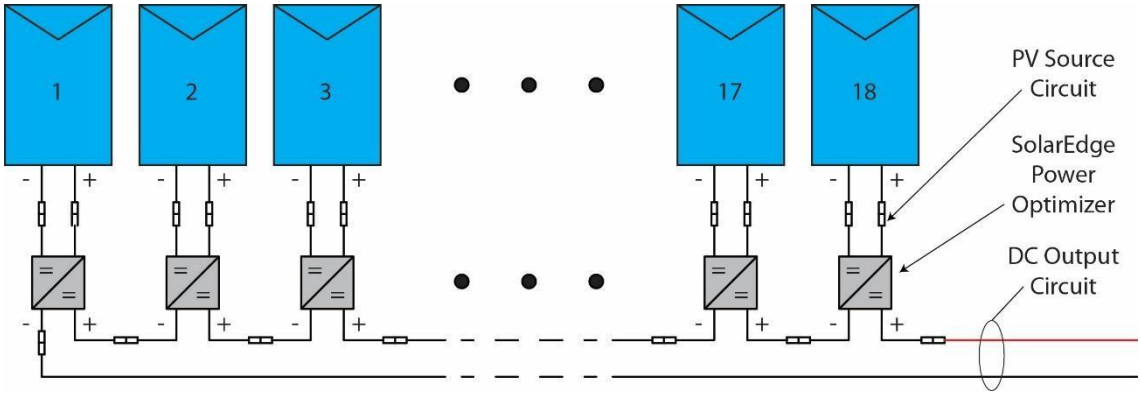
# PV Power Source Labeling in a SolarEdge system

## Version History

- Version 1.1, October 2019: Inverters modules were added. NEC 2017 requirements were updated.
- Version 1.0, January 2019: Initial release

## Introduction

String design and installation is significantly different in a SolarEdge system when compared to a traditional string inverter. PV modules do not get connected in series directly. Every PV module in the array is first connected to the input of a SolarEdge power optimizer, the power optimizer output cables are connected to other power optimizer output cables connecting the power optimizers in series.

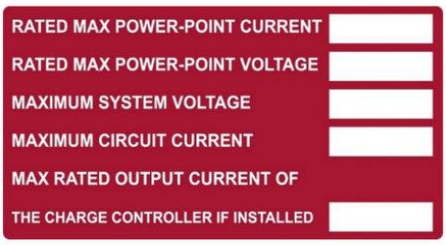



PV module open circuit voltage at low temperature needs to be considered to avoid exceeding the power optimizer input voltage rating but it does not have an impact on string length. Both voltage and current are regulated at the string level. SolarEdge inverters operate with a fixed string voltage regardless of the number of power optimizers connected in series.

## NEC 2014 Requirements

NEC Article 690.53 specifies that the following PV power source information be provided in a permanent label at the PV disconnecting means

- Rated maximum power point current.
- Rated maximum power point voltage.
- Maximum system voltage.
- Maximum circuit current.




## SolarEdge system labeling

- **Rated maximum power point current**
  The maximum power point current is the **lower** of the following 2 values:
  - The total STC DC power rating for all PV Modules divided by the nominal string voltage value listed in item (2) below for maximum power point voltage.
    For example, a system with 28 – 260 watt PV Modules with the SE6000H-US inverter connected to a 240 Vac single phase grid connection would be: 7280 watts divided by 380 Vdc = 19.2 amps.
  - The maximum input current rating of the inverter.
    For example the SE6000H-US inverter has a maximum input current rating of 16.5 amps and will limit current to 16.5 amps.

  If the calculated maximum power point current is lower than the inverter input rating, the calculated value should be used. In this case the calculated value is higher than the inverter input current rating so the 16.5 amp inverter current limit should be used.

- **Rated maximum power point voltage**
  SolarEdge inverters operate with a fixed string voltage. The labeling requirement for the supported grid voltages are below:

  Single Phase Inverters

  SE3000H-US through SE6000H-US=380 Vdc nominal string voltage

  SE7600H-US through SE11400H-US = 400Vdc nominal string voltage

  Three Phase Inverters

  208/120 Vac grid = 400 Vdc nominal string voltage

  480/277 Vac grid = 850 Vdc nominal string voltage

- **Maximum system voltage**
  In a SolarEdge system the PV Modules are not connected directly to the DC output circuit. When the inverter is offline for any reason, on-off switch turned off or no AC voltage applied to the inverter, the power optimizers are in their safe-mode and only output 1 Vdc per power optimizer. During the inverter startup process the power optimizers are instructed by the inverter to exit safe-mode and the string voltage will be slightly higher than the values listed above for maximum power point voltage until the inverter starts to regulate current in the string. The value for this labeling requirement should be the maximum input voltage rating of the inverter below:

  Single Phase Inverters = 480 Vdc

  Three Phase Inverters

  SE9k-US - 208/120 Vac grid = 500 Vdc

  SE14.4KUS, SE43.2KUS – 208/120 Vac grid = 600 Vdc

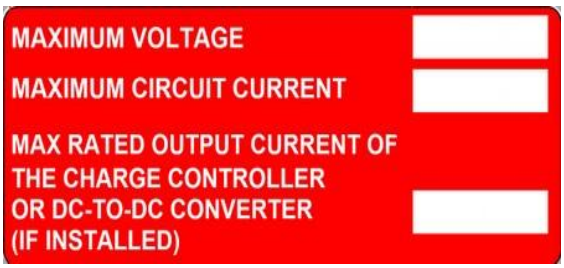
  480/277 Vac grid = 1000 Vdc

- **Maximum circuit current**
  Under normal operating conditions, the string current is regulated by the inverter and will never exceed the maximum input current rating of the inverter.

## NEC 2017 Requirements

With the new version of the NEC changes have been made to simplify the required labeling and make it less confusing.

- Maximum Voltage
- Maximum Circuit Current




## SolarEdge system labelling

- **Maximum Voltage**
  In SolarEdge systems dc to dc converters are connected in series to form a string. Therefore, the value for maximum voltage should be determined according to 690.7 (B) (2). The SolarEdge system architecture is based on a proprietary, UL listed product consisting of inverter and optimizers. The instructions included with the SolarEdge product describes the maximum voltage as 1000VDC, 600VDC, or 480VDC depending on the model of inverter used. For instance, the SE100KUS has a maximum input voltage of 1000VDC.

- **Maximum Circuit Current**
  Under normal operating conditions, the string current is regulated by the inverter and will never exceed the maximum input current rating of the inverter.