



THERMO KING

Maintenance Manual

Electric Pallet Jack (EPJ) Charger
(For 401586 models only)

Revision A

July 2022

TK 56917-11-MM-EN

TRANE
TECHNOLOGIES

Introduction

This manual is published for informational purposes only. Thermo King® makes no representations warranties express or implied, with respect to the information recommendations and descriptions contained herein. Information provided should not be regarded as all-inclusive or covering all contingencies. If further information is required, Thermo King Corporation Service Department should be consulted.

Thermo King's warranty shall not apply to any equipment which has been "so installed, maintained, repaired or altered as, in the manufacturer's judgment, to affect its integrity."

Manufacturer shall have no liability to any person or entity for any personal injury, property damage or any other direct, indirect, special, or consequential damages whatsoever, arising out of the use of this manual or any information, recommendations or descriptions contained herein. The procedures described herein should only be undertaken by suitably qualified personnel. Failure to implement these procedures correctly may cause damage to the Thermo King unit or other property or personal injury.

Revision History

Revision A (07/22) Released new manual.

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General Information

The maintenance information in this manual covers unit models:
Electric Pallet Jack (EPJ) Charger 401586 (*For 401586 models only) Note: *401586 inverters are identified as being black in color, not white.
For further information, refer to:
Electronic Parts Catalog (EPC)
The information in this manual is provided to assist owners, operators and service people in understanding the operation as well as the proper upkeep and maintenance of the Thermo King EPJ charger.

About This Manual

Purpose

The purpose of this manual is to provide general procedural and maintenance information necessary to understand the operation and maintenance of your Thermo King Electric Pallet Jack (EPJ) Charger for peak operating standards. This includes safety information, operational information, unit information such as bills of material and kit numbers, general unit information, maintenance procedures and related information, and diagnostic and troubleshooting information.

Contents

This manual is organized into the following chapters:

Chapter	Purpose
Safety Precautions	Provides detailed safety information. You should be familiar with the safety precautions before working on the EPJ Charger.
Model Systems (Systems Designations) Table	This table lists the bill of material (BOM) and kit options that make up your EPJ Charger. Use them for the following purposes: 1. To communicate with TK Service Department: If you need to call TK Service, you must know your model number(s) in order for the service representative to help you.
Specifications	Lists EPJ Charger specifications.
General Description	Gives an overview description of your EPJ Charger including standard and optional features, illustrations, and general information.
System Components	Explains each EPJ Charger component location and function.
Operating Instructions	Provides EPJ Charger operating instructions.
Power Inverter Overview	Provides an overview of power inverter operation and features.
Diagnostic Procedures	Provides diagnostic procedures for the EPJ Charger along with removal and replacement of the power inverter.
Maintenance Inspection Schedule	Table of routine maintenance procedures.
Power Inverter Dimensions	Overall dimensions of inverter.
Schematic Diagram	Schematic diagram of EPJ Charger system.

Before you Call Thermo King Service!

Who to call: Your Thermo King Service Representative.

Before you call Thermo King Service, have the following information on hand:

- Power Inverter Model Number - found on front panel of the inverter.

Blank Pages

This manual may contain blank pages at the end of chapters. This is normal. There is no information missing from the manual.

Using the Model Systems Table in “Model Systems (System Designations)”

The Model Systems Table in this section list important unit information that you will need to communicate with the Thermo King Service Department.

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Safety Precautions

Danger, Warning, Caution, and Notice

Thermo King® recommends that all service be performed by a Thermo King dealer and to be aware of several general safety practices.

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this unit depend upon the strict observance of these precautions. The four types of advisories are defined as follows:

⚠ DANGER

Hazard!

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Hazard!

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Hazard!

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury and unsafe practices.

NOTICE

Hazard!

Indicates a situation that could result in equipment or property-damage only accidents.

Electrical Hazards

Danger

⚠ DANGER

Hazardous Voltage!

Will shock, burn or cause death. Disconnect power before servicing unit.

⚠ DANGER

Hazardous Voltage!

Potentially lethal voltages exist within the power inverter as long as the battery supply is connected. During any service work, the battery supply should be disconnected.

⚠ DANGER

Risk of Injury!

Do not connect or disconnect batteries while the power inverter is operating from the battery supply. Dangerous arcing may result.

Warning**⚠ WARNING****Hazard of Explosion!**

Improperly installed battery cables could result in a fire, explosion, or injury. Battery cables must be installed, routed, and secured properly to prevent them from rubbing, chaffing, or making contact with hot, sharp, or rotating components.

⚠ WARNING**Hazard of Explosion!**

Always cover battery terminals to prevent them from making contact with metal components during battery installation. Battery terminals grounding against metal could cause the battery to explode.

⚠ WARNING**Hazard of Explosion!**

When removing battery cables, ALWAYS disconnect the negative battery terminal first. Then remove the positive terminal. When reconnecting the battery terminals, connect the positive terminal (+) first, and connect the negative (-) terminal last.

⚠ WARNING**Hazardous Voltage!**

Treat all wires and connections as if they were high voltage until a meter and wiring diagram indicate otherwise. Only use tools with insulated handles. Never hold uninsulated metal tools near exposed, energized conductors. If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other local, state, or country-specific requirements for arc flash protection PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASHING CLOTHING. ELECTRICAL METERS AND EQUIPMENT MUST BE PROPERLY RATED FOR INTENDED VOLTAGE.

⚠ WARNING**Personal Protective Equipment (PPE) Required!**

A battery can be dangerous. A battery contains a flammable gas that can ignite or explode. A battery stores enough electricity to burn you if it discharges quickly. A battery contains battery acid that can burn you. Always wear goggles or safety glasses and personal protective equipment when working with a battery. If you get battery acid on you, immediately flush it with water and get medical attention.

⚠ WARNING**Electrical Shock and Burn Hazard!**

Do not dismantle the Thermo King Power Inverter. It does not contain any user-serviceable parts. Attempting to service the unit yourself could result in an electrical shock or burns.

Caution**⚠ CAUTION****Risk of Injury!**

Always disconnect power at the battery before removing or repairing electrical components. Failure to do so may result in personal injury or damage to the equipment.

⚠ CAUTION**Hazardous Service Procedures!**

Troubleshooting of Tail Lift Charger should be done by qualified personnel.

Notice

NOTICE**Equipment Damage!**

Do not operate the unit if it is visibly damaged.

Battery Installation and Cable Routing**⚠ WARNING****Hazard of Explosion!**

An improperly installed battery could result in a fire, explosion, or injury. A Thermo King approved battery must be installed and properly secured to the battery tray.

⚠ WARNING**Hazard of Explosion!**

Improperly installed battery cables could result in a fire, explosion, or injury. Battery cables must be installed, routed, and secured properly to prevent them from rubbing, chaffing, or making contact with hot, sharp, or rotating components.

⚠ WARNING**Fire Hazard!**

Do not attach fuel lines to battery cables or electrical harnesses. This has the potential to cause a fire and could cause serious injury or death.

⚠ WARNING**Personal Protective Equipment (PPE) Required!**

A battery can be dangerous. A battery contains a flammable gas that can ignite or explode. A battery stores enough electricity to burn you if it discharges quickly. A battery contains battery acid that can burn you. Always wear goggles or safety glasses and personal protective equipment when working with a battery. If you get battery acid on you, immediately flush it with water and get medical attention.

⚠ WARNING**Personal Protective Equipment (PPE) Required!**

A battery can be dangerous. A battery contains a flammable gas that can ignite or explode. A battery stores enough electricity to burn you if it discharges quickly. A battery contains battery acid that can burn you. Always wear goggles or safety glasses and personal protective equipment when working with a battery. If you get battery acid on you, immediately flush it with water and get medical attention.

⚠ WARNING**Personal Protective Equipment (PPE) Required!**

Overcharging or over-discharging of an AGM Battery. There is a very real possibility of inducing enough heat into an AGM battery to initiate thermal runaway if the battery is charged at too high a voltage. This could cause your AGM battery to get very hot. Always wear personal protective equipment when working with a battery.

⚠ WARNING**Personal Protective Equipment (PPE) Required!**

A battery can be dangerous. Lithium Ion batteries are potentially hazardous. The combustion gas from these batteries is toxic and can present a serious FIRE HAZARD if damaged, defective or improperly used. A battery stores enough electricity to burn you if it discharges quickly. Always wear goggles or safety glasses and personal protective equipment when working with a battery. Do not replace the battery with any type other than the one approved by Thermo King for this unit.

⚠ WARNING**Hazard of Explosion!**

Always cover battery terminals to prevent them from making contact with metal components during battery installation. Battery terminals grounding against metal could cause the battery to explode.

⚠ CAUTION**Hazardous Service Procedures!**

Set all unit electrical controls to the OFF position before connecting battery cables to the battery to prevent unit from starting unexpectedly and causing personal injury.

NOTICE**Equipment Damage!**

Do not connect other manufacturer's equipment or accessories to the unit or to the TK Batteries unless approved by Thermo King. Failure to do so can result in severe damage to equipment and void the warranty.

Model Systems (System Designations)

Thermo King Electric Pallet Jack (EPJ) Charger

System Designation	System Number	BOM	Install Kit	Wiring Diagram	Schematic Diagram
EPJ Charger	N/A	401586	See below	N/A	See "Schematic Diagram," p. 34
New Trailer Installation Kit	N/A		401363		N/A
Retro-Fit Trailer Installation Kit	N/A		401364		N/A

Note: When calling the dealer or factory for information or parts please have the Bill of Material (BOM) number for your particular unit handy.

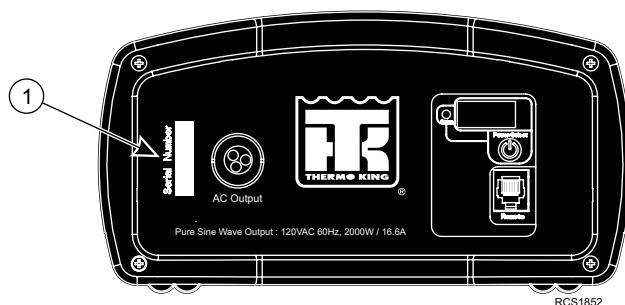
Serial Number Location

IMPORTANT NOTE

This manual is for 401586 Inverters only — These Inverters are identified as being **BLACK**

This manual does not pertain to earlier Inverter's —These Inverters are identified as being **WHITE**

Figure 1. Power Inverter Serial Number Location Shown



1.	Serial Number Location
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Specifications

Power Inverter Specifications

Electrical Specifications	
Continuous Power*	2000 W
Surge Power (Peak)**	4000 W
AC Output Voltage (12.5V)	120 VAC RMS \pm 5%
AC Output Current	16.6 AAC
AC Output Voltage Range	104-127 VAC
AC Output Frequency	60 Hz \pm 0.5 Hz
AC Output Waveform	Pure sine wave (<3% THD)
Optimum Efficiency	>85%
DC Input Voltage (Nominal)	12.5 VDC
DC Operation Voltage Range ***	10.2 - 15.75 VDC
DC Input Current (Full Load)	187 DCA
DC Input Current (No Load)	Mode use (P01, P03) Nominal 0.2ADC Mode use (P02, P04) Nominal 1.30ADC
Protection	
Low Voltage Alarm	12.2-12.5 VDC
Low Voltage Shutdown	10.2 VDC
Low Voltage Recovery	13.1 VDC
High Voltage Shutdown ***	15.75 VDC
Output Power Warning	Yes, with warning code
Output Power Shutdown	Yes, with shutdown code
Temperature Warning	Yes, with warning code
Temperature Shutdown	Yes, with shutdown code
Display Specifications	
LED Status Indicator	Green – inverter is operating normally. Amber – An amber warning light will happen often under normal operation and should not be a cause for major concern. See “ Power Inverter Diagnostics ,” p. 28 for various warning conditions. Red – an error has been detected and the inverter has shut down. Check the error code on the digital display.
Digital display	Volts in, power out, error codes
General Specifications	
Operating Temperature	-40F to 104F (-40C to 40C)
Inverter Weight	11.5 lb. (5.2 kg)
Inverter Size (L x W x H)	5 x 9.1 x 4.3 " (38.1 x 23.1 x 10.9 cm)
Regulatory Approval	
Conforms to UL STD 458, Certified to CSA STD C22.2 No. 107.1 Complies with FCC PART 15 CLASS B	
*Specifications met when DC voltage at nominal (12.5V) and temp at 25C. **Surge ratings are based on resistive load (output voltage may drop). ***Damage can occur if input voltage exceeds 16 VDC.	

EPJ Safety Features

The EPJ Charger system is equipped with numerous features to help guarantee safe and trouble-free operation.

Electrical Protection
20A Fuse – Located inside the EPJ enclosure.
150A Fuse – Located inside the EPJ enclosure.
150A Fuse – Located near the lift gate (LG) battery.
DC Disconnect Switch – Red knob located on outside of enclosure disconnects all 12 Vdc battery power to the inverter.
Ground Fault Circuit Interrupter (GFCI) Outlet – Located inside the truck box or trailer. A power indicator light on GFCI alerts that 120 Vac power is present. The GFCI outlet monitors the amount of power going to the EPJ. If the GFCI detects the interruption in current it will cut power to the outlet.

General Description

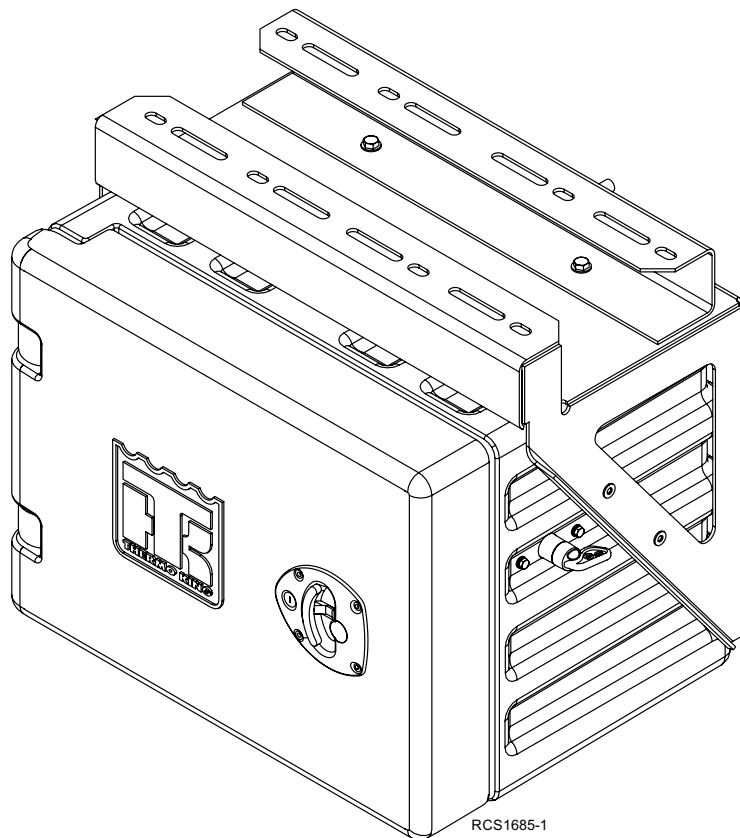
EPJ Charger Overview

The Thermo King Electric Pallet Jack (EPJ) Charger is an on-board charging system to help ensure your EPJ stays charged while in transit and between delivery stops. It has been designed to provide safe, simple and reliable charging for your EPJ batteries. Please take the time to read this manual to familiarize yourself with the features of your EPJ charger.

Features

- Ensures your EPJ stays charged
- Generates 120 volt power directly from lift gate battery pack
- Built-in low voltage protection to preserve liftgate operation
- Hermetically-sealed IP69K waterproof plastic enclosure
- Easy to operate and maintain

Figure 2. EPJ Charger Enclosure Shown

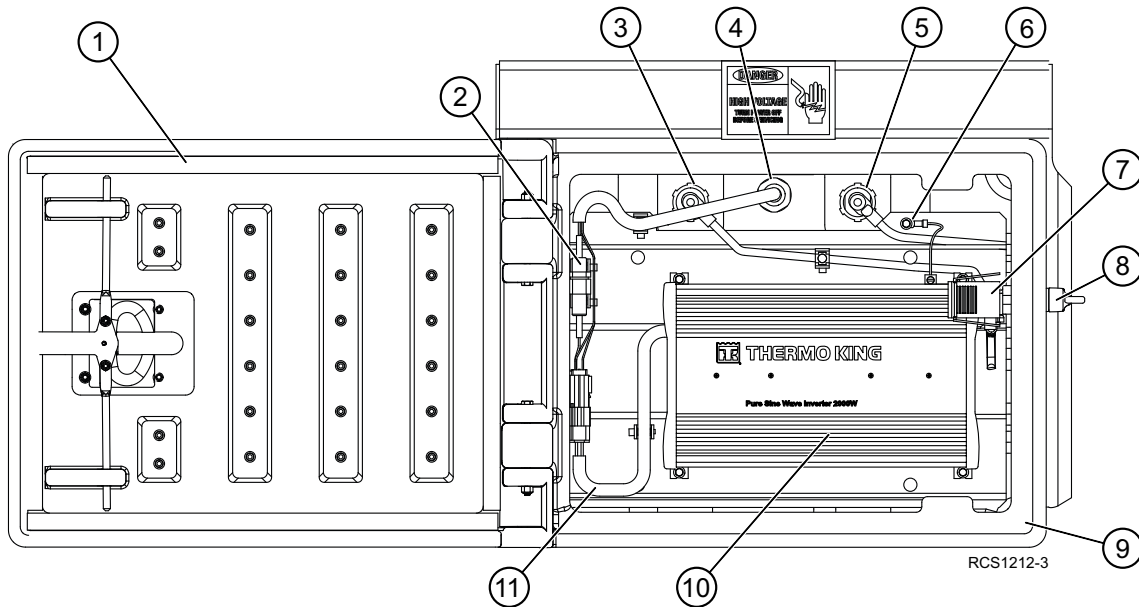


System Components

Charger Enclosure

A waterproof sealed automotive-rated enclosure contains the EPJ charging components. The enclosure is located under the truck or trailer typically near the lift gate (LG) batteries and is secured to the OEM stringers with aluminum mounting channels. A power disconnect switch is located on the side of the enclosure to disconnect (LG) DC battery power to the power inverter inside. Lifting and turning the latch opens the door to access the charging components inside the enclosure.

Figure 3. Components Inside Enclosure Shown



1.	Enclosure Door	7.	150 AMP Fuse
2.	20 Amp Fuse	8.	DC Power Disconnect Switch
3.	Negative Battery Cable and Stud	9.	Enclosure
4.	EPJ Power Cord (to GFCI)	10.	2000W Pure Sine Wave Power Inverter
5.	Positive Battery Cable and Stud	11.	AC Output Power Cable
6.	Inverter Chassis Ground Wire		

Power Inverter

The Thermo King 2000 watt pure sine wave power inverter is mounted inside the enclosure. Cables are attached from the inverter's DC terminals to the power studs on the enclosure. Cables from the LG batteries are connected to these power studs. The inverter changes the 12 volt direct current (DC) from the (LG) batteries into 2000 watts of continuous, pure sine wave alternating current (AC), similar to the 120 VAC, 60 Hz voltage provided by your utility.

DC Power Cables

Cables from the LG batteries are connected to the DC power and ground studs located on the rear of the enclosure. Inside the enclosure, cables from the studs are connected to the DC terminals on the inverter.

Important: DO NOT reverse the polarity on the DC input to the power inverter. Permanent damage to the inverter will result and will void the warranty.

DC Power Disconnect Switch

A DC power disconnect switch is located on the side of the enclosure. The switch is used to disconnect all DC battery voltage to the power inverter. Protection to the inverter is provided by the 150 Amp fuse inside the enclosure connected to the switch.

AC Output Power Cable

The power inverter is equipped with a AC output power cable and a 20 Amp in line fuse. This output cable is connected to the EPJ power cable and routed to the ground fault circuit interrupter (GFCI) outlet located inside the truck box or trailer. When the EPJ is connected to this GFCI outlet, and the EPJ charging system is asking for power, the EPJ batteries will be recharged, assuming inverter operating parameters are met. It is normal operation for no power to be available at the GFCI outlet when operating parameters are not met, which typically is when source batteries are at a low voltage.

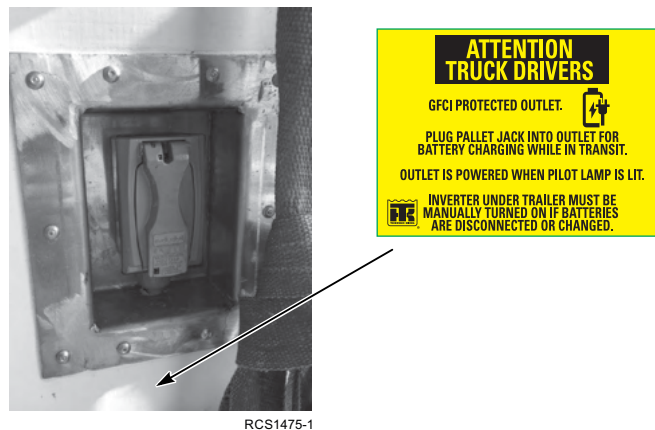
Important: *The inverter's AC power cable must be connected only to a single GFCI outlet. No other electrical connections should be made to this cable.*

GFCI Outlet

A GFCI outlet is typically located inside the cargo box on a side wall near the door opening. This allows easy access for EPJ for charging. A yellow nameplate identifies the GFCI outlet. A weatherproof cover protects the GFCI outlet when not in use.

Important: *The GFCI is specific to this application. If a replacement GFCI is necessary, only Thermo King P/N 424456 can be used for proper inverter operation.*

Figure 4. Typical Recessed GFCI with Weatherproof Cover Shown



RCS1475-1

Figure 5. Thermo King GFCI P/N 424456 Shown



RCS1198-3

Operating Instructions

Charging a EPJ

1. Verify pilot light is illuminated on GFCI outlet.

Note: If the GFCI pilot light is not illuminated, see *"Quick Troubleshooting Guide," p. 22.*

2. Connect pallet jack to the GFCI outlet located inside the truck or trailer.
3. Leave EPJ plugged in while in transit — unplug EPJ when in use.

Note: Ensure power cable does not interfere with door operation or by product moving in and out of the truck or trailer.

Figure 6. EPJ Shown Connected to GFCI Outlet



RCS1476

IMPORTANT NOTE

Depleting the EPJ battery and then trying to rapidly recharge it is not recommended. The EPJ should be connected to GFCI while in route and between each stop to maintain the battery charge. This allows the majority of the charging to occur when the truck is in route.

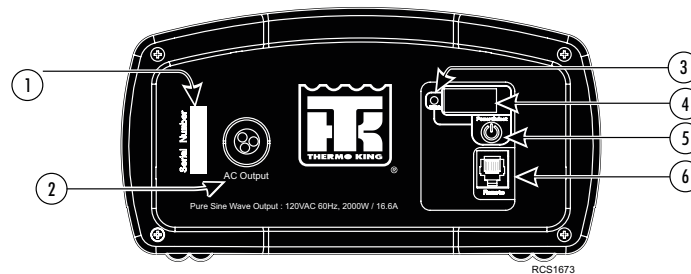
Power Inverter Overview

Please take a few minutes reviewing the front and rear panels of the power inverter. This will help you understand how to operate and service the power inverter.

Front Panel:

1. **Serial Number** – a unique identification number assigned to each inverter. This number must be recorded for warranty registration.
2. **AC Output** – a 15" long 12AWG AC output pigtail is hardwired directly to a remote ground fault circuit interrupter (GFCI) outlet.
3. **Status Indicator** – a green, red, or amber LED provides the inverter's status.
4. **Digital Display** – a three-character alphanumeric display shows the inverter's measured battery voltage, total AC output power, and any error or warning codes.
5. **Power/Select Button** – this momentary button allows the inverter to be turned on or off and switch between P01 and P04 inverter settings.
6. **Remote Port** – not used.

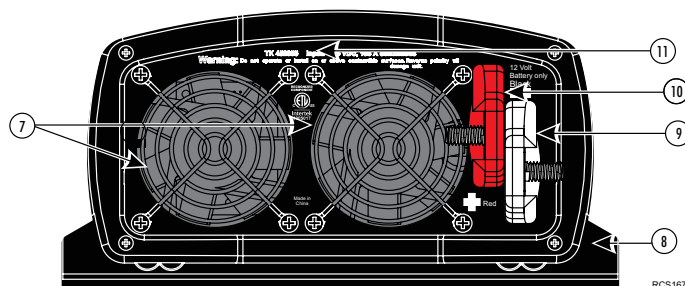
Figure 7. Front Panel



Rear Panel:

7. **Cooling Fans** – intake cooling fans automatically turn on when the inverter's internal temperature rises above a safe level, and turn off when the inverter's internal temperature falls to a safe level.
8. **Mounting Flanges** – (front and rear) used to mount and secure the inverter.
9. **DC Negative Terminal (black)** – inverter's connection to the negative terminal on the 12 VDC battery bank. M8 x 1.25 Torque 22–28 Nm (6–21 lb. ft).
10. **DC Positive Terminal (red)** – inverter's connection to the positive terminal on the 12 VDC battery bank. M8 x 1.25 Torque 22–28 Nm (6–21 lb. ft).
11. **Model Number** – the model number of the inverter.
12. **Chassis Ground Connection** – (not shown) located on side of inverter with a 2–14 AWG ground wire.

Figure 8. Rear Panel

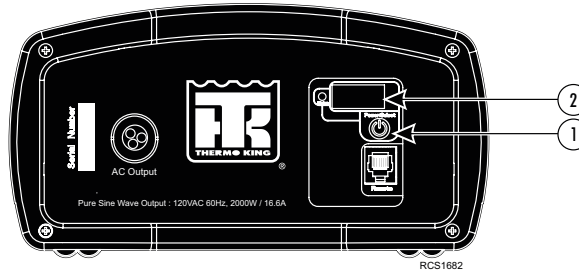


Inverter Operation

1. To access inverter, lift and turn latch on enclosure's door.
2. To turn inverter on, press and hold power/select button for 1 second until you hear a "beep".
 - The status indicator light will illuminate.
 - The digital display will show inverter's code revision level and selected mode setting. See "Mode Settings," p. 21, factory default setting is P04.
 - The digital display will alternately show inverter's measured battery voltage and AC output power.
 - Under normal operation, if the battery voltage is not within operating range of the current mode setting, the GFCI will not have power. See "Mode Settings," p. 21.
3. To turn inverter off, press power/select button.
 - Inverter's display and indicator light will no longer be illuminated.
 - GFCI outlet will no longer have power.

Important: The power/select button is not a power disconnect switch and will not remove the DC power from the inverter. You must turn the DC disconnect switch to the OFF position to disconnect all power to the inverter.

Figure 9. Power/Select Button and Digital Display Shown



1.	Power/Select Button	2.	Digital Display
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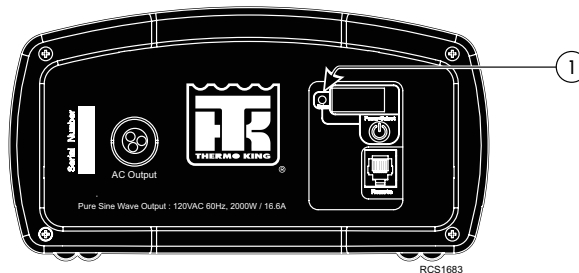
Status Indicator

When the inverter is on, the indicator light may illuminate green, amber, or red to display the inverter's status:

- **Green** – inverter is operating normally.
- **Amber** – a warning has been detected. Inverter will shut down at any time. Check error code on digital display. An amber warning light will happen often under normal operation and should not be a cause for major concern. See "Power Inverter Diagnostics," p. 28 for various warning conditions.
- **Red** – an error has been detected and inverter may shut down at any time. Check error code on digital display.

Note: When status indicator light is amber or red, use digital display and troubleshooting tables to resolve issue.

Figure 10. Status Indicator Light Shown



1.	Status Indicator Light
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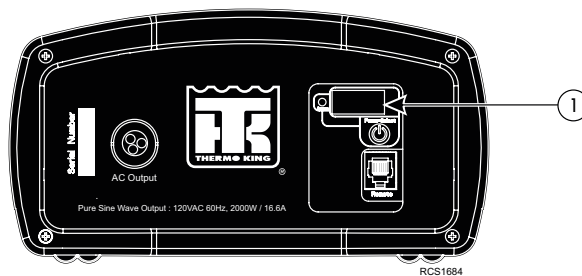
Digital Display

The alphanumeric display shows the inverter's battery voltage, total AC output power, along with additional operation codes. The display has one line of three alphanumeric characters that alternately shows the inverter's measured battery voltage (in volts) and AC output power (in kilowatts) under normal operating conditions. It also displays error/warning codes that alert you to problems with the inverter, and are used in conjunction with the troubleshooting tables to resolve any operating issues.

Table 1. Examples of Digital Display Readings

Display	Meaning
12.5	Measured battery voltage.
0.80	Total AC output power in kW (800W as shown).
E01	Error or warning code. See " Diagnostic Procedures using Power Inverter Error Codes, " p. 29 for details.
P01–P04	Unit's setting. See table on page 21.
U x.x, R x.x	Unit's revision level.

Figure 11. Digital Display Shown



1.	Digital Display
----	-----------------

Mode Settings

Built-in low voltage and under voltage protection preserves lift gate battery power to keep the EPJ from depleting the LG batteries. Four different mode settings are available to customize how to utilize the available power from the liftgate battery based on fleet's operations.

To change Mode setting:

1. Turn unit ON or when unit is already in operation.
2. Press and hold 'Power/Select' button for 5 seconds.
3. Display shows existing unit program mode.
4. Press 'Power/Select' button to toggle between different program modes to the desired new setting.
5. Wait for 5 seconds and the new desired setting will be set to the unit.

Table 2. Unit Settings

Mode	Under Voltage Shutdown Setting	Operating Time*	Power Save Mode	Low Voltage Shutdown
P01 — Warm climates EPJ not compatible with Power Saver Mode	12.2V	1 minute	OFF	If LG batteries are <10.2V for three seconds, the inverter will automatically shut off to protect the batteries. The inverter will power back up when input battery voltage is raised to normal operating ranges.
P02 — Warm climates EPJ compatible with Power Saver Mode	12.2V	1 minute	ON	
P03 — Northern/colder climates Liftgate battery prioritized EPJ not compatible with Power Saver Mode	12.5V	3 minutes	OFF	
P04 — Northern/colder climates Liftgate battery prioritized EPJ compatible with Power Saver Mode <i>Note: P04 is the factory default setting.</i>	12.5V	3 minutes	ON	
<i>*Operating Time <u>after</u> Under Voltage Setting is reached.</i>				

Mode setting with Power Save Mode Selected

If mode is set to P02 or P04 where the power save mode is active, when no AC load is connected to the unit, the inverter will pulse two sinewave AC Output cycles every 4 seconds to detect if AC load is present. If it senses AC load connected is >10W, it will continuously provide AC Output power. Unit will switch back to pulsing two AC Output cycles if it senses the AC Output load drops to ~ 6W or below.

To reset the GFCI when P02 and P04 mode is selected:

Press and hold the "RESET" button on GFCI for more than 4 seconds.

Important: The GFCI is specific to this application. If a replacement GFCI is necessary, only Thermo King P/N 424456 can be used so the inverter's power save modes work properly.

Diagnostic Procedures

Quick Troubleshooting Guide

*****PLEASE NOTE*****

These behaviors are normal operation of the EPJ Charger System:

The GFCI outlet lights to come on and turn off throughout the day.

Power at the outlet to be intermittent.

E05 & E25 codes to be present on the inverter display.

The User/driver can follow the following steps during their route if they have concerns the EPJ charging system is not operating properly or is not charging the EPJ when connected to the GFCI:

1. Unplug EPJ from GFCI outlet.
2. Ensure all charging plugs/connections from charging source if accessible (7 way, stinger cord) are seated properly.
3. Idle power source (tractor/reefer) for at least 5 minutes.
4. Ensure GFCI outlet's lights are on or flashing every 5 seconds, if not hold reset button for 5 seconds until you hear and feel a click.
 - If you can't get the outlet GFCI lights to light up or flash, notify your supporting maintenance people.
5. Ensure EPJ/equipment battery is not fully charged, if they are, the EPJ/equipment may not be calling for a charge from the outlet.
6. Check for damaged cables, replace or bypass the damaged cables.
7. Plug in EPJ and see if it starts charging.
8. If EPJ is still not charging, notify your supporting maintenance people.

IMPORTANT NOTE

Depleting the EPJ battery and then trying to rapidly recharge it is not recommended.

The EPJ should be connected to GFCI while in route and between each stop to maintain the battery charge. This allows the majority of the charging to occur when the truck is in route.

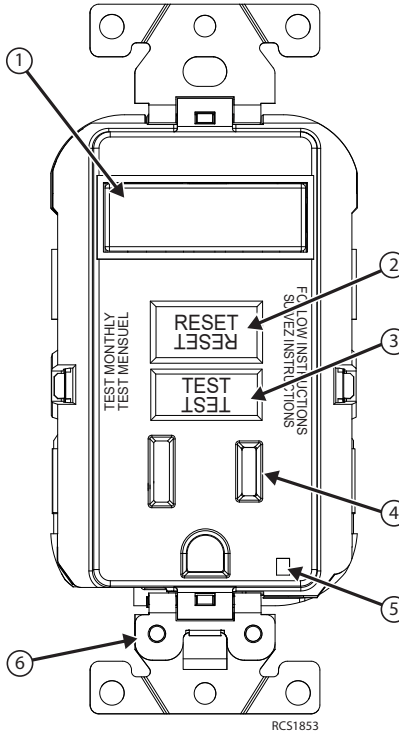
Advanced Diagnostic Procedures

⚠ WARNING

Electrical Shock and Burn Hazard!

Do not dismantle the Thermo King Power Inverter. It does not contain any user-serviceable parts. Attempting to service the unit yourself could result in an electrical shock or burns.

GFCI Outlet Output Diagnostics



1.	RED Pilot Light	3.	Test Button	5.	GREEN Indicator Light
2.	Reset Button	4.	Outlet	6.	Self-Grounding Clip

Diagnostic Procedures

If the EPJ is not being charged when connected to the GFCI outlet, check these first:

Outlet large Red Pilot light is on, small light is green.	<p>There is power at the outlet.</p> <ul style="list-style-type: none"> • Check for damaged extension cord. • Equipment may not be calling for a charge, use EPJ/equipment and plug back into outlet. • Diagnose specific EPJ system concerns based on manufacturers recommendation.
Outlet large Red Pilot light is flashing as well as the small light is flashing red every 4 seconds.	<p>System is in Power Save mode – power is available at outlet when equipment that is calling for >10w charge is detected.</p> <ul style="list-style-type: none"> • Check for damaged extension cord. • Equipment may not be calling for a charge, Use equipment and plug back in to outlet. <p>There may be compatibility problems between EPJ and Power Save mode.</p> <ul style="list-style-type: none"> • Try plugging in an alternative EPJ or connect a test light (greater than 40W) to the GFCI outlet. • If an alternative EPJ or test light works, assign a compatible EPJ to the trailer or adjust mode setting to P01 or P03 if it is desired to use the originally assigned EPJ.
Small light is flashing red every 4 seconds but Red Pilot is off.	<p>System is in power save mode and the GFCI is tripped.</p> <ul style="list-style-type: none"> • Press reset button for at least 5 seconds, you will feel and hear the reset button click, release. GFCI should now be reset and both lights flashing every 4 seconds.

<p>No lights on nor flashing on the GFCI outlet.</p>	<p>Battery voltage is below mode setting (P01, P02: 12.2v / P03, P04: 12.5v)</p> <ul style="list-style-type: none"> • Ensure all charging plugs/connections from charging source if accessible (7 way, stinger cord) are seated properly • Run charging source (tractor, unit) for at least 5 minutes to charge up source batteries above 13.1v. Confirm battery voltage above 13.1v. If battery voltage does not rise or hold charge, diagnose and repair charging system or replace batteries. <p>If lights do not come on or start flashing after several minutes of charging, GFCI may be tripped or inverter may have powered down.</p> <ul style="list-style-type: none"> • If GFCI is tripped, Press reset button for at least 5 seconds, you will feel and hear the reset button click, release. GFCI should now be reset and both lights should be on or flashing every 5 seconds. • Confirm DC disconnect switch located on the outside of the charger box is in the ON position. • Rotate knob to ON position. <p>Note: The power inverter will also need to be turned on anytime the DC disconnect switch was turned OFF.</p> <ul style="list-style-type: none"> • Open EPJ box and ensure Inverter has power at the display, press green power button to turn on if necessary. • If Inverter was powered down, check inverter screen for Error codes OR if Inverter will not Power Up, reference Power Inverter Diagnostics on pg. 26 or "Diagnostic Procedures using Power Inverter Error Codes," p. 29.
<p>Power at GFCI Outlet, but RESET button trips or stays tripped</p>	<p>If the GFCI outlet trips the RESET button without a load:</p> <ul style="list-style-type: none"> • Inspect GFCI outlet for loose or broken wire connections and repair as needed. • Inspect wire harness from the GFCI outlet down to the EPJ Charger Box and repair as needed. <p>If the GFCI outlet trips the RESET button with a load:</p> <ul style="list-style-type: none"> • Inspect EPJ power cord and repair as needed. • Inspect EPJ battery connections and repair as needed • Inspect the GFCI outlet for damage and replace if needed with Thermo King P/N 424456.

Power Inverter Diagnostics

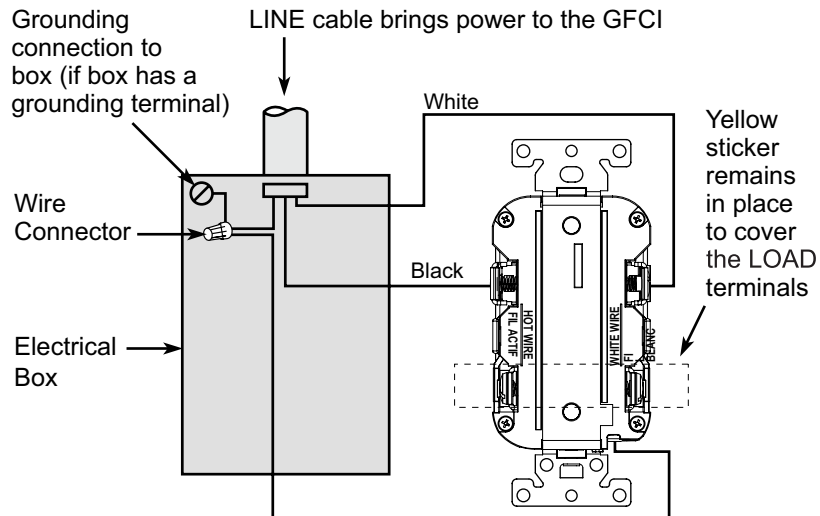
<p>Inverter will not Power Up or No Power at GFCI.</p>	<p>Confirm DC disconnect switch located on the outside of the charger box is in the ON position.</p> <ul style="list-style-type: none"> Rotate knob to ON position. <p>Note: <i>The power inverter will also need to be turned on anytime the DC disconnect switch was turned OFF.</i></p> <p>Blown Fuses</p> <ul style="list-style-type: none"> Check the 150 Amp fuses; one is located inside the charger box and one is located at the LG battery. <ul style="list-style-type: none"> Replace fuse(s) if necessary. Check for cause of blown fuse, e.g., poor battery cable connection, cable rubbing and shorted to chassis, etc. Check 20 Amp fuse located inside charger box <ul style="list-style-type: none"> Replace fuse if necessary. Check for cause of blown fuse, e.g., poor battery cable connection, cable rubbing and shorted to chassis, etc. <p>Inverter is Powered Down</p> <ul style="list-style-type: none"> Turn the power inverter ON by pressing the inverter's power button until it quickly beeps. <ul style="list-style-type: none"> Solid GREEN Status LED, flashing YELLOW LED indicates power inverter is working and has AC output. Check for power at GFCI Outlet and go through the GFCI Outlet Output Diagnostics which start on page 23. Alternating YELLOW GREEN LED indicates (with Code E05) is a warning indicating battery voltage is under the mode threshold (P01, P02: 12.2v / P03, P04: 12.5v) and AC output is about to turn off. Recommended operating charging source to charge up battery voltage above 13.1v Flashing RED Status LED indicates an error condition has been detected and the power inverter has stopped working and providing AC Output. See "Diagnostic Procedures using Power Inverter Error Codes," p. 29. <p>Battery voltage is below mode setting (P01, P02: 12.2v / P03, P04: 12.5v).</p> <ul style="list-style-type: none"> Ensure all charging plugs/connections from charging source if accessible (7 way, stinger cord) are seated properly . Run charging source (tractor, unit) for at least 5 minutes to charge up source batteries above 13.1v. Confirm battery voltage above 13.1v. If battery voltage does not rise or hold charge, diagnose and repair charging system or replace batteries.
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GFCI Replacement Procedures

Important: The GFCI is specific to this application. If a replacement GFCI is necessary, only Thermo King P/N 424456 can be used so the inverter's power save modes work properly.

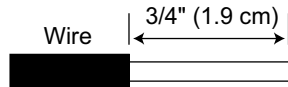
1. On the EPJ enclosure, rotate DC disconnect switch to the OFF position.
2. Reinstall wires onto GFCI as shown.

Figure 12. GFCI Wiring Connection Shown



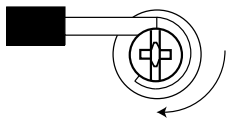
About Wire Connections:

Side Wire:

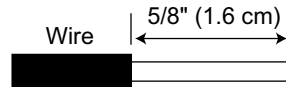


For Side wire -

Loop clockwise 2/3 of the way around screw

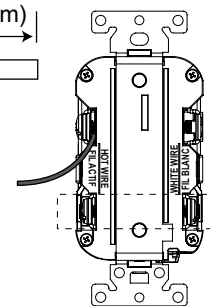


Back Wire:



For Back wire -

Insert bare wire fully and tighten terminal clamp on conductor ONLY



Connect the LINE cable wires to the LINE terminals:

- The white wire connects to the WHITE terminal (Silver)
- The black wire connects to the HOT terminal (Brass or Black)
- Connect the ground wire

Complete the installation:

- Fold the wires into the box, keeping the grounding wire away from the WHITE and HOT terminals. Screw the receptacle to the box and attach the faceplate.

RCS1484

Power Inverter Diagnostics

Basic Diagnostic Procedures

⚠ WARNING

Electrical Shock and Burn Hazard!

Do not dismantle the Thermo King Power Inverter. It does not contain any user-serviceable parts. Attempting to service the unit yourself could result in an electrical shock or burns.

If you are not able to get the GFCI outlet to operate using the GFCI Outlet Output Diagnostics section, begin the diagnostic procedures by:

- Checking the AC voltage at the back of the GFCI outlet inside the truck box or trailer.
- If AC power is present, review the GFCI Outlet Output Diagnostics section again which starts on pg. 23.
- If no AC power is present, review [“Diagnostic Procedures using Power Inverter Error Codes,” p. 29](#), or review the following conditions in the diagnostic section:
 - No lights on nor flashing on the GFCI outlet on pg. 25.
 - Inverter will not Power Up or No Power at GFCI. on pg. 26.
 - No Power at GFCI Outlet on this page below.

Table 3. GFCI Outlet Output Diagnostic Procedures

Condition	Diagnostic Procedures
No Power at GFCI Outlet	<ol style="list-style-type: none"> 1. Confirm DC disconnect switch located on the outside of the charger box is in the ON position. <ol style="list-style-type: none"> a. Rotate knob to ON position. <p>Note: The power inverter will also need to be turned on anytime the DC disconnect switch was turned OFF.</p> 2. Turn the power inverter ON by pressing the inverter’s power button for one second. <ol style="list-style-type: none"> a. A solid green status LED or alternating yellow green LED indicates power inverter is working. Check for power at GFCI Outlet. b. Flashing RED Status LED indicates an error condition has been detected and the power inverter has stopped working. “Diagnostic Procedures using Power Inverter Error Codes,” p. 29. 3. Check the 150 Amp fuses; one is located inside the charger box and one is located at the LG battery. <ol style="list-style-type: none"> a. Replace fuse(s) if necessary. b. Check for cause of blown fuse, e.g., poor battery cable connection, cable rubbing and shorted to chassis, etc. 4. Check 20 Amp fuse located inside charger box. <ol style="list-style-type: none"> a. Replace fuse if necessary. b. Check for cause of blown fuse, e.g., poor battery cable connection, cable rubbing and shorted to chassis, etc.

Diagnostic Procedures using Power Inverter Error Codes

Two types of codes are displayed on the power inverter, Shutdown and Warning.

- Shutdown error codes will shut the power inverter off.
- Warning error codes will appear on the display panel to alert of an impending system change. See important note below.

Important: *Warning messages do not immediately effect operation, but could eventually shut down inverter if not addressed.*

Table 4. Diagnostic Procedures using Power Inverter Error Codes

Error Code	Condition	Diagnostic Procedures
	Shutdown Inverter has no power, no status lights	<ol style="list-style-type: none"> 1. Confirm DC disconnect switch is in the ON position 2. Confirm power inverter's power switch is turned ON 3. Check 150 Amp fuse inside charger enclosure 4. Check 20 Amp fuse inside charger enclosure 5. Check 150 Amp fuse near lift gate battery 6. Check for loose or poor battery connections 7. Inspect battery cables and wires for abrasions and damage 8. Use voltmeter to check voltage reading at lift gate battery
E01	Shutdown Low battery voltage <10.2VDC	<p><i>Inverter's display screen will turn off after 30 seconds. After three seconds it will immediately stop inverting.</i></p> <ol style="list-style-type: none"> 1. Check lift gate battery voltage and recharge to greater than 12.6V to clear code. 2. Check for loose or poor lift gate battery connections and tighten as necessary.
E02	Shutdown High battery voltage >15.75VDC.	<p><i>Note: The unit will stop inverting.</i></p> <ol style="list-style-type: none"> 1. Check voltage regulation of the external charging system of lift gate battery, i.e., alternator.
E03	Shutdown AC output overload	<p><i>Note: The unit will stop inverting.</i></p> <ol style="list-style-type: none"> 1. Verify load is less than 2000 watts. 2. Reduce AC load verify if code clears. 3. Restart inverter.
E04	Shutdown Over temperature	<p><i>Note: NOTE: Inverter will automatically resume operation once inverter's internal temperature returns within the normal operating range.</i></p> <ol style="list-style-type: none"> 1. Reduce load(s) connected to the GFCI outlet. 2. Check ventilation grille of inverter is not blocked. 3. Move EPJ to cooler location if possible. 4. Turn inverter off for 15 minutes, then restart.
E05	Warning Low battery voltage detected. See modes below for details.	
Modes: P01/P02	<12.2 VDC, > 10.2VDC and AC output will last for one minute.	<ol style="list-style-type: none"> 1. Check lift gate battery voltage and recharge to appropriate voltage based on setting. 2. Check for loose or poor LG battery connections and tighten as necessary.
P03/P04	<12.5 VDC, > 10.2VDC and AC output will last for three minutes.	
E06	Warning AC output overload warning	<ol style="list-style-type: none"> 1. Reduce load connected to GFCI receptacle.
E07	Warning Over temperature	<ol style="list-style-type: none"> 1. Reduce load connected to GFCI receptacle. 2. Check ventilation grille of inverter is not blocked. 3. Move EPJ to cooler location if possible.

Table 4. Diagnostic Procedures using Power Inverter Error Codes (continued)

E25	Warning Input battery low, no AC output.	<p>Batteries have been under voltage threshold for designated time based on mode setting (see operating time on pg. 21).</p> <ol style="list-style-type: none"> 1. Ensure all charging plugs/connections from charging source if accessible (7 way, stinger cord) are seated properly. 2. Run charging source (tractor, unit) for at least 5 minutes to charge up source batteries above 13.1 VDC. Confirm battery voltage above 13.1VDC. If battery voltage does not rise or hold charge, diagnose and repair charging system or replace batteries.
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Note: It is normal for the internal fans to automatically turn on and off during inverter operation.

Note: It is normal for E05 and E25 codes to be present on the inverter display throughout normal operation.

Power Inverter Replacement Procedures

WARNING

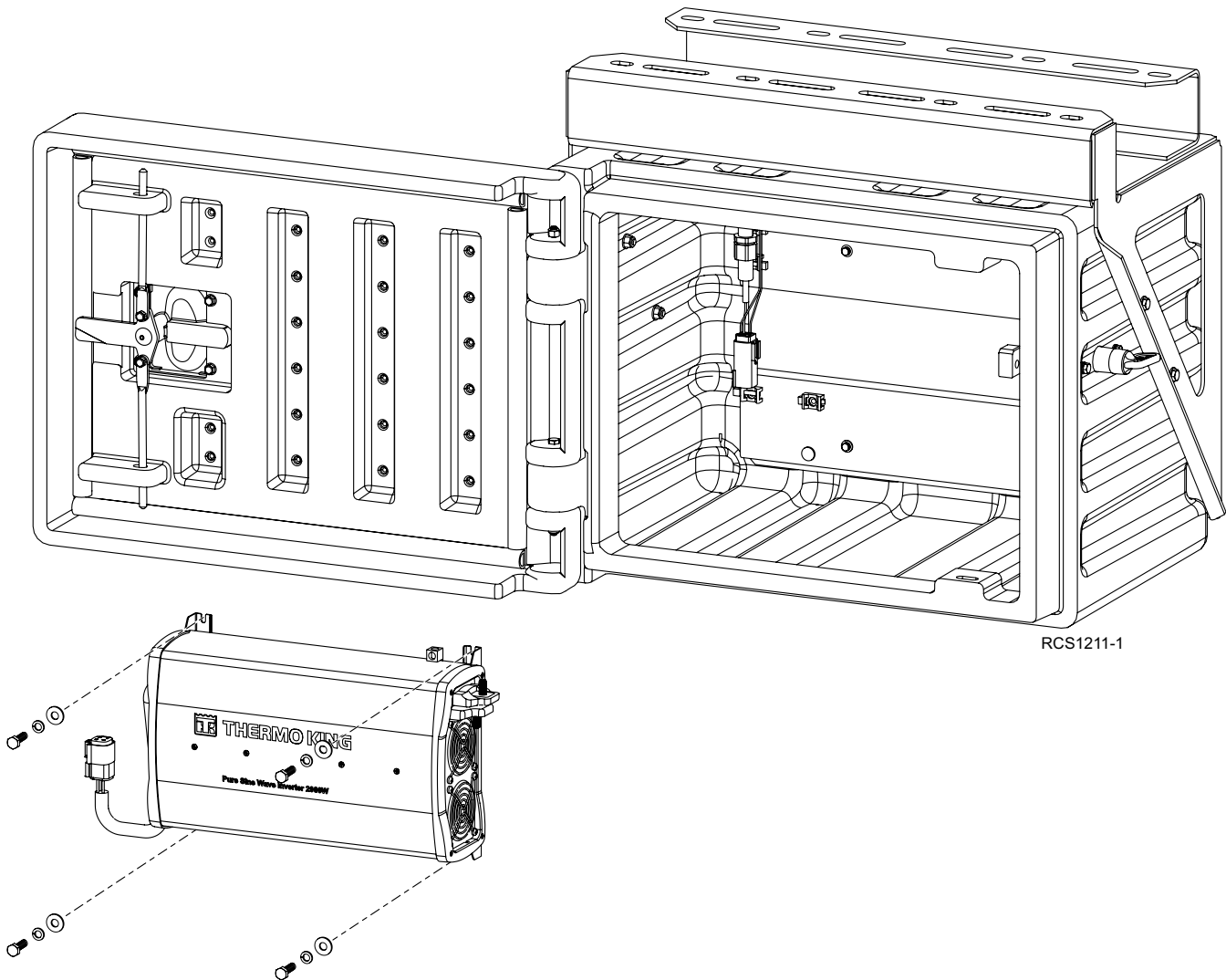
Electrical Shock and Burn Hazard!

Do not dismantle the Thermo King Power Inverter. It does not contain any user-serviceable parts. Attempting to service the unit yourself could result in an electrical shock or burns.

Inverter Removal

1. Turn DC Disconnect Switch to the **OFF** position.
2. Disconnect 12 Vdc positive (+) battery cable from the EPJ Charger to the lift gate battery.
3. Open EPJ Charger enclosure door.
4. Disconnect 12 Vdc positive (+) and 12 Vdc negative (-) cables from inverter connections.
5. Disconnect ground wire attached to inverter.
6. Disconnect AC Output Power Cable from the EPJ Power Cord.
7. Remove the 10-32 hardware securing the inverter to the base plate and remove inverter.

Figure 13. Inverter Removal Shown



Inverter Installation

1. Reinstall inverter in reverse order of removal.
- Tighten the four (4) 10-32 screws securing the inverter to the base plate to 31 in-lb. (3.5 Nm).
 - Reattach the 12 Vdc positive (+) and 12 Vdc negative (-) cables onto the DC inverter connections. Tighten hardware to 108–120 in-lb. (12–13.5 N•m).
 - Tighten the 12 AWG ground wire to the inverter chassis securely.

Inverter Mode Settings

After replacing the power inverter, the Inverter Mode Settings must be reset. See [“Mode Settings,” p. 21.](#)

Maintenance and Inspection Schedule

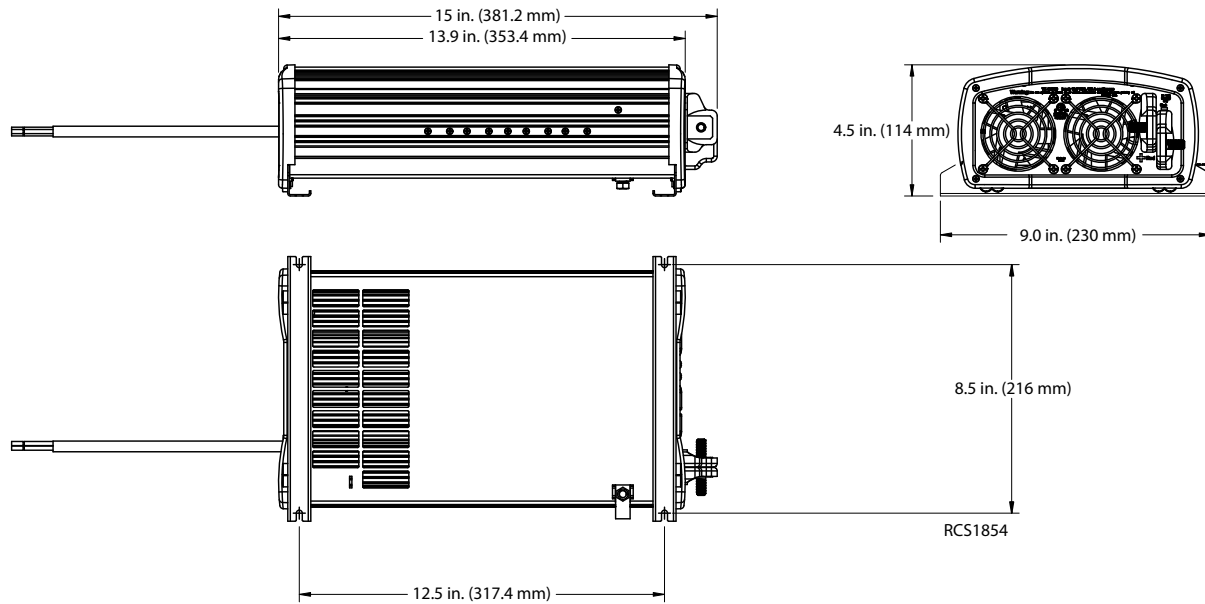
Routine Service and Maintenance Information

Regular inspection and maintenance will help keep the Thermo King Electric Pallet Jack Charger in top operating condition. The following general maintenance inspection schedule is provided to assist in monitoring that maintenance.

Interval	Inspect / Service These Items
Yearly	Inspect all mounting hardware and aluminum frame securing the EPJ Charger enclosure to the vehicle's chassis. Tighten or replace as necessary.
	Inspect the EPJ Charger enclosure for structural damage. Repair or replace as necessary.
	Inspect EPJ Charger enclosure door hinges and latch to ensure they function properly. Repair or replace as necessary.
	Verify all DC battery cables are properly routed, secured and have no abrasions or damage. Repair or replace as needed.
	Verify DC cable connections at rear of EPJ Charger enclosure are free of corrosion. Clean and apply additional dielectric grease and reinstall protective cap.
	Verify all AC power wires/cables are properly routed, secured and have no abrasions or damage. Repair or replace as needed.
	Verify GFCI outlet inside the truck box or trailer is secured properly and has no damage. Repair or replace as needed.
	Clean inverter with a damp cloth to prevent the accumulation of dust and dirt.
	Confirm inverter ventilation grille openings are not blocked with dirt and debris. Clean as necessary.
	Inspect all mounting hardware securing the inverter to the charger enclosure. Tighten as needed.
	Confirm power inverter ground cable is secure. Tighten as needed.

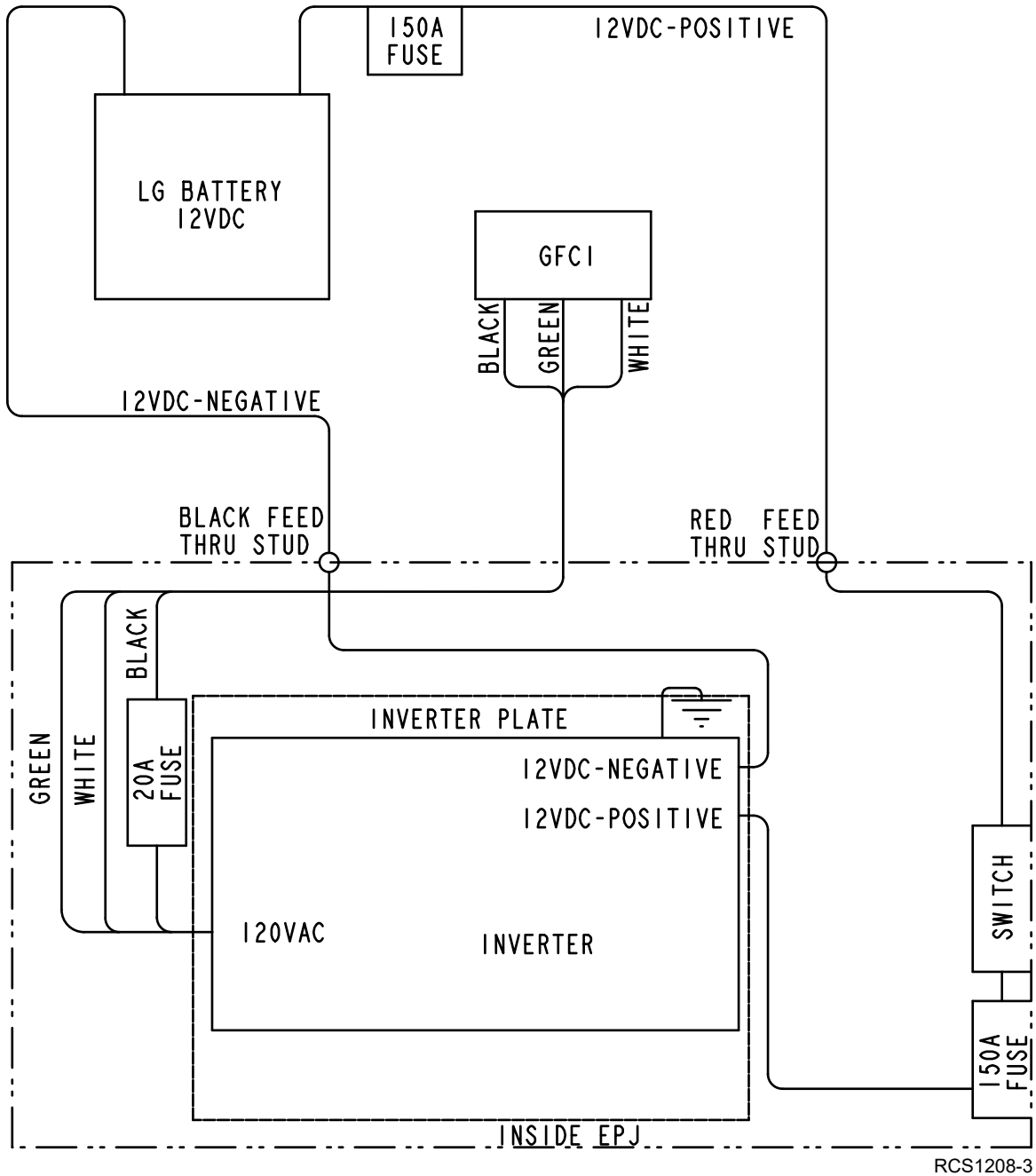
Power Inverter Dimensions

Figure 14. Power Inverter Dimensions



Schematic Diagram

Figure 15. Wiring Schematic



Thermo King – by Trane Technologies (NYSE: TT), a global climate innovator – is a worldwide leader in sustainable transport temperature control solutions. Thermo King has been providing transport temperature control solutions for a variety of applications, including trailers, truck bodies, buses, air, shipboard containers and railway cars since 1938. For more information, visit www.thermoking.com or www.tranetechnologies.com.

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