January 2017 EPS 901-103 Rev S

CROUSE-HINDS

MTL FP32 range

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 IEC61158-2:2004 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 up to 32 transmitters as specified by IEC 61158-2.

In operation the FP32 device does not adversely affect 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 voltage 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.



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com © 2017 Eaton All Rights Reserved Publication No. EPS 901-103 Rev S

January 2017

MTL FP32 range

January 2017

SPECIFICATION All figures typical at 25°C (77°F) 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@3kA8/20µs Line resistance 0.50hm per line Capacitance Line to Line: 40pF Line to Earth (Ground): 80pF Attenuation -1dB — (7kHz-7.5MHz) Ambient temperature limits -40°C to +70°C (-40°F to +158°F) (working) -40°C to +80°C (-40°F to +176°F) (storage) Humidity 5% to 95% RH (non-condensing) **Electrical connections** Plug/header screw terminal strip Weight 140g approx. (5.0 oz.) Dimensions See figure 1 **EMC** compliance BS EN 61000-6-2:1999 **Electrical Safety** BS EN 60950:1992 BS EN 61010-1:1993 **HAZARDOUS AREA APPROVALS**



TO ORDER SPECIFY - Order by module, as listed in the specification table below.

Model		FP32
Nominal voltage	Un	32V
Rated voltage (MCOV)	Uc	36V
Nominal current	In	1.6A
Nominal discharge current (8/20µs)	i _{sn}	3kA
Max discharge current (8/20µs)	Imax	20kA
Lightning impulse current (10/350µs)	limp	2.5kA
Residual voltage @ i _{sn}	Up	62V
Voltage protection level @ 1kV/µs	Up	<45V
Bandwidth	fG	73MHz
Capacitance	С	40pF
Series resistance	R	0.50hm
Operating temperature range		-40°C to +70°C
Category tested		A2, B2, C1, C2, C3, D1
Overstressed fault mode in=3kA		22kA
Impulse durability (8/20µs)		10kA
Degree of protection		IP20
AC durability		1A _{rms} , 5T
Service conditions		80kPa - 160kPa 5% - 95% RH

Tested in accordance to IEC 61643-21

Country (Authority)	Standard	Certificate/ File No.	Approved for	Product
Europe (Baseefa)	EN 60079-0:2012 EN 60079-11:2012	Baseefa04ATEX0260X	Ex ia IIB T3 Ga Ex ia IIC T4 Ga -40°C ≤ Ta ≤ +70°C	FP32
Europe (Eaton)	EN 60079-14:2009 EN 60079-15:2010	MTL02ATEX0032X	Ex n IIC T4 Ga -30°C ≤ Ta ≤ +70°C	FP32
USA (FM)	Class 3600 (1998), Class 3610 (2010), Class 3611 (1999), Class 3615 (1989), Class 3810 incl. Supp 1 (1995-07 (1989-03), ANSI/NEMA 250 (1991) ANSI/ISA 60079-0 (2009) ANSI/ISA 60079-11 (2009) ISA-S12.0.01 (1999)		IS/I/1/A-D, I/0/AEx ia IIC, I/0/AEx ia IIB, NI/I/2/A-D, NI/I/2/IIC	FP32
International (IECEx)	IEC 60079-0:2011 IEC 60079-11:2011	IECEx BAS 13.0095X	Ex ia IIB T3 Ga Ex ia IIC T4 Ga -40°C ≤ Ta ≤ +70°C	FP32
Canada (FM)	C22.2 No. 213, 142, 94, 157, 30 ANSI/NEMA 250 CAN/CSA-E79-0, CAN/CSA-E79-11	3025374C	IS/I/1/A-D, I/0/AEx ia IIC, I/0/AEx ia IIB, NI/I/2/A-D, NI/I/2/IIC	FP32
India (PESO)	Petroleum & Explosives Safety Organisation		EEx ia IIB T3	FP32
Marine (Lloyds Register)	Test Specification No. 1, 2002	09/60014	Environmental Category ENV3	FP32



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com © 2017 Eaton

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EUROPE (EMEA): +44 (0)1582 723633 mtlenguiry@eaton.com

THE AMERICAS: +1 800 835 7075 mtl-us-info@eaton.com

ASIA-PACIFIC: +65 6 645 9888 sales.mtlsing@eaton.com The given data is only intended as a product description and should not be regarded as a legal warranty of properties or guarantee. In the interest of further technical developments, we reserve the right to make design changes.

2

October 2022 EPS 901-169 Rev F

CROUSE-HINDS SERIES

MTL FS32 range

Surge protection for fieldbus components

- Protects intrinsically safe spurs on MTL 937x-FB range fieldbus
- 20kA maximum surge current per line
- Plug connectors for quick and easy connection or rewiring
- Meets the requirements of IEC61158-2:2004
- Can be used on MTL Megablocks or other fieldbus equipment
- 10 year product warranty



The FS32 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. Designed to fit Eaton's latest MTL fieldbus barrier product to protect spurs the FS32 can also be used to protect spurs on Megablock wiring hubs. This space saving design helps to reduce the size of junction boxes and ease installation.

The multi-stage hybrid surge protection network at the heart of the FS32 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 design to exhibit exceptionally low line resistance and has negligible voltage drop to the spurs.

In operation the FS32 does not adversely affect the performance or operation of the fieldbus or connected equipment, it allows signals to pass with little attenuation while diverting surge currents safely to earth (ground) and clamping output voltages to safe levels.

Fully automatic in operation the FS32 devices react immediately to make sure that the equipment is never exposed to damaging surges between lines or the lines to earth (ground). Reacting instantaneously the FS32 redirects surges safely to earth (ground) and then resets automatically.

The FS32 represents the next generation of surge protection to be fitted on FOUNDATION[™] fieldbus Systems. The space saving form factor allows the FS32 to be connected directly to the terminal receptacle on the module carrier of the 9370 fieldbus barrier. The earth (ground) is connected through the mounting screw in one simple operation. The field spur cable termination block plugs directly into the FS32 allowing fast and effective retro fitting if desired with no additional hardware being required.

For general purpose Megablock wiring hubs FCS-MBx, FCS-MBx-SG, FCS-MBx-SG-T, F300 Range and Intrinsically Safe Megablock wiring hubs F240 - F273 the FS32 represents a simple solution for the fitting of surge protection with the addition of the FS32-BAR earthing (grounding) arrangement. Furthermore the FS32 can also be used on fieldbus power supplies such as the F800 to protect the trunk.

A 10 year no fuss warranty is available as standard for the FS32, so if a correctly connected device should fail for any reason simply return it for a free replacement.



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com © 2022 Eaton All Rights Reserved

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MTL FS32 range

October 2022

SPECIFICATION

All figures typical at 25°C (77°F) unless otherwise stated Maximum surge current 20kA (8/20µs waveform) per line Leakage current 0.1µA @ 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 0.1 Ohm per line Capacitance Line — Line — 40pF Line — Earth (Ground) — 80pF Attenuation -1dB — 7kHz to 7.5MHz **Ambient temperature limits** -40°C to +75°C (-40°F to +167°F) (working) -40°C to +80°C (-40°F to +176°F) (storage) Humidity 5% to 95% RH (non-condensing) **Electrical connections** Plug/header screw terminal Weight 40q Dimensions See figure 1 **EMC** compliance BS EN 61326-1:2013 **Electrical Safety** BS EN 61643-21:2001 **INSTALLATION** Directly plugs into MTL 934x-FB and Relcom mega-blocks.

ORDERING INFORMATION

FS32 FS32-BAR



Figure 1 Dimensions (as supplied)



M3 threaded hole, X8 M3 threaded hole, X8 M4 threaded hole, X8 M4 threaded hole, X8 Part No. FS32-BAR Ground bar for Megablocks

TO ORDER SPECIFY - Order by module, as listed in the specification table below.

Model		FS32
Nominal voltage	Un	32V
Rated voltage (MCOV)	Uc	36V
Nominal current	In	1.6A
Nominal discharge current (8/20µs)	isn	3kA
Max discharge current (8/20µs)	Imax	20kA
Lightning impulse current (10/350µs)	limp	2.5kA
Residual voltage @ i _{sn}	Up	62V
Voltage protection level @ 1kV/µs	Up	<45V
Bandwidth	fĠ	73MHz
Capacitance	C	40pF
Series resistance	R	0.1
Operating temperature range		-40°C to +75°C
Category tested		A2, B2, C1, C2, C3, D1
Overstressed fault mode in=3kA		22kA
Impulse durability (8/20µs)		10kA
Degree of protection		IP20
AC durability		1A _{rms} , 5T
Service conditions		80kPa- 160kPa 5%- 95% RH

Tested in accordance to IEC 61643-21

HAZARDOUS AREA APPROVALS

For the latest certificate information ,see www.mtl-inst.com/certificates



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com

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THE AMERICAS: +1 800 835 7075 mtl-us-info@eaton.com

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

June 2021 EPS 901-255 Rev B

CROUSE-HINDS

FS32-XE MTL Trunk & Spur Surge **Protection Device**

- Protects Zone 1 trunk on 937x-FB3 MTL compact fieldbus barrier
- 20kA Total surge current
- Plug connectors for quick and easy connection or rewiring
- **Compatible to Foundation™ fieldbus** requirements of IEC61158-2:2014 and IEC6143-21
- Protects trunk and spurs of F200-XE Megablock wiring hubs
- 10 year product warranty

The FS32-XE 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. Designed to fit Eaton's latest 937x-FB3 MTL fieldbus barrier to protect the fieldbus trunk the FS32-XE can also be used to protect trunk and spurs on Megablock wiring hubs. Certification to the IEC 60079-7 standard for increased safety (Ex eb) and encapsulation (Ex mb), allows the FS32-XE to be installed in a Zone 1, IIC T4 (Gas) hazardous area in a suitably certified Ex e enclosure and within equipment with an equipment protection level of Gb. The product is IECEx and ATEX certified with marking of Ex eb mb IIC (-40°C \leq Ta \leq +80°C). This space saving design helps to reduce the size of junction boxes and ease installation.

The multi-stage hybrid surge protection network at the heart of the FS32-XE 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 design to exhibit exceptionally low line resistance and has negligible voltage drop to the spurs and trunks.

In operation the FS32-XE does not adversely affect the performance or operation of the fieldbus or connected equipment, it allows signals to pass with little attenuation while diverting surge currents safely to earth (ground) and clamping output voltages to safe levels.



Fully automatic in operation the FS32-XE devices react immediately to make sure that the equipment is never exposed to damaging surges between lines or the lines to earth (ground). Reacting instantaneously the FS32-XE redirects surges safely to earth (ground) and then resets automatically.

The FS32-XE represents the next generation of surge protection to be fitted on Foundation[™] fieldbus systems protection for the zone 1 application. The space saving form factor allows the FS32-XE to be connected directly to the trunk of the 937x-FB3 fieldbus barrier. The earth (ground) is connected through the mounting screw in one simple operation. The trunk cable termination connector plugs directly into the FS32-XE allowing fast and effective retro fitting if desired with no additional hardware being required.

For Zone 1 F200-XE Megablock wiring hubs the FS32-XE represents a simple solution for the fitting of surge protection with the addition of the FS32-BAR earthing (grounding) arrangement.

A 10 year no fuss warranty is available as standard for the FS32-XE, so if a correctly connected device should fail for any reason simply return it for a free replacement.



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com © 2021 Eaton

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FS32-XE MTLTrunk & Spur Surge Protection Device

June 2021

SPECIFICATION

All figures typical at 25°C (77°F) unless otherwise stated **Total surge current** 20kA (8/20µs waveform) Leakage current 0.1µA @ working voltage Working voltage ±32Vdc Maximum continuous operating voltage ±36V Limiting voltage <110V @ 3kA /6kV Line resistance 0.1 Ohm per line Capacitance Line — Line — 40pF Line — Earth (Ground) — 80pF Attenuation <1dB — 7kHz to 7.5MHz **Ambient temperature limits** -40°C to +75°C (-40°F to +167°F) (working) -40°C to +80°C (-40°F to +176°F) (storage) Humidity 5% to 95% RH (non-condensing) **Electrical connections** Plug/header screw terminal Weight 45g Dimensions See figure 1 **EMC** compliance BS EN 61326-1 **Electrical Safety** BS EN 61643-21 **INSTALLATION** Directly plugs into trunk of 937x-FB3 and

ORDERING INFORMATION

FS32-XE FS32-BAR



Figure 1 Dimensions (as supplied)





TO ORDER SPECIFY - Order by module, as listed in the specification table below.

Model		FS32-XE
Nominal voltage	Un	32V
Rated voltage (MCOV)	Uc	36V
Nominal current	l _n	1.6A
Nominal discharge current (8/20µs)	i _{sn}	3kA
Total discharge current (8/20µs)	l _{total}	20kA
Lightning impulse current (10/350µs)	limp	2.5kA
Residual voltage @ i _{sn} (3kA/6kV)	Up	<110V
Voltage protection level @ 1kV/µs	Up	<90V
Bandwidth	fG	73MHz
Capacitance	С	40pF
Series resistance	R	0.1
Operating temperature range		-40°C to +75°C
Category tested		A2, B2, C1, C2, C3, D1
Overstressed fault mode in=3kA		9kA
Impulse durability (8/20µs)		3kA/6kV
Degree of protection		IP20
AC durability		1A _{rms} , 5T
Service conditions		80kPa- 160kPa 5% - 95% RH

Tested in accordance to IEC 61643-21

HAZARDOUS AREA APPROVALS

trunk and spurs of F200-XE Megablocks

Standard/Authority	Certificate/File No.	Approved for	Product
ATEX Directive 2014/34/EU (Baseefa)	SGS20ATEX0120U	Ex eb mb IIC (-40°C < Ta <+80°C)	FS32-XE
IECEx	IECEx BAS 20.0079U	Ex eb mb IIC (-40°C < Ta <+80°C)	FS32-XE



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com

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THE AMERICAS: +1 800 835 7075 mtl-us-info@eaton.com

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

September 2016 EPS 901-114 rev N

CROUSE-HINDS SERIES

MTL TP32 range

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 in excess of the optional transient protection available from some transmitter manufacturers.

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 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 a 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 highpower, solid state electronics and a gas discharge tube which is capable of diverting surges up to 20kA. Encased in a 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 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 voltage to safe levels.

Approvals for intrinsically safe, flameproof, explosion-proof and non-incendive operation are available, in all gas groups and apparatus temperature classifications 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.



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com © 2016 Eaton All Rights Reserved Publication No. EPS 901-114 rev N Seotember 2016



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 Explosion-proof, 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.

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

Installation Using TP32-T



ORDERING INFORMATION

Model		TP32 & TP32-T
Nominal voltage	Un	32V
Rated voltage (MCOV)	Uc	35V
Nominal current	In	n/a
Nominal discharge current (8/20µs)	i _{sn}	3kA
Max discharge current (8/20µs)	I _{max}	20kA
Lightning impulse current (10/350µs)	l _{imp}	2.5kA
Residual voltage @ i _{sn}	Up	46V
Voltage protection level @ 1kV/µs	Up	<38V
Bandwidth	fG	7.5MHz
Capacitance	С	50pF
Series resistance	R	n/a
Operating temperature range		-40°C to +60°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		1A _{rms} , 5T
Service conditions		80kPa - 160kPa 5% - 95% RH

APPROVALS

Country (Authority)	Standard No.	Certificate/File	Approved for	Product
EC (BASEEFA)	EN 60079-0:2012 + A11:2013 EN 60079-11:2012	BASEEFA04ATEX0251X	€ II 1G Ex ia IIC T4 Ga (-40°C ≤ Ta ≤ +60°C), or Ex ia IIC T5 Ga (-40°C ≤ Ta ≤ +80°C), or Ex ia IIC T6 Ga (-40°C ≤ Ta ≤ +60°C) € II 1D Ex ia IIIC T135°C/T100°C/T85°C Da (-40°C ≤ Ta ≤ See certificate)	TP32-N-NDI TP32-I-NDI TP32-G-NDI
EC (BASEEFA)	EN 60079-0:2012 + A11:2013 EN 60079-1:2015	BASEEFA04ATEX0053X	ⓑ II 2G Ex db IIC T6 Gb (-40°C ≤ Ta ≤ +70°C)	TP32-N-NDI TP32-I-NDI TP32-G-NDI
ATEX Directive 2014/34/EU	EN 60079-0:2012 + A11:2013 EN 60079-15:2010	TML01ATEX0048	 (E) II 3 G Ex nA IIC T6 (-40°C≤T_{amb}≤+60°C) (E) II 3 G Ex nA IIC T5 (-40°C≤T_{amb}≤+85°C) 	TP32-N TP32-I TP32-G
USA (FM)	Class 3600 (1998), Class 3610 (2010), Class 3611 (1999), Class 3615 (1989), Class 3810 (1989) Incl Suppl #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 Explosion-proof: 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	TP32-N-NDI TP32-I-NDI TP32-G-NDI
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 Explosion-proof: 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	TP32 All
Global	IEC 60079-0:2011, IEC 60079-11:2011	IECEx BAS 07.0045X	Ex ia IIC T6 Ga (-40°C \leq Ta \leq +60°C) Ex ia IIC T5 Ga (-40°C \leq Ta \leq +80°C) Ex ia IIIC T135°C/T100°C/T85 Da (-40°C \leq Ta \leq See certificate)	TP32-X-NDI TP32-T-X-NDI

MTLTP32 range

September 2016

SPECIFICATION

All figures typical at 25°C (77°F) 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 commonmode

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°C to +60°C (-40°F to +140°F) T5: -40°C to +85°C (-40°F to +185°F)

Humidity

5% to 95% RH (non-condensing)

Electrical connections

3 flying leads: line 1 & line 2 plus nonpolarised earth Wire size: 32 / 0.2 (1.0mm2, 18 AWG) Lead length: 250mm minimum supplied <75mm recommended

Casing

316 stainless steel suitable for harsh environments

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 61326-1:2013

Electrical Safety

BS EN 61326-21:2001



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 explosion-proof (flameproof) standards, and can be fitted into a similarly approved housing.

SIL INFORMATION

Failure rates according to IEC 61508

	λ_{sD}	λ_{DD}	λ _{DU}
TP32	0 FIT	12 FIT	5 FIT

The user of the TP range 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.



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

Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com

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THE AMERICAS: +1 800 835 7075 mtl-us-info@eaton.com

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

March 2019 EPS 901-130 rev L



MTL TP-Pipe range

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 and Factory Mutual** (FM) approved
- 10 year product warranty

The TP-Pipe 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 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 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 screws directly 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



Faton Electric Limited Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenguiry@eaton.com www.mtl-inst.com © 2019 Eaton

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MTL TP-Pipe range March 2019





APPROVALS

Country (Authority)	Standard No.	Certificate/File	Approved for	Product
EU (Baseefa)	EN 60079-0:2012 + A11:2013 EN 60079-11:2012	Baseefa04ATEX0034X	🐼 II 1G Ex ia IIC T4/T5/T6 Ga	TP-P32-X-NDI TP-P48-X-NDI
EU (Baseefa)	EN 60079-0:2012 + A11:2013 EN 60079-1:2014	Baseefa04ATEX0035X	⟨E⟩ 2G Ex d CT6 (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 2014/34/EU	EN 60079-0:2012 + A11:2013 EN 60079-15:2010	MTL06ATEX4832	 (☑) II 3 G Ex nA IIC T6 (-40°C<t<sub>amb<+60°C)</t<sub> (☑) II 3 G Ex nA IIC T5 (-40°C<t<sub>amb<+85°C)</t<sub> 	TP-P32-X-NDI TP-P48-X-NDI
USA (FM)	FM Class 3600: 2011, FM Class 3610: 2010, FM Class 3611: 2004, FM Class 3615: 2006, FM 3810:1989 including Supplement #1:1995, ANSI/NEMA 250: 1991 ISA-S12-0-01:1998 ANSI/ISA 60079-0:2009, ANSI/ISA 60079-11:2009	FM16US0443X	Intrinsically safe: IS/I,II,III//1/ABCDEFG/T* Intrinsically safe: I/0/AEx ia/IIC/T* Explosionproof: XP/I/1/ABCD/T6 Dust Ignition proof: DIP/II,III/1/EFG/T6 Non-incendive: NI/I/2/ABCD/T6 Non-incendive: NI/I/2/IIC/T6 Special: S/II/2/FG/T6; Type 4X T*=T4 or T6 depending on connection - refer to certificate Ta=60°C	TP-P32-X-NDI TP-P48-X-NDI
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)	3025374C	Intrinsically safe: IS/I,II,III//1/ABCDEFG/T* Intrinsically safe: I/0/AEx ia/IIC/T* Explosionproof: XP/I/1/ABCD/T6 Dust Ignition proof: DIP/II,III/1/EFG/T6 Non-incendive: NI/I/2/ABCD/T6 Non-incendive: NI/I/2/IIC/T6 Special: S/II/2/FG/T6; Type 4X T*=T4 or T6 depending on connection - refer to certificate Ta=60°C	TP-P32-X-NDI TP-P48-X-NDI

 $X=I,\,N,\,or\;G$

March 2019

SPECIFICATION

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

Maximum surge current

20kA 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: 10hm 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 (2mm²)

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 61326-1:2013 for industrial environments

Hazardous area connections

Ex ia IICT4, 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 IICT4; the unit is apparatus-approved to flameproof (explosionproof) standards, and can be fitted into a similarly approved housing.

Electrical Safety

To EN61643-21:2001 + A3:2013 for surge protection devices

INSTALLATION

Model		TP-32P	TP-48P
Nominal voltage	Un	32V	48V
Rated voltage (MCOV)	Uc	35V	58V
Nominal current	۱ _n	1.5A	1.5A
Nominal discharge current (8/20µs)	i _{sn}	3kA	ЗКА
Max discharge current (8/20µs)	I _{max}	20kA	20kA
Lightning impulse current (10/350µs)	limp	2.5kA	2.5kA
Residual voltage @ isn	Up	46V	92V
Voltage protection level @ 1kV/µs	Up	<38V	<76V
Bandwidth	f _G	7.5MHz	1MHz
Capacitance	С	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 in=3kA		22kA / Mode 3	22kA / Mode 3
Impulse durability (8/20µs)		10kA	10kA
Degree of protection		IP66	IP66
AC durability		1A _{ms} , 5T	
Service conditions		80kPa- 160kPa	a 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")

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.



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com

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THE AMERICAS: +1 800 835 7075 mtl-us-info@eaton.com

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

March 2019 EPS 901-177 Rev H

CROUSE-HINDS SERIES

MTL TP-AC range

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

- Corrosion resistant
- Protects AC power and signal line
- 120V & 240V
- Models for Foundation fieldbus[™] 4-20mA and Profibus DP
- Parallel connection avoids resistance in loop
- Easy and direct mounting screws into spare conduit entry
- FM Approved
- 10 year product warranty

The TP-AC range of surge protection devices uniquely provides a level of protection for AC powered, field-mounted transmitters that is far in excess of the optional transient protection facilities available from the transmitter manufacturers- and achieved without any additional wiring modifications or costly additions.

The TP protection network consists of high power, solid state electronics and a gas-filled discharge tube (GDT) capable of diverting 20kA impulses. The whole unit is encased in ANSI 316 stainless steel housing, threaded for attachment in conduit entries used on process transmitters. Versions are available with ½" NPT and 20mm ISO threaded entries.

Installation can easily be carried out retrospectively to existing installations. The TP-AC is screwed into any unused conduit entry on the transmitter case and flying leads are connected to the terminal block signal, power and earth terminals. The TPs operate – passing AC and 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 Fieldbus applications, the TP-AC Fieldbus models meet the requirement of IEC61158-2:2004 and ANSI/ ISA-50.02-2 1992 for 31.25kbit systems as used by Foundation Fieldbus[™], Profibus PA and WorldFIP.



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com © 2019 Eaton All Rights Reserved

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MTLTP-AC range

March 2019

SPECIFICATION

Maximum surge current

20kA peak current (8/20µs waveform

Leakage current

Less than 10µA at max. working voltage

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)

Casing

ANSI 316 stainless steel hexagonal bar stock, male thread

Ingress Protection IP66 (NEMA4X) Threads 1/2" NPT, 20mm ISO EMC compliance To Generic Immunity Standards EN61326-1, part 2 for industrial environments Dimensions See figure 1 Weight 204g (7.2oz)

Model TP-AC **TP-ACFF** TP-AC420 **TP-AC485** Profibus DP RS485 240VAC 120VAC Foundation 4-20mA **Fieldbus Pair** Pair (All models) Pair Pair Nominal Voltage 240VAC 32VDC 48VDC 7VDC Un 36VDC Rated Voltage (MCOV) 275VAC 58VDC 9VDC Uc Nominal Current N/A N/A N/A N/A In Nominal Discharge Current (8/20µs) 3kA 3kA 3kA 3kA i_{sn} Max. Discharge Current (8/20µs) 20kA 20kA 20kA 20kA I_{max} Residual Voltage @ isn Up 800V 65V 95V 19V Voltage Protection Level @ 1kV/µs 500V <50V <76V <12V Up Bandwidth 400Hz 7.5MHz 1MHz 1MHz fG Capacitance N/A 50pF 100pF 100pF С Series Resistance R N/A N/A N/A N/A Operation Temperature Range (Safe Area) -40°C to +85°C -40°C to +85°C -40°C to +85°C -40°C to +85°C

TO ORDER SPECIFY:

TP-ACFF-N	AC power & Foundation Fieldbus 1/2" NPT Thread	TP-ACFF-I	AC power & Foundation Fieldbus 20mm ISO Thread
TP-AC420-N	AC power & 4-20mA 1/2" NPT Thread	TP-AC420-I	AC power & 4-20mA 20mm ISO Thread
TP-AC485-N	AC power & Profibus DP (RS485) 1/2" NPT Thread	TP-AC485-I	AC power & Profibus DP (RS485) 20mm ISO Thread

APPROVALS

Country (Authority)	Standard No.	Certifcate/File	Approved for	Product
USA (FM)	Class 3600 (1998), Class 3611 (1999), Class 3615 (1989), Class 3810 (1989) Incl Suppl #1 (1995) ANSI/NEMA 250 (1991) ISA-S12.0.01 (1998) ANSI/ISA 60079-0 (2009)	FM16US0443X	Explosion-proof: 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 Ta:-30 to +70°C	TP-ACFF-N TP-AC420-N TP-AC485-N TP-ACFF-I TP-AC420-I TP-AC485-I



Eaton Electric Limited, Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com

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THE AMERICAS: +1 800 835 7075 mtl-us-info@eaton.com

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

MTLTP-AC range March 2019





Eaton Electric Limited,

Great Marlings, Butterfield, Luton Beds, LU2 8DL, UK. Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283 E-mail: mtlenquiry@eaton.com www.mtl-inst.com

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THE AMERICAS: +1 800 835 7075 mtl-us-info@eaton.com

ASIA-PACIFIC: +65 6 645 9888 sales.mtlsing@eaton.com The given data is only intended as a product description and should not be regarded as a legal warranty of properties or guarantee. In the interest of further technical developments, we reserve the right to make design changes.

3