Surge Protective Devices
(SPDs) for Bus Systems

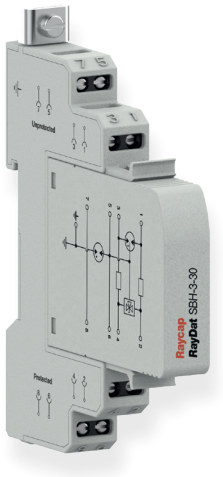
Bus Systems

RayDat SBH-3*
RayDat SGH-3
RayDat RS 485
RayDat KNX

*UL Listed

Special features:

- Very high surge ratings
- Equipped with screw or quick connect (spring loaded) terminals
- Different shield handling options available
- The connection lines remain enabled during module replacement



Symbol Legend:

DIN Rail Mounting

Screw Connect Terminals

Quick Connect Terminals

Modular Design

Shield Indirectly Grounded

The RayDat SBH-3 Series of surge protective devices has been developed to protect fieldbus systems (CAN Bus, Profibus DP, RS 232/V.24 m, RS 485, Sinec L2). It is intended for those applications where high ground potential rises may frequently occur, such as in locations close to electric railways.

The RayDat RS 485 has been designed to protect all versions of RS 485. It can be used for protection of RS 422 and V.11 protocol as well.

Coarse protection is provided by a three terminal gas discharge tube (GDT), while fine protection is provided using a high-speed silicon stage, which provides both, common (longitudinal) mode protection from each line to protective ground and differential (transverse) mode protection between each pair. Care is taken to ensure coordination between these two stages without voltage or surge current blind spots occurring. Thermal protection is provided to reduce the hazards of thermal runaway, should there be an inadvertent mains incursion fault.

RayDat KNX – has been designed to protect KNX systems. Its special design allows the protector to be installed directly to bus terminals.

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DATA SHEET

Modular SPD for Industrial Fieldbus Systems

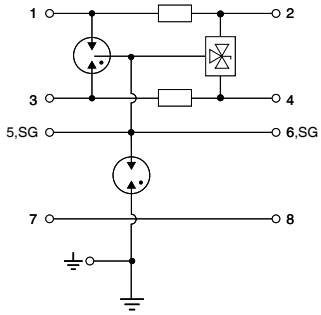
RayDat SBH-3 Series

D1 • C1 • C2 • C3

UL Listed

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5, 12, 30 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
UL 497B 4th Edition

Configuration:



Technical Data

SBH-3 Series			5	12	30
Electrical					
Lines Protected				1 (2 Conductors)	
Nominal Operating Voltage (DC)		U_n	5 V	12 V	30 V
Maximum Continuous Operating Voltage (DC)		U_c	6 V	15 V	33 V
Rated Load Current at 25°C		I_L		1 A	
C2 Nominal Discharge Current (8/20 µs)		I_n		10 kA	
Maximum Discharge Current (8/20 µs)		I_{max}		20 kA	
D1 Impulse Current (10/350 µs)		I_{imp}		2.5 kA	
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 22 V	< 42 V	< 80 V
Rated Spark Overvoltage	(SG-Ground)			184-276 V	
	(Line-Line)		7-10 V	16-19 V	35-43 V
Response Time Overvoltage Protection	(Line-Line)	t_A		< 1 ns	
	(Line-Ground)			< 100 ns	
Insulation Resistance of the Protection	(Line-Ground)	R_{iso}		> 1 GΩ / 100 V	
	(Line-Line)		≥ 6 KΩ	≥ 15 MΩ	≥ 33 MΩ
Serial Resistance per Path		R		1.6-2.0 Ω	
Transverse Capacitance	(Line-Line)	C		50 pF	
	(Line-Ground)			5 pF	
Cut-off Frequency		f_G		30 MHz	
Mechanical					
Temperature Range				-40 °F to +176 °F [-40 °C to +80 °C]	
Terminal Cross Section Multi-strand (max.)				12 AWG	
				4 mm², 2.5 mm² Q Version	
Terminal Screw Torque				4.5 lbf·in [0.5 Nm]	
Degree of Protection IEC/EN 60529				IP 20 (built-in)	
Housing Material				Thermoplastic; Grey; Extinguishing Degree V-0	
Mounting IEC/EN 60715				35 mm DIN Rail	
Order Information					
Order Code			5	12	30
SBH-3-xx			7082.86	7082.88	7082.90
SBH-3-xxQ (Quick Connect Terminals)			7085.21	7085.22	7085.23
SBH-3-xxM (module)			7082.87	7082.89	7082.91

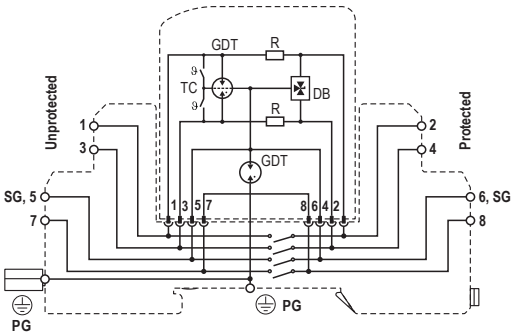
Information contained in this document is subject to change at any time without notice.

RayDat SBH-3 Series

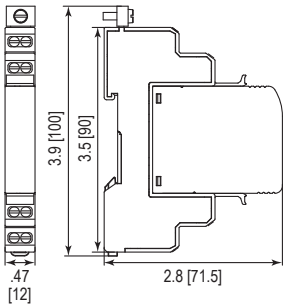
Internal Configuration

Legend

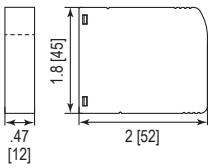
DB Diode Block
GDT Gas Discharge Tube
PG Protective Grounding
R Resistor
SG Signal Grounding
TC Thermo-clip



Dimensions & Packaging

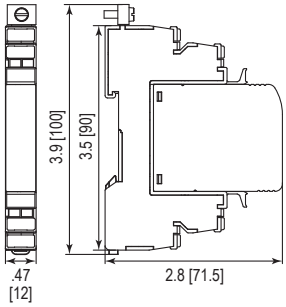


SBH-3 Series	5	12	30
Dimensions			
Weight per Unit		2.11 oz [60 g]	
Dimensions DIN 43880		2/3 TE	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	



SBH-3-xxM Series	5	12	30
Dimensions			
Weight per Unit		.91 oz [26 g]	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	

Quick Connect Terminals



SBH-3-xxQ Series	5	12	30
Dimensions			
Weight per Unit		2.18 oz [62 g]	
Dimensions DIN 43880		2/3 TE	
Packaging Dimensions (Single Unit)		3.4 × .59 × 4" [87 × 15 × 102 mm]	
Minimum Package Quantity		15 pieces	

inches
[mm]

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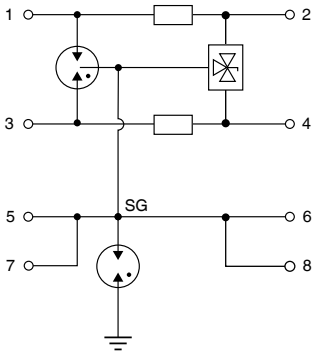
DATA SHEET

SPD with Separated Signal Ground (RS 232)

RayDat SGH-3 Series

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 10 kA, I_{max}: 20 kA, I_{imp}: 2.5 kA
Voltages: 5, 12, 15, 24, 30, 48, 60, 110 V DC
Frequency Range: 30 MHz
Housing: Modular Design
Compliance: IEC/EN 61643-21
Configuration:



Technical Data

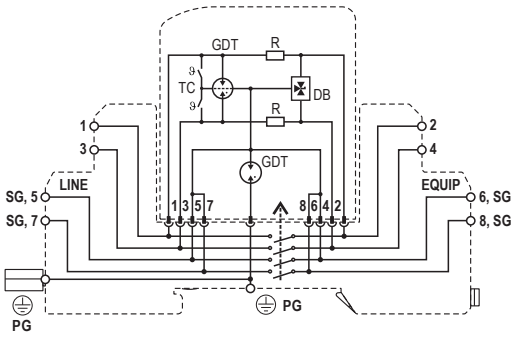
SGH-3 Series			5	12	15	24	30	48	60
Electrical									
Lines Protected			1 (2 Conductors)						
Nominal Operating Voltage (DC)		U_n	5 V	12 V	15 V	24 V	30 V	48 V	60 V
Maximum Continuous Operating Voltage (DC)		U_c	6 V	15 V	18 V	28 V	33 V	52 V	64 V
Rated Load Current at 25°C		I_L	1 A						
C2 Nominal Discharge Current (8/20 µs)		I_n	10 kA						
Maximum Discharge Current (8/20 µs)		I_{max}	20 kA						
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA						
Residual Voltage at 5 kA (8/20 µs)	(Line-Line)	U_{res}	< 22 V	< 42 V	< 48 V	< 70 V	< 80 V	< 140 V	< 160 V
Rated Spark Overvoltage	(SG-Ground)		184-276 V						
	(Line-Line), (Line-SG)		7-10 V	16-19 V	20-24 V	30-36 V	35-43 V	55-68 V	67-85 V
Response Time Overvoltage Protection	(Line-Line)	t_A	< 1 ns						
	(Line-Ground)		< 100 ns						
Insulation Resistance of the Protection	(Line-Line)	R_{iso}	≥ 6 KΩ	≥ 15 MΩ	≥ 18 MΩ	≥ 28 MΩ	≥ 33 MΩ	≥ 52 MΩ	≥ 64 MΩ
	(Line-Ground)		> 1 GΩ / 100 V						
Serial Resistance per Path		R	1.6-2.0 Ω						
Transverse Capacitance	(Line-Line)	C	50 pF						
	(Line-Ground)		5 pF						
Cut-off Frequency		f_G	30 MHz						
Mechanical									
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]						
Terminal Cross Section Multi-strand (max.)			12 AWG [4 mm², 2.5 mm² Q Version]						
Terminal Screw Torque			4.5 lbf·in [0.5 Nm]						
Degree of Protection IEC/EN 60529			IP 20 (built-in)						
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0						
Mounting IEC/EN 60715			35 mm DIN Rail						
Order Information									
Order Code			5	12	15	24	30	48	60
SGH-3-xxx			7086.61	7086.62	7086.63	7086.64	7086.65	7086.66	7086.67
SGH-3-xxxM (module)			7086.69	7086.70	7086.71	7086.72	7086.73	7086.74	7086.75

Information contained in this document is subject to change at any time without notice.

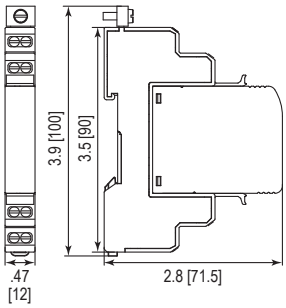
Internal Configuration

Legend

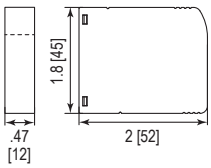
DB	*Diode Block*
GDT	*Gas Discharge Tube*
R	*Resistor*
PG	*Protective Grounding*
SG	*Signal Grounding*
TC	*Thermo-clip*



Dimensions & Packaging



SGH-3 Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	2.11 oz [60 g]						
Dimensions DIN 43880	2/3 TE						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						



SGH-3-xxxM Series	5	12	15	24	30	48	60
Dimensions							
Weight per Unit	.91 oz [26 g]						
Packaging Dimensions (Single Unit)	3.4 × .59 × 4" [87 × 15 × 102 mm]						
Minimum Package Quantity	15 pieces						

inches
[mm]

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DATA SHEET SPD for RS-485 Systems

RayDat RS 485

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Surge Discharge Ratings: I_n: 20 kA, I_{imp}: 2.5 kA
Voltages: 5 V DC
Max. Operating Voltage: 6 V DC
Frequency Range: 1 MHz
Housing: 16 Terminal, Compact Design
Compliance: IEC/EN 61643-21

Technical Data

RS 485

Electrical			
Number of Protected Pairs			2(4 Conductors)
Nominal Operating Voltage (DC)		U_n	5V
Maximum Continuous Operating Voltage (DC)		U_c	6V
Rated Load Current at 25°C		I_L	500 mA
C2 Nominal Discharge Current (8/20 µs)	(Line-Line)	I_n	20 kA
D1 Impulse Current (10/350 µs)		I_{imp}	2.5 kA
Residual Voltage at 5 kA (8/20µs)	(Line-Line)	U_{res}	20V
Rated Spark Overvoltage	(5, 6, 7 & 8-4, SG)		6.5V–8.5V
	(5-6 & 7-8)		6.5V–8.5V
	(5,6,7 & 8-2, PG)		78V–116V
Response Time Overvoltage Protection	(5,6,7,8,SG)	t_A	<1 ns
Thermal Protection	(5,6,7,8)		Yes
Insulation Resistance of Protection		R_{iso}	6 kΩ
Serial Resistance per Path		R	1.7–1.9 Ω
Transverse Capacitance		C	<2nF
Cut-off Frequency		f_G	>1 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
Terminal Cross Section Multi-strand (max.)			2x14 AWG [2×2.5 mm²]
Terminal Screw Torque			17.7 lbf.in [2.0 Nm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Mounting IEC/EN 60715			35 mm DIN Rail
Order Information			
Order Code			
RS 485			703 812

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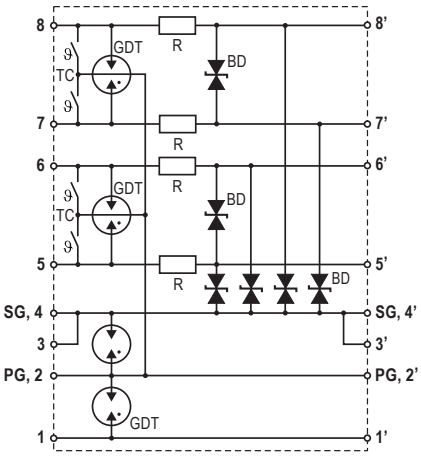
RayDat RS 485

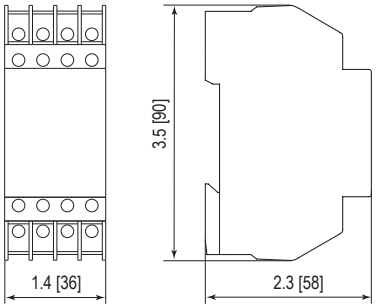
Internal Configuration



Legend

BD *Bi-directional TVS Diode*
GDT *Gas Discharge Tube*
PG *Protective Grounding*
R *Resistor*
SG *Signal Grounding*
TC *Thermo-clip*

Dimensions & Packaging



RS 485

Dimensions	
Weight per Unit	4.02 oz [114 g]
Dimensions DIN 43880	2 TE
Packaging Dimensions (Single Unit)	1.5 × 2.9 × 4.2" [39 × 74 × 106 mm]
Minimum Package Quantity	6 pieces

inches
[mm]

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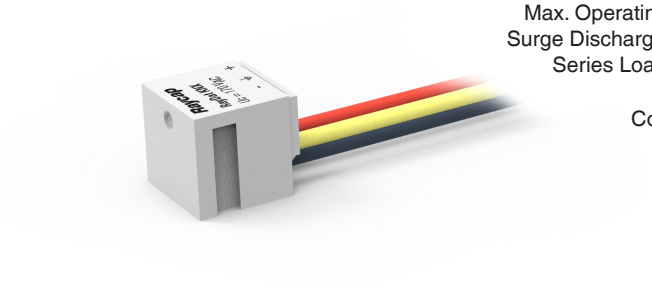
DATA SHEET

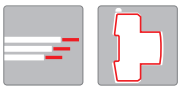
SPD with Terminal Connection for Bus Systems

RayDat KNX

D1 • C1 • C2 • C3

IEC/EN Category: D1/C1/C2/C3
Voltages: 110 V DC
Max. Operating Voltage: 180 V DC
Surge Discharge Ratings: I_n: 5 kA, I_{max}: 10 kA
Series Load Current: 7 A
Housing: Compact Design
Compliance: IEC/EN 61643-21





Technical Data

RayDat KNX

Electrical			
Number of Protected Pairs			1 (2 conductors)
Nominal Operating Voltage (DC)		U_n	110 V
Maximum Continuous Operating Voltage (DC)		U_c	170 V
Rated Load Current at 25°C		I_L	7 A
C2 Nominal Discharge Current (8/20 µs)		I_n	5 kA
Maximum Discharge Current (8/20 µs)		I_{imp}	1 kA
Residual Voltage at 5 kA (8/20 µs)	(Line-Ground)	U_{res}	< 600 V
	(Line-Line)		< 1000 V
Response Time Overvoltage Protection		t_A	< 100 ns
Thermal Protection			No
Insulation Resistance of the Protection		R_{iso}	≥ 1 GΩ
Serial Resistance per Path		R	< 0.1 Ω
Cut-off Frequency		f_G	50 MHz
Mechanical			
Temperature Range			-40 °F to +176 °F [-40 °C to +80 °C]
LIne Conductors Cross Section (max.)			20 AWG [0.5 mm²]
Ground Conductor Cross Section (max.)			18 AWG [0.75 mm²]
Connecting Conductor Length			5.9" [150 mm]
Degree of Protection IEC/EN 60529			IP 20 (built-in)
Housing Material			Thermoplastic; Grey; Extinguishing Degree V-0
Order Information			
Order Code			
RayDat KNX			127 649

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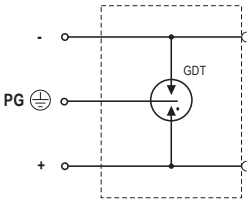
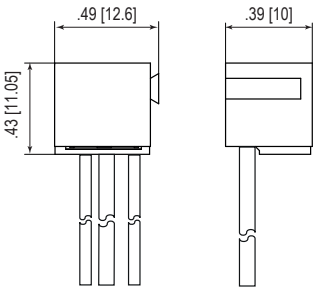
RayDat KNX

Internal Configuration



Legend
GDT Gas Discharge Tube
PG Protective Grounding

Dimensions & Packaging



RayDat KNX

Dimensions	
Weight per Unit	.28 oz [8 g]
Packaging Dimensions (Single Unit)	3.1 × .91 × .4.3" [78 × 23 × 108 mm]
Minimum Package Quantity	12 pieces

inches
[mm]

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