

# SP-111

## 3-lines Surge Arrestor, differential mode



### Description

The SP-111 surge arrester is able to protect up to 3 lines against overvoltages caused by 8/20us surges (lightning) or 10/1000us surges (power switching).

Several levels of protection are available from 18V to 75V.

A differential protection is mounted on 2 of the 3 lines.

#### General features

Dimensions	90 mm x 70 mm
Thickness	17,5 mm
Weight	80 g
Assembly	DIN rail
Connections	Screw

#### Climatic conditions

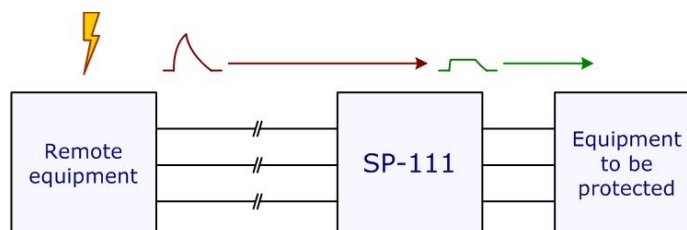
Storage temperature	-20°C to +70°C
Operating temperature	-20°C to +50°C

#### Lines protection

Nominal current ( $I_N$ )	20 kA
Maximum current ( $I_{MAX}$ )	25 kA
Protection levels ( $U_C$ )	18 V <sub>DC</sub> ( 12 V <sub>AC</sub> )
	24 V <sub>DC</sub> ( 16,5 V <sub>AC</sub> )
	48 V <sub>DC</sub> ( 33 V <sub>AC</sub> )
	75 V <sub>DC</sub> ( 50 V <sub>AC</sub> )

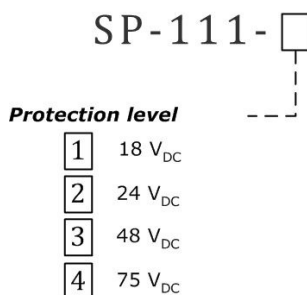
#### Lines features

DC serial resistance	0,4 Ω (Signal)
Serial resistance at 1kHz	1,8 Ω (Signal)
Maximum current per line	500 mA



## Available references

The product reference is constructed as follows :



Available references are the following :

SP-111-1	SP-111-2	SP-111-3	SP-111-4
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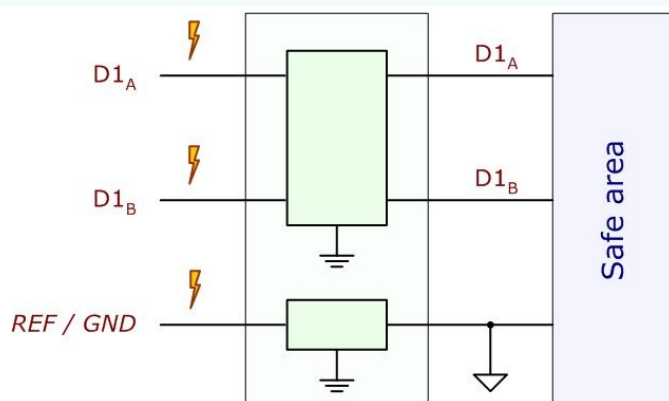
## Overview

The SP-111 module protects up to 3 low-voltage lines against the effects of transients.

Two lines have a differential protection, while the last one is in common mode.

The lines get the following functions :

REF	Voltage reference/ Ground
D1	'Signal' line (analog or digital)



## Lines definitions

### 'Reference' line (REF).

This line acts as a voltage reference. It can be an electronic ground or an other signal.

Protection levels implicitly use this line as a reference. For proper operation of the arrestor, it must be connected.

### 'Signal' line (D1).

The D1 lines have a differential protection.

These lines are general purpose lines. They can be analog or digital.

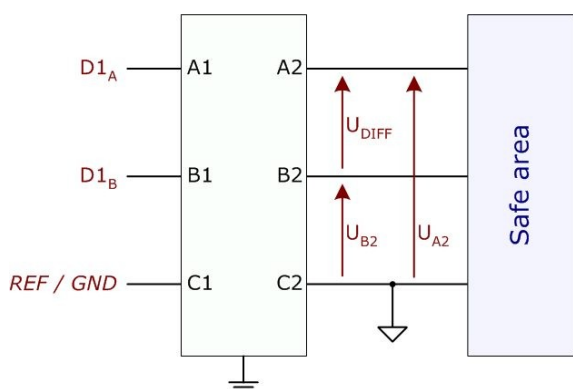
## Protection levels

The arrester protection level indicates its maximum operating voltage without tripping.

This voltage, called  $U_C$ , is the maximum steady state voltage.

For proper operation, the D1 lines voltages ( $U_{A2}$  and  $U_{B2}$ ) must remain within the limits of  $\pm U_C$  (REF line used as the reference).

The voltage between the D1 lines ( $U_{DIFF}$ ) must also remain within the limits of  $\pm U_C$ .



At the triggering of the arrester, the voltage of the D1 lines rises above the voltage  $U_C$ . This voltage is called the clamping voltage  $U_R$ .

### Reference SP-111-1

$U_C$ voltage	18 V <sub>DC</sub> ( 12 V <sub>AC</sub> )
$U_R$ clamping voltage	21,1 V min. 22,0 V typ. 29,2 V max.

### Reference SP-111-2

$U_C$ voltage	24 V <sub>DC</sub> ( 16,5 V <sub>AC</sub> )
$U_R$ clamping voltage	28,1 V min. 29,4 V typ. 38,9 V max.

### Reference SP-111-3

$U_C$ voltage	48 V <sub>DC</sub> ( 33 V <sub>AC</sub> )
$U_R$ clamping voltage	56,1 V min. 60,1 V typ. 77,4 V max.

### Reference SP-111-4

$U_C$ voltage	75 V <sub>DC</sub> ( 50 V <sub>AC</sub> )
$U_R$ clamping voltage	92,1 V min. 99,0 V typ. 121,0 V max.

## 'Signal' line protection (D1)

The D1 lines can be connected to an analog or digital signal, as an input or an output.

Their operating voltage is between  $+U_C$  and  $-U_C$ .

The arrester adds a serial resistance of 0.4  $\Omega$ .

## Earth connection

The SP-111 is connected to the Earth via the DIN rail on which it is mounted.

The user will care to check that:

- DIN rail is in good condition
- The DIN rail is properly connected to the Earth.
- SP-111 module is well fixed on the DIN rail



**Without connection to the Earth, the surge protection is ineffective.**

## Inserted impedance

SP-111 arrester is designed for low frequency equipment.

It shall be preferred for use with signals of frequency less than 10kHz.

The user will care to check the impact of the added impedance by the SPD on its application.

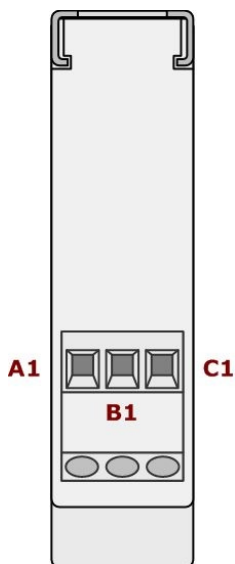
	« Reference » line « Signal » line
DC	0,4 Ω
1 kHz	1,8 Ω
3 kHz	4,6 Ω
10 kHz	14,3 Ω

## Connections

The connections A1, B1 and C1 have to be connected to the equipment that may be exposed to electrical disturbances (lightning, power switching ...).

The connections A2, B2 and C2 are connected to the protected equipment. These connections should be as short as possible.

Line	Non-protected pin	Protected pin
D1 <sub>A</sub>	A1	A2
D1 <sub>A</sub>	B1	B2
REF	C1	C2



Top view



Front view