

**CONNECT AND PROTECT**

# Data and Signal Line Protection

  
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**ERICO**

# How to Select Surge Protection for Data, Signalling and Control Circuits

Knowing where to install surge protection can be difficult. To ensure cost-effective protection is provided for data, signalling and control circuits, two issues need to be considered:

- Where should the SPDs be installed?
- What type of SPD is appropriate for each circuit type and location?

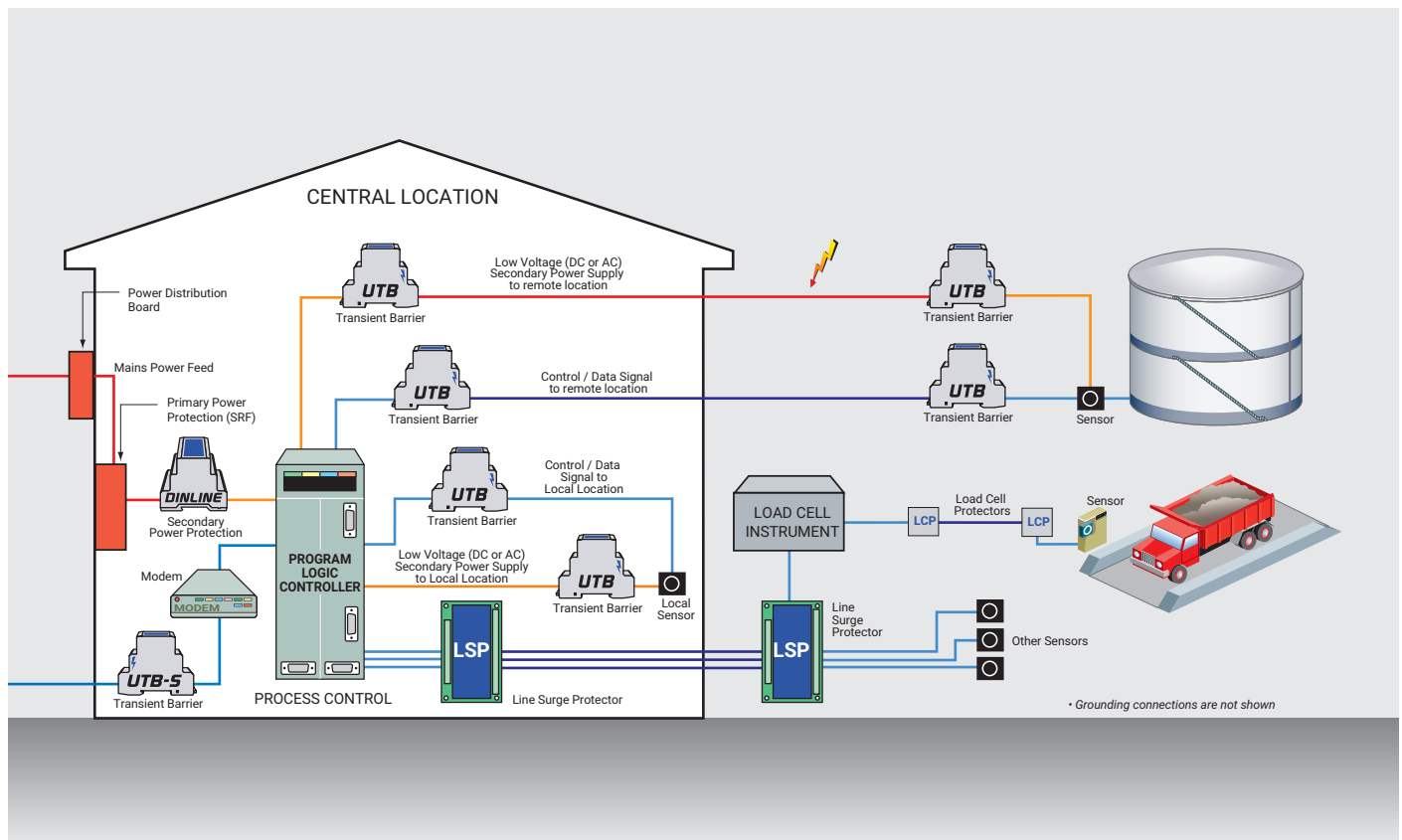
## Where should the SPD(s) be installed?

Communications devices are at risk from transients being induced onto the interconnecting signal lines. The use of surge protection barriers, installed at either end of the lines, provides cost effective protection. Communication or signal lines that enter or exit the building pose the highest risk. In such circumstances, protection devices should be installed at the point-of-entry or at the equipment termination itself. Internal wiring which extends more than 10 to 15m should also be protected. Twisting or shielding of cables provides a level of protection, however this should not be regarded as sufficient for the sensitive interfaces that characterize today's communication devices.

## How to select an SPD for a given location

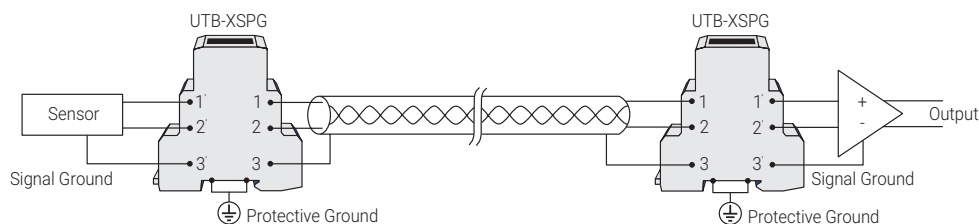
Five parameters must be considered to ensure that surge protection devices for use on data, signalling or control circuits are effective and do not adversely affect operation of the circuit.

- (1) SPDs are designed to clamp the excess transient voltage to safe levels sustainable by the equipment, yet should not interfere with the normal signalling voltages. As a guide, the SPD clamping voltage should be selected to be approximately 20% higher than peak working voltage of the circuit.
- (2) The line current rating of the SPD should be sufficient to handle the maximum expected signalling current.
- (3) The SPD bandwidth should be sufficient to allow correct operation of the system without adverse attenuation. This ensures that the attenuation of the SPD at the nominal operating frequency of the system does not exceed the stated limit. For most SPDs, frequency attenuation data or a maximum recommended baud rate is generally specified.
- (4) The connection termination, mounting method, number of lines to be protected and other physical aspects must be considered.
- (5) The SPD surge rating should be appropriate for the intended location. For circuits internal to the building, surge ratings of 1-5kA are generally sufficient. For the protection of circuits that connect to exposed lines entering or exiting the facility, 10-20kA is recommended. Alternatively a protocol or standard may be specified that defines the above parameters. All UTB products are rated 20kA for higher exposure areas.

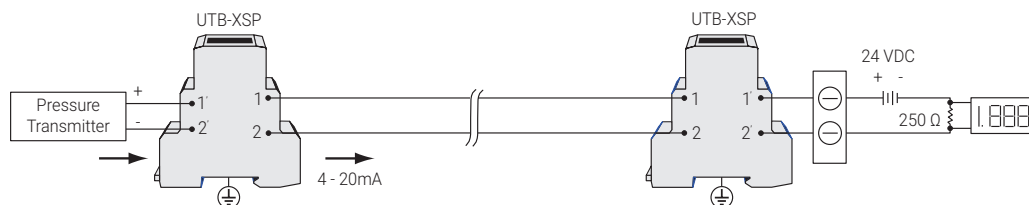


# Sample Applications

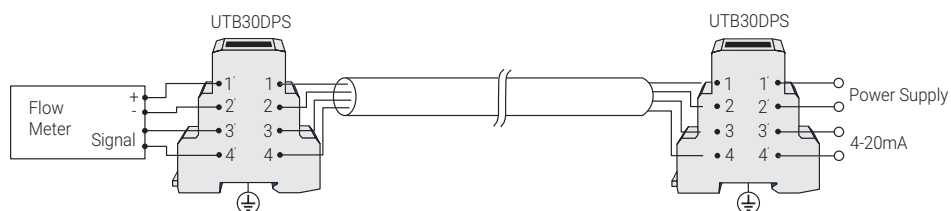
## 2-WIRE ISOLATED GROUND TRANSDUCERS/SENSORS



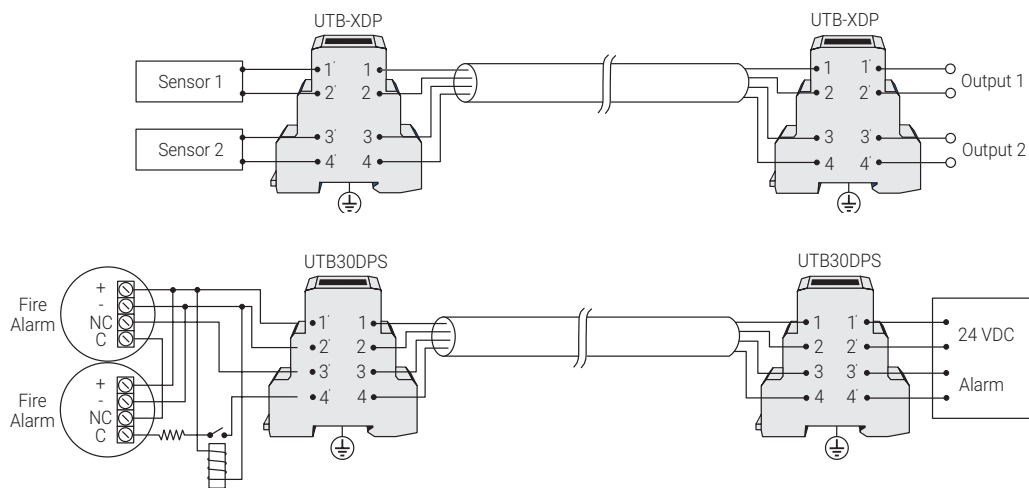
## 2-WIRE SENSORS



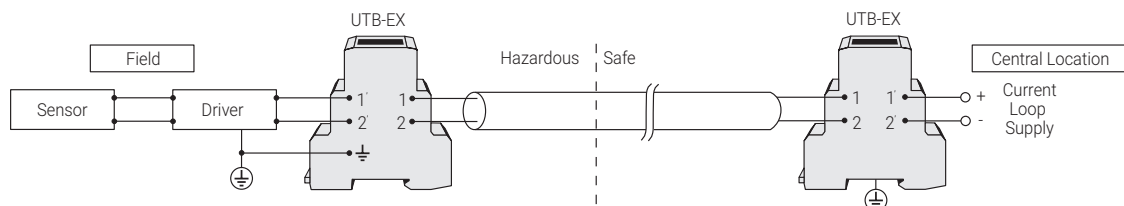
## POWERED SENSOR PROTECTION



## MULTIPLE SENSOR OR UP TO 4-WIRE SENSOR



## PROTECTING SENSORS IN HAZARDOUS LOCATIONS



# UTB SP & SPG

## UNIVERSAL TRANSIENT BARRIER SINGLE PAIR

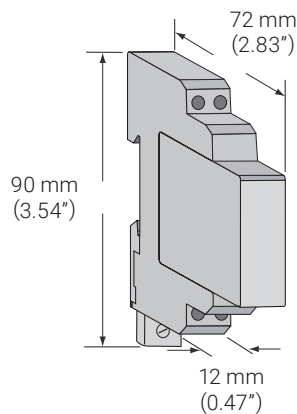
### FEATURES

- General purpose barrier – protection of low-voltage circuits and transducers
- Separate plug and base design – hot swappable feature allows ease of module replacement
- Multi stage protection – fine over-voltage protection, helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode protection – protects against both possible surge conditions
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20 kA 8/20  $\mu$ s – ideal for exposed wiring
- Allows for protection of 25 analog signals or 50 digital signals per linear foot of DIN rail space

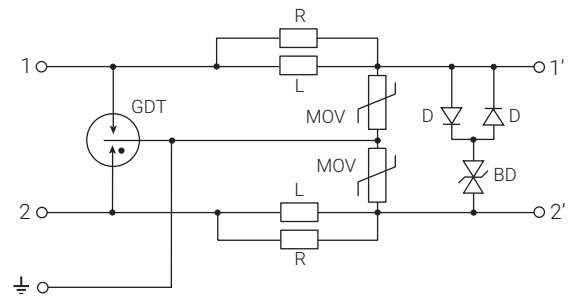
The UTB series is designed to provide transient protection for equipment from surges induced onto balanced pair signal lines. They are well suited to the protection of industrial equipment such as PLCs and SCADA systems. Other uses include the protection of fire and security alarms, industrial monitoring and control equipment.

The UTB-SP (single pair) employs a hybrid multistage clamping circuit, to help ensure the best possible protection to sensitive electronic equipment while maintaining a minimum of line interference and insertion loss.

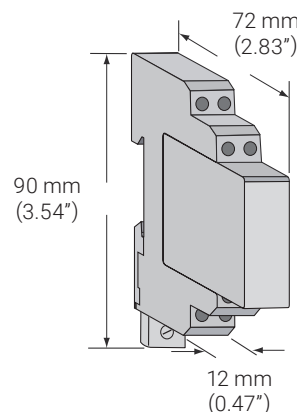
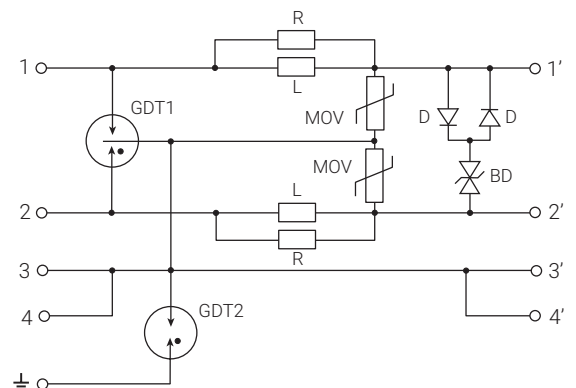
The UTB-SPG (single pair - isolated ground) provides isolation between the shield/common return and protective ground at the point of connection.



### UTB SINGLE PAIR



### UTB SINGLE PAIR - ISOLATED GROUND



## UTB SINGLE PAIR

Model	UTB5SP	UTB15SP	UTB30SP	UTB60SP	UTB110SP
Item Number for Europe	702861	702862	702863	702864	702866
Nominal Voltage	0 V to 3 VAC 0 V to 5 VDC	3 V to 10 VAC 5 V to 15 VDC	10 V to 21 VAC 15 V to 30 VDC	21 V to 42 VAC 30 V to 60 VDC	100 V to 110 VAC 142 V to 154 VDC
Max Cont. Operating Voltage, $U_c$	5 VAC 7 VDC	12 VAC 18 VDC	23 VAC 33 VDC	45 VAC 64 VDC	120 VAC 170 VDC
Max Line Current, $I_L$	2 A				
Frequency	0.5 MHz	1 MHz	2 MHz	3 MHz	
Loop Resistance	1.0 $\Omega$				
Max Discharge Current, $I_{max}$	20 kA 8/20 $\mu$ s (L+L)-PE				
Protection Modes	Differential & Common Mode				
Technology	GDT, MOV, Silicon				
Voltage Protection Level (8/20 $\mu$ s)	L-L 10 V @ 3 kA	L-L 25 V @ 3 kA	L-L 44 V @ 3 kA	L-L 85 V @ 3 kA	L-L 220 V @ 3 kA
Dimensions H x D x W: mm (in)	90 x 72 x 12 (3.54 x 2.83 x 0.47)				
Weight: kg (lbs)	0.07 (0.15)				
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)				
Connection	1 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (#18AWG to 14AWG) Grounding via terminal or DIN rail connection				
Mounting	35 mm top hat DIN rail				
Temperature	-20°C to 65°C (-4°F to 149°F)				
Humidity	0 % RH to 90 % RH				
Approvals	CE, UL® 497B				
Surge Rated to Meet	ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C				
Replacement Module	UTB5SPM	UTB15SPM	UTB30SPM	UTB60SPM	UTB110SPM
Replacement Module (Europe)	(702867)	(702868)	(702869)	(702871)	(702872)

## UTB SINGLE PAIR - ISOLATED GROUND

Model	UTB5SPG	UTB15SPG	UTB30SPG	UTB60SPG	UTB110SPG
Item Number for Europe	702873	702874	702876	702877	702878
Nominal Voltage	0 V to 3 VAC 0 V to 5 VDC	3 V to 10 VAC 5 V to 15 VDC	10 V to 21 VAC 15 V to 30 VDC	21 V to 42 VAC 30 V to 60 VDC	100 V to 110 VAC 142 V to 154 VDC
Max Cont. Operating Voltage, $U_c$	5 VAC 7 VDC	12 VAC 18 VDC	23 VAC 33 VDC	45 VAC 64 VDC	120 VAC 170 VDC
Max Line Current, $I_L$	2 A				
Frequency	0.5 MHz	1 MHz	2 MHz	3 MHz	
Loop Resistance	1.0 $\Omega$				
Max Discharge Current, $I_{max}$	20 kA 8/20 $\mu$ s (L+L)-PE				
Protection Modes	Differential & Common Mode				
Technology	GDT, MOV, Silicon				
Voltage Protection Level (8/20 $\mu$ s)	L-L 10 V @ 3 kA	L-L 25 V @ 3 kA	L-L 44 V @ 3 kA	L-L 85 V @ 3 kA	L-L 220 V @ 3 kA
Dimensions H x D x W: mm (in)	90 x 72 x 12 (3.54 x 2.83 x 0.47)				
Weight: kg (lbs)	0.07 (0.15)				
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)				
Connection	1 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (#18AWG to 14AWG) Grounding via terminal or DIN rail connection				
Mounting	35 mm top hat DIN rail				
Temperature	-20°C to 65°C (-4°F to 149°F)				
Humidity	0 % RH to 90 % RH				
Approvals	CE, UL® 497B				
Surge Rated to Meet	ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C				
Replacement Module	UTB5SPGM	UTB15SPGM	UTB30SPGM	UTB60SPGM	UTB110SPGM
Replacement Module (Europe)	(702879)	(702881)	(702882)	(702883)	(702884)

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# UTB DP

## UNIVERSAL TRANSIENT BARRIER DUAL PAIR

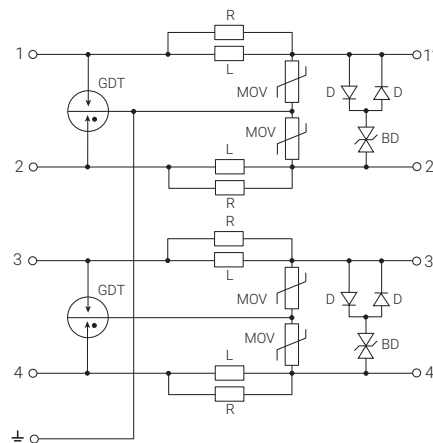
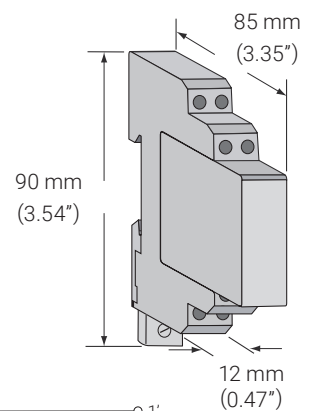
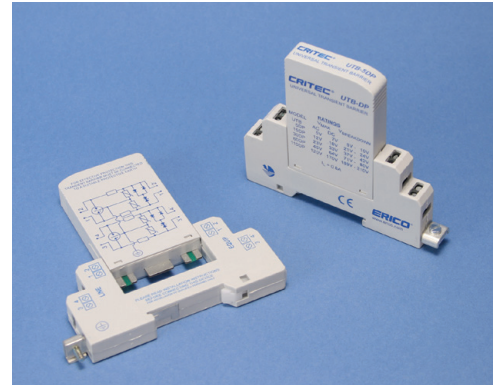
### FEATURES

- Compact design universal transient barrier – protection of low-voltage circuits and transducers
- Separate plug and base design – hot swappable feature allows ease of module replacement
- Compact, slimline two pair housing 12 mm wide
- Multi stage protection – fine over-voltage protection helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode protection – protects against both possible surge conditions
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20 kA 8/20  $\mu$ s – ideal for exposed wiring
- "UTB-DPS" model designed for compact protection of signal and power supply in one compact housing
- Allows for protection of 50 analog signals or 100 digital signals per linear foot of DIN rail space

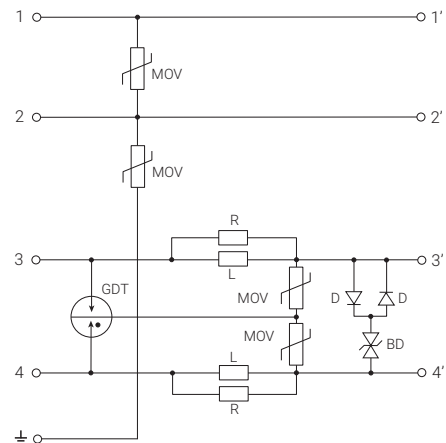
The UTB series is designed to provide transient protection for equipment from surges induced onto balanced pair signal lines or low-voltage AC or DC power supplies. The compact series is well suited to applications where panel space is limited, yet provides similar protection performance when compared to the UTB Modular series. They are well suited to the protection of industrial equipment such as PLCs and SCADA systems.

The UTB-DP (dual pair) employs a hybrid, multi-stage clamping circuit to help ensure the best possible protection to sensitive electronic equipment while maintaining a minimum of line interference and insertion losses.

The UTB-DPS (dual pair - single power supply, single data pair) is specifically designed for applications where compact protection is required for one signal pair and one power supply, common in powered transducer applications. The UTB-DPS combines both these protection circuits in one compact package.



UTB Dual Pair



UTB Dual Pair -  
Single Power Supply,  
Single Data Pair

## UTB DUAL PAIR

Model	UTB5DP	UTB15DP	UTB30DP	UTB60DP	UTB110DP	UTB30DPS
Item Number for Europe	702886	702887	702888	702889	702891	702892
Nominal Voltage	0 V to 3 VAC 0 V to 5 VDC	3 V to 10 VAC 5 V to 15 VDC	10 V to 21 VAC 15 V to 30 VDC	21 V to 42 VAC 30 V to 60 VDC	100 V to 110 VAC 142 V to 154 VDC	24 V to 48 VAC 12 V to 60 VDC
Max Cont. Operating Voltage, $U_c$	5 VAC 7 VDC	12 VAC 18 VDC	23 VAC 33 VDC	45 VAC 64 VDC	120 VAC 170 VDC	48 V~AC 60 VDC
Max Line Current, $I_L$	800 mA					5 A
Frequency	0.5 MHz	1 MHz	2 MHz	3 MHz		0-60 Hz
Loop Resistance	0.6 $\Omega$					0.0 $\Omega$
Max Discharge Current, $I_{max}$	20 kA 8/20 $\mu$ s (L+L)-PE					15 kA 8/20 $\mu$ s/mode
Protection Modes	Differential & Common Mode					
Technology	GDT MOV Silicon					MOV
Voltage Protection Level (8/20 $\mu$ s)	L-L 10 V @ 3 kA	L-L 25 V @ 3 kA	L-L 44 V @ 3 kA	L-L 85 V @ 3 kA	L-L 220 V @ 3 kA	
Dimensions H x D x W: mm (in)	90 x 85 x 12 (3.54 x 3.35 x 0.47)					
Weight: kg (lbs)	0.09 (0.20)					
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)					
Connection	1 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (#18AWG to 14AWG) Grounding via terminal or DIN rail connection					
Mounting	35 mm top hat DIN rail					
Temperature	-20°C to 65°C (-4°F to 149°F)					
Humidity	0 % RH to 90 % RH					
Approvals	CE, UL® 497B					
Surge Rated to Meet	ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C					
Replacement Module Replacement Module (Europe)	UTB5DPM (702893)	UTB15DPM (702894)	UTB30DPM (702896)	UTB60DPM (702897)	UTB110DPM (702898)	UTB30DPSM (702899)

(1) UTB30DPS has one data/signal pair circuit equal in electrical specification rating to one pair of the UTB30DP product. The electrical specifications shown for the UTB30DPS is specific to the power supply (PS) circuit of the product.

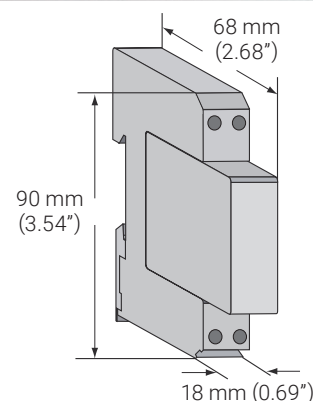
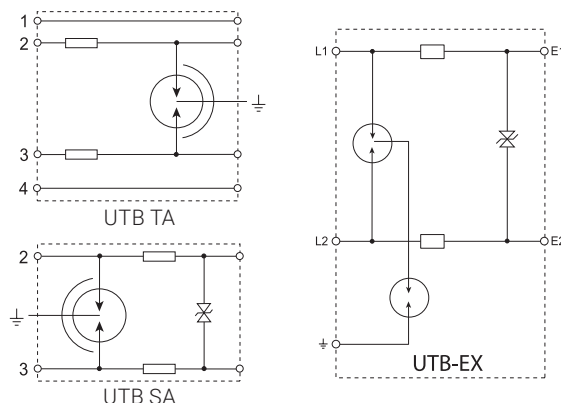
# Universal Transient Barrier Special Applications

## FEATURES

- General purpose barrier – protection of low-voltage circuits and transducers
- Separate plug and base design – hot swappable feature allows ease of module replacement
- Multi stage protection – fine over-voltage protection, helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode protection – protects against both possible surge conditions
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20 kA 8/20  $\mu$ s – ideal for exposed wiring
- EX series for use in intrinsically safe areas

The UTB-TA and UTB-SA are specifically designed to protect telephone / modem circuits.

The UTB15EX and UTB30EX are BASEEFA approved versions for hazardous area applications (ATEX Category II 1G EEx ia IIC T4). They can be inserted without recertification into any IS loop where input <1.3W.



## TELECOMMUNICATIONS LINE PROTECTION

Model	UTBSA	UTBTA
Item Number for Europe	702860	702850
Frequency	15 MHz	
Max Discharge Current $I_{max}$	20 kA 8/20	500 A 8/20
Max Line Current, $I_L$	160 mA	
Technology	GDT, PTC	
Voltage Protection Level (8/20 $\mu$ s)	L-L: 340 V @ 3 kA	L-L: 480 V @ 3 kA
Loop Resistance	1.0 $\Omega$	
Weight: kg (lbs)	0.1 (0.22)	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection	1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG) Grounding via terminal or DIN rail connection	
Mounting	35 mm top hat DIN rail	
Temperature	-25°C to 65°C (-13°F to 149°F)	
Humidity	0 % RH to 90 % RH	
Approvals	CE	CE, UL® 497
Surge Rated to Meet	ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C	

## DATA AND SIGNAL LINE PROTECTION

Model	UTB15EX	UTB30EX
Item Number for Europe	702811	702821
Nominal Voltage	3 V to 10 VAC, 5 V to 15 VDC	10 V to 21 VAC, 15 V to 30 VDC
Max Cont. Operating Voltage, $U_c$	12 VAC, 1 7VDC	23 VAC, 33 VDC
Frequency	1 MHz	2 MHz
Max Discharge Current $I_{max}$	20 kA 8/20	
Max Line Current, $I_L$	400 mA	80 mA
Technology	GDT, Silicon	
Voltage Protection Level (8/20 $\mu$ s)	L-L: 25 V @ 3 kA	L-L: 44 V @ 3 kA
Loop Resistance	1.0 $\Omega$	
Weight: kg (lbs)	0.1 (0.22)	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection	1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG) Grounding via terminal or DIN rail connection	
Mounting	35 mm top hat DIN rail	
Temperature	-30°C to 65°C (-22°F to 149°F)	
Humidity	0 % RH to 90 % RH	
Approvals	ATEX, CE, UL® 497B, UL® 913	
Surge Rated to Meet	ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C	



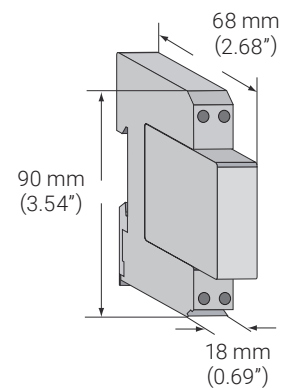
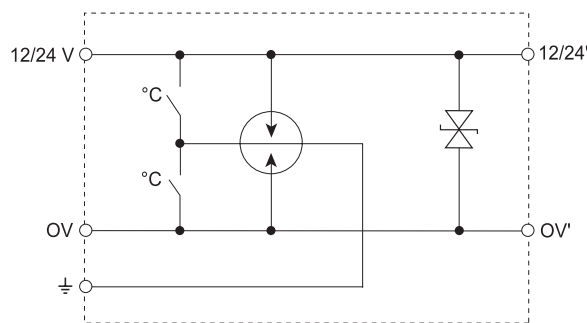
# DSD (DC)

## DINLINE SURGE DIVERTER

### FEATURES

- Ease of grounding – through DIN mounting rail or via terminal
- General purpose barrier – protection of 12 / 24V DC systems and equipment
- Large surge rating to 20kA 8/20μs – suitable for exposed DC wiring
- Separate plug and base design – facilitates ease of module replacement
- Two stage protection – suitable for the protection of power supply feeds
- High series current rating of 10A

The DSD120 series is designed to provide protection for higher load current circuits that are exposed to higher transient levels, such as those which exit the facility building. The DSD120 series provides a high series current rating of 10A, making it especially useful on power supply circuits and higher current relay control circuits.



Model	DSD120S12	DSD120S24
Item Number for Europe	702670	702680
Nominal System Voltage, $U_n$	12 VDC	24 VDC
Max Cont. Operating Voltage, $U_c$	24 VDC	28 VDC
Max Line Current, $I_L$	10 A	
Max Discharge Current, $I_{max}$	20 kA 8/20 μs (L+L)-PE	
Protection Modes	Differential & Common Mode	
Technology	GDT Silicon	
Voltage Protection Level	L-L 30 V @ 3 kA	L-L 40 V @ 3 kA
Loop Resistance	0.5 Ω	
Dimensions H x D x W: mm (in)	90 x 68 x 18 (3.54 x 2.68 x 0.69)	
Module Width	1 M	
Weight: kg (lbs)	0.1 (0.22)	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection	1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG) Grounding via terminal or DIN rail connection	
Mounting	35 mm top hat DIN rail	
Temperature	-25°C to 70°C (-13°F to 158°F)	
Humidity	0 % RH to 90 % RH	
Approvals	CE	
Surge Rated to Meet	ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C	
Replacement Module	DSD120S12M	DSD120S24M
Replacement Module (Europe)	(702675)	(702685)

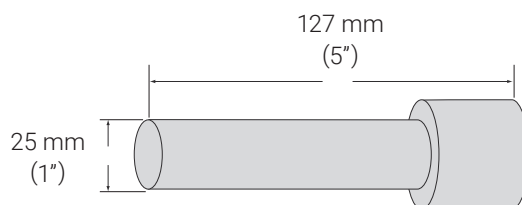
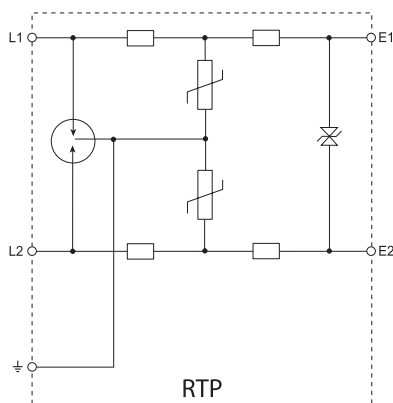
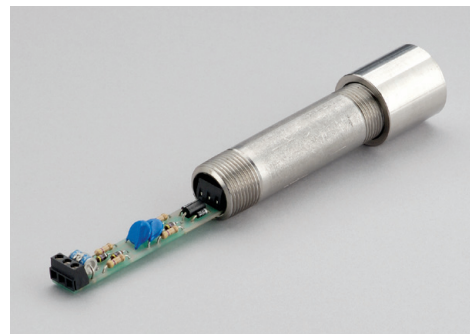
# RTP

## REMOTE TRANSMITTER PROTECTOR

### FEATURES

- 3 stage protection – fine over-voltage protection helps ensure lowest residual surge voltage reaches sensitive equipment
- Flexible installation – enclosure can be installed “dead ended,” “T” configured or in-line
- Optimized for protection of 2-wire industrial 4-20mA loops – suitable for exposed locations
- Supports line currents up to 145mA – protect 24Vdc powered equipment

The RTP is designed for the protection of industrial 4-20 mA loop connected transducers. The stainless steel enclosure can be installed in-line with the field conduit, or fitted to the spare transducer connection port. Installation is simplified as the protection circuit can be removed from the enclosure to connect field wiring to the screw terminals. The RTP employs a hybrid three stage clamping circuit to help ensure the best possible protection to sensitive field equipment.



Model	RTP3034
Item Number for Europe	700865
Nominal System Voltage, $U_n$	30 VDC & 21 VAC
Max Cont. Operating Voltage, $U_c$	33 VDC & 23 VAC
Max Line Current, $I_L$	145 mA
Frequency	3 dB @ 2 MHz (120 $\Omega$ )
Max Discharge Current, $I_{max}$	20 kA 8/20 $\mu$ s (L+L)-PE
Protection Modes	Differential & Common Mode
Technology	GDT MOV Silicon
Voltage Protection Level	L-L 44 V @ 3 kA
Loop Resistance	14.0 $\Omega$
Dimensions Dia. x L: mm (in)	25 x 127 (1 x 5)
Weight: kg (lbs)	0.34 (0.75)
Enclosure	304 Stainless Steel
Connection	$\leq 2.5 \text{ mm}^2$ (#14AWG)
Mounting	3/4" NPT thread (14 threads per inch)
Temperature	-40°C to 65°C (-40°F to 149°F)
Humidity	0 % RH to 90 % RH
Approvals	CE
Surge Rated to Meet	ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C

# Guide to Data and Signaling Circuits

The selection of an SPD for communication and signalling circuits requires knowledge of the:

- 1) Maximum Continuous Operating Voltage ( $U_c$ )
- 2) Maximum line current ( $I_L$ )
- 3) Frequency
- 4) Termination (connector type and/or impedance)

Where a protocol is known, this often eliminates the need to verify product selection criteria 1-3, and occasionally 4.

A number of different SPDs often meet the requirements as defined by the protocol, so the final choice of which SPD to use is often determined by its type of physical connection, number of lines to be protected, or its surge rating. Some protocols do not define the actual connector or pin configuration, and in some cases, not all lines defined by the protocol will be used. Please refer to the documentation provided with the equipment requiring protection to ensure the proposed protection modes are adequate and that the SPD's characteristics will not interfere with normal system operation.

Protocol/Standard	Description	Applicable SPD Series
RS-232 (V.24)	Unbalanced, bi-directional communication circuit.	UTB 15 SP <sup>(1)</sup> , UTB 15DP <sup>(2)</sup>
	Although standard allows +/- 25 V signaling, use of more than +/- 12 V is uncommon	UTB 5 <sup>(1)</sup>
RS-422 (V.11)	Industrial version of RS-232. 0-5 V balanced signaling	UTB 5 <sup>(1)</sup>
RS-423	Similar to RS-232 but +/- 5 V signaling used	UTB 5 <sup>(1)</sup>
RS-485	Similar to RS-422 but allows multiple devices to communicate. DB-9 connector is common	UTB 5 <sup>(1)</sup>
Ethernet	Ethernet is the term used to describe a family of communication protocols.	LAN RJ45 Series
Cat 4	* 10BaseT is a 10 MHz system using twisted pair of coax cables	
Cat 5	* 100BaseT is a 100 MHz system using twisted pair cables	
10BaseT	Cat 4 is a cable specification that allows operation up to 10BaseT, while Cat 5 allows operation up to 100BaseT frequencies.	
100BaseT		
Telephone Lines		UTB SA <sup>(2)</sup> , UTB TA <sup>(2)</sup>
4-20 mA current loop (with HART)	Common industrial communications protocol used to interface with transducers etc	UTB xDP, UTB 30DPS, UTB xSP
Binary Signals		UTB xSP <sup>(1)</sup> , UTB xDP <sup>(1)</sup>
Bitbus (IEEE 1118)	Digital communications network based on RS-485 and SDLC allowing communication between PLCs and controllers	UTB 5 <sup>(1)</sup>
CAN-Bus (data signal line)	Differential serial communications protocol defined in ISO 11898 standard	
DeviceNet (data signal line)	Communication protocol used to connect industrial devices such as limit switches, motor starters to PLCs and controllers	
M-Bus	Communication protocol for networking and remote reading of heat, gas, water, and energy meters	UTB 60 <sup>(1)</sup>
Ex (I) - HART, 4-20 mA circuit, measurement circuits	Hazardous locations	UTB15 Ex , UTB30 Ex
Profibus - PA	Process field bus - process automation. Ideal for explosion - hazardous areas	UTB30 Ex
Strain gauge / Load cells	As used in weigh bridges etc.	LCP01A
ASDL	Asy mmetric Digital Subscriber Line. Protocol for data communication over copper telephone lines. Uses single copper wire pair.	UTB TA <sup>(2)</sup> , UTB SA <sup>(2)</sup>
HDSL	High bit rate Digital Subscriber Line. Protocol for data communication over copper telephone lines. Uses two copper wire pairs.	
ISDN	Integrated Service Digital Network. Protocol for voice and data over copper telephone lines	

(1) The number of UTB's required is dependent on the number of wires being used in the signalling circuit. UTBs are designed for balanced circuits and each UTB will protect one pair of wires. The UTB can also be used to protect two unbalanced circuits.

(2) The UBT TA is rated to 500 A 8/20 us and intended to meet US NEC requirements. The UTB SA are rated to 20 kA 8/20 us and specifically designed and approved for use on the Australian telecommunication network.

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