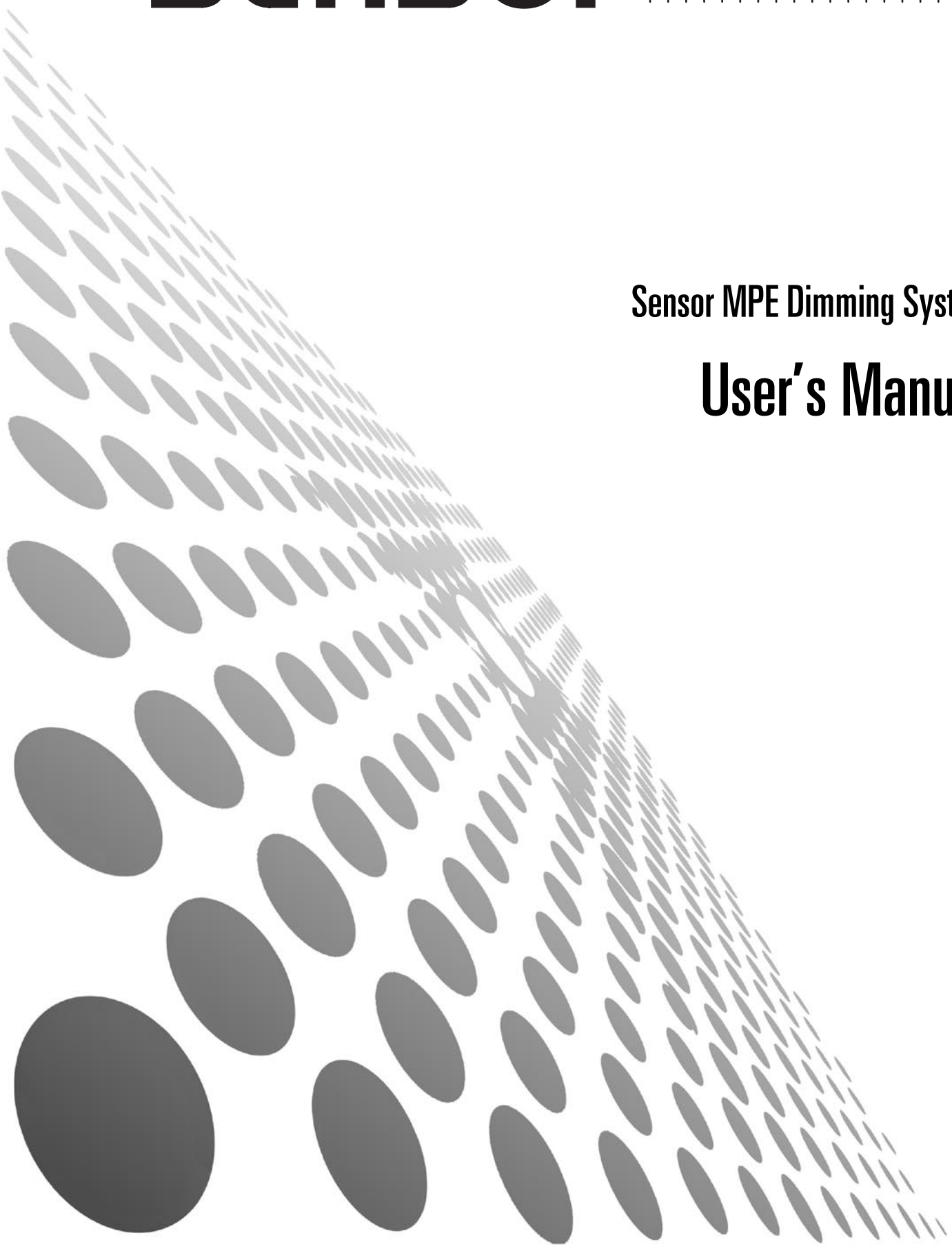


Sensor MPE Dimming System

User's Manual

Contents

Introduction

Welcome to the User Manual for the Sensor MPE dimming system. This manual contains operating instructions for Sensor MPE dimming systems. There are two Sensor MPE installation racks, the six slot SR6 and the twelve slot SR12.

How to use this manual

Manual organization

This manual has separate sections to tell you how to use, maintain and troubleshoot your Sensor MPE dimming system:

- *Operation* on page 7 describes system operation and normal operating indications
- *Maintenance* on page 9 describes routine system maintenance
- *Service* on page 11 tells you how to perform repairs and replace defective components
- *Troubleshooting* on page 15 tells you how to correct problems you might experience with your system and how to contact ETC to get more advanced technical assistance.
- *Specifications* on page 19 describes basic system specs

Warnings and notice conventions

These symbols alert you to danger or important information:

Warning! Warns you when electricity may cause injury

Warning! Warns you when there is a possibility of other types of injury

Caution Alerts you to important information relating to equipment performance or reliability

Contacting ETC

For questions about Sensor MPE systems, contact ETC Customer Service at 800/688-4116.

Sensor MPE overview

A Sensor MPE systems uses signals from your lighting control system (usually a lighting console or architectural system) to control the power output to lighting circuits. The MPE system can process two kinds of control signals:

Digital

DMX512 is the digital signal used by most modern lighting control systems. A single DMX512 connection can control up to 512 dimmer channels. The MPE can process DMX512 and an analog-type signal simultaneously.

Analog

Systems using analog control signals require the Analog/AMX adapter box. Although your system can be set to receive either type of analog signals, only one type can be used at one time.

- The most basic is 0 – 10Vdc Analog. It controls each dimmer by varying a DC voltage. Analog uses separate signal and common wires for each dimmer.
- AMX 192 sends a pulsed 0-5Vdc analog control signal. Each pulse sets the level for a single dimmer, allowing an AMX 192 connection to control up to 192 dimmers.

Note: *Because both types of analog control systems use voltage values to set levels, they are more susceptible to output fluctuations caused by interference and signal loss. See Turning on input filtering on page 14 for instructions on enabling input filtering to reduce level fluctuations.*

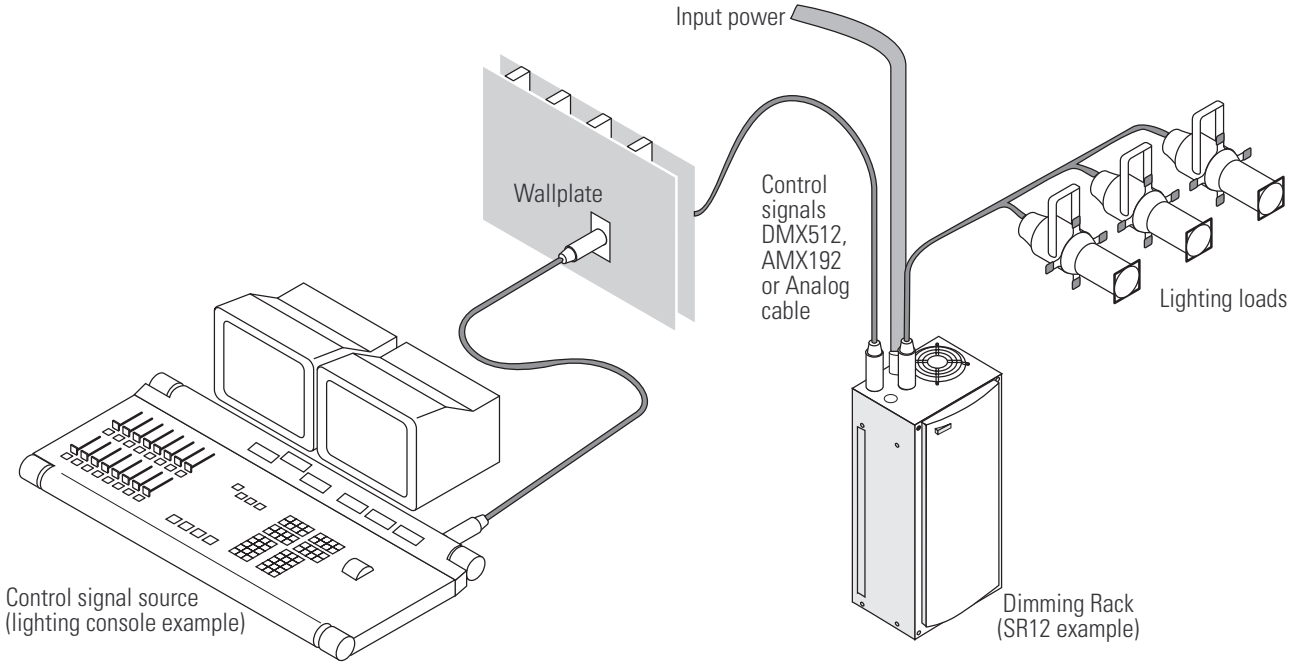


Figure 1: A typical MPE lighting system

Operation

Basic operation

MPE dimming systems normally operate automatically, without any user input. Normal conditions are indicated by a steadily lit Sensor beacon on the top left corner of the rack door.

This door protects your dimming components and contains the air filter. It should not be left open during operation.

Caution *Running your Sensor system with the door open exposes components to tampering and will quickly contaminate your system with dust, causing overheating and system shutdown.*

For manual dimming control and detailed status information, use the front panel controls and indicators on the Multi-Protocol Electronics module inside your dimmer rack.

Using the Multi-Protocol Electronics (MPE) module

The Multi-Protocol Electronics (MPE) module is installed in the bottom slot of the SR6 or SR12 dimmer rack. You access it by opening the dimmer rack door.

During normal operation, the MPE sets dimmer levels in response to signals from your control system and shows basic system information. You can also use front panel indicators and controls to:

- Monitor your system status
- Enable six manual control modes
- Run diagnostic tests on your system

MPE face panel indicator LEDs

LED name	Function	Normal indication
Phase A	Phase A power present	**On**
Phase B	Phase B power present	Three phase **On**, single phase **Off**
Phase C	Phase C power present	**On**
DMX	DMX512 signal status	**On** when DMX512 is present and valid
AMX	AMX192 signal status	**On** when AMX192 is present and valid
Analog	Analog 0-10Vdc status	**On** when Analog 0-10-Vdc is enabled
IAS	Integrated Architectural status	**Off** (IAS is not offered with MPE)
Error	Error indicator	**Off** (flashes to signal errors)

The eight status LEDs normally display system information. They are also used to display results of MPE diagnostic tests.

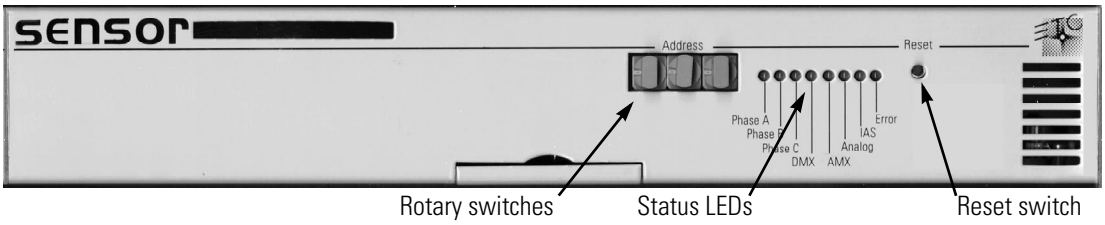


Figure 2: MPE face panel components

MPE face panel controls

MPE face panel controls are used in normal and self test operations.

Rotary switches

Three 10-position rotary switches are normally set to the MPE's DMX512 or AMX192 starting address. In diagnostic mode the switches can also be used to select self test options and set output levels.

Reset switch

The reset switch is used to start the MPE's self tests and to reset system electronics after you have made changes.

Maintenance

Cleaning dimmer rack air filters

Clean the air filter on your dimmer cabinet every six months, more often if your system operates in a dusty environment.

1. Open the dimmer rack door. The air filter is mounted on the inside of the door, held in on the bottom by a metal lip.
2. Slide the filter up about 1/2 inch until the filter base clears the top edge of the lip. Pull the base out far enough to clear the retaining lip and slide the filter down and out.

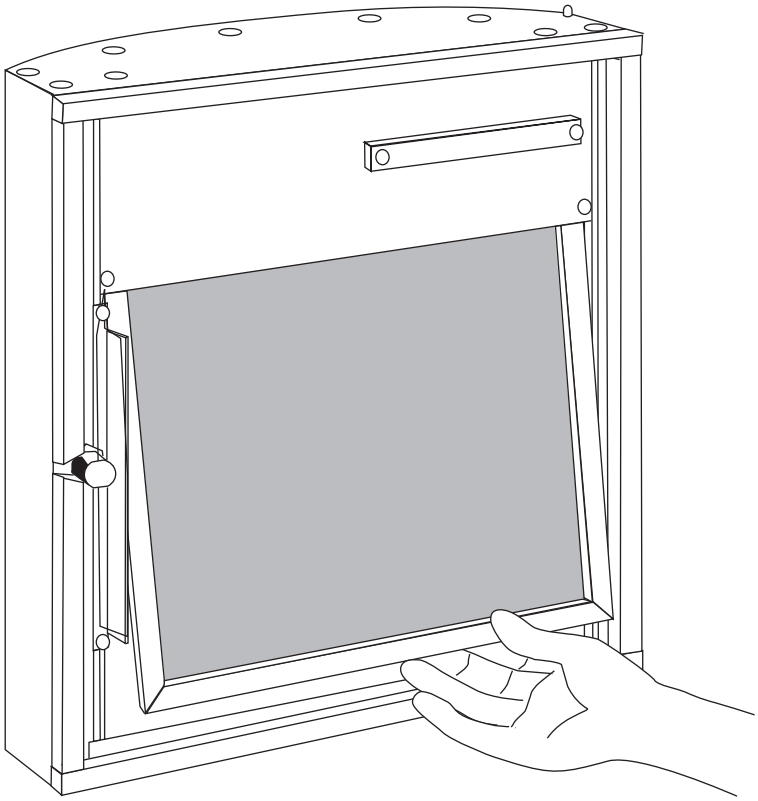


Figure 3: Removing the air filter

3. Vacuum or blow dust out of the filter.

Note: *You can wash the filter under clear tap water, but it must be completely dry before you reinstall it. Do not use soap or other chemicals to clean the filter.*

4. Slide the top of the filter back up into the slot at the top of the door until the base clears the metal retaining lip on the bottom of the door.
5. Let the filter drop back into place and close the door.

Note: *When you clean the air filter, you should also check the dimmer module air vents for dust. See Vacuuming dimmer racks on the next page for instructions.*

Vacuuming dimmer racks

You should inspect your dimmer rack when you clean the air filter and vacuum the front of the dimmer modules if necessary.

Warning! *To avoid the possibility of electrical shock, turn off power at the main breaker before touching the rack with the vacuum nozzle.*

1. Open the door and look at the modules' air vents and Silicon Controlled Rectifier (SCR) power cube air inlets. If a dust buildup is visible, vacuum the front of the modules.
2. Leave the modules inside the rack. Most dust collects on the dimmer choke vents and SCR power cube air inlets of the dimmer modules.

Warning! *Phase voltages inside the rack can be deadly. Do not remove rack modules when vacuuming dimmer racks. Only qualified technicians should expose the inside of the dimmer cabinet.*

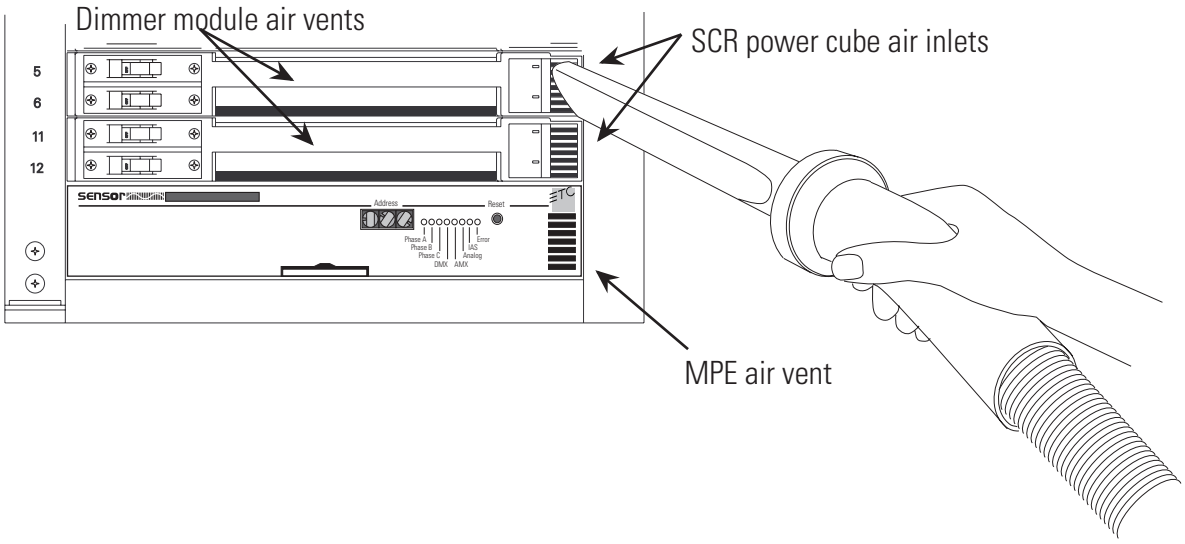


Figure 4: Vacuuming MPE rack modules

3. Use a narrow vacuum cleaner nozzle to vacuum dimmer module air vents, the SCR power cube air inlets and the MPE air vent. Do not push debris into the modules.
4. Close the door.

Service

Warning! *Servicing Sensor MPE dimming equipment exposes high amperage power connections inside the rack. Turn off power at the main circuit breaker before servicing your system.*

Contacting ETC about equipment problems

If possible, please have this information available before contacting ETC about an equipment problem:

- Your location, job name and Sales Order number.

Note: *The Sales Order number on a sticker on the bottom of your rack, visible when you remove the MPE module. See page12 for details.*

- Any error signals on the MPE status LEDs
- Related system problems or equipment failures

ETC Technical Services
3030 Laura Lane
Middleton, WI. 53562
Phone: 1-800-775-4382

Note: *For the best service results, always tell your service representative you are using the MPE version of Sensor dimming system.*

Changing Installation Rack modules

All Sensor MPE rack modules can be easily replaced without tools. Modules slide in and out of their slots and are ready to start dimming immediately.

Although Sensor modules, including the MPE, can be replaced with power on, always turn rack power off at the main circuit breaker before changing them.

Note: *Operating a dimmer rack with open module slots disrupts airflow inside the rack, which can lead to rack overheating.*

Using dimmer module circuit breakers

Circuit breakers are turned On and Off or reset using the switch handles on the left side of the dimmer modules.

Note: *Dual density dimmer modules have two circuit breaker switches.*

1. Open the dimmer rack door.
2. Put the circuit breaker switch in the desired On or Off position.
   - Push the handle **left** to turn the dimmer on or reset a tripped breaker.
   - Push the handle **right** to turn the dimmer off.

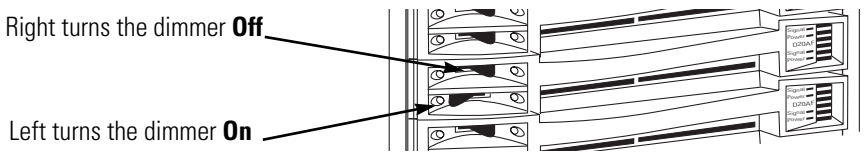


Figure 5: Dimmer module circuit breakers

Replacing an MPE module

1. Turn off rack power at the main breaker.
2. Open the rack door.
3. Grasp the pull tab centered on the bottom of the MPE and pull the MPE straight out.

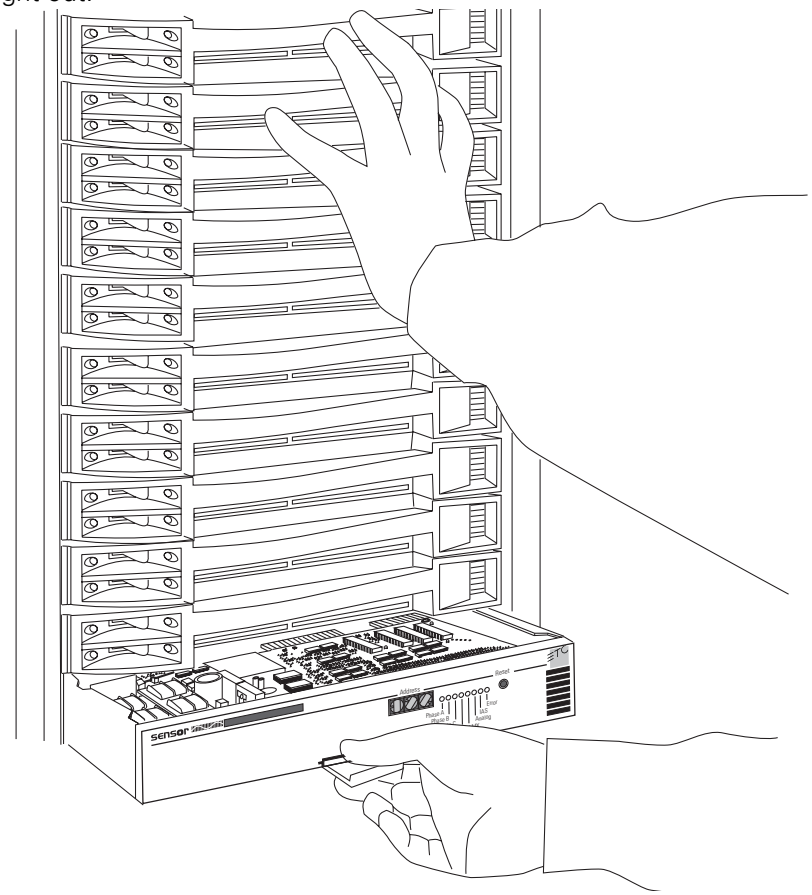


Figure 6: Removing an MPE module

4. Duplicate the configuration DIP switch and front panel rotary switch settings from the old MPE to the switches on the new MPE, unless directed to do otherwise by an authorized ETC technician.
5. Firmly press the new MPE module into the correct slot until you feel the connections seat (the module face will be flush with the other modules).
6. Close the Sensor rack door before applying power.

Replacing a dimmer module

1. Turn off rack power at the main breaker.
2. Open the rack door.
3. Grasp the dimmer module by the center of the main air vent and pull the module straight out.
4. Firmly press the replacement dimmer or airflow module into the correct slot until you feel the connections seat (the module face will be flush with the other modules).
5. Close and lock the Sensor rack door before applying power, if possible

Internal MPE configuration settings

DIP switch configuration settings

After removing the MPE module you can set the configuration DIP switches for your system.

Note: *Don't change the switch settings unless they are obviously incorrect, or you are advised to do so by an authorized ETC representative.*

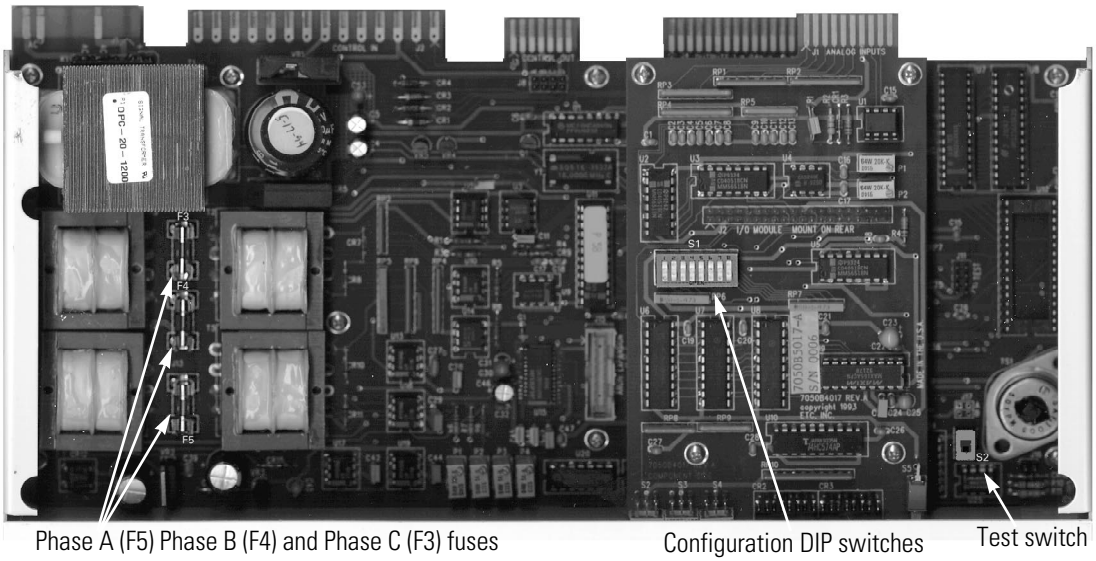


Figure 7: Top view of MPE module

1. Set DIP switches **1**, **2**, and **3** to the proper setting based on the modules installed in your rack.

Note: *If your rack contains fluorescent modules, or a mix of module types, your MPE must use a custom configuration provided by the factory.*

Table 1: Rack configuration DIP switch settings

Rack configuration	Channel order	Switch 1 position	Switch 2 position	Switch 3 position
SR6 with three D100 modules	1, 2, 3… Unbalanced	off	off	off
SR6 with six D50 modules	1, 2, 3… Unbalanced	off	off	on
SR6 with six D15/D20 modules	1, 2, 3… Unbalanced	off	on	off
SR12 with six D100 modules	1, 4, 7… Balanced	off	on	on
SR12 with twelve D50 modules	1, 4, 7… Balanced	on	off	off
SR12 with twelve D15/D20 modules	1, 4, 7… Balanced	on	off	on
SR12 with twelve D15/D20 modules	1, 2, 3… Unbalanced	on	on	off
Custom configuration (set at factory)	Depends on configuration	on	on	on

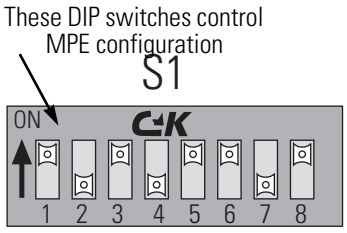


Figure 8: Configuration DIP switch settings

Turning on Dimmer Doubling™

1. Set DIP switch 4 to **On** (up) to turn on Dimmer Doubling for all modules in the rack. See Figure 7 on page 13 for DIP switch location.

Turning on input filtering

If you notice an output fluctuation at low levels, particularly when using the AMX/Analog Adaptor box, you can use input filtering to help steady the output. See Figure 7*: Top view of MPE module* for DIP switch location.

Note: *Input filtering reduces system response time, so it should be left off unless a fluctuation problem is noted.*

1. Set DIP switch 5 to **On** (up) to enable input filtering.

Setting the control input type

The MPE module can accept three different types of control input. Internal DIP switches 6, 7 and 8 should be set to the control type used in your facility. See Figure 7*: Top view of MPE module* for DIP switch location.

Note: *DMX512 input can be enabled with AMX192 or Analog (0-10 Vdc), but AMX192 and Analog input cannot be used together.*

Table 2: DIP switch settings to select control type

Control type	Switch 6 position	Switch 7 position	Switch 8 position
DMX512	off	off	on
AMX192	off	on	off
Analog (0-10 Vdc)	on	off	off

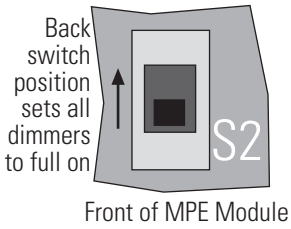


Figure 9: Test switch

Test switch operation

Switch **S2** sets all dimmer channels to 100 percent intensity, overriding all other switch settings. For normal operation it should be in the **Off** position. See Figure 7 on page 13 to locate **S2**.

Caution *To avoid overloading your main power supply, turn off all of your dimmer module circuit breakers before setting **S2** to **On**. Use the circuit breakers to test modules one at a time. See Using dimmer module circuit breakers on page 11.*

Changing MPE phase fuses

The MPE has three phase fuses:

- The phase A fuse, F5, is a 250V, 1.5amp, 5 x 20mm 2AG-type fuse. MPE operating power is drawn through F5. If F5 fails, the MPE will not function.
- Phase B (F4) and Phase C (F3) fuses, are 250V, 0.125 amp, 5 x 20mm 2AG-type fuses. If F4 or F3 fail, the MPE will function, but dimmers on the affected phase will not operate. The Sensor rack beacon, MPE Error LED, and affected phase Status LED will flash to signal a problem.

Replacing a phase fuse

1. Remove the MPE module (See *Replacing an MPE module* on page 12).
2. Locate and replace the defective fuse (See Figure 7 on page 13).
3. Replace the MPE module and close the door.

Troubleshooting

Your Sensor MPE system can help you identify system problems with status reporting and diagnostic testing capabilities. You will usually notice a system problem in one of two ways:

- The Sensor Beacon on the dimmer rack begins blinking, indicating the MPE has detected a problem. The system may still function normally.
- You notice a performance problem. The error beacon may flash, or the problem may be caused by another part of your lighting control system.

If these situations occur, follow these steps to isolate and correct the cause.

Make a preliminary examination of your system

1. Check for loose or damaged control cables coming into your dimmer rack.
2. Check tripped breakers on your main circuit breaker panel.
3. Look for obstructions on top or in front of your installation rack that may be blocking rack ventilation.
4. Open the door and look for dust buildup on the air filter or rack modules.
5. Check for tripped dimmer module circuit breakers.

Correct any of these problems you find, press [**Reset**] on the front of the MPE module and observe the system to see if the problem still exists.

Using the MPE for direct control and testing

You can evaluate switch settings and LED functions or control dimmer levels using MPE Direct Control Mode.

Caution *Direct Control Mode interrupts normal dimming. Direct control should only be used by qualified lighting technicians.*

Enabling MPE Direct Control Mode

You enable Direct Control Mode with the rotary switches and [Reset] button.

Caution *Tests 820 and 850 can set all dimmer levels to 100 percent. Your main power must be able to supply full rack loading.*

1. Enter the number of the control mode you want with the rotary switches.

Switch setting	Control mode function
800	Shows DIP switch settings and rotary switch position using the status LEDs
810	Cycles each dimmer channel on and off in numerical order
820	Cycles all dimmer channels from 0 to 100 percent intensity
830	Cycles each dimmer channel from 0 to 100 percent in numerical order
840	Sets dimmer channel selected with rotary switch to 100 percent.
850	Sets all dimmer channels to intensity level set with rotary switches

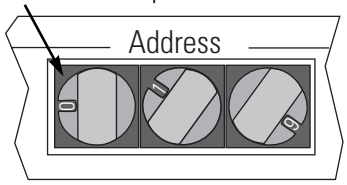


Figure 10: Setting switches

2. Press [Reset] to enter direct control mode. The status LEDs flash on and off from right to left once and out from the center four times.
3. When you finish using direct control, return the system to normal function by pressing [Reset] with the rotary switches in their start address setting.

Internal DIP switch positions

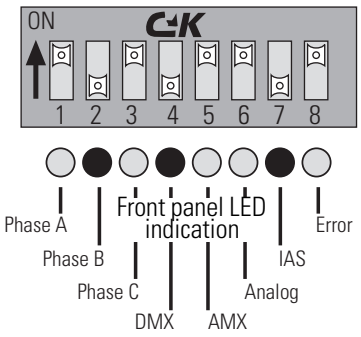


Figure 11: Status LED internal Dip switch position

Value	LED	Value	LED
0	●●●●	5	●○●○
1	●●●○	6	●○○●
2	●●○●	7	●○○○
3	●●○○	8	○●●●
4	●○●●	9	○●●○

Figure 12: Binary LED display

800– Evaluating DIP and Rotary switch position and function

After you press [Reset], the individual status LEDs will turn on or off according to the combined settings of the front panel rotary switches and eight internal DIP switches. You must neutralize either the internal DIP or front panel switches to completely check the function of the other set.

Checking settings of the internal DIP switches

This process shows the setting of the internal configuration DIP switches.

1. Set all three rotary switches to **0**.
2. The status LEDs show the internal DIP switch settings (See Figure 11.)

Checking rotary switch functioning

This mode allows you to test functioning of each rotary switch.

1. Remove the MPE module. See *Replacing an MPE module* on page 12.
2. Record the internal DIP switch settings and set them all to **Off**.
3. Set the rotary switches to 8-0-0, re-insert the MPE and let it reset.
4. Set the rotary switches to 0-0-0. All the LEDs will be dark.
5. Select numbers on the rotary switch you want to test. The four status LEDs on the right will display that number in binary (base 2) format.
6. Return the internal DIP switches and the front panel display to their original settings and re-install the MPE module.

810–Cycling dimmer channels on and off

After you set the rotary switches to 810 and press [Reset] the MPE begins turning each dimmer channel on and off in numerical progression. You set the cycling speed with the last rotary switch on the right (higher setting = faster speed).

This cycling continues until you end the test by setting the rotary switches back to their original position and pressing [Reset].

820–Fade all dimmer channels up and down

Caution *Test 820 will fade all dimmer levels up 100 percent. Your main power must be able to supply full rack loading.*

After you set the rotary switches to 820 and press [Reset] the MPE repeatedly fades all dimmer channel levels up to full and back down to zero. You set the fading speed with the last rotary switch on the right (higher setting = faster fade).

This fading continues until you end the test by setting the rotary switches back to their original position and pressing [Reset].

830–Fade individual dimmer channels up and down in numerical order

After you set the rotary switches to 830 and press [Reset] the MPE repeatedly fades each dimmer channel level up and down in numerical order. You set the speed with the last rotary switch on the right (higher setting = faster cycle).

This fading continues until you end the test by setting the rotary switches back to their original position and pressing [Reset].

840–Set a selected dimmer channel to full intensity

After you set the rotary switches to 840 and press [Reset] the MPE sets a selected dimmer channel to full intensity. You select the dimmer number with the last two rotary switches on the right.

End the test by setting the rotary switches back to their original position and pressing [Reset].

850–Setting levels for all dimmer channels

Caution *Test 850 can set all dimmer levels to 100 percent. Your main power must be able to supply full rack loading.*

After you set the rotary switches to 850 and press [Reset] the MPE sets all dimmer channels to a selected level between 0 – 100 percent. You set the level with the rotary switches. Any switch setting higher than 100 sets intensity to full.

End the test by setting the rotary switches back to their original position and pressing [Reset].

Check system status with the MPE front panel display

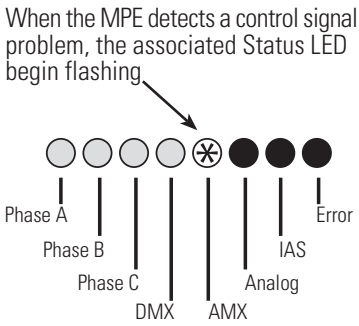


Figure 14: LED error indication

If the preliminary check doesn't find the problem, you can use the MPE front panel display to get more information.

1. Open the dimmer rack door and look at your MPE module LED display.

Note: *If you have multiple racks, look for a rack with a flashing or dark Sensor beacon. If none of the beacons are flashing, check all your racks.*

2. The basic display tells you if there is a line phase or control signal problem:

- If the MPE cannot detect a line phase or the voltage is out of tolerance (between 90 – 140Vdc) the status LED for that phase will be dark. Check the MPE phase fuses (See *Replacing a phase fuse* on page 14).

Note: *If Phase A is out of tolerance, the MPE will be shut off.*

- If the MPE is programmed for AMX192 or DMX512 control input, the indicator LEDs for those signal will be lit when the signals are present and valid. If a signal fails, its status LED will flash. Make sure your control system is turned on and properly connected.
- MPE systems programmed for Analog control input will show a lit indicator LED at all times. Because Analog input voltage can be 0 during normal operation, the MPE cannot test for a valid signal.

Running the Show Beacon Errors tests

If you can't diagnose and fix the problem using the front panel status display, you can run the Show Beacon Errors test to get more specific information.

1. Record the address setting on your front panel rotary switches.
2. Set the front panel rotary switches to 860 and press [**Reset**].
3. Set the rotary switches on the MPE face panel to 001 to run the first test. If the Error LED lights, indicating a failed test, record the test number.
4. Repeat Step 2, setting the switches one number higher each time until you reach 32. Record all failed tests numbers.
5. Use the table below to determine what problems were detected.

Note: *Test numbers 015, 017, 019-024, 026, and 028-031 do not perform tests or generate an error signal. These numbers can be skipped or ignored.*

Test number	Problem indication	Recommended action
001	MPE cannot determine phasing	Check MPE fuses and phase voltages
002	MPE cannot determine phase A zero crossing	Contact ETC Technical Services
003	Temp input hardware line is stuck high	Contact ETC Technical Services
004	Dimmers are shut down due to overheating	Check for proper airflow
005	A dimmer is showing overtemp	Check for proper airflow
006	No airflow detected	Check for proper airflow or MPE airflow vent blockage
007	Hardware error detected	Contact ETC Technical Services
008	Phase A voltage <90 or >140	Check phase voltages
009	Phase A dimmers shut down	Check phase voltages
010	Phase B voltage <90 or >140	Check phase voltages
011	Phase B dimmers shut down	Check phase voltages
012	Phase C voltage <90 or >140	Check phase voltages
013	Phase C dimmers shut down	Check phase voltages
014	Line voltage frequency <47 or >63 Hz	Check phase frequency
016	DMX512 input error	Check control system and DMX512 cable connections
018	AMX192 input error	Check control system and AMX192 cable connections
025	EEPROM checksum bad	Contact ETC Technical Services
027	Configuration data error	Contact ETC Technical Services
032	Setup error detected	Contact ETC Technical Services

If you can correct a problem identified by the tests

1. Restore the address settings on your front panel rotary switches and press [**Reset**].
2. Check your system's performance to see if the problem still exists.
3. If you are unable to eliminate the problem, contact ETC Technical Services at 800/775-4382.

If you cannot correct a problem identified by the tests

Contact ETC Technical Services at 800/775-4382. See *Contacting ETC about equipment problems* on page 11 for procedures on contacting ETC for technical help.

Specifications

Dimensions

SR6 – 16.4 inches high x 14.8 inches wide x 13.3 inches deep

SR12 – 25.8 inches high x 14.8 inches wide x 13.3 inches deep

Weight without dimmer modules

SR12 – 36 pounds
SR12 – 50 pounds

Rack module weights

Multi-Protocol Electronics module – 4.3 pounds

D15 and D20 module – 5.0 pounds
D50AF module – 5.5 pounds
D100AF module – 7.6 pounds
Airflow (AFM) module – 1.5 pounds

Electrical compliance

SR6 – 100 amps per phase (3 phase maximum)

SR12 – 200 amps per phase (3 phase maximum)

(These are maximum current ratings. Your rack will probably use less depending on the type and number of dimmer modules.)

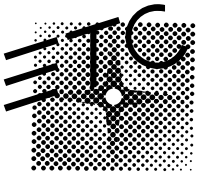
Class I electrical device
Frequency: 50/60Hz
Operational Voltage (Ue): 120V ±10% (3p + N + ⏚)
120V ±10% (2p + N + ⏚)
Insulation Voltage: (U_i): 400V
Impulse withstand Voltage (U_{imp}): 4000V
Short-circuit current: 10kA
Degree of protection: IP20
Types of Electrical Connections: W.W.W
EMC Environment 1
Pollution Degree 2

Environment

Ambient temperature between 32°F and 104°F (0 – 40°C)
Humidity between 30 – 95% (non-condensing)
Altitude below 6500 feet (2000 meters)

ETC Technical Service

3030 Laura Lane
Middleton, WI. 53562
Phone: 800/755-4382
Fax: 800/836-1736



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