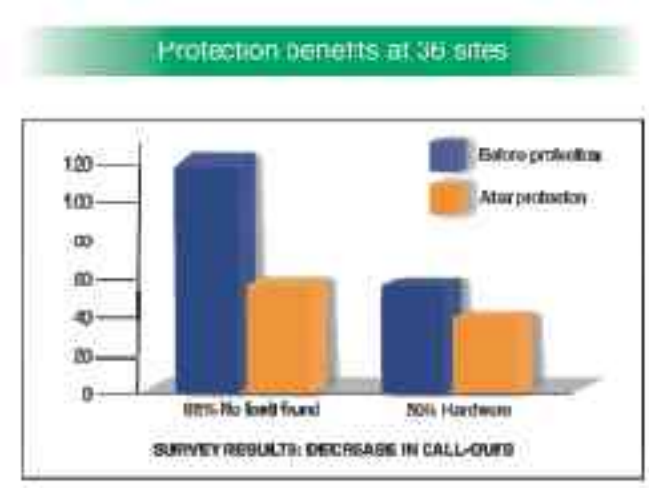
TELECOMMUNICATIONS CATALOGUE

LIGHTNING AND SURGE PROTECTION

WHY SURGE PROTECTION?

Data and voice communication has become vitally important in our modern age. Businesses rely heavily on good communications. Speed and reliability are no longer a “nice to have”, but a necessity. Modern digital PABX equipment has vastly reduced in size over the last decade, but due to miniaturization, has also become increasingly more susceptible to outside interference emanating from induced lightning and electrical noise. The electricity supplier has no control what loads get connected to the grid, thus resulting in transients, surges and spikes which are all a by-product of the electrical system. This interference, if left unchecked, can seriously shorten the life of electronic equipment.

Independent tests conducted on 36 telephone PABX sites depicted a dramatic decrease in reported faults when the correct protection was fitted. This resulted in greater equipment reliability and lower maintenance costs.



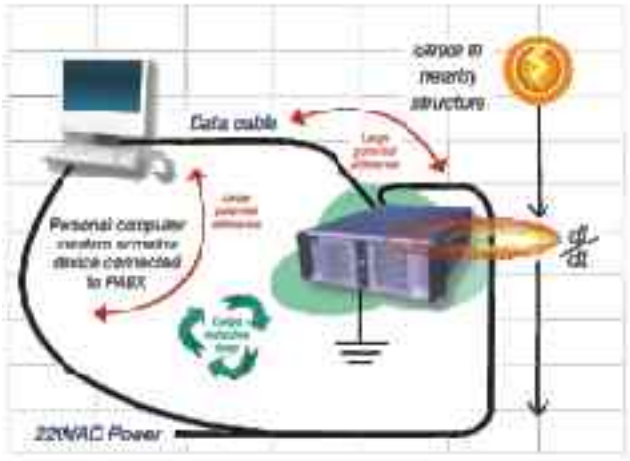
What became apparent in this survey was that a number of unexplained soft faults were caused by power line noise. When the correct protection devices were fitted, these faults no longer occurred.

HOW SURGES ENTER A PABX SYSTEM

Contrary to popular belief, direct strikes account for a very small percentage of damage to electronic systems. The majority of damage is caused by inductive coupling and ground potential differences.

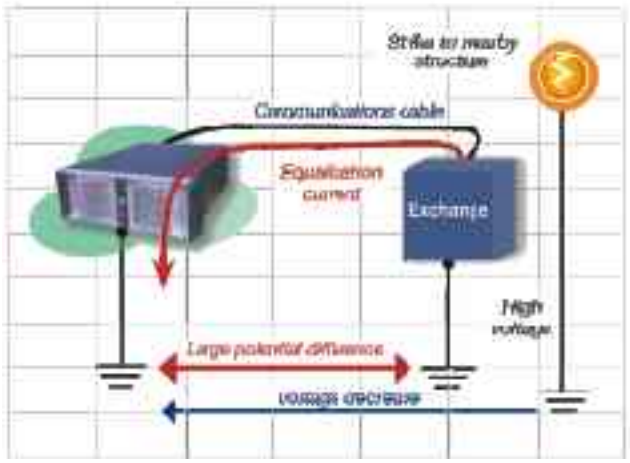
Inductive Coupling

This occurs because the communication line forms part of an inductive loop caused by the communication cable on the one side and the power connection on the other side. Surge currents flowing in the lightning strike produce a change in the magnetic field, which will induce a voltage in the loop. The greater the rate of surge current, the higher the voltage which will be induced in the loop. Equalization will then take place through the equipment on both sides.



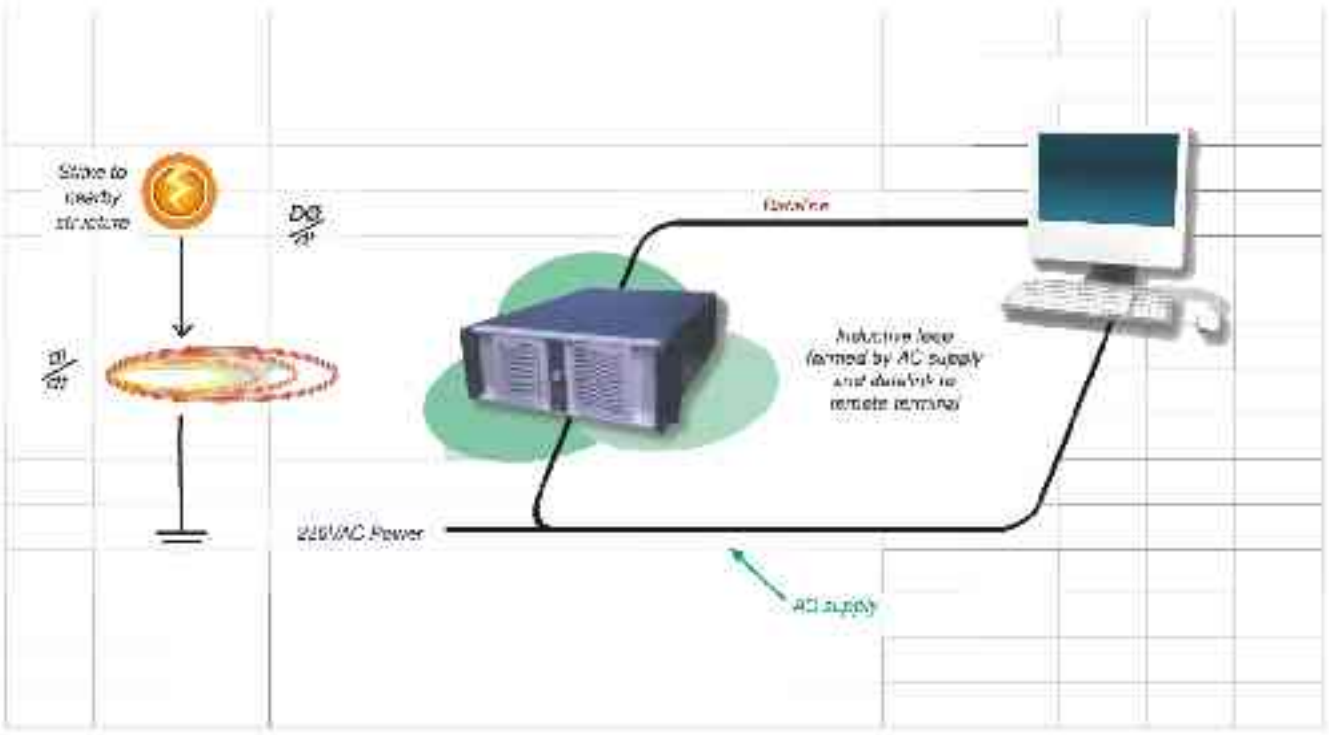
Ground Potential Difference

When two installations in separate buildings are connected via copper communication cables, the equipment will be subjected to a difference in voltage which may exist between the two equipment grounds. Such differences may exist whenever lightning currents are flowing in the earth from nearby strikes, as shown in the diagram. Equalization takes place via communication cables, causing damage to equipment.

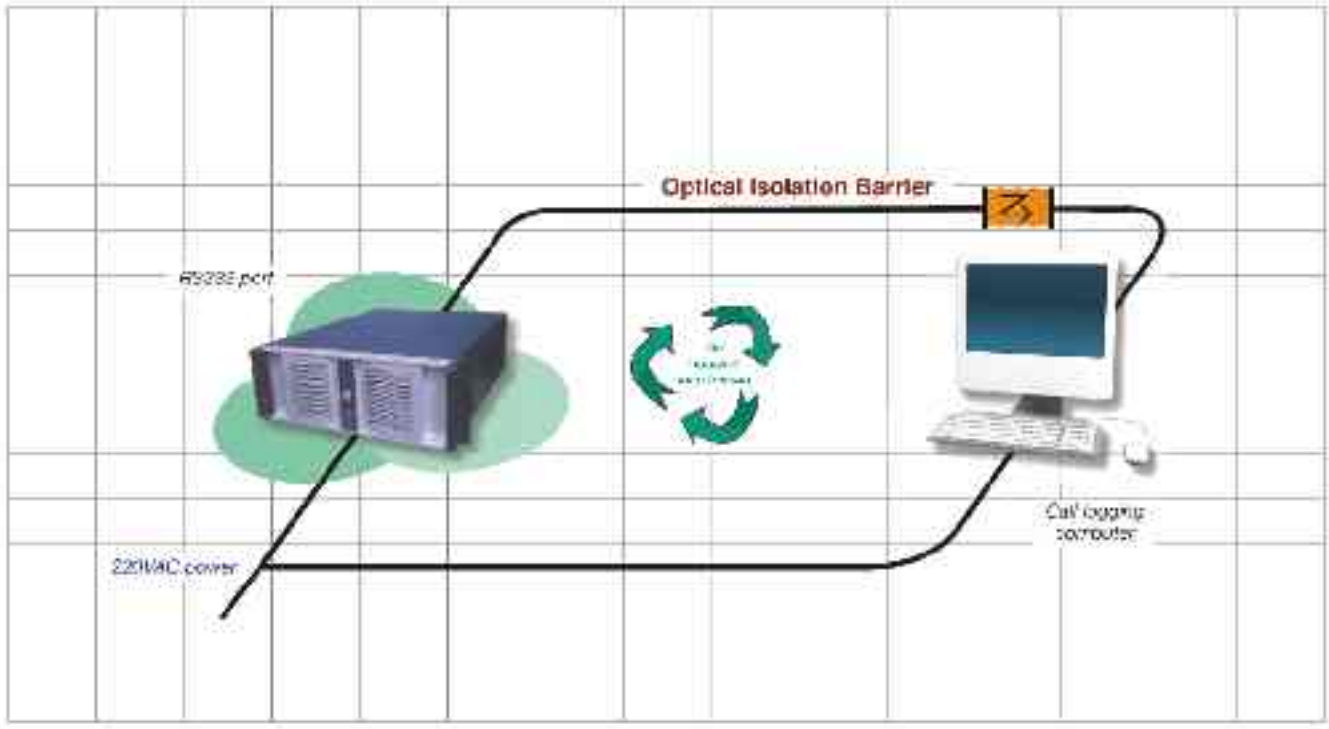


DAMAGE TO TELEPHONE MANAGEMENT SYSTEMS

When call logging computers are attached to modern PABX systems and are located some distance away from the main system, damage may occur due to inductive loops and ground potential differences.



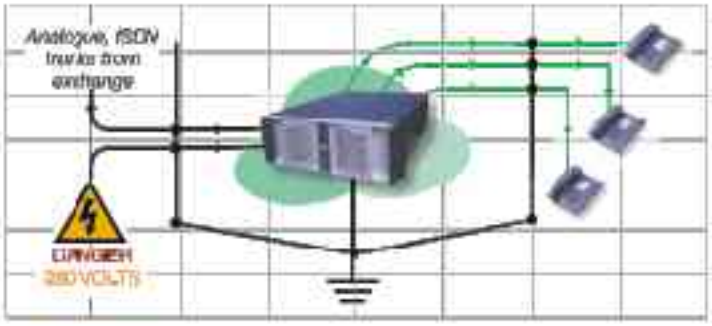
This occurs because the dataline forms part of an inductive loop formed by the communication line on the one side and the power cable on the other side. Again, the greater the rate of change of surge current, the higher the voltage which will be induced in the dataline loop.



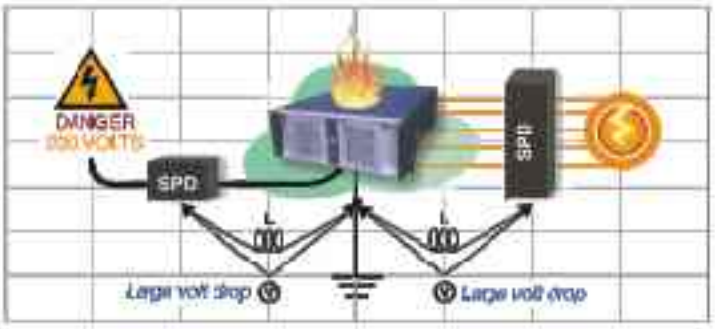
This problem may easily be overcome by fitting an optical isolation device in the communication line as shown above. Because the loop is broken no equalisation currents flow and no damage occurs.

THE IDEAL PROTECTION SYSTEM

The ideal protection system would involve strapping all incoming and outgoing connections to the PABX together and connecting them to a good earth system. With this configuration, there would be no potential difference between any of the incoming or outgoing lines and equipment would be fully protected. The only problem is that the equipment will not function.



If we try simulate this ideal protection system using good surge protection devices, we have the additional problem of long lead lengths connecting the protection devices to the system ground. Under fast rise time transients, as in the case of induced lightning, large volt drops will occur across these leads due to their inherent inductance, rendering the protection devices ineffective. Although the protection devices would function correctly on their own, the method of installation would cause large potential differences between the various input and output ports, thus damaging the equipment.

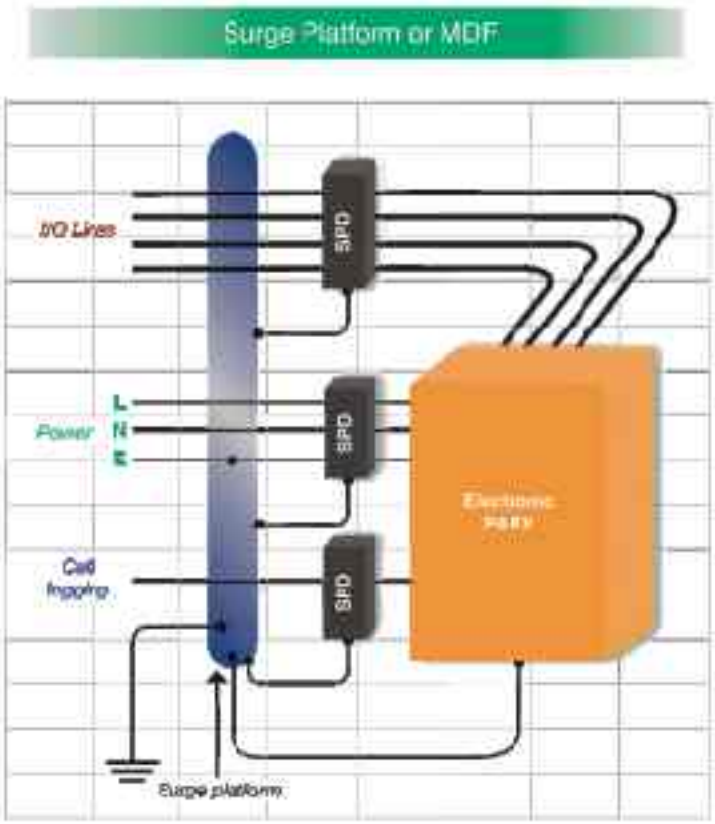


The solution is Clearline's patented Paxform protection system

PAXFORM PROTECTION PLATFORMS

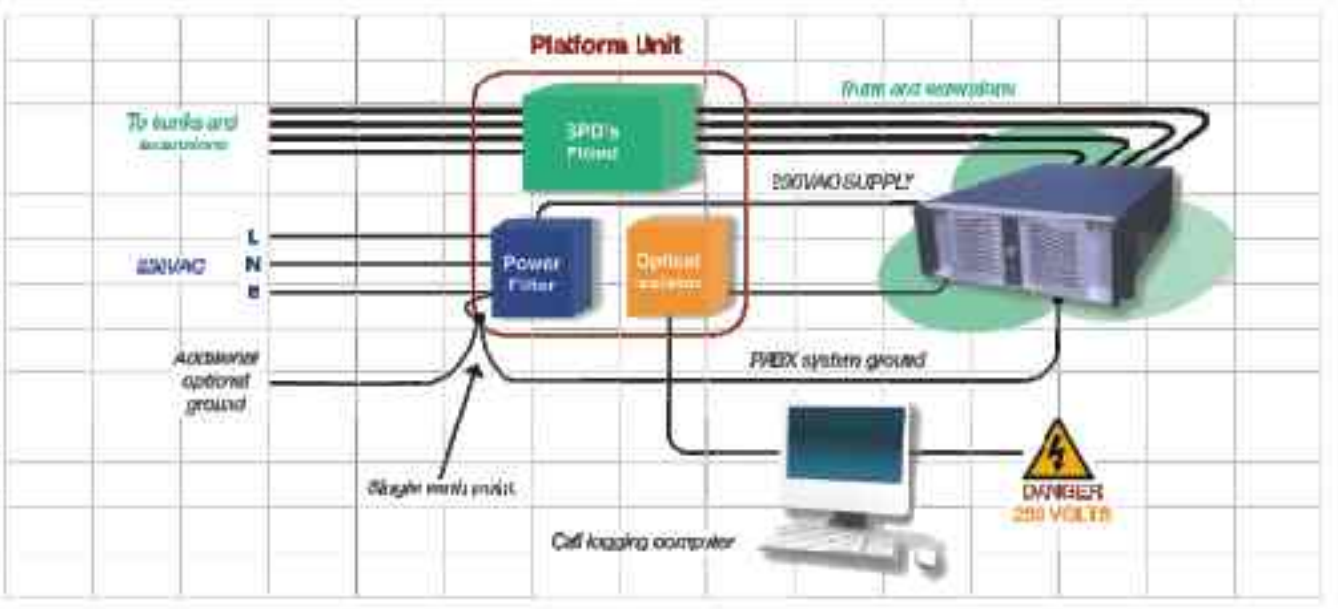
The paxform is an equi-potential platform which serves two purposes. It provides a surge platform for the exchange of surge currents to take place without affecting the PABX. All surge protection devices are installed on this platform in such a way that the inductances of bonding leads are minimised. In this way, good protection will be afforded even if a poor earth system is present. Provision has been made for the protection of power, analogue or digital lines and the telephone management system.

It also provides the connection medium between the PABX and the Telkom service. All popular connection or disconnect blocks have been catered for.



PRACTICAL PLATFORM INSTALLATION

In this practical installation, all trunk and extension circuits are passed through the platform disconnect blocks. Surge protection devices (SPD's) are then fitted to the blocks. It is essential that no circuits are connected to the PABX without passing through the SPD's on the platform unit. The power input to the PABX is first passed through the opto-isolator on the platform unit and then to the PABX. The call logging computer signal cable is first passed through the opto-isolator on the platform unit and then to the PABX. A single point earth stud has been provided on the platform unit to which the power earth, PABX and any other optional earth (e.g. water pipe or special earth system) is connected.



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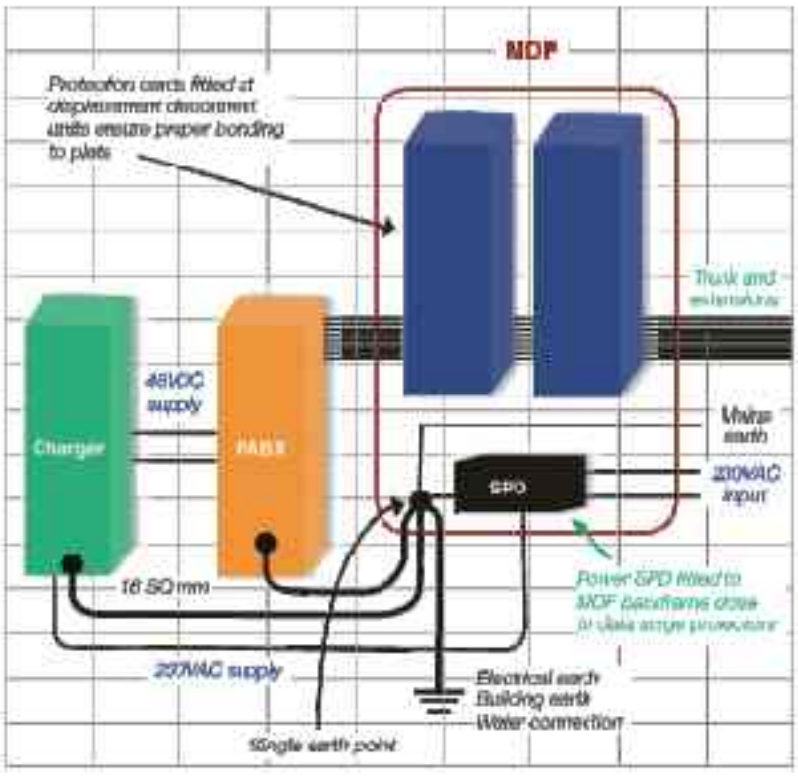


PROTECTION PLATFORMS

The most important principle in lightning and surge protection is to ensure that the potential of all the parts of a PABX system, including the power connection, rise and fall together. This is called an equi-potential platform. The parented surge platform (Paxform) from Clearline has proven to be the most powerful protection concept in the world. Each Paxform has a multistage power filter which offers good surge protection and filtration, thus alleviating harmful stresses on the equipment. Clearline's wide range of surge protection data modules ensures that the data and voice ports are fully protected whilst having no degrading effect on system performance.

Paxform PP50

- Up to 50 ports
- Power filter included
- Accepts Krone LSA Plus* disconnect blocks

Paxform PP100

- Up to 100 ports
- Power filter with surge protection
- Accepts Krone LSA Plus* disconnect blocks
- Accepts TMS protection module

Paxform PP260

- Up to 260 ports
- Accepts Krone LSA Plus* 10 way disconnect blocks
- A wide range of protection modules may be used
- Power protection and filtration is included
- Accepts a TMS protector and 2 Mbit isolator

Paxform PP640

- Will accept 64 Krone LSA Plus* 10 way disconnect modules
- A wide range of protection modules may be used
- Power protection and filtration is standard
- Will accept 2 Mbit isolators for high speed lines and opto-isolators for management systems
- 640 port capability

Paxform Selection Guide						
Part No.	**Model**	**Ports**	**Size (L x W x H)**	**Power filter**	**2 Mbit isolator**	**RS232 Protector**
12-00502	PP50	50	210 x 100 x 90	Yes	No	Yes
12-00913	PP100	100	320 x 210 x 120	Yes	No	Yes
12-00745	PP260	260	505 x 360 x 150	Yes	Yes	Yes
12-00637	PP640	640	450 x 900 x 160	Yes	Yes	Yes

* Krone is a registered trademark of Krone GMBH Germany

Note: Platforms are supplied without connection blocks

ACCESSORIES

Platform Power Filter

Features:

- High performance filter
- Failsafe surge protection
- Earth connection indicator
- Status indicator

An integrated surge and power filter for use with PP100, 260 platform systems. Easy installation.
High performance filter with status indication.

Order code: 12-00910

Trip-Connect Power Protector

Features:

- Over/under voltage protection
- Status indication
- Retrofits existing platform filters

Ideal for sites where frequent over and under voltages occur.
In the case of over/under voltage, the unit will disconnect the power and re-connect after 10 seconds.

Order code: 12-00755

Platform Tube Filter

Features:

- In-line design
- Failsafe protection
- Thermal protection

An in-line surge and power filter for PP640 platform systems up to 10 Amp current capability.

Order code: 12-00138

Power Tripconnect®

Features:

- Over & Under voltage protection
- Soft-start
- Compact design
- Easy installation

Prevents damage from power surges, power shutdowns and over-voltages from unstable power. Easy to use and indication is provided.

Order code: 12-00333

SUBSCRIBER LINE PROTECTION SINGLE PAIR

Clearline's KP1 range of sinlge pair plug-in modules utilise the state of the art balanced / unbalanced semiconductor technology, gas, or multistage (combination of these technologies) to achieve reliable protection for telecommunications networks from over voltages and over currents caused by lightning AC induction, electrostatic discharges, AC power crosses and faults.

The KP1 range of single pair plug-in modules are designed to always be on guard, protecting the infrastructure and at the same time remain transparent to data flow, allowing it to operate at its maximum speed and bandwidth without signal degradation.

The KP1 series are designed to interface with standard Krone LSA Plus* disconnect blocks and may be used to protect applications at central offices, telephone exchanges, remote locations, building entrance terminations and customer premises installations.

Features:

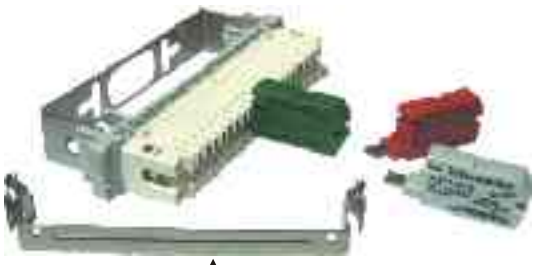
- Compact design
- Mates with LSA Plus* disconnect blocks
- Stops all harmful effects without signal loss
- Suitable for high speed networks
- 2 year warranty
- Increase network reliability

Order code: 12-00202

Order code: 12-00203

Order code: 12-00621

Order code: 12-00663



Order code: 12-00660

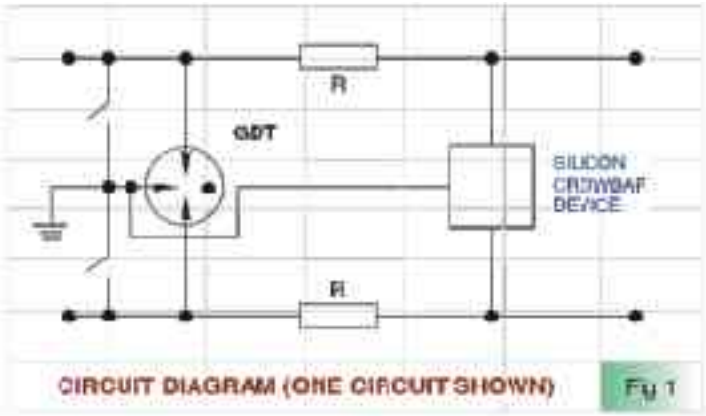
Product Selection Guide						
Part No.	**Product**	**Voltage**	**Data speed**	**Analogue**	**Digital ISDN**	**DSL, ADSL**
12-00202	KP1	230VDC	100kHz	✗	✗	
12-00203	KP1HS	6VDC	10MHz			✗
12-00621	KP1HS	230VDC	10MHz	✗	✗	✗
12-00663	KP1HS	130VDC	10MHz		✗	✗
12-00660	Earth bar for all models for use with LSA Plus* disconnect blocks					

* Krone is a registered trademark of Krone GMBH Germany

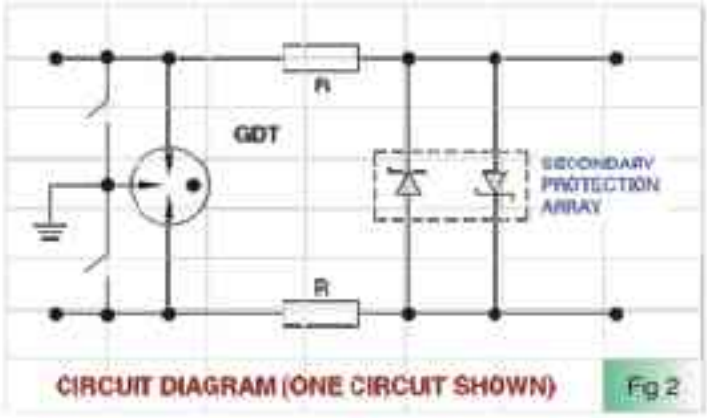
SUBSCRIBER LINE PROTECTION SINGLE PAIR

Specifications	12-00202	12-00203	12-00621	12-00663
Application	Voice / Data	High speed data	High speed data	High speed data
Max. operating voltage	230VDC	6VDC	230VDC	130VDC
Max. operating current	0.3A	0.3A	0.3A	0.3A
Max. discharge current 8/20 differential mode	5kA	400A	400A	400A
Max. discharge current 8/20 common mode	10kA	10kA	10kA	10kA
Residual voltage at 5kA differential mode	100V approx.	170V approx.	200V approx.	200V approx.
Residual voltage at 5kA common mode	200V approx.	160V approx.	200V approx.	200V approx.
Series resistance (per leg)	20Ω	3.3Ω	3.3Ω	3.3Ω
Data rate	0.2dB 100kHz	10MHz	10MHz	10MHz
Temperature range	0°C to 70°C	0°C to 70°C	0°C to 70°C	0°C to 70°C
Diagram number	Fig 1	Fig 2	Fig 2	Fig 2

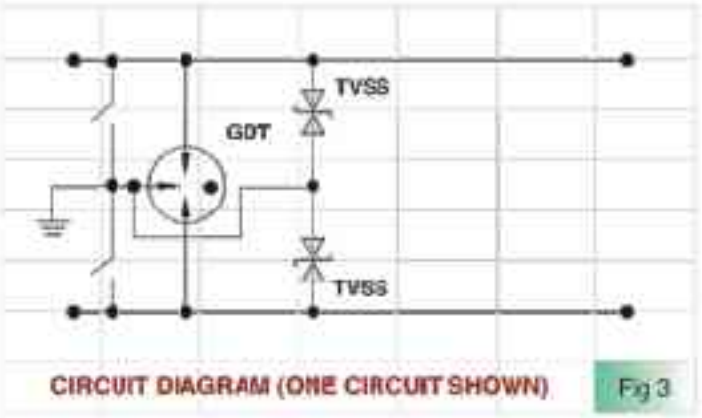
CIRCUIT CONFIGURATIONS SINGLE AND 10 PAIR



CIRCUIT DIAGRAM (ONE CIRCUIT SHOWN) Fig 1



CIRCUIT DIAGRAM (ONE CIRCUIT SHOWN) Fig 2



CIRCUIT DIAGRAM (ONE CIRCUIT SHOWN) Fig 3

SUBSCRIBER LINE PROTECTION 10 PAIR

Clearline's KP10 range of multiple pair plug-in modules utilise the state of the art balanced / unbalanced semiconductor technology, gas, or multistage (combination of these technologies) to achieve reliable protection for telecommunications networks from over voltages and over currents caused by lightning AC induction, electrostatic discharges, AC power crosses and faults.

The KP10 protection modules are designed to always be on guard, protecting the infrastructure and at the same time remain transparent to data flow, allowing it to operate at its maximum speed and bandwidth without signal degradation.

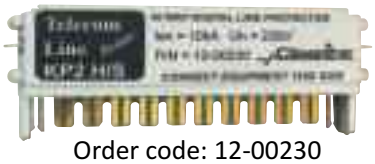
The KP10 series are designed to interface with standard Krone LSA Plus* disconnect blocks and may be used to protect applications at central offices, telephone exchanges, remote locations, building entrance terminations and customer premises installations.

Features:

- Compact design
- Mates with LSA Plus* disconnect blocks
- Stops all harmful effects without signal loss
- Suitable for high speed networks
- 2 year warranty
- Increase network reliability

Order code: 12-00441

Order code: 12-00151



Order code: 12-00230

Order code: 12-00196

Order code: 12-00643

Product Selection Guide						
Part No.	**Product**	**Voltage**	**Data speed**	**Analogue**	**Digital ISDN**	**DSL, ADSL**
12-00151	KP10	230VDC	0.2dB 100kHz	✗	✗	
12-00196	KP2HS	130VDC	0.1dB 2MHz		✗	✗
12-00441	KP2HS	6VDC	0.2dB 10MHz		✗	
12-00230	KP2HS	230VDC	0.2dB 10MHz	✗	✗	✗
12-00643	KP10H	230VDC	0.1dB 2MHz	✗	✗	

Specifications	12-00151	12-00196	12-00441	12-00230	12-00643
Number of pairs	10	10	10	10	10
Max. operating voltage	230VDC	130VDC	6VDC	230VDC	230VDC
Max. operating current	0.3A	0.3A	0.3A	0.3A	0.3A
Max. discharge current differential mode	5kA	5kA	400A	400A	5kA
Max. discharge current common mode	20kA	20kA	20kA	20kA	20kA
Residual voltage at 5kA differential mode	200V	100V	20V	200V	200V
Residual voltage at 5kA common mode	200V	150V	70V	200V	200V
Series resistance (per leg)	20Ω	3.3Ω	3.3Ω	3.3Ω	None
Temperature range	0°C to 70°C	0°C to 70°C	0°C to 70°C	0°C to 70°C	0°C to 70°C
Failsafe fitted	Yes	Yes	Yes	Yes	Yes
Diagram number	Fig 1	Fig 2	Fig 2	Fig 2	Fig 3

* Krone is a registered trademark of Krone GMBH Germany

2MBIT ISOLATOR FOR TELECOM LINES

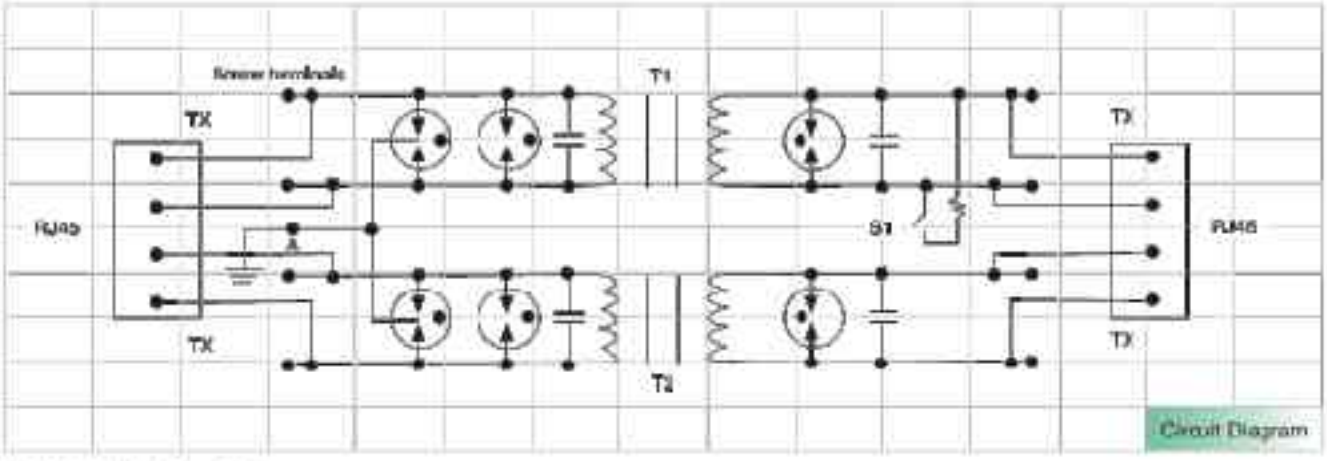
The 2Mbit isolator eliminates ground loops by galvanically isolating the input from the output. The high degree of isolation prevents surges on incoming lines finding a return path inside the equipment. The unit supports ISDN at 144Kbits/s basic rate as well as the full 2048Kbits/s primary rate. Isolation is in excess of 10kVDC. This unit may be used for galvanic isolation between the Telkom NTU and PABX cards as well as for microwave installations.

Features:

- Eliminates ground loops
- RJ45 or wire termination
- Terminating facility
- High isolation level
- Transparent to data
- Full 2048Kbits/s

Order code: 12-00925

Isolation between input and output or receiver (and vice versa)	10kVDC typ
Max. discharge current 8/20 differential mode	6kA
Max. discharge current 8/20 common mode	10kA
Frequency response (3dB)	30MHz
Return loss at 3072.0kHz (1mW > 14 dB)	37.3dB
Characteristic impedance	120Ω balanced
Approvals and standards	Telkom TSR 12 & G.703
Connectors	Plugcab screw connectors and RJ45
Order code	12-00925



A= Earth stud (Optional connection)

RS232 PROTECTORS

An easy to use range of in-line RS232 protectors for use with telephone management systems. A device is fitted at each end of the RS232 cable and bonded to the equipment chassis. Two models are available for use with DB25 and DB9 connectors.

Features:

- In-line connection
- Compact design
- Failsafe protection
- Easy installation

Order code: 12-00768

Order code: 12-00676

Specifications	12-00768	12-00676
Max. operating voltage	15VDC	15VDC
Max. discharge current 8/20 differential mode	500A	500A
Max. discharge current 8/20 common mode	500A	500A
Residual voltage differential mode	25V	25V
Residual voltage common mode	100V	100V
Response time	<100ns	<100ns
Pins protected	1-9	1-25
Series resistance	None	None
Connectors	DB9	DB25

TELECOMMUNICATIONS PROTECTOR

The Plug and Play range of Telecommunications protectors are ideal for protecting single line equipment against power surges and induced lightning.

Features:

- Plug and play installation
- Compact size
- For analogue and ISDN applications
- Power and data protection, incorporates "surge platform" concept
- Status indication

SA 16A
Order code: 12-00706

Specifications			
Power Module		**Data Module**	
Nom. input voltage	230VAC 50Hz	Max. operating voltage	230VDC
Max. continuous voltage	275VAC 50Hz	Max. operating current	0.3A
Max. continuous current	16A	Max. discharge current at Ismax (8/20)	10kA
Max. discharge current at Ismax L-L (8/20)	8kA L-N, L-E, N-E	Residual voltage	100V (typ)
Residual voltage at Ismax L-L	900V (typ)	Residual voltage	100V (typ)
Response time	<25ns	No. of wires protected	2
Power connectors	16A round pin	Data speed	128Kbits/s
Standards compliance	IEC 61643-1	Data protector	2 x RJ11