



## TP32 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 61158-2:2004 & ANSI/ISA-50.02-2 1992
- TP32-T includes a TERMINATOR for fieldbus in addition to surge protection
- Easy and direct mounting — screws into 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 T32 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 20kA. 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.

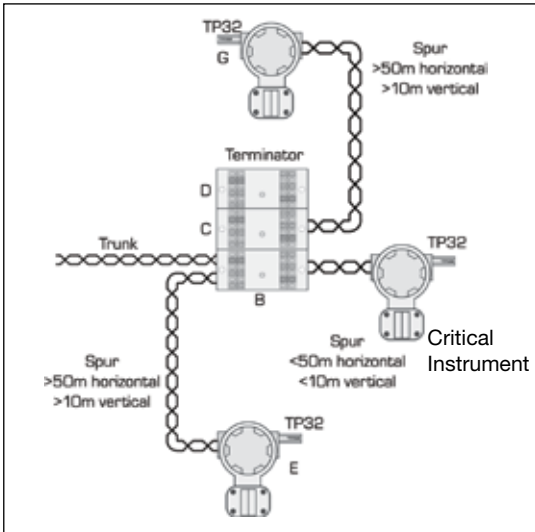
**Installation is very simple** and can easily be carried out retrospectively to existing installations. By connecting in parallel to the transmitter circuit the TP32 does not interfere with the normal operation of the bus – passing AC or DC signals without adding increased voltage drop across the segment while consistently diverting surge currents safely to ground and clamping output voltages to safe levels.

**Approvals for intrinsically safe, flameproof/ explosionproof** and non incandive 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.

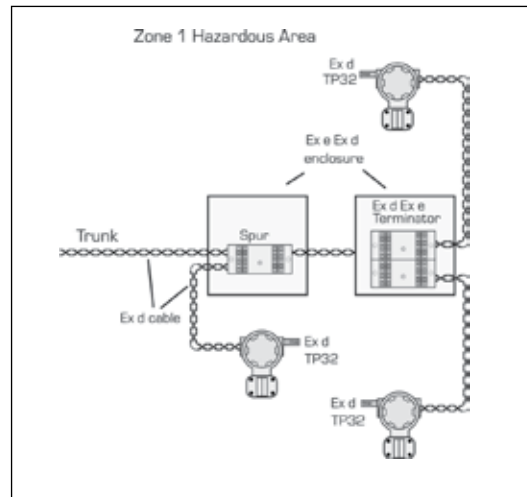
For a detailed risk analysis (to minimize the number of protectors required) and guidance for total fieldbus system protection, please see TAN 1010.

### Hazardous Area Explosionproof/Flameproof/Increased Safety

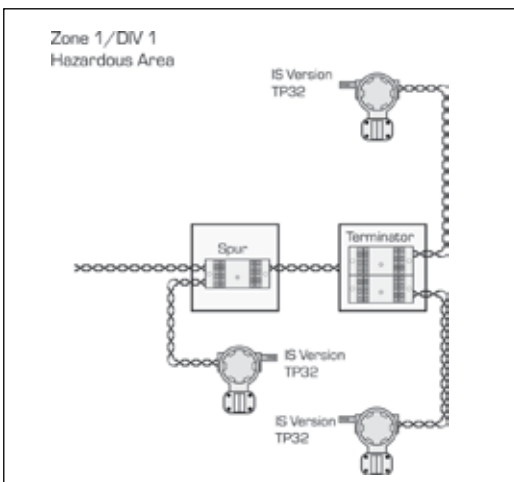
Install TP32-X-NDI (where X = thread type) on every instrument critical to the operation of the process.

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.

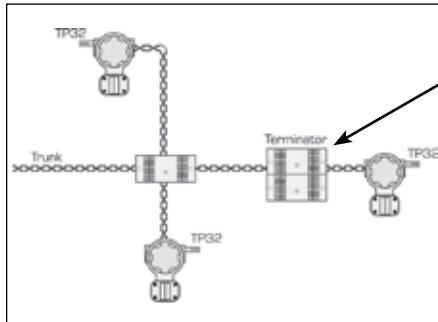
**NOTE:** Protection at the host end of the trunk is mandatory, see FP32 datasheet and TAN 1010 for more information.

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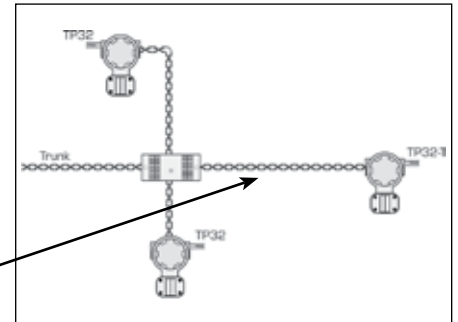
## USE OF THE TP32-T TO TERMINATE A FIELDBUS TRUNK

### 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.

| Model                                      |           | TP32 & TP32-T              |
|--|-----------|----------------------------|
| Nominal voltage                            | $U_n$     | 32V                        |
| Rated voltage (MCOV)                       | $U_c$     | 35V                        |
| Nominal current                            | $I_n$     | n/a                        |
| Nominal discharge current (8/20 $\mu$ s)   | $i_{sn}$  | 3kA                        |
| Max discharge current (8/20 $\mu$ s)       | $I_{max}$ | 20kA                       |
| Lightning impulse current (10/350 $\mu$ s) | $I_{imp}$ | 2.5kA                      |
| Residual voltage @ $i_{sn}$                | $U_p$     | 46V                        |
| Voltage protection level @ 1kV/ $\mu$ s    | $U_p$     | <38V                       |
| Bandwidth                                  | $f_G$     | 7.5MHz                     |
| Capacitance                                | 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 $i_n=3kA$          |           | 12kA                       |
| Impulse durability (8/20 $\mu$ s)          |           | 10kA                       |
| Degree of protection                       |           | IP66                       |
| AC durability                              |           | 1A <sub>rms</sub> , 5T     |
| Service conditions                         |           | 80kPa - 160kPa 5% - 95% RH |

## APPROVALS

| Country (Authority)    | Standard No.   | Certificate/File   | Approved for  | Product                                |
|------------------------|--|--------------------|---|--|
| EC (BASEEFA)           | EN 50014:1997 + Amendments 1 & 2<br>EN 50020:1994, EN 50284:1999   | BASEEFA04ATEX0251X | EEx ia IIC T6 (Tamb = -40 to 60°C)<br>EEx ia IIC T5 (Tamb = -40 to 85°C)<br>EEx ia IIC T4 (Tamb = -40 to 60°C)  | TP32-N-NDI<br>TP32-I-NDI<br>TP32-G-NDI |
| EC (BASEEFA)           | EN 50014:1997 + Amendments 1 & 2<br>EN 50018:2000 + Amendment 1  | BASEEFA04ATEX0053X | EEx d IIC T6 (Tamb = -40 to 60°C)<br>EEx d IIC T5 (Tamb = -40 to 80°C)<br>EEx d IIC T4 (Tamb = -40 to 85°C)   | TP32-N-NDI<br>TP32-I-NDI<br>TP32-G-NDI |
| Atex Directive 94/9/EC | BS EN 50021:1999   | TML02ATEX0032X     | Ex n II T6 (-40°C<Tamb<+60°C)<br>EEx n II T5 (-40°C<Tamb<+85°C)   | TP32-N<br>TP32-I<br>TP32-G             |
| USA (FM)               | Class Nos. 3600 (1998), 3610 (1999),<br>3611 (1999), 3615 (1989), 3810 incl.<br>Supp 1 (1995-07 (1989-03),<br>ANSI/NEMA 250 (1991),<br>ISA-S12.0.01 (1999) | 3011208            | Intrinsically Safe:<br>I, II, III/1/A-G, I/O/IIC<br>Explosionproof: I/1/A-D<br>Non-incendive: I/2/A-D, I/2/IIC<br>Dust ignition proof: II,III/1/EFG<br>Special protection: II/2/FG  | TP32-N-NDI<br>TP32-I-NDI<br>TP32-G-NDI |
| Canada (FM)            | C22.2 No. 157<br>C22.2 No. 213<br>C22.2 No. 142<br>C22.2 No. 94<br>C22.2 No. 30  | 3025374            | Intrinsically Safe:<br>I, II, III/1/A-G, I/O/IIC<br>Explosionproof: I/1/A-D<br>Non-incendive: I/2/A-D, I/2/IIC<br>Dust ignition proof: II, III/1/EFG<br>Special protection: II/2/FG | TP32 All                               |
| Global                 | IEC 60079-0:2004, IEC 60079-11:2006<br>IEC 61241-0:2004, IEC 61241-1:2004  | IECEx BAS 07.0045X | Ex ia IIC T4/T5/T6<br>Ex tD A20 IP6X T85°C/T100°C/T135°C  | TP32-X-NDI<br>TP32-T-X-NDI             |

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901-114 Rev K 070410

## SPECIFICATION

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

### Maximum surge current

20kA 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 100W 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 bar stock, 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 (6.2oz)

### 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 Pi=5.32W.

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

## SIL INFORMATION

### Failure rates according to IEC 61508

|      | $\lambda_{SD}$ | $\lambda_{DD}$ | $\lambda_{DU}$ |
|------|----------------|----------------|----------------|
| TP32 | 0 FIT          | 12 FIT         | 5 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 is 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](http://www.mtl-inst.com).

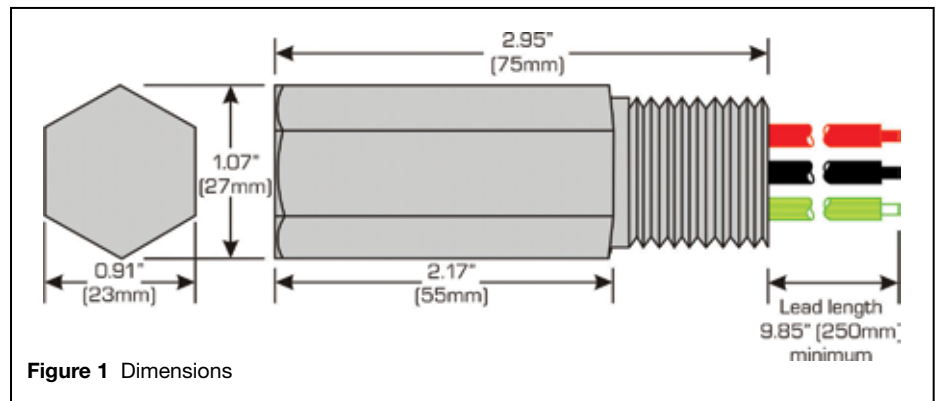


Figure 1 Dimensions

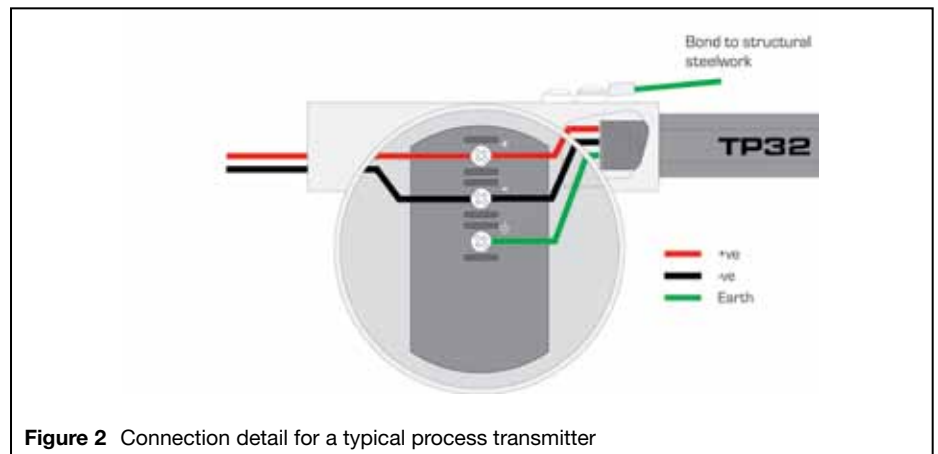


Figure 2 Connection detail for a typical process transmitter

## TO ORDER SPECIFY -

| TP32       | TP32-T       |   |
|------------|--------------|---|
| TP32-N     | TP32-T-N     | 1/2" NPT thread                                     |
| TP32-N-NDI | TP32-T-N-NDI | 1/2" NPT thread, with EEx ia, EEx d, approval       |
| TP32-I     | TP32-T-I     | 20mm ISO thread                                     |
| TP32-I-NDI | TP32-T-I-NDI | 20mm ISO thread, with EEx ia, EEx d, approval       |
| TP32-G     | TP32-T-G     | G 1/2" (BSP 1/2 inch)                               |
| TP32-G-NDI | TP32-T-G-NDI | G 1/2" (BSP 1/2 inch), with EEx ia, EEx d, approval |

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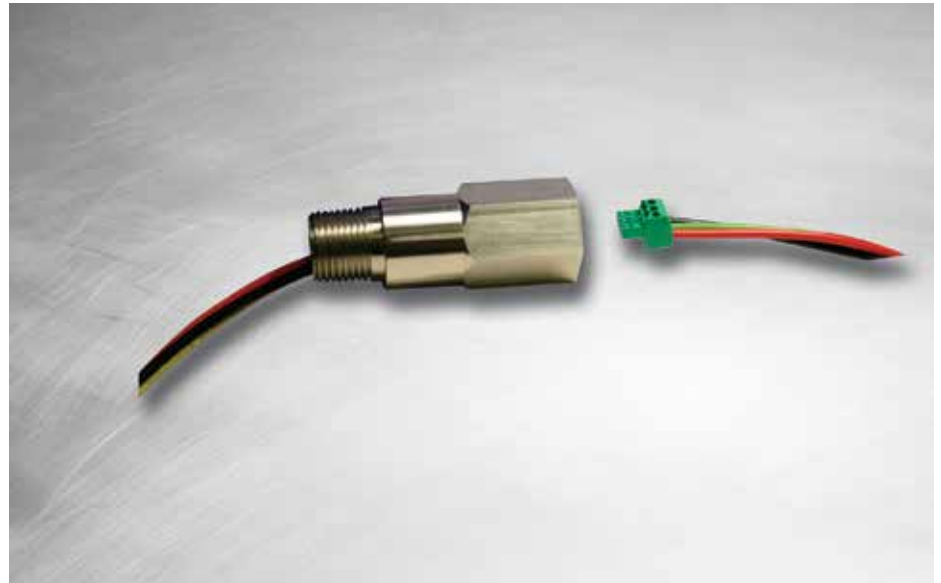
901-114 Rev K 070410



## 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

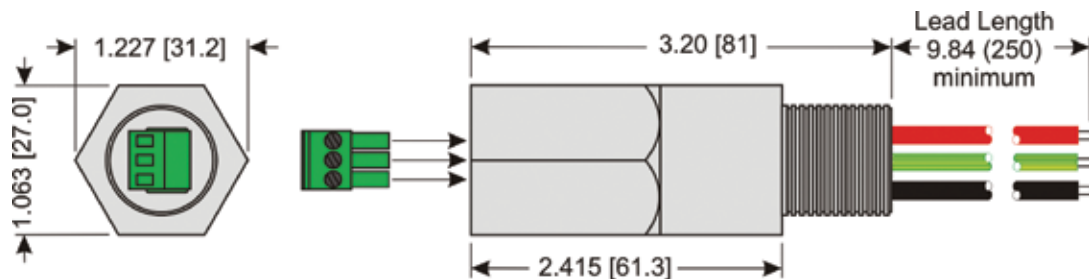


Figure 1 Dimensions

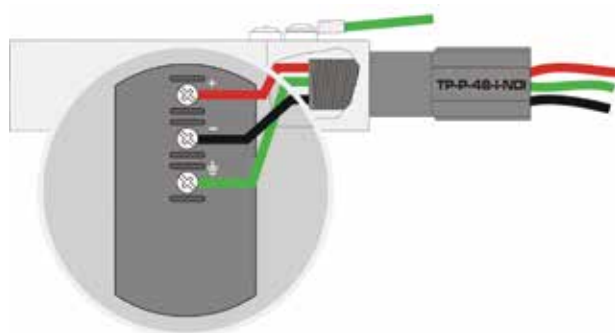


Figure 2 Connection detail for a typical process transmitter

## APPROVALS

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

X = I, N, or G

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901-130 Rev H 160713

## 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<sup>2</sup>))

#### Output:

3 flying leads (line 1, line 2 & earth)  
Wire size 32/0.2 (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 (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=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 flameproof (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.

| 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") |
| <b>Transmitter Applications</b> |   |
| 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") |

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