Accessories

EMP Protection Devices

Atmospheric disturbances may cause problems in antenna and cable systems and can present a severe danger to high-frequency equipment. The two most effective types of EMP protection are the spark gap and the quarter wavelength shorting stub. RFS offers devices using coaxial technology for N and 7-16 connector systems. During normal operation these devices will not influence the RF behavior of the antenna and cable system.

Selection Criteria

To find selection criteria for the right choice of protection devices the following should be considered:

The spark gap protector can be used for broadband applications up to 2.5 GHz. The gas capsules are replaceable and can be ordered separately.

The device provides a DC-path for tower mounted amplifiers or other applications with remote bias supply. The protection level can be selected by choice of the appropriate breakdown voltage. The RF-voltage must not exceed the breakdown voltage, otherwise disturbances of the RF-signal can occur due to unwanted ignition of the spark gap.

The quarter wave stub protector is especially suited for transmit applications, since power handling is limited by the connecting system only. Due to its resonant behavior, it provides minimum VSWR in the design frequency range. Standard types are available for 800 to 2000 MHz frequency bands as well as dual band types, other frequency ranges are available on request. No maintenance is necessary, a DC-path is not available with standard types.

Product Spectrum

Different housing options are available to meet specific user requirements.

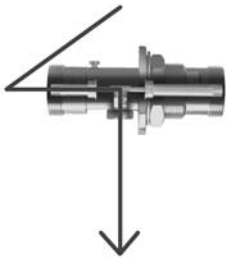
Adapter types feature male / female connector combinations and can be easily inserted into any feeder system. They may even be installed at later stages to upgrade the protection level of existing systems.

Fixed adapters with square flange can be installed in system cabinets, container walls or any other panel with a thickness not exceeding 4mm.

Fixed adapters with bulkhead version can be installed in system cabinets, container walls or any other panel with a thickness not exceeding 5mm. Only a single hole is required.

Gas type protectors are available with the gas capsule installed or without gas capsule. Gas capsules are available separately to select the protection level at installation time or for replacement.

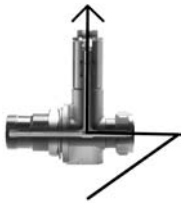
No tuning is necessary for any protection device offered by RFS.



Spark Gap Protector

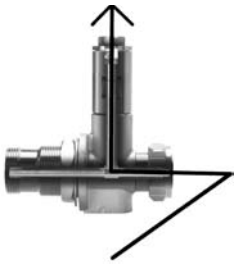
The spark gap protector is based on the gas discharge principle. Within an extremely short time the resistance drops from MOhm to mOhm in case of an atmospheric disturbance. This is caused by the ionization of the gas. A pulse traveling along the line will be diverted to ground.

Quarter Wavelength Shorting Stub



The quarter wavelength stub consists of a short-circuited branch line connected to the main line, providing a direct ground path for the low frequency spectrum of the disturbances. The electrical length of the branch line equals a quarter wavelength at the desig frequency, transforming the short into an open circuit at the connecting point. There is a trade-off between the transformation bandwidth and the residual voltage, thus the standard types are optimized for the telecommunication frequency bands.

Hybrid Quarter Wave Shorting Stub



The hybrid quarter wavelength stub is a special design used in applications where high RF power, DC-fed components or trunked-/multi-channel transmitters are used on coaxial transmission lines. These devices have a specially designed gas capsule circuit which is de-coupled from the RF path. This allows higher RF power or DC-fed components to reside on a single transmission line while improving the VSWR performance above ordinary spark gap protectors. Only a special 90v gas capsule protects the RF system where much higher voltage level gas capsules were previously required. Systems requiring tower-top amplifiers benefit from these types of EMP protection devices.

Accessories

Overview Table EMP Protection Devices

Protective Device	Connector Series	Connector Transition	Frequency Range	Return Loss (VSWR)	Insertion Loss	Surge Current	Model Number
Quarter Wave	7-16 DIN	7-16 DIN Male, adapter, 7-16 DIN Female	806-960 MHz	26.4 dB (1.08:1)	0.15 dB	100 kA	716-STUB-01
Quarter Wave	7-16 DIN	7-16 DIN Male, adapter, 7-16 DIN Female	1710-2200 MHz	29.5 dB (1.10:1)	0.15 dB	100 kA	716-STUB-02
Quarter Wave	7-16 DIN	7-16 DIN Female, adapter, 7-16 DIN Female	806-2200 MHz	20 dB (1.22:1)	0.15 dB	100 kA	716-STUB-03
Quarter Wave	7-16 DIN	7-16 DIN Male, adapter, 7-16 DIN Female	824-900 MHz	32 dB (1.06:1)	0.10 dB	100 kA	716-STUB-04
Quarter Wave	N	N Male, adapter, N Female	806-960 MHz	26.4 dB (1.08:1)	0.15 dB	50 kA	N-STUB-01
Quarter Wave	N	N Male, adapter, N Female	1710-2200 MHz	26.4 dB (1.10:1)	0.15 dB	50 kA	N-STUB-02
Quarter Wave	N	N Male, adapter, N Female	890-2200 MHz	20 dB (1.22:1)	0.15 dB	50 kA	N-STUB-03
Quarter Wave	N	N Male, adapter, N Female	2000-6000 MHz	20 dB (1.22:1)	0.15 dB	50 kA	N-STUB-07

Protective Device	Connector Series	Connector Transition	Frequency Range	Return Loss (VSWR)[1]	Insertion Loss[2]	Nominal Breakdown Voltage	Model Number
Gas Tube	7-16 DIN	7-16 DIN Male, adapter, 7-16 DIN Female	DC-2500 MHz	26 dB (1.10:1)	0.15 dB	230 V	716-UC230-01
Gas Tube	7-16 DIN	7-16 DIN Female, adapter, 7-16 DIN Female	DC-2500 MHz	26 dB (1.10:1)	0.15 dB	230 V	716-UC230-03
Gas Tube	N	N Male, bulkhead, N Female	DC-2500 MHz	26.4 dB (1.10:1)	0.15 dB	230 V	N-UC230-01
Gas Tube	N	N Female, bulkhead, N Female	DC-2500 MHz	26.4 dB (1.10:1)	0.15 dB	230 V	N-UC230-03

Protective Device	Connector Series	Connector Transition	Frequency Range	Return Loss (VSWR)	Insertion Loss	Surge Current	Model Number
Quarter Wave Hybrid	7-16 DIN	7-16 DIN male, adapter, 7-16 DIN female	806-2500 MHz	20.8 dB (1.2:1)[3]	0.10 dB	30kA	716-UC90-05
Quarter Wave Hybrid	7-16 DIN	7-16 DIN female, adapter, 7-16 DIN female	806-2200 MHz	20.0 dB (1.2:1)	0.15 dB	30kA	716-UC90-04

Protective Device	Nominal Breakdown Voltage	Model Number
Spare Capsule	230 V	UC230
Spare Capsule for Quarter Wave Hybrid Only	90 V	UC90-HP

[1] For DC-1000MHz; Max. Return Loss (VSWR) for 1000-2500MHz = 20.0 dB (1.22:1)

[2] For DC-1000MHz; Max. Insertion Loss for 1000-2500MHz = 0.2 dB

[3] For 806-2500MHz; Max. Return Loss for 806-960 & 1710-2500MHz = 26 dB (1.1:1)