

HT Chillers

Flow-Through Chiller 36000 Plus

User Manual & Installation Guide



Hensley Thermodynamics
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Manufacturer Information

About Hensley Thermodynamics

Hensley Thermodynamics, Inc. is chiller manufacturer focused on the design and manufacture of affordable, efficient, easy to use and easy to maintain chiller units for everyone from major industry to the individual hobbyist that have machines that require chilled coolant less than 65°F for optimal operation.

Hensley Thermodynamics

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HT Chiller is used herein as shorthand notation to refer to the Hensley Thermodynamics Chiller.

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Instructions in English

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**This User Manual & Installation Guide
applies to the following units:**

Flow-Through Chiller

Model F32301

Model F32303

Model F34603

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Important Information



Read this **User Manual & Installation Guide** carefully before you begin chiller installation, operation, or service. This manual contains important information. Failure to read this manual can result in personal injury or damage to your chiller.


Abbreviations and Definitions


Abbreviation	Definition
CBEST	Chiller Barrel Energy Storage Tank.
gpm	gallons per minute
HT	Hensley Thermodynamics
HT Chiller	Hensley Thermodynamics Chiller
psi	pounds per square inch


Safety Information


Safety instructions must be followed when you install, operate, inspect, or perform maintenance or service on this equipment. If ignored, physical injury or death may follow, or damage may occur to the equipment. Always observe applicable safety precautions when using this equipment.

Recognizing Safety Information in this Manual

This is the safety-alert symbol . When you see this symbol on the unit and in this manual, be alert to the potential for personal injury or equipment damage. Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol.

 **DANGER** Identifies the most serious hazards that will result in severe personal injury or death.



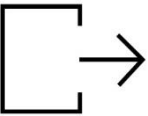
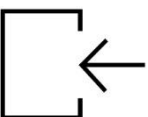
 **WARNING** Identifies hazards that could result in personal injury or death.

 **CAUTION** Identifies unsafe practices, which would result in minor personal injury or product and property damage.

NOTE, TIP and IMPORTANT Used to highlight suggestions, which will result in enhanced installation, reliability, or operation.

Equipment Labels, Symbols and Meanings

The following labels and symbols are used in/on the Hensley Thermodynamics Chiller.

Symbol / Label	Purpose / Meaning	Location
	Hazardous voltage may cause severe injury or death. Only Qualified and Authorized Personnel may access areas marked with this label.	Condensing Unit
	Hazardous voltage may cause severe injury or death. Only Qualified and Authorized Personnel may access areas marked with this label.	Recirculating Pump
	Indicates the Water Out valve.	Front panel to the right of the Water Out valve.
	Indicates the Water In valve.	Front panel to the right of the Water In valve.

Access by Qualified Personnel Only

Access to the HT Chiller shall be restricted to properly trained and qualified personnel who are familiar with the potential hazards of equipment that uses high voltages, high temperatures, low temperatures, refrigerant and components under pressure.

Electrical Precautions

Only properly trained and qualified personnel are authorized to perform work on an energized system.

⚠ WARNING To prevent electrical shock:

- The HT Chiller must be grounded through your electrical power source.
- The HT Chiller must be powered off and disconnected from the main power supply prior to installation, maintenance, moving, and decommissioning.

Emergency Shutdown

In case of emergency, disconnect power to the HT Chiller at your electrical power source.



Structural Support

The HT Chiller is mounted on steel legs; however, underlying, level and structurally sound support must be provided.

⚠ WARNING Failure to provide proper support may result in personal injury and / or damage to the Chiller Unit.

Mechanical Strength

Do not stack, mount or lean anything on the HT Chiller.

⚠ WARNING External loads or stresses placed on or against the chiller unit may result in personal injury and / or damage to the HT Chiller.

Product Description

Purpose

The Hensley Thermodynamics Chiller (HT Chiller) is designed specifically for waterjet cutting machines with the goal of helping to reduce waterjet machine downtime due to pump failure. To extend the life of your waterjet pump and to protect your pump manufacturer warranty, it is critical to keep the pump water temperature between 45°F and 65°F. Water temperatures above the recommended values cause the pump seals to wear and fail sooner. Extend the life of your equipment by cooling the water.

Flow-Through 36000 Model Configurations

HT *Flow-Through* Chillers are available in the following configurations:

Model F32301 – 3 Ton, 230 Volt, Single-Phase

Model F32303 – 3 Ton, 230 Volt, Three-Phase

Model F34603 – 3 Ton, 460 Volt, Three-Phase

Description

This HT Chiller is a *flow-through* system that efficiently provides chilled water to waterjet cutting machines. Our HT Chiller is designed specifically for the water usage requirements of a waterjet machine (1 to 2 gallons/minute) and is a true waterjet chiller that can handle 95°F incoming water temperatures; dropping the temperature of the water going to the waterjet to below 65°F without having to oversize its capacity.

The internal Chiller Barrel Energy Storage Tank holds approximately 55 gallons of water used to store refrigeration energy. The storage tank has a capacity of “storing” 11,000 BTUs of energy and the HT Chiller produces a nominal 36,000 BTUs. The HT Chiller can efficiently handle constant cutting even when the incoming water is above 90°F. Refrigerant lines submerged in the Chiller Barrel Energy Storage Tank first remove heat from water traveling through the flow-through water lines going to the waterjet. Then, any unused refrigeration capacity not used by the flow-through water lines is stored in the Chiller Barrel Energy Storage Tank. This ability to store energy saves energy because the HT Chiller is not running needlessly when you are working in light load conditions, changing material, and re-setting up.

When the water in the Chiller Barrel reaches 45°F, the condensing unit cycles off to save energy. The cold water in the Chiller Barrel continues to absorb heat in the water traveling through the flow-through water line. When the water discharge temperature reaches approximately 58°F, the condenser unit cycles on to once again lower the Chiller Barrel water temperature to 45°F.

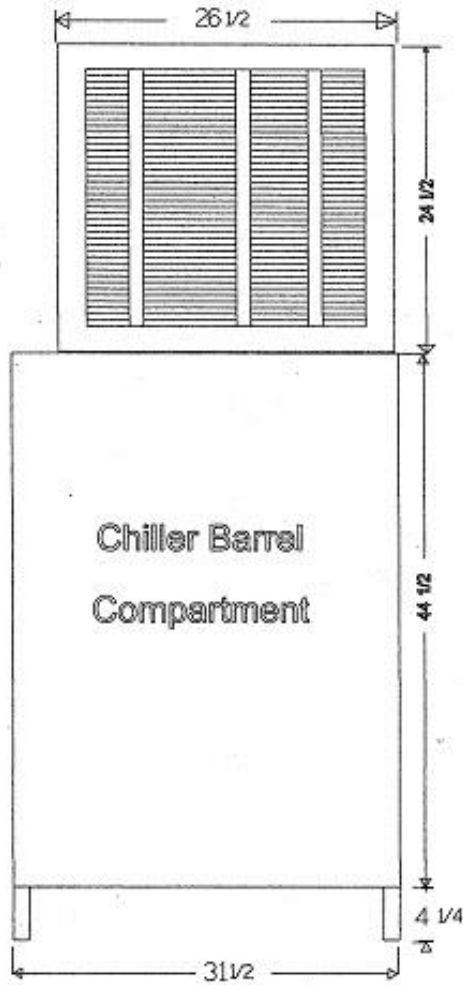
The HT Chiller is mounted on 4-inch metal legs. This design provides a means to easily transport the HT Chiller with a pallet jack or forklift. As an optional installation feature, the HT Chiller can be “field split”; therefore, allowing you to install the Chiller Barrel Energy Storage Tank Cabinet near the waterjet machine, and install the condensing unit up to 200 feet away from the work area.

Note: The HT Chiller is not intended for use other than described in this manual.

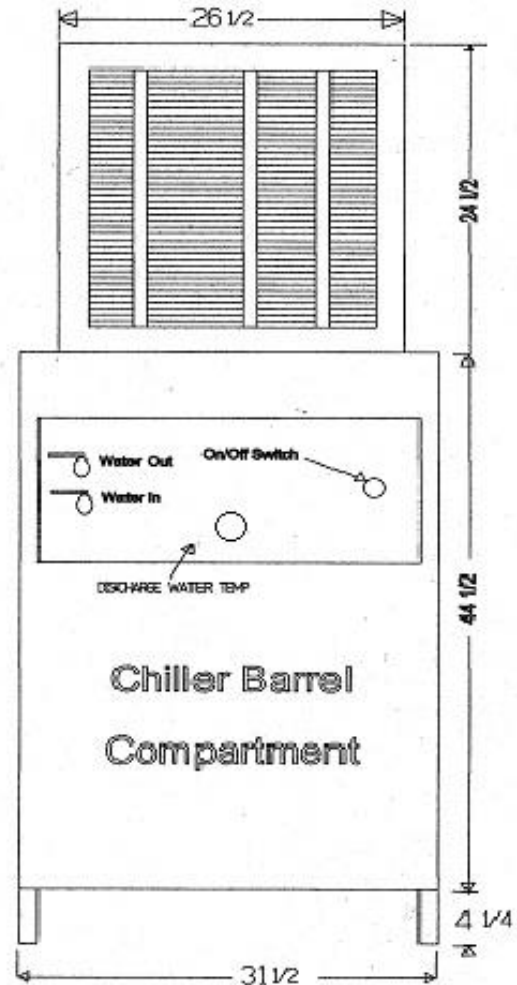
To prevent damage to the HT Chiller and voiding the warranty, call the Hensley Thermodynamics Engineering Department at 1-830-370-2362 or 1-800-259-2720 before using the HT Chiller beyond the scope of this manual.

Dimensions and Weight

Flow-Through HT Chiller	Weight	Width	Length	Height
Empty	525 Pounds	31 ½ inches	31 ½ inches	73 ¼ inches
Barrel Filled with water	985 Pounds			



HT Chiller Side View



HT Chiller Front View

Product Components

The HT *Flow-Through* Chiller is comprised of the following major components:

Condensing Unit

The condensing unit is a 13 SEER unit manufactured by Ruud and contains the environmentally friendly 410A refrigerant.

Chiller Barrel Energy Storage Tank

The R-10 insulated Chiller Barrel Energy Storage Tank is located within the Chiller Barrel Compartment.

The Chiller Barrel holds approximately 55 gallons of water that is utilized for two specific purposes:

1. The thermo-conductive property of water enables efficient heat transfer, and
2. The water stores excess energy to be used when the refrigeration system cycles off.

Copper flow-through water lines are submerged within this R-10 insulated Chiller Barrel where they are cooled both by the accompanying refrigerant lines and the chilled water within the Chiller Barrel. Fill the Chiller Barrel with clean water upon installation and secure the lid. The water in the barrel stays in the barrel and you will only need to check the water level during periodic inspections.

Installation Instructions

Use a pallet jack or forklift to safely position the HT Chiller in the designated location. The HT Chiller is mounted on metal legs for convenience.

The HT Chiller is quiet with a maximum decibel level of 74. This low decibel level does not overwhelm normal conversation so the unit can be placed in the work environment.

Location Checklist

Review the following items to help determine the best location for the HT Chiller:

- The HT Chiller must be installed on a level surface and indoors.
- The HT Chiller can be separated (field split) with the condensing unit located in one area and the Chiller Barrel Compartment (lower half of the HT Chiller) located in another area. To separate the unit, refer to the section “Field Splitting the HT Chiller”.
- The Chiller Barrel Compartment (lower half of the HT Chiller) is designed for indoor installation **only** where ambient temperatures do not fall below 32°F.
- The Condensing Unit is designed for use with ambient temperatures of 55°F or more. If you are field splitting the HT Chiller and the condensing unit will be required to operate in conditions below 55°F, contact us or your authorized Ruud representative to install low ambient controls and/or accessories.
- The maximum ambient temperature for the Condensing Unit is 125°F.
- Allow sufficient airflow around and vertical discharge above the Condensing Unit for proper operation.

Proper Clearance	Measurement
Around all sides of chiller	18 inches
Above top of condensing unit	4 feet

- Access to required electrical source as follows:

Model Number	Phase	Freq. (Hz)	Voltage (Volts)	Rated Load Amperes (RLA)	Minimum Circuit Amperes	Fuse/HACR Breaker	
						Min Amps	Max Amps
F32301	1	60	230	16.7	15	30	35
F34303	3	60	230	10.4	15	20	20
F34603	3	60	460	5.8	15	15	15

Contact a licensed electrician and your local power company to ensure that installation wiring complies with local fire, safety and electrical codes.

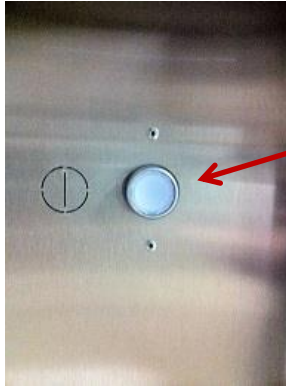
- Access to a clean water source.
- To prevent heat gain to the Chiller Unit Water Out line, place the Chiller Unit near the waterjet machine and insulate the water line. (Insulating the waterline also protects surrounding surfaces from condensation or sweating from the chilled waterline.)

How to Access the Chiller Barrel Energy Storage Tank

1. If the HT Chiller is powered on, press the ON/OFF push button power switch to turn the HT Chiller off. The light will extinguish to indicate that the chiller is powered off.



ON



OFF

Push Button Power Switch

2. Disconnect electrical power from the HT Chiller.



3. Remove the left side panel of the Chiller Barrel Energy Storage Tank Compartment by unscrewing the 7 screws around the perimeter.



4. Loosen and remove the clamp ring on the Chiller Barrel Energy Storage Tank.



5. Lift off and remove the Chiller Barrel Energy Storage Tank lid.



How to Fill the Chiller Barrel Energy Storage Tank

⚠ CAUTION Do **not** add any chemical to the Chiller Barrel Energy Storage Tank; possible damage to the Chiller Unit may occur. Adding chemicals to the Chiller Barrel water tank will void the warranty.

1. If necessary, follow the instructions to “How to Access the Chiller Barrel Energy Storage Tank.”
2. Fill the Chiller Barrel with clean water to the water line indicator located on the inside of the tank. (Approximately 55 gallons.)



3. Replace the Chiller Barrel lid securely.
4. Replace and fasten the Chiller Barrel ring onto the Chiller Barrel.
5. Replace the side panel securing all 7 screws.

Attaching Water In / Water Out Lines

1. The Water In and the Water Out lines are ½” NPT valves.
2. Use a backup wrench to secure the water valve while installing connections to prevent damage to the water lines.
3. Purge air from the flow through line before applying power to the HT Chiller.



Valves Open

- TIP:** The chilled water leaving the HT Chiller will be typically below the dew point so condensation may occur. Properly insulate the water out line (chilled water) to prevent nearby surfaces from condensation damage.
- TIP:** To maintain the chilled water temperature and to prevent heat gain of the chilled water line, the HT Chiller either needs to be close to the waterjet machine, or the water out (chilled water) line needs to be properly insulated. This is especially important if the water out (chilled water) line is exposed to high temperatures or hot surfaces.

Reminder about the Water in the Chiller Barrel

This HT Chiller is a flow-through system with water flowing through a water pipe that is submerged in the Chiller Barrel Energy Storage Tank. This water pipe is chilled by refrigerant lines **and** the cold water within the Chiller Barrel Energy Storage Tank. The purpose of the water in the Chiller Barrel is to store cooling energy only, in other words, the water in the barrel stays in the barrel.

Wiring Electrical Power to the HT Chiller

 **DANGER ELECTRICAL SHOCK HAZARD – Disconnect Main Power!**

Before installing, modifying, or servicing the HT Chiller, your main electrical disconnect switch must be in the OFF position. Your setup may have more than 1 (one) disconnect switch. Lock out and tag switch(es) with a suitable warning label(s).

All Electrical Work Must Be Completed By a Qualified Person

Wire according to all national, state and city electrical codes.

 **CAUTION Prevent Reverse Wiring of 3-Phase**

As with all typical 3-phase systems, you can accidentally wire the HT Chiller incorrectly to cause the compressor motor to run backwards. This is evident by excessive compressor noise, no heat being exhausted by the condenser fan within 1 minute, and flow-through water not cooling. Reverse any two leads to change the phase for proper rotation. Not correcting the wiring will cause the compressor to overheat and turn off.

 **CAUTION Prevent Breakage of Lines - Fill Chiller Barrel Before Applying Power**

To prevent freezing and breakage of flow-through water lines, the Chiller Barrel Energy Storage Tank **MUST** be filled with water before power is applied to the HT Chiller.

 **CAUTION Prevent Skin Damage – Do not Touch Refrigerant Lines in Chiller Barrel**

Refrigerant lines in the Chiller Barrel Energy Storage Tank can operate at temperatures below freezing. Touching these lines can freeze skin.

Note: Operating the HT Chiller on improper line voltage will void the warranty.

Note: Do not connect the HT Chiller to an electrical source that has power fluctuations beyond approved limits.

Wiring Instructions

1. Connect proper voltage to condensing unit.
See applicable data plate on condensing unit.
2. Install proper size wire to the “Line In” connections in the condensing unit electrical compartment.
3. Attach proper ground.
4. Reinstall covers on condensing unit.

HT Chiller Operation

Your HT Chiller arrives pre-set and ready to use as soon as:

- Proper electrical connections are made,
- Chiller Barrel Energy Storage Tank is filled with water, and
- Water line connections attached.

TIP: If the condensing unit does not come on upon initial installation, the freezestat may have tripped due to unit being exposed to below 35°F during shipping or storage. See section “Freeze Thermostat” for instructions on how to reset the freezestat.

⚠ CAUTION Prevent damage to your equipment and/or the HT Chiller by confirming the following:

1. Chiller Barrel Energy Storage Tank has been properly filled.
2. Flow-through water source is turned on.

How to Turn On the HT Chiller

- Press the HT Chiller ON/OFF push button power switch located on the front panel.
- Verify the power indicator light in the switch is illuminated.



Power Light Illuminated


How to Turn Off the HT Chiller

1. Press the HT Chiller ON/OFF push button power switch.
2. Verify the indicator light in the switch goes out.



Power Light Off

Maintenance, Repairs and Storage

 **WARNING** To prevent electrical shock, the HT Chiller (condensing unit and Chiller Barrel Compartment) must be disconnected from all electrical sources during maintenance and repair.

General Maintenance

The HT Chiller is designed to be virtually maintenance free when operated under normal working conditions.

As long as the Chiller Barrel Energy Storage Tank is securely sealed, water will not escape. If you move the HT Chiller after the tank has been filled, it is recommended that you visually inspect the water level.

The condensing unit requires only routine maintenance as required with a standard air conditioning condensing unit. If you have a yearly contract with an air conditioning service company, ask them to inspect your HT Chiller condensing unit during your yearly inspection.

Repairing Components

Other than the general maintenance outlined in the sections below, do NOT attempt to repair any HT Chiller components unless previously authorized in writing by Hensley Thermodynamics. **Unauthorized repairs will VOID warranty.**

Contact Technical Support:

Telephone: **1-830-370-2362** or **1-800-259-2720** toll-free

8:00 a.m. to 5:00 p.m. Central Time, Monday - Friday

Email: Support@HTChillers.com

Freeze Thermostat

If the HT Chiller has been stored or shipped in temperatures less than 35° F, the freeze thermostat (freezestat) will trip. This thermostat, by design, requires a manual reset.

Indications of a tripped freezestat are the pump is running, but the condensing unit on top is not running and the chiller is not cooling.

Note: If the freezestat trips during operation, turn the chiller off and troubleshoot the Chiller Barrel thermostats.

How to Reset the Freezestat


1. Remove the right side panel of the Chiller Barrel Energy Storage Tank compartment by unscrewing the 7 screws around the perimeter.
2. Remove the 2 screws that hold the control box cover.

3. Press (push down) the reset button. (The freezestat is the larger of the 2 thermostats.)



Storing the HT Chiller while Not in Service

To prolong the life of the HT Chiller when taking the unit out of service, it is recommended that all water be removed from the Chiller Barrel Energy Storage Tank **and** all water evacuated (purged) from the flow-through water lines; **especially** if the HT Chiller will be stored in a location that could potentially freeze.

 **CAUTION** Prevent component damage/rupture by removing/purging all water from the HT Chiller if the unit is taken out of service.

How to Remove Water from Chiller Barrel and Flow-Through Lines

1. Turn off the HT Chiller by pushing the ON/OFF push button power switch located on the front panel. The light in the switch will go out.
2. Turn off your flow-through water source.
3. Disconnect the HT Chiller from your electrical power source.
4. Access the Chiller Barrel Energy Storage Tank by removing the left side panel.
5. Remove the tank ring and the tank lid.
6. Either siphon or pump the water out of the tank.
7. With both the incoming and outgoing water valves in the open position, apply no more than 60 psi of pressure to one of the valves so that when under pressure the water escapes from the other valve. (Alternatively, a wet-dry vac can be used if you seal off the vacuum head to create sufficient suction. There isn't that much water in the line but it **must** be removed.

Field Splitting the HT Chiller


Note: Field Splitting the HT Chiller is **optional** and not required.

The HT Chiller is “Field Splittable” allowing you to place the condensing unit away from the Chiller Barrel Compartment. For example, split the Chiller Unit if you prefer that the condensing unit be located away from the waterjet work area to eliminate noise and heat exhaust.

How to Field Split the HT Chiller


IMPORTANT: These instructions are a general guide to be used in conjunction with the “Refrigeration Technician Section: Installing the Condensing Unit” located near the end of this manual.

Step 1: Empty the Chiller Barrel Water Storage Tank (Optional)

 **WARNING** The weight of the Chiller Unit when filled with water is 985 pounds. If you are moving the Chiller Unit for the splitting process, it is highly recommended that you drain the Chiller Barrel water tank.

1. Gain access to the internal Chiller Barrel by following the instructions “How to Access the Chiller Barrel Energy Storage Tank.”
2. Empty the Chiller Barrel by following the instructions “How to Remove Water from Chiller Barrel and Flow-Through Lines.”


Step 2: Pump Down Refrigerant

 **WARNING** To prevent personal injury and/or damage to equipment, only qualified refrigeration technicians are authorized to make the modifications outlined below. The condensing unit uses 410A refrigerant.



1. Using the proper High Pressure gauges for 410A, connect the High and Low side hoses to the appropriate pump-down valves at condensing unit.
2. On Chiller Barrel Cabinet front panel, press the ON/OFF push button power switch to apply power to the condenser.
3. Close the High side pump-down valve and pump refrigerant into the condenser until suction pressure reaches approximately 5 psi.
4. Turn off the condenser by pushing ON/OFF push button power switch. The light in the switch will go out.
5. Disconnect the electrical power from the HT Chiller.
6. Close the Low side pump-down valve.

Step 3: Remove Internal Wiring

 **DANGER** To prevent electrical shock, only qualified electricians are authorized to make the modifications outlined below.

1. Completely remove all electrical power from the HT Chiller by using the breaker on your fuse box, or pulling the fuse in your electrical panel, as is appropriate for your electrical connections.
2. Remove the HT Chiller side panel (right side when facing front of chiller.)
3. Disconnect the 24 Volt control wiring from the Control Box.

Step 4: Cut Refrigeration Lines

1. With all electrical lines removed, proceed to unsweat copper connection at the base of the condensing unit after following proper refrigeration techniques for removing remaining refrigerant. Be sure that the brass pump-down valves stay cool while unsweating the connections.
2. Seal refrigerant lines to prevent contamination.

Step 5: Separate Chiller Barrel Compartment from Condensing Unit

The condensing unit is attached to the Chiller Barrel Compartment top by 2 bolts accessible from the inside of the condensing unit under the fan housing.

1. Separate the condensing unit from the Chiller Barrel Compartment top by removing these 2 bolts.
2. Provide a pad for the condensing unit at its new location.

Step 6: Connect New Refrigerant Lines and Electrical Wires

1. Install the condensing unit at the new location according to all city and state codes.
2. Install new refrigerant lines in accordance to the instructions by following section "Refrigeration Technician Section: Installing the Condensing Unit" following proper refrigeration techniques and referring to the long line application chart.
3. Install new liquid line filter dryer.
4. Run new 24-volt control wiring from the condensing unit to the Control Panel in the Chiller Barrel Compartment.
5. Replace the Control Box cover in the Chiller Barrel Compartment.
6. Replace the electrical panel on the condensing unit.



CAUTION The Chiller Barrel water tank **MUST** be filled before power is applied.
Follow the instructions below.

Step 7: Position the Chiller Barrel Compartment in the new location.

Step 8: Refill the Chiller Barrel Water Tank

1. Fill the Chiller Barrel Energy Storage Tank to the waterline indicated on the inside of the tank. Refer to the instructions “How to Fill the Chiller Barrel Energy Storage Tank.”
2. Secure the water tank cover and ring.
3. Replace the Chiller Barrel Energy Storage Tank cover and secure the ring.
4. Replace the Chiller Barrel Compartment front panel, and then the side panels.


Step 9: Evacuate Refrigerant System



CAUTION The Chiller Barrel Energy Storage Tank must be filled with water **BEFORE** powering on the condensing unit to prevent damage to the HT Chiller.


1. Pull proper evacuation of the condensing unit system and release refrigerant accordingly.
2. Deliver power to the HT Chiller by energizing the breakers or fuses depending on your electrical setup.
3. Power up the system by pressing the ON/OFF push button power switch located on the Chiller Barrel Cabinet front panel. The system will begin cooling the water in the Chiller Barrel if the water is above 58°F.
4. Adjust refrigerant to 9° subcooling.

Refrigeration Technician Section: Installing the Condensing Unit

 **WARNING** The following steps must be performed by a qualified refrigerant technician.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions, which may cause death, personal injury, or property damage. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing. Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and current editions of the National Electrical Code (NEC) NFPA 70. In Canada, refer to current editions of the Canadian electrical code CSA 22.1.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards, which **will** result in severe personal injury or death. WARNING signifies hazards, which could result in personal injury or death. CAUTION is used to identify unsafe practices, which would result in minor personal injury or product and property damage. NOTE is used to highlight suggestions, which will result in enhanced installation, reliability, or operation.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position.

There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.



CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

The condensing unit contains system refrigerant charge for operation with the HT Chiller Barrel. For proper unit operation, check refrigerant charge using charging information located inside condenser electrical cover and/or in the Check Charge section of this instruction.

IMPORTANT: Maximum liquid-line size is 3/8-in. OD for all applications including long line. Refer to Piping and Longline Guideline for further information.

IMPORTANT: Always install the factory-supplied liquid-line filter drier. If replacing the filter drier, refer to Product Data Digest for appropriate part number. Obtain replacement filter driers from your HVAC distributor or branch.

INSTALLATION

Check Equipment and Job Site

Install on a Solid, Level Mounting Pad

If conditions or local codes require the unit be attached to pad, tie down bolts should be used and fastened through knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 2 to determine base pan size and knockout hole location. For hurricane tie downs, contact local distributor for details and PE (Professional Engineer) certification, if required by local authorities. On rooftop applications, mount on level platform or frame. Place unit above a load-bearing wall and isolate unit and tubing set from structure. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications. Roof mounted units exposed to winds may require wind baffles. Consult the Ruud Application Guideline and Service Manual - Residential Split System Air Conditioners for wind baffle construction.

NOTE: Unit must be level to within $\pm 2^\circ$ ($\pm 3/8$ in./ft., ± 9.5 mm/m) per compressor manufacturer specifications.

Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 24 in. (609.6 mm) clearance to service end of unit and 60 in. (1219.2 mm) (above unit. For proper airflow, a 6-in. (152.4 mm) clearance on 1 side of unit and 12-in. (304.8 mm) on all remaining sides must be maintained. Maintain a distance of 24 in. (609.6 mm) between units or 18 in. (457.2 mm) if no overhang within 12 ft. (3.66 m) Position so water, snow, or ice from roof or eaves cannot fall directly on unit.


NOTE: 18" (457.2 mm) clearance option described above is approved for outdoor units with wire grille coil guard only. Units with louver panels require 24" (609.6 mm) between units.

On rooftop applications, locate unit at least 6 in. (152.4 mm) above roof surface.

Operating Ambient

The minimum outdoor operating ambient in cooling mode without accessory is 55 °F (12.78 °C), and the maximum outdoor operating ambient in cooling mode is 125°F (51.67 °C).

Sweat Connection

	CAUTION
UNIT DAMAGE HAZARD	
Failure to follow this caution may result in equipment damage or improper operation.	
Service valves must be wrapped in a heat-sinking material such as a wet cloth while brazing.	

Use refrigeration grade tubing. After wrapping service valve with a wet cloth, braze sweat connections using industry accepted methods and materials. Consult local code requirements. Refrigerant tubing and Chiller Barrel heat exchanger are now ready for leak testing. This check should include all field and factory joints.

24ABB3			
UNIT SIZE	LIQUID	RATED VAPOR	
	Connection & Max. Tube Diameter	Connection Diameter	Tube Diameter
36	3/8	3/4	3/4


Notes:

- Do not apply capillary tube or fixed orifice coils to these units.
- For Tubing Set lengths between 50 and 200 ft. (24.38 and 60.96 m) horizontal or 35 ft. (10.7 m) vertical differential 250 ft. (76.2 m) Total Equivalent

Length), refer to the Ruud Residential Piping and Longline Guide line - Air Conditioners and Heat Pumps using 410 A refrigerant.

- For alternate liquid line options on 18-42 size units, see Product Data or Piping and Application Guideline.

Change Liquid-Line Filter Drier Inside Chiller Barrel Compartment

	CAUTION
UNIT DAMAGE HAZARD	
Failure to follow this caution may result in equipment damage or improper operation.	
1. Installation of a new filter drier in liquid line is required.	
2. Filter drier must be wrapped in a heat-sinking material such as a wet cloth while brazing.	
3. Flow arrow must point towards Chiller Barrel heat exchanger.	

Refer to Fig. 3.

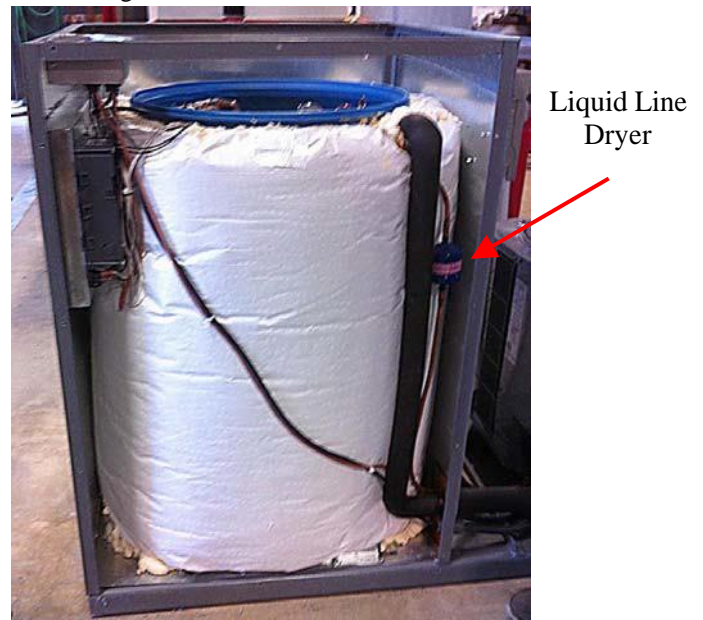



Fig. 3

Refrigerant tubes and Chiller Barrel heat exchanger should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple

	CAUTION
UNIT DAMAGE HAZARD	
Failure to follow this caution may result in equipment damage or improper operation.	
Never use the system compressor as a vacuum pump.	

evacuation method may be used (see triple evacuation procedure in service manual). Always break a vacuum with dry nitrogen.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. A tight dry system will hold a vacuum of 1000 microns after approximately 7 minutes. See Fig. 4.

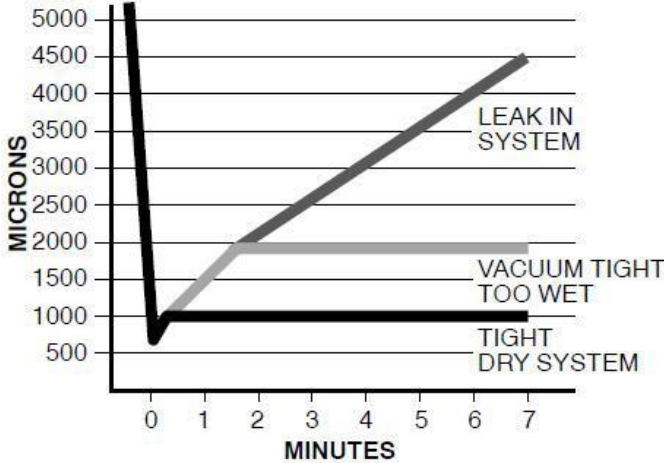


Fig. 4 - Deep Vacuum Graph

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Final Tubing Check

IMPORTANT: Check to be certain factory tubing on both Chiller Barrel heat exchanger and outdoor unit has not shifted during shipment. Ensure tubes are not rubbing against each other or any sheet metal or wires. Pay close attention to feeder tubes, making sure wire ties on feeder tubes are secure and tight.

Make Electrical Connections

Be sure field wiring complies with local and national fire, safety, and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company for correction of improper voltage. See unit rating plate for recommended circuit protection device.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

NOTE: Install branch circuit disconnect of adequate size per NEC to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC.

Route Ground and Power Wires

Remove access panel to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box.

WARNING

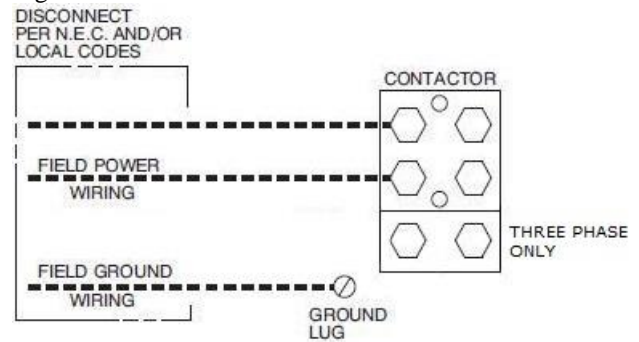
ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

The unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes.

Connect Ground and Power Wires

Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor as shown in Fig. 5.



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Fig. 5 - Line Connections

Connect Control Wiring

Route 24-v control wires through control wiring grommet and connect leads to control wiring. Refer to Chiller Unit Wiring Diagram.


Use No. 18 AWG color-coded, insulated (35°C minimum) wire. If condensing unit is located more than 100 ft. (30.48 m) from Chiller Barrel Cabinet, as measured along the control voltage wires, use No. 16 AWG color-coded wire to avoid excessive voltage drop.


All wiring must be NEC Class 1 and must be separated from incoming power leads.

Final Wiring Check

IMPORTANT: Check factory wiring and field wire connections to ensure terminations are secured properly. Check wire routing to ensure wires are not in contact with tubing, sheet metal, etc.

Start-Up

	<h1>CAUTION</h1>
<p>UNIT OPERATION AND SAFETY HAZARD</p> <p>Failure to follow this caution may result in personal injury, equipment damage or improper operation.</p> <ul style="list-style-type: none">• Do not overcharge system with refrigerant.• Do not operate unit in a vacuum or at negative pressure.• Compressor dome temperatures may be hot.	

	<h1>CAUTION</h1>
<p>PERSONAL INJURY HAZARD</p> <p>Failure to follow this caution may result in personal injury. Wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:</p> <ul style="list-style-type: none">• Front seating service valves are equipped with Schrader valves.	

Follow these steps to properly start up system:

1. After system is evacuated, fully open liquid and vapor service valves.
2. Replace stem caps after system is opened to refrigerant flow. Replace caps finger-tight and tighten with wrench an additional 1/12 turn.
3. Close electrical disconnects to energize system.
4. If the Chiller Unit Water Barrel was emptied, confirm that it was refilled.
5. If Water In / Water Out lines were cut, confirm that they were reconnected and purged of air.
6. Confirm that Water In / Water Out lines are open and flowing.
5. Turn on the HT Chiller by pushing the on/off push button switch located on the front panel.

Note: If the unit is noisy and/or cooling not be achieved, the compressor is probably running in reverse direction. Remedy is to change any 2 Incoming power leads.

6. Operate unit for 15 minutes.

Check Charge

Factory charge amount is 67.8 oz. and desired subcooling is 7 °F and is shown on unit rating plate. Charging method is shown on information plate inside condensing unit. To properly check or adjust charge, conditions must be favorable for subcooling charging. Favorable conditions

exist when the outdoor temperature is between 70°F and 100°F (21.11°C and 37.78°C), and the Chiller water is between 70°F and 90°F (7.22°C and 26.67°C). Follow the procedure below:

Unit is factory charged for 15ft of lineset. Adjust charge by adding or removing 0.6 oz/ft of 3/8 liquid line above or below 8ft (2.44 m) respectively.

For standard refrigerant line lengths (50 ft/24.38 m or less), allow system to operate in cooling mode at least 15 minutes. If conditions are favorable, check system charge by subcooling method. If any adjustment is necessary, adjust charge slowly and allow system to operate for 15 minutes to stabilize before declaring a properly charged system.

If the Chiller water temperature is above 80°F (26.67°C), and the outdoor temperature is in the favorable range, adjust system charge by weight based on line length and allow the Chiller water temperature to drop to 80°F (26.67°C) before attempting to check system charge by subcooling method as described above.

NOTE: If line length is beyond 50 ft (24.38 m) or greater than 20 ft (6.10 m) vertical separation, See Long Line Guideline for special charging requirements.

Final Checks

IMPORTANT: Before leaving job, be sure to do the following:

1. Ensure that all wiring is routed away from tubing and sheet metal edges to prevent rub-through or wire pinching.
2. Ensure that all wiring and tubing is secure in unit before adding panels and covers. Securely fasten all panels and covers.
3. Tighten service valve stem caps to 1/12-turn past finger tight.
4. Leave this User Manual & Installation Guide including Wiring Diagram with owner.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, periodic maintenance must be performed on this equipment.

Frequency of maintenance may vary depending upon geographic areas, such as coastal applications. See Owner's Manual for information.

REFRIGERANT PIPING LENGTH LIMITATIONS

Liquid Line Sizing and Maximum Total Equivalent Lengths[†] for Cooling Only Systems with Puron[®] Refrigerant:

The maximum allowable length of a split system depends on the liquid line diameter and vertical separation between Chiller Barrel heat exchanger and condensing unit.

See Table below for liquid line sizing and maximum lengths:

Maximum Total Equivalent Length Outdoor Unit BELOW Indoor Unit

Size	Liquid Line Connection	Liquid Line Diam. w/ TXV	AC with 410A Refrigerant Maximum Total Equivalent Length [†] : Outdoor unit BELOW Indoor Vertical Separation ft (m)								
			0-5 (0-1.5)	6-10 (1.8-3.0)	11-20 (3.4-6.1)	21-30 (6.4-9.1)	31-40 (9.4-12.2)	41-50 (12.5-15.2)	51-60 (15.5-18.3)	61-70 (18.6-21.3)	71-80 (21.6-24.4)
036 AC with 410A	3/8	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*

* Maximum actual length not to exceed 200 ft (61 m)

[†] Total equivalent length accounts for losses due to elbows or fitting.

Maximum Total Equivalent Length Outdoor Unit ABOVE Indoor Unit

Size	Liquid Line Connection	Liquid Line Diam. w/ TXV	AC with 410A Refrigerant Maximum Total Equivalent Length [†] : Outdoor unit BELOW Indoor Vertical Separation ft (m)							
			25 (7.6)	26-50 (7.9-15.2)	51-75 (15.5-22.9)	76-100 (23.2-30.5)	101-125 (30.8-38.1)	126-150 (38.4-45.7)	151-175 (46.0-53.3)	176-200 (53.6-61.0)
036 AC with 410A	3/8	3/8	250*	250*	250*	250*	250*	250*	250*	250*

* Maximum actual length not to exceed 200 ft (61 m)

[†] Total equivalent length accounts for losses due to elbows or fitting.

REFRIGERANT CHARGE ADJUSTMENTS

Liquid	Line
3/8	0.5 oz./ft (Factory charge for lineset = 3 oz / 85.05 g)

Charging Formula:

$[(\text{Lineset oz./ft} \times \text{total length}) - (\text{factory charge for lineset})] = \text{charge adjustment}$

Example: System has 20 ft of line set.

Formula: $(.50 \text{ oz./ft} \times 20\text{ft}) - (3 \text{ oz.}) = 7 \text{ oz.}$

Net result is to add 7 oz. of refrigerant to the system.

LONG LINE APPLICATIONS

An application is considered Long Line, when the refrigerant level in the system requires the use of accessories to maintain acceptable refrigerant management for systems reliability. See Accessory Usage Guideline table for required accessories. Defining a system as long line depends on the liquid line diameter, actual length of the tubing, and vertical separation between the indoor and outdoor units.

For Air Conditioner systems, the chart below shows when an application is considered Long Line.

AC WITH 410A REFRIGERANT LONG LINE DESCRIPTION ft (m) Beyond these lengths, long line accessories are required

Liquid Line Size	Units On Same Level	Outdoor Below Indoor	Outdoor Above Indoor
3/8	80 (24.4)	35 (10.7) vertical or 80 (24.4) total	80 (24.4)

ELECTRICAL DATA

UNIT SIZE- VOLTAGE, SERIES	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MAX FUSE** or CKT BRK AMPS
		MIN	MAX	LRA	RLA	FLA		
036	460/3	414	508	38	5.8	0.35	8.6	15
036	230/1 Ø			79.0	16.7	0.8		35
036	230/3 Ø			73.0	10.4	0.8		20

* Permissible limits of the voltage range at which the unit will operate satisfactorily

† If wire is applied at ambient greater than 30°C, consult table 310-16 of the NEC (NFPA 70). The ampacity of non-metallic-sheathed cable (NM), trade name ROMEX, shall be that of 60°C conditions, per the NEC (NFPA 70) Article 336-26. If other than uncoated (no-plated), 60 or 75°C insulation, copper wire (solid wire for 10 AWG or smaller, stranded wire for larger than 10 AWG) is used, consult applicable tables of the NEC (NFPA 70).

‡ Length shown is as measured one way along wire path between unit and service panel for voltage drop not to exceed 2%.

** Time -Delay fuse.

FLA - Full Load Amps

LRA - Locked Rotor Amps

MCA - Minimum Circuit Amps

RLA - Rated Load Amps

NOTE: Control circuit is 24-V on all units and requires external power source. Copper wire must be used from service disconnect to unit. All motors/compressors contain internal overload protection.

Complies with 2007 requirements of ASHRAE Standards 90.1

CHARGING SUBCOOLING (TXV-TYPE EXPANSION DEVICE)

UNIT SIZE-VOLTAGE, SERIES	REQUIRED SUBCOOLING °F
36,000	9°

Trouble Shooting

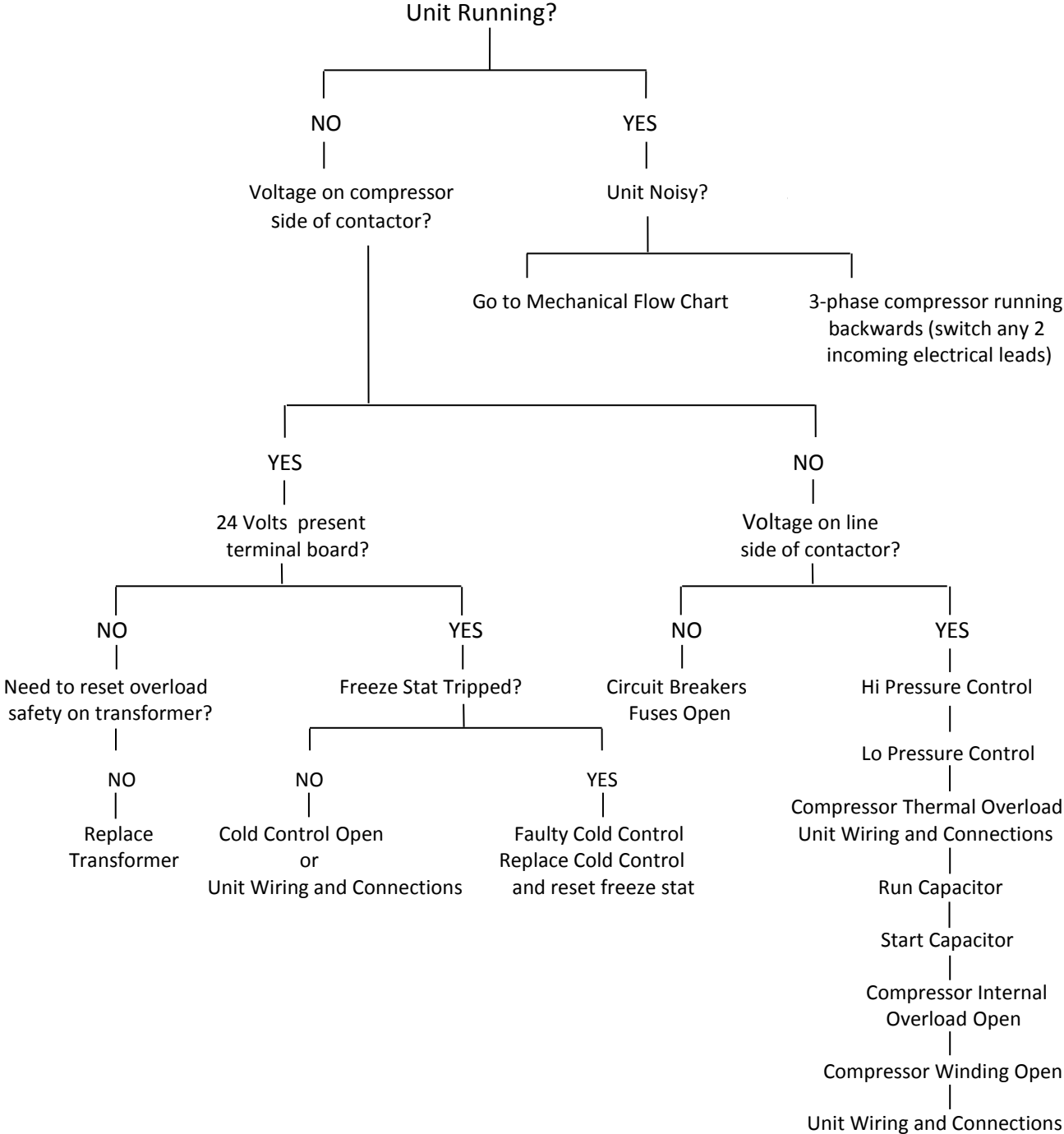
In diagnosing common faults with the HT Chiller, it is useful to present the logical pattern of thought that is used by experienced technicians.

The charts on the following pages are not intended to be an answer to all problems, but only to guide your thinking as you attempt to decide on your course of action.

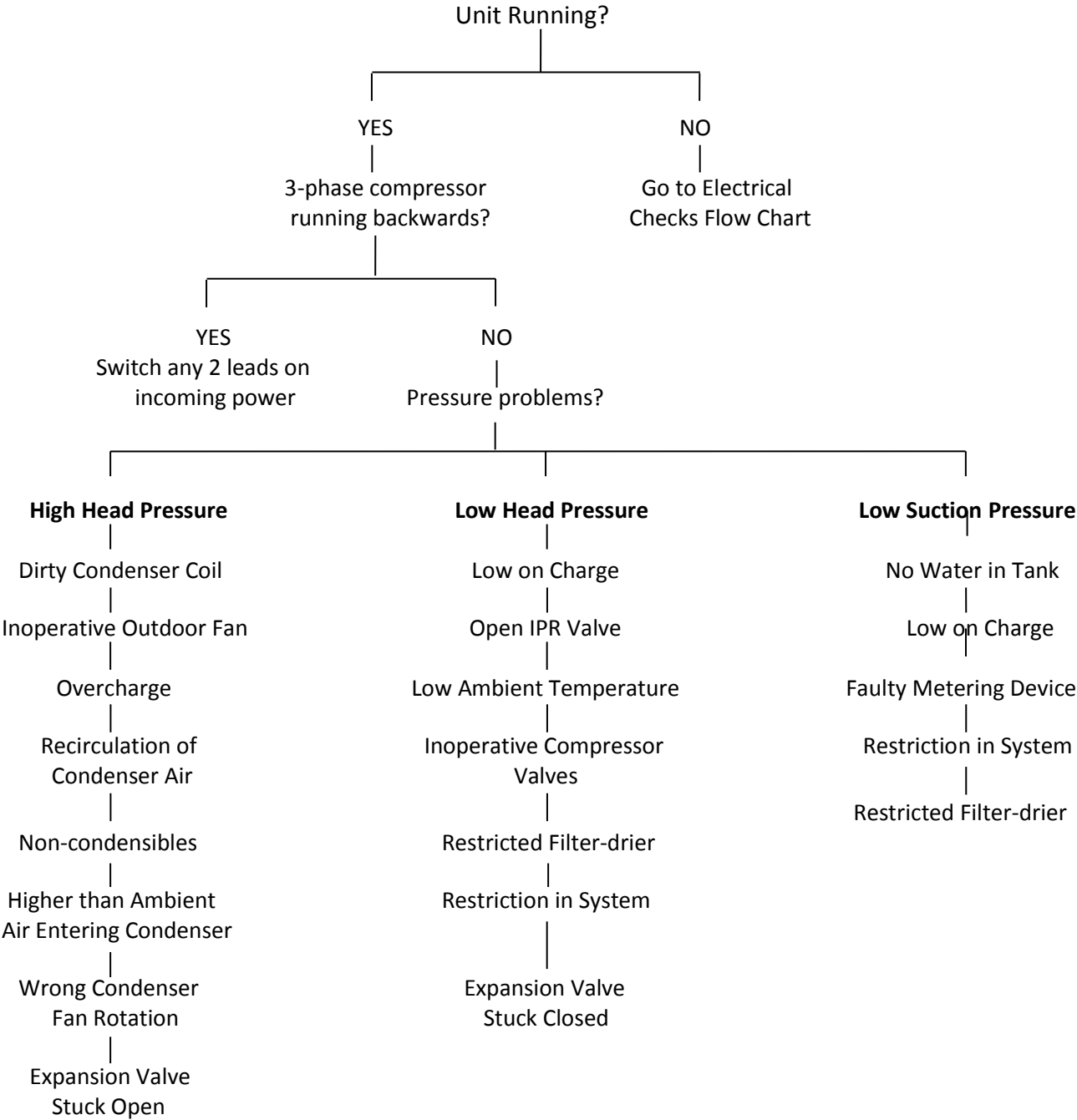
Through a series of yes and no answers, you will follow the logical path to a likely conclusion.

TIP: For assistance with any questions, please feel free to call Technical Support at:
1-830-370-2362 or 1 800-259-2720 toll-free.

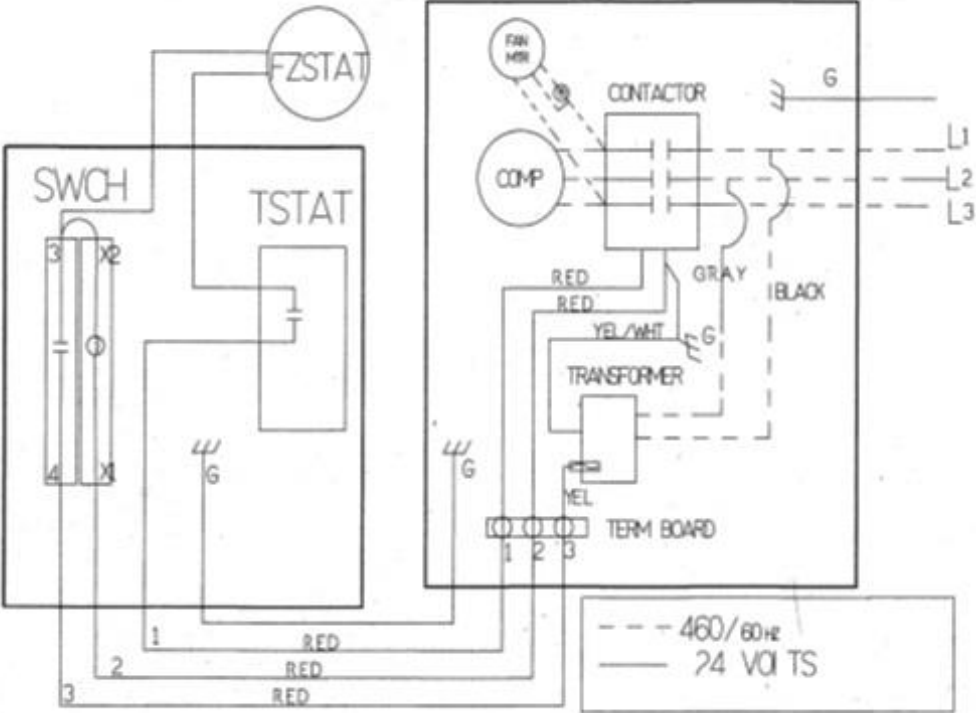
Electrical Checks Flow Chart



Mechanical Checks Flow Chart



Wiring Diagram (3 Phase Units Only)



Receiving and Unpacking Instructions

IMPORTANT: Inspect the shipping crate immediately upon receipt and file a claim with the delivery driver if any obvious damage is present.

Upon delivery, carefully remove the crating and inspect the HT Chiller for damage.

Call HT Chiller Support at 1-830-370-2362 or 1-800-259-2720 toll-free within 72 hours of receipt if you have any questions or concerns.

Repair Authorization

All HT Chiller warranty repairs must be first authorized by calling Hensley Thermodynamics technical support: 1-830-370-2362 or 1-800-259-2720. **Any repairs performed without prior authorization will be at owner's expense and may void the warranty.**

Proof of purchase and delivery date are required before service can be authorized.

Only qualified personnel shall be allowed to unpack, install, use and perform maintenance on this unit.

Only a qualified HVAC technician is authorized to repair the condensing unit under warranty.

This warranty will be null and void if unauthorized personnel perform any modifications or repairs on this unit. Misuse of the product will void the warranty.

Hensley Thermodynamics Corporation is not liable for any injury or damaged cause by incorrect installation, maintenance, or operation of this HT Chiller resulting from failure to follow instructions and guidelines outlined in this manual.

Replacement of parts or subassemblies will be provided under warranty when they have failed due to faulty manufacturing. Misuse will void warranty.

Limited Warranty

The Limited Warranty for the HT Chiller is 2 years parts and labor starting the date of delivery. **This warranty is non-transferable.**

You will need the chiller unit **serial number** for all correspondence.

The unit's serial number is located on the back of the condenser.

MODEL NO. / MODÈLE NO. /	13ACK06A01	MFG. YRAG	09/2013
SERIAL NO. / N° DE SÉRIE	N081315406	OUTDOOR USE/ USAGE EXTÉRIEUR	
PHASE	3	HERTZ	60
COMPRESSOR/ COMPRESSEUR	R.L.A. 30.4/30.4	L.R.A.	73.00
OUTDOOR FAN MOTOR/ MOTEUR VENTIL. EXT.	F.L.A. 0.80	HP.	1/6
MIN. SUPPLY CIRCUIT AMPLACITY/ COURANT ADMISSIBLE D'ALIM. MIN.		1A/1A	AMP
MAX. FUSE OR CKT. BRK. SIZE*/ CAL. MAX. DE FUSIBLE/DISJ*	25/20	AMP	
MIN. FUSE OR CKT. BRK. SIZE*/ CAL. MIN. DE FUSIBLE/DISJ*	25/20	AMP	
DESIGN PRESSURE HIGH/ PRESSION NOMINALE HAUTE	450 P510/1032	KPa	
DESIGN PRESSURE LOW/ PRESSION NOMINALE BASSE	250 P510/1174	KPa	
OUTDOOR UNITS FACTORY CHARGE/ CHARGE USINE D'UNITÉS EXT.	90.6 oz/2569g	R410A	
TOTAL SYSTEM CHARGE/ CHARGE TOTALE SYSTÈME		R410A	
SEE INSTRUCTIONS INSIDE ACCESS PANEL. VOIR INSTRUCTIONS DANS LE PANNEAU D'ACCÈS RHEEM SALES COMPANY, INC. FORT SMITH, ARKANSAS *NACR TYPE BREAKER FOR U.S.A./ DISJONCTEUR DIFFÉRENTIEL. 92-22950-17			

Limited Warranty – Parts and Labor – 2 years

SCOPE OF WARRANTY AND EQUIPMENT COVERED: The products covered by this Limited Warranty. Hensley Thermodynamics (Manufacturer) warrants the Covered Equipment to be free from defects in materials and workmanship, and will repair or replace, at its option, ANY PART of Covered Equipment which fails in normal use and service within the Applicable Warranty Periods in accordance with the terms, including, but not limited to, the specific exclusions set forth below, of this Limited Warranty and subject to the Manufacturer's right to inspect and validate the warranty claim as set forth below. If an exact replacement is not available, an equivalent unit or credit will be provided. The replacement will be warranted for only the unexpired portion of the original Applicable Warranty Period. If government regulations, industry certification or similar standards require the replacement unit to have features not found in the defective unit, you will be charged for the difference for those required features. If you pay the difference, you will also receive a completely new Limited Warranty for the new replacement unit. The Manufacturer does not authorize or warranty any online/Internet sale of equipment through auction or any other method of unapproved online sales direct to the consumer, nor the sale of equipment by liquidators. The ONLY approved online sales are through the Manufacture's websites: www.HTChillers.com and www.HensleyThermodynamics.com

EFFECTIVE DATE AND APPLICABLE WARRANTY PERIODS: The Effective Date of warranty coverage is the date of sale plus 2 years.

EXCLUSIONS – In addition to the specific exclusions set forth in the other sections of this Limited Warranty document, THIS Limited Warranty WILL NOT APPLY TO: A) damages, malfunctions, or failures resulting from failure to properly install, operate or maintain Covered Equipment in accordance with the Manufacturer's instructions

B) damages, malfunctions, or failures caused by misuse, accident, contaminated or corrosive atmosphere, vandalism, freight damage, fire, flood, freeze, lightning, acts of war, acts of God and the like

C) Covered Equipment which is not installed by qualified, trained personnel in accordance with applicable codes, ordinance, and good trade practices; or

D) damages, malfunctions, or failures caused by the use of any attachment, accessory or component not authorized by the Manufacture;

E) Covered equipment when operated with system components or accessories which do not match or meet the specifications recommended by the Manufacturer;

F) any Covered Equipment manufactured by the Manufacturer that has been sold to the consumer via the Internet from an unapproved website or auction website. Online sales are only authorized through www.HTChillers.com and www.HensleyThermodynamics.com

SHIPPING COSTS: This Limited Warranty does NOT cover shipping costs. You are responsible for the cost of shipping warranty replacement parts from our factory to the location of your Covered Equipment. You also are responsible for the cost of shipping failed parts and for incidental costs incurred locally, including handling charges. (You also must pay the shipping costs of returning the failed part to the port of entry into the continental United States.)

LABOR COSTS: This Limited Warranty covers any labor costs or expenses for repair that has been authorized by the Manufacturer.

HOW TO OBTAIN WARRANTY CLAIMS ASSISTANCE: You must promptly report any failure covered by this Warranty to the Manufacturer. Normally, your local HVAC air conditioning contractor will be able to take the necessary corrective action by obtaining replacement parts through the Manufacturer. The name and location of local HVAC contractors can be usually found in your telephone directory in the HVAC contractor section. HOWEVER, ANY PART REPLACEMENTS ARE MADE SUBJECT TO VALIDATION BY THE MANUFACTURER OF IN-WARRANTY COVERAGE. Any part to be replaced must be made available in exchange for the replacement.

EXCLUSIVE WARRANTY- LIMITATION OF LIABILITY: This Limited Warranty is the ONLY warranty given by the Manufacturer. This warranty is non-transferable. No one is authorized to make any warranties on behalf of the Manufacturer. ANY IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE WARRANTY PERIODS SPECIFIED IN THIS LIMITED WARRANTY. THE MANUFACTURER'S SOLE LIABILITY WITH RESPECT TO DEFECTIVE PARTS OR FAILURE SHALL BE AS SET FORTH IN THIS LIMITED WARRANTY, AND ANY CLAIMS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES ARE EXPRESSLY EXCLUDED. Some states do not allow limitations on how long an implied warranty lasts or for the exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

The Manufacture suggests that you immediately complete the Purchase and Installation Records section and retain this Limited Warranty Certificate in the event warranty service is needed and that you keep proper documentation.

Purchase and Installation Records

COMPLETE THE FOLLOWING INFORMATION FOR YOUR RECORDS – DO NOT MAIL

Date of Purchase: _____

Date of Delivery: _____

Model Number: _____

Serial Number: _____

Date of Original Installation: _____

Installing Contractor Name: _____

Contractor's address/phone: _____

Owner Name: _____

Address: _____

City/State/Zip: _____

Manufactured by Hensley Thermodynamics

P.O. Box 318, Ingram, Texas 78025 (mailing address)
454 Cade Loop, Ingram, Texas 78025 (shipping address)
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1-800-259-2720
www.HTChillers.com