ZEF ENERGY

Installation & Commissioning Manual ZEFNET Pro Series

PLEASE NOTE

This user manual includes the latest information at the time of printing. ZEF Energy, Inc. reserves the right to make changes to this product without further notice. Changes or modifications to this product by other than an authorized service facility may void the product warranty.

Contact a Customer Service Representative with any questions about the use of this product. **(612) 404-0956**

WARNING: This product can expose you to chemicals, including Carbon Black, which is known to the State of California to cause cancer. For more information go to: www.P65Warnings.ca.gov

To view the latest version of this manual please visit our website at zefenergy.com/resources or make a request from the support team at support@zefenergy.com.

ZEFNET Pro User Manual, Version 8, March 2023

Manual Number: ZNP-008-A

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IMPORTANT SAFETY INSTRUCTIONS

Carefully read these instructions and the charging instructions in your vehicle owner's handbook before charging your electric vehicle.

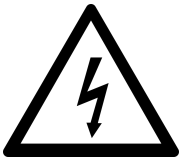
The following symbols may be found in this manual or on labels affixed to the Electric Vehicle Supply Equipment (EVSE):

NOTE: *This means pay particular attention.* Notes contain helpful suggestions.

REMARQUE: *Cela signifie accorder une attention particulière.* Les remarques contiennent des suggestions utiles.

CAUTION: *This symbol means be careful.* There is potential to do something that may result in damage to the equipment.

ATTENTION: *Ce symbole signifie être prudent.* Vous êtes capable de faire quelque chose qui pourrait causer des dommages à l'équipement.



WARNING: *This symbol means danger.* You are in a situation that could cause bodily injury. Before you work on any electrical equipment, be aware of the hazards involved with electrical circuitry and standard practices for preventing accidents.

AVERTISSEMENT: *Ce symbole signifie un danger.* Vous êtes dans une situation qui pourrait causer des blessures corporelles. Avant de travailler sur un équipement électrique, être conscient des dangers présentés par les circuits électriques et les pratiques courantes de prévention des accidents.

Instructions Pertaining to a Risk of Fire or Electric Shock

When using the ZEFNET Pro, basic electrical safety precautions should be followed:

- Use this EVSE to charge electric vehicles equipped with an SAE J1772™ charge port only. Consult the vehicle's owner manual to determine if the vehicle is equipped with the correct charge port.

- Make certain the EVSE SAE J1772 charge cable is positioned so it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- This product contains no user serviceable parts. Consult the Customer Support section in this manual for service information. Do not attempt to repair or service the EVSE yourself.
- Do not operate your EVSE if it or the SAE J1772 charge cable is physically open, cracked, frayed, or otherwise visibly damaged. Contact a Service Representative for service immediately. Consult the Customer Support section in this manual for information on the Service Representative in your area.
- Not for use in commercial garages where a COMMERCIAL GARAGE is defined as a facility (or portion thereof) used for the repair of internal combustion vehicles in which the area may be classified due to flammable vapors being present (such as from gasoline).
- Do not place fingers inside of the coupler end of the SAE J1772 charge cable.
- Do not allow children to operate this device. Adult supervision is mandatory when children are in proximity to an EVSE that is in use.

Additional Safety Instructions

WARNING: Turn off power to the ZEFNET-Pro at the circuit breaker panel before moving, servicing or cleaning the unit.

NOTE: VENTILATION - Some electric vehicles require an external ventilation system to prevent the accumulation of hazardous or explosive gasses when charging indoors. Consult the vehicle owner’s manual to determine if your vehicle requires ventilation during indoor charging.

NOTE: Vehicles which conform to the SAE J1772 standard for communication can inform the charge station that they require an exhaust fan. The ZEFNET Pro is not equipped to control ventilation fans. Do not charge the vehicle with the ZEFNET Pro if ventilation is required.

CAUTION: DO NOT CHARGE a vehicle indoors if it requires ventilation. Contact a Service Representative for Information.

Save these instructions for future reference.

FCC INFORMATION

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This product has been designed to protect against Radio Frequency Interference (RFI). However, there are some instances where high powered radio signals or nearby RF-producing equipment (such as digital phones, RF communications equipment, etc.) could affect operation.

If interference to the EVSE is suspected, the following steps should be taken before consulting a ZEF Energy Sales or Service Representative for assistance:

1. Reorient or relocate nearby electrical appliances or equipment during charging.
2. Turn off nearby electrical appliances or equipment during charging.

CAUTION: Changes or modifications to this product by other than an authorized service facility may void FCC compliance.

MOVING & STORAGE INSTRUCTIONS

NOTE: The ZEFNET Pro is intended for fixed installations. For mounting requirements, consult the **Mounting Procedures** section of the **Installation Instructions** in this manual.

Always turn off input power to the EVSE at the circuit breaker panel prior to hard-wiring an ZEFNET Pro to or disconnecting an ZEFNET Pro from the service lines. Likewise, always turn off input power to the EVSE at the circuit breaker panel prior to opening the front or rear panels of the ZEFNET Pro.

When transporting the EVSE, do not lift or carry the entire unit by the charge cables. Likewise, do not use the Credit Card Reader or Cellular Antennas as lifting points when moving the ZEFNET Pro.

The EVSE has a non-operational storage temperature range of -40°C to +80°C (-40°F to +176°F).

FRONT PANEL STORAGE POSITION

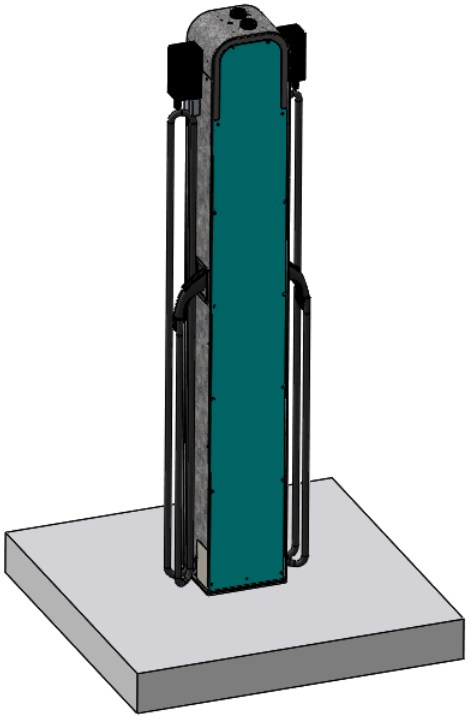
Whenever removal of the front panel is required for mounting, wiring or service it must be stored using the included thumb screws and front panel storage instructions located on the structure plate inside the ZEFNET Pro. Please see detail below:

MOUNTING PROCEDURES

Installation with new concrete:

The location, dimensions, and composition of the concrete pad underlying the pedestal should always adhere to local building codes. The following dimensions are minimum recommended values. Always verify that installation plans adhere to local code requirements prior to proceeding.

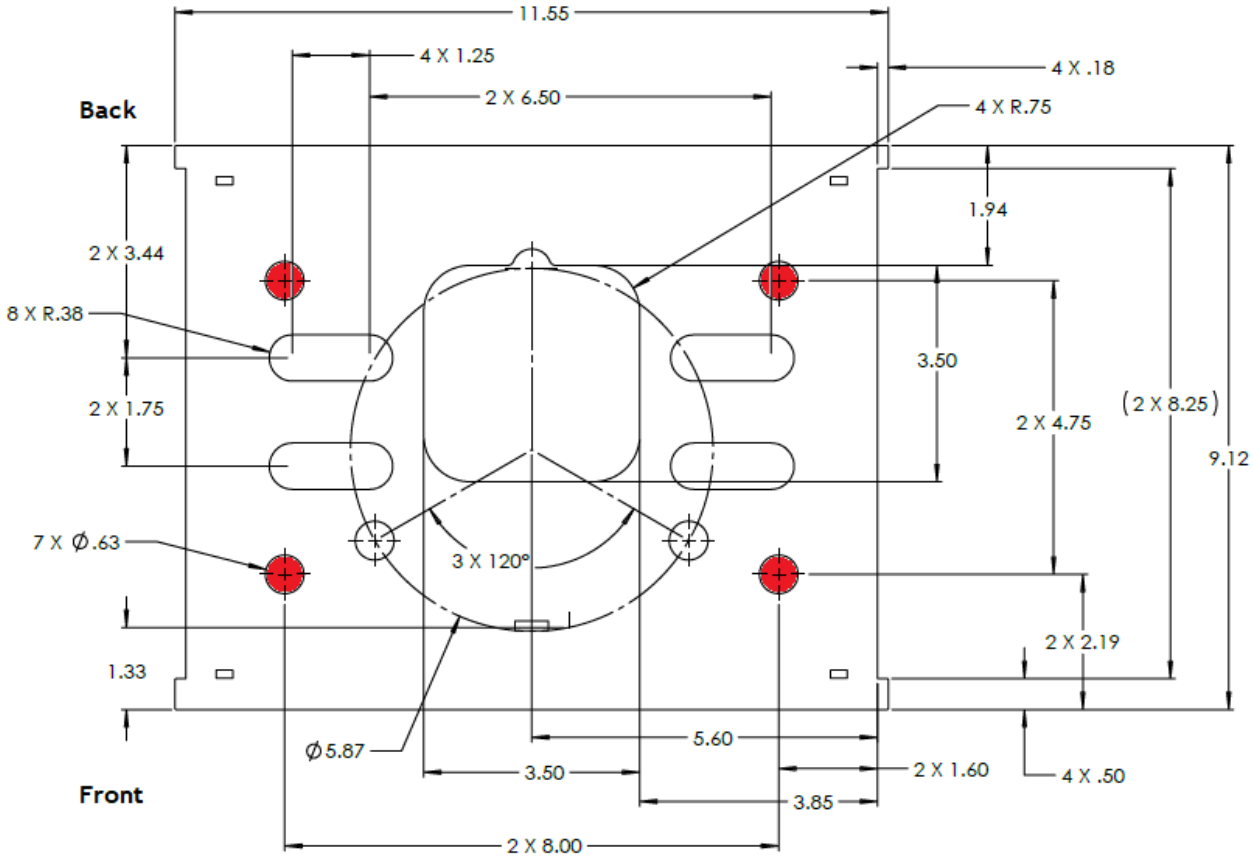
It is possible to configure the new concrete as a pier or a pad with the following minimum dimensions.



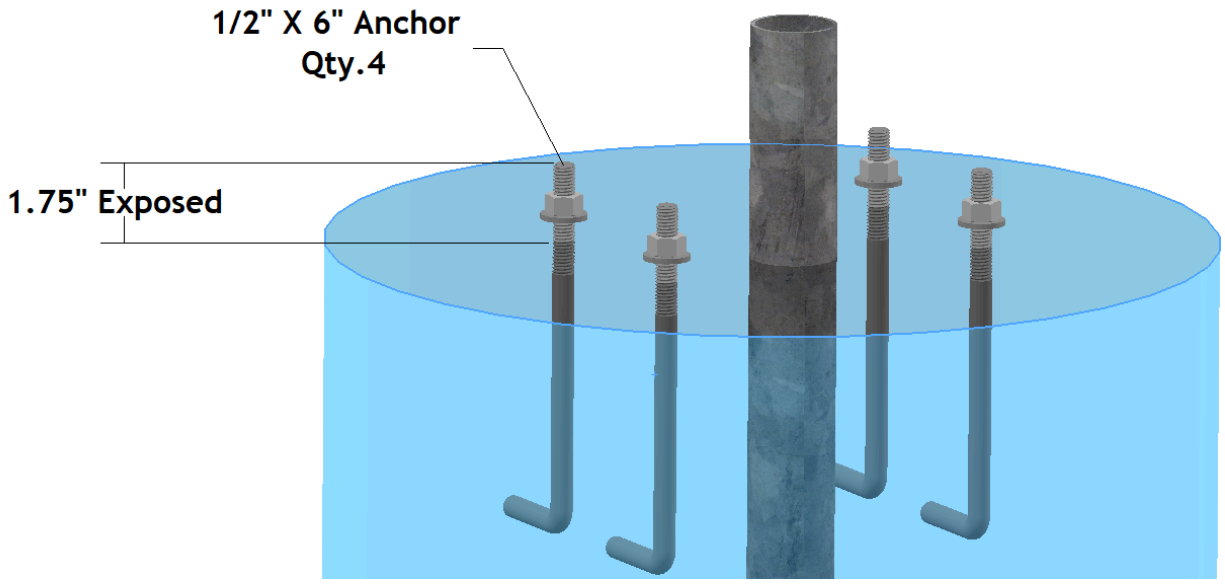
Minimum Pad dimensions: 48” x 48” x 6”

Minimum Pier dimensions: 24” diameter x 36” deep

The ZEFNET Pro has a bolt mounting pattern in the base that has multiple bolt pattern options. For new concrete, using the outermost pattern is required.

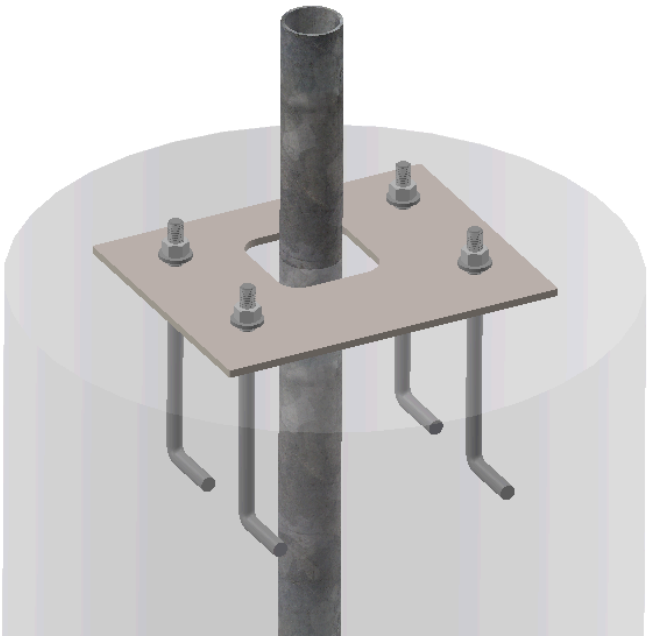


New Concrete ZEFNET PRO Anchor Bolt Pattern requirement.



Anchor detail

- Use Galvanized or Stainless steel ½” x 6” anchor bolts embedded into the concrete pedestal at time of concrete pour. 1.75” of thread should be exposed above the surface.
- Conduit should be placed in the large central area in the baseplate, as illustrated below
- Leveling (if necessary) is performed with washers over the holes and under the plate.



*Optional Installation kit includes surface carrier plate and anchors which allows for properly spaced anchors and pre-leveling which speeds the installation process.

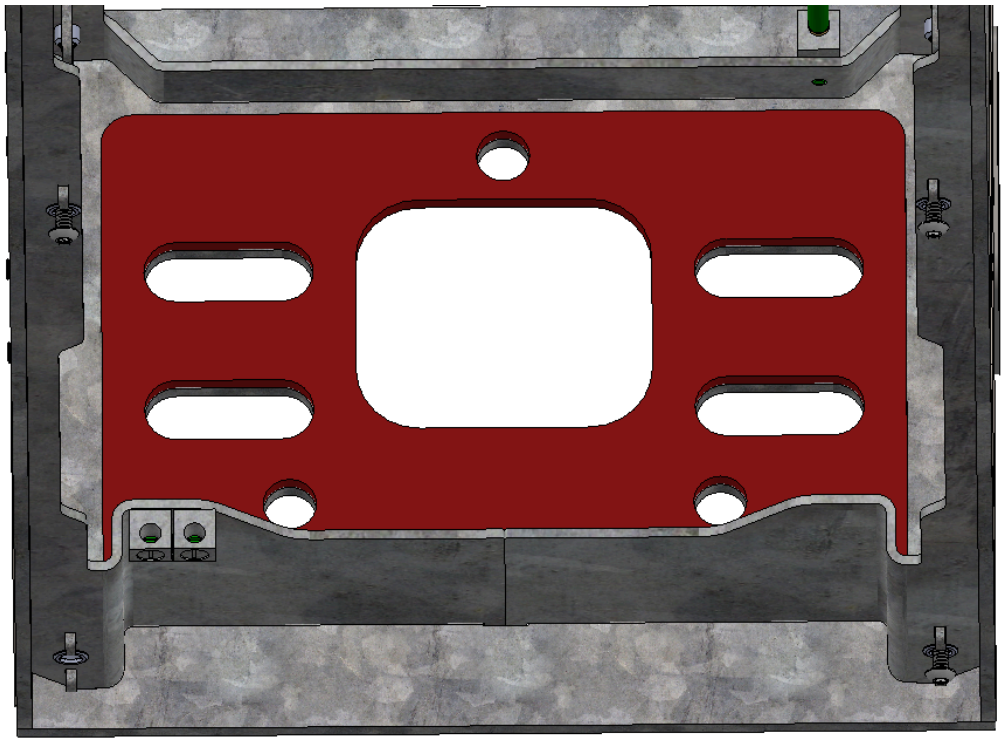
Note: The installation kit leveling plate is not symmetrical. The conduit/wire entrance opening is closer to the rear side of the plate and also to the rear side of ZEFNET Pro. If installed incorrectly the charger will be oriented in the wrong direction.

Installation on existing concrete:

It is possible to use ½” epoxy anchors or ½” expansion anchors into existing slabs. Follow anchor manufacturer’s recommendations. Minimum pad dimensions still apply. Ask your ZEF Energy representative which anchor is appropriate for your application.

Installations replacing Chargepoint or Clipper Creek Pro Mount Duo:

If you are replacing an existing Chargepoint or Clipper Creek Pro Mount Duo installation with a ZEFNET Pro, it is possible to reuse the existing concrete and anchors. The existing anchors must be a suitable ½” anchor, minimum pad dimensions should be followed, and a retrofit installation plate is required and must be ordered separately. Ask your ZEF Energy representative if your existing site is appropriate for this retrofit solution.



Optional Retrofit Installation Plate to be placed on the inside of the Zef Net Pro prior to installation.

SERVICE CONNECTIONS

CAUTION: To reduce the risk of fire, connect only to a circuit provided with the appropriate maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70 (US) or the Canadian Electric Code C22.2 NO. 280-13 (Canada).

Table 1: Service Connections for ZEFNET Pro units

ZEFNET Pro Model	Load Balancing	Circuit Breaker Rating
ZEFNET-Pro-40	No	2 x 40A
ZEFNET-Pro-40	Yes	1 x 40A
ZEFNET-Pro-60	No	2 x 60A
ZEFNET-Pro-60	Yes	1 x 60A
ZEFNET-Pro-80	No	2 x 80A
ZEFNET-Pro-80	Yes	1 x 80A

Load balancing refers to ZEFNET software settings that allow the ZEFNET Pro to share a single circuit entering the unit, instead of the standard two dedicated circuits the ZEFNET Pro typically requires.

Note: If ZEFNET Pro is wired with a single circuit the amperage rating of that circuit cannot exceed the amperage rating of a single plug within the charger. Ie: A ZEFNET-Pro-40 cannot be fed with a circuit with an amperage rating higher than 40 Amps.

CAUTION: <u>This is a single-phase device. Do not connect all three phases of a 3-phase feed!</u> You may use any two phases of a three phase wye-transformer feed. The centerpoint of the three phases (usually used as Neutral) must be grounded somewhere in the system. A Neutral connection is not required by the ZEFNET Pro. Only Line 1, Line 2, and Ground are required, as shown in **Figure 3.**

CAUTION: The two phases used must each measure 120V to Neutral. Earth Ground must be connected to Neutral at only one point, usually at the service entry breaker panel.

CAUTION: If a 240V 3-phase feed is from a Delta-connected secondary, the leg used must have a center-tap. That tap must be <u>Grounded</u>. Only the two phases on either side of the center-tapped leg can be used. See **Figure 5.**

<u>CAUTION: Warranty is void if this unit is not wired properly.</u>

WARNING: Only a qualified electrician should perform the installation. The installation must be performed in accordance with all local electrical codes and ordinances.

Only 3 wires are connected, but care must be taken that the service transformer secondary connection is definitely known, and the 3 wires from the main circuit breaker panel are connected and labeled correctly. Figures 3, 4, and 5 show the most common service transformer secondary wiring formats.

Notice that L1, L2, & Ground are labeled on each diagram. Those transformer outputs correspond to the same inputs on the ZEFNET Pro. Also, each of the two 3-phase diagrams shows an L3 output, which is not used. Do not connect all three phases of a 3-phase secondary to the ZEFNET Pro. This is a single-phase device.

The Neutral at the service panel *must* be connected to Earth Ground *somewhere* in the system on *any* of the three connection arrangements. Ground-fault protection is not possible unless the Neutral (center-tap on the service transformer) is connected to an Earth Ground. If no Ground is provided by the electrical service, a grounding stake must be driven into the Ground nearby, following local electrical codes. The grounding stake must be connected to the ground bar in the main breaker panel, and Neutral connected to Ground at that point.

WARNING: Local electrical codes must always be followed when installing the grounding stake.

The following diagrams illustrate the three service transformer secondary connections most common in North America.

Figure 3: 220/240V Single Phase

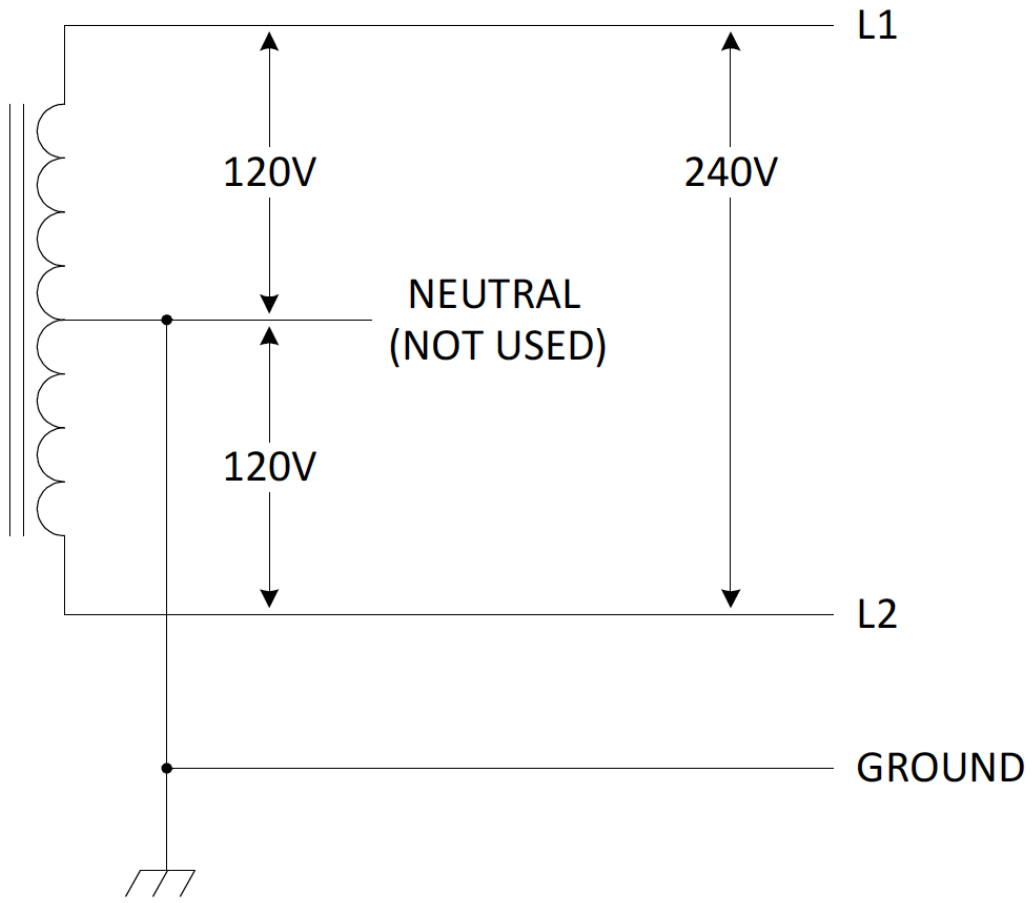
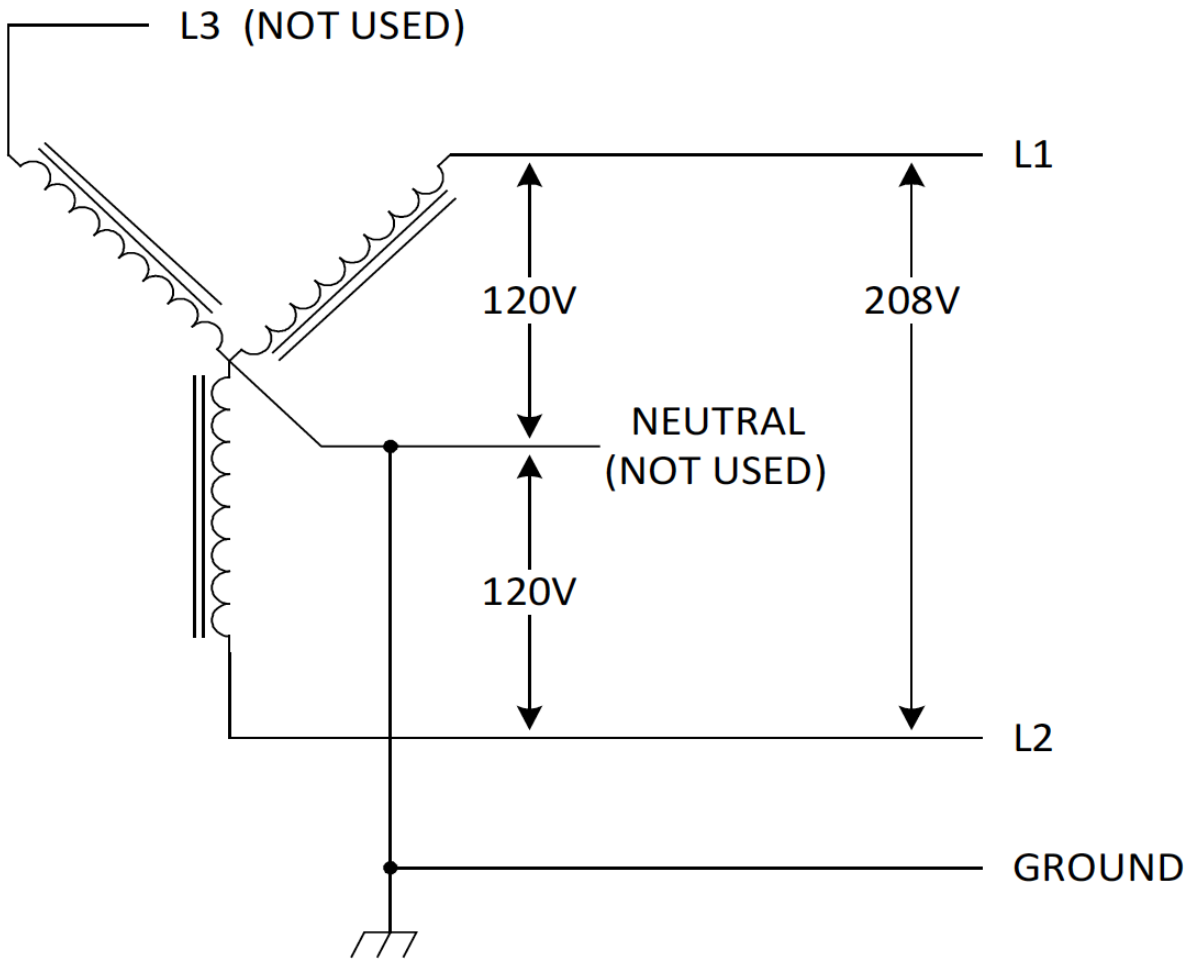
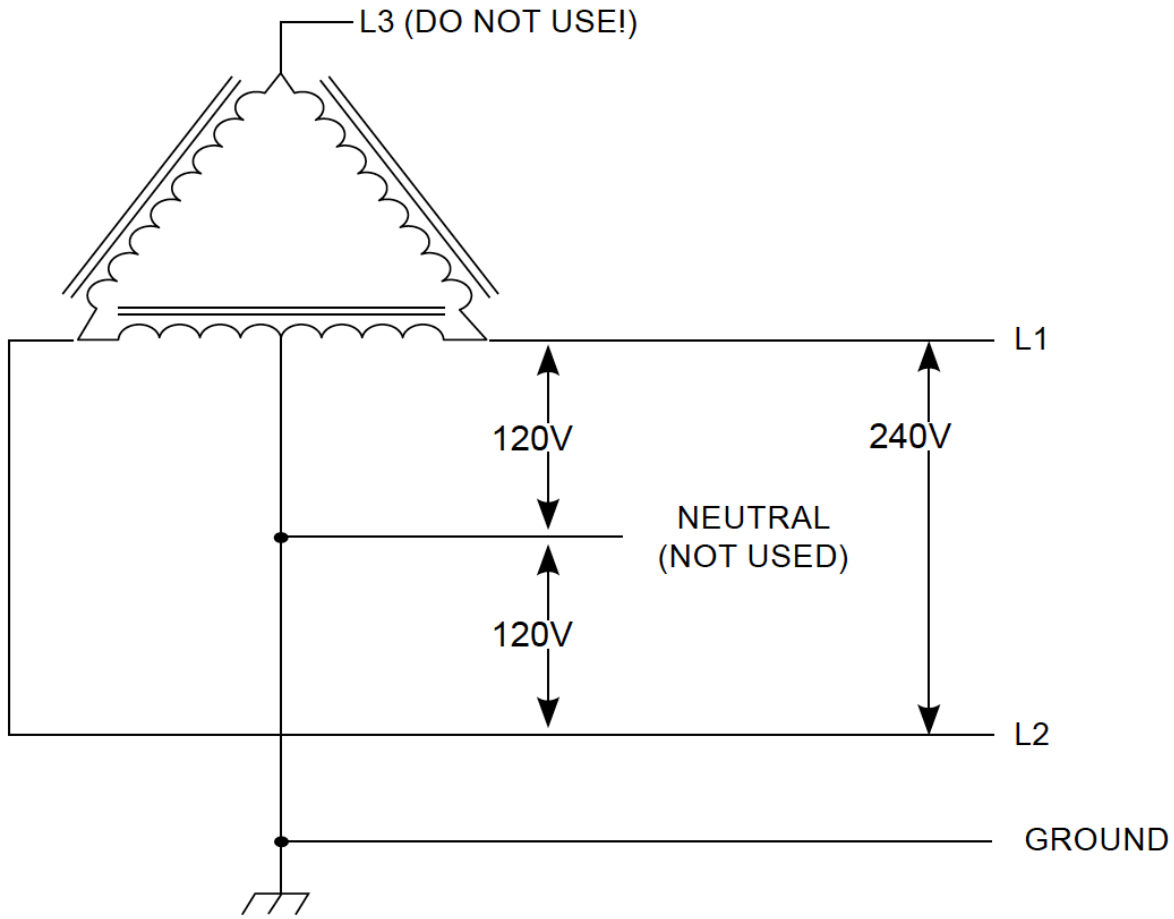


Figure 4: 208V 3-Phase, Wye-Connected



NOTE: With a wye-connected secondary, any two of the legs can be used to provide 208V to the ZEFNET Pro. For example, L1 & L2, or L1 & L3, or L2 & L3. Leave the unused leg open. Do not connect it to a Neutral bar, or to Ground. Be sure the center point is grounded to Earth somewhere in the system.

Figure 5: 240V 3-Phase, Delta-Connected, with Center-Tap on One Leg



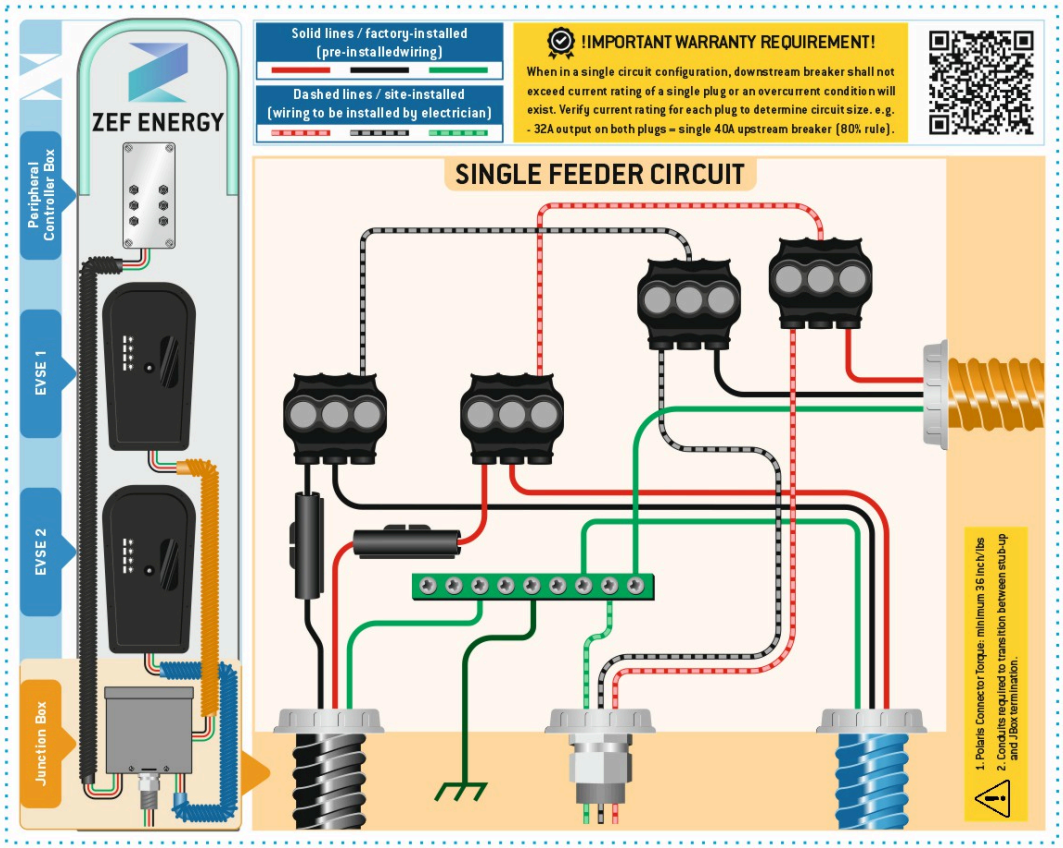
CAUTION: With the delta connection, one leg *must* be center-tapped. *Only* the two phases on either side of the center tap can be used. The two phases *must both* measure 120V to Neutral. The third line (L3) of the delta is 208V, with respect to Neutral, and is sometimes referred to as a “stinger” or “wild leg”. ***Do not use this third line!*** Consult the transformer manufacturer’s literature to be sure the single leg can supply the required power.

CAUTION: A 3-phase delta-connected transformer secondary without a center-tap on one leg *cannot be used with the ZEFNET Pro*. No “Neutral” point is available to be connected to ground for ground-fault protection. The ZEFNET Pro will not allow the contactor to close if it does not sense the presence of a Ground wire connected to a “Neutral” point on the transformer secondary.

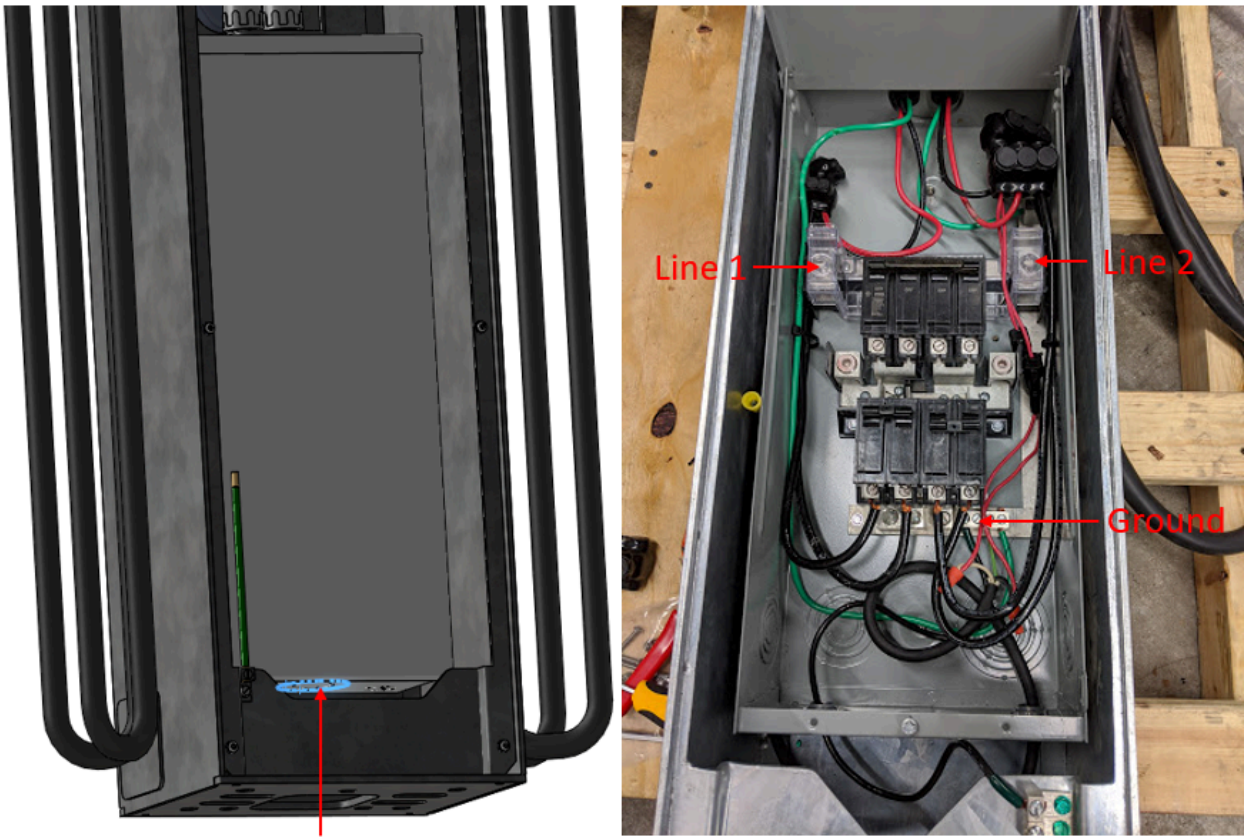
The ZEFNET Pro has two options for the installation of wiring. The first option includes a NEMA 3-R rated junction box in the lower portion of the body. This is the most common option and requires the installation of one (1) or two (2) supply circuits to feed the charger. If one circuit is supplied the two plugs will be in “load balancing” mode. (**Please refer to note on page 14 of this manual*) When wired with two circuits of rated amperage the ZEFNET Pro will be capable of rated capacity on each plug when both are in use.

WIRING INSTRUCTIONS

Remove the front panel of ZEFNET Pro and store using the thumb screws provided. Remove the front cover of the NEMA 3-R enclosure. Pull the power conductors through conduit or rated raceway into the 3-R rated junction box. Please refer to the following diagrams for Single Circuit and Dual Circuit wiring.



See the diagram below for the Service Entrance Rated Enclosure:



Before connecting the HCS service conductors, please carefully read the section of this manual titled Installation - Service Connections. If unsure of the type of power provided at the service panel, please consult with the local utility or call a Service Representative for assistance.

Service conductors landing in the ZEFNET Pro enclosure should be 90ºC rated. The wiring gauge should be suitable given the ZEFNET Pro model, and normal rules around NEC derating over the length of conductor run back to the main panel in the building, or service equipment.

GROUNDING INSTRUCTIONS

This product must be grounded. If this product should malfunction, grounding provides a path of least resistance for electric current to reduce the risk of electric shock.

This hardwired EVSE is equipped with six service conductors, which are terminated within the internal junction box. This product must be connected to a grounded, metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the ground lead on the product.

In the case of having a Junction Box variant of the charger, ensure that the grounding studs on both the top of the box and door are both grounded, as indicated

WARNING: Improper connection of the equipment grounding conductor may result in a risk of electric shock. Check with a qualified electrician if doubt exists as to whether the product is properly grounded.

OPERATION

The ZEFNET Pro EVSE is a floor mounted commercial dual EVSE that provides the Plug-in Hybrid or Battery Electric Vehicle (together Plug-In Electric Vehicles, or “PEV”) user with a safe and manageable link between the power grid and the PEV.

Simply unplug one of the SAE J1772 charge plugs from the ZEFNET Pro holster, then plug firmly into the vehicle’s charge port.

Free Vend Mode:
When connected, the vehicle will immediately request a charge using a special communication line in the cable. Within a few seconds the LED indicators at the top of the unit will transition from Blue, and then to Orange and the charging cycle will begin (depending upon the specific vehicle - some vehicles go straight to Orange to indicate charging). After an average driving day the vehicle battery pack will require several hours to recharge completely. Charging overnight is the most convenient way to maintain healthy batteries and ensure the vehicle’s full range will be available.

When the vehicle has stopped charging the Orange LEDs on the ZEFNET Pro will change to Blue, signifying that the plug is connected but the vehicle is not currently charging. To remove the connector plug once a charge cycle has completed (or to interrupt a charge in progress) press and hold down the latch release lever on the connector handle then unplug the connector from the vehicle charge port.

Authentication Mode:
When the ZEFNET Pro is used with authentication there are three possible methods to initiate a charge.

1. ZEFNET Charge App
    a. The ZEFNET Charge App is the most popular and simple way to allow for an authenticated charging session. Once the app is downloaded and an account is created the user can scan or input the Charging Station Code and follow the app instructions to select a plug and initiate the charging session.
2. Credit Card Reader (Requires optional HMI with CCR)
    a. Use the HMI (Human Machine Interface) to select the credit card option as the authentication method, then select an available plug which will allow a credit card to be used to initiate a charging session.
3. RFID Card (Requires optional HMI with CCR)
    a. Use the HMI (Human Machine Interface) to select the RFID option as the authentication method, then select an available plug which will allow a programmed RFID card to be used to initiate a charging session.

Note: All ZEFNET Pro’s using authentication are configured in ZEFNET during the initial commissioning and onboarding process.

The ZEFNET Pro Front Panel

The front panel of the ZEFNET Pro has two EVSE status indicator lights, and optionally, an HMI with integrated Credit Card Reader (CCR) **Figure 1**.

Figure 1: ZEFNET Pro Front Panel

The LED indicator lights according to the state of the plug on that side of the charger. **Figure 2**

Figure 2: LED Indicators

LED Status	EVSE State
Green	Signifies that the EVSE is available
Orange	Signifies that the EVSE is active with power flowing.
Blue	Signifies that the EVSE is plugged in, no active charging session.
Red	Signifies that the EVSE is faulted or out of service.
White	Signifies that charger(s) is powered but not communicating

ZEFNET PRO FEATURES

Breaker Balancing

Breaker Balancing allows a ZEFNET Pro to share power on a single set of conductors supplied by one circuit breaker. When only one plug is charging a vehicle, the full charging capacity is available to that vehicle. When both plugs are charging vehicles, each plug will offer 50% of the circuit capacity to each vehicle (thus “sharing” the circuit breaker).

WARNING: BREAKER SETUP NEEDS TO BE COMPLETED IN THE ZEFNET CLOUD SOFTWARE BEFORE BREAKER BALANCING WILL BE ENABLED.

Breaker Balancing Operating Instructions

1. Connect Vehicle #1 to either plug #1 or plug #2 with the corresponding SAE-J1772TM connector. Vehicle #1 will have access to the full power available through that circuit.
2. Connect Vehicle #2 to the remaining plug with the SAE-J1772TM connector. Each vehicle will now have access to half of the power available through that circuit.
3. If one vehicle disconnects or completes charging, the other vehicle will have access to the full circuit power after 15 seconds.

MAINTENANCE

The ZEFNET Pro requires no periodic maintenance other than occasional cleaning, and if installed with a Credit Card Reader, annual inspection for evidence of tampering.

WARNING: To reduce the risk of electrical shock or equipment damage, exercise caution while cleaning the EVSE and the EV charge connector cable.

1. Turn off the EVSE at the circuit breaker.
2. Unplug the EVSE from the receptacle.
3. Clean the EVSE using a soft cloth lightly moistened with mild detergent solution. Never use any type of abrasive pad, scouring powder, or flammable solvents such as alcohol or benzene.

CUSTOMER SUPPORT

Contact a ZEF Energy Inc. Service Representative at any time, 24 hours a day, at the details below. PLEASE HAVE THE MODEL NUMBER AND SERIAL NUMBER AVAILABLE. This information is printed on the label on the side of the HCS enclosure. If a contact is made after business hours or on weekends, please leave a name, telephone number, the unit serial number, and a brief description of the problem. A Service Representative will reply back at the earliest opportunity.

TO CONTACT ZEF ENERGY, INC. DIRECTLY FOR SERVICE, EMAIL SUPPORT@ZEFENERGY.COM.

SPECIFICATIONS

<table>
<tr><td>Line Input Power Voltage & Wiring:</td><td>240V AC single-phase - L1, L2, and Safety Ground.
208V AC 3-phase wye-connected - Any two phases and Safety Ground.
240V AC 3-phase, delta-connected. With center-tap on one leg, must use only the two phases on either side of the center-tap. The two phases must both measure 120V AC to ground. Do not use the third leg (208V “Stinger”).</td></tr>
<tr><td>Supplied Input Conductors:</td><td>Pre-installed supplied input conductors of the ZEFNET-PRO-40: L1, L2 and Ground use 3 feet of 10AWG, 90ºC copper wire.
Pre-installed supplied input conductors of the ZEFNET-PRO-60 & ZEFNET-PRO-80: L1, L2 and Ground use 3 feet of 8AWG, 90ºC copper wire.</td></tr>
<tr><td>Voltage Range:</td><td>185V AC to 264V AC</td></tr>
<tr><td>Frequency:</td><td>60Hz</td></tr>
<tr><td>CCID:</td><td>20mA</td></tr>
<tr><td>Current & Output Power: (at 240V AC)</td><td>
<table>
<tr><th>ZEFNET Pro Model</th><th>Circuit Breaker Rating</th><th>Max Current</th><th>Output Power</th><th>Cable Length</th></tr>
<tr><td>ZEFNET-Pro-40</td><td>2 x 40A</td><td>2 x 32A</td><td>2 x 7.7 kW</td><td>22 ft</td></tr>
<tr><td>ZEFNET-Pro-40</td><td>1 x 40A</td><td>1 x 32A</td><td>7.7kW Total</td><td>22 ft</td></tr>
<tr><td>ZEFNET-Pro-60</td><td>2 x 60A</td><td>2 x 48A</td><td>2 x 11.5 kW</td><td>22 ft</td></tr>
<tr><td>ZEFNET-Pro-60</td><td>1 x 60A</td><td>1 x 48A</td><td>11.5kW Total</td><td>22 ft</td></tr>
<tr><td>ZEFNET-Pro-80</td><td>2 x 80A</td><td>2 x 64A</td><td>2 x 15.4 kW</td><td>22 ft</td></tr>
<tr><td>ZEFNET-</td><td>1 x 80A</td><td>1 x 64A</td><td>15.4kW</td><td>22 ft</td></tr>
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	<table><tr><td>Pro-80</td><td></td><td></td><td>Total</td><td></td></tr></table>
Plugs:	SAE J1772 Rubber Overmolded Plugs
Dimensions:	80” x 19” x 8.5”
Weight:	250lbs.
Environment:	Operating Temperature: -22°F to +122°F (-30°C to +50°C) Storage Temperature: -40°F to +176°F (-40°C to +80°C) Enclosure Rating: NEMA 3R
Agency Approvals:	ETL Listed, FCC Part 15 Class B

Limited Warranty Information

ELECTRIC VEHICLE SUPPLY EQUIPMENT and ACCESSORIES

ZEF Energy Inc.
323 North Washington Avenue, Suite 200
Minneapolis, MN 55401
Primary Line: (888) 493-3638
Email: support@zefenergy.com

ZEF Energy shall provide the following warranty with respect to the Products to Representative, its Sub-Representatives and their customers:

Product 5-year parts, 5-year factory labor:
ZEF Energy, Inc. warrants this product to be free from defects in material and workmanship. The warranty period shall commence on the date of installation (first use). The product installation date must be evidenced and communicated to ZEF Energy by way of the warranty registration card (or registration within the ZEFNET platform). The warranty registration card must be filled out completely and accurately, and returned to ZEF Energy within 30 days after installation, and the product installation date shall be within 6 months after the purchase date. If a Product installation date is not communicated to ZEF Energy as described above, the product purchase date shall serve as the warranty commencement date.

If this product is defective in materials or workmanship during the warranty period, ZEF Energy will, at its option, repair or replace the product. Repair parts and/or replacement products may be either new or reconditioned at ZEF Energy's discretion. This limited warranty does not cover service or parts to repair damage due to improper installation or use, including but not limited to improper connections with peripherals, external electrical faults, accident, disaster, misuse, abuse or modifications to the product not approved in writing by ZEF Energy. Any service repair outside the scope of this limited warranty shall be at applicable rates and terms then in effect. This warranty covers factory parts and factory labor only; it does not cover field service or removal and replacement of the product or any other costs.

All other express and implied warranties for this product including the warranties of merchantability and fitness for a particular purpose are hereby disclaimed. Some states do not allow the exclusion of implied warranties or limitations on how long an implied warranty lasts, so the above limitation may not apply to you. If this product is not as warranted above, your sole and exclusive remedy shall be repair or replacement as provided above. In no event will ZEF Energy, any of its authorized sales and service representatives, or its parent company, be liable to customer or any third party for any damages in excess of the purchase price of the product. This limitation applies to damages of any kind including any direct or indirect damages, lost profits, lost saving or other special, incidental, exemplary or consequential damages whether for breach of contract, tort or otherwise or whether arising out of the use of or inability to use the product, even if ZEF Energy or an authorized ZEF Energy representative or dealer has been advised of the possibility of such damages or of any claim by any other party. Some states do not allow the exclusion or limitation of incidental damages for some products, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which may vary from state to state.

To obtain warranty service:
Call your nearest authorized Service Representative or ZEF Energy at the above numbers. You will receive information as to how service for the product will be provided. If you mail or ship the product in for service, you must insure the product, prepay all shipping charges, and properly pack it for shipment in its original shipping container or its equivalent. You are responsible for all loss or damage that may occur in transit. You must provide proof of purchase of the product and the purchase date before any warranty service can be performed.

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