

## SURGE PROTECTION FOR DATA & SIGNAL APPLICATIONS

TP48 Series

TP24/7

FP32

SLP Series

SD Series

TP32/32T Series

HW48

IOP Series

TP-Pipe Series

mSA Series

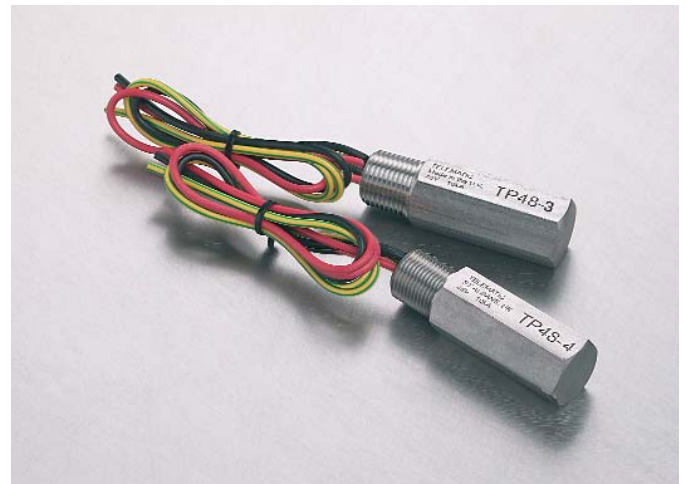
Zone Barrier



# TP48 Series

Safeguards electronic process transmitters against induced surges and transients from field cabling

- Protects 2, 3 and 4 wire transmitters
- Easy and direct mounting - simply screws into spare conduit entry
- Intrinsically safe and flameproof to GENELEC standards
- Parallel connection avoids introduction of any resistance into loop
- ATEX approved



The TP Series of surge protection devices uniquely provide a level of protection for 2, 3 and 4 wire field-mounted transmitters that is far in excess of the optional transient protection facilities available from the transmitter manufacturers - without involving any additional wiring, conduit modifications or other expensive extras.

The TP Series protection network consists of high-power, solid-state electronics and a gas-filled discharge tube capable of diverting 10kA impulses. The whole unit is encased in an ANSI 316 stainless steel housing, threaded for the common conduit entries used on process transmitters. Versions are available for 1/2" NPT, 20mm ISO, and G1/2" (BSP 1/2 inch) threaded entries.

Installation is very simple and can easily be carried out retrospectively to existing installations. The TP is screwed into any unused conduit entry on the transmitter case and flying leads are connected to the terminal block (+ve, -ve) and the internal earth stud. The 3 wire TP protects +ve, -ve and signal. The 4 wire

TP protects +ve, -ve, signal +ve and -ve. The TPs operate without in any way affecting normal operation - passing ac or dc signals without attenuation while diverting surge currents safely to earth and clamping output voltages to specific levels.

The all important earthing connection is made to the local casing of the transmitter with no separate earth connection or ground stake at the transmitter being needed. In operation, the TP makes sure that the transmitter electronics are never exposed to damaging transients between lines or between lines and casing/earth. Any surge current appearing as a series-mode or common-mode transient is converted into a common-mode voltage - whereupon the transmitter electronics are temporarily raised to some higher voltage level before 'floating' down automatically (and without damage) to resume normal operation.

For hazardous-area use,

approvals for both intrinsically safe and flameproof (explosionproof) operation are available (pending for the TP48 3 & 4 wire), in all gas groups and apparatus temperature classification up to T4 for the TP48 3 & 4 wire and T6 for the TP48. Where transmitters are used in circuits suitable for Div 2/Zone 2 installations, the TP can be added without adversely affecting the level of safety.

For fieldbus applications, use the TP32 which meets the requirements of IEC61158-2:2000 and ANSI/ISA-50.02-2 1992 for 31.25kbit/s systems as used by FOUNDATION™ Fieldbus, PROFIBUS-PA and WorldFIP.

**Data & Signal  
Protection**

# Specification

(all figures typical at 25°C unless otherwise stated)

## Maximum surge current

10kA peak current (8/20µs waveform)

## Leakage current

Less than 10µA at maximum working voltage

## Working voltage

48V dc maximum

## Bandwidth

1MHz

## Resistance

No resistance introduced into loop

## Ambient temperature limits

-20°C to +80°C (working)

-40°C to +80°C (storage)

## Humidity

5% to 95% RH (non-condensing)

## Electrical connections

### TP48

3 flying leads (line1, line 2 & earth)

### TP48 3 Wire

4 flying leads (+ve, -ve, signal & earth)

### TP48 4 Wire

5 flying leads (+ve, -ve, signal +ve, signal -ve, earth)

Wire size 32/O.2 (1.0mm<sup>2</sup>, 18 AWG)

Lead length 250mm (minimum)

## Casing

ANSI 316 stainless steel hexagonal barstock, male thread

## Threads

TP48-3-N & TP48-4-N 1/2" NPT

TP48-3-I & TP48-4-I 20mm ISO

(M20 x 1.5)

TP48-3-G & TP48-4-G G 1/2"

(BSP 1/2")

## Weight

175g

## Dimensions

See figure 1

## EMC compliance

To Generic Immunity Standards EN50082, part 2 for industrial environments

## Electrical safety

EEx ia IIC T4, Ceq=0, Leq=0; the unit can be connected without further certification into any intrinsically safe loop with open circuit voltage <60V and input power <1.2W.

EEx d IIC T4; the unit is apparatus-approved to flameproof (explosionproof) standards, and can be fitted into a similarly approved housing.

## Installation

The TP units are designed for mounting directly into an unused conduit entry on a process transmitter housing. Generally, two such entries are provided, one of which is used for the loop wiring. On the unused entry, the blanking plug or other closure device is removed and an appropriately threaded TP screwed into its place. The transmitter specification should provide information indicating the required thread type. TP units can be installed using thread adaptors if necessary, including certified adaptors in hazardous area applications. For applications where two conduit entries are not provided or where both are used for electrical connections, TP units can be housed in conventional conduit hub or junction boxes, provided access to the loop terminals is possible. Figure 2 shows connection details for 3 & 4 wire process transmitter.

## MTL Surge Technologies

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A member of the MTL Instruments Group plc

Model		TP48
Nominal voltage	$U_n$	48V
Rated voltage (MCOV)	$U_c$	58V
Nominal current	$I_n$	n/a
Nominal discharge current (8/20µs)	$i_{sn}$	3kA
Max discharge current (8/20µs)	$I_{max}$	10kA
Lightning impulse current (10/350µs)	$I_{imp}$	2.5kA
Residual voltage @ $i_{sn}$	$U_p$	92V
Voltage protection level @ 1kV/µs	$U_p$	<76V
Bandwidth	$f_G$	1MHz
Capacitance	C	100pF
Series resistance	R	n/a
Operating Temperature Range		-40°C to +85°C
Category tested		A2, B2, C1, C2, C3, D1
Overstressed fault mode $i_n=3kA$		12kA
Impulse durability (8/20µs)		10kA
Degree of protection		IP66
AC durability		1A <sub>rms</sub> , 5T
Service conditions		80kPa - 160kPa 5% - 95% RH

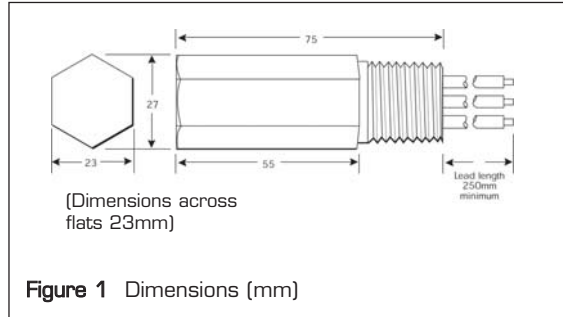


Figure 1 Dimensions (mm)

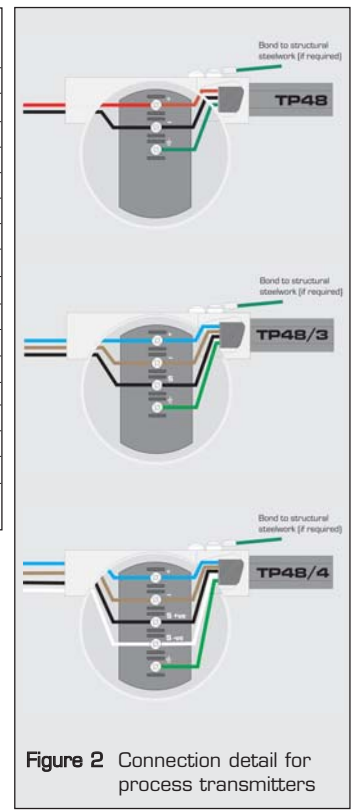


Figure 2 Connection detail for process transmitters

## Approvals

Country (Authority)	Standard	Certificate/File No.	Approved for	Product
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50020:1994, EN 50284:1999	BASEEFA04ATEX0251X	EEx ia IIC T6 (T <sub>amb</sub> = -40 to 60°C) EEx ia IIC T5 (T <sub>amb</sub> = -40 to 85°C) EEx ia IIC T4 (T <sub>amb</sub> = -40 to 60°C)	TP48-X-Y-Z
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50018:2000 + Amendment 1	BASEEFA04ATEX0053X	EEx d IIC T6 (T <sub>amb</sub> = -40 to 60°C) EEx d IIC T5 (T <sub>amb</sub> = -40 to 80°C) EEx d IIC T4 (T <sub>amb</sub> = -40 to 85°C)	TP48-X-Y-Z
Atex Directive 94/9/EC	BS EN 50021:1999	TML02ATEX0032X	Ex n II T6 (-40°C<T <sub>amb</sub> <+60°C) EEx n II T5 (-40°C<T <sub>amb</sub> <+85°C)	TP48-X-Y-Z
USA (FM)	Class Nos. 3600 (1998), 3610 (1999), 3611 (1999), 3615 (1989), 3810 incl. Supp 1 (1995-07 [1989-03], ANSI/NEMA 250 (1991), ISA-S12.0.01 (1999)	3022293	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Non incandive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EFG Special protection: II/2/FG	TP48-X-Y-Z
Canada (FM)	C22.2 No. 157 C22.2 No. 213 C22.2 No. 142 C22.2 No. 94 C22.2 No. 30	3025374	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Nonincandive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EFG Special protection: II/2/FG	TP48-X-Y-Z

Key: X = 3 or 4 or blank  
Y = N, I or G  
Z = NDI

## To order specify -

### TP48-NNDI

Certified process transmitter surge protection device - 1/2" NPT thread

### TP48-NDI

Certified process transmitter surge protection device - 20mm ISO thread

### TP48-GNDI

Certified process transmitter surge protection device - G 1/2" (BSP 1/2 inch)

### TP48-N

Non-certified process transmitter surge protection device - 1/2" NPT thread

### TP48-I

Non-certified process transmitter surge protection device - 20mm ISO thread

### TP48-G

Non-certified process transmitter surge protection device - G 1/2" (BSP 1/2 inch)

### TP48-3-NNDI

Certified process transmitter surge protection device - 1/2" NPT thread

### TP48-3-NDI

Certified process transmitter surge protection device - 20mm ISO thread

### TP48-3-GNDI

Certified process transmitter surge protection device - G 1/2" - BSP 1/2 inch

### TP48-3-N

Non-certified process transmitter surge protection device - 1.2" NPT thread

### TP48-3-I

Non-certified process transmitter surge protection device - 20mm ISO thread

### TP48-3-G

Non-certified process transmitter surge protection device - G 1/2" BSP 1/2 inch

### TP48-4-NNDI

Certified process transmitter surge protection device - 1/2" NPT thread

### TP48-4-NDI

Certified process transmitter surge protection device - 20mm ISO thread

### TP48-4-GNDI

Certified process transmitter surge protection device - G 1/2" - BSP 1/2 inch

### TP48-4-N

Non-certified process transmitter surge protection device - 1.2" NPT thread

### TP48-4-I

Non-certified process transmitter surge protection device - 20mm ISO thread

### TP48-4-G

Non-certified process transmitter surge protection device - G 1/2" BSP 1/2 inch

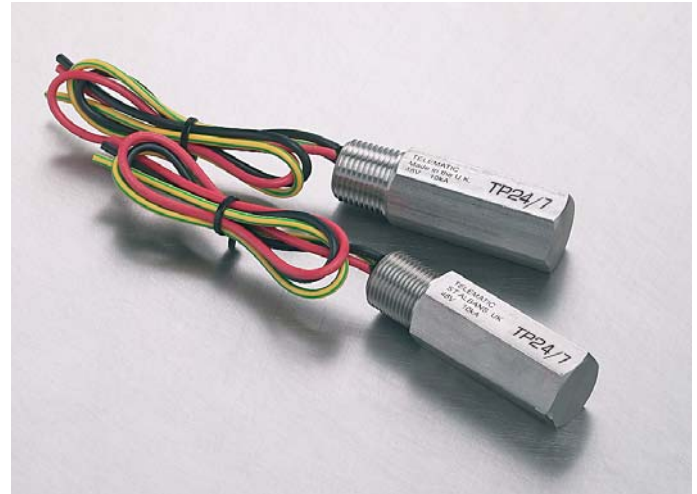
Note: In accordance with our policy of continuous improvement, MTL Surge Technologies reserves the right to change the product's specification without notice.



# TP24/7

Safeguards 4 wire process transmitters against induced surges and transients from field cabling

- Specifically designed for *Multivariable Transmitters and Level Transmitters*
- Four wires protected, one pair at 12V to 24V and one pair at 7V (e.g. RS485)
- Easy and direct mounting - simply screws into spare conduit entry
- Intrinsically safe and flameproof to CENELEC standards
- FM for US and Canada and ATEX approved



The TP24/7 surge protection device is a unique unit providing a level of protection for field-mounted transmitters that is far in excess of the optional transient protection facilities available from the transmitter manufacturers - without involving any additional wiring, conduit modifications or other expensive extras.

The TP24/7 protection network consists of high-power, solid-state electronics and a gas-filled discharge tube capable of diverting 10kA impulses. The whole unit is encased in an ANSI 316 stainless steel housing, threaded for the common conduit entries used on process transmitters. Versions are available for 1/2" NPT, 20mm ISO, and G1/2" (BSP 1/2 inch) threaded entries.

Installation is very simple and can easily be carried out retrospectively to existing installations. The TP24/7 is screwed into any unused conduit entry

on the transmitter case and flying leads are connected to the terminal block (+ve, -ve), RS485 terminals and the internal earth stud. They operate without in any way affecting normal operation - passing ac or dc signals without attenuation while diverting surge currents safely to earth and clamping output voltages to specific levels.

The all important earthing connection is made to the local casing of the transmitter with no separate earth connection or ground stake at the transmitter being needed. In operation, the TP24/7 makes sure that the transmitter electronics are never exposed to damaging transients between lines or between lines and casing/earth. Any surge current appearing as a series-mode or common-mode transient is converted into a common-mode voltage - whereupon the transmitter electronics are temporarily

raised to some higher voltage level before 'floating' down automatically (and without damage) to resume normal operation.

For hazardous-area use, approvals for both intrinsically safe and flameproof (explosionproof) operation are available, in all gas groups and apparatus temperature classification up to T4. Where transmitters are used in circuits suitable for Div 2/Zone 2 installations, the TP24/7 can be added without adversely affecting the level of safety.

# Specification

(all figures typical at 25°C unless otherwise stated)

## Maximum surge current

10kA peak current (8/20µs waveform)

## Leakage current

Less than 10µA at maximum working voltage

## Working voltage

12V to 24V dc power  
7V dc maximum RS485 communications

## Bandwidth

1MHz

## Resistance

No resistance introduced into loop

## Ambient temperature limits

-40°C to +60°C (working)  
-40°C to +85°C (storage)

## Humidity

5% to 95% RH (non-condensing)

## Electrical connections

4 flying leads  
Wire size 32/O.2 (1.0mm<sup>2</sup>, 18 AWG)  
Lead length 250mm (minimum)

## Casing

ANSI 316 stainless steel hexagonal barstock, male thread

## Threads

TP24/7-N 1/2" NPT  
TP24/7-I 20mm ISO (M20 x 1.5)  
TP24/7-G G 1/2" (BSP 1/2 inch)

## Weight

175g

## Dimensions

See figure 1

## EMC compliance

To Generic Immunity Standards EN50082, part 2 for industrial environments

## Electrical safety

EEx ia IIC T4, Ceq=0, Leq=0; the unit can be connected without further certification into any intrinsically safe loop with open circuit voltage <60V and input power <1.2W.

EEx d IIC T4; the unit is apparatus-approved to flameproof (explosionproof) standards, and can be fitted into a similarly approved housing.

## Installation

The TP24/7 is designed for mounting directly into an unused conduit entry on a process transmitter housing. Generally, two such entries are provided, one of which is used for the loop wiring. On the unused entry, the blanking plug or other closure device is removed and an appropriately threaded TP24/7 screwed into its place. The transmitter specification should provide information indicating the required thread type. TP24/7 units can be installed using thread adaptors if necessary, including certified adaptors in hazardous area applications. For applications where two conduit entries are not provided or where both are used for electrical connections, TP24/7 units can be housed in conventional conduit hub or junction boxes, provided access to the loop terminals is possible. Figure 2 shows connection details for a typical process transmitter.

Note: In accordance with our policy of continuous improvement, MTL Surge Technologies reserves the right to change the product's specification without notice.

## MTL Surge Technologies

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Model		TP24/7
Nominal voltage	U <sub>n</sub>	24V/7V
Rated voltage (MCOV)	U <sub>c</sub>	34V/7V
Nominal current	I <sub>n</sub>	n/a
Nominal discharge current (8/20µs)	i <sub>sn</sub>	3kA
Max discharge current (8/20µs)	I <sub>max</sub>	10kA
Lightning impulse current (10/350µs)	I <sub>imp</sub>	2.5kA
Residual voltage @ i <sub>sn</sub>	U <sub>p</sub>	43V/19V
Voltage protection level @ 1kV/µs	U <sub>p</sub>	<36V/<12V
Bandwidth	f <sub>G</sub>	1MHz
Capacitance	C	100pF
Series resistance	R	n/a
Operating Temperature Range		-40°C to +85°C
Category tested		A2, B2, C1, C2, C3, D1
Overstressed fault mode i <sub>n</sub> =3kA		12kA
Impulse durability (8/20µs)		10kA
Degree of protection		IP66
AC durability		1A <sub>rms</sub> , 5T
Service conditions		80kPa - 160kPa 5% - 95% RH

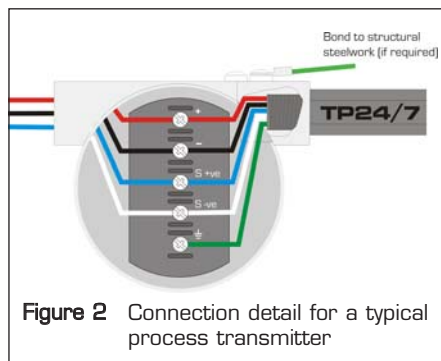


Figure 2 Connection detail for a typical process transmitter

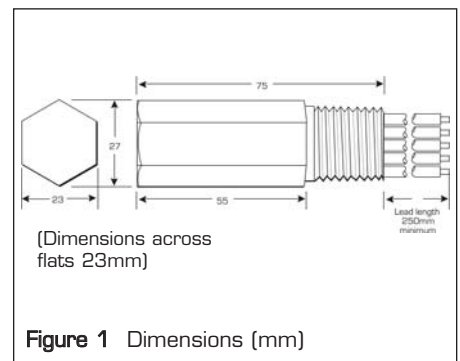


Figure 1 Dimensions (mm)

## Approvals

Country (Authority)	Standard No.	Certificate/File	Approved for	Product
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50020:1994, EN 50284:1999	BASEEFA04ATEX0251X	EEx ia IIC T6 (T <sub>amb</sub> = -40 to 60°C) EEx ia IIC T5 (T <sub>amb</sub> = -40 to 85°C) EEx ia IIC T4 (T <sub>amb</sub> = -40 to 60°C)	TP24/7-N-NDI TP24/7-I-NDI TP24/7-G-NDI
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50018:2000 + Amendment 1	BASEEFA04ATEX0053X	EEx d IIC T6 (T <sub>amb</sub> = -40 to 60°C) EEx d IIC T5 (T <sub>amb</sub> = -40 to 80°C) EEx d IIC T4 (T <sub>amb</sub> = -40 to 85°C)	TP24/7-N-NDI TP24/7-I-NDI TP24/7-G-NDI
Atex Directive 94/9/EC	BS EN 50021:1999	TML02ATEX0032X	Ex n II T6 (-40°C<T <sub>amb</sub> <+60°C) EEx n II T5 (-40°C<T <sub>amb</sub> <+85°C)	TP24/7-N TP24/7-I TP24/7-G
USA (FM)	Class Nos. 3600 (1998), 3610 (1999), 3611 (1999), 3615 (1989), 3810 incl. Supp 1 (1995-07 [1989-03], ANSI/NEMA 250 (1991), ISA-S12.0.01 (1999)	3022293	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Non incandive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EFEG Special protection: II/2/FG	TP24/7-N-NDI TP24/7-I-NDI TP24/7-G-NDI
Canada (FM)	C22.2 No. 157 C22.2 No. 213 C22.2 No. 142 C22.2 No. 94 C22.2 No. 30	3025374	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Nonincandive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EFEG Special protection: II/2/FG	TP24/7 All

Note: TP24/7 part numbers ending in NDI are approved for IS, non-incandive and explosion proof installations.

## To order specify -

**TP24/7-N-NDI** Certified process transmitter surge protection device - 1/2" NPT thread  
**TP24/7-I-NDI** Certified process transmitter surge protection device - 20mm ISO thread  
**TP24/7-G-NDI** Certified process transmitter surge protection device - G 1/2" (BSP 1/2")  
**TP24/7-N** Non-certified process transmitter surge protection device - 1/2" NPT thread  
**TP24/7-I** Non-certified process transmitter surge protection device - 20mm ISO thread  
**TP24/7-G** Non-certified process transmitter surge protection device - G 1/2" (BSP 1/2")



# FP32

Din rail mounting, 20kA surge protection for Fieldbus systems

- **DIN rail mounting for easy installation and automatic earthing (grounding)**
- **20kA maximum surge current per line**
- **Plug connectors for quick and easy connection or rewiring**
- **Meets the requirements of IEC 61158-2:2000 for FOUNDATION FIELDBUS**
- **10 year product warranty**



**The FP32 surge protection device** prevents surges and transient over-voltages conducted along the Trunk or Spurs of fieldbus systems from damaging the associated electronics such as terminators, spur blocks and the bus control equipment. The FP32 is designed to be used at both ends of the Trunk where a Spur is connected to safely divert any surges to earth.

**The multi-stage hybrid surge protection network** at the heart of the FP32 uses a combination of solid state electronics and a gas filled discharge tube (GDT) to provide surge protection up to 20kA. This impressive surge protection circuit is designed to exhibit exceptionally low line resistance and adds only a tiny voltage drop to the bus. As a result, no matter how many FP32 devices are connected to a Trunk or Spur the system will still be able to support its full 32 transmitters as specified by IEC 61158-2.

In operation the **FP32 device does not adversely effect the performance or operation of the fieldbus** or connected equipment, it allows signals to pass with very little attenuation while diverting surge currents safely to earth (ground) and clamping output voltages to safe levels.

**Fully automatic in operation,** FP32 devices react immediately to make sure that equipment is never exposed to damaging surges between lines or the lines and earth (ground). Reacting instantaneously the FP32 redirects surges safely to earth and then resets automatically.

**Din rail mounting and a small footprint** allow the FP32 to be conveniently located near terminators and spur blocks while plug connectors for Trunk / spur cables and the earth (ground)

& shield of the cable make removing a device or re-patching a simple operation.

**A 10 Year 'No Fuss' warranty** is available as standard for the FP32, so if a correctly connected device should fail for any reason, simply return it for a free replacement.

**The FP32 meets IEC 61158-2:2000** for 31.25kB/s systems such as FOUNDATION Fieldbus, PROFIBUS-PA and WorldFIP.

# Specification

All figures typical at 77°F (25°C) unless otherwise stated

## Maximum surge current

20kA (8/20µs waveform) per line

## Leakage current

<1mA @ working voltage

## Working voltage

±32Vdc

## Maximum continuous operating voltage

±36V peak normal mode

±225V peak common mode

## Limiting voltage

62V @ 3kA 8/20µs

## Line resistance

0.5Ω per line

## Capacitance

Line – Line – 40pF

Line – Earth (Ground) – 80pF

## Attenuation

-1dB – 7kHz-75mHz

## Ambient temperature limits

-4°F – +158°F (-20°C – +70°C) – working

-40°F – +176°F (-40°C – +80°C) – storage

## Humidity

5% to 95% RH (non-condensing)

## Electrical connections

Plug/header screw terminal strip

## Weight

5.0 oz (140g approx)

## Dimensions

See figure 1

## EMC compliance

BS EN 60950:1992

BS EN 61000-6-2:1999

BS EN 61010-1:1993

## Electrical Safety

ATEX II 3 G

DOC #MTL02ATEX0032X

Model		FP32
Nominal voltage	$U_n$	32V
Rated voltage (MCOV)	$U_c$	36V
Nominal current	$I_n$	675mA
Nominal discharge current (8/20µs)	$i_{sn}$	3kA
Max discharge current (8/20µs)	$I_{max}$	20kA
Lightning impulse current (10/350µs)	$I_{imp}$	2.5kA
Residual voltage @ $i_{sn}$	$U_p$	62V
Voltage protection level @ 1kV/µs	$U_p$	<45V
Bandwidth	$f_G$	73MHz
Capitance	C	40pF
Series resistance	R	0.5
Operating Temperature Range		-40°C to +70°C
Category tested		A2, B2, C1, C2, C3, D1
Overstressed fault mode $i_n=3kA$		22kA
Impulse durability (8/20µs)		10kA
Degree of protection		IP20
AC durability		1A <sub>rms</sub> , 5T
Service conditions		80kPa - 160kPa 5% - 95% RH

Tested in accordance to IEC 61643-21

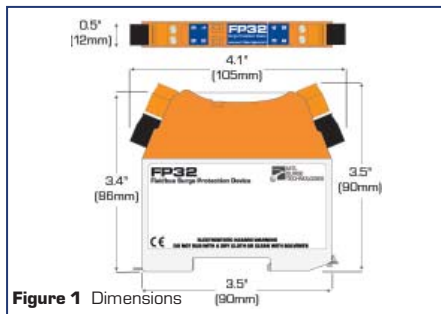


Figure 1 Dimensions

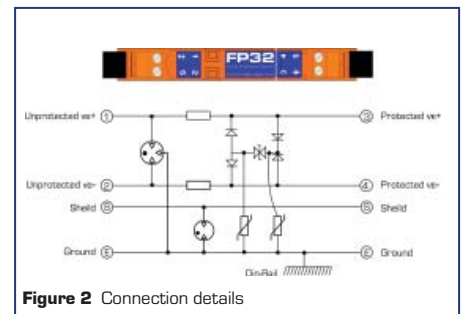


Figure 2 Connection details

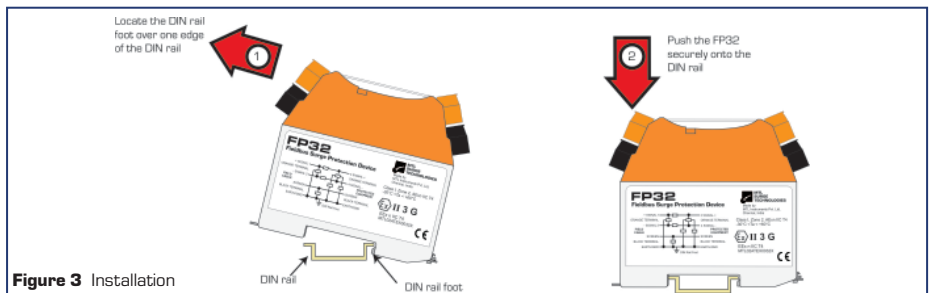


Figure 3 Installation

Note: In accordance with our policy of continuous improvement, we reserve the right to change the product's specification without notice

## Approvals

Standard/Authority	Certificate/File No.	Approved for	Product
ATEX Directive 94/9/EC FISCO (BASEEFA)	BASEEFA04ATEX0260X	EEx ia IIC T4 EEx ia IIB T3 (-40°C≤Ta≤70°C)	FP32
USA (FM)	3022293 Class Nos. 3600 (1998), 3610 (1999), 3611 (1999), 3615 (1989), 3810 incl. Supp 1 (1995-07 (1989-03), ANSI/NEMA 250 (1991), ISA-S12.0.01 (1999)	Intrinsically Safe: I/1/A-D, I/O/II C Non incandive: I/2/A-D, I/2/II C	FP32
Canada (FM)	3025374 C22.2 No. 213, 142, 94, 157, 30 ANSI/NEMA 250 CAN/CSA-E79-0 CAN/CSA-E79-11	IS/I/1/ABCD I/O/Ex ia/IIC I/O/Ex ib/IIC NE/I/2/ABCD NE/I/2/IIC	FP32
India	Petroleum & Explosives Safety Organisation (PESO)	EEx ia IIB T3	FP32

For more information please contact your local MTL sales office:

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**UK:** +44 (0)1582 723633  
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**The Netherlands:** +31 (0)481 450250  
**Italy:** +39 (0)2 6180 2011  
**Australia:** +61 (0)8 9455 2994  
**India:** +91 (0)44 450 1660

Local sales office information is also available on our web site at:  
[www.mtl surge.com/support/distribution/index.htm](http://www.mtl surge.com/support/distribution/index.htm)



# SLP Series

80kA power surge protection for small distribution panels, tower lights, equipment cabinets and confined spaces



- **Surge protection for two loops per SLP (or one 4-wire circuit)**
- **Range of ATEX Certified intrinsically safe surge protectors**
- **Space-saving design; easy installation**
- **Multi-stage hybrid protection circuitry – 20kA maximum surge current**
- **Range of voltage ratings – to suit all process I/O applications**
- **Designed for high bandwidth, low resistance applications**



**The SLP Series** is a range of surge protection devices combining high packing densities, application versatility, proven hybrid circuitry and simple installation – features which make the series the most cost effective surge protection solution for process control equipment systems and communications networks.

**The multi-stage hybrid surge protection network** at the heart of the SLP uses a combination of solid state electronics and a gas filled discharge tube (GDT) to provide surge protection up to 20kA. This impressive surge protection circuit is designed to exhibit exceptionally low line resistance and adds only a tiny voltage drop to the circuit.

**In operation, the SLP device does not adversely affect the performance or operation of the loop** or combined equipment. The device allows signals to pass with very little attenuation while diverting surge currents safely to earth and clamping output voltages to safe levels.

**Fully automatic in operation**, SLP devices react immediately to make sure that equipment is never exposed to damaging surges between lines or the lines and earth. Reacting instantaneously, the SLP redirects surges safely to earth and then resets automatically.

**The versatile SLP series design considers the need for high packing densities** and has a product combining protection for two process loops into one case. Each module provides full hybrid surge protection for two process loops.

**For higher bandwidth applications**, the SLP series has been developed to meet the demands of today's highest speed communication systems.

**One simple manual operation** clamps modules securely onto DIN rail, which automatically

provides the essential high-integrity earth connection.

**A 10 Year 'No Fuss' warranty** is available as standard for the SLP so if a correctly connected device should fail for any reason, simply return it for a free replacement. 'Top-hat' (T-section) DIN rail is generally suitable for mounting SLP modules although for adverse environments, a specially-plated version is available from MTL Surge Technologies.

## Data & Signal Protection

# Specification

All figures typical at 77°F (25°C) unless otherwise stated

## Maximum surge current

20kA (8/20µs waveform) per line

## Leakage Current

<1mA @ working voltage

## Maximum rated load current

1.50A

## Loop resistance

2 Ohm

## Capacitance

Line - Line - 60pF

## Bandwidth

-0.1db @9kHz - 37MHz

-3dB @50MHz

## Response time

<1ns

## Ambient temperature

-40°C to +80°C (working)

-40°F to +176°F (working)

-40°C to +80°C (storage)

-40°F to +176°F (storage)

## Humidity

5 to 95% RH (non-condensing)

## Terminals

2.5mm<sup>2</sup> (12 AWG)

## Electrical connections

Plug/header screw terminal strip

## Mounting

T-section DIN-rail (35 x 15mm rail)

## Weight

5oz (140g approximately)

## Case flammability

UL94-V0

## EMC compliance

BS EN 60950:1992

BS EN 61000-6-2:1999

BS EN 61010-1:1993

Model		SLP07D	SLP16D	SLP32D
Nominal voltage	$U_n$	7V	16V	24V
Rated voltage (MCOV)	$U_c$	8V	18V	32V
Nominal current	$I_n$	1.50A	1.50A	1.50A
Nominal discharge current (8/20µs)	$i_{sn}$	3kA	3kA	3kA
Max discharge current (8/20µs)	$I_{max}$	20kA	20kA	20kA
Lightning impulse current (10/350µs)	$I_{imp}$	2.5kA	2.5kA	2.5kA
Residual voltage @ $i_{sn}$	$U_p$	10V	23V	40V
Voltage protection level @ 1kV/µs	$U_p$	<8V	<18V	<38V
Bandwidth	$f_G$	50MHz	50MHz	50MHz
Capitance	C	60pF	60pF	60pF
Series resistance	R	1.0	1.0	1.0
Operating Temperature Range		-40°C to +80°C		
Category tested		A2, B2, C1, C2, C3, D1		
Overstressed fault mode $i_n=3kA$		22kA	22kA	22kA
Impulse durability (8/20µs)		10kA	10kA	10kA
Degree of protection		IP20		
AC durability		1A <sub>rms</sub> , 5T		
Service conditions		80kPa - 160kPa 5% - 95% RH		

Tested in accordance to IEC 61643-21.

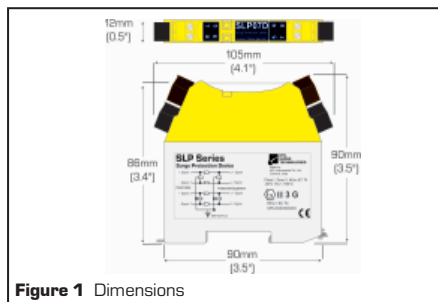


Figure 1 Dimensions

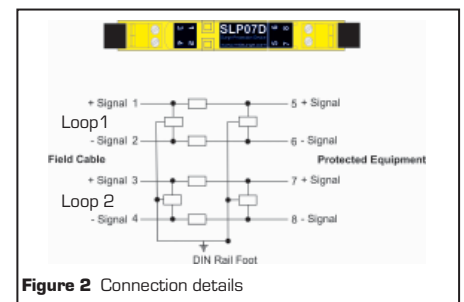


Figure 2 Connection details

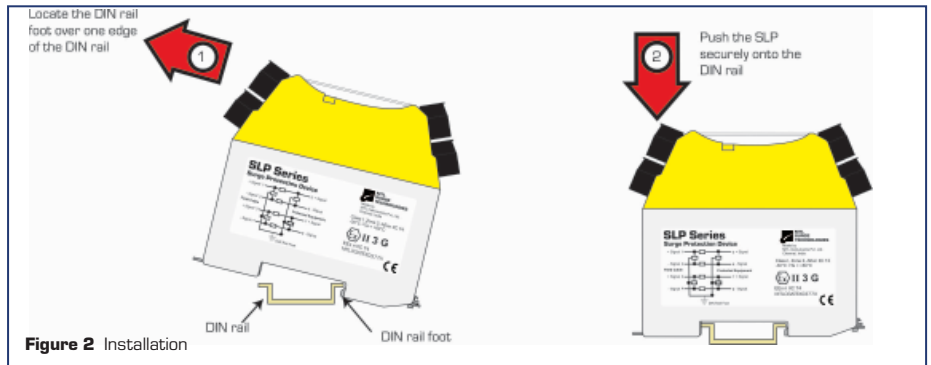


Figure 2 Installation

## To order specify -

Order by module, as listed in the specification table.

Note: In accordance with our policy of continuous improvement, we reserve the right to change the product's specification without notice.

## Approvals

Country	Standard/Authority	Certificate/ File No.	Approved for	Product
ATEX	BS EN 60950:1992 BS EN 61000-6-2:1999 BS EN 61010-1:1993	ATEX0377X SLP32D	EEx N IIC T4	SLP07D, SLP16D,
EC [Baseefa]	EN50014:1997-A1 & A2 EN50020:2002 EN50284:1999	Baseefa 04 ATEX0303X	EEx ia IIC T4	SLP07D, SLP16D, SLP32D
USA (FM)	Class Nos. 3600 (1998), 3610 (1999), 3611 (1999), 3615 (1989), 3810 incl. Supp 1 (1995-07 (1989-03), ANSI/NEMA 250 (1991), ISA-S12.0.01 (1999)	3022293 3011208	Intrinsically Safe: I/O/A-D, I/O/II C Non incandive: I/2/A-D, I/2/II C	SLP07D, SLP16D, SLP32D
Canada (FM)	C22.2 No. 213, 142, 94, 157, 30 ANSI/NEMA 250 CAN/CSA-E79-0 CAN/CSA-E79-11	3025374	IS/I/1/ABCD I/O/Ex ia/IIC I/O/Ex ib/IIC NE/I/2/ABCD NE/I/2/IIC	SLP07D, SLP16D, SLP32D

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Singapore: +65 6 487 7887

The Netherlands: +31 (0)481 450250

Italy: +39 (0)2 6180 2011

Australia: +61 (0)8 9455 2994

India: +91 (0)44 450 1660

Local sales office information is also available on our web site at:

[www.mtl surge.com/support/distribution/index.htm](http://www.mtl surge.com/support/distribution/index.htm)



# SD Series

Ultra-slim user-friendly devices for protecting electronic equipment and systems against surges on signal and I/O cabling



- Range of ATEX Certified intrinsically safe surge protectors
- Ultra-slim space-saving design; easy installation
- Multistage hybrid protection circuitry – 10kA maximum surge current
- Range of voltage ratings – to suit all process I/O applications
- High bandwidth, low resistance, RTD, PSTN and 3-wire transmitter versions available



The **SD Series** is a range of surge protection devices combining unparalleled packing densities, application versatility, proven reliable hybrid circuitry, simple installation and optional 'loop disconnect' facilities – features which make the series the ultimate surge protection solution for process equipment, I/O systems and communications networks.

The **exceptionally high packing densities** are the consequence of an ultra slim 'footprint' for individual modules which can thus 'double-up' as feedback terminals. Each module provides full hybrid surge protection for 2 and 3 wire loop protection.

**Modules with a comprehensive range of voltage ratings** cover all process related signals such as RTDs, THC's, 4 to 20mA loops, telemetry outstations, shut-down systems and fire and gas detectors.

**Optional 'loop disconnect'**, is a feature which allows commissioning and maintenance to be carried out without

removal of the surge protection device. This facility is provided by the SD07, SD16, SD32 and SD55 units. In addition, a third connection on the field and safe side of the protector is provided in order to terminate screens safely.

**For three wire applications** the specially designed SDRTD (Resistance Temperature Detector) and the SD32T3, (for separately powered 4-20mA loops) provide full 3-wire protection in a single compact unit. The recommended choice for the protection of 3-wire pressure transducers on low power circuits is the SD07R3.

**For higher bandwidth applications**, the SDR series has been developed to meet the demands of today's highest speed communication systems.

**120V and 240V AC versions** are available for I/O and power supplies up to three Amps of load current.

**Telephone networks** can be protected by the SDPSTN.

**One simple manual operation** clamps modules securely onto DIN rail, which automatically provides the essential high-integrity earth connection.

**'Top-hat' (T-section) DIN rail** is generally suitable for mounting SD modules although for adverse environments, a specially-plated version is available from MTL Surge Technologies. A comprehensive range of mounting and earthing accessories can also be supplied, see page 7 for further details.

## Data & Signal Protection

# Guide to applications and selection



The SD Series of SPDs includes models for almost all possible applications operating at voltages up to 250V ac. The optional 'fuse/disconnect' package provides both fused protection against fault currents and a convenient method of isolating field circuitry from protected circuitry without needing additional disconnect terminals. The standard fuse (which is replaceable) is rated 250mA with 50mA fuses also being available by special request. Where only the disconnect feature is required, solid links can be used.

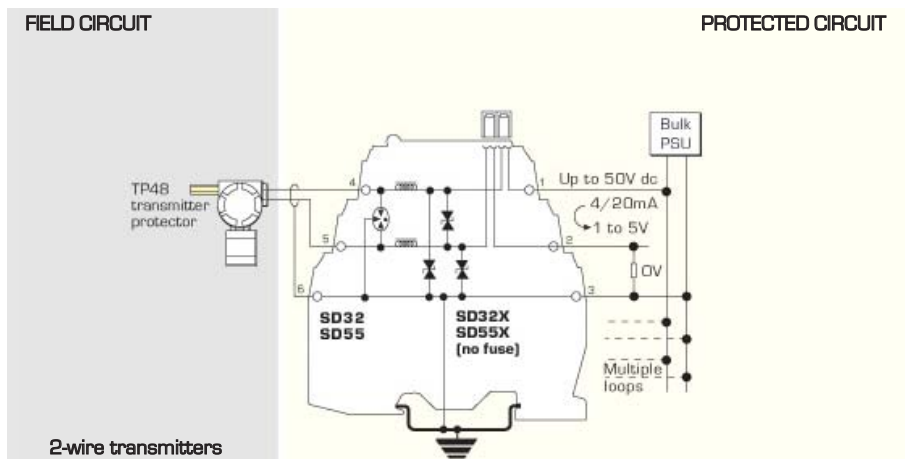
As an example, this feature is of particular value in applications in which an SPD is used with a bulk power supply feeding multiple loops. The individual module fuse prevents a fault or follow on current on one loop disrupting the power supply to the others. Also, loops can be removed from the circuit for maintenance reasons or added without needing additional disconnect terminals.

The following guide to selection suggests the most suitable SDs for a number of specific applications. For technical information, see the detailed specifications on the back page of this publication (some field circuit protection is shown for completeness).

## Analogue inputs (high-level)

### 2-wire transmitters, 4-20mA, conventional and smart

The SPDs recommended for use with 'conventional' and 'smart' 4-20mA transmitters (fed by a well-regulated supply) are the SD32 and SD55, the choice depending upon the maximum working voltage of the system (32V and 55V respectively). The diagram illustrates a prime example of an application for which the fuse/disconnect facility is particularly useful, however, both models are available in 'X' versions without the optional fuse/disconnect feature.

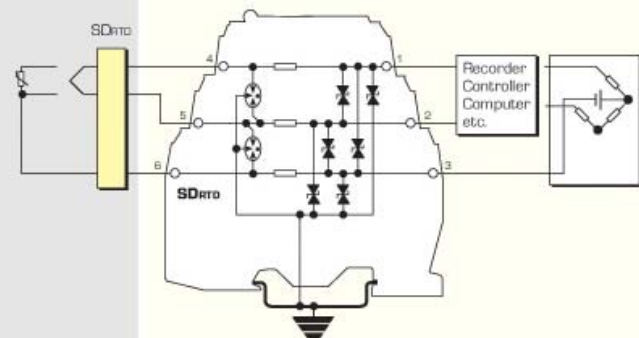


2-wire transmitters

## Analogue inputs (low-level)

### RTDs

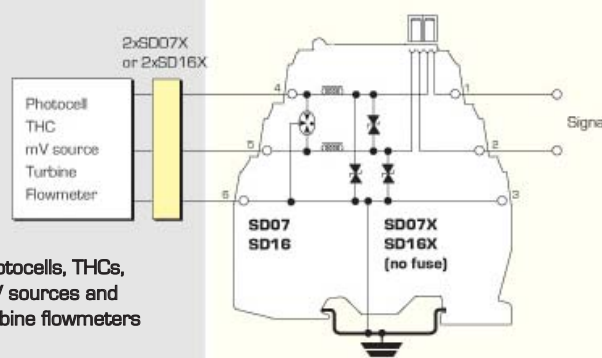
These applications are best served using the SD<sub>RTD</sub>. For optimum accuracy, the energising current should be chosen to ensure the voltage across the RTD does not exceed 1V over the full measurement range. When using a PT100 device, we recommend an energising current of 1mA.



3 wire RTDs

### Photocells, THC's, mV sources and turbine flowmeters

The SD07 or SD16 (depending upon the operational voltage) are the favoured choices for this application. SD07X and SD16X are also suitable.



photocells, THC's, mV sources and turbine flowmeters



## Analogue outputs

### Controller outputs (I/P converters)

For this application, the recommendations are the SD16, SD32 and SD55 (and the equivalent 'X' versions), the final choice depending upon the operating voltage.

## Digital (on/off) inputs

### Switches

Suitable SPDs for switches include the SD07, SD16, SD32 and SD55 modules – the choice depending upon the operating voltage of the system. The 'X' versions of these are also suitable.

## Digital (on/off) outputs

### Alarms, LEDs, solenoid valves, etc

The recommended choice for this application is the SD32 or SD32X.

## Telemetry (PSTN)

### Telemetry outstations

The SDPSTN has been designed specifically for the protection of signals transmitted on public switched telephone networks.

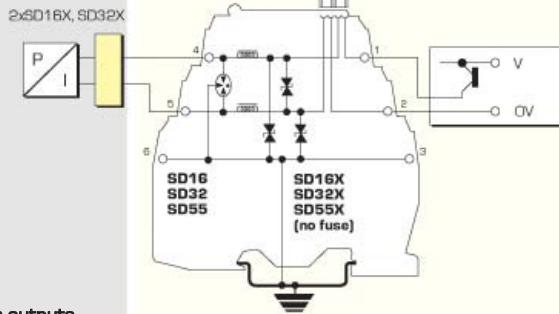
## AC supplied equipment

### PLC, I/O systems

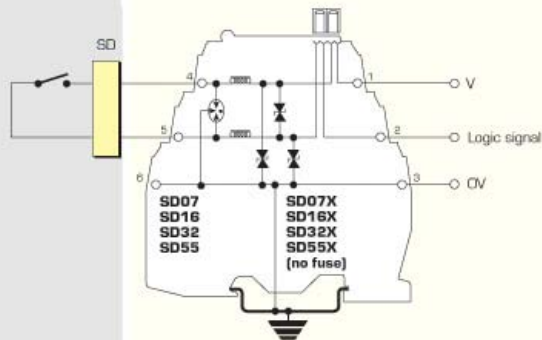
For systems on 110-120V ac, the SD150X is the recommended choice and for 220-240V ac systems, the SD275X is recommended.

FIELD CIRCUIT

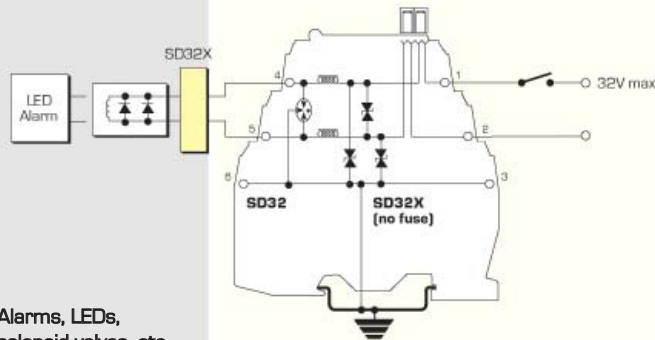
PROTECTED CIRCUIT



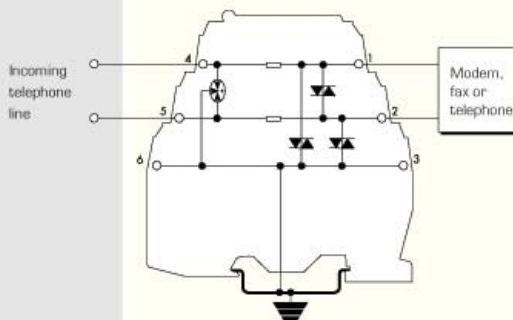
Controller outputs (I/P converters)



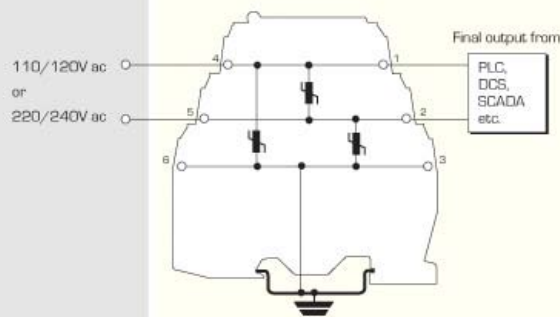
Switches



Alarms, LEDs, solenoid valves, etc.



Telecom line



PLC, I/O systems

# Transmitter and sensor protection

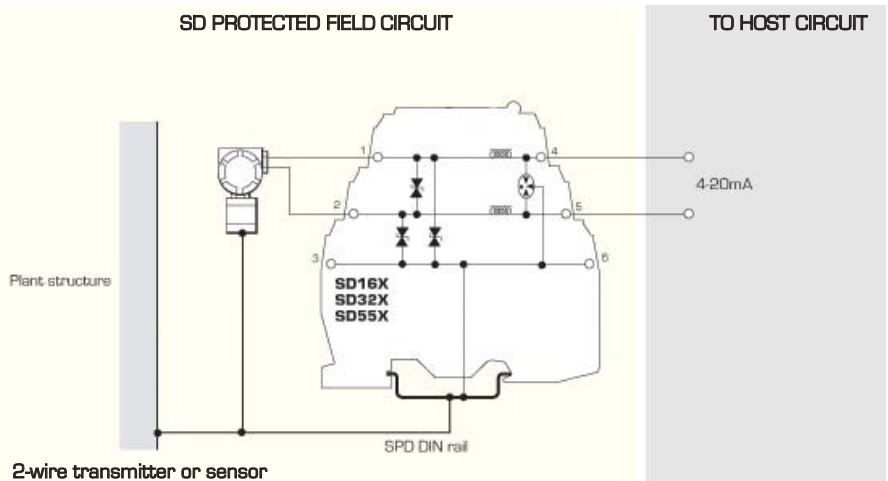
Transmitters and sensors are widely used in highly exposed areas and where lightning damage is common. In many cases, the ideal solution for 2-wire transmitters or sensors is the TP48 which mounts directly onto the transmitter housing via spare cable entries. Where these entries are not available or 3-wire devices are used, the compact design and simple installation of the SD series makes it the obvious choice for transmitter protection.

The SDs within the junction box should be installed no further than one metre away but as close as possible to the sensor or transmitter they are protecting. A bond is required from the general mass of steelwork to the sensor or transmitter housing either using a flat short braid or a cable of at least 4mm<sup>2</sup> cross sectional area. In most instances this bond is automatically made by fixing the metallic transmitter housing to the plant structure. This bond ensures the voltage difference between the signal conductors and the transmitter housing is below the transmitter's insulation rating. Please note that the transmitters or sensors are connected to the 'Protected Equipment' terminals of the SD and not the 'Field Cables'.

## 2-wire transmitters or sensors

### 4-20mA transmitters, conventional and smart

Where the TP48 is not an acceptable solution, either because of technical suitability or difficulties in mounting, the SD16X, SD32X and SD55X are an excellent alternative.



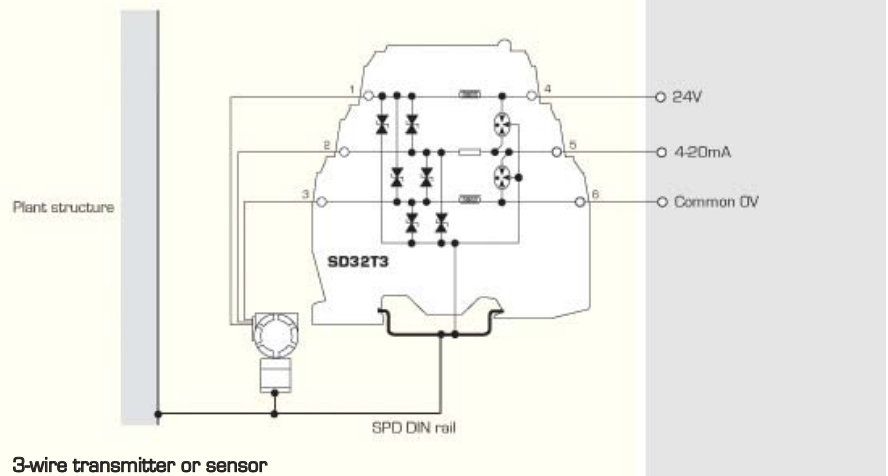
## 3-wire transmitters or sensors

Vibration Sensors and 4-20mA loop process control systems invariably require three wire connections, when powered from an external source.

This may be accomplished in one unit by using the SD32T3 three terminal Surge Protection Device (SPD).

Because the SD32T3 protects all three conductors within the same unit, higher protection is achieved, as the SPD hybrid circuitry is common to all three wires.

The SDO7R3 is available for the protection of 3-wire pressure transducers on low power circuits.

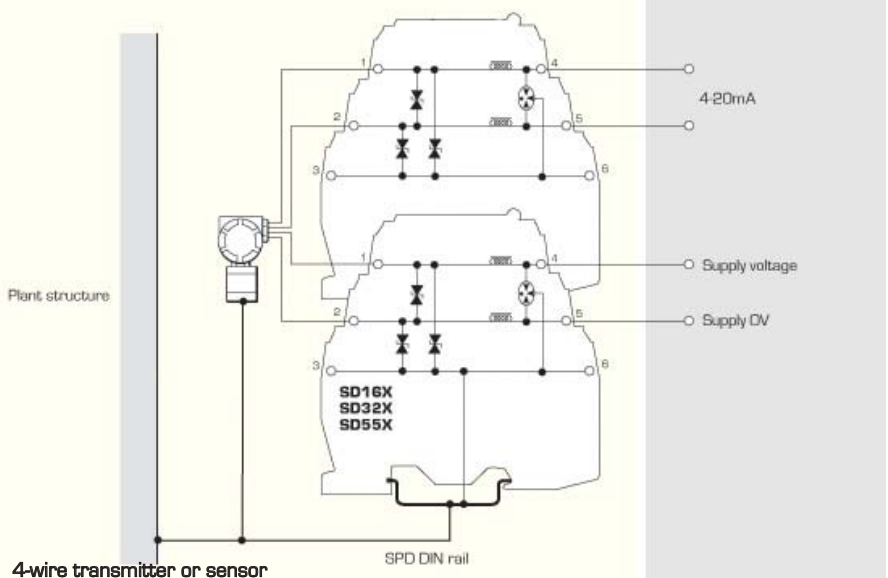


## 4-wire transmitters or sensors

### Flow meters, level detectors, etc.

4-wire systems such as level detectors require two SDs, one for the supply and the other for the transmitter output. Generally the voltages across the pairs are similar and so the recommended choice would be a pair of SD16X, SD32X or SD55Xs. However, mains powered transmitters should be protected with an SD150X or 275X (depending upon supply voltage) for the supply inputs.

Loadcells are catered for by MTL Surge Technologies' LC30 which is suitable for both 4 and 6-wire load cells.



# Communication systems protection

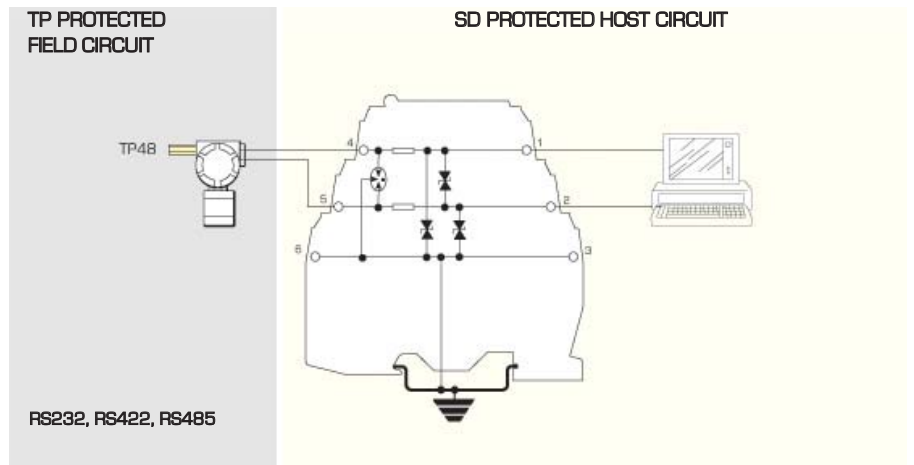


High speed data links between buildings or one part of a plant to another have become more common with the widespread use of smart transmitters and the increase in unmanned installations. The SD series has an SPD suitable for all process I/O applications with a choice of low resistance units, high bandwidth and a variety of voltage variants. The SDR series has been specially designed to meet the requirements for high speed data links with an extremely high bandwidth.

## Communication systems

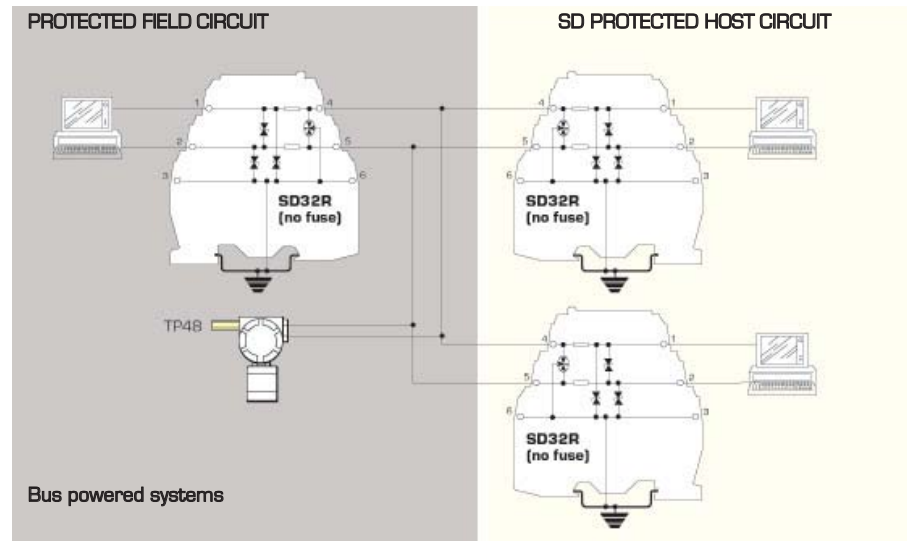
### RS232, RS422, RS485

The recommended choice for these applications is the SD16R or SD32R depending on the maximum driver signal.



### Bus powered systems

There are a variety of bus powered systems specially designed for the process industry. The ideal surge protection device for these systems is the SD32R as it has a very high bandwidth and a modest in-line resistance.



### Typical Applications

Table 1 shows suitable SD devices for different applications. In some applications alternative devices may be used, for example, where lower in-line resistance or a higher voltage power supply is used.

Telematic have operationally tested the recommended SD series with representative highways listed but no formal approval for their use in systems by the respective bodies has been sought.

**Table 1**

Application	Preferred SPD	Alternative
Allen Bradley Data Highway Plus	SD16R	
Foundation Fieldbus		
31.25kbits/s voltage mode	SD32R	
1.0/2.5 Mbits/s	SD55R	
HART	SD32X	SD32, SD32R
Honeywell DE	SD32X	SD32, SD32R
LonWorks		
FFT-10	SD32R	
LPT-10	SD55R	
TP-7B	SD07R	
IS7B†	SD32R	
Modbus 'S' & Modbus Plus (RS485)	SD16R	
PROFIBUS		
DP	SD32R	
PA (IEC 1158, 31.25 kbits/s)	FP32	
RS232	SD16	SD16X
RS422	SD07R	
RS423	SD07R	
RS485	SD07R	
WorldRP (IEC 1158)	SD32R	
31.25 kbits/s voltage mode		
1.0/2.5 Mbits/s	SD55R	

# Hazardous area applications

## Zone 0/Zone 1

The dangers from lightning induced sparking in Zone 0 are considered real enough to require preventative measures. IEC 60079-14 (1996-12) Electrical apparatus for explosive gas atmospheres Part 14: Electrical installations in hazardous areas (other than mines) stresses the importance of SPDs in hazardous areas. An outdoor installation where there is a high likelihood of both lightning induced transients and combustible gases requires the installation of SPDs to prevent possible ignition of the gases. Areas seen particularly at risk include flammable liquid storage tanks, effluent treatment plants, distillation columns in petrochemical works and gas pipelines.

SPDs for transmitter protection should be installed in Zone 1 but sufficiently close to the Zone 0 boundary to prevent high voltages entering Zone 0. The distance from the SPD to Zone 0 should be less than one metre where possible. However, in practice the SPD would normally be mounted on the transmitter or sensor housing which usually lies in Zone 1 and is very close to Zone 0. Because there is only a very small free volume, the SD Series is suitable for mounting in flameproof or explosion proof enclosures.

## Zone 2

The SD series is suitable for protecting electrical circuits in Division 2, Zone 2 and can be used without affecting the safety aspects of the circuit. Non-incendive (low-current) circuits can be protected using any SD series unit mounted in either the safe or hazardous area including those with the fuse disconnect facility. Non arcing (high current) circuits can also be protected except that SPDs with the fuse disconnect facility may only be mounted in the safe area. For use in these circuits the units must be mounted in a suitable enclosure, normally the minimum requirements are IP54 and 7Nm resistance to impact. The SD series is self certified by Telematic Ltd as being suitable for this purpose.

## Certification

Introducing surge protection into Intrinsically Safe (IS) circuits is trouble free as long as the current and power parameters are not exceeded. In the SD Series, the SD\*\*X, SD\*\*R, SD\*\*R3, SDRTD and SD\*\*T3 all have ATEX certification for use in IS circuits located in Zones 0, 1 or 2. The certification parameters for the SD\*\*X and SD\*\*T3 are:

**EEx ia IIC T4, Li = 0.22mH**  
 $I_i = 260\text{mA}$  for  $U_i$  up to 20V  
 $I_i = 175\text{mA}$  for  $U_i$  up to 26V  
 $I_i = 140\text{mA}$  for  $U_i$  up to 28V  
 $I_i = 65\text{mA}$  for  $U_i$  up to 60V

The certification parameters for the SD\*\*R, SD\*\*R3 and SDRTD are:

**EEx ia IIC T4, Li = 0**  
 $I_i = 260\text{mA}$  for  $U_i$  up to 60V

The power rating for each of the above is dependent on the table shown below.

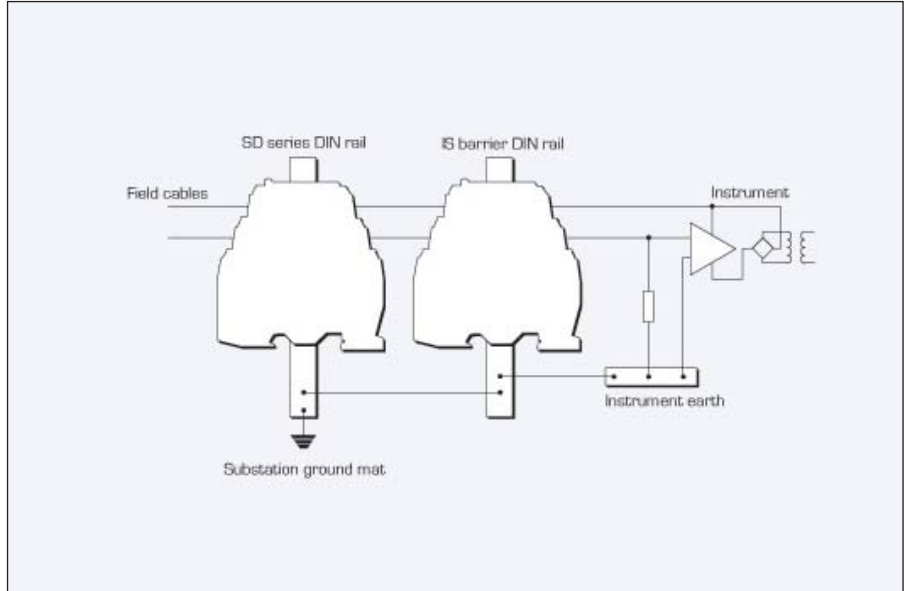
$P_i = 1\text{W}$  (-30°C to +75°C)  
 $P_i = 1.2\text{W}$  (-30°C to +60°C)  
 $P_i = 1.3\text{W}$  (-30°C to +40°C)

The SD\*\* Series are classified as simple apparatus and are intended for use in Zone 2 or safe areas only, because their fuses are not fully encapsulated.

## Installation

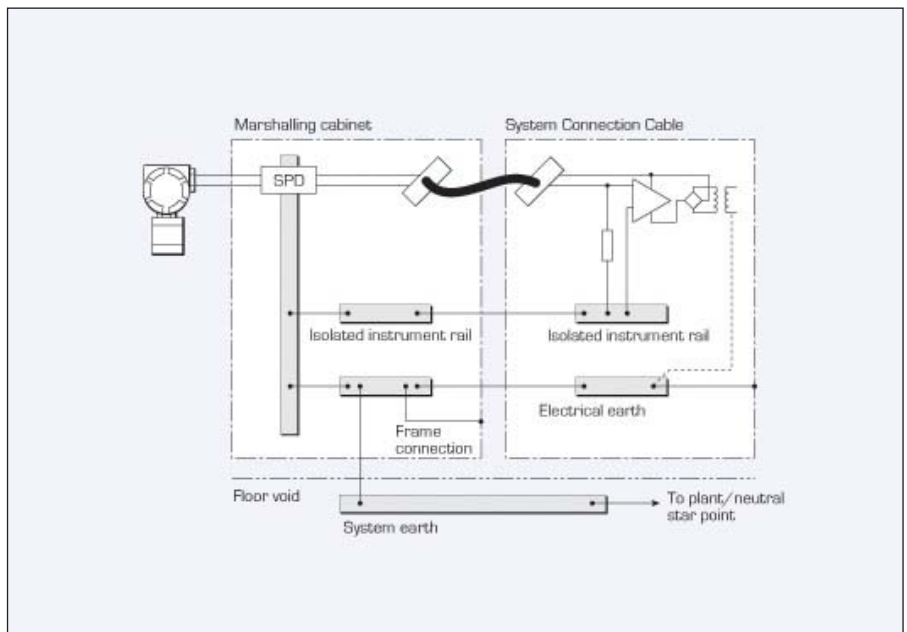
### Positioning

The SDs should be mounted on the field wiring side to ensure that any surges entering from the field do not damage any intrinsically safe barriers or galvanic isolators in the system. The SDs and IS interfaces should be mounted close to each other but on separate DIN rails in order to maintain the required 50mm clearance between safe area and hazardous area terminals.



### Earthing

The recommended earthing for field mounted devices has been illustrated previously but it is the earthing at the control panel that is more critical as there are usually a number of earthing systems, each with their own requirements. The earthing system illustrated here replaces the instrument OV bond, the control system PSU bond and the IS earth with one single earth connection to meet all the design requirements and give the most effective protection against the effects of lightning induced surges.

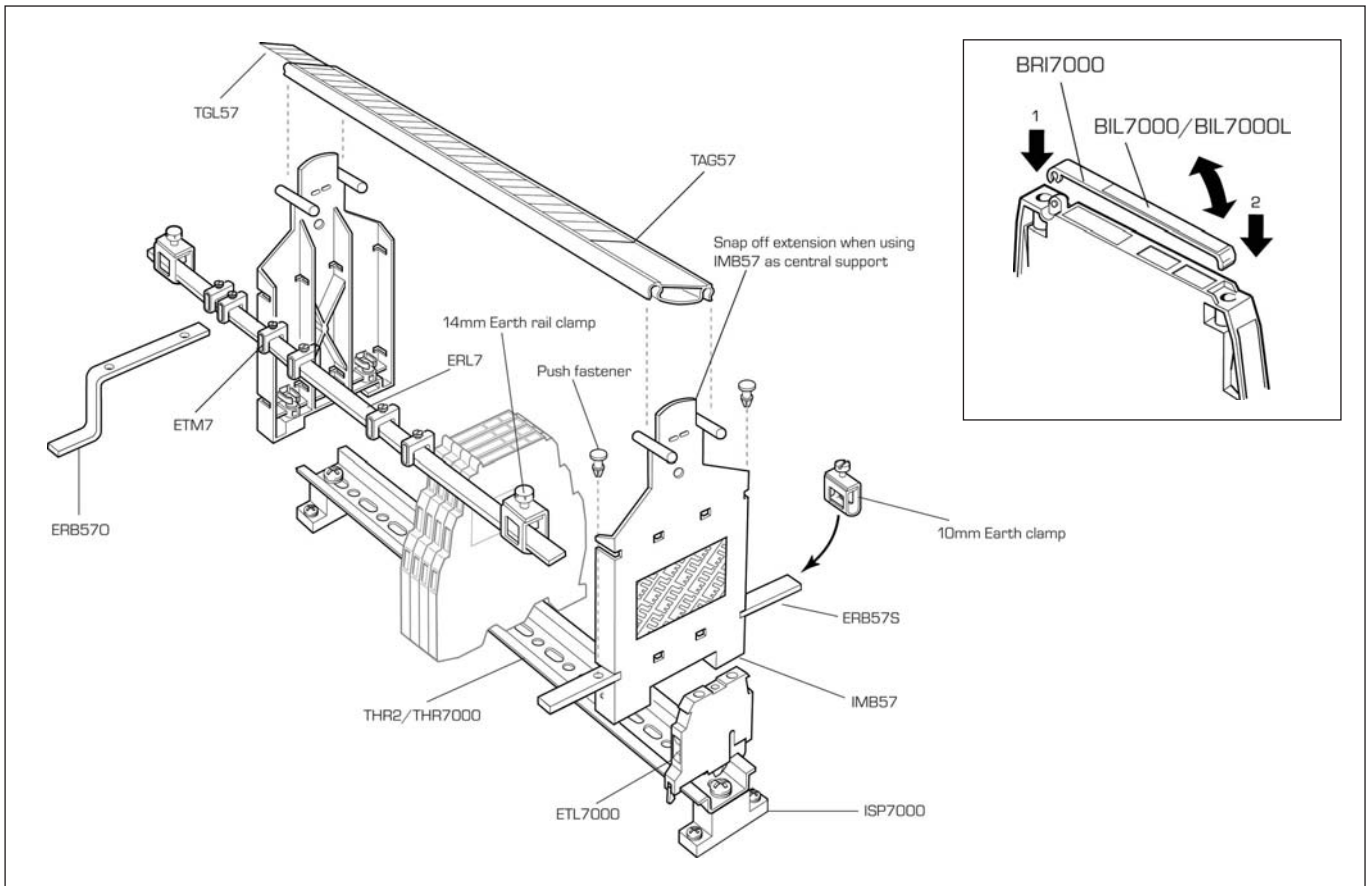


# SD Series mounting kits and accessories



The SD Series has a full range of mounting kits and accessories to simplify installation and tagging of individual loops. Insulating spacers (ISP7000) are available to allow mounting of the units onto backplanes without compromising correct earthing practice. These are placed at regular intervals along the rail or at each end as required. Earth connections can be made to the DIN rail via the earth terminal (ETL7000). Weatherproof enclosures are also available with all the necessary mounting accessories to install the SD series surge protection devices.

Two tagging systems are available. One consists of tagging strips (TAG57) with labels (TGL57) mounted on posts (IMB57) at each end of a row of surge protection devices (SPDs). The other consists of separate tagging identifiers (BRI7000) mounted on the tops of individual SPDs. Both methods can be used conjointly. Replaceable fuses or solid links are available in packs of 5 (SD-F25, SD-F05 and SD-LNK).



## Mounting accessories

- ISP7000 Insulating spacer
- THR2 Standard DIN rail, 35mm x 7.5mm
- THR7000 T-section DIN rail, specially nickel plated, 35mm x 7.5mm, 1m length

## Earthing/earth rail accessories

- ETL7000 Earth terminal, DIN rail mounted
- IMB57 Insulated mounting block (two needed)
- ERB575 Earth rail bracket, straight
- ERB570 Earth rail bracket, offset
- ERL7 Earth rail, 1m length
- ETM7 Earth terminal, pack of 50

## Tagging accessories

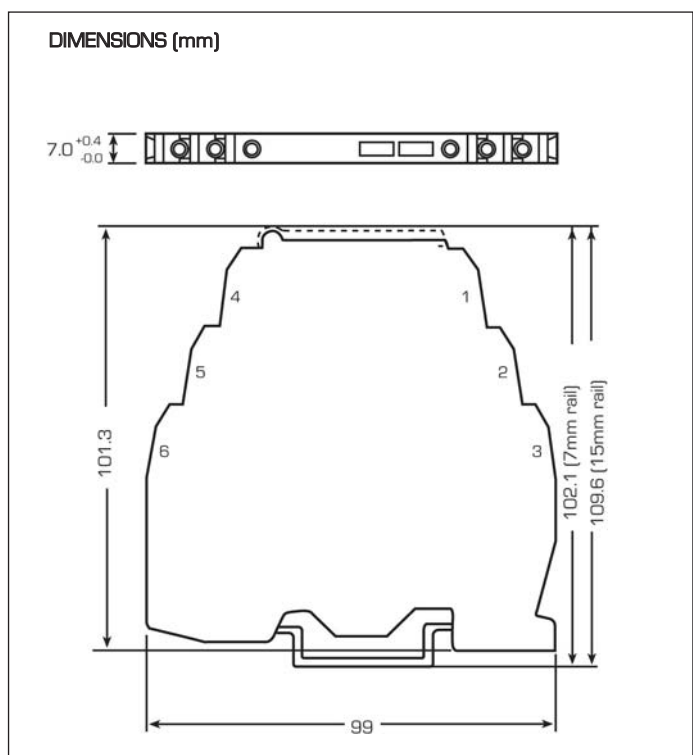
- TAG57 Tagging strip, 1m length
- TGL57 Tagging strip labels, set of 10 x 0.5m
- BRI7000 Barrier identifier
- BIL7000 Barrier identification labels, sheet of 120
- BIL7000L Barrier identification labels, A4 sheet of 126

## Enclosures

- DX070 Enclosure for up to 9 x SD series SPDs
- DX170 Enclosure for up to 22 x SD series SPDs
- DX430 Enclosure for up to 58 x SD series SPDs

## Accessories (replacement)

- SD-F25 Replaceable fuse pack - 250mA standard (available in packs of 5)
- SD-F05 Replaceable fuse pack - 50mA special (available in packs of 5)
- SD-LNK Solid Link (available in packs of 5)



# Specification

(all figures typical at 25°C unless otherwise stated)

## Protection

Full hybrid line to line  
Each line to screen/ground

## Max. discharge surge current ( $I_{max}$ )

(8/20µs)  
10kA  
6.5kA (SD150X and SD275X only)

## Max. discharge surge current ( $i_{SN}$ )

3kA (8/20µs)

## Lightning impulse current ( $I_{imp}$ )

### (10/350µs)

2.5kA  
1.0kA (SD150X and SD275X only)

## Response time

<1ns

## RTD resistance range (SDRTD)

10 to 1500Ω

## Degradation accuracy (SDRTD at 1mA)

0.1% (RTD resistance ≥ 100Ω)  
0.1Ω (RTD resistance < 100Ω)

## Ambient temperature

-40°C to +80°C (working)  
-40°C to +80°C (storage)

## Humidity

5 to 95% RH (non-condensing)

## Category tested

A2, B2, C1, C2, C3

## Overstressed fault mode $i_n=3kA$

12kA  
9kA (SD150X and SD275X only)

## Impulse durability (8/20µs)

10kA  
6.5kA (SD150X and SD275X only)

## Terminals

2.5mm<sup>2</sup> (12 AWG)

## Mounting

T-section DIN-rail  
(35 x 7.5 or 35 x 15mm rail)

## Weight

70g approximately

## Case flammability

UL94 V-2

## AC durability

1A<sub>rms</sub>, 5T

## Service conditions

80kPa - 160kPa  
5% - 95% RH

## EMC compliance

To Generic Immunity Standards,  
EN 50082, part 2 for industrial  
environments

## R&TTE compliance

EN 50082-2 : 1995  
EN 41003 : 1999  
EN 60950 : 1992

(not applicable to SD150X and  
SD275X)

## LVD compliance

SD150X & SD275X  
EN 60950 : 1992  
EN 61010 : 1995  
SDPSTN  
EN 41003 : 1999

## IEC compliance

EN 61643-21:2001

## To order specify -

Order by module, as listed in the  
specification table and/or accessory  
part numbers as defined on page 7.

Note: In accordance with our policy of continuous  
improvement, we reserve the right to change the  
product's specification without notice.

## MTL Surge Technologies

Power Court, Luton, Bedfordshire, England LU1 3JJ  
Tel: +44 (0)1582 723633 Fax: +44 (0)1582 422283  
E-mail: enquiry@mtlurge.com WWW: www.mtlurge.com

A member of the MTL Instruments Group plc

Model	Nominal voltage* ( $U_n$ )		Nominal current ( $I_n$ ) (mA)	Series resistance (Ω/line)	Max. leakage current (µA)	Rated voltage (MCOV) ( $U_c$ )	Voltage Protection level ( $U_p$ ) @ 1kV/µs (V)	Residual voltage @ $i_{SN}$ (V)	Bandwidth (Frequency) (f <sub>C</sub> )	Special feature	
	(Vdc)	(Vac)									
SD07	7	5	250	4.2†	500	7.7	<12	30	25kHz	Fuse Disconnect	
SD16	16	11	250	4.2†	5	17	<25	40	25kHz	Fuse Disconnect	
SD32	32	22	250	4.2†	5	36	<45	60	25kHz	Fuse Disconnect	
SD55	55	38	250	4.2†	5	62	<90	100	25kHz	Fuse Disconnect	
SD07R	7	5	400	2.7	500	7.7	<12	30	50MHz	High Bandwidth	
SD16R	16	11	400	4.7	5	17	<25	40	50MHz	High Bandwidth	
SD32R	32	22	400	10	5	36	<45	60	50MHz	High Bandwidth	
SD55R	55	38	400	10	5	62	<90	100	50MHz	High Bandwidth	
SD07X	7	5	400	2.2	500	7.7	<12	30	25kHz	Low Resistance	
SD16X	16	11	400	2.2	5	17	<25	40	25kHz	Low Resistance	
SD32X	32	22	400	2.2	5	36	<45	60	25kHz	Low Resistance	
SD55X	55	38	400	2.2	5	62	<90	100	25kHz	Low Resistance	
SD32T3	32	22	400	2.2^	5 10**	36	<45	60	720kHz	3 Terminal	
SD07R3	7	5	400	2.7	500	7.7	<12	30	50MHz	3 Terminal	
SD16R3	16	11	400	4.7	5	17	<25	40	50MHz	3 Terminal	
SD32R3	32	22	400	10	5	36	<45	60	50MHz	3 Terminal	
SD55R3	55	38	400	10	5	62	<90	100	50MHz	3 Terminal	
SDRTD	1	0.75	10❖	2.7	0.3	5	<12	30	50MHz	3-wire RTD	
SDPSTN	162	114	550	4.7	5	175	<200	235	4MHz	PSTN	
SD150X	170	120	3A‡	0.1	ac rms 250	dc 170	ac rms 130	<400	450	-	High current
SD275X	339	240	3A‡	0.1	250	350	275	<700	850	-	High current

Note: all figures are typical at +25°C unless otherwise stated; \*standard fuse; +over full working temperature range; †at 20mA with a 250mA standard fuse; ‡these units need external 3A fuses; ^Signal; \*\*Power & Common; ❖maximum energising current depends upon RTD resistance.

Blue colour signifies products ATEX certified EEx ia IIC T4.

## Definitions of terminology used in table

### 1 Working voltage ( $U_n$ )

Maximum voltage between lines or lines/  
ground for the specified leakage current

### 2 Maximum leakage current ( $I_c$ )

Maximum current drawn by the SPD at the  
working voltage

### 3 Maximum continuous operating voltage ( $U_c$ )

Maximum voltage that can be applied to the

protected terminals without damage

### 4 Voltage protection level ( $U_p$ )

Peak output voltage after injection of test  
impulse from 1kV/µs generator (often  
known as 'let-through' voltage)

### 5 Bandwidth

Frequency range up to which ac signals can  
be transmitted without undue attenuation;  
3dB into 50Ω (600Ω for the SDPSTN)

## Approvals

Country (Authority)	Standard	Certificate/ File No.	Approved for	Product
BASEEFA (EC)	EN 50014:1997 EN 50020:2002 EN 50284:1999	BASEEFA 02ATEX0211X	EEx ia IIC T4*	SD07X,SD16X,SD32X, SD55X,SD07R, SD16R, SD32R,SD55R,SDRTD, SD32T3,SD07R3,SD16R3, SD32R3,SD55R3
CSA/C/US (Canada, USA)	CSA C22.2 No. 0-M1991 CSA C22.2 No. 157-M1992 UL 913, 5th edition CSA C22.2 No. 142-M1987 CSA C22.2 No. 213-M1987 UL 508, 17th edition UL 1604, 3rd edition	LR 103652-3	EEx ia Class 1, Groups A, B C and D, T4 Class 1, Div 2 Groups A,B,C, D T4	SD07,SD16,SD32,SD55, SD07X,SD16X,SD32X, SD55X,SD07R,SD16R, SD32R,SD55R,SDRTD, SD32T3,SD07R3,SD16R3, SD32R3,SD55R3
UL (USA)	UL 497B Listed	E220693	Isolated loop communication circuits	SD07,SD16,SD32,SD55 SD07X,SD16X,SD32X SD55X,SD07R,SD16R SD32R,SD55R,SD07R3 SD16R3,SD32R3,SD55R3 SD32T3,SD55T3, SD07X3,SD16X3,SD32X3, SD55X3,SDRTD
UL (USA, Canada)	UL 1449 2nd Edition Recognised Component	E217523	AC power protection	SD150X,SD275X
Austel (Australia)	AS/NZ3548:1995 AS/NZ54117:1996 TS001: 1997	—	Private Wire	SD07R

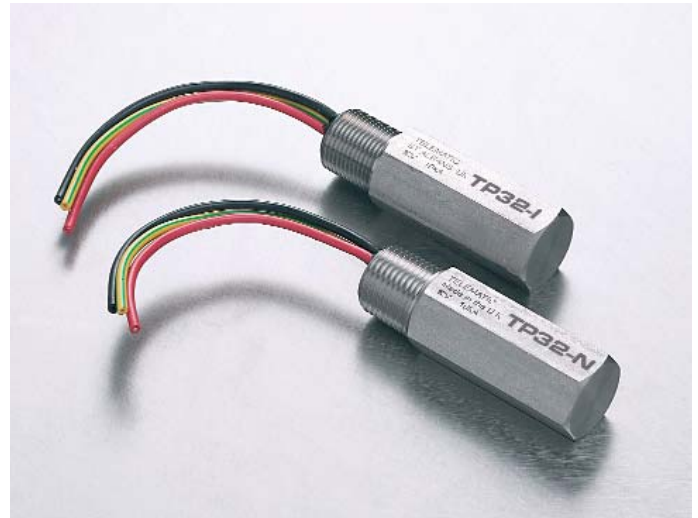
\* See page 6 for further details



# TP32, TP32-T (Terminator) Series

Protects transmitters and smart transmitters from induced surges and transients on fieldbus cabling.

- TP32 is a Fieldbus specific surge protector designed to meet the requirements of IEC 61158-2:2000 & ANSI/ISA-50.02-2 1992
- TP32-T includes a TERMINATOR for Fieldbus in addition to surge protection
- Easy and direct mounting – simply screws into a spare conduit entry on the transmitter
- Parallel connection ensures 'transparent' operation - zero voltage drop across device
- ATEX approved, Certified FISCO Terminator
- 10 year product warranty



The TP32 surge protection device is specifically designed to protect process transmitters and devices on Fieldbus systems. The TP32 builds on the high specification of the acclaimed TP48 range to provide a level of surge protection for fieldbus transmitters that is well in excess of the optional transient protection available from some transmitter manufactures.

The terminated TP32-T has the same protection circuit as the standard product, but also includes a Foundation Fieldbus termination circuit. This unique combination eliminates the need to purchase and install additional termination circuitry for the FF segment. The TP32-T provides excellent transient protection control and terminates the bus segment in one simple-to-install package. The termination circuit is designed to the requirements described in ANSI/ISA 50.02-2. Note: Two (and only two) terminators are required per bus segment.

The all important earth connection is made via the casing of the transmitter negating the need for a separate earth connection or ground stake at the transmitter. In operation, the TP32 makes sure that the

transmitter electronics are never exposed to damaging transients between the lines and ground. Any surge current appearing as a series-mode or common-mode transient is converted into a common-mode voltage whereupon the transmitter electronics are temporarily raised to some higher voltage level before 'floating' down automatically (and without damage) to resume normal operation.

The TP32 protection network is a hybrid design consisting of high-power, solid state electronics and a gas discharge tube which is capable of diverting surges up to 10kA. Encased in an ANSI 316 stainless steel enclosure, the TP32 exhibits unparalleled mechanical durability providing years of maintenance free operation in harsh environments. The enclosure is available threaded for all the common conduit entries. Versions are available for 1/2" NPT, 20mm ISO, and G 1/2" (BSP 1/2 inch) threaded entries.

Installation is very simple and can easily be carried out retrospectively to existing

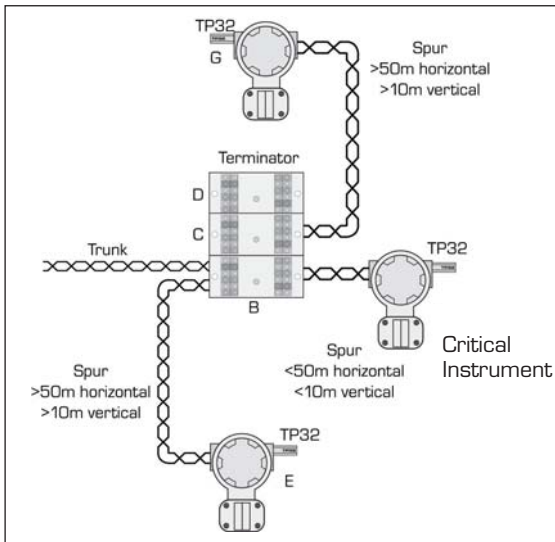
installations. By connecting in parallel to the transmitter circuit the TP32 does not interfere with the normal operation of the bus – passing AC or DC signals without adding increased voltage drop across the segment while consistently diverting surge currents safely to ground and clamping output voltages to safe levels.

Approvals for intrinsically safe, flameproof/explosionproof and non incendive operation are available, in all gas groups and apparatus temperature classification up to T6.

The TP32 is designed to meet the requirements of IEC 61158-2:2000 and ANSI/ISA-50.02-2:1992 for 31.25kB/sec systems as used by FOUNDATION Fieldbus, PROFIBUS-PA and WorldFIP.

# Field device protection using TP32

## Non Hazardous Installation



Install a TP32 on **every** instrument critical to the operation of the process system.

Install TP32 on each instrument with a spur length greater than 50m horizontal and 10m vertical.

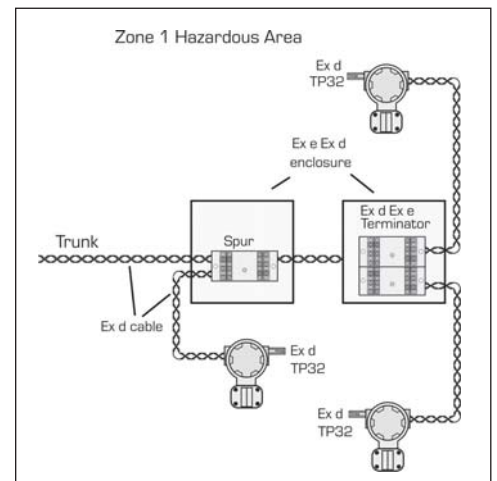
For a detailed risk analysis (to minimize the number of protectors required) and guidance for total Fieldbus system protection, please see TAN 1010.

## Hazardous Area Explosionproof/Flameproof/ Increased Safety

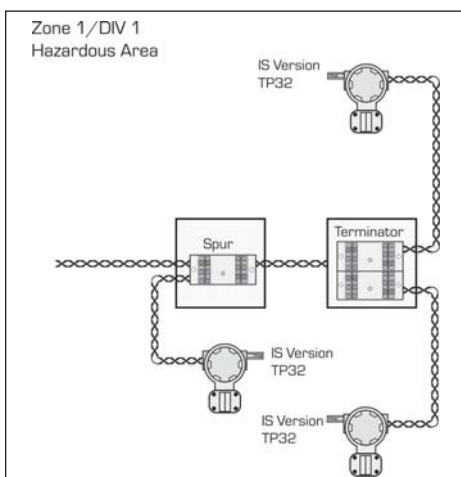
Install TP32-X-NDI (where X = thread type) on **every** instrument critical to the operation of the process.

Install TP32-X-NDI on each instrument with a spur length greater than 50m horizontal, 10m vertical.

See TAN 1010 for details of total Fieldbus protection.



## Hazardous Area Intrinsically Safe System; FISCO



Install TP32-X-NDI (where X = thread type) on **every** instrument critical to the operation of the process.

Install TP32-X-NDI on each instrument with a spur length greater than 50m horizontal, 10m vertical.

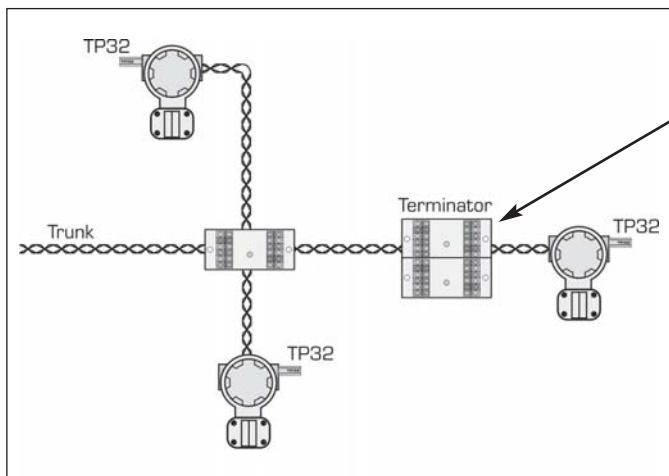
See TAN 1010 for details of total Fieldbus protection.

**NOTE:** The TP32 NDI is FISCO compatible.

**NOTE:** Protection at the host end of the trunk is mandatory, see FP32 datasheet and TAN 1010 for more information.

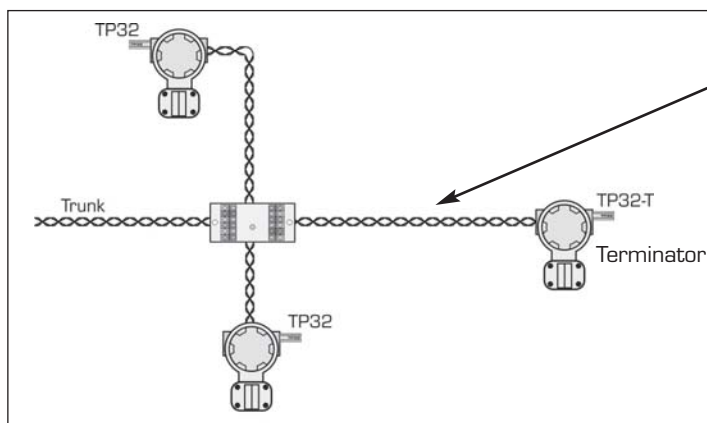
# Use of the TP32-T to terminate a Fieldbus trunk

## Conventional Installation



Junction block and terminator are required at the far end of a Fieldbus trunk.

## Installation Using TP32-T



Use of TP32-T eliminates the need for an extra junction block and terminator.

## Why Use a TP32-T TERMINATOR?

- ◆ Saves the expense of extra junction blocks and terminators.
- ◆ Saves time during installation
- ◆ Provides the correct termination of a Fieldbus trunk with the added benefit of high performance surge protection.



# Specification

All figures typical at 25°C (77°F) unless otherwise stated

## Maximum surge current

10kA peak (8/20µs waveform)

## Leakage current

Line-line: < 1µA at working voltage

Line-earth: < 1µA at 120V common-mode

## Working voltage

±32V dc maximum

±120V peak (or DC) maximum common-mode

## Maximum continuous operating voltage

35V

## Limiting voltage

Line-line with 250mm cable:

< 49V (10A, 10/1000µs pulse)

Line-earth with 75mm cable:

<635V (3kA, 8/20µs waveform)

<635V (6kV, 1.2/50µs waveform)

## Line resistance

No resistance introduced into the loop

## Capacitance

Line-line: < 50pF

Line-earth: < 100pF

Terminator (TP32-T only): 100 ohm, 1µF

## Attenuation

7.8KHz–7.5MHz monotonic & better than

-1dB

typical bandwidth, 150MHz on 100Ω system

## Ambient temperature limits

T6 -40°F to +140°F (-40°C to +60°C)

T5 -40°F to +185°F (-40°C to +85°C)

## Humidity

5% to 95% RH (non-condensing)

## Electrical connections

3 flying leads: line 1 & line 2 plus non-polarised earth

Wire size: 32 / 0.2 (1.0mm<sup>2</sup>, 18 AWG)

Lead length: 250mm minimum supplied  
≤ 75mm recommended

## Casing

ANSI 316 stainless steel hexagonal barstock, male thread

## Threads

TP32-N 1/2" NPT

TP32-I 20mm ISO (M20 x 1.5)

TP32-G G 1/2" (BSP 1/2 inch)

## Weight

175g (6.18oz)

## Dimensions

See figure 1

## ATEX compliance

See Approvals table for details

## EMC compliance

BS EN 61643-1

## Electrical Safety

EEx ia IIC T6, Ceq=0, Leq=0; the unit can be connected without further certification into any intrinsically safe loop with open circuit voltage <30V and input power <1.2W.

EEx ia IIC T4, Ceq=0, Leq=0; the unit can be connected into any FISCO application with the following input parameters P<sub>i</sub>=5.32W.

EEx d IIC T6; the unit is apparatus-approved to explosionproof (flameproof) standards, and can be fitted into a similarly approved housing.

## Installation

The TP32 is designed for mounting directly into an unused conduit entry on a fieldbus transmitter housing (see figure 2). Generally, two such entries are provided, one of which is used for the bus wiring. On the unused entry, the blanking plug or other closure device is removed and an appropriately threaded TP32 screwed into its place. The transmitter specification should provide information indicating the required thread type. TP32 units can be installed using thread adaptors (such as a tee piece) if necessary, including certified adaptors in hazardous area applications. For applications where two conduit entries are not provided or where both are used for electrical connections, TP32 units can be housed in conventional conduit hub or junction boxes, provided access to the loop terminals is possible.

Note: In accordance with our policy of continuous improvement, we reserve the right to change the product's specification without notice.

## MTL Surge Technologies

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E-mail: enquiry@mtlurge.com WWW: www.mtlurge.com

A member of the MTL Instruments Group plc

Model		TP32 & TP32-T
Nominal voltage	U <sub>n</sub>	32V
Rated voltage (MCOV)	U <sub>c</sub>	35V
Nominal current	I <sub>n</sub>	n/a
Nominal discharge current (8/20µs)	I <sub>sn</sub>	3kA
Max discharge current (8/20µs)	I <sub>max</sub>	10kA
Lightning impulse current (10/350µs)	I <sub>imp</sub>	2.5kA
Residual voltage @ I <sub>sn</sub>	U <sub>p</sub>	46V
Voltage protection level @ 1kV/µs	U <sub>p</sub>	<38V
Bandwidth	f <sub>G</sub>	7.5MHz
Capacitance (excludes TP32-T)	C	50pF
Series resistance	R	n/a
Operating Temperature Range		-40°C to +85°C
Category tested		A2, B2, C1, C2, C3, D1
Overstressed fault mode i <sub>n</sub> =3kA		12kA
Impulse durability (8/20µs)		10kA
Degree of protection		IP66
AC durability		1A <sub>rms</sub> , 5T
Service conditions		80kPa - 160kPa 5% - 95% RH

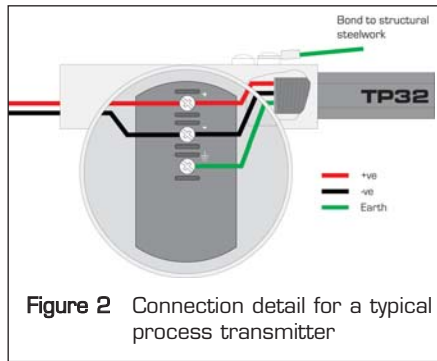


Figure 2 Connection detail for a typical process transmitter

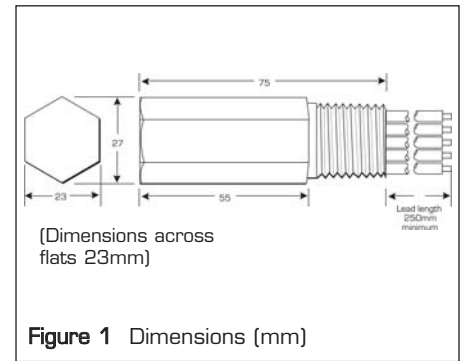


Figure 1 Dimensions (mm)

## Approvals

Country (Authority)	Standard No.	Certificate/File	Approved for	Product
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50020:1994, EN 50284:1999	BASEEFA04ATEXD251X	EEx ia IIC T6 (T <sub>amb</sub> = -40 to 60°C) EEx ia IIC T5 (T <sub>amb</sub> = -40 to 85°C) EEx ia IIC T4 (T <sub>amb</sub> = -40 to 60°C)	TP32-N-NDI TP32-I-NDI TP32-G-NDI
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50018:2000 + Amendment 1	BASEEFA04ATEX0053X	EEx d IIC T6 (T <sub>amb</sub> = -40 to 60°C) EEx d IIC T5 (T <sub>amb</sub> = -40 to 80°C) EEx d IIC T4 (T <sub>amb</sub> = -40 to 85°C)	TP32-N-NDI TP32-I-NDI TP32-G-NDI
Atex Directive 94/9/EC	BS EN 50021:1999	TML02ATEX0032X	Ex n II T6 (-40°C<T <sub>amb</sub> <+60°C) EEx n II T5 (-40°C<T <sub>amb</sub> <+85°C)	TP32-N TP32-I TP32-G
USA (FM)	Class Nos. 3600 (1998), 3610 (1999), 3611 (1999), 3615 (1989), 3810 incl. Supp 1 (1995-07 (1989-03), ANSI/NEMA 250 (1991), ISA-S12.0.01 (1999)	3022293	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Non incandive: I/2/A-D, I/2/IIC Dust ignition proof: II,III/1/EF/G Special protection: II/2/FG	TP32-N-NDI TP32-I-NDI TP32-G-NDI
Canada (FM)	C22.2 No. 157 C22.2 No. 213 C22.2 No. 142 C22.2 No. 94 C22.2 No. 30	3025374	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Nonincandive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EF/G Special protection: II/2/FG	TP32 All

## To order specify -

TP32-N, TP32-T-N  
TP32-N-NDI, TP32-T-N-NDI  
TP32-I, TP32-T-I  
TP32-I-NDI, TP32-T-I-NDI  
TP32-G, TP32-T-G  
TP32-G-NDI, TP32-T-G-NDI

1/2" NPT thread  
1/2" NPT thread, with EEx ia, EEx d, approval  
20mm ISO thread  
20mm ISO thread, with EEx ia, EEx d, approval  
G 1/2" (BSP 1/2 inch)  
G 1/2" (BSP 1/2 inch), with EEx ia, EEx d, approval



# HW48

Safeguards Honeywell STT350 transmitters against induced surges and transients from field cabling

- **Built-in reliability - solid state**
- **Simple installation and wiring - customised mounting**
- **Retrofittable - easily fitted to transmitters in existing installations**
- **Honeywell tested and approved for use with STT350 transmitters**
- **Analogue and Smart meter compatible**
- **10 year product warranty**



**The HW48** is a unique device, designed to give comprehensive surge protection to any Honeywell STT350 intelligent transmitter without incurring penalties of additional wiring, conduit modifications or other expensive extras. Nor are key transmitter features such as smart communications compromised. The surge protection network consists of high-power solid-state electronics and a gas-filled discharge tube capable of diverting impulses of over 10kA. The unit fits onto the side of the STT350 transmitter inside the standard 'flameproof' (Ex d) enclosure housing.

**Installation is simple** - the HW48 device is mounted by the side of the transmitter, where it connects directly to the transmitter's input terminals. Field wiring is then connected into the HW48's own terminals.

**Earthing** for any surge protection device is very important. In this context, 'earth' is the local casing of the transmitter - no separate

earth connection or ground stake is needed. The HW48 makes sure that transmitter electronics are never exposed to damaging transients between lines or between lines and casing/earth. Any surge current appearing as a series mode or common mode transient will be converted into a common-mode voltage. The transmitter electronics will be elevated to some higher voltage level and then float down again automatically without damage to the transmitter. For optimum protection, surge protection devices should also be fitted at the control panel.

**Hazardous-area applications** are unaffected - the Ex d certification of the transmitter covers use in Zone 1 hazardous areas, while the HW48 is rated as 'simple apparatus' for intrinsically safe applications. The device can also, of course, be used with transmitters

for which hazardous-area approval is not needed.

**Analogue and Smart** local current meters can be wired into the transmitter and will benefit from the protection provided by the HW48.

**Existing installations** can be upgraded easily by retrofitting HW48 units as the installation process does not call for modifications to plant wiring or conduit runs and needs no external connection boxes.

**Data & Signal  
Protection**

# Specification

All figures typical at 77°F (25°C) unless otherwise stated

## Maximum surge current

- 10kA peak current (8/20µs waveform)
- 10kV peak voltage (1.2/50µs waveform)

## Leakage current

- < 2µA at 32Vdc
- < 10µA at maximum working voltage, over full temperature range

## Working voltage

- 48V dc maximum

## Signal level

- 4/20mA dc plus DE communications

## Series resistance

- 18 ohms/line (36 ohms loop)

## Ambient temperature limits

- 40°F to +176°F (-40°C to +80°C) working
- 40°F to +212°F (-40°C to +100°C) storage

## Humidity

- 5% to 95% RH (non-condensing)

## Electrical connections

- 3-way terminal block (+ve, E, -ve)
- 1.5mm<sup>2</sup> maximum flying lead earth connection

## Weight

- 1.7 oz (48g) excluding transmitter housing

## Dimensions

- See figure 1

## Electrical safety (for hazardous-area use)

- Intrinsic safety: Non-energy storing apparatus (<1.2V, <0.1A, <20µJ, <25mW), Ceq=0, Leq=0; the device can be connected into any IS loop with input power < 2W.
- Flameproof/Explosionproof: No effect on existing Ex d approval when fitted into an STT350 transmitter in an approved housing.

## Installation

The HW48 mounts onto the side of a Honeywell STT350 transmitter inside the protective housing. The device is fitted with spade-tag connectors for attachment to transmitter terminals 6 and 8 (see figure 2). If local current metering is being used then the meter is connected to the transmitter terminals as detailed in the meter installation manual. If local metering is not being used, then a link is provided to connect transmitter terminals 5 and 8. The HW48 surge protection device should be earthed to the screw securing the transmitter to the housing by the green/yellow flying lead. The field wiring is connected directly to the 3-way terminal block on the HW48 printed circuit board.

## To order specify -

- HW48  
(Process transmitter surge protection device for Honeywell STT350 transmitters).

Note: In accordance with our policy of continuous improvement, we reserve the right to change the product's specification without notice

For more information please contact your local MTL sales office:

- The Americas:** +1 800 835 7075
- UK:** +44 (0)1582 723633
- Singapore:** +65 6 487 7887
- The Netherlands:** +31 (0)481 450250
- Italy:** +39 (0)2 6180 2011
- Australia:** +61 (0)8 9455 2994
- India:** +91 (0)44 450 1660

Local sales office information is also available on our web site at:  
[www.mtlsurge.com/support/distribution/index.htm](http://www.mtlsurge.com/support/distribution/index.htm)

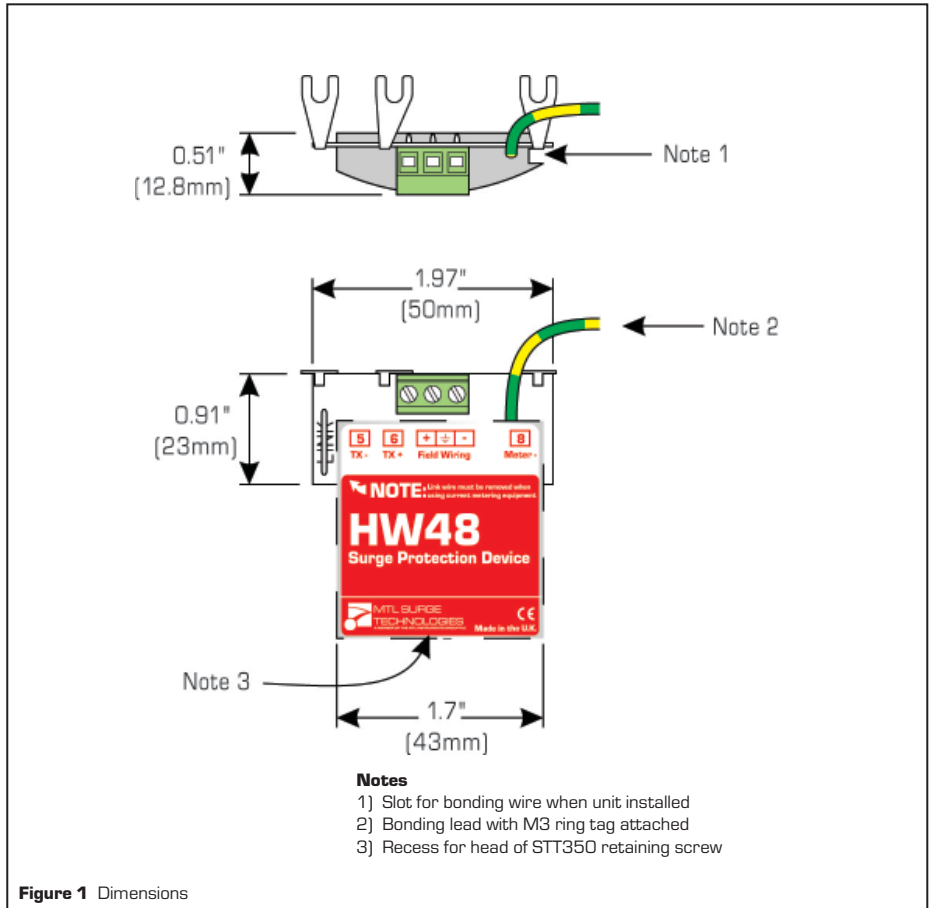


Figure 1 Dimensions

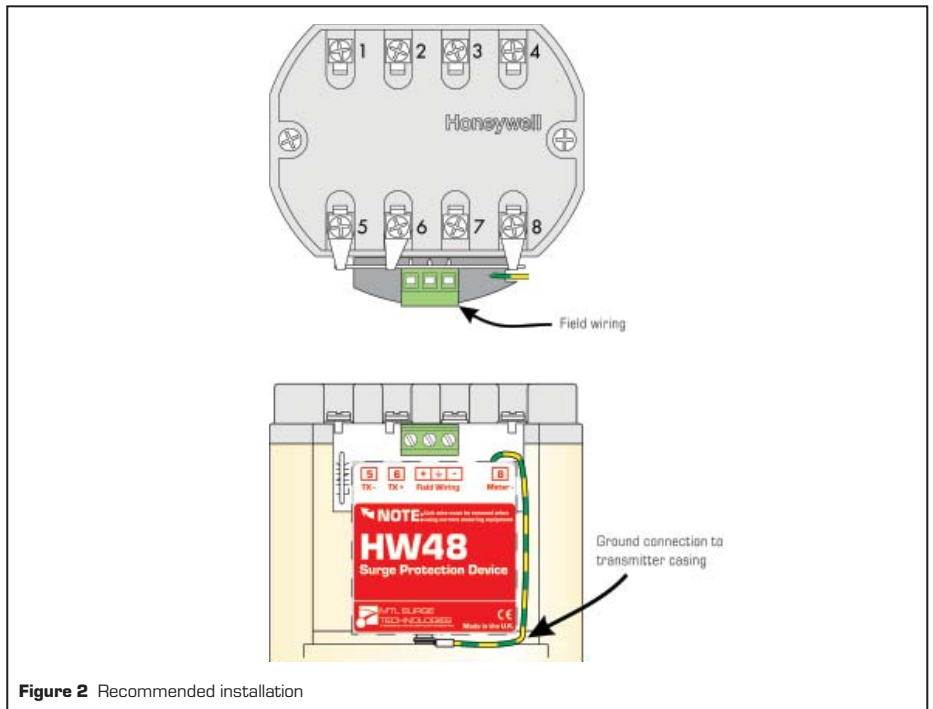


Figure 2 Recommended installation



# IOP Series

Cost effective surge protection for digital and analogue I/O



- **IOP32D provides surge protection for two loops or 4 wires**
- **IOP32 provides surge protection for one loop or 2 wires**
- **Removable terminals - easy installation, easy to test**
- **Hybrid protection circuit - 20kA rated surge current**
- **ATEX certified**
- **Space saving - 6mm width per loop IOP32D - 12mm width per loop IOP32**



**The IOP was conceived to offer protection for both digital I/O and analogue I/O.** The IOP range is the most economical surge protection solution for I/O offered by MTL Surge Technologies. High packing density, high protection level and low price combine to make the IOP a value solution.

**The IOP Series is cost effective** and still retains a hybrid circuit comprising 20kA gas discharge tubes and solid state components. This impressive product is designed to exhibit exceptionally low line resistance and therefore adds only a tiny voltage drop to the circuit.

**Removable terminals are used** on both variations of the IOP for ease of installation, maintenance and for providing a loop disconnect by simply unplugging the terminals from the side of the module. Wire entry is angled to assist wiring within limited space enclosures.

**Fully automatic in operation,** IOP devices react immediately to make sure that equipment is never exposed to damaging surges between lines or the lines and ground. Reacting instantaneously, the IOP redirects surges safely to ground and then resets automatically.

**The versatile design minimizes space.** The IOP32D has protection for two loops in a package that is only 0.48" wide. The effective space taken up per loop is only 0.24". For customers desiring single channel integrity, the IOP32 fits this need exactly.

**One simple manual operation** clamps modules securely onto DIN rail, which automatically provides the essential high-integrity ground connection.

**A 10 Year 'No Fuss' warranty** is available as standard for the IOP so if

a correctly connected device should fail for any reason, simply return it for a free replacement.

**'Top-hat' (T-section) DIN rail** is generally suitable for mounting IOP modules although for adverse environments, a specially-plated version is available from MTL Surge Technologies.

## Data & Signal Protection

# Specification

All figures typical at 77°F (25°C) unless otherwise stated

## Maximum surge current

20kA (8/20µs waveform) per line

## Leakage Current

<1mA @ working voltage

## Maximum rated load current

0.675A

## Loop resistance

4 Ohm

## Bandwidth

6.5 MHz

## Attenuation

< -0.3dB @ < 1MHz

-3.0dB @ 6.5MHz

## Response time

<1ns

## Ambient temperature

-40°F to +176°F [-40°C to +80°C] working

-40°F to +176°F [-40°C to +80°C] storage

## Humidity

5 to 95% RH (non-condensing)

## Terminals

2.5mm<sup>2</sup> (12 AWG)

## Electrical connections

Plug/header screw terminal strip

## Mounting

T-section DIN-rail (35 x 15mm rail)

## Weight

5oz (140g approximately)

## Case flammability

UL94-V0

## EMC compliance

BS EN 60950:1992

BS EN 61000-6-2:1999

BS EN 61010-1:1993

## Electrical safety

See approvals on bottom, right

Model		IOP32	IOP32D
Nominal voltage	$U_n$	32V	32V
Rated voltage (MCOV)	$U_c$	36V	36V
Nominal current	$I_n$	675mA	675mA
Nominal discharge current (8/20µs)	$i_{sn}$	3kA	3kA
Max discharge current (8/20µs)	$I_{max}$	20kA	20kA
Lightning impulse current (10/350µs)	$I_{imp}$	2.5kA	2.5kA
Residual voltage @ $i_{sn}$	$U_p$	45V	45V
Voltage protection level @ 1kV/µs	$U_p$	<38V	<38V
Bandwidth	$f_G$	6.5MHz	6.5MHz
Series resistance	R	2	2
Operating Temperature Range		-40°C to +80°C	
Category tested		A2, B2, C1, C2, C3, D1	
Overstressed fault mode $i_n=3kA$		22kA	22kA
Impulse durability (8/20µs)		10kA	10kA
Degree of protection		IP20	
AC durability		1A <sub>rms</sub> , 5T	
Service conditions		80kPa-160kPa5% - 95% RH	

Tested in accordance to IEC 61643-21.

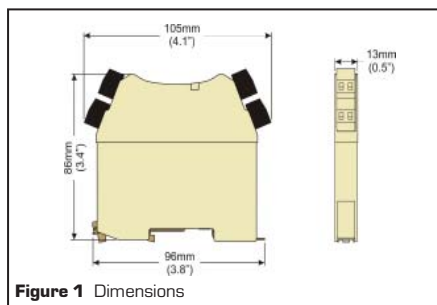


Figure 1 Dimensions

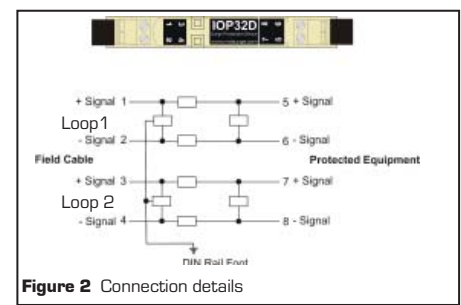


Figure 2 Connection details

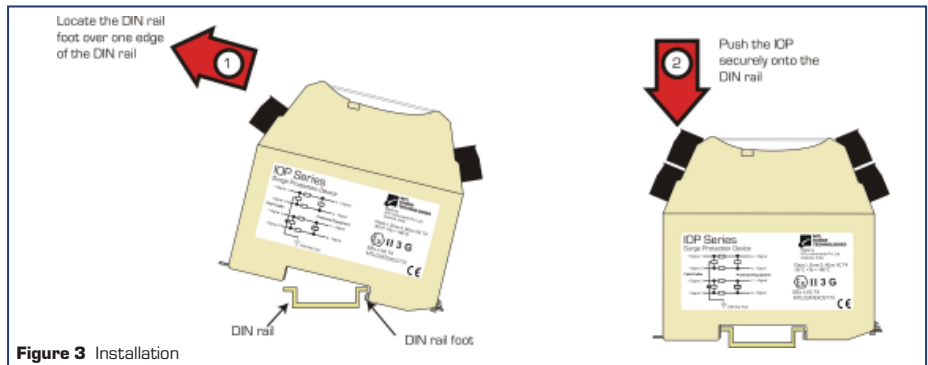


Figure 3 Installation

## To order specify -

Order by module, as listed in the specification table.

Note: In accordance with our policy of continuous improvement, we reserve the right to change the product's specification without notice.

For more information please contact your local MTL sales office:

**The Americas:** +1 800 835 7075  
**UK:** +44 (0)1582 723633  
**Singapore:** +65 6 487 788  
**The Netherlands:** +31 (0)481 450250  
**Italy:** +39 (0)2 6180 2011  
**Australia:** +61 (0)8 9455 2994  
**India:** +91 (0)44 450 1660

Local sales office information is also available on our web site at:  
[www.mtl surge.com/support/distribution/index.htm](http://www.mtl surge.com/support/distribution/index.htm)

## Approvals

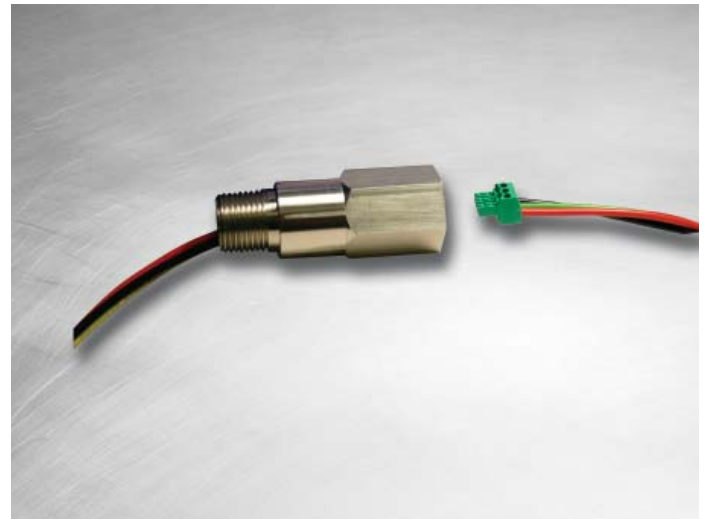
Country	Standard/Authority	Certificate/ File No.	Approved for	Product
EU (Baseefa)	EN 50014:1997 + A1 & A2 EN 50020:2002 EN60079-26:2004	Baseefa06ATEX0036X	EEx ia IIC T4	IOP32 IOP32D
EU (MTL)	BS EN 50014:1998 BS EN 50021:1999 EN 60079-15:2003	MTL06ATEX0132X	EEx n IIC T4	IOP32 IOP32D
USA (FM)	Class Nos. 3600 (1998), 3610 (1999), 3611 (1999), 3615 (1989), 3810 incl. Supp 1 (1995-07 (1989-03), ANSI/NEMA 250 (1991), ISA-S12.0.01 (1999)	3011208	Intrinsically Safe: I/1/A-D, I/O/II C Non incensive: I/2/A-D, I/2/II C	IOP32 IOP32D
Canada (FM)	C22.2 No. 213, 142, 94, 157, 30 ANSI/NEMA 250 CAN/CSA-E79-0 CAN/CSA-E79-11	3025374	IS/I/1/ABCD I/O/Ex ia/IIC I/O/Ex ib/IIC NE/I/2/ABCD NE/I/2/IIC	IOP32 IOP32D



# TP-Pipe Series

Safeguards electronic process transmitters against induced surges and transients from field cabling

- **Easy and direct mounting - simply screws into conduit entry**
- **Straightforward and simple installation**
- **Intrinsically safe and flameproof to CENELEC standards**
- **Low impedance series connection avoids signal degradation of the loop**
- **ATEX approved**
- **10 year product warranty**



**The TP-Pipe Series of surge protection device** is a unique unit providing a level of protection for field-mounted transmitters that is far in excess of the optional transient protection facilities available from the transmitter manufacturers - without involving any additional wiring, conduit modifications or other expensive extras.

**The TP-Pipe protection network** consists of high-power, solid-state electronics and a gas-filled discharge tube capable of diverting 10kA impulses. The whole unit is encased in an ANSI 316 stainless steel housing, threaded for the common conduit entries used on process transmitters. Versions are available for 1/2" NPT, 20mm ISO, and G 1/2" (BSP 1/2 inch) threaded entries.

**Installation is very simple** and can easily be carried out retrospectively to existing installations. The TP-P is screwed into the conduit entry on the transmitter case and flying leads are connected to the terminal block and the in-

ternal earth stud. Field wiring is connected to a three position socket and then connected to the provided header. They operate without in any way affecting normal operation - passing ac or dc signals without attenuation while diverting surge currents safely to earth and clamping output voltages to specific levels.

**The all important earthing connection** is made to the local casing of the transmitter with no separate earth connection or ground stake at the transmitter being needed. In operation, the TP-P makes sure that the transmitter electronics are never exposed to damaging transients between lines or between lines and casing/earth. Any surge current appearing as a series-mode or common-mode voltage - whereupon the transmitter electronics are temporarily raised to some higher voltage level before 'floating' down automatically (and without damage) to resume normal operation.

**For hazardous-area use**, approvals for both intrinsically safe and flameproof (explosion-proof) operation are available in all gas groups and apparatus temperature classification up to T4. Where transmitters are used in circuits suitable for Div 2/Zone 2 installations, the TP-P can be added without adversely affecting the level of safety.

**For fieldbus applications**, use the TP-P-32 which meets the requirements of IEC61158-2:2000 and ANSI/ISA-50.02-2 1992 for 31.25kbit/s systems as used by FOUNDATION™ Fieldbus, PROFIBUS-PA and WorldFIP.

**Data & Signal  
Protection**

# Specification

All figures typical at 77°F (25°C) unless otherwise stated

## Maximum surge current

10kA peak current (8/20µs waveform)

## Leakage current

Less than 10µA at maximum working voltage

## Working voltage

48V dc and 32V dc maximum

## Bandwidth

1MHz

## Resistance

Loop resistance: 1ohm

## Ambient temperature limits

-40°C to +85°C (-40°F to +185°F) (working)  
-40°C to +85°C (-40°F to +185°F) (storage)

## Humidity

5% to 95% RH (non-condensing)

## Electrical connections

### Input:

3 position socket/header (max wire #14AWG (2mm<sup>2</sup>))

### Output:

3 flying leads (line 1, line 2 & earth)  
Wire size 32/O.2 (1.0mm<sup>2</sup>, 18AWG)  
Lead length 250mm (9.85") minimum

## Casing

ANSI 316 stainless steel hexagonal barstock, male and female thread

## Weight

175g

## Dimensions

See figure 1

## EMC compliance

To Generic Immunity Standards EN50082, part 2 for industrial environments Electrical safety EEx ia IIC T4, Ceq=0, Leq=0; the unit can be connected without further certification into any intrinsically safe loop with open circuit voltage <60V and input power <1.2W. Ex d IIC T4; the unit is apparatus-approved to flame-proof (explosionproof) standards, and can be fitted into a similarly approved housing.

## Installation

The TP-Pipe units are designed for mounting directly into the conduit entry on a process transmitter housing. Generally, two such entries are provided, one of which is used for the loop wiring. The transmitter specification should provide information indicating the required thread type. TP-Pipe units can be installed using thread adaptors if necessary, including certified adaptors in hazardous area applications. Figure 2 shows connection details for typical process transmitters.

Note: In accordance with our policy of continuous improvement, we reserve the right to change the product's specification without notice.

Model		TP32-P	TP48-P
Nominal voltage	$U_n$	32V	48P
Rated voltage (MCOV)	$U_c$	35V	58V
Nominal current	$I_n$	1.5A	1.5A
Nominal discharge current (8/20µs)	$i_{sn}$	3kA	3kA
Max discharge current (8/20µs)	$I_{max}$	10kA	10kA
Lightning impulse current (10/350µs)	$I_{imp}$	2.5kA	2.5kA
Residual voltage @ $i_{sn}$	$U_p$	46V	92V
Voltage protection level @ 1kV/µs	$U_p$	<38V	<76V
Bandwidth	$f_G$	7.5MHz	1MHz
Capacitance	C	50pF	100pF
Series resistance	R	0.5	0.5
Operating Temperature Range		-40°C to +85°C	
Category tested		A2, B2, C1, C2, C3, D1	
Overstressed fault mode $i_n=3kA$		12kA	12kA
Impulse durability (8/20µs)		10kA	10kA
Degree of protection		IP66	IP66
AC durability		1A <sub>rms</sub> , 5T	
Service conditions		80kPa - 160kPa 5% - 95% RH	

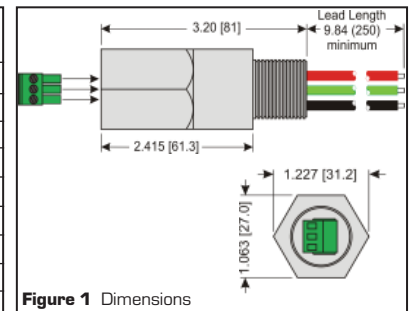


Figure 1 Dimensions

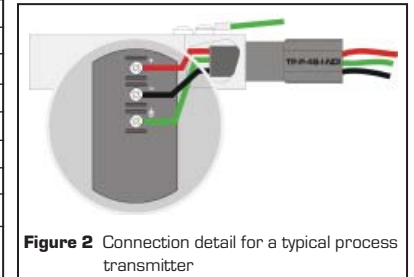


Figure 2 Connection detail for a typical process transmitter

## Approvals

Country (Authority)	Standard No.	Certificate/File	Approved for	Product
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50020:1994, EN 50284:1999	BASEEFA06ATEX0034X	EEx ia IIC T6 ( $T_{amb} = -40$ to $60^{\circ}C$ ) EEx ia IIC T5 ( $T_{amb} = -40$ to $85^{\circ}C$ )	TP-P32-X-NDI TP-P48-X-NDI
EC (BASEEFA)	EN 50014:1997 + Amendments 1 & 2 EN 50018:2000 + Amendment 1	BASEEFA06ATEX0035X	Ex d IIC T6 ( $T_{amb} = -40$ to $60^{\circ}C$ ) Ex d IIC T5 ( $T_{amb} = -40$ to $80^{\circ}C$ )	TP-P32-X-NDI TP-P48-X-NDI
Atex Directive 94/9/EC	BS EN 50021:1999	MTL06ATEX4832	EEx n II T6 ( $-40^{\circ}C < T_{amb} < +60^{\circ}C$ ) EEx n II T5 ( $-40^{\circ}C < T_{amb} < +85^{\circ}C$ )	TP-P32-X-NDI TP-P48-X-NDI TP-P32-X TP-P48-X
USA (FM)	Class Nos. 3600 (1998), 3610 (1999), 3611 (1999), 3615 (1989), 3810 incl. Supp 1 (1995-07 (1989-03), ANSI/NEMA 250 (1991), ISA-S12.0.01 (1999)	3011208	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Non incandive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EFG Special protection: II/2/FG	TP-P32-X-NDI TP-P48-X-NDI TP-P32-X TP-P48-X
Canada (FM)	C22.2 No. 157 C22.2 No. 213 C22.2 No. 142 C22.2 No. 94 C22.2 No. 30	3025374	Intrinsically Safe: I, II, III/1/A-G, I/O/IIC Explosionproof: I/1/A-D Nonincandive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EFG Special protection: II/2/FG	TP-P32-X-NDI TP-P48-X-NDI TP-P32-X TP-P48-X

X = I, N, or G

## To order specify -

### Fieldbus Applications

#### TP-P32-N-NDI

Certified process transmitter surge protection device - 1/2" NPT thread

#### TP-P32-I-NDI

Certified process transmitter surge protection device - 20mm ISO thread

#### TP-P32-G-NDI

Certified process transmitter surge protection device - G 1/2" (BSP 1/2 inch)

#### TP-P32-N

Non-certified process transmitter surge protection device - 1/2" NPT thread

#### TP-P32-I

Non-certified process transmitter surge protection device - 20mm ISO thread

#### TP-P32-G

Non-certified process transmitter surge protection device - G 1/2" (BSP 1/2 inch)

### Transmitter Applications

#### TP-P48-N-NDI

Certified process transmitter surge protection device - 1/2" NPT thread

#### TP-P48-I-NDI

Certified process transmitter surge protection device - 20mm ISO thread

#### TP-P48-G-NDI

Certified process transmitter surge protection device - G 1/2" (BSP 1/2 inch)

#### TP-P48-N

Non-certified process transmitter surge protection device - 1/2" NPT thread

#### TP-P48-I

Non-certified process transmitter surge protection device - 20mm ISO thread

#### TP-P48-G

Non-certified process transmitter surge protection device - G 1/2" (BSP 1/2 inch)

## For more information please contact your local MTL sales office:

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**The Netherlands:** +31 (0)481 450250

**Italy:** +39 (0)2 6180 2011

**Australia:** +61 (0)8 9455 2994

**India:** +91 (0)44 450 1660

Local sales office information is also available on our web site at:

[www.mtl surge.com/support/distribution/index.htm](http://www.mtl surge.com/support/distribution/index.htm)



# mSA Series

Protects electronic equipment and systems against surges on signal and data cabling

- Easy installation – ready boxed in IP65 weatherproof housing with cable glands
- Multi-stage hybrid protection circuitry – high surge absorption capability
- Single and dual pair versions available
- Range of voltage ratings covering all process related signals
- 10 year product warranty



The **mSA Series** prevents surges and transient overvoltages conducted through data and signal cabling from causing damage to electronic systems such as instrumentation control panels, telemetry outstations and fire and security alarm installations.

**Isolated applications are particularly at risk**, e.g. unmanned water monitoring stations, as they are regularly exposed to lightning activity and therefore suffer frequent damage. Telematic mSA Series surge protection devices increase system reliability, prevent costly damage to equipment and reduce maintenance costs at remote sites.

**Sophisticated hybrid circuitry** protects vulnerable equipment without affecting normal operation, passing ac or dc signals with little attenuation while diverting surge currents safely to earth and clamping output voltages to safe levels.

**Modules with a comprehensive range of voltage ratings** (6V, 16V, 30V, 51V and 75V versions) cover all process related signals such as RTDs, THCs and 4-20mA loops. Single and dual pair versions allow installation flexibility and are ideal for 3 and 4-wire RTD applications.

**These self-contained units** provide a weatherproof barrier especially suitable for exposed locations. The whole circuit is assembled inside an IP65 (NEMA 12 and 13) enclosure which is ready fitted with cable glands and an external earth stud, so installation is very simple. Connections for the mSA Series are via screw-clamp terminals.

**The mSA design incorporates test points** to enable fast maintenance checks. Removable links enable the 'high' and 'low' energy sections to be tested independently.

The **mSA Series** is also suitable for **Telecom applications** - private wire installations can be protected using the standard mSA range. Public Switched Telephone Networks (PSTNs) are served by the specifically designed mSAPN Series which utilises the same rugged enclosure as the mSA range. mSAPN devices are available with either single or dual line-pair protection networks, like the mSA units, and are supplied with IDC-type terminals. An IDC insertion tool is supplied for ease of convenience.

**Data & Signal  
Protection**

# Specification

All figures typical at 25°C (77°F) unless otherwise stated

## Maximum surge current

10kA (8/20µs waveform)

## Nominal resistance per line

mSA's 43 ohms  
mSAPN's 5 ohms

## Ambient temperature limits

-40°C to +80°C - working  
-40°F to +176°F - working

## Humidity

5% to 95% RH (non-condensing)

## Enclosure

Plastic ABS  
IP65 (NEMA 12 and 13)  
Ready fitted with cable glands

## Connectors

mSA's screw-clamp terminals  
mSAPN's IDC terminals

## Terminals

mSA's 2.5mm<sup>2</sup> (12AWG)  
mSAPN's IDC terminals (tool provided)

## Mounting

via M5 external earth stud

## Weight

220g (7.8oz) approx.

## Dimensions

See figure 1

## EMC compliance

To Generic Immunity Standards  
BS EN 50082, part 2 for industrial environments

## R&TTE compliance

BS EN 50082-2: 1995  
BS EN 41003: 1999

## LVD compliance (mSAPN)

BS EN 41003: 1999

## Installation

Figure 2 shows the installation for a typical telemetry outstation. All cables entering the telemetry cabin should be fitted with surge protection devices (SPDs) to prevent lightning currents entering telemetry equipment. mSA30 devices can be used for 4-20mA applications whilst PSTN lines should be protected using the mSAPN.

Correct earthing is essential for optimum protection against lightning induced overvoltages. The units should be bonded to the incoming mains power supply using a short length, preferably less than 1 metre, of 2.5mm<sup>2</sup> or greater thickness cable.

Model	Body	Certificate
mSA06 - mSA51	BT	NS/2190/2/F/450911
mSAPN	Oftel PTT ODTR	NS/G/1235/W/100025 NL 93040203 (The Netherlands) DOC 19/99 (Eire)

## To order specify -

Model number as per specification table above

Note: In accordance with our policy of continuous improvement, Telematic reserves the right to change the product's specification without notice.

## MTL Surge Technologies

Power Court, Luton, Bedfordshire,  
England LU1 3JJ  
Tel: +44 (0)1582 723633  
Fax: +44 (0)1582 422283  
E-mail: enquiry@mtlsurge.com; www.mtlsurge.com

A member of the MTL Instruments Group plc

Model	Lines	Working voltage (V)	Rated load current (mA)	Maximum leakage current (µA)	Maximum continuous operating voltage (V)	Limiting voltage (V)	Bandwidth
mSA06/1	1 pair	5.5	70	1000	6	30	220kHz
mSA16/1	1 pair	13.5	180	5	16	40	380kHz
mSA30/1	1 pair	25.5	340	5	30	60	500kHz
mSA51/1	1 pair	43.5	400	5	51	100	580kHz
mSA75/1	1 pair	64	400	5	75	150	600kHz
mSA06/2	2 pairs	5.5	70	1000	6	30	220kHz
mSA16/2	2 pairs	13.5	180	5	16	40	380kHz
mSA30/2	2 pairs	25.5	340	5	30	60	500kHz
mSA51/2	2 pairs	43.5	400	5	51	100	580kHz
mSA75/2	2 pairs	64	400	5	75	150	600kHz
mSAPN/1	1 pair	180	N/A	10	200	250	10MHz
mSAPN/2	2 pairs	180	N/A	10	200	250	10MHz

## Definitions of terminology used in table

### 1 Working voltage

Maximum voltage between lines or lines/earth for the specified leakage current

### 2 Maximum leakage current

Maximum current drawn by the SPD at the working voltage

### 3 Maximum continuous operating voltage

Maximum voltage that can be applied to the protected terminals without damage

### 4 Limiting voltage

Peak output voltage after injection of test impulse from 6kV/3kA combination waveform generator (often known as 'let-through' voltage)

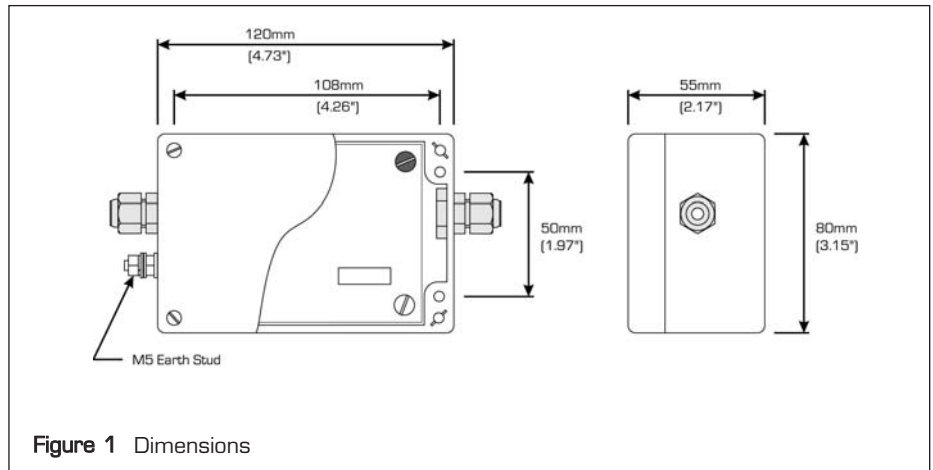


Figure 1 Dimensions

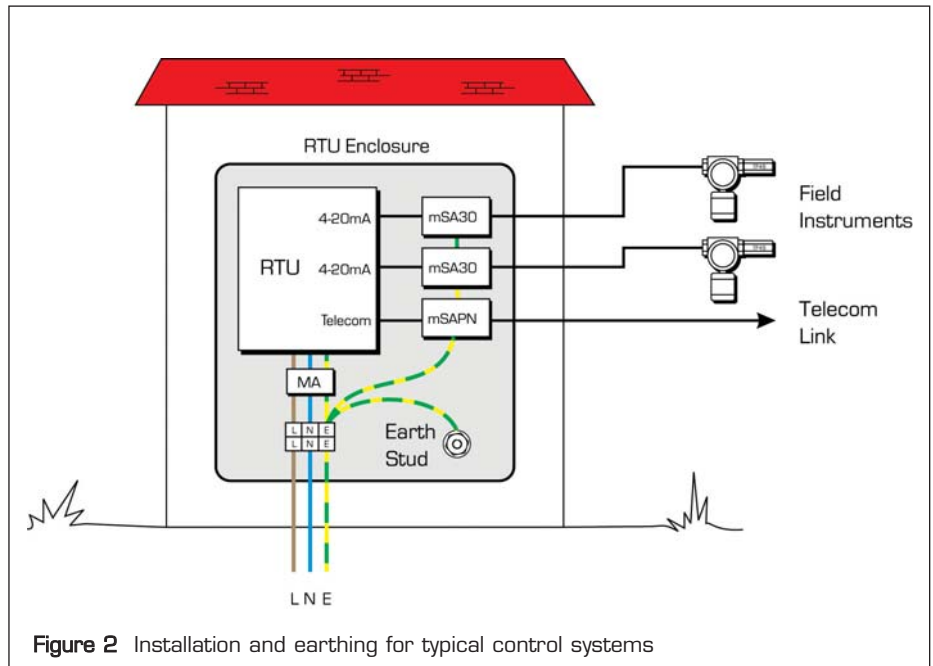


Figure 2 Installation and earthing for typical control systems

## Approvals

Note: Approvals now superseded by CE marking under the R&TTE Directive. See 'Specification' section for further information.



# ZoneBarrier

Protects sensitive I/O ports against induced surges and transients

- **For 24V, 4-20mA current loop applications**
- **Industrial Ethernet compatible versions, UL Certified Cat.5**
- **Three stage protection including Gas Discharge Tube and Silicon Avalanche Diode technology**
- **Tested to IEC 61000-4-5 and CCITT K17**
- **10 year product warranty**



**The ZoneBarrier Series** is a uniquely modular data and signal line protection system for 24V, 4-20mA current loop and Industrial Ethernet applications. By providing an effective barrier between uncontrolled transient environments and your valuable electronic systems the ZoneBarrier Series protects you from costly system down time and equipment failure.

**The sophisticated hybrid circuitry** employed by the ZoneBarrier Series protects your equipment without impeding normal operation. ZoneBarrier protection components comprise a combination of high energy Gas Discharge Tubes with ultra fast diodes and Silicon Avalanche Diodes. This combination of high quality surge protection components gives the ZoneBarrier Series its characteristic low let-through voltage and high, 10kA, surge current capacity which provides excellent protection. ZoneBarrier devices have RJ45, terminal strip or pluggable terminal strip connectors.

**Designed for multi-loop or single control loop applications** the ZoneBarrier Series offers a flexible surge protection solution that is capable of growing with your requirements. A ZoneBarrier module can be used as a stand-alone device or as a building block in a surge protection solution as simple or as complex as your requirements, now and in the future.

**One simple manual operation** clamps modules securely onto DIN rail, an action that also automatically provides the essential high-integrity ground connection. Standard 'Top-hat' (T-section) DIN rail is generally suitable for mounting ZoneBarrier Series modules. Where a number of ZoneBarrier Series modules are mounted on one rail, any that are incorrectly mounted (and therefore not securely grounded) are very obvious and can easily be remounted correctly. The ZoneBarrier Series also has two mounting feet at

either end of the unit, enabling mounting to a flat surface such as a cabinet wall.

**ZoneBarrier data and signal devices are tested to IEC 61000-4-5** and CCITT K17. Industrial Ethernet compatible versions are also UL Certified Cat.5 and UL 497B Listed. ZoneBarriers come complete with a full 10 year product warranty.

**Additional protection** should be provided for other systems which may be inter-connected e.g. power feeds, telephone wiring etc., other units are available for this purpose.

# Specification

All figures typical at 77°F (25°C) unless otherwise stated

## Maximum load current

0.5 Amps

## Maximum surge current

4-20mA versions 10kA  
100Base-T versions 8kA (1kA per line)

## Maximum leakage current

5µA at working voltage (4-20mA versions)

## Maximum in line resistance

< 5 ohms

## Bandwidth

4-20mA versions 0.5 MHz  
100Base-T versions 155 MHz

## Ambient temperature limits

-40°F to +185°F (working)  
-40°C to +85°C (working)

## Humidity

95% RH (non-condensing)

## Casing

Molded plastic

## Weight

2.8oz (0.08Kg)

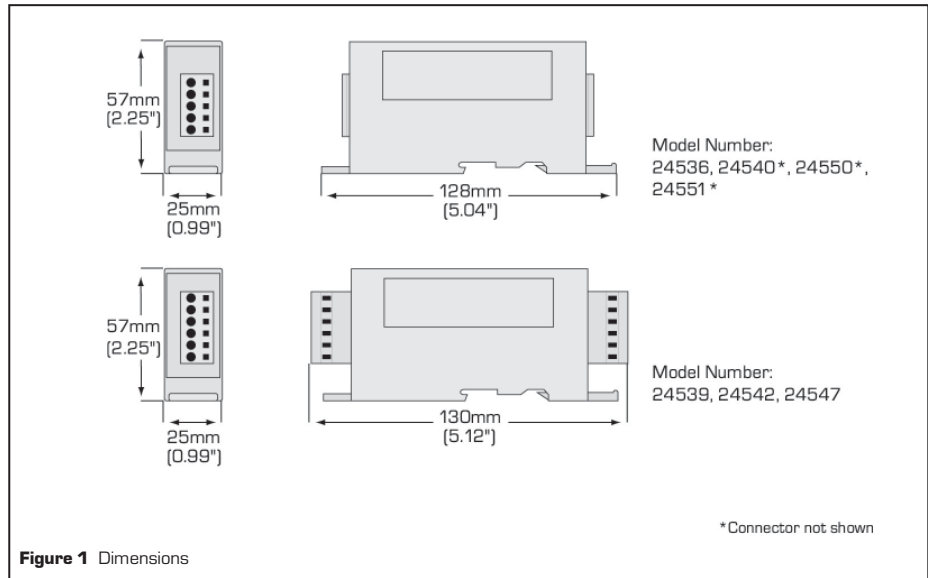
## Dimensions

See figure 1

## EMC compliance

BS EN 60950: 1992  
BS EN 61000-6-2: 1999

Model	Type	Lines	Working voltage (V)	Limiting voltage (V)	Maximum continuous operating voltage (V)	Connectors
ZB24536	4-20mA	4 plus shield	24	30†	30	Terminal strip
ZB24539	4-20mA	2 plus shield	24	30†	30	Pluggable terminal strip
ZB24542	4-20mA	6	24	30†	30	Pluggable terminal strip
ZB24547	4-20mA	4 plus 2 shields	24	30†	30	Pluggable terminal strip
ZB24540	100Base-T*	8	5	10	N/A	RJ45
ZB24550	100Base-T	2 x 4	5	10	N/A	2 x RJ45
ZB24551	100Base-T*	8	5	10	N/A	RJ45 / 110 Block



## Installation

All ZoneBarrier modules are installed in-line and are identified with "Protected" and "Unprotected" for fail-safe installation.

### DIN rail mounting (figure 2)

ZoneBarrier modules can be mounted on any standard T-section DIN rail or on the optional 19" DIN rail assembly. To attach the ZoneBarrier module to the DIN rail, simply locate the DIN rail foot of the module over on edge of the DIN rail and then securely push the ZoneBarrier onto the DIN rail. Note the DIN rail must be properly grounded.

### Stand-alone installation (figure 3)

To install a ZoneBarrier module as a stand-alone protector, attach an ground lead to the supplied ring terminal and secure this with the self tapping screw provided to the base of the unit. Using screws (or bolts) mount the module on any flat surface.

## To order specify -

Model number as per specification table above

### Mounting options

- DR21605** 5" DIN rail for up to 4 ZoneBarriers
- DR21649** 17.5" DIN rail for up to 16 ZoneBarriers
- DR24500** 19" DIN rail (with mounting brackets) for up to 32 ZoneBarriers

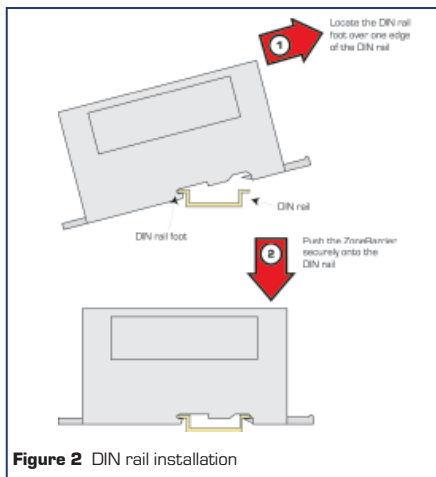


Figure 2 DIN rail installation

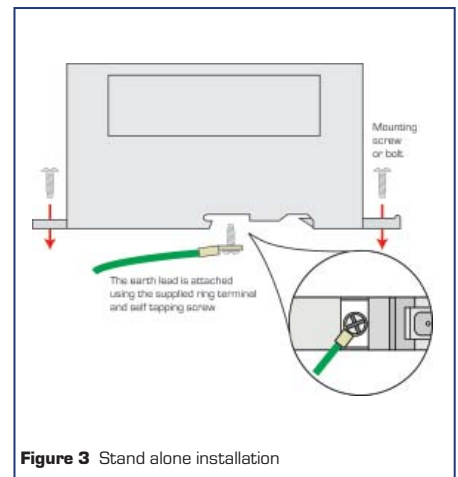


Figure 3 Stand alone installation

## Approvals

For more information please contact your local MTL sales office:

- The Americas:** +1 800 835 7075
- UK:** +44 (0)1582 723633
- Singapore:** +65 6 487 7887
- The Netherlands:** +31 (0)481 450250
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- Australia:** +61 (0)8 9455 2994
- India:** +91 (0)44 450 1660

Local sales office information is also available on our web site at: [www.mtl surge.com/support/distribution/index.htm](http://www.mtl surge.com/support/distribution/index.htm)

Country	Standard/Authority	Approved for	Product
United States & Canada	UL 497B Listed UL Certified TIA/EIA 568-A Cat.5	Networks	ZB24540

