

OAM Purger^ä

Installation, Operation & Maintenance Manual

Redi Controls, Inc.

Literature File No. 1140-02

Oil Acid & Moisture Purge Unit

The
OAM-Purger
May be used with
Centrifugal Chillers utilizing
the following refrigerants:

R-11, R-113, R-114 & R-123
R-12, R-22, R-134a

This manual may be use with
The following OAM Purger
Models:

OAM-LPC200-11/113
OAM-LPC200-123
OAM-HPC200



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GENERAL INFORMATION

YOU ARE URGED TO READ THIS MANUAL COMPLETELY *BEFORE* INSTALLING AND/OR OPERATING THIS UNIT

Upon Receiving Your Unit

Inspect the unit for possible damage caused during shipping. **Contact Equipment servicing before attempting to use a damaged unit.**

WARNINGS and Cautions

NOTE: WARNINGS and Cautions appear in highlighted boxes as illustrated below at appropriate points throughout this manual. Give special attention to these items.

WARNINGS: Provided to alert you to special situations that could result in serious personal injury, damage to your equipment, or cause your equipment not to work properly. Warnings may appear in this manual or on the equipment. Heed all Warnings.

Cautions: Designed to alert you to situations that may result in damage to your equipment.

Personal safety and the proper operation of your equipment require strict observance of these precautions.

EQUIPMENT SHOULD BE INSTALLED AND OPERATED ONLY BY QUALIFIED PERSONNEL

WARNING: Certain servicing procedures may expose you to harmful materials and dangerous conditions. To minimize the possibility of injury, follow safety procedures and instructions described in this manual, on product labels and provided in material safety data sheets.

NOTE: The manufacturer has a continuous equipment improvement policy and reserves the right to change specifications and design of its products without notice.

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INSTALLATION

Before You Start

The **OAM Purger** is designed to remove **O**il, **A**cid & **M**oisture from the refrigerant charge of a Centrifugal Chiller and automatically return the oil to the Chiller's oil sump.

This section discusses the proper procedures for installing the OAM Purger.

WARNING: Installing or servicing refrigerant support equipment can be hazardous due to system pressures and dangerous voltages. Only qualified service personnel should work on such equipment.

OAM Purger Specifications

Electrical Power Requirements:	120 VAC, 50/60 Hz., 1-Phase, 15 Amp Fused Circuit Actual current draw Approximately 4 Amps
Remote Alarm Relay (RLY) Contact Rating:	120 VAC; 15 Amp
Operating Environment:	70°F to 105°F, 5% to 80% relative humidity, non condensing
Storage Environment:	0°F to 120°F, 5% to 80% relative humidity, non condensing
Dimensions (approximate):	33" height x 16" length x 12" depth
Weight (approximate):	60 pounds
Shipping weight (approximate):	95 pounds
Operating Distillation Temperature:	155 degrees F
Operating pressures:	30" to 250 psi
Distillation Tank Factory Pressure Tested At:	350 psig
Average Refrigerant/oil mixture in Purge Tank per distillation (varies depending upon installation and refrigerant level in Chiller):	10 to 20 lbs.
Average Rate of refrigerant/oil mixture processed (depends upon installation, refrigerant level in Chiller, and whether Chiller is Running or Off):	850 to 1250 lbs. per week 44000 to 65000 lbs. per year

NOTE: The OAM Purger unit comes equipped with a remote alarm capability.

Contents of the OAM Purger Installation Kit

Each "kit" includes: One Installation, Operation and Maintenance Manual.
One OAM Purger with EZ-Change Refrigerant Filter attached.
One Oil Filter/Drier (*for use in oil return line*).
One Liquid-line Strainer (*for use in refrigerant fill line*).
One ¼' sweat check valve (with spring) (*for use in oil return line*).
One 3/8" charging Valve Adapter with copper ferrules and cap.
One 1/2" charging Valve Adapter with copper ferrules and cap.
Two 5/8" charging Valve Adapters with copper ferrules and cap.
One ¾" to 5/8" Reducing Flare Union (*for use with Charging Valve Adapter if necessary*).
One 5/8" to 1/2" Reducing Flare Union (*for use with Charging Valve Adapter if necessary*).
One 1/2" to 3/8" Reducing Flare Union (*for use with Charging Valve Adapter if necessary*).
One ¼" MPT Run Brass Fitting (*fitting with Schrader valve for use with oil adapter fitting for leak testing.*)
One plastic tool for inserting power line into electrical terminal block.
One Brass Three-way Internal Branch Tee and Copper Ferrule.
Two ¼" NPT to ¼" Brass Flare Fittings.
Two ¼" NPT to ¼" Brass 90 degree Flare Fittings.
Two ¼" NPT Pipe Plugs
Twelve ¼" Flare Nuts.
One six feet length of 3/8" ID ¾" Line Insulation
One ten feet length of 1/8" adhesive backed Insulation Tape.
One 18" x 24" x ½" sheet of adhesive backed Insulation.

Field-Provided Items

To be furnished by the installer:	OAM Purger Unit mounting hardware. Electrical conduit and wiring materials. 1/4-inch copper refrigerant tubing. Refrigerant cylinder (for collection of excess oil) IF excess oil is not initially returned directly to the Chiller's oil sump.
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Preliminary Inspection

Before installing the OAM Purger, check the data on the Purger unit nameplate and verify that it is the appropriate model for the refrigerants in the Chiller it is to be installed on. Make sure the voltage is correct for the application. Visually inspect all components for damage in shipment before installing. Pay particular attention to the Temperature Sensor (TS-1) capillary tube.

OAM PURGER OPERATIONAL OVERVIEW

The Redi Controls **OAM Purger** is designed to remove **oil, acids and moisture** from a Centrifugal Chiller's refrigerant. However, its main purpose is to remove **oil** from the refrigerant and return it to the Chiller's lubrication circuit (**oil sump**) where it belongs. Initial oil stripping is accomplished in two phases. The first phase, or **initial oil stripping process**, occurs at initial start-up of the OAM Purger. This is when all the excess oil that has been added to the system over time is removed and discarded. Often times the initial stripping process can yield several gallons to multiple tens of gallons depending on how severely the refrigerant is saturated with oil.

The second phase begins when all **excess oil** has been removed from the refrigerant. The OAM Purger will, from that point on, maintain the system in **lubrication balance**. Lubrication balance meaning virtually **100 percent** of the compressor's lubricating oil is **kept in the oil sump where it belongs**.

Operation of the OAM Purger is accomplished by a "**Patented**" process utilizing **gravity, heat and pressure** in conjunction with **special high capacity desiccants** to completely remove **oil, acids and moisture** from a Chiller's refrigerant charge.

The OAM Purger works by repeatedly extracting **10 to 20 pounds** (depending upon the refrigerant level available in the chiller evaporator) of oil-contaminated refrigerant for processing from the Chiller each purge cycle. The oil-contaminated refrigerant is heated by means of a flexible band electric heater and the liquid refrigerant is vaporized off. As the refrigerant vaporizes it passes through the special **E-Z Change "High Capacity" Moisture/Acid** filter-drier where it is cleaned before returning to the Chiller evaporator.

At the end of the distillation phase any distilled oil is **automatically returned to** the Chiller's **oil sump through** an in-line "**High Acid Capacity**" filter-drier where any residual acids are removed.

The OAM Purger is able to process between **850 and 1250 pounds of refrigerant per week**.

How It Works

OAM Purger operation is **cyclic** and non-stop **as long as power is applied**. Each complete purge cycle comprises **three (3) operational phases** and is approximately **2 ½ to 3½ hours in duration**.

The Three Operational Phases:

1. "**Fill phase**" (**Phase 1**): Refrigerant **contaminated with oil, acid and moisture** flows by **gravity** from the Chiller's evaporator into the OAM Purger **Distillation Tank**. The Fill Cycle terminates automatically when liquid refrigerant is sensed by the optical level sensor, or after **75 minutes fill time, whichever comes first**. At the end of the fill phase "distillation Phase 2" is initiated.

2. **“Distillation” (Phase 2):** During the distillation phase the **distillation heater** is energized heating the **refrigerant-oil mixture** causing the liquid refrigerant to vaporize. The vaporized refrigerant vapor flows from the distillation tank to the chiller evaporator through an integral **“High Acid / Moisture Capacity” Filter-Dryer** where acids and moisture are removed.

Once all refrigerant is vaporized any distilled oil remaining accumulates at the bottom of the OAM Purger Distillation Tank where it is further heated. Upon reaching **155 degrees F** an Oil return Phase (Phase 3) is initiated. Average duration of a typical Distillation Phase is approximately 1 1/2 to 2 1/4 hours, depending upon the refrigerant level in the Distillation Tank at the start of the distillation phase.

3. **“Oil Transfer” (Phase 3):** During the oil return phase distilled oil is automatically transferred from the Distillation Tank to the Chiller’s oil sump. The returning oil flows through an in-line **“High Acid Capacity” Filter** where residual acids are removed before entering the oil sump.

How the OAM Purger transfers oil to the Chiller’s oil sump

During the Distillation Phase vaporized refrigerant is returned to the chiller evaporator through a 10 psid check valve. Therefore, at the conclusion of the distillation phase the vapor pressure in the OAM tank will be at a pressure 10 psi higher than chiller evaporator / oil sump pressure. This pressure is used to push accumulated oil from the OAM tank back to the oil sump.

Operating Parameters

1. **FILL PHASE:** 75 minutes maximum. (Controlled by either programmed time or liquid level sensor.)

2. **DISTILLATION PHASE:** Duration of the Distillation Phase is dependant upon the amount of refrigerant in the OAM Purger tank at the conclusion of the Fill Phase and will vary from approximately **1½ to 2 1/4 hours**.

3. **OIL TRANSFER PHASE:** The Oil Transfer Phase is a **6 minute** timed cycle.

4. **OIL TEMPERATURE:** The temperature of the distilled oil is limited to **155 degrees F** by **Temperature Sensor (TS-1)**. This setting can be calibrated in the field when necessary. However, **DO NOT change the factory setting unless calibration is absolutely necessary**. Refer to the Maintenance section for calibration instructions.

5. **REFRIGERANT PROCESS CAPACITY:** The OAM Purger, on average, processes approximately **850 to 1250 pounds** of refrigerant per week. Thus, each week 850 to 1250 pounds of the Chiller’s total refrigerant charge is processed and made progressively cleaner until **all oil, acids and moisture** have been removed. To completely clean the refrigerant, the Purger must **cycle the Chiller’s total refrigerant charge several times (at least 4 or 5 times)**.

6. **OIL-REFRIGERANT SEPARATION EFFICIENCY:** The amount of refrigerant returned to the Chiller's oil sump along with the oil being returned at the completion each cycle is proportionate to the level of oil concentration in the refrigerant. The higher the oil concentration, the more refrigerant will be returned with the oil to the oil sump. **However, under any condition, the amount of refrigerant reaching the oil sump is insignificant.** **Example -** A Chiller with a **500 pound** charge containing an average of **12% oil by weight** means that the OAM Purger will return approximately **1 Lb. of oil** and approximately two ounces or so of refrigerant to the Chiller oil sump on any given cycle. This is only during the initial clean-up period. **Once the excess oil is removed, only trace amounts of refrigerant (if any) will ever reach the oil sump because only a small amount of oil will be returned during each return cycle (again that is once the excess oil has been removed).** The two ounces or so of refrigerant that does reach the Chiller oil sump every 2 1/2 to 3 1/2 hours is inconsequential and will have no bearing on Chiller operation if the chiller's oil sump heater is on. The Chiller's oil sump heater will quickly vaporize such a miniscule amount of refrigerant long before the next OAM Purger's oil transfer cycle occurs.
7. **POWER CONSUMPTION:** Distillation is accomplished by means of a 350 watt electric heater. However, because the heater is only energized approximately **60%** of the time power consumption is approximately that of a **250 watt light bulb.**

Operational LED Indicators

A series of **6 LED indicators** located on the upper right side of the Solid State Logic Board are provided as a means of monitoring purger operation. **(See Figure 6, page 33.)**

Purger Operation LED indicators

D1, D2, D3, D4, D5 Green LED Blinking Indicates 5 second delay before program starts.

- | | |
|------------------------------|---|
| D1 Green LED Blinking | Indicates purger is in FILL Phase 1 and the Distillation Tank is currently being filled with the oil laden refrigerant from the chiller evaporator. The Fill phase is either a 75 minute timed period <u>or</u> until a Liquid Level High signal is received from the Optical Level Sensor of the OAM Purger, whichever comes first. |
| D2 Green LED Blinking | Indicates the purging cycle has advanced to DISTILLATION Phase 2 and is currently in the process of vaporizing the refrigerant from the refrigerant/oil mixture. |
| D3 Green LED Blinking | Indicates the liquid refrigerant has vaporized, distilled oil temperature has reached 155 degrees F. and is currently in the OIL TRANSFER Phase 3. |
| D4 Green LED ON Solid | Anytime the Heater is on the green LED D5 will be on solid. This is simply for informational purposes. |

D5 Green LED On Solid Anytime the **Liquid Level High sensor** senses a liquid level the Green D5 LED is on solid. This is simply for information.

Diagnostic LED indicators

When diagnosing purger problems it is helpful to be able to verify various system components for proper operation. (See “Using Switch SW2 dip switches as diagnostic aid” page 42.)

Fault LED indicators

The LED indicators are also used to indicate certain **Purge Fault** conditions. (Refer to the “Trouble Shooting Section” starting on page 42.) The following is a description of the possible fault conditions:

D6 Red LED Blinking with D1 Green LED ON Solid: Indicates temperature in the Distillation Tank **did not drop below 155 degrees F.** within a pre-programmed time limit of **20 minutes** after initiating a **Fill Phase.** Refer to **Trouble Shooting Section starting on page 42** for probable cause.

D6 Red LED Blinking with D2 Green LED ON Solid: Indicates temperature failed to reach **155 degrees F.** within a pre-programmed **6 hour** time limit after initiation of the **Distillation Phase.** Refer to **Trouble Shooting Section starting page 42** for probable cause.

D6 Red LED Blinking with D3 Green LED ON Solid: Indicates that the Purger reached a temperature of 155 degrees F. too soon during the distillation phase, which would indicate that the OAM is not filling with oil laden refrigerant properly. **Refer to Trouble Shooting Section page 42** for probable cause.

D6 Red LED Blinking with D4 Green LED ON Solid: Logic board received a signal from the Liquid Level High Optical sensor for a period of 2 hours straight indicating a problem **Refer to Trouble Shooting Section page 42** for probable cause.

NOTE: When you see the Red FAULT light “ON”, DO NOT immediately turn the power switch OFF. First, remove the cover from the control box and observe and record which of the LED light(s) are “ON”. This will tell you the kind of fault that has occurred. Turning the switch OFF resets the Logic Board, terminating the Fault indicator. Retain the record of the purge fault. Examine the purger for any apparent problems, and check the troubleshooting section for possible causes of the fault. If there is no readily apparent problem, reset the purger and, then allow purger to operate normally to see if the fault repeats.

INSTALLING THE OAM PURGER

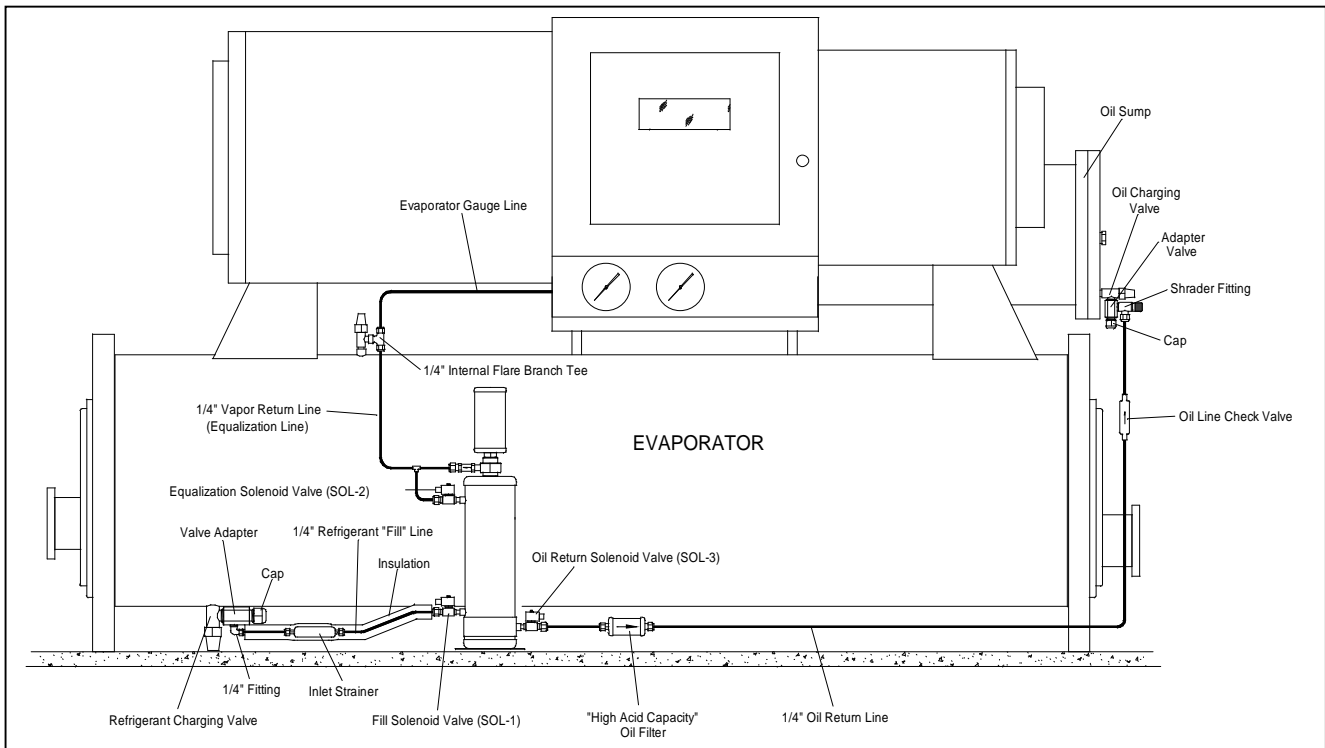
Location and Mounting

The OAM Purger comes mounted on its own integral base sufficient for proper support. Unit piping normally provides adequate support necessary to stabilize the unit. Additional support may be provided as deemed necessary.

1. The OAM Purger **must** be located within **four (4) feet** of the Chiller's refrigerant charging valve or other appropriate valve located near the bottom of the evaporator to which the liquid refrigerant "**Fill**" line is to be connected.
2. The OAM Purger should be mounted **directly on the floor** so the liquid refrigerant "**Fill**" inlet port is **as low as possible** relative to the refrigerant level in the evaporator. When the **Chiller** is mounted on a pad, the OAM Purger still should **sit on the floor**. The extra height of the pad provides additional liquid head to aid in gravity flow of liquid refrigerant from the Chiller to the purger. The OAM Purger cannot overfill because of a Liquid Level High optical sensor which when reached terminates a fill phase and initiates the distillation phase.
3. The OAM Purger **MUST** be installed standing in an **upright** (vertical) position.

WARNING: During a Fill phase if the refrigerant level in the Distillation Tank does not reach at least to the **middle sight Glass** the Purger **is not filling to an acceptable operating level**. (Contact Redi Controls for available options.)

Figure 1. – OAM Purger Hook-up



NOTICE: Complete FILL LINE and FITTINGS from evaporator to the OAM Purger MUST BE COMPLETELY INSULATED to avoid vapor locking, which will prevent filling.

Plumbing the OAM Purger

To facilitate connection of the refrigerant “**Fill**” line and the “**Oil Return**” line, to their respective Chiller Valves, special brass “**Valve Adapter**” fittings and **Copper Ferrules** have been provided in the **OAM Installation Kit**. These special adapters allow hook-up to the Chiller’s valves without interfering with normal service access.

NOTE: Each **Valve Adapter** has opposing ¼” **FNPT side ports**. To determine which of the ports to use, temporarily screw the Valve Adapter onto the charging valve hand tight. Usually only one of these ports will be accessible. This is the port you will use. The other port will be plugged. From the OAM Installation Kit select the appropriate fitting, as called for in the piping instructions, and install in this port. Then, using a ¼” **pipe plug** from the Installation Kit, **plug the unused side port**.

Each Valve Adapter comes with **Flare Cap** and **Ferrule** to cap off the Adapter’s charging access port. Be sure to **always use a Ferrule** when installing the Valve Adapter and cap.

Liquid Refrigerant Fill Line (with Strainer)

IMPORTANT:

NOTE: Although the following instructs you to connect the Liquid Refrigerant Fill Line to the Chiller's refrigerant charging valve, **this is not always best**. Some Chillers have the charging valve located very close to where liquid refrigerant from the condenser enters the evaporator. Usually, when this is the case, the Chiller manufacturer provides an alternate access valve elsewhere near the bottom of evaporator. When this is the case, you should connect to the alternate valve. **If the chiller currently has an oil recovery eductor system it probably will be necessary to disconnect the eductor** and make the connection there. Wherever the connection is made so as long as sufficient refrigerant from the evaporator is available to the OAM Purger it **will function and remove oil from the refrigerant**. However, connecting to the optimum location assures fastest **oil removal**.

Note: **On some Carrier Series D centrifugal chillers the refrigerant charging valve is located about even with the refrigerant level in the cooler. Therefore, for the OAM Purger to fill by gravity it will be necessary to cut into the horizontal section of the refrigerant charging line where it exits the bottom of the cooler and add a fitting and valve for connection of the OAM Purger "Fill Line".**

1. Select the appropriate size Valve Adapter from the Installation Kit that fits the Chiller's refrigerant charging valve. Depending on how the Fill Line is to run, select either a straight (U1-4B) or 90 degree (E1-4B) brass ¼" NPT x 1/4" Flare fitting from the Installation Kit and install in the appropriate side port. Install a ¼" pipe plug from the Installation Kit into the opposite side port.
2. Using the appropriate Copper Ferrule, permanently install the Valve Adapter onto the Chiller's refrigerant charging valve. **(See Figure 1, page 14.)**
3. Using ¼" **O.D.** copper tubing, run a ¼" copper line to the **Fill Solenoid Valve (SOL-1)** from the valve adapter fitting. **(See Figure 1, page 14.)**

NOTE 1: Be absolutely sure to keep the Fill Line LOWER than the Liquid Fill Inlet connection on the Distillation Tank. If any part of the Fill Line rises higher than the Fill Inlet, liquid refrigerant may not flow by gravity from the Chiller into the Distillation Tank.

4. Next, from the Installation Kit select the Fill line Strainer and two ¼" flare nuts-and install anywhere in the Fill Line. **Make certain the connections to the strainer are leak tight.**
5. Before making final connection to the purge unit, **INSULATE THE ENTIRE REFRIGERANT FILL LINE AND STRAINER**. Insulation materials have been included in the Installation Kit. **IMPORTANT-** (See **WARNING** below about **INSULATING**.)

WARNING: The entire Fill Line, Strainer, the refrigerant charging valve and ALL interconnecting piping UP TO THE EVAPORATOR SHELL MUST be insulated. Failure to properly insulate these items may cause vapor lock preventing the OAM Purger from functioning. (See Figure 1, on page 14.)

6. **DO NOT** open the refrigerant charging valve at this time.

Vapor Return Line

1. Close the evaporator gauge stop valve.
2. Disconnect the gauge line from valve.
3. From the Installation Kit, select the ¼” **Brass T6-4 Three-way Internal Branch Tee and Copper Ferrule.** Connect the Tee to the gauge stop valve ¼” port. (See Figure 1, pg 14.)
4. Re-connect gauge line to one end of Tee.
5. From the other end of the Tee, run a ¼” copper line to the **Equalization Solenoid Valve (SOL-2).** (See Figure 1, page 14.)

NOTE: Avoid sagging or traps in the Vapor Return (Equalization) Line where vapor can condense and accumulate causing a blockage

6. **DO NOT** re-open evaporator gauge valve at this time.

Oil Return Line and Oil Filter-Dryer installation

NOTE: IMPORTANT! Based on the severity of oil contamination in your system, the amount of oil that will be removed by the OAM Purger on initial start-up could be several gallons more (“excess oil”) than the capacity of your Chiller’s Oil Sump. For example, a 500 pound refrigerant charge with 12% oil by weight will contain approximately 8.5 gallons of excess oil. Until the Chiller’s refrigerant is purged free of oil, you must decide how you are going to deal with the excess oil before the initial start-up of the OAM Purger.

UNDERSTAND: The above example is for illustrative purposes only. A smaller refrigerant charge with a higher percent oil concentration, or a larger refrigerant charge with a lower percentage, may yield much more than 8.5 gallons of excess oil. **Before proceeding estimate how much excess oil you will accumulate. To estimate the excess oil** you are likely to accumulate, refer to the most recent **refrigerant analysis** for your Chiller. You will also need to know the weight of your Chiller’s refrigerant charge. Then refer to the **“Percent of Oil” Chart 1** on Page 18. Once you know approximately how much excess oil you will be dealing with **YOU HAVE TWO OPTIONS:**

NOTE: It is important to note that the percentage of oil in a sample can vary by as much as 10 percent depending upon where the oil sample is taken from the Chiller. For example, if the sample is taken from a location near where the refrigerant is returned from the condenser, mostly pure refrigerant is being returned to the evaporator at that location and the sample will indicate a lower percentage of oil contamination than actually exists in the Chiller.

1. Option 1: Plumb the “**Oil Return Line**” as per “**Option (1)**” **Piping Instructions (See page 19)**. This option allows the excess oil, as it is being stripped from the refrigerant, to flow direct to the Chiller’s oil sump where it can accumulate. With **Option (1)**, it will be necessary to **periodically monitor** the sump’s oil level and **remove excess oil** as it accumulates. Once the initial oil stripping process is complete and all excess oil has been removed from the oil sump, further monitoring will no longer be necessary. **See Option (1) Piping Instructions.**

Advantage...once the initial oil stripping process is complete no further action is required.

Disadvantage...the main disadvantage to **Option (1)** is the necessity for someone to periodically monitor and drain-off oil from the oil sump. This can be both time consuming and inconvenient, especially since the oil stripping process can take days or weeks to complete.

Option 2: Plumb the “**Oil Return Line**” as per “**Option (2)**” **Piping Instructions (see page 19)**. As determined by previous calculation, install sufficient containment capacity, **such as a single 50, 100, 200, etc., pound refrigerant recovery cylinder**, in the “**Oil Return**” line between the OAM Purger and the Chiller’s oil sump. The cylinder will retain and hold the excess oil as it is stripped from the refrigerant, preventing it from accumulating in the oil sump. **NOTE** that the rated capacity of a refrigerant recovery cylinder is for refrigerant which is heavier than oil, therefore a refrigerant recovery cylinder will not hold the same weight of Oil as the rated refrigerant capacity. **(See Figures 2 & 3 on page 22 which includes approximate oil holding capacities of various size refrigerant recovery cylinders.)** Once the stripping process is complete the cylinder and excess oil must be removed from the system.

Advantage...does not require periodic monitoring and draining of oil in order to maintain proper oil level in the oil sump. (Good practice is still to periodically monitor the accumulation of oil in the recovery cylinder in the event that there is more oil recovered than anticipated.)

Disadvantage...requires temporary installation of a containment vessel. Also, once the oil stripping process is complete and the excess oil is collected, the containment vessel must be removed from the system.

Use this chart to estimate the amount of excess oil in the Chiller's Refrigerant Charge. According to ASHRAE study 601-TRP, the Average Chiller has 12 % oil by weight in its Refrigerant Charge. A 500 lb. Refrigerant Charge at 12% by weight contains 60 lbs., or 8.5 gallons of oil.

CHILLER REFRIGERANT CHARGE BY WEIGHT IN lbs.												
	100	200	300	400	500	600	700	800	900	1000	1100	1200
% OIL	lbs. of Oil in Refrigerant Charge based on % by weight											
1%	1	2	3	4	5	6	7	8	9	10	11	12
2%	2	4	6	8	10	12	14	16	18	20	22	24
3%	3	6	9	12	15	18	21	24	27	30	33	36
4%	4	8	12	16	20	24	28	32	36	40	44	48
5%	5	10	15	20	25	30	35	40	45	50	55	60
6%	6	12	18	24	30	36	42	48	54	60	66	72
7%	7	14	21	28	35	42	49	56	63	70	77	84
8%	8	16	24	32	40	48	56	64	72	80	88	96
9%	9	18	27	36	45	54	63	72	81	90	99	108
10%	10	20	30	40	50	60	70	80	90	100	110	120
11%	11	22	33	44	55	66	77	88	99	110	121	132
12%	12	24	36	48	60	72	84	96	108	120	132	144
13%	13	26	39	52	65	78	91	104	117	130	143	156
14%	14	28	42	56	70	84	98	112	126	140	154	168
15%	15	30	45	60	75	90	105	120	135	150	165	180
16%	16	32	48	64	80	96	112	128	144	160	176	192
17%	17	34	51	68	85	102	119	136	153	170	187	204
18%	18	36	54	72	90	108	126	144	162	180	198	216
19%	19	38	57	76	95	114	133	152	171	190	209	228
20%	20	40	60	80	100	120	140	160	180	200	220	240
21%	21	42	63	84	105	126	147	168	189	210	231	252
22%	22	44	66	88	110	132	154	176	198	220	242	264
23%	23	46	69	92	115	138	161	184	207	230	253	276
24%	24	48	72	96	120	144	168	192	216	240	264	288
25%	25	50	75	100	125	150	175	200	225	250	275	300
OIL WEIGHS APPROXIMATELY 7 Lbs. PER GALLON												
60 Lbs = approximately 8.5 Gallons												

Chart 1. – Refrigerant-Oil Contamination Chart

OPTION 1 Oil Line Piping Instructions

1. From the Installation Kit select the appropriate Valve Adapter that fits the Chiller's oil charging valve. Depending on how the line is to be run, select either a straight (U1 -4B) or a 90 degree (E1-4B) brass ¼" NPT x ¼" flare fitting and install in the appropriate adapter side port. Then, using a ¼" NPT pipe plug from the Installation Kit, plug the unused side port.
2. Screw the Valve Adapter **permanently** onto the Chiller's oil charging valve. Select the mating flare cap and Copper Ferrule from the Installation Kit and install on the Adapter's larger access port.
3. Next run a ¼" copper line from the Valve Adapter fitting (*from the installation kit you will find a ¼" MPT Run [fitting with a Schrader valve] that **must be installed in the Adapter fitting.** It will be use later in the leak testing*) to the ¼" flare outlet fitting on the OAM Purger "Oil Return" Solenoid Valve (SOL-3). (See Figure 1, page 14.) **ALSO A (¼) INCH SWEAT CHECK VALVE (with a spring) (provided in the installation kit) MUST BE INSTALLED IN THE LINE NEAR THE ADAPTER FITTING YOU JUST INSTALLED ON THE CHILLER'S OIL CHARGING VALVE.** Make sure the flow direction arrow is pointing toward the oil sump.
4. **DO NOT** open the oil-charging valve at this time.

OPTION 2 Oil Line Piping Instructions

CAUTION: This method is intended to be a temporary arrangement only and should be replaced once the excess oil has been removed and the refrigerant is OIL FREE.

IMPORTANT

NOTICE: if you choose option 2 you should be aware that during the initial oil stripping process about 10 to 15% by weight of the oil accumulated in the temporary Collection Cylinder will be refrigerant. Therefore, because of this refrigerant and the volume of the oil recovered be prepared to add make-up refrigerant to the chiller once the initial stripping process is complete.

All of the refrigerant in the temporary Collection Cylinder may be recovered by applying a low wattage electric band heater to the recovery tank during the stripping process. It also helps to allow the tank to set with the heater energized for a day or two once the process is complete.

After the initial oil stripping process, and once the OAM Purger's oil return line is connected permanently to the chiller's oil sump, any refrigerant still entrained in the oil will be returned to the oil sump and be evaporated there.

1. **Option (2) Installation** is identical to **Option (1)** except you will **temporarily** install one, **and only one**, containment vessel in the oil return line. The size of the containment vessel (determined by previous calculation) should be of sufficient capacity to collect and hold **all excess oil**.

CAUTION: DO NOT connect multiple cylinders in series. The excess oil collection hook-up MUST be limited to a single cylinder: i.e., a single 50, 100, or 200 lb., etc. cylinder, and MUST not be filled to more than 80% of its rated capacity. NOTE that the rated capacity of a refrigerant recovery cylinder is for refrigerant which is heavier than oil, therefore a refrigerant recovery cylinder will not hold the same weight of Oil as the rated refrigerant capacity. (See Figures 2 & 3 on page 22 which indicates the approximate oil holding capacities of various size refrigerant recovery cylinders.)

2. Plumb the selected excess oil containment vessel in the Oil-Return line **precisely** as illustrated in **Figure 2 on page 22**. Remember to install the check valve (provided in the OAM Purger Installation Kit) in the oil return line between the containment vessel and the oil sump, **as shown in figure 2, on page 22**. The **check valve MUST** be installed it prevents back flow of oil from the oil sump into the oil containment vessel.

WARNING: Failure to install the Check Valve may result in oil draining from the oil sump into the temporary oil containment vessel, causing the Chiller to shut down because of low oil level.

WARNING: the OAM Purger will not function and also will not transfer oil to the oil containment vessel unless the vessel is properly connected to the Chiller's oil charging valve and the valve is open.

NOTE: *Unless the excess oil that is collected is intended for reuse later, DO NOT install the Oil Filter-Dryer at this time. Wait until the oil stripping process is finished before installing the Oil Filter-Dryer.*

CAUTION: Option (2) is intended only as a convenient method of dealing with excess oil. You MUST still occasionally monitor the oil sump for excessive oil accumulation since there may be more excess oil than anticipated. Refer to approximate oil holding capacities of the refrigerant recovery cylinders under Figure 2 on page 22.

NOTE: On initial start-up the OAM Purger Distillation Tank will accumulate and retain approximately 2 pounds of recovered oil. Therefore, depending upon the level of oil contamination, a number of cycles may be required before actual oil transfer to the Chiller oil sump begins.

3. Once all excess oil has been stripped from the Chiller's refrigerant, **remove the Temporary containment vessel (with excess oil).**

Using ¼" copper tubing, reconnect the OAM Purger to the Chiller's oil sump as per **Option 1 Piping Instructions**. Be sure to install the oil filter at this time.

DO NOT open valve at this time.

Properly dispose of the accumulated excess waste oil.

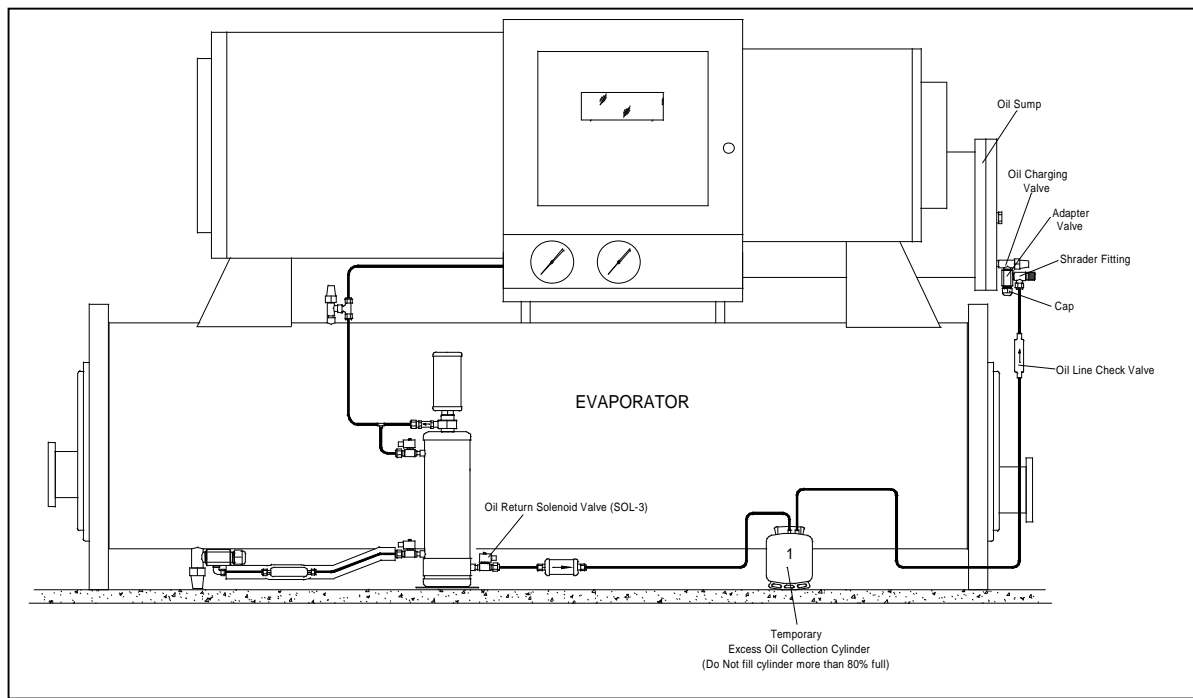


Figure 2. – CORRECT Optional Oil Collection Cylinder Hook-up

Approximate Oil holding capacities at 80% full of various size refrigerant recovery cylinders.

- 50 lb. Cylinder..... 23 pounds / 3.3 gallons
- 100 lb. Cylinder..... 46.4 pounds / 6.6 gallons
- 200 lb. Cylinder..... 92.8 pounds / 13.2 gallons

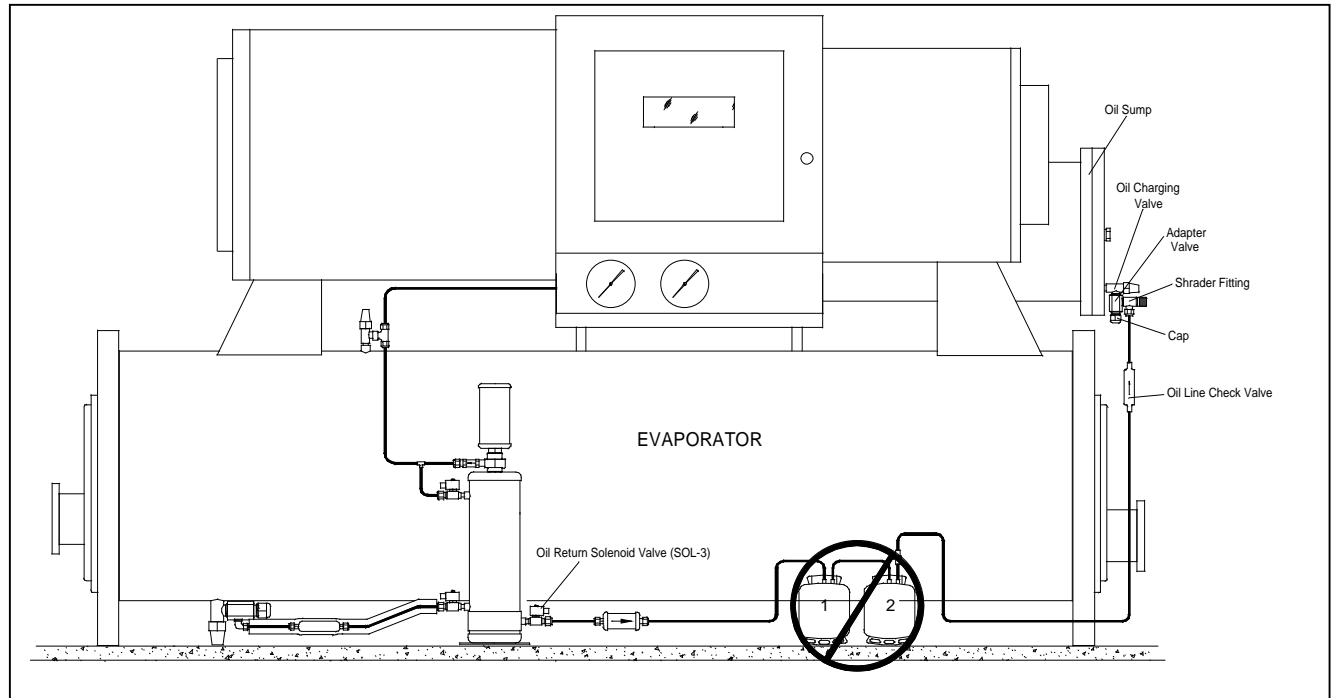


Figure 3. – WRONG Optional Oil Collection Cylinder Hook-up

Electrical Connection

WARNING: Be sure to open and lockout all electrical disconnects to prevent possible injury or death caused by electrical shock during installation

NOTE: Use Class 1, 14 AWG copper wire and metal conduit. All field installed wiring must comply with applicable NEC and local electrical codes.

Power Requirement

The OAM Purger requires one power connection to the Chiller's fused control panel. The electrical requirement is:

120 VAC, 50/60 Hz, 1-Phase 15 Amp Fused Circuit.

Actual current draw approximately 4 amps.

Optional “Chiller Run” Signal

The OAM Purger Logic Board is provided with an optional **“Chiller Run” Signal** input terminal designated as **“IN6”**. In most instances it will not be necessary to provide a Chiller Run Signal to the OAM Purger. However, the option is available should there be a need.

When the Chiller “Run Signal” option (activation of which requires turning ON dip switch 6 of SW1, see Figure 6 page 33) is used the OAM Purger will be active **only while the Chiller is running** (while purger receives a Chiller run signal). When the Chiller shuts down the OAM Purger will suspend operation. OAM Purger operation resumes when the Chiller re-starts.

If you think you have an application requiring use of the Chiller “Run Signal” option proceed with installation as follows:

1. Connect a Chiller Run Signal” from an appropriate 120 VAC source in the Chiller control panel to **input “IN-6”** on the OAM Purger Logic Board **and turn ON dip switch 6 on SW1**, see Figure 6, page 33, for Switch **SW1 Dip switch 6** location (See Wiring Diagram Fig. 8, Page 46, and Fig. 6, page 33, Logic Board for “input 6” terminal location.)
2. Now you **Must connect a neutral** for the “Run Signal” **from the Chiller control circuit** to the terminal **J22** on the OAM control Logic Board, (See Wiring Diagram Fig. 8, Page 46, and Fig. 6, page 33, Logic Board for J22 terminal location.)

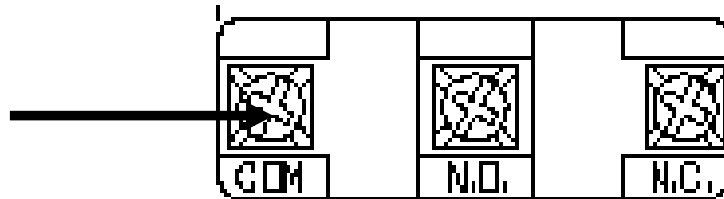
Connecting Power to Purger

The picture to the right shows how to make electrical connections to Terminal Block TB-1. Strip 5/16" of the insulation on each wire. Insert the tool provided with the Installation Kit (or a small screwdriver) into the space above the place you are going to insert the stripped wire. Slightly pry the tool or screwdriver toward the center of the block until you hear a click. This opens the spring clip where the wire is to be inserted. Insert the wire, and then remove the screwdriver. The wire should be held in place. Test by pulling on wire to make sure connection is firm.

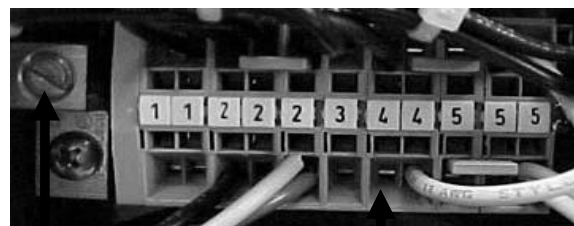


1. Connect the Line voltage wire to the Common terminal of the Pressure Disconnect switch.

(High) Pressure Disconnect
Switch Common Terminal



2. Connect the Neutral lead to Terminal-4 slot of TB-1
3. Connect the **Ground wire** to the ground lug.



Ground Lug

Neutral

**Figure 4. –
Electrical Control
Box Field Wiring**

INITIAL START-UP

WARNING: Before starting the OAM Purger for the first time be sure you have considered how you will be handling the excess oil that will be removed. You have two options: see Oil Return Line installation instructions starting on page 16. Removal of excess purged oil from system is essential.

WARNING: THE CHILLER'S OIL SUMP HEATER MUST BE ON, ANYTIME THE OAM PURGER IS ON. Should the chiller's oil sump heater be off for any reason the OAM Purger must be off.

STARTUP PROCEDURE

NOTE: Even though each OAM Purger Unit is completely leak tested at the factory before shipment, it is possible for a fitting or line, etc. to become loosened during shipment. It is absolutely imperative that there be **NO LEAKS** anywhere in the OAM Purger system. A leak can either result in air entering the Chiller, or the **loss of refrigerant**. (Instructions on how to locate the leak testing procedure that must be followed is described in step 3 below.)

WARNING! *It may be necessary to add refrigerant to the system during the initial oil stripping process. Every pound of oil removed from the refrigerant is equivalent to a volumetric reduction of two (2) pounds of refrigerant from the system. Therefore when significant quantities of oil are removed from the system it may be necessary to compensate for this volumetric loss by adding refrigerant. If the refrigerant level in the evaporator is not at least 2 inches" above the inlet FILL port nuisance OAM Purger faults may result.*

1. Check **all** fittings and piping connection to make absolutely sure all are tight.
2. Verify that the **E-Z Change Filter** on top of the Purge Distillation Tank is tight.
3. **THE OAM PURGER MUST BE LEAK TESTED.**
See page 39 for OAM purger leak test procedure on a chiller using **LOW pressure refrigerants.**
See page 40 for OAM purger leak test procedure on a chiller using **HIGH pressure refrigerants.**
4. **WHEN YOU HAVE COMPLETED THE LEAK TESTING PROCEDURE** proceed to step 5.

5. The **D1 Green LED** indicator (see **Figure 6, page 33**) should now be **blinking**, indicating the purger is in Fill Phase and the Distillation Tank is being filled by gravity with oil laden refrigerant from the Chiller. **Filling of the distillation tank can be observed by viewing the three (3) sight glasses on the right side of the OAM distillation tank.**

After **75 minutes**, (**OR if the Liquid Level High sensor senses a level indicating that the tank has filled with an appropriate amount of oil laden refrigerant**) the **D1 Green LED** indicator will de-energize and **D2 Green LED** indicator will energize and blink, indicating the purger is in the **Distillation Phase**.

After the distillation cycle (approximately 1 ½ to 2¼ hours) the **Oil return phase** will begin, it is a timed 6 minutes period. The **D3 Green LED** should begin blinking. This is good indication that the Purger is functioning properly. After about a day of operation, either the oil level in the oil sump should begin rising or the temporary collection cylinder should begin **accumulating oil**. **The oil removal rate will depend on several things: the percentage of oil in the Chiller's refrigerant charge, the amount of refrigerant processed in each cycle, and the location from which the refrigerant was removed from the Chiller.**

6. Initial **start-up is now complete**.

7. Replace Control Box Cover.

NOTE: The OAM Purger can remove several gallons of oil per day from a Chiller during the initial first few days of operation, when properly installed and with a refrigerant charge that has a high percentage of oil, then gradually decrease in amount day by day until all oil is eventually removed from the Chiller's refrigerant.

DESCRIPTION OF OAM PURGER COMPONENTS

(See Figure 5, page 31, Figure 6, page 33 and Figure 7, pages 34 and 35.)

250 PSIG Pressure Cut-Out Switch (HPC-1)

High Pressure Cut Out Switch (HPC-1) turns OAM Purger off when pressure reaches 250 psi.

Distillation Heater

The Distillation Heater is a 350 watt flexible band heater attached around the bottom of the Distillation Tank and supplies the heat to distill the liquid refrigerant from the oil. The heater temperature is regulated by Temperature Sensor (TS-1) to a maximum of **155 degrees F**.

Distillation Tank

The Distillation Tank is where the **refrigerant is distilled and separated from the oil by heat**.

Electrical Control Box

The Electrical Control Box contains the Solid State Logic Board, Temperature Sensor (TS-1) and terminal strip and the 250 PSIG Pressure Cut Out Switch (HPC-1). On top of the Control Box are the ON-OFF lighted rocker switch and the Red "FAULT" light..

EZ-Change "High Moisture Capacity" Filter-Dryer

The EZ-Change Filter-Dryer is an integral part of the OAM Purger. Its function is to remove **acids** and **moisture** from the vaporized refrigerant on its return to the Chiller evaporator. The EZ-Change Filter-Dryer is connected to the OAM Purger Distillation Tank via a "**Quick-Connect**" coupler with **automatic flow shut-off**. This permits **quick and easy** replacement of the EZ-Change Filter-Dryer **without the necessity of shutting down either the Chiller or the OAM Purger**.

Fill Solenoid Valve (SOL-1)

The Fill Solenoid valve (SOL-1) controls the filling of the oil laden liquid refrigerant from the Chillers Evaporator.

Oil Transfer Solenoid Valve (SOL-3)

Oil Transfer Solenoid Valve (SOL-3) controls the transfer of distilled oil from the Distillation Tank to the Chiller's oil sump.

Oil Return Check Valve (CK-1)

The oil return check valve **prevents inadvertent back-flow of oil from the Chiller's oil sump** into the OAM Purger Distillation Tank.

Oil Return Filter "High Acid Capacity"

The High Acid Capacity oil filter removes acids from the distilled oil as it passes from the Distillation Tank to the Chiller's oil sump.

Power Switch (PS-1)

Power Switch (PS-1) **controls input power** to the purger control circuit and illuminates when switched ON. The switch **also** functions as the unit **FAULT RESET** switch.

Pressure Equalization Check Valve (CK-2)

The Pressure Equalization Check Valve maintains 10 psid between the OAM tank and the chiller evaporator during the distillation phase in order to maintain sufficient pressure differential to push accumulated oil to the oil sump during the oil transfer phase.

Pressure Equalization Solenoid Valve (SOL-2)

During the Fill Phase Pressure Equalization Solenoid Valve (SOL-2) is energized (opened) to allow the pressures in the Distillation Tank and the Chiller evaporator to equalize. Once the pressures are equalized, the liquid refrigerant levels in the two vessels are free to **seek a common level by gravity, thus allowing filling**.

Safety Relief Valve (SRV-1)

300 PSI Atmospheric Pressure Relief Valve protects OAM Purger from over pressurization.

Temperature Sensor (TS-1)

Temperature Sensor (TS-1) controls the Distillation Heater and limits oil temperature in the Distillation Tank to **155 degrees F**.

Terminal Block (TB-1)

Terminal Block (TB-1) is used for convenient termination of unit wiring.

Solid State Logic Board –Switches SW1 and SW2 – & – Relays

(See Fig. 6, Page 33 for further information.)

Switches (SW1) & (SW2) During normal operation All Dip Switches on SW1 & SW2 of the Logic Board MUST be in the off position. During diagnostics and leak testing procedures certain Dip Switches on Switch SW2 are placed in the on position. (See Fig. 6, page 33.)

Relay RLY-1 Controls the Fill Solenoid (SOL-1).

Relay RLY-2 Controls Equalization Solenoid (SOL-2).

Relay RLY-3 Controls Oil Transfer Solenoid (SOL-3).

Relay RLY-4 Controls the Distillation Heater via Temperature Sensor (TS-1).

Relay RLY-5 Is a SPDT relay dedicated to Purge Fault indication. It can be utilized for remote purge fault indication.

Relay RLY-6 Is not used.

WARNING: During normal operation! All Dip Switches of SW1 & SW2 must be set to the OFF position or the unit will not function correctly. Certain SW2 dip switches are used, but generally only during the leak testing procedures, or diagnostic procedures. See Using SW2 as diagnostic aid (page 42) and Using SW2 during Leak Testing, (page 39).

Safety Features

Safety # 1 guarding against over pressurization.

A 250 psi High Pressure Cut Out Switch turns OAM Purger off when pressure reaches 250 psi to prevent Safety relief pressure valve from activating at 300 psi.

Safety # 2 guarding against over pressurization.

A **300 PSI Atmospheric Pressure Relief Valve** is provided on the OAM Purger Distillation Tank to protect against over-pressurization.

Safety guarding against inadvertent closing of any Isolation Valve(s).

If any of the Chiller's Isolation Valves to which the OAM Purger is connected are closed, the OAM Purger will go into a fault condition to protect the Chiller and the OAM Purger. The OAM Purger will remain in the fault condition until power is removed and then reapplied.

Safety preventing transfer of un-distilled refrigerant into Chiller's oil sump.

The OAM Purger is designed so that if the Oil Transfer Solenoid (SOL-3) fails in the open position, the OAM Purger will not transfer refrigerant into the oil sump.

Safety guarding against Fill Solenoid (SOL-1) failing in the open, or closed position.

The OAM Purger is programmed to determine if the Fill Solenoid Valve (SOL -1) fails in the open or closed position. If either occurs, the OAM Purger will go into a fault condition to protect the Chiller and the OAM Purger. The OAM Purger will remain in the fault condition until power is removed and then reapplied.

Safety guarding against Equalization Solenoid (SOL-2) failing in the open, or closed position.

The OAM Purger is programmed to determine if the equalization solenoid (SOL -2) fails in the open or closed position. If either occurs, the OAM Purger will go into a fault condition to protect the Chiller and the OAM Purger. The OAM Purger will remain in the fault condition until power is removed and then reapplied.

Safety guarding against the oil transfer Solenoid (SOL-3) failing in the open position.

The OAM Purger is programmed to determine if the oil transfer Solenoid (SOL -3) fails in the open position. If this occurs, the OAM Purger will go into a fault condition to protect the Chiller and the OAM Purger. The OAM Purger will remain in the fault condition until power is removed and then reapplied.

Safety guarding Against Temperature Sensor (TS-1) failing.

The OAM Purger is programmed to determine if the Temperature Sensor (TS-1) fails. If this occurs, the OAM Purger will go into a fault condition to protect the Chiller and the OAM Purger. The OAM Purger will remain in the fault condition until power is removed and then reapplied.

Safety guarding against Solid State Logic Board Relays sticking or not making.

The OAM Purger is programmed to determine if the Relays on the Solid State Logic Board are either welded shut or if they fail to make. If this occurs, the OAM Purger will go into a fault condition to protect the Chiller and the OAM Purger. The OAM Purger will remain in the fault condition until power is removed and then reapplied.

Safety guarding against the heater failing in, ON position, or OFF position.

If the Heater fails in the ON position, or if the Heater does not work, the OAM Purger will go into a fault condition to protect the Chiller and the OAM Purger. The OAM Purger will remain in the fault condition until power is removed and then reapplied.

Electrical Control Box

The Electrical Control Box contains the Solid State Logic Board, Temperature Sensor (TS-1) and terminal strip and the 250 PSIG Pressure Cut Out Switch (HPC-1). On top of the Control Box are the ON-OFF lighted rocker switch and the Red "FAULT" light.

Terminal Block (TB-1)

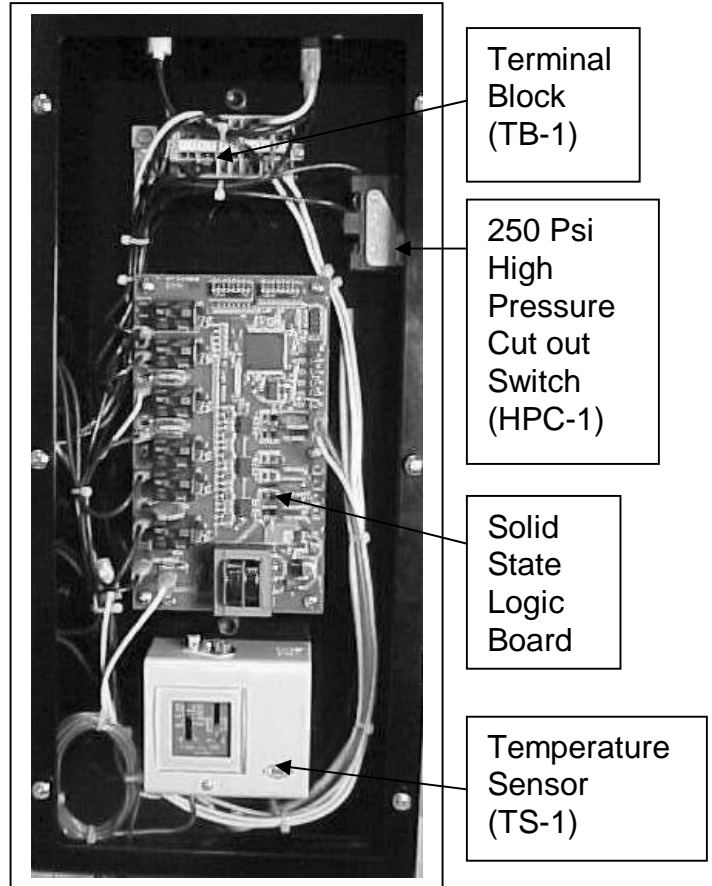
Terminal Block (TB-1) is used for control wiring and for providing convenient termination for unit power wiring.

Temperature Sensor (TS-1)

Temperature Sensor (TS-1) controls the Distillation Heater and limits oil temperature in the Distillation Tank to **155 degrees F.**

250 PSIG Pressure Cut Out Switch (HPC-1)

High Pressure Cut Out Switch terminates OAM Purger operation when pressure in the OAM Purger Distillation Tank exceeds 250 Psi. Used to protect the OAM Purger and the Chiller from over pressurization.



**Figure 5. –
Major Components
Electrical Box**

Logic Board Relays and Dip Switches

(See Figure 6, on page 33)

Relay RLY-1

Controls the Fill Solenoid Valve (**SOL-1**)

Relay RLY-2

Controls Equalization Solenoid Valve (**SOL-2**).

Relay RLY-3

Controls Oil Transfer Solenoid Valve (**SOL-3**).

Relay RLY-4

Controls the Distillation Heater via Temperature Sensor (**TS-1**).

Relay RLY-5

A SPDT relay dedicated to Purge Fault indication. It can also be utilized for remote indication.

Relay RLY-6

Not used.

Switches (SW1) & (SW2) (dip switches)

Switches (SW1) & (SW2) During normal operation All Dip Switches on SW1 & SW2 of the Logic Board **MUST** be in the off position. During diagnostics and leak testing procedures certain Dip Switches on Switch SW2 are placed in the on position. (See Fig. 6, page 33.)

WARNING: During normal operation All Dip Switches of SW1 & SW2 must be set to the OFF position, or the unit will not function correctly. Certain SW2 dip switches are used, but generally only during the leak testing procedures, or for diagnostic aids. See using SW2 as diagnostic aid (page 42) and using SW2 during Leak Testing, (page 39).

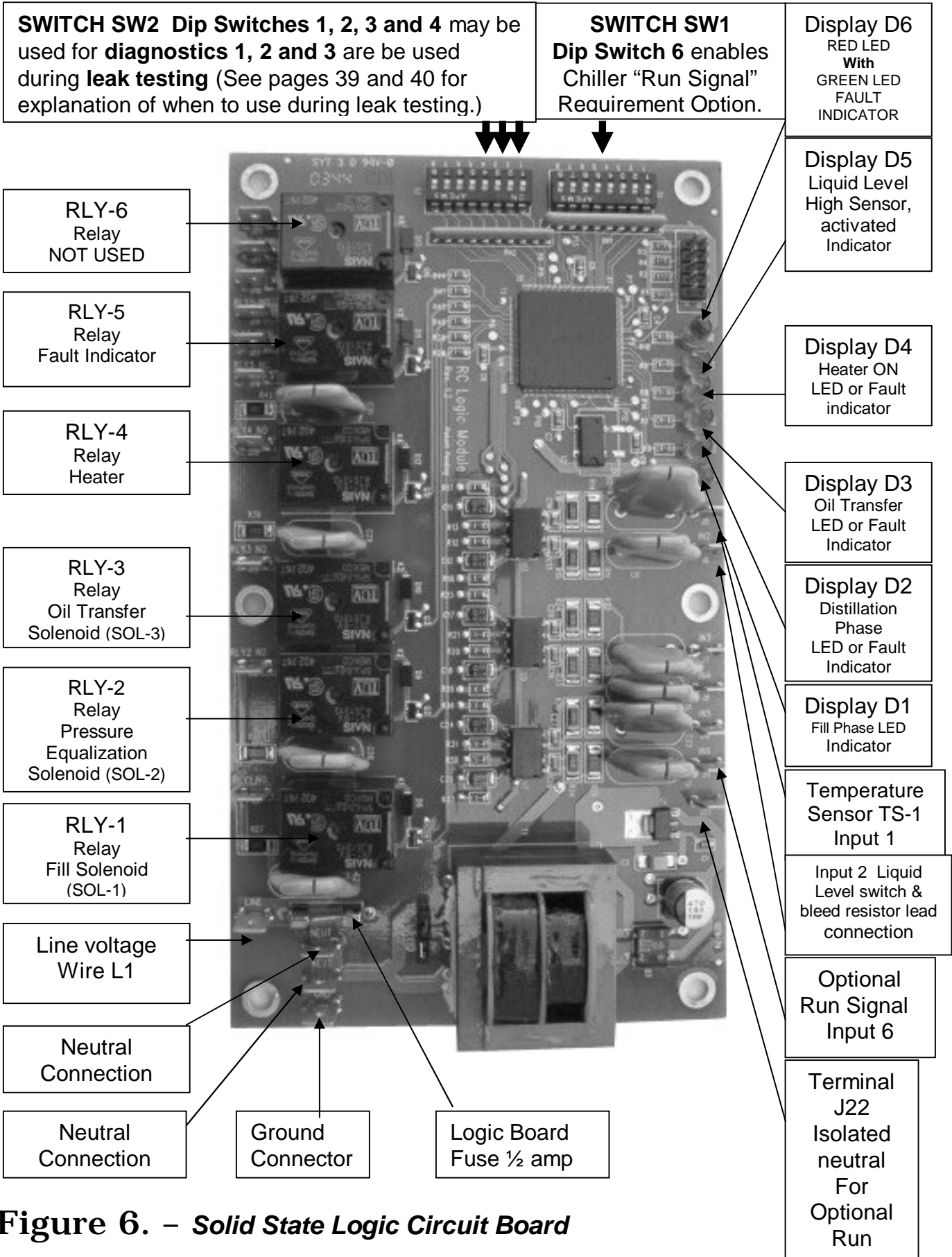
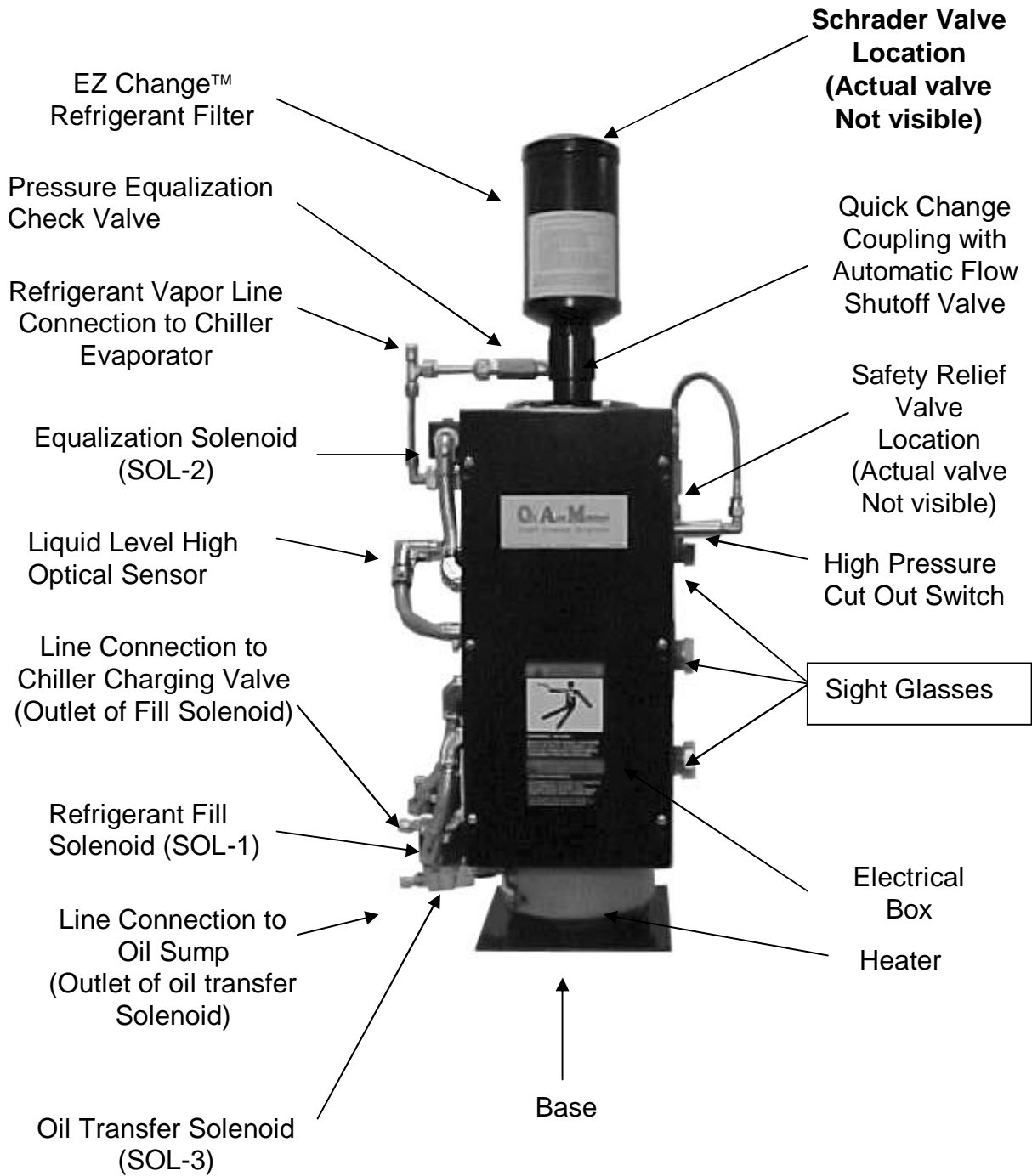


Figure 6. – Solid State Logic Circuit Board



**Figure 7. – Major Components of OAM Purger
(Also See Next Page)**

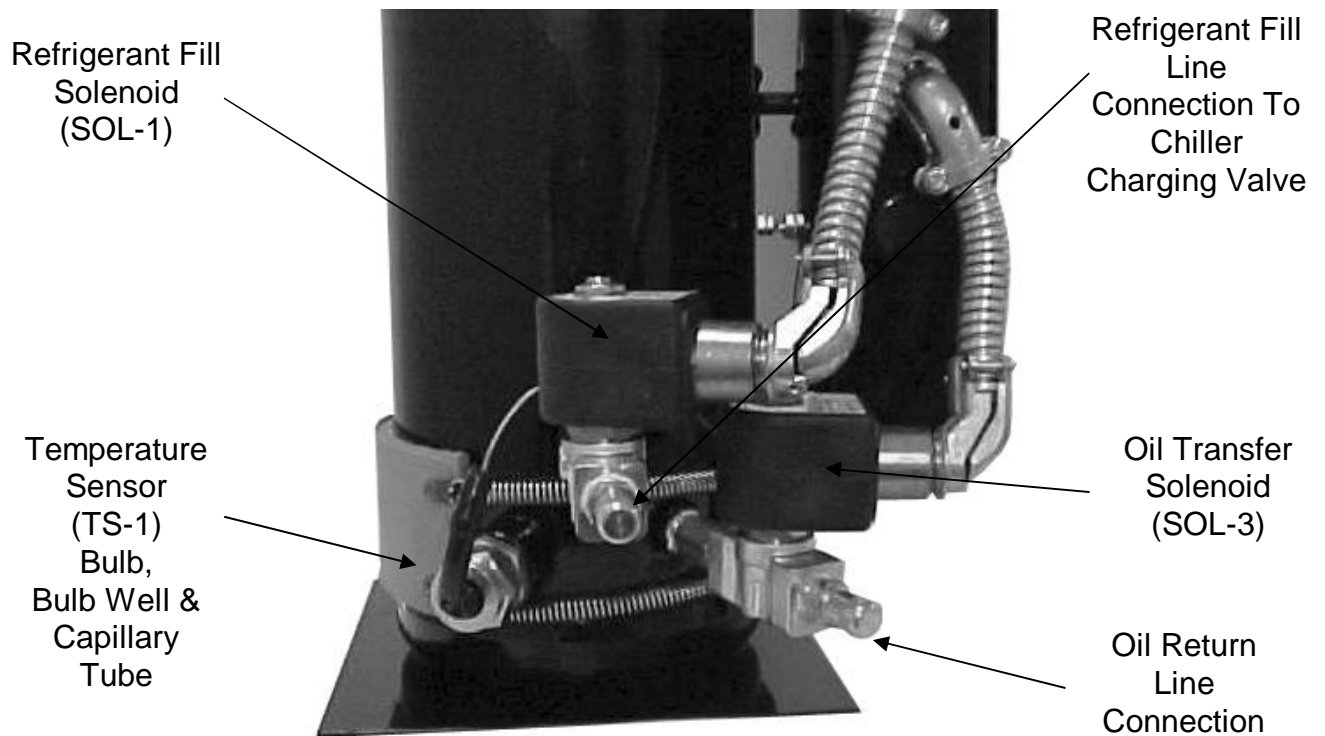
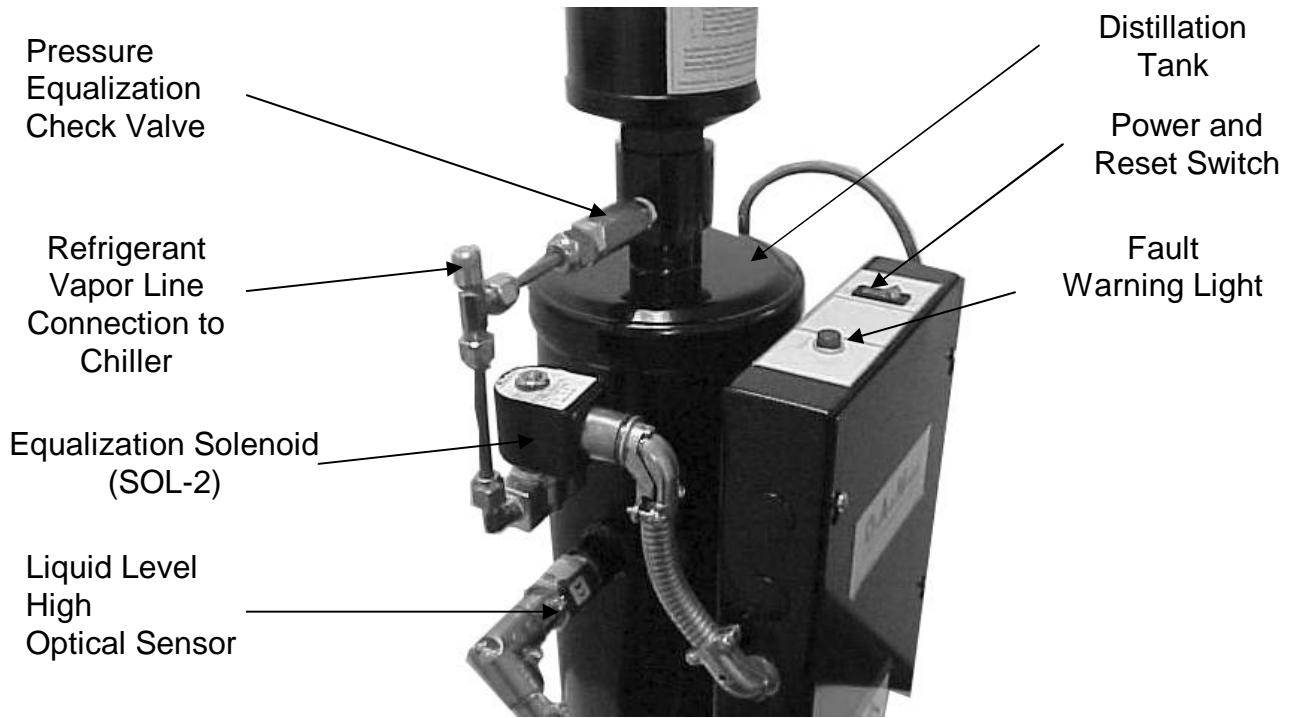


Figure 7. – (continued) Major Components of OAM Purger

MAINTENANCE

This section discusses the OAM Purger system maintenance requirements and procedures, electrical wiring diagram, basic OAM Purger troubleshooting procedures and leak testing procedure.

The following maintenance procedures are required to assure efficient and reliable operation of the OAM Purger.

WARNING: Certain servicing procedures may expose you to harmful materials and dangerous conditions. To minimize the possibility of injury, follow safety procedures and instructions described in this manual, on product labels and provided in material safety data sheets.

EZ Change Refrigerant Filter Dryer Replacement Instructions

Most centrifugal Chillers have no means for removal of harmful oil, moisture and acids from the refrigerant. Typically, oil, moisture and acids are allowed to accumulate in the refrigerant until a refrigerant analysis indicates they have reached dangerous levels and it is time to do something about them. Usually this means either replacing the entire refrigerant charge or removing the charge and distilling it back into the Chiller. Leaving moisture, acid and oil in the Chiller's refrigerant charge not only subjects the Chiller to **unnecessary harmful conditions**, it is not a very cost-effective way to maintain a centrifugal Chiller.

The purpose of the OAM Purger is not just to **remove oil** from the Chiller's refrigerant. It removes **moisture** and **acids** as well. In fact, the OAM Purger is the most effective means, **if not the only means**, of continually purging **harmful moisture and acids** from a centrifugal Chiller.

The OAM Purger will continue removing oil from the refrigerant after the filter-dryer is saturated. However, the OAM Purger can **only** remove **moisture** and **acids** as long as the **EZ Change filter-dryer is fresh and active**.

The EZ Change Refrigerant Filter-Drier should be changed about every three months. A place has been provided on the filter-dryer label to record the date the filter-dryer was installed.

Although three months may seem like a short time, you must remember that the OAM Purger processes approximately between 850 and 1250 pounds of liquid refrigerant per week. This means that during each three month period the OAM Purger will have processed (**removed moisture and acids**) from between **10,000 to 15,000 pounds** of refrigerant.

The OAM Purger incorporates an integral self-sealing ball-check valve between the

filter-dryer and the Purger Distillation Tank. When the filter-dryer is unscrewed and removed, the ball-check valve closes off the flow path from the distillation tank preventing either refrigerant from escaping or air from being drawn in.

The EZ Change Filter-Dryer requires much less time for change-out than a typical in-line filter-dryer.

NOTE: *Although the OAM Purger unit self-seals when the EZ Change Filter-Dryer is removed, a small amount (de minimus) of pressure release from dryer canister should be anticipated when removing.*

Steps for Changing EZ Change Filter-Dryer

1. Turn unit power switch to “OFF” position.
2. Using appropriate wrenches, loosen filter dryer.
3. **SLOWLY** unscrew and remove spent filter dryer.
4. Immediately install new filter dryer. (Use small amount of O-ring lubricant on each O-ring.)
5. Using wrenches, gently tighten. DO NOT over-tighten.
6. Turn unit power switch back to “ON” position.



WARNING: Always complete filter change-out. Never leave OAM Purger Unit unattended with filter port open. Unit WILL NOT function with filter dryer removed.

NOTE: *Upon power-up, the OAM Purger will always initiate operation in a Fill Phase of the operating cycle.*

Periodic Maintenance

Quarterly

1. **Replace the EZ Change Refrigerant Filter Dryer.**
2. Visually inspect the Purger.

Annually

1. Replace the EZ Change Filter-Dryer if due (see last replacement date indicated on label).
2. Replace the **High Acid Capacity** Oil Filter. The oil filter also has a place on the label to record the replacement date. It is essential that the Oil Filter be replaced at least once a year. However, semi-annual replacement is preferred.
3. Visually inspect the Purger.



High Acid Capacity
Oil Filter

Control Calibration

Temperature Sensor TS-1

General instructions on maintenance and adjustments.

Avoid sharp bends or kinks in the capillary tube.

Do not allow capillary tube to rub and abrade against any moving surface. Avoid constant bending of the tubing to avoid work hardening effects.

The readings on the temperature sensor are a guide only. A separate thermometer must be used for exact adjustment of the set points. The temperature sensor in your OAM Purger came adjusted by use of a separate thermometer. The setting as it appears on the temperature sensor may not exactly correspond to the actual set point of 155 degrees F.

1. Use a flat screwdriver or a ¼" refrigeration (square) wrench to adjust set points.
2. Adjust the upper set point using the range spindle (the spindle to the left as you look at it).
3. Adjust the lower set point by turning the differential spindle (the spindle to the right as you look at it).

UPPER SET POINT (minus) DIFFERENTIAL (equals) LOWER SET POINT

LEAK TESTING PROCEDURES

DIP Switch SW2 switches 1, 2 and 3 must be ON during leak testing procedure. (See Fig. 6, page 33 for location of Switch SW2.)

WARNING: During the leak testing procedure ALL VALVES supplying the OAM PURGER MUST BE CLOSED.

Switching SW2's Dip switches 1, 2 and 3 ON opens all the OAM Purger's solenoid valves so their respective lines can be tested for leaks.

1. **Dip Switch 1 ON**...energizes **Fill Solenoid (SOL-1)** and opens OAM Purger tank and line up to the Chiller Charging Valve. (Green D1 LED on solid.)
2. **Dip Switch 2 ON**...energizes **Equalization Solenoid (SOL-2)** and opens OAM Purger tank and line up to the Evaporator Valve. (Green D2 LED on solid.)
3. **Dip Switch 3 ON**...energizes **Oil Return Solenoid (SOL-3)** and opens OAM Purger tank and line up to the Oil Sump valve. (Green D3 LED on solid.)

WARNING: Be sure DIP Switches 1, 2 and 3 on SW2 are returned to the OFF position when finished with the leak test. If either of these DIP Switches are left in the ON position, the OAM Purger will not function properly. (See Fig. 6, page 33 for location of Switch SW2.)

Leak Testing OAM Purger when installed on Chillers using LOW PRESSURE REFRIGERANTS.

(See page 40 for leak test procedure on chillers using High pressure refrigerants.)

ALL chiller valves to OAM Purger MUST remain CLOSED during this procedure unless.

To properly leak test the entire OAM Purge system you will have to pressurize the OAM Purger Unit including all fittings and piping connections up to the Chiller's Valves.

- 1) Remove control box cover and flip DIP-switches 1, 2 and 3 on SW2 to the **ON position** (See Figure 6, page 33 for location of SW2 and Dip Switches 1, 2 and 3). This will energize all three Purger Unit solenoid valves allowing interconnecting lines to chiller to be pressurize.
- 2) Connect a pressure source, such as nitrogen, to the schrader port on the top of the Purger Filter Drier. (See Figure 7, page 34 for location.)
- 3) Pressurize OAM Purger to approximately 40 psig.

- 4) Turn OAM Power Switch to **ON**.
- 5) Leak test entire OAM Purger system.
- 6) Repair any leaks.
- 7) Once the leak test procedure is complete, bleed off test pressure and evacuate entire OAM Purge system. **Because of the various check valves in the OAM system the only way the entire system can be evacuated is by connecting the vacuum pump to the oil charging valve adapter schrader valve.**
- 8) Once evacuation is complete, turn Unit Power Switch OFF.
- 9) Flip SW2 DIP switches 1, 2 and 3 back to the **OFF** position.
- 10) **OPEN all Chiller Valves to OAM Purger.**
- 11) Turn OAM Purger Power Switch back to the **ON** position. The OAM Purger is now in operation.

NOTE: Any time power is applied or re-applied to the OAM, (after a 5 second delay, indicated by 5 green blinking LEDs) **the OAM Purger always starts in a Fill Phase.** After the 5 second programmed delay the D1 green LED should begin flashing.

Leak Testing OAM Purger when installed on Chillers using HIGH PRESSURE REFRIGERANTS.

(See page 39 for leak test procedure on chillers using Low pressure refrigerants.)

ALL chiller valves to OAM Purger MUST remain CLOSED during this procedure EXCEPT when otherwise instructed as part this procedure.

1. Connect refrigeration manifold gauge to the ¼" schrader valve. *(See Figure 7, page 34.)*
2. With power to OAM Purger **OFF** remove cover from control panel. On the solid-state logic control board locate **DIP-Switch SW2.** *(See Figure 6, page 33 for dip-switch SW2 location.)* Flip switches **1, 2** and **3** to the **ON** position. This will energize all three OAM Purger solenoid valves when power is applied.
3. Replace control panel cover and turn power switch **ON**. Solenoid **valves (SOL-1), (SOL-2) and (SOL-3) should now be energized.**
4. Now, while monitoring the refrigeration gauge, **slowly and carefully** crack open the refrigerant "**FILL**" Line valve on the chiller and allow chiller pressure to pressurize the OAM system to approximately 40 psig and **re-close valve.** The entire purge system including the **FILL line, Vapor Return line, Oil Return line (and the temporary oil recovery cylinder if installed) will be pressurized.**

5. Using appropriate leak-testing method, leak test entire OAM System including all interconnecting lines, fittings, etc. Fix and repair any leaks.
6. Once you are certain there are **NO leaks**, turn OFF power and **flip Dip switches 1, 2 and 3 back to the OFF position.**
7. **RE-OPEN ALL CHILLER VALVES.**
8. Turn power **ON**. The OAM Purger is now in operation.

OAM Purger Evacuation Procedure

ALL chiller valves to OAM Purger MUST remain CLOSED during this procedure EXCEPT when otherwise instructed as part this procedure.

1. Due to system check valves the only way the entire OAM System can be completely evacuated is by connecting the vacuum pump to oil sump valve adapter schrader valve. (see figure 1 page 14 for location).
2. Flip Dip switches **1, 2** and **3** on SW2 to the **ON** position.
3. Turn power ON to OAM and evacuate.
4. Once evacuation is complete close valve on gauge manifold set and remove vacuum pump. Leave manifold gauges **closed** and connected to oil return schrader valve.
5. Again, while monitoring the refrigeration gauge, slowly and carefully crack open the refrigerant "**FILL**" **Line** valve on the chiller and allow chiller pressure to pressurize the OAM system to approximately $\frac{1}{2}$ **psig**.
6. Now, disconnect refrigeration gauges and cap the schrader valve.
7. Turn OAM Power Switch **OFF** and flip switch SW2's dip switches **1, 2 and 3 to the OFF position.**
8. **RE-OPEN all three (3) chiller valves to the OAM Purger.**
9. Turn OAM Power Switch to ON position. The power switch "Green" indicator light should now be energized. The OAM Purger is now in operation.

NOTE: Any time power is applied or re-applied to the OAM, (after a 5 second delay, indicated by 5 green blinking LEDs) **the OAM Purger always starts in a Fill Phase**. After the 5 second programmed delay the D1 green LED should begin flashing.

TROUBLE SHOOTING

Should an operational difficulty or malfunction occur, the diagnostic chart and checkout procedures on the following pages should help to quickly determine the cause and corrective action. The Troubleshooting Chart has a "Symptom" column which describes what the unit is doing; a "Possible Cause" column which identifies possible sources of the problem; and a "Solution" column which describes what must be done to correct the problem.

NOTE: Should the OAM Purger shut down on a **FAULT** condition, DO NOT POWER OFF THE PURGER until you have first removed its electrical panel cover and recorded the status of the green indicator LED's D1 through D5 located on the Logic Board. Knowing the particular LED(s) that are lighted will help you diagnose the cause of the problem. Once the unit is powered off, this information will be lost. Retain the record of the LED readings. Examine the purger for any apparent problems, check the troubleshooting section for possible causes of the fault. Check to see if all appropriate Dip Switches on SW1 & SW2 are off (see pages 33, 39 & 42), then if there is no apparent problem, reset power. See if the fault repeats.

Using Switch SW2 Dip Switches as a diagnostic aid

Switch SW2 Dip Switches can be used to activate the solenoid valves and distillation heater for various procedures. This can be very helpful when diagnosing and or correcting certain operational problems. By switching the appropriate DIP Switch to the **ON** position, the corresponding valve or heater will energize.

1. **SW2** switching **Dip Switch 1 ON**.....energizes **Fill Solenoid (SOL-1), Green D1 LED** will be on **solid**.
2. **SW2** switching **Dip Switch 2 ON**.....energizes **Equalization Solenoid (SOL-2), Green D2 LED** will be on **solid**.
3. **SW2** switching **Dip Switch 3 ON**..... energizes **Oil Return Solenoid (SOL-3), Green D3 LED** will be on solid.
4. **SW2** switching **Dip Switch 4 ON**.....energizes the **Distillation Heater** and the **Green D4 LED** will be on **solid**.

WARNING: Be sure DIP Switches, 1, 2, 3 and 4 on Switch SW2 are returned to the OFF position when finished. If any of these DIP Switches are left in the ON position, the OAM Purger will not function properly. (See Fig. 6, page 33 for location of Switch SW2.)

Trouble-shooting Chart

Symptom	Possible Cause	Solution
Power switch ON but switch Light is Off.	Main power to unit Off. Switch light defective.	Restore main power. Replace Switch.
Power switch ON and lighted but Logic Board LED's are all OFF.	Logic Board fuse blown. Logic Board defective.	Replace fuse. Replace Logic Board.
D5 green LED flashing	Chiller Run Signal requirement enabled and no Run signal received	Restore chiller Run Signal
Fault Red LED D6 flashing Green LED D1 ON solid.	Indicates distillation tank temperature did not drop below 155 degrees F during the first 20 minutes of the fill phase.	Distillation heater stuck on. RLY-1 contacts stuck. Replace Logic Board. Temperature Sensor TS-1 defective. Replace sensor. Chiller's charging valve closed. Open valve. Oil Return Solenoid Valve SOL-2 defective and the purger still has hot oil in it. Replace solenoid coil or valve. Check if Oil sump valve is closed. Check RLY-4 relay, if defective, Replace Logic Board. Refer to "Distillation Tank will not fill" Symptom troubleshooting chart.
Fault Red LED D6 flashing Green LED D2 ON solid.	Indicates distillation temperature failed to reach 155 Degrees F within 6 hours after starting Primary Distillation Phase.	Distillation heater defective. Replace heater (see Maintenance Using Switch SW2 dip switch 4 as a diagnostic aid See page 42). Heater relay RLY-4 on Logic Board defective. Replace Logic Board. Temperature Sensor TS-1 defective. Replace Sensor. Fill Solenoid valve (SOL-1) fails open or shut. Replace valve
Fault Red LED D6 flashing Green LED D3 ON solid.	Indicates the purger Logic Board detected that the Purger has gone through 12 purging cycles and reached programmed distillation temperature too soon, indicating the OAM Purger is not filling properly. Refer to "Distillation Tank will not fill" Symptom below in troubleshooting section. Dip Switches on Switches SW1 or SW2 may be set improperly.	Refer to "Distillation Tank will not fill" Symptom below in troubleshooting section. Verify that all dip switches on SW1 and SW2 are in the OFF position. Pay particular attention to SW2 dip switches 6 and 8 and make sure they are definitely OFF (sometimes they may appear to be off but not actually be off (See pages 33, 39 & 42 for SW1 and SW2 information.)

Trouble-shooting Chart (continued)

Symptom	Possible Cause	Solution
<p>Fault</p> <p>Red LED D6 flashing</p> <p>Green LED D4 ON solid.</p>	<p>Indicates the Logic Board sees a signal from the Liquid Level High Sensor for longer than 2 hours straight.</p>	<p>Check the Liquid Level Sensor for defect. See pages 46 & 47 for test procedure</p> <p>Check Logic Board for loose connection to INPUT 2</p> <p>Logic Board may be defective, Replace logic board</p> <p>Bleed resistor wire lead between IN2 and Neutral on logic board may be defective or disconnected</p>
<p>Distillation Tank will not fill.</p>	<p>Chiller's refrigerant charging valve closed or obstructed.</p> <p>Vapor return line stop valve closed.</p> <p>Distillation Heater stuck ON during Fill Phase.</p> <p>Fill line kinked or obstructed.</p> <p>Fill line strainer clogged.</p> <p>Fill Solenoid (SOL-1) fails to open.</p> <p>Equalization Solenoid (SOL-2) failed to open.</p> <p>Purger may be mounted too high.</p> <p>Fill line and connecting piping up to evaporator shell may not be insulated causing vapor lock.</p> <p>Refrigerant Charge low.</p> <p>Dip Switches on Switches SW1 or SW2 may be set improperly.</p> <p>Purger Logic Board may be defective</p> <p>Liquid Level Sensor may be defective Indications may be D6 Fault light and/or D3 and/or D4 green LED activated</p>	<p>Open Valve or replace valve.</p> <p>Open Valve.</p> <p>Defective TS-1, Replace. Or RLY-4 contacts stuck. Replace Logic Board.</p> <p>Correct as needed.</p> <p>Replace Fill line Strainer.</p> <p>Replace Fill Solenoid (SOL-1).</p> <p>Replace Equalization Solenoid (SOL-2).</p> <p>See installing the Purger Page 13.</p> <p>Insulate, (see page 16 for warning information on insulating.)</p> <p>Correct Refrigerant Charge.</p> <p>(See pages 33, 39 & 42 for SW1 and SW2 information.)</p> <p>Replace Logic Board</p> <p>Check the Liquid Level Sensor for defect. See pages 46 & 47 for test procedure</p>
<p>Heater fails to heat.</p>	<p>Defective Heater.</p> <p>RLY-4 relay defective.</p> <p>Disconnected lead.</p> <p>Defective Temperature Sensor TS-1 Contacts stuck closed.</p> <p>Defective Logic Board.</p>	<p>Replace heater (See Maintenance Section on Using Switch SW2 DIP switch 4 as a diagnostic aid. See page 42 for SW2 information)</p> <p>Replace Logic Board.</p> <p>Reconnect lead.</p> <p>Replace Sensor.</p> <p>Replace Logic Board.</p>

Trouble-shooting Chart (continued)

Symptom	Possible Cause	Solution
Fill Solenoid Valve (SOL-1) fails to open or close	Solenoid coil defective. SOL-1 Solenoid Valve defective. RLY-1 relay defective. Disconnected lead.	Replace coil. Replace valve. Replace Logic Board. Reconnect lead.
Equalization Solenoid Valve (SOL-2) fails to open or close.	Solenoid coil defective. SOL-2 Solenoid Valve defective. RLY-2 relay defective. Disconnected lead.	Replace coil. Replace valve. Replace Logic Board. Reconnect lead.
Oil transfer Solenoid Valve (SOL-3) fails to open or close.	Solenoid coil defective. SOL-3 Solenoid Valve defective. RLY-3 relay defective. Disconnected lead.	Replace coil. Replace valve. Replace Logic Board. Reconnect lead.
Oil will not transfer from Distillation Tank to oil sump.	Oil Return Solenoid Valve SOL-3 Solenoid coil defective. SOL-3 Solenoid Valve defective. Oil Sump valve closed. Oil return line kinked or blocked. Oil Filter blocked. RLY-3 relay defective. Equalization Solenoid Valve SOL-2 stuck open or leaking past valve seat. Oil Check Valve CK-1 stuck closed	Replace coil. Replace valve. Open Valve. Correct as necessary. Replace oil filter. Replace Logic Board. Replace valve. Replace oil Check Valve CK-1

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317-865-4130**

TROUBLESHOOTING THE LIQUID LEVEL SENSOR

Preliminary Test:

- 1) Turn OAM Power Switch OFF.
- 2) While observing the LEDs on OAM Logic Board; turn OAM Power Switch back ON.

Normal Result (A)

LED D1 ON Blinking; indicates the OAM liquid level sensor is functioning properly and the OAM Unit is operating in the **FILL** Mode. (So long as liquid is not present in the upper sight glass).

Faulty Result (B)...

LEDs D2 ON Blinking, D4 and D5 ON SOLID; means either the Liquid Level Sensor has erroneously detected a liquid level and is therefore defective, or the Logic Board is defective.

To determine which component is at fault proceed with the following test:

- 1) Again, turn OAM Power Switch OFF.
- 2) Disconnect the **Yellow** level sensor wire and the **Blue** Bleed Resistor wire from **Input Terminal IN2** on the OAM Logic Board. This eliminates the Level sensor from the circuit.
- 3) Turn the OAM Power Switch back ON.

Determination (1)

LED D1 ON Blinking; indicates the **Logic Board is responding** correctly therefore the problem is the Liquid Level Sensor.

Proceed to **Liquid Level Sensor Replacement Instructions** on page 47.

Determination (2)

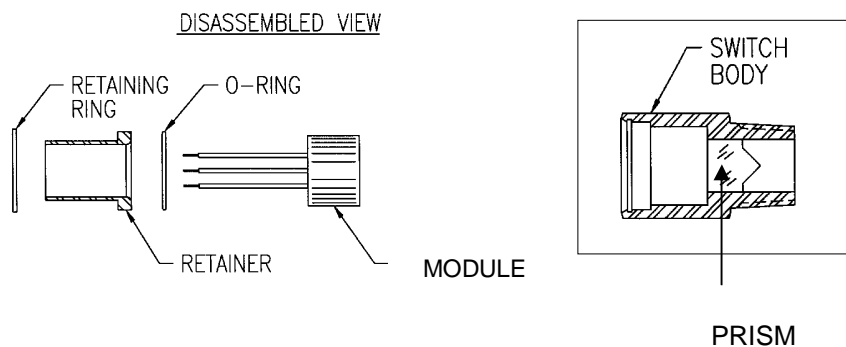
Any other result indicates a bad board. Board must be replaced. (When replacing Board do not forget to re-connect the **Yellow** level sensor wire and the **Blue** Bleed Resistor wire to **Input Terminal IN2** on the OAM Logic Board.)

Liquid Level Sensor Replacement Instructions

Liquid Level Sensor malfunction can result from either a defective **Electronic Module** or a cracked or cloudy **Prism**. A faulty Electronic Module is most likely causing the problem and therefore should be replaced first since it can be replaced quickly and easily without opening the refrigeration system.

However, if after replacing the Electronic Module the Liquid Level Sensor still does not function properly then the **Prism is probably at fault**. A cracked or cloudy Prism can cause erratic response or no response at all to the presence of liquid.

If the Prism is defective the complete Liquid Level Sensor will have to be replaced. In order to replace the complete sensor it will be necessary to **isolate and depressurize the OAM Distillation Tank**.



Replacing Level Sensor Switch Electronic Module...

- 1) Turn OAM Power Switch OFF.
- 2) Disconnect the **white** Liquid Level Sensor wire from TB-1 terminal 2, and the **black** sensor wire from TB-1 terminal 5.
- 3) Disconnect the **yellow** sensor wire from the Bleed Resistor connected to Input terminal IN2 on the Logic Board
- 4) Remove sensor wiring and conduit from electrical box.
- 5) Remove conduit and conduit connector from sensor.
- 6) Remove the Retaining Ring that holds the Electronic Module in place in the sensor body. This will require a pair of IRR P-101 or equivalent snap ring pliers.
- 7) Remove the retainer
- 8) Using the module leads gently pull the defective module and O-ring from the sensor body, being careful not to lose the O-ring.
- 9) Insert the new replacement module with old O-ring into the sensor body.
- 10) Insert retainer and re-install retaining ring.
- 11) Re-connect sensor wires.

NOTE: It is imperative that the white wire be connected to TB-1 terminal 2 and the black wire be connected to TB-1 terminal 5. The yellow wire must be connected to the Blue Bleed Resistor wire and both must be connected to Logic Board Input terminal IN2.

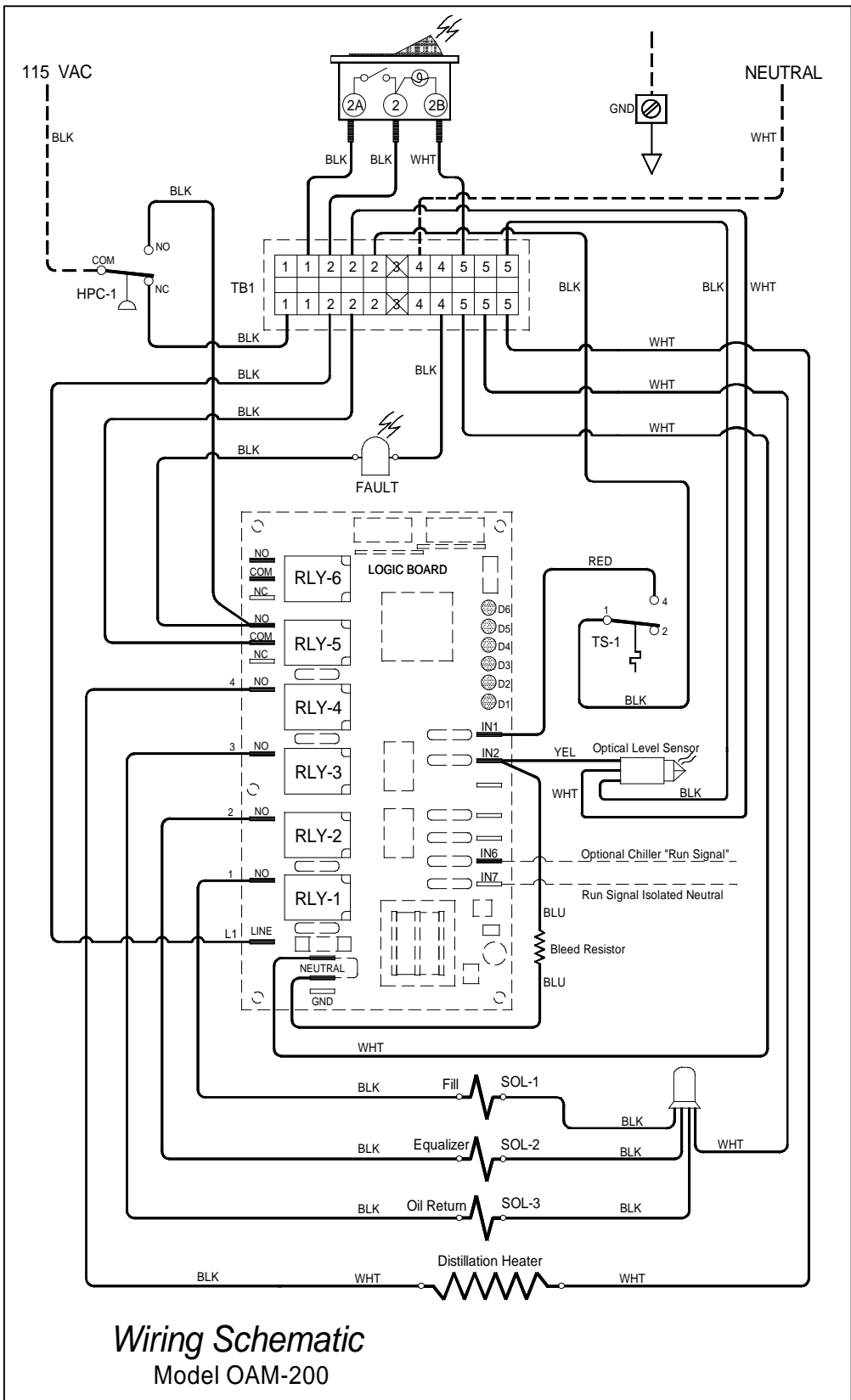


Figure 8. – Electrical wiring diagram

WARRANTY

Equipment Warranty

Subject to the terms below, **REDI CONTROLS** will, within one year after date of purchase, repair any **REDI CONTROLS'** product being used by the original purchaser, which is defective due to faulty materials or workmanship. **REDI CONTROLS** has the right to repair or replace a defective part or replace the entire product.

To file a Warranty claim on any system or component, return the defective unit to the address below, or other location as **REDI CONTROLS** directs, freight prepaid.

This Warranty does not apply to or cover:

- Damages beyond **REDI CONTROLS'** control.
- Malfunctions that result from failure to properly install, operate or maintain a product in accordance with instructions provided by **REDI CONTROLS**.
- Failures of equipment due to abuse, accident or negligence.
- Damages from, or part failures due to equipment not being installed per **REDI CONTROLS'** instructions, per applicable codes or ordinances, or in accordance with good trade practices.
- Labor or other charges incurred in removing or reinstalling any **REDI CONTROLS** product or part.
- Damages resulting from use of a **REDI CONTROLS** product for any purpose other than for which it was designed and manufactured.
- Any implied warranty of merchantability or fitness for any particular purpose, occurring after the Warranty Period.
- Loss of use, loss of time, inconvenience, rental for substitute products, loss of business, loss of income, or any other consequential damages resulting from use or failure of any **REDI CONTROLS** product.

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