



Surge Protective Device

LINE-TO-LINE ISOLATION.

OPTIMIZED FOR HIGH-VOLTAGE DC BESS.

Paperless Datasheet

In support of environmental sustainability, WatchfulEye provides digital datasheets accessible via a QR code laser-marked on the product housing. Scan the QR code or visit the link below to download the latest datasheet:
<http://datasheet.watchfuleyesolutions.com/US220395.html>

Model & Ordering Code (3P Mode)

Model	Ordering Code	MCOV/Uc	Up	Ures	UPC/EAN Code
WTH-40/C/3P-PV200	US220397	200Vdcpv	1.7kV	1.2kV	(0) 811914032076
WTH-40/C/3P-PV400	US220398	400Vdcpv	2.2kV	1.5kV	(0) 811914032083
WTH-40/C/3P-PV600	US220334	600Vdcpv	2.5kV	1.9kV	(0) 811914032090
WTH-40/C/3P-PV800	US220335	800Vdcpv	3.2kV	2.5kV	(0) 811914032106
WTH-40/C/3P-PV1000	US220330	1000Vpvdv	3.4kV	2.8kV	(0) 811914032113
WTH-40/C/3P-PV1000G	US220330G	1000Vpvdv	3.4kV	2.8kV	with GDT, limp:15kA
WTH-40/C/3P-PV1200	US220331	1200Vpvdv	3.6kV	3.0kV	(0) 811914032120
WTH-40/C/3P-PV1600	US220395	1600Vpvdv	4.6kV	3.6kV	(0) 811914032137
WTH-40/C/3P-PV2000	US220396	2000Vpvdv	5.7kV	4.6kV	(0) 811914032144





Surge Protective Device

Description

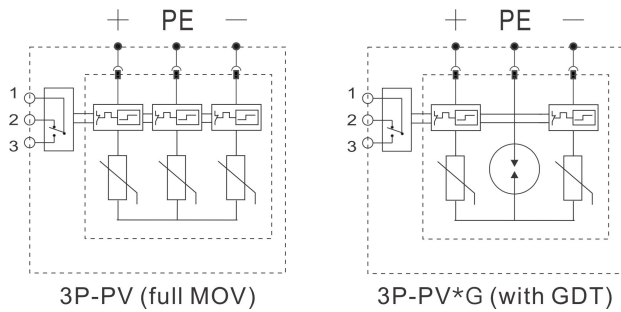
In accordance with: IEC/EN61643-11 - Class II and UL1449 Type 4 Location
Battery Management System, Suitable for off-grid PV system or grid-connected system
Location of use: Battery Energy Storage System (BESS), DC System, DCpv System, Photovoltaic Combiner Box, Photovoltaic Power Supply Box
Plug-in module and separate base design enables convenient maintenance.
Internal thermal disconnect devices help ensure safe or at end-of-life

WTH-40/C DC & PV Series Technical Data

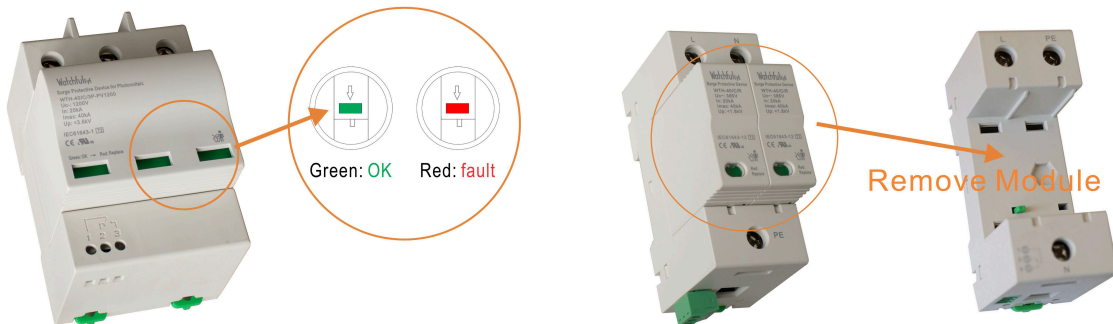
Requirement Class to IEC/EN61643-11	Class II
IEEE Category Rating	B & A
Nominal Discharge Current (In)	20kA
Max. Discharge Current (Imax)	40kA
Protection Modes	DC+/PE, DC-/PE, DC+/DC-
Protective Element	MOV
Follow Current (If)	NO
Response Time (tA)	<5ns
Leakage Current (at 75%U1mA)	<20μA
Thermal Protection	YES
Protection Rating (IP Code)	IP 20
Short Circuit Current Ratings (SCCR)	25kA rms
Max. Back-up Fuse (if mains >80A)	80A gL (circuit-breaker: <40A)
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 ² (solid) / 25mm ² (stranded)
Stripping Length Contacts	0.6inches (15mm)
Terminal Screw Torque	Max. 3.5Nm
DIN Rail EN60715	35mm top-hat rail
Housing Material	Thermoplastic (UL94 V-0)
Housing Design	Modular design

Surge Protective Device

Surge Protection Connection Diagram



Fault Indication (same indication in 1P/2P/3P models)

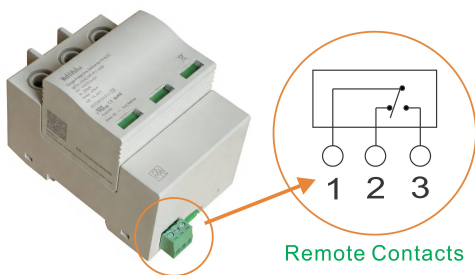
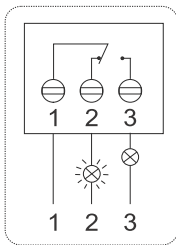


Surge Protective Device

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 ²
Stripping Length Contacts	0.25 inches (6-7mm)
Remote Terminal Torque	0.25Nm



Surge Protective Device

Three features of 3P mode strengthening protection

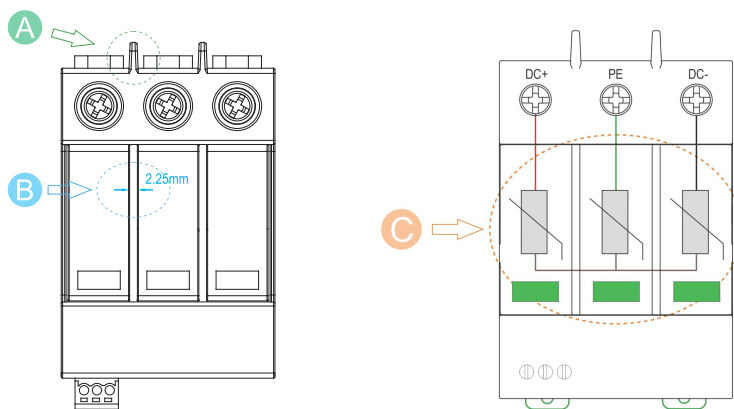
A: The isolated barrier between two modules

B: 2.25mm-wide gap between two modules

1. Increase creepage distance

2. Increase the capacity of insulation isolation and make the connection more secure

3. More important for the application with MCOV (Uc) higher than 800Vdc

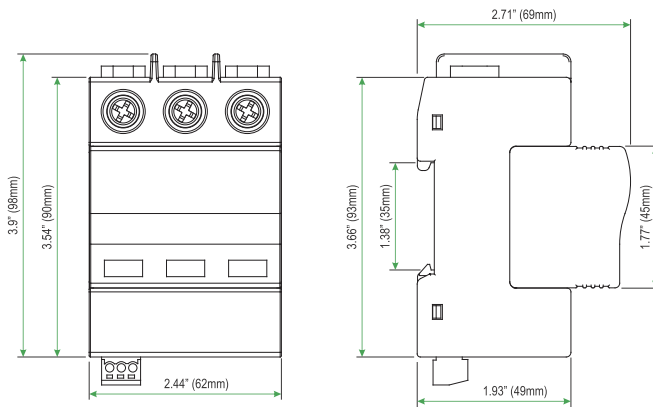


C: Two MOVs are connected in series between each line to make the conduction voltage of common mode and differential mode surge protection achieve the best balance, and the Up value between all lines is kept on a horizontal level.



Surge Protective Device

Dimensions



3D file download

http://www.watchfuleyesolutions.com/wth_rar/3D/24WTH40-3PPV-62.stp.zip



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 μ s.

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

Crest value of a current through the surge protective device having an 8/20 μ 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.

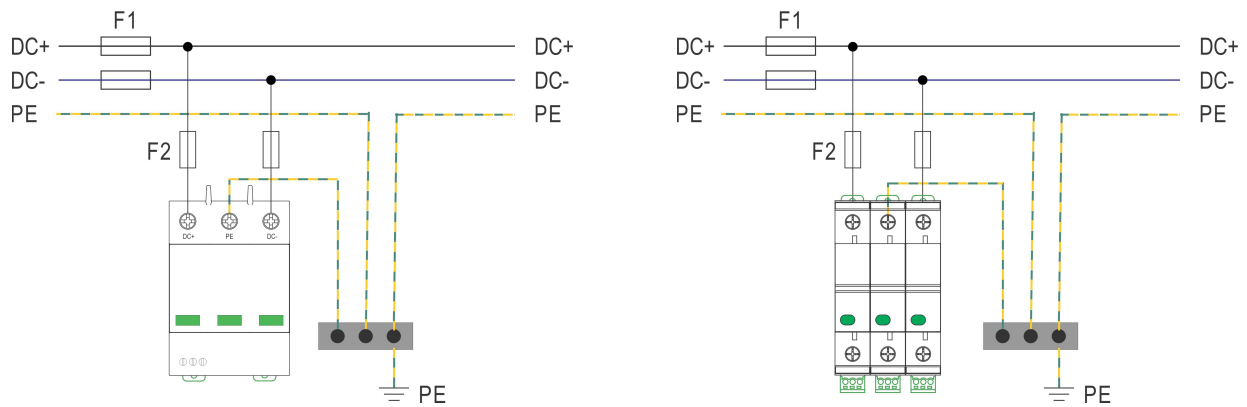
If you are unsure of the voltage stability of the grid,

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

DC System (U_n)	MCOV(U_c), DC+/DC-	DC System (U_n)	MCOV(U_c), DC+/DC-
70Vdc	100Vdc	560Vdc	800Vdc
140Vdc	200Vdc	700Vdc	1000Vdc
210Vdc	300Vdc	840Vdc	1200Vdc
280Vdc	400Vdc	1120Vdc	1600Vdc
350Vdc	500Vdc	1400Vdc	2000Vdc
420Vdc	600Vdc		

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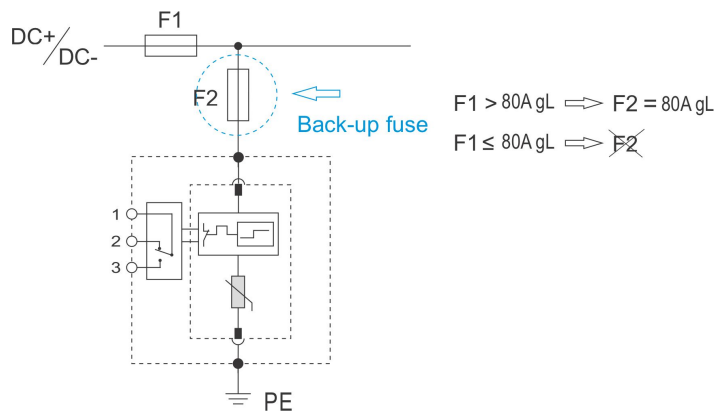
3P Mode Difference mode & Common mode Connection Diagram



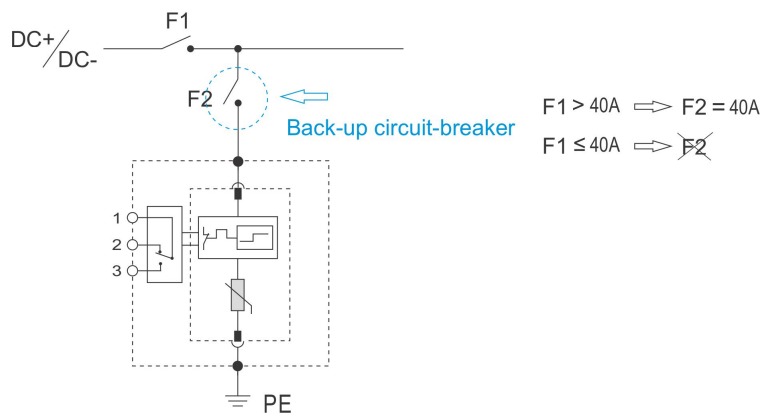
Common mode: DC+ to PE, DC- to PE surge protection
Difference mode: DC+ to DC- surge protection

Surge Protective Device

Selection of back-up fuse

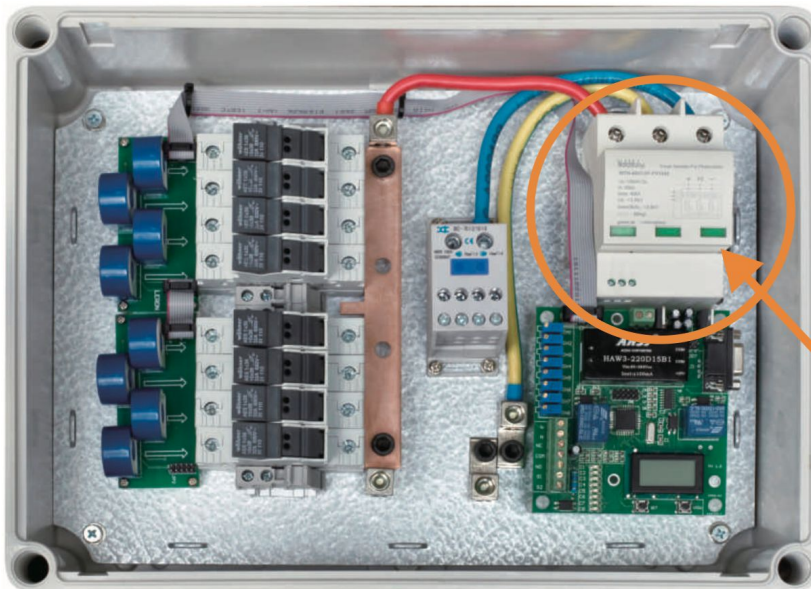


Selection of back-up circuit-breaker



Surge Protective Device

Application



Surge Protector



Surge Protective Device

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?

DC System, DCpv System, Photovoltaic Combiner Box, Photovoltaic Power Supply Box



Surge Protective Device

Certificates of Products



LISTED
E345944



RoHS

IEC61643-11



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Version Update

V22.1: Updated document layout and visual design. Standardized CSS formatting and revised color scheme.
V22.0: Added product description details and enhanced document formatting.

Download WatchfulEye Official App

Scan the QR code to access the WatchfulEye official website for product information and updates.



After-sale Services

WatchfulEye offers a global 5-year quality warranty.

Activate Your 10-Year Warranty

Register this product within 90 days of purchase to receive:

- 5-year standard warranty
- Additional 5-year free extended warranty

Customers are responsible for shipping, labor, and any incidental costs.

This warranty does not cover damage caused by misuse, improper installation, or unauthorized modifications.

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