

Installation Manual

B-100 **Model 10 and 20 with Direct Smart Reefer**

TK-54436 -18-IM (Rev. 1,11/09)

Release History

Original (7/09) Released

Rev. 1 (11/09) Page 40, changed text from “start-up wire fuse” to “fused ignition circuit”

Introduction

This installation manual was written to help assist with the installation of Thermo King refrigeration units powered by vehicle batteries onto either a truck or a van. The manual comprises sections on condenser, evaporator and other modules that are mounted on the truck or van body, as well as sections on components and wiring that are to be connected to the vehicle engine from which the unit derives power. Due to its complexity, do not attempt this installation unless you:

- Are an experienced mechanic.
- Can safely lift 34 kg (75 lb.).
- Are certified or approved 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.

This manual is published for informational purposes only. Thermo King makes no representations or 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 contacted.


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.


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Safety Precautions


The  symbol appears next to a point that is particularly important.


 **DANGER:** Addresses a circumstance that, if encountered, will lead to death or serious injury.


 **WARNING:** Addresses a circumstance that, if encountered, might lead to death or serious injury.


 **CAUTION:** Addresses a circumstance that, if encountered, may cause damage to equipment or minor injury.


 **DANGER:** Never operate the unit with the discharge valve closed because it could cause the compressor to explode, causing death or serious injury.


 **DANGER:** Never apply heat to a sealed refrigeration system or container because it could explode, causing death or serious injury.


 **DANGER:** Fluorocarbon refrigerants, in the presence of an open flame or electrical short, produce toxic gases that are severe respiratory irritants capable of causing death.


 **DANGER:** Be careful when working with a refrigerant or refrigeration system in any enclosed or confined area with a limited air supply (i.e., a trailer, container or the hold of a ship). Refrigerant tends to displace air and can cause oxygen depletion which may result in death by suffocation.


 **DANGER:** When removing a battery from the Battery Pack, ALWAYS disconnect the negative battery terminal first. Then remove the positive terminal. When reconnecting the battery terminals, connect the positive terminal (+) first, and connect the negative (-) terminal last.


 **WARNING:** Always wear goggles or safety glasses. Refrigerant liquid, refrigeration oil, and battery acid can permanently damage the eyes (see First Aid under Refrigeration Oil).

 **WARNING:** Keep your hands away from fans and belts when the unit is running. This should also be considered when opening and closing the compressor service valves.


 **WARNING:** Make sure gauge manifold hoses are in good condition. Never let them come in contact with a belt, fan motor pulley, or any hot surface.


 **WARNING:** Make sure all mounting bolts are tight and are of correct length for their particular application.


 **WARNING:** Never drill holes in the unit unless absolutely necessary. Holes drilled into the unit may weaken structural components. Holes drilled into electrical wiring can cause fire or explosion.


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Safety Precautions (continued)

 **WARNING:** When using ladders to install or service refrigeration systems, always observe the ladder manufacturer's safety labels and warnings. A work platform is the recommended method for installations.


 **WARNING:** Exposed coil fins are very sharp and can cause painful lacerations.

 **WARNING:** Control circuits used in the refrigeration unit are low voltage. This voltage potential is not considered dangerous, but the large amount of current available can cause severe burns if shorted to ground.

 **WARNING:** Do not wear jewelry, watches, or rings. These items can short out electrical circuits and cause severe burns to the wearer.

 **CAUTION:** Use tools with insulated handles that are in good condition.


Refrigerant

 **WARNING:** *Although fluorocarbon refrigerants are classified as safe refrigerants, certain precautions must be observed when handling them or servicing a unit in which they are used. When released to the atmosphere in the liquid state, fluorocarbon refrigerants evaporate rapidly, freezing anything they contact*

First Aid

- **FROST BITE:** In the event of frost bite, the objectives of First Aid are to protect the frozen area from further injury, to warm the affected area rapidly and to maintain respiration.
- **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 lukewarm water. Do not apply heat. Remove contaminated clothing and shoes. Wrap burns with dry, sterile, bulky dressing to protect from infection/injury. Get medical attention. Wash contaminated clothing before reuse.
- **INHALATION:** Move victim to fresh air and use CPR or mouth-to-mouth ventilation, if necessary. Stay with victim until arrival of emergency medical personnel.

Refrigeration Oil

 **CAUTION:** *Avoid refrigeration oil contact with the eyes. Avoid prolonged or repeated contact of refrigeration oil with skin or clothing. Wash thoroughly after handling refrigeration oil to prevent irritation.*

First Aid

In case of eye contact, immediately flush with plenty of water for at least 15 minutes. CALL A PHYSICIAN. Wash skin with soap and water.

RECOVERY OF REFRIGERANT

At Thermo King, we recognise 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.

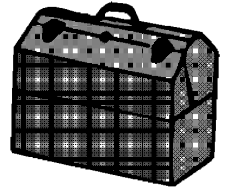
We strictly adhere to a policy that promotes the recovery and limits the loss of refrigerant into the atmosphere.

In addition, service personnel must be aware of national regulations concerning the use of refrigerants and the certification of technicians. For additional information on regulations and technician certification programs, contact your local THERMO KING dealer.

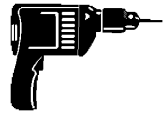
Required Tools

1. Electric drill
2. Set of drill bits
3. Set of glass-shaped cutters
4. Protective goggles
5. Adhesive tape
6. Measuring tape
7. Drilling template
8. Pencil
9. Socket wrenches
10. Fixed wrenches
11. Monkey wrench
12. Silicone
13. Protective gloves
14. File
15. Plastic flanges
16. Riveter
17. Electric connectors
18. Electrical wire
19. Voltmeter
20. Set of screwdrivers
21. Hose cutters
22. Wire strippers
23. Wire cutters
24. Electric and hand saws
25. Electrical terminal press
26. Pincers for hose clips
27. Gauge manifold
28. Vacuum pump
29. Leak detector
30. Nitrogen cylinder
31. Refrigerant cylinders
32. Table-mounted vice
33. Crane or hoist
34. TK refrigerant oil
35. Open Y wrench
36. Torx Tube Wrench

Required Tools



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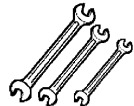
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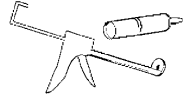
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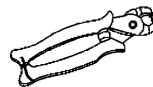
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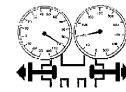
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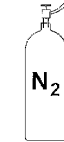
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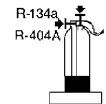
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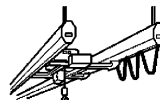
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Operating Method

The operations indicated in this manual should be carried out by a mechanic in the exact sequence in which they are presented in the manual.

TASK	t(min)	1h	2h	3h	4h	5h	6h	7h
Unpacking	10 min	█						
Inspection	5 min	█						
Install Condenser	25 min	█						
Install Evaporator	20 min	█						
Prepare hoses	10 min		█					
Connect hoses to condenser	10 min		█					
Connect hoses to evaporator	14 min		█					
Electrical connections	10 min		█					
Drainage circuit	5 min		█					
Vacuum and leak test	180 min		█	█	█	█	█	
Install in-cab control	10 min			█				
Control cable connection	5 min			█				
Connect to battery	15 min			█				
Standby socket	10 min			█				
Check installation	10 min			█				
Charge refrigerant	30 min			█				

Mechanic A

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.

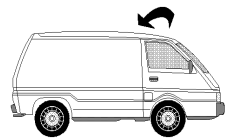
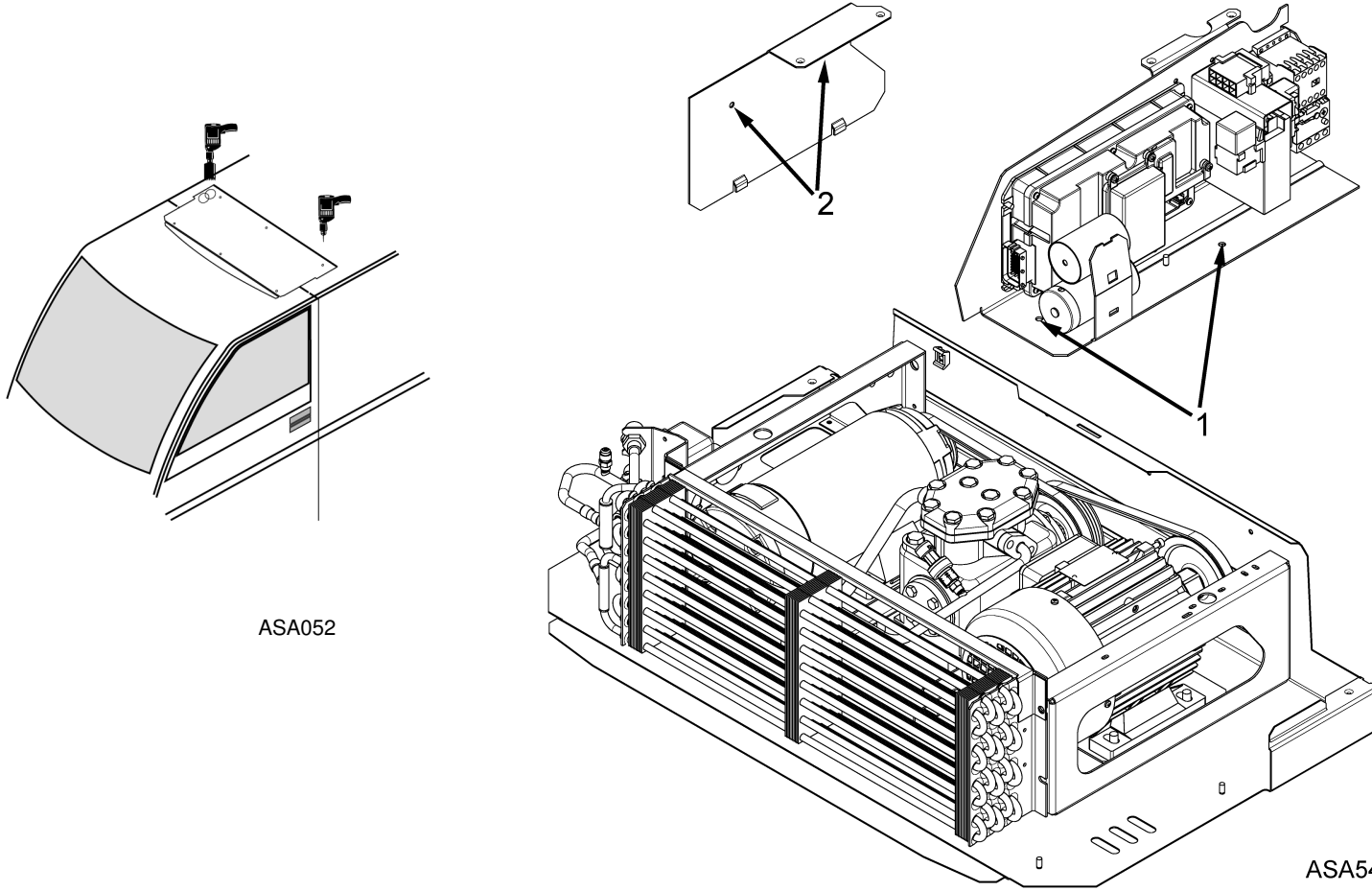
Inspecting the Unit

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 battery 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 battery should be charged with helium gas.
 - The voltage of all the electrical components is correct (12/24V).

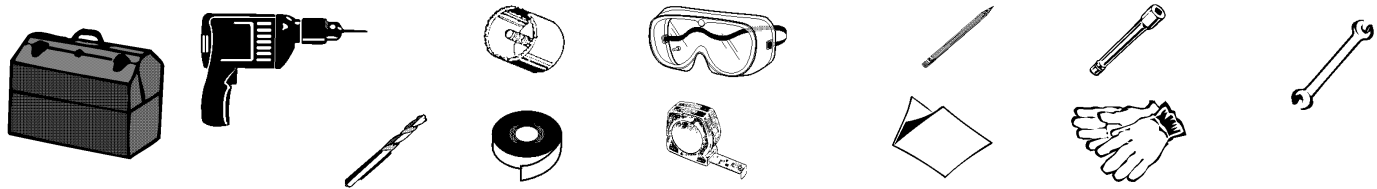
Installing the Condenser Unit (roof-mounted)

1. Fit the template according to the instructions given.
2. Mark the position of the drilled holes and openings. Avoid any possible interference with electrical wires and parts of the vehicle chassis.
3. Drill the holes to hold the condenser unit in place (D 12) and the holes for routing hoses (D 70).
4. Disassemble the canalizer.
5. Disassemble the electric box support plate on the unit, by removing the two nuts, **1**, securing the plate to the unit chassis.
6. Disassemble the canalizer support bracket plate by removing the two hold-down bracket screws, **2**, from the unit chassis.

Installing the Condenser Unit (roof-mounted)



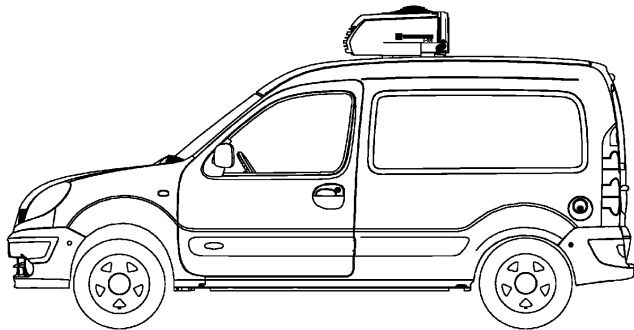
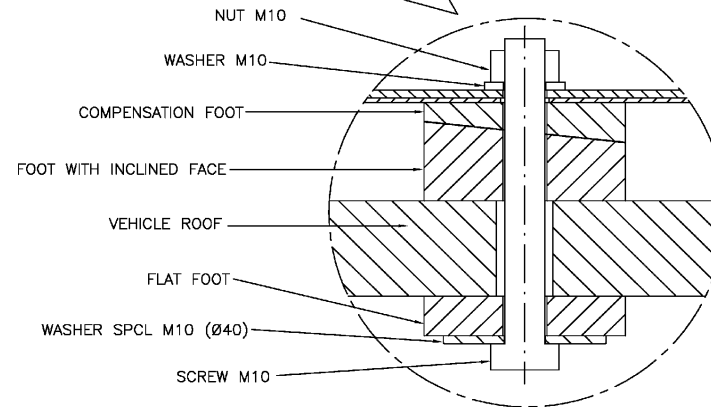
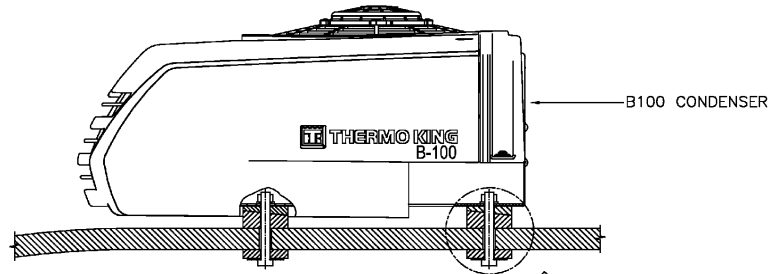
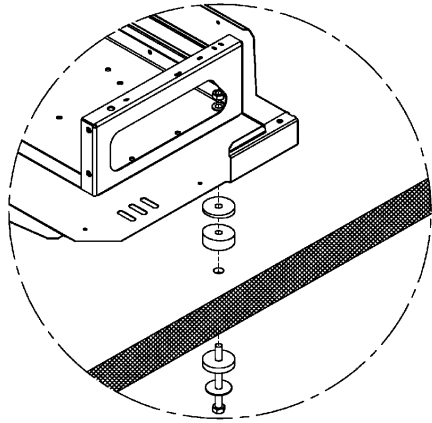
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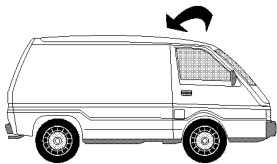
Installing the Condenser Unit (roof-mounted)

1. Fasten two strong straps attached to a crane to the unit. Lift the unit, making sure that it remains in a horizontal position. If it does not, change the position of the straps.
2. Place the unit on the roof of the vehicle. Remove the straps and the crane.
3. Pass the 4 lock screws through the holes in the frame, placing a flat washer onto each screw. **Avoid direct contact between the unit and the body by using rubber rings.**
4. Fit the unit by attaching a nut and a washer onto each screw.
5. Reassemble the electrical box and canalizer support brackets.
6. Pass the hoses through the corresponding hole in the frame.

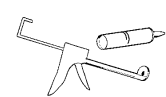
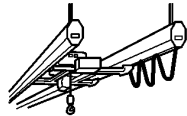
Installing the Condenser Unit (roof-mounted)



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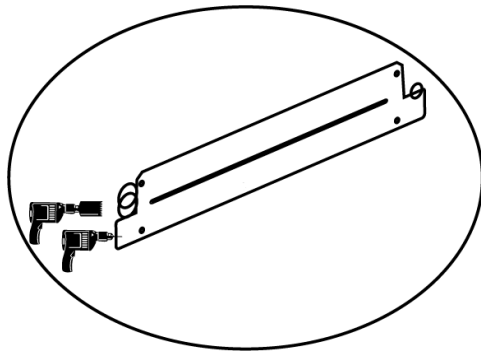
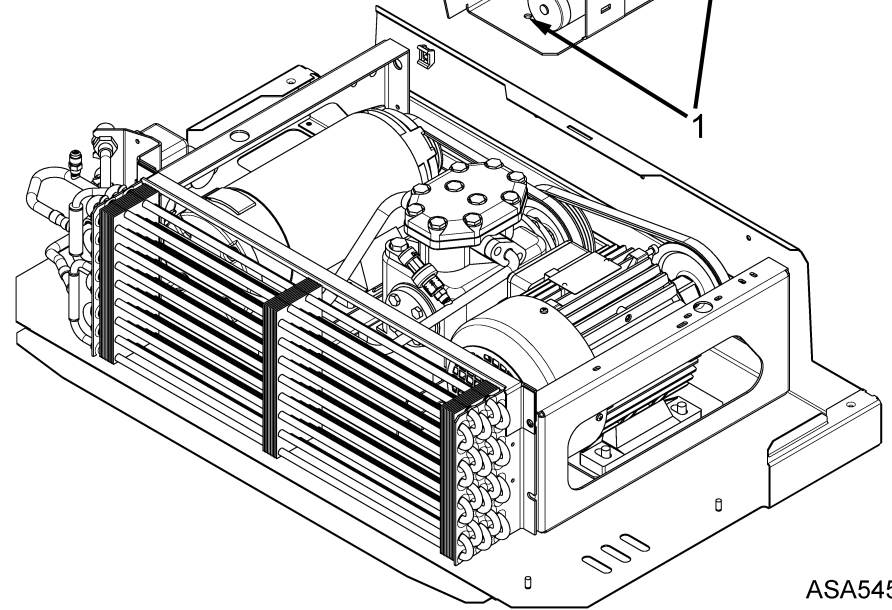
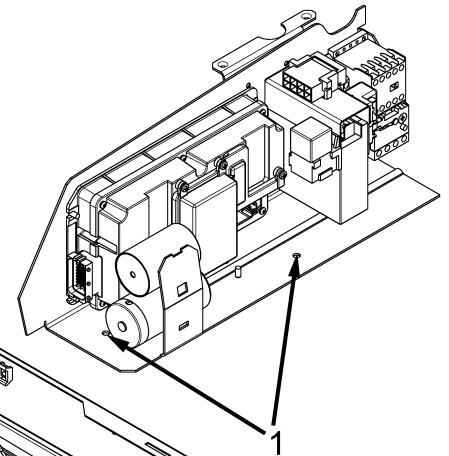
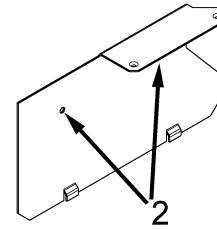
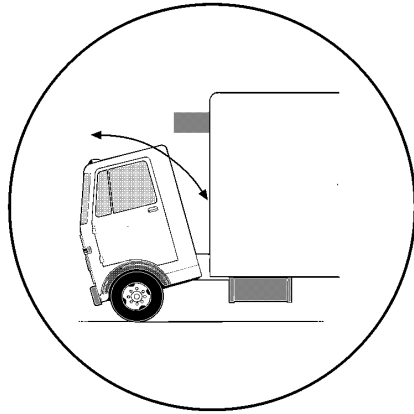
T = 12 min.



Installing the Condenser Unit (front-mounted)

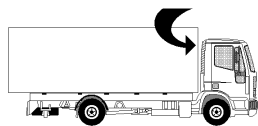
1. Fit the template according to the instructions given.
2. Mark the position of the drilled holes and openings. Avoid any possible interference with electrical wires and parts of the vehicle chassis.
3. Drill the holes to hold the condenser unit in place (D 12) and the holes for routing hoses (D 70).
4. Disassemble the canalizer.
5. Disassemble the electric box support plate on the unit, by removing the two nuts, **1**, securing the plate to the unit chassis.
6. Disassemble the canalizer support bracket plate by removing the two hold-down bracket screws, **2**, from the unit chassis.

Installing the Condenser Unit (front-mounted)

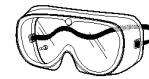


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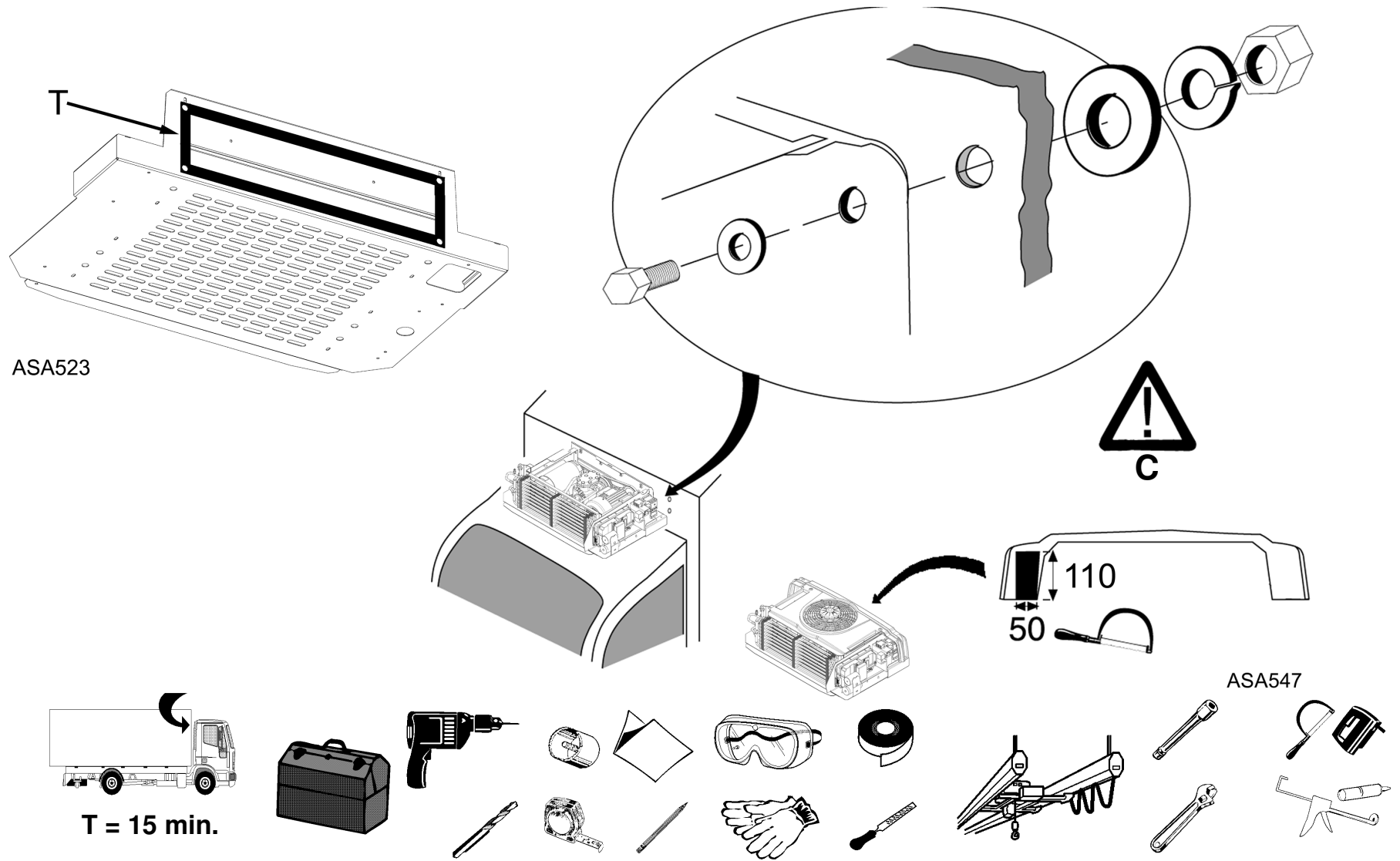
T = 10 min.



Installing the Condenser Unit (front-mounted)

1. Cut the routing guide **C** down as indicated in the illustration.
2. Fasten the adhesive tape **T** (supplied by Thermo King) to the rear of the structure.
3. Fasten two strong straps attached to a crane to the unit. Lift the unit, making sure that it remains in a horizontal position. If it does not, change the position of the straps.
4. Pass the 4 locks crews through the holes of the structure and fix them with a flat washer.
5. Fit the unit by twisting a nut and a Grower washer onto each screw. Before tightening the screws completely, remove the straps and the crane.
6. Reassemble the electrical box and canalizer support brackets.
7. Route the hoses through the correct hole in the structure.

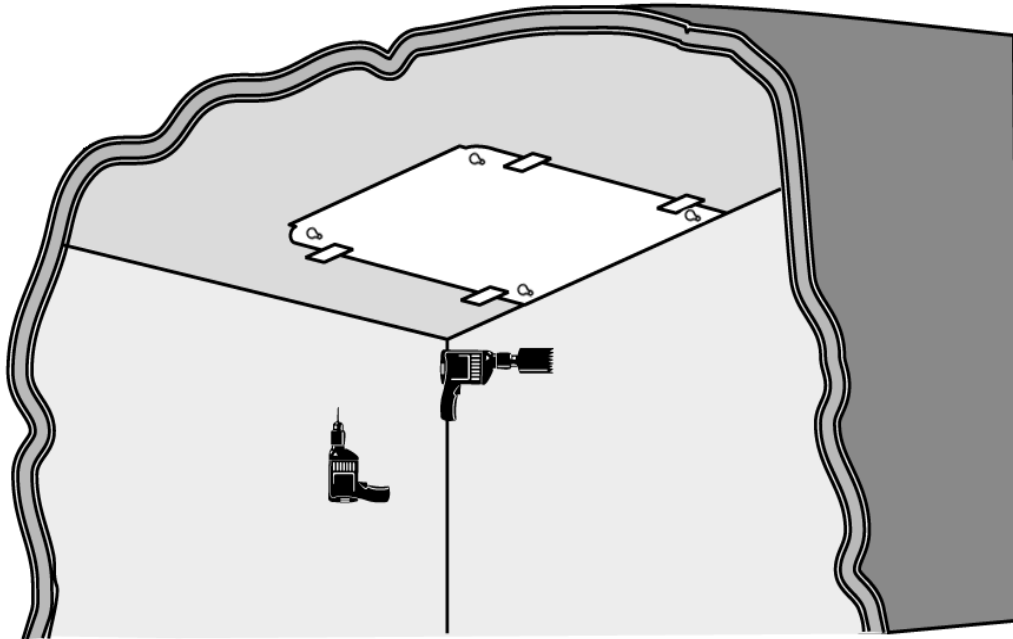
Installing the Condenser Unit (front-mounted)



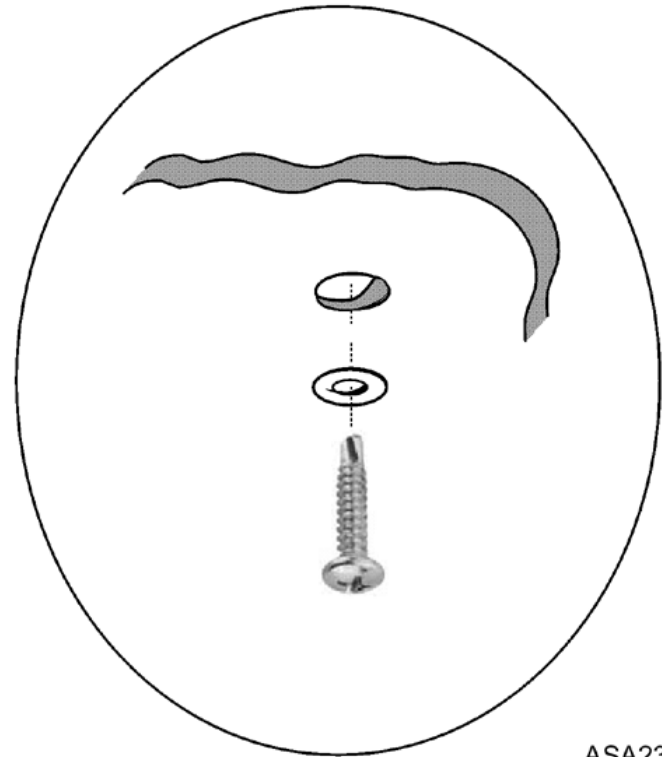
Installing the ES100 Evaporator Unit

1. Fit the template according to the instructions given.
2. Mark the position of the drilled holes. Avoid any possible interference with electrical wires and parts of the vehicle chassis.
3. Drill blind holes to screw the evaporator unit in place. Screw in the bolts and washers supplied for the ceiling. Do not tighten.
4. Cut the hole to route the moisture drain hose (diameter 22).
5. Install the unit on the ceiling supported by the bolts screwed in previously.
6. Tighten the bolts.

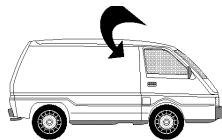
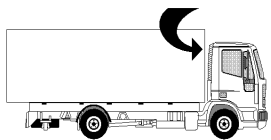
Installing the ES100 Evaporator Unit



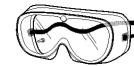
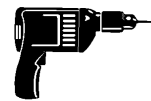
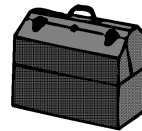
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T = 20 min.

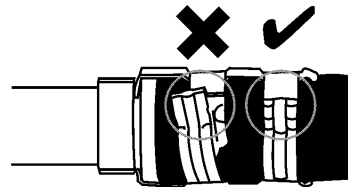
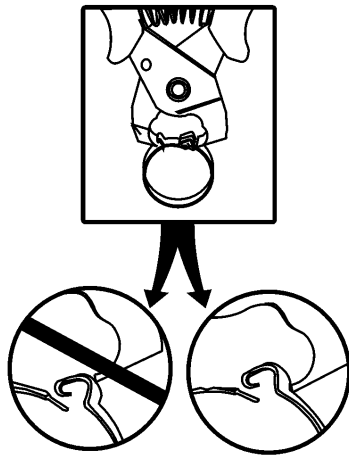
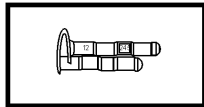
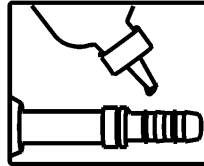


Preparing Refrigeration Hoses

Speedy Clip System

1. Cut the hose to the required length. Use the recommended hose cutters. Do not use saws, knives or similar tools.
2. Pass two clips of appropriate diameter over the hose.
3. Lubricate the cylinder of the fitting to be inserted in the hose, using Thermo King refrigerant oil.
4. Manually insert the fitting into the hose. The hose should touch the projecting part of the fitting without going into it. Clean off excess oil.
5. Place the clamp for the clips into the fitting slot. The clamp is properly positioned when it can rotate within the slot.
6. Place the clips in the clamp arm seats.
7. Close both clips using recommended pincers. Check that the clips are properly positioned and closed (see drawings).

Preparing Refrigeration Hoses



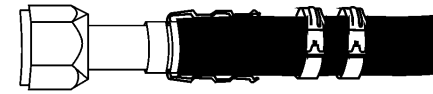
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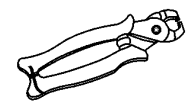
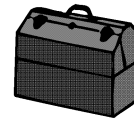
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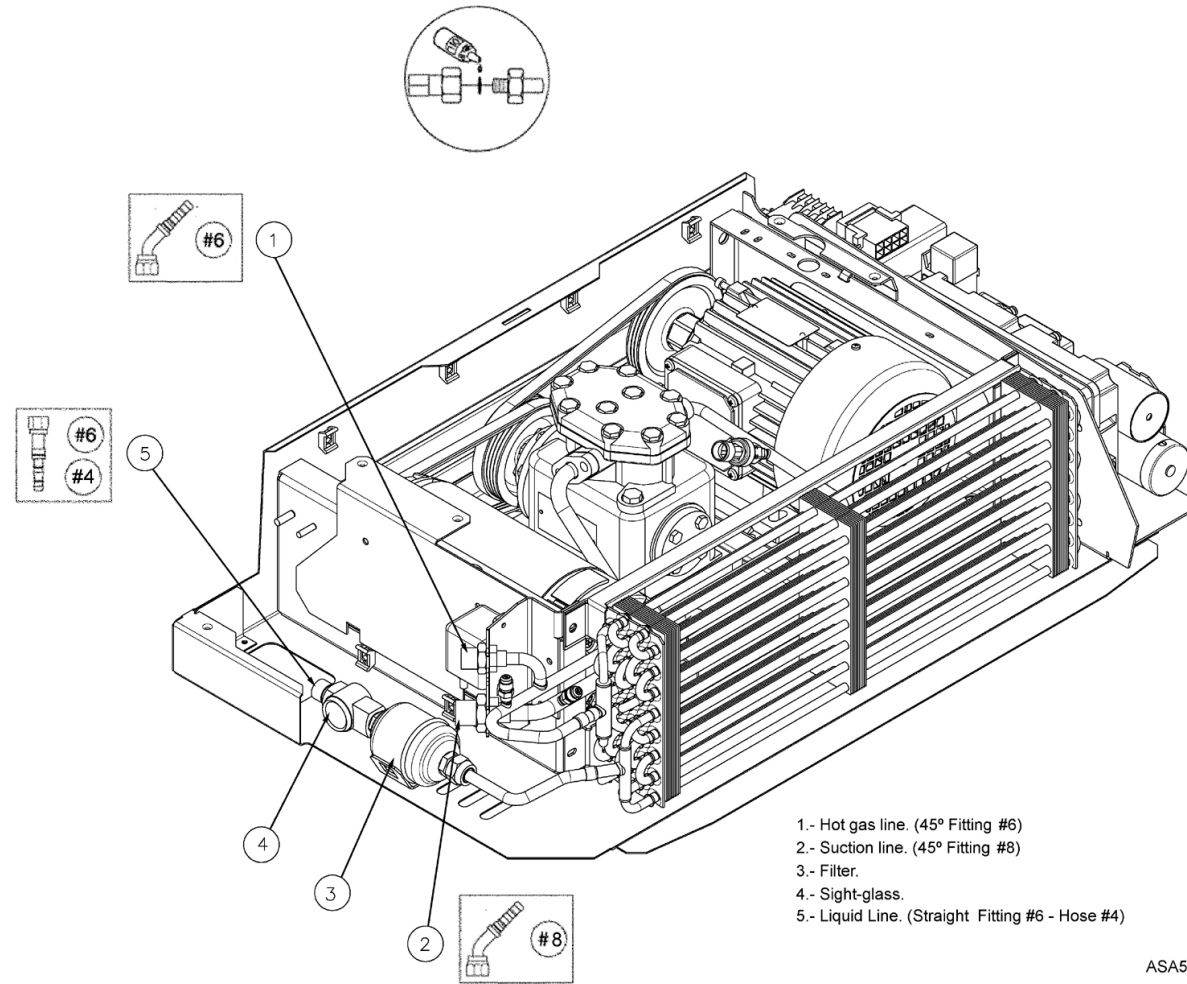
T = 10 min.



Connecting Hoses to the Condenser Unit

1. Take the plugs off all the tubes.
2. Lubricate all refrigeration intakes with Thermo King refrigerant oil.
3. Place an O-ring on each refrigeration intake.
4. Check that the O-ring is properly positioned and connect each hose using two fixed wrenches. **The unconnected ends of the hoses must be sealed.**

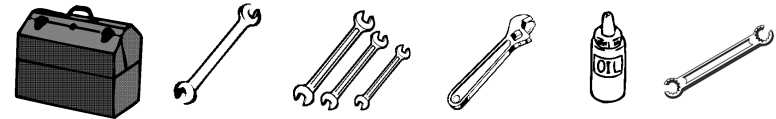
Connecting Hoses to the Condenser Unit



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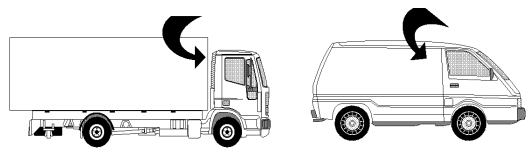
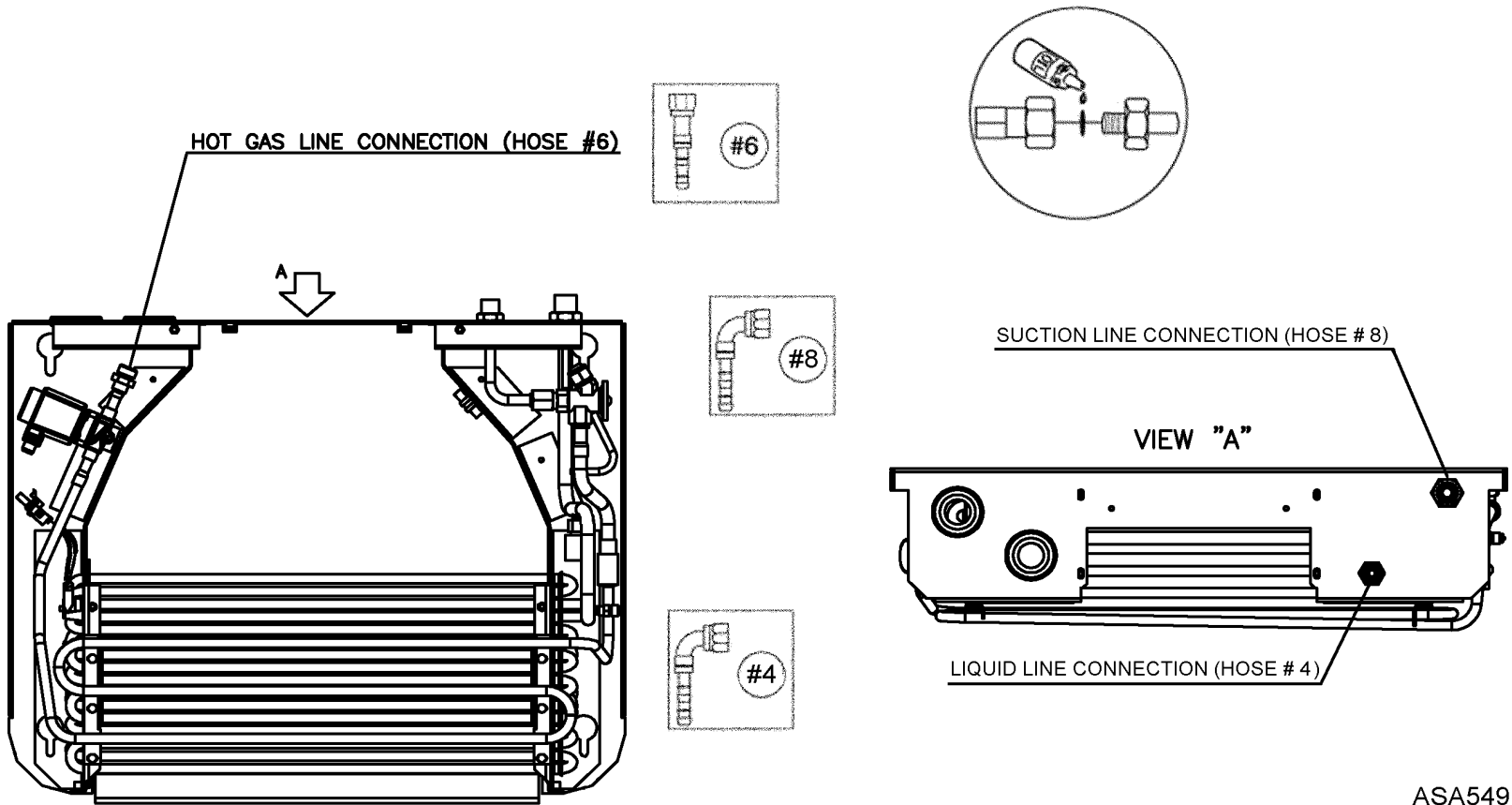
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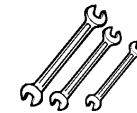
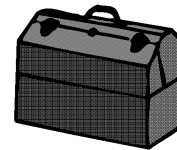
Connecting Hoses to the ES100 Evaporator

1. Remove plugs from all tubing.
2. Lubricate all refrigeration intakes with Thermo King refrigerant oil.
3. Place an O-ring on each refrigeration intake.
4. Connect each hose using two fixed wrenches.
The O-ring should be properly positioned before the fitting is screwed on.
5. Wrap the hoses with thermal **insulation material** (armaflex type) to prevent water condensation.
6. Hermetically seal all holes where hoses and lock screws pass through.

Connecting Hoses to the ES100 Evaporator



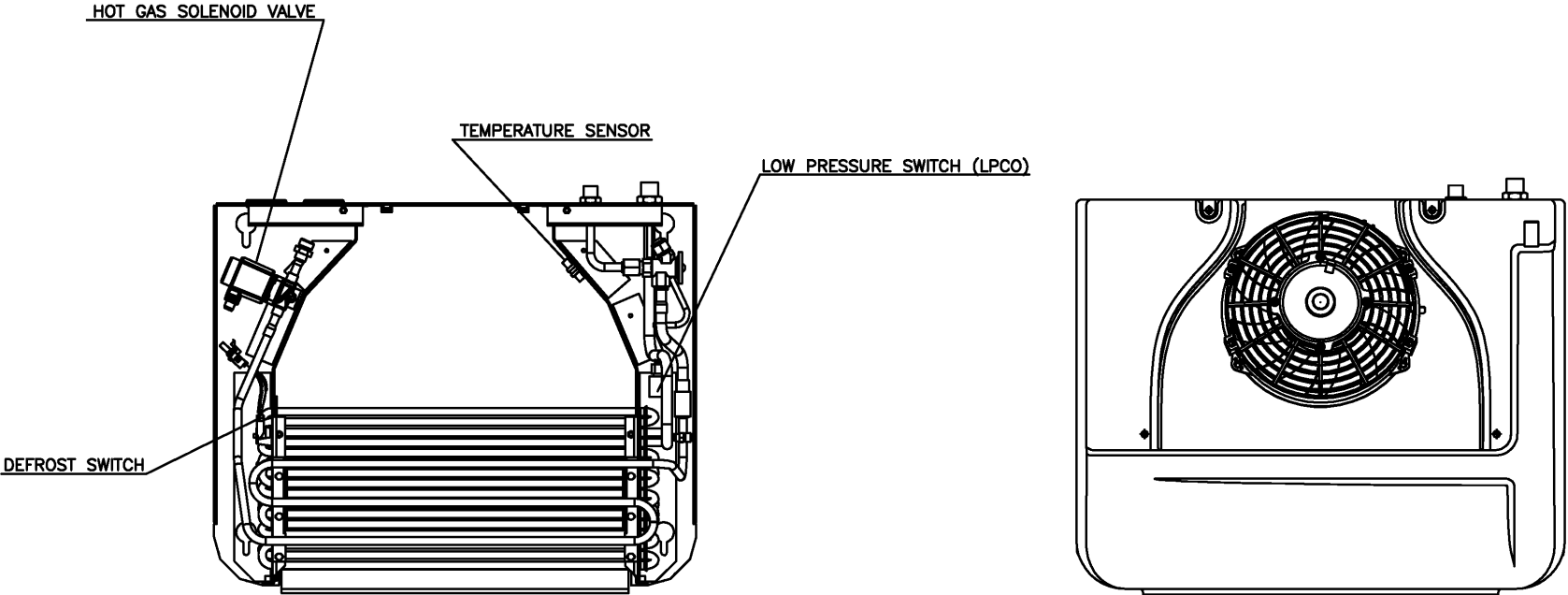
T = 14 min.



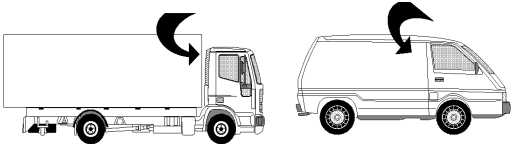
Electrical Connections in the ES100 Evaporator

1. Pass the electrical hose and the return temperature sensor through as far as the evaporator.
2. Connect the low pressure cutout, the defrost temperature thermostat, the hot gas solenoid valve, and the temperature sensor.
3. Connect the fan.
4. Put the evaporator cover into position and secure using screws.

Electrical Connections in the ES100 Evaporator



ASA554



T = 10 min.



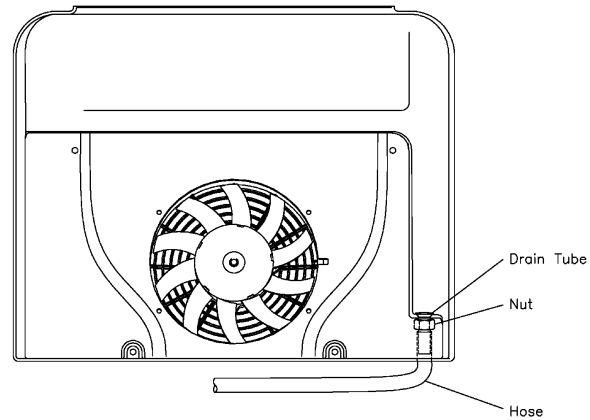
Drain Circuit in the ES100 Evaporator

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.

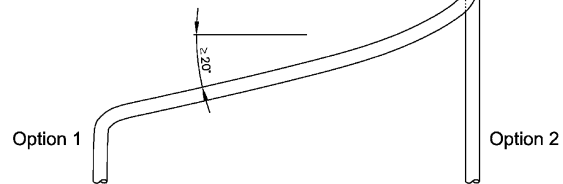
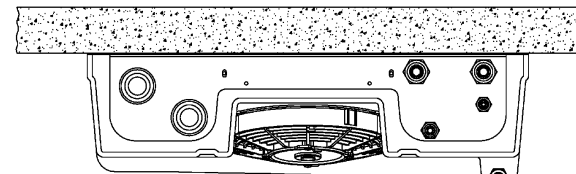
Drain Circuit in the ES100 Evaporator

ES100 evaporator

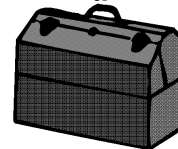
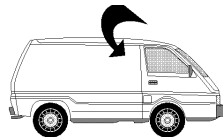
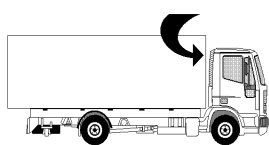
TOP VIEW



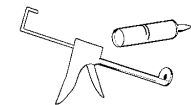
REAR VIEW



T = 5 min.



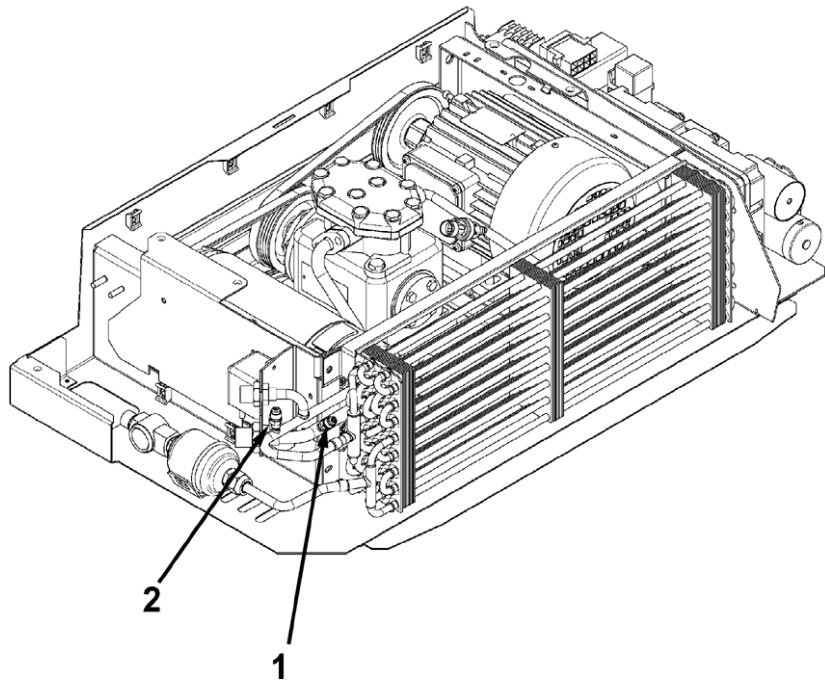
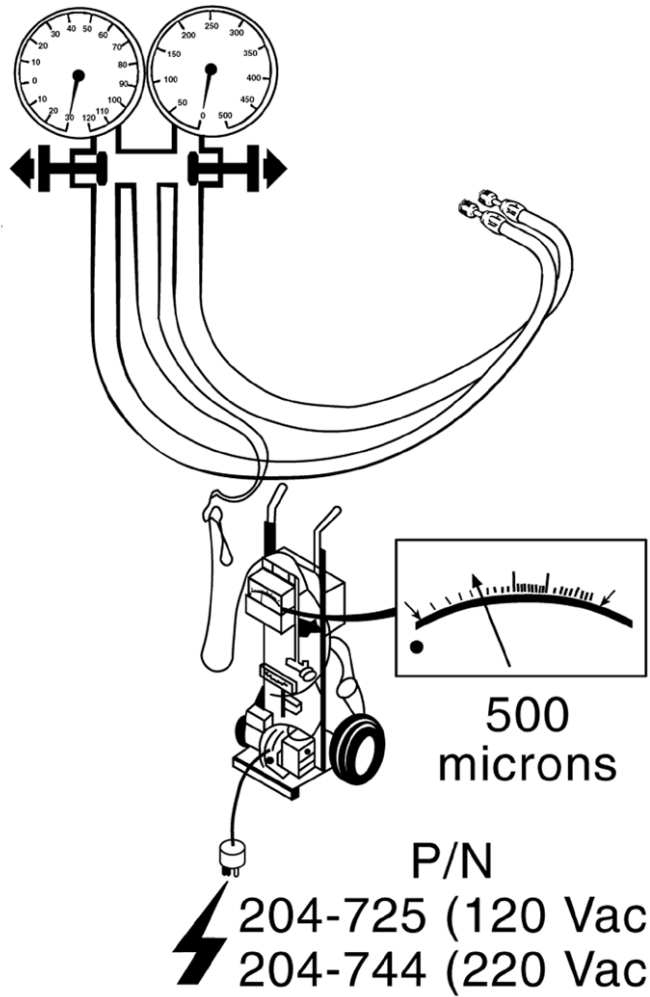
ASA550



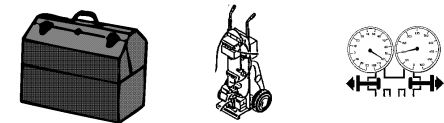
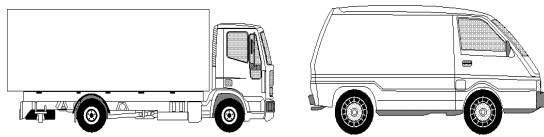
Circuit Seal Test

1. Heat the box up to +20°C/+70°F using a ventilated radiator.
2. Connect the gauge manifold to the suction **1** and discharge **2** intakes of the condenser unit.
3. Connect the central line of the gauge manifold to the vacuum pump. **Use recommended vacuum equipment.** Before each use, check that there are no leaks in the vacuum equipment, either in the pump itself or in the hoses.
4. Open the gauge manifold and vacuum pump valves. Open all the solenoid valves on the circuit.
5. Start the vacuum pump and maintain suction until it reaches **500 microns**.
6. Once it reaches 500 microns, leave suction running for **one hour**.
7. Close the vacuum pump valve, switch off the pump, checking that the gauge reading for the vacuum pump does not exceed **2000 microns** in the following 5 minutes. If it does exceed 2000 microns, follow the procedure in the section: **“In Case of Leaks”**.
8. Start the vacuum pump again and open the vacuum valve. Leave the pump running until it reaches **500 microns** of pressure again.
9. Once it reaches 500 microns, close the vacuum pump valve and switch off the pump. The unit is ready to be filled with refrigerant.

Circuit Seal Test



ASA551

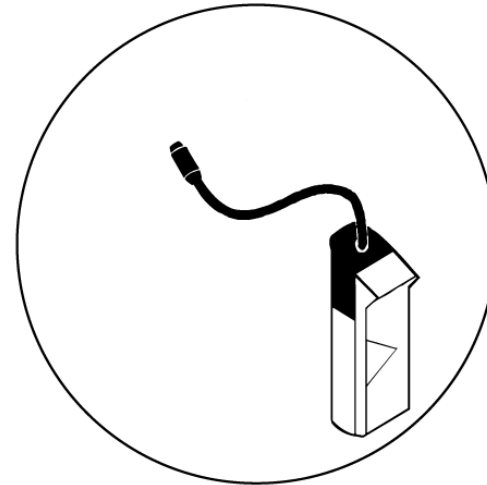
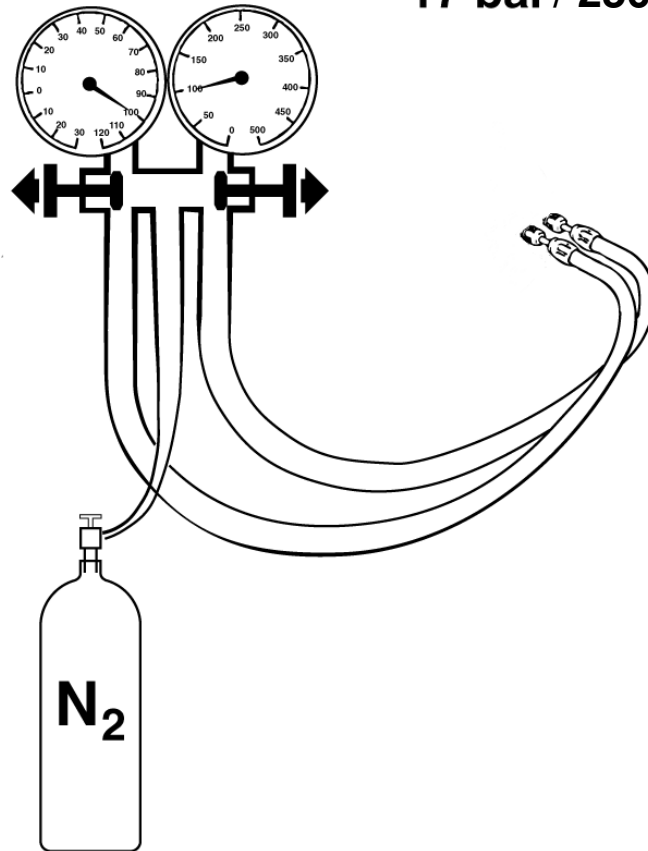


In Case of Leaks

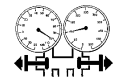
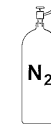
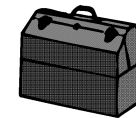
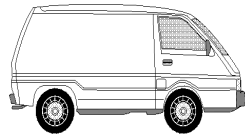
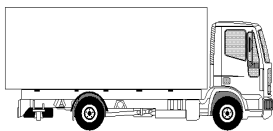
1. Pressurize the circuit to **17 bar / 250 psig** with nitrogen.
2. Identify the defective part (fitting, sleeve, line, hose, O-ring, etc.) and replace it with a new part (if in doubt replace the entire joint).
Use the recommended leak detector.
3. Repeat the seal test from the beginning.

In Case of Leaks

17 bar / 250 psig



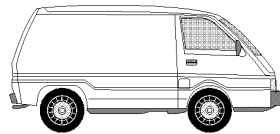
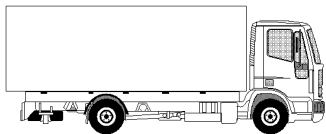
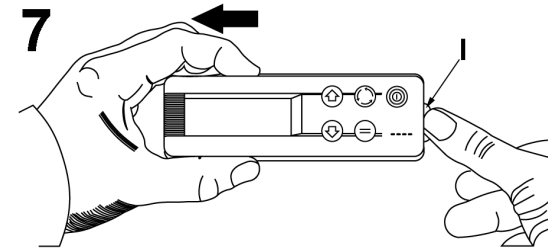
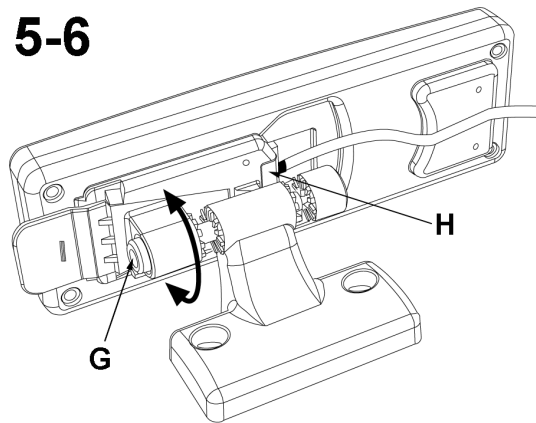
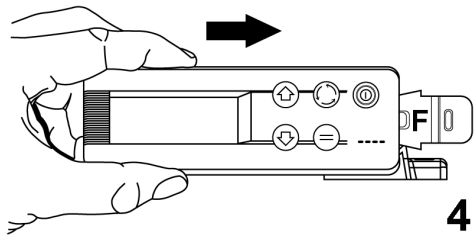
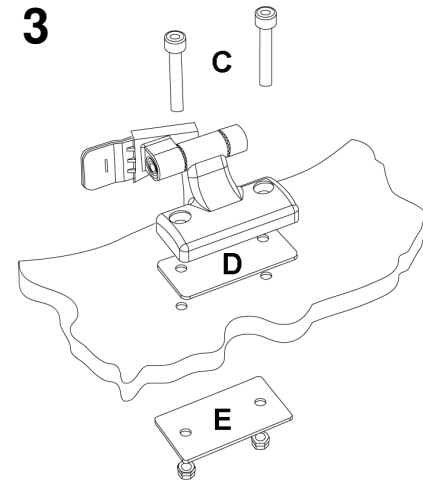
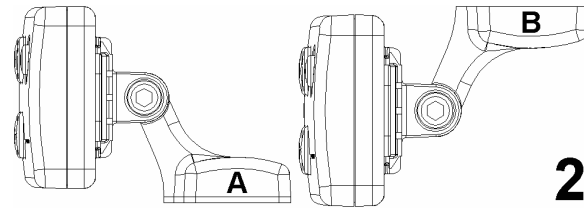
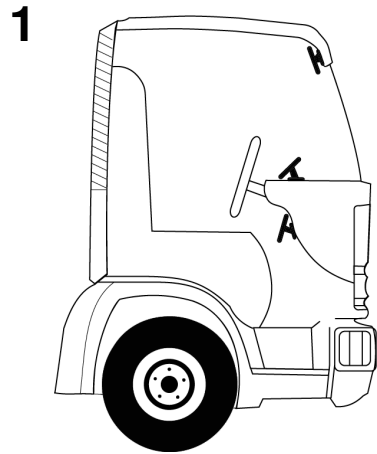
ASA552



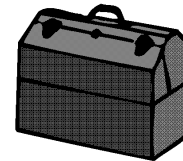
Installing the In-Cab Control

1. Install the mounting bracket for the in-cab control box. 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 in-cab control box on the bracket, rest the in-cab control box on the arm (**F**), and slide it to the right until the arm tab is properly fitted to the in-cab control box frame.
5. The tilt of the in-cab control box's front face may be altered by loosening screw **G**.
6. Connect the data cable to connector **H**.
7. To remove the in-cab control box from the bracket, press the tab (**I**) and slide to the left.

Installing the In-Cab Control



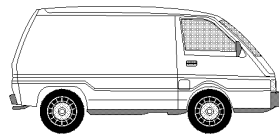
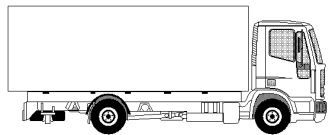
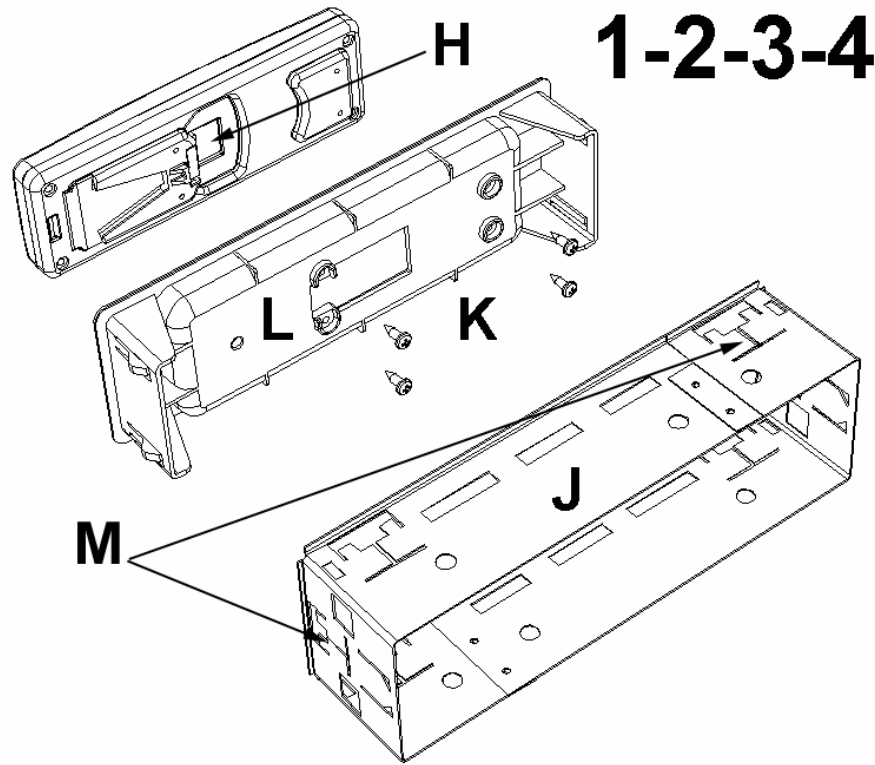
T = 10 min.



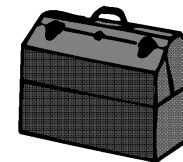
Optional Internal DIN Adaptor

1. Place the 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.

Optional Internal DIN Adaptor



T = 5 min.

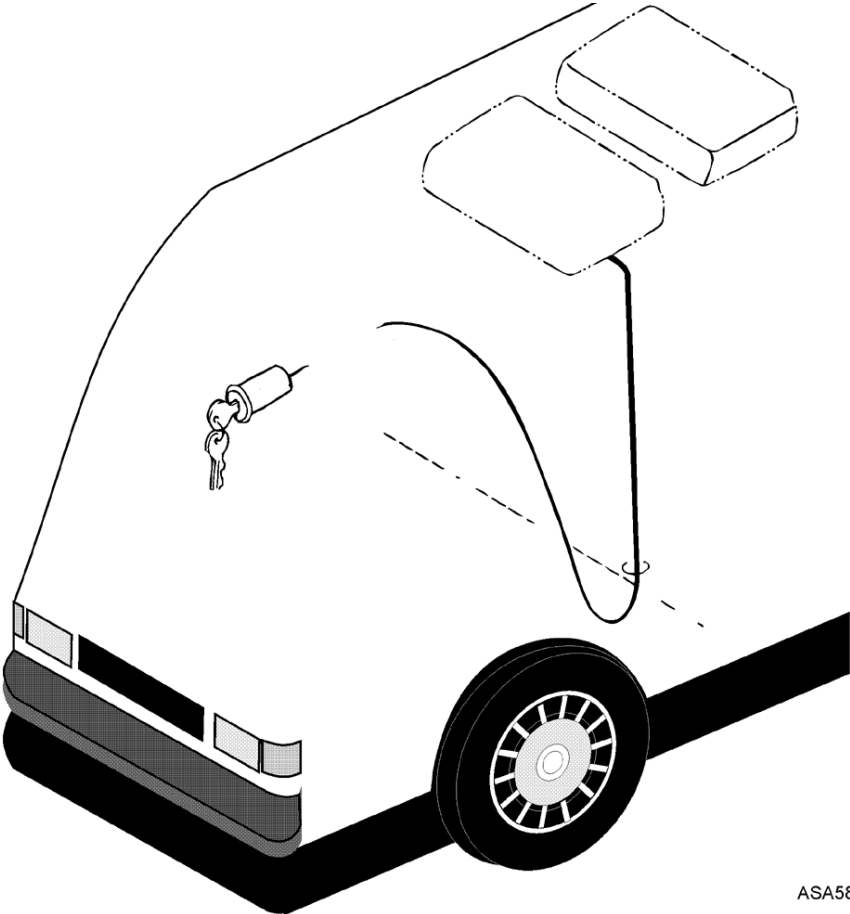


Control Cable Connection

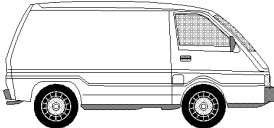
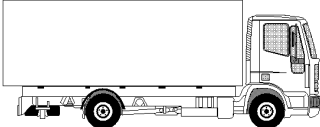
1. Pass cable **01** of the electrical hose through to the cab.
2. Locate the fuse box.
3. Connect wire **01** to the vehicle's fused ignition circuit.

***NOTE:** Use a splice capable of supporting a 3A electrical current.*

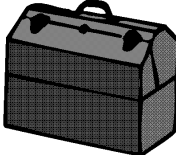
Control Cable Connection



ASA583



T = 5 min.

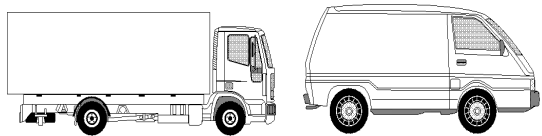
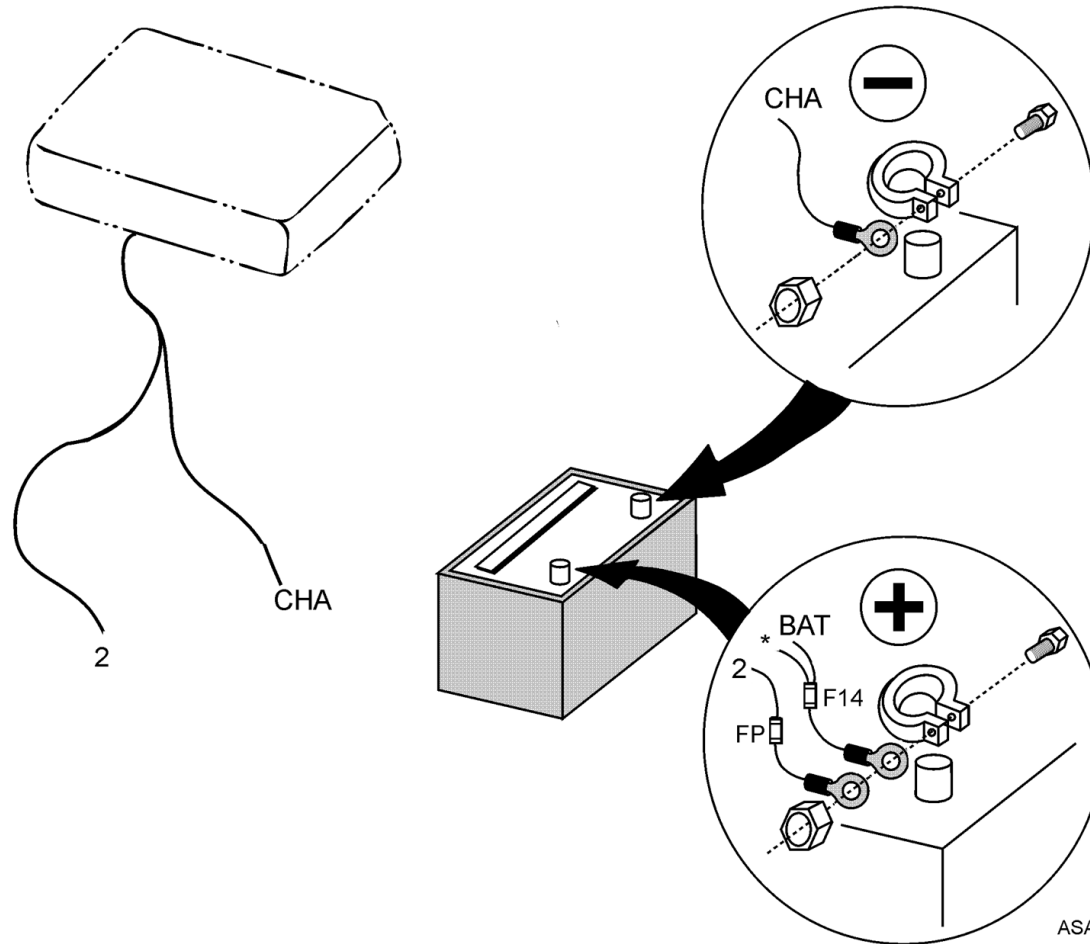


Battery Connection

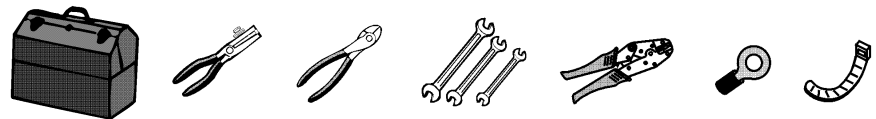
NOTE: If the vehicle is equipped with a battery disconnect switch, always wire the unit after the switch. This allows power to the unit to be turned off by the battery disconnect switch.

1. Pass electrical wires CHA (black), 01, BAT and 2 (brown) to the battery.
2. Using the recommended tools, cut the wires to the proper length.
Do not coil or splice the excess wire.
3. Strip the wires and position the terminals supplied with the recommended tools.
4. DISCONNECT THE CLAMP FROM THE BATTERY'S NEGATIVE TERMINAL.
5. Connect wire 2 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 pole. Install fuse FP (100A/12V or 60A/24V) in the fuse holder. See note above.
6. Connect the *wire (wire between the battery and the vehicle starter key) and the BAT wire to one end of the fuse F14 fuse holder (both supplied by Thermo King), and connect the other end of the fuse holder to the battery's positive pole. Install fuse F14 (5A) in the fuse holder.
If F14 cannot be connected to the *wire, connect an additional fuse (5A) between wire 01 and the vehicle starter key.
7. Connect the CHA wire to the clamp of the battery's negative pole.
8. Reconnect the clamp of the battery's negative terminal.

Battery Connection



T = 15 min.



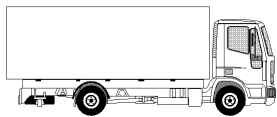
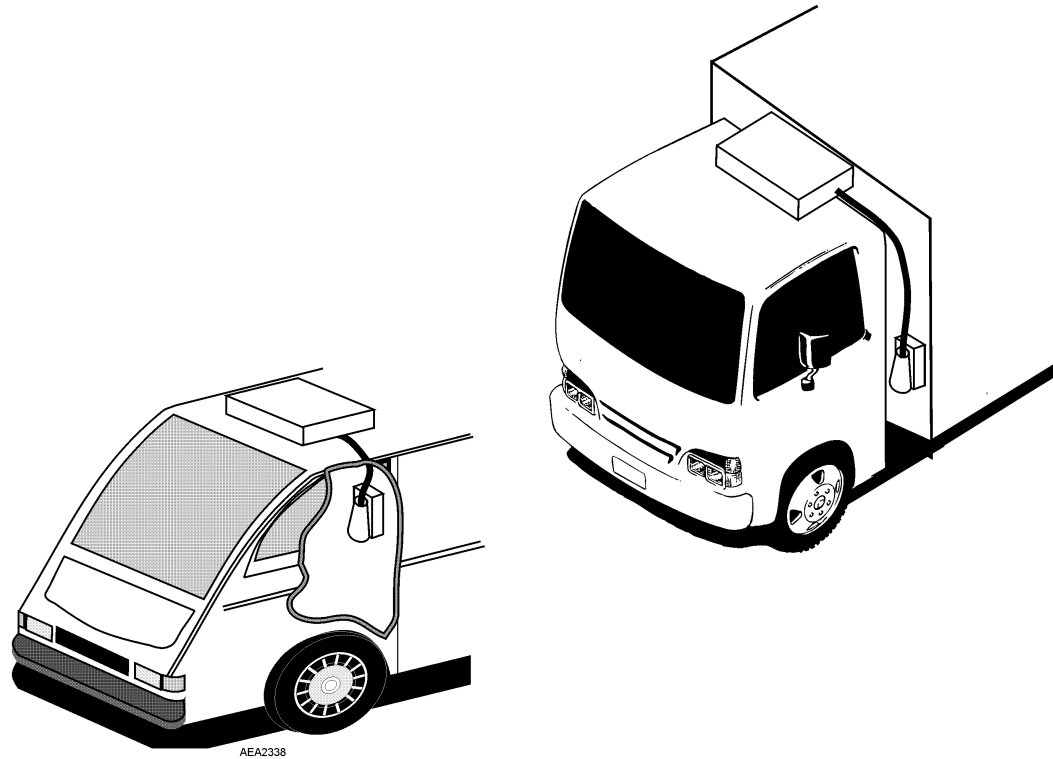
Fitting the Power Supply Units with Electric Standby



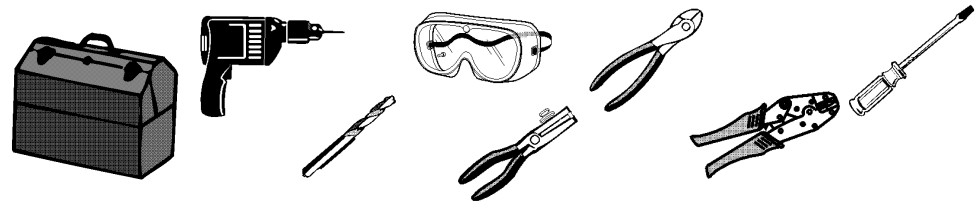
WARNING: *Always confirm the supply voltage matches the voltage specifications of your particular unit prior to making any electrical connections.*

1. Install the power supply housing in a protected and accessible location.
2. Route the wire from the unit to the power supply, using the clamps provided.
3. Cut off the excess electrical wire. In order to avoid the coil effect, **do not roll up the excess electrical wire. Do not create splices in the electrical wire.**
4. Connect the electrical wire to the power supply, using recommended tools.

Fitting the Power Supply Units with Electric Standby



T = 10 min.



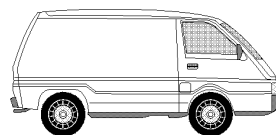
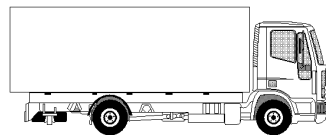
Door Switch Connection

1. Pass the electrical cable **DSW1/CHW** through to the door of the compartment of the truck.
2. Connect the door switch to the two-way connector on cable **DSW1/CHW**.

Door Switch Connection



DSW1/CHW

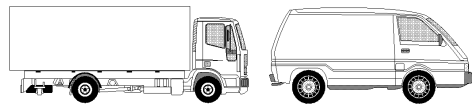
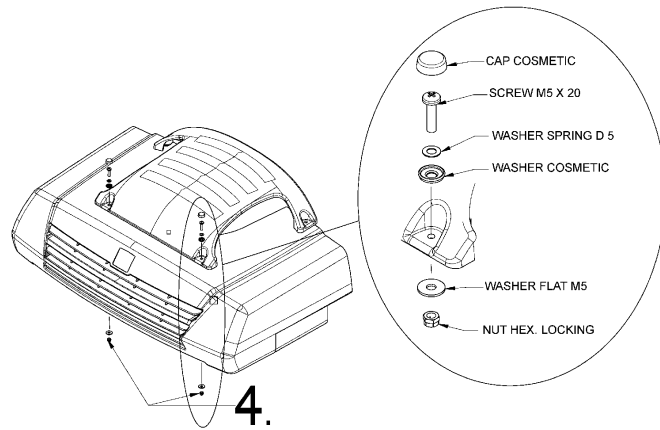
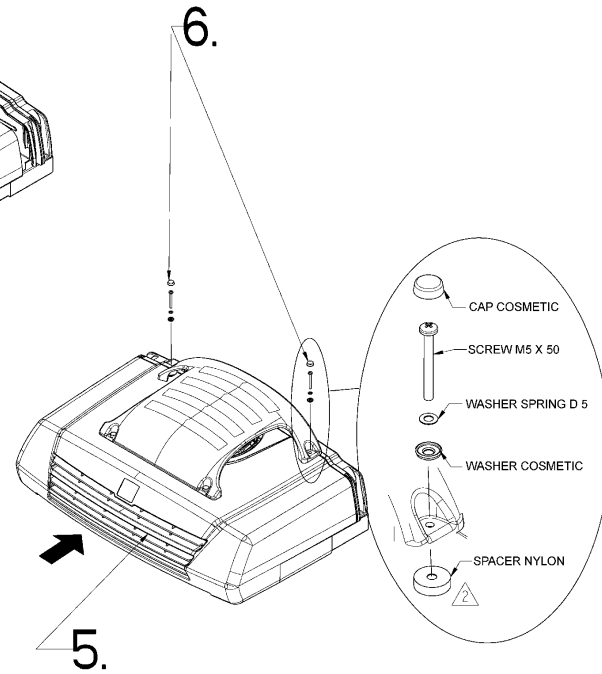
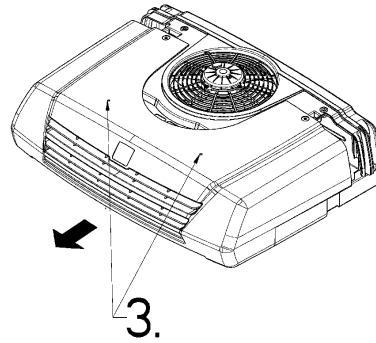
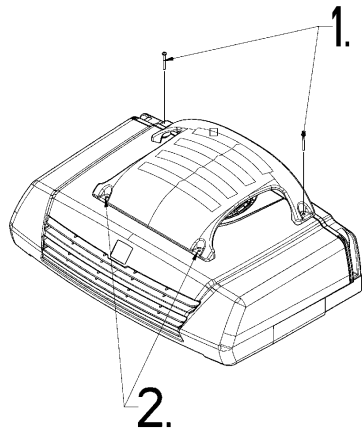


T = 1 min.

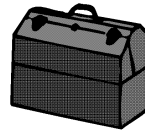
Installing the Deflector

1. Place the deflector on the condenser cover and align it with the two rear holes.
2. Mark the two front holes on the condenser cover.
3. Remove the cover from the condenser and drill the two front holes.
4. Fit the deflector onto the cover, and secure it via two front holes using the screws supplied by Thermo King.
5. Fit the cover-deflector assembly onto the condenser.
6. Secure the cover-deflector assembly to the condenser via the two rear holes using the screws supplied by Thermo King.

Installing the Deflector



T = 5 min.



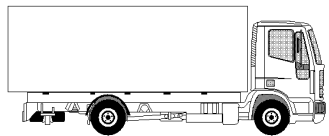
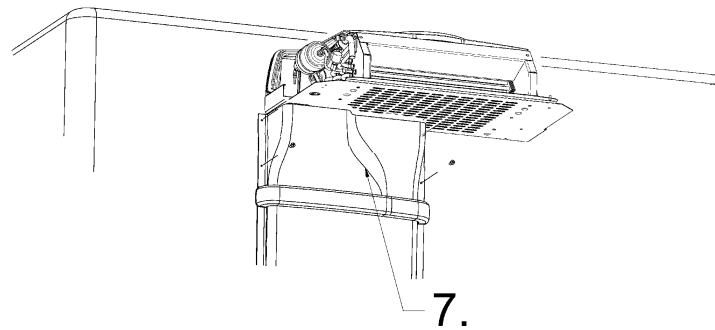
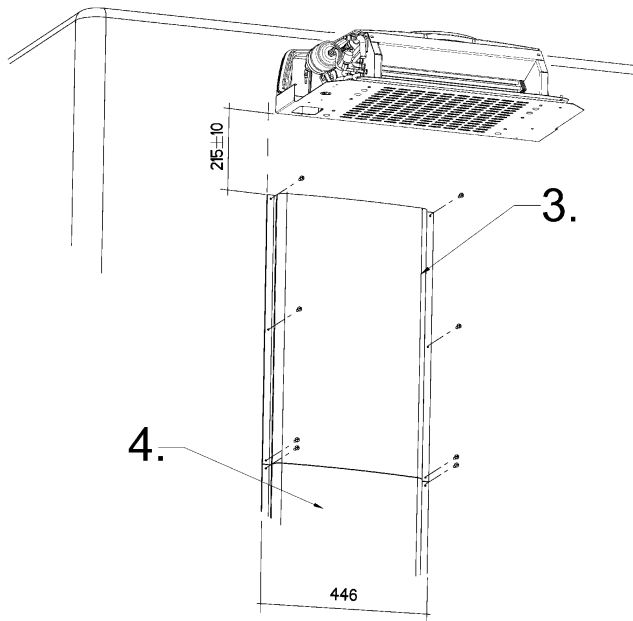
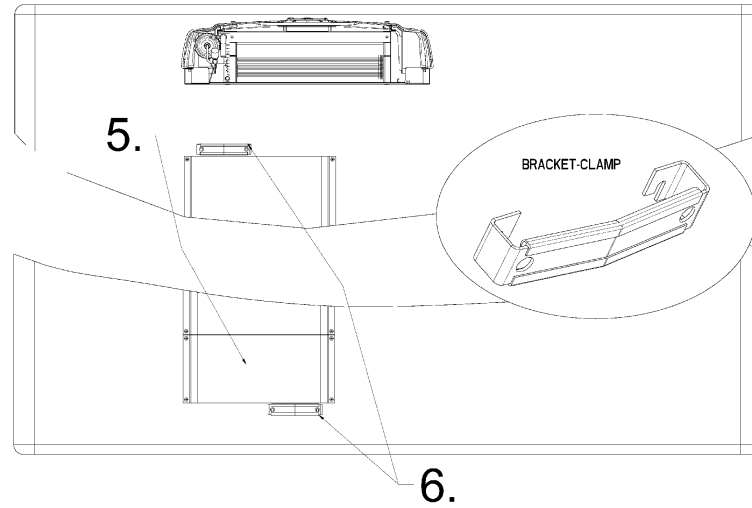
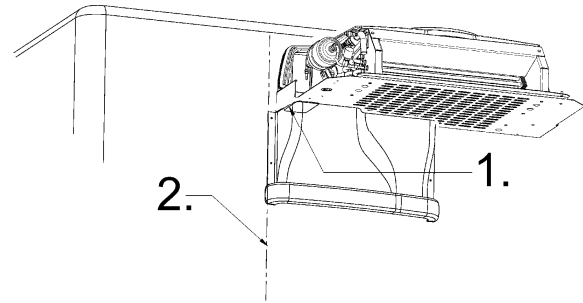
ASA408

Installing the Hose Covers

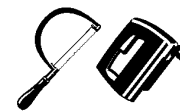
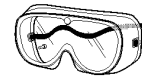
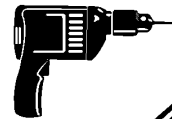
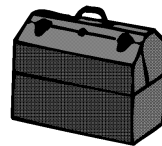
1. Place (but do not fit for the moment) the elbow-shaped curved section, aligning it so that the inside coincides with the rim of the hose outlet hole.
2. Mark the left-hand baseline.
3. Mount and fit the straight section of the cover. To ensure the correct curvature, the total width should be 446 mm.
4. If necessary, fit additional straight sections.
5. Cut the last straight section to the required length.
6. Secure the hoses using the clamps, choosing the best possible location.
7. Mount and fit the elbow-shaped curved section of the cover.

NOTE: The hoses may be connected before or after fitting the straight section of the cover, depending on the particular characteristics of each installation.

Installing the Hose Covers



T = 12 min.

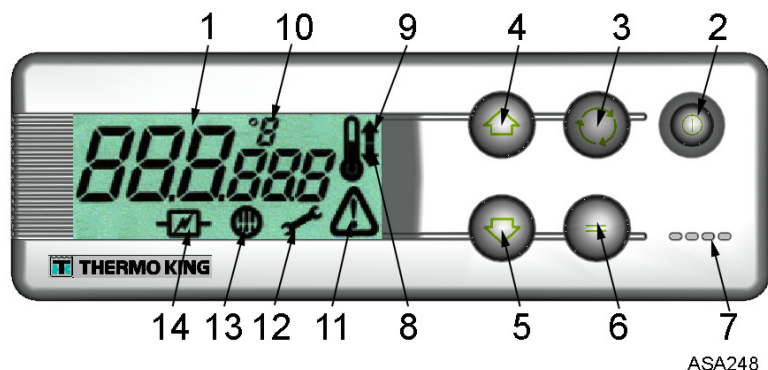


ASA409



In-Cab Control Box

DISPLAY, KEYS AND SYMBOLS



1. **Display.** It is always active and backlit except when the unit is disconnected (no power) or when the unit is connected but has been manually switched off from the In-cab Control Box. It normally displays the return air temperature (of both load compartments in bi-temperature units).
2. **ON/OFF Key.** This key is used to start/stop the unit. It is always lit except when the unit is disconnected (no power), and thus acts as an indicator of the presence of power in the unit.
3. **Select Key.** Selects prompt screens and information screens.
4. **Up Key.** Is used to increase the setpoint temperature.
5. **Down Key.** Is used to reduce the setpoint temperature.
6. **Enter Key.** Is used to enter a new command such as manual defrost, etc.
7. **Buzzer.** It is energized when the vehicle battery and the electric power supply are connected simultaneously. It is also energized if the doors are opened while the refrigeration unit is running.
8. **Cool Symbol** (Thermometer with an arrow pointing downward). The unit is cooling.
9. **Heat Symbol** (Thermometer with an arrow pointing upward). The unit is heating.

10. **°C/°F Symbol.** Indicates whether the on-screen temperature reading is in degrees Celsius (°C) or degrees Fahrenheit (°F).
11. **Alarm Symbol.** Indicates that there is an alarm in the system.
12. **Maintenance Symbol.** Warns of the need to carry out maintenance to the unit.
13. **Defrost Symbol.** Indicates the unit is in Defrost Mode.
14. **Electrical Symbol.** Indicates that the unit is in Electric Standby.
15. **Triangle Symbol.** Indicates that the return air temperature of the remote load compartment is outside the setpoint temperature range of the remote compartment.

HOURLMETER MENU

From the **Standard Display** press the SELECT key for 3 seconds to enter the **Hourmeter Menu**, then use the SELECT key to display:

1. **HC:** Hours remaining to maintenance notice.
2. **tH:** The total amount of time the unit has been switched on protecting the load.
3. **CC:** Battery Mode Compressor Hours.
4. **EC:** Electric Mode Compressor Hours.
5. Return to Standard Display.

INFORMATION MENU

From the **Standard Display** press the ENTER plus the UP key during 3 seconds to enter the **Information Menu**, which scrolls automatically through the following:

1. Display test (all symbols on).
2. Software version.
3. Refrigerant type.
4. **bat:** current battery voltage (value in volts, decimal).
5. **HP:** current pressure.
6. Number of Compartments/Unit type.
7. Return to Standard Display.

In-Cab Control Box

INSTALLATION MENU

From the Standard Display press the ENTER plus the DOWN key for 3 seconds to enter the Installation Menu: the first parameter will be displayed, the value in the large digits and its name in the small digits. To modify the parameter value press the ENTER key, the value will flash, press the UP or DOWN key to modify the value and confirm by pressing the ENTER key again. To scroll through the menu press the UP or DOWN keys.

NOTE: Some Direct Smart Reefer versions show the setpoint temperature (SP) as the first parameter in the Installation Menu.

NAME	DESCRIPTION	DEFAULT	MIN	MAX
diF	Set Points Differential Once the setpoint temperature has been reached, and while the temperature remains between diF °C/°F above or below the setpoint, there is no demand for transfer of heat or cold, and the unit remains in null mode. Increments of 1°.	3	1	5
SSC	Soft Start Cycles (ON/OFF) Programmable soft start for the road compressor clutch.	OFF	OFF	ON
dit	Defrost Initiation Timer (Minutes) Increments of 30 minutes. On time out the unit will switch from cool to the appropriate defrost mode. The timer will count all the time the system is in any cool mode. The timer will be reset when a defrost starts. When the value is set at 0, is the test position: the defrost will begin in 15 seconds.	240	30	480
dtT	Defrost Termination Timer (Minutes) Increments of 5 minutes. Timer will count from defrost mode initiation. Timer will reset after a temperature defrost termination or timer time out. On time out the unit will switch from defrost to null mode. When the value is set at 0, is the test position: the defrost will stop in 15 seconds.	30	5	50
EFC	Evaporator Fans Constant Blow on: evaporator fans stays on also during null mode. off: evaporator fans cycles on and off with the regulators.	OFF	OFF	ON
dAL	Out Of Range Alarm Programmable from 1° up to 10° or off (0). When the difference between the return air temperature and the set point exceeds the on-screen return air temperature reading flashes.	0	0	10
HC	Hour Counter Initial Value For Maintenance Purposes (Tens of hours, e.g. 150=1500 hours), programmable from 1000 up to 5000, 500 steps.	150	0	500

In-Cab Control Box

NAME	DESCRIPTION	DEFAULT	MIN	MAX
dSP	Doors Switches Presence/polarity 0: normally closed, 1: normally open, 2: not present.	1	0	2
bE	Buzzer Enable 0: not enabled, 1: enabled, 2: enabled also when keys are pressed, 3: enabled only when keys are pressed.	2	0	3
tu	Thermostat Units C: temperature visualization in °C, F: temperature visualization in °F.	C	C	F
Pu	Pressure Units b: pressure visualization in bar, P: pressure visualization in psig	P	b	P

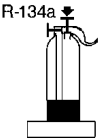
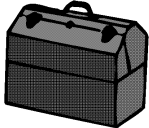
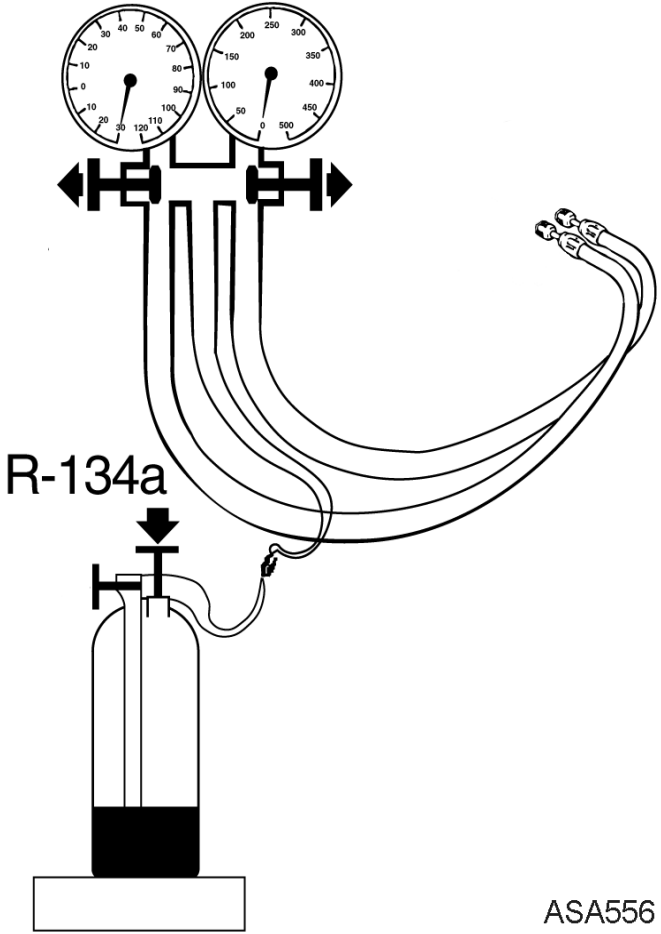
Checking the Installation

- 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 spot 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 and be shortened in case of leaks).
- 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.

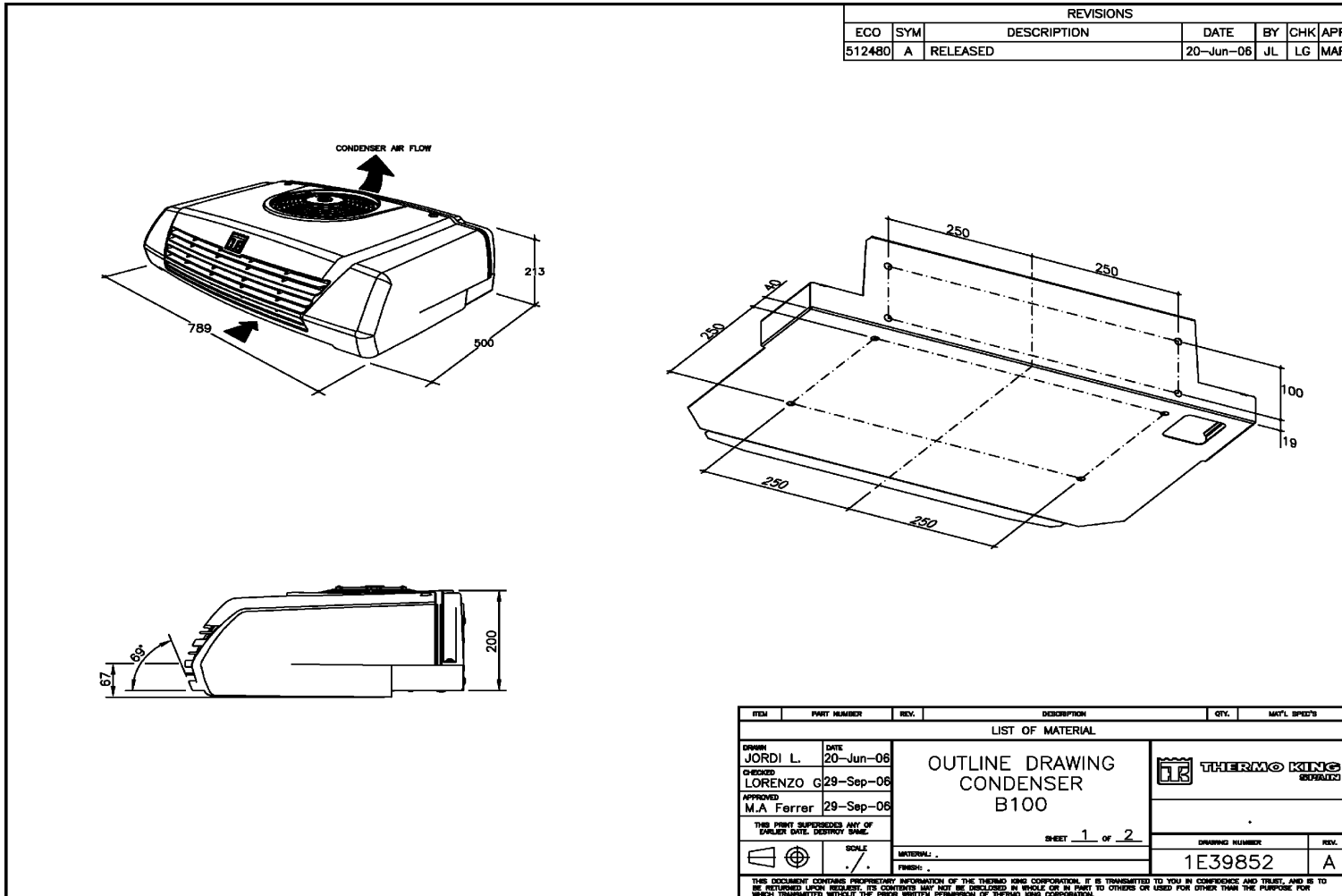
Charging the Circuit

1. Connect the gauge manifold to the suction and discharge line intakes of the condenser unit.
2. Connect the refrigerant bottle to the gauge manifold and place it on a set of scales.
3. Open the refrigerant bottle valve and **drain the gauge fitting line**.
4. Keep the low pressure side valve of the gauge manifold closed. Open the high pressure side valve.
5. Add refrigerant until reaching approximately **0.95 kg/2.1 lb of R-134a**.
6. Close the refrigerant bottle valve and the high side valve of the gauge manifold.
7. Start the vehicle engine running at around 1000 rpm and switch on the unit.
8. Set the unit thermostat at 0°C/32°F (see operating manual).
9. Run the unit until it reaches a temperature close to that indicated, and a **high circuit pressure of 12.5 bar / 180 psig for R-134a**. Partially close the air intake to the condenser if necessary.
10. Open the low side valve of the gauge manifold and the refrigerant bottle valve, and add refrigerant slowly until no bubbles can be seen through the liquid sight glass.
11. Close the refrigerant bottle and gauge manifold valves.
12. Leave the unit running for 15 minutes.
13. Only if you are installing a unit without electrical standby, turn off the unit, stop the vehicle and remove the gauge manifold.

Charging the Circuit



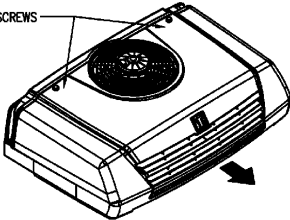
Outline Drawings



Outline Drawings

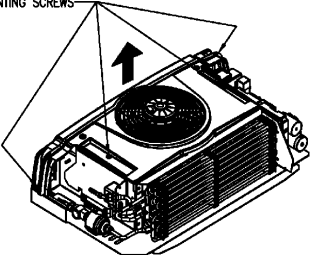
① REMOVE THE COVER

2 MOUNTING SCREWS



② REMOVE THE COIL CANALIZER (Remove the fan connector)

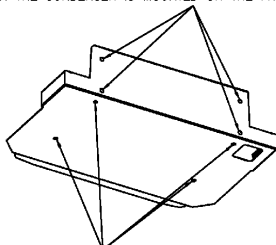
4 MOUNTING SCREWS



NOTA:
El aspecto y los componentes de la unidad pueden variar dependiendo del modelo en concreto

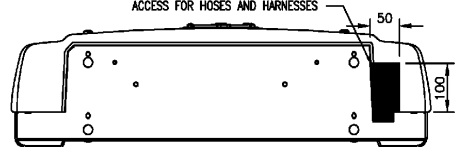
NOTA:
The components and the unit look's can changed depending on the model


FIX THE CONDENSER BY MEANS OF THESE 4 HOLES WHEN THE CONDENSER IS MOUNTED ON THE FRONT OF THE TRUCK



IN A ROOF-MOUNTING FIX THE CONDENSER BY MEANS OF THESE 4 HOLES

WHEN THE CONDENSER IS MOUNTED ON THE FRONT OF THE TRUCK (A NON-ROOF MOUNTING); THE SHADED MATERIAL MUST BE REMOVED FROM THE COVER AS SHOWN:



ITEM	PART NUMBER	REV.	DESCRIPTION	QTY.	MAT'L SPECS
LIST OF MATERIAL					
<small>DRAWN</small> JORDI L. <small>CHECKED</small> LORENZO <small>APPROVED</small> M.A Ferrer	<small>DATE</small> 20-Jun-06 <small>DATE</small> 29-Sep-06 <small>DATE</small> 29-Sep-06	OUTLINE DRAWING CONDENSER B100			
<small>THIS PRINT SUPERSEDES ANY OF EARLIER DATE. DESTROY SAME.</small>			SHEET <u>2</u> OF <u>2</u>	<small>DRAWING NUMBER</small> 1E39852	<small>REV.</small> A
<small>SCALE</small> 1/1		<small>MATERIAL:</small> -		<small>FINISH:</small> -	
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Outline Drawings

