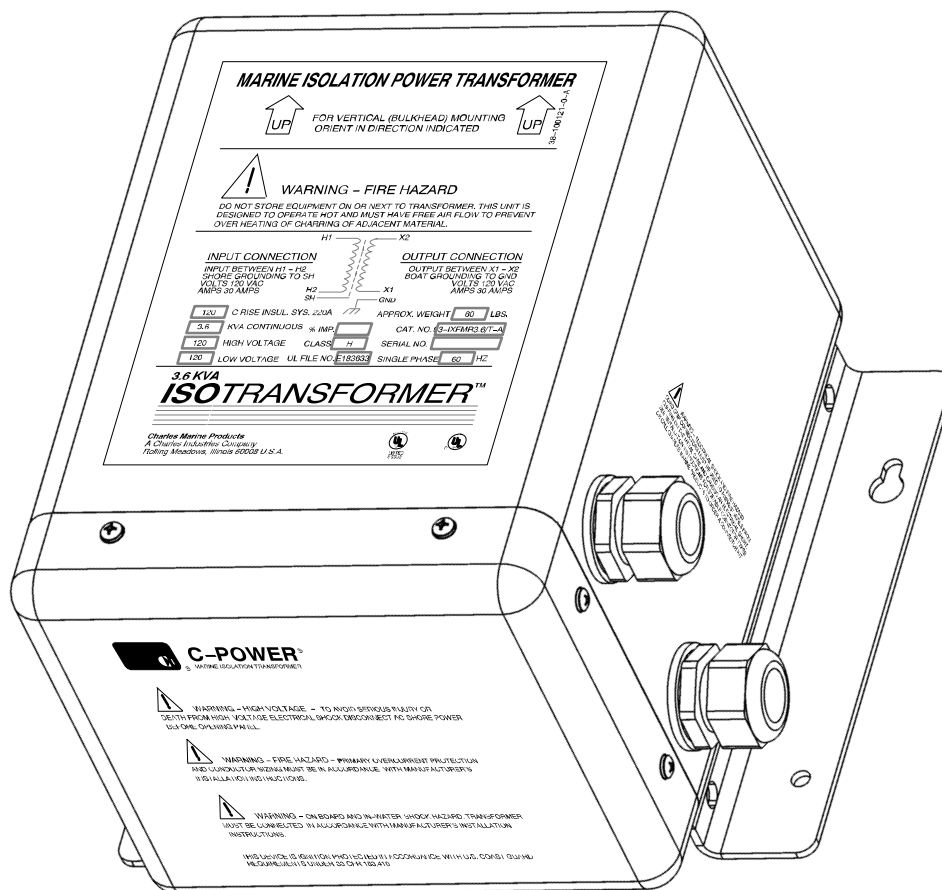


3.8I KVA International Universal IsoTransformer

SHORELINE ISOLATION TRANSFORMER

INSTALLATION INSTRUCTIONS & OWNER'S MANUAL Model 93-IXFMR3/8I-A



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INTRODUCING... THE 3.8I INTERNATIONAL UNIVERSAL ISOTRANSFORMER™

Thank you for purchasing the IsoTransformer™! Your IsoTransformer completely isolates input power from output power providing an improved degree of safety and reducing galvanic current corrosion due to the direct connection to AC shore power.

Warranty/Registration

Before proceeding, complete and mail back the Warranty Registration card.

Manual Purpose

With your personal safety in mind, this manual lists important safety precautions first, then covers installation, operation, maintenance, troubleshooting, warranty, and customer service information.

APPLICATION

The 3.8I KVA International Universal IsoTransformer is a shoreline isolation transformer intended for boats with 30 amp/120 volt or 16 amp/240 volt service. The unit will operate on either 50 or 60 Hz and provides easy adaptation to European electrical systems. Properly installed, the IsoTransformer will electrically isolate AC shore power from the boat's AC power system, reducing galvanic current corrosion due to the AC shore power connection.

The boat's electrical system and grounding conductor are not actually connected to the shoreside system when you use the 3.8I KVA International Universal IsoTransformer as an isolation transformer. Power is transferred from the shoreside electrical system to the boat's electrical system by magnetic coupling. This means there is no direct electrical connection between the earth-grounded shore AC power and boat AC power systems. The shore grounding conductor is connected to a shield that is wound between the primary (shore) and secondary (boat) transformer windings. This shield assures isolation on the boat by providing a protective layer between primary and secondary windings within the transformer. In the unlikely event of a breakdown within the transformer, the shield can withstand the fault current of a properly sized shore supply circuit breaker long enough for the breaker to trip. In addition, by grounding one leg of the transformer secondary (X2) on board the boat, a "neutral" ground is established for the vessel's electrical system. When using the transformer, shoreline polarity is no longer a consideration and a shoreline polarity device is not necessary.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important safety and operating instructions for the IsoTransformer. Read the entire manual before usage. Also read all instructions and cautions for and on the IsoTransformer.

Warnings

WARNING — HIGH VOLTAGE

To avoid serious injury or death from high voltage electrical shock disconnect AC shore power before opening panel.

WARNING — FIRE HAZARD

Primary and secondary overcurrent protection and conductor sizing must be in accordance with manufacturer's installation instructions.

WARNING

On board and in-water shock hazard. Transformer must be connected in accordance with manufacturer's installation instructions.

WARNING — FIRE HAZARD

Do not store equipment on or next to transformer. This unit is designed to operate hot and must have free air flow to prevent over heating or charring of adjacent material.

WARNING — ELECTRICAL SHOCK AND FIRE HAZARD

Cord grip connectors must be used to prevent wires from chafing on the metal case and causing an electrical short. See installation instructions for suitable connector types or call Charles Marine Products to order a connector kit.

Installation Precaution

Boat wiring is a complex task that can cause shock, corrosion and other hazards if not done properly by trained, experienced personnel. For more information on this subject contact the **American Boat and Yacht Council (ABYC)** or see the standards and regulations below:

American Boat and Yacht Council
E-8 “Alternating Current (AC) Electrical Systems on Boats”

3069 Solomon’s Island Road
 Edgewater, MD 21037
 Telephone: 410.956.1050
 FAX: 410.456.2737

NFPA Standard 302. National Fire Protection Association
“Pleasure and Commercial Motor Craft”

1 Batterymarch Park
 P.O. Box 9101
 Quincy, MA 02269-9401
 800.344.3555

Telephone:

Rules and Regulations for Recreational Boats. Excerpts from the United States Code (USC) and the Code of Federal Regulations (CFR) (U.S. Coast Guard Regulations) are available from the **American Boat and Yacht Council** listed above.

Note: Installation of the IsoTransformer must be made in accordance with all applicable standards and regulations.

Environmental Precaution

The IsoTransformer is intended for installation inside an engine room or elsewhere inside the boat. Make sure that the location will not subject the unit to rain, snow, excessive moisture, or excessive heat.

NOTICE

This device is ignition protected in accordance with U.S. Coast Guard regulations under 33 CFR 183.410.

Application Precaution

These units are intended for hard-wired, permanent, on-board applications. Use of attachments not recommended or sold by Charles Marine Products may result in risk of fire, electrical shock or personal injury.

Damaged Unit Precaution

Do not operate the IsoTransformer if it has received a sharp blow, been dropped, immersed in water or otherwise damaged. See the section in this manual on *Warranty & Customer Service* for repair information.

Disassembly Precaution

Do not disassemble the IsoTransformer. See the sections in this manual on *Maintaining the IsoTransformer*, *Troubleshooting the IsoTransformer* and *Warranty & Customer Service*.

INSTALLING THE ISOTRANSFORMER

Ratings and Connections

The 3.8I KVA International Universal IsoTransformer is designed for 120 or 240 volt input, 120, 120/240 (3 wire) or 240 volt output and 50 or 60 Hz operation in order to provide maximum flexibility in a multitude of applications. Both the primary (input) and secondary (output) windings may be reconnected for various voltages as shown below. The unit is rated at 3.8 KVA in order to be compatible with 16 ampere, 50 Hz European dockside power sources.

The following diagrams do not include all variations of the IsoTransformer. Contact Charles Marine Products for additional information.

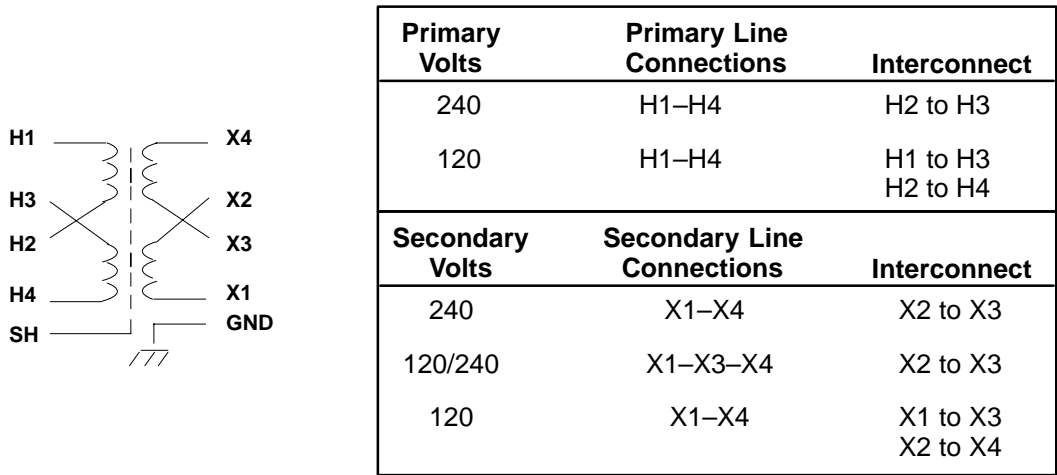


Figure 1. Schematic and Connections

Choosing an Electrical Wiring Method

There are two wiring methods that can be used to install the IsoTransformer as an isolation transformer in accordance with *ABYC E-8 Alternating Current (AC) Electrical Systems on Boats*. A third method, also in accordance with *ABYC E-8*, can be used to install the IsoTransformer as a polarization transformer if desired. The third method is not preferred, because wiring the unit in the manner described circumvents the AC grounding conductor isolation between shore and boat power and may require the use of a galvanic isolator to reduce galvanic corrosion.

Note: Figure 2 through Figure 7 are reprinted with permission from the American Boat and Yacht Council (ABYC). To obtain the complete standard referenced or any other standards contact:

*American Boat and Yacht Council: 3069 Solomon's Island Road
Edgewater, MD 21037
Telephone: 410.956.1050
FAX: 410.456.2737*

Wired as an Isolation Transformer

The only difference between Method 1 and Method 2 is that in Method 2, a Ground Fault Protector (GFP) must be used instead of just a circuit breaker, and the shore grounding conductor is not wired past the inlet of the boat. Method 1 is most commonly used.

Note: This diagram does not illustrate a complete system. Refer to the appropriate ABYC text.

Isolation Transformer System with Single-Phase 120-Volt Input with Grounded Secondary. Shield Grounded on Shore. Metal Case Grounded on the Boat. The green grounding wire from the shore inlet is connected to the isolation transformer shield. The green grounding wire is connected to the shell of the power inlet which is insulated from the hull of the boat.

The ungrounded and grounded shore current-carrying conductors are connected from the power inlet to the primary winding of the isolation transformer through an overcurrent protection device which simultaneously opens both current-carrying shore conductors. Fuses shall not be used in lieu of the simultaneous trip devices.

120-Volt branch circuit breakers are permitted to use single-pole breakers in the ungrounded current-carrying conductors.

The secondary of the isolation transformer is grounded (polarized) on the boat.

The boat grounding system (green) conductor is connected from the metal case of the isolation transformer to all noncurrent-carrying parts of the boat's AC electrical system including the engine negative terminal or its bus without interposing switches or overcurrent protection devices.

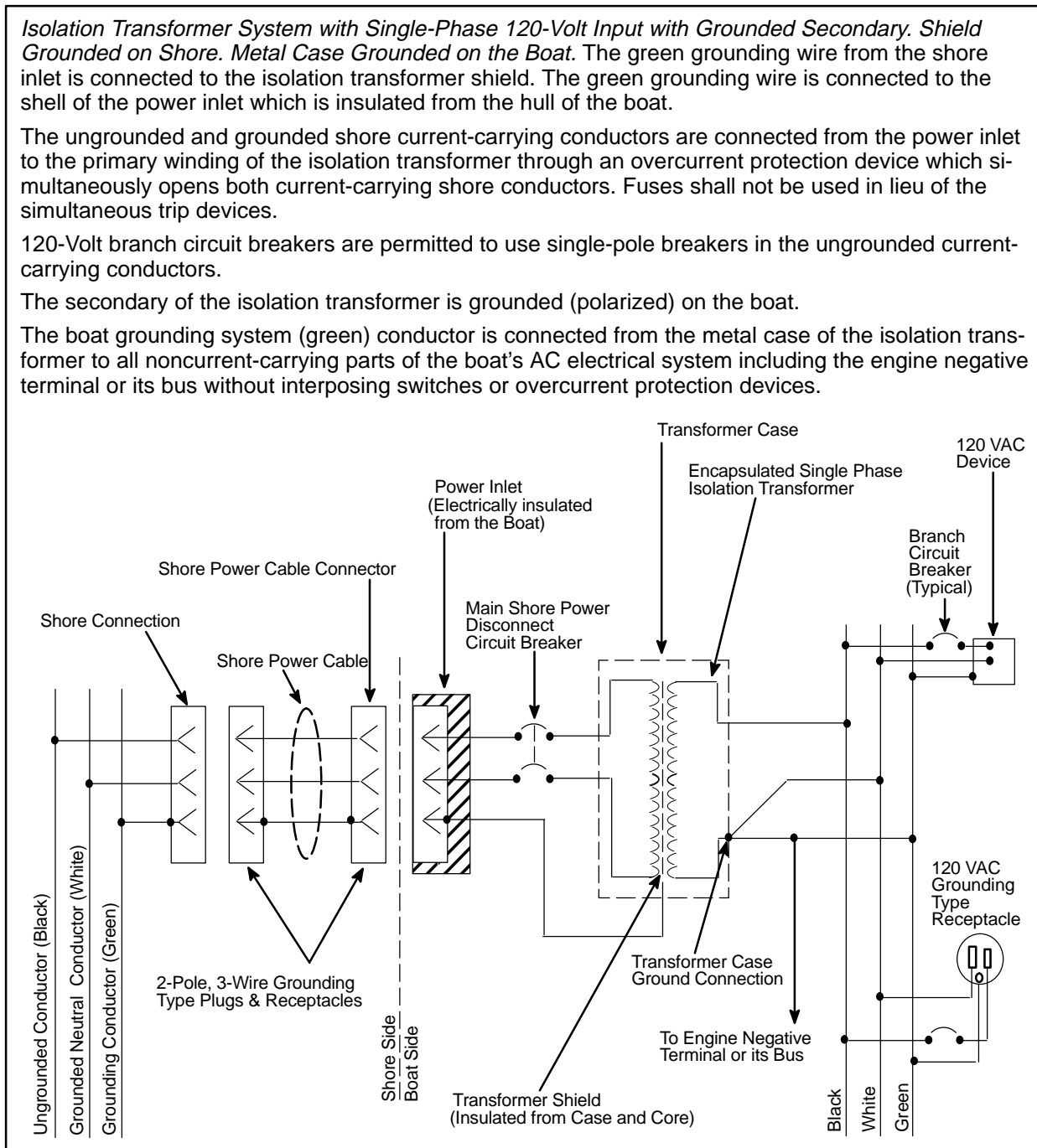


Figure 2. Electrical Diagram – Method 1 (see Figure 8 for Wiring Connections)

Note: This diagram does not illustrate a complete system. Refer to the appropriate ABYC text.

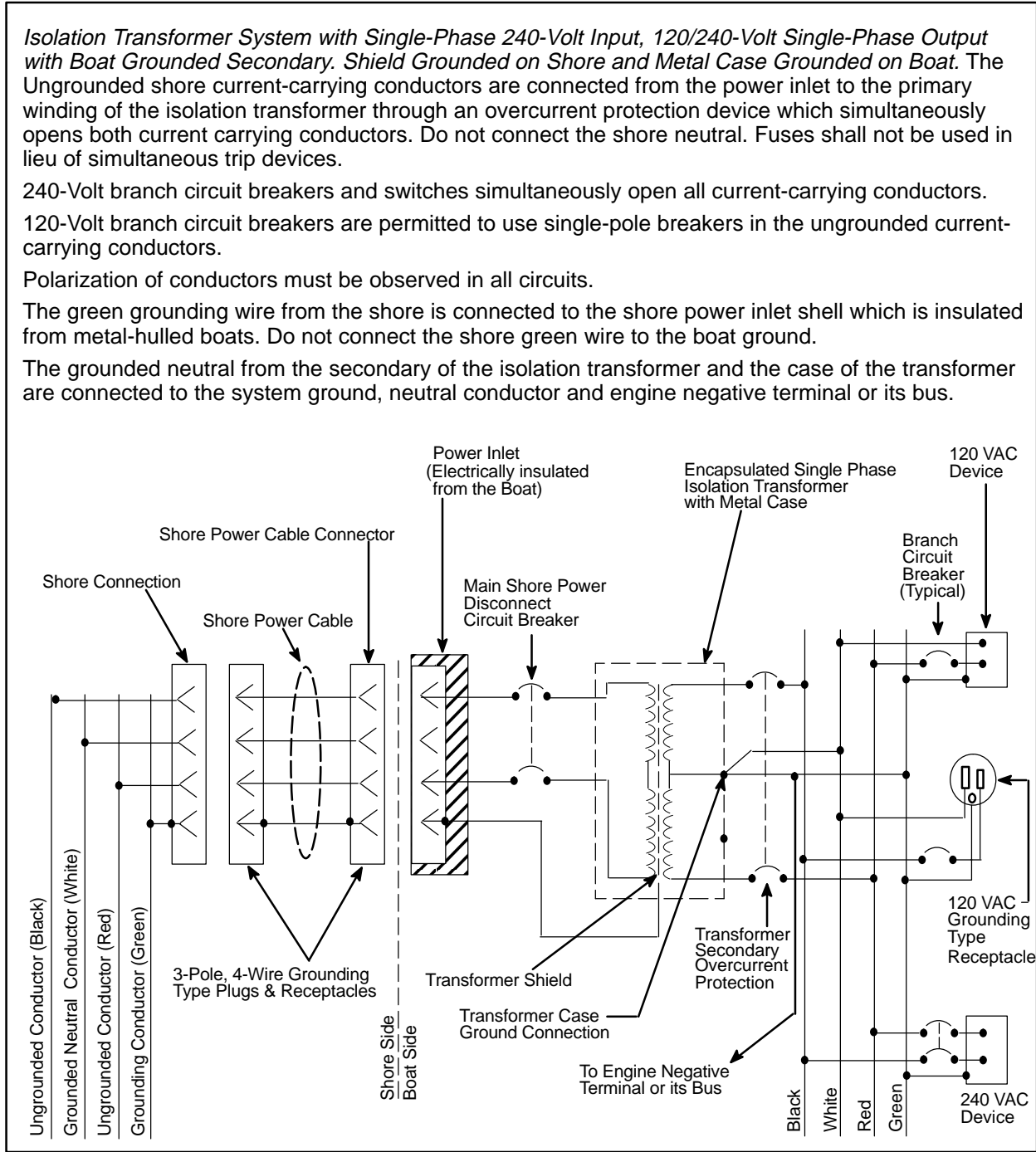


Figure 3. Electrical Diagram – Method 2 (see Figure 9 for Wiring Connections)

Note: This diagram does not illustrate a complete system. Refer to the appropriate ABYC text.

Isolation Transformer System with Single-Phase 120-Volt Input with Ground Fault Protection and Grounded Secondary. Shield and Metal Case Grounded on the Boat. The green grounding wire from the shore inlet is not connected to the isolation transformer shield or metal case. The green grounding wire is connected to the shell of the power inlet which is insulated from the hull of the boat.

The ungrounded and grounded shore current-carrying conductors are connected from the power inlet to the primary winding of the isolation transformer through a ground fault protection device which simultaneously opens both current-carrying shore conductors. Fuses shall not be used in lieu of the simultaneous trip devices.

120-Volt branch circuit breakers are permitted to use single-pole breakers in the ungrounded current-carrying conductors.

The secondary of the isolation transformer is grounded (polarized) on the boat.

The boat grounding system (green) conductor is connected from the shield and metal case of the isolation transformer to all noncurrent-carrying parts of the boat's AC electrical system including the engine negative terminal or its bus without interposing switches or overcurrent protection devices.

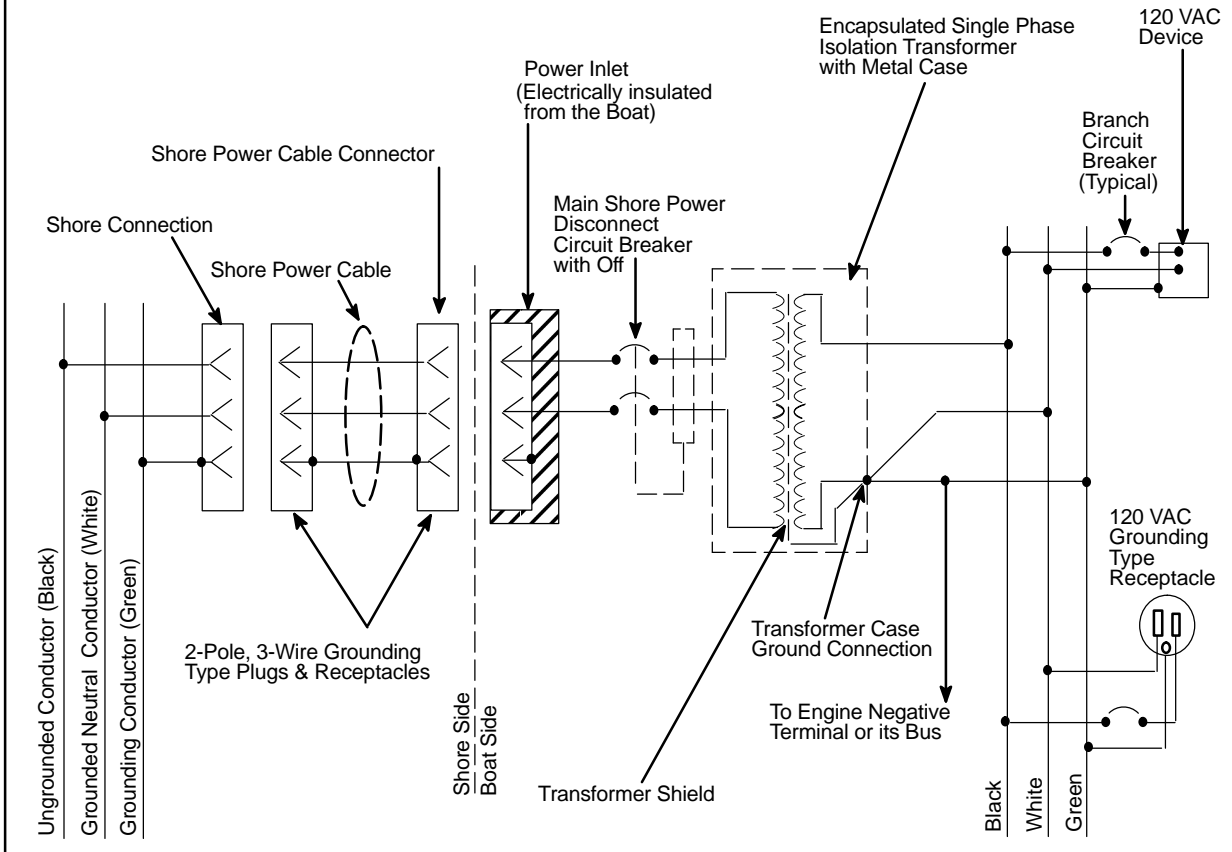


Figure 4. Electrical Diagram – Method 3 (see Figure 10 for Wiring Connections)

Note: This diagram does not illustrate a complete system. Refer to the appropriate ABYC text.

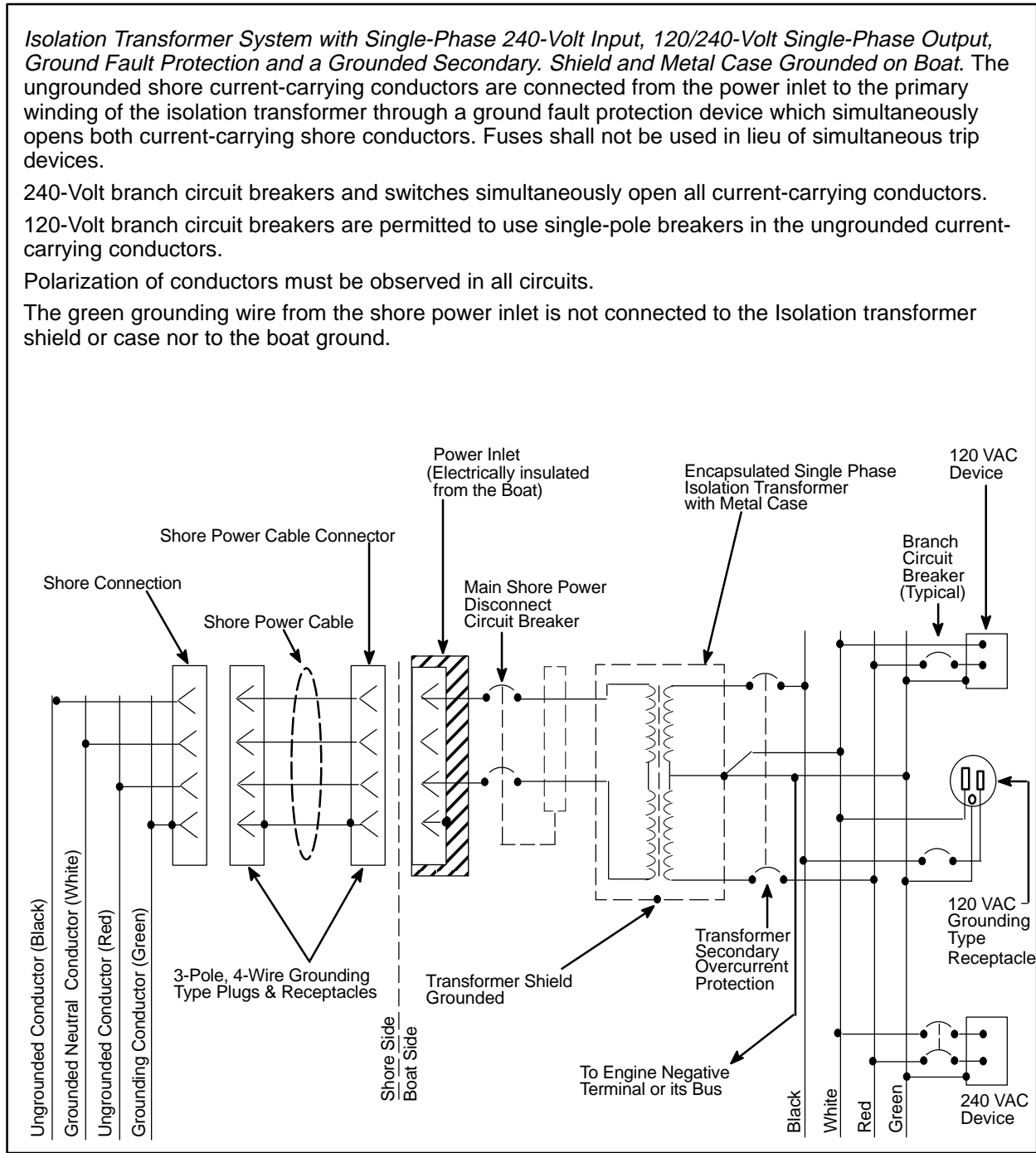


Figure 5. Electrical Diagram – Method 4 (see Figure 11 for Wiring Connections)

Wired as a Polarization Transformer

In this method the shield and the shore grounding conductor are wired directly to the transformer neutral (X2) and case ground (GND). An optional galvanic isolator is also shown in-line with the shoreline grounding wire.

Note: This diagram does not illustrate a complete system. Refer to the appropriate ABYC text.

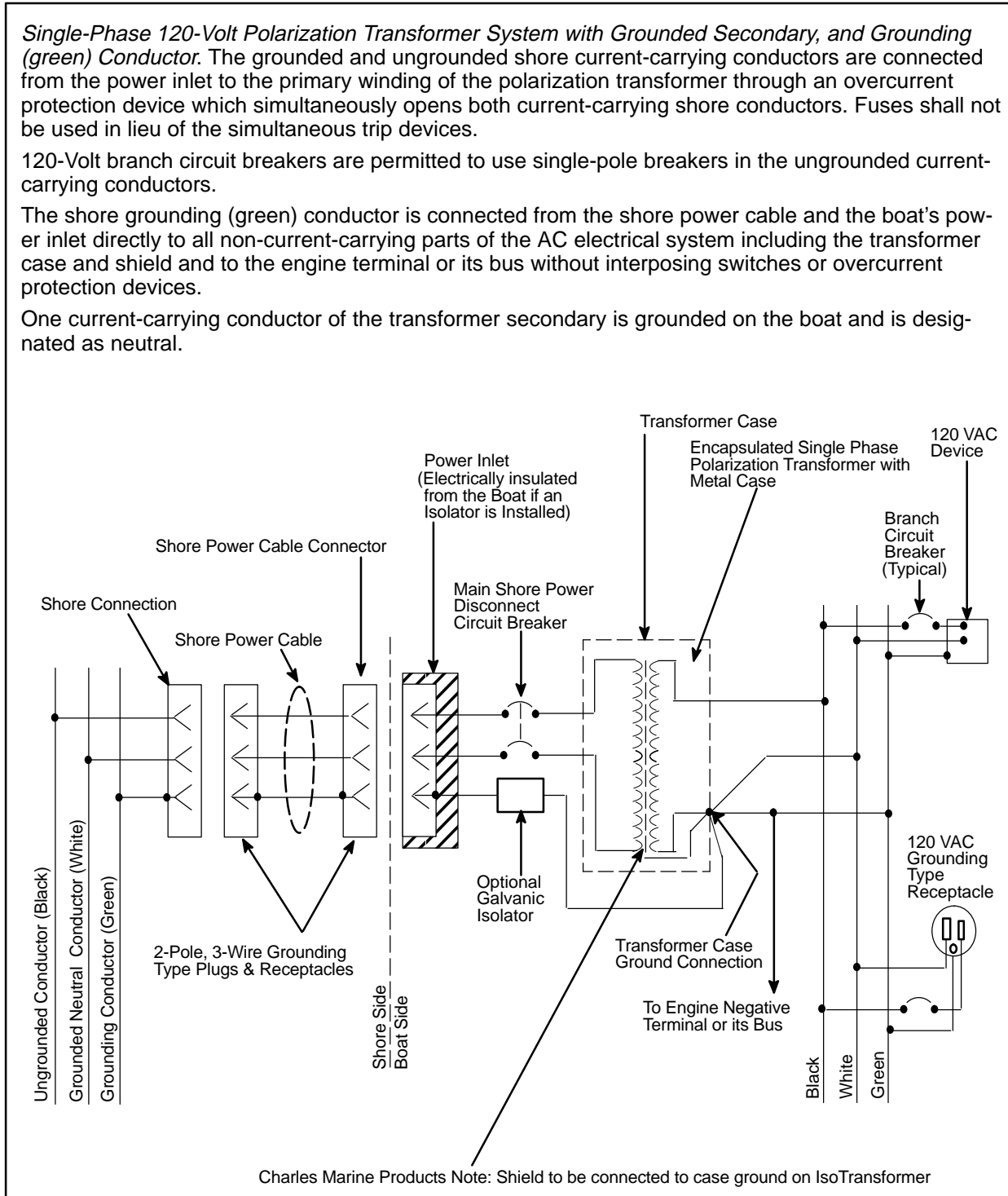


Figure 6. Electrical Diagram – Method 1 (see Figure 12 for Wiring Connections)

Note: This diagram does not illustrate a complete system. Refer to the appropriate ABYC text.

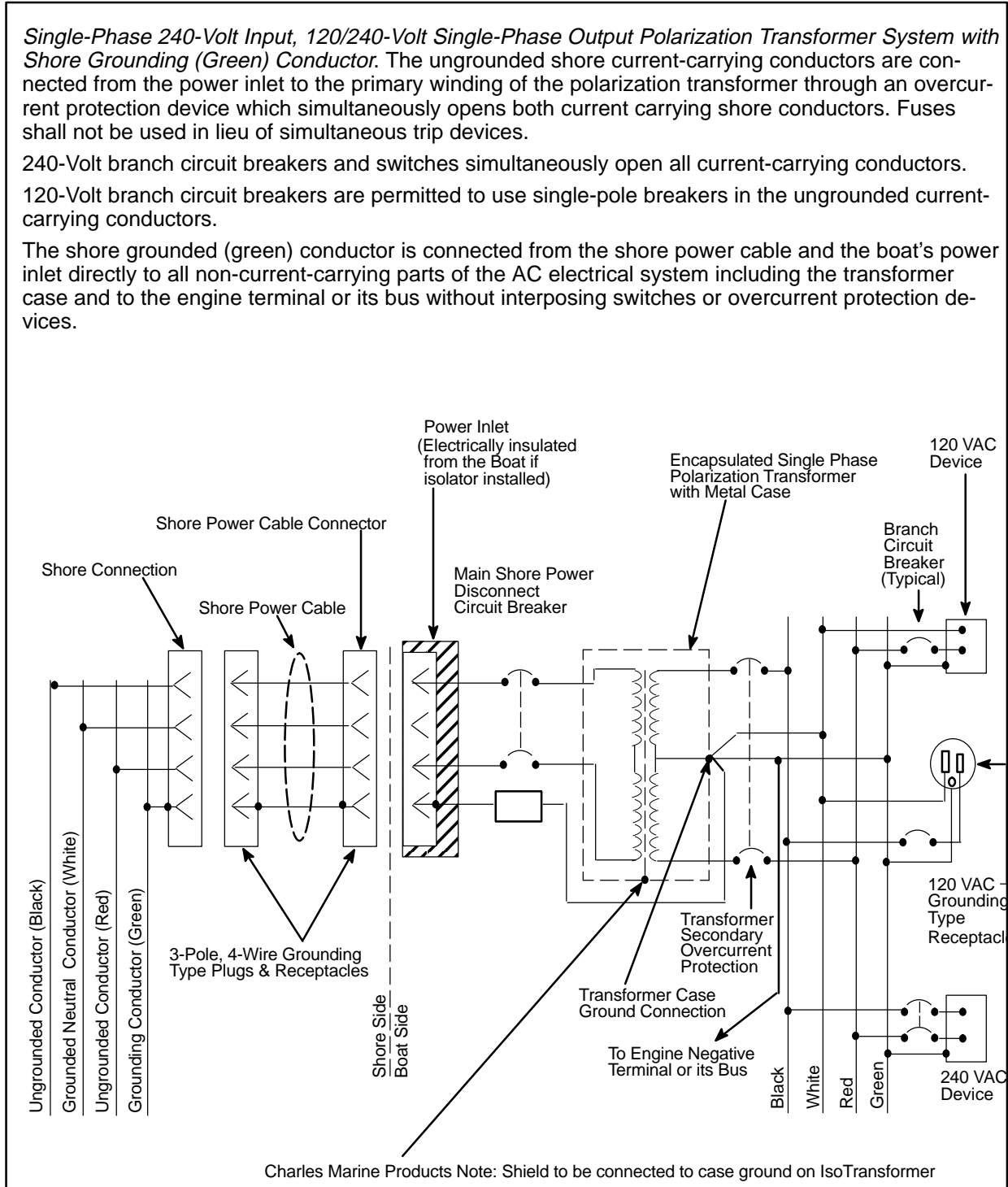


Figure 7. Electrical Diagram – Method 2 (see Figure 13 for Wiring Connections)

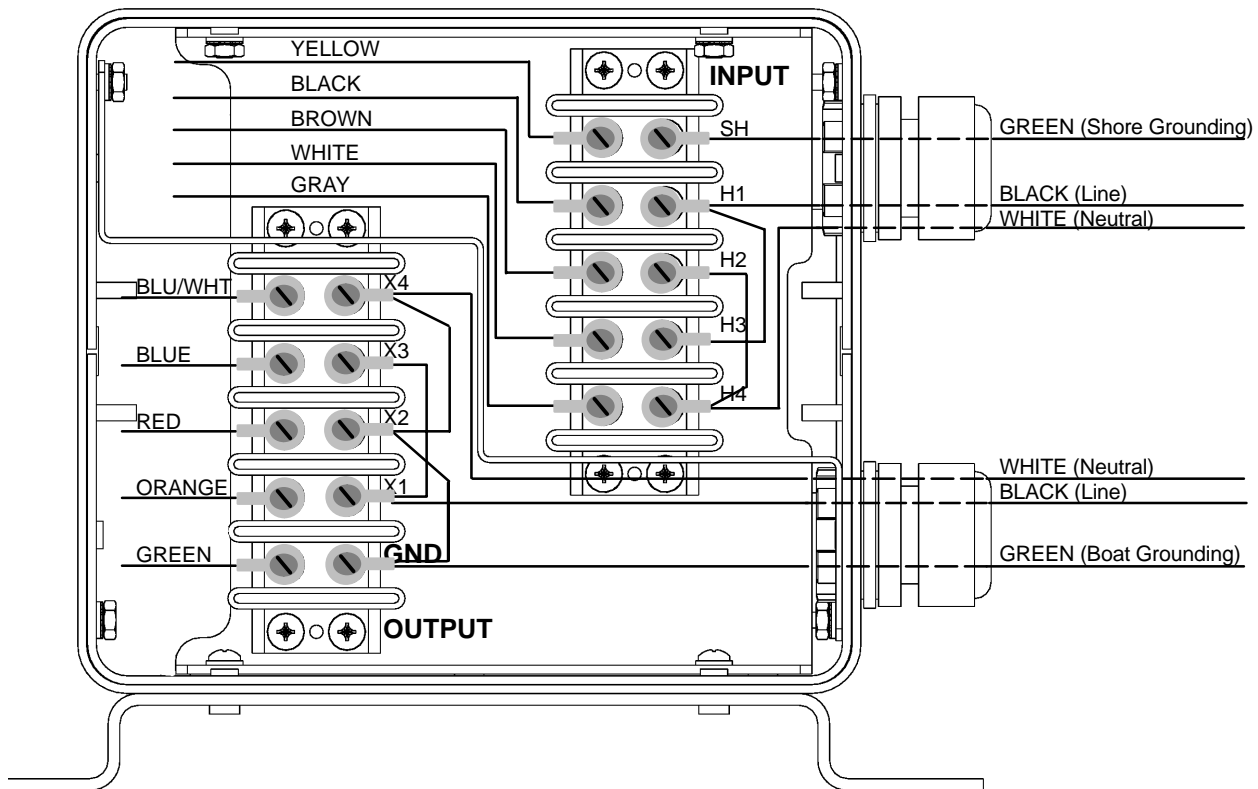


Figure 8. Typical Wiring as a 120 Volt Input/120 Volt Output Isolation Transformer – Method 1 (see Figure 2 for Electrical Diagram)

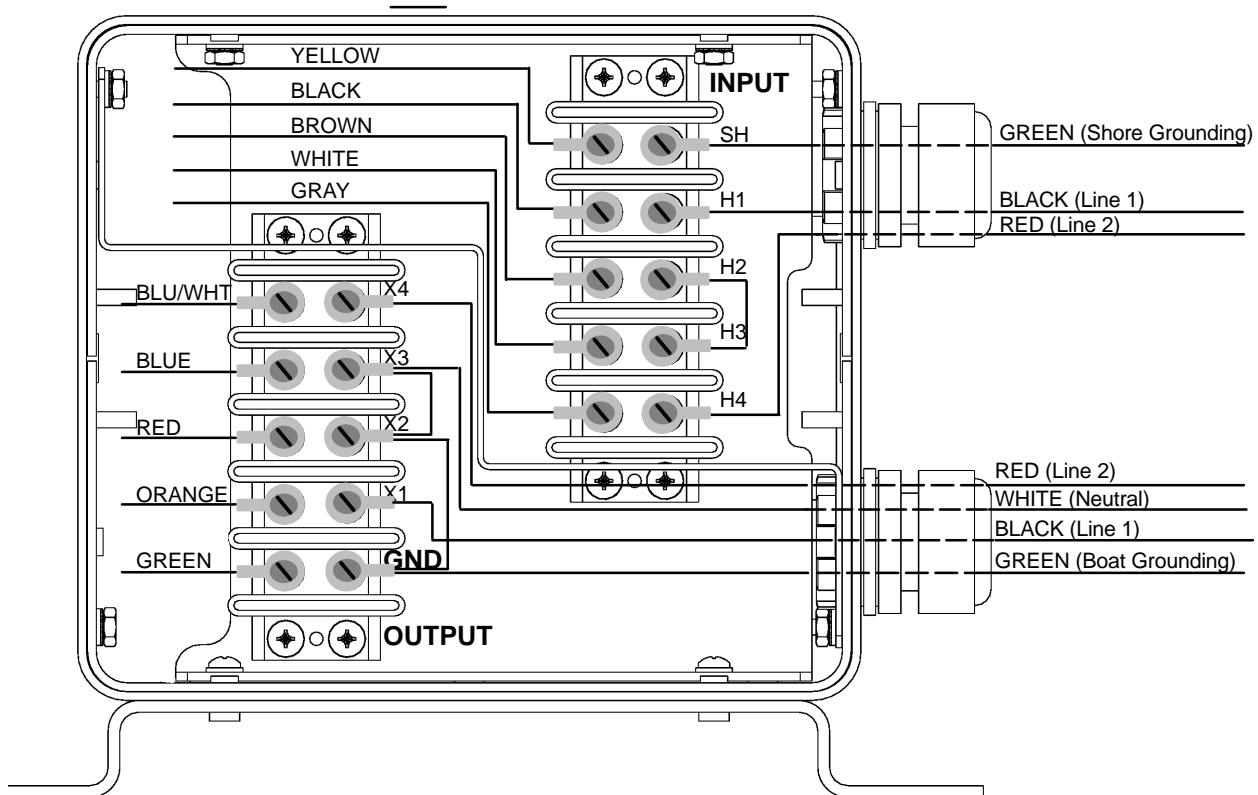


Figure 9. Typical Wiring as a 240 Volt Input, 120/240 Volt Output Isolation Transformer – Method 1 (see Figure 3 for Electrical Diagram)

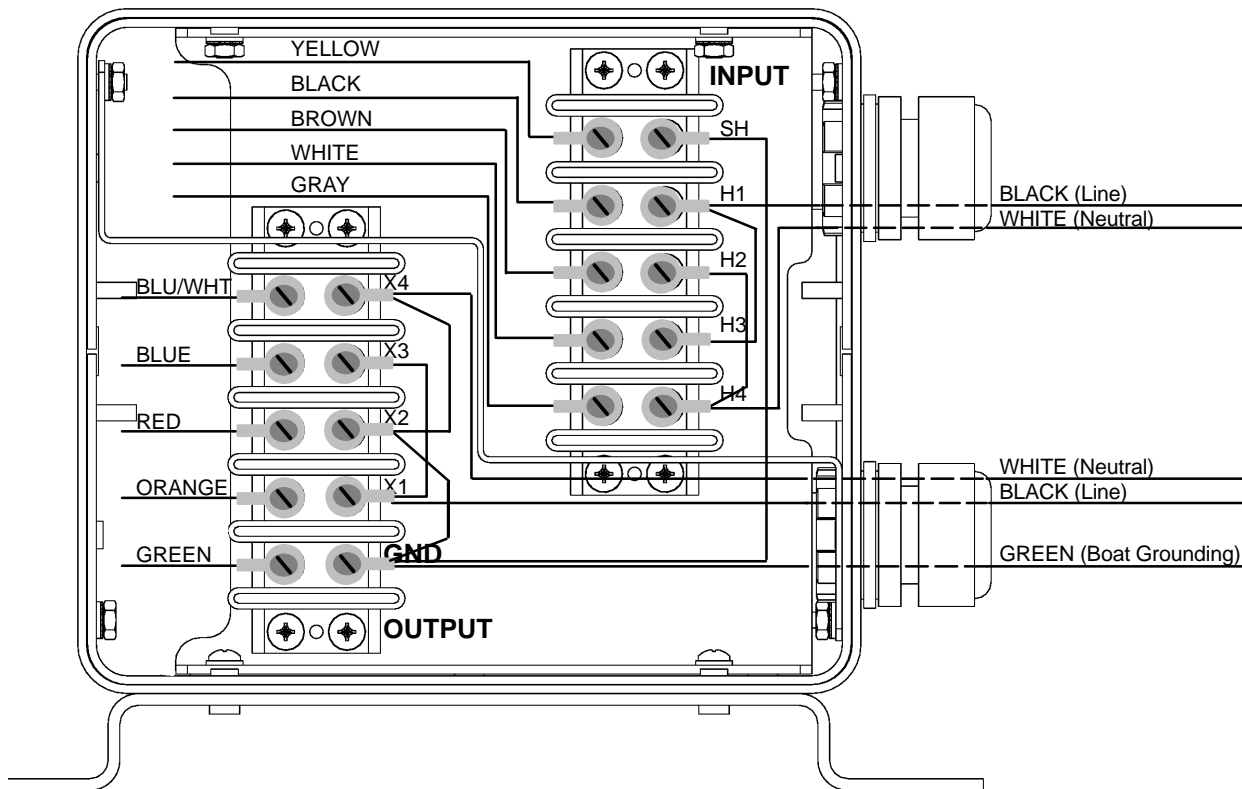


Figure 10. Typical Wiring as a 120 Volt Input/120 Volt Output Isolation Transformer with Primary Ground Fault Protector – Method 2 (see Figure 4 for Electrical Diagram)

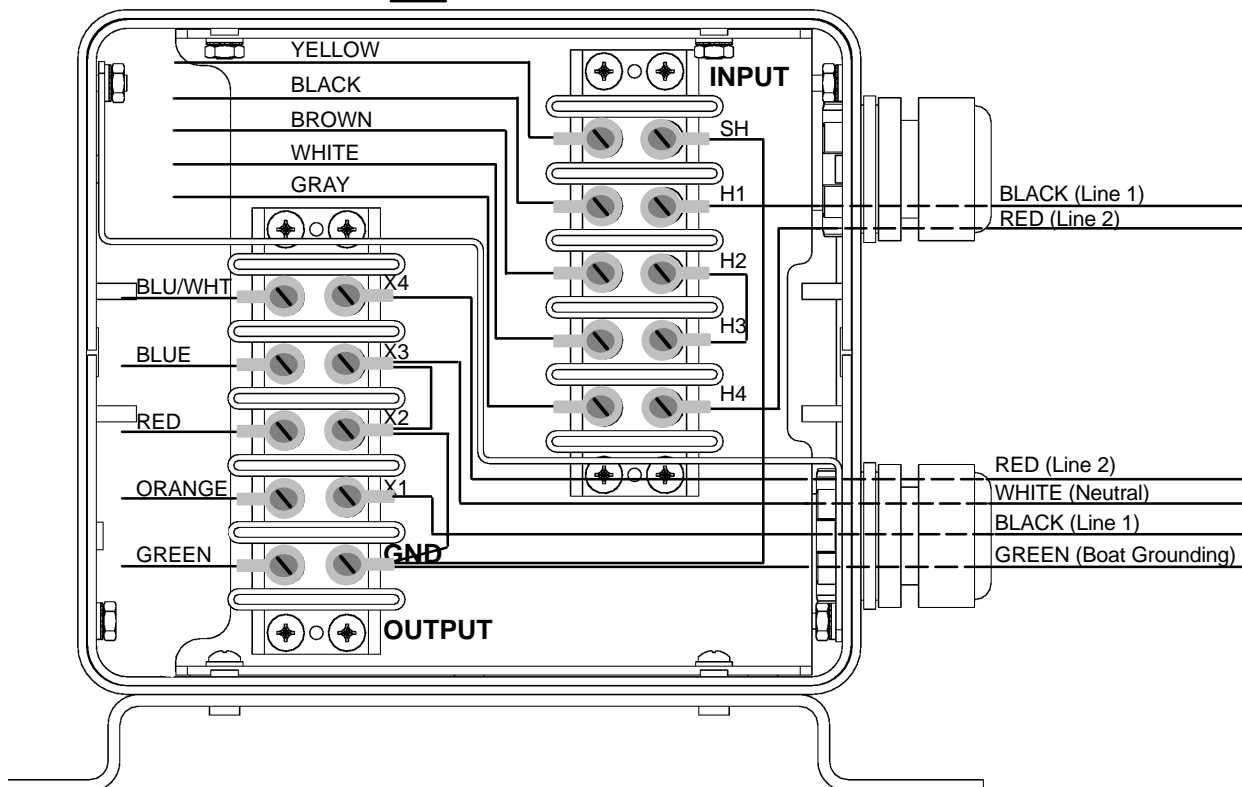


Figure 11. Typical Wiring as a 240 Volt Input, 120/240 Volt Output Isolation Transformer with Primary Ground Fault Protector – Method 2 (see Figure 5 for Electrical Diagram)

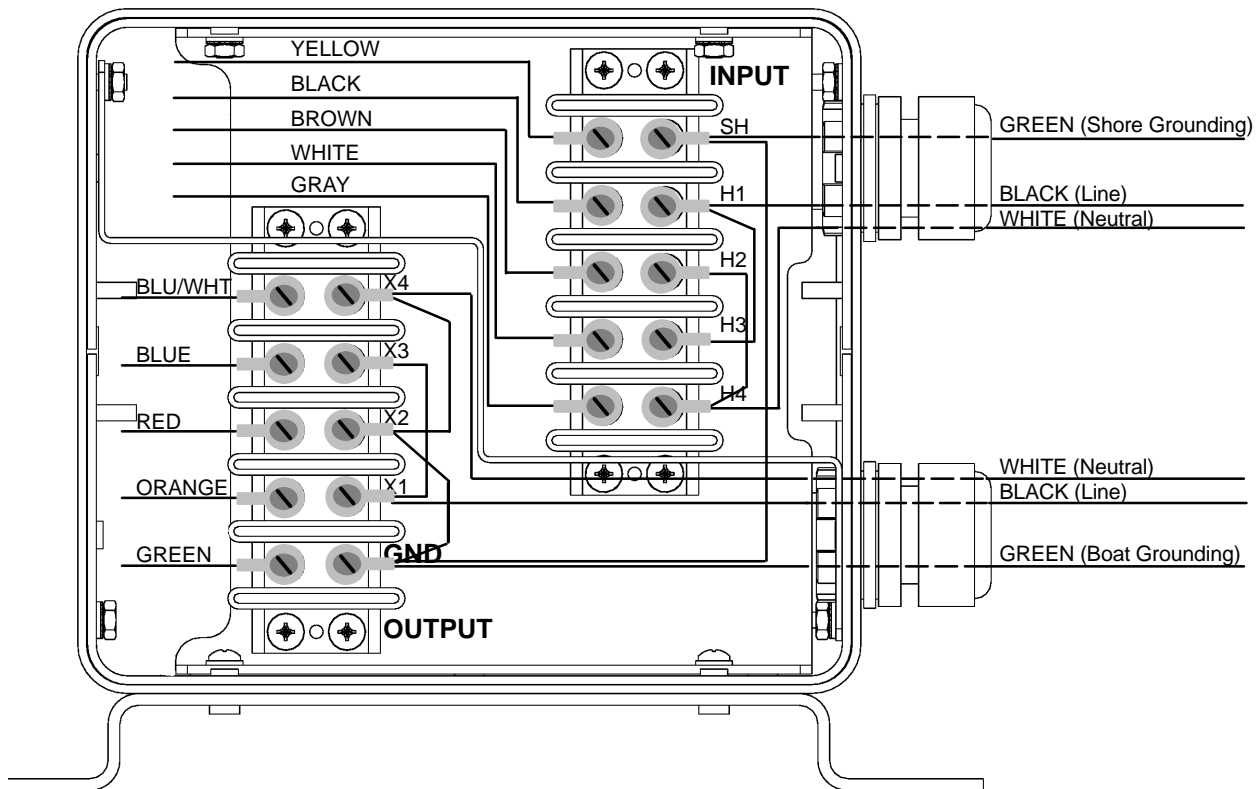


Figure 12. Typical Wiring as a 120 Volt Input, 120 Volt Output Polarization Transformer – Method 3 (see Figure 6 for Electrical Diagram)

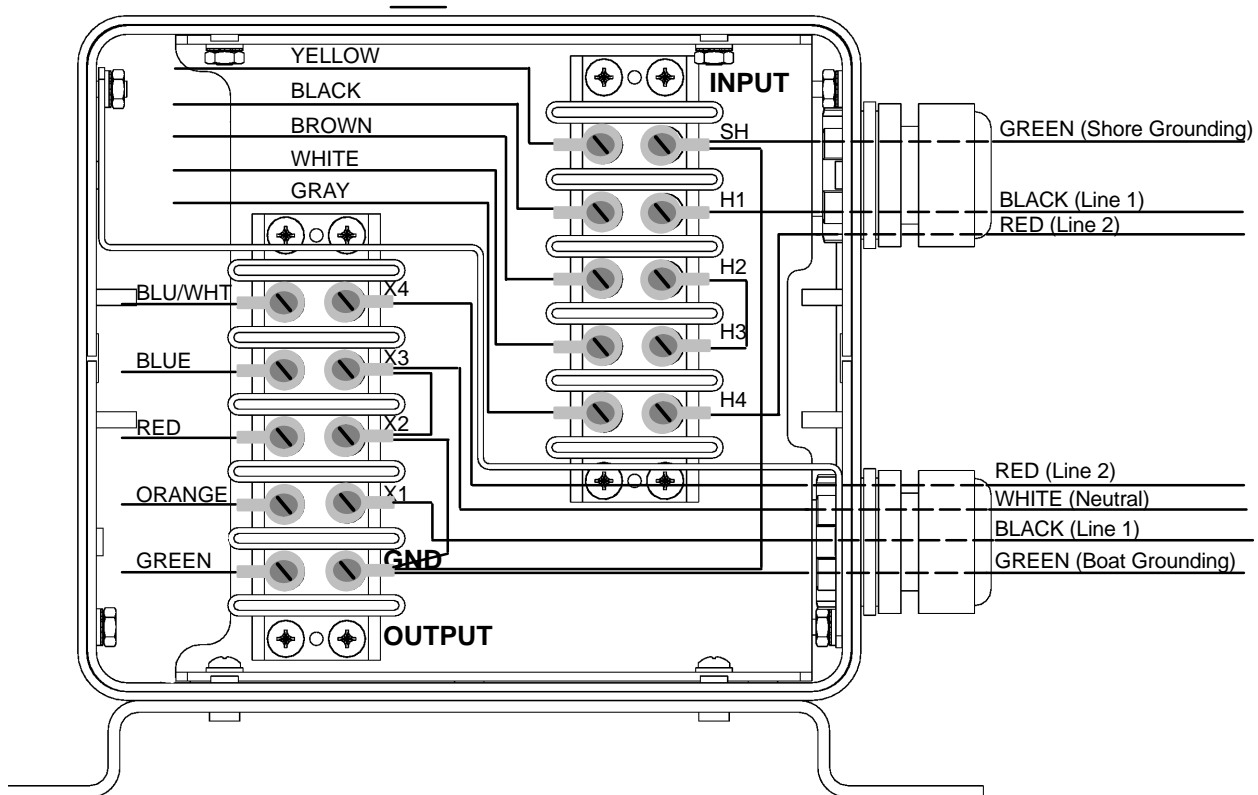


Figure 13. Typical Wiring as a 240 Volt Input, 120/240 Volt Output Polarization Transformer – Method 3 (see Figure 7 for Electrical Diagram)

Securing Covers

After all connections and terminations have been made, the access cover should be re-installed using all hardware supplied.

Applying Power

Power should only be applied after all connections and terminations have been made and the access cover is secure. Plug in the shore power and turn on the appropriate circuit breakers to apply power. Refer to the section on *Proper Operation*.

OPERATING THE ISOTRANSFORMER

Safety First

Follow all precautions in the *IMPORTANT SAFETY INSTRUCTIONS* section in this manual. Pay close attention to the DANGER, WARNING and CAUTION boxes both within this manual and labeled on the unit.

Proper Operation

When properly installed and connected, the IsoTransformer will provide isolation between shore and boat power while maintaining a one to one turns ratio (shore voltage equals boat voltage).

MAINTAINING THE ISOTRANSFORMER

WARNING – HIGH VOLTAGE

To avoid serious injury or death from high voltage electrical shock, disconnect the AC shore power before attempting any maintenance or cleaning.

No adjustment or maintenance is required for the IsoTransformer other than periodic cleaning of the outside cabinet with a dry cloth and inspecting all connections for tightness and corrosion by a qualified service person.

TROUBLESHOOTING

If there is a problem with the IsoTransformer, first check that all connections are accurate and secure, and retest. If all connections are good, contact Charles Marine Products for technical assistance.

WARRANTY & CUSTOMER SERVICE

Warranty

CHARLES MARINE PRODUCTS warrants the IsoTransformer will be free from defects in materials and workmanship which cause mechanical failure for one (1) year, as set forth in the Limited Warranty. Review this warranty carefully for information on what is covered by its terms. Complete and return the warranty registration card within ten (10) days of purchase to establish proof of ownership and validate the warranty coverage. You must provide notice of any alleged defect in material or workmanship within thirty (30) days of discovering the problem, and within the warranty period. Follow the procedure outlined below to obtain warranty service.

Warranty Service and Repair

If the unit fails to operate properly after following all the instructions in the manual, or if the unit requires service, take the following steps.

1. Return the unit to:
Charles Industries, Ltd.
400 S.E. 8th Street
Casey, IL 62420
ATTN: Service Center

Note: Shipping costs to and from the service center are your responsibility.

2. Include a letter with your company name (if applicable), contact, return address, daytime phone number and the nature of the failure.
3. When service is complete, Charles Industries, Ltd. will return the unit to you. If there are any repair charges, a representative from Charles Industries will contact you with that information prior to having the unit repaired.

Customer Service

If technical assistance or customer service is needed, contact Charles Marine Products at:

847/806-6300 (Customer Service)
 847/806-6231 (FAX)

For correspondence only, mail to:

Charles Marine Products
 Charles Center
 5600 Apollo Drive
 Rolling Meadows, IL 60008-4049

SPECIFICATIONS

The specifications for the IsoTransformer are listed in Table 1.

Table 1. IsoTransformer Specifications

Feature	Specification
Input Voltage	120/240 VAC
Input Current	30/16 Amps
Output Voltage	120/240 VAC
Output Current	30/16 Amps
KVA Continuous	3.8 KVA
Operating Frequency	50/60 Hertz
°C Rise Insulation System 220A	120° C
Insulation Class	H
% Impedance	3.4
Operating Temperature	0° to 50° C
Approximate Weight	60 pounds
Height	8 inches
Width	10.5 inches
Width (excluding the mounting flange)	8 inches
Depth	10.5

