

Section 712 – Solar Photovoltaic Systems

ElectricalOM Calculation Checks

1. Protection of PV Modules-Strings (Reg. 712.431.101 and 712.431.102):

$$1.35 \times I_{MOD_MAX_OCPR} < (N_s - 1) \times I_{SC_MAX}$$

$$1.1 \times I_{SC_MAX} \leq I_n \leq I_{MOD_MAX_OCPR}$$

$$N_p \times 1.1 \times I_{SC_MAX} \leq I_n \leq I_{MOD_MAX_OCPR} - (N_p - 1) \times I_{SC_MAX}$$

2. Choice of Protective Devices (IEC 62548) – [Extra Checks]

$$1.5 \times I_{SC_STC} < I_n < 2.4 \times I_{SC_STC}$$

3. Protection of PV String Cable (Reg. 712.433.101):

$$I_{SC_MAX} \leq I_Z$$

$$(N_s - 1) \times I_{SC_MAX}$$

$$(N_s - 1) \times I_{SC_MAX} \leq I_Z$$

$$I_n \leq I_Z$$

4. Calculation of U_{OC_MAX} and I_{SC_MAX} (Reg. 712.433.101.1):

$$U_{OC_MAX} = 1.2 \times U_{OC_STC}$$

$$I_{SC_MAX} = 1.25 \times I_{SC_STC}$$

5. Protection of PV sub-array cable (Reg. 712.433.102)

$$I_{SC_MAX} \leq I_Z$$

$$(N_a - 1) \times I_{SC_MAX}$$

$$(N_a - 1) \times I_{SC_MAX} \leq I_Z$$

$$1.1 \times I_{SC_MAX} \leq I_n \leq I_Z$$

Equipment Specifications

String Inverter 10kW:

| | | | 10.0-3-M | |
|--|--|--------|---------------------|---------------------|
| Input data | Number of MPP trackers | | 2 | |
| | | | MPPT1 | MPPT2 |
| | Max. input current ($I_{dc\ max}$) | A | 27.0 | 16.5 ¹ |
| | Max. usable input current ($I_{dc\ max\ MPPT\ 1+2}$) | A | 43.5 | |
| | | | MPPT1 | MPPT2 |
| | Max. array short circuit current MPPT1/MPPT2 ($I_{sc\ pv}$) ² | A | 55.7 | 34 |
| | DC input voltage range ($U_{dc\ min} - U_{dc\ max}$) | V | 200 - 1000 | |
| | Feed-in start-up input voltage ($U_{dc\ start}$) | V | 200 | |
| | Usable MPP voltage range | V | 200 - 800 | |
| | MPP Voltage range (at rated power) ($U_{mpp\ min} - U_{mpp\ max}$) | V | 270 - 800 | |
| | | | MPPT1 | MPPT2 |
| | Number of DC connections | | 3 | 3 |
| Max. PV generator output ($I_{dc\ max}$) | Wpeak | 15,000 | | |
| Output data | AC nominal output ($P_{ac,r}$) | W | 10,000 | |
| | AC nominal output ($P_{ac,r}$) | VA | 10,000 | |
| | | | 380 V _{AC} | 400 V _{AC} |
| | AC output current ($I_{ac\ nom}$) | A | 15.2 | 14.4 |
| | Grid connection (voltage range) | | 3-NPE 400 V / 230 | |
| | Frequency (frequency range) | Hz | 50 / 60 (45 - 65) | |
| | Total harmonic distortion | % | < 1.75 | |
| | Power factor ($\cos\ \varphi_{ac,r}$) | | | |

String Inverter 10kW with Power Optimisers:

| | SE3K ⁽²⁾⁽³⁾ | SE4K ⁽²⁾ | SE5K | SE6K ⁽²⁾ | SE7K | SE8K | SE9K | SE10K | Units |
|--|-------------------------------|---------------------|------|---------------------|--------|--------|--------|--------|-------|
| Applicable to inverters with part number | SEXK-XXXTBXX4 | | | | | | | | |
| OUTPUT | | | | | | | | | |
| Rated AC Power Output | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10,000 | VA |
| Maximum AC Power Output | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10,000 | VA |
| AC Output Voltage - Line to Line / Line to Neutral (Nominal) | 380 / 220; 400 / 230 | | | | | | | | Vac |
| AC Output Voltage - Line to Neutral Range | 184 – 264.5 | | | | | | | | Vac |
| AC Frequency | 50/60 ± 5 | | | | | | | | Hz |
| Maximum Continuous Output Current (per Phase) | 5 | 6.5 | 8 | 10 | 11.5 | 13 | 14.5 | 16 | A |
| Grids Supported - Three Phase | 3 / N / PE (WYE with Neutral) | | | | | | | | |
| Utility Monitoring, Islanding Protection, Configurable Power Factor, Country Configurable Thresholds | Yes | | | | | | | | |
| INPUT | | | | | | | | | |
| Maximum DC Power (Module STC) | 4500 ⁽⁴⁾ | 6000 | 7500 | 9000 | 10,500 | 12,000 | 13,500 | 15,000 | W |
| Transformer-less, Ungrounded | Yes | | | | | | | | |
| Maximum Input Voltage | 900 | | | | | | | | Vdc |
| Nominal DC Input Voltage | 750 | | | | | | | | Vdc |
| Maximum Input Current | 5 | 7 | 8.5 | 10 | 12 | 13.5 | 15 | 16.5 | Adc |
| Reverse-Polarity Protection | Yes | | | | | | | | |
| Ground-Fault Isolation Detection | 700kΩ Sensitivity | | | | | | | | |
| Maximum Inverter Efficiency | 98 | | | | | | | | % |
| European Weighted Efficiency | 96.7 | 97.3 | 97.3 | 97.3 | 97.4 | 97.6 | 97.5 | 97.6 | % |
| Nighttime Power Consumption | < 2.5 | | | | | | | | W |
| ADDITIONAL FEATURES | | | | | | | | | |

Power Optimiser:

| | S440 | S500 | S500B | S650B | UNIT |
|---|---|--|-------------------------------|-------------------------------|------|
| INPUT | | | | | |
| Rated Input DC Power ⁽¹⁾ | 440 ⁽²⁾ | 500 ⁽³⁾ | | 650 | W |
| Absolute Maximum Input Voltage (Voc) | 60 | | 125 | 85 | Vdc |
| MPPT Operating Range | 8 – 60 | | 12.5 – 105 | 12.5 – 85 | Vdc |
| Maximum Short Circuit Current (Isc) of Connected PV Module | 14.5 ⁽²⁾ | | 15 | | Adc |
| Maximum Efficiency | 99.5 | | | | % |
| Weighted Efficiency | 98.6 | | | | % |
| Overvoltage Category | II | | | | |
| OUTPUT DURING OPERATION | | | | | |
| Maximum Output Current | | 15 | | | Adc |
| Maximum Output Voltage | 60 | | 80 | | Vdc |
| PV System Design Using a SolarEdge Inverter⁽⁷⁾ | | | | | |
| | SolarEdge Home Wave Inverter Single Phase | SolarEdge Home Short String Inverter Three Phase | Three Phase for 230/400V Grid | Three Phase for 277/480V Grid | |
| Minimum String Length (Power Optimizers) | S440, S500: 8 S500B, S650B: 6 | 9 | 16 | 18 | |
| Maximum String Length (Power Optimizers) | 25 | 20 | 50 | | |
| Maximum Continuous Power per String | 5700 | 5625 | 11,250 | 12,750 | W |
| Maximum Allowed Connected Power per String ⁽⁸⁾ (In multiple string designs, the maximum is permitted only when the difference in connected power between strings is 2,000W or less) | 6800 ⁽⁹⁾ | See ⁽⁸⁾ | 13,500 | 15,000 | W |
| Parallel Strings of Different Lengths or Orientations | | Yes | | | |

PV Modules 500Wp:**Specifications (STC)**

| | | | | | | |
|----------------------------------|------------|-------|-------|-------|-------|-------|
| Maximum Power – Pmax [Wp] | 475 | 480 | 485 | 490 | 495 | 500 |
| Maximum Power Voltage – Vmp [V] | 35.88 | 36.06 | 36.25 | 36.43 | 36.62 | 36.79 |
| Maximum Power Current – Imp [A] | 13.24 | 13.31 | 13.38 | 13.45 | 13.52 | 13.59 |
| Open-circuit Voltage – Voc [V] | 43.45 | 43.60 | 43.76 | 43.91 | 44.07 | 44.21 |
| Short-circuit Current – Isc [A] | 13.77 | 13.85 | 13.93 | 14.01 | 14.09 | 14.17 |
| Module Efficiency STC [%] | 21.98 | 22.21 | 22.44 | 22.67 | 22.90 | 23.17 |
| Power Tolerance | 0 ~ + 3 % | | | | | |
| Temperature Coefficients of Pmax | -0.29 %/°C | | | | | |
| Temperature Coefficients of Voc | -0.25 %/°C | | | | | |
| Temperature Coefficients of Isc | 0.045 %/°C | | | | | |

STC: Irradiance 1000W/m², Cell Temperature 25°C, AM=1.5

Application Conditions

| | |
|----------------------------|---------------------|
| Operating Temperature | -40 °C ~ +70°C |
| Maximum System Voltage | 1000/1500 VDC (IEC) |
| Maximum Series fuse Rating | 25 A |

PV System Configurations

