WatchfulEyE

Surge Protective Device

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WatchfulEyE

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

3D file download

http://www.watchfuleyesolutions.com/wth_rar/3D/WTH-165.STEP.zip

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 CE RoHS IEC61643-11

Note: MCOV 385VAC UL listed only

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

WatchfulEyE

Surge Protective Device

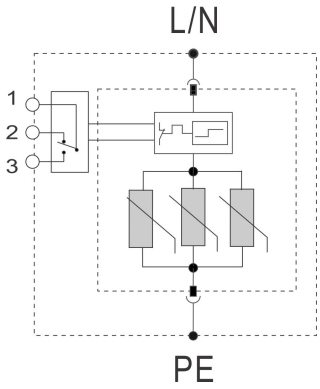
Description

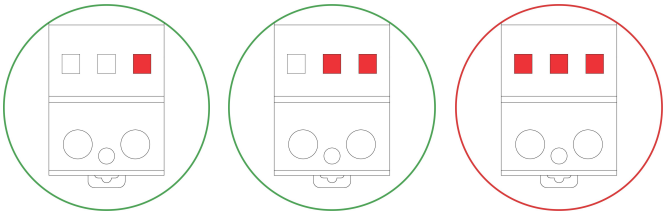
In accordance with: IEC/EN61643-11 - Class I and UL1449 Type 4 Location
Location of use: main sub-distribution boards
One-piece compact design with minimized volume but maximized capability of Class I surge protection.
Internal thermal disconnect devices help ensure safe or at end-of-life

WTH-120/B/R/1P Series Technical Data	
Requirement Class to IEC/EN61643-11	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	35mm² (solid) / 25mm² (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

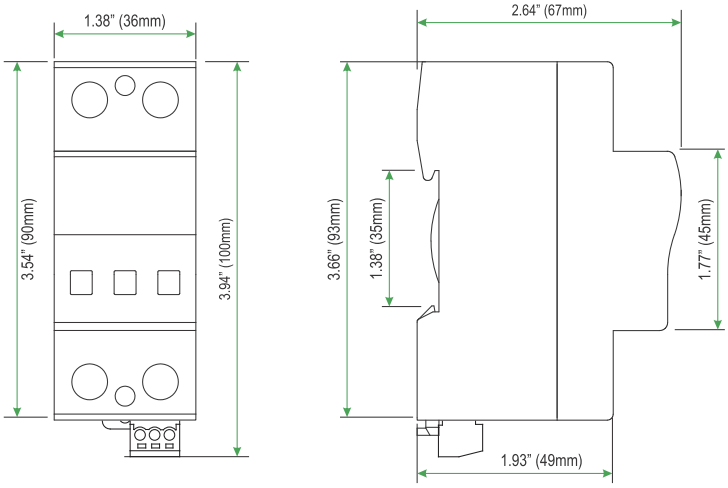




Indication of three levels of surge protection
With three MOVs' protection at the same time, the module can realize Class I surge protection; in case that two of the indicator windows indicates red, it can still meet Class II surge protection requirements.

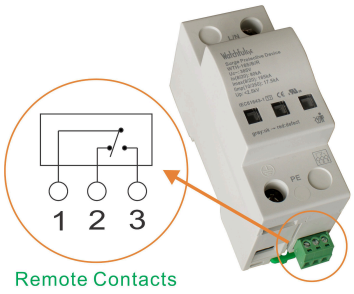
Maximum Continuous Operating Voltage (MCOV/Uc)	275VAC	320VAC	385VAC	420VAC
Voltage Protection Level (Up)	2.1kV	2.2kV	2.4kV	2.5kV
Residual Voltage (Ures)	1.0kV	1.1kV	1.2kV	1.4kV

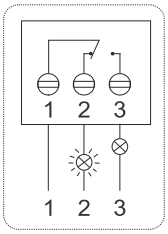
Dimensions



Remote Contacts (Dry Contacts)

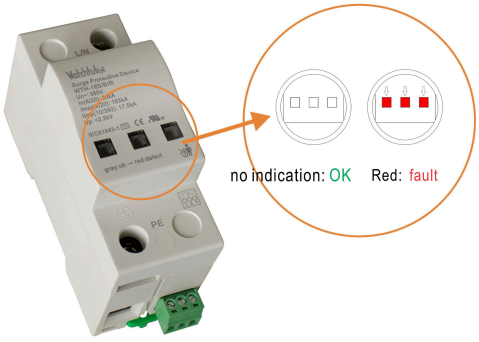
1: COM (Common)
2: NC (Normally Close)
3: NO (Normally Open)





Contact Ratings	125VAC/3A, 250VAC/1.5A
Terminal Cross Section	Max. 1.5mm²
Stripping Length Contacts	0.25 inches (6-7mm)
Remote Terminal Torque	0.25Nm

Fault Indication



Common Terms and Definitions

1. Normal operating voltage rating (Un)
2. Maximum Continuous Operating Voltage (Uc/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 (In):
crest value of the current through the surge protective device having a current waveshape of 8/20μs.
4. Maximum Discharge Current (Imax):
Crest value of a current through the surge protective device having an 8/20μs waveshape and magnitude according to the manufacturers specification. Imax is equal to or greater than In.
5. Voltage Protection Level (Up):
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 (Ures):
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)

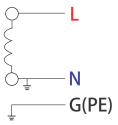
How to choose a suitable Uc(MCOV) value

Note: Uc >1.15Un
The relationship between two parameters Uc and Up of a surge protective device is proportional.
If Uc is small, the value of Up is also small; surge protective devices with smaller Up can provide better surge protection.
Whether to choose smaller Uc depends on the voltage stability of the grid.
If you choose surge protective devices with smaller Uc 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 Uc, and the value of Up 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(Uc) using the following formula: $\sqrt{2}$ Un < Uc < $\sqrt{3}$ Un

AC Network (Un)	MCOV(Uc), 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)

1



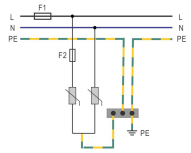
Single Phase
2 Wire + Ground

AC System Voltage

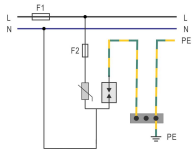
L-N:

110V, 120V, 127V
220V, 230V, 240V
277V, 480V

2P Combination



1P+NPE Combination



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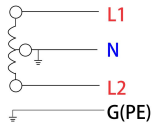


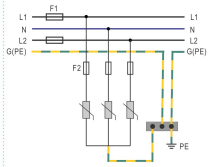
Split Phase
3 Wire + Ground

AC System Voltage

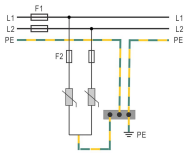
L-N/L-L:

120/240Y
127/254V
240/480V
277/480V

3P Combination



2P Combination



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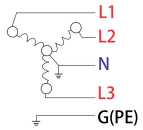


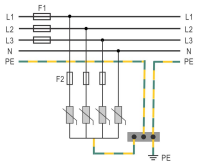
3 Phase Wye
4 Wire + Ground

AC System Voltage

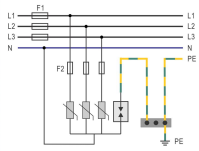
L-N/L-L:

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

4P Combination



3P+NPE Combination



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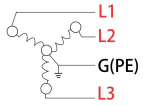


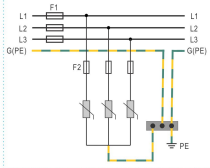
3 Phase Wye
3 Wire + Ground

AC System Voltage

L-L:

480V

3P Combination



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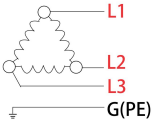


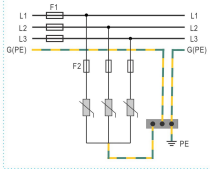
3 Phase Delta
3 Wire + Ground

AC System Voltage

L-L:

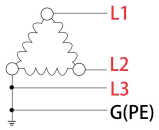
240V
480V
600V

3P Combination



AC Network Connection Diagram (2/2)

6



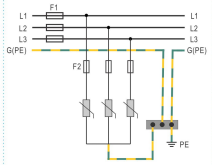
3 Phase Delta
3 Wire + Ground

AC System Voltage

L-L:

240V
480V
600V

3P Combination



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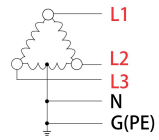


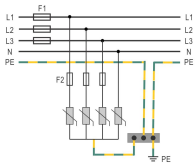
3 Phase Delta
4 Wire + Ground

AC System Voltage

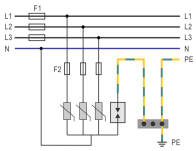
L-N/L-L:

120/240V
240/480V

4P Combination

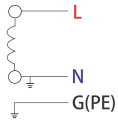


3P+NPE Combination



Difference mode & Common mode Connection Diagram

8



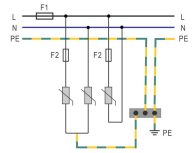
Single Phase
2 Wire + Ground

AC System Voltage

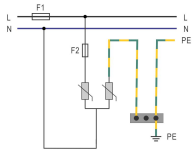
L-N:

110V, 120V, 127V
220V, 230V, 240V
277V, 480V

3P Full Protection



2P, L-N, N-PE Mode



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

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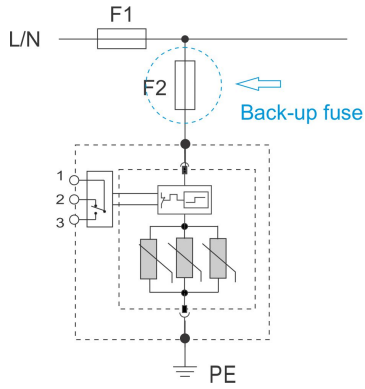
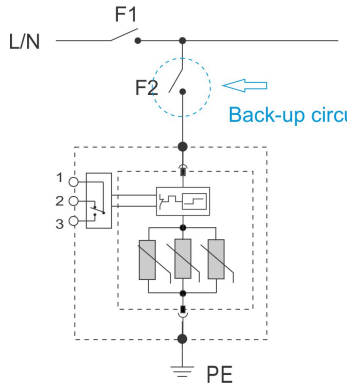
Selection of back-up fuse



F1 > 160A gL ⇨ F2 = 160A gL
F1 ≤ 160A gL ⇨ ~~F2~~

Selection of back-up circuit-breaker



F1 > 100A ⇨ F2 = 100A
F1 ≤ 100A ⇨ ~~F2~~

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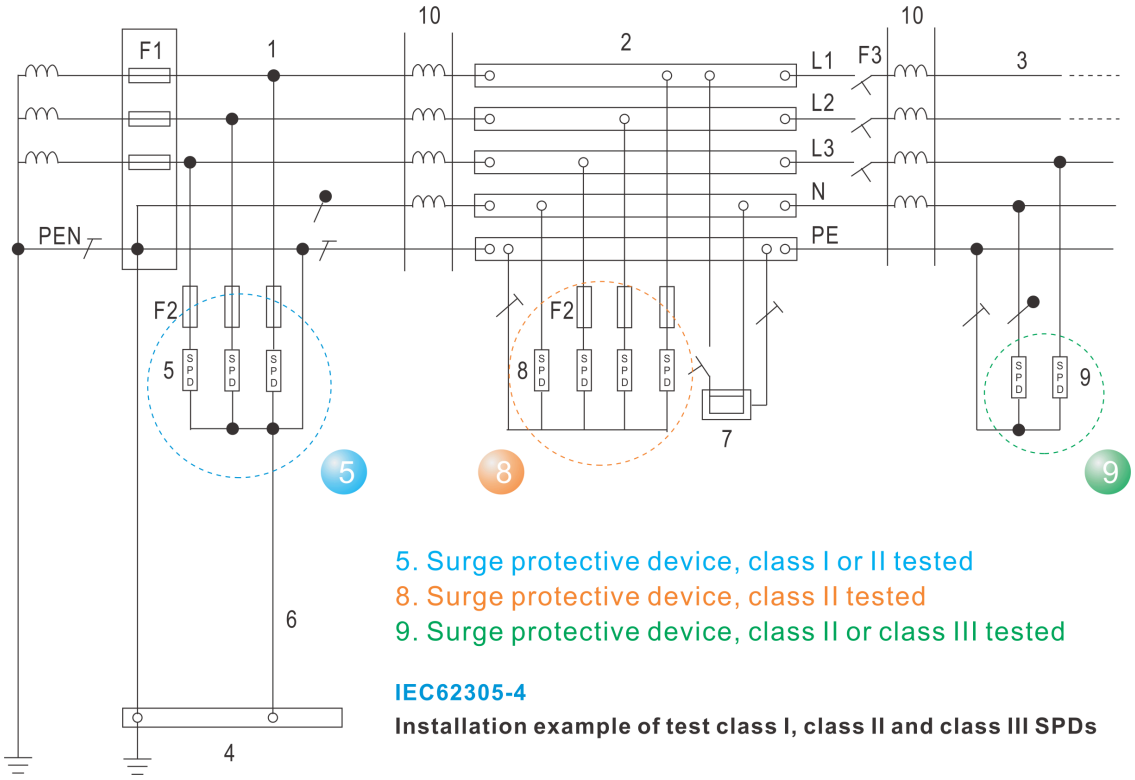
Application



5. Surge protective device, class I or II tested
8. Surge protective device, class II tested
9. Surge protective device, class II or class III tested

IEC62305-4

Installation example of test class I, class II and class III SPDs

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.

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

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 mm² copper or equivalent for class II tested SPDs installed at or near the origin of the installation;
- 16 mm² 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 (10mm²), minimum: 6mm²
b) surge protector to PE copper recommended diameter: 5AWG (16mm²), minimum: 10mm²
(a+b) ≤ 0.5m

5. Can you list more applications?
Power supply panel, whole house

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After-sale Services

Watchful Eye provides a 5-year quality warranty globally.

I have a question