

# HLS1

## Series Surge Protection Device

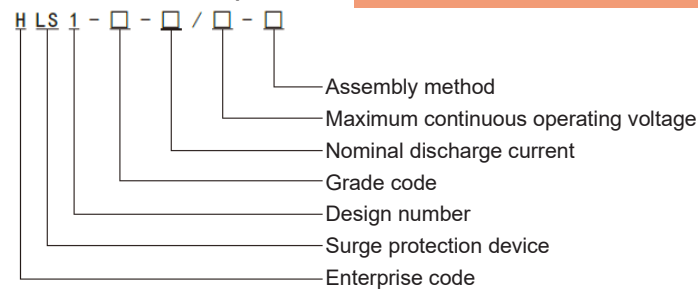


### I. Scope of Application

The HLS1 Series Surge Protection Device (SPD) is suitable for low-voltage power grids with AC 50/60 Hz and rated voltage of 400 V, which can protect the system from the impact of transient surge voltage caused by lightning strike or switching operation, limit instantaneous overvoltage and discharge surge current.

It is designed in accordance with GB/T 18802.1-2011, IEC 61643-1/II test and GB/T 50057-94 *Design Code for Protection Of Structures Against Lightning*.

### II. Model Description



E.g. IP surge protection device with nominal discharge current of 20 kA, grade code of Type C and maximum continuous operating voltage of 385 V AC is denoted by HLS1-C/20kA/385V/1P.

### III. Model Selection

#### 3.1 According to the site environmental characteristics (with the lightning rod system):

According to the lightning electromagnetic pulse (LEMP) and the position of equipotential connection points, the protection space is divided into several lightning protection zones (LPZs) including LPZOA, LPZOB, LPZ1, LPZ2, and LPZ3.

The HLS1-B Surge Protection Device is used in Zone LPZOA or the junction of Zone LPZOB and Zone LPZ1 as the equipotential connection during lightning strike. It is suitable to be installed at perforated incoming low-voltage main distribution frames, and usually used in medium-sized computer centers, mobile communication base stations, large-scale monitoring systems and Class B security systems. Generally, the nominal discharge current ranges from 25 to 80 kA.

The HLS1-C Surge Protection Device is used in Zone LPZOB or the junction of Zone LPZ1 and Zone LPZ2 as the equipotential connection during lightning strike. It is suitable to be installed in the distribution box, and usually used in computer centers, motor rooms, building automatic control rooms, industrial automatic control rooms, frequency conversion equipment control rooms, hospital operating rooms, intensive care units, and distribution cabinets in places with electronic medical devices. Generally, the nominal discharge current ranges from 15 to 20 kA.

#### 3.2 According to the type of the low-voltage grounding network system:

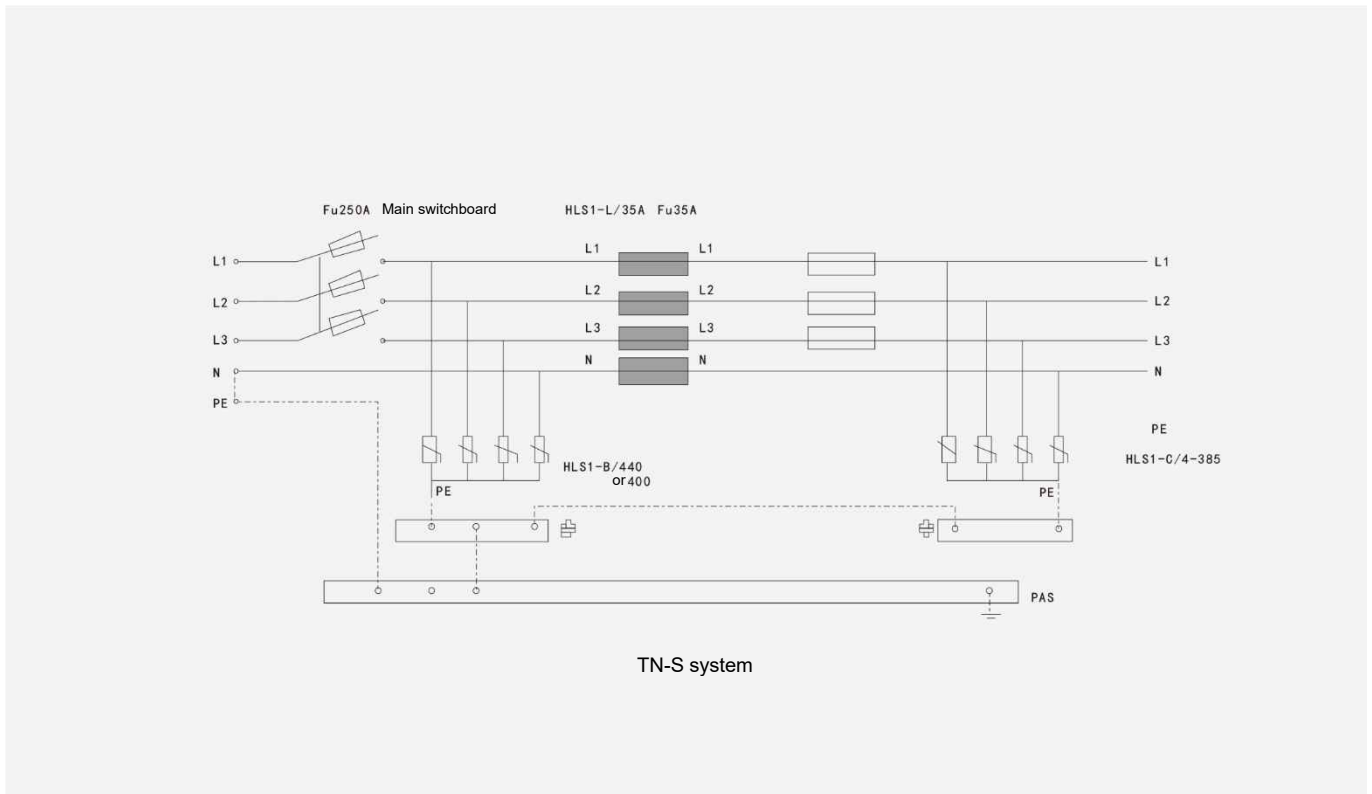
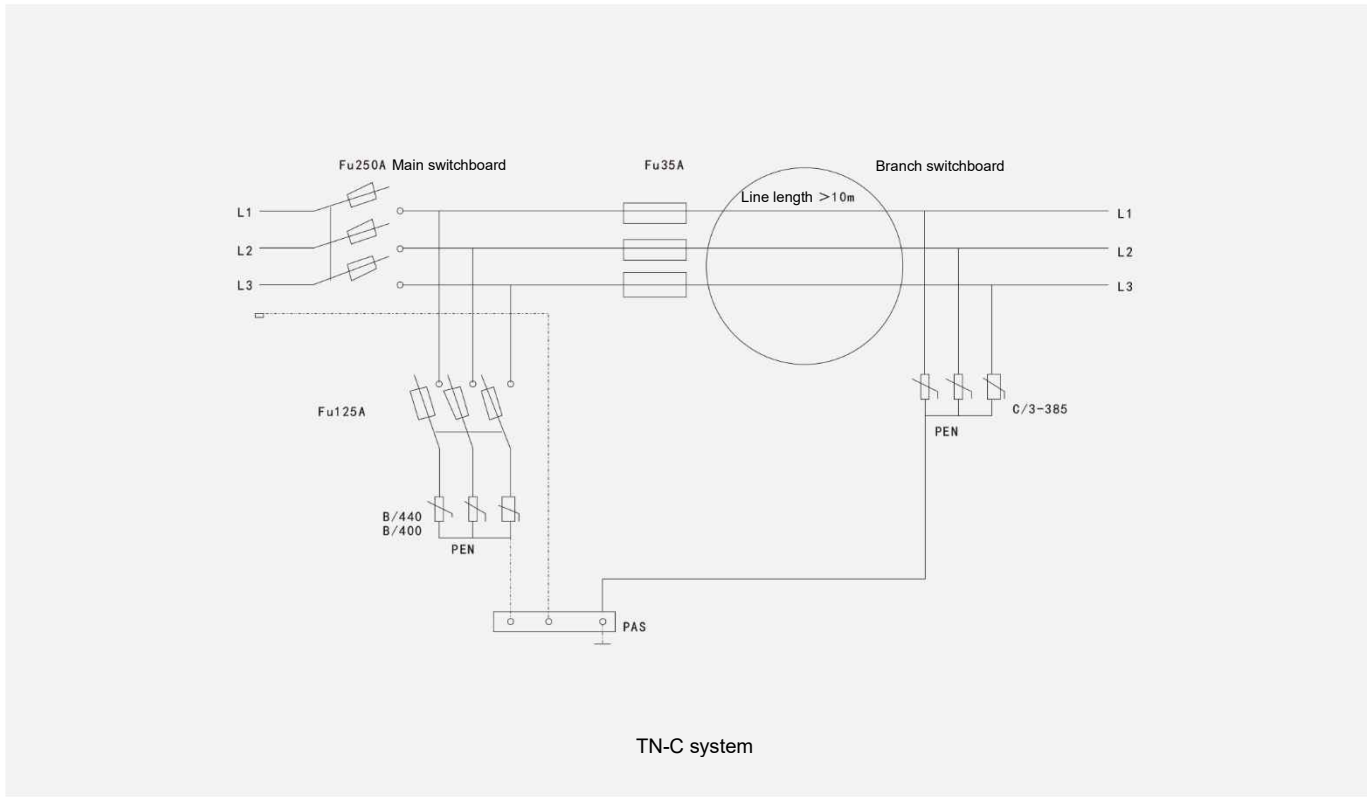
The maximum continuous operating voltage ( $U_c$ ) of the surge protection device shall not be lower than the maximum operating voltage  $U_{s,max}$  (phase voltage) of the power grid.

The TT system shall adopt differential mode protection (MD: protection between phase lines and neutral lines); and other network systems such as TN-C, TN-S and TN-C-S shall adopt common mode protection (MC: protection of phase lines and neutral lines to the ground). The wiring diagram is shown in Figure 1, and the wiring type of HLS1 Series Surge Protection Device is shown in Figure 2.

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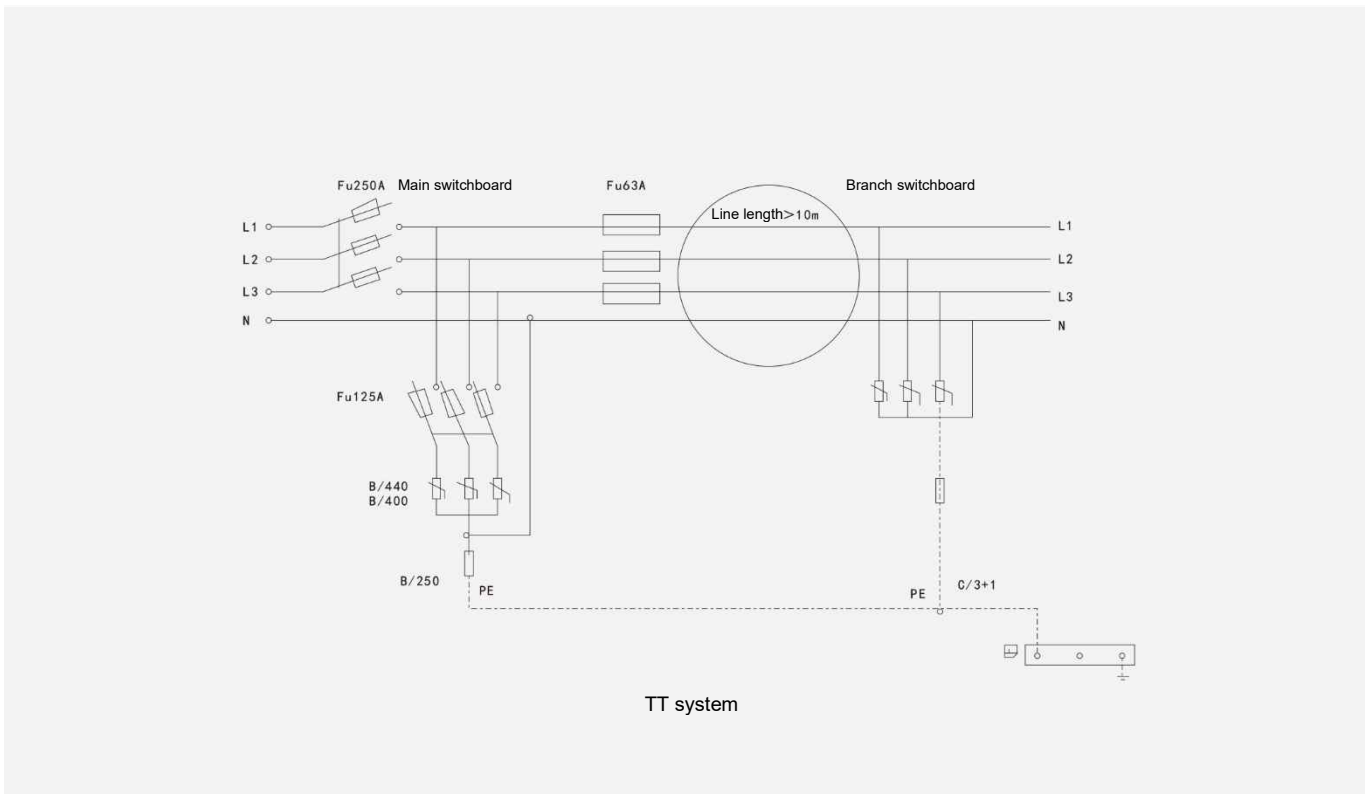
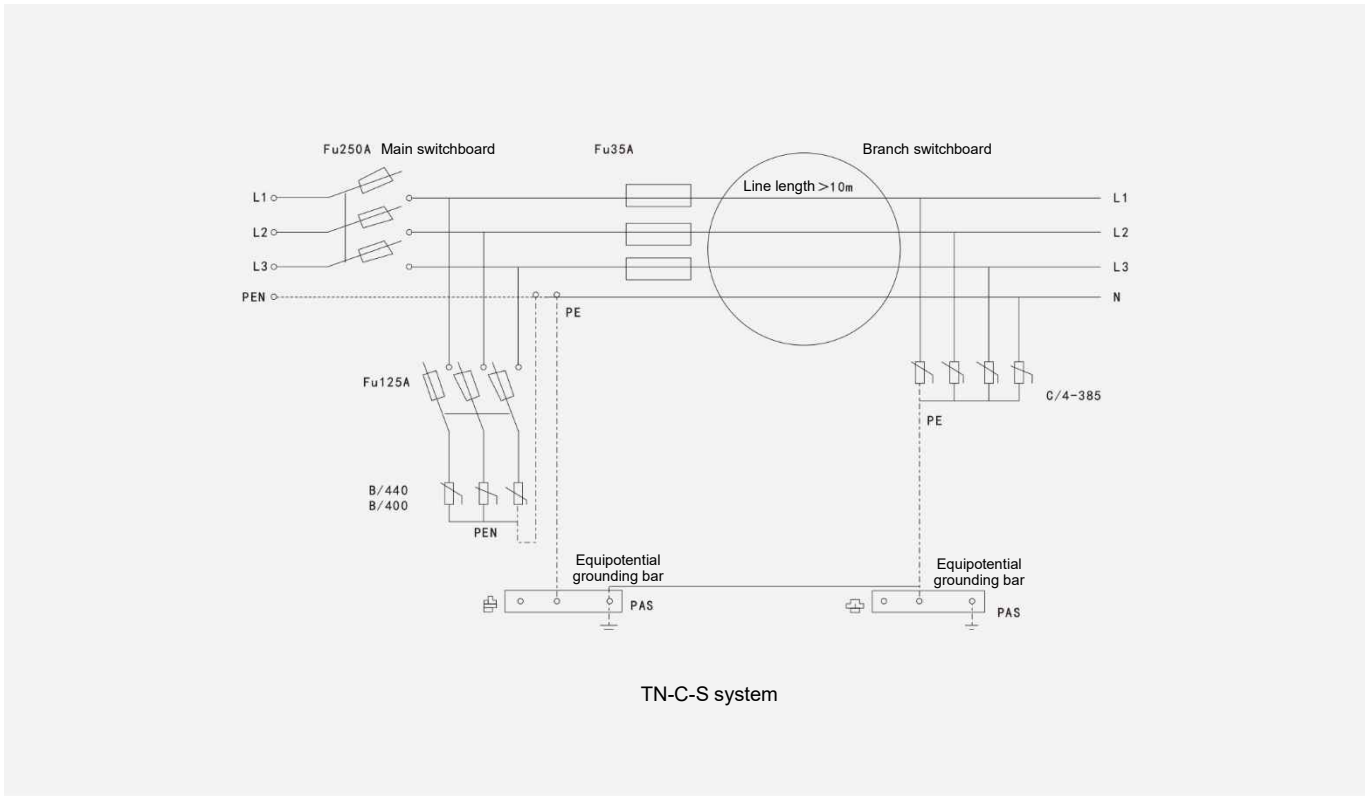
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### IV. Wiring Diagram



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### VI. Wiring Type

#### 1. HLS1-B wiring diagram



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### VII. Operating Conditions

- 4.1 Normal service conditions
  - a) Altitude  $\leq 2,000\text{m}$
  - b) Ambient air temperature: Normal range:  $-5^{\circ}\text{C} - +40^{\circ}\text{C}$ ; limit range:  $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$
  - c) Relative humidity: Between 30% and 90% at room temperature of  $25^{\circ}\text{C}$
  - d) Frequency: The AC frequency of the power supply is between 48 Hz and 62 Hz.
  - e) Voltage: The voltage continuously applied between SPD terminals shall not exceed its maximum continuous working voltage.
- 4.2 Normal installation conditions
  - a) The inclination angle with the vertical plane shall be less than  $5^{\circ}$ .
  - b) The installation place shall have no significant shaking and impact vibration.
  - c) The installation medium shall have no explosion risks and no enough gas or dust (including conductive dust) to corrode metals or destroy insulation.
- 4.3 Normal storage and transportation conditions
  - a) Temperature range:  $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$
  - b) Relative humidity (at  $+25^{\circ}\text{C}$ )  $\leq 90\%$
  - c) Handle with care during transportation to avoid violent collision

### VIII. Main Technical Parameters

See Table 1 and Table 2 for the main technical parameters of surge protection device

Table 1 Main Parameters of Type B Surge Protection Device

Index \ Model	B-25/385/1P	B-40/385/1P	B-60/385/1P	B-80/385/1P	B-150/385/1P
Voltage protection level Up (kV)	1.8	2.1	2.5	3.0	2.5
Maximum continuous operating voltage U <sub>c</sub> (V~)	385	385	385	385	385
Nominal discharge current I <sub>n</sub> (8/20 $\mu\text{s}$ ) kA	25	40	60	80	25
Maximum discharge current I <sub>max</sub> (8/20 $\mu\text{s}$ ) kA	50	80	100	150	/
Impulse discharge current I <sub>imp</sub> (10/350 $\mu\text{s}$ ) kA	/				50
Short-circuit current tolerance (A)	300				
Response time t <sub>a</sub> ( $\mu\text{s}$ )	<25				
Maximum backup fuse/circuit breaker (A)	gL63A/C40	gL75A/C50	gL75A~gL125A/C63~C100		
Terminal connection capability	Hard wire 2.5 - 35 mm <sup>2</sup> , flexible conductor 2.5 - 25 mm <sup>2</sup>				

Table 2 Main Parameters of Type C Surge Protection Device

Index \ Model	C-10/385/1P	C-20/385/1P
Voltage protection level Up (kV)	1.5	1.8
Maximum continuous operating voltage U <sub>c</sub> (V~)	385	385
Nominal discharge current I <sub>n</sub> (8/20 $\mu\text{s}$ ) kA	10	20
Maximum discharge current I <sub>max</sub> (8/20 $\mu\text{s}$ ) kA	20	40
Short-circuit current tolerance (A)	300	
Response time t <sub>a</sub> ( $\mu\text{s}$ )	<25	
Maximum backup fuse/circuit breaker (A)	gL50/C32 (DZ47, HUM18)	
Terminal connection capability	Hard wire 2.5 - 35 mm <sup>2</sup> , flexible conductor 2.5 - 25 mm <sup>2</sup>	

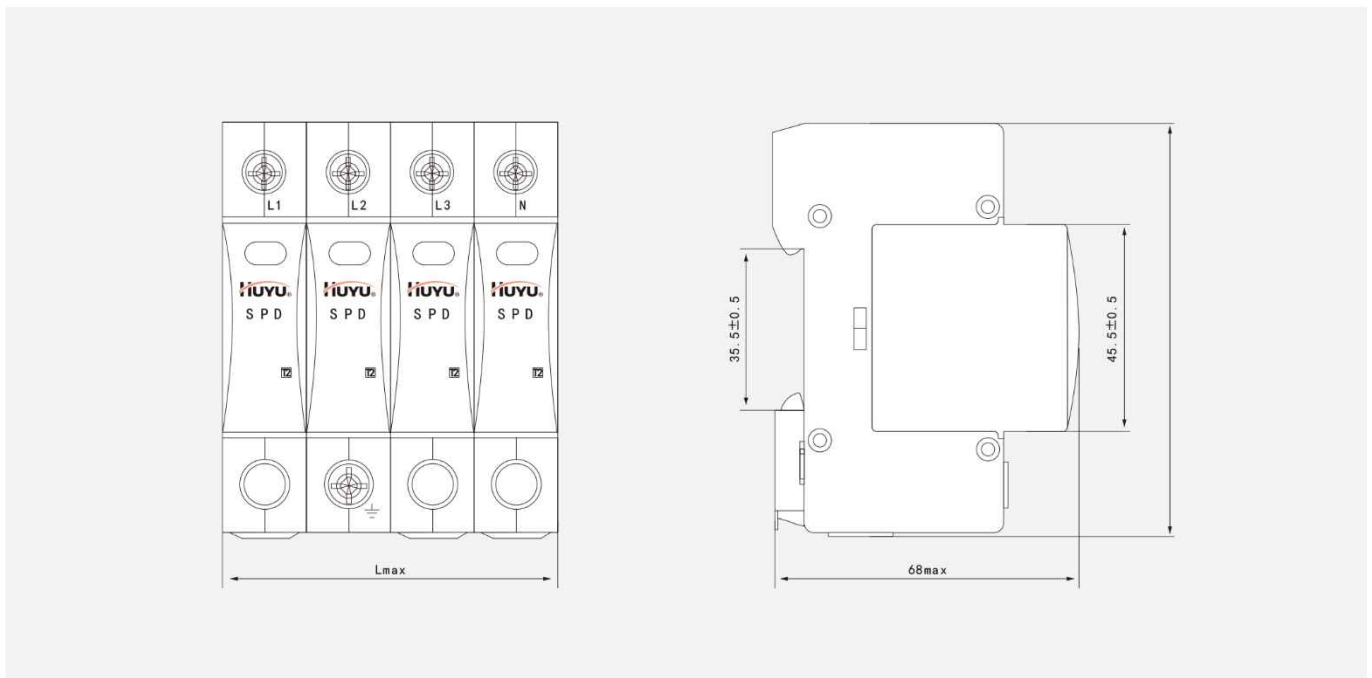
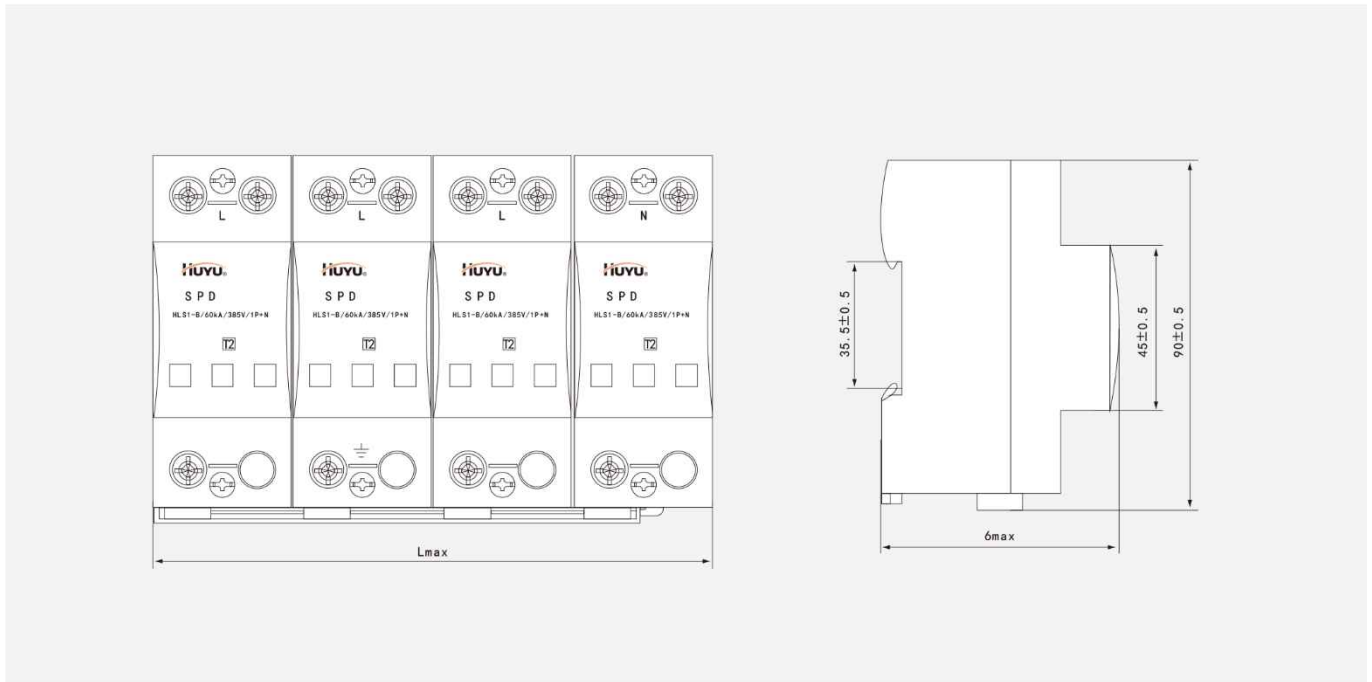
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### Structure of surge protection device

The structure is divided into 1P, 1P+N, 2P, 3P, 3P+N, 4P shell with the internal chips of varistors. The surge protection device for differential mode protection is equipped with a discharge tube unit with a gas discharge tube inside. The surge protection device has a failure release device, which is obvious when it fails due to lightning.

## IX. Outline and Installation Dimensions



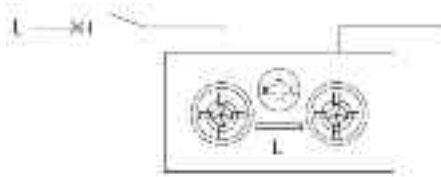
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Model \ Width (mm)		Number of poles					
		1P	1P+N(1N)	2P	3P	3P+N(3N)	4P
Type B	Lmax	36	72	72	108	108	144
Type C	Lmax	18	36	36	54	72	72

### X. Application Considerations

- 10.1 The voltage protection level of the surge protection device shall not be lower than the maximum operating voltage  $U_{s,max}$  (phase voltage) of the power grid, and shall be lower than the withstand impulse voltage of the load at the same time.
- 10.2 Generally, TT and TN-S systems shall adopt differential mode protection (MD), and other systems such as TN-C and IT shall adopt common mode protection.
- 10.3 Fuses or circuit breakers must be connected in series in front of the phase circuit protection device as backup protection. The rated current of the backup protection appliance shall not exceed the maximum allowed by the surge protection device, and its breaking capacity must be greater than the maximum short-circuit current at the network installation.
- 10.4 The minimum cross section area of the earth wire is  $6 \text{ mm}^2$ , the cross-section area of the neutral wire shall not be less than  $4 \text{ mm}^2$ , and the length of the connecting wire shall be less than 0.5 m.
- 10.5 In the TT system, a surge isolating switch shall be connected at the lower end of the surge protection device to prevent the hazard of high voltage to the ground due to the damage of the protection device.
- 10.6 The two terminal structures at the incoming terminal of Type B surge protection device connect the surge protection device in series in the line. The wiring diagram is shown below.



### XI. Ordering Information

When ordering the HLS1 Series Surge Protection Device (SPD), users need to specify the product model, class code (Type B and Type C), number of poles (1P, 1P+N, 2P, 3P, 3P+N, and 4P), continuous operating voltage  $U_c$ , nominal discharge current  $I_n$ , and the quantity of ordered products.