# Trade Mark Waterjet Chillers

Trade Mark Hensley Corporation 1.830.367.1935 1.800.259.2720

# User Manual & Installation Guide



24000 Plus 36000 Plus

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Trade Mark Waterjet Chillers Ingram, TX USA 1.830.367.1935 1.800.259.2720

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

# 24000 Plus

Model 22301

# 36000 Plus

Model 32301

Model 32303

Model 34603

Trade Mark Waterjet Chiller User Manual & Installation Guide, Rev 3.

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# **Manufacturer Information**

### Introduction

Thank you for purchasing a Trade Mark Waterjet Chiller. As Waterjet Machine users ourselves, we have designed and manufactured this chiller to meet and exceed your Waterjet machine needs.

# **Contact Information**

**Trade Mark Waterjet Chillers** 

Sales & Technical Support call: 1-830-367-1935 or 1-800-259-2720 toll-free

Shipping Address: Trade Mark Waterjet Chillers

454 Cade Loop Ingram, TX 78025

Mailing Address: Trade Mark Waterjet Chillers

P.O. Box 318 Ingram, TX 78025

Visit us Online: www.TradeMarkWaterjetChillers.com

# **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. 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.

MARNING 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.

# Safety Labels on the Chiller Unit

#### Label

#### **Additional Information**



Only Qualified and Authorized Personnel may access areas marked with this label.

# Read Documentation before Use

This User Manual & Installation Guide contains important installation and operating instructions and should be read thoroughly before attempting to run the unit.

# **Equipment Usage**

This Trade Mark Chiller Unit is specifically designed for cooling water for waterjet cutting machines and is not intended for use other than described in this manual. This Chiller Unit is designed to use water only.

# Structural Support

The Chiller Unit is mounted on steel legs; however, underlying, level and structurally sound support must be provided. Failure to provide proper support may result in personal injury and / or damage to the Chiller Unit.

# **Chiller Unit Cabinet / Compressor Mechanical Strength**

Do not stack, mount or lean anything on the Chiller Unit. Any external loads or stresses may result in personal injury and / or damage to the Chiller Unit.

# **Access by Qualified Personnel Only**

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

# **Electrical Precautions**

The Chiller Unit must be grounded through your electrical power source. Prior to any installation work or standard maintenance, the Chiller Unit must be powered off and disconnected from the main power supply. Only properly trained and qualified personnel are authorized to perform work on an energized system.

# **Emergency Shutdown**

In case of emergency, disconnect power to the chiller unit at circuit breaker.

# **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 Chiller Unit for damage.

Call Trade Mark Waterjet Chiller Support at 1-830-367-1935 or 1-800-259-2720 toll-free within 72 hours of receipt if you have any questions or concerns.

# **Standard Warranty**

Date of Delivery:	
Serial Number*:	

\*The unit's serial number is located on the rear of the Chiller Barrel Compartment near the disconnect switch.

This warranty is non-transferable. The limited warranty is two (2) years parts and labor starting the date of delivery.

# **Repair Authorization**

All Chiller Unit warranty repairs must be first authorized by calling Trade Mark Waterjet Chillers technical support: 1-830-367-1935 or 1-800-259-2720 toll-free. Any repairs performed without prior authorization will be at owners expense and may void the warranty.

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

Only qualified personnel should 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 the unit. Misuse of the product will void the warranty.

Trade Mark Hensley Corporation is not liable for any injury or damaged cause by incorrect installation, maintenance, or operation of this Chiller Unit 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.

# **Product Description**

Trade Mark Waterjet Chillers are available in the following configurations:

24000 Plus

**Model 22301** – 2 Ton, 230 Volt, Single Phase

36000 Plus

**Model 32301** – 3 Ton, 230 Volt, Single Phase

**Model 32303** – 3 Ton, 230 Volt, Three Phase

Model 34603 - 3 Ton, 460 Volt, Three Phase

# **Purpose**

The Trade Mark Waterjet 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.

# **Description**

The Trade Mark Waterjet Chiller is a flow through system that efficiently provides chilled water to waterjet cutting machines. Our Chiller Unit 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.

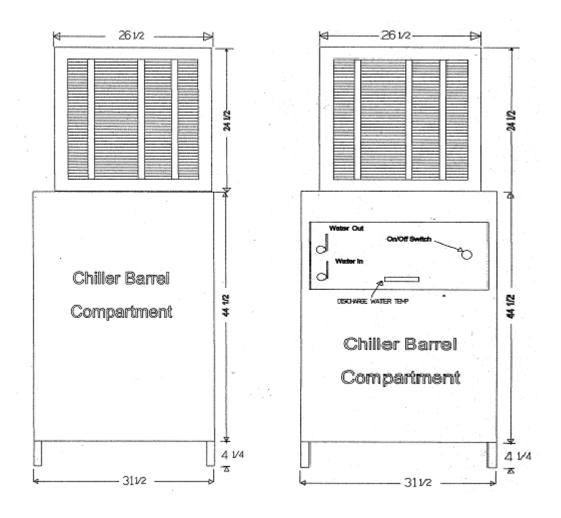
The Chiller Barrel Water Storage Tank holds approximately 55 gallons of water used for refrigeration energy storage. The storage tank has a capacity of "storing" 11,000 BTUs of energy and the unit produces a nominal 36,000 BTUs. The Chiller Unit can efficiently handle constant cutting even when the incoming water is above 90°F. Refrigerant lines submerged in the Chiller Barrel Water Storage Tank first remove heat from water passing 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's Storage Tank. This ability to store energy saves energy because the Chiller Unit is not running needlessly when you are working in light load conditions, changing material, and re-setting up.

When the Chiller Barrel water temperature reaches 45°F, the condensing unit cycles off to save energy. The water in the storage tank continues to absorb heat flowing 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 entire Chiller Unit is mounted on 4-inch metal legs. This design provides a means to easily transport the Chiller Unit with a pallet jack or forklift. As an optional installation feature, the Chiller Unit can be "field split"; therefore, allowing you to install the Chiller Barrel Water Storage Tank cabinet near the waterjet machine, and install the condensing unit up to 200 feet away from the work area.

**Dimensions and Weight** 

Chiller Unit	Weight	Width	Length	Height	
Empty	425 Pounds	044/	044/:	70.47:	
Filled with water	885 Pounds	31 ½ inches	31 ½ inches	73 ¼ inches	



Chiller Unit Side View

**Chiller Unit Front View** 

# **Product Components**

The Trade Mark Waterjet 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 Water Tank**

The R-20+ insulated Chiller Barrel Water 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 water tank where they are cooled both by the accompanying refrigerant lines and the chilled water.

# **Installation Instructions**

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

The Trade Mark Waterjet 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 installing the Chiller Unit:

☐ The Chiller Unit must be installed on a level surface.

Field Split the Chiller Unit" if necessary.
only where ambient temperatures do not fall below 32°F. Refer to the section "How to
The Chiller Barrel Compartment of the Chiller Unit is designed for indoor installation

- The Condensing Unit is designed for use with ambient temperatures of 55°F or more. If you are field splitting the Chiller Unit with the condensing unit being required to operate in conditions below 55°F, contact us or your authorized Trade Mark representative to install low ambient controls and/or accessories.
- Allow sufficient airflow around and vertical discharge area above the Condensing Unit for proper operation.
- ☐ The maximum ambient temperature for the Condensing Unit is 125°F.
- ☐ Access to required electrical source as follows:

Model		Freq.	Voltage (Volts)	Rated Load	Minimum	Fuse/HACR Breaker	
Model Number	Phase	(Hz)		Amperes (RLA)	Circuit Amperes	Min Amps	Max Amps
22301	1	60	230	13.5	15	25	30
32301	1	60	230	16.7	15	30	35
34303	3	60	230	10.4	15	20	20
34603	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.

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

☐ The Chiller Unit can be separated with the condensing unit being in one area (example: outside) and the Chiller Barrel Compartment in another area (example: inside.) To separate the unit, refer to the section "How to Field Split the Chiller Unit."

# **How to Open the Internal Chiller Barrel**

- 1. Press the on/off switch to the OFF position.
- 2. Disconnect electrical power from the Chiller Unit.
- 3. Remove the Chiller Barrel Water Tank compartment side panel by unscrewing the 12 screws around the perimeter.



4. Lift out the insulation pad.



5. Loosen and remove the clamp ring on the Chiller Barrel.





6. Lift off and remove the Chiller Barrel lid.



# **How to Fill the Chiller Barrel Water Storage Tank**

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

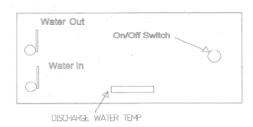
- 1. Follow the instruction to "How to Open the Internal Chiller Barrel."
- 2. Fill the Chiller Barrel with water to the water line indicator located on the inside of the tank. (Approximately 55 gallons.)



- 3. Replace the Chiller Barrel lid securely.
- 4. Replace and fasten the barrel ring onto the Chiller Barrel.
- 5. Replace the insulation pad.
- 6. Replace the Chiller Barrel side panel securing all 12 screws.

# Attaching Water In / Water Out to Chiller Unit

- 1. The Water In and the Water Out lines are ½" NPT valves.
- 2. Use a backup wrench to secure 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 Chiller Unit.



**TIP:** The chilled water leaving the Chiller Unit 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 Chiller Unit 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:** This Chiller Unit is a flow-through system with water flowing through a water pipe that is submerged in the Chiller Barrel Tank. This water pipe located in the tank is chilled by refrigerant lines and the cold water within the Chiller Barrel. The purpose of the water in the barrel is to store cooling energy, in other words, the water in the barrel stays in the barrel.

# How to Wire Power to the Chiller Unit



# A DANGER ELECTRICAL SHOCK HAZARD

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

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



# **A** CAUTION IMPORTANT NOTE:

As with all typical 3-phase systems, you can accidentally wire the unit incorrectly to cause the compressor motor to run backwards. This is evident by excessive compressor noise, no heat being rejected by the condenser fan within 1 minute, and 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.



# **A CAUTION** Water Tank Must Be Filled Before Power is Applied

Failure to follow this caution may result in equipment damage or improper operation.



# CAUTION Refrigerant Lines in The Water Tank Operate at Temperatures Below Freezing

- Do not touch refrigerant lines.
- Water Tank MUST be filled before power is applied to the unit to prevent freezing and breakage of flow through water lines.

**Note**: Operating this Chiller Unit on improper line voltage will void the warranty.

**Note**: Do not connect this Chiller Unit to an electrical source that has power fluctuations beyond approved limits.

# **Wiring Instructions**



# **ANGER** All Electrical Work Must Be Completed By a Qualified Person

Danger of electrical shock.

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

- 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.

# **Chiller Unit Operation**

Your Trade Mark Waterjet Chiller Unit arrives pre-set and ready to use after the barrel has been filled with water, water connection have been made, and proper electrical connections have been made.

# How to Turn On the Chiller Unit



CAUTION Confirm that the Chiller Barrel Water Tank has been properly filled.



**CAUTION** Confirm that the flow-through water source is turned on.

• Press the Chiller Unit on/off switch to the ON position. Indicator light on front of unit will illuminate.

# How to Turn Off the Chiller Unit

Simply press the on/off switch on the front of the Chiller Unit to the OFF position. Indicator light on front of unit will go out.

# Maintenance, Repairs and Storage

NOTE: Unless previously authorized by Trade Mark, No Warranty Repairs shall be attempted on any Chiller Unit components.

Please call Technical Support at 1-830-367-1935 or 1-800-259-2720 toll-free for assistance.



**DANGER** The unit must be disconnected from all electrical sources during maintenance and repair.

#### **Maintenance Schedule**

The Trade Mark Waterjet Chiller is designed to be virtually maintenance free.

As long as the Chiller Barrel Water Tank is securely sealed, water will not escape. If you move the Chiller Unit 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 Chiller Unit condensing unit during your yearly inspection.

# **Repair Advice**

Before attempting repairs on the Trade Mark Waterjet Chiller, contact Technical Support:

Telephone: 1-830-367-1935 or 1-800-259-2720 toll-free Central Time

Email: Support@TradeMarkWaterjetChillers.com

# Storing the Chiller Unit while Not in Service

If the Chiller Unit is to be taken out of service for an extended period of time, it is important that you drain all water from the Chiller Barrel Tank and flow-through water lines (see Caution below).



CAUTION If the Chiller Unit is going to be stored in a location that could potentially freeze, the water barrel tank MUST be drained and the water MUST be evacuated (purged) from the flow-through water lines.

> Even if freezing conditions are not anticipated, draining the water from the Chiller Barrel Tank and evacuating the flow-through water lines is recommended to prolong the life of your Chiller Unit.

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

- 1. Empty the Chiller Barrel water tank by following the instructions "How to Remove the Water from the Chiller Barrel."
- 2. Turn OFF the Chiller Unit by pressing the on/off switch to the OFF position.
- 3. Utilize a licensed electrician to disconnect the electrical power source.
- 4. Turn off the water and disconnect the incoming water source.
- 5. Disconnect the outgoing water source.
- 6. Access the Chiller Barrel Water Tank by removing the cabinet top, insulation pillow, tank ring, and tank lid.
- 7. Either siphon or pump the water out of the tank.
- 8. 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 Chiller Unit - OPTIONAL

The Chiller Unit is "Field Splitable" 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 wateriet work area to eliminate noise and heat exhaust.

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

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

# How to Field Split the Chiller Unit

**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.



MARNING The condensing unit uses 410A refrigerant. To prevent

personal injury and damage to equipment, only qualified refrigeration technicians are authorized to make the modifications outlined below.



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



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



MARNING The weight of the Chiller Unit when filled with water is 855 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 Open the Internal Chiller Barrel."
- 2. Empty the Chiller Barrel by following the instructions "How to Remove the Water from the Chiller Barrel."

# **Step 2: Pump Down Refrigerant**

- 1. With the Chiller Barrel empty, use High Pressure gauges (410A) and connect High and Low side hoses to appropriate pump-down valves at condensing unit.
- On Chiller Unit Control Panel, press the on/off switch to the ON position 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. Disconnect the electrical power from the chiller unit.
- 5. Close the Low side pump-down valve.

#### Step 3: Remove Internal Wiring



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

- 1. Completely remove all electrical power from the Chiller Unit 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 Chiller Unit Side Panel (right side when facing front of chiller.)



3. Disconnect the 24 Volt control wiring from the Control Panel.

# **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 the Chiller Barrel Compartment from the Condensing Unit

Disconnect the condensing unit from the Chiller Barrel top by removing the bolts located in the condensing unit.

# **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 side panel of the Chiller Barrel Compartment.
- 7. 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: Refill the Chiller Barrel Water Tank

- 1. Position the Chiller Barrel Compartment in its permanent location.
- 2. Fill the Chiller Barrel water tank to the waterline indicated on the inside of the tank. (Refer to the instructions "How to Fill the Chiller Barrel Water Storage Tank."
- 3. Secure the water tank cover and ring.
- Replace the insulation pad.
- 5. Secure the Chiller Barrel Cabinet side panel.

# **Step 8: Evacuate Refrigerant System**



CAUTION The Chiller Barrel water tank must be full BEFORE powering on the condensing unit to prevent damage to the unit.

- 1. Pull proper evacuation of the condensing unit system and release refrigerant accordingly.
- 2. Deliver power to the Chiller Unit by energizing the breakers or fuses depending on your electrical setup.
- 3. Power up the system by pressing the on/off switch on the Chiller Barrel Compartment Control Panel to the ON position and the system will begin cooling the water in the Chiller Barrel if the water is above 58°F.
- 4. Adjust refrigerant accordingly.

# Refrigeration Technician Section: Installing the Condensing Unit

MARNING 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 Trade Mark 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  $\pm 2$  ° ( $\pm 3/8$  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								
	LIQUID	RATED VAPOR						
UNIT SIZE	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.
- 2. 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.
- 3. 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.



Liquid Line Dryer

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.

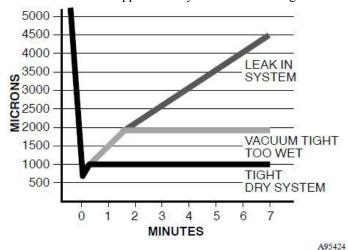


Fig. 4 - Deep Vacuum Graph

#### **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**

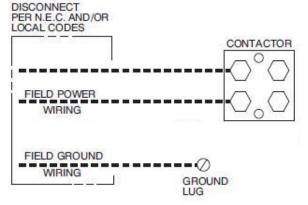
### ELECTRICAL SHOCK HAZARD

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.



A94025

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



# **CAUTION**

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this caution may result in personal injury, equipment damage or improper operation.

- Do not overcharge system with refrigerant.
- Do not operate unit in a vacuum or at negative pressure.
- Compressor dome temperatures may be hot.



# **CAUTION**

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury. Wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:

 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 Chiller Unit by pressing the on/off switch located on the Chiller Unit Cabinet to the ON position.

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:

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

<sup>\*</sup> Maximum actual length not to exceed 200 ft (61 m)

#### **Maximum Total Equivalent Length**

#### **Outdoor Unit ABOVE Indoor Unit**

Liquid Line Liquid Line Country AC with 410A Refrigerant Maximum Total Equivalent Length†: Outdoor unit For Vertical Separation ft (m)								or unit BELOV	W Indoor	
Size	Connection	Diam. w/ TXV	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*

<sup>\*</sup> Maximum actual length not to exceed 200 ft (61 m)

#### REFRIGERANT CHARGE ADJUSTMENTS

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

# **Charging Formula:**

[(Lineset oz/ft x total length) – (factory charge for lineset)] = charge adjustment

**Example:** System has 20 ft of line set. Formula: (.50 oz/ft x 20ft) - (3 oz.) = 7 oz.

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

<sup>&</sup>lt;sup>†</sup> Total equivalent length accounts for losses due to elbows or fitting.

<sup>†</sup> Total equivalent length accounts for losses due to elbows or fitting.

### 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	<b>Units On Same Level</b>	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,	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MAX FUSE** or
SERIES		MIN	MAX	LRA	RLA	FLA		CKT BRK AMPS
036	460/3	414	508	38	5.8	0.35	8.6	15

<sup>\*</sup> Permissible limits of the voltage range at which the unit will operate satisfactorily

‡ 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 (°C)
24,000 and 36,000	10° (5.6°)

<sup>†</sup> 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).

# **Trouble Shooting**

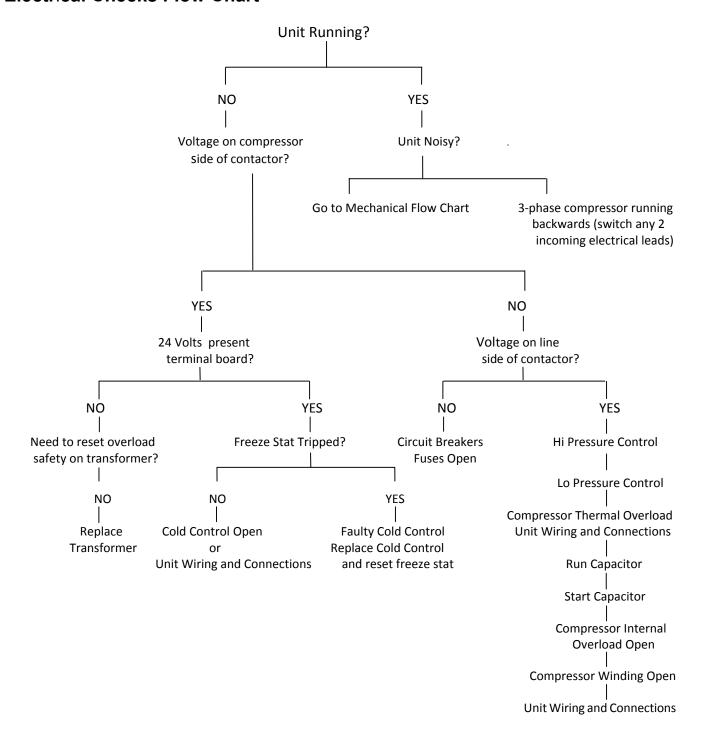
In diagnosing common faults in the Chiller Unit, it is useful to present the logical pattern of thought that is used by experienced technicians.

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.

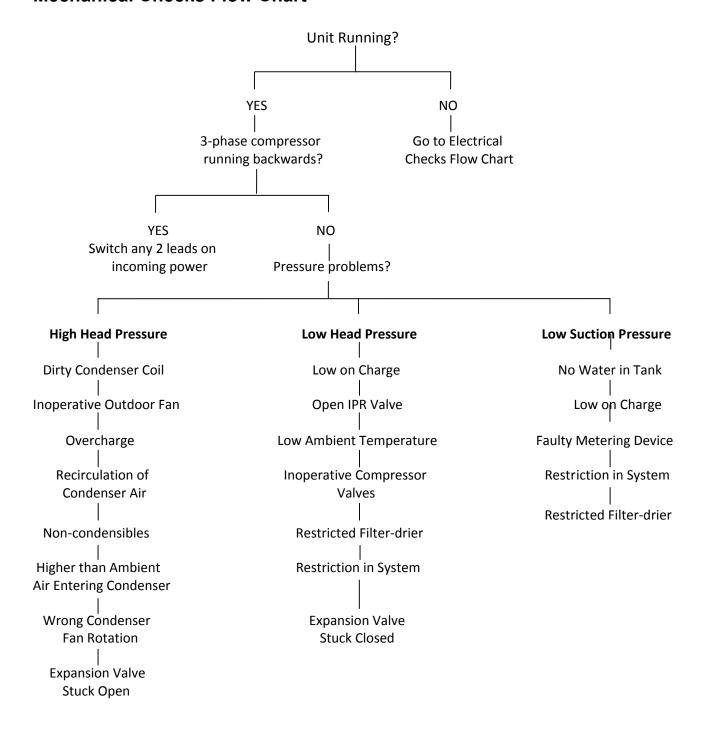
Through a series of yes and no answers, you will follow the logical path to a likely conclusion.

**TIP:** For assistance with any questions, please feel free to call Technical Support at: 1-830-367-1935 or 1-800-259-2720 toll-free.

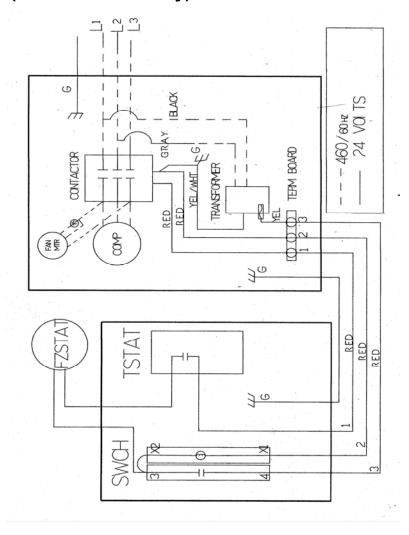
# **Electrical Checks Flow Chart**



# **Mechanical Checks Flow Chart**



# Wiring Diagram (3 Phase Units Only)



# Limited Warranty – Parts and Labor – 2 years

SCOPE OF WARRANTY AND EQUIPMENT COVERED: The products covered by this Limited Warranty. Trade Mark Waterjet Chillers 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 no 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, and 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 online sales direct to the consumer, nor the sale of equipment by liquidators.

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, THUS 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 in the United States or Canada
- D) Covered Equipment which is not installed by a qualified, trained HVAC professional in accordance with applicable codes, ordinances, and good trade practices: or
  - E) damages, malfunctions, or failures caused by the use of any attachment, accessory or component not authorized by the Manufacturer:
- F) Covered Equipment when operated with system components or accessories which do not match or meet the specifications recommended by the Manufacturer;
- G) any Covered Equipment manufactured by the Manufacturer that has been sold to the consumer via the internet or auction website, and/or has not been installed by a trained, qualified HVAC professional

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. (If in Alaska, Hawaii or Canada, you also must pay the shipping costs of returning the failed [art 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 manufacturer.

HOW TO OBTAIN WARRANTY CLAIMS ASSISTANCE: You must promptly report any failure covered by this Warranty to Trade Mark Waterjet Chillers. Normally, the installing contractor will be able to take the necessary corrective action by obtaining through the Manufacturer any replacement parts. The name and location of a local contractor can usually be found in your telephone directory or by contacting the Manufacturer. If necessary, the Manufacturer's office can advise you of the nearest authorized contractor. HOWEVER, ANY PART REPLACEMENTS ARE MADE SUBLIECT TO VALIDATION BY THE MANUFACTURER OF IN-WARRANTY COVERAGE. Any part to be replaced must be made available in exchange for the replacement.

ECLUSIVE WARRANTY-LIMITATION OF LIABILITY: This Limited Warranty is the ONLY warranty given by the Manufacturer. no one is authorized to make any warranties on behalf of the Manufacturer. ANY IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULARR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE WARRANTY PERIODS SPECIFIED IN THIS LIMITED WARRANTY. THE MANUFACTURER'S SOLE LIABILITYWITH 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 Manufacturer suggests that you immediately complete the information on the reverse side of this Limited Warranty and retain this Limited Warranty Certificate in the event warranty service is needed and that you keep proper documentation.

# Manufactured by Trade Mark Waterjet Chillers P.O. Box 318, Ingram, Texas 78025 (mailing address) 454 Cade Loop, Ingram, Texas 78025 (shipping address) 830-367-1935 office, 830-370-2362 cell

www.trademarkwaterjetchillers.com

# COMPLETE THE FOLLOWING INFORMATION: KEEP THIS WARRANTY FOR YOUR RECORDS – DO NOT MAIL

Owner Name:
Owner Address:
City/State Postal Code:
Date of Original Installation:
Installing Contractor Company Name:
City/State Postal Code:
Model Number:
Serial Number: