



## Surge Protective Device

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| WTH-80/B+C/R Series                              |    |
|--------------------------------------------------|----|
| Paperless Datasheet                              | 01 |
| Model & Ordering Code                            | 01 |
| Certificates of Products                         | 01 |
| More Package                                     | 02 |
|                                                  |    |
| Technical Data                                   | 03 |
| Surge Protection Connection Diagram              | 04 |
| Dimensions                                       | 04 |
| Remote Contacts (Dry Contacts)                   | 05 |
| Fault Indication                                 | 05 |
|                                                  |    |
| Common Terms and Definitions                     | 06 |
| How to choose a suitable Uc(MCOV) value          | 06 |
| AC Network Connection Diagram                    | 07 |
| Difference mode & Common mode Connection Diagram | 08 |
| Selection of back-up fuse                        | 09 |
| Selection of back-up circuit-breaker             | 09 |
| Application                                      | 10 |
|                                                  |    |
| N-PE Module                                      | 11 |
| 3P + NPE Combintion Package                      | 11 |
| 1P + NPE Combintion Package                      | 11 |
|                                                  |    |
| FAQ & Help                                       | 12 |
| Download WatchfulEyE Official App                | 13 |
| After-sale Services                              | 13 |
| I have a question                                | 13 |



## 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/US220254.html>

### 3D file download

[http://www.watchfuleyesolutions.com/wth\\_rar/3D/24WTH100-1P-36.stp.zip](http://www.watchfuleyesolutions.com/wth_rar/3D/24WTH100-1P-36.stp.zip)

### Model & Ordering Code

| Model               | Ordering Code | MCOV/Uc | Remote Contacts | UPC/EAN Code     |
|---------------------|---------------|---------|-----------------|------------------|
| WTH-80/B+C/R/1P-275 | US220254      | 275VAC  | YES             | (0) 811914030669 |
| WTH-80/B+C/1P-275   | US220244      |         | NO              | (0) 811914030720 |
| WTH-80/B+C/R/1P-320 | US220255      | 320VAC  | YES             | (0) 811914030676 |
| WTH-80/B+C/1P-320   | US220245      |         | NO              | (0) 811914030737 |
| WTH-80/B+C/R/1P-385 | US220256      | 385VAC  | YES             | (0) 811914030683 |
| WTH-80/B+C/1P-385   | US220246      |         | NO              | (0) 811914030744 |
| WTH-80/B+C/R/1P-420 | US220257      | 420VAC  | YES             | (0) 811914030690 |
| WTH-80/B+C/1P-420   | US220247      |         | NO              | (0) 811914030751 |



### Certificates of Products



CE RoHS IEC61643-11



## Surge Protective Device

### More Package

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-275 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220254            | US220254x2 | US220254x3 | US220254x4 |

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-275 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220244            | US220244x2 | US220244x3 | US220244x4 |

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-320 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220255            | US220255x2 | US220255x3 | US220255x4 |

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-320 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220245            | US220245x2 | US220245x3 | US220245x4 |

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-385 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220256            | US220256x2 | US220256x3 | US220256x4 |

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-385 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220246            | US220246x2 | US220246x3 | US220246x4 |

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-420 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220257            | US220257x2 | US220257x3 | US220257x4 |

|                   |                     |            |            |            |
|-------------------|---------------------|------------|------------|------------|
| Model with suffix | WTH-80/B+C/R/1P-420 | x2pcs      | x3pcs      | x4pcs      |
| Ordering Code     | US220247            | US220247x2 | US220247x3 | US220247x4 |



## Surge Protective Device

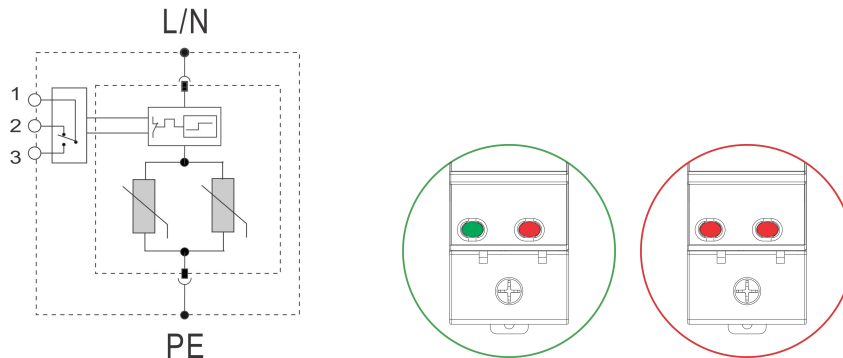
### Description

In accordance with: IEC/EN61643-11 - Class I+II and UL1449 Type 4 Location  
Location of use: main sub-distribution boards, branch sub-distribution boards  
Plug-in module and separate base design enables convenient maintenance.  
Internal thermal disconnect devices help ensure safe or at end-of-life

### WTH-80/B+C/R/1P Series Technical Data

|                                      |                                                          |
|--------------------------------------|----------------------------------------------------------|
| Requirement Class to IEC/EN61643-11  | Class I+II                                               |
| IEEE Category Rating                 | C, B & A                                                 |
| Nominal Discharge Current (In)       | 40kA                                                     |
| Max. Discharge Current (Imax)        | 80kA                                                     |
| Pulsed Current (Iimp)                | 10kA                                                     |
| 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 >100A)   | 100A gL (circuit-breaker: <50A)                          |
| 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                       | Modular design                                           |
| Net Weight Per Unit                  | 0.5Lb (227g)                                             |

### Surge Protection Connection Diagram

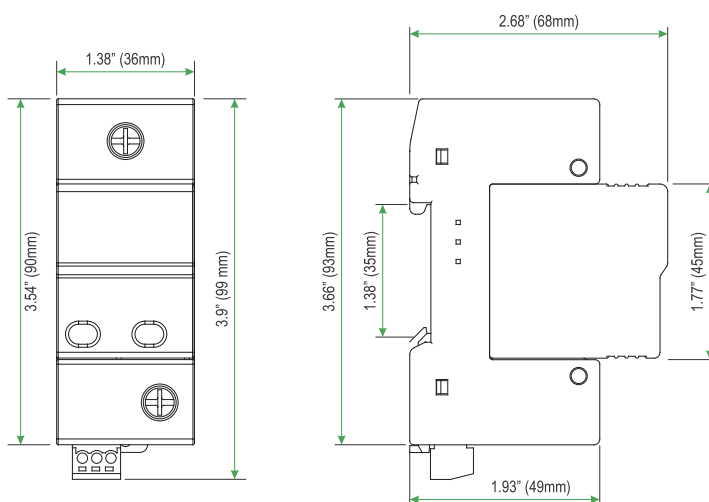


Indication of two levels of surge protection

The capability of displaying 50 percent of surge protection capacity: under normal circumstances, with two MOVs' protection at the same time, the module can realize Class I surge protection; in case that one of the indicator windows indicates red, there's still 50% of surge protection capacity to meet Class II surge protection requirements, and the module shall be replaced timely at this point.

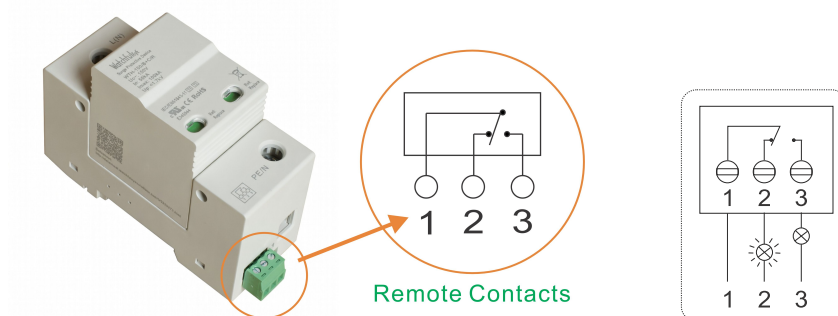
|                                                |        |        |        |        |
|------------------------------------------------|--------|--------|--------|--------|
| Maximum Continuous Operating Voltage (MCOV/Uc) | 275VAC | 320VAC | 385VAC | 420VAC |
| Voltage Protection Level (Up)                  | 1.8kV  | 2.0kV  | 2.1kV  | 2.2kV  |
| Residual Voltage (Ures)                        | 1.0kV  | 1.1kV  | 1.2kV  | 1.4kV  |

### Dimensions



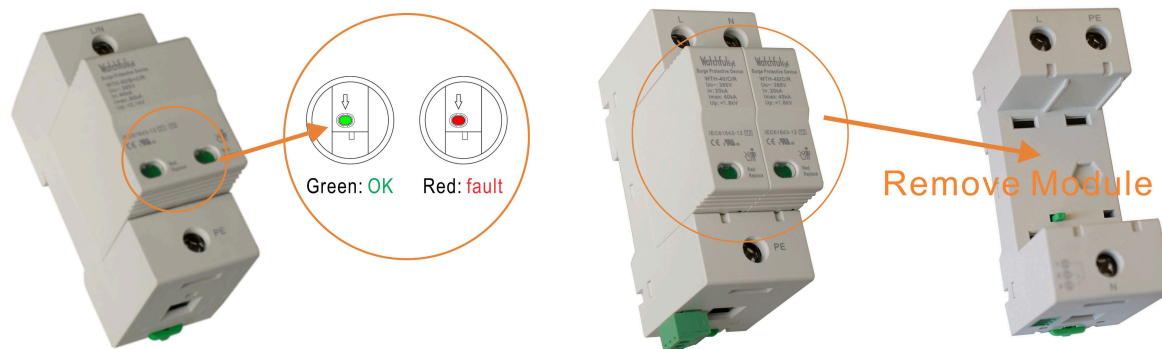
### Remote Contacts (Dry Contacts)

- 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



### 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.

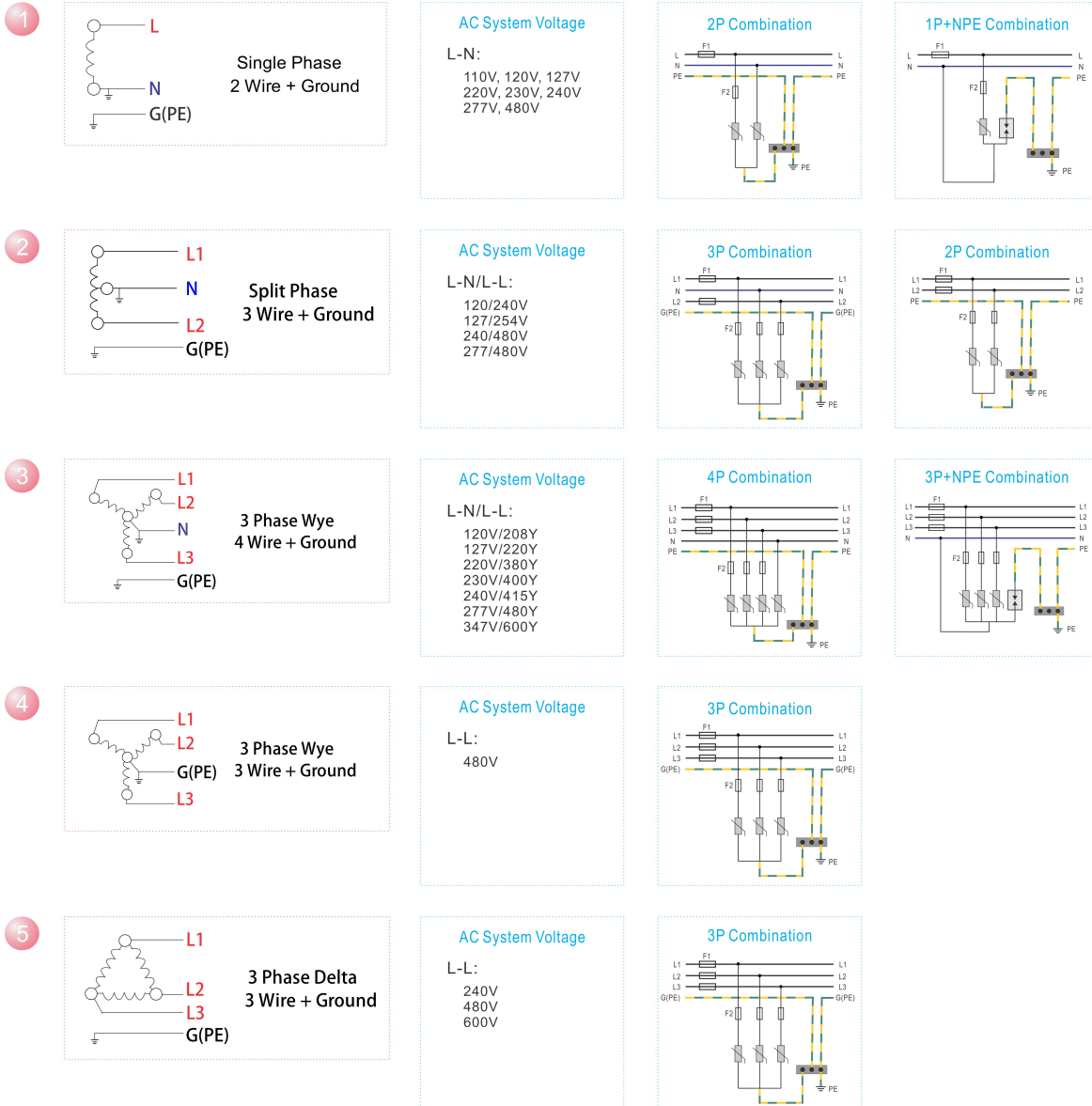
If you choose larger  $U_c$ , and the value of  $U_p$  is accordingly large, the surge protective efficiency will not be so fine.

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, 120/208V, 127/220V | 150V                                  |
| 220/380V                 | 275V, 320V, 385V                      |
| 230/400V                 | 275V, 320V, 385V, 420V                |
| 240/415V                 | 320V, 385V, 420V                      |
| 266/460V, 277/480V       | 385V, 420V                            |
| 347/600V                 | 550V, 690V                            |
| Wind Power System        | 690V (Grid side ), 885V (Gen side )   |

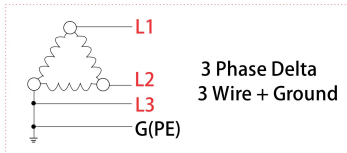
### AC Network Connection Diagram (1/2)





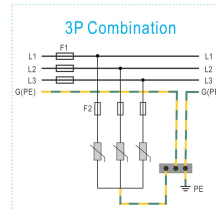
### AC Network Connection Diagram (2/2)

6

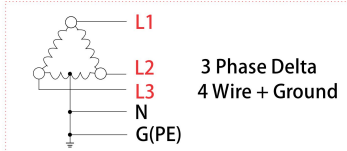


#### AC System Voltage

L-L:  
240V  
480V  
600V

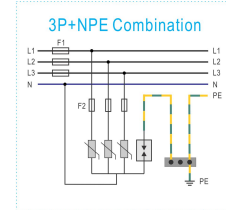
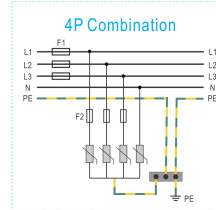


7



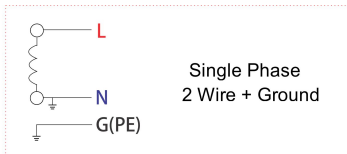
#### AC System Voltage

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



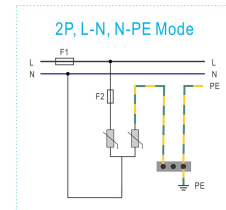
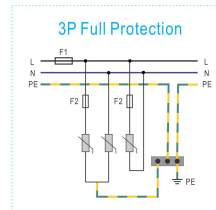
### Difference mode & Common mode Connection Diagram

8



#### AC System Voltage

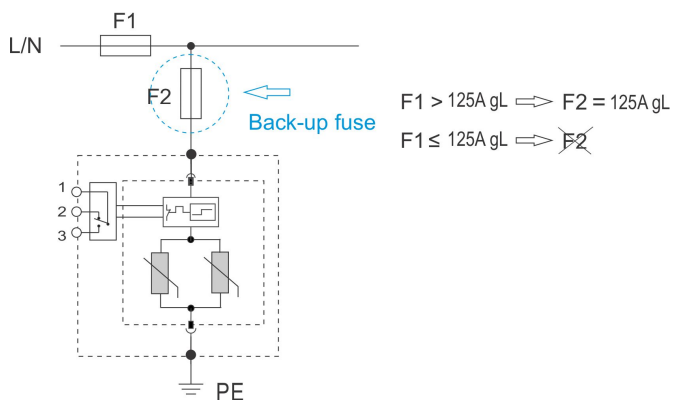
L-N:  
110V, 120V, 127V  
220V, 230V, 240V  
277V, 480V



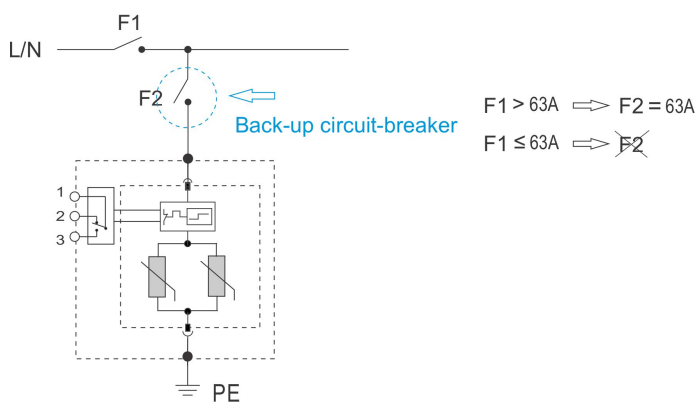
Common mode: L-PE, N-PE surge protection

Difference mode: L-N surge protection

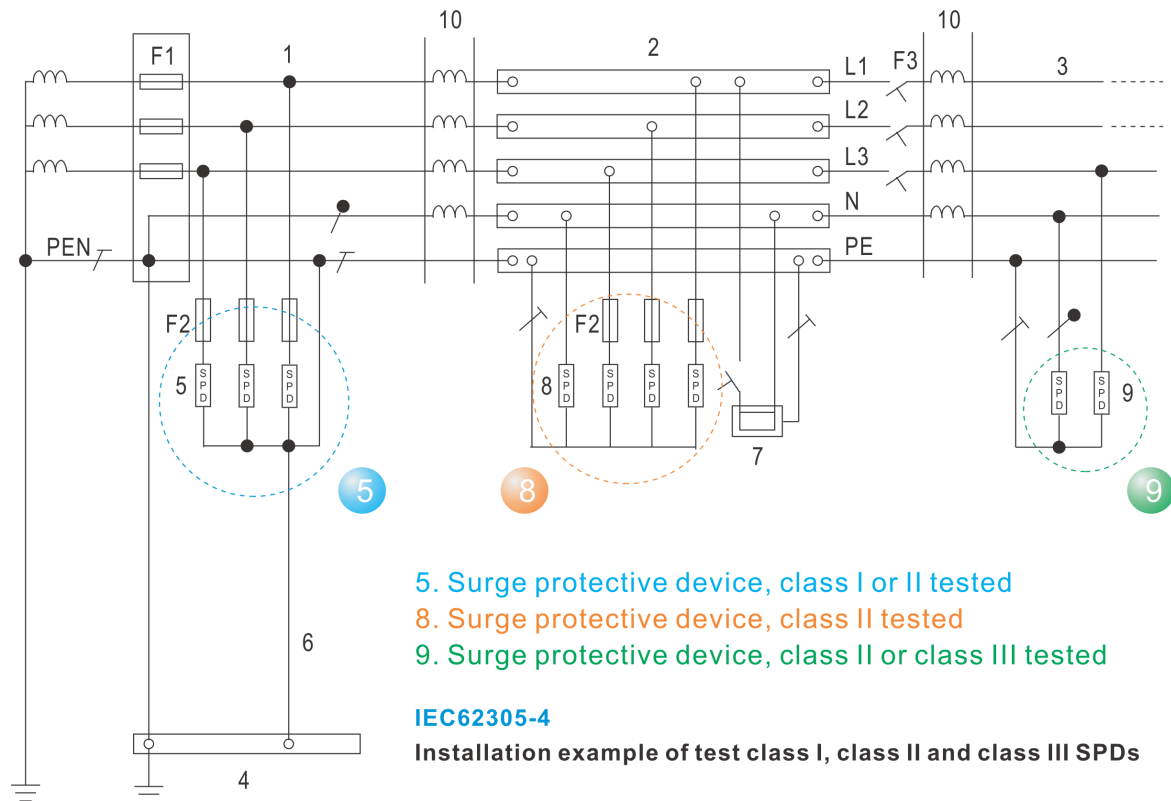
### Selection of back-up fuse



### Selection of back-up circuit-breaker



### 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-100/G module integrates High-Energy GDT, no leakage current. It pairs WTH-80/B+C/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-100/G Technical Data

|                                        |                 |
|----------------------------------------|-----------------|
| Max. continuous operating voltage (Uc) | 255V            |
| Nominal Discharge Current (In)         | 50kA            |
| Max. Discharge Current (Imax)          | 100kA           |
| Pulsed Current (Iimp)                  | 37.5kA          |
| Voltage protection level (Up)          | 1.2kV           |
| 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-80/B+C/R/1P-275 x3pcs +NPE | US220254x3N   | WTH-80/B+C/1P-275 x3pcs +NPE | US220244x3N   |
| WTH-80/B+C/R/1P-320 x3pcs +NPE | US220255x3N   | WTH-80/B+C/1P-320 x3pcs +NPE | US220245x3N   |
| WTH-80/B+C/R/1P-385 x3pcs +NPE | US220256x3N   | WTH-80/B+C/1P-385 x3pcs +NPE | US220246x3N   |
| WTH-80/B+C/R/1P-420 x3pcs +NPE | US220257x3N   | WTH-80/B+C/1P-420 x3pcs +NPE | US220247x3N   |

### 1P + NPE Combintion Package

| Model with suffix        | Ordering Code | Model with suffix      | Ordering Code |
|--------------------------|---------------|------------------------|---------------|
| WTH-80/B+C/R/1P-275 +NPE | US220254x1N   | WTH-80/B+C/1P-275 +NPE | US220244x1N   |
| WTH-80/B+C/R/1P-320 +NPE | US220255x1N   | WTH-80/B+C/1P-320 +NPE | US220245x1N   |
| WTH-80/B+C/R/1P-385 +NPE | US220256x1N   | WTH-80/B+C/1P-385 +NPE | US220246x1N   |
| WTH-80/B+C/R/1P-420 +NPE | US220257x1N   | WTH-80/B+C/1P-420 +NPE | US220247x1N   |



## 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. How to connections of the SPD?

Please refer to the standard IEC 60364-5-53

Connecting conductors of SPDs:

Conductors between the SPD and the main earthing terminal or the protective conductor shall have a cross-sectional area not less than: - 6 mm<sup>2</sup> copper or equivalent for class II tested SPDs installed at or near the origin of the installation;

- 16 mm<sup>2</sup> copper or equivalent for class I tested SPDs installed at or near the origin of the installation.

a) L/N to surge protector copper recommended diameter: 7AWG (10mm<sup>2</sup>), minimum: 6mm<sup>2</sup>

b) surge protector to PE copper recommended diameter: 5AWG (16mm<sup>2</sup>), minimum: 10mm<sup>2</sup>

(a+b) ≤ 0.5m

5. Can you list more applications?

Power supply panel, whole house

6. What is the feature of Class I+II?

It provides high capability of Class I surge protection, and capability of Class II (equivalent to the parameters of WTH-40) fine protection with low residual voltage as well, applying to Class I and Class II surge protection in multiple areas. If you are not sure which module to choose for protecting your area, Class I + II is the best solution.

6. What's the difference between protection modes of 3+NPE and 4P?

According to the electrical diagram, 4P is common mode protection, the surge of each line will leak to the PE ground;

3P+NPE is differential mode protection, the surge of L-line is discharged to the N-line first, and then to PE ground.

The selection of 4P or 3P+NPE mode protection is based on the engineer's preference.

Normally it's default that PE grounding is in good condition and either 4P or 3P+NPE can be used, and the better option is 4P.

If you can't confirm whether the grounding is good or not, using 3P+NPE can protect against leakage to N. But in surge protection standards, poor PE grounding is not in compliance with the requirements.

You can choose MOV or GDT for N-PE as protection components. If GDT is used, there will be no leakage current on N-PE.



## 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](#)