



Kodiak® Chiller Overview



Presentation Outline

Lytron Technical Support Contact Information	3
Introduction	4
Part I: Unpacking	5
Part II: Installation	7
Part III: Chiller Startup	13
Part IV: Flow Components	19
Part V: Refrigeration System	23
Part VI: Electrical System	27
Part VII: Draining and Storage	31
Conclusion	34

Lytron Technical Support Contact Information

- Lytron is available for technical support 24 hours a day, 7 days a week.

- To contact us, please call 781-933-7300
 - When calling after hours, please select the “System Service Group” option to be connected to our on-call Service Engineer

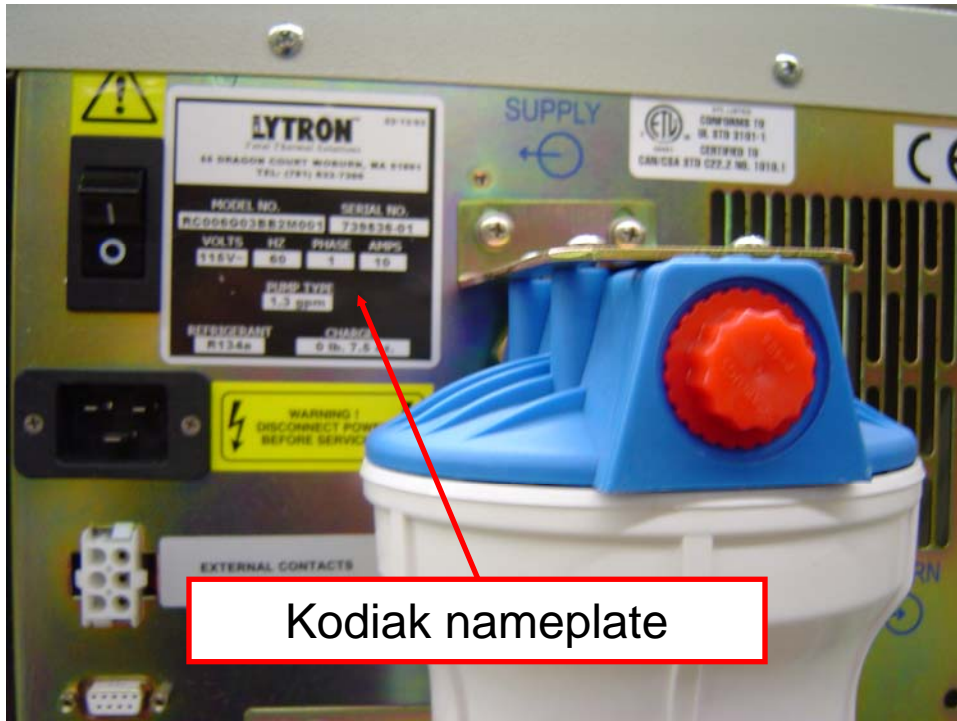
Introduction

- This program is designed to train Kodiak chiller users.
- Topics covered include: unpacking, installation, the basic control functions and all the internal components of a Lytron Kodiak Chiller.
- The chiller models discussed in this presentation are the Kodiak RC006G03 through RC045H03 as they are presently manufactured.
- Always turn the unit "OFF" and disconnect the power cord from the power source before performing any service or maintenance procedures, or before moving the unit.

Part I: Unpacking

- Carefully unpack the chiller and check for shipping damage. If you notice shipping damage, immediately contact your freight carrier. Please note that Lytron is not responsible for any shipping damage.
- Save the packaging for any future shipping. If the chiller ever needs to be shipped to another location, or in the unlikely event that the chiller needs to be returned to Lytron, we recommend that you use the original packaging.

Part I: Unpacking - Chiller nameplate

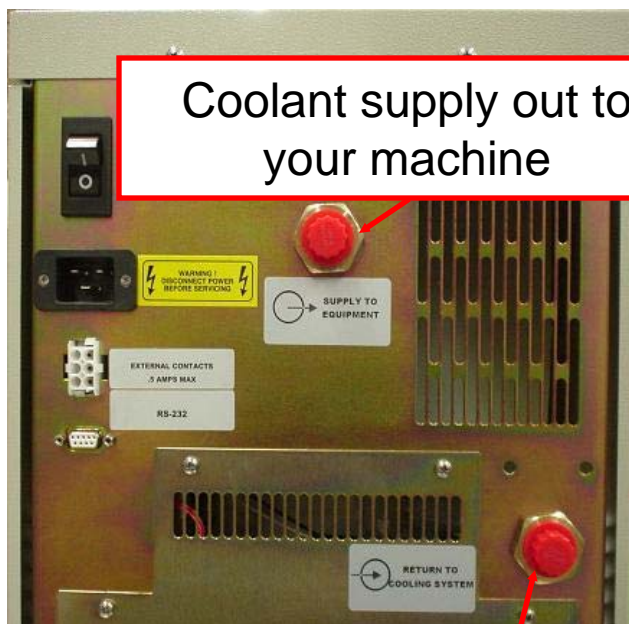


- Confirm that the chiller you received is the correct one by checking the model and serial number found on the nameplate, on the rear of the unit.
- Verify the chiller's power requirements and make sure that it has the proper electrical configuration for your facility's power supply.

Part II: Installation

- If the chiller arrived lying sideways or on its top, put it back upright and wait for at least one hour before turning it on. This will allow the compressor oil to settle.
- It is recommended to place the chiller with a 18” clearance on all sides to allow maximum air flow. Systems with a water cooled condenser have no minimum clearance requirements.

Part II: Installation - Chiller Coolant Connections



Coolant supply out to
your machine

Coolant return
coming from your
machine

- Remove the red caps for the return and the supply lines.
- Install hoses with ½” male NPT fittings.
- Use thread sealant, such as Teflon® tape, to eliminate the risk of leaks.

Part II: Installation

Water Cooled Condenser



- Water-cooled systems use facility water or a building's chilled water system to cool the condenser.
- Remove the red caps for the return and the supply lines.
- Install hoses with ½" male NPT fitting.

Part II: Installation

Adding Cooling Fluid



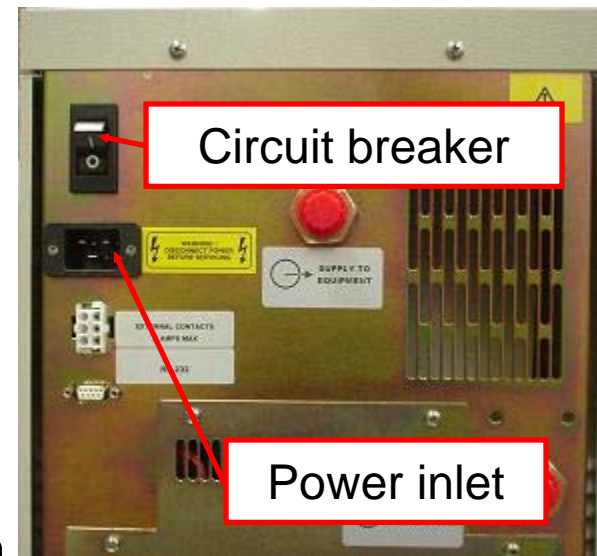
Level indicator

- Use a Philips screwdriver and open the small cover on the top of the chiller. It will expose the reservoir tank cover.
- Remove the reservoir cap.
- Fill the tank with water. For set points below 10°C please use a mixture of 30% ethylene or propylene glycol/water. Do not use automotive antifreeze. It contains additives that damage pump seals.
- Check the tank level using the level indicator and add water if necessary.
- Replace both the reservoir cap and the cover when finished.

Part II: Installation

Electrical Connections

- Verify that the chiller has the proper electrical configuration for your facility's power supply. The electrical configuration of the chiller is noted on the nameplate.
- Plug the chiller into your power source.
- Turn the circuit breaker on by flipping the switch found on the rear of the unit to the "up" position. Please note that this switch is not designed to be used as an on/off switch. The proper way of turning the chiller on, is to use the on/off button on the front keypad.
- You will notice a diagnostics countdown on the front display when you turn the unit on. This will occur every time power is restored to the chiller.



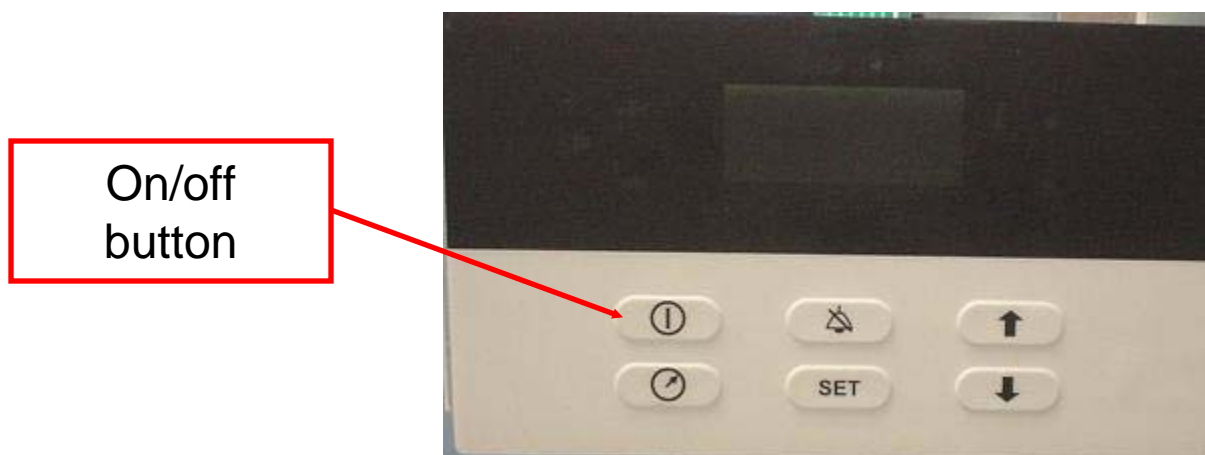
Part II: Installation

Electrical Connections

- All chillers with controller packages 2 and 3 are equipped with dry contacts. Pin 5 is the common contact, pin 4 closes on fault and pin 6 opens on fault. These contacts are rated for 250V, 1/2 amp maximum.
- The RS-232 port option is only available with controller package 3 and is used to connect the chiller to a computer.
- With RS232, you can use the Kodiak Host Software (provided by Lytron) that simulates the front control panel and all its functions. Alternatively, you can create your own software to interface with our system. Please consult the Host Interface Data Link section of the Kodiak manual. If you do not have this manual, you can download it from the Lytron website:
http://www.Lytron.com/service/srv_manuals.htm

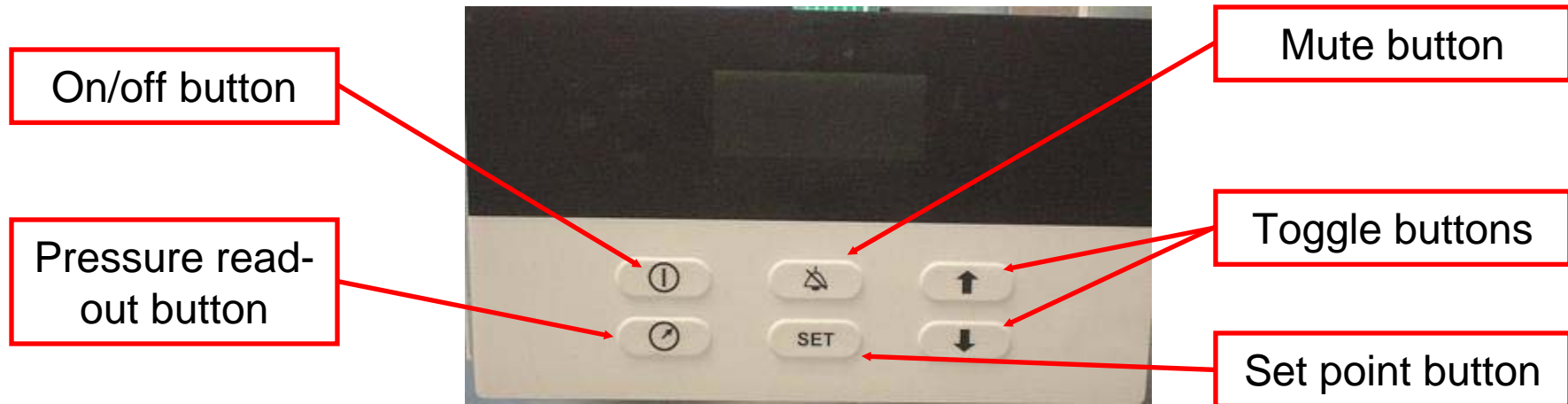


Part III: Chiller Startup



- There will be a diagnostics countdown on the front display after the power is turned on.
- Once the screen clears, press the on/off button and the chiller will start.
- Occasionally, the chiller may vibrate slightly and be noisy the first time it is started. Wait a few minutes and the noise should stop. If it doesn't, please contact the Lytron service department.

Part III: Chiller Startup Kodiak Function Buttons



- Pressing the “SET” button will allow you to change the temperature set point of the chiller using the toggle buttons.
- Pressing the pressure button will display the water pressure coming out of the chiller’s supply line.
- Pressing the mute button will stop the alarm noise, when the audible alarm is beeping.

Part III: Chiller Startup Controller Menu

You can access the controller menu by holding both toggle buttons down for five seconds. This allows the user to configure the chiller that will allow you to change certain settings.

- **DEGC English or Metric Units:** Changes the temperature readings on the display from °C to °F and pressure. This feature is not available if you have a 0.1° set point chiller.
- **CAL Calibration Offset:** Adjusts the reading on the display by the offset that you enter, from -4°C to 4°C (or -7°F to 7°F). This should read zero when you receive your chiller.
- **Ar Auto Restart:** When enabled this allows the chiller to start automatically in the event of a power failure or if the chiller is unplugged and plugged back in. If you manually press “off” on the chiller, the chiller will not startup automatically if Ar is enabled.

Part III: Chiller Startup

Controller Menu ... *Continued*

- **Ot Over Temperature Alarm Set Point** (option available with controller package II and III) The indicator illuminates when the coolant temperature exceeds the over temperature set point. The over temperature set point should be at least 3°C (6°F) above the coolant set point to prevent nuisance alarms.
- **Lt Low Temperature Alarm Set Point** (option available with controller package II and III) The indicator illuminates when the coolant temperature falls below the low temperature set point. The low-temperature set point should be at least 3°C (6°F) below the coolant set point to prevent nuisance alarms.
- **AL Audible alarm** When this is enabled, an audible alarm sounds when any fault occurs.

Part III: Chiller Startup Controller Menu ...*Continued*

- **FS Fault chiller shutoff** (option available with controller package II and III) When enabled, this turns off the chiller when any fault occurs.
- **rS Remote Start** (optional feature) Allows the chiller to be started and stopped with a dry contact.
- **bAr** Changes the pressure display from PSI to Bar.

Part III: Chiller Startup

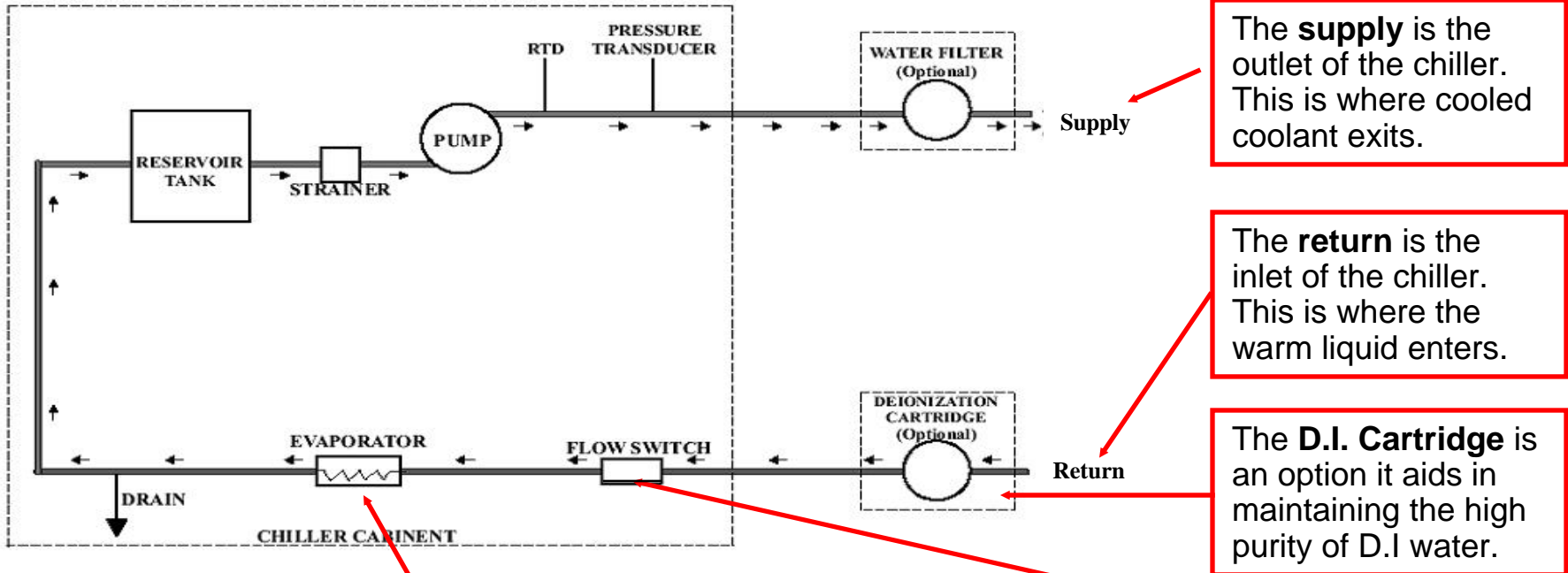
Low Flow: Error 4 ...*Continued*

A low flow error may occur at startup and will be indicated by “Err 04” on the display. This happens when the flow switch on the return side of the chiller does not detect enough flow. A low flow error can have a few different causes:

- **Trapped air:** When first starting the chiller, some air may be trapped in the system. Restarting the chiller a few times usually flushes the air out. As liquid returns to the reservoir tank, the air escapes out of the vent holes. If the chiller still shuts down on low flow, try loosening the supply hose connection slightly to allow air to exit the system.
- **Flow restriction:** If there is excessive pressure drop across the coolant lines (because of small fittings, excessively long lines, kinks in flexible hoses, etc.), the internal pump bypass will open, the net flow out of the pump will decrease, potentially causing a low flow error. Reducing the pressure drop or purchasing an external flow control valve or an external pressure relief valve may solve a low flow error caused by a flow restriction.

Part IV: Flow Side Components

Flow Diagram



The **supply** is the outlet of the chiller. This is where cooled coolant exits.

The **return** is the inlet of the chiller. This is where the warm liquid enters.

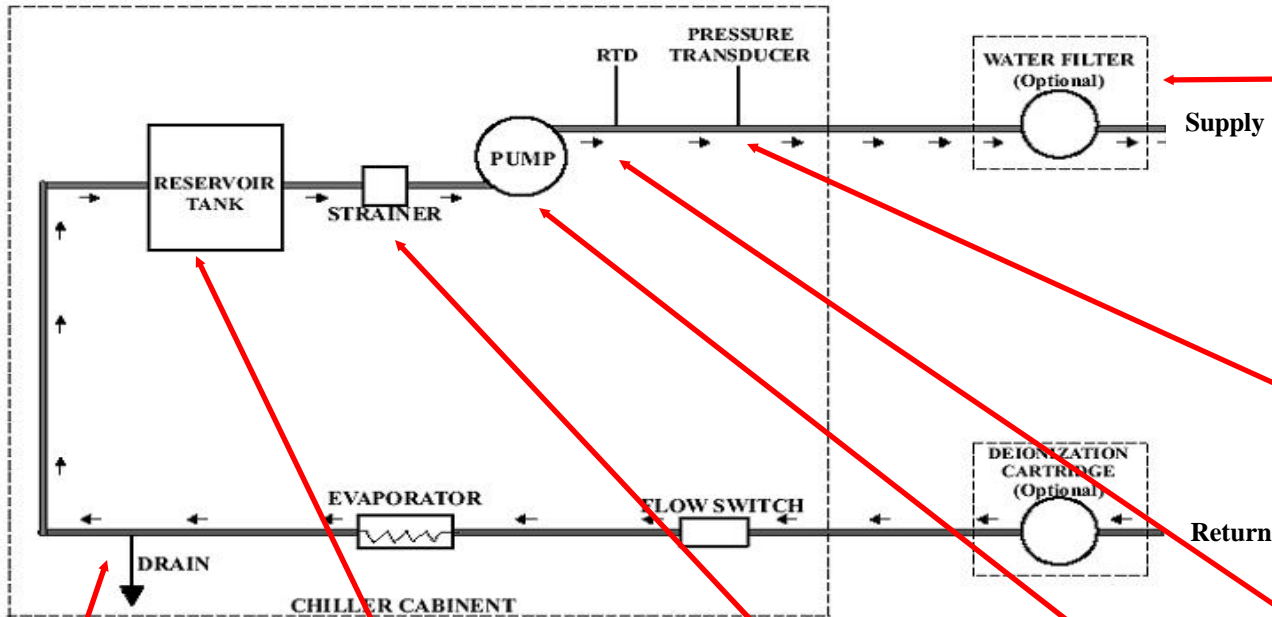
The **D.I. Cartridge** is an option it aids in maintaining the high purity of D.I. water.

The **evaporator** is a heat exchanger. The coolant flows on one side, and cold refrigerant from the refrigeration system flows on the other side. Since the refrigerant is colder than the coolant, heat flows from the coolant to the refrigerant, and the coolant becomes colder. Please note that it is recommended to use ethylene glycol to prevent freezing when chiller's set point is under 10°C/50°F.

The **flow switch** is designed to prevent low flow through the evaporator or liquid heat exchanger. Very low or no flow can freeze the coolant inside the evaporator and destroy it. The switch is found just after the inlet to the chiller.

Part IV: Flow Side Components

Flow Diagram



The optional **liquid filter** (which is highly recommended) is attached outside of the chiller and connected to the supply port. It filters particles bigger than 5 microns.

The **pressure transducer** sends the liquid pressure measurement to the control board.

The **RTD** sends temperature measurements to the control board.

The **drain** allows you to empty your system of all coolant. It is located on the outlet of the evaporator.

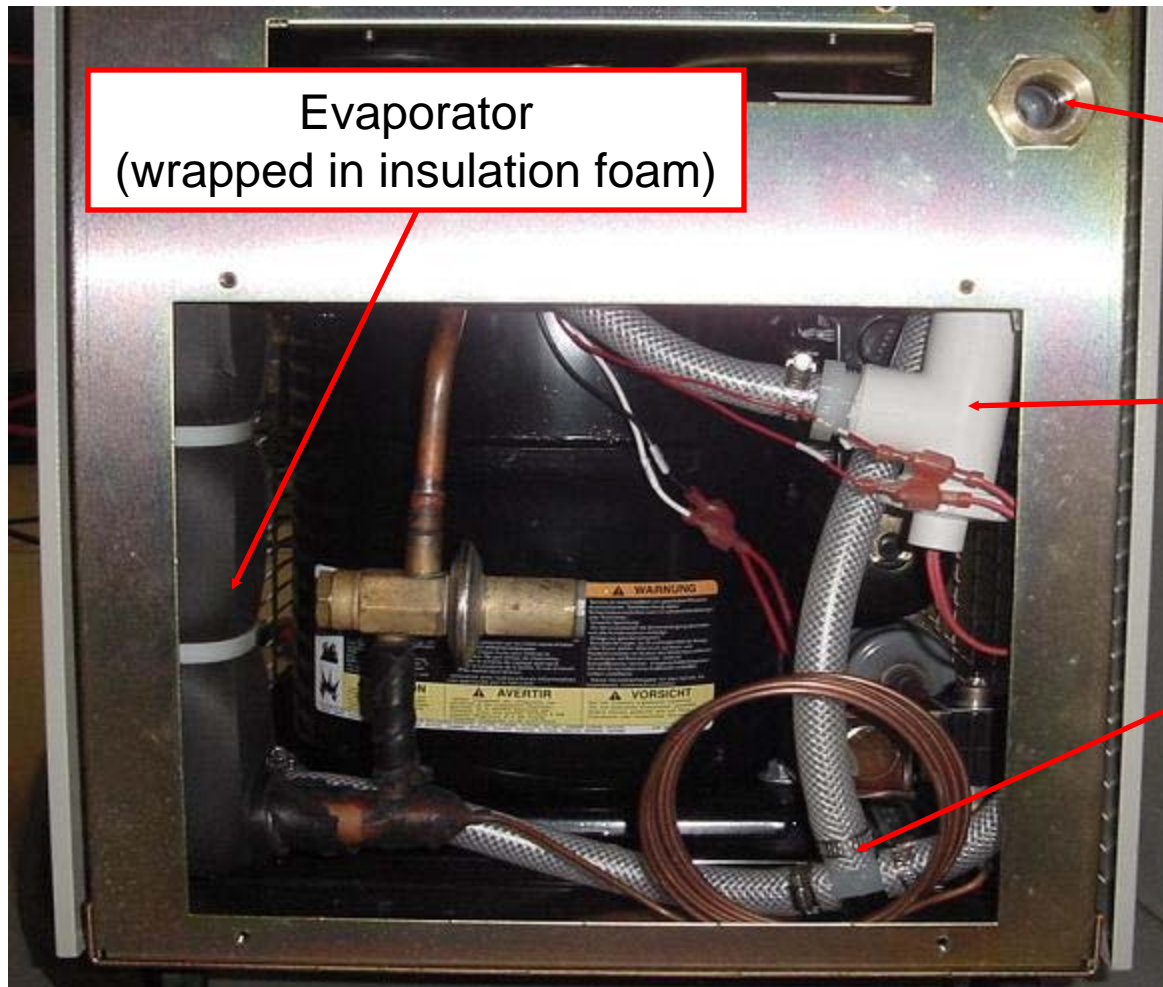
The **reservoir tank** helps regulate the system's liquid temperature. More liquid in the tank will result in a better temperature stability.

The **strainer** can either be internal or external to the pump. It protects the pump against particulate. It is only present in systems with positive displacement pumps.

The **pump** provides coolant circulation.

Part IV: Flow Side Components

Bottom Rear View of an RC006



Evaporator
(wrapped in insulation foam)

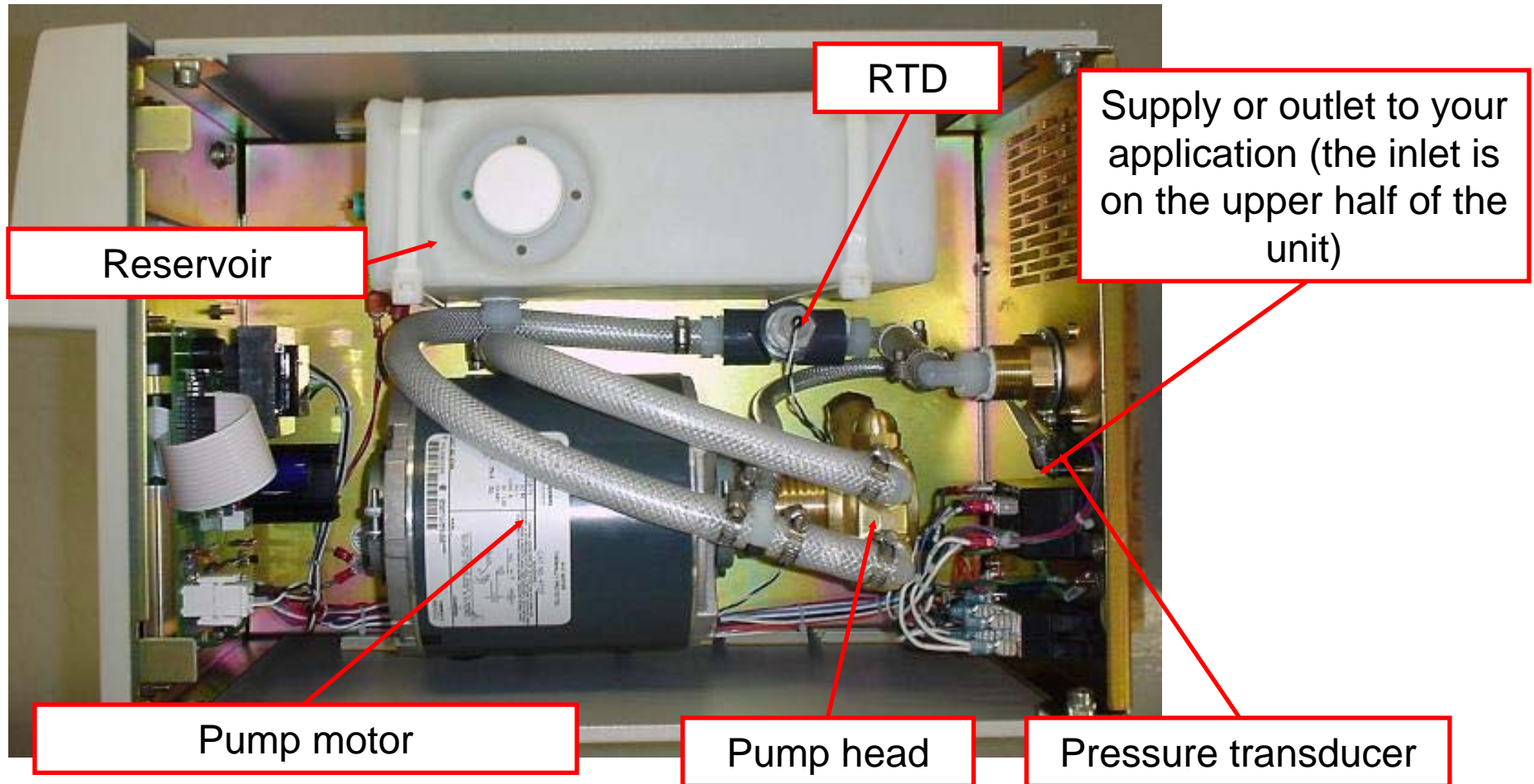
Return or inlet to the
chiller (the supply
outlet is on the upper
half of the unit)

Flow switch

Line coming from the
evaporator, splits to
the drain and the
reservoir tank.

Part IV: Flow Side Components

Top View of a RC006



Part V: Refrigeration System

- Please note that only a certified refrigeration technician should service the refrigeration side of a Kodiak chiller.
- We highly recommend returning the chillers to Lytron for any refrigeration servicing.
- Alternatively, you can contact the Lytron service department to coordinate onsite service by a Lytron approved refrigeration service technician.

Part V: Refrigeration System Refrigeration Diagram

The **evaporator** is a cross-flow heat exchanger with channels that pass refrigerant and coolant through thin plates. The two flows do not mix, but the close contact allows heat to transfer. Refrigerant enters the evaporator as a gas-liquid mixture, and exits as a low pressure gas.

The **hot gas bypass** valve opens on low pressure, when the solenoid shuts flow off. This allows hot refrigerant gas to flow from the compressor to the evaporator. Bypassing refrigerant when not cooling maintains the compressor on at all times, thus extending its life.

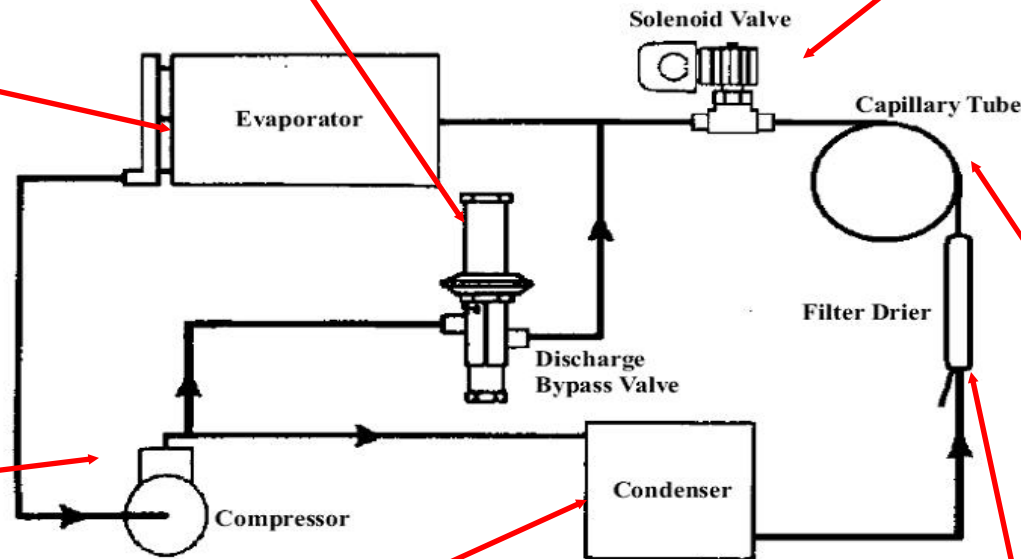
The **solenoid valve** is controlled by the chiller's the control board. It shuts off the refrigerant flow when no cooling is required. Alternatively, it turns the refrigerant flow back on to allow for more cooling to occur.

The **compressor** takes refrigerant coming from the evaporator and converts it to high pressure, high temperature gas. Because of the hot gas bypass, the compressor does not cycle, extending its life significantly.

The **condenser** is a heat exchanger. Heat from the refrigerant is transferred either to ambient air or to water (for water-cooled condensers). The refrigerant condenses from a gas into liquid.

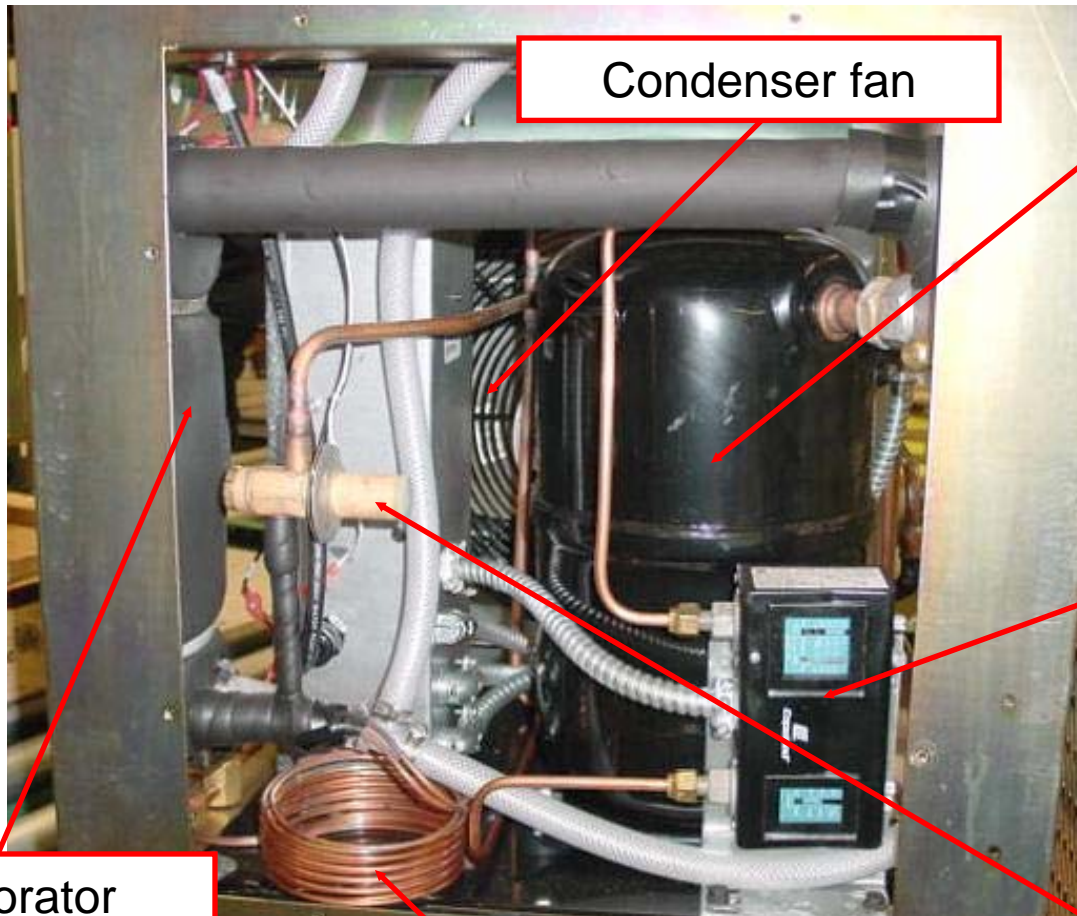
The **filter drier** cleans and removes moisture from the refrigerant before passing through the capillary tube.

The **capillary tube** reduces the refrigerant pressure



Part V: Refrigeration System

Bottom Rear View of a RC045



Condenser fan

Compressor

Refrigerant pressure control. Found on some 1hp or larger condensing units or all water cooled units.

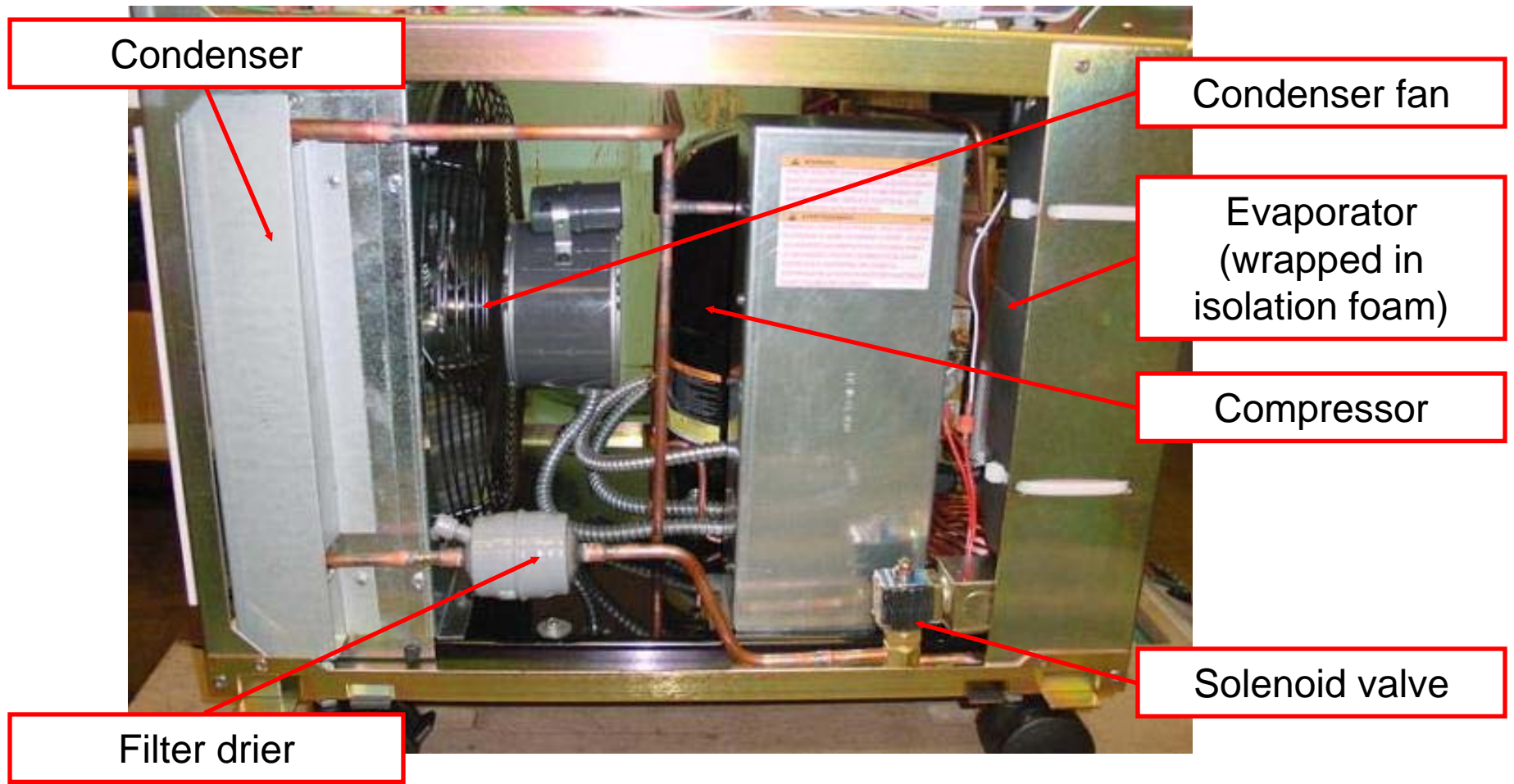
Hot gas bypass valve

Evaporator (wrapped in insulation foam)

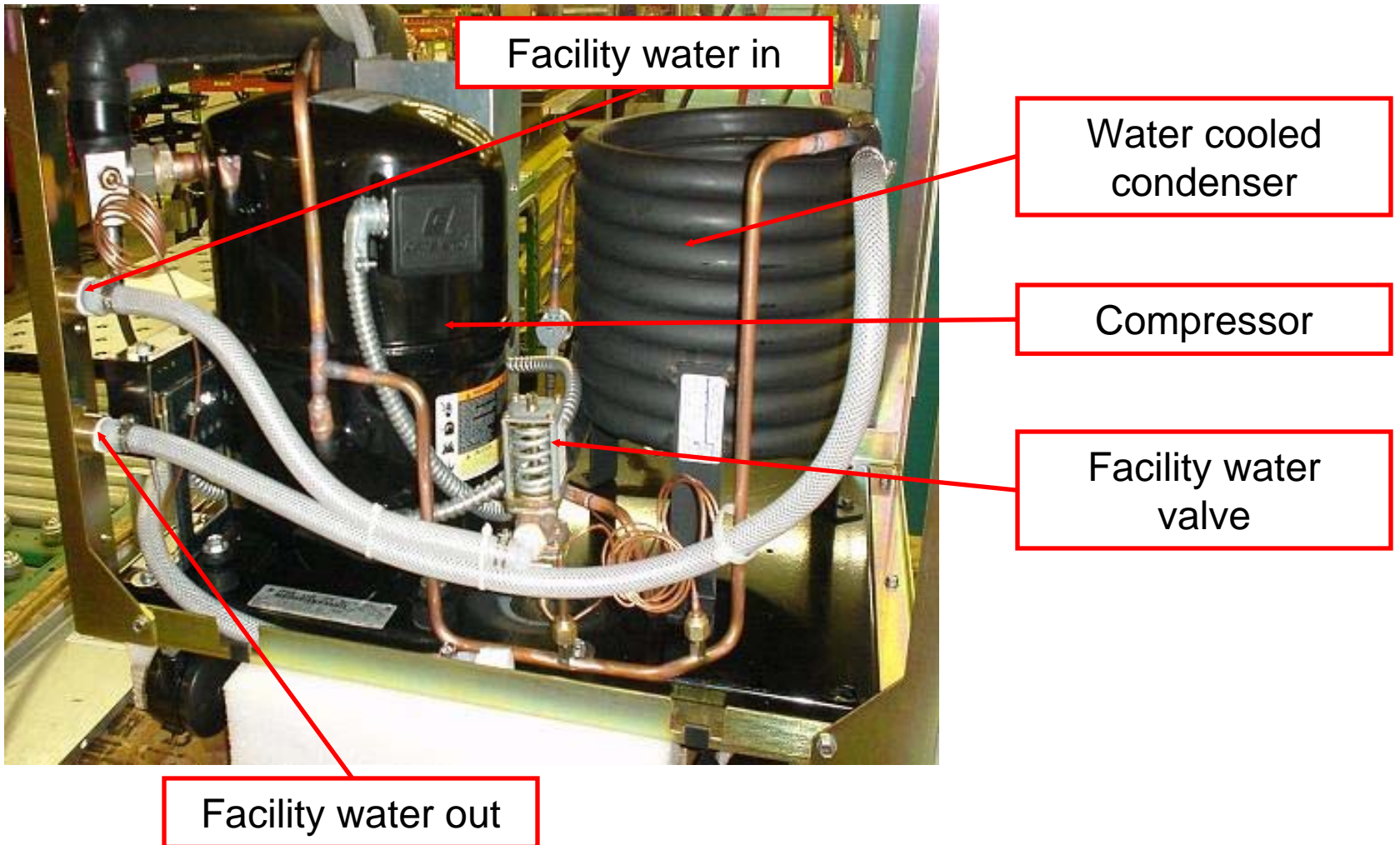
Capillary tube

Part V: Refrigeration System

Bottom Side View of a RC045



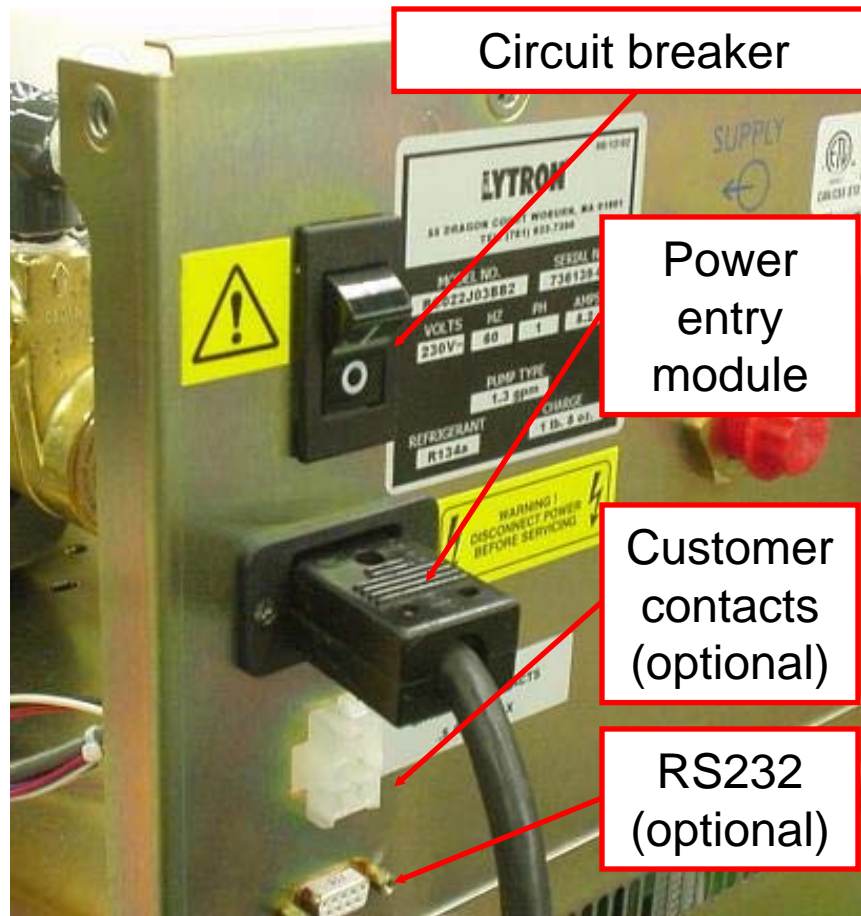
Part V: Refrigeration System Side View of a Liquid Cooled Unit



Part VI: Electrical System – Important Safety Information

- Please shut the unit off and disconnect it from the power supply before removing any panels and performing electrical work on the chiller.
- Please refer to the electrical diagram found in the Kodiak chiller manual.
- Kodiak chillers have one main wire harness that connects the control board to all of its input and outputs.
- Power comes in through the power inlet, goes through the circuit breaker and then goes to both the controller and the pump/condensing unit relay
- The control board controls the pump/condensing unit relay and the solenoid valve.

Part VI: Electrical System, Rear Panel

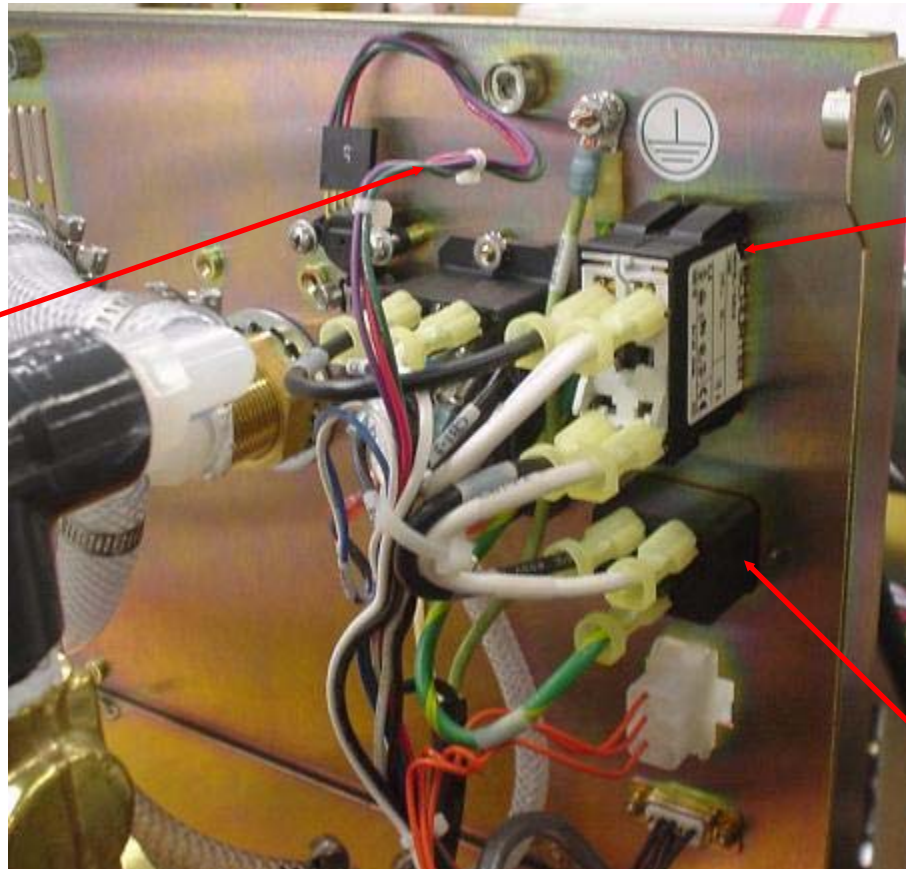


- On the top rear panel of the chiller you will find a circuit breaker, the customer contacts, and RS-232 serial port.
- It is not recommended to use the circuit breaker as an on/off switch.
- The name plate to the right provides the voltage, amperage, and any other relevant chiller information.

Part VI: Electrical System, Inside Panel

DPST Relay

Wires from the control board send out a 12V DC signal to activate the relay. The relay sends the main power to the pump motor and condensing unit. The controller will open the relay if problems occur.



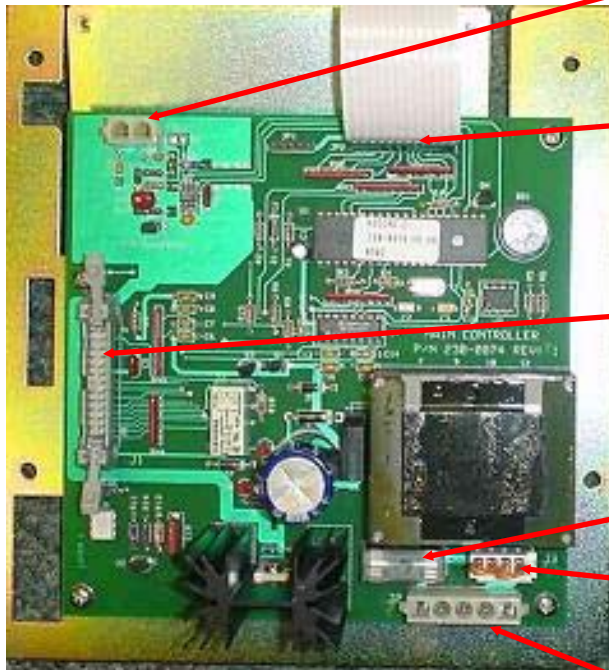
Circuit breaker

When the circuit breaker is turned on, power is distributed to the control board and to the relay.

Power inlet

Power enters the chiller through the inlet receptacle. It is wired in series to the circuit breaker.

Part VI: Electrical System, Control Board



RTD Temp. probe
connector P1

Display/keyboard
connector JP2

Main wire harness
connector J1

Fuse holder F1

115V to 240V
Jumper J3

Power inlet/solenoid
connector J2

Part VII: Draining and Storage

Draining the Tank



- Drain your chiller before storage. Stagnant water can produce algae or freeze and damage the interior components.
- Lytron recommends using a wet/dry shop vacuum to remove all liquids.
- Shut off the system and unplug the chiller whenever removing panels.
- Unscrew the cover from the rear and remove it. Remove all of the liquid directly from the reservoir tank using a vacuum.

Part VII: Draining and Storage

Draining the Reservoir



- Remove the left side panel to expose a drain hose. Uncap and drain the system of all liquid.
- Use the vacuum on the supply and return lines to ensure the chiller is completely drained.
- The chiller is not designed to withstand outdoor weather. Please do not store it outside.

Conclusion

- Please refer to the Kodiak manual for more detailed information on operating, troubleshooting, or any other inquiries on Lytron's Kodiak line of recirculating chillers. The manuals are available on Lytron's website at the following link:
http://www.Lytron.com/service/srv_manuals.htm
- Please contact Lytron's service department for comments or feedback on this training presentation.