

# Monitoring Relays Surge Arresters for PV system Type DSF D

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- Type 2 (class C) according to EN61643-11 (VDE 0675, part 6-11)
- Approved UL1449 3<sup>rd</sup> Edition
- Complies with IEC-61643-1, VTE C 61-740-51
- Do not require backup fuse up to 200kArms (UL 1449 3<sup>rd</sup> Ed.)
- Innovative technology to prevent dangerous failures in case of temporary overvoltages
- Suitable for unstable networks where sustained overvoltages may persist for some minutes or longer
- Plug-in cartridges
- Optical indication of exhausted cartridges (red window)
- Voltage-free contact, for remote function monitoring
- Including thermal and dynamic separating device
- Assembled unit ready for mounting
- Marked connections
- For DIN-rail mounting

## Product Description

DSF D is a Type 2 (Class C) surge arrester according to EN 61643-11 (VDE 0675, part 6-11) and UL1449 3<sup>rd</sup> edition suitable for protecting DC systems from transient overvoltage due to both indirect atmospheric discharges and switching actions.

It is available both in 2-pole or 3-pole configurations, allowing both differential and common mode protection. The control windows (no/red indication) and the contact allow both a local and a remote monitoring of the

status of the plug-in cartridges, warning the operator about the need to promptly replace the cartridges themselves.

In installation without external LPS (Lightning Protection System) or where the distance between the LPS elements and the solar panel frames is >50cm, DSF can be used in the DC side of photovoltaic generation plants, and can be installed on a DIN-rail in every commercially available distribution box.

## Ordering Key

**DSF 53 C D 1200 PV**

Description	Code
<b>Mounting</b>	
DIN-rail	D
<b>Function</b>	
Surge arresters	S
<b>Type</b>	
Type 2 (class C) "Fuseless"	F
<b>Cartridge dimensions</b>	
17.5 mm	5
<b>Configuration</b>	
2-pole	2
3-pole	3
<b>Contact</b>	
None	X
1 (relay)	C
<b>Network</b>	
DC	D
<b>Range</b>	
600 VDC	600
1000 VDC	1000
1200 VDC	1200
<b>Application</b>	
Photovoltaic system	PV

## Type Selection

Code	Description	Max. cont. operating voltage	Output relay	Cartridge
<b>DSF52CD600PV</b>	2-pole surge arrester for PV installations	600 VDC	SPDT	2x DS0600F
<b>DSF52XD1000PV</b>	2-pole surge arrester for PV installations	1000 VDC	NO	2x DS1000F
<b>DSF52CD1000PV</b>	2-pole surge arrester for PV installations	1000 VDC	SPDT	2x DS1000F
<b>DSF53XD1200PV</b>	3-pole (Y) surge arrester for PV installations	1200 VDC	NO	3x DS0600F
<b>DSF53CD1200PV</b>	3-pole (Y) surge arrester for PV installations	1200 VDC	SPDT	3x DS0600F

## Product specifications

<b>Max. continuous operating voltage DC</b> DSF52CD600PV DSF52xD1000PV DSF53xD1200PV	<b>U<sub>c</sub></b> 600 VDC 1000 VDC 1200 VDC	<b>Voltage protection level</b> DSF52CD600PV DSF52xD1000PV DSF53xD1200PV	<b>U<sub>p</sub></b> < 2.2 kV < 2.8 kV < 4.4 kV
<b>SPD (Surge Protection Device) according to EN 61643-11</b> DSF5xCDxxxxPV	Type 2	<b>Response time</b> DSF5xxDxxxx	<b>t<sub>a</sub></b> < 25 ns
<b>SPD (Surge Protection Device) according to IEC 61643-1</b> DSF5xCDxxxxPV	Class II	<b>Protection fuse size (UL 1449 3rd Ed.)</b> DSF5xxDxxxx	Not required up to 200 kA rms
<b>LPZ (Lightning Protection Zone)</b> DSF5xCDxxxxPV	1 --> 2	<b>Follow current</b> DSF5xxDxxxx	No
<b>Nominal discharge surge current (8/20)</b>  DSF52CD600PV DSF52xD1000PV DSF53xD1200PV  DSF52CD600PV DSF52xD1000PV DSF53xD1200PV	<b>I<sub>n</sub></b> <b>+ or - to PE</b> 20 kA 12.5 kA 20 kA <b>+ and - to PE</b> 40 kA 25 kA 20 kA	<b>Short-circuit withstand current (data for AC applications according to EN 61643-11)</b> DSF5xxDxxxx	25kA/50Hz
<b>Max. discharge surge current (8/20)</b>  DSF52CD600PV DSF52xD1000PV DSF53xD1200PV  DSF52CD600PV DSF52xD1000PV DSF53xD1200PV	<b>I<sub>max</sub></b> <b>+ or - to PE</b> 40 kA 25 kA 40 kA <b>+ and - to PE</b> 80 kA 50 kA 40 kA	<b>Front window</b> DSF5xxDxxxx	No indication: working cartridge. Red: exhausted cartridge (to be replaced)
		<b>Operating temperature</b> DSF5xxDxxxx	-40 to +80 °C

## Output Specifications

<b>Output</b> DSF5xCDxxxxPV Rating	SPDT AC: 250V/0.5A 125V/3A	<b>Cable cross-section area</b> <b>Terminal torque</b>	max 1.5 mm <sup>2</sup> 0.25 Nm max
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## General Specifications

<b>Protection degree</b>	IP 20	<b>Approvals</b> degree UL 94 V-0 CE, UL1449 3 <sup>rd</sup> Edition
<b>Dimensions</b> DSF52CD600PV DSF52xD1000PV DSF53xD1200PV	36 x 90 x 72 mm 36 x 90 x 72 mm 54 x 90 x 72 mm	
<b>Screw terminals</b> Cable cross-section area  Terminal torque	25 mm <sup>2</sup> (stranded) 35 mm <sup>2</sup> (solid) 4.5 Nm max	
<b>Housing material</b>	Thermoplastic, extinguishing	

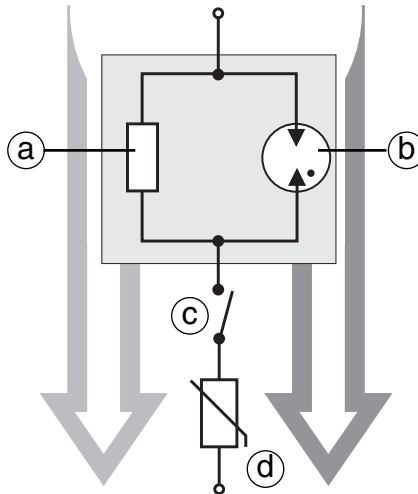
## No backup-fuse technology

### Long duration overvoltage path

The arrester is activated in the event of electric power system failure. The voltages are much lower than transient voltages but substantially more destructive. The system is composed of a current limiter and a varistor. In the event of increased voltage level the current limiter circuit limits the current through the varistor. When the normal condition is re-established (rated line voltage), the surge arrester continues to perform its normal function.

### Transient (short duration) overvoltage path

The arrester is activated at the occurrence of instantaneous high voltage surges lasting only a few microseconds. Such condition states are experienced at switching operations and atmospheric discharges. The system is composed of a gas tube surge arrester and a varistor. Both components have a very short response time which is reflected in a low protective residual voltage level. This provides an efficient protection of sensitive electronic devices.



a) Current limiter b) Gas tube c) Thermal disconnecter d) Varistor

## Installation notes

### Protection distance

- If DSF is installed less than 10 m from the device to be protected, the distance can be ignored.
- If DSF and its connection wires have a total protection level  $U_{p/f}$  ( $U_{prot}$ )  $< 0.5 U_w$ , where  $U_w$  is the breaking voltage of the device to be

protected, the distance can be neglected.

- If the protection distance is longer than 10 m, the real protection distance  $\ell_{po}$  can be calculated by the following formula:

$$\ell_{po} = (U_w - U_{p/f}) / K \text{ [m]}$$

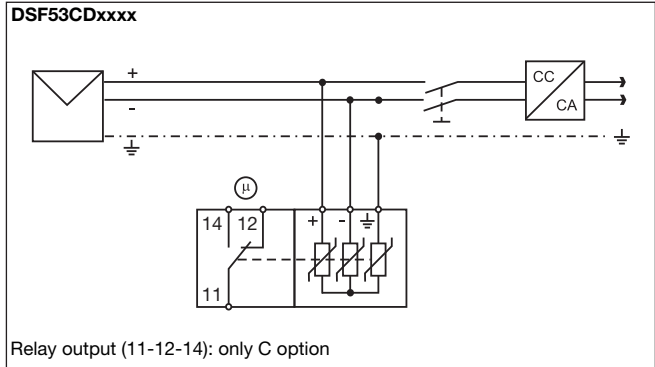
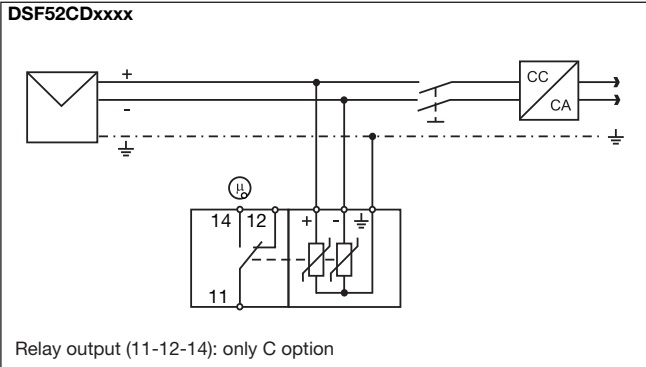
with  $K = 25 \text{ V/m}$ .

### Protection against over-currents and indirect contacts

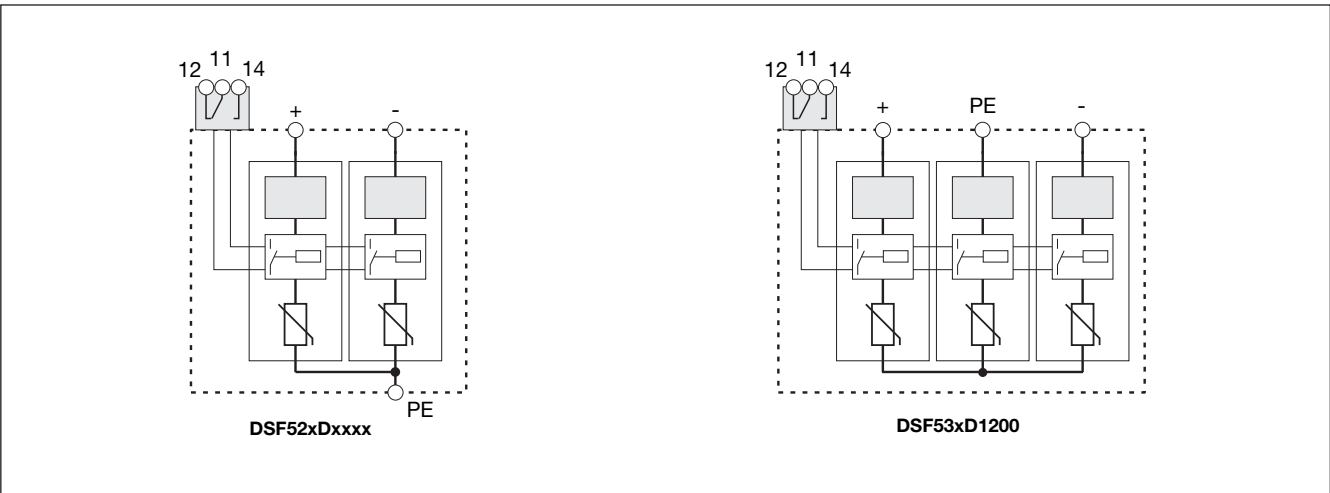
DSF can be installed without further integrative protections even if a general circuit breaker/fuses with nominal current  $> 125 \text{ kA}$  is installed and if in the DSF installation point the short circuit current

is  $> 25 \text{ kA}$  (but  $< 200 \text{ kArms}$ ). No protection fuses are needed for backup protection.

## Wiring Diagrams



## Connection Diagrams



## Dimensions

