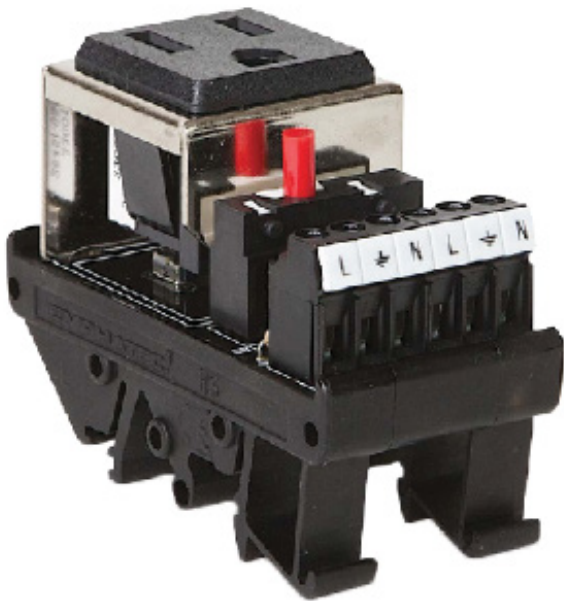


# Emphatec VanGuard®

## AC Outlet Module



The Emphatec VanGuard® AC Outlet Module provides a quick and easy way to install a maintenance outlet in a control panel. Clip it on a DIN rail and connect 120Vac and you're done. Included on the module is a 5A supplemental circuit breaker with status LED. As the breaker is a supplemental rated device, NEC/CEC requirements with regards to interrupting ratings and upstream protection by a branch breaker or fuse must be adhered to. See attached application note. The module requires just 35mm of DIN rail. Also available is a GFCI version.

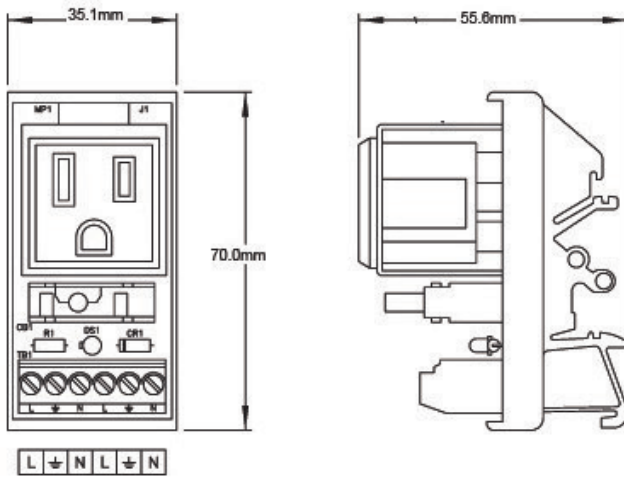
### Features

- Compact AC outlet module for installation in control cabinets
- Built-in supplemental circuit breaker
- Mounts on 32mm and 35mm DIN rails

### Ordering Data

Type	Order Number
Emphatec VanGuard® AC Outlet Module	330014

## Technical Data



### Emphatec VanGuard® AC Outlet Module

**Order Number** 330014

Input voltage: 120Vac

Output (load) current: 5A maximum

Breaker type: Thermal, manual reset

Operating temperature: -10°C To +40°C

Terminations: 26 - 12 AWG

Termination type: Screw clamp

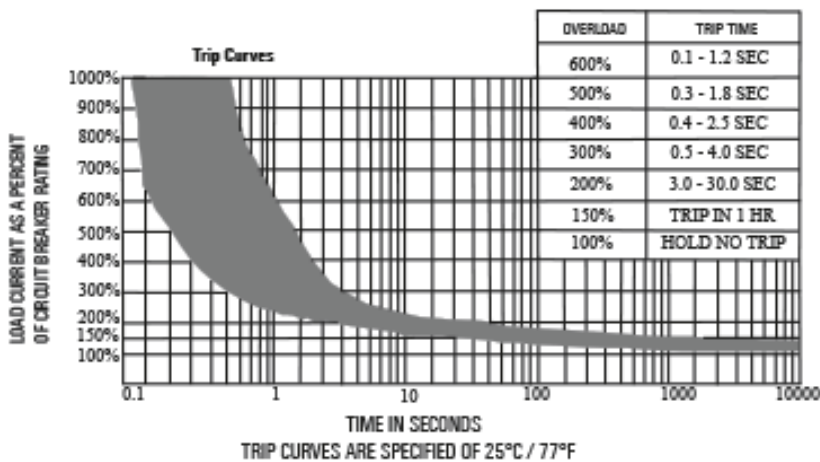
Dimensions: 30 x 70 x 48mm

Housing material: polyamide, UL94-V0 rated

DIN rail mounting: 32mm and 35mm

Direct mounting: No

Approvals: cULus Listing E252394



## Application Note

Control cabinets have an overall interrupting capacity rating. The rating refers to the maximum fault current that can be interrupted safely. The process of determining this rating needs some detailed explanation.

Individual devices with interrupting ratings include circuit breakers, fuses, contactors, motor starters etc. The manufacturer of each device provides an interrupting rating in amps or kilo-amps. Branch circuit breakers are rated 10KA at 600Vac while 13/32" x 1 1/2" midget fuses are rated 100KA or 200KA for the CC versions. The supplemental breaker used on 330014 is rated 1000A.

Unfortunately the overall rating of the cabinet is often equal to the lowest individual component rating. For example, even if a motor control circuit uses 100kA rated fuses and a contactor rated 10kA the overall rating might be 1000A if the cabinet contains 9915480001. Since the AC outlet is used for non-permanently connected devices such as a laptop computer or test equipment and is not in the actual motor control circuit this does not seem to make sense but the standard used by inspection authorities such as CSA and the Electrical Safety Authority (typically CSA 22.2 No. 14 – Industrial Control Equipment) does not distinguish between different portions of the cabinet. In the example above a 1000A rating will not likely be acceptable for a motor control application.

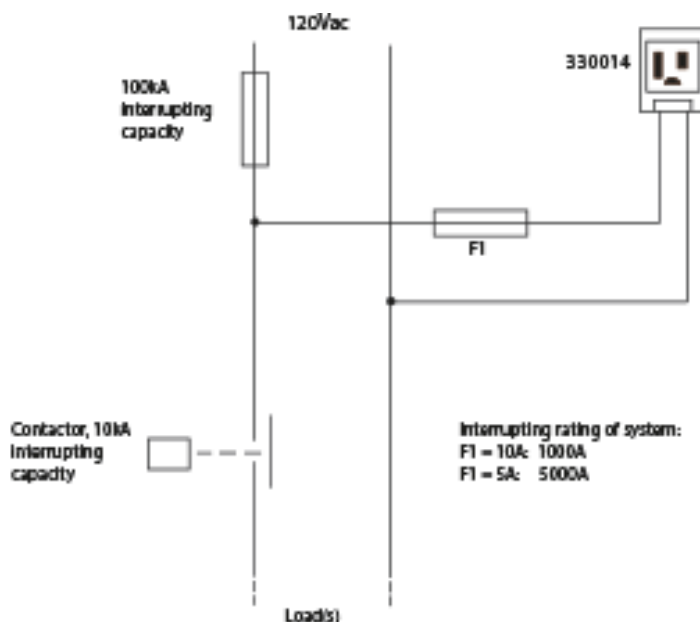


Figure 1. Overall interrupting rating based on F1 (5000A max.)

There are two possible ways to increase the overall cabinet rating. One solution is referred to as a "series tested pair" and is included in the Supplemental Protection standard (CSA 22.2 No. 235, section 6.8.1.3). In this situation the 330014 would be tested with an external fuse or circuit breaker and an available fault current of more than 1000A. As long as the external device interrupts the fault current before the supplemental breaker on the module tripped for an interrupting rating equal to the fault current.

330014 was tested by CSA with external 5A and 10A branch rated fuses. When tested with the 5A fuse and an available fault current of 5000A the fuse failed and interrupted the current before the supplemental breaker on the module tripped. Therefore this combination would allow the overall cabinet interrupting capacity to be rated 5000A (assuming there are no other devices rated less than 5000A in the cabinet). When the external fuse was increased to 10A the supplemental breaker on the module tripped before the fuse failed so the interrupting capacity of this combination would be that of the supplemental breaker - 1000A.

In this situation if an overall rating for the cabinet of 5000A is not sufficient the AC outlet module would have to be changed to the version without the supplemental breaker (330036).

A method of increasing the overall interrupting capacity is to use a control transformer. For example, many motor control cabinets use 3 phase 480V or 600V power for the motors and 120V for the PLC and control components. The 120V powers the PLC and 24Vdc power supplies and maybe some interposing relays used to interface PLC outputs to contactors. In this situation the available fault current is equal to the short circuit current of the control transformer and may be less than 1000A. If this is the case the rating of the supplemental breaker on the AC Outlet Module is sufficient and the 120V control circuitry does not impact the interrupting capacity of the motor control devices.

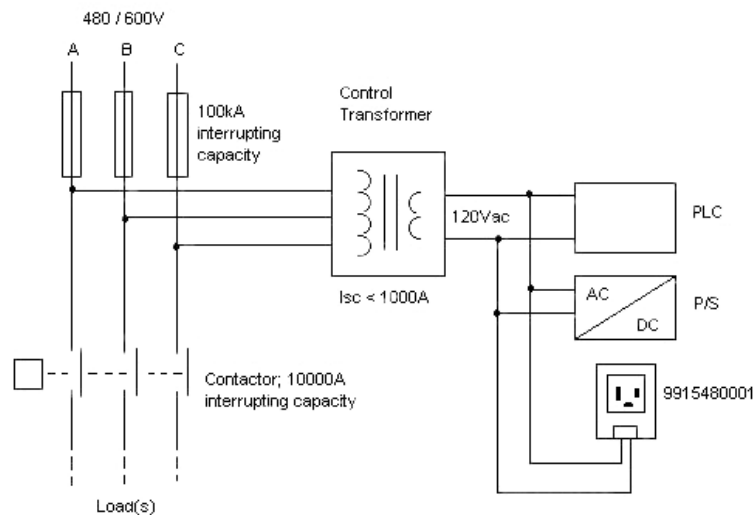


Figure 2. Overall interrupting rating: 10000A

**The short circuit current of a control transformer is calculated as follows:**

$$ISC = ISEC / (ZT / 100)$$

where ISEC = secondary current = VA rating / VSEC  
 ZT = transformer impedance in %

**For a 1KVA control transformer with an impedance of 3% the short circuit current would be:**

$$ISC = (1000/120) / (3/100) = 278A$$

This is well below the interrupting rating of the supplemental breaker used on the AC Outlet Module so the application is acceptable. If the control transformer was rated 10KVA the short circuit current would be 2780A so the AC Outlet Modules would not be acceptable.

As long as the 330014 is installed on the secondary of a control transformer and the available short circuit current does not exceed 1000A then the AC Outlet Module does not affect the overall interrupting rating of the cabinet. The overall rating will now be determined based on the individual component ratings in the 480V or 600V motor control circuitry.

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