

LPI PRODUCT Summary Brochure





Lightning Protection International Pty Ltd

Lightning Protection International Pty Ltd is a fully owned Australian manufacturer and supplier of direct strike lightning, surge and transient protection equipment and earthing products to a wide range of industries throughout the world.

LPI personnel and their associates have combined experience over many years in servicing customers throughout the world on many types of projects in some of its most lightning prone areas. Our personnel have vast experience in providing direct strike area protection, surge and transient protection and earthing solutions. Our extensive experience has involved risk management, system design, training, certification and installation and commissioning in key industry groups such as:

- Telecommunications and Broadcasting
- Petrochemical, oil & gas
- Highrise buildings and hotels – all types of structures
- Sporting centre and grounds – Golf courses, race tracks, stadiums
- Aviation - Civil & Military
- Mining – coal, gold, nickel, iron, copper, bauxite etc.
- Industrial facilities of all kinds
- Defence – communications, surveillance and storage of armaments
- Power generation and distribution
- Rail / transport systems
- Monuments / Ecological sites

Guardian CAT terminal has been developed utilising the latest field and research data.

LPI Product Offering

Lightning Protection International Pty Ltd offers a comprehensive range of products and services as part of its complete solution to your lightning problems. These products cover direct strike protection, surge and transient protection and earthing solutions.

- Range of lightning air terminals and accessories
- Surge and transient protection products for powerlines, data, communications and signal lines
- EXOWELD range of exothermic welding products
- Earth rods and accessories including earth enhancing compounds

LPI's Guardian™ System 5

LPI offers a family of air terminals and accessories. Our product design is based on the most recent advances in the field whilst maintaining proven principles associated with the successes of the past.

LPI's Guardian™ System 5 provides a purpose-designed package for direct lightning protection.

1. A Family of LPI CAT (Controlled Advanced Triggering) series air terminals.
2. A Fibreglass Reinforced Plastic (FRP) mast which provides an insulated mast for mounting of LPI CAT series air terminals.
3. A purpose designed LPI High Voltage Shielded Cable (HVSC) specifically designed for the conveying of lightning energy to ground. Alternatively, depending on the local codes and applications, other materials such as flat copper tape or stranded cable may be used.
4. LPI Lightning Strike Recorder (LSR) which confirms system efficiency and effectiveness.
5. An earthing system consisting of earth rods, clamps, copper tapes and earth enhancing compounds such as LPI Ground Resistance Improvement Powder (GRIP) or LPI Reslo.

The LPI Guardian™ System 5 provides a safe and efficient system for the protection of your facility from direct lightning strikes. The LPI CAT terminal captures the lightning discharge at a preferred point and the energy is transferred to ground via the High Voltage Shielded Cable with minimal risk of electrifying the structure. Once the energy enters the dedicated lightning earth, it is safely dissipated without risk to personnel and equipment.



Terminals

LPI Guardian™ CAT series terminals consist of

- A finial with a blunt tip
- An electrically “floating” medium consisting of 4 electrically isolated panels
- A triggering procedure which allows for an intercepting streamer to be released at the correct time, thus providing the greatest possible area of protection
- A high voltage connection at the base of the finial

LPI offers Guardian CAT Terminal in both **Anodised Aluminium** and **Stainless Steel**.

CAT **XXYY - ZZ**

XX: CAT terminal model. Model I, II and III

YY: Blank for standard version, **GI** for 2 inch BSP GI Pipe adaptor

ZZ: **G** for Gold (anodised aluminium) Model, **SS** for Stainless Steel Model (only for I & II)



What is lightning?

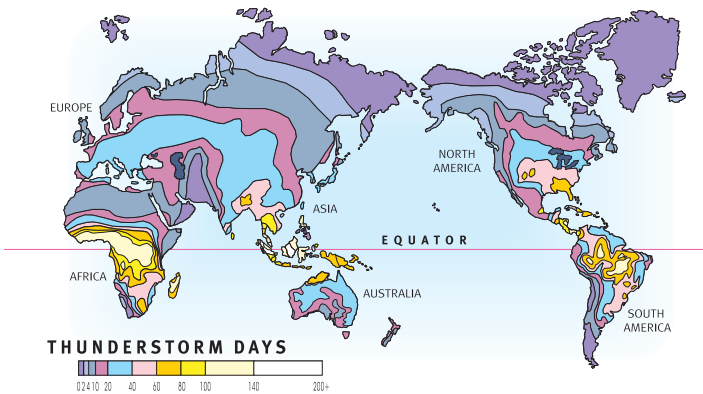
Lightning initiates from an electrical storm which usually generates within a cumulonimbus cloud.

When electrical energy has built up within such a cloud a “leader” of energy leaves it and will try to attach itself to a point on the ground which contains the most particles of energy of reverse polarity.

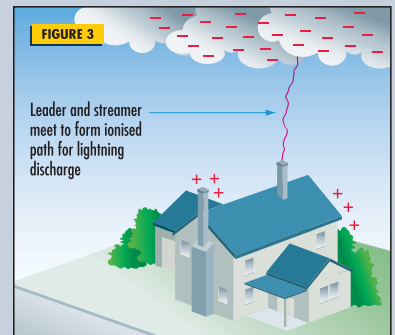
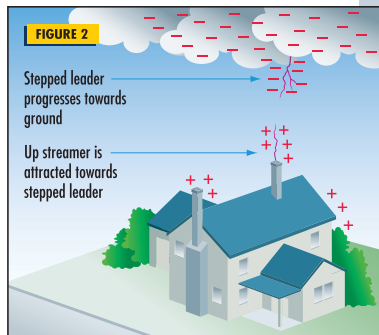
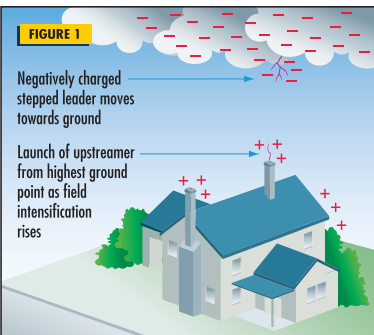
Some 90% of such “leaders” contain negative charges.

It has long been the endeavour of lightning protection specialists such as LPI to create a preferred point of attachment as offered by the LPI Guardian terminal and in more recent times, to do so effectively so that larger areas of protection can therefore be provided from a single lightning terminal.

WORLD THUNDERSTORM DAYS



Typical formation of lightning



Principles of the LPI Guardian™

The LPI Guardian™ CAT series are Controlled Advanced Triggering devices which intercept lightning discharges for the safe passage to a low impedance down-conductor system. The Guardian™ terminals have been designed to emit a “streamer” of ionised air at precisely the right time so that an approaching “down leader” is intercepted and brought under control.

The concept of controlled triggering is important because if a “streamer” is launched too early the median or ambient field will not be strong enough to sustain propagation and the “streamer” will stall or die. This will leave space charge behind which may inhibit future “streamer” development. An electric field of $\sim 3\text{MV/m}$ is essential at the tip of the air terminal to initiate a corona streamer but an electric field of $\sim 300\text{kV/m}$ is needed in the region between the air terminal and the down-leader to convert the streamer into an up-leader and to sustain propagation.

The dynamic response of the Guardian terminals to the approach of a lightning down leader is the key – detrimental space charge generation prior to leader approach is suppressed and the Guardian™ launches its streamer at the correct time to ensure both electric field criteria are met thus giving the greatest possible area of protection.



DIRECT STRIKE PROTECTION



Ordering Code	Description
CAT I-G	CAT Terminal, Gold, Model I
CAT II-G	CAT Terminal, Gold, Model II
CAT III-G	CAT Terminal, Gold, Model III
HVSCPLUS-PM	High Voltage Shielded Cable - per metre
LSR1	Lightning Strike Recorder
LSR1-Tester-MK1	Lightning Strike Recorder Tester

*Stainless steel Guardian CAT terminals available upon request.
 *2 inch GI versions of Guardian CAT terminals available on request.



Ordering Code	Description
STORMMASTER-ESE-15	Stormmaster, ESE 15, Air Terminal, Gold
STORMMASTER-ESE-30	Stormmaster, ESE 30, Air Terminal, Gold
STORMMASTER-ESE-50	Stormmaster, ESE 50, Air Terminal, Gold
STORMMASTER-ESE-60	Stormmaster, ESE 60, Air Terminal, Gold
STORMMASTER-TESTER	Stormmaster ESE Air Terminal Tester

* Stainless steel Stormmaster ESE terminals available upon request.
 *2 inch GI versions of Stormmaster ESE terminals available on request.

Guardian Lightning Protection System 5

- LPI's Guardian System 5 provides a purpose designed package for direct strike lightning protection
- Family of Controlled Advanced Triggering Terminals (CAT) with the design based on the latest research
- High Voltage Shielded Cable Plus (HVSC Plus) is a purpose designed insulated downconductor which greatly reduces the risk of side flashing, tested to 500kV
- Lightning Strike Recorder (LSR1) to effectively count strikes captured by the Guardian System
- The Guardian System 5 is economical and simple to install
- Installations in over 70 countries worldwide
- Tested in compliance to IEC Test Standard: IEC 60-1:1989



Stormmaster ESE Air Terminal

- LPI offers a selection of models from within its ESE range of terminals
- All terminals have been tested to standard NFC 17-102 (2011)
- Economical and easy to install



LPI also offers an extensive range of conventional lightning protection products and accessories. Contact LPI or an authorised representative for product details.

Lightning Warning System

LPI's Lightning Warning System is designed for the early warning of an approaching storm front. The LPI LWS sounds an alarm on the approach of a lightning discharge and allows all personnel to take precautionary action to protect themselves from the dangers of a lightning discharge.

Ordering Code	Description
LWS Mk 3	Lightning Warning System Mk III
LWS - Tester	Lightning Warning System Tester

- Suitable applications include – sporting events such as golf and football, mining, defence and explosive environments
- Detects lightning activity within 10 to 25 km
- Warning and alert status
- All clear signal



EARTHING AND BONDING



LPI provides an extensive range of earthing products for the installation of a low impedance earthing system. Whether you are installing a dedicated lightning earth or a facility earth grid it is essential to ensure personnel safety and provide an effective earth which will limit disruptions to services.

Telecommunications Earthing

LPI manufactures a range of specialised telecommunications earthing and lightning protection solutions. The experienced LPI team delivers hassle-free solutions, tailored to each project, with a commitment to holding local stock.

The LPI range includes:

- In-ground earthing
- Feeder Earthing Kits
- Earth Bars
- Surge Protection
- Associated Accessories

All this is backed by exceptional customer service and LPI's strong focus on engineering, research and development which ensure reliable, well supported products of the highest quality.

Earth Rods and Accessories

LPI offers a range of earthing products and accessories as part of its packaged solution for the complete approach to lightning protection. The LPI range includes a complete selection of copper bonded steel earth rods, clamps, tapes, braids and pre-engineered ground grids and meshes.

Contact LPI or an authorised representative for details on the full range of earth rods and accessories.

Earth Enhancing Compounds

LPI offers a selection of earth enhancing compounds for the treatment of soil in and around an earthing system to reduce the soil resistivity and lower ground impedance.

Ground Resistance Improvement Powder (GRIP) is supplied in 10 kg and 40 kg kits and is particularly effective in difficult sites such as sandy soils and rocky ground.

LPI RESLO is an economical treatment compound which is supplied in 20 kg bags and is best suited to sites where excessive soil resistivity is not considered a problem.



HVSC Plus has been tested by a certified, independent high voltage laboratory located at Monash University, Australia. Withstand Voltage $\geq 500kV$

LPI offers a selection of downconductors and fixing accessories.



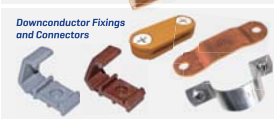
High Voltage Shielded Cable (HVSC Plus)



Flat tapes - Bare, Tinned & PVC Covered



PVC Coated and bare stranded copper cable



Downconductor Fixings and Connectors

Ordering Code	Description
GRIP-10	Ground Resistance Improvement Powder – 10 kg
GRIP-40	Ground Resistance Improvement Powder – 40 kg
RESLO-20	Resistance Lowering Compound – 20 kg Bag
SRIM-20	Soil Resistance Improving Material – 20 kg Bag

• Independent test reports available

Transient Earth Clamp

The LPI Transient Earth Clamp provides equipotential bonding under transient conditions by forming a closed circuit, whilst remaining in "open circuit" under normal operating conditions.

The TEC should be used where separate earthing systems are installed.

Ordering Code	Description
TEC100	Transient Earth Clamp, DC Sparkover voltage $>350V$ DC, Impulse Current (Iimp) 100kA 10/350 μs Max discharge current (I _{max}) 150kA 8/20 μs

Insulated Joint Protector

The LPI Insulated Joint Protector is designed for the protection of insulated joints in oil and gas pipelines. The IJP is connected directly across the insulated joint, should the insulated joint voltage exceed the breakdown voltage of 350V the IJP will immediately conduct the surge current to ground.

Ordering Code	Description
IJP100	Insulated Joint Protector, DC Sparkover voltage $>350V$ DC, Impulse Current (Iimp) 100kA 10/350 μs Max discharge current (I _{max}) 150kA 8/20 μs Type approval: II 2GD EEx m II T3

Key components of a lightning earth include:

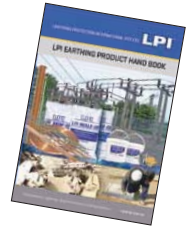
- **Earth Rods** – Copperbonded (threaded or unthreaded), Solid Copper or Stainless Steel



- **Mechanical Clamps and Earth Pits**
Polymer earth pit



- **Earthing Conductor** – Use of flat copper tape is recommended as it provides greater surface contact with the soil mass as opposed to circular or stranded copper conductors



LPI ESE AND CSE / CAT AIR TERMINAL PROTECTION RADIUS CALCULATION

Protection Performance

The protection radius (R_p) of a Stormaster ESE terminal is calculated using the following formula as defined in NF C 17-102 [September 2011], namely:

$$R_p[h] = \sqrt{2rh - h^2 + \Delta[2r + \Delta]} \text{ for } h \geq 5 \text{ m}$$

and

$$R_p = h \times R_{p_5} / 5 \text{ for } 2 \leq h < 5 \text{ m}$$

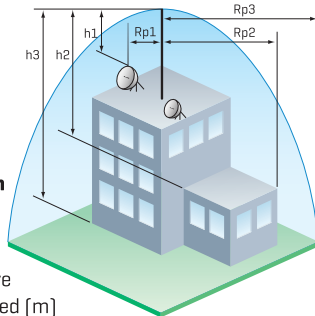
where h = Stormaster height relative to the area being protected (m)

R_{p_5} = value of R_p from Eqn. [1] when $h = 5$ m

- r = 20 m for protection level I (Very High protection)
- 30 m for protection level II (High protection)
- 45 m for protection level III (Medium protection)
- 60 m for protection level IV (Standard protection)

and Δ = Stormaster time and height advantage according to the Stormaster model installed:

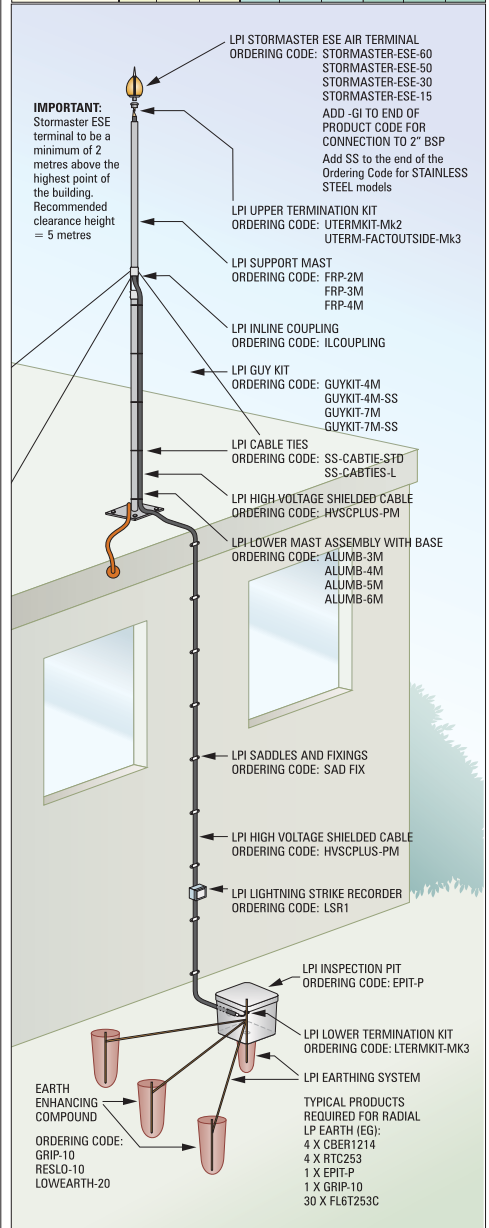
- Choices: Stormaster ESE 15: $\Delta = 15 \mu\text{s}$
- Stormaster ESE 30: $\Delta = 30 \mu\text{s}$
- Stormaster ESE 50: $\Delta = 50 \mu\text{s}$
- Stormaster ESE 60: $\Delta = 60 \mu\text{s}$



The figures in this table are indicative only, a full design should be completed by LPI upon application. All figures represented as metres (m).

Structure height + installed CAT terminal (typically 5m above Structure)	Protection Level - Very High			Protection Level - High			Protection Level - Standard		
	CAT I	CAT II	CAT III	CAT I	CAT II	CAT III	CAT I	CAT II	CAT III
10	38	44	54	52	60	72	69	80	88
20	46	54	66	63	73	89	74	99	109
30	52	62	75	73	84	118	77	113	120
50		75	92		102	124		128	134
80		75	92		115	124		128	134
100		75	92		115	124		128	134
120		75	92		115	124		128	134
150		75	92		115	124		128	134

PROTECTION RADIUS, R_p (m)											
h = height of Stormaster ESE terminal above the area to be protected (m)	2	4	5	6	10	15	20	45	60	80	100
Protection Level I (Very High)											
Stormaster ESE 15	13	25	32	32	34	35	35	35	35	35	35
Stormaster ESE 30	19	38	48	48	49	50	50	50	50	50	50
Stormaster ESE 50	27	55	68	69	69	70	70	70	70	70	70
Stormaster ESE 60	31	63	79	79	79	80	80	80	80	80	80
Protection Level II (High)											
Stormaster ESE 15	15	30	37	38	40	42	44	44	44	44	44
Stormaster ESE 30	22	44	55	55	57	58	59	59	59	59	59
Stormaster ESE 50	30	61	76	76	77	79	79	79	79	79	79
Stormaster ESE 60	35	69	86	87	88	89	89	89	89	89	89
Protection Level III (Medium)											
Stormaster ESE 15	18	36	45	46	49	52	55	60	60	60	60
Stormaster ESE 30	25	51	63	64	66	69	71	75	75	75	75
Stormaster ESE 50	35	69	86	87	88	90	92	95	95	95	95
Stormaster ESE 60	39	78	97	97	99	101	102	105	105	105	105
Protection Level IV (Standard)											
Stormaster ESE 15	20	41	51	52	56	60	63	73	75	75	75
Stormaster ESE 30	29	57	71	72	75	78	81	89	90	90	90
Stormaster ESE 50	38	76	95	96	98	100	102	109	110	110	110
Stormaster ESE 60	43	85	107	107	109	111	113	119	120	120	120



SERIES POWERLINE PROTECTION



Series powerline protection is the best available protection for sensitive electronics such as rectifiers, switchmode power supplies, and other mission critical equipment. The Series Filter reduces the rate of rise of any transient overvoltage to acceptable levels, and also reduces the overall magnitude of the transient voltage the equipment receives.

Low Current Single Phase Filters Location: IEC 61643 Class III

Ordering Code	Description
DLSF-XXA-24V	DIN line surge filter, 1Ph 240Vac, 3 modes of protection, 25kA 8/20µs L-N primary protection, 25kA 8/20µs L-N secondary protection, and 25kA 8/20µs N-E protection.
DLSF-XXA-230V	110Vac version available upon request
DLSF-XXA-385V	
DLSF-XXA-480V	Variants available with 8A, 16A and 20A load current capacity

XX refers to load currents in amps = **8** or **16** or **20**

Please ask for Technical Data Sheet (TDS) on DLSF Surge Filters for more details

Single and Three Phase Surge Filters Location: IEC 61643 Class I, II & III

Standard Surge Filter specifications:

All units can withstand overvoltage and fault conditions in accordance with IEC 61643 requirements. All units incorporate non saturating inductors combined with high reliability capacitors to form an effective low pass filter, incorporating shunt protection elements on the line and load sides.

Standard Surge Filter Order code:

SF X YY A-NE

Where X is number of phases, and YY is circuit current rating per phase.

Other voltages available on request.



Number of Phases X	Current Rating YY	Description
1 or 3	32A, 63A	Surge filter with Class II protection applied P-N, 100kA 8/20µs line side protection, 50kA 8/20µs load side protection per phase. 100kA 10/350µs N-E
1 or 3	125A, 200A	Surge filter with Class I protection applied P-N, 50kA 10/350µs, 135kA 8/20µs line side protection, 50kA 8/20µs load side protection per phase. 100kA 10/350µs N-E
3	315A, 400A, 630A, 800A, 1000A, 1250A, 1500A, 1750A	Surge filter with Class I protection applied P-N, 50kA 10/350µs, 135kA 8/20µs line side protection, 50kA 8/20µs load side protection per phase. 100kA 10/350µs N-E

TELECOMMUNICATION PROTECTION

Din Mount Data and Telephone Line Protectors



- New DD range used directly with EIA standard interfaces RS-232, RS-422, RS-423, RS-485 and with 4-20mA instrumentation loops
- DD-1T single pair telephone line protector is suitable for analogue phone lines, ISDN, ADSL and PCM circuits

Electrical Specifications		DD-06	DD-06-BNC	DD-12	DD-24	DD-48	DD-1T
Nominal Operating Voltage	U_N	6V	6V	12V	24V	48V	Telephone
Max. Continuous Operating Voltage	U_C	6.6V _{DC} 4.7V _{RMS}	6.6V _{DC}	15.6V _{DC} 11.0V _{RMS}	29V _{DC} 20V _{RMS}	62V _{DC} 44V _{RMS}	190V _{DC}
Surge Current rating (8/20µs)	I_{MAX}	20kA					
Operating Current (DC or RMS)	I_L	2A					
Voltage Protection Level @ 3kA (8/20µs)	U_p	16V	16V	28V	60V	120V	240V
Loop Resistance		< 0.1Ω					
Bandwidth		5MHz					
Protection Modes		Line-Line & Line-Ground					
Operating Temperature		-40°C to 60°C					

Application	DD-06	DD-06-BNC	DD-12	DD-24	DD-48	DD1T
RS-232				ü		
RS-422	ü					
RS-485			ü			
Fire Alarm Panels				ü		
Security Systems			ü	ü		
Process Control loops				ü		
C-BUS					ü	
Analogue telephone line						ü
Digital telephone line						ü
CTTV		ü				

TELECOMMUNICATIONS PROTECTION



Telephone and Data Line Protectors

Ordering Code	Description
VHS-K10-72	Very High Speed, 10 Pair, 12 MHz, 8Mbps/s, 72V, a+b+e 20kA 8/20µs, Multistage, Krone, LSA
VHS-K10-230	Very High Speed, 10 Pair, 12 MHz, 8Mbps/s, 230V, a+b+e 20kA 8/20µs, Multistage, Krone, LSA

- Telephone and data line protection
- Multistage / over voltage protection
- Plugs directly into a KRONE* disconnect block

* KRONE, KRONE LSA and PROFIL are registered Trade Marks of KRONE GmbH Germany.

Please add "A" at the end of product code for markets outside of Australia.

Protection of RF Feeder Cables & High Speed Coaxial Cable Data Lines

Ordering Code	Description
RF-NMF-90	RF Protector, 20kA, 72V – 108V, N Type M to F
RF-BNC-90	RF Protector, 20kA, 72V – 108V, BNC Type M to F
RF-NB-90	RF Protector, 20kA, 72V – 108V, N Type F to F (Bulkhead)
RF-NMF-350	RF Protector, 20kA, 280V – 420V, N Type M to F
RF-BNC-350	RF Protector, 20kA, 280V – 420V, BNC Type M to F
RF-NB-350	RF Protector, 20kA, 280V – 420V, N Type F to F (Bulkhead)
RF-NMF-600	RF Protector, 20kA, 480V – 720V, N Type M to F
RF-BNC-600	RF Protector, 20kA, 480V – 720V, BNC Type M to F
RF-NB-600	RF Protector, 20kA, 480V – 720V, N Type F to F (Bulkhead)
CF-90	RF / High Speed coaxial cable data line protector, 90V, 20kA, 75 Ohms
C75-BNC90	CCTV Circuit, 20kA, 90V, 75 Ohm, BNC Type
GSM 7/16F-7/16F	GSM Protector, 20kA, 50V, 50 Ohms, Frequency range 890 – 960 MHz, Female to Female*
GSM 7/16M-7/16F	GSM Protector, 20kA, 50V, 50 Ohms, Frequency range 890 – 960 MHz, Male to Female*

- For protection against transients on coaxial antenna RF feeder cables
- Simple plug in installation
- High impulse rating of 20kA 8/20µs
- Characteristic impedance: 50 Ohms and 75 Ohms where applicable

* 1800 & 1900 MHz versions available on request.



Computer & Data Equipment Protectors

Ordering Code	Description
RS232 9-9 Pin	RS232 9-9 Pin (9 Pin Protected), 50A 10/1000 Wave Shape
RS232 25-9 Pin	RS232 25-9 Pin (9 Pin Protected), 50A 10/1000 Wave Shape
RS232 25-25 Pin	RS232 25-25 Pin (25 Pin Protected), 50A 10/1000 Wave Shape
RS422 25-25 Pin	RS422 25-25 Pin (25 Pin Protected), 50A 10/1000 Wave Shape

- High performance surge protectors for computers, terminals and printers
- Moulded construction
- Low clamping voltage
- Standard RS-232 Male / Female 9 & 25 pin



Local Area Network Protector

Ordering Code	Description
LAN RJ45 Cat6	LAN, RJ45, 100 Base T Protector, Cat 6
POE-RJ45-Cat5	Power over ethernet protector for CAT5 10/100 Base-T data & 48V DC power signals

- Simple plug in operation
- CAT 6 / 1000Mbps application
- Low attenuation
- Compact design



Load Cell Protector

Ordering Code	Description
ILC36V	Load Cell Surge Protector, 4 or 6 wire application, 36V

- Designed for protection of sensitive strain gauge measuring equipment
- Protects against excitation overvoltage
- Low capacitance

Distributed by:



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