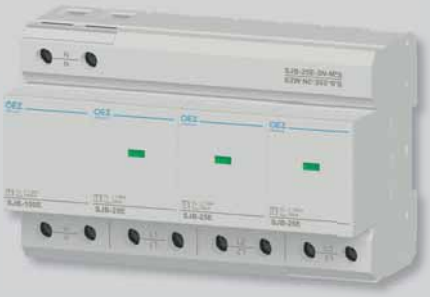
LIGHTNING CURRENT ARRESTERS SJB

T1

- For protection of electric networks and equipment against overvoltage from direct or indirect lightning strokes in the arresting equipment of buildings, LV lines etc.
- For protection of electric networks and equipment in residential, commercial and industrial buildings etc.
- It reduces voltage and „cut up" the overvoltage wave power caused by direct or indirect lightning stroke.
- Use: as the first stage (coarse protection) in three degree scale of protection against overvoltage – **type 1** according to EN 61643-11.
- For detail information on OEZ overvoltage protection see the document "Overvoltage protections - Application manual".



Lightning current arresters SJB-25E-...

- Lightning current arresters designed for building, residential, commercial and other similar installations classed in group „big installation threat".
- For four-wire TN-C network use SJB-25E-3-MZS and for five-wire TN-S, TT network use SJB-25E-3N-MZS.
- Main component is a powerful arrester gap with electronic ignition release able to arrest lightning current up to 25 kA (10/350µs).
- Ability of quenching of follow current up to 50 kA.
- Possibility of mounting in casual empty enclosures and switchboard cabinets Distri.
- Design: multipart, consisting of a base and replaceable modules. The modules can be removed in case of measurement or failure without necessity of device disconnection.
- Remote and visual signalling of the shut-down device state (after disconnection the lightning current arrester is non-functional and the replaceable module must be replaced).
- The modules can be turned in their base by 180°, so that it is also possible to turn the whole device while keeping legibility of description (e.g. at connection from the top).

Network	Type	Order code	Number of modules	Weight [kg]	Package [pcs]
TN-C (3L + PEN)	**SJB-25E-3-MZS**	OEZ:38357	6	0.91	1
TN-S (3L + N + PE)	**SJB-25E-3N-MZS**	OEZ:38358	8	1.31	1

Replaceable modules

For device	Spare module	Order code	Number of modules in the device	Weight [kg]	Package [pcs]
SJB-25E-3-MZS	**SJB-25E-1-M**	OEZ:38360	3	0.240	10
SJB-25E-3N-MZS	**SJB-25E-1-M**	OEZ:38360	3	0.240	10
	SJB-100E-N-M	OEZ:38359	1	0.240	10

LIGHTNING CURRENT ARRESTERS SJB

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Lightning current arresters SJBplus-50-2,5

- Lightning current arrester intended for demanding applications, industry, power engineering etc.
- For four-wire TN-C network use 3 pcs SJBplus-50-2,5 and for five-wire TN-S, TT network use the combination 3 pcs SJBplus-50-2,5 + 1 pc SJB-NPE-1,5.
- Main component is a powerful arrester gap with electronic ignition release able to arrest lightning current up to 50 kA (10/350 µs).
- Ability of quenching of follow current up to 50 kA.
- It is necessary to consider deionization space shown on page D7.

Connection between	Type	Order code	Number of modules	Weight [kg]	Package [pcs]
L-PEN, L-PE, L-N	**SJBplus-50-2,5**	OEZ:39227	2	0.567	1

Summing spark gap SJB-NPE-1,5

- Lightning current arrester intended especially for connection 3+1 or 1+1.
- Use as a summary spark gap between N and PE in TN-S or TT network (connection „3 + 1“ or „1 + 1“).
- Main component is a powerful arrester gap with electronic ignition release able to arrest lightning current up to 100 kA (10/350 µs).
- Ability of quenching of follow short-circuit current up to 100 A without the ionized gas.
- Possibility of mounting in casual distribution board and switchboard cabinets Distri.

Connection between	Type	Order code	Number of modules	Weight [kg]	Package [pcs]
N-PE	**SJB-NPE-1,5**	OEZ:34716	2	0.32	1

LIGHTNING CURRENT ARRESTERS SJB

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Specifications

Type				SJB-25E-3-MZS	SJB-25E-3N-MZS	SJBplus-50-2,5	SJB-NPE-1,5
Standards				EN 61643-11 IEC 61643-11	EN 61643-11 IEC 61643-11	EN 61643-11 IEC 61643-11	EN 61643-11 IEC 61643-11
Approval marks							
Rated voltage	U_N			AC 230/400 V	AC 230/400 V	AC 400 V	AC 230 V
Maximum constant operating voltage	U_C	L-N		-	AC 350 V	AC 440 V	-
		L-PEN		AC 350 V	-	AC 440 V	-
		N-PE		-	AC 350 V	-	AC 260 V
Impulse current (10/350 µs)	I_{imp}	peak value I_{peak}	L-N	-	75 kA (25 kA / pole)	50 kA	-
			L-PEN	75 kA (25 kA / pole)	-	50kA	-
			N-PE	-	100 kA	-	100 kA
		charge Q		37,5 As	50 As	25 As	50 As
		specific energy W/R		1.4 MJ/Ω	2.50 MJ/Ω	0.625 MJ/Ω	2.5 MJ/Ω
Rated discharge current (8/20 µs)	I_n	L-N		-	25 kA / pole	50 kA	-
		L-PEN		25 kA / pole	-	50 kA	-
		N-PE		-	100 kA	-	100 kA
Rated frequency	f_n			50/60 Hz	50/60 Hz		
Voltage protection level	U_p	L-N		-	≤ 1.5 kV	≤ 2.5 kV	-
		L-PEN/L-PE		≤ 1.5 kV / -	- / 2.5 kV	≤ 2.5 kV	-
		N-PE		-	≤ 1.5 kV	-	≤ 1.5 kV
Voltage protection level		according to EN 61643-11		type 1 T1	type 1 T1	type 1 T1	type 1 T1
		according to EN 61643-11		class I	class I	class I	class I
Response time		L-N		-	≤ 100 ns	≤ 100 ns	-
		L-PEN		≤ 100 ns	-	≤ 100 ns	-
		N-PE		-	≤ 100 ns	-	≤ 100 ns
Quenching follow-current	I_{fi}	L-N		-	50 kA / AC 264 V	50 kA / AC 400 V	-
		L-PEN		50 kA / AC 264 V	-	50 kA / AC 400 V	-
		N-PE		-	0.1 kA	-	0.1 kA / AC 260 V
Maximum backup fuse gG/gL		parallel connection (T)		315 A	315 A	500 A	-
		serial connection (V)		125 A	125 A	500 A	-
Degree of protection - with connected conductors				IP20	IP20	IP20	IP20
Mounting on "U" rail according to EN 60715 – type				TH 35	TH 35	TH 35	TH 35
Connection							
Conductor - rigid (solid, stranded)				2.5 ÷ 35 mm²	2.5 ÷ 35 mm²	10 ÷ 50 mm²	10÷ 50 mm²
Conductor – flexible				2.5 ÷ 25 mm²	2.5 ÷ 25 mm²	16 ÷ 35 mm²	16 ÷ 35 mm²
Torque				4.5 Nm	4.5 Nm	8 Nm	8 Nm
Top or bottom connection				yes	yes	yes	yes
Optical signalling							
Functional state				green	green	-	-
Non-functional state				red	red	-	-
Remote signalling							
Arrangement of contacts [1]				001	001	-	-
Max. voltage/current	U_{max}/I_{max}			AC 250 V / 1 A	AC 250 V / 1 A	-	-
				DC 30 V / 1 A	DC 30 V / 1 A	-	-
Min. voltage/current	U_{min}/I_{min}			AC 12 V / 10 mA	AC 12 V / 10 mA	-	-
Connection – conductor (rigid, flexible)				0.14 ÷ 1,5 mm²	0.14 ÷ 1,5 mm²	-	-
Torque				0.25 Nm	0.25 Nm	-	-
Operating conditions							
Ambient temperature				-40 ÷ 80 °C	-40 ÷ 80 °C	-40 ÷ 80 °C	-40 ÷ 80 °C
Working position				arbitrary	arbitrary	arbitrary	arbitrary

[1] Each digit indicates successively the number of make, break and break-make contacts.

LIGHTNING CURRENT ARRESTERS SJB

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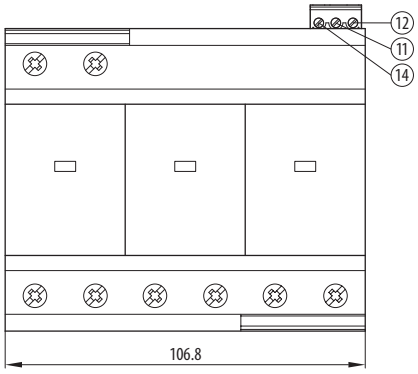
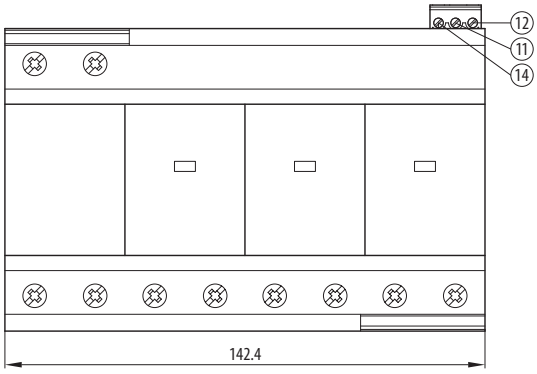
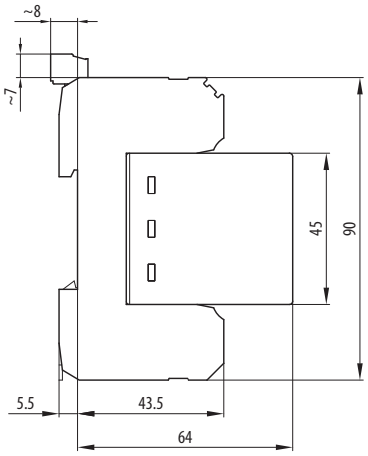
Dimensions

SJB-25E-3-MZS

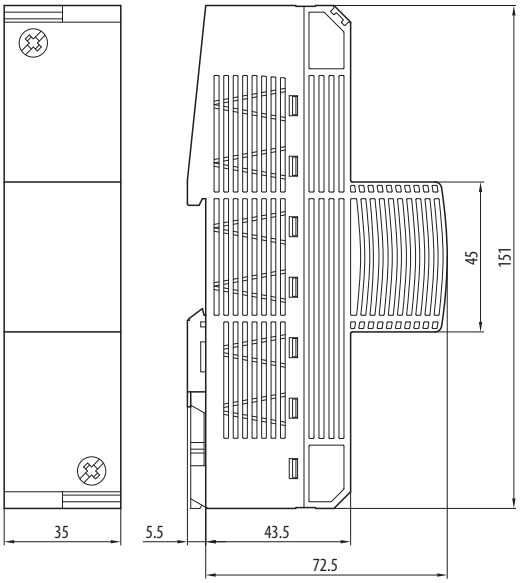


SJB-25E-3N-MZS

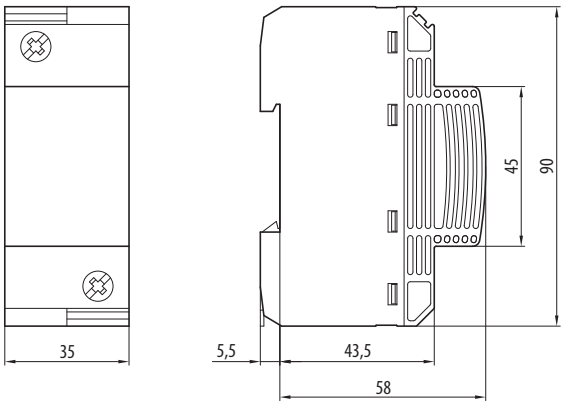




SJBplus-50-2,5



SJB-NPE-1,5



LIGHTNING CURRENT ARRESTERS SJB

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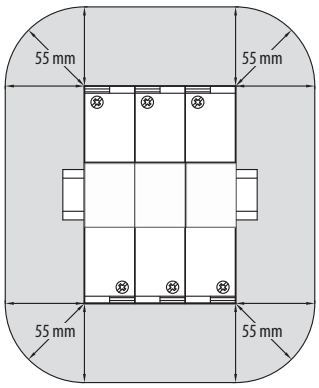
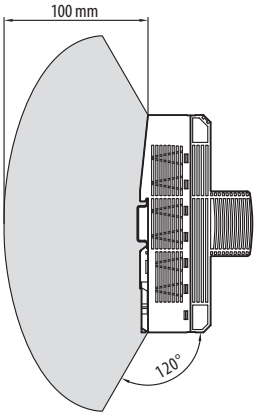
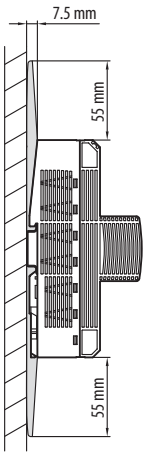
Deionization spaces SJBplus-50-2,5

1)





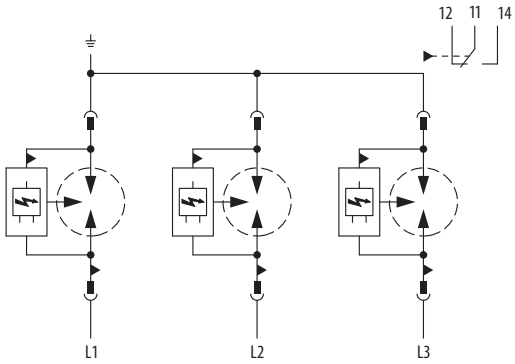
2)



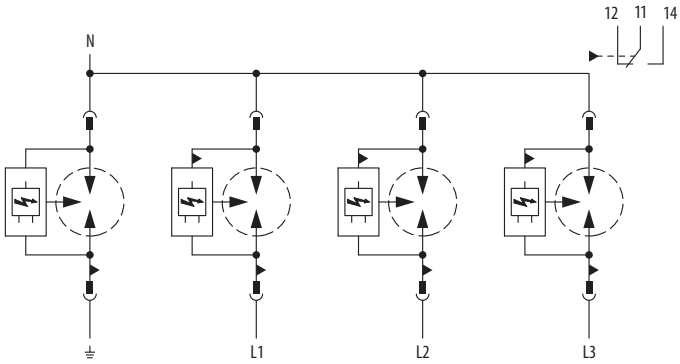
By the action of arrester happens to the ionized gas from the back side of the arrester. Deionization space is defined in fig. 1. In the deionization space there must not be any highly and medium combustible material (fire reaction class C, D, E or F according to EN 13501-1 +A1) or live bare conductive parts. Minimum distance from materials combustible with difficulty or non-combustible materials (fire reaction class A1, A2, B) is shown in fig. 2.

Diagram

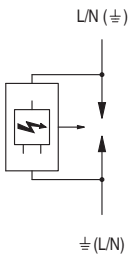
SJB-25E-3-MZS



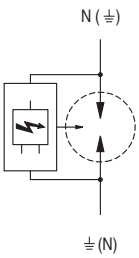
SJB-25E-3N-MZS



SJBplus-50-2,5



SJB-NPE-1,5



RECOMMENDATIONS FOR DESIGN, INSTALLATION AND MEASUREMENT OF OVERVOLTAGE PROTECTIONS

Conversion tables of former and new designs

	Formerly produced devices		Newly produced devices		Note
	Type designation	Order code	Type designation	Order code	
Type 1	SJBplus-50-1,5	OEZ:34715	SJBplus-50-2,5	OEZ:39227	adequate design
	SJBplus50/1,5	OEZ:14423	SJBplus-50-2,5	OEZ:39227	adequate design
	SJBplus-50	OEZ:34714	SJBplus-50-2,5	OEZ:39227	innovation - electronic ignition spark gap
	SJBplus50	OEZ:14424	SJBplus-50-2,5	OEZ:39227	innovation - electronic ignition spark gap
	SJBpro-35-1,5	OEZ:34713	SJB-25E-3-MZS	OEZ:38357	multipole design (3+0; TN-C)
			SJB-25E-3N-MZS	OEZ:38358	multipole design (3+1; TN-S, TT)
	SJBpro35/1,5	OEZ:14422	SJB-25E-3-MZS	OEZ:38357	multipole design (3+0; TN-C)
			SJB-25E-3N-MZS	OEZ:38358	multipole design (3+1; TN-S, TT)
	SJBpro-35	OEZ:34712	SJB-25E-3-MZS	OEZ:38357	multipole design (3+0; TN-C)
			SJB-25E-3N-MZS	OEZ:38358	multipole design (3+1; TN-S, TT)
	SJBpro35	OEZ:13019	SJB-25E-3-MZS	OEZ:38357	multipole design (3+0; TN-C)
			SJB-25E-3N-MZS	OEZ:38358	multipole design (3+1; TN-S, TT)
	SJB100/NPE/1,5	OEZ:14425	SJB-NPE-1,5	OEZ:34716	adequate design
Type 2	SVM440-Z	OEZ:18565	SVM-440-Z	OEZ:34720	adequate design
	SVM440-ZS	OEZ:18566	SVM-440-ZS	OEZ:34721	adequate design
	SVM-275-Z	OEZ:34717	SVC-350-3-MZ	OEZ:38365	multipole design (3+0; TN-C)
			SVC-350-3N-MZ	OEZ:38367	multipole design (3+1; TN-S, TT)
	SVM275-Z	OEZ:13004	SVC-350-3-MZ	OEZ:38365	multipole design (3+0; TN-C)
			SVC-350-3N-MZ	OEZ:38367	multipole design (3+1; TN-S, TT)
	SVM-275-ZS	OEZ:34718	SVC-350-3-MZS	OEZ:38366	multipole design (3+0; TN-C)
			SVC-350-3N-MZS	OEZ:38368	multipole design (3+1; TN-S, TT)
	SVM275-ZS	OEZ:13005	SVC-350-3-MZS	OEZ:38366	multipole design (3+0; TN-C)
			SVC-350-3N-MZS	OEZ:38368	multipole design (3+1; TN-S, TT)
	SVM-NPE-Z (+SVM-440-Z)	OEZ:34723	SVC-350-1N-MZ	OEZ:42380	multipole design (1+1; TN-S, TT)
	SVM-NPE-Z (+3 pcs SVM-440-Z)	OEZ:34723	SVC-350-3N-MZ	OEZ:38367	multipole design (3+1; TN-S, TT)
	SVC-275-1	OEZ:38842	SVC-350-1-MZ	OEZ:42378	adequate design
	SVC-275-1-S	OEZ:38843	SVC-350-1-MZS	OEZ:42379	adequate design
	SVF-1000-2VB-MZ	OEZ:39165	SVC-DC-1170-3V-MZ	OEZ:42708	adequate design
	SVF-1000-2VB-MZ	OEZ:39527	SVC-DC-1170-3V-MZS	OEZ:42709	adequate design
	SVF-600-3V-MZ	OEZ:39528	SVC-DC-800-3V-MZ	OEZ:42711	adequate design
	SVF-600-3V-MZ	OEZ:39529	SVC-DC-800-3V-MZS	OEZ:42712	adequate design
Type 3	SVD-250M-ZS	OEZ:34725	SVD-253-1N-MZS	OEZ:38371	adequate design
	SVD250M-ZS	OEZ:13020	SVD-253-1N-MZS	OEZ:38371	adequate design

Varistor function test

- Varistor is able to provide protection against overvoltage repeatedly. However, every such actuating changes its structure to certain extent. We can detect by timely varistor check whether is this change of structure and resulting varistor function already beyond the acceptable limit or not.
- Standard EN 62 305-4 requires besides others also periodic overvoltage protections checks. This check is usually completed with varistor measurement.
- On principle, the check of overvoltage protections is carried out by connecting to the DC voltage, while increasing the voltage to the point when current 1 mA flows through the arrester. Subsequently the voltage level is deducted. This procedure shall be repeated for opposite polarity as well.
- If the deducted voltage level is in between the Voltage tolerance zone given in the table, the overvoltage protection is functional. In the opposite case it is necessary to replace the overvoltage protection or its module. The table of Voltage tolerance zones is given below.

Table of tolerance zones at 1 mA

Type designation	Note	Order code	Voltage tolerance zone at 1 mA
SVBC-12,5-1-MZ	T1+T2	OEZ:40615	510 - 561 V
SVBC-12,5-1N-MZS	T1+T2	OEZ:40618	510 - 561 V
SVBC-12,5-3-MZ	T1+T2	OEZ:40619	510 - 561 V
SVBC-12,5-3-MZS	T1+T2	OEZ:40620	510 - 561 V
SVBC-12,5-3N-MZ	T1+T2	OEZ:40621	510 - 561 V
SVBC-12,5-3N-MZS	T1+T2	OEZ:40622	510 - 561 V
SVBC-12,5-4-MZ	T1+T2	OEZ:40623	510 - 561 V
SVBC-12,5-4-MZS	T1+T2	OEZ:40624	510 - 561 V
SVBC-12,5-1-M	Replaceable module T1+T2	OEZ:40625	510 - 561 V
SJBC-25E-3-MZS	T1+T2 - only varistor module is measured	OEZ:38361	508.5 - 565 V
SJBC-25E-3N-MZS	T1+T2 - only varistor module is measured	OEZ:38362	508.5 - 565 V
SVC-N350-1-M	Replaceable module T1+T2	OEZ:38364	508.5 - 565 V
SVC-350-1-MZ	T2	OEZ:42378	509 - 621 V
SVC-350-1-MZS	T2	OEZ:42379	509 - 621 V
SVC-350-1N-MZ	T2	OEZ:42380	509 - 621 V
SVC-350-1N-MZS	T2	OEZ:42381	509 - 621 V
SVC-350-3-MZ	T2	OEZ:38365	509 - 621 V
SVC-350-3-MZS	T2	OEZ:38366	509 - 621 V
SVC-350-3N-MZ	T2	OEZ:38367	509 - 621 V
SVC-350-3N-MZS	T2	OEZ:38368	509 - 621 V

Type designation	Note	Order code	Voltage tolerance zone at 1 mA
SVC-350-4-MZ	T2	OEZ:40861	509 - 621 V
SVC-350-4-MZS	T2	OEZ:40862	509 - 621 V
SVC-350-1-M	Replaceable module T2	OEZ:38369	509 - 621 V
SVC-DC-1170-3V-MZ	T2	OEZ:42708	643.5 - 786.5 V
SVC-DC-1170-3V-MZS	T2	OEZ:42709	643.5 - 786.5 V
SVC-DC-1170-V-M	Replaceable module T2	OEZ:42710	643.5 - 786.5 V
SVC-DC-800-3V-MZ	T2	OEZ:42711	484.5 - 561 V
SVC-DC-800-3V-MZS	T2	OEZ:42712	484.5 - 561 V
SVC-DC-800-V-M	Replaceable module T2	OEZ:42713	484.5 - 561 V
SVBC-DC-1050-3V-MZ	T1+T2	OEZ:42714	643.5 - 786.5 V
SVBC-DC-1050-3V-MZS	T1+T2	OEZ:42715	643.5 - 786.5 V
SVBC-DC-1050-V-M	Replaceable module T2	OEZ:42716	643.5 - 786.5 V
SVBC-DC-720-3V-MZ	T1+T2	OEZ:42717	484.5 - 561 V
SVBC-DC-720-3V-MZS	T1+T2	OEZ:42718	484.5 - 561 V
SVBC-DC-720-V-M	Replaceable module T2	OEZ:42719	484.5 - 561 V
SVD-253-1N-MZS	T3	OEZ:38371	216 - 264 V
SVD-335-3N-MZS	T3	OEZ:38372	459 - 561 V
SVD-335-1N-AS	T3	OEZ:39164	459 - 561 V
SVM-440	T2	OEZ:34720	644 - 786 V
SVM-440-ZS	T2	OEZ:34721	644 - 786 V

RECOMMENDATIONS FOR DESIGN, INSTALLATION AND MEASUREMENT OF OVERVOLTAGE PROTECTIONS

INSTALLATION OF OVERVOLTAGE PROTECTIONS

1. Installation of lightning current arresters – T1 T1

Lightning current arresters, i.e. the arresters of type 1 are installed mainly on the interface of zones LPZ0/LPZ1. The main switchboard is usually placed on this interface. The devices are installed on „U" rail type TH 35 (DIN rail). Installation of the lightning current arresters in metering switchboard shall be approved by relevant power distribution companies. In not measured part, use the lightning current arresters SJBplus-... or SJB-25E-...

2. Installation of compact combined surge voltage arresters of type T1+T2 T1+T2

We recommend to install the compact combined arrester type 1 and 2 (SJBC = spark gap + varistor) in the main switchboard on „U" rail type TH 35, in case it is possible to unite the boundaries of lightning protection levels LPZ0/ LPZ1 and LPZ1/LPZ2. With its parameters and small dimensions, this combination is suitable for both industrial applications and applications in buildings, apartments etc. The advantage of combined arresters is that they provide complete solution for given system (etc. TN-C, TN-S) without the need of interconnecting busbars etc. -„one device = complete solution". If it is not possible to unite the boundaries of lightning protection levels LPZ0/LPZ1 and LPZ1/ LPZ2 (etc. in block of flats - in the unmeasured part there can not be installed varistor based overvoltage protection), then type SJB-25E-. . . has to be used on the boundary of LPZ0/ LPZ1 and type SVC-...on the boundary of LPZ1/ LPZ2.

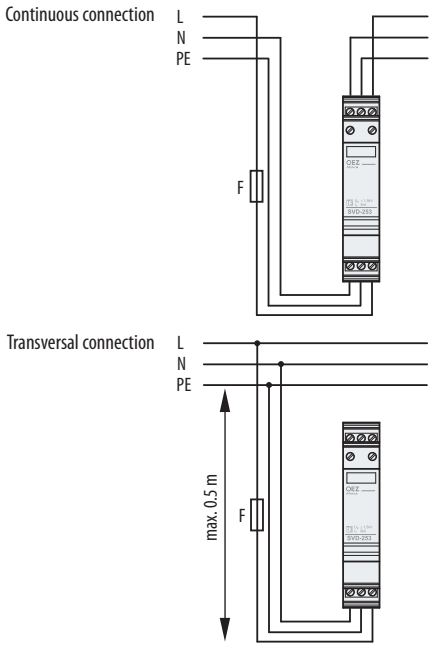
Combined arrester of lightning current type 1 and type 2 (SVBC – varistor) can be used in switchboards of individual flats in cases when it is not possible to install common first protection stage (etc. block of flats, where there is not allowed to install in unmeasured part any type of overvoltage protection). Combined arrester of lightning current SVBC is thank to lightning current separation in several branches convenient protection for these applications. It is installed on „U" rail type TH 35.

3. Installation of surge voltage arresters – T2 T2

Surge voltage arresters T2 are installed mainly on boundaries of LPZ1/LPZ2 that means in subsidiary switchboard behind the arresters of lightning current installed in the main switchboard. They are installed on „U" rail type TH 35. It is necessary to ensure coordination of individual protection stages at installation. For more information see paragraph "Coordination of overvoltage protection".

4. Installation of surge voltage arresters – T3 T3

Surge voltage arresters SVD are installed on „U" rail of type TH 35. If the length of the line between T2 and T3<5 m, it is not necessary to use T3 – the parameters of coordination T2 and T3 would not be fulfilled. Protection is sufficiently provided by the surge voltage arrester T2. Install another surge voltage arresters of stage 3 at least 10 m downstream of the previous T3. Surge voltage arresters of stage 3 can be connected to the line both lengthwise and cross-wise. Cross-connection to the line is advantageous in particular if the current flowing through the line is higher than the permitted rated load current I_L of the surge voltage arrester T3.



5. Installation of surge voltage arresters for photovoltaic systems

Overvoltage protections SVBC-DC and SVC-DC are installed on „U" rail type TH 35 usually at the solar panel. At the length of the line between solar panels and inverter L > 10 m we recommend to install the overvoltage protection also at the inverter on the DC side.

PROTECTION OF OVERVOLTAGE PROTECTIONS

1. Protection of lightning current arresters – T1 T1

Protection can be implemented in two ways:

- protection only by fuses F1 in the house main switchboard, if F1 correspond to the values stated in the table of technical parameters of given type. However, if in such wiring there are leakages and follow short-circuit currents, though the SJB arresters are able to quench the follow short-circuit currents, F1 may blow with subsequent interruption of power supply in the building.
- use of fuses F2 in addition to F1 if the latter are too big or if you do not want to interrupt the power supply. In such case selectivity must be ensured between F1 and F2 i.e. $I_{nF1} \geq 1.6 \times I_{nF2}$. With this ratio of rated currents, F2 will cut out sooner than F1, and the power supply of the building will not be interrupted. However the values I_{nF2} may be low and F2 will blow more frequently. For this reason it is recommended to equip the fuse F2 with a signalling device.

2. Protection of surge voltage arresters – T2 T2

The previous paragraph applies also to the protection of surge voltage arresters, however in *Wiring diagram examples* these fuses are designated F3.

3. Protection of surge voltage arresters – T3 T3

Surge voltage arresters SVD shall be protected by circuit breakers or fuses gG max. 25 A.

4. Protection of arresters for connection „3+1"

Arresters for connection between N and PE conductors, i.e. the arrester SJB-NPE-1.5 and the module between N and PE for the other versions are not protected separately. Because their protection is already provided by fuses F1, F2 or F3, see the wiring diagram examples.

5. Protection of arresters for photovoltaic systems

It is not needed to protect the arrester for photovoltaic systems in any special way. However, in case of two varistors design and one spark gap the limit of maximum short-circuit current has to be considered.

COORDINATION OF OVERVOLTAGE PROTECTION

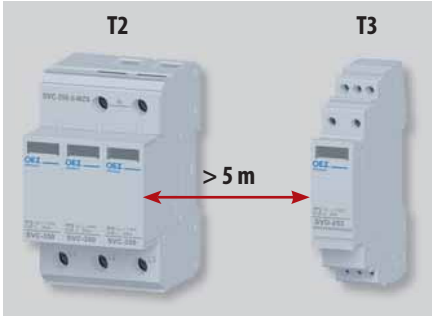
The correct function of multiple stage protection is conditioned by correct coordination of individual stages. At first the most sensitive stage of protection reacts. Before it gets overloaded the superior stage has to react.

It is valid in case of T1 and T2 that if their mutual distance is bigger than 10 m (the length of conductors), the coordination is guaranteed by the physical features of the lines. It means that we can use any combination of first and second protection stage (once we follow other installation instructions).

In case we need to install T2 closer to T1, it is necessary to use combination of overvoltage protection designed for this purpose.

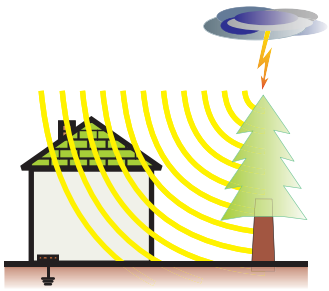
T1	T2		
	< 5 m	5 ÷ 10	> 10
SJBplus-50-2,5	SVM-440-..	SVC-350-..	arbitrary
SJB-25E-..	SVC-350-..	SVC-350-..	arbitrary

It is necessary to observe the minimal distance 5 m for the coordination between the second end the third stages of the protection.



RECOMMENDATIONS FOR DESIGN, INSTALLATION AND MEASUREMENT OF OVERVOLTAGE PROTECTIONS

Low installation thread



a) Family houses without lightning conductor and exposed conductive parts

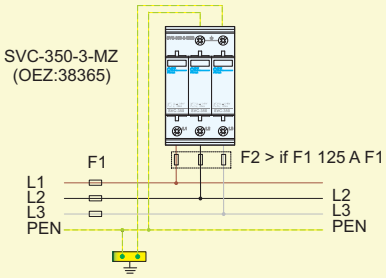
- Conducted by underground cable line.
- Where there is no threat of direct lightning stroke to the nearby building with lightning conductor which is galvanically connected to the protected building.

b) Individual housing units

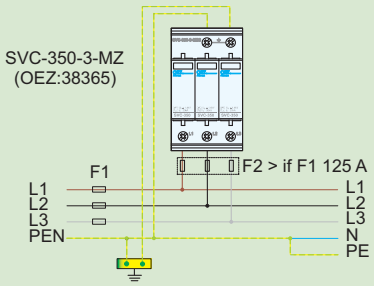
- It is possible to install common first protection stage T1 in the main switchboard in the block of flats.

Standard solution

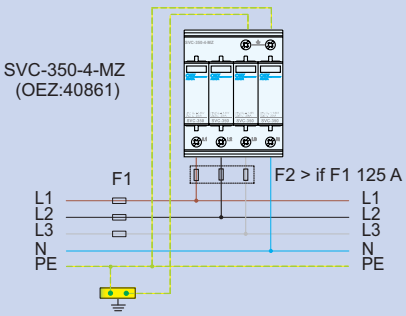
TN-C



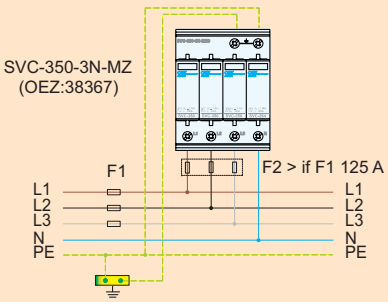
TN-C-S



TN-S

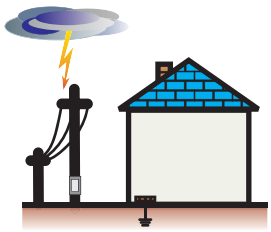


TN-S, TT



RECOMMENDATIONS FOR DESIGN, INSTALLATION AND MEASUREMENT OF OVERVOLTAGE PROTECTIONS

Medium installation thread

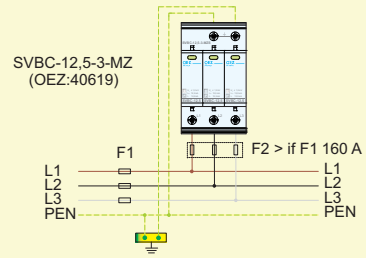
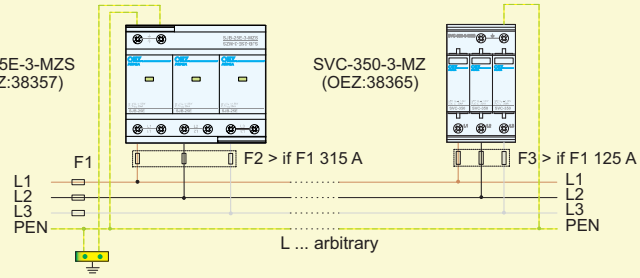
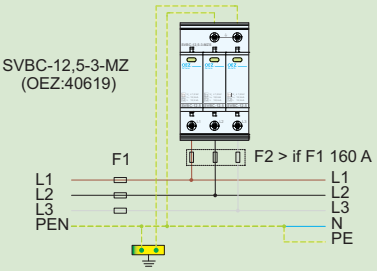
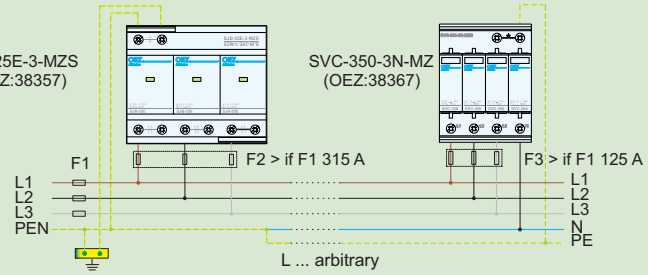
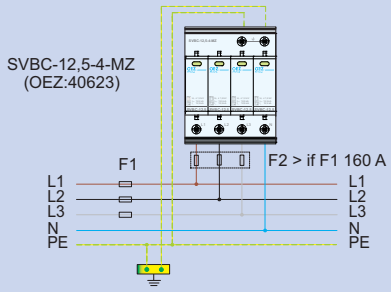
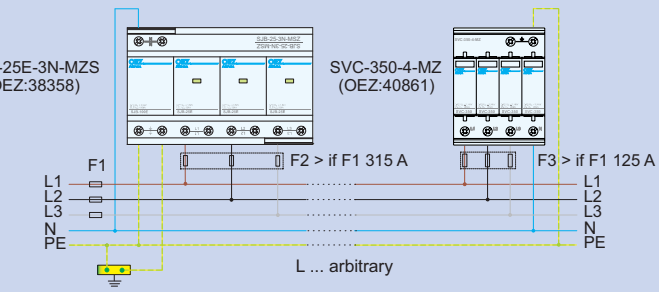
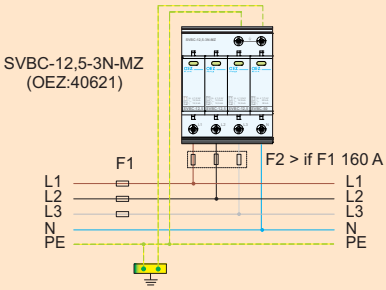
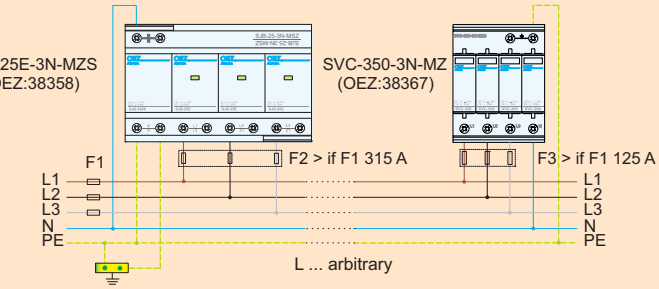


a) Family houses

- Where there is a threat of direct lightning stroke to the protected building or to the nearby building with lightning conductor which is galvanically connected to the protected building - level of protection against lightning LPL III or LPL IV.
- With overhead cable line.

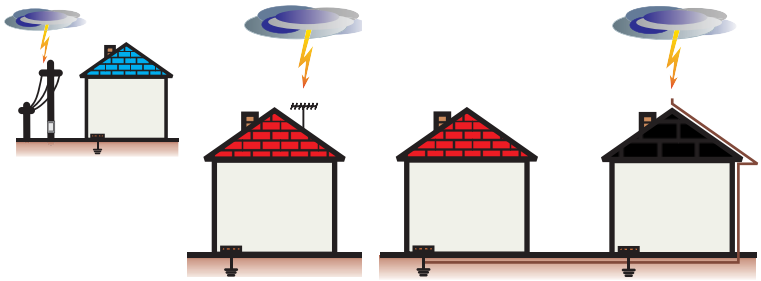
b) Individual housing units

- In the block of flats where it is not possible to install common first protection stage T1 in the main switchboard and where due to lightning current separation in several branches its level does not exceed 12.5 kA (10/350 µs).

	Standard solution	Solution for necessary T1 and T2 separation
TN-C		
TN-C-S		
TN-S		
TN-S, TT		

RECOMMENDATIONS FOR DESIGN, INSTALLATION AND MEASUREMENT OF OVERVOLTAGE PROTECTIONS

Big installation thread

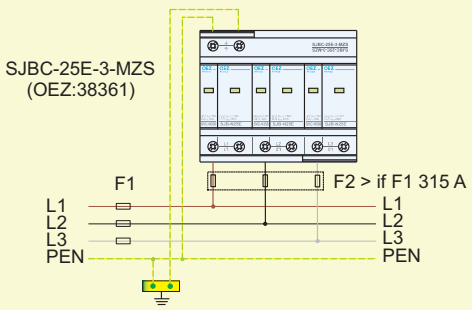
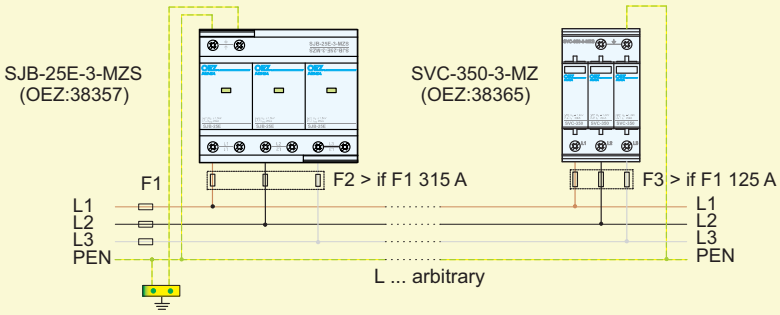
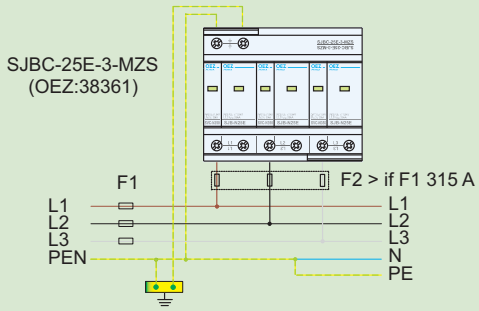
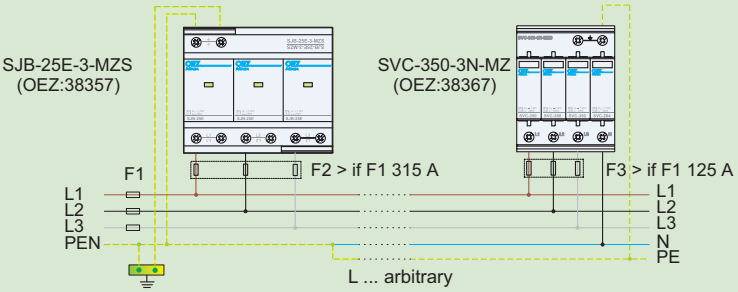
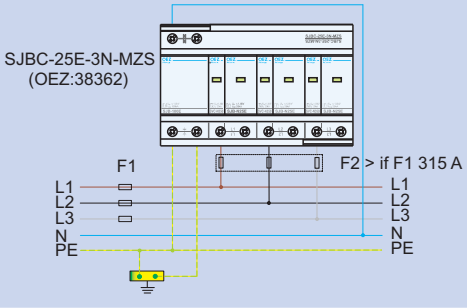
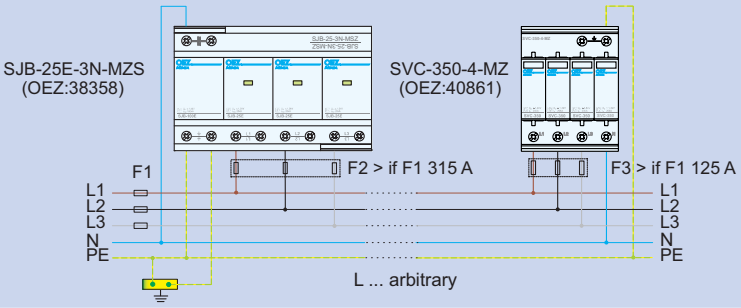
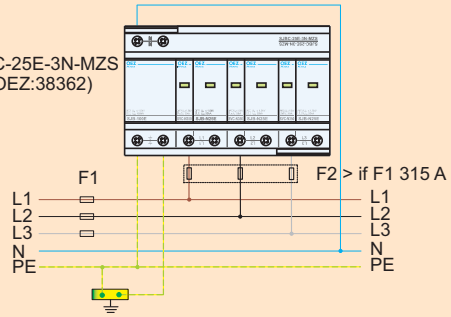
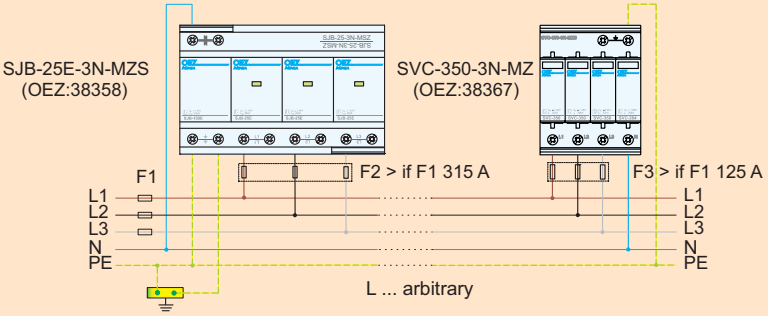


a) Family houses with lightning conductor or exposed conductive parts.

- Independent on connection type.
- Where there is a threat of direct lightning stroke to the protected building or to the nearby building with lightning conductor which is galvanically connected to the protected building - level of protection against lightning LPL I or LPL II.

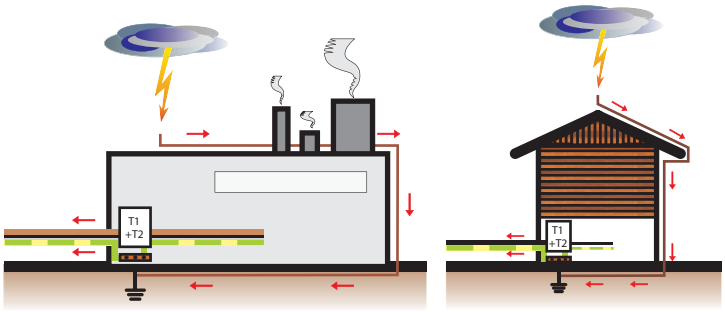
b) Individual housing units.

- In the block of flats where it is not possible to install common first protection stage T1 in the main switchboard and where the lightning current can exceed 12.5 kA (10/350 µs).

Standard solution	Solution for necessary T1 and T2 separation	
		TN-C
		TN-C-S
		TN-S
		TN-S, TT

RECOMMENDATIONS FOR DESIGN, INSTALLATION AND MEASUREMENT OF OVERVOLTAGE PROTECTIONS

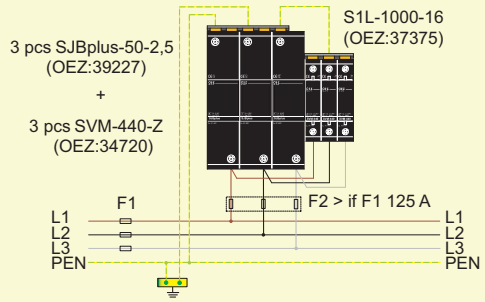
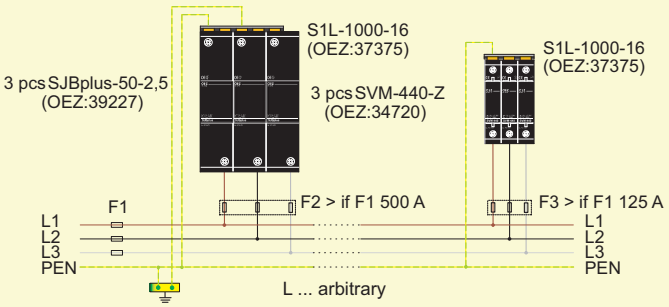
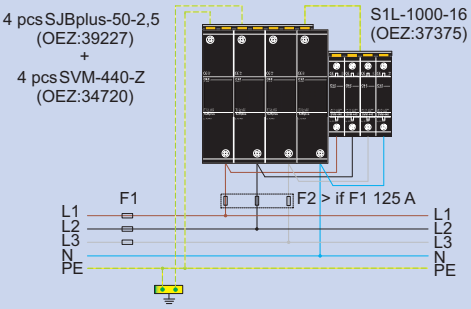
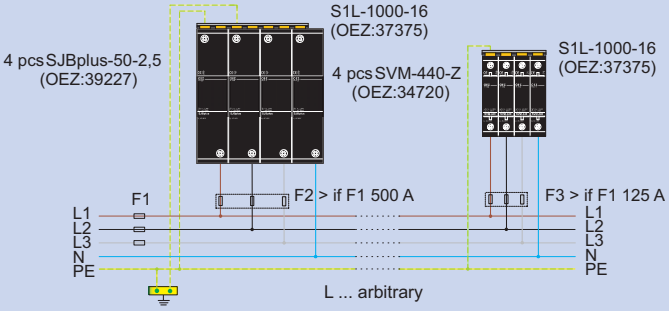
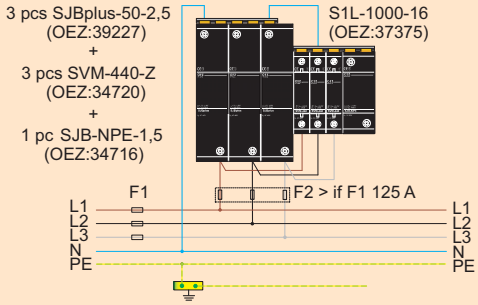
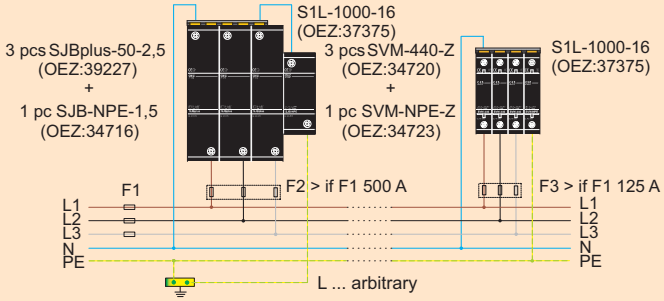
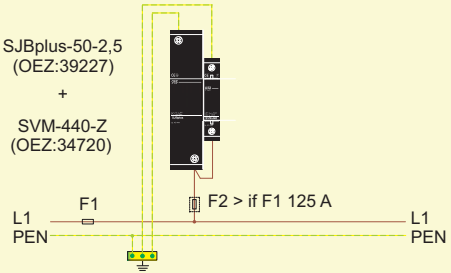
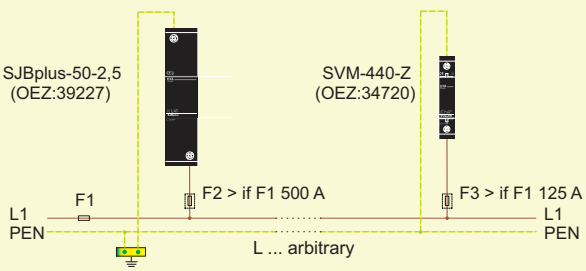
Industrial and special applications



a) Industrial applications, where higher requirements for overvoltage protections have to be met, e.g. due to high short-circuit current.

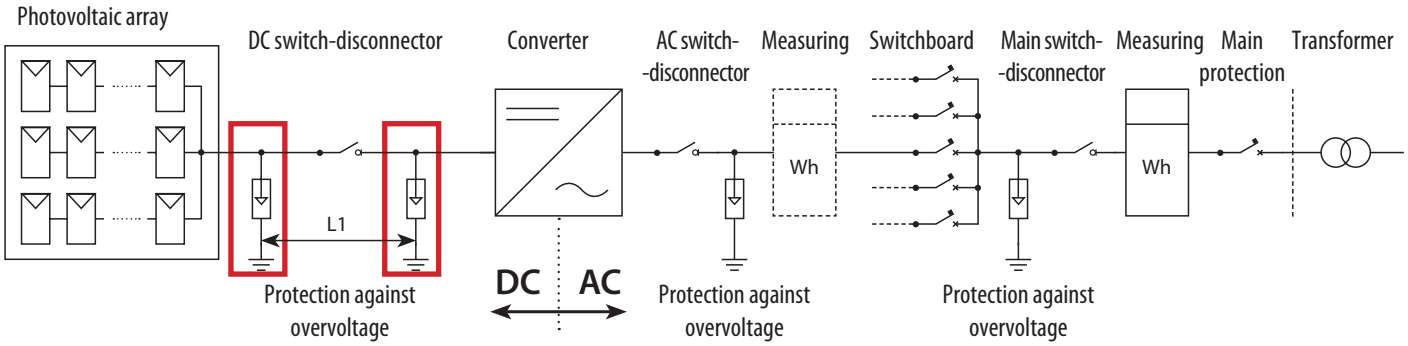
- The separation of lightning current is the same as in case of big installation threat.

b) The separation of lightning current is the same as in case of big installation threat.

	Standard solution	Solution for necessary T1 and T2 separation
TN-C		
TN-S		
TN-S, TT		
TN-C		

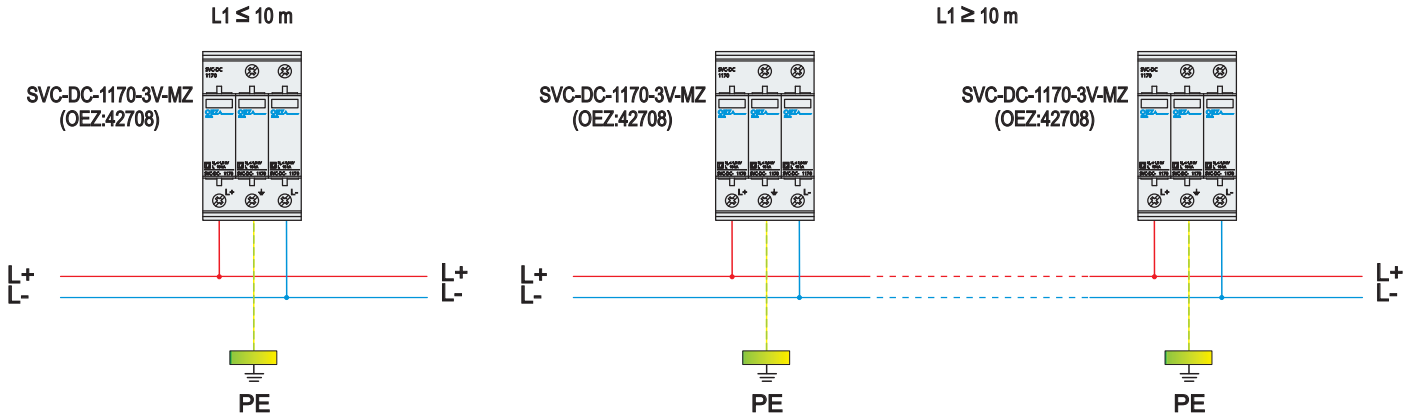
RECOMMENDATIONS FOR DESIGN, INSTALLATION AND MEASUREMENT OF OVERVOLTAGE PROTECTIONS

Photovoltaic systems



a) Photovoltaic sources, where there is no threat of direct stroke to the solar panel or lines

- Dependent on the length of line between the panels and the inverter one or two devices are used. In general, at the length of line L1 > 10 m we use the overvoltage protection at both the solar panel and the inverter, at the length of the line L ≤ 10 m we use the overvoltage protection either at the solar panel or at the inverter.
- Design SVC-DC-1170-3V-MZ(S) or SVC-DC-800-3V-MZ(S).



b) Photovoltaic sources, wherein there is a risk of direct stroke in a panel or a line, especially in cases, where the panel is connected with the arresting system galvanically

- Dependent on the length of line between the panels and the inverter one or two devices are used. In general, at the length of line L1 > 10 m we use the overvoltage protection at both the solar panel and the inverter, at the length of the line L ≤ 10 m we use the overvoltage protection either at the solar panel or at the inverter.
- Design SVBC-DC-1050-3V-MZ(S) or SVBC-DC-720-3V-MZ(S).