THERMO KING

Operator's Manual

Axle Power System

Energ-e Pack and ePower Axle

Revision C

March 2025

TK 61960-18-OP-EN

TRANE TECHNOLOGIES

Introduction

This manual is published for informational purposes only and the information furnished herein should not be considered as all-inclusive or meant to cover all contingencies. If more information is required, consult your Thermo King Service Directory for the location and telephone number of the local dealer.

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.

There is nothing complicated about operating and maintaining your Thermo King unit, but a few minutes studying this manual will be time well spent.

Performing pre-trip checks and enroute inspections on a regular basis will minimize operating problems. A regular maintenance program will also help to keep your unit in top operating condition. If factory recommended procedures are followed, you will find that you have purchased the most efficient and dependable temperature control system available.

All service requirements, major and minor, should be handled by a Thermo King dealer for four very important reasons:

- They are equipped with the factory recommended tools to perform all service functions.
- They have factory trained and certified technicians.
- They have genuine Thermo King replacement parts.
- The warranty on your new unit is valid only when the repair and replacement of component parts is performed by an authorized Thermo King dealer.

Software License

The product includes software that is licensed under a non-exclusive, non-sublicensable, terminable and limited license to use the software as installed on the product for its intended purpose. Any removal, reproduction, reverse engineering, or other unauthorized use of the software is strictly prohibited. Hacking the product or installing unapproved software may void the warranty. The owner or operator shall not reverse engineer, decompile, or disassemble the software, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding this limitation. The product may include third party software separately licensed as specified in any documentation accompanying the product or in an about screen on a mobile application or website that interfaces with the product. You are obliged to complete the declaration for “THERMO KING EQUIPMENT SOFTWARE LICENSE AGREEMENT” before you put your unit in operation.

This is located in your language at the following location: https://www.emea-user-manuals.thermoking.com“THERMO KING EQUIPMENT SOFTWARE LICENSE AGREEMENT”.

Open Source Software

This product contains open source software that may be subject to separate licensing terms: Refer to TK 62177 for licenses and notices for the open source software used in this product.

Thermo King Emergency Contacts

Emergency Assistance

Thermo Assistance is a multi-lingual communication tool designed to put you in direct contact with an authorized Thermo King dealer.

Thermo Assistance should only be contacted for breakdown and repair assistance.

To use this system, you need following information before you call:

- Contact phone number
- Type of TK Unit
- Thermostat temperature setting
- Ambient temperature
- Probable cause of fault
- Warranty details of the unit
- Payment details for the repair

Leave your name and contact number and a Thermo King assistance operator will call back . At this point you can give details of the service required and the repair will be organized.

No payment is needed at point of repair for customers with a ThermoKare service contract or with a guarantee of payment from their Thermo King home-dealer.

Thermo Assistance	00800 80 85 85 85
Belgium	+32 270 01 735
Denmark	+45 38 48 76 94
France	+33 171 23 05 03
Germany	+49 695 00 70 740
Italy	+39 02 69 63 32 13
Spain	+34 914 53 34 65
The Netherlands	+31 202 01 51 09
United Kingdom	+44 845 85 01 101
Kazakhstan	+7 727 349 31 08
Russia	+7 49992718539
Others	+32 270 01 735

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Safety Precautions

Danger, Warning, Caution, and Notice

Thermo King®/ FRIGOBLOCK recommends that all service be performed by a Thermo King/FRIGOBLOCK 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.

General Safety Practices

⚠ Danger

Hazardous Voltage!

This unit is equipped with high voltage electrical components capable of causing serious injury or death. ONLY qualified individuals should service, repair, or replace any of the electrical power system components, including fuses.

⚠ 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

Risk of Injury!

Temperatures above 120 degrees F (50 degrees C) can cause serious burns. Use an infrared thermometer or other temperature measuring device before touching any potentially hot surfaces.

⚠ 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!

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!

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.

⚠ Caution

Hazardous Service Procedures!

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

Notice

Equipment Damage!

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

First Aid

BATTERY ACID

- **Eyes:** Immediately flush with large amounts of water for at least 15 minutes. Get prompt medical attention. Wash skin with soap and water.
- **Skin:** Immediately remove contaminated clothing. Wash skin with large volumes of water, for at least 15 minutes. Wash skin with soap and water. Do not apply fatty compounds. Seek immediate medical assistance.
- **Inhalation:** Provide fresh air. Rinse mouth and nose with water. Seek immediate medical assistance.
- **Ingestion:** If the injured person is fully conscious: make the person drink extensive amounts of milk. Do not induce vomiting. Take the injured person immediately to a hospital.

ELECTRICAL SHOCK

The Axle Power System is a state of the art product and is very safe to operate.

However, in a very unlikely scenario of electrical shock proceed with the following steps: **Immediate** action must be initiated after a person has received an electrical shock. **DO NOT TOUCH THE VICTIM!**

You can receive a shock from current flowing through the victim's body. The person may still be in contact with the electrical source. The source of electricity must be removed first.

CALL FOR EMERGENCY AND MEDICAL ASSISTANCE! TURN THE VEHICLE'S ENGINE OFF!

Remove the source of electricity, if possible. If not, move the source away from you and the person, using a dry, nonconducting object made of cardboard, plastic, or wood. The electrical wire should be cut with either an insulated instrument (e.g. wooden handled axe or cable cutters with heavy insulated handles) or by a rescuer wearing electrically insulated gloves and safety glasses. Whichever method is used, **DO NOT LOOK AT THE WIRE** while it is being cut. The ensuing flash can cause burns and blindness. After separating the victim from power source, check immediately for presence of a pulse and respiration. If the victim has no pulse, start CPR (Cardio Pulmonary Resuscitation) until the emergency medical assistance arrives. If the victim has a pulse, respiration may be restored by using mouth-to-mouth resuscitation.

ASPHYXIATION

Move victim to fresh air and use Cardio Pulmonary Resuscitation (CPR) or mouth-to-mouth resuscitation to restore breathing, if necessary. Stay with victim until emergency personnel arrive.

Disposing of the Product

Please dispose of your product according to your national and local regulations at the end of it's life. Contact your service partner for information about disposing of this product in your region of the world.

Battery Safety

⚠ Danger

Equipment Damage and Risk of Injury!

Do not open battery housing to avoid loss of warranty and possible body injury. If you notice any mechanical damage of housing or any other mechanical damage, stop using the battery and contact the Thermo King's Service center.

⚠ Warning

Equipment Damage and Risk of Injury!

Lithium-ion batteries are extremely sensitive to high temperatures and flammable. If a lithium-ion battery pack fails, it will burst into flames and can cause widespread damage.

⚠ Warning

Risk of Injury!

If lithium-ion batteries are leaking, contact of the leakage with skin could cause serious injuries.

⚠ Warning

Equipment Damage and Risk of Injury!

Broken or cracked cases can allow moisture and oxygen to enter the battery and oxidize the lithium components, causing a heat reaction. This can lead to fires or explosions.

⚠ Warning

Equipment Damage and Risk of Injury!

Lithium-ion batteries contain metals such as cobalt, nickel, and manganese, which are toxic and can contaminate water supplies.

⚠ Warning

Risk of Injury!

Gases released by the burning lithium-ion battery have toxicity and will cause harm to humans.

⚠ Warning

Hazardous Voltage — Personal Protective Equipment (PPE) Required!

Only isolated tools approved for 1000 VDC can be used during battery service or installation.

⚠ Warning

Risk of Injury!

Lithium-ion batteries are declared as dangerous goods (according to UN Class 9).

⚠ Warning

Risk of Injury!

Keep away from fire or hot heat sources immediately when a leakage or foul odors are detected. If liquid leaks onto your skin or cloths, wash it out with plenty of fresh water immediately.

⚠ Caution

Risk of Fire!

Charge battery only on a non-flammable surface at battery temperatures between -25°C and 55°C (-13°F and 131°F).

⚠ Caution

Equipment Damage!

Use the dedicated charger and adapter provided with the Energ-e Pack. Important: It is not allowed to use extension cords for the charging cable.

⚠ Caution

Equipment Damage!

Stop charging the battery if charging isn't completed within the usual time.

⚠ Caution

Equipment Damage!

Avoid exposing battery to long-term moisture, water, or sun when the truck/trailer with the Energ-e Pack is not in use.

Notice

Equipment Damage and Risk of Injury!

Before using a charger, be sure to read the charger's user manual.

System Safety

⚠ Warning

Equipment Damage and Risk of Injury!

Park the vehicle in a safe area in case of accidents and contact Thermo King service center.

⚠ Warning

Risk of Injury!

Keep away from fire or hot heat sources immediately when a leakage or foul odors are detected. If liquid leaks onto your skin or cloths, wash it out with plenty of fresh water immediately.

⚠ Warning

Equipment Damage and Risk of Injury!

Only instructed operators/service technicians should open the Energ-e Pack.

⚠ Caution

Equipment Damage and Risk of Injury!

Stop using the system if the Energ-e Pack is damaged, develops an odor, becomes deformed, or develops any other abnormal conditions during use, charge, discharge, or storage.

⚠ Caution

Equipment Damage!

After long storage and leaving the unit idle for a longer period, if charging and operating is not available, stop the charging or operating and contact the service center.

⚠ Caution

Equipment Damage and Risk of Injury!

Energ-e Pack — System Inverter, Power Combo Filter, Shore Power Filter, and Energ-e Pack PDU are only certified for use in Axle Power System. Energ-e Pack — System Inverter, Power Combo Filter, Shore Power Filter and Energ-e Pack PDU may not be used outside Energ-e Pack.

Notice

Use on Ferry!

If you use Axle Power System on a ferry, note that the Energ-e Pack cannot be connected to the power supply of the ferry via the type 2 connection.

Safety Decals

Warning labels shall be used to inform and warn the personnel of risks associated with batteries, battery installation and high voltage above 1000 VAC and above 60 VDC.

High voltage electricity hazard

Flammable material

Corrosive substance

Explosive materials

Toxic material

Substance or mixture presenting a health hazard

Substance or mixture that can cause an environmental hazard

Safety Decals Location

Figure 1. Safety Decals on the Front Side of the Energ-e Pack

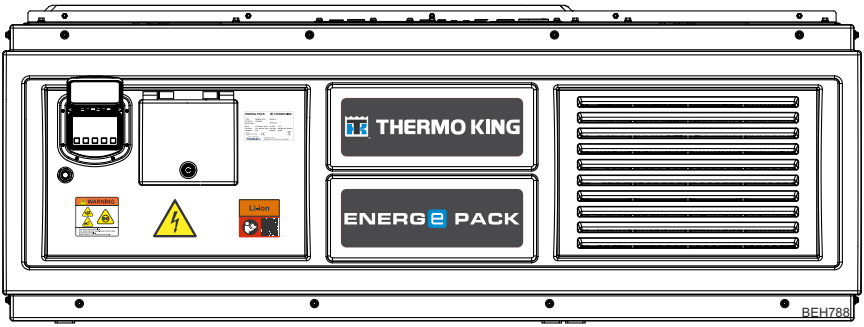
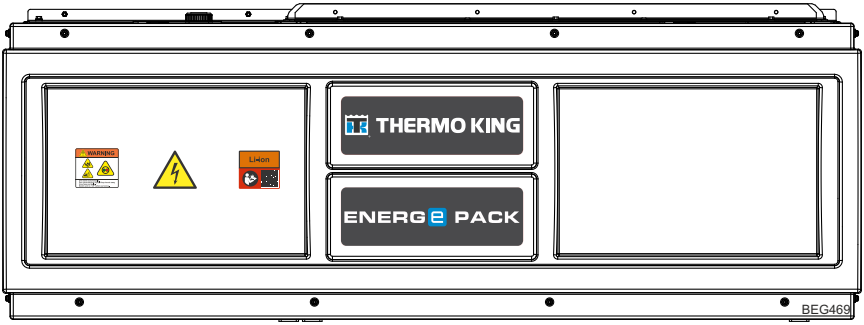


Figure 2. Safety Decals on the Back Side of the Energ-e Pack



Operation

The operation decal is located in an appropriate position near the Human-Machine Interface (HMI). This decal gives you the information to access/ download your unit's operator manual and other supporting documentation in many supported languages.

Figure 3. Operation Decal

BEN525

Energ-e Pack Storage Conditions

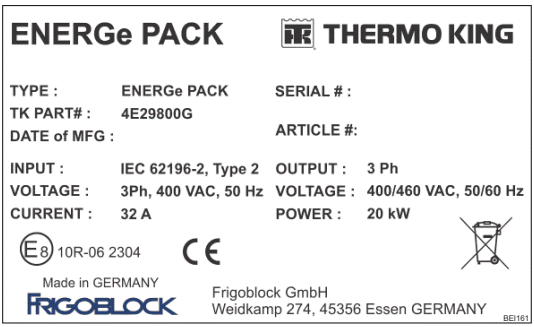
The storage conditions of the Energ-e Pack are determined by the HV battery storage requirements:

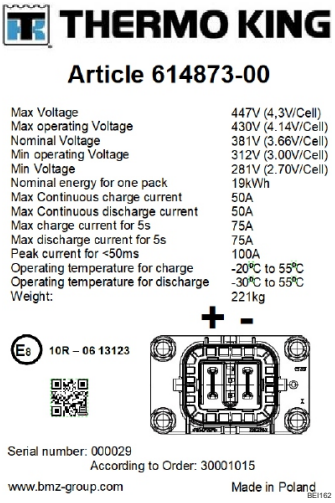
The recommended storage temperature for a period **< 3 months** is **-10°C to +30°C.**

The recommended storage temperature for a period **3 months** is **0°C to +25°C.**

For short periods (**< 4 weeks**) during transport, given that the SOC is ~30%, temperatures from **-20°C to +45°C** are acceptable.

The humidity must be below **70 % RH.**





System Description

The Axle Power System is a 2-piece assembly:

1. The **Energ-e Pack** controls generation and provision of the Trailer Refrigeration Unit (TRU). It stores the power generated by the ePower Axle Generators or by charging with shore power connection in its high voltage batteries. It supplies electric power to the TRU.

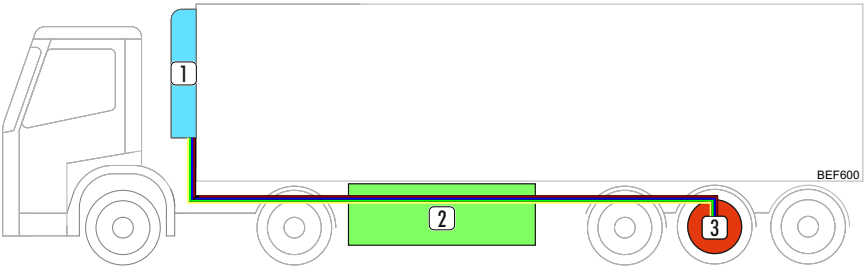
   The Energ-e Pack consists of the following components, among others:

   - High voltage battery (HV battery). There are systems with one or two HV batteries.
   - Energ-e Pack HMI panel, the Human-Machine Interface or User Interface.
   - Temperature Management System (TMS).
   - Controllers, inverters, filters, sensors.

2. The **ePower Axle** unit generates electrical power for the Energ-e Pack. The Generator Transmission Units (GTUs) with the two generators are mounted below the trailer and convert mechanical power from vehicle movement into electric power to supply the Trailer Refrigeration Unit (TRU) and charge the high voltage battery of the Energ-e Pack.

These units in combination, the Axle Power System, provide electrical power for operating the refrigeration unit.

Main Assemblies Locations



1	Trailer Refrigeration Unit	3.	ePower Axle Generators
2.	Energ-e Pack		

Energ-e Pack

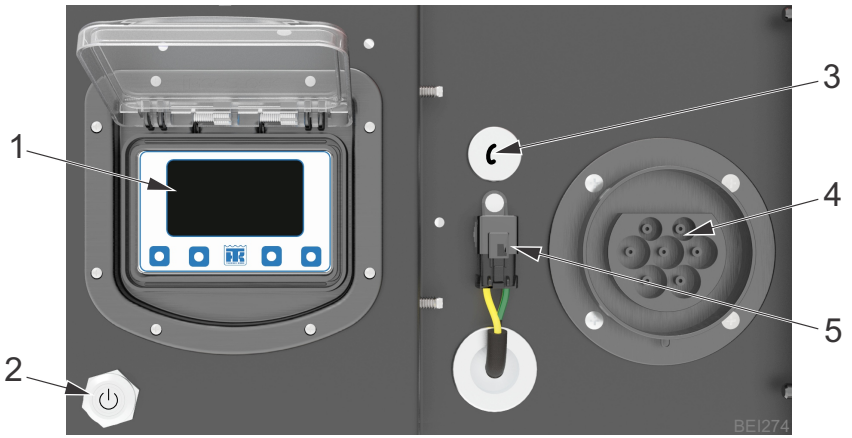
1	HMI panel	3.	Air out louver for Temperature Management System (TMS)
2.	Air in louver for Temperature Management System (TMS)		

HMI Panel

The HMI panel is the User Interface. It contains the instruments to operate the Axle Power System:

- Human-Machine Interface (HMI) on the left side
- ON/OFF button, also on the left
- Charging socket, on the right
- Only in case of emergency: Kill Wire (Emergency Shutdown Disconnect) on the right shall only be cut by instructed operators and service technicians.
- Only for technical service: Service Port.

The HMI panel is the most important instrument for information on the system and on power supply, for charging the battery via shore power and for an emergency shutdown of the system.



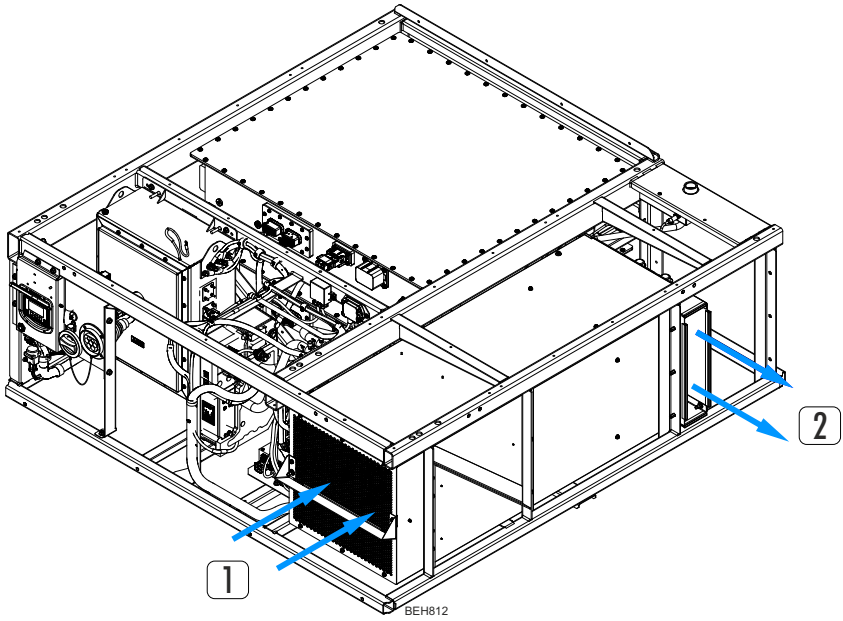
1	**HMI display and soft keys**	**4**	**Charging socket**
2	**ON/OFF button**	5	Service Port
3	Kill Wire		

Note: *To see the HMI display while driving, the optional Combo Display can be screwed onto the trailer. It is possible then to check whether there are problems concerning the State of Charge (SOC) of the HV battery.*

Temperature Management System (TMS)

The Temperature Management System (TMS) system provides cooling to the electronic components. Please ensure that the Temperature Management System is accessible for service and that the ventilation openings are not blocked.

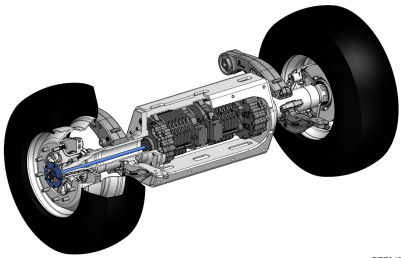
Figure 4. Temperature Management System (TMS) in the Energ-e Pack box



1.	Air in louver	2.	Air out louver

Generator Transmission Unit (GTU)

The Generator Transmission Unit (GTU) is part of the ePower Axle unit. The main function of the GTU is to convert mechanical power from vehicle movement to electrical power (AC). The GTU consists of two generators for power conversion and two gear boxes for transmission of slow rate of rotation. The Generator Transmission Unit is integrated into the trailer axle.


BEE948


BEE949

Trailer Refrigeration Unit (TRU)

The Axle Power System can be connected to any Trailer Refrigeration Unit (A-Series, SLXi and HK25). The manuals of these units can be downloaded from http://iservice.thermoking.com/esa.

How Axle Power Works

Axle Power Modes Overview

The activities of Axle Power are depicted by three categories:

- System Modes
- Operation Modes
- Energy Modes (ePower Axle)

The Energ-e Pack is based on three **System Modes**. They describe and determine the states of the system: How the system starts, operates, and shuts down its functions and operation. The mode OFF has always an exceptional cause: If Axle Power System is OFF, either Axle Power has not been used for a longer period or there is some problem with the system, an event of emergency, or there is ongoing maintenance work in the open Energ-e Pack box (Service Switch switched off).

Axle Power runs in three **Operation Modes** that determine how the Energ-e Pack supplies power to the Trailer Refrigeration Unit (TRU): Road, Shore Power, and Parking Mode. Road Mode is the most important and unique Axle Power Operation Mode. In Road Mode, Axle Power generates electric energy via ePower Axle for the Trailer Refrigeration Unit (TRU).

Depending on the energy demand and driving situation of the vehicle and the Trailer Refrigeration Unit (TRU), the ePower Axle Generators produce varying amounts of electrical energy. Generating and provisioning electrical power is controlled using three **Energy Modes**: Active, Recuperation, and Passive.

Axle Power Modes automatically change, activate and deactivate themselves. They depend on certain conditions — if these particular conditions are met, then the corresponding Axle Power Mode starts or changes to another one.
Example: You turn the ignition on. This forces Axle Power to start working.

These processes are triggered and managed by the Axle Power System itself. You do not have to do anything.

System Modes

The **System Modes** of Axle Power describe the states of the system: How and when the system starts, how and when it operates, and how and when it shuts down its functions and operation.

- High Voltage Mode (HV Mode) for core operation: producing electrical energy by the axle generators and supplying the refrigeration unit.
- Standby Mode (Low Voltage Mode, LV Mode): The HMI is on.
- Shutdown Mode (Sleep Mode): HMI is off.
- If Axle Power is OFF, either Axle Power has not been used for a longer period or there is a problem, a case of emergency or ongoing maintenance work.

The System Modes automatically change and de-/activate themselves. They depend on certain conditions — and if these particular conditions are met, then the corresponding System Mode starts or changes to another one.

Example:

- Truck and trailer are parked.
- The Energ-e Pack system is in Shutdown Mode, the HMI display is off.
- You connect the shore power cable into the shore power interface of the building and into the shore power socket on the HMI panel.
- Automatically the Axle Power System changes to HV Mode, the HMI starts up, the refrigeration unit is powered.

In nearly all cases, these processes are triggered and managed by the Axle Power System itself.

Operation Modes

Axle Power runs in three Operation Modes that determine how the system supplies power to the Trailer Refrigeration Unit (TRU).
In all three Operation Modes the Energ-e Pack powers the TRU.

Road Mode

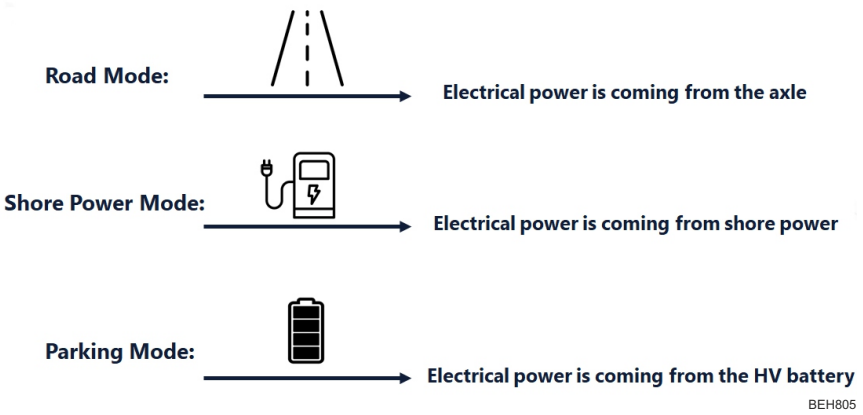
- Truck and trailer with the TRU are moving. The system detects that the trailer is towed by a tractor.
- The system starts power generation. ePower Axle Generators are generating electrical power.
- The Axle generators charge the HV battery of the Energ-e Pack and supply the TRU.

Shore Power Mode

- Truck and trailer with the TRU are parking.
- The Energ-e Pack is connected to shore power or a charging station.
- The HV battery is charged and the TRU is supplied with shore power.

Parking Mode

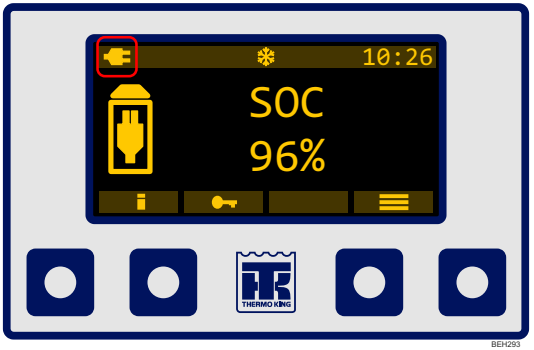
- Truck and trailer with the TRU are parking or can run on the road, but the ePower Axle Generators do not generate energy.
- The HV battery supplies the TRU if it is sufficiently charged.



The Energ-e Pack activates and changes to the appropriate Operation Mode autonomously.

The current Operation Mode is displayed by the Human-Machine Interface (HMI) on the top left:

Figure 5. Operation Mode on the HMI (example Shore Power Mode)



Operation Mode Icons

Road Mode. Truck with trailer is moving and generators can produce power to charge the high voltage battery.

Shore Power Mode. Energ-e Pack is connected to shore power to charge the high voltage battery or to power the Trailer Refrigeration Unit (TRU).

Parking Mode. If the high voltage battery is sufficiently charged, it powers the refrigeration unit.

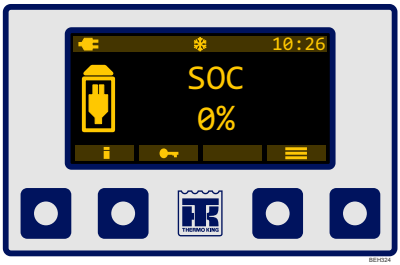
Important: *Switch to Road Mode may be impeded*

- *if the battery is (nearly) empty: State of Charge (SOC) 0%,*
- *and if ignition is on for a longer period,*
- *and if the vehicle is not moving (no power generated by ePower Axle).*

In this event, you have to toggle the ignition signal before starting to drive away the truck. Thereby the ePower Axle Generators begin to charge the battery and supply the refrigeration unit.Example:

You have a break and leave the vehicle running. Axle Power may not start automatically if one more condition is met, namely the battery is (nearly) empty.

The HMI shows that the battery is nearly empty. The battery State of Charge (SOC) is 0%:

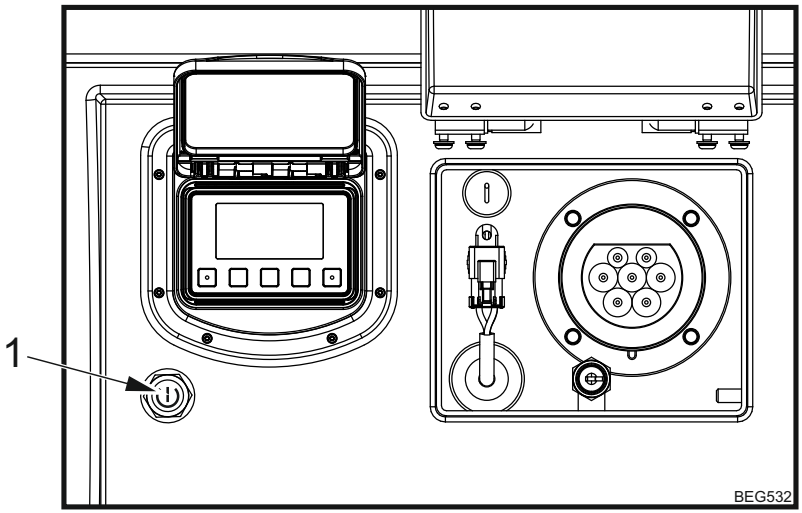


Operation Instructions

Starting and Shutting Down

Axle Power changes, activates, and deactivates its mode of working (*System Modes*) autonomously.

- Axle Power starts working automatically: It is not possible to start operation and the High Voltage Mode (HV Mode) of the Energ-e Pack manually via the ON/OFF button. HV Mode is activated automatically when ignition or Trailer Refrigeration Unit (TRU) are on or when the Energ-e Pack is connected with shore power.
- HMI is off (display black): You manually start the HMI by the ON/OFF button that is located next to the display of the HMI.
  - Short press ON/OFF button for 1-2 seconds for activating the Standby Mode of the Energ-e Pack.



1.	ON/OFF button		

Human-Machine Interface (HMI)

There are three access levels: User, Supervisor, and Service. The User does not need a login with pin or password.

The HMI changes depending on context and access level. Operator (truck driver, User access) and Supervisor (fleet manager) have access to the information of the HMI about the state of the Axle Power System (System Mode) and possible errors in the system.

The HMI consists of the Standard Display, the Information Menu and the Main Menu with various submenus, among others the Alarms Submenu.

Please pay special attention to the alarm icons on the Standard Display and the Alarm Details including the *recommended action to take*.

⚠ Warning

Equipment Damage and Risk of Injury!

Do not operate the unit until you are completely familiar with the location and function of each control.

HMI

The main functions of the Human-Machine Interface (HMI):

- Display Alarms / Error
- Monitor battery State of Charge (SOC)
- Geofencing
- Information on Axle Power System

Activating the HMI

In general, you do not have to activate the HMI. In normal operation, the HMI and its display are always on:

- When the Trailer Refrigeration Unit (TRU) is on,
- or when the ignition is on or the truck is on the road,
- or when the Energ-e Pack is connected to shore power and the HV battery is being charged.
- The HMI is also on when Axle Power is in Standby Mode.

There is no time out for the HMI display, for example if you do not use it for some minutes.

If the HMI is off and the display is 'black', you can activate the HMI:

- Short press the ON/OFF button for 1-2 seconds. This 'wakes up' the system, starting the HMI at the same time.

Of course, you can also turn on ignition or the TRU or connect the Energ-e Pack with shore power. This also 'wakes up' the system and with it the HMI.

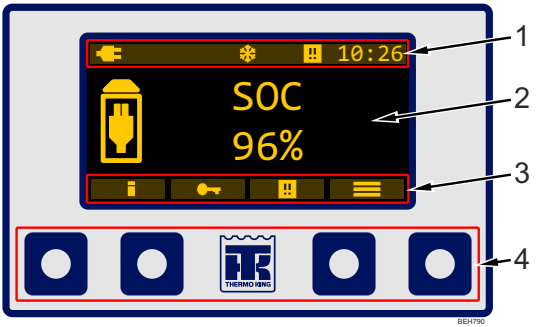
Note that information needs a few seconds until it is completely shown on the display.

Display

The display of the HMI consists of three parts:

- Header line for information and icons, depending on menu and feature (1).
- Main screen with information or input fields, depending on menu and feature (2).
- Footing tool bar with four action buttons (3) that change depending on the context.

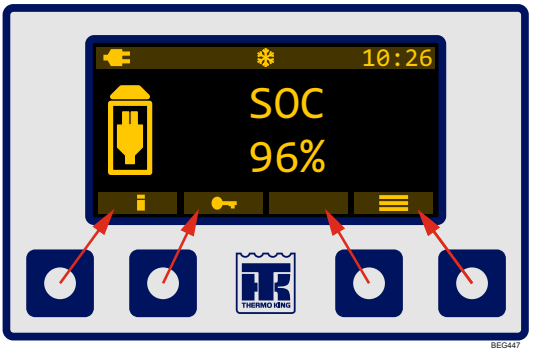
HMI has no touch screen: It is operated by pressing the soft keys below the screen (4) that correspond to action buttons in the footing of the display.



1	Header line	3	Footing with action buttons
2	Main screen	4	Soft keys

Action Buttons and Soft Keys

The soft key correspond to the action buttons that appear above them on the display. That means the functionality of the soft keys is flexible and change with the corresponding action buttons.

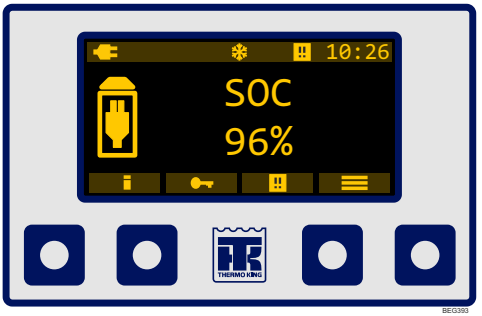


The example above shows the Standard Display. You press:

- left key to open the Information Menu,
- second key to the left to open the Access Menu,
- right key to open the Main Menu.

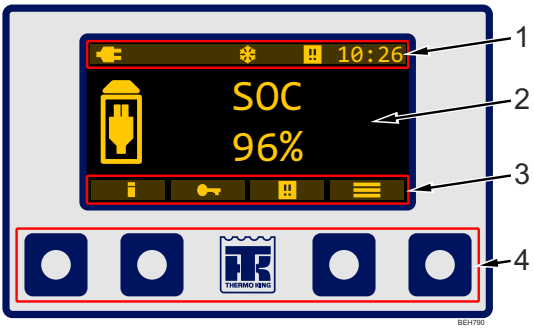
If there is a problem and an alarm is raised as in the figure below,

- an alarm icon appears in the header line on the left of the time display. In the example below it is: .
- Also, the second button to the right becomes the Alarms Menu button that you choose by pressing on the second soft key to the right.



Icons

Icons of the header line and the footing of the HMI display:



1	Header line	3	Footing with action buttons

Header of the HMI display

Header top left **Operation Modes:**


Shore Power Mode


Parking Mode


Road Mode

System Mode:


Standby

Header center

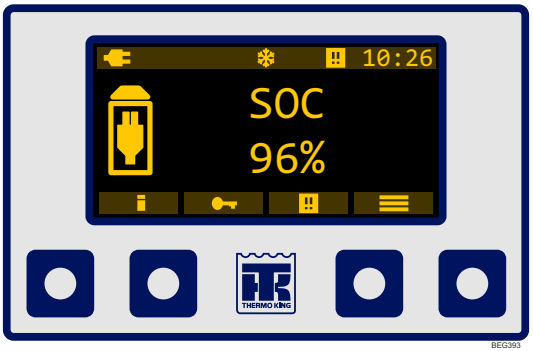
The icon appears if the Energ-e Pack is connected to the activated Trailer Refrigeration Unit (TRU).

Note: *The TRU does not necessarily need to be running. The icon just indicates that the TRU is on and connected to the Energ-e Pack.*

Header right

Shutdown and Check alarms

Footing of the HMI display

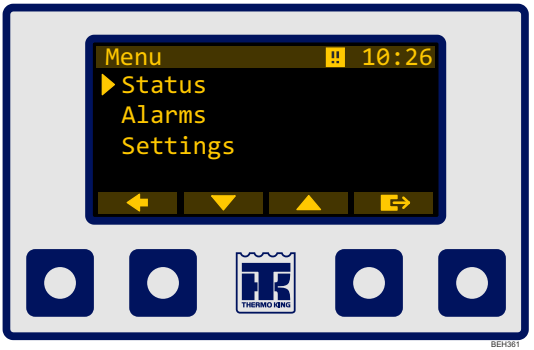


Info Menu

Access Menu

Alarms Menu

Main Menu



Navigation buttons in the footing:

Arrow down to navigate and select

- Moves cursor down and selects option.
- In case of features which require input of digits:
  - Arrow down circles the value from 9 to 0. Each time, the corresponding soft key is pressed, it counts down 1:
    press arrow down once: 9,
    press arrow down twice: 8, …
    press arrow down five times: 5, ...

Arrow up to navigate and select

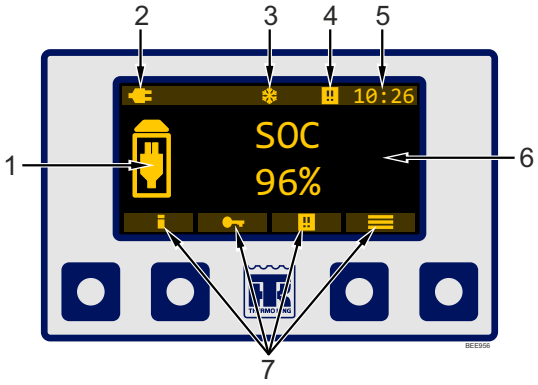
- Moves cursor up and selects option.
- In case of features which require input of digits:
  - Arrow up circles the value from 0 to 9. Each time, the corresponding key is pressed, there will be added 1:
    press arrow up once: 1,
    press arrow up twice: 2, ...
    press arrow up five times: 5, ...

One step back

Confirmation: Enter, Return

Acknowledge, Confirm

Standard Display



1	Icon for: Charging of high voltage battery or State of Charge (SOC) of the high voltage battery	5	Time
2	Icon for: Operation Mode or Standby In this example: Charging / Shore Power Mode icon	6	Main information
3	Icon for: Trailer Refrigeration Unit (TRU) connected (TRU on)	7	Action buttons: Info, Access, Alarms, Main Menu
4	Icon for shutdown / check alarm		

The components of the Standard Display:

Header line:
(from left to right)

- Icon to designate the current Operation Mode or Standby Mode.

  In the image above the icon  tells you that the Energ-e Pack is connected to shore power and that the battery is being charged.

- TRU on:

  The icon appears if the Energ-e Pack is connected with the activated Trailer Refrigeration Unit (TRU).

  Note: *The TRU need not to be running. The icon indicates just that the TRU is on and connected to the Energ-e Pack.*

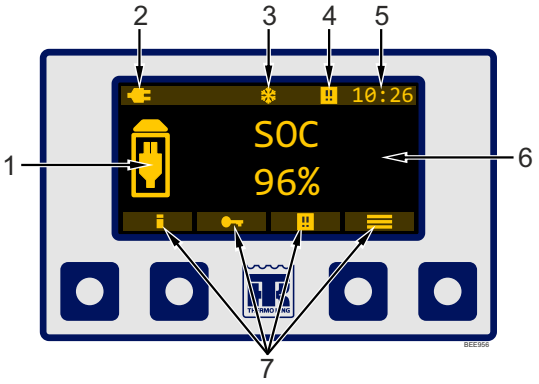
- Reminder of alarms, depending on alarm level:

  Shutdown alarm **Check alarm**

- Time

Footing:

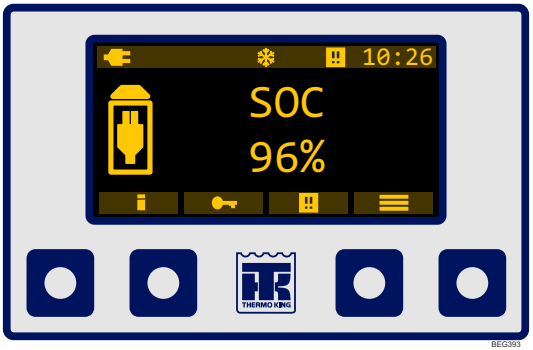
- Action buttons to open Information Menu, Access Menu, Alarms Menu, and Main Menu.



Main Screen

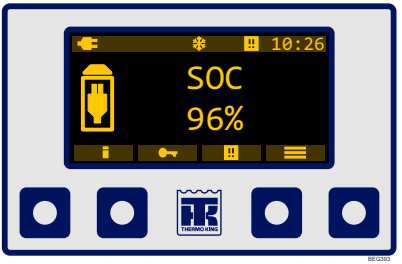
The main screen of the Standard Display contains information on

- either the state of charge of the batteries,
- or the time to charge the high voltage batteries,
- or the time to run down the high voltage batteries.



The main screen of the Standard Display is switching every three seconds between these three topics: State of Charge, Time to charge, Time to run down the HV battery.

- State of Charge (SOC) of the high voltage batteries



- How long it will take to charge the high voltage batteries (SOC 100%): in hours and minutes (hh:mm)

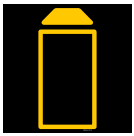
- How long it takes for the high voltage batteries to run down (SOC 0%): in hours and minutes (hh:mm)

On the left of the main screen, the icons also change according to the topic:

- The battery icon roughly visualizes the state of charge of the high voltage battery by its filling level:

for a nearly full high voltage battery

for a state of charge of about 20 % (SOC 20%)



for a nearly empty high voltage battery

- If the high voltage battery is being charged (as in the example screens above), the icon is a battery with an electrical plug.

In this case, the icon for Shore Power Mode also appears top left in the header: 

HMI Menus

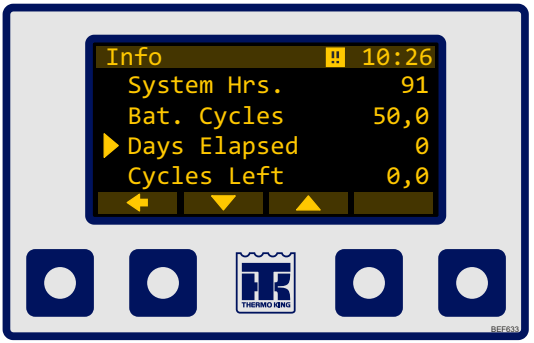
Information Menu

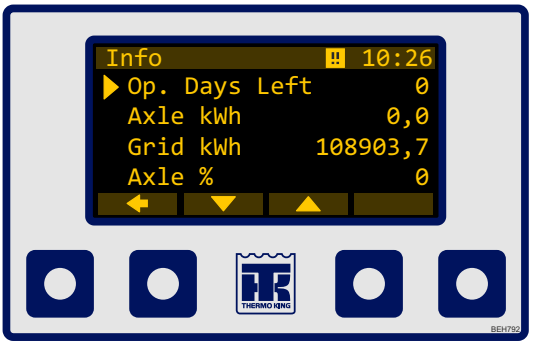
After starting the system, the left soft key opens the Information Menu which gives an overview on the Energ-e Pack system:

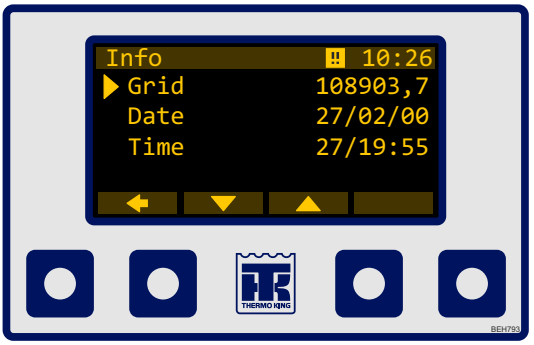
The Information Menu is read-only.

Table 1. Information Menu

Options	Description
System Hrs.	System hours. How many hours the Energ-e Pack has worked.
Bat. Cycle	High voltage battery cycles. How many cycles (charging and discharging) of the high voltage batteries have been completed.
Days Elapsed	How many days the system has been running.
Cycles left	How many cycles (charging and discharging) of the high voltage batteries are left.
Op. Days left	Operating days left. How many days the Energ-e Pack will be running (estimated).
Axle power (kWh)	kWh supplied by Axle Power. How many kWh Axle Power has generated and supplied.Only in systems with ePower Axle.
Grid (kWh)	kWh supplied by shore power. How many kWh have been supplied by shore power.
Axle %	Percentage of energy for the Trailer Refrigeration Unit (TRU) which ePower Axle has contributed. Only in systems with ePower Axle.
Grid %	Percentage of energy for the Trailer Refrigeration Unit (TRU) supplied by shore power.
Date	Current date.
Time	Current time.


Info 10:26
System Hrs. 91
Bat. Cycles 50,0
Days Elapsed 0
Cycles Left 0,0
THERMO KING
BEF633


Info 10:26
Op. Days Left 0
Axle kWh 0,0
Grid kWh 108903,7
Axle % 0
THERMO KING
BEH792


Info 10:26
Grid 108903,7
Date 27/02/00
Time 27/19:55
THERMO KING
BEH793

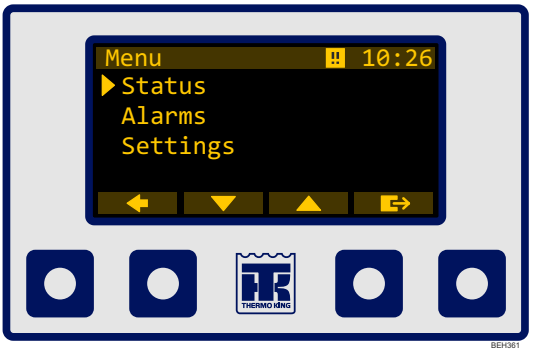
Main Menu

Note: *You cannot modify any configuration. Everything is read-only.*

The Main Menu is accessed from the Standard Display using the right **Menu** soft key.

The User's Main Menu consists of the following submenus:

- Status
- Alarms
- Settings



Status Submenu

The Status submenu is the same and read-only for all three access levels.

The option *System* contains important information in case of alarms and for contact with Thermo King service.

Table 2. Status submenu — Service / User / Supervisor

Option	Description Options/Information
System	Information on the product. • Hard. Ver. Hardware version, model number • Serial version • Soft. Version Software version
Hours	Information on operation, running, or charging time of the Energ-e Pack and ePower Axle (if integrated in this individual Axle Power System). • System Hrs. System hours. Run time of the Energ-e Pack. How many hours the Energ-e Pack has been running. • Axle G. Hrs. Axle generators hours. Operation time of the ePower Axle Generators. How many hours the ePower Axle Generators have been running. Can only be selected in Energ-e Pack Systems containing ePower Axle Generators. • Battery Hours High voltage (HV) battery hours. Operation time of the HV batteries in hours. How many hours the batteries have been charging or discharging. • Grid Hrs. Shore power hours. Shore power operation time. How many hours the Energ-e Pack has been running with shore power. • Charge Hrs. Charge hours. How many hours the batteries have been charged with shore power. • TRU Hrs. Bat. How many hours the Trailer Refrigeration Unit (TRU) has been been running, powered by the batteries of the Energ-e Pack. • TRU Hrs. Grid How many hours the Trailer Refrigeration Unit (TRU) has been powered with shore power.

Table 2. Status submenu — Service / User / Supervisor (continued)

Option	Description Options/Information
Battery	Information on the high voltage batteries (HV batteries) • Bat. Cycles HV battery cycles. How many full cycles of the batteries have been performed (discharging and charging). A battery cycle is understood as the process of fully discharging a charged battery with subsequent recharge. "Fully discharging" means discharge down to 7% SOC. A "charged" battery means charged up to 97% SOC. • Days Elapsed Elapsed operation days. 'Operation day' is a day during which the system is used, that means it is at least one hour 'on' on that calendar day. • Cycles Left Estimated full cycles of the batteries left (discharging and charging). How many cycles (charging and discharging) of the batteries are left. • Op. Days Left Operation days left. Estimated operation days left. How many days the Energ-e Pack will be running (estimated). 'Operation day' is a day during which the system is used, that means it is at least one hour 'on' on that calendar day.
Energy	Information on power consumption, supplied either by ePower Axle Generators or shore power. • Axle kWh How many kWh Axle Power has generated and supplied. Can only be selected in Energ-e Pack Systems containing ePower Axle Generators. • Grid kWh Shore power kWh. How many kWh Axle Power has generated and supplied. • Axle % Percentage of energy for the Trailer Refrigeration Unit (TRU) which ePower Axle has contributed. Can only be selected in Energ-e Pack Systems containing ePower Axle Generators.

Alarms Submenu

Lists all alarms and reminders, including basic information.

Table 3. Alarms submenu

- Alarm Code Number
- Source Component
- Alarm Severity
- Alarm Description
- System Impact
  Recommended action to take
- FMI
- Count
  Frequency with which this alarm has arisen. How often the alarm has arisen.
- On [Time and Date]
  Date and time the current alarm was raised (appeared).
- Off [Time and Date]
  Last time (date and time) the alarm was cleared (disappeared).

Notes:

- *For further information, refer to "Alarms," p. 56.*

Access Submenu

Important: *Users do not need to log in.*

For *Supervisors (Fleet Manager)*: The preferred and easy way to access this feature is by using the "2 Way Command" feature within the tracking software. This feature provides supervisors with a comprehensive overview and control over additional operations/settings.

Settings Submenu

To change and select language, brightness, and unit system of HMI display.

The Settings submenu is the same for all three access levels.

Table 4. Settings submenu — Service / User / Supervisor

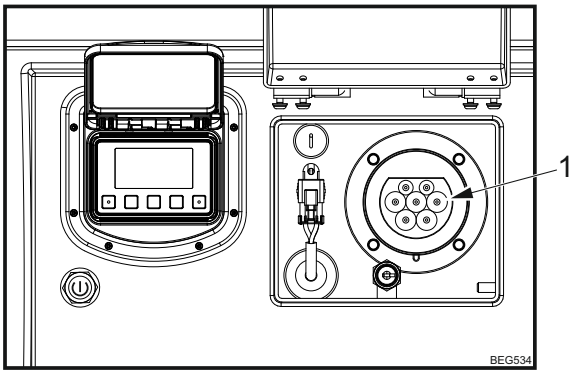
Options
• Language To select the preferred language from a list of languages. All subsequent displays are shown in the selected language. English is the default language. • Brightness To adjust the HMI display and HMI keypad backlight intensity as required by local conditions. • Unit (Measurement System) To select whether you want to use HMI and Axle Power with international metric system (SI) with measuring units like meters, Celsius or whether you choose Imperial System with measuring units such as miles or Fahrenheit. ***Note:*** *Unit is not available at the moment.*

Charging with Shore Power

Charging Equipment

The charging socket on the Energ-e Pack side is on the right side of the HMI panel, behind the cover which needs to be opened with coin or screwdriver.

Figure 6. HMI panel with charging socket



1	Charging socket		

Whereas the charging socket on the HMI panel of the Energ-e Pack is a type 2 socket, the socket of shore power interface in the building has to be a 32 Amp 5 pins CEE socket, as shown in the figures below.

Figure 7. Type 2 socket (Energ-e Pack side)

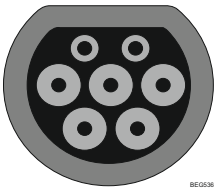
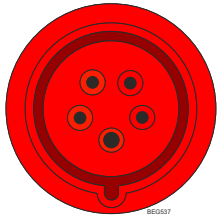


Figure 8. 32 Amp 5 pins CEE socket (Shore Power side)



Important: *For operating the Energ-e Pack with the onboard charger, the shore power interface in the building must comply with following specifications:*

- *400V/50Hz/3phases + neutral*
- *The fuses used shall meet the requirements according to the standards of your country.*
- *In case the neutral pin is not connected, the charger will not operate.*
- *Use RCCB (Residual Current Circuit Breaker) Type B. If any other RCCB type (Type A/AC/F) is used, it may result in nuisance tripping of the building shore power RCCB protection.*
  - *Type B RCCB should be used for variable-speed drives, electric charging equipment, and inverter-driven systems.*

Notice

Use on Ferry!

If you use Axle Power System on a ferry, note that the Energ-e Pack cannot be connected to the power supply of the ferry via the type 2 connection.

⚠ Caution

Equipment Damage!

Use the dedicated charger and adapter provided with the Energ-e Pack.
Important: It is not allowed to use extension cords for the charging cable.

The Energ-e Pack is equipped with a charging cable provided with an in-cable charger module (Eveline). In order to avoid system damage, only this charging cable which is provided by Thermo King should be used for charging the Energ-e Pack with shore power. It is equipped with a Type B RCCB.
For charging the Energ-e Pack, it is not allowed to use extension cords.

Figure 9. Charging cable: Red 32 Amp 5 Pins CEE plug, black type 2 plug

Figure 10. Eveline Max 22 kW Portable Type 2 Charger

The in-cable device of the charging connector should be set on 30 A. The LED on the charger indicates this by flashing 7 times.

When the Energ-e Pack is charged with shore power,

- the trailer is immobilized: The trailer cannot move.
- the charging plug is locked into the charging socket: The charging plug cannot be pulled out of the charging socket.

Note: *For more information, refer to the manual of the Eveline Max 22 kW Portable Charger.*

Connecting with Shore Power

⚠ Caution

Equipment Damage!

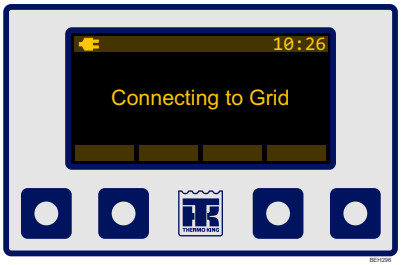
Use the dedicated charger and adapter provided with the Energ-e Pack.
Important: It is not allowed to use extension cords for the charging cable.

1. Connect the red CEE plug with the shore power connection.
   Do not use extension cables.
2. For the charging connection of the Energ-e Pack, open the cover of the HMI panel with coin or screwdriver.
3. Insert the black type 2 plug into the Energ-e Pack charging socket.
4. When the LED of the in-cable device of the charging connector (Eveline) stays yellow, the charger is ready to charge and charging starts automatically.

The HMI display will automatically light up.

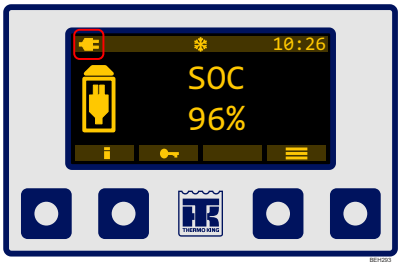
If the Trailer Refrigeration Unit (TRU) is switched on, the Energ-e Pack will supply the TRU — either by shore power or by the HV battery.

Figure 11. Connecting with shore power: Message on HMI



The icon for Shore Power Mode appears in the HMI header:

Figure 12. HMI, header: Operation Mode icon



Disconnecting Shore Power

For safe disconnecting and safe shore power plug removal, follow the procedure below:

1. Press ON/OFF button for 1-2 seconds.
2. Wait for 5 seconds for the high voltage system to power down and for the charging plug to disengage.
3. Remove the black type 2 plug from the Energ-e Pack charging socket.
4. Remove the red CEE plug from the shore power connection.

On the HMI display, the shore power disconnect screens accompany and control this process.

HMI screen 1, telling the user that the system is disconnecting from shore power:

Figure 13. Disconnecting shore power: Message on HMI

HMI screen 2, telling the user to remove the shore power plug now:

Figure 14. Safe removal of shore power plug: Message on HMI

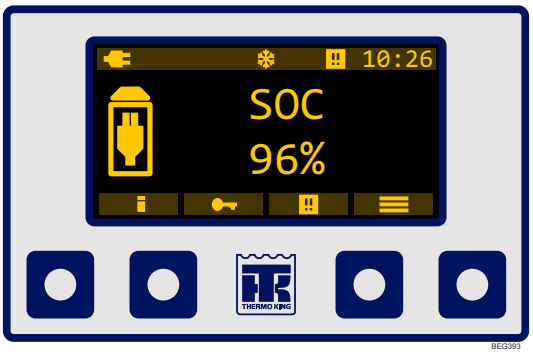
Alarms

Alarm Level Icons

If an alarm is raised, the following icons appear on the HMI in the header line. They indicate the severity of the alarm in two levels (high and medium).

	High Severity	Medium Severity
Active Alarm		
Inactive Alarm		

In the screen below, a check alarm was raised:



Severity	corresponds to **traffic light**
High	Red or **Shutdown alarm**. Indicates critical damage and error of the system.
Medium	Yellow or **Check alarm** . Immediate action and service is needed.

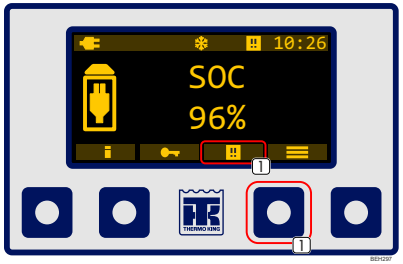
- Filled form: The **active alarm** icons indicate that some type of error is active.
- The **inactive alarm** icon indicates that some type of error was active.

HMI Alarms List

Call Up Alarms List

You access the Alarms submenu via the Alarms action button.

- Press the corresponding soft key.
  Alarms action button and the corresponding soft key are labelled with "1" and framed red in the image below:

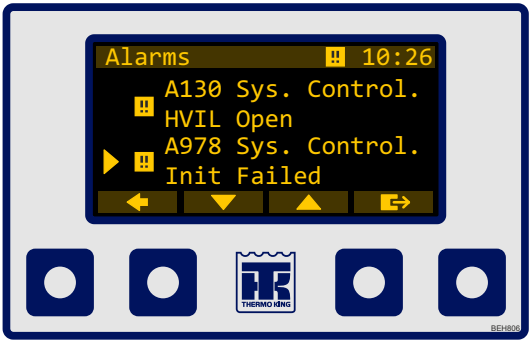


1	Alarms action button and corresponding soft key

The Alarms submenu is opened.

Alarms Information

The Alarms submenu contains a list of all recent alarms:



1		Scroll down with 'arrow down' to view more alarms.

The following information is provided with the alarm code on the HMI display:

- Alarm level (symbol for alarm type)
- Component ID (source component of alarm)
- Alarm name

The example is framed red in the figure below (from left to right):

- Alarm level: Filled square with exclamation mark, that means medium severity
- Alarm code: 978
- Component (source component): Sys. Contr. = Energ-e Pack — System Controller
- HMI display text (in the second line): Init Failed = Initialization failed

Alarm Details

If you want to get more information on a single alarm, select this alarm in the alarms list:

1		In the alarms list, select the alarm with 'arrow down' soft key (second to the left).
2		Press 'arrow down' or 'arrow up' until the marking arrow pointing to the right is positioned besides the desired alarm.

In the figure below, this is alarm 978:

3		Confirm with the confirmation button on the right.

The details on an alarm have two or three pages.

1		You access the following page with 'arrow down'.
2		You return to the preceding page with 'arrow up'.
3		Press the left soft key to return to the Alarms submenu.

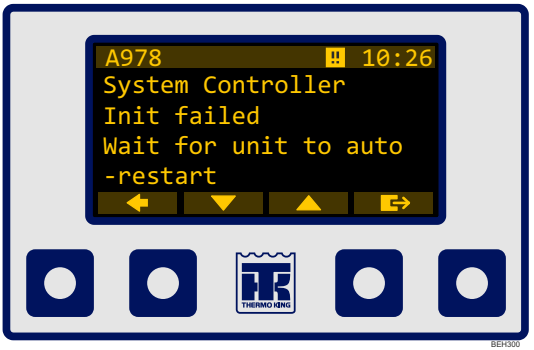
The recommended action to take is on the first page. For more information, refer to “Alarms Listed by Recommended Action to Take,” p. 62.

Detailed information on a selected alarm — example:

The following figures show details for alarm 978:

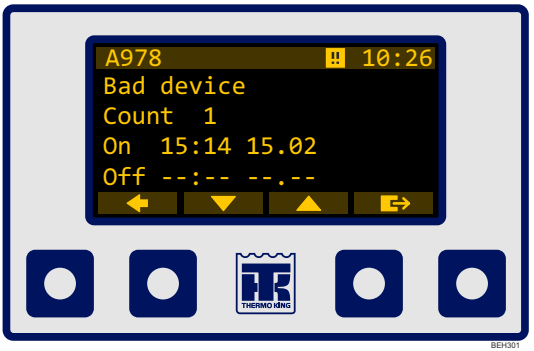
- In this case of alarm 978, the recommended action to take is "Wait for unit to auto-restart". You always find this on page 1 of the alarm details:

Figure 15. Alarm details, page 1



- On the second page, you find further technical information on the alarm (FMI, Failure Mode Indicator) and how often the alarm popped up. In this example it is “Bad device” (FMI 12) and the alarm was raised just once (“Count: 1”).

Figure 16. Alarm details, page 2



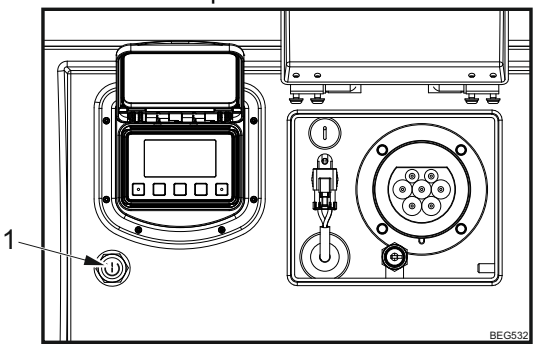
Alarms Listed with Recommended Action to Take

TAKE IMMEDIATE ACTION	ACT AS SPECIFIED
Icon on the HMI display: 	Icon on the HMI display: 

The ‘recommended action to take’ is what you should do if a specific alarm occurs.

Many alarms do not require immediate actions on a large scale: After restart of Axle Power, the problem is often solved.

- **Restarting Energ-e Pack:**
  - Long press ON/OFF button for more than 3 seconds.
  - Then short press ON/OFF button for 1-2 seconds.



1.	ON/OFF Button

Another example is the so-called auto-clearing: Alarm A120 arises because of high temperatures. When the system has cooled down, the alarm automatically disappears from the HMI display. The problem and with it the alarm disappears together with the condition that caused the problem. In this case you just have to wait, till the system has cooled down.

In the table below, you find all alarms with the corresponding recommended action.

Alarm		Name on Display	Recommendation
A118		Enable Off Failed	Report alarm at end of day.
A119		Pers. Mem. Fail	Report alarm at end of day.
A120		Controller Overheat	Keep unit off for cool down.
A121		LV Voltage Low	Connect to grid/shore power for battery recharging.
A121		LV Voltage Low	Connect to grid/shore power for battery recharging.
A122		Send on CAN Failed	Restart unit, report alarm.
A130		HVIL Open	Not ready to start. Contact service.
A131		HV Isolation Low	Not ready to start. Contact service.
A131		HV Isolation Low	Report alarm at end of day.
A132		Iso Monitor Fault	Performance reduced. Contact service.
A133		LVSupplyDcDcConvFault	Report alarm at end of day.
A134		EnableLineAct.Fault	Not ready to start. Contact service.
A140		TRU Power Reduced	Report alarm at end of day.
A141		TRU power stopped	Restart unit, report alarm.
A150		No Com. to Battery	Restart unit, report alarm.
A151		No Com. Inverter	Restart unit, report alarm.
A152		No Com. to HMI	Restart unit, report alarm.
A153		No Com. to eAxle Ctrl	Restart unit, report alarm.
A154		No Com. to BlueBox	Restart unit, report alarm.
A155		No SOC Signal	Restart unit, report alarm.
A180		ECU Missing on Bus	Restart unit, report alarm.
A181		ECU Init Failure	Not ready to start. Contact service.
A190		HV Bat. Overcharged	Keep unit off. Contact service.
A190		HV Bat. Overcharged	Disconnect unit from grid/shore power.
A191		HV Battery Empty	Connect to grid/shore power for battery recharging.

Alarm		Name on Display	Recommendation
A191		HV Battery Empty	Connect to grid/shore power for battery recharging.
A192		HV Bat. Temp High	Keep unit off for cool down.
A192		HV Bat. Temp High	Keep unit off for cool down.
A193		HV Bat. Temp Low	Connect to grid/shore power for battery heating.
A193		HV Bat. Temp Low	Connect to grid/shore power for battery heating.
A195		Bat. Heater Fault	Performance reduced. Contact service.
A196		B. Deep Discharged	Not ready to start. Contact service.
A196		B. Deep Discharged	Connect to grid/shore power for battery recharging.
A197		Bat. unbalanced	Connect to grid/shore power for battery recharging.
A200		PDU Disch. Overheat	Wait for unit to auto-restart.
A201		HV Bus Overvoltage	Keep unit off. Contact service.
A250		Coolant Temp Low	Move unit to warmer ambient.
A250		Coolant Temp Low	Connect to grid/shore power for battery heating.
A251		Coolant Temp High	Keep unit off for cool down.
A251		Coolant Temp High	Performance reduced. Contact service.
A252		T-Sensor Not Working	Report alarm at end of day.
A400		General Fault	Keep unit off. Contact service.
A401		LV Supply Failure	Restart unit, report alarm.
A402		Update Failed	Keep unit off. Contact service.
A403		Module Ver. Mismatch	Keep unit off. Contact service.
A404		Selftest Failed	Keep unit off. Contact service.
A405		Interlock Failed	Wait for unit to auto-restart.
A411		Intern Volt. Fail	Report alarm at end of day.

Alarm		Name on Display	Recommendation
A412		Internal Temp High	Keep unit off for cool down.
A412		Internal Temp High	Performance reduced. Contact service.
A423		DC Link Volt. Fail	Restart unit, report alarm.
A424		IGBT Temp High	Keep unit off for cool down.
A424		IGBT Temp High	Performance reduced. Contact service.
A425		Drive Sync Failure	Restart unit, report alarm.
A426		Shorepower Fault	Performance reduced. Contact service.
A436		Overcurrent Fault	Restart unit, report alarm.
A900		Disconnect Request	Restart unit, report alarm.
A901		Precharge Overcurrent	Restart unit, report alarm.
A902		Precharge dV Too High	Restart unit, report alarm.
A903		No Com. to Sys. Ctrl.	Restart unit, report alarm.
A904		Multiple Primary Bat.	Keep unit off. Contact service.
A905		Cell Type Mismatch	Keep unit off. Contact service.
A906		Sec. Bat. Com. Error	Wait for unit to auto-restart.
A907		Sys. Shutdown Req.	Restart unit, report alarm.
A908		No Bat. to Charge	Restart unit, report alarm.
A909		No Bat. to Discharge	Restart unit, report alarm.
A924		BMS Software Fault	Wait for unit to auto-restart.
A925		BMS Timeout Msg.	Wait for unit to auto-restart.
A926		BMS Timeout w. Flags	Wait for unit to auto-restart.
A927		BMS Com. Error	Wait for unit to auto-restart.
A928		Shutdown Req. Timeout	Wait for unit to auto-restart.
A929		BMS Cell Com. Fault	Wait for unit to auto-restart.
A930		BMS Ext. Com. Fault	Wait for unit to auto-restart.
A931		Src. Addr. Conflict	Keep unit off. Contact service.
A932		Precharge Timeout	Wait for unit to auto-restart.

Alarm		Name on Display	Recommendation
A933		No Charge Ack.	Wait for unit to auto-restart.
A934		No Discharge Ack.	Wait for unit to auto-restart.
A935		No BMS Chrg. Enable	Wait for unit to auto-restart.
A936		No BMS Disch. Enable	Keep unit off. Contact service.
A937		Fault Current Detect.	Keep unit off. Contact service.
A938		BMS I-Sensor Fault	Keep unit off. Contact service.
A939		BMS I-Sensor Failsafe	Wait for unit to auto-restart.
A940		BMS Low Cell V Fault	Connect to grid/shore power for battery recharging.
A941		BMS Open Cell V Fault	Wait for unit to auto-restart.
A942		BMS V-Sensor Failsafe	Wait for unit to auto-restart.
A943		Max Cell Voltage Hit	Disconnect unit from grid/shore power.
A944		Min Cell Voltage Hit	Connect to grid/shore power for battery recharging.
A945		Charge Overcurrent	Disconnect unit from grid/shore power.
A946		Disch. Overcurrent	Wait for unit to auto-restart.
A947		Unexp. Heater Curr	Wait for unit to auto-restart.
A948		HVIL Circuit Open	Keep unit off. Contact service.
A949		3rd T-Sensor Fault	Wait for unit to auto-restart.
A950		BMS 12V Power Fault	Wait for unit to auto-restart.
A951		BMSHardware Fault	Keep unit off. Contact service.
A952		No Switching Ack +on	Wait for unit to auto-restart.
A953		No Switching Ack +off	Wait for unit to auto-restart.
A954		No Switching Ack -on	Wait for unit to auto-restart.
A955		No Switching Ack -off	Wait for unit to auto-restart.
A956		No Charge Enable	Wait for unit to auto-restart.
A957		No Discharge Enable	Wait for unit to auto-restart.
A958		No Com. to Sec. Ctrl	Restart unit, report alarm.

Alarm		Name on Display	Recommendation
A959		Pack Addr. Changed	Report alarm at end of day.
A960		Weak Cell Detected	Report alarm at end of day.
A961		No Heater Current	Restart unit, report alarm.
A962		Heater I-Sensor Fault	Restart unit, report alarm.
A966		HighSOCBat.avai	Report alarm at end of day.
A967		LowerSOCBat.avai	Report alarm at end of day.
A971		EEPROM Fault	Report alarm at end of day.
A972		RAM Fault	Report alarm at end of day.
A973		Software Fault	Report alarm at end of day.
A974		Hardware Fault	Report alarm at end of day.
A975		CAN Network Fault	Restart unit, report alarm.
A976		No EBS Data	Check EBS connector. Contact service.
A977		No Com. to Main Ctrl.	Wait for unit to auto-restart.
A978		Init Failed	Restart unit, report alarm.
A980		No Com. to eAxle Inv.	Performance reduced. Contact service.
A981		Init Failed	Performance reduced. Contact service.
A982		Config. Failed	Performance reduced. Contact service.
A983		Validation Failed	Performance reduced. Contact service.
A985		Temporary Fault	Report alarm at end of day.
A986		Permanent Fault	Performance reduced. Contact service.
A987		High Temperature	Performance reduced.
A988		DC Voltage High	Performance reduced. Contact service.
A989		DC Voltage Low	Performance reduced. Contact service.
A990		No Enable Signal	Performance reduced. Contact service.
A991		High Temperature	Performance reduced.
A992		Bad Resolver	Performance reduced.
A993		Generated Power Low	Performance reduced. Contact service.

Alarm		Name on Display	Recommendation
A994		Generator Not Turning	Keep unit off, contact service.
A995		Torque Too High	Report alarm at end of day.

There are a few alarms that appear in variants with different recommendations:
121, 131, 190, 191, 192, 193, 196, 250, 251, 412, 424.

In these events, look into the details of the alarms.

Important: *If you are uncertain how to react, you **MUST** contact your Thermo King or Frigoblock service representative.*

For more detailed information refer to https://europe.thermoking.com/tools/tk-alarm-codes/.

Shutting OFF Axle Power System

Like most processes of Axle Power, the shutting off process is carried out automatically: The system turns off if certain conditions are met.

Axle Power works until

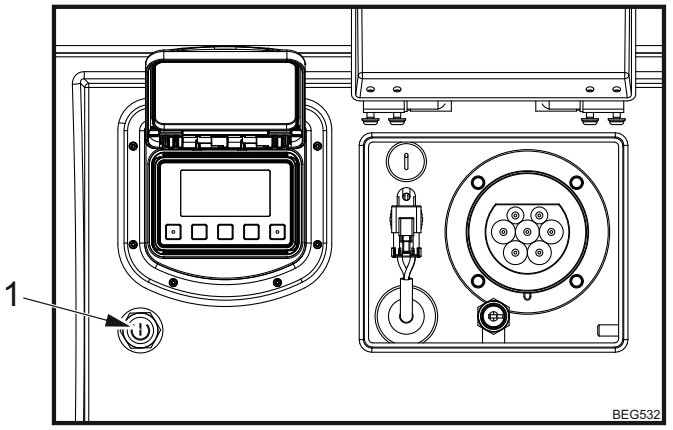
- the Trailer Refrigeration Unit (TRU) is not on anymore
- and there is no shore power connection
- and the truck has ignition off
- and the battery runs out.

If *all* of these conditions are met, the Energ-e Pack shuts down after one minute of inactivity.

Normal Shutdown

Nevertheless, there may be situations when you have to shut down Axle Power System manually, for example in case of strange noise or smell from Energ-e Pack.
Shut down Axle Power normally:

- Press ON/OFF button for more than three seconds.
  => Axle Power System shuts down within another 3 seconds.



1.	ON/OFF button		

Automatic Shutdown:

- Switch TRU (Trailer Refrigeration Unit) OFF and turn ignition OFF. In case the Energ-e Pack is connected to shore power, also disconnect the shore power connection.
  => Axle Power System shuts down after 1 minute of inactivity.

Emergency Shutdown

If you notice any strange noise or smell from the unit, shut down the unit normally:

- Turn TRU off,
- and disconnect shore power connection,
- and turn ignition off.

With this, the Energ-e Pack automatically shuts down after one minute of inactivity.

- Alternatively long press ON/OFF button for more than 3 seconds. The Energ-e Pack System shuts down immediately.

⚠ Danger

Risk of Injury and Equipment Damage!!

Stop using the system if the Energ-e Pack is damaged, develops an odor, becomes deformed, or develops any other abnormal conditions during use, charge, discharge, or storage. If you notice any abnormal conditions, contact the Thermo King service center.

⚠ Danger

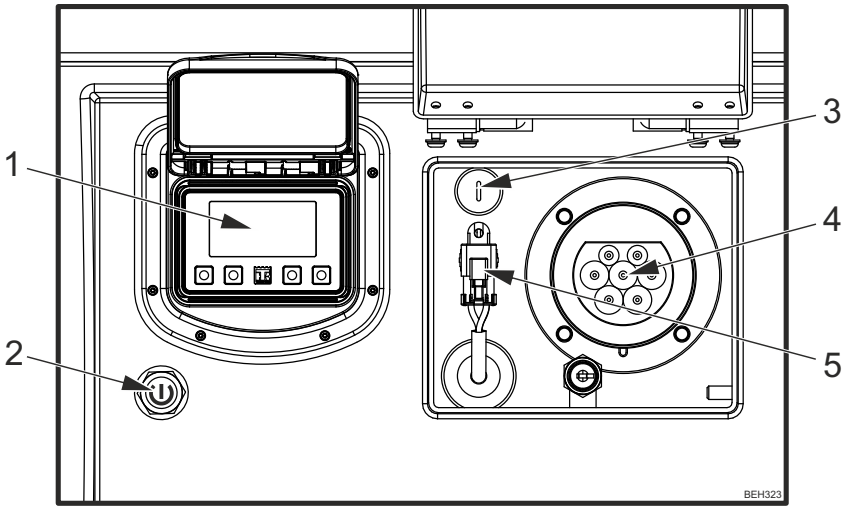
Risk of Injury and Equipment Damage!!

In case of accidents, keep away from fire and hot sources and park the vehicle in a safe area. Contact the Thermo King service center.

In the event of an emergency (fire, accident), you have to stop all high voltage current flow by cutting the Kill Wire (Emergency Disconnect).

The Kill Wire is located next to the HMI behind the lid which needs to be unlocked with coin or screwdriver.

Figure 17. Elements of the HMI panel



3	Kill Wire (Emergency Disconnect)		

⚠ Danger

Risk of Injury and Equipment Damage!!

Only instructed operators or service technicians with the recommended tools should cut the Emergency Disconnect Wire.

⚠ Warning

Equipment Damage!!

If you are charging the battery, shutting off the power supply on the wall side is recommended in case of Emergency Disconnect and cutting the Kill Wire. Switch off the wall box or pull the CEE plug.

Emergency Shutdown:

- Cut the Kill Wire (Emergency Disconnect wire).
- Please move away from the vehicle and follow the emergency communication procedure.
  => Cutting the Emergency Disconnect wire does not de-energize the HV battery and does not prevent hazards associated with the HV battery.

Important: *This will shut off the system immediately and* ***permanently****. Use it only in case of a real emergency.*

Warranty

Please also refer to TK 61654-18-WA Thermo King EMEA Unit Limited Warranty for Vehicle Powered Truck Units.

Maintenance Inspection Schedule

Inspection and Service Intervals

Please present Energ-e Pack to your dealer for inspection once per year.

You can schedule your maintenance in conjunction with your Reefer Unit

Service Record: Each inspection and service performed should be recorded on your Dealer Service Record.

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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Supersedes TK 61960-18-OP-EN (May 2024)