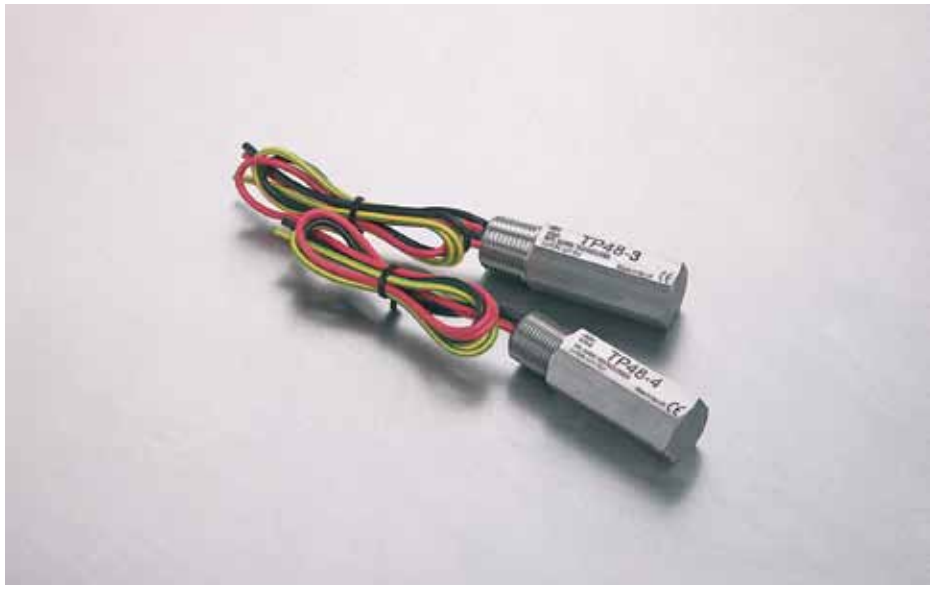
technical datasheet

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 — screws into spare conduit entry
- Intrinsically safe and flameproof to CENELEC standards
- Parallel connection avoids introduction of any resistance into loop
- ATEX approved
- 10 year product warranty



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 20kA 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 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 IEC61158-2:2004 and ANSI/ISA-50.02-2 1992 for 31.25kbit/s sytems as used by FOUNDATION™ fieldbus, PROFIBUS-PA and WorldFIP.

901-100 Rev S 060410

COOPER Crouse-Hinds

SPECIFICATION

Maximum surge current
20kA peak current (8/20µs waveform)
Leakage current
Less than 10µA at max. working voltage
Working voltage
35V dc maximum
Bandwidth
1MHz
Resistance
No resistance introduced into loop
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
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: 32/0.2 (1.0mm2, 18 AWG)
Lead length: 250mm (minimum)
Casing
ANSI 316 stainless steel hexagonal bar stock, male thread
Threads
TP48-3-N & TP48-4-N - 1/2" NPT
TP48-3-I & TP48-4-1 - 20mm ISO)
(M20 x 1.5)
TP48-3-G & TP48-4-G - G 1/2" (BSP 1/2")
Weight
175g (6.2oz)
Dimensions
See figure 1
EMC compliance
To Generic Immunity Standards EN50082, part 2 for industrial environments
Electrical safety
EEx ia IIC T4, Ceq=O, 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.

Model		TP48 Series
Nominal voltage	U_n	35V
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}	20kA
Lightning impulse current (10/350µs)	I_{imp}	2.5kA
Residual voltage @ isn	U_p	95V L-G 500V
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 in=3kA		12kA
Impulse durability (8/20µs)		10kA
Degree of protection		IP66
AC durability		1Arms, 5T
Service conditions		80kPa - 160kPa 5% - 95% RH

SIL INFORMATION

Failure rates according to IEC 61508

	ISD	ISU*	IDD	IDU
TP48 2 wire+earth	0 FIT	23 FIT	12 FIT	5 FIT
TP48 3 wire+earth	0 FIT	40 FIT	15 FIT	7 FIT
TP48 4 wire+earth	0 FIT	40 FIT	15 FIT	7 FIT

The user of the TP series can utilize these failure rates in a probabilistic model of a safety instrumented function (SIF) to determine the suitability in part for safety instrumented system (SIS) usage in a particular safety integrity level. A full table of failure rates in presented in the EXIDA report (section 4.4) along with all assumptions.

*The Residual Effect failures are included in the Safe Undetected failure category according to IEC 61508. Note that these failures alone will not affect system reliability or safety and should therefore not be included in spurious trip calculations.

Safe Failure Fraction needs to be calculated on (sub)system level.

A complete copy of the EXIDA report can be downloaded at www.mtl-inst.com.

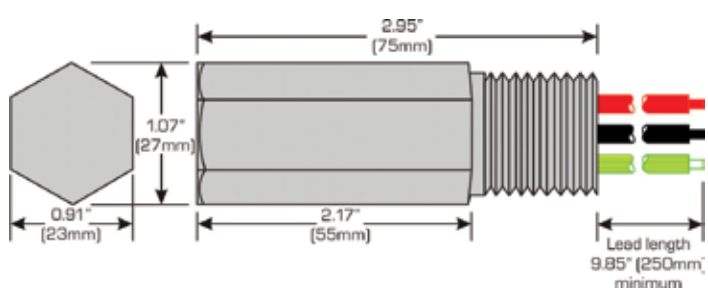
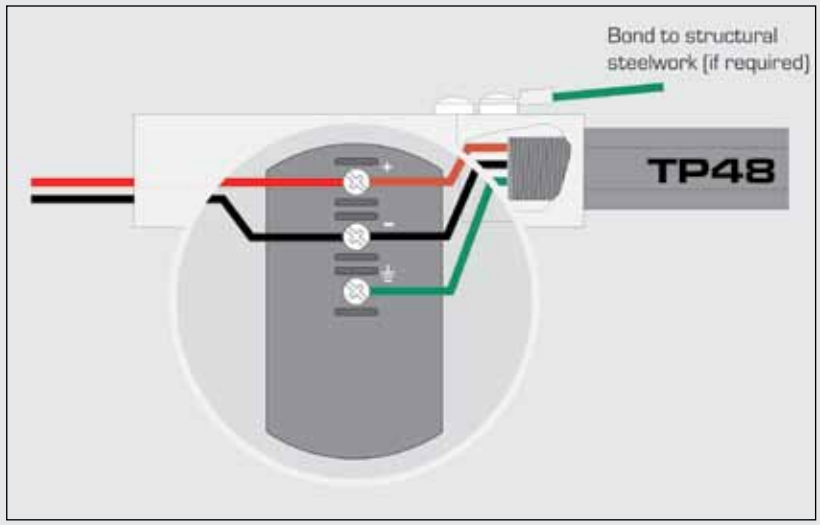
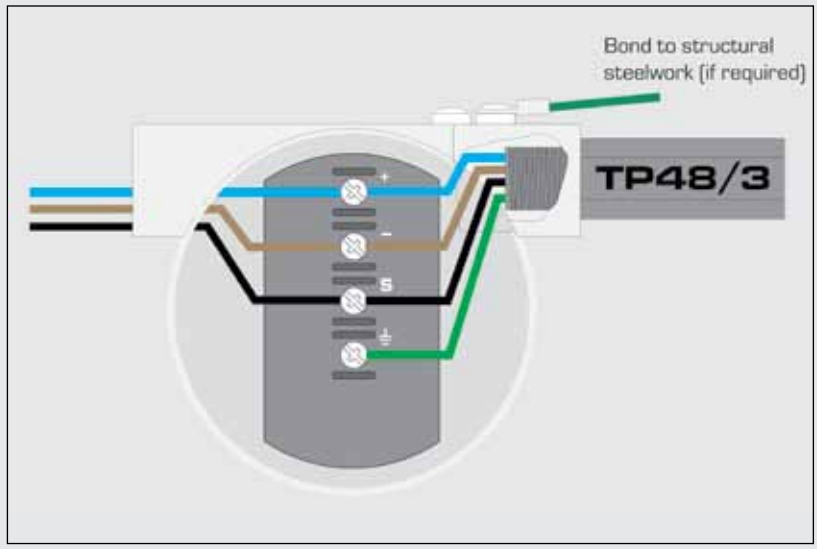


Figure 1 Dimensions





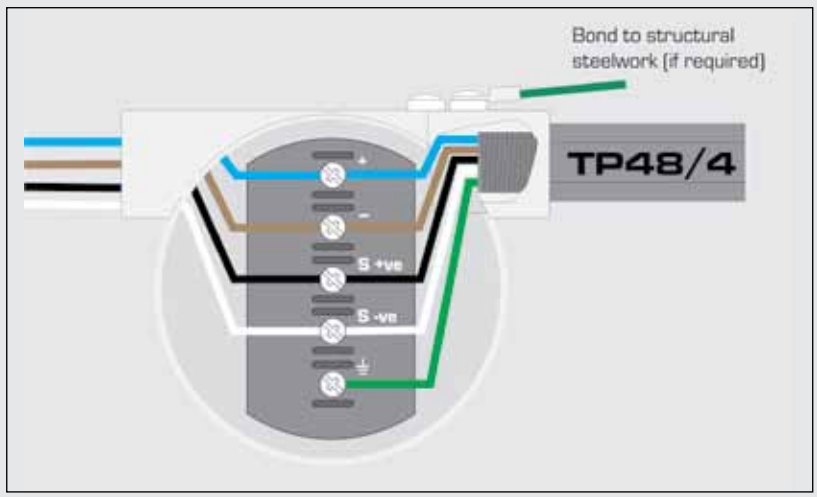


Figure 2 Connection detail for process transmitters

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 (Tamb = -40 to 60°C) EEx ia IIC T5 (Tamb = -40 to 85°C) EEx ia IIC T4 (Tamb = -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 (Tamb = -40 to 60°C) EEx d IIC T5 (Tamb = -40 to 80°C) EEx d IIC T4 (Tamb = -40 to 85°C)	TP48-X-Y-Z
Atex Directive 94/9/EC	BS EN 50021:1999	TML01ATEX0048	Ex n II T6 (-40°C<Tamb<+60°C) EEx n II T5 (-40°C<Tamb<+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)	3011208	Intrinsically Safe: I, II, III/1/A-G, I/0/IIC Explosionproof: I/1/A-D Non incendive: 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, II/1/A-G, I/O/IIC Explosionproof: I/1/A-D Nonincendive: I/2/A-D, I/2/IIC Dust ignition proof: II, III/1/EFG Special protection: II/2/FG	TP48-X-Y-Z
Global	IEC 60079-0:2004 IEC 60079-11:2006 IEC 61241-0:2004 IEC 61241-1:2004	IECEx BAS 07.0045X	Ex ia IIC T4/T5/T6 Ex tD A20 IP6X T85°C/T100°C/ T135°C	TP48-X-Y-NDI

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

TO ORDER SPECIFY -

TP48-N	Non-certified SPD - 1/2” NPT thread
TP48-I	Non-certified SPD - 20mm ISO thread
TP48-G	Non-certified SPD - G 1/2” (BSP 1/2 inch)
TP48-3-N	Non-certified SPD - 1/2” NPT thread
TP48-3-I	Non-certified SPD - 20mm ISO thread
TP48-3-G	Non-certified SPD - G 1/2” BSP 1/2 inch
TP48-4-N	Non-certified SPD - 1/2” NPT thread
TP48-4-I	Non-certified SPD - 20mm ISO thread
TP48-4-G	Non-certified SPD - G 1/2” BSP 1/2 inch
TP48-N-NDI	Certified SPD - 1/2” NPT thread
TP48-I-NDI	Certified SPD - 20mm ISO thread
TP48-G-NDI	Certified SPD - G 1/2” (BSP 1/2 inch)
TP48-3-N-NDI	Certified SPD - 1/2” NPT thread
TP48-3-I-NDI	Certified SPD - 20mm ISO thread
TP48-3-G-NDI	Certified SPD - G 1/2” - BSP 1/2 inch
TP48-4-N-NDI	Certified SPD - 1/2” NPT thread
TP48-4-I-NDI	Certified SPD - 20mm ISO thread
TP48-4-G-NDI	Certified SPD - G 1/2” - BSP 1/2 inch

EUROPE (EMEA): +44 (0)1582 723633
enquiry@mtl-inst.com

THE AMERICAS: +1 800 835 7075
csinfo@mtl-inst.com

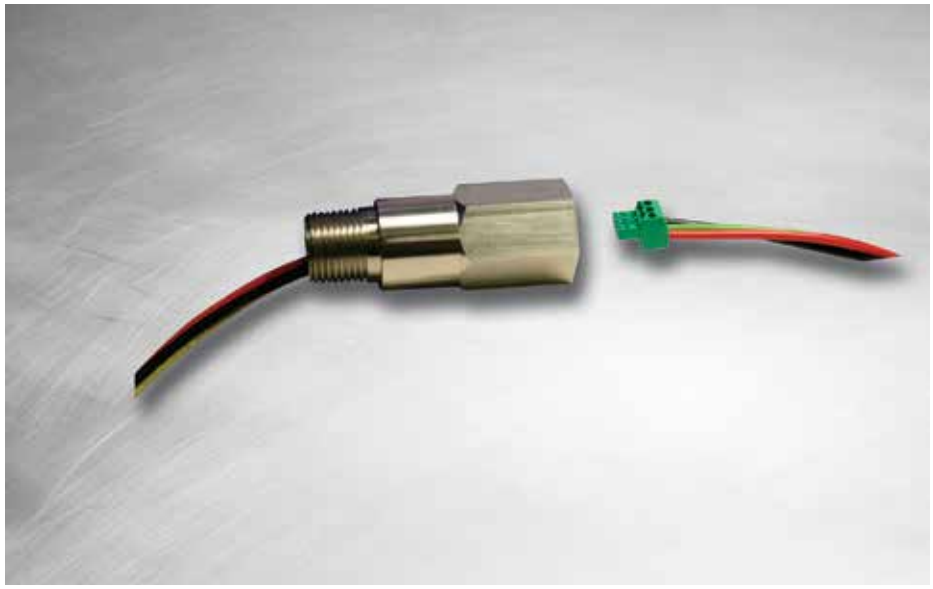
ASIA-PACIFIC: +65 6 645 9888
sales.mtlsing@cooperindustries.com

technical datasheet

TP-Pipe Series

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

- Easy and direct mounting — screws into spare conduit entry on the transmitter
- 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 internal 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 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 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 IEC61158-2:2004 and ANSI/ISA-50.02-2 1992 for 31.25kbit/s systems as used by FOUNDATION™ fieldbus, PROFIBUS-PA and WorldFIP

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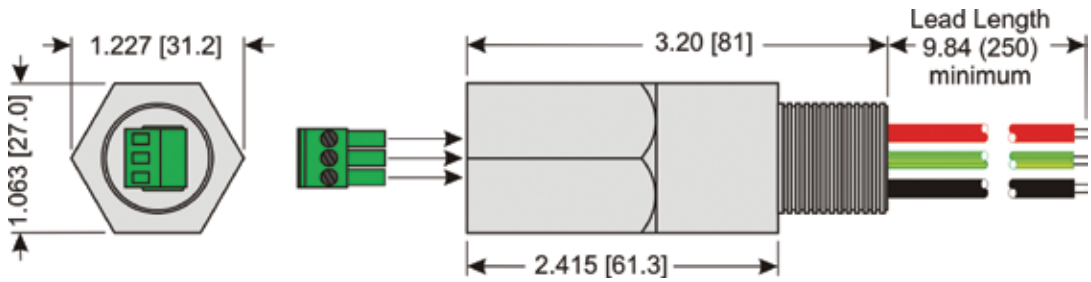

Figure 1 Dimensions

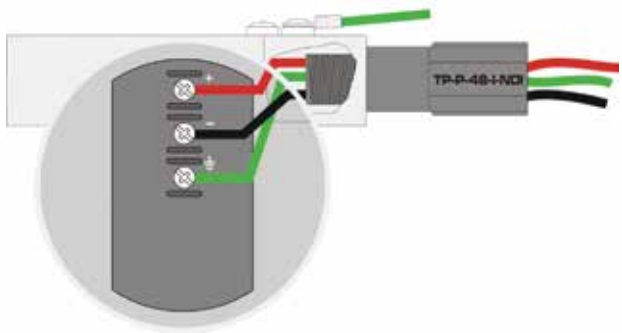

Figure 2 Connection detail for a typical process transmitter

APPROVALS

Country (Authority)	Standard No.	Certificate/File	Approved for	Product
EU (Baseefa)	IEC 60079-0:2011 EN 60079-11:2012 EN 60079-26:2007	Baseefa04ATEX0034X	II 1G Ex ia IIC T4/T5/T6 Ga	TP-P32-X-NDI TP-P48-X-NDI
EU (Baseefa)	EN 60079-0:2009 EN 60079-1:2007	Baseefa04ATEX0035X	II 2G Ex d IIC T6 (T_{amb}= -40°C to +60°C) Gb or T5 (T_{amb}= -40°C to +80°C) Gb or T4 (T_{amb}= -40°C to +85°C) Gb	TP-P32-X-NDI TP-P48-X-NDI
ATEX Directive 94/9/EC	EN 60079-0:2009 EN 60079-15:2010	MTL06ATEX4832	II 3 G Ex nA IIC T6 (-40°C<T_{amb}<+60°C) II 3 G Ex nA IIC T5 (-40°C<T_{amb}<+85°C)	TP-P32-X-NDI TP-P48-X-NDI TP-P32-X TP-P48-X
USA (FM)	Class Nos. 3600 (1998), 3610 (2010), 3611 (1999), 3615 (1989), 3810 (1989) Incl. Supp #1 (1995) ANSI/NEMA 250 (1991) ISA-S12.0.01 (1998) ANSI/ISA 60079-0 (2009) ANSI/ISA 60079-11 (2009)	3011208	Intrinsically Safe: I, II, III/1/A-G, I/0/IIC Explosionproof: I/1/A-D Non incendive: 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. 213 (1987) C22.2 No 142 (1987) C22.2 No. 94 (1991) C22.2 No. 157 (1992) C22.2 No. 30 (1986) ANSI/NEMA 250 (1991) CAN/CSA-E79-0 (2002) CAN/CSA-E79-11 (2002)	3025374	Intrinsically Safe: I, II, II/1/A-G, I/O/IIC Explosionproof: I/1/A-D Nonincendive: 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

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 max. 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^2)
Output:
3 flying leads (line 1, line 2 & earth)
Wire size 32/0.2 (1.0mm2, 18AWG)
Lead length 250mm (9.85") minimum
Casing
ANSI 316 stainless steel hexagonal barstock,male and female thread
Weight
175g (6.2oz.)
Dimensions
See figure 1
EMC compliance
To Generic Immunity Standards
BS EN 61326-1:2006 for industrial environments
Electrical safety
EEx ia IIC T4, Ceq=O, 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 flameproof (explosionproof) standards, and can be fitted into a similarly approved housing.

Model		TP-32P	TP-48P
Nominal voltage	U_n	32V	48V
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		$1A_{rms}$, 5T	
Service conditions		80kPa - 160kPa 5% - 95% RH	

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")
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")
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")
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")

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.