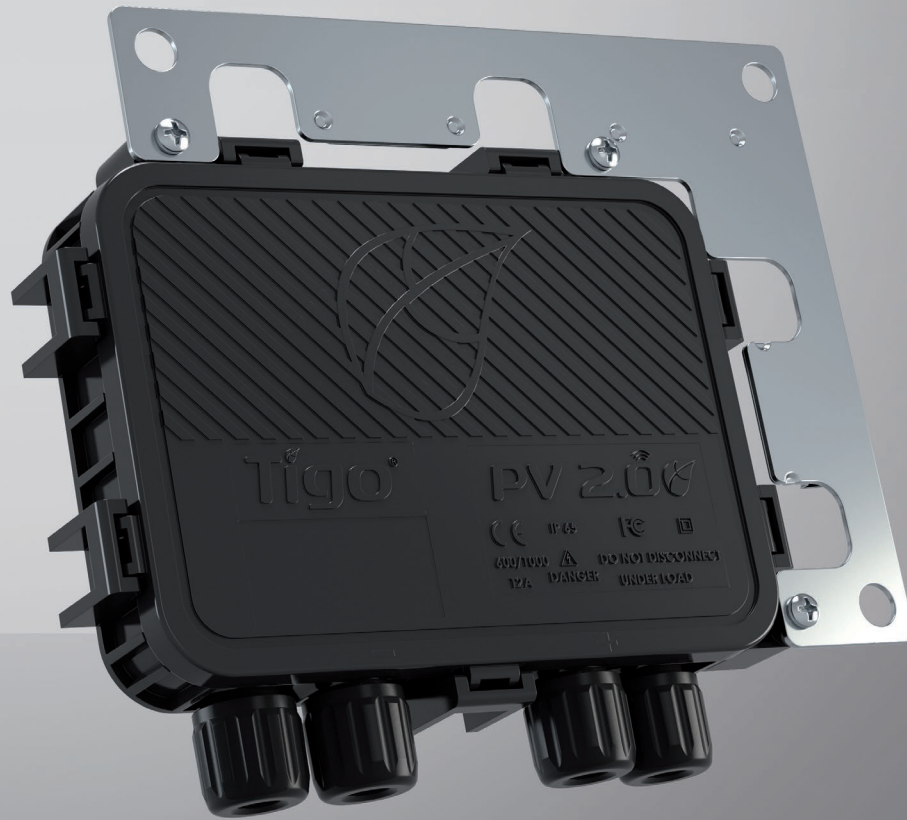


TS4-R MODULE TECHNOLOGY

TS4-R-M / TS4-R-O



TS4-R MODULE TECHNOLOGY COMPATIBLE WITH ALL MAJOR INVERTER BRANDS.

System optimization

- Yields boosted in partial shading and different module configurations
- Module-level shutdown
- Module-level monitoring

Ultimate flexibility

- Selective Deployment of DC optimizers as needed
- Compatible with all standard modules

Fast installation

- Faster installation thanks to fewer components
- Easy installation on the ground reduces roof time

Maximum reliability

- Reduced operation and maintenance costs thanks to less components
- Long service life due to demand-specific bypass operation
- Comprehensive SMA service for the entire system

TS4-R MODULE TECHNOLOGY

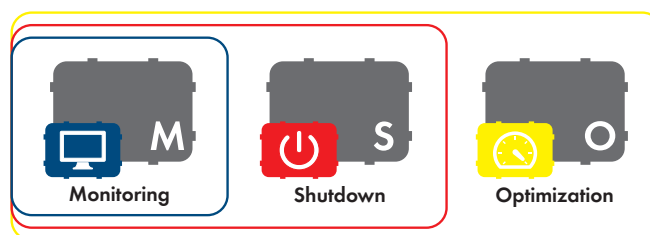
Optimization redefined

The TS4-R module technology is a cost-effective system that fits into any PV module design, making it the right solution for every application. TS4-R ensures maximum energy yields and configuration flexibility; only fit the modules affected by partial shading or output loss. Tool free installation and selective deployment saves you time and risk whilst allowing for simple upgrades at any time. With TSR-4 you can be sure of maximum energy yields, system reliability and minimum maintenance costs. Whether for shading, shutdown, different module configurations and other challenges, TS4-R is the ultimate solution.

TS4-R Progressive Functionality

The TS4-R platform offers integrated power electronics with various functions. Functionality increases with each unit.

With the **Monitoring** function, the entire PV system can be monitored at the module level. Faults on individual modules, such as those caused by dirt, are displayed and can be rectified quickly. The **Shutdown** function enables the PV system to be switched off at the module level. Using the **Optimization** function, the power of the PV system can be boosted even in partial shading or with different module configurations.



| Technical data | TS4-R-M | TS4-R-S | TS4-R-O |
|---|--|-------------------|-------------------|
| Electrical ratings | | | |
| Nominal DC input power | 375 W | 475 W | 475 W |
| Max. PV module open-circuit voltage (V_{OC}) at STC | 52 V | 75 V | 75 V |
| Max. current | 12 A | 12 A | 12 A |
| Min. V_{MPP} | 16 V | 16 V | 16 V |
| Output | | | |
| Output power range | 0 W to 375 W | 0 W to 475 W | 0 W to 475 W |
| Output voltage range | 0 V to V_{OC} | 0 V to V_{OC} | 0 V to V_{OC} |
| Communication | 802.15.4, 2.4 GHz | 802.15.4, 2.4 GHz | 802.15.4, 2.4 GHz |
| Impedance matching capability | No | No | Yes |
| Output voltage limit | No | No | No |
| Maximum system voltage | 1000 V | 1000 V | 1000 V |
| Max. series fuse rating | 15 A | 15 A | 15 A |
| Mechanical | | | |
| Operating temperature range | -40°C to +75°C (-40°F to +167°F) | | |
| Storage temperature range | -40°C to +75°C (-40°F to +167°F) | | |
| Cooling method | Natural convection | | |
| Dimensions (with cover) | 195.5 mm x 158 mm x 23 mm | | |
| Weight (with cover) | 670 g | 670 g | 720 g |
| Degree of protection | IP65 / IP67, NEMA 3R | | |
| Cabling | | | |
| Cabling type | PV1-F | | |
| Output cable length | 1.0 m; other lengths upon request | | |
| Connector | MC4 | | |
| UV resistance | 500 h with UVB light between 300 and 400 nm at 65°C | | |
| Max. string voltage | 600 V UL / 1000 V IEC or 1000 V UL / IEC | | |
| Outer cable diameter | 6.25 mm ± 0.25 mm (600 V UL) / 7.15 mm ± 0.25 mm (1000 V UL) | | |
| Conductor cross-section | 4.0 mm ² (12 AWG) | | |
| Functions | | | |
| Monitoring ¹⁾ | • | • | • |
| Shutdown ¹⁾ | | • | • |
| Optimization | | | • |
| Warranty | 25 years | | |
| ¹⁾ Cloud Connect Advanced and Gateway are required | | | |
| Type designation | TS4-R-M | TS4-R-S | TS4-R-O |

CLOUD CONNECT ADVANCED (CCA)*

The Cloud Connect Advanced communication unit connects the TS4-R components with the SMA Sunny Portal monitoring solution via WLAN or Ethernet. This means that operators can keep an eye on their systems via remote monitoring and can respond quickly in the event of irregularities. Cloud Connect Advanced can communicate with up to six gateways. Via Cloud Connect Advanced, the TS4-R and gateway components of the PV system can be configured easily using a smartphone app.



| Technical data | Cloud Connect Advanced |
|--|---|
| CCA power consumption | |
| Input voltage | 6–25 VDC (at least 12 VDC when gateways are used; 24 VDC for two or more gateways) |
| Input current | Maximum 1.8 A (internally protected, independent reserve) |
| Power consumption | Typical (at 1 GTWY): less than 3 W, max. 16 W, plus max. 0.5 W per additional gateway |
| Max. 5 W for mobile phone option | |
| Available ports | |
| RS485-1 AND RS485-2 for inverters/AC meters/MODBUS etc. | |
| USB 2.0, output power 5 W, output current 1 A | |
| Power supply unit | |
| Input voltage | 100 V–240 VAC, 50 Hz–60 Hz |
| Mounting type | DIN carrier rail |
| Capacity | |
| Number of supports modules | up to 360 |
| Internet connection options | |
| Ethernet interface | 10/100Base-T with detection of straight-through or crossover cables |
| Wireless interface | WLAN, IEEE 802.11 b/g/n 2.4 GHz One WLAN antenna: 2.4–2.5 GHz, 50 Ω (RP SMA connector) |
| Mechanical data | |
| Top hat rail assembly dimensions (with enclosure, without antennae, W x H x D) | 31 mm x 115.51 mm x 71.54 mm |
| Weight (CCA + enclosure) | 126 g |
| Operating temperature range | –20°C to +70°C (–40°F to 158°F) |
| Cooling method | Convection cooling |
| User interface | |
| Mobile app | iOS and Android (directly connected to the CCA via WLAN) |
| Multifunction LED display | Red/green/orange |
| Warranty | 5 years |

GATEWAY (GTWY)*

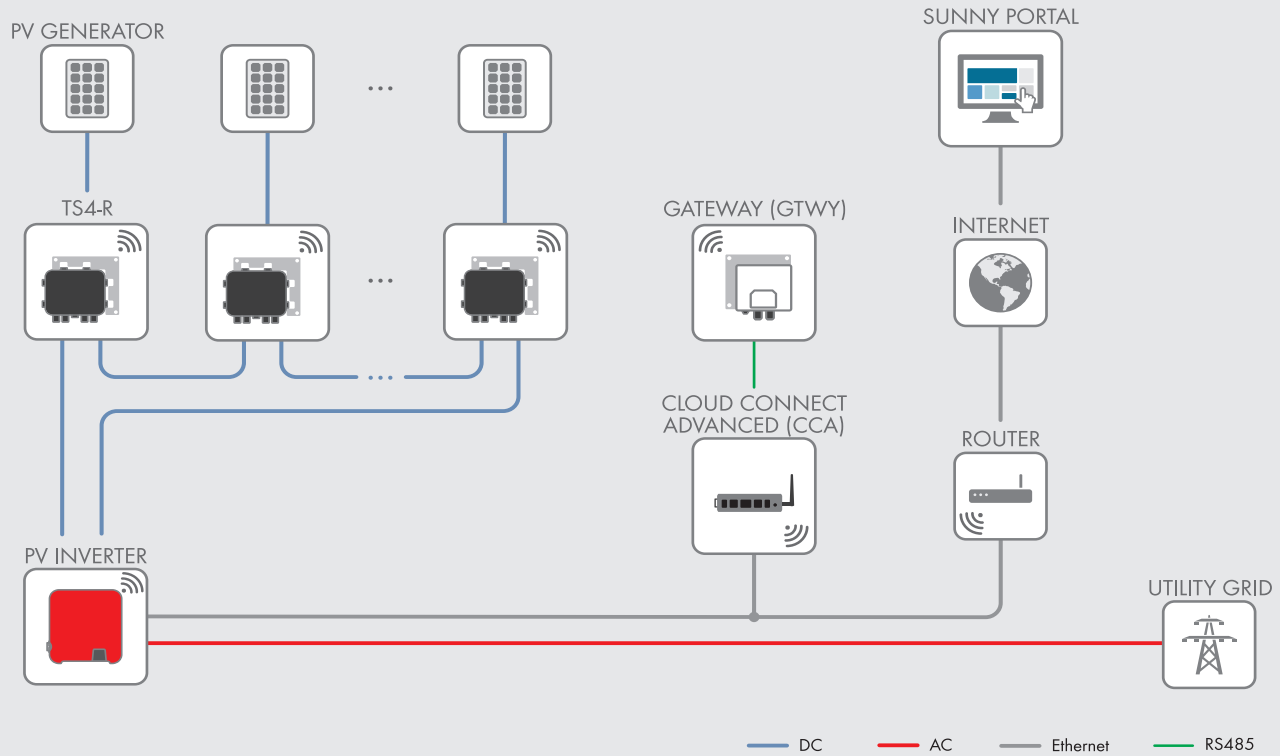
The Gateway enables wireless communication for up to 120 TS4-R components. It can be installed easily on the rear of the module or the substructure and has a range of up to 15 meters. The connection to Cloud Connect Advanced is a wired RS485 connection.



| Technical data | Gateway |
|---|--|
| Communication | |
| Communication with TS4-R | Wireless (802.15) |
| Communication with Cloud Connect Advanced (CCA) | RS-485 cable connection; connected in series with other gateways |
| Range of wireless communication | 15 m within line of sight (50 ft) |
| Max. number of TS4-Rs per gateway | 120 |
| Installation | |
| Installation position | Center of the system |
| Installation method | On the rear of the module or on the frame Clamps are supplied for installation on the frame |
| Mechanical data | |
| Dimensions including retaining bracket | 200 mm x 200 mm x 73 mm |
| Weight | 900 g |
| Operating temperature range | –30°C to +70°C |
| Environmental rating of enclosure | IP65 |
| Warranty | 10 years |

* Necessary only if Monitoring and Shutdown functions are used.

SYSTEM DIAGRAM



Communication set

The communication set enables the TS4-R to be connected to the SMA inverter quickly and easily. The outdoor communications set is perfectly suited to installation outdoors, where the communications technology is installed in a separate enclosure. Module-based data are transmitted via WLAN across the rooftop from the TS4-R optimizers to the Gateway, which is connected via RS485 to Cloud Connect Advanced (CCA). The relevant performance data can be viewed on Sunny Portal. The communication set is necessary only if the Monitoring and/or Shutdown functions are used.

Communication set for installation indoors

| | | |
|--|---|--|
|  <p>Gateway</p> |  <p>Cloud Connect Advanced</p> | <p>Set includes:</p> <ul style="list-style-type: none"> » Gateway » Cloud Connect Advanced » DIN rail power supply & mounting hardware |
|--|---|--|

Outdoor communication set for installation outdoors

| | | | |
|--|--|--|---|
|  <p>Gateway</p> |  <p>Cloud Connect Advanced</p> |  <p>Outdoor enclosure</p> | <p>Set includes:</p> <ul style="list-style-type: none"> » Gateway » Cloud Connect Advanced » Outdoor enclosure » DIN rail power supply & mounting hardware |
|--|--|--|---|