

Lightning & overvoltage protection

Photovoltaic systems



ABB

COMPETENCE

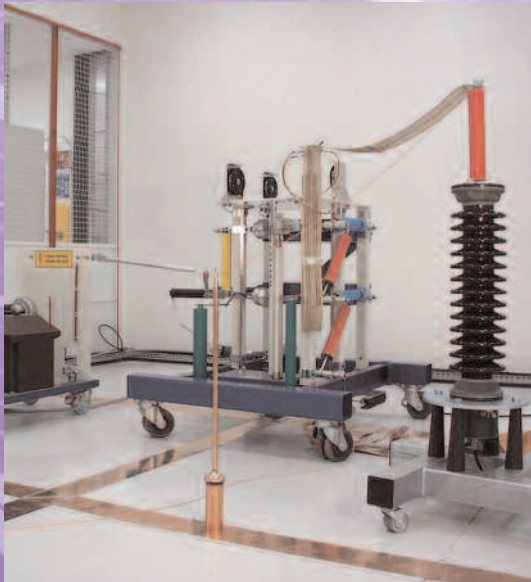
ABB : Recognized competence in lightning protection



Lightning wave generator 10 / 350



ABB Laboratory at Bagnères-de-Bigorre, in France



200 kV generator

ABB Lightning Protection Group, established in the South West of France, benefiting from acquired experience during the last decades, makes the most of its masterly skills in lightning and overvoltage protection technology. In addition to its present expertise concerning the global supply for lightning protection (both external and internal protection), Soulé henceforth proposes a range of lightning arresters against overvoltages, dedicated to photovoltaic installations, both standalone and connected facilities.

Moreover, ABB Lightning Protection Group benefits from a laboratory including various generators enabling arresters to be tested under real conditions with shock currents of different amplitudes, and this in order to optimize protection solutions specific to the customer as regards photovoltaic installations.

Why do photovoltaic systems need to be protected?

PROTECT



Standalone system at the Pourtalet pass, France



Photovoltaic system at an industrial site



Photovoltaic system at Villeurbanne, France



Photovoltaic system at the IUT of Tarbes, France

Providing power with photovoltaic solar panels is tremendously interesting in the context of renewable energy sources, as regards economical LV photovoltaic systems connected to the public electricity network, and also for standalone photovoltaic systems in isolated sites.

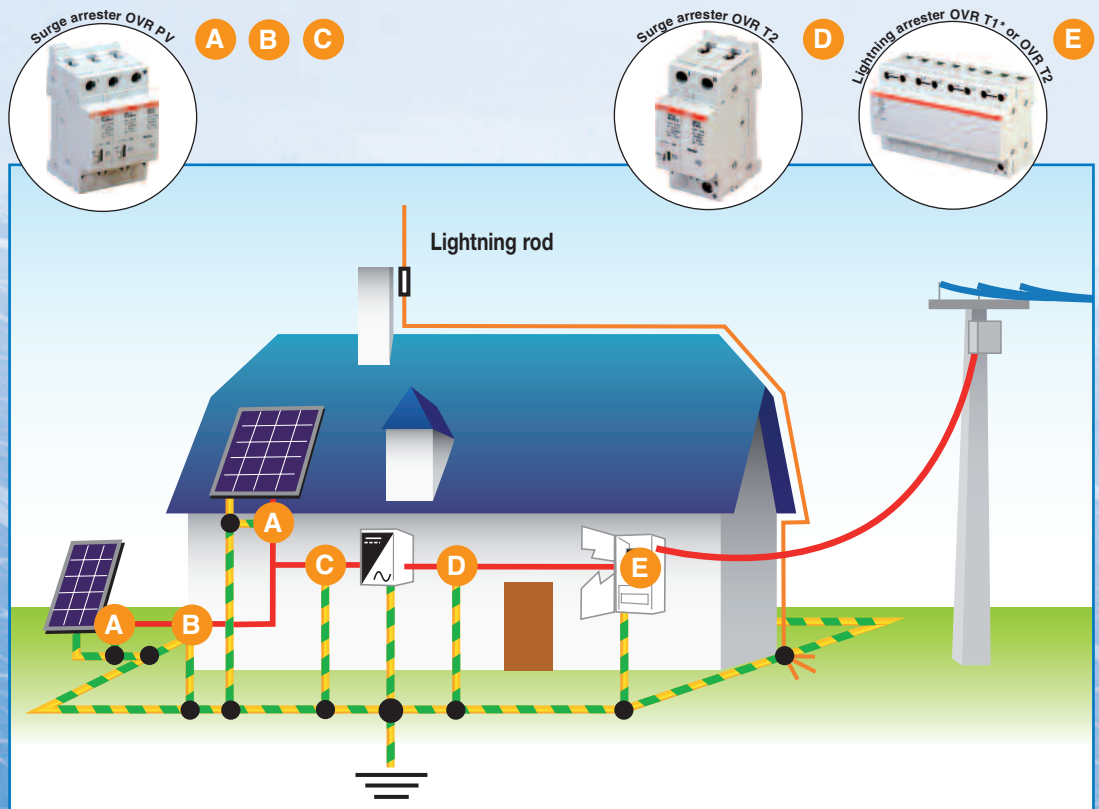
Because of their exposition, frequently in isolated sites and of the extended surface of photovoltaic systems (PV), lightning strikes are a major component in the risk to be assumed, both for the direct effect of lightning on the structure, and of the surge overvoltages on the installation.

Risk analysis on photovoltaic installations leads us to the following criteria: the extent, structure and exposition of the photovoltaic system as well as lightning strike density at the relevant site.

The consequences of lightning on the photovoltaic generator have repercussions on the entire equipment, because of the interconnection between the photovoltaic system and the electrical installation of the building. Moreover, the risk of financial losses should be taken into account, when considering the investment in solar panels at a photovoltaic site.

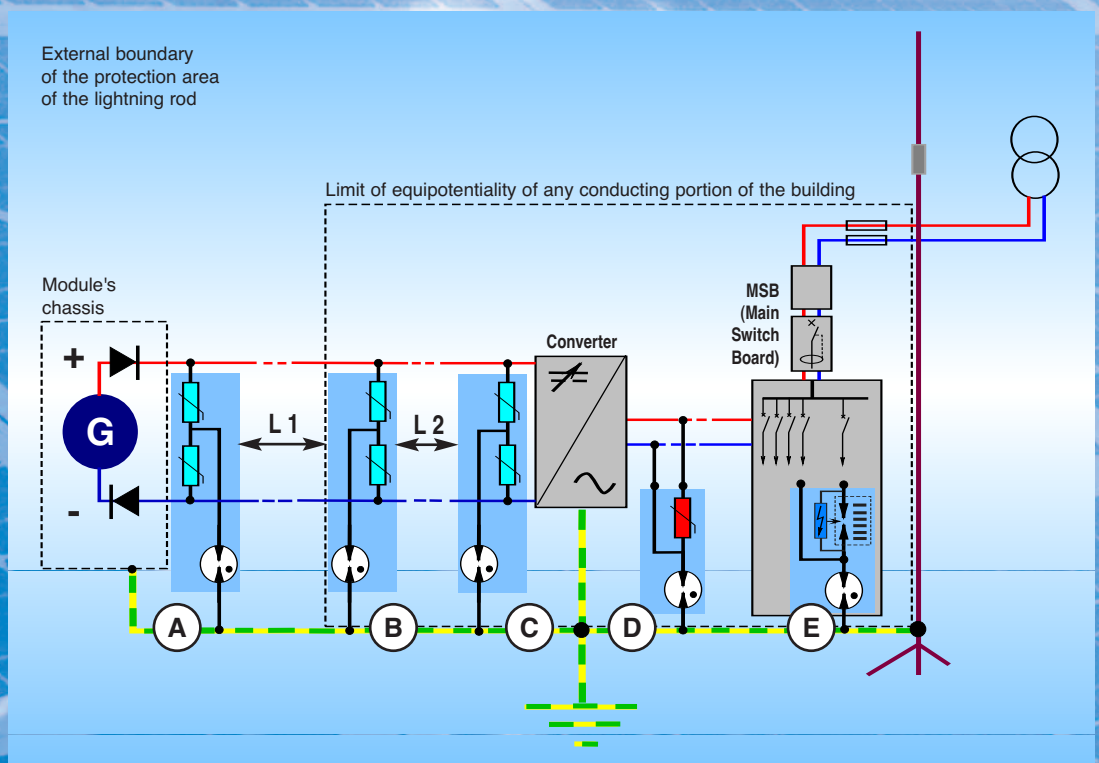
CONNECTED

Protection of connected systems








Example of a typical installation

*: OVR T1 mandatory in a presence of a lightning rod.



Example of a 600 V installation diagram

Configuration of the surge arresters of the whole installation

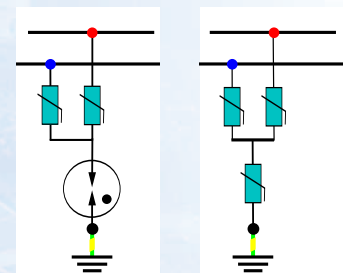
Surge arrester location	Role	Options	Comment
	Single unit protection per solar panel (cell + connections)	Installation is recommended if distance L1 is larger than 10 m, or if coupling risks exist between different cables.	Connection to the chassis should be as short and rectilinear as possible. The lightning arrester depending on the environment should be installed in a leak-proof casing.
	Protects the DC power supply head connection (building entrance)	Routine installation	The earthing bar should be as short and rectilinear as possible.
	Fine protection of the converter input on the DC side	Installation is recommended if distance L2 is larger than 10 m	Connection to the earthing bar and to the ground of the converter on the DC side should be as short and rectilinear as possible.
	Fine protection of the converter output on the AC side	Routine installation	Connection to the earthing bar and to the ground of the converter on the AC side should be as short and rectilinear as possible.
	AC head protection at the entrance of the building	Routine installation	Connection to the earthing bar should be as short and rectilinear as possible.

OVR PV surge arresters for protecting photovoltaic systems are particularly suitable:

- Modular systems with pluggable cartridges for easy maintenance (without breaking the circuit),
- Mechanical surge arrester status indicator with safety reserve (s),
- Fitted with remote signaling contacts for monitoring the operating status (TS),
- No follow current
- No risk of + and - inversion.



OVR PV surge arrester (A, B or C)



600 V OVR PV surge arrester block diagram (A, B or C)

1000 V OVR PV surge arrester block diagram (A, B or C)

Selection of surge arresters, DC portion

Surge arrester locations	Converter U max.	Risk	Current flow capacity	Designation / Part number
A B C	500 and 600 V	High	70 kA	OVR PV 70 600 s P TS/ 2CTB803953R5200
A B C	500 and 600 V	Low	40k A	OVR PV 40 600 P TS*/ 2CTB803953R5100
A B C	1000 V	High	70 kA	OVR PV 70 1000 s P TS/ 2CTB803953R6300
A B C	1000 V	Low	40 kA	OVR PV 40 1000 P TS/ 2CTB803953R6200

*: without remote signaling (TS) – OVR PV 40 600 P / Part No. 2CTB803953R5000

** : without remote signaling (TS) – OVR PV 40 1000 P / Part No. 2CTB803953R6100

Selection of lightning arresters, AC portion

(TT earthing system, Ph+N. Other surge arresters see OVR catalog)

Surge arrester location	Lightning rod presence	Distance between D and E	Designation / Part number
D	No	Between 1 and 5 m	OVR T2 1N 15 275 P / 2CTB803952R1200
D	No	> 5 m	OVR T2 1N 40 275 P / 2CTB803952R1100
E	Yes	/	OVR T1 3N 25 255 TS / 2CTB815101R0700*
E	No	/	OVR T2 1N 70 275 s P / 2CTB803952R0700

*: for Iimp = 15 kA (10/350), there are products based on varistor technology (please consult us)

Dimensions

L. 42.5mm X H. 85mm X P. 63mm

Cartridges for maintenance in 600 V

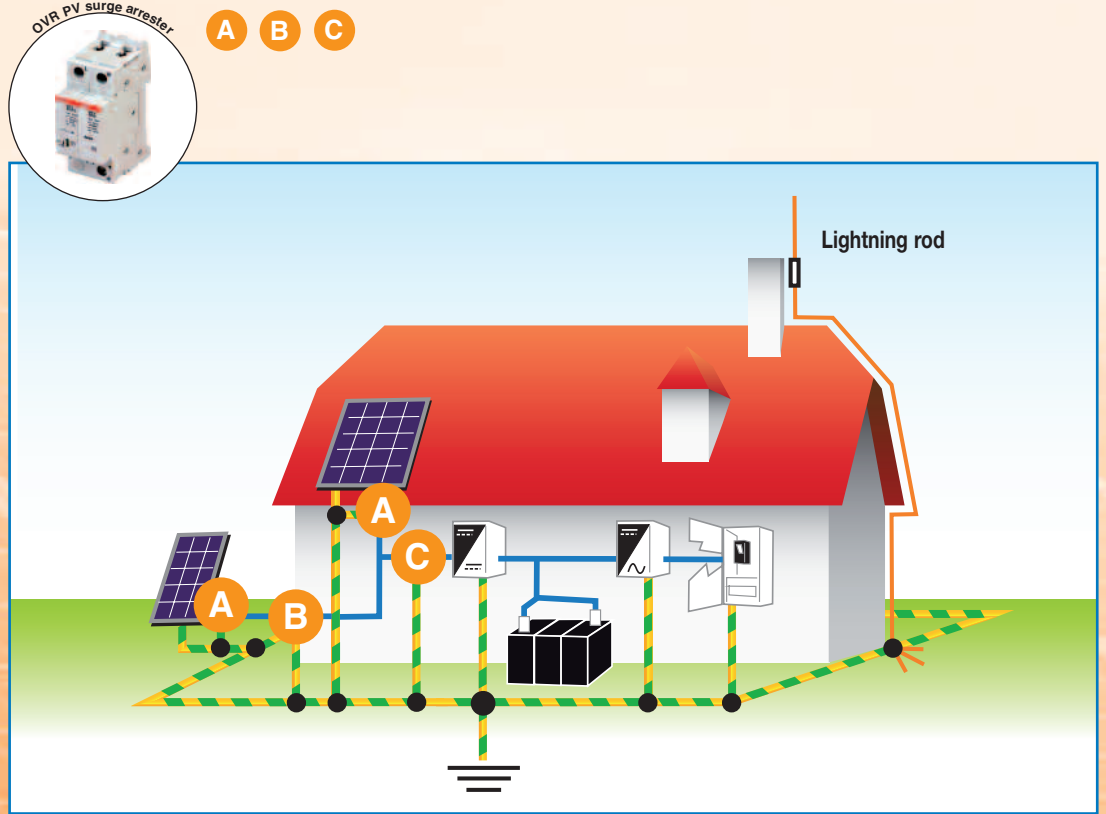
2 x OVR T2 40 275 C	2CTB803854R1000
+ 1 x OVR T2 70 N C	2CTB803854R0000
2 x OVR T2 70 275 s C	2CTB803854R0700
+ 1 x OVR T2 70 N C	2CTB803854R0000

Cartridges for maintenance in 1000 V

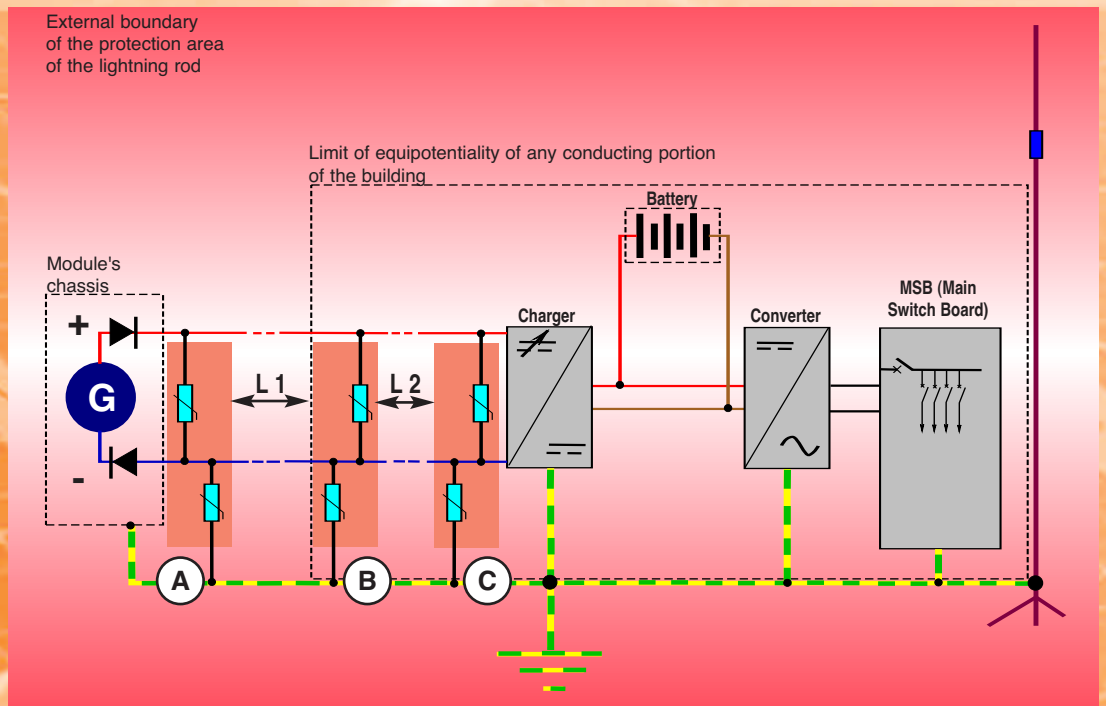
3 x OVR T2 40 440 C	2CTB803854R0400
3 x OVR T2 70 440 s C	2CTB803854R0100

STANDALONE

Protection of standalone systems



Example of typical installation



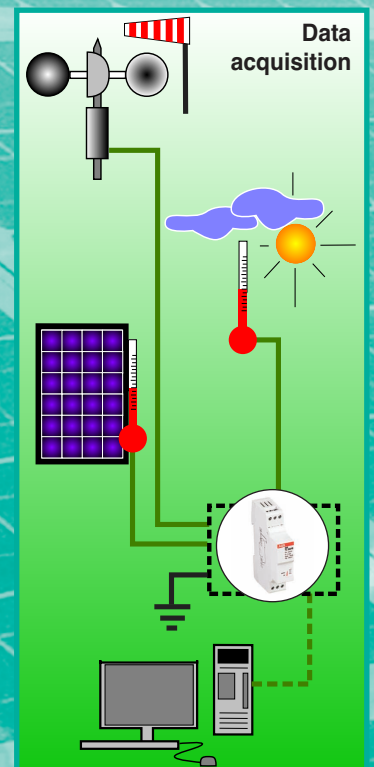
DATA

Protection of data lines

Selection guide according to use



Surge arrester type	Protection type
OVR TC 06V/ 2CTB813814R0100	Series
OVR TC 12V/ 2CTB813814R0200	Series
OVR TC 24V/ 2CTB813814R0300	Series
OVR TC 48V/ 2CTB813814R0400	Series
OVR TC 200FFR/ 2CTB813814R0000	Series
OVR TC 200V/ 2CTB813814R0500	Parallel



Configuration of the surge arresters on the whole installation

Surge arrester location	Role	Option	Comments
	Single unit protection per solar cell (cell + connections)	Installation is recommended if distance L1 is larger than 10 m, or if coupling risks exist between the different cables	Connection to the chassis should be as short and rectilinear as possible. The lightning arrester depending on the environment should be installed in a leak-proof casing.
	Protects the DC power supply head (building entrance)	Routine installation	Connection to the earthing bar should be as short and rectilinear as possible.
	Fine protection of the charger (DC power supply input)	Installation is recommended if distance L2 is larger than 10 m.	Connection to the earthing bar and to the converter's ground should be as short and rectilinear as possible.

Selection of low voltage surge arresters

Surge arrester location	Converter U max.	Risk	Current flow capacity	Designation Part number
A B C	106V D.C.	High	65kA	OVR PV 65 75 s P TS 2CTB803953R3200
A B C	106V D.C.	Low	30kA	OVR PV 30 75 P TS 2CTB803953R3100

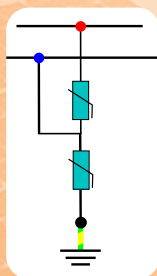
PVD surge arresters for protecting photovoltaic systems are particularly suitable:

- Modular systems with pluggable cartridges for easy maintenance (without breaking the circuit),
- Mechanical lightning arrester status indicator with safety reserve (s),

- Fitted with remote signaling contacts for monitoring the operating status (TS),
- No follow current,
- No risk of + and - inversion.



OVR PV surge arrester (A, B or C)



Low voltage 75V OVR PV surge arrester block diagram (A, B or C)

Dimensions

L 35mm x H 85mm x D 63mm

Cartridges for maintenance

65kA: 2x OVRT2.65 75 s C 2CTB803854R1300

30kA: 2x OVRT2.30 75 C 2CTB803854R1500



ABB Lightning Protection Group

22, rue du 8 Mai 1945
95340 – Persan
France

Tel : +33 (0) 1 30 28 60 88
Fax : +33 (0) 1 30 28 60 79