

 **SALTEK®**

SURGE ARRESTERS

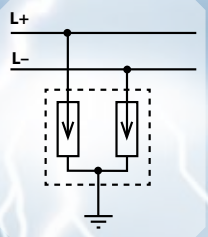
FOR PHOTOVOLTAIC SYSTEMS



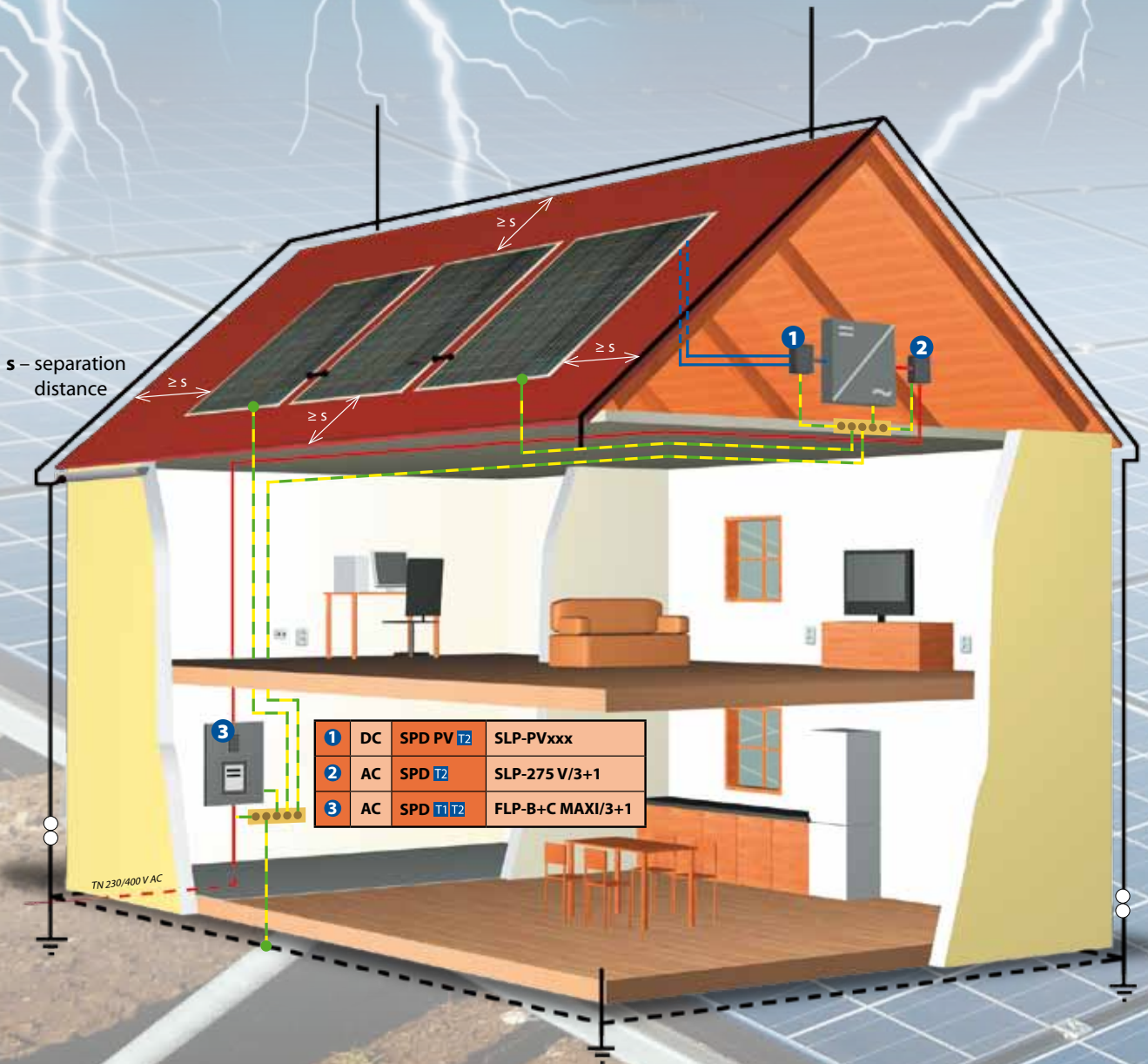
NEW

Conform to:
prEN 50539-11
UTE C 61-740-51

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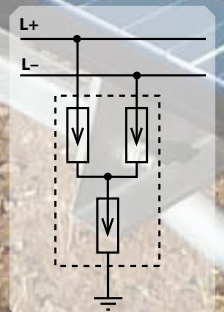


U connection	SPD PV	U_{CPV}	I_{imp}	I_{max}	I_n	U_p	width
FLP-PV700 V/U	T1 T2	700 V DC	25 kA	60 kA	30 kA	4,8 kV	4 TE
FLP-PV500 V/U	T1 T2	500 V DC	25 kA	60 kA	30 kA	3,4 kV	4 TE
SLP-PV600 V/U	T2	600 V DC	–	40 kA	20 kA	4,0 kV	2 TE
SLP-PV500 V/U	T2	500 V DC	–	40 kA	20 kA	3,6 kV	2 TE
SLP-PV170 V/U	T2	170 V DC	–	40 kA	15 kA	1,2 kV	2 TE



1	DC	SPD PV T2	SLP-PVxxx
2	AC	SPD T2	SLP-275 V/3+1
3	AC	SPD T1 T2	FLP-B+C MAXI/3+1

Y connection	SPD PV	U_{CPV}	I_{imp}	I_{max}	I_n	U_p	width
FLP-PV1000 V/Y	T1 T2	1000 V DC	12,5 kA	60 kA	30 kA	4,8 kV	6 TE
FLP-PV720 V/Y	T1 T2	720 V DC	12,5 kA	60 kA	30 kA	3,4 kV	6 TE
SLP-PV1200 V/Y	T2	1200 V DC	–	30 kA	15 kA	4,4 kV	3 TE
SLP-PV1000 V/Y	T2	1000 V DC	–	30 kA	15 kA	4,0 kV	3 TE
SLP-PV700 V/Y	T2	700 V DC	–	40 kA	20 kA	3,6 kV	3 TE



Remote signalling optional (recommended!)

Dimension 1 TE = 17,5 mm (DIN 43880)

SLP-PV170 V/U

SLP-PV170 V/U S

SPD type 2 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of solar photovoltaic systems.

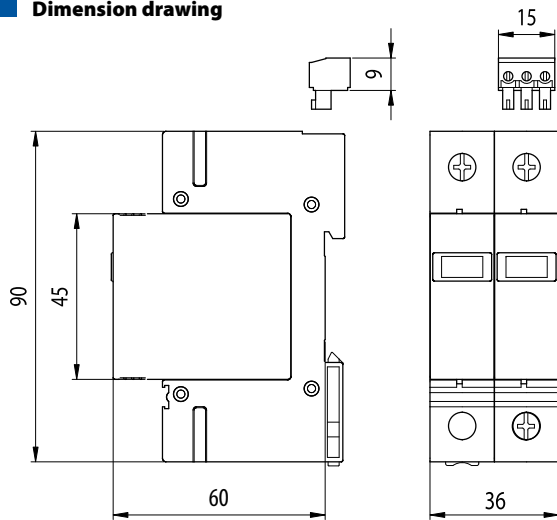
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

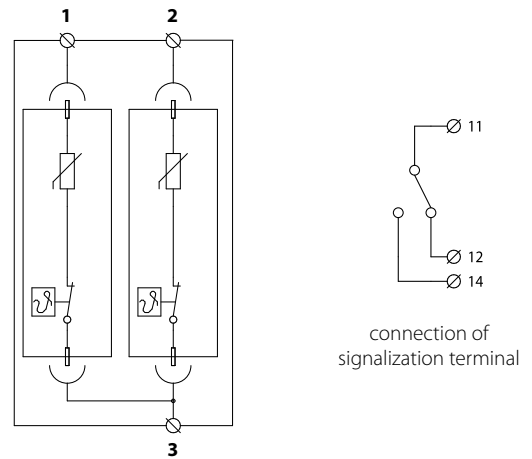
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

		SLP-PV170 V/U
Maximum continuous operating voltage (1/2→3)	U_{CPV}	170 V DC
Maximum continuous operating voltage – wiring "I" (1→2)	U_{CPV}	250 V DC
Nominal discharge current (8/20 μ s)	I_n	15 kA
Max. discharge current (8/20 μ s)	I_{max}	40 kA
Voltage protection level (1→2)	U_p	1,2 kV
Voltage protection level (1/2→3)	U_p	0,6 kV
Short-circuit withstand	I_{SCWPV}	63 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	SLP-PV170 V/U	8595090536628
	SLP-PV170 V/U S	8595090536635

SLP-PV500 V/U

SLP-PV500 V/U S

SPD type 2 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of solar photovoltaic systems.

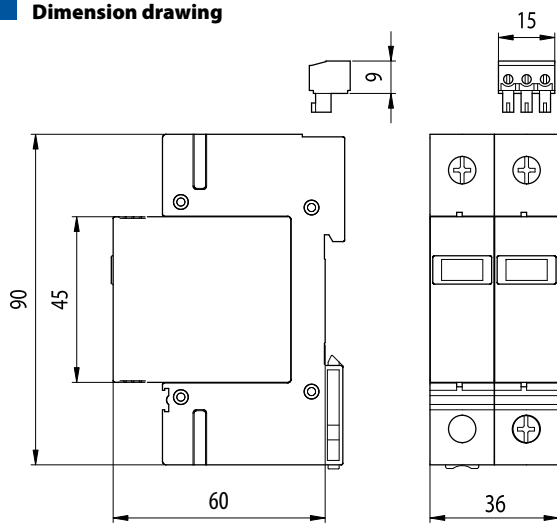
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

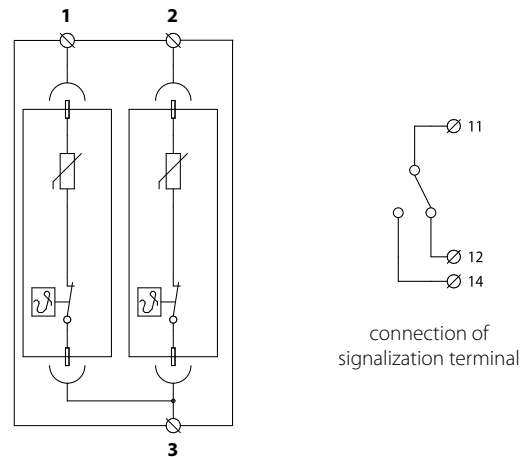
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

		SLP-PV500 V/U
Maximum continuous operating voltage (1/2→3)	U_{CPV}	510 V DC
Maximum continuous operating voltage – wiring "I" (1→2)	U_{CPV}	750 V DC
Nominal discharge current (8/20 μ s)	I_n	20 kA
Max. discharge current (8/20 μ s)	I_{max}	40 kA
Voltage protection level (1→2)	U_p	3,6 kV
Voltage protection level (1/2→3)	U_p	1,8 kV
Short-circuit withstand	I_{SCWPV}	63 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	SLP-PV500 V/U	8595090536642
	SLP-PV500 V/U S	8595090536659

SLP-PV600 V/U

SLP-PV600 V/U S

SPD type 2 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of solar photovoltaic systems.

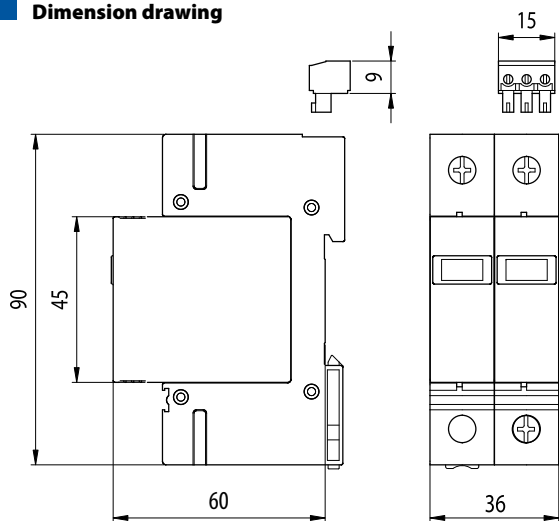
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

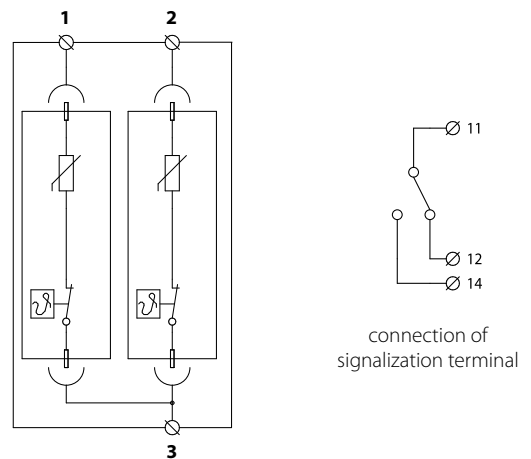
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

		SLP-PV600 V/U
Maximum continuous operating voltage (1/2→3)	U_{CPV}	600 V DC
Maximum continuous operating voltage – wiring "I" (1→2)	U_{CPV}	900 V DC
Nominal discharge current (8/20 μ s)	I_n	20 kA
Max. discharge current (8/20 μ s)	I_{max}	40 kA
Voltage protection level (1→2)	U_p	4,0 kV
Voltage protection level (1/2→3)	U_p	2,0 kV
Short-circuit withstand	I_{SCWPV}	125 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	SLP-PV600 V/U	8595090536666
	SLP-PV600 V/U S	8595090536673

SLP-PV700 V/Y

SLP-PV700 V/Y S

SPD type 2 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of photovoltaic/solar systems.

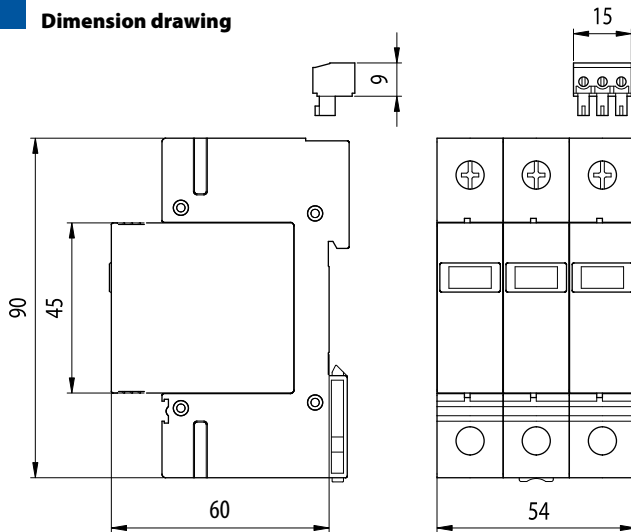
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

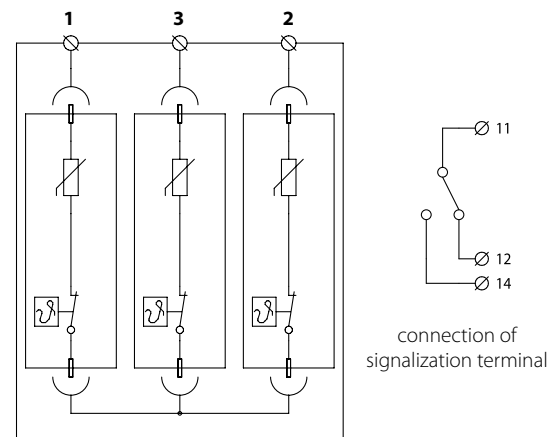
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

SLP-PV700 V/Y (S)

Maximum continuous operating voltage	U_{CPV}	750 V DC
Nominal discharge current (8/20 μ s)	I_n	20 kA
Max. discharge current (8/20 μ s)	I_{max}	40 kA
Voltage protection level	U_p	3,6 kV
Short-circuit withstand	I_{SCWPV}	63 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	SLP-PV700 V/Y	8595090536680
	SLP-PV700 V/Y S	8595090536697

SLP-PV1000 V/Y

SLP-PV1000 V/Y S

SPD type 2 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of photovoltaic/solar systems.

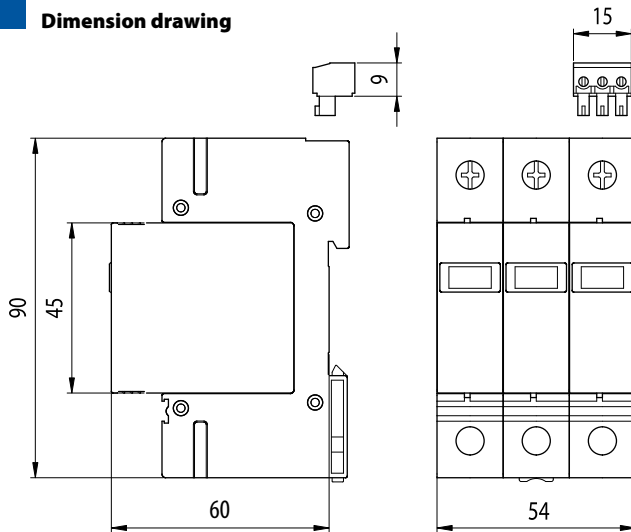
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

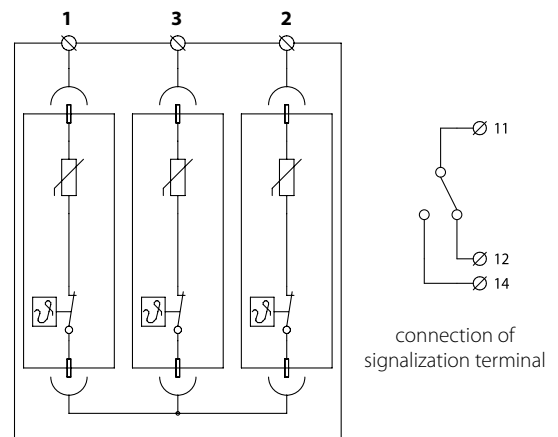
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

SLP-PV1000 V/Y (S)

Maximum continuous operating voltage	U_{CPV}	1 020 V DC
Nominal discharge current (8/20 μ s)	I_n	15 kA
Max. discharge current (8/20 μ s)	I_{max}	30 kA
Voltage protection level	U_p	4,0 kV
Short-circuit withstand	I_{SCWPV}	125 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	SLP-PV1000 V/Y	8595090536703
	SLP-PV1000 V/Y S	8595090536710

SLP-PV1200 V/Y SLP-PV1200 V/Y S



SPD type 2 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of photovoltaic/solar systems.

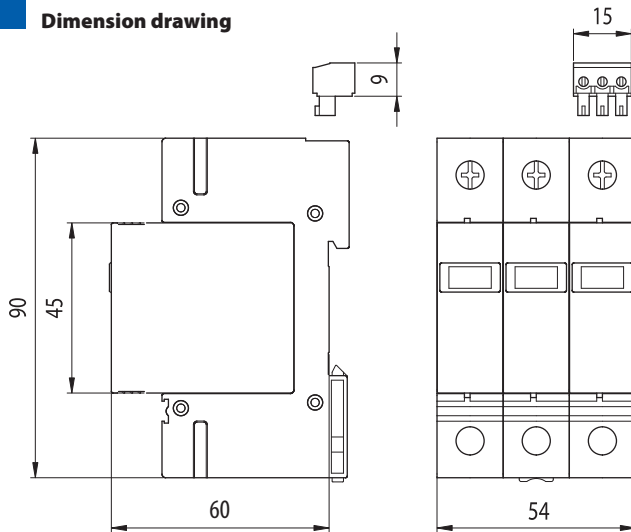
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

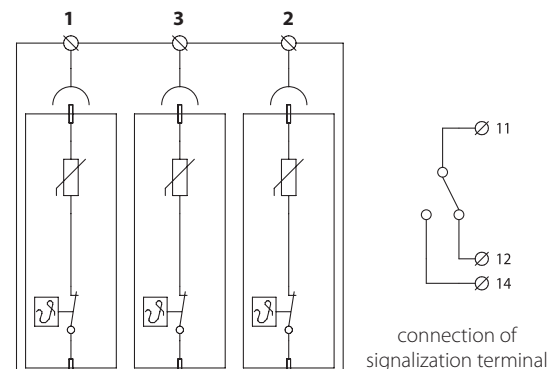
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

SLP-PV1200 V/Y (S)

Maximum continuous operating voltage	U_{CPV}	1 200 V DC
Nominal discharge current (8/20 μ s)	I_n	15 kA
Max. discharge current (8/20 μ s)	I_{max}	30 kA
Voltage protection level	U_p	4,2 kV
Short-circuit withstand	I_{SCWPV}	125 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	SLP-PV1200 V/Y	8595090538974
	SLP-PV1200 V/Y S	8595090538981

FLP-PV500 V/U

FLP-PV500 V/U S

SPD type 1 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of solar photovoltaic systems.

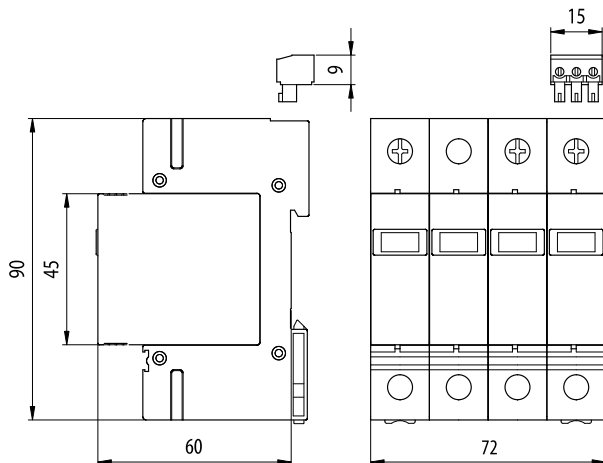
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

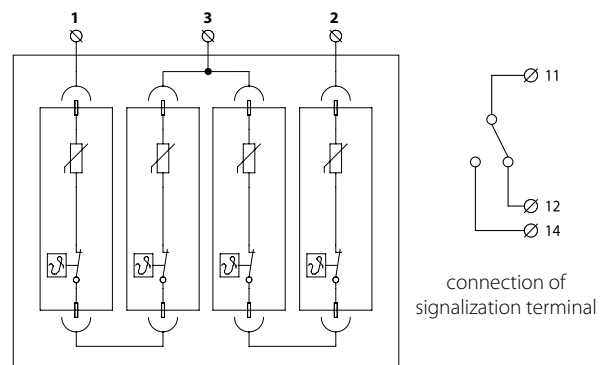
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

		FLP-PV500 V/U
Maximum continuous operating voltage (1/2→3)	U_{CPV}	500 V DC
Nominal discharge current (8/20 μ s)	I_n	30 kA
Max. discharge current (8/20 μ s)	I_{max}	60 kA
Lighting impulse current (10/350 μ s)	I_{imp}	25 kA
Voltage protection level (1→2)	U_p	3,4 kV
Voltage protection level (1/2→3)	U_p	1,7 kV
Short-circuit withstand	I_{SCWPV}	63 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	FLP-PV500 V/U	8595090536727
	FLP-PV500 V/U S	8595090536734

FLP-PV700 V/U

FLP-PV700 V/U S

SPD type 1 – surge arrester for photovoltaic systems

Replaceable varistor module, visual fault signalling

Surge arrester is specially designed for installation in the direct current circuits of solar photovoltaic systems.

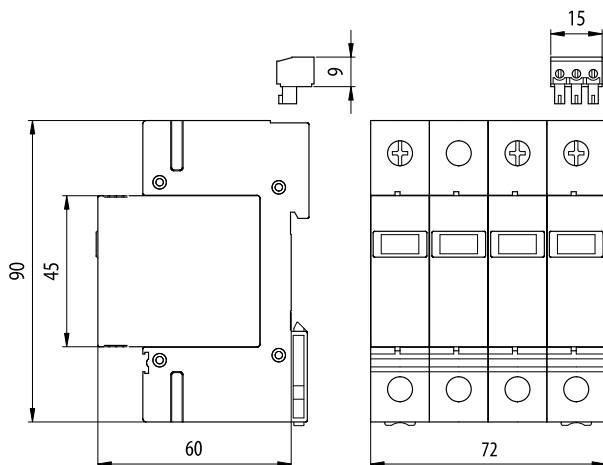
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

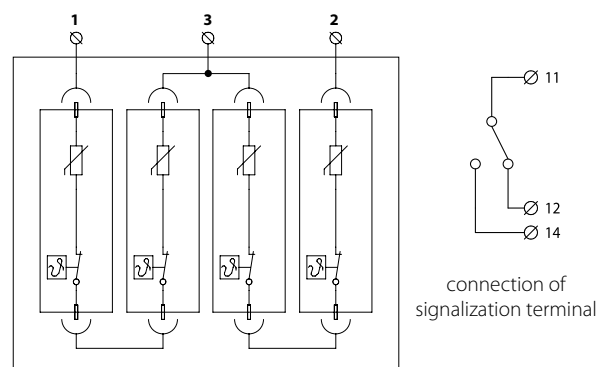
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing



Basic circuit diagram



Technical data

		FLP-PV700 V/U
Maximum continuous operating voltage (1/2→3)	U_{CPV}	700 V DC
Nominal discharge current (8/20 μ s)	I_n	30 kA
Max. discharge current (8/20 μ s)	I_{max}	60 kA
Lighting impulse current (10/350 μ s)	I_{imp}	25 kA
Voltage protection level (1→2)	U_p	4,8 kV
Voltage protection level (1/2→3)	U_p	2,4 kV
Short-circuit withstand	I_{SCWPV}	125 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Remote indication – S design		potential-free change-over contact
Remote indication contacts		250 V / 0,5 A AC, 250 V / 0,1 A DC
Cross-section of remote indication conductors		max. 1,5 mm ²
Meets the requirements		prEN 50539-11:2010
Ordering number	FLP-PV700 V/U	8595090536741
	FLP-PV700 V/U S	8595090536758

FLP-PV720 V/Y

FLP-PV720 V/Y S

SPD type 1 – surge arrester for photovoltaic systems

Surge arrester is specially designed for installation in the direct current circuits of photovoltaic/solar systems.

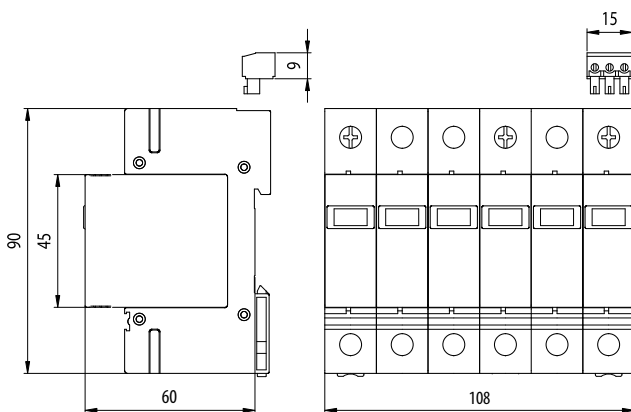
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

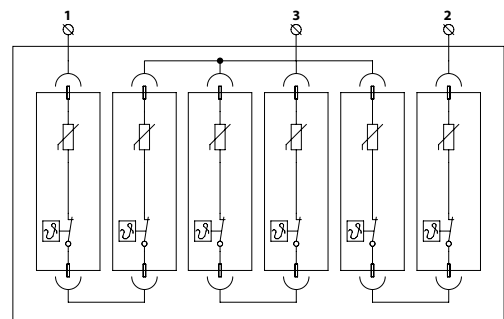
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing

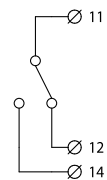


Basic circuit diagram



Technical data

		FLP-PV720 V/Y
Maximum continuous operating voltage (1/2→3)	U_{CPV}	720 V DC
Nominal discharge current (8/20 μ s)	I_n	30 kA
Max. discharge current (8/20 μ s)	I_{max}	60 kA
Lighting impulse current (10/350 μ s)	I_{imp}	12,5 kA
Voltage protection level (1→2)	U_p	3,4 kV
Voltage protection level (1/2→3)	U_p	3,4 kV
Short-circuit withstand	I_{SCWPV}	125 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Meets the requirements		prEN 50539-11:2010
Ordering number	FLP-PV1000 V/Y	8595090538899
	FLP-PV1000 V/Y S	8595090538905



connection of signalization terminal

FLP-PV1000 V/Y

FLP-PV1000 V/Y S

SPD type 1 – surge arrester for photovoltaic systems

Surge arrester is specially designed for installation in the direct current circuits of photovoltaic/solar systems.

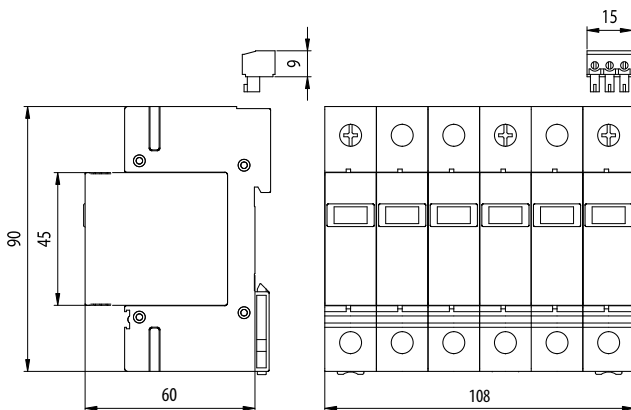
Optional remote status signalling (S).

Maximum continuous operating voltage for PV application:

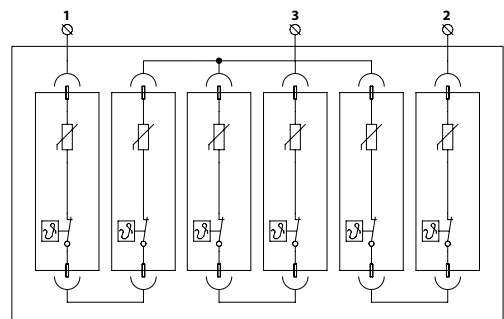
$$U_{CPV} \geq 1,2 \times U_{OC,STC}$$



Dimension drawing

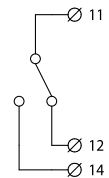


Basic circuit diagram



Technical data

		FLP-PV1000 V/Y
Maximum continuous operating voltage (1/2→3)	U_{CPV}	1 000 V DC
Nominal discharge current (8/20 μ s)	I_n	30 kA
Max. discharge current (8/20 μ s)	I_{max}	60 kA
Lighting impulse current (10/350 μ s)	I_{imp}	12,5 kA
Voltage protection level (1→2)	U_p	4,8 kV
Voltage protection level (1/2→3)	U_p	4,8 kV
Short-circuit withstand	I_{SCWPV}	125 A DC
Response time	t_a	25 ns
Degree of protection		IP 20
Range of operating temperatures		- 40 °C ... + 80 °C
Mounting on		DIN rail 35 mm
Cross-section of connected conductors		
Solid min/max		ISO: 1/50 mm ² ; AWG: 17/1
Stranded min/max		ISO: 1/35 mm ² ; AWG: 17/2
Stripping length of the supply conductor		14 mm
Tightening torque		max. 4 Nm
Fault indication		red indication field
Meets the requirements		prEN 50539-11:2010
Ordering number	FLP-PV1000 V/Y	8595090536789
	FLP-PV1000 V/Y S	8595090536796



connection of signalization terminal

Protection of photovoltaic systems

Photovoltaic arrays are costly to install and demanding in terms of technology. Their service life must be measured in decades to see a return on the invested funds. Manufacturers usually provide about a twenty-year guarantee for photovoltaic systems.

To provide trouble-free technology throughout its service life, it is necessary to include comprehensive protection against atmospheric and induced overvoltage at the design stage to implement the technology into the project.

Protection must be provided not only at the output side of the inverter, but also at the photovoltaic panels.

Solar photovoltaic arrays are usually installed on rooftops, or on a "greenfield".

As for the anticipated risks (pursuant to EN 62305-2), direct or near lightning strikes are considered. Overvoltage or lightning strike can bring about financial loss, and for photovoltaic systems installed on rooftops where individuals could be working, injury should also be considered.

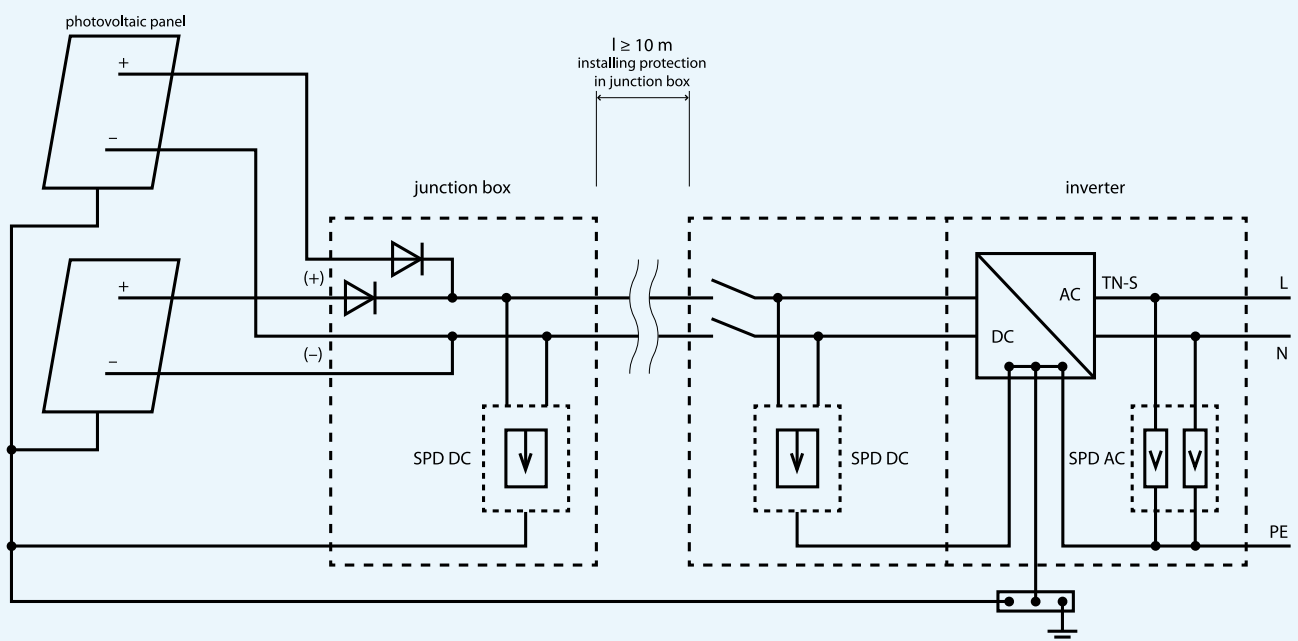
Photovoltaic system designs, including lightning and overvoltage suppression, shall comply with the HD 60364-7-712 standard (Electrical installations of buildings – Solar photovoltaic (PV) systems), EN 61173 (Overvoltage protection for energy produced by photovoltaic systems), technical specification CLC/TS 50539-12 (SPD for specific application including DC – Selection and application principles – SPDs connected to PV installations) and the group of EN 62305 standards (Lightning protection).

The core (key device) of the whole photovoltaic system is the inverter, so the lightning and overvoltage protection should be focused on the inverter and, it should be incorporated into the whole lightning and overvoltage protection system. Furthermore, photovoltaic units and their bearing metal structures should be integrated into the grounding design.

Selection of SPDs:

- maximum continuous operating voltage of SPD U_{cPV} must be higher than or equal to 1,2 time U_{ocSTC}
- if a separation distance "s" is kept between the lightning conductor system (LPS) and the photovoltaic panels (insulated LPS) – install products **SLP-PVxxx** (otherwise FLP-PVxxx)
- if distance between inverter and PV modules is **longer than 10 m, two SPDs on DC side are necessary** to protect both the PV modules (one SPD in front of the PV modules) and the inverter (one SPD in front of the inverter). Otherwise it is possible to use only one SPD (generally in front of the inverter).
- to complete the protection system an SPD must be installed on AC side of the inverter and an SPD to protect data communication lines of the inverter.

All SALTEK® SPDs for PV are tested in accordance with prEN 50539-11 and French standard UTE C 61-740-51



General wiring diagram of solar photovoltaic system connection