

Applied Energy LLC

Voltage Stabilizing Ground Reference, Harmonic Silencer, Drive Voltage Stabilizer (VSGR/HS/DVS)

OPERATION, INSTALLATION AND MAINTENANCE GUIDE



IMPORTANT SAFETY INSTRUCTION

SAVE THESE INSTRUCTIONS - This manual contains important instructions for the Voltage Stabilizing Ground Reference/Harmonic Silencer/Drive Voltage Stabilizer (VSGR/HS/DVS) that must be followed during installation, operation, and maintenance of the VSGR/HS/DVS and its auxiliary equipment.



WARNING

OPENING ENCLOSURES EXPOSES HAZARDOUS VOLTAGES.

ALWAYS REFER SERVICE TO QUALIFIED PERSONNEL ONLY.

Applied Energy LLC

**The Voltage Stabilizing Ground Reference/Harmonic
Silencer/Drive Voltage Stabilizer
(VSGR/HS/DVS)**

INSTALLATION, OPERATION AND MAINTENANCE GUIDE

Applied Energy LLC
3011 Mackinaw Meadows Drive
Saginaw, Michigan 48603
989-790-1441 Office
989-791-7993 Fax

**The Voltage Stabilizing Ground Reference/Harmonic
Silencer/Drive Voltage Stabilizer (VSGR/HS/DVS)**

Owner's Manual

Lifetime Warranty and Limitation of Liability

Applied Energy LLC (The Company) Saginaw, Michigan warrants to the purchaser or their original customer the "Silencer" as manufactured by the company that such equipment will be free from defects in material and workmanship under normal use and service for a Lifetime from the date of shipment from the Company authorized factory or warehouse of the Company.

THE COMPANY'S OBLIGATION UNDER THIS WARRANTY SHALL BE STRICTLY AND EXCLUSIVELY LIMITED TO REPAIRING OR REPLACING, AT THE FACTORY OR SERVICE CENTER OF THE COMPANY ANY SUCH EQUIPMENT OR PARTS THEREOF WHICH AN AUTHORIZED REPRESENTATIVE OF THE COMPANY FINDS TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP UNDER NORMAL USE AND SERVICE EXCLUDING FREIGHT COSTS WITHIN SUCH PERIOD OF EFFECTIVE PRODUCT LIFE. This warranty does not apply to any equipment that has been tampered with or altered in any way, which has been damaged as a result of misapplication or improper installation or which has been subject to misuse, or accident.

The Company reserves the right to satisfy such obligation in full by refunding the purchase price of any such defective equipment. The buyer agrees to these terms and that no other remedy shall be available to him.

Written authorization and/or material return authorization (MRA#) to return any equipment or parts must be obtained from the Company. The Company shall not be responsible for any transportation charges.

IF FOR ANY REASON ANY OF THE FOREGOING PROVISIONS SHALL BE INEFFECTIVE, THE COMPANY'S LIABILITY FOR DAMAGES ARISING OUT OF ITS MANUFACTURE OR SALES OF EQUIPMENT OR USE THEREOF, WHETHER SUCH LIABILITY IS BASED ON WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE, SHALL NOT IN ANY EVENT EXCEED THE FULL PURCHASE PRICE OF SUCH EQUIPMENT.

This warranty is void if a unit is improperly ventilated or a serious power condition is ignored for a prolonged period of time or returned to the Company with an application related defect. (Low voltage unit installed on medium voltage equipment).

This warranty is not transferable.

P.O. Box 5617
Saginaw, Michigan 48603-5617
Phone (989) 790-1441
Fax (989) 791-7993

Applied Energy LLC, retains any and all patent rights, including exclusive rights of use and/or manufacture and/or sale. Possession of this information does not convey any permission to reproduce, print, or manufacture the article or articles shown herein. Such permission may be granted only by specific written authorization, signed by an officer of Applied Energy LLC.

Table of Contents


Section	Description	Page
1.0	General Information.....	1
1.1	General.....	1
2.0	Product Description and Application.....	1
2.1	Description.....	1
2.2	Voltage Imbalances from the Power System.....	1
2.3	System Resonance.....	1
2.4	Leading Power Factor.....	1
2.5	Harmonic Distortion Reduction.....	1
2.6	Isolation Transformers.....	1
3.0	Installation.....	1
3.1	Location.....	1
3.2	Inspection.....	1
3.3	Handling.....	2
3.4	Grounding.....	2
4.0	Maintenance.....	2
4.1	Periodic Inspection and Maintenance.....	2
4.2	Cleaning.....	2
4.3	Drying of Core and Coil Assembly.....	2
5.0	Operation.....	2
5.1	Effect of Humidity.....	2
5.2	Loading.....	2
6.0	Technical Data.....	2
6.1	General Specifications.....	2
6.2	Connection Diagrams.....	3
6.3	Rating Table.....	4
6.4	Enclosure Dimensions.....	4
7.0	Troubleshooting Guide.....	5

1.0 General Information

1.1 General

The VSGR/HS/DVS units are manufactured to provide optimum performance for a lifetime of uninterrupted service. Careful attention to the following instructions is recommended for safe and reliable operation.

Installation should be performed by authorized persons, familiar with electrical apparatus and the potential hazards involved.

	<p>WARNING</p> <p><i>Danger! There is the potential of electric shock whenever working in or around electrical equipment such as the Voltage Stabilizing Ground Reference. Power must be shut off before any work is conducted on the Unit.</i></p>
---	--

As with any electrical device, the VSGR/HS/DVS must be installed according to the requirements of the national and local electrical codes.

2.0 Product Description and Application

2.1 Description

The VSGR/HS/DVS is a completely passive device consisting of tried and true technology with no sacrificial components to fail during required operation. Its innovative design achieves Voltage Stability on three phase ungrounded power systems at the speed of current flow.

2.2 Voltage imbalances from the Power System

The VSGR/HS/DVS will provide stable voltages and eliminate damage due to arcing ground faults and transient overvoltages, and remove the harmonics caused by these problems.

2.3 System Resonance

The VSGR/HS/DVS has no components that would create resonance in a power system, therefore inadvertent resonance is avoided.

2.4 Leading Power Factor

The VSGR/HS/DVS stabilizes and improves power factor, and will not cause a potentially damaging leading power factor.

2.5 Harmonic Distortion Reduction

The VSGR/HS/DVS will reduce voltage distortion by approximately 85% at all loads.

2.6 Isolation Transformers

The use of the VSGR/HS/DVS eliminates the need for isolation transformers.

3.0 Installation

3.1 Location

Location of the VSGR/HS/DVS should be made with consideration given to accessibility and ventilation conditions.

Do not install above other heat source equipment.

Enclosures are designed in accordance with NEMA and UL standards and can allow for installation in various environments. Standard enclosures for VSGR/HS/DVS Reference are NEMA 3R rated.

3.2 Inspection

Upon receipt of shipment, the VSGR/HS/DVS should be inspected for any damage incurred during shipment.

3.3 Handling

When placing the VSGR/HS/DVS, it should be placed on a skid and moved with a fork truck or hoist.

3.4 Grounding

Consideration must be given to equipment grounding (case and core) and must be made in accordance with all applicable electrical codes.

Caution: Before entering or working on the VSGR/HS/DVS, it should be de-energized, properly grounded and isolated.

4.0 Maintenance

4.1 Periodic Inspection and Maintenance

The VSGR/HS/DVS has no moving or active parts and therefore requires only minimal periodic maintenance when installed in a ventilated environment. Annual maintenance is recommended. This should include:

4.1.1 Blow air through the unit to remove accumulated dust on an annual basis.

4.2 Cleaning

Use a blower or compressed air but pressure should not exceed 25 psi. Clean air louvers to maintain proper air flow.

5.0 Operation

Caution: Do not remove covers, shrouds, panels, or any enclosure parts while the VSGR/HS/DVS is energized.

6.0 Technical Data

6.1 General Specifications

All standard voltages up to 690V

Frequency

60Hz and optional 50Hz

Overload Capability

150% for life of VSGR/HS/DVS

Harmonics Treated

Full Harmonic Spectrum

Input Voltage Distortion

85% Reduction

Efficiency

> 99%

Ambient Temperature

155°C Rise

Ventilation

Convection Air Cooled

Winding Material

Copper

Insulating Varnish

Glyptol

Enclosure

Type: NEMA-3R (Type-3R)

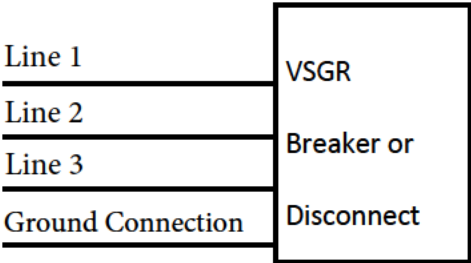
Paint: Powder Coated

Color: ANSI 61 Grey

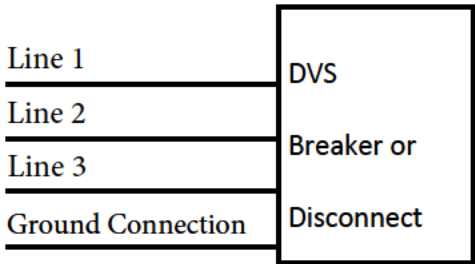
Wall or Floor Mounting

6.2 Connection Diagrams

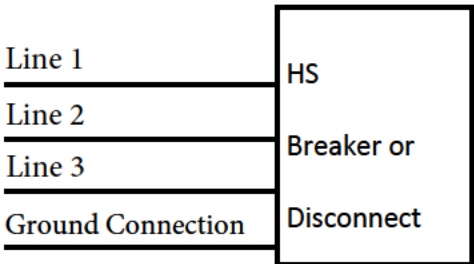
Connect Phaseback VSGR to the power source to be protected with (3) #10 phase conductors and a #10 ground wire as shown below.



Connect Phaseback DVS to the motor to be protected with (3) #10 phase conductors and a #10 ground wire as shown below.

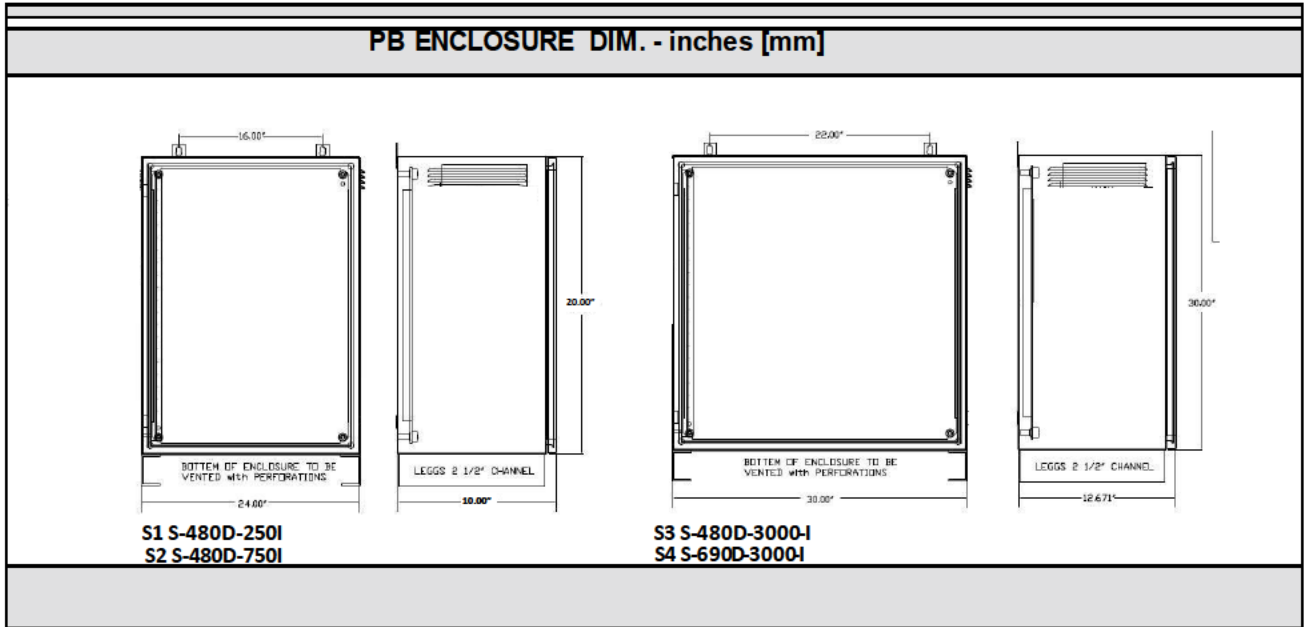


Connect Phaseback HS to the power source to be protected with (3) #10 phase conductors and a #10 ground wire as shown below.



6.3 Rating Table

6.4 Enclosure Dimensions



Phaseback/Silencer	Voltage	Transformer Size	Y or Delta	Industrial or Marine
PB/HS	480/690	250/750/3000/6000	Y or D	I or M

CASE STYLE		ENCLOSURE DIMENSIONS - inches [mm]				
Standard	Enhanced	W	H	D		
PB1	PB1-S	24.00 [609.6]	20.00 [508]	10.00 [254]		
PB2	PB2-S	24.00 [609.6]	20.00 [508]	10.00 [254]		
PB3	PB3-S	30.00 [762]	30.00 [762]	12.00 [305]		
PB4	PB4-S	30.00 [762]	30.00 [762]	12.00 [305]		

* Industrial Units supplied with fused disconnects

* Marine Units supplied with Circuit Breakers w/aux contacts

* All Units supplied with Current Detector incl. solid state contacts for remote alarm

7.0 Troubleshooting Guide

Caution: Before entering or working on the VSGR/HS/DVS, it should be de-energized, properly grounded and isolated.

1. PROBLEM: No power to VSGR or HS or DVS

- a. Possible cause: Power is turned off.

Solution: Check that upstream circuit breaker is closed or that fuses are installed in upstream fused disconnect and are not blown.