EQUATOR®
ADVANCED Appliances

SERVICE MANUAL

(TROUBLE SHOOTING AND REPAIRING TIPS)

Fourth Edition – February 2006

CONSERV' REFRIGERATOR

MODELS

375 / 1200 SERIES (OLD & NEW)

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WARRANTY INFORMATION

Your Equator appliance is protected by this warranty under normal, personal, family or household use (1 Year), and limited commercial use (90 days) in the USA and Canada.

WARRANTY

Equator Corporation undertakes to the consumer-owner to repair or, at Equator Corporation's option, to replace any part of this product which proves to be defective in workmanship or material under normal personal, family or household use, in the USA and Canada, for a period of one year from the date of original purchase.

For commercial use, the product is warranteed for a period of 90 days.

During this period, Equator Corporation will provide all labor and parts necessary to correct such defect, free of charge, if the appliance has been installed and operated in accordance with Equator Corporation's written instructions with the appliance. Ready access to the appliance, for service, is the responsibility of the consumer-owner.

EXCLUSIONS

In no event shall Equator Corporation be liable for incidental or consequential damages or for damages resulting from external causes such as abuse, misuse, incorrect voltage or acts God.

This warranty does not cover service calls which do not involve defective workmanship or materials covered by this warranty. Accordingly, diagnosis and repair costs for a service call which does not involve defective workmanship or materials will be the responsibility of the consumer-owner.

Specifically, the following work is not covered under warranty and does not constitute warranty work:

. Installation - improper hook-up or leveling
. Maintenance - cleaning of air and/or water filter
. Damage - replacing broken door handle

Most work is covered. The defining factor is, has the machine malfunctioned (Equator is responsible) or has the customer omitted or done something to cause machine to malfunction (customer is responsible).
Some States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

WARRANTY SERVICE

This warranty is given by:

Equator Corporation,
Equator Plaza,
2801 W. Sam Houston Pkwy. N.,
Houston, TX 77043-1611.

Service under this warranty must be obtained by the following steps, in order:

Call an Equator Corporation Authorized Service Agent (obtain number of nearest agent from your dealer or by calling Equator Service at 1-800-776-3538). Under normal circumstances, Service will be provided during regular business hours (9:00 a.m. to 5:00 p.m. weekdays).

GENERAL

Since it is responsibility of the consumer-owner to establish the warranty period by verifying the original purchase date, Equator Corporation recommends that a receipt, delivery slip or some other appropriate payment record be kept for that purpose.

Remember to send in your Warranty Registration Card so that a proof of your purchase exists with Equator.
This warranty gives you specific legal rights, and you may also have other rights which vary from State to State.

Corporate Office

EQUATOR CORPORATION
Equator Plaza
2801 W. Sam Houston Pkwy. N.
Houston, TX 77043-1611
Tel: 713-464-3422 - Fax: 713-464-2151
Tel: 800-935-1955

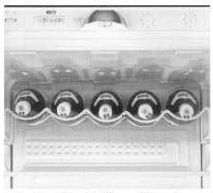
LISTED
Underwriters Laboratories Inc.®
US N° 77119 CANADA

EQUATOR®

ConServ Commercial Refrigerator

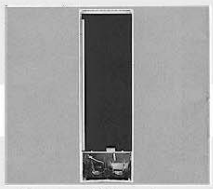
Made In Denmark

European Ecolabel



5 Bottle Wine Rack

External Indicator Lights



Covered Condenser
Built-in Casters for easy positioning

Glass Shelves

The ConServ Commercial Refrigerator provides incomparable features in a slim design package. The easy to load Bottom Mount Freezer uses space very efficiently. It is perfect for compact spaces and sits flush against any wall because it is completely sealed and there are no exposed coils. To add to its utility, a 5-bottle wine rack is included in the refrigerator. To compliment the glass shelves in the refrigerator, the 3-drawer freezer along with the ice drawer make efficient use of space in the unit. With reversible doors and the ability to stack units side-by-side, the options are limitless.

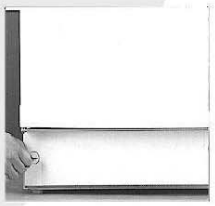
The unique design of Equator's new ConServ series of Refrigerators and Freezers speak for themselves. David Lewis, the award-winning designer of these works of art, has worked extensively with Bang & Olufsen® audio systems. David Lewis's design has achieved a unique style which softens the lines and enhance the modern home with quality, style and elegance.

The control panel is incorporated - completely hidden when the door is closed. The new handles complement the overall design and with the option of Stainless Steel doors, the Equator ConServ series offers an artistic concept in kitchen equipment. With an energy usage of only **$2.50/month**, The ConServ Commercial Refrigerator is the perfect combination of form and function.

EZ Load
Bottom-Mount Refrigerator Freezer

ConServ Commercial Refrigerator Specifications	
Models	375 W - White
	375 B - Black
	375 S - Brushed Stainless
Size (HxWxD)	79.2" (6 ft. 7.2") x 23.6" x 23.4"
Shipping Size (HxWxD) incl. packaging	86" (7ft. 2") x 26" x 27"
Gross Weight - Lb(Kg)	220 (99.8)
Net Weight - Lb(Kg)	175 (79.4)
Electrical	110 V / 60 Hz / 1.8 Amp
Power Cord Length	6 ft. 4"
Capacity - Fridge	7.1 ft^3
Freezer	3.4 ft^3
Super Freeze for Refrigerator	Yes
Compressors	2
Freezer Defrost	Manual
Refrigerant Type / Quantity - lb (kg)	R134-A / Ref: 0.20(.09)/ Freezer: 0.28(0.13)
Design Pressure - High Side / Low Side	430 psig / 87 psig
Insulation	Polyurethane Foam w/Cyclopentane

Easy Defrost



Removable Kick Plate

USA UL CANADA

Concealed Light

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EQ-ECORF-2001-2

1.1 Trouble-Shooting Chart

Disturbance	Cause	Trouble-Shooting	Remedy
Unit does not refrigerate or freeze, compressor does not operate.	Wall socket is dead.	Check installation.	Install new fuse if necessary. Inform user.
	Mains cable is defective.	See section 1.2: Trouble-shooting in the electrical circuit.	Repair or replace socket or mains cable.
	Thermostat is defective.		Replace thermostat.
	Defective winding in compressor.	See section 1.6: Trouble-shooting for Electrical Faults in the Compressor.	Replace compressor.
	Starting device is defective.	See section 1.2: trouble shooting in the Electric circuit.	Replace starting device.
	Wiring for starting device is incorrectly installed.		Correct in accordance with wiring diagram in the spare parts list.
No-Frost	Timer is set in defrosting position.		Turn timer knob past defrosting.
Unit does not refrigerate or freeze, compressor tries to start but fails to operate.	Insufficient mains voltage.	Check mains voltage.	Inform user that installation should be repaired by an electrician.
	Wrong or defective starting device.	See section 1.2: Troubleshooting in the Electric Circuit.	Install new starting device.
	Wiring for starting device is incorrectly installed.		Correct according to wiring diagram in the spare parts list.
	Winding fault in compressor.	See section 1.5: Troubleshooting for Electrical Faults in the compressor.	Replace compressor.
	Condensing pressure too high (obstruction capillary tube).	Open system and location obstruction by blowing N2 through system. See Section 2.1: Opening the Refrigerating System with R600a for Repairs.	Remove filter drier and cut 5 cm of the capillary tube. Blow through the system thoroughly before installing new filter.

To be continued on the next page

Disturbance	Cause	Trouble-Shooting	Remedy
	Oil present in system after horizontal transport.	Question user about mode of transportation and time interval between installation and start-up.	Let unit stand for several hours at warm temperature and try to start again. If compressor does not start, open the system and blow through with N2.
	Locked rotor (fault in compressor).	Check that compressor hums and picks up total starting current. Open system and blow N2 through system.	If system (filter) is not blocked, replace compressor.
	Ambient temperature very low. Oil in compressor too cold, possibly in connection with undervoltage.	Measure ambient temperature. Measure voltage.	Find a better location for unit. Condenser can be insulated if necessary, but DON'T FORGET to remove again if ambient temperature increases.
Compressor tries to start but does not always succeed on first attempt.	Can be normal. Ventilation is perhaps insufficient.	Measure the temperature of compressor housing (max. 110°C) and filter (max. 70°C).	Find a better location for the unit.arrange ways for a better ventistat.
Refrigerate and/or freeze normally. Compressor tries to start but does not succeed on first attempt.	Standstill time for compressor is too short.	Check for snug fit of doors. Time standstill period for compressor.	If standstill time is too short, replace thermostat.
Compressor runs continuously. Unit refrigerates/freezes normally or too much.	Thermostat phial is incorrectly installed.	Check location of phial.	Correct the fault. Cutout temperature can be raised by giving the phial a greater surface contact with the evaporator.
	Ice formation around thermostat phial.	Check for snug fit of doors	Inform user to defrost unit.
	Thermostat set too low.	Turn thermostat knob counter-clockwise.	If compressor stops, inform user about function of thermostat.
To be continued on the next page.	Ice formation in phial tube.		Defrost unit. Remove thermostat phial, dry thoroughly and replace. Repeat until the phial is dry. Seal with putty.

Disturbance	Cause	Troubleshooting	Remedy
	Defective thermostat.	1.Turn thermostat knob to zero. 2.Compressor continues to run. 3.Dismount brown wire. 4.Compressor continues to run. 5.Compressor stops.	4.Check internal wiring for short circuit (fast-freeze switch). 5.Replace thermostat.
Compressor starts normally but stops again.	Extremely high voltage.	Measure voltage.	Inform user.
	High ambient temperature. Poor ventilation.	Measure temperature and check ventilation around compressor.	Improve ventilation.
	Can be normal.	Check temperature in unit.	Inform user.
Unit refrigerates/freezes too much, normally, too little or not at all. Compressor may run continuously.	Leakage in system with resulting loss of refrigerant.	Symptom: Evaporator not wholly utilized. Localize leak with electronic leak detector-first at soldering joints, pipes and compressor in motor compartment. Next in the evaporator and condenser. When leak is localized, cover area with a layer of Leak-Tec or liquid soap. Bubbles will appear at the exact site of leakage.	After repairing leakage, repair system as in the case of ice blockage in capillary tube. See relevant section in chart.
		Check pressure side with compressor running and suction side when pressure ise equalized. If refrigerant pressure is insufficient for leak detection, install a service valve on charging pipe and refrigerant and N_2 (approximately $10kg/cm_2$). Repeat leak detection.	
No-Frost	Fan is not operating.	Electric connections. Check and see if blade is fixed properly on shaft.	Blade is fixed or replaced.

Ditrubance	Cause	Trouble-shooting	Remedy
No-Frost		Check if blade is locked mechanically.	Fittings for fan or air guiding duct are adjusted or replaced.
		Check if blade is fixed correctly on shaft.	Blade must turn so that air flow only can be sucked in and blown out in the right places. Blade must cover 10mm of shaft end, on two-step fan 14mm.
No-Frost		Check id timer is set in defrosting position.	Turn timer forward.
No-Frost	Evaporator blocked by ice.	Check for snug fit of doors, cable or tube wall ducts. Check if timer is under tension when set at defrosting (remember that timer is only under is under tension when freezer thermostat is cut in). Check bimetallic thermostat and thermal fuse. Bimetallic thermostat can only be checked when the evaporator is cold (colder than 5°C). Check if heating element is under tension. Furthermore, when the doors have been open for a long time, the evaporator may be blocked by ice.Even though the compressor runs continuously, up to 10 hours will be elapsed before the next defrosting takes place. There will be no cooling in this period.	Repair leakage. Check electric connections and contact unit of timer.
Refrigerates/freezes too little or not at all. Compressor runs continuously.	Capillary tube completely or partially blocked (material from filter in capillary tube opening). Capillary tube is inserted so far up in the filter that it touches the filter net.	Mount valve on charging pipe. Measure suction pressure. Check pressure equalizing time. Cut capillary tube approximately 5cm after filter. Blow N2 through charging pipe and check flow through capillary tube	See section 4.1 and 4.1.1

Disturbance	Cause	Trouble-shooting	Remedy
	Ice blockage in capillary tube.	Heat injection area on evaporator with cloth with hot water. If refrigerant now can be heard to flow more quickly through the system, ice blockage in capillary tube is indicated. Alternatively, stop compressor and let evaporator defrost and start compressor again. In case of ice blockage, frost formation on the evaporator will increase initially and then return to its original level.	Blow N2 through system. Install outsize service filter. Ensure careful evacuation. Start compressor. Stop when warm. Evacuate system again. With heavy contamination of system it is necessary to repeat this process several times. Filter can be replaced again.
	No or very little compressor capacity.	Mount a service valve on charging pipe and check suction pressure. Pressure conditions indicate no or very little compressor capacity. Test compressor.	If volumetric check indicates insufficient compressor capacity, replace compressor. Note that defects in the compressor can be caused by complete or partial blockage at another point in the system. This situation must be remedied before a new compressor is installed.
	Capillary tube mounted incorrectly at injection site (roll-bond evaporator).	Symptoms resemble those of loss of refrigerant.	Replace refrigerating evaporator.
Insufficient refrigerating/freezing.	Thermostat is set too high.	Turn thermostat knob clockwise. Check to ensure that phial is correctly installed.	Replace thermostat.

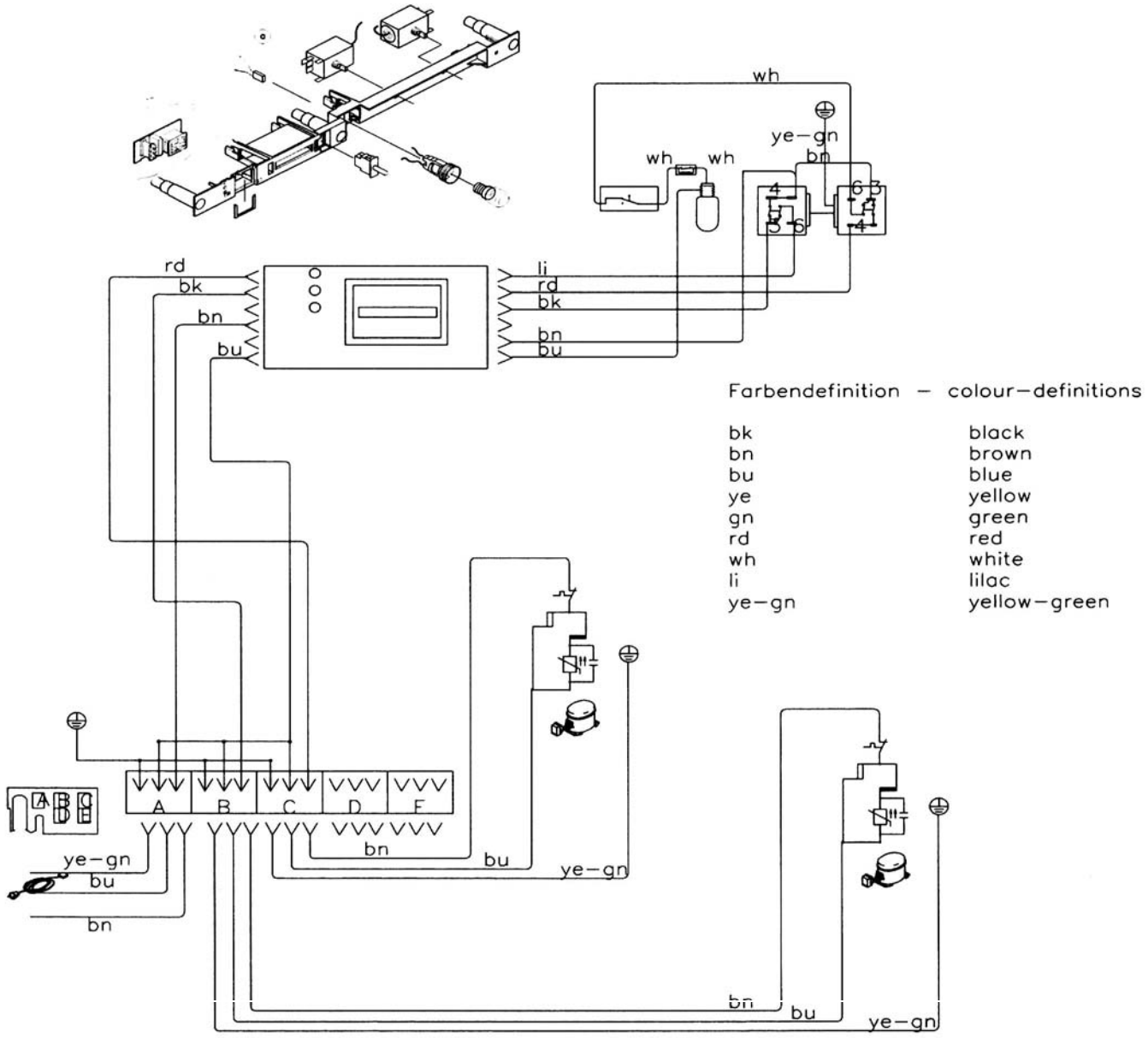
Disturbance	Cause	Trouble-shooting	Remedy
	Unit has recently been filled with large quantities of food.	Question user about use of unit immediately prior to service call.	Inform user about the problems caused by this. Instruct user about use of fast-freeze switch.
	Built-in thermometer is defective. User's thermometer is defective.	Check for correct thermometer readings.	Replace built-in thermometer if necessary.
	Ambient temperature is below 0°C. refrigerant has collected in the condenser.	Symptoms resemble those of partially blocked capillary tube. Record ambient temperature.	Find a more suitable location for the unit, with higher ambient temperature.
	Ambient temperature is too high, possibly because unit is too close to a heat source, or ventilation is insufficient.	Compare exact temperature with user's observations. Check air circulation.	Arrange for better location of unit and/or better ventilation.
Compressor runs continuously.	Doors do not fit snugly.	Insert paper between door and frame and closed door. If paper can be pulled out without resistance, the door does not fit tightly enough.	Fold double-sided tape to suitable thickness and press in between gasket and door. Pull gently in gasket at relevant area.
Rapid ice formation on freezer shelves.	As above.	As above.	As above.
Insufficient refrigeration.	User wishes to lower temperature in unit.	Measure the exact temperature.	The cut-out temperature can be lowered by giving the thermostat phial a reduced surface contact with the aluminum evaporator (refer to automatic defrosting section).
Automatic defrosting does not function. Possibly due to ice formation on evaporator.	The cut-in temperature of the thermostat is too low. The thermostat phial has insufficient surface contact with the evaporator.	Measure temperature at phial. Temperature here must not be lower than the cut-out temperature. See Section 2.	Increase the cut-in temperature of the thermostat by giving the phial a greater surface contact with the evaporator. If this does not help, replace the thermostat.

1.2. Trouble-Shooting in the Electric Circuit.

Before systematic trouble-shooting is commenced, check to ensure that:

- The fuses are intact.
- The correct voltage has been used (vo!trneter).
- The electrical equipment used is suitable for the cam- pressOr.
- The wiring has been correcUy installed (compare with wiring diagram as found in the spare parts list).
- There is no leakage between the live parts and the frame (see Section 1.3).

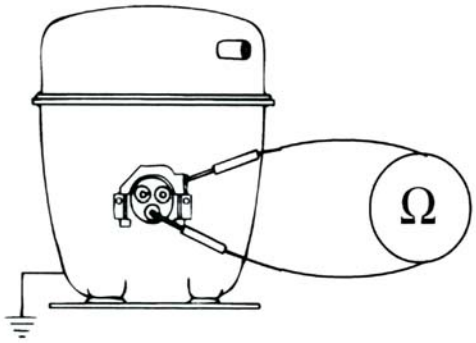
Example of wiring diagram: Diagram BKF, BMC, BSKF.



1.3. Checking for Leakage to Frame

For checking whether there is leakage between the live parts and the frame, the insulation resistance can be tested using an ohmmeter, megger or high-voltage testing device.
An ohmmeter can be used for a rough check.
When investigating the wires on the unit, a clamp from the ohmmeter is placed on the unit earth terminal.
Investigate the compressor for leakage to the frame by placing the clamp from the ohmmeter on the joint connection and on the compressor earth terminal. The ohmmeter will now show if there is any leakage to the frame.

Flammable Refrigerant
When checking compressors for flammable refrigerants using a megger or a high-voltage testing device, make sure that the compressor is completely emptied of refrigerant, as sparks may be formed during the check.



1.4. Compressor Failure

Check whether voltage is being supplied to the unit.

PTC starting device with LST.

Connect a voltmeter between terminals neutral and L on the starting device.
If no voltage can be measured, either the mains cable or the socket is defective.
Connect a voltmeter between terminals neutral and C on the starting device.
If no voltage can be measured, a defective thermostat or thermostat wiring is indicated.

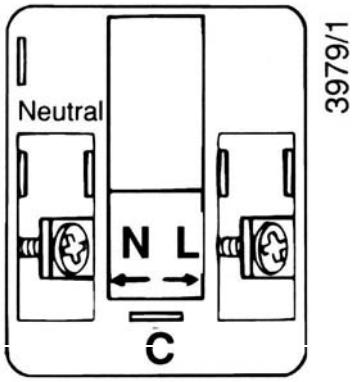
Neutral terminal = N on starting device 1 03N001 1 + 1 03N0021

Neutral terminal = M on starting device 103N0012

Dismount the red and brown wires on the thermostat and short-circuit them. If the compressor runs now, the thermostat is defective. If the compressor does not run, a break in the thermostat wiring is indicated.

If there is voltage between terminals neutral and C on the starting device, a defect in the starting device, compressor or refrigerating system is indicated.

PTC starting device.



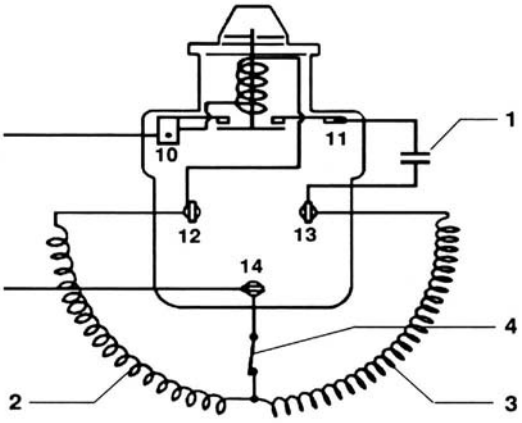
Starting device with HST

Connect a voltmeter between terminals 10 and 13 on the starting device. If no voltage can be measured, either the mains cable or the socket is defective.

Connect a voltmeter between terminals 10 and 14 on the starting device, It no voltage can be measured, a defective thermostat or thermostat wiring is indicated.

Dismount the red and brown wires on the thermostat and short-circuit them. If the compressor runs now, the thermostat is detective, It the compressor does not run, a break in the thermostat wiring is indicated.

If there is voltage between terminals 10 and 14 on the starting device, a defect in the starting device, starting condenser, compressor or refrigerating system is indicated.



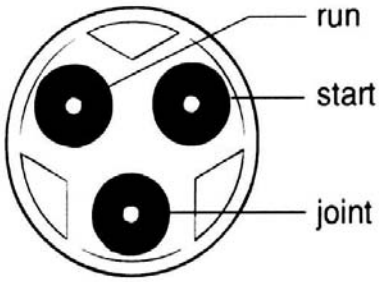
1.Starting condenser
2. Run winding
3. Start winding
4. Winding protector

1.5. Trouble-Shooting for Electrical Faults in the Compressor

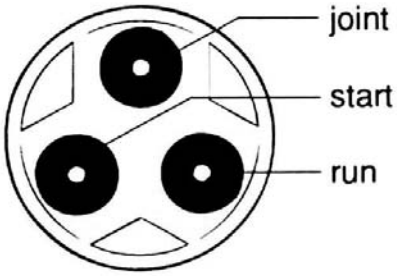
Separate the starting device from the compressor and use an ohmmeter to test the main and start winding of the compressor.
Connect the ohmmeter between “Run” and “joint” to determine the resistance of the main winding. And between “Start’ and “Joint” to determine the resistance of the start winding.
NB: Measurements must be made when the compressor is cold.
If the measurements indicate a damaged winding, replacement of the compressor is necessary.
If the measurements indicate that the windings are not defective, a new starting device should be installed. If the compressor still does not start, check the refrigerating system and compressor for possible blockage.

Compressor Connecting

Pins Location
Danfoss Compressors



Za nussi Compressors
Unidad Hermética Compressors



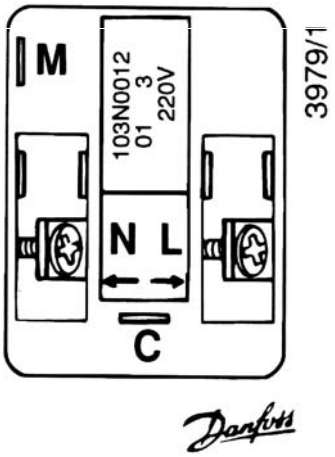
1.6. The PTC Starting Device

It should be noted that starting device 1 03N001 2, which is used for the freezing compressor of refrigerator/freezer uprights, is installed differently than is starting device 1 03N001 1, which is used for the refrigerating compressor.

On starting device 1 03N001 2, the N terminal is separated from the connections in the starting device and is used as a terminal for the thermostat wire to the refrigerating compressor.

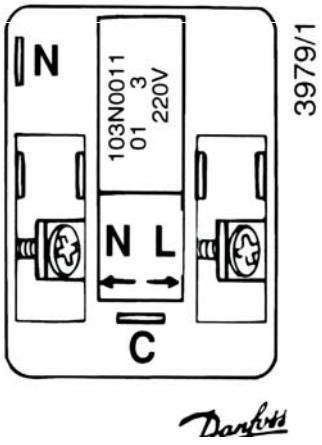
Note that there are three black wires at this starting device, which can cause confusion in installation. The return wire from the freezing thermostat is normally equipped with a protective plastic cover. This wire is connected at terminal C on the starting device.

From serial No.212 starting device 1 03N001 1 or 1 03N0021 is mounted on both cooling and freezing compressors.



103N0012

PTC starting device



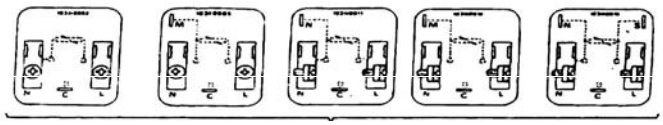
103N0011 and
103N0021

PTC starting device

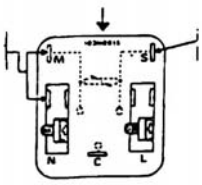
Universal PTC Starting Device

The relay 103N0015 is a universal relay, which can replace the relays 103N0002, 103N0005, 103N0011, 103N0012 and 103N0016.

103N0002 103N0005 103N0011 103N0012 103N0016

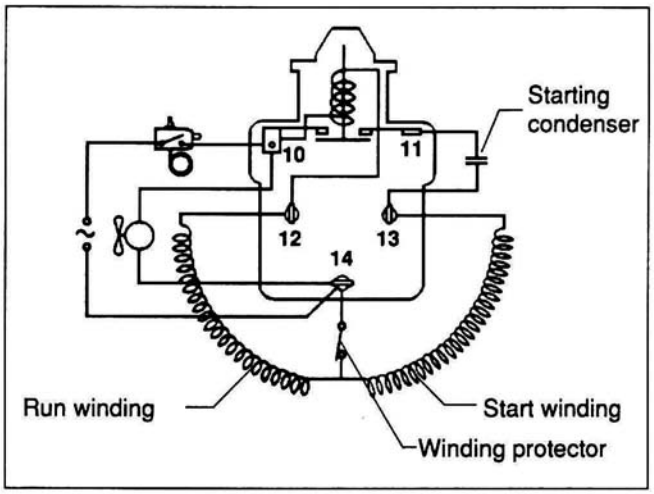


is replaced by



Place the shunt between M and N when replacing 103N0002, 103N0011 and 103N0016.
The plug S is only used when connecting a condenser.

3.6.1.

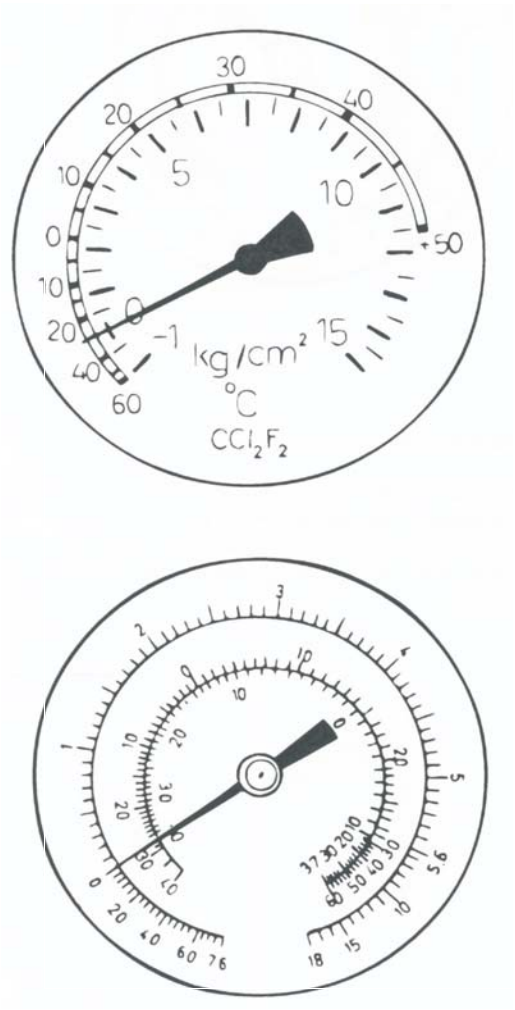


The HST Starting Device

The tunction of the starting relay is to cut in the motor start winding in order to attain a torque. When the motor speed is high enough (and the current through the run winding is reduced), the relay cuts out the start winding.
Ensure that the starting device and the starting condenser fit the compressor. See the spare parts list.

1.7. Using a Manometer in Trouble-Shooting

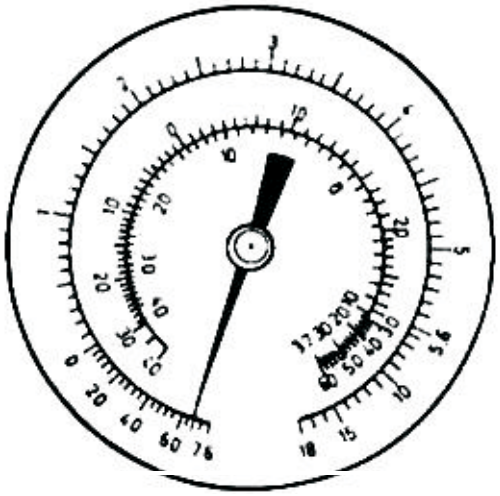
The pressure in a refrigerating system is directly dependent on the temperature. For this reason, the manometer can indicate both temperature in degrees Celsius and pressure in bar.



By mounting a manometer on the suction side of the compressor ~process ppe~. the temperature in the evaporator at which the refrigerant evaporates can be read. This temperature is normally from -15 C to -25 C in a refrigerator and from -3CC to -35 C in a freezer. These temperatures apply when the unit is set at its coldest position.

The pressure equalizing time is the time taken to reach an denhcal liquid pressure in the condenser and the evaporator after stop of the compressor. This is usually 8 minutes in treezers and slightly less in refrigerators.

Examples of trouble-shooting using a manometer on the suction side (process pipe) and a service valve:

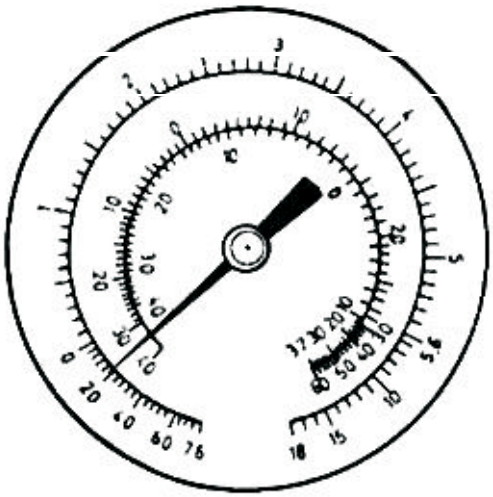


1. The system is blocked.

   The suction pressure is very low.
   Pressure equalizing takes place very slowly or not at all.
   Cause: Ice blockage in the capillary tube at the filter or blockage in the system for other reasons. See trouble-shooting chart.

2. No compressor capacity.

   The suction pressure is high.
   The suction pressure does not change appreciably when the compressor stops.
   If a slight defect in the compressor is suspected, this can be checked with a volumetric gauge.
   See Section 4.1.: Opening the Refrigerating System for Repairs and Section 4.3.: Replacing the Compressor.



3. Leakage in the system.

   The manometer indicates insufficient suction pressure.
   The pressure equalizing time is short.
   The equalizing pressure is lower than would be expected.
   Ensure that the equalizing pressure is sufficient for leak detection.

2. MAKING REPAIRS TO THE REFRIGERATING SYSTEM

2.1. Opening the Refrigerating System with Refrigerant R600a (Isobutane) for Repairs

The Possibility of Fire/Explosion exists

Therefore, it is important to pay attention to the following points before commencing repairs of the refrigerating system:

1. The serviceman is familiar with the dangers related to combustible refrigerants and knows how to use the personal protection equipment.
2. There is no risk of sparks forming near the workroom.
3. Do not smoke or use naked flame or other means of heat. Therefore, no soldering on the system is allowed.
4. Electrical appliances to be used during the service must not produce sparks.
5. See that there is good ventilation in the workroom.
6. Do not let the refrigerant flow into basement openings, low lying rooms, sewer systems, etc. as R600a is heavier than air.
7. Safety rules for handling, storage and transport of combustible refrigerant applicable in the various countries must be followed.

If a hermetic refrigerating system is to function correctly and have a reasonably long life, it is essential that the number of impurities present in the system i.e. moisture, foreign gases, dirt, etc. is kept at a minimum.

This fact must be taken into consideration when repairs are to be made, and the necessary precautions must be taken.
If there is any risk at all of finding refrigerant near or inside the cooling/freezing unit, it must be found before commencing the repairs. Note that some leak detectors must not be switched on in the workroom.
Before commencing repairs, make sure that an exact diagnosis of the problem has been made.
Mount a service valve or drilling tongs on the charging pipe (process pipe) and confirm the diagnosis with a suction manometer. Close the valve.

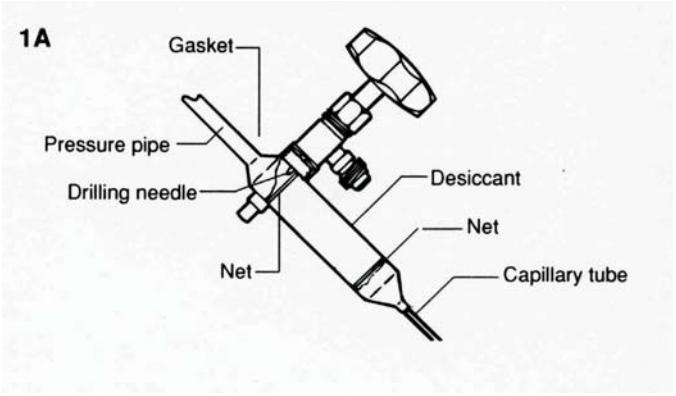
First Evacuation

After thorough cleaning of the spot where the gasket of the drilling tongs is to seal and adjusting of the tongs into filter size, the drilling tongs are mounted on the top of the filter drier just below the curve (at the pressure pipe - see figure 1A.) and the drilling is carried out- see figure 1.
Mount the hose on the threaded branch of the drilling tongs. The hose is carried outside (see figure 2A). Thereafter, the valve on the drilling tongs is opened (see figure 2), and the refrigerant will pressure equalize through the hose situated outside.
If the compressor **does not** need to be replaced, the oil is degassed in the compressor by letting the compressor run for about 1 minute.
The compressor is started at the thermostat, after the area around the thermostat has been found free from refrigerant.
Never start the compressor under vacuum, it would risk damage to the motor.
The system can then be blown through with nitrogen (see section: The Blowing Process). The valve is closed at the filter drier (see figure 3), the hose is dismounted and mounted on the vacuum pump outlet on the oil separator - see figure 4.
Connect the hose of the filling station to the valve on the filter drier and open the valve - see figures 5 and 6.
The refrigerating system is now ready for the first evacuation.
Evacuate to a pressure of approximately 5 mbar. After the first evacuation, the valves are closed at the filter drier (9), at the vacuum gauge (10), for the filling station (11), for the vacuum pump (12), and the spherical valve (18) is closed.

The Blowing Process

Connect dry nitrogen (N2) (8) to the valve on the charging pipe.
Open the valve on the charging pipe and on the nitrogen tank (14), regulate the working pressure with the reducing valve (15) and equalize the pressure into the system.
Thereafter, the system, the filling station and the vacuum pump are thoroughly blown through by opening the valve on the drilling tongs at the filter drier (see figure 9) for the filling station (11) and the valve for the vacuum pump is opened slowly (12).
Open the system by cutting off the capillary tube using capillary tube scissors (see figure 13), so that burrs and deformation of the tube are avoided. Cut out the filter drier with a pipe cutter.
Blow dry nitrogen (N2) through the system. The blowing process allows the localization of any obstructions in the piping. Investigate the dismounted filter as well for possible blockage.
Any leakages can be remedied and components remounted (see sections 2.2.: Replacing the Filter Drier, 2.3.: Replacing the Compressor and 2.4.: Replacing the Evaporator).
When transporting dismounted compressors, the connecting branches must be sealed with a tube joining system.
Mount a service filter, which is larger than the filter originally used (as specified in the spare parts list). The filter drier must be hermetically sealed until it is mounted.
The refrigerating system is prepared for assembly using a tube joining system.

Mounting of Drilling Tongs on Filter Drier



Actual Evacuation

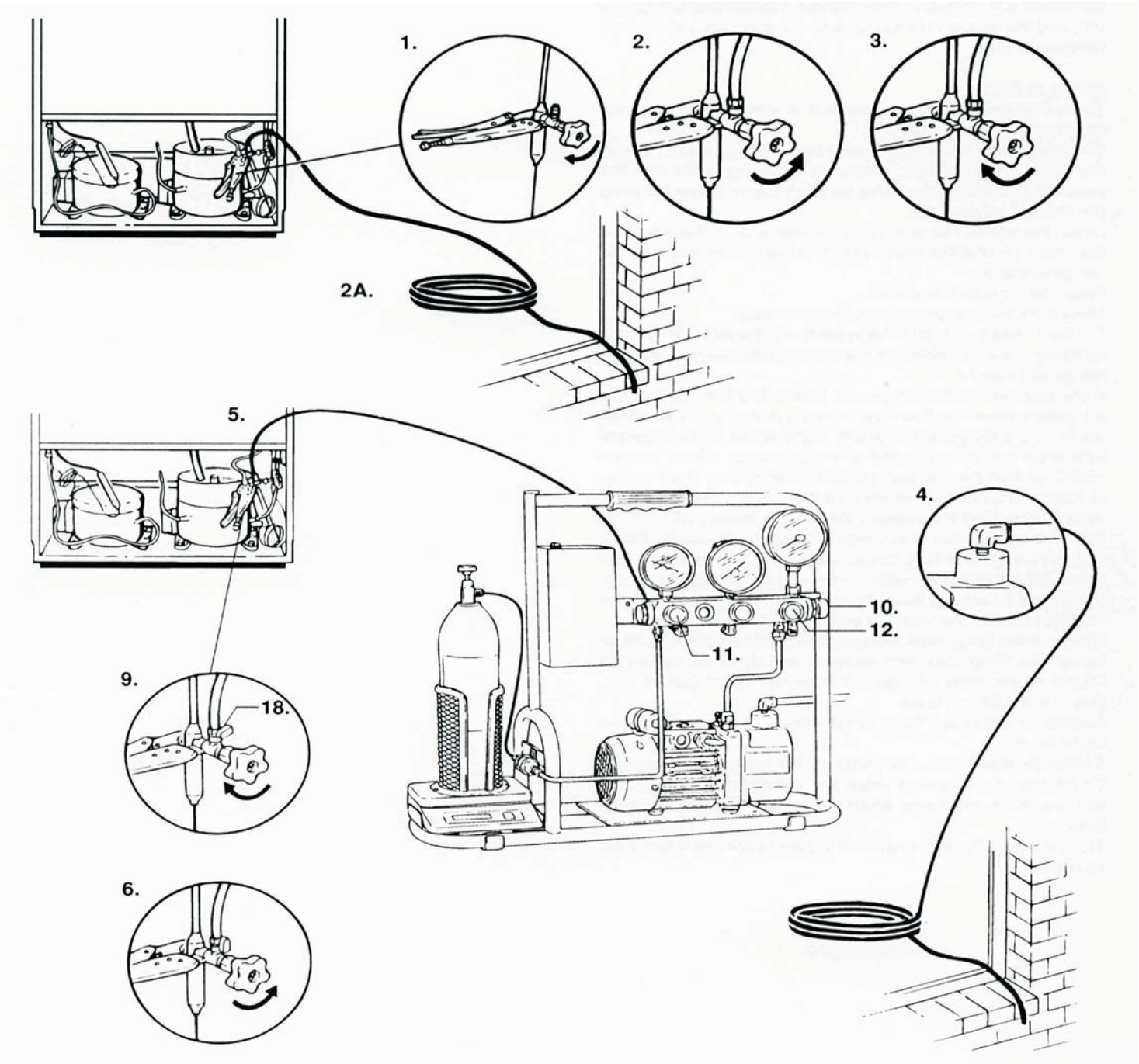
After mounting of the filling hose, the system is ready for the actual evacuation. Evacuate until a stable vacuum of 1 mbar has been reached. Check for stability of the vacuum by closing the valve for the vacuum pump (12). If the vacuum gauge needle falls appreciably, possible leakage in the system is indicated.
When a stable vacuum of 1 mbar has been reached, evacute further 5-10 minutes, close the valve for the vacuum gauge (10) and the vacuum pump (12) and the spherical valve of the filling hose (18).

Filling of R600a

Thereafter, test the microscales with a weight so as to check the exactitude of the scales.
The refrigerant tank is connected to the filling hose (16) and the valve (9) is opened. Evacuate the filling hose and the manifold by opening the valve for the vacuum pump (12) and the vacuum gauge (10).
Close the valves (12 and 10) after evacuation. Fill the hose from the tank and the manifold with refrigerant by opening the refrigerant tank.
Place the tank on the scales.
Make sure that the plastic hose hangs freely.
Set the scales to 0 and fill the system with the exact amount of refrigerant that is given on the rating plate, by opening the refrigerant valve (9).
If the pressure in the refrigerant tank is too low, so that the refrigerant does not flow over in the system, you can either warm up the refrigerant tank with warm water (the refrigerant tank must not be subjected to temperatures which exceed +50°C) or start the compressor at the thermostat. (Remember to control around the thermostat if there is any refrigerant).
After having filled the system, the valve is closed (9).
Start the compressor and check the suction pressure. Close the valve on the drilling tongs. Close the process pipe and check the tube joining system. - Pressure equalize the refrigerant hose by closing the refrigerant tank and by opening the manifold (9) and the vacuum pump (12. Dismount the filling hose and open the spherical valve (18. Blow though the filling hose with nitrogen, and close the valve (11) Dismount and blow through he hose for the refrigerant tank (16) and the filling station. ontrol if there is any trace of refrigerant at the mouth of the outlet hose.
Search for leakages on all joints on the refrigerating system. Check the pressure side when the compressor is in operation, and the suction side when the system is pressure equalized.
Test the unit. Check to ensure that the evaporator frosts over as usual.

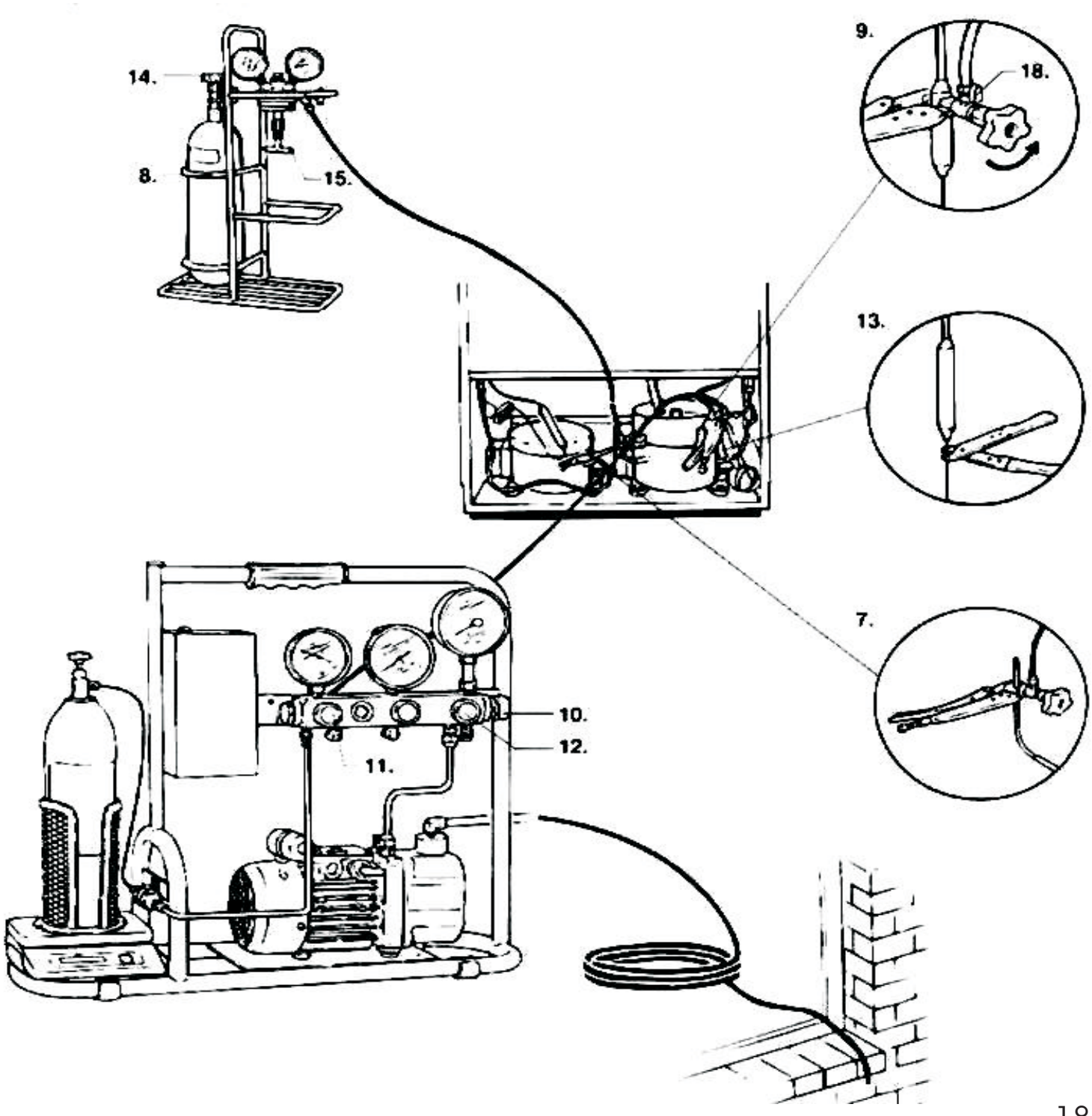
First Evacuation of Appliances with R600a in the System

1. Drilling and tapping of filter drier, after thorough cleaning where the gasket of the tongs must be tight.
2. Mount the hose - open the valve. The system can then be blown through with nitrogen (see section: The Blowing Process).
3. Close the valve after pressure equalization - dismount the hose.
4. Mount the hose on the vacuum pump outlet.
5. Mount the hose for the filling station on the valve for the filter drier.
6. Open the valve and start evacuation.
7. After the first evacuation, close the valves at the filter drier (9), at the vacuum pump (10), for the filling station (11) and for the vacuum pump (12) and close the spherical valve on the filling hose (18).



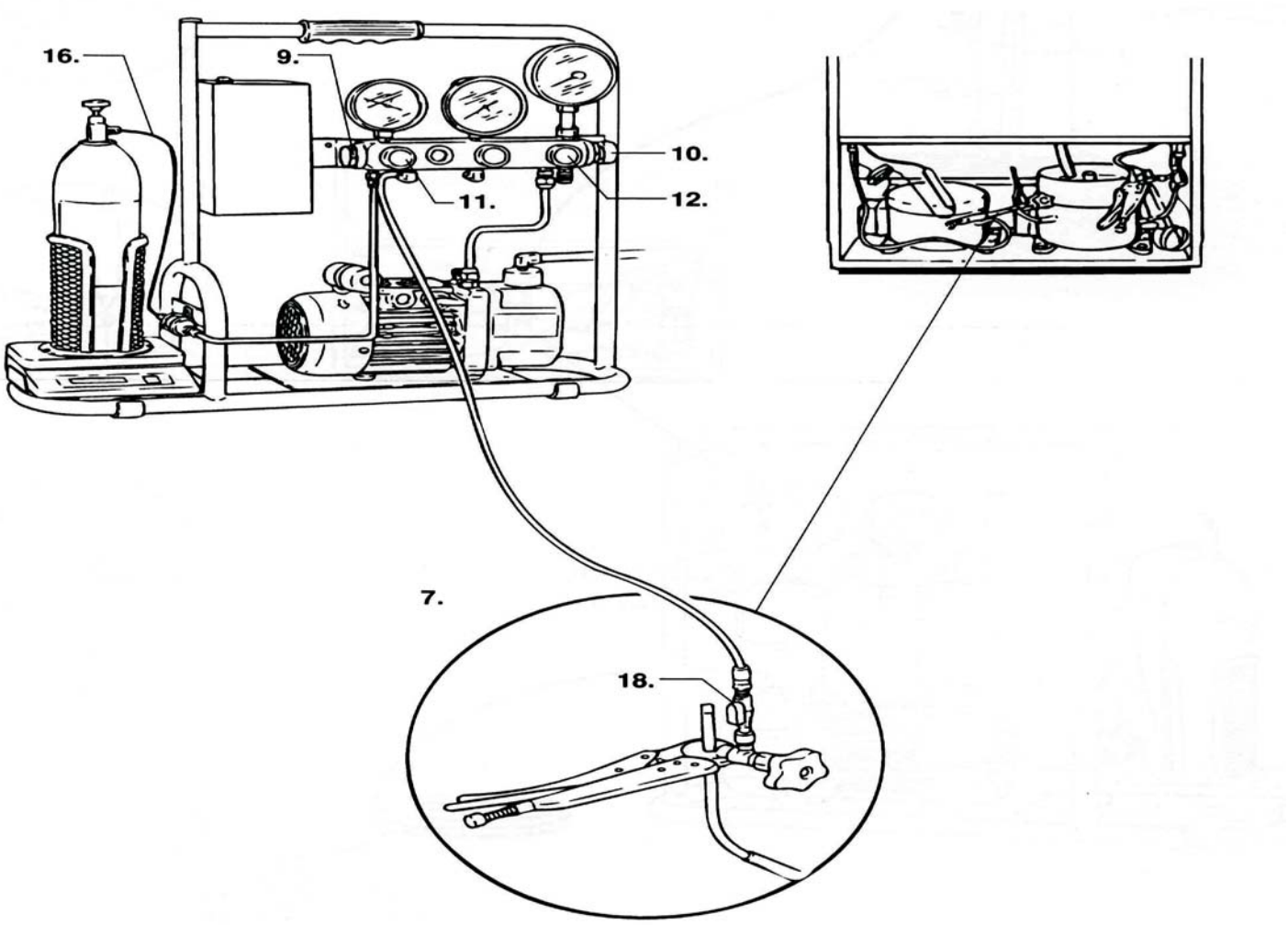
The Blowing Process of the System. the Filling Station and the Vacuum Pumo and Opening of the System

7. Drilling and tapping of the process pipe.
8. Connect dry nitrogen and equalize the pressure in the system.
9. Open the valve on the tongs at the filter drier and the spherical valve (18).
10. Open the valve for the filling station (11).
11. Slowly open the valve for the vacuum pump (12) and blow the system, the filling station and the vacuum pump through.
12. The system can then be opened with capillary tube scissors.



Actual Evacuation and Filling of R600a

1. Mounting of the filling hose with spherical valve - see fig. 7. Thereafter, evacuate.
2. Testing of the microscales with a weight.
3. Connect the refrigerant tank to the filling hose (16), and open the valve (9). Evacuate the filling hose and the manifold by opening the valve for the vacuum pump (12) and the vacuum gauge (10). After evacuation, close the valves (12 and 10). Fill the hose from the tank and the manifold with refrigerant by opening the refrigerant tank. Place the tank on the scales.
4. Set the scales at 0.
5. Open the refrigerant valve (9) and fill the system with refrigerant.
6. Then, close the valve for the manifold (9).
7. Start the compressor, and measure the suction pressure.
8. Close the valve on the drilling tongs (process valve) and close the process pipe using the tube joining system.
9. Pressure equalize the refrigerant hose by closing the refrigerant tank and by opening the manifold (9) and the vacuum pump (12).
10. Dismount the filling hose and open for the spherical valve (18). Blow through the filling hose. Close the valve (11). Dismount and blow through the hose for the refrigerant tank (16) and filling station. Then, check if there is any refrigerant around the mouth of the outlet hose.



2.1.1. Opening the Refrigerating System for Repairs with Recovery of Refrigerant.

If a hermetic refrigerating system is to function correctly and have a reasonably long life, it is essential that the amount of impurities pre-sent in the system, i.e. moisture, foreign gases, dirt, etc., be kept at a minimum.

This fact must be taken into consideration when repairs are to be made, and the necessary precautions must be taken.
Before commencing repairs, make sure that all other possible faults have been eliminated and that an exact diagnosis of the problem has been made.
Mount a service valve or drilling tongs on the charging pipe (process pipe) and confirm the diagnosis with a suction manometer.
Close the valve.
After thorough cleaning of the spot where the gasket of the drilling tongs is to seal and adjusting of the tongs into filter size(if the tongs are tightened too much, the filter will be deformed the drilling tongs are mounted on the top of the filter drier just below the curve (at the pressure pipe - see fig. 1.) and drill the filter. Mount the hose on the threaded branch of the drilling tongs. After the mounting of the refrigerant bag, the valve on the drilling tongs is opened, and the refrigerant will pressurequalize into the refrigerant bag. After the pressure equalization the valve is closed, and the refrigerant bag is dismounted and mounted on the vacuum pump outlet - see fig. 4. Connect the hose for the filling station on the valve for the filter and open the valve - see fig. 5 and 6. The refrigerating system is now ready for the first evacuation with recovery of refrigerant. Evacuate to a pressure of approx. 1 mbar. There must not be any appreciable overpressure in the refrigerant bag, as this may damage the vacuum pump. When changing refrigerant bag the evacuation is stopped by closing the valve for the vacuum pump. After the evacuation the valve is closed at the filter drier. Dry nitrogen (N) is connected to the valve on the process pipe and the pressure is equalized - see fig. 7 and 8.
Plan the repair work so that the refrigerating system will not be open for more than 10 - 15 minutes.
Assemble the special equipment required for the repairs.
Assemble any spare parts required.

Open the system by breaking off the capillary tube at the filter drier. This is done using special-purpose pliers or capillary tube scissors, so that burrs and deformation of the tube are avoided.
Cut out the filter drier with a pipe cutter - see fig. 9. The filter must never be soldered off, as any moisture collected in thefilter will evaporate and be pressed back into the system,where it can later lead to the formation of ice in the capillary tube. Blow dry nitrogen (N) through the process pipe and into the system. The inlet pressure should be approx. 5 bar.
Continue blowing for 1 - 2 minutes. This creates an inactive atmosphere, which is a pre-requisite if soldering is to be carried out.
The blowing process also allows the localization of any obstructions in the piping.
Investigate the filter as well for possible blockage.

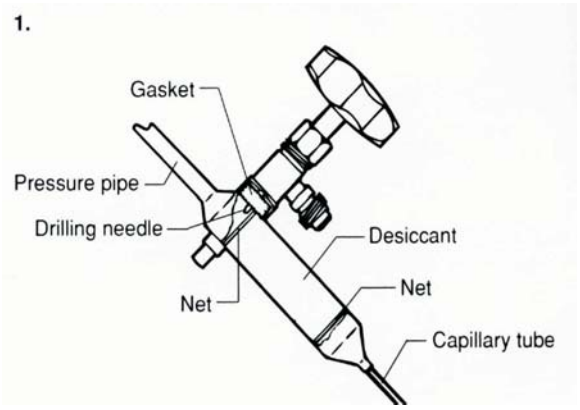
The refrigerating system is now ready for soldering.
Any leakages can be remedied and components remounted.
All pipes which have been cut over (eg. when replacing the compressor) must be plugged during the repair work. See Sections 2.2.: Replacing the Filter Drier, 2.3.: Replacing the Compressor and 2.4.: Replacing the Evaporator.
Solder on the pipes and blow 2 through the system again. Use special-purpose pliers to make a wave in the capillary tube (2.2.).
Mount a service filter which is larger than the filter originally used (as specified in the spare parts list). The filter drier must be hermetically sealed until it is mounted.

When soldering the filter, note that the thin capillary tube cannot with-stand high temperatures due to the risk of melting and that heating must therefore be confined to the filter.
Evacuate the system through the process pipe to a pressure of ap-prox. 1 mbar. Rinse thereafter with approx. 309 refrigerant. This causes any moisture or non-condensable gases present to be mixed together and discharged.
By letting the compressor run warm, this process can be furthered. With very contaminated systems, the above process must be repeated several times.

The system is now ready for the actual evacuation. Evacuate until a stable vacuum of 1 mbar has been reached. Check for stability of the vacuum by closing the valve for the vacuum pump. If the vacuum gauge needle falls appreciably, possible leakage in the system is indicated.
When a stable vacuum of 1 mbar has been achieved, close the valve for the vacuum gauge and commence charging.
Switch on the heating element for the filling glass. Read the manometer on the filling glass and select the column height.
The amount of refrigerant to be added is specified in grams on the rating plate. Fill the unit with the exact amount and start the compressor.
Use the suction manometer to check for correct charging.

Mounting of Drilling Tongs on Filter Drier.

1.



Pinch the charging pipe with pliers. Remove the service valve and solder the hole together.

Brush off all solderings in the system and check for possible leakage with an electronic leak detector. Check the pressure side when the compressor is in operation and the suction side when the system is pressure equalized.

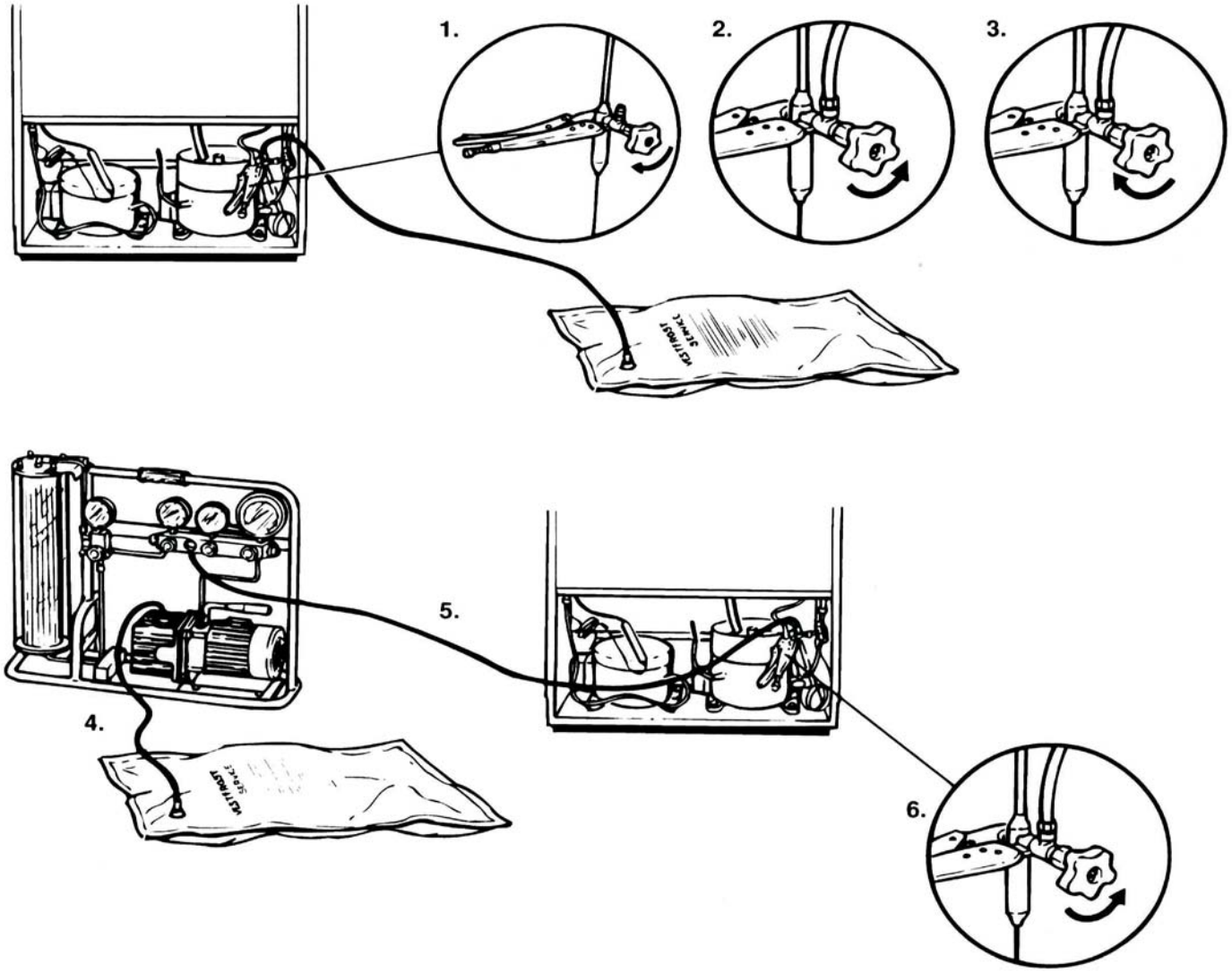
Coat the area around the solderings with tectyl or paint for corrosion protection.

Test the unit. Check to ensure that the evaporator frost over as usual.

The refrigerant bag is dismounted from the vacuum pump outlet and the refrigerant is later emptied to a pressure vessel intended for used refrigerant. This is done using a special emptying unit - see section 2.1.2.

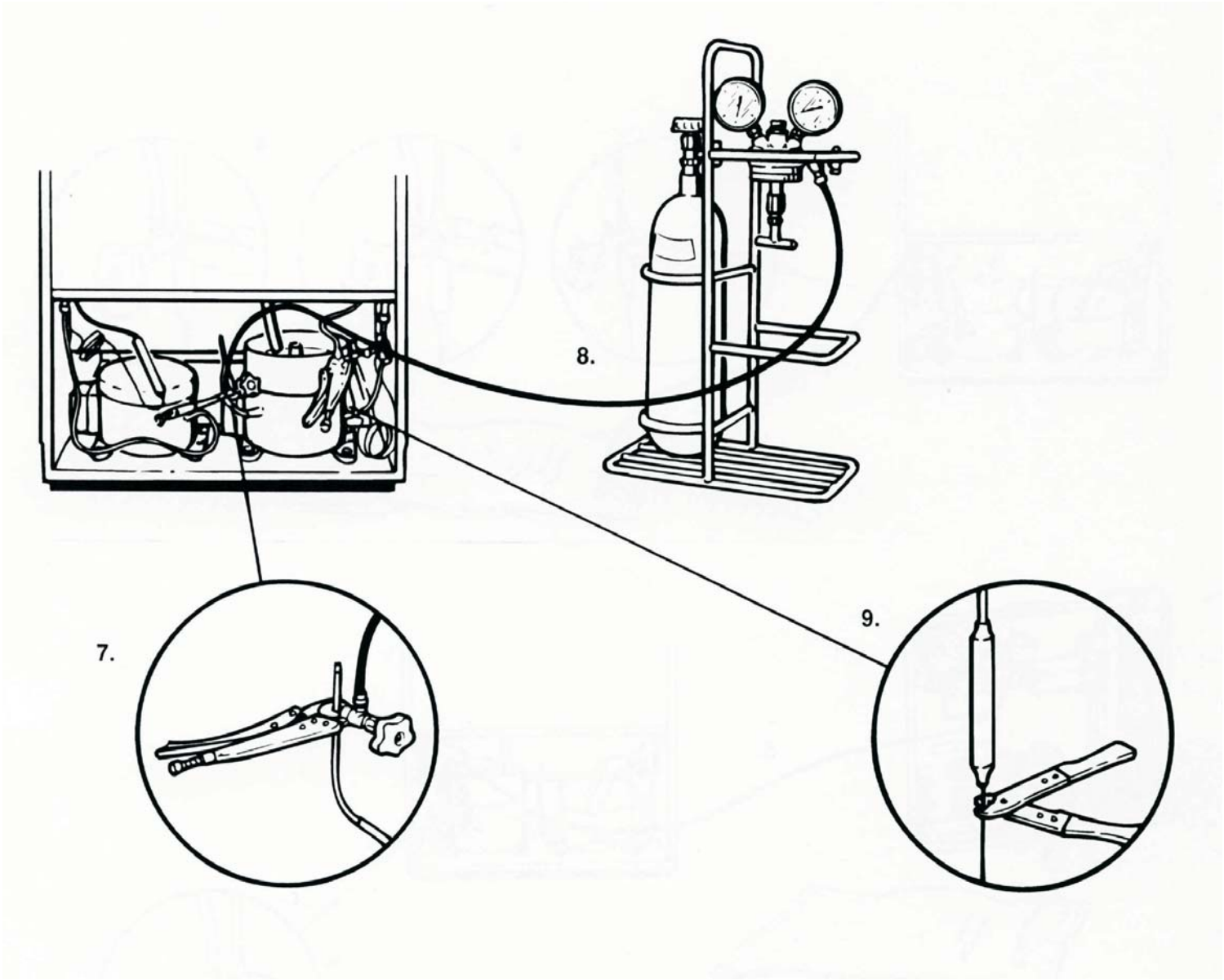
Evacuation with Recovery of Refrigerant

1. Drilling and tapping of filter drier after thorough cleaning where the gasket of the tongs must be tight.
2. Mount the refrigerant bag - open the valve.
3. Close the valve after pressure equalizing-dismount the refrigerant bag.
4. Mount the refrigerant bag on the vacuum pump outlet.
5. Mount the hose for the filling station on the valve for the filter drier.
6. Open the valve and start evacuation.



Opening the System

7. Drilling and tapping of process pipe.
8. Connect dry nitrogen and equalize the pressure.
9. Open the system with capillary tube scissors and remove the drilling and tapping valve. The tongs are removed from the used filter drier and dry nitrogen (N2) is now blown through the process pipe and into the system (see Section 2.1.1. + 2.1.: R600a).

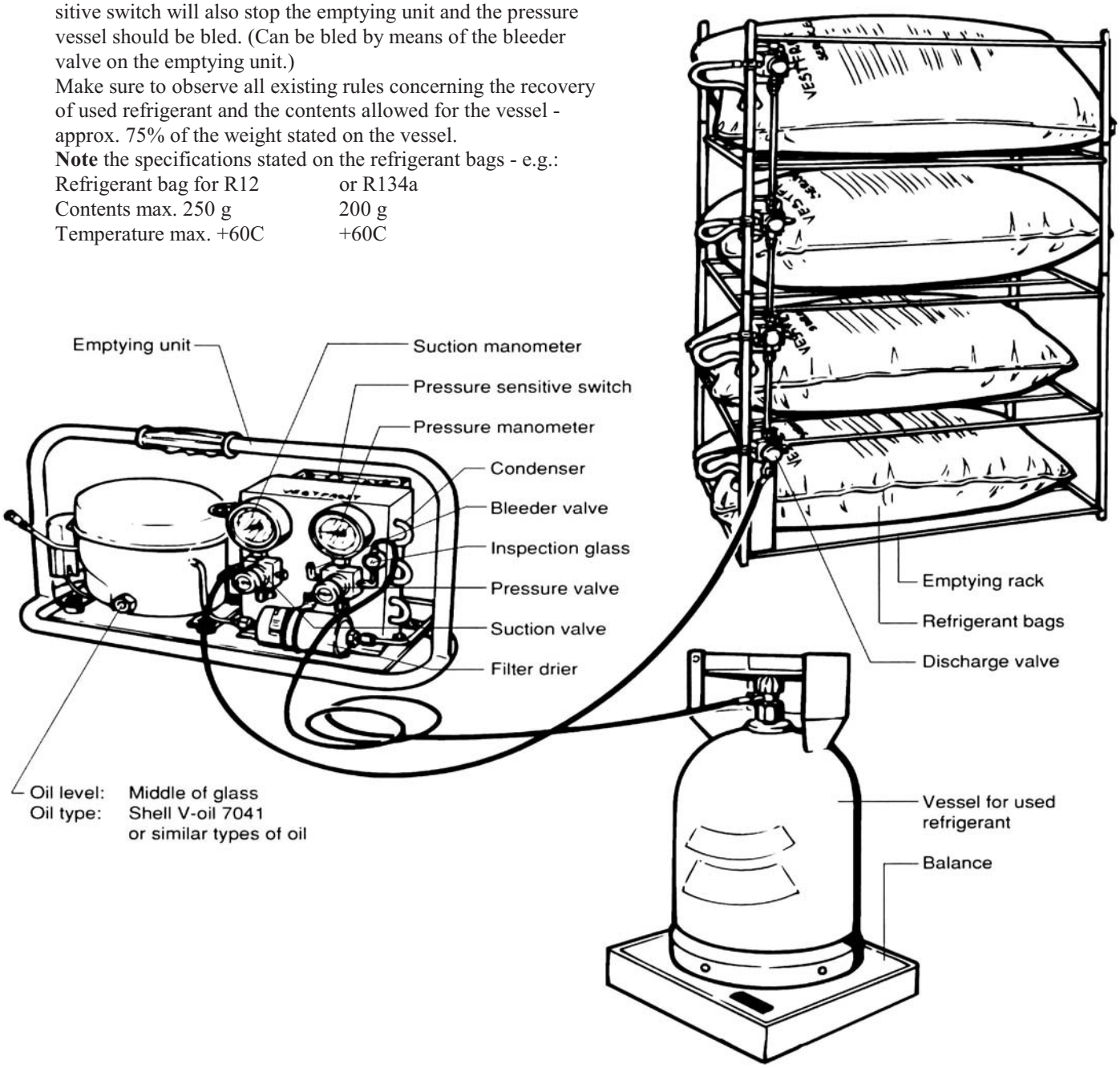


2.1.2. Emptying used Refrigerant to Pressure Vessel from Refrigerant Bag

Connect the suction valve on the emptying unit with hose to the outlet valve on the emptying rack for refrigerant bags. Open the main valve and the valve for the bags to be emptied.

Connect the pressure valve on the emptying unit to the vessel for used refrigerant. This hose is to have a closing valve when connected to the emptying unit.
When the required bag(s) haslhave been emptied the pressure sensitive switch will stop the emptying unit. In case air should enter the vessel causing the pressure to rise the pressure sensitive switch will also stop the emptying unit and the pressure vessel should be bled. (Can be bled by means of the bleeder valve on the emptying unit.)
Make sure to observe all existing rules concerning the recovery of used refrigerant and the contents allowed for the vessel - approx. 75% of the weight stated on the vessel.
Note the specifications stated on the refrigerant bags - e.g.:

Refrigerant bag for R12	or R134a
Contents max. 250 g	200 g
Temperature max. +60C	+60C



2.1.3. Opening the Refrigerating System with Refrigerant R134a for Repairs

As R134a has other properties than the R12 used till now, it is important to note the following before opening the hermetic refrigerating system:

1. **Service Tools**
   Do ***not*** use service tools that have been used for chlorine-containing refrigerants because microscopic chlorine residues may cause a chemical reaction in the refrigerating system.

2. **Evacuation**
   As the oil used for R134a has the property that it absorbs more moisture than the oil used for R12, it is necessary to evacuate 5- 10 minutes after the system has been evacuated to the required vacuum.

3. **Recovery**
   Be careful, at the recovery of R134a, that no air goes into the recovery tank as there may be a danger of explosion at high pressure, and a safety valve should therefore be mounted on the tank for used refrigerant.

4. **Filter Drier**
   A filter drier with desiccant XH9 is to be used.
   This service filter has part No. 0-6538053 and price code V3. The filter drier for emptying unit has part No. 04.99.54.066.

5. **Oil**
   The oil of the filling station and emptying unit should be changed when needed.
   The oil for emptying unit has part No. 04.99.54.070.
   The oil for filling station has part No. 04.99.54.065.
   These oils, which have to be used for R134a, are polyol ester oil.
   Remember to put back the lid on the oil can after use, as the oil will otherwise absorb moisture from the air.

6. **Marking with R134a**
   The amount of filling is indicated on the rating plate of the unit. As to the compressors for R134a the refrigerant type is indicated on the rating plate placed on the front of the compressor.

2.2. Replacing the Filter Drier

Some moisture and impurities will always be accumulated in the filter drier, both from residue left in the system after installation and from contamination given off by the compressor, pipe system and refrigerant. When repairs are made to the refrigerating system, the filter will often be unable to absorb the extra contamination which results, and ice blockage and contamination of the capillary tube can result.

It is therefore important to note that REPAIRS MADE TO THE REFRIGERATING SYSTEM HAVE NOT BEEN CORRECTLY CARRIED OUT UNLESS THE FILTER DRIER HAS ALSO BEEN REPLACED.

The following procedure should be used:

Open the refrigerating system by breaking off the capillary tube approx. 5cm after the filter drier (use special-purpose pliers or capillary tube scissors).

Discharge the refrigerant. In case of recovery of refrigerant - see Section 2.1.1. + 2.1.3.

Cut out the filter using a pipe cutter.

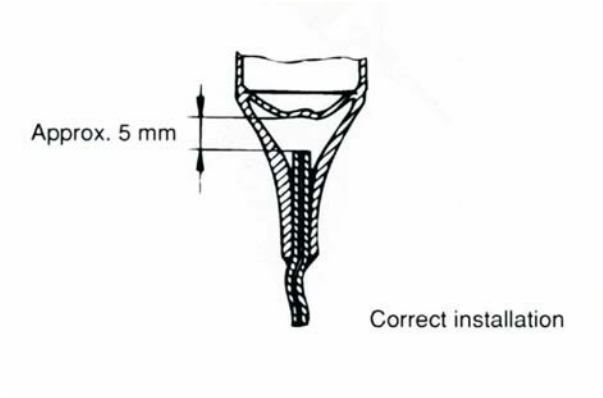
THE FILTER MUST NOT BE SOLDERED OFF, AS ANY MOISTURE COLLECTED IN THE FILTER WILL EVAPORATE BACK INTO THE SYSTEM.

Open the system at the process pipe and blow dry nitrogen (N2) through the system. In case of recovery of refrigerant - see Section 2.1.1. + 2.1.3.

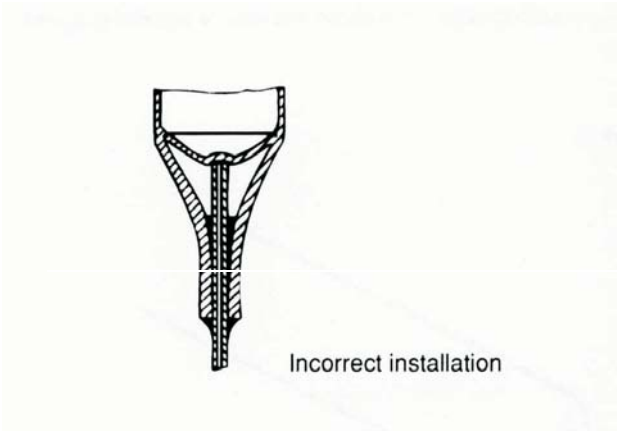
Install an outsize service filter (as specified in the spare parts list).

Ensure that the capillary tube does not touch the compressor when the filter is positioned.

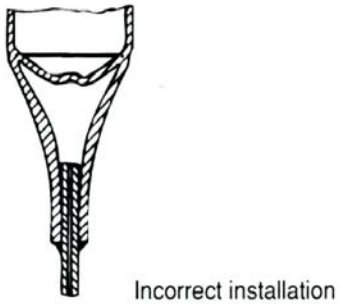
Should this happen, the flow through the capillary tube can be reduced (moisture barrier). This problem can be confused with slight under-filling of the system.



This filter drier has been installed correctly.
Special-purpose pliers have been used to make a wave in the capillary tube.

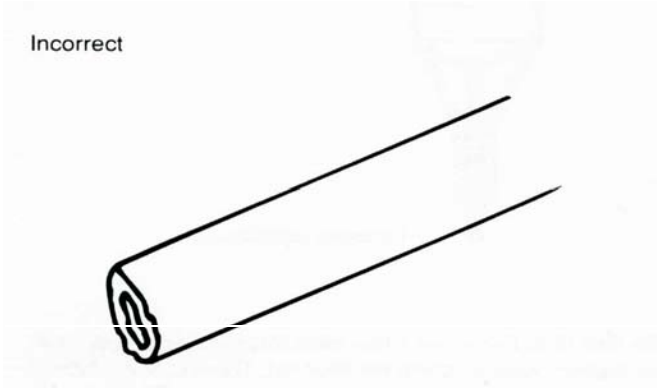


The filter drier shown here has been installed incorrectly, with the capillary tube touching the filter net. The end of the tube is not free, and the resistance is thus increased. The tube will become completely blocked after a period of use. Special-purpose pliers should therefore be used.

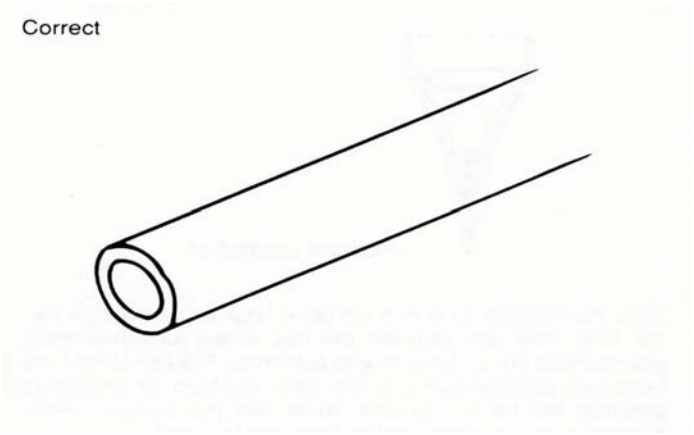


Here the capillary tube has not been inserted far enough into the filter. This will increase the risk of the tube becoming plugged with flux or silver during soldering. The risk of the tube becoming plugged during operation is also high, as circulating particles will be led directly down into the capillary tube. Special-purpose pliers should therefore be used.

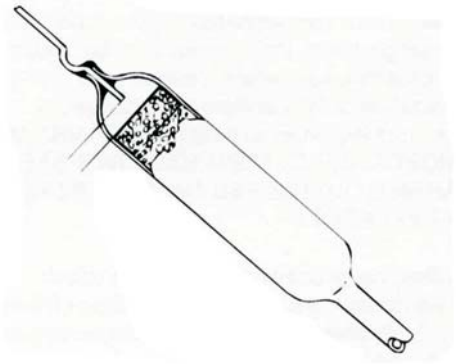
Capillary tube broken off without the use of special-purpose pliers.

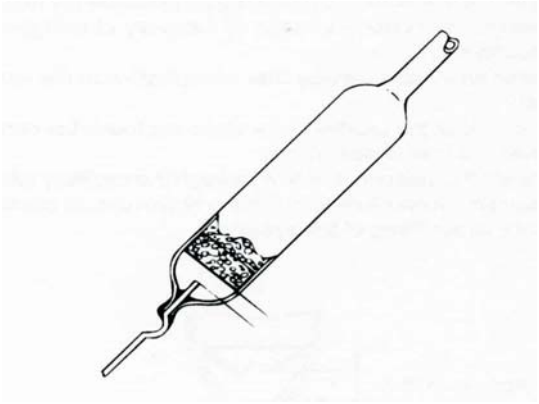


Capillary tube broken off using special-purpose pliers or capillary tube scissors.



In order to ensure an efficient utilization of the filter drier, it should be positioned with an inclination of at least 15° and with the capillary tube lowered.





2.3. Replacing the Compressor

If trouble-shooting in the electric circuit or volumetric measurements indicate that the compressor is defective, a new compressor must be installed.

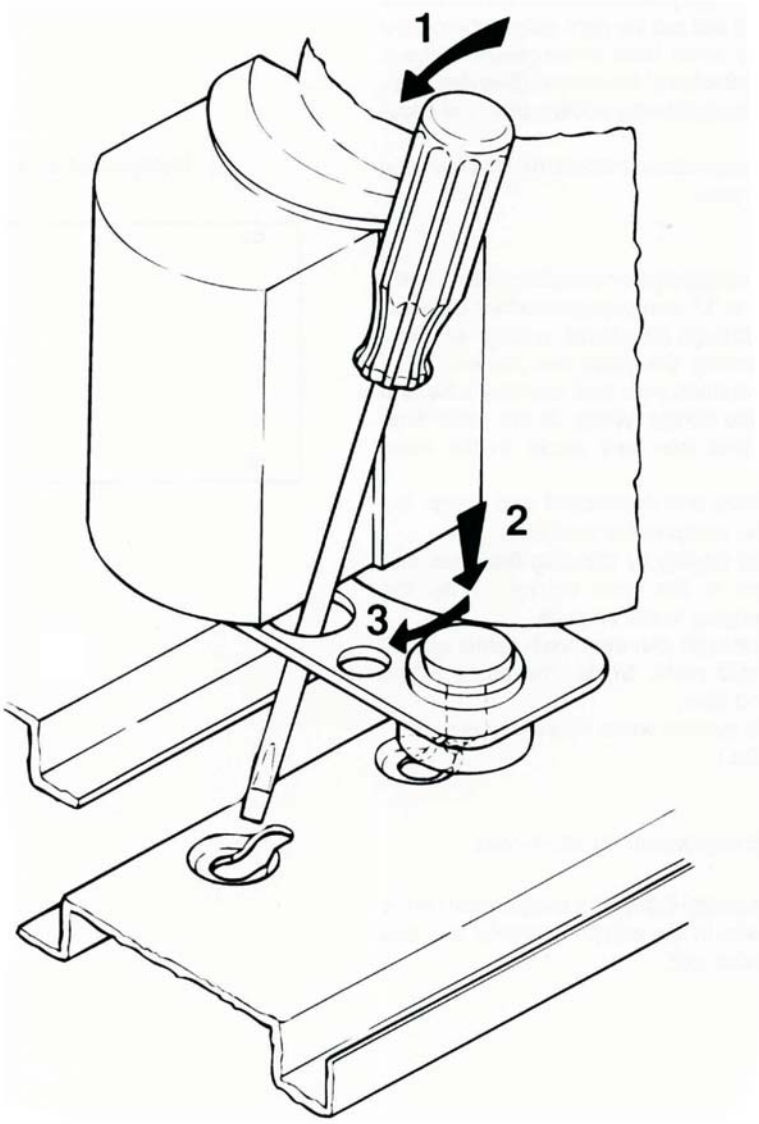
The following procedure is to be used:

Ensure that the new compressor is ready for installation.
Replace the electrical equipment.
Clean a good area of the pipes at the compressor branches with a wire brush. This makes it easier to solder on the new compressor and prevents contamination inside the pipes.
Remove the filter. Open the process pipe and blow dry nitrogen (N2) through the system. Cut off the pipes approx. 2cm from the compressor branches using a pipe cutter. Plug the pipes.

The dismounting of the compressor is carried out as shown in the diagram:

1. Insert a robust screwdriver or similar tool through the hole in the base plate and press against the compressor track in the direction of the arrow.
2. Press the bolt downwards to free it from the attachment hole.
3. Release the bolt by pressing in the direction of the arrow.

When mounting the new compressor, carry out the above steps in the reverse order.



2.4. Replacing the Evaporator

The pipe systems of all Vestfrost heat exchangers are mounted in plastic tubing with a diameter of 18/14.6 mm. It is therefore necessary to straighten out the suction pipe and capillary tube when an evaporator is to be replaced.

Dismounting:

1. a) Refrigerator evaporator:
   Release the evaporator by removing the 4 screws for the inner cabinet and thermostat phial.
   b) Freezer evaporator:
   Remove the shelf flaps and baskets. Release by pulling the front edging out of the clips holding it to the middle of the shelves. Remove the thermostat and thermostat phial. Loosen the snapper carefully with a screwdriver to release.
   On two-door cabinets remove both doors as well as the cover plate, hinge piece and plate for the centre bridge. Carefully pull out the right side of the centre bridge, until the inner level of the centre bridge is even with the front edge of the cabinet (See drawing).
2. a + b) Dismount and straighten the suction pipe and capillary tube.
3. a + b) Draw out the evaporator, at the same time drawing out the suction pipe.

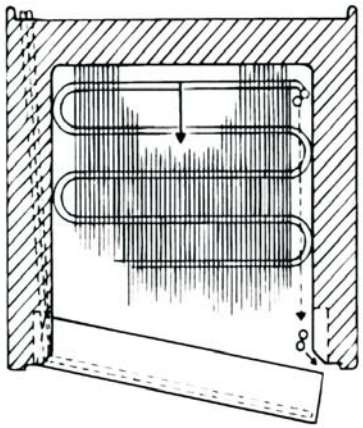
Mounting:

1. a) Straighten the suction pipe and capillary tube, determine the distance "L, and push the suction pipe and capillary tube through the plastic tubing, at the same time pushing the plate into place.
   b) Straighten the suction pipe and capillary tube and push through the plastic tubing. At the same time guide the shelves into their tracks in the inner cabinet.
2. a) Mount the screws and thermostat and solder the pipe ends to the compressor and filter.
   b) Mount the front edging by bending the ends and attaching these to the inner cabinet. Snap the middle of the edging to the shelves.
   Mount the thermostat and thermostat phial and all other dismounted parts. Solder the pipes to the compressor and filter.
   (Use a tube joining system when making repairs to uprights with R600a.)

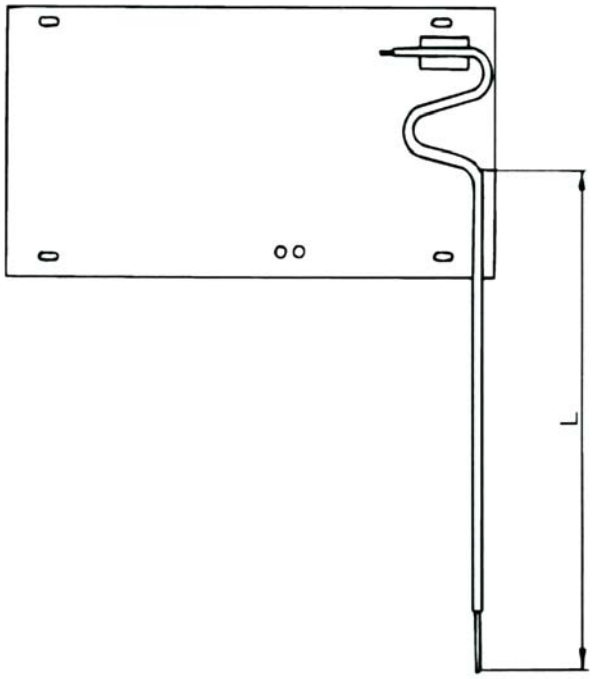
2.4.1. Replacing the Evaporator in No-Frost Appliances

When replacing the evaporator the entire evaporator unit is removed. Dismount the wire in the exterior terminal box and pull it out with the evaporator unit.

b) Freezer evaporator



a) Refrigerator evaporator

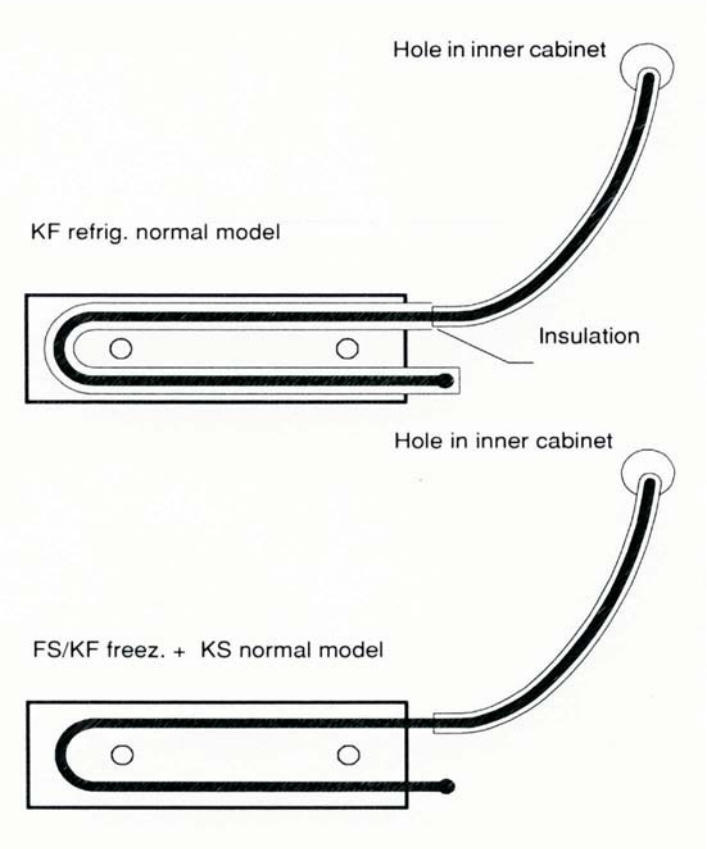


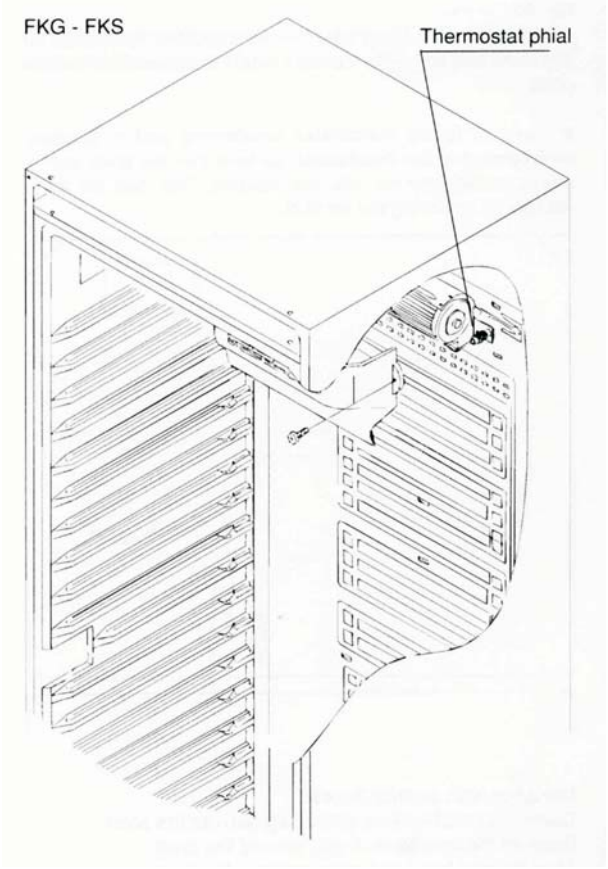
2.5. Replacing the Thermostat

Uprights
Dismount the phial tube and straighten out the phial. Draw off the insulation, if any, around the phial. The phial can now be drawn out of the lead-in pipe from the back of the unit.
After the plug has been removed from the socket, remove the cover for the top panel and the panel box.
Remove the thermostat knob, nut and thermostat wiring.
Install the new thermostat in reverse order.

Chest freezers
The procedure for replacing the thermostat can readily be seen on chest units. Ensure that the phial is inserted as far as possible inside the phial tube.

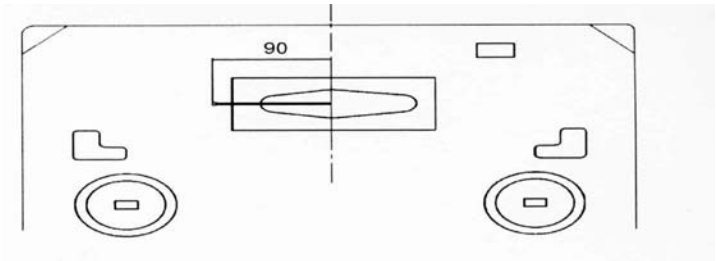
Installing the Thermostat Phial





Positioning of the Thermostat Phial in NFG 307 till Serial No. 501-----
In order to ensure the proper functioning of the thermostat 90 mm of the free end of the capillary tube is to serve as thermostat phial.

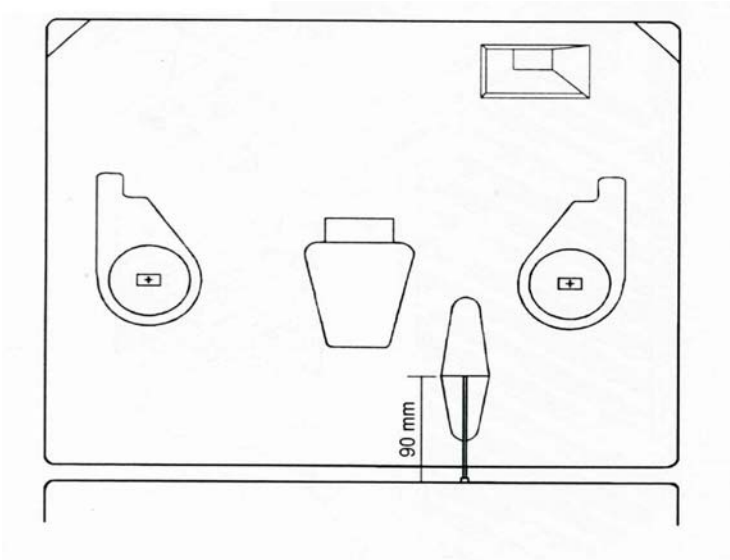
In case of failing thermostat functioning and a possible replacement of the thermostat, be sure that the phial part is placed sufficiently far into the cabinet. This can be done visually by loosening the screws holding the evaporator box against the top of the inner cabinet and lowering the evaporator box so that the phial can be seen at the back of the cabinet.



Positioning of the Thermostat Phial in NFG 307 from Serial No. 501-----

In order to ensure the proper functioning of the thermostat 90 mm of the free end of the capillary tube is to serve as thermostat phial.

In case of failing thermostat functioning and a possible replacement of the thermostat, be sure that the phial part is placed sufficiently far into the cabinet. This can be done visually by removing the air duct.



Uprights with curved doors

Dismount the phial tube and straighten out the phial.
Draw off the insulation, if any, around the phial.
After the plug has been removed from the socket, remove the cover for the top panel and the electrical unit simultaneously.
Remove the thermostat knob, nut and thermostat wiring and draw the phial out of the mounting pipe behind the electrical unit.
Install the new thermostat in reverse order.