

## Dual Shelf for the CC12500/ CH12500 Rectifier

Model: J2015001L001

### RoHS Compliant



### Features

- Fits into standard 19" EIA-310-D racks (mounting features dependent on application; 1.5-2 RU)
- Isolated 380 Vdc output with High-Resistance Midpoint Ground (HRMG,  $\pm 190$  Vdc) for improved safety
- +12V standby power isolated from the main output
- Supports hot-swapping of modules
- Accommodates mechanical latching into the slot
- Communicates by a common RS485 bus
- Designed to meet Zone 4 earthquake requirements when mounted in a Zone 4 rated cabinet / system
- CUR\*† recognized
- CB report
- CE Mark§
- Shock & Vibration: Meets IPC 9562 Class II standards
- Three front panel LED indicators
- EN/IEC/UL/CSA C22.2 60950-1 2nd edition +A1
- EN/IEC/UL/CSA EN62368-1 ready
- CE mark§
- Meets FCC part 15 subpart B, EN55022 Class B standards
- Meets EN61000 immunity and transient standards
- Shock & vibration: Meets IPC 9592 Class II standards

### Description

The J2015001L001 shelf positions and interconnects two CC12500H3C380TEZ-GM High-Efficiency Water-Cooled Rectifiers or two CH12500H3C380TEZ-GM High Efficiency Conduction-Cooled Rectifiers, enabling easy hot-swap replacement. Available support hardware may be added to create a rugged enclosure that meets Zone 4 earthquake rating.

\* UL is a registered trademark of Underwriters Laboratories, Inc.

† CSA is a registered trademark of Canadian Standards Association.

‡ VDE is a trademark of Verband Deutscher Elektrotechniker e.V.

§ This product is intended for integration into end-user equipment. All CE marking procedures of end-user equipment should be followed. (The CE mark is placed on selected products.)

\*\* ISO is a registered trademark of the International Organization of Standards

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## Change History

V2.2 – May 8, 2019

p.6: Updated control, rectifier signal and jumper connection sections

p10: Corrected ordering comcode to 150046616.

## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only; functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Min	Max	Unit
Input Voltage: Continuous	$V_{IN}$	0	528	$V_{AC}$
Operating Ambient Temperature	$T_A$	2	50	$^{\circ}C$
Storage Temperature (ensure that all liquid has been removed from cooling pipes for storage temperatures < 2 $^{\circ}C$ )	$T_{stg}$	-40	85	$^{\circ}C$
I/O Isolation voltage to Frame (100% factory Hi-Pot tested)			2500	$V_{AC}$

## Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage,  $V_o=380V_{DC}$ , resistive load, and temperature conditions. To meet measurement accuracy a warm up time of 1hr may be required.

INPUT (one feed, separate for each slot)					
Parameter	Symbol	Min	Typ	Max	Unit
Operating Voltage Range (3 $\Phi$ delta with safety frame ground)	$V_{IN}$	360	400/480	509	$V_{AC}$
Frequency	$F_{IN}$	47	50/60	63	Hz
Input current per phase (max at $V_{in}$ 360 $V_{AC}$ , $W_{OUT}$ 11700W)	$I_{IN}$			20	$A_{rms}$
Recommended AC Breaker Size		@ 480 $V_{AC}$ @ 400 $V_{AC}$			$A_{AC}$
Leakage Current (per $\Phi$ , 530 $V_{AC}$ , 60Hz)	$I_{IN}$			5 <sup>1</sup>	%
Isolation (per EN60950)		Input – Output Input-Chassis/Signals			$V_{AC}$ $V_{AC}$

<sup>1</sup>Leakage current shall not exceed 5% of the nominal input current per phase under testing. Appropriate marking requirements of UL 1950, CSA 950, and IEC/EN 60950 should be applied.

MAIN OUTPUT					
Parameter	Symbol	Min	Typ	Max	Unit
Output Power (360 – 432 $V_{AC}$ – 3 $\Phi$ , $T_{INLET}$ = 2–50 $^{\circ}C$ ) (432 – 509 $V_{AC}$ – 3 $\Phi$ , $T_{INLET}$ = 2–50 $^{\circ}C$ )	$W_{OUT}$			21,000 25,000	$W_{DC}$ $W_{DC}$
Output Voltage Programming Range		360	380 ( $\pm$ 190)	400	$V_{DC}$
Output Current ( $V_{AC}=480$ , $T_{INLET}$ = 50 $^{\circ}C$ ) (all 12,500W)	$I_{OUT}$			69.4 66 62.6	$A_{DC}$
Isolation Output/frame – other circuits	$V$	200			$V_{DC}$

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### Electrical Specifications (continued)

12V <sub>DC</sub> Auxiliary Output					
Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage Setpoint	V <sub>OUT</sub>		12		V <sub>DC</sub>
Output Current	I <sub>OUT</sub>	0		3.6	A
Isolation Output/Frame Output/Main output	V	50			V <sub>DC</sub>
	V	50			V <sub>DC</sub>

### General Specifications

Parameter	Min	Typ	Max	Units	Notes
Service Life		10		Yrs	Full Load
Unpacked Weight		5.0		Kgs	
		11.0		(Lbs)	
Packed Weight		7.7		Kgs	
		17.0		(Lbs)	

### Safety / Standard Compliance

Parameter	
Safety Standards	UL60950-1, CAN/CSA C22.2 No 60950-1, EN60950-1
Certification Marks	CE mark, UL Recognized (Canada and U.S.)

### Environmental Specifications

Parameter	Min	Typ	Max	Units	Notes
Coolant Water Inlet Temperature <sup>2,3</sup>	2		50	°C	
Operating Ambient Air Temperature	2		50	°C	
Storage Ambient Air Temperature	-40		85	°C	
Humidity (operating and storage)	5		85	%	Relative humidity, non-condensing
Shock and Vibration Operational	Meets IPC 9592 Class II, Section 5 and GR-63_CORE, Level 3 requirements				
Earthquake Rating	4			Zone	Meets GR-63_CORE requirements <sup>4</sup>

<sup>2</sup>Coolant must remain free of algae and corrosion products. The use of suitable inhibitors in the coolant is recommended, compatible with copper tubing. Full-rated output power is available up to 50°C inlet water temperature (lower for coolants other than water).

<sup>3</sup>Water connections are indicated by color on faceplate (blue – cool inlet, red – warm exit). Water delivery method should include strain relief feature to mitigate the risk of water leak in the end product. Leak detection and protection mechanisms should be used to mitigate the effect of water leaks. Care must be taken to prevent water clogs that could reduce the water pressure or restrict flow.

<sup>4</sup>When installed in a Zone 4 rated cabinet.

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### EMC [Surges and sags applied one $\Phi$ at a time and all 3 $\Phi$ 's simultaneously; phase angles 0°, 90°, 270°]

Parameter	Function	Standard	Level	Criteria	Test
AC input	Conducted emissions <sup>5</sup>	EN55022, FCC part 15 EN61000-3-2 Telcordia GR1089-CORE	A		0.15 – 30MHz 0 – 2 KHz
	Radiated emissions <sup>5</sup>	EN55022/CISPR22, FCC part 15 Subpart B, ICES-003, KN22, CNS 13438	B		30 – 10000MHz
	Input Harmonics	EN61000-3-2	A		
AC Input Immunity	Line sags and interruptions	EN61000-4-11	Class 3	A	-30% (from 400Vac) for 10ms
		Output will stay above 320V <sub>DC</sub> @ 75% load		A	25% sag from nominal (400V <sub>AC</sub> ) for 0.5 s
		SEMI-F47 Compliant at 480Vac Output will stay at Full Power	50% Sag	Any Phase	10 cycles @ 50Hz 12 cycles @ 60Hz
		70% Sag	25 cycles @ 50Hz 30 cycles @ 60Hz		
		80% Sag	50 cycles @ 50Hz 60 cycles @ 60Hz		
	Lightning surge	EN61000-4-5, Level 4, 1.2/50 $\mu$ s – error free		A	4kV L-E
				A	2kV L-L
	ANSI C62.41-2002	100kHz ring wave 1.2/50 $\mu$ s-8/20 $\mu$ s 5/50ns EFT burst	3, Category B 3, Category B	B, Table 2 B, Table 3 B, Table 6	6kV/0.5kA 6kV, 3kA 2kV, severity II
Fast transients	EN61000-4-4		3	A	5/50ns, 2kV (common mode)
Enclosure immunity	Conducted RF fields	EN61000-4-6	3	A	130dB $\mu$ V, 0.15-80MHz, 80% AM
	Radiated RF fields	EN61000-4-3	3	A	10V/m, 80-1000MHz, 80% AM
	Power Frequency Magnetic Fields	EN61000-4-8	4	A	30A/m
	ESD	EN61000-4-2	4	A	8kV contact, 15kV air

<sup>5</sup>Tested with shelf, external AC input filter, and shielded DC output cables with filter beads

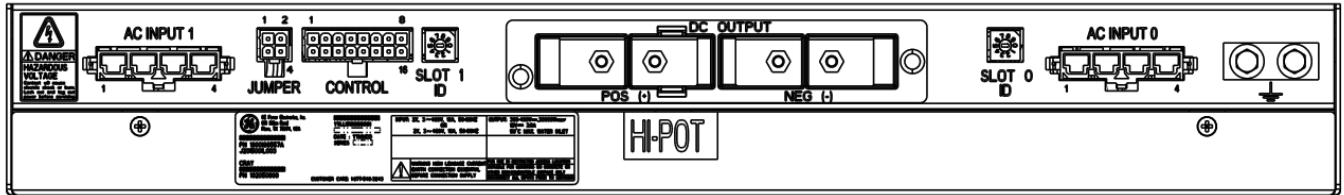
#### Criteria Performance

- A No performance degradation
- B Temporary loss of function or degradation not requiring manual intervention
- C Temporary loss of function or degradation that may require manual intervention
- D Loss of function with possible permanent damage

# Dual Shelf for the CC12500/ CH12500 Rectifier

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## Shelf Connections



## AC Input

Each rectifier slot has a separate AC input.

For AC INPUT 1 and 2, devices to mate with two installed Molex # 428180412 4-circuit connectors with ground pins # 428170032 and other pins # 428170012:

- 2 ea. Molex # 428160412 - 10.00mm Pitch Mini-Fit Sr.™ Receptacle Housing, Single Row, 4 Circuits
- 8 ea. Molex # 428150012 - Female Crimp terminal (10-12awg)

### AC INPUT 1 and 2:

Pin	Function
1	Phase 1
2	Phase 2
3	Phase 3
4	Earth Ground

## DC Output

DC output should be provided by busbars supplying the total power from both rectifier slots, labeled “+” and “-“. Customer terminations should be provided by the following method:

- 2X 1-hole lug connections plus anti-rotation feature per busbar.

## Control

Connect ENABLE to LGND to enable rectifiers, open is disabled.

MOD\_PRES\_x is connected to LGND inside each rectifier, indicating the rectifier is installed.

Detailed descriptions of other signals may be found in the rectifier datasheet.

Devices to mate with installed Molex # 39301162 Mini-Fit® Jr. Header:

- 1X Molex # 39012165 - Mini-Fit Jr.™ Receptacle Housing, Dual Row, 16 Circuits, UL 94V-0, Natural
- 12X Molex # 39000091 - Mini-Fit® Female Crimp Terminal, Gold (Au) over Brass, 22-28 AWG, Reel

To interconnecting 2 or more shelves, the following signals must be daisy-chained to each shelf: RS485 (pins 1 and 2), LGND (pins 3 and 11), 12V+ Aux (pins 4 and 12), Enable (pin 6), OPW (pin 14). LGND, 12V+ Aux, Enable and OPW signals may also be daisy chained using the JUMPER connector. All rectifiers can be turned ON by connecting Global Enable (pin 3) to Logic Ground (pin 1). Over Power Warning (Pin 4) is floating if all rectifiers outputs are in normal power range, but if one or more rectifiers output enters the Over Power range, this pin is pulled down to Logic Ground.

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CONTROL connector:

Pin #	Function	Name
1	RS485 signal B	RS485_B
2	RS485 signal A	RS485_A
3	Logic Ground (signal return)	LGND
4	12V+	12V_AUX
5	Module 1 present	MOD_PRES_1
6	Global Enable	ENABLE
7	RS485 signal B0 (if separate RS485 lines)	RS485_B0
8	RS485 signal A0 (if separate RS485 lines)	RS485_A0
9	rsvd blank	
10	rsvd blank	
11	Logic Ground (signal return)	LGND
12	12V+	12V_AUX
13	Module 0 present	MOD_PRES_0
14	Over Power Warning	OPW
15	rsvd blank	
16	rsvd blank	

### Rectifier Signals Terminated Inside Shelf

Where x represents the slot number,

- INTERLOCK\_x (short pin) is connected to SEC\_RTN\_x for hot-plug, to indicate to the rectifier that other pins are seated.
- SLOT\_ID\_x can be selected for each rectifier with two rotary switches located on the shelf backplane. Unique slot IDs must be selected, for up to 10 rectifiers per RS485 line.

Detailed descriptions of these signals may be found in the rectifier datasheet.

### Jumper

As an alternative method for interconnecting 2 or more shelves, each shelf's JUMPER connectors pins must be tied together with a cable. All rectifiers can be turned ON by connecting Global Enable (pin 3) to Logic Ground (pin 1). Over Power Warning (Pin 4) is floating if all rectifiers outputs are in normal power range, but if one or more rectifiers output enters the Over Power range, this pin is pulled down to Logic Ground. RS485 signals must also be daisy-chained from the control connector. Please refer to the rectifier datasheet for detailed descriptions of other signals.

Devices to mate with installed Molex # 26-01-3115 Mini-Fit® Jr. Header:

- 1 ea. Molex # 39-01-2045 - Mini-Fit Jr.™ Receptacle Housing, Dual Row, 4 Circuits, UL 94V-0, Natural
- 4 ea, Molex # 39-00-0139 - Mini-Fit® Female Crimp Terminal, Selective Gold (Au) and Selective Tin (Sn) over Nickel (Ni), 22-28 AWG, Reel

JUMPER connector:

Pin	Function	Name
1	Logic Ground (signal return)	LGND
2	12V+	12V_AUX
3	Global Enable	ENABLE
4	Over Power Warning	OPW

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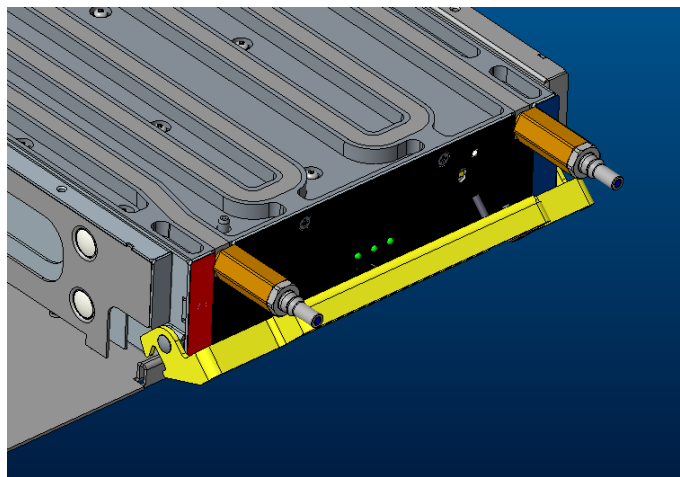
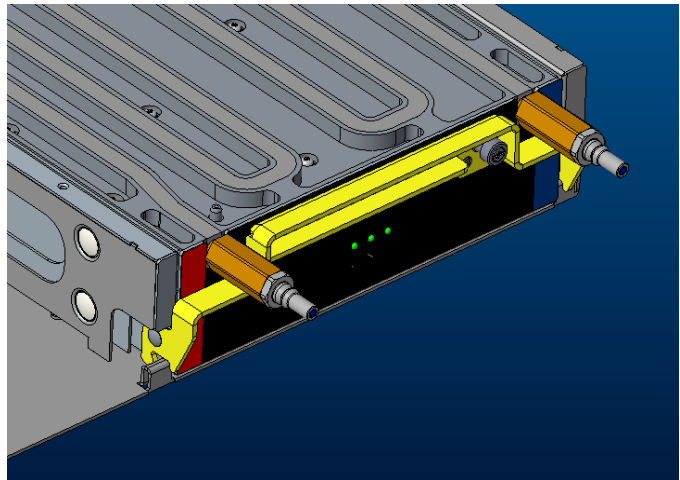
### Rectifier Installation

**Caution:** The handle on the front is for extracting or securing the rectifier in the shelf, NOT for carrying -- it cannot support the weight!

The rectifier may be inserted or removed while the system is energized.

**Directions:**

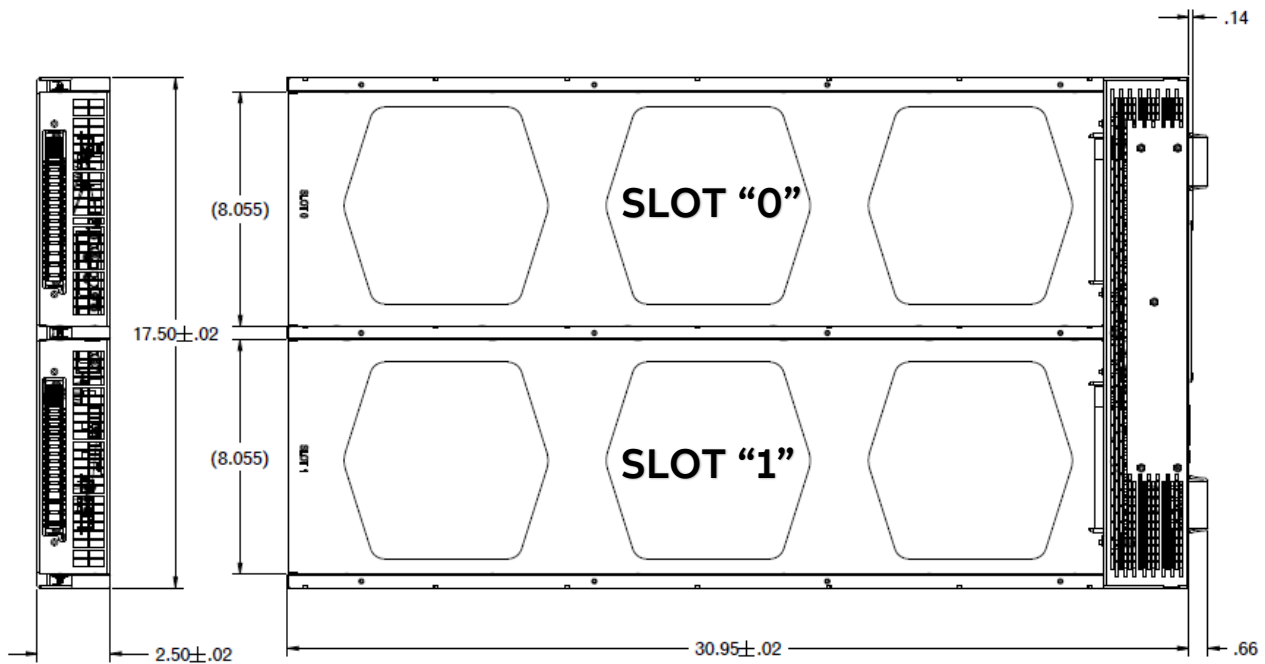
1. Open the latch by unscrewing the locking device and rotating the handle away from the faceplate.
2. Slide the rectifier into the shelf while the latch is in the open position. When resistance is felt near the end of insertion, slowly rotate the handle against the faceplate to close the latch and complete the insertion.
3. Screw in the locking device fully to secure the rectifier in the shelf. Torque the screw to 6.7 in-lb (0.76 N-m)



## Dual Shelf for the CC12500/ CH12500 Rectifier

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### Package Outline



### Safety

#### Product Labeling

Follow all warnings and instructions marked on the product. Some of the safety symbols used with this shelf may include the following. They may also be accompanied by instructions:

#### *Mounting and Installation*

- This product shall be installed in compliance with mounting requirements for the ultimate application.
- This product must be installed, serviced, and operated only by skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment. This product is intended for use in a Restricted Access Location.
- This equipment is to be used in controlled environments (an area where the humidity is maintained at levels that cannot cause condensation on the equipment, the contaminating dust is controlled, and the steady-state ambient temperature is within the range specified).
- This equipment has been evaluated for use in a continuous ambient temperature of up to 50°C and the application environment should not exceed 50°C.
- The CE mark if provided on the product is applied to show conformance to the requirements outlined in the European Union's Low Voltage Directive [2006/95/EC] and EMC Directive [2004/108/EC].
- This shelf has been evaluated for hot swapping.
- A separate protective Earthing terminal is provided at the rear of the shelf
  - the building installation shall provide a means for connection to protective earth; and
  - the equipment is to be connected to that means; and
  - a SERVICE PERSON shall check whether or not the socket-outlet from which the equipment is to be powered provides a connection to the building protective earth. If not, the SERVICE PERSON shall arrange for the installation of a PROTECTIVE EARTHING CONDUCTOR from the separate protective Earthing terminal to the protective earth wire in the building.



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### Output Connections

- All field wiring should comply with the U.S. National Electrical Code (NEC) and/or applicable local codes/standards.
- Routing of the DC output cables should guarantee that cables are not in contact with sources of heat and surfaces that may damage the cable insulation.
- The DC output is not provided with a fuse or circuit breaker suitable for branch circuit protection. Therefore, the power shelf should be mounted in the same rack or cabinet as the equipment being powered. Use interconnecting power cables suitable for the application and sized to carry the rated output current. The interconnecting cables should be capable of carrying the overload current and short circuit current without damage or risk of fire.
- The output for the system is SELV and has available power greater than 240VA.
- Insulation on output field-wired conductors should be rated no less than 90°C. Wiring internal to enclosed equipment cabinets should be rated at 105°C (minimum).
- Before opening the insulating cover to gain access to load and ground connections, ensure all power supplies are disconnected from the AC MAINS.

### AC Input Connections

- This shelf is configured with primary internal wiring and Molex connectors, rated for internal factory wiring only. The Molex connector is not UL Recognized for direct connection to the AC mains. The internal wiring is not UL recognized to be directly accessible by a user. Consideration should be taken on the end product's Listing to comply with NEC requirement for AC mains installations.
- AC branch circuits to this equipment must be protected with fuses or circuit breakers sized as required by the U.S. National Electric Code (NEC) and/or local codes. Up to four AC mains power cords are required to power the shelf (one for each rectifier). Each power cord should be connected to a separate AC mains branch circuit with an overcurrent protector rated at no more than 25A.
- The power supply mains inlet may be used as the means to provide AC protective earthing.
- An accessible AC disconnect/protection device to remove AC power from the equipment in the event of an emergency must be provided. An accessible socket-outlet/receptacle installed near the equipment is also acceptable as a disconnect.
- The equipment is powered by multiple AC inputs (one per rectifier). Disconnect all AC sources of power before servicing.
- These units are to be used with TN-S power systems only.

### Safety Symbols and Guidelines

Read and understand all instructions before attempting any installation of this product. When installing, operating, or maintaining the J2015001L001/3 Power System, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons. Such precautions include the following:



This symbol identifies the need to refer to the equipment instructions for important information.



This symbol identifies the presence of hazardous AC or DC voltages or hazardous energy levels. In the context of this product

- The DC output cables contain electrical energy levels capable of causing heating and arcing if shorted to metal objects. Make connections with the power disconnected.
- Hazardous AC voltage and DC electrical energy is contained within the enclosure of the power shelf. No user or field serviceable parts inside.



This symbol is used to identify safety earth ground connection points within the equipment.

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### German Safety Guidelines

#### Installationsanleitung

- Alle Ausgänge des Gerätes erfüllen die Anforderungen für SELV nach IEC/EN60950-1.
- Die Ausgänge des Gerätes liegen über den Limits für Energiegefahr nach IEC/EN60950-1 (>240 VA). Das Gerät ist zum Einbau in ein Montage-Rack bestimmt. Siehe Einbaubestimmungen in der Montageanleitung, um eine Gefährdung des Benutzers während der Installation zu vermeiden.

#### ACHTUNG:

##### Hoher Ableitstrom Vor Anschluss an den Versorgungsstromkreis unbedingt Erdungsverbinding herstellen

- Das Produkt ist zum Gebrauch in einer Umgebungstemperatur von max. 50°C bestimmt.
- Die Gerätestecker des Produktes sind dazu bestimmt, eine sichere Erdung des Gerätes herzustellen.
- Das Produkt ist zum Gebrauch in einer Umgebung mit Verschmutzungsgrad 2 nach IEC/EN60950 bestimmt.
- Die Netzteile des Gerätes können während des Betriebes einzeln ausgetauscht werden (Hot Swapping).
- Das Gerät wurde zusammen mit den Anschlussleitungen (ohne Anschlussstecker) geprüft. Die Installation eines Steckers des jeweiligen Landes, sollte nur durch geschultes Service Personal durchgeführt werden. Als alternative könnte eine Vorinstallation des Steckers bereits bei der Herstellung erfolgt sein.