Always "On" UPS Systems Inc.

®

"ESE" ELECTRICAL SERVICE ENTRANCE

SMART HOME PROTECTOR

USER MANUAL

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Dear Customer,

We thank-you for choosing the Electrical Service Entrance Smart Home Protector. We are pleased to include you as one of our valued customers at ***Always "On" UPS Systems Inc.***

We are confident that this Always “On” Transient Voltage Surge Suppressor (TVSS)**,** developed and manufactured in our ISO 9001 Certified facilities will provide the quality and satisfaction you demand.

Please read the User Manual carefully as it will inform you to how to use this Smart Home Protector.

Thank you for choosing us.

We Are ***Always "On"!***

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1.0 ELECTRICAL SAFETY

- This manual is designed as an aid tool. Always "On" does not assume responsibility if information causes injuries.
- Extremely dangerous voltage levels can exist within the SHP. Extreme caution must be used at all times.
- Before connecting hazardous voltages, verify that the equipment is correctly grounded.
- This product should only be installed by a Qualified Electrician.

2.0 INTRODUCTION

Always "On" UPS Systems Smart Home Protector (SHP) is designed to protect your electrical equipment against external and internally produced surges, impulses, interference associated with low frequency harmonics and lighting induced spikes. This User Manual should be read in its entirety before installation begins.

Please pay attention to the warning boxes to ensure the safe and proper use of your SHP. Ignoring these warnings could be hazardous to the user and/or the equipment.

2.1. Theory of Operation

The "SHP" is designed as a TVSS (Transient Voltage Surge Suppressor) for low voltage distribution equipment of 240V or less, and is configured to connect directly to the main service entrance panel or downstream sub-panels as a primary or secondary form of protection, as used in one or two stage systems.

Parallel hybrid circuitry incorporates both voltage and frequency dependant components which protect against all high amplitude impulses, low level transients and broadband noise. The hybrid filter is designed to accurately track and filter all angles of each waveform throughout the entire phase rotation. This process ensures let-through voltages are minimized while ring wave and electrical noise attenuation is maximized.

All modes of protection are incorporated into every model of SHP as standard features. These include; L-N, L-G, N-G as well as L-L. This allows for a total of six modes in a single phase system, maximizing suppression and filtering capacity and characteristics.

The use of separate fuses, common for each phase within the module, allows for the surge suppression and filter components to more accurately share the dissipation of the transients' energy. The fuses also provide short circuit protection for each individual phase should a fault occur, while allowing remaining phases to stay online and protected.

The SHP is designed to have a service life in excess of 25 years under normal circumstances.

3.0 INSTALLATION

3.1. Inspection

Carefully inspect the Transient Voltage Surge Suppressor (TVSS) filter for any marks or damage incurred during shipping. If visible damage is evident, do not attempt to install the product. Immediately contact the delivery company and inform Always "On" directly.

Verify your system application voltage is the same as the SHP by checking the voltage rating on the box.

The TVSS filter should only be installed by a Qualified Electrician.

3.2. Location

To obtain maximum performance and life span of your TVSS filter, always keep in mind the following:

- The operating temperature of the TVSS is –40˚C to +40˚C, at an operating humidity of 0-97% (non-condensing)
- The TVSS filter should be installed as close to the panel as possible to minimize lead length.
- Inadequate grounding can decrease the effectiveness and life span of your TVSS filter. Use an insulated grounding conductor whenever possible. Grounding system must meet the applicable National and Local Electrical Codes.
- Make sure the circuits are de-energized prior to installation.
- Ensure there is adequate space available to install the SHP on or beside the electrical panel or device

3.3. Dimensional Drawings

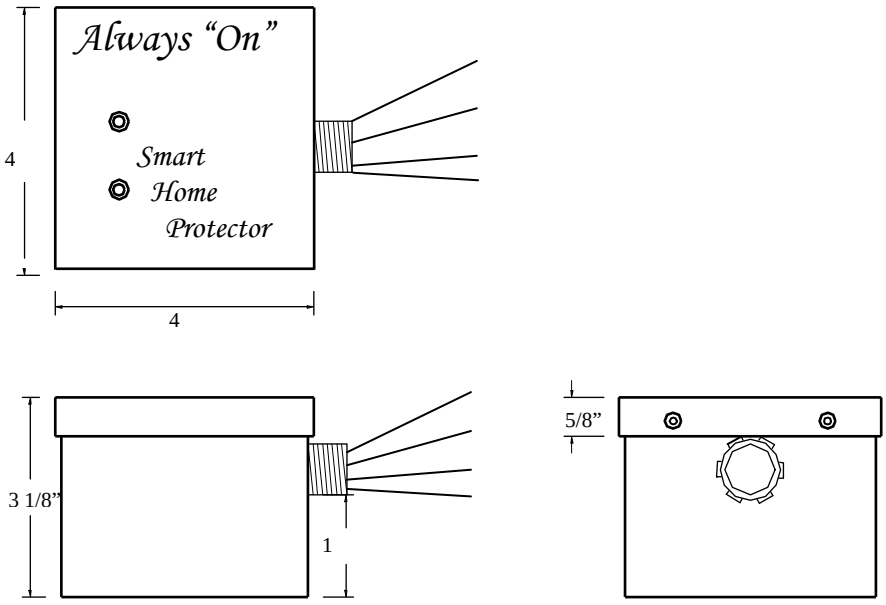


Figure 3.3.1

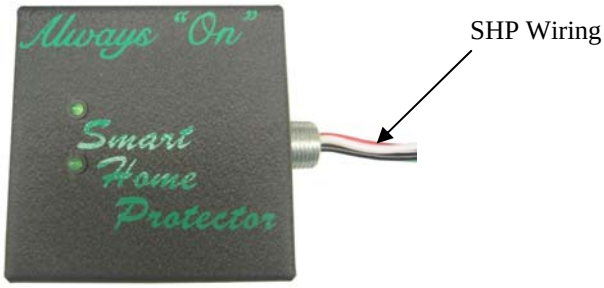
3.4. Mounting

The SHP should be mounted on the side of the Distribution Panel. If the SHP cannot be installed on the panel, it should be installed as close to the panel as possible to minimize lead length.

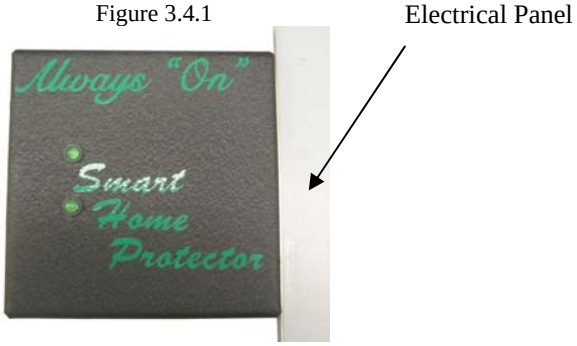
Follow the steps listed below to properly mount the SHP:

> ENSURE DISTRIBUTION PANEL IS DE-ENERGIZED BEFORE MOUNTING THE SHP.

1) Turn off Electrical Panel the SHP is to be installed on.
2) Drill a 7/8" hole, or remove a blank on the side of the Electrical Panel.
3) Remove nut threaded on the SHP chase nipple.
4) Pull the wiring from the SHP through the hole until the chase nipple is inside the panel.
5) Screw the previously removed nut back on the chase nipple to secure the SHP to the panel.



SHP Before Mounting
Figure 3.4.1



SHP After Mounting
Figure 3.4.2

3.5. Wiring the Smart Home Protector

Follow steps listed below for proper installation (Refer to Figure 2.5.1):

ENSURE SHP IS SECURELY MOUNTED.
ENSURE DISTRIBUTION PANEL IS TURNED OFF BEFORE CONNECTING OR WORKING IN PANEL.

1) Ensure distribution panel where the SHP is to be installed is turned off before proceeding.
2) A branch circuit breaker (see Figure 2.5.1) should be installed to feed the SHP. The SHP comes with internal fusing and protection against short circuit faults within the system. The internal fuses are rated at 15A per phase; therefore the branch circuit breaker should match the internal fusing.

Note: Breaker rating and installation must meet National and Local Electrical Codes and should be installed by qualified personnel.

3) Connect the provided wires to the appropriate terminals listed below and shown in Figure 2.5.1.

Note: Twist and bind the leads together and route the wires in such a way that the overall length is kept to a minimum. This procedure will ensure maximum protection by keeping the impedance of the system to a minimum.

4) Connect the Red wire to the breaker protecting L1.
5) Connect the Black wire to the breaker protecting L2.
6) Connect the White wire directly to the Neutral Buss.
7) Connect the Green wire directly to the Ground Buss.
8) Recheck all connections.
9) Turn on the Main power to the distribution panel.
10) Close the breaker supplying the SHP.
11) Ensure all LED indicators are illuminated as per Section 4.1.

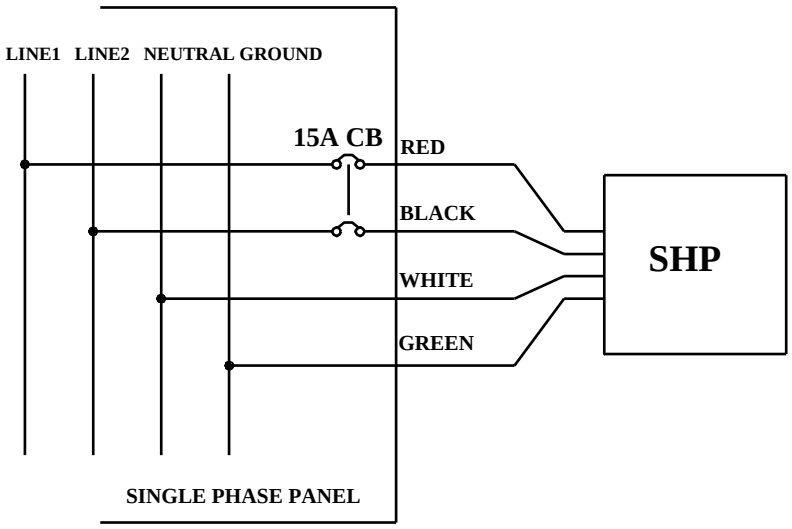


Figure 3.5.1

4.0 OPERATION

The Smart Home Protector is a passive device and does not require regular maintenance. Status indicators (LED's) for each phase are located on the front panel to alert the user of a potential failure within the protection device, open fuse, or loss of one or more phases due to an upstream error. An error could leave the system unprotected, so immediate action is required.

4.1. LED Operation

The LED indicators are positioned on the front of the unit (One per phase) for easy reference.

The illuminated LED's indicate normal operation of the "SHP" filter. In the event that the LED is not lit, a failure in the utility has occurred, an internal fault has occurred or the LED itself has failed.

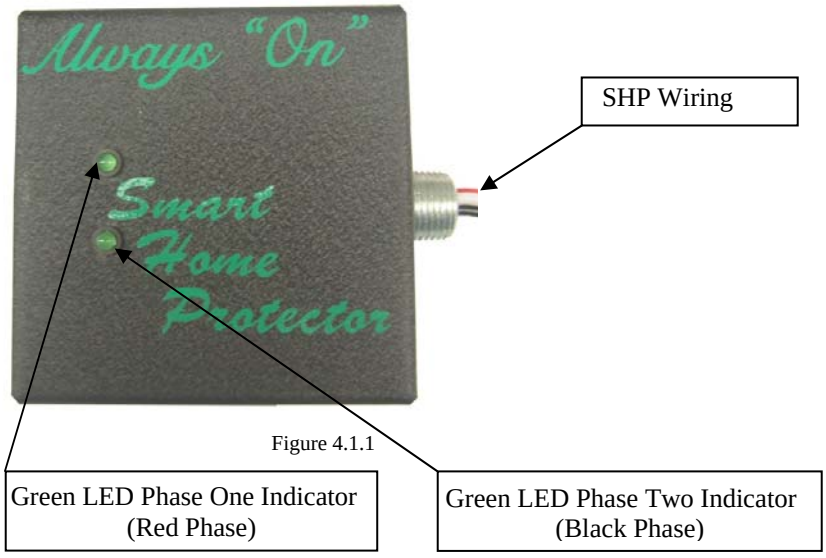

Always "On"
Smart
Home
Protector
SHP Wiring
Green LED Phase One Indicator
(Red Phase)
Green LED Phase Two Indicator
(Black Phase)

Figure 4.1.1

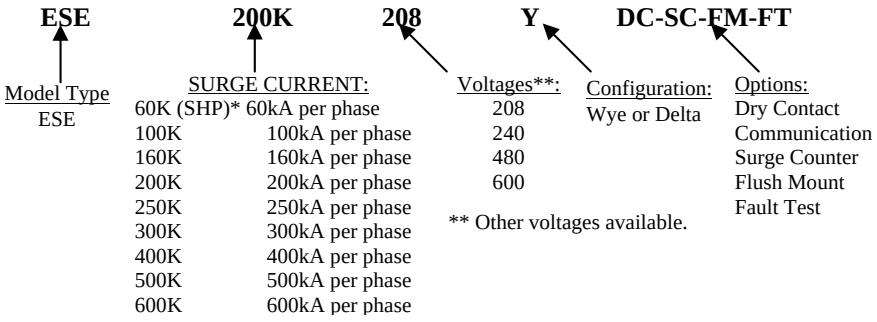
5.0 TECHNICAL SPECIFICATIONS

Frequency:	50/60Hz
Voltage:	240VAC (Other voltages available)
Phases:	Single phase
Protection Modes:	6
Technology:	Bi-Directional Parallel
Insertion Loss:	Nominal 60dB, Mil-Standard-220A@100kHz
Bandwidth:	10kHz-50MHz or 180Hz-50MHz
Response Time	Instantaneous / Constant
Standards:	UL1449 Rev. 1998 (TVSS) Peak
Surge Current	60kA
Sink Current Capacity / Ø:	15 amps
Operating Humidity:	0-97% (non-condensing)
Operating Temp:	-40º C to +40º C
Warranty:	10 years
Enclosure:	4 ¼" x 3 1/8" x 4 ¼"
Weight:	3 lbs.

6.0 REFERENCE CHARTS AND TABLES

When ordering or inquiring into our TVSS products, please refer to our particular TVSS products from the table below.

6.1. Description of Model Number



* Note: "SHP" Smart Home Protector for residential use only.

Examples:

MODEL	SURGE CURRENT	VOLTAGE	Y or D	MODEL
ESE	100K	208	Y	ESE-100K-208Y-DC-SC
ESE	250K	480	Y	ESE-250K-480Y-DC-SC

Options
DC - Dry Contact (Form "C") Communications for remote monitoring.
SC - Surge Counter to indicate number of high energy, potentially damaging spikes and surges.
FM – Flush Mount
FT - Fault Test Button to check system for internal faults.

6.2. ESE Sizing Chart

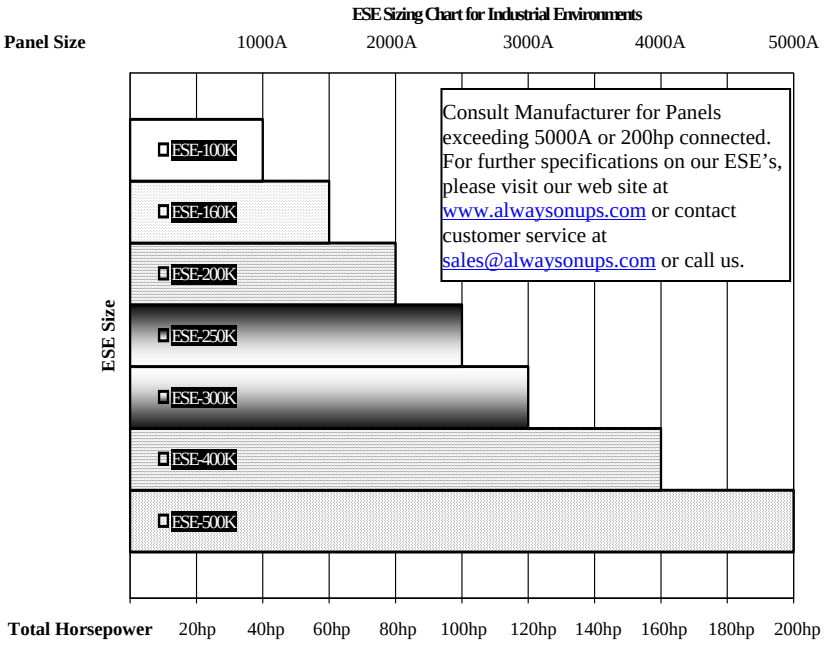
Residential (Smart Home) and **Multi-residential** Complexes

Model #	Panel Size
ESE-60K-240Y [2∅]	Up to 200A
ESE-100K-208Y-DC-SC [3∅] (other voltages available)	Above 200A

Commercial (Office, Retail, etc.)

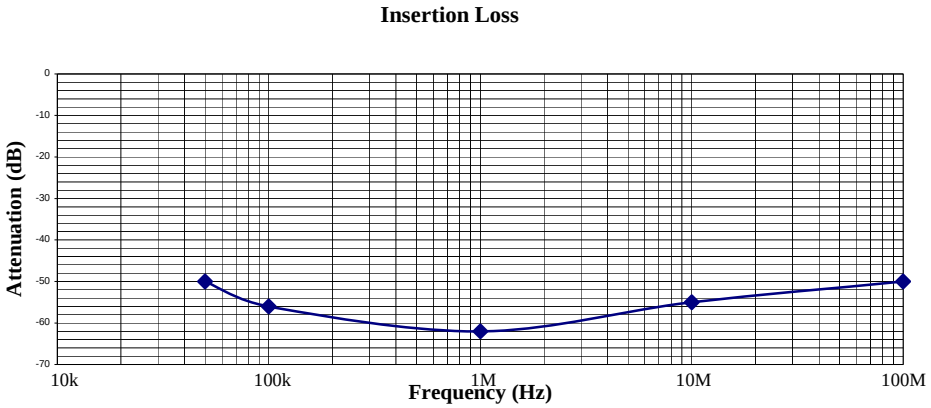
Model #	Panel Size
ESE-100K-208Y-DC-SC [3∅] (other voltages available)	Up to 2000A
ESE-160K-208Y-DC-SC [3∅] (other voltages available)	Up to 3000A
ESE-200K-208Y-DC-SC [3∅] (other voltages available)	Above 3000A

Industrial



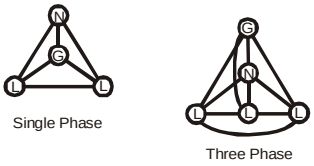
6.3. Insertion Loss Chart

This chart shows the insertion loss of a system.



INSERTION LOSS
-50dB @ 50kHz
-56dB @ 100kHz
-62dB @ 1MHz
-55dB @ 10MHz
-50dB @ 100MHz

Modes of Protection/Circuits



Peak Surge Current and Joule Rating (A)
Peak Surge Current Rating Based on 8 x 20 s Wave

ESE Model: ESE-120K240Y-DC
Peak Surge Current per Circuit: 70,000A
Total Peak Surge Current Capacity:

1Y, 2D	2Y, 3D
210,000A	420,000A

Joule Rating Based on 8 x 20 s Wave

ESE Voltage: 208-240Vac
Peak Surge Current per Circuit: 70,000
Joule Rating:

1Y, 2D	2Y, 3D
7,560J	15,120J

7.0 CONTACT INFORMATION

7.1. Additional Purchases or Upgrades

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7.2. QA / Warranty Questions

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7.3. Software Questions

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