

	AIR-COOLED SCREW LIQUID CHILLERS	
INSTALLATION, OPERATION, MAINTENANCE	New Release	Form 201.31-ICOM1 (516)

**MODEL YVFA STYLE A
WITH VARIABLE SPEED DRIVE
AND FREE COOLING**

**2 COMPRESSOR
50 AND 60 HZ**



R-134a



Issue Date:
May 31, 2016



IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of rigging, installation, and operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in

which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized rigging, installation, and operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:



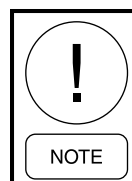
Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.



Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions are not followed.



Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.



Highlights additional information useful to the technician in completing the work being performed properly.



External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with Johnson Controls' published specifications and must be performed only by a qualified electrician. Johnson Controls will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls' policy for continuous product improvement, the information contained in this document is subject to change without notice. Johnson Controls makes no commitment to update or provide current information automatically to the manual or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls QuickLIT website at <http://cgproducts.johnsoncontrols.com>.

It is the responsibility of rigging, lifting, and operating/service personnel to verify the applicability of these documents to the equipment. If there is any question

regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the chiller.

CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.



The Control/VSD Cabinet contains lethal high AC and DC voltages. Before performing service inside the cabinet, remove the AC supply feeding the chiller and verify using a non-contact voltage sensor.



The DC voltage on the VSD DC Bus will take 5 minutes to bleed off, after AC power is removed. Always check the DC Bus Voltage with a Voltmeter to assure the capacitor charge has bled off before working on the system.



NEVER short out the DC Bus to discharge the filter capacitors.



NEVER place loose tools, debris, or any objects inside the Control Panel/VSD Cabinet.



NEVER allow the Control Panel VSD Cabinet doors to remain open if there is a potential for rain to enter the panel. Keep doors closed and assure all latches are engaged on each door unless the unit is being serviced.



ALWAYS lockout the disconnect supplying AC to the chiller.

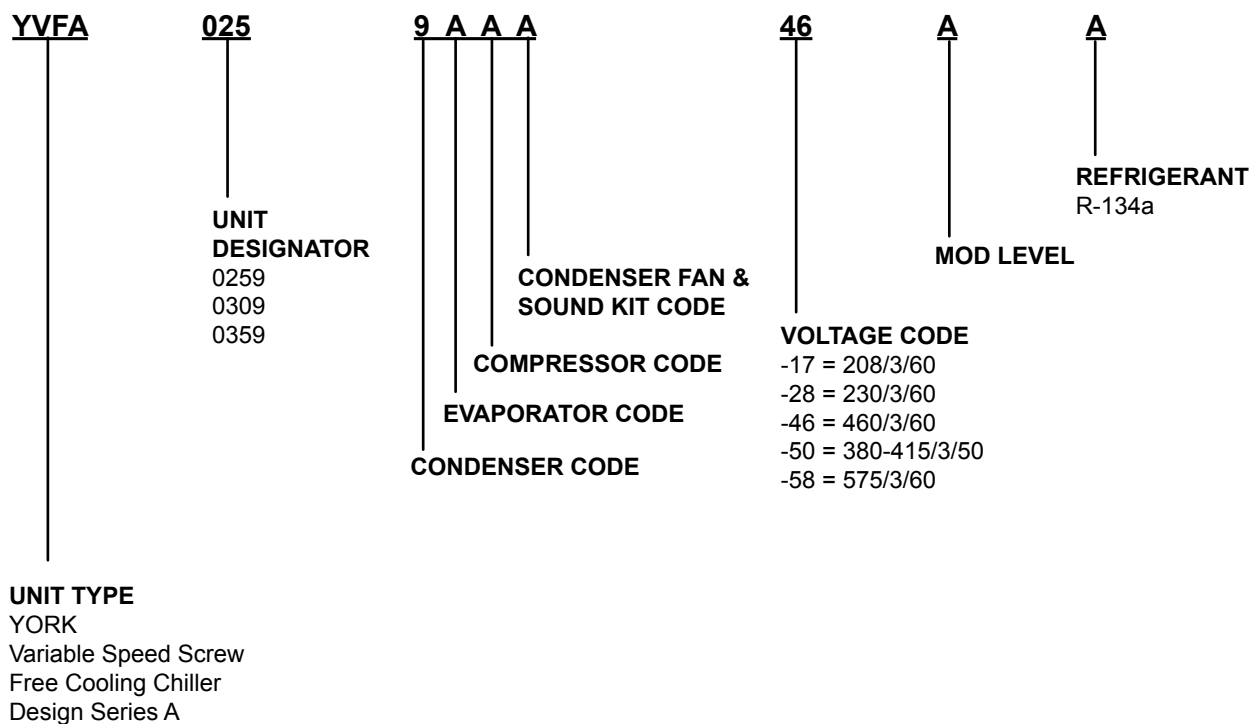


The 1L Line Inductor will reach operating temperatures of over 150°C (300°F). DO NOT open panel doors during operation. Assure the inductor is cool whenever working near the inductor with power OFF.

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Screw/Scroll Chillers Long Term Storage	50.20-NM7
All Products - Replacement Parts Electrical Connectors	50.20-RP1
All Products - Replacement Parts Fittings	50.20-RP2

NOMENCLATURE



ABBREVIATIONS

ABBREVIATIONS	
SCR	Silicone Controlled Rectifier
VSD	Variable Speed Drive
PWM	Pulse Width Modulator
RES	Resistor
IGBT	Insulator Gate Bipolar Transistor
LED	Light Emitting Diode
FLA	Full Load Amps
k	1,000
TP	Test Point
OL	Over Load
MOD	Module
DSP	Digital Signal Processors
MTR	Motor
RCV	Receive
XMT	Transmit
VI	Variable Volume Index

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SECTION 1 - GENERAL CHILLER INFORMATION AND SAFETY

1

INTRODUCTION

YORK YVFA chillers are manufactured to the highest design and construction standards to ensure high performance, reliability and adaptability to all types of air conditioning installations.

The unit is intended for cooling water or glycol solutions and is not suitable for purposes other than those specified in this manual.

Rigging and lifting should only be done by a professional rigger in accordance with a written rigging and lifting plan. The most appropriate rigging and lifting method will depend on job specific factors, such as the rigging equipment available and site needs. Therefore, a professional rigger must determine the rigging and lifting method to be used, and it is beyond the scope of this manual to specify rigging and lifting details.

This manual contains all the information required for correct installation and commissioning of the unit, together with operating and maintenance instructions. The manual should be read thoroughly before attempting to operate or service the unit.

All procedures detailed in the manual, including installation, commissioning and maintenance tasks must only be performed by suitably trained and qualified personnel.

The manufacturer will not be liable for any injury or damage caused by incorrect installation, commissioning, operation or maintenance resulting from a failure to follow the procedures and instructions detailed in the manual.

WARRANTY

Johnson Controls warrants YVFA chillers in accordance with the *Limited Warranty Engineered Systems Equipment (Form 50.05-NM2)*.

Johnson Controls warrants all equipment and materials against defects in workmanship and materials for a period of eighteen months from date of shipment or 12 months from date of startup, whichever comes first, unless labor or extended warranty has been purchased as part of the contract.

The warranty is limited to parts only replacement and shipping of any faulty part, or sub-assembly, which has failed due to poor quality or manufacturing errors. All claims must be supported by evidence that the failure

has occurred within the warranty period, and that the unit has been operated within the designed parameters specified.

All warranty claims must specify the unit model, serial number, order number and run hours/starts. Model and serial number information is printed on the unit identification plate.

The unit warranty will be void if any modification to the unit is carried out without prior written approval from Johnson Controls.

For warranty purposes, the following conditions must be satisfied:

- The initial start of the unit must be carried out by trained personnel from an authorized Johnson Controls Service Center. Refer to *SECTION 6 - COMMISSIONING* for more information.
- Only genuine YORK approved spare parts, oils, coolants, and refrigerants must be used.
- All the scheduled maintenance operations detailed in this manual must be performed at the specified times by suitably trained and qualified personnel. Refer to *SECTION 9 - MAINTENANCE* for more information.
- Failure to satisfy any of these conditions will automatically void the warranty. Refer to *Form 50.05-NM2* for complete details.

CERTIFICATIONS AND LABELS

The following certifications and labels are applicable to YVFA chillers:

- AHRI certified (60Hz models)
- Eurovent certified (50Hz models up to 600KW)
- ETL/cETL GB, CE
- ASHRAE 90.1 compliant
- ISO9001
- LEED USGBC member

QUALITY ASSURANCE AND SAFETY

Products are Designed, Tested, Rated and Certified IAW, and installed in compliance with applicable sections of the following Standards and Codes:

- AHRI 550/590 – Water Chilling Packages Using the Vapor Compression Cycle
- AHRI 70 – Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment
- ANSI/ASHRAE Standard 15 – Safety Code for Mechanical Refrigeration
- ASHRAE 34 – Number Designation and Safety Classification of Refrigerants
- ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings
- ANSI/NFPA Standard 70 – National Electrical Code (N.E.C.).
- ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
- ASTM A48 – Gray Iron Castings
- OSHA – Occupational Safety and Health Act
- YVFA chillers are designed within EN ISO 9001 and built within an EN ISO 9002 accredited manufacturing organization.
- Conform to Intertek (ETL) and provide ETL listing label.
- Units are Rated (all) and Certified (140 - 200 tons) IAW AHRI Standard 550/590.

When required, chillers (50 Hz only) have the option available to conform with the following European Directives.

CE/PED marked units conform to the following standards:

- Machinery Directive (2006/42/EC).
- EMC Directive (2004/108/EC).
- Pressure Equipment Directive (97/23/EC).
- Low Voltage Directive (2006/95/EC).
- Safety Code for Mechanical Refrigeration (EN378-2(2008)).

ETL/ASME marked units conform to the following standards:

- ANSI/ASHRAE 15 – Safety Code for Mechanical Refrigeration.
- ANSI/ASHRAE 34 – Number Designation and Safety Classification of Refrigerants.

- ANSI/NFPA 70 – National Electrical Code (N.E.C.).
- ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

GB marked units conform to the following standards:

- GB5226.1 Safety of machinery- Electrical equipment of machines – Part 1: General requirements.
- GB25131 Safety requirements for water chiller (heat pump) using the vapor compression cycle.

FLUORINATED GREENHOUSE GASES

- This equipment contains fluorinated greenhouse gases covered by the Kyoto Protocol.
- The global warming potential of the refrigerant (R134a) used in this unit is 1300.
- The refrigerant quantity is stated in the Physical Data table in Section 5 of this document.
- The fluorinated greenhouse gases in this equipment may not be vented to the atmosphere.
- This equipment should only be serviced by qualified technicians

RESPONSIBILITY FOR SAFETY

Every care has been taken in the design and manufacture of the unit to ensure compliance with the safety requirements listed above. However, the individual rigging, lifting, maintaining, operating or working on any machinery is primarily responsible for:

- Personal safety, safety of other personnel, and the machinery.
- Correct utilization of the machinery in accordance with the procedures detailed in the manual.

ABOUT THIS MANUAL

The contents of this manual include suggested best working practices and procedures. These are issued for guidance only, and they do not take precedence over the above stated individual responsibility and/or local safety regulations.

This manual and any other document supplied with the unit are the property of Johnson Controls which reserves all rights. They may not be reproduced, in whole or in part, without prior written authorization from an authorized Johnson Controls representative.

MISUSE OF EQUIPMENT

Suitability for Application

The unit is intended for cooling water or glycol solutions and is not suitable for purposes other than those specified in these instructions. Any use of the equipment other than its intended use, or operation of the equipment contrary to the relevant procedures may result in injury to the operator, or damage to the equipment.

The unit must not be operated outside the design parameters specified in this manual.

Structural Support

Structural support of the unit must be provided as indicated in these instructions. Failure to provide proper support may result in injury to the operator, or damage to the equipment and/or building.

Mechanical Strength

The unit is not designed to withstand loads or stresses from adjacent equipment, pipework or structures. Additional components must not be mounted on the unit. Any such extraneous loads may cause structural failure and may result in injury to the operator, or damage to the equipment.

General Access

There are a number of areas and features, which may be a hazard and potentially cause injury when working on the unit unless suitable safety precautions are taken. It is important to ensure access to the unit is restricted to suitably qualified persons who are familiar with the potential hazards and precautions necessary for safe operation and maintenance of equipment containing high temperatures, pressures and voltages.

Pressure Systems

The unit contains refrigerant vapor and liquid under pressure, release of which can be a danger and cause injury. The user should ensure that care is taken during installation, operation and maintenance to avoid damage to the pressure system. No attempt should be made to gain access to the component parts of the pressure system other than by suitably trained and qualified personnel.

Electrical

The unit must be grounded. No installation or maintenance work should be attempted on the electrical equipment without first switching power OFF, isolat-

ing and locking-off the power supply. Servicing and maintenance on live equipment must not be attempted. No attempt should be made to gain access to the control panel or electrical enclosures during normal operation of the unit.

Rotating Parts

Fan guards must be fitted at all times and not removed unless the power supply has been isolated. If ductwork is to be fitted, requiring the wire fan guards to be removed, alternative safety measures must be taken to protect against the risk of injury from rotating fans.

Sharp Edges

The fins on the air-cooled condenser coils have sharp metal edges. Reasonable care should be taken when working in contact with the coils to avoid the risk of minor abrasions and lacerations. The use of gloves is recommended.

Frame rails, brakes, and other components may also have sharp edges. Reasonable care should be taken when working in contact with any components to avoid risk of minor abrasions and lacerations.

Refrigerants, Oils, and Glycol

Refrigerants and oils used in the unit are generally non-toxic, non-flammable and non-corrosive, and pose no special safety hazards. Use of gloves and safety glasses is, however, recommended when working on the unit. The buildup of refrigerant vapor, from a leak for example, does pose a risk of asphyxiation in confined or enclosed spaces and attention should be given to good ventilation.

Use only the refrigerant specifically designated for the unit. Any other type of refrigerant may cause damage to the equipment and will void the warranty.

A certain amount of glycol must be charged into the free cooling coil to prevent the coolant inside the coil from freezing. Two types of glycol can be used; Ethylene Glycol (EG) or Propylene Glycol (PG). To determine the appropriate concentration, verify the local minimum ambient temperature. A buffer band of 10R (minimum) should be considered when determining the freezing point per glycol classification. The concentration (weight by volume) can be found in the *Table 1 on page 15*. In the event of extreme weather conditions, it is strongly recommended that all glycol liquid be drained out of the free cooling coils to prevent pipe and coil damage.

If the unit is installed on the top of a building, or the free cooling coils are located at the top of glycol liquid system, use the Schrader valve (at the top of header of free cooling coils) to vent the air inside of the coils when charging the liquid glycol. If this is not the case, use the vent valve at the top of the glycol liquid system to vent the air.

The charging pump can be used to charge glycol into the system. In addition, glycol can be poured into the system through the charging valve located at the top of the system.

High Temperature and Pressure Cleaning

High temperature and pressure cleaning methods (e.g. steam cleaning) should not be used on any part of the pressure system as this may cause operation of the pressure relief device(s). Detergents and solvents, which may cause corrosion, should also be avoided.

Emergency Shutdown

In case of emergency, the control panel is fitted with a UNIT switch to stop the unit. When operated, it removes the low voltage 120VAC electrical supply from the inverter system, thus shutting down the unit. CE certified units use a circuit breaker/non-fused disconnect to remove all power to the unit.

MSDS Information

Manufacturer Safety Data Sheets (MSDS) information can be obtained by calling (800) 451-8346 in the U.S. or e-mail to MSDS@3Ecompany.com. Please provide the product name, manufacturer, part number, and the specific language required.

Safety Labels



White symbol on blue background.

For safe operation, read the Instructions first.



Black symbol on yellow background.

Warning: This machine may start automatically without prior warning



Black symbol on yellow background.

Warning: Hot surface.



Black symbol on yellow background.

Warning: Safety relief valve may discharge gas or liquid without prior warning.



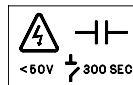
Black symbol on yellow background.

Warning: Isolate all electrical sources of supply before opening or removing the cover, as lethal voltages may exist.



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General attention symbol.



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Warning: On isolating the supply it may take up to 300 seconds for the capacitor voltage to fall below 50 volts.

TABLE 1 - GLYCOL CONCENTRATION CORRESPONDING FREEZE POINT

1

EG/PG	DENSITY (G/CM ³) @20°C	CONCENTRATION (%) BY WT	CONCENTRATION (%) BY VOL	FREEZE POINT (°C)	FREEZE POINT (°F)
ETHYLENE GLYCOL (EG)	1	0	0	0	32
	1.001	2	1.8	-1	30.2
	1.002	3	2.7	-1	30.2
	1.003	4	3.6	-1	30.2
	1.004	5	4.4	-2	28.4
	1.006	6	5.4	-2	28.4
	1.007	7	6.3	-2	28.4
	1.008	8	7.2	-3	26.6
	1.01	9	8.2	-3	26.6
	1.011	10	8.9	-3	26.6
	1.013	12	10.9	-4	24.8
	1.016	14	12.8	-5	23
	1.019	16	14.6	-6	21.2
	1.021	18	16.5	-7	19.4
	1.024	20	18.1	-8	17.6
	1.03	24	22	-10	14
	1.035	28	25.8	-13	8.6
	1.041	32	29.6	-16	3.2
	1.046	36	33.5	-20	-4
	1.051	40	37.5	-24	-11.2
	1.057	44	41.5	-28	-18.4
	1.062	48	45.5	-33	-27.4
	1.067	52	49.6	-39	-38.2
	1.072	56	53.7	-45	-49
	1.077	60	57.8	-51	-59.8
PROPYLENE GLYCOL (PG)	1	0	0	0	32
	1.003	4	3.8	-1	30.2
	1.006	8	7.7	-2	28.4
	1.009	12	11.6	-4	24.8
	1.012	16	15.5	-5	23
	1.016	20	19.4	-7	19.4
	1.018	22	21.4	-8	17.6
	1.02	24	23.4	-9	15.8
	1.022	27	26.4	-11	12.2
	1.025	30	29.4	-13	8.6
	1.027	32	31.4	-14	6.8
	1.029	34	33.5	-16	3.2
	1.031	37	36.5	-18	-0.4
	1.034	40	39.6	-21	-5.8
	1.036	42	41.6	-22	-7.6
	1.038	45	44.7	-27	-16.6
	1.04	48	47.8	-30	-22
	1.041	50	49.9	-34	-29.2

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SECTION 2 - PRODUCT DESCRIPTION

YORK YVFA R134a chillers are designed for water or glycol cooling. All units are designed to be located outside on the roof of a building or at ground level.

The units are completely assembled with all interconnecting refrigerant piping and internal wiring, ready for field installation.

Prior to delivery, the unit is pressure tested, evacuated, and fully charged with refrigerant and oil in each of the two independent refrigerant circuits. After assembly, an operational test is performed with water flowing through the evaporator to ensure that each refrigerant circuit operates correctly.

The unit structure is manufactured from heavy gauge, galvanized steel. Many external structural parts are coated with "Champagne" baked-on enamel powder paint. This provides a finish which, when subjected to ASTM B117, 1000 hour, 5% salt spray conditions, shows breakdown of less than 1/8" either side of a scribed line (equivalent to ASTM D1654 rating of "6").

All exposed power wiring is routed through liquid-tight, non-metallic conduit.

GENERAL SYSTEM DESCRIPTION

The YVFA Chiller combines the best of modern screw compressor design with the latest technology in variable speed drives. The result is superior control and efficiency in real world conditions. The VSD enables slowing the speed of the compressor to match the load on the system resulting in precise chilled liquid control, minimized sound, maximum energy efficiency, and reduced cost of ownership. The VSD also provides soft starts with no electrical inrush. The lack of heat build-up on start also enables required off time between starts to be reduced to a period of two minutes.

The YVFA Air-Cooled Screw Chiller utilizes many components, which are the same or nearly the same as a standard screw chiller of a similar size. This includes modular frame rails, condenser, fans, compressors, evaporator, free cooling coil, free cooling valve (open loop), glycol pump and BPHX (closed loop).

The chiller consists of two screw compressors in a corresponding number of separate refrigerant circuits, a hybrid falling film evaporator, an air-cooled condenser, receiver/flash tanks, feed valves, oil separators, and

compressor mufflers. Oil separators utilize no moving parts. Oil cooling is accomplished by refrigerant leaving the eductor flashing in the suction line which cools the oil, motor and compressor.

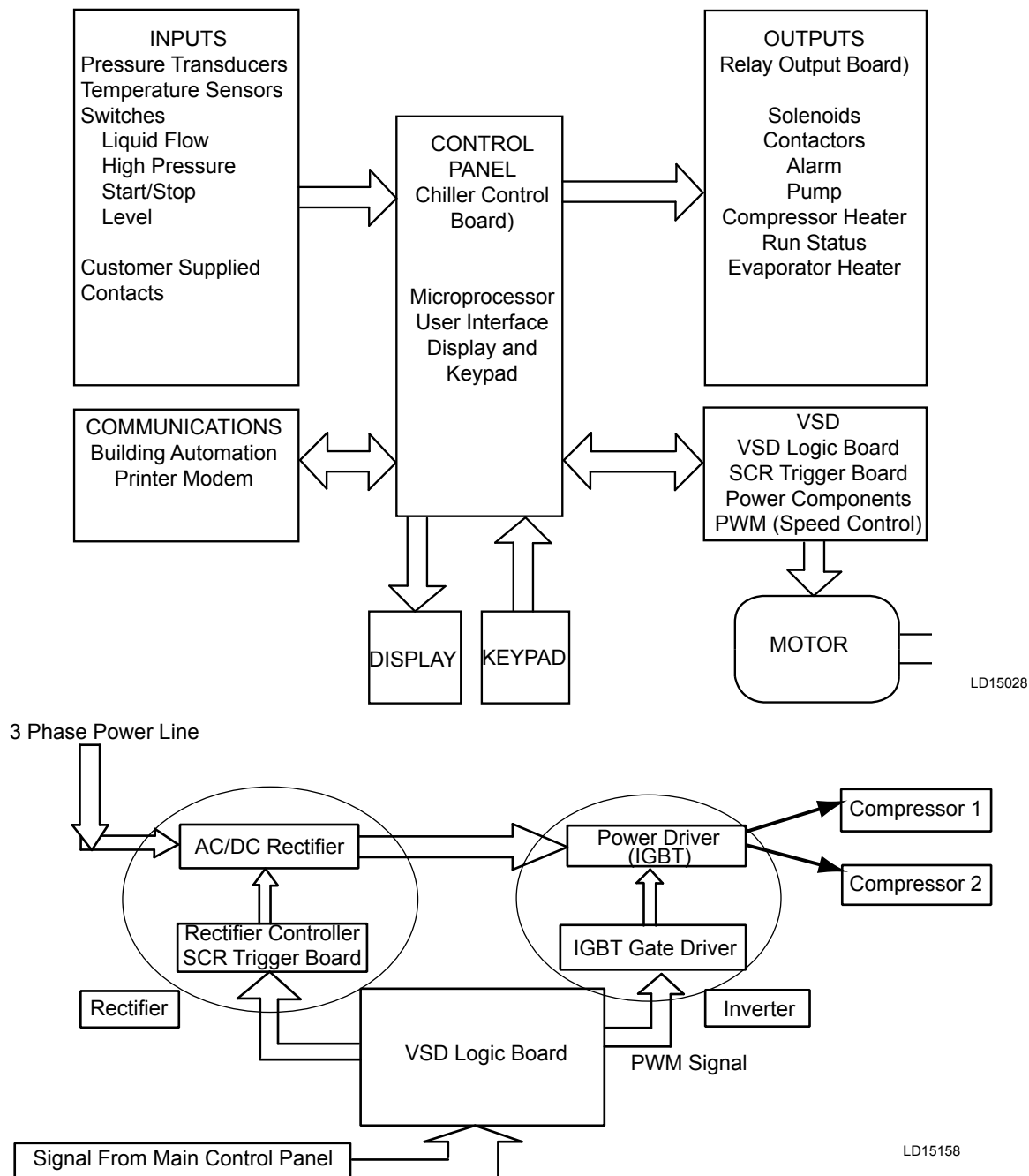
YVFA is the first Variable Speed Drive Screw chiller to include integrated free cooling economizer coils. The free cooling coils reject heat directly to the atmosphere when ambient temperature permits, reducing mechanical cooling requirement and saving energy. The free cooling economizer coils are round tube, plate fin design, delivering a low liquid-side pressure drop to reduce pump energy and providing a robust design that can accommodate small particle debris from the building liquid loop without clogging. Coils are two-row depth and circuited to make draining for service easy. The coils are factory piped to the evaporator, providing simple single-point inlet and outlet connections to the unit. A pair of factory mounted, unit powered and controlled butterfly valves divert liquid to the economizer when ambient is suitable for free cooling. The coils are bypassed during high ambient to avoid unnecessary pressure drop and reduce pump energy.

YVFA contains 2 different ways of free cooling: Open Loop and Closed Loop.

The YVFA open-loop unit design permits building glycol to flow through the free-cooling coils directly, providing the best performance at the lowest first cost.



FIGURE 1 - YVFA AIR-COOLED SCREW LIQUID CHILLER WITH VARIABLE SPEED DRIVE

**FIGURE 2 - CHILLER CONTROL SYSTEM**

The YVFA closed loop unit design separates the building loop and free cooling glycol loop with use of a brazed plate heat exchanger (BPHX) and circulating pump. This type of free cooling is most suitable for the large building liquid systems where glycol is not preferred. The glycol circulating pump will run only when the ambient can meet the requirement of free cooling and Free Cooling mode is enabled.

An integral liquid cooled, transistorized, PWM, Variable Speed Drive (VSD) is controlled by the chiller microprocessor control panel to start/stop, select compressors to run, and select compressor speed. Displacement Power Factor is 0.95 at part or full load.

The standard VSD uses existing VSD technology long proven in prior chiller products.

The chiller microprocessor communicates with the VSD Logic Board via a 3-wire RS-485 opto coupled data link. The VSD Logic Board runs the number of compressors required to meet the load and the compressors to the speed requested by the chiller microprocessor.

The basic system control and VSD system architecture is shown in *Figure 2 on page 18*.

The chiller is designed to operate in ambient temperatures of 0°F to 115°F (-18°C to 46°C). Capacity control is capable of reducing chiller capacity as low as 10% of full load without the need for Hot Gas Bypass.

SEMI-HERMETIC YORK TWIN-SCREW COMPRESSORS

Compressors are direct drive, semi-hermetic, rotary twin-screw type, including: muffler, temperature actuated 'off-cycle' heater, IP55 terminal board and precision machined cast iron housing.

Reliable suction gas cooled, high efficiency, accessible hermetic compressor motor, full suction gas flow through mesh screen filter, with inherent internal thermal overload protection and external current overload on all three phases.

Continuous function, microprocessor controlled, Variable Speed Drive (VSD) shall provide valve-less, smooth capacity control from 100% down to 10% of chiller capacity.

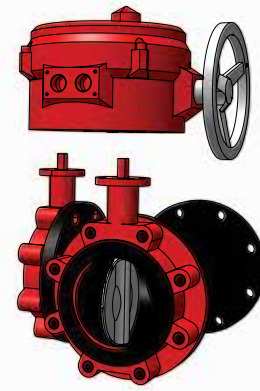
In addition, elimination of the slide valve and associated unloading components has resulted in a 50% reduction in compressor moving parts.

Free Cooling Valve (3-Way Valve)

The free cooling valve is included only in the open loop free cooling system. It consists of two butterfly valves driven by single activator with a link rod; which is used to switch the operational mode. There are three different operational modes:

- Mechanical Cooling,
- Free Cooling, and
- Hybrid Cooling.

The free cooling valve will direct the glycol flow to the free cooling coils unless the unit is in Mechanical mode. In Mechanical mode, the free cooling valve switches to direct the glycol flow to the evaporator. The free cooling valve can be set to automatically switch based on the ambient and entering water temperature.

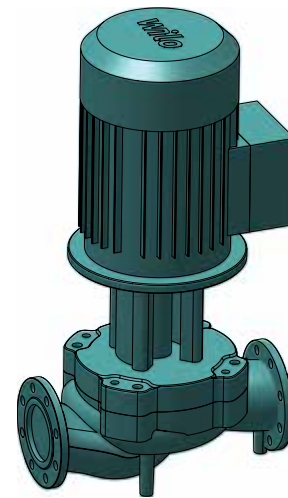


LD20193

FIGURE 3 - FREE COOLING VALVE

Glycol Pump of Free Cooling

The glycol pump is only in the closed loop free cooling system and is used to circulate the glycol liquid through the free cooling coil. The glycol solution rejects the heat and is cooled down by air flowing through the coil. The cooled glycol solution proceeds to the Brazen Plate Heat Exchanger (BPHX), where the glycol will absorb heat from the chilled water.



LD20207

FIGURE 4 - FREE COOLING GLYCOL PUMP

Expansion Tank

The expansion tank is only included in the closed loop system. It is a critical component used to protect the free cooling system from excessive pressure build up. As the glycol liquid gets hot, this tank absorbs the expansion of the glycol. When the temperature goes down, it will release the glycol liquid back into the system.

There is a diaphragm inside the tank that separates the tank into two sections. One section is charged with pressured Nitrogen gas and the other section is connected to the glycol system. If this tank shows no Nitrogen Gas pressure, it will not absorb the expansion.

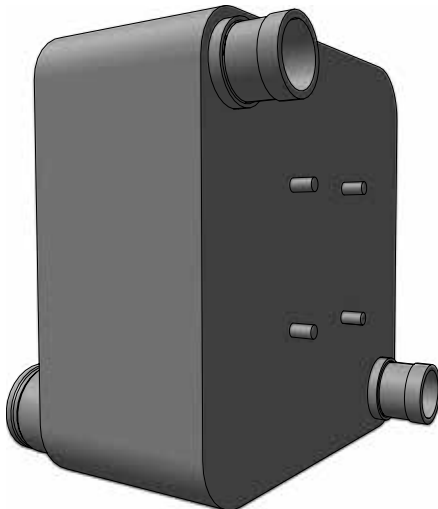


LD20208

FIGURE 5 - EXPANSION TANK

Brazed Plate Heat Exchanger (BPHX)

The Brazed Plate Heat Exchanger (BPHX) is only used in the closed loop free cooling system. Chilled water flows through one side of the BPHX and cooled glycol liquid flows through the other side. The chilled water will reject heat to the glycol liquid and then the glycol liquid will reject heat to cold air in the free cooling coil.



LD20194

FIGURE 6 - BRAZED PLATE HEAT EXCHANGER

V Module

The "V" module is consisted with 2 stack coil, the inner coil is MCHX (Micro Channel Heat Exchanger), which is used as condenser of refrigerant system, the outer coil is RTPF (Round Tube Plate Fin) coil, which is surface cooling heat exchanger filled with Glycol Liquid that can be cooled when glycol liquid tem-

perature is higher than ambient; 2 MCHX inside and 2 RTPF outside combined into a V-shape coil, linked with "Delta-Shaped" plates and fan deck to form a "V" module. Each "V" module contains 2 fans. When fan is running, airflow will go through both MCHX and RTPF coil to take away the heat rejected from either MCHX or RTPF. When no compressor is running, the glycol liquid is chilled and only fan energy is consumed, we call this concept "Free Cooling".

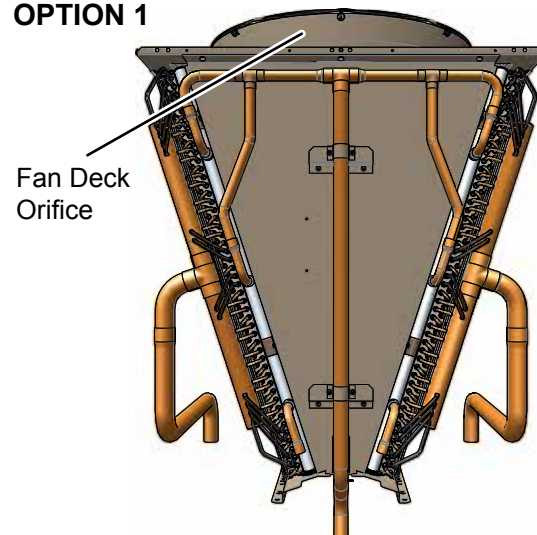
- **Option 1: No Service Ports**

Access via Fan Deck orifice for cleaning.

- **Option 2: Service Ports**

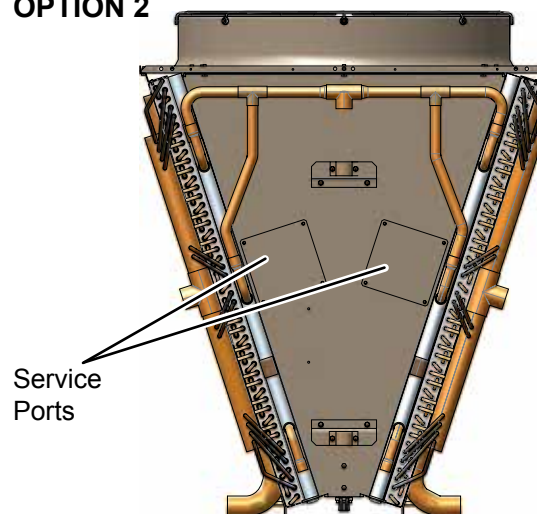
Access by removing the cover plates at Service Port, on V-panel, through these 2 ports for leak hunting and MCHX cleaning with fresh water.

OPTION 1



LD20452

OPTION 2



LD20540

FIGURE 7 - V MODULES

Economizer

A flash tank/receiver is utilized to provide additional subcooling, for increased capacity and efficiency. Liquid in the flash tank/receiver is allowed to gas off from the liquid refrigerant being fed to evaporator. This provides additional liquid subcooling. The vapor from the refrigerant that gases off is fed into the compressor rotors at about 1.25 x suction. The flow is modulated by a stepper valve to optimize the control (Refer to *Figure 8 on page 21*).

REFRIGERANT CIRCUIT

An independent refrigerant circuit is provided per compressor. Each circuit uses copper refrigerant pipe formed on computer controlled bending machines to reduce the number of brazed joints resulting in a reliable and leak resistant system.

- Discharge lines are provided with a manual compressor shutoff service valve (See *Accessories and Options on page 23* for suction line service valve).
- The external oil separators, with no moving parts and designed for minimum oil carry-over, are mounted in the discharge line of the compressor.
- Liquid line components include: high absorption removable core filter-drier, sight glasses with moisture indicators, manual shut-off valve with charging port, orifice and electronic expansion valve.
- An economizer (flash) tank is located in each refrigerant circuit to increase the system efficiency.

ELECTRICAL

Johnson Controls has over 25 years of experience designing variable -speed drives specifically for chiller applications. The result is an extremely reliable air-cooled chiller system that offers industry leading efficiency at real world operating conditions, valve-less compressor loading/unloading, excellent capacity control, high power factor and soft start..

Incoming single point power is standard utilizing a lockable circuit breaker, 115VAC control transformer, VSD, fan contactors, ON/OFF unit switch, microcomputer keypad and display, Chiller Control and VSD Logic boards, and relay boards.

Standard design includes IP55 rating, powder painted steel cabinet with hinged, latched, and gasket sealed outer doors equipped with wind struts for safer servicing. The panel includes a control display access door so

that display and control features can be accessed without opening main cabinet doors.

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



LD15038

FIGURE 8 - ECONOMIZER STEPPER CONTROL VALVE

Relief Valves

Two relief valves are installed in each refrigerant circuit. A 325 PSIG relief valve is located on each flash tank and a 250 PSIG relief valve is located on the suction line of the compressor near the evaporator.

Capacity Control

When cooling is needed, one or more compressors, as determined by the system microprocessor based on deviation from setpoint, will start at minimum speed with low inrush current. Variable speed operation of the compressor reduces the capacity and allows smooth balancing of the compressor capacity with the cooling load.

Capacity control is accomplished by varying the number of compressors and the speed of the compressors with the VSD to promote stable, smooth, and precise loading/unloading.

Hot Gas Bypass is not required with VSD control of the compressors.

Power and Control Panel

All controls and the VSD are factory-wired and function tested. The panel enclosures are designed to NEMA 3R (IP55) rating and are manufactured from powder-painted steel with hinged, latched, and gasket sealed outer doors with wind struts for safer servicing.

The power and micro control panels are combined into a single control/power cabinet and include:

- Compressor VSD Controls.
- Chiller Microprocessor Controls.
- Fan Controls.
- All Other Chiller Controls.

The Display and keypad are accessible through an access door without opening the main doors to the electrical cabinet.

Power Compartment

Each power compartment contains:

- 115VAC Control Transformer
- VSD
- ON/OFF Unit Switch
- Microcomputer, Keypad and Display
- Chiller Control and VSD Logic Boards
- Relay Boards
- U.L. units use an incoming Single Point Power (standard utilizing either a Lockable Circuit Breaker or Terminal Block). C.E. units use a non-fused disconnect switch.

Current transformers sense each phase of motor current, and send corresponding signals to the Chiller Logic Board. Current monitoring protects the compressor motors from damage due to low motor current, high motor current, short circuit current, single phasing, and compressor overload.

Short Circuit Withstand Rating of the chiller is 65,000 Amps for 380V, 400V and 460V units. Ratings are in accordance with UL508C.

Microprocessor and VSD Controls

Microprocessors on the Chiller Control Board and VSD Logic Board control starting, stopping, loading, unloading, safeties, and chilled liquid temperature control. Chilled liquid control decisions are a function of temperature deviation from setpoint and the rate of change of temperature.

The standard controls include:

- Brine Chilling.
- Thermal Storage.
- Run Signal Contacts.
- Unit Alarm Contacts.
- Chilled Liquid Pump Control.
- Automatic reset after power failure.
- Automatic system optimization to match operating conditions.

Remote cycling, optional current limiting, optional temperature setpoint reset, and optional remote sound limit can be accomplished by connecting user-supplied signals to the microprocessor.

Unit operating software is stored in non-volatile memory. Field programmed setpoints are retained in lithium battery backed real time clock (RTC/BRAM) memory for 10 years.

Display

The display consists of a liquid crystal 2 line by 40 characters per line display, with backlighting for outdoor viewing of operating parameters and program points.

Parameters are displayed in 5 languages in either English (°F and PSIG) or Metric (°C and Bars) units, and for each circuit, the following items can be displayed:

- Entering and leaving chilled liquid, and ambient temperature.
- Day, date and time. Daily start/stop times. Holiday and Manual Override status.
- Compressor operating hours and starts.
- Run permissive status. Compressor run status.
- Anti-recycle timers.
- System suction, discharge (and discharge superheat), and oil pressures and temperatures.
- Percent full load compressor motor current and average motor current. Compressor motor speed (frequency).
- Cutout status and setpoints for supply chilled liquid temperature, low suction pressure, high discharge pressure and temperature, high oil tem-

perature, low ambient, and low leaving liquid temperature.

- Unloading limit setpoints for high discharge pressure and compressor motor current.
- Status of evaporator heater, condenser fans, load/unload timers, and chilled water pump.
- “Out of range” message.
- Up to 10 fault shutdown histories.

Keypad

An operator keypad allows complete control of the system from a central location. The keypad utilizes an overlay to allow use in 8 languages. The keypad is a color-coded, 36 button, sealed keypad with keys for Display, Entry, Setpoints, Clock, Print, Program, Unit ON/OFF and other functions. Details on a few of the keys follow:

Status

Allows viewing present unit or system status displayed by the microprocessor.

Entry

Numeric keypad and supporting keys used to confirm Setpoint changes, cancel inputs, advance day, and change AM/PM.

Setpoints

For setting chilled liquid temperature, chilled liquid range, remote reset temperature range.

Date/Time

Used to set time, daily or holiday start/stop schedule, manual override for servicing, and sound limiting schedule.

Print

Used to display or print operating data or system fault shutdown history for last ten faults. Printouts are generated through an RS-232 port via a separate printer.

Program

For setting low leaving liquid temperature cutout, average motor current limit, and pulldown demand limit.

Displays are also provided for programming low ambient cutout, low suction pressure cutout, superheat setpoint, etc., under the PROGRAM key.

Unit Switch

A master UNIT switch allows activation or de-activation of the chiller system. Separate system switches for controlling each system are provided as part of the chiller control panel keypad.

Glycol Coil and VSD Cooling

Glycol cooling coils for the power panel and each system IGBT heat sink are mounted on the ends of some of the condenser “V” sections. The glycol is cooled in the coil by air flowing through the coil and out the condenser fan discharge. The glycol is used to cool the VSD. The cooled glycol is routed back to the internal cooling coil in the VSD cabinet and the IGBT heat sinks. A glycol pump is used to pump the glycol through the system.

ACCESSORIES AND OPTIONS

Sound Reduction Options

Low Noise Kits

The standard chiller configuration is equipped with standard acoustic treatments on the refrigerant lines and compressors. There are several additional options to help further reduce sound at its source:

- **Level 1 Reduction** – This option includes a compressor enclosure to reduce sound of the standard chiller. This option is typically used for daytime operation where background noise is lower than normal city traffic, etc.

Variable Speed Control

Variable speed control of condenser fans provides better reduction in sound and improved unit efficiency at part load conditions.

SilentNight™

Standard variable speed compressors result in a chiller system that has lower part load sound values than conventional air-cooled chillers. Over 99% of chiller operating hours occur when building loads are less than design and/or ambient temperatures are less than design. As a result, all YVFA model chillers will operate with less than full load sound output nearly all the time. This is especially important on evenings and weekends when neighbors are home the most. Due to time of day based sound regulations it may be desirable to force the chiller to a lower sound level on demand. The SilentNight™ 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 signal (4 to 20mA or 0 to 10 VDC) from a BAS system.

Condenser Coil Protection

Post-Coated Epoxy Dipped Condenser

Micro-channel condenser coils and RTPF Free Cooling Coils applied with electro-deposited and baked flexible epoxy coating that is finished with a polyurethane UV resistant top-coat suitable for highly corrosive applications.

Protective Chiller Panels

Wire Panels (Full Unit)

UV stabilized black polyvinyl chloride coated, heavy gauge, welded wire mesh guards mounted on the exterior of the 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. **(Factory-mounted)**

Louvered Panels (Full Unit)

Louvered panels, painted the same color as the unit, enclose the unit to protect condenser coils from incidental damage, visually screen internal components, and prevent unauthorized access to internal components. **(Factory-mounted)**

Louvered (Condensers)/Wire Panels (Mechanical)

Louvered panels, painted the same color as the unit, are mounted on external condenser coil faces. Heavy gauge, welded wire-mesh, coated to resist corrosion, around base of machine to restrict unauthorized access. **(Factory-mounted)**

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. **(Field or Factory-mounted)**

Evaporator Options

Double Thick 1-1/2" Insulation

Double thickness insulation is provided. **(Factory-mounted)**

Flange Kit

Provides contractor with the couplings best suited to tie into the chilled water piping. All flanges are ANSI 150 psig (10.3 barg). **(Field mounted)**. Options include:

- **ANSI/AWWA C-606 flanges** - 2 flanges, for applications where field piping has existing flanges.
- **ANSI/AWWA C-606 flanges** - 4 flanges, for applications where customer wants flanged connections which do not exist on the field piping.
- **Weld flanges** - 2 flanges, for customer to weld to evaporator to mate to existing flanges on field piping
- **Weld flanges** - 4 flanges, for customer to weld to evaporator and customer wants flanged connections which do not exist on the field piping

Two Pass Evaporator

The evaporator is only constructed with two chilled water passes through the evaporator.

Connection Location

The standard unit configuration is available with fluid inlet connections at rear (opposite control panel end) of unit. Options are available for front fluid inlet on select configurations.

Water Box Heater

The standard unit comes with evaporator shell heaters and water pump control software. Optional water box heaters are required for storage below 0°F (-17°C). Refer to the Refrigerant Valve - Off option on *Page 87* for more information on freeze protection.

Pressure Vessel Options

The evaporator can be provided with either ASME or PED pressure vessel codes certification.

Building Automation System Interface (Temperature)

Factory installed option to accept a 4 to 20mA or a 0 to 10VDC input to allow remote reset of the Leaving Chilled Liquid Temperature Setpoint. The setpoint can be positively offset upwards up to 40°F (22.2°C). 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 20mA or a 0 to 10VDC input to allow remote reset of the Load Limit Setpoint. The setpoint can limit system demand from 30 to 100%. Available alone or in combination with BAS Temperature Reset.

Onboard Native Communication and Gateway

The 031-03478-xxx microboard are capable to communicate to BACnet or N2 system by Port 1 TB3 or to Modbus system by Port 2 TB1. The optional E-Link gateway provides communication between the equipment and Building Automation Systems, including BACnet (MS/TP), Modbus, LON and N2.

General Options

Differential Pressure Switch

Alternative to the paddle-type flow switch. Range is 3 to 45 psig (0.2 to 3 barg) with 1/4" NPTE pressure connections. **(Field-mounted)**

Chicago Code Relief Valve

Special relief valves per Chicago code. **(Factory-mounted)**

Dual Pressure Relief Valve

Two safety relief valves are mounted in parallel; one is always operational to assist in valve replacement during maintenance.

Pressure Relief (CE/PED) Service Valve Kit

Each relief valve is mounted on a sealable ball valve to aid maintenance. **(Factory-mounted)**

Terminal Block [not available for CE marked units]

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.

Circuit Breaker or Non-fused Disconnect Switch

Power panel will come equipped with an optional factory mounted circuit breaker or non-fused disconnect switch at the point of incoming single or multi-point connections that provides the following:

- A means to disconnect power mounted on chiller.
- Circuit breaker 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. (Chiller mounted circuit breaker option sized for branch circuit protection eliminates the need to provide a separate 'line of sight' disconnect and separate branch circuit protection device.)
- A lockable operating handle that extends through power panel door. This allows power to be disconnected without opening any panel doors.
- A Short Circuit Withstand Rating of 65,000 amps when the chiller electrical enclosure when using circuit breaker option is 380, 400, and 460V. Rated IAW UL508.

Convenience Outlet (Optional)

A 115V female 10.0-amp GFI (Ground Fault Interrupt) that powers maintenance tools is provided as an option. Kit protects against rain and moisture ingress, open the case to access to the convenience outlet. **(Field-mounted)**. See *Figure 9 on page 26*.

Special Requirement Documents

There are three options to select from:

- **Special Requirement Document Package (SRDP)** includes Pressure Vessel Report, Unit Run Test Report, Production System Check Sheet and Final Unit Inspection Check Sheet.

- **Materials Package** includes steel mill material reports for vessels in addition to the SRDP (may be combined with Witness Factory Run Package).
- **Witness Factory Run Package** combines the SRDP with a customer opportunity to witness the Factory Run Test of their chiller. The test is an

operational run test and conditions are dependent on the ambient and water loop temperatures at the time of the test. Contact your Johnson Controls representative for further information (may be combined with Materials Package).

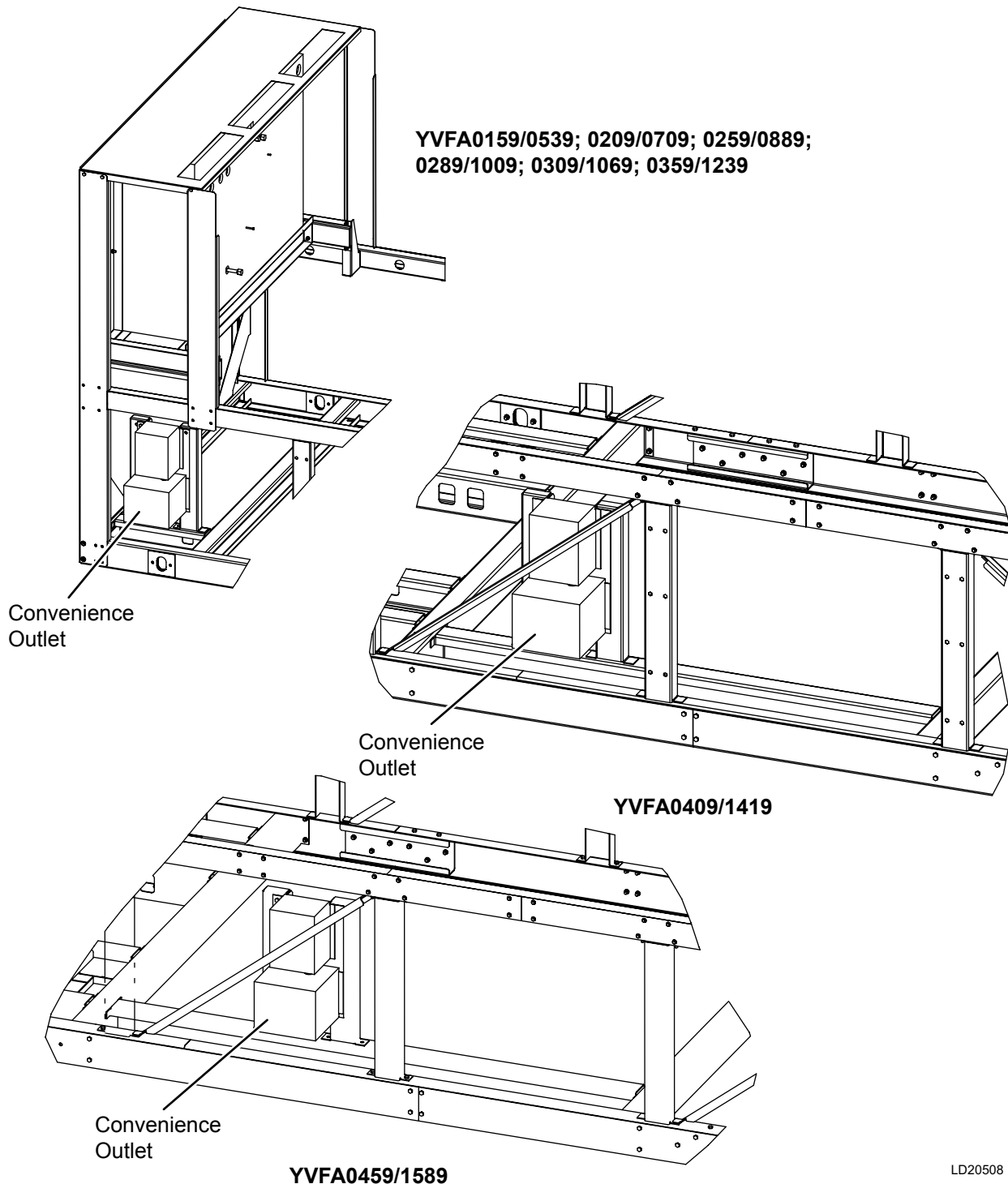


FIGURE 9 - CONVENIENCE OUTLET

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)**

One Inch Spring Isolators

Spring and cage type isolators for mounting under the unit base rails. They are level adjustable. Nominal deflection is 1" and may vary slightly by application. **(Field-mounted)**

Two Inch 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)**

DIMENSIONS

The data below is applicable to select 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.

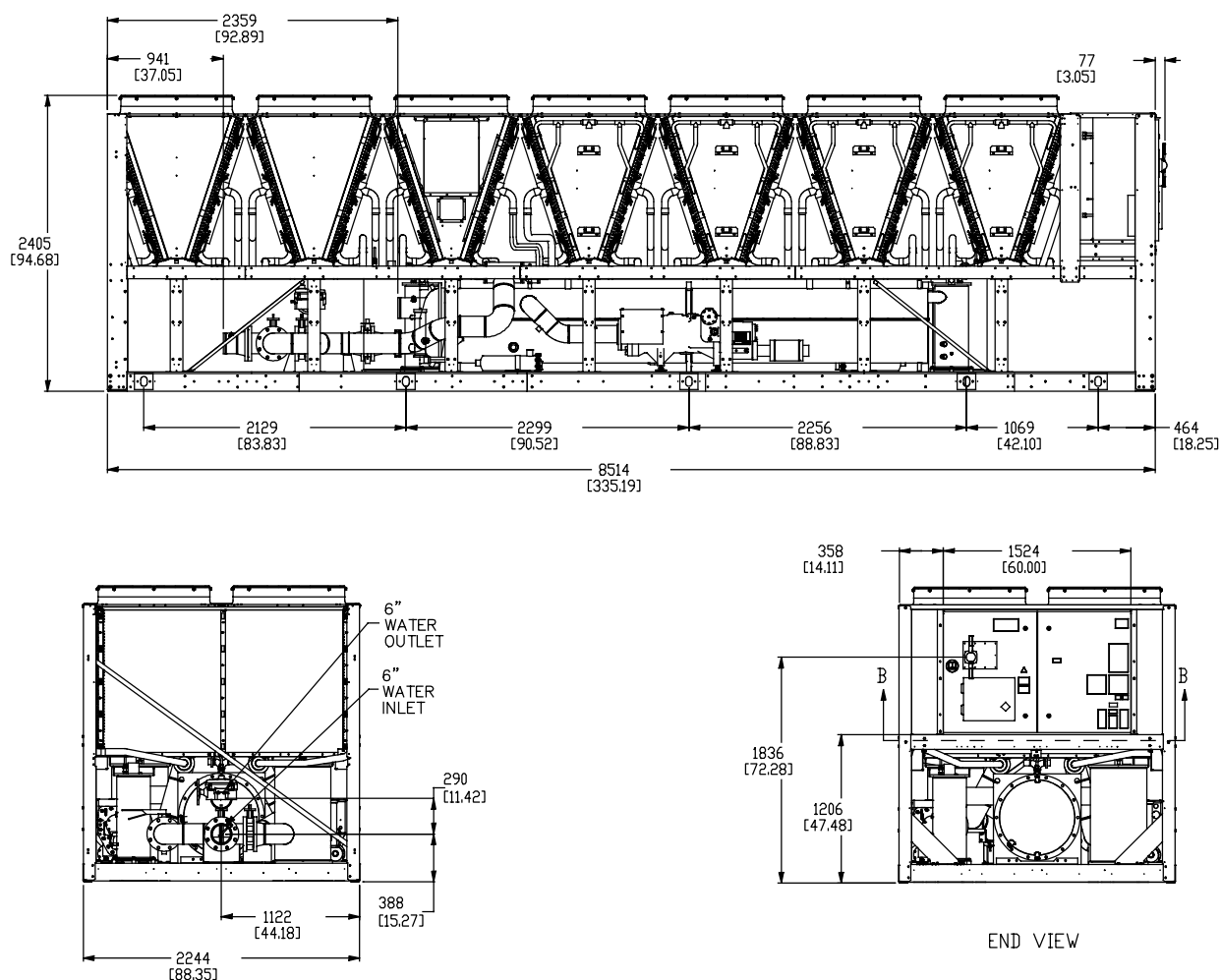
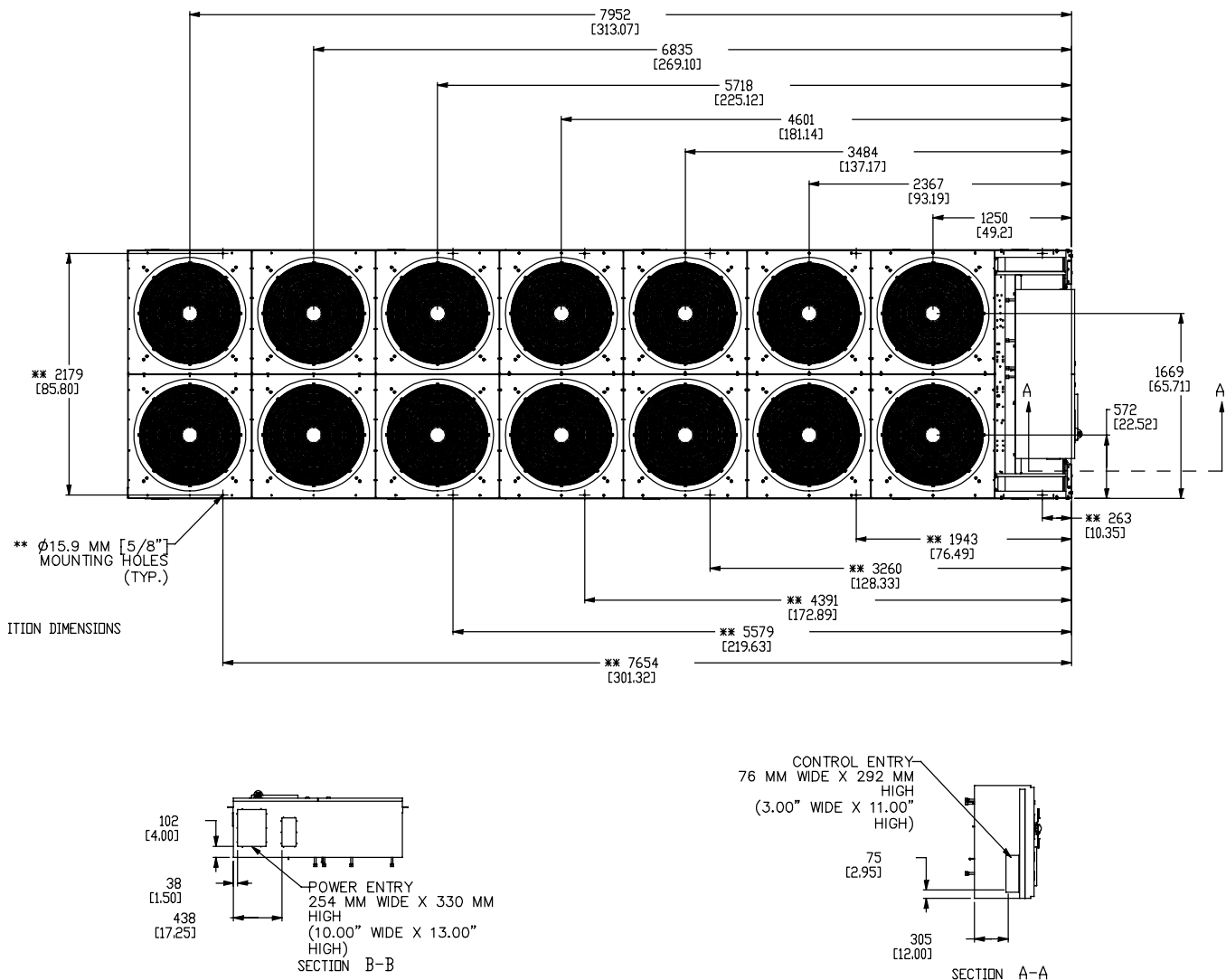


FIGURE 10 - YVFA0259/YVFA0889 DIMENSIONS

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LD 9940

FIGURE 11 - YVFA0259/YVFA0889 DIMENSIONS (TOP VIEW)

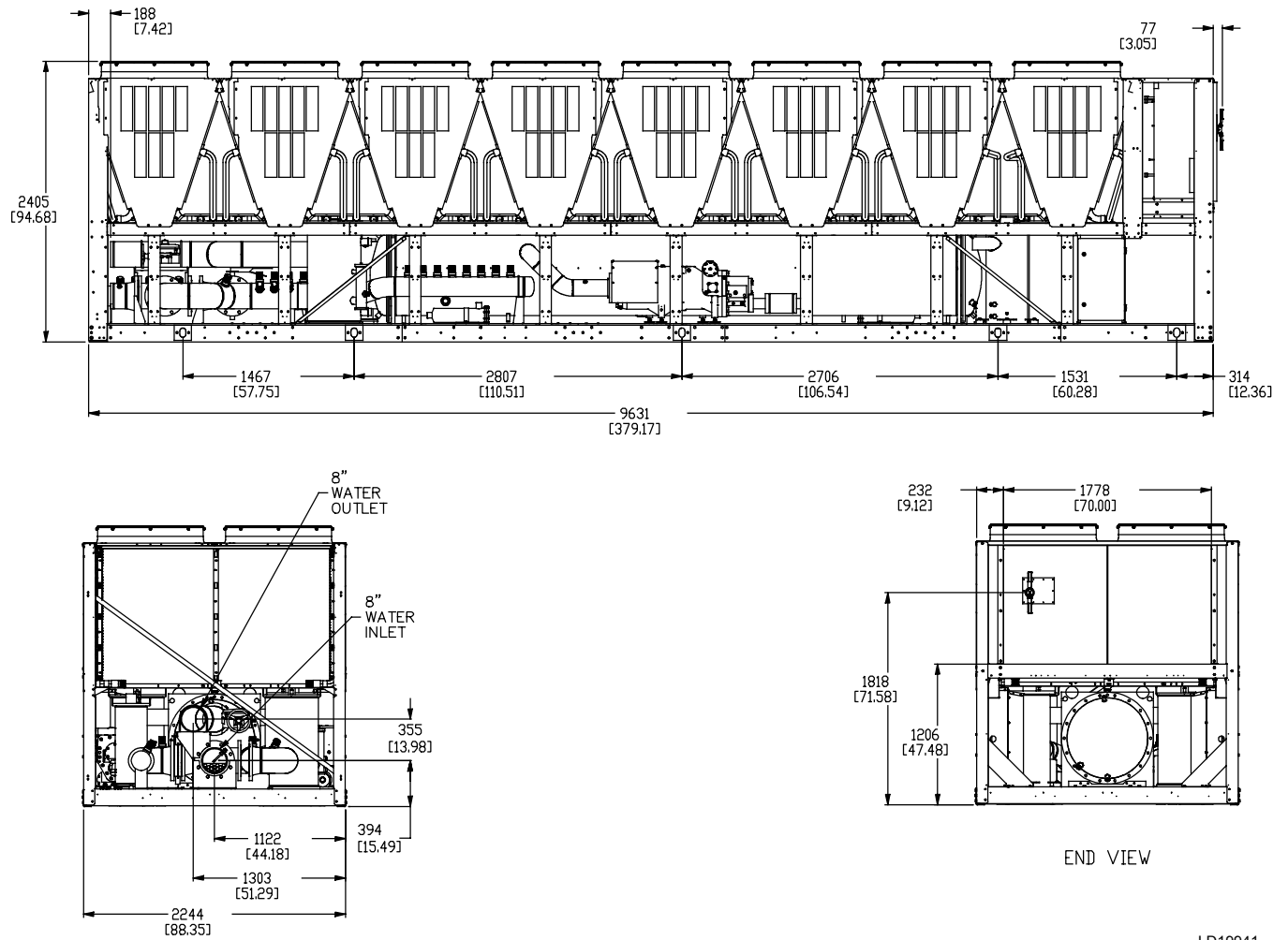


FIGURE 12 - YVFA0309/YVFA1069 DIMENSIONS

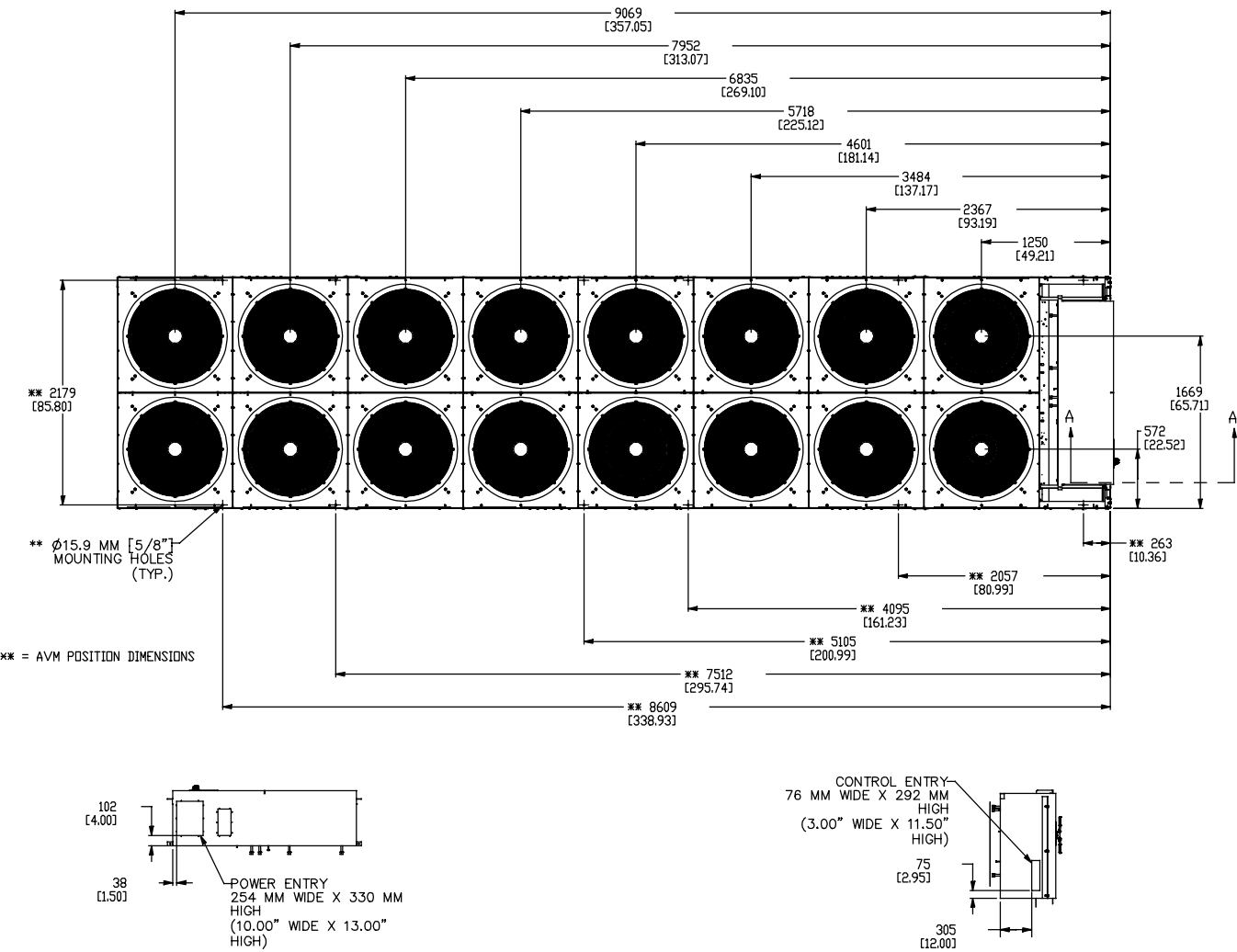


FIGURE 13 - YVFA0309/YVFA1069 DIMENSIONS (TOP VIEW)

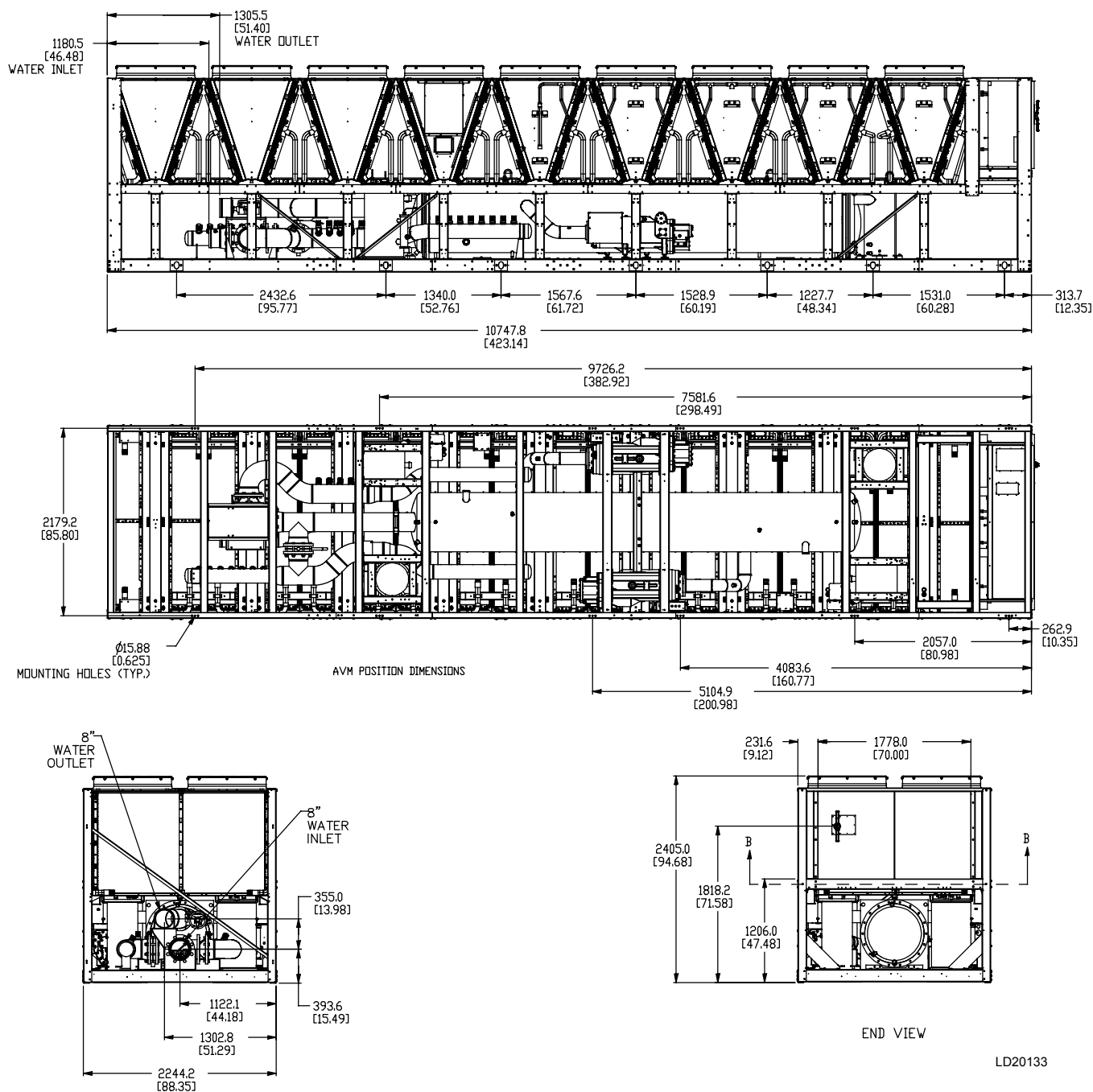
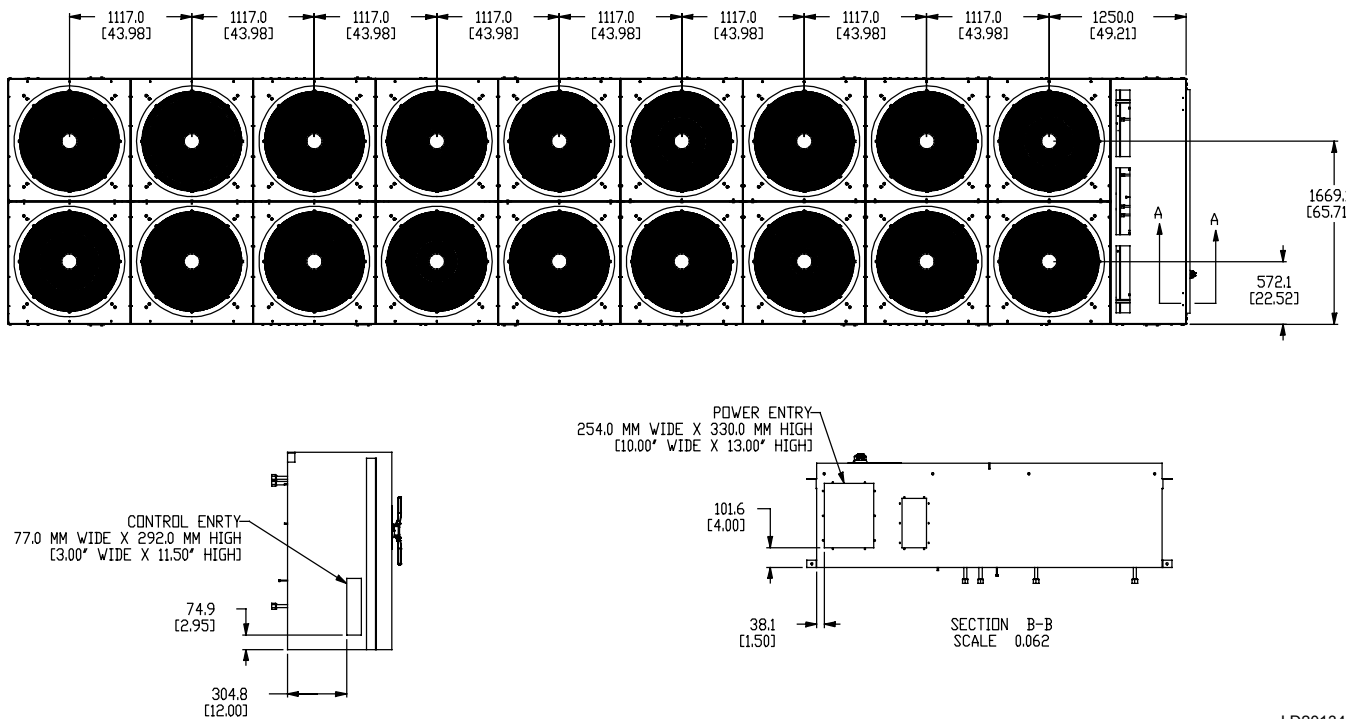


FIGURE 14 - YVFA0359/YVFA1239 DIMENSIONS



LD20134

FIGURE 15 - YVFA0359/YVFA1239 DIMENSIONS (TOP VIEW)

SECTION 3 - RIGGING, HANDLING AND STORAGE



WARNING

Failure to follow these instructions could result in death, serious injury or equipment damage.

Follow all warnings and instructions in the unit's Manual(s).

EN Installation Instructions for the technician / fitter PL Instrukcja instalacji dla technika / monter SV Installationsguide för installatör / montör CS Pokyny k instalaci pro techniky a montéry	IT Istruzioni d'installazione per il personale specializzato NL Installatiehandleiding voor de vakman / monteur DE Installationsanleitung für die Fachkraft / Monteur ES Instrucciones de instalación para el técnico / contratista especializado	JA 一般仕様・取扱説明書 FR Manuel d'installation pour le spécialiste / monteur RU Инструкция по установке для техника/монтажника ZH 适用于技术人员与安装人员的 安装说明书
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1. Follow all applicable regulations and safety practices during rigging and lifting.
2. Prepare and follow written rigging and lifting plan.
3. Rigging must be directed by trained professional rigger.
4. Spreader bars must be used and be long enough to prevent rigging from contacting unit.
5. Use all and only designated lift points according to units manual(s).
6. Locate center of gravity through trial lifts to account for possible variations in unit configuration.
7. Use rigging and lifting techniques that keep unit stable and level.
8. Keep clear of unit when lifted.

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Rigging and lifting should only be done by a professional rigger in accordance with a written rigging and lifting plan. The most appropriate rigging and lifting method will depend on job specific factors, such as the rigging equipment available and site needs. Therefore, a professional rigger must determine the rigging and lifting method to be used, and it is beyond the scope of this manual to specify rigging and lifting details.

LIFTING WEIGHTS

Refer to the unit nameplate for unit shipping weight. Note that weight may vary depending on unit configuration at the time of lifting. Refer to the Physical Data tables within this manual for further information regarding shipping and operating weights.

DELIVERY AND STORAGE

To ensure consistent quality and maximum reliability, all units are tested and inspected before leaving the factory. Units are shipped completely assembled and containing refrigerant under pressure. Units are shipped without export crating unless crating has been specified on the Sales Order.

If the unit is to be put into storage, prior to installation, the following precautions should be observed:

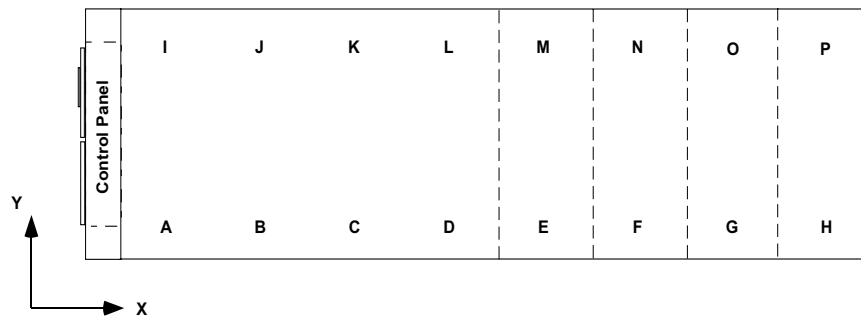
- The chiller must be “blocked” so that the base is not permitted to sag or bow.
- Ensure that all openings, such as water connections, are securely capped.
- Do not store where exposed to ambient air temperatures exceeding 43°C (110°F).

- The condensers should be covered to protect the coils and fins from potential damage and corrosion, particularly where building work is in progress.
- The unit should be stored in a location where there is minimal activity in order to limit the risk of accidental physical damage.
- To prevent inadvertent operation of the pressure relief devices the unit must not be steam cleaned.
- It is recommended that the unit is periodically inspected during storage.

INSPECTION

Remove any transit packing and inspect the unit to ensure that all components have been delivered and that no damage has occurred during transit. If any damage is evident, it should be noted on the carrier's freight bill and a claim entered in accordance with the instructions given on the advice note.

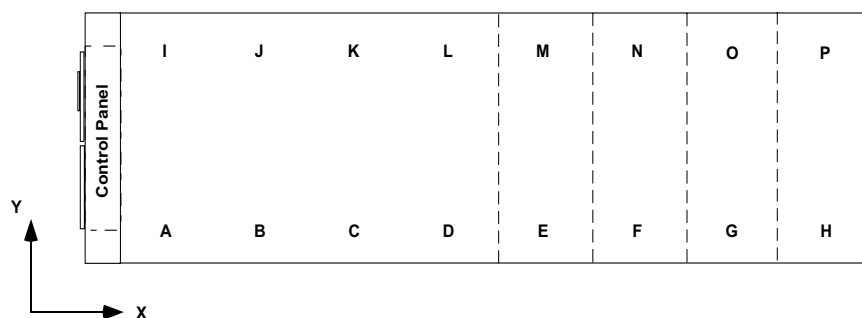
Major damage must be reported immediately to your local Johnson Controls representative.

**TABLE 2 - UNIT RIGGING**

YVFA MODEL			DESCRIPTION	UNITS	RIGGING HOLES							
FRAME	COND	EVAP			A	B	C	D	E	F	G	H
025	9	C	Open Loop Location	in	18.25	60.35	149.2	239.7	323.5	/	/	/
				mm	464	1533	3789	6088	8217	/	/	/
030	9	E	Open Loop Location	in	12.36	72.64	179.2	289.7	347.4	/	/	/
				mm	314	1845	4551	7358	8825	/	/	/
035	9	E	Open Loop Location	in	12.35	72.63	121	181.2	242.9	295.6	391.4	/
				mm	313.7	1845	3072	4601	6169	7509	9942	/

NOTES

1. Microchannel condenser coils and RTPF (Round Tube Plate Fin) Free Cooling Coil.
2. Operating weight shown is for base unit (460/3/60, no options); selected option may add weight to unit. Contact your nearest Johnson Controls Sales office for weight data.
3. All rigging holes are 3" x 2".



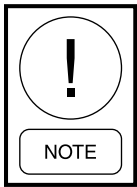
3

TABLE 2 - UNIT RIGGING (CONT'D)

YVFA MODEL			DESCRIPTION	UNITS	RIGGING HOLES							
FRAME	COND	EVAP			I	J	K	L	M	N	O	P
025	9	C	Open Loop Location	in	18.25	60.35	149.2	239.7	323.5	/	/	/
				mm	464	1533	3789	6088	8217	/	/	/
030	9	E	Open Loop Location	in	12.36	72.64	179.2	289.7	347.4	/	/	/
				mm	314	1845	4551	7358	8825	/	/	/
035	9	E	Open Loop Location	in	12.35	72.63	121	181.2	242.9	295.6	391.4	/
				mm	313.7	1845	3072	4601	6169	7509	9942	/

NOTES

1. Microchannel condenser coils and RTPF (Round Tube Plate Fin) Free Cooling Coil.
2. Operating weight shown is for base unit (460/3/60, no options); selected option may add weight to unit. Contact your nearest Johnson Controls Sales office for weight data.
3. All rigging holes are 3" x 2".



Weights and approximate center of gravity location shown for base unit. Any options selected may add weight to the unit and affect the center of gravity. Locate the center of gravity through trial lifts to account for possible variations in unit configuration. Contact your nearest Johnson Controls Sales Office for weight data.

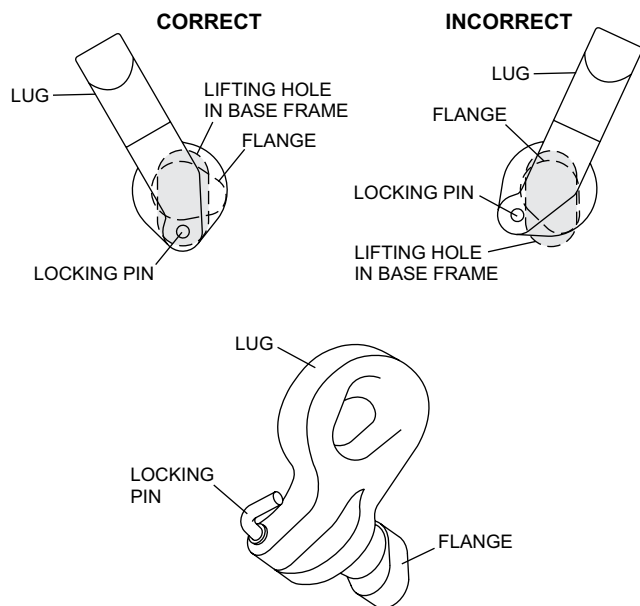
UNIT REMOVAL FROM SHIPPING CONTAINER

1. Place a clevis pin into the holes provided at the end of each base rail on the unit. Attach chains or nylon straps through the clevis pins and hook onto a suitable lift truck for pulling the unit out of the container.
2. Slowly place tension on the chains or straps until the unit begins to move and then slowly pull the unit from the container. Be sure to pull straight so the sides do not scrape the container.
3. Place a lifting fixture on the forks of the lift truck and reattach the chain or strap. Slightly lift the front of the unit to remove some weight from the floor of the container. Continue pulling the unit with an operator on each side to guide the lift truck operator.
4. Pull the unit until the lifting locations are outside of the container. Place 4 X 4 blocks of wood under the base rails of the unit. Gently rest the unit on the blocks and remove the chains and lift truck.
5. Attach lifting rigging from the crane and slowly complete the removal from the container then lift up and away.



LIFTING USING LUGS

Units are provided with lifting holes in the base frame which accept the accessory lifting lug set as shown in the figure below. The lugs (RH and LH) should be inserted into the respective holes in the base frame and turned so that the spring loaded pin engages into the hole and the flanges on the lug lock behind the hole. The lugs should be attached to the cables/chains using shackles or safety hooks.



LIFTING USING SHACKLES

The shackles should be inserted into the respective holes in the base frame and secured from the inside.

Use spreader bars to avoid lifting chains hitting the chiller. Various methods of spreader bar arrangements may be used, keeping in mind the intent is to keep the unit stable and to keep the chains from hitting the chiller and causing damage.

Never lift the chiller using a forklift or by hooking to the top rails. Use only the lifting holes provided.

Lifting Instructions are placed on a label on the chiller and on the shipping bag.

SECTION 4 - INSTALLATION

LOCATION REQUIREMENTS

For optimum performance and trouble-free service, it is essential that the installation site meet the location and space requirements for the model being installed.

It is important to ensure that the minimum service access space is maintained for cleaning and maintenance purposes.

OUTDOOR INSTALLATIONS

The units are designed for outdoor installation and can be installed at ground level on a suitable flat level foundation easily capable of supporting the weight of the unit, or on a suitable rooftop location. In both cases an adequate supply of air is required. Avoid locations where the sound output and air discharge from the unit may be objectionable.

The location should be selected for minimum sun exposure and away from boiler flues and other sources of airborne chemicals that could attack the condenser coils and steel parts of the unit.

If located in an area accessible to unauthorized persons, steps must be taken to prevent access to the unit by means of a protective fence. This will help to prevent the possibility of vandalism, accidental damage, or possible harm caused by unauthorized removal of protective guards or opening panels to expose rotating or high voltage components.

For ground level locations, the unit must be installed on a suitable flat and level concrete base that extends to fully support the two side channels of the unit base frame. A one-piece concrete slab, with footings extending below the frost line is recommended. To avoid noise and vibration transmission, the unit should not be secured to the building foundation.

On rooftop locations, choose a place with adequate structural strength to safely support the entire operating weight of the unit and service personnel. The unit can be mounted on a concrete slab, similar to ground floor locations, or on steel channels of suitable strength. The channels should be spaced with the same centers as the unit side and front base rails. This will allow vibration isolators to be fitted if required. Isolators are recommended for rooftop locations.

Mounting holes (5/8") are provided in the base rails for bolting the unit to its foundation. Refer to *Table 11 on page 64* for location of the mounting holes.

Any ductwork or attenuators fitted to the unit must not have a total static pressure resistance, at full unit airflow, exceeding the capability of the fans installed in the unit.

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.

When it is desirable to surround the unit(s) in addition to whatever optional louver package is selected, it is recommended that the screening be able to pass the required chiller CFM without exceeding 0.1"w.g. (24.9084 pa) external static pressure.

Protection against corrosive environments is available by ordering the units with cured epoxy-coating on the microchannel condenser coil. Epoxy-coated coils should be used with any units being installed at the seashore where salt spray/mist may hit the units, or where acid rain is prevalent.

On installations where winter operation is intended and snow accumulations are expected, additional elevation must be provided to insure normal condenser air flow.

Avoid locations near windows or structures where normal operating sounds may be objectionable.

LOCATION CLEARANCES

Adequate clearances around the unit(s) are required for the unrestricted airflow for the air-cooled condenser coils and to prevent re-circulation of warm discharge air back onto the coils. If clearances given are not maintained, airflow restriction or re-circulation will cause a loss of unit performance, an increase in power consumption, and may cause the unit to malfunction. Consideration should also be given to the possibility of down drafts, caused by adjacent buildings, which may cause re-circulation or uneven unit airflow.

For locations where significant cross winds are expected, such as exposed roof tops, an enclosure of solid or louver type is recommended to prevent wind turbulence interfering with the unit airflow.

When units are installed in an enclosure, the enclosure height should not exceed the height of the unit on more than one side. If the enclosure is of louvered construction, the same requirement of static pressure loss applies as for ducts and attenuators stated above.

Recommended Minimum Clearances

Recommended clearances for the YVFA units are:

- Side to wall – 6' (1.83m)
- Rear to wall – 6' (1.83m)
- Control panel end to wall – 4' (1.22m)
- Top – no obstructions whatsoever
- Distance between adjacent units – 10' (3.05m)

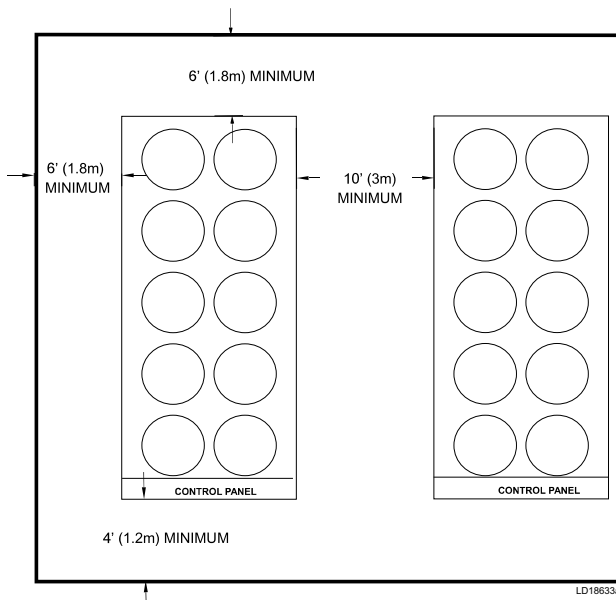


FIGURE 16 - ACCEPTABLE MINIMUM CLEARANCES AROUND/BETWEEN UNIT(S)



Clearance dimensions provided in Figure 36 on page 38 are necessary to maintain good airflow and ensure correct unit operation. It is also necessary to consider access requirements for safe operation and maintenance of the unit and power and control panels. Local health and safety regulations, or practical considerations for service replacement of large components, may require larger clearances than those recommended.

VIBRATION ISOLATORS

Optional sets of vibration isolators can be supplied loose with each unit.

Using the Isolator tables shipped with the unit in the information pack, refer to *Isolator Selection and Mounting* under **SECTION 5 - TECHNICAL DATA** to identify each mount and its correct location on the unit.

Installation

Place each mount in its correct position and lower the unit carefully onto the mounts ensuring the mount engages in the mounting holes in the unit base frame.

On adjustable mounts, transfer the unit weight evenly to the springs by turning the mount adjusting nuts (located just below the top plate of the mount) counter-clockwise to raise and clockwise to lower. This should be done two turns at a time until the top plates of all mounts are between 1/4" (6 mm) and 1/2" (12 mm) clear of top of their housing and the unit base is level.

SHIPPING BRACES

The chiller's modular design shipping brace is used to prevent coils at top from swaying in shipment. The brace can be removed after the unit is properly installed.

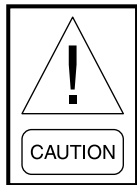


FIGURE 17 - SHIPPING BRACES

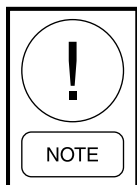
CHILLED LIQUID PIPING

General Requirements

The following piping recommendations are intended to ensure satisfactory operation of the unit(s). Failure to follow these recommendations could cause damage to the unit, or loss of performance, and may invalidate the warranty.



The maximum flow rate and pressure drop for the evaporator must not be exceeded at any time. Refer to SECTION 5 - TECHNICAL DATA on page 55 for details.



The liquid must enter the evaporator at the inlet connection. The standard inlet connection for the evaporator is opposite the control panel end of the evaporator.

A flow switch must be installed in the customer piping at the outlet of the evaporator and wired back to the control panel using shielded cable.

There should be a straight run of piping of at least 5 pipe diameters on either side. The flow switch should be wired to Terminals 2 and 13 on the 1TB terminal block (Refer to Figure 18 on page 40). A flow switch is required to prevent damage to the evaporator caused by

the unit operating without adequate liquid flow. It must be adjusted to assure it cuts out below the minimum published flow.

The flow switch used must have gold plated contacts for low voltage/current operation. Paddle type flow switches suitable for 150 PSIG (10 bar) working pressure and having a 1" N.P.T. connection can be obtained from Johnson Controls as an accessory for the unit. Alternatively, a differential pressure switch fitted across an orifice plate may be used, preferably of the high/low limit type.

The chilled liquid pump(s) installed in the piping system(s) should discharge directly into the unit evaporator section of the system. The pump(s) may be controlled by the chiller controls or external to the unit. For details, refer to *Electrical Connection* on page 45.

Pipework and fittings must be separately supported to prevent any loading on the evaporator. Flexible connections are recommended which will also minimize transmission of vibrations to the building. Flexible connections must be used if the unit is mounted on anti-vibration mounts, as some movement of the unit can be expected in normal operation.

Piping and fittings immediately next to the evaporator should be readily de-mountable to enable cleaning before operation, and to facilitate visual inspection of the exchanger nozzles.

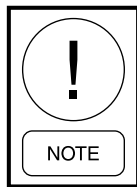


115 VAC (Kit)
For Maintenance, Tools Etc
Field Mounted

Control Cable
Connections 1 TB
Terminal Block

Input Power
Cable
Connection

FIGURE 18 - USER CONTROL AND POWER CABLE CONNECTIONS



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.

Thermometer and pressure gauge connections should be provided on the inlet and outlet connections of each evaporator. Gauges and thermometers are not provided with the unit and are to be furnished by others.

Drain connections should be provided at all low points and air vents connecting at all high points in the piping to permit drainage of the system and to vent any air in the pipes.

Liquid system lines at risk of freezing, due to low ambient temperatures should be protected using insulation and heater tape and/or a suitable glycol solution. The liquid pump(s) may also be used to ensure liquid is circulated when the ambient temperature approaches freezing point.

Insulation should also be installed around the evaporator nozzles. Heater tape of 21 Watts per meter under the insulation is recommended, supplied independently and controlled by an ambient temperature thermostat set to switch ON at approximately 36°F (2.2°C), above the freezing temperature of the chilled liquid.

Evaporator heater mats are installed under the insulation, and are powered from the chiller's control panel. In sub-freezing conditions, unless the evaporator has been drained or an appropriate water-to-glycol concentration is maintained, high voltage power to the chiller must be kept on to ensure the heater mats assist in evaporator freeze protection. If there is a potential for power loss, Johnson Controls recommends that the evaporator is drained or that water in the chilled water circuit be replaced with an appropriate water-to-glycol concentration.



Any debris left in the water piping between the strainer and evaporator could cause serious damage to the tubes in the evaporator and must be avoided. Be sure the piping is clean before connecting it to the evaporator. Keep evaporator nozzles and chilled liquid piping capped prior to installation to assure construction debris is not allowed to enter.



The installer/user must also ensure that the quality of the water in circulation is adequate, without any dissolved gases, which can cause oxidation of steel or copper parts within the evaporator.

WATER TREATMENT

The unit performance provided in the Design Guide is based on a fouling factor of 0.0001 ft²hr°F/Btu (0.018m²/hr °C/kW). Dirt, scale, grease and certain types of water treatment will adversely affect the heat exchanger surfaces and therefore the unit performance. Foreign matter in the water system(s) can increase the heat exchanger pressure drop, reducing the flow rate and causing potential damage to the heat exchanger tubes.

Aerated, brackish or salt water is not recommended for use in the water system(s). Johnson Controls recommends that a water treatment specialist should be consulted to determine whether the proposed water composition will adversely affect the evaporator materials of carbon steel and copper. The pH value of the water flowing through the evaporator must be kept in a range between 7 and 8.5.

PIPEWORK ARRANGEMENT

The following is a suggested piping arrangement for single unit installations.

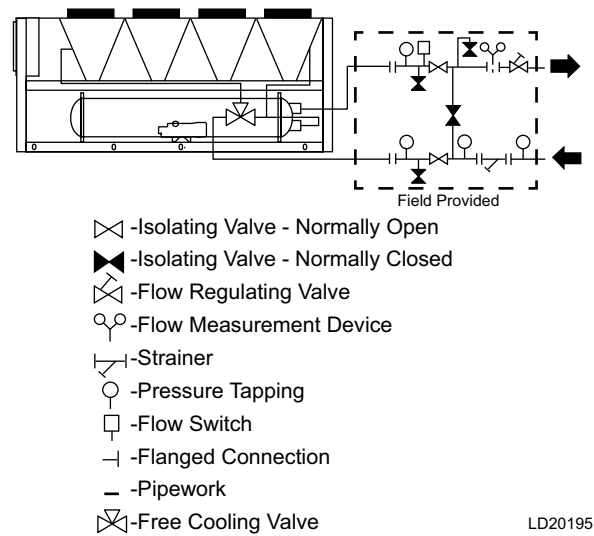


FIGURE 19 - PIPEWORK ARRANGEMENT - OPEN LOOP

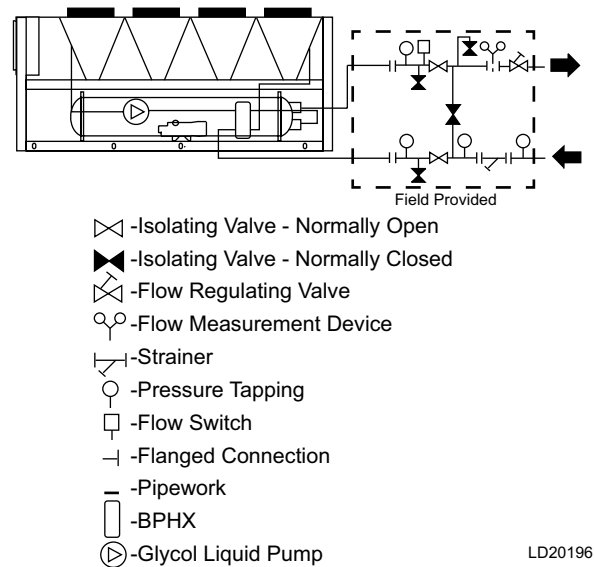


FIGURE 20 - PIPEWORK ARRANGEMENT - CLOSED LOOP

MINIMUM WATER VOLUME

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

For air conditioning applications, a minimum of 3 gallons/ton is required. It is preferred that the gallon/ton ratio be within the 5 to 8 range. For process applications, a minimum of 6 gallons/ton ratio is required with preference towards a range of 7 to 11. Install a tank or increase pipe sizes to provide sufficient water volume.

LEAVING WATER TEMPERATURE OUT OF RANGE

The YVFA chiller line has a maximum leaving water temperature of 70°F (21°C). Where process applications require a chilled water temperature higher than what the chiller provides, a simple piping change can remove the problem. By using a mixture of chiller-cooled water and returning process water, the chilled water entering the process can be held at the desired temperature. A tank can also be used to meet high leaving water temperature requirements.

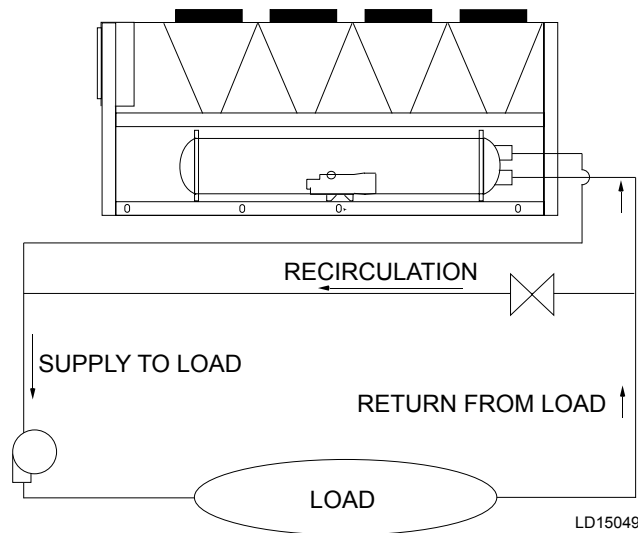


FIGURE 21 - LEAVING WATER TEMPERATURE OUT OF RANGE SUGGESTED LAYOUT

FLOW RATE OUT OF RANGE

Each YVFA 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 water can be recirculated to the chiller. (Refer to *Figure 22 on page 43*)

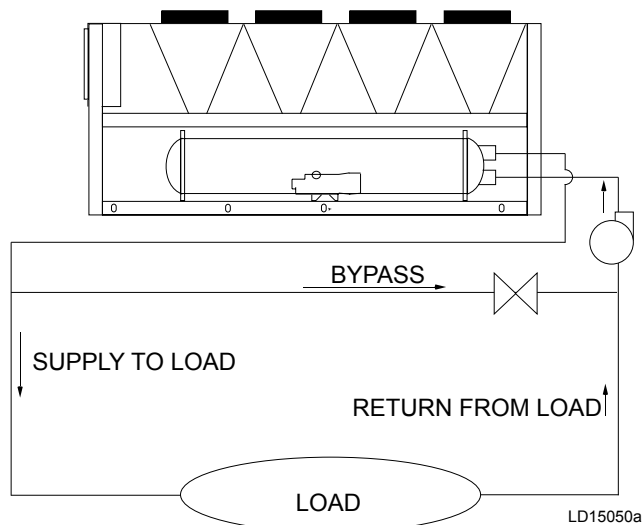


FIGURE 22 - SUGGESTED LAYOUT FOR APPLICATIONS WITH A FLOW RATE LESS THAN THE EVAPORATOR MINIMUM ALLOWABLE FLOW RATE

In applications where the required flow rate is greater than the evaporator's maximum allowable, the chilled water can be recirculated to the load.

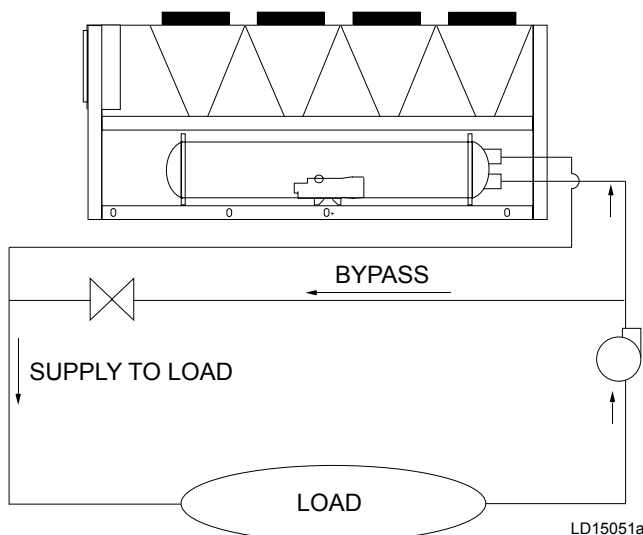


FIGURE 23 - SUGGESTED LAYOUT FOR APPLICATIONS WITH A FLOW RATE GREATER THAN THE EVAPORATOR MAXIMUM ALLOWABLE FLOW RATE

VARIABLE PRIMARY FLOW

Johnson Controls recommends a maximum 10% per minute flow rate of change, based on design flow, for variable primary flow applications. Provide 8 to 10 gallons per chiller ton (8.6 to 10.8 liter per cooling KW) system water 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 YVFA chillers.

CONNECTION TYPES AND SIZES

For connection sizes relevant to individual models refer to *SECTION 5 - TECHNICAL DATA*.

EVAPORATOR CONNECTIONS

Standard chilled liquid connections on evaporators are of the Victaulic Groove type for ASME and PED marked units and Flange type for GB marked units (see *Figure 25 on page 44* for flange dimensions on GB marked vessels).

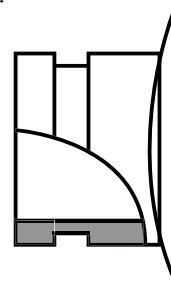


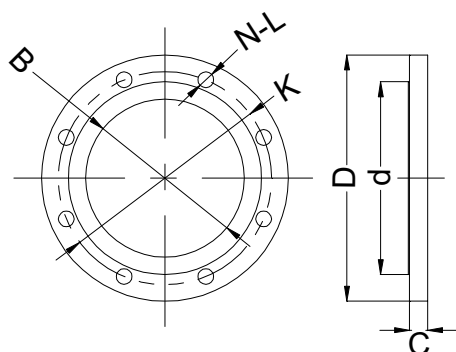
FIGURE 24 - VICTAULIC GROOVE

LD10494

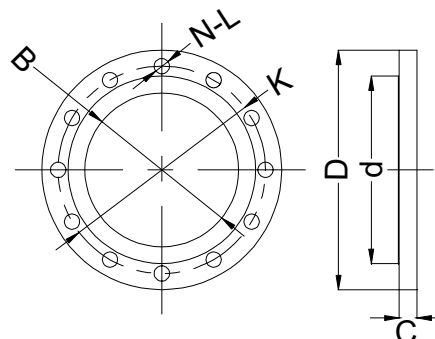
TABLE 3 - EVAPORATOR CONNECTIONS DIMENSIONS

FRAME	COND.	EVAP.	VICTAULIC CONNECTIONS SIZE	NOMINAL DIAMETER	FLANGE DIMENSIONS (GB ONLY) IN MM*							QTY
					B	C	D	K	L	d	N	
015	9	B	6"	DN150	170.5	27	280	241.5	22	216	8	2
020	9	A	6"	DN150	170.5	27	280	241.5	22	216	8	2
025	9	C	6"	DN150	170.5	27	280	241.5	22	216	8	2
028	9	E	8"	DN200	221.5	27	345	298.5	22	270	8	2
030	9	E	8"	DN200	221.5	27	345	298.5	22	270	8	2
035	9	E	8"	DN200	221.5	27	345	298.5	22	270	8	2
040	9	H	8"	DN200	221.5	27	345	298.5	22	270	8	2
045	9	J	8"	DN200	221.5	27	345	298.5	22	270	8	2

* Reference Figure 44 on Page 44 for flange dimensions.



4" / 6" / 8" FLANGE



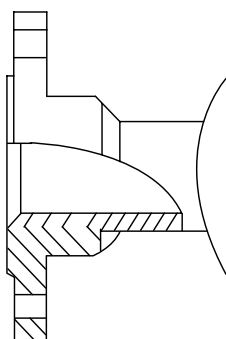
10" FLANGE

FIGURE 25 - FLANGE FOR GB VESSELS

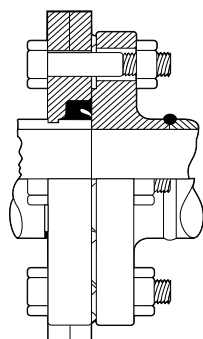
LD16185b

Option Flanges

One of two types of flanges may be fitted depending on the customer or local pressure vessel code requirements. These are Victaulic-Adapter flanges, normally supplied loose. These Victaulic-Adapter can be bolted to any existing welded/steel flange. Which may be supplied loose or ready-fitted. Victaulic-Adapter and weld flange dimensions are to ISO 7005 - NP10.



WELD FLANGE



VICTAULIC® FLANGE

LD10495a

FIGURE 26 - FLANGE ATTACHMENT**REFRIGERANT RELIEF VALVE PIPING**

The evaporator is protected against internal refrigerant overpressure by refrigerant relief valves. A pressure relief valve is mounted on each of the main refrigerant lines connecting the evaporator to the compressors.

A piece of pipe is fitted to each valve and directed so that when the valve is activated the release of high pressure gas and liquid cannot be a danger or cause injury. For indoor installations (not recommended), pressure relief valves should be piped to the exterior of the building.

The size of any piping attached to a relief valve must be of sufficient diameter so as not to cause resistance to the operation of the valve. Unless otherwise specified by local regulations. Internal diameter depends on the length of pipe required and is given by the following formula:

$$D^5 = 1.447 \times L$$

- Where:
- D = minimum pipe internal diameter in cm
- L = length of pipe in meters

If relief piping is common to more than one valve, its cross-sectional area must be at least the total required by each valve. Valve types should not be mixed on a common pipe. Precautions should be taken to ensure the outlets of relief valves or relief valve vent pipes remain clear of obstructions at all times.

ELECTRICAL CONNECTION

The following connection recommendations are intended to ensure safe and satisfactory operation of the unit. Failure to follow these recommendations could cause harm to persons or damage the unit, and may invalidate the warranty.



No additional controls (relays, etc.) should be mounted in the control panel. Power and control wiring not connected to the control panel should not be run through the control panel. If these precautions are not followed it could lead to a risk of electrocution. In addition, electrical noise could cause malfunctions or damage the unit and its controls.



After power wiring connection, do not switch on mains power to the unit. Some internal components are live when the mains are switched on and this must only be done by "Authorized" persons familiar with starting, operating, and troubleshooting this type of equipment.

POWER WIRING

All electrical wiring should be carried out in accordance with local regulations. Route properly sized cables to cable entries on the unit.

In accordance with local codes, NEC codes, U.L. and C.E. standards, it is the responsibility of the user to install over current protection devices between the supply conductors and the power supply terminals on the unit.

To ensure that no eddy currents are set up in the power panel, the cables forming the 3-phase power supply must enter via the same cable entry.



All sources of supply to the unit must be taken via a common point of isolation (not supplied by Johnson Controls).

Copper power wiring only should be used for supplying power to the chiller. This is recommended to avoid safety and reliability issues resulting from connection failure at the power connections to the chiller. Aluminum wiring is not recommended due to thermal characteristics that may cause loose terminations resulting from the contraction and expansion of the wiring. Aluminum oxide may also build up at the termination causing hot spots and eventual failure. If aluminum wiring is used to supply power to the chiller, AL-CU compression fittings should be used to transition from aluminum to copper. This transition should be done in an external box separate to the power panel. Copper conductors can then be run from the box to the chiller.



Caulk power and control wiring conduit entering the power panel to assure moist air from the building cannot enter the panel.

POWER SUPPLY WIRING

Units require only one 3-phase supply, plus earth ground.

Connect the 3-phase supplies to the terminal block or optional circuit breaker located in the panel using lug sizes detailed in this section (Refer to Figure 27 on page 46).

Connect a ground wire from the chiller panel ground lug to the incoming line supply ground.

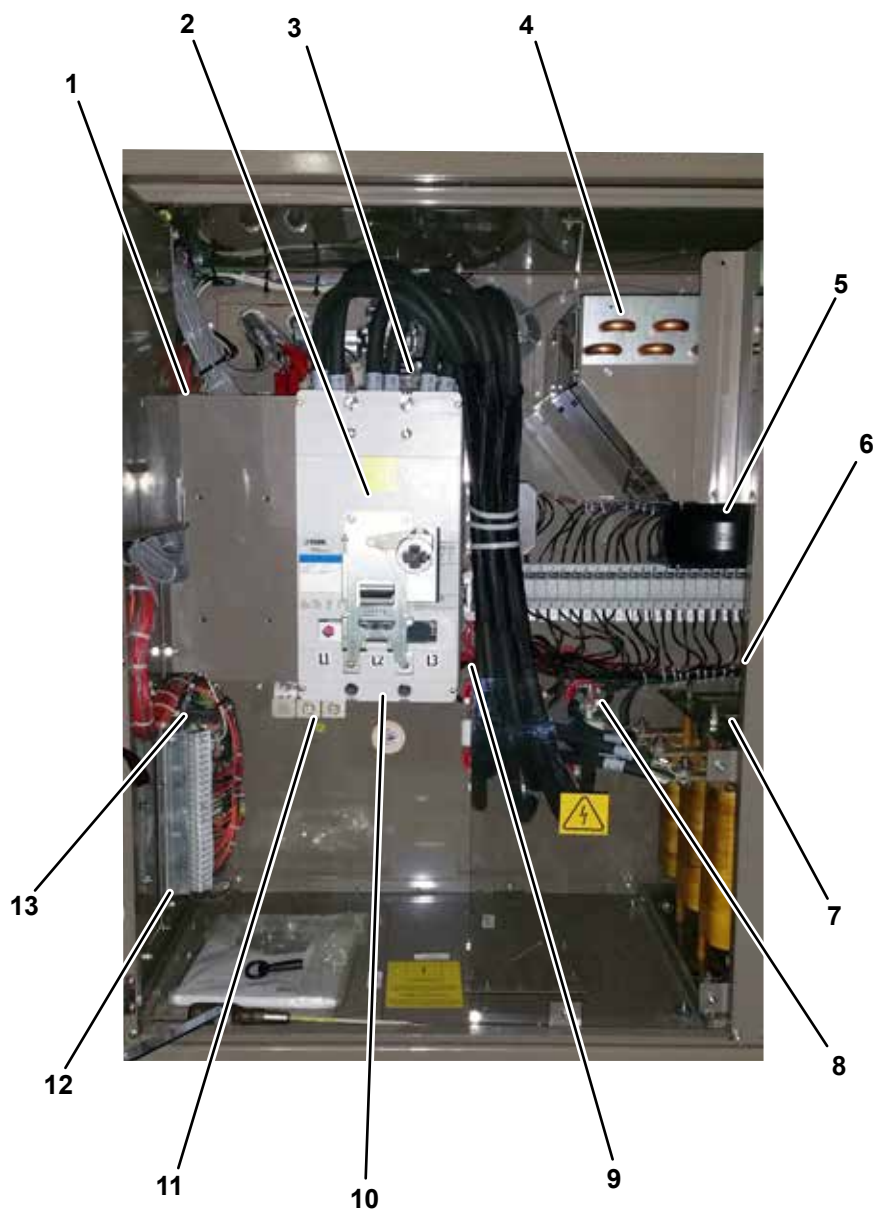
115VAC CONTROL SUPPLY TRANSFORMER

A 3-wire high voltage to 115VAC supply transformer is standard in the chiller. This transformer is mounted in the cabinet and steps down the high voltage supply to 115VAC to be used by the controls, VSD, Feed and Drain Valve Controller, valves, solenoids, heaters, etc.

The high voltage for the transformer primary is taken from the chiller input. Fusing is provided for the transformer.



Removing high voltage power to the chiller will remove the 115VAC supply voltage to the control panel circuitry and the evaporator heater. In cold weather, this could cause serious damage to the chiller due to evaporator freeze-up. Do not remove power unless alternate means are taken to ensure operation of the evaporator heater.



LD20411

1	11T Transformer
2	Optional Circuit Breaker (Standard Unit will have terminal blocks)
3	Flash Tank Feed and Drain Valve Controller
4	Control and VSD Cabinet Cooling Coil
5	Control and VSD Cabinet Cooling Fan
6	10CR Fan Pump Control Relay
7	1L AC Line Inductor
8	4-9FU Fuses and 14-16FU Fuses
9	17-21 FU Fuses
10	Input Power to the Chiller Connects Here
11	Incoming Power Ground Lugs
12	1TB Terminal Block (User input connection points)
13	10T Transformer

FIGURE 27 - USER CONTROL AND POWER CABLE CONNECTIONS

CONTROL PANEL WIRING

All control wiring utilizing contact closures to the control panel terminal block is nominal 115VAC and must be run in shielded cable, with the shield grounded at the panel end only, and run in water tight conduit. Run shielded cable separately from high voltage power cable to avoid electrical noise pick-up. Use the control panel cable entry to avoid the power cables.

Voltage free contacts connected to the panel must be suitable for 115VAC-10mA (gold contacts recommended). If the voltage free contacts form part of a relay or contactor, the coil of the device must be suppressed using a standard R/C suppressor. The above precautions must be taken to avoid electrical noise, which could cause a malfunction or damage to the unit and its controls.

VOLTS FREE CONTACTS

Chilled Liquid Pump Starter

Terminals 23 and 24 on 1TB close to start the chilled liquid pump. This contact can be used as a master start/stop for the pump in conjunction with the daily start/stop schedule. Cycle the pumps from the unit panel if the unit will be operational or shut-down during sub-freezing conditions. Refer to the *Evaporator Pump Control* on page 90 for more information on testing the pumps.

Run Contact

Terminals 21 and 22 on 1TB close to indicate that a system is running.

Alarm Contacts

Each system has a single voltage-free contact, which will operate to signal an alarm condition whenever any system locks out, or there is a power failure. To obtain system alarm signal, connect the alarm circuit to volt free Terminals 25 and 26 (Sys 1), Terminals 27 and 28 (Sys 2) of 1TB.

SYSTEM INPUTS

Flow Switch

A chilled liquid flow switch of suitable type MUST be connected between Terminals 2 and 13 of 1TB to provide protection against loss of liquid flow, which will cause evaporator freeze-up if the chiller is permitted to run. The flow switch circuitry is a 115VACcircuit. Contacts must be rated for low current (5mA). Gold contacts should be used.

Remote Run / Stop

A Remote Run/Stop input is available for each systems. These inputs require a dry contact to start and stop the system. System 1 remote dry contacts are connected between Terminals 2 and 15 of 1TB and System 2 dry contacts are connected between Terminals 2 and 16 of 1TB. If remote start/stop is not utilized, a jumper must be placed across the terminals to allow the system to run. The remote run/stop circuitry is a 115VACcircuit. Contacts must be rated for low current (5mA). Gold contacts should be used.

Remote Print

Closure of suitable contacts connected to Terminals 2 and 14 of 1TB will cause a hard copy printout of Operating Data/Fault History to be made if an optional printer is connected to the RS-232 port. The remote print circuitry is a 115VACcircuit. Contacts must be rated for low current (5mA). Gold contacts should be used.

Optional Remote Setpoint Offset – Temperature

A voltage signal connected to Terminals 17 and 18 of 1TB will provide a remote offset function of the chilled liquid setpoint, if required.

Optional Remote Setpoint Offset – Current

A voltage signal connected to Terminals 19 and 20 of 1TB will provide a remote setting of current limit setpoint, if required.

Optional Remote Setpoint Offset – Sound Limiting

A voltage signal connected to Terminals 40 and 41 of 1TB will provide remote setting of sound limit setpoint, if required.

DUCTWORK CONNECTION

The following ductwork recommendations are intended to ensure satisfactory operation of the unit. Failure to follow these recommendations could cause damage to the unit, or loss of performance, and may invalidate the warranty.

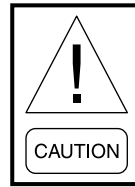
When ducting is to be fitted to the fan discharge it is recommended that the duct should be the same cross-sectional area as the fan outlet and straight for at least three feet (1 meter) to obtain static regain from the fan. Ductwork should be suspended with flexible hangers to prevent noise and vibration being transmitted to the structure. A flexible joint is also recommended between the duct attached to the fan and the next section for the same reason. Flexible connectors should not be allowed to concertina.

The unit is not designed to take structural loading. No significant amount of weight should be allowed to rest on the fan outlet flange, deck assemblies or condenser coil module. No more than 3 feet (1 meter) of light construction ductwork should be supported by the unit. Where cross winds may occur, any ductwork must be supported to prevent side loading on the unit.

If the ducts from two or more fans are to be combined into a common duct, back-flow dampers should be fitted in the individual fan ducts. This will prevent recirculation of air when only one of the fans is running.

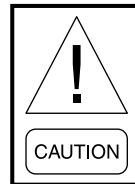
Units are supplied with outlet guards for safety and to prevent damage to the fan blades. If these guards are removed to fit ductwork, adequate alternative precautions must be taken to ensure persons cannot be harmed or put at risk from rotating fan blades.

REMOVING WATER/GLYCOL FROM THE EVAPORATOR



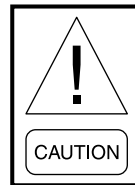
If the chiller is equipped with a -20°F evaporator freeze protection option, which incorporates immersion heaters, power must be removed from the chiller before the evaporator is drained to assure the heaters are not damaged. Failure to remove power will cause the evaporator immersion heaters to fail.

BEFORE APPLYING POWER TO THE CHILLER, ASSURE THE CHILLED LIQUID SYSTEM IS FILLED



DO NOT apply power to the chiller unless the system is filled with water or glycol. If the chiller is equipped with the -20°F option, applying power to an empty chilled liquid system will cause the evaporator immersion heaters to fail.

EVAPORATOR FREEZE DAMAGE



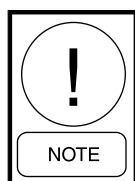
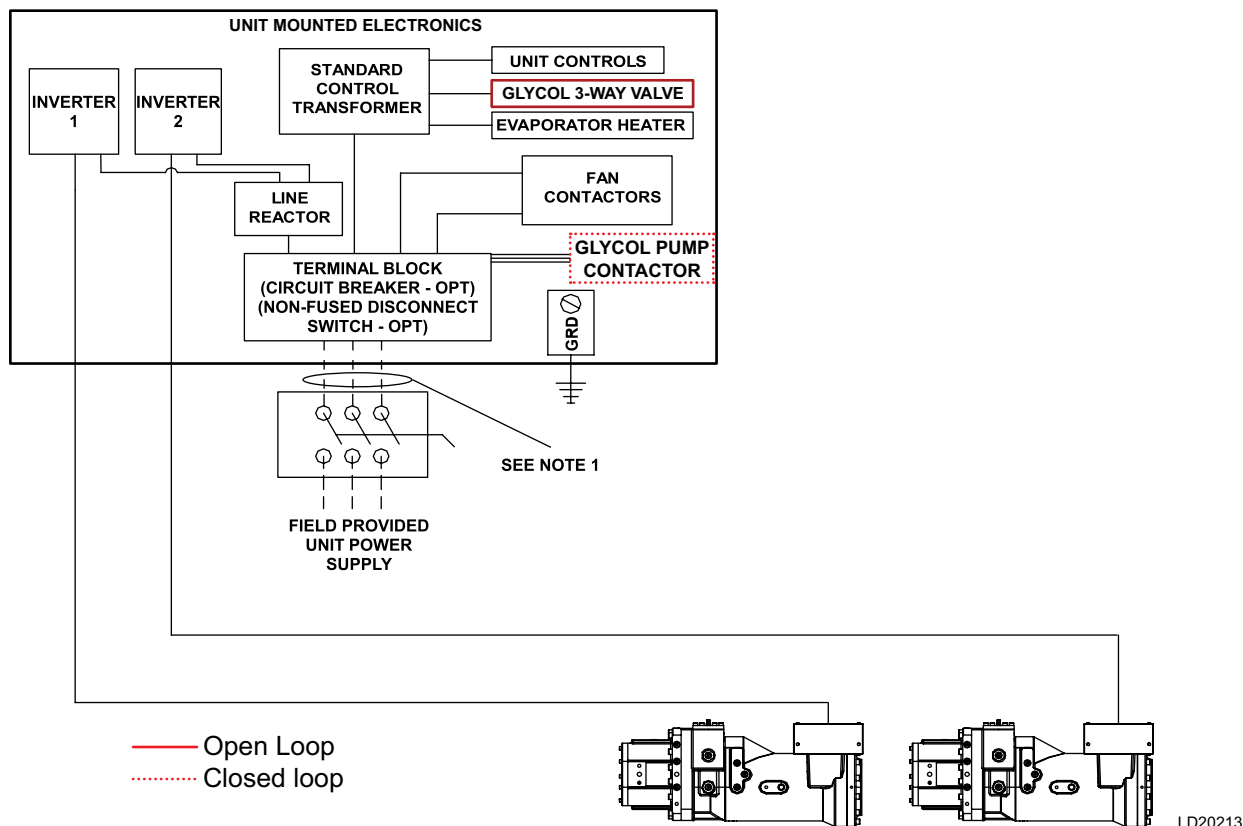
Power must remain on the chiller whenever the ambient temperature drops below 32°F with water in the evaporator to avoid evaporator damage. To avoid damage, assure the correct heater option for 0°F minimum ambient or -20°F minimum ambient temperature is installed, based on the lowest expected ambient temperature at the chiller location.



If glycol is installed in the evaporator, the glycol concentration must assure that the freeze point is below the lowest expected ambient temperature at the chiller location to avoid evaporator damage.

POWER SUPPLY WIRING

Single Point Wiring (YVFA0159, 0209, 0259, 0289, 0309, 0359)



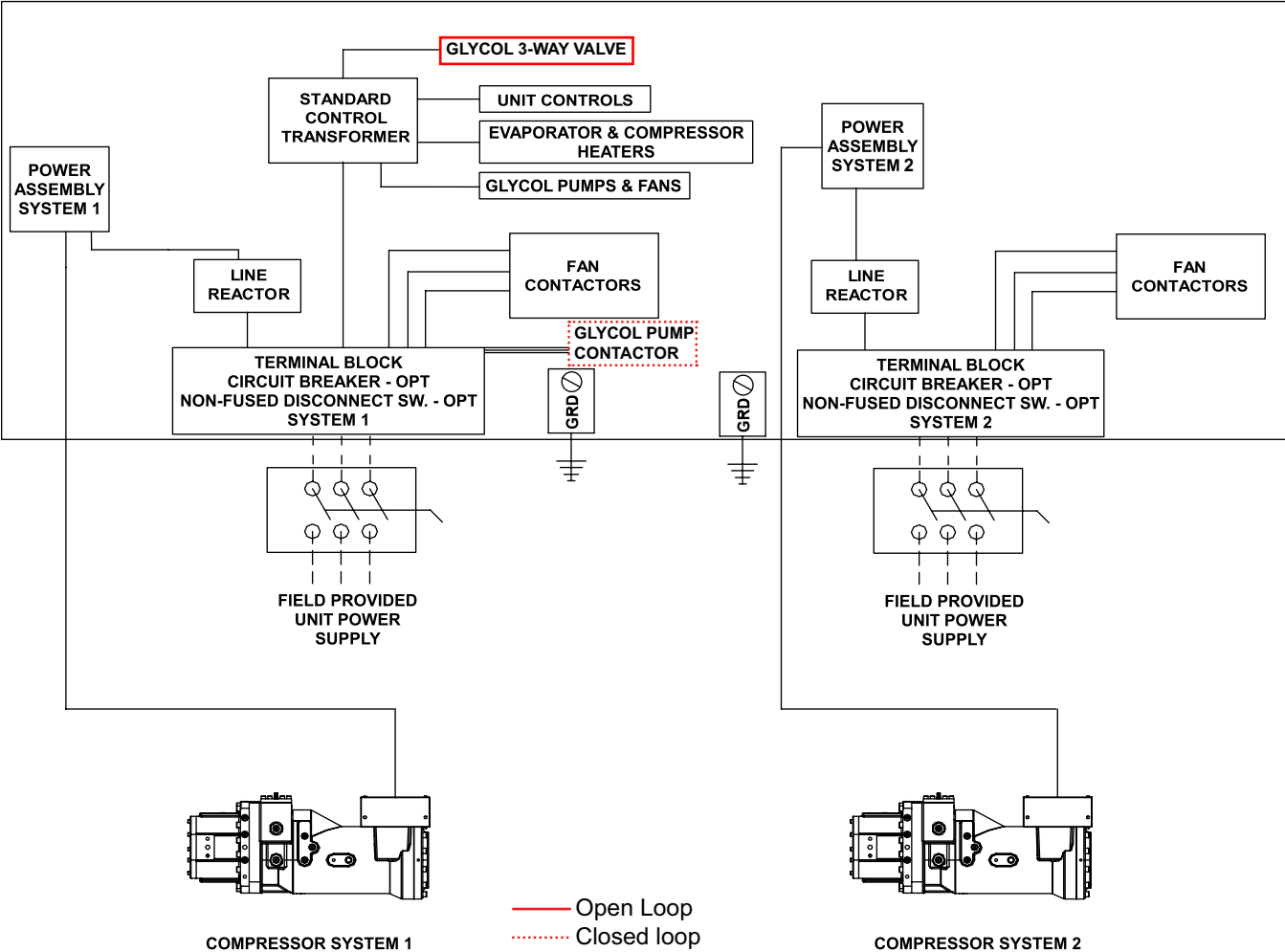
Minimum Circuit Ampacity (MCA), Minimum/Maximum Fuse Size and Minimum/Maximum Circuit Breaker size varies on chillers based upon model and options ordered. Consult YorkWorks or the chiller data plate for electrical data on a specific chiller.

Voltage Utilization Range

RATED VOLTAGE	UTILIZATION RANGE
200/60/3	180-220
230/60/3	208-254
380/60/3	342-402
400/60/3	360-440
460/60/3	414-508
575/60/3	520-635
400/50/3	360-440

FIGURE 28 - SINGLE POINT POWER WIRING

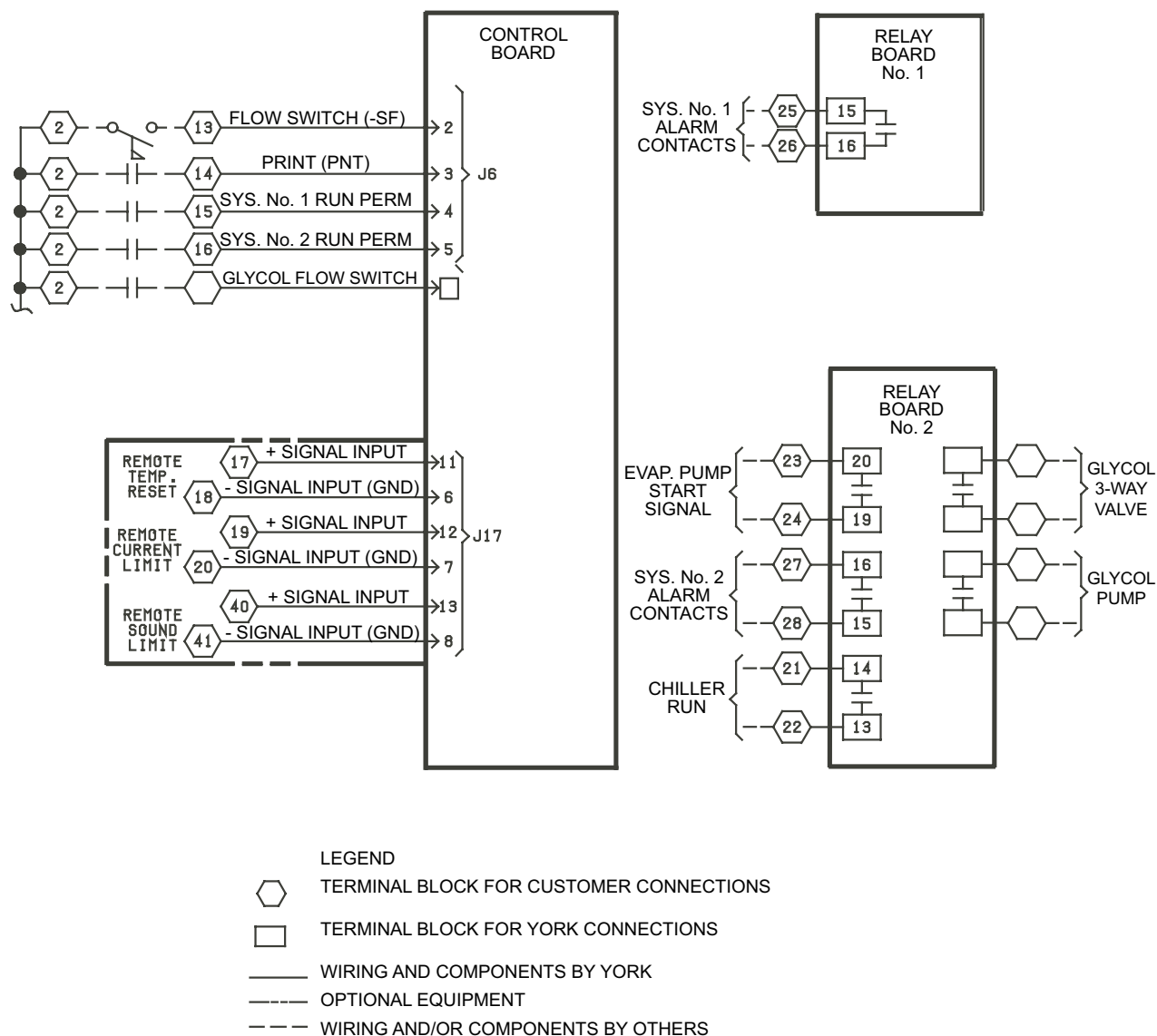
Dual Point Wiring
(YVFA0409, 0459)



LD20217

FIGURE 29 - DUAL POINT POWER WIRING

CUSTOMER CONTROL WIRING



LD18589b

FIGURE 30 - CUSTOMER CONTROL CONNECTIONS - OPEN LOOP

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TABLE 4 - ELECTRICAL LUG DATA - OPEN LOOP

FIELD WIRING LUGS				HIGH AIRFLOW/HIGH STATIC CONDENSER FANS					
				TERMINAL BLOCK		CIRCUIT BREAKER		NON-FUSED DISCONNECT SWITCH	
YVFA MODEL		INPUT VOLTS	INPUT FREQ	WIRE PER PHASE	LUG WIRE RANGE	WIRES PER PHASE	LUG WIRE RANGE	WIRES PER PHASE	LUG WIRE RANGE
FRAME	EVAP								
SINGLE POINT WIRING									
YVFA0259	YVFA0889	200	60	4	#2-600 kcmil				
		230	60	4	#2-600 kcmil	4	4/0-500 kcmil		
		380	50	3	#2-600 kcmil	3	3/0-400 kcmil	3	#2-600 kcmil
		400	60	3	#2-600 kcmil	3	3/0-400 kcmil	3	#2-600 kcmil
		460	60	2	#2-600 kcmil	2	#1-500 kcmil	3	#2-600 kcmil
		575	60	2	#2-600 kcmil	2	#1-500 kcmil	2	#2-600 kcmil
YVFA0309	YVFA1069	200	60						
		230	60						
		380	50	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		400	60	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		460	60	3	#2-600 kcmil	4	#4/0-500 kcmil	3	#2-600 kcmil
		575	60	3	#2-600 kcmil	3	#3/0-400 kcmil	3	#2-600 kcmil
YVFA0359	YVFA1239	200	60						
		230	60						
		380	50	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		400	60	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		460	60	3	#2-600 kcmil	4	#4/0-500 kcmil	3	#2-600 kcmil
		575	60	3	#2-600 kcmil	3	#3/0-400 kcmil	3	#2-600 kcmil

* Up to 4 wires per phase, consisting of 2 lugs per phase where each lug can accomodate 2 wires.

TABLE 5 - ELECTRICAL LUG DATA - CLOSED LOOP

FIELD WIRING LUGS				HIGH AIRFLOW/HIGH STATIC CONDENSER FANS					
				TERMINAL BLOCK		CIRCUIT BREAKER		NON-FUSED DISCONNECT SWITCH	
YVFA MODEL		INPUT VOLTS	INPUT FREQ	WIRE PER PHASE	LUG WIRE RANGE	WIRES PER PHASE	LUG WIRE RANGE	WIRES PER PHASE	LUG WIRE RANGE
FRAME	EVAP								
SINGLE POINT WIRING									
YVFA0259	YVFA0889	200	60	4	#2-600 kcmil				
		230	60	4	#2-600 kcmil	4	4/0-500 kcmil		
		380	50	3	#2-600 kcmil	3	3/0-400 kcmil	3	#2-600 kcmil
		400	60	3	#2-600 kcmil	3	3/0-400 kcmil	3	#2-600 kcmil
		460	60	2	#2-600 kcmil	2	#1-500 kcmil	3	#2-600 kcmil
		575	60	2	#2-600 kcmil	2	#1-500 kcmil	2	#2-600 kcmil
YVFA0309	YVFA1069	200	60						
		230	60						
		380	50	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		400	60	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		460	60	3	#2-600 kcmil	4	#4/0-500 kcmil	3	#2-600 kcmil
		575	60	3	#2-600 kcmil	3	#3/0-400 kcmil	3	#2-600 kcmil
YVFA0359	YVFA1239	200	60						
		230	60						
		380	50	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		400	60	4	#2-600 kcmil	4	#4/0-500 kcmil	4*	#2-600 kcmil
		460	60	3	#2-600 kcmil	4	#4/0-500 kcmil	3	#2-600 kcmil
		575	60	3	#2-600 kcmil	3	#3/0-400 kcmil	3	#2-600 kcmil

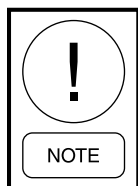
* Up to 4 wires per phase, consisting of 2 lugs per phase where each lug can accommodate 2 wires.

SECTION 5 - TECHNICAL DATA

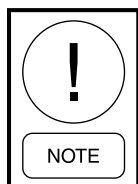
CHILLER INTERNAL PRESSURE DROP

The flow rate must not exceed the maximum GPM for the open and closed loops. For the open loop when the operational mode is changed from Free Cooling Mode to Mechanical Mode the flow rate **may** exceed the maximum GPM. Make sure that the liquid flow rate is between minimum GPM and maximum GPM under both operational modes.

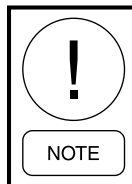
The minimum and maximum flow rate for YVFA chillers models are shown in *Table 6 on page 55* for Open Loop.



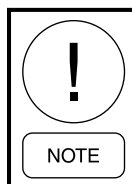
Excessive flow above the Maximum GPM may damage the Evaporator or Free Cooling Coil.



To determine which curve to use based on Chiller Model, Open Loop or Closed Loop.



Variable speed pump is recommended to keep the constant GPM on operational switching.



Fixed speed pump should be selected properly to make sure the flow rate under both Mechanical mode and Hybrid mode is in the range between allowable max flow and min flow. it is a good way to add 5 ft H2O to Liquid Press Drop in "Mechanical Mode" when select the liquid pump.

Different Glycol Categories and concentrations will make different pressure drop, even with same GPM. Check the overall pressure drop output in the YORK-works based on different glycol (EG/PG) and concentration, then in term of the output of "Overall Pressure Drop" and "Mech Mode Pressure Drop" to select the appropriate pump.

TABLE 6 - OPEN LOOP FLOW RATE LIMIT

MODEL	YVFA0259	YVFA0309	YVFA0359
"Max Flow (GPM / l/s)"	810/51.1	925/58.4	1040/65.6
"Min Flow (GPM / l/s)"	300/18.9	410/25.9	410/25.9
Evap (Mech) Code	C	E	E
Evap Model	FFE278	FFE331	FFE331

NOTE: Flow Limits determined with EG 30%

Open Loop

Open Loop Overall Pressure Drop of Glycol Liquid in "Hybrid" or "Free Cooling Mode" include that of Free Cooling Valve, Free Cooling Coils, Evaporator and Piping & Valves.

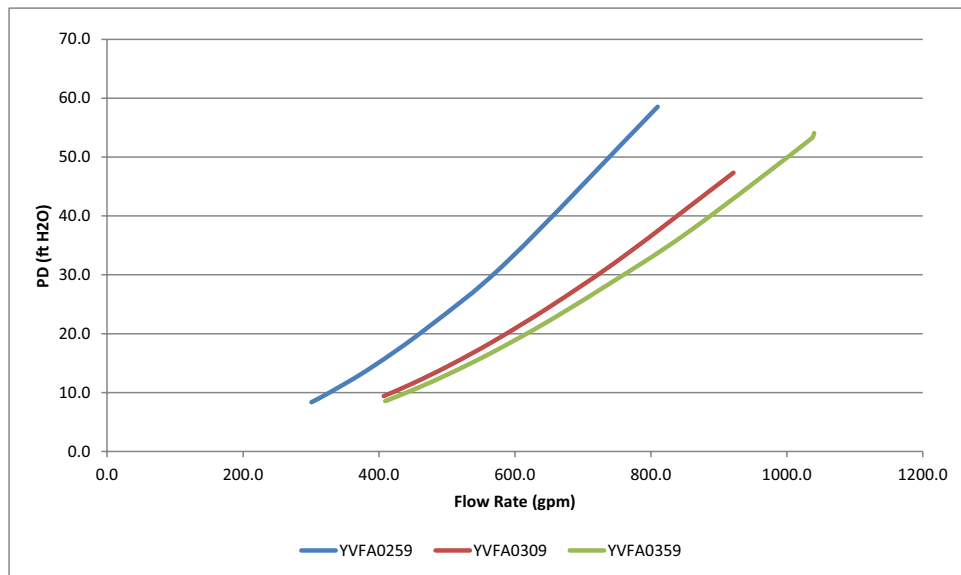
Open Loop Mech Mode Pressure Drop of Glycol Liquid in Mechanical Mode include that of Evaporator and Valves & Piping.

Figure 31 on page 56 is the Free Cooling Mode curve of EG glycol liquid with concentration of 30% in English Units for open loop YVFA chiller.

Figure 32 on page 56 is the Free Cooling Mode curve of EG glycol liquid with concentration of 30% in SI Units for open loop YVFA chiller.

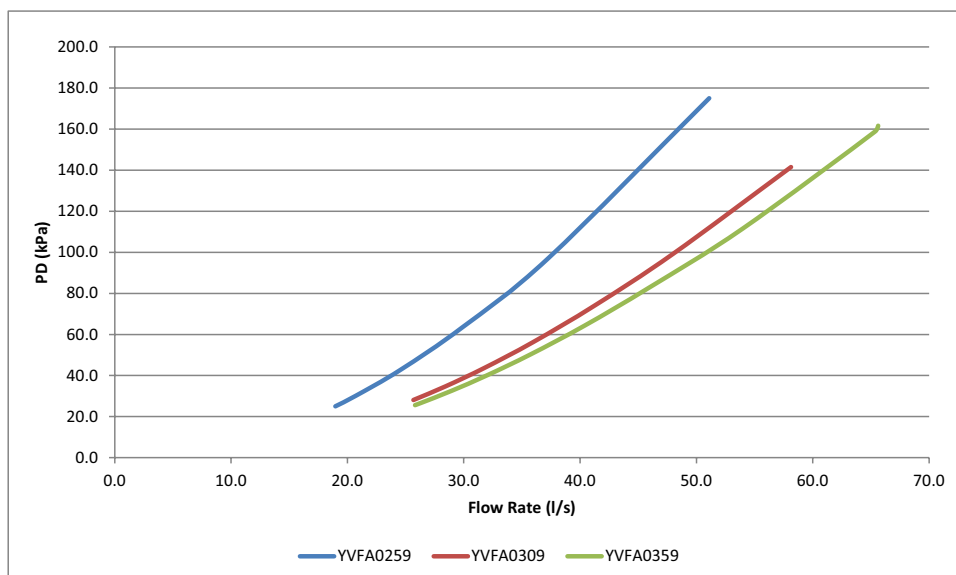
Figure 33 on page 57 is the Mech Mode PD curve of EG glycol liquid with concentration of 30% in English Units for open loop YVFA chiller.

Figure 34 on page 57 is the Mech Mode PD curve of EG glycol liquid with concentration of 30% in SI Units for open loop YVFA chiller.



LD20499

FIGURE 31 - OPEN LOOP OVERALL PRESSURE DROP, ENGLISH UNITS



LD20500

FIGURE 32 - OPEN LOOP OVERALL PRESSURE DROP, SI UNITS

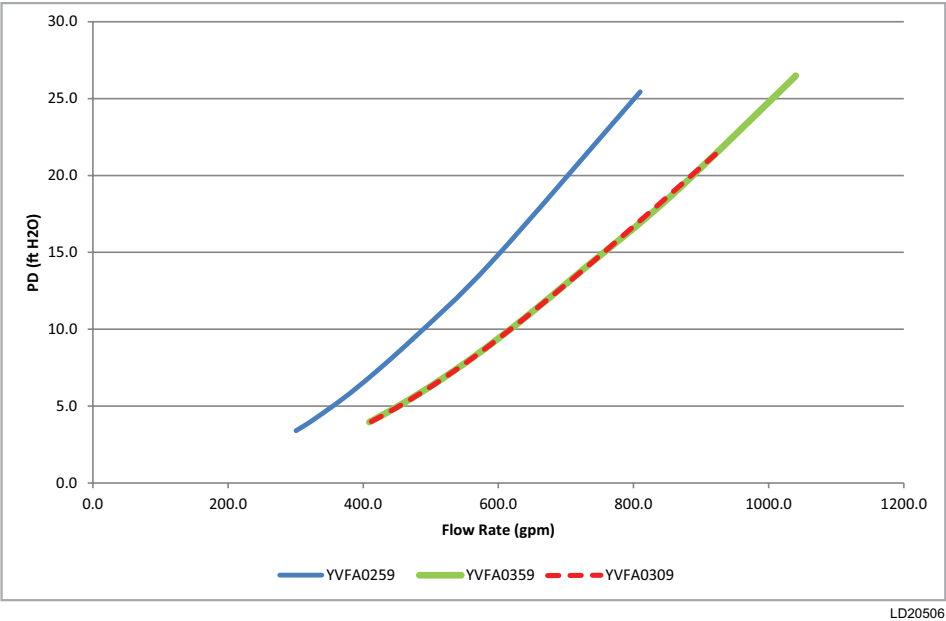


FIGURE 33 - OPEN LOOP MECH MODE PRESSURE DROP, ENGLISH UNITS

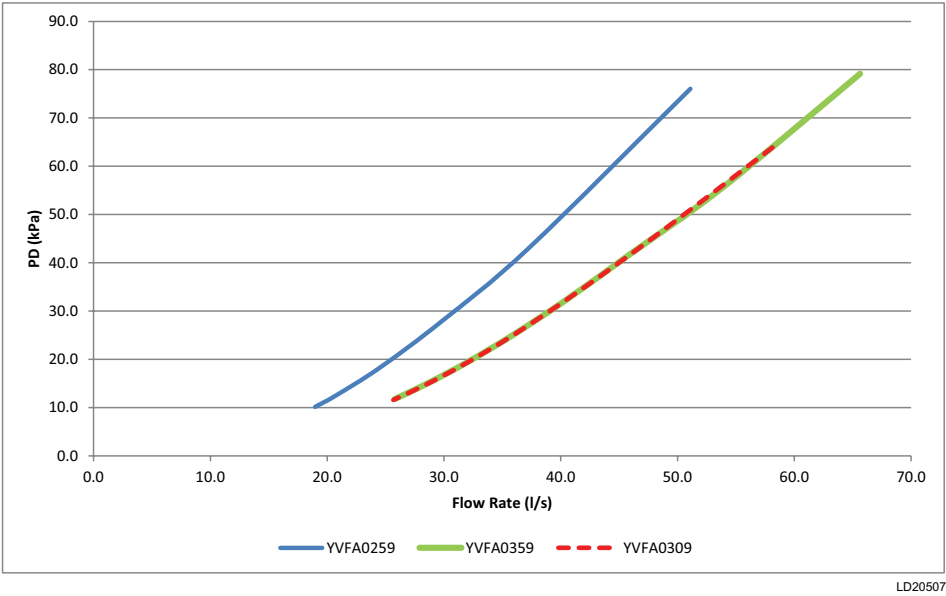


FIGURE 34 - OPEN LOOP MECH MODE PRESSURE DROP, SI UNITS

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Glycol Correction Factors

When using glycol solutions, pressure drops are higher than with water (see correction factors to be applied when using glycol solutions). Special care must be taken not to exceed the maximum flow rate allowed.

A. = Correction Factor

B. = Mean Temperature through Evaporator

C. = Concentration WIW

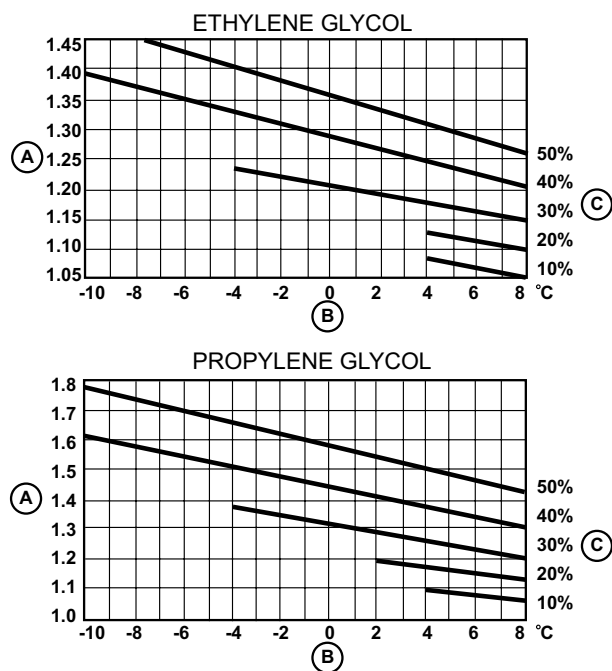


FIGURE 35 - GLYCOL CORRECTION FACTORS



If glycol is installed in the evaporator, the glycol concentration must assure that the freeze point is below either the lowest expected ambient temperature at the chiller location or the lowest expected refrigerant temperature, whichever is lower, to avoid evaporator damage.

REMOVING WATER/GLYCOL FROM THE EVAPORATOR



If the chiller is equipped with a -20°F evaporator freeze protection option, which incorporates immersion heaters, power must be removed from the chiller before the evaporator is drained to assure the heaters are not damaged. Failure to remove power will cause the evaporator immersion heaters to fail.

EVAPORATOR FREEZE DAMAGE



Power must remain on the chiller whenever the ambient temperature drops below 32°F with water in the evaporator to avoid evaporator damage. To avoid damage, assure the correct heater option for 0°F minimum ambient or -20°F minimum ambient temperature is installed, based on the lowest expected ambient temperature at the chiller location.

BEFORE APPLYING POWER TO THE CHILLER, ASSURE THE CHILLED LIQUID SYSTEM IS FILLED



DO NOT apply power to the chiller unless the system is filled with water or glycol. If the chiller is equipped with the -20°F option, applying power to an empty chilled liquid system will cause the evaporator immersion heaters to fail.

TABLE 7 - WATER TEMPERATURE AND FLOWS

MODEL NUMBER YVFA	LEAVING LIQUID TEMPERATURE		EVAPORATOR FLOW GPM (L/S)		AIR ON CONDENSER °F (°C)	
	MIN ¹	MAX ²	MIN ³	MAX ⁴	MIN	MAX
0259	40° (4.4°)	70° (21.2°)	300 (19)	810 (51)	0 (-17.8)	115 (46.1)
0309			410 (26)	925 (58)	Standard / -20 (-28.9)	
0359			410 (26)	1040 (66)	Optional	

NOTES:

1. For leaving brine temperature below 40°F (4.4°C), contact your nearest Johnson Controls office for application requirements.
2. For leaving water temperature higher than 70°F (21.1°C), contact the nearest Johnson Controls office for application guidelines.
3. The evaporator is protected against freezing to 0°F (-17.8°C) with an electric heater as standard. An optional immersion heater is available for protection to -20°F (-28.8°C).
4. Flows are in gallons per minute (liters per second).

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.

TABLE 8 - PHYSICAL DATA - MICROCHANNEL COIL AND ROUND TUBE FC COIL

UNIT FRAME	025	030	035
CONDENSER CODE	9	9	9
EVAPORATOR CODE	C	E	E
GENERAL UNIT DATA			
Number of Independent Refrigerant Circuits	2		
Refrigerant Charge, R-134a, Ckt.-1/Ckt.-2, lbs (kg)	250/225 (113/102)	310/265 (141/120)	310/310 (141/141)
Oil Charge, Ckt.-1/Ckt.-2, gal (liters)	2.9/2.8 (11.1/ 10.5)	3.8/3.1 (14.4/ 11.7)	3.8/3.8 (14.4/ 14.4)
Minimum Load (%)			
"Unit shipping weight, lbs (kg) 1"	20367 (9238)	23045 (10453)	25131 (11399)
"Operating weight, lbs (kg) 2"	22907 (10390)	26013 (11799)	28686 (13012)
"Chassis Dimension-Length inches (mm)"	335.2 (8514)	379.2 (9631)	423.1 (10748)
"Chassis Dimension-Width inches (mm)"	88.3 (2242)	88.3 (2242)	88.3 (2242)
"Chassis Dimension-Height inches (mm)"	94.6 (2403)	94.6 (2403)	94.6 (2403)
COMPRESSORS, SEMI-HERMETIC SCREW			
Qty per Chiller	2		
CONDENSER FANS			
Number Ckt-1/Ckt-2	8/6	9/7	9/9
Air on Condenser (Min/Max), °F (°C)	-20° (-28.9°) 115° (46.1°)	-20° (-28.9°) 115° (46.1°)	-20° (-28.9°) 115° (46.1°)
EVAPORATOR, SHELL AND TUBE HYBRID FALLING FILM ²			
Water Volume, gal (liters)			
Leaving Water Temperature (Min/Max), °F (°C) 3	40/70 (4.4/21.1)		
Maximum Water Side Pressure, psig (barg)	150 (10.3)		
Maximum Refrigerant Side Pressure, psig (barg)	235 (16.2)		
Evap Drain Connection, inches (mm)	3/4 (19.05)		
Minimum Chilled Water Flow Rate, gpm (l/sec)	300 (19)	410 (26)	410 (26)
Maximum Chilled Water Flow Rate, gpm (l/sec)	810 (51)	925 (58)	1040 (66)
Inlet and Outlet Water Connections, in	6	8	8

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 60°F (15.6°C), contact your nearest Johnson Controls Sales Office for application requirements.

TABLE 9 - FAN DATA

UNIT FRAME		025	030	035
CONDENSER CODE		9	9	9
EVAPORATOR CODE		C	E	E
FAN RPM	60 Hz / 50 Hz	1150/950		
TOTAL CHILLER AIRFLOW (60HZ)	cfm	171500	196000	220500
	m ³ /sec	81	93	104
TOTAL CHILLER AIRFLOW (50HZ)	cfm	169904	194176	218448
	m ³ /sec	80	92	103

NOTE: The data shown in this table is applicable to typical configurations. Other configurations may be available.

EVAPORATOR OPTIONS

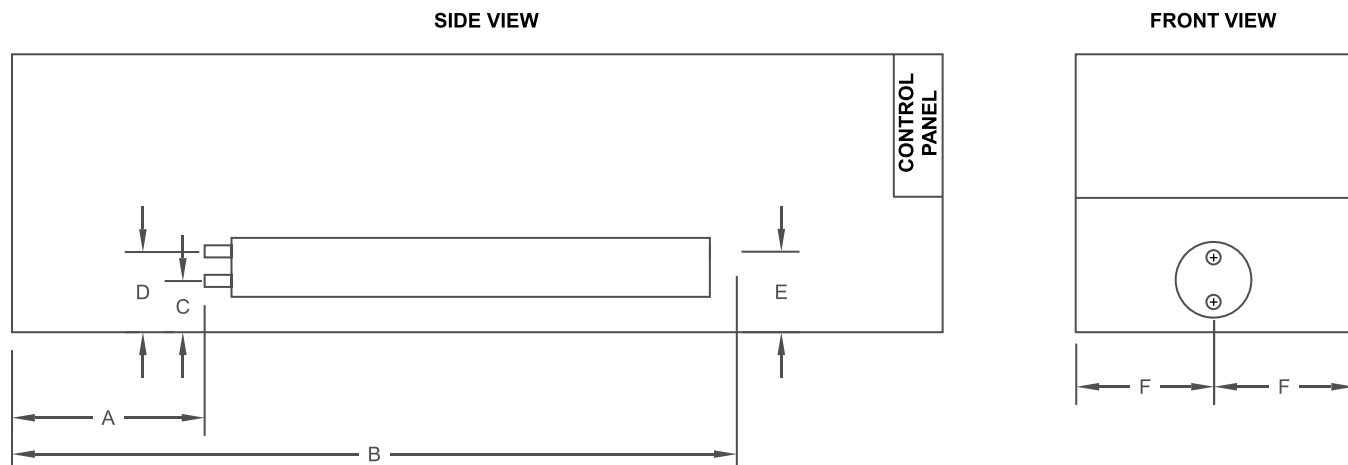
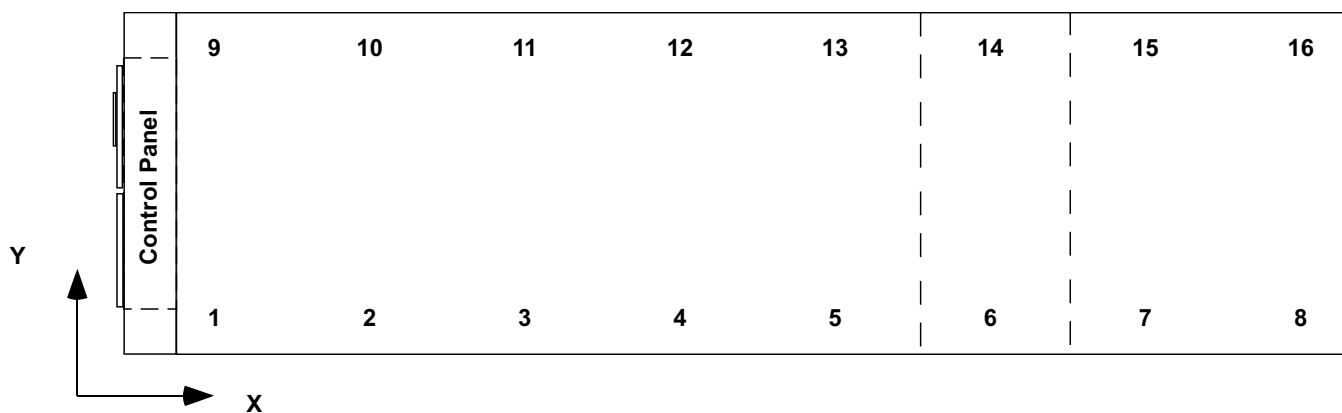


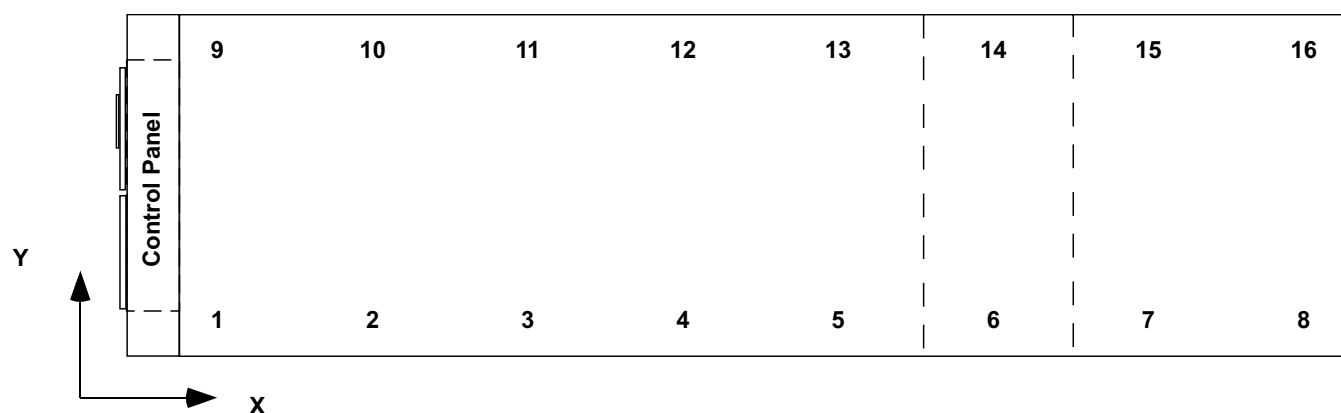
TABLE 10 - STANDARD (TWO-PASS, REAR INLET/OUTLET) EVAPORATOR

FRAME	CONDENSER	EVAPORATOR	INLET			OUTLET			C-606 CONNECTION SIZE	WATER VOLUME GALLONS (LITERS)	MIN. CHILLED WATER FLOW RATE GPM (L/S)	MAX. CHILLED WATER FLOW RATE GPM (L/S)
			A	B	C	D	E	F (IN)/ F (OUT)				
025	9	C	37.05	N/A	15.27	26.69	N/A	44.18/ 37.09	6	71 (269)	300 (19)	810 (51)
030	9	E	7.42	N/A	15.49	29.47	N/A	44.18/ 37.09	8	113 (428)	410 (26)	925 (58)
035	9	E	46.48 (in) 51.4 (out)	N/A	15.49	29.47	N/A	44.18/ 37.09	8	113 (428)	410 (26)	1040 (66)

NOTES: Dimensions are in inches (mm) and weights are in pounds (kg)

**TABLE 11 - ISOLATOR SELECTION AND MOUNTING LOCATIONS**

YVFA CONFIGURATION			DESCRIPTION	1	2	3	4	5	6	7	8
FRAME	COND	EVAP									
025	9	C	Isolator X-Dimension mm (in)	263 (10.4)	1943 (76.5)	3260 (128.3)	4391 (172.9)	5579 (219.6)	7654 (301.3)	N/A	N/A
			Isolator Y-Dimension mm (in)	2211.5 (87.1)							
030	9	E	Isolator X-Dimension mm (in)	263 (10.4)	2057 (81)	4095 (161.2)	5105 (201)	7512 (295.7)	8609 (338.9)	N/A	N/A
			Isolator Y-Dimension mm (in)	2211.5 (87.1)							
035	9	E	Isolator X-Dimension mm (in)	263 (10.4)	2057 (81)	4083.6 (160.9)	5104.9 (201)	7581.6 (298.5)	9726.2 (382.9)	N/A	N/A
			Isolator Y-Dimension mm (in)	2211.5 (87.1)							



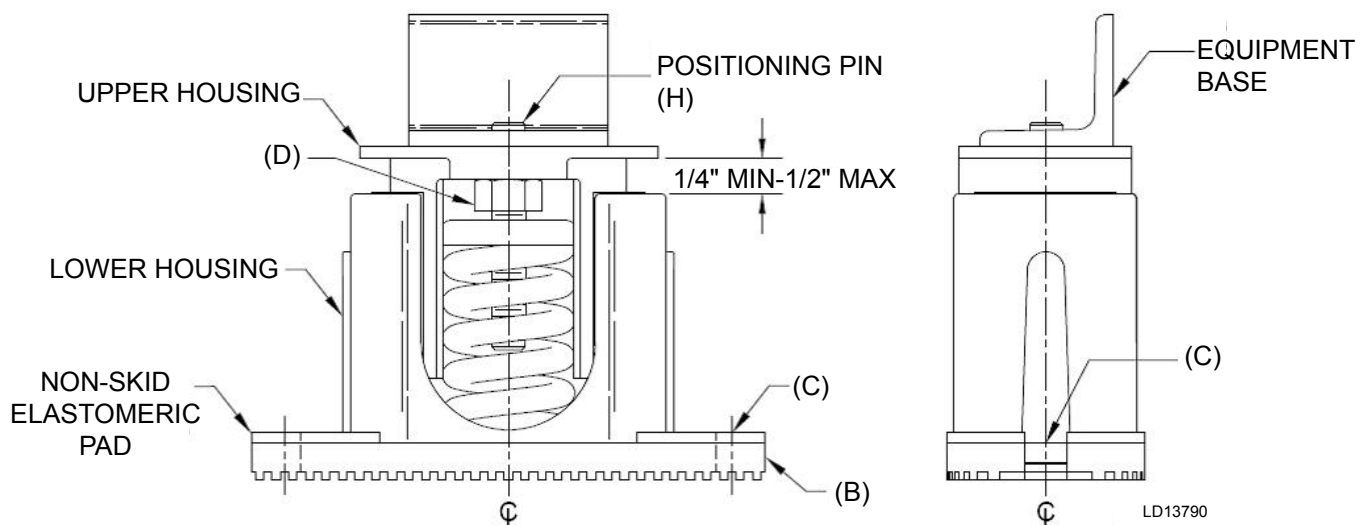
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TABLE 11 - ISOLATOR SELECTION AND MOUNTING LOCATIONS (CONT'D)

YVFA CONFIGURATION			DESCRIPTION	9	10	11	12	13	14	15	16
FRAME	COND	EVAP									
025	9	C	Isolator X-Dimension mm (in)	263 (10.4)	1943 (76.5)	3260 (128.3)	4391 (172.9)	5579 (219.6)	7654 (301.3)	N/A	N/A
			Isolator Y-Dimension mm (in)	32.5 (1.3)							
030	9	E	Isolator X-Dimension mm (in)	263 (10.4)	2057 (81)	4095 (161.2)	5105 (201)	7512 (295.7)	8609 (338.9)	N/A	N/A
			Isolator Y-Dimension mm (in)	32.5 (1.3)							
035	9	E	Isolator X-Dimension mm (in)	263 (10.4)	2057 (81)	4083.6 (160.9)	5104.9 (201)	7581.6 (298.5)	9726.2 (382.9)	N/A	N/A
			Isolator Y-Dimension mm (in)	32.5 (1.3)							

ONE INCH DEFLECTION SPRING ISOLATORS INSTALLATION INSTRUCTIONS

1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad or sub-base, ensuring that all isolator centerlines match the equipment mounting holes. The VMC group recommends that the isolator base ("B") be installed on a level surface. Shim or grout as required, leveling all isolator bases to the same elevation [1/4-inch (6.35 mm) maximum difference can be tolerated].
4. Bolt or anchor all isolators to supporting structure utilizing base slotted holes ("C").
5. Place equipment on top of isolators making sure that mounting holes of the equipment line up with isolator positioning pin ("H").
6. The adjustment process can only begin after the equipment or machine is at its full operating weight.
7. Adjust each isolator in sequence by turning spring adjusting bolt ("D") one full counterclockwise turn at a time. Repeat this procedure on all isolators, one at a time.
8. Continue adjusting each isolator until a minimum of 1/4" (6.35 mm) clearance is achieved between the lower housing and upper housing. (Refer to *Figure 36 on page 66*).
9. Fine adjust isolators to level equipment.
10. Installation is complete.



NOTE:

Other materials, compounds or finishes with equal or superior properties may be submitted as they become available

FIGURE 36 - CROSS SECTIONAL VIEW OF ONE INCH DEFLECTION SPRING ISOLATOR

ONE INCH DEFLECTION SPRING ISOLATORS

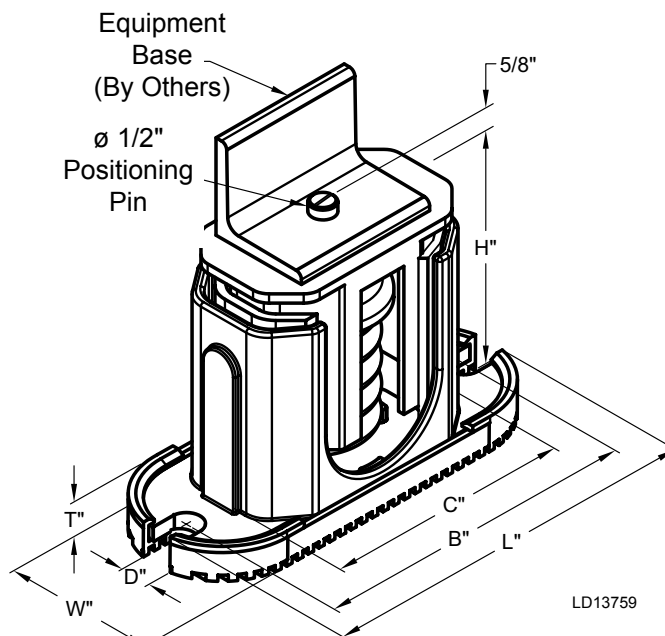


TABLE 12 - ONE INCH DEFLECTION SPRING ISOLATORS CROSS-REFERENCE

MOUNT TYPE	DIMENSION DATA (INCHES)						
	W	D	L	B	C	T	H
CP	3	5/8	7-3/4	6-1/2	4-3/4	1/2	5-5/8
C2P	3	5/8	10-1/2	9-1/4	7-3/4	9/16	6

MODEL NUMBER	COLOR CODE	RATED CAPACITY (FOR UNITS WITH ALL LOAD POINTS LESS THAN 1785 LBS (810 KG))		YORK P/N
		(LBS.)	(KG)	
CP-1D-510	BLACK	Up thru 434	Up thru 197	029-25334-002
CP-1D-900	DARK GREEN	435 thru 765	198 thru 347	029-25334-003
CP-1D-1200	GRAY	766 thru 1020	348 thru 463	029-25334-004
CP-1D-1360	WHITE	1021 thru 1156	464 thru 524	029-25334-005
CP-1D-1785N	GRAY/RED	1157 thru 1785	525 thru 810	029-25334-006

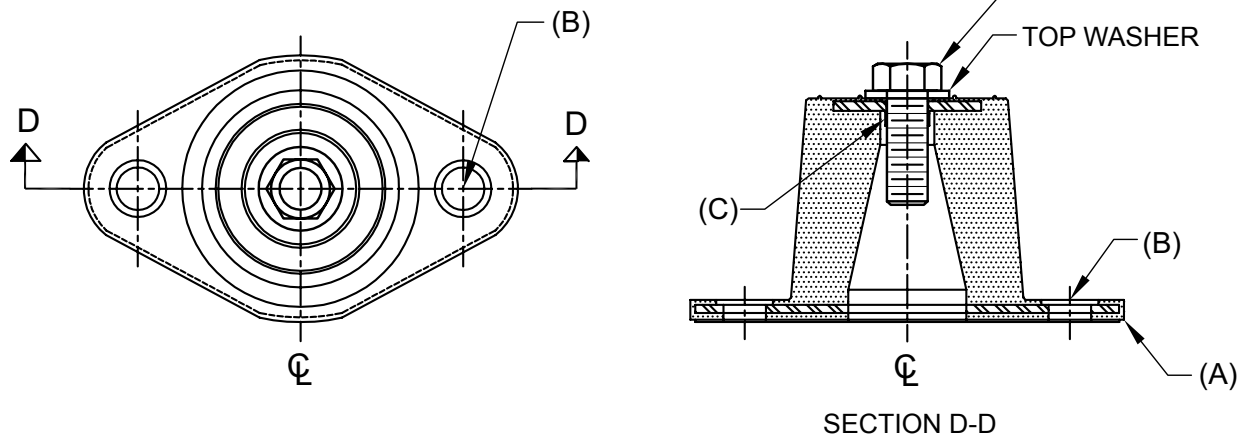
MODEL NUMBER	COLOR CODE	RATED CAPACITY (FOR UNITS WITH ANY LOAD POINT ABOVE 1518 LBS (689 KG))		YORK P/N
		(LBS.)	(KG)	
C2P-1D-1350	DARK PURPLE	Up thru 1148	Up to 521	029-25334-008
C2P-1D-1800	DARK GREEN	1149 thru 1530	522 - 694	029-25334-009
C2P-1D-2400	GRAY	1531 thru 2040	695 - 925	029-25334-010
C2P-1D-2720	WHITE	2041 thru 2312	926 - 1049	029-25334-012
C2P-1D-3570N	GRAY/RED	2313 thru 3570	1050 - 1619	029-25334-013

NOTES:

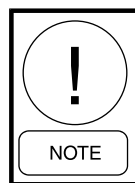
1. All dimensions are in inches per ANSI Y14.
2. Standard finish: Housing - Powder coated Spring - Powder coated. (Color: see Table Hardware - Zinc electroplate.
3. Installation requires bolting or anchoring mount to support structure with a min. (2) 5/8" dia. bolt or (2) 1/2" dia. concrete anchors.
4. All springs are designed for 50 % over-travel.
5. Refer to next page for Installation Instructions.
6. Isolators with 1" deflection (Pin 54 = 1) must be of the same class for the entire unit. IE. Must use C2P's at all locations on a selected unit, or all CP's.
7. * Value is de-rated by 15%.

INSTALLATION OF ELASTOMERIC ISOLATORS

1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad, or sub-base, ensuring that all isolator centerlines match the equipment mounting holes. The VMC group recommends that the isolator base (A) be installed on a level surface. Shim or grout as required, leveling all isolator bases to the same elevation [1/32-inch (0.794 mm) maximum difference can be tolerated].
4. Bolt or anchor all isolators to supporting structure utilizing base thru holes (B).
5. Remove top bolt and top washer. Place equipment on top of isolators so that mounting holes in equipment or base line up with threaded hole (C).
6. Reinstall top bolt and washer and tighten down.
7. Installation is complete.



LD13762C

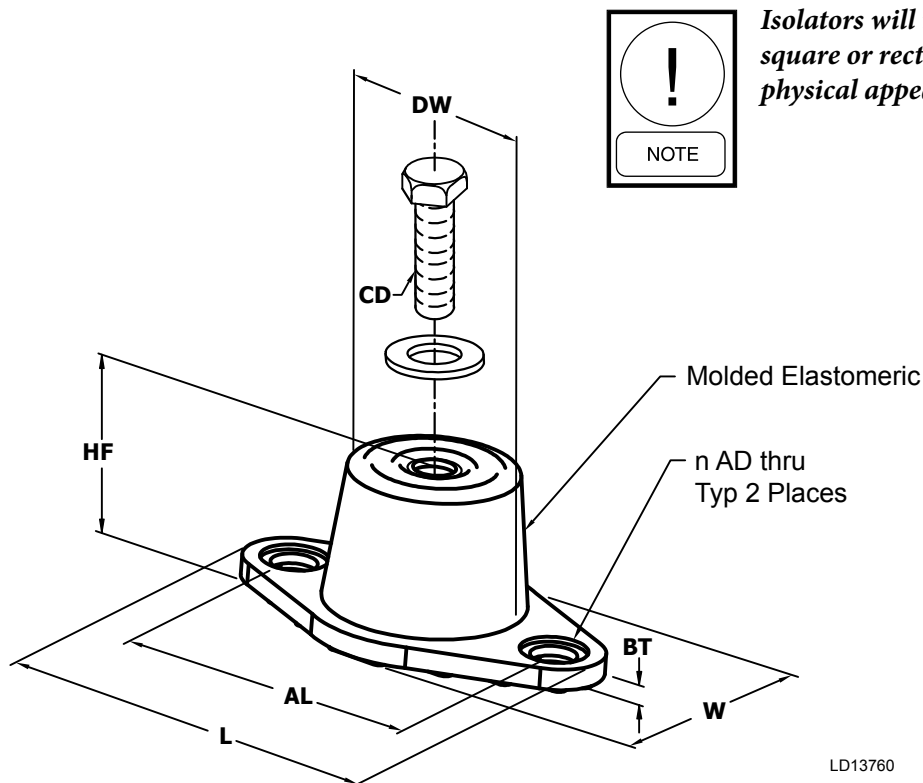


Isolators will typically appear square or rectangular in physical appearance.

FIGURE 37 - ELASTOMERIC ISOLATOR CROSS SECTIONAL VIEW

ELASTOMERIC ISOLATOR CROSS REFERENCE

RD-Style Isolators



MOUNT TYPE	DIMENSION DATA inches / (mm)							
	L	W	HF	AL	AD	BT	CD	DW
RD1-WR	3.13 (79.50)	1.75 (44.45)	1.25 (31.75)	2.38 (60.45)	0.34 (8.64)	0.19 (4.83)	5/16-18 UNC X 3/4 (M14 X 2)	1.25 (31.75)
RD2-WR	3.88 (98.55)	2.38 (60.45)	1.75 (44.45)	3.00 (76.20)	0.34 (8.64)	0.22 (5.59)	3/8-16 UNC X 1 (M18 X 2.5)	1.75 (44.45)
RD3-WR	5.50 (139.7)	3.38 (85.85)	2.88 (73.15)	4.13 (104.90)	0.56 (14.22)	0.25 (6.35)	1/2-13 UNC X 1 (M27 X 3)	2.50 (63.50)
RD4-WR	6.25 (158.75)	4.63 (117.6)	2.75 (69.85)	5.00 (127.00)	0.56 (14.22)	0.38 (9.65)	1/2-13 UNC X 1 (M27 X 3)	3.00 (76.20)

MODEL NUMBER	ISOLATOR COLOR	WEIGHT RANGE (LBS)	WEIGHT RANGE (KGS)	YORK P/N
RD-3-CHARCOAL-WR	CHARCOAL	Up thru 825	UP TO 374	029-25335-001
RD-4-BRICK RED-WR	BRICK RED	826 thru 1688	375 - 766	029-25335-002
RD-4-CHARCOAL-WR	CHARCOAL	1689 thru 4000	767 - 1814	029-25335-004

NOTES:

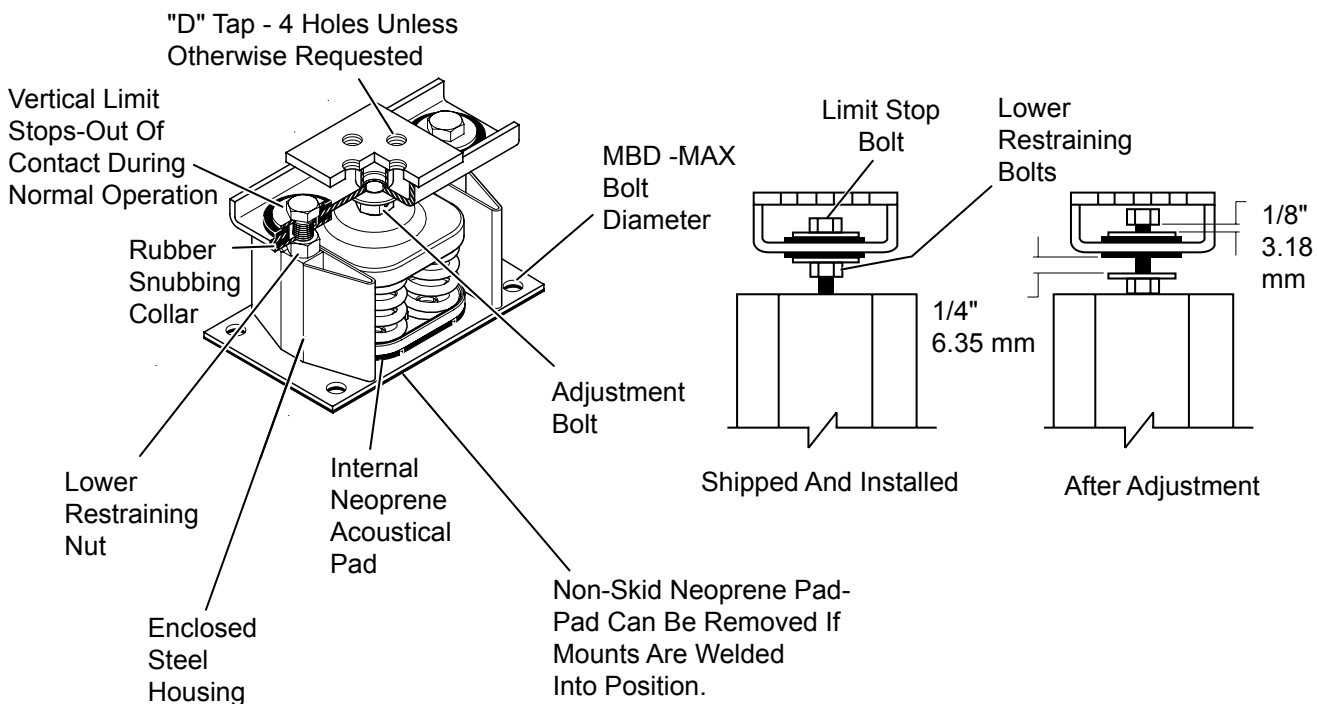
1. All dimensions are in inches (mm) per ANSI Y14.
2. Refer to next page for Installation Instructions.
3. Mount molded in weather resistant durulene compound as standard; also available in other materials such as natural rubber, extreme high temperature silicone, high-damped silicone, nitrile and EDPM.
4. AL = Mounting hole center to center spacing.
5. HF = Free height of mount, prior to loading. Operating height calculated by the free height less the static deflection under load. All dimensions for reference only.
6. Hardware - Zinc electroplate.

FIGURE 38 - ELASTOMERIC ISOLATOR DATA

TWO INCH DEFLECTION ISOLATOR INSTALLATION AND ADJUSTMENT

To install and adjust mounts:

1. Supports for mountings must be leveled to installation's acceptable tolerances.
2. Mountings not subjected to seismic or wind forces do not require bolting to supports.
3. Mountings subjected to seismic or wind forces must be bolted or welded in position.
4. If mountings are welded in position, remove lower friction pad before welding.
5. Set mountings with top channels held in place by the lower restraining nuts and limit stops.
6. Place equipment on mountings and secure by bolting or welding.
7. Hold lower restraining nut in place and turn vertical limit stop bolt counter-clockwise until there is a 1/8" gap between the bolt head and the steel washer.
8. Turn adjustment bolt 8 turns on each mount.
9. Take one additional complete turn on each adjustment bolt in sequence until the top plate lifts off of the lower restraining nuts. Take no additional turns on that mount. Continue with equal turns on the other mounts until the top plates lift off of the lower restraining nuts of all mounts.
10. Hold the limit stop bolt in place and turn the lower restraining nut clockwise and tighten it against the stanchion. Repeat the same procedure on all mounts.
11. Top plate should remain at a fixed elevation, plus or minus 1/8" (3.18 mm).

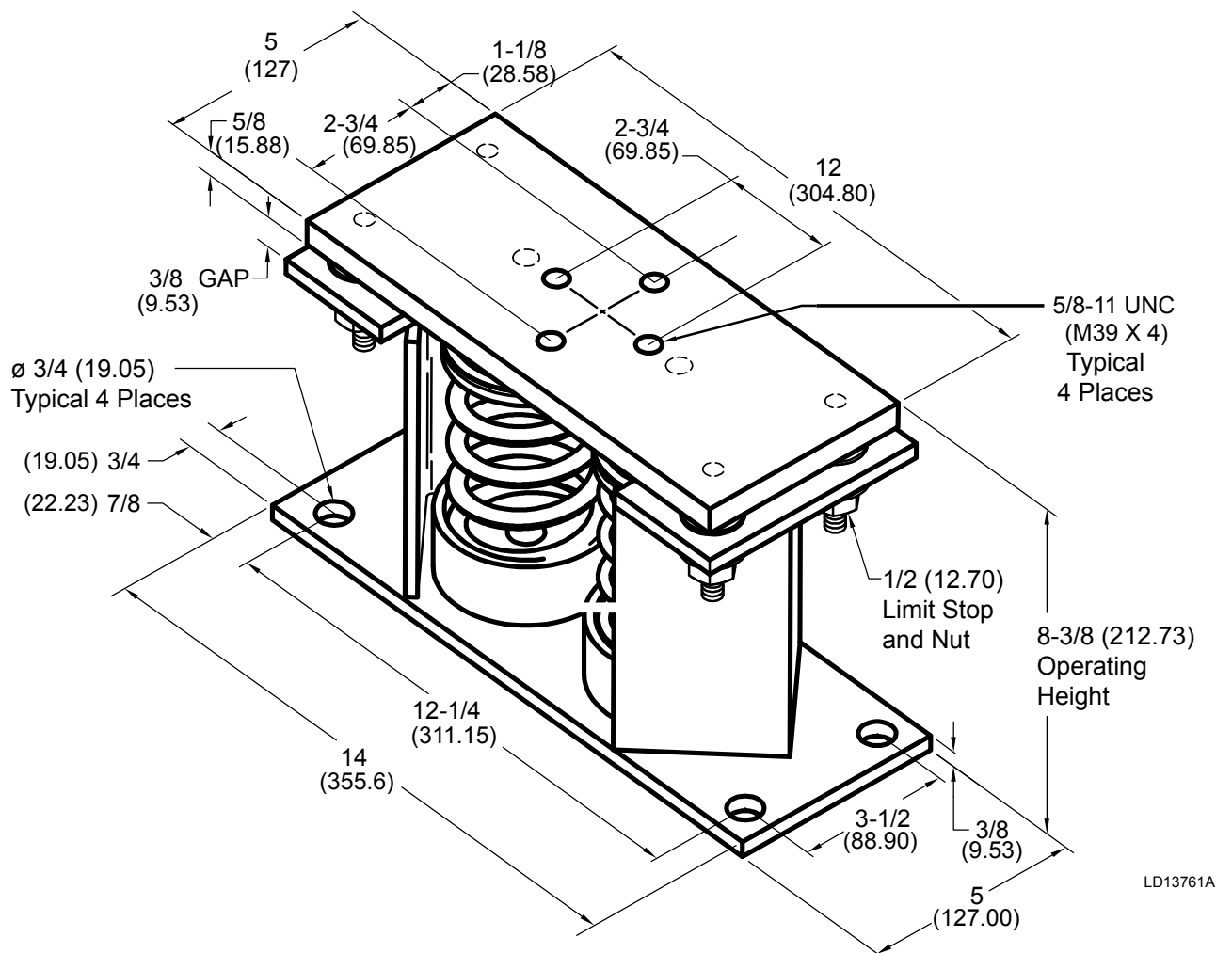


LD10568

FIGURE 39 - TWO INCH DEFLECTION ISOLATOR

TWO INCH DEFLECTION RESTRAINED SPRING ISOLATOR

Y2RS



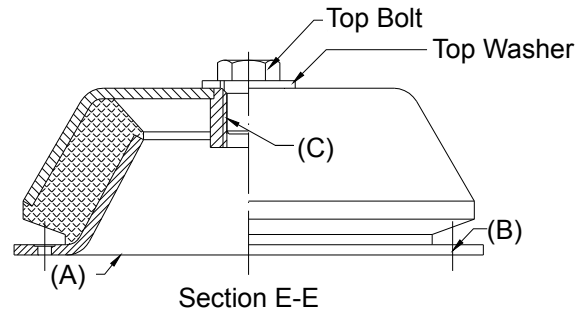
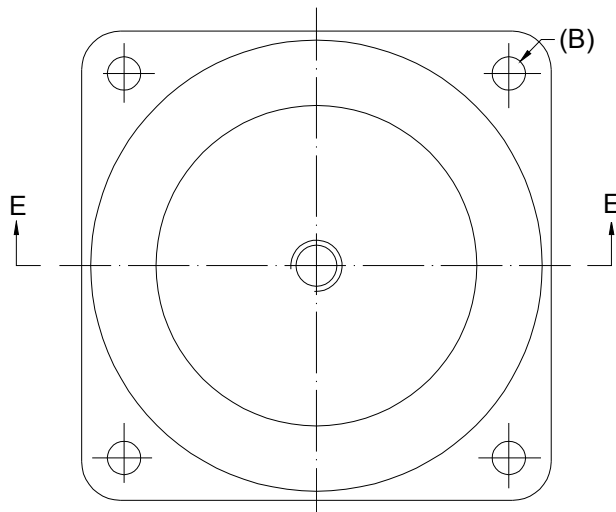
* WEIGHT RANGE (LBS)	* WEIGHT RANGE (KGS)	MODEL P/N	COLOR	YORK P/N
Up to 391	Up to 177	Y2RSI-2D-460	GREEN	029-25336-006
392 through 604	178 through 274	Y2RSI-2D-710	DK BROWN	029-25336-008
605 through 740	275 through 336	Y2RSI-2D-870	RED	029-25336-009
741 through 1020	337 through 463	Y2RSI-2D-1200N	RED/BLACK	029-25336-010
1021 through 1437	464 through 652	Y2RSI-2D-1690	PINK	029-25336-011
1438 through 2244	653 through 1018	Y2RSI-2D-2640N	PINK/GRAY	029-25336-012
2245 through 2618	1019 through 1188	Y2RSI-2D-2870N	PINK/GRAY/ORANGE	029-25336-013
2619 through 3740	1189 through 1696	Y2RSI-2D-3280N	PINK/GRAY/DK BROWN	029-25336-014

* Value is de-rated by 15%

NOTES:

1. All dimensions are in inches (mm), interpret per ANSI Y14. Standard finish: housing-powder coated (color, black), spring-powder coated (color, see table above) hardware - zinc-electroplate.
2. Equipment must be bolted or welded to the top plate to meet allowable seismic ratings.
3. All springs are designed for 50% overload capacity with exception of the 2D-3280N and 2D-2870.
4. Refer to next page for installation instructions.
5. Consult factory for concrete installation.

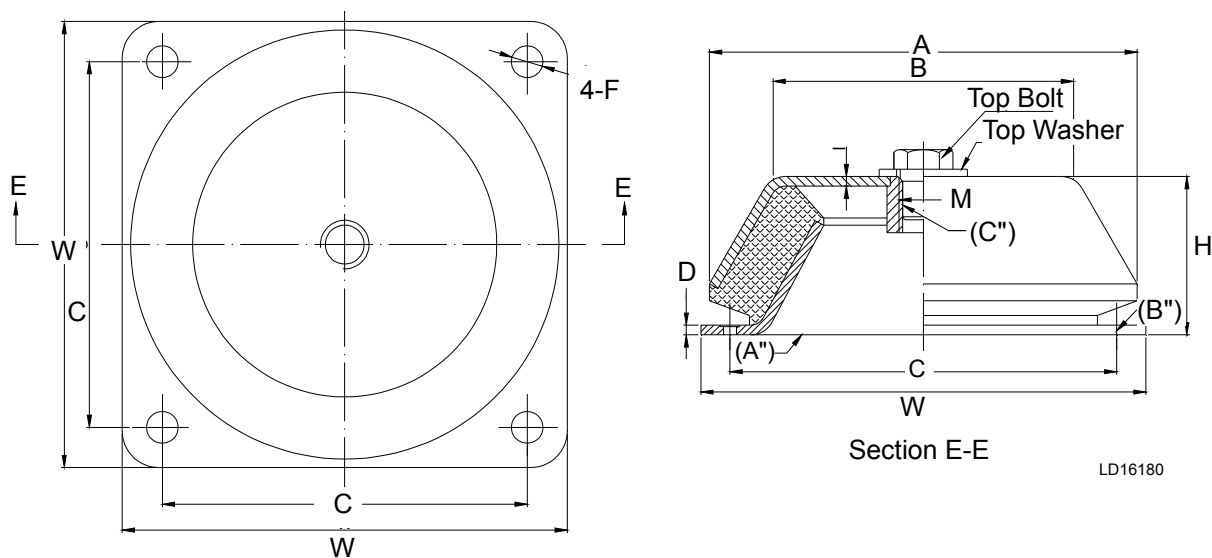
FIGURE 40 - SEISMIC ISOLATOR DATA

ELASTOMERIC ISOLATOR INSTALLATION (GB CERTIFIED UNITS)

LD16179

1. Read the following instructions before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on the floor, housekeeping pad or subbase, ensuring that all isolator centerlines match the equipment mounting holes. It is recommended that the isolator base (A) be installed on a level surface. Shim or grout the isolator as required, leveling all isolator bases to the same elevation. The maximum difference that can be tolerated is 0.03125" (0.78 mm).
4. Bolt or anchor all isolators to the supporting structure utilizing base thru holes (B).
5. Remove the top bolt and top washer. Place equipment on top of the isolators so that the mounting holes in the equipment or base line up with the threaded hole (C).
6. Reinstall the top bolt and washer and tighten the bolt down.

ELASTOMERIC ISOLATOR SPECIFICATIONS (GB CERTIFIED UNITS)



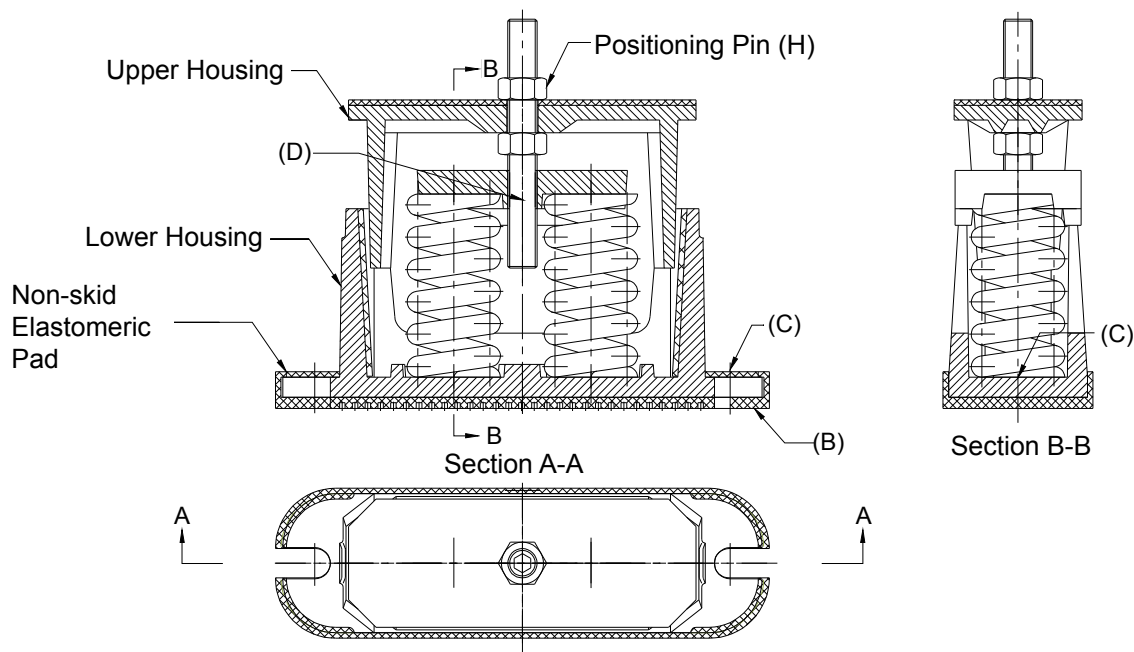
MOUNT TYPE	DIMENSION DATA (MM)							
	A	B	C	W	H	D	M	F
JG 1	Φ 146	Φ 95	125	150	55	3	M16	Φ 13
JG 2	Φ 176	Φ 125	150	183	65	4	M20	Φ 13

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

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

NOTES:

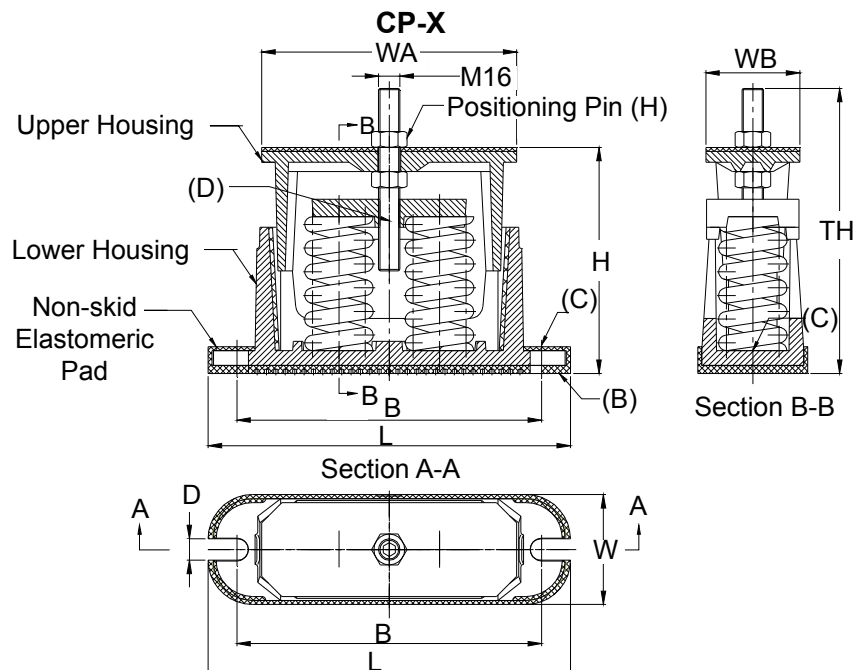
1. All dimensions are in millimeters.
2. Use either all JG 1's or all JG 2's at all locations on a unit.
3. Installation requires bolting or anchoring mount to support structure with 4 x 0.5122" (4 x 13.0 mm) diameter bolts or 2 x 0.5" (2 x 12.7mm) diameter concrete anchors.

ONE INCH DEFLECTION ISOLATOR INSTALLATION (GB CERTIFIED UNITS)

LD16181

1. Read the following instructions before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on the floor, housekeeping pad or subbase, ensuring that all the isolator centerlines match the equipment mounting holes. It is recommended that the isolator base (B) be installed on a level surface. Shim or grout the isolators as required, leveling all isolator bases to the same elevation. The maximum difference that can be tolerated is 0.25" (6.3 mm).
4. Bolt or anchor all isolators to the supporting structure utilizing base slotted holes (C).
5. Place the equipment on top of the isolators making sure that the mounting holes on the equipment line up with the isolator positioning pin (H).
6. Ensure the equipment is at full operating weight before adjusting the isolators.
7. Adjust each isolator in sequence by turning the spring adjusting bolt (D) one full counterclockwise turn at a time. Repeat this procedure on all isolators, one at a time.
8. Continue adjusting each isolator until the same clearance is achieved between the lower housing and the upper housing for all isolators.
9. Fine adjust isolators to level the equipment.

ONE INCH DEFLECTION ISOLATOR SPRING ISOLATOR (GB CERTIFIED UNITS)



LD16182

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

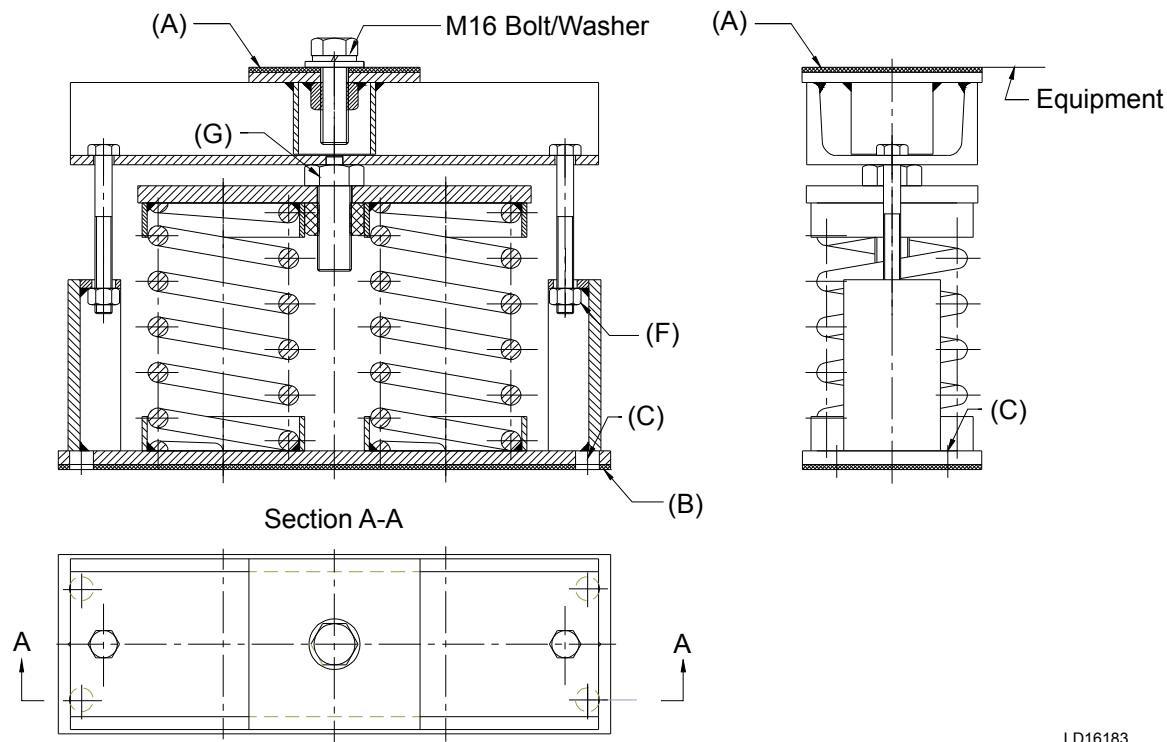
MODEL NUMBER	SPRING NUMBER	RATED CAPACITY FOR UNITS WITH ALL LOAD POINTS LESS THAN 1808 LBS (820 KG)		
		WEIGHT RANGE		PART NUMBER
		(LBS.)	RANGE (KG)	
CP-2-200	2	Up thru 441	Up thru 200	028G00031A028
CP-2-300	2	442 thru 661	201 thru 300	028G00031A029
CP-2-400	2	662 thru 882	301 thru 400	029G23000A018
CP-2-550	2	883 thru 1213	401 thru 550	029G23000A019
CP-2-680	2	1214 thru 1499	551 thru 680	028G00031A030
CP-2-820	2	1500 thru 1808	681 thru 820	029G23000A020

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

NOTES:

1. All dimensions are in millimeters.
2. Use either all CP-2's or all CP-4's at all locations on a unit.
3. Installation requires bolting or anchoring mount to support structure with 2 x 0.625" (2x16 mm) diameter bolts or 2 x 0.5" (2x12.7mm) diameter concrete anchors.

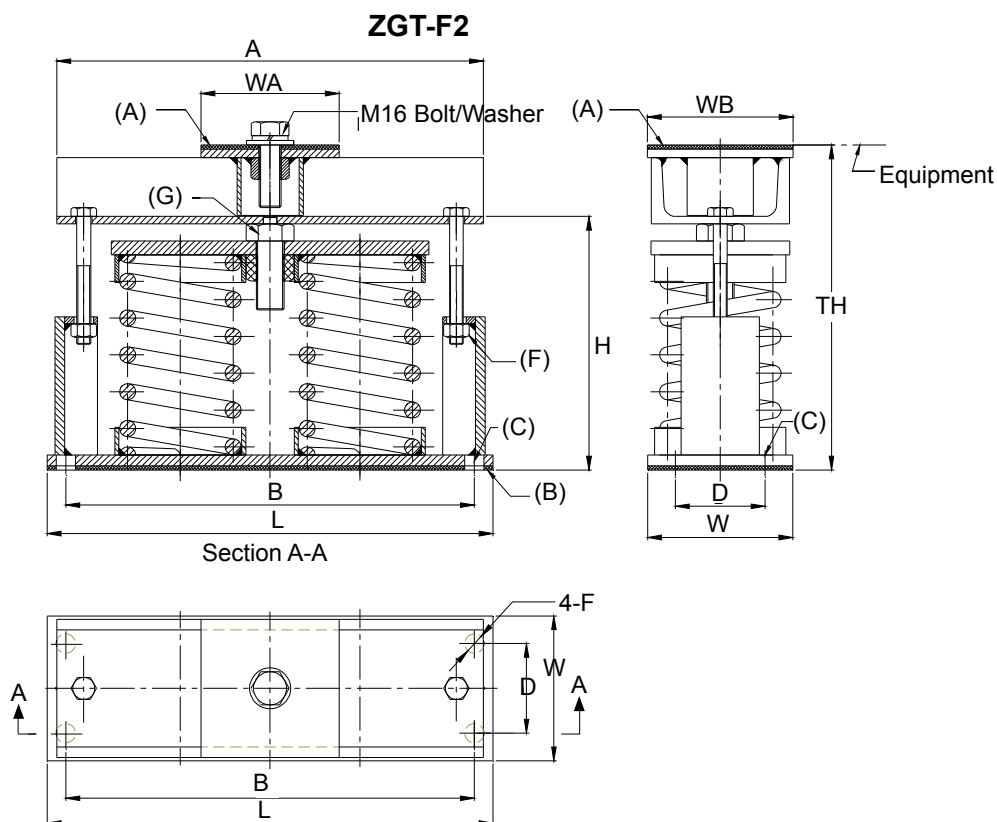
TWO INCH DEFLECTION ISOLATOR INSTALLATION AND ADJUSTMENT (GB CERTIFIED UNITS)



LD16183

1. Read the following instructions before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on the floor, housekeeping pad, or subbase, ensuring that all isolator centerlines match the equipment mounting holes. It is recommended that the isolator base plates (B) be installed on a level surface. Shim or grout the isolators as required, leveling all isolator bases to the same elevation. The maximum difference that can be tolerated is 0.25" (6.35 mm).
4. Bolt or anchor all isolators to the supporting structure utilizing base plate thru holes (C) or weld the base plate to the supporting structure with 0.375" (9.5mm) fillet weld 2"(50.8mm) long @ 4" (101.6mm) on center around the entire base plate; or as engineered for specific load and or field conditions.
5. Ensure the equipment is at full operating weight before adjusting the isolators.
6. Bolt or anchor all isolators to the supporting structure utilizing the base slotted holes (C).
7. Place equipment on top of the isolators making sure that mounting holes of the equipment line up with the isolator M16 bolt.
8. Adjust each isolator in sequence by turning spring adjusting nuts (G) one full clockwise turn at a time. Repeat this procedure on all isolators, one at a time. Continue adjusting each isolator until the same clearance is achieved between the lower housing and top plate. Check the limit stop lock nuts (F) periodically to ensure that clearance between the washer and grommet is maintained.
9. Fine adjust the isolators to level equipment.
10. Adjust all limit stop lock nuts (F) per isolator, maintaining a gap between 0.25" (6.3mm) to 0.375" (9.5mm). The limit stop lock nuts must be kept at this gap to ensure uniform bolt loading during uplift (as is the case when equipment is drained)

TWO INCH DEFLECTION, RESTRAINED SPRING ISOLATOR (GB CERTIFIED UNITS)



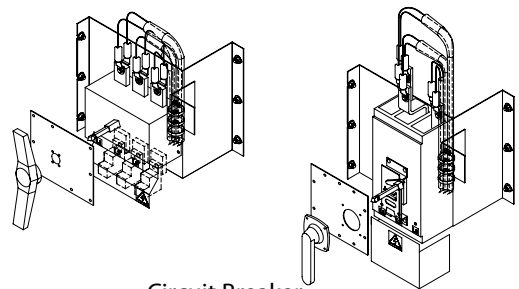
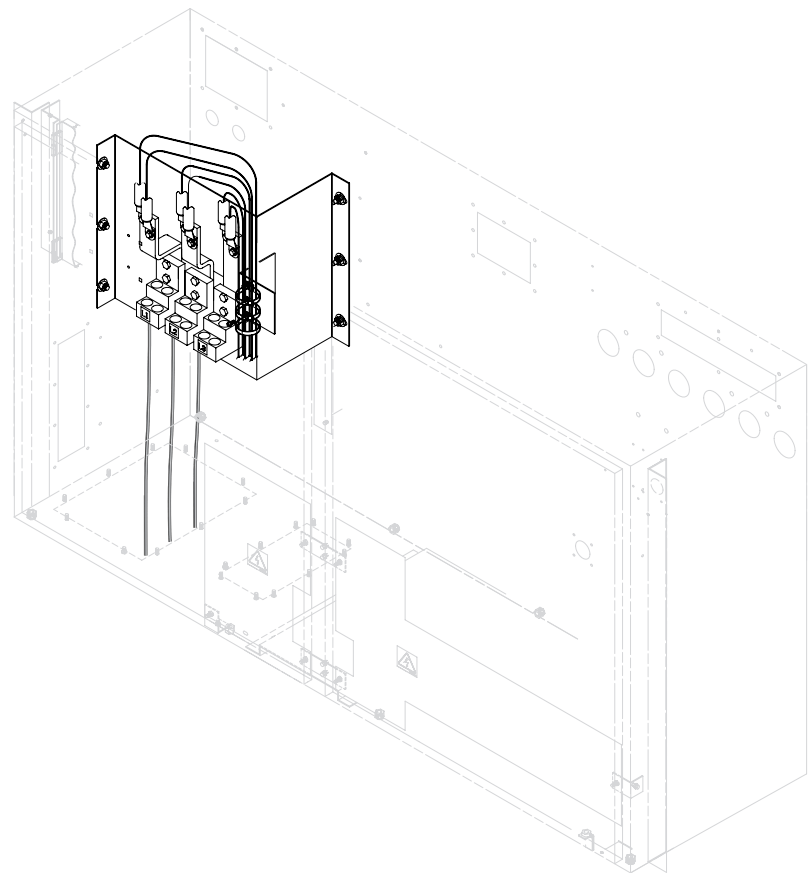
MOUNT-TYPE	DIMENSION DATA (MM)									
	A	WA	WB	W	H	TH	B	L	D	F
ZGT-F2	290	110	110	110	150	200	283	310	60	Φ16

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

NOTES:

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

2 COMPRESSOR POWER WIRING CONNECTIONS
FOR SINGLE POINT CONNECTION



Circuit Breaker
(Optional)

LD17319



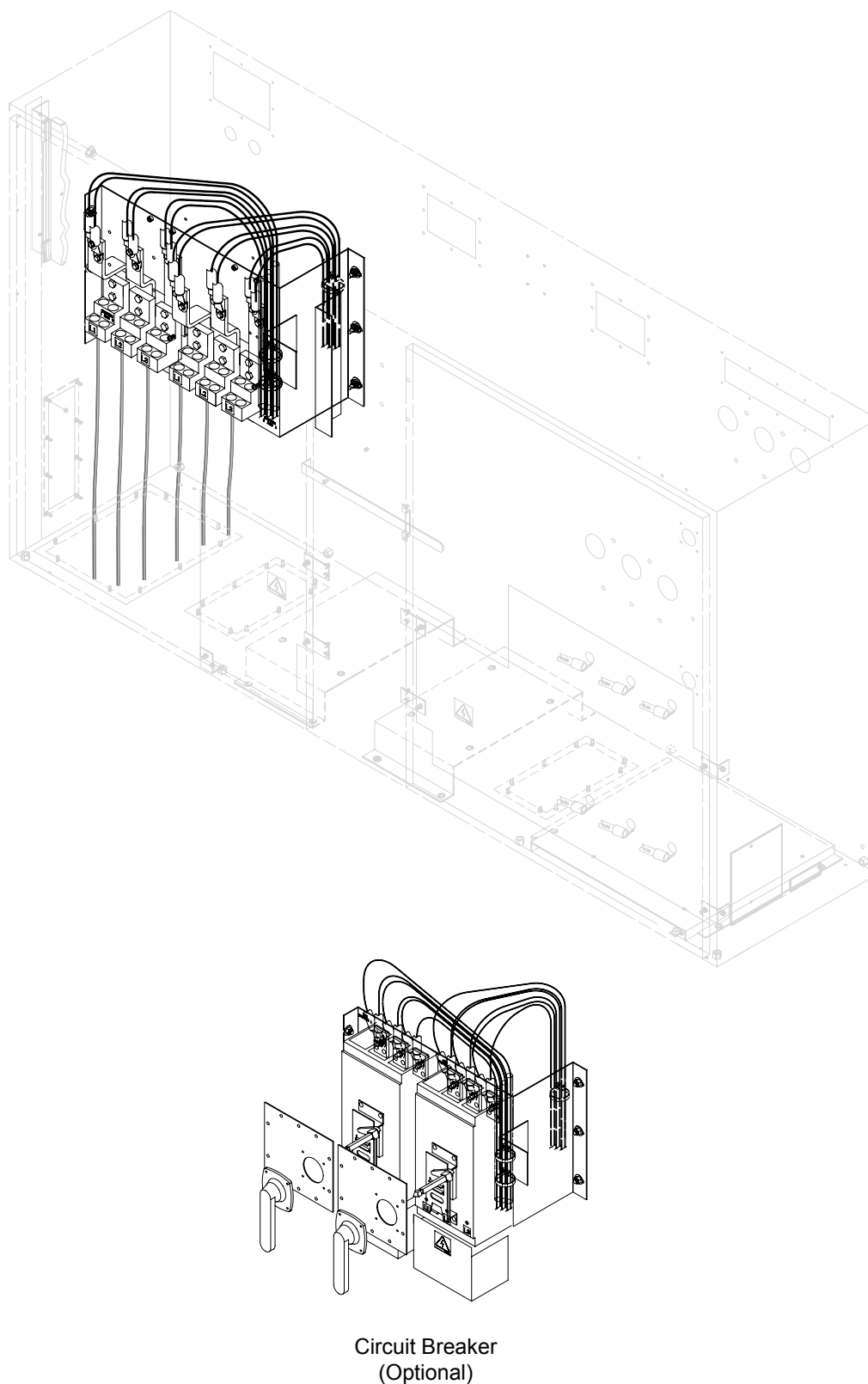
Minimum Circuit Ampacity (MCA), Minimum/Maximum Fuse Size and Minimum/Maximum Circuit Breaker size varies on chillers based upon model and options ordered. Consult YorkWorks or the chiller data plate for electrical data on a specific chiller.

Voltage Utilization Range

RATE VOLTAGE	UTILIZATION RANGE
200/60/3	180-220
230/60/3	208-254
380/60/3	342-402
460/60/3	414-508
575/60/3	520-635
400/50/3	360-440

FIGURE 41 - POWER WIRING - 2 COMPRESSOR CONNECTIONS

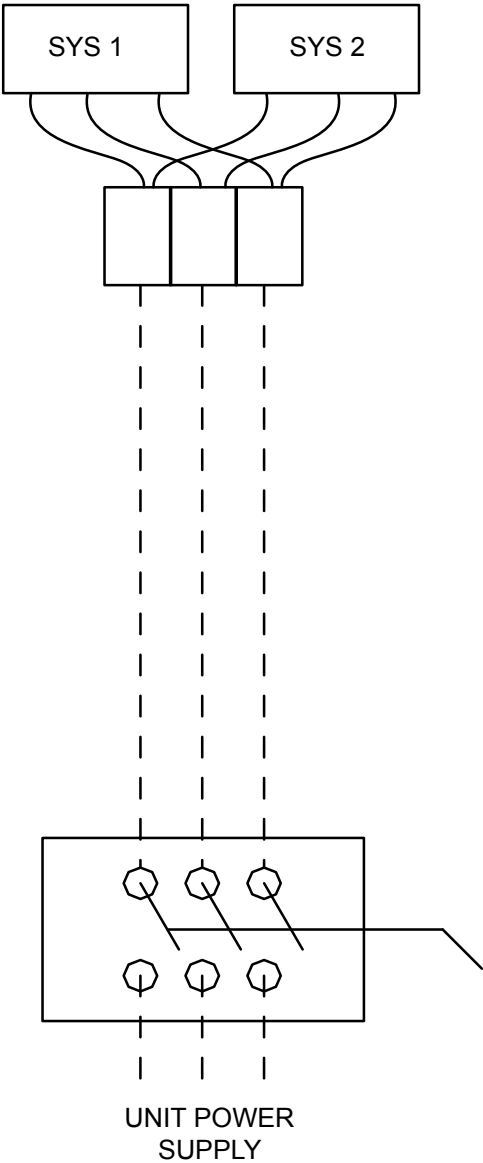
2 COMPRESSOR POWER WIRING CONNECTIONS FOR MULTIPOINT CONNECTION



LD17320

FIGURE 41 - POWER WIRING - 2 COMPRESSOR CONNECTIONS (CONT'D)

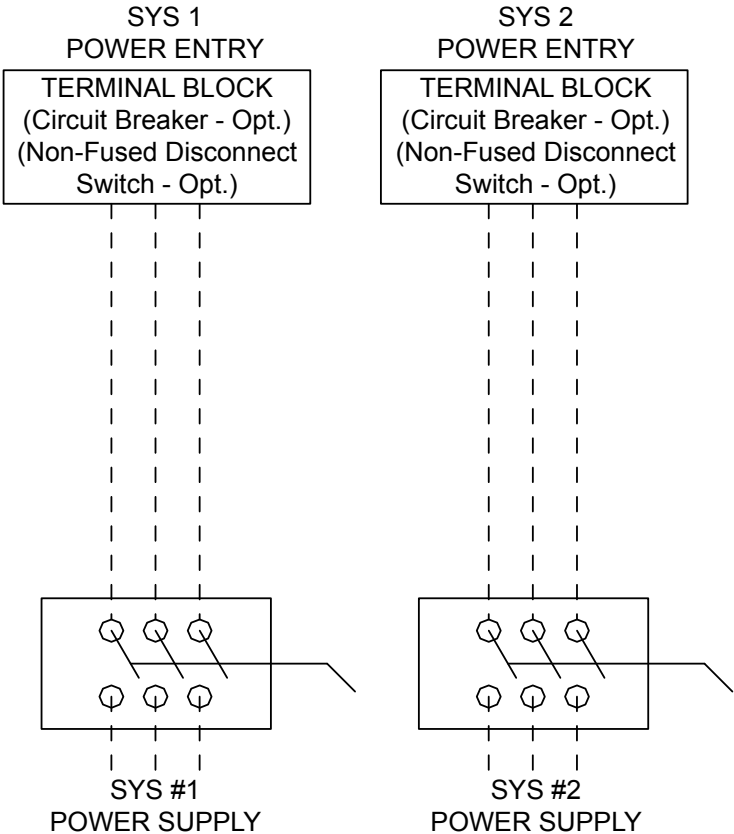
**SINGLE POINT CONNECTIONS
VSD CONTROL PANEL**



LD17318

FIGURE 42 - SINGLE POINT CONNECTIONS FOR VSD CONTROL PANEL

MULTIPOINT CONNECTIONS
VSD CONTROL PANEL



NOTE: Sys #1 and Sys #2 Power connections located on left side mid panel

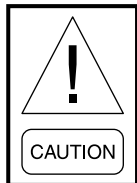
LD17317

FIGURE 43 - MULTIPOINT CONNECTIONS FOR VSD CONTROL PANEL

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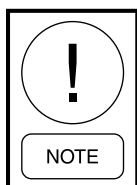
SECTION 6 - COMMISSIONING

PREPARATION



Commissioning of this unit should only be carried out by Johnson Controls Authorized personnel.

Commissioning personnel should be thoroughly familiar with the information contained in this document before starting the unit.



Commission the unit using the detailed checks outlined in the Equipment Pre - Startup Checklist and Startup Checklist found at the end of this section.

The following basic checks should be made with the customer power to the unit switched OFF.



Proper electrical lock out and tag out procedures must be followed.

Inspection

Inspect unit for installation damage. If found, take action and/or repair as appropriate.

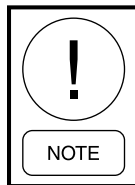
Refrigerant Charge

Packaged units are normally shipped as standard with a full refrigerant operating charge. Check that refrigerant pressure is present in both systems and that no leaks are apparent. If no pressure is present, a leak test must be undertaken, the leak(s) located and repaired.

Do not evacuate or liquid charge with static water in the evaporator. Turn the pump on. Take care to liquid charge slowly to avoid excessive thermal stress at the charging point and to assure the refrigerant temperature in the evaporator does not go below the freezing point with liquid refrigerant in the evaporator. Once the vacuum is broken, charge into the evaporator or flash tank with the Condenser Drain Valve (Flash Tank Feed) open and the chilled liquid pump ON to the full operating charge, as detailed in *SECTION 5 - TECHNICAL DATA*.

Correct System Refrigerant Charge

The charge on a system should always be checked when operating for several minutes at full speed with the system stable. Stable conditions are defined as operation without fan cycling, economizer cycling, VI solenoid cycling, or any other system transient conditions. Ideal refrigerant charge will be reached when the refrigerant level in the evaporator is near the middle of the evaporator sight glass.



Refrigerant should not be added or removed unless the level is at the bottom or the top of the glass. It is not necessary to weigh charge unless the entire charge has been lost. The ease of charging is possible since the microchannel coils hold only a small amount of refrigerant charge. A charging valve is located between the fixed orifice and the evaporator for adjusting charge. Charge should be added as liquid with the pump ON and liquid flowing through the evaporator. See Refrigerant Removal, Evacuation and Charging a YVFA Chiller on page 174

Service and Oil Line Valves

Open each compressor oil, economizer, and discharge ball or service valves. If valves are of the back-seat type, open them fully (counterclockwise) then close one turn of the stem to ensure operating pressure is fed to pressure transducers.

Compressor Oil

To add oil to a circuit - connect a YORK hand oil pump (Part No. 470-10654-000) to the 1/4" (6.35mm) oil charging valve on the oil separator piping with a length of clean hose or copper line, but do not tighten the flare nut. Using clean oil of the correct type ("L" oil), pump oil until all air has been purged from the hose then tighten the nut. Stroke the oil pump to add oil to the oil system. While the compressor is running at full speed, the oil level should be visible in the sight glass of the oil separator. Approximately 2 to 3.1 gallons (7.5 to 11.6 liters) are present in each refrigerant system. Avoid levels above the sight glass. This may cause excessive oil carryover in the system. High oil concentration in the system may cause nuisance trips resulting from incorrect readings on the level sensor and temperature sensors. Temperature sensor errors may result in poor liquid control which will result in liquid overfeed and

subsequently damage the compressor. High oil carry-over may also cause liquid to be returned to the compressor, which can damage the compressor.

Fans

Check that all fans are free to rotate and are not damaged. Ensure blades are at the same height when rotated. Ensure fan guards are securely fixed.

Isolation / Protection

Verify all sources of electrical supply to the unit are taken from a single point of isolation. Check that the maximum recommended fuse sizes given in the “Technical Data” section has not been exceeded.

Control Panel

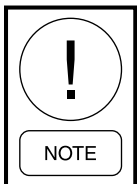
Check the panel to see that it is free of foreign materials (wire, metal chips, etc.) and clean out if required.

Power Connections

Check that the customer power cables are connected correctly to the terminal blocks or optional circuit breaker. Ensure that connections of power cables within the panels to the circuit breaker or terminal blocks are tight.

Grounding

Verify that the unit's protective ground terminal(s) are properly connected to a suitable grounding point. Ensure that all unit internal ground connections are tight.



Check PIN #54 on the unit's nameplate to identify whether the unit is an Open Loop or Closed Loop system.

Glycol Charging (Open Loop and Closed Loop)

Open Loop System:

In Open Loop units, the free cooling coil is shipped without a glycol charge. Before shipment, Nitrogen gas has been charged to free cooling coil to positive pressure, make sure no leak exist after arrival, prior to commissioning, a specific concentration of glycol needs to be charged into the glycol circuit. The amount of glycol charge depends on the volume of the coil, the cooler tube side, the piping system and water side of the air handling unit.

When charging the glycol to the chilled water piping system, ensure all vent valves at the top of coil are

open. Test all other air vent valves at different pipe sections to ensure they function properly.

Control the charging rate with a manual valve to prevent excessive glycol from overflowing out of the glycol system, especially when approaching the end of the glycol charging.

Closed Loop System:

Generally in Closed Loop units, the free cooling coil is shipped with a glycol charge. The amount of glycol in the system should be confirmed and more added if there was a loss of glycol during shipping.

When charging the glycol to chilled water piping system, ensure all vent valves at the top of coil are open. Test all other air vent valves at different pipe sections to ensure they function properly.

It is very important to control the charging rate with a manual valve to prevent excessive glycol from overflowing out of the glycol system, especially when approaching the end of the glycol charging.

Liquid System

Verify the chilled liquid system has been installed correctly, and has been commissioned with the correct direction of liquid flow through the evaporator. The inlet should be at the bottom connection on a two pass evaporator. Purge air from the top of the evaporator using the plugged air vent mounted on the top of the evaporator body.

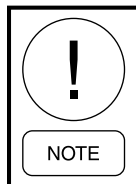
Flow rates and pressure drops must be within the limits given in *SECTION 5 - TECHNICAL DATA*. Operation outside of these limits is undesirable and could cause damage.

If main power must be switched OFF for maintenance or shutdown, precautions must be taken. If there is a possibility of liquid freezing due to low ambient temperatures, the evaporator should be drained or power should be applied to the chiller. This will allow the evaporator heater to protect the evaporator from freezing down to 0°F (-17.7°C). Before placing the unit back in service, valves should be opened and power must be switched on (if power is removed for more than 8 hours) for at least 8 hours (24 hours if ambient temperature is below 86°F [30°C]) before the unit is restarted.

Expansion Tank (Closed Loop)

The free cooling glycol system are a closed loop. This makes the glycol solution expand or contract with the changes in ambient temperature. The expansion tank

can buffer the pressure change and protect the glycol solution system from cracking or exploding during extreme pressure changes.



Do not release the gas in the expansion tank. If gas is released, the expansion tank will cease to function. Only non-condensable gas, such as air or Nitrogen, can be charged into it to restore its function. Refer to the vessel nameplate for specific gas pressure.

Flow Switch

Verify the chilled water flow switch is correctly fitted in the customer's piping on the evaporator outlet, and wired in the control panel correctly with shielded cable.

There should be a straight run of at least five pipe diameters on either side of the flow switch. The flow switch should be connected to Terminals 2 and 13 in the panel.

Temperature Sensor(s)

Ensure the leaving liquid temperature sensor is coated with heat conductive compound (Part No. 013-00890-000) and is inserted to the bottom of the water outlet sensor well in the evaporator. This sensor is part of the pump control freeze protection operation. It provides some freeze protection and must always be fully inserted in the water outlet sensor well.

- Leaving Liquid Temperature Sensor
- Entering Liquid Temperature Sensor
- Evaporator Entering Liquid Temperature Sensor

Programmed Options

Verify that the options factory-programmed into the Micro Panel are in accordance with the customer's order requirements by pressing the OPTIONS key on the keypad and reading the settings from the display.

Programmed Settings

Ensure the system cutout and operational settings are in accordance with the operating requirements by pressing the PROGRAM key.

Date and Time

Program the date and time by first ensuring that the CLK jumper JP2 on the Chiller Control Board is in the ON position. Then press the DATE/TIME key and set the date and time (Refer to *SECTION 8 - MICROPANEL, Date/Time and Schedule Keys on page 135*).

Start/Stop Schedule

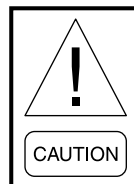
Program the daily and holiday start/stop by pressing the SCHEDULE key (Refer to *SECTION 8 - MICROPANEL, Schedule Key Operation on page 136*).

Setpoint and Remote Offset

Set the required leaving chilled liquid temperature setpoint and Control Range under the SETPOINTS key. The chilled liquid temperature control settings need to be set according to the required operating conditions.

If remote temperature reset (offset) is to be used, the maximum reset required must be programmed by pressing the SETPOINTS key (Refer to *SECTION 8 - MICROPANEL, Setpoints Key on page 127*).

FIRST TIME START-UP



During the commissioning period there should be sufficient heat load to run the unit under stable full load operation to enable the unit controls, and system operation to be set up correctly, and a commissioning log taken. Be sure that the chiller is properly programmed and the Equipment Pre Startup and Startup Checklist (located at the end of this section) are completed.

Interlocks

Verify that liquid is flowing through the evaporator and that heat load is present. Ensure that any remote run interlocks are in the run position and that the Daily Schedule requires the unit to run or is overridden.

Unit Switch

Place the UNIT switch on the keypad to the ON position.

Startup

Press the SYSTEM SWITCHES key and place the system switch for System 1 to the ON position. There may be a few seconds delay before the first compressor starts because of the anti-recycle timer). Be ready when each compressor starts, to switch the UNIT switch OFF immediately, if any unusual noises or other adverse conditions develop.

When a compressor is running, the controller monitors oil pressure, motor current, and various other system parameters such as discharge pressure, chilled liquid temperature, etc. Should any problems occur; the control system will immediately take appropriate action and display the nature of the fault.

Oil Pressure

When a compressor starts, press the relevant “System Pressures” key and verify that oil differential pressure (oil pressure-suction pressure) develops immediately. If oil pressure does not develop, the automatic controls will shut down the compressor. Under no circumstances should a restart attempt be made on a compressor, which does not develop oil pressure immediately. Switch the UNIT switch to the OFF position.

Loading

Once the unit has been started, all operations are fully automatic. After an initial period at minimum capacity, the control system will adjust the unit load depending on the chilled liquid temperature and rate of temperature change. If a high heat load is present, the controller will increase the speed of the compressor(s).

Condenser and Fan Rotation

Once a compressor is running, discharge pressure rises as refrigerant is pumped into the air-cooled condenser coils. This pressure is controlled by stages of fans to ensure maximum unit efficiency while maintaining sufficient pressure for correct operation of the condensers and the lubrication system.

As discharge pressure rises, the condenser fans operate in stages or ramp up in speed to control the pressure. Verify that the fans operate in the correct direction of rotation and operation is correct for the type of unit.

System Charge

Check system charge at steady full compressor load only and confirm that all fans are running for the system. The refrigerant level in the evaporator should be close to the middle of the sight glass. Unless levels are at the bottom or top of the sight glass, there is no cause for concern or require adding or removing charge.

3-Way Valve Control (Open Loop System Only)

"3-Way Valve" is also called "Free Cooling Valve".

A 3-way valve is used only in the open loop free cooling systems to control the flow direction of coolant. The 3-way valve only has two positions, fully open or fully closed. Verify whether this valve is opened or closed.

When free cooling mode is engaged, the 3-way valve will allow the coolant to flow through the free cooling coil and into the cooler before entering the air conditioned space.

When free cooling mode is disengaged, the 3-way valve will close access to the free cooling coil and open directly to the cooler.

Free Cooling Glycol Pump Control (Closed Loop System Only)

The free cooling glycol pump is used only in the closed loop free cooling system to circulate the glycol solution through the free cooling coil. Check this pump to ensure it is functioning as required.

The glycol solution rejects the heat and is cooled down by air flowing through the coil. The cooled glycol solution passes through the brazed plate heat exchanger where the glycol solution absorbs heat from the chilled water. The heated glycol solution will return to the pump and circulate again.

FREE COOLING OPERATION

The YVFA is a cooling only chiller with a free cooling option.

This unit has three different operational modes:

1. Mechanical Only mode

In this mode, the YVFA free cooling option is disabled either due to automatic control logic or operator setting. When operating in this mode, the YVFA functions very similar to a standard YVAA Air-Cooled Screw Compressor chiller.

2. Hybrid mode

In this mode, both the free cooling option and the compressor are operating together. When operating in this mode, the chilled water first flows through the free cooling coil and then enters the cooler to further cool down. All fans will run at the same speed based on the control logic to ensure maximum energy savings.

3. Free Cooling Only

In this mode, the YVFA free cooling option is only enabled; no compressor will run. When operating in this mode, cooling capacity is dependant on the free cooling system.

After completion of all component checks for System 1, switch SYS 1 OFF on the keypad and repeat the component check process for each subsequent system.

Verify all checks are completed as defined in the Equipment *Pre-Startup and Startup Checklist (Form 201.31-CL2)*. The chiller is now ready to be placed into operation.

tion. When all components are running correctly, stop the unit, change all applicable switches to the 'ON' position and restart the unit.

BRAZED PLATE HEAT EXCHANGER ANTIFREEZING (CLOSED LOOP ONLY)

The following are steps that have been taken to prevent the brazed plate heat exchanger (BPHX) from freezing up during sub-freezing ambient temperatures.

1. A check valve to prevent the cold glycol liquid sink to BPHX;
2. Proper glycol pump control, once detect the building liquid flow switch open, stop the glycol pump immediately;
3. Electrical Heater to prevent freezing up when unit stopped

Operation in Sub-freezing Conditions

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

- A. A 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.



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.

Unit Maintenance and Shutdown in Sub-freezing Conditions

If the YVFA is maintained or shutdown 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, leave the evaporator drain valves open.

-or-

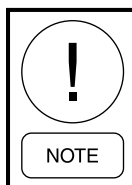
- C. **Refrigerant Valve - Off:** Close the water valves, close flash tank drain valves, close the suction service valves and leave power to the chiller for evaporator heater mat and waterbox heater operation. For units without a suction service valve, close the discharge and compressor oil valves.

-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.



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.



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

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SECTION 7 - OPERATION

OPERATING CONTROLS

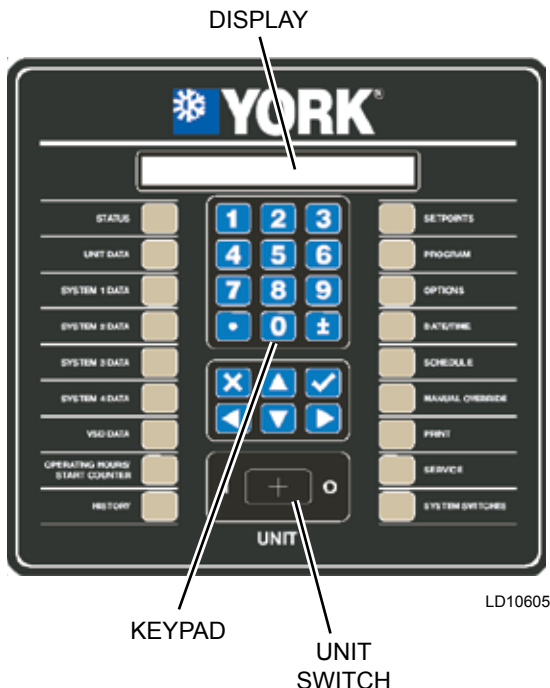


FIGURE 44 - KEYBOARD AND DISPLAY

Unit Switch

A double pole single throw ON/OFF rocker switch on the front of the control panel is used to turn the entire chiller ON and OFF. When the switch is placed in the OFF position, the entire unit shuts down immediately and all systems will be disabled. One pole of the UNIT switch contacts is wired to the Run Signal input and the Chiller Control Board “UNIT switch X” digital input (X equals System 1 or 2). Separate System Fuses are also wired in series with each set of UNIT switch contacts. If either fuse is pulled or blown, only the system with the good fuse (Input is high) will run. When both inputs are high, the entire chiller will be enabled to run. When both inputs are low, the chiller will be disabled as a UNIT switch OFF Shutdown.

Keypad

An operator keypad allows complete control of the system from a central location. The keypad offers a multitude of command keys on the left and right side of the keypad to access displays, program setpoints, history data, and initiate system commands. Most keys have multiple displays that can be accessed by repetitively pressing the key or by pressing the ▲, ▼, ◀, and ▶ (ARROW) keys. The keypad utilizes an overlay to convert the keypad to various languages.

The keypad also contains keys in the center section for data entry in the various program modes. These keys are listed below:

- 0-9 Keys NUMERIC KEYPAD
- PERIOD/DECIMAL
- +/- PLUS/MINUS
- ✓ ENTER
- X CANCEL
- ▲ UP ARROW
- ▼ DOWN ARROW
- ◀ LEFT ARROW
- ▶ RIGHT ARROW

The numeric keys allow keying numeric values into memory.

The • (PERIOD/DECIMAL) key allows keying a decimal point into numeric values.

The +/- (PLUS/MINUS) key allows making numeric values negative.

The ✓ (ENTER) key stores program changes into memory.

The X (CANCEL) key is used to cancel the data entry operation and returns the programmed value to the original value, before any programming changes were made, when an error is made.

The ▲ (UP ARROW) and ▼ (DOWN ARROW) keys allow scrolling backward (▲) and forward (▼) through items to be programmed under keys such as the PROGRAM or OPTIONS key.

The ▲ (UP ARROW) and ▼ (DOWN ARROW) keys also allow scrolling forward (▼) or backwards (▲) through data display keys that have multiple displays under keys such as UNIT DATA, SYSTEM DATA, HISTORY, PROGRAM, OPTIONS, etc. The arrow keys can be used instead of repeatedly pressing the data key to see the multiple displays under a key. Once the ▲ ▼ (ARROW) keys are pressed and used for scrolling, pressing the original data key will return to the first display message displayed under the data (UNIT DATA, SYSTEM DATA, etc.) keys.

The ◀ ▶ (LEFT and RIGHT ARROW) keys allow scrolling between non-numeric program choices under the OPTION, DATE/TIME, and SCHEDULE keys.

The ◀ (LEFT ARROW) key allows programming the default value when programming numeric values. For changing numeric values, the ▶ (RIGHT ARROW) key has no function.

The ◀ ▶ (ARROW) keys also allow scrolling sideways between the same displays on different systems. For example, pressing the ▶ (RIGHT ARROW) key while viewing the system #1 suction pressure moves the display to system #2 suction pressure.

Pressing the ◀ (LEFT ARROW) key moves the opposite direction. The arrow keys also allow fast scrolling through data under keys such as HISTORY by enabling the operator to move between subgroups of data such as Unit, System, and VSD data.

Keypad Data Entry Mode

For numeric programmable items, the data entry mode is entered by pressing any of the number keys, the decimal point key, or the +/- key. When the data entry mode is entered, the data from the key press will be entered and the cursor will appear under the position where the data is being entered.

For non-numeric programmable items, data entry mode is entered by pressing the ◀ or ▶ (ARROW) keys. When the data entry mode is entered, the cursor will appear under the first position of the non-numeric string. The programmable choice may be changed by pressing the ◀ or ▶ (ARROW) keys.

To exit the data entry mode and store the programmed value, the ✓ (ENTER) key must be pressed. When the ✓ (ENTER) key is pressed, the cursor will disappear.

The data entry mode may also be exited by pressing the X (CANCEL) key. The programmed data will be returned to its original value when the X (CANCEL) key is pressed.

When the data entry mode is exited, the cursor will disappear. If any other key is pressed while in the Data Entry Mode, the following display will appear for 2 seconds indicating the user must choose between accepting or canceling the change:

```
XXXXXXXXXX PRESS ✓ TO ACCEPT VALUE OR
X TO CANCEL DATA ENTRY
```

If the ✓ (ENTER) key was pressed from the data entry mode and the numeric value entered was out of range, the following message will appear for 2 seconds followed by the original data display.

```
XXXXXXXXXXXX OUT OF RANGE TRY AGAIN!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

Display

The 80 character (2 lines of 40 characters per line) display is a Liquid Crystal Display (LCD) used for displaying unit parameters, system parameters, and operator messages. The display has an LED backlight background for night viewing and is viewable in direct sunlight.

Anti-recycle Timer

On power-up of the control panel, the anti-recycle timer for each system will be set to 120 seconds and must time out before a compressor is allowed to start.

Whenever a system starts, the anti-recycle timer for all systems will be set to 120 seconds and will count down from the time the motor starts. The timer must time out before another compressor is allowed to start.

Whenever a system shuts down, the anti-recycle timer for that system will be set to 120 seconds. The timer must time out before the system is allowed to restart.

Evaporator Pump Control

The evaporator pump dry contacts are energized when any of the following conditions are true:

- If a Low Leaving Chilled Liquid Fault occurs.
- Whenever a compressor is running.
- The Daily Schedule is ON and the UNIT switch is ON.

Even if one of above is true, the pump will not run if the panel has been powered up for less than 30 seconds or if the pump has run in the last 30 seconds to prevent pump motor overheating.

Evaporator Heater Control

The evaporator heater is controlled by ambient air temperature. If no systems are running and the ambient temperature drops below 4.4 °C (40°F), the heater is turned ON. If no systems are running and the temperature rises above 7.2°C (45°F) the heater is turned OFF. Whenever a system is running, the evaporator heater is turned OFF. Both evaporator heater outputs will always be turned ON and OFF together. An

under voltage condition will keep the heater OFF until full voltage is restored to the system.

Compressor Heater Control

Each compressor has its own heater. The purpose of the heater is to assure refrigerant does not condense in the compressor. There is no oil sump, but refrigerant could possibly condense in the rotors or the motor housing. The heater will be OFF whenever the respective compressor is running. As soon as the compressor shuts OFF, the heater will turn ON as long as all motor temperature sensors in the compressor read less than 70°C (158°F). The heater will turn OFF, if any internal compressor motor temperature sensor reads more than 71.1°C (160°F).

Alarms

Each system has its own alarm. The Alarm output is ON (dry contact closed) when no fault condition is present and OFF (dry contact open) to indicate an alarm situation. The Alarm will be activated (contacts open), if any of the following are true.

- A System is faulted or inhibited from starting for more than 5 seconds.
- The Unit is faulted or inhibited from starting for more than 5 seconds.
- A System is locked out.
- The Unit is locked out.
- Power is removed from the chiller.

Chiller Run Contact

The Chiller Run dry contact is closed whenever any system is running. It is open when all systems are shut OFF.

Flow Switch Control

A chilled liquid flow switch of suitable type MUST be connected between Terminals 2 and 13 of 1TB to provide protection against loss of liquid flow, which will cause evaporator freeze-up if the chiller is permitted to run.

Remote Run / Stop

A Remote Run/Stop input is available for each system.

BASIC OPERATING SEQUENCE

Start Sequence and Loading

To initiate the start sequence of the chiller, the following conditions must be satisfied before the precharge of the DC Bus will take place:

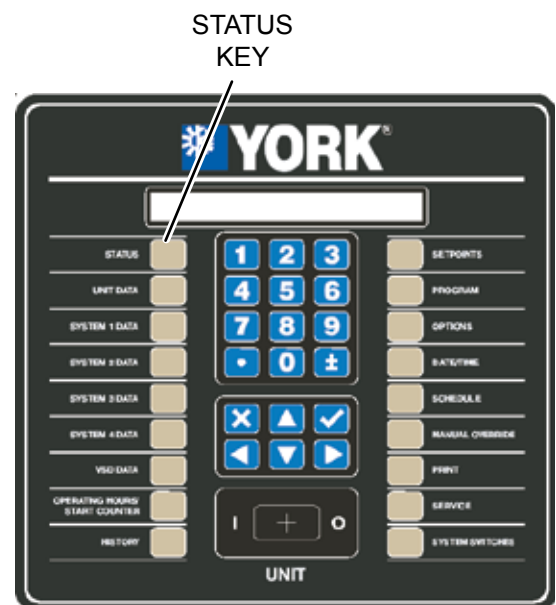
- UNIT SWITCH must be ON.
- At least one System Switch is ON
- Run permissive inputs (Remote Cycling Contacts) must be closed.
- No unit faults exist.
- No unit start inhibits exist.
- At least one system not faulted or inhibited.
- The Daily Schedule is calling for the chiller to run.
- The Flow Switch is closed.
- Leaving Chilled Liquid Setpoint is above the Setpoint plus CR (Setpoint High Limit).

Once the precharge takes place, if the anti-recycle timer is timed out the chiller control system on the Chiller Control Board will select the number of compressors to start and begin operation of the compressors. The compressor(s) speed will be ramped to the minimum start frequency and increase speed as needed in an effort to regulate the leaving chilled liquid temperature to meet the desired Setpoint.

UNIT WARNING

Unit Warning Operation

Unit warnings are caused when a condition is present requiring operator intervention to restart the unit. All setpoints, program values, and options should be checked before operating the unit. Warnings are not logged to the history buffer. If a unit warning is in effect, the message will be displayed to the operator when the STATUS key is pressed.



LD10605

Low Battery Warning

The LOW BATTERY WARNING can only occur at unit power-up. On micropanel power-up, the RTC battery is checked to see if it is still operational. If it is, normal unit operation is allowed. If the battery voltage is determined to be low, the following warning message is displayed indefinitely.

UNIT WARNING: !! LOW BATTERY !!
CHECK SETPOINTS/PROGRAM/OPTIONS/TIME

If a low battery condition exists, all programmed setpoints, program values, time, schedule, and history buffers will have been lost. These values will all be reset to their default values, which may not be the desired operating values. Once a bad battery is detected, the unit will be prevented from running until the MANUAL OVERRIDE key is pressed. Once the MANUAL OVERRIDE key is pressed, the anti recycle timers will be set to the programmed default anti recycle time to allow the operator sufficient time to check setpoints, program values, etc.

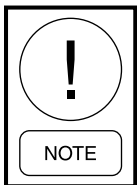
If a low battery is detected, it should be replaced as soon as possible. The programmed values will all be lost and the unit will be prevented from running on the next power interruption.

Invalid Number of Compressors Warning

The INVALID NUMBER OF COMPRESSORS SELECTED Warning will occur after the VSD has been initialized, if no "Number of Compressors Select" jumpers are installed or if more than 1 jumper is installed. The following warning message will be displayed indefinitely.

UNIT WARNING:
INVALID NUMBER OF COMPRESSORS SELECTED

To clear this warning, both the control panel and VSD control voltage must be turned OFF and the jumpers properly installed in the VSD wiring harness.



These jumpers are factory installed in the wire harness plug and should not require changes.

Invalid Serial Number Warning

If the INVALID SERIAL NUMBER message appears, immediately contact Johnson Controls Product Technical Support. The appearance of this message may mean

the chiller has lost important factory programmed information. The serial number can be entered using the SERVICE key.

UNIT WARNING: INVALID SERIAL NUMBER
ENTER UNIT SERIAL NUMBER

This status message can be bypassed to view additional messages under the STATUS key by pressing the STATUS key repeatedly to scroll through as many as three STATUS messages that could possibly be displayed at any time.

UNIT SAFETIES

Unit Safety Operation

Unit faults are safeties that cause all running compressors to be shut down, if a safety threshold is exceeded for 3 seconds. Unit faults are recorded in the history buffer along with all data on the unit and system operating conditions. Unit faults are auto reset faults where the unit will be allowed to restart automatically after the fault condition is no longer present. The only exception is any of the VSD related unit faults. If any 3 VSD unit faults occur within 90 minutes, the unit will be locked out on the last fault. A VSD lockout condition requires a manual reset using the system switches. Both system switches must be cycled OFF and ON to clear a VSD unit lockout fault. If a unit safety is in effect, the message will be displayed to the operator when the STATUS key is pressed.

In the descriptions of the fault displays that follow, the fault message will show a YYYYYYYY to indicate that a system is in a "FAULT" condition and will restart when the fault clears or LOCKOUT" and will not restart until the operator clears the fault using the keypad.

If a control panel safety occurs after the VSD fault, but before the fault is reset, the control panel fault is an ALL FAULT of the VSD fault, meaning it will be registered as such in the History because it occurred while the VSD was shutting down or while the systems were shut down. All faults do not store operating data at the time of the fault.

If a "VSD" fault occurs during the fault rampdown or while the systems are shut down, the VSD fault will be registered as a new fault. The reason for this is the belief any VSD fault should be registered with a full account of the systems data at the time of the fault.

High Ambient Temp Fault

If the ambient temperature rises above 54°C (130°F), the chiller will shut down with a controlled ramped shutdown. Restart will automatically occur, if demand allows, when temperature falls 1.1°C (2°F) below the cutout (52.9°C [128°F]). This fault cannot cause a lockout. The fault display message will be present only during the time when the ambient temperature is causing a fault condition. A sample display is shown below:

UNIT YYYYYYYY
HIGH AMBIENT TEMP

The unit will also be inhibited from starting any time the temperature is above 52.9°C (128°F).

Low Ambient Temp Fault

If the ambient temperature falls below the programmable Low Ambient Temp Cutout the chiller will shut down with a controlled ramped shutdown. This fault will only occur if the Low Ambient Cutout is “ENABLED” under the OPTIONS key. Restart can occur, if demand allows, when temperature rises 1.1°C (2°F) above the cutout. This fault cannot cause a lockout. The fault display message will be present only during the time when the ambient temperature is causing a fault condition. A sample display is shown below:

UNIT YYYYYYYY
LOW AMBIENT TEMP

The unit is also inhibited from starting any time the temperature is below the cutout plus 1.1°C (2°F).

Low Leaving Chilled Liquid Temp Fault

The Low Leaving Chilled Liquid Temp Cutout helps to protect the chiller from an evaporator freeze-up should the chilled liquid temp drop below the freeze point. This situation could occur under low flow conditions or if the Micro Panel setpoint values are improperly programmed. Any time the leaving chilled liquid temperature (water or brine) drops below the programmable cutout point, the chiller will fault and shutdown with a controlled ramped shutdown. Restart can occur, if demand allows, when chilled liquid temperature rises 2.2°C (4°F) above the cutout. This fault cannot cause a lockout. A sample shutdown message is shown below:

UNIT YYYYYYYY
LOW LEAVING CHILLED LIQUID TEMP

The unit is inhibited from starting any time the chilled liquid temperature is below the cutout plus 2.2°C (4°F).

VSD Communications Failure Fault

The VSD Communications Failure is to prevent the unit from trying to run, if the Chiller Control Board never initializes communications with the VSD Logic Board. The unit will also shut down with a controlled ramped shutdown if the Chiller Control Board loses communications with the VSD Logic Board while the chiller is operating.

On power-up, the Chiller Microprocessor Board will attempt to initialize communications with the VSD Logic Board. The control panel will request data from the VSD, which includes the number of compressors and the VSD software version. Once these data points have been received by the Chiller Control Board, and have been successfully initialized, the Chiller Control Board will not request them again. If the comms connection fails to occur and a reply from the VSD Logic Board does take place in 8 seconds, the Chiller Control Board will prevent the chiller from operating and a fault message will be displayed.

During normal operation, if the control panel Chiller Control Board receives no valid response to messages for 8 seconds, the unit will shut down all compressors on a Comms fault. The Chiller Control Board will continue to send messages to the VSD while faulted. The unit will be inhibited from starting until communications is established. The fault will automatically reset when the Chiller Control Board receives a valid response from the VSD for a data request. Shown below is an example of a Comms Failure fault message:

UNIT YYYYYYYY
VSD COMMUNICATIONS FAILURE

SYSTEM SAFETIES (FAULTS)

System Safety (Fault) Operation

System safeties are faults that cause individual systems to be shut down if a safety threshold is exceeded for 3 seconds. System faults are auto reset faults in that the system will be allowed to restart automatically after the 120 second anti-recycle timer times out. The only exception is after any 3 faults on the same system occur within 90 minutes, that system will be “locked out” on the last fault. The lockout condition requires a manual reset using the system switch. The respective system switch must be cycled OFF and ON to clear the lockout fault.

When multiple systems are operating and a system fault occurs, the running systems will ramp down and

the faulted system will be shut OFF and the previously operating will restart if required after the fault clears and/or the 120 second anti-recycle timer times out.

In the descriptions of the fault displays that follow, the fault message will show a YYYYYYYY to indicate that a system is in a "FAULT" condition and will restart when the fault clears, or "LOCKOUT" and will not restart until the operator clears the fault using the keypad. If a system safety is in effect, the message will be displayed to the operator when the STATUS key is pressed.

In some cases, a control panel fault will occur after a VSD fault, possibly during system shutdown or at some later time. This is known as an "ALL FAULT" and these faults will be recorded as such under the HISTORY information stored at the instant of the primary fault. In some cases, this information may be valuable in troubleshooting the primary fault. An example of the "ALL FAULT" history message is shown on *Page 120* under the HISTORY key. When an "ALL FAULT" occurs, associated history information will not be stored. If an additional fault does not occur, the "ALL FAULTS" display will indicate NONE.

In cases where a VSD fault occurs during the ramp-down of a control panel fault (i.e.: low suction pressure, low water temp, etc.), the VSD fault will be stored as a new fault with the associated fault information stored at the instant the VSD fault occurred (i.e.: IGBT Gate Drive, Single Phase Input, VSD CT Plug, etc.). The control panel fault that occurred prior to the VSD fault will be stored with the associated complete data related to the fault as a numerically lower numbered history in the history buffers.

High Discharge Pressure Cutout (Software) Fault

The High Discharge Pressure Cutout is a software fault. A system will fault and shut down with a controlled ramped shutdown on high discharge pressure when the discharger pressure rises above the programmed discharge pressure cutout for 0.5 seconds. The system will be allowed to restart when the discharge pressure falls to "The programmed pressure cutout-30 PSIG", the system will also be inhibited from starting if the discharge pressure is above "The programmed pressure cutout-30 PSIG". the fault message for this safety is shown below.

SYS X YYYYYYYY HIGH DISCHARGE PRESSURE

The X indicates the system and YYYYYYYY indicates the system is in a "FAULT" condition and will restart when the 120 second anti-recycle timer times out, or "LOCKOUT" and will not restart until the operator clears the fault using the keypad.

High Discharge Pressure Cutout (HPCO) (Hardware) Fault

The mechanical High Pressure Cutout protects the system from experiencing dangerously high discharge pressure. A system will fault and shut down immediately when the mechanical high pressure cutout contacts open. The fault will occur immediately and not wait 3 seconds, which is typical of most system faults. The HPCO is wired in series with the VSD Run Signal and will only be checked by the Chiller Control Board when the system is running. The mechanical cutout opens at 23.2 barg $\pm$ 0.55 barg (337 PSIG $\pm$ 8 PSIG) and closes at 17.4 barg $\pm$ 0.69 barg (252 PSIG $\pm$ 10 PSIG). The Status display fault message for this system is shown below:

SYS X YYYYYYYY HPCO FAULT

The X indicates the system and YYYYYYYY indicates the system is in a "FAULT" condition and will restart when the 120 second anti-recycle timer times out or "LOCKOUT" and will not restart until the operator clears the fault using the keypad.

Low Suction Pressure Cutout (Software) Fault

The programmable Low Suction Pressure Cutout is a secondary back-up for the flow switch and protects against operation with low refrigerant charge, which helps protect the chiller from an evaporator freeze-up, should the system attempt to run with a low refrigerant charge. The Status display fault message for this cutout is shown below:

SYS X YYYYYYYY LOW SUCTION PRESSURE

The X indicates the system and YYYYYYYY indicates the system is in a "FAULT" condition and will restart when the 120 second anti-recycle timer times out or "LOCKOUT" and will not restart until the operator clears the fault using the keypad. Typically, the cutout will be set at 1.65 barg (24 PSIG) for chilled water applications.

The cutout is ignored for the first 30 seconds of system run time. During the next 3 minutes of run time the

cutout point is linearly ramped from 10% of the cutout value up to the programmed cutout point. If at any time during the first 3 minutes of operation the suction pressure falls below the ramped cutout point, the system will shut down with a controlled ramped shutdown.

The cutout pressure during operating periods of 30 seconds to 210 seconds is ramped and can be calculated by:

After the first 3 minutes and 30 seconds of run time, if the suction pressure falls below the cutout as a result of a transient in the system, a transient timer is set at 30 seconds and a linearly ramped cutout is set starting at 10% of the programmed cutout. If over the next 30 seconds, the suction pressure does not stay above the ramped cutout, which ramps between 10% of the cutout and the programmed cutout over the 30 second period, the system will fault on low suction pressure.

Low Motor Current Cutout Fault

The Motor Current Cutout shuts the system down with a controlled ramped shutdown when the microprocessor detects the absence of motor current (less than 10% FLA), usually indicating that a compressor is not running. This safety is ignored for the first 10 seconds of operation.

The status display fault message for this safety is shown below:

SYS X YYYYYYYY LOW MOTOR CURRENT

The X indicates the system and YYYYYYYY indicates the system is in a “FAULT” condition and will restart when the 120 second anti-recycle timer times out or “LOCKOUT” and will not restart until the operator clears the fault using the keypad.

High Differential Oil Pressure Cutout Fault

The High Differential Oil Pressure Cutout protects the compressor from low oil flow and insufficient lubrication, possibly from a dirty oil filter. A system will fault and shut down with a controlled ramped shutdown when its Discharge to Oil Differential Pressure rises above the cutout of 4.48 bard (65 PSID). This safety is ignored for the first 90 seconds of run time. This safety measures the pressure differential between discharge and oil pressure, which is the pressure drop across the oil filter. The Status display fault message for this safety is shown below:

SYS X YYYYYYYY HIGH DIFF OIL PRESSURE

The X indicates the system and YYYYYYYY indicates the system is in a “FAULT” condition and will restart when the 120 second anti-recycle timer times out or “LOCKOUT” and will not restart until the operator clears the fault using the keypad.

Low Differential Oil Pressure Cutout Fault

The Low Differential Oil Pressure Cutout protects the compressor from low oil flow and insufficient lubrication. A system will fault and shut down with a controlled ramped shutdown when it's differential between oil and suction pressure falls below the cutout. This safety assures that the compressor is pumping sufficiently to push oil through the oil cooling circuit and through the internal compressor lubrication system. The Status display fault message for this safety is shown below:

SYS X YYYYYYYY LOW DIFF OIL PRESSURE

The X indicates the system and YYYYYYYY indicates the system is in a “FAULT” condition and will restart when the 120 second anti-recycle timer times out or “LOCKOUT” and will not restart until the operator clears the fault using the keypad.

The safety is ignored for the first 60 seconds of run time. After the first 60 seconds of operation, the cutout is linearly ramped from 0 bard to 2.09 bard (0 PSID to 30 PSID) in 5 to 10 minutes based on ambient temperature. See the following table for the ramp times for the given ambient temperatures.

TABLE 13 - LOW DIFFERENTIAL OIL PRESSURE CUTOUT

AMBIENT TEMPERATURE	RAMP TIME
more than 10°C (50°F)	5 Minutes
more than 7.2°C (45°F)	6 Minutes
more than 4.4°C (40°F)	7 Minutes
more than 1.6°C (35°F)	8 Minutes
more than 1.1°C (30°F)	9 Minutes
more than or equal to 1.1°C (30°F)	10 Minutes

A 30 second safety bypass below 50 Hertz is employed during rampdown. The bypass is primarily needed under conditions where another compressor is being brought on and the running compressor is being ramped down to 5 Hertz to add the additional compres-

sor due to load requirements. Under these conditions, the slow speed of the running compressor(s) causes the oil differential to become very low, especially if the water temperature is high and the suction pressure is high. The bypass assures the compressor(s) will not trip on a nuisance low oil differential fault.

High Discharge Temperature Cutout Fault

The High Discharge Temperature Cutout protects the motor and compressor from overheating. A system will fault and shut down with a controlled ramped shutdown when its Discharge Temperature rises above 121°C (250°F). A system will also be inhibited from starting if the discharge temperature is above 93°C (200°F). The Status display fault message for this safety is shown below:

SYS X YYYYYYYY HIGH DISCHARGE TEMP

The X indicates the system and YYYYYYYY indicates the system is in a “FAULT” condition and will restart when the 120 second anti-recycle timer times out or “LOCKOUT” and will not restart until the operator clears the fault using the keypad.

Low Discharge Superheat Cutout Fault

The Low Discharge Superheat safety helps protect the compressor from liquid floodback through the economizer line due to a high flashtank level. It also helps protect the compressor from excessive oil in circulation due to excess oil charge in the system. Excessive oil in circulation brings back liquid refrigerant which is entrained in the oil. The liquid then drops out once it enters the compressor.

The safety is ignored for the first 10 minutes of operation if the system economizer feed valve is closed (0%) and for 5 minutes of operation if the economizer feed valve is open greater than 0%. If the discharge superheat falls below 2.8°C (5.0°F) for 5 minutes under either condition, the system will shut down.

The X indicates the system and YYYYYYYY indicates the system is in a “FAULT” condition and will restart when the 120 second anti-recycle timer times out or “LOCKOUT” and will not restart until the operator clears the fault using the keypad.

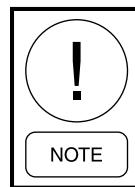
Sensor Failure Cutout Fault

The Sensor Failure Cutout prevents the system from running when a critical sensor (transducer, level sensor, or motor winding temp sensor) is not functioning properly and reading out of range. This safety is checked at startup and will prevent the system from running if one of the sensors has failed.

The sensor failure safety will also fault and shutdown a system while in operation, if a safety threshold is exceeded or a sensor reads out of range (high or low). Following is the Status display fault message.

SYS X YYYYYYYY SENSOR FAILURE:

ZZZZZZZZZZZZ



The X indicates the specific system. YYYYYYYY will either indicate the system is in a “FAULT” condition and will restart when the fault clears, or “LOCKOUT” after 3 faults and will not restart until the operator clears the fault using the keypad.

ZZZZZZZZZZZZ indicates the failed sensor below:

- SUCT PRESS
- OIL PRESS
- DSCH PRESS
- MOTOR TEMP X *

*The Unit Setup Mode allows a specific motor temperature sensor to be ignored, if it fails.

The start inhibit thresholds for each sensor are shown in the following table.

TABLE 14 - START INHIBIT SENSOR THRESHOLDS

SENSOR	LOW THRESHOLD	HIGH THRESHOLD
Suction Transducer	0.3VDC	4.7VDC
Oil Transducer	0.3VDC	4.7VDC
Discharge Transducer	0.3VDC	4.7VDC
Motor Temp. Sensor	0°C (0°F)	116°C (240°F)

High Motor Temperature Cutout Fault

The High Motor Temperature Cutout prevents a compressor from running when its motor temperature is too high. A system will fault and shut down when any com-

pressor motor temperature sensor rises above 121°C (250°F). The system will be inhibited from starting if its motor temperatures sensors indicate temperatures above 116°C (240°F). If any single temperature sensor is being ignored under the Unit Set-up Mode, that sensor will not be utilized when evaluating motor temperature.

Below is a sample Status display fault message:

SYS X YYYYYYYY HIGH MOTOR TEMP

The X indicates the system and YYYYYYYY indicates the system is in a “FAULT” condition and will restart when the fault clears or “LOCKOUT” and will not restart until the operator clears the fault using the keypad.

System Control Voltage Cutout Fault

The System Control Voltage Cutout alerts the operator the 115VAC Control voltage to one of the systems is missing. This could be due to a system fuse that has been removed or is blown. The affected system will fault and shut down immediately when the 115VAC supply is lost.

The safety will “not” shut down a system if the UNIT switch is OFF, which electrically removes the 115VAC to “all” systems. The safety is only used to indicate a situation where a single system is missing the 115VAC. The safety will not cause a lockout and the system fault will reset when power is returned. A sample message is shown below:

SYS X YYYYYYYY CONTROL VOLTAGE

The X indicates the system and YYYYYYYY indicates the system is in a “FAULT” condition and will restart when the fault clears or “LOCKOUT” and will not restart until the operator clears the fault using the keypad.

Eductor Clog Fault

To sense a loss of oil return to the compressor, an eductor clog detection safety is utilized. The safety monitors the temperature of the line between the eductor and the suction line.

The control algorithm looks at the eductor line temperature once a second. At start, a clog timer is set at 600 seconds. If the eductor line temperature is less than the saturated suction temperature plus 5.5°C (10°F) each time the control circuit looks at the temperature, the clog timer is reset to 600 seconds.

If the eductor line temperatures is greater than the saturated suction temperature plus 5.5°C (10°F), the clog timer is decremented one second. If the temperature remains above the saturated suction temperature plus 5.5°C (10°F) for 600 seconds, the clog timer will count to “0” and the system will shut down and lock out. The status fault will indicate an eductor clog fault.

EDUCTOR CLOG FAULT

Whenever this fault occurs, the eductor filter should be changed.

The clog timer resets to 600 seconds whenever the control algorithm sees the eductor line temperature is less than the saturated suction pressure plus 5.5°C (10°F). This prevents nuisance eductor clog faults.

Operational Modes

YVFA contain 3 different operation modes, they depend on the setting of “Free Cooling Control”, the status of “Free Cooling Valve” and Compressor status.

Mechanical Cooling

The Free Cooling Mode shall be set to Mechanical Cooling when Free Cooling Control is Disabled or when all of the following are true:

- Free Cooling Control is Enabled
- Free Cooling Valve is Closed to the free cooling coil (relay de-energized)

Free Cooling

The Free Cooling Mode shall be set to Free Cooling when all of the following are true:

- Free Cooling Control is Enabled
- Free Cooling Valve is Open to the free cooling coil (relay energized)
- No compressors are running

Hybrid Cooling

The Free Cooling Mode shall be set to Hybrid Cooling when all of the following are true:

- Free Cooling Control is Enabled
- Free Cooling Valve is Open to the free cooling coil (relay energized)
- Any compressor is running

Free Cooling Valve Control**Valve Open to Free Cooling Coil**

The Free Cooling Valve relay shall be energized (valve open to free cooling coil) when all of the following are true:

- "Free Cooling Control" is "Enabled";
- "Ambient Air Temperature" is a computed degrees less than "Entering Chilled Liquid Temperature" per the setting of "ECHLT Offset";
- "LCHLT" is a computed degrees higher than "LCHLT Setpoint" in cooling mode per the setting to "LCHLT Control Range" and "FC Control Range Offset".

Valve Closed to Free Cooling Coil

The Free Cooling Valve relay shall be de-energized (valve closed to free cooling coil) when any of the following are true:

- "Free Cooling Control" is "Disabled";
- "Ambient Air Temperature" is a computed degrees higher than "Entering Chilled Liquid Temperature" per the setting of "FC Valve Off ECHLT Offset";
- "Free Cooling Mode" is "Free Cooling" and "LCHLT" is a computed degrees less than "LCHLT Setpoint" per the setting of "LCHLT Control Range", "FC Control Range Offset" and "FC Valve Off Setp Offset".

Condenser Fan Speed Control

If both compressor system switches are OFF and Free Cooling Mode is Free Cooling, Fan speed control will still follow the fuzzy logic routine and will increase up to 100% speed to satisfy load. In this mode, the existing LCHLT fuzzy control shall be used to control the condenser fan speed in place of the compressor speed. Both system's fans shall be run and controlled to the same speed in this mode.

When Free Cooling Mode is Hybrid Cooling, the condenser fans on both systems shall always be run and the following controls apply. When Free Cooling Mode is Mechanical Cooling and Ambient Temperature is less than Subcooling Override Amb Temp the following controls apply. No change shall be made to the existing conversion from fan speed command in % to output voltage.

Free Cooling Optimum Fan Speed

Set the Condenser Fan Speed Command to the minimum of "Free Cooling Optimum Fan Speed in %" and "100%".

If the compressor is running, the following condenser fan speed control overrides shall exist in order of priority:

High Discharge Pressure Limit (per system, same logic as existing Optimized Fan Control, highest priority)

Low Oil Pressure Limit (per system, same logic as existing Optimized Fan Control)

High Ambient Override (same logic as existing Optimized Fan Control)

Flash Tank Temperature Override (new, defined below)

The condenser fan speed control overrides shall only affect the fan speed on the system experiencing the override condition.

When transitioning from any override to using the "Free Cooling Optimum Fan Speed in %", limit increases to Condenser Fan Speed Command to 1% every 3 seconds until the Command is more than "the Minimum of 'Free Cooling Optimum Fan Speed in %' and '100%' - 1".

VSD OPERATION AND CONTROLS

VSD Logic Board

The VSD Logic Board communicates with the Chiller Control Board via comms and controls the VSD functions. It converts the frequency and run commands from the Chiller Control Board into the necessary voltage and frequency commands to operate the inverter section. It also controls the converter section of the drive (AC Line to DC Bus conversion) by controlling the pre-charge function.

The VSD Logic Board contains a 2nd microprocessor (motor controller) that generates the PWM signals that control the IGBT outputs in the inverter section of the VSD.

An FPGA handles the hardware safeties that can shut down the VSD much faster than the software safeties. The VSD Logic Board handles all of the VSD related safeties, which includes motor current, BUS voltage, and other safeties.

The VSD Logic Board reports shutdown information back to the Chiller Control Board via the RS-485 communication link.

VSD Start/run Initiation

Following a successful precharge of the DC Bus and a run command from the Chiller Control Board, the VSD Logic Board microprocessor will determine the motor output voltage (% modulation) and the output frequency required based on the operating frequency command from the Chiller Control Board. This information will then be sent to the PWM generator located on the VSD Logic Board.

On startup, the output frequency from the VSD to the motor(s) will be increased from 0 Hz to the operating frequency commanded by the Chiller Control Board. The rate of change of the frequency will also be controlled by the VSD Logic Board.

The rate of change of the output frequency at startup, during acceleration is 10 Hz/sec between 0 and 50 Hz and 30.4 Hz/sec above 50 hertz. The maximum rate of change of the output frequency during deceleration between 200 and 100 Hz is 30.4 Hz/sec, and 100 and 0 Hz is 10 Hz/sec.

The VSD Logic Board and its PWM generator will receive operating frequency and voltage commands from the Chiller Control Board based on the load.

When a frequency (speed) change is requested from the Chiller Control Board, the chiller microprocessor will send the change to the VSD Logic Board and the VSD Logic Board will acknowledge it accepted the change. Loading and unloading will take place at the rate of 0.1 to 1Hz every 2 seconds.

PWM Generator Type and Carrier Frequency

The PWM generator is responsible for providing asymmetrical uniform sampled PWM waveforms to the compressor motor at a carrier frequency of 3125 Hz by turning ON an OFF the inverter IGBT's. The waveform generated is equivalent to a specific V/F ratio at a given speed based on the voltage and frequency commands from the Chiller Control Board. The PWM Generator receives operating frequency and voltage commands from the VSD Logic Board control processor.

Short Circuit Protection Minimum Output Pulse Width and Interlock Delay

The PWM generator is programmed to drop all "ON" pulses in less than 10 microseconds (and all matching "OFF" pulses in the mirrored waveform) to permit time for the IGBT gate drivers to detect and self extinguish an inverter short circuit condition.

Modulating Frequency

The modulating frequency range will range from 0 to 200 Hz. The modulating frequency waveform consists of a sinusoidal waveform summed together with 16.66% of the third harmonic component of the sinusoidal waveform. Utilization of this waveform as the modulating waveform will permit the drive to generate a fundamental line to line voltage equal to the DC Bus voltage divided by 1.414.

Maximum VSD Frequency

The maximum VSD frequency will vary for each chiller model. The microprocessor board determines the frequency according to jumpers' factory installed in the wiring on the J7 plug of the microprocessor board. The location of these jumpers' is interpreted as a binary value, which presently allows 7 speed selections plus a default. The maximum frequency may vary from 178 to 200 Hz. If the J7 plug is not installed, the speed will default to 178 Hz.

VSD % Modulation

The voltage and frequency commands issued by the VSD Logic Board microprocessor are determined by the frequency command from the Chiller Control Board. The VSD output is a PWM signal which has effects on the motor comparable to an AC voltage sinusoidal waveform. To change the speed of an AC motor, the frequency of the AC voltage must be changed. Whenever frequency is changed, the voltage is changed in a linear ratio. Maintaining a relatively constant V/F ratio as speed changes assures motor losses and overheating do not occur.

The output voltage of the VSD is not a sinusoidal waveform. Instead, the PWM generator provides an output that simulates a true AC waveform by repetitively turning ON and OFF the voltage to the motor to create an average voltage that is equal to a lower AC voltage at lower frequencies and a higher voltage at higher frequencies. The PWM generator also changes the % modulation of the waveform to simulate the frequency change to maintain the V/F ratio with motor speed changes.

The PWM generator is programmed to essentially operate a linear volts/Hz ratio over the 0 to 200 Hz frequency range. The complex control algorithm modifies the voltage command to boost the voltage of the V/F ratio at lower speeds to provide additional torque.

The 100% modulation operating point occurs at a fundamental frequency of 189.6 Hz. As the output frequency increases above 189.6 Hz, the drive operates in an over-modulated mode. For example, at 200 Hz fundamental modulating frequency the PWM waveform is over-modulated by approximately 18%. This will yield a fundamental output line to line voltage applied to the motor terminals at maximum output frequency that is equal to the input line to line voltage applied to the drive (provided the DC Bus current remains continuous).

VSD Cooling and Cooling Loop

The VSD generates heat in the IGBT power modules and the SCR/Diode assemblies, which must be removed. The heat not only heats the modules but also the Micro/VSD cabinet.

The VSD is cooled by a glycol loop and circulating pump. The glycol cooling loop feeds a liquid cooled heatsink called a chill plate that cools the IGBT's and SCR/Diode modules. The coolant is pumped by a circulator pump through the heatsink where it absorbs heat in several passes of tubes on the lower rows of the inside condenser

coils where the condenser fans remove the heat picked up from the modules. The coolant is then pumped back to the modules. The glycol loop also provides cooling for the Micro/VSD cabinet. The baseplates of the power components are mounted to the glycol cooled heatsinks in the cooling loop. The cooling loop also circulates the glycol through a cooling coil in the cabinet. A fan blows air from the cabinet across the cooling coil to cool the electronics in the cabinet.



Never run the glycol pump without coolant! Running the glycol pump without coolant may damage the pump seals

Always fill the system with approved coolant to avoid damage to the pump seals and other components.

Heat transfer characteristics of the coolant are very critical. Substituting coolant or adding water will result in cooling loop performance loss and chiller shutdown.

The glycol coolant level in the VSD cooling system should be maintained between 9 and 15 inches (23 and 38 cm) from the top of the fill tube. This check should be performed prior to running the pump. The pump can be test run by placing the chiller in Service Mode. It is advisable to fill the tube to the required level before starting the glycol pump because it may empty when the pump starts. The level should be topped off as needed while running. Be sure to re-install the cap before stopping the glycol pump to avoid overflowing the fill tube when the glycol pump is turned OFF.

Glycol coolant has a defined operating life. System coolant should be changed 5 years from date of shipment of the equipment. Mixing other coolants or water with the special glycol will reduce the life of the coolant, and cause VSD overheating and damage.



FIGURE 45 - VSD GLYCOL PUMP

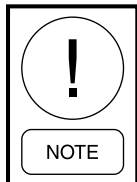
LD15134

The VSD fan and glycol pump will run if any of the following conditions listed below are true, provided the VSD has been powered up for less than 30 seconds and the pump has not run in the last 30 seconds. The 30 second limitations prevent pump motor overheating.

- Compressor Baseplate temp is more than Cutout (218°F) minus 10°F.
- Pre-charge Enable 1 from the Chiller Logic Board is ON.
- VSD Internal Ambient Temp more than Cutout minus 10°F.
- Any compressor is running.
- Service Mode Fan/Pump Run is enabled.

The VSD fan/glycol pump will turn OFF when ALL of the following conditions are true:

- Compressor 1 IGBT Baseplate temp is less than Cutout minus 15°F.
- Compressor 2 IGBT Baseplate temp is less than Cutout minus 15°F.
- Pre-charge Enable 1 from the Chiller Logic Board is OFF.
- VSD Internal Ambient Temp less than Cutout minus 15°F.
- No compressors are running.
- Service Mode Fan/Pump is disabled.



In some cases, the condenser fans may be turned on by the microprocessor, when no compressors are running, to keep the power components and Control/VSD Cabinet from overheating.

IGBT Module Baseplate Temperature Sensing

Each IGBT module has an internal 5Kohm thermistor built in to measure the temperature of the module. Up to 4 thermistors are connected to the VSD Logic Board (one per compressor). The highest module temperature of compressors 1 and 2 are sent to the logic board. If the temperature exceeds the software trip point, the unit will shut down on a safety. Refer to *High Baseplate Temperature (Software) Fault* on page 105 for details.

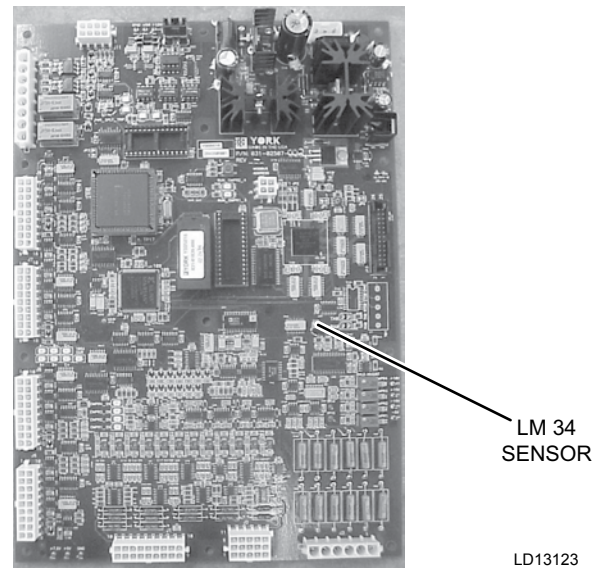


FIGURE 46 - NEW BOARD - P/N 031-02507-XXX

VSD Internal Ambient Temperature Sensing

A National LM34 temperature sensor located on the VSD Logic Board (shown in the *C* on page 87) is used to measure the internal ambient temperature of the Control Panel/VSD enclosure. It has an output voltage that is linearly proportional to the temperature in degrees Fahrenheit. If the temperature exceeds the software trip point, the unit will shut down on a safety. Refer to *High VSD Internal Ambient Temperature (Software) Fault* on page 106 for details.

Pre-charge

When cooling is required (LCWT is more than SPHL), leaving chilled liquid temp is greater than the setpoint high limit, the chiller Control Board will send a Pre-Charge Enable via comms to the VSD Logic Board. The VSD's DC Bus voltage(s) across the Bus Filter Capacitors will slowly be increased to the proper level (more than 500VDC) through firing of the SCR Trigger Board(s) and the associated pre-charge enable control signal(s). The pre-charge time interval is fixed at 20 seconds. The purpose of the precharge is to limit current when charging an uncharged capacitor bank. When uncharged, the capacitor bank looks like an electrical short. The bus is brought up slowly by only turning ON the SCR's during the trailing half of the + and - portion of the incoming AC sine wave. Following is the status message displayed while the precharge is taking place.

• S YS X VSD DC BUS PRECHARGE

Following successful completion of the pre-charge interval, the SCR's on the AC to DC semi-converter (SCR/Diode Modules) will be gated fully ON by the SCR Trigger Board and the DC Bus will be brought up to its full potential. After pre-charge has been successfully completed, the SCR's will stay fully ON until the Chiller Control Board turns off the Pre-Charge Enable via comms.

The pre-charge will only take place when all of the following conditions are true, otherwise it is disabled:

- Daily Schedule is ON.
- UNIT switch is ON.
- System Switch(es) are ON.
- Run Permissive(s) are Enabled.
- Flow Switch indicates flow.
- LCHLT more than Setpoint High Limit.
- Unit not faulted / locked out.
- Any system not faulted, locked out

Run Mode / Unit Restart

In order to initiate a system run, two conditions must be met. At least 1 of the 2 systems run signals from the control panel must be present and at least 1 of the 4 possible Compressor RUN bits must be set in the serial communications link between the VSD Logic Board and the Chiller Control Board. Following successful completion of pre-charge and receipt of the system run signals, the motor output voltage (% modulation) and output frequency commands will be determined by the VSD microprocessor located on the VSD Logic Board. These two parameters will be sent to the PWM generator located on the VSD Logic Board for waveform processing at a rate of once every 10 msec.

The voltage and frequency commands issued by the VSD microprocessor are determined by the operating frequency command received on the communications link from the Chiller Control Board and by the present operating frequency of the drive. Upon receipt of a legitimate run command communication, the VSD's output frequency will be increased from 0 Hz to the operating frequency command from the communications link.

DC Bus Voltage Sensing and Scaling

Full DC Bus voltage and ½ DC Bus voltages are sensed for up to 2 DC Buses. The 2 compressor chillers share a common DC Bus. The DC Bus is wired to the DC Bus Isolation Board, the voltage is divided down through a resistance voltage divider, and the reduced voltage is fed to the VSD Logic Board for safety monitoring.

Current Sensing and Scaling

Individual current transformers on each leg sense three phases of output current on each compressor. These signals are buffered, divided by 2, and filtered by an RMS to DC converter. The highest of the currents in the three phases of each compressor leaving the RMS converters is then sent to an A-D converter scaled, monitored by the VSD Logic Board overload and high current protection circuitry, and sent to the Chiller Control Board for display as the compressor current.

In order to set the motor overload level (determined by the setting of the overload ADJUST potentiometer on the VSD Logic Board), the voltage level on the wipers of the four overload ADJUST potentiometers is continuously sensed by the VSD Logic Board for current protection and sent to the Chiller Control Board for both display purposes and for current limiting control. This parameter is the 105% FLA value.

VSD Transmitted Operating Parameters

VSD operating parameters will be transmitted to the Chiller Control Board over the RS-485 communications link between the 2 boards. These values will be displayed on the control panel display. The data and display format are outlined in *Table 15 on page 103*.

VSD SAFETIES (FAULTS)

VSD operating conditions are monitored by both software algorithms and hardware circuitry. Both types exist as a result of the need for both extremely fast protection requirements such as a short circuit condition or a slow reacting trip such as a slow rising overload condition. To eliminate nuisance unit trips, the sensor inputs for the VSD's operating parameters are averaged four times before "Software" generated unit/system fault trips from the VSD Logic Board are initiated. These faults cause single compressor or total unit controlled

“ramped” shutdown. Other parameters that are not fed to the VSD Logic Board microprocessor are protected by “Hardware” generated fault trips. Hardware trips involve electronic circuitry that measures voltages or currents and activate level sensitive comparators connected to programmable gate arrays on the VSD Logic Board FPGA (Field Programmable Gate Array). These safeties operate extremely fast and provide “immediate” shutdown, because they are not dependent upon software program loops that operate in seconds or fractions of a second. Outputs from the gate arrays provide a digital signal to indicate whether a safety threshold has been reached.

Immediate Fault shutdowns are often accompanied by audible motor backspin due to equalizing of the differential between discharge and suction when the compressor is turned OFF while rotating at high speeds. This should not cause concern and will not damage the chiller.

Each fault outlined in the descriptions that follow will indicate whether it is a hardware or software generated fault.

It will be noted the “ramped” shutdown results in minimal compressor backspin and noise associated with backspin. “Immediate” shutdowns will result in compressor backspin and a higher noise level based upon the differential pressure between discharge and suction.

When a VSD fault occurs, the VSD Logic Board captures VSD data in the onboard battery backed RAM. At the same time, the VSD Board “Fault Relay” will open, signaling the Chiller Control Board microprocessor to save a snapshot of system data. The VSD Logic Board then transmits the fault data to the Chiller Control Board microprocessor on the next comms between the two boards. If the Chiller Control Board receives

the comms fault indication before the Fault Relay signal, it will immediately save a snapshot of system data when the comms fault is recognized. This also enables the microprocessor to capture fault data if the Fault relay fails. Both the system and VSD fault data are then stored in the Chiller Control Board history buffers. Any additional faults that may occur during shutdown on the first fault or between the first fault and the next comms will also be stored and transmitted to the Chiller Control Board along with the original fault data. This data will be stored as “ALL FAULT” data.

When the control panel acknowledges a fault (via the fault acknowledge bit in comms) the fault relay will be reset (closed) by the VSD Logic Board and the fault indication flag (in comms) will be reset.

The fault relay will not open when a non-running fault occurs. In this case, the system will be inhibited from running until the fault condition is corrected. An inhibit message will be displayed on the panel display indicating the system is not allowed to run. Examples of this type of fault would be the High Internal Ambient fault and the VSD CT Plug Fault. When the chiller receives the transmitted fault data via comms, it will save a snapshot of system data in the history buffer even though the chiller is not running.

Some faults will be unit faults; other faults will be system (specific compressor or compressor pairs) faults, depending upon the number of compressors in the chiller. Most faults will shut down the unit/ system and allow restart once the fault clears and the 120 sec anti-recycle timer times out. These faults will allow up to 3 faults within 90 minutes before locking out the unit/ system. Other faults lock out the unit/system after only a single fault. Details on individual faults are provided in the following explanations.

TABLE 15 - VSD OPERATING DISPLAY PARAMETERS

DATA	DISPLAY FORMAT
Highest Phase of Compressor Motor Current in Amperes RMS (per Compressor)	XXX Amps
VSD Output Frequency	XXX.X Hz
Motor Overload Setting (105% FLA potentiometer setting) in amperes RMS (per Compressor)	XXX Amps
DC Bus Voltage in DC Volts (maximum of 2)	XXX Volts
VSD Internal Ambient Temperature	XXX.X°F (or °C)
IGBT Power Assembly Power Module Highest Baseplate Temperature (maximum of 2)	XXX.X°F (or °C)
Pre-Charge Enable Signal (maximum of 2)	On or OFF
VSD cooling Fan/Pump	On or OFF
Compressor Run Status (maximum of 4)	On or OFF

A start inhibit will take place if a VSD fault condition exists and a compressor that is not running is called to start. The start inhibit will be cleared when the fault condition goes away and the compressor will be permitted to start.

Pre-charge Low DC Bus Voltage (Software) Fault

On standard 200V, 230V, 460V and 575V chillers the DC Bus voltage must reach at least 41VDC within four seconds and 500VDC within 19 seconds after the pre-charge signal has been asserted. If not, the unit/system will shut down on a fault. On 380-400VAC chillers the voltage must reach 41VDC in 4 seconds and 414VDC in 19 seconds.

This is auto-restart safety will lock out on the third fault within 90 minutes. The fault will be a unit fault. The Status display fault message is shown below:

```
UNIT YYYYYYYY
PRECHARGE - LOW DC BUS VOLTAGE
```

Pre-charge DC Bus Voltage Imbalance (Software) Fault

The 1/2 DC Bus voltage magnitude must remain within plus or minus 100VDC of the total DC Bus voltage divided by two during the pre-charge interval. If not, the unit/system shall shut down on a fault.

This safety will lock out on the 1st fault. The fault will be a unit fault. The Status display fault message is shown below:

```
UNIT YYYYYYYY
PRECHARGE - DC BUS VOLTAGE IMBALANCE
```

High DC Bus Voltage (Hardware) Fault

The high DC Bus voltage trip level is determined by hardware on the VSD Logic Board and is designed to trip the unit at 766 plus or minus 30VDC. If the DC Bus exceeds this level, the unit/system will fault and shut down immediately.

This safety is an auto-restart safety that will lock out on the 3rd fault in 90 minutes. The fault will be a unit fault. Two key presses of the STATUS KEY are required to show the fault on both systems. Below is the control panel Status display fault message:

```
UNIT YYYYYYYY
HIGH DC BUS VOLTAGE
```

Low DC Bus Voltage (Software) Fault

The low DC Bus voltage trip level is set at 500VDC on 200V, 230V, 460V and 575V chillers. If the DC Bus drops below this level the unit/system will fault and immediately shut down. On 380V and 400V chillers the trip point will be 414VDC.

The low DC Bus voltage cutout is an auto-restart safety that will lock out on the 3rd fault in 90 minutes. The fault is a unit fault. Below is an example of the Status display fault message:

```
UNIT YYYYYYYY
LOW DC BUS VOLTAGE
```

DC Bus Voltage Imbalance (Software) Fault

The 1/2 DC Bus voltage magnitude must remain within plus or minus 100VDC of the total DC Bus voltage divided by two. If the 1/2 DC Bus magnitude exceeds the plus or minus 100VDC tolerances, the unit/system will fault and immediately shut down.

This safety will lock out on the first fault. The fault will be a unit fault. Below is the Status display fault message:

```
UNIT YYYYYYYY
DC BUS VOLTAGE IMBALANCE
```

High Motor Current (Hardware) Fault

The three output lines to each phase of the compressor motor are monitored via three current transformers within the VSD. The unit's three phases of instantaneous output current will be compared to a predetermined limit, which is contained in hardware.

The nominal peak current trip level is:

- 575.5 Amps (554 Amps minimum, 597 Amps maximum).
- 380VAC, 60Hz and 400VAC, 50Hz nominal peak current trip level is 649.5 Amps (626 Amps minimum, 674 Amps maximum).
- VAC units, nominal peak current load is 863.3 Amps (831 Amps minimum, 896 Amps maximum).

The variation in trip point is the result of component tolerances on the VSD Logic Board. If the peak current limit is exceeded, the unit will fault and shutdown immediately.

This fault is an auto-restart safety that will lock out system on the 3rd fault in 90 minutes. The fault will be an individual system/compressor fault for all units. Following is a sample Status display fault message:

SYS X YYYYYYYY HIGH MOTOR CURRENT

The X indicates the system and YYYYYYYY indicates the system is in a "FAULT" condition and will restart or "LOCKOUT" and will not restart until the operator clears the fault using the keypad.

Motor Current Overload (Software) Fault

The Motor Current Overload will compare the highest of the 3 phases of motor current per compressor to the compressor's 105 % FLA ADJUST (overload) potentiometer setting on the VSD Logic Board. If the current exceeds the setting continuously for 20 seconds, the compressor will trip.

This safety will lock out a system on the 1st fault and shut down with a controlled ramped shutdown. The fault will be an individual system/compressor fault for all systems. A sample Status display fault is shown below:

SYS X YYYYYYYY MOTOR CURRENT OVERLOAD

The X indicates the system and YYYYYYYY indicates the system is in a "LOCKOUT" condition and will not restart until the operator clears the fault using the keypad.

Motor Current Overload (Hardware) Fault

The Motor Current Overload will compare the highest of the 3 phases of motor current per compressor to the compressor's overload ADJUST potentiometer setting. If the current exceeds the setting continuously for 30 seconds, all compressors will fault and shut down immediately.

The fault will be a unit fault and will lock out all systems on the first fault. A sample Status display fault is shown below:

**UNIT YYYYYYYY
MOTOR CURRENT OVERLOAD**

YYYYYYYY indicates the unit is in a "Lockout" condition and will not restart until the operator clears the fault using the keypad.

IGBT Gate Driver (Hardware) Fault

The unit's phase bank assembly(s) contains one IGBT gate driver control board per compressor. These boards monitor the saturation voltage drop across each of the six IGBT's while gated ON. If the IGBT's saturation voltage exceeds the prescribed limit, the gate driver will make the determination that a short circuit is present. This in turn will cause the system to trip. During normal operation, the voltage drop across a saturated IGBT is low. When a short or shoot occurs, the extremely high current causes the voltage across the device to increase. When the electronic hardware on the IGBT Gate Driver Board senses the current rise, it immediately turns OFF all IGBT's in the module and the system will shut down immediately.

Additionally, if the IGBT's Gate Driver board's power supply voltage falls below the permissible limit, this same fault will be generated.

This is an auto-restart safety that will lock out on the third fault within 90 minutes. The fault will be a system fault for all units. Following is the Status display fault messages for all systems.

SYS X YYYYYYYY GATE DRIVER

The X indicates the system and YYYYYYYY indicates the system is in a "FAULT" condition and will restart or "LOCKOUT" and will not restart until the operator clears the fault using the keypad.

High Baseplate Temperature (Software) Fault

Each phase bank assembly contains one liquid cooled heatsink to cool both the inverter power modules and the converter SCR/Diode modules. Each compressor's inverter power module (6 IGBT's and Gate Driver Board) contains an internal temperature sensor (5K ohm at 25 Deg. °C) to monitor the baseplate temperature.

On two compressor chillers, the outputs from System 1 and System 2 sensors are each compared in software to a limit of 218°F (226°F for 380 and 400VAC). If either sensor exceeds this limit, the unit will fault and shut down with a controlled ramped shutdown.

This is an auto-restart safety that will lock out on the third fault within 90 minutes. The fault will be a system fault for all units. Below are the Status display fault messages for all systems.

SYS X YYYYYYYY HIGH VSD BASEPLATE TEMP

The X indicates the system and YYYYYYYY indicates the system is in a "FAULT" condition and will restart when the fault clears or "LOCKOUT" and will not restart until the operator clears the fault using the keypad.

After a fault, the fan(s) and water pump will remain energized until the inverter power module base plate temperature(s) falls below 165°F. The system will be allowed to restart when the inverter power module base plate temperatures drop below this value.

It is possible for an internal sensor to fail and not sense temperature without causing a high baseplate sensor fault.

High VSD Internal Ambient Temperature (Software) Fault

The VSD Logic board contains a temperature sensor, which monitors the unit's internal ambient temperature. If the VSD internal ambient temperature rises above the cutout of 158°F, the unit will fault and shut down with a controlled ramped shutdown.

This safety will not cause a lockout. The fault will be a unit fault for all units. Following is the Status display fault message.

UNIT YYYYYYYY
HIGH VSD INTERNAL AMBIENT TEMP

The unit will be allowed to restart when the internal ambient temperature drops 10°F below the cutout.

YYYYYYYY indicates the unit is in a "Fault" condition and will restart when the condition clears.

Single Phase Input (Hardware) Fault

The VSD's SCR Trigger Control board contains circuitry that checks the three phase mains for the presence of all three-line voltages. If any of the line voltages are not present, the system will immediately shut down on a fault.

This fault will not cause a lockout. The fault will be a unit fault. Below is the Status display fault message.

Power Supply (Hardware) Fault

Various DC power supplies which power the VSD Logic Board are monitored via hardware located on the logic board. If any of these power supplies fall outside their allowable limits, the unit will immediately shut down on a fault.

This is an auto-restart safety that will restart after the fault clears and lock out on the 3rd fault in 90 minutes. The fault will be a unit fault for all units. Below is the Status display fault message.

UNIT YYYYYYYY
VSD LOGIC BOARD POWER SUPPLY

YYYYYYYY indicates the system is in a "FAULT" condition and will restart when the fault clears or "LOCKOUT" and will not restart until the operator clears the fault using the keypad.

Run Relay (Software) Fault

Upon receipt of either of the two types of run commands (hardware and software) a 5 second timer will commence timing. The hardware run signal comes from the SYS X VSD Run Signal to the VSD Logic Board. The software run signal comes through the comms from the Chiller Control Board. If the missing run signal is not asserted within the 5-second window, the system will fault. In addition, if either run signal is disabled while the VSD is running, the remaining run signal must be disabled within 5 seconds after the VSD is shut down or the system will fault. If running, the unit will fault and shut down with a controlled ramped shutdown.

This is an auto-restart safety that will autostart after the 120 second anti-recycle timer times out and will lock out on the 3rd fault in 90 minutes. The fault will be a system fault.

VSD Logic Board Failure (Software) Fault

Upon receipt of the voltage and frequency commands, the PWM generator will acknowledge receipt of the command. If the system microprocessor does not receive the handshake within 1.5 seconds of issuing the command, the unit will trip. This safety is only active during precharge and during running of a compressor. It is not active when all the compressors are shut down and the precharge is disabled. If the VSD Logic Board Fault occurs while the chiller is running, all systems will immediately shut down on a fault.

This is an auto-restart safety that will auto restart after the 120 second anti-recycle timer times out and lock out on the 3rd fault in 90 minutes. The fault is a unit fault for all units. Following is the fault message.

UNIT YYYYYYYY
VSD LOGIC BOARD FAILURE

VSD CT Plug (Hardware) Fault

Jumpers are installed in each CT plug on the VSD Logic Board to feed back signals to indicate if the plugs are installed or not. If either plug is not installed, a low value is read on the digital input and the unit will immediate shutdown on a fault or will not run if OFF.

This is an auto-restart safety that will restart after the 120 second anti-recycle timer times out and lock out on the 3rd fault in 90 minutes. The fault is a unit fault for all units. Following is the fault message.

UNIT YYYYYYYY
VSD CT PLUG FAULT

YYYYYYYY indicates the system is in a "FAULT" condition and will restart or "LOCKOUT" and will not restart until the operator clears the fault using the keypad.

VSD Fault Data

When a fault has occurred, the VSD Logic Board will capture fault data. This data will be stored in the on-board battery backed RAM for safekeeping and transferred to the panel via the communications link as soon as possible.

A fault code will be set for the fault that initiated the system shutdown. This fault will appear as a specific fault in the Status message.

Any faults that occur after the initial fault, which occur within the comms transmission time frame following the inception of the first fault, will be stored and transmitted to the Micro Logic Board together with the first fault data. These faults will appear in the "All Fault" display in the History.

A snapshot of the operating parameters of the VSD is continuously updated in battery-backed memory once every program loop. Upon receipt of a first fault, the snapshot of the operating parameters will be stored in memory and are transmitted to the panel as the fault data.

Fault Relay/Fault Acknowledge Bit

Control of the Fault Relay is from the VSD Logic Board. The Fault Relay on the VSD will be closed during a non-fault condition.

When a running or pre-charge fault occurs on the VSD, the fault relay will immediately open. The relay will not open for non-running faults that occur.

When the Chiller Control Board sees the VSD fault relay open, it will immediately take a snapshot of system data and save it to the history buffer.

A fault acknowledge bit from the Chiller Control Board is sent to the VSD via comms after receiving valid fault data from the VSD. When the VSD Logic Board receives the fault acknowledge via comms from the panel it will reset (close) the Fault Relay. The fault acknowledge is reset by the Chiller Control Board after the Fault Relay is closed by the VSD Logic Board.

VSD Fault Compressor Start Inhibit

If a VSD fault condition exists while the compressor is not running or pre-charging, the Chiller Control Board will not try to start the faulted compressor(s). The start inhibit will be automatically cleared when the fault condition goes away.

VSD Logic Board Test Mode

The VSD Logic Board contains a manual "TEST" pushbutton, which enables the service person to perform gate testing of the IGBT's Gate Drivers in the VSD by observing the LED'S on the IGBT Gate Driver Board and the VSD Logic Board.

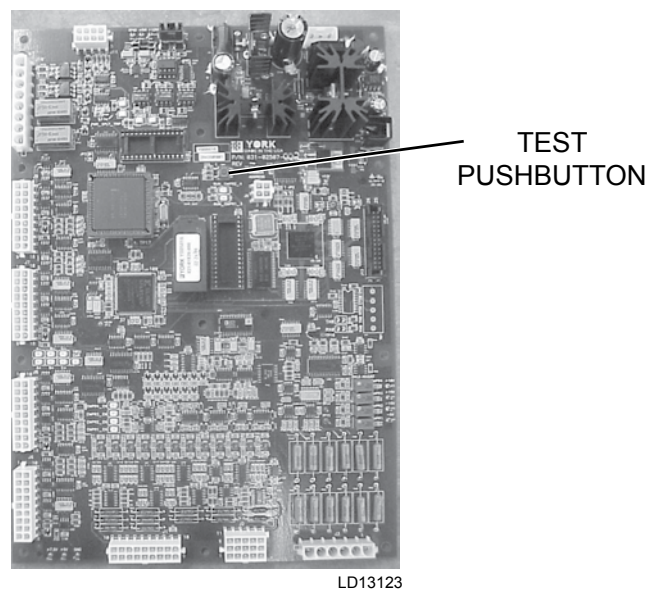


FIGURE 47 - VSD LOGIC BOARD



This should only be used when it is believed a VSD problem exists.

Once the test mode is enabled, the VSD Logic Board Processor will enable all compressor run signals.

When the "TEST" pushbutton is pressed, the PWM generator on the VSD Logic Board is programmed to pulse the output phase LED'S on the VSD Logic Board for all compressors in the following order:

- Upper 3 phases (+ LED's) for 1 second.
- All phases (+ and - LED's) for 1 second.
- Lower 3 phases (-LED's) for 1 second.
- All phases for 1 second.

At the same time, the 6 LED's on the GATE Driver Boards will alternate between dim and bright as the signals are sequenced.

The chiller will only be permitted to enter the "Test" mode under certain circumstances. The following conditions must exist:

- Pre-charge Enable 1 signal is disabled.
- Pre-charge Enable 2 signal is disabled.
- The system is not in the Run Mode.
- No system faults exist.
- DC Bus Voltage 1 is less than 50VDC.
- DC Bus Voltage 2 is less than 50VDC.
- No VSD Inhibits exist.

If the chiller is operating, the conditions required to allow the "Test" mode to be utilized require all systems to be manually shut down with the system switches and all faults must be cleared. After the DC Bus voltage bleeds down for several minutes, the "Test" mode can be utilized.

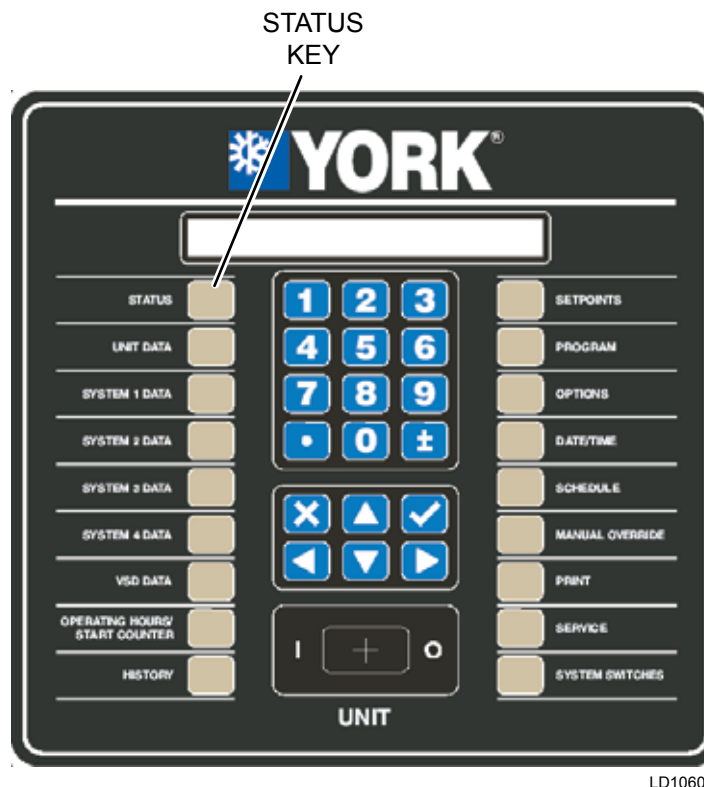
The "Test" pushbutton **MUST** be held down during the entire test. During the time the test takes place, the STATUS display message will indicate the systems are "shutting down". An example is shown below:

SYSTEM 1 SHUTTING DOWN
SYSTEM 2 SHUTTING DOWN

No History will be created for a shutdown in the "Test" mode.

SECTION 8 - MICROPANEL

STATUS KEY



Status Key Operation

The STATUS key displays the current chiller or system operational status. The messages displayed include running status, cooling demand, system faults, unit faults, VSD faults, unit warnings, external device status, load limiting, anti-recycle timer, status of unit/system switches, and a number of other messages. Pressing the STATUS key will enable the operator to view the current status of the chiller. The display will show one message relating to the “highest priority” information as determined by the microprocessor. There are three types of status data, which may appear on the display:

- General Status messages
- Unit Safeties
- System Safeties.

When power is first applied to the control panel, the following message displaying York International Corporation, the EPROM version, date, and time will be displayed for 2 seconds, followed by the appropriate general status message:

(C)2004 YORK INTERNATIONAL CORPORATION
C.XXX.XX.XX 18-SEPT-2010 12:45: AM

Unit status messages occupy 2 lines of the Status message display. If no unit status message applies, individual status messages for each system will be displayed.

Any time the STATUS key is pressed or after the EPROM message disappears at power-up, a status display indicating chiller or system status will appear.

Multiple STATUS messages may appear and can be viewed by pressing the STATUS key repeatedly to allow scrolling through as many as three STATUS messages, which could possibly be displayed at any time on a 2 compressor chiller.

Examples of the typical Status messages are shown in the next topic

General Status Messages

UNIT STATUS
MANUAL OVERRIDE

This message indicates the chiller is operating in MANUAL OVERRIDE mode. This message is a priority message and cannot be overridden by any other STATUS message. When in Manual Override, no other status message will ever be present.

**UNIT STATUS
UNIT SWITCH OFF SHUTDOWN**

This message indicates the UNIT SWITCH is in the OFF position and not allowing the unit to run.

**UNIT STATUS
DAILY SCHEDULE SHUTDOWN**

This message indicates that either the daily or holiday schedule programmed is keeping the chiller from running.

**UNIT STATUS
REMOTE CONTROLLED SHUTDOWN**

This message indicates that either an ISN or RCC has turned the chiller OFF and is not allowing it to run.

**UNIT STATUS
FLOW SWITCH SHUTDOWN**

This message indicates the flow switch is not allowing the chiller to run. There is a 1 second delay on this safety to assure the flow switch did not momentarily open.

**UNIT STATUS
VSD COOLING SHUTDOWN**

This message indicates the chiller is shutdown, but running all the condenser fans, VSD glycol pump, and VSD fan in an effort to bring the internal VSD ambient temperature down to an acceptable level before allowing the chiller to start.

SYS X REMOTE RUN CONTACT IS OPEN

This message indicates the remote start/stop contact between 2 and 15 or 2 and 16 of the 1TB terminal block is open. There is a 1 second delay on this safety to assure the remote contacts did not momentarily open.

SYS X SYSTEM SWITCH IS OFF

This message indicates the system switch (software via keypad) is turned OFF. The system will not be allowed to run until the system switch is turned ON via the keypad.

SYS X NOT RUNNING

This message indicates the system is not running because the chilled liquid is below the setpoint or the micro has not loaded the lag system far enough into the loading sequence to bring the lag system ON. This message will be displayed on the lag system until the loading sequence is ready for the lag system to start.

SYS X COOLING DEMAND SHUTDOWN

This message is only displayed in the Normal Shutdown History display to indicate a capacity control shutdown.

SYS X COMPRESSOR RUNNING

This message indicates the system is running as a result of cooling demand.

SYS X SHUTTING DOWN

The compressor shutting down message indicates the respective system is ramping down in speed prior to shutting OFF. This message is displayed after the software run signal is disabled until the VSD notifies the Chiller Control Board the compressor is no longer running.

SYS X ANTI-RECYCLE TIMER = XXX SEC

This message indicates the amount of time left on the respective system anti-recycle timer and the system is unable to start until the timer times out.

SYS X DISCHARGE PRESSURE LIMITING

The Discharge Pressure Limiting message indicates the discharge pressure load limit or discharge pressure unloading is in effect.

SYS X SUCTION PRESSURE LIMITING

The Suction Pressure Limiting message indicates the suction pressure load limit or suction pressure unloading is in effect.

SYS X MOTOR TEMP LIMITING

The Motor Temp Limiting message indicates the motor temp load limit or motor temp unloading is in effect.

SYS X MOTOR CURRENT LIMITING

The motor current limiting message indicates the motor current load limit or motor current unloading is in effect.

SYS X PULLDOWN MOTOR CURRENT LIMITING

The pulldown motor current limiting message indicates the pulldown motor current load limit or pulldown motor current unloading is in effect based on the programmed setpoint.

SYS X ISN CURRENT LIMITING

The ISN Current Limiting message indicates the motor current load limit or motor current unloading is in effect through the use of the YORKTalk setpoint.

SYS X REMOTE MOTOR CURRENT LIMITING

The Remote Motor Current Limiting message indicates the motor current load limit or motor current unloading is in effect through the use of the remote setpoint offset. The setpoint may be offset using a remote voltage or a current signal. The remote current limit must be activated for this function to operate.

SYS X VSD BASEPLATE TEMP LIMITING

The VSD Baseplate Temp Limiting message indicates the VSD Baseplate temp is high and load limit or unloading is in effect.

SYS X VSD INTERNAL AMBIENT TEMP LIMITING

The VSD Internal Ambient Temp Limiting message indicates the VSD internal ambient temp is high and load limit or unloading is in effect.

SYS X SOUND LIMITING

The sound limiting message indicates the sound load limit is in effect based on the locally programmed sound limit from the keypad. The sound limit must be activated for this function to operate.

SYS X ISN SOUND LIMITING

The ISN sound limiting message indicates the sound load limit is in effect based on the ISN transmitted sound limit setpoint. The sound limit must be activated for this function to operate.

SYS X REMOTE SOUND LIMITING

The Remote sound limiting message indicates the sound load limit is in effect based on the Remote controlled sound limit setpoint. The setpoint may be offset using a remote voltage or current signal. The sound limit option must be activated for this function to operate.

When free cooling is enabled and free cooling fans are operating, the following status message will appear once the anti-recycle timer expires.

SYS X FREE COOLING

Unit Safety (Fault) Status Messages

A complete listing of the unit safeties and the corresponding status messages is provided in *Unit Safeties on page 92*.

System Safety (Fault) Status Messages

A complete listing of the system safeties and the corresponding status messages is provided in *System Safeties (Faults) on page 93*.

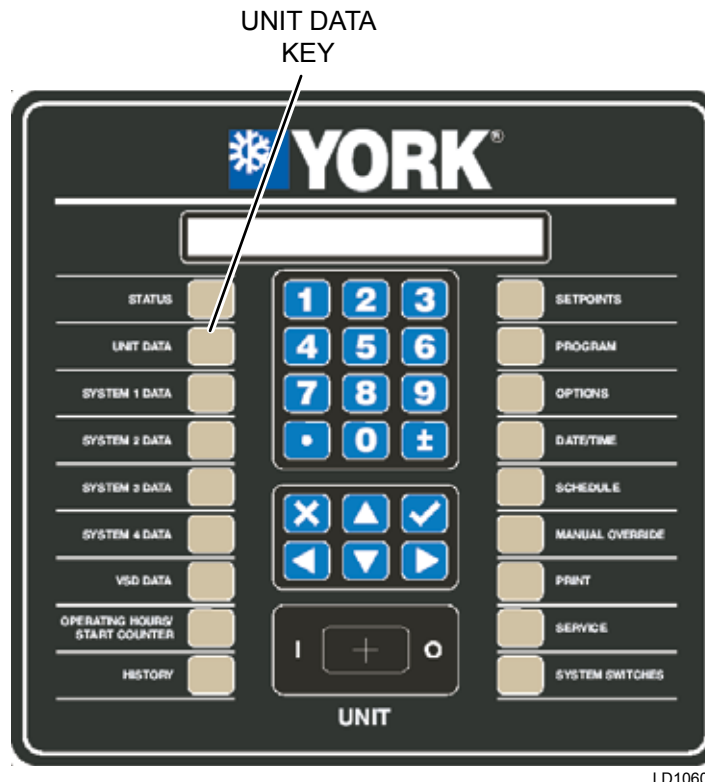
VSD Safety (Fault) Status Messages

A complete listing of VSD safeties and the corresponding status messages is provided in *VSD Safeties (Faults) on page 102*.

Unit Warning Messages

A complete listing of the unit warnings and the corresponding status messages is provided in *Unit Warning on page 91*.

UNIT DATA KEY



LD10605

General

The UNIT DATA key provides the user with displays of unit temperatures, and unit related data. Displays can be selected by repeatedly pressing the UNIT DATA key or the ▲ or ▼ Keys.

Unit Data Key Operation

The first key press displays Evaporator Leaving and Return Chilled Liquid Temperatures.

UNIT CHILLED LIQUID LEAVING = XXX.X °F
ENTERING = XXX.X °F

The ▼ key press of the UNIT DATA key or the ▼ key displays the ambient air temperature.

UNIT EVAP ENTERING TEMP = XX.X °F
OUTSIDE AMBIENT AIR TEMP = XXX.X °F

The ▼ key press will display the time remaining on the load and unload timers.

UNIT LOAD TIMER = XXX SEC
UNLOAD TIMER = XXX SEC

The ▼ key press displays the error in temperature between the actual leaving chilled liquid temperature and the setpoint temperature. The display also shows the rate of change of the chilled liquid temperature.

UNIT TEMP ERROR = XXX.X °F
RATE = XXX.X °F/M

The ▼ key press displays the system designated as the lead system and the Flow Switch status (ON or OFF).

UNIT LEAD SYSTEM NUMBER = X
FLOW SWITCH = XXX

The ▼ key press displays the status of the evaporator pump and heater, where XXX is either ON or OFF.

UNIT EVAP PUMP RUN = XXX
EVAP HEATER = XXX

The ▼ key press displays the status of Active Remote Control.

UNIT ACTIVE REMOTE CONTROL = XXXXXX
TYPE: RCC ISN CURR TEMP SOUND

XXXXXX is either ACTIVE or NONE.

If no remote keys are active, the items on the second line are all blanked out. Any remote items that are active will be displayed, while the inactive items will be blanked out.

The types of remote control are listed as follows:

- NONE - No remote control is actively controlling the chiller; however, remote monitoring by a remote device may still be active.
- RCC - A Remote Control Center is providing remote control. The chiller is in remote mode.
- ISN - YorkTalk via ISN. The chiller in remote mode.
- CURR - Remote Current Limiting is enabled.
- TEMP - Remote Temperature Reset is enabled.
- SOUND - Remote Sound Limiting is enabled.

The ▼ key press displays the power absorbed of compressor and fan in system 1 and system 2.

SYS 1	COMP KW = XXX.X,	FAN KW = XXX.X
SYS 2	COMP KW = XXX.X,	FAN KW = XXX.X

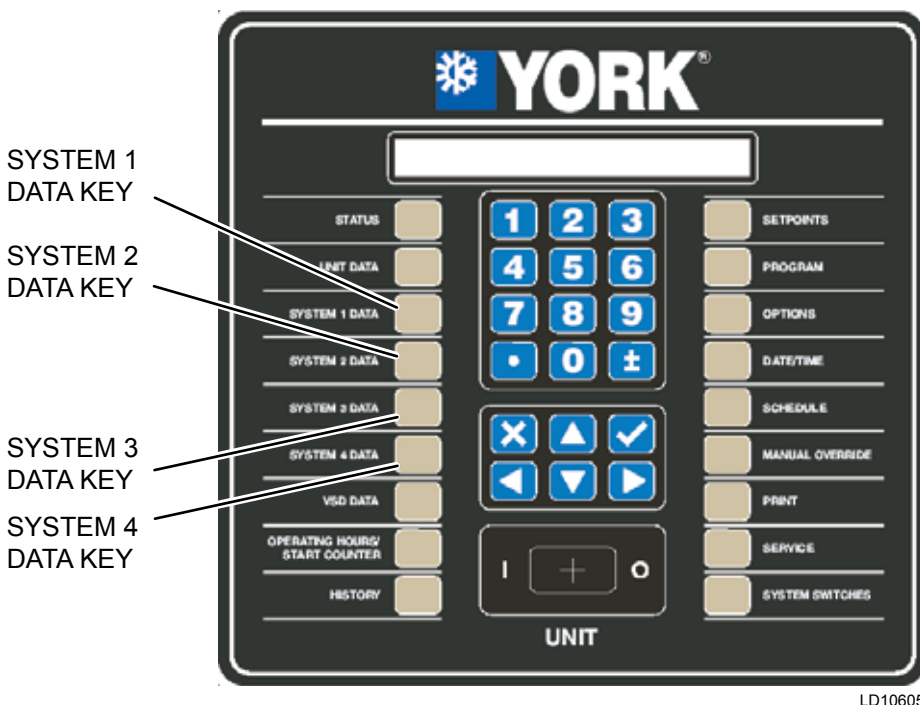
The ▼ key press displays the status of Free Cooling Valve and the operation mode of unit. The Free Cooling Valve can be "CLOSED TO EVAP" or "OPEN TO EVAP" and the Mode can be "MECHANICAL", "HYBRID" or "FREE COOLING".

FREE COOLING VALVE	XXXXXXXXXXXXXXXX
MODE =	XXXXXXXXXXXX

The ▼ key press displays the sound limit values as set under the PROGRAM key by the Local, ISN, and the Remote Sound Limit Inputs. Any sound limits that are inactive will display XXX instead of a numeric value.

UNIT SOUND LIMIT	LOCAL = XXX %
ISN = XXX	REMOTE = XXX %

SYSTEM DATA KEYS 1 THROUGH 4

**General**

The data keys provide the user with many displays of individual system temperatures, pressures, and other operating data. These keys have multiple displays, which can be seen by repeatedly pressing the SYSTEM DATA or the ▲ or ▼ keys. An explanation of each key and its messages is provided below.

System 1 Data Key Operation

The SYSTEM 1 DATA key provides the user with access to System 1 operating parameters. The following is a list of the data in the order in which it appears.

The first key press of the SYSTEM X DATA key displays all of the measured system pressures (oil and discharge).

SYS 1 PRESSURES	OIL = XXXX PSIG
	DISCHARGE = XXXX PSIG

The second key press of the SYSTEM DATA key or the ▼ key displays system suction and condenser liquid pressure.

SYS 1 PRESSURES	SUCTION = XXXX PSIG
	CONDENSER LIQUID = XXXX PSIG

The ▼ key press displays system oil and eductor temperatures.

SYS 1 TEMPERATURES	EDUCTOR = XXX.X °F
	DISCHARGE = XXX.X °F

The ▼ key press displays system condenser liquid temperature, liquid line subcooling and saturated discharge temperature on the liquid line.

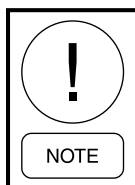
SYS 1 CONDENSER LIQUID TEMP = XXX.X °F
SUBCOOLING = XXX.X SAT TEMP = XXX.X °F

The ▼ key press displays discharge temperature, discharge superheat and saturated discharge pressure at the compressor.

SYS 1 DISCHARGE	TEMP = XXX.X °F
SUPERHEAT = XXX.X	SAT TEMP = XXX.X °F

The ▼ key press displays the System 1 motor thermistor temperatures.

SYS 1 MOTOR TEMPS	T1 = XXX.X °F
T2 = XXX.X °F	T3 = XXX.X °F



If any motor temp sensor is being ignored, (selectable under Unit Set-up Mode), that sensor's value will be displayed as XXXXX.

The ▼ key press displays the compressor speed in % (0 to 100%) and the compressor heater status (ON or OFF)

SYS 1 COMPRESSOR	SPEED = XXX.X %
	HEATER = XXX

The ▼ key press indicates the flash tank level low/high and the economizer valve % open.

SYS 1	FLASH TANK LEVEL = XXXX
	ECONOMIZER VALVE = XXX.X %

The ▼ key press displays the condenser liquid line subcooling and the drain valve position.

SYS 1	CONDENSER SUBCOOLING = XXX.X °F
	CONDENSER DRAIN VALVE = XXX.X %

The ▼ key press indicates the number of condenser fans steps that are enabled (1 to 4), if the fans are not operating on a VSD.

SYS 1	CONDENSER FANS ON = X
--------------	------------------------------

If the fans are controlled by an optional VSD, the display will indicate fan speed signal control voltage to the VSD and the fan speed (0 to 100%).

SYS 1	CONDENSER FANS ON = X
	VSD FAN SPEED = XX.X V = XXX %

The ▼ key press will indicate the state of the optional VI solenoids where XXX indicates ON or OFF.

SYS 1	VI STEP SOLENOID 1 = XXX
	VI STEP SOLENOID 2 = XXX

The ▼ key press displays the system run time in days, hours, minutes and seconds.

SYS 1 RUN TIME
XX DAYS XX HOURS XX MINUTES XX SECONDS

The ▼ key press indicates the status of the RUN Relay where XXX is ON or OFF, the status of the RUN Permissive signal (flow switch/remote start/stop circuit 2 and 15 of 1TB, SYS 1) or 2 and 16 of 1TB, SYS 2) and whether the internal software is telling the system to run (ON or OFF)

SYS 1 RUN SIGNALS	RELAY = XXX
RUN PERM = XXX	SOFTWARE = XXX

System 2 Data Key Operation

System 2 keys function the same as the SYSTEM 1 DATA key except that it displays data for System 2.

On a 2 compressor system, the SYSTEM 3 and SYSTEM 4 data keys will display the following messages:

SYS 3 DATA NOT AVAILABLE

SYS 4 DATA NOT AVAILABLE

Sensor Displays

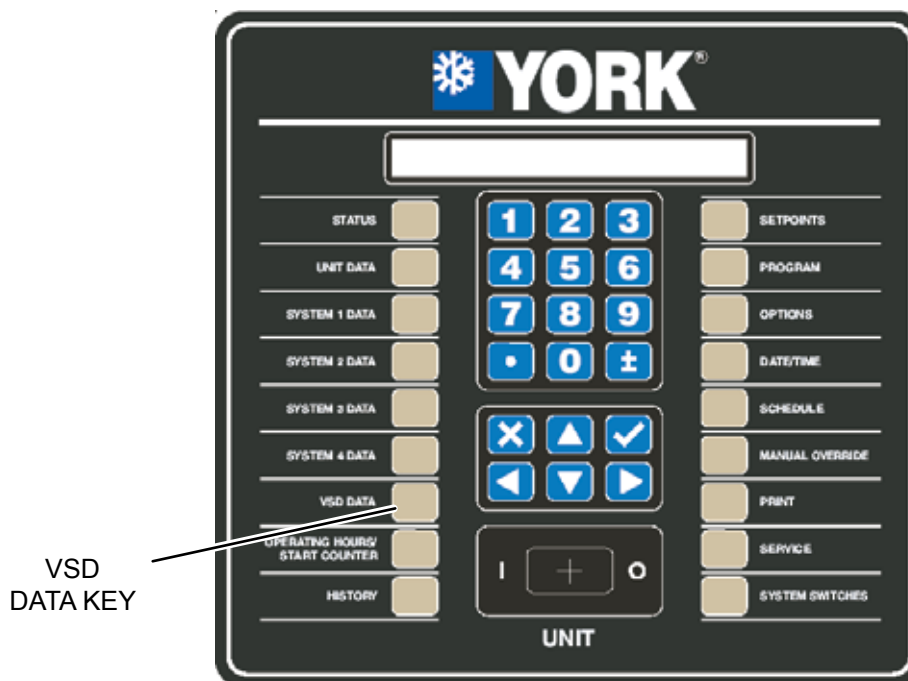
Sensor table lists all the sensors attached to the control board associated with system data keys. The minimum and maximum values displayed on the micro display are provided.

If values exceed the limits in the table, a < (less than) or > (more than) sign will be display along with the minimum or maximum value.

TABLE 16 - SENSOR MIN/MAX OUTPUTS

SYSTEM SENSOR			
SENSOR / INPUT	TYPE	MINIMUM VALUE	MAXIMUM VALUE
Suction Pressure	Transducer	0.0 PSIG	125.0 PSIG
Condenser Liquid Pressure	Transducer	0.0 PSIG	400.0 PSIG
Discharge Pressure	Transducer	0.0 PSIG	400.0 PSIG
Oil Pressure	Transducer	0.0 PSIG	400.0 PSIG
Flash Tank Level	Switch	Low	High
Condenser Liquid Temp	Thermistor	-4.1 °F (-20.06 °C)	155.6 °F (68.67°C)
Leaving Chilled Liquid Temp	Thermistor	-19.1 °F (-28.49°C)	110.2 °F (43.44°C)
Return Chilled Liquid Temp	Thermistor	-19.1 °F (-28.49°C)	110.2° F (43.44°C)
Eductor Temp	Thermistor	-4.1° F (-20.06°C)	132.8 °F (56.00°C)
Ambient Air Temp	Thermistor	-4.6 °F (-20.33°C)	137.9° F (58.83°C)
Compressor Motor Temp	Thermistor	-30.2 °F (-34.56°C)	302.0° F (150.00°C)
Discharge Temp	Thermistor	40.3 °F (4.61°C)	302.6 °F (150.33°C)
Remote Temp Reset	4 to 20ma, 0 to10 VDC, 0 to 20ma or 2 to 10VDC	0%	100%
Remote Current Limit	4 to 20ma, 0 to10 VDC, 0 to 20ma or 2 to 10VDC	0%	100%
Remote Sound Limit	4 to 20ma, 0 to 10VDC, 0 to 20ma or 2 to 10VDC	0%	100%

VSD DATA KEY



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8

General

The VSD DATA key provides the user with displays of VSD temperatures, voltages, currents, and other operating data. This key has multiple displays, which can be seen by repeatedly pressing the VSD DATA or the ▲ or ▼ keys. An explanation of each message is provided below.

VSD Data Key Operation

The first VSD DATA key press displays the actual VSD Output Frequency and Command Frequency.

VSD FREQUENCY ACTUAL = XXX.X HZ
COMMAND = XXX.X HZ

The second key press of the VSD DATA key or the ▼ key displays the calculated compressor % FLA and measured motor currents in amps for systems 1 and 2. When measuring motor current keep in mind that measuring inverter PWM current is difficult and meter error can be significant.

VSD COMP 1 = XXX AMPS = XXX %FLA
COMP 2 = XXX AMPS = XXX %FLA

The ▼ key press displays the current limit values set locally on the panel under the PROGRAM key, remotely by an ISN, and remotely by the Current Limit input. Any current limits that are inactive will display “XXX” instead of a numeric value.

VSD CURRENT LIMIT LOCAL = XXX %FLA
BAS = XXX REMOTE = XXX %FLA

The ▼ key press displays DC Bus voltage.

VSD DC BUS VOLTAGE = XXX VDC

The ▼ key press displays the Control Panel/VSD Internal Ambient Temperature and VSD Cooling Pump/ Fan Status. YYY will indicate ON or OFF.

VSD INTERNAL AMBIENT TEMP = XXX.X °F
COOLING SYSTEM STATUS = YYY

The ▼ key press displays the IGBT highest baseplate temperature.

VSD IGBT BASEPLATE TEMPS T1 = XXX °F
T2 = XXX °F

The ▼ key press displays the state of the Precharge signal, where XXX is either ON or OFF.

VSD PRECHARGE SIGNAL = XXX

The ▼ key press displays the setting of the VSD's 105% FLA overload potentiometer for Compressor #1 and 2. The settings are determined by the adjustment of

the overload potentiometers on the VSD Logic Board. These pots are factory set and should not require changing unless the circuit board is replaced. Refer to *Table 17 on page 118* for factory settings.

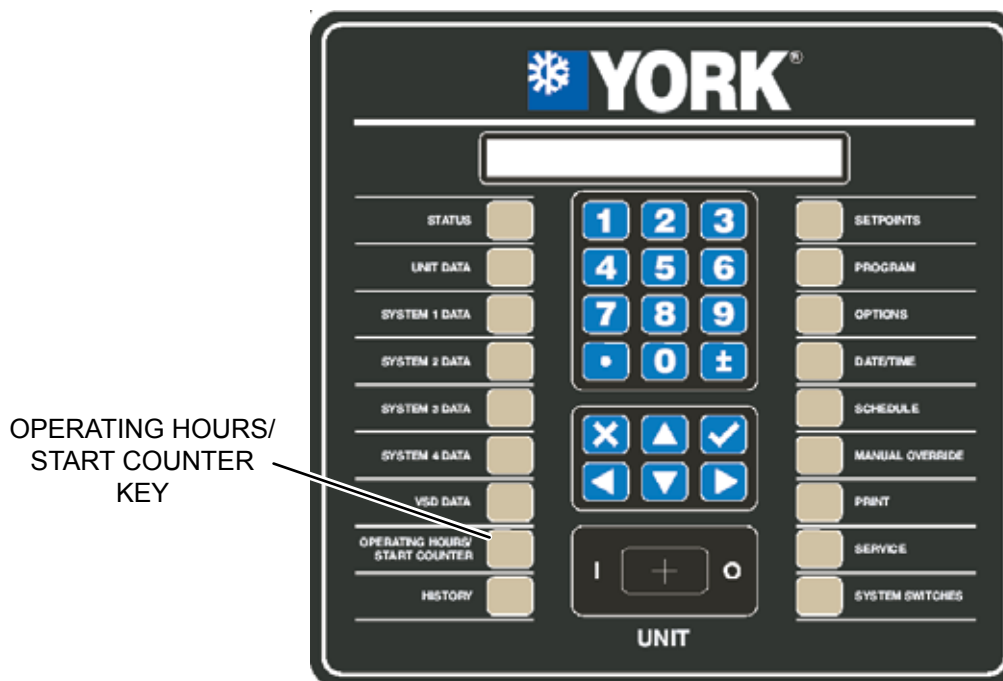
**VSD COMP 1 MOTOR OVERLOAD = XXX AMPS
COMP 2 MOTOR OVERLOAD = XXX AMPS**

TABLE 17 - COMPRESSOR MOTOR OVERLOAD SETTINGS

MODEL		380V-60HZ		400V-50HZ		460V-60HZ (see note 1)	
		SYS # 1	SYS # 2	SYS # 1	SYS # 2	SYS # 1	SYS # 2
50/60 HZ TONS	50/60 HZ KW	OL SETTING	OL SETTING	OL SETTING	OL SETTING	OL SETTING	OL SETTING
YVFA0259	YVFA0889	338	300	338	283	283	236
YVFA0309	YVFA1069	412	334	412	317	392	276
YVFA0359	YVFA1239	412	412	412	412	392	392

NOTE 1 For 200V, 230V, and 575V chillers, use the 460V selection.

OPERATING HOURS / START COUNTER KEY

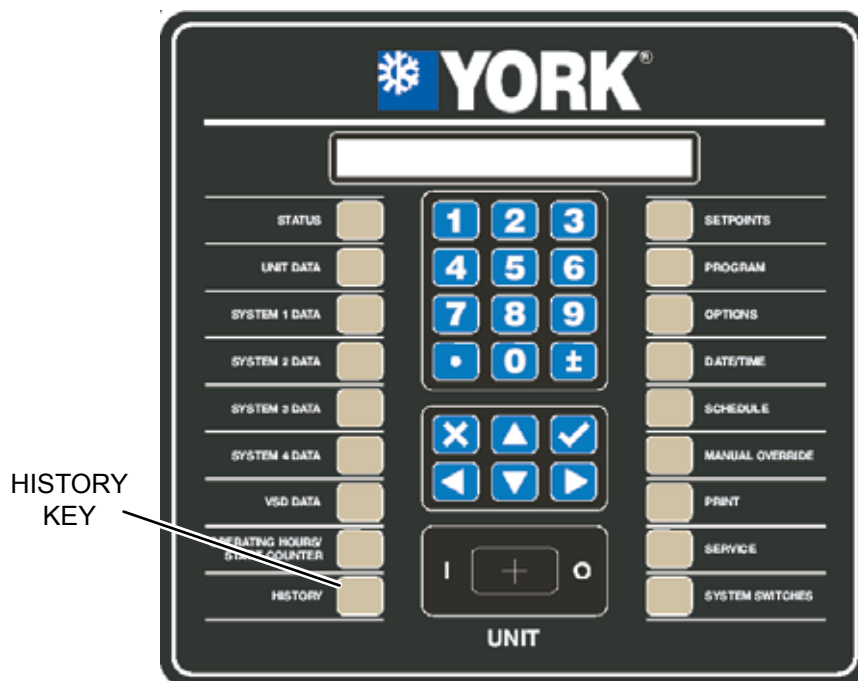


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Compressor operating hours and compressor starts are displayed with a single key press. The maximum value for both hours and starts is 99,999, at which point they will roll over to 0. A single display is available under this key and is displayed below.

HOURS 1=XXXXX, 2=XXXXX
START 1=XXXXX, 2=XXXXX

HISTORY KEY



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History Key Operation

The HISTORY key provides the user access to many unit and system operating parameters captured at the instant a unit or system safety (fault) shutdown occurs. The history buffer will also capture system data at the time of normal shutdowns such as cycling shutdowns. When the HISTORY key is pressed the following screen is displayed:

```

HISTORY      CHOOSE HISTORY TYPE
◀ ▶  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  
```

The ◀ and ▶ keys allow choosing between NORMAL SHUTDOWNS and FAULT SHUTDOWNS. “Fault” shutdowns provide information on safety shutdowns, while “Normal” shutdowns provide chiller cycling information on temperature (demand), cycling, remote, system switch, etc., shutdowns that are non-safety related shutdowns. Once the selection is made, the ✓ (ENTER) key must be pressed to enter the selection.

Normal Shutdowns History

If the NORMAL SHUTDOWNS History is selected, the following screen will be displayed:

```

NORM HIST XX 18-JUN-20004 10:34:58 AM
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  
```

XX is the normal shutdown number. The display will provide date and time of the shutdown and the reason for the cycling shutdown (YYY....).

The free cooling mode shall be considered a running state and the following normal shutdowns will be logged to history (excluding system switches):

- Daily Schedule Shutdown
- Unit Switch OFF
- Remote Controlled Shutdown
- Flow Switch
- Run Permissive
- Capacity Control

The operator can view any of the stored 20 single display normal shutdown history buffers. History buffer number 1 provides the most recent shutdown information and buffer number 20 is the oldest safety shutdown information saved. The ◀ and ▶ keys allow scrolling between each of the history buffers. The ▶ key scrolls to the next normal history shutdown and the ◀ key scrolls to the previous normal history shutdown.

The following display will typically be displayed on a normal shutdown due to shutdown on lack of cooling demand.

```
NORM HIST XX 18-JUN-20004 10:34:58 AM
SYS X COOLING DEMAND SHUTDOWN
```

Fault Shutdowns History

If the FAULT SHUTDOWNS History is selected, the following screen will be displayed:

```
FAULT HIST XX 18-JUN-20004 10:34:58 AM
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

XX is the FAULT HISTORY shutdown number. The display will provide the date, time, and a description of the specific type of fault that occurred (YYY....).

The operator can view any of the stored 10 fault history buffers. History buffer number 1 provides the most recent safety shutdown information and buffer number 10 is the oldest safety shutdown information saved. The ◀ and ▶ keys allow scrolling between each of the FAULT HIST buffers 1 through 10. The ▲ and ▼ keys can be used to scroll forwards and backwards through the data in a specific history buffer, once it is displayed.

There is a large amount of data provided under each history. Rather than scroll sequentially through the data in a history, which is possible using the ▼ key, the use of a combination of the ◀, ▶, ▲, and ▼ keys allows fast scrolling to specific data the user desires to view. To use this feature, the user needs to be aware the ◀ and ▶ keys allow scrolling to the top of the data subgroups. Once a specific history is selected, the history data is divided under the subgroups of Unit Data, VSD Data, System Data, Hours/Starts, Setpoints, Options, and Program data. The ◀ and ▶ keys allow moving to the first display under the next or previous subgroup at any time. Once the first display of a subgroup is displayed, the ▲, and ▼ keys allow scrolling through the data in the subgroup. The ▼ key allows scrolling through the data from first to last. When the last piece of data is displayed, the next press of the ▼ key scrolls to the first piece of data in the next subgroup. The ▲ key allows going to the previous display.

Listed below is a description of the fault data displays and their meaning. Data will be displayed in a specific order starting with the Status Display (System Faults only), Fault Display, All Fault Display, Unit Data, VSD Data, System Data, Operating Hours/Starts, Setpoints, Options, and Program Values at the time of the fault.

Status Fault Type

```
SYS X COMPRESSOR RUNNING
SYS X YYYYYYYY HIGH DIFF OIL PRESSURE
```

This message indicates the type of system fault. This screen is skipped if a UNIT Fault caused the shutdown.

Unit Fault Type

```
UNIT FAULT
LOW AMBIENT TEMP
```

This message indicates the type of unit fault. This screen is skipped if a SYSTEM Fault caused the shutdown.

All Fault Data

```
FAULT HIST XX ALL FAULTS ZZ OF WW
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

The ALL FAULT display indicates whether a fault occurred while the unit is shutting down on another fault.

If a control panel fault occurred while the unit is shutting down on a VSD fault before it is reset, the control panel fault is an ALL FAULT of the VSD fault.

If another VSD fault occurs while the unit is shutting down on a VSD fault, the next VSD fault will be registered as an ALL FAULT of the VSD fault.

If a VSD fault occurs during the ramp down shutdown of a control panel fault, the VSD fault is registered as a new fault, not an ALL FAULT

XX is the history number, YYY is the ALL FAULT description, ZZ is the ALL FAULT number and WW is the total number of All Faults for the current history. Sometimes, multiple faults may occur during the shutdown and multiple displays will be observed when scrolling through the data using the ▼ key. In most cases, the ALL FAULT display will indicate NONE. The ALL FAULT display will only indicate the cause of the fault. No additional chiller information will be displayed under the ALL FAULT, since a snapshot of all chiller data was taken at the time of the first fault.

Unit Data**Evaporator Leaving and Entering Chilled Liquid Temperatures**

UNIT CHILLED LIQUID LEAVING = XXX.X °F ENTERING = XXX.X °F

This message indicates the leaving and entering chilled liquid temperatures at the time of the fault.

Ambient Air Temperature

UNIT OUTSIDE AMBIENT AIR TEMP = XXX.X °F

This message indicates the ambient air temperature at the time of the fault.

Load / Unload Timers

UNIT LOAD TIMER = XXX SEC UNLOAD TIMER = XXX SEC
--

This message indicates remaining time on the load and unload timers at the time of the fault.

Chilled Liquid Temperature Error and Rate of Change

UNIT TEMP ERROR = XXX.X °F RATE = XXX.X °F/M
--

This message indicates the temperature error between the actual and the programmed setpoint at the time of the fault and the rate of temperature change.

Programmed Lead System Selection and Flow Switch Status

UNIT LEAD SYSTEM NUMBER = X FLOW SWITCH = XXX

This message indicates the designated lead system at the time of the fault and whether the flow switch was ON (Closed) or OFF (Open) at the time of the fault.

Evaporator Pump and Evaporator Heater Status

UNIT EVAP PUMP RUN = XXX EVAP HEATER = XXX
--

This message indicates the status of the evaporator pump and the evaporator heater at the time of the fault. XXX indicates ON or OFF.

Active Remote Control Status

UNIT ACTIVE REMOTE CONTROL = XXXXXX

This message indicates whether the system was operating under Active Remote Control (RCC, ISN, LOAD, TEMP, or SOUND) or standard control (NONE) at the time of the fault.

UNIT SOUND LIMIT ISN = XXX	LOCAL = XXX % REMOTE = XXX %
-------------------------------	---------------------------------

This message indicates that sound limiting was in effect, the amount, and whether it was local or remotely limited.

VSD Data**VSD Actual and Command Frequency**

VSD FREQUENCY VSD ACTUAL = XXX.X HZ COMMAND = XXX.X HZ
--

This message indicates the VSD actual operating frequency and the command frequency at the time of the fault. Actual and command may not match due to load/unload timers, limitation of 1 Hz per load/unload increment, and to allowable acceleration/deceleration of the motor.

Compressor Amps and %FLA

The message indicates the compressor %FLA and motor currents for systems 1 and 2 at the time of the fault.

COMP 1 = XXX AMPS	= XXX %FLA
COMP 2 = XXX AMPS	= XXX %FLA

VSD Current Limit

VSD CURRENT LIMIT ISN = XXX	LOCAL = XXX %FLA REMOTE = XXX %FLA
--------------------------------	---------------------------------------

This message displays the current limit values as set locally, by an ISN, or a remote current limiting input at the time of the fault.

DC BUS Voltage

VSD DC BUS VOLTAGE = XXX VDC

This message displays the DC Bus voltage at the time of the fault.

VSD Internal Ambient Temp

VSD INTERNAL AMBIENT TEMP = XXX.X °F
COOLING SYSTEM STATUS = YYY

This message displays the VSD/Microprocessor internal ambient cabinet temperature and the cooling system status (ON or OFF) at the time of the fault.

IGBT Baseplate Temperature

VSD IGBT BASEPLATE TEMPS T1 = XXX °F
T2 = XXX °F

This message displays the IGBT highest baseplate temperature for 2 and 3 compressor units at the time of the fault. 4 compressor units display temperatures for 1/3 (T1) and 2/4 (T2).

Precharge Signal Status and VSD Cooling Status

VSD PRECHARGE SIGNAL = XXX

This display provides the state of the precharge signal, where XXX is either ON or OFF at the time of the fault.

Compressor #1 and #2, 105% FLA Motor Overload Current Setting

VSD COMP 1 MOTOR OVERLOAD = XXX AMPS
COMP 2 MOTOR OVERLOAD = XXX AMPS

This message displays the setting of the VSD's 100% FLA potentiometer for Compressor #1 and #2 at the time of the fault.

System Data

System #1 Pressures

SYS 1 PRESSURES OIL = XXXX PSIG
DISCHARGE = XXXX PSIG

This message displays the measured system oil and discharge pressures at the time of the fault.

SYS 1 PRESSURES SUCTION = XXXX PSIG
CONDENSER LIQUID = XXXX PSIG

This message displays the measured system suction and condenser liquid line pressure at the time of the fault.

System # 1 Temperatures

SYS 1 TEMPERATURES OIL = XXX.X °F
EDUCTOR = XXX.X °F

This message displays the measured system oil and eductor temperatures at the time of the fault.

SYS 1 CONDENSER LIQUID TEMP = XXX.X °F
SUBCOOLING = XXX.X SAT TEMP = XXX.X °F

This message displays the condenser liquid, liquid line subcooling and saturated discharge temperatures at the time of the fault.

SYS 1 DISCHARGE TEMP = XXX.X °F
SUPERHEAT = XXX.X SAT TEMP = XXX.X °F

This message displays the system discharge, discharge superheat and saturated discharge temperatures at the time of the fault.

Compressor Speed and Heater Status

SYS 1 COMPRESSOR SPEED = XXX.X %
HEATER = XXX.X °F

This message indicates the compressor speed in % and the heater status at the time of the fault.

System #1 Motor Temperatures

SYS 1 MOTOR TEMPS T1 = XXX.X °F
T2 = XXX.X T3 = XXX.X °F

This message displays the System 1 motor thermistor temperatures at the time of the fault.

Flash Tank Level and Economizer Position

SYS 1 FLASH TANK LEVEL Y 512 ADC
ECONOMIZER VALVE = XXX.X %

This message displays the flash tank level and the economizer valve position in % at the time of the fault.

Condenser Subcooling and Condenser Drain Valve Position

SYS 1 CONDENSER SUBCOOLING = XXX.X °F
CONDENSER DRAIN VALVE = XXX.X %

This message displays the condenser subcooling and the Condenser Drain Valve position at the time of the fault.

Condenser Fans

SYS 1	CONDENSER FANS ON = X
-------	-----------------------

SYS 1	CONDENSER FANS ON = X
	VSD FAN SPEED XX.X V = XXX %

This message displays the number of condenser fans ON or the optional VSD fan control speed signal to the inverter and the % of full speed.

VI Step Solenoid

SYS 1	VI STEP SOLENOID 1 = XXX
	VI STEP SOLENOID 2 = XXX

This message displays whether the VI solenoids were ON or OFF at the time of the fault.

Compressor #1 Run Time

SYS 1 RUN TIME
XX DAYS XX HOURS XX MINUTES XX SECONDS

This message displays the system run time since the last start in days, hours, minutes, and seconds at the time of the fault.

System #1 Run Signals

SYS 1 RUN SIGNALS	RELAY = XXX
RUN PERM = XXX	SOFTWARE = XXX

This message displays the System Run Signal Relay (Relay Output Board) status, Run Permissive Input status, and the Internal Software (microprocessor command) ON/OFF Start status. The status of each will indicate either ON or OFF.

System 2 Data

Data for the system 2 at the time of the fault is displayed in the same sequence as the system #1 data.

Compressor Operating Hours and Starts

HOURS 1=XXXXX, 2=XXXXX
START 1=XXXXX, 2=XXXXX

This message displays compressor operating hours and compressor starts at the time of the fault.

Chilled Liquid Setpoint Cooling Setpoints

SETPOINTS
LOCAL COOLING SETPOINT = XXX.X °F

This message displays the programmed cooling setpoint at the time of the fault.

SETPOINTS
LOCAL CONTROL RANGE = +/- X.X °F

This message displays the programmed Control Range at the time of the fault.

Remote Setpoint and Range

SETPOINTS REMOTE SETPOINT = XXX.X °F
REMOTE CONTROL RANGE = +/- X.X °F

This message displays the remote setpoint and Control Range at the time of the fault.

Maximum Remote Temperature Setpoint

SETPOINTS
MAXIMUM REMOTE TEMP RESET = XXX.X °F

This message displays the maximum remote reset programmed at the time of the fault.

Options**Display Language**

OPTIONS	DISPLAY LANGUAGE
◀ ▶	XXXXXXXXXXXXXXXXXXXXXX

This message displays the language selected at the time of the fault.

Chilled Liquid Cooling Mode

OPTIONS	CHILLED LIQUID COOLING MODE
◀ ▶	WATER COOLING

This message displays the chilled liquid temperature mode (water or glycol) selected at the time of the fault.

Local / Remote Control Mode

OPTIONS	CHILLED LIQUID COOLING MODE
◀ ▶	GLYCOL COOLING

This message indicates whether Local or Remote Control Mode was selected at the time of the fault.

OPTIONS	LOCAL / REMOTE CONTROL MODE
◀ ▶	XXXXXXXXXXXXXXXXXXXXXX

When Remote Control Mode is selected, control of the Chilled Liquid Setpoint is from a remote device such as an ISN/BAS controller.

Display Units Mode

OPTIONS	DISPLAY UNITS
◀ ▶	XXXXXXXXXXXXXXXXXXXXXX

This message indicates whether SI (°C, Barg) or Imperial units (°F, PSIG) was selected at the time of the fault.

System Lead/Lag Control Mode

OPTIONS	LEAD / LAG CONTROL MODE
◀ ▶	XXXXXXXXXXXXXXXXXXXXX

This message indicates the type of lead lag control selected at the time of the fault. Three choices are available:

- Automatic
- Sys 1 Lead
- Sys 2 Lead

The default mode will be AUTOMATIC.

Remote Temperature Reset

OPTIONS	REMOTE TEMP RESET INPUT
◀ ▶	XXXXXXXX

This message indicates whether temperature reset was active or disabled at the chiller keypad at the time of the fault and if active, the type of reset signal selected.

If the option is not factory enabled, the option will not appear.

Remote Current Reset

OPTIONS	REMOTE CURRENT LIMIT INPUT
◀ ▶	XXXXXXXXXXXX

This message indicates whether remote current reset was active or disabled at the chiller keypad at the time of the fault and if active, the type of reset signal selected.

If the option is not factory enabled, the option will not appear.

Remote Sound Limit Selection

OPTIONS	REMOTE SOUND LIMIT INPUT
◀ ▶	XXXXXXXXXXXX

This message indicates whether remote sound limit was active or disabled at the chiller keypad at the time of the fault and if active, the type of reset signal selected.

If the option is not factory enabled, the option will not appear.

Program Values

Suction Pressure Cutout

PROGRAM
SUCTION PRESSURE CUTOUT = XXX.X PSIG

This message indicates the suction pressure cutout programmed at the time of the fault.

Low Ambient Cutout

PROGRAM
LOW AMBIENT TEMP CUTOUT = XXX.X °F

This message displays the low ambient temp cutout programmed at the time of the fault.

Low Leaving Chilled Liquid Temp Cutout

PROGRAM
LEAVING LIQUID TEMP CUTOUT = XXX.X °F

This message displays the low leaving chilled liquid temperature cutout programmed at the time of the fault.

Motor Current Limit

PROGRAM
MOTOR CURRENT LIMIT = XXX %FLA

This message indicates the motor current limit programmed at the time of the fault.

Pulldown Current Limit

PROGRAM
PULLDOWN CURRENT LIMIT = XXX %FLA

This message indicates the pulldown current limit programmed at the time of the fault.

Pulldown Current Limit Time

PROGRAM
PULLDOWN CURRENT LIMIT TIME = XXX MIN

This message indicates the pulldown current limit time programmed at the time of the fault.

Condenser Subcooling Setpoint

PROGRAM
SUBCOOLING SETPOINT = XXX.X °F

This message indicates the liquid subcooling setpoint programmed at the time of the fault.

Unit ID Number

```
PROGRAM
REMOTE UNIT ID NUMBER    = X
```

This indicates the unit ID # programmed at the time of the fault.

Sound Limit Setpoint

```
PROGRAM
SOUND LIMIT SETPOINT     = XXX %
```

This indicates the sound limit setpoint programmed at the time of the fault, if the sound limit option is activated at the factory. If the option is not factory activated, the display will not appear.

Eductor Differential Temperature

```
PROGRAM  ◀DEF XXXXX LO XXXXX HI XXXXX
EDUCTOR DIFFERENTIAL      = XXX °F
```

This message indicates the programmed eductor differential temperature at the time of the fault.

Eductor Safety Time

```
PROGRAM  ◀DEF XXXXX LO XXXXX HI XXXXX
EDUCTOR SAFETY TIME       = XXX MIN
```

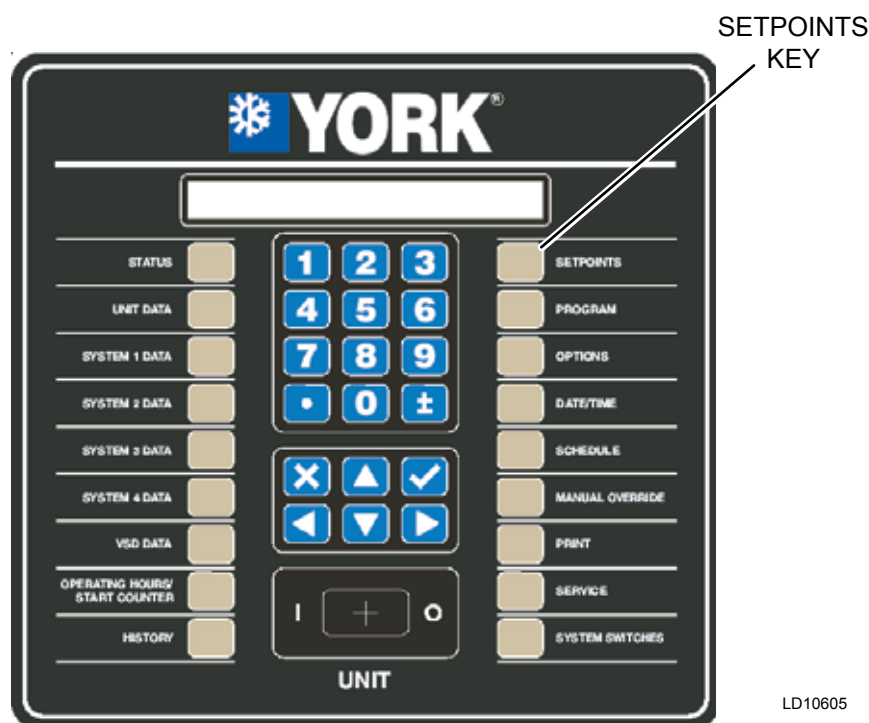
This message indicates the eductor safety time programmed at the time of the fault.

Motor Temperature Unload

```
PROGRAM  ◀DEF XXXXX LO XXXXX HI XXXXX
MOTOR TEMPERATURE UNLOAD = XXX °F
```

This message indicates the motor temperature programmed at the time of the fault.

SETPOINTS KEY



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Setpoints Key Operation

Cooling setpoints and ranges may be programmed by pressing the SETPOINTS key. The first setpoint entry screen will be displayed as shown below. The first line of the display will show the chiller default (DEF), minimum acceptable value (LO) and maximum acceptable value (HI). The second line shows the actual programmed value. *Table 18 on page 128* also shows the allowable ranges for the cooling setpoints and Control Ranges. Note that the Imperial units are exact values while the Metric units are only approximate.

**SETPOINTS ◀DEF XXXXX LO XXXXX HI XXXXX
LOCAL COOLING SETPOINT = XXX.X °F**

Pressing the SETPOINTS key a second time or the ▼ key will display the leaving chilled liquid Control Range, default, and low/high limits.

**SETPOINTS ◀DEF XXXXX LO XXXXX HI XXXXX
LOCAL CONTROL RANGE = +/- X.X °F**

Pressing the SETPOINTS key or the ▼ key a third time will display the remote setpoint and cooling range. This display automatically updates about every 2 seconds. This remote setpoint message is shown below:

**SETPOINTS REMOTE SETPOINT = XXX.X °F
REMOTE CONTROL RANGE = +/- X.X °F**

If there is no remote setpoint being utilized, the remote setpoint value will be displayed as XXXXXX and the remote Control Range will display XXX.

Pressing the SETPOINTS key or the Arrow key a fourth time will bring up a screen that allows the Maximum Remote Temperature Reset to be programmed. This message is shown below:

**SETPOINTS ◀DEF XXXXX LO XXXXX HI XXXXX
MAXIMUM REMOTE TEMP RESET = XXX.X °F**

The values displayed under each of the key presses may be changed by keying in new values and pressing the ✓ (ENTER) key to store the new value into memory. Where more than one value may be keyed in on a display, a portion of the data that does not need updating may be skipped by pressing the ✓ (ENTER) key. The ✓ (ENTER) key must also be pressed after the last value in the display to store the data into memory.

The ▲ key allows scrolling back through the setpoints displays.

The minimum, maximum, and default values allowed under the SETPOINTS key are provided in the following table.

TABLE 18 - SETPOINT LIMITS

PROGRAM VALUE	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
Leaving Chilled Liquid Setpoint	Water Cooling	40.0°F	60.0°F	44.0°F
		4.4°C	15.6°C	6.7°C
	Glycol Cooling	15.0°F	60.0°F	44.0°F
		-9.4°C	15.6°C	6.7°C
	Data Center	40.0°F	70.0°F	44.0°F
		4.4°C	21.1°C	6.7°C
Leaving Chilled Liquid Control Range	-	1.5°F	2.5°F	2.0°F
		0.8°C	1.4°C	1.1°C
Max. Remote Temperature Reset	-	2°F	40°F	20°F
		1°C	22°C	11°C

For YVFA chiller, Free Cooling is a standard configuration, when the unit is operating in free cooling only mode, the setpoint of "Leaving Chilled Liquid Temperature" can be set within the range of 60° to 70° (15.5°-21.1°), which is higher than that "mechanical mode" can withstand, and the "Leaving Chilled Liquid Temperature" within this range is more suitable for application of data center in cold weather.

Follow the procedures below to set the LCLT setpoint within 60° to 70° (15.5°-21.1°).

Press PROGRAM and input the password "4245" then press ✓;

Using ▲ or ▼ key to scroll up or down to FREE COOLING MODE;

SETUP MODE	FREE COOLING MODE
◀ ▶	XXXXXXX

Using ► key to enable FREE COOLING MODE mode then press ✓ to save;

SETUP MODE	FREE COOLING MODE
◀ ▶	ENABLE

Using ▲ or ▼ key to scroll up or down to DATA CENTER MODE";

SETUP MODE	DATA CENTER MODE
◀ ▶	XXXXXXX

Using ► key to enable DATA CENTER MODE mode then press ✓ to save;

SETUP MODE	DATA CENTER MODE
◀ ▶	ENABLE

Press STATUS key to exit SETUP MODE;

Press OPTION key; Repeatedly pressing ▼ key to scroll down until CHILLED LIQUID COOLING Mode is displayed;

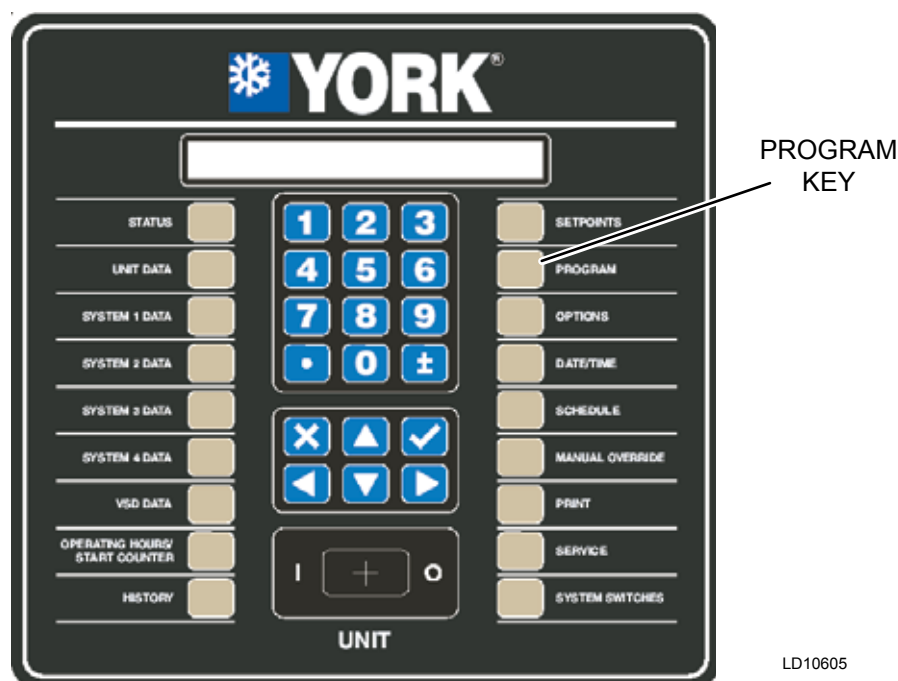
OPTIONS	CHILLED LIQUID COOLING MODE
◀ ▶	XXXXXX XXXXXX

Using ► key to select DATA CENTER mode then press ✓ to save;

Press STATUS key to exit Option mode;

The chiller is now ready to accept the setpoint between 60° and 70° (15.5°-21.1°).

PROGRAM KEY



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Program Key Operation

Various operating parameters are programmable by the user. These are modified by pressing the PROGRAM key and then the ✓ (ENTER) key to enter Program Mode. A listing of the limits of the programmable values is found below. Note that the Imperial units are exact values, while Metric units are only approximate.

The ▲ and ▼ keys are used to scroll through the user programmable values. A value may be changed by keying in the new value and pressing the ✓ (ENTER) key to store the new value in memory. The cursor will be displayed on the screen when a number key is pressed. The first line of each message will indicate the chiller default (DEF) value), lowest acceptable programmable value (LO), and highest acceptable programmable value (HI). The user programmable value is programmed ON in the second line of the message.

When the PROGRAM key is first pressed, the following display will appear indicating the user is in the program mode:

```
PROGRAM MODE XXXX
PRESS ENTER KEY TO CONTINUE
```

Pressing the ✓ (ENTER) key again will display the first programmable selection.

Suction Pressure Cutout

```
PROGRAM ◀DEF XXXXX LO XXXXX HI XXXXX
SUCTION PRESSURE CUTOUT = XXX.X PSIG
```

The suction pressure cutout protects the chiller from a low refrigerant condition. It also helps protect from a freeze-up due to low or no chilled liquid flow. However, it is only a back-up for a flow switch and cannot protect against an evaporator freeze under many conditions. This cutout is programmable and should generally be programmed for 24PSIG (1.65 Barg) for chilled water cooling.

The cutout is programmable between 24.0 and 36.0 PSIG (1.65 and 2.48 Barg) in the Water Cooling mode and 5.0 and 36.0 (0.34 and 2.28 Barg) in the Glycol Cooling mode. The default value for both modes will be 24.0 PSIG (1.65 Barg) PSIG.

Low Ambient Cutout

```
PROGRAM ◀DEF XXXXX LO XXXXX HI XXXXX
LOW AMBIENT TEMP CUTOUT = XXX.X °F
```

The low ambient temp cutout allows programming the outdoor temperature at which it is desired to shut down the chiller to utilize other methods of cooling.

The cutout is programmable between -2.0°F (-18.9°C) and 50°F (10.0 C) with a 25°F (-3.9°C) default.

Low Leaving Liquid Temp Cutout

PROGRAM	◀DEF	XXXXX	LO	XXXXX	HI	XXXXX
LEAVING LIQUID TEMP CUTOUT = XXX.X °F						

The leaving chilled liquid temp cutout is programmed to avoid freezing the evaporator due to excessively low chilled liquid temperatures. The cutout is automatically set at 36°F (2.2 °C) in the Water Cooling mode and is programmable in the Glycol Cooling mode. In the Glycol Cooling Mode, the cutout is programmable from 11.0°F to 36.0°F (-11.7 to 2.2°C) with a default of 36.0°F (2.2°C).

Motor Current Limit

PROGRAM	◀DEF	XXXXX	LO	XXXXX	HI	XXXXX
MOTOR CURRENT LIMIT = XXX % FLA						

The motor current limit %FLA is programmable. This allows the microprocessor to limit a system before it faults on high current. Typically, the limit point is set at 100%. The unload point is programmable from 30 to 100% with a default of 103%.

Pulldown Current Limit

PROGRAM	◀DEF	XXXXX	LO	XXXXX	HI	XXXXX
PULLDOWN CURRENT LIMIT = XXX % FLA						

The pulldown current limit %FLA is programmable. This allows the microprocessor to limit a system on pulldown limiting for the purpose of peak time energy savings. Typically, the limit point is set at 100%. The pulldown limit point is programmable from 30 to 100% with a default of 100%. Be aware when using pulldown motor current limit, the chiller may not be able to load to satisfy temperature demand

Pulldown Current Limit Time

PROGRAM	◀DEF	XXXXX	LO	XXXXX	HI	XXXXX
PULLDOWN CURRENT LIMIT TIME = XXX MIN						

The pulldown current limit time is programmable. This allows the microprocessor to limit a system on pulldown limiting for a defined period of time for the purpose of peak time energy savings. The pulldown limit point is programmable from 0 to 255 minutes, with a default of 0 minutes.

Subcooling Setpoint

PROGRAM	◀DEF	XXXXX	LO	XXXXX	HI	XXXXX
SUBCOOLING SETPOINT = XXX.X °F						

The liquid subcooling superheat setpoint is programmable from 0.0 to 20.0°F (0.0 to 11.1°C) with a 5.0°F (2.8°C) default. Typically the subcooling control will be programmed for 5.0 °F.

Sound Limit Setpoint

PROGRAM	◀DEF	XXXXX	LO	XXXXX	HI	XXXXX
SOUND LIMIT SETPOINT = XXX %						

The sound limit setpoint is programmable from 0 to 100 % with a 0% default. 0% allows operating up to the full speed capability of the unit with no sound limiting. Typically the sound limit control setting will be programmed for 0 % unless sound limiting is utilized on the chiller. Sound limiting will only permit the unit to run to a frequency less than the maximum speed capability of the unit. Programming a value of 1% would be the minimum sound limiting that can be programmed and 100% will be the maximum. 100% will only allow the unit speed to operate at the minimum frequency. Usually, the sound limit % will be programmed somewhere between 0 and 100% according the limiting needed to satisfy the sound requirements of the site. Typically, sound limiting will be utilized in areas sensitive to noise during night-time hours. The sound limit display will only be present if the sound limit option is programmed at the factory.

Eductor Differential

PROGRAM	◀DEF	XXXXX	LO	XXXXX	HI	XXXXX
EDUCTOR DIFFERENTIAL = XXX °F						

The eductor temperature differential is programmable from 0.0° F to 50.0° F. The default value is 5.0°F. The programmed temperature assures the micro will sense a loss of educator oil flow, if the temperature differential rises. A small differential of 15.0°F is recommended. New versions of Software will use a 15.0°F default value.

Eductor Safety Time

PROGRAM ◀DEF XXXXX LO XXXXX HI XXXXX
EDUCTOR SAFETY TIME = XXXX MIN

The eductor safety time allows programming the time period the system is permitted to run if the safety threshold is exceeded. The safety time is programmable for 10 minutes to 1000 minutes with 10 minutes as the default. This safety assures the compressor is not starved for oil for long periods of time due to the eductor circuit not siphoning oil from the evaporator. A minimum time of 30 minutes is recommended as the program point. New versions of software will utilize a 30 minute default value.

Motor Temperature Unload

PROGRAM ◀DEF XXXXX LO XXXXX HI XXXXX
MOTOR TEMPERATURE UNLOAD = XXX °F

The motor temperature unload is programmable from 150.0° F (65.6° C) to 250.0° F (121.1° C). The default value is 240.0° F (115.5° C). The programmed temperature assures the micro will sense a rise in motor

temperature due to a lack of compressor cooling. If the temperature rises above the programmed threshold, the system will unload the compressor by reducing speed. An unload temperature of 240.0° F (115.5° C) is recommended to assure the system does provides maximum capacity.

Default Values

A listing of the low limits, high limits, and default values for each of the programmable values is noted in each display and can be found in *Table 19 on page 131*. Note that the Imperial units are exact values while the Metric units are only approximate.

Unit ID Number

PROGRAM ◀DEF XXXXX LO XXXXX HI XXXXX
REMOTE UNIT ID NUMBER = X

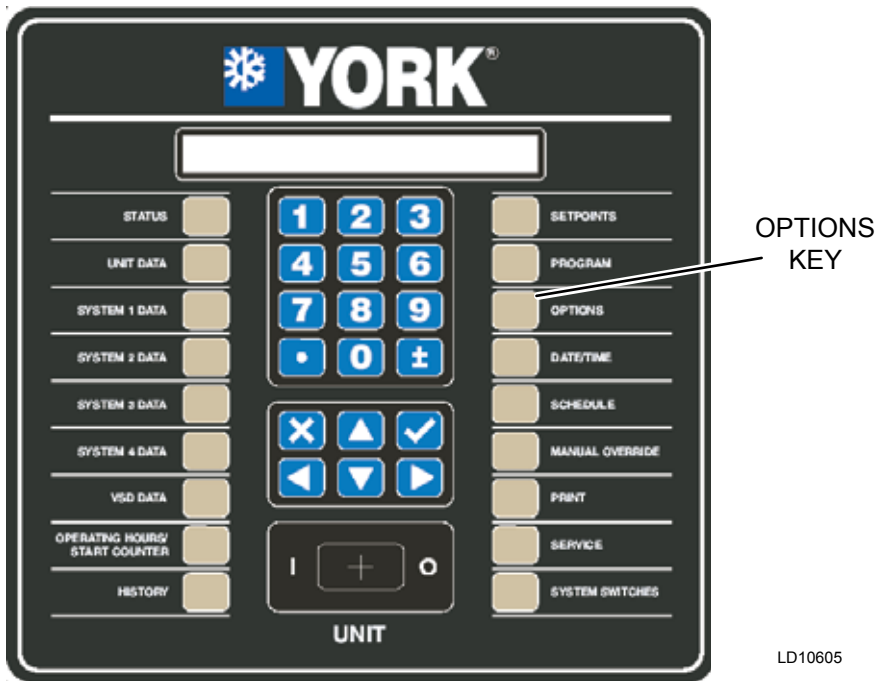
For purposes of remote communications, multiple chillers may be connected to an RS-485 communications bus. To allow communications to each chiller, a chiller ID number may be programmed into memory. On a single chiller application, the value will be “0”.

TABLE 19 - PROGRAMMABLE OPERATING PARAMETERS

PROGRAM VALUE	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
Suction Pressure Cutout	Water Cooling	24.0 PSIG	36.0 PSIG	24.0 PSIG
		1.65 Bars	2.48 Bars	1.65 Bars
	Glycol Cooling	5.0 PSIG	36.0 PSIG	24.0 PSIG
		0.34 Bars	2.48 Bars	1.65 Bars
Low Ambient Temp. Cutout	-	-2.0°F	50.0°F	25.0°F
		-18.9°C	10.0°C	-3.9°C
Leaving Chilled Liquid Temp. Cutout	Water Cooling	-	-	36.0°F
		-	-	2.2°C
	Glycol Cooling	11.0°F	36.0°F	36.0°F
		-11.7°C	2.2°C	2.2°C
Motor Current Limit	-	30% FLA	103% FLA	103% FLA
Pulldown Motor Current Limit	-	30% FLA	100% FLA	100% FLA
Pulldown Motor Current Limit Time	-	0 Min	255 Min	0 Min
Condenser Subcooling Setpoint	-	0.0°F	20.0°F	5.0°F
		0.0°C	11.1°C	2.8°C
Sound Limit Setpoint	Sound Limit Option Enabled	0%	100%	0%
Eductor Temp Differential	-	5.0°F	50.0°F	5.0°F*
		2.77°C	27.8°C	2.77°C*
Eductor Safety Time	-	10 Min	1000 Min	10 Min*
Motor Temperature Unload	-	150.0°F	250.0°F	240.0°F
		65.6°C	121.1°C	115.5°C
Unit ID Number	-	0	7	0

*New versions of software will have the Eductor Temp Differential default set to 15.0°F (8.3°C) and the Eductor Safety Time set to 30 minutes.

OPTIONS KEY



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Options Key Operation

The OPTIONS key provides the user with a display of unit configuration and the capability to modify the configuration. These options can only be viewed under the OPTIONS key. To view the current options settings, press the OPTIONS key. Each press of the OPTIONS key or press of the ▲ or ▼ keys will scroll to the next option setting. The ◀ and ▶ keys allow changing the option choices. The ✓ (ENTER) key must be pressed after a selection is made to save the change in memory.

An explanation of each option message is provided below.

Display Language Selection

The display language can be selected for English, Italian, Polish, Hungarian, German, French, Portuguese, and Spanish.

OPTIONS	DISPLAY LANGUAGE
◀ ▶	XXXXXXXXXXXXXXXXXXXX

The default language will be English.

Chilled Liquid Cooling Mode Selection

The Chilled liquid cooling mode can be selected for Water Cooling or low temperature Glycol Cooling or Data Center.

OPTIONS	CHILLED LIQUID COOLING MODE
◀ ▶	XXXXXXXXXXXXXXXXXXXX

When Water Cooling is chosen, the chilled liquid temperature setpoint can only be programmed from 40°F to 60°F

OPTIONS	CHILLED LIQUID COOLING MODE
◀ ▶	WATER COOLING

When Glycol Cooling is chosen, the chilled liquid temperature setpoint can be programmed from 15°F to 60°F.

OPTIONS	CHILLED LIQUID COOLING MODE
◀ ▶	GLYCOL COOLING

When Data Center is chosen, the chilled liquid temperature setpoint can be programmed from 40°F to 70°F.

OPTIONS	CHILLED LIQUID COOLING MODE
◀ ▶	DATA CENTER

The default Chilled Liquid Mode will be WATER COOLING.

Local / Remote Control Mode Selection

Local or Remote Control Mode allows the user to select the chilled liquid temperature control mode.

OPTIONS	LOCAL / REMOTE CONTROL MODE
◀ ▶	XXXXXXXXXXXXXXXXXXXX

When LOCAL CONTROL mode is selected, chilled liquid control is from the keypad of the chiller. In local mode, a remote device can read system data, but not reset operating parameters.

OPTIONS	LOCAL / REMOTE CONTROL MODE
◀ ▶	LOCAL CONTROL

When REMOTE CONTROL mode is selected, control of the chilled liquid setpoint is from a remote device such as an ISN/BAS controller.

OPTIONS	LOCAL / REMOTE CONTROL MODE
◀ ▶	REMOTE CONTROL

The default mode will be LOCAL CONTROL.

Display Units Selection

Imperial or SI display units may be selected for data display.

OPTIONS	DISPLAY UNITS
◀ ▶	XXXXXXXXXXXXXXXXXXXX

The user may select system operating temperatures and pressures to be displayed in either SI (°C, Barg) or Imperial units (°F, PSIG).

OPTIONS	DISPLAY UNITS
◀ ▶	IMPERIAL

OPTIONS	DISPLAY UNITS
◀ ▶	SI

The default mode is IMPERIAL.

System Lead/Lag Control Mode Selection

The operator may select the type of lead/lag control desired.

OPTIONS	LEAD / LAG CONTROL MODE
◀ ▶	XXXXXXXXXXXXXXXXXXXX

In most cases, automatic lead/lag will be selected. When automatic lead/lag is selected, the microprocessor will attempt to balance run time by switching the lead compressor whenever all compressors are shut OFF. If a compressor is not able to run when the mi-

croprocessor attempts a start, the microprocessor will select another compressor in an effort to control chilled liquid temperature. Manual lead/lag allows selecting a specific compressor to be the lead.

OPTIONS	LEAD / LAG CONTROL MODE
◀ ▶	AUTOMATIC

The default mode will be AUTOMATIC.

Lag selections of individual systems will appear as:

OPTIONS	LEAD / LAG CONTROL MODE
◀ ▶	MANUAL SYS 1 LEAD

OPTIONS	LEAD / LAG CONTROL MODE
◀ ▶	MANUAL SYS 2 LEAD

OPTIONS	FLASH CARD UPDATE
◀ ▶	XXXXXXXXXXXXXXXXXXXXXXXXXXXX

The selection may be made for DISABLE or ENABLE, when select ENABLE and copy the new file into the IPUII flash memory, the unit switch must be off; Press Enter to confirm, the Message below will displayed, at the moment, Do not reset or power down the IPUII hardware until the update is finished.

FLASH CARD UPDATE
PLEASE WAIT

After the software is finishing updating, the new software and database will be started with an automatic board reboot. If there was an error. This following display will appear with the error code and no reboot will occur.

FLASH CARD UPDATE
ERROR XXXXX

FLASH CARD UPDATE	
ERROR CODE	DEFINITION
0	Okay
10	Flash card not found.
11	SOFTWARE.BIN file not found.
14	SOFTWARE.BIN file larger than expected.
15	RAM to IPU Flash transfer of DATABASE.BIN failed.
16	RAM to IPU Flash transfer of SOFTWARE.BIN failed.
17	Could not allocate sufficient memory to read or write file.
99	internal software error.

Data Log to Flash Card

The choices for this option are ON/OFF/SKIP UN-CHANGED (Does not log unchanged data)

OPTIONS	DATALOG TO FLASHCARD
◀ ▶	XXXXXXXXXXXXXXXXXXXXXXXXXXXX

Low Ambient Cutout Enable/Disable

The low ambient cutout may be enabled or disabled. When enabled, the chiller will cut OFF when the low ambient cutout is reached. When disabled, the chiller will run at any temperature.

OPTIONS	LOW AMBIENT TEMPERATURE CUTOUT
◀ ▶	ENABLED

OPTIONS	LOW AMBIENT TEMPERATURE CUTOUT
◀ ▶	DISABLED

The default setting for the low ambient cutout will be ENABLED.

Remote Temperature Reset Selection

Remote temperature reset from an external source may be tied directly into the chiller microprocessor board.

OPTIONS	REMOTE TEMP RESET INPUT
◀ ▶	XXXXXXXXXXXXXXXXXXXX

Selections may be made for DISABLED (no signal), 0 to 10VDC, 2 to 10VDC, 0 to 20ma, and 4 to 20ma.

OPTIONS	REMOTE TEMP RESET INPUT
◀ ▶	DISABLED

OPTIONS	REMOTE TEMP RESET INPUT
◀ ▶	0.0 TO 10.0 VOLTS DC

OPTIONS	REMOTE TEMP RESET INPUT
◀ ▶	2.0 TO 10.0 VOLTS DC

OPTIONS	REMOTE TEMP RESET INPUT
◀ ▶	0.0 TO 20.0 MILLIAMPS

OPTIONS	REMOTE TEMP RESET INPUT
◀ ▶	4.0 TO 20.0 MILLIAMPS

The default setting for Remote Temp Reset is DISABLED. This display will only appear if the remote temperature limit option is enabled under the Unit Setup Mode.

Remote Current Limit Input Selection

Remote current limit from an external source may be tied directly into the chiller microprocessor board.

OPTIONS	REMOTE CURRENT LIMIT INPUT
◀ ▶	XXXXXXXXXXXXXXXXXXXX

Selections may be made for DISABLED (no signal), 0 to 10VDC, 2 to 10VDC, 0 to 20ma, and 4 to 20ma.

OPTIONS	REMOTE CURRENT LIMIT INPUT
◀ ▶	DISABLED

OPTIONS	REMOTE CURRENT LIMIT INPUT
◀ ▶	0.0 TO 10.0 VOLTS DC

OPTIONS	REMOTE CURRENT LIMIT INPUT
◀ ▶	2.0 TO 10 VOLTS DC

OPTIONS	REMOTE CURRENT LIMIT INPUT
◀ ▶	0.0 TO 20.0 MILLIAMPS

OPTIONS	REMOTE CURRENT LIMIT INPUT
◀ ▶	4.0 TO 20.0 MILLIAMPS

The default setting for Remote Current Reset is DISABLED. This display will only appear if the remote current limit option is enabled under the Unit Setup Mode.

Remote Sound Limit Selection

Remote sound limit from an external source may be tied directly into the chiller microprocessor board.

OPTIONS	REMOTE SOUND LIMIT INPUT
◀ ▶	XXXXXXXXXXXXXXXXXXXX

Selections may be made for DISABLED (no signal), 0 to 10VDC, 2 to 10VDC, 0 to 20ma, and 4 to 20ma.

OPTIONS	REMOTE SOUND LIMIT INPUT
◀ ▶	DISABLED

OPTIONS	REMOTE SOUND LIMIT INPUT
◀ ▶	0.0 TO 10.0 VOLTS DC

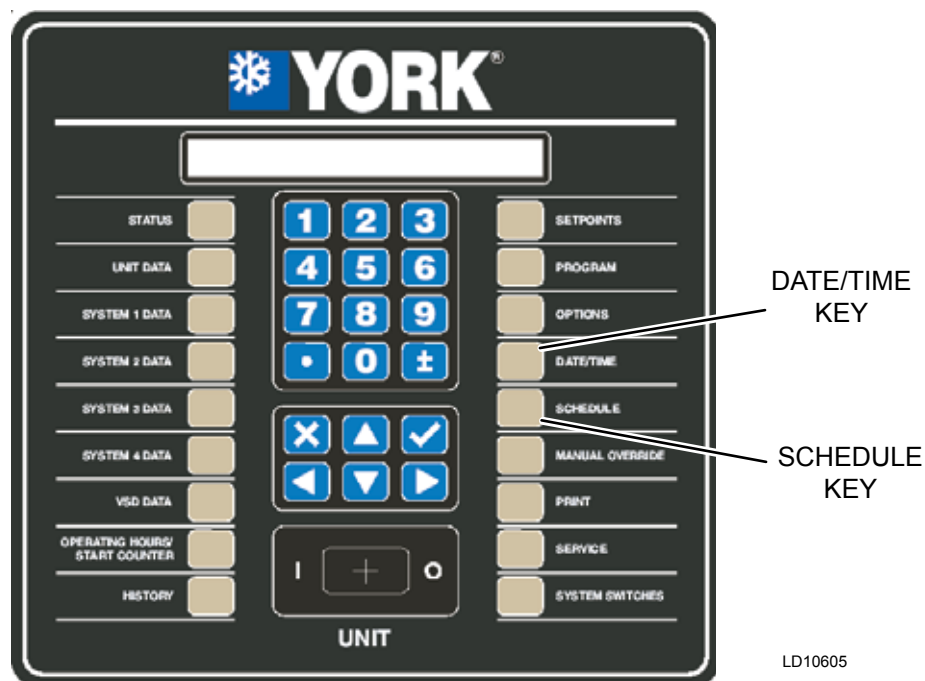
OPTIONS	REMOTE SOUND LIMIT INPUT
◀ ▶	2.0 TO 10.0 VOLTS DC

OPTIONS	REMOTE SOUND LIMIT INPUT
◀ ▶	0.0 TO 20.0 MILLIAMPS

OPTIONS	REMOTE SOUND LIMIT INPUT
◀ ▶	4.0 TO 20.0 MILLIAMPS

The default setting for Remote Sound Limit is DISABLED. This display will only appear if the remote sound limit option is enabled under the Unit Setup Mode.

DATE/TIME AND SCHEDULE KEYS



8

Date/Time Key Operation

When the DATE/TIME key is pressed, the chiller microprocessor will display the date and the time. This feature is useful and required for using the Daily Schedule. It is also a valuable tool for troubleshooting to allow a technician to determine the time of the fault, which is stored in the history memory buffers. When the DATE/TIME key is pressed, the first display screen shown below will be displayed:

CLOCK FRI 18-JUN-2011 10:15:33 AM
DAY OF WEEK ◀ ▶ = XXX

Whenever any changes are made, the ✓ (ENTER) key must be pressed to store the data.

Pressing the ▲ or ▼ keys allows scrolling to the next programmed item. Pressing the ▼ key scrolls to the next item that can be programmed and the ▲ key scrolls to the previous item.

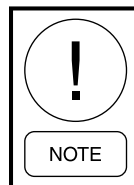
The day of the week is the first display and can be changed by pressing either the ◀ or ▶ key to select the day. After the day is selected, the ✓ (ENTER) key must be pressed to store the data.

CLOCK FRI 18-JUN-2011 10:15:33 AM
DAY OF MONTH = XX

Pressing the ▼ key again scrolls to the day of the month:

CLOCK FRI 18-JUN-2011 10:15:33 AM
DAY OF MONTH = XX

The day of the month can be selected by keying in the numerical value to select the day. After the day of the month is selected, the ✓ (ENTER) key must be pressed to store the data.



A "0" must be typed in to select dates for days of the 1st through the 9th.

Pressing the ▼ key again scrolls to month:

CLOCK FRI 18-JUN-2011 10:15:33 AM
MONTH ◀ ▶ = XXX

The month can be selected by scrolling through the months with the ◀ or ▶ keys. After the month is se-

lected, the ✓ (ENTER) key must be pressed to store the data.

Pressing the ▼ key again scrolls to the year:

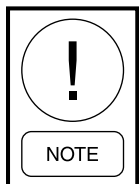
CLOCK FRI 18-JUN-2011 10:15:33 AM
YEAR = XXXX

The year can be selected by keying in the numerical value to select the year. After the year is selected, the ✓ (ENTER) key must be pressed to store the data.

Pressing the ▼ key again scrolls to the hour:

CLOCK FRI 18-JUN-2011 10:15:33 AM
HOUR = XX

The hour can be selected by keying in the numerical value for the hour. After the hour is selected, the ✓ (ENTER) key must be pressed to store the data.

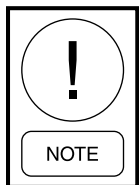


One or two "0's" must be keyed in for hours 00-09.

Pressing the ▼ key again scrolls to the minute:

CLOCK FRI 18-JUN-2011 10:15:33 AM
MINUTE = XX

The minute can be selected by keying in the numerical value for the hour. After the minute is selected, the ✓ (ENTER) key must be pressed to store the data.



One or two "0's" must be keyed in for minutes 00 through 09.

Pressing the ▼ key again scrolls to AM/PM:

CLOCK FRI 18-JUN-2011 10:15:33 AM
AM/PM ◀ ▶ = XX

AM/PM can be selected by pressing the ◀ or ▶ keys. After the meridian is selected, the ✓ (ENTER) key must be pressed to store the data.

Pressing the ▼ key again scrolls to the time format selection:

CLOCK FRI 18-JUN-2011 10:15:33 AM
TIME FORMAT ◀ ▶ = XXXXXXXX

The time format may be displayed in either a 12 hour or 24 hour format. Selection can be changed by pressing the ◀ or ▶ keys. The ✓ (ENTER) key must be pressed to store the data.

Schedule Key Operation

The Daily Schedule must be programmed for the unit start and stop times. To set the schedule, press the SCHEDULE key. The display will provide a message allowing access to 2 types of schedule information:

SCHEDULE CHOOSE SCHEDULE TYPE
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXX

The schedule types are:

- UNIT OPERATING SCHEDULE
(Default selection)
- SOUND LIMIT SCHEDULE
(Only if Sound Limiting is enabled by the factory when the option is installed.)

The schedule type (UNIT OPERATING SCHEDULE or SOUND LIMIT SCHEDULE) may be changed by pressing the ◀ or ▶ keys followed by the ✓ (ENTER) key. The selection must be entered by pressing the ✓ (ENTER) key before a schedule display will appear.

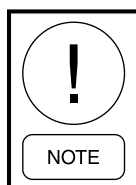
Unit Operating Schedule

The Unit Operating Schedule is used to enable/disable the chiller unit on time of day. The chiller can be enabled and disabled once each day or it can be programmed to run continuously. Any time the daily or holiday schedule shuts the chiller down, the running system(s) will go through a controlled ramped shut-down. If the UNIT OPERATING SCHEDULE is selected under the CHOOSE SCHEDULE display, the following message will appear:

SCHEDULE UNIT OPERATING
MON START = 06:00 AM STOP = 10:00 PM

The line under the 0 above is the cursor. If the start time is wrong, it can be changed by keying in the new time from the numeric keypad. Once the correct values for the START hour and minute are entered, press the ✓ (ENTER) key. The cursor will then move to the AM/PM selection. The meridian (AM/PM) value may be changed by the ◀ or ▶ keys and entered by pressing ✓

(ENTER) key. Repeat this process for the STOP time. Once a schedule is entered, the schedule for the next day will appear. The start and stop time of each day may be programmed differently. To view the schedule without making a change, simply press the SCHEDULE key until the day you wish to view appears. The ▲ key will scroll backwards to the previous screen.



If at any time the schedule is changed for Monday, all the other days will change to the new Monday schedule. This means if the Monday times are not applicable for the whole week, then the exceptional days would need to be reprogrammed to the desired schedule.

To program the chiller for 24 hour operation, program the start and stop times of each day of the week for 00:00.

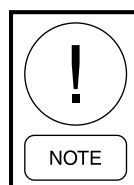
After the SUN (Sunday) schedule appears on the display, a subsequent press of the SCHEDULE or ▲ key will display the Holiday schedule. This is a two-part display. The first reads:

SCHEDULE	UNIT OPERATING
HOL	START = 00:00 AM STOP = 00:00 PM

The holiday times may be set using the same procedure as described above for the days of the week. Be sure to press the ✓ (ENTER) key after setting the START and STOP times to save the change in memory. Pressing the SCHEDULE key a second time, the display will show the individual days:

SCHEDULE	UNIT OPERATING
S M T W T F S	HOLIDAY NOTED BY *

The line below the empty space is the cursor and will move to the next or previous empty space when the ◀ or ▶ keys and pressed. To set a day for the Holiday Schedule, the cursor must be moved to the space following the day of the week. The * key is then pressed and an “*” will appear in the space signifying that day as a holiday. The Holiday schedule must be programmed weekly. If there is no holiday, the “*” key is also used to delete the “*”. The ✓ (ENTER) key is used to accept the holiday schedule for the entire week.



The HOLIDAY SCHEDULE is a temporary schedule. Once the schedule is executed, the selected holidays will be cleared from memory for the following week.

Sound Limit Schedule

The SOUND LIMIT SCHEDULE allows setting the day and time when the user desires using the “SILENT NIGHT” factory programmed option to limit chiller loading and fan operation for reduced audible noise in the surrounding area. If the SOUND LIMIT SCHEDULE is selected under the CHOOSE SCHEDULE display, the following message will appear:

SCHEDULE	SOUND LIMIT	= XXX %
MON	START = 06:00 AM	STOP = 10:00 PM

The Sound Limit option can be enabled and disabled once each day or the chiller can be set to run continuously in this mode for sound limiting whenever the chiller is operating. When sound limiting is enabled, the unit will be limited by the Sound Limit setpoint % as set under the PROGRAM key. XXX in the display above will show the Sound Limit Setpoint % programmed under the PROGRAM key. 0% will cause no speed reduction, while 100% only allows running at minimum speed.

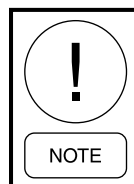
The START Time for a specific day (hour and minute) is entered using the same guidelines used for the start/stop schedules, and press the ✓ (ENTER) key to store it into memory. The cursor will then move to the AM/PM selection.

The AM/PM selection may be chosen using the ◀ or ▶ keys and pressing the ✓ (ENTER) key to store the value.

This process is repeated for the STOP time.

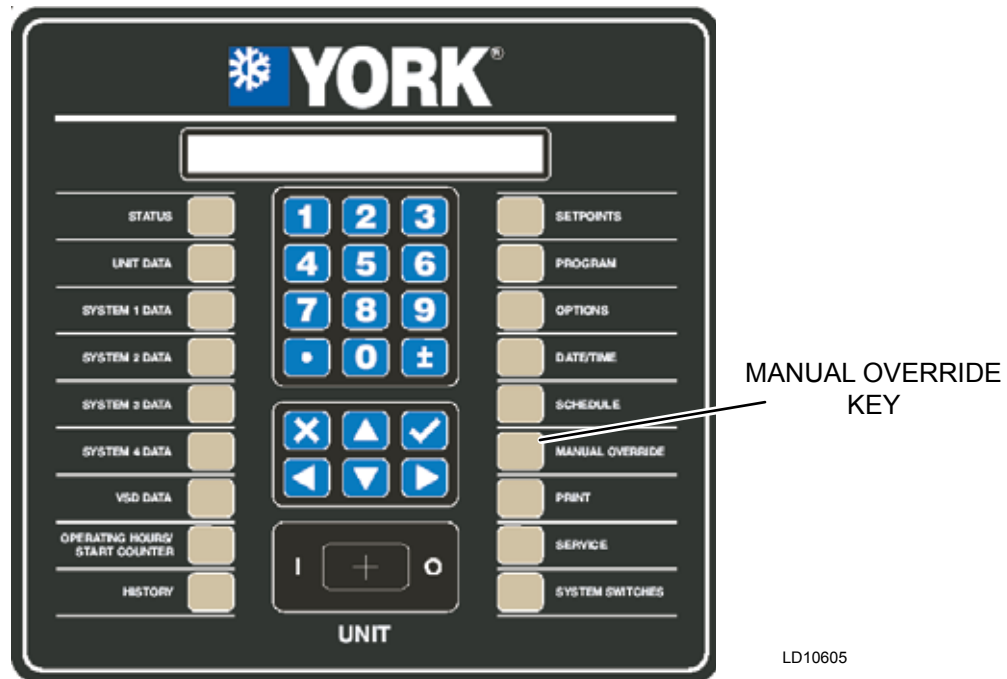
Once the schedule for a specific day is programmed and entered, the schedule for the next day will appear. The schedule for each day may be programmed the same or differently.

To view the schedule without changing it, simply press the SCHEDULE key or the ▼ key until the desired day is displayed. The ▲ key will scroll backwards to the previous screen.



If the schedule is changed for Monday, all other days will change to the Monday schedule. Be aware of this when programming.

MANUAL OVERRIDE KEY



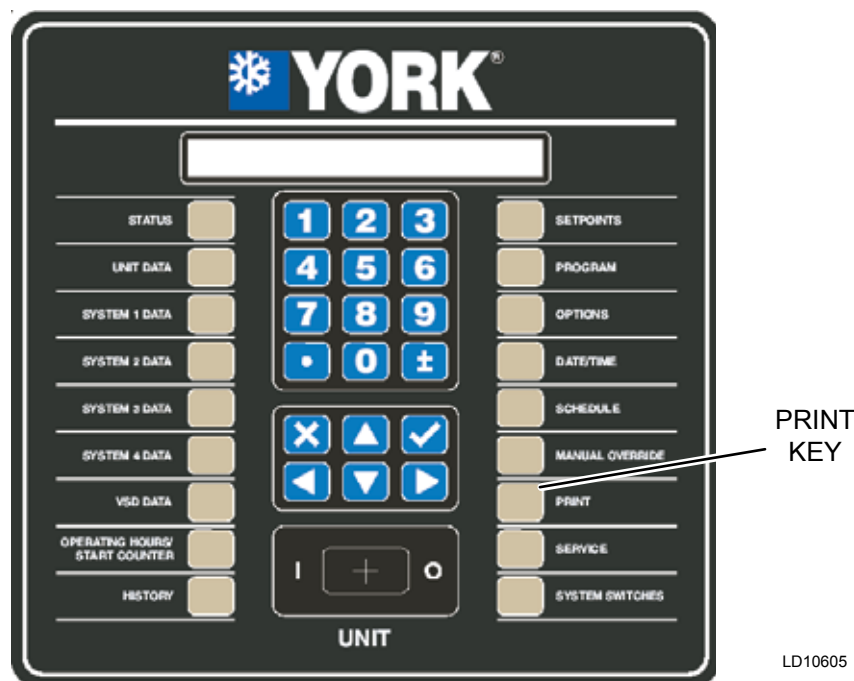
Manual Override Key Operation

If the MANUAL OVERRIDE key is pressed during a schedule shutdown, the STATUS display will display the message below. This indicates that the Daily Schedule is being ignored and the chiller will start when chilled liquid temperature allows, Remote Contacts, UNIT switch and SYSTEM switches permitting. This is a priority message and cannot be overridden by anti-recycle messages, fault messages, etc. when in the

STATUS display mode. Therefore, do not expect to see any other STATUS messages when in the MANUAL OVERRIDE mode. MANUAL OVERRIDE is to only be used in emergencies or for servicing. Manual override mode automatically disables itself after 30 minutes.

MANUAL OVERRIDE

PRINT KEY



8

Print Key Operation

The PRINT key is used to initiate a printout of current operating data (real time data), a complete history printout of all history (fault) buffers, a printout of all normal shutdowns (compressor cycling, chiller shutdown, etc.) or history (fault) data printout of a specific fault. History Buffer 1 will always be the most recent fault history printout. Printing may also be canceled by selecting the CANCEL PRINTING option. The following message is displayed when the PRINT key is pressed.

PRINT CHOOSE PRINT REPORT
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXX

After pressing the PRINT key, the printout type is selected by pressing the ◀ or ▶ keys until the desired printout is displayed.

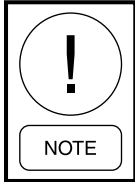
The following table shows the available printout types.

TABLE 20 - PRINTOUT TYPES

PRINTOUT TYPES
Operating Data (Default Selection)
All History Buffers
Normal Shutdowns
History Buffer 1
History Buffer 2
History Buffer 3
History Buffer 4
History Buffer 5
History Buffer 6
History Buffer 7
History Buffer 8
History Buffer 9
History Buffer 10
Cancel Printing

The specific printout is initiated by pressing the ✓ (ENTER) key.

A sample of the operating data printout is shown below. The operating data printout is a snapshot of current system operating conditions when the printout was selected. The sample shows combined printouts of 2, 3, and 4 circuit units. The actual printout will only show data for the appropriate chiller type.



Bold italic text below a line of print is not on the actual printout. Bold italic text indicates information that may not be available on all printouts or is additional information to help explain the difference in a 2/3 or 4-circuit printout.

Operating Data Printout

```

SCREW CHILLER
OPERATING DATA
2:04:14 PM 30 APR 10

SYS 1
NOT RUNNING
SYS 2
COMPRESSOR RUNNING

OPTIONS
CHILLED LIQUID WATER
LOCAL/REMOTE MODE REMOTE
LEAD/LAG CONTROL AUTOMATIC
REMOTE TEMP RESET DISABLED
REMOTE CURRENT LIMIT 0 TO 10 V
REMOTE SOUND LIMIT 4 TO 20 MA
(if Sound Limiting enabled)
LOW AMBIENT CUTOUT ENABLED
CONDENSER TYPE MICROCHANNEL

PROGRAM VALUES
SUCTION PRESS CUTOUT 44 PSIG
LOW AMBIENT CUTOUT 25.0 DEGF
LEAVING LIQUID CUTOUT 36.0 DEGF
MOTOR CURRENT LIMIT 100 %FLA
PULLDOWN CURRENT LIMIT 100 %FLA
PULLDOWN LIMIT TIME 0 MIN
SUBCOOLING SETPOINT 12.0 DEGF
EDUCTOR DIFFERENTIAL 50.0 DEGF
EDUCTOR SAFETY TIME 1000 MIN
MOTOR TEMP UNLOAD 250.0 DEGF
UNIT ID NUMBER 0
SOUND LIMIT SETPOINT 100 %
(if Sound Limiting enabled)
  
```

UNIT DATA

```

LEAVING LIQUID TEMP 49.0 DEGF
RETURN LIQUID TEMP 58.2 DEGF
TEMP RATE XXX.X DEGF/MIN
COOLING RANGE 42.0 +/- 2.0 DEGF
REMOTE SETPOINT 44.0 DEGF
AMBIENT AIR TEMP 74.8 DEGF
FREE COOLING VALVE CLOSED
(if FC enabled)
EVAP ENTER LIQ TEMP XXX.X DEGF
(if FC enabled)
LEAD SYSTEM SYS 2
FLOW SWITCH ON
EVAPORATOR PUMP RUN ON
EVAPORATOR HEATER OFF
ACTIVE REMOTE CONTROL NONE
OPERATING HOURS 1=XXXXXX, 2=XXXXXX
START COUNTER 1=XXXXXX, 2=XXXXXX
SOFTWARE VERSION Y.ACS.20.00
SERIAL NUMBER PPPPPYYYYXXZZZ
  
```

VSD DATA

```

ACTUAL FREQUENCY XXX.X HZ
COMMAND FREQUENCY XXX.X HZ
DC BUS VOLTAGE XXX VDC
INTERNAL AMBIENT TEMP XXX.X DEGF
COOLING SYSTEM STATUS XXX
BASEPLATE TEMPS XXX XXX DEGF
PRECHARGE SIGNAL XXX
MOTOR OVERLOADS 1/2 XXX XXX AMPS
VSD SOFTWARE VERSION C.VSD.XX.00
  
```

SYSTEM 1 DATA

```

COMPRESSOR STATUS OFF
RUN TIME 0- 0- 0- 0 D-H-M-S
MOTOR CURRENT 0 AMPS 0 %FLA
SUCTION PRESSURE 125 PSIG
DISCHARGE PRESSURE 131 PSIG
OIL PRESSURE 130 PSIG
CONDENSER LIQUID TEMP 68.4 DEGF
DISCHARGE TEMPERATURE 68.8 DEGF
EDUCTOR TEMPERATURE 68.8 DEGF
SAT CONDENSER TEMP 71.8 DEGF
SUBCOOLING 3.4 DEGF
SAT DISCHARGE TEMP 74.5 DEGF
DISCHARGE SUPERHEAT 6.3 DEGF
MOTOR TMP XXX.X XXX.X XXX.X DEGF
COMPRESSOR SPEED XXX.X %
  
```

FLASH TANK LEVEL	HIGH
COND DRAIN % OPEN	XXX.X %
ECONOMIZER % OPEN	XXX.X %
CONDENSER FANS ON	0
CONDENSER FAN SPEED	XXX % (vsd)
COMPRESSOR HEATER	ON
VI STEP SOLENOID 1	OFF
VI STEP SOLENOID 2	OFF
RUN PERMISSIVE	ON
VSD RUN RELAY	OFF
VSD SOFTWARE RUN SIGNAL	OFF
EVAP LIQ LEVEL	XXX.X %
(round tube)	
FLASH TANK LIQ TEMP	XXX.X DEGF
(if FC enabled)	

SYSTEM 2 DATA

COMPRESSOR STATUS	ON
RUN TIME	0- 0-15-26 D-H-M-S
MOTOR CURRENT	104 AMPS 87 %FLA
SUCTION PRESSURE	57 PSIG
DISCHARGE PRESSURE	233 PSIG
OIL PRESSURE	218 PSIG
CONDENSER LIQUID TEMP	42.9 DEGF
DISCHARGE TEMPERATURE	145.5 DEGF
EDUCTOR TEMPERATURE	102.8 DEGF
SAT CONDENSER TEMP	31.7 DEGF
SUBCOOLING	11.2 DEGF
SAT DISCHARGE TEMP	112.1 DEGF
DISCHARGE SUPERHEAT	33.4 DEGF
MOTOR TMP	XXX.X XXX.X XXX.X DEGF
COMPRESSOR SPEED	XXX.X %
FLASH TANK LEVEL	LOW
COND DRAIN % OPEN	XXX.X %
ECONOMIZER % OPEN	XXX.X %
CONDENSER FANS ON	3
CONDENSER FAN SPEED	XXX % (vsd)
COMPRESSOR HEATER	OFF
VI STEP SOLENOID 1	OFF
VI STEP SOLENOID 2	OFF
RUN PERMISSIVE	ON
VSD RUN RELAY	OFF
VSD SOFTWARE RUN SIGNAL	OFF
EVAP LIQ LEVEL	XXX.X %
(round tube)	
FLASH TANK LIQ TEMP	XXX.X DEGF
(if FC enabled)	

UNIT OPERATING SCHEDULE

S	M	T	W	T	F	S	
MON							START=00:00AM STOP=00:00AM
TUE							START=00:00AM STOP=00:00AM
WED							START=00:00AM STOP=00:00AM
THU							START=00:00AM STOP=00:00AM
FRI							START=00:00AM STOP=00:00AM
SAT							START=00:00AM STOP=00:00AM
HOL							START=00:00AM STOP=00:00AM

SOUND LIMIT SCHEDULE (if enabled)

MON	START=00:00AM	STOP=00:00AM
TUE	START=00:00AM	STOP=00:00AM
WED	START=00:00AM	STOP=00:00AM
THU	START=00:00AM	STOP=00:00AM
FRI	START=00:00AM	STOP=00:00AM
SAT	START=00:00AM	STOP=00:00AM
HOL	START=00:00AM	STOP=00:00AM

8

History Data Printout

History printouts, when selected, provide stored data relating to all specific system and chiller operating conditions at the time of the fault, regardless of whether a lockout occurred. History information is stored in battery-backed memory on the Chiller Control Board and is not affected by power failures or resetting of faults. Whenever a fault of any type occurs, all system operating data is stored in battery-backed memory at the instant of the fault. The history printout is similar to the operating data printout except for the change in the header information shown below:

YORK INTERNATIONAL CORPORATION

YVFA SCREW CHILLER

HISTORY NUMBER 1

2:04:14 PM 30 APR 11

SYS 1 YYYYYYYY

HIGH DSCH PRESS SHUTDOWN

STATUS AT TIME OF SHUTDOWN

SYS 1 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

SYS 2 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

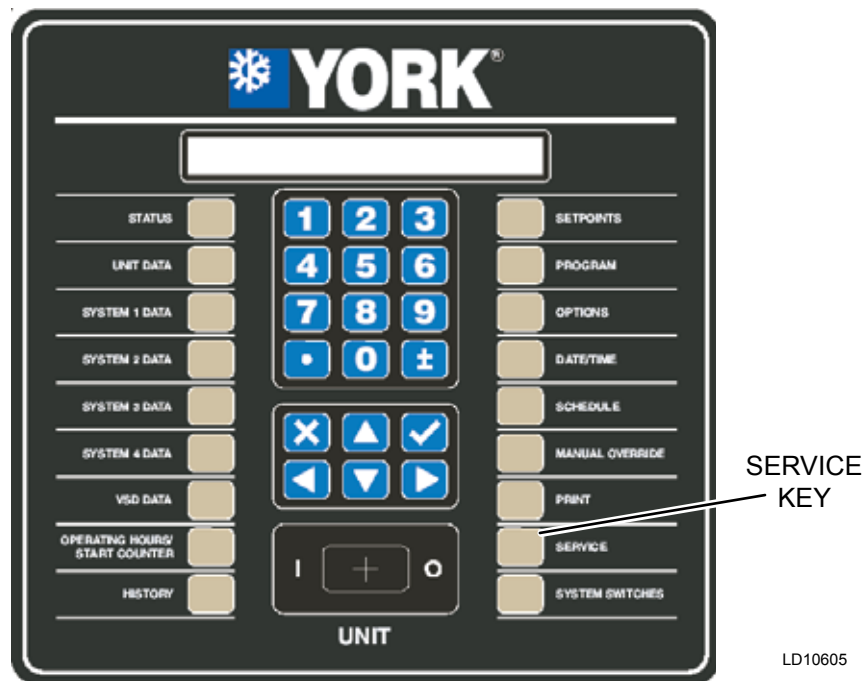
ALL FAULTS

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

The most recent fault will always be stored as HISTORY BUFFER #1.

SERVICE KEY



LD10605

Service Key Operation

The SERVICE key allows viewing data related to the internal function of the chiller system electronics. Data such as circuit board output status as controlled by the Chiller Control software while operating can be viewed and compared to actual chiller operation in the event servicing is required. The SERVICE key allows controlling of analog and digital outputs for troubleshooting purposes when the unit is not running. The Unit Serial Number and Optimized IPLV Control mode are also entered using the SERVICE key.

The ▲▼ keys allow scrolling through the displays. The ▼ key scrolls through the displays in the forward direction.

When the SERVICE key is pressed, the following message will appear:

SERVICE MODE XXXX
PRESS ENTER KEY TO CONTINUE

XXXX will display a password, if a numerical password is entered.

Pressing the ✓ (ENTER) key allows “view only” Service Mode operation. All control board I/O will be viewable in this mode. No outputs can be changed. For troubleshooting or startup commissioning purposes,

the Chiller Micro Board and some VSD outputs can be toggled or changed by turning OFF the UNIT SWITCH, pressing the SERVICE key, entering password 9675, and pressing the ✓ (ENTER) key. Once the password is entered, the Digital Outputs (DO) can be toggled by pressing the ✓ (ENTER) key. The Analog Outputs can be programmed to output a specific value using the keypad and programming in the desired value, which will usually be noted as a % or VDC. If the UNIT SWITCH is turned back on, the chiller will revert to normal viewable only control.

Displays can be viewed by pressing the ▲ and ▼ keys. The ▼ key scrolls through the displays in the forward direction.

The ◀ and ▶ keys allow jumping from data section to data section to avoid scrolling sequentially through all the data. Once in a data section, the ▲ and ▼ keys allow scrolling through the data under the section. Pressing the ◀ and ▶ keys at any time moves to the top of the next data section.

The data sections are listed below:

- Software Versions / Unit Serial Number
- Analog Inputs

- Digital Inputs
- Digital Outputs
- Analog Outputs
- VSD Logic Digital Output

Software Version / Unit Serial Number

SERVICE	SOFTWARE	CONTROL = Y.AJJ.KK.LL
BUILD = XXXXXXXXXX		

SERVICE	SOFTWARE	I/O	= Y.PIC.01.LL
---------	----------	-----	---------------

SERVICE	SOFTWARE	VSD	= C.VJJ.KK.LL
---------	----------	-----	---------------

The software version of the chiller Micro Control Board, the I/O board and the VSD microprocessor are viewable in first 3 data sections.

JJ, KK, LL will be filled in with alphanumeric characters.

Analog Inputs

The second data section displays the Analog Inputs (AI). Displays for 3 and 4 compressor chillers are skipped if the unit does not have those systems. These messages will only be displayed in English. The voltage displayed is referenced to common (return, ground) in the system. J12-3 can also be used as common, as well as chassis ground, or the common terminal point on the Chiller Control Board. See the wiring diagrams.

SERVICE AI J17-11	REMOTE TEMP RESET
X.X VDC	= XXX.X %

SERVICE AI J17-12	REMOTE CURRENT LIMIT
X.X VDC	= XXX.X %

SERVICE AI J17-13	REMOTE SOUND LIMIT
X.X VDC	= XXX.X %

The Remote Temp Reset, Remote Current Limit Reset, and Remote Sound Limit inputs have onboard voltage dividers, if the jumper is set for a voltage input. This will cause the voltage read on the display to be less than the voltage on the board header inputs between TB1-17 and 18, TB1-19 and 20, or TB1-40 and 41. To correct for this when measuring voltage at the remote device supplying voltage to the board header while troubleshooting, use the following calculation:

$$\text{Voltage} = 10 \times \text{VDC volts} / 4.5$$

If the input is programmed for a current input, the voltage read by the MUX is displayed. If the input is disabled under the OPTIONS key, the voltage display will display "DISABLED".

The analog inputs display will continue to sequence as follows. The inputs indicate voltages read between the input terminal to the Chiller Logic Board and the plug GND or Drain.

SERVICE AI J17-14	SYS 1 COND LIQUID PRS
X.X VDC	

SERVICE AI J17-15	SYS 2 COND LIQUID PRS
X.X VDC	

SERVICE AI J18-7	LEAVING LIQUID TEMP
X.X VDC	= XXX.X °F

SERVICE AI J18-8	RETURN LIQUID TEMP
X.X VDC	= XXX.X °F

SERVICE AI J18-9	AMBIENT AIR TEMP
X.X VDC	= XXX.X °F

SERVICE AI J19-1	SYS1 MOTOR TEMP T1
X.X VDC	= XXX.X °F

SERVICE AI J19-2	SYS1 MOTOR TEMP T2
X.X VDC	= XXX.X °F

SERVICE AI J19-3	SYS1 MOTOR TEMP T3
X.X VDC	= XXX.X °F

SERVICE AI J19-6	SYS2 MOTOR TEMP T1
X.X VDC	= XXX.X °F

SERVICE AI J19-7	SYS2 MOTOR TEMP T2
X.X VDC	= XXX.X °F

SERVICE AI J19-8	SYS2 MOTOR TEMP T3
X.X VDC	= XXX.X °F

SERVICE AI J20-1	SPARE ANALOG
X.X VDC	

SERVICE AI J20-2	SPARE ANALOG
X.X VDC	

SERVICE AI J20-3	SPARE ANALOG
X.X VDC	

SERVICE AI J20-6	SPARE ANALOG
X.X VDC	

SERVICE AI J20-7	SPARE ANALOG
X.X VDC	

SERVICE AI	J20-8	SPARE ANALOG
	X.X VDC	
SERVICE AI	J21-3	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J21-6	SYS1 FL TANK LEVEL
	X.X VDC	= XXX ADC %
SERVICE AI	J21-13	SYS1 COND LIQUID TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J21-16	SYS1 DISCHARGE TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J21-20	SYS1 SUCTION PRESS
	X.X VDC	= XXX.X PSIG
SERVICE AI	J21-22	SYS1 OIL PRESS
	X.X VDC	= XXX.X PSIG
SERVICE AI	J21-24	SYS1 DISCHARGE PRESS
	X.X VDC	= XXX.X PSIG
SERVICE AI	J22-3	SPARE ANALOG INPUT
	X.X VDC	= XXX.X °F
SERVICE AI	J22-6	SYS2 FL TANK LEVEL
	X.X VDC	= XXX ADC %
SERVICE AI	J22-13	SYS2 COND LIQUID TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J22-16	SYS2 DISCHARGE TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J22-20	SYS2 SUCTION PRESS
	X.X VDC	= XXX.X PSIG
SERVICE AI	J22-22	SYS2 OIL PRESS
	X.X VDC	= XXX.X PSIG
SERVICE AI	J22-24	SYS2 DISCHARGE PRESS
	X.X VDC	= XXX.X PSIG
SERVICE AI	J23-3	SYS 1 FT LIQUID TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J23-6	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J23-13	SYS1 EDUCTOR TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J23-16	EVAP ENTER LIQ TEMP
	X.X VDC	= XXX.X °F

The above message appears when the Free Cooling Control is enabled.

SERVICE AI	J23-20	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J23-22	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J23-24	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J24-3	SYS 2 FT LIQUID TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J24-6	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J24-13	SYS2 EDUCTOR TEMP
	X.X VDC	= XXX.X °F
SERVICE AI	J24-16	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J24-20	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J24-22	SPARE ANALOG INPUT
	X.X VDC	
SERVICE AI	J24-24	SPARE ANALOG INPUT
	X.X VDC	

Digital Inputs

The third data section displays the Digital Inputs (DI) to the Chiller Control Board that can be viewed from the Service Mode. Displays for systems 3 and 4 are skipped if the systems are not present on the chiller. In this case, XXX is replaced with ON or OFF in the actual display. These messages will only be displayed in English.

SERVICE DI	J4-2	UNIT SWITCH 1
		STATUS = XXX
SERVICE DI	J4-3	UNIT SWITCH 2
		STATUS = XXX
SERVICE DI	J4-4	SYS 1 HPCO
		STATUS = XXX
SERVICE DI	J4-5	SYS 2 HPCO
		STATUS = XXX
SERVICE DI	J4-6	VSD FAULT RELAY
		STATUS = XXX

SERVICE DI J5-1	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J5-2	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J5-3	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J6-2	FLOW SWITCH STATUS = XXX
SERVICE DI J6-3	PRINT STATUS = XXX
SERVICE DI J6-4	SYS 1 RUN PERM STATUS = XXX
SERVICE DI J6-5	SYS 2 RUN PERM STATUS = XXX
SERVICE DI J6-6	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J7-2	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J7-4	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J7-6	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J7-8	SPARE DIGITAL INPUT STATUS = XXX
SERVICE DI J7-10	SPARE DIGITAL INPUT STATUS = XXX

Digital Outputs

The fourth data section displays the Digital Outputs (DO) from the Chiller Control Board that can be viewed in the Service Mode. Displays for Systems 3 and 4 are skipped if the systems are not present on the chiller. In this case, XXX is replaced with ON or OFF in the actual display. These messages will only be displayed in English.

SERVICE DO J9-1 RB1 TB1-20	EVAP HEATER STATUS = XXX
SERVICE DO J9-2 RB1 TB1-18	SYS 1 VSD RUN STATUS = XXX
SERVICE DO J9-3 RB1 TB1-16	SYS 1 ALARM STATUS = XXX

SERVICE DO J9-4 RB1 TB1-14	EVAP HEATER 2 STATUS = XXX
SERVICE DO J9-5 RB1 TB1-12	SYS 1 VI STEP 1 STATUS = XXX
SERVICE DO J9-6 RB1 TB1-10	SYS 1 VI STEP 2 STATUS = XXX
SERVICE DO J9-7 RB1 TB1-8	SYS 1 COND FAN OUT 4 STATUS = XXX
SERVICE DO J9-8 RB1 TB1-6	SYS 1 COND FAN OUT 1 STATUS = XXX
SERVICE DO J9-9 RB1 TB1-5	SYS 1 COND FAN OUT 2 STATUS = XXX
SERVICE DO J9-10 RB1 TB1-4	SYS 1 COND FAN OUT 3 STATUS = XXX
SERVICE DO J9-11 RB1 TB1-3	SYS 1 COMP HEATER STATUS = XXX
SERVICE DO J9-12 RB1 TB1-2	SYS 1 SUBCOOLED VALVE STATUS = XXX
SERVICE DO J9-12 RB1 TB1-2	FREE COOLING VALVE STATUS = XXX
SERVICE DO J9-12 RB1 TB1-2	SPARE DIGITAL OUTPUT STATUS = XXX

The above message appears when Remote Evaporator is enabled.

The above message appears when the Free Cooling Control is enabled.

The above message appears when the Free Cooling Control is disabled and Remote Evaporator Control is disabled.

SERVICE DO J10-1 RB1 TB1-20	EVAP PUMP RUN STATUS = XXX
SERVICE DO J10-2 RB2 TB1-18	SYS 2 VSD RUN STATUS = XXX
SERVICE DO J10-3 RB2 TB1-16	SYS 2 ALARM STATUS = XXX
SERVICE DO J10-4 RB1 TB1-14	CHILLER RUN STATUS = XXX
SERVICE DO J10-5 RB2 TB1-12	SYS 2 COND FAN OUT 4 STATUS = XXX

SERVICE DO J10-6 RB2 TB1-10	SYS 2 VI STEP 1 STATUS = XXX
SERVICE DO J10-7 RB2 TB1-8	SYS 2 VI STEP 2 STATUS = XXX
SERVICE DO J10-8 RB1 TB1-6	SYS COND 2 FAN OUT 1 STATUS = XXX
SERVICE DO J10-9 RB1 TB1-5	SYS COND 2 FAN OUT 2 STATUS = XXX
SERVICE DO J10-10 RB1 TB1-4	SYS COND 2 FAN OUT 3 STATUS = XXX
SERVICE DO J10-11 RB1 TB1-3	SYS 2 COMP HEATER STATUS = XXX
SERVICE DO J10-12 RB2 TB1-2	SYS 2 SUBCOOLED VALVE STATUS = XXX

The above messages appears when remote Evaporator is enabled.

SERVICE DO J10-12 RB2 TB1-2	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-1 RB3 TB1-20	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-2 RB3 TB1-18	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-3 RB3 TB1-16	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-4 RB3 TB1-14	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-5 RB3 TB1-12	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-6 RB3 TB1-10	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-7 RB3 TB1-8	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-8 RB3 TB1-6	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-9 RB3 TB1-5	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-10 RB3 TB1-4	SPARE DIGITAL OUTPUT STATUS = XXX

SERVICE DO J11-11 RB3 TB1-3	SPARE DIGITAL OUTPUT STATUS = XXX
SERVICE DO J11-12 RB3 TB1-2	SPARE DIGITAL OUTPUT STATUS = XXX

Analog Outputs

The fifth data section displays the Analog Outputs (AO) that can be viewed from the Service Mode. The Analog Output signals are typically referenced to the common (return, ground) in the system. Terminal J12-3 can also be used as common, as well as chassis ground, or the common terminal point on the Chiller Control Board. See the wiring diagrams. Displays for systems 3 and 4 are skipped if the systems are not present on the chiller. XXX is replaced with ON or OFF in the actual display. The state of these outputs is only viewable unless the password 9675 ✓(ENTER) key was entered from the initial Service Mode display with the UNIT switch in the OFF position. The chiller will not be permitted to run when the outputs are made active. The outputs can be programmed for a specific % output by keying in the value and pressing the ✓(ENTER) key. These messages will only be displayed in English.

SERVICE AO J15-1 XXX.X %	SYS 1 COND VALVE OUT = XX.X VDC
SERVICE AO J15-3 XXX.X %	SYS 1 ECON VALVE OUT = XX.X VDC
SERVICE AO J15-5 XXX.X %	SYS 2 COND VALVE OUT = XX.X VDC
SERVICE AO J15-7 XXX.X %	SYS 2 ECON VALVE OUT = XX.X VDC
SERVICE AO J14-1 XXX.X %	SPARE ANALOG OUTPUT = XX.X VDC
SERVICE AO J14-2 XXX.X %	SPARE ANALOG OUTPUT = XX.X VDC
SERVICE AO J14-3 XXX.X %	SPARE ANALOG OUTPUT = XX.X VDC
SERVICE AO J14-4 XXX.X %	SPARE ANALOG OUTPUT = XX.X VDC

Vout = 6.0 V*% Full Scale/1000 Optimized VSD Fans
Vout = 5.0 V*% Full Scale/1000 Standard VSD Fans

SERVICE AO J25-1 XXX.X %	SYS 1 COND FAN SPEED = XX.X VDC
-----------------------------	------------------------------------

Vout = 6.0 V*% Full Scale/1000 Optimized VSD Fans
Vout = 5.0 V*% Full Scale/1000 Standard VSD Fans

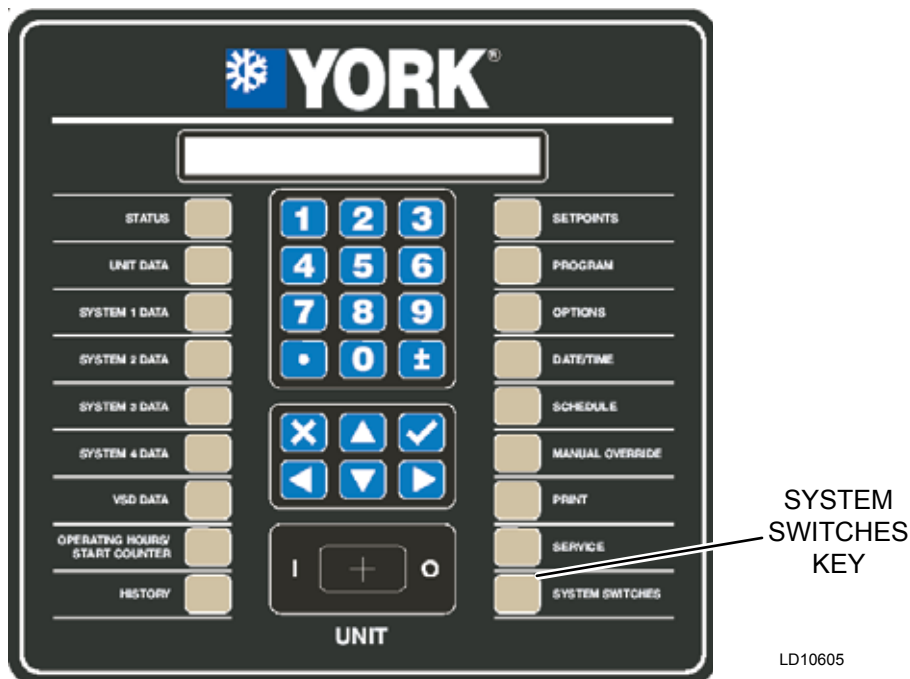
SERVICE AO J25-2	SYS 2 COND FAN SPEED
XXX.X %	= XX.X VDC
SERVICE AO J25-3	SPARE
XXX.X %	= XX.X VDC
SERVICE AO J25-4	SPARE
XXX.X %	= XX.X VDC

VSD Digital Outputs

The sixth data section displays the “VSD” digital outputs (DO) that can be viewed from the Service Mode. The Digital Output signals indicate the status of the output. The 0 to 120VAC digital outputs are referenced to neutral (Wire 2).

SERVICE DO J10-2	VSD COOLING FAN/PUMP
VSD LOGIC	STATUS = XXX

SYSTEM SWITCHES KEY



System Switches Key Operation

The SYSTEM SWITCHES key allows the operator to turn individual systems ON and OFF. Safety lock-outs are also reset by selecting the respective system switch RESET. When the SYSTEM SWITCHES key is pressed, the following message will appear:

SYSTEM SWITCHES	SYS 1 ON / OFF / RESET
◀ ▶	=XXXXXXXXXXXXXXXXXX

The display indicates the respective system and it's ON/OFF /reset switch status. The ▲ ▼ keys allow scrolling to the next and previous system switch (System 1 and 2).

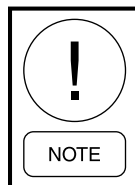
SYSTEM SWITCHES	SYS 2 ON / OFF / RESET
◀ ▶	=XXXXXXXXXXXXXXXXXX

The ◀ or ▶ keys allow scrolling through the choices of:

- SYSTEM OFF (default)
- SYSTEM ON
- RESET (LOCKOUT)

The switch selection is accepted into memory by pressing the ✓ (ENTER) key.

When the "RESET" selection is made and accepted, it will not change the position of the switch (either ON or OFF).



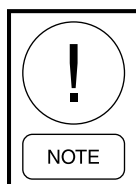
Whenever possible, except in emergencies, always use the associated system switch to turn off a compressor, which allows the compressors to go through a controlled shutdown. Avoid using the "UNIT" switch to turn off the compressors.

SERIAL NUMBER PROGRAMMING

When changing a Chiller Control Board, a Chiller Control Board EPROM, or if a situation occurs where a chiller is not programmed from the factory, the chiller serial number will need to be programmed into the chiller. The serial number is the actual serial number displayed on the unit Data Plate. The serial number will be in a format similar to 0000RANX000000, where the first 4 are number followed by 4 characters of letter and the next 6 are numbers again. The lack of a serial number programmed into the panel will not prevent a chiller from operating. The STATUS display will inform the operator a serial number problem exists by displaying the following message:

UNIT WARNING: INVALID SERIAL NUMBER
ENTER UNIT SERIAL NUMBER

If the following message appears, immediately contact Johnson Controls Product Technical Support. The appearance of this message may also mean the chiller has lost important factory programmed information and may need to be reprogrammed. Additional STATUS messages can be viewed by pressing the STATUS key repetitively to enable the technician to view any other messages that may be preventing the chiller from operating.



Changing the programming of this feature requires the date and time to be set on the chiller prior to programming. The password is also time sensitive and must be used on the date used to calculate the password.

Unit serial number entry mode will allow the programming of all the fields that make up the unit's serial number. These will either be programmed at the factory or by service personnel on the job. This mode may be entered by pressing the PROGRAM key, entering the unit serial number entry mode password (7562), and pressing ENTER.

The following table lists the serial number fields that can be programmed in this mode.

TABLE 21 - SERIAL NUMBER FIELD

UNIT SERIAL NUMBER FIELD	LOW LIMIT	HIGH LIMIT	DEFAULT
Unit serial number position 1-4	0	9999	0000
Unit serial number position 5	0	Z	R
Unit serial number position 6	0	Z	A
Unit serial number position 7	0	Z	N
Unit serial number position 8	0	Z	X
Unit serial number position 9-11	0	999	O
Unit serial number position 12-14	0	999	O

S/N ENTRY UNIT S / N = PPPYYYYXXZZZ
UNIT SERIAL NUMBER POS 1-4 = PPPP

Key in the number (0 through 9) or letter (A through Z) in this position by using ◀ or ▶ and press the ✓ (ENTER) key, press the ▼ key to scroll to next position, and following message will appear:

S/N ENTRY UNIT SERIAL NUMBER POS 5
◀ ▶ Y

Key in the number (0 through 9) or letter (A through Z) in this position by using ◀ or ▶ and press the ✓ (ENTER) key, press the ▼ key to scroll to next position, and following message will appear:

S/N ENTRY UNIT SERIAL NUMBER POS 6
◀ ▶ Y

Key in the number (0 through 9) or letter (A through Z) in this position by using ◀ or ▶ and press the ✓ (ENTER) key, press the ▼ key to scroll to next position, and following message will appear:

S/N ENTRY UNIT SERIAL NUMBER POS 7
◀ ▶ Y

Key in the number (0 through 9) or letter (A through Z) in this position by using ◀ or ▶ and press the ✓ (ENTER) key, press the ▼ key to scroll to next position, and following message will appear:

S/N ENTRY UNIT SERIAL NUMBER POS 8
◀ ▶ Y

Key in the number (0 through 9) or letter (A through Z) in this position by using ◀ or ▶ and press the ✓ (ENTER) key, press the ▼ key to scroll to next position, and following message will appear:

S/N ENTRY UNIT S / N = PPPYYYYXXZZZ
UNIT SERIAL NUMBER POS 9-11 = XXX

Key in the number (0 through 9) or letter (A through Z) in this position by using ◀ or ▶ and press the ✓ (ENTER) key, press the ▼ key to scroll to next position, and following message will appear:

S/N ENTRY UNIT S / N = PPPYYYYXXZZZ
UNIT SERIAL NUMBER POS 12-14 = ZZZ

If the first four characters of the Unit Serial Number are all equal to 0, then only the remaining ten characters will be displayed on the screen and in the print data.

TABLE 22 - UNIT SETUP PROGRAMMABLE VALUES

SETUP MODE VALUE	LOW LIMIT	HIGH LIMIT	DEFAULT
Sys 1 Number of Cond Fans	4	14	6
Sys 2 Number of Cond Fans	4	14	6
Compressor 1 Operating Hours	0	99,999	0
Compressor 2 Operating Hours	0	99,999	0
Compressor 1 Starts	0	99,999	0
Compressor 2 Starts	0	99,999	0
Clear History Buffers	No	Yes	-
Remote Temp Reset Option	Disabled	Enabled	Disabled
Remote Current Limit Option	Disabled	Enabled	Disabled
Sound Limit Option	Disabled	Enabled	Disabled
Remote Inputs Service Time Standard	5 Min.	60 Min.	15 Min.
Remote Inputs Service Quick Start	15 Sec.	3600 Sec.	900 Sec.
Free Cooling Disabled STD STAGED, OPT STAGED, STD VSD, or OPT VSD	Std Staged	Opt Vsd	Std Staged
Condenser Fan Control Free Cooling Enabled OPT VSD	Opt Vsd	Opt Vsd	Opt Vsd
Sys 1 Compressor Displacement CTS70=187, CTS51=128, CTS45=100, CTS36=82, or CTS24=62	Cts24	Cts70	--
Sys 2 Compressor Displacement CTS70=187, CTS51=128, CTS45=100, CTS36=82, or CTS24=62	Cts24	Cts70	--
Maximum Compressor Speed	170.0 Hertz	210.0 Hertz	180.0 Hertz
Minimum Running Speed	50 Hertz	100 Hertz	50 Hertz
Hybrid Minimum Running Speed Free Cooling Enabled	50 Hz	100 Hz	70 Hz
Sys 1 Motor Sensor To Ignore None, Temp Sensor T1, Temp Sensor T2, Temp Sensor T3	None	Temp Sensort3	None
Sys 2 Motor Sensor To Ignore None, Temp Sensor T1, Temp Sensor T2, Temp Sensor T3	None	Temp Sensort3	None
Fan Speed Multiplier 50 HZ PIN 52=M 1.11, 60 HZ PIN 52=M 1.05, 50/60 HZ PIN 52=V 1.00, 60 HZ PIN 52=K 0.86, 50 HZ PIN 52=K 0.83	50 Hz Pin 52=K 0.83	50 Hz Pin 52=M 1.11	50/60 Hz Pin 52=V 1.00
Sys 1 Cond EEV Multiplier	1.0 %/°F .6 %/C	5.0 %/°F 2.8 %/C	3.0 %/°F 1.7 %/C
Sys 2 Cond EEV Multiplier	1.0 %/°F .6 %/C	5.0 %/°F 2.8 %/C	3.0 %/°F 1.7 %/C
Sys 1 Cond EEV Time Interval	1 Sec	3 Sec	2 Sec
Sys 2 Cond EEV Time Interval	1 Sec	3 Sec	2 Sec
Sys 1 Cond EEV Divisor Standard	2 Hz/%	5 Hz/%	5 Hz/%
Sys 1 Cond EEV Divisor Quick Start	2 Hz/%	20 Hz/%	5 Hz/%
Sys 2 Cond EEV Divisor Standard	2 Hz/%	5 Hz/%	5 Hz/%
Sys 2 Cond EEV Divisor Quick Start	2 Hz/%	20 Hz/%	5 Hz/%
Sys 1 VI Differential Temp Setpoint	60.0 °F	90.0 °F	73.0 °F
	33.3 °C	50.0 °C	40.6 °C
Sys 2 VI Differential Temp Setpoint	60.0 °F	90.0 °F	73.0 °F
	33.3 °C	50.0 °C	40.6 °C
VI Deadband	2.0 °F	10.0 °F	4.0 °F
	1.1 °C	5.5 °C	2.2 °C
VI Differential Temp Setpoint Offset	2.0 °F	40.0 °F	20.0 °F
	1.1 °C	22.2 °C	11.1 °C

TABLE 22 - UNIT SETUP PROGRAMMABLE VALUES (CONT'D)

SETUP MODE VALUE	LOW LIMIT	HIGH LIMIT	DEFAULT
Sys 1 Maximum Fan Speed %	50 %	100 %	100 %
Sys 2 Maximum Fan Speed %	50 %	100 %	100 %
Sys 1 Minimum Fan Speed %	0 %	50 %	0 %
Sys 2 Minimum Fan Speed %	0 %	50 %	0 %
Sys 1 Min Discharge Suction Diff	50 Psid	300 Psid	80 Psid
	3.45 Bard	20.69 Bard	5.52 Bard
Sys 2 Min Discharge Suction Diff	50 Psid	300 Psid	80 Psid
	3.45 Bard	20.69 Bard	5.52 Bard
Free Cooling Control	Disabled	Enabled	Disabled
Remote Evaporator Free Cooling Disabled	Disabled	Enabled	Disabled
Remote Evaporator Free Cooling Enabled	Disabled	Enabled	Disabled
Condenser Type Free Cooling Disabled	Microchannel	Round Tube	Microchannel
Condenser Type Free Cooling Enabled	Microchannel	Microchannel	Microchannel
Sys 1 Evaporator Level Control Setpoint	20.0%	80.0%	50.0%
Sys 2 Evaporator Level Control Setpoint	20.0%	80.0%	50.0%
Evaporator Level Control Valve Startup Position	5%	95%	30%
Evaporator Level Control Startup Delay	0 Minutes	10 Minutes	3 Minutes
Voltage Code 380, 400, 460	380	460	460
Fan Type Low Noise, Ultra Quiet, High Air Flo	Low Noise	High Air Flo	Low Noise
Quick Start	Disabled	Enabled	Disabled
Discharge Pressure Cutout	275 Psig	325 Psig	325 Psig
Condenser Drain Valve Control Condenser Type Microchannel	Standard	Optimized	Optimized
Soft Shutdown Free Cooling Disabled Quick Start Enabled	Disabled	Enabled	Enabled
Soft Shutdown Free Cooling Enabled Quick Start Enabled	Disabled	Enabled	Disabled
Anti-Recycle Timer Quick Start Enabled	30 Sec	120 Sec	30 Sec
Economizer Transition Remote Evaporator Enabled	10.0 %	40.0 %	20.0 %

NOTE This value can only be modified when the Unit Switch is off.

At this point, the letters entered for the YYYY and XXX inputs should now appear in the top line of the display and should match the first 7 characters of the serial number on the unit Data Plate. The next three digits of the serial number should now be keyed in (ZZZ). Press the ✓ (ENTER) key to store the input. The full serial number should now be displayed across the top of the display and the cursor should disappear.

Press the STATUS key to go to the next STATUS display to determine if additional Status messages are preventing the chiller from operating.

UNIT SETUP MODE

Unit Setup Mode will allow the programming all of the programmable values that the user should never change. These will either be programmed at the fac-

tory or by service personnel on the job. These values will also need to be checked when changing a Chiller Control Board or EPROM.

This mode may be entered by pressing the PROGRAM key, entering the password 4245, and pressing the ✓(ENTER) key. *Table 22 on page 150* lists the values that can be programmed in this mode. Details relating to the actual message follow the table.

The following messages will be displayed for the Unit Setup Mode in the order they appear. The first group of displays relates to setup parameters that relate to unit configuration and factory setpoints.

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
SYS 1 NUMBER OF COND FANS = X

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
SYS 2 NUMBER OF COND FANS = X

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
COMP 1 OPERATING HOURS = XXXXX

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
COMP 2 OPERATING HOURS = XXXXX

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
COMP 1 STARTS = XXXXX

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
COMP 2 STARTS = XXXXX

The following setup display is selectable as YES or NO using the ◀ and ▶ keys.

SETUP MODE CLEAR HISTORY BUFFERS?
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

The following (3) setup OPTION displays are selectable as ENABLED or DISABLED using the ◀ and ▶ keys according to the options installed on the chiller:

SETUP MODE REMOTE TEMP RESET OPTION
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

SETUP MODE REMOTE CURRENT LIMIT OPTION
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

SETUP MODE SOUND LIMIT OPTION
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

The following setup OPTION display is selectable as ENABLED or DISABLED using the ◀ and ▶ keys:

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
REMOTE INPUTS SERVICE TIME = XX MIN

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
REMOTE INPUTS SERVICE TIME = XX XX SEC

The following setup OPTION display allows programming of the type of fan control installed. This includes DISABLED (contactor fan control), STD, VSD (standard VSD) or OPT VSD (optimized) VSD). Only DISABLED and OPT VSD should be used based on whether VSD fan control is installed.

SETUP MODE VSD FAN CONTROL
XXXXXXXXXXXXXXXXXXXXXXXXXXXX

The Compressor Displacement Setup option displays the compressor type installed in the respective circuits. This must be programmed per the compressor data plate information to assure the control algorithms to cycle fans, perform correctly. The following are selectable using the ◀ and ▶ keys:

- CTS70 = 187
- CTS36 = 82
- CTS51 = 128
- CTS24 = 62
- CTS45 = 100

SETUP MODE SYS 1 COMPRESSOR DISPLACEMENT
XXXXXXXXXXXXXXXXXXXXXXXXXXXX

SETUP MODE SYS 2 COMPRESSOR DISPLACEMENT
XXXXXXXXXXXXXXXXXXXXXXXXXXXX

The following setup OPTION display programs the Maximum Compressor Speed of the chiller. This must be programmed based on the PIN number (model number) on the chiller data plate. Refer to PIN number 39, 40 and 41 for the program value.

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
MAXIMUM COMPRESSOR SPEED = XXX.X HZ

The following setup OPTION display programs the Minimum Compressor Speed of the chiller. This is normally programmed for 50 Hz.

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
MINIMUM COMPRESSOR SPEED = XXX HZ

SETUP MODE ◀ DEF XXXXX LO XXXXX HI XXXXX
HYBRID MIN RUNNING SPEED = XXX HZ

The following Motor Temp Sensor OPTION displays are selectable as ENABLED or DISABLED using the ◀ and ▶ keys. The choices are:

- NONE (default)
- TEMP SENSOR 1
- TEMP SENSOR 2
- TEMP SENSOR 3

SETUP MODE SYS 1 MOTOR SENSOR TO IGNORE
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

SETUP MODE SYS 2 MOTOR SENSOR TO IGNORE
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

If a motor temperature sensor fails, a single sensor may be ignored by making a program change in the Unit Setup Mode. The default setting is “NONE”, indicating all sensors are being monitored.

The Fan Speed Multiplier Option displays the multiplier programmed. The multiplier is based on the type of fan installed based on PIN 52 of the chiller data plate and the type of power (50 Hz or 60 Hz) applied to the chiller. The options are selectable using the ◀ and ▶ keys and are listed along with the display as follows:

- 50Hz PIN 52 = M 1.11
- 60Hz PIN 52 = M 1.05
- 50/60 Hz PIN 52 = V 1.00 (default)
- 60Hz PIN 52 = K 0.86
- 50Hz PIN 52 = K 0.83

SETUP MODE FAN SPEED MULTIPLIER
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 COND EEV MULTIPLIER = X.X %/°F

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 COND EEV MULTIPLIER = X.X %/°F

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 COND EEV TIME INTERVAL= XX SEC

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 COND EEV TIME INTERVAL= XX SEC

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 COND EEV DIVISOR = XX HZ/%

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 COND EEV DIVISOR = XX HZ/%

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 VI DIFF TEMP SETPOINT = XX.X °F

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 VI DIFF TEMP SETPOINT = XX.X °F

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
VI DEADBAND = XX.X °F

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
VI DIFF TEMP OFFSET = XX.X °F

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 MAXIMUM FAN SPEED = XXX %

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 MAXIMUM FAN SPEED = XXX %

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 MINIMUM FAN SPEED = XXX %

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 MINIMUM FAN SPEED = XXX %

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 MIN DISCHARGE SUCT DIF= XX PSID

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 MIN DISCHARGE SUCT DIF= XX PSID

SETUP MODE FREE COOLING CONTROL
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

XXX = DISABLED or ENABLED selectable via the ◀ and ▶ keys when the Unit Switch is off.

SETUP MODE REMOTE EVAP CONTROL
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

XXX = DISABLED or ENABLED selectable via the ◀ and ▶ keys.

SETUP MODE CONDENSER TYPE
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

XXX = MICROCHANNEL or ROUND TUBE selectable via the ◀ and ▶ keys.

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 1 EVAP LEVEL SETP = XX.X

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
SYS 2 EVAP LEVEL SETP = XX.X

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
EVAP VLV STARTUP POS = XX %

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
EVAP VLV START DELAY = XX MIN

SETUP MODE VOLTAGE CODE
◀ ▶ XXX V

XXX = 380 V, 400 V, 460 V, selectable via ◀ and ▶ keys.

SETUP MODE FAN TYPE
◀ ▶ XXXXXXXXXXXXXXX

XXX = LOW NOISE, ULTRA QUIET, HIGH AIR FLO, selectable via ◀ and ▶ keys.

SETUP MODE QUICK START UNIT OPERATION
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXX

XXX = DISABLED or ENABLED selectable via the ◀ and ▶ keys.

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
DISCHARGE PRESSURE CUTOUT = XXX PSIG

SETUP MODE CONDENSER EEV CONTROL
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

XXX = OPTIMIZED or STANDARD selectable via the ◀ and ▶ keys when Condenser Type is Micro-channel.

SETUP MODE UNIT SOFT SHUTDOWN OPERATION
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

XXX = DISABLED or ENABLED selectable via the ◀ and ▶ keys when Quick Start is enabled.

SETUP MODE DATA CENTER OPERATION
◀ ▶ XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

XXX = DISAVLE OR ENABLE selectable via the ◀ or ▶ keys when a range of frequency need to be skipped due to vibration, 2 ranges can be set as SKIP FREQ 1 and SKIP FREQ 2, set the range by defining the low limit and high limit.

SETUP MODE **SKIP FREQ 1**
◀ ▶ XXXXXXXXXXXX

SETUP MODE ◀DEF XX LO XX HI XXX
SKIP FREQ 1 **LOW LIMIT** **= XXHZ**

SETUP MODE ◀DEF XX LO XX HI XX
SKIP FREQ 1 **HIGH LIMIT** **= XXHZ**

SETUP MODE **SKIP FREQ 2**
◀ ▶ XXXXXXXXXXXX

SETUP MODE ◀DEF XX LO X HI XXX
SKIP FREQ 2 **LOW LIMIT** **= XXHZ**

SETUP MODE ◀DEF XXX LO XX HI XXX
SKIP FREQ 2 **HIGH LIMIT** **= XXXHZ**

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
ANTI RECYCLE TIMER = XXX SECS

This option is available when Quick Start is enabled.

SETUP MODE ◀DEF XXXXX LO XXXXX HI XXXXX
ECONOMIZER TRANSITION = XX.X %

The Economizer Transition Percent only appears when unit programmed for Remote Evaporator.

DEFAULT PROGRAMMABLE VALUES

To quickly program or reset most of the user programmable values to their default values, press PROGRAM, 6140, ENTER. The following message will then be displayed, allowing a choice to reset the operating parameters to their default values.

DEFAULTS SET PROG VALUES TO DEFAULT?
◀ ▶ XXX

YES or NO may be selected for XXX using the ◀ and ▶ keys to change the selection.

Following is a list of the operating parameters that will be reset to their default values:

- Suction Pressure Cutout = 24.0 PSIG
- Low Ambient Air Temp Cutout = 25°F
- Leaving Chilled Liquid Temp Cutout = 36°F
- High Motor Current Limit = 103%
- Pulldown Current Limit = 100%
- Pulldown Current Limit Time = 0 Min.
- Subcooling Setpoint = 5°F
- Sound limit Setpoint = 0%

SERIAL PORT CONNECTIONS

Table 23 on page 155 lists the serial ports and the circuit board they are located on. The serial communications lines provide communications to external devices outside the chiller and between microprocessors located in the chiller control panel.

TB2 allows connecting to a remote OptiView RCC or Microgateway. The OptiView RCC option is not yet available. The OptiView RCC and Microgateway option cannot both be used. Only one or the other is permitted to be connected to the chiller.

ANALOG INPUT CONNECTIONS

Table 24 on page 156 lists the Analog inputs and the circuit board they are located on. Not all of the sensors are installed in every unit, as some of them are optional. The software must read the optional sensors if installed. The Analog input signals are typically referenced to the common (return, ground) in the system.

J12-3 can also be used as common, as well as chassis ground, or the common terminal point on the Chiller Control Board. See the wiring diagrams. The +DC Bus, -DC Bus and ½ DC Bus voltages are measured in reference to one of the other DC Bus points. For example: +DC Bus measured to ½ DC Bus.

TABLE 23 - SERIAL PORT CONNECTIONS

BOARD	HEADER	PORT TYPE	PORT USE
Control Board	TB1 / TB2	RS-232 / RS-485	Printer / ISN
Control Board	J2 / J1	RS-485	VSD #1 / #2 <-> Control Panel
Control Board	TB3/PL2	RS-485	BAS Port
Control Board	TB5	RS-485	Spare/Future Remote Monitoring
VSD Logic Board	J12	Opto-Coupled RS-485	VSD <-> Control Panel

TABLE 24 - ANALOG INPUT CONNECTIONS

CIRCUIT BOARD	PLUG	INPUT
Control Board	J17-11	Remote Temperature Reset
Control Board	J17-12	Remote Current Limit
Control Board	J17-13	Remote Sound Limit
Control Board	J17-14	Sys 1 Condenser Liquid Pressure
Control Board	J17-15	Sys 2 Condenser Liquid Pressure
Control Board	J18-7	Leaving Chilled Liquid Temp Sensor
Control Board	J18-8	Return Chilled Liquid Temp Sensor
Control Board	J18-9	Ambient Air Temp Sensor
Control Board	J19-1	Comp 1 Motor Temperature 1
Control Board	J19-2	Comp 1 Motor Temperature 2
Control Board	J19-3	Comp 1 Motor Temperature 3
Control Board	J19-6	Comp 2 Motor Temperature 1
Control Board	J19-7	Comp 2 Motor Temperature 2
Control Board	J19-8	Comp 2 Motor Temperature 3
Control Board	J21-13	Sys 1 Condenser Liquid Temperature
Control Board	J21-3	Spare
Control Board	J21-16	Sys 1 Discharge Temperature
Control Board	J21-6	Sys 1 Flash Tank Level Sensor
Control Board	J21-20	Sys 1 Suction Pressure
Control Board	J21-22	Sys 1 Oil Pressure
Control Board	J21-24	Sys 1 Discharge Pressure
Control Board	J22-13	Sys 2 Condenser Liquid Temperature
Control Board	J22-3	Spare
Control Board	J22-16	Sys 2 Discharge Temperature
Control Board	J22-6	Sys 2 Flash Tank Level Sensor
Control Board	J22-20	Sys 2 Suction Pressure
Control Board	J22-22	Sys 2 Oil Pressure
Control Board	J22-24	Sys 2 Discharge Pressure
Control Board	J20-1	Spare
Control Board	J20-2	Spare
Control Board	J20-3	Spare
Control Board	J20-6	Spare
Control Board	J20-7	Spare
Control Board	J20-8	Spare
Control Board	J23-13	Sys 1 Eductor Temperature
Control Board	J23-3	Sys 1 Flash Tank Liquid Temperature Sensor
Control Board	J23-16	Evaporator Entering Chilled Liquid Temp Sensor
Control Board	J23-6	System 1 Evaporator Level Sensor (Round Tube)

CIRCUIT BOARD	PLUG	INPUT
Control Board	J23-20	Spare
Control Board	J23-22	Spare
Control Board	J23-24	Spare
Control Board	J24-13	Sys 2 Eductor Temperature
Control Board	J24-3	Sys 2 Flash Tank Liquid Temperature Sensor
Control Board	J24-16	Spare
Control Board	J24-6	System 2 Evaporator Level Sensor (Round Tube)
Control Board	J24-20	Spare
Control Board	J24-22	Spare
Control Board	J24-24	Spare
VSD Logic Board	J1-1,2	Comp 1 Phase A Motor Current
VSD Logic Board	J1-3,4	Comp 1 Phase B Motor Current
VSD Logic Board	J1-5,6	Comp 1 Phase C Motor Current
VSD Logic Board	J1-13,14	Comp 3 Phase A Motor Current (N/A)
VSD Logic Board	J1-15,16	Comp 3 Phase B Motor Current (N/A)
VSD Logic Board	J1-17,18	Comp 3 Phase C Motor Current (N/A)
VSD Logic Board	J2-1,2	Comp 2 Phase A Motor Current
VSD Logic Board	J2-3,4	Comp 2 Phase B Motor Current
VSD Logic Board	J2-5,6	Comp 2 Phase C Motor Current
VSD Logic Board	J2-9,10	Comp 4 Phase A Motor Current (N/A)
VSD Logic Board	J2-11,12	Comp 4 Phase B Motor Current (N/A)
VSD Logic Board	J2-13,14	Comp 4 Phase C Motor Current (N/A)
VSD Logic Board	J3-1	+DC Bus Voltage 1
VSD Logic Board	J3-2	½ DC Bus Voltage 1
VSD Logic Board	J3-3	-DC Bus Voltage 1
VSD Logic Board	J3-4	-DC Bus Voltage 2 (Frame F)
VSD Logic Board	J3-5	½ DC Bus Voltage 2 (Frame F)
VSD Logic Board	J3-6	+DC Bus Voltage 2 (Frame F)
VSD Logic Board	J6-8	Comp 1 IGBT Baseplate Temperature
VSD Logic Board	J8-8	Comp 2 IGBT Baseplate Temperature
VSD Logic Board	R19	Comp 1 Overload Adjust
VSD Logic Board	R64	Comp 2 Overload Adjust

DIGITAL INPUT CONNECTIONS

Table 25 on page 157 lists the digital inputs and the circuit board they are located on. The Digital input signals are typically referenced to the common (return, ground) in the system.

J12-3 can also be used as common, as well as chassis ground, or the common terminal point on the Chiller Control Board. See the wiring diagrams.

TABLE 25 - DIGITAL INPUT CONNECTIONS

CIRCUIT BOARD	PLUG	INPUT
Control Board	J4-2	Unit Switch 1
Control Board	J4-3	Unit Switch 2
Control Board	J4-4	Sys 1 HPCO
Control Board	J4-5	Sys 2 HPCO
Control Board	J4-6	VSD Fault Relay 1
Control Board	J5-1	Spare
Control Board	J5-2	Spare
Control Board	J5-3	Spare
Control Board	J6-2	Flow Switch
Control Board	J6-3	Print
Control Board	J6-4	Sys 1 Run Permissive
Control Board	J6-5	Sys 2 Run Permissive
Control Board	J6-6	Spare
Control Board	J7-1,2	Spare
Control Board	J7-3,4	Spare
Control Board	J7-5,6	Spare
Control Board	J7-7,8	Spare
Control Board	J7-9,10	Spare
Control Board	J7-11,12	Spare
VSD Logic Board	J1-10	2 Compressor Select (Standard) (N/A Frame F)
VSD Logic Board	J1-11	3 Compressor Select (N/A)
VSD Logic Board	J1-12	4 Compressor Select (N/A Standard) (Frame F)
VSD Logic Board	J5-1,2	MODBUS Address Bit 0
VSD Logic Board	J5-3,4	MODBUS Address Bit 1

CIRCUIT BOARD	PLUG	INPUT
VSD Logic Board	J6-2	Comp 1 Phase A Gate Driver Fault
VSD Logic Board	J6-5	Comp 1 Phase C Gate Driver Fault
VSD Logic Board	J6-12	Comp 1 Phase B Gate Driver Fault
VSD Logic Board	J7-2	Comp 3 Phase A Gate Driver Fault (N/A)
VSD Logic Board	J7-5	Comp 3 Phase C Gate Driver Fault (N/A)
VSD Logic Board	J7-12	Comp 3 Phase B Gate Driver Fault (N/A)
VSD Logic Board	J8-2	Comp 2 Phase A Gate Driver Fault
VSD Logic Board	J8-5	Comp 2 Phase C Gate Driver Fault
VSD Logic Board	J8-12	Comp 2 Phase B Gate Driver Fault
VSD Logic Board	J9-2	Comp 4 Phase A Gate Driver Fault (N/A)
VSD Logic Board	J9-5	Comp 4 Phase C Gate Driver Fault (N/A)
VSD Logic Board	J9-12	Comp 4 Phase B Gate Driver Fault (N/A)
VSD Logic Board	J11-2	Phase Loss Fault 1
VSD Logic Board	J11-6	Phase Loss Fault 2
VSD Logic Board	SW1	Test Pushbutton
VSD Logic Board	J10-5,6	Comp 1 Run (from control panel)
VSD Logic Board	J10-7,8	Comp 2 Run (from control panel)

ANALOG OUTPUT CONNECTIONS

Table 26 on page 158 lists the analog outputs and the circuit board they are located on. The analog output signals are feed to the associated control device from the 2 wires connected to the pins in the associated plug.

TABLE 26 - ANALOG OUTPUTS CONNECTIONS

BOARD	PLUG	ANALOG OUTPUT
Control Board	J15-1,2	Sys 1 Condenser Drain Valve
Control Board	J15-3,4	Sys 1 Economizer Feed Valve
Control Board	J15-5,6	Sys 2 Condenser Drain Valve
Control Board	J15-7,8	Sys 2 Economizer Feed Valve
Control Board	J14-1,6	Spare
Control Board	J14-2,7	Spare
Control Board	J14-3,8	Spare
Control Board	J14-4,9	Spare
Control Board	J25-1,5	Sys 1 Condenser Fan Speed
Control Board	J25-2,6	Sys 2 Condenser Fan Speed
Control Board	J25-3,7	Spare
Control Board	J25-4,8	Spare

DIGITAL OUTPUT CONNECTIONS

Table 27 on page 158 lists the digital outputs and the plug/terminals of the circuit board they originate from. Not all of the outputs will be used on every unit. Signal levels may be 12VDC, 120VAC, or a dry contact (no voltage closure). 120VAC signals typically may show only one connection point; the other will be neutral (Wire 2). Outputs which reference multiple boards, such as “Chiller Control Board / Relay Board 1” indicate the signal originates on the Chiller Control Board as a 0 to 12VDC digital signal (example: J9-1) that is then fed to the Relay board and output as a dry contact closure between TB1-20 and 19. In this case, outputs from both boards are called out in the table.

The 0 to 120VAC single digital outputs from the Relay Output Boards are referenced to neutral (Wire 2). For example, the fan output on TB1-6 is a single 120VAC output. The 0 to 12VDC outputs from the Chiller Control Board are referenced to common (return, ground) in the system. J12-3 can also be used as common, as well as chassis ground, or the common terminal point on the Chiller Control Board. See the wiring diagrams. Refer to the wiring diagrams whenever there is a requirement for tracing out these signals.

TABLE 27 - DIGITAL OUTPUTS CONNECTIONS

BOARD	PLUG	DIGITAL OUTPUT
Control Board / Relay Board 1	J9-1 / TB1-20/19	Evaporator Heater
Control Board / Relay Board 1	J9-2 / TB1-18/17	Sys 1 VSD Run
Control Board / Relay Board 1	J9-3 / TB1-16/15	Sys 1 Alarm
Control Board / Relay Board 1	J9-4 / TB1-14/13	Evaporator Heater 2
Control Board / Relay Board 1	J9-5 / TB1-12/11	Sys 1 VI Step 1
Control Board / Relay Board 1	J9-6 / TB1-10/9	Sys 1 VI Step 2
Control Board / Relay Board 1	J9-7 / TB1-8/7	Sys 1 Condenser Fans Output 4
Control Board / Relay Board 1	J9-8 / TB1-6	Sys 1 Condenser Fans Output 1
Control Board / Relay Board 1	J9-9 / TB1-5	Sys 1 Condenser Fans Output 2
Control Board / Relay Board 1	J9-10 / TB1-4	Sys 1 Condenser Fans Output 3
Control Board / Relay Board 1	J9-11 / TB1-3	Sys 1 Compressor Heater
Control Board / Relay Board 1	J9-12 / TB1-2	Sys 1 Subcooled Liquid Solenoid (Remote Evaporator) Free Cooling Valve (Free Cooling Enabled)
Control Board / Relay Board 2	J10-1 / TB1-20/19	Evaporator Pump Start
Control Board / Relay Board 2	J10-2 / TB1-18/17	Sys 2 VSD Run
Control Board / Relay Board 2	J10-3 / TB1-16/15	Sys 2 Alarm
Control Board / Relay Board 2	J10-4 / TB1-14/13	Chiller Run
Control Board / Relay Board 2	J10-5 / TB1-12/11	Sys 2 Condenser Fans Output 4
Control Board / Relay Board 2	J10-6 / TB1-10/9	Sys 2 VI Step 1
Control Board / Relay Board 2	J10-7 / TB1-8/7	Sys 2 VI Step 2
Control Board / Relay Board 2	J10-8 / TB1-6	Sys 2 Condenser Fans Output 1
Control Board / Relay Board 2	J10-9 / TB1-5	Sys 2 Condenser Fans Output 2
Control Board / Relay Board 2	J10-10 / TB1-4	Sys 2 Condenser Fans Output 3
Control Board / Relay Board 2	J10-11 / TB1-3	Sys 2 Compressor Heater

TABLE 27 - DIGITAL OUTPUTS CONNECTIONS (CONT'D)

BOARD	PLUG	DIGITAL OUTPUT
Control Board / Relay Board 2	J10-12 / TB1-2	Sys 2 Subcooled Liquid Solenoid (Remote Evaporator)
Control Board / Relay Board 3	J11-1 / TB1-20/19	Spare
Control Board / Relay Board 3	J11-2 / TB1-18/17	Spare
Control Board / Relay Board 3	J11-3 / TB1-16/15	Spare
Control Board / Relay Board 3	J11-4 / TB1-14/13	Spare
Control Board / Relay Board 3	J11-5 / TB1-12/11	Spare
Control Board / Relay Board 3	J11-6 / TB1-10/9	Spare
Control Board / Relay Board 3	J11-7 / TB1-8/7	Spare
Control Board / Relay Board 3	J11-8 / TB1-6	Spare
Control Board / Relay Board 3	J11-9 / TB1-5	Spare
Control Board / Relay Board 3	J11-10 / TB1-4	Spare
Control Board / Relay Board 3	J11-11 / TB1-3	Spare
Control Board / Relay Board 3	J11-12 / TB1-2	Spare
VSD Logic Board	J6-1	Comp 1 Phase A+ IGBT Gating Signal
VSD Logic Board	J6-3	Comp 1 Phase B- IGBT Gating Signal
VSD Logic Board	J6-4	Comp 1 Phase C+ IGBT Gating Signal
VSD Logic Board	J6-10	Comp 1 Phase A- IGBT Gating Signal
VSD Logic Board	J6-11	Comp 1 Phase B+ IGBT Gating Signal
VSD Logic Board	J6-13	Comp 1 Phase C- IGBT Gating Signal
VSD Logic Board	J6-14	Comp 1 Enable
VSD Logic Board	J7-1	Comp 3 Phase A+ IGBT Gating Signal (N/A)
VSD Logic Board	J7-3	Comp 3 Phase B- IGBT Gating Signal (N/A)
VSD Logic Board	J7-4	Comp 3 Phase C+ IGBT Gating Signal (N/A)
VSD Logic Board	J7-10	Comp 3 Phase A- IGBT Gating Signal (N/A)

BOARD	PLUG	DIGITAL OUTPUT
VSD Logic Board	J7-11	Comp 3 Phase B+ IGBT Gating Signal (N/A)
VSD Logic Board	J7-13	Comp 3 Phase C- IGBT Gating Signal (N/A)
VSD Logic Board	J7-14	Comp 3 Enable (N/A)
VSD Logic Board	J8-1	Comp 2 Phase A+ IGBT Gating Signal
VSD Logic Board	J8-3	Comp 2 Phase B- IGBT Gating Signal
VSD Logic Board	J8-4	Comp 2 Phase C+ IGBT Gating Signal
VSD Logic Board	J8-10	Comp 2 Phase A- IGBT Gating Signal
VSD Logic Board	J8-11	Comp 2 Phase B+ IGBT Gating Signal
VSD Logic Board	J8-13	Comp 2 Phase C- IGBT Gating Signal
VSD Logic Board	J8-14	Comp 2 Enable
VSD Logic Board	J9-1	Comp 4 Phase A+ IGBT Gating Signal (N/A)
VSD Logic Board	J9-3	Comp 4 Phase B- IGBT Gating Signal (N/A)
VSD Logic Board	J9-4	Comp 4 Phase C+ IGBT Gating Signal (N/A)
VSD Logic Board	J9-10	Comp 4 Phase A- IGBT Gating Signal (N/A)
VSD Logic Board	J9-11	Comp 4 Phase B+ IGBT Gating Signal (N/A)
VSD Logic Board	J9-13	Comp 4 Phase C- IGBT Gating Signal (N/A)
VSD Logic Board	J9-14	Comp 4 Enable (N/A)
VSD Logic Board	J11-3	Pre-charge Enable 1
VSD Logic Board	J11-7	Pre-charge Enable 2 (N/A Standard) (Frame F)
VSD Logic Board	J10-1,2	VSD Fan / Pump Run
VSD Logic Board	J10-3,4	VSD Fault Relay (to control panel)

BUILDING AUTOMATION SYSTEM (BAS) COMMUNICATIONS

There are 3 different ways the chiller communicates to the BAS.

- Via board native communication protocol;
- Using an E-Link Gateway, or
- Using a SC-EQ Gateway.

Data can be read and some setpoints modified using a BAS serial communication protocol. This capability allows communications of chiller operating parameters and external control changes to chilled liquid temperature setpoint, load limiting, and start/stop commands.

ON-BOARD NATIVE COMMUNICATION PROTOCOLS

The 031-03478-xxx microboard has native communication capabilities to BACnet or N2 systems connected to Port 1 TB3 terminals providing a RS-485 interface.

Native Modbus communication is available on Port 2 TB1 for RS-232 and TB2 for RS-485 interfaces. The hardware select parameter found in the program settings is used to select which port is active.

NOTE: If a LON interface is needed with the 03478 microboard, the E-Link option must be applied.

DE MODIFIER ADDRESS XXXXX	P2 PROTOCOL XXXXXXXXXXXX
DE MODIFIER OFFSET XX	P2 MANUAL MAC ADDRESS XXX
P1 PROTOCOL XXXXXX	P2 BAUD RATE XXXXX
P1 MANUAL MAC ADDRESS XXX	P2 PARITY XXXXX
P1 BAUD RATE XXXXX	P2 STOP BITS X
P1 PARITY XXXXX	P2 HW SELECT BIT XXXXX
P1 STOP BITS X	REAL TIME ERROR ## RESET 1 = YES, 0 = NO 0

NOTE: See TABLE 46 on page 161 for error descriptions.

BACnet MS/TP or N2

- RS-485: connect to TB3 +, - REF and SHLD

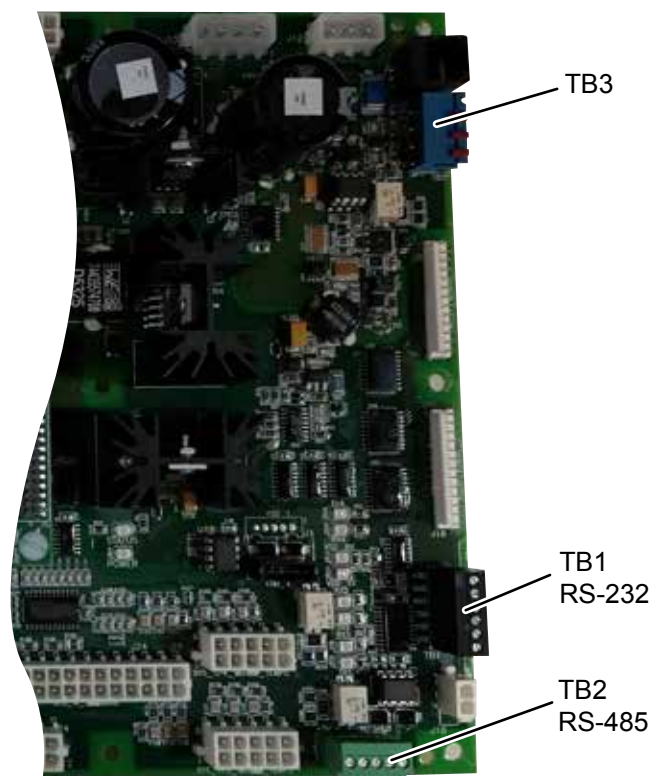
Modbus RTU

- RS-485: connect to TB2 +, - GND and SHLD
- RS-232: connect to TB1 TXD, RXD and GND

NOTE: The hardware select parameter in the program settings is used to select which port to use for Modbus.

Refer to Figure 49 on page 165 for TB1, and TB2 locations.

In most cases, communication parameters will need to be modified. Table 28 on page 161 lists setup parameters for the available protocols. In the 03478 microboard, press the PROGRAM key then enter the password 5255. The list below shows the displays for the values that may be modified:



LD20285

FIGURE 48 - BAS CONNECTORS IN MICROBOARD

The table below shows set-up requirements for each communication protocol.

TABLE 28 - VALUES REQUIRED FOR BAS COMMUNICATION

SETTING DESCRIPTION	Protocol		
	BACnet MS/TP	Modbus RTU ⁵	N2
DE MODIFIER ADDRESS	0 to 41943 ⁽³⁾	1	N/A
DE MODIFIER OFFSET	0 to 99 ⁽⁴⁾	0	N/A
P1 PROTOCOL	BACNET	N/A	N2
P1 MANUAL MAC ADDRESS	0-127 ⁽¹⁾	N/A	0-127 ⁽¹⁾
P1 BAUD RATE	9600 To 76800 or Auto Selectable ⁽¹⁾	N/A	9600 or 19200
P1 PARITY	NONE	N/A	NONE
P1 STOP BITS	1	N/A	1
P2 PROTOCOL	N/A	MODBUS SVR	N/A
P2 MANUAL MAC ADDRESS	N/A	0-127 ⁽¹⁾	N/A
P2 BAUD RATE	N/A	19,200 ⁽²⁾	N/A
P2 PARITY	N/A	NONE ⁽²⁾	N/A
P2 STOP BITS	N/A	1	N/A
P2 HW SELECT BIT	N/A	RS-485 or RS-232 ⁽¹⁾	N/A
RESET REAL TIME ERROR	N/A	N/A	N/A
CHILLER ID	N/A	N/A	N/A

¹as Required By Network

²or Other As Required By Network

³number Is Multiplied By 100, Set As Required By Network

⁴number Is Added To De Modifier Address, Set As Required By Network

⁵unit Operating Software Version C.Mmc.13.03 Or Later Required For Modbus Protocol

TABLE 29 - REAL TIME ERROR NUMBERS

ERROR NUMBER (##)	DESCRIPTION
0	ALL OK
1	DATUM TYPE OK TEST FAILED
2	ENGLISH TEXT TOO LONG
3	FLOATING POINT EXCEPTION
4	GET PACKET FAILED
5	GET TYPE FAILED
6	INVALID UNIT CONVERSION
7	INVALID HARDWARE SELECTION
8	REAL TIME FAULT
9	SPANISH TEXT TOO LONG
10	THREAD EXITED
11	THREAD FAILED
12	THREAD STALLED
13	IO BOARD RESET
14	RTC/BRAM INVALID
15	BACNET SETUP FAILED

This data can be read and in some cases modified using a BACnet, Modbus, or N2 network connection. The BACnet Name is a 12 character or shorter name used to identify the data in BACnet. The AI, AV, BI, and BV columns are indexes used to select the data.

The AI, AV, BI, and BV number associated with a BACnet Name should not be changed. If a value is not wanted in this table, change the BACnet Name to SPARE_XX_##. SPARE rows can be used for new values.

When set to BACnet or N2, communications automatically sets Stop Bit (1) and Parity (None) for port.

When connected via BAS and port is set for BACnet, Modbus, or N2, the remote settings will continue to follow the remote setpoints until the port is changed to another protocol or Demodifier address is set to -1.

TABLE 30 - YVFA NATIVE COMMUNICATIONS DATA MAP

YVFA

Native

Modbus, BACnet MS/TP, N2 Data Map

Micro Board: 031-03478-101

Item		Version	Date	York P/N	COMMENTS									
1		Y.ACS.20.02	15 May	031-03476-010										
2														
3														
4														
5														
6														
7														
8														
9														
10														
ITEM REF NUM		BACnet Name	BACnet Object Instance	Modbus Address	Modbus Data Type Supported	Modbus Scaling	N2 Metasys Address	ENG UNITS		POINT LIST CODE: S = STANDARD O = OPTIONAL				
						see note 1		Imper	SI	POINT LIST DESCRIPTION				
										1	2	3	4	5 6 7 8 9 10
ANALOG WRITE POINTS														
1		REM_SETPT	AV1	1026	03.06,16	DIV 10	ADF 1	°F	°C	Remote Leaving Chilled Liquid Setpoint				
2		DMD_LIMIT	AV2	1027	03.06,16	DIV 10	ADF 2	%	%	Remote Unit Current Limit Setpoint				
3		SND_LIMIT	AV3	1028	03.06,16	DIV 10	ADF 3	%	%	Remote Sound Limit				
BINARY WRITE POINTS														
4		START_STOP	BV1	1538	01,03,05,06,15	n/a	BD 1	Q/1	Q/1	Remote Run/Stop [0=Stop, 1=Run]				
ANALOG READ ONLY POINTS														
5		LCHLT	A11	514	03.04	X10	ADF 5	°F	°C	Leaving Chilled Liquid Temperature				
6		ECHLT	A12	515	03.04	X10	ADF 6	°F	°C	Entering Chilled Liquid Temperature				
7		EV_ELT	A13	516	03.04	X10	ADF 7	°F	°C	Evaporator Entering Liquid Temperature (Free Cooling Enabled)				
8		VSD_IA_TEMP	A14	517	03.04	X10	ADF 8	°F	°C	VSD Internal Ambient Temperature				
9		S1_COND_TEMP	A15	518	03.04	X10	ADF 9	°F	°C	Sys 1 Condenser Temperature				
10		S2_COND_TEMP	A16	519	03.04	X10	ADF 10	°F	°C	Sys 2 Condenser Temperature				
11		S1_DSCH_TEMP	A17	520	03.04	X10	ADF 11	°F	°C	Sys 1 Discharge Temperature				
12		S2_DSCH_TEMP	A18	521	03.04	X10	ADF 12	°F	°C	Sys 2 Discharge Temperature				
13		OAT	A19	522	03.04	X10	ADF 13	°F	°C	Ambient Air Temperature				
14		S1_EDT_TEMP	A110	523	03.04	X10	ADF 14	°F	°C	Sys 1 Eductor Temperature				
15		S2_EDT_TEMP	A111	524	03.04	X10	ADF 15	°F	°C	Sys 2 Eductor Temperature				
16		S1_OIL_PRESS	A112	525	03.04	X10	ADF 16	PSIG	BARG	Sys 1 Oil Pressure				
17		S2_OIL_PRESS	A113	526	03.04	X10	ADF 17	PSIG	BARG	Sys 2 Oil Pressure				
18		S1_SUCT_PRESS	A114	527	03.04	X10	ADF 18	PSIG	BARG	Sys 1 Suction Pressure				
19		S2_SUCT_PRESS	A115	528	03.04	X10	ADF 19	PSIG	BARG	Sys 2 Suction Pressure				
20		S1_DSCH_PRESS	A116	529	03.04	X10	ADF 20	PSIG	BARG	Sys 1 Discharge Pressure				
21		S2_DSCH_PRESS	A117	530	03.04	X10	ADF 21	PSIG	BARG	Sys 2 Discharge Pressure				
22		S1_MC_FLA	A118	531	03.04	X1	ADF 22	%	%	Sys 1 Motor Current FLA				
23		S2_MC_FLA	A119	532	03.04	X1	ADF 23	%	%	Sys 2 Motor Current FLA				
24		S1_OP_HRS	A120	533	03.04	X1	ADF 24	hrs	hrs	Sys 1 Operating Hours				
25		S2_OP_HRS	A121	534	03.04	X1	ADF 25	hrs	hrs	Sys 2 Operating Hours				
26		S1_COMP_ST	A122	535	03.04	X1	ADF 26	count	count	Sys 1 Compressor Starts				
27		S2_COMP_ST	A123	536	03.04	X1	ADF 27	count	count	Sys 2 Compressor Starts				
28		S1_HI_MTR_T	A124	537	03.04	X10	ADF 28	°F	°C	Sys 1 Highest Motor Temperature				
29		S2_HI_MTR_T	A125	538	03.04	X10	ADF 29	°F	°C	Sys 2 Highest Motor Temperature				
30		VSD_OUT_FR	A126	539	03.04	X10	ADF 30	Hz	Hz	VSD Output Frequency				
31		VSD_CMD_FR	A127	540	03.04	X10	ADF 31	Hz	Hz	VSD Command Frequency				
32		S1_COND_DR	A128	541	03.04	X10	ADF 32	%	%	Sys 1 Condenser Drain Valve % Open				
33		S2_COND_DR	A129	542	03.04	X10	ADF 33	%	%	Sys 2 Condenser Drain Valve % Open				
34		S1_OP_CODE	A130	543	03.04	X1	ADF 34	index	index	Sys 1 Operational Code				
35		S2_OP_CODE	A131	544	03.04	X1	ADF 35	index	index	Sys 2 Operational Code				
36		S1_FLT_CODE	A132	545	03.04	X1	ADF 36	index	index	Sys 1 Fault Code				
37		S2_FLT_CODE	A133	546	03.04	X1	ADF 37	index	index	Sys 2 Fault Code				
38		S1_FAN_STG	A134	547	03.04	X1	ADF 38	count	count	Sys 1 Condenser Fan Stage (0-14)				

TABLE 30 - YVFA NATIVE COMMUNICATIONS DATA MAP (CONT'D)

ITEM REF NUM	BACnet Name	BACnet Object & Instance	Modbus Address	Modbus Data Type Supported	Modbus Scaling	N2 Metasys Address	ENG UNITS		POINT LIST DESCRIPTION	N = NOT AVAILABLE										
							Imper	SI		1	2	3	4	5	6	7	8	9	10	
ANALOG READ ONLY POINTS																				
39	S2 FAN STG	AI35	548	03.04	X1	ADF 39	count	count	Sys 2 Condenser Fan Stage (0-14)	S										
40	S1 FAN SPD	AI36	549	03.04	X1	ADF 40	%	%	Sys 1 Condenser Fan Speed (VSD)	S										
41	S2 FAN SPD	AI37	550	03.04	X1	ADF 41	%	%	Sys 2 Condenser Fan Speed (VSD)	S										
42	LEAD	AI38	551	03.04	X1	ADF 42	count	count	Lead System	S										
43	LCHLT SETP	AI39	552	03.04	X10	ADF 43	°F	°C	Leaving Chilled Liquid Setpoint	S										
44	LCHLT CUTOUT	AI40	553	03.04	X1	ADF 44	°F	°C	Leaving Chilled Liquid Cutoff	S										
45	S1 ECON VLV	AI41	554	03.04	X1	ADF 45	%	%	Sys 1 Economizer Valve % Open	S										
46	S2 ECON VLV	AI42	555	03.04	X1	ADF 46	%	%	Sys 2 Economizer Valve % Open	S										
47	SUCT PRS CUT	AI43	556	03.04	X10	ADF 47	PSIG	BARG	Suction Pressure Cutoff	S										
48	VSD DCB VT	AI44	557	03.04	X1	ADF 48	volts	volts	VSD DC Bus Voltage (Unit) or (Sys 1 Frame E/F)	S										
49	VSD DCB VT2	AI45	558	03.04	X1	ADF 49	volts	volts	VSD DC Bus Voltage (Sys 2 Frame E/F)	S										
50	REM SETPOINT	AI46	559	03.04	X1	ADF 50	°F	°C	Remote Leaving Chilled Liquid Setpoint	S										
51	S1 SUBCOOL	AI47	560	03.04	X1	ADF 51	°F	°C	Sys 1 Subcooling (Microchannel)	S										
52	S1 EVAP LL	AI48	561	03.04	X10	ADF 52	%	%	Sys 1 Evaporator Liquid Level (Round Tube)	S										
53	S2 SUBCOOL	AI49	562	03.04	X1	ADF 53	°F	°C	Sys 2 Subcooling (Microchannel)	S										
54	S2 EVAP LL	AI50	563	03.04	X10	ADF 54	%	%	Sys 2 Evaporator Liquid Level (Round Tube)	S										
55	COOLING RNG	AI51	564	03.04	X10	ADF 55	°F	°C	Cooling Range	S										
56	S1 DSC SHEAT	AI52	565	03.04	X10	ADF 56	°F	°C	Sys 1 Discharge Superheat	S										
57	S2 DSC SHEAT	AI53	566	03.04	X10	ADF 57	°F	°C	Sys 2 Discharge Superheat	S										
58	S1 SYS STATE	AI54	567	03.04	X1	ADF 58	count	count	Sys 1 Sys State, 0=STOP, 1=RUN, 2=FAULT, 4=LOCK_OUT, 5=PRE-RUN	S										
59	S2 SYS STATE	AI55	568	03.04	X1	ADF 59	count	count	Sys 2 Sys State, 0=STOP, 1=RUN, 2=FAULT, 4=LOCK_OUT, 5=PRE-RUN	S										
60	S1 MTR OVER	AI56	569	03.04	X1	ADF 60	%	%	Sys 1 Motor Current Overload Setting	S										
61	S2 MTR OVER	AI57	570	03.04	X1	ADF 61	%	%	Sys 2 Motor Current Overload Setting	S										
62	FAN TYPE	AI58	571	03.04	X1	ADF 62	count	count	Cond Fan Ctrl Type 1=Std. VSD, 2=Opt. VSD, 3=Std. Staged, 4=Opt. Staged	S										
63	FC MODE	AI59	572	03.04	X1	ADF 63	count	count	Free Cooling Mode - FC enabled (0=Mechanical, 1=Free Cooling, 2=Hybrid)	S										
BINARY READ ONLY POINTS																				
64	CH_ALARM	BI1	1282	01,02,03	n/a	BD 5	0/1	0/1	Chiller Alarm (0=Alarm, 1=No Alarm)	S										
65	CH_RUN	BI2	1283	01,02,03	n/a	BD 6	0/1	0/1	Chiller Run (0=Off, 1=Run)	S										
66	EVAP_HEATER	BI3	1284	01,02,03	n/a	BD 7	0/1	0/1	Evaporator Heater (0=Off, 1=On)	S										
67	EVAP_PUMP	BI4	1285	01,02,03	n/a	BD 8	0/1	0/1	Evaporator Pump (0=Off, 1=On)	S										
68	S1_COMP_RUN	BI5	1286	01,02,03	n/a	BD 9	0/1	0/1	Sys 1 Compressor Run Status (0=Off, 1=On)	S										
69	S2_COMP_RUN	BI6	1287	01,02,03	n/a	BD 10	0/1	0/1	Sys 2 Compressor Run Status (0=Off, 1=On)	S										
70	S1_VI_STEP1	BI7	1288	01,02,03	n/a	BD 11	0/1	0/1	Sys 1 VI Step Solenoid Valve 1 Status (0=Off, 1=On)	S										
71	S2_VI_STEP1	BI8	1289	01,02,03	n/a	BD 12	0/1	0/1	Sys 2 VI Step Solenoid Valve 1 Status (0=Off, 1=On)	S										
72	S1_VI_STEP2	BI9	1290	01,02,03	n/a	BD 13	0/1	0/1	Sys 1 VI Step Solenoid Valve 2 Status (0=Off, 1=On)	S										
73	S2_VI_STEP2	BI10	1291	01,02,03	n/a	BD 14	0/1	0/1	Sys 2 VI Step Solenoid Valve 2 Status (0=Off, 1=On)	S										
74	WATER_GLYCOL	BI11	1292	01,02,03	n/a	BD 15	0/1	0/1	Water/Glycol (0 = Water, 1 = Glycol)	S										
75	LOCAL_REMOTE	BI12	1293	01,02,03	n/a	BD 16	0/1	0/1	Local/Remote (0=Local, 1=Remote)	S										
76	DISP_UNITS	BI13	1294	01,02,03	n/a	BD 17	0/1	0/1	Imperial/Metric (0=Imperial, 1=SI)	S										
77	S1_LOCKOUT	BI14	1295	01,02,03	n/a	BD 18	0/1	0/1	Sys 1 Lockout (0=No Lockout, 1=Lockout)	S										
78	S2_LOCKOUT	BI15	1296	01,02,03	n/a	BD 19	0/1	0/1	Sys 2 Lockout (0=No Lockout, 1=Lockout)	S										
79	FC_VALVE	BI16	1297	01,02,03	n/a	BD 20	0/1	0/1	Free Cooling Valve (FC enabled): 0=Closed, 1=Open	S										
80	SOFT_SHUT	BI17	1298	01,02,03	n/a	BD 21	0/1	0/1	Soft Shutdown: 0=Disabled, 1=Enabled											
81	REM_EVAP	BI18	1299	01,02,03	n/a	BD 22	0/1	0/1	Remote Evaporator: 0=Disabled, 1=Enabled											
82	QUICK_ST	BI19	1300	01,02,03	n/a	BD 23	0/1	0/1	Quick Start: 0=Disabled, 1=Enabled											
83	FRAME_EF	BI20	1301	01,02,03	n/a	BD 24	0/1	0/1	Frame E/F (0=Disabled, 1=Enabled)											
84	SOUND_OPT	BI21	1302	01,02,03	n/a	BD 25	0/1	0/1	Sound Limit Option (0=Disabled, 1=Enabled)											
NOTES																				
1 Modbus values are all of type SIGNED. Scaling and signing are not modifiable in the field.																				
3 BACnet Object Types: 0=Analog In, 1=Analog Out, 2= Analog Value, 3=Binary In, 4=Binary Out, 5=Binary Value, 8=Device, 15=Alarm Notification (0-127 are reserved ASHRAE Objects)																				
4 Values that are not applicable due to unit configuration and options will be sent as zero (0).																				
5																				
6																				
7																				
8																				

YVFA Status Codes

[illegible]

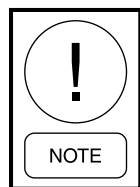
E-LINK GATEWAY

Received Data (Control Data)

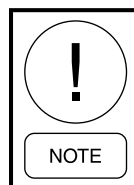
The unit receives eight data values from the E-Link Gateway. The first four are analog values and the last four are digital values. These eight data values are used as control parameters when in REMOTE mode. When the unit is in LOCAL mode, these eight values are ignored. If the unit receives no valid YorkTalk 2 transmission for 5 minutes it will revert back to all local control values. YVFA Communications Data Map in *Table 32 on page 166* lists the control parameters. These values are found under feature 54 in the E-Link Gateway.

Transmitted Data

After receiving a valid transmission from the E-Link Gateway, the unit will transmit either operational data or history buffer data depending on the "History Buffer Request" on ENG PAGE 10. Data must be transmitted for every page under feature 54. If there is no value to be sent to a particular page, a zero will be sent. *Table 32 on page 166* "YVFA Communications Data Map" shows the data values and page listings for this unit.



The most current data map information is listed on the Johnson Controls/York Chiller Equipment Integration website. A copy of the data map can also be obtained by contacting a local Johnson Controls office.



Reboot required (cycle power) after settings are changed.

The table below shows the real time error numbers that may be encountered during communication setup and a description of each.

TABLE 31 - REAL TIME ERROR NUMBERS

ERROR NUMBER (##)	DESCRIPTION
0	ALL OK
1	DATUM TYPE OK TEST FAILED
2	ENGLISH TEXT TOO LONG
3	FLOATING POINT EXCEPTION
4	GET PACKET FAILED
5	GET TYPE FAILED
6	INVALID UNIT CONVERSION
7	INVALID HARDWARE SELECTION
8	REAL TIME FAULT
9	SPANISH TEXT TOO LONG
10	THREAD EXITED
11	THREAD FAILED
12	THREAD STALLED
13	IO BOARD RESET
14	RTC/BRAM INVALID
15	BACnet SETUP FAILED

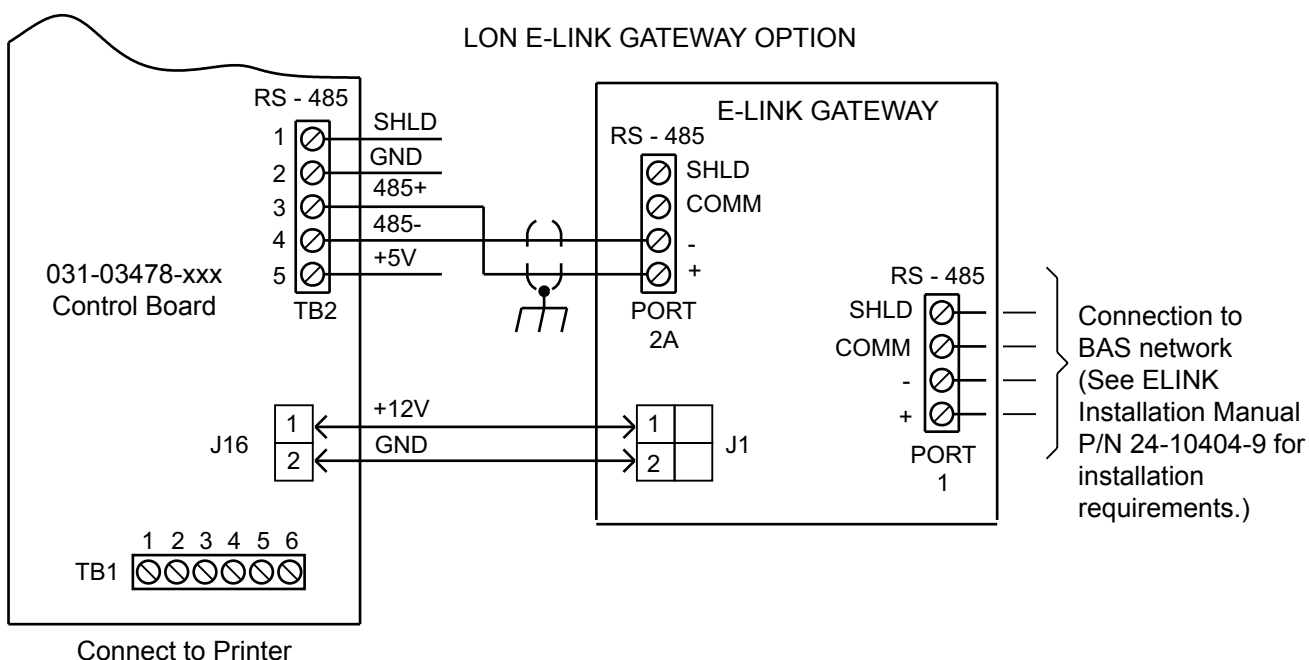


FIGURE 49 - CONTROL BOARD CONNECTIONS FOR BAS COMMUNICATIONS

LD20214

TABLE 32 - YVFA E-LINK COMMUNICATIONS DATA MAP

2/16/2016

YVAA / YVFA Sys 1 & 2

REV K03H

SECTION 1

E-LINK

YORK TALK 2

Item	Version		Software P/N	Microboard P/N	Baud	COMMENTS										ENG PAGE Ref			
	C.ACS.20.xx	C.ACS.23.xx	031-02476-010	031-02478-xxx	4800	Std. see Elink Installation manual PN 24-10404-9 for wiring instructions, YVAA Chiller with Frame A-D VSD													
2	C.ACS.23.xx		031-02476-013	031-02478-xxx	4800	YVAA Chiller with Frame E-F VSD										P03			
3	C.ACS.21.xx		031-02476-301	031-02478-xxx	4800	YVAA Chiller with Frame E-F VSD and Quickstart											P04		
4	C.ACS.27.xx		031-02476-331	031-02478-xxx	4800	YVAA Chiller with Frame A-D VSD and Quickstart												P05	
5	Y.ACS.20.xx		031-03476-010	031-03478-xxx	4800	YVAA / YVFA Chiller (all Frame sizes, Quickstart, Non-quickstart)													P06
6																			
7																P08			
8																	P09		
9																P10			
10																	P11		
																P12			
																	P13		
																P14			
																	P15		
																P16			
																	P17		
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																	P39		
																P40			
																	P41		
																P42			

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ENG PAGE Ref	BACnet Object Typ/Ins	Bacnet Object Name	LON Profile Name	LON SNVT Type	N2 Metasys	MODBUS		ENG UNITS		POINT LIST CODE: S = STANDARD O = OPTIONAL										ENG PAGE	
						Address	Scale	Imper	SI	POINT LIST DESCRIPTION											
										1	2	3	4	5	6	7	8	9	10		REF
P43	BV12	YT2_S01_P43	nvoYT501p043	SNVT switch (95)	BD 12		0072	N/A	0/1	0/1	Sys 2 VI Step Solenoid Valve 1 Status										P43
P44	BV13	YT2_S01_P44	nvoYT501p044	SNVT switch (95)	BD 13		0073	N/A	0/1	0/1	Sys 1 VI Step Solenoid Valve 2 Status										P44
P45	BV14	YT2_S01_P45	nvoYT501p045	SNVT switch (95)	BD 14		0074	N/A	0/1	0/1	Sys 2 VI Step Solenoid Valve 2 Status										P45
P46	BV15	YT2_S01_P46	nvoYT501p046	SNVT switch (95)	BD 15		0075	N/A													P46
P47	BV16	YT2_S01_P47	nvoYT501p047	SNVT switch (95)	BD 16		0076	N/A													P47
P48	BV17	YT2_S01_P48	nvoYT501p048	SNVT switch (95)	BD 17		0077	N/A													P48
P49	BV18	YT2_S01_P49	nvoYT501p049	SNVT switch (95)	BD 18		0078	N/A													P49
P50	BV19	YT2_S01_P50	nvoYT501p050	SNVT switch (95)	BD 19		0079	N/A	0/1	0/1	S1-1 Cooling Type: 0=Water, 1=Glycol										P50
P51	BV20	YT2_S01_P51	nvoYT501p051	SNVT switch (95)	BD 20		0080	N/A	0/1	0/1	Local/Remote Control Mode: 0 = Local, 1 = Remote										P51
P52	BV21	YT2_S01_P52	nvoYT501p052	SNVT switch (95)	BD 21		0081	N/A	0/1	0/1	Display Units Mode: 0 = Imperial, 1 = SI										P52
P53	BV22	YT2_S01_P53	nvoYT501p053	SNVT switch (95)	BD 22		0082	N/A													P53
P54	BV23	YT2_S01_P54	nvoYT501p054	SNVT switch (95)	BD 23		0083	N/A													P54
P55	BV24	YT2_S01_P55	nvoYT501p055	SNVT switch (95)	BD 24		0084	N/A													P55
P56	BV1	YT2_S01_P56	nvoYT501p056	SNVT count f (51)	ADI 1		0030	X 1	enum	enum	*Sys 1 Operational Code										P56
P57	BV2	YT2_S01_P57	nvoYT501p057	SNVT count f (51)	ADI 2		0031	X 1	enum	enum	*Sys 1 Fault Code										P57
P58	BV3	YT2_S01_P58	nvoYT501p058	SNVT count f (51)	ADI 3		0032	X 1	enum	enum	*Sys 2 Operational Code										P58
P59	BV4	YT2_S01_P59	nvoYT501p059	SNVT count f (51)	ADI 4		0033	X 1	enum	enum	*Sys 2 Fault Code										P59
P60	BV5	YT2_S01_P60	nvoYT501p060	SNVT count f (51)	ADI 5		0034	X 1	count	count	Sys 1 Condenser Fan Stage (0-14)										P60
P61	BV6	YT2_S01_P61	nvoYT501p061	SNVT count f (51)	ADI 6		0035	X 1	count	count	Sys 1 Condenser Fan Speed (vsd)										P61
P62	BV7	YT2_S01_P62	nvoYT501p062	SNVT count f (51)	ADI 7		0036	X 1	count	count	Sys 2 Condenser Fan Stage (0-14)										P62
P63	BV8	YT2_S01_P63	nvoYT501p063	SNVT count f (51)	ADI 8		0037	X 1	count	count	Sys 2 Condenser Fan Speed (vsd)										P63
P64	BV9	YT2_S01_P64	nvoYT501p064	SNVT count f (51)	ADI 9		0038	X 1	count	count	Lead System Number										P64
P65	BV10	YT2_S01_P65	nvoYT501p065	SNVT count f (51)	ADI 10		0039	X 1	enum	enum	Spare										P65
P66	BV30	YT2_S01_P66	nvoYT501p066	SNVT count f (51)	ADF 30		0040	X 1	°C	°C	Local Leaving Chilled Liquid Setpoint										P66
P67	BV31	YT2_S01_P67	nvoYT501p067	SNVT count f (51)	ADF 31		0041	X 1	°C	°C	Low Leaving Chilled Liquid Temp Cutout										P67
P68	BV32	YT2_S01_P68	nvoYT501p068	SNVT count f (51)	ADF 32		0042	X 1	%	%	Sys 1 Economizer Valve % Open										P68
P69	BV33	YT2_S01_P69	nvoYT501p069	SNVT count f (51)	ADF 33		0043	X 1	%	%	Sys 2 Economizer Valve % Open										P69
P70	BV34	YT2_S01_P70	nvoYT501p070	SNVT count f (51)	ADF 34		0044	X 10	PSI	BAR	Low Suction Pressure Cutout										P70
P71	BV35	YT2_S01_P71	nvoYT501p071	SNVT count f (51)	ADF 35		0045	X1*	volts	volts	VSD DC Bus Voltage										P71
P72	BV36	YT2_S01_P72	nvoYT501p072	SNVT count f (51)	ADF 36		0046	X1*	°C	°C	Remote Leaving Chilled Liquid Setpoint										P72
P73	BV37	YT2_S01_P73	nvoYT501p073	SNVT count f (51)	ADF 37		0047	X1*	°C	°C	Sys 1 Subcooling										P73
P74	BV38	YT2_S01_P74	nvoYT501p074	SNVT count f (51)	ADF 38		0048	X1*	°C	°C	Cooling Range										P74
P75	BV39	YT2_S01_P75	nvoYT501p075	SNVT count f (51)	ADF 39		0049	X1*	°C	°C	Sys 1 Discharge Superheat										P75
P76	BV40	YT2_S01_P76	nvoYT501p076	SNVT count f (51)	ADF 40		0050	X 1	°C	°C	Sys 2 Condenser Temperature										P76
P77	BV41	YT2_S01_P77	nvoYT501p077	SNVT count f (51)	ADF 41		0051	X 1	°C	°C	Sys 2 Discharge Temperature										P77
P78	BV42	YT2_S01_P78	nvoYT501p078	SNVT count f (51)	ADF 42		0052	X 1	°C	°C	Sys 2 Subcooling										P78
P79	BV43	YT2_S01_P79	nvoYT501p079	SNVT count f (51)	ADF 43		0053	X 1	°C	°C	Sys 2 Discharge Superheat										P79
P80	BV25	YT2_S01_P80	nvoYT501p080	SNVT switch (95)	BD 25		0085	N/A	0/1	0/1	Sys 1 Lockout										P80
P81	BV26	YT2_S01_P81	nvoYT501p081	SNVT switch (95)	BD 26		0086	N/A	0/1	0/1	Sys 2 Lockout										P81
P82	BV27	YT2_S01_P82	nvoYT501p082	SNVT switch (95)	BD 27		0087	N/A													P82
P83	BV28	YT2_S01_P83	nvoYT501p083	SNVT switch (95)	BD 28		0088	N/A													P83
P84	BV29	YT2_S01_P84	nvoYT501p084	SNVT switch (95)	BD 29		0089	N/A													P84
NOTES																					
1	LON SNVTs Used: SNVT_count (8), SNVT_leve_percent (81), SNVT_temp_p (105), SNVT_switch (95), SNVT_time_minute (123), SNVT_freq_hz (76), SNVT_amp (01), SNVT_elec_kwh (13), SNVT_power_kilo (83), SNVT_volt (44), SNVT_volt_ac (138), SNVT_press_p (87)																				
2																					
3	MODBUS scaling factors indicated in BOLD with an (*) asterisk are User Configurable, by a field technician if necessary. All Modbus values are of the type SIGNED with the exception of the User Configurable values that are all UNSIGNED. Modbus Function Types Supported (ENG P03-P06 = Types 03, 06, 16), (ENG P07-P10 = 01, 03, 05, 15, 06, 16), (ENG P11-P35, P56-P79) = 03, 04), (ENG P36-P55, P80-P84 = 01, 02, 03)																				
4	BACnet Engineering Units shown with an (*) Asterisk will be assigned a BACnet Eng Unit type of (95) ie NO UNITS.																				
5	Status Codes: Special Display characters such as (.), !, , , , % and > are not compatible with Elink N2 formats. Substitute text strings, "", PCT, GTN will be used.																				
6	Status Codes: Status Code Text string lengths are limited to 60 total characters (including spaces)																				
7	Codes are available only in Firmware versions C.A21.14.03 or later. Contact your JCI PSC for assistance on upgrading your firmware																				
8																					
9																					
10																					

NOTE: The Appropriate Product Code Listing Summary Should Accompany Document

2/16/2016

JOHNSON CONTROLS

SC-EQUIP GATEWAY

The SC-EQUIP (SC-EQ) Gateway supersedes the E-Link Gateway and provides BAS network connectivity for Johnson Controls® and YORK® mechanical equipment, such as chillers and rooftop units. It is designed with four active serial ports: The J12 BAS (RS-485) port, the J7 Equipment (RS-232) port, the J8 Equipment (RS-485) port and the J11 CS port which allows equipment data to be sent to the Johnson Controls Remote Operation Center for remote chiller monitoring and diagnostics.

To simplify the installation and setup, the SC-EQ Gateway automatically determines the BAS protocol and Baud rate and the model of the connected chiller or rooftop unit. The only user setting is the MAC address for the SC-EQ on the BAS network.

Several SC-EQ Gateway models are available for connection to various types of input voltage and equipment. For chillers using the OptiView™ 01730, 02430 or 03630 microboards, the SC-EQ Gateway consists of a single circuit board attached to four studs inside the Micro Panel, using the accessory mounting kit. The microboard supplies 12 VDC input power, eliminating the need for an external power supply.

For screw compressor chillers using the 02478 or 03478 microboards, the SC-EQ Gateway is installed inside the Micro Panel, using the accessory mounting kit. The microboard supplies 12 VDC input power, eliminating the need for an external power supply.

For scroll compressor chillers using the 02050 or 02550 microboards, the SC-EQ Gateway is installed inside the Micro Panel and requires an additional transformer to supply power to the SC-EQ Gateway. The transformer is included in the SC-EQ Scroll Chiller Installation Kit.

For other types of chillers, the SC-EQ Gateway is packaged in its own enclosure. In addition to the SC-EQ Gateway circuit board, a transformer is included inside the enclosure that converts a 120VAC or 240VAC input to 24 VAC power.

TABLE 33 - SC-EQ GATEWAY PRODUCT CODE NUMBERS

DESCRIPTION	PRODUCT CODE NUMBERS
SC-EQ with Serial Outputs (BACnet Master-Slave/Token-Passing [MS/TP], Modbus Remote Terminal Unit [RTU], and N2)	SE-SCC1001-0 (031-03610-000)
SC-EQ with Serial Outputs in Enclosure	YK-SCCPNL-0
SC-EQ OptiView Panel Installation Kit	331-03607-000
SC-EQ Screw Chiller Panel Installation Kit	392-41228-000
SC-EQ Scroll Chiller Panel Installation Kit	392-41230-000

NOTE: For LON integration use the appropriate E-Link.

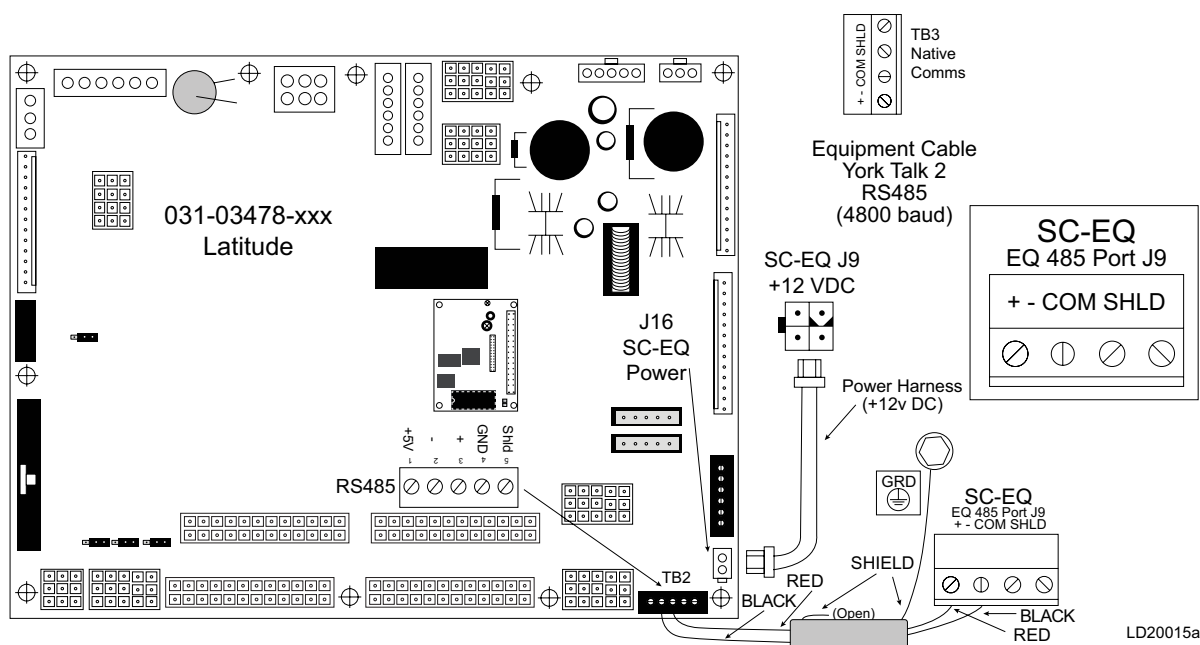


FIGURE 50 - SC-EQ GATEWAY CONNECTIONS FOR CHILLERS WITH THE 03478 MICROBOARD
YCAV/YCIV/YVAA/YVWA/YVFA

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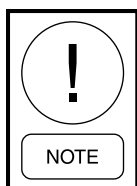
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SECTION 9 - MAINTENANCE

GENERAL REQUIREMENTS

The units have been designed to operate continuously, provided they are regularly maintained and operated within the limitations given in this manual. Each unit should be included in a routine schedule of daily maintenance checks by the operator/customer, backed up by regular service inspection and maintenance visits by a suitably qualified Service Engineer.

It is entirely the responsibility of the owner to provide for these regular maintenance requirements and/or enter into a maintenance agreement with a Johnson Controls service organization to protect the operation of the unit. If damage or a system failure occurs due to improper maintenance during the warranty period, Johnson Controls shall not be liable for costs incurred to r



This “Maintenance” section applies to the basic unit only and may, on individual contracts, be supplemented by additional requirements to cover any modifications or ancillary equipment as applicable.



The “Safety” section of this manual should be read carefully before attempting any maintenance operations on the unit.

Weekly Maintenance

The following maintenance checks should be carried out on a weekly basis by the operator/customer. Please note that the units are not generally user serviceable and no attempt should be made to rectify faults or problems found during daily checks unless competent and equipped to do so. If in any doubt, contact your local Johnson Controls Service Agent.

Unit Status

Press the ‘STATUS’ key on the keypad and ensure no fault messages are displayed.

Refrigerant Leaks

Visually check the heat exchangers, compressors and pipework for damage and gas leaks.

Operating Conditions

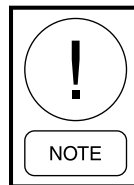
Read the operating pressures and temperatures at the control panel using the display keys and check that these are within the operating limitations given in the manual.

Compressor Oil Level

Compressor oil level will typically run below the bottom of the sight glass. Oil levels will only be visible in the sight glass after running for periods of 15 to 30 minutes at full compressor speed. Do not run with oil levels above the sight glass. Be careful when viewing the sight glass not to confuse a full sight glass with an empty sight glass.

Refrigerant Charge

A sight glass for each system is located in the evaporator. When optimally charged after running full load for 15 to 30 minutes, the refrigerant level should be approximately in the center of the evaporator sight glass. There should be little concern if the level is high or low in the glass, it should not affect operation, and therefore refrigerant should not be added or removed. Always run the system for 15 to 30 minutes before adding charge since a level may not be visible when commissioning or after servicing the chiller. When the charge is correct and the system is operating full load, there should also not be any bubbles visible in the liquid line sight glass under most operating conditions.



It is not necessary to weigh charge unless the entire charge has been lost. The ease of charging is possible since the micro-channel coils hold only a small amount of refrigerant charge. A charging valve, located between the fixed orifice and the evaporator, may be used if charge adjustment is required. Charge should be added as liquid while circulating water through the evaporator. If the complete charge needs to be added, refer to “Charging Refrigerant into a System” on page 175.

GLYCOL CHARGE FOR FREE COOLING**Open Loop:**

1. Close both valves of inlet and outlet of unit to water system of building;
2. Open all venting valves at the top of header of all coils;
3. Connect all venting valves together to one open container;
4. Connect the charging pump to glycol charging valve;
5. Start pump and always ensure the inlet tube of charging pump is dipped into glycol liquid;
6. Observe the status of the venting tube to container, firstly, should be gas only escaping from the venting tube to container, when glycol liquid flush out from venting tube, stop the charging pump;
7. Wait 2-5 minutes, so that the liquid level in different coils can be level up;
8. Restart the pump but at less flow rate to charging glycol, simultaneously observe the status of venting tube;
9. Stop the pump when liquid come out again.
10. Repeat step 7 to 9, until liquid will come out of venting tube once pump starts.
11. Properly dispose the glycol collected in the container.

For Open Loop Free Cooling system, actually it is connected with the building chilled liquid system, suggest to charge glycol separately, recommend to use a quicker way to charge glycol to building chilled liquid system considering its volume, and be certain that identical concentration glycol liquid is charged to both Free Cooling system of unit and Chilled Liquid System of the building.

Closed Loop:

1. Open the valve between Glycol Pump and Free Cooling Coils;
2. Open all venting valves at the top of header of all coils;
3. Connect all venting valves together to one open container;
4. Connect the charging pump to glycol charging valve;

5. Start pump and always ensure the inlet tube of charging pump is dipped into glycol liquid;
6. Observe the status of the venting tube to container, firstly, should be gas only escaping from the venting tube to container, when glycol liquid flush out from venting tube, stop the charging pump;
7. Wait 2-5 minutes, so that the liquid level in different coils can be level up;
8. Restart the pump but at less flow rate to charging glycol, simultaneously observe the status of venting tube;
9. Stop the pump when liquid come out again.
10. Repeat step 7 to 9, until liquid will come out of venting tube once pump starts.
11. Properly dispose the glycol collected in the container.

REFRIGERANT REMOVAL, EVACUATION AND CHARGING A YVFA CHILLER**Refrigerant Removal**

The YVFA utilizes a flooded evaporator. Extreme care must be taken when removing refrigerant to prevent damage to the evaporator and the chiller. Carefully review the following caution below before proceeding with the recommended process.



Incorrect removal of refrigerant will result in catastrophic freeze damage to the evaporator and possible additional damage to other chiller components. Whenever there is water in the evaporator, the chilled liquid pumps must be ON and circulating liquid through the evaporator above minimum recommended flow rates. When liquid refrigerant is being removed, monitor the pressure and do not allow the pressure to drop below the freeze point of the chilled liquid flowing through the evaporator until all liquid refrigerant has been removed from the evaporator and only gas remains. Once all liquid has been removed, the remaining refrigerant vapor can be removed while allowing the pressure to drop below the freeze point with the pump circulating liquid through the evaporator.

To remove refrigerant from the evaporator, follow the procedure below:

1. Turn the chilled liquid pump ON and assure the flow is above the minimum recommended flow.
2. Assure all manual valves in the system are open. Open Condenser Drain and Economizer Feed valves to 100% in the service mode.
3. Connect the recovery unit and a manifold gauge to the liquid line feeding the eductor. There may be a valve in the line or a Schrader fitting on the eductor filter for this purpose.
4. Connect the recovery unit to a recovery cylinder sitting on an accurate scale.
5. Turn the recovery unit ON and observe the liquid refrigerant flowing from the line into the cylinder. The flow of liquid should be obvious.
6. Monitor the pressure gauge to assure that the pressure does not drop below the freeze point of the chilled liquid. Throttle the flow as needed with the manifold gauge valves to prevent pressures from dropping below the freeze point.
7. Continue to remove the liquid refrigerant while observing the flow and the pressure. Note the charge in the system based on the nameplate data to determine when the charge removal is nearly complete. Monitor the weight of the recovery cylinder to determine when the cylinder is full. Change the cylinder as needed.
8. Continue removing refrigerant until liquid is no longer observed flowing in the manifold hoses.
9. Once the liquid is removed and no longer visible in the hose, the remaining gas can be pumped out with the recovery unit while the pressure is allowed to drop to 0 PSIG.
10. Servicing may now be performed on the system as needed.

Glycol Liquid Drainage

1. Contact professional company to dispose the replaced glycol liquid;
2. Open the venting valve fully at the top of overall glycol system;
3. Connect the drainage valve to the inlet of recycle pump; (the drainage valve should be at the bottom of overall system so that all of the glycol can be empty)

4. Start the pump to collecting the glycol liquid to be replaced;
5. Gradually open much more vent valves if no liquid escape through it;
6. Stop the pump and close the valve to pump inlet if the container in truck is filled;
7. Repeat step 4 to Step 6 until all of the glycol liquid drained out;
8. Shipped the drained glycol liquid to professional disposal plant or company for properly treatment.

Glycol Disposal Attentions

To effectively protect the environment including soil, water and air, Glycol disposal must observe the national or local code and all of the regulations on glycol disposal or chemical material disposal.

Evacuating a System

To evacuate a system, follow the procedure below:

1. Turn the chilled liquid pump ON and assure the flow is above the minimum recommended flow.
2. Assure all manual valves are open. Open the Condenser Drain (Flash Tank Feed) and Economizer Valves in the Service Mode to 100 %
3. Connect vacuum hoses to as many points as possible. Be sure that at least one connection is made on both the high and low side of the piping. A connection to the evacuation fitting on the compressor is also recommended. Evacuate the system to a minimum of 500 microns. Close the valves at the evacuation points and assure the pressure in the chiller does not rise more than 50 microns in 10 minutes. Check for leaks if the pressure rises.

Charging Refrigerant into a System

To charge the system with refrigerant, follow the procedure below:

1. Turn the chilled liquid pump ON and assure the flow is above the minimum recommended flow. Open all manual system valves and open the Condenser Drain Valve to 100% by manually opening them in the Service Mode. Charge refrigerant vapor into the high side of the empty system at the charging port on the line between the flash tank and the evaporator. Continue charging vapor until the pressure is above the freeze point of the chilled liquid. Once above the freeze point, liq-

uid can be charged according to the recommended nameplate charge.

2. Close (0%) the Condenser Drain Valve in the Service Mode. Recycle the chiller power.
3. Once the system is operating, the charge will distribute itself throughout the system. Trim the charge as needed to a level of about midway on the evaporator sight glass while running full speed for 15 minutes.



Evaporator pumps must be run while servicing chiller. Liquid above the minimum flow rate must be circulated through the evaporator to prevent risk of evaporator freezing while transferring refrigerant or evacuating refrigerant systems.

MICROCHANNEL COIL CLEANING

The coil cleaning procedure for microchannel coils is significantly different than tube and fin type coils. As such, care must be taken to understand the differences to avoid damage to the microchannel coil. These differences require a number of DO NOT's that must be observed:

- DO NOT use coil cleaners or any chemical on a microchannel coil. This can cause severe damage to the coils.
- DO NOT use a pressure washer to clean the coils. While it is possible to clean a coil with a pressure washer, it's also possible to destroy it.
- DO NOT contact the coil with a hard surface such as a hose nozzle or metal vacuum nozzle or any other tool.

Open the service port covers as indicated in *Figure 7 on page 20* and follow the three steps below for cleaning the coil.

1. Remove surface debris such as dirt, leaves, insects, fibers, etc. with a vacuum cleaner having a soft attachment rather than a metal tube. Compressed air blown from the inside out can also be used. When brushing debris off the face of the coil a soft bristle (not wire) brush can be used. Do not scrape the coil with the vacuum nozzle, air nozzle, or any other tool.
2. Rinse the coil with tap water. Do not use coil cleaners. Rinse the coil from the inside out, running water through every passage in the heat

exchanger surface until it is clean. Use a gentle spray from a spray nozzle with a plastic end or put your finger on the end of the spray nozzle to reduce impact and provide a gentle spray.

3. Because of the fin geometry, microchannel coils retain water more than tube and fin style. It is generally recommended to blow or vacuum out the rinse water from the coils to speed drying and prevent water pooling.

CHILLED LIQUID SYSTEM MAINTENANCE

Whenever the chilled liquid system requires maintenance, adhere to and observe all precautions noted below.

Scheduled Maintenance

The maintenance operations detailed in the following table should be carried out on a regular basis by a suitably qualified Service Engineer. It should be noted that the interval necessary between each 'minor' and 'major' service can vary depending on, for instance, application, site conditions and expected operating schedule. Normally a 'minor' service should be carried out every three to six months and a 'major' service once a year. It is recommended that your local Johnson Controls Service Center is contacted for recommendations for individual sites.

Chiller / Compressor Operating Log

A Chiller/Compressor Operating Log is supplied at the end of this section for logging compressor and chiller operating data.

Before Applying Power To The Chiller, Assure The Chilled Liquid System Is Filled



DO NOT apply power to the chiller unless the system is filled with water or glycol. If the chiller is equipped with the -20° F option, applying power to an empty chilled liquid system will cause the evaporator immersion heaters to fail.

Removing Water/Glycol From The Evaporator



If the chiller is equipped with a -20° F evaporator freeze protection option, which incorporates immersion heaters, power must be removed from the chiller before the evaporator is drained to assure the heaters are not damaged. Failure to remove power will cause the evaporator immersion heaters to fail.

Evaporator Freeze Damage



Power must remain on the chiller whenever the ambient temperature drops below 32°F with water in the evaporator to avoid evaporator damage. To avoid damage, assure the correct heater option for 0°F minimum ambient or -20°F minimum ambient temperature is installed, based on the lowest expected ambient temperature at the chiller location.

During operation, the glycol freeze point must also be below the lowest expected refrigerant temperature.

Glycol Concentration



If glycol is installed in the evaporator, the glycol concentration must assure that the freeze point is below the lowest expected ambient temperature at the chiller location to avoid evaporator damage.

Winterization



If glycol is filled in the Free Cooling Coils, the glycol concentration must assure that the freeze point is below the lowest expected ambient temperature at the chiller location to avoid Free Cooling Coils damage.



MAINTENANCE REQUIREMENTS FOR YVFA CHILLERS

BY JOHNSON CONTROLS

PROCEDURE	WEEKLY	MONTHLY	QUARTERLY	SEMI-ANNUALLY	ANNUALLY	EVERY 5 YEARS
Check Oil Level in Oil Separator Sight Glass.	x					
Check Liquid Line Sight Glass/ Moisture Indicator.	x					
Check Refrigerant Level in the Evaporator Sight Galss while running full load for 10 to 15 minutes.	x					
Record System Operating Temperatures and Pressures.	x					
Check Condenser Coils for dirt / debris and clean as necessary.		x				
Check Programmable Operating Setpoints and Safety Cutouts, Assure they are correct for the application.		x				
Check Compressor and Evaporator Heater operation.		x				
Check fan operation status.		x				
Check the leak of glycol system and filled the glycol.		x				
Leak check the chiller.		x				
Check the actuator of "Free Cooling Valve" (3-way Valve) or "Shut off Valve" and grease the driving Arm Pins of rotation pair.			x			
Check for dirt in the Panel, Check Door Gasket sealing integrity.			x			
Check glycol anti-freezing feature in glycol system with hydrometer.			x			
Check the shaft sealing of Glycol Pump.				x		
Check the pressure indicator of expansion tank in glycol system.				x		
Sample Compressor Oil, check for Acid, and replace if necessary.					x	
Disconnect Power Source and Lock out, Check tightness of Power Wiring connections.					x	
Check Glycol connection on Low Temp, or other applications where freezing may be a problem.					x	
VSD Glycol Charge.						x
Free Cooling Glycol Charge.						x

TABLE 34 - TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	ACTION
NO DISPLAY ON CONTROL PANEL. UNIT WILL NOT RUN.	Supply to the Panel is missing.	High Voltage to the Chiller is missing.
		Check 1FU, 2FU, 4FU, 5FU 17FU, or 19FU.
		Check 2T or 10T Transformer.
	Line Fuse is blown.	Check Fuses.
	Chiller Control Board is defective.	Replace Chiller Control Board.
	Display Board defective.	Replace Display Board.
LINE FUSE BLOWS.	SCR Diode Module is defective.	Check SCR/Diode Module.
	IBGT Module is defective.	Check IBGT Module.
	VSD Logic Board is defective.	Replace VSD Logic Board.
	SCR Trigger Board is defective.	Replace SCR Trigger Board.
CHILLER FAULT: LOW AMBIENT TEMPERATURE	Ambient temperature is lower than the programmed operating limit.	Check the programmed cutout and determine if it is programmed correctly.
	Ambient Sensor is defective.	Check the panel against the thermometer reading of ambient temperature.
CHILLER FAULT: HIGH AMBIENT TEMPERATURE	Ambient Temperature is above the maximum operating limit.	Check outside air temperature.
	Ambient Sensor is defective.	Check the Panel Display against Thermometer reading of Ambient Temperature at the sensor.
CHILLER FAULT: LOW LEAVING CHILLED LIQUID	Leaving chilled liquid temperature drops faster than the unit can unload.	Check for restricted flow.
		Check for rapid flow changes.
		Water loop is too small.
		Flow is below minimum for chiller.
	Chilled Water Sensor is defective.	Check Sensor against Temp. Gauge in water line.
		Check Sensor for intermittent operation.
		Check Wiring for shorts or opens.
SYSTEM FAULT: CONTROL VOLTAGE	System Fuse is blown.	Check respective system Fuse 20FU or 21FU.
SYSTEM FAULT: HIGH OIL TEMPERATURE	Oil Temperature Sensor is defective.	Check Sensor with infrared to determine if reading is reasonable.
	Condenser Fans NOT operating or running backwards.	Check Fans.
	Coils dirty.	Check and clean Coils.

NOTE: Always remove power to the chiller and assure the DC Bus voltage has bled off.

TABLE 34 - TROUBLESHOOTING GUIDE (CONT'D)

SYSTEM FAULT: HIGH DISCHARGE PRESSURE	Coils dirty.	Check and clean coils.
	Coils are damaged.	Comb out fins.
	Fans NOT operating.	Check fan fuses.
		Check fan rotation.
		Check fan motor/blade.
	System is overcharged.	Remove charge and check subcooling.
SYSTEM FAULT: HIGH DISCHARGE TEMPERATURE	Discharge Temperature Sensor is defective.	Check Sensor.
	Condenser Fans NOT operating or are running backwards.	Check Fans.
	Coils dirty.	Check and clean Coils.
	High Superheat.	Measure Superheat with gauges and thermocouple. Determine cause.
SYSTEM FAULT: HIGH MOTOR TEMPERATURE	High Motor temperature input from one of the sensors.	Refrigerant charge low. Check evaporator sight glass.
		Excess charge in system, High discharge pressure. Check subcooling.
		High Superheat. Flash Tank Feed Valve NOT controlling. Isolate cause.
		Motor Sensor reading incorrectly. Program panel to ignore a single sensor.
		Economizer Solenoid energized at low speeds. Valve is leaking through.
SYSTEM FAULT: LOW SUCTION PRESSURE	Low charge.	Check evaporator sight glass.
	Transducer reads incorrectly.	Check transducer against a gauge.
	Suction Temp. Sensor reads incorrectly.	Check sensor against a thermocouple.
	Low flow.	Check flow.
	Condenser Drain (Flash Tank Feed) Valve NOT operating.	Check Flash Tank Feed Valve operation. Check superheat.
	Condenser or Drain (Flash Tank Feed) Valve defective.	Check Flash Tank Feed Valve operation. Check superheat.
SYSTEM FAULT: DISCHARGE PRESSURE LIMITING	Discharge Transducer is defective.	Check transducer against a gauge.
	Ambient Temp. very high.	Normal operation.
	Fans NOT operating.	Check fan operation.
	Remote or local discharge pressure load limiting is programmed.	Normal operation.

NOTE: Always remove power to the chiller and assure the DC Bus voltage has bled off.

TABLE 34 - TROUBLESHOOTING GUIDE (CONT'D)

SYSTEM STATUS: MOTOR CURRENT LIMITING	A high motor current anticipatory control has activated current limiting	Ambient temperature is high, normal response from controller
		Remote or panel limiting is in effect, Normal response.
		Excess charge in system, adjust charge.
		Condenser coils dirty, Clean condenser.
		Fans NOT operating. Check fans.
VSD FAULT: HIGH BASEPLATE TEMPERATURE	Coolant level low.	Add coolant.
	Glycol Pump is defective.	Replace Glycol Pump.
	VSD Board is defective	Replace VSD Logic Board.
	IGBT Module is defective.	Check defective IGBT Module.
VSD FAULT: LOW DC BUS VOLTAGE	SCR / Diode Module is defective.	Check SCR / Diode Module.
	SCR Trigger Board is defective.	Check SCR Trigger Board.
FREE COOLING COILS BROKEN	Ambient temperature is lower than the freezing point of the glycol liquid.	Lift the concentration of glycol liquid to a safety level according to the instruction in this handbook.
	No expansion tank or expansion tank too small in glycol liquid system.	Check and replace a suitable expansion tank.
NO EFFECT OF FREE COOLING	Ambient is not low enough to Entering Glycol Liquid Temperature	Check and make sure the ambient thermal sensor is in good status.
	No or insufficient Glycol liquid in Coils	Fill the coil with glycol
	That Free Cooling Valve not open to FC Coils	Check if the "Free Cooling Control" is set to "Enable"; if ambient can meet the requirement of free cooling.
	Glycol pump is not running	
	Free Cooling Valve failed	Replace it
	Glycol pump failed	Check the motor and mechanical section to confirm the failure before replace the pump. Such as check the motor winding resistance, the grounding MegaOhmn to confirm the status of motor.
EXPANSION TANK NO PRESSURE IN GAS SIDE. (CLOSED LOOP)	Gas leaked	Charge gas to specified press indicated in nameplate of expansion tank or replace the expansion tank if it failed.
BPHX FREEZING UP (CLOSED LOOP)	BPHX heater disfunction	Check and make sure heater can work normally and replace it if it failed.
	Glycol pump continue to run even though no flow in building water side.	Check the water flow switch is normal or not, replace or maintain it if possible.
	Insulation is incomplete or BPHX open to air	Always keep BPHX insulation to be good.
FREE COOLING VALVE FAILED	Driver board failed	Replace the valve
	Motor failed	Replace the valve
	Wiring loose or miswiring	Tighten the wiring or correct the wiring

NOTE: Always remove power to the chiller and assure the DC Bus voltage has bled off.

R-134A CONVERSION TABLES

The following table can be used for converting R-134A pressures to their equivalent saturated temperatures.

TABLE 35 - R-134A PRESSURE TO SATURATED TEMPERATURE CONVERSION

PRESSURE PSIG (BAR)	DEW POINT TEMP. °F (°C)	PRESSURE PSIG (BAR)	DEW POINT TEMP. °F (°C)	PRESSURE PSIG (BAR)	DEW POINT TEMP. °F (°C)
0.0 (0)	-14.9 (-26.1)	135.0 (9.31)	105.0 (40.6)	270.0 (18.62)	152.0 (66.7)
5.0 (.34)	-3.0 (-19.4)	140.0 (9.65)	107.2 (41.8)	275.0 (18.96)	153.4 (67.4)
10.0 (.69)	6.7 (-14.1)	145.0 (10.0)	109.4 (43)	280.0 (19.31)	154.7 (68.2)
15.0 (1.03)	14.9 (-9.5)	150.0 (10.34)	111.5 (44.2)	285.0 (19.65)	156.1 (68.9)
20.0 (1.38)	22.2 (-5.4)	155.0 (10.69)	113.6 (45.3)	290.0 (19.99)	157.4 (69.7)
25.0 (1.72)	28.7 (-1.8)	160.0 (11.03)	115.6 (46.4)	295.0 (20.34)	158.7 (70.4)
30.0 (2.07)	34.6 (1.4)	165.0 (11.38)	117.6 (47.6)	300.0 (20.68)	160.0 (71.1)
35.0 (2.41)	40.0 (4.4)	170.0 (11.72)	119.6 (48.7)	305.0 (21.03)	161.3 (71.8)
40.0 (2.76)	45.0 (7.2)	175.0 (12.07)	121.5 (49.7)	310.0 (21.37)	162.5 (72.5)
45.0 (3.10)	49.6 (9.8)	180.0 (12.41)	123.3 (50.7)	315.0 (21.72)	163.8 (73.2)
50.0 (3.45)	54.0 (12.2)	185.0 (12.76)	125.2 (51.8)	320.0 (22.06)	165.0 (73.9)
55.0 (3.79)	58.1 (14.5)	190.0 (13.10)	126.9 (52.7)	325.0 (22.41)	166.2 (74.6)
60.0 (4.14)	62.0 (16.7)	195.0 (13.44)	128.7 (53.7)	330.0 (22.75)	167.4 (75.2)
65.0 (4.48)	65.7 (18.7)	200.0 (13.79)	130.4 (54.7)	335.0 (23.10)	168.6 (75.9)
70.0 (4.83)	69.2 (20.7)	205.0 (14.13)	132.1 (55.6)	340.0 (23.44)	169.8 (76.6)
75.0 (5.17)	72.6 (22.6)	210.0 (14.48)	133.8 (56.6)	345.0 (23.79)	171.0 (77.2)
80.0 (5.52)	75.9 (24.4)	215.0 (14.82)	135.5 (57.5)	350.0 (24.13)	172.1 (77.8)
85.0 (5.86)	79.0 (26.1)	220.0 (15.17)	137.1 (58.4)	355.0 (24.48)	173.3 (78.5)
90.0 (6.21)	82.0 (27.8)	225.0 (15.51)	138.7 (59.3)	360.0 (24.82)	174.4 (79.1)
95.0 (6.55)	84.9 (29.4)	230.0 (15.86)	140.2 (60.1)	365.0 (25.17)	175.5 (79.7)
100.0 (6.89)	87.7 (30.9)	235.0 (16.20)	141.8 (61)	370.0 (25.51)	176.6 (80.3)
105.0 (7.24)	90.4 (32.4)	240.0 (16.55)	143.3 (61.8)	375.0 (25.86)	177.7 (80.9)
110.0 (7.58)	93.0 (33.9)	245.0 (16.89)	144.8 (62.3)	380.0 (26.20)	178.8 (81.6)
115.0 (7.93)	95.5 (35.3)	250.0 (17.24)	146.3 (63.5)	385.0 (26.54)	179.9 (82.2)
120.0 (8.27)	98.0 (36.7)	255.0 (17.58)	147.7 (64.3)	390.0 (26.89)	180.9 (82.7)
125.0 (8.62)	100.4 (38)	260.0 (17.93)	149.2 (65.1)	395.0 (27.23)	182.0 (83.3)
130.0 (8.96)	102.7 (39.3)	265.0 (18.27)	150.6 (65.9)	400.0 (27.58)	183.0 (83.9)

CHILLED LIQUID AND SUCTION TEMPERATURE SENSOR INPUT VOLTAGE

TABLE 36 - TEMPERATURE INPUT VOLTAGE SENSOR (MEASURED SIGNAL TO SHIELD AT THE SENSOR)

TEMP. °F (°C)	VOLTAGE	TEMP. °F (°C)	VOLTAGE	TEMP. °F (°C)	VOLTAGE
16.1 (-8.8)	1.52	35.9 (2.2)	2.19	55.6 (13.1)	2.85
16.7 (-8.5)	1.54	36.5 (2.5)	2.21	56.3 (13.5)	2.87
17.3 (-8.2)	1.56	37.0 (2.8)	2.23	56.9 (13.8)	2.89
17.9 (-7.8)	1.58	37.6 (3.1)	2.25	57.5 (14.2)	2.91
18.5 (-7.5)	1.60	38.2 (3.4)	2.27	58.1 (14.5)	2.93
19.1 (-7.2)	1.62	38.7 (3.7)	2.29	58.7 (14.8)	2.95
19.7 (-6.8)	1.64	39.3 (4.1)	2.30	59.4 (15.2)	2.97
20.3 (-6.5)	1.66	39.9 (4.4)	2.32	60.0 (15.6)	2.99
20.9 (-6.2)	1.68	40.4 (4.7)	2.34	60.6 (15.9)	3.01
21.5 (-5.8)	1.70	41.0 (5.0)	2.36	61.3 (16.3)	3.03
22.1 (-5.5)	1.72	41.6 (5.3)	2.38	61.9 (16.6)	3.05
22.7 (-5.2)	1.74	42.1 (5.6)	2.40	62.5 (16.9)	3.07
23.3 (-4.8)	1.76	42.7 (5.9)	2.42	63.2 (17.3)	3.09
23.9 (-4.5)	1.78	43.3 (6.3)	2.44	63.8 (17.7)	3.11
24.5 (-4.2)	1.80	43.9 (6.6)	2.46	64.5 (18.1)	3.13
25.0 (-3.9)	1.82	44.4 (6.9)	2.48	65.1 (18.4)	3.14
25.6 (-3.6)	1.84	45.0 (7.2)	2.50	65.8 (18.8)	3.16
26.2 (-3.2)	1.86	45.6 (7.5)	2.52	66.5 (19.2)	3.18
26.8 (-2.9)	1.88	46.2 (7.9)	2.54	67.1 (19.5)	3.20
27.3 (-2.6)	1.90	46.7 (8.2)	2.56	67.8 (19.9)	3.22
27.9 (-2.8)	1.91	47.3 (8.5)	2.58	68.5 (20.3)	3.24
28.5 (-1.9)	1.93	47.9 (8.8)	2.60	69.2 (20.7)	3.26
29.0 (-1.7)	1.95	48.5 (9.2)	2.62	69.9 (21.1)	3.28
29.6 (-1.3)	1.97	49.1 (9.5)	2.64	70.6 (21.4)	3.30
30.2 (-1)	1.99	49.7 (9.8)	2.66	71.3 (21.8)	3.32
30.8 (-0.7)	2.01	50.3 (10.2)	2.68	72.0 (22.2)	3.34
31.3 (-0.4)	2.03	50.8 (10.4)	2.70	72.7 (22.6)	3.36
31.9 (-0.1)	2.05	51.4 (10.8)	2.71	73.4 (23)	3.38
32.5 (0.3)	2.07	52.0 (11.1)	2.73	74.2 (23.4)	3.40
33.0 (0.6)	2.09	52.6 (11.4)	2.75	74.9 (23.8)	3.42
33.6 (0.9)	2.11	53.2 (11.8)	2.77		
34.2 (1.2)	2.13	53.8 (12.1)	2.79		
34.8 (1.5)	2.15	54.5 (12.5)	2.81		
35.3 (1.8)	2.17	55.0 (12.8)	2.83		

TABLE 37 - OUTSIDE AIR TEMPERATURE SENSOR INPUT VOLTAGE (MEASURED SIGNAL TO SHIELD AT THE SENSOR)

TEMP. °F (°C)	VOLTAGE	TEMP. °F (°C)	VOLTAGE	TEMP. °F (°C)	VOLTAGE
0.24 (-17.6)	0.68	49.8 (9.9)	2.00	93.3 (34.1)	3.31
1.79 (-16.8)	0.71	50.7 (10.4)	2.03	94.4 (34.7)	3.34
3.30 (-15.9)	0.74	51.6 (10.9)	2.06	95.6 (35.3)	3.37
4.76 (-15.1)	0.77	52.5 (11.4)	2.09	96.8 (36)	3.40
6.19 (-14.3)	0.80	53.4 (11.9)	2.11	98.0 (36.7)	3.43
7.58 (-13.6)	0.83	54.3 (12.4)	2.14	99.2 (37.3)	3.46
8.94 (-12.8)	0.85	55.3 (12.9)	2.17	100.4 (38)	3.49
10.3 (-12.1)	0.88	56.2 (13.4)	2.20	101.6 (38.7)	3.52
11.6 (-11.3)	0.91	57.1 (13.9)	2.23	102.9 (39.4)	3.55
12.8 (-10.7)	0.94	58.0 (14.4)	2.26	104.2 (40.1)	3.57
14.1 (-9.9)	0.97	58.9 (14.9)	2.29	105.5 (40.8)	3.60
15.3 (-9.3)	1.00	59.8 (15.4)	2.32	106.8 (41.6)	3.63
16.5 (-8.6)	1.03	60.7 (15.9)	2.35	108.1 (42.3)	3.66
17.7 (-7.9)	1.06	61.6 (16.4)	2.38	109.5 (43.1)	3.69
18.9 (-7.3)	1.09	62.6 (17)	2.41	110.9 (43.8)	3.72
20.0 (-6.7)	1.12	63.5 (17.5)	2.44	112.3 (44.6)	3.75
21.2 (-6)	1.15	64.4 (18)	2.47	113.8 (45.4)	3.78
22.3 (-5.4)	1.18	65.3 (18.5)	2.50	115.2 (46.2)	3.81
23.4 (-4.8)	1.21	66.3 (19.1)	2.52	116.7 (47.1)	3.84
24.4 (-4.2)	1.24	67.2 (19.5)	2.55	118.3 (47.9)	3.87
25.5 (-3.6)	1.26	68.1 (20.1)	2.58	119.9 (48.8)	3.90
26.6 (-3)	1.26	69.1 (20.6)	2.61	121.5 (49.7)	3.93
27.6 (-2.4)	1.32	70.0 (21.1)	2.64	123.2 (50.7)	3.96
28.7 (-1.8)	1.35	70.9 (21.6)	2.67	124.9 (51.6)	3.98
29.7 (-1.3)	1.38	71.9 (22.2)	2.70	126.6 (52.6)	4.01
30.7 (-0.7)	1.41	72.8 (22.7)	2.73	128.4 (53.6)	4.04
31.7 (-0.2)	1.44	73.8 (23.2)	2.76	130.3 (54.6)	4.07
32.7 (0.4)	1.47	74.8 (23.8)	2.76		
33.7 (0.9)	1.50	75.8 (24.3)	2.82		
34.7 (1.5)	1.53	76.7 (24.8)	2.85		
35.7 (2.1)	1.56	77.7 (25.4)	2.88		
36.7 (2.6)	1.59	78.7 (25.9)	2.91		
37.6 (3.1)	1.62	79.7 (26.5)	2.93		
38.6 (3.7)	1.65	80.7 (27.1)	2.96		
39.6 (4.2)	1.67	81.7 (27.6)	2.99		
40.5 (4.7)	1.70	82.7 (28.2)	3.02		
41.4 (5.2)	1.73	83.6 (28.7)	3.05		
42.4 (5.8)	1.76	84.6 (29.2)	3.08		
43.3 (6.3)	1.79	85.7 (29.8)	3.11		
44.3 (6.8)	1.82	86.7 (30.4)	3.13		
45.2 (7.3)	1.85	87.8 (31)	3.16		
46.1 (7.8)	1.88	88.9 (31.6)	3.19		
47.0 (8.3)	1.91	90.1 (32.3)	3.22		
48.0 (8.9)	1.94	91.1 (32.8)	3.25		
48.9 (9.4)	1.97	92.2 (33.4)	3.28		

TABLE 38 - PRESSURE TRANSDUCER OUTPUT VOLTAGE (MEASURED SIGNAL TO RETURN AT THE TRANSDUCER)

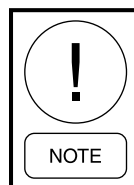
SUCTION PRESSURE TRANSDUCER (125 PSIG)		DISCHARGE CONDENSER LIQUID PRESSURE AND DISCHARGE PRESSURE TRANSDUCER (400 PSIG)	
PRESSURE	VOLTAGE	PRESSURE	VOLTAGE
0	0.50	0	0.50
5	0.66	25	0.75
10	0.82	50	1.00
15	0.98	75	1.25
20	1.14	100	1.50
25	1.30	125	1.75
30	1.46	150	2.00
35	1.62	175	2.25
40	1.78	200	2.50
45	1.94	225	2.75
50	2.10	250	3.00
55	2.26	275	3.25
60	2.42	300	3.50
65	2.58	325	3.75
70	2.74	350	4.00
75	2.90	375	4.25
80	3.06	400	4.50
85	3.22		
90	3.38		
95	3.54		
100	3.70		
105	3.86		
110	4.02		
115	4.18		
120	4.34		
125	4.50		

TABLE 39 - MOTOR TEMPERATURE SENSOR RESISTANCE (CHECK AT THE MOTOR)

TEMP. °F (°C)	RNOMINAL (OHMS)	RTOL (± %)	RMIN (OHMS)	RMAX (OHMS)
-4 (-20)	97,062	5.00	92,209	101,915
5 (-15)	77,941	4.60	69,586	76,296
14 (-10)	55,391	4.20	52,996	57,643
23 (-5)	42,324	3.85	40,695	43,954
32 (0)	32,654	3.50	31,511	33,797
41 (5)	25,396	3.15	24,596	26,196
50 (10)	19,903	2.80	19,346	20,461
59 (15)	15,713	2.50	15,321	16,106
68 (20)	12,493	2.20	12,218	12,768
77 (25)	10,000	2.00	9,800	10,200
86 (30)	8,056	2.40	7,863	8,250
95 (35)	6,531	2.70	6,354	6,707
104 (40)	5,326	3.00	5,166	5,485
113 (45)	4,368	3.25	4,226	4,510
122 (50)	3,602	3.50	3,476	3,728
131 (55)	2,986	3.75	2,874	3,098
140 (60)	2,488	4.00	2,389	2,588
149 (65)	2,083	4.25	1,995	2,172
158 (70)	1,753	4.50	1,674	1,832
167 (75)	1,481	4.75	1,411	1,551
176 (80)	1,257	5.00	1,194	1,321
185 (85)	1,071	5.20	1,016	1,127
194 (90)	916.9	5.40	867.4	966.4
203 (95)	787.7	5.60	743.6	831.9
212 (100)	679.3	5.80	639.9	718.7
221 (105)	587.9	6.00	552.6	623.2
230 (110)	510.6	6.20	479.9	542.3
239 (115)	445.0	6.40	416.5	473.5
248 (120)	389.0	6.60	363.4	414.7
257 (125)	341.2	6.70	318.4	364.1
266 (130)	300.2	6.90	279.5	320.9
275 (135)	264.9	7.10	246.1	283.7
284 (140)	234.4	7.30	217.3	251.5
293 (145)	208.0	7.40	192.6	223.3
302 (150)	185.0	7.50	171.1	198.9

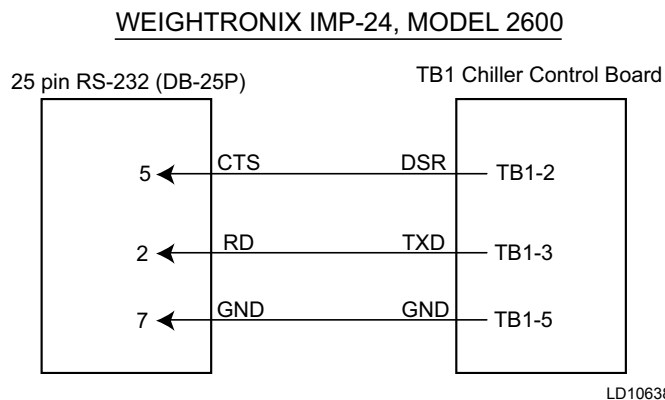
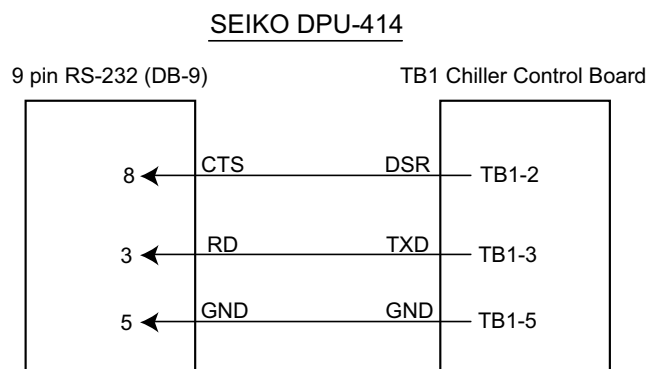
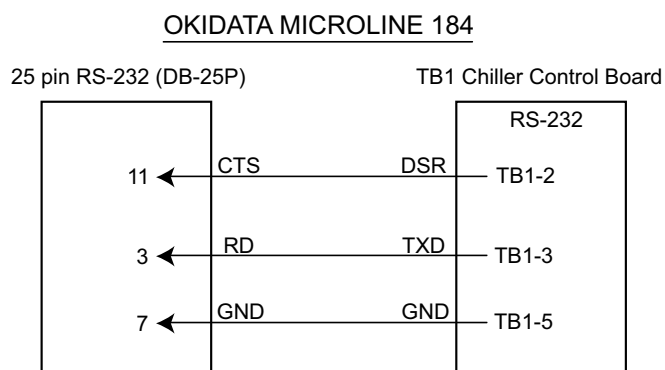
PRINTER WIRING

A “serial” printer may be connected to the TB1 connector on the Chiller Logic Board for the purposes of logging data and troubleshooting. Weightronix Imp-2600, Seiko DPU-414, and Okidata Microline 184 printers or equivalents may be used.



Printer designs change rapidly. The user should use the printer manual for the respective printer for set-up and wiring.

Data from the chiller is transmitted at 1200 baud. Wiring diagrams for cables are shown below:



LD10638

FIGURE 51 - PRINT CABLE - CHILLER TO SERIAL PRINTER

Printer Cables

Printer cables should be shielded coaxial, #18AWG, stranded wire cables, not to exceed 50' in length. On long cable runs or whenever permanent installation is required, the shield of the coax should be tied to the chassis ground at the chiller only, not at the printer.

Printer Setup

The following information may be useful for quick set up of a printer. Specific printer manuals should be utilized, if problems occur, since functions often change as new versions of printers are introduced with enhancements requiring control code, signal programming, and wiring changes.

Okidata 184**Control Board Switch Settings**

- SW1 – ON: Unslashed 0
- 2 – OFF: Unslashed 0
- 3 – OFF: Unslashed 0
- 4 – OFF: Form Length 11 in.
- 5 – ON: Form Length 11 in.
- 6 – OFF: Auto Line feed OFF
- 7 – ON: 8 bit data
- 8 – OFF: Enable front panel

With Super Speed Serial Board

- SW1-1 – ON: Odd or even parity
- 1-2 – ON: No parity
- 1-3 – ON: 8 bit data
- 1-4 – ON: Protocol ready/busy
- 1-5 – ON: Test select
- 1-6 – ON: Print mode
- 1-7 – OFF: SDD(-) pin 11
- 1-8 – ON: SDD(-) pin 11
- 2-1 – ON: 1200 baud
- 2-2 – ON: 1200 baud
- 2-3 – OFF: 1200 baud
- 2-4 – OFF: DSR active
- 2-5 – ON: Buffer threshold 32 bytes
- 2-6 – ON: Busy signal 200ms
- 2-7 – ON: DTR space after power on
- 2-8 – not used

With High Speed Serial Board

- SW1 – OFF: (-) Low when busy
- 2 – OFF: 1200 baud
- 3 – OFF: 1200 baud
- 4 – ON: 1200 baud
- 5 – not used
- 6 – OFF: no parity
- 7 – OFF: Pin 20 and pin 11 act as busy line

Weigh-tronix IMP 24 Model 2600

- SW1 – OFF: 1200 baud
- 2 – ON: 1200 baud

Seiko

- DipSW1-1 – OFF: Input -Serial
- 1-2 – ON: Printing speed high
- 1-3 – ON: Auto loading - ON
- 1-4 – OFF: Auto LF - OFFF
- 1-5 – ON: Setting Command - Enable
- 1-6 – OFF: Printing density - 100%
- 1-7 – ON: Printing density - 100%
- 1-8 – ON: Printing density - 100%
- DipSW2-1 – ON: Printing Columns - 40
- 2-2 – ON: User Font Back-up - ON
- 2-3 – ON: Character Select - normal
- 2-4 – OFF: Zero - slash
- 2-5 – ON: International character set - American
- 2-6 – ON: International character set - American
- 2-7 – ON: International character set - American
- 2-8 – OFF: International character set - American
- DipSW3-1 – ON: Data length - bits
- 3-2 – ON: Parity Setting - no
- 3-3 – ON: Parity condition - odd
- 3-4 – ON: Busy control – H/W busy
- 3-5 – ON: Baud rate select - 1200
- 3-6 – OFF: Baud rate select - 1200
- 3-7 – ON: Baud rate select - 1200
- 3-8 – OFF: Baud rate select - 1200

		MODEL – YVFA
---	--	---------------------

OPERATING LOG SHEET SITE AND CHILLER INFORMATION

JOB NAME: _____

LOCATION: _____

TECHNICIAN NAME: _____

SALES ORDER #: _____ YORK ORDER #: _____ YORK CONTRACT #: _____

CHILLER _____

MODEL #: _____	CHILLER SERIAL #: _____
COMPRESSOR #1 MODEL #: _____	COMPRESSOR #2 MODEL #: _____
COMPRESSOR #1 SERIAL #: _____	COMPRESSOR #2 SERIAL #: _____

A. PROGRAMMED SETPOINT VALUES

Chilled Liquid Setpoint

B. PROGRAMMED OPTIONS

Display Language

Chilled Liquid Mode

Local/Remote Mode

Display Units

Lead/Lag Control

Remote Temperature Reset Input

Remote Current Reset Input

Remote Sound Limit Input

Low Ambient Cutout

C. PROGRAMMED CUTOUTS/LIMITS

Suction Press Cutout PSIG (kPa)

Low Ambient Cutout °F (°C)

Leaving Chilled Liq Temp Cutout °F (°C)

Motor Current Limit % FLA

Pulldown Current Limit % FLA

Pulldown Current Limit Time..... MIN

D. VSD OPERATING DATA

Chilled Liquid Temperatures

Entering Temperature °F (°C)

Leaving Temperature °F (°C)

Outdoor Ambient Temperature

OAT °F (°C)

VSD DC Bus Voltage

Bus 1 VDC

VSD Frequency

	SYSTEM 1	SYSTEM 2
Actual.....		
Command.....		

VSD Internal Ambient Temperature

Ambient Temperature °F (°C)

VSD Cooling System Status

ON ☐ OFF ☐

VSD IGBT Baseplate Temps

T1 °F (°C)

T2 °F (°C)

VSD Compressor Current

	SYSTEM 1	SYSTEM 2
		Amps
		%FLA

E. SYSTEM OPERATING TEMPERATURES, PRESSURES, CURRENTS**Chilled Liquid Temperature**Entering Temperature..... °F (°C)FC Exit Temperature..... °F (°C)Leaving Temperature..... °F (°C)**System Pressures**

	SYSTEM 1	SYSTEM 2	
Oil			PSIG(kPa)

	SYSTEM 1	SYSTEM 2	
Suction.....			PSIG(kPa)

	SYSTEM 1	SYSTEM 2	
Discharge			PSIG(kPa)

	SYSTEM 1	SYSTEM 2	
Cond Liquid			PSIG(kPa)

Motor Temperatures

	SYSTEM 1	SYSTEM 2	
T1			°F (°C)

	SYSTEM 1	SYSTEM 2	
T2			°F (°C)

	SYSTEM 1	SYSTEM 2	
T3			°F (°C)

Compressor Speed

	SYSTEM 1	SYSTEM 2	
Speed			%

Compressor Heater

(ON/OFF)..... **System Temperatures**

	SYSTEM 1	SYSTEM 2	
Oil			°F (°C)

	SYSTEM 1	SYSTEM 2	
Eductor			°F (°C)

	SYSTEM 1	SYSTEM 2	
Cond Liquid			°F (°C)

	SYSTEM 1	SYSTEM 2	
Subcooling.....			°F (°C)

	SYSTEM 1	SYSTEM 2	
Sat Discharge Temp			°F (°C)

	SYSTEM 1	SYSTEM 2	
Discharge Temp.....			°F (°C)

	SYSTEM 1	SYSTEM 2	
Discharge Superheat.....			°F (°C)

F. SYSTEM OPERATING CONDITIONS**Economizer Valve % Open**

	SYSTEM 1	SYSTEM 2	
Economizer.....			%

Condenser Drain Valve % Open

	SYSTEM 1	SYSTEM 2	
Drain Valve			%

System Run Time

	DAYS	HOURS	MIN	SEC
System 1.....				

	DAYS	HOURS	MIN	SEC
System 2.....				

VSD Fan Speed (If applicable)

	SYSTEM 1	SYSTEM 2	
Fan Speed			%

Condenser Fan Stage (0-4) (If applicable)

SYSTEM 1	SYSTEM 2

VI Step SolenoidVI Step SOL 1..... (ON/OFF)VI Step SOL 2..... (ON/OFF)**Oil Separator Level**

Check oil separator oil levels

	SYSTEM 1	SYSTEM 2
Oil Level		

Evaporator Level

Evaporator Refrigerant Level

	SYSTEM 1	SYSTEM 2
Refrigerant Level in Sight Glass		

G. WATER SYSTEM CONDITIONS**Evaporator Flow**

Flow Rate

 GPMEvap Pressure Drop..... FT / LBS (circle one)

Glycol Freeze Point

 °F (°C)

H. CONDENSER CONDITIONS

Air Temperature

Air On Temperature °F (°C)

Air Off Temperature °F (°C)

I. FREE COOLING MODE

Free Cooling Control (Enable/Disable)

Free Cooling Valve (ON/OFF to FC Coils)

Glycol Classification (EG/PG)

Glycol Concentration %

J. CLOSED LOOP FREE COOLING

BPHX Entering Glycol Temperature °F (°C)

BPHX Leaving Glycol Temperature °F (°C)

Glycol Flowing Switch Status (ON/OFF)

Glycol Pump Status (ON/OFF)

BPHX Heater (ON/OFF)



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