCB

Step 1: Remove the two screws that hold the beacon PCB in the face of the rack.

**Note:** Be sure to use a properly sized screw driver (#2 Phillips) and a good amount of force as those screws are kept in place with a thread locker. Don’t worry about damaging the existing screws (replacements are provided) or shearing off the heads of the screws (the screw shanks are threaded into the PCB’s standoffs).

Step 2: Pull the PCB down and around the rack case. (The wire harness will only let it go so far.)

Step 3: Note the orientation of the connector and unplug the wire harness from the old Beacon PCB.

Step 4: Attach the wire harness to the new beacon PCB with the connector in the same orientation.

Step 5: Install the new beacon PCB (ETC Part # 7050B5109) with two screws (ETC Part # HW222) (two new screws of the same type are provided in case the old ones get damaged during the removal process).
**Finishing Touches**

Step 1: Remove the old Sensor beacon acrylic in the door and discard.

Step 2: Install the Sensor+ beacon acrylic in the door.

Step 3: Remove old Sensor label from the front of the door and discard.

Step 4: Clean the door surface to remove any dirt or old adhesive.

Step 5: Apply the new Sensor+ label to the front of the door. Line up the label around the opening for the acrylic in the door and be sure the label is straight. Use a piece of cloth or paper towel to make sure the label is flat & smooth and properly adhered to the rack door.

**Repeat the above steps for the remainder of connected racks.**

**Verify the Retrofit**

Step 1: Put the dimmer modules back in the rack in the correct/original order.

Step 2: Put the CEM+ in the rack.

Step 3: Power up the rack.

Step 4: Check that the CEM+ powers up and the rack fan turns on. (The only rack errors should be a lack of DMX on the ports if the DMX source is not present.)

**Configure the CEM+**

Step 1: Configuration of the CEM+ is done via the front face panel interface or via a graphical HTML interface called Sensor+ Connect that is resident in the CEM+.

Step 2: Configure the rack to reflect the rack type and dimmer module types installed.

Step 3: Configure the data types that will be used (DMX and EDMX) including the rack patch.

Step 4: For detailed configuration information, please refer to the CEM+ Configuration Manual.
Number the ribbon cables

Label the data wiring (use the pin-out from #4)

Start to remove the old backplane

Transfer wire groups one at a time to the new backplane data connectors.

CEM to CEM+

DMX A - 1  J2  J10  1  DMX COM
DMX A + 2  2  2  DMX A -
DMX COM 3  3  3  DMX A +
PANIC IN 4  4  5  COM/GND
BEACON 5  5  6  COM/GND
+10V 6  6  7  N/C
COMMON 7  7  8  N/C
PANIC OUT 8  Red
DMX B - 9  Blue
DMX B + 10  Black
DMX COM 11  J16
ETCLink V+ 12
ETCLink (B2) 13
ETCLink (B1) 14

Physical Overview

- Remove the backplane screws
- Transfer wire groups one at a time to the new backplane data connectors.
- Clip ends, heat shrink, and tie back.
5 Assemble the power harness adapter & heat shrink it

6 Identify the ribbon cable transition cards for correct use and placement

7 Mate the transition card(s) with the correct ribbon cable connector. Note the markings for proper orientation to both the ribbon cable and the backplane.

8 Set the DMX termination

9 Bend & insert the new backplane

10 Make the power & data connections

11 Install backplane screws (2)

12 Address AF cards

13 Install new beacon PCB

14 Install new beacon acrylic

15 Apply new Sensor+ label
Notes: