

**Visor Series Ordering Guidelines**

**Table 35.1-4. Retrofit**

**CPS 100 480Y S K**

<p><b>Surge Ratings</b></p> <p>100 = 100 kA/phase              120 = 120 kA/phase              160 = 160 kA/phase              200 = 200 kA/phase              250 = 250 kA/phase              300 = 300 kA/phase              400 = 400 kA/phase              500 = 500 kA/phase</p>	<p><b>Diagnostics Packages</b></p> <p><b>A</b> = AdVisor c/w — Status indicator lights on each phase, Form “C”, Audible Alarm — Enable/Disable.</p> <p><b>S</b> = SuperVisor c/w — Status indicator lights on each phase, Form “C”, Audible Alarm — Enable/Disable, Transient Counter, Push-to-Test, PQ Meter (no date stamp).</p> <p><b>N</b> = NetVisor c/w — Status indicator lights on each phase, Form “C”, Audible Alarm — Enable/Disable, Transient Counter, Push-to-Test, PQ Meter (date stamp), Modbus and Ethernet Communication Port, % Life Remaining, % Voltage THD.</p>	<p><b>Enclosure Cross Reference</b></p> <p><b>K</b> = Standard (NEMA 1, 3R)  <b>L</b> = Flushmount (NEMA 1)  <b>M</b> = Standard (NEMA 1, 3R) c/w Disconnect Switch  <b>N</b> = NEMA 4X  <b>O</b> = NEMA 4X c/w Disconnect Switch  <b>P</b> = NEMA 12  <b>Q</b> = NEMA 12 c/w Disconnect Switch</p>																														
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**Table 35.1-5. Integrated**

**CPS 100 480Y S C**

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① Valid for 220/415 and 240/415 per IEC standards.

## Surge Protection

**The Problem****Voltage Transients and High Frequency Noise**

The quality of power feeding sensitive electronic loads is critical to the reliable operation of any facility. In modern offices, hospitals and manufacturing facilities, the most frequent causes of microprocessor-based equipment downtime and damage are voltage transients and electrical noise.

Electrical loads and sensitive microprocessor-based equipment are highly susceptible to both high and low energy transients.

**High Energy Transients**

Sources of high energy transients include lightning induced surges, power company switching and short circuits. These high energy transients can destroy components instantly.

**Low Energy Transients and High Frequency Noise**

More frequently the electrical system experiences low energy transients and high frequency noise that originate from the basic nature of AC current. Continuous or momentary surge sources from 250 to 3000 volts can be present from the operation or switching of electric motors, air conditioner compressors, or other inductive loads.

The effects of continual low energy transients and high frequency noise can cause erratic equipment performance or sudden failure of electronic circuit board components.

**The Solution**

**Note:** Surge Protective Devices (SPD) are also called TVSS or Transient Voltage Surge Suppressors.

Eaton Corporation has an extensive family of surge protection products for any facility or application. Using our products will ensure that the quality of power required to maximize productivity in today's competitive environment will be supplied in the most reliable, safe and cost-effective manner.

The Cutler-Hammer business has developed specific surge protection solutions for commercial, industrial, institutional, telecommunication, military, medical and residential applications — both for U.S. and international applications.

**Other Application and Technical Information**

Please contact your Cutler-Hammer Sales Engineer for copies of the following surge protection/power quality information not contained in this catalog:

- Technotes on surge protection.
- Surge Protection — Market Segment Application Matrix.
- Questions and Answers — Surge Protective Devices.
- Independent Test Reports on the CPS System.
- Installation manuals.
- Technical Specifications on Dataline Protectors (communications, telephone lines).
- Sales literature.
- Video — Benefits of Integrated Surge Protection.
- International surge products.
- Typical specifications for AEGIS, CHSP, RWT and other products.
- Telecommunication and Wireless Base Station — Protection Manual.
- TC — Telecommunication Power System.
- Surge strip product information.
- Lightning Response — Investigation and Power Quality Audit.

**Applicable Standards:**

- IEEE C62.41 (1991): Guide to Surge Voltages in Low Voltage AC Power Circuits.
- IEEE C62.45 (1992): Guide to Surge Testing.
- IEEE Emerald Book (ANSI/IEEE Standard 1100).
- UL® 1449: Underwriters Laboratories Standard for TVSS Devices.
- CSA®: Canadian Safety Standards.
- NFPA: National Fire Protection Association.
- IEC 1024-1: Protection of Structures Against Lightning.
- IEC 1312-3: Protection Against Electromagnetic Impulse.
- NEMA® LS-1: National Equipment Manufacturers Association.

In addition, you can contact your local Cutler-Hammer office or visit [www.cutler-hammer.eaton.com](http://www.cutler-hammer.eaton.com) to obtain the following items:

**Articles**

- Specifying the Right Ratings for Surge Suppressors.
- IEEE White Paper on Facility Wide Surge Protection.
- When Lightning Strikes.
- New Life for Old (and New) Motors: the Reflected Wave Trap.
- Panelboards Designed Specifically for Wireless Telecommunication Sites.

**Technotes**

- Summary of Applicable UL and IEEE Standards for Surge Protection Devices.
- Surge Current Per Phase (Industry Definition).
- Facility-Wide Surge Suppression.
- Debunking the Surge Current Myth, "Why Excessive Surge Current Ratings are Not Required."
- Surge Arrester vs. Surge Suppressor.
- SurgePlane™ — The Foundation to Effective Surge Suppression.
- Benefits of Hybrid Filtering in Surge Protection Devices.
- Why Silicon Avalanche Diodes are Not Recommended for AC Powerline Suppressors.
- New UL 1449 Safety Standard for Transient Voltage Surge Suppressors.

**Datacom Application Guides**

- Water Treatment Facility.
- Control Room.
- Alarm Systems.
- Intercom Systems.
- Control Systems.
- Isolated Loop Circuit Protector.
- Secondary Protectors.
- Data Line Correct Application.
- The Ground Window Concept.
- Instrumentation and Signal Lines.

## Clipper Power System — Visor™ Series



Visor Series — Retrofit and Integrated Versions

### General Description

Eaton's Cutler-Hammer leading-edge surge suppression system for retrofit applications offers the widest variety of surge current rating, monitoring features, and enclosure options. The Visor Series is the most up to date and respected line of surge protection devices in the industry due to its exceptional technology and performance.

With over two decades of experience in the surge suppression industry and extensive R & D initiatives, the Cutler-Hammer business is considered a world leader in surge protective device (SPD) manufacturing.

When installing a surge suppressor in a retrofit environment, it is important to mount the suppressor as close to the electrical equipment as possible. Keep the wiring (lead length) between the electrical equipment and the suppressor as short as possible, and twist or wire tie the conductors to reduce inductive effects.

Installation lead length reduces the performance of any surge suppressor. For each inch of wiring (installation lead length), add 15 to 25 volts to the surge suppressor's published let-through value (e.g., suppressor let-through at 400V and installation of 3 feet (.9 m) of cable = 1000V installed rating).

### Applications

- The Visor can be integrated into Switchboards, Switchgear, Motor Control Centers, Panelboards and Busway.
- The Visor can also be externally mounted to existing distribution equipment.
- Standard NEMA 1/3R retrofit enclosure.
- NEMA 4X and NEMA 12 enclosure available as an option.
- Enclosures with disconnect switch available as an option.
- The Visor is available from 100 to 500 kA/phase units.

### Remote Mounting Kits

The monitoring display panel can be remotely mounted on the Visor using either ribbon cables or DB15 connector cable. Both optional kits can be ordered separately. Cable supplied in the kits comes in different lengths. Refer to Table 35.1-1.

Table 35.1-1. Remote Mounting Kits ①

Style Number	Type
TBA	Ribbon cable
TBA	DB15 cable 4 ft. (1.2 m)
TBA	DB15 cable 8 ft. (2.4 m)

① Consult factory for availability.

## Features, Functions and Benefits

### Standard Features

- 200 kAIC internal fusing system.
- Thermo-Dynamic Fusing System.
- Standard NEMA 1/3R enclosure.
- Advisor monitoring package, which is loaded with features. An audible alarm with reset button, Form C dry contacts and phase operating status lights.
- Remote mountable display panel.

### Optional Features

- SuperVisor and NetVisor monitoring packages.
- Different enclosure packages.
- For OEM packages, contact factory.

### Industry Leadership

- The Visor is an intelligent surge suppression device that offers advanced monitoring options.
- It offers improved safety and reliability from a new patent pending technology — Thermo-Dynamic Fusing™.
- Independently tested by lightning laboratories to ensure performance, long-term reliability, and quality standards are met.
- Installation flexibility for all low voltage distribution equipment.
- Worldwide customer, engineering, and application support.

### Application Flexibility

- 100, 120, 160, 200, 250, 300, 400 and 500 kA/phase ratings are available.
- All units utilize our low impedance SurgePlane™ suppression platform to ensure surge currents are equally diverted to all suppression components, therefore extending life expectancy.

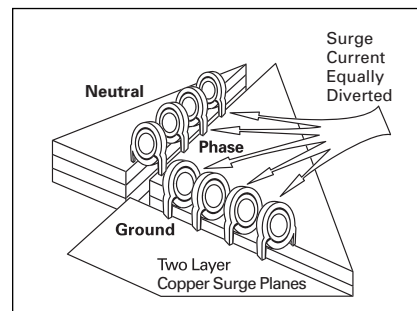


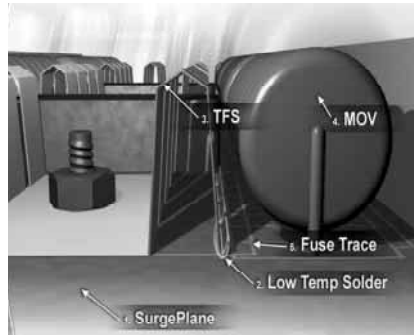
Figure 35.1-2. SurgePlane™ Technology

**Comprehensive Diagnostics**

- Maintenance-free surge suppression. (No external test set or routine maintenance required.)
- The NetVisor, our premium display, allows you to monitor your surge protective device from across the plant or across the world.
- All monitoring display panels are completely removable and can be installed horizontally or vertically, offering four mounting positions.
- AdVisor and SuperVisor monitoring display panels are completely removable and can be installed horizontally or vertically, offering four mounting positions.

*Visor Monitoring Options*

- Our patent pending Thermo-Dynamic Fusing System provides both safety and performance. This technology uses a fuse trace on each individual metal oxide varistor (MOV) that can sustain high surge currents and provide the necessary interruption of high fault currents (kAIC).
- Thermo-Dynamic Fusing System also includes a thermal fuse spring (TFS) that provides the needed disconnection from low level fault currents.

*Components of the Thermo-Dynamic Fusing System***Standards and Certifications**

- All Clipper units have been tested by UL and meet the requirements under UL 1449 2nd Edition for surge suppression devices.
- All Clipper units have been tested as per NEMA LS-1 and ANSI/IEEE C62.45.
- Category A3 Ringwave (6 kV open circuit, 200A short circuit current at 100 kHz).
- Category B3 Ringwave (6 kV open circuit, 500A short circuit current at 100 kHz).
- Category C1 Combination Wave (6 kV 1.2/50us open circuits, 3 kA 8/20us short circuit current).
- Category C3 Combination Wave (20 kV 1.2/50us open circuits, 10 kA 8/20us short circuit current).
- UL 1020 (standard for safety for thermal cutoffs for use in electrical appliances and components).
- UL 1283 listed for EMI/RFI noise attenuation filtering (50 db at 100 kHz). CSA C22.2.

### General Description — Clipper Power System — Visor Series

## Display Packages

Table 35.1-2. Visor Series

Description	AdVisor	SuperVisor	NetVisor

### Diagnostics Package

Status Indicator Lights – Red/Green	✓	✓	✓
Form “C” Contacts	✓	✓	✓
Audible Alarm with Reset Button	✓	✓	✓
Transient Counter	✗	✓	✓
Push-to-Test Button	✗	✓	✓
Power Consumption in Watts	0.5W	1.2W	3.0W
Remote Mounting Kits			
Ribbon Cable	✓	✓	✓
DB15 Cable	✓	✓	✓
PQ Meter	✗	✓	✓
Adjustable Set Points	✗	✗	✓
Non-Volatile Memory	✗	✓	✓
Web Enabled	✗	✓	✓
Date Stamped	—	—	✓
Communication Port	✗	✗	✓
Modbus and Ethernet	—	—	✓
Communication Speed (10Base-T)	—	—	✓
Temperature			
Storage	-40° C to +60° C	-40° C to +60° C	-40° C to +60° C
Operating	-40° C to +60° C	-20° C to +60° C	-20° C to +60° C
Humidity (Relative) = 5% – 95%	✓	✓	✓
Remote Mountable Display	✓	✓	✓
Dimensions (4.2-inch W x 4.2-inch H x 0.4-inch D) (106.7 x 106.7 x 10.2 mm)	✓	✓	✓

### Power Quality (PQ) Metering

% Life Remaining	—	—	✓
% THD (Voltage)	—	—	✓
Event Storage (9999 Events)	—	✓	✓
LCD (2 x 16)	—	✓	✓
<b>Event Capture</b>	—	<b>Counter:</b>	<b>Meter:</b>
Sag Counter		■ -10% System Voltage	■ User Defined Set Points for Voltage Trigger
		■ 23 Cycles	■ 1 Cycle
		■ Fixed Set Points	
Swell Counter	—	<b>Counter:</b>	<b>Meter:</b>
		■ +10% System Voltage	■ User Defined Set Points for Voltage Trigger
		■ One Cycle	■ 1 Cycle
		■ Fixed Set Points	
Outage Counter	—	<b>Counter:</b>	<b>Meter:</b>
		■ Zero Voltage	■ >10% System Voltage
		■ 2 Cycles	■ 1 Cycle
		■ Fixed Set Points	■ Fixed Set Point
Surge Counter	—	<b>Counter:</b>	<b>Meter:</b>
		■ Sensitivity Minimum 104	■ Sensitivity Minimum 104
		■ 8x20 vs. Waveform	■ 8x20 vs. Waveform
Voltage Meter	—	✓	✓
L – L	—	✓	✓
N – G	—	✗	✓
Accuracy	—	± 5%	± 5%
Resolution	—	8 bit	8 bit

**Note:** ✓ = Yes  
✗ = No  
— = Not Applicable

Technical Data — Clipper Power System — Visor Series

**Table 35.1-6. Eaton's Cutler-Hammer Clipper Power System Visor Series Specifications**

Guide for applying the appropriate surge suppressor based upon life expectancy and performance.

CPS Models	CPS100	CPS120 ①	CPS160	CPS200 ②	CPS250 ①	CPS300 ②	CPS400 ②	CPS500 ②
<b>Surge Current Per Phase</b>	100 kA	120 kA	160 kA	200 kA	250 kA	300 kA	400 kA	500 kA
<b>Surge Current Mode</b>								
L-N (Line-to-Neutral)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
L-G (Line-to-Ground)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
N-G (Neutral-to-Ground)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
L-L (Line-to-Line, Delta, and Ungrounded Applications Only)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
<b>Single Pulse Surge Current Test</b> Based on IEEE C62.41 8x20 microsecond waveform	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Modes of Protection</b>	All	All	All	All	All	All	All	All
3-Phase Wye System	7	7	7	7	7	7	7	7
3-Phase Delta System	6	6	6	6	6	6	6	6
<b>Filter Attenuation</b> (Based on MIL-STD-220A) at 100 kHz	50 dB	50 dB	50 dB	50 dB	50 dB	50 dB	50 dB	50 dB
<b>Surge Withstand Capabilities</b> ANSI/IEEE C3 Wave (10 kA)	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000
<b>Thermo-Dynamic Fusing System</b>								
Overcurrent Protection (Thermal Fuse Spring)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
200 kAIC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fused MOVs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Monitoring Display Options</b>								
SuperVisor (Standard)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AdVisor	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
NetVisor	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
<b>Direct Bus Bar Connection</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Warranty — Clipper Power System Visor Series</b>	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years

① CPS250 recommend for service entrance. CPS120 recommended for branch locations using IEEE recommended cascade approach.

② Optional sizes to meet competitive specifications. All CPS have been independently tested to verify all suppressor components can survive published surge current ratings. Test documents are available upon request.

**Visor Series Ordering Guidelines**

**Table 35.1-4. Retrofit**

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**CPS 100 480Y S C**

<p><b>Surge Ratings</b></p> <p>100 = 100 kA/phase              120 = 120 kA/phase              160 = 160 kA/phase              200 = 200 kA/phase              250 = 250 kA/phase              300 = 300 kA/phase              400 = 400 kA/phase              500 = 500 kA/phase</p>	<p><b>Diagnostics Packages</b></p> <p><b>A</b> = AdVisor c/w — Status indicator lights on each phase, Form “C”, Audible Alarm — Enable/Disable.</p> <p><b>S</b> = SuperVisor c/w — Status indicator lights on each phase, Form “C”, Audible Alarm — Enable/Disable, Transient Counter, Push-to-Test, PQ Meter (no date stamp).</p> <p><b>N</b> = NetVisor c/w — Status indicator lights on each phase, Form “C”, Audible Alarm — Enable/Disable, Transient Counter, Push-to-Test, PQ Meter (date stamp), Modbus and Ethernet Communication Port, % Life Remaining, % Voltage THD.</p>	<p><b>Enclosure Cross Reference</b></p> <p><b>A</b> = Panelboards (PRL1A, 2A, 3A, 4)  <b>B</b> = Remote Monitor Display (PRL4, Switchgear, Busway)  <b>C</b> = MCC Version  <b>D – J</b> = Warranty Versions, Consult Factory.</p>																														
<p><b>Voltage Code</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>120/208 127/220 240V</th> <th>230/400 400V <sup>①</sup></th> <th>277/480 480V</th> <th>347/600 600V</th> </tr> </thead> <tbody> <tr> <td>220/127 Three-Phase Wye (4W+G) (Mexico)</td> <td>220Y</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>120/240 Single Split Phase (3W+G)</td> <td>240S</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>Three-Phase Delta High Leg (4W+G)</td> <td>240H</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>Three-Phase Wye (4W+G)</td> <td>208Y</td> <td>400Y</td> <td>480Y</td> <td>600Y</td> </tr> <tr> <td>Three-Phase Delta (3W+G)</td> <td>240D</td> <td>—</td> <td>480D</td> <td>600D</td> </tr> </tbody> </table>				120/208 127/220 240V	230/400 400V <sup>①</sup>	277/480 480V	347/600 600V	220/127 Three-Phase Wye (4W+G) (Mexico)	220Y	—	—	—	120/240 Single Split Phase (3W+G)	240S	—	—	—	Three-Phase Delta High Leg (4W+G)	240H	—	—	—	Three-Phase Wye (4W+G)	208Y	400Y	480Y	600Y	Three-Phase Delta (3W+G)	240D	—	480D	600D
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① Valid for 220/415 and 240/415 per IEC standards.

## Surge Protection

**The Problem****Voltage Transients and High Frequency Noise**

The quality of power feeding sensitive electronic loads is critical to the reliable operation of any facility. In modern offices, hospitals and manufacturing facilities, the most frequent causes of microprocessor-based equipment downtime and damage are voltage transients and electrical noise.

Electrical loads and sensitive microprocessor-based equipment are highly susceptible to both high and low energy transients.

**High Energy Transients**

Sources of high energy transients include lightning induced surges, power company switching and short circuits. These high energy transients can destroy components instantly.

**Low Energy Transients and High Frequency Noise**

More frequently the electrical system experiences low energy transients and high frequency noise that originate from the basic nature of AC current. Continuous or momentary surge sources from 250 to 3000 volts can be present from the operation or switching of electric motors, air conditioner compressors, or other inductive loads.

The effects of continual low energy transients and high frequency noise can cause erratic equipment performance or sudden failure of electronic circuit board components.

**The Solution**

**Note:** Surge Protective Devices (SPD) are also called TVSS or Transient Voltage Surge Suppressors.

Eaton Corporation has an extensive family of surge protection products for any facility or application. Using our products will ensure that the quality of power required to maximize productivity in today's competitive environment will be supplied in the most reliable, safe and cost-effective manner.

The Cutler-Hammer business has developed specific surge protection solutions for commercial, industrial, institutional, telecommunication, military, medical and residential applications — both for U.S. and international applications.

**Other Application and Technical Information**

Please contact your Cutler-Hammer Sales Engineer for copies of the following surge protection/power quality information not contained in this catalog:

- Technotes on surge protection.
- Surge Protection — Market Segment Application Matrix.
- Questions and Answers — Surge Protective Devices.
- Independent Test Reports on the CPS System.
- Installation manuals.
- Technical Specifications on Dataline Protectors (communications, telephone lines).
- Sales literature.
- Video — Benefits of Integrated Surge Protection.
- International surge products.
- Typical specifications for AEGIS, CHSP, RWT and other products.
- Telecommunication and Wireless Base Station — Protection Manual.
- TC — Telecommunication Power System.
- Surge strip product information.
- Lightning Response — Investigation and Power Quality Audit.

**Applicable Standards:**

- IEEE C62.41 (1991): Guide to Surge Voltages in Low Voltage AC Power Circuits.
- IEEE C62.45 (1992): Guide to Surge Testing.
- IEEE Emerald Book (ANSI/IEEE Standard 1100).
- UL® 1449: Underwriters Laboratories Standard for TVSS Devices.
- CSA®: Canadian Safety Standards.
- NFPA: National Fire Protection Association.
- IEC 1024-1: Protection of Structures Against Lightning.
- IEC 1312-3: Protection Against Electromagnetic Impulse.
- NEMA® LS-1: National Equipment Manufacturers Association.

In addition, you can contact your local Cutler-Hammer office or visit [www.cutler-hammer.eaton.com](http://www.cutler-hammer.eaton.com) to obtain the following items:

**Articles**

- Specifying the Right Ratings for Surge Suppressors.
- IEEE White Paper on Facility Wide Surge Protection.
- When Lightning Strikes.
- New Life for Old (and New) Motors: the Reflected Wave Trap.
- Panelboards Designed Specifically for Wireless Telecommunication Sites.

**Technotes**

- Summary of Applicable UL and IEEE Standards for Surge Protection Devices.
- Surge Current Per Phase (Industry Definition).
- Facility-Wide Surge Suppression.
- Debunking the Surge Current Myth, "Why Excessive Surge Current Ratings are Not Required."
- Surge Arrester vs. Surge Suppressor.
- SurgePlane™ — The Foundation to Effective Surge Suppression.
- Benefits of Hybrid Filtering in Surge Protection Devices.
- Why Silicon Avalanche Diodes are Not Recommended for AC Powerline Suppressors.
- New UL 1449 Safety Standard for Transient Voltage Surge Suppressors.

**Datacom Application Guides**

- Water Treatment Facility.
- Control Room.
- Alarm Systems.
- Intercom Systems.
- Control Systems.
- Isolated Loop Circuit Protector.
- Secondary Protectors.
- Data Line Correct Application.
- The Ground Window Concept.
- Instrumentation and Signal Lines.



## Clipper Power System — Visor™ Series



Visor Series — Retrofit and Integrated Versions

### General Description

Eaton's Cutler-Hammer leading-edge surge suppression system for retrofit applications offers the widest variety of surge current rating, monitoring features, and enclosure options. The Visor Series is the most up to date and respected line of surge protection devices in the industry due to its exceptional technology and performance.

With over two decades of experience in the surge suppression industry and extensive R & D initiatives, the Cutler-Hammer business is considered a world leader in surge protective device (SPD) manufacturing.

When installing a surge suppressor in a retrofit environment, it is important to mount the suppressor as close to the electrical equipment as possible. Keep the wiring (lead length) between the electrical equipment and the suppressor as short as possible, and twist or wire tie the conductors to reduce inductive effects.

Installation lead length reduces the performance of any surge suppressor. For each inch of wiring (installation lead length), add 15 to 25 volts to the surge suppressor's published let-through value (e.g., suppressor let-through at 400V and installation of 3 feet (.9 m) of cable = 1000V installed rating).

### Applications

- The Visor can be integrated into Switchboards, Switchgear, Motor Control Centers, Panelboards and Busway.
- The Visor can also be externally mounted to existing distribution equipment.
- Standard NEMA 1/3R retrofit enclosure.
- NEMA 4X and NEMA 12 enclosure available as an option.
- Enclosures with disconnect switch available as an option.
- The Visor is available from 100 to 500 kA/phase units.

### Remote Mounting Kits

The monitoring display panel can be remotely mounted on the Visor using either ribbon cables or DB15 connector cable. Both optional kits can be ordered separately. Cable supplied in the kits comes in different lengths. Refer to Table 35.1-1.

Table 35.1-1. Remote Mounting Kits ①

Style Number	Type
TBA	Ribbon cable
TBA	DB15 cable 4 ft. (1.2 m)
TBA	DB15 cable 8 ft. (2.4 m)

① Consult factory for availability.

### Features, Functions and Benefits

#### Standard Features

- 200 kAIC internal fusing system.
- Thermo-Dynamic Fusing System.
- Standard NEMA 1/3R enclosure.
- Advisor monitoring package, which is loaded with features. An audible alarm with reset button, Form C dry contacts and phase operating status lights.
- Remote mountable display panel.

#### Optional Features

- SuperVisor and NetVisor monitoring packages.
- Different enclosure packages.
- For OEM packages, contact factory.

#### Industry Leadership

- The Visor is an intelligent surge suppression device that offers advanced monitoring options.
- It offers improved safety and reliability from a new patent pending technology — Thermo-Dynamic Fusing™.
- Independently tested by lightning laboratories to ensure performance, long-term reliability, and quality standards are met.
- Installation flexibility for all low voltage distribution equipment.
- Worldwide customer, engineering, and application support.

#### Application Flexibility

- 100, 120, 160, 200, 250, 300, 400 and 500 kA/phase ratings are available.
- All units utilize our low impedance SurgePlane™ suppression platform to ensure surge currents are equally diverted to all suppression components, therefore extending life expectancy.

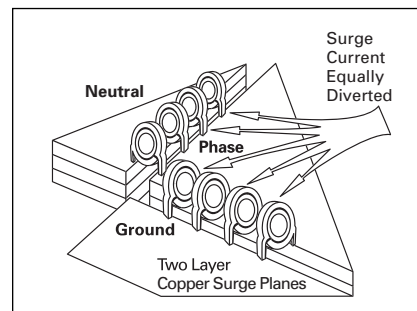


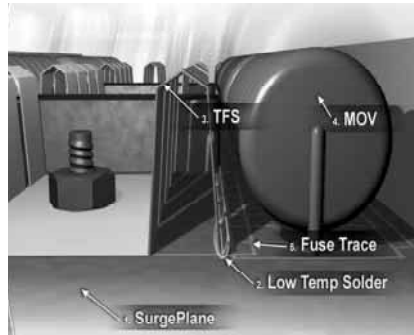
Figure 35.1-2. SurgePlane™ Technology

**Comprehensive Diagnostics**

- Maintenance-free surge suppression. (No external test set or routine maintenance required.)
- The NetVisor, our premium display, allows you to monitor your surge protective device from across the plant or across the world.
- All monitoring display panels are completely removable and can be installed horizontally or vertically, offering four mounting positions.
- AdVisor and SuperVisor monitoring display panels are completely removable and can be installed horizontally or vertically, offering four mounting positions.

**Visor Monitoring Options**

- Our patent pending Thermo-Dynamic Fusing System provides both safety and performance. This technology uses a fuse trace on each individual metal oxide varistor (MOV) that can sustain high surge currents and provide the necessary interruption of high fault currents (kAIC).
- Thermo-Dynamic Fusing System also includes a thermal fuse spring (TFS) that provides the needed disconnection from low level fault currents.

**Components of the Thermo-Dynamic Fusing System****Standards and Certifications**

- All Clipper units have been tested by UL and meet the requirements under UL 1449 2nd Edition for surge suppression devices.
- All Clipper units have been tested as per NEMA LS-1 and ANSI/IEEE C62.45.
- Category A3 Ringwave (6 kV open circuit, 200A short circuit current at 100 kHz).
- Category B3 Ringwave (6 kV open circuit, 500A short circuit current at 100 kHz).
- Category C1 Combination Wave (6 kV 1.2/50us open circuits, 3 kA 8/20us short circuit current).
- Category C3 Combination Wave (20 kV 1.2/50us open circuits, 10 kA 8/20us short circuit current).
- UL 1020 (standard for safety for thermal cutoffs for use in electrical appliances and components).
- UL 1283 listed for EMI/RFI noise attenuation filtering (50 db at 100 kHz). CSA C22.2.

### General Description — Clipper Power System — Visor Series

## Display Packages

Table 35.1-2. Visor Series

Description	AdVisor	SuperVisor	NetVisor

### Diagnostics Package

Status Indicator Lights – Red/Green	✓	✓	✓
Form “C” Contacts	✓	✓	✓
Audible Alarm with Reset Button	✓	✓	✓
Transient Counter	✗	✓	✓
Push-to-Test Button	✗	✓	✓
Power Consumption in Watts	0.5W	1.2W	3.0W
Remote Mounting Kits			
Ribbon Cable	✓	✓	✓
DB15 Cable	✓	✓	✓
PQ Meter	✗	✓	✓
Adjustable Set Points	✗	✗	✓
Non-Volatile Memory	✗	✓	✓
Web Enabled	✗	✓	✓
Date Stamped	—	—	✓
Communication Port	✗	✗	✓
Modbus and Ethernet	—	—	✓
Communication Speed (10Base-T)	—	—	✓
Temperature			
Storage	-40° C to +60° C	-40° C to +60° C	-40° C to +60° C
Operating	-40° C to +60° C	-20° C to +60° C	-20° C to +60° C
Humidity (Relative) = 5% – 95%	✓	✓	✓
Remote Mountable Display	✓	✓	✓
Dimensions (4.2-inch W x 4.2-inch H x 0.4-inch D) (106.7 x 106.7 x 10.2 mm)	✓	✓	✓

### Power Quality (PQ) Metering

% Life Remaining	—	—	✓
% THD (Voltage)	—	—	✓
Event Storage (9999 Events)	—	✓	✓
LCD (2 x 16)	—	✓	✓
<b>Event Capture</b>	—	<b>Counter:</b>	<b>Meter:</b>
Sag Counter		■ -10% System Voltage	■ User Defined Set Points for Voltage Trigger
		■ 23 Cycles	■ 1 Cycle
		■ Fixed Set Points	
Swell Counter		<b>Counter:</b>	<b>Meter:</b>
		■ +10% System Voltage	■ User Defined Set Points for Voltage Trigger
		■ One Cycle	■ 1 Cycle
		■ Fixed Set Points	
Outage Counter		<b>Counter:</b>	<b>Meter:</b>
		■ Zero Voltage	■ >10% System Voltage
		■ 2 Cycles	■ 1 Cycle
		■ Fixed Set Points	■ Fixed Set Point
Surge Counter		<b>Counter:</b>	<b>Meter:</b>
		■ Sensitivity Minimum 104	■ Sensitivity Minimum 104
		■ 8x20 vs. Waveform	■ 8x20 vs. Waveform
Voltage Meter			
L – L	—	✓	✓
N – G	—	✗	✓
Accuracy	—	± 5%	± 5%
Resolution	—	8 bit	8 bit

**Note:** ✓ = Yes  
✗ = No  
— = Not Applicable

Technical Data — Clipper Power System — Visor Series

**Table 35.1-6. Eaton's Cutler-Hammer Clipper Power System Visor Series Specifications**

Guide for applying the appropriate surge suppressor based upon life expectancy and performance.

CPS Models	CPS100	CPS120 ①	CPS160	CPS200 ②	CPS250 ①	CPS300 ②	CPS400 ②	CPS500 ②
<b>Surge Current Per Phase</b>	100 kA	120 kA	160 kA	200 kA	250 kA	300 kA	400 kA	500 kA
<b>Surge Current Mode</b>								
L-N (Line-to-Neutral)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
L-G (Line-to-Ground)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
N-G (Neutral-to-Ground)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
L-L (Line-to-Line, Delta, and Ungrounded Applications Only)	50 kA	60 kA	80 kA	100 kA	125 kA	150 kA	200 kA	250 kA
<b>Single Pulse Surge Current Test</b> Based on IEEE C62.41 8x20 microsecond waveform	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Modes of Protection</b>	All	All	All	All	All	All	All	All
3-Phase Wye System	7	7	7	7	7	7	7	7
3-Phase Delta System	6	6	6	6	6	6	6	6
<b>Filter Attenuation</b> (Based on MIL-STD-220A) at 100 kHz	50 dB	50 dB	50 dB	50 dB	50 dB	50 dB	50 dB	50 dB
<b>Surge Withstand Capabilities</b> ANSI/IEEE C3 Wave (10 kA)	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000
<b>Thermo-Dynamic Fusing System</b>								
Overcurrent Protection (Thermal Fuse Spring)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
200 kAIC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fused MOVs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Monitoring Display Options</b>								
SuperVisor (Standard)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AdVisor	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
NetVisor	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
<b>Direct Bus Bar Connection</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Warranty — Clipper Power System Visor Series</b>	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years	10 Years

① CPS250 recommend for service entrance. CPS120 recommended for branch locations using IEEE recommended cascade approach.

② Optional sizes to meet competitive specifications. All CPS have been independently tested to verify all suppressor components can survive published surge current ratings. Test documents are available upon request.