



IOP Series

Cost effective surge protection for digital and analogue I/O

- IOP32D and IOP-AC each provide surge protection for two loops or 4 wires
- IOP32 provides surge protection for one loop or 2 wires
- IOP HC32 provides surge protection for one high current loop, up to 5A
- IOP-AC provides surge protections for two 120V or 240V AC loops
- Hybrid protection circuit
- 20kA rated surge current
- ATEX & FM certification for IOP32 and IOP32D
- Space saving - width per loop:
IOP32D & IOP-AC 6mm
IOP32 & IOP HC32 12mm



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. 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 the IOP Series 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.

The IOP HC32 is ideal for applications requiring up to 5A of load current. Protection of circuits to drive solenoids, relays, and actuators is now possible. The IOP AC is ideal for 120V and 240V AC circuit loops

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 and IOP-AC models have protection for two loops in a package that is only 12mm wide. The effective space taken, per loop, is therefore only 6mm. 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.

SPECIFICATION

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

Maximum surge current

20kA (8/20μs waveform) per line

Leakage Current

<1μA @ working voltage

Maximum rated load current

0.675A (5A for IOP HC32)

Loop resistance

4 ohm IOP32 & IOP32D

1 ohm IOP-AC

0 ohm IOP HC32

Bandwidth

6.5 MHz (N/A for IOP HC32)

Attenuation

< -0.3dB @ < 1MHz

-3.0dB @ 6.5MHz

Response time

<1ns

Ambient temperature

-40°F — +158°F

(-40°C — +70°C) — working

-40°F — +176°F

(-40°C — +80°C) — storage

Humidity

5 to 95% RH (non-condensing)

Terminals

2.5mm² (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 below right

Model		IOP32	IOP32D	IOP HC32	IOP-AC
Nominal voltage	U_n	32V	32V	32V	240V
Rated voltage (MCOV)	U_c	36V	36V	36V	275V
Nominal current	I_n	675mA	675mA	5A	1.75A
Nominal discharge current (8/20μs)	i_{sn}	3kA	3kA	3kA	3kA
Max discharge current (8/20μs)	I_{max}	20kA	20kA	20kA	20kA
Lightning impulse current (10/350μs)	I_{imp}	2.5kA	2.5kA	2.5kA	2.5kA
Residual voltage @ i_{sn}	U_p	45V L-L 78V L-G	45V L-L 90V L-G	65V L-L (250V sparkover) 65V L-G	800V L-L 800V L-G
Voltage protection level @ 1kV/μs	U_p	<38V	<38V	<38V	500V
Bandwidth	f_G	6.5MHz	6.5MHz	N/A	N/A
Series resistance	R	2Ω	2Ω	0Ω	0.5Ω
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	22kA
Impulse durability (8/20μs)		10kA	10kA	10kA	10kA
Degree of protection		IP20			
AC durability		1A _{rms} , 5T			N/A
Service conditions		80kPa-160kPa5% - 95% RH			

Tested in accordance with IEC 61643-21.

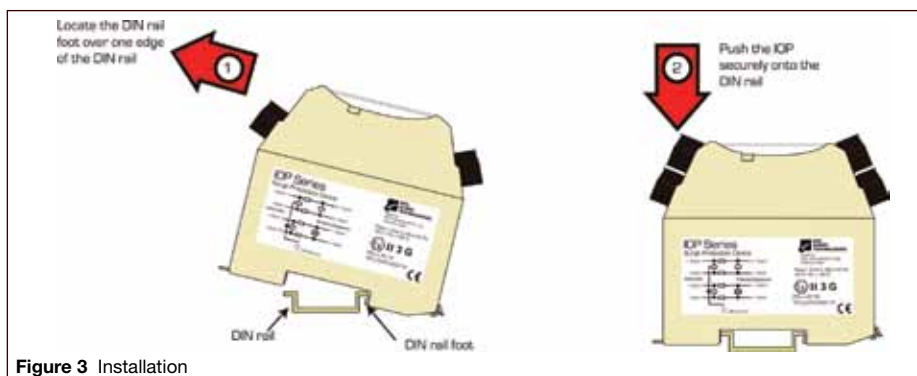


Figure 3 Installation

To order specify -

Order by module, as listed in the specification table.

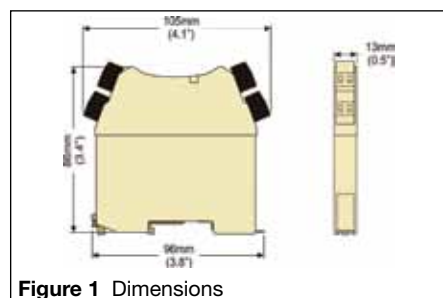


Figure 1 Dimensions

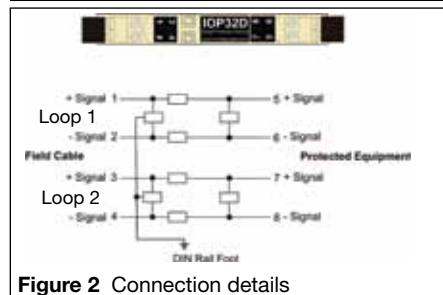


Figure 2 Connection details

APPROVALS

Country (Authority)	Standard	Certificate/ File No.	Approved for	Product
EU (Baseefa)	EN 50014:1997 + A1 & A2 EN 50020:2002 EN 60079-26:2004	Baseefa06ATEX0036X	EEx ia IIC T4	IOP32 IOP32D
EU (MTL)	BS EN 50014:1998 BS EN 50021:1999 EN 60079-15:2003	MTL03ATEX0755X	EEx n IIC T4	IOP32D IOP32D
USA (FM)	Class Nos. 3600 (1998), 3610 (2010), 3611 (1999), 3615 (1989), 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)	3011208	IS/I/1/A-D I/O/AEx ia IIC I/O/AEx ia IIB NI/I/2/A-D NI/I/2/IIC	IOP32 IOP32D
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/O/AEx ia IIC I/O/AEx ia IIB NI/I/2/A-D NI/I/2/IIC	IOP32 IOP32D

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901-123 Rev N 010711



SLP Series

Cost effective surge protection for digital and analogue I/O

- Surge protection for two loops per SLP (or one 4-wire circuit)
- Range of ATEX Certified intrinsically safe surge protectors
- Multi-stage hybrid protection circuit — 20kA maximum surge current
- Range of voltage ratings — to suit all process I/O applications
- Designed for high bandwidth, low resistance applications
- 10 year product warranty



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.

SPECIFICATION

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

Maximum surge current

20kA (8/20μs waveform) per line

Leakage current

<1μA @ working voltage

Maximum rated load current

1.50A

Loop resistance

2 ohm

Capacitance

Line to Line: 60pF

Attenuation

-0.1db @ 9kHz - 37MHz

-3dB @ 50MHz

Response time

<1ns

Ambient temperature

-40°F — +158°F

(-40°C — +70°C) — working

-40°F — +176°F

(-40°C — +80°C) — storage

Humidity

5 to 95% RH (non-condensing)

Terminals

2.5mm² (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

BS EN 61000-4-5:2006

Electrical safety

See approvals below right

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
Capacitance	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 _{rms} , 5T		
Service conditions		80kPa - 160kPa 5% - 95% RH		

Tested in accordance with IEC 61643-21.

SIL INFORMATION

Failure rates according to IEC 61508

	λ_{SD}	λ_{SU}^*	λ_{DD}	λ_{DU}
SLP07D	0	128	41	2
SLP16D	0	128	41	2
SLP32D	0	128	41	2

The user of the SLP 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.

*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.

APPROVALS

Country (Authority)	Standard	Certificate/ File No.	Approved for	Product
Europe (Baseefa)	EN 50014:1997 + A1 & A2 EN 50020:2002 EN 60079-26:2004	Baseefa04ATEX0303X	EEx ia IIC T4	SLP07D, SLP16D, SLP32D
Europe (MTL)	BS EN 50014:1998 BS EN 50021:1999 EN 60079-15:2003	MTL03ATEX0377X	EEx n IIC T4	SLP07D, SLP16D, SLP32D
USA (FM)	Class Nos. 3600 (1998), 3610 (2010), 3611 (1999), 3615 (1989), 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)	3011208	IS/1/1/A-D I/O/AEx ia IIC I/O/AEx ia IIB NI/1/2/A-D NI/1/2/IIC	SLP07D, SLP16D, SLP32D
Canada (FM)	C22.2 No. 213, 142, 94, 157, 30 ANSI/NEMA 250 CAN/CSA-E79-0 CAN/CSA-E79-11	3025374C	IS/1/1/A-D I/O/AEx ia IIC I/O/AEx ia IIB NI/1/2/A-D NI/1/2/IIC	SLP07D, SLP16D, SLP32D

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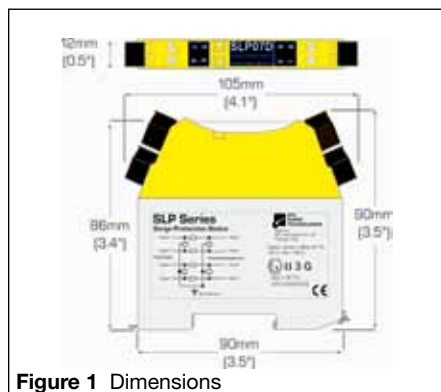


Figure 1 Dimensions

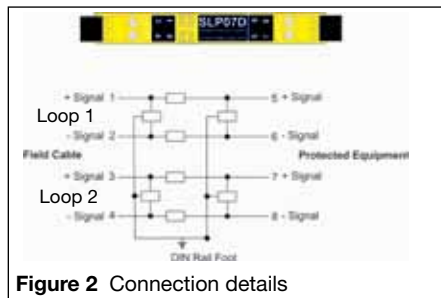


Figure 2 Connection details



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901-106 Rev L 111010



SSP Series

Surge protection against sustained voltages and AC faults

- Extension of the IOP/SLP range
- Withstand AC fault crossover voltages
- Protect against attenuated surges
- Full voltage range 7/16/32/55/75/200
- Resets after removal of fault



The self-healing surge protector (SSP) from MTL adds AC fault withstand capability and current limiting protection to our traditional hybrid surge technology.

The single loop design is packaged in the well-known IOP/SLP enclosure giving the customer a wider range of performance offering when choosing this family of products. The product eliminates the most common cause of SPD failure (continuous overvoltage/over current conditions) while adding current limiting protection to the circuit.

The use of Surge Protection Devices on communication lines has increased significantly over the last number of years. However if the communication lines are subjected to induced AC power or AC power-cross, the surge protector can pose possible

safety hazards. In these circumstances, the surge protector will respond and draw AC current. The magnitude of current could be large enough to represent a fire risk to the surge protector itself or the thin gauge UTP (unshielded twisted pair) wiring.

The SSP series incorporates circuitry to mitigate the hazards of induced AC or AC power-cross up to 240Vrms. The SSP stops the flow of current in milli-seconds to prevent surge protector and wiring damage. Once the AC power is removed, the SSP will cool down and automatically begins normal operation again.

The SSP range takes our proven hybrid surge circuit and its performance characteristics and adds another layer of protection.

Should the signal loop be subjected to surges which will not operate the Gas Discharge Tube (GDT) yet operate the other surge protection elements, the additional network will immediately protect these elements by elevating to high resistance. This will stop current flowing through the device and damaging the surge protection elements while protecting the loop equipment from being subjected to these sustained overvoltages.

The SSP range also provides overcurrent protection to the wiring and the load. Should a sustained current of 500mA or greater be present the SSP will stop the current flow thus providing additional protection to the load and the wiring.

SPECIFICATION

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

Maximum surge current

20kA (8/20µs waveform) per line

Leakage Current

see table below

Maximum rated load current

150mA

Loop resistance

<20 ohms

Bandwidth

see table below

Attenuation

-3.0dB @ 25kHz

Response time

<1ns

Ambient temperature

Working & Storage

-40 to +80°C/-40 to +176°F

Humidity

5 to 95% RH (non-condensing)

Terminals

2.5mm² (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 61326-1:2006

BS EN 61010-1:2010

Electrical safety

Pending

To order specify -

Order by module, as listed in the specification table.

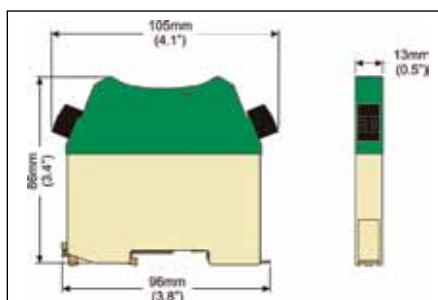


Figure 1 Dimensions

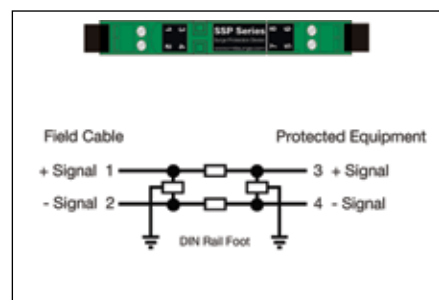


Figure 2 Connection details

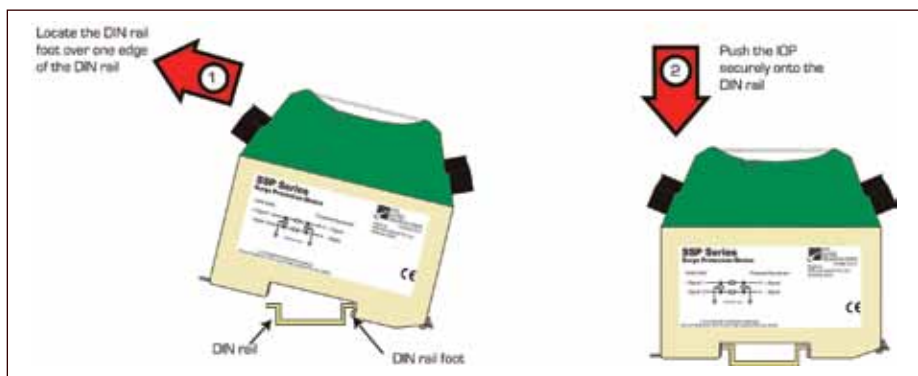


Figure 3 Installation

Model		SSP07X	SSP16X	SSP32X	SSP55X	SSP75X	SSP200X
Nominal voltage	U _N	7Vdc	16Vdc	32Vdc	55Vdc	75Vdc	200Vdc
		5Vac	11Vac	22Vac	38Vac	53Vac	140Vac
Rated voltage (MCOV)	U _C	7.7V	17V	36V	62V	90V	220V
Max leakage current	µA	500	5	5	5	5	5
Residual voltage @ i _{SN}	U _P	50	60	100	122	184	344
Voltage protection level @ 1kV/µs	U _P	<12V	<25V	<45V	<90V	<115V	<300V
Bandwidth	f _G	25kHz	25kHz	25kHz	25kHz	25kHz	25kHz
Series resistance	R	20Ω	20Ω	20Ω	20Ω	20Ω	20Ω
Special feature		Sustained Over-voltage					

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