

Application note

Surge protective devices OVR PV QS range - The toughest SPD PV range on the market

New EN 50539-11 and UL 1449 4th Edition for photovoltaic products

Part 11: Requirements and tests for SPDs in photovoltaic applications.

A new standard on a developing market

A new document taking account of varied aspects of photovoltaic generators and technologies is available, designed EN 50539-11, to define specific surge protection to photovoltaic installations.

According to the very specific characteristics of PV generators and PV installations with high voltages and low DC current, the EN 50539-11 introduces the idea of testing the behavior of photovoltaic surge protective devices on end of life for the safety of the equipments.

PV characteristics

The following information shall be given by the manufacturer:

- **PV** symbol on the product
- **Ucpv** maximum continuous operating voltage
- **In** nominal discharge current
- **I_{max}** maximum discharge current as a Type 2 surge protection
- **Up** or VPR (UL) protection level at In
- **Iscpv** or SCCR (UL) short circuit DC current withstand.

Only SPDs with the above declared characteristics and with their conformity declaration are suitable for photovoltaic installations.

Using a surge protection not conform to such specific application on DC photovoltaic installations shall result in fire and equipment damages.

UL 1449 4th Edition

The UL 1449 standard for SPDs has been the primary safety standard for surge protection since 1985. Prior to UL 1449 4th Edition, the devices covered by the standard were known as Transient Voltage Surge Suppressors (TVSS), operating on circuits not exceeding 600 V. With the 4th Edition these devices are now known as SPDs and may operate on power circuits not exceeding 1500 V.

New ABB photovoltaic OVR surge protection ratings

Complying with the new EN 50539-11 or UL 1449 4th Edition, the new ratings of our OVR PV QS range have been defined for an easier selection and to fulfil requirements of photovoltaic specific networks.



Iscpv = 10 kA
The highest value on the market

Surge arrester	OVR PV T2 40-600 P QS	OVR PV T2 40-1000 P QS	OVR PV T2 40-1500 P QS
Maximum operating voltage	Ucpv: 600 V	Ucpv: 1100 V	Ucpv: 1500 V
Short circuit current (EN 50539-11)	Iscpv: 300 A	Iscpv: 10 kA	Iscpv: 10 kA
Over current protection (UL 1449 4 th Edition)	UL approved with SCCR 10 kA. If continuity of service is preferred, an additional 10AgPV fuse is recommended.		

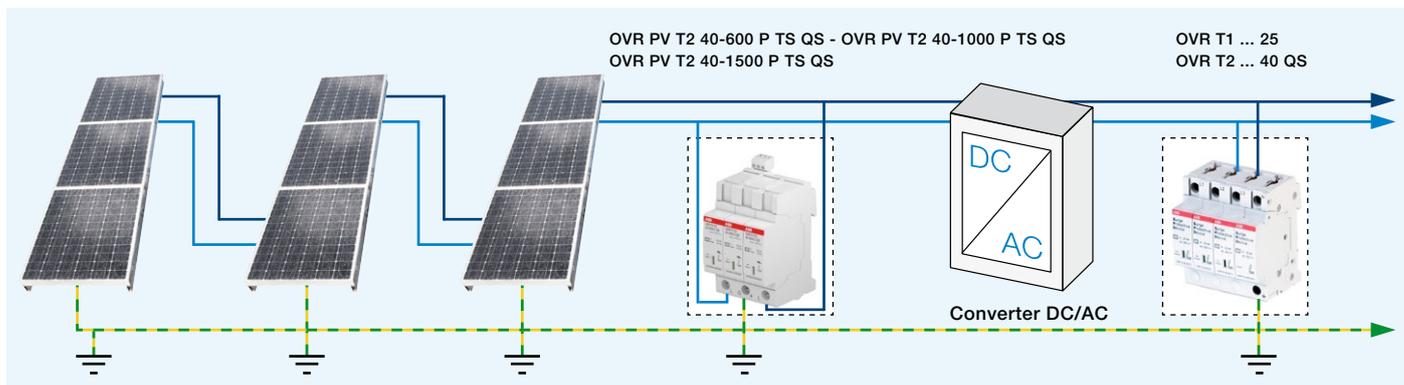
Back-up protection for applications with Iscpv up to 10 kA (for 1500 V DC and 1100 V DC), **no back-up needed.**

OVR PV T2 QS is ABB's new Surge Protective Devices (Type 2/Class II) able to cover from residential to solar farm installations with the maximum level of safety (high performances), easy to install and combined with the auxiliary contacts. All in agreement to the new EN 50550-11 and UL 1449 4th Edition (Type 1 C.A).



Installations of our OVR and OVR PV QS range on photovoltaic networks

Recommendations



On photovoltaic installations with PV generators

600 V DC range

For surge protection of each converter and each solar panel, use a surge protective device:

Type	Order code	Complying with/Certified
OVR PV T2 40-600 P QS	2CTB804153R2800	EN 50539-11 / UL 1449 4 th Edition
OVR PV T2 40-600 P TS QS	2CTB804153R2900	

Iscpv: < 300 A without any specific DC back-up fuse.

For prospective short circuit current higher than 300 A, it is necessary to use a specific back up fuse ≤ 10 A (PV applications).

On photovoltaic installations with PV generators

1000 V DC range

For surge protection of each converter and each solar panel, use a surge protective device:

Type	Order code	Complying with/Certified
OVR PV T2 40-1000 P QS	2CTB804153R2400	EN 50539-11 / UL 1449 4 th Edition
OVR PV T2 40-1000 P TS QS	2CTB804153R2500	

Iscpv: 10 kA without any specific DC back-up fuse.

On photovoltaic installations with PV generators

1500 V DC range

For surge protection of each inverter and each solar panel, use a surge protection device:

Type	Order code	Complying with/Certified
OVR PV T2 40-1500 P QS	2CTB804153R2600	EN 50539-11 / UL 1449 4 th Edition
OVR PV T2 40-1500 P TS QS	2CTB804153R2700	

Iscpv: 10 kA without any specific DC back-up fuse.

For all OVR and OVR PV QS range of products:

P: Pluggable

TS: Auxiliary contact

For more information please contact:

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For AC side, according to IEC 61643-11

Surge protection in the Main Distribution Board:

Type	Order code
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If external protection on the building (meshed cage, simple rod, ESE):

Type 1 SPD – Iimp 25 kA

Type	Order code
OVR T1 1N 25-255	2CTB815101R1500
OVR T1 1N 25-255 TS	2CTB815101R1000
OVR T1 3N 25-255	2CTB815101R1600
OVR T1 3N 25-255 TS	2CTB815101R0700

If no external protection on the building: Type 2 SPD – I_{max} 40 kA

Type	Order code
OVR T2 1N 40-275 P QS	2CTB803972R1100
OVR T2 1N 40-275 P TS QS	2CTB803972R0500
OVR T2 3N 40-275 P QS	2CTB803973R1100
OVR T2 3N 40-275 P TS QS	2CTB803973R0500

For the protection of the metering unit

Type	Order code
OVR TC 200V P	2CTB804820R0400
OVR TC 200FR P	2CTB804820R0500

For AC part, certified UL 1449

Surge protection in the Main Distribution Board:

Type	Order code
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If no external protection on the building: Type 4 SPD – I_{max} 40 kA

Type	Order code
OVR T2 1N 40-150 P TS U	2CTB802342R2100
OVR T2 1N 40-320 P TS U	2CTB802342R2500
OVR T2 1N 40-440 P TS U	2CTB802342R2900
OVR T2 1N 40-550 P TS U	2CTB802342R3300
OVR T2 3N 40-150 P TS U	2CTB802346R2100
OVR T2 3N 40-320 P TS U	2CTB802346R2500
OVR T2 3N 40-440 P TS U	2CTB802346R2900
OVR T2 3N 40-550 P TS U	2CTB802346R3300

External Protection System with early streamer emission air terminal (ESEAT)

The OPR draws its energy from the ambient electrical field during the storm. After capturing the lightning strike, the OPR directs it towards the down conductors to the ground where it is dissipated.



Type	Order code
OPR 30	2CTB899800R7000
OPR 45	2CTB899800R7500
OPR 60	2CTB899800R7100

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