



## Surge Protective Device

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## Surge Protective Device

### Paperless Datasheet

Going green and protecting environment is manufacturers' responsibility. Each WatchfulEyE product has a link of downloading data sheet on its enclosure:

<http://datasheet.watchfuleyesolutions.com/US120304.html>

### Model & Ordering Code

Model	Ordering Code	MCOV/Uc	Remote Contacts	UPC/EAN Code
WTH-120/B/R/1P-275	US120304	275VAC	YES	(0) 811914030904
WTH-120/B/1P-275	US120294		NO	(0) 811914030959
WTH-120/B/R/1P-320	US120305	320VAC	YES	(0) 811914030911
WTH-120/B/1P-320	US120295		NO	(0) 811914030966
WTH-120/B/R/1P-385	US120306	385VAC	YES	(0) 811914030928
WTH-120/B/1P-385	US120296		NO	(0) 811914030973
WTH-120/B/R/1P-420	US120307	420VAC	YES	(0) 811914030935
WTH-120/B/1P-420	US120297		NO	(0) 811914030980



### Certificates of Products



LISTED  
E345944



RoHS

IEC61643-11

Note: MCOV 385VAC UL listed only



## Surge Protective Device

### More Package

Model with suffix	WTH-120/B/R/1P-275	x2pcs	x3pcs	x4pcs
Ordering Code	US120304	US120304x2	US120304x3	US120304x4

Model with suffix	WTH-120/B/1P-275	x2pcs	x3pcs	x4pcs
Ordering Code	US120294	US120294x2	US120294x3	US120294x4

Model with suffix	WTH-120/B/R/1P-320	x2pcs	x3pcs	x4pcs
Ordering Code	US120305	US120305x2	US120305x3	US120305x4

Model with suffix	WTH-120/B/1P-320	x2pcs	x3pcs	x4pcs
Ordering Code	US120295	US120295x2	US120295x3	US120295x4

Model with suffix	WTH-120/B/R/1P-385	x2pcs	x3pcs	x4pcs
Ordering Code	US120306	US120306x2	US120306x3	US120306x4

Model with suffix	WTH-120/B/1P-385	x2pcs	x3pcs	x4pcs
Ordering Code	US120296	US120296x2	US120296x3	US120296x4

Model with suffix	WTH-120/B/R/1P-420	x2pcs	x3pcs	x4pcs
Ordering Code	US120307	US120307x2	US120307x3	US120307x4

Model with suffix	WTH-120/B/1P-420	x2pcs	x3pcs	x4pcs
Ordering Code	US120297	US120297x2	US120297x3	US120297x4



## Surge Protective Device

### Description

In accordance with: IEC 61643-11 - Class I and UL1449 Type 4 Location

Location of use: main sub-distribution boards

One-piece compact design with minimized volume but maximized capability of Class I surge protection.

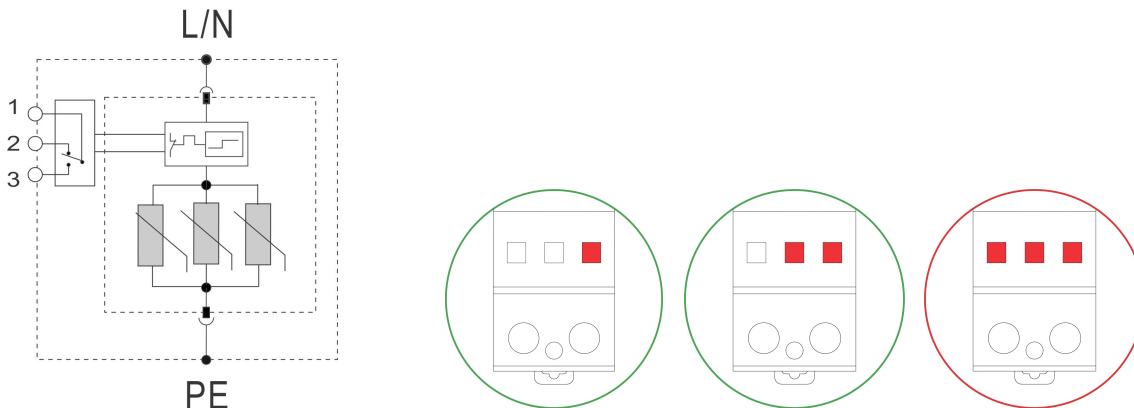
Internal thermal disconnect devices help ensure safe or at end-of-life

### WTH-120/B/R/1P Series Technical Data

Requirement Class to IEC61643-11	Class I
IEEE Category Rating	C & B
Nominal Discharge Current (In)	60kA
Max. Discharge Current (Imax)	120kA
Pulsed Current (Iimp)	15kA
Protection Modes	L-PE, N-PE
Protective Element	MOV
Follow Current (If)	NO
Response Time (tA)	<5ns
Leakage Current (at 75%U1mA)	<20μA
Thermal Protection	YES
Protection Rating (IP Code)	IP 20
Short Circuit Current Ratings (SCCR)	25kA rms
Max. Back-up Fuse (if mains >160A)	160A gL (circuit-breaker: <100A)
Surge Life at 3kA (8/20μs)	>5000 events
Temperature Range	- 40°F to 176°F (-40°C to 80°C)
Relative Humidity	0% to 95% noncondensing
Maximum Operating Altitude	10,000 feet (3000m)
Terminal Cross Section	35mm <sup>2</sup> (solid) / 25mm <sup>2</sup> (stranded)
Stripping Length Contacts	0.6inches (15mm)
Terminal Screw Torque	Max. 3.5Nm
DIN Rail EN60715	35mm top-hat rail
Dimensions DIN 43880	36mm (2TE)
Housing Material	Thermoplastic (UL94 V-0)
Housing Design	One-piece compact design
Net Weight Per Unit	0.46Lb (209g)

## Surge Protective Device

### Surge Protection Connection Diagram

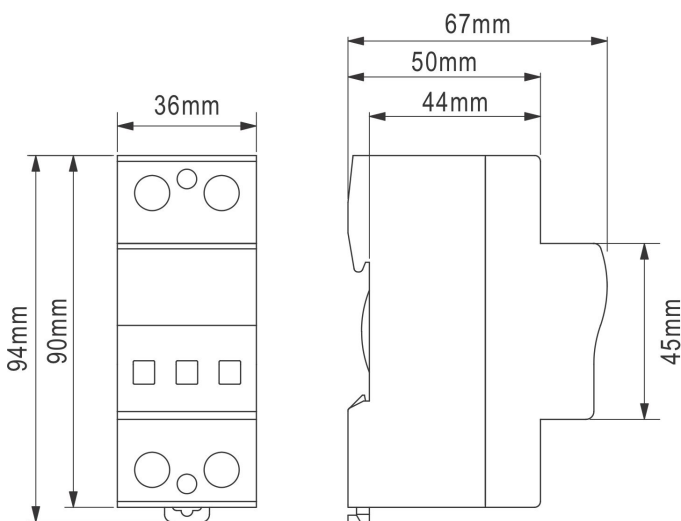


Indication of three levels of surge protection

With three MOVs' protection at the same time, the module can realize Class I surge protection; in case that two of the indicator windows indicates red, it can still meet Class II surge protection requirements.

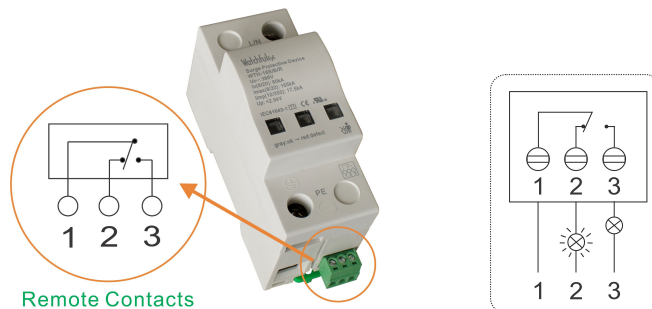
Maximum Continuous Operating Voltage (MCOV/Uc)	275VAC	320VAC	385VAC	420VAC
Voltage Protection Level (Up)	2.1kV	2.2kV	2.4kV	2.5kV
Residual Voltage (Ures)	1.0kV	1.1kV	1.2kV	1.4kV

### Dimensions



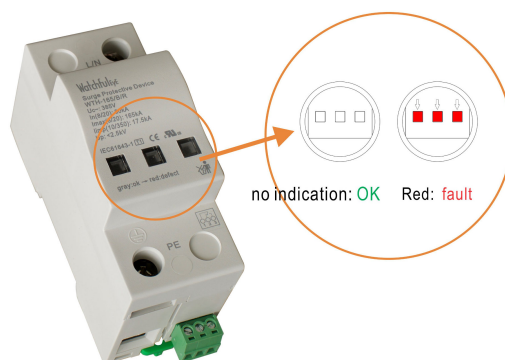
### Remote Contacts (Dry Contacts)

- 1: COM (Common)
- 2: NC (Normally Close)
- 3: NO (Normally Open)



Contact Ratings	125VAC/3A, 250VAC/1.5A
Terminal Cross Section	Max. 1.5mm <sup>2</sup>
Stripping Length Contacts	0.25 inches (6-7mm)
Remote Terminal Torque	0.25Nm

### Fault Indication





## Surge Protective Device

### Common Terms and Definitions

1. Normal operating voltage rating ( $U_n$ )

2. Maximum Continuous Operating Voltage ( $U_c$ /MCOV):

Maximum r.m.s. voltage, which may be continuously applied to the surge protective device's mode of protection.

3. Nominal Discharge Current for Class II Test ( $I_n$ ):

crest value of the current through the surge protective device having a current waveshape of  $8/20\mu s$ .

4. Maximum Discharge Current ( $I_{max}$ ):

Crest value of a current through the surge protective device having an  $8/20\mu s$  waveshape and magnitude according to the manufacturers specification.  $I_{max}$  is equal to or greater than  $I_n$ .

5. Voltage Protection Level ( $U_p$ ):

Maximum voltage to be expected at the surge protective device terminals due to an impulse stress with defined voltage steepness and an impulse stress with a discharge current with given amplitude and waveshape.

6. Residual Voltage ( $U_{res}$ ):

Crest value of voltage that appears between the terminals of an surge protective device due to the passage of discharge current.

7. IEEE 62.41

CATEGORY C: outdoor overhead lines, service entrance (most severe)

CATEGORY B: major feeder, short branch circuits, service panel (indoor)

CATEGORY A: long branch circuits, receptacles (indoor) (least severe)

### How to choose a suitable $U_c$ (MCOV) value

Note:  $U_c > 1.15U_n$

The relationship between two parameters  $U_c$  and  $U_p$  of a surge protective device is proportional.

If  $U_c$  is small, the value of  $U_p$  is also small; surge protective devices with smaller  $U_p$  can provide better surge protection.

Whether to choose smaller  $U_c$  depends on the voltage stability of the grid.

If you choose surge protective devices with smaller  $U_c$  for the grid with instable voltage, the surge protective devices will frequently work while the grid voltage fluctuates, resulting in shortening surge protective device's product life.

If you choose larger  $U_c$ , and the value of  $U_p$  is accordingly large, the surge protective efficiency will not be so fine.

If you are unsure of the voltage stability of the grid,

it is suggested to calculate MCOV( $U_c$ ) using the following formula:  $\sqrt{2} U_n < U_c < \sqrt{3} U_n$

AC Network ( $U_n$ )	MCOV( $U_c$ ), L/N-PE Protection Mode
110V	150V
120/208V	150V
127/220V	150V
220/380V	275V, 320V, 385V
230/400V	275V, 320V, 385V, 420V
240/415V	320V, 385V, 420V
277/480V	320V, 385V, 420V
347/600V	550V, 690V

### AC Network Connection Diagram (1/2)

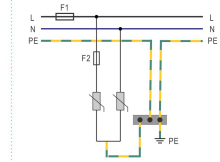
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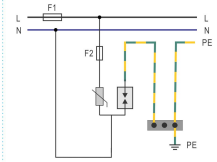
#### AC System Voltage

L-N:  
110V, 120V, 127V  
220V, 230V, 240V  
277V, 480V

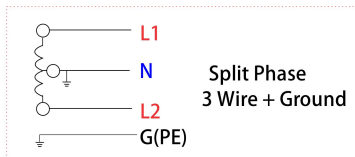
#### 2P Combination



#### 1P+NPE Combination



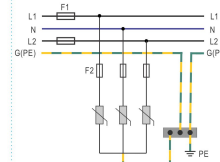
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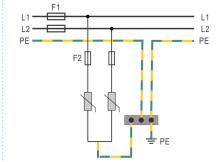
#### AC System Voltage

L-N/L-L:  
120/240V  
127/254V  
240/480V  
277/480V

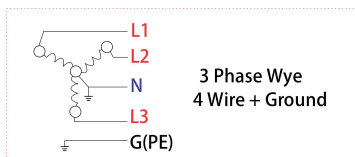
#### 3P Combination



#### 2P Combination



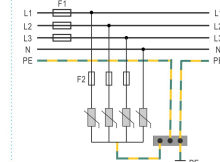
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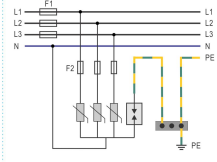
#### AC System Voltage

L-N/L-L:  
120V/208Y  
127V/220Y  
220V/380Y  
230V/400Y  
240V/415Y  
277V/480Y  
347V/600Y

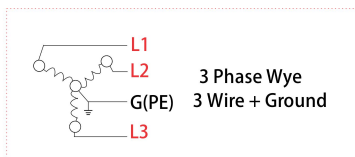
#### 4P Combination



#### 3P+NPE Combination



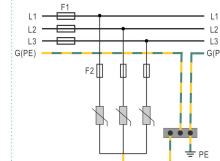
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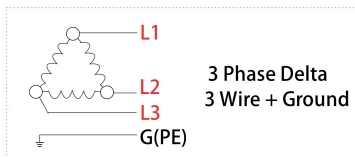
#### AC System Voltage

L-L:  
480V

#### 3P Combination



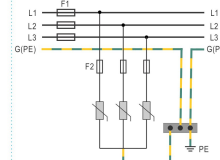
5



#### AC System Voltage

L-L:  
240V  
480V  
600V

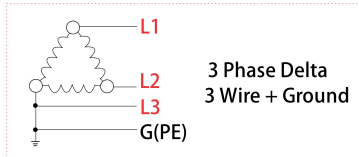
#### 3P Combination





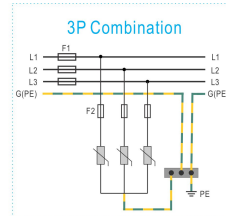
### AC Network Connection Diagram (2/2)

6

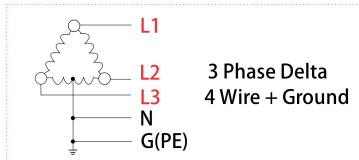


AC System Voltage

L-L:  
240V  
480V  
600V

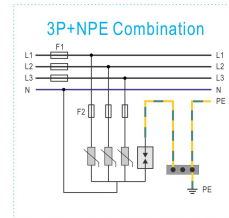
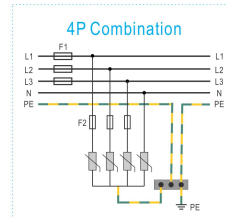


7



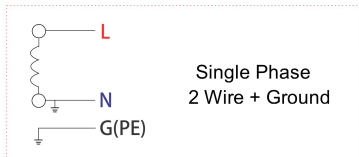
AC System Voltage

L-N/L-L:  
120/240V  
240/480V



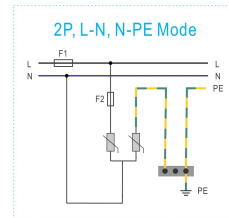
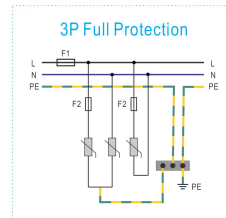
### Difference mode & Common mode Connection Diagram

8



AC System Voltage

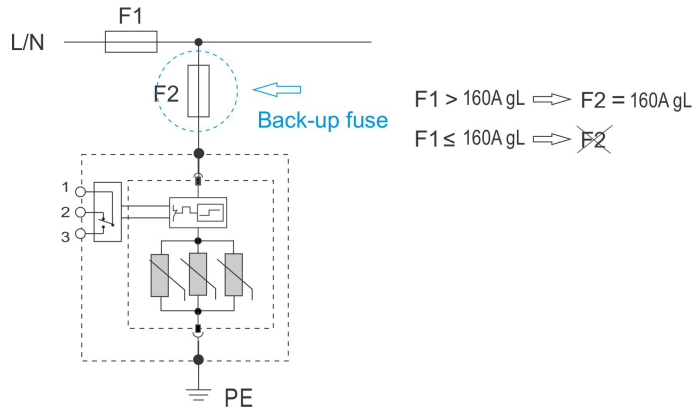
L-N:  
110V, 120V, 127V  
220V, 230V, 240V  
277V, 480V



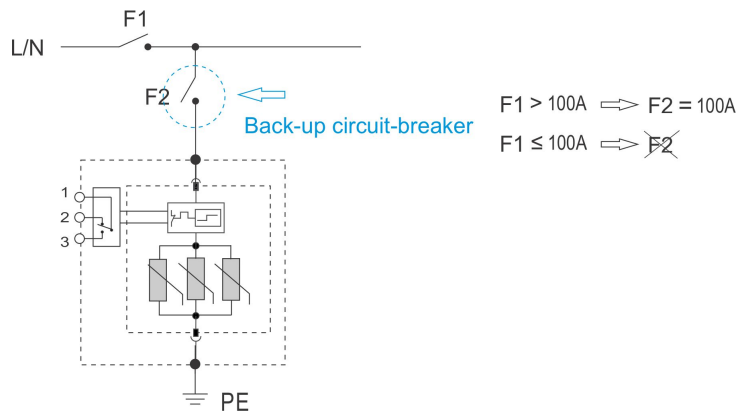
**Common mode:** L-PE, N-PE surge protection

**Difference mode:** L-N surge protection

### Selection of back-up fuse

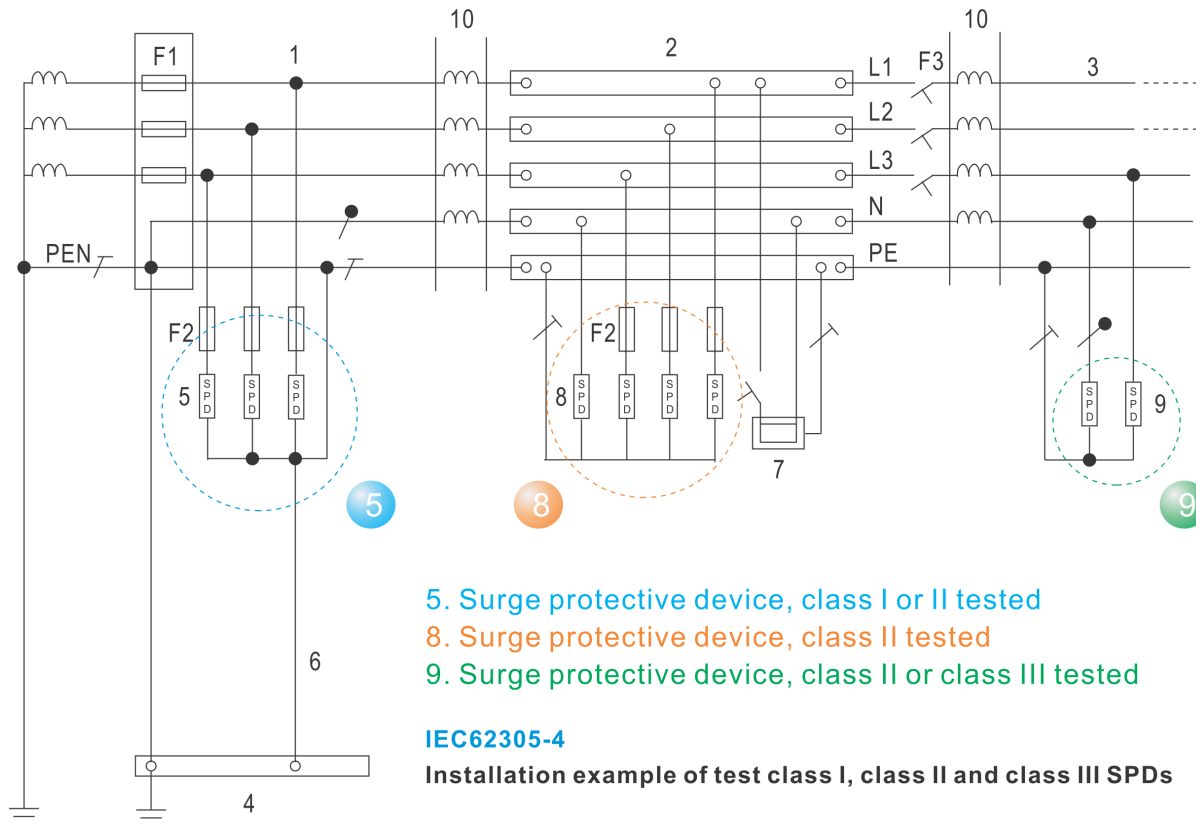


### Selection of back-up circuit-breaker



## Surge Protective Device

### Application



### Key

1. Origin of the installation
  2. Distribution board
  3. Distribution outlet
  4. Main earthing terminal or bar
  5. Surge protective device, class I or II tested
  6. Earthing connection (earthing conductor) of the surge protective device
  7. Fixed equipment to be protected
  8. Surge protective device, class II tested
  9. Surge protective device, class II or class III tested
  10. Decoupling element or line length
- F1, F2, F3 overcurrent protective disconnectors
- NOTE Refer to IEC 61643-12 for further information.



## Surge Protective Device

### N-PE Module

WTH-165/G module integrates High-Energy GDT, no leakage current. It pairs WTH-120/B/R series surge protector, combined into N-PE protection mode, the two modules are the same in dimension and shape, and are connected with a dedicated bus-bar to achieve a perfect combination.

#### WTH-165/G Technical Data

Max. continuous operating voltage (Uc)	255V
Nominal Discharge Current (In)	80kA
Max. Discharge Current (Imax)	165kA
Pulsed Current (Iimp)	52.5kA
Voltage protection level (Up)	1.5kV
Protection Modes	N-PE only
Protective Element	High Energy GDT
Follow Current (If)	100A rms
Response Time (tA)	<100ns
Net Weight Per Unit	0.4Lb (180g)

### 3P + NPE Combintion Package

Model with suffix	Ordering Code	Model with suffix	Ordering Code
WTH-120/B/R/1P-275 x3pcs +NPE	US120304x3N	WTH-120/B/1P-275 x3pcs +NPE	US120294x3N
WTH-120/B/R/1P-320 x3pcs +NPE	US120305x3N	WTH-120/B/1P-320 x3pcs +NPE	US120295x3N
WTH-120/B/R/1P-385 x3pcs +NPE	US120306x3N	WTH-120/B/1P-385 x3pcs +NPE	US120296x3N
WTH-120/B/R/1P-420 x3pcs +NPE	US120307x3N	WTH-120/B/1P-420 x3pcs +NPE	US120297x3N

### 1P + NPE Combintion Package

Model with suffix	Ordering Code	Model with suffix	Ordering Code
WTH-120/B/R/1P-275 +NPE	US120304x1N	WTH-120/B/1P-275 +NPE	US120294x1N
WTH-120/B/R/1P-320 +NPE	US120305x1N	WTH-120/B/1P-320 +NPE	US120295x1N
WTH-120/B/R/1P-385 +NPE	US120306x1N	WTH-120/B/1P-385 +NPE	US120296x1N
WTH-120/B/R/1P-420 +NPE	US120307x1N	WTH-120/B/1P-420 +NPE	US120297x1N



## Surge Protective Device

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### FAQ & Help

1. What should I do if I can't find the paper manual in the product packaging?

Watchful Eye products is committed to going green with paperless data sheets. On the side of each product enclosure is an engraved link with URL for downloading paperless data sheet and QR code of the website. If you need the paper data sheet, you can open the link and print the data sheet by yourself.

2. The advantages of fault indication windows?

If surge protection fails, the fault indication windows will turn red, thus it can be seen intuitively, and the surge protective device can be replaced in time to avoid damage to the equipment caused by a second surge.

3. What instruments can be used to test whether its surge protection function is normal or not?

Test with a Watchful Eye surge protector tester

4. Can you list more applications?

Power supply panel, whole house



## Surge Protective Device

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### Download WatchfulEye Official App

To learn about more products and updates from company, please scan QR code to download the official App:



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### After-sale Services

Watchful Eye provides a 5-year quality warranty globally.

[I have a question](#)