THERMO KING

Installation Manual

Vehicle Powered Truck Edition
E-200 Series

Single Temperature Systems

Revision B

July 2021

TK 56881-18-IM-EN

TRANE TECHNOLOGIES

Introduction

This 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	(02/21) Released new manual.
Revision B	(07/21) Page 45 - Corrected 115V/1PH electrical plug number.

Customer Satisfaction Survey

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THERMO KING

Table of Contents

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.

Recover Refrigerant

At Thermo King®, we recognize the need to preserve the environment and limit the potential harm to the ozone layer that can result from allowing refrigerant to escape into the atmosphere.

We strictly adhere to a policy that promotes the recovery and limits the loss of refrigerant into the atmosphere.

When working on transport temperature control systems, a recovery process that prevents or minimizes refrigerant loss to the atmosphere is required by law. In addition, service personnel must be aware of the appropriate European Union, National, Federal, State, and/or Local regulations governing the use of refrigerants and certification of technicians. For additional information on regulations and technician programs, contact your local THERMO KING dealer.

Service Tools - Use the proper service tools. Gauge manifold sets should include appropriate shutoff valves or disconnects near the end of each service line.

Recovery Equipment - Recovery equipment must be used. Proper recovering, storing and recycling of refrigerants is an important part of all service work.

Service Procedures - Recommended procedures must be used to minimize refrigerant loss.

Components may be isolated by closing service valves and performing system pump-downs.

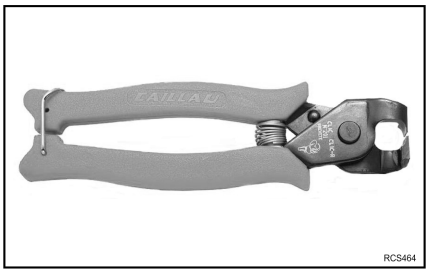
Components unable to be isolated for service must be repaired only after refrigerant is properly recovered.

Required Tools

Overview

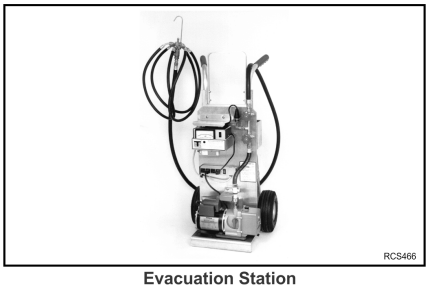
While basic mechanics tools and refrigeration service equipment are a necessity, there are also special tools that are required when installing Thermo King Vehicle Powered Truck Units. Using these tools will assure the installation is done correctly. Many of these are available from Thermo King.

Hose Cutting Tool
(204-677)



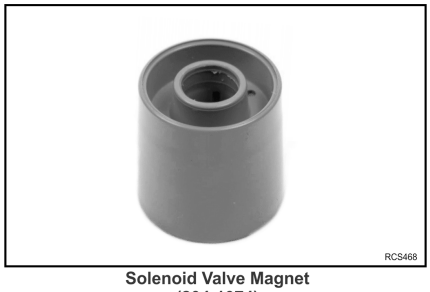
#4 - #12 Hose Fitting Tool
(204-1045)

#16 Hose Fitting Tool
(2041128)



Evacuation Station
(204-725)

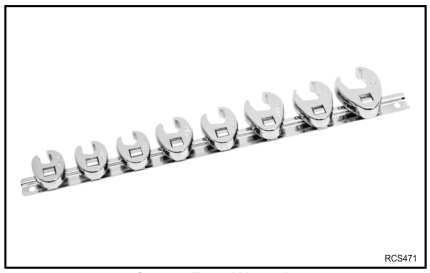
Leak Detection Probe
(2040888)



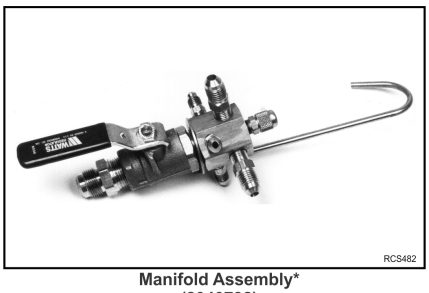
Solenoid Valve Magnet
(204-1074)

Gauge Manifold Set
(204-1925)

Torque Wrench

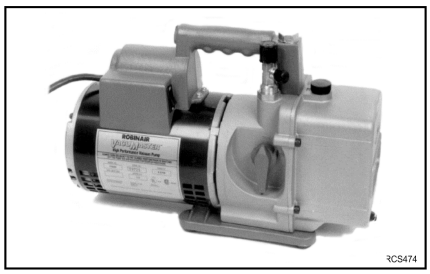


Crows Foot Wrenches



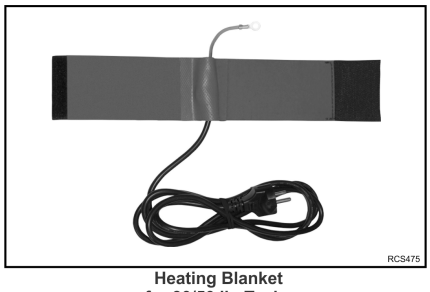
Manifold Assembly*
(2040732)

Micron Gauge*



Vacuum Pump*
(204713)

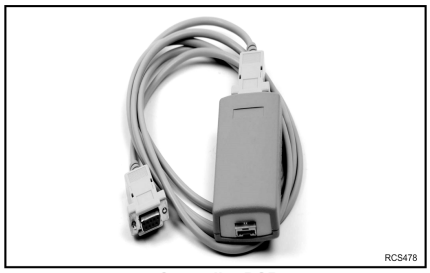
*These are included with the Evacuation Station 204-725.



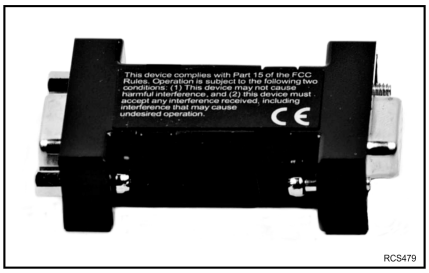
Heating Blanket
for 30/50 lb. Tanks
(204077)

TK 2000 Assembly Kit
(2041044)

Digital Voltage Meter
(2041079)

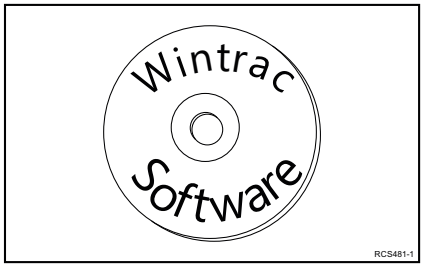


Controller DSR
Communication Tool
(2041126)



Serial Adapter
(2041151)

USB Serial Adapter
(420575)



WinTrac Software
(latest version must always be used)

Scale
(204760)

Required Support Materials

Please have the following support material in hand prior to starting your installation as it is listed as reference throughout this manual:

1. Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430) located at www.thermoking.com

Alternator Amperage Test

Recommended Best Practice

Before install of the E-200 it is recommended to get a baseline of the amp draw being consumed by the vehicle. Using an amp clamp on the alternator output wire measure the amp draw:

1. At idle
2. Radio on
3. AC and fans on high
4. Wipers on high
5. Headlights on

For the example above we measure 60 amps.

The E-200 requires an additional 115 amps excess amperage from the alternator.

For best results, this should be available even at idle, at which point the alternator will have approximately 60-75% the rated amperage.

Example:

- Using the amp draw as defined above the vehicle uses 60 amps.
- Power requirement of 60A draw from the vehicle + 115A draw of the E-200 = 175A.
- Available power at idle needs to be 60-75% of the alternators rated amperage/150-187 amps available for an alternator rated at 250 amps.
- Knowing the E-200 and vehicle needs 175 amps we would want an alternator with at least 250 amps or higher.

Unpacking and Inspecting the Unit

Unpacking the Unit

1. Open the packaging.
2. Find the unit documentation.
3. Verify that the packaging contains all the accessories indicated on the list attached with the documentation.
4. Check that the hose length is correct before starting the installation. Checking can be carried out by consulting the “Packing List” included with the unit documentation.

Inspecting the Unit

1. Open the condenser unit cover and ensure the following:
   - Neither the cover nor the unit should show any shock damage or imperfections.
   - The condenser unit should be charged with helium gas.
   - The voltage of all the electrical components is correct (12/24V).
2. Open the evaporator unit cover and make the following checks:
   - Neither the cover nor the unit should show any shock damage or imperfections.
   - The evaporator unit should be charged with helium gas.
   - The voltage of all the electrical components is correct (12/24V).

Auto Start Hard Stop / Disable Connector

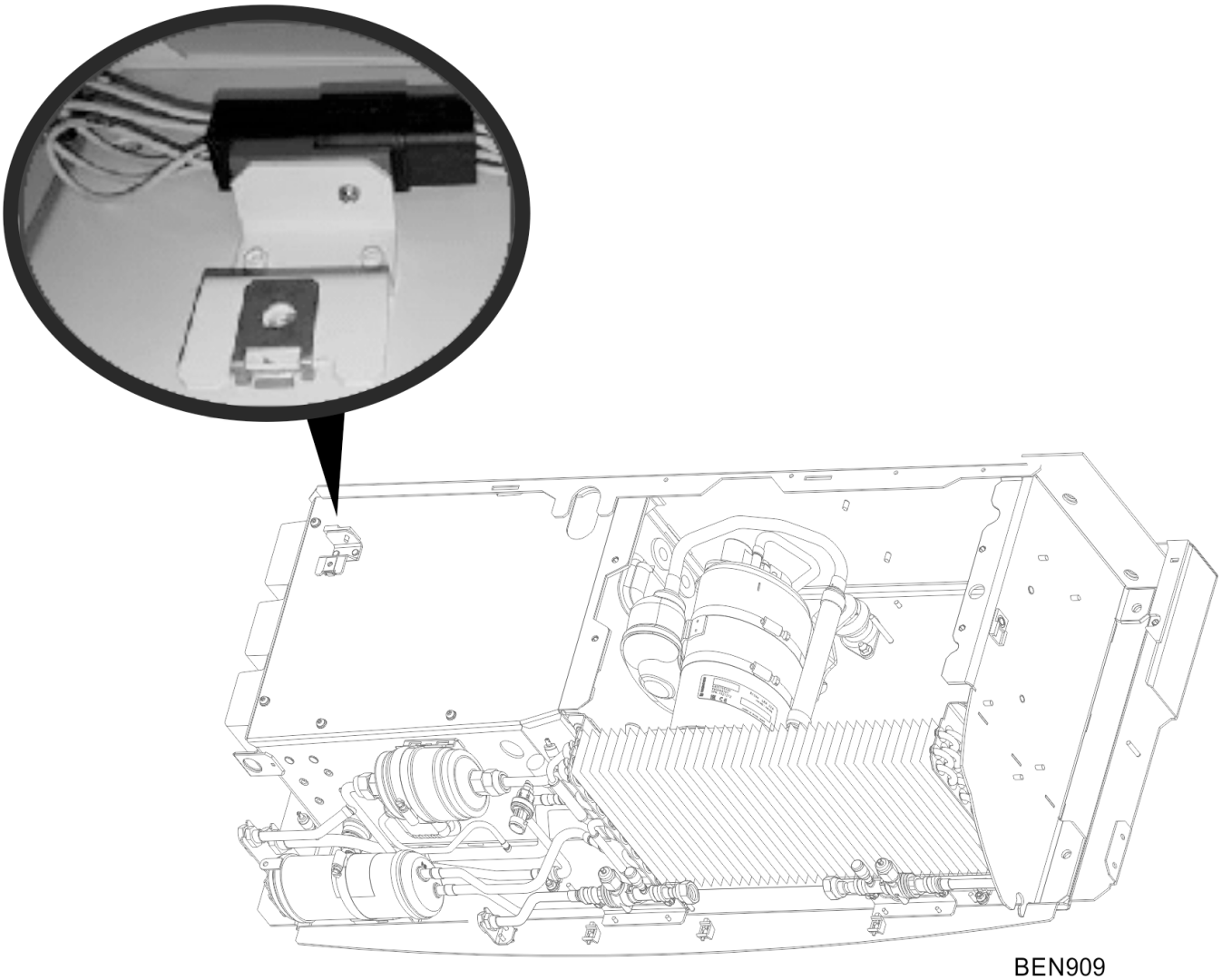
⚠ DANGER

Hazardous Voltage!

Take care that this connector does not disconnect the AC voltage input. If service of the electrical box is required, you MUST unplug the AC Shore Power before proceeding.

This connector has the following two main functionalities:

1. **Hard Stop** - this connector is wired directly to the power relays. When you disconnect (unplug this connector), the relays and the circuit opens immediately stopping the unit.
2. **Disable Autostart** - during unit commissioning or while any maintenance is being carried out on the unit, and a power off Is needed, is recommended to unplug this connector. In this case, the power relays remain open and the machine cannot start.



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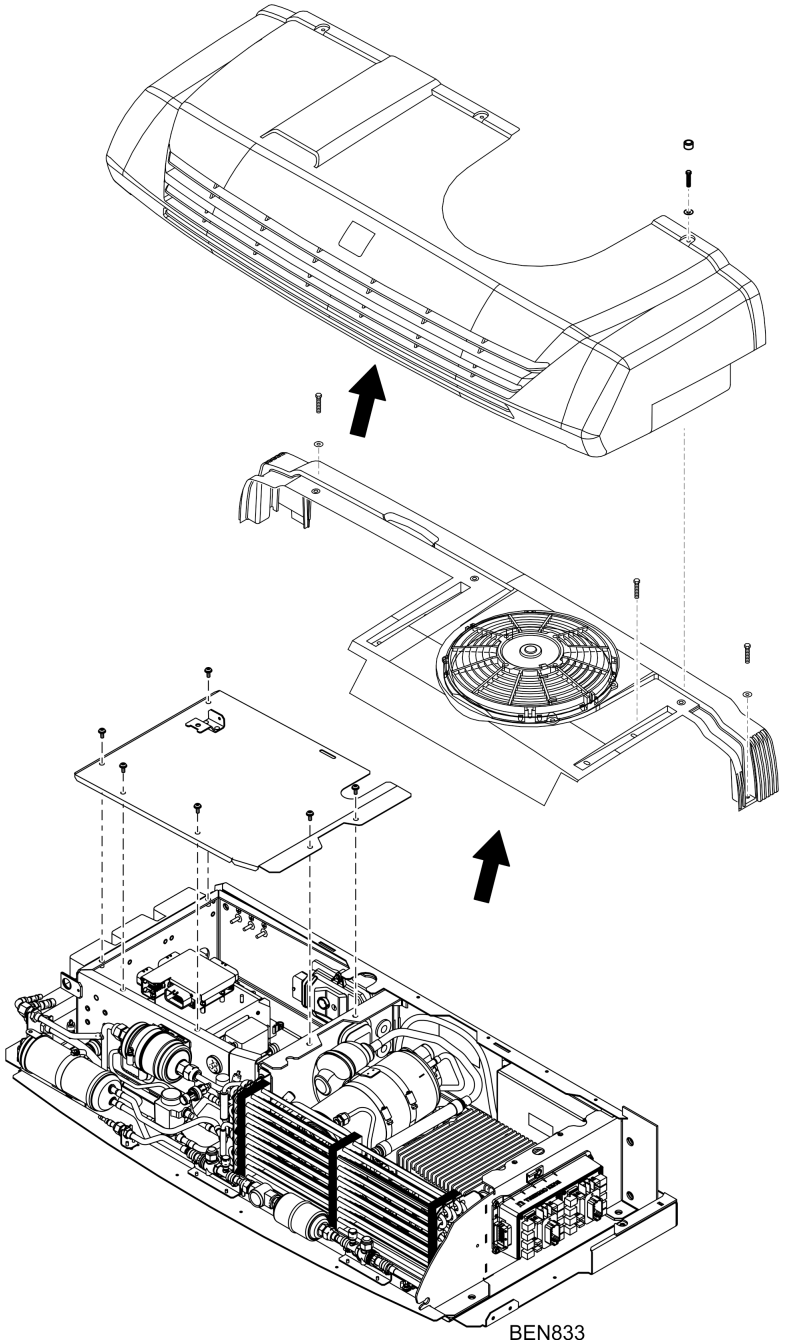
Preparing Condenser for Installation

Cover and Fan Housing Removal (All Models)

To access the unit mounting holes:

1. Remove plastic condenser cover.
2. Remove the fan housing assembly. (Remove the fan connector).
3. Remove “Power Off Device” Connector and Electric Box Cover.
4. Mounting holes are now accessible.



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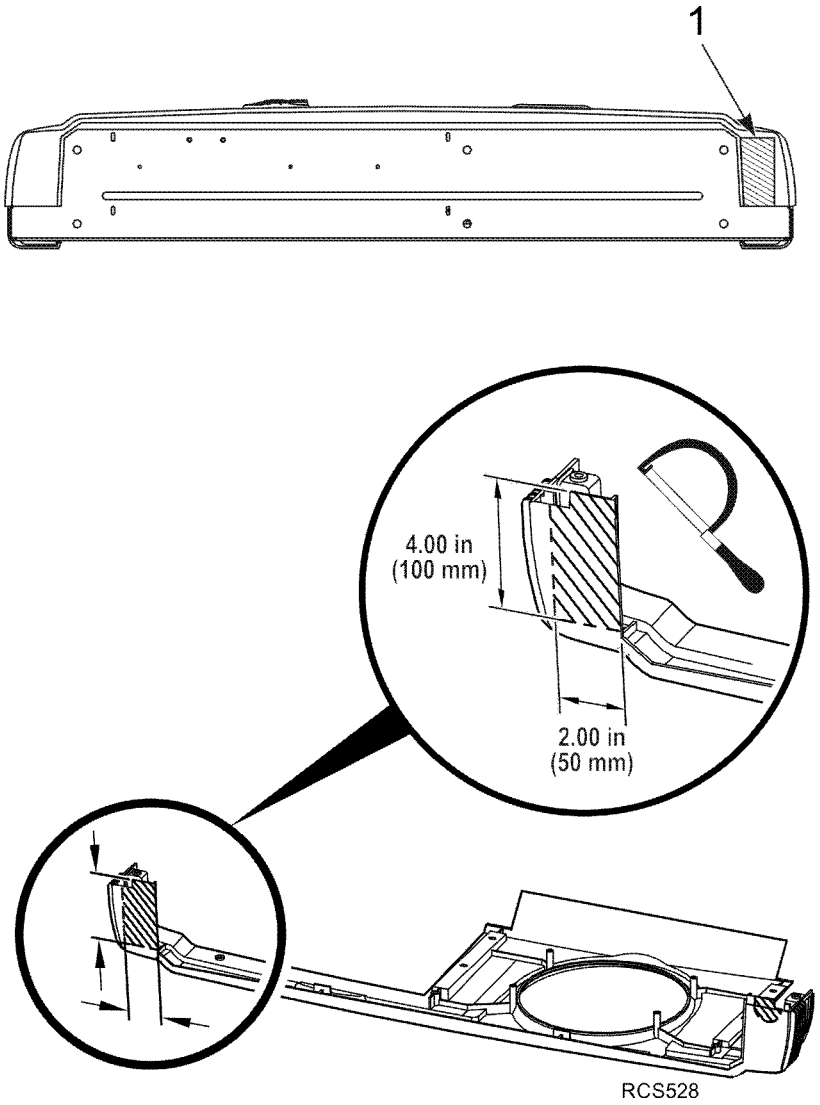
Fan Housing Modifications (Nosemount Installations Only)

Turn fan housing over and use a hand saw to trim the area shown for refrigeration hose clearance.

Note: *The fan housing assembly will be reinstalled later.*



1.	Access for Hoses and Harnesses

Installing the Condenser

Condenser Installation

Important: *See Section 4 - Unit Installation Standards and Procedures in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

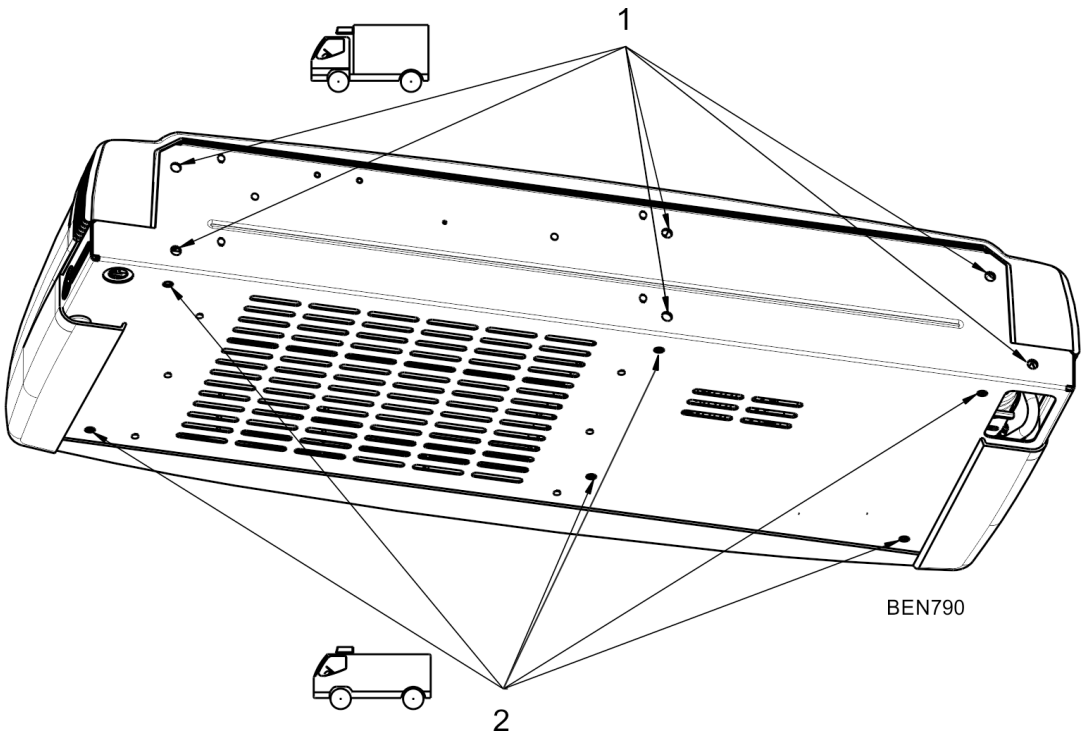
Note: *Nose mount and roof top condenser mounting and access hole dimensions can be found at the back of this manual.*

⚠ WARNING

Equipment Damage!

Seal all the holes inside the electric box which are not used for installation (depending nose mount/roof top). Otherwise water will get into the electric box and damage the components.

Figure 1. Condenser Mounting Bolts



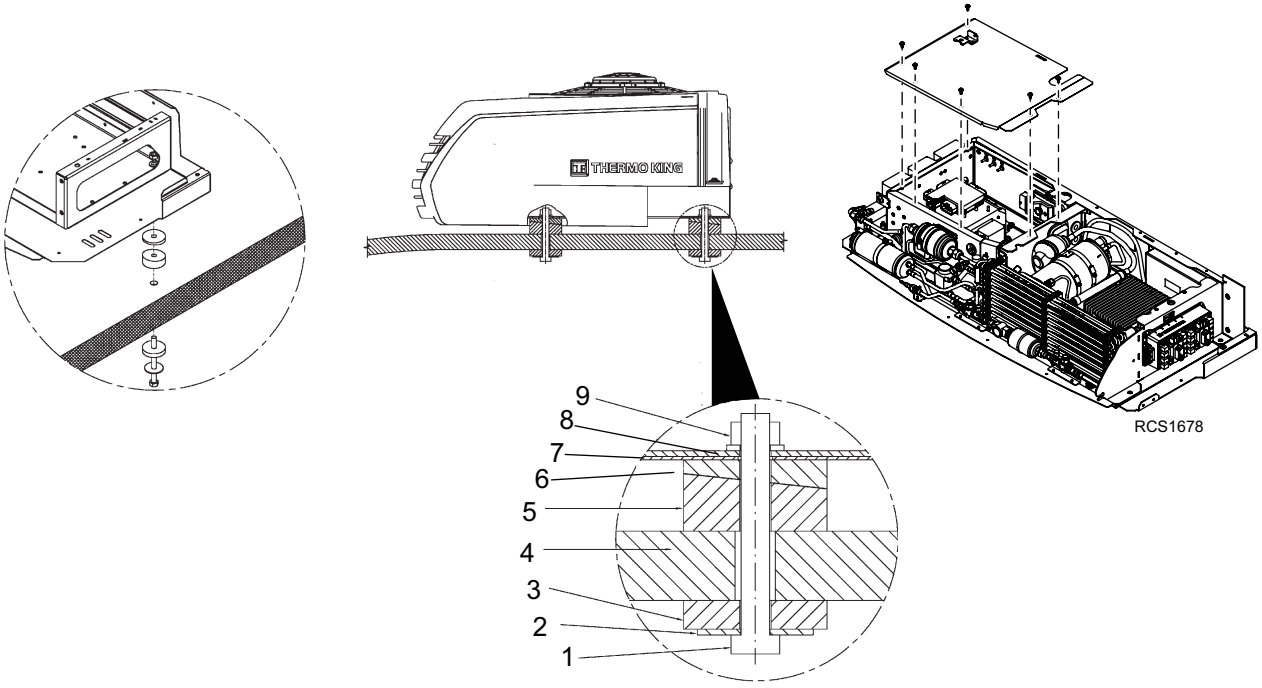
1.	Mounting holes when unit is mounted on the Front of the Truck (6)
2.	Mounting holes when unit is mounted on the Roof of the Truck (6)

Roof Mounted

Important: *See Section 4 - Unit Installation Standards and Procedures in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

1. Position condenser onto roof and install mounting hardware as shown.
   a. Rotate rubber compensation washers until condenser is level.
   b. Tighten hardware to 7 ft-lbs (10 N•m).
2. Reinstall electric box cover and reattach "Power Off Device" connector.
3. Route electrical harnesses through access hole in condenser frame and into cargo area.

Figure 2. Roof Mounted Condenser Shown



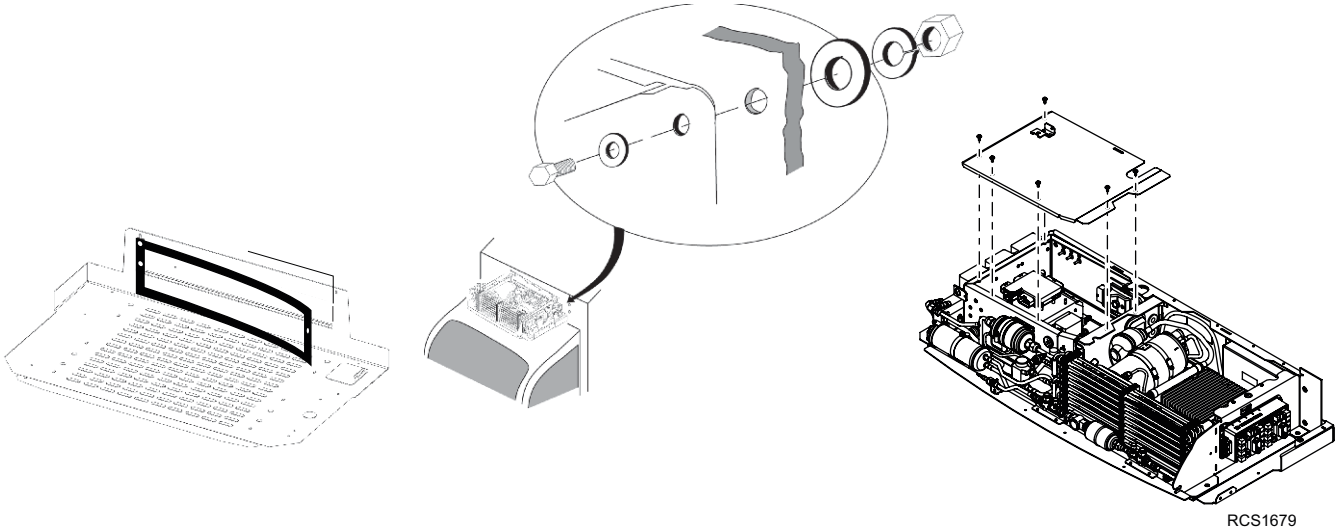
1.	Bolt, M10
2.	Washer, large metal M10
3.	Washer, flat rubber
4.	Vehicle roof
5.	Washer, large rubber (with incline)
6.	Washer, small rubber (compensation)
7.	E-100 Condenser frame
8.	Washer, split lock M10
9.	Nut, M10

Front Mounted

Important: *See Section 4 - Unit Installation Standards and Procedures in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

1. Attach supplied foam insulation to rear of condenser as shown.
2. Position condenser onto front of cargo box and install mounting hardware as shown.
   a. Tighten hardware to 26.5 ft-lb. (36 N•m).
3. Reinstall electric box cover and reattach “Power Off Device” connector.
4. Route electrical harnesses through access hole in condenser frame and into cargo area.

Figure 3. Front Mounted Condenser Shown



Evaporator Installation

Installing the Evaporator

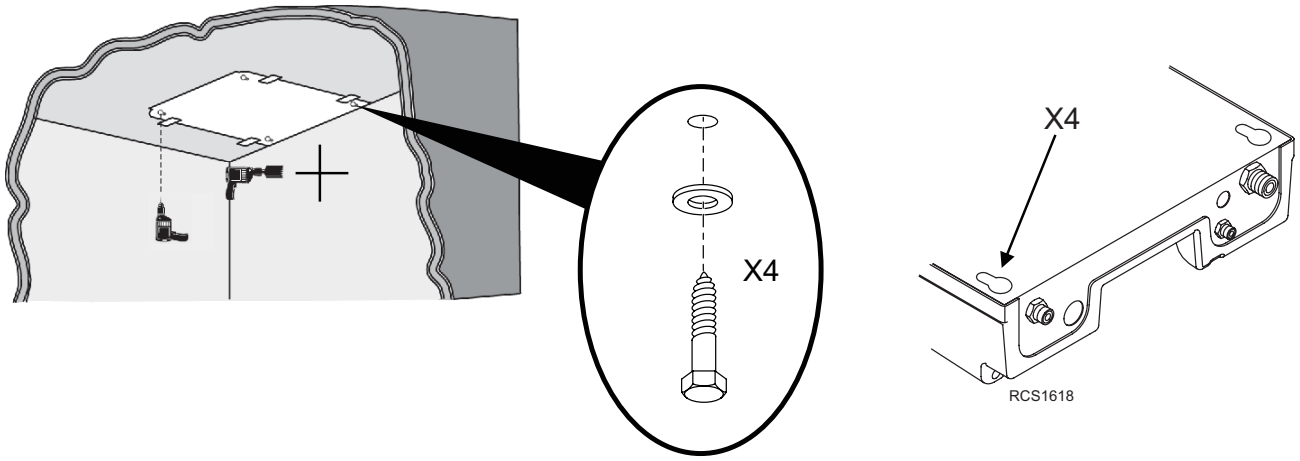
Important: *See Section 4 - Unit Installation Standards and Procedures in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

1. Remove screws securing evaporator cover to evaporator frame and remove cover.

Note: *Follow instruction on template to install evaporator on vehicle's ceiling and to drill access hole for refrigerant hoses and electrical wiring. Check for interference with vehicle electrical wires, etc. before drilling holes.*

2. Drill access hole for refrigerant hoses and electrical wiring.
3. Mark mounting locations and drill pilot holes in ceiling.
   a. Loosely install supplied lag bolts and washers into ceiling pilot holes.
   b. Tighten bolts until approximately 0.50 in. (6 mm) protrudes from ceiling.
4. Position the evaporator's keyhole mounting holes onto the lag bolts in the ceiling.
   a. Slide evaporator so bolts fit into keyhole slots and tighten screws securely.

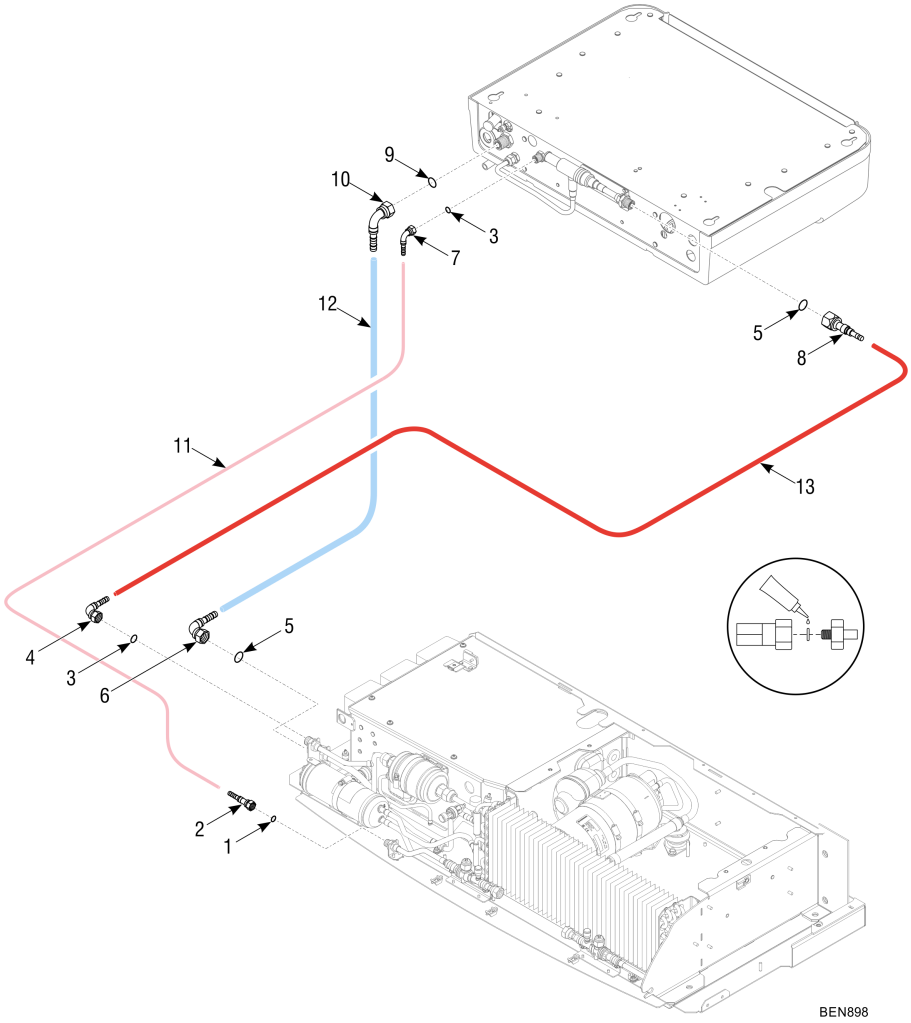
Figure 4. Typical ceiling mounted evaporator shown



Refrigerant Hose Connections

Important: *See Section 6 - Refrigerant Hose and Fittings Standards in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

Figure 5. Hose Connections Shown



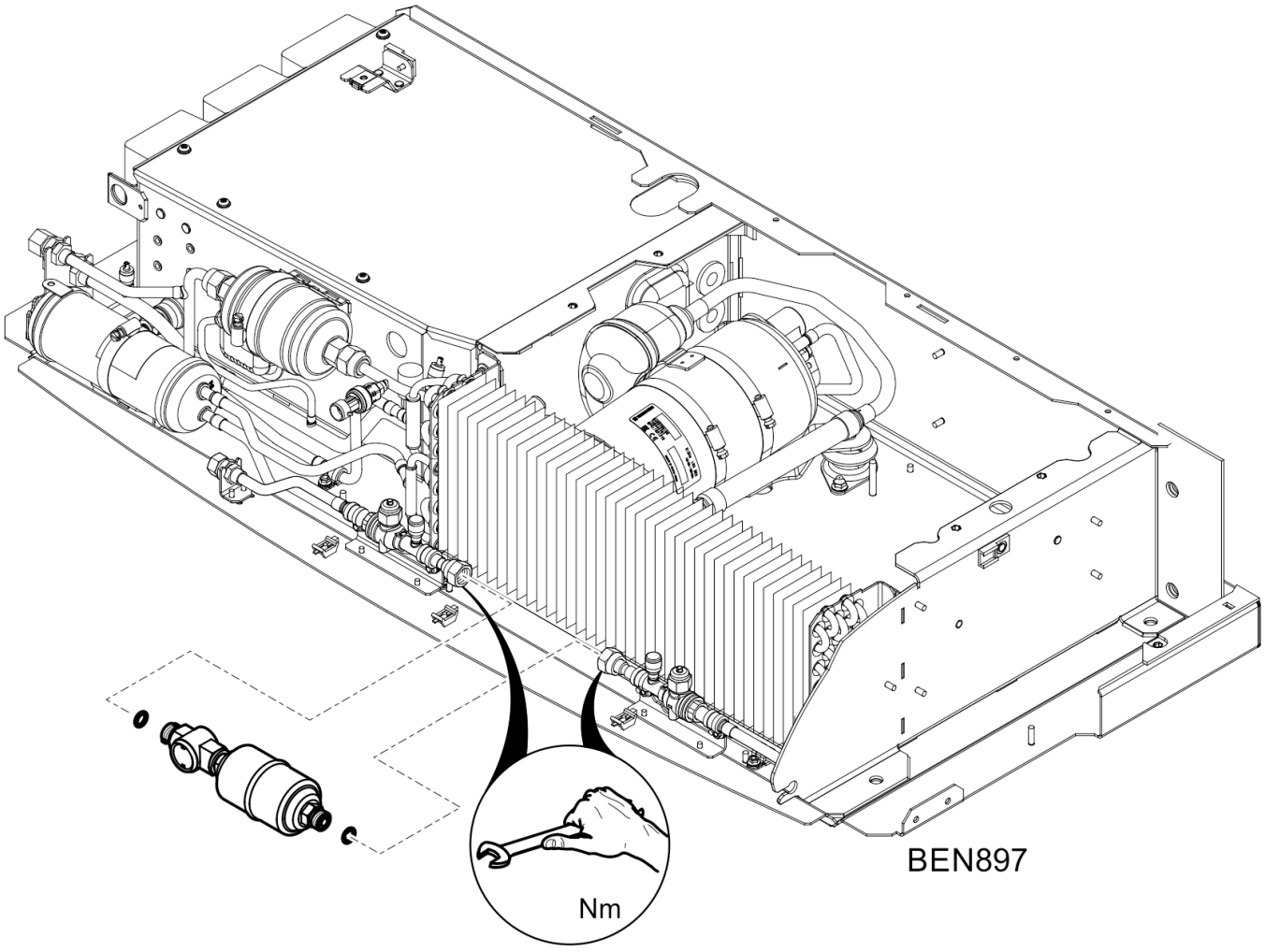
1.	O-Ring (#4, o-ring seal)	8.	Fitting, straight (female o-ring seal, #6 fitting to #8 hose)
2.	Fitting, straight (female o-ring seal, #4 fitting to #4 hose)	9.	O-Ring (#10, o-ring seal)
3.	O-Ring (#6, o-ring seal)	10.	Fitting, 90 degree (female o-ring seal, #10 fitting to #10 hose)
4.	Fitting, 90 degree (female o-ring seal, #6 fitting to #6 hose)	11.	Hose, liquid line (#4, 50 ft)
5.	O-Ring (#8, o-ring seal)	12.	Hose, defrost line (#6, 50 ft)
6.	Fitting, 90 degree (female o-ring seal, #8 fitting to #10 hose)	13.	Hose, suction line (#10, 50 ft)
7.	Fitting, 90 degree (straight, #6 fitting to #4 hose)		

Installing the Filter Drier and Sight Glass

1. Locate the Filter Drier/Sight Glass assembly in your installation kit.
2. Lubricate the o-rings prior to installing them onto each end of the assemblies.
3. Install the assembly with appropriate wrench (hand tighten).
4. Perform vacuum procedure of air from the Filter Drier and Sight Glass via the service valves on either side of this assembly.

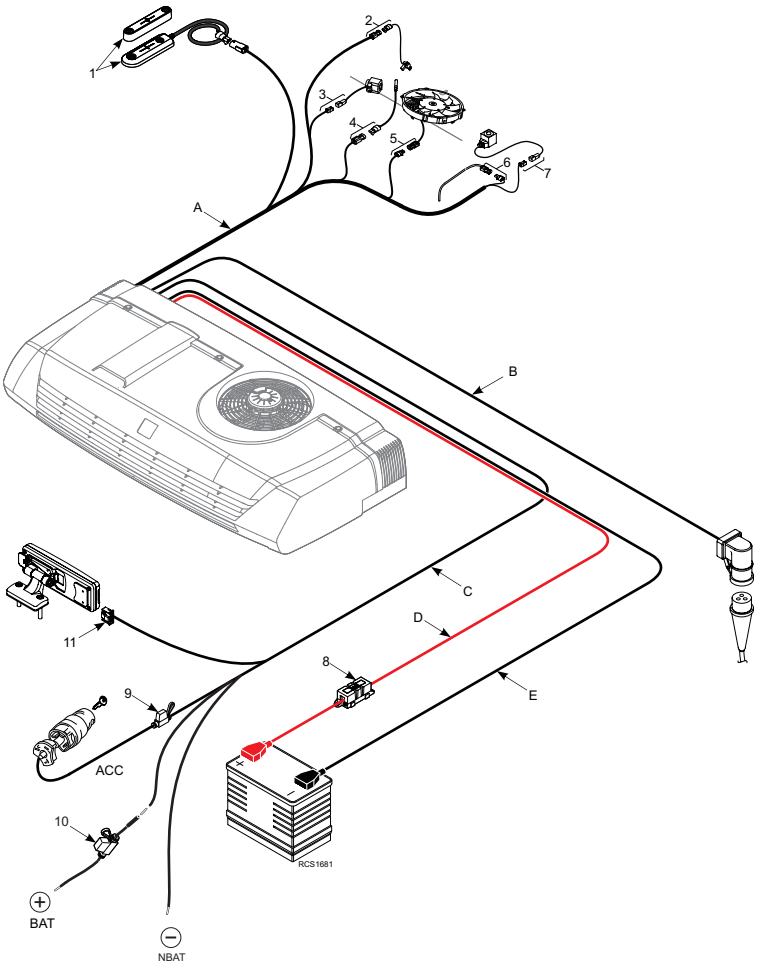
Important: *See Section 10 - System Evacuation Procedures and Section 12 - System Charging Procedures in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

Figure 6. Installing the Filter Drier and Sight Glass



Wiring Connections

Important: *See Section 7 - Electrical Standards in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

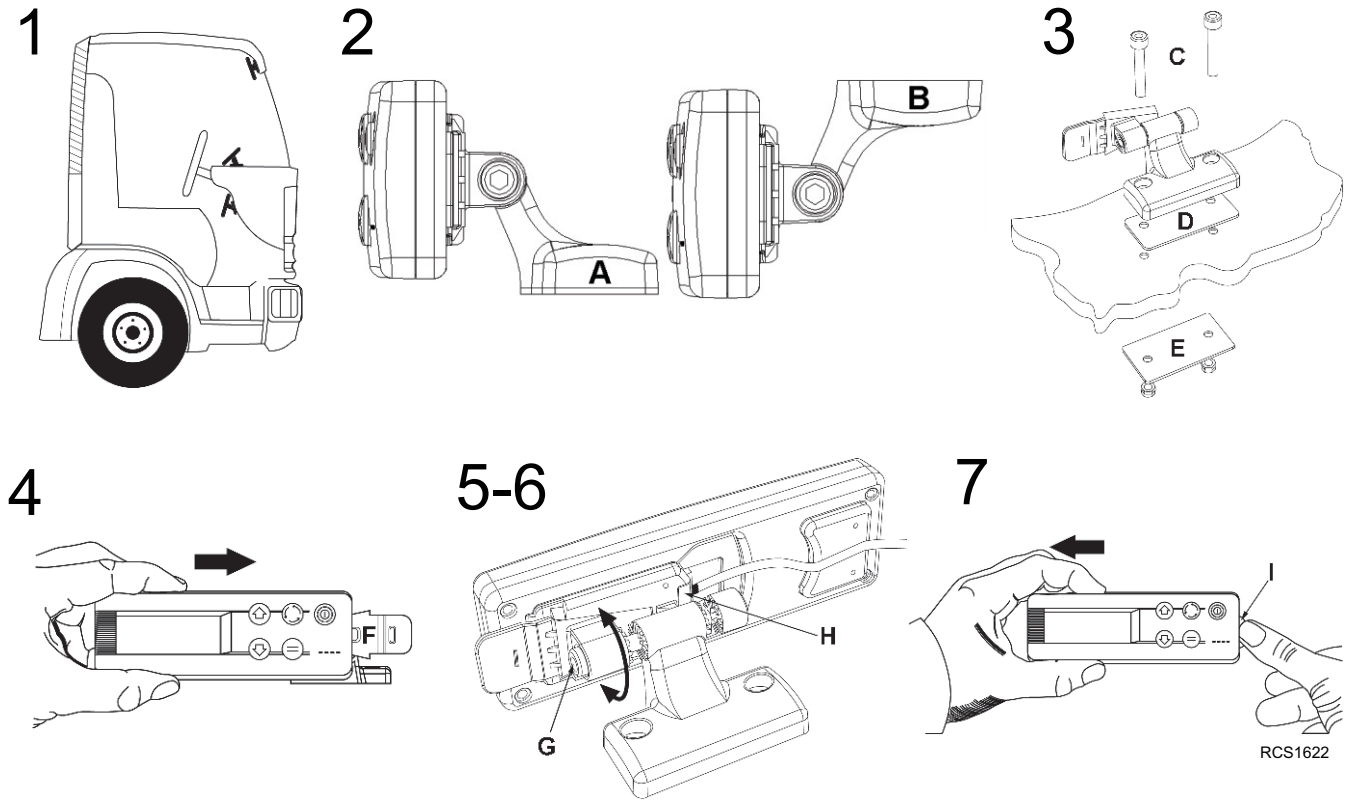


Item	Component Description	Connections	Item	Component Description	Connections
A.	Main Harness	Connections	4.	Temperature Sensor	S1/PNK
B.	To Power Receptacle		5.	Evaporator Fan 1	CH_B/EF1
C.	To Vehicle Ignition Switch	ACC.	6.	Drain Line Heater 1	HT1/CH_A
D.	To Vehicle Battery +	BAT+	7.	Defrost Solenoid	PS1/CH_Y
E.	To Vehicle Battery —	BAt-	8.	Vehicle Battery Fuse (F25)	5A
1.	Door Switch	DSW1/CHW	9.	Ignition Fuse	5A
2.	Defrost Temperature Switch	DKI/CHB	10.	Main Fuse	150A
3.	Liquid Solenoid Valve	PS3/CHI	11.	HMI In-Cab Controller	RXD, TXD, 8XP, CH_N

Installing the In-Cab Controller

1. Install the mounting bracket for the controller. Its design allows the mounting bracket to be positioned in various places in the cab interior. Find a location which is accessible and visible from the driver's seat, and which does not restrict the mobility or visibility of either the driver or the vehicle's instruments and levers.
2. Depending on the location chosen, the base should be mounted following either Option A or Option B.
3. Mount the base of the mounting bracket in the chosen location. Use screws **(C)**, rubber mat **(D)** and metal plate **(E)**, which are supplied by Thermo King, as indicated in the drawing.
4. When placing the controller on the bracket, rest the controller on the arm **(F)**, and slide it to the right until the arm tab is properly fitted to the controller frame.
5. The tilt of the controller's front face may be altered by loosening screw **(G)**.
6. Connect the data cable to connector **(H)**.
7. To remove the controller from the bracket, press the tab **(I)** and slide to the left.

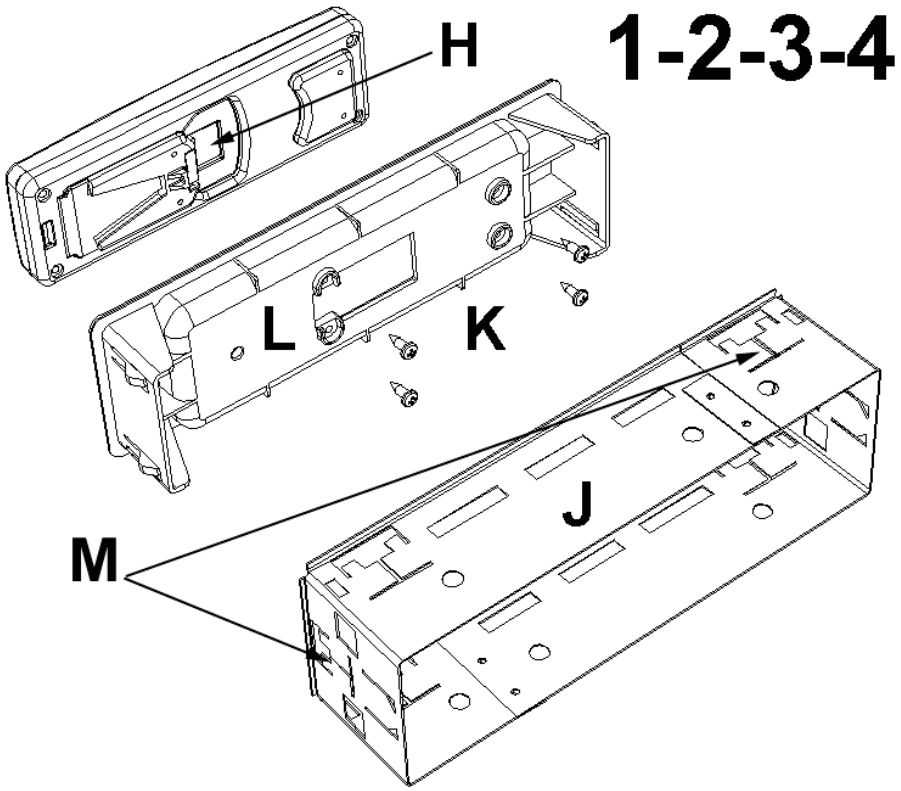
Figure 7. In-Cab controller shown



Optional Internal DIN Adaptor

1. Place the DIN adapter metal box **(J)** supplied in the housing designed for the radio. Raise the tabs **(M)** sufficiently to fit the box into the housing.
2. Attach the control to the plastic bracket **(L)** using the 4 screws **(K)**.
3. Connect the data cable to the control connector **(H)**.
4. Insert the assembly formed by the control box and the plastic bracket into the metal box, until the bracket tabs are properly fitted to the metal box.

Figure 8. DIN adaptor shown



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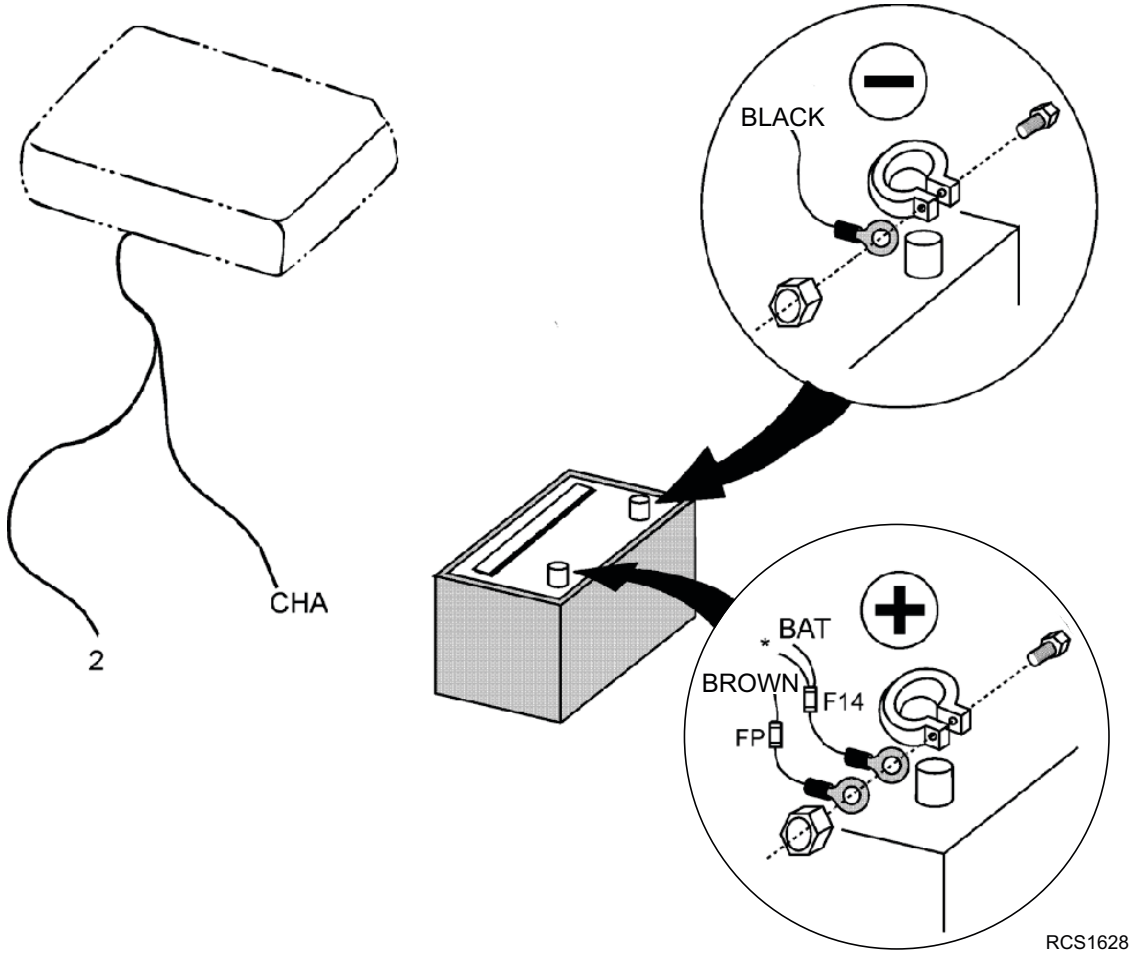
Battery Connections

Important: *See Section 7 - Electrical Standards in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

Note: *If the vehicle is equipped with a battery disconnect switch, always wire the unit after the switch. This allows power to the unit to be turned off by the battery disconnect switch.*

1. Route electrical wires BLACK, 01/ BAT, and BROWN to the vehicle battery.
2. Cut wires to the proper lengths. **Do not coil or splice the excess wire.**
   a. Strip wires and install the terminals supplied.
3. **REMOVE THE NEGATIVE CABLE FROM THE BATTERY.**
4. Connect 2 wire to one end of the fuse FP fuse holder (both supplied by Thermo King) and connect the other end of the fuse holder to the battery's positive terminal.
   a. Install fuse FP (100A/12V or 60A/24V) in the fuse holder. See note above.
5. Connect the 01/BAT wire to one end of the fuse F14 fuse holder (supplied by Thermo King), and connect the other end of the fuse holder to the battery's positive terminal.
   a. Install fuse F14 (5A) in the fuse holder.
6. Connect BLACK wire to the battery's negative terminal.
7. Reconnect the battery's negative cable.

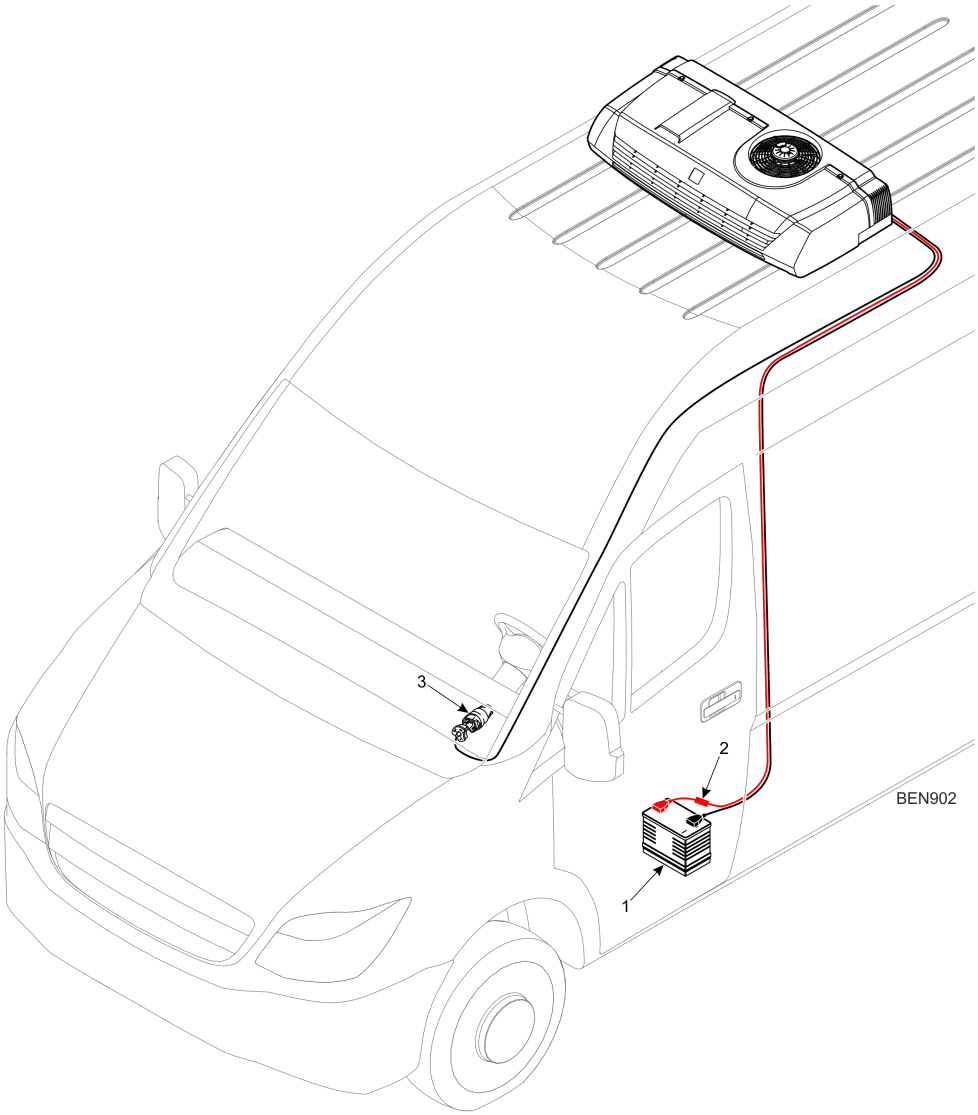
Figure 9. Typical battery connections shown



Connecting to Third Party Holdover Battery Option

This option uses an auxiliary battery provided by your vehicle manufacturer. It allows the user to maintain the temperature control of the compartment for a certain period when there is no alternator or stand-by power sources available. Some vehicle manufacturers include from factory option to equip a secondary battery of the same technology of the main battery (AGM) with an optional relay (KBAT) and a higher rating alternator to serve auxiliary equipment. Other Vehicle manufacturers may offer it as an option, installed by vehicle dealer.

- The holdover time will depend on the thermal losses ad the load conditions.
- The energy is taken from a battery supplied with the vehicle.
- The **Kbat** signal is activated by the vehicle ECU that closes the contact when the engine has started.
- The **Kbat** opens when the engine has stopped allowing the E-200 equipment to drain only the secondary battery without compromising the start-up of the engine.



1.	Vehicle Secondary Battery
2.	Fuse (150 A)
3.	Ignition Switch

Hold-over Option Installation Guidelines

NOTICE

Equipment Damage!

Do not use hold-over functionality in a vehicle without extended battery option otherwise the main battery will be depleted compromising the ability to start the engine.

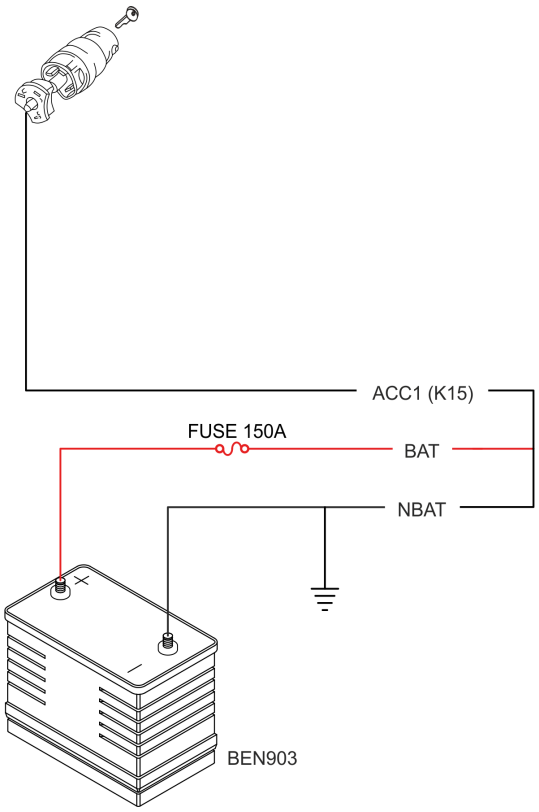
⚠ WARNING

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.

Controller Set-up

1. Gateway Controller software version - GC 4.7 or higher
2. In order to enable the hold over the dealer have to change the setting of the parameter H1A to HOSTA =1 (The factory setting is HOSTA = 0). To do so follow the process described in Service Bulletin SB 1228 or save the appropriate WINTRAC file.
3. The following parameters are also required to function correctly:
   - [H1d] [HOCFR]=45Hz (Compressor frequency in Holdover state) that allows the maintenance personnel to adjust the operating frequency in holdover state.
   - [H1b] HOTYP=2 (Default setting from factory) that indicates the holdover functionality is performed using the extended battery option.



Start/Stop Functionality

Important: *The presented proposal does not cover all the diversity of vehicle manufacturer implementations. An adaptation to each application will be required. A carefully revision of your vehicle documentation is advised.*

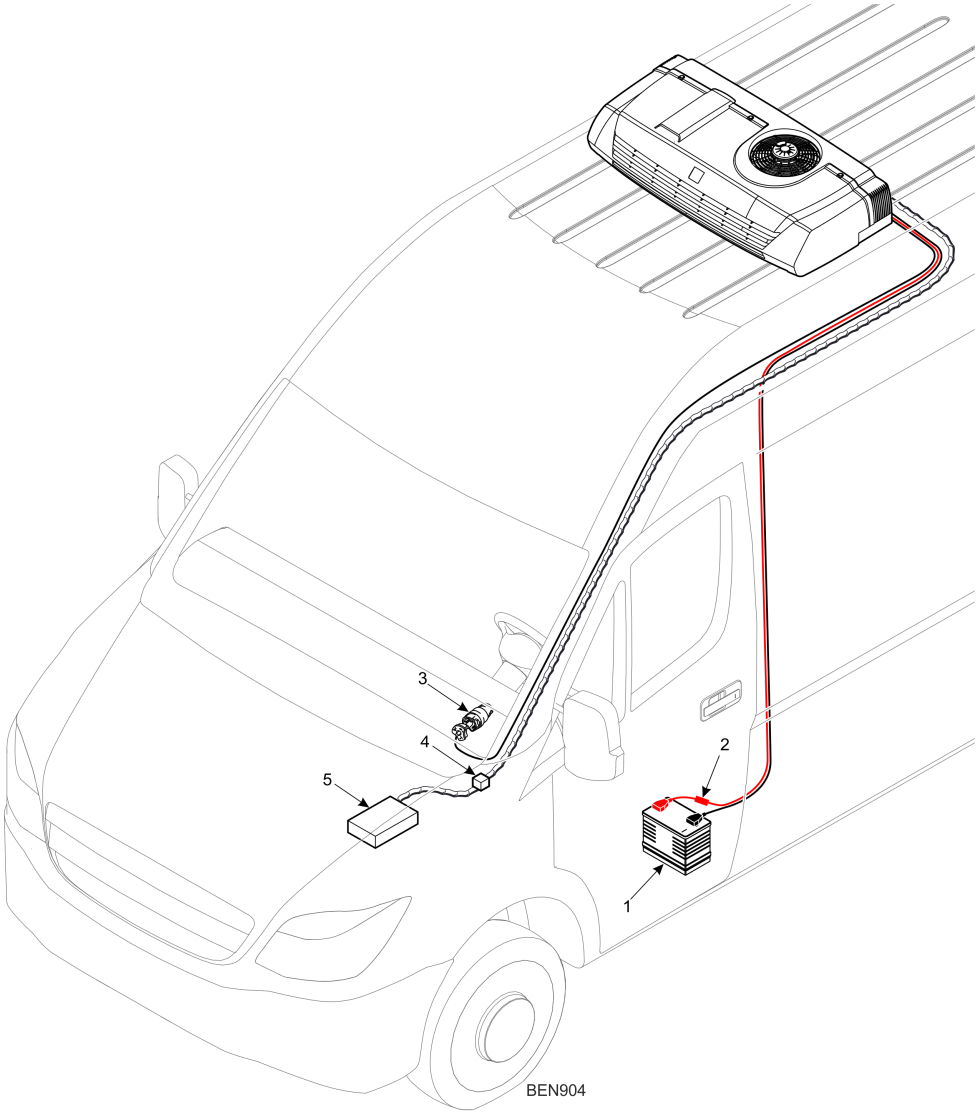
The START/STOP signal has been implemented as a low-side transistor - this means that, when the signal is active, the associated pin XG3-H1 is internally grounded (conducting condition). Otherwise, the pin is in high-impedance condition (blocking condition).

Concept

- This function is beneficial to improve the refrigeration performance during long periods of engine stops due to vehicle START/STOP activation (eg. Traffic jam, urban distribution with high density of traffic lights etc.)
- The Gateway Control Module (GCM) has a digital output (START/STOP signal) that indicates that the refrigeration unit demands electric power from the alternator.
- The START/STOP signal can be used to inhibit the start/stop function of the vehicle allowing to:
  - Maintain the engine running despite the vehicle engine stop conditions are met (Typically the vehicle is stopped, gear not engaged etc.)

    and/or
  - Activate the engine start. All the safety precautions have to be considered by the OEM vehicle manufacturer (seat belt fastened, door closed, battery charged etc.).
- Check the vehicle documentation if the vehicle is equipped with such a feature and how to integrate into it's circuitry.
- The START/STOP signal is linked to the activation of the Compressor Drive Module (CDM) which is the main consuming load. When the CDM is active the start stop is active.
- A delay (3s) between the activation of the START/STOP signal and the activation of the Compressor Drive Module (CDM).

  Note: *This is to prevent simultaneously starting the vehicle engine with a load due to high current demand from the CDM.*
- In order to prevent nuisance transients the START/STOP signal is elapsed during a time (3s) when the CDM is disabled by the Gateway controller.
- Parameters SSRED and SSFED will need to be adjusted to the customer's application.



1.	Vehicle Battery
2.	Fuse (150 A)
3.	Ignition Switch
4.	Relay
5.	ECU

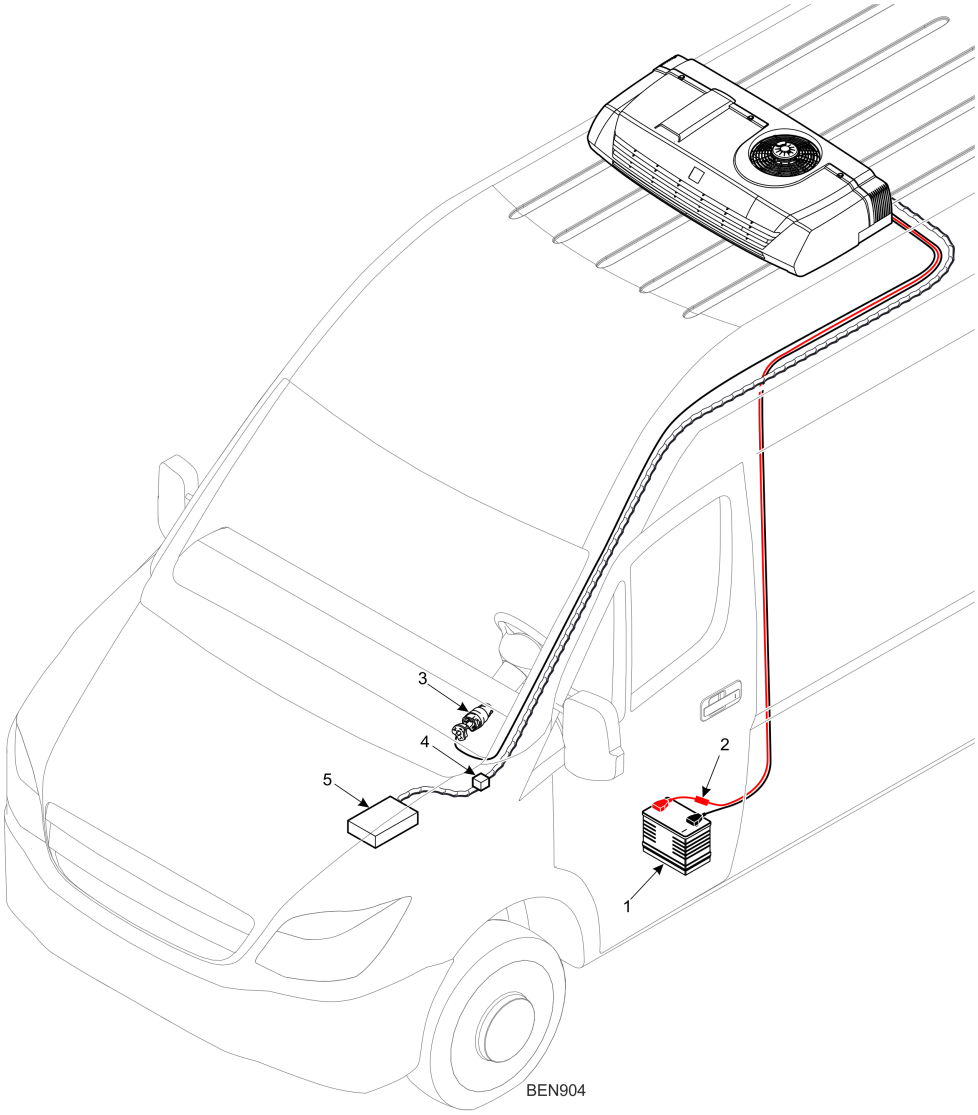
Increased Idle Speed Setup

Important: *The presented proposal does not cover all the diversity of vehicle manufacturer implementations. An adaptation to each application will be required. A careful review of your vehicle documentation is advised.*

The IIS signal has been implemented as a low-side transistor - this means that, when the signal is active, the associated pin XG3-H1 is internally grounded (conducting condition). Otherwise, the pin is in high-impedance condition (blocking condition). Please refer to your unit schematic for further details.

Concept

- This function is beneficial to improve the refrigeration performance during long periods of vehicle running in idle (eg. Traffic jam, urban distribution with high density of traffic lights, etc.)
- The alternator maximum capacity is obtained at maximum engine rpm. When running in idle, the maximum power is approximately 60% of the rate power.
- Some vehicles incorporate a digital or analog input that can used to increase the idle speed.
- The Gateway Controller (GC) has a digital output (IIS signal) that indicates that the refrigeration units demand is higher than the alternator can provide.
- The IIIS signal can be then used to “tell” the vehicle ECU to increase the idle speed in order to increase the power delivered.
- Check the vehicle documentation if the vehicle is equipped with such a feature and how to integrate into their circuitry.
- The IIS signal goes active when the Gateway goes to POWER DERATING mode. This state can be identified by a triangle oriented downwards.
- The IIS signal it is cleared when the Compressor Drive Module (CDM) becomes inactive. eg when the unit goes to NULL mode.

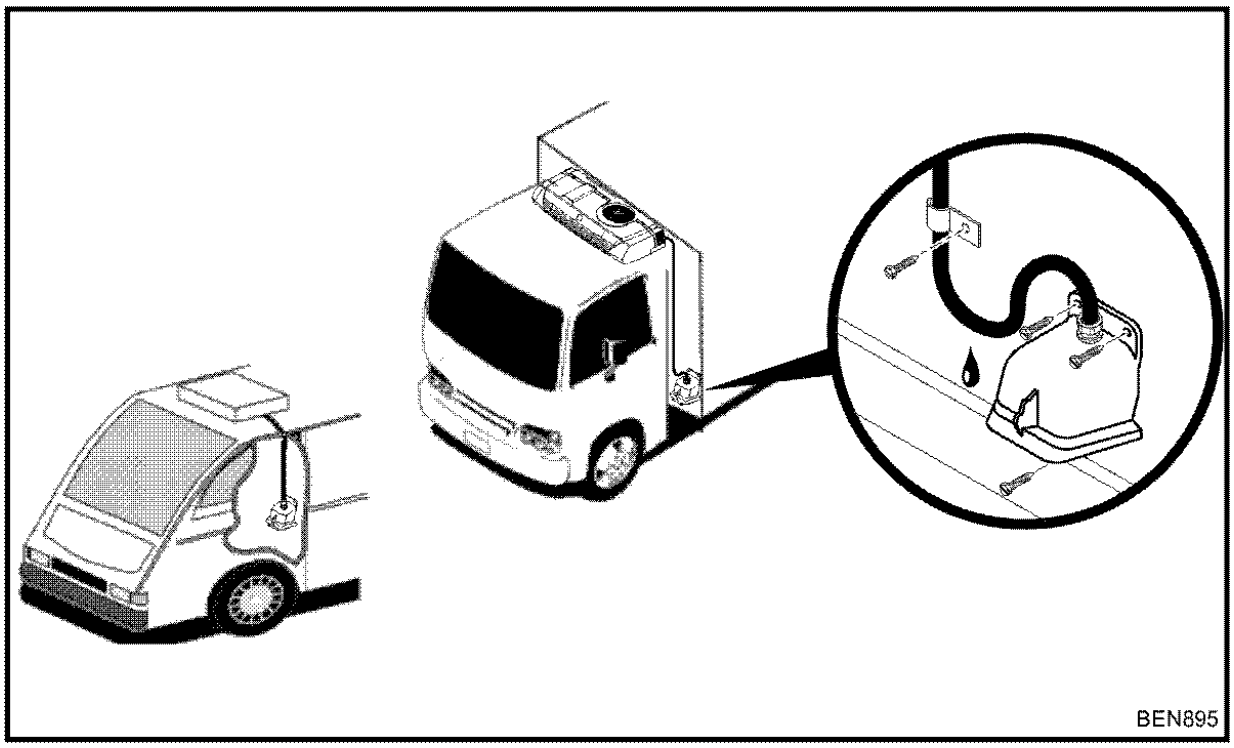


1.	Vehicle Battery
2.	Fuse (150 A)
3.	Ignition Switch
4.	Relay
5.	ECU

Standby Receptacle Box Installation (Models 20 and 50 Only)

Important: *See Section 7 - Electrical Standards in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

Figure 10. Typical receptacle installation with correct drip loop shown



Evaporator Drain Hose Installation

Important: *See Section 8 - Evaporator Drain Hose Standards in the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430). THESE PROCEDURES MUST BE FOLLOWED!*

1. *DO NOT fit band wrap to hold the wires.*
2. *DO NOT cut the wires to fit.*
3. *DO NOT cover the Heaters.*
4. *DO NOT fit more than 4 wires into the tube.*

ES-100N/ES150

1. Cut the drain hose to the required length.
2. Connect the hose to the drain tube. Secure connections with plastic flanges.
3. Route the hose through the drain hole and seal hermetically.
4. Check that the corresponding siphon or moisture trap is installed at the end of each drain hose. If not, install it.

Figure 11. ES-100 Rear and Bottom views

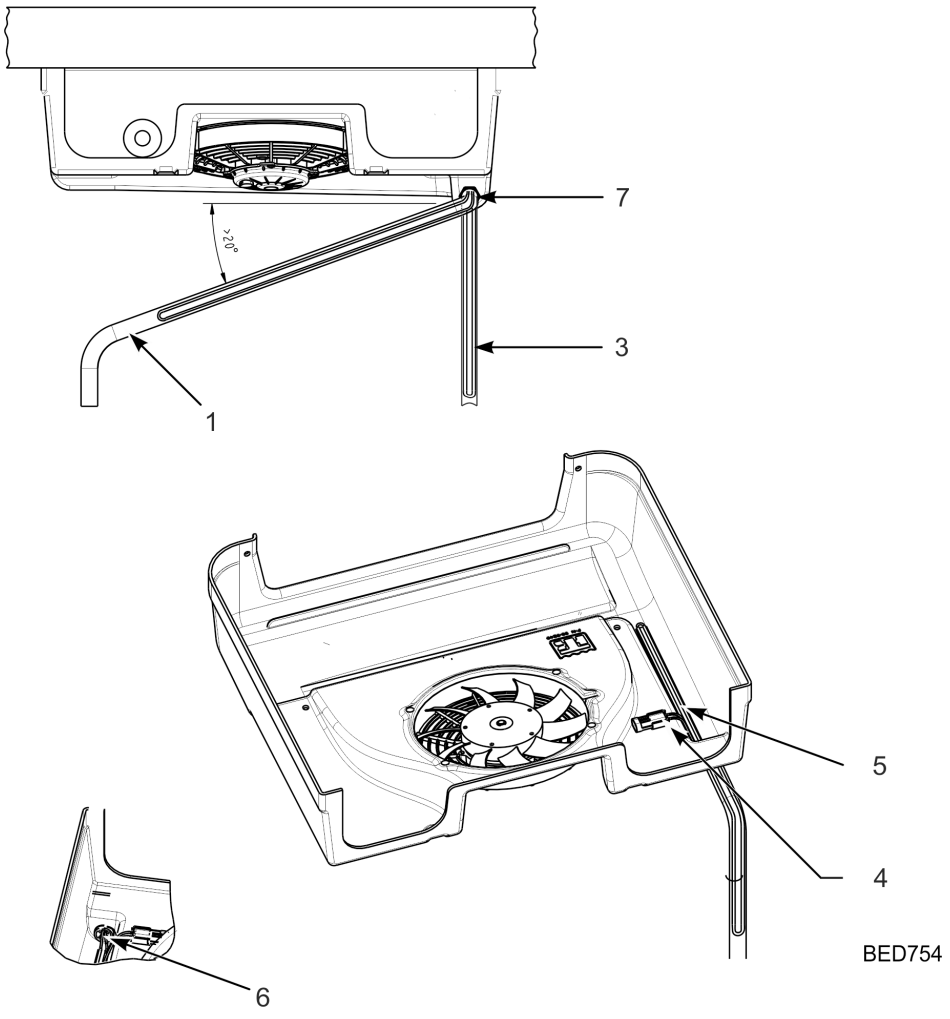
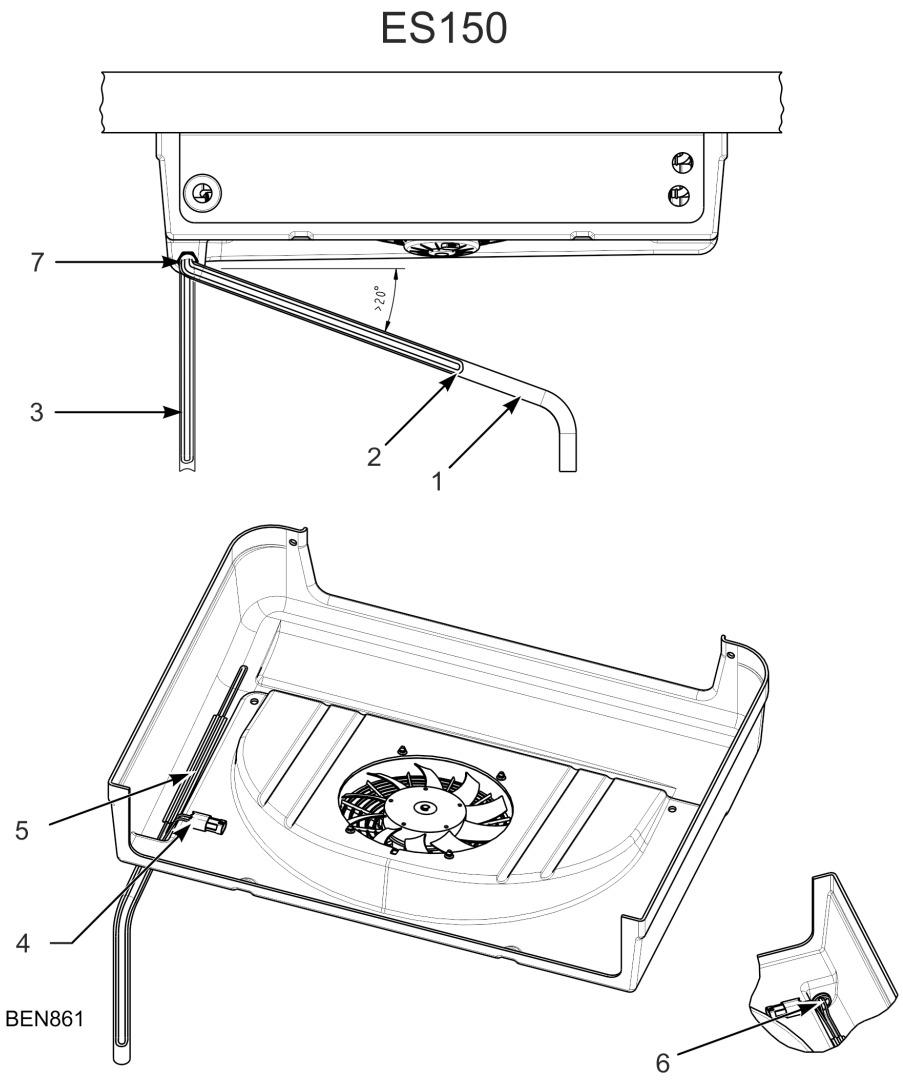


Figure 12. ES-150 Rear and Bottom views



Legend

1.	Option 1 Hose
2.	Heaters
3.	Option 2 Hose
4.	Connector
5.	Aluminium Foil Tape
6.	Drain Tube
7.	Nut

Completing the Installation

Important: *BEFORE COMPLETING THE INSTALLATION, YOU MUST PERFORM THE FOLLOWING PROCEDURES IN ACCORDANCE WITH THE THERMO KING INSTALLATION STANDARDS AND PROCEDURES GUIDE (TK 56430):*

- *SYSTEM EVACUATION PROCEDURES*
- *SYSTEM LEAK CHECK PROCEDURES*
- *SYSTEM CHARGING PROCEDURES*
- *CONFIGURATION SOFTWARE PROCEDURES*
- *CONTROLLER PARAMETER SETUP*

Suction Pressure Regulator (SPR) Adjustment Procedures - MAX

Important: *Using the absence of bubbles in the sight glass as an indicator of correct refrigerant charge can be misleading,* ***YOU MUST*** *refrigerate the box to 0-5°C (32-41°F) to get a more precise indication from the sight glass.*

⚠ WARNING

Equipment Damage!

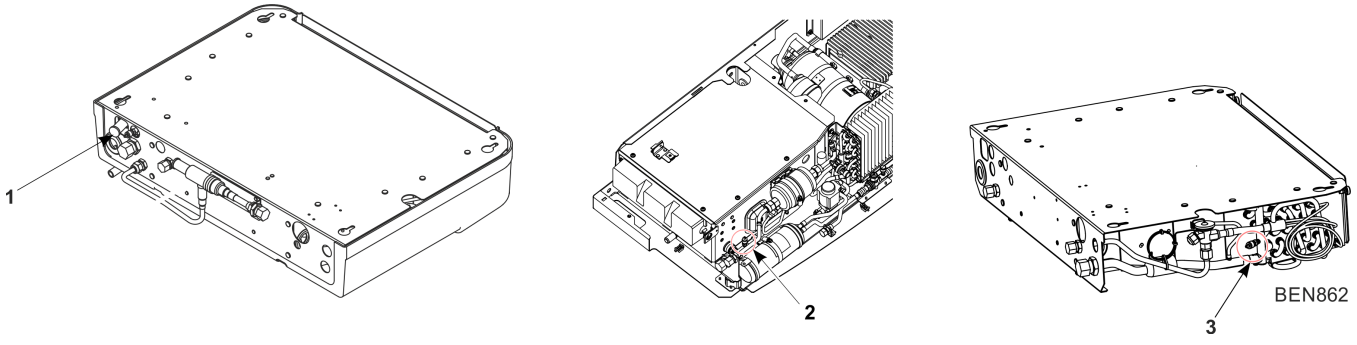
Lower settings can be selected based on local preferences to optimize heating operation. HIGHER valve settings than specified will lead to system malfunction including operation interruption when box is warm (motor overcurrent conflict with inverter limits).

Important: *All new unit installations require these adjustment procedures. Failure to do so may not allow the unit to operate at its maximum capacity.*

Note: *The following procedures are for initial settings. Sometimes conditions such as high or low ambient temperatures may require that the settings be fine-tuned for optimum performance.*

MAX units are equipped with a SPR valve located in the evaporator (See illustration below). The valve is used to limit the load on the compressor. This also affects the current draw of the electric motor.

1. Install gauge manifold set onto the suction service port at the compressor (See illustration below).
2. Attach an additional compound gauge on suction service port located on copper suction tube in evaporator to monitor suction pressure going to the SPR valve (See illustration below).
3. Connect standby power receptacle to an appropriate electric power source.
4. Place jumper wire between the 12 and CHB wires at the defrost termination switch to verify the unit will run in defrost.
5. Start unit and run in defrost on the electric compressor until the pressure on the additional compound gauge attached to the suction service port stabilizes at a pressure above 45 psig (310 kPa).
6. Check the suction pressure on the gauge attached to the service port at the electric compressor. It should be not higher than 40 +-2psig (275kPa +-14kPa).
7. If the pressure is not within range, remove the protective cap and adjust the SPR valve to the correct setting.
8. Remove gauge manifold set, the additional compound gauge, and the jumper wire when finished with the procedure.



1.	SPR Valve
2.	Service Port E-200
3.	Service Port Evaporator

Discharge Pressure Regulator (DPR) Adjustment Procedures - MAX

⚠ WARNING

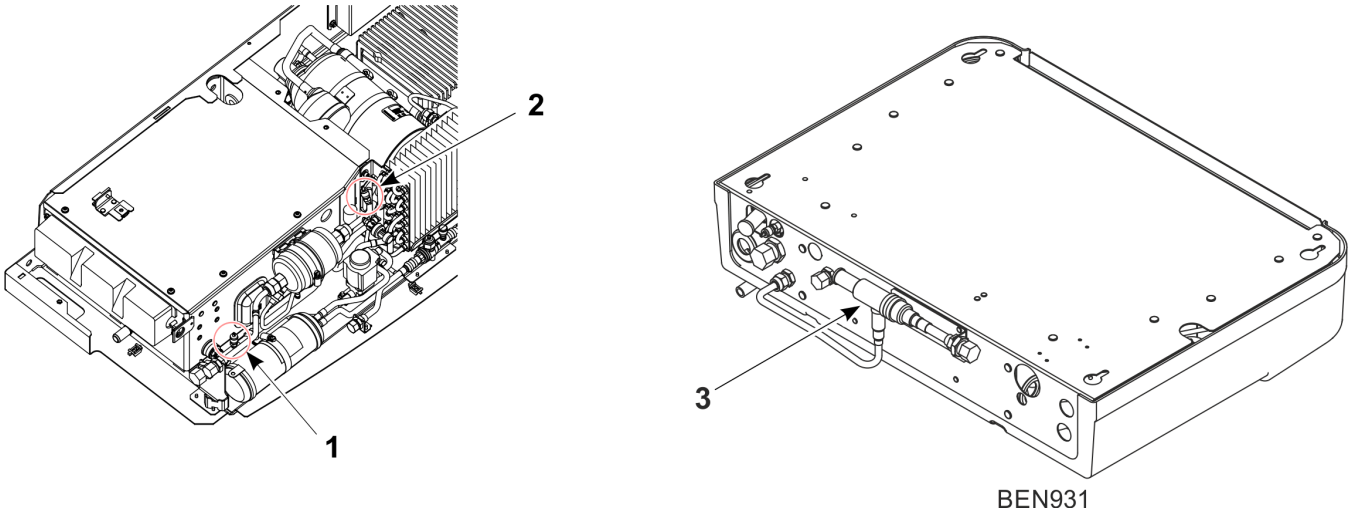
Equipment Damage!

Lower settings can be selected based on local preferences to optimize heating operation. HIGHER valve settings than specified will lead to system malfunction including operation interruption when box is warm (motor overcurrent conflict with inverter limits).

The DPR setting is factory set, however, the below procedure can be used to check the setting in the case of any doubt.

Note: *The measurement of the High Pressure > 6 bar (87 psig) does not necessarily mean that the DPR is set > 6 bar (87 psig). To get a more precise measurement of the DPR setting follow the procedure below in the exact order that it is listed:*

1. Cool down the box to -20° C (-4° F).
2. Change operation to heating mode.
3. Attach a gauge manifold to the suction service port (1) and the discharge service port (2). A low loss fitting must be used on the hose connected to the discharge service port. (See illustration below).
4. Operate the unit in high speed heat until the system pressures stabilize.
5. Check High Pressure with the gauges as follows:
   a. Check the discharge pressure on the gauge attached to the discharge service port.
   b. A pressure of >= to 6 bar (87 psig) is required for the DPR to function, however It should be within a range of 6 bar (87 psig) to 10 bar (145 psig) and no higher.
   c. If the setting is incorrect, remove the protective cap and try to adjust the DPR (3) to the correct setting.
6. Remove the gauges to return the unit to normal operation.



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Compressor Oil Amounts and Type

Important: *Using the absence of bubbles in the sight glass as an indicator of correct refrigerant charge can be misleading,* ***YOU MUST*** *refrigerate the box to 0-5°C (32-41°F) to get a more precise indication from the sight glass.*

NOTICE

Compressor Damage!

Failure to add the correct amount and type of oil will damage the compressor.

Table 1. Oil Capacity for Units Utilizing Hermetic Compressors

		Oil Supplied in Unit	Oil Added at Installation		
Model	Compressor Type	Compressor (oz.)	Total Oil Added at Installation (oz.)	Total System Capacity (oz.)	Oil Type
E-200	Rotary hermetic (variable speed)	10 oz. (0.29 liter)	4 oz. (0.12 liter)	14 oz. (0.41 liter)	PVE
Note: *The remaining oil supplied (8oz) to be used for greasing the o-rings at the fittings*					

Recommended Refrigerant Charge by Model

Important: *Failure to add the proper amount of refrigerant will result in decreased system performance. Refer to the Thermo King Vehicle Powered Truck Installation Standards and Procedures Guide (TK 56430) for information on proper system charging procedures.*

Model	**Recommended Refrigerant Charge (lb.)**
E-200 20 E-200 MAX 50 E-200 MAX 50 Spectrum	1.3kg (2.8lb) (including 1.5m (60") hoses supplied as standard) R134a 1.3kg (2.8lb) (including 1.5(60") hoses supplied as standard) R452A/ R404A 1.6kg (3.5lb) (including 6m(237") hoses supplied as standard) R452A/ R404A ***Important:*** 1. *For each additional meter (39") of hose extension, 80g (0.17lb) of refrigerant **MUST** be added* 2. *It is a good idea to utilise the WINTRAC tool to set compressor speed at an intermediate level (for example - 60Hz) during refrigeration charge. If the unit is charged with the compressor at full speed, overcurrent protection may trip.*

Checking the Installation

- All holes should be sealed with silicone or foam.
- Check with a sheet of paper that the fans blow in the right direction.
- The drain circuit should be slanted on all evaporators and the moisture trap should be installed.
- The hole should be located at the expansion valve on all evaporators.
- The temperature sensor should be connected on all evaporators.
- The in-cab control box should be located in a location that it is accessible and visible from the driver’s position.
- The contact draw should be made.
- Hoses should not be taut (they should be able to absorb vibrations).
- Hoses should not rub against moving parts, sharp parts, or parts that can reach high temperatures.
- The unit should be connected to the battery.
- The seal test should have been carried out.

Condenser and Evaporator Dimensions

Note: *Paper Templates are available to assist in the installation of the Condenser and Evaporator. These Templates provide the installer with a footprint of the component and provide the correct mounting and access hole locations. Contact your Thermo King dealer for details.*

Figure 13. Condenser Nose Mounting/Access Hole Locations Shown

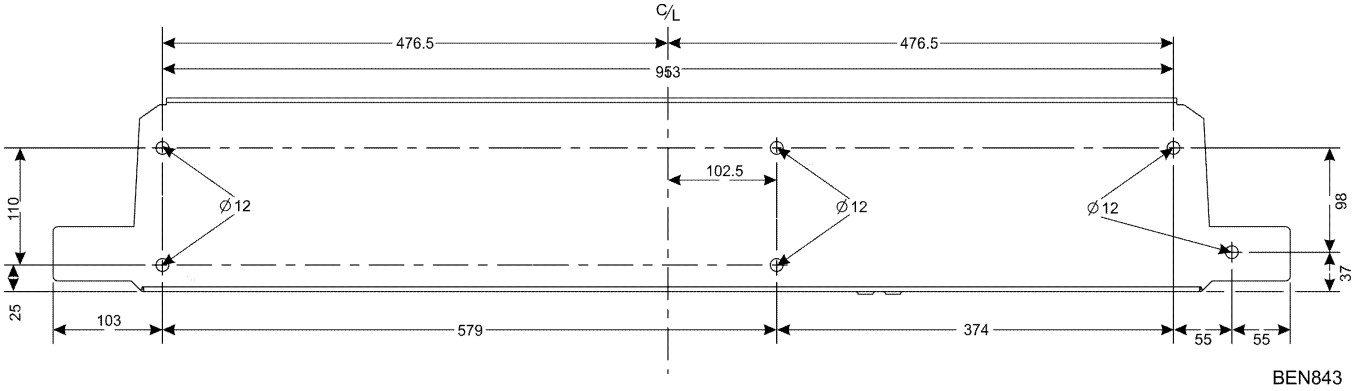


Figure 14. Condenser Roof Top Mounting/Access Hole Locations Shown

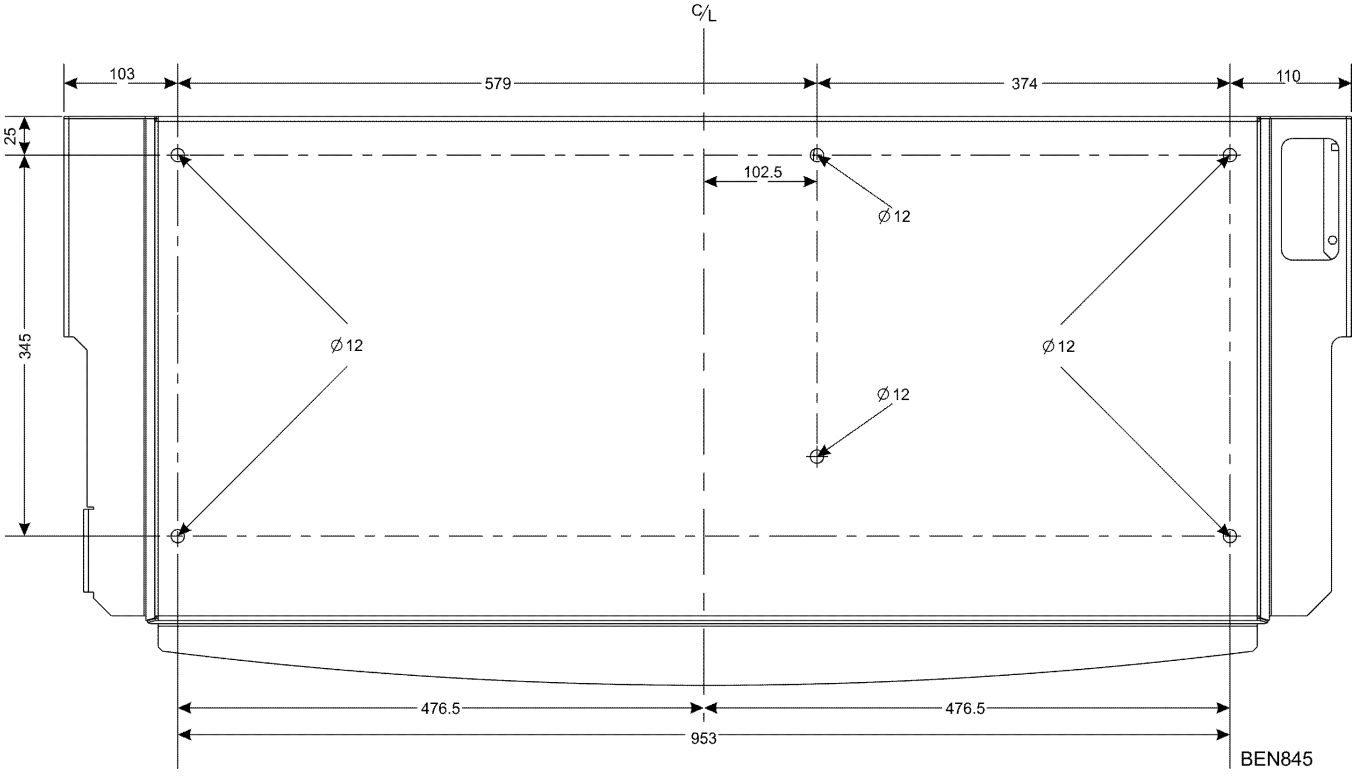
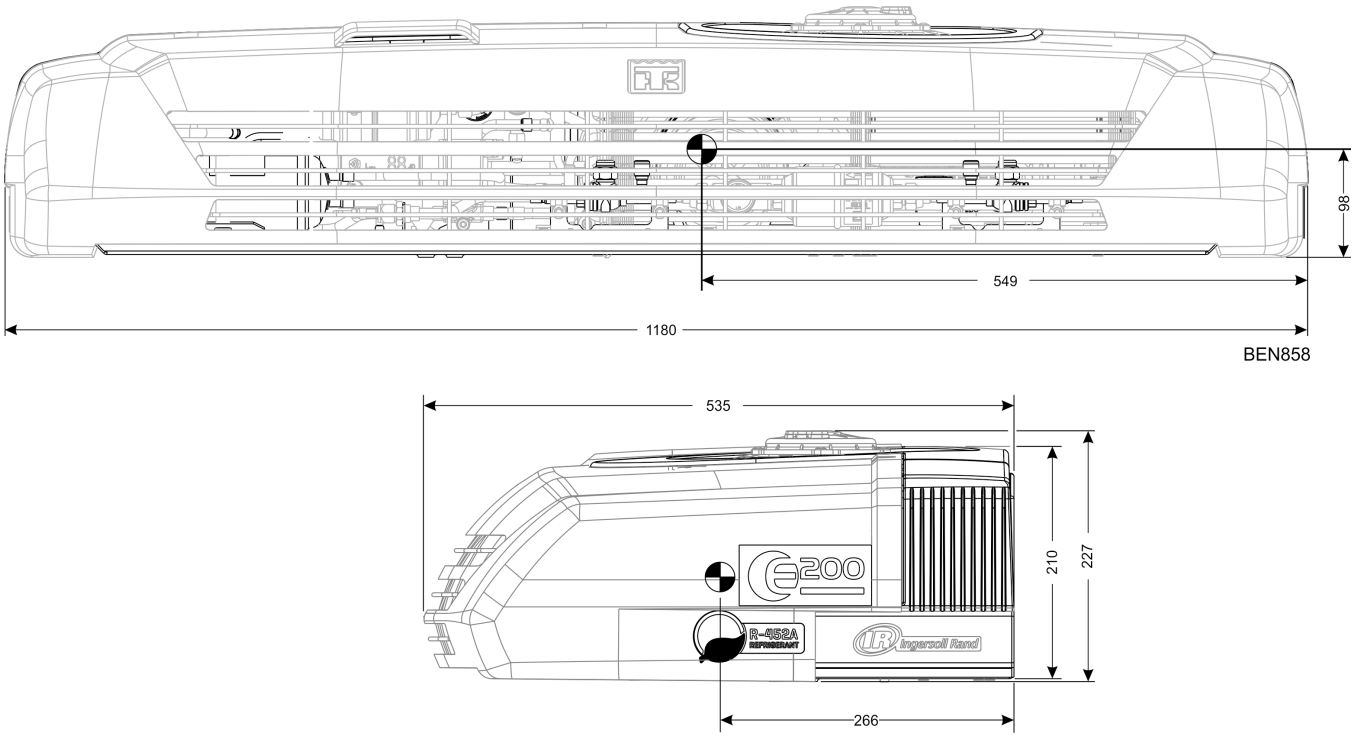
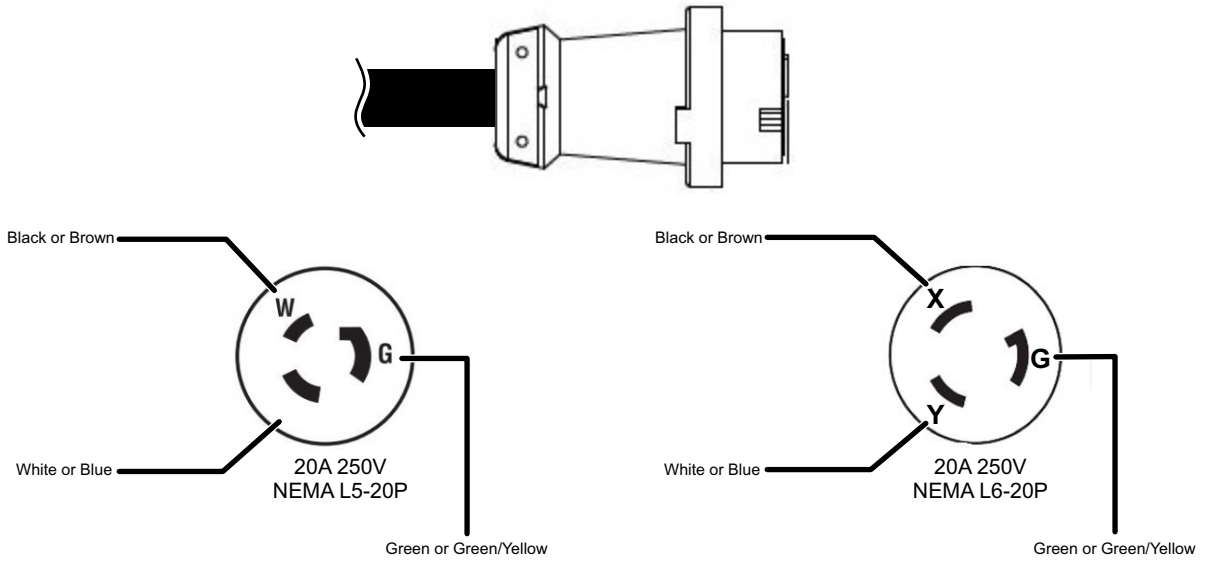


Figure 15. Center of Gravity Shown



Standby Power Plug Wiring



115V/1PH **230V/1PH**

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Notes

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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