

## Surge Protectors



Surges are mainly caused by electromagnetic fields generated by nearby lightning strikes.

SPINNER offers a premium choice of different protection elements for coaxial systems. It covers all relevant RF applications for which a surge protection is necessary e.g.:

- The protection of installations for analog and digital communication such as 4m radio, VHF ground radio in aviation, 2m radio, TETRA, GSM900/1800, UMTS, LTE
- The protection of communication lines in tunnels
- The protection related to radiating cables

Version	Gas Discharge Arrestor (GDA)	Quarter Wavelength Stub (QWS)	Hybrid
<b>Application</b>	- Universal broadband - From 0 to 2500 MHz	- Up to 3 mobile bands - From 380 to 2200 MHz	- All mobile bands with active elements at the antenna
<b>Advantages</b>	- DC transmission possible	- No maintenance - High RF power rating - Very low intermodulation	- DC transmission possible - High RF power rating - Low intermodulation
<b>Remark</b>	- Maintenance required - Limited RF power - High intermodulation	- No DC transmission possible	- Maintenance required

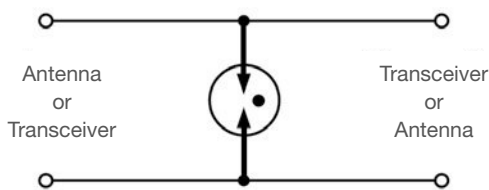
## Surge Protectors – Technical Preface

### Gas discharge arrestor (GDA)

#### Construction:

A gas discharge arrestor consists of a cylindrical insulator (mostly ceramics) with conductive caps at the ends. The inside is filled with noble gas under defined pressure.

circuit symbol



#### Function:

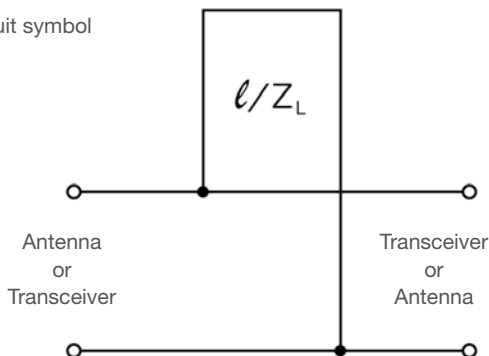
During normal operation the arrestor has a quasi-infinite resistance ( $> 1 \text{ G}\Omega$ ). If the voltage between the electrodes rises above the sparkover voltage, a breakthrough and discharge in the form of an electrical arc occurs. The sparkover voltage is dependent upon the rise time of the voltage and the type of arrestor. As the discharge is of low resistance the voltage between the electrodes is reduced to the arc (residual) voltage (typ. 20 V). The surge current can grow to very high values ( $\geq 25 \text{ kA}$ ) before the arrestor is destroyed. If the voltage between the electrodes falls below the arc voltage the arc extinguishes and the arrestor returns to normal operation.

### Quarter Wavelength Stub (QWS)

#### Construction:

A coaxial line with a defined characteristic nominal impedance is short-circuited at one end. The other end of the line with a length similar to a quarter wavelength is connected parallel to the main line.

circuit symbol



#### Function:

The short at the end of the stub is transformed to an open at the bottom. Thus the RF on the main line is inessentially influenced, and the stub acts like a simple band-pass filter with the quarter-wave frequency as centre frequency. The nature of the stub line (characteristic nominal impedance  $Z_L$  and length  $l$ ) together with additional transforming elements in the main line is responsible for the operating bandwidth of the device.

Because of the galvanic connection of inner and outer conductor, a DC transmission is not possible.

The missing of any non-linear component (e.g. a gas discharge arrestor) secures very low intermodulation.

The stub can be orthogonal to or folded into the axis of the main line (in-line design).

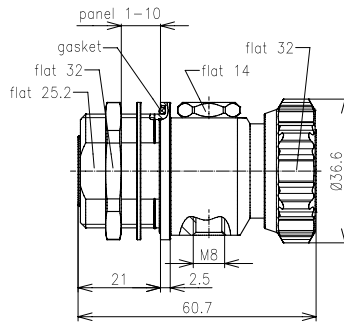
### Hybrid – with Quarter Wavelength Stub and Gas Discharge Arrestor

The Hybrid type combines both protection mechanisms. The short at the end of the  $\lambda/4$  line is replaced by a capacity and a gas discharge arrestor. The inner and outer conductor of the main line are not connected galvanically, therefore DC and low frequency can be transmitted. The main line is decoupled from the effects of the arrestor and vice versa by the quarter wavelength line. Thus the arrestor is free of electrical stress in normal operation.

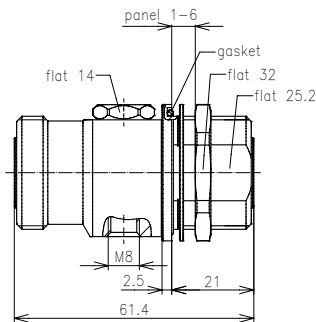
## Surge Protectors – Gas Discharge Arrestors



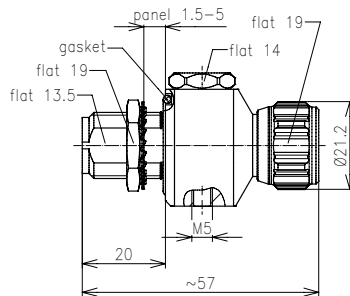
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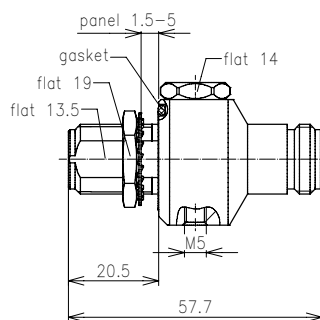
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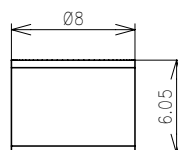
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**BN 950888**



**BN A71307**

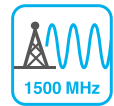


## Surge Protectors – Quarter Wavelength Stubs

This kind of surge protector is suitable for applications with single or multiple combined mobile communication bands (e.g. GSM900, GSM1800 and UMTS). DC transmission via the coaxial ports is not possible with this type.

- Symmetrical design, both sides protected
- High RF power rating
- Very low intermodulation
- Suitable for outdoor installation
- Maintenance free

The stub can be orthogonal to or folded into the axis of the main line (in-line design).

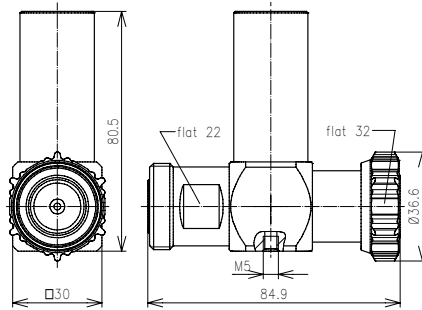


Part Number	<b>BN 766419</b>	<b>BN 756473</b>	<b>BN 756474</b>
Frequency range	380 - 512 MHz	800 - 2170 MHz	
Insertion loss	≤ 0.1 dB		
Surge current (8/20 μs)	≤ 50 kA	≤ 60 kA	
Test pulse	4 kV (1.2/50 μs) and 2 kA (8/20 μs)		
Residual energy at test pulse	≤ 20 μJ	≤ 7 μJ	
Passive intermodulation (IM3) @ 2 x 20 W	N/A	≤ -160 dBc	
VSWR	≤ 1.22	≤ 1.11	
Power rating	≤ 3 kW	≤ 0.95 kW @ 800 MHz ≤ 0.60 kW @ 2170 MHz	
Connectors	7-16 male / 7-16 female		7-16 female / 7-16 female
Temperature range	-40 °C ... +75 °C	-40 °C ... +85 °C	
Degree of protection (mated)	IP 67		
Weight	~ 430 g	~ 500 g	~ 450 g
Grounding cable	<b>BN A71367</b>	Included	

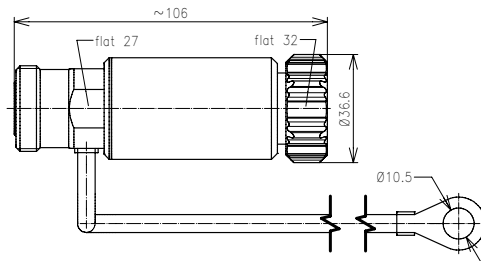
## Surge Protectors – Quarter Wavelength Stubs



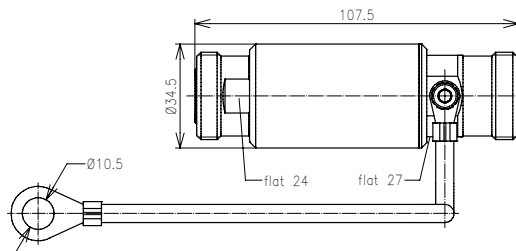
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**BN 756473**



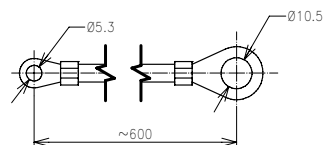
**BN 756474**



### Accessory



**BN A71367**



Grounding cable length: 600 mm.  
Ground lead Li2Y 1x6 mm<sup>2</sup> with crimped ground lugs for M5/M8 screws.