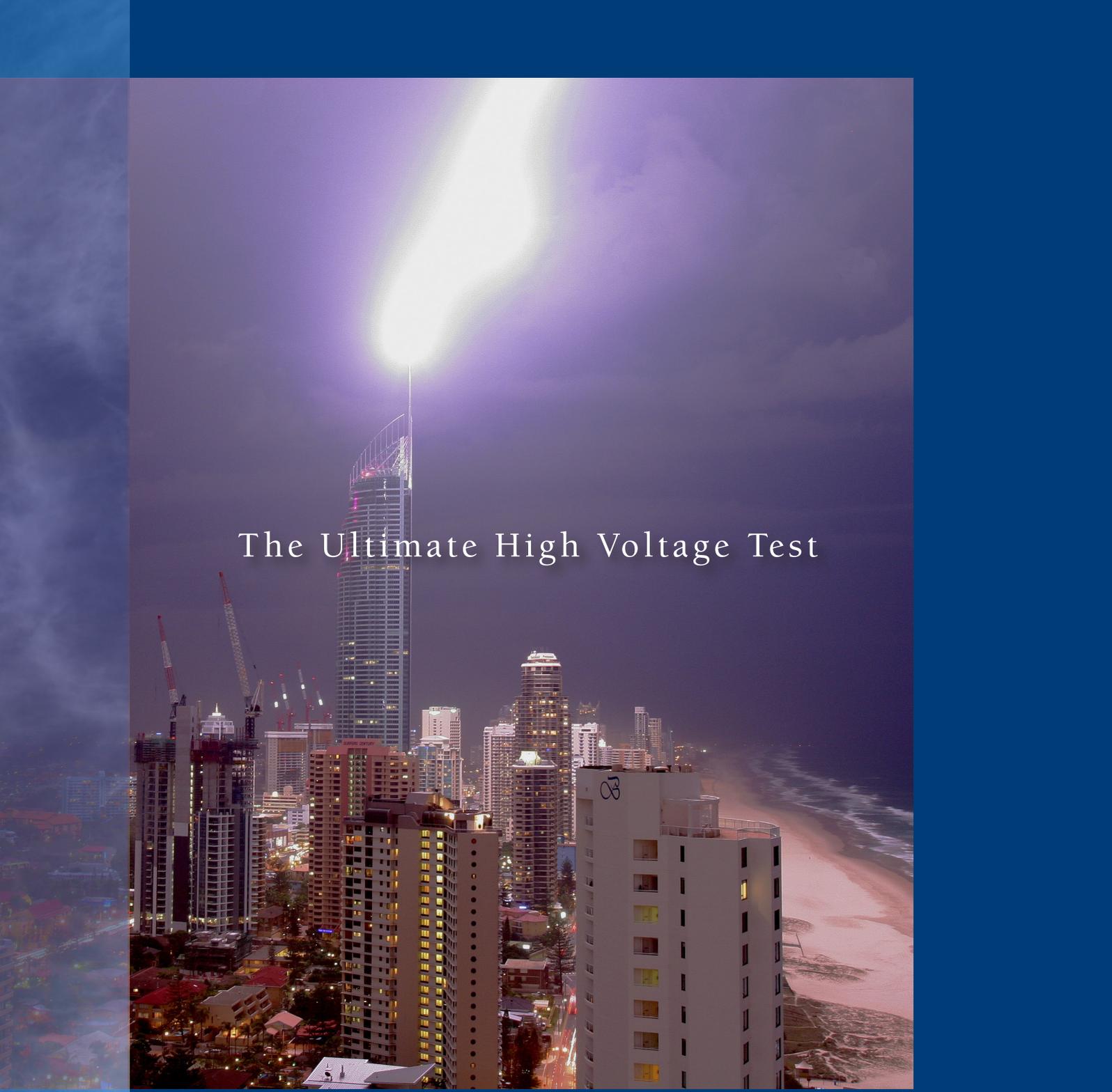




Novaris

**Global Solutions in
Lightning and Surge Protection**

PRODUCT HANDBOOK 2013-14

A dramatic photograph of a city skyline at night. A massive, bright lightning bolt strikes the top of a tall skyscraper, illuminating the dark, stormy sky. The city lights are visible in the foreground and middle ground, including several other high-rise buildings and construction cranes. The overall atmosphere is intense and powerful.

The Ultimate High Voltage Test

Photographer: Renee Doyle

Q1 Building - Gold Coast, Queensland AUSTRALIA

Lightning Protection Consultants:

Powercom Consultants Pty Ltd

Surge Protection Design and Manufacture:

Novaris Pty Ltd

This was the ultimate high voltage test of **The Novaris Systematic Approach** to lightning and surge protection.

Lightning strikes are an unpredictable natural phenomenon. However the way equipment can be protected from lightning strikes is predictable. The 'Novaris Systematic Approach' is a step-by-step solution to lightning and surge protection that can be applied to any application.

1**Define Boundaries**

Boundaries divide areas of different potential.

2**Protect Structure**

Novaris supports conventional lightning protection methods.

3**Install Bonded Earthing System**

A single bonded earthing system within each boundary is essential.

4**Protect Power Lines**

Protect all power lines crossing protection boundaries.

5**Protect Signal/Data Lines**

Protect all signal/data lines crossing protection boundaries.

Novaris offers:**Investigation and Analysis**

- Novaris offers a complete package from analysis of your existing lightning and surge protection system to providing complete recommendations based on site surveys and technical analysis.

Structural Lightning Protection and Earthing Systems

- design and advice on lightning protection systems for all structures in accordance with recognised world standards.
- supply of structural lightning protection and earthing components.

A Comprehensive range of Surge Protection Products to suit any application

- ranging from main switchboard and distribution board surge protection, PLC and control system protection, to RF coaxial protection.

Custom Product Design

- our innovative R&D team can engineer a surge protection solution for even the most demanding of applications.

Project Management & Installation

- Novaris actively seeks consultancy, project management and installation work. Our experience extends from Australia to the Pacific, Asia, Africa and the Middle East.

**IEC
Compliant**

Compliant with the relevant IEC lightning and surge protection standards, in particular IEC 62305 and IEC 61643.

**All Mode
Protection**

Novaris models featuring all mode protection provide protection for all combinations of lines (L-N, L-E, N-E) ensuring the maximum level of protection is achieved at all times. They have been designed for installation in any wiring system worldwide.

**Multistage
Transient
Protection**

Models featuring multistage transient protection deliver greater levels of protection through a staged approach. The primary stage absorbs the majority of the surge energy. The remaining stages provide accurate clamping and a degree of redundancy.

**Redundant
Segments**

Models featuring redundant segments have a parallel redundant arrangement of high energy metal oxide varistors (MOVs), thus promoting long life and exceptional surge handling capacity.

**Thermal
Sensing**

Sustained overvoltages can cause components to overheat and degrade. Thermal sensing warns of this condition without disconnecting the protection.

**Percentage
Active Display**

A digital display confirms the device rating upon switch on, then displays percentage active. The display indicates segment status and thermal overload.

**LED Status
Display**

LED indicators are provided to indicate operating status.

**SIP and
External Alarms**

The Novaris Surge Indicator Panel (SIP) allows remote monitoring of any Novaris product featuring external alarms. Models featuring external alarms have voltage free changeover contacts (SPDT) for remote status indication.

**DIN 43880
Compliant**

Protection devices housed in DIN 43880 compliant enclosures allow for convenient installation on DIN rail fittings commonly used in switchboards worldwide.

**Safe Metal
Enclosure**

Novaris surge protection products are housed in safe, all metal enclosures. In the event of a prolonged overvoltage they will not catch fire or explode.

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NOTE:

Due to the Novaris policy of continuing product development, specifications are subject to change without notice.

**Power Protection
Surge Diverters**



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**Power Protection
Surge Filters**



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**Process Control
Protection**



26

**LAN & CCTV
Protection**



35

Coaxial Protection



40

Telephone Protection



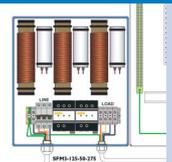
44

Special Products



47

**Additional
Information**

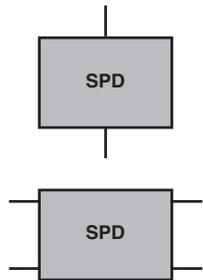


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Power line surge protection must:

1. Provide adequate protection for all equipment.
2. Achieve a long working life.
3. Optimise the cost and size of the surge protection devices (**SPDs**).

Options for Surge Protection Devices



There are two common configurations of SPDs:

One port SPDs are parallel or shunt connected across the line. These include the Novaris SD, SG and HSG products.

Two port SPDs are connected in series with the line. These include the Novaris SSP, SF and PP products.

There are two classes of SPD components:

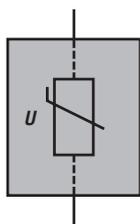
Voltage limiting SPDs include metal oxide varistors and suppressor diodes. These have a high impedance when no surge is present but can reduce impedance continuously with increased surge current and voltage. These are also called “clamping devices”. Novaris SD, SSP, SF and PP products are voltage clamping SPDs.

Voltage switching SPDs include spark gaps, gas discharge tubes, thyristors and triacs. These have a high impedance when no surge is present but can have a sudden change to a low impedance in response to a voltage surge. These are also called “crowbar devices”. The Novaris SG products are voltage switching SPDs.

Sometimes a combination of these components may be used. The Novaris HSG is an example of a combination SPD.

Selection of Surge Protection Devices

1. Surge Diverters, SD

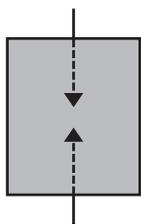


All Novaris surge diverters with initial product code SD employ metal oxide varistor (**MOV**) voltage limiting components. These can be used for main switchboard primary protection, distribution board and final circuit protection. As voltage limiting components there is no follow on current, and with suitable fusing these are easy to install and operate.

SD products are suitable for all applications except where extreme voltage fluctuations may be experienced. Excessive overvoltage can damage MOV based SPDs although all Novaris surge diverters are housed in metal enclosures and meet the fail-safe requirements of UL1449 - specifically package rupture and the effects of excessive heating.

Novaris manufactures surge diverters to suit all applications from high exposure environments to final circuit protection with ratings of I_{max} up to 250kA (8/20µs) or I_{imp} of 25kA (10/350µs)*.

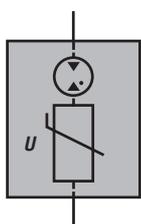
Like all one port shunt connected SPDs, performance can be compromised by the presence of long connecting leads, particularly in physically large main switchboards. For this reason primary SPDs on main switchboards would be followed by secondary protection on distribution boards and final circuits.



2. Spark Gaps, SG

Spark gaps have high surge ratings and are suitable for point of entry protection in installations with highly exposed overhead LV power lines with no local transformer in high lightning areas. As voltage switching SPDs, spark gaps have a crowbar effect and effectively place a short circuit across the line once fired. Thus high levels of AC follow on current will flow. Unless properly configured to be compatible with the AC fault rating of the supply and suitably fused, spark gaps can cause nuisance tripping of supply circuit breakers and extreme voltage disturbances whilst the follow on current flows.

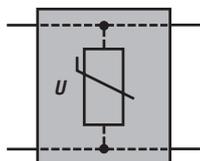
Novaris spark gap SPDs have surge ratings (I_{imp}) of up to 110kA (10/350 μ s). Triggered spark gaps must be followed by secondary protection further downstream in the distribution network because they have a high impulse firing voltage.



3. Hybrid Spark Gaps, HSG

Hybrid spark gaps combine the best qualities of voltage switching and voltage limiting components. Novaris HSG hybrid spark gaps are suitable for all high exposure installations and meet the recommendations of IEC61643-12 in relation to surge ratings with I_{max} of 250kA (8/20 μ s) or I_{imp} of 25kA (10/350 μ s)*. The spark gap in the HSG is a high energy gas discharge tube with a clearly defined impulse firing voltage, its let through voltage closely approaches that of an MOV based surge diverter.

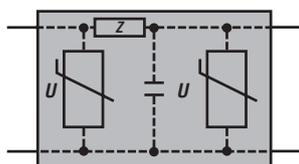
The hybrid combination ensures that there is no follow on current and the HSG may be as easily deployed as our SD range. The HSG is able to tolerate excessive temporary overvoltages (TOV) and is ideal for applications where mains voltages fluctuations are significant.



4. Series Surge Protector, SSP

All shunt connected SPDs are compromised in performance by the presence of their interconnecting leads. Typically voltage drops of 500V per meter of connecting lead can be expected. Such lead lengths are often unavoidable in physically large main switchboards. Nevertheless one port SPDs provide effective protection for the main switchboard.

For circuits that are more sensitive the SSP provides a means of eliminating the shunt connected leads and places the SPD directly across the line. Such applications might include UPS inputs, rectifiers, VSDs and motors.



5. Surge Filters, SF

The surge filter is a true two port SPD offering an extremely low let through voltage capable of protecting the most sensitive of electronic circuits. The Novaris range of surge filters is extensive: from 2A DIN rail mount units designed to protect sensitive PLCs and process equipment; plug in units for final circuit outlets; to 2000A per phase filters designed to protect major data centres.

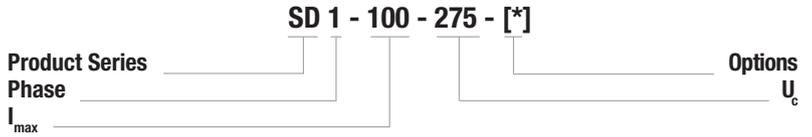
Surge ratings up to 250kA (8/20 μ s) are available making surge filters suitable for providing primary and secondary protection in one package as may be required at a cellular basestations, process plant control rooms or data centres. As surge filters are series connected they must have a current rating I_L equal to or greater than the protected circuit.

*Surge Ratings: tests conducted by some manufacturers and informally reported to the IEEE have indicated that the stress imposed on an MOV based SPD by a 10/350 μ s impulse might be equivalent to the stress imposed by a standard 8/20 μ s impulse, with a scaling factor of 10. Thus an SPD with $I_{imp}=25kA$ could be equivalent to $I_{max}=250kA$. From IEEE Std C62.41.2-2002.



SD Surge Diverters

Novaris MULTIMOV MSB surge diverters offer unsurpassed safety, quality and reliability in protection for your electrical system. MULTIMOV surge diverters are an ideal point-of-entry protector for all industrial, commercial and communications applications.



- SD1-100-275
- SD1-150-275
- SD1-200-275
- SD1-250-275
- SD3-100-275
- SD3-150-275
- SD3-200-275
- SD3-250-275

Electrical Specifications									
Connection Type		Shunt							
Modes of protection		L-N							
Phases		1				3			
Nominal voltage	U_0	230V / 50Hz (110V / 60Hz by request)							
Maximum continuous voltage	U_c	275V / 50Hz (130V / 60Hz by request)							
Maximum discharge current (8/20 μ s)	I_{max}	100kA	150kA	200kA	250kA	100kA	150kA	200kA	250kA
Nominal discharge current (15 x 8/20 μ s)	I_n	40kA	60kA	80kA	100kA	40kA	60kA	80kA	100kA
Voltage protection level @ 3kA (8/20 μ s)	U_p	<800V							
Response time	t_A	<5ns							
Earth leakage current		<5 μ A							
Display		7-segment LED, percentage active							
Alarms		Segment / thermal failure, clean SPDT contact							
Alarm isolation to active circuitry		4kV							
Recommended backup fuse (HRC) / circuit breaker		63A	80A	100A	125A	63A	80A	100A	125A

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing
Terminal capacity - power	16mm ²
Terminal capacity - alarm	2.5mm ²
Terminal screw torque - power	1.0Nm
Terminal screw torque - alarm	0.5Nm
Environmental	IP 20
Mounting	Panel mount / TS35 DIN Panel mount
Enclosure / Colour	Metal / Black
Weight	1.2kg 5.0kg

Dimensions	
Width	60mm 260mm
Height	200mm 310mm
Depth	70mm 78mm

Standards Compliance

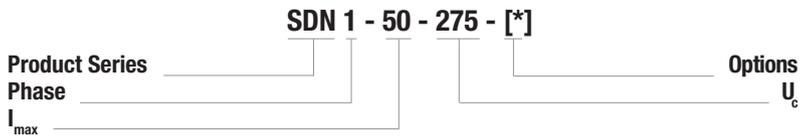
- IEC 61643-1 class I
- AS/NZS 1768 category C
- IEEE C62.41 category C
- BS 6651 category C
- CP 33 category C
- IEC 1000-4-5
- UL1449 third edition
- A-tick

Options [*]	
Neutral-earth protection	N
Metal enclosure	M
Polycarbonate enclosure	P
Extended operating voltage (95-415V / 50Hz)	X
Over / under voltage relay	O
Non-MEN version (L-PE)	U



SDN All Mode Surge Diverters

Novaris SDN Surge Diverters are the ideal choice for all mode protection in major distribution switchboards. Being all mode the SDN is particularly suitable for switchboards in non MEN installations.



- SDN1-50-275
- SDN1-100-275
- SDN3-50-275
- SDN3-100-275
- SDN3-150-275
- SDN3-200-275

Electrical Specifications							
Connection type		Shunt					
Modes of protection		All mode (L-N, L-PE, N-PE)					
Phases		1		3			
Nominal voltage	U ₀	230V / 50Hz (110V / 60Hz by request only)					
Maximum continuous voltage	U _c	275V / 50Hz (130V / 60Hz by request only)					
Maximum discharge current (8/20µs)	I _{max}	50kA	100kA	50kA	100kA	150kA	200kA
Nominal discharge current (15 x 8/20µs)	I _n	20kA	40kA	20kA	40kA	60kA	80kA
Voltage protection level @ 3kA (8/20µs)	U _p	<800V					
Response time	t _A	<5ns					
Earth leakage current		<500µA					
Display		LED, status					
Alarms		Segment / thermal failure, clean SPDT contact					
Alarm isolation		4kV					
Backup fuse (HRC)		32A	63A	32A	63A	80A	100A

Mechanical Specifications							
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing					
Terminal capacity - power		16mm ²					
Terminal capacity - alarm		2.5mm ²					
Terminal screw torque - power		1.0Nm					
Terminal screw torque - alarm		0.5Nm					
Environmental		IP 20					
Mounting		Panel mount / TS35 DIN					
Enclosure / colour		Metal / Black					
Weight		1.0kg	1.2kg		1.7kg	1.8kg	

Dimensions							
Width		60mm	80mm			120mm	
Height		200mm					
Depth		70mm					

Standards Compliance
IEC 61643-1 class I
AS/NZS 1768 categories B, C
IEEE C62.41 categories B, C
BS 6651 categories B, C
CP 33 categories B, C
IEC 1000-4-5
UL1449 third edition

Options [*]							
Metal enclosure		M					
Polycarbonate enclosure		P					
Extended operating voltage (95-415V / 50Hz)		-		X			
Over / under voltage relay		O					
Surge Counter		C					
HRC Fusing		H					

SDD DINsafe Surge Diverters

Novaris SDD DINsafe Surge Diverters offer powerful performance at domestic MSB and industrial DBs. The SDD diverters are housed in DIN compliant, fail-safe metal enclosures and are fully compliant to AS/NZS1768-2007 and to AS/NZS3000 wiring rules.



SDD 1 - 50 - 275 - [*]



	SDD1-50-275	SDD1-50-275-A	SDD1-100-275	SDD1-100-275-A	SDD3-50-275	SDD3-50-275-A	SDD3-100-275	SDD3-100-275-A
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Electrical Specifications									
Connection type		Shunt							
Modes of protection		All mode (L-N, L-PE, N-PE)							
Phases		1				3			
Nominal voltage	U_0	230V / 50Hz							
Maximum continuous voltage	U_c	275V / 50Hz							
Maximum discharge current (8/20µs)	I_{max}	50kA	100kA	50kA	100kA	50kA	100kA	50kA	100kA
Nominal discharge current (15 x 8/20µs)	I_n	20kA	40kA	20kA	40kA	20kA	40kA	20kA	40kA
Maximum switchboard fault rating	I_{SCCR}	25kA	50kA	25kA	50kA	25kA	50kA	25kA	50kA
Voltage protection level @ 3kA (8/20µs)	U_p	<800V							
Response time	t_a	<5ns							
Earth leakage current		<10µA							
Display		LED status per phase							
Alarms (optional)		Power fail safe, thermal overload, SPDT voltage free contact							
Alarm isolation		4kV							
Recommended fuse		32A	63A	32A	63A	32A	63A	32A	63A

Mechanical Specifications									
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing							
Terminal capacity - power		16mm ²							
Terminal capacity - alarms		2.5mm ²							
Terminal screw torque - power		1.0Nm							
Terminal screw torque - alarm		0.5Nm							
Environmental		IP 20							
Mounting		TS35 DIN rail							
Enclosure / Colour		Metal / black							
Weight		150g	230g	250g	260g	355g	370g	485g	495g

Dimensions									
Width		18mm	36mm	54mm	72mm	90mm	108mm	126mm	144mm
Height		95mm							
Depth		70mm							

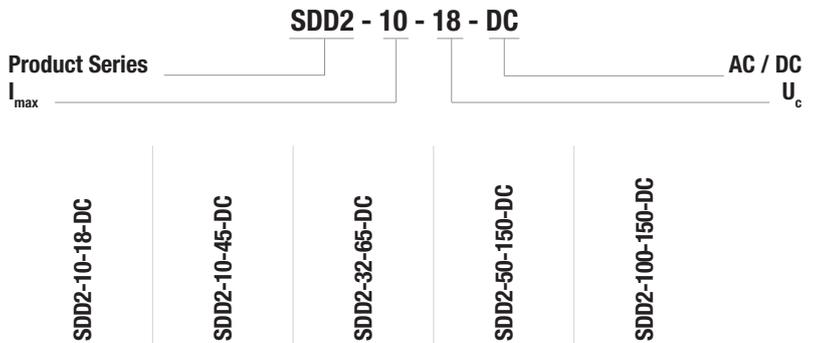
Standards Compliance
IEC 61643-1 class II
AS/NZS 1768 categories B, C
IEEE C62.41 categories B, C
UL1449 third edition

Options [*]									
External alarm		N/A	Standard	A	Standard	A	Standard	A	Standard
Polycarbonate enclosure		P							



SDD2 DINsafe Surge Diverters

Novaris SDD2 Surge Diverters offer an ideal solution for DC and two phase systems. The SDD2 diverters are housed in a DIN compliant, fail-safe metal enclosure.



Electrical Specifications						
Connection Type		Shunt				
Modes of protection		Common and transverse modes or L1-PE and L2-PE				
Phases / poles		2				
AC / DC		DC				
Nominal voltage	U_N	12V	24V	48V	110V	
Maximum continuous voltage	U_c	18V	45V	65V	150V	
Maximum discharge current (8/20µs)	I_{max}	10kA		32kA	50kA	100kA
Voltage protection level @ 3kA (8/20µs)	U_p	<80V	<150V	<190V	<400V	
Response time	t_A	<5ns				
Earth leakage current		<10µA				
Display		LED status				

Mechanical Specifications	
Operating temperature / humidity	-40°C to +70°C / 5 to 95% non-condensing
Terminal capacity	16mm ²
Terminal screw torque	1.0Nm
Environmental	IP 20
Mounting	TS35 DIN rail
Enclosure / colour	Metal / Black
Weight	500g

Dimensions	
Width	72mm
Height	95mm
Depth	80mm

Standards Compliance

- IEC 61643-1 class II, III
- AS/NZS 1768 categories A, B
- IEEE C62.41 categories A, B
- BS 6651 categories A, B
- CP 33 categories A, B
- IEC 1000-4-5
- UL1449 third edition

SDPV Surge Diverters - Photovoltaic

Novaris SDPV surge diverters provide the highest level of protection for photovoltaic equipment with voltages up to 1000V. Their compact design makes them an ideal choice for space restricted applications.



SDPV - 40 - 1000 - [*]

Product Series

Options

I_{max}

U_c

SDPV-40-400	SDPV-40-400-A	SDPV-40-600	SDPV-40-600-A	SDPV-40-800	SDPV-40-800-A	SDPV-40-1000	SDPV-40-1000-A
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Electrical Specifications

		Series					
Connection type		Series					
Modes of protection		All mode ((+)-(-), (+)-PE, (-)-PE)					
Phases		2					
Maximum continuous voltage	U_{cpv}	400V	600V	800V	1000V		
Maximum discharge current (8/20 μ s)	I_{max}	40kA					
Nominal discharge current (15 x 8/20 μ s)	I_n	20kA					
Voltage protection level @ 3kA (8/20 μ s)	U_p	<1600V	<2500V	<3600V	<4000V		
Response time	t_A	Instantaneous					
Earth leakage current		<200 μ A					
Display		LED status					
Alarms (optional)		Thermal failure					
Alarm isolation to active circuitry		4kV					

Mechanical Specifications

Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing					
Connection type		Screw terminal					
Terminal capacity - power		16mm ²					
Terminal capacity - alarm		2.5mm ²					
Terminal screw torque - power		1.0Nm					
Terminal screw torque - alarm		0.5Nm					
Environmental		IP 20					
Mounting		TS35 DIN rail					
Enclosure / colour		Metal / Black					
Weight		400g					

Dimensions

Width		90mm
Height		95mm
Depth		70mm

Standards Compliance

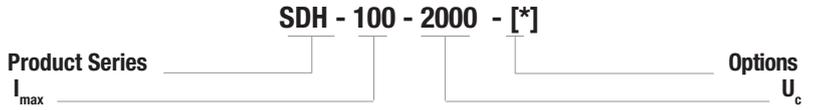
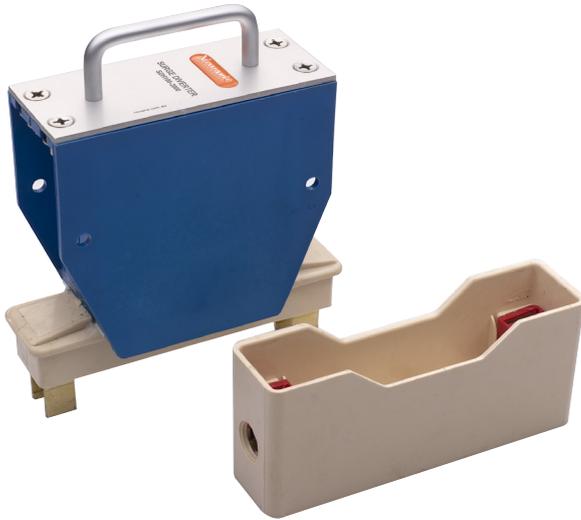
IEC 61643-31
AS/NZS 1768 categories A, B

Options [*]

External alarm		A
Polycarbonate enclosure		P

SDH High Voltage Surge Diverters

Novaris SDH High Voltage Surge Diverters have been engineered for system voltages above 600VRMS. Typical applications include aviation runway lighting, mining and railway industries.



- SDH-100-550
- SDH-200-1000
- SDH-100-1500
- SDH-100-2000

Electrical Specifications					
Connection type		Shunt			
Modes of protection		L-PE			
Phases		1			
Maximum continuous voltage	U_0	550V	1000V	1500V	2000V
Maximum discharge current (8/20 μ s)	I_{max}	100kA	200kA	100kA	
Voltage protection level @ 3kA (8/20 μ s)	U_p	1.6kV	2.6kV	3.8kV	4.8kV
Response time	t_A	<5ns			

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing
Terminal capacity	25mm ²
Terminal screw torque	2.5Nm
Environmental	IP 20
Mounting	See mounting options below
Enclosure / colour	ABS, ceramic / Blue
Weight	2.0kg

Dimensions	
Width	57mm
Height	214mm
Depth	162mm

Options [*]	
GEC RSL63H mounting	H
GEC RSL63P mounting	P
GEC RSL63PH mounting	PH

Standards Compliance
IEC 61643-1 class I
AS/NZS 1768 category C
IEEE C62.41 category C
BS 6651 category C
CP 33 category C



SG Spark Gap Arresters

Novaris SG Spark Gap Arresters have high surge ratings suitable for point of entry protection in installations with highly exposed overhead LV power lines with no local transformer. These are triggered spark gaps resulting in relatively low let through voltages sufficient to protect switchgear in main switchboards.

SG 1 - 50 - 275 - [*]



SG1-50-255

SG1-110-275

SG3-50-255

SG3-110-275

SGN-100-275

ECD-100-600

Electrical Specifications						
Connection type		Shunt				
Modes of protection		L-N	L-N	L-N	L-N	N-PE
Phases		1	3	3	3	-
Nominal voltage	U_0	230V / 50Hz				
Maximum continuous voltage	U_c	255V / 50Hz	275V / 50Hz	255V / 50Hz	275V / 50Hz	-
Interrupting follow current @ U_c	I_{fi}	3kA _{RMS}	50kA _{RMS}	3kA _{RMS}	50kA _{RMS}	100A _{RMS}
Lightning impulse voltage sparkover (1.2/50µs)	U_p	<1.3kV	<2.5kV	<1.3kV	<2.5kV	<1.5kV
Maximum impulse current (10/350µs)	I_{imp}	50kA	110kA	50kA	110kA	100kA
Charge	Q	25As	55As	25As	55As	50As
Specific energy	W/R	600kJ/Ω	3000kJ/Ω	600kJ/Ω	3000kJ/Ω	2500kJ/Ω
Response time	t_A	<100ns				
Backup fuse (HRC)		315A	500A	315A	500A	-

Mechanical Specifications						
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing				
Terminal capacity		35mm ²	Lug Ø10	35mm ²	Lug Ø10	35mm ² 16mm ²
Terminal screw torque		2.5Nm		2.5Nm		2.5Nm 1.0Nm
Environmental		IP 20	IP 00	IP 20	IP 00	IP 20
Mounting		TS35 DIN	Panel	TS35 DIN	Panel	TS35 DIN
Enclosure / colour		Flame retardant Polyamide 6 / Black				Metal/Black
Weight		230g	1.0kg	690g	3.0kg	210g 300g

Dimensions						
Width		36mm	67mm	106mm	201mm	36mm
Height		90mm	150mm	90mm	150mm	90mm 95mm
Depth		67mm	94mm	67mm	94mm	67mm 70mm

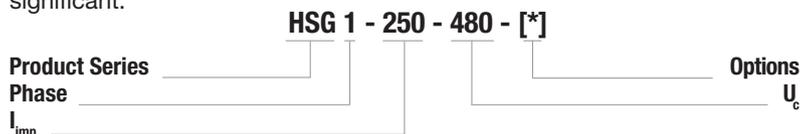
Options [*]						
Neutral-earth protection		N			-	
Metal enclosure		M				
Over / under voltage relay		O			-	

Standards Compliance
IEC 61643-1 class I
AS/NZS 1768 category C
IEEE C62.41 category C
BS 6651 category C
CP 33 category C
IEC 1000-4-5



HSG Hybrid Spark Gap Arresters

Novaris HSG Hybrid Spark Gap Arresters combine the best qualities of voltage switching and voltage limiting components. Novaris HSG hybrid spark gaps suit all high exposure installations. There is no follow on current. The HSG is ideal for applications where mains voltages fluctuations are significant.



HSG1-25-480

HSG3-25-480

Electrical Specifications		
Connection type		Shunt
Modes of protection		L-N
Phases		1 3
Nominal voltage	U_0	230V / 50Hz
Maximum continuous voltage	U_c	480V / 50Hz
Interrupting follow current @ U_c	I_{fi}	-
Lightning impulse voltage sparkover (1.2/50 μ s)	U_p	<1.1kV
Maximum impulse current (10/350 μ s)	I_{imp}	25kA
Charge	Q	12.5As
Specific energy	W/R	625kJ/ Ω
Response time	t_A	<100ns
Display		LED status
Alarms		Clean SPDT contact
Alarm isolation to active circuitry		4kV
Backup fuse (HRC)		63A

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95%
Terminal capacity - power	16mm ²
Terminal capacity - alarms	2.5mm ²
Terminal screw torque - power	1.0Nm
Terminal screw torque - alarms	0.5Nm
Environmental	IP 20
Mounting	Panel mount / TS35 DIN
Enclosure / colour	Metal / Black
Weight	1.2kg 5.0kg

Dimensions		
Width	60mm	240mm
Height	200mm	260mm
Depth	70mm	78mm

Standards Compliance

IEC 61643-1 class I
AS/NZS 1768 category C
IEEE C62.41 category C
BS 6651 category C
CP 33 category C
IEC 1000-4-5
UL1449 third edition

Options [*]	
Neutral-earth protection	N
Metal enclosure	M
Surge Counter	C
Over / under voltage relay	O

SSP Surge Protectors - Single Phase

Novaris SSP protectors are suitable for installation in circuits up to 63A. The SSP range has been engineered to provide excellent performance and installation independent let-through voltage. Their compact design makes them an ideal choice for space restricted applications.



SSP 1- 63 -100 - 275 -[*]



SSP1-6-6.5-275	SSP1-10-6.5-275	SSP1-16-15-275	SSP1-20-50-275	SSP1-20-100-275	SSP1-32-50-275	SSP1-32-100-275	SSP1-63-50-275	SSP1-63-100-275
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Electrical Specifications										
Connection type		Series								
Modes of protection		All mode (L-N, L-PE, N-PE)								
Phases		1								
Nominal voltage	U_0	240V / 50Hz								
Maximum continuous voltage	U_c	275V / 50Hz								
Maximum load current	I_L	6A	10A	16A	20A	32A	63A			
Maximum discharge current (8/20 μ s)	I_{max}	6.5kA		15kA	50kA	100kA	50kA	100kA	50kA	100kA
Nominal discharge current (15 x 8/20 μ s)	I_n	3kA		6kA	20kA	40kA	20kA	40kA	20kA	40kA
Voltage protection level @ 3kA (8/20 μ s)	U_p	<800V								
Response time	t_A	<5ns								
Earth leakage current		<500 μ A			<10 μ A					
Display		-			LED status					
Alarms (optional)		-			Segment / thermal failure, clean SPDT contact					
Alarm isolation to active circuitry		-			4kV					
Backup fuse		6A	10A	16A	20A	32A	63A			

Mechanical Specifications										
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing								
Connection type		Screw terminal								
Terminal capacity - power		2.5mm ²			16mm ²					
Terminal capacity - alarm		-			2.5mm ²					
Terminal screw torque - power		0.5Nm			1.0Nm					
Terminal screw torque - alarm		-			0.5Nm					
Environmental		IP 20								
Mounting		TS35 DIN rail								
Enclosure / colour		Metal / Black								
Weight		220g	350g	200g	315g	335g	315g	335g	395g	415g

Dimensions									
Width		18mm	27mm	18mm	54mm			72mm	
Height		95mm							
Depth		80mm			70mm				

Options [*]									
External alarm contacts		-			A				
Polycarbonate enclosure		P							
Voltage variation	U_c	50V / 130V			130V				

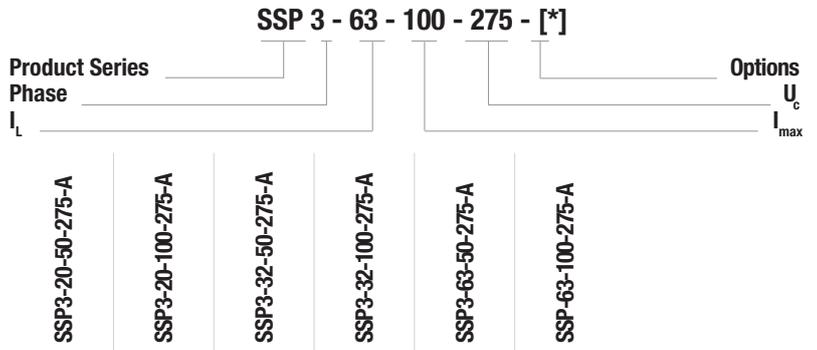
Standards Compliance
IEC 61643-1 class II, III
AS/NZS 1768 categories A, B, C
IEEE C62.41 categories A, B, C
BS 6651 categories A, B, C
CP 33 categories A, B, C
IEC 1000-4-5
UL1449 third edition

* 2A, 6A and 16A models in old style extrusion



SSP Surge Protectors - Three Phase

Novaris SSP protectors are suitable for installation in circuits up to 63A. The SSP range has been engineered to provide excellent performance and installation independent let-through voltage. Their compact design makes them an ideal choice for space restricted applications.



Electrical Specifications							
Connection type		Series					
Modes of protection		All mode (L-N, L-PE, N-PE)					
Phases		3					
Nominal voltage	U_0	240V / 50Hz					
Maximum continuous voltage	U_c	275V / 50Hz					
Maximum load current	I_L	20A		32A		63A	
Maximum discharge current (8/20µs)	I_{max}	50kA	100kA	50kA	100kA	50kA	100kA
Nominal discharge current (15 x 8/20µs)	I_n	20kA	40kA	20kA	40kA	20kA	40kA
Voltage protection level @ 3kA (8/20µs)	U_p	<800V					
Response time	t_A	<5ns					
Earth leakage current		<10µA					
Display		LED status					
Alarms (optional)		Segment / thermal failure, clean SPDT contact					
Alarm isolation to active circuitry		4kV					
Backup fuse		20A		32A		63A	

Mechanical Specifications							
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing					
Connection type		Screw terminal					
Terminal capacity - power		16mm ²					
Terminal capacity - alarm		2.5mm ²					
Terminal screw torque - power		1.0Nm					
Terminal screw torque - alarm		0.5Nm					
Environmental		IP 20					
Mounting		TS35 DIN rail					
Enclosure / colour		Metal / Black					
Weight		690g	750g	690g	750g	690g	750g

Dimensions		
Width		126mm
Height		95mm
Depth		70mm

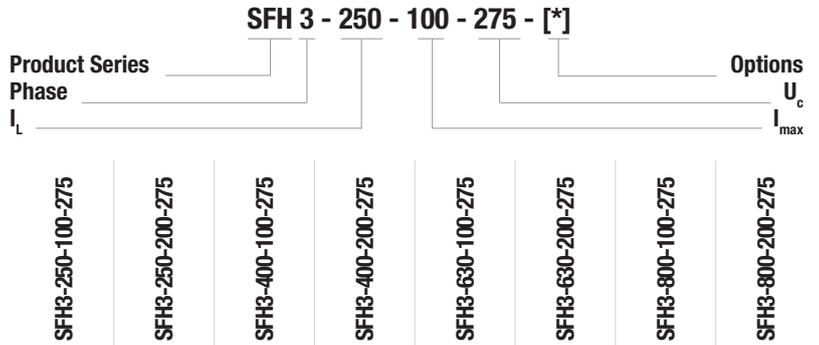
Standards Compliance
IEC 61643-1 class II, III
AS/NZS 1768 categories A, B, C
IEEE C62.41 categories A, B, C
BS 6651 categories A, B, C
CP 33 categories A, B, C
IEC 1000-4-5
UL1449 third edition

Options [*]		
External alarm contacts		Standard
Polycarbonate enclosure		P
Voltage variation	U_c	130V



SFH Surge Filters 250 – 800A

Novaris SFH surge filters provide the highest level of protection with the lowest let through voltage. When installed at a main switchboard Novaris surge filters will protect all connected equipment.



Electrical Specifications									
Connection type		Series							
Modes of protection		All mode (L-N, L-PE, N-PE)							
Nominal voltage	U_0	230V / 50Hz							
Maximum continuous voltage	U_c	275V / 50Hz							
Phases		3							
Discharge current 8/20 μ s	I_{max}	100kA	200kA	100kA	200kA	100kA	200kA	100kA	200kA
Nominal discharge current (15 x 8/20 μ s)	I_n	40kA	80kA	40kA	80kA	40kA	80kA	40kA	80kA
Maximum load current	I_L	250A		400A		630A		800A	
Protection stages		Metal oxide varistor / LC filter / metal oxide varistor							
Voltage protection @ 3kA (8/20 μ s)	U_p	<360V							
Response time	t_A	Instantaneous							
Earth leakage current		<10 μ A							
Maximum voltage drop (% of U_0)	ΔU	<1%							
3dB Frequency @ 50 Ω		200Hz			150Hz			80Hz	
Displays		7-segment LED, percentage active							
Alarms		Segment / thermal failure, clean SPDT contact							
Alarm isolation to active circuitry		4kV							

Standards Compliance	
IEC 61643-1 class I	
AS/NZS 1768 category C	
IEEE C62.41 category C	
BS 6651 category C	
CP 33 category C	
IEC 1000-4-5	
UL1449 third edition	

Mechanical Specifications		
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing
Connection type		Bus bar / cable lug
Alarm terminal capacity		2.5mm ²
Terminal screw torque		0.5Nm
Environmental		IP 55 in enclosure
Mounting		Wall mount
Weight	90kg	160kg

Options [*]	
HRC fusing	H
Metal enclosure IP 55	M
Over / under voltage relay	O
Extended voltage (95-415V)	X
Spark Gap Frontend	G

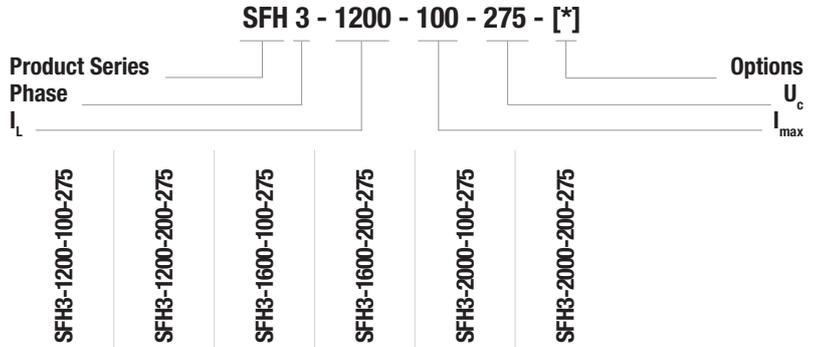
Dimensions (in enclosure)		
Width	710mm	800mm
Height	710mm	1200mm
Depth	285mm	400mm

Maximum Discharge Current Variations		
Discharge Current variations	I_{max}	150kA / 250kA



SFH Surge Filters 1200 – 2000A

Novaris SFH surge filters provide the highest level of protection with the lowest let through voltage. When installed at a main switchboard Novaris surge filters will protect all connected equipment.



Electrical Specifications		Series					
Connection type		Series					
Modes of protection		All mode (L-N, L-PE, N-PE)					
Nominal voltage	U_0	230V / 50Hz					
Maximum continuous voltage	U_c	275V / 50Hz					
Phases		3					
Discharge current 8/20µs	I_{max}	100kA	200kA	100kA	200kA	100kA	200kA
Nominal discharge current (15 x 8/20µs)	I_n	40kA	80kA	40kA	80kA	40kA	80kA
Maximum load current	I_L	1200A		1600A		2000A	
Protection stages		Metal oxide varistor / LC filter / metal oxide varistor					
Voltage protection @ 3kA (8/20µs)	U_p	<360V					
Response time	t_A	Instantaneous					
Earth leakage current		<10µA					
Maximum voltage drop (% of U_0)	ΔU	<1%					
3dB Frequency @ 50Ω		80Hz					
Displays		7-segment LED, percentage active					
Alarms		Segment / thermal failure, clean SPDT contact					
Alarm isolation to active circuitry		4kV					

Standards Compliance	
IEC 61643-1 class I	
AS/NZS 1768 category C	
IEEE C62.41 category C	
BS 6651 category C	
CP 33 category C	
IEC 1000-4-5	
UL1449 third edition	

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing
Connection type	Bus bar / cable lug
Alarm terminal capacity	2.5mm ²
Terminal screw torque	0.5Nm
Environmental	IP 55 in enclosure
Mounting	Wall mount
Weight	120kg

Options [*]	
HRC fusing	H
Metal enclosure IP 55	M
Over / under voltage relay	O
Extended voltage (95-415V)	X
Spark Gap Frontend	G

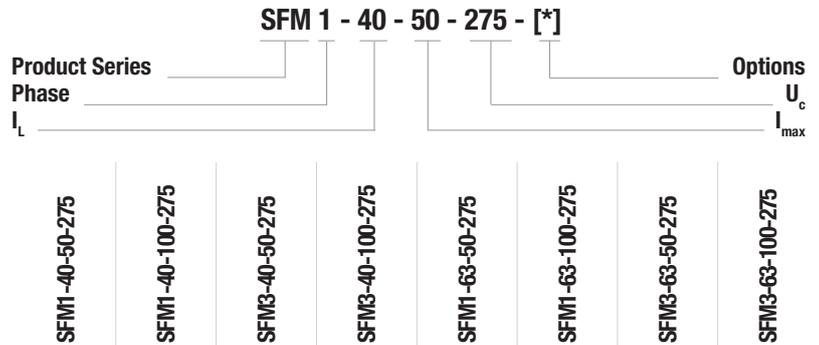
Dimensions (in enclosure)	
Width	700mm
Height	1300mm
Depth	340mm

Maximum Discharge Current Variations	
Discharge Current variations	I_{max} 150kA / 200kA / 250kA



SFM Surge Filters 40 – 63A

Novaris SFM surge filters provide excellent and effective MSB and DB protection for critical equipment up to 63A per phase.



Electrical Specifications									
Connection type		Series							
Modes of protection		All mode (L-N, L-PE, N-PE)							
Nominal Voltage	U_0	230V / 50Hz (110V / 60Hz by request only)							
Maximum continuous voltage	U_c	275V / 50Hz (130V / 60Hz by request only)							
Phases		1		3		1		3	
Discharge current 8/20 μ s	I_{max}	50kA	100kA	50kA	100kA	50kA	100kA	50kA	100kA
Nominal discharge current (15 x 8/20 μ s)	I_n	20kA	40kA	20kA	40kA	20kA	40kA		
Maximum load current	I_L	40A				63A			
Protection stages		Metal oxide varistor / LC filter / metal oxide varistor							
Voltage protection @ 3kA (8/20 μ s)	U_p	<360V							
Response time	t_A	Instantaneous							
Earth leakage current		<1 μ A							
Maximum voltage drop (% of U_0)	ΔU	<1%							
3dB Frequency @ 50 Ω		750Hz				420Hz			
Displays		LED status	% active	LED status	% active	LED status	% active	LED status	% active
Alarms		Segment failure and overcurrent / thermal overload, SPDT contact							
Alarm isolation to active circuitry		4kV							

Mechanical Specifications									
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing							
Connection type		UIK35 Terminals							
Terminal capacity - power		35mm ²							
Terminal capacity - alarm		2.5mm ²							
Terminal screw torque - power		1.0Nm							
Terminal screw torque - alarm		0.5Nm							
Environmental		IP 55 in enclosure							
Mounting		Wall mount							
Weight (in enclosure)		9kg	10kg	18kg	22kg	10kg	11kg	20kg	24kg

Dimensions (in enclosure)							
Width		310mm	426mm	310mm	426mm		
Height		390mm	506mm	390mm	506mm		
Depth		130mm		200mm	130mm		200mm

Maximum Discharge Current Variations		
Discharge Current variations	I_{max}	150kA / 200kA / 250kA

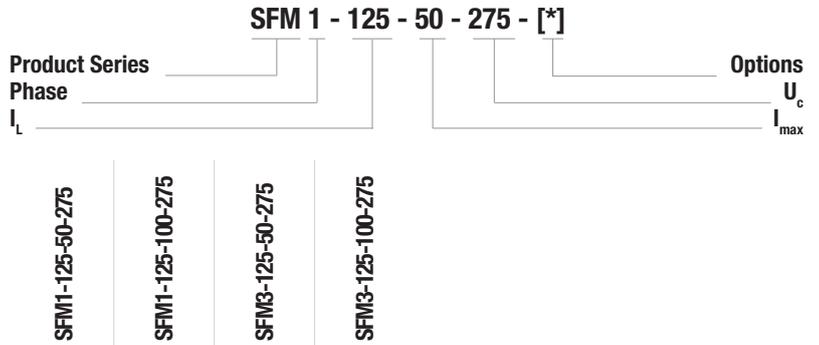
Standards Compliance	
IEC 61643-1 class I, II	
AS/NZS 1768 categories B, C	
IEEE C62.41 categories B, C	
BS 6651 categories B, C	
CP 33 categories B, C	
IEC 1000-4-5	
UL1449 third edition	

Options [*]	
Circuit breaker	C
HRC fusing	H
Metal enclosure IP 55	M
Over / under voltage relay	O
Extended voltage (95-415V)	X
Spark Gap Frontend	G



SFM Surge Filters 125A

Novaris SFM surge filters provide excellent and effective MSB and DB protection for critical equipment up to 125A per phase.



Electrical Specifications					
Connection type		Series			
Modes of protection		All mode (L-N, L-PE, N-PE)			
Nominal Voltage	U_0	230V / 50Hz (110V / 60Hz by request only)			
Maximum continuous voltage	U_c	275V / 50Hz (130V / 60Hz by request only)			
Phases		1		3	
Discharge current 8/20 μ s	I_{max}	50kA	100kA	50kA	100kA
Nominal discharge current (15 x 8/20 μ s)	I_n	20kA	40kA	20kA	40kA
Maximum load current	I_L	125A			
Protection stages		Metal oxide varistor / LC filter / metal oxide varistor			
Voltage protection @ 3kA (8/20 μ s)	U_p	<360V			
Response time	t_A	Instantaneous			
Earth leakage current		<1 μ A			
Maximum voltage drop (% of U_0)	ΔU	<1%			
3dB Frequency @ 50 Ω		350Hz			
Displays		LED status	% active	LED status	% active
Alarms		Seg failure and o'current / thermal o'load, SPDT contact			
Alarm isolation to active circuitry		4kV			

Mechanical Specifications					
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing			
Connection type		UIK35 Terminals			
Terminal capacity - power		35mm ²			
Terminal capacity - alarm		2.5mm ²			
Terminal screw torque - power		1.0Nm			
Terminal screw torque - alarm		0.5Nm			
Environmental		IP 55 in enclosure			
Mounting		Wall mount			
Weight (in enclosure)		11kg	12kg	25kg	28kg

Standards Compliance	
IEC 61643- class I, II	
AS/NZS 1768 categories B, C	
IEEE C62.41 categories B, C	
BS 6651 categories B, C	
CP 33 categories B, C	
IEC 1000-4-5	
UL1449 third edition	

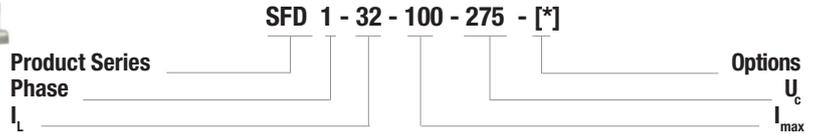
Options [*]	
HRC fusing	H
Metal enclosure	M
Over / under voltage relay	O
Extended voltage (95-415V)	X
Spark Gap Frontend	G

Dimensions (in enclosure)			
Width		310mm	426mm
Height		390mm	506mm
Depth		130mm 200mm	

Maximum Discharge Current Variations			
Discharge Current variations	I_{max}	150kA / 200kA / 250kA	

SFD Surge Filters - Single Phase

Novaris SFD surge filters provide the highest level of protection for critical and essential equipment up to 32A per phase. Their compact design makes them an ideal choice for space restricted applications.



SFD1-2-6.5-275	SFD1-6-6.5-275	SFD1-10-50-275	SFD1-10-50-275-A	SFD1-20-50-275	SFD1-20-100-275	SFD1-32-50-275	SFD1-32-100-275
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Electrical Specifications								
Connection type		Series						
Modes of protection		All mode (L-N, L-PE, N-PE)						
Phases		1						
Nominal voltage	U ₀	240V / 50Hz						
Maximum continuous voltage	U _c	275V / 50Hz						
Maximum load current	I _L	2A	6A	10A	20A	32A		
Maximum discharge current (8/20μs) (L-N)	I _{max}	6.5kA		50kA	50kA	100kA	50kA	100kA
Nominal discharge current (15 x 8/20μs)	I _n	3kA		20kA		40kA	20kA	40kA
Voltage protection level @ 3kA (8/20μs)	U _p	<700V			<600V			
Response time	t _A	Instantaneous						
Earth leakage current		<500μA			<10μA			
Maximum voltage drop (% of U ₀)	ΔU	<1%						
Display		LED status optional			LED status			
Alarms (optional)		-			Segment / thermal failure, clean SPDT contact			
Alarm isolation to active circuitry		-			4kV			

Mechanical Specifications								
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing						
Connection type		Screw terminal						
Terminal capacity - power		2.5mm ²			16mm ²			
Terminal capacity - alarm		2.5mm ²						
Terminal screw torque - power		0.5Nm			1.0Nm			
Terminal screw torque - alarm		0.5Nm						
Environmental		IP 20						
Mounting		TS35 DIN rail						
Enclosure / colour		Metal / Black						
Weight		350g	440g	600g	605g	625g	730g	750g

Standards Compliance
IEC 61643-1 class II, III
AS/NZS 1768 categories A, B
IEEE C62.41 categories A, B
BS 6651 categories A, B
CP 33 categories A, B
IEC 1000-4-5
UL1449 third edition

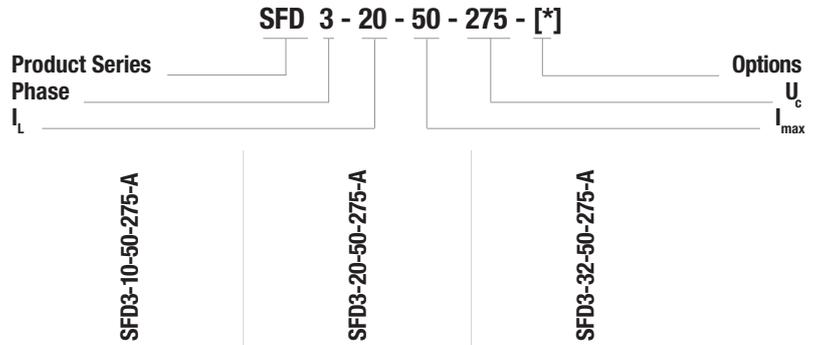
Dimensions				
Width	27mm (54mm with LED)	54mm	72mm	108mm
Height	116mm (95mm with LED)		95mm	
Depth	78mm		70mm	

Options [*]		
LED indication and external alarm	L (LED only)	A
Polycarbonate enclosure	P	

* 2A and 6A models in old style extrusion

SFD Surge Filters - Three Phase

Novaris SFD surge filters provide the highest level of protection for critical and essential equipment up to 32A per phase. Their compact design makes them an ideal choice for space restricted applications.



Electrical Specifications			
Connection type		Series	
Modes of protection		All mode (L-N, L-PE, N-PE)	
Phases		3	
Nominal voltage	U_0	240V / 50Hz	
Maximum continuous voltage	U_c	275V / 50Hz	
Maximum load current	I_L	10A	20A
Maximum discharge current (8/20 μ s) (L-N)	I_{max}	50kA	
Nominal discharge current (15 x 8/20 μ s)	I_n	20kA	
Voltage protection level @ 3kA (8/20 μ s)	U_p	<600V	<650V
Response time	t_A	Instantaneous	
Earth leakage current		<10 μ A	
Maximum voltage drop (% of U_0)	ΔU	<1%	
Display		LED status	
Alarms (optional)		Segment / thermal failure, clean SPDT contact	
Alarm isolation to active circuit		4kV	

Mechanical Specifications			
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing	
Connection type		Screw terminal	
Terminal capacity - power		16mm ²	
Terminal capacity - alarm		2.5mm ²	
Terminal screw torque - power		1.0Nm	
Terminal screw torque - alarm		0.5Nm	
Environmental		IP 20	
Mounting		TS35 DIN rail	
Enclosure / colour		Metal / Black	
Weight		1.2kg	1.5kg

Dimensions			
Width		180mm	
Height		95mm	
Depth		70mm	

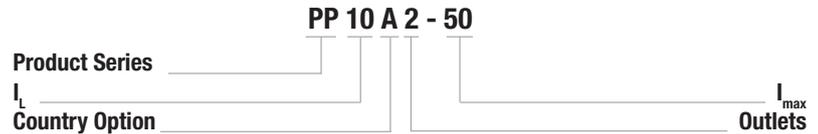
Options			
External alarm		Standard	
Polycarbonate enclosure		P	

Standards Compliance

IEC 61643-1 class II, III
AS/NZS 1768 categories A, B, C
IEEE C62.41 categories A, B, C
BS 6651 categories A, B, C
CP 33 categories A, B, C
IEC 1000-4-5
UL1449 third edition

Plug-in Surge Filters

Novaris plug-in surge filters plug into a standard mains outlet socket to provide premium protection for sensitive or critical electronic equipment



		PP10A2-50	PP10A4-50	PP10A6-50	PP10A8-50
Electrical Specifications					
Connection type		Series			
Modes of protection		All mode (L-N, L-PE, N-PE)			
Nominal voltage	U_0	230V / 50Hz			
Maximum continuous voltage	U_c	275V / 50Hz			
Maximum discharge current (8/20 μ s)	I_{max}	50kA			
Nominal discharge current (15 x 8/20 μ s)	I_n	20kA			
Maximum load current	I_L	10A			
Protection stages		Metal oxide varistor / LC filter / Metal oxide varistor			
Voltage protection level @3kA (8/20 μ s)	U_p	<600V			
Response time	t_A	Instantaneous			
Power Consumption (@230V 50Hz)		<1W			
Attenuation		-3dB at 900Hz, -60dB at 100kHz			
Earth leakage current		<500 μ A			
Maximum voltage drop (% of U_0)	ΔU	<1%			
Display		LED power and status			

Standards Compliance	
IEC 61643-1 class II, III	
AS/NZS 1768 categories A, B	
IEEE C62.41 categories A, B	
BS 6651 categories A, B	
CP 33 categories A, B	
IEC 1000-4-5	
UL1449 third edition	

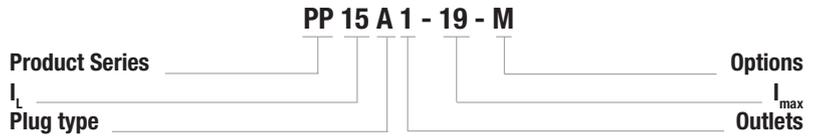
Mechanical Specifications				
Operating temperature / humidity	-40 to +70°C / 0 to 90% non-condensing			
Connection type - line side cord	IEC C14 Inlet			
Connection type - load side outlet	10A Australian (type I) outlet			
Number of outlets	2	4	6	8
Environmental	IP 20			
Mounting	Free standing, (optional wall mount -M)			
Weight	1.3kg			

Country Option	
Australian - AS-3112	A
European - CEE7/4	E
British - BS-1363	B

Dimensions				
Width	155mm	205mm	255mm	305mm
Height	140mm			
Depth	60mm			

PP Plug-in Surge Filters 15A and Rack Mount

Novaris plug-in surge filters plug into Australian 15A outlet sockets and provide premium protection for sensitive electronic equipment.



Electrical Specifications				
Connection type		Series		
Modes of protection		All mode (L-N, L-PE, N-PE)		
Nominal voltage	U_0	230V / 50Hz		
Maximum continuous voltage	U_c	275V / 50Hz		
Maximum discharge current (8/20µs)	I_{max}	19kA	50kA	19kA
Nominal discharge current (15 x 8/20µs)	I_n	8kA	20kA	8kA
Maximum load current	I_L	15A		10A
Protection stages		Metal oxide varistor / LC filter / metal oxide varistor		
Voltage protection level @ 3kA (8/20µs)	U_p	<600V		
Response time	t_A	Instantaneous		
Earth leakage current		<500µA		
Maximum voltage drop (% of U_0)	ΔU	<1%		
Display		LED power and status		LED Status

Mechanical Specifications			
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing		
Connection type - line side cord	Australian plug	IEC Male / Country Lead	
Connection type - load side outlet	Australian socket		IEC Female
Number of outlets	1	8	
Environmental	IP 20		
Mounting	Free standing	Rack Mount	
Weight	1.3kg	2.8kg	

Dimensions		
Width	170mm	484mm
Height	100mm	44mm
Depth	60mm	220mm

Standards Compliance

- IEC 61643-1 class III, III
- AS/NZS 1768 category A, B
- IEEE C62.41 category A, B
- BS 6651 category A, B
- CP 33 category A, B
- IEC 1000-4-5
- UL1449 third edition

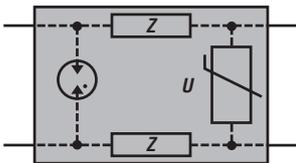


NEWSMAN 40

Process control protection must:

1. Provide adequate protection for all equipment.
2. Achieve a long working life.
3. Allow the signal to pass under normal operation.
4. Optimise the cost and size of the surge protection devices (SPDs).

Options for Surge Protection Devices



Two port SPDs are connected in series with the line. Almost all Novaris process control SPDs incorporate this configuration where a low let through voltage, (U_p) is always required to adequately protect low level signals.

Novaris process control SPDs contain a combination of voltage switching components comprising gas discharge tubes, series impedances and voltage limiting components comprising MOVs and suppressor diodes.

Selection of Surge Protection Devices

The selection of SPDs for process control requires more attention than the selection of power line SPDs to ensure the signal is not attenuated or lost through the SPD. Novaris manufactures process control SPDs for almost all applications and can design custom solutions for unique applications.

1. Determine the signalling protocol and peak line voltage

Table 1 on page 58 provides common signalling protocols and the appropriate Novaris SPD for each application. Even if the actual protocol is unknown the peak signal voltage must be determined.

2. Select the clamping voltage

The clamping voltage of the SPD must be greater than the peak signalling voltage.

The following is a guide.

Nominal Peak Signal Voltage (V)	Power System (V)	Clamping Voltage (V)
0-6	6	7v5
6-15	12	18
15-30	24	36
30-60	48	68

3. Determine the signal current

Standard SL models are rated at $I_L = 250mA$. For current up to $I_L = 6A$ use the SSP6A series.

For higher current applications, consider using SFD surge filters.

4. Select signal frequency / data rate

Standard SL series will pass signals up to 250kHz. For higher frequency / faster data rates consider the SL485 or SL-DH.

5. Consider earth isolation

The normal SL DIN rail base, designated -G, connects the protective earth to the DIN rail to provide a low impedance earth path. If the earth must be isolated, for example with instrument loops, use the -EC90 base.

SL Slimline Signal Line Protectors

Novaris SL range of plug-in signal line protectors provide surge protection for most twisted pair signalling schemes. Ideal for the protection of PLCs, fire and security systems, telecommunications and telemetry systems, railway signalling, SCADA and other industrial monitoring and control equipment.



SL 7v5 - [*]

Product Series
Top

Base option

SL7v5

SL18

SL36

SL68

SL-PSTN

SL-iSwitch

Electrical Specifications		SL7v5	SL18	SL36	SL68	SL-PSTN	SL-iSwitch
Connection type		Series					
Modes of protection		Transverse and common mode					
Maximum continuous voltage (DC)	U_c	7V	16V	34V	65V	200V	200V
Maximum continuous voltage (AC)	U_c	5V	11V	24V	46V	140V	140V
Discharge current 8/20 μ s	I_{max}	10kA					
Maximum load current	I_L	250mA					180mA
Impulse voltage 1.2/50 μ s	U_p	8V	19V	40V	76V	235V	30V
Impulse durability		C2 8/20 μ s, 5kA, 10 times					
AC durability		1 A _{rms} , 1s, 5 times					
Overstressed fault mode		Mode 3					
Line resistance		9 Ω			8.2 Ω	17 Ω	
Insertion loss @ 150 Ω		0.5dB			0.4dB		
3dB Frequency @ 50 Ω		250kHz			10MHz	20MHz	

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing @ min current
Terminal capacity	2.5mm ²
Terminal screw torque	0.5Nm
Environmental	IP 20
Mounting	TS35 DIN rail
Weight	35g

Dimensions	
Width	7mm
Height	102mm
Depth	68mm

Base Options [*]	
Earth connected to DIN rail	G
Earth connected to DIN rail via GDT	EC90

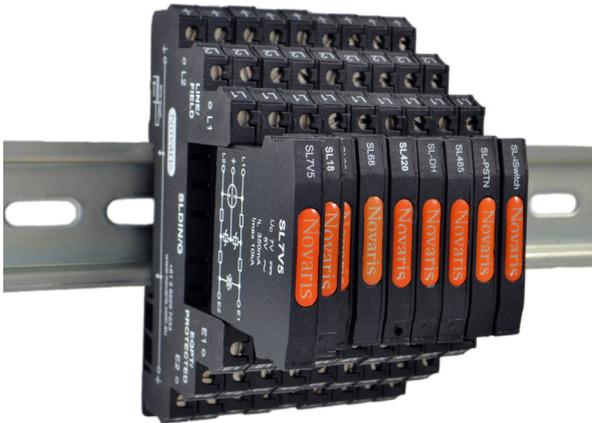
Standards Compliance

ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21
UL497B
A-tick (PSTN & iSwitch)

IECEx ia models available with the Novaris Hazardous Area range

SL Slimline Signal Line Protectors

Novaris SL range of plug-in signal line protectors provide surge protection for most twisted pair signalling schemes. Ideal for the protection of PLCs, fire and security systems, telecommunications and telemetry systems, railway signalling, SCADA and other industrial monitoring and control equipment.



SL 485 - [*]

Product Series
Top

Base option

SL485-EC90

SL-DH

SL-RTD

SL-420

Electrical Specifications					
Connection type		Series			
Modes of protection		Transverse and common mode			
Maximum continuous voltage (DC)	U_c	8V	34V	8V	34V
Maximum continuous voltage (AC)	U_c	6V	24V	6V	-
Discharge current 8/20 μ s	I_{max}	10kA			
Maximum load current	I_L	250mA			30mA
Impulse voltage 1.2/50 μ s	U_p	15V	50V	15V	40V
Impulse durability		C2 8/20 μ s, 5kA, 10 times			
AC durability		1 A_{rms} , 1s, 5 times			-
Overstressed fault mode		Mode 3			
Line resistance		3.9 Ω			8.2 Ω
Insertion loss @ 150 Ω		0.2dB			1.5dB
3dB Frequency @ 50 Ω		20MHz			250kHz
Display		-			LED Status

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing @ min current
Terminal capacity	2.5mm ²
Terminal screw torque	0.5Nm
Environmental	IP 20
Mounting	TS35 DIN rail
Weight	35g

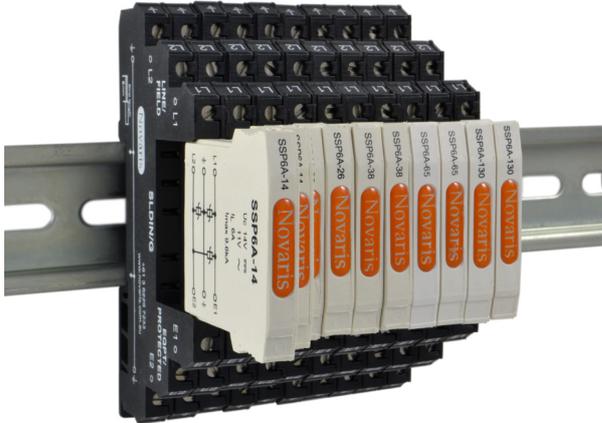
Dimensions	
Width	7mm
Height	102mm
Depth	68mm

Base Options [*]		
Earth connected to DIN rail	-	G
Earth connected to DIN rail via GDT	Standard	EC90

Standards Compliance

- ITU-T K.44
- AS/NZS 1768
- IEEE C62.41
- BS 6651
- CP 33
- IEC 61643-21
- UL497B

IECEx ia models available with the Novaris Hazardous Area range



SSP Slimline Series Surge Protectors

Novaris SL range of plug-in signal line protectors provide surge protection for power supplies with loads up to 6A. Ideal for the protection of PLCs, fire and security systems, telecommunications and telemetry systems, railway signalling, SCADA and other industrial monitoring and control equipment.

SSP 6A - 14 - G

Product Series

Base options

I_L

U_c

SSP6A-14

SSP6A-26

SSP6A-38

SSP6A-65

SSP6A-130

Electrical Specifications						
Connection type		Series				
Modes of protection		Transverse and common mode				
Maximum continuous voltage (DC)	U_c	14V	26V	38V	65V	170V
Maximum continuous voltage (AC)	U_c	11V	20V	30V	50V	130V
Maximum discharge current (8/20 μ s)	I_{max}	9.6kA				3.6kA
Maximum load current	I_L	6A				
Voltage protection level @ 5kV (10/700 μ s)	U_p	26V	52V	70V	120V	250V
Line resistance		0 Ω				
3dB Frequency @ 50 Ω		100kHz				

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing
Terminal capacity	2.5mm ²
Terminal screw torque	0.5 Nm
Environmental	IP 20
Mounting	TS35 DIN rail
Weight	35g

Dimensions	
Width	7mm
Height	102mm
Depth	68mm

Base Options	
Earth connected to DIN rail	G

Standards Compliance

ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21
UL497B

IECEx ia models available with the Novaris Hazardous Area range

Accessories

SL Test Plug

SL-TEST

Novaris SL Test Plug provides access to field and equipment terminals plus earth via mini banana sockets mounted in the top face of the test plug. It provides a convenient way to connect to these lines for testing.



SL Earth Comb

SL-COMB

The **Novaris SL Earth Comb** provides a convenient means of connecting the common points of SL series surge protectors. The earth comb contains nine contacts, allowing banks of 8 SL protectors to be commoned together with one overlapping contact. The earth comb can be cut to provide a lesser number of points. The earth comb contains two 6.3mm spade terminals.



Novaris Screwdriver

SL-SCREW



SLM Multiline Protectors

Novaris SLM offers protection for up to 12 signal lines. Typical applications include process control, telemetry, PLC, and irrigation systems.



SLM-7v5 **SLM-18** **SLM-36** **SLM-68** **SLM-200**

Electrical Specifications						
Connection type		Series				
Modes of protection		Transverse and common mode				
Number of lines		12				
Maximum continuous voltage (DC)	U_c	7V	16V	34V	65V	200V
Maximum continuous voltage (AC)	U_c	5V	11V	24V	46V	140V
Discharge current 8/20 μ s	I_{max}	20kA				
Protection stages		Multistage				
Maximum load current	I_L	350mA (2A for option 2; 500mA for option H)				
Impulse voltage 10/700 μ s	U_p	8V	19V	40V	76V	235V
Line resistance - base		8.2 Ω				
Line resistance - 2A		0.1 Ω				
Line resistance - high frequency		3.9 Ω				
Maximum frequency	f_c	250kHz (25MHz high frequency option)				

Mechanical Specifications	
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing
Terminal capacity	2.5mm ²
Terminal screw torque	0.5Nm
Environmental	IP 20
Mounting	Panel mount
Weight	250g

Dimensions	
Width	128mm
Height	80mm
Depth	42mm

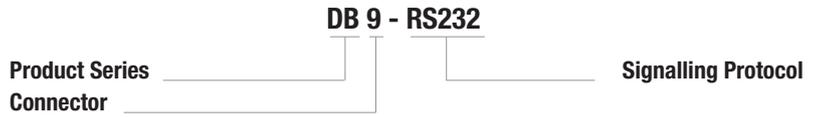
Options [*]	
Maximum load current 2A	I_L 2
High frequency 25MHz	f_c H

Standards Compliance
IEC61643-21
ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
UL497B



RS Serial Port Protectors

Novaris RS Protectors provide protection for serial protocol systems in RS232 and RS485 applications. These units are housed in a headshell enclosure.



DB9-RS232

DB25-RS232

DB9-RS485

DB25-RS485

Electrical Specifications			
Connection type		Series	
Modes of protection		Transverse and common	
Maximum continuous voltage	U_c	36V	8.2V
Discharge current 8/20 μ s	I_{max}	250A	
Protection stages		SAD and GDT	
Number of lines		8	
Impulse voltage 10/700 μ s	U_p	40V	14V
Signalling protocol		RS232	RS485

Mechanical Specifications			
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing		
Connection type	DB9	DB25	DB25
Connector orientation	M / F		
Environmental	IP 20		
Weight	70g		

Dimensions			
Width	34mm	56mm	56mm
Height	17mm		
Depth	63mm		

Standards Compliance
IEC61643-21
ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
UL497B

LCP Load Cell Protector

The Novaris LCP provides protection for both 4-wire and 6-wire loadcells as well as the measuring instrument. The LCP is contained within an IP65 enclosure, or alternatively as a PCB only. Installation of the LCP is certified and does not affect weighbridge calibration.



LCP - 36 - [*]

Product Series

Option
U_c

LCP-18

LCP-36

LCP-18-PCB

LCP-36-PCB

Electrical Specifications					
Connection type		Series			
Modes of protection		Transverse and common mode			
Maximum continuous voltage (DC)	U _c	18V	36V	18V	36V
Maximum discharge current (8/20μs)	I _{max}	250A			
Protection stages		SAD and GDT			
Maximum load current	I _L	6.5A		5A	
Lines protected		4 or 6			

Mechanical Specifications					
Operating temperature / humidity		-40 to +85°C / 5 to 95% non-condensing			
Terminal capacity		2.5mm ²			
Terminal screw torque		0.5Nm			
Ground connection		M5 s/s stud	100mm lead		
Environmental		IP 65	IP 00		
Mounting		Panel mount			
Enclosure / colour		Aluminium / blue	PCB only		
Weight		600g	80g		

Dimensions					
Width		116mm	76mm		
Height		65mm	63mm		
Depth		56mm	20mm		

Standards Compliance

IEC61643-21
ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
UL497B
NSC No: S366

IECEx ia models available with the Novaris Hazardous Area range



Surge Protection Tester

The Novaris SPT Series allows surge protection installers and maintainers to monitor* and diagnose surge protection equipment on site. The SPT-02 uses an auto-range function to accurately determine the clamping voltage of voltage limiting products and the firing voltage of voltage switching products. The SPT-02 is also a multifunction device that supports insulation resistance, continuity, voltage and diode testing. Test results are displayed on a 2 x 16 character display.

SPT - 02

Product Series _____ Version _____

MOV Test	
Measuring Range	5 -- 1020 V DC
Voltage Accuracy	± 3%

GDT Test	
Measuring Range	5 -- 1020 V DC
Voltage Accuracy	± 3%

Voltmeter	
DC Voltage	0 -- 950 V
AC Voltage	0 -- 700V
Resolution	1V
Voltage Accuracy	± 3%

Insulation Resistance	
Test voltage	250, 500, 1000V
Measuring Ranges	250V: 0.2MΩ -- 2GΩ 500V: 0.2MΩ -- 4GΩ 1000V: 0.2MΩ -- 8GΩ
Accuracy	0.2MΩ - 4GΩ : ± 3% 4GΩ -- 8GΩ : ± 5%
Short Circuit Current	1.2mA
Polarisation Index (PI)	on all ranges
Detective Absorption Ratio (DAR)	on all ranges

KΩ Test	
Ranges	1 -- 400kΩ
Short Circuit Test Current	≥ 1.3mA

Standards Compliance	
EN 61010-1 CATIII 600V	
EN 61326-1	

Continuity	
Ranges	0.01 -- 100Ω 100 -- 300Ω 300 -- 1999Ω
Accuracy	0.01 -- 100Ω : ± 1.0% 100 -- 300Ω : ± 1.5% 300 -- 1999Ω : ± 2.0%
Auto Null	up to 5Ω
Buzzer	up to 3Ω

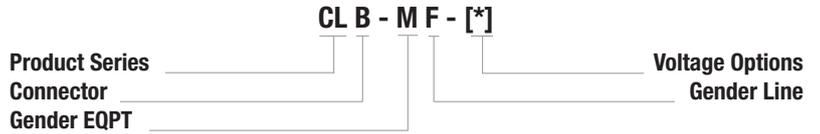
Diode Test	
Test Voltage	5V DC
Max Test Current	1.5 mA
Resolution	0.1V
Measurement Voltage	0 -- 4.5V
Accuracy	± 3%

General	
Fuse	500mA 250V Fast Blow
Display	2 Line x 16 Character LCD
Dimensions	205 (L) x 90 (W) x 55 (D)
Weight	1.5kG
Power Source	1.5V AA x 6
Storage Temperature	-20°C to 70°C
Accessories	Test Leads Fuse (0.5A 250V) Heavy Duty Case Instruction Manual Batteries

* Measurements of SPDs with intact display hardware will be inaccurate due to the current required to drive the hardware.

CL Coaxial CCTV Protectors

Novaris Coaxial CCTV protectors are suited to the protection of security and CCTV applications.



	CLB-MF	CLB-FF	CLB-FM	CLF-FF
Electrical Specifications				
Connection type				Series
Modes of protection				Transverse and common modes
Maximum discharge current (8/20µs)	I_{max}			20kA
Maximum load current	I_L			500mA
Protection stages				Multistage
3dB frequency				20MHz
Insertion loss				<1dB @ 20MHz
Mechanical Specifications				
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing			
Connector type	BNC			F-type
Connector orientation (EQPT / line)	M / F	F / F	F / M	F / F
Environmental	IP 20			
Enclosure / colour	Aluminium / Black			
Weight	100g			
Dimensions				
Width	26mm			
Height	26mm			
Depth	89mm	86mm	86mm	88mm

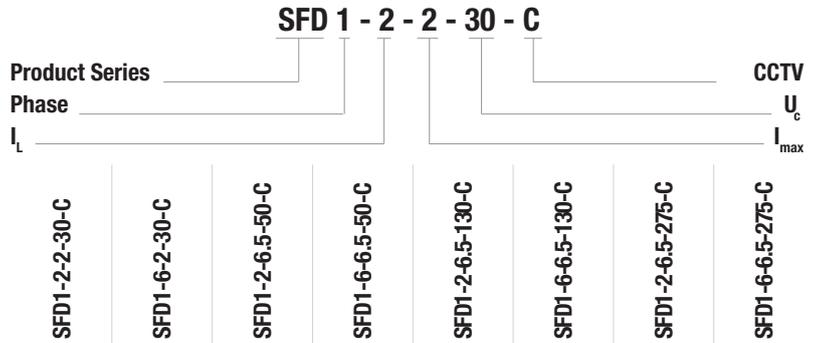
Standards Compliance
ITU-T K.44
AS/NZS 1768
BS 6651
IEEE C62.41
CP 33
IEC 61643-21
UL497B

		10	18	36
Voltage Options [*]				
Maximum continuous voltage	U_c	8.2V	18V	36V
Voltage protection level @ 5kV (10/700µs)	U_p	14V	20V	40V



SFD Combined Power and Signal Protectors

Novaris protection for both power and signal is provided in one compact and economical DIN compliant package. Ideal for security and CCTV camera protection.



Power Line Protection									
Connection type		Series							
Modes of protection		All mode (L-N, L-PE, N-PE)							
Nominal voltage	U_0	24V / 50Hz	40V / 50Hz	110V / 50Hz	230V / 50Hz				
Maximum continuous voltage	U_c	30V / 50Hz	50V / 50Hz	130V / 50Hz	275V / 50Hz				
Phases		1							
Maximum discharge current (8/20 μ s)	I_{max}	2kA		6.5kA					
Maximum load current	I_L	2A	6A	2A	6A	2A	6A	2A	6A
Protection stages		Metal oxide varistor / LC filter / metal oxide varistor							
Voltage protection level @ 3kA (8/20 μ s)	U_p	<50V	<150V	<450V	<750V				
Response time	t_A	Instantaneous							
Earth leakage current		<500 μ A							
Maximum voltage drop (% of U_0)	ΔU	<1%							

Signal Line Protection									
Connection type		Series							
Modes of protection		Transverse and common modes							
Maximum continuous voltage	U_c	8.2V							
Maximum discharge current (8/20 μ s)	I_{max}	20kA							
Maximum load current	I_L	500mA							
Protection stages		Gas discharge tube / series impedance / SAD							
Impulse voltage 1.2/50 μ s	U_p	14V							
3dB frequency		20MHz							
Insertion loss		<1dB @ 20MHz							

Mechanical Specifications									
Operating temperature / humidity		-40 to +85°C / 5 to 95% non-condensing							
Connector type - power		2.5mm ² polarised plugs							
Connector type - signal		Female / female BNC							
Terminal screw torque		0.5 Nm							
Environmental		IP 20							
Mounting		TS35 DIN rail							
Weight		300g							

Dimensions									
Width		28mm							
Height		116mm							
Depth		78mm							

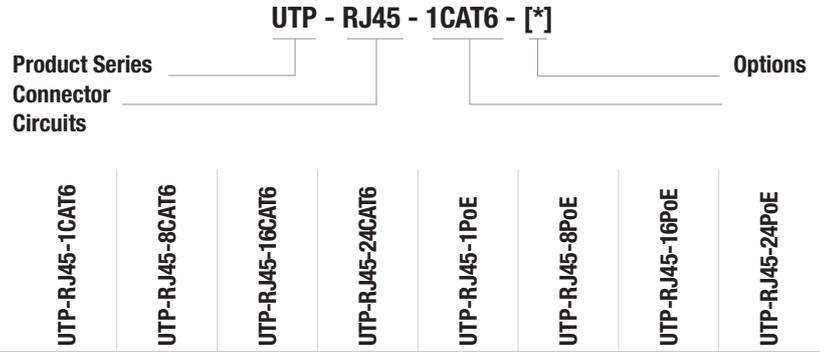
Standards Compliance

IEC 61643-1 class II, III
AS/NZS 1768 categories A, B
IEEE C62.41 categories A, B
BS 6651 categories A, B
CP 33 categories A, B
IEC 1000-4-5
UL1449 third edition
ITU-T K.44
IEC 61643-21
UL497B



RJ45 UTP Network Protectors - Terminal

Novaris RJ45 terminal protectors are compliant with 1000BaseT (gigabit Ethernet), CAT6 and power over ethernet applications.



Electrical Specifications			
Connection type		Series	
Modes of protection		Transverse and common modes	
Lines protected		All	
Maximum continuous voltage	U_c	6VDC	6VDC signal, 230VDC power
Maximum discharge current (8/20 μ s)	I_{max}	10kA	
Protection stages		Multistage	Multistage signal, single stage power
Voltage protection level @ 5kV (10/700 μ s)	U_p	<20V	
Maximum frequency	f_c	250MHz	

Mechanical Specifications									
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing								
Connection type	RJ45 socket								
Number of outlets	1	8	16	24	1	8	16	24	
Environmental	IP 20								
Mounting	Inline	2RU rack mount			Inline	2RU rack mount			
Enclosure / colour	Aluminium / black								
Weight	200g	1.85kg	1.95kg	2.0kg	200g	1.85kg	1.95kg	2.0kg	

Dimensions					
Width	26mm	483mm		26mm	483mm
Height	26mm	89mm		26mm	89mm
Depth	85mm	80mm		85mm	80mm

Options [*]					
DIN rail mounting clip	D	-		D	-

Standards Compliance

100BaseT
1000BaseT
CAT5
CAT5e
CAT6
TIA/EIA 568A
TIA/EIA 568B
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21



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 return loss.
4. Optimise the cost and size of the surge protection devices (SPDs).

Options for Surge Protection Devices

Novaris manufacturers two types of RF coaxial SPDs. Those containing a gas discharge tube (GDT) are suitable for a wide frequency range but must be chosen carefully taking into account the power on the line if used for a transmitting application. Quarter wave stub protectors offer exceptionally low let through voltages but are frequency sensitive. Their power handling capability is only limited by the rating of the coaxial connectors employed.

Selection of Surge Protection Devices

1. Identify the connector type

Novaris manufactures a range of coaxial SPDs to suit most common connectors 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 when 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

Please contact us for higher power levels

3. Identify the maximum operating frequency

For standard models using N-type connectors the maximum frequency is 2GHz. 3G models feature replaceable GDTs and will operate to 3GHz. For other variations the upper frequency is dependent upon the connector type.

4. Tuned stub protectors

For narrow bandwidth applications where no DC voltage is injected, tuned stub protectors provide exceptionally low let through voltages and very low intermodulation products. The centre operating frequency must be specified when ordering.



RF Equipment Protection up to 3GHz

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.

C N - FF - 90 - 3 - [*]

Product Series _____ Options
 Connector _____ f_c
 Gender _____ U_c

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**

Electrical Specifications		Series			
Connection type		Signal-Earth			
Modes of protection		Signal-Earth			
Sparkover voltage	U_c	90VDC	230VDC	350VDC	600VDC
Maximum discharge current (8/20 μ s)	I_{max}	20kA			
Power rating		0 - 40W	40 - 125W	125 - 300W	300-800W
Maximum working frequency	f_c	3GHz			
Voltage protection level @ 3kA (8/20 μ s)	U_p	<650V	<820V	<1.1kV	<1.3kV
Characteristic impedance		50 Ω (75 Ω F-type only)			
VSWR		<1.1:1			
Return loss		>26dB			
Insertion loss		<0.2dB			

Mechanical Specifications	
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing
Connection type	N-type
Connection orientation	M / F F / F M / F F / F M / F F / F M / F F / F
Mounting	Inline / bulkhead (N-type only)
Environmental	IP 55
Enclosure / colour	Brass / Nickel Plated
Weight	150g

Options [*]

90° mounting bracket	M
DIN rail mounting clip	D
Mounting stud	S

Standards Compliance

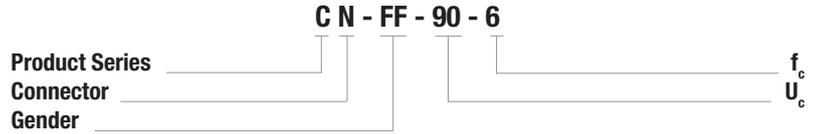
ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21
UL497B

Connector type variation	
BNC	B
7/16 DIN	D (Mounting bracket not available)
F-type	- F - F - F - F
N-type (bulkhead mount female)	N Standard N Standard N Standard N Standard
UHF	U
SMA	S

Dimensions	
Configuration	CB-MF CB-FF CD-MF CD-FF CF-FF CN-MF CN-FF CU-MF CU-FF CT-MF CT-FF
Width	25mm \emptyset 40mm 25mm
Height	25mm 25mm
Maximum length	58mm 52mm 70mm 73mm 50mm 60mm 60mm 57mm 54mm

RF Equipment Protection up to 6GHz

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.



CN-MF-90-6

CN-FF-90-6

CN-MF-230-6

CN-FF-230-6

Electrical Specifications				
Connection type		Series		
Modes of protection		Signal-Earth		
Sparkover voltage	U_c	90VDC	230VDC	
Maximum discharge current (8/20 μ s)	I_{max}	20kA		
Power rating		0 - 40W	40 - 125W	
Maximum working frequency	f_c	6GHz		
Voltage protection level @ 3kA (8/20 μ s)	U_p	<650V	<820V	
Characteristic impedance		50 Ω		
VSWR		<1.1:1		
Return loss		>26dB		
Insertion loss		<0.2dB		

Mechanical Specifications				
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing			
Connection type	N-type			
Connection orientation	M / F	F / F	M / F	F / F
Mounting	Inline / bulkhead			
Maximum bulkhead thickness	9mm			
Environmental	IP 55			
Enclosure / colour	Brass / Nickel Plated			
Weight	160g			

Dimensions				
Width	26mm			
Height	26mm			
Maximum length	62mm	69mm	62mm	69mm

Standards Compliance

ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21
UL497B



RF Equipment Protection Tuned Stub

Novaris tuned stub surge protectors employ quarter-wavelength short circuit stub technology. Suitable for narrow bandwidth applications where no DC voltage is injected. RF power and surge rating are limited by the cables and connectors only.

CSTUB - N - MF - 2400

Product Series _____ Gender t_f
 Connector _____

CSTUB-D-MF-900

CSTUB-D-FF-900

CSTUB-N-MF-900

CSTUB-N-FF-900

CSTUB-D-MF-2400

CSTUB-D-FF-2400

CSTUB-N-MF-2400

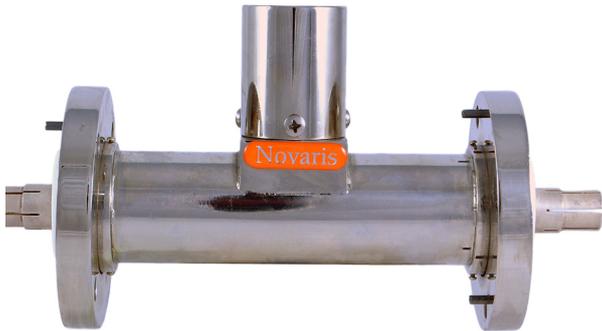
CSTUB-N-FF-2400

Electrical Specifications		
Connection type		Series
Modes of protection		Signal-Earth
Maximum discharge current (8/20 μ s)	I_{max}	50kA
Power rating		Limited only by connectors and cables used.
Tuned frequency range	t_f	400MHz to 3GHz (specify)
Voltage protection level @ 3kA (8/20 μ s)	U_p	<20V
Characteristic impedance		50 Ω
Bandwidth		$\pm 10\%$ of tuned frequency
VSWR		<1.1:1 within bandwidth
Return loss		>26dB within bandwidth
Insertion loss		<0.1dB at tuned bandwidth

Mechanical Specifications									
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing								
Connection type	7/16 DIN		N-type		7/16 DIN		N-type		
Connection orientation	M / F	F / F	M / F	F / F	M / F	F / F	M / F	F / F	
Mounting	Inline								
Maximum bulkhead thickness	9mm								
Environmental	IP 55								
Enclosure / colour	Brass / silver								

Dimensions									
Body diameter	32mm								
Height	Depends upon operating frequency								
Maximum length	63mm	60mm	56mm	54mm	63mm	60mm	56mm	54mm	

Standards Compliance
ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21



RF Equipment Protection High Power

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

CEIA - 078 - 1

Product Series
Connector Size

Options

	CEIA-078	CEIA-158	CEIA-318
Electrical Specifications			
Connection type		Series	
Modes of protection		Signal-Earth	
Maximum discharge current (8/20µs)	I_{max}	100kA	
Power rating		>50kW limited only by coaxial cable	
Surge element		Spark gap, gap setting: 2mm / 10kW	
Spark over voltage		2.6kV for 2mm gap	
Characteristic impedance		50Ω	
Insertion loss		<0.1dB to 500MHz <0.2db to 1GHz (gap setting: 1mm)	
Return loss		>26dB to 500MHz >20dB to 1GHz (gap setting: 1mm)	
Arc sensor		Optical detector utilising photodiode, feeding transmitter interface to provide momentary shutdown	
Power requirements		Arc sensor: 12VDC @ 35mA	
Transmission medium		Arc detector fed to transmitter via optic fibre. Alternate metallic cable available.	

Mechanical Specifications			
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing		
Connection type	7/8" EIA	1 5/8" EIA	3 1/8" EIA
Mounting	Bulkhead / flange		
Environmental	IP 55		
Enclosure	Brass and copper		

Options	
Spark gap only, no TX controller	Standard
1RU 19" rack, one TX controller only	1
3RU 19" rack, up to 14 TX controllers	n*

* Denotes number of TX controllers

Standards Compliance
ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21
UL497B



KP KRONE-LSA® MDF - 1 Pair / 10 Pair

The Novaris KP provides protection for KRONE-LSA® termination systems and is suitable for all twisted pair telecommunication services. The unique iSwitch technology offers the ultimate in protection against induced transients and AC induction by totally isolating the load from the incoming line during the disturbance.



	KP1	KP10	KP1-i	KP10-i
--	-----	------	-------	--------

Electrical Specifications				
Connection type		Series		
Modes of protection		Transverse and common modes		
Maximum continuous voltage	U_c	200VDC		
Maximum discharge current (8/20µs)	I_{max}	10kA		
Maximum load current	I_L	350mA	180mA	
Protection stages		Multistage		
Voltage protection level @ 1kV/µs	U_p	<150V	<30V	
Maximum frequency	f_c	20MHz		
Series resistance		8.2Ω	17Ω	

Mechanical Specifications				
Operating temperature / humidity	-40 to +85°C / 5 to 95% non-condensing			
Connection type	KRONE LSA-PLUS®			
Environmental	IP 20			
Mounting	KRONE LSA-PLUS®			
Enclosure / colour	ABS / black			
Weight	6.5g	150g	6.5g	150g

Dimensions				
Width	9.4mm	125mm	9.4mm	125mm
Height	21mm	18mm	21mm	18mm
Depth	36mm	42mm	36mm	42mm

Standards Compliance

ITU-T K.44
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21
UL497B
A-tick

Note: KRONE-LSA® is a trademark of KRONE, GmbH, Germany

RJ Modular Plug Protection

Novaris Modular Plug provides protection for twisted pair telecommunication services suitable for telephones, FAX, dial-up, ISDN and DSL modems.



MPP - RJ12

Product Series

Connector Type

MPP-RJ12-1

MPP-RJ12-2

MPP-RJ45

MPP-RJ12-i

MPPRJ12-Bi

Electrical Specifications				
Connection type		Series		
Modes of protection		Transverse and common		
Number of pairs		1	2	1
Maximum continuous voltage	U_c	200VDC		
Maximum discharge current (8/20 μ s)	I_{max}	10kA		50kA
Maximum load current	I_L	350mA		180mA
Protection stages		Multistage		
Voltage protection level @ 5kV (10/700 μ s)	U_p	<150V		<30V
Maximum frequency		20MHz		
Series resistance		8.2 Ω		17 Ω

Standards Compliance
AS/NZS 4117
AS/ACIF S002
AS/NZS 60950
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC 61643-21
UL497B
A-tick

Mechanical Specifications			
Operating temperature / humidity	-40 to +85°C / 5 to 95%		
Connection type	RJ12	RJ45	RJ12 / Screw terminal
Environmental	IP 20		
Enclosure / colour	Aluminium / black		
Weight (packed)	100g		

Dimensions (enclosure only)	
Width	26mm
Height	26mm
Depth	90mm

SLD - Hardwired

Novaris hardwired high energy multistage transient protection for highly exposed circuits.



SLD 1 - [SIG] - [*]

Product Series
Pairs

Options
Signal Type

		SLD1	SLD2	SLD4
Electrical Specifications				
Connection type		Series		
Modes of protection		Transverse and common modes		
Number of pairs		1	2	4
Maximum discharge current (8/20µs)	I_{max}	20kA		
Protection stages		Multistage		
Mechanical Specifications				
Operating temperature / humidity		-40 to +85°C / 5 to 95% non-condensing		
Connection type		2.5mm ² pluggable		
Environmental		IP 20		
Mounting		TS35 DIN rail		
Enclosure / colour		Metal / Black		
Weight		250g	300g	400g
Dimensions				
Width		19.5mm	29mm	49mm
Height		95mm		
Depth		78mm		
Options [*]				
Maximum load current 2A	I_L	2		

Standards Compliance
ITU-T K.44
AS/NZS 1768
AS4117
BS 6651
CP 33
IEC 61643-21
UL497B
A-tick

		PSTN	DH	485	7v5	18	36	68
Signal Type [SIG] Electrical Specifications								
Maximum Continuous Voltage (DC)	U_c	200V	34V	8V	7V	18V	36V	68V
Maximum Continuous Voltage (AC)	U_c	-	24V	6V	5V	11V	24V	46V
Impulse Voltage 1.2/50µs	U_p	-	50V	15V	8V	19V	40V	76V
Voltage Protection Level @ 1kV/µs	U_p	<130V	-					
Maximum Load Current	I_L	250mA	500mA		250mA			
Line Resistance		8.2Ω	3.9Ω		8.2Ω			
3dB Frequency @ 50Ω		20MHz	10MHz		250kHz			



SIP Surge Indicator Panel

Novaris Surge Indicator Panel allows remote monitoring of any Novaris product featuring external alarms. Visual and audible indicators provide at-a-glance surge protection status. Designed to fit in standard 72mm panel meter cutouts, integration into switchboards is simple.

Product Series SIP - 230 Nominal voltage

SIP-110

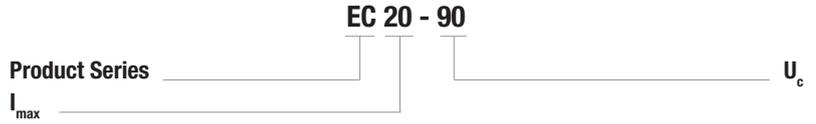
SIP-230

Electrical Specifications			
Nominal voltage	U ₀	110V / 60Hz	230V / 50Hz
Display		LED power and status	
Alarm		SPDT contacts	
Alarm isolation to active circuitry		4kV	
Mechanical Specifications			
Operating temperature / humidity		-40 to +70°C / 5 to 95%	
Connector type		2.5mm ² polarised plug	
Terminal screw torque		0.5Nm	
Environmental		IP 20	
Mounting		Flush panel mount	
Panel cut-out		68mm x 68mm	
Weight		200g	
Dimensions			
Width		72mm	
Height		72mm	
Depth		55mm	



EC Earth Clamp 20kA

Novaris EC provides a means to electrically clamp different earthing systems during transient disturbances. Applications include computer rooms and in the bonding of cable sheaths to ground where direct bonding would introduce interference and “earth loops”.



- EC20-90
- EC20-230
- EC20-350
- EC20-600
- EC20-1000

Electrical Specifications						
Active element		Gas Discharge Tube (GDT)				
DC spark over voltage	U_c	90V	230V	350V	600V	1000V
Voltage tolerance		± 20%				
Discharge current 8/20µs	I_{max}	20kA				
Isolation resistance		>10 ¹⁰ Ω				
Capacitance		<2pF				

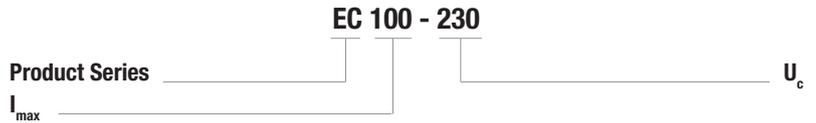
Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing
Connection type	6mm ² flying leads
Environmental	IP 65
Weight	160g

Dimensions	
Body diameter	20mm
Body length	60mm
Lead length	500mm each

Standards Compliance
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC61643

EC Earth Clamp 100kA

Novaris EC provides a means to electrically clamp different earthing systems during transient disturbances. Applications include computer rooms, defence installations and gas pipeline insulated joints.



EC100-230

EC100-350

EC100-500

EC100-1000

Electrical Specifications					
Active element		Gas Discharge Tube (GDT)			
DC spark over voltage	U_c	230V	350V	500V	1000V
Voltage tolerance		± 20%			
Discharge current 8/20 μ s	I_{max}	100kA			
Isolation resistance		>10 ¹⁰ Ω			
Capacitance		<4pF			

Mechanical Specifications	
Operating temperature / humidity	-40 to +70°C / 5 to 95% non-condensing
Connection type	10mm ² flying leads
Environmental	IP 65
Weight	200g

Dimensions	
Body diameter	30mm
Body length	100mm
Lead length	500mm each

Standards Compliance
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33
IEC61643 Class 1



EKIT Cable Bonding Kit

Novaris Cable Bonding Kits are used to bond the shields of coaxial feeders and wave guides on communication towers and at cable entry points to communications buildings.

EKIT - 012

Product Series _____ Cable size _____

EKIT-014

EKIT-038

EKIT-012

EKIT-078

EKIT-158

Standards Compliance
AS/NZS 1768
IEEE C62.41
BS 6651
CP 33

Electrical Specifications					
Connection type	Cable clamp				
Sheath connection	25mm braid				
Earth connection	900mm 6mm ² flying lead				
Cable sealing	Self amalgamating upper and lower seals				
Coaxial cable size	1/4"	3/8"	1/2"	7/8"	1 5/8"



TSC Transient Surge Counter

Novaris Transient Surge Counters count direct lightning strikes and transient events. They may be clamped to the downconductor of a building or tower or in the earth return conductor of a surge diverter or filter. The EC version also acts as a transient earth clamp.



		TSC1-IP65	TSC1-DIN	TSC1-DIN-EC
Electrical Specifications				
Sensitivity			150A	
DC spark over voltage	U_c	-		230V
Discharge current 8/20 μ s	I_{max}	-		150kA
Battery life of counter		7 years		
Display		Resettable, LCD		
Active element		-		GDT
Voltage tolerance		-		$\pm 20\%$
Isolation resistance		-		$>10^{10}\Omega$
Capacitance		-		$<4pF$
Mechanical Specifications				
Operating temperature / humidity		-40 to +70°C / 5 to 95% non-condensing		
Terminal capacity		-		16mm ²
Terminal screw torque		-		2.5Nm
Environmental		IP 65		IP 20
Mounting		Clamp		TS35 DIN rail
Counter connection		-		2-way plug
Weight		400g		600g
Dimensions				
Width		80mm		54mm
Height		110mm		95mm
Depth		65mm		80mm

Standards

Many countries have comprehensive lightning protection standards. As a global provider of lightning and surge protection solutions Novaris strives to provide its solutions in accordance with recognised world standards.

As an Australian company Novaris conforms strictly to the guidelines contained in the Australian and New Zealand standard on lightning protection AS/NZS1768:2007.

Additionally Novaris' solutions and products conform to the relevant IEC standards, notably IEC62305 (Protection against Lightning) and IEC61643 (Low-voltage Surge Protection Devices).

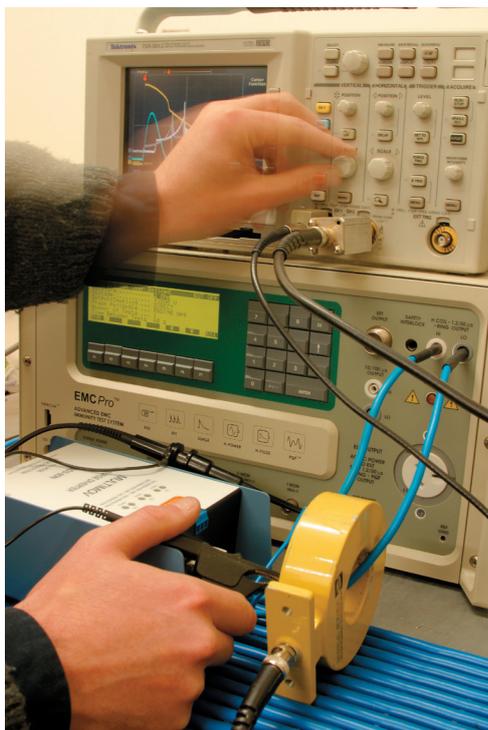
In line with AS/NZS1768:2007, Novaris does not recommend or endorse the use of so called non-conventional lightning 'attraction' or protection systems.

Safety

Because Novaris cares about personnel and equipment safety all our products are subjected to rigorous testing in our laboratory. We are able to generate most of the test waveforms specified in the IEC, Australian and US standards. We can test for temporary overvoltage and high current test series connected or two port SPDs up to 2000A per phase.

Because of the unpredictable nature of lightning transients and the follow on effects of power systems overvoltages, surge protection components can be overloaded and fail catastrophically. For this reason our laboratory is equipped to carry out the most severe of destructive tests.

From years of experience we know that surge protection components can rupture and be subject to excessive heating under fault conditions. It is for this reason that all Novaris power line surge protection products are housed in robust metal enclosures and we recommend that all SPDs be protected with appropriate fuses or circuit breakers in accordance with the relevant standards.



Historically, lightning protection consulting only concentrated on the protection of buildings and structures. Little thought was ever given to protecting against the indirect effects of lightning strikes which causes damage to equipment, regardless of whether structural protection is present or not. It was simply assumed that structural lightning protection would protect everything.

This is far from being the case, and protection against the indirect effects of a lightning strike is often more important than structural protection.

When it is considered that many modern buildings with steel frames and metal sheet roofing are inherently self protecting, it is regrettable to see structural lightning protection added for absolutely no reason, particularly when the indirect protection has been completely ignored.

Fortunately this situation is now recognised and both the IEC and the Australian and New Zealand lightning protection standards present risk assessment procedures capable of clearly defining the need for both structural and surge (or indirect) protection. The IEC standard (IEC62305-2) recognizes the need for both structural and surge protection but mandates that structural protection is necessary whenever surge protection is needed (Figure 1). The Australian and New Zealand standard (AS/NZS1768:2007) allows surge protection in the absence of structural protection (Figure 2). This is entirely rational.

Any lightning protection design should first start with a risk assessment. If structural protection is required, first determine if the structure is self protecting before following the procedures in the standards.

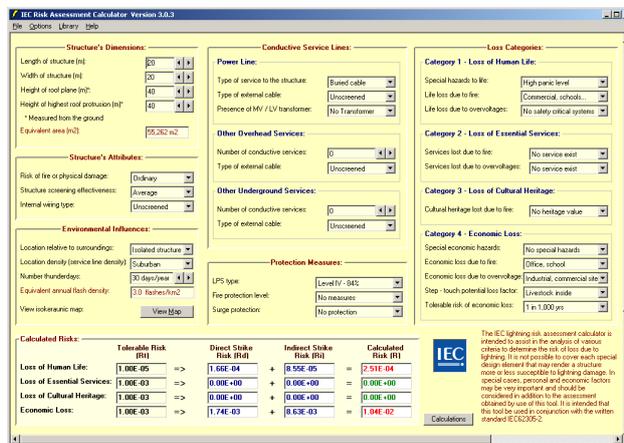


Figure 1. IEC Risk Assessment Procedure (from IEC62305-2)

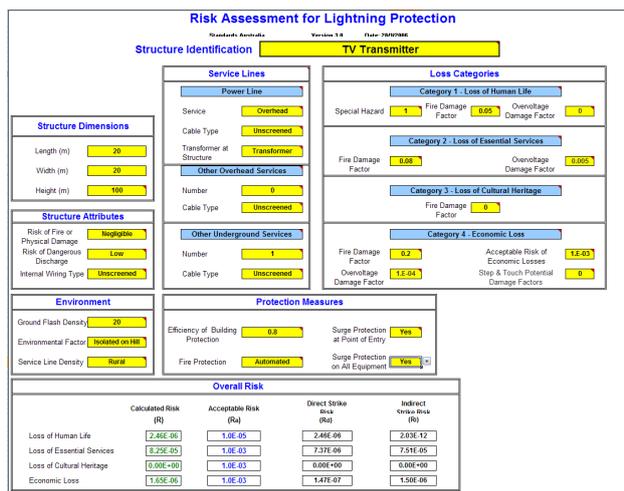


Figure 2. Australian and New Zealand Standard Risk Assessment Procedure (from AS/NZS1768:2007)

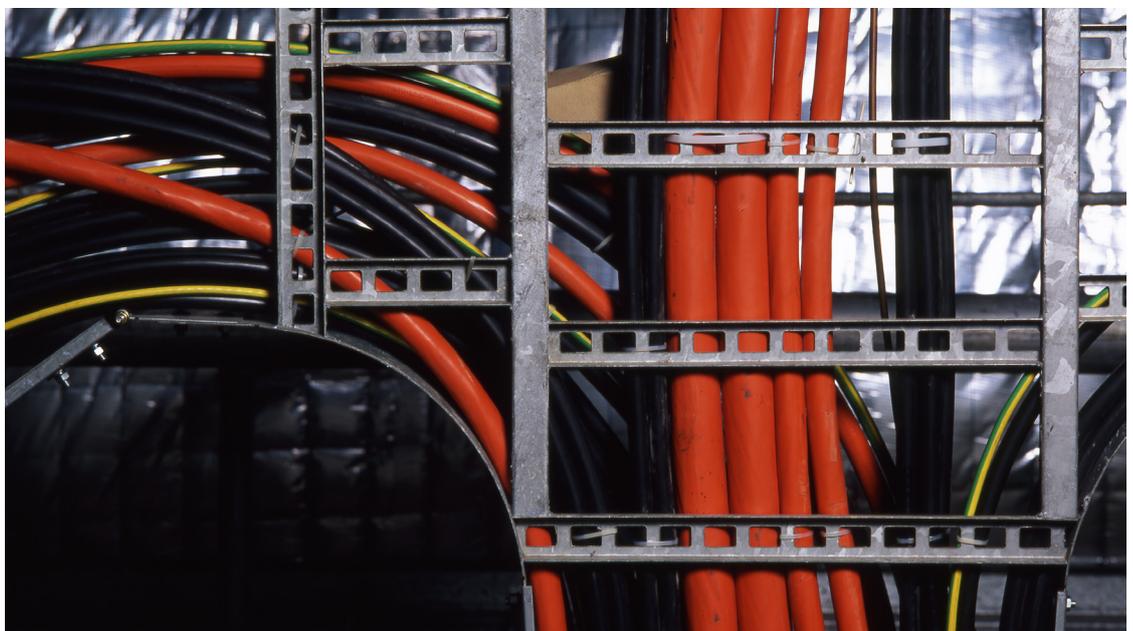
The ratings of primary and secondary surge protection can be obtained from the Australian Standard. AS/NZS1768:2007 makes specific recommendations for the surge ratings of surge protection devices. **Figure 3** is taken from this standard.

RECOMMENDED SURGE RATINGS FOR A.C. POWER SYSTEM SPDs PER PHASE			
AS1768 Category	IEC 61643-1 Classification	SPD location	I _{max} ratings
A	Type III	Long final subcircuits and electricity supply outlets	3-10kA
B	Type II	Major submains, short final subcircuits and load centres	10-40kA
C1	Type I, II	Service entrance, other than below	40kA
C2	Type I	Service entrance, building fed by long overhead service lines, or is a large industrial or commercial premises	40-100kA
C3	Type I	Service entrance, building in a high lightning area, or fitted with a LPS	100kA

Figure 3. Table 5.1 from AS/NZS1768:2007, IEC 61643-1 Type classification addition

The above table recommends that for main switchboards at sites fitted with a lightning protection system, or fed with long overhead power lines, the surge rating of primary LV arresters (per phase) should be at least 100kA for an 8/20µs impulse. Product lifespan, redundancy and improved let through voltages are benefits to be taken into consideration when selecting products with a higher I_{max} rating.

All SPDs should be installed in accordance with AS4070, or the equivalent wiring standard for that country, and be connected between each phase and neutral. At switchboards where there is no MEN, neutral-earth protection is also required. The neutral-earth protection is generally provided by means of a high energy gas discharge tube (GDT), with I_{max} = 100kA.



Secondary protection generally requires a lower surge rating. Sub-boards within buildings can be regarded as occupying location category B and surge ratings around 40kA are suitable. The most appropriate surge protector for these applications is a series connected device, either a series surge protector or surge filter. These will require all mode protection since there is unlikely to be an MEN link in the equipment cabinet.

The normal configuration of primary and secondary protection would be shunt surge diverters as the primary protection and suitably rated series protection devices as secondary protection in the sub or distribution boards.

At sites where primary and secondary protection is required, yet the cable length from MSB to equipment is short (typically less than 10m), a surge filter protecting the whole site should be considered. This would have the appropriate category C surge rating plus an LC filter and a final stage of category B surge protection. The series inductance “builds out” (artificially lengthens) the line. The above is appropriate for small sites such as cellular basestations, TV translators, remote telemetry field sites etc.

At installations with an MSB and a number of distribution boards, such as a multi-storey building, primary and secondary protection should be provided. The primary protection would comprise shunt connected surge diverters fitted to the main switchboard. These provide a path to earth, via the neutral, for the surge energy.

Note: These SPDs are wired from phase to neutral in accordance with the IEC and other standards. In countries employing the MEN system the MEN link provides the neutral to earth path. In other countries the neutral to earth connection may be via a high energy gas discharge tube (GDT).

The effectiveness of this primary protection depends upon how it is installed. In large switchboards long shunt leads are unavoidable and the voltage let through by such primary protection is unlikely to be low enough to provide effective protection for sensitive loads. It is generally sufficient to protect the switchboard. For this reason secondary protection is recommended.

Surge filters provide the best protection and are recommended to protect electronic and computing equipment. Being series connected these eliminate the degradation caused by long shunt connected leads; and with an inbuilt low pass LC filter their let through voltage (U_p), is low enough to protect the most sensitive electronic equipment.

Effective surge protection is highly dependant upon installation practices. All Novaris products are supplied with detailed installation instructions to ensure they are installed correctly. The following diagrams show examples of power line surge diverter and surge filter installations.

Surge Diverter – Main Switchboard (Figure 4)

Install protection:

- Downstream of the main switch.
- Upstream of all equipment including earth leakage devices where possible.
- Protect with product recommended HRC fuses.
- Keep lead lengths as short as possible to improve let-through voltage.

MEN systems - install single mode (L-N) protection as close to the MEN link as possible.

Non-MEN systems - install all mode (L-N, L-PE, N-PE) protection.

Surge Filter – Distribution Board (Figure 5)

Install all mode protection:

- Downstream of main switch.
- Upstream of all equipment, including earth leakage devices where possible.
- Protect with product recommended HRC fuses where possible or circuit breaker, with current rating less than or equal to the load current rating of the filter.
- Keep output cables away from input cables.

Surge Diverter – Distribution Board (Figure 6)

Install all mode protection:

- Downstream of main switch.
- Upstream of all equipment, including earth leakage devices where possible.
- Protect with product recommended HRC fuses where possible or circuit breakers.
- Keep lead lengths as short as possible to improve let-through voltage.

Surge Filter – Final Circuit / Equipment (Figure 7)

Install all mode protection:

- Downstream of fuses or circuit breaker with current rating less than or equal to the load current rating of the filter.
- As close to the equipment as possible.
- Keep output cables away from input cables.

For further details see individual product installation instructions.

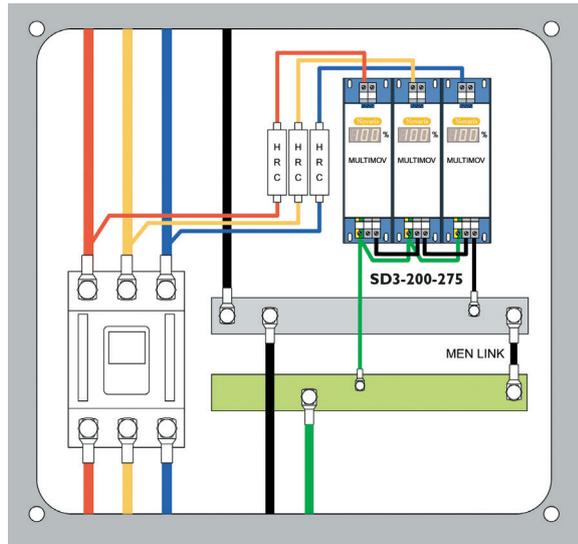


Figure 4. Surge Diverter - Main Switchboard.

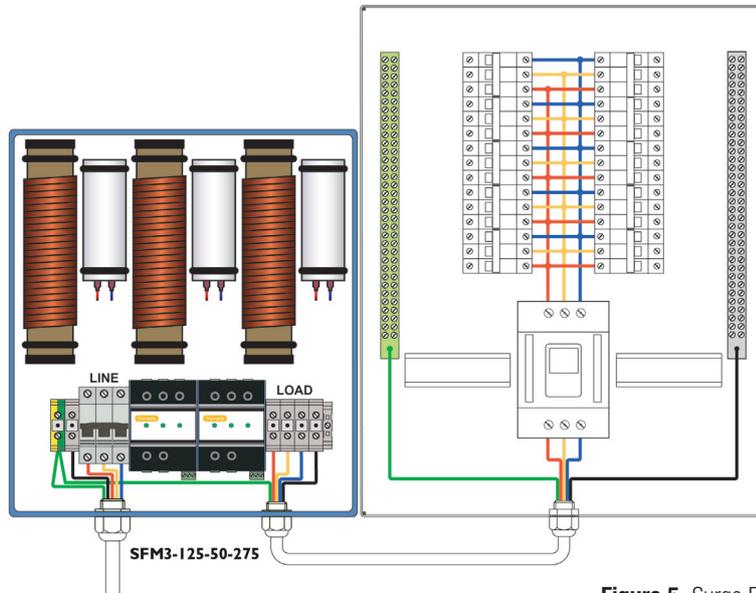


Figure 5. Surge Filter – Distribution Board.

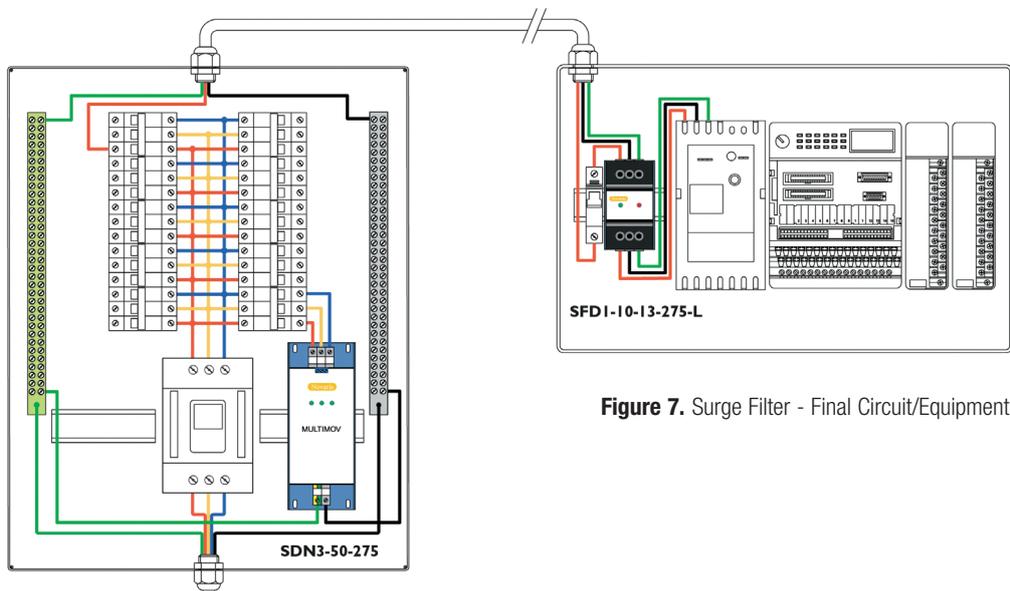


Figure 6. Surge Diverter – Distribution Board.

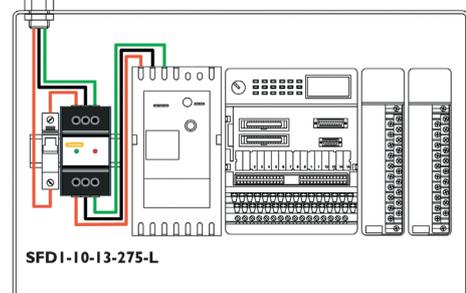


Figure 7. Surge Filter - Final Circuit/Equipment.

Table 1 outlines some of the most common signalling protocols along with the Novaris surge protection product best suited to your application. For other signalling protocols please contact Novaris to discuss your protection requirements.

Protocol	Signal Type	Novaris Product		
I/O	± 5 VDC, < 250kHz	SL7v5-G	SLT1-7v5	
I/O	± 12 VDC, < 250kHz	SL18-G	SLT1-18	
I/O	± 24 VDC, < 250kHz	SL36-G	SLT1-36	
I/O	± 48 VDC, < 250kHz	SL68-G	SLT1-68	
I/O	0-20mA / 4-20mA	SL420-G	SLT1-36	
I/O	RS-232	DB9-RS232	DB25-RS232	SL-DH
I/O	RS-422	SL485-EC90 (x2)	DB9-RS485	
I/O	RS-452	SL485-EC90 (x2)	DB9-RS485	
I/O	RS-485	SL485-EC90	DB9-RS485	
I/O	1-Wire	SL485-EC90	DB9-RS485	
10/100/1000BaseT	Ethernet	UTP-RJ45-xCAT6		
AS-i	32 VDC 1-pair	SL36-G	SLT1-36	
BACnet	ARCNET / Ethernet / BACnet/IP	UTP-RJ45-xCAT6		
BACnet	RS-232	DB9-RS232	DB25-RS232	SL-DH
BACnet	RS-485	SL485-EC90	DB9-RS485	
BitBus	RS-485	SL485-EC90	DB9-RS485	
CAN Bus (Signal)	5 VDC 1-Pair	SL485-EC90	DB9-RS485	
C-Bus	36 VDC 1-pair	SSP6A-38		
CC-Link/LT/Safety	RS-485	SL485-EC90	DB9-RS485	
CC-Link IE Field	Ethernet	UTP-RJ45-xCAT6		
CCTV	Coaxial	CLB-MF-10		
CCTV	Power over Ethernet	UTP-RJ45-xPoE		
ControlNet	Coaxial	CLB-MF-10		
DALI	Digital Serial Interface	SL36-G	SLT1-36	
Data Highway/Plus	RS-485	SL485-EC90	DB9-RS485	
DeviceNet (Signal)	5 VDC 1-Pair	SL7v5-G	SLT1-7v5	
DF1	RS-232	DB9-RS232	DB25-RS232	SL-DH
DirectNET	RS-232	DB9-RS232	DB25-RS232	SL-DH
DirectNET	RS-485	SL485-EC90	DB9-RS485	
Dupline (Signal)	5 VDC 1-Pair	SL7v5-G	SLT1-7v5	
Dynalite	DyNet	UTP-RJ45-xPoE		
EtherCAT	Ethernet	UTP-RJ45-xCAT6		
Ethernet Global Data	Ethernet	UTP-RJ45-xCAT6		
Ethernet Powerlink	Ethernet	UTP-RJ45-xCAT6		
FIP Bus	RS-485	SL485-EC90	DB9-RS485	
FINS	Ethernet	UTP-RJ45-xCAT6		
FINS	RS-232	DB9-RS232	DB25-RS232	SL-DH
FINS	DeviceNet (Signal)	SL7v5-G	SLT1-7v5	
FOUNDATION Fieldbus H1	32 VDC 1-pair	SSP6A-38-G	SLT1-36	
FOUNDATION Fieldbus HSE	Ethernet	UTP-RJ45-xCAT6		
GE-SRTP	Ethernet	UTP-RJ45-xCAT6		
HART	4-20mA + HF Data	SL-DH		
HostLink	RS-232	DB9-RS232	DB25-RS232	SL-DH
HostLink	RS-422	SL485-EC90 (x2)	DB9-RS485	
Interbus	RS-485	SL485-EC90	DB9-RS485	
ISDN	PSTN	SL-PSTN	KP1/10/i	MPP-RJxx
KNX TP0/1	30 VDC 1-pair	SL36-G	SLT1-36	
KNXnet/IP	Ethernet	UTP-RJ45-xCAT6		
Load Cell	Wheatstone Bridge	LCP-36		
MODBUS	RS-485	SL485-EC90	DB9-RS485	
MODBUS TCP	Ethernet	UTP-RJ45-xCAT6		
P-Net	RS-485	SL485-EC90	DB9-RS485	
PieP	Ethernet	UTP-RJ45-xCAT6		
Power over Ethernet	Power over Ethernet	UTP-RJ45-xPoE		
Process Bus (P-Bus)	RS-485	SL485-EC90	DB9-RS485	
Profibus DP/FMS	RS-485	SL485-EC90	DB9-RS485	
Profibus PA	32 VDC 1-pair	SL36-G	SLT1-36	
Profinet IO	Ethernet	UTP-RJ45-xCAT6		
PSTN	POTS	SL-PSTN	KP1/10/i	MPP-RJxx
S-Bus	32 VDC 1-pair	SL36-G	SLT1-36	
Sercos III	Ethernet	UTP-RJ45-xCAT6		
Sinec H1	Ethernet	UTP-RJ45-xCAT6		
SynqNet	Ethernet	UTP-RJ45-xCAT6		
TTEthernet	Ethernet	UTP-RJ45-xCAT6		
xDSL	PSTN	SL-PSTN	KP1/10/i	MPP-RJxx

Ph	Phase
I_{imp}	Defined by three parameters, a current peak value, a charge and a specific energy. Generally relates the IEC definition of a direct lightning strike modelled by a 10/350 μ s waveshape. This is used for the classification of SPDs for test class I in accordance with IEC61643-1.
Q	Charge contained in a test waveform. Expressed in coulombs (As).
W/R	Specific Energy relating to a test waveform. Expressed in kJ/ μ s.
I_{max}	Defined as the peak value of a current through the SPD having an 8/20 μ s waveshape. This is used for the classification of SPDs for test class II in accordance with IEC61643-1. This is generally recognized for MOV based SPDs as the single shot impulse rating.
I_n	Defined as the peak value of a current through the SPD having an 8/20 μ s waveshape. This is used for the classification of SPDs for test class II in accordance with IEC61643-1. This is known 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 or DC current that can be supplied to a load connected 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 is called the follow-on current and is particularly applicable to voltage switching type SPDs such as spark gaps and gas discharge tubes.
I_{fi}	Follow-on current interrupting rating. This is the maximum AC RMS current that a voltage switching SPD such 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.
ΔU	Voltage drop of a two port SPD at rated current expressed as a percentage of U_0 .
f_c	The maximum usable frequency.



Novaris

Distributed By
Alpha Power System Pty Ltd
Unit 18, 30 Heathcote Rd
Moorebank NSW 2170
Australia
Ph. 61-2-9602 8332
Webste: www.alphapower.com.au