
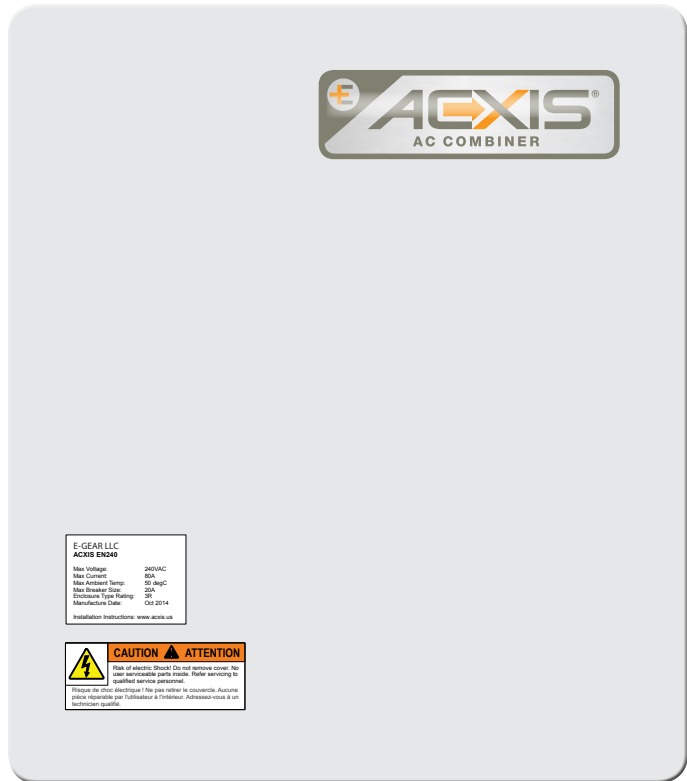


Identifier: EN-240	Revision: 002	Effective Date: 05/19/15	
Document Catalog Number: EN-240 (ENG)			
Author: SG			



User Guide



99-1350 Koaha Place
Aiea, Hawaii, USA
Ph: (844) 443-4327

Email
Visit our Website

Info@Acxis.us
www.ACXIS.us



User Guide

Copyright © 7/28/14 E-Gear, LLC All rights reserved.

No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from E-Gear, LLC.

All copyright, confidential information, patents, design rights and all other intellectual property rights of whatsoever nature contained herein are and shall remain the sole and exclusive property of E-Gear, LLC. The information furnished herein is believed to be accurate and reliable.

However, no responsibility is assumed by E-Gear, LLC for its use, or for any infringements of patents or other rights of third parties resulting from its use.

The ACXIS® name and E-Gear, LLC logo are trademarks or registered trademarks of E-Gear, LLC.

All other trademarks are the property of their respective owners.

US Patent No. 8,847,614 B2 September 30, 2014





User Guide

Document History

Revision History

Revision Number	Revision Date	Summary of Changes	Author
000	08/08/14	Original - Shipping with No Breakers installed	CD
001	12/04/14	UL Rev. Shipping with 2 Breakers installed	SG
002	05/19/15	Logo Change, Registered Trademark Addition	SG

Approvals

This document requires following approvals:

Name	Title
Steven Godmere	Managing Partner, E-Gear™ LLC
Chris DeBone	Managing Partner, E-Gear™ LLC

Distribution

This document has been distributed to:

Name	Title





User Guide

Table of Contents

1. Introduction.....	7
1.1. Overview	7
1.2. Unpacking and Inspection.....	7
2. Installation	8
2.1. Information for installer:	8
2.2. Enclosure Mounting	9
2.3. Enclosure Dimensions	10
2.4. Input Wiring	11
2.5. Output Wiring	11
2.6. PV Branch Circuit Breakers	13
2.7. Adding Branch Circuit Breakers	14
3. Integration.....	15
3.1. Integration into the PV System	15
3.2. Overview of Internal Components.....	15
3.3. Power Line Communication (PLC) Filter Installation	17
3.4. Optional Bridge Adapter Ethernet Connection	18
4. PV System Troubleshooting	20
4.1. Input current indicators	20
4.2. Output voltage indicator	20
5. Warranty	21





User Guide

About this guide

This document is divided into the following chapters:

- Chapter 1, “Introducing our device”.
- Chapter 2, “Installation”
- Chapter 3, “Integration”, explains how the **ACXIS**[®] enclosure interacts with the PV system.
- Chapter 4, “PV System Troubleshooting”, describes built in troubleshooting functions.
- Chapter 5, “Warranty”

Who Should Use It

This guide is intended for users of different degrees of knowledge and experience in photovoltaic system installations. This guide assumes that you have knowledge in the micro-inverter photovoltaic system installation process.

For more information, refer to the inverter manufacturers installation manual, local NEC codes and/or other appropriate documentation.





User Guide

IMPORTANT SAFETY INSTRUCTIONS ***SAVE THESE INSTRUCTIONS***

This manual contains important instructions that must be followed during the installation and use of the ACXIS® enclosure.

The ACXIS® enclosures are designed and tested according to international safety requirements. As with all electrical and electronic equipment, certain precautions must be observed when installing the enclosure. To reduce the risk of personal injury and to ensure the safe installation and operation of the enclosure, you must carefully read and follow all instructions and warnings in this Installation Guide.

Safety and Hazard Symbols



This symbol appears beside instructions and warnings that deal with dangerous voltages that can injure people who come in contact with them.

Warnings



WARNING: A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the ACXIS® equipment and/or other equipment connected to the ACXIS® equipment or personal injury.

Warnings may also be accompanied by one or more of the safety and hazard symbols described above to indicate the type of hazard described therein.

Other Symbols

In addition to the safety and hazard symbols described previously, the following symbol is also used in the Installation Guide:

	Direct current supply symbol
	Alternating current supply symbol
	Phase Symbol
	Equipment grounding conductor
	Supplementary information that you should know to ensure optimal operation of the system.



User Guide

1. Introduction

1.1. Overview

The ACXIS® enclosure is an AC branch circuit combiner for micro-inverter installations, that incorporates a communications monitoring device and Ethernet bridge in a custom-designed, weather resistant enclosure. ACXIS® offers system troubleshooting, security, safety and convenience features.

Key features include:

- Listed UL 1741
- NEMA 3RX enclosure with passive ventilation
- Allows up to 5 individual branch circuits that allows wide installation versatility
- 240V Utility voltage indicator light
- LED branch circuit indicator lights
- AC surge protection
- Power Line Communication (PLC) noise filters
- Simplified input and output wiring

1.2. Unpacking and Inspection

All ACXIS® enclosures are thoroughly checked before they are packaged and shipped. Although they are shipped in sturdy packaging, damage can still occur during shipping and delivery. It is important to carefully inspect the shipping container and contents prior to installation. If you detect any external damage after unpacking, report the damage immediately to your distributor and the shipping company that delivered the unit. Items not rejected within 10 days of delivery are considered accepted without recourse. If it becomes necessary to return the combiner, please use the original packing material.

If you need assistance in dealing with a damaged unit, please contact your distributor.



User Guide

2. Installation

2.1. Information for installer:

1. The National Electrical Code, ANSI/NFPA 70 wiring methods are to be used.
2. The AC input and AC output circuits are isolated from the enclosure and that system grounding, if required by Section 250 of the National Electrical Code, ANSI/NFPA 70, is the responsibility of the installer.
3. Photovoltaic System Grounding shall be installed per the requirements of Sections 690.41 through 690.47 of the National Electrical Code, ANSI/NFPA 70 and is the responsibility of the installer.
4. The tightening torque, allowable wire size, and type, for the Field-Wiring Terminals:

<i>Model EN-240</i>	<i>Tightening torque (lb-in)</i>	<i>Wire size (AWG/kCmil/MCM)</i>	<i>Wire type</i>	<i>Wire Temperature rating</i>
<i>Input</i>	<i>Marked on breaker</i>	<i>8-14 AWG</i>	<i>Cu Stranded</i>	<i>90C</i>
<i>Output</i>	<i>100 lb-in</i>	<i>2/0 - #1 AWG</i>	<i>Cu Stranded</i>	<i>90C</i>
	<i>80 lb-in</i>	<i>#2 - #6 AWG</i>	<i>Cu Stranded</i>	<i>90C</i>
<i>Grounding Terminal</i>	<i>45 lb-in</i>	<i>4-6 AWG</i>	<i>Cu Stranded</i>	<i>90C</i>
	<i>40 lb-in</i>	<i>8 AWG</i>	<i>Cu Stranded</i>	<i>90C</i>
	<i>35 lb-in</i>	<i>10-14 AWG</i>	<i>Cu Stranded</i>	<i>90C</i>



User Guide

2.2. Enclosure Mounting

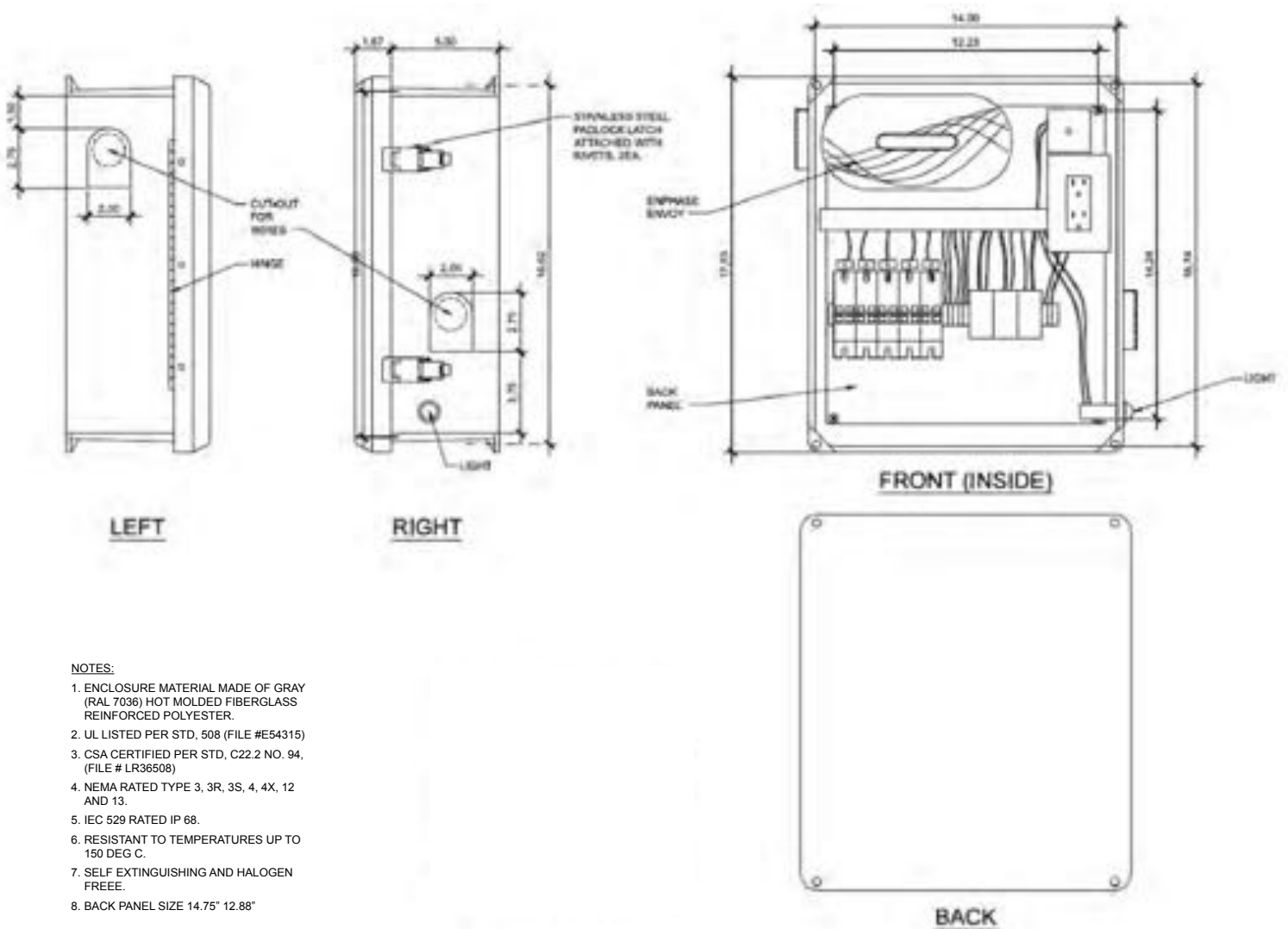
The enclosure should be attached flat against an interior/exterior wall. If possible, position the enclosure in the shade to protect it from weather. Locate the enclosure at a convenient height that is within local electrical jurisdiction guidelines and where it will be accessible for maintenance.

1. Mount the enclosure with the exterior voltage indicator light in the lower right corner.
2. Two air vents are mounted per enclosure to ensure sufficient air circulation and prevent condensation water. Provide a minimum of 6" on each side of the enclosure to prevent airflow restrictions.
3. Minimum Mounting requirements:
 - a. Drywall:
Minimum 3/8" drywall.
Toggler TB Plastic Toggle 3/8" - 1/2" Drywall Anchor with #8 x 1-1/2" sheet metal screw - 5/16" pre-drilled hole.
 - b. Hardiplank or concrete:
Minimum 1/4" Hardipank
Tapcon Concrete Anchors 3/16" x 2-3/4" - 5/32" pre-drilled hole.
 - c. Plywood and/or wooden wall stud:
#10 x 1-1/2" Wood Screw



User Guide

2.3. Enclosure Dimensions



NOTES:

1. ENCLOSURE MATERIAL MADE OF GRAY (RAL 7036) HOT MOLDED FIBERGLASS REINFORCED POLYESTER.
2. UL LISTED PER STD. 508 (FILE #E54315)
3. CSA CERTIFIED PER STD. C22.2 NO. 94, (FILE # LR36508)
4. NEMA RATED TYPE 3, 3R, 3S, 4, 4X, 12 AND 13.
5. IEC 529 RATED IP 68.
6. RESISTANT TO TEMPERATURES UP TO 150 DEG C.
7. SELF EXTINGUISHING AND HALOGEN FREE.
8. BACK PANEL SIZE 14.75" 12.88"

Figure 1. Combiner Enclosure Dimensions



User Guide

2.4. Input Wiring

Refer to Figure 2 for the input wiring locations of the **ACXIS**[®] enclosure. Conductors from each individual PV branch circuit conductors are wired into L1 and L2 dedicated circuit breakers and neutral connection points respectively. All PV safety ground conductors are wired into the ground bus located at the bottom of the enclosure backplate. Refer to Figure 3 for each input connection point.



NOTE: The **ACXIS**[®] enclosure is shipped with no entry holes. A knock-out is required for the appropriate conductor size. E-Gear recommends wire entry to be made according to Figure 2.



NEMA 4 or 4X applications must use only UL Listed watertight hubs that comply with the Standard UL514B. Use Myers- type, water-tight conduit fittings. Install fittings per manufacturer's recommendations.

2.5. Output Wiring

Refer to Figure 2 for the output wiring locations of the **ACXIS**[®] enclosure. Each individual PV branch circuit is combined into separate L1, L2 and neutral power terminal blocks for a single output connection of each conductor. Refer to Figure 3 for output connection points.



NOTE: The **ACXIS**[®] enclosure is shipped with no entry holes. A knock-out is required for the appropriate conductor size. E-Gear recommends wire entry to be made according to Figure 2.



NOTE: NEMA 4 or 4X applications must use watertight hubs that comply with the Standard UL514B. Use Myers- type, water-tight conduit fittings. Install fittings per manufacturer's recommendations.

NEMA 3R Fiberglass (4XF) (Not to Scale)

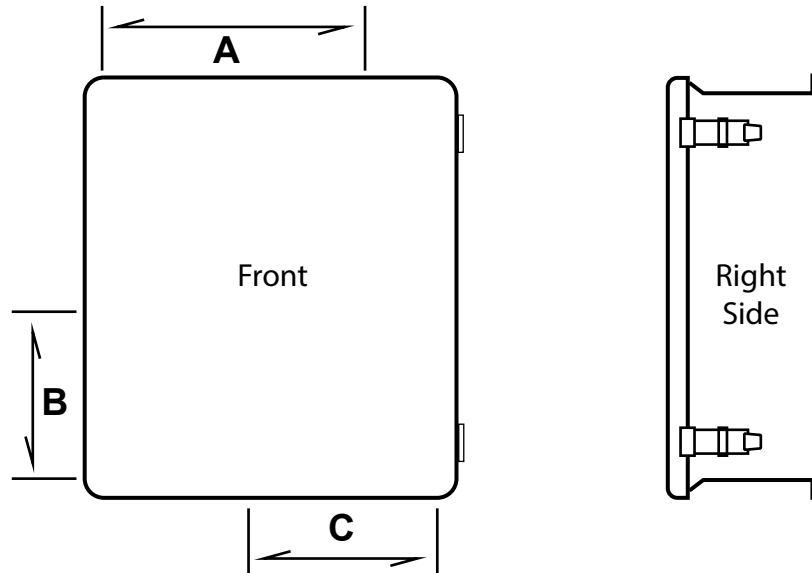


Figure 2. Wire Entry Locations

Dimension “A” and “B” are for input wire locations. Dimension “C” is for output wire location. These locations are recommendations only. Care should always be taken to assure there is enough wire bend space for the desired output wire gauge when choosing a conduit entry location.

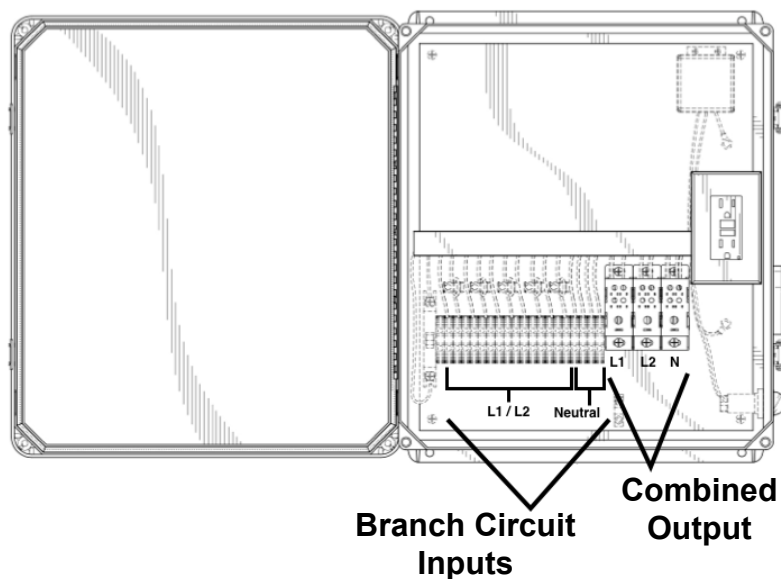


Figure 3. Connection Points

2.6. PV Branch Circuit Breakers & Neutral Terminal Blocks

All ACXIS® enclosures ship configured to accommodate DIN-Rail rear mounted branch circuit breakers and pass through neutral terminal blocks. Refer to your particular inverter manufacturer for maximum number of inverters per branch circuit and proper breaker sizing. Your distributor maintains stock of common breaker sizes if more than 2 branch circuits are necessary or spares desired.

** Follow supplied instructions for adding additional branch circuits.



Figure 4. DIN rail Type QCR breaker & Neutral Terminal Block



NOTE: All ACXIS® boxes are shipped to accommodate at least two branch circuits, each pre-wired with their own neutral terminal block and 2P 20A circuit breaker. Additional Branch Circuits can be installed in the field up to a maximum of 5 branch circuits. ** Follow supplied instructions for adding additional branch circuits.



WARNING: All electrical installation must be done in accordance with the National Electrical Code ANSI/NFPA 70, local building codes, and the requirements of the authority having jurisdiction.



WARNING: To prevent electrical shock or injury, all wiring and commissioning procedures must be performed by qualified personnel.



WARNING: Before installing or powering on the ACXIS® enclosure, read all of the instructions and warnings on the enclosure and in this Installation Guide.

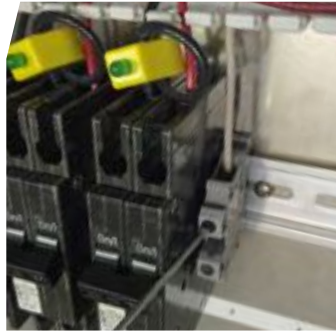
2.7. Adding Branch Circuit Breakers & Terminal Blocks



1) Remove wire raceway cover.



2) Snap the Terminal Block onto the DIN Rail.



3) Secure the line side Neutral wire to the terminal block.



4) Snap the Breaker onto the DIN Rail.



5) Secure the line side L1 & L2 wires to the top of the Breaker looping the L1 Wire through the LED Current Indicator.



6) Secure line side L1, L2 & Neutral wires to the top of the Distribution Blocks labeled L1 & L2.



7) Replace the wire raceway cover.



WARNING: BEFORE INSTALLING ADDITIONAL BREAKERS, insure that electrical service to the ACXIS™ enclosure has been disconnected. All electrical installation must be done in accordance with the National Electrical Code ANSI/NFPA 70, local building codes, and the requirements of the authority having jurisdiction.



WARNING: To prevent electrical shock or injury, all wiring and commissioning procedures must be performed by qualified personnel.



WARNING: Before installing or powering on the ACXIS™ enclosure, read all of the instructions and warnings on the enclosure and in this Installation Guide.

3. Integration

3.1. Integration into the PV System

The ACXIS® box is designed to be installed between the PV generation components and the load side of the homes distribution panel as detailed in Figure 5.

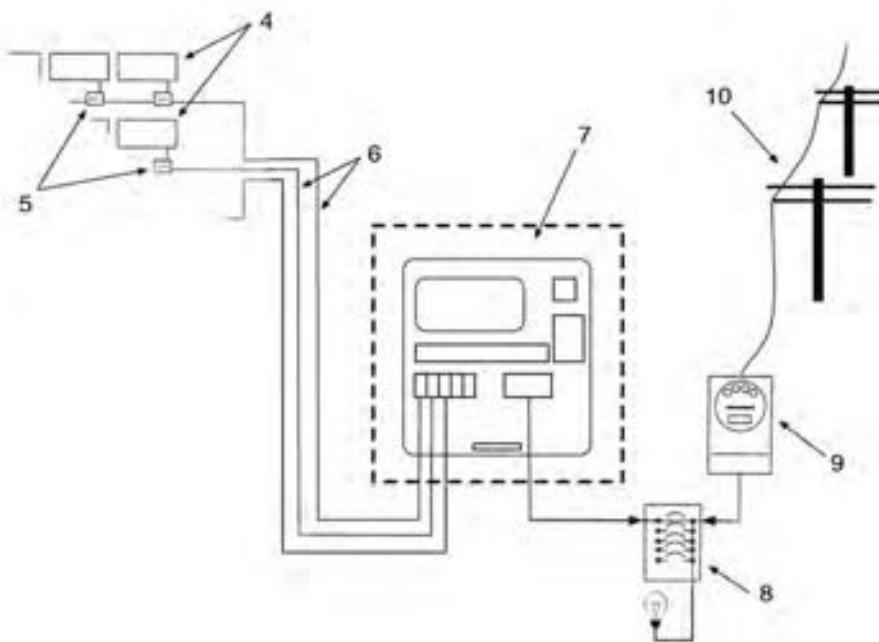


Figure 5. Integration into PV system

- 4. Solar panels
- 5. Micro-Inverters
- 6. Inverter branch circuits
- 7. ACXIS box housing
- 8. Home power distribution panel (Local load)
- 9. Utility meter
- 10. Utility grid

3.2. Overview of Internal Components

Detail of each component as shown in Figure 6

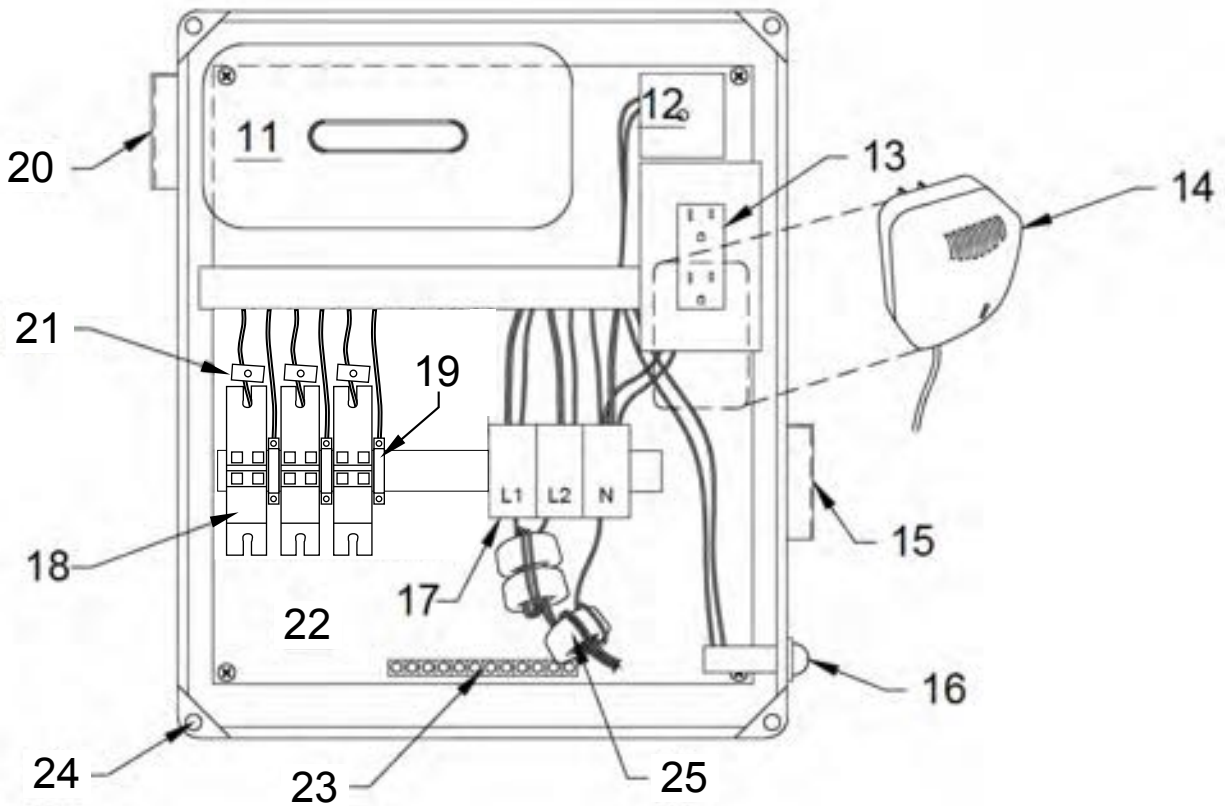


Figure 6. Internal components

- 11. Solar energy monitoring unit
- 12. AC surge protection device
- 13. Electrical outlet
- 14. Internet connection device
- 15. Lower ventilation
- 16. 240V Voltage indicator light
- 17. Output power distribution blocks
- 18. Input branch circuit over current protection device
- 19. Neutral wire terminal block
- 20. Upper ventilation
- 21. Current indicators
- 22. Mounting plate for electrical components
- 23. Grounding point
- 24. Enclosure mounting holes
- 25. Power Line Communication (PLC) noise filters

3.3. Power Line Communication (PLC) Filter Installation

PLC filter “beads” are installed on the output wiring as illustrated in Figure 7.

Step 1) Wrap L1/L2/N once through one bead.

Step 2) Wrap L1/L2 once through two beads.

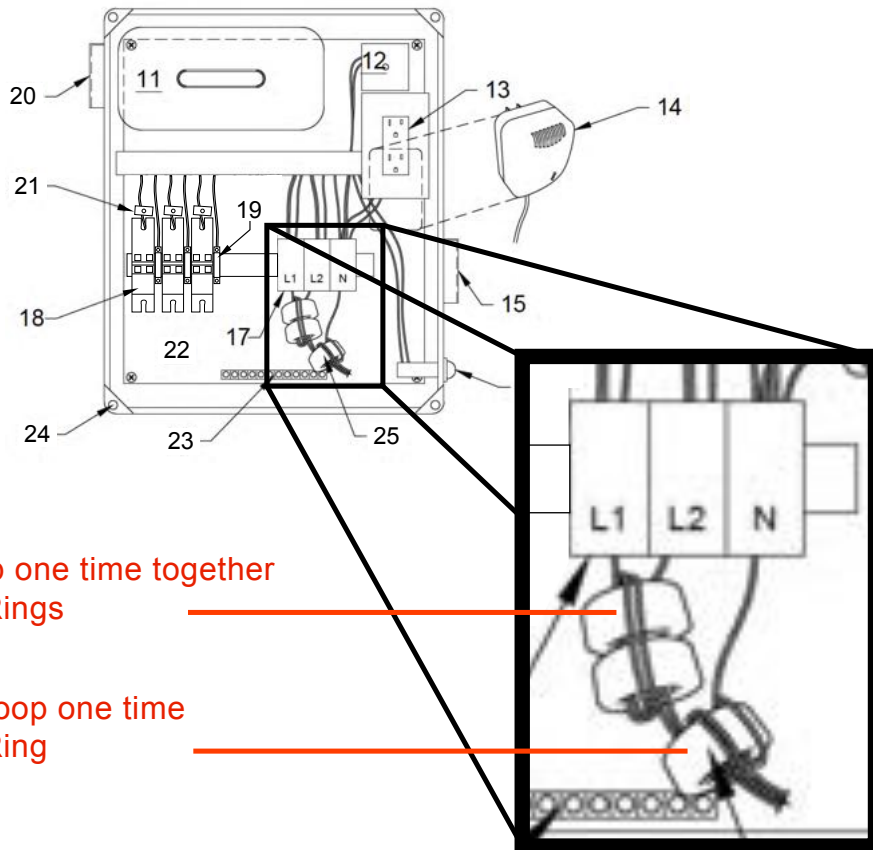


Figure 7. PLC filter installation



NOTE: It is important to separate, physically, the input array wires and output load wires in the ACXIS® box. If the wire sets come close to each other, they will crosstalk and effectively bypass the filter made with the beads. Do not run array conductors and load conductors in the same raceway or conduit. Input and output wiring should be separated. You may need additional beads in cases of extreme cases of power line noise.

3.4. Optional Bridge Adapter Ethernet Connection

Connection within the ACXIS® enclosure:

Install the ethernet bridge adapter (Homeplug #1) that was supplied with your micro-inverter monitoring system into the lower power outlet located within the ACXIS® enclosure as shown in Figure 8. Connect the ethernet LAN cable between the bridge adapter and solar monitoring gateway.

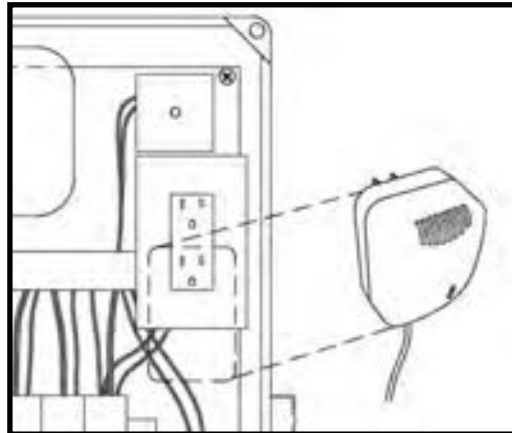


Figure 8. Homeplug #1

Connection within the home:

A second ethernet bridge adapter (Homeplug #2) is supplied to be plugged into an electrical outlet near the homes broadband router as illustrated in Figure 9. The ethernet bridge adapters, or commonly referred to as “Homeplugs”, make an ethernet IP connection between the two devices over the power lines in the home. The solar monitoring gateway will use this IP address to access the Internet and send reports for online monitoring.

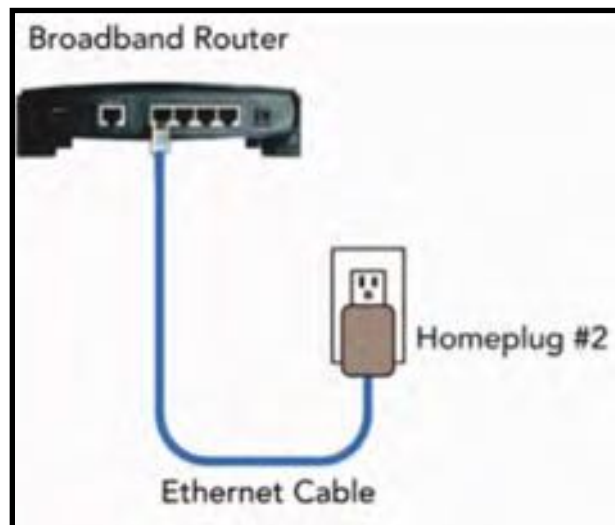


Figure 9. Homeplug #2

Are My Power Line Communication Bridges Working?

Use the status lights to verify connections. The table below describes the lights on the front panel of the unit.

Indicator	State	What it means
Power	On	Indicates device powered on
	Off	Indicates no power
PLC Activity	Blinking	Indicates activity on power line
	Off	Indicates no activity on power line (should blink intermittently)
Ethernet Link	On	Indicates Ethernet connectivity
	Blinking	Indicates Ethernet traffic
	Off	Indicates no Ethernet activity




Figure 10. Homeplug indicators

4. PV System Troubleshooting

Built into the design of the **ACXIS**[®] enclosure are features that aid in the troubleshooting overall PV system production issues.

4.1. Input current indicators

Wire-mounted electrical current indicators provide an effective method of monitoring electrical current. The indicators are attached directly to the input current-carrying wire from the PV arrays. When the current exceeds the turn-on point, the LED will illuminate to indicate the presence of current from each individual branch circuit of micro-inverters. Refer to Figure 6 component #20 for location within enclosure.

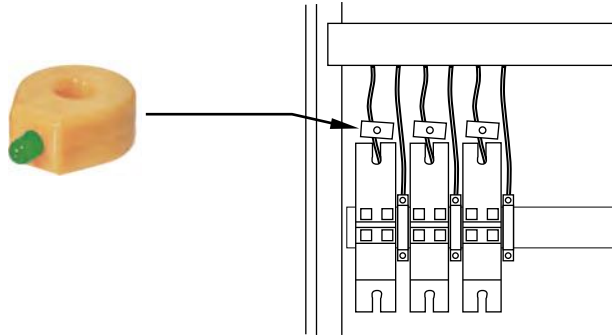


Figure 11. Current Indicators

4.2. Output voltage indicator

240v light indicates the presence of grid voltage from the utility. It also indicates blown fuses and / or tripped breakers between the **ACXIS**[®] enclosure and the point of home load connection. Refer to Figure 6 component #16 for location within enclosure.

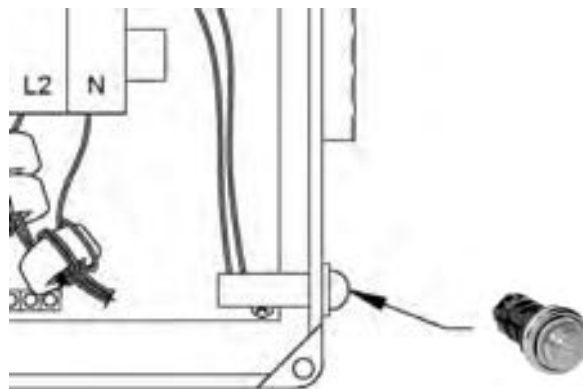


Figure 12. 240v Indicator



User Guide

5. Warranty

All **ACXIS**[®] enclosure sold in the USA have a five-year warranty. For warranty coverage, or if you have questions about the **ACXIS**[®] enclosure warranty, contact E-Gear at the address, telephone number, or web site listed on page 1 (to send e-mail, see the contact section of the E-Gear web site: www.ACXIS.us)