

# MODEL YVAA AIR-COOLED SCREW COMPRESSOR CHILLER WITH VARIABLE SPEED DRIVE STYLE A

150-500 Tons  
525-1750 kW  
2 Compressor  
50 Hz  
HFC-134a  
For Asia Sourcing Only

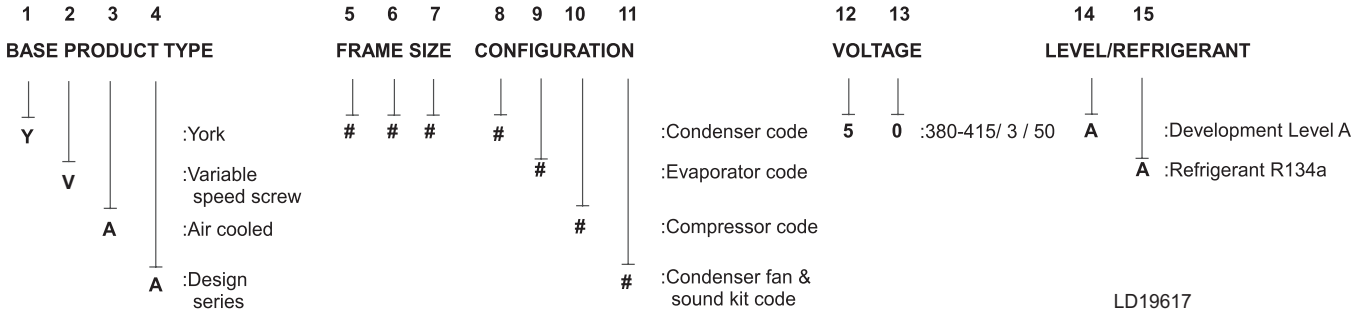


 **YORK**<sup>®</sup>

**INSTALL CONFIDENCE**

# Nomenclature

# YVAA 021 3AXX 50 AA



## Approvals

- AHRI 550/590 and 551/591– Water Chilling Packages Using the Vapor Compression Cycle
- AHRI 551/591 (SI)- Water Chilling Packages Using the Vapor Compression Cycle
- GB 19517 – National Safety Technical Code for Electric Equipment.
- GB 150/151 – Steel Pressure Vessels/Tubular Heat Exchangers.
- OSHA – Occupational Health and Safety Act.
- ISO – International Organization for Standardization

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# Introduction

For over 140 years, Johnson Controls has raised the bar of chiller design and customer expectations. We are raising the bar again with a leap forward in air-cooled chiller technology. Continuing the history of innovation in both compressor design and Variable Speed Drive (VSD) technology, Johnson Controls proudly introduces the YORK® YVAA.

In the past, the choice to use an air-cooled chiller came with the expectation of compromise, where simplicity of design and maintenance were traded for performance and efficiency. The new YVAA provides a better balance by combining the best of both - a high performance design that minimizes the total cost of ownership.

YORK YVAA model air-cooled chillers provide superior performance. Higher efficiency heat exchangers coupled with variable speed operation and smart controls elevate the system efficiency to a whole new level. The resulting benefit from YVAA chillers is much greater than the sum of its parts.

## **Efficiency: Reduce your consumption**

YVAA chillers are Johnson Controls' most efficient air-cooled chillers. The design offers a lighter, smaller and quieter package that minimizes the installed cost and maximizes usable building space. YVAA chillers are simpler in design with easy access to service components for reliable operation and efficient maintenance. With up to a 40% improvement in real world efficiency versus current products, YVAA sets the new standards for lowering energy use.

## **Sustainability: Improve your environmental footprint**

YVAA lowers both direct and indirect impact on the environment. It uses R134a refrigerant which has zero ozone depletion potential (ODP). The design minimizes the quantity of refrigerant used in the system. Every YVAA model helps LEED projects earn the Energy and Atmosphere Credit 4. The highest portion of green house gases is carbon dioxide generated from electric power plants. HVAC systems are one of the largest consumers of electricity in commercial buildings. YVAA chillers reduce the electricity usage, thereby contributing to reducing greenhouse gases and helping keep the planet cool.

## **Low Sound: Quiet operation makes you a good neighbor**

The variable speed technology on YVAA allows unparalleled low sound levels at off peak design conditions. This makes YVAA a great solution for sound sensitive zones. Several acoustic attenuation options such as smart controls (Silent Night™), aerodynamic fans, and effective sound enclosures allow the chiller to meet even the most stringent sound level requirements.

## **Confidence: Proven performance provides peace of mind**

YVAA design is proven by years of success with the previous generation of YORK VSD air-cooled screw chillers with thousands of machines operating in more than one hundred countries.

YVAA is configurable to be the perfect fit for your unique needs. YVAA offers an array of options that can be tailored and tuned to match the capacity, efficiency, sound and footprint for your specific application. Several variations of condenser fans, evaporator arrangements, sound kits, protection enclosures, and controls schemes are available to meet specific requirements for your site.

*YVAA chillers are Johnson Controls' most efficient air-cooled chillers. The design offers a lighter, smaller and quieter package that minimizes the installed costs*

## Unit Overview

### SEMI-HERMETIC YORK TWIN SCREW COMPRESSORS

The direct-drive, semi-hermetic rotary twin-screw compressors incorporate advanced technology in a rugged design. The continuous function, microprocessor controlled VSD provides smooth capacity control from 100% down to 10% of chiller capacity. State-of-the-art technology, obtained from decades of screw compressor design and manufacturing by FRICK®, ensures optimal efficiencies at all chiller load points. With no unloading steps or slide valves in the compressors, the YVAA variable speed driven compressors have 50% fewer moving parts than fixed speed compressors with slide valves. The YVAA compressor is one of the most efficient and reliable screw compressors in the industry.

### EVAPORATOR

The evaporator is a shell and tube, hybrid falling film type heat exchanger. It contains a balance of flooded and falling film technology to optimize efficiency, minimize refrigerant charge, and maintain reliable control. A specifically designed distribution system provides uniform refrigerant flow for optimum performance.

### CONDENSER

The YVAA introduces the microchannel coil to the YORK screw compressor chiller line. Microchannel coils are made of a single material to avoid galvanic corrosion due to dissimilar metals. Coils and headers are brazed as one piece, minimizing leaks. The inherently rugged coil construction, which includes non-overhanging fins, eliminates the possibility of fin damage. The microchannel maximizes condenser heat transfer, resulting in a smaller footprint, and reduces refrigerant charge by as much as 50%.

The condenser fans are composed of corrosion resistant aluminum hub and glass-fiber-reinforced polypropylene composite blades molded into a low-noise airfoil section. All blades are statically and dynamically balanced for vibration-free operation. Fan motors are Totally Enclosed Air-Over (TEAO), squirrel-cage type and current protected. The direct drive motors feature double-sealed and permanently lubricated ball bearings, cutting down on maintenance cost over the life of the unit.

### REFRIGERANT CIRCUIT

The YVAA has one independent refrigerant circuit per compressor. Each circuit uses copper refrigerant pipe formed on computer-controlled bending machines. By using computer-aided technology, over 60% of system piping brazed joints have been eliminated (as compared to designs that use fittings), resulting in a highly reliable and leak-resistant system.

### COMPLETE FACTORY PACKAGE

Each unit is shipped as a complete factory package, completely assembled with all interconnecting refrigerant piping and internal wiring and ready for field installation. Prior to shipment, each individual chiller undergoes an extensive testing procedure, ensuring workmanship is the highest quality and that the initial start-up is trouble-free.

## Unit Overview (Cont'd)

Before leaving the factory, each refrigerant circuit is factory pressure tested, evacuated and then fully charged with R134a refrigerant and oil. An operational test is performed with water flowing through the evaporator to ensure each circuit functions correctly.

### ELECTRICAL

All controls and motor starting equipment necessary for unit operation are factory wired and function tested. There are no surprises when you go to start-up; you can have confidence that the unit will start up right the first time and every time.

The chillers come with a single point power connection and are supplied with a factory mounted and wired control transformer that powers all unit controls from the main unit power supply. The transformer utilizes scheduled line voltage on the primary side and provides 115V/1Ø on secondary. The standard unit is equipped with terminal block electrical connections. All exposed power wiring is routed through liquid-tight, UV-stabilized, non-metallic conduit.

VSD Power/Control Panel includes main power connection(s), VSD and fan motor contactors, current overloads, and factory wiring. All display and control features can be accessed through the keypad and control display access door, eliminating the need to open the main cabinet doors.

### BUILDING AUTOMATION SYSTEM CAPABILITIES

The YVAA chiller comes standard with native communication capability for BACnet (MS/TP), Modbus and N2, with optional capabilities available for LON. The standard unit capabilities include built-in-scheduling, remote start-stop, remote water temperature reset and up to two steps of demand (load) limiting depending on model. The standard control panel can be directly connected to a Johnson Controls Building Automated System via the standard factory-installed RS232 communication port.

For connection with Johnson Controls Connected Services, an optional interface card (SC-EQUIP) is required and may be factory installed for easier field commissioning. Additional hardware (SC-AP access point), field provided, must be installed remotely from the chiller to interface with the Connected Services remote operations center. Contact your local Johnson Controls office to learn more about Connected Services and to schedule installation during chiller commissioning.

During extreme or unusual conditions (i.e. blocked condenser coils, ambient above scheduled maximum, etc.) the chiller control system will avoid shutdown by varying capacity. By monitoring motor current and suction and discharge pressures, the chiller can maintain maximum available cooling output without shutting down.

Unit Safeties are provided for the chiller to perform auto-reset shut down for the following conditions:

- Ambient temperature above or below allowable range
- Out of range leaving chilled liquid temperature
- Under voltage
- Flow switch operation•

## Unit Overview (Cont'd)

### AHRI CERTIFICATION PROGRAM

YORK YVAA chillers have been tested and certified by Air-Conditioning, Heating and Refrigeration Institute (AHRI) in accordance with the latest edition of AHRI Standard 550/590 and 551/591. Under this Certification Program, chillers are regularly tested in strict compliance with this Standard. This provides an independent, third-party verification of chiller performance. Refer to the AHRI site at: <http://www.ahrinet.org/site/831/Certification/AHRI-Certification-Programs/Air-Cooled-Water-Chilling-Packages> for complete Program Scope, Inclusions, and Exclusions as some options listed herein fall outside the scope of the AHRI certification program. For verification of certification, go to the AHRI Directory at [www.ahridirectory.org](http://www.ahridirectory.org).



Rated in accordance with the latest issuance of AHRI Standard 550/590 and 551/591.

### COMPUTERIZED PERFORMANCE RATINGS

Each chiller is custom-matched to meet the individual building load and energy requirements. A variety of standard heat exchangers and pass arrangements are available to provide the best possible match.

It is not practical to provide tabulated performance for each combination, as the energy requirements at both full and part load vary significantly with each heat exchanger and pass arrangement. Computerized ratings are available through each Johnson Controls sales office. Each rating can be tailored to specific job requirements, and is part of the AHRI Certification Program.

### OFF-DESIGN PERFORMANCE

Since the vast majority of its operating hours are spent at off-design conditions, a chiller should be chosen not only to meet the full load design, but also for its ability to perform efficiently at lower loads. It is not uncommon for chillers with the same full load efficiency to have an operating cost difference of over 10% due to differences in off-design (part-load) efficiencies.

Part load information can be easily and accurately generated by use of the computer. And because it is so important to an owner's operating budget, this information has now been standardized within the AHRI Certification Program in the form of an Integrated Part Load Value (IPLV), and Non-Standard Part Load Value (NPLV).

The current IPLV/NPLV rating from AHRI Standard 550/590 and 551/591 much more closely tracks actual chiller operation, and provides a more accurate indication of chiller performance than the previous IPLV/NPLV rating. A more detailed analysis must take into account actual building load profiles, and local weather data. Part load performance data should be obtained for each job using its own design criteria.

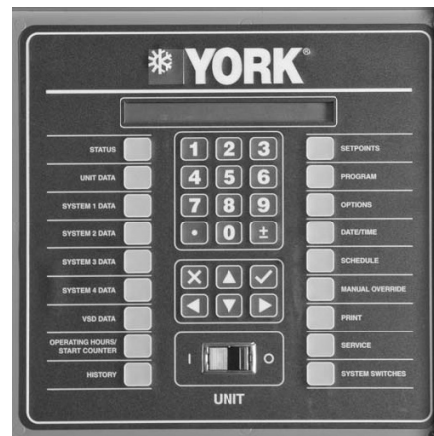


## YVAA Control Center

The unit control center provides automatic control of chiller operation including compressor start/ stop and load/unload anti-recycle timers, condenser fans, chilled liquid pump, evaporator heater, unit alarm contacts and run signal contacts. The microcomputer control center comes online as soon as the main power switch on the unit is switched on; immediately, the microcomputer control center will begin to continuously monitor all variables.

The microprocessor controls the unit's capacity by matching the actual leaving chilled liquid temperature (LCHLT) to the user-defined setpoint. Factors that may cause the system's actual LCHLT to fluctuate are changes in ambient temperature, load, and chilled liquid loop flow rate and volume. The controls system reacts to such changes by adjusting the number of compressors that are on and the loading of each compressor in order to keep the LCHLT at the setpoint.

The controls system logic monitors the rate at which the LCWT is approaching the setpoint to ramp up or down compressor capacity as required. The variable frequency drive allows the compressor capacity to match the load.



**FIGURE 1** - VIEW OF YORK CONTROL CENTER KEYPAD AND DISPLAY

### Display Data

- Leaving Chilled Liquid Temperature
- Returning Liquid Temperature
- Ambient Temperature
- Lead System
- Compressor Capacity (% of Full Load Amps)
- VSD Output Frequency / Compressor Speed
- Compressor Run Hours
- Compressor Number of Starts

## ***YVAA Control Center (Cont'd)***

- Oil Pressure and Temperature (per Compressor)
- Chilled Liquid Pump Status
- Evaporator Heater Status
- History Data for Last Twenty Normal Shutdowns
- History Data for Last Ten Shutdown Faults

### **Programmable Setpoints**

- Chiller on/Off
- Chilled Liquid (Water or Glycol)
- Local or Remote Control
- Units of Measure (Imperial or SI)
- System Lead/Lag
- Remote Temperature Reset
- Remote Current Limit
- Leaving Chilled Liquid Temperature Setpoint and Range

# Accessories and Options

*All options factory mounted unless otherwise noted.*

## SOUND ATTENUATION

**Low Noise Kits** – The standard chiller configuration is equipped with low sound fans and acoustic treatments on the refrigerant lines and compressors. There are several sound attenuation options available to further reduce sound at its source thereby meeting local sound level regulations.

**Silent Night** - Due to time-of-day based sound regulations in some locations, it may be desirable to force the chiller to a lower sound level on demand. The Silent Night control option provides a control input to limit sound output of the chiller based on time of day. This feature is programmable at the chiller panel or can be controlled remotely via a signal (4-20mA or 0-10 VDC) from a BAS system.

**Ultra Quiet Fans** – The chiller is equipped with specially designed fans and motors to provide lower sound levels yet retain appropriate airflow. The result is reduced fan generated sound with minimal effect on the chiller capacity or efficiency at standard AHRI conditions. The fans are five-bladed for 50Hz.

## FAN OPTIONS

**High Static Fans - (400V/50 Hz)** The chiller is equipped with condenser fans with higher power motors suitable for high external static pressure, up to 100Pa (0.4 in. water), across condenser coils. This option should be selected if additional airflow resistance may be present due to flow restrictions such as field installed ducts, filters, sound enclosures etc. Please contact your local Johnson Controls representative for more information.

**High Airflow Fans - (400V/50 Hz)** The chiller is equipped with condenser fans with airfoil-type blades and high power motors providing extra airflow across coils. In some chiller configurations, this option can provide an increase in chiller capacity at high ambient. Please contact your local Johnson Controls representative for more information.

## CONDENSER

**Coils** – Fin and tube condenser coils of seamless, internally-enhanced, high-condensing-coefficient, corrosion resistant copper tubes are arranged in staggered rows. The tubes are mechanically expanded into aluminum fins. Integral subcooling is included. The design working pressure of the coils is 350 PSIG (24 barg).

## CONDENSER COIL PROTECTION

The aluminum alloys used in the YVAA microchannel condenser have been carefully selected and tested for high corrosion resistance. However, all metals can corrode in harsh conditions. Consider protecting coils from corrosive environments such as coastal, marine, urban and industrial.

**Environment Guard Premium** – Microchannel condenser coils coated with an electrodeposited and baked flexible epoxy coating that is finished with a polyurethane UV resistant top-coat. **Microchannel condenser shall be provided with a 5-year warranty against corrosion damage.**

## Accessories and Options (Cont'd)

### PROTECTIVE CHILLER PANELS

**Wire Panels** – UV stabilized black polyvinyl chloride coated, heavy gauge, welded wire mesh guards mounted on the exterior of the full unit. Protects condenser coil faces and prevents unauthorized access to refrigerant components (compressors, pipes, evaporator, etc.), yet provides free air flow. This can cut installation cost by eliminating the need for separate, expensive fencing. See Figure 2.

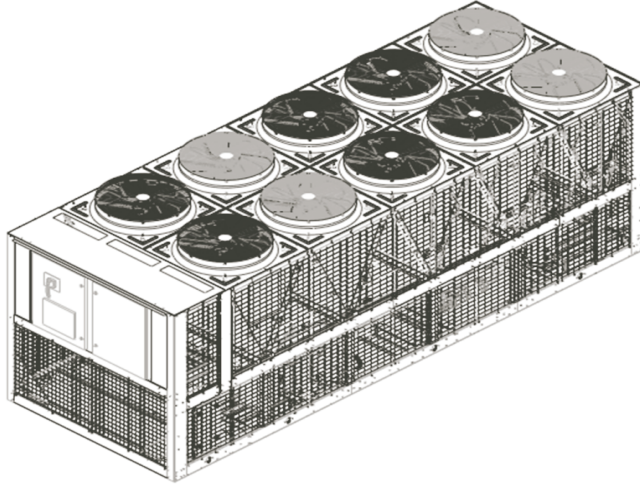


FIGURE 2 - FULL UNIT WIRE PANELS

**Louvered Panels** – Louvered panels, painted the same color as the unit, enclose the unit to visually screen and protect the coils as well as prevent unauthorized access to internal components. Also available as a condenser-only option. See Figure3.

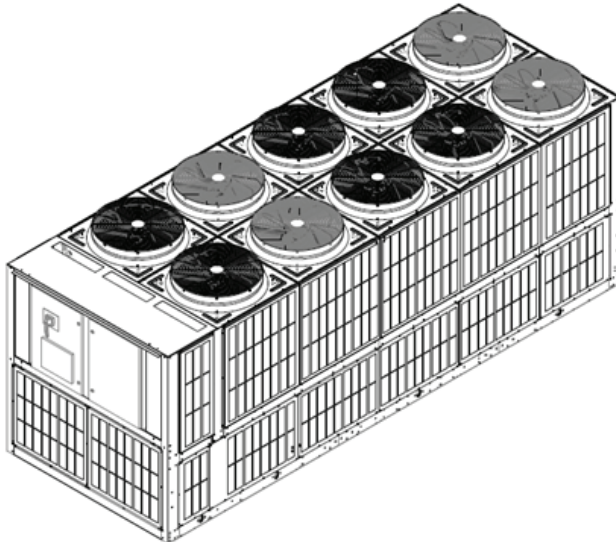
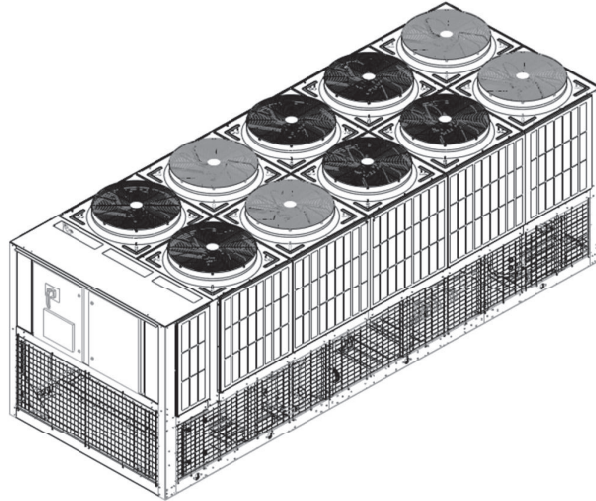


FIGURE 3 - FULL UNIT LOUVERED PANELS

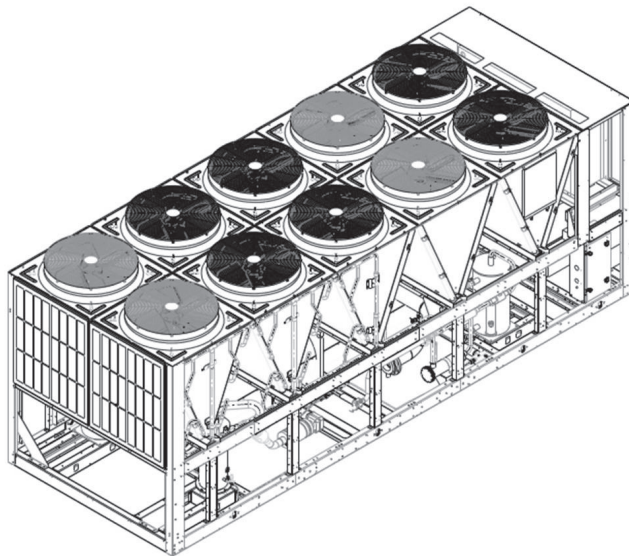
## Accessories and Options (Cont'd)

**Louvered/Wire Panels Combination** - Louvered panels, painted the same color as the unit, are mounted on external condenser coil faces. Heavy gauge, welded wire-mesh panels, coated to resist corrosion, are mounted around base of machine to restrict unauthorized access. See Figure 4.



**FIGURE 4 - LOUVERED/WIRE PANELS COMBINATION**

**End Hail Guard** – Louvered panels, painted the same color as the unit, are installed on the rear of the unit (opposite end of the control panel) to protect the exposed condenser from flying debris or hail. See Figure 5.



**FIGURE 5 - END HAIL GUARD**

## Accessories and Options (Cont'd)

**V-Guard Panels** – Solid panels, painted the same color as the unit, are installed along the sides of the units to cover exposed piping within the condenser section without impacting airflow. These guard panels can be combined with End Hail Guard option for additional protection from debris. See Figure 6.

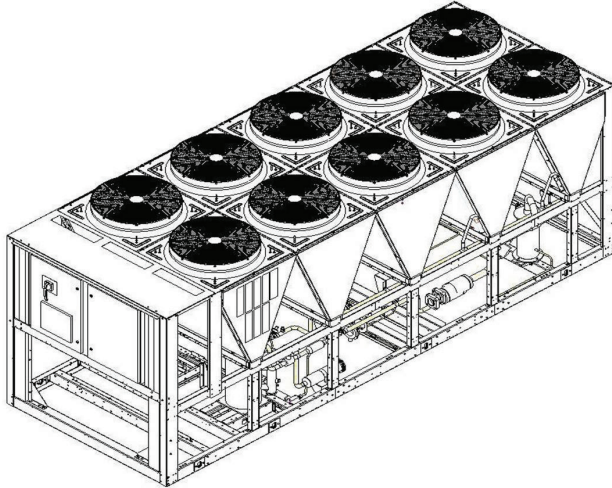


FIGURE 6 - V-GUARD OPTION

### EVAPORATOR OPTIONS

**1-1/2" Insulation** – Double thickness insulation provided.

**Cooler Connections** - Standard chilled liquid connections on all coolers are of the flange type. Flanges standard shall confirm to HG20625, and flange manufacture requirements refer to HG20615. Optional chilled liquid connections on all coolers are of the ANSI/AWWA C-606 groove type.

**Connection Location** - The standard unit configuration is available with liquid inlet connections at rear (opposite control panel end) of unit. Option available for front fluid inlet on select configurations.

**Three-Pass** – The standard evaporator is constructed with two chilled water passes through the evaporator. The three-pass option is recommended for use in brine applications or where a greater water temperature difference is required but efficiency cannot be sacrificed.

**Single Pass** – The single pass evaporator option offers the lowest water pressure drop and is recommended for high flow or series chiller applications.

**Water Box Heater** - The standard unit comes with freeze protection on the evaporator down to 0°F (-17.8°C) Unless the appropriate concentration of glycol is used, optional water box heaters are required for storage below 0°F (-17.8°C). See Application Data section for additional information on freeze protection. Separate 120V single phase power supply required.

## Accessories and Options (Cont'd)

### CONTROLS OPTIONS

**Building Automation System Interface (Temperature)** - Factory installed option to accept a 4 to 20 mA or a 0 to 10 VDC input to allow remote reset of the Leaving Chilled Liquid Temperature Setpoint. The setpoint can be positively offset upwards up to 4.4°C (40°F). This option is useful for ice storage or process applications or for periods where higher chilled liquid temperatures are adequate for low loads. Available alone or in combination with BAS Load Limit.

**Building Automation System Interface (Load Limit)** - Factory installed option to accept a 4 to 20 mA or a 0 to 10 VDC input to allow remote reset of the Load Limit Setpoint. The setpoint can limit system demand from 30-100%. Available alone or in combination with BAS Temperature Reset.

**Gateway** – Provides communication for Building Automation Systems, including BACnet (MS/TP), Modbus, N2, and LON. (Field commissioned by BAS manufacturer.)

**Thermal Storage** – Provides special control logic and modifications to produce leaving chilled brine temperatures below 40°F (4.4°C) primarily at times of low ambient temperatures (night time). Option can be used to produce ice to supplement cooling and significantly decrease energy costs. The capability of the chiller is enhanced by using both ice and chilled liquid simultaneously during times of peak cooling needs.

### GENERAL OPTIONS

**Flow Switch Accessory** - Vapor proof SPDT, IP55 switch, 150 psig (10.3 barg) DWP, -20°F to 250°F (-29°C to 121°C) with 1" NPT (IPS) connection for upright mounting in horizontal pipe (This flow switch or equivalent must be furnished with each unit). **Field mounted.**

**Differential Pressure Switch** – This 3-45 psig (0.2-3 barg) range switch, with 1/4" NPTE pressure connections, is an alternative to the paddle-type flow switch. **Field mounted.**

**Service Isolation Valve** – Service suction isolation valve added to unit for each refrigerant circuit. (Valve is available in both manual and chiller actuated configurations. Actuated valve is recommended for operation below freezing ambient with water in evaporator. Refer to "Operation in Sub-freezing Conditions" on page 20).

**Pressure Vessel Options** – The evaporator can be provided either GB or ASME pressure vessel codes certification.

**Circuit Breaker** – Unit-mounted circuit breaker(s) with external lockable handle(s) will be supplied to isolate the power voltage for servicing. The circuit breaker(s) is (are) sized to provide motor branch circuit protection, short circuit protection and ground fault protection for the motor branch-circuit conductors, the motor control apparatus and the motors.

**Non-Fused Disconnect Switch** – Unit-mounted disconnect switch(es) with external lockable handle can be supplied to isolate the unit power voltage for servicing. Separate external fusing must be supplied by the power wiring, which must comply with local codes.

## ***Accessories and Options (Cont'd)***

### **VIBRATION ISOLATION**

**Elastomeric Isolation** – This option is recommended for normal installations. It provides very good performance in most applications for the least cost. **Field mounted.**

**1" Spring Isolators** – Spring and cage type isolators for mounting under the unit base rails are available to support unit. They are level adjustable. 1" nominal deflection may vary slightly by application. **Field mounted.**

**2" Restrained Spring Isolators** – Restrained Spring-Flex Mounting isolators incorporate a rugged welded steel housing with vertical and horizontal limit stops. Housings designed to withstand a minimum 1.0g accelerated force in all directions up to 2" (51mm). The deflection may vary slightly by application. They are level adjustable. **Field mounted.**



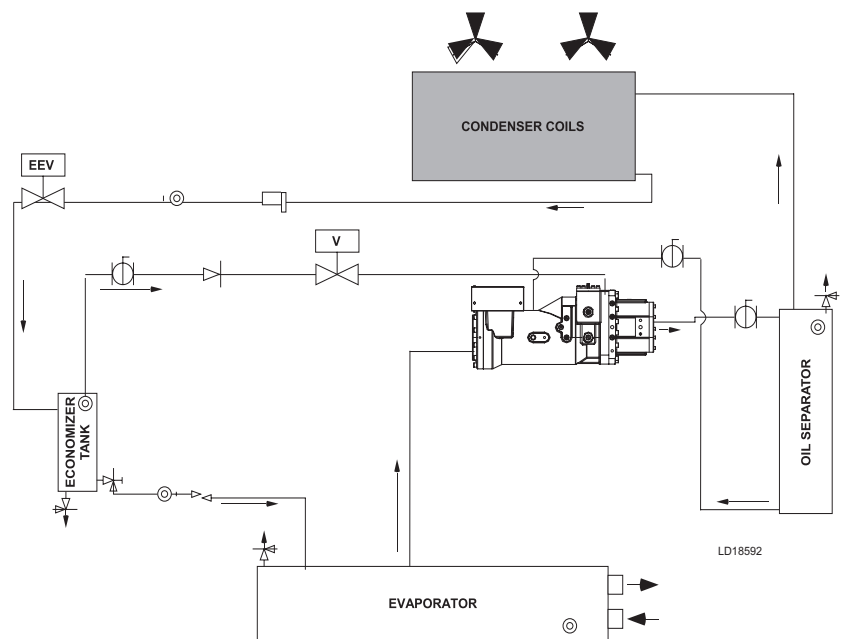
# Refrigerant Flow Diagram

Low pressure refrigerant (liquid and gas) enters the evaporator and is sprayed across the top of the tube bundle from spray nozzles. The liquid refrigerant from the nozzles gravity drains down across the tube bundle and is evaporated and superheated by the heat energy absorbed from the chilled liquid passing through the tubes.

The low pressure refrigerant vapor leaves the top of the evaporator and enters the compressor where the refrigerant vapor is compressed and the pressure and superheat are increased. The high pressure superheated gas enters the air cooled condenser where heat is rejected via the condenser coils and fans.

The fully condensed and sub-cooled liquid leaves the air cooled condenser, flows through the filter drier and enters the economizer tank. The flow of refrigerant into the economizer is controlled by the electronic expansion valve.

Additional cooling of the refrigerant liquid may take place in the economizer tank when the economizer valve is opened. After leaving the economizer tank, liquid refrigerant flows through an orifice where pressure reduction and further cooling take place. The low pressure refrigerant (liquid and gas) then enters the evaporator.



LD18592

SYMBOL	YVAA SYSTEM COMPONENT
	Electronic Expansion Valve
	Ball Valve
	Relief Valve
	Stop Valve Angle, Access
	Replacement Core Filter/Dryer
	Sight Glass
	Orifice
	Check Valve
	Valve

# Application Data

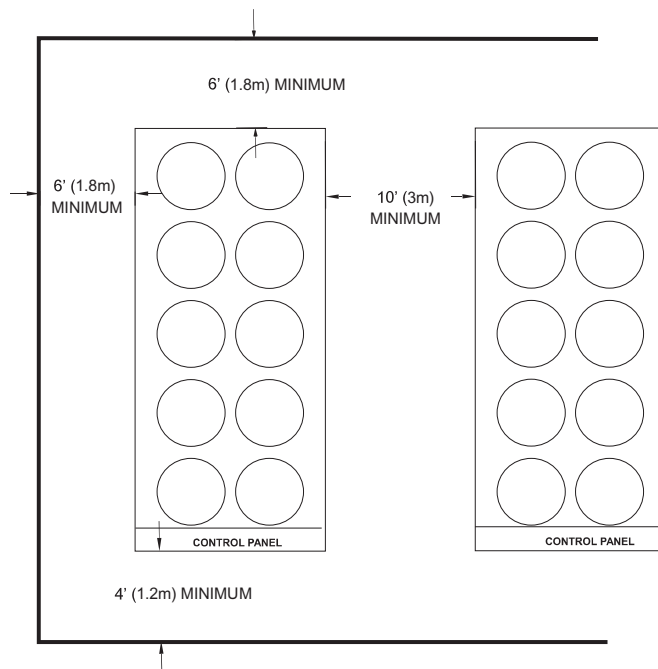
## UNIT SIZING

Avoid over-sizing a chiller. Properly sized chillers operate stably and provide the best life cycle cost. When designing phased projects, select multiple small chillers to match demand for each phase. Use multiple small chillers when the minimum cooling demand is less than 10% of the maximum cooling demand.

## UNIT LOCATION

The YVAA chillers are designed for outdoor installation. To achieve optimum performance and trouble-free service provide adequate space around chillers (see Figure 7). When selecting chiller installation sites, follow these requirements:

- A. Installation sites may be either on a roof or on ground level. (See **FOUNDATION**)
- B. Provide space for air to flow into condensers per dimensions shown *on page 42*. Restricted airflow or hot air recirculation will diminish performance. Johnson Controls' unit controls will optimize the operation without nuisance high pressure safety cutouts; however, the system designer **MUST** consider potential performance degradation. Recommended clearances (See Figure 7) for all units are as follows:
  1. Access to the unit control center stipulates the unit is no higher than on spring isolators.



**FIGURE 7 - ACCEPTABLE MINIMUM CLEARANCES AROUND/BETWEEN UNIT(S) FOR PROPER AIRFLOW**

## Application Data (Cont'd)

2. Recommended minimum clearances:
  - a. Side to wall – 6' (1.8m)
  - b. Rear to wall – 6' (1.8m)
  - c. Control panel end to wall – 4' (1.2m)
  - d. Top – no obstructions whatsoever
  - e. Distance between adjacent units – 10' (3m)
  - f. No more than one wall around the chiller yard should be higher than the chiller(s)
- C. Avoid locations near windows or structures where normal operating sounds may be objectionable.
  1. The condenser fans are propeller-type and are not recommended for use with ductwork, filters or other impediments to airflow in the condenser air stream.
  2. When obstructions to airflow exist, they must not add more than 0.1" external static pressure.
  3. Protection against corrosive environments is available by ordering the units with cured epoxy-coating on the condenser microchannel coils. Epoxy-coated coils should be used with any units being installed at the seashore, or where salt spray may hit the units, or where acid rain is prevalent.
  4. On installations where winter operation is intended and snow accumulations are expected, additional elevation must be provided to insure normal condenser air flow.
  5. Provide adequate space for tubes to be removed from evaporator. For clearances please contact your nearest Johnson Controls Sales Office.

### FOUNDATION

Mount units on a flat and level foundation, ground or roof, capable of supporting the entire operating weight of the equipment. Please contact your nearest Johnson Controls Sales Office for shipping and operating weights.

**Roof Locations** – Provide structure to safely support the entire weight of the unit and service personnel. Do not damage the roof during installation. If the roof is "bonded", consult a building contractor or architect for special installation requirements. Use spring isolators to minimize vibration transmission into building structure. Provide additional structural support at the spring-isolator locations.

**Ground Locations** – Units must be installed on a substantial base that will not settle and cause strain on the refrigerant lines, resulting in possible leaks. A one-piece concrete slab, with footers extending below the frost line is recommended. The slab should not be tied to the main building foundation as operational noise will telegraph. Mounting holes (5/8") are provided in the base rails for bolting the unit to its foundation. See *Isolator Locations on page 50* for location of the mounting holes.

For ground installations, precautions should be taken to protect the unit from tampering by, or injury to, unauthorized persons. Fasteners on access panels will prevent casual tampering; however, further safety precautions such as unit enclosure options, a fenced-in enclosure, or locking devices on the panels may be advisable. Check local authorities for safety regulations.

## Application Data (Cont'd)

**Seismic Applications** – Avoid installing chillers on springs or roofs where earthquakes are a risk. Springs and roofs amplify earthquake forces. Rigidly mounting chillers to ground level concrete pads is typically the best option for earthquake zones. Contact Johnson Controls equipment specialists for help with projects that have seismic requirements.

### CHILLED LIQUID PIPING

Design the chilled liquid piping system so that the circulating pump discharges into the evaporator. The inlet and outlet evaporator-liquid connections are given in *Dimensions on page 42*. Hand stop valves are recommended in all lines to facilitate servicing. Provide drain connections at low points to permit complete drainage of the evaporator and system piping.

The evaporator must be protected by a strainer, preferably of 40 mesh, fitted as close as possible to the liquid inlet connection, and provided with a means of local isolation.

The evaporator must not be exposed to flushing velocities or debris released during flushing. It is recommended that a suitably sized bypass and valve arrangement is installed to allow flushing of the piping system. The bypass can be used during maintenance to isolate the heat exchanger without disrupting flow to other units.

Pressure-gauge connections are recommended for installation in the inlet and outlet liquid lines. Gauges are not provided with the unit and are to be furnished by others.

Chilled liquid lines exposed to the weather should be wrapped with a supplemental heater cable and insulated, or glycol should be added to the chilled liquid to protect against freezing if low-ambient periods are expected.

A flow switch is available as an accessory on all units. A flow switch must be installed in the leaving liquid piping of the evaporator and must not be used to start and stop the unit.

### OPERATION IN SUB-FREEZING CONDITIONS

The YVAA may be operated in sub-freezing conditions if the following freeze protections are taken :

A. An automatic suction service valve electric actuator is installed. Chiller software will operate the actuator in order to protect against freezing due to evaporator refrigerant migration.

-or-

B. No suction service valve is installed but the water circuit valves are kept open, there is continuous power to the chiller and pump for chilled water pump control, and the pump will operate and circulate water through the evaporator whenever commanded by the chiller.

**Warning:** The above operation is only advised if uninterrupted power can be ensured. Unforeseen power interruptions can damage the evaporator in a very short time frame if the temperature falls below freezing.

If there is potential for power loss, Johnson Controls recommends the water in the chilled water circuit be replaced with an appropriate water-to-glycol concentration.

## Application Data (Cont'd)

### MINIMUM LIQUID VOLUME

It is good practice to include as much liquid volume as possible in a chilled liquid loop. This increases the thermal mass and “Flywheel” effect within the system (i.e. the more the better) which in turn promotes stable liquid temperature control and increases reliability by reducing compressor cycling.

For air conditioning applications, a minimum of 3 gallons/ton (3.2 liters/cooling kW) is recommended. It is preferred that the gallon/ton ratio be within the 5 to 8 gallons/ton (5.4 to 8.6 liter/cooling KW) range for constant flow rate chilled liquid systems. See *VARIABLE PRIMARY FLOW* on page 23 for recommendations for VPF systems. For process applications, a minimum of 6 gallons/ton (6.5 liter/cooling KW) ratio is recommended with preference towards a range of 7 to 11 (7.5 to 11.8). Install a tank or increase pipe sizes to provide sufficient liquid volume.

### LEAVING LIQUID TEMPERATURE OUT OF RANGE

The YVAA chiller line has a maximum leaving liquid temperature of 70°F (21.1°C). Some process applications require a chilled liquid temperature higher than what the chiller provides. In those applications, a simple piping change can remove the problem. By using a mixture of chiller-cooled liquid and returning process liquid, the chilled liquid entering the process can be held at the desired temperature. (A tank can also be used to meet high leaving liquid temperature requirements.) (*Figure 8 - Leaving Liquid temperature out of range suggested layout on page 22*)

### UNIT MAINTENANCE AND SHUTDOWN IN SUB-FREEZING CONDITIONS

If the YVAA is maintained or shut down and will be subjected to sub-freezing conditions, it is critical to protect against evaporator and waterbox freeze damage. Johnson Controls recommends the following options (in order of freeze protection level) be performed on each circuit.

**A. Glycol:** Replace water with an appropriate water to glycol concentration of antifreeze.

-or-

**B. Drain:** Remove power to the waterbox heaters. Close the water valves, drain the evaporator, and leave the evaporator drain valves open.

-or-

**C. Refrigerant Valve - Off:** Close the water valves, close flash tank drain valves, close the suction service valves and leave power to the chiller for evaporator heater mat and waterbox heater operation. For units without a suction service valve, close the discharge and compressor oil valves.

-or-

**D. Pump Control:** Keep power to the chiller in order to have control over chilled water pumps and heater operation and leave the water circuit valves open. This will enable water to circulate through the evaporator to avoid freezing.

**Warning:** Options A and B are the recommended processes for unit maintenance and shutdown. Unforeseen power interruptions can damage the evaporator in a very short time frame if the temperature falls below freezing.

**Note:** Failure to follow Johnson Controls freeze protection recommendations can void the warranty.

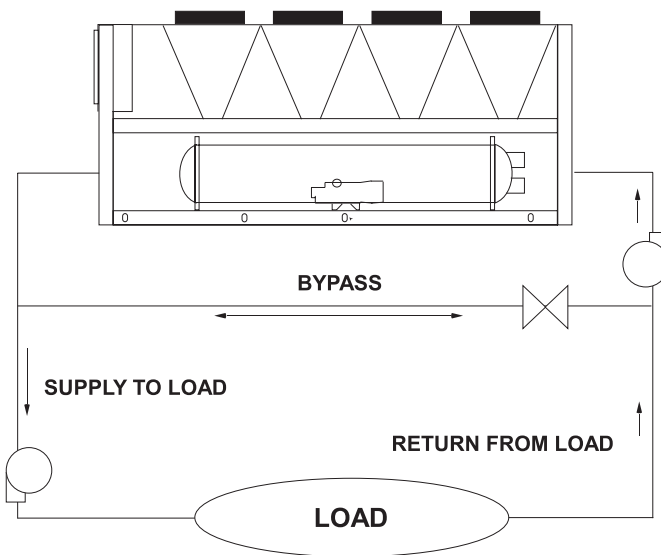
# Application Data (Cont'd)

## FLOW RATE OUT OF RANGE

Each YVAA evaporator has a minimum and maximum flow rate. Some process applications require a flow rate that is out of range for the evaporator. In those applications, a piping change can remove the problem.

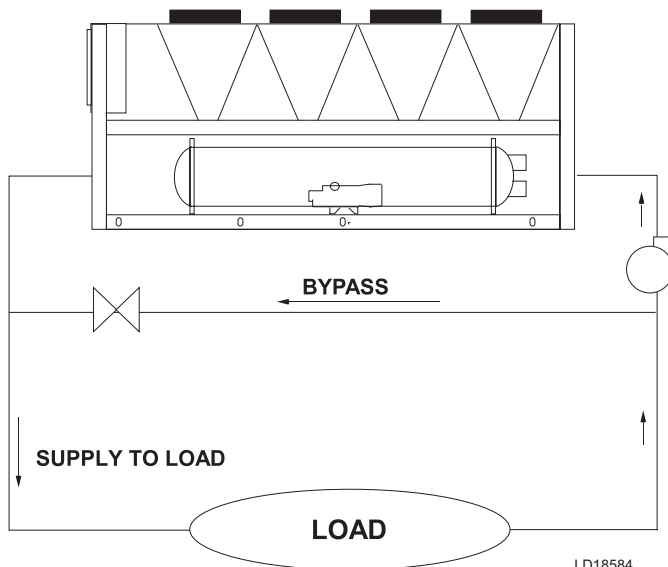
In applications where the required flow rate is less than the evaporator's minimum allowable, the chilled liquid can be recirculated to the chiller. (*Figure 9 - Suggested layout for applications with a flow rate greater than the evaporator maximum allowable flow rate on page 23*).

In applications where the required flow rate is greater than the evaporator's maximum allowable, the chilled liquid can be recirculated to the load (*Figure 10 - Suggested layout for applications with a flow rate less than the evaporator minimum allowable flow rate on page 23*).



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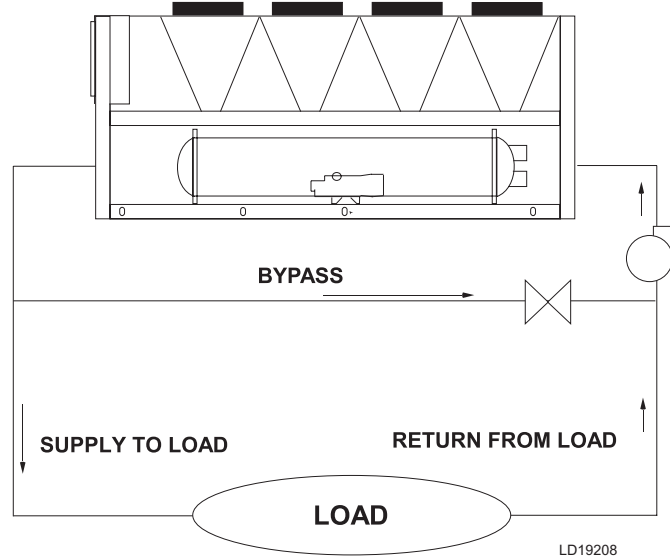
**FIGURE 8 - LEAVING LIQUID TEMPERATURE OUT OF RANGE SUGGESTED LAYOUT**



LD18584

**FIGURE 9 - SUGGESTED LAYOUT FOR APPLICATIONS WITH A FLOW RATE GREATER THAN THE EVAPORATOR MAXIMUM ALLOWABLE FLOW RATE**

## Application Data (Cont'd)



**FIGURE 10** - SUGGESTED LAYOUT FOR APPLICATIONS WITH A FLOW RATE LESS THAN THE EVAPORATOR MINIMUM ALLOWABLE FLOW RATE

### THERMAL STORAGE

Thermal storage is the practice of storing cooling energy during a period of little or no load and/or low energy costs for use during periods of high load and/or energy costs. Conventional cooling systems produce cooling when it is needed which is commonly during times of peak demand. Thermal storage allows generation of cooling capacity to occur during off-peak periods and store that capacity to meet future cooling requirements. Using thermal storage can result in smaller equipment sizes, thereby reducing capital cost, and also can result in significant energy cost savings.

The YVAA has special control logic to be able to produce chilled leaving brine temperatures below 40°F (4.4°C) so as to supply a storage tank with chilled liquid during times of low demand. YVAA chillers selected for thermal storage operation can also be selected to efficiently provide chilled liquid at nominal cooling loads.

### VARIABLE PRIMARY FLOW

Johnson Controls recommends a maximum 10% per minute flow rate of change, based on design flow, for variable primary flow applications. Eight to ten gallons per chiller ton (8.6 to 10.8 liter per cooling KW) is recommended for the system liquid volume. Insufficient system volume and rapid flow changes can cause control problems or can even cause chiller shutdowns. There are many other design issues to evaluate with variable primary flow systems. Consult your Johnson Controls Sales Office for more information about successfully applying YVAA chillers.

## Physical Data - Microchannel - English

The data shown in this table is applicable to selected typical configurations. Other configurations are available through our configuration/selection software. Please contact your nearest Johnson Controls Sales Office for the chiller configuration that best matches your specific needs.

UNIT FRAME	015	016	017	018	019	019	021	021
<b>CONDENSER CODE</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>3</b>	<b>5</b>
<b>EVAPORATOR CODE</b>	<b>B</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>A</b>	<b>B</b>	<b>A</b>	<b>C</b>
<b>GENERAL UNIT DATA</b>								
Number of Independent Refrigerant Circuits	2							
Refrigerant Charge, R-134a, Circuit -1, lbs	175	190	225	175	190	220	175	225
Refrigerant Charge, R-134a, Circuit -2, lbs	175	190	225	155	170	195	175	225
Oil Charge, Circuit -1, gal	2	2.2	2.5	2.4	2.6	2.7	2.5	2.8
Oil Charge, Circuit -2, gal	2	2.2	2.5	2	2.1	2.2	2.5	2.8
% Minimum Load	10%							
Unit shipping weight, lbs <sup>1</sup>	11518	12084	14668	12019	12781	13776	12859	14915
Operating Weight, lbs <sup>1</sup>	11979	12546	15432	12460	13222	14237	13300	15678
Chassis Dimensions - Length, inches	203.3	247.2	291.2	247.2	291.2	335.2	291.2	291.2
Chassis Dimensions - Width, inches	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4
Chassis Dimensions - Height, inches	94.6	94.6	94.6	94.6	94.6	94.6	94.6	94.6
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>								
Quantity per Chiller	2							
<b>CONDENSER FANS</b>								
Number Ckt-1/Ckt-2	4/4	5/5	6/6	6/4	7/5	8/6	6/6	6/6
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>								
Water Volume, gal	58	58	71	48	48	58	48	71
Leaving Water Temperature (Min/Max) °F <sup>3</sup>	40/70							
Air on Condenser (Min/Max) °F	0/131							
Maximum Water Side Pressure, psig	150							
Opt. 300 psi Max Water Side Pressure, psig	300							
Maximum refrigerant Side Pressure, psig	235							
Evaporator Drain Connection, in	3/4							

UNIT FRAME	027	029	030	030	030	031	032	033
<b>CONDENSER CODE</b>	<b>8</b>	<b>5</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>8</b>	<b>3</b>	<b>3</b>
<b>EVAPORATOR CODE</b>	<b>E</b>	<b>E</b>	<b>C</b>	<b>C</b>	<b>E</b>	<b>E</b>	<b>E</b>	<b>C</b>
<b>GENERAL UNIT DATA</b>								
Number of Independent Refrigerant Circuits	2							
Refrigerant Charge, R-134a, Circuit -1, lbs	270	310	290	295	315	315	295	290
Refrigerant Charge, R-134a, Circuit -2, lbs	270	265	245	250	275	295	295	290
Oil Charge, Circuit -1, gal	3.1	4.2	4.1	4.1	4.3	4.3	4.1	4.1
Oil Charge, Circuit -2, gal	3.1	3.1	3	3	3.2	3.3	4.1	4.1
% Minimum Load	10%							
Unit shipping weight, lbs <sup>1</sup>	17753	18205	17114	18967	18967	19728	18554	18224
Operating Weight, lbs <sup>1</sup>	18612	19065	17877	19827	19827	20588	19414	18987
Chassis Dimensions - Length, inches	379.2	379.2	379.2	423.1	423.1	467.1	379.2	423.1
Chassis Dimensions - Width, inches	88.4	88.4	88.4	88.4	88.4	88.4	88.4	88.4
Chassis Dimensions - Height, inches	94.6	94.6	94.6	94.6	94.6	94.6	94.6	94.6
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>								
Quantity per Chiller	2							
<b>CONDENSER FANS</b>								
Number Ckt-1/Ckt-2	8/8	9/7	9/7	10/8	10/8	10/10	8/8	9/9
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>								
Water Volume, gal	113	113	71	71	113	113	113	71
Leaving Water Temperature (Min/Max) °F <sup>3</sup>	40/70							
Air on Condenser (Min/Max) °F	0/131							
Maximum Water Side Pressure, psig	150							
Opt. 300 psi Max Water Side Pressure, psig	300							
Maximum refrigerant Side Pressure, psig	235							
Evaporator Drain Connection, in	3/4							

### NOTES:

- Shipping and operating weights shown are for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales office for weight data.
- For leaving liquid temperature below 40°F(4.4°C) or above 70°F (21.1°C), contact your nearest Johnson Controls Sales Office for application requirements.



## Physical Data - Microchannel - English (Cont'd)

The data shown in this table is applicable to selected typical configurations. Other configurations are available through our configuration/selection software. Please contact your nearest Johnson Controls Sales Office for the chiller configuration that best matches your specific needs.

UNIT FRAME	021	023	024	024	026	027	027
<b>CONDENSER CODE</b>	<b>8</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>3</b>	<b>3</b>	<b>5</b>
<b>EVAPORATOR CODE</b>	<b>C</b>	<b>B</b>	<b>C</b>	<b>C</b>	<b>B</b>	<b>D</b>	<b>E</b>
<b>GENERAL UNIT DATA</b>							
Number of Independent Refrigerant Circuits	2						
Refrigerant Charge, R-134a, Circuit -1, lbs	240	210	250	250	210	265	265
Refrigerant Charge, R-134a, Circuit -2, lbs	240	190	225	250	210	265	265
Oil Charge, Circuit -1, gal	2.9	2.7	2.9	2.9	2.7	3	3
Oil Charge, Circuit -2, gal	2.9	2.6	2.8	2.9	2.7	3	3
% Minimum Load	10%						
Unit shipping weight, lbs <sup>1</sup>	15677	13288	15873	16634	14706	16275	16991
Operating Weight, lbs <sup>1</sup>	16440	13750	16636	17398	14538	17103	17851
Chassis Dimensions - Length, inches	335.2	291.2	335.2	379.2	335.2	335.2	335.2
Chassis Dimensions - Width, inches	88.4	88.4	88.4	88.4	88.4	88.4	88.4
Chassis Dimensions - Height, inches	94.6	94.6	94.6	94.6	94.6	94.6	94.6
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>							
Quantity per Chiller	2						
<b>CONDENSER FANS</b>							
Number Ckt-1/Ckt-2	7/7	7/5	8/6	8/8	7/7	7/7	7/7
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>							
Water Volume, gal	71	58	71	71	58	82	113
Leaving Water Temperature (Min/Max) °F <sup>3</sup>	40/70						
Air on Condenser (Min/Max) °F	0/131						
Maximum Water Side Pressure, psig	150						
Opt. 300 psi Max Water Side Pressure, psig	300						
Maximum refrigerant Side Pressure, psig	235						
Evaporator Drain Connection, in	3/4						

UNIT FRAME	034	034	037	041	044	048	052
<b>CONDENSER CODE</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>EVAPORATOR CODE</b>	<b>E</b>	<b>E</b>	<b>F</b>	<b>H</b>	<b>G</b>	<b>G</b>	<b>J</b>
<b>GENERAL UNIT DATA</b>							
Number of Independent Refrigerant Circuits	2						
Refrigerant Charge, R-134a, Circuit -1, lbs	310	315	420	460	370	385	445
Refrigerant Charge, R-134a, Circuit -2, lbs	310	315	245	345	370	385	445
Oil Charge, Circuit -1, gal	4.2	4.3	5.3	5.5	5	5.1	5.4
Oil Charge, Circuit -2, gal	4.2	4.3	2.9	4.3	5	5.1	5.4
% Minimum Load	10%						
Unit shipping weight, lbs <sup>1</sup>	19315	20077	22346	21241	25941	26704	22346
Operating Weight, lbs <sup>1</sup>	20175	20937	23404	22048	27000	27762	29762
Chassis Dimensions - Length, inches	423.1	467.1	467.1	467.1	467.12 / 88.18	467.12 / 132.16	467.12 / 132.16
Chassis Dimensions - Width, inches	88.4	88.4	88.5	88.5	88.5	88.5	88.5
Chassis Dimensions - Height, inches	94.6	94.6	94.8	94.8	94.8	94.8	94.8
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>							
Quantity per Chiller	2						
<b>CONDENSER FANS</b>							
Number Ckt-1/Ckt-2	9/9	10/10	13/7	12/8	12/12	13/13	13/13
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>							
Water Volume, gal	113	113	96	130	96	96	147
Leaving Water Temperature (Min/Max) °F <sup>3</sup>	40/70						
Air on Condenser (Min/Max) °F	0/131						
Maximum Water Side Pressure, psig	150						
Opt. 300 psi Max Water Side Pressure, psig	300						
Maximum refrigerant Side Pressure, psig	235						
Evaporator Drain Connection, in	3/4						

### NOTES:

- Shipping and operating weights shown are for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales office for weight data.
- For leaving liquid temperature below 40°F(4.4°C) or above 70°F (21.1°C), contact your nearest Johnson Controls Sales Office for application requirements.
- 0443/0483/0523 units are two-piece shipment.

## Physical Data - Microchannel - SI

The data shown in this table is applicable to selected typical configurations. Other configurations are available through our configuration/selection software. Please contact your nearest Johnson Controls Sales Office for the chiller configuration that best matches your specific needs.

UNIT FRAME	015	016	017	018	019	019	021	021
<b>CONDENSER CODE</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>3</b>	<b>5</b>
<b>EVAPORATOR CODE</b>	<b>B</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>A</b>	<b>B</b>	<b>A</b>	<b>C</b>
<b>GENERAL UNIT DATA</b>								
Number of Independent Refrigerant Circuits	2							
Refrigerant Charge, R-134a, Circuit -1, kg	80	86	102	80	86	100	80	102
Refrigerant Charge, R-134a, Circuit -2, kg	80	86	102	70	78	89	80	102
Oil Charge, Circuit -1, liter	7.7	8.4	9.5	9.2	9.9	10.3	9.5	10.6
Oil Charge, Circuit -2, liter	7.7	8.4	9.5	7.7	8	8.4	9.5	10.6
% Minimum Load	10%							
Unit shipping weight, kg <sup>1</sup>	5224	5481	6653	5452	5797	6248	5833	6765
Operating Weight, kg <sup>1</sup>	5434	5691	7000	5652	5997	6458	6033	7111
Chassis Dimensions - Length, mm	5163	6280	7397	6279	7397	8514	7397	7397
Chassis Dimensions - Width, mm	2244	2244	2244	2244	2244	2244	2244	2244
Chassis Dimensions - Height, mm	2402	2402	2402	2402	2402	2402	2402	2402
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>								
Quantity per Chiller	2							
<b>CONDENSER FANS</b>								
Number Ckt-1/Ckt-2	4/4	5/5	6/6	6/4	7/5	8/6	6/6	6/6
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>								
Water Volume, liter	220	220	269	182	182	220	182	269
Leaving Water Temperature (Min/Max) °C <sup>3</sup>	4.4/21.1							
Air on Condenser (Min/Max) °C	-17.8/55							
Maximum Water Side Pressure, barg	10.3							
Opt. 300 psi Max Water Side Pressure, barg	20.6							
Maximum refrigerant Side Pressure, barg	16.2							
Evaporator Drain Connection, mm	19							

UNIT FRAME	027	029	030	030	030	031	032	033
<b>CONDENSER CODE</b>	<b>8</b>	<b>5</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>8</b>	<b>3</b>	<b>3</b>
<b>EVAPORATOR CODE</b>	<b>E</b>	<b>E</b>	<b>C</b>	<b>C</b>	<b>E</b>	<b>E</b>	<b>E</b>	<b>C</b>
<b>GENERAL UNIT DATA</b>								
Number of Independent Refrigerant Circuits	2							
Refrigerant Charge, R-134a, Circuit -1, kg	123	141	132	134	143	143	134	132
Refrigerant Charge, R-134a, Circuit -2, kg	123	121	112	114	125	134	134	132
Oil Charge, Circuit -1, liter	11.8	15.9	15.6	15.6	16.3	16.3	15.6	15.6
Oil Charge, Circuit -2, liter	11.8	11.8	11.4	11.4	12.2	12.5	15.6	15.6
% Minimum Load	10%							
Unit shipping weight, kg <sup>1</sup>	8052	8258	7763	8603	8603	8948	8416	8266
Operating Weight, kg <sup>1</sup>	8442	8648	8109	8993	8993	9339	8806	8612
Chassis Dimensions - Length, mm	9631	9631	9631	10748	10748	11865	9631	10748
Chassis Dimensions - Width, mm	2244	2244	2244	2244	2244	2244	2244	2244
Chassis Dimensions - Height, mm	2402	2402	2402	2402	2402	2402	2402	2402
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>								
Quantity per Chiller	2							
<b>CONDENSER FANS</b>								
Number Ckt-1/Ckt-2	8/8	9/7	9/7	10/8	10/8	10/10	8/8	9/9
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>								
Water Volume, liter	428	428	269	269	428	428	428	269
Leaving Water Temperature (Min/Max) °C <sup>3</sup>	4.4/21.1							
Air on Condenser (Min/Max) °C	-17.8/55							
Maximum Water Side Pressure, barg	10.3							
Opt. 300 psi Max Water Side Pressure, barg	20.6							
Maximum refrigerant Side Pressure, barg	16.2							
Evaporator Drain Connection, mm	19							

### NOTES:

- Shipping and operating weights shown are for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales office for weight data.
- For leaving liquid temperature below 40°F(4.4°C) or above 70°F (21.1°C), contact your nearest Johnson Controls Sales Office for application requirements.

## Physical Data - Microchannel - SI (Cont'd)

The data shown in this table is applicable to selected typical configurations. Other configurations are available through our configuration/selection software. Please contact your nearest Johnson Controls Sales Office for the chiller configuration that best matches your specific needs.

UNIT FRAME	021	023	024	024	026	027	027
<b>CONDENSER CODE</b>	8	3	5	8	3	3	5
<b>EVAPORATOR CODE</b>	C	B	C	C	B	D	E
<b>GENERAL UNIT DATA</b>							
Number of Independent Refrigerant Circuits	2						
Refrigerant Charge, R-134a, Circuit -1, kg	109	96	114	114	96	121	121
Refrigerant Charge, R-134a, Circuit -2, kg	109	86	102	114	96	121	121
Oil Charge, Circuit -1, liter	11	10.3	11.1	11	10.3	11.4	11.4
Oil Charge, Circuit -2, liter	11	9.9	10.6	11	10.3	11.4	11.4
% Minimum Load	10%						
Unit shipping weight, kg <sup>1</sup>	7111	6027	7200	7545	6385	7382	7707
Operating Weight, kg <sup>1</sup>	7457	6237	7546	7891	6594	7758	8097
Chassis Dimensions - Length, mm	8514	7397	8514	9631	8514	8514	8514
Chassis Dimensions - Width, mm	2244	2244	2244	2244	2244	2244	2244
Chassis Dimensions - Height, mm	2402	2402	2402	2402	2402	2402	2402
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>							
Quantity per Chiller	2						
<b>CONDENSER FANS</b>							
Number Ckt-1/Ckt-2	7/7	7/5	8/6	8/8	7/7	7/7	7/7
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>							
Water Volume, liter	269	220	269	269	220	310	428
Leaving Water Temperature (Min/Max) °C <sup>3</sup>	4.4/21.1						
Air on Condenser (Min/Max) °C	-17.8/55						
Maximum Water Side Pressure, barg	10.3						
Opt. 300 psi Max Water Side Pressure, barg	20.6						
Maximum refrigerant Side Pressure, barg	16.2						
Evaporator Drain Connection, mm	19						

UNIT FRAME	034	034	037	041	044	048	052
<b>CONDENSER CODE</b>	3	5	3	3	3	3	3
<b>EVAPORATOR CODE</b>	E	E	F	H	G	G	J
<b>GENERAL UNIT DATA</b>							
Number of Independent Refrigerant Circuits	2						
Refrigerant Charge, R-134a, Circuit -1, kg	141	143	190	290	168	175	202
Refrigerant Charge, R-134a, Circuit -2, kg	141	143	111	156	168	175	202
Oil Charge, Circuit -1, liter	15.9	16.3	20	20.8	18.9	19.3	20.4
Oil Charge, Circuit -2, liter	15.9	16.3	10.9	16.2	18.9	19.3	20.4
% Minimum Load	10%						
Unit shipping weight, kg <sup>1</sup>	8761	9107	10136	9635	11767	12113	12894
Operating Weight, kg <sup>1</sup>	9151	9497	10616	10001	12247	12593	13500
Chassis Dimensions - Length, mm	10748	11865	11865	11865	11865 / 2240	11865 / /3357	11865 / /3357
Chassis Dimensions - Width, mm	2244	2244	2248	2248	2248	2248	2248
Chassis Dimensions - Height, mm	2402	2402	2407	2407	2407	2407	2407
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>							
Quantity per Chiller	2						
<b>CONDENSER FANS</b>							
Number Ckt-1/Ckt-2	9/9	10/10	13/7	12/8	12/12	13/13	13/13
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>							
Water Volume, liter	428	428	363	492	363	363	556
Leaving Water Temperature (Min/Max) °C <sup>3</sup>	4.4/21.1						
Air on Condenser (Min/Max) °C	-17.8/55						
Maximum Water Side Pressure, barg	10.3						
Opt. 300 psi Max Water Side Pressure, barg	20.6						
Maximum refrigerant Side Pressure, barg	16.2						
Evaporator Drain Connection, mm	19						

### NOTES:

- Shipping and operating weights shown are for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales office for weight data.
- For leaving liquid temperature below 40°F(4.4°C) or above 70°F (21.1°C), contact your nearest Johnson Controls Sales Office for application requirements.
- 0443/0483/0523 units are two-piece shipment.

## Physical Data - Round Tube Coil - English

The data shown in this table is applicable to selected typical configurations. Other configurations are available through our configuration/selection software. Please contact your nearest Johnson Controls Sales Office for the chiller configuration that best matches your specific needs.

UNIT FRAME	015	018	021	023	026	027	030
<b>CONDENSER CODE</b>	3	3	3	3	3	3	3
<b>EVAPORATOR CODE</b>	B	A	A	B	B	D	C
<b>GENERAL UNIT DATA</b>							
Number of Independent Refrigerant Circuits	2						
Refrigerant Charge, R-134a, Circuit -1, lbs	211	229	229	273	273	328	371
Refrigerant Charge, R-134a, Circuit -2, lbs	211	191	229	235	273	328	308
Oil Charge, Circuit -1, gal	2.1	2.4	2.5	2.7	2.7	3.0	4.1
Oil Charge, Circuit -2, gal	2.0	2.0	2.5	2.6	2.7	3.0	3.0
% Minimum Load	10%						
Unit shipping weight, lbs <sup>1</sup>	12354	13064	14113	14542	15539	17738	18786
Operating Weight, lbs <sup>1</sup>	12815	13505	14554	15004	16001	18566	19549
Chassis Dimensions - Length, inches	203.3	247	291.2	291.2	335.2	335.2	379.2
Chassis Dimensions - Width, inches	88.3	88.3	88.3	88.3	88.3	88.3	88.3
Chassis Dimensions - Height, inches	94.6	94.6	94.6	94.6	94.6	94.6	94.6
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>							
Quantity per Chiller	2						
<b>CONDENSER FANS</b>							
Number Ckt-1/Ckt-2	4/4	6/4	6/6	7/5	7/7	7/7	9/7
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>							
Water Volume, gal	58	48	48	58	58	82	71
Leaving Water Temperature (Min/Max) °F <sup>3</sup>	40/70						
Air on Condenser (Min/Max) °F	0/131						
Maximum Water Side Pressure, psig	150						
Opt. 300 psi Max Water Side Pressure, psig	300						
Maximum refrigerant Side Pressure, psig	235						
Evaporator Drain Connection, in	3/4						

UNIT FRAME	032	033	034	037	041	044	048	052
<b>CONDENSER CODE</b>	3	3	3	3	3	3	3	3
<b>EVAPORATOR CODE</b>	E	C	E	F	H	G	J	J
<b>GENERAL UNIT DATA</b>								
Number of Independent Refrigerant Circuits	2							
Refrigerant Charge, R-134a, Circuit -1, lbs	367	371	391	537	568	478	502	562
Refrigerant Charge, R-134a, Circuit -2, lbs	367	371	391	308	417	478	502	562
Oil Charge, Circuit -1, gal	4.1	4.1	4.2	5.3	5.5	5.0	5.1	5.4
Oil Charge, Circuit -2, gal	4.1	4.1	4.2	2.9	4.3	5.0	5.1	5.4
% Minimum Load	10%							
Unit shipping weight, lbs <sup>1</sup>	20226	20105	21196	24436	23332	28450	29421	31144
Operating Weight, lbs <sup>1</sup>	21086	20868	22056	25495	24139	29509	30480	32501
Chassis Dimensions - Length, inches	379.2	423.1	423.1	467.1	467.1	555.3	599.3	599.3
Chassis Dimensions - Width, inches	88.3	88.3	88.3	88.3	88.3	88.3	88.4	88.3
Chassis Dimensions - Height, inches	94.6	94.6	94.6	94.7	94.7	94.7	94.7	94.7
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>								
Quantity per Chiller	2							
<b>CONDENSER FANS</b>								
Number Ckt-1/Ckt-2	8/8	9/9	9/9	13/7	12/8	12/12	13/13	13/13
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>								
Water Volume, gal	113	71	113	96	130	96	96	147
Leaving Water Temperature (Min/Max) °F <sup>3</sup>	40/70							
Air on Condenser (Min/Max) °F	0/130							
Maximum Water Side Pressure, psig	150							
Opt. 300 psi Max Water Side Pressure, psig	300							
Maximum refrigerant Side Pressure, psig	235							
Evaporator Drain Connection, in	3/4							

### NOTES:

- Shipping and operating weights shown are for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls sales office for weight data.
- For leaving liquid temperature below 40°F (4.4°C) or above 70°F (21.1°C), contact your nearest Johnson Controls Sales Office for application requirements..
- 0443/0483/0523 is two-piece shipment.

## Physical Data - Round Tube Coil - SI

The data shown in this table is applicable to selected typical configurations. Other configurations are available through our configuration/selection software. Please contact your nearest Johnson Controls Sales Office for the chiller configuration that best matches your specific needs.

UNIT FRAME	015	018	021	023	026	027	030
<b>CONDENSER CODE</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>EVAPORATOR CODE</b>	<b>B</b>	<b>A</b>	<b>A</b>	<b>B</b>	<b>B</b>	<b>D</b>	<b>C</b>
<b>GENERAL UNIT DATA</b>							
Number of Independent Refrigerant Circuits	2						
Refrigerant Charge, R-134a, Circuit -1, kgs	96	104	104	124	124	149	168
Refrigerant Charge, R-134a, Circuit -2, kgs	96	87	104	107	124	149	140
Oil Charge, Circuit -1, ltr	8.0	9.2	9.3	10.1	10.1	11.4	15.5
Oil Charge, Circuit -2, ltr	7.7	7.7	9.3	9.7	10.1	11.4	11.4
% Minimum Load	10%						
Unit shipping weight, kgs <sup>1</sup>	5224	5926	6402	6596	7048	8046	8521
Operating Weight, kgs <sup>1</sup>	5813	6126	6602	6806	7258	8421	8867
Chassis Dimensions - Length, inches	5163	6274	7397	7397	8514	8514	9631
Chassis Dimensions - Width, inches	2242	2242	2242	2242	2242	2242	2242
Chassis Dimensions - Height, inches	2403	2403	2403	2403	2403	2403	2403
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>							
Quantity per Chiller	2						
<b>CONDENSER FANS</b>							
Number Ckt-1/Ckt-2	4/4	6/4	6/6	7/5	7/7	7/7	9/7
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>							
Water Volume, gal	220	182	182	220	220	310	269
Leaving Water Temperature (Min/Max) °C <sup>3</sup>	4.4/21.1						
Air on Condenser (Min/Max) °C	-17.8/55						
Maximum Water Side Pressure, barg	10.3						
Opt. 300 psi Max Water Side Pressure, barg	20.6						
Maximum refrigerant Side Pressure, barg	16.2						
Evaporator Drain Connection, mm	19						

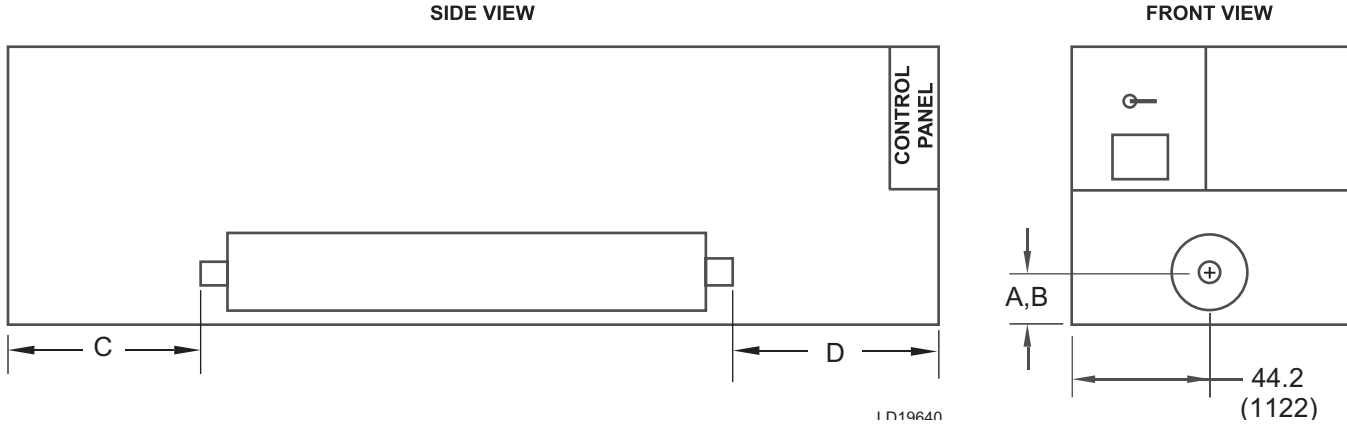
UNIT FRAME	032	033	034	037	041	044	048	052
<b>CONDENSER CODE</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>EVAPORATOR CODE</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>F</b>	<b>H</b>	<b>G</b>	<b>J</b>	<b>J</b>
<b>GENERAL UNIT DATA</b>								
Number of Independent Refrigerant Circuits	2							
Refrigerant Charge, R-134a, Circuit -1, kgs	166	168	177	244	258	217	228	255
Refrigerant Charge, R-134a, Circuit -2, kgs	166	168	177	140	189	217	228	255
Oil Charge, Circuit -1, ltr	15.5	15.5	15.9	20.1	20.8	18.9	19.3	20.4
Oil Charge, Circuit -2, ltr	15.5	15.5	15.9	11.0	16.3	18.9	19.3	20.4
% Minimum Load	10%							
Unit shipping weight, kgs <sup>1</sup>	9174	9119	9614	11084	10583	12905	13345	14127
Operating Weight, kgs <sup>1</sup>	9504	9466	10004	11564	10949	13385	13826	14742
Chassis Dimensions - Length, inches	9631	10748	10748	11864	11864	14104	15222	15222
Chassis Dimensions - Width, inches	2242	2242	2242	2242	2242	2242	2242	2242
Chassis Dimensions - Height, inches	2403	2403	2403	2403	2403	2403	2403	2403
<b>COMPRESSORS, SEMI-HERMETIC SCREW</b>								
Quantity per Chiller	2							
<b>CONDENSER FANS</b>								
Number Ckt-1/Ckt-2	8/8	9/9	9/9	13/7	12/8	12/12	13/13	13/13
<b>EVAPORATOR, TUBE IN SHELL HYBRID FALLING FILM <sup>2</sup></b>								
Water Volume, gal	428	269	428	363	492	363	363	556
Leaving Water Temperature (Min/Max) °C <sup>3</sup>	4.4/21.1							
Air on Condenser (Min/Max) °C	-17.8/55							
Maximum Water Side Pressure, barg	10.3							
Opt. 300 psi Max Water Side Pressure, barg	20.6							
Maximum refrigerant Side Pressure, barg	16.2							
Evaporator Drain Connection, mm	19							

### NOTES:

- Shipping and operating weights shown are for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls sales office for weight data.
- For leaving liquid temperature below 40°F(4.4°C) or above 70°F (21.1°C), contact your nearest Johnson Controls Sales Office for application requirements.
- 0443/0483/0523 is two-piece shipment.

# Evaporator Options

## OPTIONAL ONE-PASS EVAPORATOR

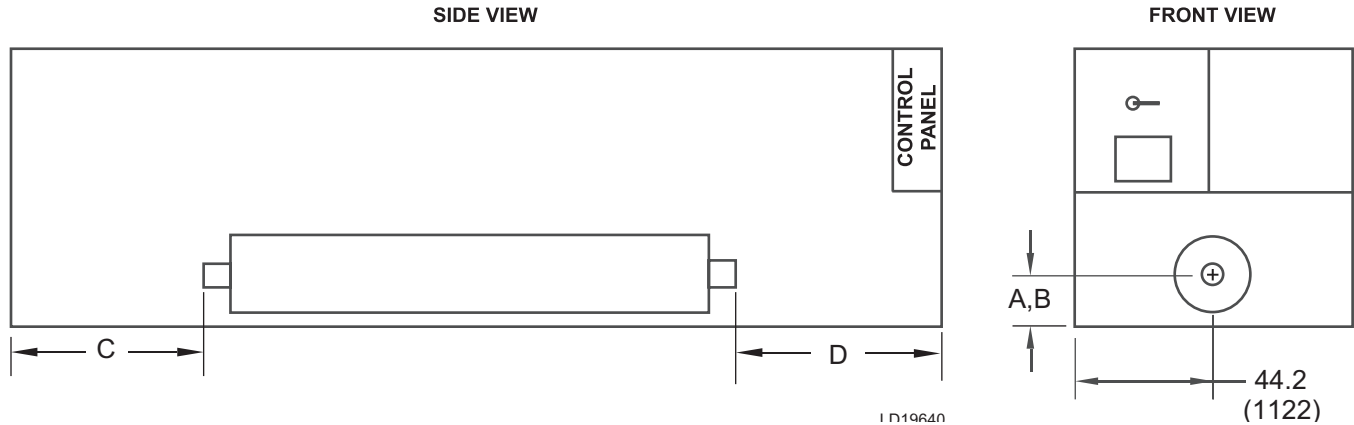


ALL DIMENSIONS - INCHES (MM)								
YVAA		A,B	C	D	E NOZZLE SIZE	WATER VOLUME. GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.							
15	3	20.8 (528)	6.8 (173)	34.5 (876)	8	58 (220)	250 (16)	950 (60)
16	5	20.8 (528)	29.2 (742)	56.1 (1425)	8	58 (220)	250 (16)	950 (60)
17	8	20.8 (528)	34.9 (886)	70 (1778)	8	71 (269)	300 (19)	1150 (73)
18	3	19.8 (503)	17.7 (450)	56.8 (1443)	6	48 (182)	200 (13)	750 (47)
19	5	19.8 (503)	61.5 (1562)	56.7 (1440)	6	48 (182)	200 (13)	750 (47)
19	8	21 (533)	117.3 (2979)	56.1 (1425)	8	58 (220)	250 (16)	950 (60)
20	0	20.8 (528)	1.7 (43)	38.1 (968)	8	71 (269)	300 (19)	1150 (73)
21	3	19.8 (503)	61.7 (1567)	56.8 (1443)	6	48 (182)	200 (13)	750 (47)
21	5	20.8 (528)	34.9 (886)	70 (1778)	8	71 (269)	300 (19)	1150 (73)
21	8	21 (533)	78.9 (2004)	70 (1778)	8	71 (269)	300 (19)	1150 (73)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## OPTIONAL ONE-PASS EVAPORATOR

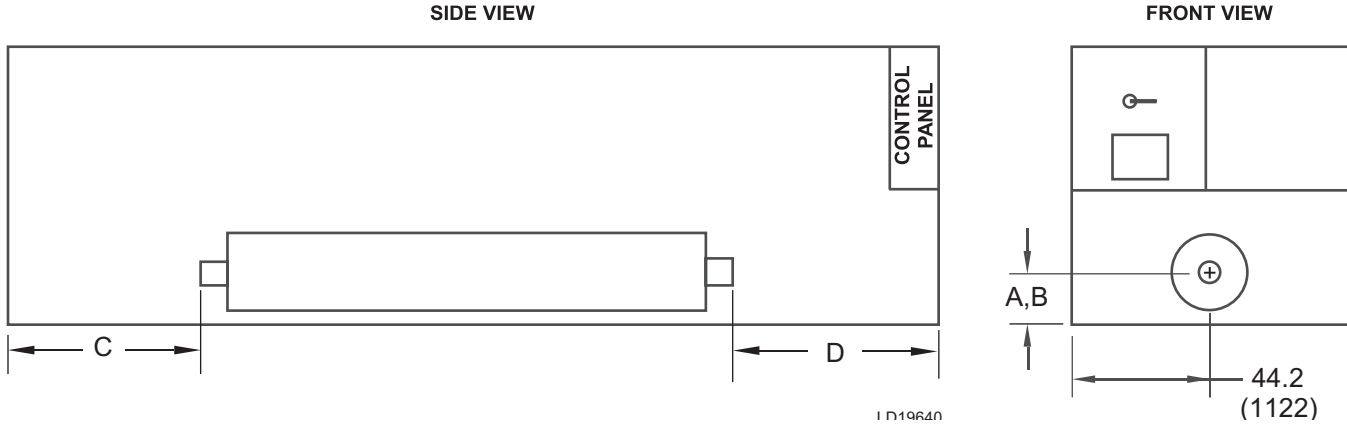


ALL DIMENSIONS - INCHES (MM)								
FRAME	YVAA COND.	A,B	C	D	E NOZZLE SIZE	WATER VOLUME. GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
24	5	21 (533)	92.9 (2360)	56.1 (1425)	8	71 (269)	300 (19)	1150 (73)
24	8	21 (533)	122.9 (3122)	70 (1778)	8	71 (269)	300 (19)	1150 (73)
26	3	21 (533)	117.1 (2974)	56.1 (1425)	8	58 (220)	250 (16)	950 (60)
27	3	21 (533)	42.9 (1090)	70 (1778)	8	82 (310)	300 (19)	1150 (73)
27	5	22.5 (572)	44.7 (1135)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
27	8	22.5 (572)	88.3 (2243)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
29	5	22.5 (572)	88.6 (2250)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
30	3	21 (533)	122.9 (3122)	70 (1778)	8	71 (269)	300 (19)	1150 (73)
30	5	21 (533)	166.9 (4239)	70 (1778)	8	71 (269)	300 (19)	1150 (73)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## OPTIONAL ONE-PASS EVAPORATOR



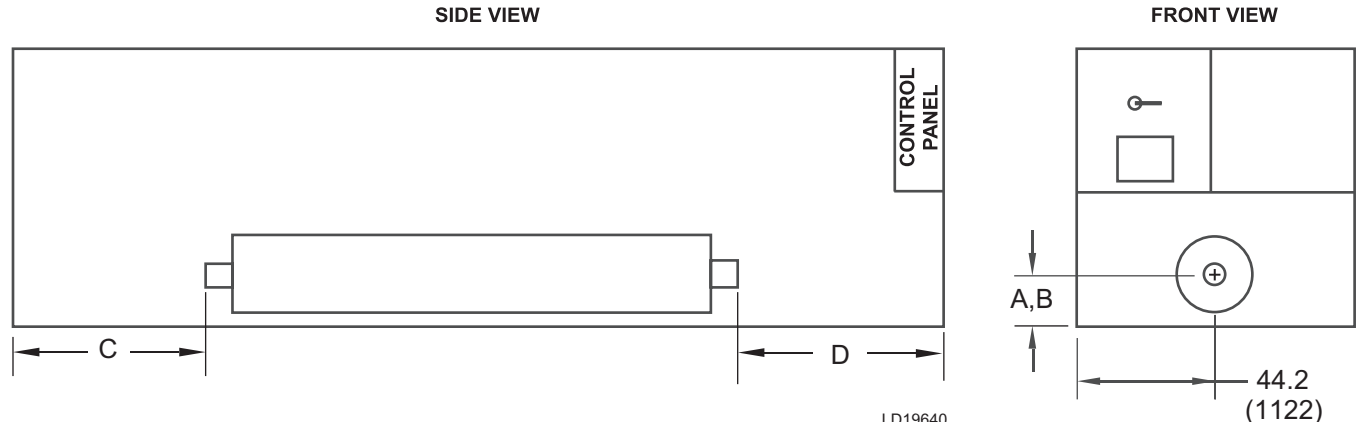
ALL DIMENSIONS - INCHES (MM)								
YVAA		A,B	C	D	E NOZZLE SIZE	WATER VOLUME. GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.							
30	8	22.5 (572)	132.2 (3358)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
31	8	22.5 (572)	176.6 (4486)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
32	3	22.5 (572)	88.6 (2250)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
33	3	21 (533)	166.9 (4239)	70 (1778)	8	71 (269)	300 (19)	1150 (73)
34	3	22.5 (572)	132.6 (3368)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
34	5	22.5 (572)	176.21 (4476)	71.8 (1824)	10	113 (428)	400 (25)	1500 (95)
36	8	23.3 (592)	208.6 (5298)	83.5 (2121)	10	147 (556)	550 (35)	1880 (119)
37	3	22.3 (566)	180.9 (4595)	112.2 (2850)	10	96 (363)	460 (29)	1540 (97)
37	5	23.3 (592)	164.3 (4173)	83.4 (2118)	10	147 (556)	550 (35)	1880 (119)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.



# Evaporator Options (Cont'd)

## OPTIONAL ONE-PASS EVAPORATOR

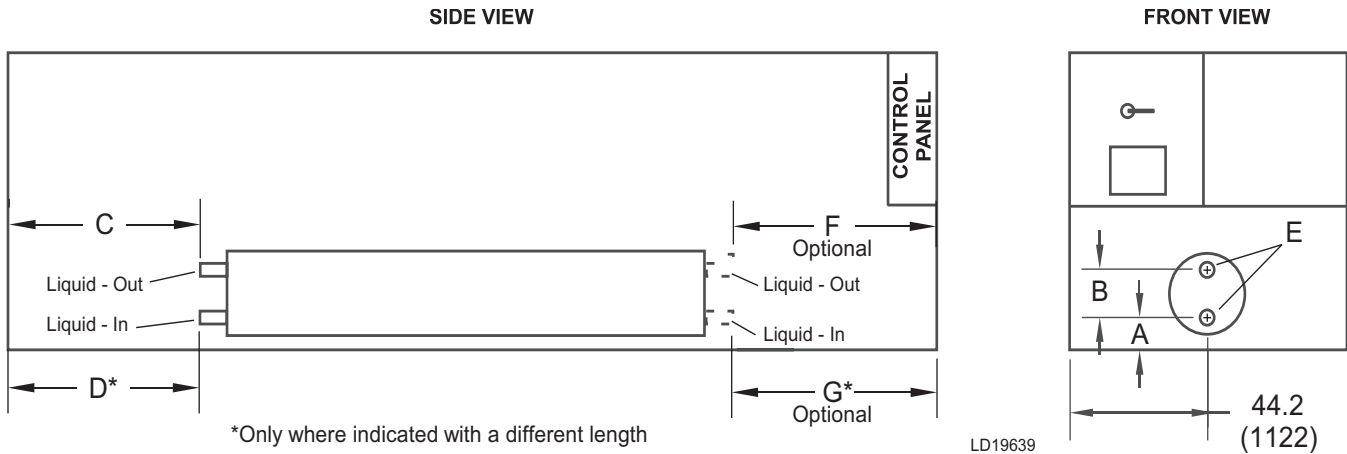


ALL DIMENSIONS - INCHES (MM)								
FRAME	YVAA COND.	A,B	C	D	E NOZZLE SIZE	WATER VOLUME. GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
41	3	22.5 (572)	164.6 (4181)	83.8 (2129)	10	130 (492)	520 (33)	1700 (107)
42	5	22.5 (572)	252.6 (6416)	83.8 (2129)	10	130 (492)	520 (33)	1700 (107)
42	8	23.3 (592)	296.5 (7531)	83.5 (2121)	10	147 (556)	550 (35)	1880 (119)
44	3	22.3 (566)	287.1 (7292)	94.2 (2393)	10	96 (363)	460 (29)	1540 (97)
47	5	23.3 (592)	308.4 (7833)	71.5 (1816)	10	147 (556)	550 (35)	1880 (119)
48	3	22.3 (566)	331.2 (8412)	94.2 (2393)	10	96 (363)	460 (29)	1540 (97)
50	0	23.3 (592)	176.2 (4475)	71.5 (1816)	10	147 (556)	550 (35)	1880 (119)
52	3	23.3 (592)	308.4 (7833)	71.5 (1816)	10	147 (556)	550 (35)	1880 (119)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## STANDARD TWO-PASS, REAR INLET/OUTLET EVAPORATOR

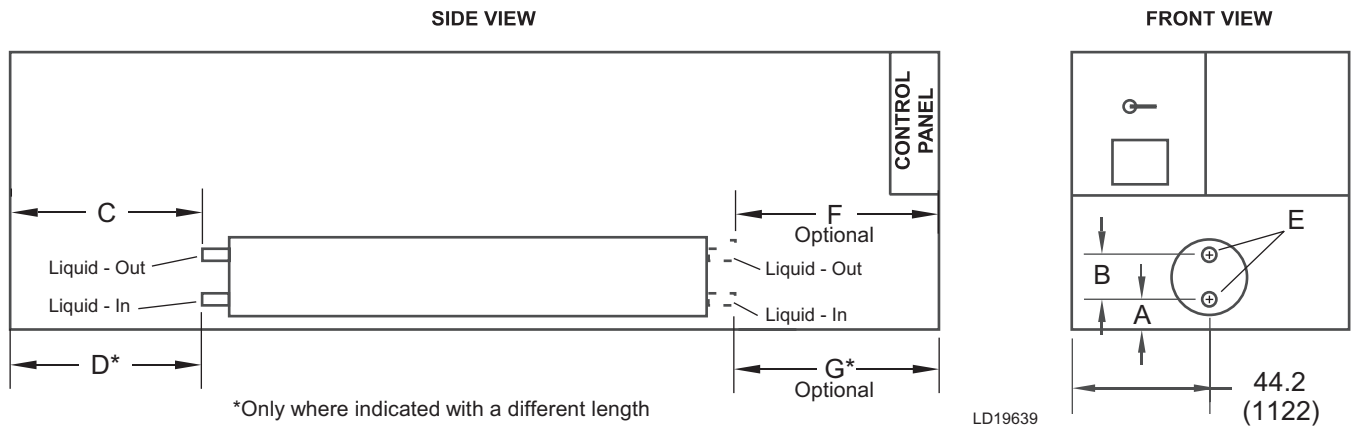


ALL DIMENSIONS - INCHES (MM)											
YVAA		A	B	C	D	E NOZZLE SIZE	F	G	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.										
15	3	15.1 (384)	11.4 (290)	6.8 (173)	-	6	34.5 (876)	-	58 (220)	250 (16)	950 (60)
16	5	15.1 (384)	11.4 (290)	29.4 (747)	-	6	56.1 (1425)	-	58 (220)	250 (16)	950 (60)
17	8	15.1 (384)	11.4 (290)	34.9 (886)	-	6	70 (1778)	-	71 (269)	300 (19)	1150 (73)
18	3	14.1 (358)	11.4 (290)	17.7 (450)	-	6	56.8 (1443)	-	48 (182)	200 (13)	750 (47)
19	5	14.1 (358)	11.4 (290)	61.5 (1562)	-	6	56.7 (1440)	-	48 (182)	200 (13)	750 (47)
19	8	15.3 (389)	11.4 (290)	117.3 (2979)	-	6	56.1 (1425)	-	58 (220)	250 (16)	950 (60)
20	0	15.1 (384)	11.4 (290)	1.7 (43)	-	6	38.1 (968)	-	71 (269)	300 (19)	1150 (73)
21	3	14.1 (358)	11.4 (290)	61.7 (1567)	-	6	58.8 (1494)	-	48 (182)	200 (13)	750 (47)
21	5	15.1 (384)	11.4 (290)	29.9 (759)	-	6	70 (1778)	-	71 (269)	300 (19)	1150 (73)
21	8	15.3 (389)	11.4 (290)	78.9 (2004)	-	6	70.3 (1786)	-	71 (269)	300 (19)	1150 (73)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## STANDARD TWO-PASS, REAR INLET/OUTLET EVAPORATOR

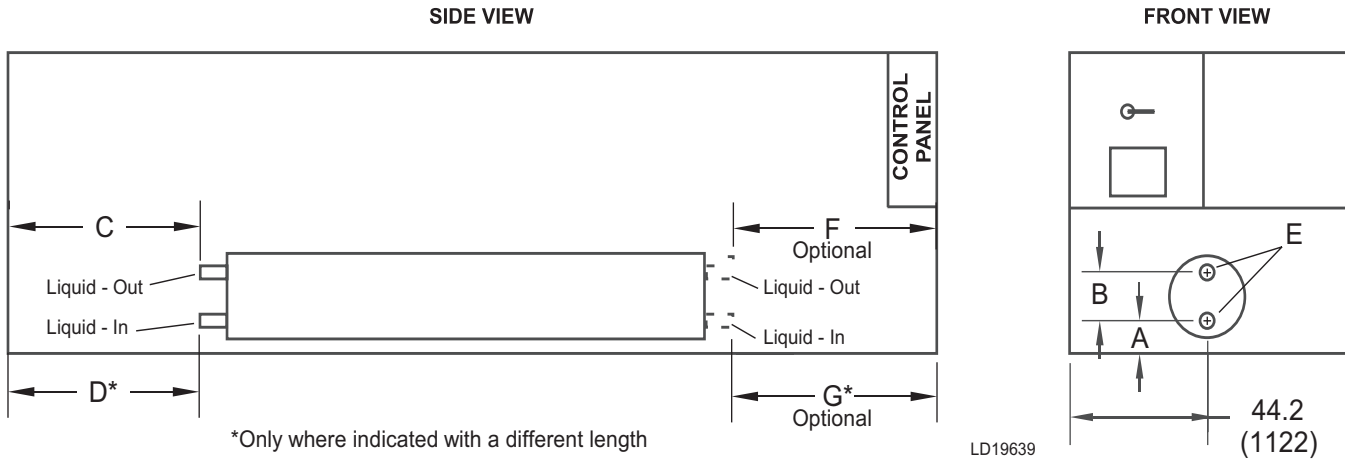


ALL DIMENSIONS - INCHES (MM)											
YVAA		A	B	C	D	E NOZZLE SIZE	F	G	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.										
23	3	15.1 (384)	11.4 (290)	73.3 (1862)	-	6	56.1 (1425)	-	58 (220)	250 (16)	950 (60)
24	5	15.3 (389)	11.4 (290)	29.9 (759)	-	6	56.1 (1425)	-	71 (269)	300 (19)	1150 (73)
24	8	15.3 (389)	11.4 (290)	122.9 (3122)	-	6	70 (1778)	-	71 (269)	300 (19)	1150 (73)
26	3	15.3 (389)	11.4 (290)	117.3 (2979)	-	6	56.1 (1425)	-	58 (220)	250 (16)	950 (60)
27	3	15.3 (389)	11.4 (290)	42.9 (1090)	-	6	70 (1778)	-	82 (310)	300 (19)	1150 (73)
27	5	15.5 (394)	14 (356)	44.3 (1125)	-	8	71.8 (1824)	-	113 (428)	400 (25)	1500 (95)
27	8	15 (381)	14 (356)	88.3 (2243)	-	8	71.8 (1824)	-	113 (428)	400 (25)	1500 (95)
29	5	15.5 (394)	14 (356)	88.3 (2243)	-	8	71.8 (1824)	-	113 (428)	400 (25)	1500 (95)
30	3	15.3 (389)	11.4 (290)	122.9 (3122)	-	6	70 (1778)	-	71 (269)	300 (19)	1150 (73)
30	5	15.3 (389)	11.4 (290)	166.8 (4237)	-	6	70 (1778)	-	71 (269)	300 (19)	1150 (73)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## STANDARD TWO-PASS, REAR INLET/OUTLET EVAPORATOR

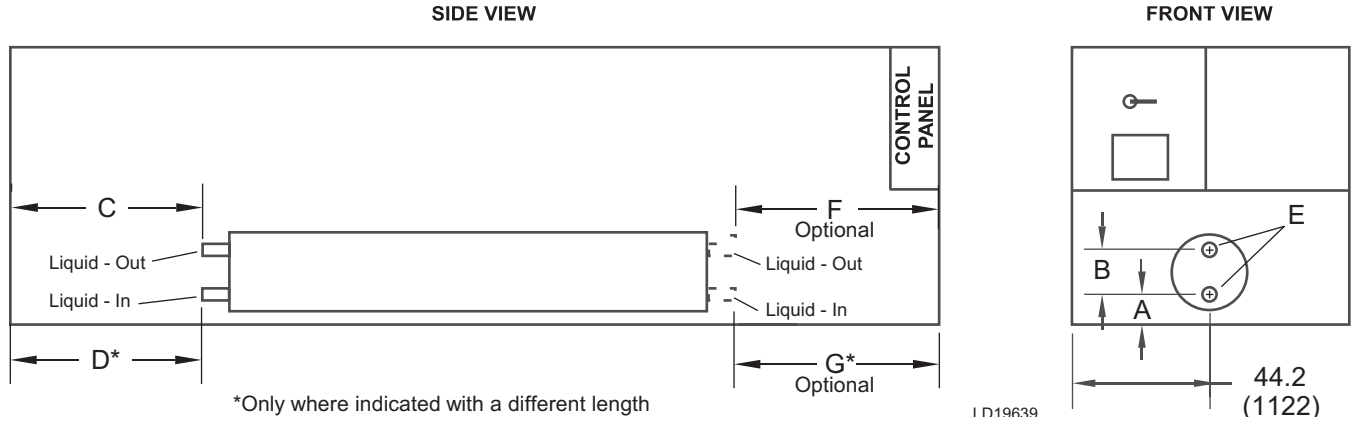


ALL DIMENSIONS - INCHES (MM)											
YVAA		A	B	C	D	E NOZZLE SIZE	F	G	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.										
30	8	15.5 (394)	14 (356)	132.2 (3358)	-	8	83.4 (2118)	-	113 (428)	400 (25)	1500 (95)
31	8	15.5 (394)	14 (356)	176.21 (4476)	-	8	83.4 (2118)	-	113 (428)	400 (25)	1500 (95)
32	3	15.5 (394)	14 (356)	88.6 (2250)	-	8	83.4 (2118)	-	113 (428)	400 (25)	1500 (95)
33	3	15.3 (389)	11.4 (290)	166.9 (4239)	-	6	83.4 (2118)	-	71 (269)	300 (19)	1150 (73)
34	3	15.5 (394)	14 (356)	132.2 (3358)	-	8	83.4 (2118)	-	113 (428)	400 (25)	1500 (95)
34	5	15.5 (394)	14 (356)	176.2 (4475)	-	8	83.4 (2118)	-	113 (428)	400 (25)	1500 (95)
36	8	16.3 (414)	14 (356)	208.5 (5296)	-	8	83.4 (2118)	-	147 (556)	550 (35)	1880 (119)
37	3	15.8 (401)	13 (330)	180.9 (4595)	176.4 (4480)	8	112.2 (2850)	107.7 (2735)	96 (363)	460 (29)	1540 (97)
37	5	16.3 (414)	14 (356)	164.4 (4176)	-	8	83.4 (2118)	-	147 (556)	550 (35)	1880 (119)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## STANDARD TWO-PASS, REAR INLET/OUTLET EVAPORATOR

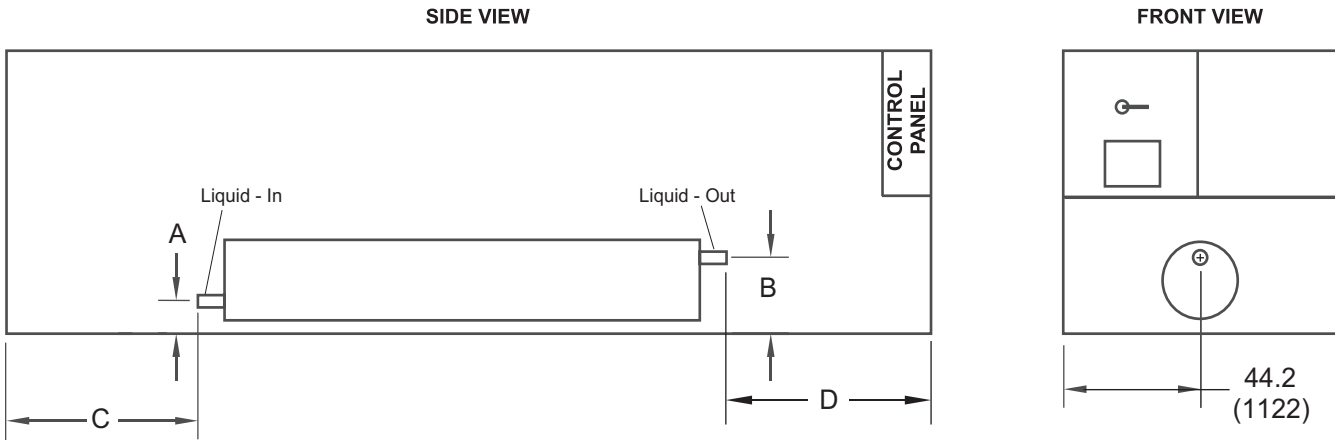


ALL DIMENSIONS - INCHES (MM)											
YVAA		A	B	C	D	E NOZZLE SIZE	F	G	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.										
39	8	16.3 (414)	14 (356)	252.5 (6414)	-	8	83.5 (2121)		147 (556)	550 (35)	1880 (119)
41	3	15.5 (394)	14 (356)	164.6 (4181)	-	8	83.8 (2129)		130 (492)	520 (33)	1700 (107)
42	5	15.5 (394)	14 (356)	252.6 (6416)	-	8	83.8 (2129)		130 (492)	520 (33)	1700 (107)
42	8	16.3 (414)	14 (356)	296.5 (7531)	-	8	83.5 (2121)		147 (556)	550 (35)	1880 (119)
44	3	15.8 (401)	13 (330)	287.1 (7292)	282.5 (7177)	8	94.2 (2393)	89.7 (2278)	96 (363)	460 (29)	1540 (97)
47	5	16.3 (414)	14 (356)	308.4 (7833)	-	8	71.5 (1816)	-	147 (556)	550 (35)	1880 (119)
48	3	15.8 (401)	13 (330)	331.2 (8412)	326.6 (8296)	8	94.2 (2393)	89.7 (2278)	96 (363)	460 (29)	1540 (97)
50	0	16.3 (414)	14 (356)	176.2 (4475)	-	8	71.5 (1816)	-	147 (556)	550 (35)	1880 (119)
52	3	16.3 (414)	14 (356)	308.4 (7833)	-	8	71.5 (1816)	-	147 (556)	550 (35)	1880 (119)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## OPTIONAL THREE-PASS REAR INLET/FRONT OUTLET EVAPORATOR



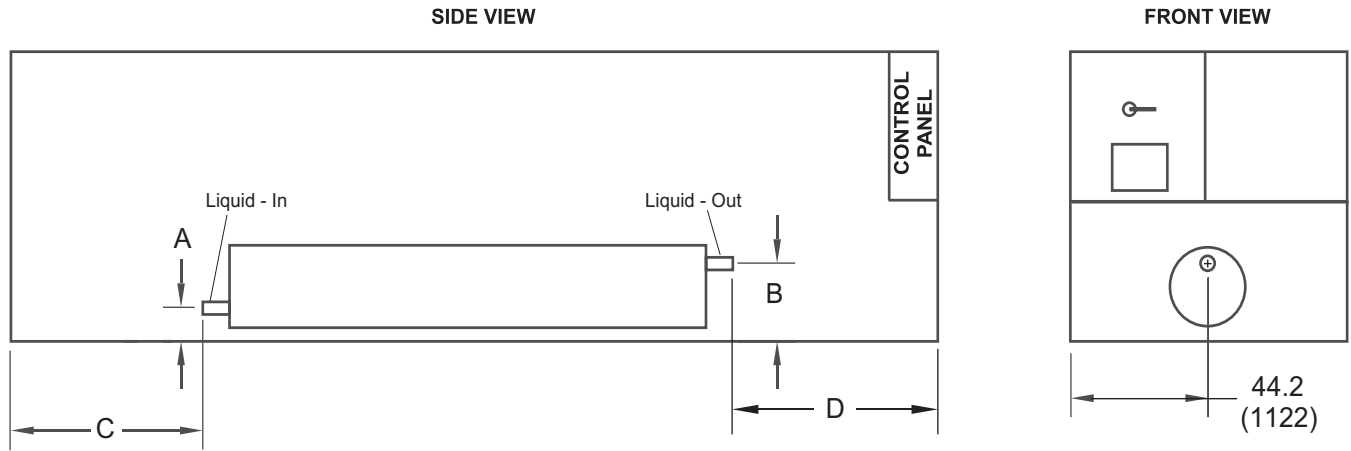
LD19641

ALL DIMENSIONS - INCHES (MM)									
YVAA		A	B	C	D	E NOZZLE SIZE	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.								
15	3	15.1 (384)	26.5 (673)	6.8 (173)	34.5 (876)	5	58 (220)	160 (10)	600 (38)
16	5	15.1 (384)	26.5 (673)	29.2 (742)	56.1 (1425)	5	58 (220)	160 (10)	600 (38)
17	8	15.1 (384)	26.5 (673)	34.9 (886)	70 (1778)	6	71 (269)	200 (13)	750 (47)
18	3	25.5 (648)	25.5 (648)	17.7 (450)	56.8 (1443)	5	48 (182)	120 (8)	500 (32)
19	5	14.1 (358)	25.5 (648)	61.5 (1562)	56.7 (1440)	5	48 (182)	120 (8)	500 (32)
19	8	15.3 (389)	26.7 (678)	117.3 (2979)	56.1 (1425)	5	58 (220)	160 (10)	600 (38)
20	0	15.1 (384)	26.53 (674)	1.7 (43)	38.1 (968)	6	71 (269)	200 (13)	750 (47)
21	3	14.1 (358)	25.5 (648)	61.6 (1565)	58.8 (1494)	5	48 (182)	120 (8)	500 (32)
21	5	15.1 (384)	26.5 (673)	34.9 (886)	70 (1778)	6	71 (269)	200 (13)	750 (47)
21	8	15.3 (389)	26.7 (678)	78.9 (2004)	70.3 (1786)	6	71 (269)	200 (13)	750 (47)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## OPTIONAL THREE-PASS REAR INLET/FRONT OUTLET EVAPORATOR



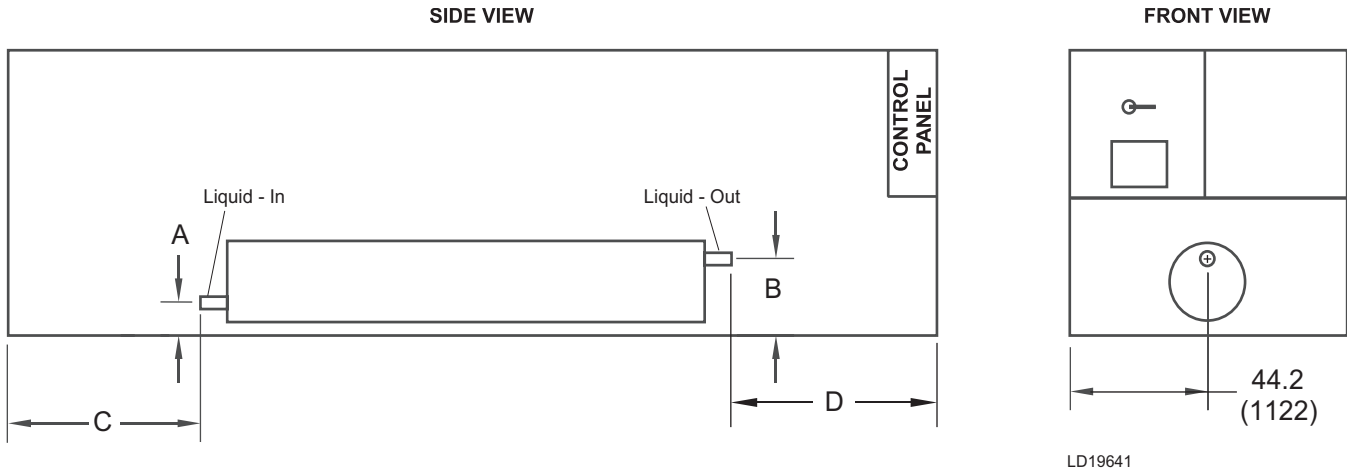
LD19641

ALL DIMENSIONS - INCHES (MM)									
YVAA		A	B	C	D	E NOZZLE SIZE	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.								
23	3	14.1 (358)	25.5 (648)	73.2 (1859)	56.1 (1425)	5	58 (220)	160 (10)	600 (38)
24	5	15.3 (389)	26.7 (678)	29.9 (759)	56.1 (1425)	6	71 (269)	200 (13)	750 (47)
24	8	15.3 (389)	26.7 (678)	122.9 (3122)	70 (1778)	6	71 (269)	200 (13)	750 (47)
26	3	15.3 (389)	26.7 (678)	117.1 (2974)	56.1 (1425)	5	58 (220)	160 (10)	600 (38)
27	3	15.3 (389)	26.7 (678)	42.9 (1090)	70 (1778)	6	82 (310)	200 (13)	750 (47)
27	5	15.5 (394)	29.5 (749)	88.6 (2250)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
27	8	15.5 (394)	29.5 (749)	88.3 (2243)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
29	5	15.5 (394)	29.5 (749)	88.6 (2250)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
30	3	15.3 (389)	26.7 (678)	122.9 (3122)	70 (1778)	6	71 (269)	200 (13)	750 (47)
30	5	15.3 (389)	26.7 (678)	166.9 (4239)	70 (1778)	6	71 (269)	200 (13)	750 (47)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Evaporator Options (Cont'd)

## OPTIONAL THREE-PASS REAR INLET/FRONT OUTLET EVAPORATOR



LD19641

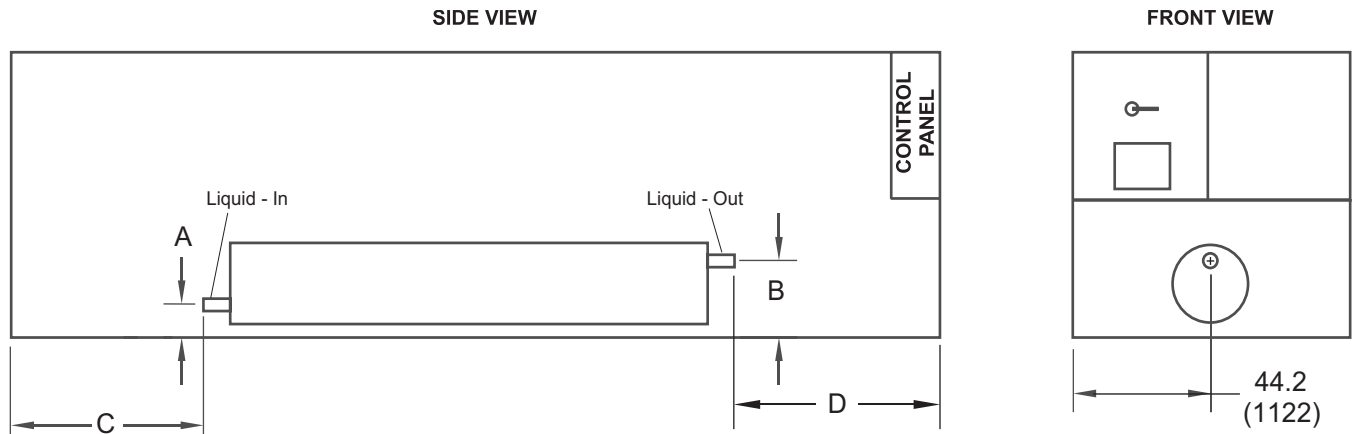
ALL DIMENSIONS - INCHES (MM)									
YVAA		A	B	C	D	E NOZZLE SIZE	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.								
30	8	15 (381)	30.3 (770)	132.2 (3358)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
31	8	15 (381)	29.5 (749)	176.6 (4486)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
32	3	15.5 (394)	29.5 (749)	88.6 (2250)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
33	3	15.3 (389)	26.7 (678)	166.9 (4239)	70 (1778)	6	71 (269)	200 (13)	750 (47)
34	3	15.5 (394)	29.5 (749)	132.6 (3368)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
34	5	15.5 (394)	29.5 (749)	176.2 (4475)	71.8 (1824)	6	113 (428)	300 (19)	850 (54)
36	8	16.3 (414)	30.3 (770)	208.6 (5298)	83.5 (2121)	8	147 (556)	350 (25)	1400 (88)
37	3	15.8 (401)	28.8 (732)	180.9 (4595)	112.2 (2850)	6	94 (356)	310 (20)	1070 (68)
37	5	16.3 (414)	30.3 (770)	164.3 (4173)	83.4 (2118)	8	147 (556)	400 (25)	1400 (88)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.



# Evaporator Options (Cont'd)

## OPTIONAL THREE-PASS REAR INLET/FRONT OUTLET EVAPORATOR



LD19641

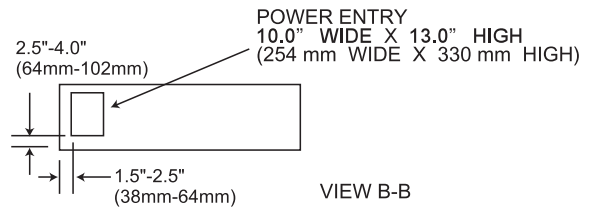
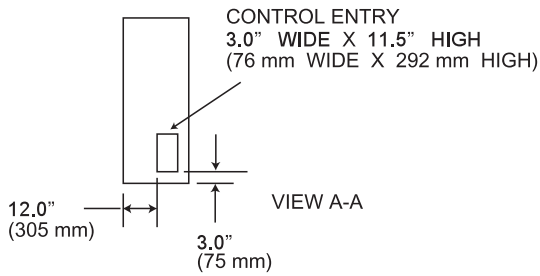
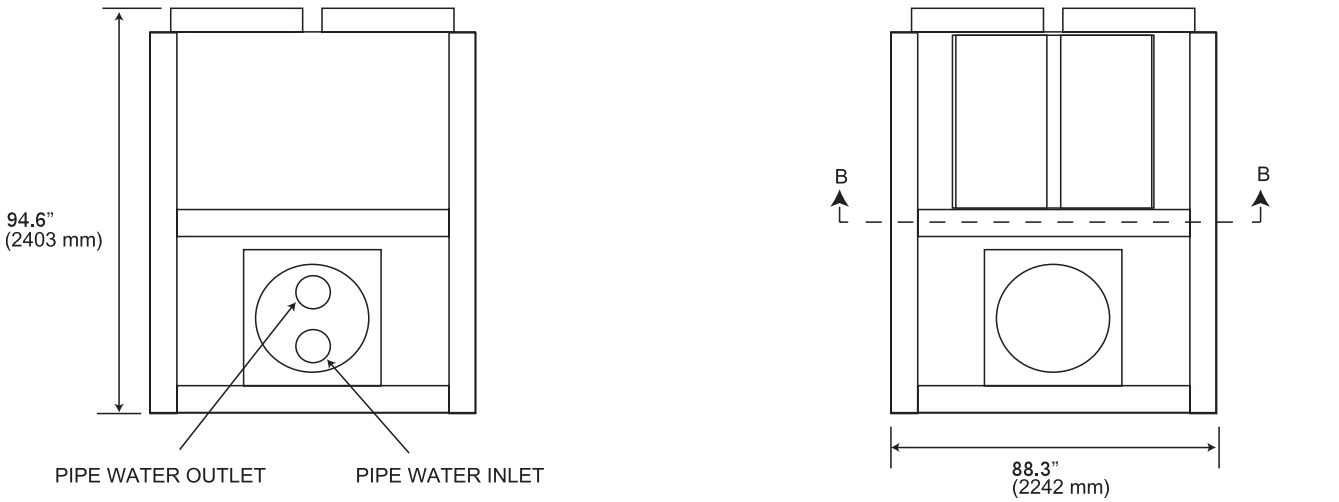
ALL DIMENSIONS - INCHES (MM)									
YVAA		A	B	C	D	E NOZZLE SIZE	WATER VOLUME GALLONS (LITERS)	MINIMUM CHILLED WATER FLOW RATE GPM (L/S)	MAXIMUM CHILLED WATER FLOW RATE GPM (L/S)
FRAME	COND.								
39	8	16.3 (414)	30.3 (770)	252.5 (6414)	83.5 (2121)	8	147 (556)	400 (25)	1400 (88)
41	3	15.5 (394)	29.5 (749)	164.6 (4181)	83.8 (2129)	6	128 (485)	350 (22)	1200 (76)
42	5	15.5 (394)	29.5 (749)	252.6 (6416)	83.8 (2129)	6	128 (485)	350 (22)	1200 (76)
42	8	16.3 (414)	30.3 (770)	296.5 (7531)	83.5 (2121)	8	147 (556)	400 (25)	1400 (88)
44	3	15.8 (401)	28.8 (732)	287.1 (7292)	94.2 (2393)	6	94 (356)	310 (20)	1070 (68)
47	5	16.3 (414)	30.3 (770)	308.4 (7833)	71.5 (1816)	8	147 (556)	400 (25)	1400 (88)
48	3	15.8 (401)	28.8 (732)	331.2 (8412)	94.2 (2393)	6	94 (356)	310 (20)	1070 (68)
50	0	16.3 (414)	30.3 (770)	176.2 (4475)	71.5 (1816)	8	147 (556)	400 (25)	1400 (88)
52	3	16.3 (414)	30.3 (770)	308.4 (7833)	71.5 (1816)	8	147 (556)	400 (25)	1400 (88)

Minimum Chilled Water Flow Rate is for full load selections; Variable Primary Flow ratings as low as 50% of the minimum are permitted. Glycol limits are higher. Please contact your Johnson Controls Sales Office for ratings and further information.

# Dimensions

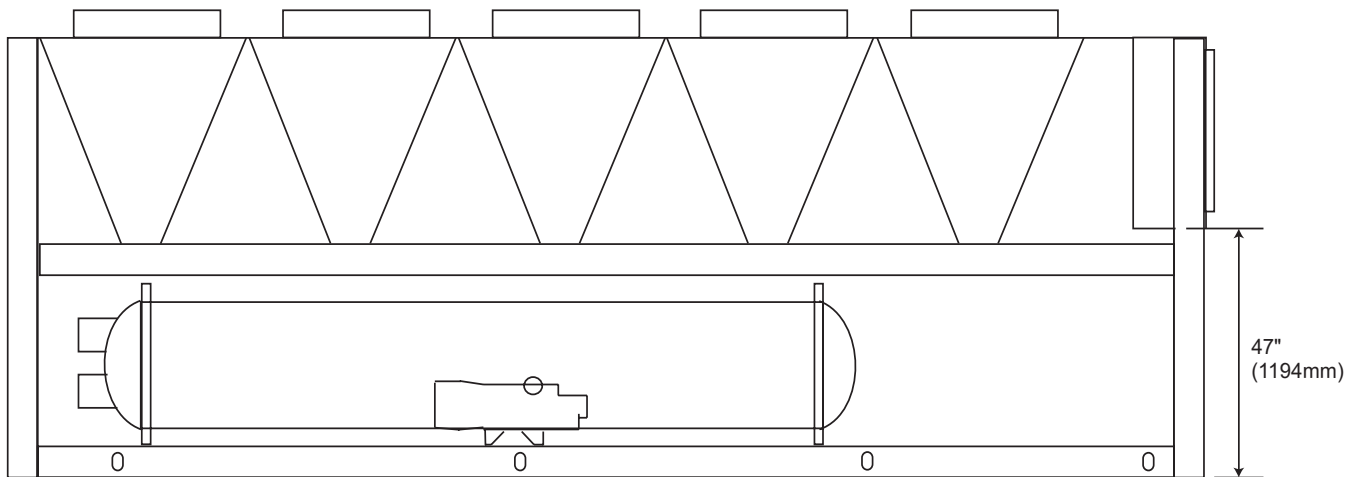
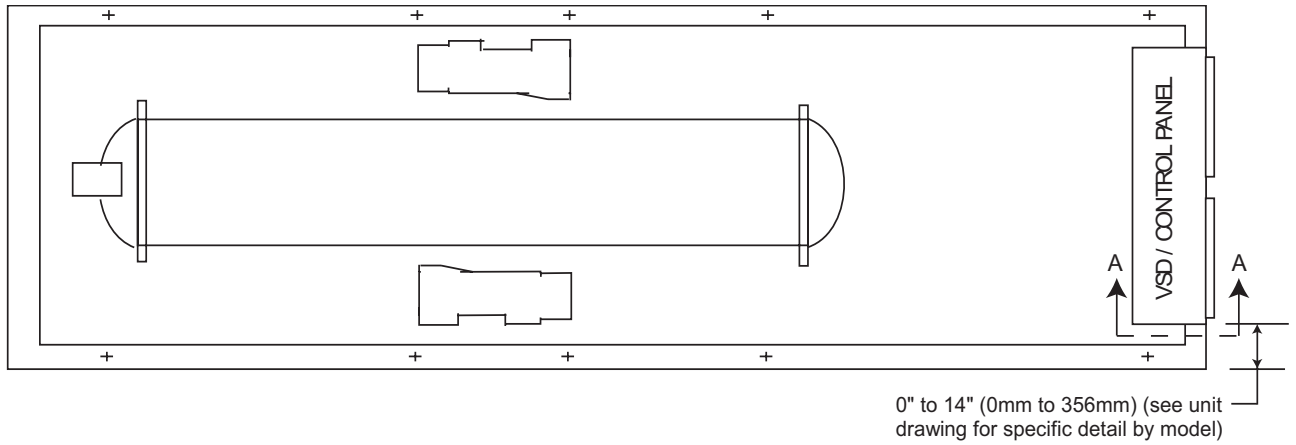
The data shown in this figure is applicable to selected typical configurations. Other configurations are available through our configuration/selection software. Please contact your nearest Johnson Controls Sales Office for the chiller configuration that best matches your specific needs.

## ENGLISH AND SI DIMENSIONS



LD18586

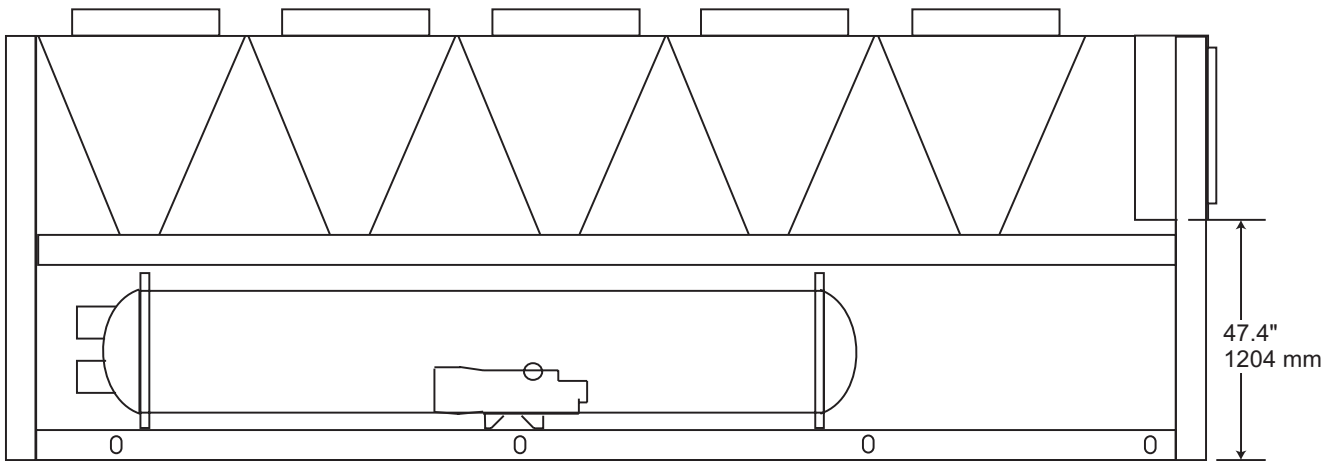
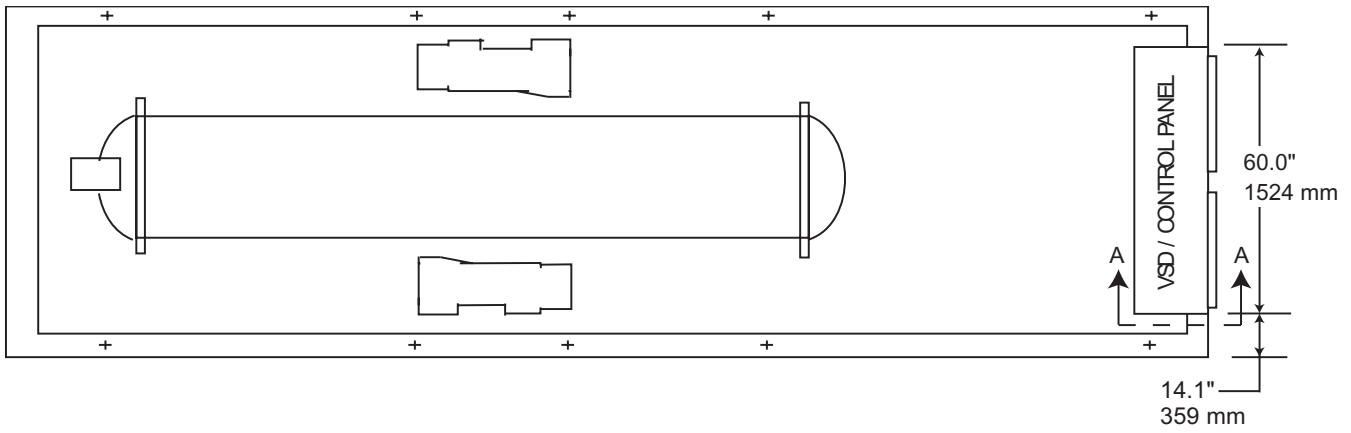
# Dimensions (Cont'd)



LD19666

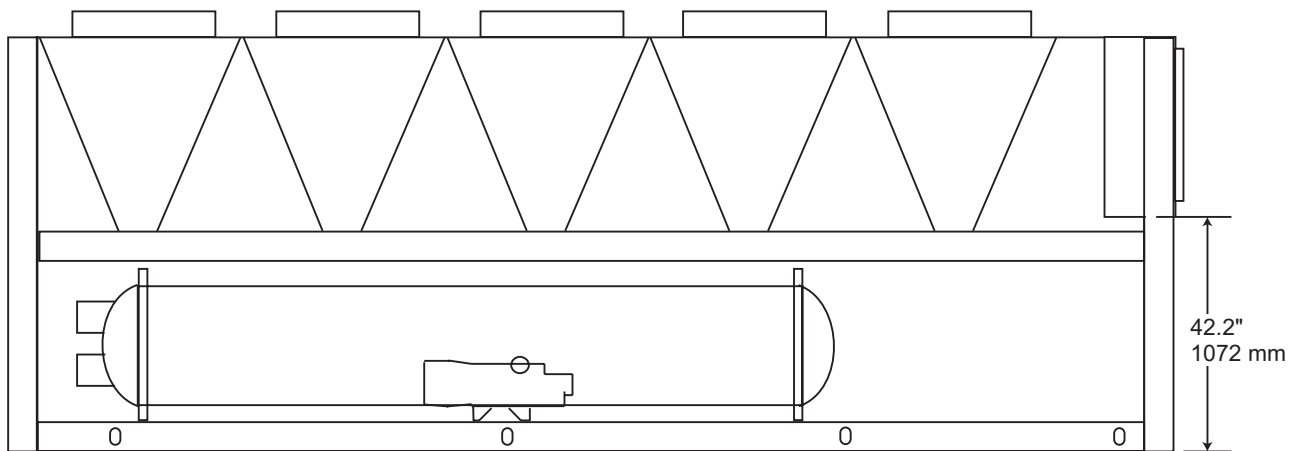
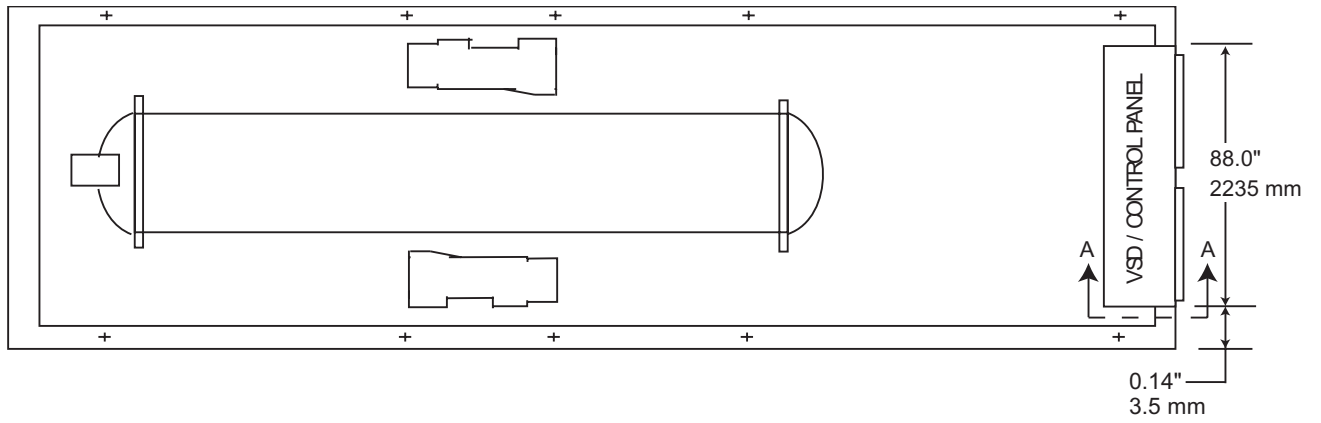
YVAA0153, 0183, 0213, 0233, 0263, 0273, 0165, 0195, 0215, 0245, 0275, 0178 , 0198, 0218, 0248, 0278

# Dimensions (Cont'd)



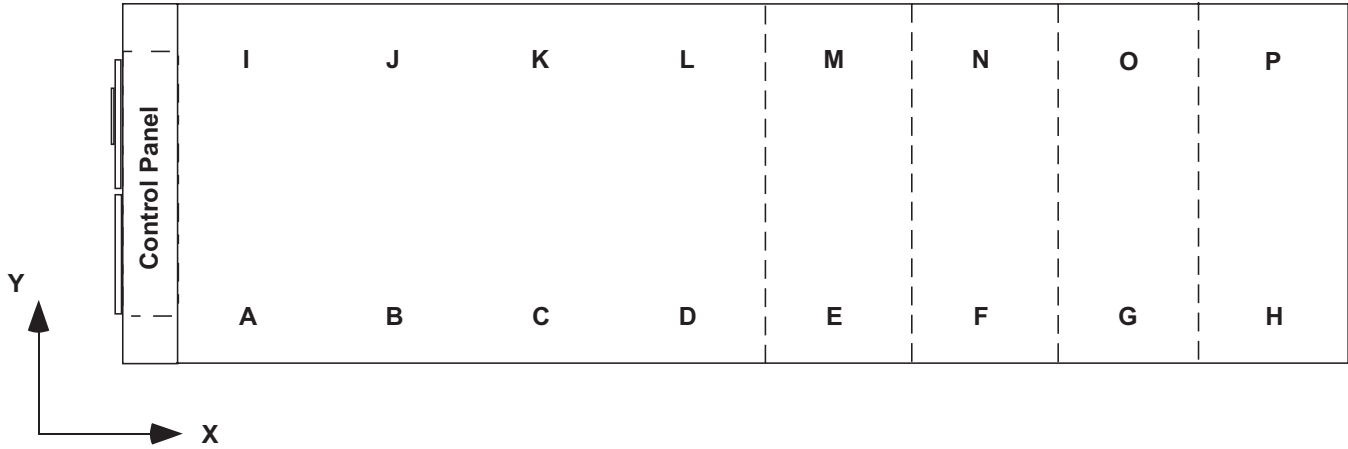
YVAA0303, 0323, 0343, 0295, 0345, 0308, 0318

## Dimensions (Cont'd)



YVAA 0373, 0413, 0443, 0483, 0523

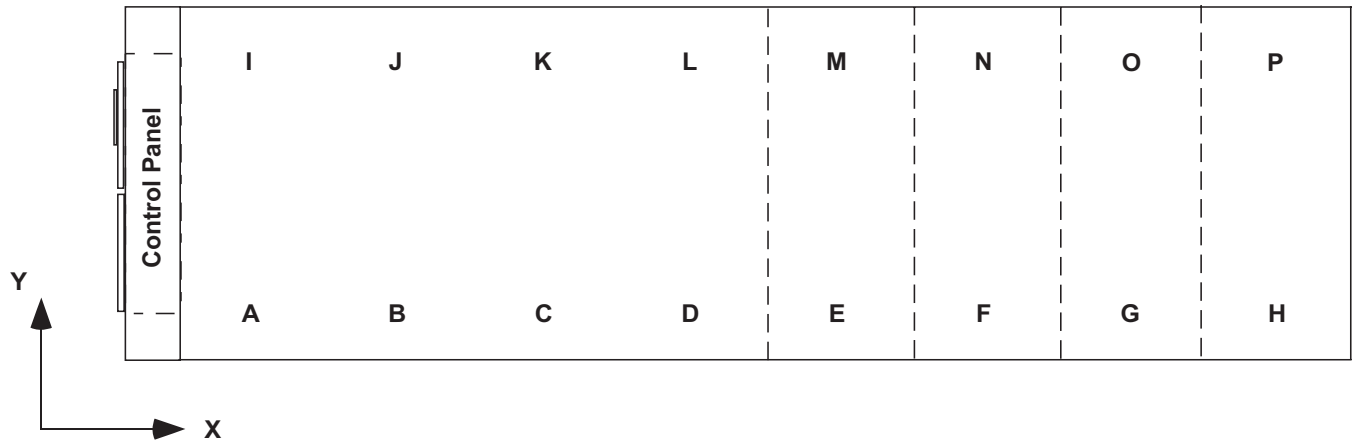
# Rigging Hole Locations - Microchannel Coil - English



YVAA MODEL			DESCRIPTION ENGLISH UNITS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	CENTER OF GRAVITY		
FRAME	COND	EVAP																		X	Y	
015	3	B	Rigging Hole Location	18	60	116	192					18	60	116	192						102	44
			Point Load	1035	1676	1676	1372						951	1656	1656	1495						
016	5	B	Rigging Hole Location	18	60	137	214					18	60	137	214						126	44
			Point Load	624	1139	3081	1198					606	1120	3057	1259							
017	8	C	Rigging Hole Location	12	73	144	197	260				12	73	144	197	260					144	44
			Point Load	625	1746	2573	1287	1103				634	1612	2611	1305	1172						
018	3	A	Rigging Hole Location	18	60	143	220					18	60	143	220						128	44
			Point Load	504	1448	2890	1142					510	1416	2917	1192							
019	5	A	Rigging Hole Location	18	60	143	227	272				18	60	143	227	272					139	44
			Point Load	469	1474	2778	1389	256				484	1422	2831	1416	264						
019	8	B	Rigging Hole Location	18	60	137	215	302				18	60	137	215	302					148	44
			Point Load	416	1628	2445	1657	717				396	1631	2453	1716	717						
021	3	A	Rigging Hole Location	18	60	143	227	272				18	60	143	227	272					139	44
			Point Load	472	1467	2822	1411	257				484	1419	2841	1420	264						
021	5	C	Rigging Hole Location	12	73	144	197	260				12	73	144	197	260					150	44
			Point Load	480	1988	1988	1688	1314				472	1935	1935	1736	1379						
021	8	C	Rigging Hole Location	12	73	163	254	324				12	73	163	254	324					153	44
			Point Load	518	2344	3047	1501	428				510	2282	2967	1743	336						
023	3	B	Rigging Hole Location	18	60	137	215	272				18	60	137	215	272					135	44
			Point Load	340	2054	2049	2049	143				329	2038	2067	2067	151						
024	5	C	Rigging Hole Location	18	60	149	240	324				18	60	149	240	324					152	44
			Point Load	358	2130	2982	2151	307				354	2079	2911	2340	261						
024	8	C	Rigging Hole Location	12	73	163	254	347				12	73	163	254	347					169	44
			Point Load	697	1921	3078	1741	871				697	1800	3169	1773	886						
026	3	B	Rigging Hole Location	18	60	137	215	302				18	60	137	215	302					146	44
			Point Load	513	1610	2517	1681	717				490	1620	2489	1722	717						
027	3	D	Rigging Hole Location	12	73	121	181	264	324				12	73	121	181	264	324			168	44
			Point Load	877	553	1442	3605	1108	554				808	570	1411	3527	1214	607				
027	5	E	Rigging Hole Location	12	73	121	181	264	324				12	73	121	181	264	324			168	44
			Point Load	872	569	1524	3811	1146	573				803	587	1493	3734	1252	626				

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

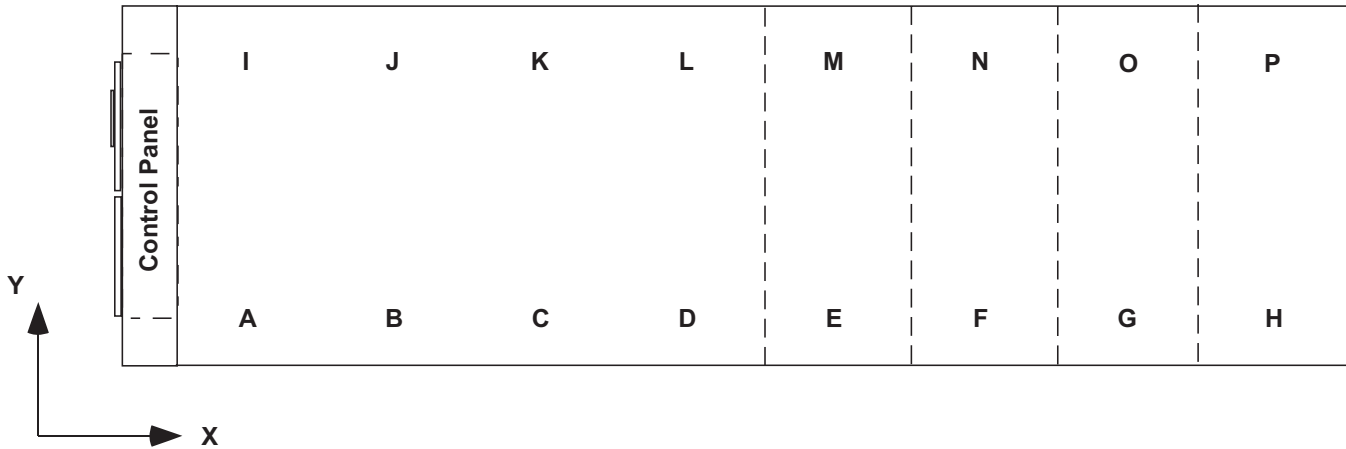
# Rigging Hole Locations - Microchannel Coil - English (Cont'd)



YVAA MODEL			DESCRIPTION ENGLISH UNITS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	CENTER OF GRAVITY			
FRAME	COND	EVAP		X	Y																		
027	8	E	Rigging Hole Location	12	73	121	181	243	347		12	73	121	181	243	347					178	44	
			Point Load	616	1372	1138	2845	1937	968		542	1407	1099	2747	2054	1027							
029	5	E	Rigging Hole Location	12	73	179	290	347			12	73	179	290	347							177	44
			Point Load	500	1930	4518	1506	533		434	1937	4698	1566	583									
030	3	C	Rigging Hole Location	12	73	161	254	347			12	73	161	254	347							168	44
			Point Load	747	1875	3196	1749	874		747	1784	3464	1785	893									
030	5	C	Rigging Hole Location	12	73	161	254	306	391		12	73	161	254	306	391						180	44
			Point Load	559	2024	3021	2164	302	752		411	2226	2990	2374	299	752							
030	8	E	Rigging Hole Location	12	73	121	179	243	296	391	12	73	121	179	243	296	391					204	44
			Point Load	1113	323	2182	2182	1309	1505	753	1073	398	2162	2162	1547	1505	753						
031	8	E	Rigging Hole Location	12	73	121	179	243	353	435	12	73	121	179	243	353	435					210	44
			Point Load	1028	575	2009	2009	2022	1580	527	988	650	1988	1988	2259	1580	527						
032	3	E	Rigging Hole Location	12	73	121	181	243	347		12	73	121	181	243	347						177	44
			Point Load	701	1261	1250	3125	1960	980		604	1370	1204	3010	2060	1030							
033	3	C	Rigging Hole Location	12	73	163	254	306	391		12	73	163	254	306	391						180	44
			Point Load	550	2052	3327	2098	333	752		373	2354	2951	2387	295	752							
034	3	E	Rigging Hole Location	12	73	121	181	243	296	391	12	73	121	181	243	296	391					204	44
			Point Load	1087	408	2224	2224	1456	1505	753	1038	514	2135	2135	1578	1505	753						
034	5	E	Rigging Hole Location	12	73	121	181	243	353	435	12	73	121	181	243	353	435					210	44
			Point Load	1002	659	2048	2048	2173	1580	527	953	765	1959	1959	2295	1580	527						
037	3	F	Rigging Hole Location	12	73	181	238	302	435			12	73	181	238	302	435					210	49
			Point Load	396	2152	4507	396	2142	881		368	2116	5853	368	2287	881							
041	3	H	Rigging Hole Location	12	73	181	238	302	435			12	73	181	238	302	435					219	48
			Point Load	423	2025	4375	423	1910	881		406	1977	5529	406	2008	881							
044	3	G	Rigging Hole Location	12	73	181	238	290	435	478	545	12	73	181	238	290	435	478	545	227	46		
			Point Load	189	2952	5346	608	2066	77	176	1557	119	3024	5101	796	2117	78	176	1561				
048	3	G	Rigging Hole Location	12	73	181	238	290	435	494	572	12	73	181	238	290	435					234	46
			Point Load	338	2564	5914	104	2308	518	1055	551	270	2630	5677	282	2367	518	1055	551				
052	3	J	Rigging Hole Location	12	73	181	238	290	435	494	572	12	73	181	238	290	435	494	572	234	46		
			Point Load	335	3102	5541	318	2792	518	1055	551	263	3176	5295	496	2858	518	1055	551				

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

# Rigging Hole Locations - Microchannel Coil - SI

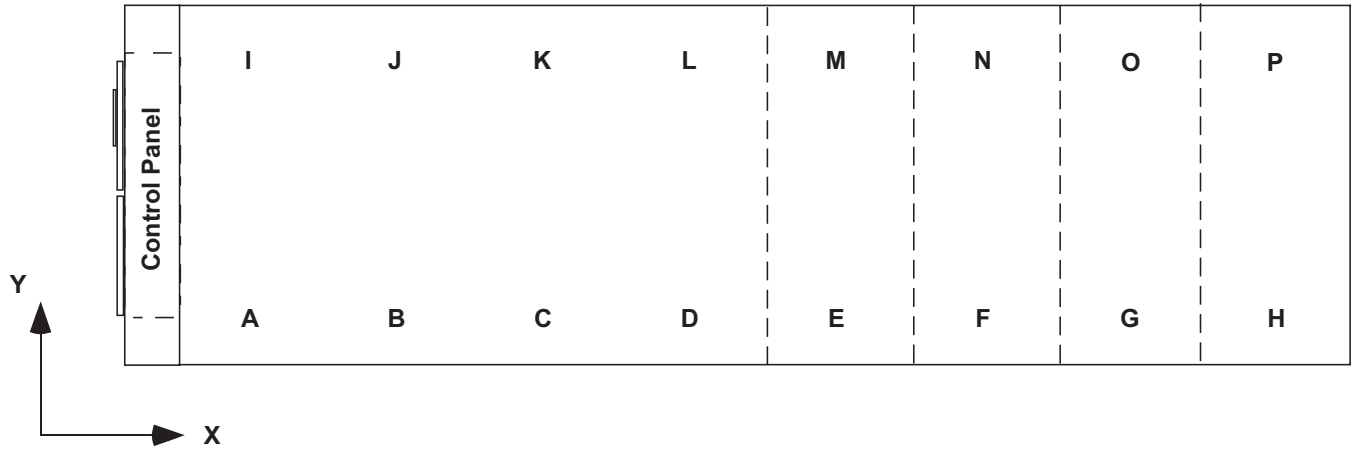


YVAA MODEL			DESCRIPTION SI UNITS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	CENTER OF GRAVITY			
FRAME	COND	EVAP																		X	Y		
015	3	B	Rigging Hole Location	464	1512	2937	4866					464	1511	2937	4866						2682	1164	
			Point Load	470	760	760	622							431	751	751	678						
016	5	B	Rigging Hole Location	464	1533	3485	5435					464	1533	3485	5435							3348	1158
			Point Load	283	516	1397	543							275	508	1387	571						
017	8	C	Rigging Hole Location	314	1845	3654	5012	6593				314	1845	3654	5012	6593						3835	1173
			Point Load	283	792	1167	584	501						288	731	1184	592	532					
018	3	A	Rigging Hole Location	464	1533	3636	5598					464	1533	3636	5598							3365	1161
			Point Load	229	657	1311	518							231	642	1323	541						
019	5	A	Rigging Hole Location	464	1533	3636	5761	6920				464	1533	3636	5761	6920						3649	1162
			Point Load	213	669	1260	630	116						219	645	1284	642	120					
019	8	B	Rigging Hole Location	464	1533	3484	5455	7670				464	1533	3484	5455	7670						3912	1161
			Point Load	189	738	1109	751	325						180	740	1113	779	325					
021	3	A	Rigging Hole Location	464	1533	3637	5761	6920				464	1533	3637	5761	6920						3655	1155
			Point Load	214	665	1280	640	117						220	644	1288	644	120					
021	5	C	Rigging Hole Location	314	1845	3654	5012	6593				314	1845	3654	5012	6593						4013	1176
			Point Load	218	902	902	766	596						214	878	878	788	626					
021	8	C	Rigging Hole Location	314	1845	4144	6443	8218				314	1845	4144	6443	8218						4086	1173
			Point Load	235	1063	1382	681	194						231	1035	1346	791	152					
023	3	B	Rigging Hole Location	464	1533	3485	5456	6919				464	1533	3485	5456	6919						3553	1160
			Point Load	154	932	929	929	65						149	925	938	938	69					
024	5	C	Rigging Hole Location	464	1533	3789	6088	8218				464	1533	3789	6088	8218						4033	1174
			Point Load	162	966	1352	975	139						160	943	1320	1061	118					
024	8	C	Rigging Hole Location	314	1845	4144	6443	8825				314	1845	4144	6443	8825						4500	1172
			Point Load	316	871	1396	790	395						316	817	1437	804	402					
026	3	B	Rigging Hole Location	464	1533	3484	5455	7670				464	1533	3484	5455	7670						3866	1153
			Point Load	233	730	1142	763	325						222	735	1129	781	325					
027	3	D	Rigging Hole Location	314	1845	3073	4601	6717	8217			314	1845	3073	4601	6717	8217					4506	1176
			Point Load	398	251	654	1635	502	251					366	259	640	1600	551	275				
027	5	E	Rigging Hole Location	314	1845	3073	4601	6717	8218			314	1845	3073	4601	6717	8218					4506	1176
			Point Load	396	258	691	1729	520	260					364	266	677	1694	568	284				

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.



# Rigging Hole Locations - Microchannel Coil - SI (Cont'd)



YVAA MODEL			DESCRIPTION SI UNITS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	CENTER OF GRAVITY			
FRAME	COND	EVAP																		X	Y		
027	8	E	Rigging Hole Location	314	1845	3073	4601	6169	8825				314	1845	3073	4601	6169	8825			4747	1173	
			Point Load	280	622	516	1290	878	439					246	638	498	1246	932	466				
029	5	E	Rigging Hole Location	314	1845	4551	7358	8825					314	1845	4551	7358	8825					4712	1186
			Point Load	227	875	2049	683	242						197	879	2131	710	264					
030	3	C	Rigging Hole Location	314	1845	4092	6443	8825					314	1845	4092	6443	8825					4441	1184
			Point Load	339	850	1450	793	397						339	809	1571	810	405					
030	5	C	Rigging Hole Location	314	1845	4092	6443	7763	9941				314	1845	4092	6443	7763	9941				4729	1183
			Point Load	253	918	1370	981	137	341					187	1010	1356	1077	136	341				
030	8	E	Rigging Hole Location	314	1845	3072	4549	6169	7508	9942			314	1845	3072	4549	6169	7508	9942			4971	1183
			Point Load	505	147	990	990	594	683	341				487	180	981	981	702	683	341			
031	8	E	Rigging Hole Location	314	1845	3072	4549	6169	8962	11059			314	1845	3072	4549	6169	8962	11059			5256	1181
			Point Load	466	261	911	911	917	717	239				448	295	902	902	1025	717	239			
032	3	E	Rigging Hole Location	314	1845	3073	4601	6169	8825				314	1845	3073	4601	6169	8825				4717	1171
			Point Load	318	572	567	1417	889	445					274	622	546	1365	934	467				
033	3	C	Rigging Hole Location	314	1845	4144	6443	7765	9942				314	1845	4144	6443	7765	9942				4737	1166
			Point Load	250	931	1509	952	151	341					169	1068	1338	1083	134	341				
034	3	E	Rigging Hole Location	314	1845	3073	4602	6170	7511	9942			314	1845	3073	4602	6170	7511	9942			4974	1169
			Point Load	493	185	1009	1009	660	683	341				471	233	968	968	716	683	341			
034	5	E	Rigging Hole Location	314	1845	3073	4602	6170	8961	11059			314	1845	3073	4602	6170	8961	11059			5254	1167
			Point Load	455	299	929	929	986	717	239				432	347	889	889	1041	717	239			
037	3	F	Rigging Hole Location	314	1845	4602	6039	7662	11059				314	1845	4602	6039	7662	11059				5334	1245
			Point Load	179	976	2044	179	972	400					167	960	2655	167	1037	400				
041	3	H	Rigging Hole Location	314	1845	4601	6039	7662	11059				314	1845	4601	6039	7662	11059				5563	1219
			Point Load	192	918	1984	192	867	400					184	897	2508	184	911	400				
044	3	G	Rigging Hole Location	314	1845	4602	6039	7662	11059	12135	13835		314	1845	4602	6039	7358	11059	12135	13835		5766	1168
			Point Load	86	1339	2425	276	937	35	80	706	54	1372	2314	361	960	35	80	708				
048	3	G	Rigging Hole Location	314	1845	4602	6039	7358	11059	12546	14529		305	1854	4597	6045	7366	11049				5944	1168
			Point Load	153	1163	2683	47	1047	235	479	250	122	1193	2575	128	1074	235	479	250				
052	3	J	Rigging Hole Location	305	1854	4597	6045	7366	11049	12548	14529		305	1854	4597	6045	7366	11049	12548	14529		5944	1168
			Point Load	152	1407	2513	144	1266	235	478	250	119	1441	2402	225	1296	235	478	250				

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

# Isolator Locations - Microchannel Coil - English



YVAA MODEL			DESCRIPTION ENGLISH UNITS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
FRAME	COND	EVAP																		
015	3	B	Isolator X-Dimension	10	73	144	193					10	73	144	193					
			Isolator Y-Dimension					1									87			
			Point Load	1052	2147	2147	644							978	2116	2116	780			
016	5	B	Isolator X-Dimension	10	77	118	157	220				10	77	118	157	220				
			Isolator Y-Dimension					1									87			
			Point Load	882	759	1790	1790	1052						863	731	1788	1788	1103		
017	8	C	Isolator X-Dimension	10	81	149	187	251				10	81	149	187	251				
			Isolator Y-Dimension					1									87			
			Point Load	734	2308	1598	1598	1477						726	2201	1616	1616	1557		
018	3	A	Isolator X-Dimension	10	76	124	163	210				10	76	124	163	210				
			Isolator Y-Dimension					1									87			
			Point Load	711	1659	1088	1088	1660						704	1654	1084	1084	1729		
019	5	A	Isolator X-Dimension	10	76	118	157	209	281			10	76	118	157	209	281			
			Isolator Y-Dimension					1									87			
			Point Load	851	851	1311	2170	702	702					844	844	1286	2227	717	717	
019	8	B	Isolator X-Dimension	10	76	118	157	209	308			10	76	118	157	209	308			
			Isolator Y-Dimension					1									87			
			Point Load	614	2113	659	659	2442	606					594	2130	649	649	2516	606	
021	3	A	Isolator X-Dimension	10	76	118	157	209	281			10	76	118	157	209	281			
			Isolator Y-Dimension					1									87			
			Point Load	851	851	1317	2210	711	711					844	844	1287	2236	719	719	
021	5	C	Isolator X-Dimension	10	81	149	187	251				10	81	149	187	251				
			Isolator Y-Dimension					1									87			
			Point Load	659	2075	1705	1705	1697						652	1990	1710	1710	1776		
021	8	C	Isolator X-Dimension	10	81	149	187	235	301			10	81	149	187	235	301			
			Isolator Y-Dimension					1									87			
			Point Load	717	2727	564	564	2431	1216					704	2650	571	571	2482	1241	
023	3	B	Isolator X-Dimension	10	76	118	157	209	281			10	76	118	157	209	281			
			Isolator Y-Dimension					1									87			
			Point Load	947	947	1423	2230	659	659					933	933	1430	2247	670	670	
024	5	C	Isolator X-Dimension	10	76	128	173	220	301			10	76	128	173	220	301			
			Isolator Y-Dimension					1									87			
			Point Load	813	1915	1459	1459	1775	887					807	1825	1482	1482	1821	910	
024	8	C	Isolator X-Dimension	10	81	143	187	245	339			10	81	143	187	245	339			
			Isolator Y-Dimension					1									87			
			Point Load	661	1793	2030	2030	1088	1088					661	1645	2097	2097	1104	1104	

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

# Isolator Locations - Microchannel Coil - English (Cont'd)



YVAA MODEL			DESCRIPTION ENGLISH UNITS																
FRAME	COND	EVAP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
026	3	B	Isolator X-Dimension	10	76	118	157	209	308			10	76	118	157	209	308		
			Isolator Y-Dimension	1								87							
			Point Load	694	2119	689	689	2472	606			674	2135	666	666	2523	606		
027	3	D	Isolator X-Dimension	10	81	161	201	301			10	81	161	201	301				
			Isolator Y-Dimension	1								87							
			Point Load	710	1539	2778	2135	1389			681	1372	3036	1946	1518				
027	5	E	Isolator X-Dimension	10	81	161	201	301			10	81	161	201	301				
			Isolator Y-Dimension	1								87							
			Point Load	689	1641	2874	2283	1437			660	1474	3132	2093	1566				
027	8	E	Isolator X-Dimension	10	81	161	201	298	339			10	81	161	201	298	339		
			Isolator Y-Dimension	1								87							
			Point Load	650	1770	2535	2535	908	908			596	1729	2529	2529	962	962		
029	5	E	Isolator X-Dimension	10	81	161	201	296	339			10	81	161	201	296	339		
			Isolator Y-Dimension	1								87							
			Point Load	693	1821	2532	2532	919	919			629	1830	2621	2621	973	973		
030	3	C	Isolator X-Dimension	10	81	143	187	245	339			10	81	143	187	245	339		
			Isolator Y-Dimension	1								87							
			Point Load	708	1803	2071	2071	1085	1085			708	1666	2245	2245	1095	1095		
030	5	C	Isolator X-Dimension	10	81	144	187	277	383			10	81	144	187	277	383		
			Isolator Y-Dimension	1								87							
			Point Load	870	1451	2185	2185	1652	861			765	1551	2240	2240	1779	861		
030	8	E	Isolator X-Dimension	10	81	161	201	298	383			10	81	161	201	298	383		
			Isolator Y-Dimension	1								87							
			Point Load	800	2001	2138	2138	1858	863			789	1968	2235	2235	1939	863		
031	8	E	Isolator X-Dimension	10	81	161	201	298	427			10	81	161	201	298	427		
			Isolator Y-Dimension	1								87							
			Point Load	787	2033	2067	2067	2211	1013			777	2000	2164	2164	2292	1013		
032	3	E	Isolator X-Dimension	10	81	161	201	298	339			10	81	161	201	298	339		
			Isolator Y-Dimension	1								87							
			Point Load	700	1767	2701	2701	919	919			633	1790	2678	2678	964	964		
033	3	C	Isolator X-Dimension	10	81	143	188	245	383			10	81	143	188	245	383		
			Isolator Y-Dimension	1								87							
			Point Load	575	2930	891	891	3346	861			441	3177	707	707	3601	861		
034	3	E	Isolator X-Dimension	10	81	161	201	298	383			10	81	161	201	298	383		
			Isolator Y-Dimension	1								87							
			Point Load	801	1995	2260	2260	1910	863			790	1966	2259	2259	1951	863		

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

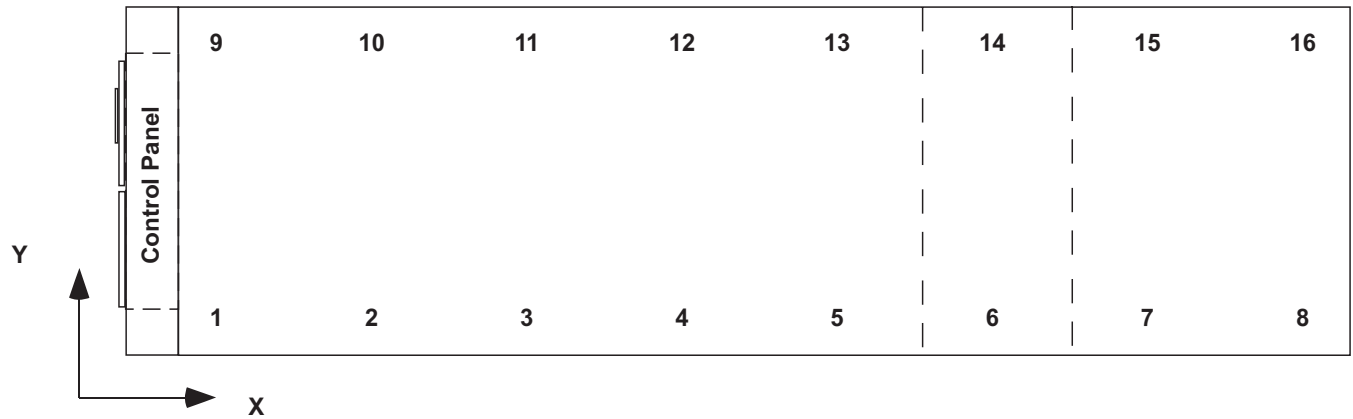
# Isolator Locations - Microchannel Coil - English (Cont'd)



YVAA MODEL			DESCRIPTION ENGLISH UNITS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FRAME	COND	EVAP																	
034	5	E	Isolator X-Dimension	10	81	161	201	298	427			10	81	161	201	298	427		
			Isolator Y-Dimension	1								87							
			Point Load	786	2025	2189	2189	2265	1014			775	1996	2188	2188	2307	1014		
037	3	F	Isolator X-Dimension	10	81	145	205	284	427			10	81	145	205	284	427		
			Isolator Y-Dimension	1								87							
			Point Load	743	1570	2455	2455	2816	964			751	1419	3135	3135	2998	964		
041	3	H	Isolator X-Dimension	10	81	145	205	284	427			10	81	145	205	284	427		
			Isolator Y-Dimension	1								87							
			Point Load	797	1328	2447	2447	2457	964			813	1167	3043	3043	2580	964		
044	3	G	Isolator X-Dimension	10	81	154	206	284	427	483	539	10	81	154	206	284	427	483	539
			Isolator Y-Dimension	1								87							
			Point Load	415	2617	3160	3160	2285	976	451	436	396	2548	3152	3152	2388	976	451	436
048	3	G	Isolator X-Dimension	10	81	154	206	284	427	505	562	10	81	154	206	284	427	505	562
			Isolator Y-Dimension	1								87							
			Point Load	686	2160	3224	3224	2240	1202	386	759	667	2092	3216	3216	2343	1202	386	759
052	3	J	Isolator X-Dimension	10	81	154	206	284	427	505	562	10	81	154	206	284	427	505	562
			Isolator Y-Dimension	1								87							
			Point Load	794	2611	3112	3112	2916	1202	386	759	772	2550	3098	3098	3026	1202	386	759

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

# Isolator Locations - Microchannel Coil - SI



YVAA MODEL			DESCRIPTION SI UNITS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FRAME	COND	EVAP																	
015	3	B	Isolator X-Dimension	263	1852	3662	4900					263	1852	3662	4900				
			Isolator Y-Dimension	32								2213							
			Point Load	477	974	974	292					444	960	960	354				
016	5	B	Isolator X-Dimension	263	1943	3000	3984	5589				263	1943	3000	3984	5589			
			Isolator Y-Dimension	32								2213							
			Point Load	400	344	812	812	477				391	332	811	811	501			
017	8	C	Isolator X-Dimension	263	2057	3779	4756	6368				263	2057	3779	4756	6368			
			Isolator Y-Dimension	32								2213							
			Point Load	333	1047	725	725	670				329	998	733	733	706			
018	3	A	Isolator X-Dimension	264	1943	3152	4136	5323				264	1943	3152	4136	5323			
			Isolator Y-Dimension	32								2213							
			Point Load	322	753	493	493	753				319	750	492	492	784			
019	5	A	Isolator X-Dimension	263	1943	2999	3984	5299	7136				263	1943	2999	3984	5299	7136	
			Isolator Y-Dimension	32								2213							
			Point Load	386	386	595	984	318	318				383	383	583	1010	325	325	
019	8	B	Isolator X-Dimension	263	1943	2999	3984	5298	7823				263	1943	2999	3984	5298	7823	
			Isolator Y-Dimension	34								2215							
			Point Load	278	959	299	299	1108	275				269	966	295	295	1141	275	
021	3	A	Isolator X-Dimension	263	1943	2999	3984	5299	7136				263	1943	2999	3984	5299	7136	
			Isolator Y-Dimension	32								2213							
			Point Load	386	386	597	1002	322	322				383	383	584	1014	326	326	
021	5	C	Isolator X-Dimension	263	2057	3779	4756	6368				263	2057	3779	4756	6368			
			Isolator Y-Dimension	32								2213							
			Point Load	299	941	773	773	770				296	903	776	776	806			
021	8	C	Isolator X-Dimension	263	2057	3779	4756	5968	7653				263	2057	3779	4756	5968	7653	
			Isolator Y-Dimension	34								2215							
			Point Load	325	1237	256	256	1103	551				320	1202	259	259	1126	563	
023	3	B	Isolator X-Dimension	263	1943	2999	3984	5298	7135				263	1943	2999	3984	5298	7135	
			Isolator Y-Dimension	32								2213							
			Point Load	430	430	646	1012	299	299				423	423	649	1019	304	304	
024	5	C	Isolator X-Dimension	263	1943	3260	4391	5579	7654				263	1943	3260	4391	5579	7654	
			Isolator Y-Dimension	34								2215							
			Point Load	369	869	662	662	805	403				366	828	672	672	826	413	
024	8	C	Isolator X-Dimension	263	2057	3638	4748	6232	8609				263	2057	3638	4748	6232	8609	
			Isolator Y-Dimension	34								2215							
			Point Load	300	813	921	921	493	493				300	746	951	951	501	501	
026	3	B	Isolator X-Dimension	263	1943	2999	3984	5298	7823				263	1943	2999	3984	5298	7823	
			Isolator Y-Dimension	34								2215							
			Point Load	315	961	313	313	1121	275				306	969	302	302	1144	275	

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

# Isolator Locations - Microchannel Coil - SI (Cont'd)



YVAA MODEL			DESCRIPTION SI UNITS																
FRAME	COND	EVAP		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
027	3	D	Isolator X-Dimension	260	2054	4081	5102	7651				260	2054	4081	5102	7651			
			Isolator Y-Dimension	34								2215							
			Point Load	322	698	1260	969	630						309	622	1377	882	688	
027	5	E	Isolator X-Dimension	263	2057	4084	5105	7654				263	2057	4084	5105	7654			
			Isolator Y-Dimension	34								2215							
			Point Load	313	744	1304	1036	652						300	669	1420	950	710	
027	8	E	Isolator X-Dimension	263	2057	4084	5105	7582	8609			263	2057	4084	5105	7582	8609		
			Isolator Y-Dimension	34								2215							
			Point Load	295	803	1150	1150	412	412					270	784	1147	1147	436	436
029	5	E	Isolator X-Dimension	260	2054	4092	5102	7509	8606			260	2054	4092	5102	7509	8606		
			Isolator Y-Dimension	34								2215							
			Point Load	314	826	1149	1149	417	417					285	830	1189	1189	441	441
030	3	C	Isolator X-Dimension	260	2054	3636	4745	6229	8606			260	2054	3636	4745	6229	8606		
			Isolator Y-Dimension	34								2215							
			Point Load	321	818	939	939	492	492					321	756	1018	1018	496	496
030	5	C	Isolator X-Dimension	260	2054	3660	4752	7044	9723			260	2054	3660	4752	7044	9723		
			Isolator Y-Dimension	34								2215							
			Point Load	394	658	991	991	749	391					347	703	1016	1016	807	391
030	8	E	Isolator X-Dimension	260	2054	4081	5102	7579	9723			260	2054	4081	5102	7579	9723		
			Isolator Y-Dimension	34								2215							
			Point Load	363	908	970	970	843	391					358	893	1014	1014	879	391
031	8	E	Isolator X-Dimension	260	2054	4081	5102	7579	10840			260	2054	4081	5102	7579	10840		
			Isolator Y-Dimension	34								2215							
			Point Load	357	922	938	938	1003	459					352	907	981	981	1040	459
032	3	E	Isolator X-Dimension	260	2054	4081	5102	7579	8606			260	2054	4081	5102	7579	8606		
			Isolator Y-Dimension	34								2215							
			Point Load	318	801	1225	1225	417	417					287	812	1215	1215	437	437
033	3	C	Isolator X-Dimension	260	2054	3634	4779	6229	9723			260	2054	3634	4779	6229	9723		
			Isolator Y-Dimension	34								2215							
			Point Load	261	1329	404	404	1518	391					200	1441	321	321	1633	391
034	3	E	Isolator X-Dimension	260	2054	4081	5102	7579	9723			260	2054	4081	5102	7579	9723		
			Isolator Y-Dimension	34								2215							
			Point Load	363	905	1025	1025	866	391					358	892	1025	1025	885	391
034	5	E	Isolator X-Dimension	260	2054	4081	5102	7579	10840			260	2054	4081	5102	7579	10840		
			Isolator Y-Dimension	34								2215							
			Point Load	356	919	993	993	1027	460					351	905	993	993	1046	460

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

# Isolator Locations - Microchannel Coil - SI (Cont'd)

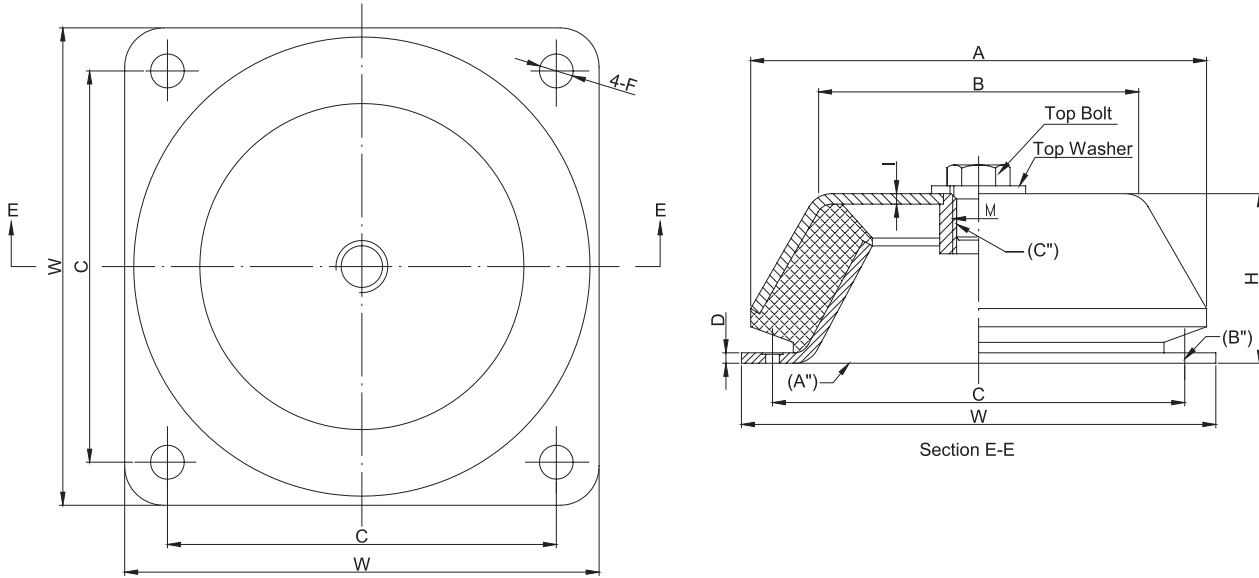


YVAA MODEL			DESCRIPTION SI UNITS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FRAME	COND	EVAP																	
037	3	F	Isolator X-Dimension	260	2046	3677	5216	7215	10839			260	2046	3677	5216	7215	10839		
			Isolator Y-Dimension	34								2204							
			Point Load	337	712	1113	1113	1277	437			341	644	1422	1422	1360	437		
041	3	H	Isolator X-Dimension	260	2046	3677	5216	7215	10839			260	2046	3677	5216	7215	10839		
			Isolator Y-Dimension	34								2204							
			Point Load	361	602	1110	1110	1114	437			369	529	1380	1380	1170	437		
044	3	G	Isolator X-Dimension	262	2057	3907	5220	7219	10843	12271	13691	262	2057	3907	5220	7219	10843	12271	13691
			Isolator Y-Dimension	34								2204							
			Point Load	188	1187	1433	1433	1036	443	205	198	180	1156	1430	1430	1083	443	205	198
048	3	G	Isolator X-Dimension	262	2057	3907	5220	7219	10843	12819	14265	262	2057	3907	5220	7219	10843	12819	14265
			Isolator Y-Dimension	34								2204							
			Point Load	311	980	1462	1462	1016	545	175	344	303	949	1459	1459	1063	545	175	344
052	3	J	Isolator X-Dimension	262	2057	3907	5220	7219	10843	12819	14265	262	2057	3907	5220	7219	10843	12819	14265
			Isolator Y-Dimension	34								2204							
			Point Load	360	1184	1411	1411	1323	545	175	344	350	1157	1405	1405	1373	545	175	344

NOTE: Weights shown for base unit; selected options may add weight to unit. Contact your nearest Johnson Controls Sales Office for weight data.

# Isolator

## ELASTOMETRIC ISOLATOR SPECIFICATIONS



MOUNT TYPE	DIMENSION DATA (mm)							
	A	B	C	W	H	D	M	F
JG 1	F146	F95	125	150	55	3	M16	F13
JG 2	F176	F125	150	183	65	4	M16	F13

MODEL NUMBER	RATED CAPACITY (FOR UNITS WITH ALL LOAD POINTS LESS THAN 1984 LBS (900 KG))		
	Weight Range		PART NUMBER
	(LBS.)	(KG)	
JG 1-1	331 thru 661	150 thru 300	028G00031A035(716487)
JG 1-2	662 thru 1213	301 thru 550	028G00031A036(716488)
JG 1-3	1214 thru 1984	551 thru 900	028G00031A037(716489)

MODEL NUMBER	RATED CAPACITY (FOR UNITS WITH ALL LOAD POINTS LESS THAN 4409 LBS (2000 KG))		
	Weight Range		PART NUMBER
	(LBS.)	(KG)	
JG 2-1	882 thru 1984	400 thru 900	028G00031A038(716490)
JG 2-2	1985 thru 3527	901 thru 1600	028G00031A039(716491)
JG 2-3	3528 thru 4409	1601 thru 2000	028G00031A040(716492)

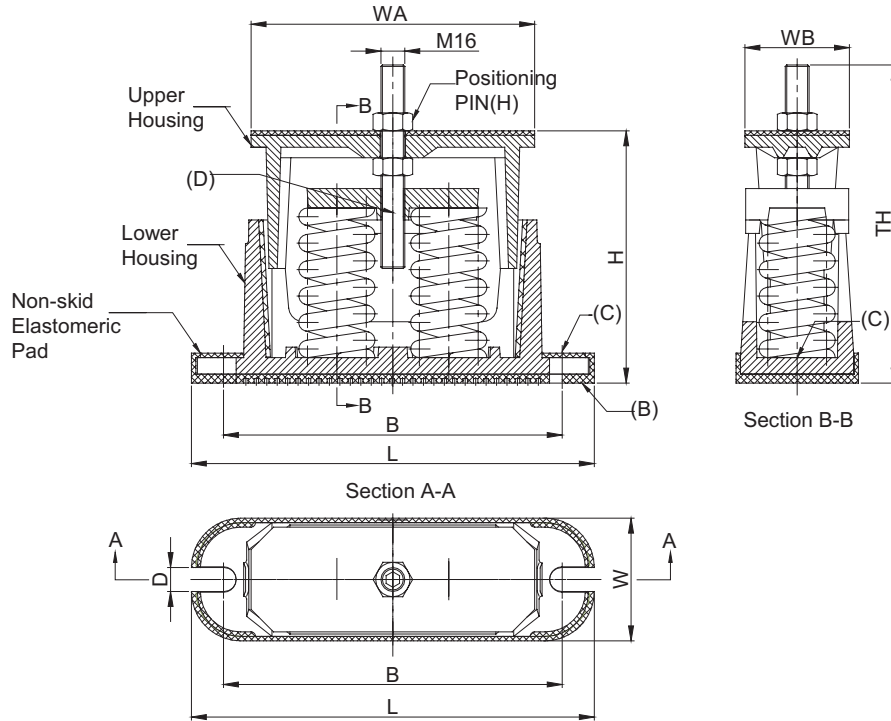
Notes:

1. All dimensions are in millimeter.
2. Use either all JG 1's or all JG 2's at all locations on a unit.
3. Installation requires bolting or anchoring mount to support structure with a 4 x 0.5122" (4 x 13.0mm) diameter bolts or 2 x 0.5" (2 x 12.7mm) diameter concrete anchors.



# Isolator (Cont'd)

## ONE INCH DEFLECTION SPRING ISOLATOR



MOUNT TYPE	DIMENSION DATA (mm)							
	WA	WB	H	TH	B	L	D	W
CP-2	190	70	168	211	228	270	16	80
CP-4	193	130	160	202	228	270	16	142

MODEL NUMBER	Spring Number	RATED CAPACITY (FOR UNITS WITH ALL LOAD POINTS LESS THAN 1808 LBS (820 KG))		
		Weight Range		PART NUMBER
		(LBS.)	(KG)	
CP-2-200	2	Up thru 441	Up thru 200	029G23000A028(717762)
CP-2-300	2	442 thru 661	201 thru 300	029G23000A029(717763)
CP-2-400	2	662 thru 882	301 thru 400	029G23000A018(716477)
CP-2-550	2	883 thru 1213	401 thru 550	029G23000A019(716478)
CP-2-680	2	1214 thru 1499	551 thru 680	029G23000A030(717764)
CP-2-820	2	1500 thru 1808	681 thru 820	029G23000A020(716479)

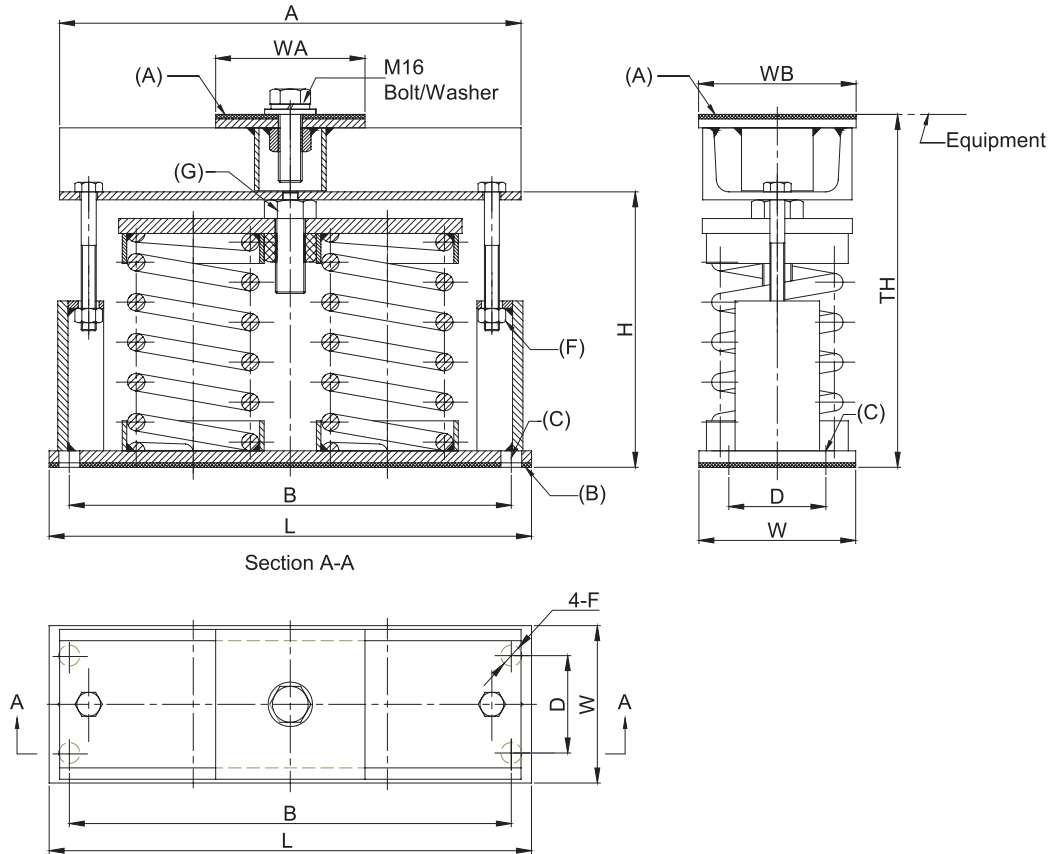
MODEL NUMBER	Spring Number	RATED CAPACITY (FOR UNITS WITH ALL LOAD POINTS LESS THAN 3594 LBS (1630 KG))		
		Weight Range		PART NUMBER
		(LBS.)	(KG)	
CP-4-400	4	Up thru 882	Up thru 400	029G23000A021(716480)
CP-4-550	4	883 thru 1213	401 thru 550	029G23000A022(716481)
CP-4-680	4	1214 thru 1499	551 thru 680	029G23000A023(716482)
CP-4-820	4	1500 thru 1808	681 thru 820	029G23000A024(716483)
CP-4-1100	4	1809 thru 2425	821 thru 1100	029G23000A025(716484)
CP-4-1360	4	2426 thru 2998	1101 thru 1360	029G23000A026(716485)
CP-4-1630	4	2999 thru 3594	1361 thru 1630	029G23000A027(716486)

Notes:

1. All dimensions are in millimeter.
2. Use either all CP-1's or all CP-2's at all locations on a unit.
3. Installation requires bolting or anchoring mount to support structure with a 2 x 0.625"(2x16mm) diameter bolts or 2 x 0.5"(2x12.7mm) diameter concrete anchors.

# Isolator (Cont'd)

## TWO INCH DEFLECTION, RESTRAINED SPRING ISOLATOR



MOUNT TYPE	DIMENSION DATA (mm)									
	A	WA	WB	W	H	TH	B	L	D	F
ZGT-F2	290	110	110	110	150	200	283	310	70	F16

MODEL NUMBER	RATED CAPACITY (FOR UNITS WITH ALL LOAD POINTS LESS THAN 3527 LBS (1600 KG))		
	Weight Range		PART NUMBER
	(LBS.)	(KG)	
ZGT-F2-200	0 thru 441	0 thru 200	029G23000A031(717765)
ZGT-F2-300	442 thru 661	201 thru 300	029G23000A032(717766)
ZGT-F2-350	662 thru 772	301 thru 350	029G23000A033(717767)
ZGT-F2-500	773 thru 1102	351 thru 500	029G23000A034(717768)
ZGT-F2-650	1103 thru 1433	501 thru 650	029G23000A035(717769)
ZGT-F2-1000	1434 thru 2205	651 thru 1000	029G23000A036(717770)
ZGT-F2-1200	2206 thru 2646	1001 thru 1200	029G23000A037(717771)
ZGT-F2-1600	2647 thru 3527	1201 thru 1600	029G23000A038(717772)

Notes:

1. All dimensions are in millimeter.
2. Equipment must be bolted or welded to the top plate to meet allowable seismic ratings.
3. Consult JCI for concrete installation.

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# Electrical Data

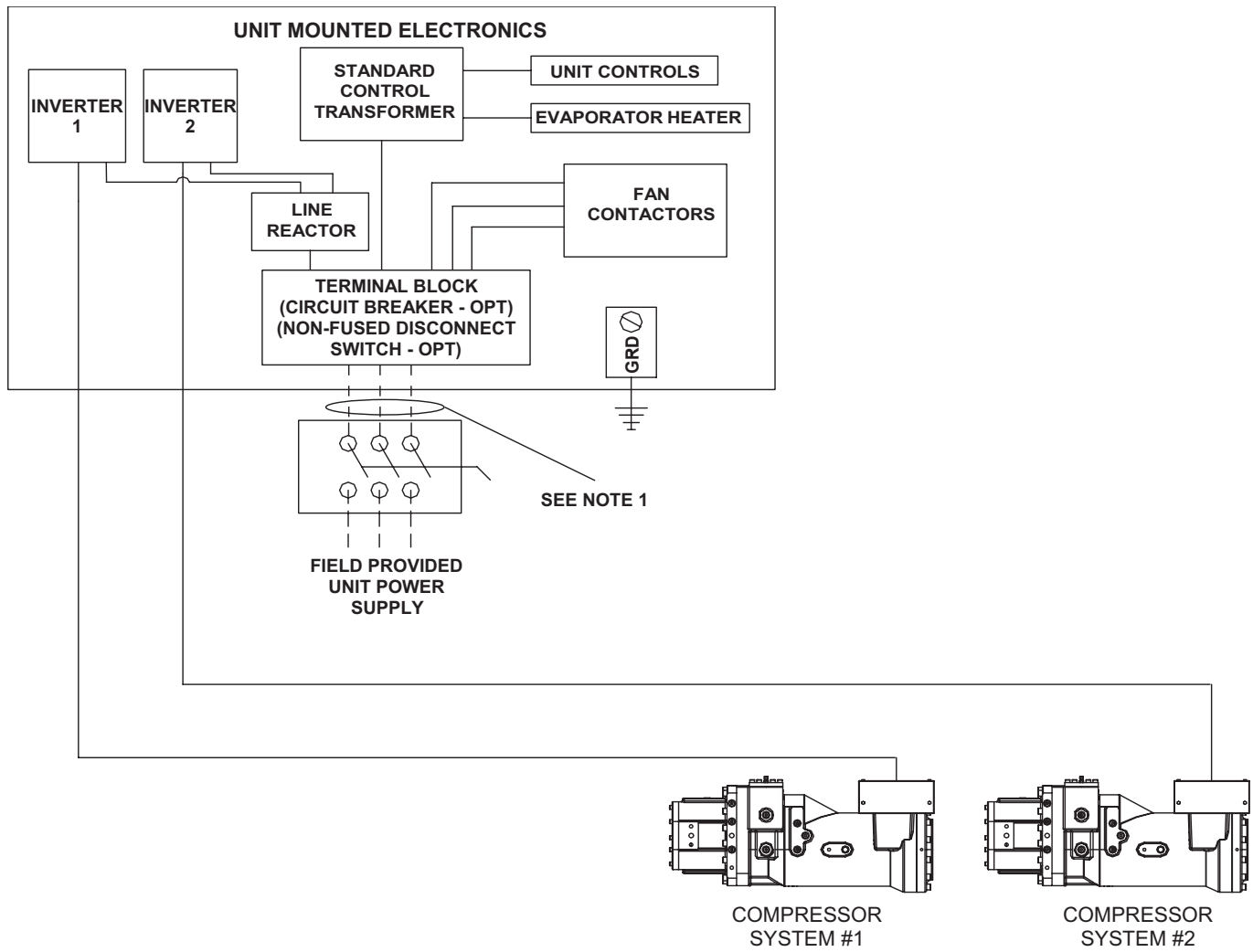
YVAA MODEL			VOLT	HZ	STANDARD / ULTRA QUIET CONDENSER FANS			
FRAME	CONDENSER	EVAPORATOR			R/S/T		GROUNDING CABLE	
					CABLE SIZE EACH(MM2)	QTY PER PHASE	CABLE SIZE EACH(MM2)	QTY
015	3	B	400	50	240	2	240	2
016	5	B	400	50	240	2	240	2
017	8	C	400	50	240	2	240	2
018	3	A	400	50	240	2	240	2
019	5	A	400	50	240	2	240	2
019	8	B	400	50	240	2	240	2
021	3	A	400	50	240	2	240	2
021	5	C	400	50	240	2	240	2
021	8	C	400	50	240	2	240	2
023	3	B	400	50	300	2	300	2
024	5	C	400	50	300	2	300	2
024	8	C	400	50	300	2	300	2
026	3	B	400	50	300	2	300	2
027	3	D	400	50	300	2	300	2
027	5	E	400	50	300	2	300	2
027	8	E	400	50	300	2	300	2
029	5	E	400	50	185	3	185	3
030	3	C	400	50	185	3	185	3
030	5	C	400	50	185	3	185	3
030	8	E	400	50	185	3	185	3
031	8	E	400	50	185	3	185	3
032	3	E	400	50	185	3	185	3
033	3	C	400	50	185	3	185	3
034	3	E	400	50	185	3	185	3
034	5	E	400	50	185	3	185	3
037	3	F	400	50	300	4	300	4
041	3	H	400	50	300	4	300	4
044	3	G	400	50	300	4	300	4
048	3	G	400	50	300	4	300	4
052	3	J	400	50	300	4	300	4

**Electrical Data (Cont'd)**

YVAA MODEL			VOLT	HZ	HIGH AIRFLOW/HIGH STATIC CONDENSER FANS			
FRAME	CONDENSER	EVAPORATOR			R/S/T		GROUNDING CABLE	
					CABLE SIZE EACH(MM2)	QTY PER PHASE	CABLE SIZE EACH(MM2)	QTY
015	3	B	400	50	240	2	240	2
016	5	B	400	50	240	2	240	2
017	8	C	400	50	240	2	240	2
018	3	A	400	50	240	2	240	2
019	5	A	400	50	240	2	240	2
019	8	B	400	50	240	2	240	2
021	3	A	400	50	240	2	240	2
021	5	C	400	50	240	2	240	2
021	8	C	400	50	240	2	240	2
023	3	B	400	50	300	2	300	2
024	5	C	400	50	300	2	300	2
024	8	C	400	50	300	2	300	2
026	3	B	400	50	300	2	300	2
027	3	D	400	50	300	2	300	2
027	5	E	400	50	300	2	300	2
027	8	E	400	50	300	2	300	2
029	5	E	400	50	240	3	240	3
030	3	C	400	50	240	3	240	3
030	5	C	400	50	240	3	240	3
030	8	E	400	50	240	3	240	3
031	8	E	400	50	240	3	240	3
032	3	E	400	50	240	3	240	3
033	3	C	400	50	240	3	240	3
034	3	E	400	50	240	3	240	3
034	5	E	400	50	240	3	240	3
037	3	F	400	50	300	4	300	4
041	3	H	400	50	300	4	300	4
044	3	G	400	50	300	4	300	4
048	3	G	400	50	300	4	300	4
052	3	J	400	50	300	4	300	4

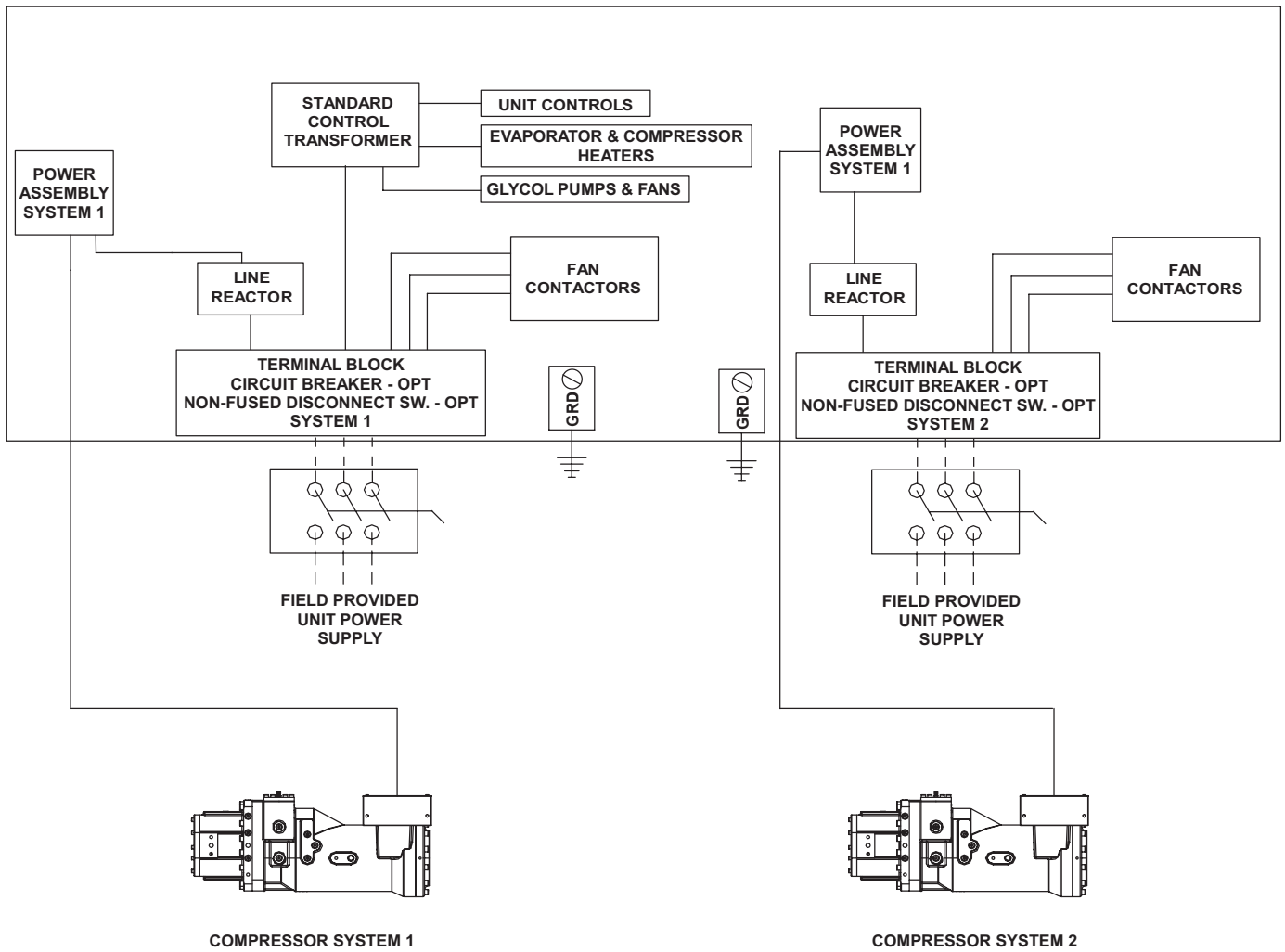
# Power Wiring

## SINGLE POINT WIRING

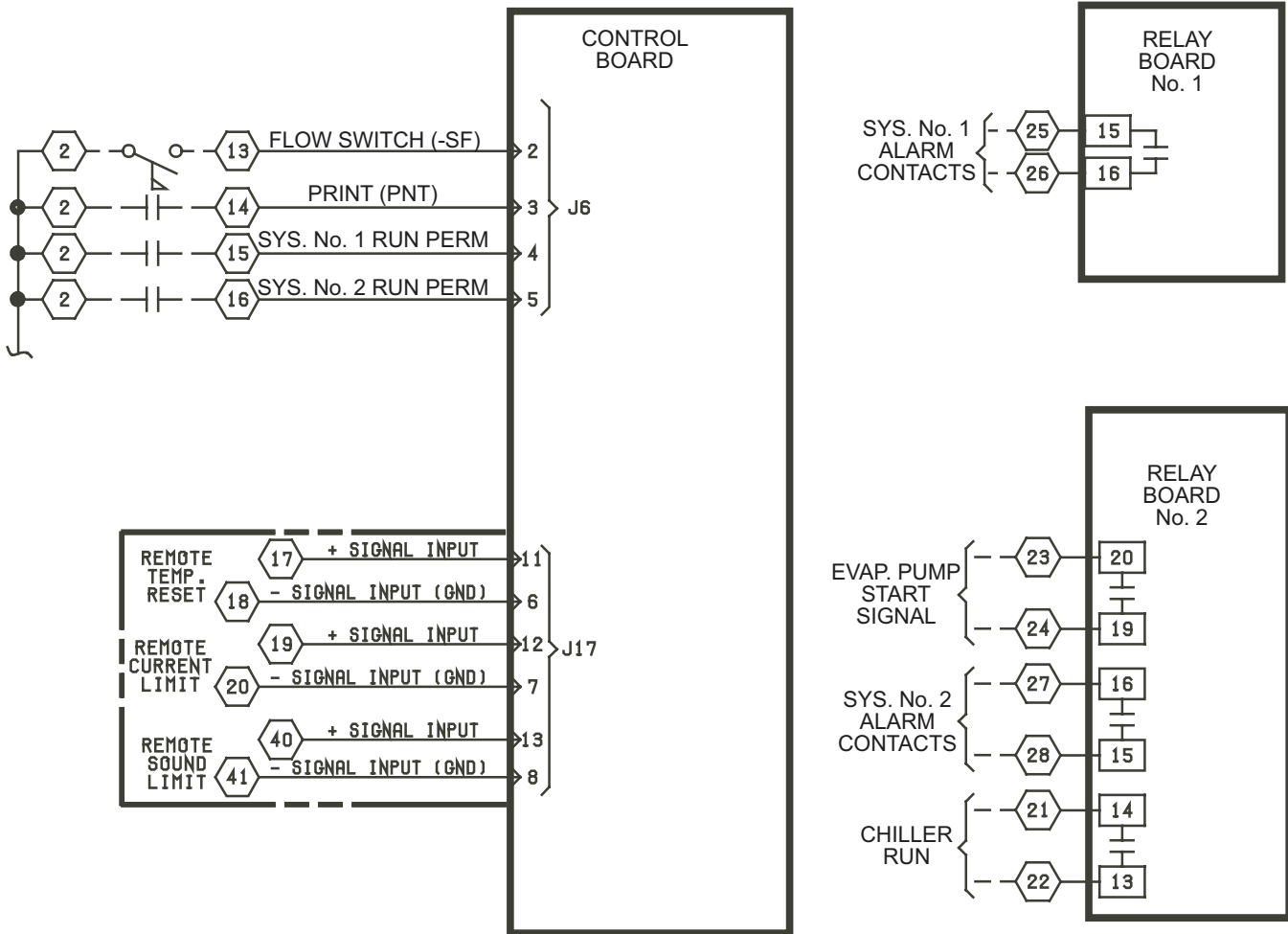


# Power Wiring (Cont'd)






## DUAL POINT WIRING



# Customer Control Wiring



**LEGEND**

-  TERMINAL BLOCK FOR CUSTOMER CONNECTIONS
-  TERMINAL BLOCK FOR YORK CONNECTIONS
-  WIRING AND COMPONENTS BY YORK
-  OPTIONAL EQUIPMENT
-  WIRING AND/OR COMPONENTS BY OTHERS

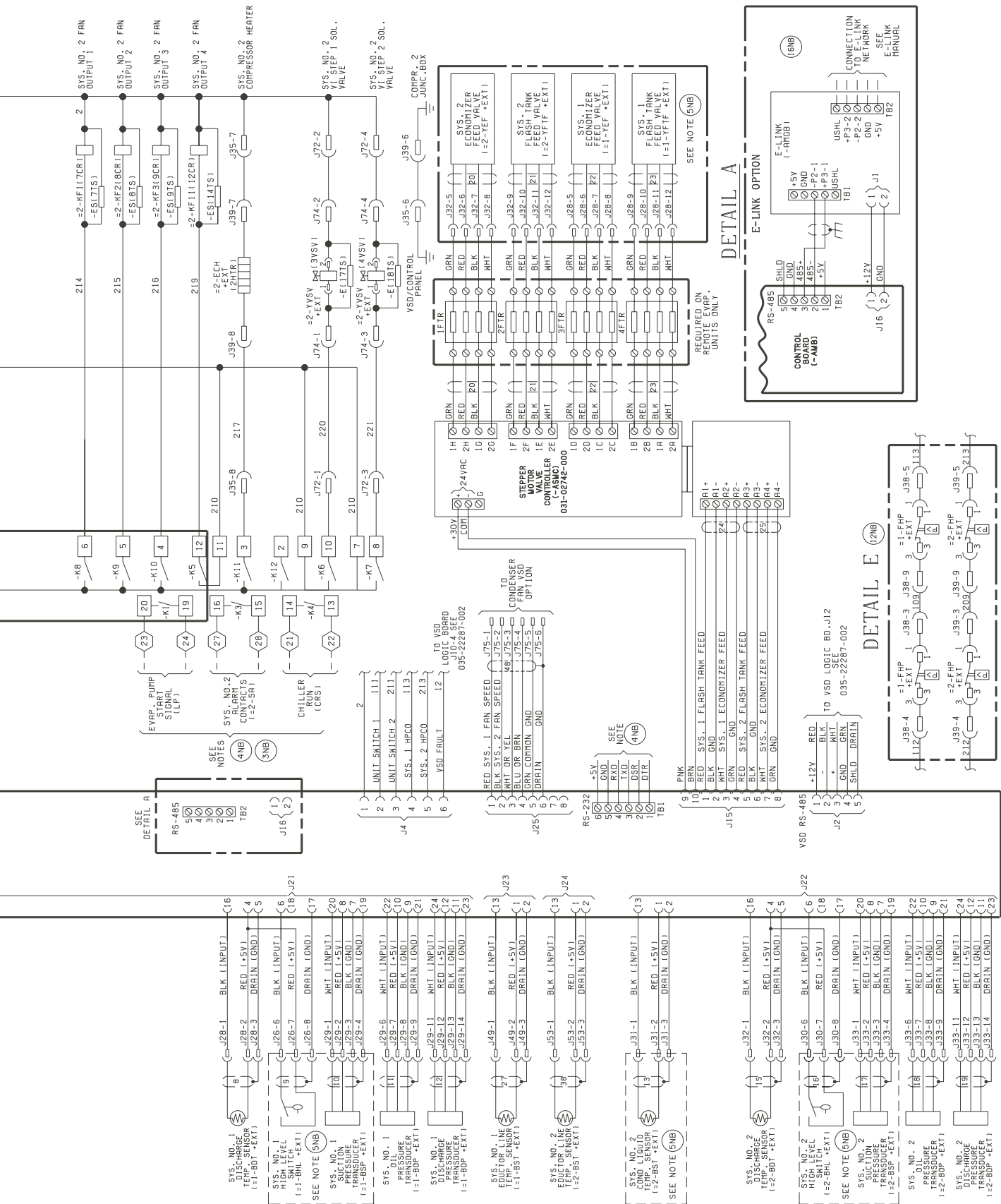
**FIGURE 11 - CUSTOMER CONTROL WIRING DIAGRAM**



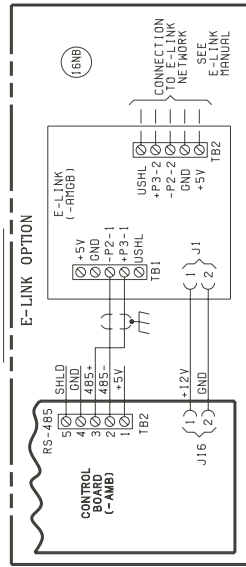
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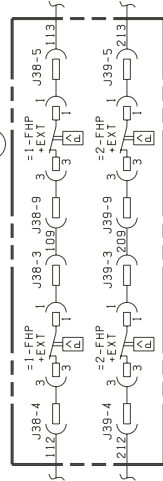
# Control Wiring (Cont'd)



DETAIL A



DETAIL E



# Guide Specifications

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

The requirements of this Section shall conform to the general provisions of the Contract, including General and Supplementary Conditions, Conditions of the Contract, and Contract Drawings.

### 1.02 SCOPE

Provide microprocessor controlled, twin-screw compressor, air-cooled, liquid chillers of the scheduled capacities as shown and indicated on the Drawings, including but not limited to:

1. Chiller package
2. Charge of refrigerant and oil
3. Electrical power and control connections
4. Chilled liquid connections
5. Manufacturer start-up

### 1.03 QUALITY ASSURANCE

A. Products shall be Designed, Tested, Rated and Certified in accordance with, and Installed in compliance with applicable sections of the following Standards and Codes:

1. AHRI 550/590 and 551/591 – Water Chilling Packages Using the Vapor Compression Cycle
2. GB18430.1 – Water chilling (heat pump) package using the vapor compression cycle Part 1: Water chilling (heat pump) package for industrial & commercial and similar application.
3. AHRI 370 – Sound Rating of Large Outdoor Refrigerating and Air-Conditioning Equipment.
4. GB9237 – Mechanical refrigerating systems used for cooling and heating—Safety Requirements.
5. JB86 54 – Safety requirements of Positive Displacement and Centrifugal Water—Chilling Packages.
6. GB5226 .1 – Electrical safety of machinery Electrical equipment of machines Part 1: General requirements.
7. GB 150 – Steel pressure vessels.
8. GB 151 – Tubular heat exchangers.
9. OSHA – Occupational Safety and Health Act.
10. Manufactured in facility registered to ISO 9001.

## Guide Specifications (Cont'd)

- B. Factory Run Test: Chiller shall be pressure-tested, evacuated and fully charged with refrigerant and oil, and shall be factory operational run tested with water flowing through the vessel.
- C. Chiller manufacturer shall have a factory trained and supported service organization.
- D. Warranty: Manufacturer shall Warrant all equipment and material of its manufacture against defects in workmanship and/or material for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first.

### 1.04 DELIVERY AND HANDLING

- A. Unit shall be delivered to job site fully assembled with all interconnecting refrigerant piping and internal wiring ready for field installation and charged with refrigerant and oil by the Manufacturer.
- B. Provide protective covering over vulnerable components for unit protection during shipment. Fit nozzles and open ends with plastic enclosures.
- C. Unit shall be stored and handled per Manufacturer's instructions.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. The design shown on the Drawings is based on YORK model YVAA chiller manufactured by Johnson Controls / YORK. Alternate equipment will be acceptable if the manufacturer's equipment meets the scheduled performance and complies with these specifications. If equipment manufactured by a manufacturer other than that scheduled is utilized, then the Mechanical Contractor shall be responsible for coordinating with the General Contractor and all affected Subcontractors to insure proper provisions for installation of the furnished unit. This coordination shall include, but not be limited to, the following:
  1. Structural supports for units.
  2. Piping size and connection/header locations.
  3. Electrical power requirements and wire/conduit and overcurrent protection sizes.
  4. Chiller physical size on plant layout.
  5. Site noise considerations.
- B. The Mechanical Contractor shall be responsible for all costs incurred by the General Contractor, Subcontractors, and Consultants to modify the building provisions to accept the furnished alternate equipment.

## Guide Specifications (Cont'd)

### 2.02 GENERAL

- A. **Description:** Furnish, Install, and Commission factory assembled, charged, and operational run tested air-cooled screw compressor chiller as specified herein and shown on the Drawings. Chiller shall include, but is not limited to: a complete system with multiple independent refrigerant circuits, semi hermetic twin screw compressors, shell and tube hybrid falling film type evaporator, air-cooled condenser, R134a refrigerant, lubrication system, interconnecting wiring, safety and operating controls including capacity controller, control center, motor starting components, and special features as specified herein or required for safe, automatic operation.
- B. Operating Characteristics:
1. Provide low and high ambient temperature control options as required to ensure unit is capable of operation from 0°F to 131°F (-18°C to 55°C) ambient temperature. When cooling load is at or above 75%, unit needs to be equipped with variable speed drive on fan motors at ambient temperature below -10°C for stable operation.  
  
When cooling load is below 75%, unit needs to be equipped with variable speed drive on fan motors at ambient temperature below -1°C for stable operation..
  2. Provide capacity control system capable of reducing unit capacity to 10% of full load for 2 compressor units. Compressor shall start in unloaded condition. Application of factory installed hot gas bypass shall be acceptable as required to meet specified minimum load.
- C. Cabinet: Unit panels, structural elements, control boxes and heavy gauge structural base shall be constructed of painted galvanized steel. All exposed sheet steel shall be coated with baked on powder paint to meet 500-hour salt spray test in accordance with the ASTM B117 standard.
- D. Shipping: Unit shall ship in one piece and shall require installer to provide only a single evaporator inlet and outlet pipe connection. If providing chiller model that ships in multiple pieces, bid shall include all the material and field labor costs for factory authorized personnel to install a trim kit to connect the pieces as well as all interconnecting piping and wiring.

### 2.03 COMPRESSORS

- A. Compressors: Shall be direct drive, semi hermetic, rotary twin-screw type, including: muffler, temperature actuated 'off-cycle' heater, rain-tight terminal box, discharge shut-off service valve, and precision machined cast iron housing. Design working pressure of entire compressor, suction to discharge, shall be 350 psig (24 barg) or higher.
1. [OPTIONAL]: Suction shut-off service valve for each compressor
- B. Compressor Motors: Refrigerant suction-gas cooled accessible hermetic compressor motor, full suction gas flow through 0.006" (0.1524 mm) maximum mesh screen, with inherent internal thermal overload protection and external current overload on all three phases.
- C. Balancing Requirements: All rotating parts shall be statically and dynamically balanced.
- D. Lubrication System: External oil separators with no moving parts, 450 psig (31 barg) design working pressure. Refrigerant system differential pressure shall provide oil flow through service replaceable, 0.5 micron, full flow, cartridge type oil filter internal to compressor. Filter bypass, less restrictive media, or oil pump not acceptable.

## Guide Specifications (Cont'd)

- E. Capacity Control: Compressors shall start at minimum load. Provide Microprocessor control to command compressor capacity to balance compressor capacity with cooling load.

### 2.04 REFRIGERANT CIRCUIT COMPONENTS

- A. Refrigerant: R-134a. Classified as Safety Group A1 according to ASHRAE 34
- B. Equipment supplied shall comply with LEED Energy & Atmosphere Credit 4, Enhanced Refrigerant Management.
- C. Each independent refrigerant circuit shall incorporate all components necessary for the designed operation including: liquid line shut-off valve with charging port, low side pressure relief device, removable core filter-drier and sight glass with moisture indicator.
- D. Chiller manufacturer shall provide an independent circuit for each compressor to provide maximum redundancy during chiller operation. If equipment does not have independent circuits per compressor, manufacturer shall provide owner one spare compressor of each unique size.
- E. Discharge lines shall be provided with manual compressor shut-off service valves.

### 2.05 HEAT EXCHANGERS

- A. Evaporator:
  1. Evaporator shall be shell and tube, hybrid falling film type to optimize efficiency and refrigerant charge. Tubes shall be high-efficiency, internally and externally enhanced type copper tubes with 0.035" (0.89 mm) minimum wall thickness at all intermediate tube supports to provide maximum tube wall thickness at the support area. Each tube shall be roller expanded into the tube sheets providing a leak proof seal, and be individually replaceable. Independent refrigerant circuits shall be provided per compressor. **[OPTIONAL]**: 3 pass arrangement.
  2. Constructed, tested, and stamped in accordance with applicable sections of GB pressure vessel code for minimum 235 psig (16 barg) refrigerant side design working pressure and 150 psig (10 barg) liquid side design working pressure.
  3. Water boxes shall be removable to permit tube cleaning and replacement. Water boxes shall include nozzle connections suitable for GB150 flanges.
  4. Provide vent and drain fittings, and thermostatically controlled heaters to protect to 0°F (-17.8°C) ambient temperature in off-cycle.
    - a. **[OPTIONAL]**: Provide freeze protection down to -20°F (-28°C) ambient temperature. A separate power connection for evaporator heaters is required and shall be provided by the Contractor.
  5. Connection location: Chilled liquid inlet and outlet nozzle connections are located at rear (opposite control panel) end of unit.

## Guide Specifications (Cont'd)

### B. Air-cooled Condenser:

1. Condenser coils shall be microchannel type, parallel flow aluminum alloy tubes metallurgically brazed as one piece to enhanced aluminum alloy fins. Condenser coils shall be made of a single material to avoid galvanic corrosion due to dissimilar metals. Tube and fin type condenser coils are an acceptable alternate when tubes and fins are fabricated of the same metal material to avoid galvanic corrosion due to dissimilar metals. Coils shall be designed for 350 psig (24 barg) or higher working pressure.
  - a. **[OPTIONAL]**: Coils, internally enhanced, seamless copper tubes, mechanically expanded into aluminum alloy fins with full height collars. Subcooling coil an integral part of condenser. Design working pressure shall be 350 PSIG (24 barg).
  - b. **[OPTIONAL]**: Post-coated epoxy dipped condenser microchannel: The unit shall be built with microchannel sections that have been applied with an electro-deposited and baked flexible epoxy coating that is finished with a polyurethane UV resistant top-coat suitable for highly corrosive applications.
  - c. **[OPTIONAL]**: Wire Panels: Heavy gauge, welded wire mesh coated to resist corrosion, to protect condenser coils from incidental damage and also restrict unauthorized access to internal components.
  - d. **[OPTIONAL]**: Louvered Panels (Condenser Coils): Painted steel to match unit panels, over external condenser coil faces.
  - e. **[OPTIONAL]**: Louvered Panels (Full Unit): Painted steel to match unit panels, over internal components.
  - f. **[OPTIONAL]**: Louvered/Wire Panels: Louvered steel panels on external condenser coil faces, painted to match unit panels. Heavy gauge, welded wire mesh, coated to resist corrosion, around base of machine to restrict unauthorized access.
  - g. **[OPTIONAL]**: End Hail Guard: Louvered steel panels on rear of unit (opposite end of control panel), painted to match unit panels.
  - h. **[OPTIONAL]**: V-Guard Panels: Steel panels installed over exposed condenser piping to protect from damage.
2. Low Sound Fans: Shall provide vertical air discharge from extended orifices. Fans shall be composed of corrosion resistant aluminum hub and glass-fiber-reinforced polypropylene composite blades molded into a low-noise airfoil section. Fan impeller shall be dynamically balanced for vibration-free operation. Fan guards of heavy gauge, PVC (polyvinyl chloride) coated or galvanized steel.
  - a. **[OPTIONAL]**: Ultra-Quiet Fans
  - b. **[OPTIONAL]**: High Airflow Fans
  - c. **[OPTIONAL]**: High Static Fans
3. Fan Motors: High efficiency, direct drive, 3-phase, insulation class "F", current protected, Totally Enclosed Air-Over (TEAO), with double sealed, permanently-lubricated ball bearings. Open Drip Proof (ODP) fan motors will not be acceptable.



## Guide Specifications (Cont'd)

### 2.06 INSULATION

- A. Material: Closed-cell, flexible, UV protected, thermal insulation complying with ASTM C 534 Type 2 (Sheet) for preformed flexible elastomeric cellular thermal insulation in sheet and tubular form.
1. Thickness: 3/4" (19mm.)
    - a. **[OPTIONAL]**: 1-1/2" (38mm.)
- B. Thermal conductivity: 0.26 (BTU/HR-Ft<sup>2</sup>-°F/in) maximum at 75°F mean temperature.
- C. Factory-applied insulation over cold surfaces of liquid chiller components including evaporator shell, water boxes, and suction line. Liquid nozzles shall be insulated by Contractor after pipe installation.
- D. Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface including all seams and joints.

### 2.07 ACOUSTICAL DATA

- A. Provide acoustical sound power or sound pressure level data in decibels (dB) at the scheduled eight (8) octave band center frequencies. A-weighted sound data alone is not acceptable.
- B. Provide all sound power or sound pressure level data at 100%, 75%, 50%, and 25% load.
- C. Supplied equipment shall not exceed scheduled sound power or sound pressure level data at any load point. The mechanical Contractor shall be responsible for any additional costs associated with equipment deviation.
- D. Acoustical performance ratings shall be in accordance with AHRI Standard 370
1. **[OPTIONAL]**: Provide factory-installed sound reduction enclosures and ultra-quiet fans to meet chiller sound levels scheduled at all load points.
  2. **[OPTIONAL]**: Provide optional control input to limit sound output of the chiller based on time of day. Shall be programmable at the chiller panel or controlled remotely via signal (4-20 mA or 0-10VDC) from BAS system. Chillers without this feature shall be provided with the necessary sound attenuation to meet the scheduled sound performance data at all load points.

### 2.08 POWER AND ELECTRICAL REQUIREMENTS

- A. Power/Control Panel:
1. Factory installed and wired IP55, powder painted steel cabinets with tool lockable, hinged, latched, and gasket sealed outer doors equipped with wind struts for safer servicing. Provide main power connection(s), compressor starters and fan motor contactors, current overloads, and factory wiring.
  2. Panel shall include control display access door.

## Guide Specifications (Cont'd)

### B. Single Point Power:

1. Provide single point power connection to chiller, shall be 3 phase of scheduled voltage.
2. Terminal Block connections shall be provided at the point of incoming single point connection for field connection and interconnecting wiring to the compressors. Separate external protection must be supplied, by others, in the incoming power wiring, which must comply with local codes.
3. **[OPTIONAL]**: Single Point Disconnect: A non-fused disconnect and lockable external handle shall be supplied to isolate the unit power voltage for servicing. Separate external fusing must be supplied, by others, in the incoming power wiring which must comply with local codes.
4. **[OPTIONAL]**: Single Point Circuit Breaker: A unit-mounted Circuit Breaker with external lockable handle shall be supplied to isolate power voltage for servicing. Incoming power wiring must comply with local codes. Circuit breaker shall be sized to provide the motor branch circuit protection, short circuit protection and ground fault protection for the motor branch-circuit conductors, the motor control apparatus and the motors.

C. Control Transformer: Power panel shall be supplied with a factory mounted and wired control transformer that will supply all unit control voltage from the main unit power supply. Transformer shall utilize scheduled line voltage on the primary side and provide 115V/1Ø on secondary.

D. Short Circuit Withstand Rating of the chiller electrical enclosure shall be (380, 400, & 460V: minimum of 30,000 Amps [OR 65,000 Amps for Single Point Circuit Breaker]).

E. Motor Starters: Motor starters shall be zero electrical inrush current (Variable Frequency Drives) or reduced inrush type (Closed transition Wye-Delta or Solid State) for minimum electrical inrush. Open transition Wye-Delta and Across the Line type starters will not be acceptable.

### F. Power Factor:

1. Provide equipment with power factor correction capacitors as required to maintain a displacement power factor of 95% at all load conditions.
2. The installing contractor is responsible for additional cost to furnish and install power factor correction capacitors if they are not factory mounted and wired.

G. All exposed power wiring shall be routed through liquid-tight, UV-stabilized, non-metallic conduit.

H. Supplied equipment shall not exceed scheduled Minimum Circuit Ampacity (MCA.) The mechanical Contractor shall be responsible for any additional costs associated with equipment deviation.

## 2.09 CONTROLS

### A. General:

1. Provide automatic control of chiller operation including compressor start/stop and load/unload, anti-recycle timers, condenser fans, evaporator pump, evaporator heater, unit alarm contacts and run signal contacts.

## Guide Specifications (Cont'd)

2. Chiller shall automatically reset to normal chiller operation after power failure.
  3. Unit operating software shall be stored in non-volatile memory. Field programmed set points shall be retained in lithium battery backed regulated time clock (RTC) memory for minimum 5 years.
  4. Alarm contacts shall be provided to remote alert for any unit or system safety fault.
- B. Display and Keypad:
1. Provide minimum 80 character liquid crystal display that is both viewable in direct sunlight and has LED backlighting for nighttime viewing. Provide one keypad and display panel per chiller.
  2. Display and keypad shall be accessible through display access door without opening main control/electrical cabinet doors.
  3. Display shall provide a minimum of unit setpoints, status, electrical data, temperature data, pressures, safety lockouts and diagnostics without the use of a coded display.
  4. Descriptions in English (or available language options), numeric data in English (or Metric) units.
  5. Sealed keypad shall include unit On/Off switch.
- C. Programmable Setpoints (within Manufacturer limits): Display language, chilled liquid cooling mode, local/remote control mode, display units mode, system lead/lag control mode, remote temperature reset, remote current limit, remote sound limit, low ambient temperature cutout enable/disable, leaving chilled liquid setpoint and range, maximum remote temperature reset.
- D. Display Data: Chilled liquid leaving and entering temperatures; outside ambient air temperature; lead system; evaporator pump status; active remote control; compressor suction, discharge, and oil pressures per refrigerant circuit; compressor discharge, motor, and oil temperatures per refrigerant circuit; saturation temperatures per refrigerant circuit; compressor speed; condenser fan status; condenser subcooling temperature; condenser drain valve percentage open; compressor capacity in percentage of Full Load Amps; compressor number of starts; run time; operating hours; evaporator heater status; history data for last ten shutdown faults; history data for last 20 normal (non-fault) shutdowns.
- E. Predictive Control Points: Unit controls shall avoid safety shutdown when operating outside design conditions by optimizing the chiller controls and cooling load output to stay online and avoid safety limits being reached. The system shall monitor the following parameters and maintain the maximum cooling output possible without shutdown of the equipment: motor current, suction pressure, discharge pressure, starter internal ambient temperature, and starter baseplate temperature.
- F. System Safeties: Shall cause individual compressor systems to perform auto-reset shut down if: high discharge pressure or temperature, low suction pressure, low motor current, high/low differential oil pressure, low discharge superheat, high motor temperature, system control voltage.
- G. Unit Safeties: Shall be automatic reset and cause compressors to shut down if: high or low ambient temperature, low leaving chilled liquid temperature, under voltage, flow switch operation. Contractor shall provide flow switch and wiring per chiller manufacturer requirements.

## Guide Specifications (Cont'd)

H. Manufacturer shall provide any controls not listed above, necessary for automatic chiller operation. Mechanical Contractor shall provide field control wiring necessary to interface sensors to the chiller control system.

### 2.10 ACCESSORIES AND OPTIONS

Some accessories and options supersede standard product features. All options are factory-mounted unless otherwise noted.

#### A. CONTROLS OPTIONS:

1. Building Automation System Interface: Chiller to accept 4 to 20mA or 0 to 10 VDC input from BAS (by others) to reset the leaving chilled liquid temperature or load limit setpoint or both.
2. Gateway: Provides communication for Building Automation Systems, including BACnet (MS/TP), Modbus, N2, and LON. (Field Commissioned by BAS Manufacturer)
3. Thermal Storage: Provide special control logic and modifications to produce leaving chilled brine temperatures below 40°F (4.4°C.)

#### B. GENERAL OPTIONS:

1. Flow Switch: Vapor proof SPDT, IP55 switch, 150 psig (10.3 barg), -20°F to 250°F (-28.9°C to 121.1°C.) (**Field Mounted by Contractor**)
2. Differential Pressure Switch: 3-45 psig (0.2-3 barg) range with 1/4" NPTE pressure connections. (**Field Mounted by Contractor**)
3. Vibration Isolation (All Options Field Mounted by Contractor):
  - a. Elastomeric Isolators.
  - b. 1" Deflection Spring Isolators: Level adjustable, spring and cage type isolators for mounting under the unit base rails.
  - c. 2" Deflection Restrained Spring Isolators: Level adjustable, restrained mounts in rugged welded steel housing with vertical and horizontal limit stops. Housings shall be designed to withstand a minimum 1.0g accelerated force in all directions to 2" (50.8 mm.)

## ***Guide Specifications (Cont'd)***

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. General: Rig and Install in full accordance with Manufacturer's requirements, Project drawings, and Contract documents.
- B. Location: Locate chiller as indicated on drawings, including cleaning and service maintenance clearance per Manufacturer instructions. Adjust and level chiller on support structure.
- C. Components: Installing Contractor shall provide and install all auxiliary devices and accessories for fully operational chiller.
- D. Electrical: Coordinate electrical requirements and connections for all power feeds with Electrical Contractor.
- E. Controls: Coordinate all control requirements and connections with Controls Contractor.
- F. Finish: Installing Contractor shall paint damaged and abraded factory finish with touch-up paint matching factory finish.

## SI Metric Conversion

Values provided in this manual are in the English inch-pound (I-P) system.  
The following factors can be used to convert from English to the most common SI Metric values.

MEASUREMENT	MULTIPLY THIS ENGLISH VALUE	BY	TO OBTAIN THIS METRIC VALUE
CAPACITY	TONS REFRIGERANT EFFECT (ton)	3.516	KILOWATTS (kW)
POWER	KILOWATTS (kW)	NO CHANGE	KILOWATTS (kW)
	HORSEPOWER (hp)	0.7457	KILOWATTS (kW)
FLOW RATE	GALLONS / MINUTE (gpm)	0.0631	LITERS / SECOND (L/s)
LENGTH	FEET (ft)	304.8	MILLIMETERS (mm)
	INCHES (in)	25.4	MILLIMETERS (mm)
WEIGHT	POUNDS (lb)	0.4536	KILOGRAMS (kg)
VELOCITY	FEET / SECOND (fps)	0.3048	METERS / SECOND (m/s)
PRESSURE DROP	FEET OF WATER (ft)	2.989	KILOPASCALS (kPa)
	POUNDS / SQ. INCH (psi)	6.895	KILOPASCALS (k Pa)

### TEMPERATURE

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), subtract 32° and multiply by 5/9 or 0.5556.

To convert a temperature range (i.e., 10°F or 12°F chilled water range) from Fahrenheit to Celsius, multiply by 5/9 or 0.5556.

### FOULING FACTOR

ENGLISH I-P (ft <sup>2</sup> °F hr/Btu)	EQUIVALENT SI METRIC (m <sup>2</sup> k/kW)
0.0001	0.018
0.00025	0.044
0.0005	0.088
0.00075	0.132

### EFFICIENCY

In the English I-P system, chiller efficiency is measured in kW / ton:

$$\text{kW/ton} = \frac{\text{kW input}}{\text{tons refrigeration effect}}$$

In the SI Metric system, chiller efficiency is measured in Coefficient of Performance (COP).

$$\text{kW/ton} = \frac{\text{kW input}}{\text{kW refrigeration effect}}$$

kW / ton and COP are related as follows:

$$\text{kW/ton} = \frac{3.516}{\text{COP}}$$

$$\text{COP} = \frac{3.516}{\text{kW/ton}}$$

# Notes

