Installation, Operating, and Maintenance Instructions

For Use With Low-Pressure Centrifugal Liquid Chillers

SAFETY CONSIDERATIONS

Purge units are designed to provide safe and reliable service when operated within design specifications. When operating this equipment, use good judgment and safety precautions to avoid damage to equipment and property or injury to personnel.

Be sure you understand and follow the procedures and safety precautions contained in this guide.

⚠ DANGER

DO NOT VENT refrigerant relief devices within a building Outlet from rupture disc or relief valve must be vented outdoors in accordance with the latest edition of ASHRAE 15 (American Society of Heating, Refrigeration and Air Conditioning Engineers) The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation.

PROVIDE adequate ventilation in accordance with ASHRAE 15, especially for enclosed and low overhead spaces. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Misuse can be fatal. Vapor is heavier than air and reduces the amount of oxygen available for breathing. Product causes eye and skin irritation. Decomposition products are hazardous

DO NOT USE OXYGEN to purge lines or to pressurize a machine for any purpose Oxygen gas reacts violently with oil, grease, and other common substances.

NEVER EXCEED specified test pressures. VERIFY the allowable test pressure by checking the instruction literature and the design pressures on the equipment nameplate

DO NOT USE air for leak testing. Use only tracer gases and dry nitrogen.

DO NOT VALVE OFF any safety device

BE SURE that all pressure relief devices are properly installed and functioning before operating any machine.

⚠ WARNING

DO NOT WELD OR FLAMECUT any refrigerant line or vessel until all refrigerant *(liquid and vapor)* has been removed from chiller Traces of vapor should be displaced with dry air or nitrogen and the work area should be well ventilated. *Refrigerant in contact with an open flame produces toxic gases.*

DO NOT USE eyebolts or eyebolt holes to rig machine sections or the entire assembly.

DO NOT work on high-voltage equipment unless you are a qualified electrician.

DO NOT WORK ON electrical components, including control panels, switches, starters, or oil heater until you are sure ALL POWER IS OFF and no residual voltage can leak from capacitors or solid-state components.

LOCK OPEN AND TAG electrical circuits during servicing IF WORK IS INTERRUPTED, confirm that all circuits are deenergized before resuming work.

DO NOT siphon refrigerant.

AVOID SPILLING liquid refrigerant on skin or getting it into the eyes. USE SAFETY GOGGLES. Wash any spills from the skin with soap and water If any enters the eyes, IMMEDIATELY FLUSH EYES with water and consult a physician.

NEVER APPLY an open flame or live steam to a refrigerant cylinder. Dangerous over pressure can result When necessary to heat refrigerant, use only warm (110 F [43 C]) water.

DO NOT REUSE disposable (nonreturnable) cylinders or attempt to refill them. It is DANGEROUS AND ILLEGAL. When cylinder is emptied, evacuate remaining gas pressure, loosen the collar, and unscrew and discard the valve stem DO NOT INCINERATE

CHECK THE REFRIGERANT TYPE before adding refrigerant to the machine. The introduction of the wrong refrigerant can cause damage or malfunction to this machine.

Operation of this equipment with refrigerants other than those cited herein should comply with ASHRAE-15 (latest edition). Contact Carrier for further information on use of this machine with other refrigerants.

DO NOT ATTEMPT TO REMOVE fittings, covers, etc., while machine is under pressure or while machine is running. Be sure pressure is at 0 psig (0 kPa) before breaking any refrigerant connection.

CAREFULLY INSPECT all relief valves, rupture discs, and other relief devices AT LEAST ONCE A YEAR. If machine operates in a corrosive atmosphere, inspect the devices at more frequent intervals.

DO NOT ATTEMPT TO REPAIR OR RECONDITION any relief valve when corrosion or build-up of foreign material (rust, dirt, scale, etc) is found within the valve body or mechanism. Replace the device.

DO NOT install relief devices in series or backwards.

USE CARE when working near or in line with a compressed spring. Sudden release of the spring can cause it and objects in its path to act as projectiles.

⚠ CAUTION

DO NOT STEP on refrigerant lines. Broken lines can whip about and cause personal injury.

DO NOT climb over a machine. Use platform, catwalk, or staging Follow safe practices when using ladders.

USE MECHANICAL EQUIPMENT (crane, hoist, etc.) to lift or move inspection covers or other heavy components Even if components are light, use such equipment when there is a risk of slipping or losing your balance.

BE AWARE that certain automatic start arrangements CAN ENGAGE THE STARTER. Open the disconnect *ahead of* the starter in addition to shutting off the machine or pump.

USE only repair or replacement parts that meet the code requirements of the original equipment.

DOUBLE-CHECK that coupling nut wrenches, dial indicators, or other items have been removed before rotating any shafts.

DO NOT LOOSEN a packing gland nut before checking that the nut has a positive thread engagement.

PERIODICALLY INSPECT all valves, fittings, and piping for corrosion, rust, leaks, or damage.

CONTENTS

INTRODUCTION

The PreVent® II high efficiency purge unit substantially reduces the purge refrigerant emissions of low-pressure chillers that use CFC and HCFC refrigerants. Three distinguishing features of the PreVent II unit are its ability to operate when the chiller is not running, its use of a purge pump to quickly remove noncondensable gases, and its ability to adsorb and recover refrigerant gas using a carbon tank. The PreVent II unit uses an innovative and patented carbon adsorption and regeneration method to obtain one of the highest purge emission efficiencies in the industry. See Fig. 1 and Tables 1 and 2 for additional information.

INSTALLATION

Complete Pre-Installation Checks

IDENTIFY UNIT — Identify the model number and serial number printed on the nameplate (located inside the control panel). See Fig. 1 and 2. Check this information against the job requirements

INSPECT SHIPMENT — Inspect unit for damage before removing unit from shipping conveyance. If unit appears damaged, it should be inspected by a shipping inspector before removal. File claim with shipping company if shipment is damaged or incomplete. The manufacturer is not responsible for damage incurred during shipment.

RIGGING — The PreVent II unit weighs 208 lb (95 kg) (without shipping crate). Place a sling at each end of the PreVent II unit and lift from the center.

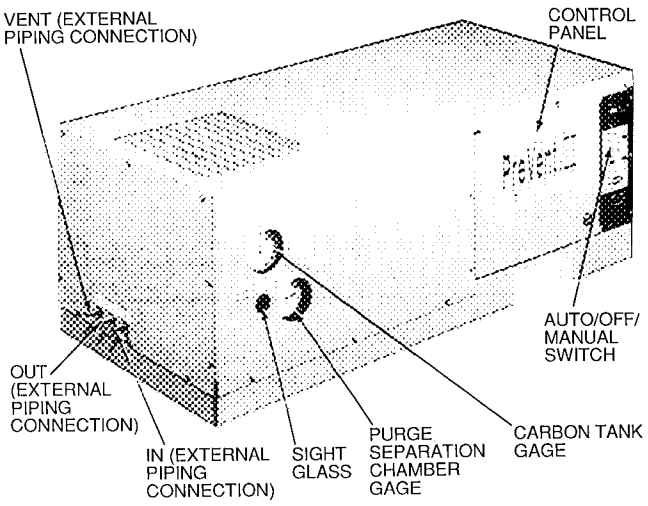


Fig. 1 — Prevent II Purge Unit (External Components)

Table 1 — Physical Data

19DK UNIT (50/60 Hz)	ENGLISH	(SI)
DRY WEIGHT lbs (kg)	208	(95)
CARBON TANK		
Design Pressure psig (kPa)	15	(103)
Max. Operating Pressure psig (kPa)	10	(69)
PURGE PUMP		
Design Pressure psig (kPa)	60	(414)
Max. Operating Pressure psig (kPa)	45	(310)
Suction Connection (in.)	3/8*	(3/8*)
Flow Rate		
50 Hz cfm (L/s)	.91	(.43)
60 Hz cfm (L/s)	1 1	(.52)
Horsepower (kW)	25	(.19)
REGENERATING PUMP		
Design Pressure psig (kPa)	10	(69)
Max. Operating Pressure psig (kPa)	2	(14)
Flow Rate		
50 Hz cfm (L/s)	1.7	(.8)
60 Hz cfm (L/s)	2.0	(.95)
Max. Vacuum in. Hg (kPa)	29	(–98)
Horsepower (kW)	.5	(37)
PURGE SEPARATION CHAMBER		
Design Pressure psig (kPa)	60	(414)
Max. Operating Pressure psig (kPa)	45	(310)
AIR-COOLED CONDENSER		
Design Pressure psig (kPa)	60	(414)
Max. Operating Pressure psig (kPa)	45	(310)
Motor Horsepower (kW)	.012	(009)

*Piping connections are 3/8 in O D. copper tubing.

Table 2 — PreVent II Purge Unit Power Requirements

MODEL NUMBER	19DK011154
POWER	115-1-50/60
MAXIMUM FLA	4.9/5.5
MINIMUM SUPPLY CIRCUIT AMPACITY	15 A
MAXIMUM FUSE/CIRCUIT BREAKER TIME DELAY	15 A

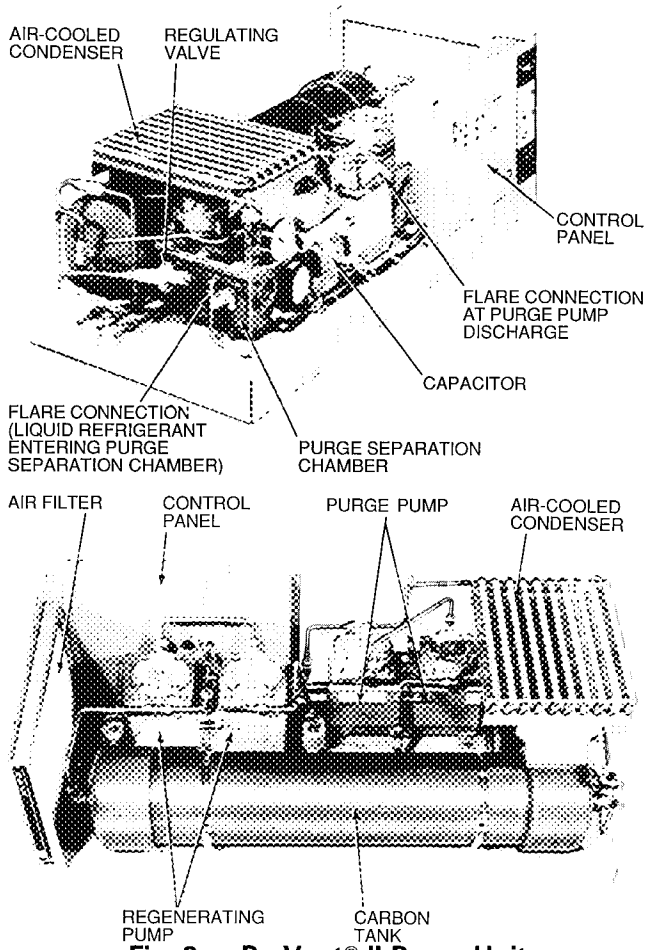


Fig. 2 — PreVent® II Purge Unit (Internal Components)

MOUNTING THE UNIT — The PreVent II unit must be mounted near the chiller. The best location for the PreVent II unit is on top of the chiller's condenser (above the purge probe connection). If the PreVent II unit cannot be mounted on the chiller's condenser, additional installation procedures must be followed. Accessory mounting kits and components are available when the PreVent II unit is installed on the chiller's condenser or on the floor next to the chiller. See Table 3 for additional information.

Mounting kit instructions are furnished with the accessory mounting kits.

Table 3 — PreVent II Purge Unit Accessory Information

ITEM	PART NUMBER	QUANTITY REQUIRED	CONDENSER MOUNT	FLOOR MOUNT
CONDENSER MOUNTING KIT	19DK660027	1	X	
FLOOR MOUNTING KIT	19DK660028	1		X
SUCTION ACCUMULATOR	KH71KK120	1		X
SHUTDOWN SOLENOID	EF13CQ062	1		X
220/115 V TRANSFORMER	HT01AH884	1	*	*

*When only 220 v power is available, an optional 220/115 v transformer is required

NOTE: The accessories listed in this table can be purchased from Carrier's Replacement Components Division

Make Piping Connections — See Fig. 1 and 3 The PreVent II unit requires 3 external piping connections. The piping connection labelled IN is the refrigerant and air gas connection from the chiller's purge probe. The connection labelled OUT is the recovered refrigerant connection from the unit to the chiller's evaporator. The piping connection labelled VENT is the purge vent line. The purge vent line should be connected to the chiller's rupture disc/relief valve vent line

Each piping connection is ⅜-in. O.D. copper tubing. Each connection from the chiller to the PreVent II unit must be as short as possible to avoid an excessive pressure drop in the copper lines. In the refrigerant and air gas line, excessive pressure drop will lengthen the time the unit takes to remove noncondensable gases from the chiller. The recovered refrigerant line (OUT external piping connection) leaving the PreVent II unit must be above the refrigerant liquid level in the chiller's cooler. The recovered refrigerant line entering the chiller's cooler can be below the refrigerant level. This is required to avoid a backup of refrigerant in the recovered refrigerant line The vent connection should be piped in accordance with ASHRAE 15, latest edition, and all applicable local codes.

If the PreVent II unit is not mounted on top of the chiller's condenser (above the purge probe connection) or mounted on a Carrier 17/19DR chiller, then a field supplied suction accumulator and a shutdown solenoid will be needed. The suction accumulator must be installed at the inlet of the PreVent II unit. The shutdown solenoid must be installed at the outlet of the chiller's purge probe. See Fig. 3. The suction accumulator and shutdown solenoid are necessary to prevent liquid refrigerant from entering the purge pump

Make Electrical Connections — The PreVent II unit operates with 115 v at either 50 Hz or 60 Hz. When only 220 v power is available, an optional 220/115 v transformer is required. Connect electrical power in accordance with the minimum circuit amps (MCA) and maximum full load amps (FLA), as specified on the unit nameplate. Be sure that the unit is connected and grounded in accordance with applicable codes. See Table 2 and Fig. 4.

Power to the PreVent II unit should be provided from the chiller control panel. A control transformer (located in the chiller starter) normally supplies power to the chiller control panel. The control transformer must have a rating of at least 2 kva. If it does not have a rating of 2 kva, a separate power source must be used.

The PreVent II unit has an AUTO/OFF/MANUAL toggle switch. See Fig. 1. On Carrier chillers, the AUTO terminal on the toggle switch must receive power from terminal 18 on the 115-v chiller control panel terminal board using terminal 10 on the PreVent II control panel. Terminal 10 will supply power to the PreVent II unit anytime the chiller's compressor is energized. A similar terminal should be available to perform this function on non-Carrier chillers.

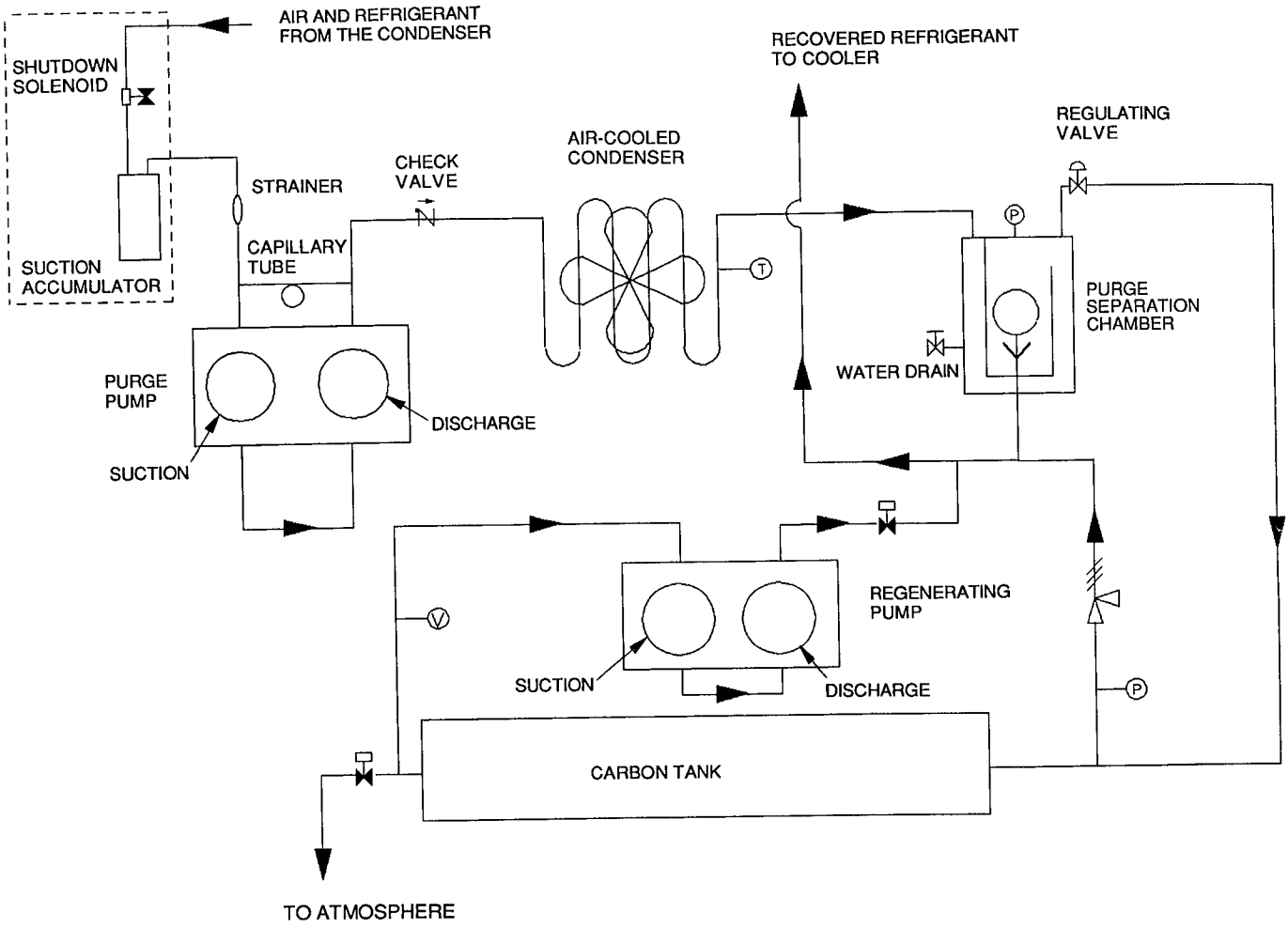
→ The top portion of the PreVent II unit wiring diagram shows relays KA and KB. These two relays are used when installing a PreVent II unit on a dual 17/19 DR chiller. These relays will enable the PreVent II to operate when either compressor is running. These relays can be installed in the chiller control panel.

NOTE: The KA and KB relays are not shipped with PreVent II unit. They must be ordered separately as needed.

The L1 and L2 terminals in the PreVent II control panel must be wired to the L1 and L2 terminals in the chiller control panel.

IMPORTANT. The PreVent II control panel must be properly grounded. Use the ground connection on the PreVent control panel and connect it to the chiller control panel ground connection.

If a shutdown solenoid is needed, it must be wired to terminal 9 and L2 in the PreVent II control panel.



LEGEND

P — Pressure Gage
T — Temperature Switch
V — Vacuum Switch

Solenoid Valve

Regulating Valve

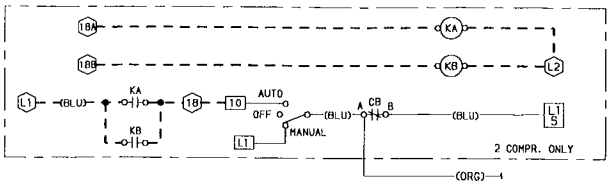
Check Valve

Relief Valve

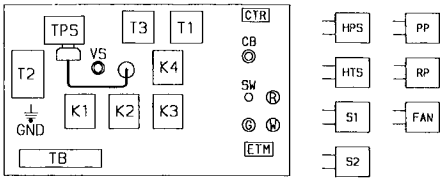
---- Indicates field installation of accumulator and shutdown solenoid for PreVent II unit

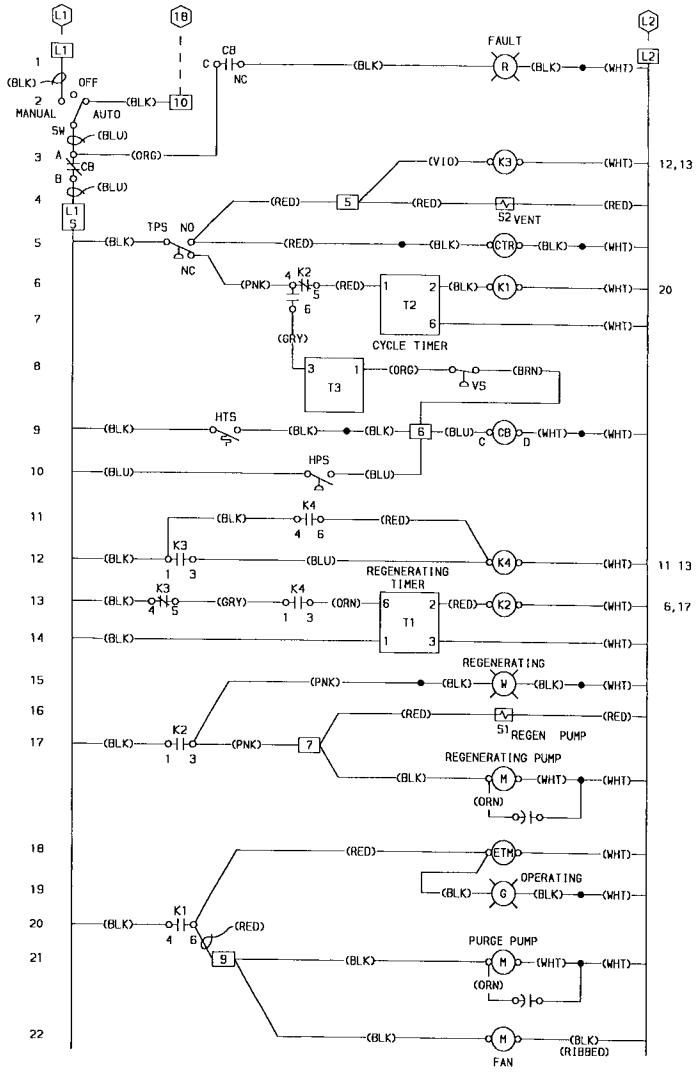
——— Indicates factory installed refrigerant lines

Fig. 3 —PreVent® II Purge Unit Piping Connections



COMPONENT ARRANGEMENT





LEGEND

CB	—	Circuit Breaker
CTR	—	Counter
ETM	—	Elapsed Time Meter
FAN	—	Air Cooled Condenser Fan Motor
GND	—	Ground
HPS	—	High-Pressure Switch
HTS	—	High-Temperature Switch
K	—	Relay
M	—	Motor
PP	—	Purge Pump
RP	—	Regenerating Pump
S	—	Solenoid
SW	—	Switch Auto/Off/Manual
T	—	Timer
TB	—	Terminal Block
TPS	—	Tank Pressure Switch
VS	—	Vacuum Switch
———		Factory Wiring
- - - -		Field Wiring
(X)		Coil
(M)		Motor
●		Splice
X		Purge Control Box Terminal
⊗		Chiller Control Panel Terminal, 115 volts 50/60 Hz

→ **Fig. 4 — PreVent® II Purge Unit Wiring Schematic and Control Wiring**

CONTROLS AND COMPONENTS

Purge Pump — This component is an oil-less diaphragm pump. It is designed to remove and pressurize gas from the chiller's condenser. The pump uses a four-pole motor and operates at 1500 rpm (25 R/s). This speed was selected to maximize pump diaphragm life. The 2 diaphragms are piped in series and achieve 1 1 cfm (.5 L/s). The pump is designed to operate at 45 psig (310 kPa).

Air-Cooled Condenser — The condenser has copper coils with aluminum fins. It is used with a fan and motor assembly to condense the refrigerant gas that has been discharged from the purge pump into a liquid. This liquid then enters the purge separation chamber.

Purge Separation Chamber — See Fig. 3 and 5. This chamber is the first stage of the air/refrigerant separation process. It is used to separate air and water from the refrigerant that is discharged from the air-cooled condenser. The purge separation chamber is designed to operate at 45 psig (310 kPa). It contains a sight glass and drain valve to view and remove any accumulation of water that was separated from the refrigerant. A copper float ball and brass valve assembly return recovered refrigerant to the chiller's cooler.

The purge separation chamber is made from cast bronze to provide superior corrosion protection and long component life. A pressure gage that indicates the chamber pressure is mounted on the purge separator chamber.

Regulating Valve — The regulating valve maintains the pressure in the purge separation chamber and air-cooled condenser. It accomplishes this by modulating open and closed to allow a relatively small amount of air and refrigerant gas discharge from the purge separation chamber to enter the carbon tank. The regulating valve is factory set and field adjustable to maintain the purge separation chamber pressure at 45 psig (310 kPa).

Carbon Tank — This tank is used as a second stage of the air/refrigerant separation process. It is used to separate refrigerant gas from air. The tank is filled with activated carbon and each end contains a fine stainless steel/felt/stainless steel mesh filter with a perforated stainless steel plate for support. Most of the refrigerant is adsorbed by the carbon in the tank. The remaining gas in the tank is mostly composed of air.

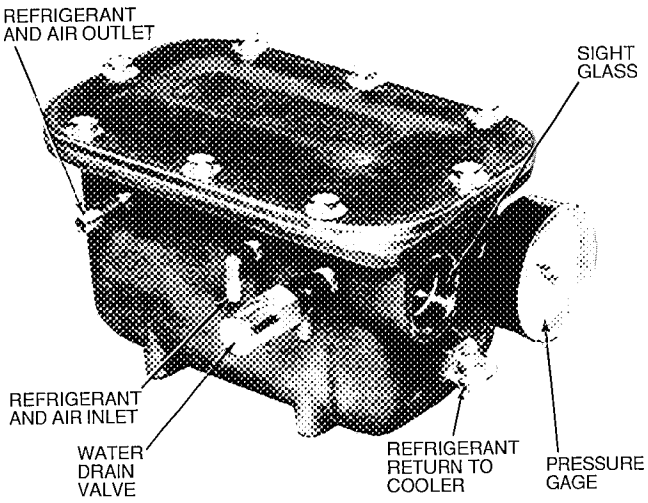


Fig. 5 — Purge Separation Chamber (External View, Shown Without Fan and Carbon Tank Gage)

Regenerating Pump — The regenerating pump is an oil-less diaphragm pump. It is designed to remove refrigerant that was adsorbed in the carbon tank. The pump uses a 2-pole motor and operates at 3000 rpm (50 R/s). It has a long diaphragm life because it only operates for 5 minutes during each purge cycle. The 2 diaphragms are piped in series to maximize its vacuum capability. The pump will achieve 29 in. Hg (–98 kPa).

Control and Display Panel — This panel contains most of the electro-mechanical and solid-state operating and safety control components. It also contains components that provide a visual display of unit operation (such as purge pump and regenerating pump operation, the number of purge cycles, the number of hours the purge pump has operated, and a system fault indicator). A more detailed description of the control and safety components can be found in the Control and Safety Sequences section on page 7.

BASIC OPERATION

The PreVent® II unit can operate while a low pressure CFC or HCFC chiller is running or shut down. However, there is one exception. The PreVent II unit WILL NOT operate effectively with a CFC-113 chiller when the chiller is shut down. It will not operate effectively because a CFC-113 chiller has a low vacuum level at normal ambient temperatures. For example, if a shut down CFC-113 chiller is at an ambient temperature of 70 F (21 C), the vacuum level in the chiller will be about 18 in. Hg (–61 kPa). The vacuum capability of the purge pump is about 15 in. Hg (–51 kPa) at 45 psig (310 kPa) discharge pressure. Therefore, there will be virtually no gas flow from the chiller to the pressure pump.

A 3-position toggle switch (AUTO, OFF, and MANUAL) is located on the front of the control panel. See Fig. 1. The MANUAL position will turn on the PreVent II unit when the chiller is running or shut down. When the AUTO position is selected, the PreVent II unit will only operate when the chiller is running. The OFF position will turn the PreVent II unit off when the chiller is running or shut down.

When the PreVent II unit is operating and the purge pump is running, a continuous flow of gas is drawn from the chiller's condenser through the purge probe. The purge probe is located in a section of the condenser where air is most likely to accumulate while a chiller is running. This gas, composed of air, water vapor, and refrigerant, is compressed by the purge pump (to a maximum of 45 psig [310 kPa]) and discharged into the air-cooled condenser. The air-cooled condenser removes heat from the gas mixture causing the refrigerant and water vapor to change from a gas to a liquid. This gas and liquid mixture is then discharged to the purge separation chamber.

When the gas and liquid mixture enters the purge separation chamber, the gas will move to the top of the chamber and the liquid will pour into a section that separates the water from the liquid refrigerant. See Fig 5. The liquid refrigerant will then travel through the water separation section into the float ball and valve section. See Fig. 6. When the refrigerant level rises high enough in this section, the float ball in the float valve assembly will rise and open the float ball valve. The liquid refrigerant will then drain from the purge separation chamber into the chiller's cooler. If water is present, it can be seen in the water separation sight glass The water will float on top of the refrigerant and can be seen as a second level of liquid in the sight glass. See Fig. 7. Remove the water (viewed in the sight glass) by slowly opening the water drain valve. See Fig. 5. Close the water drain valve once all the water is removed.

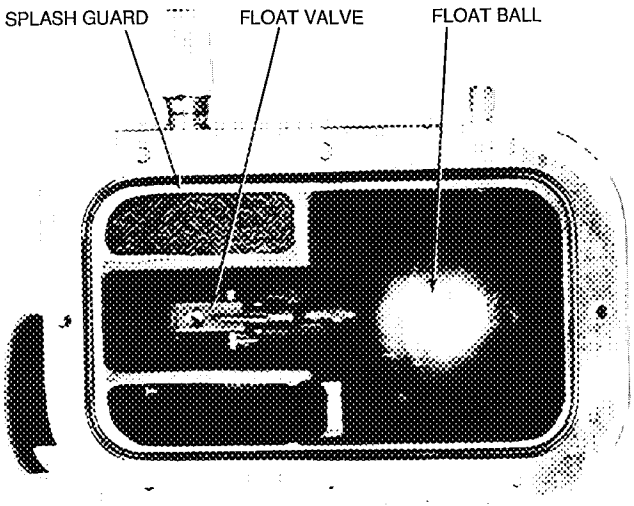


Fig. 6 – Float Valve Assembly

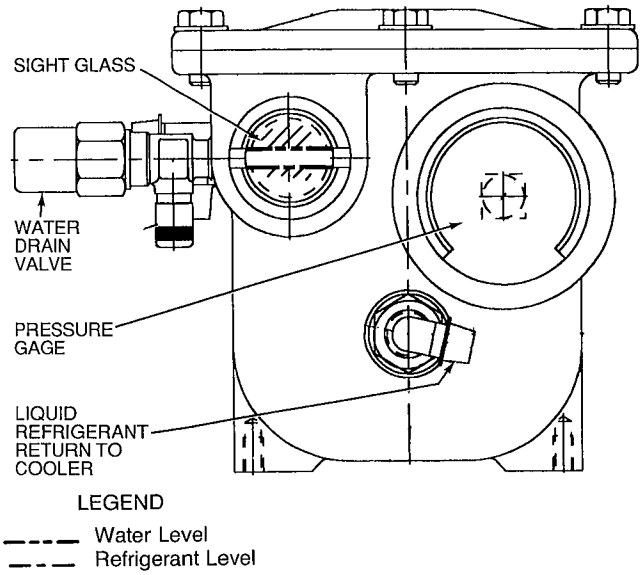


Fig. 7 – Refrigerant/Water Separation Sight Glass

As air collects in the purge separation chamber, the pressure in the chamber will increase. This pressure can be read on the pressure gage, mounted on the purge separation chamber. See Fig. 5. Once the pressure reaches 45 psig (310 kPa), a regulating valve, attached to the purge separation chamber, will open. The regulating valve will begin discharging the accumulated gas in the top of the purge separation chamber into the carbon tank. See Fig. 2 The gas in the top of the purge separation chamber will be a mixture of air and refrigerant.

As gas enters the carbon tank, the carbon in the tank will adsorb the refrigerant gas. The air will not be adsorbed by the carbon and will accumulate in the tank. As more air enters the tank, the tank pressure will begin to rise. The pressure in the carbon tank can be read on a pressure gage, located on the front of the PreVent® II unit, near the purge separation chamber. Once the pressure reaches 10 psig (69 kPa), the air vent solenoid valve opens and bleeds the air from the tank. It will continue to bleed the air until the pressure drops to 2 psig (14 kPa). The air vent solenoid valve then closes and the regenerating pump will be turned on for 5 minutes. The regenerating pump will remove refrigerant that was adsorbed by the carbon and return it to the chiller's cooler. When the regenerating pump turns off, one cycle of purge operation will have been completed. The purge pump will turn on to start a new cycle.

The PreVent II unit has a simple operating logic circuit that allows the unit to operate only when purging is necessary. When the PreVent II unit starts, an internal solid-state recycle timer controls its operation. The recycle timer actually has 2 timing circuits. The ON-TIME and the OFF-TIME control circuits are DIP switch adjustable and are initially set at 1 hour and 8 hours, respectively. The ON-TIME control circuit will let the unit operate for 1 hour. If the ON-TIME control circuit does not go through a purge cycle during the 1 hour period, it will switch to the OFF-TIME control circuit. The OFF-TIME control circuit will operate for 8 hours. After the OFF-TIME control circuit has expired, the ON-TIME control circuit will start the PreVent II unit.

If the purge unit goes through a purge cycle during the first hour of operation, the recycle timer will be reset to the ON-TIME control circuit. The recycle timer will continue to reset as long as there is air in the chiller.

The ON-TIME and OFF-TIME control circuits can be field adjusted, based upon the needs of a specific chiller. For example, the PreVent II unit ON-TIME control circuit could be modified to 2 hours and the OFF-TIME control circuit could be modified to 4 hours.

CONTROL AND SAFETY SEQUENCES

Control Operation – The PreVent II unit will operate with 115 v power from the chiller's control panel or a separate power source. When only 220 v power is available, an optional 220/115 v transformer is required. See Table 3.

The toggle switch (line 2) must be in the MANUAL or AUTO position and circuit breaker CB (line 3) must be in the ON position to turn on the PreVent II unit. Refer to Fig. 1 and 4.

The toggle switch has 3 settings (MANUAL, OFF, and AUTO). The AUTO position will turn the unit on only when the chiller is on. The MANUAL position will turn the unit on whether the chiller is on or off. The OFF position turns the PreVent II unit off.

When the PreVent II unit is turned on, cycle timer T2 (line 6) is energized. This timer contains 2 timing control circuits (ON-TIME and OFF-TIME). The ON-TIME control circuit is factory set for 60 minutes. The OFF-TIME control circuit is factory set for 480 minutes. The ON-TIME control circuit starts when T2 is energized. The T2 timer energizes relay K1 (line 6) When relay K1 is energized, normally open (NO) contact K1 (line 20) closes. When the K1 contact closes, 4 events take place: the elapsed time meter (ETM) is started (line 18), the green operating light is turned on (line 19), the purge pump is turned on (line 20), and the condenser fan is turned on (line 22). If there is not enough air in the chiller to cause the PreVent II unit to go through a purge cycle after 60 minutes of operation, timer T2 (line 6) will switch to the OFF-TIME control circuit. Timer T2 will be in the OFF-TIME control circuit for 480 minutes. When this happens relay, K1 (line 6) will be deenergized, NO K1 contact (line 20) will open, and the elapsed time meter, operating light, purge pump, and condenser fan will turn off. Once the OFF-TIME control circuit expires, the ON-TIME control circuit will energize the PreVent II unit.

If there is a sufficient amount of air in the chiller to allow the PreVent II unit to complete a purge cycle, the following sequence of events will take place:

The pressure in the carbon tank will begin to rise. See Fig. 2. Once the pressure reaches 10 psig (69 kPa), the carbon tank pressure switch (line 5) will switch from its normally closed (NC) set of contacts to its NO set of contacts.

When this happens the T2 timer, K1 relay, elapse time meter, operating light, purge pump, and condenser fan all deenergize. At the same time relay K3 (line 3), vent solenoid valve S2 (line 4) and cycle counter (CTR) (line 5) will be energized.

When relay K3 is energized, NO K3 contact closes (line 12) and NC K3 contact opens (line 13). Relay K4 is then energized and NO K4 contacts close (lines 11 and 13).

When the cycle counter (CTR) is energized, it advances one digit to record the purge vent cycle.

When vent solenoid S2 is energized it vents the carbon tank pressure into the atmosphere. The carbon tank pressure will be reduced from 10 psig (69 kPa) to 2 psig (14 kPa). When the tank pressure reaches 2 psig (14 kPa), the carbon tank pressure switch changes from the NO contact to the NC contact. The K3 relay, vent solenoid S2, and CTR will be deenergized.

When relay K3 is deenergized, NO K3 contact will open (line 12) and NC K3 contact will close (line 13). When NC K3 contact closes, timer T1 is energized (line 13) Timer T1 will energize relay K2 for 5 minutes. When relay K2 is energized, NO K2 contacts close (lines 6 and 17) and the NC K2 contact opens (line 6). When NO K2 contact closes (line 6), timer T3 is energized. This timer uses a contact closure upon expiration of time delay and is set for 3 minutes. When NO K2 contact closes (line 17), it will turn on the regenerating light (line 15), regenerating pump solenoid valve S1 (line 16), and regenerating pump (line 17).

Once the regenerating pump starts, it will begin to remove refrigerant from the carbon tank. It does this by creating a vacuum in the tank. The pump will operate for 5 minutes (due to timer T1) and achieve a vacuum of 29 in. Hg (–98 kPa).

After the regenerating timer T1 expires, the K2 relay is deenergized. Normally open (NO) K2 contact opens (line 17), deenergizing the regenerating light, regenerating pump solenoid valve, and the regenerating pump. Normally closed (NC) K2 contact closes (line 6) and energizes the timer T2 to begin the process again. Normally open (NO) K2 contact (line 6) opens, deenergizing timer T3.

Safety Operation — The PreVent® II unit has 3 safety controls to turn off the unit in the event of a malfunction. If the discharge pressure from the purge pump reaches 60 psig (414 kPa), a high-pressure switch will close (line 10) and energize circuit breaker CB (line 9). When circuit breaker CB is energized, NC CB contact opens (line 3) and turns off the unit. If the discharge temperature from the air cooled condenser reaches 135 F (57 C), the high temperature switch will close (line 9) and energize circuit breaker CB and turn off the unit by opening NC CB contact (line 3).

When the regenerating pump (line 17) begins to evacuate the carbon tank, it must reach a vacuum of 20 in. Hg (68 kPa) within 3 minutes of operation. If it does not, the vacuum switch will not open (line 8) and the timer T3 will energize circuit breaker CB and turn off the unit by opening NC CB contact (line 3).

MAINTENANCE

Periodic maintenance of the PreVent II purge unit is needed for continued high performance and minimum equipment downtime. See Fig. 8.

Removing the Cover — There are 18 screws that secure the cover to its base. Only 4 of these screws must be removed to remove the cover. The other 14 screws must be loosened due to the slotted hole design in the cover. There are 2 screws on the front of the cover that must be removed. These screws are easily identified since they are located next to the hinge on the control panel and the holes are not slotted. The other 2 screws are located on the back of the unit. These screws hold the filter retainer in place. The holes are slotted.

Leak Testing — The unit should be leak tested annually. Leak testing can be accomplished by allowing the unit to operate until normal pressures are achieved (45 psig [310 kPa] in the purge separation chamber and 8 psig [55 kPa] in the carbon tank).

Evacuation — Since the purge separation chamber may contain liquid refrigerant during service, it should be completely evacuated before service operations are begun. Evacuation can be accomplished by connecting a service vacuum pump to the water drain valve and discharging the refrigerant as a gas into the chiller.

⚠ CAUTION

Be careful not to draw liquid refrigerant into the service vacuum pump. Liquid refrigerant could damage the service vacuum pump.

Purge Pump — The control panel has an elapsed time hour meter that records the run time of the purge pump This hour meter is used to determine the replacement schedule of the diaphragms, gaskets, valves, and filters. The components are identical to the regenerating pump components. These items should be replaced after 4 years or 4,000 hours of operation. To perform maintenance on the purge pump, the flare nuts and piping to the pump inlet and outlet head must be removed from the pump head.

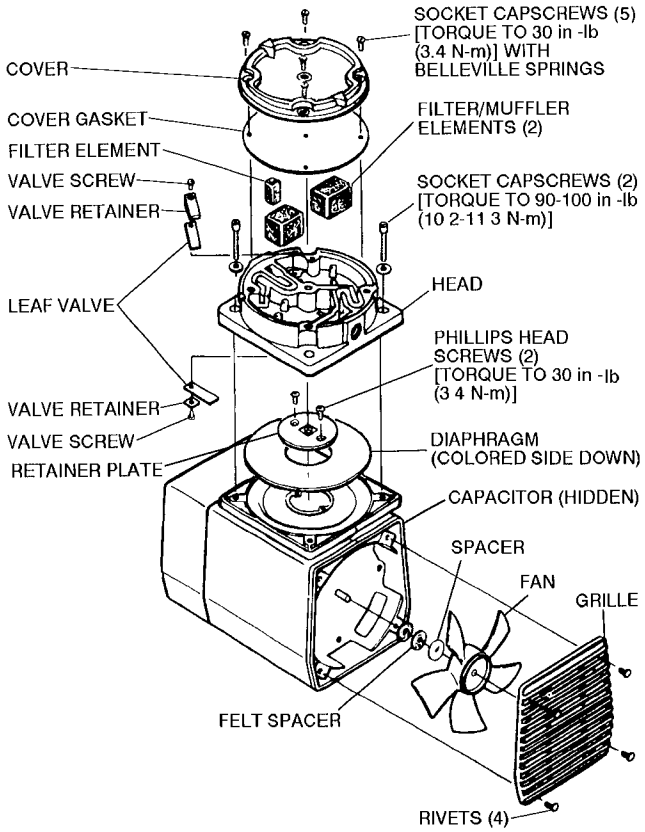


Fig. 8 — Assembly/Disassembly of the Purge Pump or Regenerating Pump

FILTER/RUBBER GASKET REPLACEMENT — To clean or replace the filters and/or rubber gasket, remove the 5 screws on top of the purge pump. See Fig. 8. The filters and gaskets are located beneath the top plate. Remove the filters and wash them in solvent or replace them, as needed. The gasket may be cleaned or replaced. Replace the filters in the proper position. Replace the gasket after the filters are replaced. The screws should be torqued to 30 in.-lb (3.4 N-m).

IMPORTANT: The gasket and top plate will fit in one position only.

DIAPHRAGM REPLACEMENT — To replace the diaphragm, remove the 4 socket cap screws from the head See Fig. 8. The diaphragm is held in place by 2 phillips-head screws. Remove the screws, retainer plate, and the diaphragm. The diaphragm will fit in any position on the connecting rod. Replace the retainer plate and the 2 phillips-head screws and torque to 30 in.-lb (3.4 N-m). The blue colored side of the diaphragm should be facing up.

Replace the head. Insert the 4 socket cap screws. The screws should be torqued to 90-100 in.-lb (10.2-11.3 N-m).

INLET/OUTLET VALVE REPLACEMENT — To replace the inlet and outlet valves, remove the slotted machine screw that holds each valve in place. The stainless steel inlet and outlet valves are interchangeable.

When replacing the outlet valve, place the new outlet valve in the correct location and note that a retaining bar is located near the machine screw hole. The retaining bar holds the valve in position.

When replacing the inlet valve, note that the valve holder is marked with an "X" in one corner. This "X" should be in the lower right hand corner near the inlet of the air chamber. Replace the head and tighten the socket head screws to 90-100 in.-lb (10.2 -11.3 N-m) of torque.

⚠ WARNING

The motor is thermally protected and can automatically restart when the overload resets. Always disconnect the PreVent II unit from the power source before servicing.

→ **Regenerating Pump —** The control panel has a cycle counter to record the number of purge cycles. The regenerating pump will run for 5 minutes during each purge cycle. Replace the filters, gaskets, and valves every 4 years. These components are identical to the components shown in the Purge Pump section. The diaphragm in the regenerating pump is different than the diaphragm in the purge pump. The regenerating pump diaphragm should be installed with the red-colored side facing down. Follow the same procedures described in the Purge Pump section to replace these components. See Fig. 8.

Purge Separation Chamber — The purge separation chamber should be inspected and cleaned every year. Remove the air-cooled condenser to access the purge separation chamber.

⚠ CAUTION

The purge separation chamber may be pressurized and contain refrigerant. Relieve pressure prior to opening the purge separation chamber.

Disconnect the flare nuts at the purge pump discharge and the liquid refrigerant line that enters the purge separation chamber. See Fig. 2. Remove the high temperature switch from the condenser discharge pipe. Loosen the 4 screws holding the condenser to the condenser support brackets. The screws must be loosened because of the slotted hole design. Remove the condenser.

→ To access the purge separation chamber, remove the 6 cap screws holding the cover of the purge separation chamber to its base. Remove the flare nut connected to the carbon tank pressure gage. Remove the condenser fan and carbon tank pressure gage from the cover. Remove the cover from the purge separation chamber. See Fig. 2 and 5.

Clean out any debris found in the purge separation chamber. Check the condition of the float valve, float ball, and valve movement. Replace if necessary.

Check the condition of the sight glass. If it is etched, it should be replaced. The sight glass, o-ring, and flat gasket can be replaced without removing the cover of the purge separation chamber. They can be accessed by removing the sight glass gland from the outside of the purge separation chamber.

Air Filter — The air-cooled condenser is a major component of the PreVent® II unit. The air-cooled condenser uses a fan to draw air into the unit. Then, it exhausts the air out the top of the unit. Since mechanical rooms can be a dusty environment, an air filter is used to keep the internal components of the PreVent II unit clean. Inspect the filter and replace it periodically, as needed.

TROUBLESHOOTING

SYMPTOM	CAUSE	REMEDY
Purge pump will not run at start-up.	Toggle switch is in the OFF position.	Make sure toggle switch is in the AUTO or MANUAL position.
	Circuit breaker is in the OFF position.	Make sure the circuit breaker is in the ON position
	Capillary tube between the suction and discharge of the purge pump are plugged	Remove the capillary tube and make sure it is free of debris
	Faulty T2 timer or K1 contactor.	Test T2 timer and K1 contactor for proper operation.
Fault light is on.	High-pressure switch closed	Reduce pressure below 40 psig (276 kPa) to reset switch. Reset circuit breaker. Restart unit and observe its operation
	High-temperature switch closed.	Reduce temperature to 100 F (38 C) to reset switch. Reset circuit breaker. Restart unit and observe its operation
	Vacuum switch did not open after 3 minutes of regenerating pump operation	Reset circuit breaker. Start unit and observe its operation through an entire cycle to determine why a vacuum of at least 20 in. Hg (–68 kPa) was not achieved in the carbon tank.
PreVent® II purge unit will not remove enough air to keep the chiller operating properly.	DIP switch settings on the T2 timer must be adjusted.	Set ON-TIME to a minimum of 1 hour and OFF-TIME to a maximum of 4 hours.
	Chiller is leaking air in at a faster rate than the purge is capable of removing	Repair leak in accordance with accepted practices.
The PreVent II purge unit will not remove air from an idle chiller.	The vacuum level in the chiller is lower than the vacuum capability of the purge pump.	Raise the pressure in the chiller to a minimum of 10 in Hg (–34 kPa) or turn the chiller on.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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