

Direct Current Surge Protection

- **Photovoltaic Systems**
- **Automotive Applications**
- **Monitoring and Control Systems**
- **With AC Power Line Applications**



MCG SURGE PROTECTION

www.mcgsurge.com

AC and DC Protector Applications

Grid-Tie Inverter (GTI):

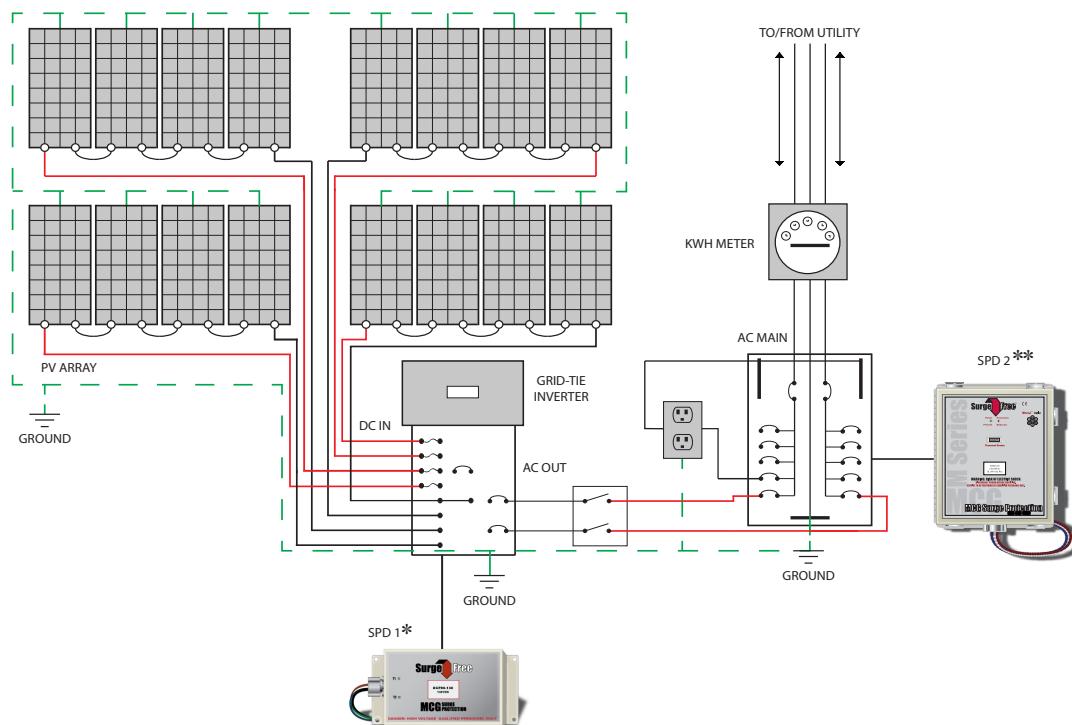
An inverter performs the function of converting DC power into AC power. However, what separates a grid-tie inverter from a common inverter is that the grid-tie inverter's AC output is electrically connected to the utility grid at all times. This enables businesses and homes with a PV (photovoltaic) system (or wind generator) to be their own power generating plant and supply the grid with any excess power created by the system. Businesses and homes can now sell power back to the utility and reduce their utility bills. This approach also lessens the amount of greenhouse gases emitted by the utility's power plants. For example, if a business uses 300 kWh (kilowatt-hours) but only consumes 200 kWh, 100kWh is leftover and the difference is compensated back to the user.

The Function of the Grid-Tie Inverter:

The grid-tie inverter synchronizes its frequency with that of the grid (e.g. 50 or 60 Hz) and limits its output voltage to no higher than the grid voltage. It also maintains its phase angle to within 1 degree of the power grid. The inverter has an on-board computer which constantly monitors the grid voltage and produces a voltage to correspond with the grid. Grid-tie inverters disconnect from the grid if there is a blackout. This ensures that any utility personnel will not be exposed to the inverter's AC power when performing repairs.

Grid Tied Photovoltaic System Protection:

Protecting the inverter(s) is of utmost importance since failure of these devices will result in the consumption of additional or even 100% utility generated power, thus reducing revenue. The grid is a constant target of surges from both lightning and utility switching which cause inverter failure on its AC output side. Surges on the DC input occur from nearby lightning activity. As a result, the grid-tie inverter is vulnerable to surges from both ends if unprotected. The DCP-90 is used to protect the inverter from surges on the inverter's DC input. The MCG PT, M, or LS series protects the AC side of the inverter. In many installations, since the AC protector also serves as the facility's service entrance protector, the SPD not only protects the inverter, but all of the building's loads connected to that particular panel.



*SPD 1 model DCP-90-xxxVDC protects inverter's DC input.

**SPD 2 model PT, M, or LS series protects inverter's grid-tied AC output.

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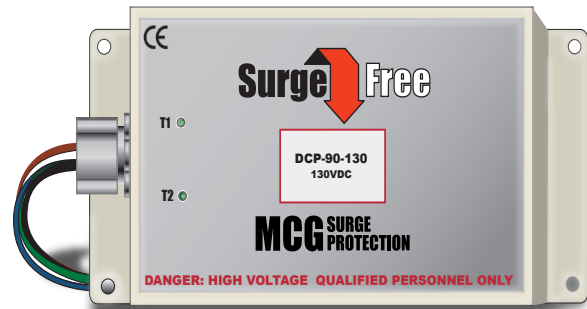


MODEL

DCP-90

DC Protection

The DCP-90 is designed to protect DC powered equipment, such as inverters and charge controllers used in photovoltaic systems from damage caused by lightning. It utilizes high energy metal oxide varistors and specialized fuses optimized to conduct transient current without opening. The unit is dual redundant and has status indicators on the front panel. Its small size makes it suitable for use in tight cabinets. Rated up to 200kA, the unit protects all modes. The DCP-90 is available in various operating voltages so it can be customized to your application.



Ipeak Total

- **Model voltage range: 200-600VDC = 200kA**
- **Model voltage range: 60-150VDC = 420kA**
- **Model voltage range: 12-48VDC = 126kA**
- **6VDC model = 36kA**

FEATURES

- **Formidable surge handling capability: up to 200kA**
- **Front panel LEDs for status indication**
- **Fast clamp response - under 5 nanoseconds**
- **Easy installation - 30 minutes or less**
- **Connection cable included**
- **Protects even in the event of a power outage**
- **All modes protected: + to -, + to Gnd, - to Gnd**
- **Low profile enclosure**
- **DC protection up to 600V applications**

20-Year Warranty

SPECS

Surge Current/Phase (8/20 μ s): 1 Event: Up to 200kA.
 Surge Life/Phase (8/20 μ s): 10,000 Events: Up to 6kA
 Status Indicators: Green LED Indicators
 Modes of Protection: + to -, + to Gnd, - to Gnd
 Operating Altitude: 13,000 ft. (4000m)
 Temp. (Operating/Storage): -40° to +70°C/-40° to +85°C
 Enclosure: NEMA 1, steel
 Dimensions: 7.25 x 4.25 x 2.75" (184 x 108 x 70mm)
 Mounting: 6.5" x 3.5"/.22" ID - 4 holes
 165mm x 89mm/5.6 ID - 4 holes
 Cable Connection: #10 AWG Cable, 3ft. Provided.
 Weight: 3.5lbs., (1.6kg)



*Models for Photovoltaic Systems	Models for Non-PV applications
DCP-90-6VDC	DCP-90-6VDC-SL
DCP-90-12VDC	DCP-90-12VDC-SL
DCP-90-24VDC	DCP-90-24VDC-SL
DCP-90-36VDC	DCP-90-36VDC-SL
DCP-90-48VDC	DCP-90-48VDC-SL
DCP-90-60VDC	DCP-90-60VDC-SL
DCP-90-75VDC	DCP-90-75VDC-SL
DCP-90-100VDC	DCP-90-100VDC-SL
DCP-90-130VDC	DCP-90-130VDC-SL
DCP-90-150VDC	DCP-90-150VDC-SL
DCP-90-200VDC	DCP-90-200VDC-SL
DCP-90-250VDC	DCP-90-250VDC-SL
DCP-90-300VDC	DCP-90-300VDC-SL
DCP-90-350VDC	DCP-90-350VDC-SL
DCP-90-400VDC	DCP-90-400VDC-SL
DCP-90-450VDC	DCP-90-450VDC-SL
DCP-90-500VDC	DCP-90-500VDC-SL
DCP-90-550VDC	DCP-90-550VDC-SL
DCP-90-600VDC	DCP-90-600VDC-SL

*Voltage in model name refers to photovoltaic array voltage at maximum power.

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MODELS

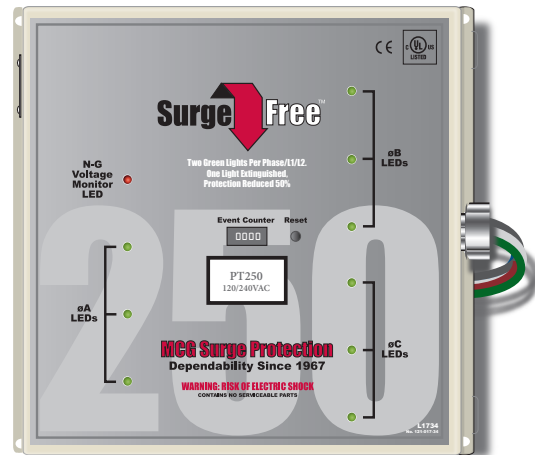
PT250 • PT160 • PT120

Critical Load Protection

Taking compact protectors to the next level, MCG's new PT Series is the most advanced non-modular AC power line protector money can buy. Within its small 10" x 10" enclosure, there are up to 20 high energy, thermally protected varistors packed inside. These high performance varistors are typically only found in much higher priced units. Guards small to medium panels.

FEATURES

- I peak: 250,000A/Phase (PT250)
160,000A/Phase (PT160)
120,000A/Phase (PT120)
- Redundancy: PT250 (Triple) ; PT160 & PT120 (Double)
- Thermally protected varistors with integral fuse element
- Surge event counter optional (Standard on PT250)
- Remote 1 Form C relay contacts with status LED
- Neutral - Ground voltage monitor LED
- All modes protected
- Front panel status monitoring
- 10 AWG connection cable
- EMI/RFI filter
- NEMA 1, powder-coated steel enclosure
- DIN-Rail mounting kit available
- Optional outdoor non-metallic enclosure kit - NEMA 4X



I peak up to 250,000A

UL 1449, 3rd Ed. Listed

20-Year Warranty

Filter Attenuation

MIL STD 220A (50 Ohm):	120VAC	240VAC	277VAC
-30db	50kHz	50kHz	80kHz
-40db	130kHz	130kHz	180kHz
-50db	195kHz	195kHz	270kHz
-60db	230kHz	230kHz	300kHz

SPD Type: Type 2

I_n : 5kA

Maximum Continuous Operating VAC (MCOV): 115% Rated Line Voltage

Varistor MCOV: 125% Rated Line Voltage Minimum

SCCR: 100kA AIC (all models except PT250, 120VAC L-N models which are 5kA AIC)

Surge Current/Phase (8/20 μ s): PT250 1 Event: 250kA; PT160 1 Event: 160kA; PT120 1 Event: 120kA

Surge Life/Phase (8/20 μ s): PT250 10,000 Events: 12kA; PT160 10,000 Events: 6kA; PT120 10,000 Events: 4.5kA

Surge Current/Mode (8/20 μ s) PT250: L-N: 125kA; L-G: 125kA; N-G: 80kA; L-L: 250kA

Surge Current/Mode (8/20 μ s) PT160: L-N: 80kA; L-G: 80kA; N-G: 80kA; L-L: 160kA

Surge Current/Mode (8/20 μ s) PT120: L-N: 80kA; L-G: 40kA; N-G: 80kA; L-L: 120kA

Response Time: < 5ns

Status Indicators: LED Status Indicators

Modes of Protection: L-N, L-G, L-L, N-G

Operating Altitude: 13,000ft. (4000m)

Temp. (Operating/Storage): -40° to +70°C/-40° to +85°C

Enclosure: NEMA 1, 16 gauge steel (0.050" thick), powder coated

Cable Connection: 10 AWG (5.27mm²) cable, 3 ft. (91.4cm) provided

Dimensions: 10" x 10" x 4" (254 x 254 x 102mm)

Mounting: 10.75" x 8.5"/.220" ID - 4 holes, (273 x 216mm/5.6mm ID) - 4 holes

Conduit Connector: 3/4" Compression connector

Weight: PT250: 12 lbs. (5.5 kg); PT160: 11.40 lbs (5.2kg); PT120: 11.20 lbs (5.1kg)

UL File Number: E322161

UL Certification: UL Listed to 1449 3rd Edition

ARRA Certification: Complies with ARRA 1605 requirements



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Specifications

- ANSI/IEEE C62.41-2002
- IEC 61643-1-1998
- UL 1449 3rd Edition

Model PT250/PT160/PT120							Cat. B3 6kV, 3kA	Cat. C3 20kV, 10kA
Model	Service	VPR L-N	VPR L-G	VPR N-G	VPR L-L	Let-Thru V, L-N***	Let-Thru V, L-N***	
PT250-120Y	120/208VAC, 3Ph., 4W+Gnd	800	800	700	1200	620	850	
PT250-120T	120/240VAC, 1Ph., 3W+Gnd	800	800	700	1200	620	850	
PT250-120S	120VAC, 1Ph., 2W+Gnd	800	800	700	N/A	620	850	
PT250-220Y	220/380VAC, 3Ph., 4W+Gnd	1200	1200	1200	2000	1140	1470	
PT250-220S	220VAC, 1Ph., 2W+Gnd	1200	1200	1200	N/A	1140	1470	
PT250-240Y	240/415VAC, 3Ph., 4W+Gnd	1200	1200	1200	2000	1140	1470	
PT250-240S	240VAC, 1Ph., 2W+Gnd	1200	1200	1200	N/A	1140	1470	
PT250-240DCT*	240/120/120VAC, 3Ph., 4W+Gnd	800/1200	800/1200	700	1200/1800	620/1100	850/1430	
PT250-277Y	277/480VAC, 3Ph., 4W+Gnd	1200	1200	1200	2000	1140	1470	
PT250-277S	277VAC, 1Ph., 2W+Gnd	1200	1200	1200	N/A	1140	1470	
PT250-347Y**	347/600VAC, 3Ph., 4W+Gnd	N/A	N/A	N/A	N/A	1190	1530	
PT160-120Y	120/208VAC, 3Ph., 4W+Gnd	800	800	700	1200	650	880	
PT160-120T	120/240VAC, 1Ph., 3W+Gnd	800	800	700	1200	650	880	
PT160-120S	120VAC, 1Ph., 2W+Gnd	800	800	700	N/A	650	880	
PT160-220Y	220/380VAC, 3Ph., 4W+Gnd	1200	1200	1200	2000	1200	1530	
PT160-220S	220VAC, 1Ph., 2W+Gnd	1200	1200	1200	N/A	1200	1530	
PT160-240Y	240/415VAC, 3Ph., 4W+Gnd	1200	1200	1200	2000	1200	1530	
PT160-240S	240VAC, 1Ph., 2W+Gnd	1200	1200	1200	N/A	1200	1530	
PT160-240DCT*	240/120/120VAC, 3Ph., 4W+Gnd	800/1200	800/1200	700	1200/1800	650/1130	880/1500	
PT160-277Y	277/480VAC, 3Ph., 4W+Gnd	1200	1200	1200	2000	1200	1530	
PT160-277S	277VAC, 1Ph., 2W+Gnd	1200	1200	1200	N/A	1200	1530	
PT160-347Y**	347/600VAC, 3Ph., 4W+Gnd	N/A	N/A	N/A	N/A	1240	1600	
PT120-120Y	120/208VAC, 3Ph., 4W+Gnd	800	800	700	1200	650	880	
PT120-120T	120/240VAC, 1Ph., 3W+Gnd	800	800	700	1200	650	880	
PT120-120S	120VAC, 1Ph., 2W+Gnd	800	800	700	N/A	650	880	
PT120-220Y	220/380VAC, 3Ph., 4W+Gnd	1200	1500	1200	2000	1200	1530	
PT120-220S	220VAC, 1Ph., 2W+Gnd	1200	1500	1200	N/A	1200	1530	
PT120-240Y	240/415VAC, 3Ph., 4W+Gnd	1200	1500	1200	2000	1200	1530	
PT120-240S	240VAC, 1Ph., 2W+Gnd	1200	1500	1200	N/A	1200	1530	
PT120-240DCT*	240/120/120VAC, 3Ph., 4W+Gnd	800/1200	800/1500	700	1200/1800	650/1130	880/1500	
PT120-277Y	277/480VAC, 3Ph., 4W+Gnd	1200	1500	1200	2000	1200	1530	
PT120-277S	277VAC, 1Ph., 2W+Gnd	1200	1500	1200	N/A	1200	1530	
PT120-347Y**	347/600VAC, 3Ph., 4W+Gnd	N/A	N/A	N/A	N/A	1240	1600	

*High-Leg Delta Center Tapped **Not tested to UL1449 ***Actual Measurements w/ 6" Lead Length

A Note On Headroom: A surge protector responds to increases in voltage. Surge protectors triggered by the nominal line voltage are undesirable, consequently headroom is always factored into surge protector design. Long duration voltage swells occur on power lines and can damage a surge protector, leaving facility equipment vulnerable. By employing higher headroom, continuity of surge protection is guaranteed. This feature is standard in MCG surge protectors. Higher headroom allows varistors to ride out voltage swells while ensuring that let-through voltage remains within CBEMA (now ITIC) guidelines. The CBEMA curve is the most accepted graph worldwide for equipment susceptibility analysis.

A Note on PT Series VPR: These VPR represent wiring plus the upstream overcurrent safety device (circuit breaker)

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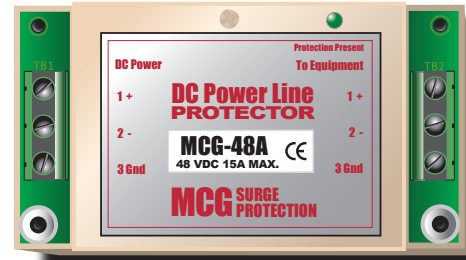


DC Protector

MODEL

MCG-12A, 24A, 32A, 48A & 130A

Direct Current Equipment Level Protection



20-Year Warranty

FEATURES

The DC Protector installed at or within equipment such as DC servo mechanisms, fire alarm monitoring systems, security system controls, etc. provides compact, heavy duty surge suppression.

The units employ brute force surge protection to prevent damage or malfunction to sensitive equipment from lightning, switching transients and momentary power supply overvoltages. Reaction time is less than five nanoseconds with automatic reset after the transient has passed.

Designed to protect up to 15A of continuous DC load current when connected in series mode, the DC protector will support higher load current ratings when optionally shunt installed. Bidirectional all-mode protection means that all potential surge and transient paths are fully covered.

On board status LED indicates full protection is present. For applications where DIN rail mounting is required, add "-DIN" to model name.

- **Compact Size** - Space efficient and easy to install, the DC Protector offers quick, hard-wired installation in locations where space is limited.
- **Maximum Surge Protection** - Large absorption capability, up to 278j.
- **Fast Clamp Response** - Currents are intercepted and safely diverted in less than 5 nanoseconds.
- **Automatic Reset** - The unit automatically resets after an overvoltage transient condition has occurred. A green LED gives verification that the unit is operational and full protection is present.
- **All Mode Protection** - positive to negative, positive to ground, negative to ground.

SPECS

Maximum continuous operating VDC: 125% rated voltage
 Response time: <5 nanoseconds
 Surge current (8/20µs): 1 Event: 4kA 4kA
 10,000 Events: 300A 300A
 Power present indicator: Green LED
 Operating altitude: 13,000 ft. (4000m)
 Temperature (Operating): -40° to +55°C
 Temperature (Storage): -40° to +85°C
 Enclosure: High-impact Plastic
 Dimensions: Dimensions: 4.95" x 2.85" x 1.25"
 Mounting: Mounting: 4.20" x 2.25"/0.185 ID - 4 holes
 Connection: Touch-Safe terminals

Model	System Voltage
MCG-12A	12 V DC
MCG-24A	24 V DC
MCG-32A	32 V DC
MCG-48A	48 V DC
MCG-130A	130 V DC

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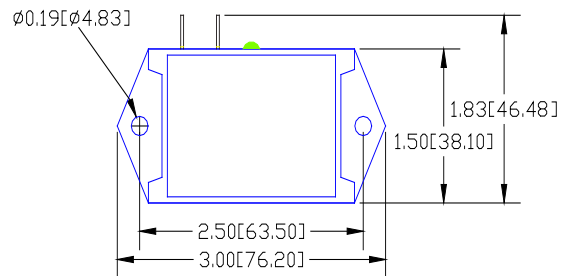
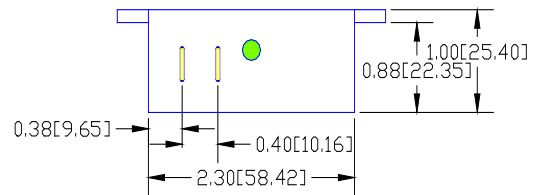
The AEP Series

Automotive Electronics Protector

MCG's Direct Current AEP-12 and AEP-24 protect sensitive electronics from damaging transients that occur in a battery/alternator electrical system. Designed with high performance and safety standards, the AEP protectors withstand repetitive transients that occur on a daily basis, in addition to the alternator's load dump transient. Protect critical equipment in generator sets, cars, trucks, limousines, military vehicles, buses, and heavy machinery such as onboard computers, GPS, entertainment systems, radio equipment, inverters etc.

The units feature both over-current and thermal fusing. If there is more than one piece of critical equipment on the same circuit, multiple protectors may be employed.

The AEP-12 and AEP-24 are easily installed in parallel on the DC power bus in front of the electronics to be protected.



Model:	AEP-12	AEP-24
Rated Voltage:	12VDC (Max.18VDC)	24VDC (Max.36VDC)
Headroom:	25% (14.4V nominal charging voltage)	28% (28V nom. charging voltage)
Peak Power Dissipation:	4400 Watts (100µs/150ms waveform)	8800 Watts (100µs/150ms waveform)
	100,000 Watts (8/20µs waveform)	200,000 Watts (8/20µs waveform)
Connection:	Positive and negative 12VDC via two 0.25" quick connects, Male	Positive and negative 24VDC via two 0.25" quick connects, Male
Protection Type:	Unidirectional	
Wiring:	Use 14AWG minimum wire size to connect protector.	
Input Fusing:	15A (fused internally)	
Local Status Indicator:	Green LED	
Dimensions:	2"L x 1.5"W x 1" D (50.8mm x 38.1mm x 25.4mm)	
Mounting:	Two mounting holes, 2.5" Centers/Hole Diameter 0.187" for # 8 screws	
Enclosure:	ABS Plastic, epoxy encapsulated.	
Warranty:	90 days defective product replacement	





Over 40 *Years of*
Perfect Protection

MCG SURGE PROTECTION

www.mcgsurge.com

\$6.00 USD
Part No. 299-300-13