Truck Refrigeration



1

INSTALLATION AND COMMISSIONING MANUAL

for

Neos 100S, Neos 200e, Integra 20X, 30S, 35X, 40X, 40XR, 50X, 50XR

Direct Drive Refrigeration Units

© 2024 Carrier Corporation • Printed in U. S. A. 0622

Safety Precautions

Electrical Power

Beware of HIGH VOLTAGE supplied by the main power as the unit may start automatically.

Before working on any unit, make sure that the main Run/Stop switch is in STOP position and the negative battery terminal is disconnected.

Fan Blades

All refrigeration units are equipped with Automatic Start/Stop and may start at any time without warning. Beware all fan blade, belts, and other moving parts.

Vehicle Battery

Vehicles are equipped with a lead-acid type battery. The battery normally vents small amounts of flammable hydrogen gas. Keep any flame, lighted object, or source of spark away. A battery explosion can cause serious physical harm and/or blindness







Safety Precautions



DISCONNECT the battery ground (-) on the vehicle battery.

Personal Protective Equipment

Always use personal protective equipment while doing anything on this refrigeration unit.

Engine Coolant

All engines have a pressurized coolant system. Under normal operating conditions, the coolant in the engine and radiator is under high pressure and very hot. Do not remove the cap from a hot radiator. If the cap has to be removed, do so very slowly in order to release pressure without spray.

Refrigerants

The refrigerant contained in the refrigeration system of the units can cause frostbite, severe burns, or blindness when in direct contact with the skin or eyes.





52-02142-00 FIEV A



Evaporator Clearances

62-11165 Rev H

ANSICOLD®



Do not obstruct the evaporator fan inlet(s) or outlet

For any movable bulkheads, there must be a MINIMUM distance "A" between the evaporator outlet and any obstruction.

When mounting X Series evaporators, it is recommended to leave a MINIMUM distance "B" for installation and service access.

MODEL	"A" Minimum Distance Inches (millimeters)	"B" Minimum Distance Inches (millimeters)	
100S, 200e, 20X	20.0" (500)	6.0" (150)	
30S	32.0" (800)	Not Applicable	
35X,40X,40XR 50X,50XR	40.0" (1,000)	6.0" (150)	

Condenser Installation – Roof Top Application



TRANSICOLD © 62-11165 Rev H



<u>Note:</u> For 30S, use the black marking on the bottom cover of the unit as a template for drilling the large refrigerant and electrical pass-thru hole.

Roof Top Applications

Mark and drill the four condenser mounting holes, as well as the larger refrigerant and electrical pass-thru hole, as indicated above (depending on unit model)

Condenser Installation – Roof Top Application

Install the four condenser mounting pads by first applying waterproof silicone caulk to the bottom cups in each pad.

Apply waterproof silicone caulk to each of the four condenser mounting screws to prevent water entry around the screw.

Apply waterproof silicone caulk to both sides of the center pad, which is used for hoses and wiring, and install the center pad.



Remove the condenser cover. On the bottom cover of the unit, drill the four 0.56" (15mm) mounting holes and the larger electrical/hose hole as per the diagram on page 5.

Mount the condenser on the mounting pads in fasten in place using the hardware supplied in the kit.









ANSICOLD®



Front Mount Applications: Mark and drill the four condenser mounting holes, as well as the larger refrigerant and electrical pass-thru hole, as indicated above (depending on unit model)

Bolt the condensing unit in place using the hardware supplied in the mounting kit.

Evaporator Mounting Preparation

62-11165 Rev H

ANSICOLD®



Remove evaporator access panels. If the box has mounting studs, fasten the evaporator using supplied hardware; otherwise, mark the mounting holes as indicated above (depending on unit model). Leave a minimum of 6" (150mm) between the box wall and the rear of the evaporator.

From the inside of the box, drill 4 holes completely through the roof of the vehicle using a 7/32" (5mm) drill bit.

From the inside of the box, step drill only through the inside skin of the vehicle using a $\frac{1}{2}$ " (12.5mm) drill bit.

From the outside of the box, use a 7/8" (22mm) hole saw to drill the outer roof of the box and the insulating foam.

Make certain NOT to drill all the way through the roof. The $\frac{1}{2}$ " (12.5mm) hole in the inside skin of the vehicle must remain intact.







62-11165 Rev H

Installation & Commissioning Manual: Neos 100S, Neos 200e, 20X, 30S, 35X, 40X, 40XR, 50X, 50XR

Evaporator Mounting Preparation – Mushroom Drilling

Evaporator Mounting – Drain Line Installation

62-11165 Rev H

ANSICOLD®



Install the evaporator drain lines.



A MINIMUM drop of 4.0" (100mm) is recommended between the drain pan outlet and where the drain lines exit the vehicle.



Note the difference in drain line recommendations for perishable versus frozen applications

For perishable applications, connect the water drain hoses together and route outside the vehicle. Note the diagram showing recommended ways of routing the lines.

For frozen applications, do NOT tee drain lines together. It is important for each line to directly exit the vehicle in as short a distance as possible to prevent condensate from freezing.



Make certain there are no low spots that can trap water in any of the drain line routings.

Secure drain lines in place using ty-wraps or clamps.



Refrigerant Hose Installation – Handling Recommendations

62-11165 Rev H







Minimum Bend Radius

#6 hose (3/8")	3.5" (90mm)
#8 hose (1/2")	4.0" (100mm)
#10 hose (5/8")	4.5" (115mm)
#12 hose (3/4")	5.25" (135mm)



For proper functioning of the refrigeration unit, the hoses must be kept clean and dry



It is recommended to leave the caps installed on the ends of the hoses while routing them to prevent internal damage or moisture entry.

Make sure to use the clamps provided in the installation kit to secure the hoses and keep them from vibrating or rubbing.

When securing hoses, note the hoses will slightly change length under pressure. When securing and clamping the hoses, make sure to account for the slight variations in length that will occur.

Use the rubber grommets provided in the installation kit when passing through holes and bulkheads to prevent the hoses and electrical wires from rubbing on any sharp edges.



As shown in the diagram, do not twist, curve or route the hoses in any manner which will stress the hose. Use as large a bend radius as possible. Use elbows and fitting as necessary to ease installation and increase hose life.

Hose Cutting / Crimping Kit:07-60117-00Fitting Insertion Tool:07-60177-00

Cut the hose to the required length using the Carrier hose cutting tool.

Lubricate the inside of the hose end with POE oil.

Widen the internal hose clearance using the expanding tool before sliding the double zinc clamp over the hose.

Installation & Commissioning Manual: Neos 100S, Neos 200e, 20X, 30S, 35X, 40X, 40XR, 50X, 50XR

Refrigerant Hose Installation – Installation Preparation

Always use the **required** tools as follows:









Refrigerant Hose Installation – Installation Preparation

Lubricate the fitting and O-ring with POE oil.

Insert the connector into the hose.



Crimp the double zinc clamp using the required crimping tool.

You will need to prepare up to 5 refrigerant lines, as indicated:

- Oil return line (all units EXCEPT 20X)
- Discharge line
- Liquid line
- Hot gas line
- Suction line









Carrier TRANSICOLD ®

Refrigerant Connection Lines – 30S ONLY











Installation & Commissioning Manual:

17

Electrical Connections

TRANSICOLD ®



If required, route the Return Air Sensor (RAS) and mount to the evaporator fan inlet.



Make all required electrical connections. Note that most are connectors that are "plug and play". The required electrical connections are listed as follows:

Evaporator Connections:

- Evaporator fan motor(s)
- Return Air Sensor (RAS)
- BPV (quench valve)
- Low Pressure switch



Engine Compartment:

- CLHR (road clutch)
- BBT (quench thermostat)





Cab Command Installation

62-11165 Rev H

Route the cab command harness to the interior of the vehicle



Protect the harness from all sharp sheet metal Make sure the harness is not in contact with anything hot Make certain the harness is secured from vibration



Mount the cab command in a accessible location where it may not be damaged; for example, where the rear view mirror would otherwise be mounted.



Be careful not to damage any of the vehicle hoses or wires.

If it is mounted in the dashboard, keep as far as possible from heating ducts. Maximum exposure temperature: 158°F (70°C).

Do not mount it where it can be exposed to constant, direct sunlight

Compressor Mounting

Install the road compressor on the vehicle following the bracket manufacturer's installation instructions.



Connect the high pressure line (HP) and the larger suction line (LP).

Install the injection thermostat (BPT) on the compressor high pressure line using the supplied clamp.



Make electrical connections for the injection thermostat and the compressor clutch. Place wires in protective split loop.



After connecting the injection thermostat terminals, insulate the injection thermostat body with the insulating material supplied.



Battery and Ignition Harness Connections

Route the neiman cable to the vehicle fuse box. Connect the wire to the 1 Amp fuse holder supplied in the mounting kit.

Connect to a +12Volt DC switched circuit (refer to the specific vehicle manufacturer's recommendations).

Cut the battery harness to the required length. Strip back both the positive (+) and negative (-) harness wires, crimp the electrical terminals on, and connect to the corresponding terminals on the fuse holder.

It is recommended to also use soft solder on the terminal connections.

Mount road fuse holder as close as possible to the vehicle battery.

Put electrical grease on fuse holder connections, install the road fuse supplied in the installation kit, and put protective cap on.

Connect the unit ground (-) to the vehicle chassis.

Re-connect the vehicle battery ground (-) to the battery.











22

Installation & Commissioning Manual: Neos 100S, Neos 200e, 20X, 30S, 35X, 40X, 40XR, 50X, 50XR

Evacuation, Leak Checking, and Refrigerant Charging

The presence of moisture in a refrigeration system can have many undesirable effects, such as sludge formation, "freezing up" of metering devices, and metal corrosion caused by acid formation. Make every effort to keep the system dry.

After performing a pressure leak test, evacuate and dehydrate the system.

Essential tools to properly evacuate and dehydrate a system include a good vacuum pump (5 cfm=8m³H displacement, P/N 07-00176-01) and a good vacuum gauge indicator (P/N 07-00414-00).

NOTE: a compound gauge is NOT recommended

Keep the ambient temperature above 60°F (16°C) to speed evaporation of moisture. If the ambient is lower than 60°F (16°C), ice may form before moisture removal is complete. If necessary, heat lamps or alternate sources may be used to raise system temperature.

The unit is shipped with a dry nitrogen holding charge. Remove the nitrogen, and then evacuate and dehydrate the system by connecting three hoses (do not use standard service hoses) to the vacuum pump and refrigeration unit. Connect an evacuation manifold with evacuation hoses only to the vacuum gauges and refrigerant recovery system.







Evacuation, Leak Checking, and Refrigerant Charging

Check the evacuation system for leaks: Without being connected to the inline service ports, open the vacuum pump and manifold gauge valves and start the pump and draw a deep vacuum. Shut off the pump and check to see that the vacuum holds. Repair if necessary.

Connect the manifold gauge set hoses to the service ports. Open the vacuum pump and manifold gauge valves (if they are not already open) and start the vacuum pump. Evacuate unit until the vacuum gauge indicates 2,000 microns. Close the vacuum gauge and vacuum pump valves. Wait a few minutes to be sure the vacuum holds.

Break the vacuum with clean, dry nitrogen. Raise system pressure to approximately 2 psig

Repeat the steps outlined above one more time.





Evacuation, Leak Checking, and Refrigerant Charging (Final Step)2-11165 Rev H

Evacuate the unit to 500 microns. Close off the vacuum pump valve and stop the pump. Wait five minutes to see if the vacuum holds. This checks for residual moisture and/or leaks.

With a vacuum still in the unit, the refrigerant charge may be drawn into the system from a refrigerant container on weight scales. The correct amount of refrigerant may be added by monitoring the scales.



Make sure to use the correct refriderant for each unit. When the correct charge has been added, close the unit manifold valves and disconnect the manifold gauges.



MODEL	Refrigerant	Refrigerant Charge		
	Туре	Pounds	Kilograms	
Neos 100S	R134a	2.2 lbs	1 kg	
Neos 200e	R452a	3.30 lbs	1.5 kg	
20X	R404a	3.10 lbs	1.4 kg	
30S	R134a	4.00 lbs	1.8 kg	
35X	R404a	3.30 lbs	1.5 kg	
40X	R404a	6.60 lbs	3.0 kg	
50X	R404a	7.05 lbs	3.2 kg	
40XR	R404a/R452a	4.8 lbs	2.2 kg	
50XR	R404a/R452a	5.5 lbs	2.5 kg	



Carrier TRANSICOLD®





TRANSICOLD

62-11165 Rev H

The Compressor Regulation Valve (CPR) is designed to regulate the flow of refrigerant returning to the compressor from the evaporator and ensures the correct capacity of the unit. The CPR also reduces compressor start-up and operation load. It is critical it is set correctly.



- **CPR** adjustment **MUST** be done under the following conditions:
- Road operation at 2,400 compressor RPM
- Heat or Defrost mode



Connect manifold gauges to the CPR fitting port. Start the unit in Heating or Defrost mode. Check that the road compressor speed is 2,400 RPM

Remove the cap on the CPR valve.



Adjust the CPR with an 8mm Allen (hex head) wrench to get correct gauge pressure (see next page).

- To raise the suction pressure, turn the set screw clockwise
- To lower the suction pressure, turn the set screw counter-clockwise.



Evaporator CPR Adjustment

62-11165 Rev H



* The CPR adjustment must be INCREASED by approximately +0.5 psi for every additional foot (+0.1 bar per meter) that the evaporator is located (distance D minus 6") from the front wall of the vehicle.

MODEL	CPR Setting at CPR Port		
	PSI	BAR	
Neos 100S	10.3 psi	.7 bar	
Neos 200e	42.1 psi	2.9 bar	
20X	27.5 psi	1.9 bar	
30S *	18.9 psi	1.3 bar	
35X	30.5 psi	2.1 bar	
40X/40XR	33.4 psi	2.3 bar	
50X/50XR	37.7 psi	2.6 bar	



*Only the 115V standby version of the 30S has a CPR. No other 30S versions require adjustment.



When the setting has been adjusted, tighten the jam nut securely against the setting screw to prevent any vibration of the set screw (and to prevent disruption of the CPR setting).

Replace the CPR cap and remove gauges.

Evaporator TXV Setting

62-11165 Rev H

ANSICOLD®



The Thermo Expansion Valve (TXV) is designed to precisely meter the flow of liquid refrigerant into the evaporator and control the refrigerant gas leaving the evaporator.

The evaporator outlet pressure (P2) must be converted to saturation temperature (T3) using a P/T chart. The superheat is the difference between the temperature at the bulb location (T1) and the evaporator outlet saturation temperature (T3).

Connect a gauge to the evaporator outlet fitting. Put a thermocouple at the expansion valve bulb location and insulate it. Run the unit in Cool mode.



Evaporator TXV Setting

62-11165 Rev H

To INCREASE superheat, turn clockwise

To DECREASE superheat, turn counter-clockwise



Repeat process a minimum of 3 times

SUPERHEAT = T1 – T3



MODEL	Superheat at 32°F (0°C) Box		Superf 0°F (-20	neat at °C) Box
ALL	14.5°F	8°C	7°F	4°C

To complete the installation, re-install any evaporator panels.



North America

Carrier Transicold 700 Olympic Drive Athens, GA 30601 USA Tel: 1-706 -357 -7223 Fax: 1-706 -355 -5435 Central America and Mexico Ejercito Nacional 253 - A Piso 5 Colonia Anahuac 11320 Mexico, D.F. Tel: 55315010 Fax: 55315010 ext. 1005 Carrier Transicold Division, Carrier Corporation P.O. Box 4805 Syracuse, N.Y. 13221 U.S.A.

www.carrier.transicold.com