A young girl with dark brown hair in two braids is sitting by a large window. She is wearing a grey long-sleeved shirt and blue jeans. Her right hand is pressed against the window glass, which is covered in raindrops. She is looking out the window with a thoughtful expression. The background outside the window is blurred, showing greenery and a building.

Keeping people and  
property safe

# Surge Protection

:hager

# Keeping people and property safe

Every electrical and electronic device has a specific dielectric strength against voltage fluctuations. If the voltage exceeds this strength, malfunctions and damage will occur.

Surge Protection Devices (SPDs) are designed to reduce the risk to people, property, electrical installations and connected devices from damage caused by surges, transients and lightning.

SPDs are inactive until a certain abnormal electrical energy threshold is crossed. Once the energy threshold is reached, SPDs temporarily divert damaging surge energy away from people and property.

# The three types of Surge Protection Devices

International standards classify SPDs as belonging to different 'Types', depending on characteristics and discharge capacity,

We offer Type 1, Spark Gap and Type 2 Surge Protection Devices; these products are designed to be permanently installed by a licensed electrician. Type 3 device are removable single socket or power board devices, available at retail outlets commonly used for limited protection of computer and audio-visual equipment.



## Lightning protection

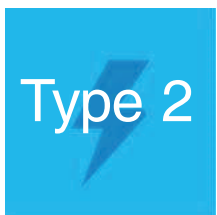
Diverts the energy content of the lightning and reduces the residual voltage to values  $< 1,500 \text{ V}$ .

## Type 1 SPD

Recommended installations at risk of lightning strike is characterized by a  $10/350 \mu\text{s}$  current wave.

**Installation:** Protection is provided when lightning currents couple into the equipotential bonding conductor of the low-voltage system, via the earth or parts of the external lightning protection system. Installed in buildings with overhead line feed and/or external lightning protection systems, in the main power supply as close as possible to the feeder before the meter, thus preventing lightning current spread.

Note, Type 1 SPDs need to be installed with Type 2 SPDs.



## Surge protection

Reduces the remaining overvoltage to values  $< 1,300 \text{ V}$ .

## Type 2 SPD

Protection system for all low voltage electrical installations and characterized by an  $8/20 \mu\text{s}$  current wave.

**Installation:** Installed in electrical switchboards, these devices protect equipment by stopping the spread of overvoltages in systems and protecting loads. As second line of protection after lightning arresters, they limit surges from remote strikes or switching overvoltages. They must be installed upstream of sensitive, safety-relevant systems that can be damaged by switching overvoltages.



## Socket surge protection for terminals

Reduces or secures the remaining overvoltage to values that are for end devices  $< 1,500 \text{ V}$ .

## Type 3 SPD

With low discharge capacity, Type 3 SPDs are recommended and installed as a supplement to Type 2 SPDs in the areas of sensitive loads, characterized by a combination of voltage waves ( $1.2/50 \mu\text{s}$ ) and current waves ( $8/20 \mu\text{s}$ ).

**Installation:** Installed near the protected device, typically at the socket.



# Modular protection devices

## Surge Protection Devices (SPD) – Type I+II

**Description**

Our SPLxxx devices protect electrical and electronic equipment against transients originating from lightning and switching sources. These transients can cause premature aging of equipment, logic failures and down time, to the complete destruction of electrical components

**Installation and connection**



- GDT and MOV technology
- Single phase or Three phase
- TN-S or TT
- Part numbers ending in 'R' have a contact to allow for wiring in alarm to indicate cartridge replacement.

**Note**

- When the surge protection device is used, backup protection must be used separately. For specific parameters, please refer to the technical data section.

**Technical information:**

[Page 9](#)

	Description	Iimp(10/350µs (kA)	In(8/20µs) (kA)	Uc (V)	Width 18mm	Cat. ref.
	Single Phase (1P+N)	12.5	12.5	350	2	SPL212R
	Three Phase (3P+N)	12.5	12.5	350	4	SPL412R

# Modular protection devices

## Surge Protection Devices (SPD) – Type II

### Description

Our SPLxxx devices protect electrical and electronic equipment against transients originating from lightning and switching sources. These transients can cause premature aging of equipment, logic failures and down time, to the complete destruction of electrical components

### Installation and connection

- GDT and MOV technology
- Single phase or Three phase
- TN-S or TT
- Part numbers ending in 'R' have a contact to allow for wiring in alarm to indicate cartridge replacement.
- Replacement NE & L-PE cartridges available

### Note

- When the surge protection device is used, backup protection must be used separately. For specific parameters, please refer to the technical data section.

### Technical information:

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SPL240



SPL440



SPL220R



SPL465R

Description	I <sub>max</sub> (8/20μs) (kA)	I <sub>n</sub> (8/20μs) (kA)	Up*(L-N) (kV)	Width 18mm	Cat. ref.
Single Phase (1P+N)	20	10	1.3	2	SPL220
	40	20	1.5	2	SPL240
	65	35	1.9	2	SPL265
Three Phase (3P+N)	20	5	1.3	4	SPL420
	40	20	1.5	4	SPL440
	65	35	1.9	4	SPL465
Single Phase (1P+N)	20	10	1.3	2	SPL220R
	40	20	1.5	2	SPL240R
	65	35	1.9	2	SPL265R
Three Phase (3P+N)	20	5	1.3	4	SPL420R
	40	20	1.5	4	SPL440R
	65	35	1.9	4	SPL465R

\*Up value (N-PE) is 1.5KV

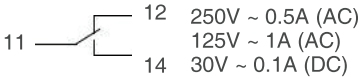
Operational Status Indication  
-(Fault indication)



Green  
OK

Red  
Replace



"R" suffix - with remote terminal (Remote signaling contact)




# Modular protection devices

## Surge Protection Devices (SPD) – Cartridge

<b>Description</b> Our SPLxxxx Surge Protection Device replacement cartridges and bases are IP2X This allows for simple 'hot swap' remove and replacement of expended cartridges.	<b>Installation and connection</b> <ul style="list-style-type: none"> <li>- SPD cartridges should be replaced when the visual indicator changes to a bright 'Red'.</li> <li>- Replacement cartridges are available for all different ratings and types</li> <li>- A keying system exists to prevent a line (L-N) cartridge being interchanged by mistake with a neutral one (N-PE) and vice versa.</li> </ul>	<b>Note</b> <ul style="list-style-type: none"> <li>- Three phase SPD requires 3 x L-N and 1 x N-PE Cartridge</li> <li>- SPLxxxx cartridges are not compatible with legacy SPNxxxx products</li> </ul>
<b>Technical information:</b> <a href="#">Page 11</a>		

	Description	Imax (kA)	In (8/20µs) (kA)	Up (kV)	Packing Qty.	Cat. ref.
 SPL065	Phase Cartridge	20	10	1.3	1	SPL020
		40	20	1.5	1	SPL040
		65	35	1.9	1	SPL065
 SPL065N	Neutral Cartridge	40	20	1.5	1	SPL040N
		65	20	1.5	1	SPL065N

## Guide of replacement cartridges for plug-in surge protection device

	Imax (kA)	Replaceable Cat. ref.	Phase Cartridge	Neutral Cartridge
 SPL465R	65kA	SPL265(R) SPL465(R)	SPL065 SPL065	SPL065N SPL065N
	40kA	SPL240(R) SPL440(R)	SPL040 SPL040	SPL040N SPL040N
	20kA	SPL220(R) SPL420(R)	SPL020 SPL020	SPL040N SPL040N

# Modular protection devices

## Surge Protection Devices (SPD) for Photovoltaic (PV)

<b>Description</b> <ul style="list-style-type: none"> <li>- For use in photovoltaic systems (IEC 60364-7-712)</li> <li>- PV Type 2 / PV Class II (EN 50539-11)</li> <li>- without remote signaling</li> </ul>	<b>Technical Specifications</b> <ul style="list-style-type: none"> <li>- <math>U_e = 1000V</math></li> <li>- <math>U_p \leq 3.7\text{ kV}</math></li> <li>- <math>U_{cpv} \leq 1170\text{ V DC}</math></li> <li>- <math>I_n = 15\text{ kA}</math></li> <li>- <math>I_{scpv} = 2000\text{ A}</math></li> <li>- <math>I_L = 80\text{ A}</math></li> <li>- <math>I_{max} = 40\text{ kA (8/20 }\mu s)</math></li> <li>- IP20</li> <li>- Dimension (LxWxH mm) = 98.7x53.4x65.7</li> </ul>
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SPV340

Description	Packing Qty.	Cat. ref.
<ul style="list-style-type: none"> <li>- SPD T2 3P pluggable 40kA photovoltaic</li> <li>- with lifetime indicator</li> </ul>	1	SPV340

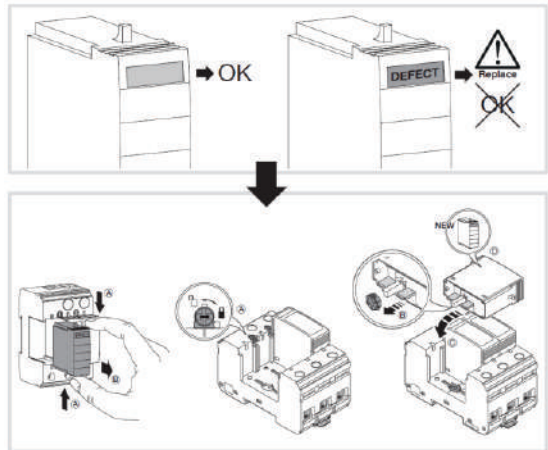


SPV040

Cartridge T2 1P photovoltaic +/- for SPV340	1	SPV040
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### Technical Guide

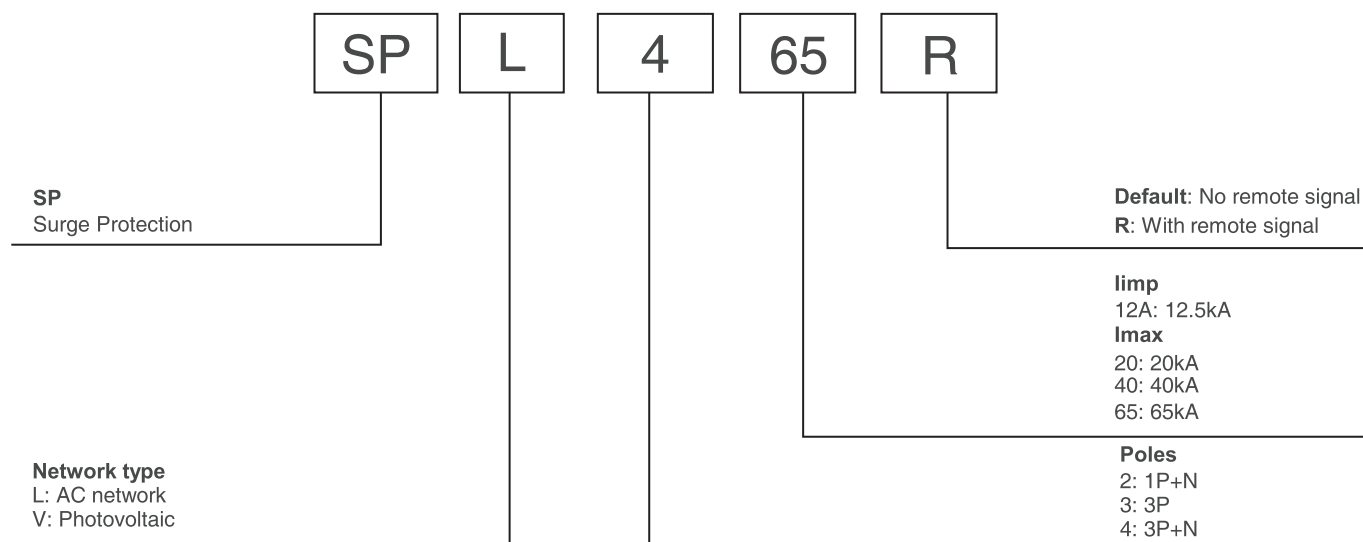
#### Fault Indication and Cartridge Replacement



#### Cross-sectional area of connecting wire of terminal block (mm)

 3 Nm (1.5 - 16 mm²) 4.5 Nm (25 - 35 mm²)		
min.	1,5 mm²	
max.	25 mm²	35 mm²

## Selection Guide





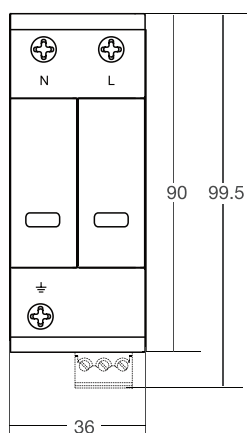
### Technical Characteristic of Class I+II Surge Protection Devices

Cat. Ref.		SPL212R		SPL412R	
Protection Level		Class I+II / Type 1+2			
Standard		IEC 61643-1 / IEC 61643-11			
Protection Mode		L - N	N - PE	L1/L2/L3 - N	N - PE
Earthing Type		TT / TN - S			
Protection Type		Common Mode / Differential Mode			
Nominal Voltage	U <sub>n</sub>	230/400V AC			
Max. Continuous Operating Voltage	U <sub>c</sub>	350V AC			
Voltage Protection Level	U <sub>p</sub>	1.5kV			
Nominal discharge current (8/20μ ) [L-N]	I <sub>n</sub>	12.5kA		12.5kA	
Nominal discharge current (8/20μ ) [N-PE]	I <sub>n</sub>		50kA		50kA
Rated inrush current (10/350μ ) [L-N]	I <sub>imp</sub>	12.5kA		12.5kA	
Rated inrush current (10/350μ ) [N-PE]	I <sub>imp</sub>		50kA		50kA
Coil flow breaking capacity [N-PE]	I <sub>fi</sub>	100 Arms			
Residual current	I <sub>PE</sub>	0.5 mA			
Maximum backup protection	Fuse	160A gL/gG			
Short circuit current (I <sub>scsr</sub> )	Fuse	12.5kA			
Response time	t <sub>A</sub>	L-N ≤ 25ns		N-PE ≤ 100ns	
Operating temperature		- 40°C ~ + 85°C			
Relative humidity		5% ~ 95%			
Altitude		- 500m ~ + 400m			
Working/Fault Local Window Indication		Green (OK) / Red (Replace)			
Tightening torque		2.5 Nm			
Installation method		35mm DIN rail, according to EN 60715			
IP rating		IP20			
Dimension (LxWxH) mm		90x36x67.6		90x72x67.6	

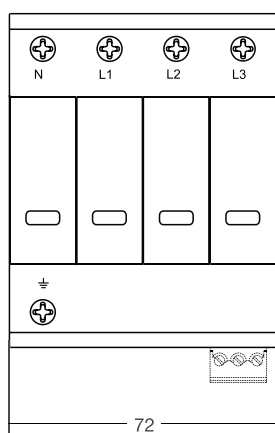
### Technical Characteristic of Class II Surge Protection Devices

Protection Level			Class II / Type 2		
Standard			IEC 61643-1 / IEC 61643-11		
Cat. Ref.	Single Phase (without remote indication)		SPL220	SPL240	SPL265
	Single Phase (with remote indication)		SPL220R	SPL240R	SPL265R
	Three Phase (without remote indication)		SPL420	SPL440	SPL465
	Three Phase (with remote indication)		SPL420R	SPL440R	SPL465R
Earthing Type			TT / TN - S		
Nominal Voltage		$U_n$	230/400 VAC	230/400 VAC	230/400 VAC
Max. Continuous Operating Voltage		$U_c$	350V AC	350V AC	350V AC
Voltage Protection Level		$U_p$	1.3kV	1.5kV	1.9kV
Nominal discharge current (8/20 $\mu$ )		$I_n$	10kA	20kA	35kA
Maximum discharge current		$I_{max}$	20kA	40kA	65kA
Coil flow breaking capacity [N-PE]		$I_{fi}$	100 Arms		
Residual current		$I_{PE}$	0.5 mA		
Maximum backup protection		Fuse	40A gL/gG	80A gL/gG	125A gL/gG
Maximum backup protection		MCB	32A Type C	32A Type C	63A Type C
Short circuit current (I <sub>sc</sub> )		Fuse	25kA	25kA	25kA
Short circuit current (I <sub>sc</sub> )		MCB	10kA	10kA	10kA
Response time		$t_A$	L-N $\leq$ 25ns      N-PE $\leq$ 100ns		
Operating temperature			- 40°C ~ + 85°C		
Relative humidity			5% ~ 95%		
Altitude			- 500m ~ + 400m		
Working/Fault Local Window Indication			Green (OK) / Red (Replace)		
Tightening torque			2.5 Nm		
Installation method			35mm DIN rail, according to EN 60715		
IP rating			IP20		
Cartridges Cat. Ref.			L-N: SPL020 N-PE: SPL040N	L-N: SPL040 N-PE: SPL040N	L-N: SPL065 N-PE: SPL065N
Dimension (LxWxH) mm		SPL2xx	90x36x66.6		
Dimension (LxWxH) mm		SPL2xxR	99.5x36x66.6		
Dimension (LxWxH) mm		SPL4xx	90x72x66.6		
Dimension (LxWxH) mm		SPL4xxR	99.5x72x66.6		

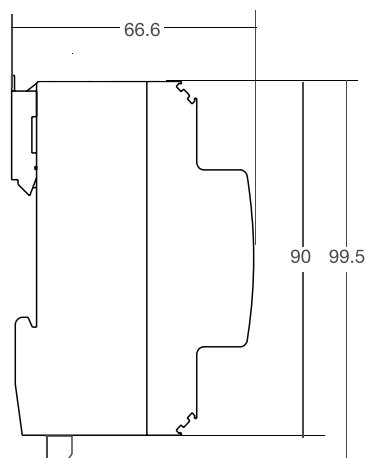
### Dimensions



SPL2\*\*



SPL4\*\*



### Cross-sectional area of connecting wire of terminal block (mm)

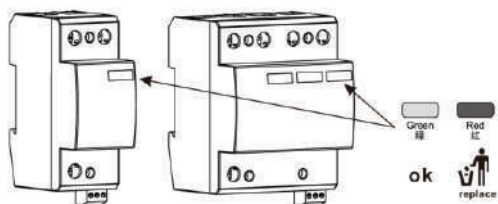
Min. □ L, N, PE	1.5 mm <sup>2</sup>	
Max. □ L, N, PE	25 mm <sup>2</sup>	35 mm <sup>2</sup>



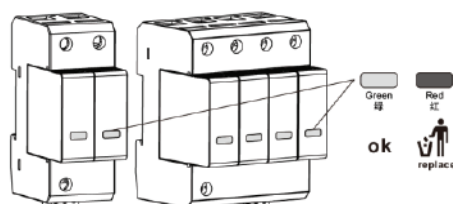
### Cross-sectional area of connecting wire of remote communication interface (mm)

	AC: 250V/0.5A 125V/1A DC: 30V/0.1A
	  Max. 1.5 mm <sup>2</sup>

### Fault - Indication

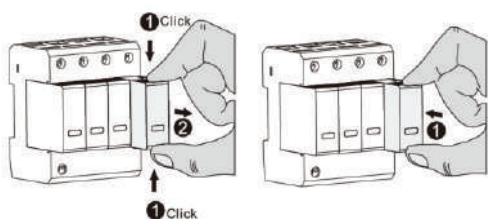


Class I+II / Type 1+2



Class II / Type 2

### Cartridge Replacement





**Hager Engineering (M) Sdn Bhd**

K03-10-08, UOA Business Park,  
No.1 Jalan Pengaturcara U1/51A,  
40150 Shah Alam, Selangor,  
Malaysia

Tel : + (60) 3 5569 0727  
Fax : + (60) 3 5569 0728  
Email : [generalmy@hager.com](mailto:generalmy@hager.com)

**[hager.my](http://hager.my)**