



# Installation Manual

## UT-1280 Single Temperature Systems

Rev. A

May 2022

TK 56374-1-IM-EN

TRANE  
TECHNOLOGIES

## Introduction

This manual was written to assist with the installation of a **Thermo King UT-1280** condensing unit and **UTSE or S-3** remote evaporators onto truck bodies specifically designed and built for refrigerated applications. Separate installation instructions for Thermo King options (e.g., door switches, status light, fuel tanks, etc.) can be found at [www.thermoking.com](http://www.thermoking.com).

Due to its complexity, you should not attempt this installation unless you:

- Are an experienced mechanic.
- Can safely lift 34 kilos (75 lbs.).
- In the U.S., EPA 608 certified and trained in the repair and maintenance of transport refrigeration systems.
- Have a basic understanding of electricity and electrical wiring.
- Have the necessary tools and equipment to complete the installation.
- Have a truck body designed and built to meet the requirements of this installation.
- Follow all safety precautions outlined in this manual.

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

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

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

## Revision History

Revision A (05/22) New manual format.

## Customer Satisfaction Survey

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# Safety Precautions

## Danger, Warning, Caution, and Notice

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

Safety advisories appear throughout this manual as required. Your personal safety and the proper installation of this unit depend upon the strict observance of these precautions.

**⚠ DANGER**

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

**⚠ WARNING**

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

**⚠ CAUTION**

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

**NOTICE**

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

**⚠ DANGER****Refrigerant Vapor Hazard!**

Do not inhale refrigerant. Use caution when working with refrigerant or a refrigeration system in any confined area with a limited air supply. Refrigerant displaces air and can cause oxygen depletion, resulting in suffocation and possible death. When working with or around hazardous chemicals, ALWAYS refer to appropriate Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

**⚠ DANGER****Hazardous Gases - Personal Protective Equipment (PPE) Required!**

Refrigerant in the presence of an open flame, spark, or electrical short produces toxic gases that are severe respiratory irritants which can cause serious injury or possible death. When working with or around hazardous chemicals, ALWAYS refer to appropriate Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

**⚠ DANGER****Hazard of Explosion!**

Never apply heat to a sealed refrigeration system or container. Heat increases internal pressure, which might cause an explosion resulting in death or serious injury.

**⚠ DANGER****Risk of Injury!**

Keep your hands, clothing, and tools clear of fans and/or belts when working on a unit that is running or when opening or closing compressor service valves. Loose clothing might entangle moving pulleys or belts, causing serious injury or possible death.

**⚠ WARNING****Equipment Damage and Risk of Injury!!**

Thermo King recommends a forklift with the correct capacity rating be used to safely lift and install the UT condenser unit to prevent equipment damage or personal injury.



## Safety Precautions

### ⚠ WARNING

#### Hazard of Explosion!

Never close the compressor discharge service valve when the unit is operating. Never operate the unit with the discharge valve closed (front seated). This condition increases internal pressure, which can cause an explosion.

### ⚠ WARNING

#### Personal Protective Equipment (PPE) Required!

Always wear goggles or safety glasses and proper PPE when working on a unit. Refrigerant liquid, oil, and battery acid can permanently damage your eyes. When working with or around hazardous chemicals, ALWAYS refer to appropriate Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

### ⚠ WARNING

#### Equipment Damage and Risk of Injury!

Never drill holes into the unit unless instructed by Thermo King. Holes drilled into high voltage cables could cause an electrical fire, severe personal injury, or even death.

### NOTICE

#### Equipment Damage!

All unit mounting bolts must be installed, be the correct length for their application, and torqued to specifications. Missing bolts, incorrect bolt lengths and improper torque specifications can damage equipment and void the warranty.

## Battery Installation and Cable Routing

### ⚠ WARNING

#### Hazard of Explosion!

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

### ⚠ WARNING

#### Hazard of Explosion!

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

### ⚠ WARNING

#### Fire Hazard!

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

### ⚠ WARNING

#### Hazard of Explosion!

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

**⚠ CAUTION****Hazardous Service Procedures!**

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

**NOTICE****Equipment Damage!**

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

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

Refrigerant in a liquid state evaporates rapidly when exposed to the atmosphere, freezing anything it contacts. Wear butyl lined gloves and other clothing and eye wear when handling refrigerant to help prevent frostbite. When working with or around hazardous chemicals, ALWAYS refer to appropriate Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

**Refrigerant Oil Hazards****⚠ WARNING****Personal Protective Equipment (PPE) Required!**

Protect your eyes from contact with refrigerant oil. The oil can cause serious eye injuries. Protect skin and clothing from prolonged or repeated contact with refrigerant oil. To prevent irritation, wash your hands and clothing thoroughly after handling the oil. Rubber gloves are recommended. When working with or around hazardous chemicals, ALWAYS refer to appropriate Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.



### First Aid

#### REFRIGERANT

- **Eyes:** For contact with liquid, immediately flush eyes with large amounts of water and get prompt medical attention.
- **Skin:** Flush area with large amounts of warm water. Do not apply heat. Remove contaminated clothing and shoes. Wrap burns with dry, sterile, bulky dressing to protect from infection. Get prompt medical attention. Wash contaminated clothing before reuse.
- **Inhalation:** Move victim to fresh air and use CPR (cardio pulmonary resuscitation) or mouth-to-mouth resuscitation to restore breathing, if necessary. Stay with victim until emergency personnel arrive.
- **Frost Bite:** In the event of frost bite, the objectives of First Aid are to protect the frozen area from further injury, warm the affected area rapidly, and to maintain respiration.

#### REFRIGERANT OIL

- **Eyes:** Immediately flush with large amounts of water for at least 15 minutes. Get prompt medical attention.
- **Skin:** Remove contaminated clothing. Wash thoroughly with soap and water. Get medical attention if irritation persists.
- **Inhalation:** Move victim to fresh air and use CPR (cardio pulmonary resuscitation) or mouth-to-mouth resuscitation to restore breathing, if necessary. Stay with victim until emergency personnel arrive.
- **Ingestion:** Do not induce vomiting. Immediately contact local poison control center or physician.

#### ENGINE COOLANT

- **Eyes:** Immediately flush with large amounts of water for at least 15 minutes. Get prompt medical attention.
- **Skin:** Remove contaminated clothing. Wash thoroughly with soap and water. Get medical attention if irritation persists.
- **Ingestion:** Do not induce vomiting. Immediately contact local poison control center or physician.

#### ELECTRICAL SHOCK

Take IMMEDIATE action after a person has received an electrical shock. Get quick medical assistance, if possible.

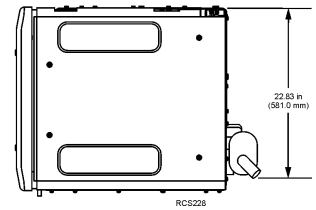
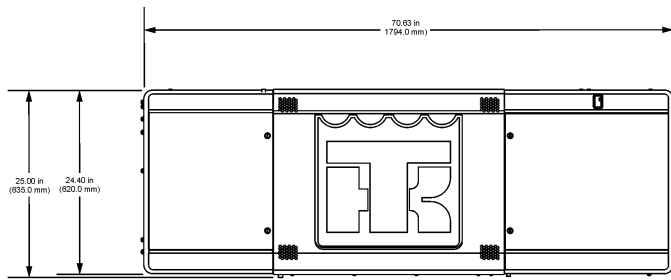
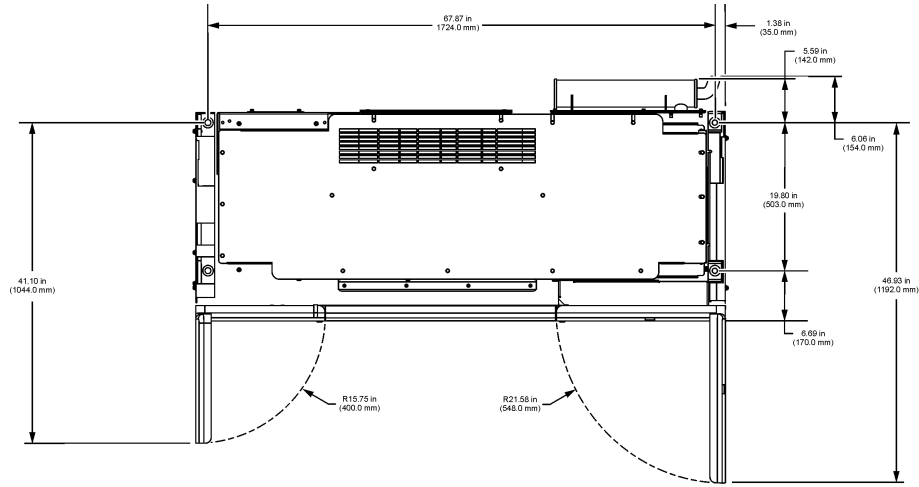
The source of the shock must be quickly stopped, by either shutting off the power or removing the victim. If the power cannot be shut off, the wire should be cut with a non-conductive tool, such as a wood-handle axe or thickly insulated cable cutters. Rescuers should wear insulated gloves and safety glasses, and avoid looking at wires being cut. The ensuing flash can cause burns and blindness.

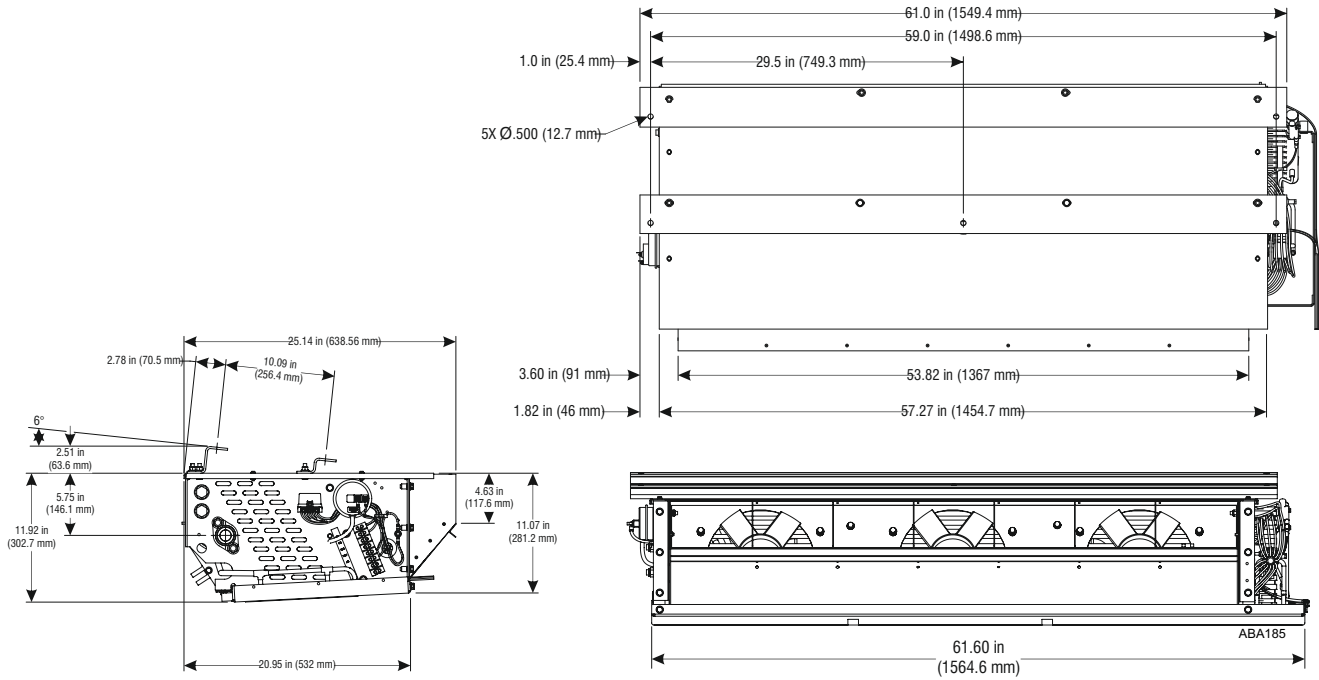
If the victim must be removed from a live circuit, pull the victim away with a non-conductive material. Use wood, rope, a belt or coat to pull or push the victim away from the current. DO NOT TOUCH the victim. You will receive a shock from current flowing through the victim's body. After separating the victim from power source, immediately check for signs of a pulse and respiration. If no pulse is present, start CPR (cardio pulmonary resuscitation). If a pulse is present, respiration might be restored by using mouth-to-mouth resuscitation. Call for emergency medical assistance.



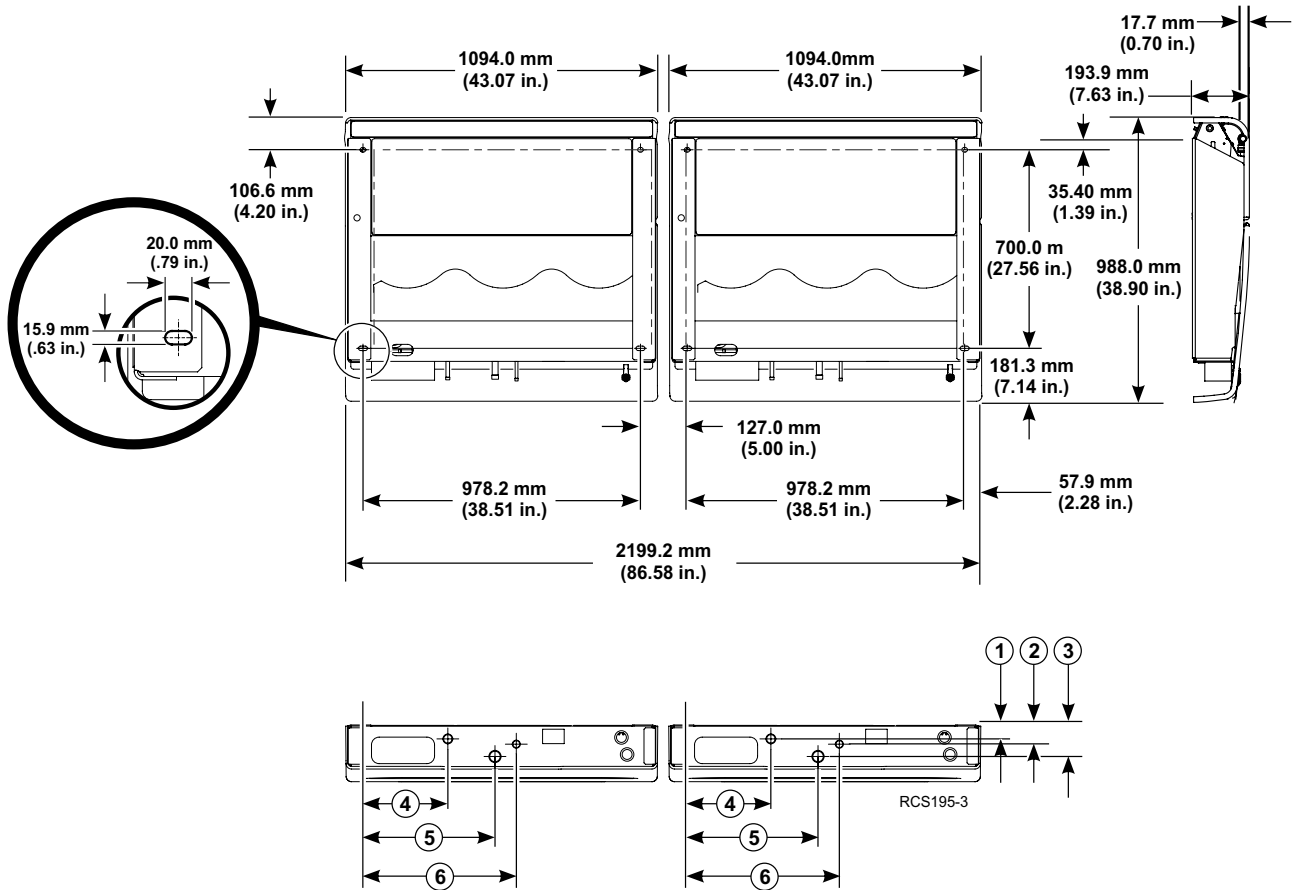
# Component Dimensions

## UT-1280 Condenser



**UTSE Evaporator (NAD-A/P)**


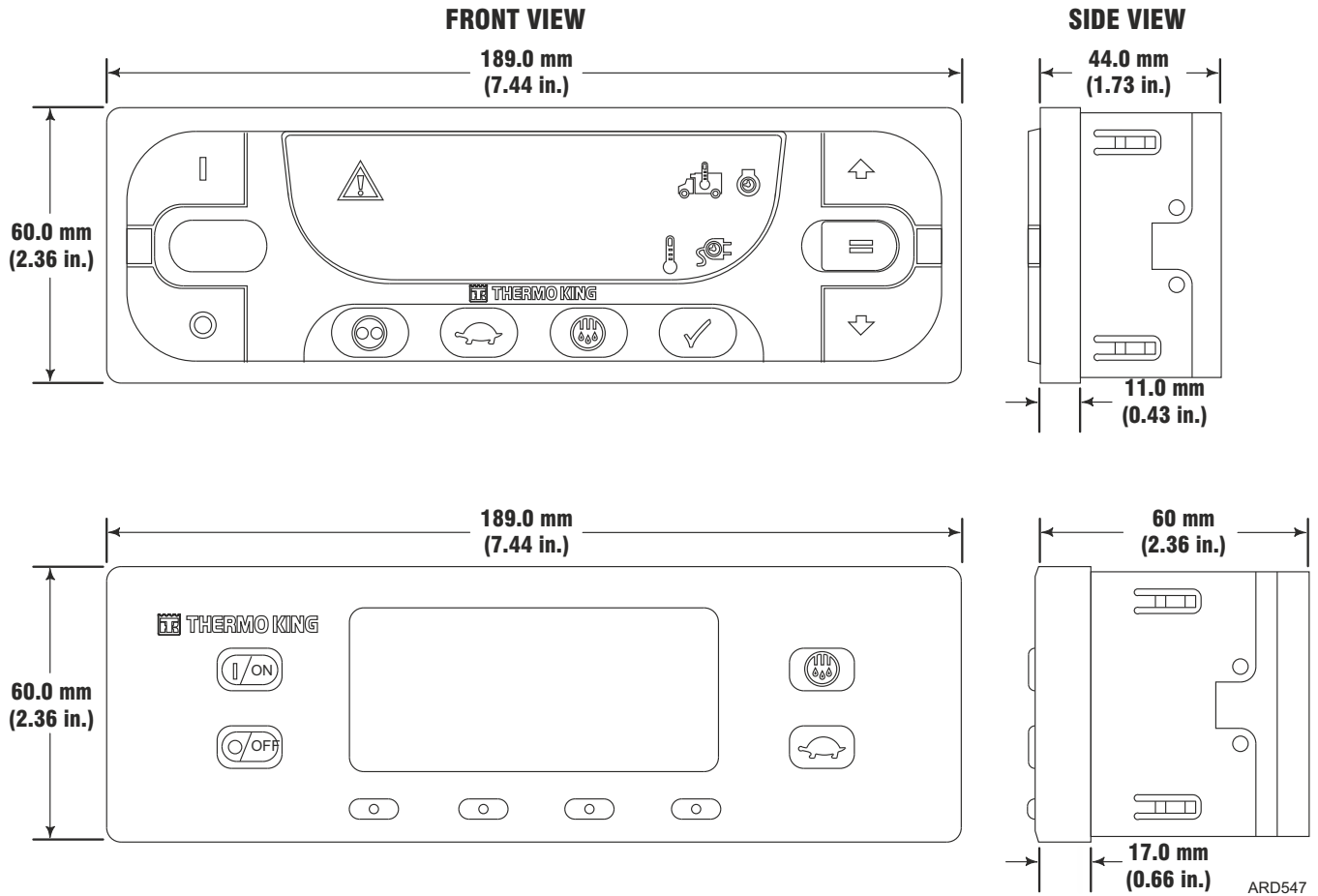
## S-3 + S-3 Evaporator



1	48.9 mm (1.93 in.)
2	67.4 mm (2.65 in.)
3	111.1 mm (4.37 in.)
4	298.6 mm (11.76 in.)
5	465.4 mm (18.32 in.)
6	541.6 mm (21.32 in.)

52 kg (115 lbs.) X 2

**HMI Controller**



# Important Installation Notes

## Safety Precautions

- See “Safety Precautions” beginning on page 5 prior to installing and servicing this product.

## Evaporator Location

*Note: Refer to the illustrations on the following pages.*

- Best airflow is achieved when evaporator is installed an equal distance from each side wall.
- It is recommended that moving bulkheads not be allowed closer than 1219 mm (48.00 in.) or 1 pallet from evaporator outlet (**Detail A**).
- Minimum clearance from bottom of evaporator to top of cargo should be 101 mm (4.00 in.) (**Detail A**).

*Note: This minimum clearance is required under the fan intake area only and does not refer to the **LOAD LINE**.*

- Evaporator should be located a minimum of 51 mm (2.00 in.) from truck wall (**Detail B**).

## Defrost Drains

*Note: Refer to the illustrations on the following pages.*

- Evaporator must be properly mounted to provide a slope towards the drain. This is accomplished by adding one 3/8 in. and one 3/16 in. washers on the drain side and only one 3/8 in. washer on the other side at each mounting surface.
- Defrost drains must exit the evaporator at a 45° angle. Drains should be 267 mm (10.50 in.) from the evaporator to the truck ceiling (**Detail C**).

## Wall Drain Tube

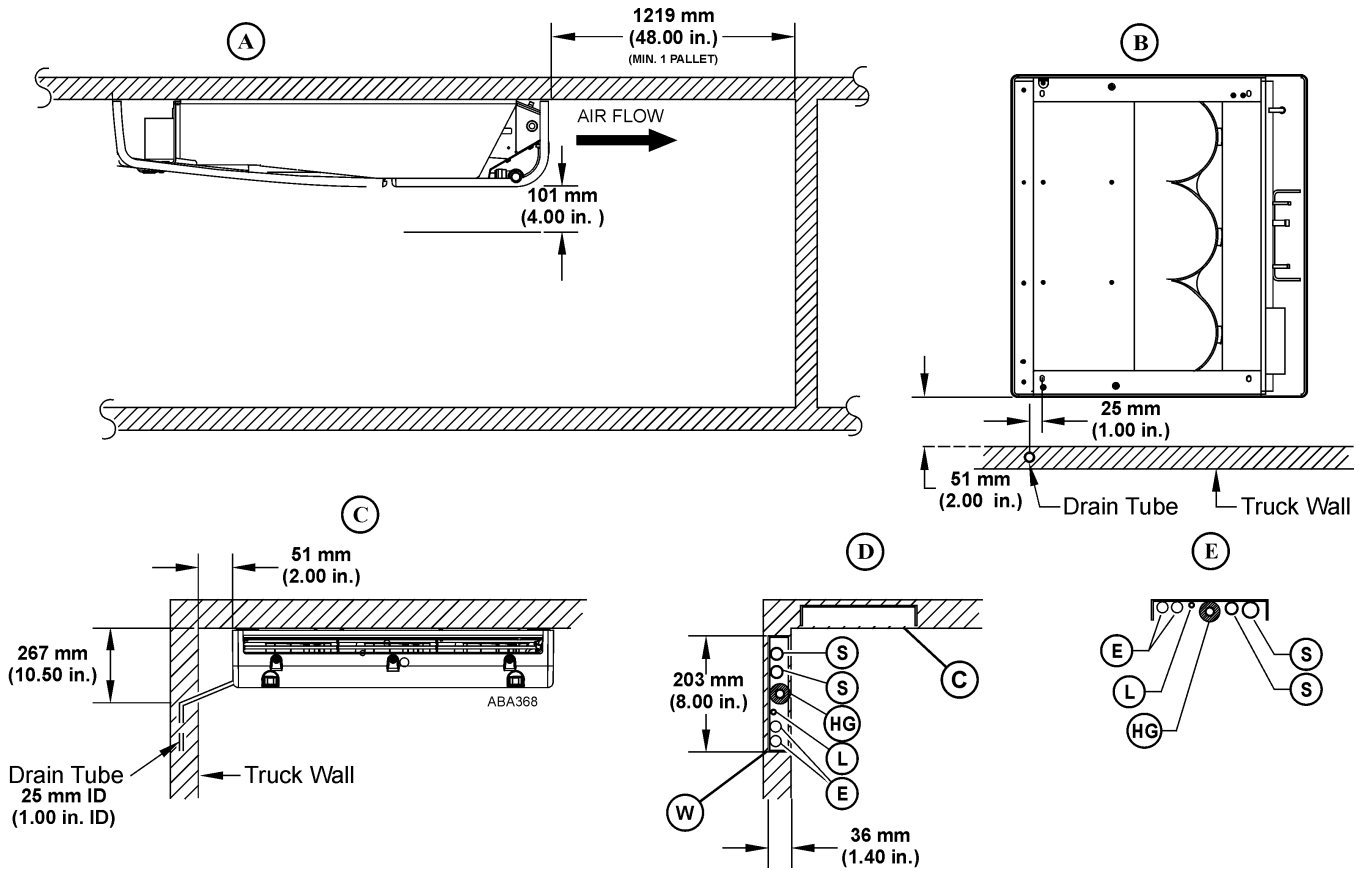
*Note: Refer to the illustrations on the following pages.*

- CPVC
- 1.00 in. ID (Internal Diameter)

## Refrigerant Tubing and Electrical Wiring

*Note: Refer to the illustrations on the following pages.*

- It is important to minimize the amount of time the refrigeration tubes are uncapped and open to ambient conditions. Always keep tubes capped until ready to connect and solder.
- Check tubes and copper fittings for obstructions prior to assembly.
- It is also required that nitrogen or another inert gas be used to purge the tubes while soldering. This prevents oxidation and formation of scale inside tubes.
- Use 35% silver solder for joining all remote refrigerant tubes.
- Insulate suction and hot gas lines.
- All refrigeration tubes should be secured by clamps every 600 mm (24.00 in.).
- All electrical harness should be secured by clamps or tie bands every 600 mm (24.00 in.).
- Only one trough (W = Wall and C = Ceiling) is required (**Detail D & E**).
- All dual evaporator installations require two suction tubes.



## Defrost Drain Tube Connectors

**Important:** Follow the instructions below to prevent defrost drain tube water leaks.

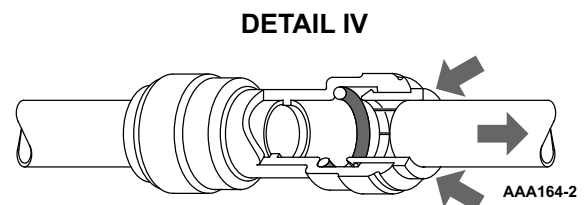
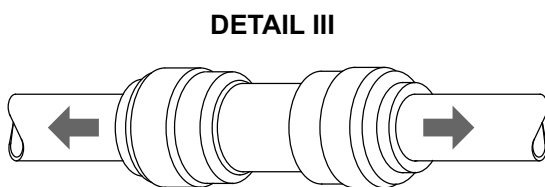
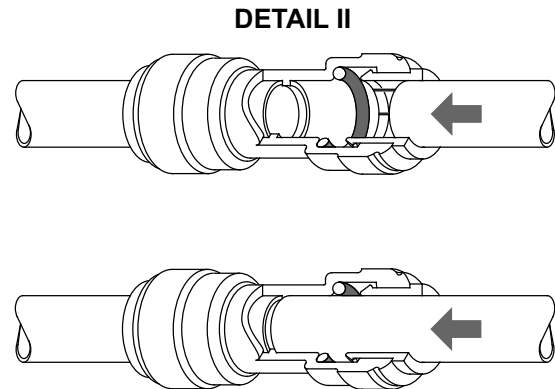
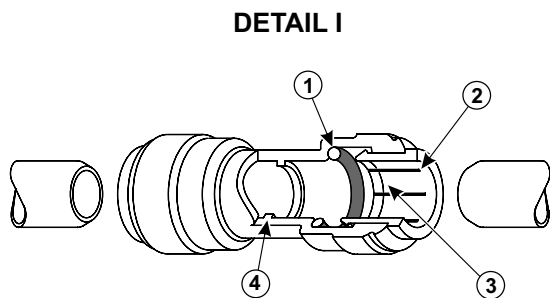
All S-3 remote evaporators are equipped with a quick disconnect fitting that connects the drain pan to the drain tubes (**Detail I**).

To properly install the tube make sure that the tube is fully inserted past the O-ring and up to the stop inside the coupler (**Detail II**).

**Important:** The fitting will grip the tube before it seals with the o-ring.

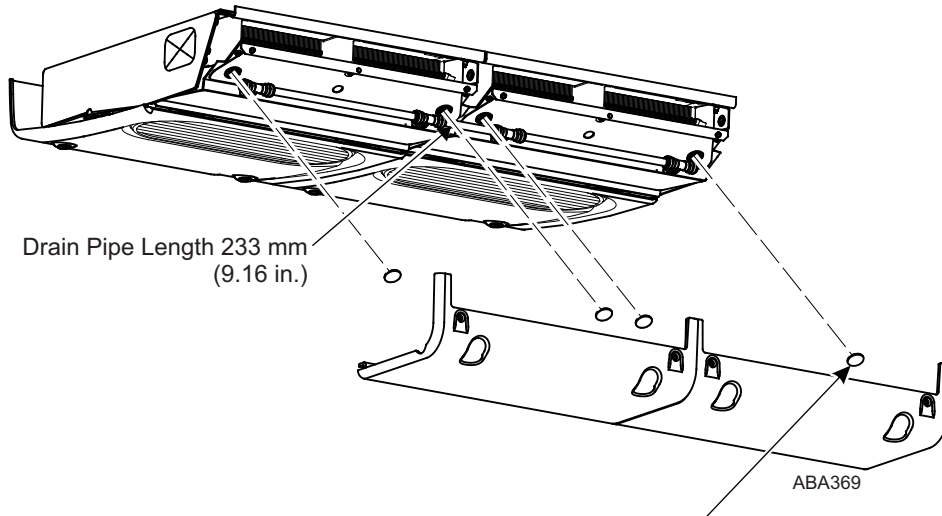
When the tube is in the correct position the O-ring will seal and the Teeth will grip the tube keeping it in place. Check the fit by pulling on the tube(s) to insure that it will not pull out of the fitting (**Detail III**).

To disconnect the tube from the fitting: press the collet into the fitting. Hold the collet in place and pull the tube out. The fitting can be re-used. Clean any burrs off the tube before re-inserting it into the fitting (**Detail IV**).



## Evaporator Cap Plugs

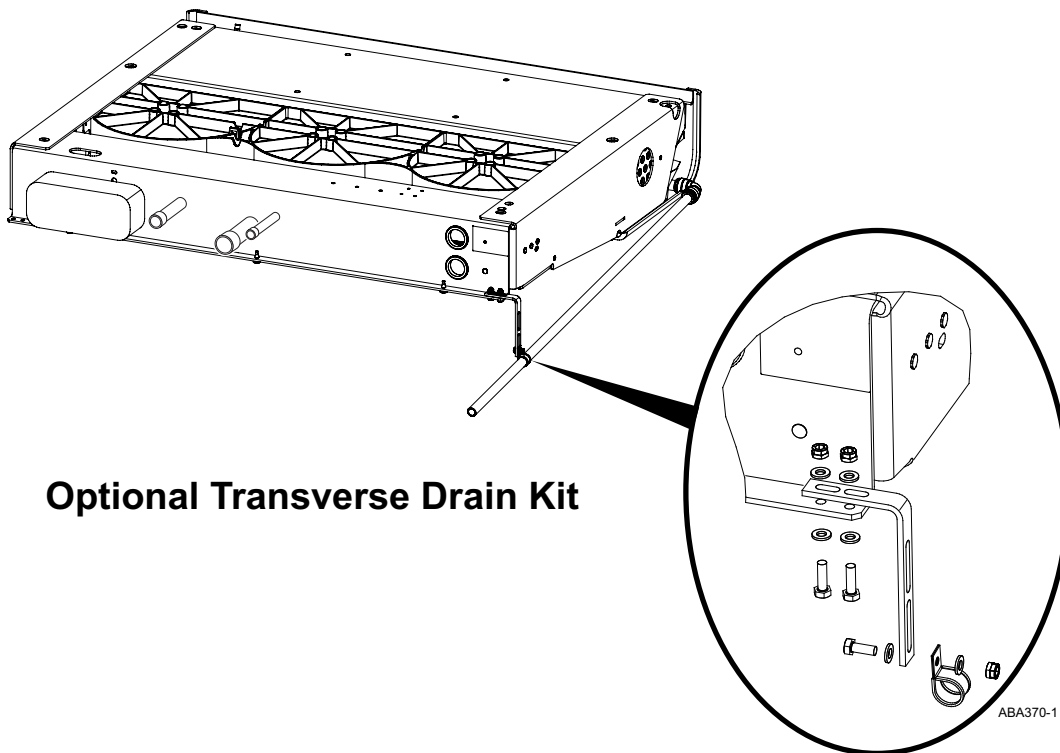
Cap plugs are provided to plug the two S-2 evaporator mounting access holes located directly above the drain pan. These plugs must be installed to prevent water in the drain pan from spilling out of these holes and into the cargo area.



**IMPORTANT:** Supplied cap plugs (2 per evap) must be installed to prevent water in drain pan from spilling out of these holes and into cargo area.

## Transverse Drain Kit (Option)

Transverse drain kits are available as an option.



**Optional Transverse Drain Kit**

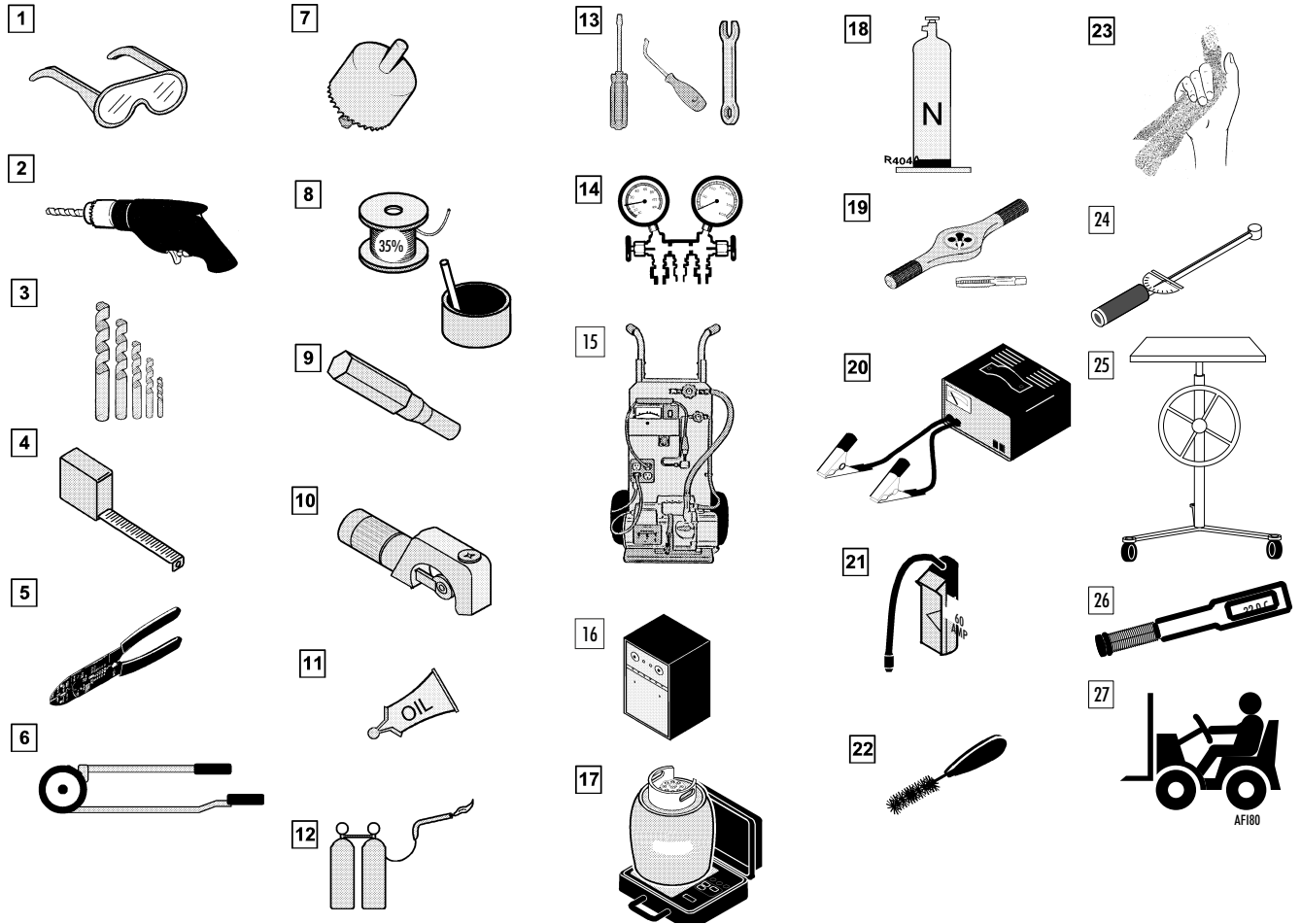


## Required Tools

1. Safety Glasses
2. Drill
3. Drill Bits
4. Tape Measure
5. Wire Crimpers
6. Tubing Benders
7. Hole Saw
8. 35% Silver Solder and Flux
9. Tubing Swage
10. Tubing Cutter
11. Refrigerant Oil
12. Torch Set
13. Mechanics Tools
14. Manifold Gauge Set
15. Evacuation Station
16. Reclaiming Station
17. Refrigerant and Scale
18. Dry Nitrogen
19. Tap and Die Set (Europe Only)
20. Battery Charger (60 AMP Minimum)
21. Electronic Leak Detector
22. Tubing Brushes
23. Scotch Brite Pads
24. Torque Wrench
25. Mechanical Lift (modified drywall lift shown)
26. Digital Contact Thermometer
27. Forklift

**Note:** *Torque wrenches should be in good working condition and routinely calibrated to assure accurate readings.*

Figure 1. Required Tools Shown



# Condenser Installation Kit Components

## **Unit Mounting Component**

1. Special Washer (if required)

## **Fuel Pump Mounting Components**

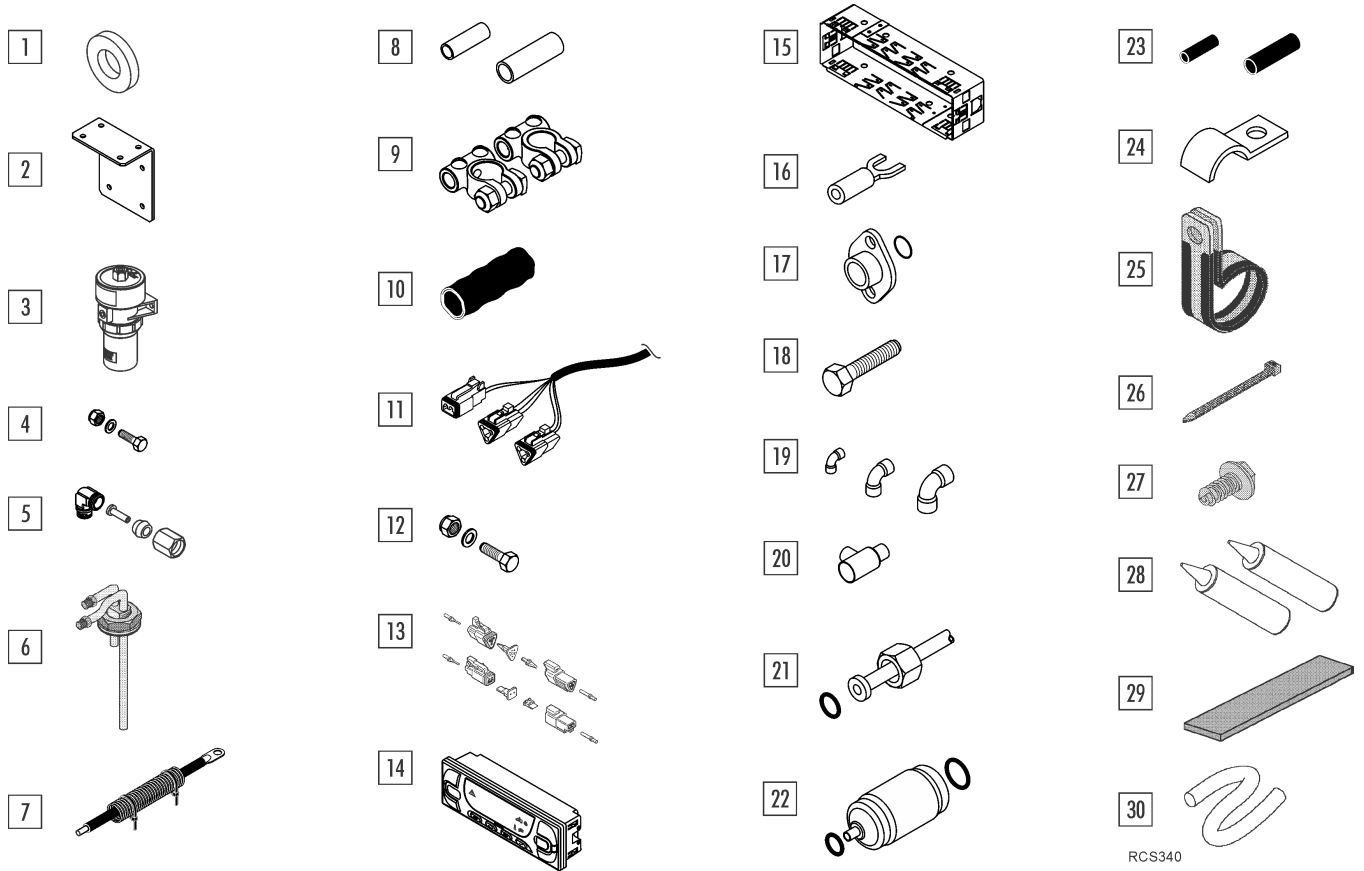
2. Fuel Pump Bracket
3. Fuel Pump
4. 1/2–20 Mounting Bolts, Washers and Locking Nuts
5. Fuel Fittings
6. Fuel Pickup Tube

## **Electrical Installation Components**

7. Fuel Holder and 60 Amp Fuse
8. Splice Connector (2 sizes)
9. Battery Cable Lugs (2 sizes)
10. Heat Shrink Sleeving
11. Remote Evaporator Harnesses (4)
12. 5/8–11 Mounting Bolts, Washers and Locking Nuts
13. 2-Pin and 3-Pin Sockets, Pins and Wedges
14. HMI Controller
15. DIN Bracket
16. Terminal Fork Connectors (2 sizes)

## **Refrigeration Tubing Installation Components**

17. Brass Flange and O-ring
18. M12 x 1.75 Screws
19. Copper Elbows (3 sizes)
20. Copper Tee
21. Tube with ORS Fitting, ORS nut and O-ring
22. Filter Drier and O-rings
23. Tube Insulation (2 sizes)
24. Metal Clamps
25. Clamps (3 sizes)
26. Band Wraps (2 sizes)
27. Screws Self-Tapping
28. Sealer
29. Sealing Gasket
30. Drain Hose

**Figure 2. Condenser Installation Kit Components Shown**


# Evaporator Installation Kit Components

## Evaporator Mounting Components

1. Special Washers (3 sizes)
2. Locking Nuts (1/2-13 and M10 x 1.5)
3. Flat Washers (1/2 " and 3/8")
4. Button Plug
5. Screws, Washers and Locking nuts (1/4-20)
6. Washers (1/2" SAE)

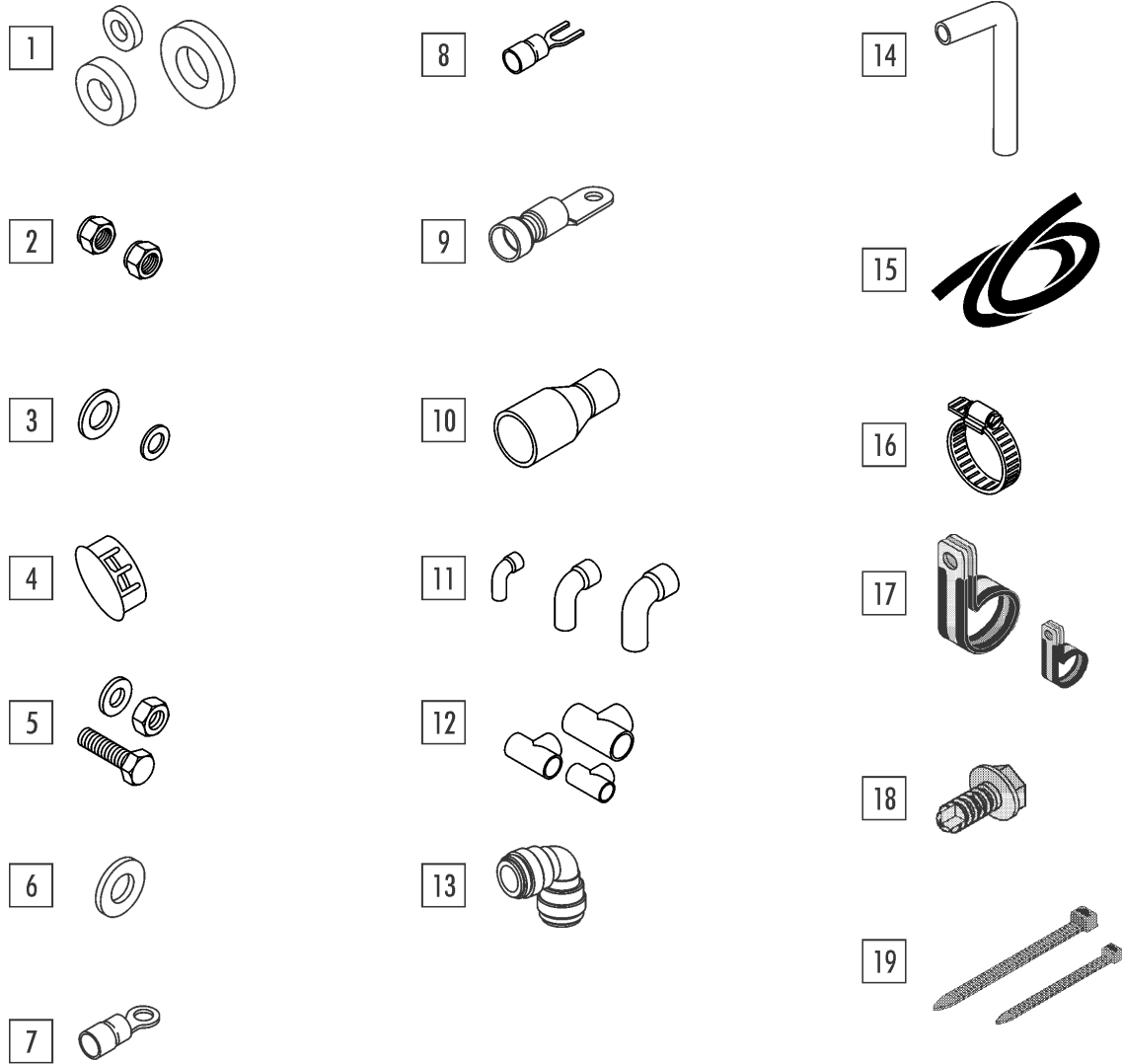
## Electrical Installation Components

7. Terminal Ring Blue
8. Terminal Fork Blue
9. Terminal Ring (Ampli-Bond Style)

## Refrigeration Tubing Installation Components

10. Coupling Reducer 1/2 "x 3/8"
11. Copper Elbows (3 sizes)
12. Copper Tee's (3 sizes)
13. Drain Elbows
14. Drain Tube
15. Drain Hose
16. Hose Clamp
17. Clamps (2 sizes)
18. Self-Tapping screws
19. Band Wraps

Figure 3. Evaporator Installation Kit Components Shown



RCS341

# Uncrating the UT-1280 Condenser

## ⚠ WARNING

### Equipment Damage and Risk of Injury!!

Thermo King requires a proper 4-point lifting fixture to safely lift the UT-1280 unit. The lifting fixture, chains, eyebolts, and lifting hooks must be able to support the UT-1280 unit's approximate weight of 1350 lbs. (612 kg)

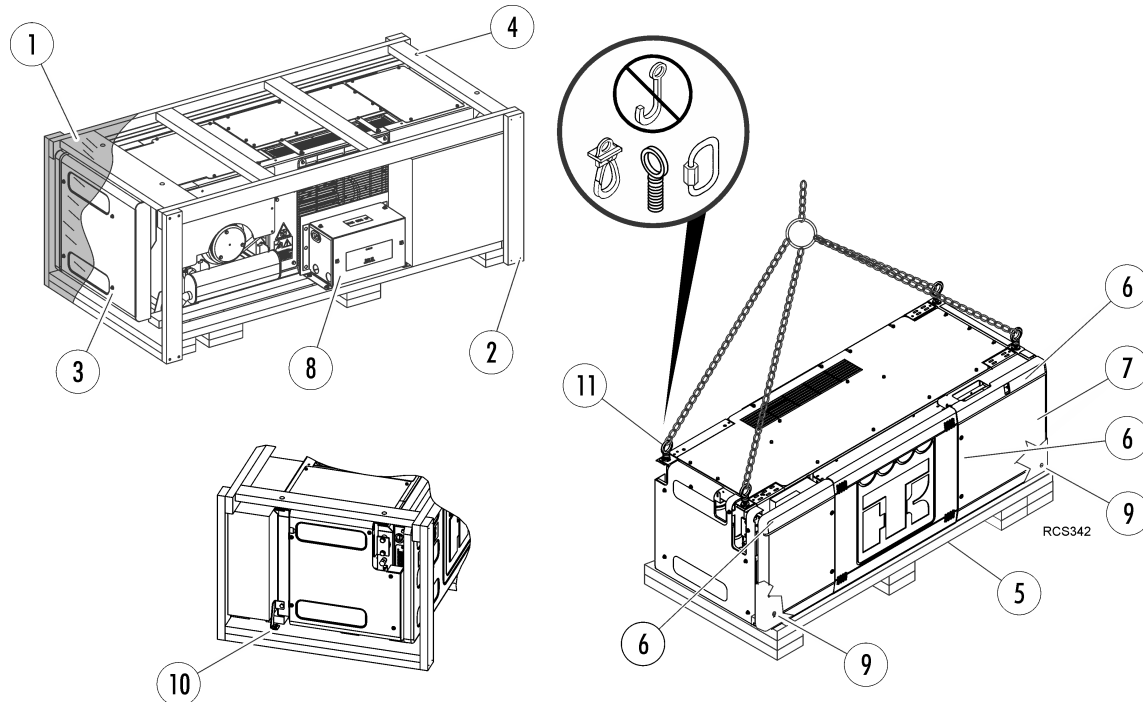
## ⚠ WARNING

### Equipment Damage and Risk of Injury!!

Lifting eyebolts must be made of forged steel and a minimum M12 or 1/2 inch diameter. Use only locking lifting hooks to attach to the eyebolts.

1. Remove all shrink wrap from the unit/crate.
2. Remove four upright boards that connect top and bottom sections of crate.
3. Remove control box side cover by removing four Torx screws.
4. Remove top crate sections by removing four carriage bolts.
5. Remove "toe board" from bottom crate section.
6. Loosen 2X quarter turn bolts and latches on front panel.
7. Rotate front door 10 to 15 degrees. Pull on handles to release latches and remove front door.
8. Remove battery box (if equipped) by removing four screws.
9. Remove two screws from front bottom frame member.
10. Remove two rear steel bracket and bottom crate section.
11. Install forged eyebolts into unit's mounting holes and use an appropriate four point lift to carefully raise unit up from the crate.

**Figure 4. Uncrating the UT-1280 Condenser Shown**



## Installing the UT-1280 Condenser

### ⚠ DANGER

#### Risk of Injury!

Mount the UT-1280 only to the truck box support channels. An improper installation could lead to serious injury! Thermo King recommends the use of fabricated Z-channels to distribute the weight evenly across the truck box support channels. All channels, brackets, and hardware must be able to support the UT-1280 unit's approximate weight of 1350 lbs. (612 kg).

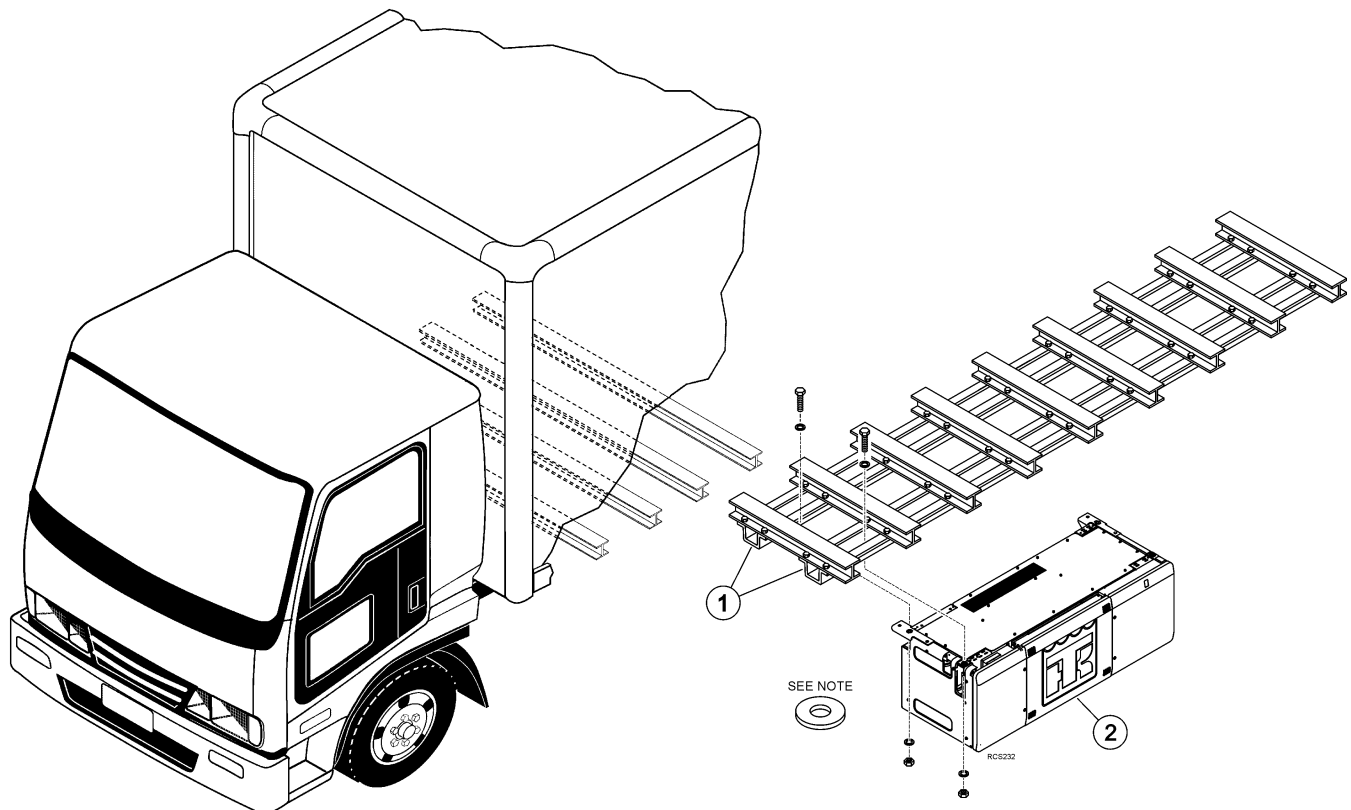
### ⚠ WARNING

#### Equipment Damage and Risk of Injury!!

Thermo King recommends a forklift with the correct capacity rating be used to safely lift and install the UT condenser unit to prevent equipment damage or personal injury.

1. Fabricate and install Z-Channels to truck box supports with Grade 5 (or better) mounting bolts, washers and locking nuts.
2. Lift unit into position and install onto Z-Channels with four Grade 5 (or better) 5/8 x 11 (16 mm x 2) mounting bolts, washers and locking nuts.
  - a. Tighten hardware securely and torque to 176-230 N•m (130-170 ft-lb).

Figure 5. Typical UT-1280 Condenser Installation Shown





# Installing the Fuel Pump

**⚠ DANGER**

**Fire Hazard!**

Leaking fuel lines could cause a fire resulting in death or serious injury. All fuel line fittings must be tight and leak free.

**⚠ DANGER**

**Fire Hazard!**

Do not route fuel lines with battery cables or electrical wires, as this could cause a fire.

**Table 1. Supplied Components**

Description	Qty.
Fuel Pump Bracket	1
Fuel Pump	1
1/4–20 Bolts	2
1/4" Washers	4
1/4–20 Locking Nuts	2
Fuel Fitting Assy.	2
Insulated Clamps	A/R

**S = SUPPLY**

**R = RETURN**

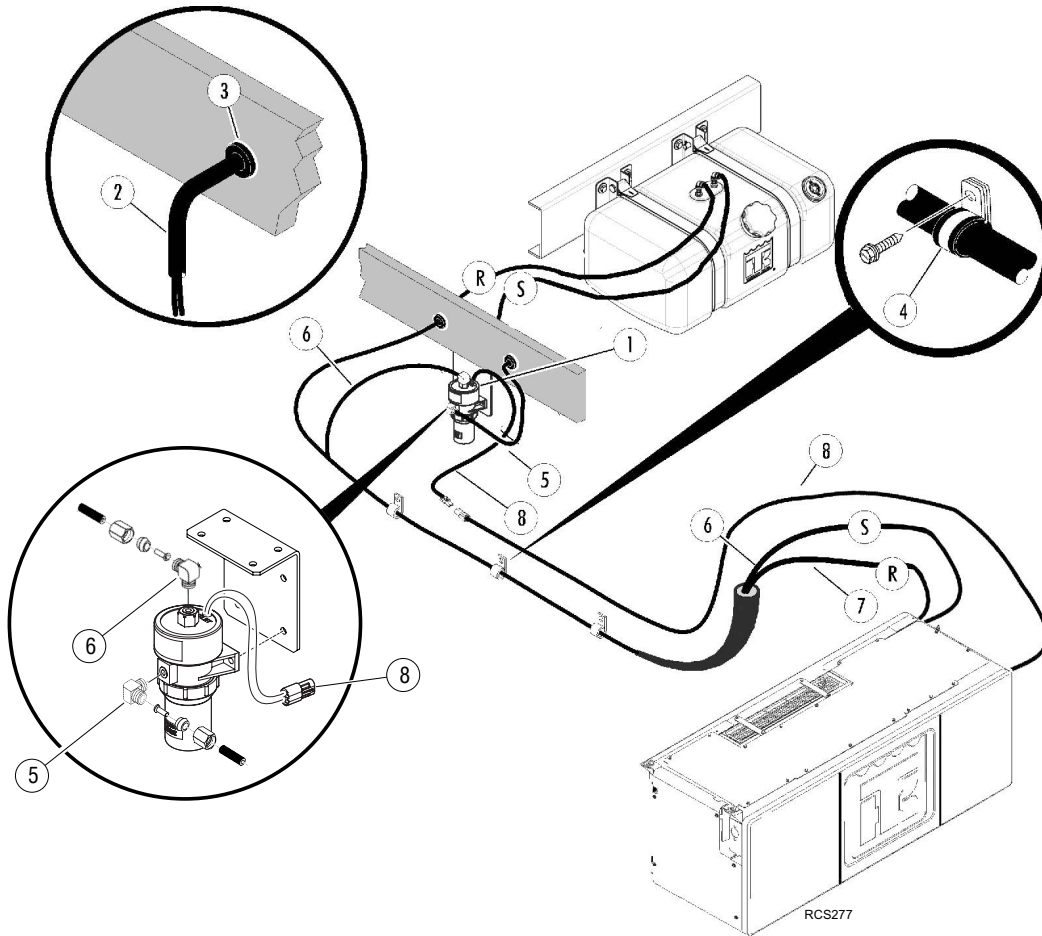
- Fuel pump must be installed as close to fuel tank as possible and not more than 762 mm (30.0 in.) above fuel in tank.
- Fuel lines should be routed in a protective housing with no kinks or sharp bends.

**Note: Do not connect unit fuel lines into truck's fuel system.**

- Rubber grommets must be used when routing fuel lines through metal.
- Secure all fuel lines with provided clamps.
- Route fuel **supply** line from fuel tank to fuel pump **inlet**.
- Route fuel line from the UT host unit to fuel pump **outlet**.
- Route fuel **return** line from fuel **outlet** located on end of UT to fuel tank pickup **return** fitting.
- Connect fuel pump harness securely to fuel pump and route harness to condenser.
- Connect fuel pump harness to mating connector inside condenser. **SEE NOTE BELOW**

**Note:** Fuel pump electrical supply connector is located in upper rear left corner of the unit near battery cables. Fuel pump harness should also exit frame through same hole that battery wires use.

Figure 6. Typical Fuel System Installation Shown



# Installing HMI Controller

## ⚠ WARNING

### Risk of Injury!!

**DO NOT** turn the unit switch “ON” before installing the controller when an electrical power source is connected to the unit. Uncontrolled start up of the unit may result and cause personal injury.

## Harness Routing and Service Loops

**Important:** Always route and secure the harness to prevent rubbing, chafing or making contact with sharp, moving or hot components. Allow excess harness for tilt cab applications. Rubber grommets must be used when routing harness through sheet metal holes.

- All harnesses, except battery and fuel pump are secured to left rear of condenser. It is important that the service loop between this point and the rear of the control box be maintained. Cables that form this service loop should not be tie banded together or to any other component. Lack of proper service loop will not allow control box to be fully extended for service procedures.
- As an aid to unit service or repair, it is advisable that the harness that goes between the condenser and the evaporators, and in-cab box cable, have extra length at the condenser end, in case unit needs to be lowered from its mounting position.
- If clearance between back of condenser and truck frame allows, harness may be secured along the bottom of rear frame member using holes provided for tie bands.

## Interior Cab DIN Mounting

Choose an appropriate location for the controller *inside* the truck cab.

### Detail A – Internal Driver Panel DIN Mounting.

1. Install DIN (ISO 7736) mounting sleeve into driver panel DIN opening.
2. Bend tabs to secure in position.
3. Connect harness and install controller into DIN sleeve.

### Detail B – External Driver Panel Mounting.

4. To install controller on top or under driver panel, install mounting brackets accordingly, connect harness and mount to driver panel.

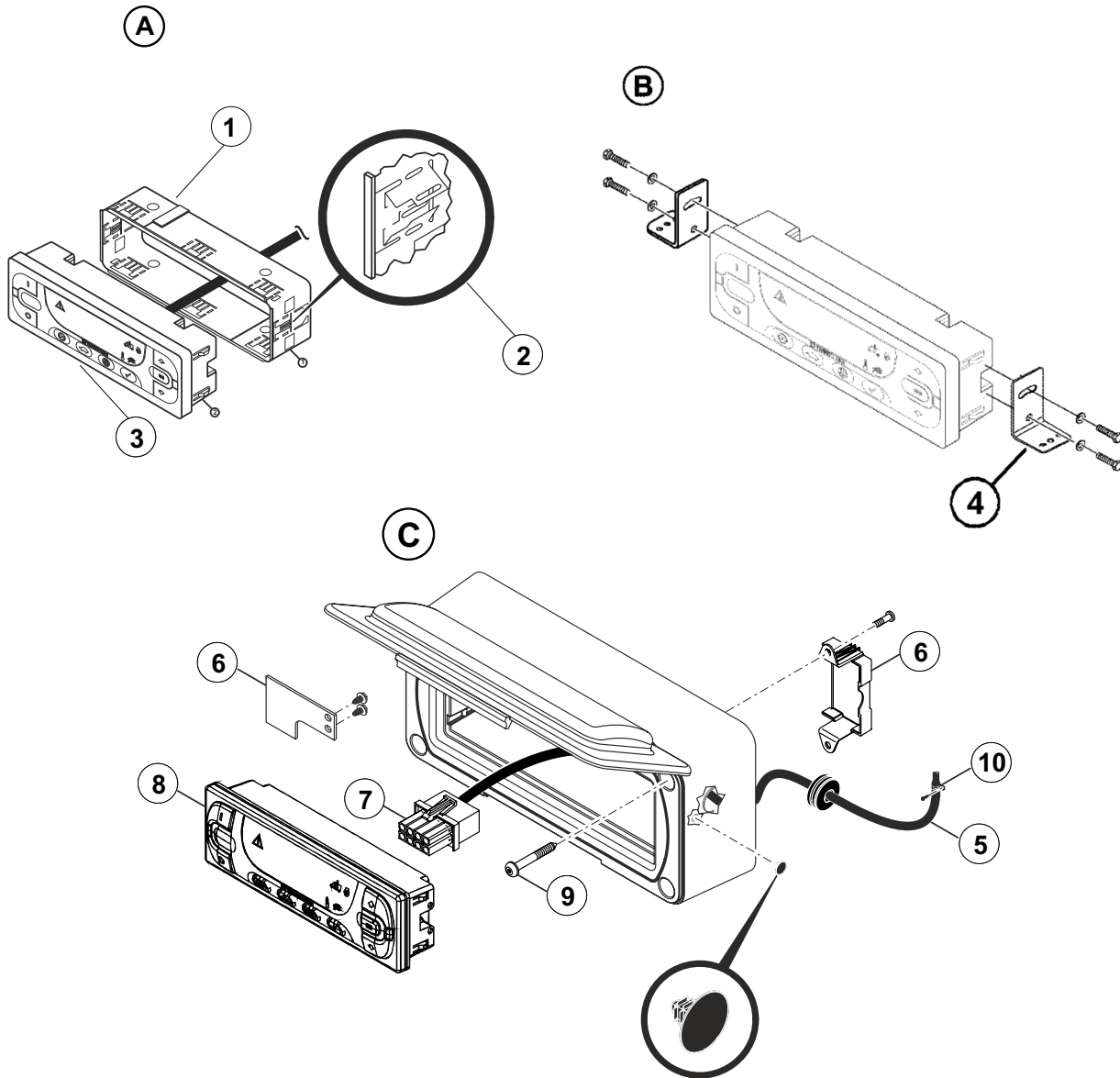
### Detail C – HMI Remote Control Box Mounting (Option).

5. Route HMI controller harness to location chosen to mount remote box.
6. Attach HMI adapter harness to controller harness.
7. Remove harness retainer cover from remote control box.
8. Route controller harness through remote control box and insert mating connector into the rear of HMI controller until it locks firmly in position. Install retaining screws.
  - Install split rubber grommet over harness and into cutout at rear of control box.
9. Insert HMI controller into remote box.
  - Secure HMI into control box by inserting four plastic retainers into holes found inside rear of box.
  - Lightly pull on harness to remove any slack and then reinstall harness retainer cover securely to remote control box.
10. Raise remote box cover to access four mounting holes.
  - Install four mounting screws to secure remote box to the cargo box.
11. Provide a drip loop and secure the excess controller harness adequately with insulated clamps.

**Important:** Do not over-tighten mounting screws or plastic remote box may be damaged.

**Note:** Premium HMI controller includes an adapter harness 422550 to attach to the Standard HMI harness connector end.

Figure 7. HMI Controller Mounting Options Shown



BEN104

## Installing the Battery Box (Option)

### ⚠ WARNING

#### Hazard of Explosion!

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

### ⚠ WARNING

#### Hazard of Explosion!

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

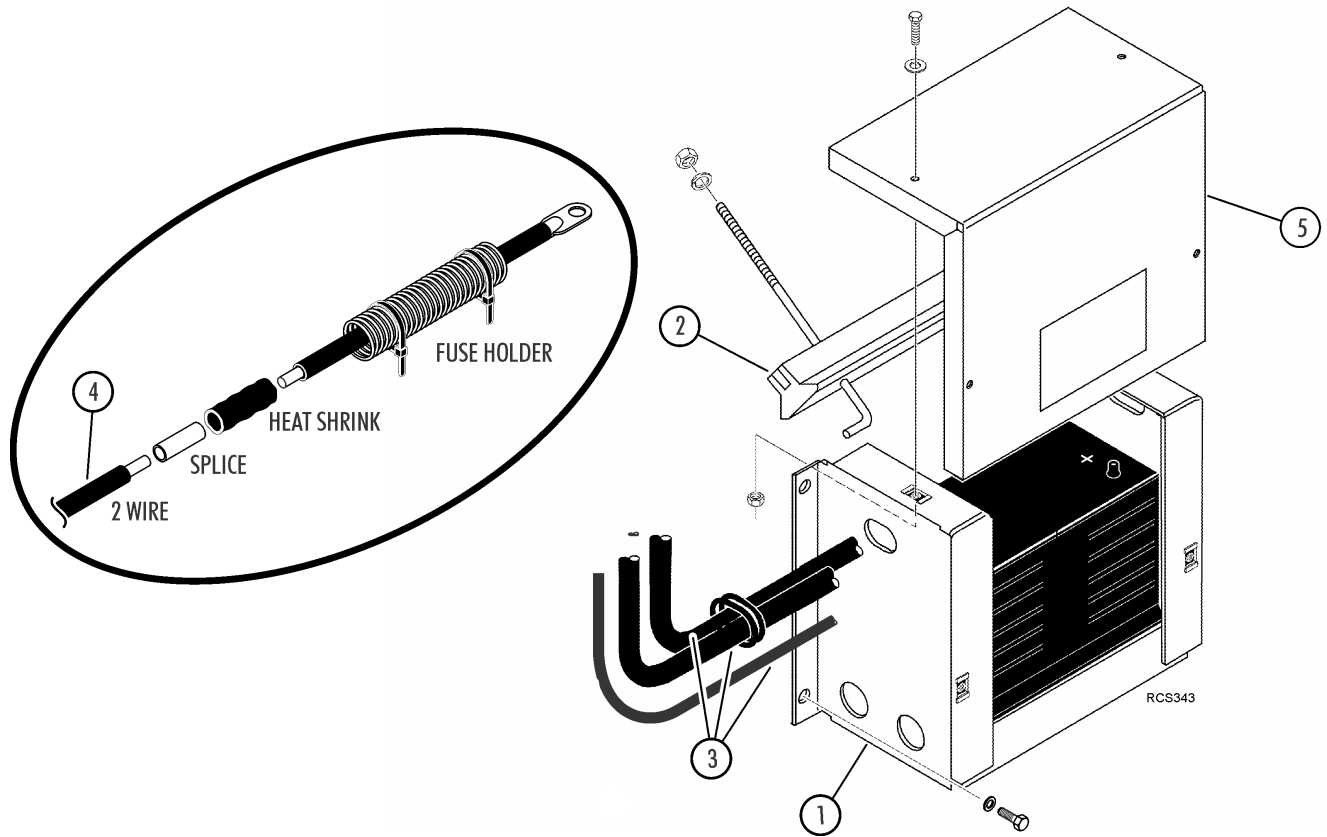
*Note: Thermo King units are designed for one 12 volt, group 31 battery. The battery must be suitable for deep cycling, heavy duty and rated with a minimum of 95 amp/hr.*

**Table 2. Supplied Components**

Description	Qty.
Battery Box	1
5/8-11 Bolts	4
5/8" Washers	8
5/8-11 Locking Nuts	4
Battery Terminal Positive	1
Battery Terminal Negative	1
Fuse Holder and 60 Amp Fuse	1
Splice Connector	1
Heat Shrink Tubing	3.00"

1. Install battery box to truck in a safe and secure location using the 5/ 8-11 stainless steel hardware supplied in installation kit.
2. Secure battery in place with hold down bracket and rod.
3. Install rubber grommet and route cables into box.
  - Cut both battery cables to length and install the supplied terminals securely onto the cables.
  - Attach the negative cable to negative terminal of battery.
  - DO NOT attach the Positive cable to the battery yet.
4. Cut 2 wire to length, strip wire ends of both the 2 wire and in-line fuse holder wire.
  - Slid heat shrink tubing onto one wire and position it away from connection.
  - Using supplied splice connector, securely crimp and solder two wires together.
  - Position heat shrink tubing over connection and then apply heat.
  - **DO NOT** attach positive cable or 2 wire at this time. They will be connected at a later step.
5. Battery box cover will also be installed after unit installation is completed.

**Figure 8. Battery Box Installation Shown**



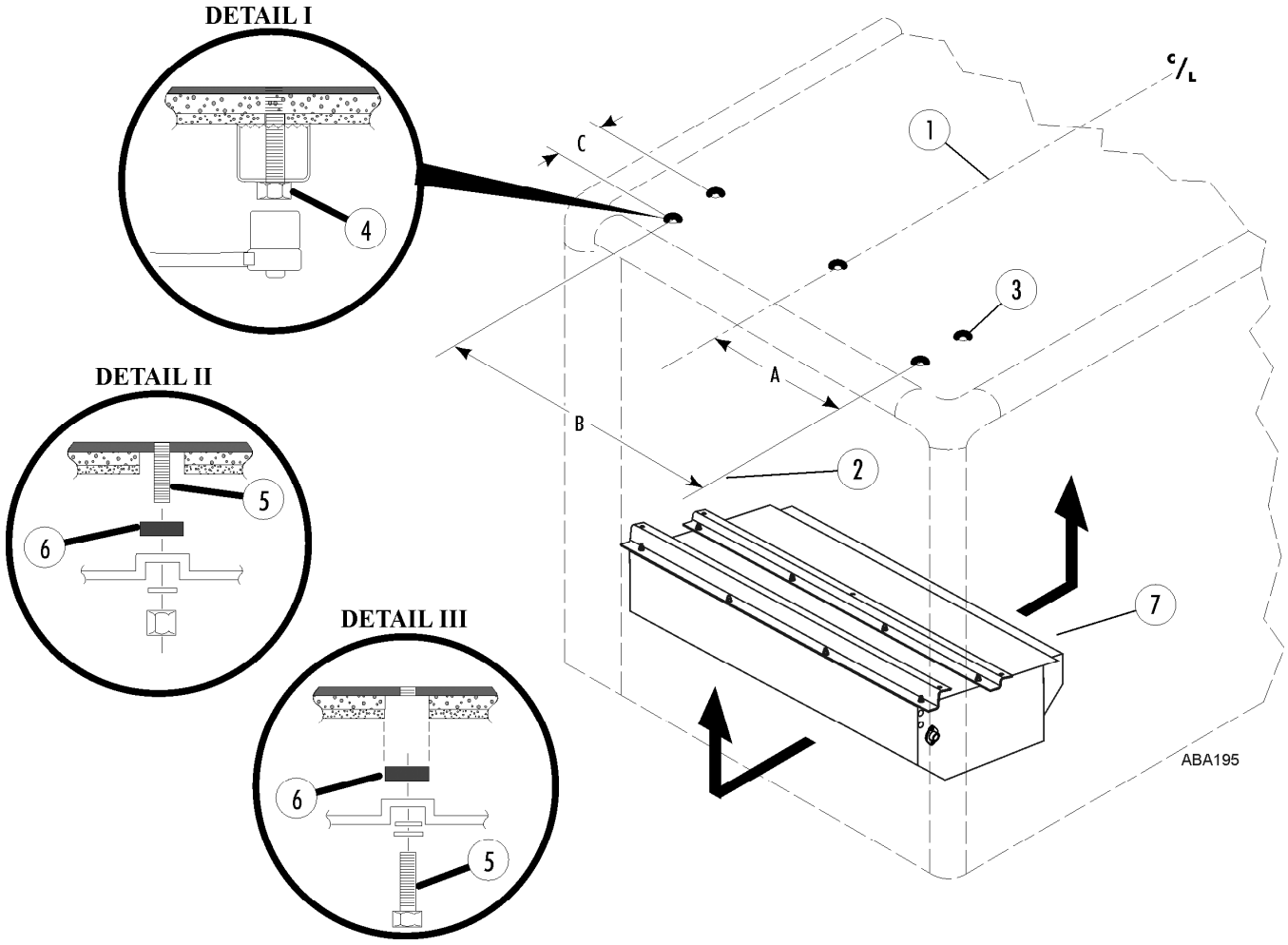
## Installing UTSE - NAD A/P

*Note: Ceiling must be flat and mounting locations correct for proper evaporator installation and operation. Thermo King recommends installing the evaporator with 8 mm (5/16 in.) bolts or studs.*

1. From inside the truck box, locate center line (**CL**) and mark its location on to truck box ceiling.
2. Measuring from the center line, locate and identify the **five** mounting locations.
3. At each location, drill appropriate size holes into ceiling support structure and use a tap and die to thread each hole with same pitch thread as mounting bolts or mounting studs.
4. Foam insulation must be removed from the mounting area on ceiling.
  - For ceiling mounting stud applications, weld a nut (same thread as stud) onto a 1-3/4 in. hole saw and turn the nut onto the mounting stud using a socket wrench (**Detail I**).
  - For ceiling mounting bolt applications, weld a bolt (same thread as tapped hole) onto a 1-3/4 in. hole saw and turn into the tapped hole using a socket wrench (**Detail I**).
5. Install the evaporator:
  - For ceiling mounting stud applications, install mounting studs, flat washers and locking nuts (**Detail II**).
  - For ceiling mounting bolt applications, install mounting bolts, locking washers and flat washers (**Detail III**).
6. Aluminum spacers must be used if ceiling is not flat, or if foam exists between the mounting plate and truck liner (**Detail II and Detail III**).
7. Install supplied foam sealing strips and rubber edging before installing the evaporator.

***Torque all mounting bolts to 81 N•m (60 ft-lb).***

Figure 9. Typical UTSE Installation Shown



A.	749.3 mm (29.50 in.)
B.	1498.6 mm (59.00 in.)
C.	256.4 mm (10.09 in.)



# Installing S-3 + S-3 Evaporators

## Ceiling Preparation

**Important:** Ceiling must be flat and mounting locations correct for proper S-3 evaporator installation. Foam insulation in ceiling must be removed from evaporator mounting area and aluminum spacers must be installed between evaporator mounting plate and truck/trailer ceiling.

- For ceiling mounting stud applications, weld a nut (same thread as stud) onto a 44.45 mm (1.75 in.) hole saw and turn nut onto mounting stud using a socket wrench (**Detail I**).
- For ceiling mounting bolt applications, weld a bolt (same thread as tapped hole) onto a 44.45 mm (1.75 in.) hole saw and turn into tapped mounting hole using a socket wrench (**Detail I**).
- Alternative method is to remove mounting studs or bolts and use a hole saw with a standard pilot drill small enough to run up into threaded hole without damaging the threads. Reinstall mounting studs or bolts.

## Mounting Stud or Bolt Requirements

Mounting studs or bolts used to attach evaporator(s) to ceiling must be 10.0 mm, (0.50 in., Grade 5, U.S. applications only), medium carbon steel, 120000 PSI tensile strength, cadmium plate and dichromate finish. Studs to extend below ceiling 38.0 mm (1.50 in.) to 50.1 mm (2.00 in.)

### Evaporator Installation

**Note:** Installation kit provides both metric and imperial nuts and washers. Be sure to use correct ones for your application.

1. Remove evaporator cover to access mounting holes.

### Mounting Stud Installations

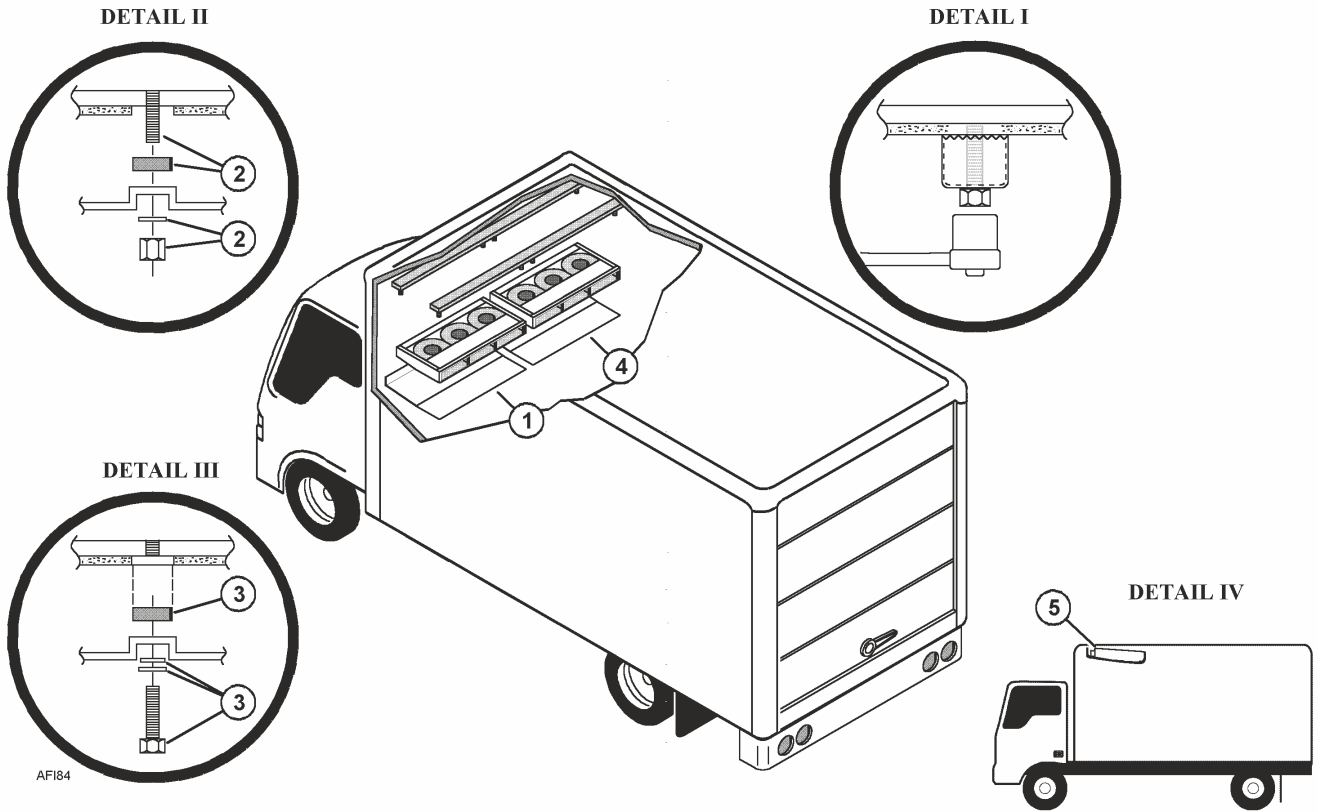
2. Install mounting studs into the ceiling. Install the aluminum spacers onto mounting studs and raise evaporator into position. Loosely secure evaporator onto mounting studs with flat washers and locking nuts (**Detail II**). **Do not** tighten the mounting hardware at this time.

### Mounting Bolt Installations

3. Raise evaporator into position. Install aluminum spacers, mounting bolts, lock washers and flat washers and loosely secure evaporator to the ceiling (**Detail III**). **Do not** tighten the mounting hardware at this time.
4. Install second evaporator. Torque each evaporator's mounting hardware to 81 N m (60 ft-lb).
5. A properly installed evaporator will slope slightly toward the drain tubes to allow for water drainage (**Detail IV**).

**Note:** Two additional washers are included in kit to help assist sloping the evaporator towards the drain.

Figure 10. Typical S3 + S3 Installation Shown



# Removing Holding Charge and Refrigerant Tubing Best Practices

## STOP

Thermo King UT-1280 condensing units and remote evaporator(s) are shipped with a 35-69 kPa (5-10 psi) holding charge of Nitrogen. This holding charge may be safely vented into the atmosphere.

**IMPORTANT:** Do not release the holding charge until necessary to prevent moisture from entering the system.

**SEVERE COMPRESSOR DAMAGE** will result from operating the UT-1280 engine/motor before completing the system installation which includes: installing the components, releasing the holding charge from both the condensing unit and the remote evaporator(s), soldering the refrigeration lines, leak testing the system, evacuation and clean-up, and charging the system with refrigerant.

## ⚠ CAUTION

### Risk of Injury!

Remove holding charge from host unit and remote evaporator(s) before proceeding to prevent personal injury!

1. Slowly remove the caps from the condensing unit to release the Nitrogen holding charge.
2. Slowly remove the caps from the remote evaporator(s) to release the Nitrogen holding charge.

### Refrigerant Tubing Best Practice

- Thermo King recommends the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable (Detail I).
- Apply refrigerant oil (supplied in the installation kit) to all refrigerant tube O-rings prior to assembly.
- It is also required that nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

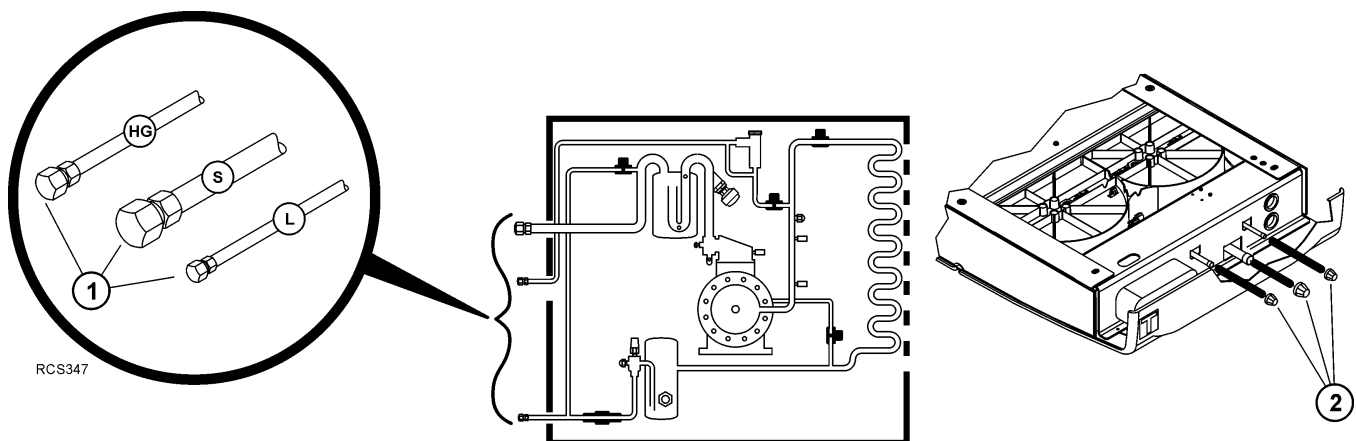
## ⚠ WARNING

### Hazard of Explosion!

Regulators used on bottles of nitrogen gas must be equipped with relief valves. The pressure in a bottle of nitrogen gas is extremely high. It is high enough to cause components of the refrigeration system to explode if the regulator malfunctions or is set wrong. The relief valve provides a safe outlet in case the regulated pressure exceeds the relief valve limit.

- Always disassemble and remove internal components from check valves before soldering to prevent damage.
- Refrigeration tubing from condenser can be routed either outside or inside the truck box depending on the particular installation and application.
- Protective covers should be fabricated to prevent damage to the refrigeration tubing and electrical wires and installed at the completion of the installation.

Figure 11. Capped Off Hot Gas, Suction and Liquid Fittings Shown



# Connecting Refrigeration Tubing to UTSE

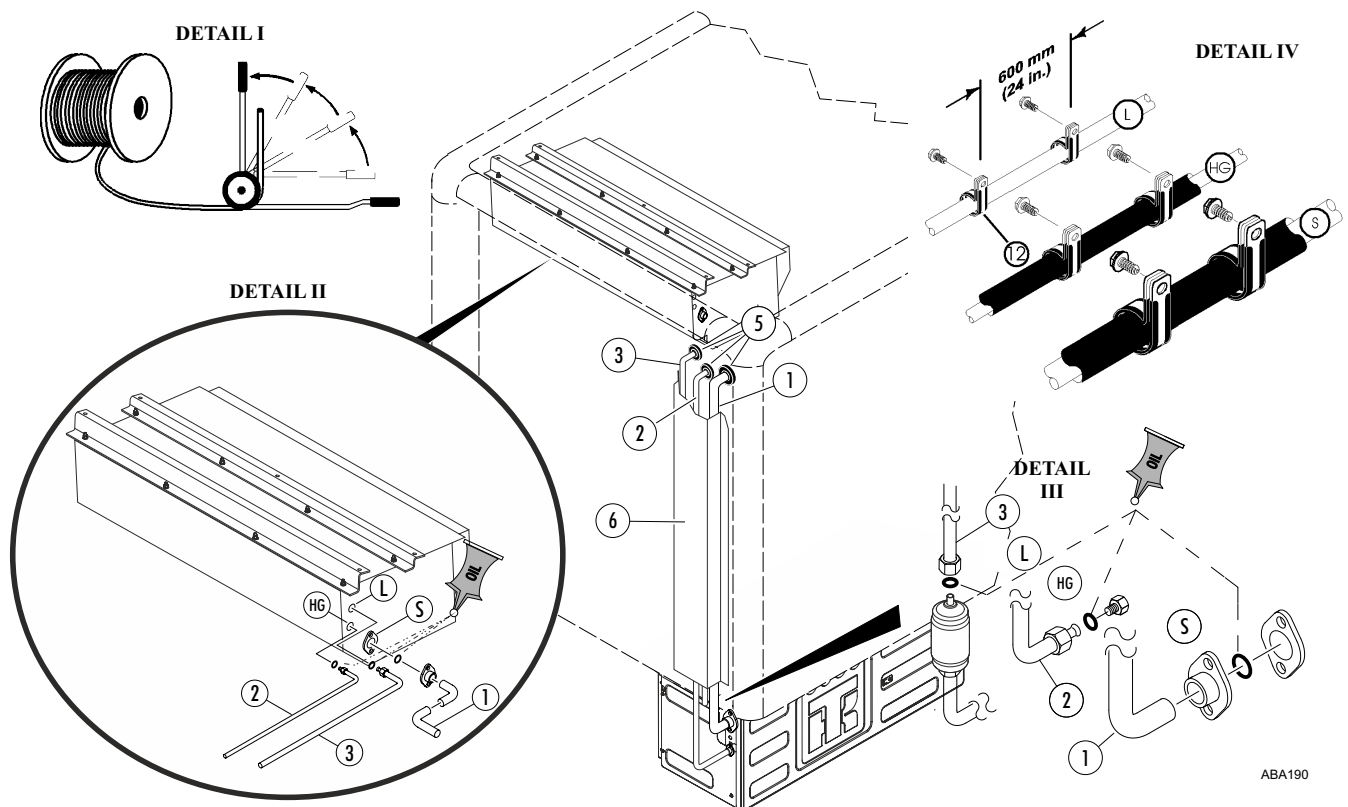
**Note:** Thermo King recommends the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable (Detail I). It is also required that nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

The refrigeration tubing can be routed either outside (as shown) or inside the truck box depending on the particular installation and application.

**Important:** Apply refrigerant oil (supplied in the installation kit) to all refrigerant tube O-rings prior to assembly.

1. Fabricate a 1-3/8 in. suction tube from the evaporator to the condenser (Detail II). Use the provided flanges and O-rings (**Detail II and III**) to connect the suction tube to the evaporator and the condenser.
2. Fabricate a 1/2 in. hot gas tube from the evaporator to the condenser. Use the provided tube with ORS fittings (**Detail II and III**).
3. Fabricate a 1/2 in. liquid tube from the evaporator to the filter drier Use the provided tube with ORS fittings (**Detail II and III**).
4. Secure all tubing with provided clamps (**Detail IV**).
5. Seal around tubing with caulk to prevent air and water leakage.
6. Protective covers should be fabricated to prevent damage to the refrigeration tubing and electrical wires and installed at the completion of the installation.

**Figure 12. Connecting Refrigeration Tubing to UTSE**



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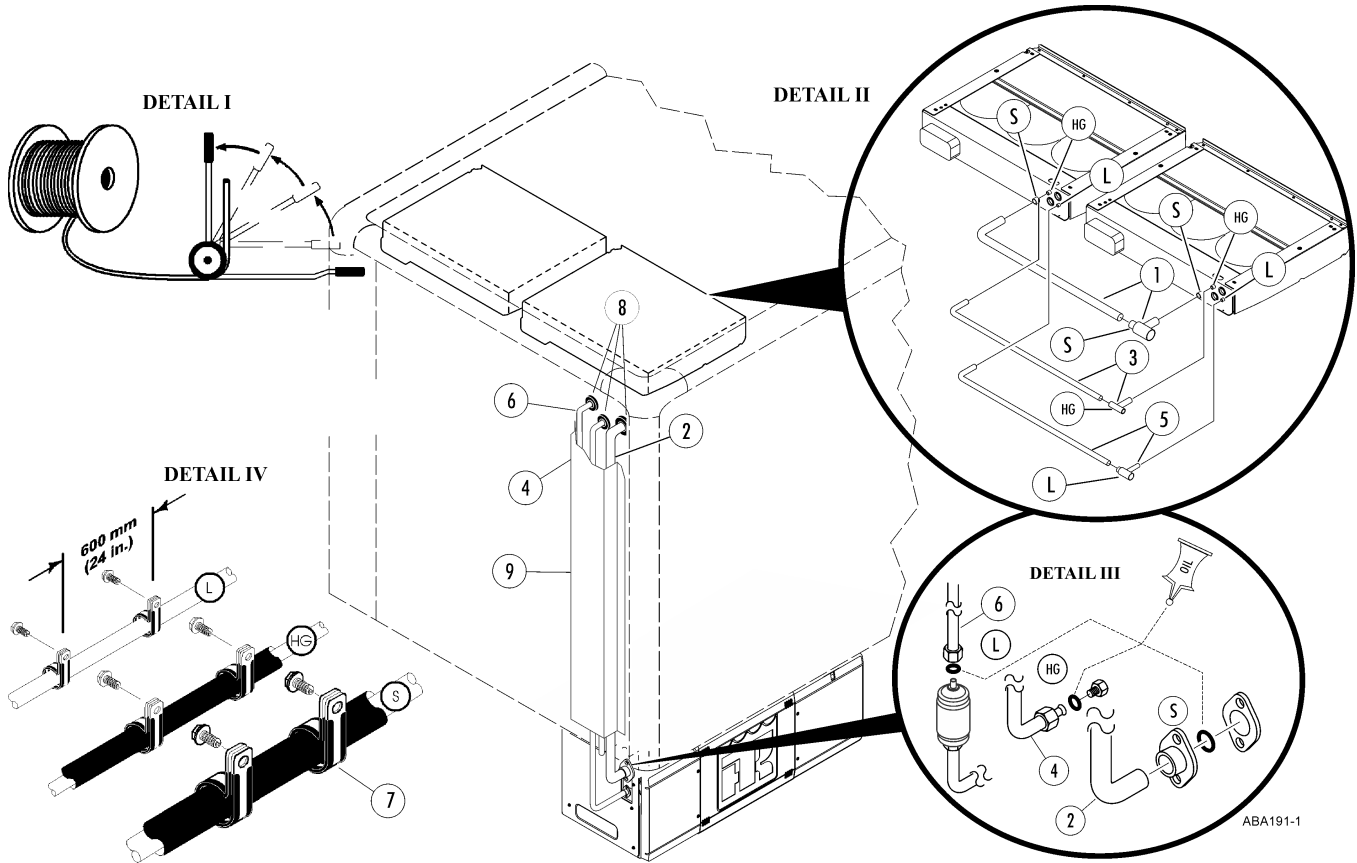
# Connecting Refrigeration Tubing to S-3 + S-3 Evaporators

**Note:** Thermo King recommends the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable (Detail I). It is also required that nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

The refrigeration tubing can be routed either outside (as shown) or inside the truck box depending on the particular installation and application.

1. Install a 1-3/8 in. x 7/8 in. x 7/8 in. tee onto the S-3 Master evaporator's suction fitting. Attach at 7/8 in. suction tube onto the S-3 Support evaporator's suction fitting and connect it to tee assembly (**Detail II**).
2. Fabricate a 1-3/8 in. suction tube from tee fitting down to condenser unit. Use provided flange and O-ring to connect suction tube to condenser unit (**Detail III**).
3. Install a 1/2 in. x 1/2 in. x 1/2 in. tee onto S-3 Master evaporator's hot gas fitting. Attach a 1/2 in. hot gas tube onto the S-3 Support evaporator's hot gas fitting and connect it to tee assembly (**Detail II**).
4. Fabricate a 1/2 in. hot gas tube from tee fitting down to condenser unit. Use the provided ORS fittings to connect hot gas tube to condenser (**Detail III**).
5. Install a 1/2 in. x 3/8 in. x 3/8 in. tee onto the S-3 Master evaporator's liquid fitting. Attach a 3/8 in. liquid tube onto the S-3 Support evaporator's liquid fitting and connect it to the tee assembly (**Detail II**).
6. Fabricate a **1/2 in. liquid tube** from the tee fitting to filter drier. Use the provided ORS fittings to connect liquid tube to drier (**Detail III**).
7. Secure all tubing with provided clamps (**Detail IV**).
8. Seal around tubing with caulk to prevent air and water leakage.
9. Protective covers should be fabricated to prevent damage to refrigeration tubing and electrical wires and installed at completion of installation.

Figure 13. Connecting Refrigeration Tubing to S-3 + S-3 Evaporators



## Installing Drain Hoses

### **⚠ DANGER**

#### **Fire Hazard!**

Never bundle evaporator drain hose resistance wires together as the amount of heat produced could result in a fire!

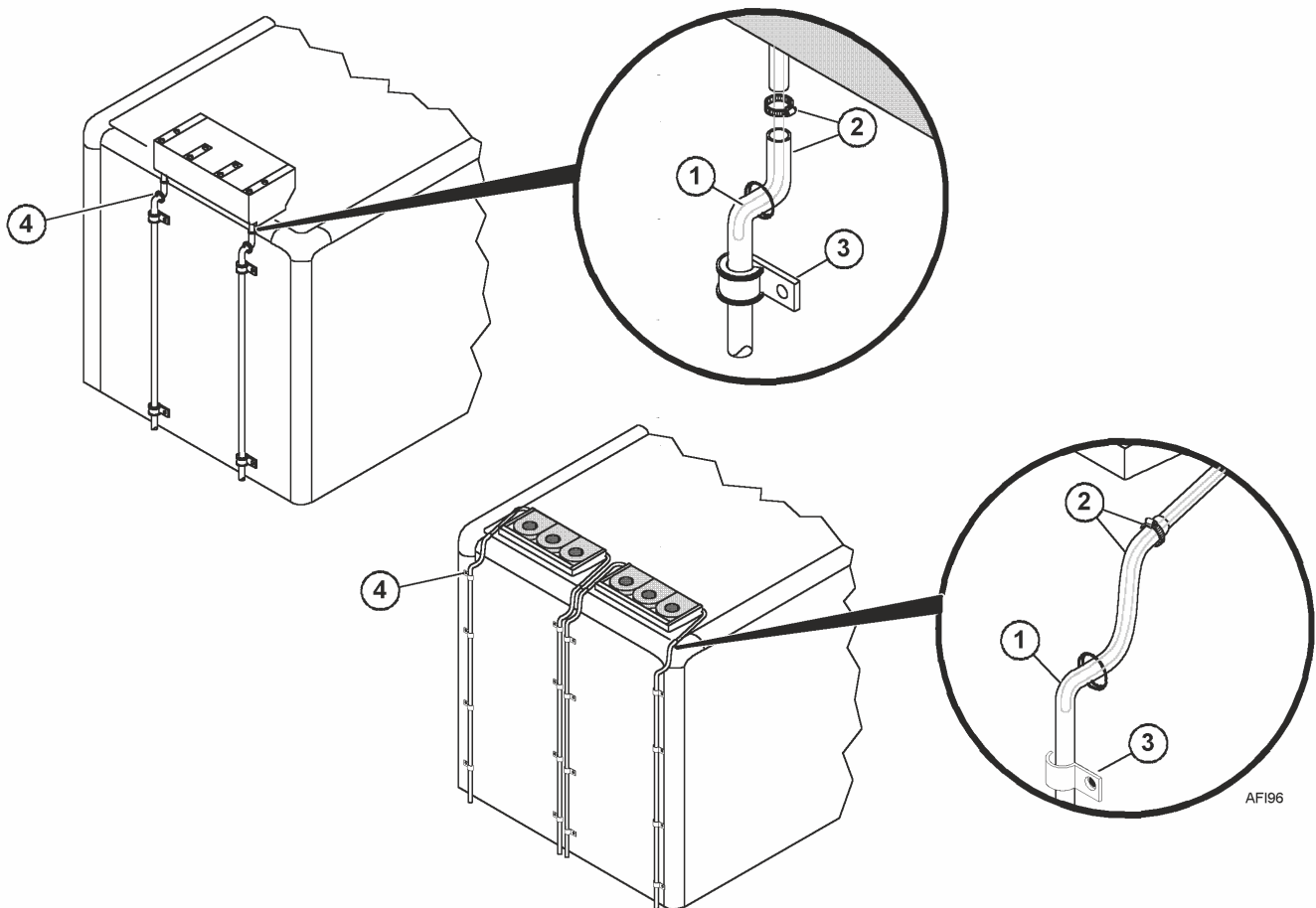
*Note: For proper drainage the drain hose must slope down continuously from the remote evaporators to the wall drains with no kinks or droop.*

Thermo King recommends routing each individual drain hose directly out of the truck box to allow faster water drainage.

1. Insert entire length of resistance wire into drain hose.
2. Attach drain hose to evaporator drain outlet and secure with supplied hose clamps.
3. Secure drain hose to outside of truck box wall with supplied clamps and screws.
4. Seal around drain hoses with caulk to prevent air and water leakage.

***Important: DO NOT CUT THE RESISTANCE WIRES!***

**Figure 14. Typical Drain Hose Installations Shown**



# Electrical Connections to UTSE

## ⚠ WARNING

### Equipment Damage!

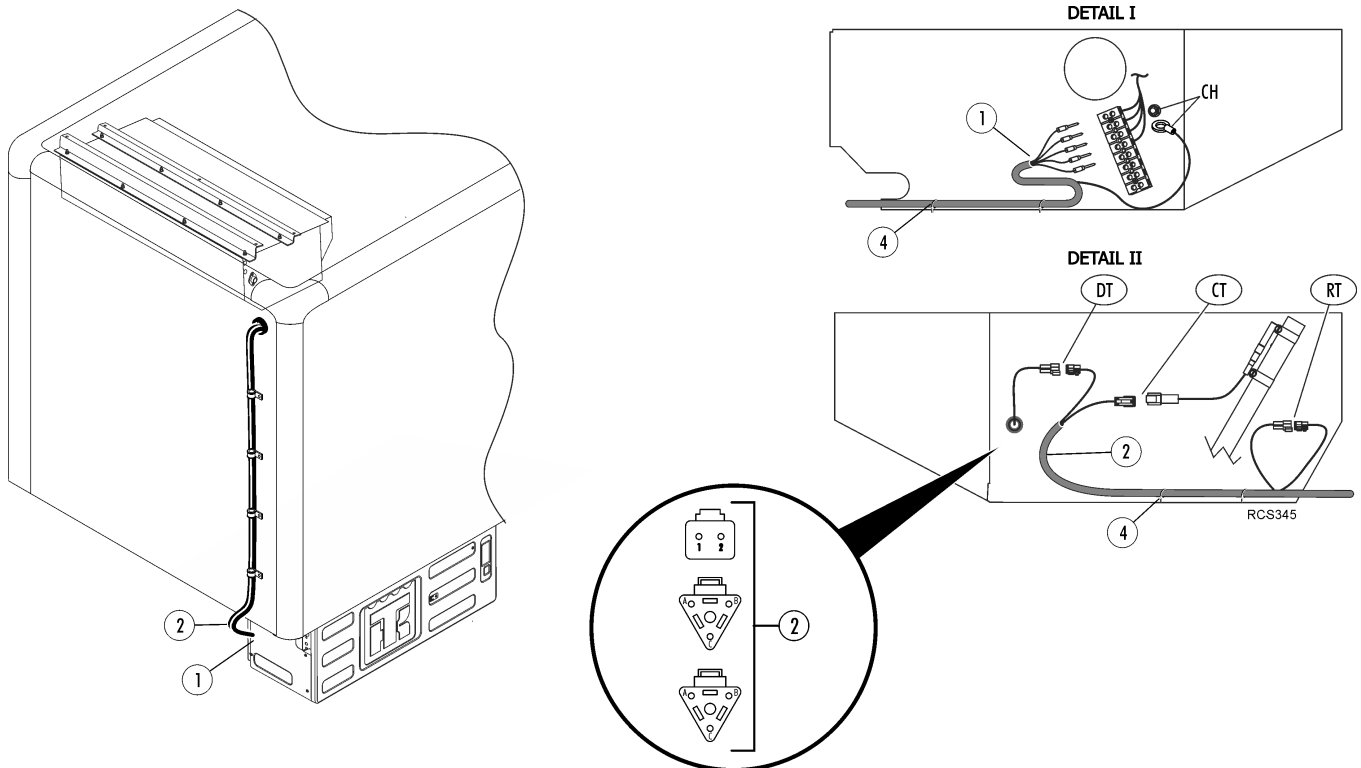
All electrical wires must be routed and secured properly to prevent them from rubbing, chaffing, or making contact with hot, sharp, or rotating components.

**Note:** When routing harness wires from the condenser unit, allow a service loop, (in case the unit needs to be lowered from it's mounting position), then route harness wires to evaporators.

**Important:** All harness connectors must be clean and firmly attached to the mating connectors. All terminal rings and forked terminals must be properly attached to the wire and firmly connected to the terminal strips.

1. **Fan Harnesses** - Connect the (3) fan harnesses to the mating 2-Pin connectors on condenser and route harnesses to evaporator.
  - Cut wires to length and re-terminate **FM** wire ends with fork terminals and **CH** wire ends with ring terminals supplied in installation kit.
  - Connect each **FM** wire to each **FM** terminal block connection (**Detail I**).
  - Attach the **CH** wires to the ground stud (**Detail I**).
2. **Sensor Harness** - Connect 8-Pin sensor harness to the mating connector on condenser and route harness to evaporator.
  - Attach sensor harness connectors to mating connectors on the evaporator (**Detail II**).
3. From the Sensor Harness, attach the **DH** wire to the single terminal block connection that has 2 defrost heater (**DH**) wires.
4. Secure Fan and Sensor Harness with tie bands using provided holes along base of evaporator (**Details I and II**).

**Figure 15. Electrical Connections – UTSE**





# Electrical Connections to S-3 + S-3 Evaporators

## ⚠ WARNING

### Equipment Damage!

All electrical wires must be routed and secured properly to prevent them from rubbing, chaffing, or making contact with hot, sharp, or rotating components.

*Note: When routing harness wires from the condenser unit, allow a service loop, (in case the unit needs to be lowered from it's mounting position), then route harness wires to evaporators.*

*Important: All harness connectors must be clean and firmly attached to the mating connectors. All terminal rings and forked terminals must be properly attached to the wire and firmly connected to the terminal strips.*

### Connecting Harnesses to Master Evaporator

*Note: Do not remove "Master" and "Support" nameplates until the installation is complete.*

1. **Fan Harnesses** - Connect the (3) fan harnesses to the mating 2-Pin connectors on condenser and route harnesses to **MASTER** evaporator.
  - Cut wires to length and re-terminate **FM** wire ends with fork terminals and **CH** wire ends with ring terminals supplied in installation kit.
  - Connect each **FM** wire to each FM terminal block connection (**Detail I**).
  - Attach the three **CH** wires to the ground stud (**Detail I**).
2. **Sensor Harness** - Connect 8-Pin sensor harness to the mating connector on condenser and route harness to **MASTER** evaporator.
  - Attach sensor harness connectors to mating connectors on the evaporator (**Detail II**).

### Connecting Interconnect Harness to Evaporators

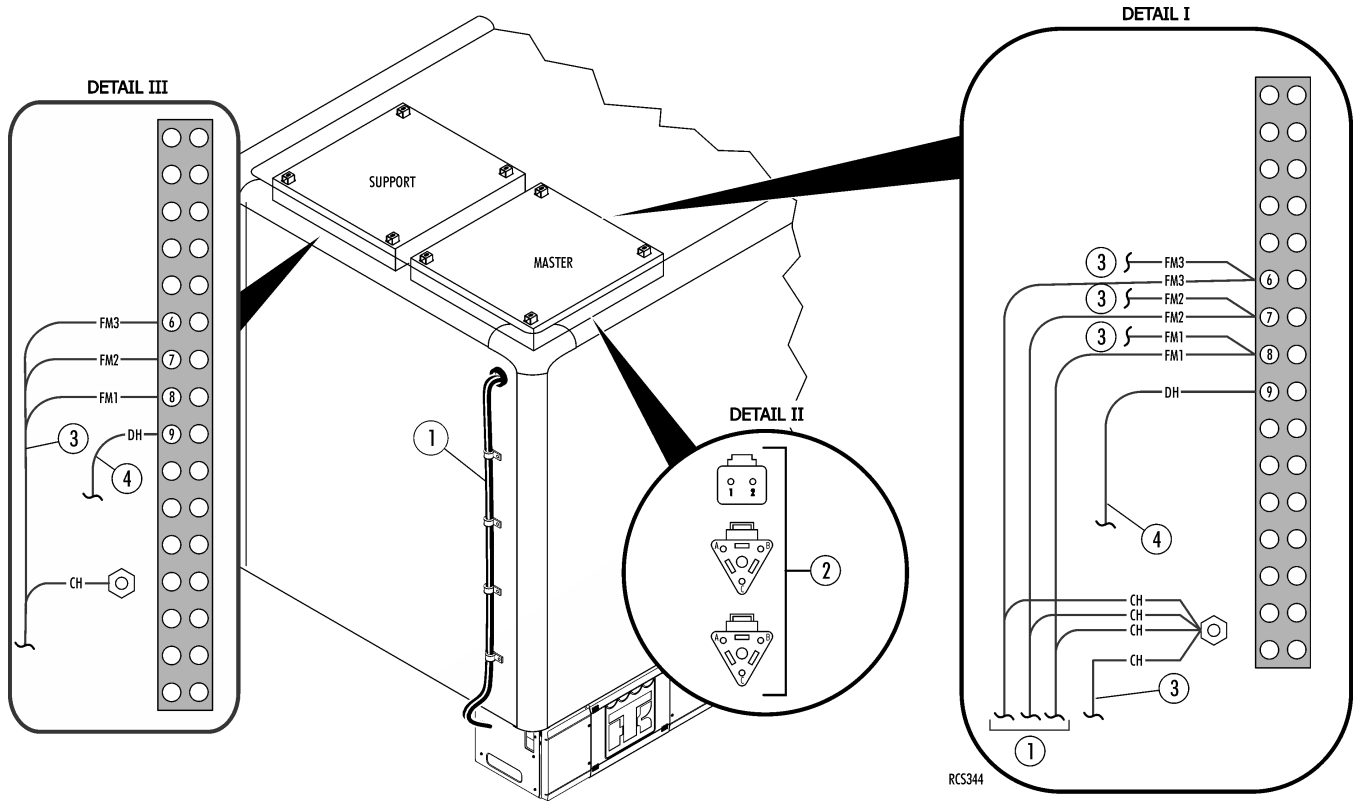
3. Route interconnect harness wires from **SUPPORT** evaporator to **MASTER** evaporator terminal block.
  - On the **MASTER** evaporator, connect each **FM** wire to each **FM** terminal block connection and tighten screws securely (**Detail I**).
  - Attach the **CH** wire to the ground stud securely (**Detail I**).

Connect the **DH** wire from the **SUPPORT** evaporator to the **DH** terminal block connection on **MASTER** evaporator.

*Note: If there is no DH wire, one will need to be added.*

- Measure and fabricate a 14 gauge wire to go from the terminal block of the **MASTER** evaporator to the terminal block of the **SUPPORT** evaporator.
  - Install #8 blue fork terminals onto both ends of the wire.
  - Attach the wire onto the **DH** terminal block connection of each evaporator (**Detail I and III**).
4. Secure all wiring adequately with tie bands.

**Figure 16. Electrical Connections to S-3 + S-3 Evaporators**



# Evaporator Drain Hose Resistance Wire Installation Guide

The following information is provided as a guide to help ensure the proper routing of the drain hose resistance wires. You should supplement this guide with whatever other documentation is required for your facility.

**Important:** *Only one resistance wire should be installed in the wall defrost drain tube. Only the resistance wire from the drain tube closest to the wall should be installed in the trailer drain tube.*

1. Remove resistance wire from evaporator drain tube and pull wire out straight.
2. Locate evaporator defrost drain furthest from wall (i.e. in the middle of the cargo box), and measure 33.00 in. (838 mm) of resistance wire from drain pan outlet (**Detail I**).
3. Bend resistance wire at this point and double it over (**Detail II**).
4. After doubling the resistance wire over (Step #3) take excess wire and insert it back into evaporator drain tube (**Detail III**).
5. Insert doubled over end of resistance wire into drain Tee or 90 degree connector (Detail IV) and then into crossover drain tube (**Detail V**).

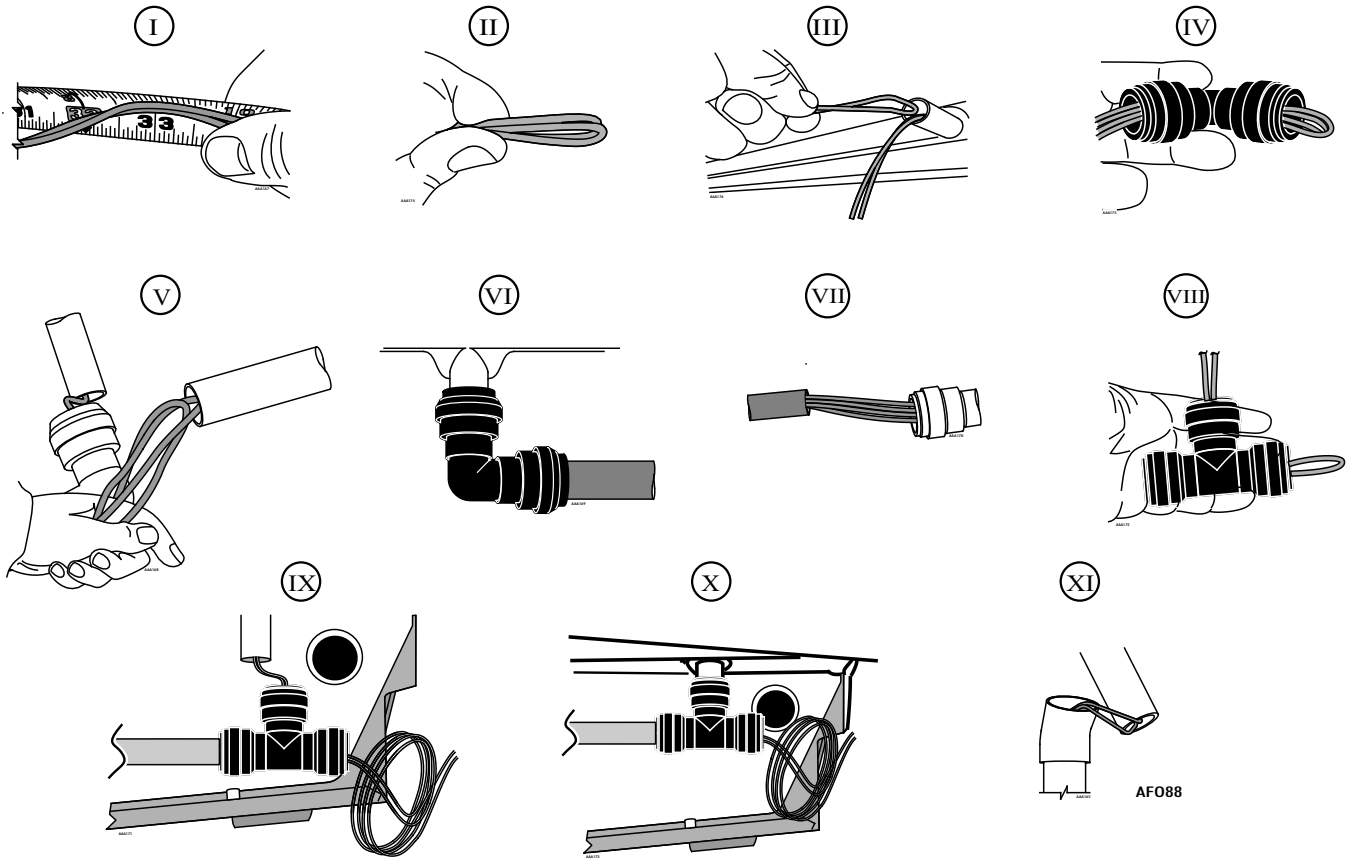
**Note:** *Use of either white or blue drain tubes is acceptable when interconnecting multiple evaporators.*

6. Attach drain Tee or 90 degree connector to evaporator drain tube and push connector on firmly to engage the O-ring (**Detail VI**).
7. Pull resistance wire through interconnecting drain tube as far as possible and make sure it is not bunched up (**Detail VII**).
8. Insert other resistance wire into the other drain Tee connector and as shown (**Detail VIII**).

**Important:** *At no time should resistance wires from one side of the drain pan overlap the resistance wires from the other side.*

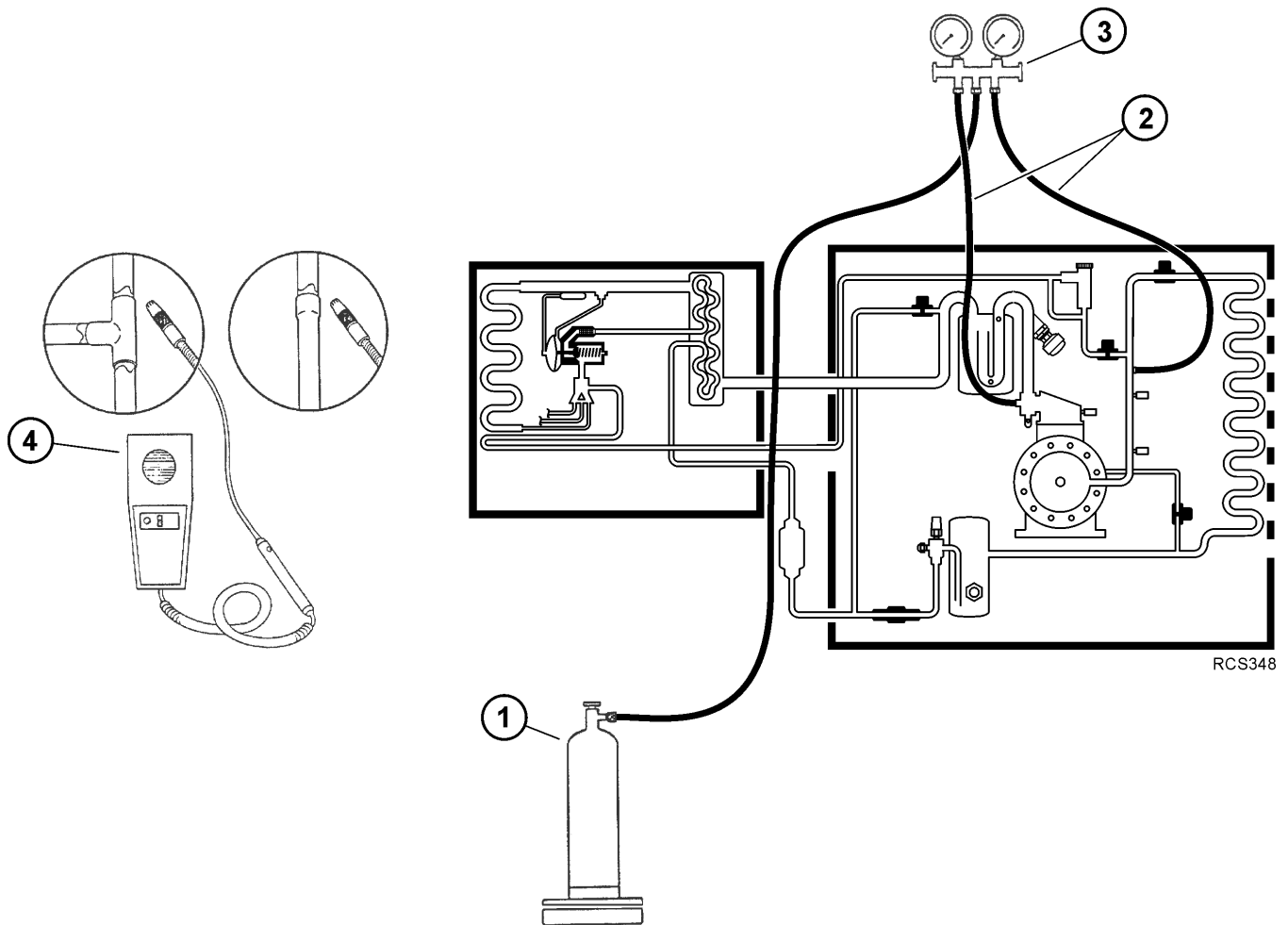
9. Attach interconnecting drain tube to opposite Tee connector by pushing the Tee connector on firmly to engage the O-ring (**Detail IX**).
10. Attach the Tee connector to the evaporator drain tube by pushing the Tee connector on firmly to engage O-ring (**Detail X**).
11. Attach and route evaporator drain tube over to wall drain. Insert resistance wire into wall drain and pull it as far down wall drain as possible (**Detail XI**).

**Figure 17. Drain Hose Resistance Wire Installation Shown**



# System Leak Check

1. Connect leak test gas supply (R404A) to center hose of gauge manifold.
2. Attach gauge manifold hoses to suction and discharge service valves.
3. Open suction and discharge valves and pressurize system with leak test gas. If desired system pressure may be boosted using nitrogen gas.
4. Check all connections made during installation for leaks using an electronic leak detector.
5. Recover test gas pressure to repair leaks. System must be vented while repairing solder leak joints. Pressurize system again after a leak has been repaired.
6. If no leaks are found, recover test gas to 0 psi.



# System Evacuation and Charging Procedures

**Important:** Do not evacuate the unit until it is leak free. Units with less than full refrigerant charge should be leak checked and all leaks must be repaired.

**Note:** The use of Thermo King Evacuation Station P/N 204-725 is required. Set up and test evacuative equipment prior to performing this operation. The UT-1280 does not have a discharge service valve, therefore it is recommended that low-loss fittings be used on any gauge sets and on evacuation station line connected to discharge line.

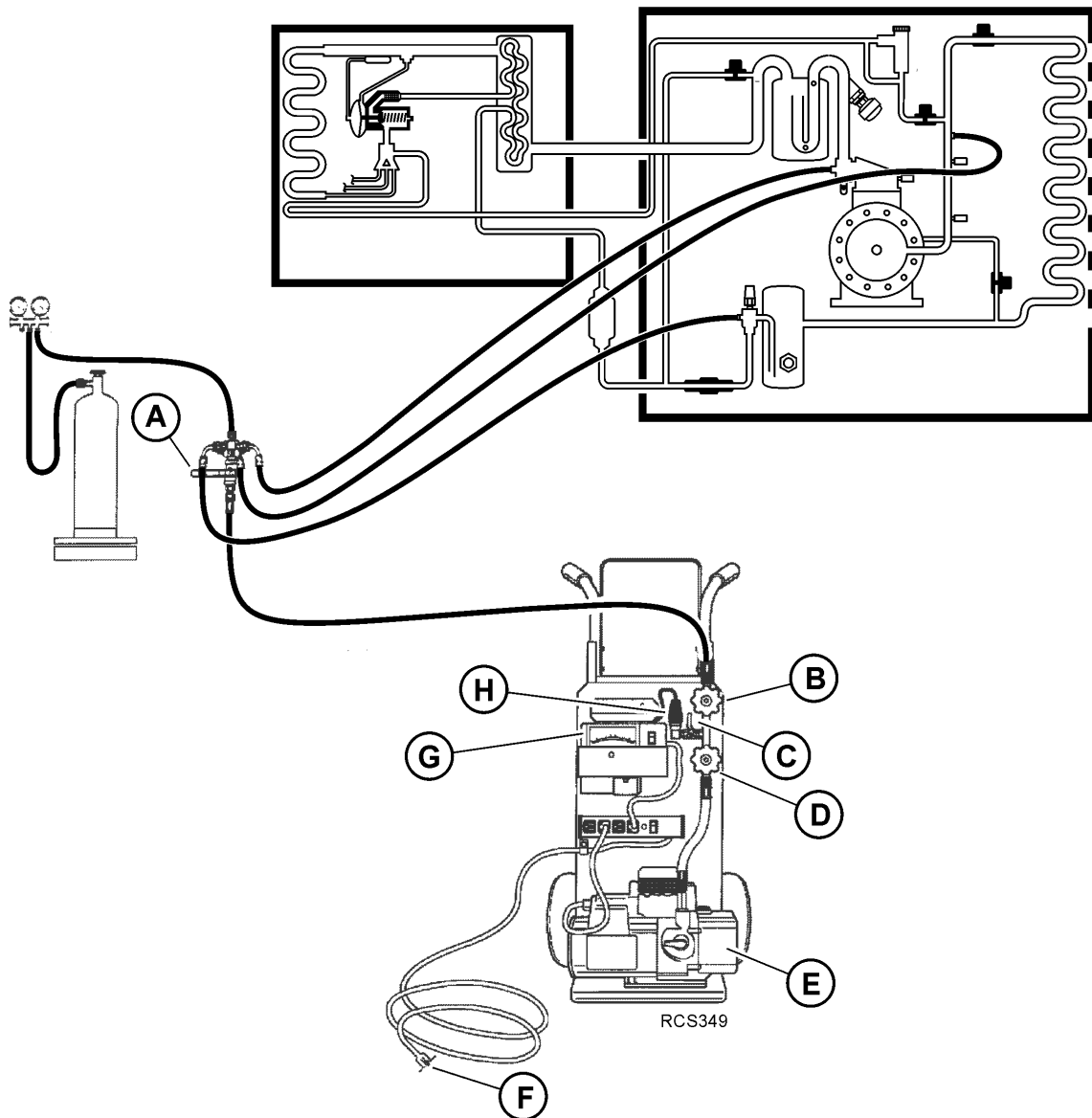
## System Evacuation and Charging Procedures

The overall procedure is:

- Evacuate system using a Thermo King Evacuation Station.
- Place a partial charge in the system using the evacuation station.
- Complete charging of system by simulating a 0 degree F box and a 100 degree F ambient and utilizing the built in liquid line sight glass.

## System Evacuation

1. Prepare unit for evacuation. Recover any refrigerant to 0 psi (regulations may require a recovery machine to pull system pressure lower than 0 psi).
2. Before connecting refrigerant hoses to unit, close valves **V1, V2, and V4**.
3. Back seat suction and receiver tank service valves.
4. Attach evacuation hoses to **SSV** and **RTDV** and to the discharge port of the compressor (check condition of hose seals).
5. Install a low pressure hose from spare access port on valve V4 service hose to a refrigerant supply. Bottle valve closed.
6. Mid-seat all service valves.
7. Start vacuum pump and open valves **V1, V2, V3, and V4**.
8. Energize Thermax valve. Refer to Service Bulletin T&T 246.
9. Evacuate system to 500 microns or lowest achievable level between 500 and 1000 microns. Split systems with multi-evaporators should be evacuated for an additional hour once 500 microns is reached.
10. When acceptable micron level is achieved (500 to 1000 microns plus one hour for multi-evaporators), close valve V1 to isolate pump. Turn pump **OFF**.
11. Observe reading on micron gauge after 5 minutes have elapsed. Vacuum rise should not exceed 2000 microns. If vacuum level exceeds 2000 microns after 5 minutes, a leak is present or additional evacuation time is required.
12. If vacuum level is acceptable, start pump and open valve **V1** to evacuate pressure rise (5 minutes).
13. With vacuum pump running, back seat suction service valve. Observe micron gauge and continue to operate vacuum pump until an acceptable micron level is achieved.
14. Close valve **V1** and stop the pump. Observe micron gauge to confirm that system remains in deep vacuum. Close valve **V4**. Unit is now ready to charge.



A.	V-4	E.	Two Stage Vacuum Pump
B.	V-3	F.	To AC Power
C.	V-2	G.	Micron Gauge
D.	V-1	H.	Thermistor

## Initial System Charge

The UT-1280 utilizes a liquid line sight glass. This is used in order to attain an optimum charge given varied installations (suction/liquid line lengths vary).

**DO NOT** use the receive tank sight glass as an indicator of the required refrigerant level in the system.

**Note:** Before charging system, make sure refrigerant lines from the gauge manifold to refrigerant supply bottle have been evacuated or purged.

1. Suction service valve is back seated and receiver outlet valve is open. Refrigerant will be added to the high side of the unit with the unit **OFF**.
2. Set refrigerant supply bottle for liquid. Open gauge manifold hand valve and add a partial charge of 4.1 kg (9.0 lb.) of R-404A refrigerant.

**Note:** Do not add more than this. Remainder of charge will be added through suction service valve while unit is running.

3. After the liquid refrigerant is added, close gauge manifold hand valve.
4. Remove hose from discharge line. A low loss fitting on this hose will prevent excessive loss of refrigerant.
5. Back seat (close) the receiver outlet valve.
6. Front seat the suction service valve (SSV). Run the unit until a 3 to 5 psig (21 to 35 kPa) reading is obtained on the suction gauge. Stop the unit. Do not run the unit into a deep vacuum as it may damage the scroll compressor.
7. Back seat (close) suction service valve.
8. Remove the evacuation station hoses.
9. Cap service valve ports, backseat (close) suction service valve (SSV).

## Final System Charge

1. Install a gauge manifold set on the suction service valve and the discharge port of the scroll compressor.
2. Start the unit and set the thermostat to COOL. Maintain a 0 degree F/ -17.8 degree C box and 100 degree F/37degree C ambient. Suction pressure should be 12-20 psig and discharge pressure to 290-310 psig (suction service valve cracked). Cover the condenser coil if needed.
3. Observe suction pressure and slowly open gauge manifold hand valve to allow liquid refrigerant to flow into suction service valve. Control liquid flow so suction pressure increases approximately 138 kPa (20 psi).
4. Add refrigerant until no bubbles appear in the liquid line sight glass.
5. Stop the flow of refrigerant into the system by closing the low-side gauge manifold hand valve.
6. Continue to operate unit in COOL for 10 minutes and check for bubbles in the liquid line sight glass. If bubbles appear, add liquid refrigerant. The total charge in the system will be about 14 lbs. / 6.6 Kg of refrigerant.

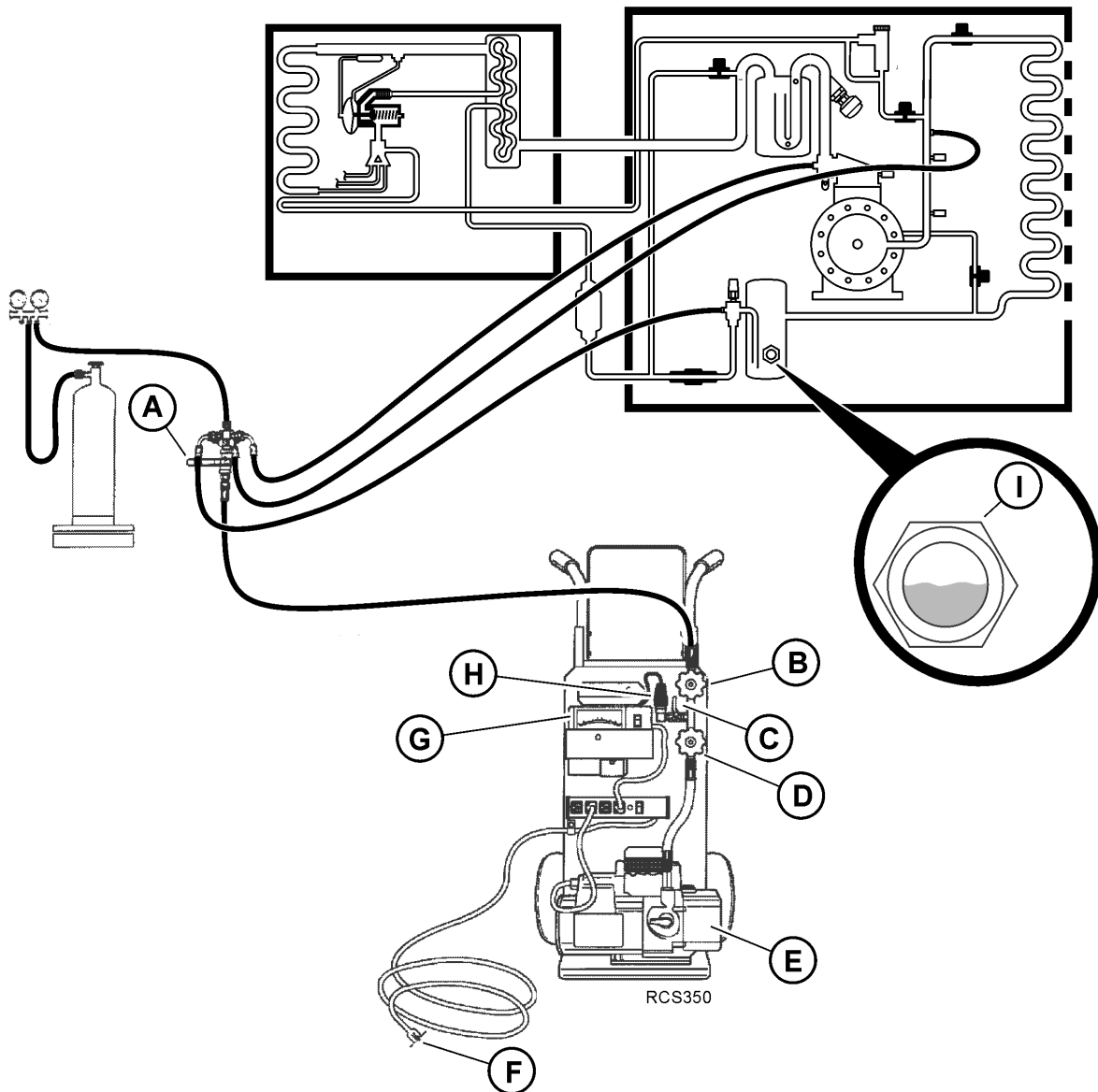
## Removal of Refrigerant Hoses

1. With a low loss fitting on the discharge gauge line, remove this line from the unit.
2. Run unit in COOL mode.
3. Front seat the suction service valve. Run unit until a 3 to 5 psig (21 to 35 kPa) reading is obtained on the suction gauge. Stop the unit.

**Important:** DO NOT run the unit into a deep vacuum as this may damage the scroll compressor.

4. Remove the gauge line from the suction service valve and cap the service port.
5. Backseat suction service valve and cap the valve stem.
6. Unit is now ready for functional check out.



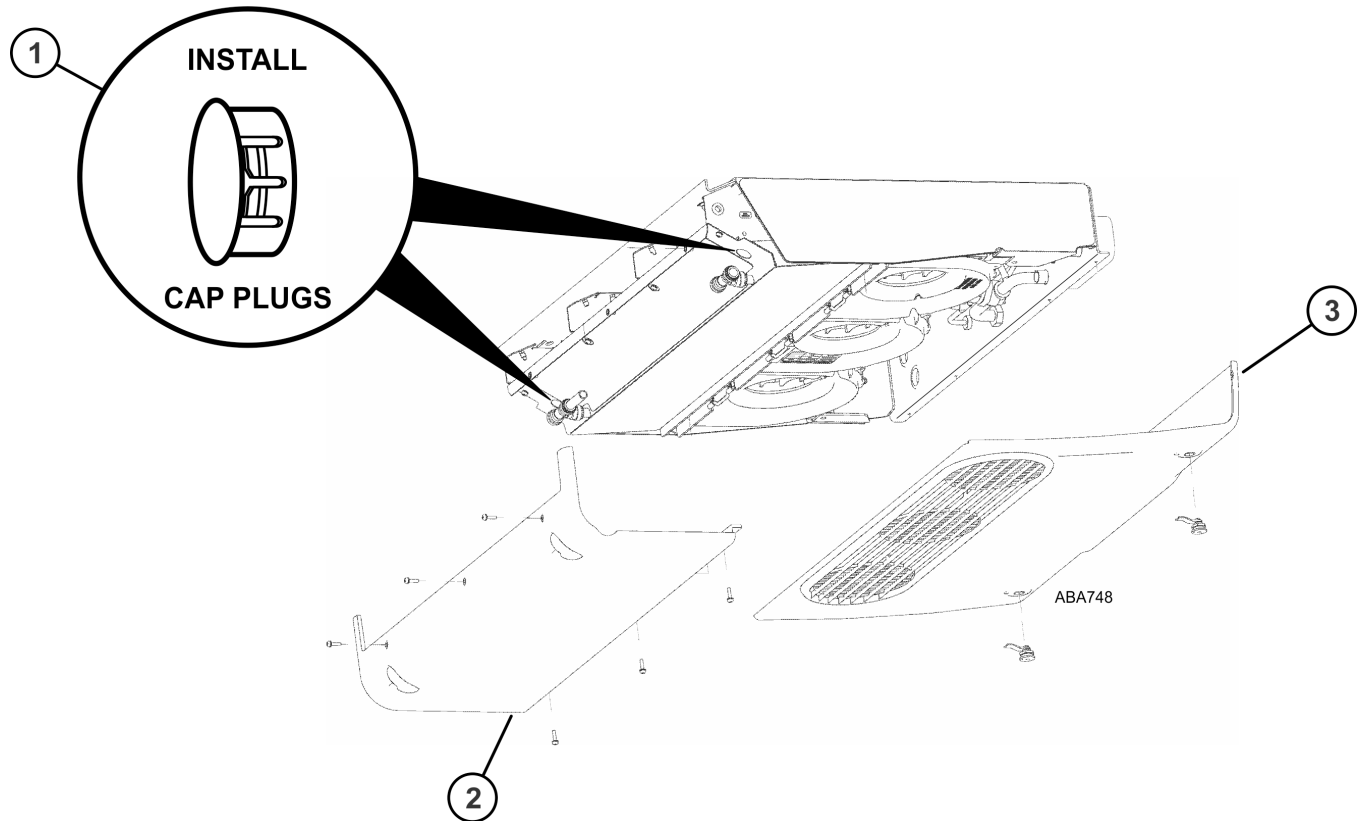


A.	V-4	D.	V-1	G.	Micron Gauge
B.	V-3	E.	Two Stage Vacuum Pump	H.	Thermistor
C.	V-2	F.	To AC Power	I.	Correct Refrigerant Level

## Installing the S-3 Evaporator Covers

Cap plugs are provided to plug the two evaporator mounting access holes located directly above the drain pan. These plugs must be installed to prevent water in the drain pan from spilling out of these holes and into the cargo area.

1. Install supplied cap plugs - 2 per evaporator.
2. Install **FRONT COVER** into support channel of evaporator and secure with screws
3. Install **BACK COVER** into support lip of front cover and secure with screws.



# Commissioning and PDI Forms

## Commissioning Form Overview

All self-powered truck units come with the Commissioning Form (TK 56640) included in the documents package. This form is also available online at Thermo King ReqDirect. By completing the Commissioning Form, the **installer** confirms the installation was done per Thermo King's Installation Manual and the unit operates as it should. Commissioning Forms should be completed for all unit installations and retained by the **installer**.

FORMS ARE LOCATED ON NEXT THREE PAGES

Figure 18. Page 1 of 3 Shown



## Self-Powered Truck Installation and Commissioning Form

Section 1 - Equipment Information			
Unit Serial No.	Model:		
Product: Self-Powered Truck	Date in Service:		
Model:	Truck No.:		
Install Date:	Break-in Beginning Hourmeter:		
VIN No.	Break-in Ending Hourmeter:		
OEM:			

Section 2 – Serialized Component Information	
#1 Remote Evap Serial No.:	Add'l Component Part No. / Desc.:
#2 Remote Evap Serial No.:	Add'l Component Part No. / Desc.:
#3 Remote Evap Serial No.:	Add'l Component Part No. / Desc.:
Add'l Component Part No. / Desc.:	Add'l Component Part No. / Desc.:

Section 3 – Unit Installed By			
Installer Name:			
Address:	City:	State:	Zip Code:

Section 4 – Company Registering Unit			
Company Name:			
Address:	City:	State:	Zip Code:

Section 5 – Unit Owned By			
Company Name:			
Address:	City:	State:	Zip Code:

Section 6 – Unit Operated By			
Company Name:			
Address:	City:	State:	Zip Code:

Section 7 - Statement	
Important: This form certifies that the unit has been delivered in satisfactory operating condition. <u>The date of service should not exceed 90 days from date of installation.</u>	
Delivering Co. Signature:	End User Signature:

*Further information can be found in the Self-Powered Single Temp Truck Installation Manual TK#56700 and the Multi-Temp Truck Installation Manual TK#56701 available through Thermo King Publications.*

**Figure 19. Page 2 of 3 Shown**

### UNIT CHECK LIST

- Visually inspect the unit for transit and handling damage, file claim with delivery carrier.
- Install the unit as outlined in the Thermo King Self-Powered Truck Installation Manual.
- If the unit has a separate fuel tank, add 20 gallons (minimum) of ultra-low sulfur diesel fuel to the tank.

### BEFORE STARTING THE UNIT

- Check battery and battery cable installation.
- Inspect fuel line routing checking for rubbing, chaffing or laying on hot surfaces.
- Visually inspect the unit for the following: loose or improperly fitting bolts, brackets, hardware, hose connections, and hose routing.
- Inspect all wiring connections and routing.
- Check defrost drain hoses and drain kazoos.
- Check unit mounting hardware for tightness.
- Check compressor and engine mounts.
- Install refrigeration gauge manifold. (Multi-Temp units only)
- Check engine oil level.
- Check condenser and evaporator section for cleanliness and signs of refrigerant leaks.
- Check belt tensions.

### MULTI-TEMP UNITS (REMOTE EVAPORATORS)

- Check evaporator(s) sections for cleanliness.
- Leak test interconnecting tubing.
- Check for damage, loose or missing bolts, and hardware on remote evaporator(s).
- Check for proper installation of drain hoses, drain kazoos and drain tube heater wires.
- Check for properly routed refrigerant tubing and wiring harnesses for remote evaporator(s). Check for properly routed harnesses for remote controller.
- Check for proper installation of remote evaporator guards if equipped.
- Check remote harness wiring connections at pass-through.
- Check wiring, connections, and terminals in the remote evaporator(s).
- Check compartment bulk head(s) for proper fit if equipped.

### START AND RUN UNIT (On Multi-Temp units, start only the host unit)

- Check for proper coolant temperature, oil, fuel, or coolant leaks.
- Check alternator output.
- Cycle the unit and ensure the unit functions in the correct modes and the mode indicators are working.
- Confirm engine speeds at high and low speed per maintenance manual.
- Set for continuous run with setpoint at 32 F (0 C) and run the unit to 32 F (0 C).
- Observe and record refrigerant operating pressures in relation to ambient and box temperatures.
- Verify the readings above are correct for the conditions.
- Run unit for 30 minutes at 32 F (0 C). During this period check for correct cycling.
- Allow unit to run and check refrigerant level at a 0 F box temperature (while running in high speed cool per truck installation manual). If unit is a multi-temp, ensure all zones are in cool mode when this check is performed.
- Visually check sight glass.
- Check for proper refrigerant level.

### MULTI-TEMP UNITS

- Install the compartment bulk head(s) if equipped.
- Check for correct rotation of remote evaporator fans.
- Check for correct cycling and operation of remote evaporator fans.
- Check the charge per multi-temp unit procedures.



Figure 20. Page 3 of 3 Shown

### ALL UNITS

- Initiate and check defrost operation and termination. Check operation and adjustment of damper door and remote fans. Each zone on multi-temp units must be checked for proper operation.
- Set the unit for Cycle Sentry Operation.
- Check for proper operation of all door switches if equipped.
- Remove the compartment bulk head(s) if equipped.
- Set the unit for continuous run. Choose a setpoint opposite of ambient temperature. Continue to run the unit with the cargo box doors open. Operate the unit until 10 (minimum of 6) hours are shown on the engine run time hourmeter to verify complete break-in. Refer to TT692-1 for additional break-in information.
- Run Pre-Trip Test.

### SMARTPOWER (ELECTRIC STANDBY) OPERATIONAL CHECKS IF EQUIPPED

- Test AC electrical contacts and connections by connecting to AC power and running.
- Check for correct electric motor rotation.
- Check compressor clutch operation.
- Adjust setpoint and check for correct modes of operation.
- Power source not available to test AC.

### STOP UNIT

- On multi-temp units, leak test interconnecting tubing.
- Check and readjust all belt tensions per maintenance manual instructions.
- Check for oil, fuel, coolant, refrigerant, and exhaust leaks.
- Check engine oil and coolant level.
- Check entire unit for loosened hardware and fittings.
- Check and adjust all skin, door and panels for correct alignment and operation.
- Program per customer required setting.
- Check belt tension.
- Release unit.

### WARRANTY REGISTRATION

- Commissioning OEM fills out sections 1, 2, 3, 5, 6 and signs section 7. Form is then returned to dealer where section 4 is completed, section 7 is signed and dealer registers unit in the Thermo King TAVANT Warranty Management System.
- Third Party Installers should ensure an authorized Thermo King Dealer performs a Pre-Delivery Inspection (PDI) and registers the unit in the Thermo King TAVANT Warranty Management System.

## **Pre-Delivery Inspection (PDI) Form Overview**

PDI Form (TK 56641) is also included in the documents package of all vehicle powered truck units. This form is also available online at Thermo King ReqDirect. The PDI form is used when the unit installation was performed by someone other than the selling party. By completing the form, the **seller** confirms the unit operates as it should. PDI Forms should be completed for all unit sales and retained by the **seller**.

Completing both the Commissioning and the Pre-Delivery Forms helps assure Thermo King equipment is installed with the highest degree of quality, reliability, and durability to meet or exceed the expectations of our customers resulting in total customer satisfaction.

**FORMS ARE LOCATED ON NEXT TWO PAGES**



Figure 21. Page 1 of 2 Shown



## Self-Powered Truck Pre-Delivery Inspection Form

Section 1 - Equipment Information	
Unit Serial No.	Date in Service:
Product: Self-Powered Truck	Truck No.:
Unit Model:	Break-in Beginning Hourmeter:
Install Date:	Break-in Ending Hourmeter:
VIN No.	OEM:

Section 2 – Serialized Component Information	
#1 Remote Evap Serial No.:	Add'l Component Part No. / Desc.:
#2 Remote Evap Serial No.:	Add'l Component Part No. / Desc.:
#3 Remote Evap Serial No.:	Add'l Component Part No. / Desc.:
Add'l Component Part No. / Desc.:	Add'l Component Part No. / Desc.:

Section 3 – Unit Installed By			
Installer Name:			
Address:	City:	State:	Zip Code:

Section 4 – Company Registering Unit			
Company Name:			
Address:	City:	State:	Zip Code:

Section 5 – Unit Owned By			
Company Name:			
Address:	City:	State:	Zip Code:

Section 6 – Unit Operated By			
Company Name:			
Address:	City:	State:	Zip Code:

Section 7 - Statement	
Important: This form certifies that the unit has been delivered in satisfactory operating condition. <u>The date of service should not exceed 90 days from date of installation.</u>	
Delivering Co. Signature:	End User Signature:

Further information can be found in the Self-Powered Single Temp Truck Installation Manual TK#56700 and the Multi-Temp Truck Installation Manual TK#56701 available through Thermo King Publications.



**Figure 22. Page 2 of 2 Shown****BEFORE STARTING THE UNIT**

- Visually inspect unit for loose or improperly fitting bolts and brackets.
- Ensure hoses are properly routed and hose connections are secure.
- Check electrical connections for tightness and properly mating of battery cables.
- Check fluid levels (engine coolant and engine oil) and adjust as needed.

**START AND RUN UNIT**

- Run unit for 15 minutes while in cool mode.
- Perform full automated Pre-Trip Test per instructions.
- Observe unit for unusual noises while running and repair as needed.
- Ensure all fans are rotating in the proper direction:
  - Condenser fans should pull air in through the condenser coils.
  - Evaporator blowers should exhaust air through the evaporator outlet.
  - If unit is a multi-temp, check for proper operation of remote evaporator fans.
- Check for any oil, fuel, antifreeze, refrigerant, or exhaust leaks.
- Check unit for alarms generated during the Pre-Trip Test and repair as needed. (Do after performing steps above).
- Allow unit to run and check refrigerant level at a 0°F (-18°C) box temperature (while running in high speed cool per truck installation manual). If unit is a multi-temp, ensure all zones are in cool mode when this check is performed.
- Verify engine break-in procedure was completed by checking unit hourmeter. If it was not completed, operate the unit until 10 (minimum of 6) hours are shown on the engine run time hourmeter to verify complete break-in. Refer to TT692-1 for additional break-in information.
- As unit operates, it is critical that the Certified Technician inspects the unit every few hours and notes pull down rates, frequency, and duration of defrost cycles and general operations of the unit. Pull down times will vary and rates of temperature drop are dependent upon factors such as trailer size, insulation type and thickness and ambient temperature.

**SMARTPOWER (ELECTRIC STANDBY) OPERATIONAL CHECKS IF EQUIPPED**

- Connect unit to electric standby power and check for proper operation and rotation of electric standby motor, condenser fans and evaporator fans.
  - Note: When not connected to electric standby power, the standby motor contactor was not checked for proper operation during the full Pre-Trip Test performed earlier.

**STOP UNIT**

- Check for any oil, fuel, antifreeze, refrigerant, or exhaust leaks.
- Check engine oil level and engine coolant level gauge or indicator.
- Check and readjust all belt tensions per maintenance manual instructions.

**WARRANTY REGISTRATION**

- Commissioning Dealer completes the Warranty Registration process in the Thermo King TAVANT Warranty Management System.



**THERMO KING**

Notes

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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](http://www.thermoking.com) or [www.tranetechnologies.com](http://www.tranetechnologies.com).

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