Novaris

Australian made

Coaxial power surge protection

Build To Order

# Selecting Coaxial Protection

## Coaxial line surge protection must:

1. Provide adequate protection for all equipment
2. Achieve a long working life
3. Allow the signal to pass under normal operation and not have an adverse affect on insertion loss and VSWR.
4. Optimise the cost and size of the surge protection devices (SPD's)

## Options for surge protection devices:

Inline GDT

Inline GDT coaxial protectors containing a gas discharge tube (GDT) are suitable for a wide frequency range but must be chosen with respect to the power on the line if used for transmitting applications.

Spark gap

Spark gap coaxial protectors provide protection for high powered transmission systems. Arc detection and extinguishing features are available as an option to prevent the transmitter from keeping the spark lit after a transient.

## Selection of surge protection devices:

**1. Identify the connector type**

Novaris manufactures a range of coaxial SPD's to suit most common connector and gender variations.

**2. Select the clamping voltage**

The clamping voltage of the SPD must be greater than the peak voltage on the line. This is particularly important whn used for transmitting applications. The following is a guide.

| Power in 50Ω(W) | GDT Voltage (V) |
|---|---|
| 0-40 | 90 |
| 40-125 | 230 |
| 125-300 | 350 |
| 300-800 | 600 |
| 800-2000 | 1000 |

**3. Identify the maximum operating frequency**

3G models are available in all standard small format connector types and feature replaceable GDT's and will operate to 3 GHz. 6G models are available in only N-type connectors and will operate to 6 GHz.

# Novaris Coaxial Protection

Build To Order

## RF equipment Protection up to 3 GHz

Novaris gas discharge surge protectors are capable of passing RF signals to 3GHz (limited by connector type). N-type female / female protectors are suitable for bulkhead mounting.


| Specifications - N-type | | CN-MF-90-3 | CN-FF-90-3 | CN-MF-230-3 | CN-FF-230-3 | CN-MF-350-3 | CN-FF-350-3 | CN-MF-600-3 | CN-FF-600-3 | CN-MF-1000-3 | CN-FF-1000-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | $U_c$ | 90VDC | | 230VDC | | 350VDC | | 600VDC | | 1000VDC | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum discharge current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-25W | | 25-125W | | 125-350W | | 300-600W | | 600-1000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs, 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: 60mm x Height: 25mm x Diameter: 25mm | | | | | | | | | |


| Specifications - SMA | | CS-MF-90-3 | CS-FF-90-3 | CS-MF-230-3 | CS-FF-230-3 | CS-MF-350-3 | CS-FF-350-3 | CS-MF-600-3 | CS-FF-600-3 | CS-MF-1000-3 | CS-FF-1000-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | $U_c$ | 90VDC | | 230VDC | | 350VDC | | 600VDC | | 1000VDC | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum discharge current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-25W | | 25-125W | | 125-350W | | 300-600W | | 600-1000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs, 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: 60mm x Height: 25mm x Diameter: 25mm | | | | | | | | | |

# Novaris Coaxial Protection

Build To Order

## RF equipment Protection up to 3 GHz

Novaris gas discharge surge protectors are capable of passing RF signals to 3GHz (limited by connector type). N-type female / female protectors are suitable for bulkhead mounting.


| Specifications - BNC | | CB-MF-90-3 | CB-FF-90-3 | CB-MF-230-3 | CB-FF-230-3 | CB-MF-350-3 | CB-FF-350-3 | CB-MF-600-3 | CB-FF-600-3 | CB-MF-1000-3 | CB-FF-1000-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | $U_c$ | 90VDC | | 230VDC | | 350VDC | | 600VDC | | 1000VDC | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum discharge current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-25W | | 25-125W | | 125-300W | | 300-600W | | 600-1000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs, 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: ~55mm x Height: 25mm x Diameter: 25mm | | | | | | | | | |


| Specifications - F-type DIN | | CF-MF-90-3 | CF-FF-90-3 | CF-MF-230-3 | CF-FF-230-3 | CF-MF-350-3 | CF-FF-350-3 | CF-MF-600-3 | CF-FF-600-3 | CF-MF-1000-3 | CF-FF-1000-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | $U_c$ | 90VDC | | 230VDC | | 350VDC | | 600VDC | | 1000VDC | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum discharge current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-25W | | 25-125W | | 125-300W | | 300-600W | | 600-1000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs, 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: 50mm x Height: 25mm x Diameter: 25mm | | | | | | | | | |

# Novaris Coaxial Protection

Build To Order

## RF equipment Protection up to 3 GHz

Novaris gas discharge surge protectors are capable of passing RF signals to 3GHz (limited by connector type). N-type female / female protectors are suitable for bulkhead mounting.


| Specifications - TNC | | CT-MF-90-3 | CT-FF-90-3 | CT-MF-230-3 | CT-FF-230-3 | CT-MF-350-3 | CT-FF-350-3 | CT-MF-600-3 | CT-FF-600-3 | CT-MF-1000-3 | CT-FF-1000-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | $U_c$ | 90VDC | | 230VDC | | 350VDC | | 600VDC | | 1000VDC | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum discharge current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-25W | | 25-125W | | 125-300W | | 300-600W | | 600-1000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs, 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: 54mm x Height: 25mm x Diameter: 25mm | | | | | | | | | |


| Specifications - UHF | | CU-MF-90-3 | CU-FF-90-3 | CU-MF-230-3 | CU-FF-230-3 | CU-MF-350-3 | CU-FF-350-3 | CU-MF-600-3 | CU-FF-600-3 | CU-MF-1000-3 | CU-FF-1000-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | $U_c$ | 90VDC | | 230VDC | | 350VDC | | 600VDC | | 1000VDC | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum discharge current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-25W | | 25-125W | | 125-300W | | 300-800W | | 600-1000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs, 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: 57mm x Height: 25mm x Diameter: 25mm | | | | | | | | | |

# Novaris Coaxial Protection

Build To Order

## RF equipment Protection up to 6 GHz

Novaris gas discharge surge protectors are capable of passing RF signals to 6GHz (limited by connector type). N-type female / female protectors are suitable for bulkhead mounting.


| Specifications - N-type | | CN-MF-90-6 | CN-FF-90-6 | CN-MF-230-6 | CN-FF-230-6 | CN-MF-350-6 | CN-FF-350-6 | CN-MF-600-6 | CN-FF-600-6 | CN-MF-1000-6 | CN-FF-1000-6 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | Uc | 90 V | | 230 V | | 350 V | | 600 V | | 1000 V | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum impulse current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-25W | | 25-125W | | 125-300W | | 300-600W | | 600-1000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: ~65mm x Height: ~28mm x Diameter: 22mm | | | | | | | | | |

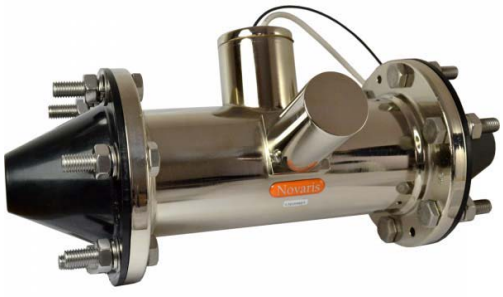

| Specifications - 7/16" DIN | | CD-MF-90-3 | CD-FF-90-3 | CD-MF-230-3 | CD-FF-230-3 | CD-MF-350-3 | CD-FF-350-3 | CD-MF-600-3 | CD-FF-600-3 | CD-MF-1000-3 | CD-FF-1000-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sparkover voltage | Uc | 90 V | | 230 V | | 350 V | | 600 V | | 1000 V | |
| Maximum discharge current (8/20µs) | $I_{max}$ | 20kA | | | | | | | | | |
| Maximum impulse current (10/350µs) | $I_{imp}$ | 5kA | | | | | | | | | |
| Power rating | | 0-40W | | 40-125W | | 125-300W | | 300-800W | | 800-2000W | |
| L-L Voltage protection level @ 5kV 10/700µs | $U_p$ | <650V | | <820V | | <1.1kV | | <1.3kV | | <1.8kV | |
| Impulse durability | | C2 8/20µs, 10kA - D1 10/350µs 5kA | | | | | | | | | |
| VSWR | | <1.1:1 | | | | | | | | | |
| Connector orientation | | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F | M/F | F/F |
| Options | | DIN rail mounting (-D) ; Earth Stud (-E) ; 90 Mounting (-M) ; G Rail Mounting (-G) | | | | | | | | | |
| Dimensions | | Length: ~72mm x Diameter: 40mm | | | | | | | | | |

# Novaris Coaxial Protection

Build To Order

## RF equipment Protection High power

Novaris high power surge protectors suit applications including MF, HF and VHF transmitters to 50kW. The spark gap arrestor has an optical arc sensor which may be used to momentarily interrupt the transmitter.




| Electrcial Specifications | | CEIA-078 | CEIA-158 | CEIA-318 |
|---|---|---|---|---|
| Maximum discharge current (8/20µs) | $I_{max}$ | 100kA | | |
| Power rating | | >50kW limited only by coaxial cable | | |
| Surge Element | | Spark gap, gap setting: 2mm / 10 kW | | |
| Spark over voltage | | 2.6kV for 2mm gap | | |
| Characteristic impedance | | 50Ω | | |
| Overstressed fault mode | | Mode 3 (open circuit) | | |
| VSWR | | >26dB to 500 MHz<br>>20dB to 1 GHz (gap setting: 1mm) | | |
| Arc sensor | | Optical detecotr utilising photdiode, feeding transmitter interface to provide momentary shutdown | | |
| Power requirements | | Arc sensor: 12VDC @ 35mA | | |
| Transmission medium | | Arc detector fed to transmitter via optical fibre. Alternate metallic cable available. | | |
| Connector type | | 7/8" EIA flanged | 1-5/8" EIA flanged | 3-1/8" EIA flanged |
| Connection type | | Series | | |
| Modes of protection | | Signal-Earth | | |
| Options | | Optional arc detection ; up to 14 arc sensor controllers | | |

| Mechanical Specifications | |
|---|---|
| Operating Temperature/Humidity | -40°C to +85°C @ 5~95% non-condensing |
| Mounting | Bulkhead / flange |
| Environmental | IP55 |
| Enclosure | Brass and copper |

| Mechanical Specifications | |
|---|---|
| Spark gap only, no TX controller | Standard |
| 1RU 19" rack, one TX controller | 1 |
| 3RU 19" rack, up to 14 TX controllers | n* - * denotes number of TX controllers required. |

# Glossary

Build To Order

| | |
|---|---|
| Ph | Phase |
| $I_{IMP}$ | Defined by three parameters, a current peak value, a charge with a specific energy. Generally realtes the IEC definition of a direct lightning strike modelled by a 10/350µS waveshape. This is used for the classification of SPDs for test class I in accordance with IEC61643-11. |
| Q | Charge contained in a test waveform. Expressed in coulombs (As). |
| W/R | Specific Energy relating to a test wareform. Expressed in kJ/µs. |
| $I_{MAX}$ | Defined as the peak value of a current through the DPS having an 8/20 µs waveshape. This is used for the classification of SPDs for test class II in accordance with IEC61643-11. This is generally recognised for MOV based SPDs as the single shot impulse rating. |
| $I_n$ | Defined as the peak value of a current throught the SPD having an 8/20 µs waveshape. this is used for the classification of SPDs for test class II in accordance with IEC61643-11. This is know as the nominal discharge current and is generally recognized for MOV based SPDs as the rating of the SPD for 15 such impulses. |
| $I_L$ | The maximum continuous RMS for DC current that can be supplied to a load connector to a two port or series connected SPD. |
| $I_f$ | The current supplied by the electrical power system which flows through an SPD after a discharge current impulse. This si called the follow-on current and is particularly applicable to voltage switching type SPDs such as spark caps and gas discharge tubes. |
| $I_{fi}$ | Follow-on current interrupting rating. This is the maximum AC RMS current that a voltage switching SPD sich as a spark gap can interrupt. |
| $U_0$ | The RMS line to neutral voltage of the power system. |
| $U_C$ | The maximum RMS or DC voltage, which may be continuously applied to an SPD. |
| $U_P$ | The let through voltage of an SPD defined for a specified test waveform. |
| $t_A$ | Response time of an SPD to a defined test waveform. |
| $I_n$ | Voltage drop of a two port SPD at rated currnt expressed as a percentage of $U_0$ |
| $f_c$ | The maximum usable frequency. |