# Air Cooled Chillers
## J Series

## Instruction Manual

## ATTENTION

This manual provides the user, installer and maintenance technician the technical information for installation, opera ion, and routine maintenance to ensure smooth and long lasting operation of the CHILLER. This manual has been writ ten with general guidelines and specifications for this plat form of chillers. Always refer to your CHILLER's specific drawings that have shipped with the unit. When contacting the factory for service or replacement parts reference your CHILLER's serial and model numbers. These can be found on the data tag on the CHILLER or on the Datapack information that shipped with the unit.

## Information Subject to Change

While every effort has been made to ensure the accuracy and completeness of the information presented in this document, IMS Company assumes no responsibility and disclaims all liability for damages resulting from the use of this information or for any errors or omissions.

## Register Your Chiller

See instructions in Appendix E for registering your chiller online. Registration is important to ensure accessibility to the IMS Company global service network and maximize your warranty coverage.

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# Important Safety Instructions

This manual contains important safety instructions that should be followed during the installation and maintenance of the J Series chillers. Read this manual thoroughly before attempting to install or operate this unit. Failure to follow the instructions in this document may damage the equipment, cause hazardous conditions and void the warranty.

Adhere to all warnings, cautions and safety instructions on the unit and in this manual when installing, operating or maintaining the unit. Follow all operating and user instructions.

## WARNING

This unit may present arc flash and electric shock hazards that could cause injury and death. Open all local electric power disconnect switches and wear protective equipment before working within any J Series cabinet.

Customer must provide earth ground to the unit, per NEC, CEC and local codes, as applicable.

The controller does not isolate power from the unit, even in the Unit Off mode. The only way to ensure that there is no voltage inside the unit is to install and open a remote disconnect switch.

Only properly trained and qualified personnel should move, install, operate or service this equipment.

Follow all local codes.

## WARNING

The J Series has high-speed moving parts, including a fan and compressor motor. Contact with these parts can cause injury and death. Open all electric power disconnect switches before working in the unit.

Do not operate this unit with any cabinet panels removed.

## WARNING

High-pressure gas cylinders present a risk of explosive rupture if improperly handled or stored. A rupturing gas cylinder can cause property damage, injury and death.

The manufacturer's instructions and local safety regulations must be observed when handling and storing high pressure gas cylinders.

## CAUTION

Water and other fluids used in this equipment may leak or be spilled, causing a slip, trip or fall hazard that could cause injury. Hoses are routed throughout parts of the equipment and on the floor during use, which also may pose a hazard.

To reduce the likelihood of a slip, trip or fall hazard, the user must clean up any spilled water around the equipment in a timely manner and route hoses in a manner that will reduce or eliminate the possibility of slipping, tripping and falling.

## CAUTION

Some components become extremely hot during operation. Allow sufficient time for them to cool before working within the unit. Wear protective gloves and arm protection when working on or near hot components.

## NOTICE

Cooling coils, heat exchangers and piping systems that are connected to open cooling towers or other open water/glycol systems are at high risk of freezing and premature corrosion. Fluids in these systems must contain the proper antifreeze and inhibitors to prevent freezing.

Read and follow individual unit installation instructions for precautions regarding fluid system design, material selection and use of field-provided devices. Never use automotive antifreeze in a J Series chiller.

## NOTICE

Improper installation, application and service practices can result in water leakage from the unit, causing damage to property.

Do not locate the unit directly above any equipment that could sustain water damage.

## NOTICE

Improper storage can cause damage to the unit.

Keep the unit upright, indoors and protected from dampness, freezing temperatures and contact damage.

## NOTICE

Using the wrong type of refrigerant or mixing refrigerant types can damage the unit and degrade performance.

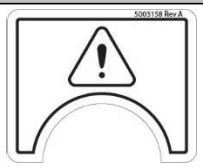
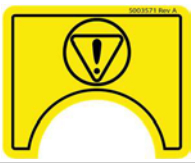
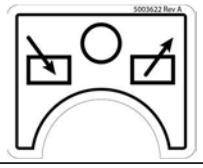
See the data tag located on the back of the chiller for the specific refrigerant type used. Other types of refrigerant gases must not be substituted for the refrigerant noted on the data tag..

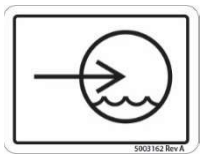
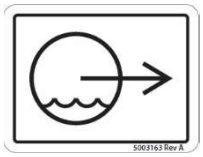
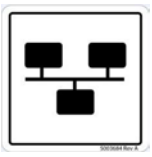
## General Safety Guidelines

- Do not weld or carry out any operation that produces heat near a system that contains oil or flammable liquids. Systems that may contain oil or flammable liquids must be drained and cleaned before being exposed to a procedure that involves a heat source. Exercise caution when welding or making any repair that generates heat, flames or sparks. Protect adjacent areas with non-flammable material.
- Never weld or modify any vessel that may be put under pressure.
- Inspect and clean heat transfer surfaces, particularly condenser fins, regularly to prevent high working temperature and pressure.
- Do not allow damage to safety valves and other pressure relief devices.
- Never use an open flame to inspect any part of the machine.
- Reattach all guards after finishing repairs or maintenances work. Never leave tools, parts or cleaning supplies on or in the chiller.
- Clean the J Series chiller only with non-flammable cleaners. If a cleaner that releases toxic vapors or strong fumes is used for cleaning, take precautions to prevent any accumulation of the toxic vapors.

# Machine Label Definitions

*Table 3: Machine Label Definitions*

| Symbol | Description |
|---|---|
|  | Alarm Light |
|  | Emergency Stop |
|  | Local/Off/Remote |
|  | Tank Level High |
|  | Tank Level Low |
|  | Do No Remove Guards |
|  | Caution Fan Starts Automatically |

| Symbol | Description |
|---|---|
|  | Tank Drain |
|  | Fluid Inlet |
|  | Fluid Outlet |
|  | Tank Fill, No Tap Water, Refer to Manual |
|  | Electrical Shock Hazard Do Not Turn Off, Lock Out Tag Out, Refer to Manual |
|   | California Proposition 65 Warning |
|  | Network Connection |

# 1. Introduction

J Series chillers are portable, closed loop systems, designed to cool a liquid flow. Featuring 1/8 to 2 ton capacity (2,100 24,000 BTU/hr),the J Series air cooled chiller is ideal for indoor plug and play applications. The brazed - plate evaporator offers efficient cooling for many processes, including clean oil applications, welding and machine tools.

Included on the J Series is a high-quality digital controller that provides precise temperature control. The sloped face makes it easy to view the controller and provides surface to mount additional gauges and controls.

Connecting the J Series is easy with terminal strips for customer power and interlocking connections for easy field wiring. All fluid connections are on the same side of the unit. With portable casters and closed tank design, the J Series can be backed up to a piece of equipment and still have full view of the controller and fluid level gauge.

The J Series chillers are available in water and water/glycol models.

The J Series operating temperature range is 50-95ºF (10-35°C) The J Series output is factory set to 65° (18°C) This can be changed ±10°F (±7°C)

## 1.1 Product Summary

J Series Chillers offer the features and options below.

| Standard Features | Options |
|---|---|
| Air-Cooled, Closed Tank | Mechanical Auto Makeup (Refills Coolant Tank) |
| Capacity from 2,100 to 24,000 BTU/hr | Pressure Relief Bypass Valve |
| Water or Water/Glycol (70/30) | Various Voltage and Flow/Pressure Options |
| Stainless Steel Cabinet | Motorized Hot Gas Bypass Valve |
| Indoor Use Only | Low Coolant Flow Alarm (External Connection) |
| Fluid Setpoint 50ºF-80ºF | Internal Low Coolant Level Alarm |
| Operating Temperature Range: 50-95ºF (10-35°C) | |
| Temperature Stability ±3ºF (1.5°C) | |
| UL 1995 Certification | |

## 1.2 General Operating Conditions

**Temperature**—This equipment will operate correctly in its intended ambient, between 50 and 95°F (10 and 35°C). Operating in temperatures outside the 65°F (18°C) setpoint will affect the cooling capacity. Contact the factory for assistance if operating at temperatures outside the setpoint is necessary.

**Relative Humidity**—This equipment will operate correctly within an environment at 90% maximum relative humidity at the maximum recommended operating temperatures, 95°F (35°C). The user must take measures to prevent the harmful effects of condensation.

**Elevation**—This equipment will operate correctly at the rated ambient up to 3280 ft. (1000m) above mean sea level. Operation at higher elevations is possible at derated ambient temperatures. Contact the factory for details.

**Transportation and Storage**—This equipment has been protected against damage in transportation and by storage at temperatures of -13°F to 131°F (-25°C to 55°C) and for short periods up to 158°F (70°C). It has been packaged to prevent damage from the effects of normal humidity, vibration and shock.

## 1.3 Component Location

Front-mounted controls make the J Series chiller simple to use. Most models install with just power connections, external monitoring connections and piping. To ease maintenance, the filter, strainer, and coolant reservoir drain are accessible by removing a panel from the stainless steel cabinet.

## NOTICE

Risk of unit moving during installation, operation and service. Can cause damage to unit and other equipment.

The casters must be locked whenever the J Series chiller is not being moved. The casters must be locked before the J Series chiller is started and must remain locked while it is operating. Vibration during chiller operation could cause the chiller to move, which could cause kinked hoses and disconnected power supply.

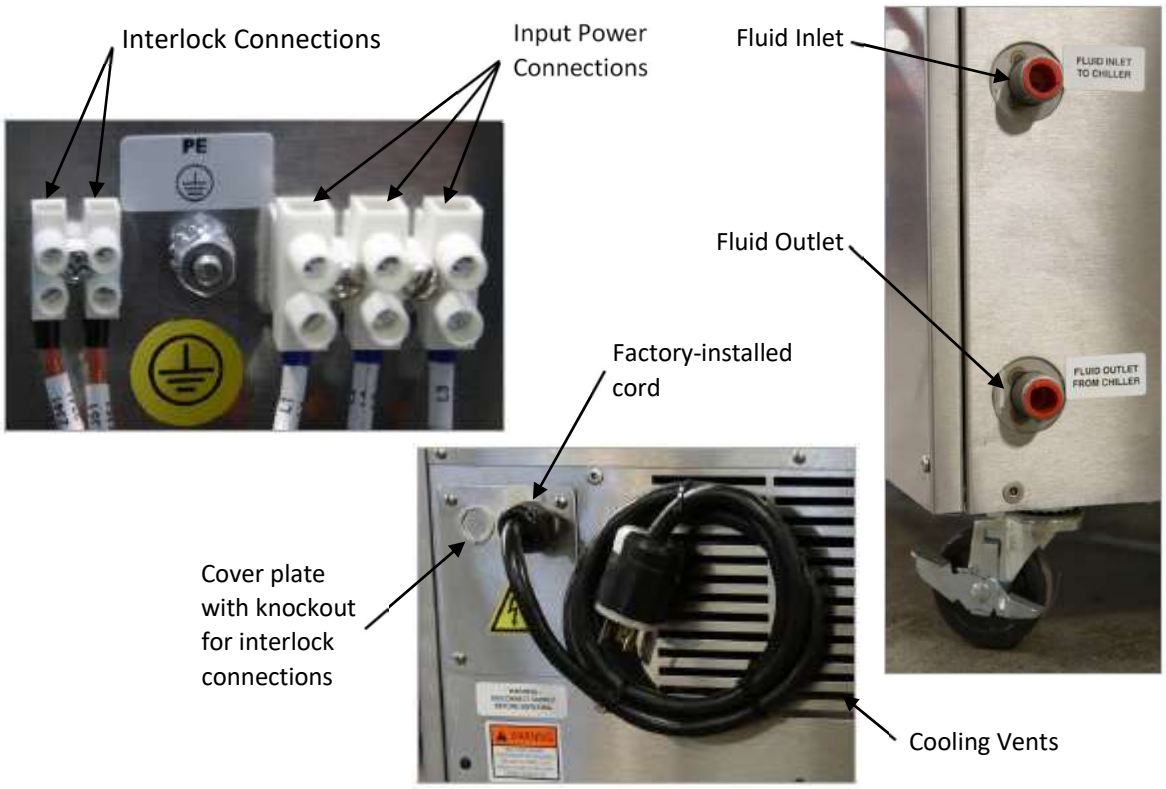



*Figure 2: Typical Features - Rear*

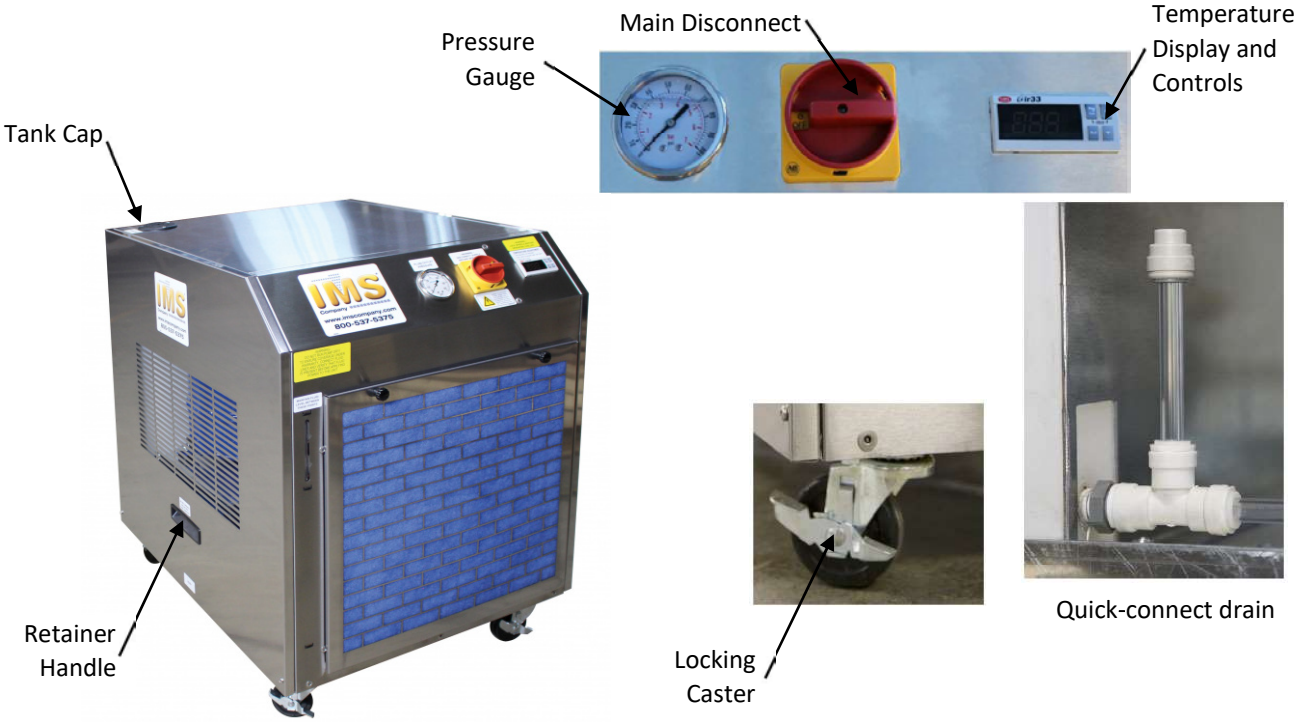



*Figure 3: Typical Features - Front*

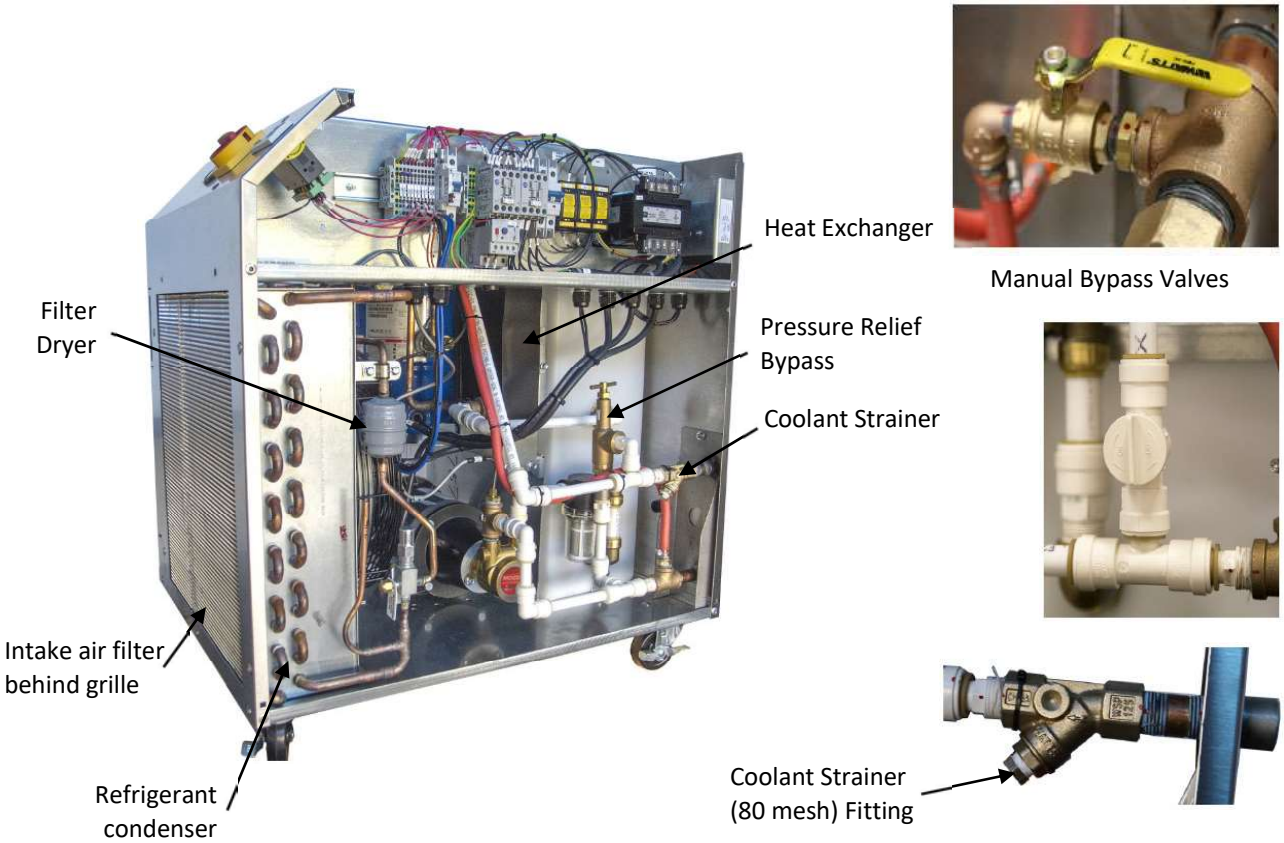



*Figure 4: Typical Components – Electrical Enclosure Side*

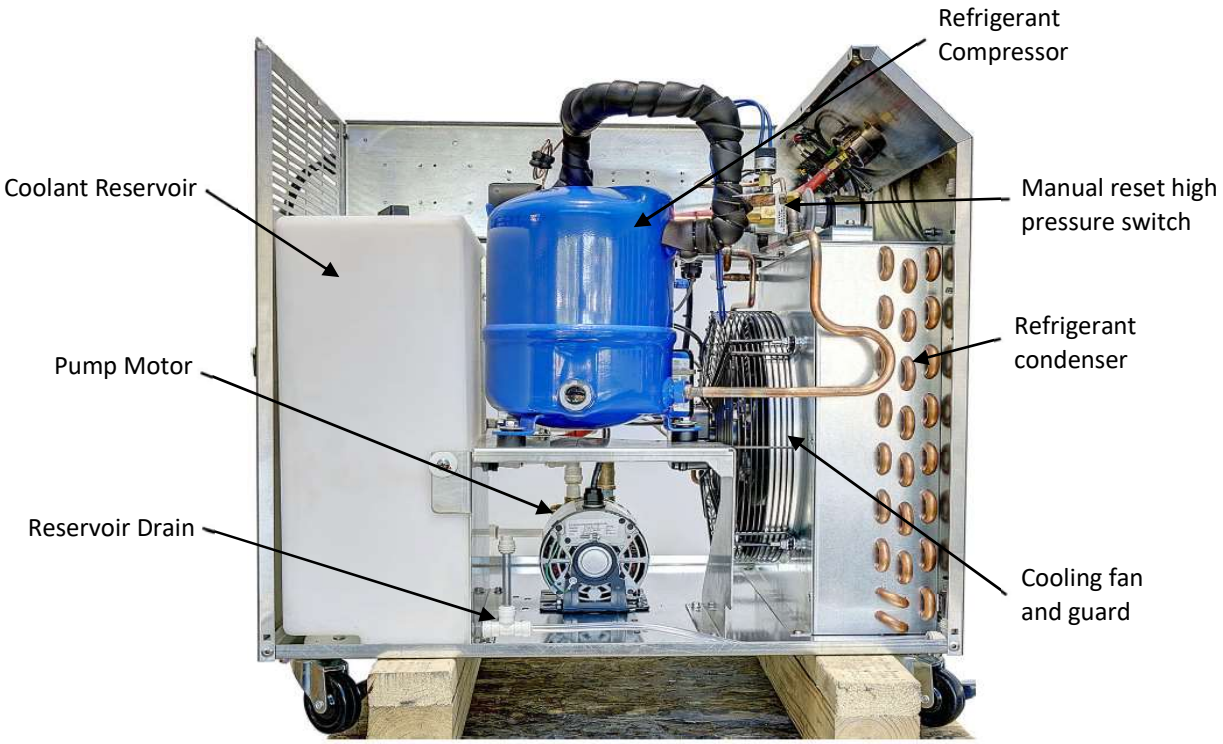



*Figure 5: Typical Components - Internal*

# 2 Installation

**WARNING**

This unit may present arc flash and electric shock hazards that could cause injury and death. Open all local electric power disconnect switches and wear protective equipment before working within any J Series cabinet.

Customer must provide earth ground to the unit, per NEC, CEC and local codes, as applicable.

The controller does not isolate power from the unit, even in the Unit Off mode. To ensure that there is no voltage inside the unit, is to turn off the chiller with the disconnect switch.

Only properly trained and qualified personnel should move, install, operate or service this equipment.

Follow all local codes.

## 2.1 Location Considerations

J Series chillers require no special preparation. J Series chillers are designed for installation indoors on a hard, flat, level surface. The room must be free of excessive moisture and corrosive substances.

The chiller must be installed in a location where it is able to dissipate heat efficiently and where there is adequate clearance for service. Leave adequate access to the top of the chiller for filling the tank as needed.

The J Series chiller must be installed at least 3 ft. (1m) from walls or large pieces of equipment that could inhibit airflow.

Airflow into and out of the chiller must not be restricted or deflected in such a way that causes air exiting the chiller to be recirculated into the chiller's air inlet.

The installation location must have the required electrical connections for the J Series' input power. Check the serial tag on the J Series chiller to be sure the available power matches the unit's required voltage and frequency rating. The unit is designed to tolerate deviations of ±10% from the rated line voltage.

The power feed must be connected to a properly grounded source for the J Series' internal grounding to function properly. It is the installer's responsibility to ensure proper grounding. Follow all local, state and national electrical codes in wiring for the J Series.

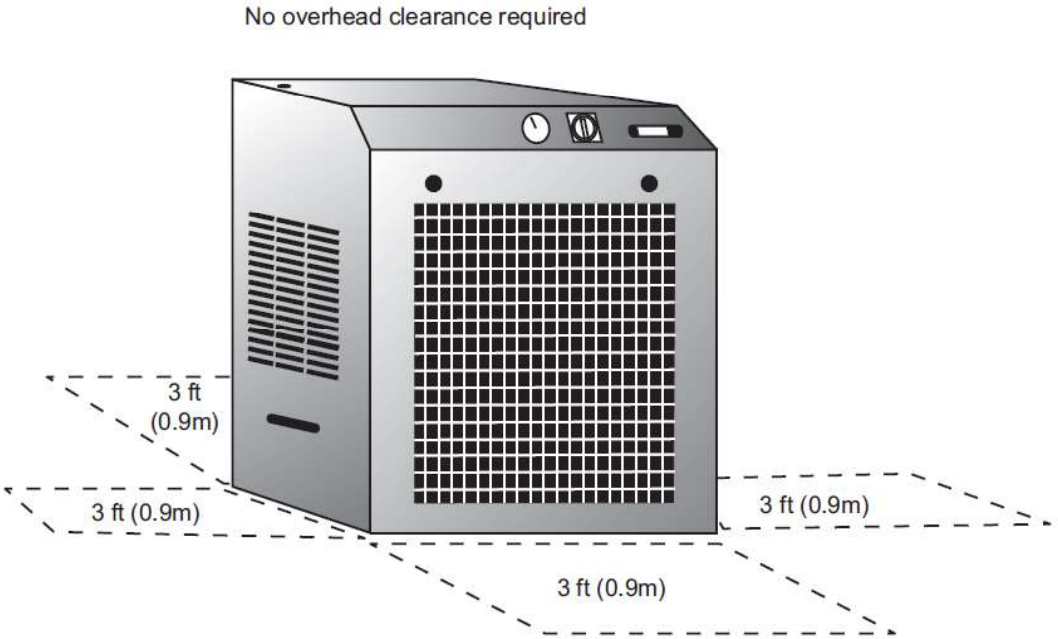



*Figure 6: Installation Clearances*

## 2.2 Unpacking and Positioning

The J Series chiller is shipped on a skid with protective packing that should remain in place until the unit is near its installation location:

- Corrugated cardboard
- Plastic shrink wrap
- Foam corner padding
- Strapping bands

## 2.3 Checking for Shipping Damage

**NOTICE**

Keep the J Series upright, indoors and protected from dampness, freezing temperatures and contact damage.

When the J Series chiller arrives and before unpacking it, verify that the shipment matches the bill of lading.

Inspect the J Series chiller immediately for signs of shipping damage visible and concealed. Damage to the card - board or to the wood skid indicates likely damage and may require removing a panel. For initial access, use a Phillips screwdriver for panel removal.

## 2.4 Packaging Materials – All Models

Most material used to package this unit is recyclable. Please save it for future use or recycle it.

## 2.5 Moving the J Series

**NOTICE**

Improper handling with a forklift or pallet jack can damage the J Series.

Keep the forklift tines level and at a height that will fit below the skid. Lift the skid and chiller only as high as necessary to clear any obstructions on the floor.

IMS Company recommends using a forklift or pallet jack to move the J Series chiller for long distances. The unit should be kept in its packing and on its shipping skid while it is moved to its installation location.

Most J Series chillers are equipped with casters for rolling the unit over smooth surfaces. Avoid any large holes or level changes that could cause damage to the casters.

### 2.5.1 Removing the Chiller from the Shipping Skid

**WARNING**

The chiller is heavy. Exercise caution when lifting the unit to prevent it from tipping over. If the unit falls off the forklift or pallet jack's tines, it could cause damage to the unit or other property and could cause injury or death.

To lift the unit, insert the tines all the way under the chiller and spread the tines as far apart as possible.

Lift the chiller only enough to slide the skid out from under the chiller.

**WARNING**

The chiller is only intended to be lifted from the sides (filter or door). Lifting the chiller from the ends (Electrical enclosure or plumbing I/O) can cause it to tip and fall leading to injury or death.

The J Series chiller is secured to the skid for shipping with metal bands. To remove the unit from the skid:

1. Move the unit as close as practical to its installation location.
2. Remove the protective carton, using a 3/8" wrench or blade screwdriver (see **Figure 7**). The carton is held in place by eight screws, three on each longer side and one on each shorter side.
3. Cut the two metal bands holding the unit to the skid (see **Figure 7**).
4. Cut or unwrap the shrink-wrap from the unit (see **Figure 7**).
5. Use a forklift or pallet jack to lift the unit until the casters clear the top boards of the skid.
6. Pull the skid from under the unit.
7. Lower the J Series chiller to the floor.
8. Move the chiller to its service location.
9. Lock the casters.

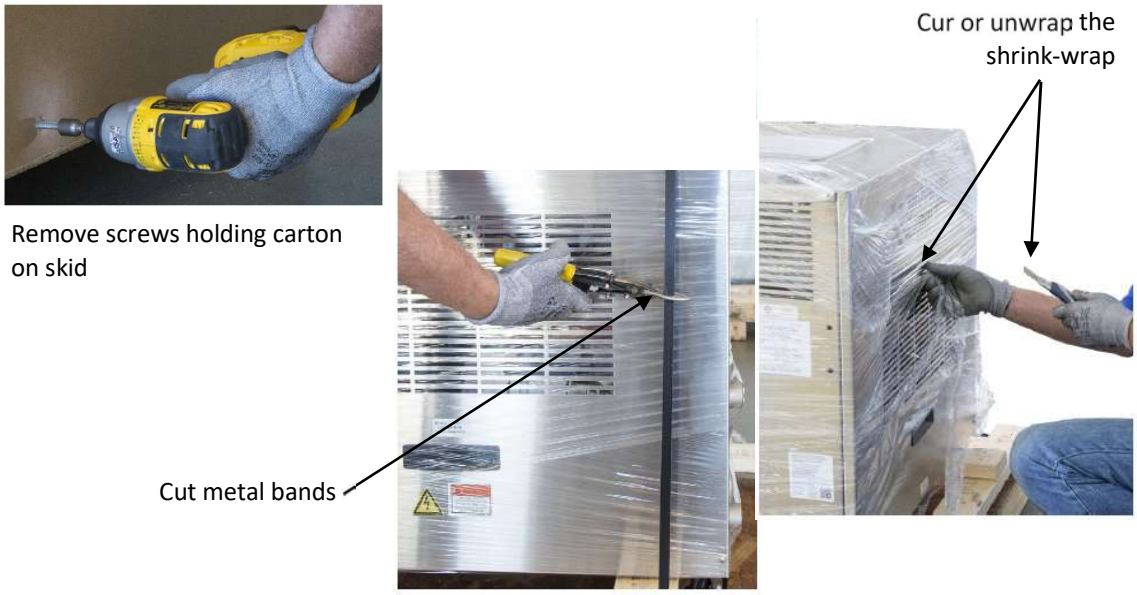



*Figure 7: Unpacking the J Series*

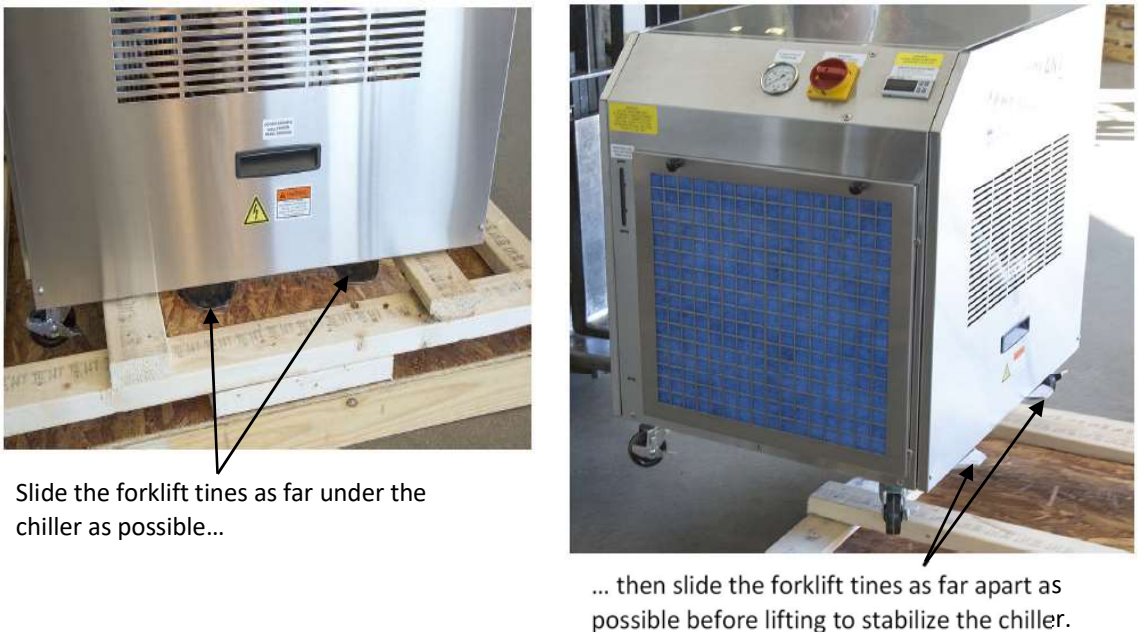



*Figure 8: Move the J Series Chiller with a Forklift*

## 2.6 Connections and System Setup

Installing the J Series chiller requires connecting the proper input electrical power, any external monitoring and piping to carry coolant to the application. The unit is charged at the factory with refrigerant. The coolant tank must be filled with the proper amount of water or water/glycol mixture before startup.

### WARNING

This procedure involves a risk of electric shock that could cause property damage, injury and death.

Electrical connections, particularly hard-wired connections, should be done only by properly trained and certified electricians wearing proper protective gear and using properly insulated tools.

Before beginning to make any electrical connections to the J Series chiller:

- Verify that the input power source matches the J Series chiller's electrical requirements; refer to the specifications information that shipped with the chiller and refer to the nameplate on the chiller.
- Verify that the unit's Main Disconnect on the front of the unit is Off.
- Lock out the input power wiring connections and place a warning tag on the connecting point to prevent power from being reconnected.
- Use a voltmeter to verify that the input power is Off.

### CAUTION

Water and other fluids used in this equipment may leak or be spilled, causing a slip, trip or fall hazard that could cause injury. Hoses are routed throughout parts of the equipment and on the floor during use, which also may pose a hazard.

To reduce the likelihood of a slip, trip or fall hazard, the user must clean up any spilled water around the equipment in a timely manner and route hoses in a manner that will reduce or eliminate the possibility of slipping, tripping and falling.

## NOTICE

Verify that the piping to and from the application to be cooled are correctly connected to the J Series pipes. Improper connections would prevent coolant flow, damaging the J Series and the connected unit. Check the external piping, especially flexible piping, and remove any kinks.

Some models have a factory-installed power cord. The 1.5 ton and 2 ton models, as well as all three-phase models have hard-wired electrical connections; see **Figure 2**. The electrical connections are on the top rear corner of the unit; see **Figure 9**. Hard-wire and control/monitoring terminal blocks are behind a plate at the top left corner of the rear of the chiller. The plate is held in place by four Phillips screws; refer to **Figure 2**.

Inlet and outlet coolant pipes are below the power connections. The unit ships with plastic inserts to protect the pipe threads and to keep foreign matter out of the pipes.

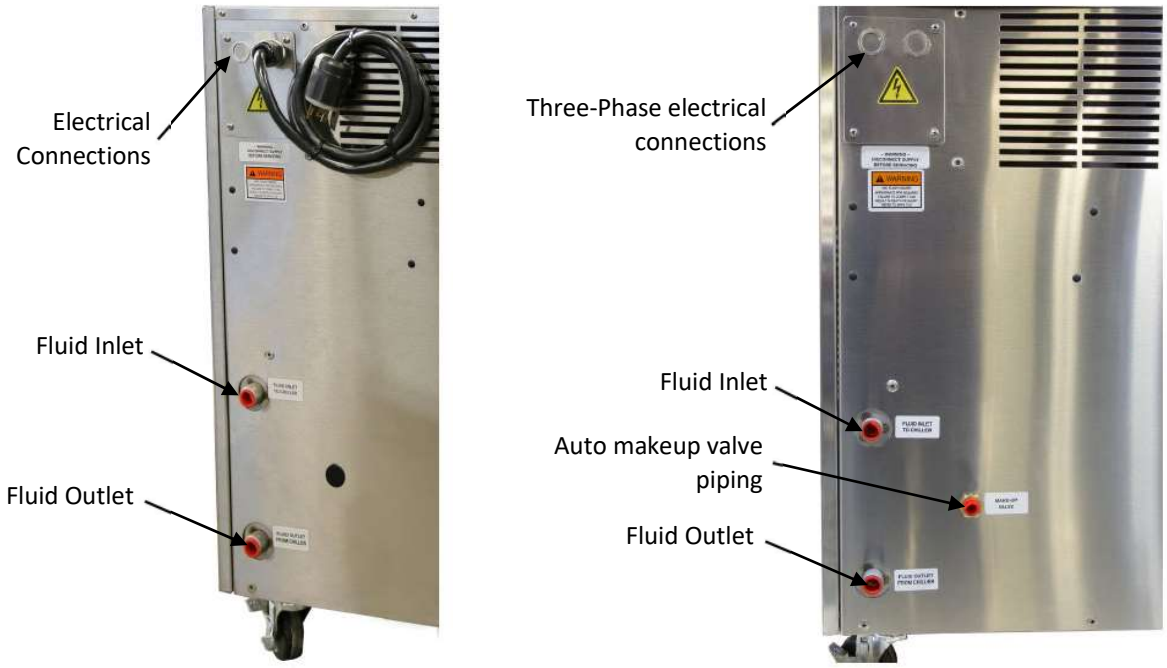



*Figure 9: Electrical and Piping Connections – rear of Chiller*

### 2.6.1 Piping Connections

Before beginning to connect the piping to the J Series chiller, inspect the hoses and piping to be used. Verify that there are no leaks or damaged sections. Connect the piping to a water source and verify that it is clear of debris and contaminants.

To install the J Series chiller:

1. Move the J Series to its operating location.
2. Lock its casters or otherwise immobilize the chiller.
3. Remove the plastic plugs from the inlet and outlet pipes. The inlet and outlet will be the same size, either 1" or 1/2", depending on the unit size (refer to **unit specific plumbing schematic for connection size**).
4. **Optional Auto Makeup Valve Connection**: Connect the automatic makeup valve piping to the appropriate refill medium, either water or a water/glycol solution. A float valve in the tank will open the connection when the fluid level drops below the minimum level. The float will shut Off the inflow when the coolant reaches the proper level.

5. Connect the application's piping to the J Series. Note that the J Series chiller's pipes are labeled for proper connection.

6. Check the chiller's strainer to verify that the plug is properly installed (refer to **Figure 4** for the strainer's location).

7. Fill the internal reservoir with the proper amount of coolant, either water or water/glycol. The filler cap is on the top of the chiller.

## Note

Additional coolant may be required after the J Series has started up and run a short time because the tank will supply coolant to the external piping.

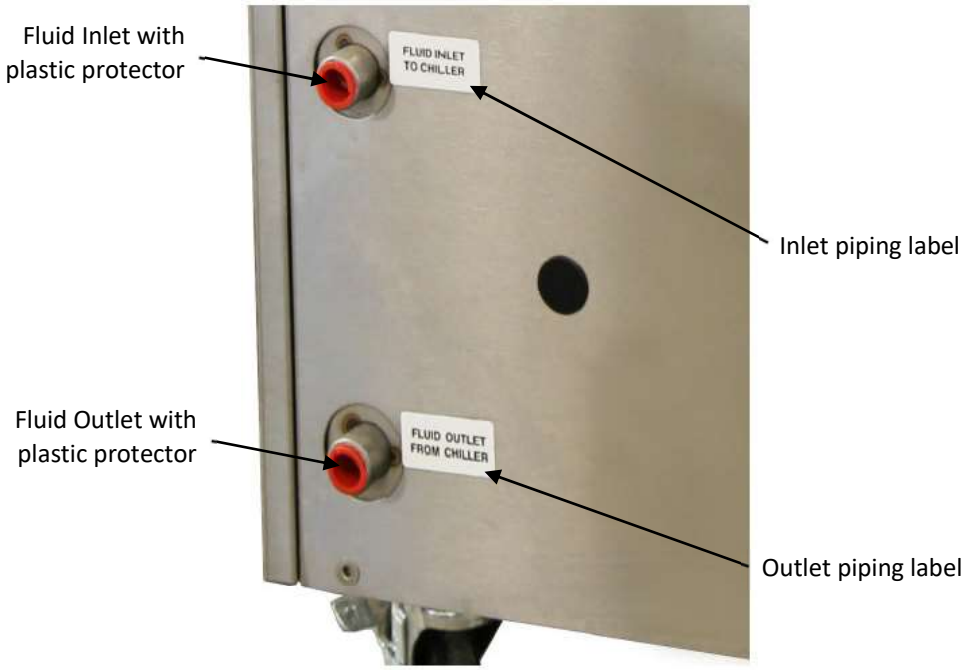



*Figure 10: Typical Piping Connections*

## 2.7 Process Coolant – Water or Water/Glycol

**WARNING**

Exercise caution when connecting pipes and wiring. Any holes or cut in the J Series chiller must not reduce the ingress protection of the panel.

IMS recommends using an industrial inhibited glycol and water mixture in its water chiller systems. A proper glycol mixture will prevent freezing and ensure consistent flow at the operating temperature. Inhibited glycols also prevent scale formation and corrosion. Water systems treated with inhibited glycol will also be protected from algae and bacteria that can degrade cooling. Ethylene and propylene are the two standard types of inhibited glycols that can be used in IMS chillers.

- Do not mix different types or brand names of glycol because some inhibitors will precipitate out of the solution.
- Do not use automotive grade antifreeze. These types of glycols are not designed for industrial applications and may cause problems with heat transfer or fluid flow. Many automotive glycols contain silicate-based inhibitors that can coat heat-exchangers, attack pump seals and form a flow-restricting gel.
- Check with the factory before using deionized water. De-ionized water is corrosive at low conductivity levels and it may damage components in some chillers.
- Check state and local codes when selecting the process fluid. Certain areas may have environmental regulations concerning the use and disposal of glycol or other additives.

Call 800-537-5375 to order glycol or visit www.imscompany.com

## 2.8 Glycol

Consider the following guidelines when using glycol, either alone or as a water/glycol solution.

### NOTICE

*Check state and local codes when selecting, preparing, using and disposing of the process fluid. Certain areas have environmental regulations about the use and disposal of glycol or other additives.*

*Failing to follow the relevant state and local codes and the guidelines below may cause damage to the environment, may damage the equipment and contravene environmental law.*

**Never Mix Glycol Types or Brands**

Do NOT mix different types or brand names of glycol. Mixing glycol types or brands can cause some inhibitors to precipitate out of the solution. Mixing glycols may also gel, which will clog filters and prevent proper flow rates. If the type of glycol is changed, the fluid system must be thoroughly drained and flushed.

**Never Use Automotive Antifreeze**

Do not use automotive grade antifreeze in the chiller. This type of glycol is not designed for industrial applications and may cause problems with heat transfer or fluid flow. Many automotive glycols contain silicate-based inhibitors that can coat heat exchangers, attack pump seals and form a flow-restricting gel.

**Ethylene Glycol—For Most Standard Industrial Applications**

Ethylene glycol is the standard heat-transfer fluid for most industrial applications. This type of glycol can be used in any application where a low-toxicity content is not required. Ethylene glycol has moderately acute oral toxicity and should not be used in processes where the fluid could come in contact with potable water, food, or beverage products.

**Propylene Glycol—For User-Contact Applications**

Propylene glycol maintains generally the same freeze protection and corrosion/algae prevention levels as ethylene glycol, but is less toxic. Propylene glycol is more readily disposable than ethylene glycol and safer to handle. Propylene glycol is commonly used in the food industry and in applications where the user may come in frequent contact with the fluid.

**Difference Between Ethylene and Propylene Glycol**

At very cold temperatures, propylene glycol become more viscous, changing the heat exchange rate slightly. Some chillers are designed to compensate for this viscosity, so either glycol type may be used. Ethylene is more widely used due to its lower cost.

**Applications Determine Water/Glycol Mix Percentages**

The location of the chiller and environmental concerns must be taken into account when selecting the proper mixture of glycol and water for the chiller process. An indoor process with no chance of freezing will require less glycol than a system located outdoors where low temperatures can cause the fluid to freeze and piping to burst.

Applications with operating temperatures below 20°F (-6°C) should use a glycol mixture equivalent to an outdoor system. After selecting the proper glycol and water types, use the following table to determine the recommended mixture depending on the application and location of the process. The glycol percentage figures in the chart below will apply to any brand of ethylene or propylene glycol.

*Table 4: Water/glycol proportions - freezing point*

| Application | Glycol% | Water% | Freezing Point |
|---|---|---|---|
| Indoor chiller and Process | 30 | 70 | 5˚F(-15˚C) |
| Low Temperature | 50 | 50 | -35˚F(-37˚C) |

***Values are based on performance of Koolant K-Kool-E brand of ethylene glycol*

## 2.9 Electrical Connections – Input power

### WARNING

Risk of improper wiring. Can cause equipment damage, injury or death.

Installation and service of this equipment should be done only by personnel who have been properly trained in the installation of precision cooling equipment

### WARNING

Open all electric power disconnect switches before working within the J Series. Use a voltmeter to verify that power is turned Off before making any electrical connections.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

Follow all local codes.

### WARNING

Risk of overheated electrical connection terminals can cause equipment damage.

Use copper wiring only. Make sure that all connections are tight.

To connect input power to the J Series.

**If the J Series has a factory-installed power cord:** Plug the input power cord into an appropriate receptacle.

**If the J Series has hard-wire connections**:

1. Extract the four screws holding the cover plate (with knockouts) to the J Series cabinet; refer to **Figure 9**
2. Remove the knockouts required.
3. Strip 1/2" (12.7mm) of insulation from the ends of the input power wiring.
4. Connect strain relief at the required position on the input power wiring and insert it in the knockout.

### Note

*If remote interlock connections will be made, delaying attachment of the strain relief to the input power cable until all connections are made will ease that work.*

5. Insert the wiring into the top-terminal wiring blocks, tightening them firmly with the screws. Refer to **Figure 3** for the location of the terminal blocks and to the documentation packet that shipped with the unit for specific connections to the unit.

### NOTICE

Improper electrical connections can damage the J Series and the application to be cooled.

Improper connections may cause the motors to run in reverse on three-phase units or may cause a short-circuit, damaging the unit.

The J Series input power connections are labeled. Verify that the input power connections match the J Series labeling and that the input power matches the unit's requirements (check the unit's serial tag).

### 2.9.1 Electrical Connections – Optional Interlock Wiring

1. Connect the interlock wiring if the optional alarms are present on your unit. Refer to **Figure 2** for the location of the terminal block and to the documentation packet for the wiring diagram. The interlock terminal blocks are marked as *2341* and *2351*.
2. Connect the interlock to the equipment as shown in the wiring diagram in the documentation packet that shipped with the unit.

**Remote Start Only**

3. Remove the factory-installed remote start/stop jumper (purple insulation) on the terminal block inside the J Series cabinet.
4. Replace the jumper with a dry contact. Refer to **Figure 11** for its location.
5. Retain the jumper for replacement if the remote Start/Stop will not be used with all applications.

**CAUTION**

Any holes or other cut outs must not reduce the ingress protection of the panel, which is IP55.

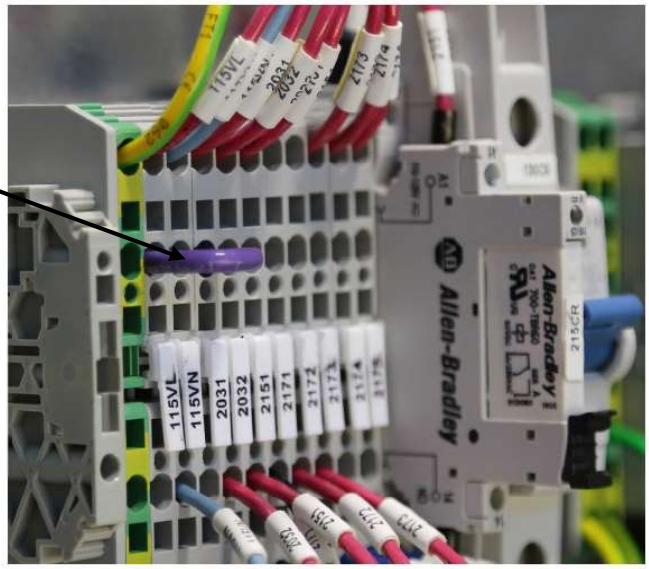



*Figure 11: Interlock Jumper Location*

## 2.10 Check Pump Motor Rotation (Three-Phase Units Only)

Input wiring connections must be correct for the pump motor to operate properly. Making improper phase connections could cause the motor to rotate in the wrong direction. To verify that the motor is rotating properly:

1. Look at the back of the pump motor to see the rotation arrow (see **Figure 12**).
2. Use the power switch on the front of the J Series to briefly power the pump motor so that it rotates a few times. Do not start the unit.
3. Watch the pump motor fan vanes to make sure it is turning as the arrow indicates.

**If the pump does not rotate in the proper direction**: Swap any two incoming power supply wires and check the rotation again. Do not change the wiring in the pump.

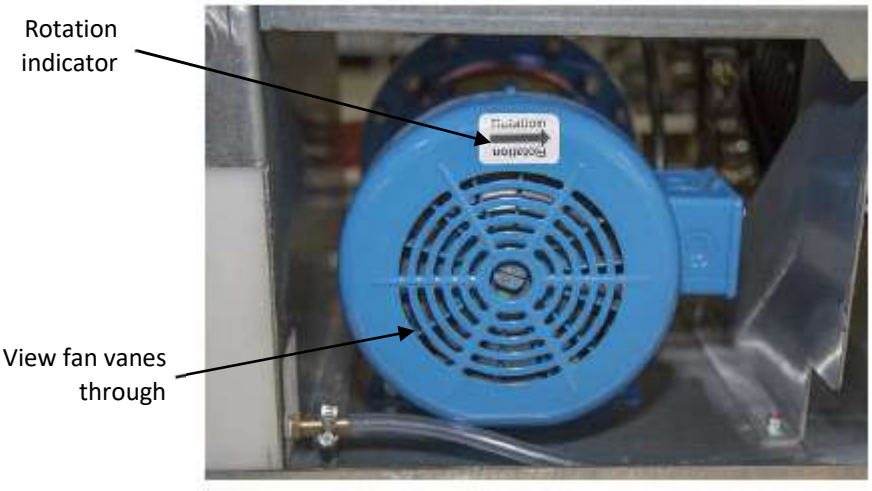



*Figure 12: Motor Rotation Indicator*

# 3. Checklist for Completed Installation

## 3.1 Moving and Placing Equipment

___ 1. Unpack and check received material.
___ 2. Proper clearance for service access and airflow has been maintained around the equipment.
___ 3. Equipment is level and mounting fasteners or casters are tight.

## 3.2 Electrical

___ 1. Supply voltage and phase matches equipment nameplate.
___ 2. All internal and external high-voltage and low-voltage wiring connections are correct.
___ 3. All internal and external high-voltage and low-voltage wiring connections are tight.
___ 4. The unit is properly grounded to an earth ground.
___ 5. Control transformer setting matches incoming power.
___ 6. Electrical service conforms to national and local codes.
___ 7. Pump rotates in the correct direction.

## 3.3 Piping

___ 1. Piping has been checked for leaks.
___ 2. Piping has been flushed to clear debris, pipe dope and contaminants.
___ 3. The plug for the chiller's internal strainer is installed.
___ 4. Piping is properly supported and is not kinked.
___ 5. Piping to and from the chiller is at least the same size as the chiller connections.
___ 6. Coolant reservoir is filled and closed.
___ 7. No closed valves exist between the chiller and the application to be cooled.

# 4. Operation

## 4.1 Initial Startup

**CAUTION**

All startup procedures must be followed precisely and performed in sequence. Failing to follow these procedures may cause damage to the unit, loss of coolant to the application and injury to personnel.

If trouble is encountered in putting a chiller in operation, the fault can often be traced to one of the control or safety devices. This outline can be used as a checklist for the initial startup and for subsequent startups if the chiller is taken out of service for a prolonged period.

___ 1. Verify that the main power source is connected properly and that it matches the voltage shown on the nameplate of the unit.

___ 2. Verify that all process chilled fluid piping connections are secure.

___ 3. Turn the main power On using the Main Disconnect on the front of the unit.

___ 4. Check the coolant flow.

___ 5. Check the coolant tank; any empty area in the piping will fill from the tank and it may require additional coolant.

___ 6. Check the coolant temperature on the LCD on the front of the unit.

## 4.2 Shutdown

**CAUTION**

All shutdown procedures must be followed precisely and performed in sequence. Failing to follow these procedures may cause damage to the unit, loss of coolant to the application and injury to personnel.

## 4.3 Routine Shutdown

### CAUTION

All shutdown procedures must be followed precisely and performed in sequence. Failing to follow these procedures may cause damage to the unit, loss of coolant to the application and injury to personnel.

### 4.3.1 Routine Shutdown

**To shut down the unit without disconnecting from the process:**

**Chiller Has an On/Off Switch**

1. Turn the On/Off switch to the Off position.
2. Wait 30 seconds for all motors to shut Off.

**Chiller Does NOT Have an On/Off Switch**

3. Turn Off the remote start, if provided.
4. Turn Off the main disconnect.

### NOTICE

Do not turn Off the main disconnect unless the J Series Chiller does NOT have an On/Off switch. Proper operation and quicker startup of the chiller requires maintaining input electrical power to the unit except when it must be disconnected for service.

**Service Shutdown**

1. Turn the On/Off switch, if present, to the Off position.
2. Turn Off the remote start, if provided.
3. Wait 30 seconds for all motors to shut down.
4. Move the main disconnect to the Off position.
5. Disengage the electrical supply to the chiller at the disconnecting device.

## 4.4 Basic Operation

The IR33 display will show the temperature of Probe B1 (fluid temperature). Other display options include temperature of Probe B2 (ambient temperature when used) and Setpoint 1 (St1) (temperature setpoint).

Other inputs and outputs may be used for specific applications. For those settings, refer to the program settings sheet in documentation package.

If the function of the controller is not being used it will display *n0*. To change the default screen information, use the *Down* arrow key and scroll to the desired display option. While scrolling, the display will flash between the parameter name and the value of that parameter. To select the desired display option hold the *Set* key for 3 seconds. If nothing is selected, the display will stop flashing and will return to the previous display option.

### 4.4.1 Changing the Setpoint

To change the setpoint, press and hold SET until *St1* appears. Use the Up and Down arrows to select the desired setpoint. Press *SET* to save.

# 5. Troubleshooting

**Fan Overload, Low Pressure and High Pressure**: These faults will prevent the compressor from starting, but will not display an error on the controller. If not resolved the fluid temperature will rise and trigger an overtemperature alarm at 10°F (°C) above the current setpoint.

**Pump #1 Overload**: This fault will cut power to the controller and all control circuits. To reset this fault, the Pump #1 overload must be reset manually in the electrical enclosure.

**Overtemperature Fault**: Output 1 relay will open and 1 will no longer be displayed on screen.

Error Codes that may display:

**E01**: Probe B1 error, check connection (Fluid Temperature Sensor).
**E02**: Probe B2 error, check connection (Ambient Temperature Sensor).
**E04**: Extreme over temperature (alarm will sound*).
**E05**: Extreme under temperature (alarm will sound*).
Any other codes will require service.
* Pressing mute will silence the audible alarm.

*Table 5: Alarm List*

| Alarm Code | Possible Cause | Corrective Action |
|---|---|---|
| E01 | Probe B1 fault. | • Turn Off main disconnect.<br>• Check NTC plug for tight, metal-to-metal connections. If connections are loose, remove the NTC plug and re-tighten the wires in the plug, then reconnect the plug to the controller. |
| B1, ST1, ST2 | B1 input is not set. | • Press the *Up* or *Down* arrow until b1 is displayed; press *Set* for 3 seconds to confirm setting. |
| B2, di 1 or di 2 and n0 | B1 input is not set. | • Press the *Up* or *Down* arrow until b1 is displayed; press *Set* for 3 seconds to confirm setting. |
| Steady n0 | B1 input is not set | • Press the *Up* or *Down* arrow until b1 is displayed; press *Set* for 3 seconds to confirm setting. |

*Table 6: Troubleshooting*

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| Chiller will not turn On. (No display on temperature controller) | 1. No power to chiller<br>2. Main disconnect is turned off<br>3. Blown fuses<br>4. Tripped starter overloads<br>5. Low fluid level in tank | 1. Check power feed to chiller<br>2. Turn On main disconnect<br>3. Check for and replace blown fuses<br>4. Reset any tripped overloads<br>5. Fill tank |
| Chiller turns On but nothing happens. (Display is On but no pump or cooling cycle) | 1. Remote signal is not active<br>2. Fault present within chiller<br>3. Fluid pump is not operating<br>4. Blown fuses<br>5. Incorrect phase rotation | 1. Check remote connection for signal<br>2. Determine fault and clear if possible<br>3. Check pump overload and power to contactor<br>4. Check and replace fuses<br>5. Correct phase rotation at main disconnect |
| Fluid pump is On but does not create required pressure or flow. (Flow fault condition) | 1. No fluid present at pump suction<br>2. Incorrect phase rotation | 1. Check fluid level and ensure there is fluid at the pump's suction<br>2. Correct phase rotation at main disconnect |

| | | |
|---|---|---|
| | 3. Pump/fluid system is air-bound<br>4. Fluid line size too small<br>5. Fluid/filters dirty<br>6. Pump discharge closed or blocked | 3. Vent pump cavity to flood the suction<br>4. Increase fluid lines outside the chiller<br>5. Clean fluid lines are open flow<br>6. Ensure all fluid system to establish flow |
| Fluid pump is operational but the refrigerant compressor will not run. | 1. Fluid temp is below set-point<br>2. Inadequate fluid flow<br>3. Low refrigerant pressure<br>4. High refrigerant pressure<br>5. Compressor overload is tripped<br>6. Compressor lube protector tripped (if equipped)<br>7. Blown fuses to compressor<br>8. Faulty temp controller output<br>9. Bad compressor | 1. Allow fluid system to increase in temperature<br>2. Correct fluid system to establish flow<br>3. See “Low refrigerant fault” section<br>4. See “High refrigerant fault” section<br>5. See “Compressor overload” section<br>6. Reset lube protector<br>7. Check and replace blown fuses<br>8. Consult GDTS customer service department<br>9. Consult GDTS customer service department |
| Chiller is running but does not maintain the desired fluid temperature. | 1. Fault present within chiller<br>2. Incorrect phase rotation<br>3. Fluid or heat exchanger is dirty<br>4. Loss of flow or fluid level<br>5. Low refrigerant pressure<br>6. Ambient temperature too high<br>7. Heat load exceeds chiller capacity | 1. Determine fault and clear if possible<br>2. Correct phase rotation at incoming power<br>3. Replace fluid and clean fluid system<br>4. Check fluid system for free flow and ensure chiller has adequate fluid level<br>5. Restart chiller or clear fault on controller. See “low refrigerant fault” section<br>6. Ensure chiller is operating within its design ambient temperature specification<br>7. Reduce heat load to chiller if possible. Check the factory specifications to ensure the chiller is not being operated more than ±10˚F of the original temperature setpoint or fluid flow |
| Low refrigerant pressure fault (automatically resets when acceptable pressure is reached) | 1. Low ambient air temperature<br>2. Loss of fluid through evaporator<br>3. Loss of refrigerant<br>4. Refrigerant solenoid not functional<br>5. Faulty pressure switch<br>6. Compressor crankcase not warm or faulty crankcase heater | 1. Ensure Chiller is operating within its designed ambient temperature specification<br>2. Check fluid flow and ensure evaporator is clean<br>3. Have a refrigeration technician leak check unit and charge with the appropriate refrigerant.<br>4. Check wiring to solenoid or replace valve<br>5. Replace pressure switch<br>6. Ensure main power disconnect has been on for at least 8 hours prior to use. Replace crankcase heater if faulty. |
| High refrigerant pressure fault - (automatically resets when acceptable pressure is reached) | 1. Air filters dirty<br>2. Condenser dirty<br>3. Incoming air too hot<br>4. Inoperative fans<br>5. Back panel out of chiller<br>6. Phase rotation incorrect<br>7. Refrigerant system overcharged | 1. Clean filters (see 10 – Maintenance)<br>2. Clean condenser (see 10 Maintenance)<br>3. Ensure that the chiller is properly ventilated with fresh air not exceeding 90˚F(32˚C), unless designed for high-ambient temperature operation<br>4. Check for blown fan fuses<br>5. Ensure all covers and panels are in chiller<br>6. Correct phase rotation at incoming power<br>7. Have a refrigerant technician ensure the system is properly charged |

# 6. Maintenance

Establishing and following a proper maintenance schedule will substantially reduce down time, reduce repair costs and extend useful lifetime for the chiller. Any cost of implementing these procedures will almost always more than pay for itself.

Prepare a checklist of the recommended service operations and when they are to be performed. A suggested list is included in 10.4 Suggested Maintenance Checklist. The checklist includes voltage readings, amperages, etc. so that they can be monitored over time. With this information, maintenance personnel may be able to correct a potential problem before it causes any downtime. For best results, these readings should be taken with a full heat load from process, preferably with similar operating conditions each time. The following is a list of suggested periodic maintenance.

Record all maintenance and repair work carried out on the unit and auxiliary equipment. The frequency and the nature of the work performed over a period can reveal adverse conditions that should be corrected and will reduce maintenance.

If replacement parts are needed use only original replacement parts.

- -

## 6.2 Cleaning External Electrical Parts

If it should become necessary to clean this equipment, disconnect the unit from its power source first. Do not use liquid cleaners, aerosols, abrasive pads, scouring powders or solvents, such as benzene or alcohol. Use a soft cloth lightly moistened with a mild detergent solution. Ensure the surface cleaned is fully dry before reconnecting power.

## 6.3 Cleaning Contaminated Refrigerant System

Cleaning out a very heavily contaminated refrigerant system, such as might result from a refrigerant compressor burnout may require services of a properly trained and qualified refrigeration engineer.

## 6.4 Maintenance Guidelines

Disposing of parts and waste material of any type must comply with national, state and local regulations. No waste material, solid or liquid, should be disposed of in a manner that drains into or placed into any body of water. Never burn waste. Recycle waste material when possible.

Use only the type of refrigerant gas specified on the unit's serial plate.

Follow all instructions about operation and maintenance strictly.

Maintain the chiller and all ancillary equipment and safety devices in good working order. Keep the unit clean. Cover components and openings during long idle periods and repair work.

Check the accuracy of temperature and pressure measuring devices regularly. Replace any measuring devices that show inaccurate readings.

## 6.4 Suggested Maintenance Checklist

### 6.4.1 Maintenance Checklist – Weekly

___ 1. Inspect and clean condenser and air filter.

Excessive buildup of dirt, oil and other debris on the condenser coil will cause refrigerant pressures to increase and prevent operation at full capacity. Ensure that the fins of the condenser are clean and not damaged to keep airflow at a maximum. Use compressed air at no more than 30 psi (2.0 bar; 200kPa) to blow out the condenser in the opposite direction of air flow.

___ 2. Check to make sure that the temperature is maintained close to the setpoint temperature. If the temperature stays more than 5°F (3°C) from the setpoint, there may be a problem with the chiller. If this is the case, refer to **Table 4** or contact IMS Company, 800.537.5375.

___ 3. Check the process fluid to be sure it is clean and free of contaminants. Check the reservoir, for debris and contaminants. Test the process fluid to ensure proper freeze and corrosion protection.

___ 4. Check for normal inlet and outlet fluid pressures through the chiller. A large pressure differential could indicate a plugged heat exchanger or dirty tank.

___ 5. Check refrigerant sight glass for air bubbles or moisture indication. If the sight glass indicates a refrigeration problem, have the unit serviced as soon as possible.

___ 6. Check the in-line strainer and remove any buildup. The fitting removes with a wrench, either 1/4" or 1/2".

___ 7. Inspect the fluid filter shortly after startup to determine how frequently they need changing. Set up a schedule for replacing the filter.

___ 8. Inspect all internal and external wiring for loose connections and damage.

___ 9. Check voltage and current draws on all motors and heaters. Refer to the chiller's electrical schematics or the motor nameplate for proper voltage and amperage ratings. Readings should be ±10% of the nameplate value and have a maximum difference of ±2% between each phase.

___ 10. Check the inside of the chiller for evidence of refrigerant leaks, such as oil spots or refrigeration lines covered in oil. Have a certified refrigeration technician make any repairs.

### 6.4.2 Maintenance Checklist – Monthly

___ 1. With the main disconnect shut Off, check the condition of electrical connections at all contactors, starters and controls. Check for loose or frayed wires.

___ 2. Check the incoming voltage to make sure it is within 10% of the design voltage for the chiller.

___ 3. Check the amp draws to each leg of the compressor and pump to confirm that they are drawing the proper current.

### 6.4.3 Maintenance Checklist – Every Three Months

___ 1. Have a qualified refrigeration technician inspect the operation of the entire unit to ensure proper operation.

___ 2. Have condenser cleaned if necessary.

### 6.4.4 Electrical Panel

The electric panel should be inspected for any loose electrical connections.

**WARNING**

Risk of electric shock. Can cause injury or death.
Open all local and remote electric power disconnect switches before working within the unit.
Be sure that power to the unit is shut down before attempting to tighten any fittings or connections.

### 6.4.5 Filter

The J Series chiller filter is in front of the unit, behind the grille. The fiberglass mat must be installed so that the blue side faces the exterior of the J Series chiller.

The filter should be inspected periodically, based on how much dust and other airborne debris is in the air. The filter can be cleaned if care is exercised, but it should be replaced when needed. The filter lays in the recessed front grille, which is hinged for easy opening. The grille on J Series chillers with the optional filter has knurled knobs for opening (See **Figure 13**).

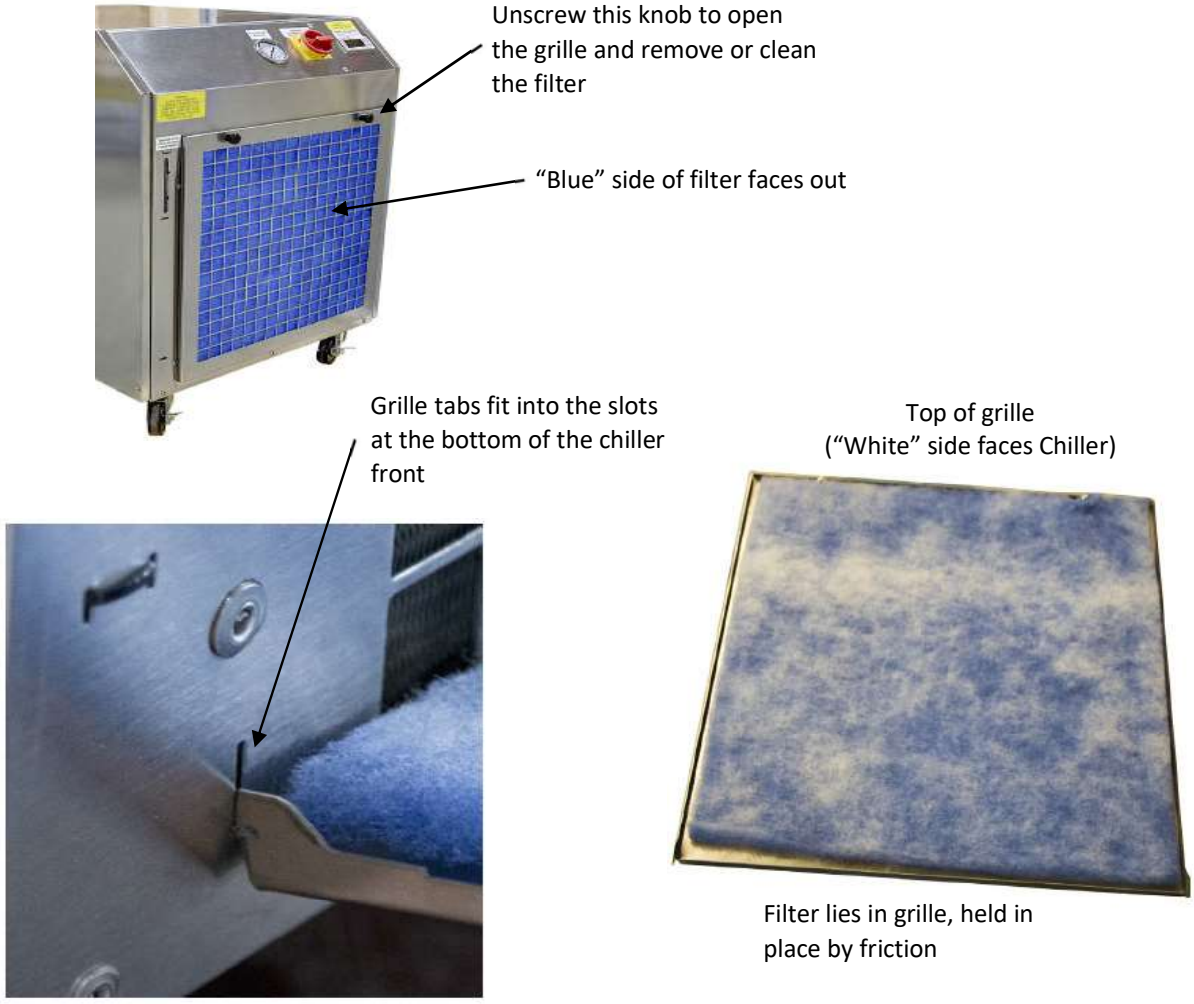



*Figure 13: Filter Replacement*

# 7. Disposal and Recycling Information

Most of the J Series chiller's components can be recycled when the unit reaches the end of its serviceable life. Fluids used in the chiller may be harmful to the environment and must be recycled or disposed of properly.

**NOTICE**

Check state and local codes when selecting, preparing, using and disposing of the process fluid. Certain areas have environmental regulations about the use and disposal of glycol or other additives.

Failing to follow the relevant state and local codes and the guidelines below may cause damage to the environment, may damage the equipment and contravene environmental law.

## 7.1 Recycling Methods

**Hydraulics, lubricants and other fluids** used in the J Series chiller must be recycled as required by local, state and national environmental laws and regulations. They must not be discharged into any type of sewer system or waterway or poured on the ground.

**Electronics** must be recycled as required local, state and national environmental laws and regulations. Many electrical and electronic components contain hazardous elements. These must be recycled. They must not be disposed of in waste disposal systems.

**Metals and other parts** of the J Series chiller must be recycled as required by local, state and national environmental laws and regulations.