

Section 5: Electrical Protection Devices

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Introduction to Electrical Protection Devices

Electrical protection devices protect the personnel and equipment who come in contact with a distribution system against electrical surges and other potentially harmful electrical currents such as lightning or power wires.

To prevent this kind of harm, the AT&T Premises Distribution System includes protector panels that hold interchangeable plug-in or screw-in protector units to control the magnitude of high-voltage surges that pass through building wiring. Each protector unit contains two carbon-block or gas-tube protectors.

Carbon-block protector units (the 3B-A Series, 4B-C Series, and 2A1A units) consist of carbon blocks inside a housing. When the voltage on the conductor being protected exceeds a predetermined level, it is limited by arcing the air gap between the carbon blocks. If the voltage is short-lived, such as that caused by lightning, the protector returns to an open circuit condition. In cases where the voltage persists, however, arcing continues long enough to melt a lead alloy spacer inside the unit, permitting one spring-loaded carbon block to move up against the other and establish a direct path to ground.

Gas-tube protector units (the 3B-E Series, 4B-E Series, and 11A2A units), which provide better margins of voltage protection than carbon-block protectors, consist of a surge protector and a fusible disc mounted inside a housing. The gas-tube protector functions much like the air-gap protector, except that the gas-tube uses two metallic electrodes sealed in a glass envelope filled with inert gas. Gas-tube protector units are recommended for areas prone to frequent lightning, for special service circuits (alarm and data), and for trunk circuits where high reliability is critical.

Some of the carbon-block (the 4B-C Series) and gas-tube (the 4B-E Series) protector units include heat coils. In addition to controlling high-voltage surges, protector units with heat coils interrupt currents of low voltage but abnormally long duration, sometimes referred to as "sneak currents," and divert those currents to ground. Although not strong enough to trigger carbon-block or gas-tube voltage-surge limiters, sneak currents can otherwise overheat and damage equipment connected to a system.

The 188 Multipair Protector Panel and the 189 Multipair Protector Panel, both of which receive any of the plug-in units described above, contain built-in cross connects. Both incorporate a swivel "input" stub cable that allows service feed from top or bottom and acts as a fuse link. The stub cable on the 188 panel is factory-wired through the protector panel to a 110 quick-connect "output" termination field. In addition to the features provided by the 188 panel, the 189 panel also offers a greater selection of pair sizes; of input and output methods, including an optional built-in splice chamber; and a hinged cover.

The 134 Multipair Protector Panel and the 190 Multipair Protector Panel are designed for applications where the cross-connect field is separated from the protectors. They are similar except that the 190 panel has a circuit disabling capability, while the 134 panel does not, and the 190 panel uses plug-in protector units, while the 134 panel uses screw-in units. Both the 134 and the 190 panels have a 26-gauge input stub and a 24-gauge output stub to the cross-connect field.

In addition to the protection provided by the panels above, the 428 protector safeguards devices connected to AC circuits.

Protector Panel, 134-Type Multipair

Applications

The 134-Type Multipair Protector Panel is used to provide indoor or outdoor station protection in buildings served by exposed cables.

Description

The 134-type panel consists of a fire-resistant, gas-tight, resin-filled terminal block equipped with 2A1A or 11A2A Individual Protector Units. It also has a 26-gauge input stub cable that serves as a fusible link, a 24-gauge output stub cable, and two ground lugs. The 134-type protector panel comes in 16-, 25-, 50-, and 100-pair sizes.

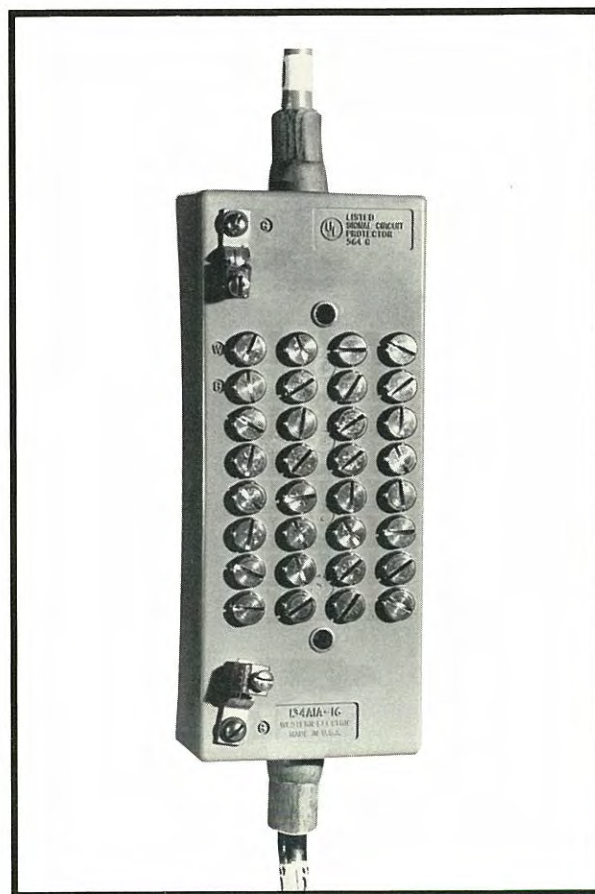
Specifications

Physical Specifications

Height: 12.625 in. (16-pair), 14.75 in. (25-pair), 17.75 in. (50-pair), 30.5 in. (100-pair)

Width: 3.375 in. (all pair sizes)

Depth: 1.625 in. (all pair sizes)



Product Code	Type	Pair Size	Input (Ft)	Output (Ft)	Comcode
134A1A-16-6	Carbon	16	6	6	101 951 556
134A1A-16-12	Carbon	16	6	12	101 951 564
134A1A-25-6	Carbon	25	6	6	101 951 572
134A1A-25-12	Carbon	25	6	12	101 951 580
134A1A-50-6	Carbon	50	6	6	101 951 598
134A1A-50-12	Carbon	50	6	12	101 951 606
134A1A-50-25	Carbon	50	6	25	101 205 532
134A1A-100-6	Carbon	100	6	6	101 951 614
134A1A-100-12	Carbon	100	6	12	102 165 859
134A1A-100-25	Carbon	100	6	25	101 413 698
134E1A-16-6	Gas	16	6	6	103 389 789
134E1A-16-12	Gas	16	6	12	103 389 797
134E1A-25-6	Gas	25	6	6	103 389 805
134E1A-25-12	Gas	25	6	12	103 389 813
134E1A-50-6	Gas	50	6	6	103 389 821
134E1A-50-12	Gas	50	6	12	103 389 839
134E1A-50-25	Gas	50	6	25	103 389 847
134E1A-100-6	Gas	100	6	6	103 389 854
134E1A-100-12	Gas	100	6	12	103 389 862
134E1A-100-25	Gas	100	6	25	103 389 870

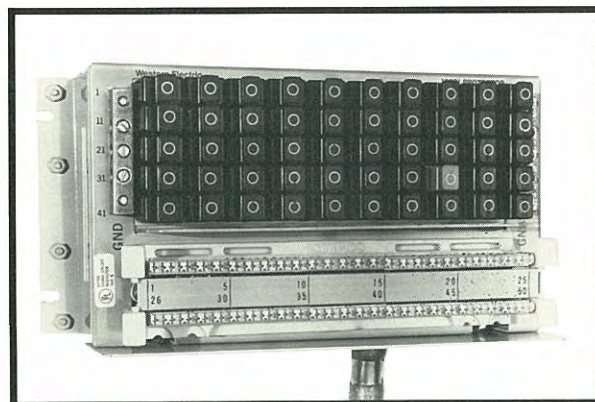
Protector Panel, 188-Type Multipair

Applications

The 188 Multipair Protector Panel is used to provide protection for communications equipment and circuits exposed to voltage surges and sneak currents. The 188 protector panel is designed for use with the 110-type cross connect.

Description

The 188 protector panel consists of a metal housing containing mountings for 3B or 4B Series Protector Units. It also has a 25-foot swivel input cable that allows cable to be fed from the top or bottom of the unit. The input cable is constructed of 26-gauge wire and acts as a fuse link, eliminating the need for a separate splice; it is wired through to a 110-type termination field and protector units are inserted into the protector panel, completing the circuit. The 188 protector panel comes in 50- and 100-pair sizes.



Specifications

Physical Specifications

Height: 5.375 in. (50-pair), 10.75 in. (100-pair)

Width: 10.75 in.

Depth: 4.5 in.

Product Code	Pair Size	Comcode
188B1-50	50	103 314 969
188B1-100	100	103 314 951

Protector Panel, 189-Type Multipair

Applications

The 189-Type Multipair Protector Panel is used to provide station protection for 25, 50, or 100 incoming service pairs; it also serves as a terminating field.

Description

The 189-type panel consists of a metal housing containing mountings for 3B or 4B Series Protector Units. The input options for the 189 panel include a swivel cable stub, which allows feed from top or bottom, or a built-in splice chamber with either a 710 connector or a 66-type connecting block, which eliminates the need for a separate splice. Output options include a 66-type block or RJ21-type connec-

tor, if both protection and a network interface are needed at the building entrance terminal. The 189 panel is also available with an optional hinged cover for security and mechanical protection, and comes in 25-, 50-, or 100-pair sizes.

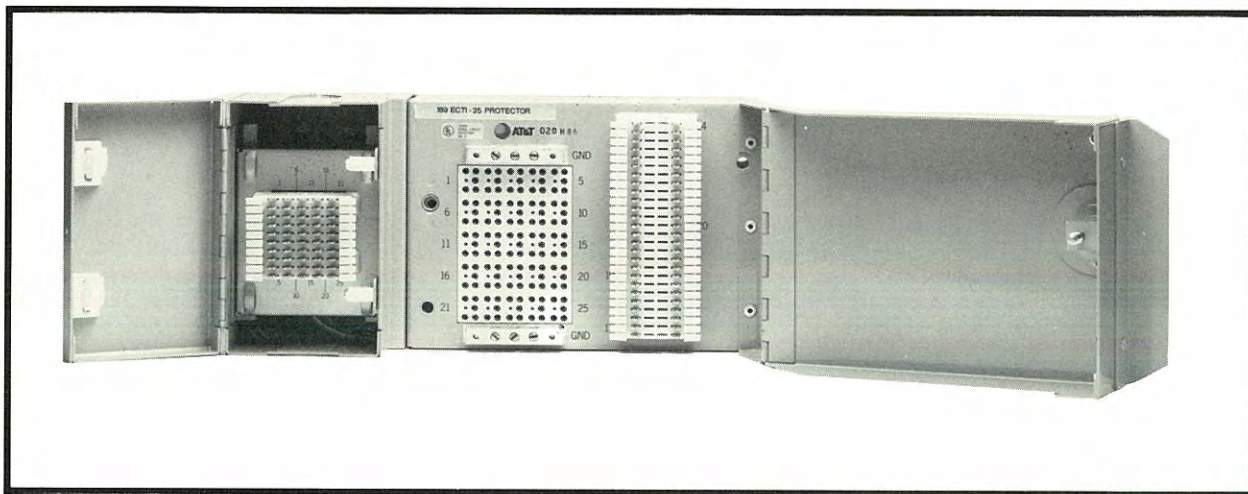
Specifications

Physical Specifications

Height: 6 in. (25-pair), 10.25 in. (50-pair), 20.25 in. (100-pair)

Width: 8.5 in.

Depth: 4.6 in. (without cover), 4.82 in. (with cover)



With Hinged Cover

Product Code	Input			Output		Comcode
	Cable Stub	Splice Chamber	66 Block	66 Block	RJ21-Type Connector	
		710 Connector				
189BC1-25 189BC1-50 189BC1-100	Yes Yes Yes			Yes Yes Yes		103 623 633 103 623 641 103 623 658
189CC1-25 189CC1-50 189CC1-100	Yes Yes Yes				Yes Yes Yes	103 623 666 103 623 674 103 623 682
189DC1-25 189DC1-50 189DC1-100	Yes Yes Yes			Yes Yes Yes	Yes Yes Yes	104 305 073 104 305 099 104 305 081
189DCS1-25 189DCS1-50 189DCS1-100		Yes Yes Yes		Yes Yes Yes	Yes Yes Yes	104 305 016 104 305 032 104 305 024
189DCT1-25 189DCT1-50 189DCT1-100			Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	104 305 040 104 305 065 104 305 057
189CCS1-25 189CCS1-50 189CCS1-100		Yes Yes Yes			Yes Yes Yes	105 041 685 105 041 669 105 040 596
189CCT1-25 189CCT1-50 189CCT1-100			Yes Yes Yes		Yes Yes Yes	105 041 693 105 041 677 105 040 604
189ECS1-25 189ECS1-50 189ECS1-100		Yes Yes Yes		Yes Yes Yes		104 305 107 104 305 123 104 305 115
189ECT1-25 189ECT1-50 189ECT1-100			Yes Yes Yes	Yes Yes Yes		104 305 131 104 305 156 104 305 149

NOTE: The numbers after the hyphen in the product code refer to the pair size of the protector.

Without Hinged Cover

Product Code	Input			Output		Comcode
	Cable Stub	Splice Chamber	66 Block	66 Block	RJ21-Type Connector	
		710 Connector				
189B1-25 189B1-50 189B1-100	Yes Yes Yes			Yes Yes Yes		103 289 252 103 289 260 103 289 245
189C1-25 189C1-50 189C1-100	Yes Yes Yes				Yes Yes Yes	103 623 609 103 623 617 103 623 625
189ES1-25 189ES1-50 189ES1-100		Yes Yes Yes		Yes Yes Yes		105 216 162 105 216 154 105 216 147
189ET1-25 189ET1-50 189ET1-100			Yes Yes Yes	Yes Yes Yes		105 216 196 105 216 188 105 216 170

NOTE: The numbers after the hyphen in the product code refer to the pair size of the protector.

Protector Panel, 190-Type Multipair

Applications

The 190-Type Multipair Protector Panel is used to provide indoor station protection for exposed lines at building entrance terminals. It is intended for use where the cross connect is separated from the protectors.

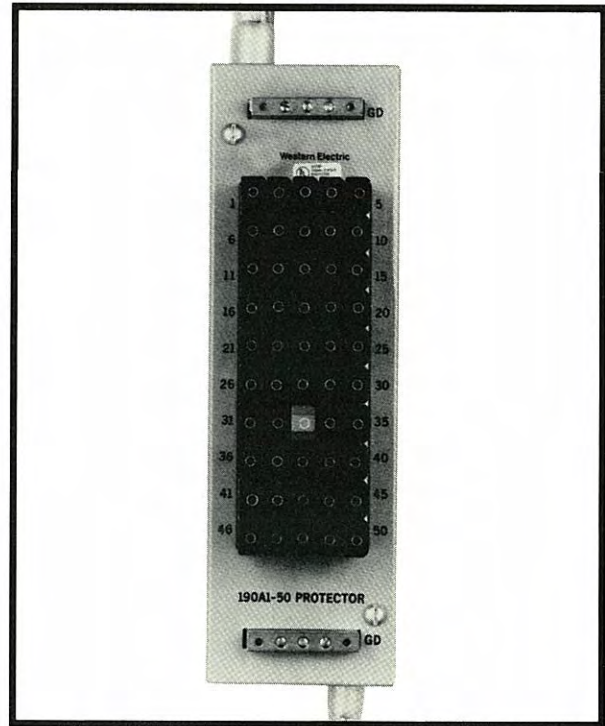
Description

The 190-type panel consists of a metal housing containing mountings for 3B or 4B Series Protector Units. It also includes a fire-retardant molded plastic connecting block, a 25-foot, 26-gauge stub cable that serves as a fusible link, a 24-gauge terminating cable, and two connectors for external ground connections. The internal wiring design prevents protector bypass, and a cable pass-through feature allows for side-to-side and top-to-bottom installation. The 190-type protector panel come in 50- and 100-pair sizes.

Specifications

Height: 13 in. (50-pair), 24 in. (100-pair)
Width: 4 in.
Depth: 2.75 in.

Product Code	Comcode
190A1-50	102 995 073
190A1-100	102 995 099



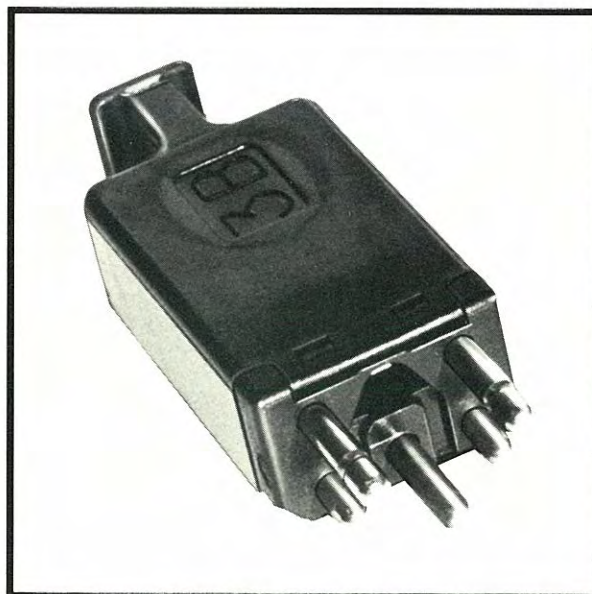
Protector Unit, 3B-A Series Individual

Applications

The 3B-A Series Protector Unit is a carbon block device that plugs into the 188-, 189-, and 190-Type Multipair Protector Panels to provide overvoltage and surge protection for a communications circuit.

Description

The 3B-A protector uses 3-mil, surge-limiting carbon blocks to protect against voltage surges. It is molded of glass-reinforced, high-heat distortion plastic (polybutylene terephthalate) and has a 5-pin plug with gold-plated tip and ring pins for long-term reliable service. Each 3B-A is color coded for quick identification of its circuit application (see table below). The 3B-A meets or exceeds UL flame test requirements.



Specifications

Physical Specifications

Length: 1.6875 in.

Width: 0.75 in.

Depth: 0.5 in.

Electrical Specifications

DC Breakdown Voltage at 2 kV/sec: Median 500V

Surge Breakdown Voltage at 100 V/ μ sec: Median 700V

Surge Breakdown Voltage: 1000V (maximum)

Insulation Resistance: 100 megohms

Product Code	Color	Application	Comcode
3B1A	Black	Standard service	102 381 779
3B2A	Green	Service denied	102 381 787
3B3A	Red	Special circuits (fire or burglar alarm, etc.)	102 381 795
3B4A	Yellow	PBX battery	102 381 803

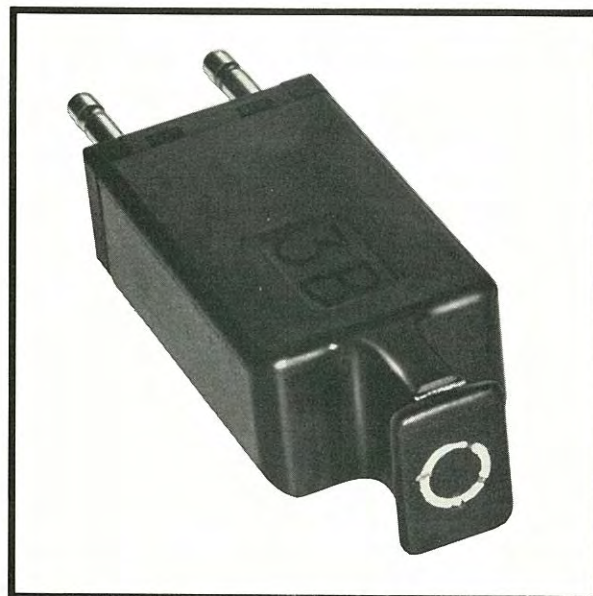
Protector Unit, 3B-E Series Individual

Applications

The 3B-E Series Protector Unit is a gas tube device that plugs into the 188-, 189-, and 190-Type Multipair Protector Panels to provide overvoltage and surge protection for a communications circuit.

Description

The 3B-E protector uses a 201A narrow-gap, sealed-gas, surge arrester to protect against voltage surges. It is molded of glass-reinforced, high-heat distortion plastic (polybutylene terephthalate) and has a 5-pin plug with gold-plated tip and ring pins for long-term reliable service. Each 3B-E is color coded for quick identification of its circuit application (see table below). The 3B-E Series Protector Unit meets or exceeds UL flame test requirements.



Specifications

Physical Specifications

Length: 1.6875 in.

Width: 0.75 in.

Depth: 0.5 in.

Electrical Specifications

DC Breakdown Voltage at 2 kV/sec: 265-400V

Surge Breakdown Voltage at 100 V/ μ sec: 200-800V

Insulation Resistance: 100 megohms

DC Holdover Voltage (IEEE 465.1): 160-180V

Vented Breakdown Voltage (exceeds UL requirements): 1000V

DC Arc Voltage: 20V (typical)

Glow-to-Arc Transition Current (IEEE 465.1): 0.1A (typical)

Capacitance (PE-80): 10 pF

AC Discharge (PE-80): 65A (11 cycles at 60 Hz)

Product Code	Color	Application	Comcode
3B1-E	Black	Standard service	103 090 395
3B2-E	Green	Service denied	103 090 403
3B3-E	Red	Special circuits (fire or burglar alarm, etc.)	103 090 411
3B4-E	Yellow	PBX battery	103 090 429

Protector Unit, 4B-C Series Individual

Applications

The 4B-C Series Protector Unit is a carbon block device that plugs into the 188-, 189-, and 190-Type Multipair Protector Panels and is used to provide voltage surge and sneak current protection for a communications circuit.

Description

The 4B-C protector uses 3-mil carbon blocks to protect against voltage surges and heat coils for sneak current protection. It is molded of glass-reinforced, high-heat distortion plastic (polybutylene terephthalate), and has a 5-pin plug with gold-plated tip and ring pins for long-term reliable service. Each 4B-C is color coded for quick identification of circuit application. The 4B-C meets or exceeds UL flame test requirements.

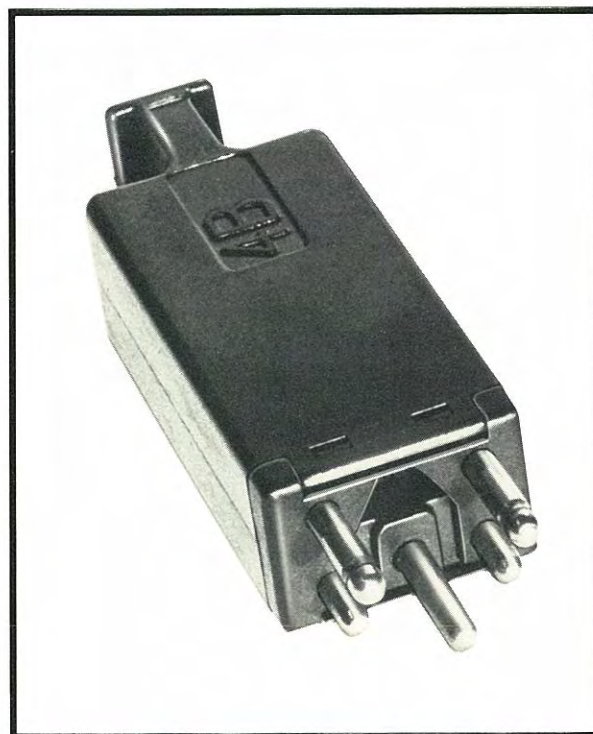
Specifications

Physical Specifications

Length: 2 in.
Width: 0.75 in.
Depth: 0.5 in.

Electrical Specifications

DC Breakdown Voltage at 2 kV/sec: Median 500V
Surge Breakdown Voltage at 100 V/ μ sec:
Median 700V
Surge Breakdown Maximum Voltage: 1000V
Insulation Resistance: 100 megohms
Sneak Current at 68°F (20°C): 210 sec at 0.54 amps



Product Code	Color	Application	Comcode
4B1-C	Black	Standard service	102 904 893
4B2-C	Green	Circuits not presently in use	102 904 901
4B3-C	Red	Special circuits (fire or burglar alarm, etc.)	102 904 919

Protector Unit, 4B-E Series Individual

Applications

The 4B-E Series Protector Unit is a gas tube device that plugs into the 188-, 189-, and 190-Type Multipair Protector Panels and is used to provide voltage surge and sneak current protection for a communications circuit.

Description

The 4B-E protector uses a 201A narrow-gap, sealed-gas, surge arrester to protect against voltage surges and heat coils for sneak current protection. It is molded of glass-reinforced, high-heat distortion plastic (polybutylene terephthalate) and has a 5-pin plug with gold plated tip and ring pins for long-term reliable service. Each 4B-E is color coded for quick identification of its circuit application. The 4B-E protector meets or exceeds UL flame test requirements.

Specifications

Physical Specifications

Length: 2 in.

Width: 0.75 in.

Depth: 0.5 in.

Electrical Specifications

DC Breakdown Voltage at 2 kV/sec: 265-400V

Surge Breakdown Voltage at 100 V/ μ sec: 200-800V

Insulation Resistance (PE-80): 100 megohms

DC Holdover Voltage (IEEE 465.1): 160-180V

Vented Breakdown Voltage (exceeds UL requirements): 1000V

Arc Voltage: 20V (typical)

Glow-to-Arc Transition Current (IEEE 465.1):

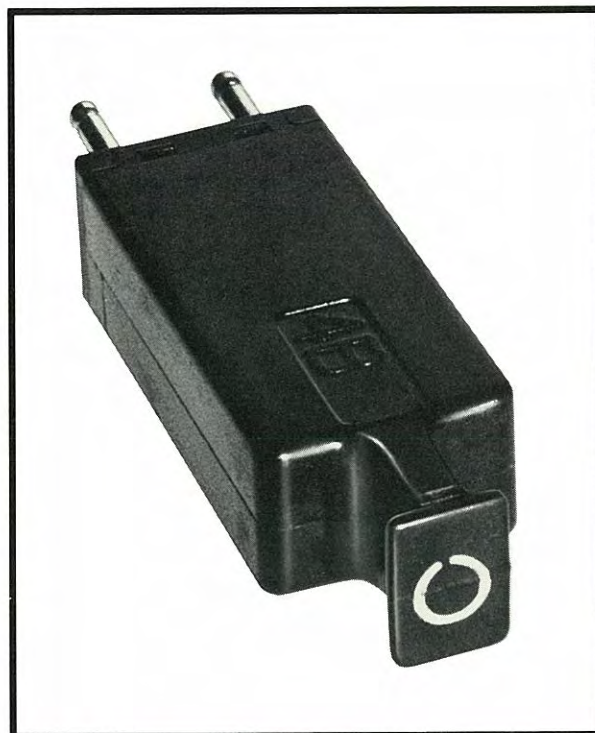
0.1A (typical)

Capacitance (PE-80): 10 pF

AC Discharge (PE-80): 65 amps (11 cycles at 60 Hz)

Maximum Impulse Discharge (PE-80): 5K amps
(8x20 μ sec waveform)

Sneak Current at 68°F (20°C): 210 sec at 0.54 amps



Product Code	Color	Application	Comcode
4B1-E	Black	Standard service	103 090 437
4B2-E	Green	Circuits not presently in use	103 090 445
4B3-E	Red	Special circuits (fire or burglar alarm, etc.)	103 090 452

Protector Unit, 2A1A Individual

Applications

The 2A1A Individual Protector Unit is a screw-in device used in protector panels, terminal blocks, cable terminals, and connecting blocks for protection of cable conductors from lightning surges or contact with power lines.

Description

The 2A1A protector features a 3-mil carbon block housed in a brass cap to guard against corrosion; it is threaded to fit a 0.4375-inch well.

Specifications

Electrical Specifications

DC Breakdown Voltage at 2 kV/sec: Median 500V

Surge Breakdown Voltage at 100 V/ μ sec:

Median 700V

Surge Breakdown Voltage Max: 1000V

Insulation Resistance: 100 megohms



Product Code	Comcode
2A1A	100 828 086

Protector Unit, 11A2A Individual

Applications

The 11A2A Individual Protector Unit is a screw-in device used in station protectors to provide voltage surge protection.

Description

The 11A2A protector features a gas tube that is housed in a brass cap to guard against corrosion; it is threaded to fit a 0.4375-inch protector well.

Specifications

Electrical Specifications

DC Breakdown Voltage at 2 kV/sec: 265-400V

Surge Breakdown Voltage at 100 V/ μ sec: 200-800V

Insulation Resistance (PE-80): 100 megohms

DC Holdover Voltage (IEEE 465.1): 160-180V

Vented Breakdown Voltage (exceeds UL requirements): 1000V

Arc Voltage: 20V (typical)

Glow-to-Arc Transition Current (IEEE 465.1):

0.1A (typical)

Capacitance (PE-80): 10 pF

AC Discharge (PE-80): 65 amps (11 cycles at 60 Hz)

Maximum Impulse Discharge (PE-80): 5K amps
(8x20 μ sec waveform)



Product Code	Comcode
11A2A	103 003 950

Protector Unit, 428 Power Line Surge

Applications

The 428 Power Line Surge Protector Unit is used to protect electronic equipment connected to an AC line against damage caused by voltage surges, spikes, and transients on the line.

Description

The 428 unit is a hybrid, self-restoring power line overvoltage surge protector that uses metal oxide varistors (MOVs) and a 3-electron gas tube to ground any overvoltages. The 428 protector plugs into a standard 120 Vac, 15 Amp outlet and has a measured response time of less than 5 nanoseconds. Its maximum surge capability is greater than 20,000 amps (8 by 20 microsecond waveform), and its clamp voltage is 390 Volts. It is recommended for use with communications systems that require 120-Vac, 60-Hz, 15 Amp, single-phase power.

Product Code	Comcode
428	403 856 115

