YORK®	AIR-COOLED LIQUID CHILLERS HERMETIC SCROLL	
INSTALLATION, OPERATION, MAINTENANCE	Supersedes 150.67-NM1 (1220)	Form 150.67-NM1 (321)

035-21456-000

YCAL0019, 0022, 0028, 0033, 0043, 0046, 0052, 0056, 0066
AIR-COOLED SCROLL CHILLERS
STYLE E (60 HZ)
15 TON TO 65 TON

DUAL CIRCUIT

SINGLE CIRCUIT

R-410A

AHRI CERTIFIED™
www.ahridirectory.org
Air-Cooled Chillers
AHRI Standard 550/590

Issue Date:
March 12, 2021

INTERTEK ETL LISTED C US

ISO 9001 Registered
Products are produced at a facility whose quality-management systems are ISO9001 certified.

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.

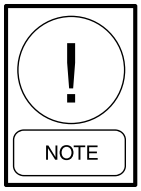
SAFETY SYMBOLS

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 and 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 Knowledge Exchange website at https://docs.johnsoncontrols.com/chillers/.

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.

REVISION NOTES

Revisions made to this document are indicated in the following table. These revisions are to technical information, and any other changes in spelling, grammar, or formatting are not included.

AFFECTED PAGES	DESCRIPTION
49	Physical data table units updated
132-136	Isolator data updated

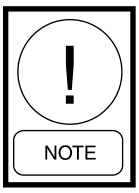
ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Replacement Parts	150.67-RP1
Air Cooled Liquid Chillers Condenser Corrosion Protection	150.12-ES1
Shipping Damage Claims	50.15-NM
Start-Up Checklist	150.67-CL1

CONDITIONED BASED MAINTENANCE

Traditional chiller maintenance is based upon assumed and generalized conditions. In lieu of the traditional maintenance program, a Johnson Controls YORK Conditioned Based Maintenance (CBM) program can be substituted. This CBM service plan is built around the specific needs for the chiller, operating conditions, and annualized impact realized by the chiller. Your local Johnson Controls Branch can propose a customized Planned Service Agreement that leverages real time and historical data, delivering performance reporting, corrective actions required and data enabled guidance for optimal operation and lifecycle assurance. The program will include fault detection diagnostics, operation code statistics, performance based algorithms and advance rules based rationale delivered by the Johnson Controls Connected Equipment Portal.

SINGLE CIRCUIT AND DUAL CIRCUIT MODELS



This manual contains installation, operation and maintenance instructions for both single and dual refrigerant circuit models. If your unit is a single circuit model (YCAL0019-0033), disregard references to "System 2" which may appear in this manual. Any references to Sys 2 are applicable to YCAL0043-0066 models.

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SECTION 1 – GENERAL CHILLER INFORMATION AND SAFETY

INTRODUCTION

YORK YCAL0019-0066 (15 ton to 65 ton, 53 kW to 218 kW) 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.

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

All procedures detailed in the manuals, 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 manuals.

WARRANTY

Johnson Controls warrants all equipment and materials against defects in workmanship and materials for a period of eighteen months from date of shipment, 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 (see *Commissioning on page 143*).
- 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 (see *SECTION 10 – MAINTENANCE on page 209*).
- Failure to satisfy any of these conditions will automatically void the warranty (refer to the Warranty Policy).

SAFETY

Standards For Safety

YCAL chillers are designed and built within an ISO 9002 accredited design and manufacturing organization. The chillers comply with the applicable sections of the following Standards and Codes:

- ANSI/ASHRAE Standard 15 - Safety Code for Mechanical Refrigeration.
- ANSI/NFPA Standard 70 - National Electrical Code (N.E.C.).
- ASME Boiler and Pressure Vessel Code- Section VIII Division 1.
- ARI Standard 550/590-98- Water Chilling Packages Using the Vapor Compression Cycle.
- ASHRAE 90.1- Energy Efficiency Compliance.
- ARI 370- Sound Rating of Large Outdoor Refrigeration and Air Conditioning Equipment.
- Conform to Intertek Testing Services, formerly ETL, for construction of chillers and provide ETL/cETL listing label.
- Manufactured in facility registered to ISO 9002.
- OSHA – Occupational Safety and Health Act.

In addition, the chillers conform to Underwriters Laboratories (U.L.) for construction of chillers and provide U.L./cU.L. Listing Label.

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 operating or working on any machinery is primarily responsible for:

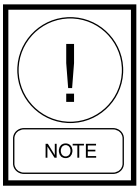
- Personal safety, safety of other personnel, and the machinery.
- Correct utilization of the machinery in accordance with the procedures detailed in the manuals.

ABOUT THIS MANUAL

The following terms are used in this document to alert the reader to areas of potential hazard.

A ***WARNING*** is given in this document to identify a hazard, which could lead to personal injury. Usually an instruction will be given, together with a brief explanation and the possible result of ignoring the instruction.

A ***CAUTION*** identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation and the possible result of ignoring the instruction.



A ***NOTE*** is used to highlight additional information, which may be helpful to you but where there are no special safety implications.

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, isolating and locking-off the power supply. Servicing and maintenance on live equipment must only be performed by suitably trained and qualified personnel. 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 and Oils

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 build up 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.

High Temperature and Pressure Cleaning

High temperature and pressure cleaning methods (for example, 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 in an emergency. When operated, it removes the low voltage 120 VAC electrical supply from the inverter system, thus shutting down the unit.

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SECTION 2 – PRODUCT DESCRIPTION

INTRODUCTION

YORK Millennium® Air-Cooled Scroll Chillers provide chilled water for all air conditioning applications using central station air handling or terminal units. They are completely self-contained and are designed for outdoor (roof or ground level) installation. Each complete packaged unit includes hermetic scroll compressors, a liquid cooler, air cooled condenser, a charge of refrigerant R-410A and a weather resistant microprocessor control center, all mounted on a pressed steel base.

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

Prior to delivery, the packaged unit is pressure-tested, evacuated, and fully charged with R-410A refrigerant and oil. After assembly, a complete operational test is performed with water flowing through the cooler to ensure that the refrigeration circuit operates correctly.

The unit structure is heavy-gauge, galvanized steel. This galvanized steel is coated with baked-on powder paint, which, when subjected to ASTM B117 1000 hour, salt spray testing, yields a minimum ASTM 1654 rating of "6". Corrosion resistant wire mesh panels are added to protect the condenser coil from incidental damage and restrict unauthorized access to internal components. Units are designed in accordance with NFPA 70 (National Electric Code), ASHRAE/ANSI 15 Safety code for mechanical refrigeration, ASME, Listed and labeled with Intertek Testing Services (ETL) and rated in accordance with ARI Standard 550/590-2003.

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

GENERAL SYSTEM DESCRIPTION

Compressors

The chiller has suction-gas cooled, hermetic, scroll compressors. The YCAL compressors incorporate a compliant scroll design in both the axial and radial direction. All rotating parts are statically and dynamically balanced. A large internal volume and oil reservoir provides greater liquid tolerance. Compressor crankcase heaters are also included for extra protection against liquid migration.

Evaporator (Heat Exchanger)

The Brazed Plate Heat Exchanger is equipped with a heater controlled by the microprocessor. The heater provides freeze protection for the cooler down to -20°F (-29°C) ambient. The cooler is covered with 3/4 in. (19 mm) flexible, closed-cell, foam insulation (K~0.25).

Brazed plate heat exchangers must be UL (Underwriters Laboratories) listed. Installing contractor must include accommodations in the chilled water piping to allow proper drainage and venting of the heat exchanger. Water inlet and outlet connections are grooved for compatibility with factory supplied grooved connections.

LD10950

Dual Circuit

FIGURE 1 - YCAL AIR-COOLED SCROLL CHILLERS

The heat exchanger is a brazed plate stainless steel construction, single or dual circuit heat exchanger capable of refrigerant working pressure of 650 psig (3103 kPa) and liquid side pressure of 150 psig (1034 kPa). An option for 300 psig (2068 kPa) is available. Each heat exchanger is covered in 3/4 in. (19 mm) flexible, closed cell insulation, thermal conductivity of 0.26k ([BTU/HR-FT^2 –°F] /in) maximum.

A strainer with a mesh size between 0.5 mm and 1.5 mm (40 mesh) is recommended upstream of the heat exchanger to prevent clogging.

Condenser

Coils

Fin and tube condenser coils of seamless, internally-enhanced, high-condensing-coefficient, corrosion resistant copper tubes are arranged in staggered rows, mechanically expanded into aluminum fins. Integral subcooling is included. The design working pressure of the coil is 650 psig (45 bar).

Low Sound Fans

The condenser fans are composed of corrosion resistant aluminum hub and glass-fiber reinforced composite blades molded into a low noise airfoil section. They are designed for maximum efficiency and are statically and dynamically balanced for vibration free operation. They are directly driven by independent motors, and positioned for vertical air discharge. All blades are statically and dynamically balanced for vibration-free operation. The fan guards are constructed of heavy-gauge, rust-resistant, PVC coated steel wire.

Motors

The fan motors are Totally Enclosed Air-Over (TEAO), direct drive, 6 pole, current protected. They feature ball bearings that are double-sealed and permanently lubricated.

MILLENNIUM CONTROL CENTER

All controls are contained in a NEMA 3R/12 cabinet equivalent to IP55*. They include a Liquid Crystal Display (LCD) with Light Emitting Diode (LED) backlighting for outdoor viewing and includes the following features:

- Two display lines
- Twenty characters for each line

Display/Print

Color coded 12-button non-tactile keypad with sections for the display and print of the following information:

- Chilled liquid temperatures
- Ambient temperature
- System pressures for each circuit
- Operating hours and starts for each compressor
- Print calls up to the liquid crystal display
- Operating data for the systems
- Fault shutdown data of up to six of the most recent fault shutdown conditions
- An RS-232 port, in conjunction with this press-to-print button, is provided to permit the capability of hard copy print-outs through a separate printer (not supplied).

Entry

Use this section to enter setpoints or modify system values.

Setpoints

You can update the following setpoints:

- Chilled liquid temperature setpoint and range
- Remote reset temperature range
- Set daily schedule/holiday for start/stop
- Manual override for servicing
- Low and high ambient cutouts
- Number of compressors
- Low liquid temperature cutout
- Low suction pressure cutout
- High discharge pressure cutout
- Anti-recycle timer (compressor start cycle time)
- Anti-coincident timer (delay compressor starts)

Unit

Use unit to set the following features

- Time
- Unit options

* Intensity of Protection European Standard

** International Electrotechnical Commission

Unit On/Off Switch

The microprocessor control center is capable of displaying the following:

- Return and leaving liquid temperature
- Low leaving liquid temperature cutout setting
- Low ambient temperature cutout setting
- Outdoor air temperature
- English or Metric data
- Suction pressure cutout setting
- Each system suction pressure
- Optional: Discharge pressure
- Liquid Temperature Reset using a YORK ISN DDC or a third part supplied Building Automation System using one of the following:
  - Pulse width modulated (PWM) input as standard
  - 4 mA to 20 mA or 0 VDC to 10 VDC input with the optional BAS interface option
- Anti-recycle timer status for each system
- Anti-coincident system start timer condition
- Compressor run status
- No cooling load condition
- Day, date, and time
- Daily start and stop times
- Holiday status
- Automatic or manual system lead and lag control
- Lead system definition
- Compressor starts and operating hours for each compressor
- Status of the hot gas valves, evaporator heater and fan operation
- Run permissive status
- Number of compressors running
- Liquid solenoid valve status
- Load and unload timer status
- Water pump status

Provisions are included for the following features:

- Pumpdown at shutdown
- Optional remote chilled water temperature reset
- Two steps of demand load limiting from an external BAS.

Unit alarm contacts are standard

The operating program is stored in non-volatile memory (EPROM) to eliminate chiller failure due to AC powered failure or battery discharge. Programmed setpoints are retained in lithium battery-backed RTC memory for 5 years minimum.

COMMUNICATIONS

- Native communication capability for BACnet (MS/TP) and Modbus
- Optional communication available for N2 and LON via eLink option

POWER PANEL

Each panel contains:

- Compressor power terminals
- Compressor motor starting contactors per l.E.C.**
- Control power terminals to accept incoming for 115-1-60 control power
- Fan contactors and overload current protection

The power wiring is routed through liquid-tight conduit to the compressors and fans.

* Intensity of Protection European Standard

** International Electrotechnical Commission

ACCESSORIES AND OPTIONS

Power Options

Compressor Power Connection

Single-point (YCAL0019-0066) terminal block connection is provided as standard. The following power connections are available as options. (See *Electrical Data* for specific voltage and options availability) (**Factory-Mounted**).

Single-Point Supply Terminal Block (Standard on YCAL0019 – 0066 models)

Includes enclosure, terminal-block and interconnecting wiring to the compressors. Separate external protection must be supplied, by others, in the incoming compressor-power wiring. (Do not include this option if either the Single-Point Non-fused Disconnect Switch or Single-Point Circuit Breaker options have been included).

Single-Point Non-Fused Disconnect Switch

Unit-mounted disconnect switch with external, lockable handle (in compliance with Article 440-14 of N.E.C.), can be supplied to isolate the unit power voltage for servicing. Separate external fusing must be supplied, by others in the power wiring, which must comply with the National Electrical Code and/or local codes.

Single-Point Circuit Breaker

A unit mounted circuit breaker with external, lockable handle (in compliance with N.E.C. Article 440-14), can be supplied to isolate the power voltage for servicing (this option includes the Single-Point Power connection).

Control Transformer

Converts unit power voltage to 115-1-60 (0.5 KVA or 1.0 KVA capacity). Factory mounting includes primary and secondary wiring between the transformer and the control panel (**Factory-Mounted**).

Power Factor Correction Capacitors

Will correct unit compressor power factors to a 0.90-0.95 (**Factory-Mounted**).

Control Options

Ambient Kit (Low)

Units will operate to 25°F (-4°C). This accessory includes all necessary components to permit chiller operation to 0°F (-18°C). This option includes the Discharge Pressure Transducer / Readout Capability option. For proper head pressure control in applications below 25°F (-4°C), where wind gusts may exceed five mph, it is recommended that Optional Condenser Louvered Enclosure Panels also be included (**Factory-Mounted**).

Ambient Kit (High)

Required if units are to operate when the ambient temperature is above 110°F (43°C). Includes discharge pressure transducers. This option includes the Discharge Pressure Transducer / Readout Capability option (**Field-Mounted**).

Building Automation System Interface

The factory addition of a Printed Circuit Board to accept a 4 mA to 20 mA, 0 VDC to 10 VDC or contact closure input to reset the leaving chiller liquid temperature from a Building Automation System. Only one of following options can be offered on a unit at a time:

- BAS
- Remote Control Panel

  or

- Multi-unit Sequence Control (**Factory-Mounted**)

The standard unit capabilities include remote start/stop, remote water temperature reset via a PWM input signal or up to two steps of demand (load) limiting depending on model. The standard control panel can be directly connected to a YORK Building Automated System via the standard onboard RS485 communication port.

Language LCD And Keypad Display

Spanish, French, and German unit LCD controls and keypad displays are available. Standard language is English.

Discharge Pressure Transducers And Readout Capability

The addition of pressure transducers allows models to sense and display discharge pressure. This is recommended for brine chilling applications. This option is included with either the low or high ambient kits (**Factory-Mounted**).

Suction Pressure Transducers

Permits unit to sense and display suction pressure. This capability is standard on YCAL0019 through YCAL0066 models.

Multi-Unit Sequencing

A separate Sequencing Control Center can be provided to handle sequencing control of up to eight chillers in parallel based on mixed liquid temperature (interconnecting wiring by others). Only one of following options can be offered on a unit at a time:

- BAS
- Remote Control Panel

  or

- Multi-unit Sequence Control) (**Factory-Mounted**)

Compressor, Piping, Evaporator Options

Low Temperature Brine

Required for brine chilling below 30°F (-1°C) leaving brine temperature for YCAL0019 through YCAL0066 models. Option includes resized thermal expansion valve (**Factory-Mounted**).

Chicago Code Relief Valves

Unit will be provided with relief valves to meet Chicago code requirements (**Factory-Mounted**).

Service Isolation Valve

Service suction and discharge (ball type) isolation valves are added to unit per system. This option also includes a system high pressure relief valve in compliance with ASHRAE 15 (**Factory-Mounted**).

Hot Gas By-Pass

Permits continuous, stable operation at capacities below the minimum step of compressor unloading to as low as 5% capacity (depending on both the unit and operating conditions) by introducing an artificial load on the cooler. Hot gas by-pass is installed on only refrigerant system #1 on two-circuited units (**Factory-Mounted**).

Heat Exchanger 300 psig (21 barg) DWP Waterside

The waterside will be of 300 psig (21 barg) instead of the standard 150 psig DWP. Included on the Heat Exchanger nozzles are 300 psig R.F. flanges. (**Factory-Mounted**). The companion flanges will be field-supplied by others.

Flanges (ANSI/AWWA C-606 Couplings Type)

Consists of two flange adapters for grooved end pipe (standard 150 psi [10.5 barg] cooler).

Flow Switch

The flow switch or its equivalent must be furnished with each unit. A description of the standard and optional flow switch is as follows:

150 psig (10.5 barg) DWP

For standard units. Johnson Controls model F61MG-1C Vapor-proof SPDT, NEMA 4X switch (150 psig [10.5 barg] DWP), -20°F to 250°F (-29°C to 121°C), with 1 in. NPT connection for upright mounting in horizontal pipe (**Field-Mounted**).

300 psig (21 BARG) DWP

For units with optional 300 psig (21 barg) DX cooler. McDonnell and Miller model FS74W Vapor-proof SPDT, NEMA 4X switch (300 psig (21 barg) DWP), -20°F to 300°F (-29°C to 149°C), with 1 1/4 in. MPT connection for upright mounting in horizontal pipe (**Field-Mounted**).

Differential Pressure Switch

Alternatives to an above mentioned flow switch are: Pretempco model DPS300AP40PF-82582-5 (300 psi max. [21 barg] working pressure), SPDT 5 amp 125/250 VAC switch, Range 3 psig to 45 psig (0.2 barg to 3 barg), deadband 0.5 psi to 0.8 psi (0.003 bar to 0.005 bar) , with 1/4 in. NPTE Pressure Connections.

Condenser And Cabinet Options

Condenser coil protection against corrosive environments is available by choosing any of the following options. For additional application recommendations, refer to *Form 150.12-ES1* (**Factory-Mounted**).

Pre-Coated Fin Condenser Coils

The unit's coils are constructed with black epoxy coated aluminum fins. This can provide corrosion resistance comparable to copper-fin coils in typical seashore locations. Either these or the post-coated coils (below), are recommended for units being installed at the seashore or where salt spray may hit the unit.

Post-Coated Dipped Condenser Coils

The unit's coils are constructed with dipped-cured condenser coils. This is another choice for seashore and other corrosive applications (with the exception of strong alkalies, oxidizers and wet bromine, chlorine and fluorine in concentrations greater than 100 ppm).

Copper Fin Condenser Coils

The unit's coils are constructed with copper fins. (This is not recommended for units in areas where they may be exposed to acid rain).

Enclosure Panels (Unit)

Tamperproof Enclosure Panels prevent unauthorized access to units. Enclosure Panels can provide an aesthetically pleasing alternative to expensive fencing. Additionally, for proper head pressure control, YORK recommends the use of Louvered Panels (described below).

Louvered Panels (Full Unit)

Louvered panels surround the front, back, and sides of the unit. They prevent unauthorized access and visually screen unit components. Unrestricted air flow is permitted through generously sized louvered openings. This option is applicable for any outdoor design ambient temperature up to 115°F (46°C) (**Factory-Mounted**).

Sound Reduction / Attenuation Options

One or both of the following sound attenuation options are recommended for residential or other similar sound-sensitive locations. Louvered Panels can be ordered for winter applications where wind gusts may exceed five miles per hour. The following types of enclosure options are available:

Compressor Acoustic Sound Blanket

Each compressor is individually enclosed by an acoustic sound blanket. The sound blankets are made with one layer of acoustical absorbent textile fiber of 5/8 in. (15mm) thickness; one layer of anti-vibrating heavy material thickness of 1/8 in. (3mm). Both are closed by two sheets of welded PVC, reinforced for temperature and UV resistance (**Factory-Mounted**).

Ultra Quiet Fans

Lower RPM, 8-pole fan motors are used with steeper-pitch fans (**Factory-Mounted**).

Vibration Isolators

Level adjusting, spring type 1 in. (25.4mm) or seismic deflection or neoprene pad isolators for mounting under unit base rails (**Field-Mounted**).

UNIT COMPONENTS YCAL0019 - 0033

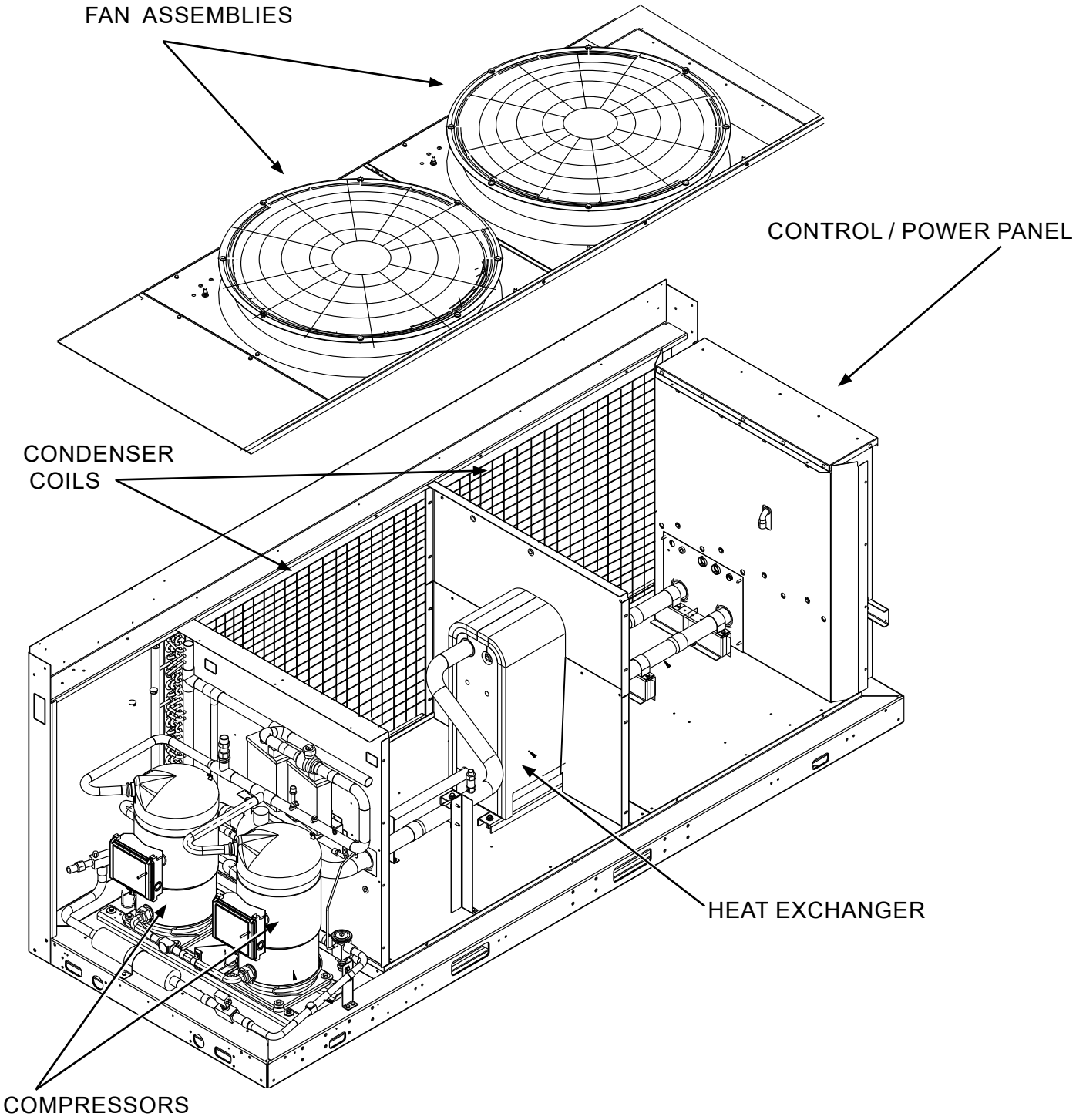

FIGURE 2 - UNIT COMPONENTS SINGLE SYSTEM UNITS

CONTROL - POWER PANEL COMPONENTS YCAL0019-0033

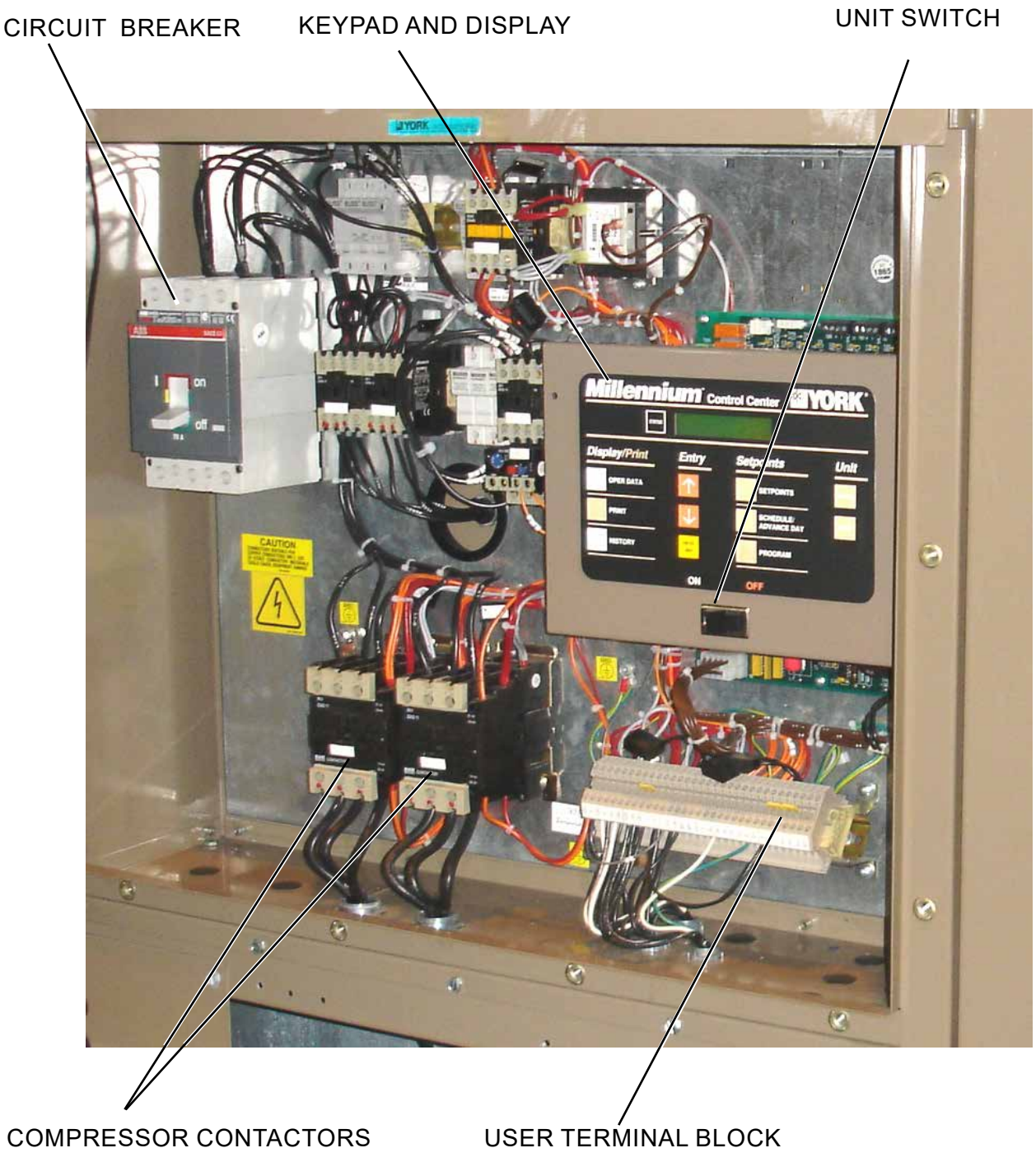

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FIGURE 3 - CONTROL/POWER PANEL COMPONENTS SINGLE SYSTEM UNITS

UNIT COMPONENTS - YCAL0043 – 0066

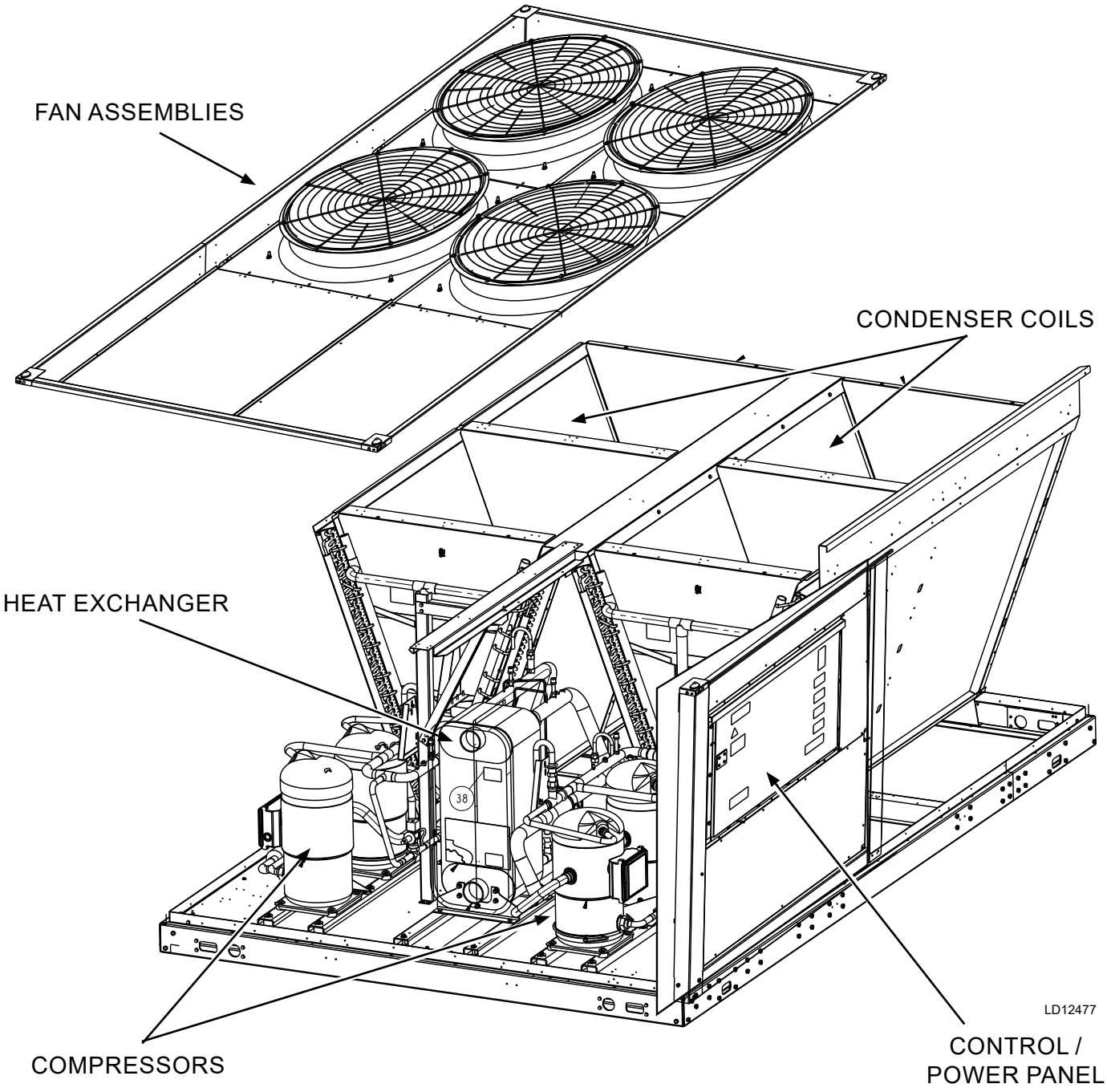

FIGURE 4 - UNIT COMPONENTS DUAL SYSTEM UNITS

CONTROL / POWER PANEL COMPONENTS - YCAL0043 – 0066

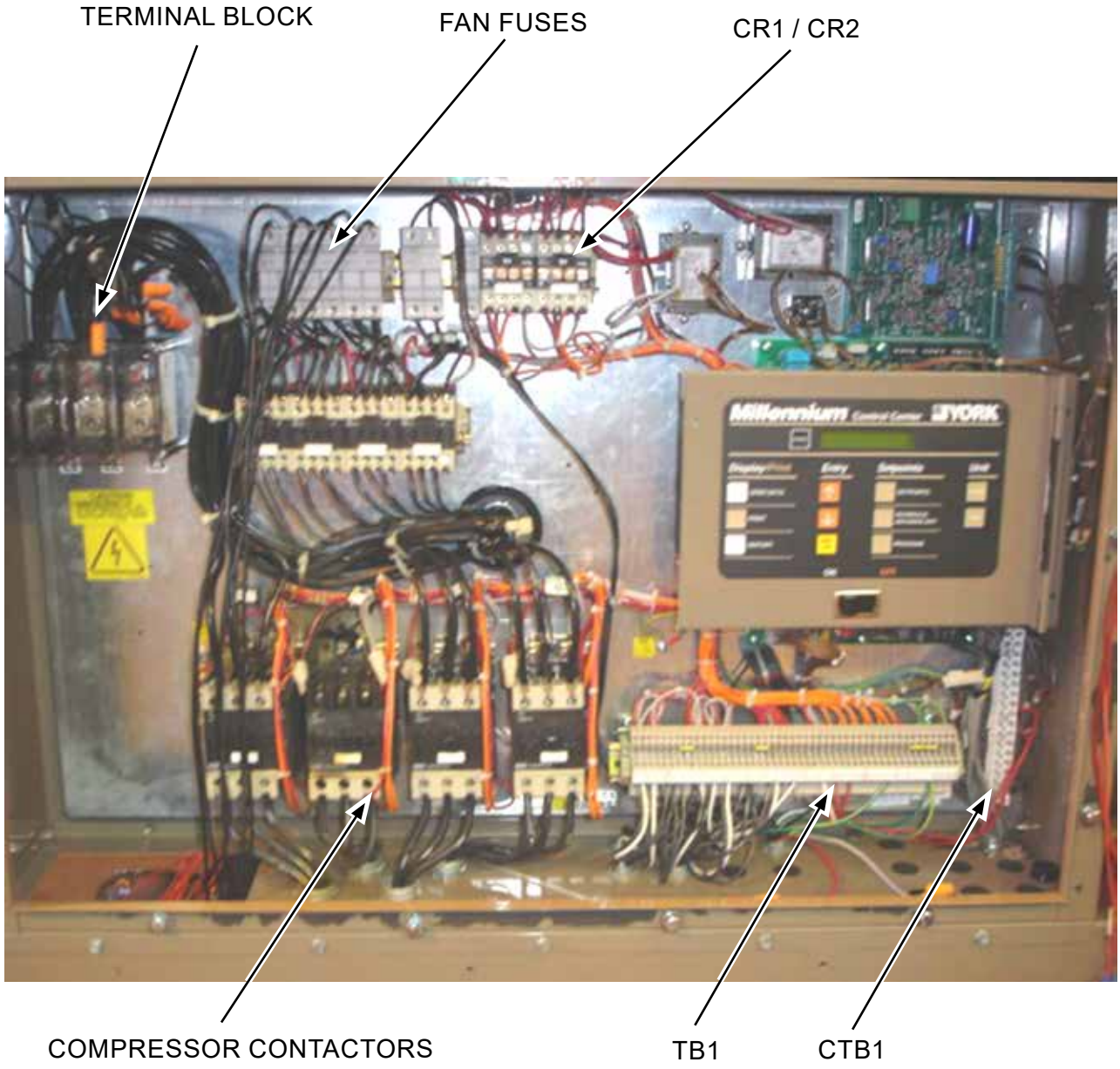

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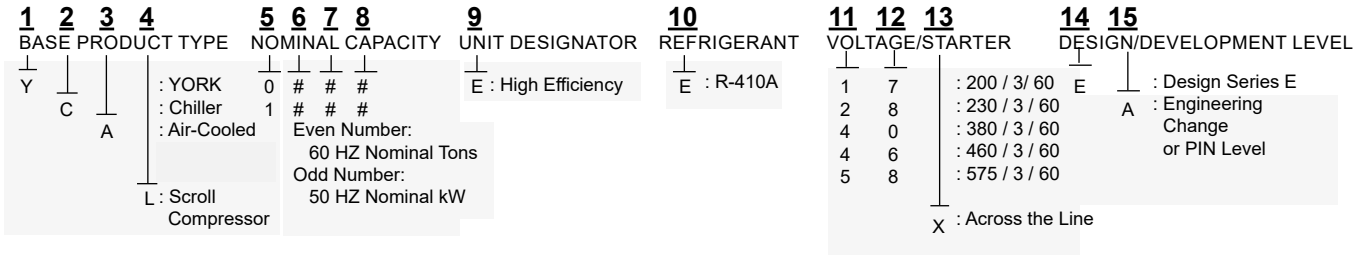
FIGURE 5 - CONTROL/POWER PANEL COMPONENTS DUAL SYSTEM UNITS

PRODUCT IDENTIFICATION NUMBER (PIN)
BASIC UNIT NOMENCLATURE

YCAL0043EE 46**XEA**



FEATURE	DESCRIPTION	OPTION	DESCRIPTION
MODEL	**Model (PIN 1-4)**	YCAL	YCAL
CAP	**Capacity (PIN 5-8)W**	0019	0019
		0022	0022
		0028	0028
		0033	0033
		0043	0043
		0046	0046
		0052	0052
		0056	0056
		0066	0066
UNIT	**Unit Designator (PIN 9)**	E	High Efficiency
REF	**Refrigerant (PIN 10)**	C	R-410a
VOLTS	**Voltage (PIN 11 & 12)**	17	200/3/60
		28	230/3/60
		40	380/3/60
		46	460/3/60
		50	380-415/3/50
		58	575/3/60
STARTER	**Starter (PIN 13)**	X	Across The Line Starter
DESIGN	**Design Series (PIN 14)**	E	Design Series E
DEV	**Development Level (PIN 15)**	B	Development Level B
POWER	**Power Field (PIN 16 & 17)**	SX	Single-Point Terminal Block
		SD	Single-Point Non-Fused Disconnect
		BX	Single-Point Circuit Breaker
		QQ	Special Power Option Required
TRANS	**Cntrl Transformer (PIN 18)**	X	No Control Transformer Required
		T	Control Transformer Required
		Q	Special Control Transformer Required
PFC	**Power Factor Capacitor (PIN 19)**	X	No Power Capacitor Required
		C	Power Capacitor Required
		Q	Special Power Capacitor Required

PRODUCT IDENTIFICATION NUMBER (PIN) (CONT'D)

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
AMB	**Ambient Kits (PIN 20)**	H	High Ambient Kits Required
		A	Both Low/High Ambient Kits Required
		Q	Special Ambient Kits Required
BAS	**BAS Reset/Offset (PIN 21)**	X	No BAS Reset/Offset Required
		L	LON E-Link Kit
		S	SC-Equip Board
		Q	Special BAS Reset/Offset Required
LCD	**Language (PIN 22)**	X	English
		S	Spanish
		F	French
		G	German
		Q	Special Language Required
RDOUT	**Readout Kits (PIN 23)**	R	Discharge Readout Kit Required
		Q	Special Pressure Readout Required
SAFETY	**Safety Codes (PIN 24)**	L	N American Safety Code (Cul/Cet)
SENSOR	**(PIN 25)**	X	No Option Required
		Q	Special Quote
PUMP	**(PIN 26)**	X	No Motor Current
		C	Motor Current Readout
		Q	Special Quote
REMOTE	**Remote Panel (PIN 27)**	X	No Remote Panel Required
		Q	Special Remote Panel Required
SEQ	**Sequence Kit (PIN 28)**	X	No Sequence Kit Required
		Q	Special Sequence Required
TEMP	**Leaving Water Temp (PIN 29, 30)**		
CHICAGO	**Chicago Code Kit (PIN 31)**	X	No Chicago Code Kit Required
		B	Both Chicago Code & Serv Isolation
		Q	Special Chicago Code Kit Required
VALVES	**Valves (PIN 32)**	X	Standard Valves Required
		Q	Special Optional Valves Required
HGBP	**Hot Gas Bypass (PIN 33)**	X	No Hot Gas Bypass Required
		1	Hot Gas Bypass Required-1 Circuit
		2	Hot Gas Bypass Required-2 Circuit
		Q	Special Hot Gas Required
GAUGE	**(PIN 34)**	X	No Option Required
		Q	Special Quote
OVERLOAD	**(PIN 35)**	X	No Option Required
		Q	Special Quote
PIN 36	**(PIN 36)**	X	No Option Required
		Q	Special Quote
HTR	**Crankcase Heater (PIN 37)**	X	Crankcase Heater Standard
		Q	Special Crankcase Heater Required
DWP	**DWP (PIN 38)**	X	150 psig DWP Waterside
		3	300 psig DWP Waterside
		Q	Special DWP

PRODUCT IDENTIFICATION NUMBER (PIN) (CONT'D)

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
INS	**Insulation (PIN 39)**	X	Standard Insulation
		D	Double Thick Insulation
		Q	Special Insulation Required
FLANGES	**Flanges (PIN 40)**	X	Standard Victaulic
		V	Victaulic to Flange Adapter
		Q	Special Flanges Required
FLOW	**Flow Switch (PIN 41)**	X	No Flow Switch Required
		S	One Flow Switch Required
		T	Two Flow Switches Required
		U	Three Flow Switches Required
		D	One Differential Pressure Switch Required
		E	Two Differential Pressure Switches Required
		F	Three Differential Pressure Switches Required
		Q	Special Flow Switch Required
VESSEL	**Vessel Codes (PIN 42)**	X	UL Pressure Code Vessel
		A	ASME Pressure Vessel Code
		Q	Special Pressure Vessel Code
CLR	**Cooler (PIN 43)**	X	Standard Cooler Required
		R	Remote Cooler Required
		Q	Special Cooler Required
PIN 44	**(PIN 44)**	X	No Option Required
		Q	Special Quote
COILS	**Coils (PIN 45)**	X	Aluminum Coil
		B	Pre-Coated Fin Coil
		C	Copper Coil
		P	Post-Coated Dipped Coil
		Q	Special Coil
PIN 46	**(PIN 46)**	X	No Option Required
		Q	Special Quote
FAN MOTORS	**Fan Motors (PIN 47)**	X	TEAO Fan Motors
		Q	Special Fan Motors Required
ENCL	**Enclosure Panel (PIN 48)**	1	Wire Enclosures-Factory
		7	Louvered Enclosure-Factory
		Q	Special Enclosures Panels
ACOUSTIC	**Acoustic Blanket (PIN 49)**	X	No Acoustic Blanket Required
		B	Acoustic Blanket Required
		Q	Special Acoustic Blanket Required
FANS	**Sound Fans (PIN 52)**	X	Standard Low Sound Fans Required
		L	Ultra Low Sound Fans Required
		Q	Special Sound Fans Required
PAINT	**(PIN 53)**	X	No Option Required
		Q	Special Quote

PRODUCT IDENTIFICATION NUMBER (PIN) (CONT'D)

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
ISOL	**Vibration Isolators (PIN 54)**	X	No Isolators Required
		1	1 in. Deflection Isolators Required
		N	Neoprene Isolators Required
		S	Seismic Isolators Required
		Q	Special Isolators Required
WARRANTY	**Warranty (PIN 55)**	X	18 months parts only (year 1)
		B	18 months labor (year 1) (entire unit)
		C	30 months parts (year 1&2) (entire unit)
		D	30 months P&L (year 1&2) (entire unit)
		E	48 months Compressor Parts Only (year 1-5)
		F	18 months (year 1) – (entire unit), 48 months P&L (year 2-5) (compressor only)
		G	48 months parts (year 2-5) (entire unit)
		H	18 months labor (year 1) – (entire unit), 48 months (P&L) (year 2-5) (entire unit)
		I	18 months labor (year 1) – (entire unit), 30 months parts (year 1&2) (entire unit)
		J	18 months labor (year 1) – (entire unit), 48 months parts (year 2-5) (compressor only)
		K	18 months labor (year 1) – (entire unit), 48 months parts (year 2-5) (entire unit)
		L	18 months labor (year 1) – (entire unit), 30 months parts (year 1&2) (entire unit) 48 month parts (year 2-5) (compressor only)
		M	18 months labor (year 1) – (entire unit), 48 months parts (year 1&2) (entire unit) 48 month P&L (year 2-5) (compressor only)
		N	30 months parts (year 1&2) – (entire unit), 48 months parts (year 2-5) (compressor only)
		O	30 months P&L (year 1&2) – (entire unit), 48 months parts (year 2-5) (compressor only)
		P	30 months P&L (year 1&2) – (entire unit), 48 months P&L (year 2-5) (compressor only)
		R	30 months P&L (year 1&2) – (entire unit), 48 months parts (year 2-5) (entire unit)
		Q	Special Warranty
REFWTY	**Refrigerant Warranty (PIN 56)**	X	No Refrigerant Warranty Required
		1	1 Year Refrigerant
		2	2 Year Refrigerant
		5	5 Year Refrigerant

REFRIGERANT FLOW DIAGRAM

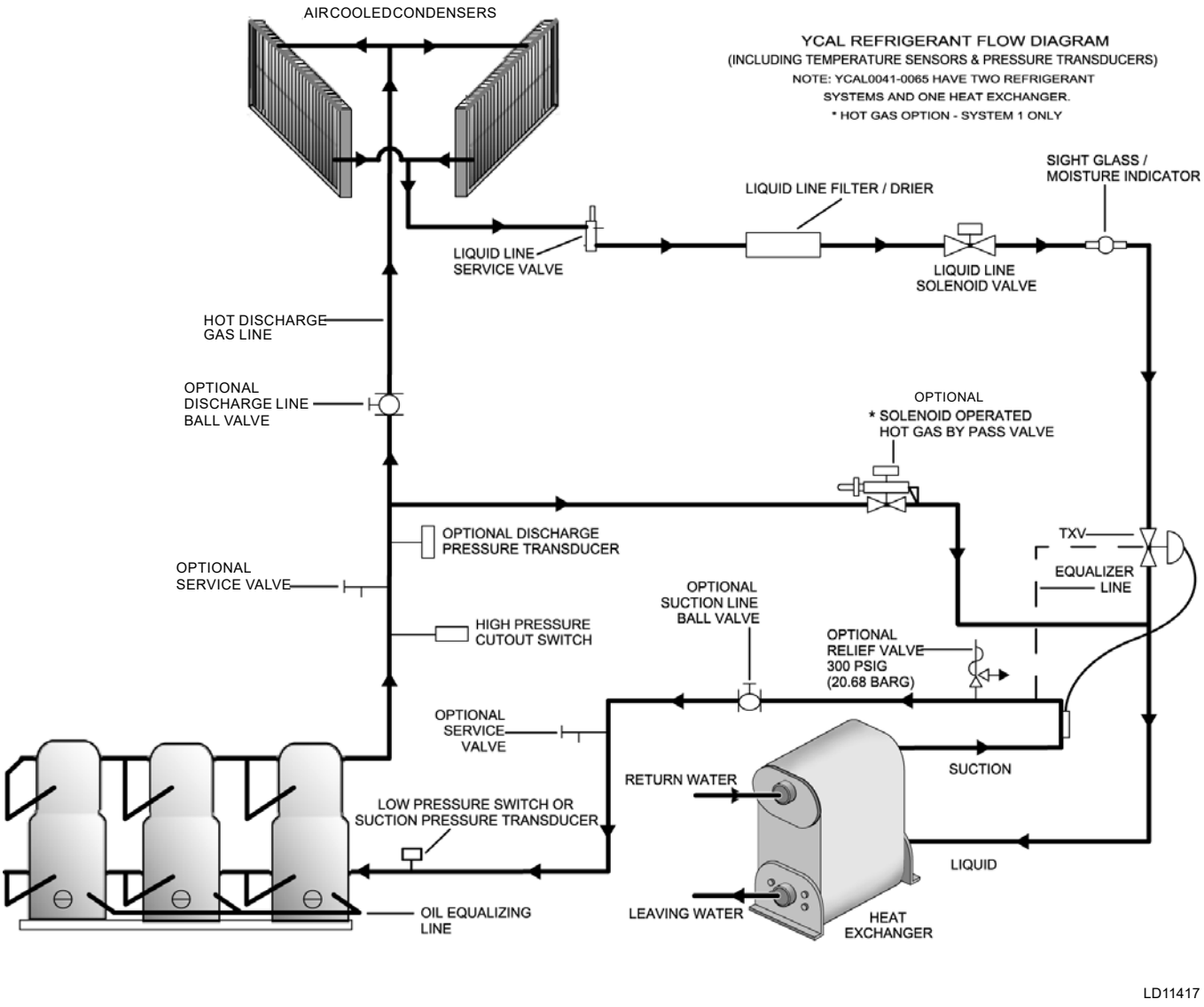


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FIGURE 6 - REFRIGERANT FLOW DIAGRAM

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SECTION 3 – HANDLING AND STORAGE

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 110°F (43°C).
- The condensers should be covered to protect the 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.

MOVING THE CHILLER (YCAL0043 – 0066 DUAL SYSTEM ONLY)

Prior to moving the unit, ensure that the installation site is suitable for installing the unit and is easily capable of supporting the weight of the unit and all associated services.

The units are designed to be lifted using cables. A spreader bar or frame should be used in order to prevent damage to the unit from the lifting chains.

Units are provided with lifting eyes in the sides of the base frame, which can be attached to directly using shackles or safety hooks.

The unit must only be lifted by the base frame at the points provided. Never move the unit on rollers, or lift the unit using a forklift truck.

Care should be taken to avoid damaging the condenser cooling fins when moving the unit.

Lifting Weights

For details of weights and weight distribution, refer to the data shipped in the chiller information packet and unit nameplate.

The unit should be lifted by inserting hooks through the holes provided in unit base rails. Spreader bars should be used to avoid crushing the unit frame rails with the lifting chains (see Figure 8).

MOVING THE CHILLER (YCAL0019 – 0033 SINGLE CIRCUIT ONLY)

Prior to moving the unit, ensure that the installation site is suitable for installing the unit and is easily capable of supporting the weight of the unit and all associated services.

The units are designed to be lifted using cables or an appropriate forklift. Refer to the unit data plate for unit weight. When using lifting cables, a spreader bar or frame should be used in order to prevent damage to the unit from the lifting chains.

Units are provided with lifting eyes in the sides of the base frame, which can be attached to directly using shackles or safety hooks.

The unit must only be lifted by the base frame at the points provided.

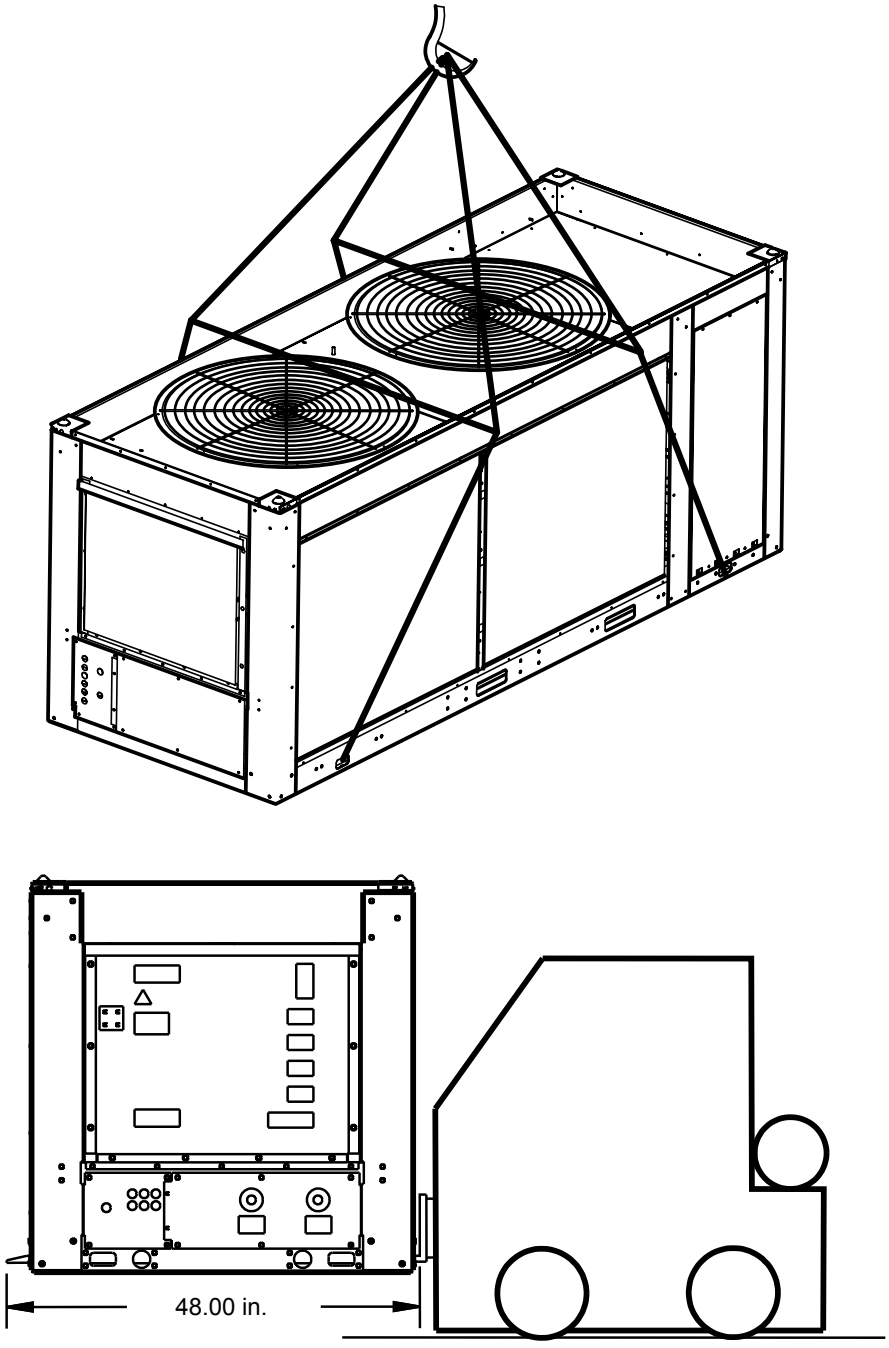
Care should be taken to avoid damaging the condenser cooling fins when moving the unit.

Lifting Weights

For details of weights and weight distribution, refer to the data shipped in the chiller information packet and unit nameplate.

UNIT RIGGING

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



CAUTION

Forks must extend beyond the width of the unit for proper lift. The thickness of the fork blade must be smaller then the opening of the lifting hole. Improper fork positioning could result in damage to the unit.

FIGURE 7 - UNIT RIGGING/LIFTING (YCAL0019 – 0033 SINGLE CIRCUIT MODELS ONLY)

Use spreader bars to avoid lifting chains hitting the chiller.

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.

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FIGURE 8 - UNIT RIGGING/LIFTING (YCAL0043 – 0066 DUAL CIRCUIT MODELS)

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SECTION 4 – INSTALLATION

To ensure warranty coverage, this equipment must be commissioned and serviced by an authorized Johnson Controls service mechanic or a qualified service person experienced in chiller installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as relief valves, HP cutout settings, design working pressures, and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panels. Before servicing, open and tag all disconnect switches.

INSTALLATION CHECKLIST

The following items, 1 through 5, must be checked before placing the units in operation.

1. Inspect the unit for shipping damage.
2. Rig unit using spreader bars.
3. Open the unit only to install water piping system. Do not remove protective covers from water connections until piping is ready for attachment. Check water piping to ensure cleanliness.
4. Pipe unit using good piping practice (refer to ASHRAE handbook section 215 and 195).
5. Check to see that the unit is installed and operated within limitations. See *Limitations*.

The following pages outline detailed procedures to be followed to install and start-up the chiller.

HANDLING

These units are shipped as completely assembled units containing full operating charge, and care must be taken to avoid damage due to rough handling.

INSPECTION

Immediately upon receiving the unit, it must be inspected for possible damage which may have occurred during transit. If damage is evident, it must be noted in the carrier's freight bill. A written request for inspection by the carrier's agent must be made at once. Refer to the Instruction manual, *Form 50.15-NM* for more information and details.

LOCATION AND CLEARANCES

These units are designed for outdoor installations on ground level, rooftop, or beside a building. Location must be selected for minimum sun exposure and to ensure adequate supply of fresh air for the condenser. The units must be installed with sufficient clearances for air entrance to the condenser coil, for air discharge away from the condenser, and for servicing access.

In installations where winter operation is intended and snow accumulations are expected, additional height must be provided to ensure normal condenser air flow.

Clearances are listed on *Figure 30*.

Foundation

The unit must be mounted on a flat and level foundation, floor, or rooftop capable of supporting the entire operating weight of the equipment. See *Physical Data (English)* for operating weight. If the unit is elevated beyond the normal reach of service personnel, a suitable catwalk must be capable of supporting service personnel, their equipment, and the compressors.

Ground Level Locations

It is important that the units be installed on a substantial base that will not settle. A one piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab must not be tied to the main building foundations as noise and vibration may be transmitted. Mounting holes are provided in the steel channel for bolting the unit to its foundation. See *SECTION 5 – TECHNICAL DATA, DIMENSIONS (ENGLISH)*.

For ground level installations, precautions must be taken to protect the unit from tampering by or injury to unauthorized persons. Screws and/or latches on access panels will prevent casual tampering. However, further safety precautions such as a fenced-in enclosure or locking devices on the panels may be advisable.

Rooftop Locations

Choose a spot with adequate structural strength to safely support the entire weight of the unit and service personnel. Care must be taken not to damage the roof.

Consult the building contractor or architect if the roof is bonded. Roof installations must have wooden beams (treated to reduce deterioration), cork, rubber, or vibration isolators under the base to minimize vibration.

Noise Sensitive Locations

Efforts must be made to ensure that the chiller is not located next to occupied spaces or noise sensitive areas where chiller noise level would be a problem. Chiller noise is a result of compressor and fan operation. Considerations must be made utilizing noise levels published in the YORK Engineering Guide for the specific chiller model. Sound blankets for the compressors and low sound fans are available.

SPRING ISOLATORS (OPTIONAL)

When ordered, four (4) isolators will be furnished.

Identify the isolator, locate at the proper mounting point, and adjust per instructions.

COMPRESSOR MOUNTING

The compressors are mounted on four (4) rubber isolators. The mounting bolts must not be loosened or adjusted at installation of the chiller.

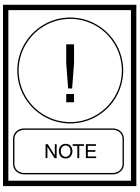
REMOTE COOLER OPTION

Not available at this time.

CHILLED LIQUID PIPING

When the unit has been located in its final position, the unit water piping may be connected. Normal installation precautions must be observed in order to receive maximum operating efficiencies. Piping must be kept free of all foreign matter. All chilled water evaporator piping must comply in all respects with local plumbing codes and ordinances.

Since elbows, tees and valves decrease pump capacity, all piping must be kept as straight and as simple as possible. **All piping must be supported independent of the chiller.**



Consideration must be given to compressor access when laying out water piping. Routing the water piping too close to the unit could make compressor servicing/replacement difficult.

Hand stop valves must be installed in all lines to facilitate servicing.

Piping to the inlet and outlet connections of the chiller must include high-pressure rubber hose or piping loops to ensure against transmission of water pump vibration. The necessary components must be obtained in the field.

Drain connections must be provided at all low points to permit complete drainage of the cooler and system water piping.

A small valve or valves must be installed at the highest point or points in the chilled water piping to allow any trapped air to be purged. Vent and drain connections must be extended beyond the insulation to make them accessible.

The piping to and from the cooler must be designed to suit the individual installation. It is important that the following considerations be observed:

1. The chilled liquid piping system must be laid out so that the circulating pump discharges directly into the cooler. The suction for this pump must be taken from the piping system return line and not the cooler. This piping scheme is recommended, but is not mandatory.
2. The inlet and outlet cooler connection sizes are 3 in. (YCAL0043 to YCAL0066).
3. A strainer, preferably 40 mesh, **must** be installed in the cooler inlet line just ahead of the cooler. This is important to protect the cooler from entrance of large particles which could cause damage to the evaporator.
4. All chilled liquid piping must be thoroughly flushed to free it from foreign material before the system is placed into operation. Use care not to flush any foreign material into or through the cooler.
5. As an aid to servicing, thermometers and pressure gauges must be installed in the inlet and outlet water lines.
6. The chilled water lines that are exposed to outdoor ambients must be wrapped with supplemental heater cable and insulated to protect against freeze-up during low ambient periods, and to prevent formation of condensation on lines in warm humid locations.
7. A chilled water flow switch, (either by YORK or others) **must** be installed in the leaving water piping of the cooler. There must be a straight horizontal run of at least 5 diameters on each side of the switch. Adjust the flow switch paddle to the

size of the pipe in which it is to be installed (refer to manufacturer's instructions furnished with the switch). The switch is to be wired to terminals 13 and 14 of CTB1 located in the control panel, as shown on the unit wiring diagram.

CAUTION

The flow switch MUST NOT be used to start and stop the chiller (i.e. starting and stopping the chilled water pump). It is intended only as a safety switch.

PIPEWORK ARRANGEMENT

The following are suggested pipework arrangements for single unit installations, for multiple unit installations, each unit must be piped as shown.

Recommendations of the Building Services Research Association.

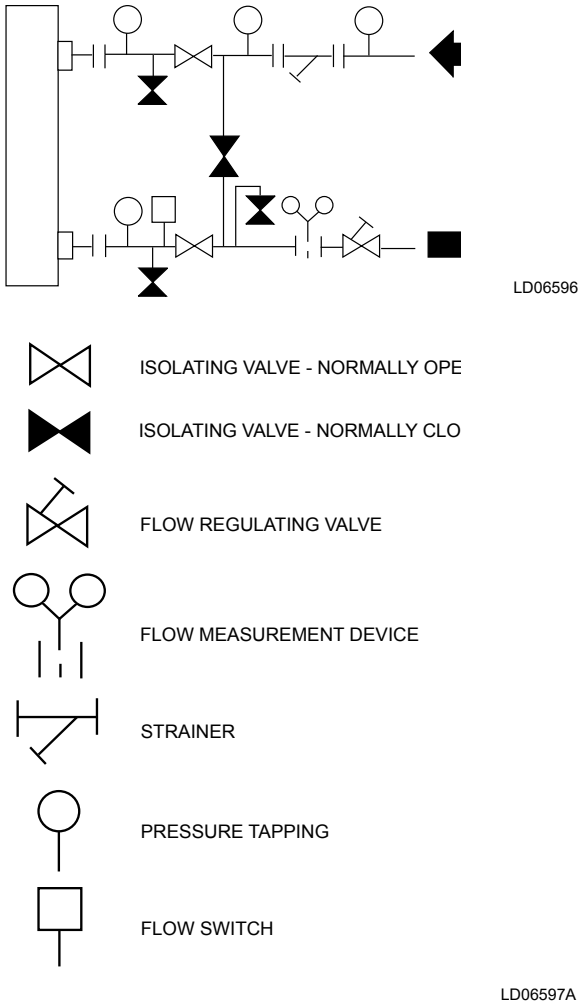


FIGURE 9 - CHILLED LIQUID SYSTEM

DUCT WORK CONNECTION

General Requirements

The following duct work 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 must 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. Duct work must 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 must not be allowed to concertina.

The unit(s) is not designed to take structural loading. No significant amount of weight must 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 duct work must be supported by the unit. Where cross winds may occur, any duct work 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 must 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 duct work, adequate alternative precautions must be taken to ensure persons cannot be harmed or put at risk from rotating fan blades.

WIRING

Liquid Chillers are shipped with all factory-mounted controls wired for operation.

Field Wiring

Power wiring must be provided through a fused disconnect switch to the unit terminals (or optional molded disconnect switch) in accordance with N.E.C. or local code requirements. Minimum circuit ampacity and maximum dual element fuse size are given in *Table 7*.

Copper power wiring only must 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 char-

acteristics 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 must be used to transition from aluminum to copper. This transition must be done in an external box separate to the power panel. Copper conductors can then be run from the box to the chiller.

A 120-1-60, 15 amp source must be supplied for the control panel through a fused disconnect when a control panel transformer (optional) is not provided (See *Figure 10*).

See unit wiring diagrams for field and power wiring connections, chilled water pump starter contacts, alarm contacts, compressor run status contacts, PWM input, and load limit input. See *SECTION 8 – UNIT OPERATION* for a detailed description of operation concerning aforementioned contacts and inputs.

Evaporator Pump Start Contacts

Terminal block TB1 terminals 23 to 24, are normally-open contacts that can be used to switch field supplied power to provide a start signal to the evaporator pump contactor. The contacts will be closed when any of the following conditions occur:

1. Low Leaving Chilled Liquid Fault
2. Any compressor is running
3. Daily schedule is not programmed OFF and the Unit Switch is ON

The pump will not run if the micro 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. See *Figure 11* and unit wiring diagram.

System Run Contacts

Contacts are available to monitor system status. Normally-open auxiliary contacts from each compressor contactor are wired in parallel with TB1 terminals 25 to 26 for system 1, and TB1 terminals 27 to 28 for system 2 (YCAL0043 to YCAL0066). See *Figure 5*, *Figure 11,* and unit wiring diagram.

Alarm Status Contacts

Normally-open contacts are available for each refrigerant system. These normally-open contacts close when the system is functioning normally. The respective contacts will open when the unit is shut down on a unit fault, or locked out on a system fault. Field connections are at TB1 terminals 29 to 30 (system 1), and terminals 31 to 32 (system 2 YCAL0043 to YCAL0066).

Remote Start/Stop Contacts

To remotely start and stop the chiller, dry contacts can be wired in series with the flow switch and CTB1 terminals 13 to 14. See *Figure 5*, *Figure 11,* and unit wiring diagram.

Remote Emergency Cutoff

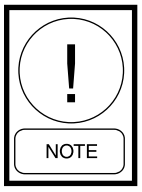
Immediate shutdown of the chiller can be accomplished by opening a field-installed dry contact to break the electrical circuit between terminals 5 to L on terminal block TB1. The unit is shipped with a factory jumper installed between terminals 5 to L, which must be removed if emergency shutdown contacts are installed. See *Figure 11* and unit wiring diagram.

Remote Temp Reset Input

The Remote Temp Reset input allows reset of the chilled liquid setpoint by supplying a voltage or current signal field wiring must be connected to CTB1 terminals A+ to A-. A detailed explanation is provided in the Unit Control section. See *Figure 3* and *Figure 5,* and unit wiring diagram.

Load Limit Input

Load limiting is a feature that prevents the unit from loading beyond a desired value. The unit can be "load limited" either 33%, 40%, 50%, 66% or 80%, depending on the number of compressors on unit. The field connections are wired to CTB1 terminals 13 to 21, and work in conjunction with the PWM inputs. A detailed explanation is provided in the Unit Control section. See *Figure 5*, *Figure 11,* and unit wiring diagram.



When using the Load Limit feature, the PWM feature will not function – SIMULTANEOUS OPERATION OF LOAD LIMITING AND TEMPERATURE RESET (PWM INPUT) CANNOT BE DONE.

Flow Switch Input

The flow switch is field wired to CTB1 terminals 13 and 14. See *Figure 4* and the unit wiring diagram.

COMPRESSOR HEATERS

Compressor heaters are standard. Non-standard applications are as follows:

- ZP103, ZP120 and ZP137 compressors utilize 90W heaters
- ZP180 compressors utilize 70W heaters
- ZP235 compressors utilize 120W heaters

If power is OFF more than two hours, the crankcase heaters must be energized for between 18 and 24 hours prior to restarting a compressor. This will ensure that liquid slugging and oil dilution does not damage the compressors on start.

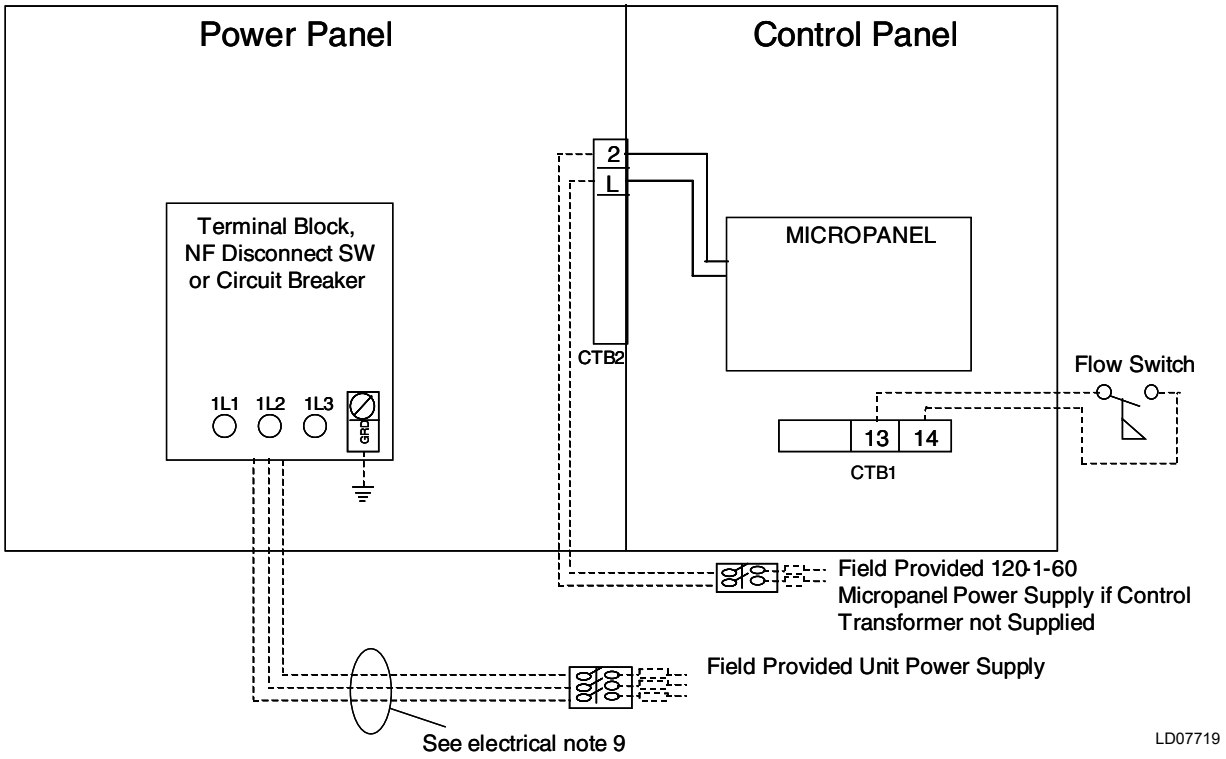
RELIEF VALVES

Relief valves are located on both the high and low pressure side of the piping. High side relief valve pressure setting is 650 psig. Low side relief valve pressure setting is 450 psig.

HIGH PRESSURE CUTOUT

A high pressure cutout is installed in the discharge piping of each system. The cutout opens at 585 psig plus or minus 10 psig and closes at 440 psig plus or minus 25 psig.

SINGLE-POINT SUPPLY CONNECTION – TERMINAL BLOCK, NON-FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER



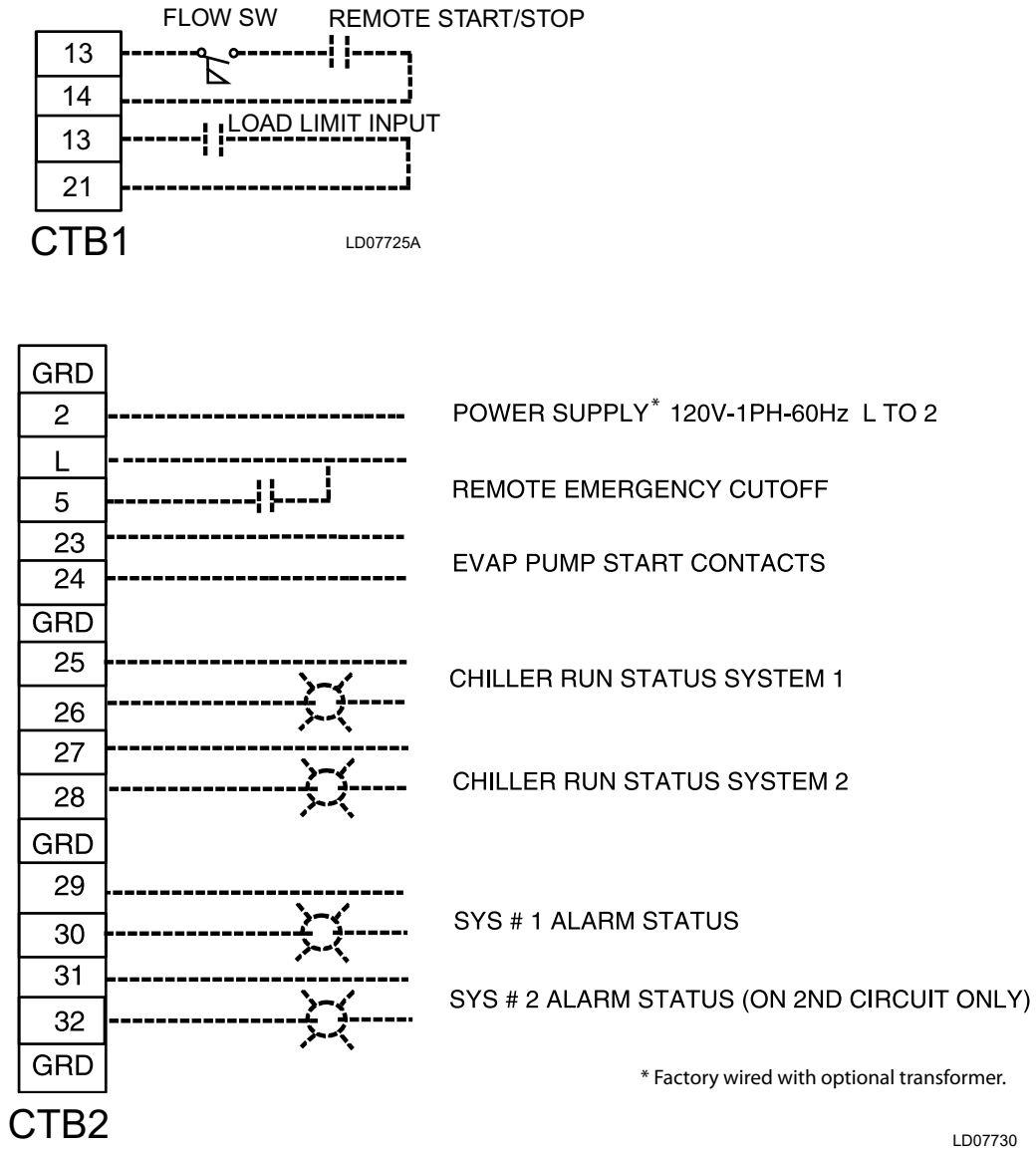
Electrical Notes and Legend located on Page 59.

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician must verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, before working on equipment.

The unit evaporator heater uses 120 VAC. Disconnecting 120 VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

FIGURE 10 - SINGLE-POINT SUPPLY CONNECTION – TERMINAL BLOCK, NON-FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER (0043 – 0066)

CONTROL WIRING



4

WARNING

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, before working on equipment.

CAUTION

The unit evaporator heater uses 120 VAC. Disconnecting 120 VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

FIGURE 11 - CONTROL WIRING

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SECTION 5 – TECHNICAL DATA
OPERATIONAL LIMITATIONS (ENGLISH)

TABLE 1 - TEMPERATURES AND FLOWS

ENGLISH						
YCAL	LEAVING WATER TEMPERATURE (°F)		COOLER FLOW (GPM)		AIR ON CONDENSER (°F)	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
0019	40	55	10	150	0	125
0022	40	55	10	150	0	125
0028	40	55	10	150	0	125
0033	40	55	10	150	0	125
0043	40	55	40	200	0	125
0046	40	55	40	200	0	125
0052	40	55	60	300	0	125
0056	40	55	60	300	0	125
0066	40	55	60	300	0	125

Excessive flow will cause damage to the cooler. Do not exceed maximum cooler flow. Special care should be taken when multiple chillers are fed by a single pump.

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 55°F (12.8°C), contact the nearest Johnson Controls Office for application guidelines.
3. The evaporator is protected against freezing to -20°F (-28.8°C) with an electric heater as standard.
4. For operation at temperatures below 25°F (-3.9°C), the optional Low Ambient Kit will need to be installed on the system (for YCAL0043 to YCAL0065).
5. For operation at temperatures above 115°F (46.1°C), the optional High Ambient Kit will need to be installed on the system.

Voltage Limitations

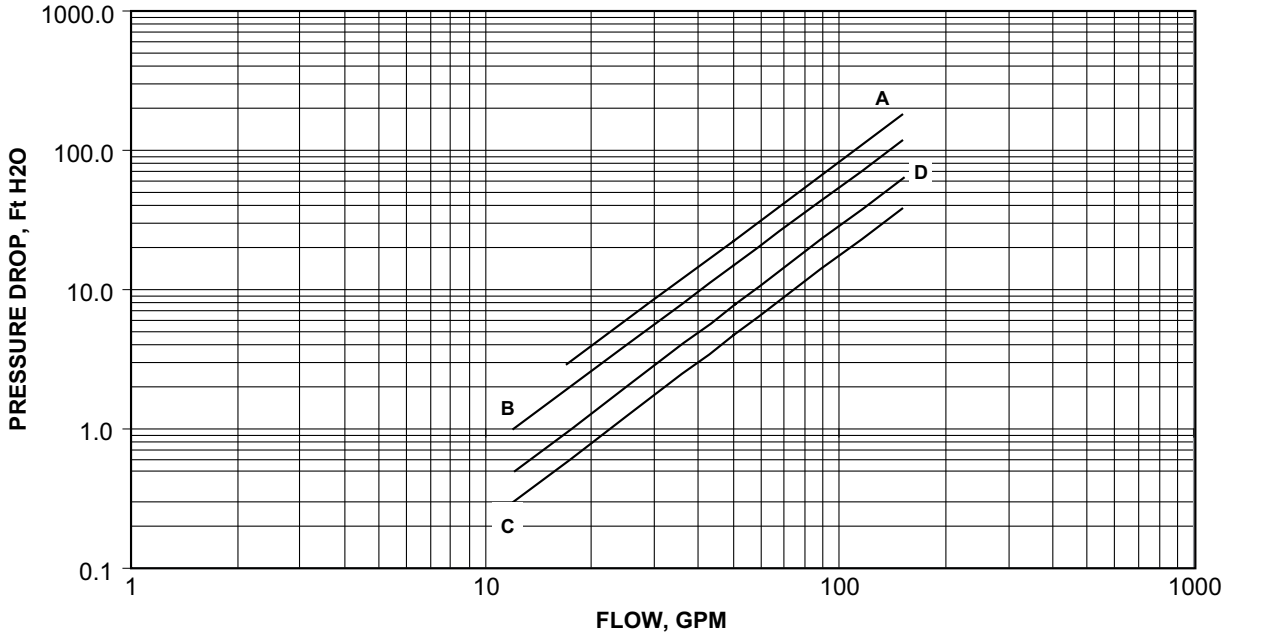
The following voltage limitations are absolute and operation beyond these limitations may cause serious damage to the compressor.

TABLE 2 - VOLTAGE LIMITATIONS

UNIT POWER	MINIMUM	MAXIMUM
200-3-60	180	220
230-3-60	207	253
380-3-60	355	415
460-3-60	414	506
575-3-60	517	633

YCAL0019-0033 HEAT EXCHANGER FLOW, GPM

ENGLISH



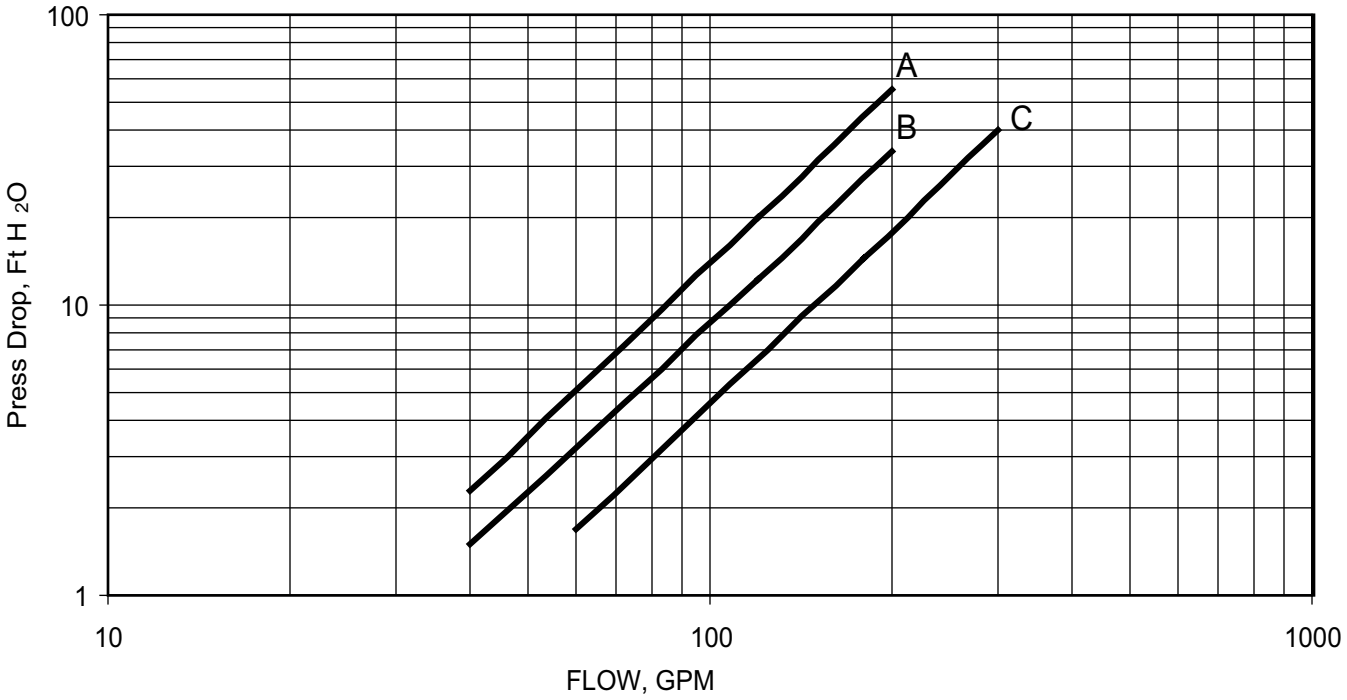
LD14085

YCAL	COOLER CURVE
0019	A
0022	B
0028	D
0033	C

Note: Water Pressure Drop Curves may extend past the minimum and maximum water flow ranges.

YCAL0043-0066 HEAT EXCHANGER FLOW, GPM

ENGLISH



LD12451

YCAL	COOLER CURVE
0043	A
0046	B
0052	B
0056	C
0066	C

Note: Water Pressure Drop Curves may extend past the minimum and maximum water flow ranges.

OPERATIONAL LIMITATIONS (SI)

TABLE 3 - TEMPERATURES AND FLOWS (SI)

VOLTAGE LIMITATIONS YCAL	LEAVING WATER TEMPERATURE (°C)		COOLER FLOW (L/S)		AIR ON CONDENSER (°C)	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
0019	4.4	12.8	0.6	9.5	-17.7	51.7
0022	4.4	12.8	0.6	9.5	-17.7	51.7
0028	4.4	12.8	0.6	9.5	-17.7	51.7
0033	4.4	12.8	0.6	9.5	-17.7	51.7
0043	4.4	12.8	2.5	12.6	-17.7	51.7
0046	4.4	12.8	2.5	12.6	-17.7	51.7
0052	4.4	12.8	3.8	18.9	-17.7	51.7
0056	4.4	12.8	3.8	18.9	-17.7	51.7
0066	4.4	12.8	3.8	18.9	-17.7	51.7

Excessive flow will cause damage to the cooler. Do not exceed max. cooler flow. Special care should be taken when multiple chillers are fed by a single pump.

NOTES:

1. For leaving brine temperature below 40°F (4.4°C), contact your nearest YORK Office for application requirements.
2. For leaving water temperature higher than 55°F (12.8°C), contact the nearest YORK Office for application guidelines.
3. The evaporator is protected against freezing to -20°F (-28.8°C) with an electric heater as standard.
4. For operation at temperatures below 25°F (-3.9°C), the optional Low Ambient Kit will need to be installed on the system.
5. For operation at temperatures above 110°F (43°C), the optional High Ambient Kit will need to be installed on the system.

Voltage Limitations

The following voltage limitations are absolute and operation beyond these limitations may cause serious damage to the compressor.

TABLE 4 - VOLTAGE LIMITATIONS

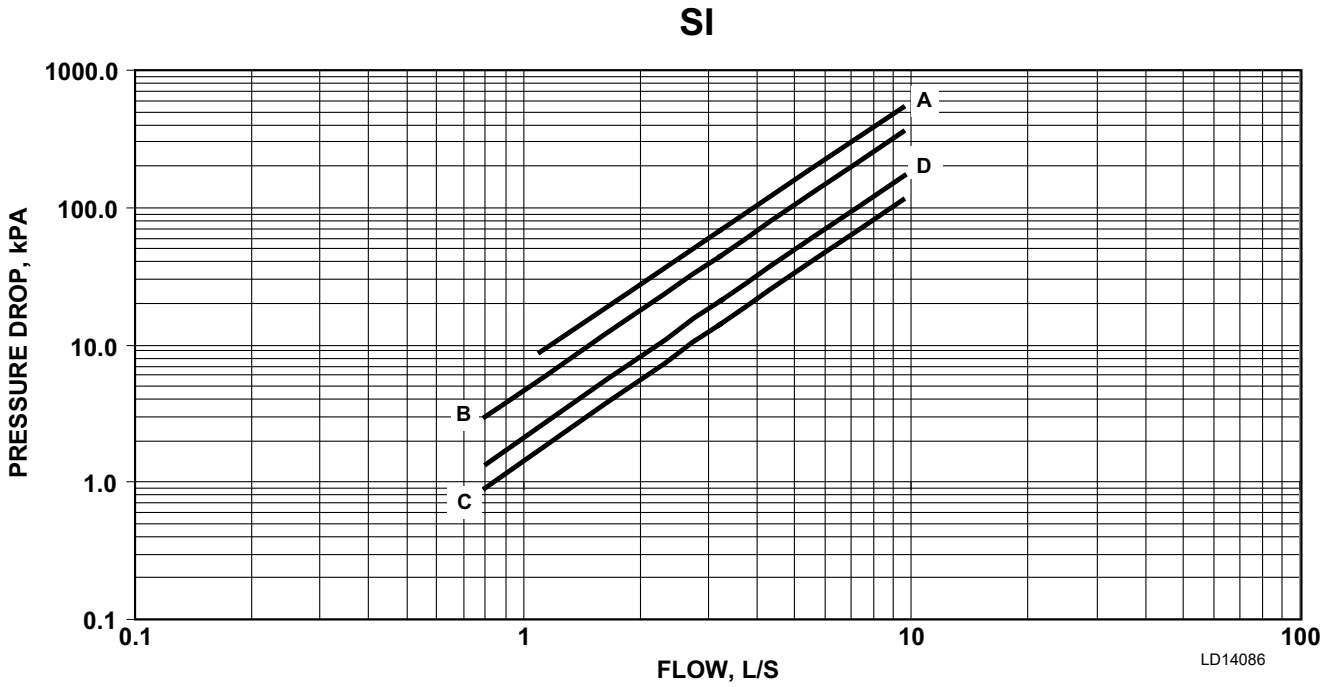
UNIT POWER	MINIMUM	MAXIMUM
200-3-60	180	220
230-3-60	207	253
380-3-60	355	415
460-3-60	414	506
575-3-60	517	633

TABLE 5 - ETHYLENE AND PROPOLYNE GLYCOL CORRECTION FACTORS

ETHYLENE GLYCOL						PROPYLENE GLYCOL					
% WEIGHT	TONS	COMPR KW	GPM F/ TON	PRESS DROP	FREEZE PT	% WEIGHT	TONS	COMPR KW	GPM F/ TON	PRESS DROP	FREEZE PT
10.0	1.0	1.0	24.3	1.0	26.2	10.0	1.0	1.0	24.0	1.0	26.0
20.0	1.0	1.0	25.1	1.1	17.9	20.0	1.0	1.0	24.3	1.1	19.0
30.0	1.0	1.0	25.9	1.2	6.7	30.0	1.0	1.0	24.9	1.3	9.0
40.0	1.0	1.0	26.9	1.4	-8.1	40.0	1.0	1.0	25.6	1.4	-6.0
50.0	1.0	1.0	28.0	1.6	-28.9	50.0	0.9	1.0	26.6	1.7	-28.0

OPERATIONAL LIMITATIONS (SI)

YCAL0019-0033 HEAT EXCHANGER FLOW, GPM

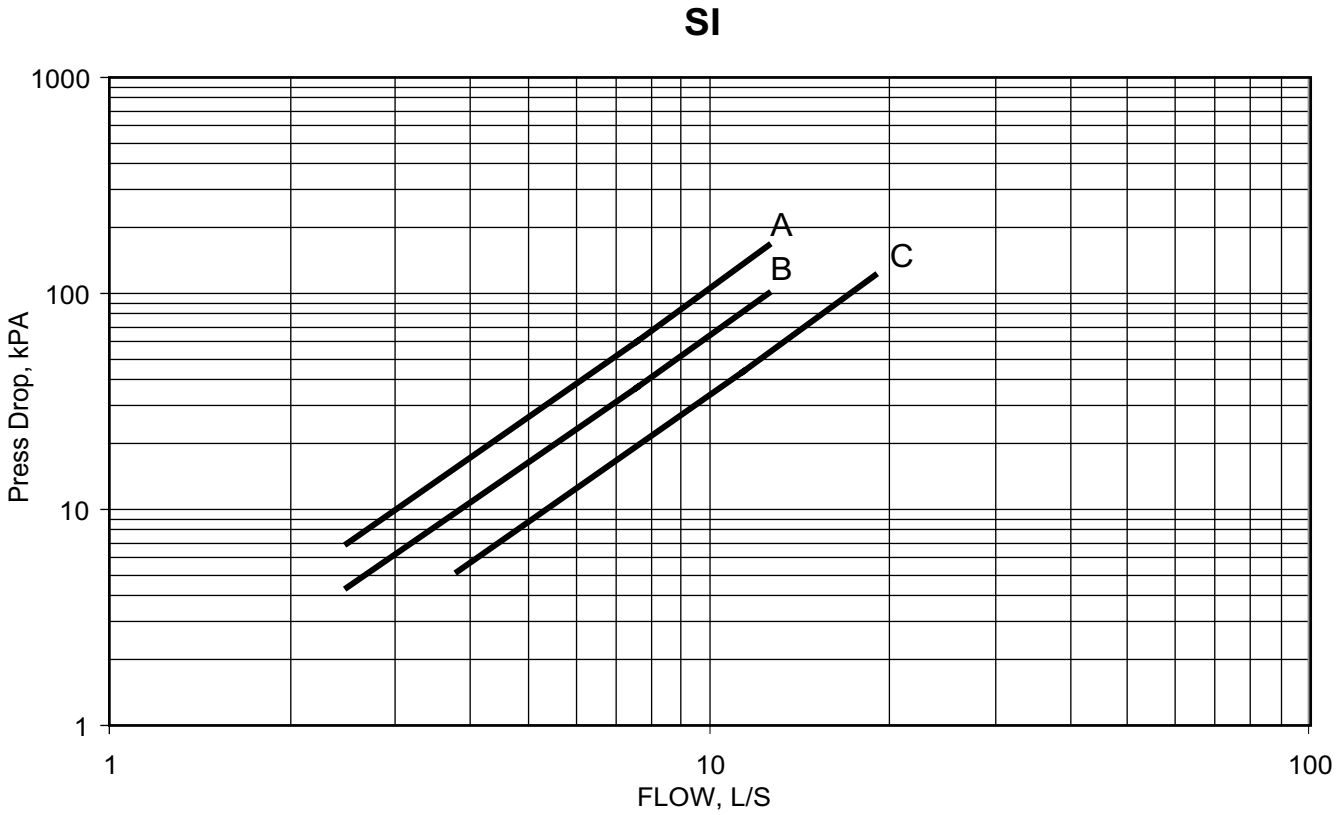


YCAL	COOLER CURVE
0019	A
0022	B
0028	D
0033	C

Note: Water Pressure Drop Curves may extend past the minimum and maximum water flow ranges.

OPERATIONAL LIMITATIONS (SI)

YCAL0043-0066 HEAT EXCHANGER FLOW, GPM



YCAL	COOLER CURVE
0043	A
0046	B
0052	B
0056	C
0066	C

Note: Water Pressure Drop Curves may extend past the minimum and maximum water flow ranges.

PHYSICAL DATA (ENGLISH)
YCAL0019_ – YCAL0066_
60Hz

TABLE 6 - PHYSICAL DATA (ENGLISH)

REFRIGERANT R-410A		YCAL STANDARD EFFICIENCY UNITS								
MODEL YCAL00		**19**	**22**	**28**	**33**	**43**	**46**	**52**	**56**	**66**
Length, in		109.8	109.8	119.6	119.6	144.8	144.8	144.8	144.8	153.6
Width, in		44.7	44.7	44.7	44.7	90.6	90.6	90.6	90.6	90.6
Height, in		46.1	46.1	50	50	47.8	47.8	62.6	62.6	62.6
NOMINAL RATINGS										
Tons		15.5	18.7	25.6	28.6	37.2	39.4	46.2	56.2	66.2
kW		18.3	22.2	30.4	32.6	44.2	46.6	54.6	66.7	76.8
EER, Btu/W.h		10.1	10.1	10.1	10.5	10.1	10.2	10.2	10.1	10.3
IPLV, Btu/W.h		14.7	15.5	13.7	14.5	14.5	14.7	15.1	14.7	15.5
REFRIGERANT R-410A										
Number of Refrigerant Circuits		1	1	1	1	2	2	2	2	2
Refrig. Chg, Opt, R-410A (lbs) Ckt1/Ckt2		25	30	45	50	35/35	40/35	45/45	50/50	65/65
Oil Charge, gallons ckt1/ckt2		1.8	1.8	1.7	2.2	1.8/1.8	1.8/1.8	1.7/1.7	1.7/1.7	2.3/2.2
Shipping Weight	Alum. Fin Coils, lbs	1454	1567	1798	2034	2942	2968	3170	3206	4097
	Copper Fin Coils, lbs	1597	1781	2005	2240	3300	3326	3673	3685	4703
Operating Weight	Alum. Fin Coils, lbs	1481	1597	1835	2077	2967	3000	3208	3244	4142
	Copper Fin Coils, lbs	1624	1811	2035	2283	3325	3359	3710	3722	4748
NOMINAL COMPRESSOR CAPACITY										
Compressor 1		8	10	15	15	10	12	13	15	20
Compressor 2		8	10	13	15	10	12	13	15	20
Compressor 3		–	–	–	–	–	–	–	–	–
Compressor 4		–	–	–	–	10	10	13	15	15
Compressor 5		–	–	–	–	10	10	13	15	15
Compressor 6		–	–	–	–	–	–	–	–	–
Condenser	Total Face Area ft^2	34.7	34.7	43.5	43.5	87	87	116	116	128
Number of Rows Deep	Ckt. 1	2	3	3	3	2	2	3	3	3
	Ckt. 2	–	–	–	–	2	2	3	3	3
Fins per Inch		17	17	13	13	17	17	17	17	13
CONDENSER FANS, LOW SOUND										
Number of Fans	Ckt. 1	2	2	2	2	2	2	2	2	2
	Ckt. 2	–	–	–	–	2	2	2	2	2
Fan Power hp/fan		0.5	0.5	1.5	1.5	1.4	1.4	1.7	1.7	1.7
Fan RPM		1075	1075	1150	1150	1150	1150	1150	1150	1150
Total Chiller CFM		11426	10670	24600	24600	47360	47360	52000	52000	52000
CONDENSER FANS, ULTRA QUIET										
Number of Fans	Ckt. 1	2	2	2	2	2	2	2	2	2
	Ckt. 2	–	–	–	–	2	2	2	2	2
Fan Power hp/fan		–	–	1.5	1.5	1.4	1.4	1.7	1.7	1.7
Fan RPM		–	–	820	820	820	820	820	820	820
Total Chiller CFM		–	–	24600	24600	47360	47360	52000	52000	52000
EVAPORATOR										
Water Volume Gallons		1.2	1.2	1.2	1.2	2.7	2.7	3.5	3.5	3.5
Max Water Side Pressure psig		300	300	300	300	300	300	300	300	300
Max Refrig Side Pressure psig		450	450	450	450	450	450	450	450	450
Min. Chiller Water Flow GPM		10	10	10	10	40	40	60	60	60
Max. Chiller Water Flow GPM		150	150	150	150	200	200	300	300	300
Water Connection Size, In.		2	2	2	2	3	3	3	3	3

ELECTRICAL DATA (ENGLISH)

YCAL0019_ – YCAL0066_ (Without Pump)

Single-Point Field Supplied Power Wiring (See *Figure 12*)
(One Field Provided Power Supply to the chiller. Field connections to Factory Provided Power Terminal Block (standard), Non-Fused Disconnect Switch (optional) or Circuit Breaker (optional)).

TABLE 7 - ELECTRICAL DATA (ENGLISH)

MODEL YCAL	VOLT 60 Hz	MCA[1]	MIN N/F DISC MDSW[2]	D.E. FUSE		CKT. BKR.[5]		FIELD WIRING LUGS[6] TERMINAL BLOCK (std)		FIELD WIRING LUGS[6] NF DISC. SWITCH (opt)		FIELD WIRING LUGS[6] CIRCUIT BREAKER (opt)	
				MIN.	MAX[4]	MIN.	MAX	LUGS/ PHASE	LUG WIRE RANGE	LUGS/ PHASE	LUG WIRE RANGE	LUGS/ PHASE	LUG WIRE RANGE
0019	200	101	150	125	125	125	125	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	230	94	100	110	125	110	125	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	380	54	60	60	70	60	70	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	460	45	60	50	60	50	60	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	575	36	60	40	50	40	50	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
0022	200	108	150	125	150	125	150	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	230	100	150	125	125	125	125	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	380	58	60	70	80	70	80	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	460	48	60	60	60	60	60	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	575	39	60	45	50	45	50	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
028	200	136	150	175	175	175	175	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	230	136	150	150	175	175	175	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	380	81	100	90	110	110	110	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	460	65	100	80	90	90	90	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	575	55	60	70	70	70	70	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
0033	200	151	200	175	200	175	200	1	6 AWG – 350 kcmil	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	230	140	150	175	175	175	175	1	6 AWG – 350 kcmil	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	380	81	100	90	110	90	110	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	460	67	100	80	90	80	90	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
	575	54	60	60	70	60	70	1	14 AWG – 2/0	1	14 AWG – 1/0	1	14 AWG – 1/0
0043	200	224	250	250	250	250	250	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	230	209	250	225	250	225	250	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	380	121	150	150	150	150	150	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	460	99	150	110	110	110	110	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	575	80	100	90	90	90	90	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
0046	200	228	250	250	250	250	250	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	230	212	250	225	250	225	250	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	380	123	150	150	150	150	150	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	460	101	150	110	110	110	110	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	575	81	100	90	90	90	90	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
0052	200	248	400	300	300	300	300	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	230	248	400	300	300	300	300	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	380	132	150	150	150	150	150	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	460	114	150	125	125	125	125	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	575	96	150	110	110	110	110	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil

ELECTRICAL DATA (ENGLISH) (CONT'D)
YCAL0019_ – YCAL0066_

Single-Point Field Supplied Power Wiring (See *Figure 12*)
(One Field Provided Power Supply to the chiller. Field connections to Factory Provided Power Terminal Block (standard), Non-Fused Disconnect Switch (optional) or Circuit Breaker (optional)).

SYSTEM #1 COMPRESSOR & FAN							SYSTEM #2 COMPRESSOR & FAN						
COMPR. #1		COMPR. #2		FANS			COMPR. #1		COMPR. #2		FANS		
RLA	LRA	RLA	LRA	QTY	FLA	RLA	RLA	LRA	RLA	LRA	QTY	FLA	RLA
42.2	250	42.2	250	2	2.6	5.0	—	—	—	—	—	—	—
39.0	250	39.0	250	2	2.6	5.0	—	—	—	—	—	—	—
22.5	155	22.5	155	2	1.6	3.0	—	—	—	—	—	—	—
18.6	114	18.6	114	2	1.3	2.5	—	—	—	—	—	—	—
14.9	100	14.9	100	2	1.0	2.0	—	—	—	—	—	—	—
45.4	250	45.4	250	2	2.6	5.0	—	—	—	—	—	—	—
42.0	250	42.0	250	2	2.6	5.0	—	—	—	—	—	—	—
24.2	155	24.2	155	2	1.6	3.0	—	—	—	—	—	—	—
20.0	125	20.0	125	2	1.3	2.5	—	—	—	—	—	—	—
16.0	100	16.0	100	2	1.0	2.0	—	—	—	—	—	—	—
51.3	300	55.8	425	2	7.6	44.0	—	—	—	—	—	—	—
51.3	300	55.8	425	2	7.4	19.1	—	—	—	—	—	—	—
26.9	139	36.0	239	2	4.5	23.1	—	—	—	—	—	—	—
23.1	150	26.9	187	2	4.0	19.0	—	—	—	—	—	—	—
19.9	109	23.7	148	2	2.9	15.3	—	—	—	—	—	—	—
59.9	425	59.9	425	2	7.6	30.9	—	—	—	—	—	—	—
55.5	425	55.5	425	2	7.4	37.0	—	—	—	—	—	—	—
32.0	239	32.0	239	2	4.5	22.3	—	—	—	—	—	—	—
26.4	187	26.4	187	2	3.4	17.2	—	—	—	—	—	—	—
21.1	148	21.1	148	2	2.9	14.6	—	—	—	—	—	—	—
45.4	250	45.4	250	2	7.6	30.9	45.4	250	45.4	250	2	7.6	30.9
42.0	250	42.0	250	2	7.4	37.0	42.0	250	42.0	250	2	7.4	37.0
24.2	155	24.2	155	2	4.5	22.3	24.2	155	24.2	155	2	4.5	22.3
20.0	125	20.0	125	2	3.4	17.2	20.0	125	20.0	125	2	3.4	17.2
16.0	100	16.0	100	2	2.9	14.6	16.0	100	16.0	100	2	2.9	14.6
47.0	250	47.0	250	2	7.6	30.9	45.4	250	45.4	250	2	7.6	30.9
43.5	250	43.5	250	2	7.4	37.0	42.0	250	42.0	250	2	7.4	37.0
25.1	155	25.1	155	2	4.5	22.3	24.2	155	24.2	155	2	4.5	22.3
20.7	125	20.7	125	2	3.4	17.2	20.0	125	20.0	125	2	3.4	17.2
16.6	100	16.6	100	2	2.9	14.6	16.0	100	16.0	100	2	2.9	14.6
51.3	300	51.3	300	2	7.6	44.0	51.3	300	51.3	300	2	7.6	44.0
51.3	300	51.3	300	2	7.4	19.1	51.3	300	51.3	300	2	7.4	19.1
26.9	139	26.9	139	2	4.5	23.1	26.9	139	26.9	139	2	4.5	23.1
23.1	150	23.1	150	2	4.0	19.0	23.1	150	23.1	150	2	4.0	19.0
19.9	109	19.9	109	2	2.9	15.3	19.9	109	19.9	109	2	2.9	15.3

ELECTRICAL DATA (ENGLISH)

YCAL0019_ – YCAL0066_ (CONT'D) (Without Pump)

Single-Point Field Supplied Power Wiring (See Figure 12)
(One Field Provided Power Supply to the chiller. Field connections to Factory Provided Power Terminal Block (standard), Non-Fused Disconnect Switch (optional) or Circuit Breaker (optional)).

TABLE 7 – ELECTRICAL DATA (ENGLISH) (CONT.)

MODEL YCAL	VOLT 60 Hz	MCA[1]	MIN N/F DISC MDSW[2]	D.E. FUSE		CKT. BKR.[5]		FIELD WIRING LUGS[6] TERMINAL BLOCK (std)		FIELD WIRING LUGS[6] NF DISC. SWITCH (opt)		FIELD WIRING LUGS[6] CIRCUIT BREAKER (opt)	
				MIN.	MAX[4]	MIN.	MAX	LUGS/ PHASE	LUG WIRE RANGE	LUGS/ PHASE	LUG WIRE RANGE	LUGS/ PHASE	LUG WIRE RANGE
0056	200	268	400	300	300	300	300	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	230	267	400	300	300	300	300	1	6 AWG – 350 kcmil	2	*(2) 3/0 – 250 kcmil	2	*(2) 3/0 – 250 kcmil
	380	171	200	200	200	200	200	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	460	130	150	150	150	150	150	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	575	112	150	125	125	125	125	1	14 AWG – 2/0	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
0066	200	324	400	350	400	350	400	1	4 AWG – 500 kcmil	1	250 kcmil – 500 kcmil	1	250 kcmil – 500 kcmil
	230	301	400	350	350	350	350	1	4 AWG – 500 kcmil	1	250 kcmil – 500 kcmil	1	250 kcmil – 500 kcmil
	380	175	200	200	200	200	200	1	6 AWG – 350 kcmil	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	460	143	200	175	175	175	175	1	6 AWG – 350 kcmil	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil
	575	115	150	125	125	125	125	1	6 AWG – 350 kcmil	1	4 AWG – 300 kcmil	1	4 AWG – 300 kcmil

* Panels will have (3) 250 KEMIL lug kit shipped loose to accommodate larger wire size if needed.

ELECTRICAL DATA (ENGLISH) (CONT'D)
YCAL0019_ – YCAL0066_

Single-Point Field Supplied Power Wiring (See Figure 12)
(One Field Provided Power Supply to the chiller. Field connections to Factory Provided Power Terminal Block (standard), Non-Fused Disconnect Switch (optional) or Circuit Breaker (optional)).

SYSTEM #1 COMPRESSOR & FAN							SYSTEM #2 COMPRESSOR & FAN						
COMPR. #1		COMPR. #2		FANS			COMPR. #1		COMPR. #2		FANS		
RLA	LRA	RLA	LRA	QTY	FLA	RLA	RLA	LRA	RLA	LRA	QTY	FLA	RLA
55.8	425	55.8	425	2	7.6	44.0	55.8	425	55.8	425	2	7.6	44.0
55.8	425	55.8	425	2	7.4	19.1	55.8	425	55.8	425	2	7.4	19.1
36.0	239	36.0	239	2	4.5	23.1	36.0	239	36.0	239	2	4.5	23.1
26.9	187	26.9	187	2	4.0	19.0	26.9	187	26.9	187	2	4.0	19.0
23.7	148	23.7	148	2	2.9	15.3	23.7	148	23.7	148	2	2.9	15.3
76.9	505	76.9	505	2	7.6	30.9	59.9	425	59.9	425	2	7.6	30.9
71.2	505	71.2	505	2	7.4	37.0	55.5	425	55.5	425	2	7.4	37.0
41.1	280	41.1	280	2	4.5	22.3	32.0	239	32.0	239	2	4.5	22.3
33.9	225	33.9	225	2	3.4	17.2	26.4	187	26.4	187	2	3.4	17.2
27.1	180	27.1	180	2	2.9	14.6	21.1	148	21.1	148	2	2.9	14.6

ELECTRICAL DATA

TABLE 8 - MICRO PANEL POWER SUPPLY

UNIT VOLTAGE	UNIT VOLTAGE	CONTROL POWER	MCA NOTE A	OVER CURRENT PROTECTION, SEE NOTE B		NF DISC SW
				MINIMUM	MAXIMUM	
MODELS W/O CONTROL TRANS		115-1-60/50	15A	10A	15A	30 A / 240V
MODELS W/ CONTROL TRANS	-17	200-1-60	15A	10A	15A	30 A / 240V
	-28	230-1-60	15A	10A	15A	30 A / 240V
	-40	380-1-60	15A	10A	15A	30 A / 480V
	-46	460-1-60	15A	10A	15A	30 A / 480V
	-50	380/415-1-60	15A	10A	15A	30A / 415V
	-58	575-1-60	15A	10A	15A	30 A / 600V

A. Minimum #14 AWG, 75°C, Copper Recommended

B. Minimum and Maximum Over Current Protection, Dual Element Fuse or Circuit Breaker

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, before working on equipment.

The unit evaporator heater uses 120 VAC. Disconnecting 120 VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

TABLE 9 - VOLTAGE RANGE

VOLTAGE RANGE			
VOLTAGE CODE	UNIT POWER	MINIMUM	MAXIMUM
-17	200-3-60	180	220
-28	230-3-60	207	253
-40	380/415-3-60	342	440
-46	460-3-60	414	506
-50	380/415-3-50	342	440
-58	575-3-60	517	633

ELECTRICAL NOTES AND LEGEND

NOTES:

1. Minimum Circuit Ampacity (MCA) is based on 125% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 430-24. If the optional Factory Mounted Control Transformer is provided, add the following MCA values to the electrical tables for the system providing power to the transformer: -17, add 2.5 amps; -28, add 2.3 amps; -40, add 1.5 amps, -46, add 1.3 amps; -58, add 1 amp.
2. The minimum recommended disconnect switch is based on 115% of the rated load amps for all loads included in the circuit, per N.E.C. Article 440.
3. Minimum fuse size is based upon 150% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit to avoid nuisance trips at start-up due to lock rotor amps. It is not recommended in applications where brown outs, frequent starting and stopping of the unit, and/or operation at ambient temperatures in excess of 95ºF (35ºC) is anticipated.
4. Maximum fuse size is based upon 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-22.
5. Circuit breakers must be UL listed and CSA certified and maximum size is based on 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit. Otherwise, an HACR-type circuit breakers must be used. Maximum HACR circuit breaker rating is based on 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit.
6. The “Incoming Wire Range” is the minimum and maximum wire size that can be accommodated by the unit wiring lugs. The (2) preceding the wire range indicates the number of termination points available per phase of the wire range specified. Actual wire size and number of wires per phase must be determined based on the National Electrical Code, **using copper connectors only.** Field wiring must also comply with local codes.
7. A ground lug is provided for each compressor system to accommodate a field grounding conductor per N.E.C. Table 250-95. A control circuit grounding lug is also supplied.
8. The supplied disconnect is a “Disconnecting Means” as defined in the N.E.C. 100, and is intended for isolating the unit for the available power supply to perform maintenance and troubleshooting. This disconnect is not intended to be a Load Break Device.
9. Field wiring by others which complies with the National Electrical Code and Local Codes.

LEGEND:

ACR	ACROSS THE LINE START
C.B.	CIRCUIT BREAKER
D.E.	DUAL ELEMENT FUSE
DISC SW	DISCONNECT SWITCH
FACT MOUNT CB	FACTORY MOUNTED CIRCUIT BREAKER
FLA	FULL LOAD AMPS
HZ	HERTZ
MAX	MAXIMUM
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
MIN	MINIMUM NON FUSED
RLA	RATED LOAD AMPS
S.P. WIRE	Single-Point WIRING
UNIT MTD SERV SW	UNIT MOUNTED SERVICE (NON-FUSED DISCONNECT SWITCH)
LRA	LOCKED ROTOR AMPS

VOLTAGE CODE
-17 = 200-3-60
-28 = 230-3-60
-40 = 380-3-60
-46 = 460-3-60
-58 = 575-3-60

LEGEND:

Field Wiring — — — —

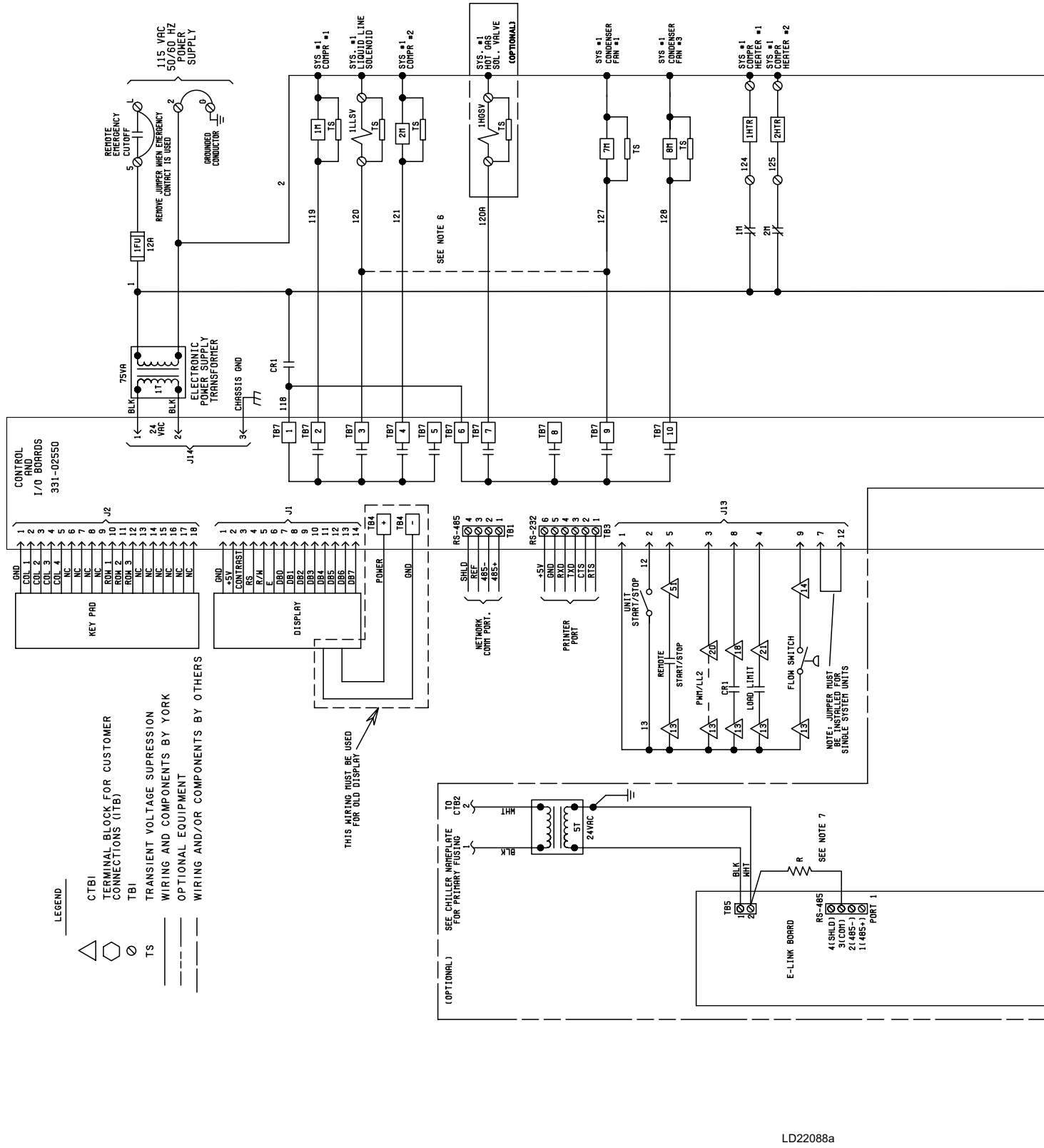
Factory Wiring ————

CONTROL WIRING DIAGRAMS

YCAL0019-YCAL0022 LOW SOUND

YCAL0028-YCAL0033 ULTRA LOW SOUND (460V AND 380-415V 50 HZ)

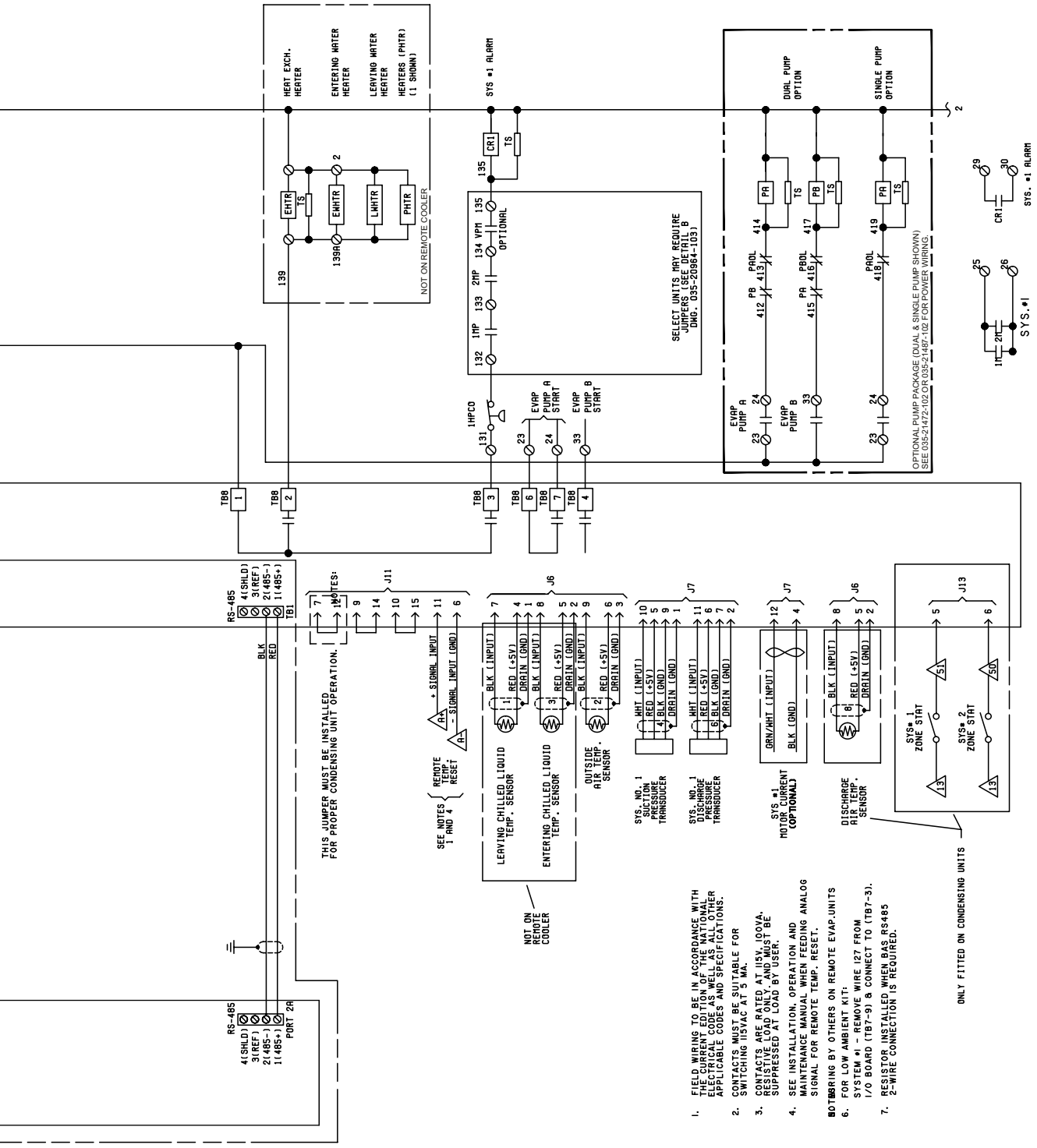
ELEMENTARY DIAGRAM
CONTROL CIRCUIT



LD22088a

FIGURE 12 - CONTROL WIRING DIAGRAM, SINGLE CIRCUIT, IPU II

035-21472-401
REV E



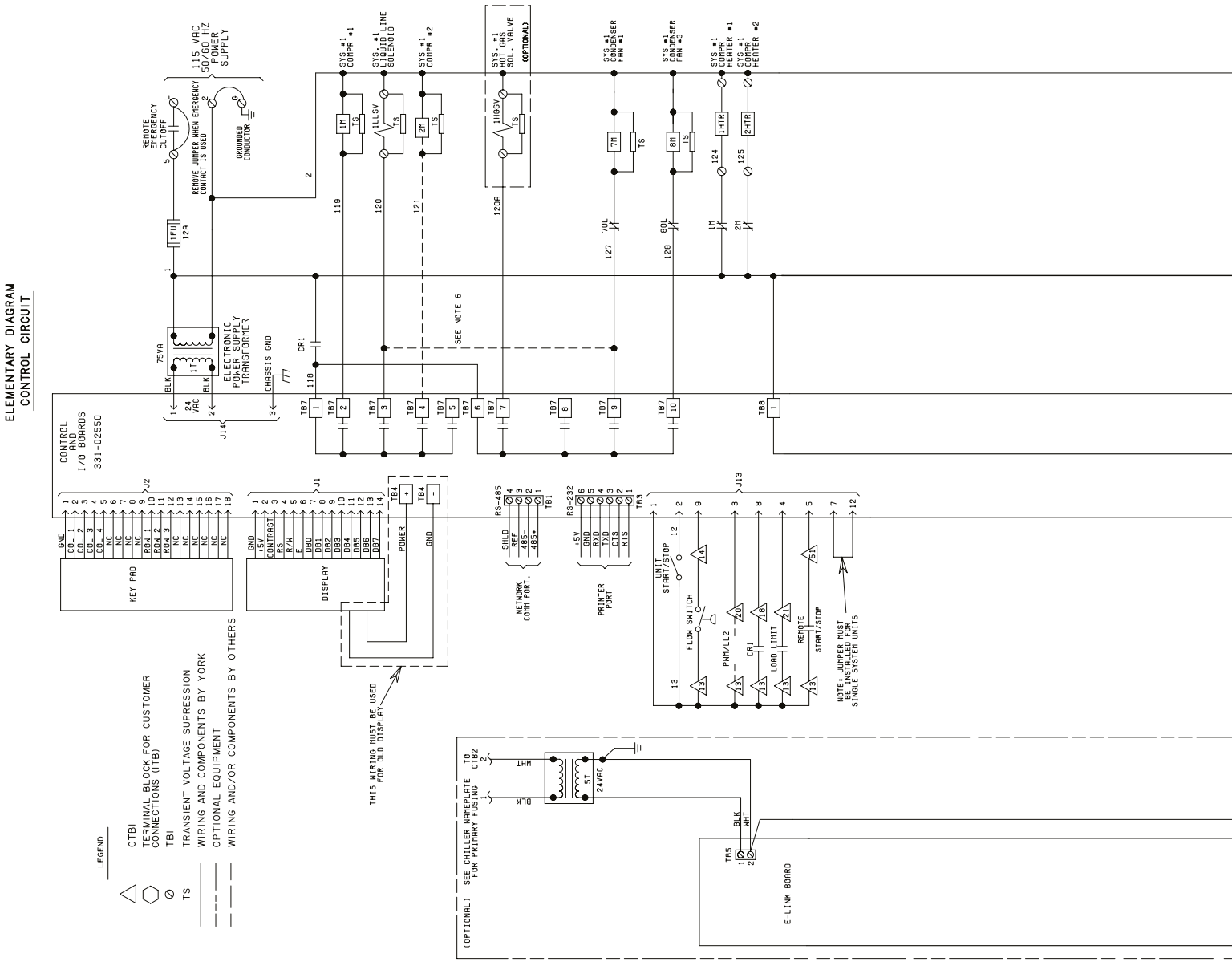
1. FIELD WIRING TO BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL OTHER APPLICABLE CODES AND SPECIFICATIONS.
2. CONTACTS MUST BE SUITABLE FOR SWITCHING 115VAC AT 5 MA.
3. CONTACTS ARE RATED AT 115V, 100VA. RESISTIVE LOAD ONLY. AND MUST BE SUPPRESSED AT LOAD BY USER.
4. SEE INSTALLATION, OPERATION AND MAINTENANCE MANUAL WHEN FEEDING ANALOG SIGNAL FOR REMOTE TEMP. RESET.

NOTES:

5. WIRING BY OTHERS ON REMOTE EVAP.UNITS
6. FOR LOW AMBIENT KIT:
   SYSTEM #1 - REMOVE WIRE 127 FROM I/O BOARD (TB7-9) & CONNECT TO (TB7-3).
7. RESISTOR INSTALLED WHEN BAS RS485 2-WIRE CONNECTION IS REQUIRED.

LD22088b

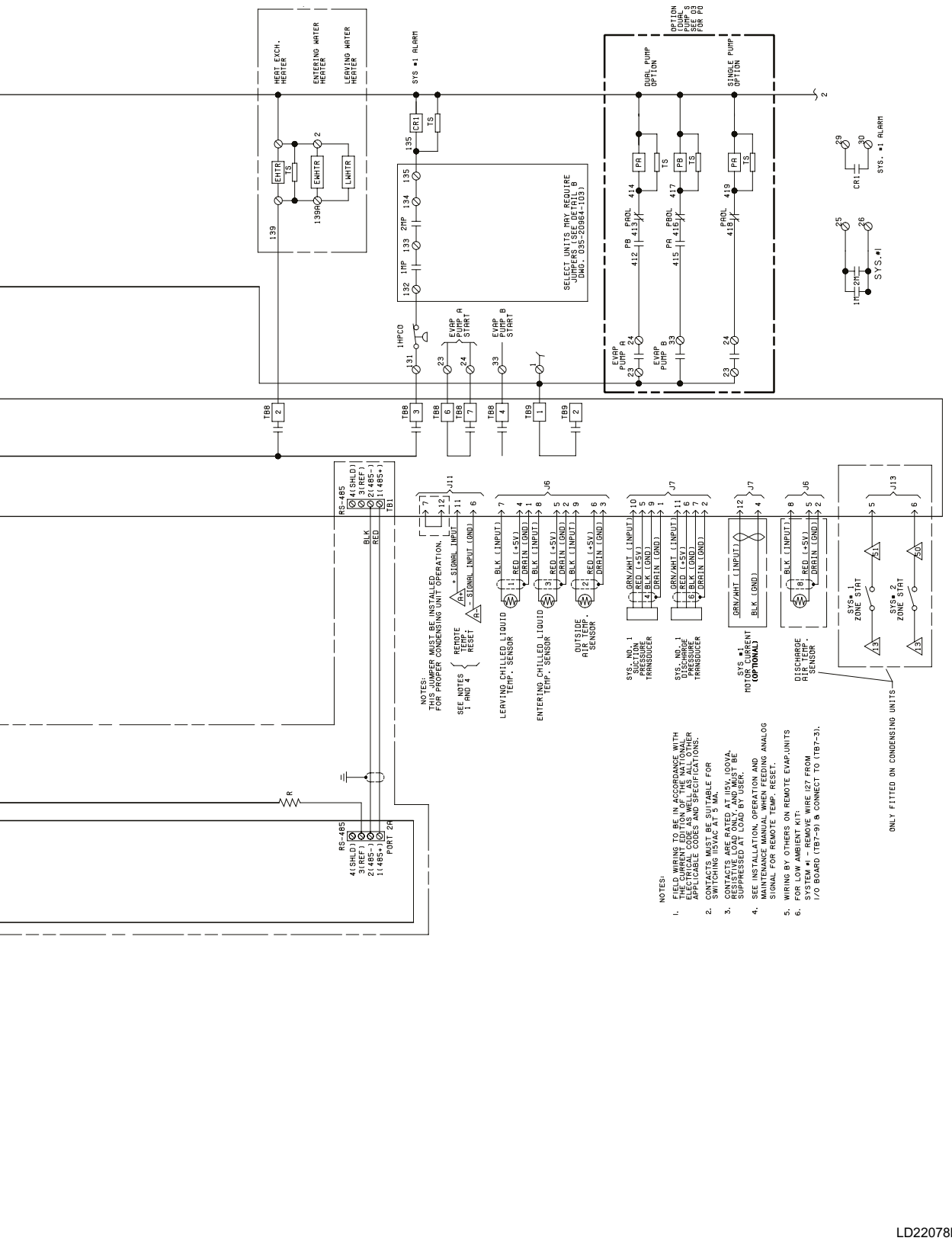
YCAL0028-YCAL0033 ULTRA LOW SOUND (200V, 230V, 380V, AND 575V)



LD22078a

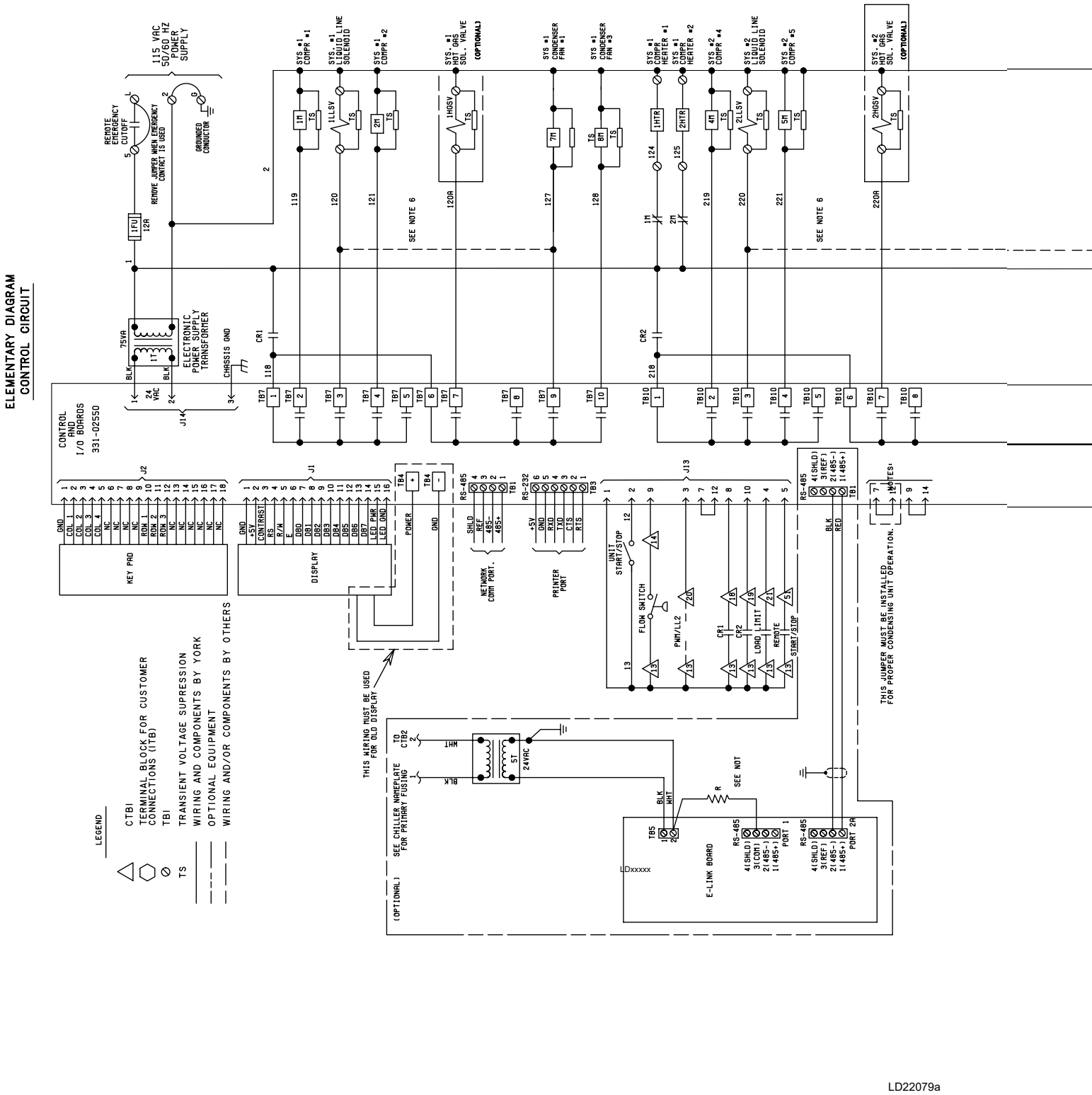
FIGURE 13 - CONTROL WIRING DIAGRAM, SINGLE CIRCUIT, IPU II

035-21585-401
REV E



LD22078b

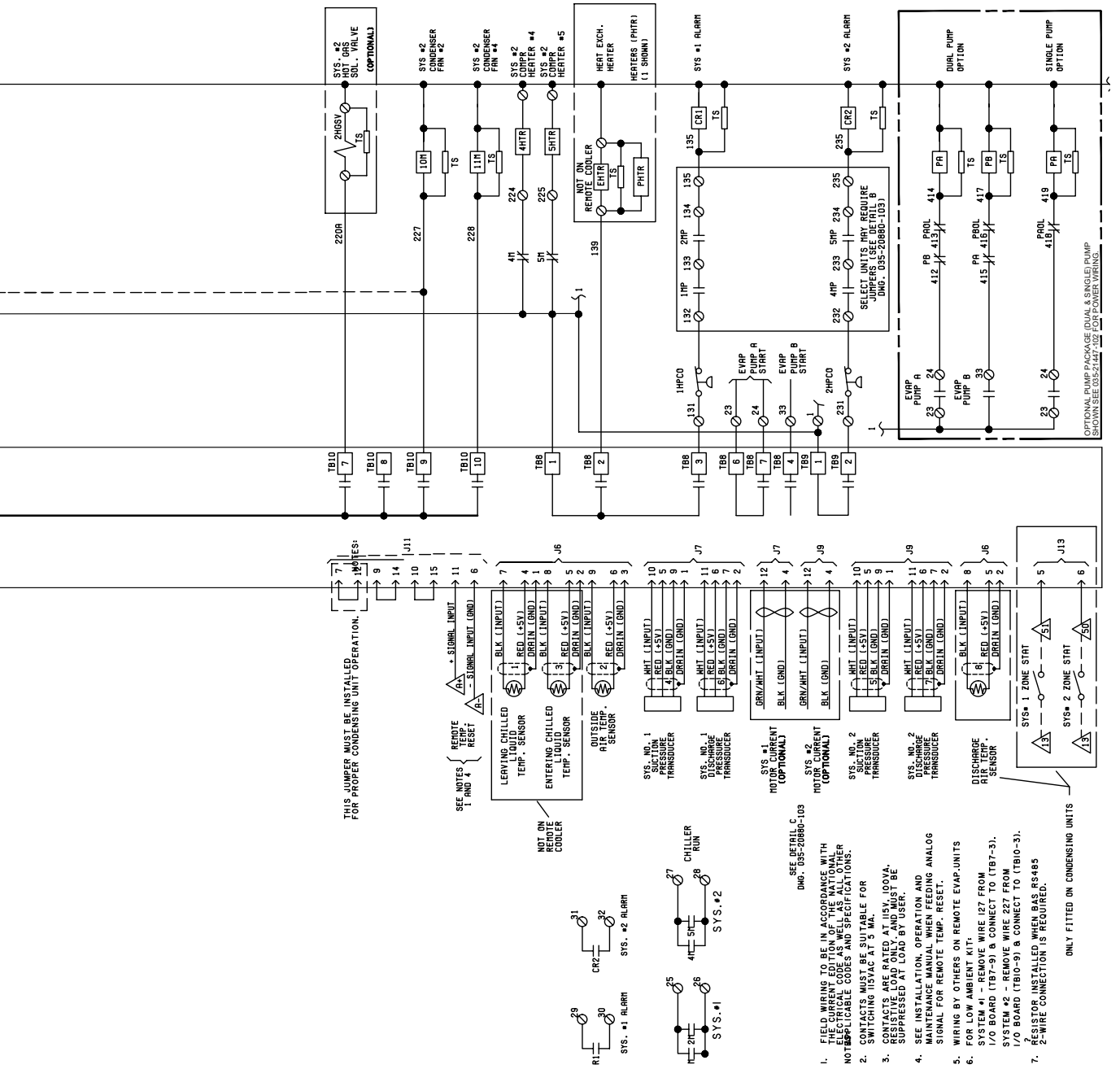
YCAL0043-YCAL0052 LOW SOUND
YCAL0043-YCAL0052 ULTRA LOW SOUND (460V AND 380-415V 50 HZ)



LD22079a

FIGURE 14 - CONTROL WIRING DIAGRAM, DUAL CIRCUIT, IPU II

035-21447-401
REV D



LD22079b

YCAL0056-YCAL0066 LOW SOUND
YCAL0043-YCAL0052 ULTRA LOW SOUND (200V, 230V, 380V AND 575V)

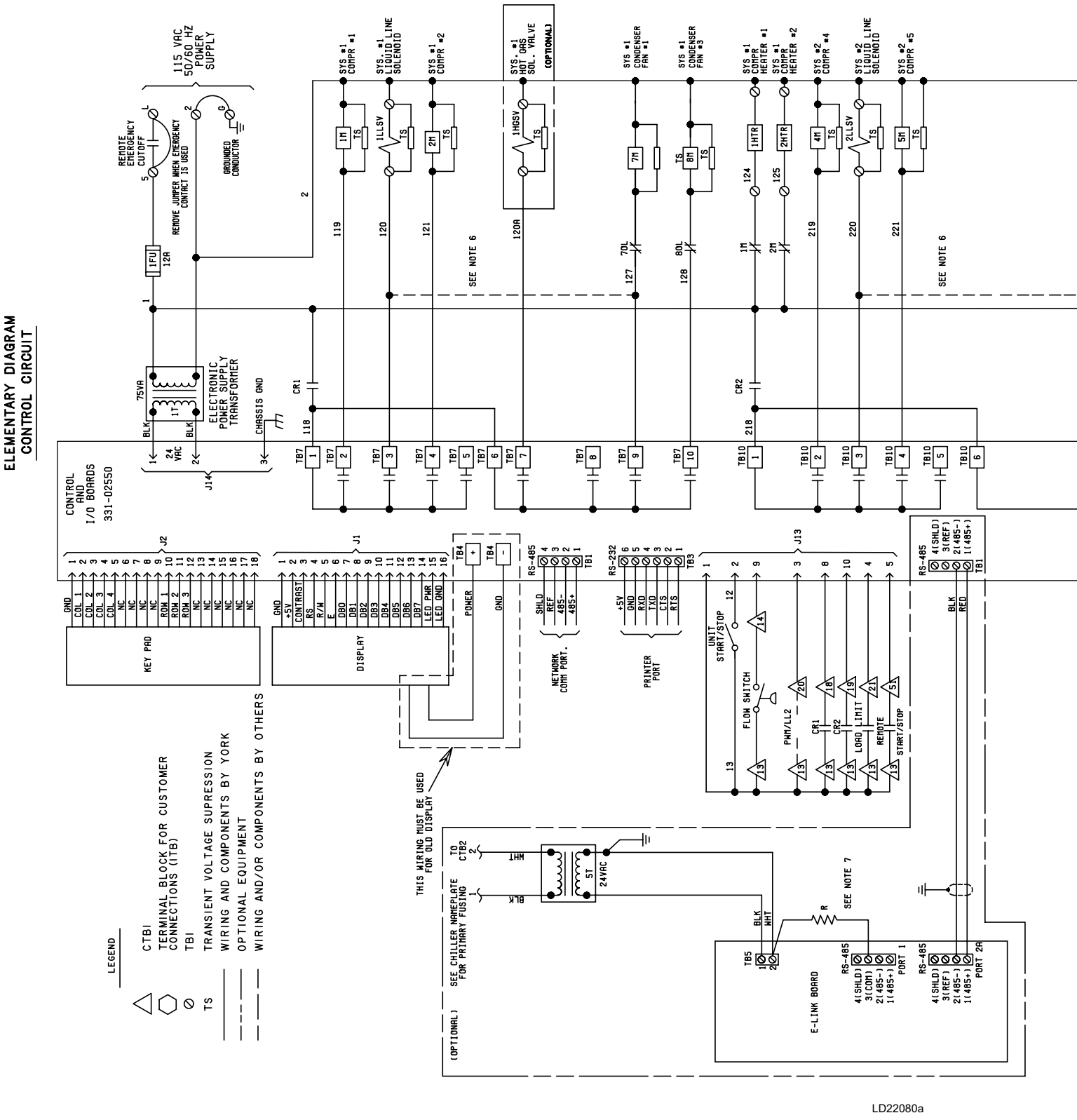
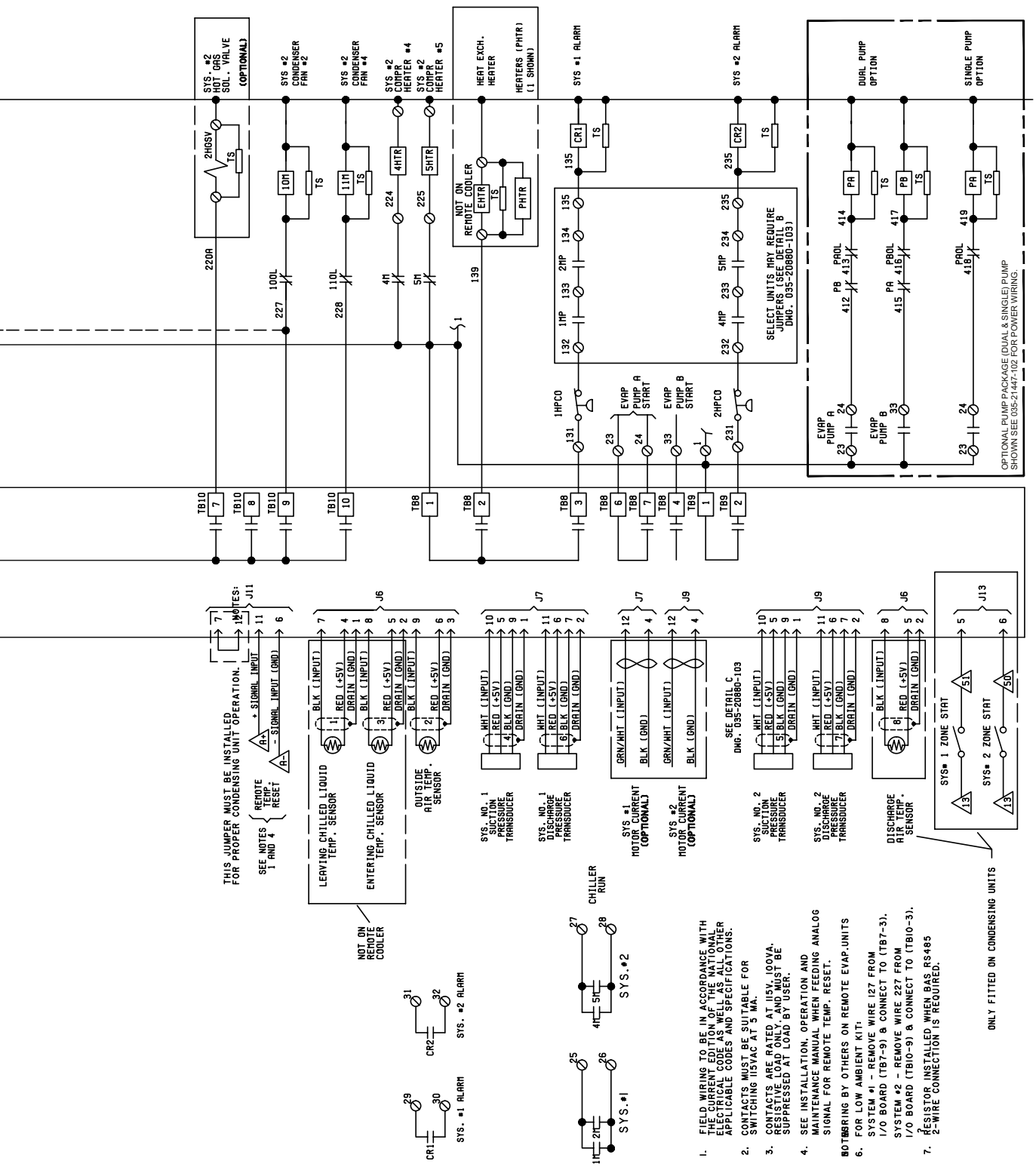


FIGURE 15 - CONTROL WIRING DIAGRAM, DUAL CIRCUIT, IPU II

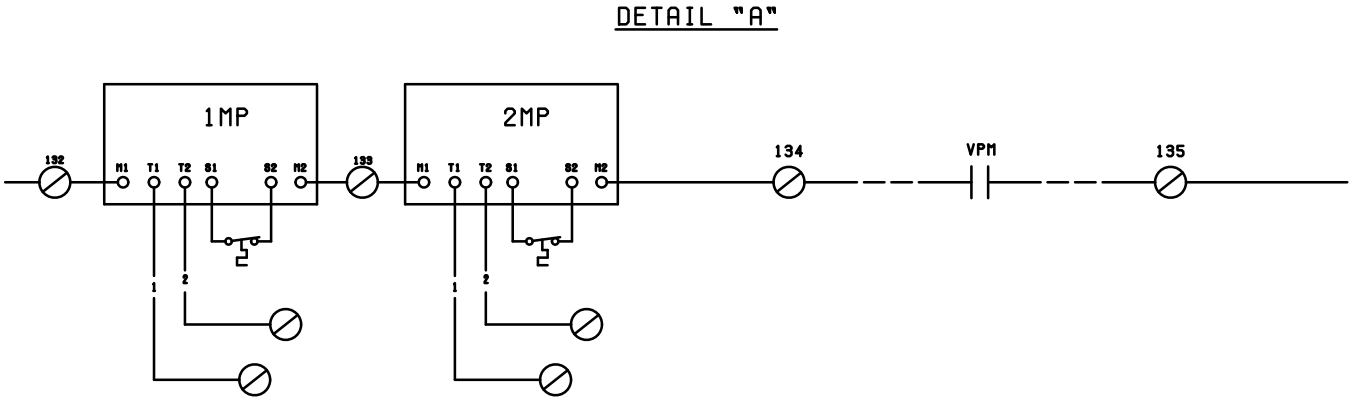
035-21586-401
REV D



LD22080b

YCAL0019-YCAL0022 LOW SOUND
YCAL0028-YCAL0033 ULTRA LOW SOUND

035-20964-103 REV C



Notes:

I. Field wiring to be in accordance with the current edition of the National Electrical Code as well as all other applicable codes and specifications.

2. Contacts must be suitable for switching 24VDC, (gold contacts recommended). Wiring must not be run in the same conduit with any line voltage (class 1) wiring.

3. To cycle unit ON and OFF automatically with contact shown, install a cycling device in series with the flow switch. See note 2 for contact rating and wiring specifications.

4. To stop unit (emergency stop) with contacts other than those shown, install the stop contact between terminals 5 and 1. If a stop device is not installed, a jumper must be connected between terminals 5 and 1. Device must have a minimum contact rating of 6A at 115VAC.

5. Contacts are rated at 115V, 100VA, resistive load only, and must be suppressed at load by user.

6. See installation, operation and maintenance manual when optional equipment is used.

7. Optional current readout. 5V = 200A.

8. 1MP thru 6MP are contained in their respective compressor junction boxes.

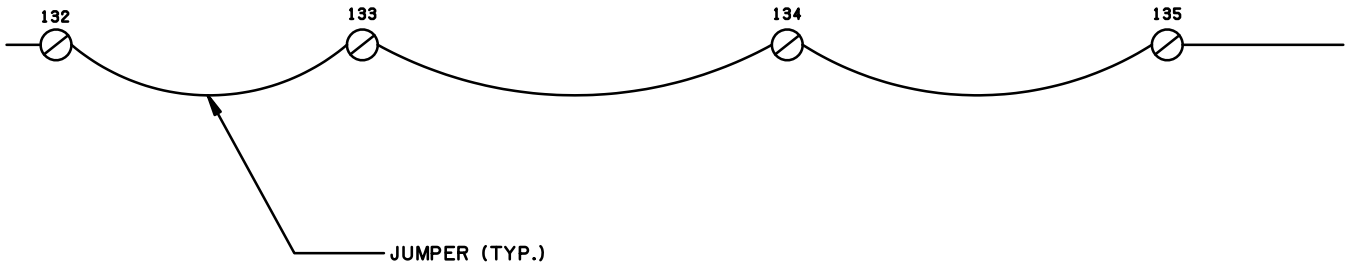
FIGURE 16 - CONTROL WIRING DIAGRAM, DETAILS, SINGLE CIRCUIT

LEGEND

TS	TRANSIENT VOLTAGE SUPRESSION
△	TERMINAL BLOCK FOR CUSTOMER LOW VOLTAGE (CLASS 2) CONNECTIONS. SEE NOTE 2.
⊘	TERMINAL BLOCK FOR YORK AND CUSTOMER CONNECTIONS
———	WIRING AND COMPONENTS BY YORK
—---—	OPTIONAL EQUIPMENT
———	WIRING AND/OR COMPONENTS BY OTHERS

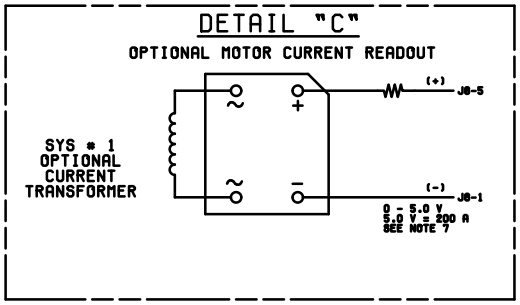
DETAIL "B"

TYPICAL FOR INTERNALLY PROTECTED MOTORS

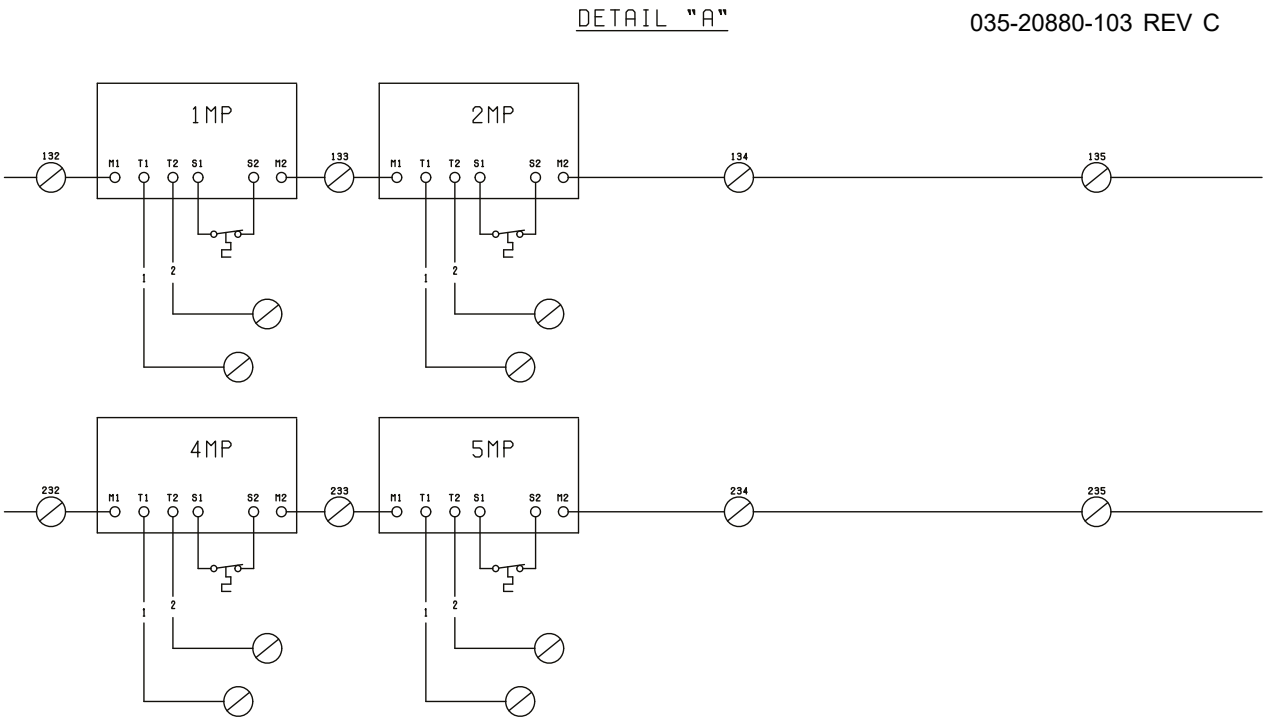


DETAIL "C"

OPTIONAL MOTOR CURRENT READOUT



YCAL0043-YCAL0052 LOW SOUND
YCAL0043-YCAL0052 ULTRA LOW SOUND



Notes:

I. Field wiring to be in accordance with the current edition of the National Electrical Code as well as all other applicable codes and specifications.

2. Contacts must be suitable for switching 24VDC, (gold contacts recommended). Wiring must not be run in the same conduit with any line voltage (class 1) wiring.

3. To cycle unit ON and OFF automatically with contact shown, install a cycling device in series with the flow switch. See note 2 for contact rating and wiring specifications.

4. To stop unit (emergency stop) with contacts other than those shown, install the stop contact between terminals 5 and 1. If a stop device is not installed, a jumper must be connected between terminals 5 and 1. Device must have a minimum contact rating of 6A at 115VAC.

5. Contacts are rated at 115V, 100VA, resistive load only, and must be suppressed at load by user.

6. See installation, operation and maintenance manual when optional equipment is used.

7. Optional current readout. 5V = 200A.

8. 1MP thru 6MP are contained in their respective compressor junction boxes.

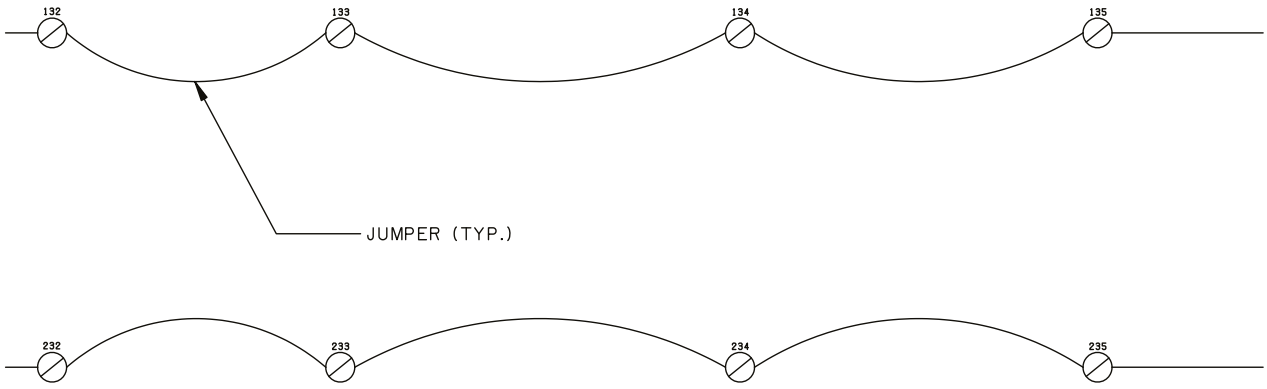
FIGURE 17 - CONTROL WIRING DIAGRAM, DETAILS, DUAL CIRCUIT

LEGEND

TS	TRANSIENT VOLTAGE SUPRESSION
△	TERMINAL BLOCK FOR CUSTOMER LOW VOLTAGE (CLASS 2) CONNECTIONS. SEE NOTE 2.
⊘	TERMINAL BLOCK FOR YORK AND CUSTOMER CONNECTIONS
———	WIRING AND COMPONENTS BY YORK
—— - ——	OPTIONAL EQUIPMENT
———	WIRING AND/OR COMPONENTS BY OTHERS

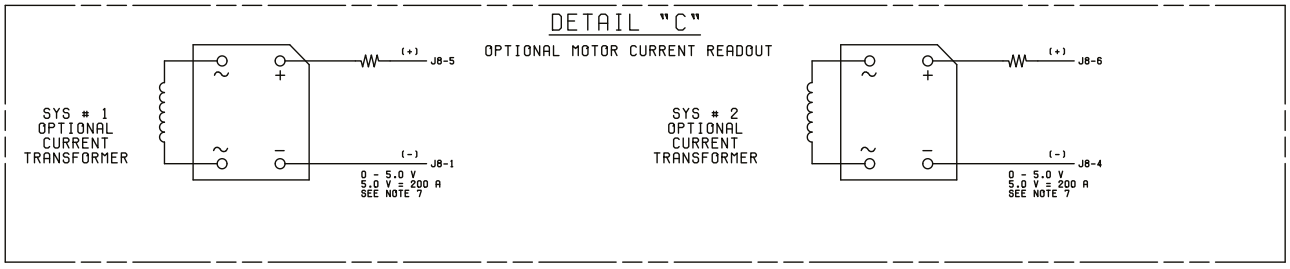
DETAIL "B"

TYPICAL FOR INTERNALLY PROTECTED MOTORS



DETAIL "C"

OPTIONAL MOTOR CURRENT READOUT



POWER OPTIONS CONNECTION DIAGRAMS

YCAL0019-YCAL0022 LOW SOUND (200V, 230V, 380V, 460V AND 575V)

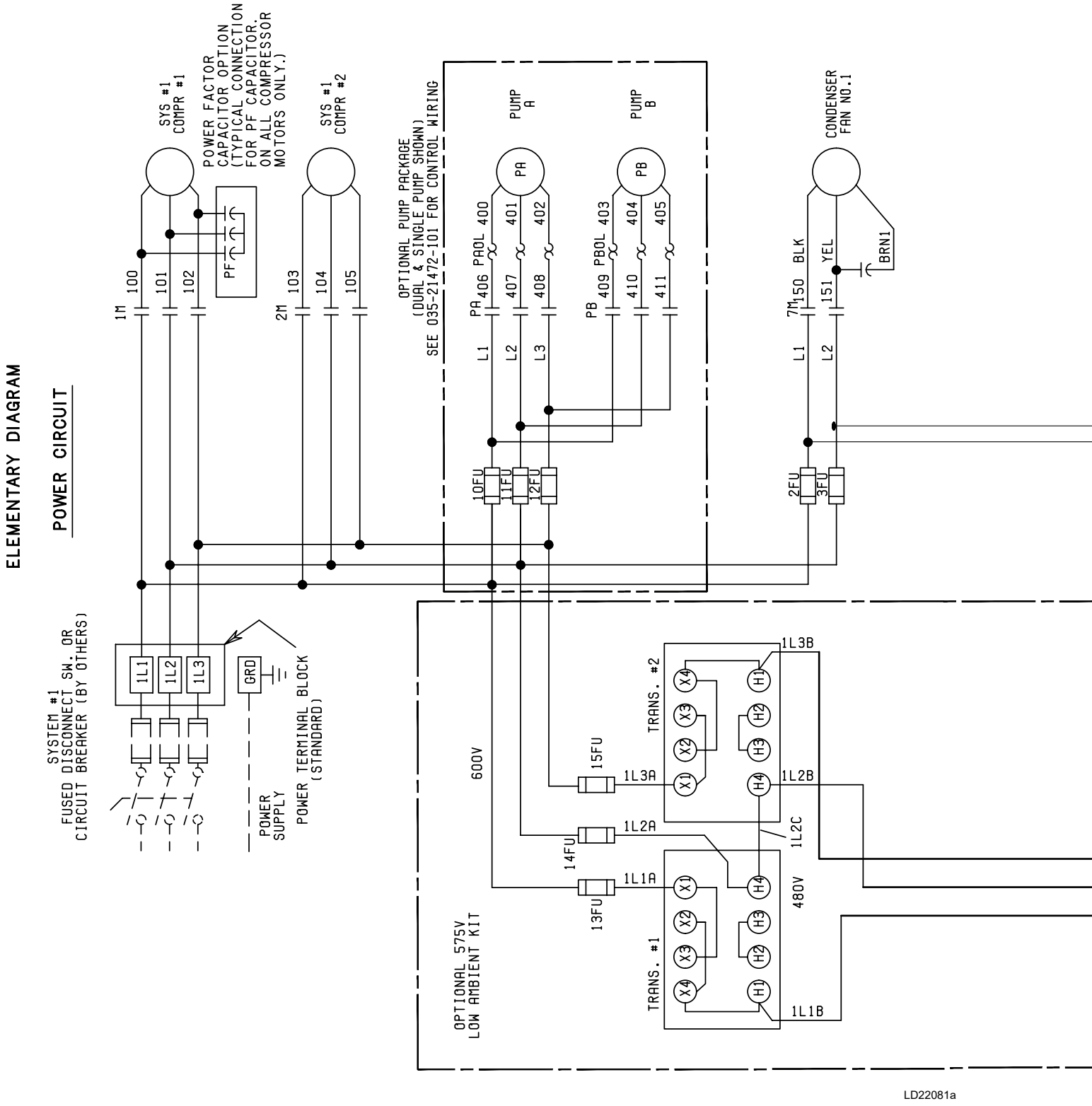
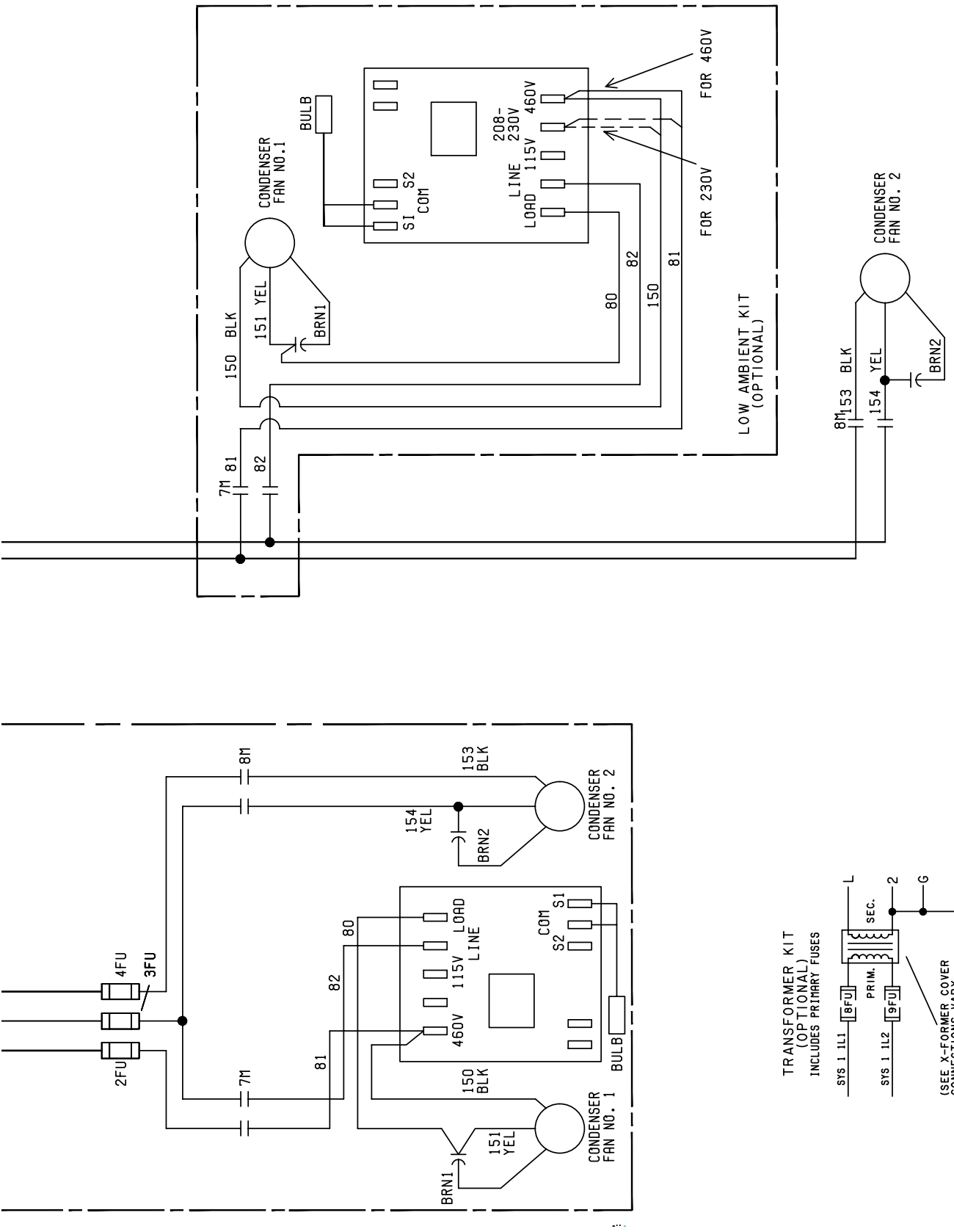


FIGURE 18 - POWER WIRING, SINGLE CIRCUIT

035-21487-102
REV A



LD22081b

YCAL0019-YCAL0022 LOW SOUND (380-415V/3/50)

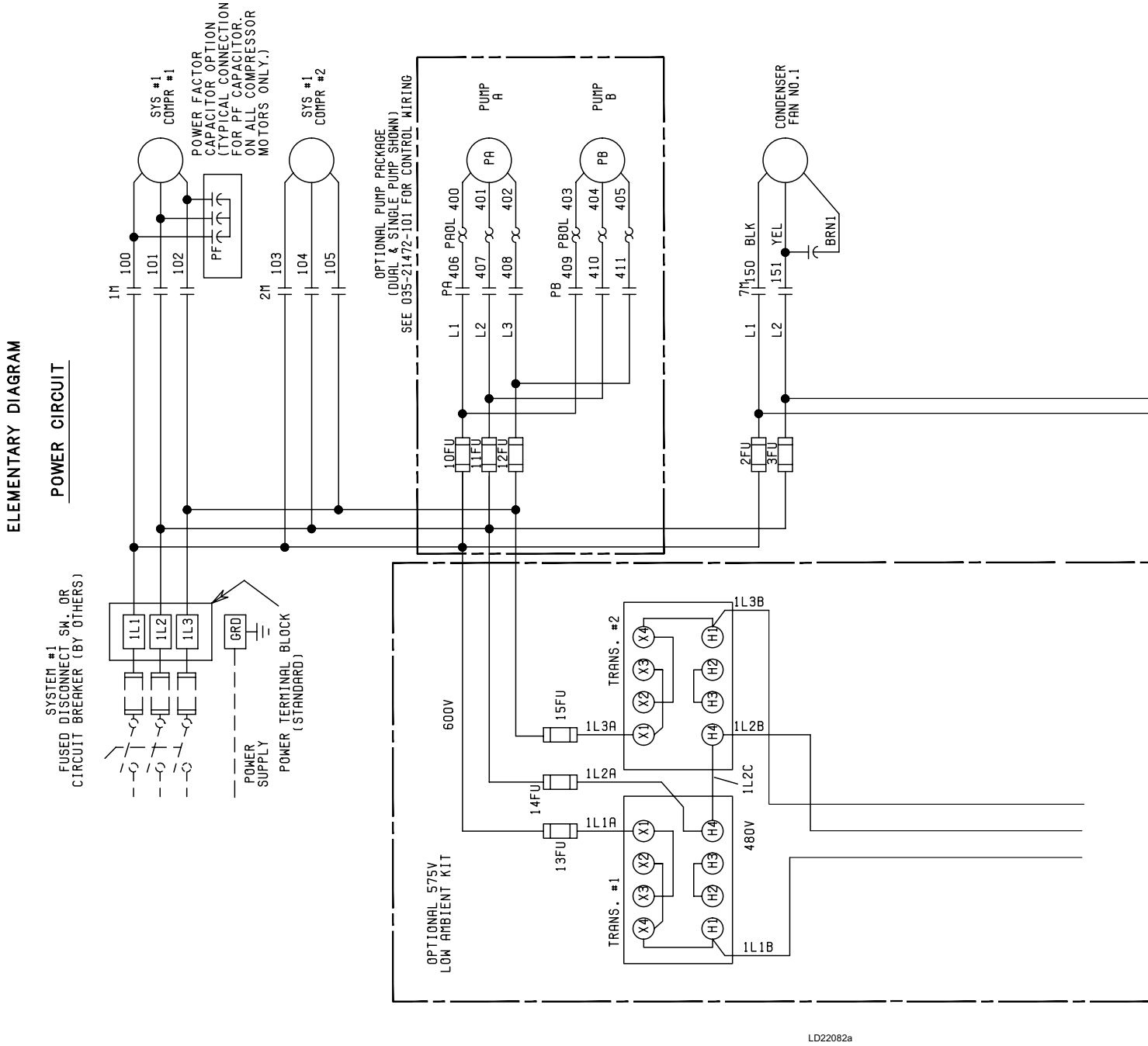
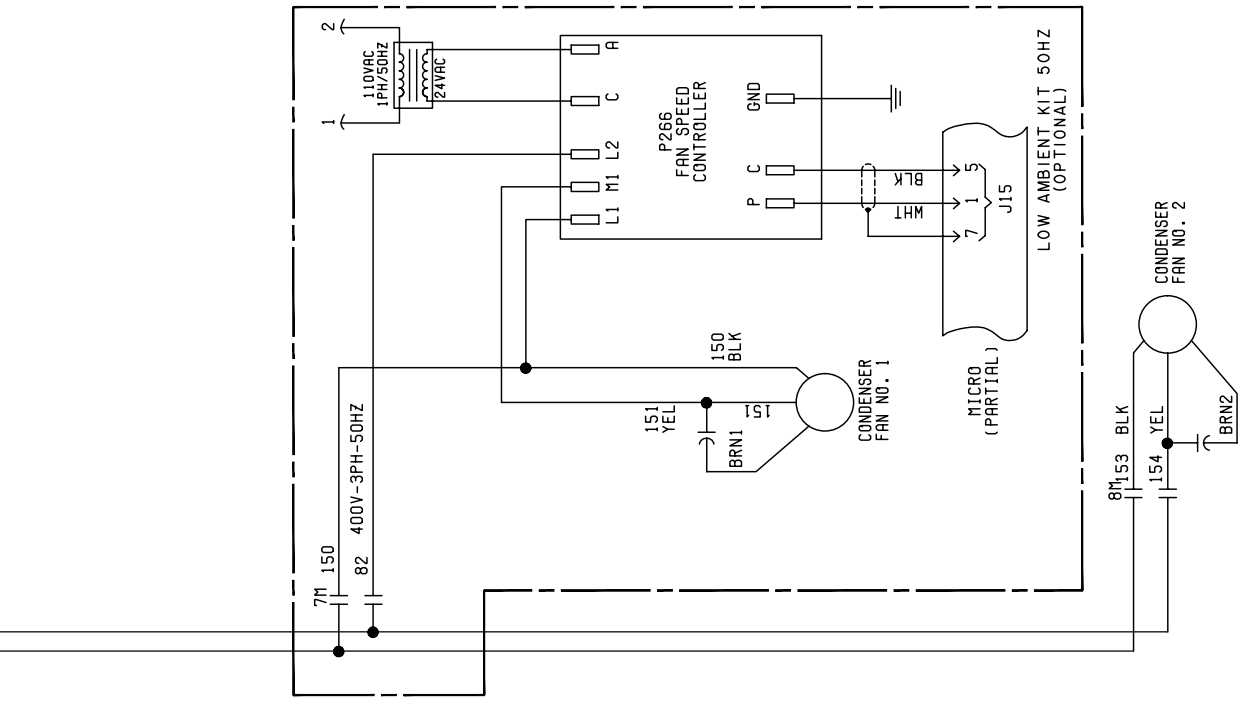
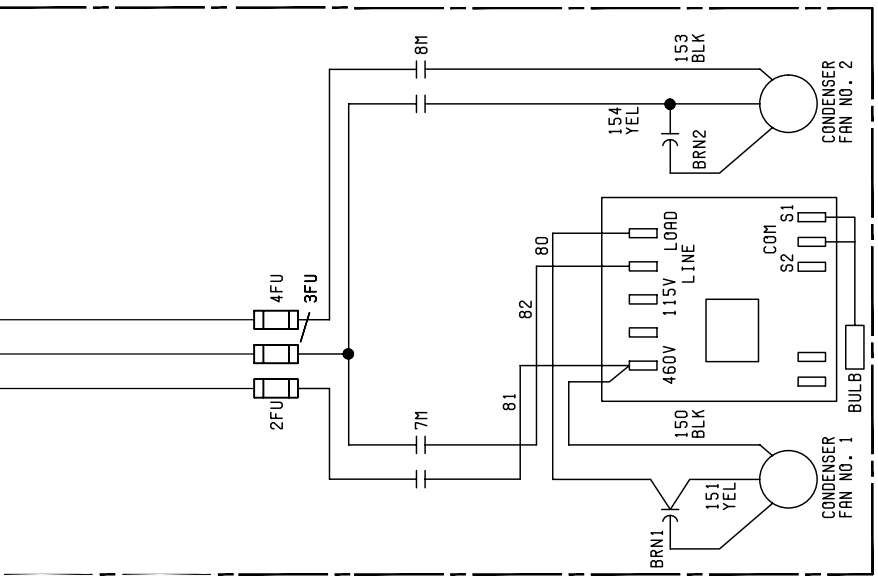
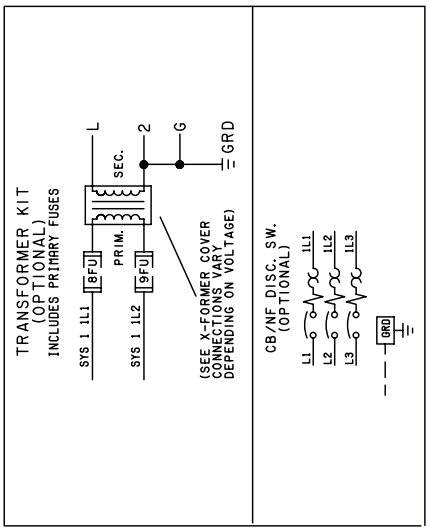


FIGURE 19 - POWER WIRING, SINGLE CIRCUIT

035-21487-105
REV B







LD22082b

YCAL0028-YCAL0033 LOW SOUND
YCAL0028-YCAL0033 ULTRA LOW SOUND (460V AND 380-415V/3/50)

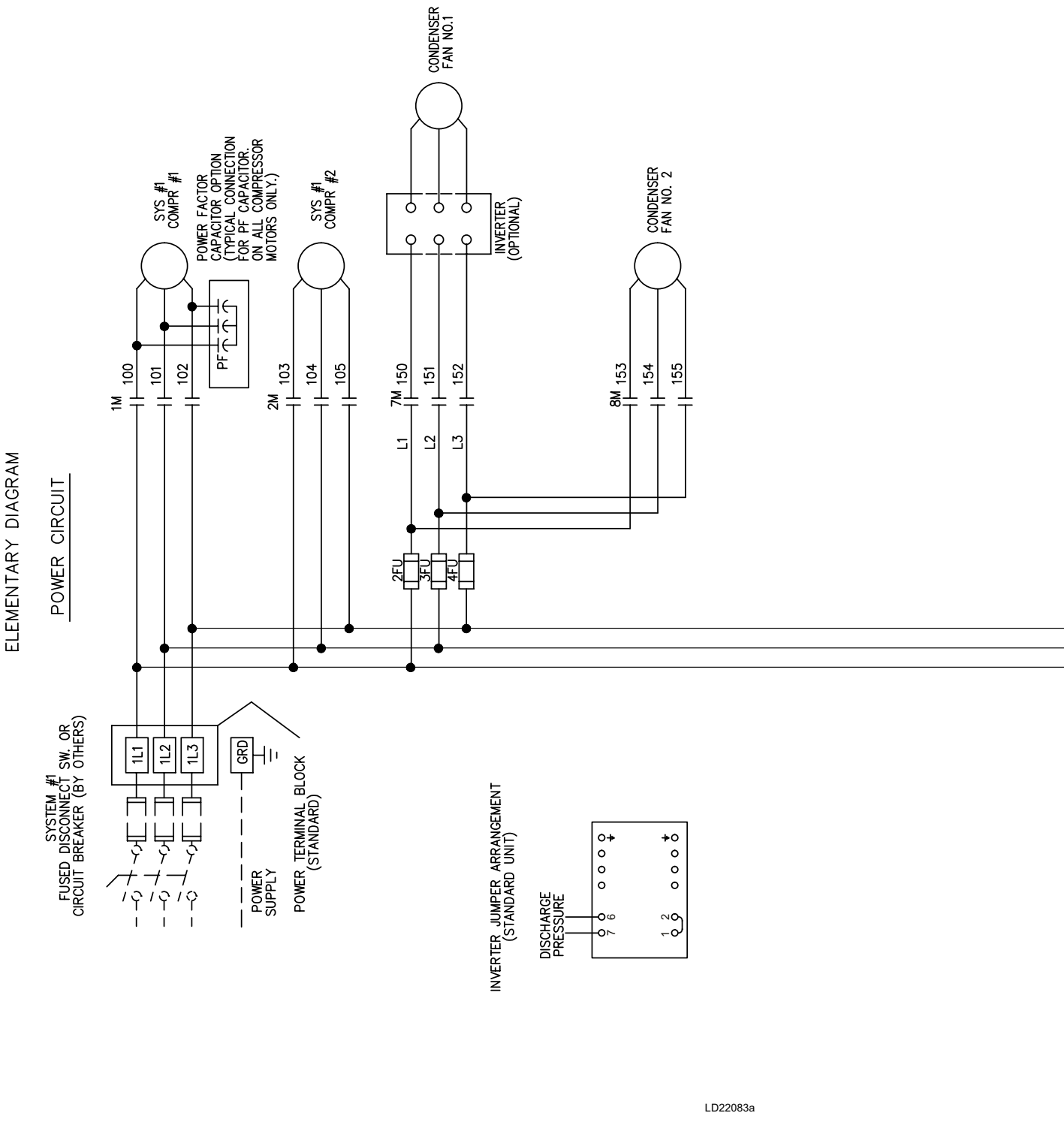
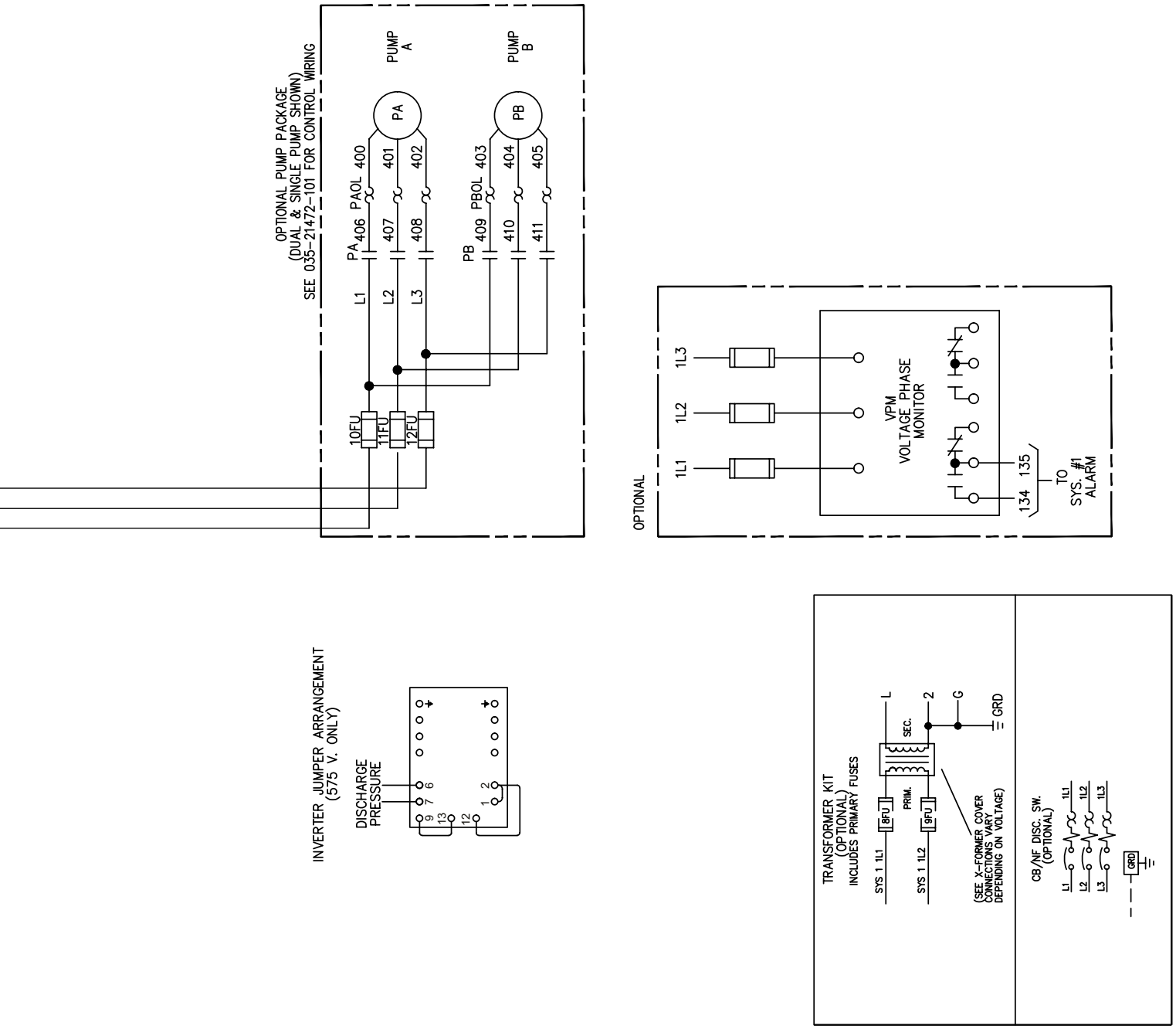


FIGURE 20 - POWER WIRING, SINGLE CIRCUIT

035-21472-102
REV D



LD22083b

YCAL0028-YCAL0033 ULTRA LOW SOUND (200V, 230V, 380V AND 575V)

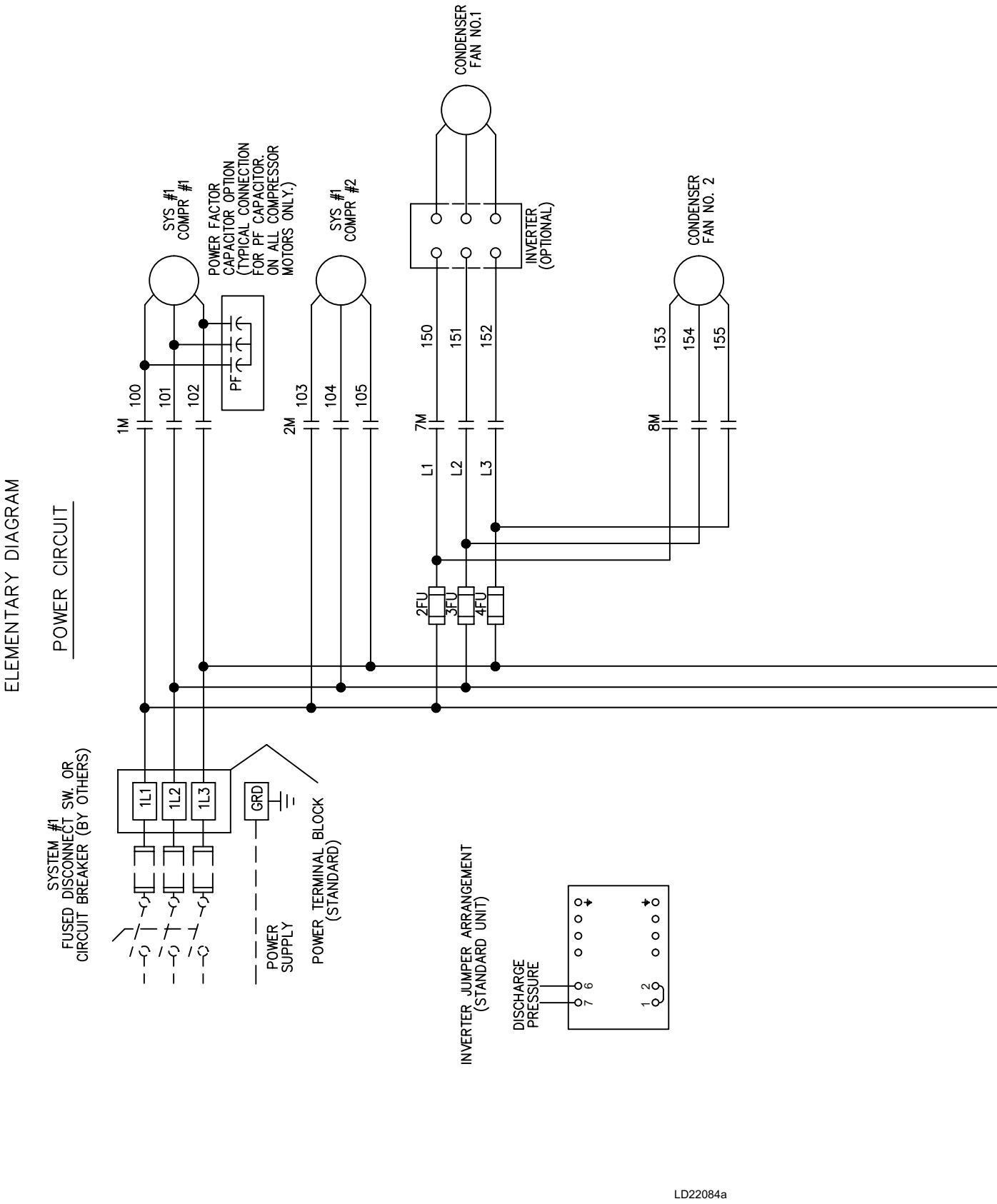
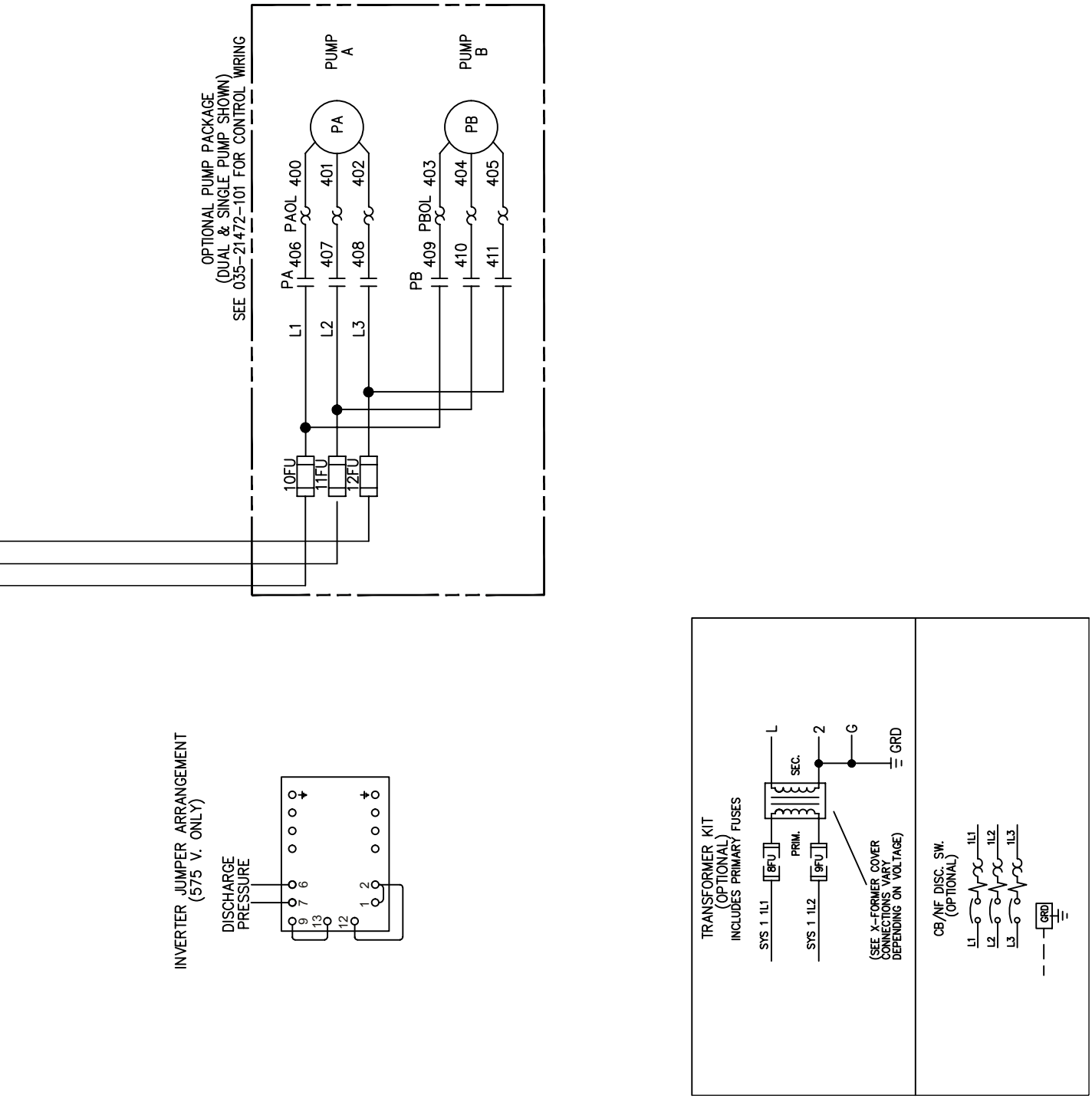


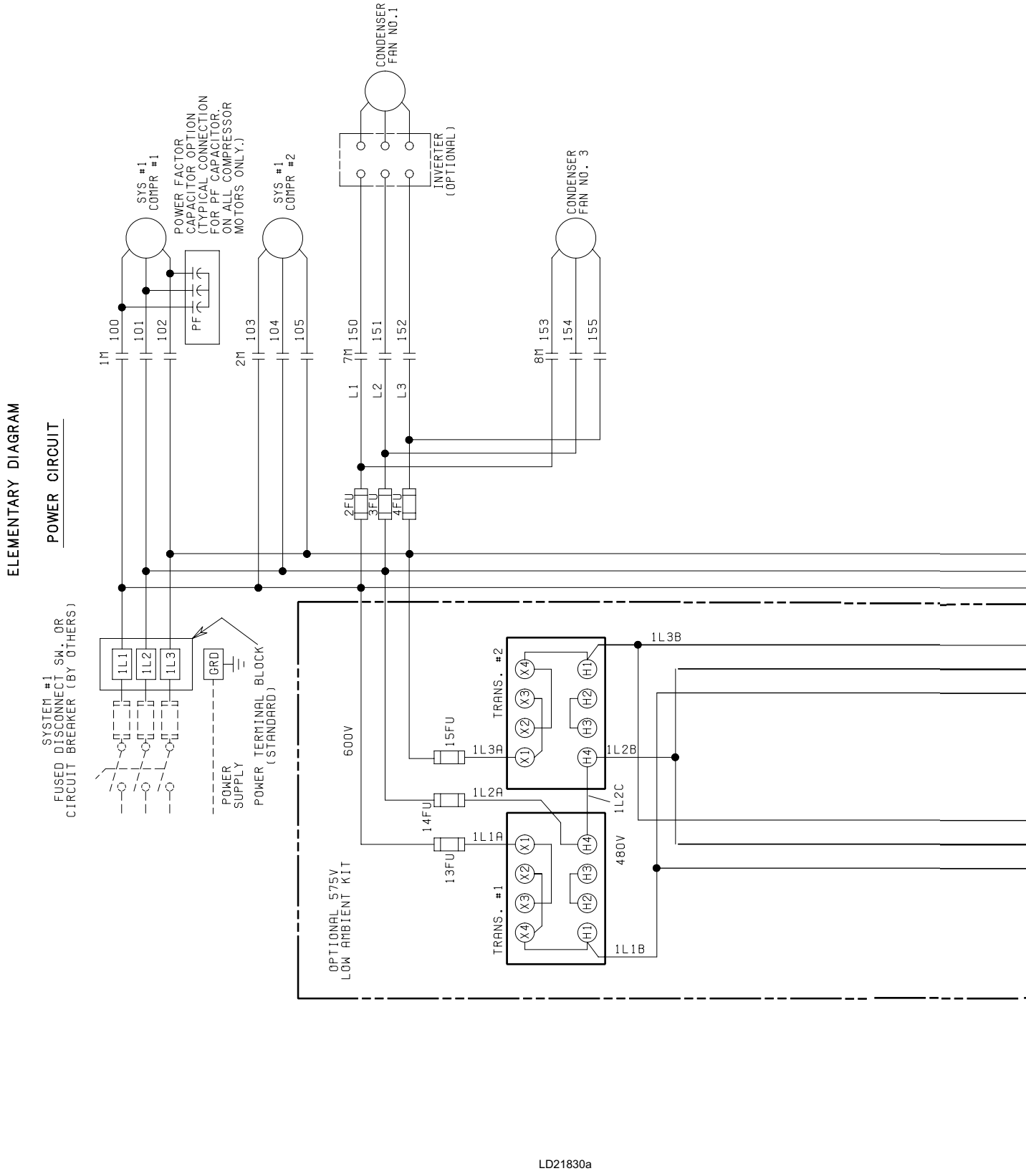
FIGURE 21 - POWER WIRING, SINGLE CIRCUIT

035-21585-102
REV C



LD22083b

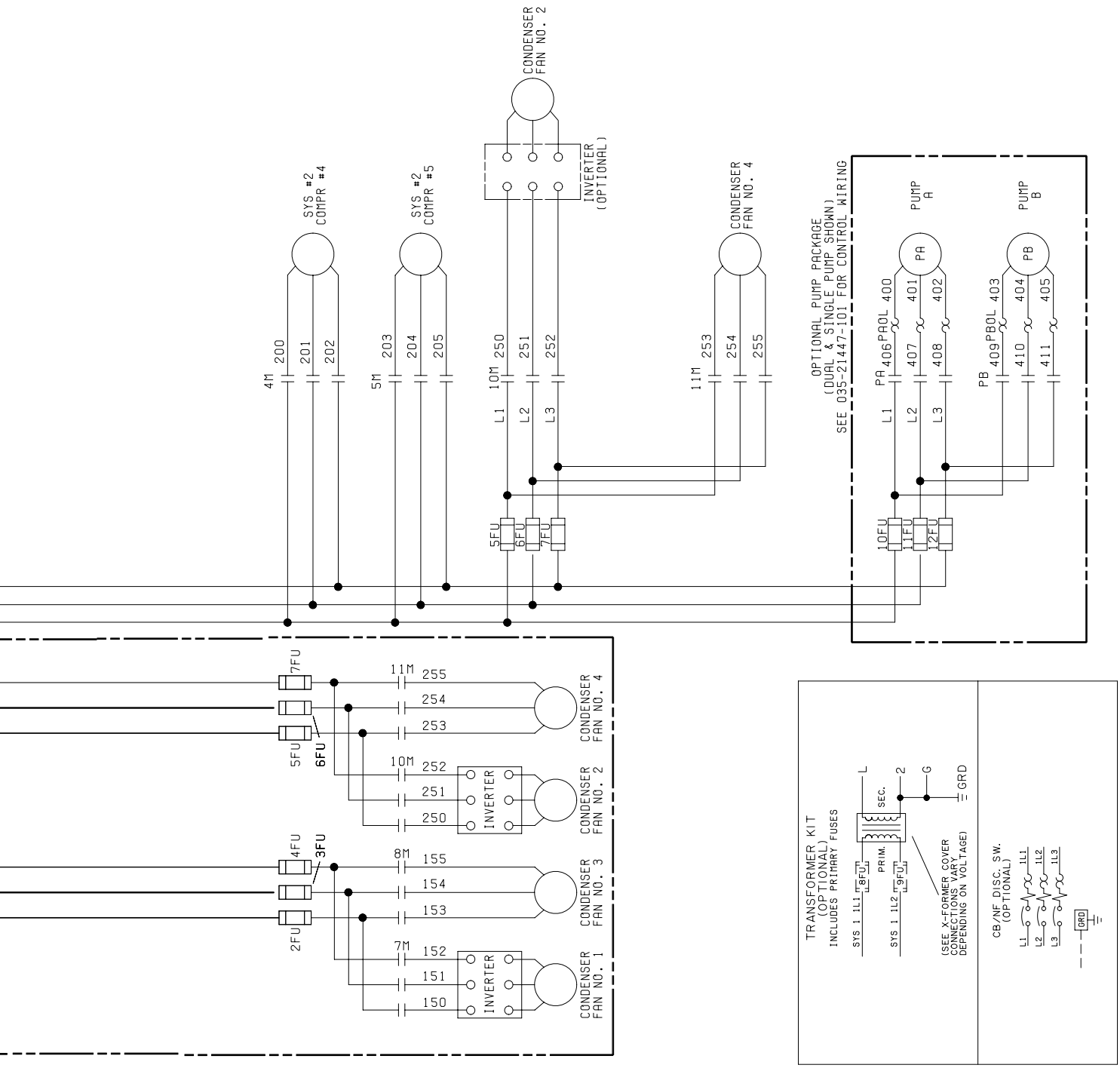
YCAL0043-YCAL0052 LOW SOUND
YCAL0043-YCAL0052 ULTRA LOW SOUND (460V AND 380-415V 50 HZ)



LD21830a

FIGURE 22 - POWER WIRING, DUAL CIRCUIT

035-21447-102
REV A



LD21830b

YCAL0056-YCAL0066 LOW SOUND
YCAL0043-YCAL0052 ULTRA LOW SOUND (200V, 230V, 380V AND 575V)

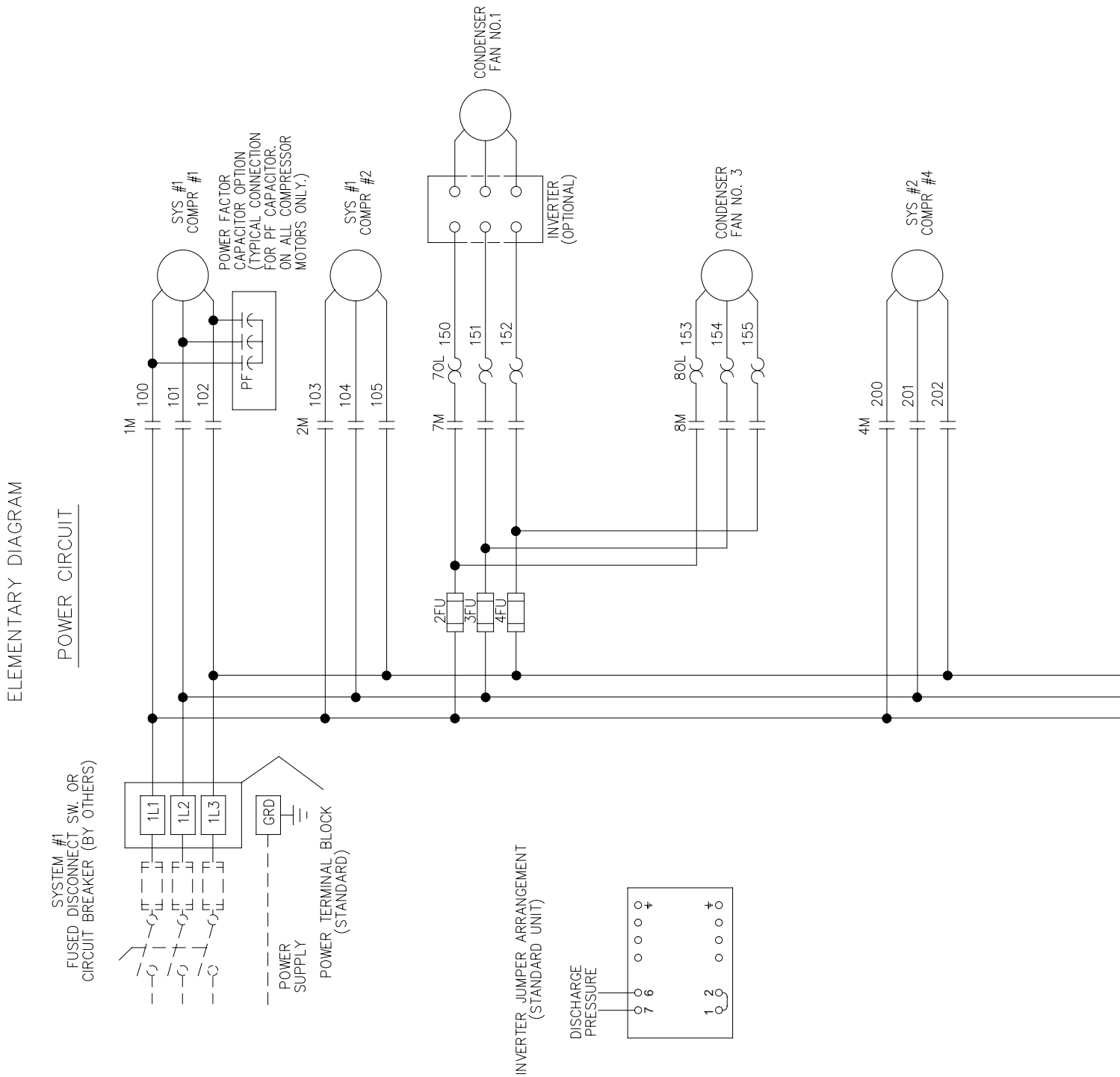
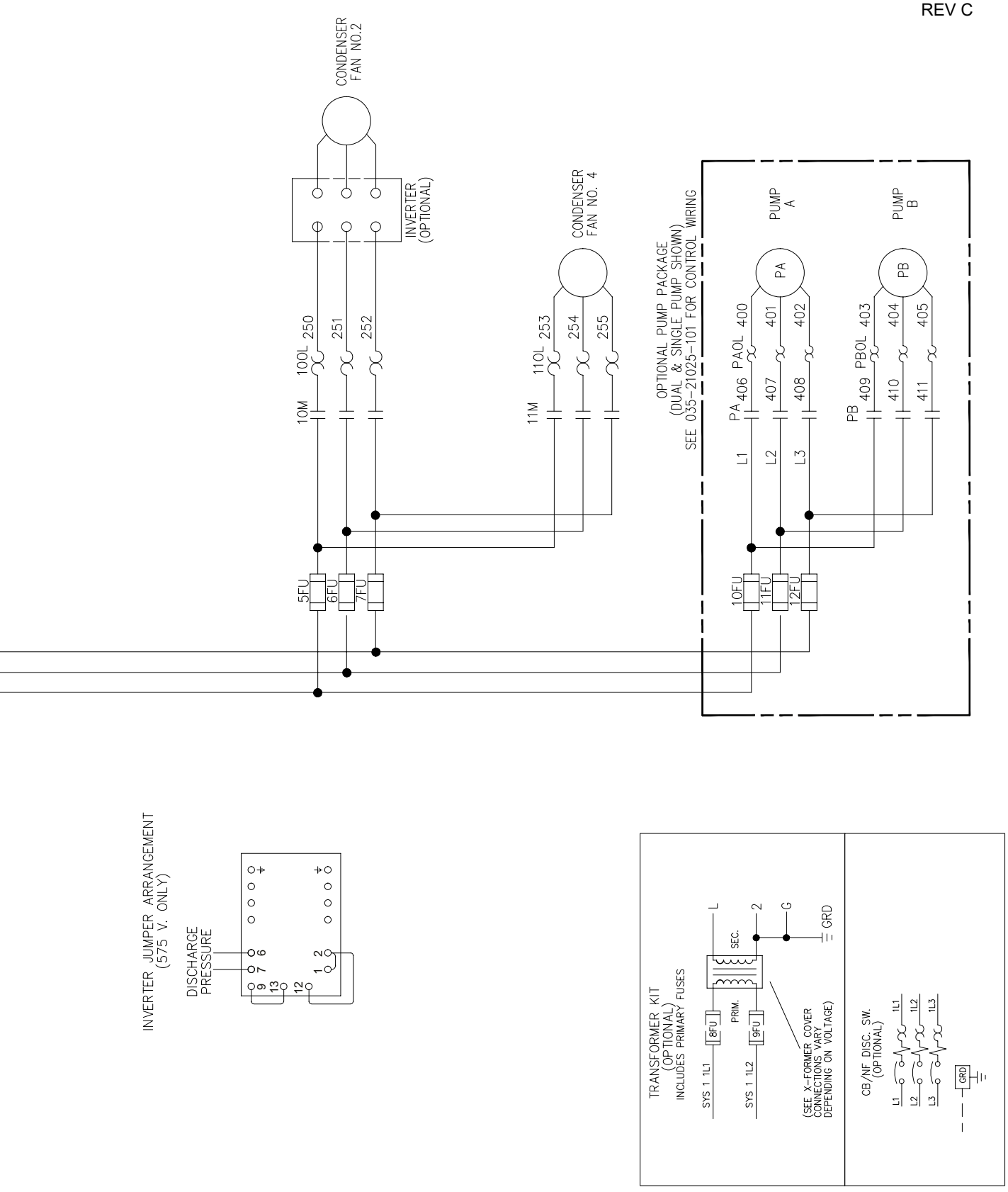


FIGURE 23 - POWER WIRING, DUAL CIRCUIT

LD22086a

035-21025-102
REV C



LD22085b

CONNECTION WIRING DIAGRAMS
YCAL0019-YCAL0022 LOW SOUND (200V, 230V, 380V, 460V AND 575V)

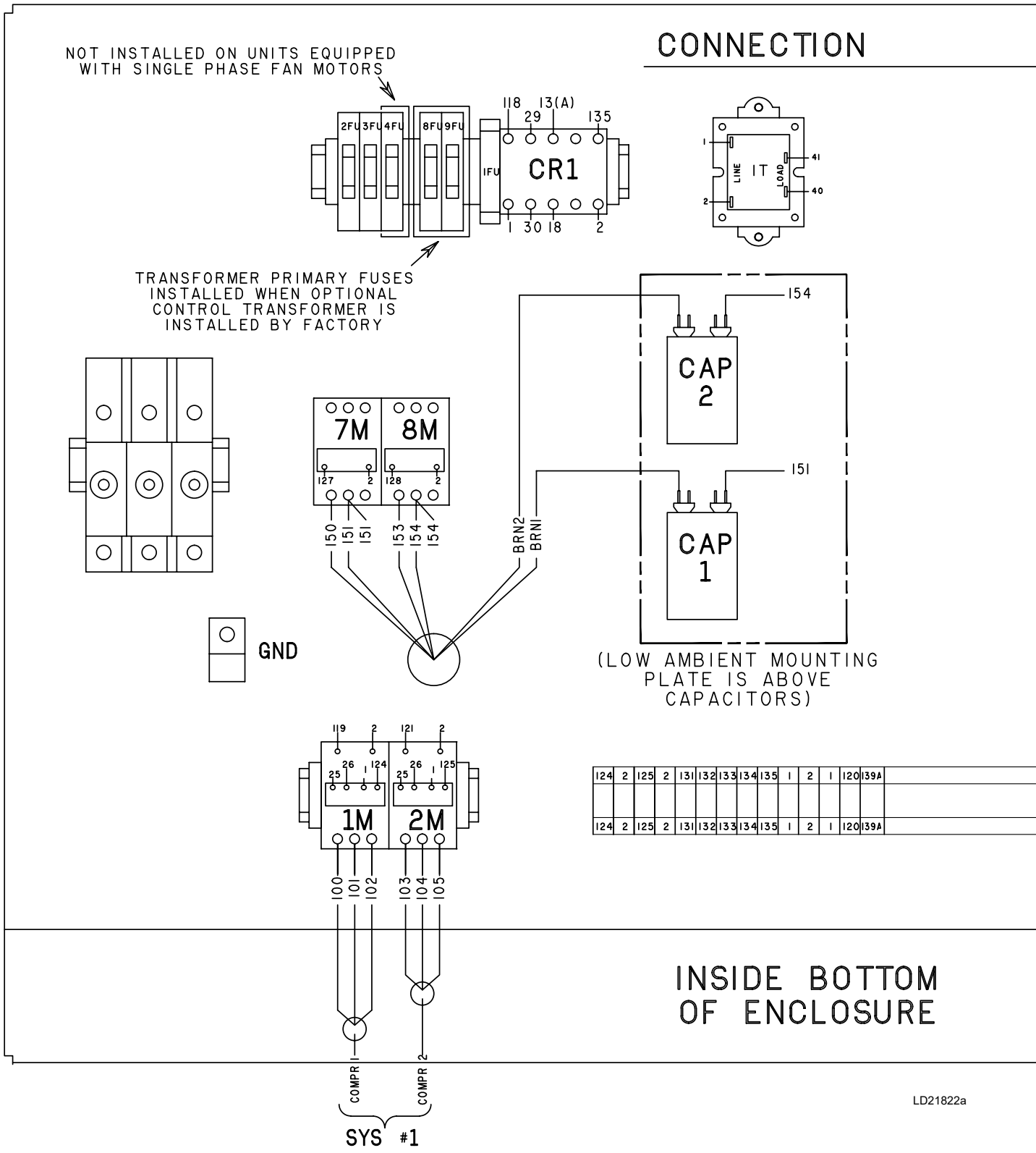
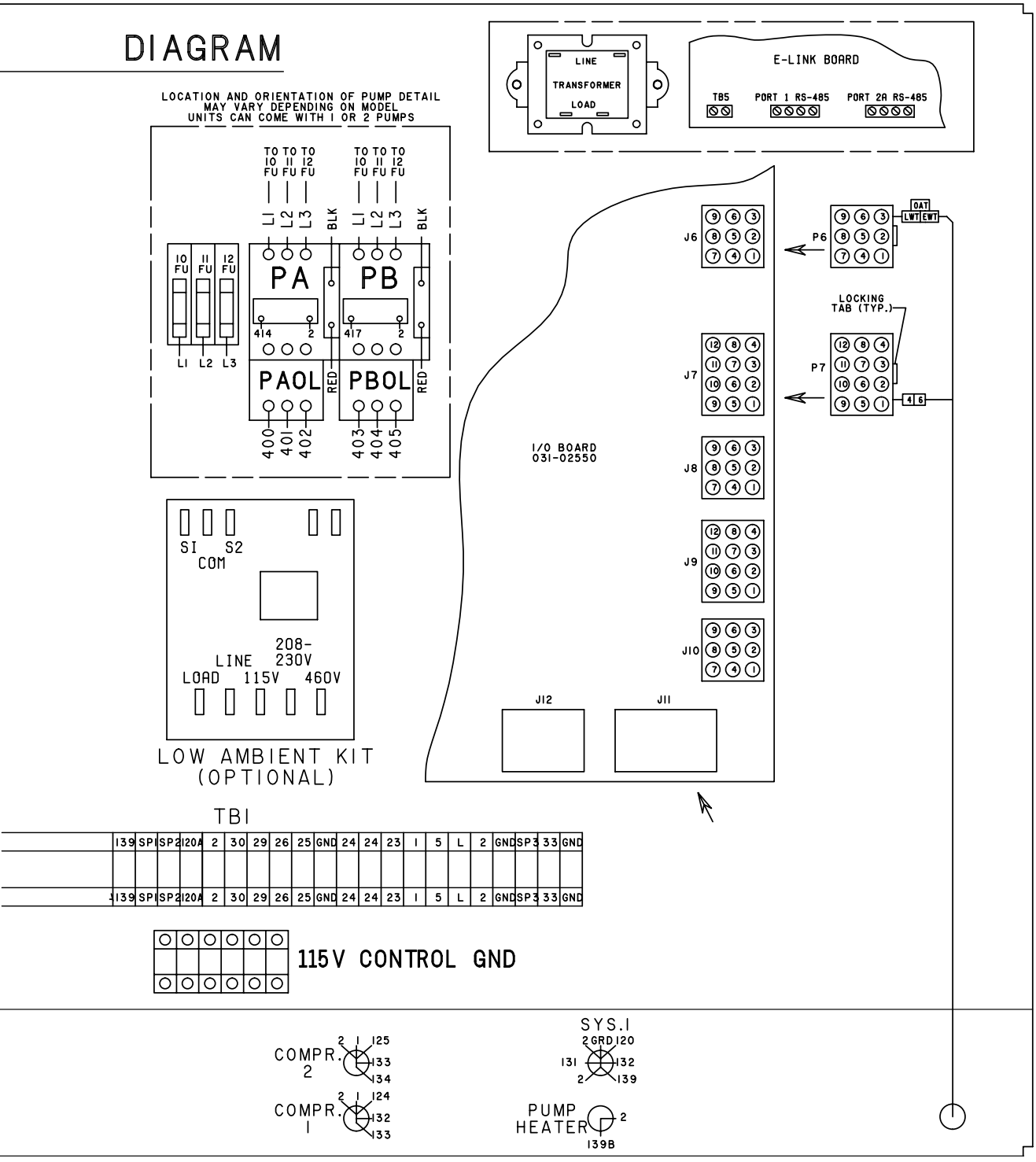


FIGURE 24 - CONNECTION WIRING, SINGLE CIRCUIT

035-21487-404
REV C

DIAGRAM



LD21822b

YCAL0019-YCAL0022 LOW SOUND (380-415V/3/50)

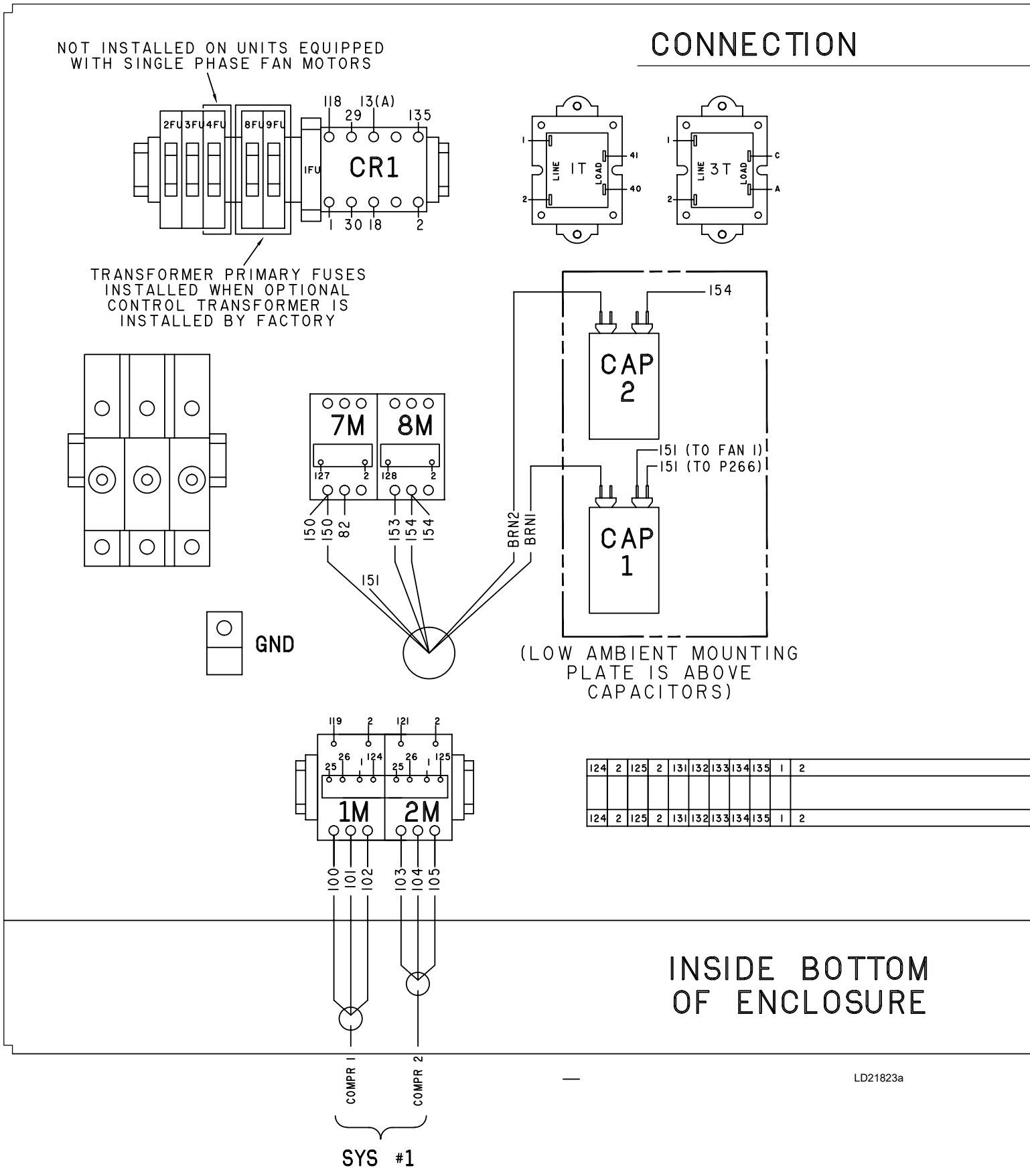
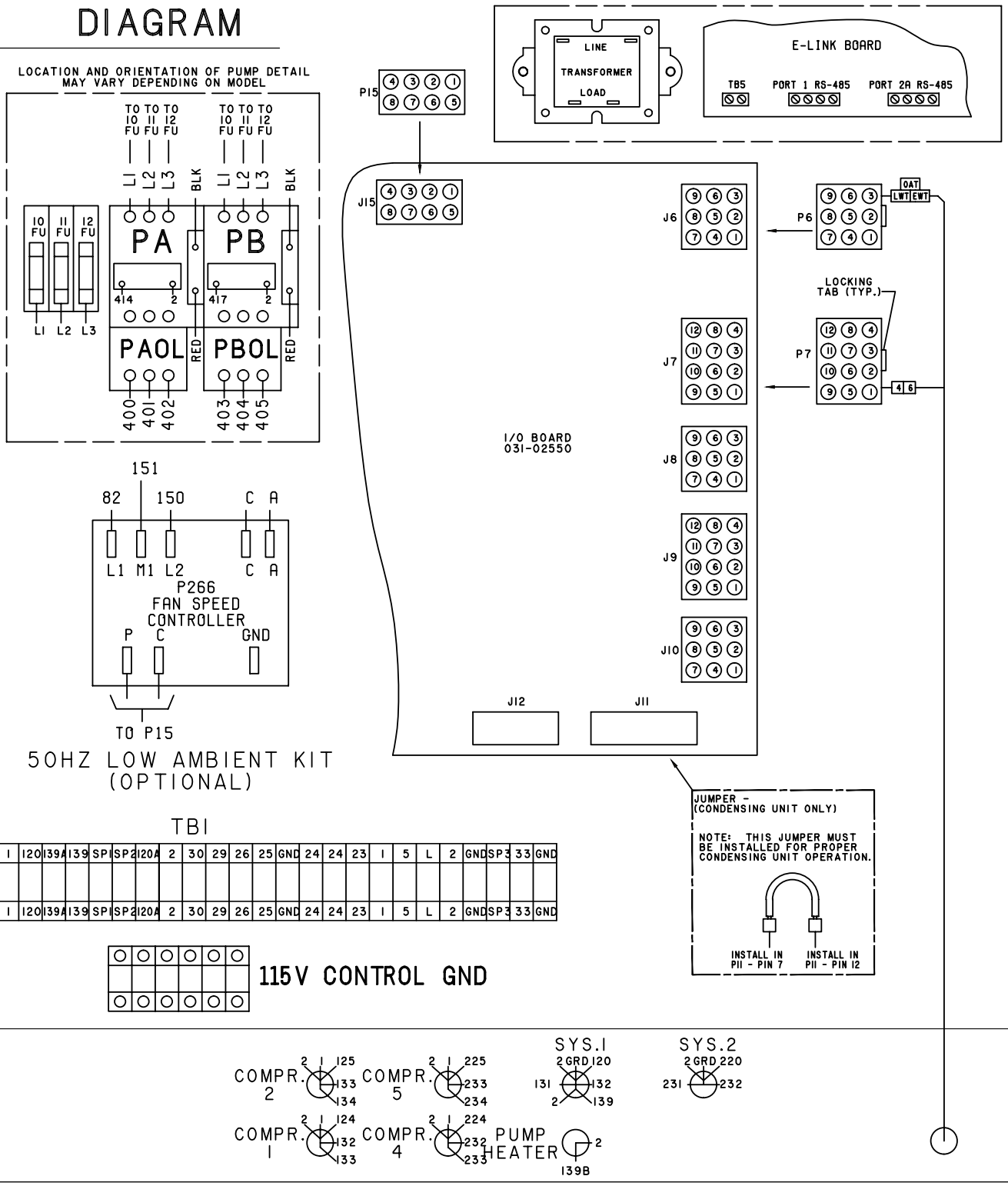


FIGURE 25 - CONNECTION WIRING, SINGLE CIRCUIT

035-21487-406
Rev D

DIAGRAM



LD21823b

YCAL0028-YCAL0033 LOW SOUND
YCAL0028-YCAL0033 ULTRA LOW SOUND (460V AND 380-415V/3/50)

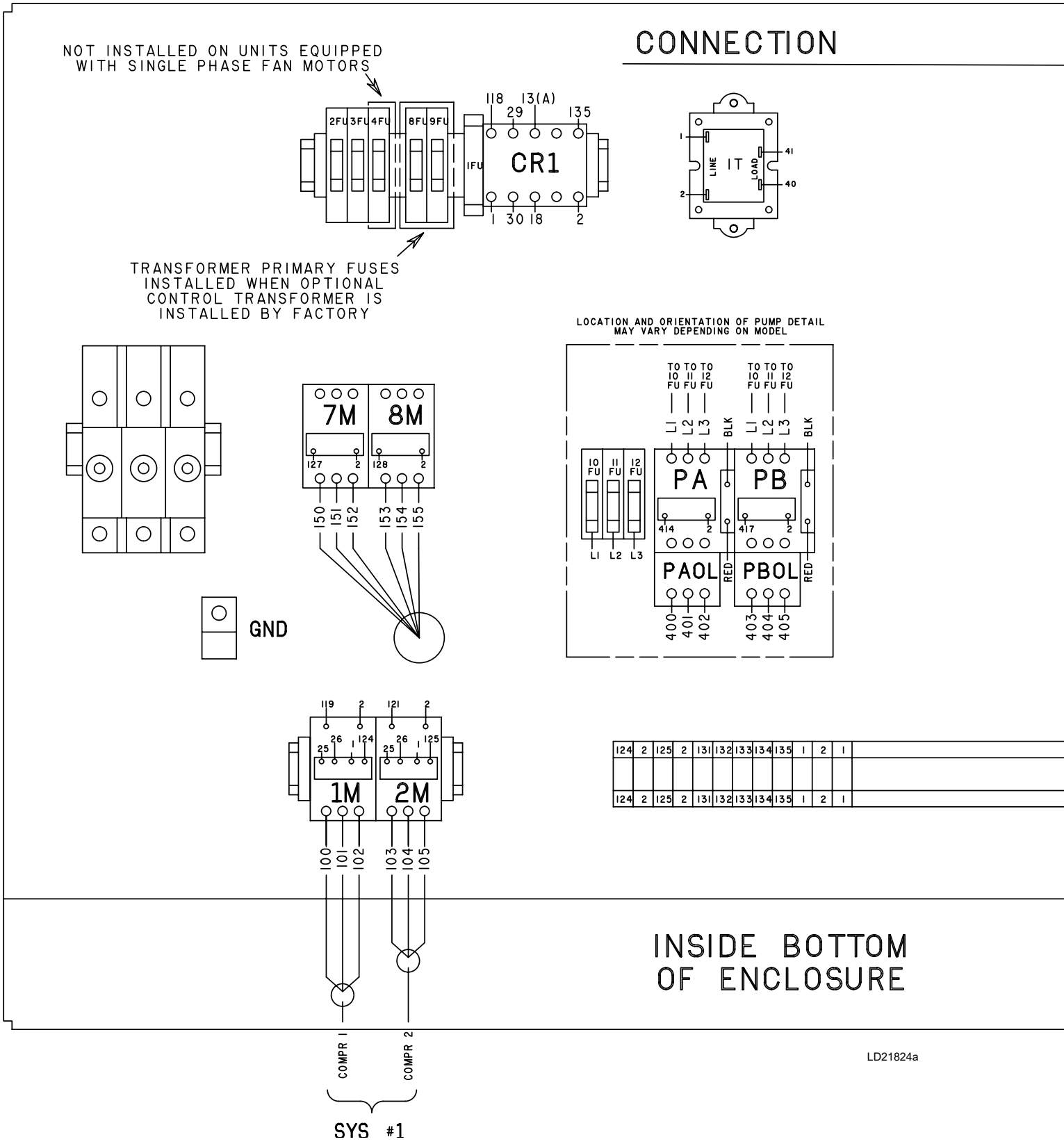
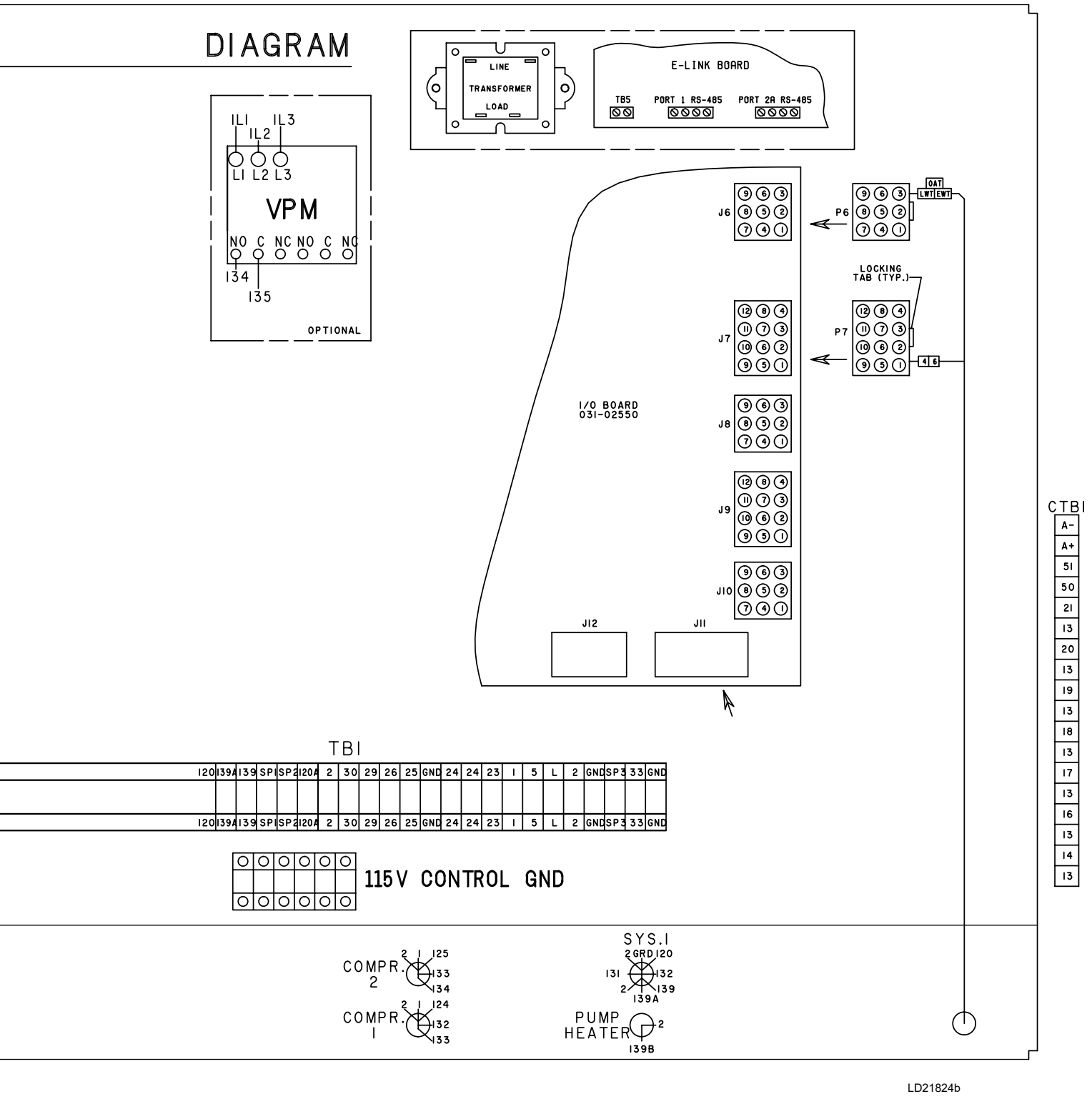


FIGURE 26 - CONNECTION WIRING, SINGLE CIRCUIT

035-21472-404
REV C

DIAGRAM



LD21824b

YCAL0028-YCAL0033 ULTRA LOW SOUND (200V, 230V, 380V AND 575V)

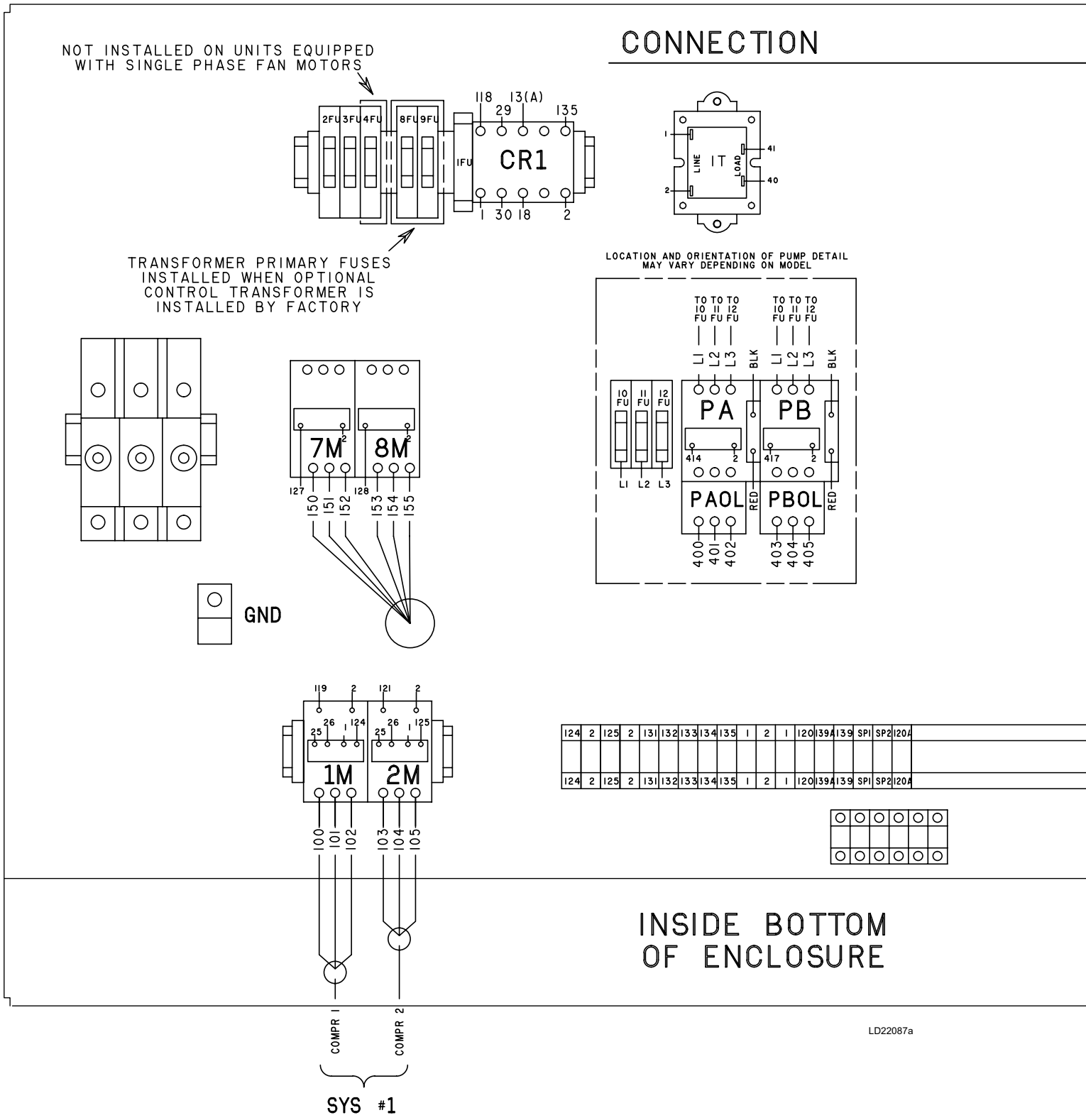
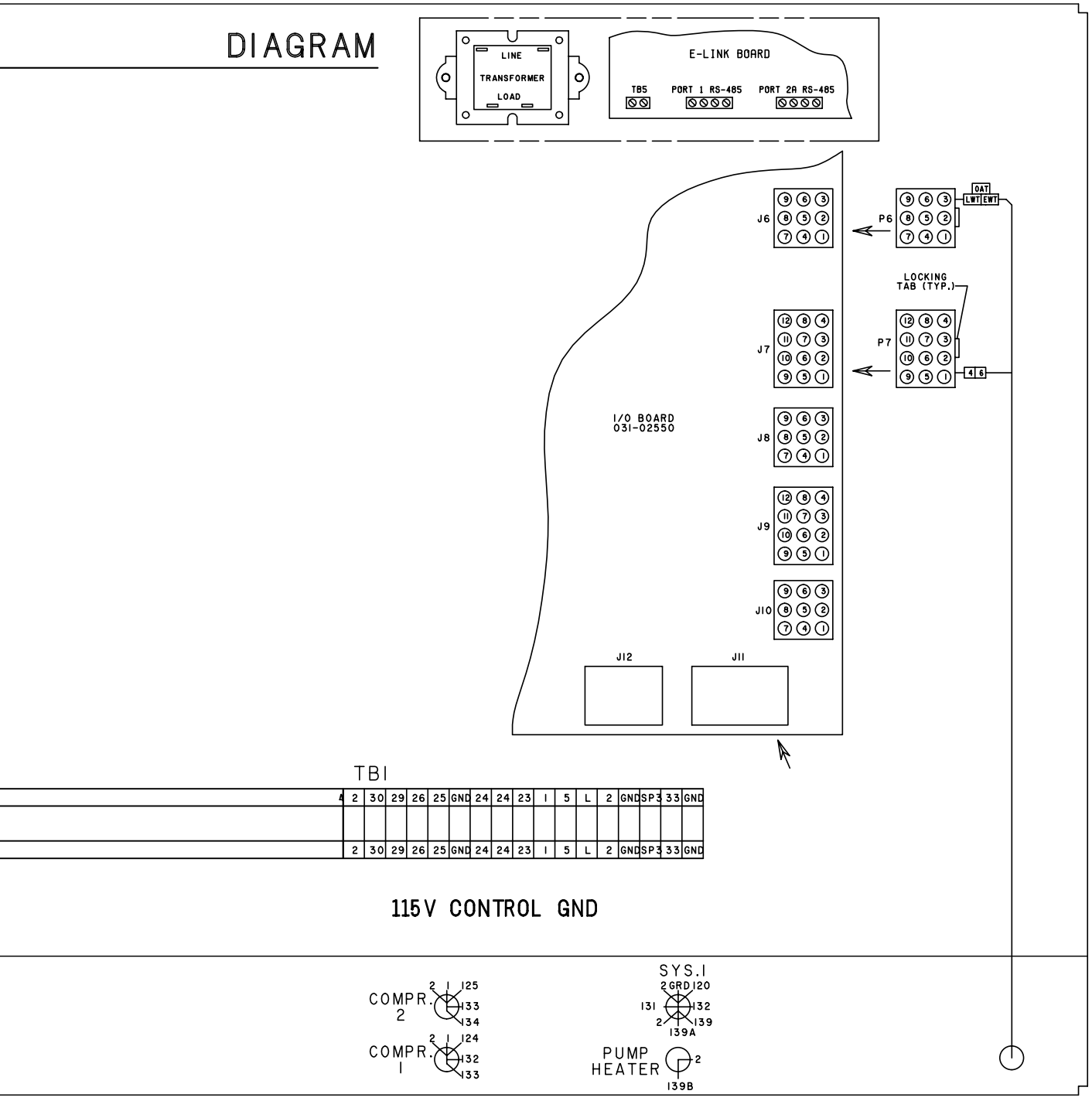


FIGURE 27 - CONNECTION WIRING, SINGLE CIRCUIT

035-21585-404
REV D

DIAGRAM



LD22087b

YCAL0043-YCAL0052 LOW SOUND
YCAL0043-YCAL0052 ULTRA LOW SOUND (460V AND 380-415V 50 HZ)

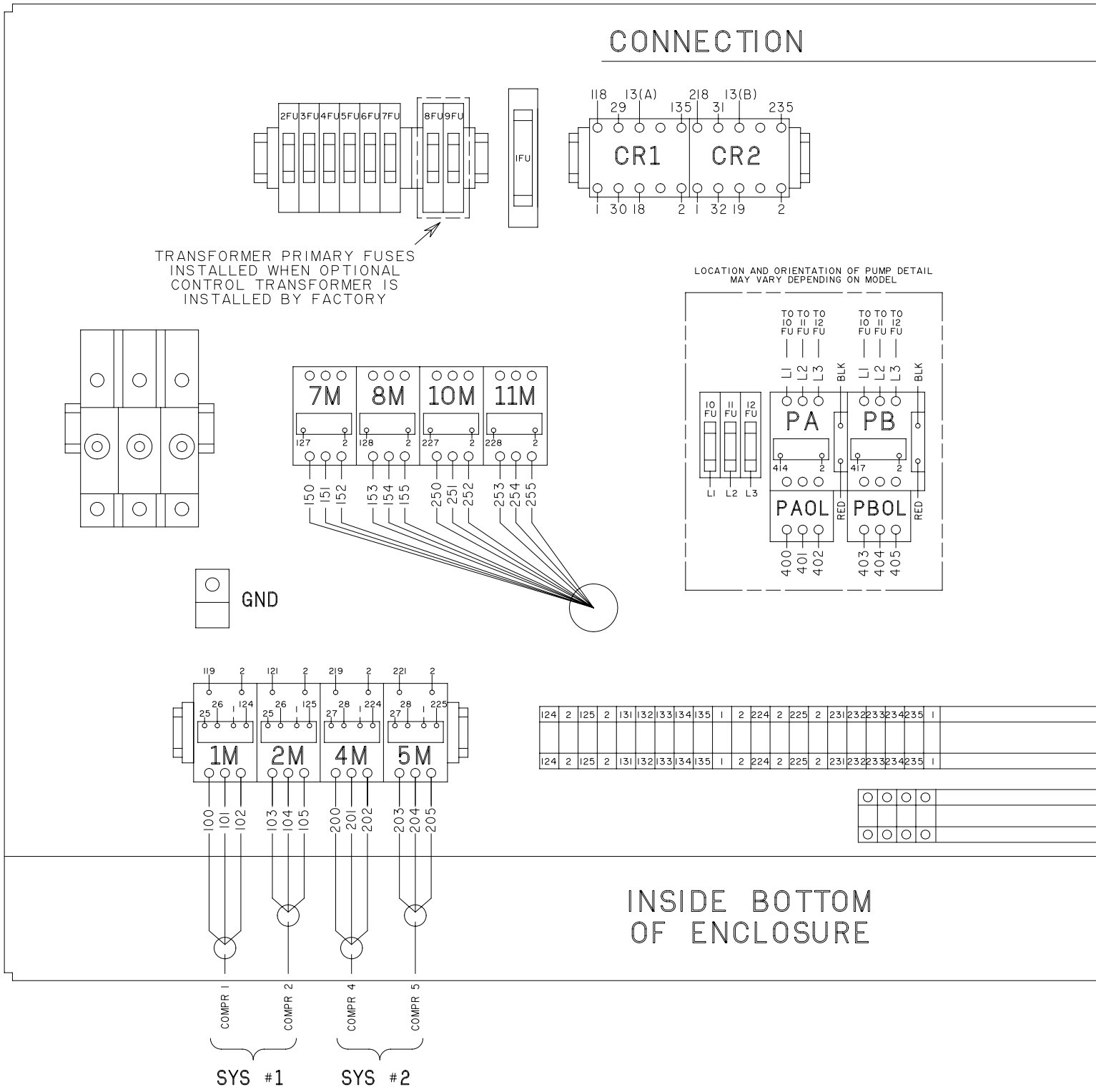
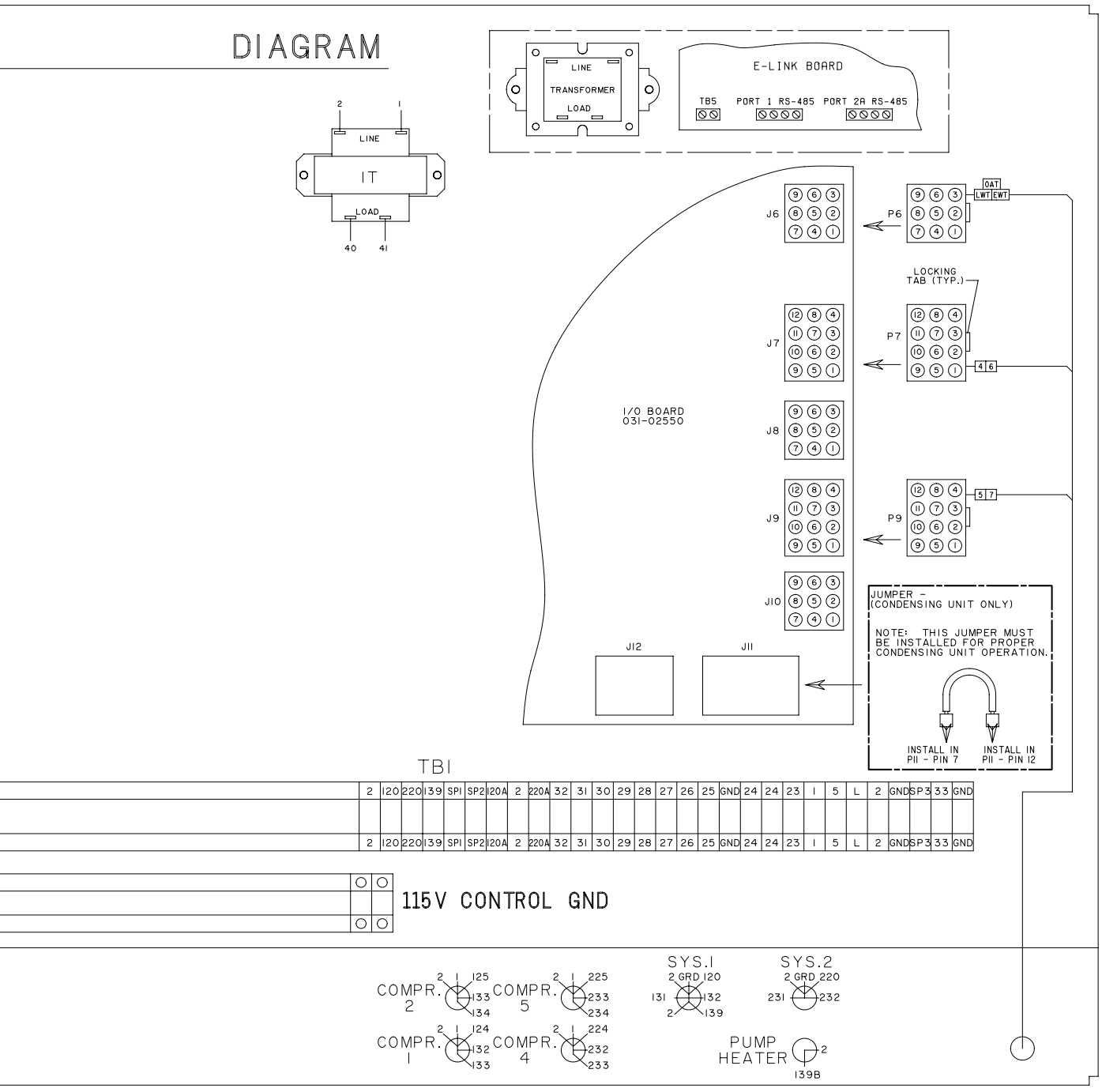


FIGURE 28 - CONNECTION WIRING, DUAL CIRCUIT

035-21447-404
REV B

DIAGRAM



YCAL0056-YCAL0066 LOW SOUND
YCAL0043-YCAL0052 ULTRA LOW SOUND (200V, 230V, 380V AND 575V)

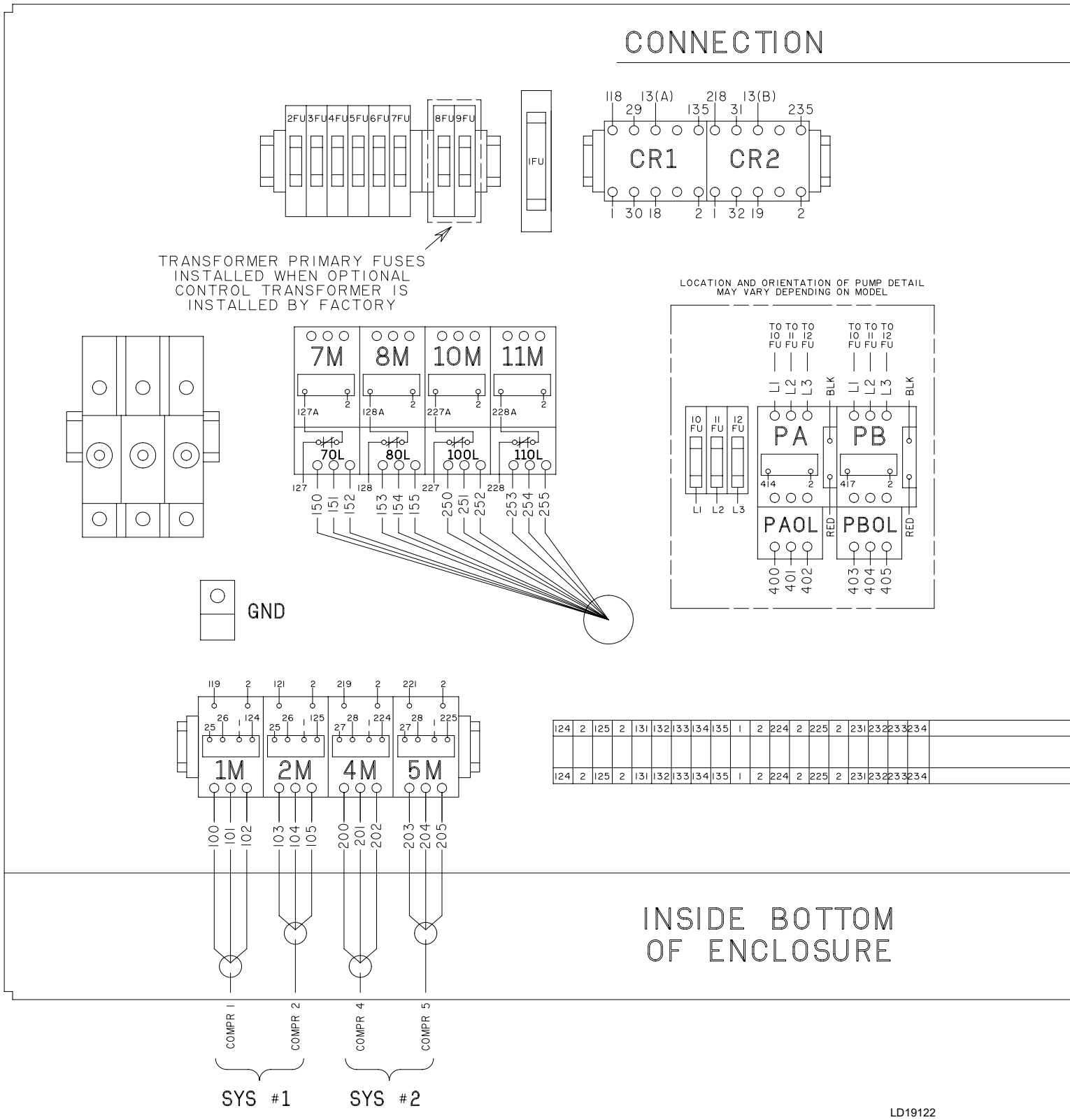
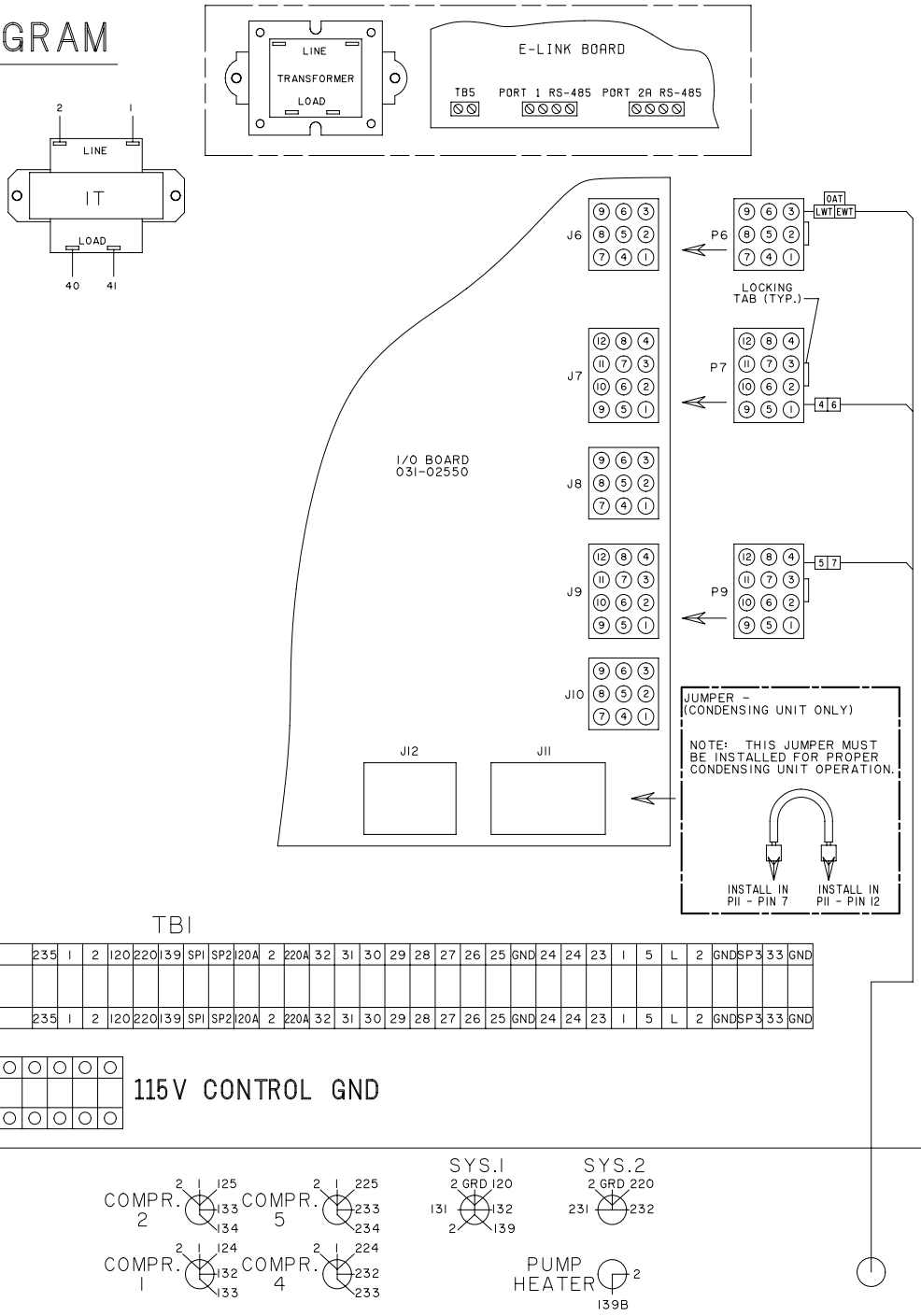


FIGURE 29 - CONNECTION WIRING, DUAL CIRCUIT

035-21586-404
REV B

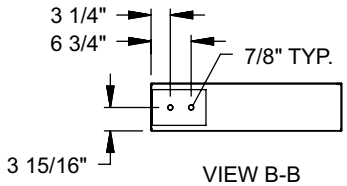
DIAGRAM



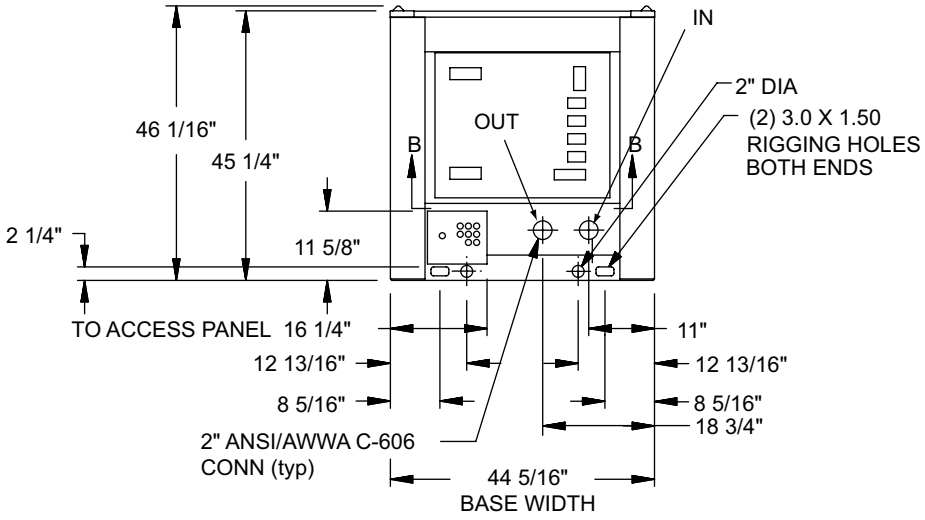
LD19123

DIMENSIONS (ENGLISH)

DIMENSIONS – YCAL0019 (ENGLISH)



VIEW B-B
BOTTOM OF PANEL

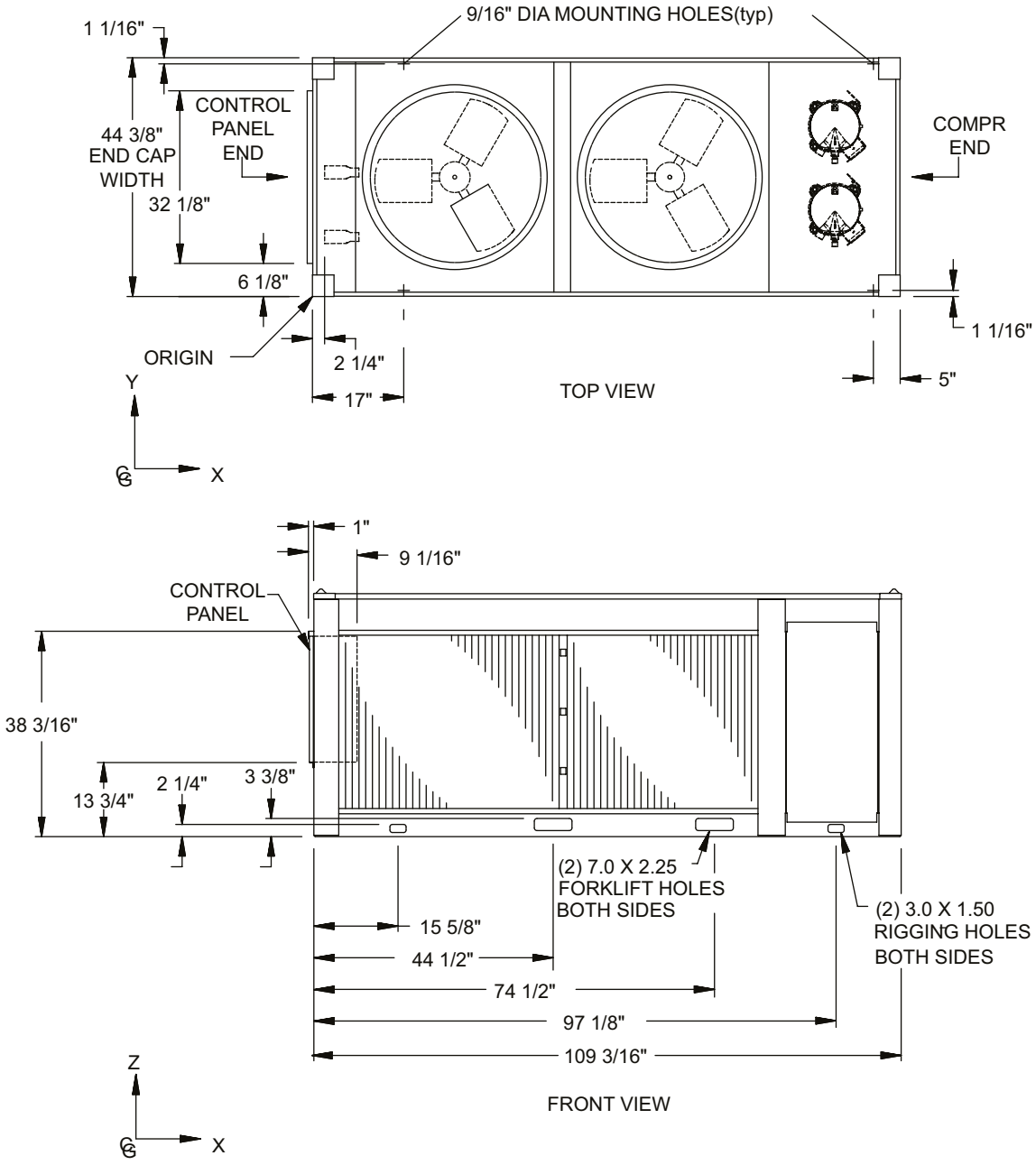


LEFT END
POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

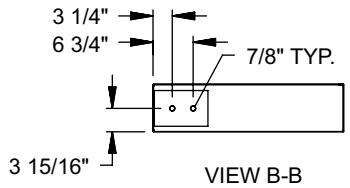
NOTE:

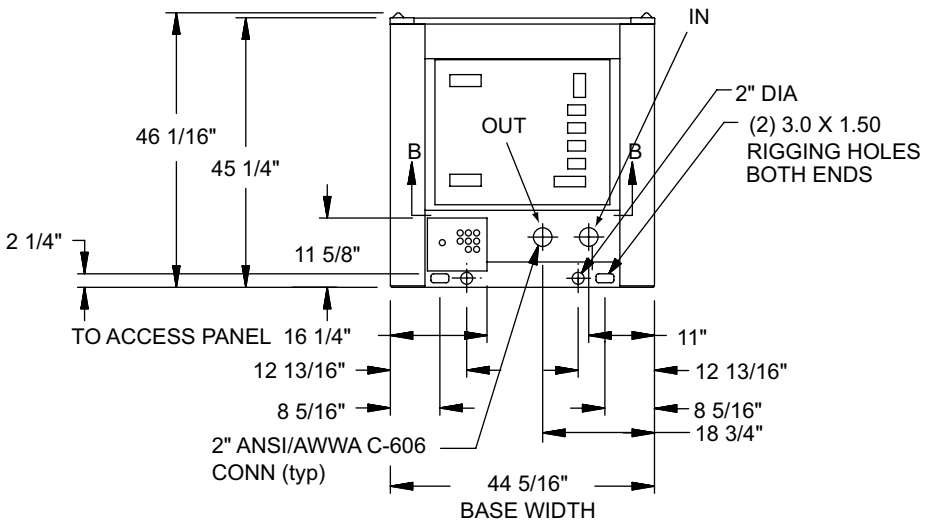
Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0 in.; coil end to wall – 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1 in. nominal deflection isolators (not shown) will increase overall unit height by 6 in..

DIMENSIONS – YCAL0019 (ENGLISH) (CONT'D)



DIMENSIONS – YCAL0022 (ENGLISH)





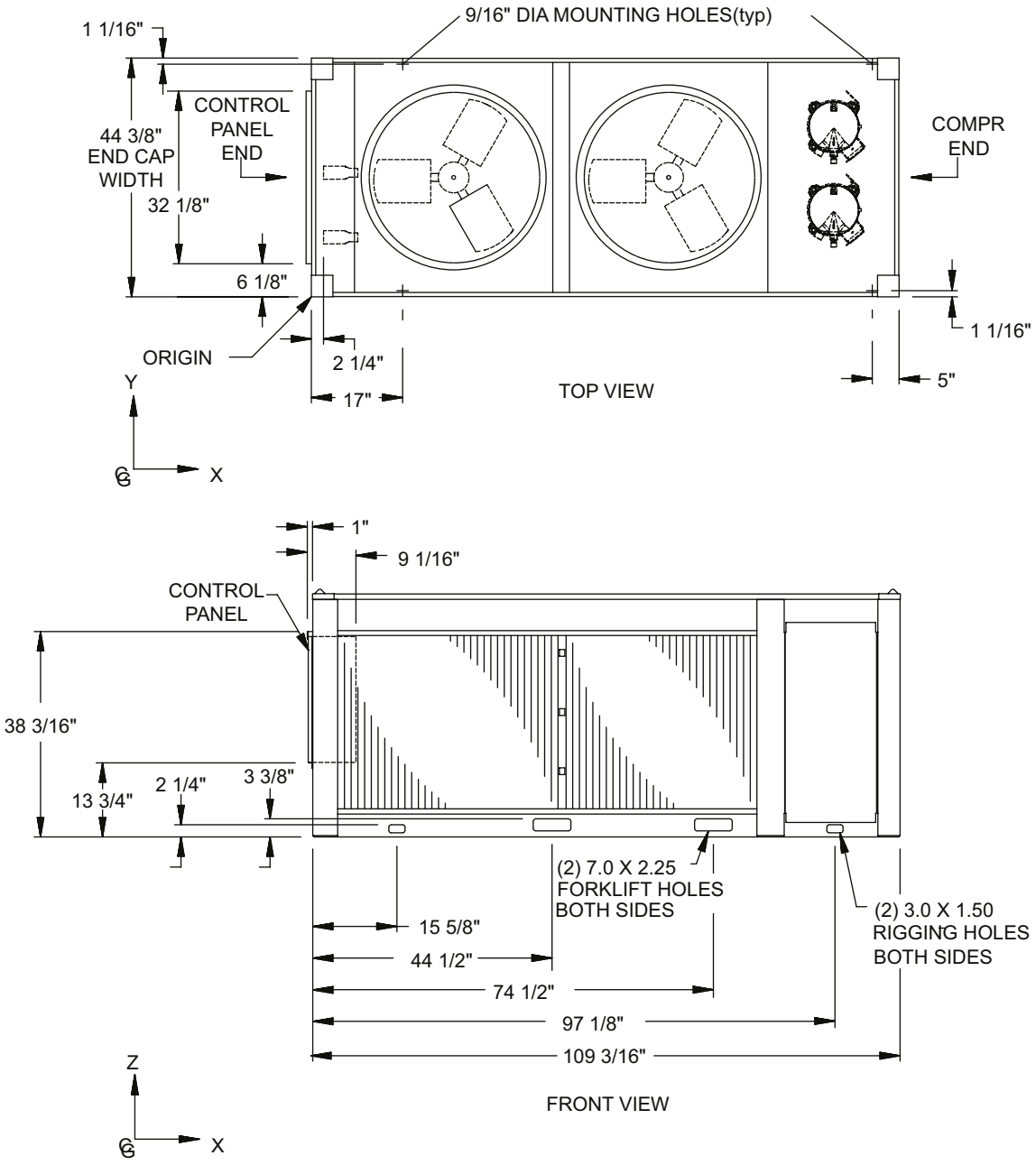
LEFT END

POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

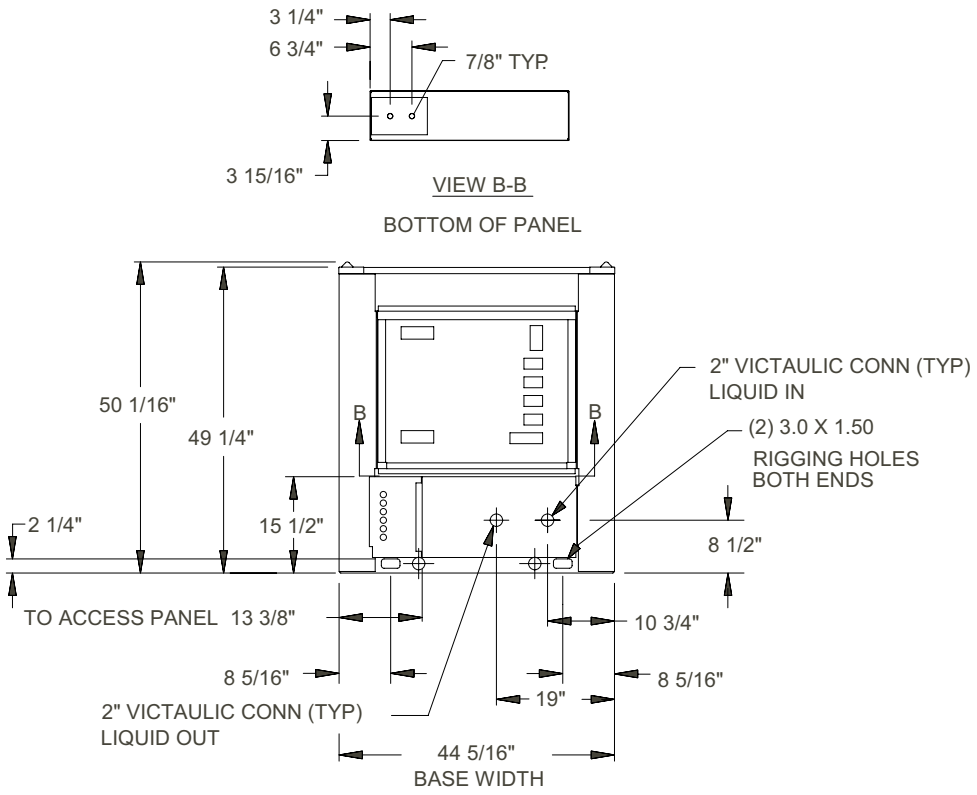
NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0 in.; coil end to wall – 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1 in. nominal deflection isolators (not shown) will increase overall unit height by 6 in..

DIMENSIONS – YCAL0022 (ENGLISH) (CONT'D)



DIMENSIONS – YCAL0028 (ENGLISH)

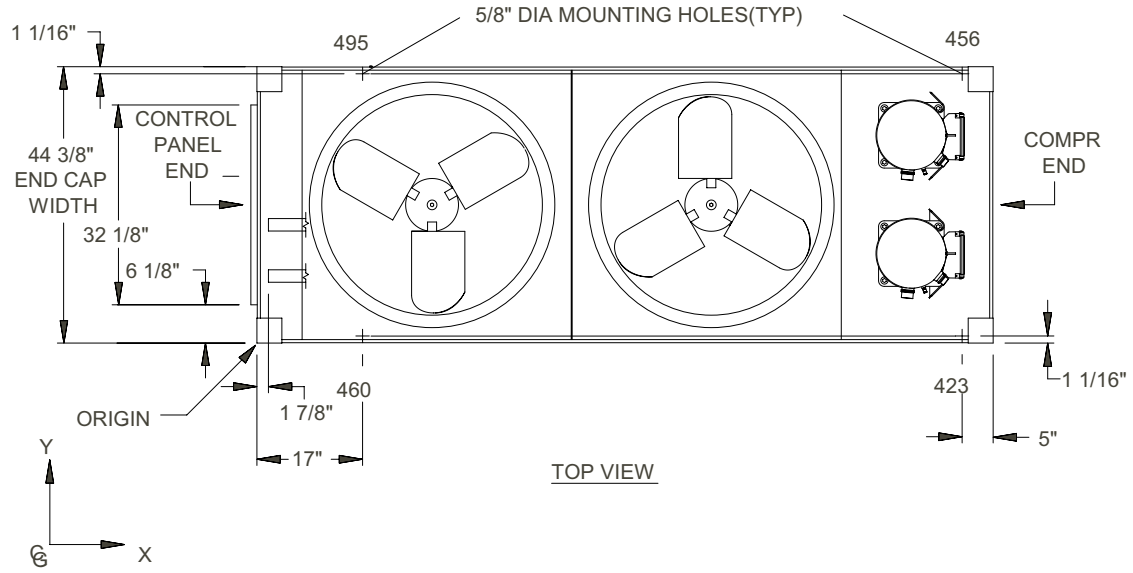


POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

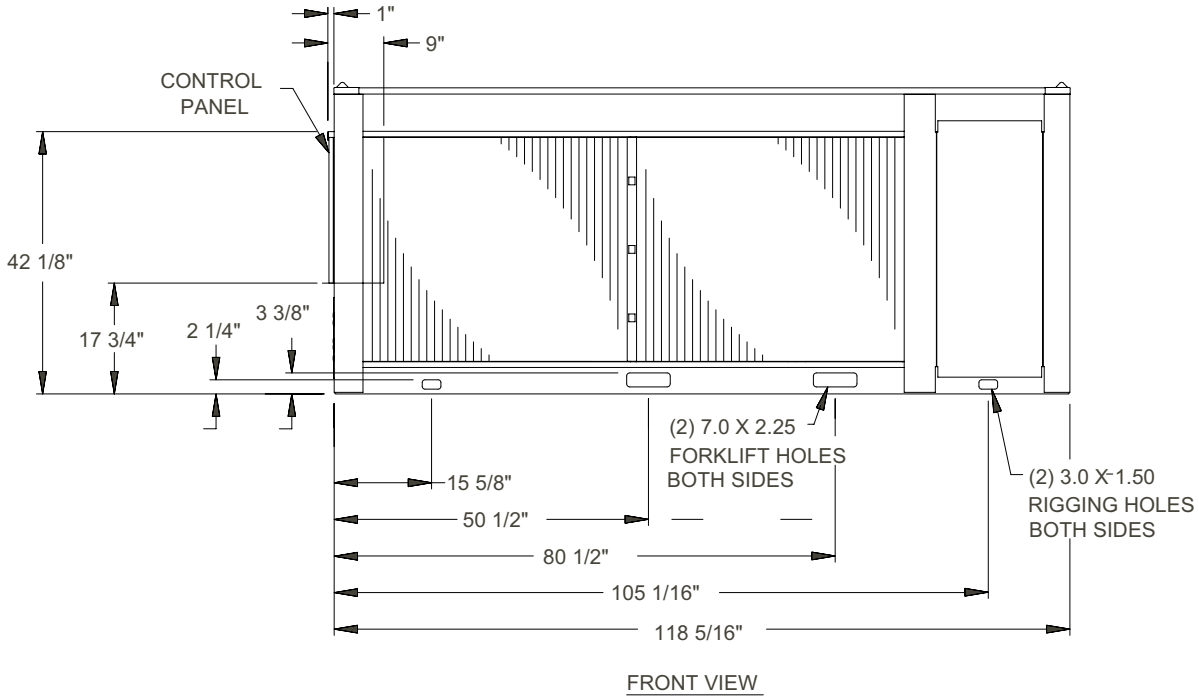
NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0 in.; coil end to wall – 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1 in. nominal deflection isolators (not shown) will increase overall unit height by 6 in..

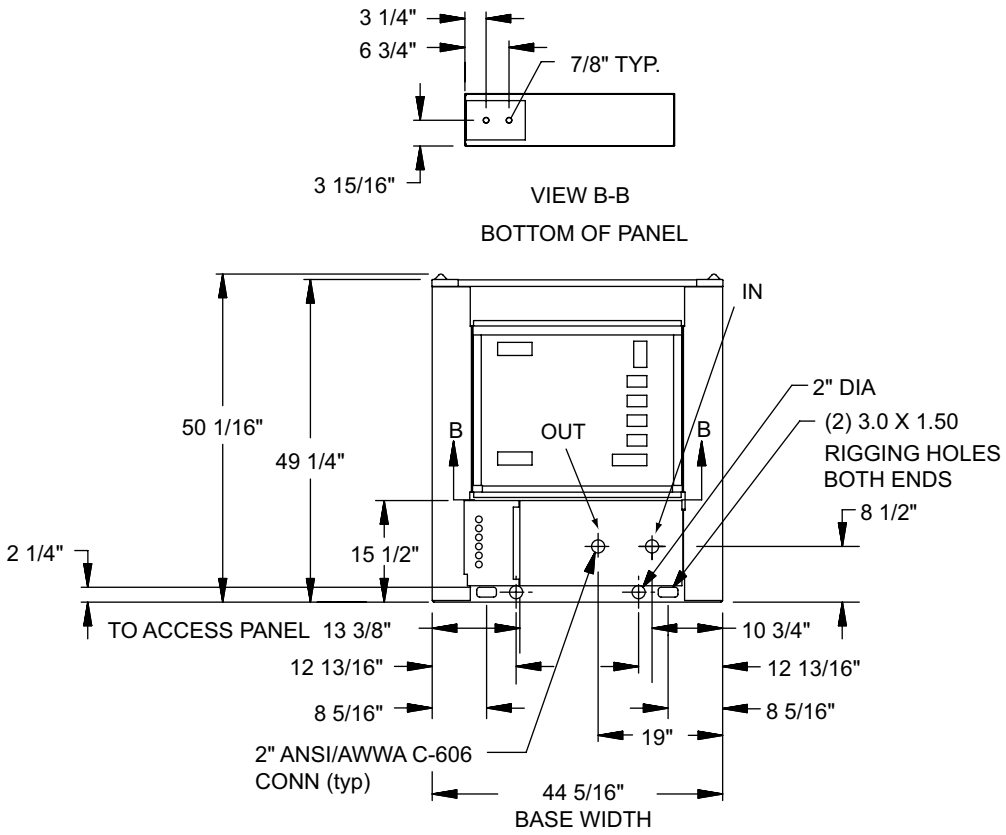
DIMENSIONS – YCAL0028 (ENGLISH) (CONT'D)



R-410A CHILLER



DIMENSIONS – YCAL0033 (ENGLISH)



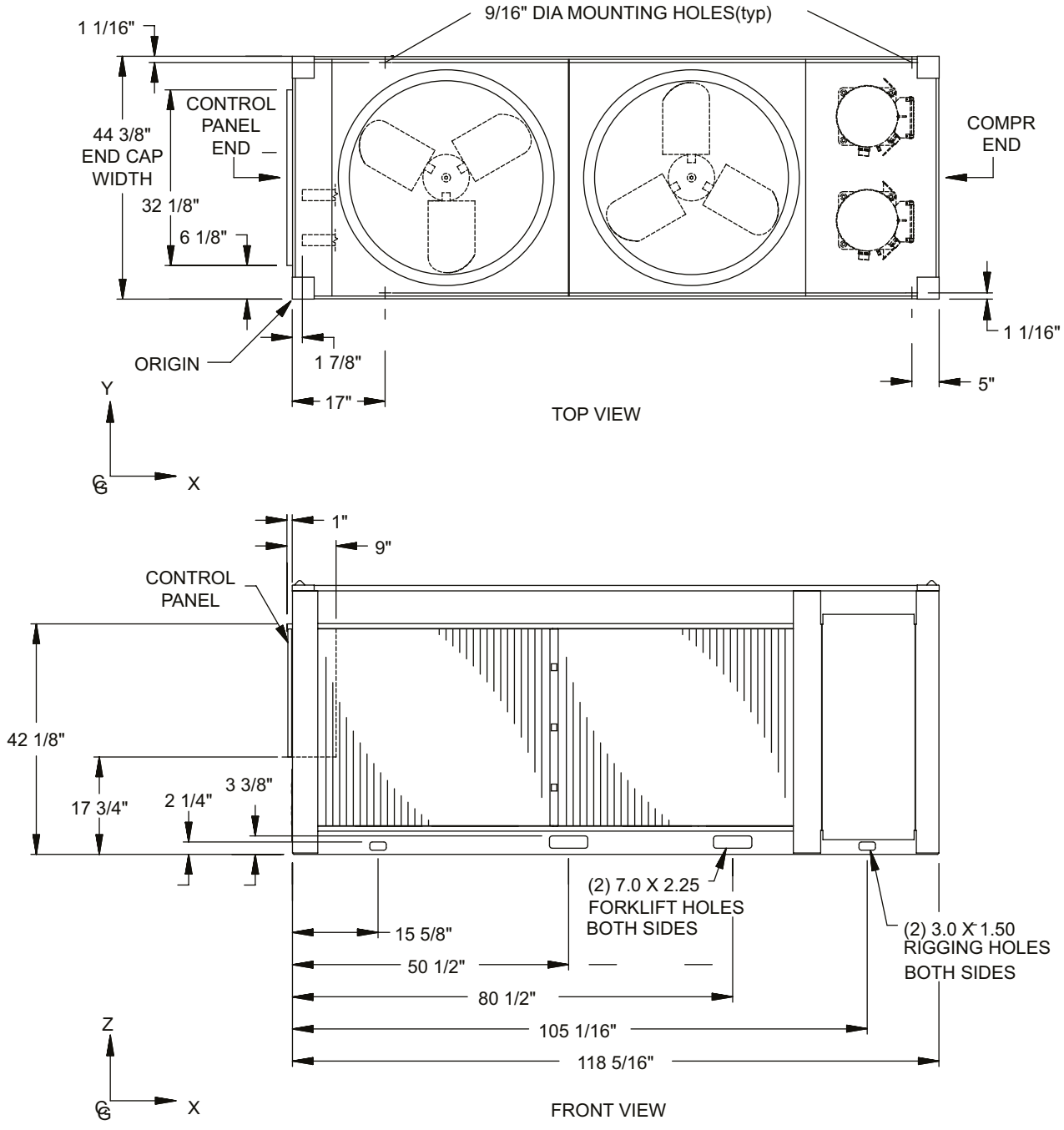
LEFT END

POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

NOTE:

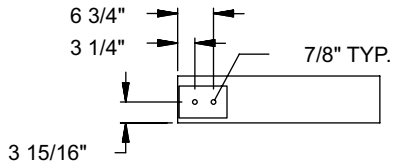
Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0 in.; coil end to wall – 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1 in. nominal deflection isolators (not shown) will increase overall unit height by 6 in..

DIMENSIONS – YCAL0033 (ENGLISH) (CONT'D)

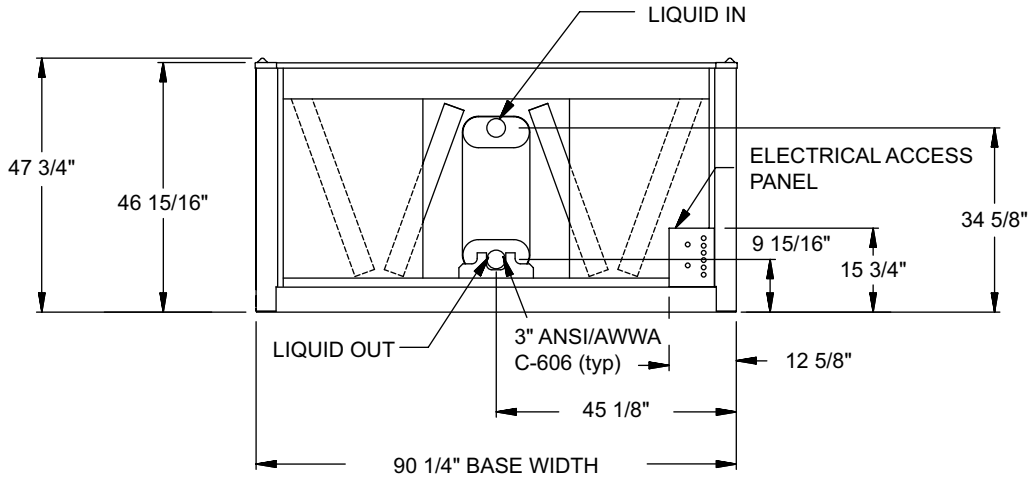


5

DIMENSIONS – YCAL0043 (ENGLISH)



VIEW B-B
BOTTOM OF PANEL

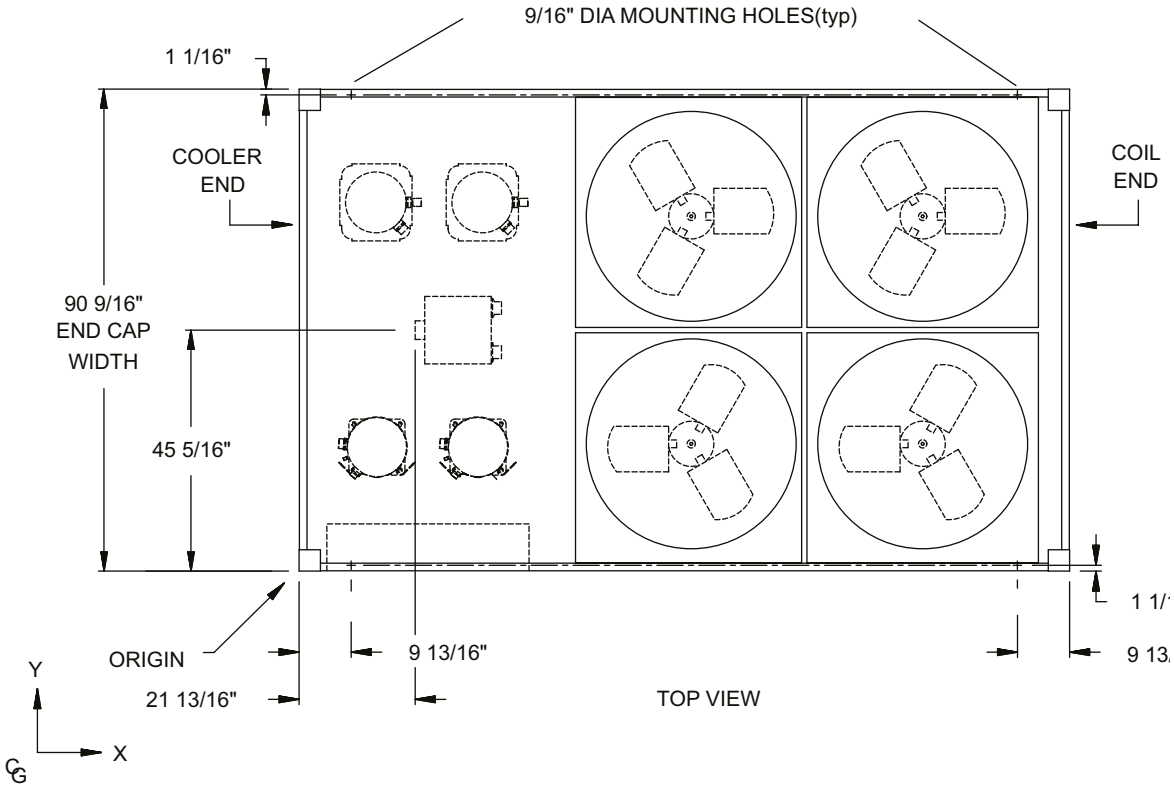


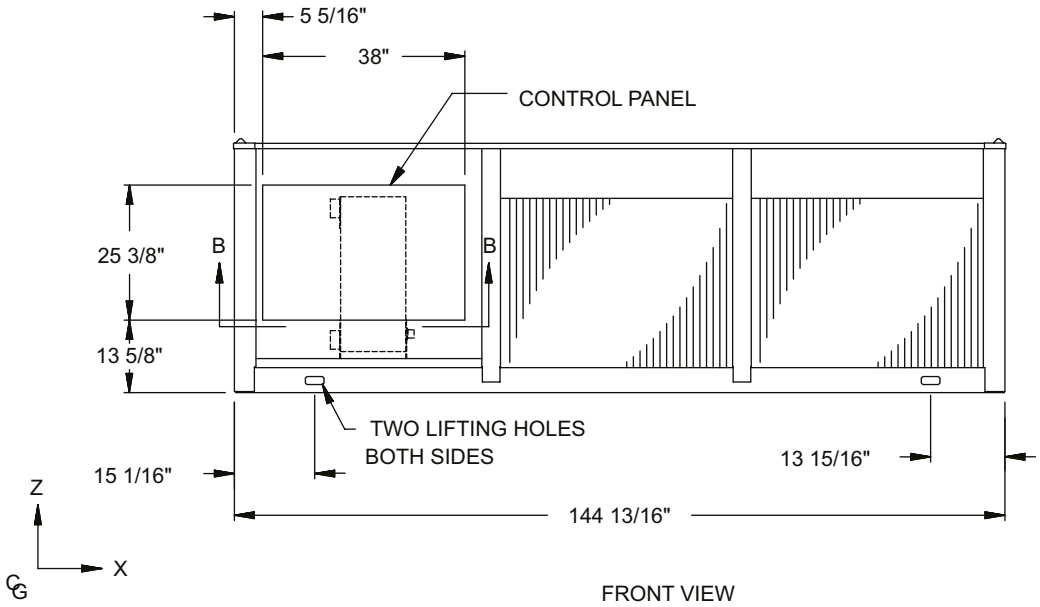
LEFT END

NOTE:

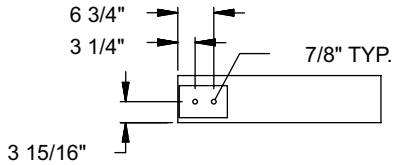
Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0 in.; coil end to wall – 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1 in. nominal deflection isolators (not shown) will increase overall unit height by 6 in..

DIMENSIONS – YCAL0043 (ENGLISH) (CONT'D)

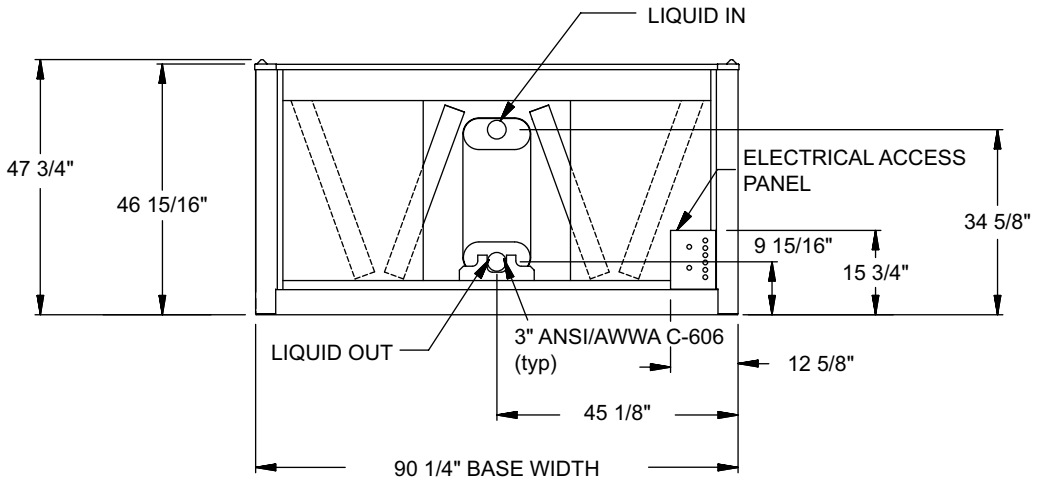




DIMENSIONS – YCAL0046 (ENGLISH)



VIEW B-B
BOTTOM OF PANEL



LEFT END

NOTE:

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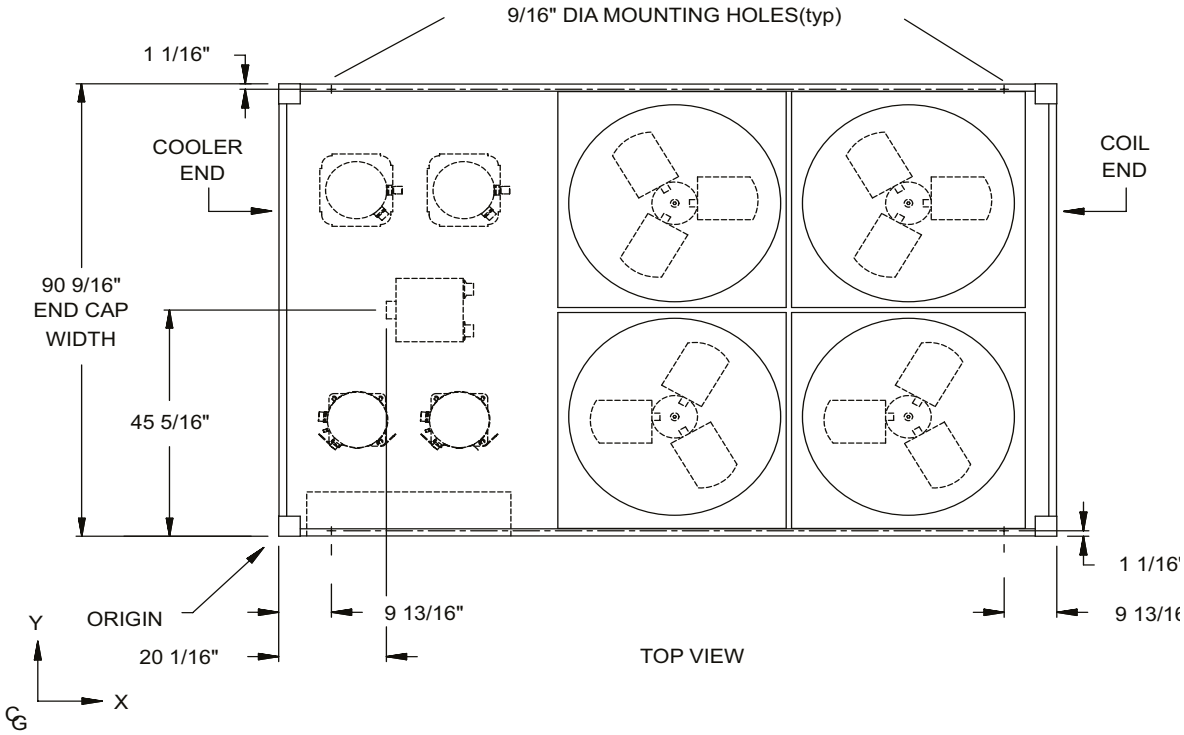
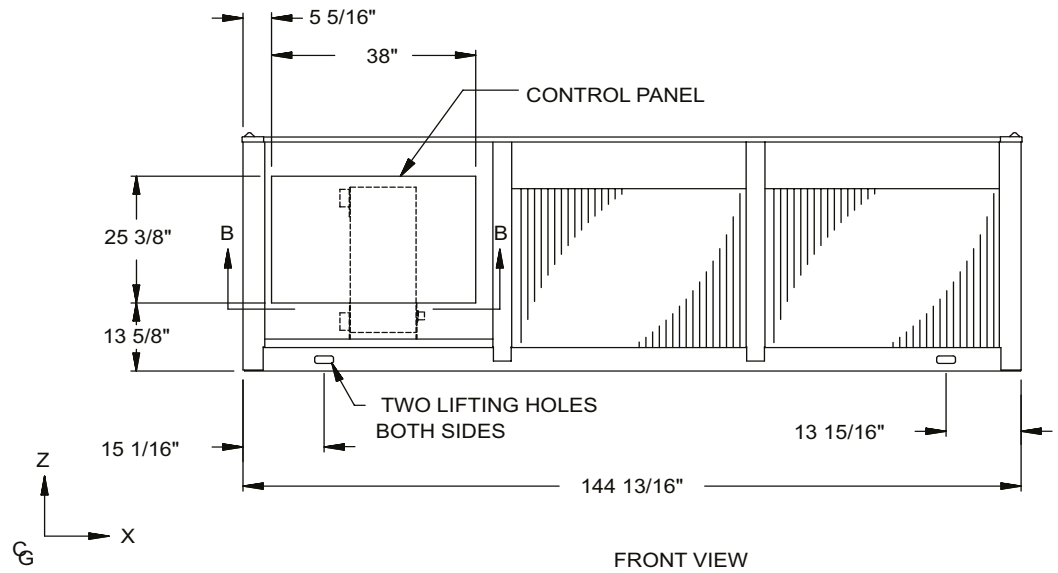
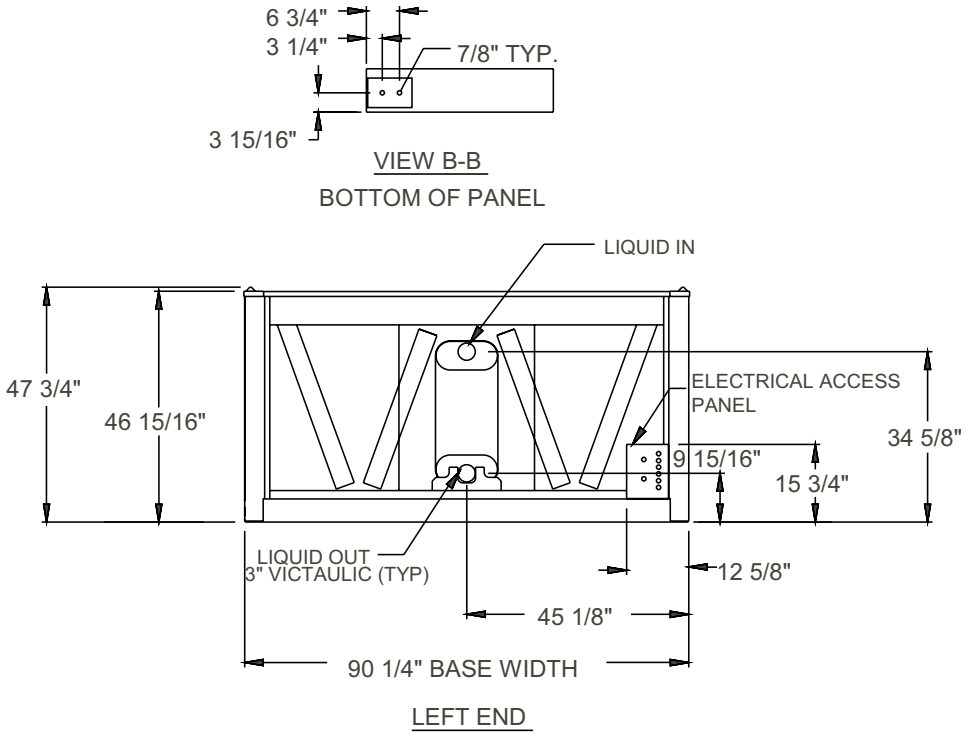
DIMENSIONS – YCAL0046 (ENGLISH) (CONT'D)





DIMENSIONS – YCAL0052 (ENGLISH)



POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

NOTE:

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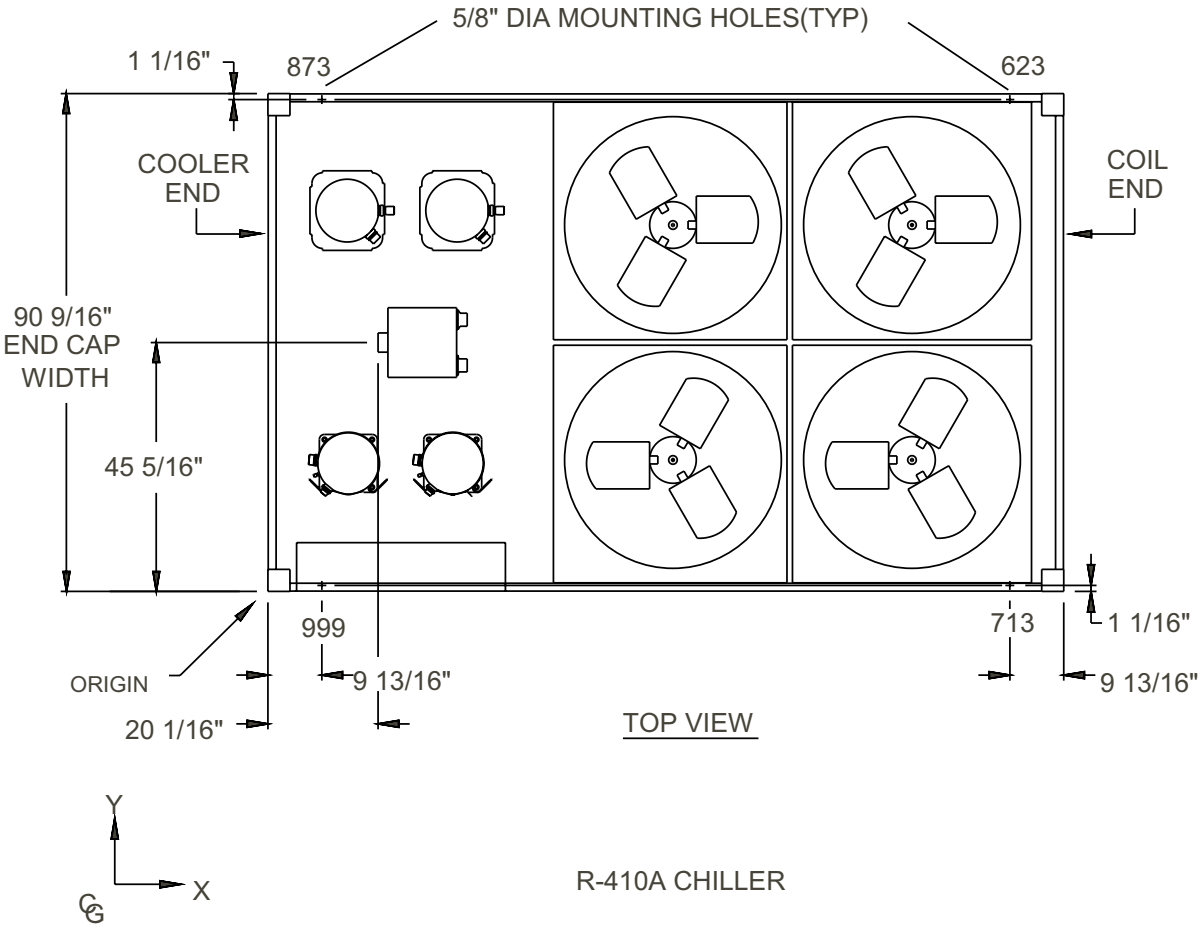
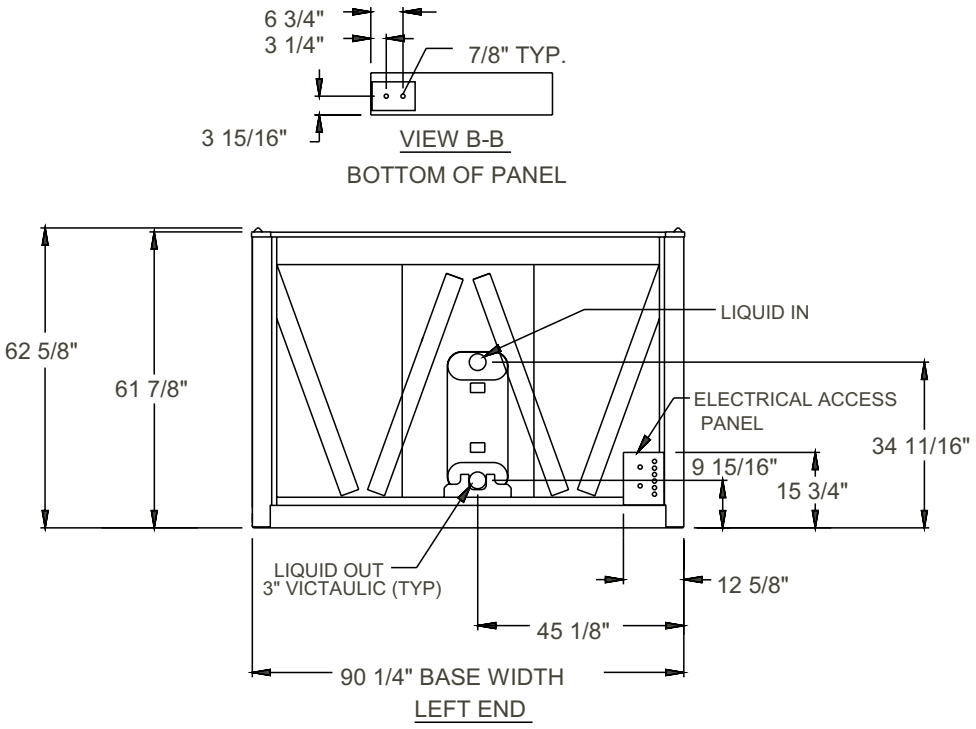
DIMENSIONS – YCAL0052 (ENGLISH) (CONT'D)



DIMENSIONS – YCAL0056 (ENGLISH)



POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

NOTE:

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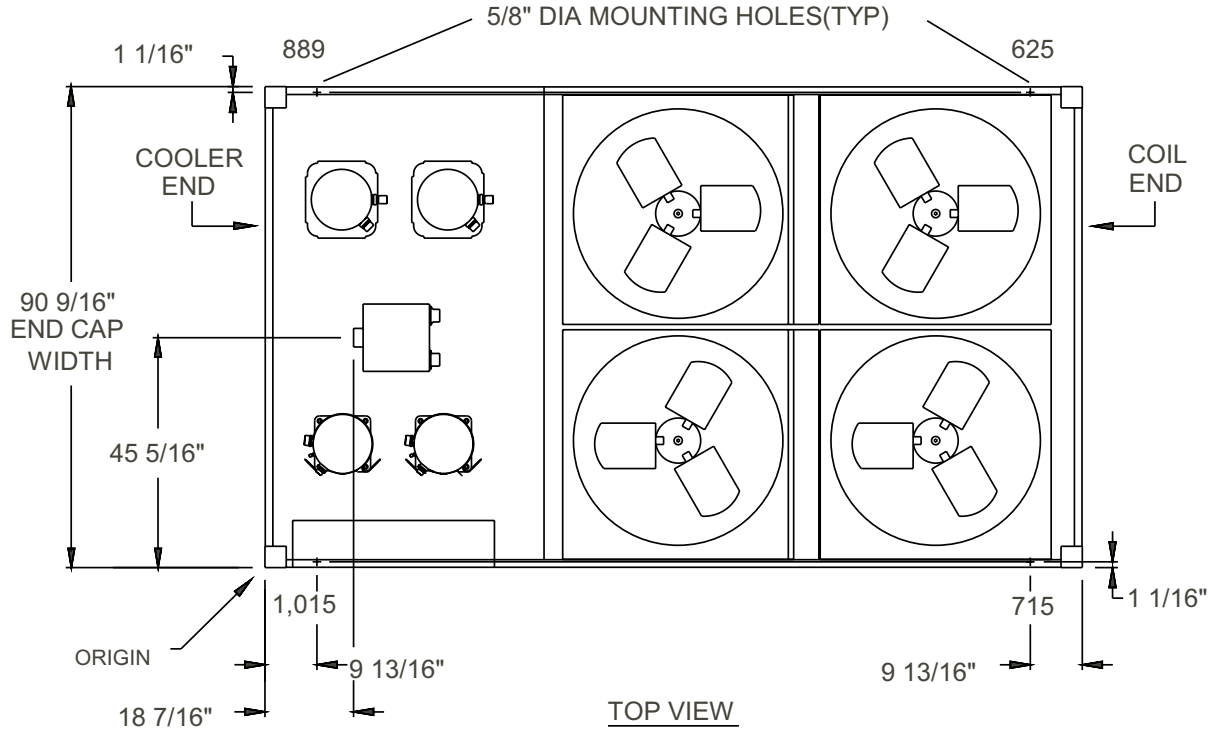
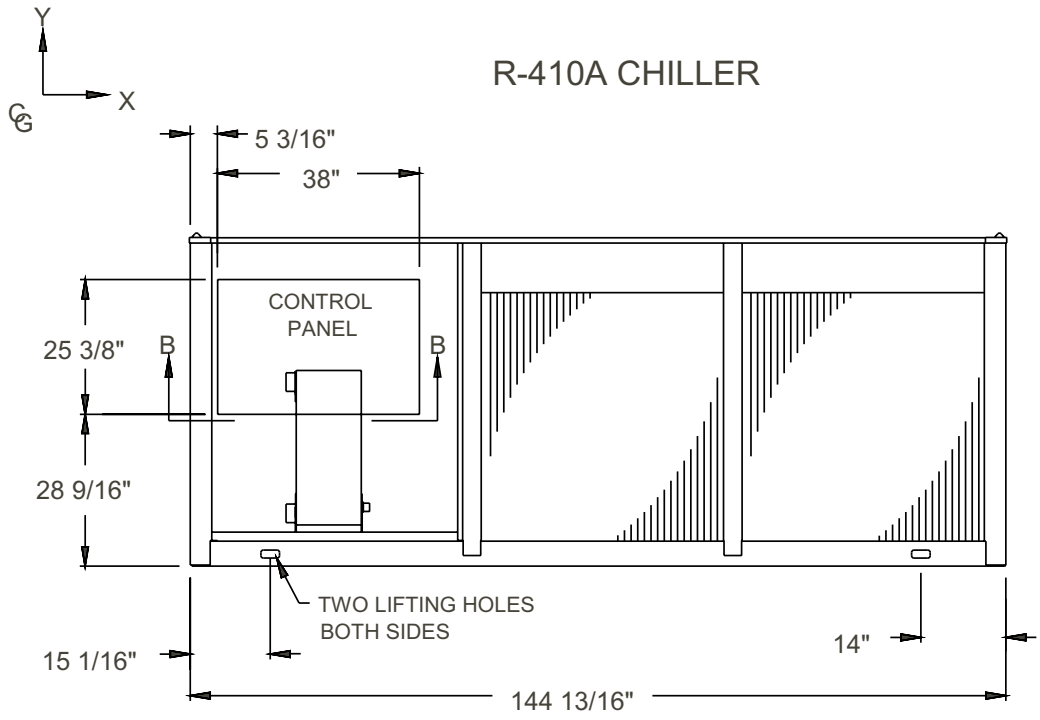
DIMENSIONS – YCAL0056 (ENGLISH) (CONT'D)



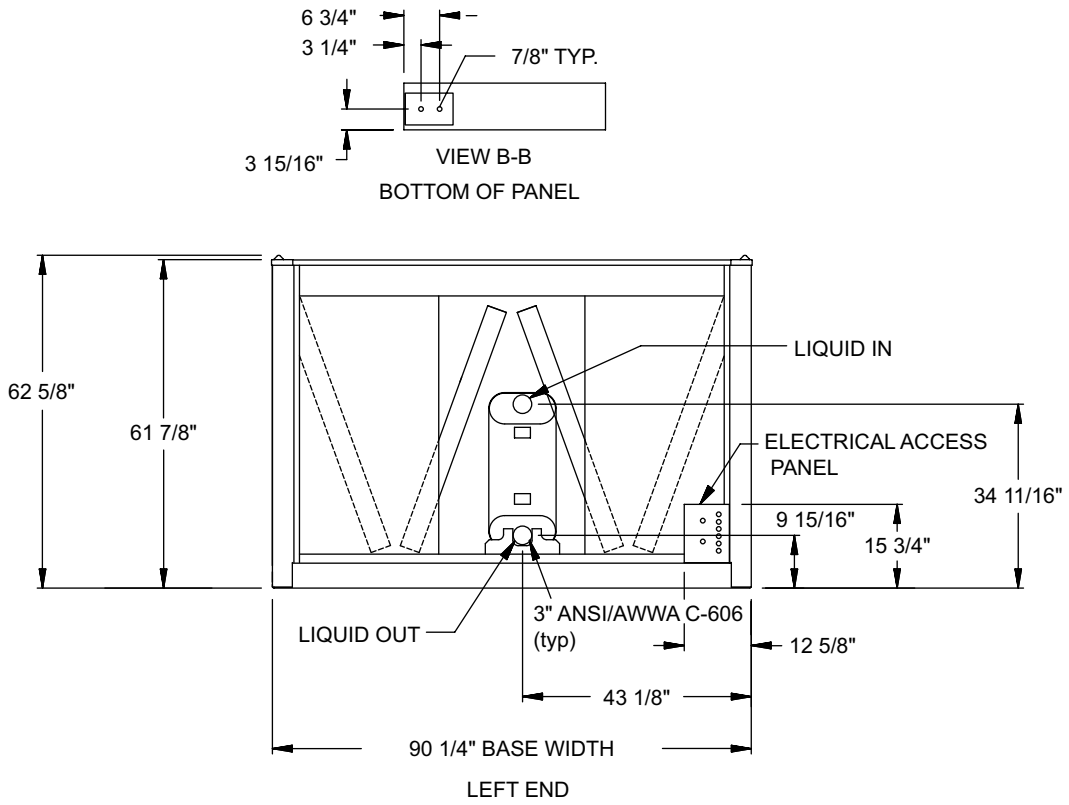
TOP VIEW



FRONT VIEW

5

DIMENSIONS – YCAL0066 (ENGLISH)



NOTE:

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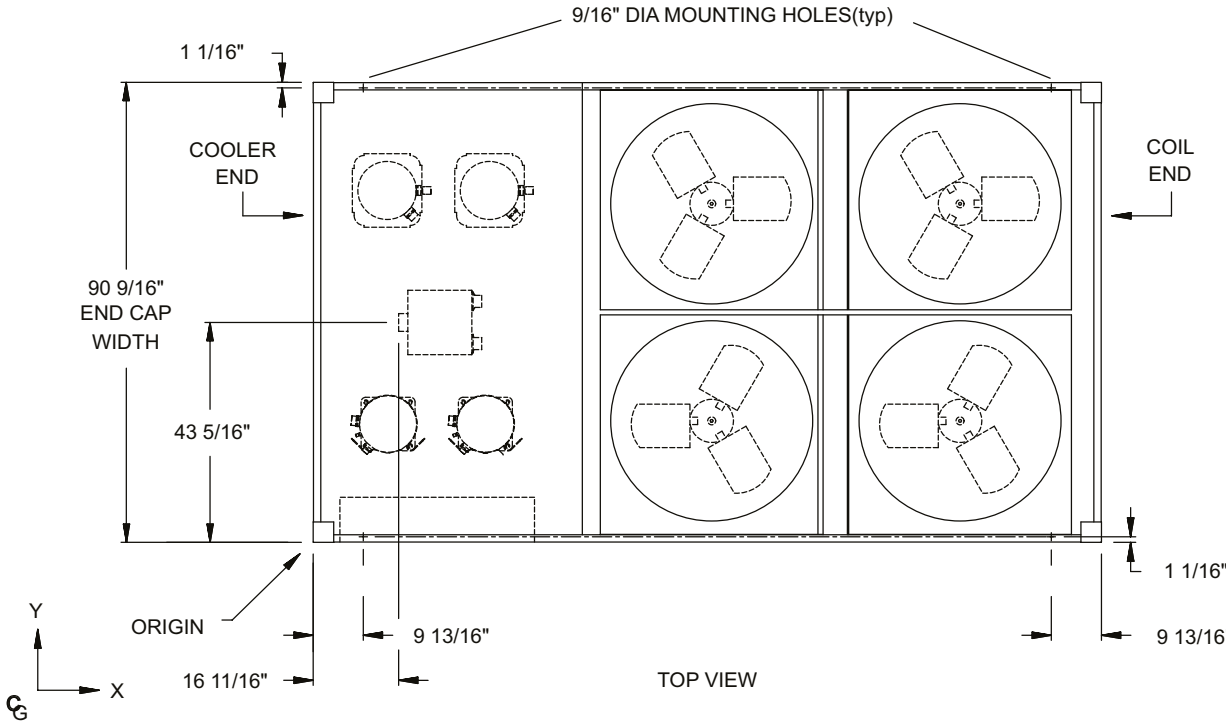
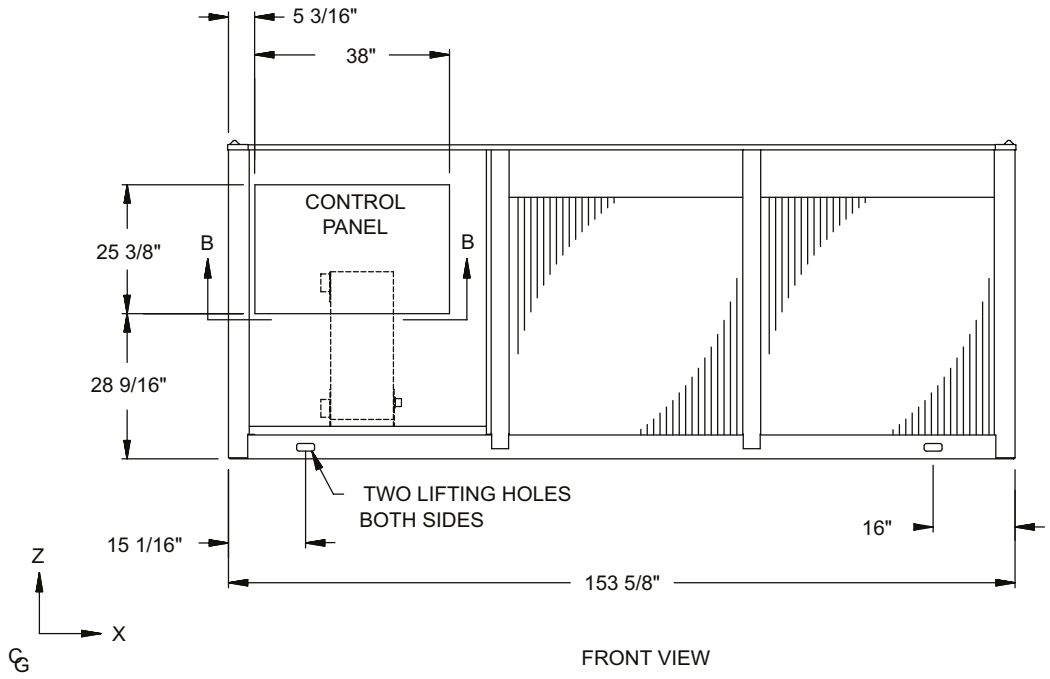
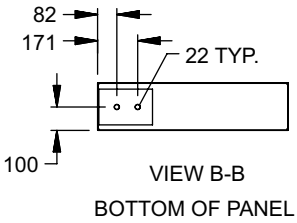
DIMENSIONS – YCAL0066 (ENGLISH) (CONT'D)

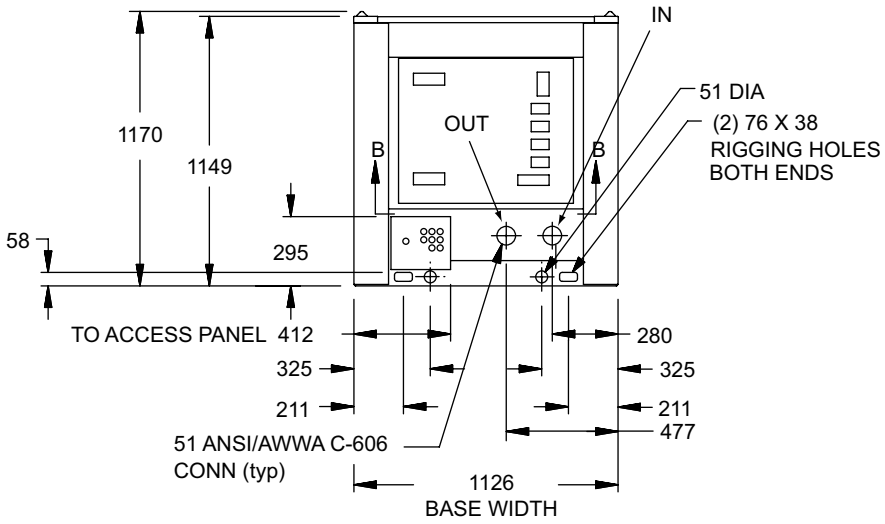




DIMENSIONS – YCAL0019 (SI)



VIEW B-B
BOTTOM OF PANEL



LEFT END

POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

All dimensions are in mm unless specified otherwise.

NOTE:

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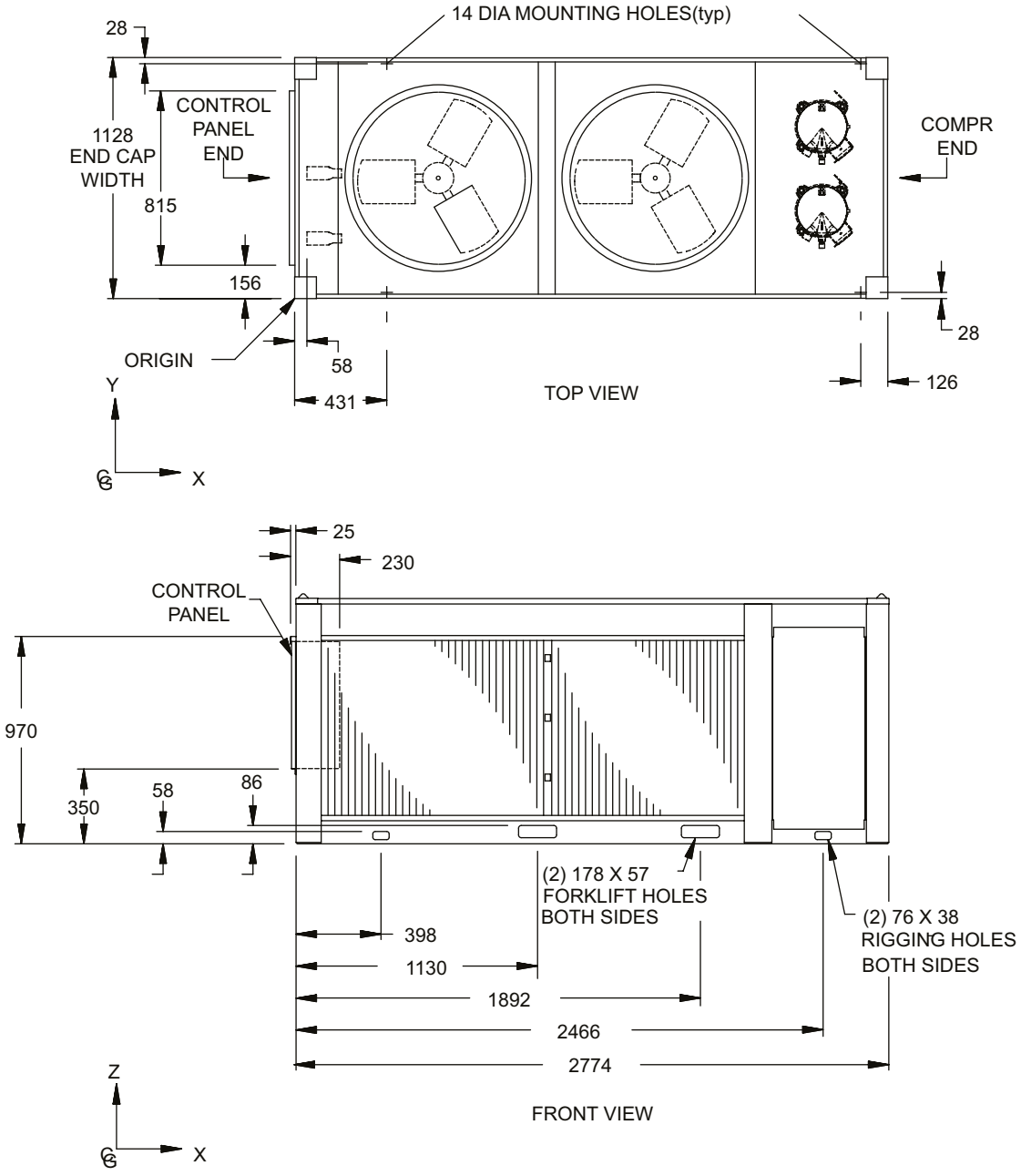
DIMENSIONS – YCAL0019 (SI) (CONT'D)



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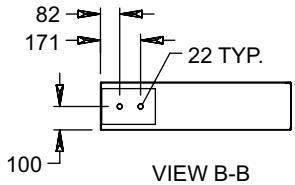
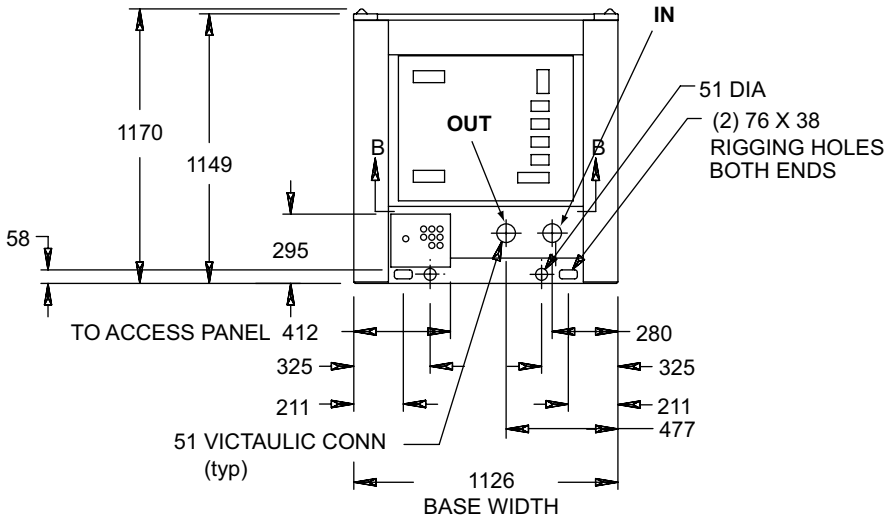
DIMENSIONS – YCAL0022 (SI)



VIEW B-B
BOTTOM OF PANEL



LEFT END

POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

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NOTE:

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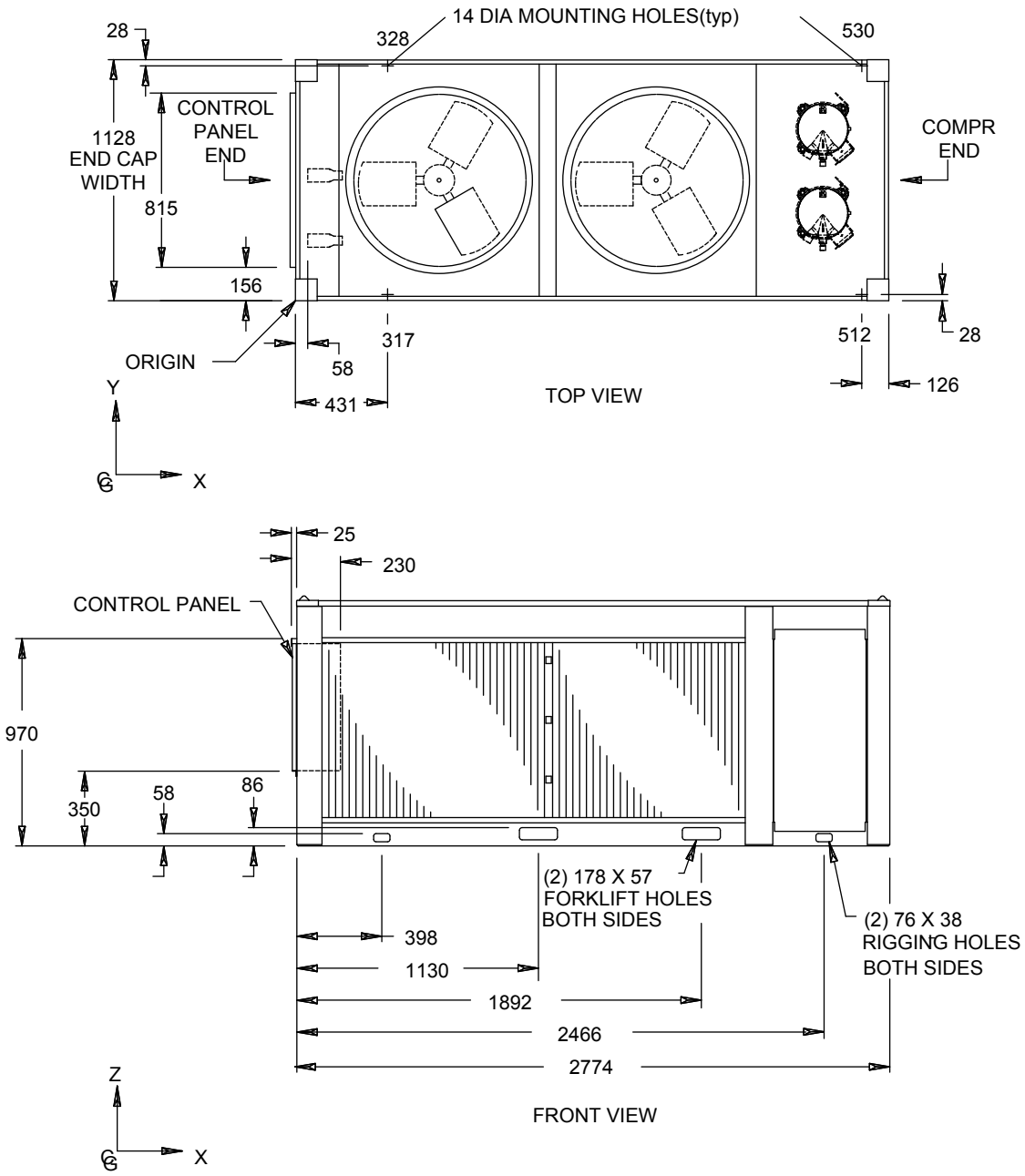
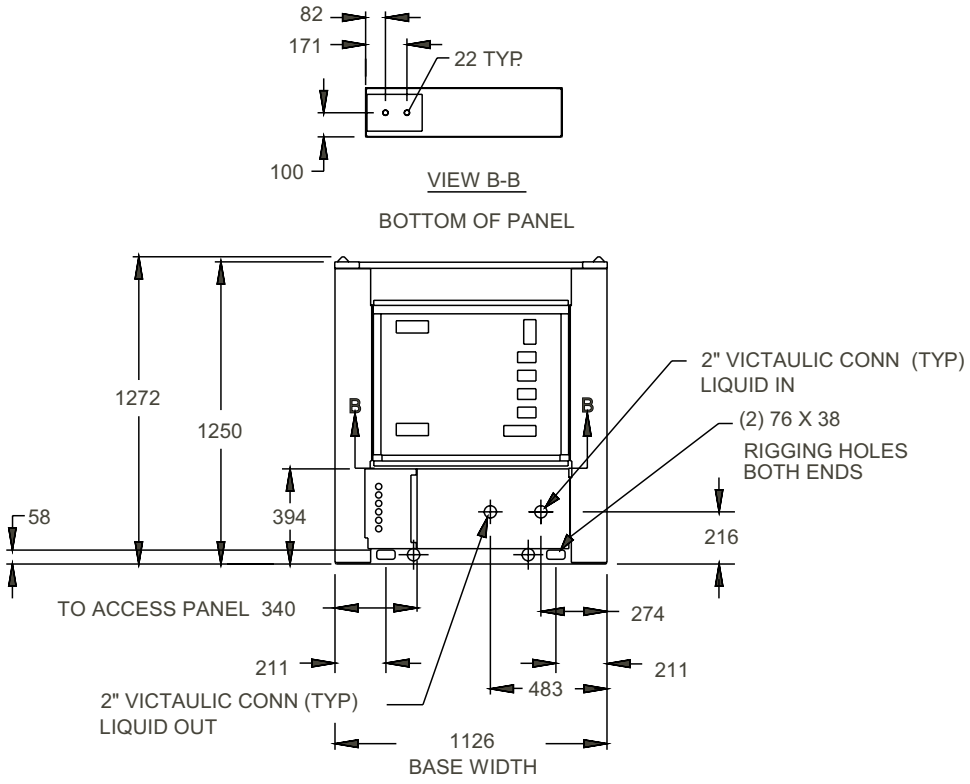
DIMENSIONS – YCAL0022 (SI) (CONT'D)



5

DIMENSIONS – YCAL0028 (SI)



LEFT END

POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

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NOTE:

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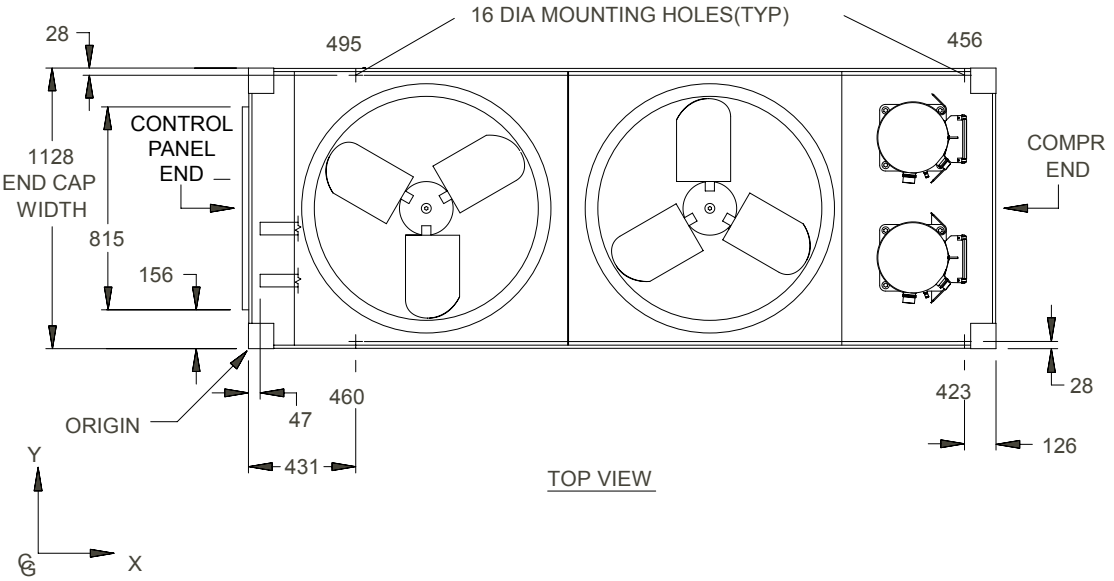
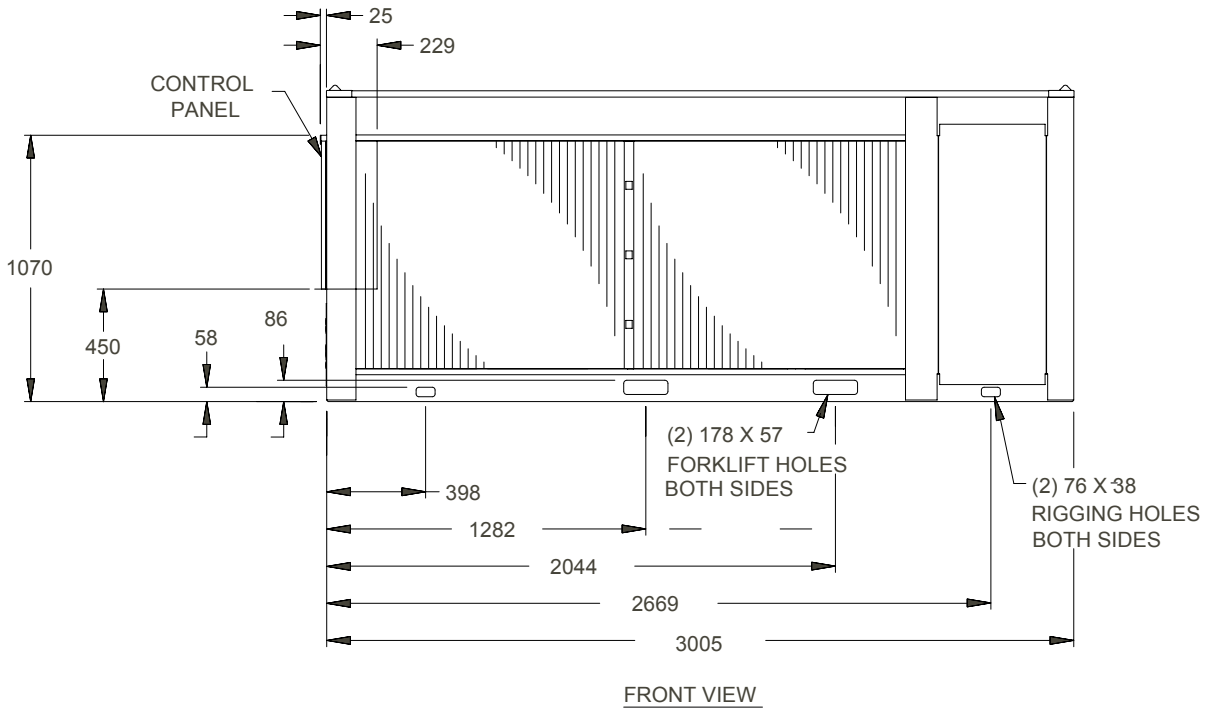
DIMENSIONS – YCAL0028 (SI) (CONT'D)

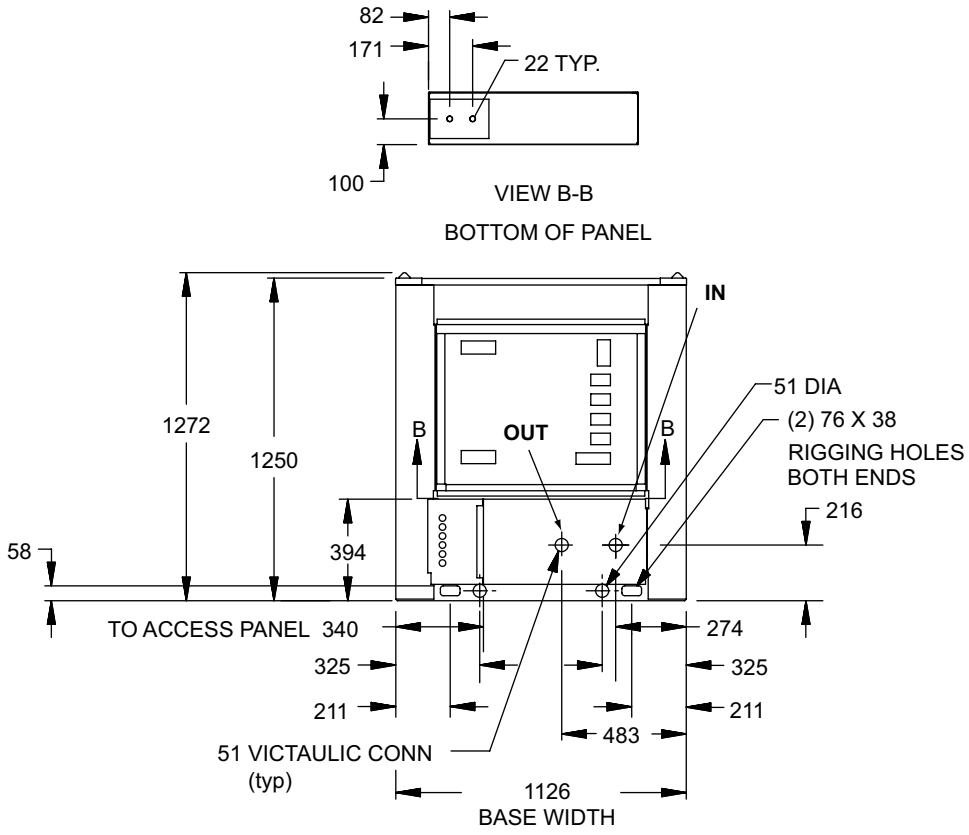


R-410A CHILLER



5

DIMENSIONS – YCAL0033 (SI)



LEFT END

POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

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NOTE:

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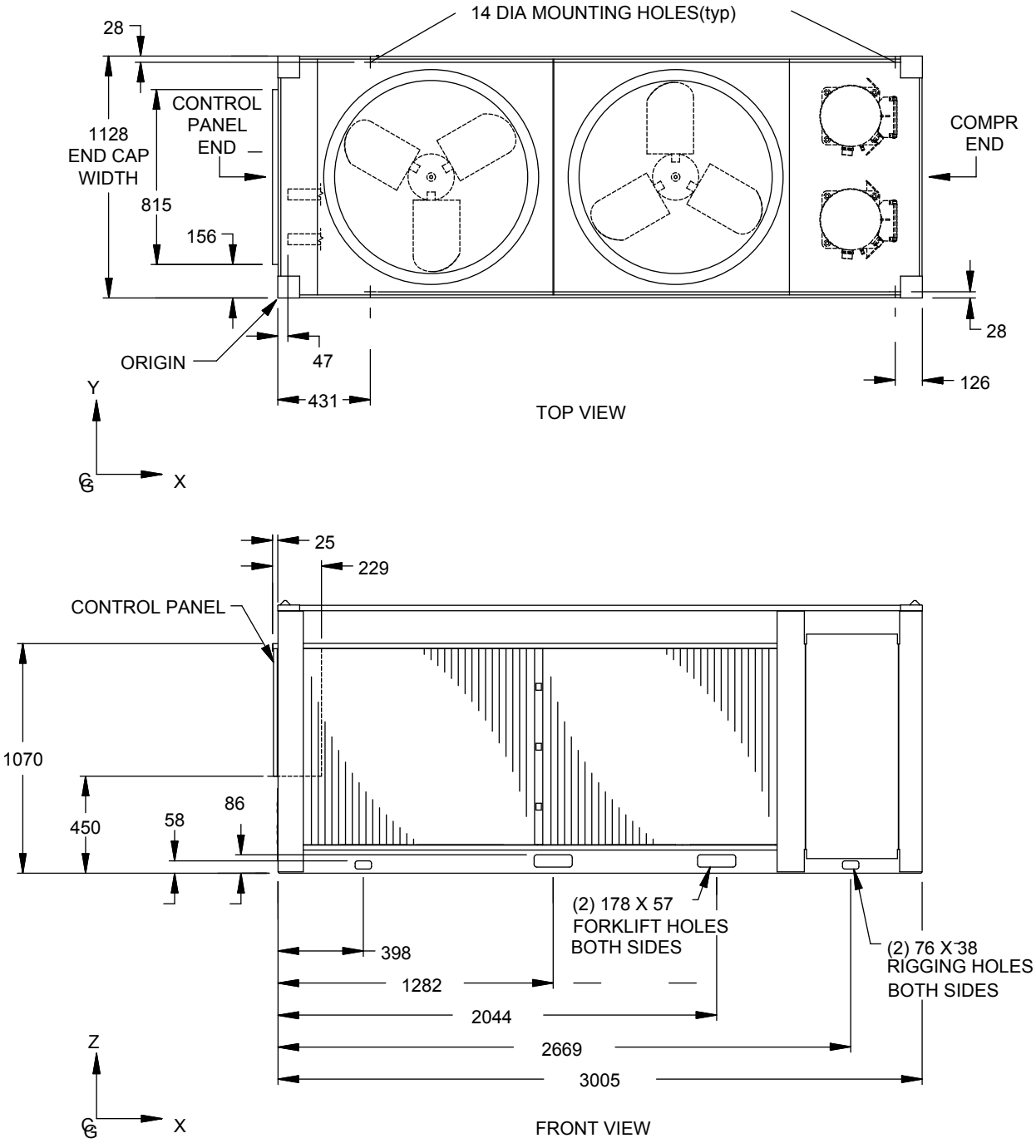
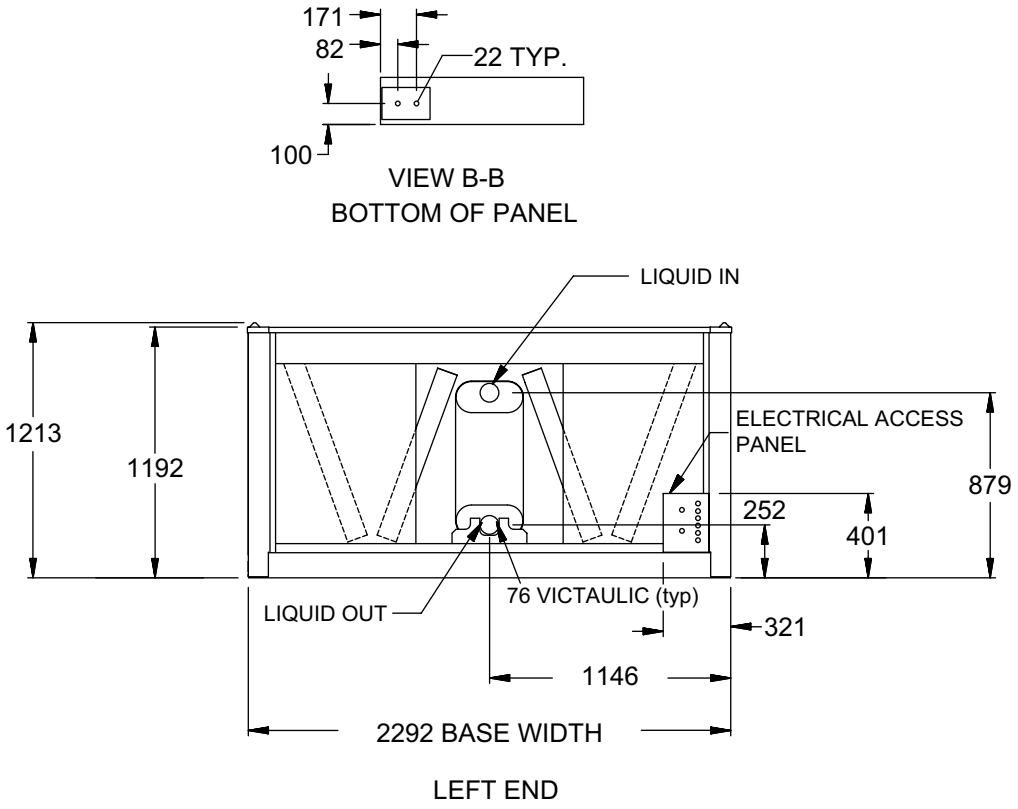
DIMENSIONS – YCAL0033 (SI) (CONT'D)



5

DIMENSIONS – YCAL0043 (SI)



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NOTE:

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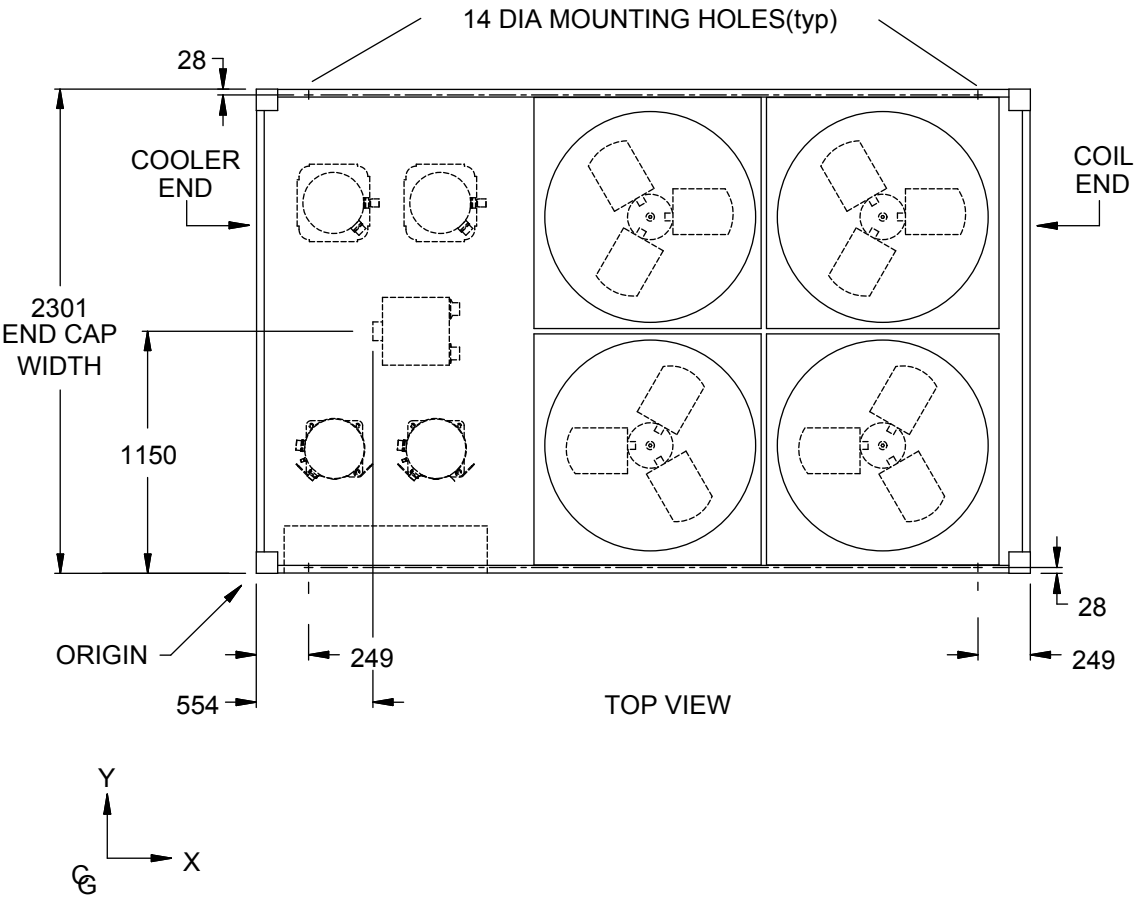
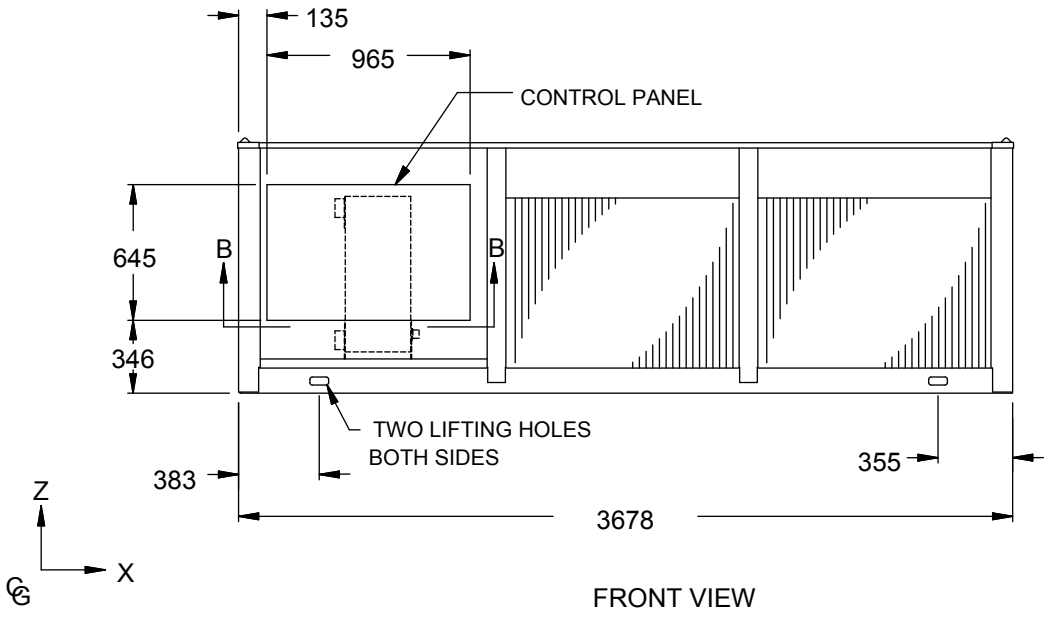
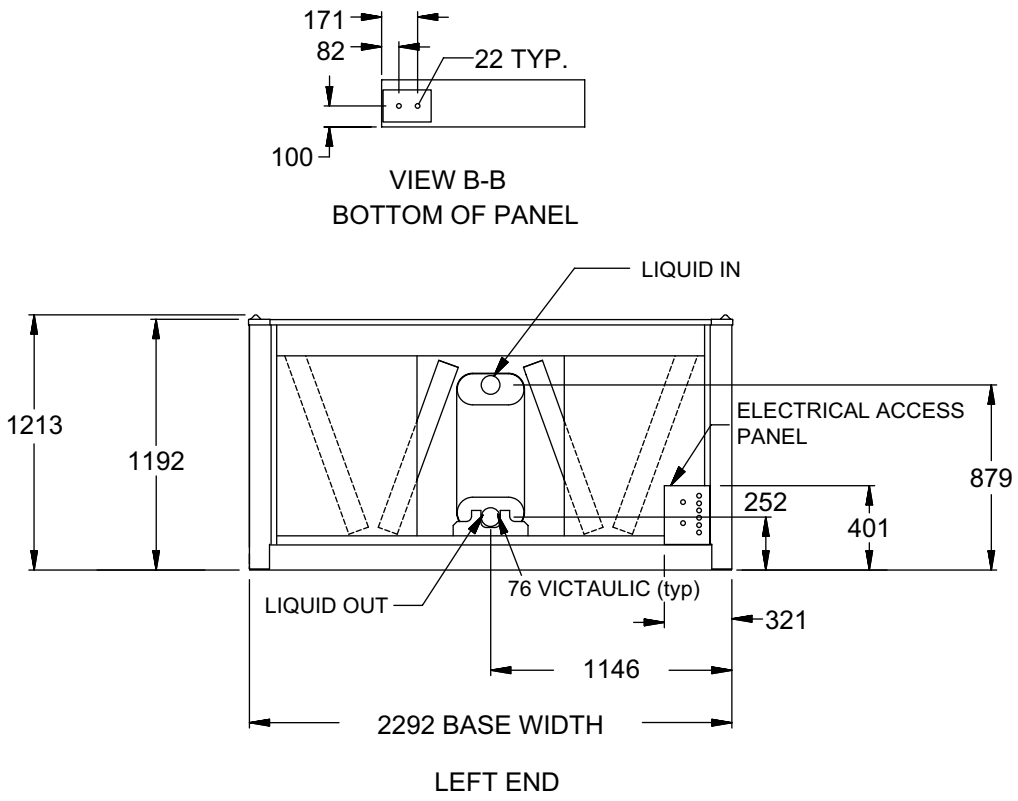
DIMENSIONS – YCAL0043 (SI) (CONT'D)





DIMENSIONS – YCAL0046 (SI)



All dimensions are in mm unless specified otherwise.

NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

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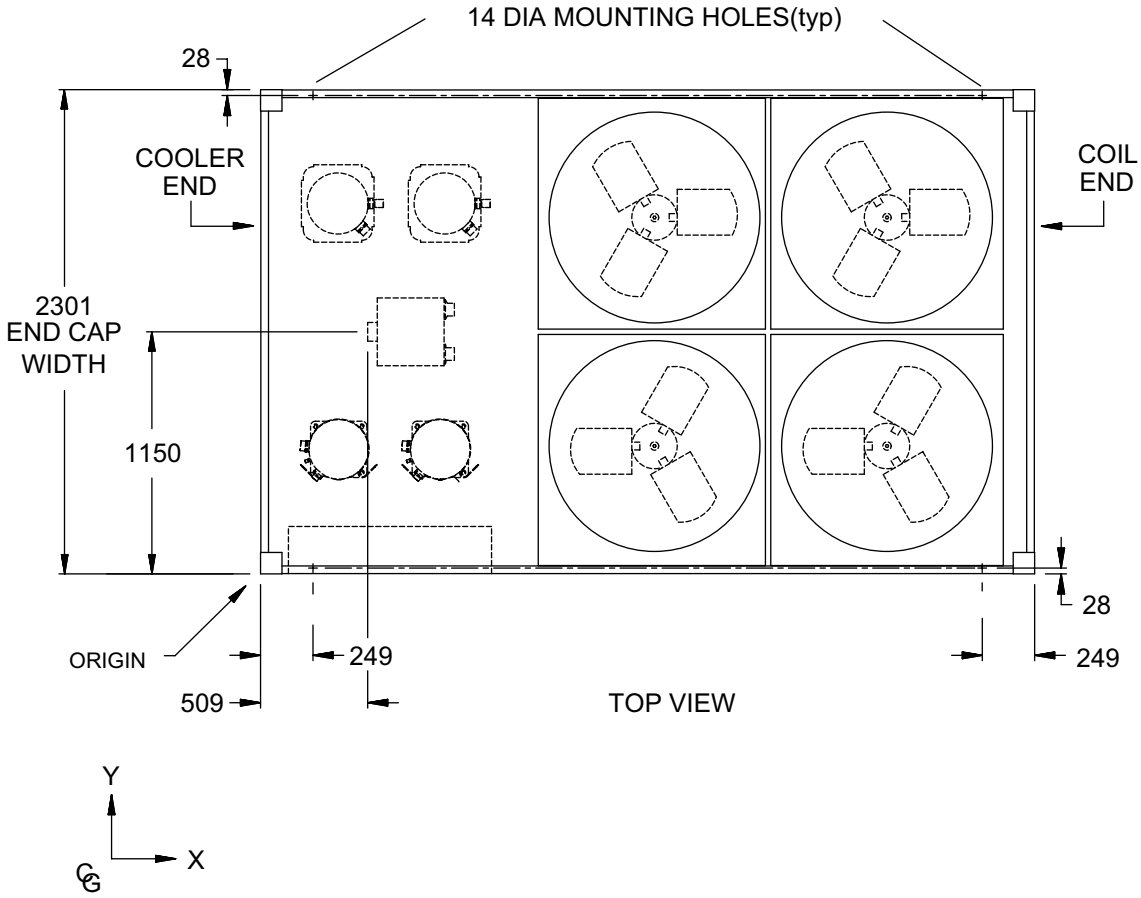
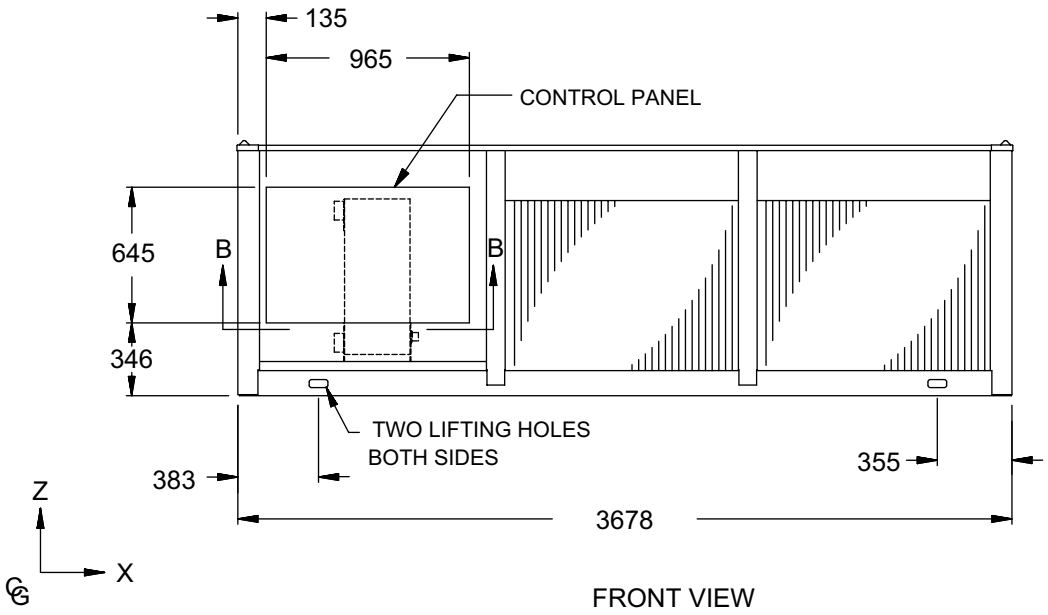
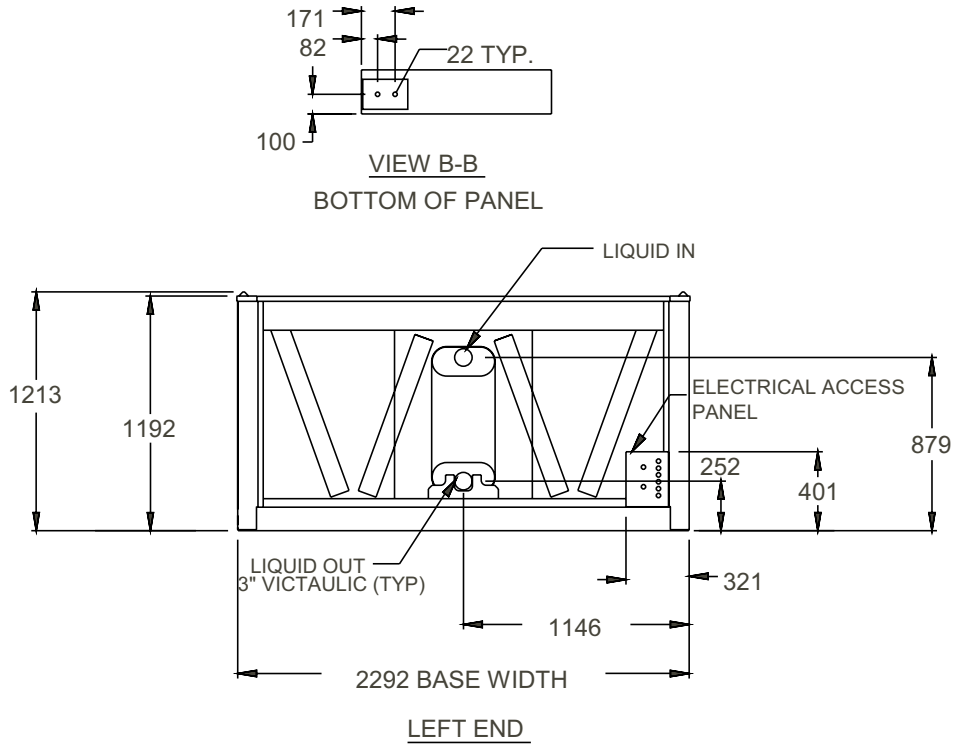
DIMENSIONS – YCAL0046 (SI) (CONT'D)





DIMENSIONS – YCAL0052 (SI)



POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

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NOTE:

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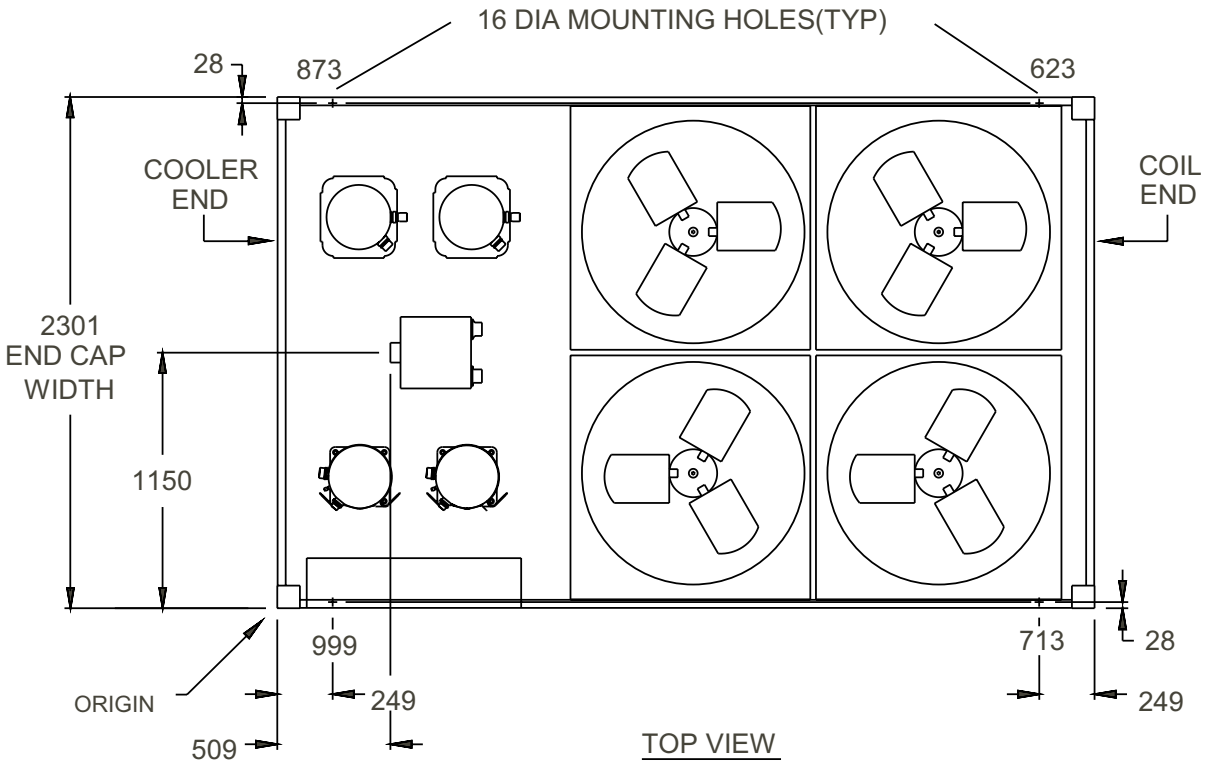
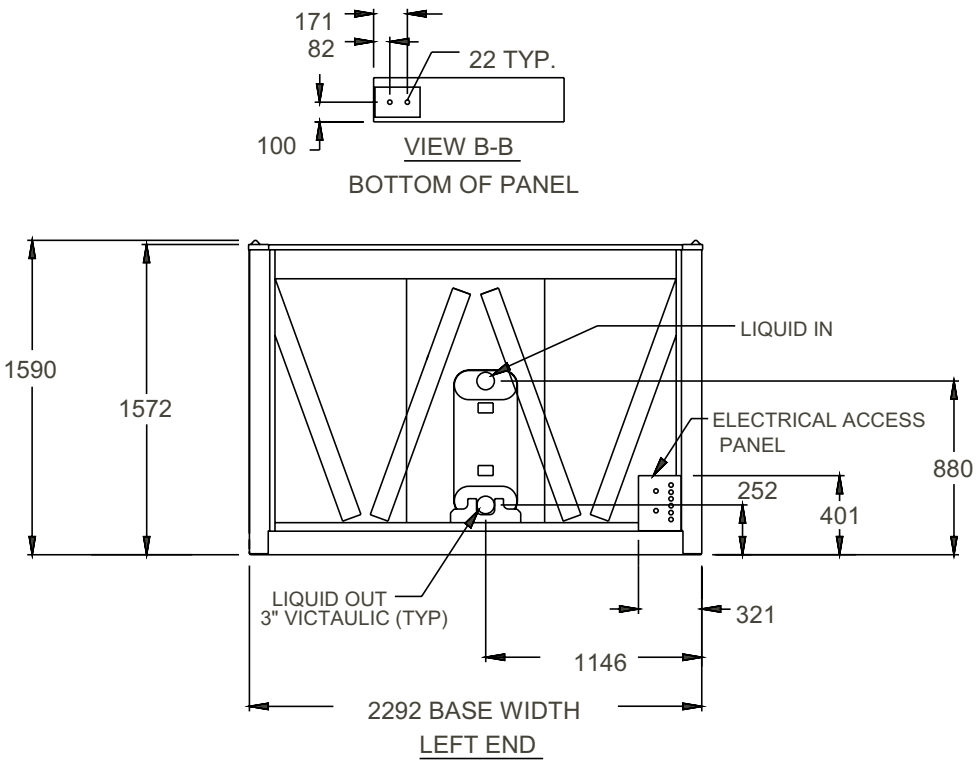
DIMENSIONS – YCAL0052 (SI) (CONT'D)



DIMENSIONS – YCAL0056 (SI)



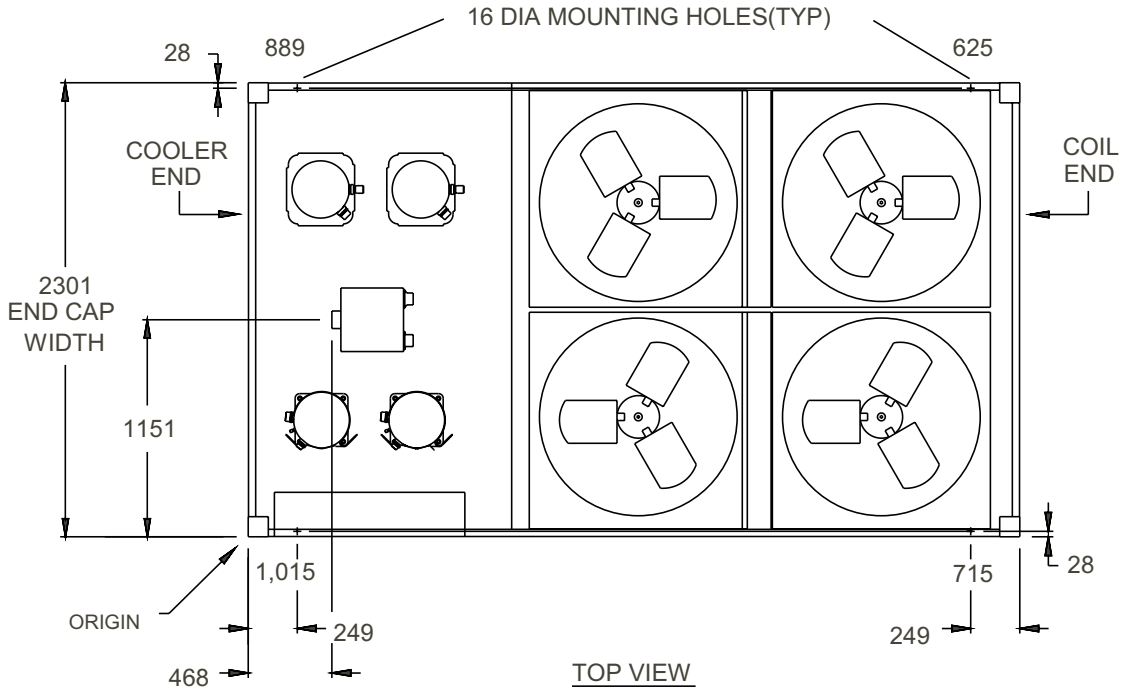
POWER: SINGLE POINT SUPPLY WITH TERMINAL BLOCK

All dimensions are in mm unless specified otherwise.

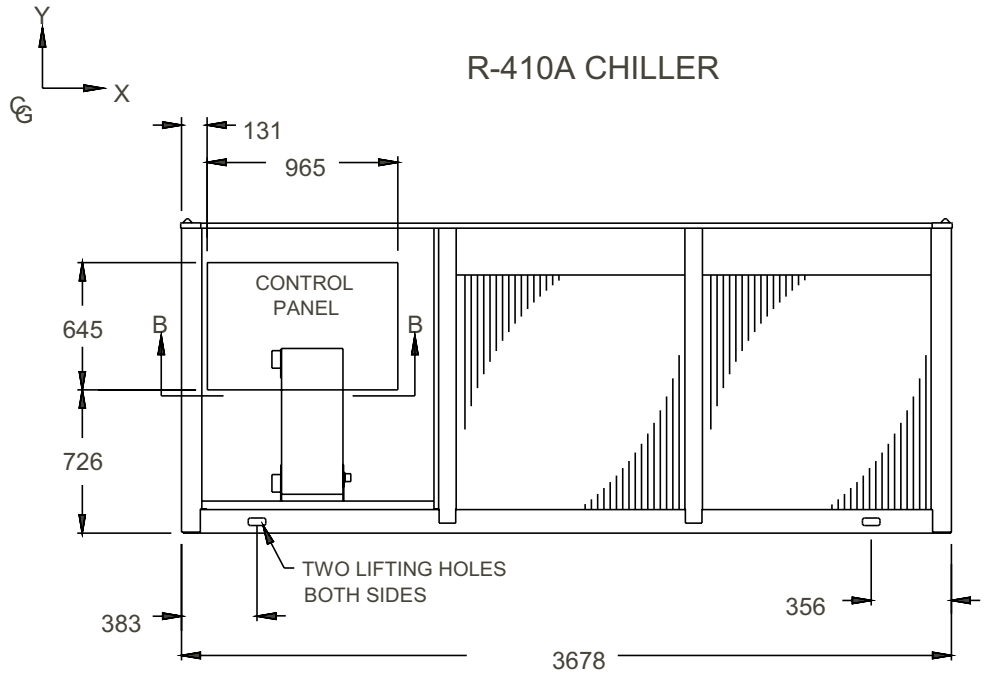
NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall – 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1 in. nominal deflection isolators (not shown) will increase overall unit height by 152mm.

DIMENSIONS – YCAL0056 (SI) (CONT'D)

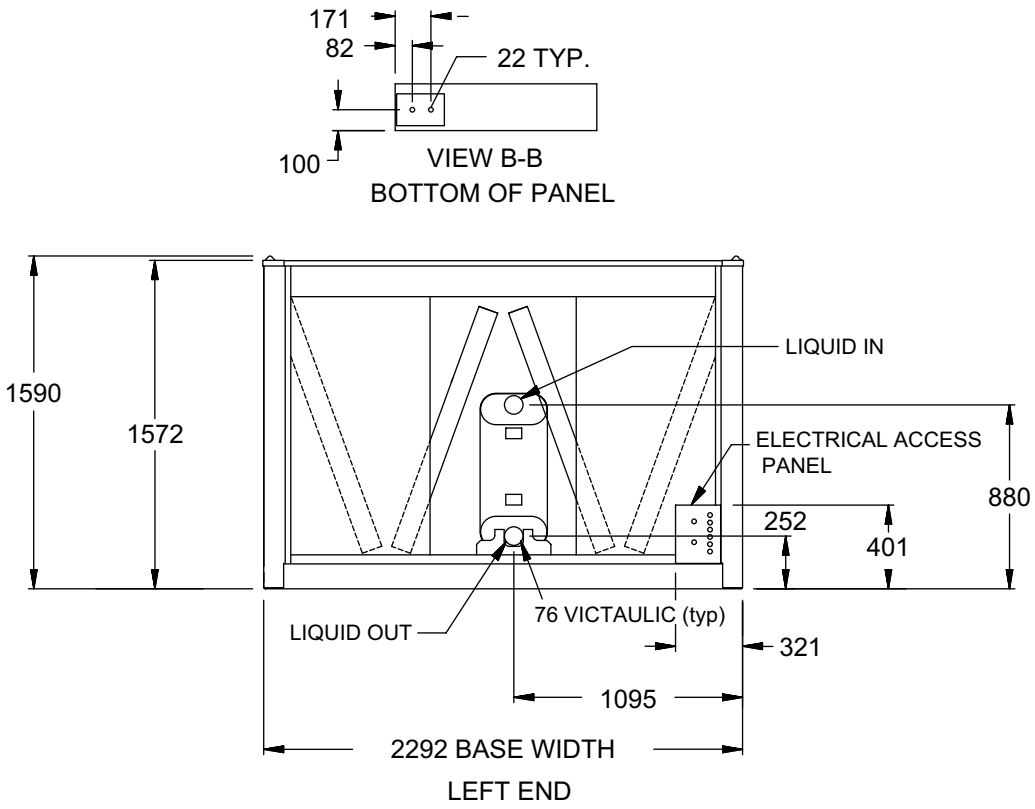


TOP VIEW



FRONT VIEW

DIMENSIONS – YCAL0066 (SI)

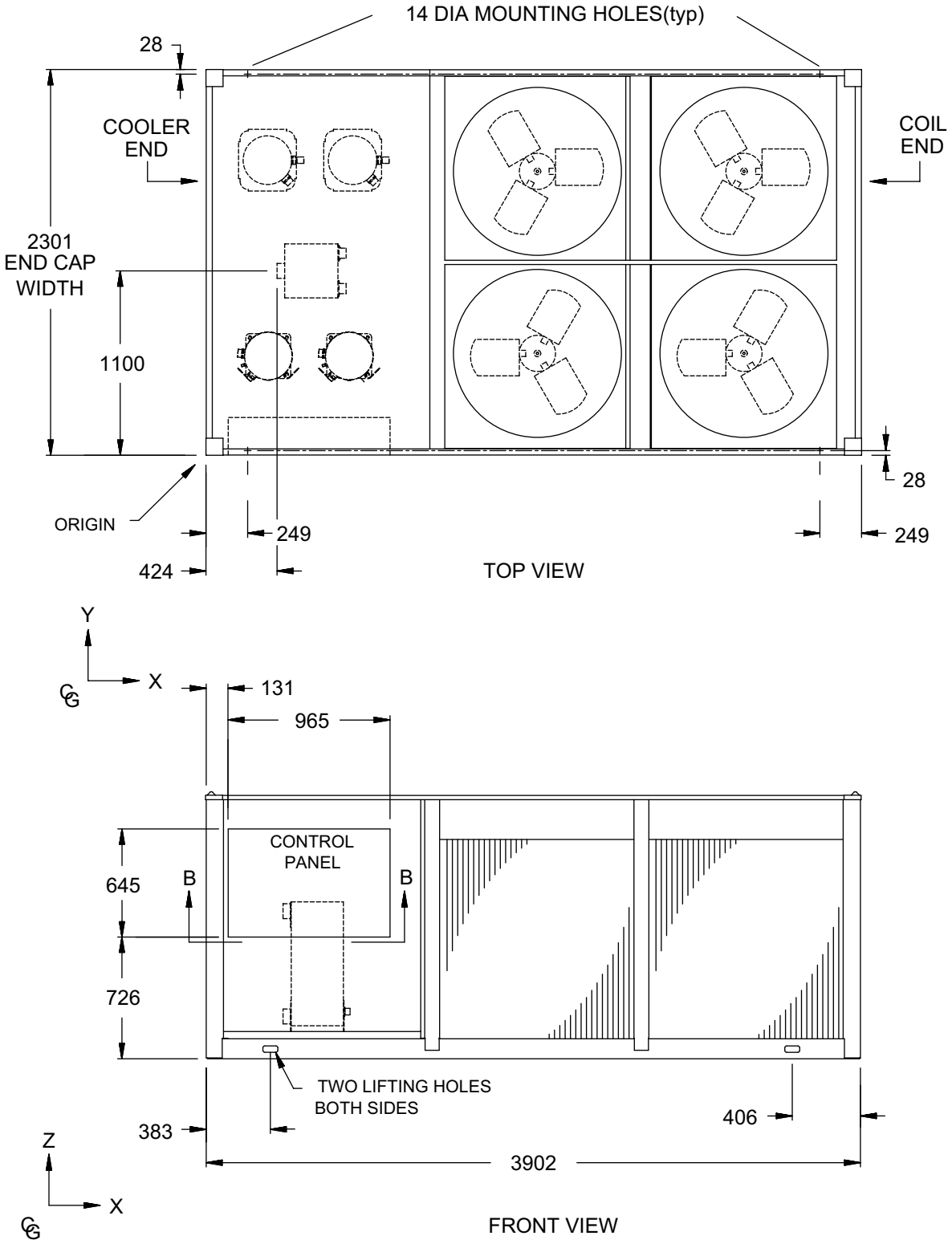


All dimensions are in mm unless specified otherwise.

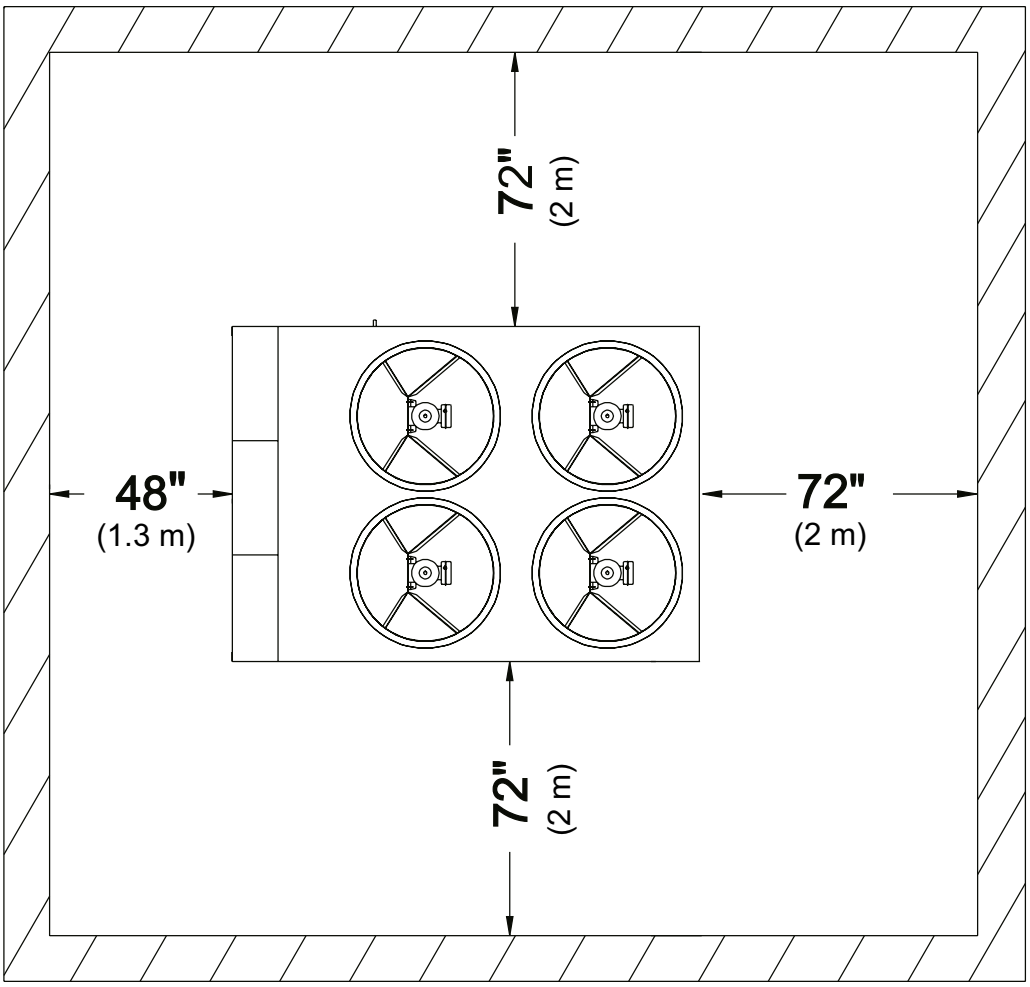
NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall – 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1 in. nominal deflection isolators (not shown) will increase overall unit height by 152mm.

DIMENSIONS – YCAL0066 (SI) (CONT'D)



TECHNICAL DATA – CLEARANCES



LD10506

NOTES:

1. No obstructions allowed above the unit.
2. Only one adjacent wall may be higher than the unit.
3. Adjacent units should be 10 ft (3 m) apart.

FIGURE 30 - UNIT CLEARANCES – ALL MODELS

ISOLATORS
WEIGHT DISTRIBUTION AND ISOLATOR MOUNTING POSITIONS
YCAL0019 – 0033 (WITHOUT PUMP PACKAGE OPTION)

General

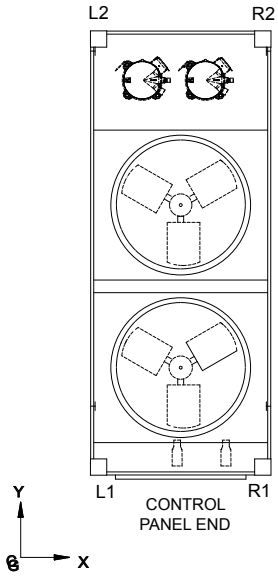
Weights of specific chiller models vary significantly as options are added. As a result, total weights, weights at individual isolator positions, and actual isolator selection at each position cannot be published due to the vast number of possible combinations. This information will be available when the specific chiller/ option selection is made from the local YORK sales office. Be aware, weights may change with each option along with possible isolator changes. Weights and isolators may need to be recalculated when the option selections are changed.

Whenever the isolator option is ordered, the isolators will be shipped loose with the chiller. Packed with the isolators and also in the control panel information packet is a drawing and table specifically for each chiller, based on the option selection. The drawing and table will be similar to the ones shown below. The drawing will show the isolator locations along with the weight in pounds and kilograms at the specific location, isolator position, and location measurements for each isolator.

ISOLATOR LOCATIONS

Order No: 069528190101
Line No: 1

UNIT SHIPPING WT. (DISPLAY ON UNIT DATA NAMEPLATE)	KG	LBS
	617	1361



LOCATION	X DISTANCE INCHES / MM	Y DISTANCE INCHES / MM	VENDOR NUMBER	OPERATING WEIGHT LBS / (KG)
R1	43.22 (1097.8)	4.94 (125.5)	CIP-B-450 / RED	276 (125.2)
L1	1.09 (27.7)	4.94 (125.5	CIP-B-450 / RED	284 (128.8)
R2	43.22 (1097.8)	92.25 (2343.2)	CIP-B-276750 / WHITE	407 (184.6)
L2	1.09 (27.7)	92.25 2343.2)	CIP-B-750 / WHITE	418 (189.6)

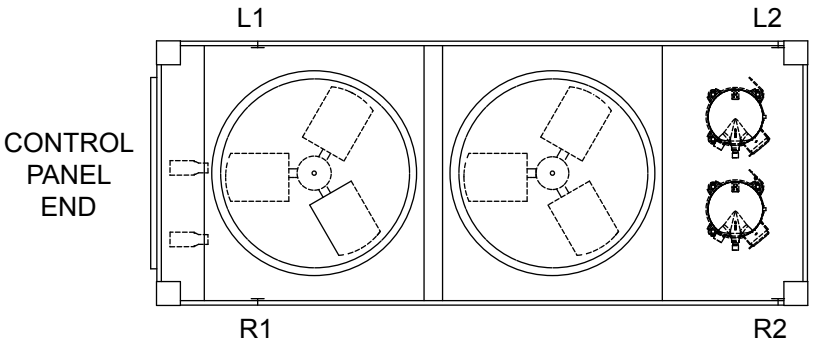
"SAMPLE PRINTOUT" TYPICAL OF THE INFORMATION SUPPLIED IN THE ISOLATOR PACKAGE AND IN THE CHILLER PANEL LITERATURE PACKET

ISOLATOR SELECTION
YCAL0019 – 0033 (WITHOUT PUMP PACKAGE OPTION)

		STANDARD ALUMINUM CONDENSER FINS				OPTIONAL COPPER CONDENSER FINS			
	LOCATION	**L1**	**L2**	**R1**	**R2**	**L1**	**L2**	**R1**	**R2**
YCAL0019	1 in. Deflection	CIP-B-450	CIP-B-750	CIP-B-450	CIP-B-750	CIP-B-450	CIP-B-750	CIP-B-450	CIP-B-750
	Neoprene	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C
	Seismic	SLRS-2-C2-420	SLRS-2-C2-660	SLRS-2-C2-420	SLRS-2-C2-660	SLRS-2-C2-420	SLRS-2-C2-660	SLRS-2-C2-420	SLRS-2-C2-660
YCAL0022	1 in. Deflection	CIP-B-450	CIP-B-750	CIP-B-450	CIP-B-750	CIP-B-450	CIP-B-750	CIP-B-450	CIP-B-750
	Neoprene	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C
	Seismic	SLRS-2-C2-420	SLRS-2-C2-660	SLRS-2-C2-420	SLRS-2-C2-660	SLRS-2-C2-520	SLRS-2-C2-660	SLRS-2-C2-520	SLRS-2-C2-660
YCAL0028	1 in. Deflection	CIP-B-450	CIP-B-1000	CIP-B-450	CIP-B-750	CIP-B-750	CIP-B-1000	CIP-B-750	CIP-B-1000
	Neoprene	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C
	Seismic	SLRS-2-C2-520	SLRS-2-C2-920	SLRS-2-C2-520	SLRS-2-C2-920	SLRS-2-C2-520	SLRS-2-C2-920	SLRS-2-C2-520	SLRS-2-C2-920
YCAL0033	1 in. Deflection	CIP-B-450	CIP-B-1000	CIP-B-450	CIP-B-1000	CIP-B-750	CIP-B-1000	CIP-B-750	CIP-B-1000
	Neoprene	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C	ND-C
	Seismic	SLRS-2-C2-520	SLRS-2-C2-920	SLRS-2-C2-520	SLRS-2-C2-920	SLRS-2-C2-520	SLRS-2-C2-920	SLRS-2-C2-520	SLRS-2-C2-920

NOTE: Isolators are selected using a service factor.

YCAL0019, 0022, 028, 0033



SAMPLE

WEIGHT DISTRIBUTION AND ISOLATOR MOUNTING POSITIONS YCAL0043 – 0066

General

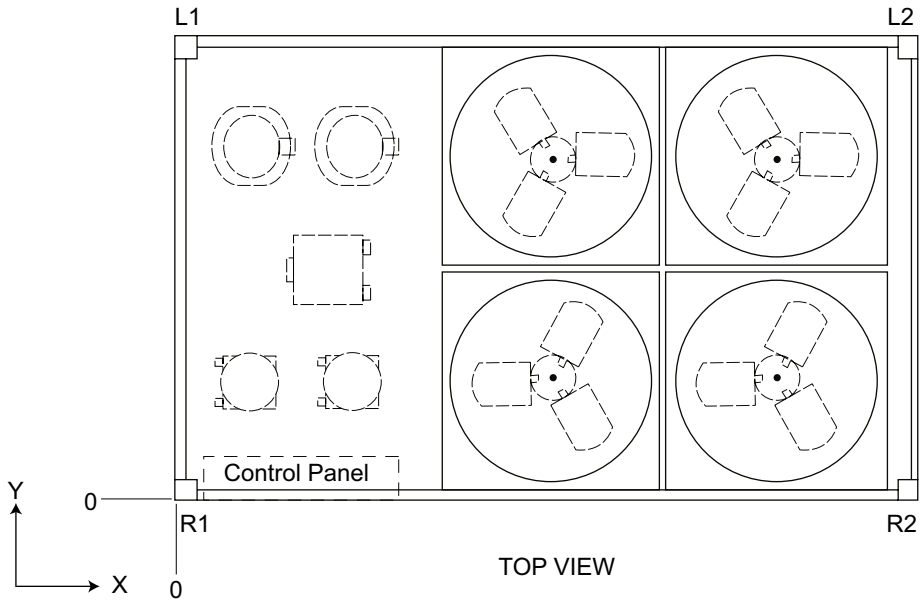
Weights of specific chiller models vary significantly as options are added. As a result, total weights, weights at individual isolator positions, and actual isolator selection at each position cannot be published due to the vast number of possible combinations. This information will be available when the specific chiller/ option selection is made from the local YORK sales office. Be aware, weights will change with each option along with possible isolator changes. Weights and isolators may need to be recalculated when the option selections are changed.

Whenever the isolator option is ordered, the isolators will be shipped loose with the chiller. Packed with the isolators and also in the control panel information packet is a drawing and table specifically for each chiller, based on the option selection. The drawing and table will be similar to the ones shown below. The drawing will show the isolator locations along with the weight in pounds and kilograms at the specific location, isolator position, and location measurements for each isolator.

Approximate Isolator Locations

Order No: 051138540701
Line No: 1

UNIT SHIPPING WEIGHT (DISPLAY ON UNIT DATA NAMEPLATE)	KG	LBS.
	1360	2999



TOP VIEW

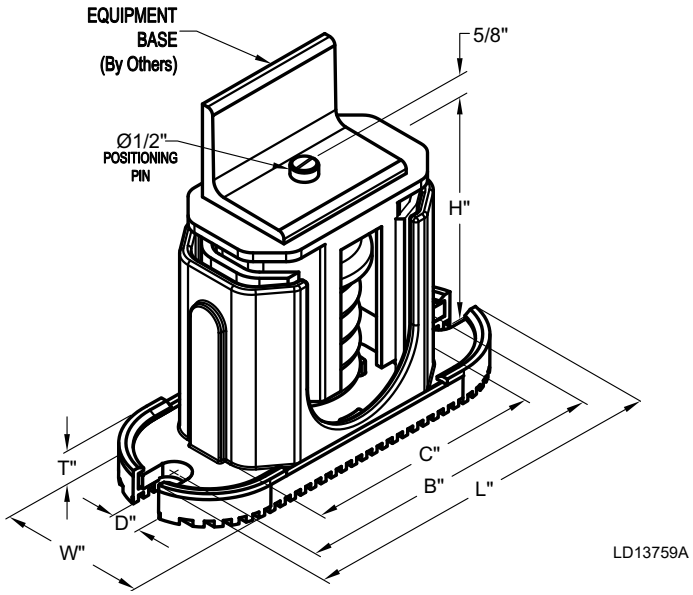
LD21562

LOCATION	X DISTANCE INCHES (MM)	Y DISTANCE INCHES (MM)	JCI PART NUMBER	SAP NUMBER	COLOR	OPERATING WEIGHT
R1	9.8 (249)	1.1 (28)	029-25335-002	434004	RD-4 Brick Red-WR	941
R2	135 (3429)	1.1 (28)	029-25335-001	434002	RD-3 Charcoal-WR	613
L1	9.8 (249)	89.5 (2273)	029-25335-002	434004	RD-4 Brick Red-WR	875
L2	135 (3429)	89.5 (2273)	029-25335-001	434002	RD-3 Charcoal-WR	570

SAMPLE PRINTOUT SUPPLIED IN THE ISOLATOR PACKAGE AND IN THE CHILLER PANEL LITERATURE PACKET.

ISOLATOR DETAILS - UNITS SHIPPED ON OR AFTER JUNE 15, 2008

ONE INCH DEFLECTION SPRING ISOLATOR CROSS-REFERENCE



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

MODEL NUMBER	RATED CAPACITY (LB)	DEFLECTION RATED (IN.)	COLOR CODE
029-25334-002 (433668)	675	1.320	DK. PURPLE
029-25334-003 (433669)	900	1.020	DK. GREEN
029-25334-004 (433670)	1200	0.900	GRAY
029-25334-005 (433871)	1360	0.770	WHITE
029-25334-006 (433872)	1785	0.880	GRAY/RED

MODEL NUMBER	RATED CAPACITY (LB)	DEFLECTION RATED (IN.)	COLOR CODE
029-25334-008 (433997)	1350	1.320	DK. PURPLE
029-25334-009 (433998)	1800	1.020	DK. GREEN
029-25334-010 (433999)	2400	0.900	GRAY
029-25334-012 (434000)	2720	0.770	WHITE
029-25334-013 (434001)	3570	0.880	GRAY / RED

FIGURE 31 - ONE INCH DEFLECTION SPRING ISOLATOR CROSS-REFERENCE

1 in. DEFLECTION SPRING ISOLATORS INSTALLATION INSTRUCTIONS

Units shipped on or after June 15, 2008

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 subbase, ensuring that all isolator center lines 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 of an inch 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 of an inch clearance is achieved between the lower housing and upper housing. (See drawing below).
9. Fine adjust isolators to level equipment.
10. Installation is complete.

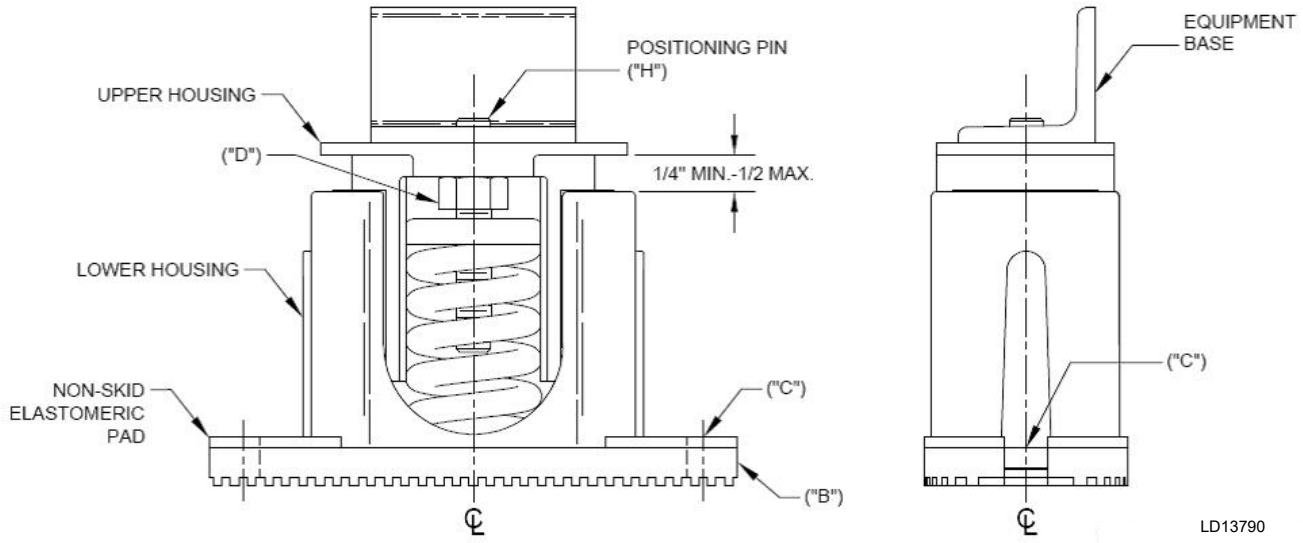
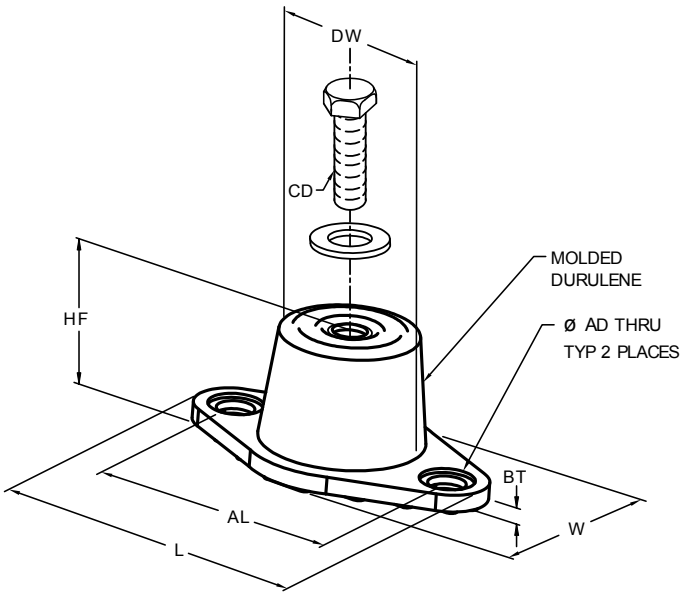


FIGURE 32 - ONE INCH DEFLECTION SPRING ISOLATORS INSTALLATION INSTRUCTIONS

DURULENE ISOLATOR CROSS-REFERENCE



Notes:

1. All dimensions are inches, interpreted per ANSI Y14.
2. See next page for installation instructions.
3. Mount molded in weather resistant duralene 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 is zinc-electroplated.

MOUNT TYPE	DIMENSION DATA MM (IN.)							
	L	W	HF	AL	AD	BT	CD	DW
TYPE A	5.50 (139.7)	3.38 (85.85)	2.88 (73.15)	4.13 (10.90)	0.56 (14.22)	0.25 (6.35)	1/2-13 UNC X 1	2.50 (63.5)
TYPE B	6.25 (168.7)	4.63 (117.60)	2.75 (69.85)	5.00 (127)	0.56 (14.22)	0.38 (9.65)	1/2-13 UNC X 1	3.00 (76.2)

TYPE A MODEL P/N	ISOLATOR COLOR	WEIGHT RANGE (LB)	WEIGHT RANGE (KG)
029-25335-001 (434002)	CHARCOAL	Up to 825	Up to 374

TYPE B MODEL P/N	ISOLATOR COLOR	WEIGHT RANGE (LB)	WEIGHT RANGE (KG)
029-25335-002 (434004)	BRICK RED	826 To 1688	375 To 766
029-25335-004 (434005)	CHARCOAL	1689 To 4000	767 To 1814

FIGURE 33 - DURULENE ISOLATOR CROSS-REFERENCE

INSTALLATION OF DURULENE VIBRATION ISOLATORS

Units shipped on or after June 15, 2008

1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submitial drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad, or subbase, ensuring that all isolator center lines 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 of an inch 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.

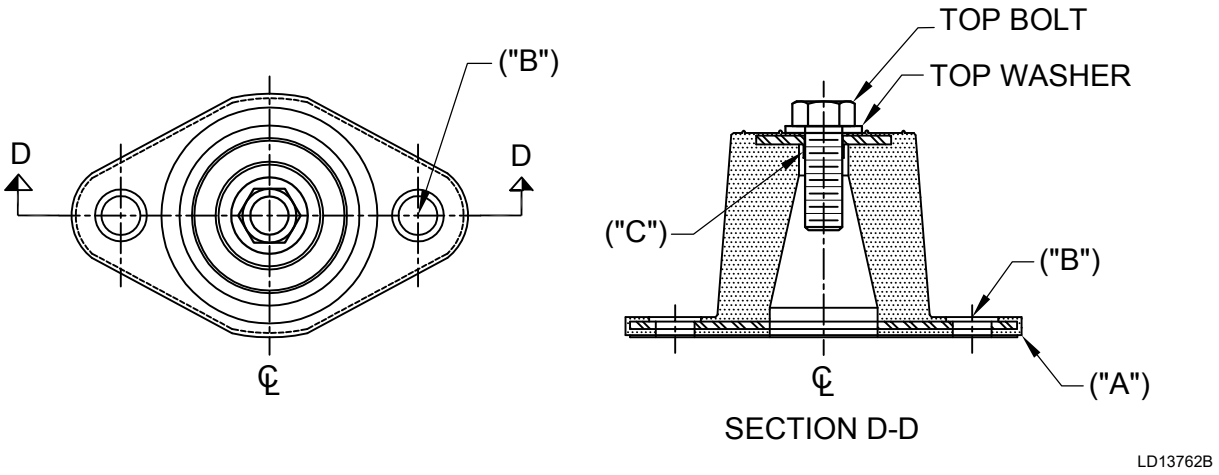
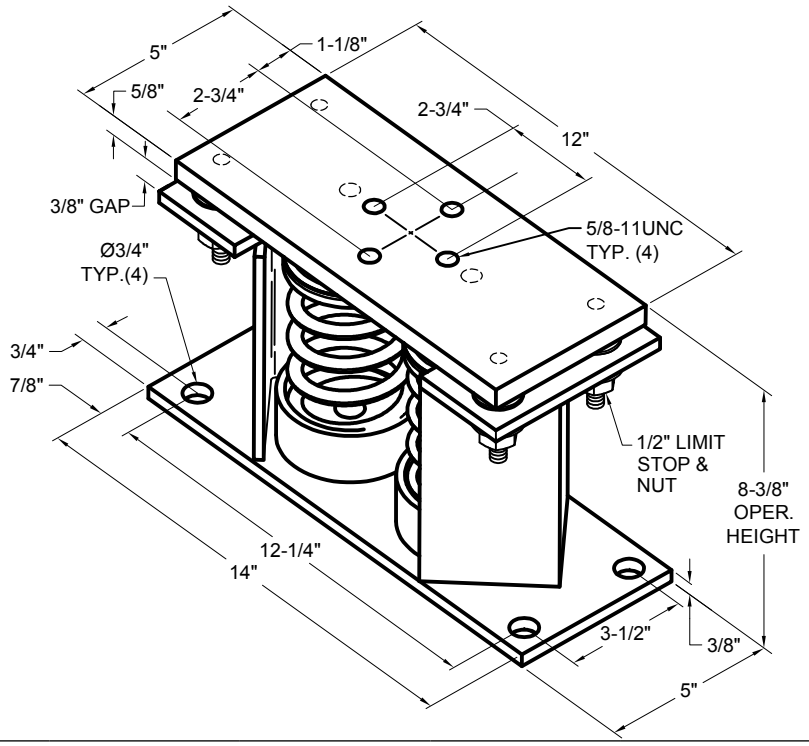


FIGURE 34 - INSTALLATION OF DURULENE VIBRATION ISOLATORS

TWO INCH DEFLECTION SEISMIC ISOLATOR CROSS-REFERENCE

Units shipped on or after June 15, 2008



RESTRAINED VIBRATION ISOLATOR FOR 2 IN. DEFLECTION

SEISMIC MOUNT SIZE	RATED LOAD (LB)	RATED DEFLECTION (IN.)	SPRING RATE (LB/IN.)	SOLID LOAD (LB)	COLOR CODE	ALLOWABLE G RATING HORIZONTAL
029-25336-006 (688690)	150	2.4	62	234	WHITE	34.7
029-25336-008 (688691)	320	2.3	140	490	YELLOW	16.3
029-25336-009 (688692)	460	2.3	200	688	GREEN	11.3
029-25336-010 (688693)	710	2.2	330	1072	DK BROWN	7.3
029-25336-011 (688694)	870	1.9	460	1312	RED	6.0
029-25336-012 (688695)	1200	1.9	638	1818	RED/BLACK	4.3
029-25336-013 (688697)	1450	1.8	900	2450	TAN	3.6
029-25336-014 (688698)	1690	1.7	1140	2892	PINK	3.1
029-25336-015 (688699)	2000	1.7	1318	3342	PINK/BLACK	2.6
029-25336-016 (688700)	2640	1.5	1854	4283	PINK/GRAY	2.0
029-25336-017 (688701)	3080	1.5	2004	4629	PINK/GRAY/ ORANGE	1.7
029-25336-018 (688702)	3740	1.8	2134	4930	PINK/GRAY/ DK BROWN	1.4

NOTES:

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

FIGURE 35 - TWO INCH DEFLECTION SEISMIC ISOLATOR CROSS-REFERENCE

SEISMIC ISOLATOR INSTALLATION AND ADJUSTMENT

Units shipped on or after June 15, 2008

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 subbase, ensuring that all isolator center lines match the equipment mounting holes. The VMC group recommends that the isolator base plates (“B”) be installed on a level surface. Shim or grout as required, leveling all isolator base plates to the same elevation (1/4th of an inch maximum difference can be tolerated).
4. Bolt or anchor all isolators to supporting structure utilizing base plate thru holes (“C”) or weld base plate to supporting structure with 3/8th fillet weld 2 inches long at 4 in. on center around entire base plate or as engineered for specific load and or field conditions.
5. Isolators are shipped to the job site with (2) removable spacer shims (“E”) between the top plate and the housing. These shims must be in place when the equipment is positioned over the isolators.
6. With all shims (“E”) in place, position equipment on top of plate (“A”) of isolator. Bolt equipment securely to top plate of isolator using a minimum of (2) 5/8th of an inch UNC A325 grade 5 SAE bolts or weld equipment or bracket to the top plate (“A”) of isolator with a minimum of 3/8th of an inch fillet welds 2 in. long at 3 in. on center for a minimum total weld of 10 in. (All sides of equipment or bracket resting on top plate (“A”) must be welded).
7. The adjustment process can only begin after the equipment or machine is at its full operating weight.
8. Back off each of the (4) limit stop lock nuts (“F”) on isolators by 1/2 in.
9. 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. Check the limit stop lock nuts (“F”) periodically to ensure that clearance between the washer and rubber grommet is maintained. Stop adjustment of isolator only when the top plate (“A”) has risen just above the shim (“E”).
10. Remove all spacer shims (“E”).
11. Fine adjust isolators to level equipment.
12. Adjust all limit stop lock nuts (“F”) per isolator, maintaining 1/4th of an in. to 3/8th of an inch gap. The limit stop nuts must be kept at this gap to ensure uniform bolt loading during uplift (as the case when equipment is drained).
13. Installation is complete.

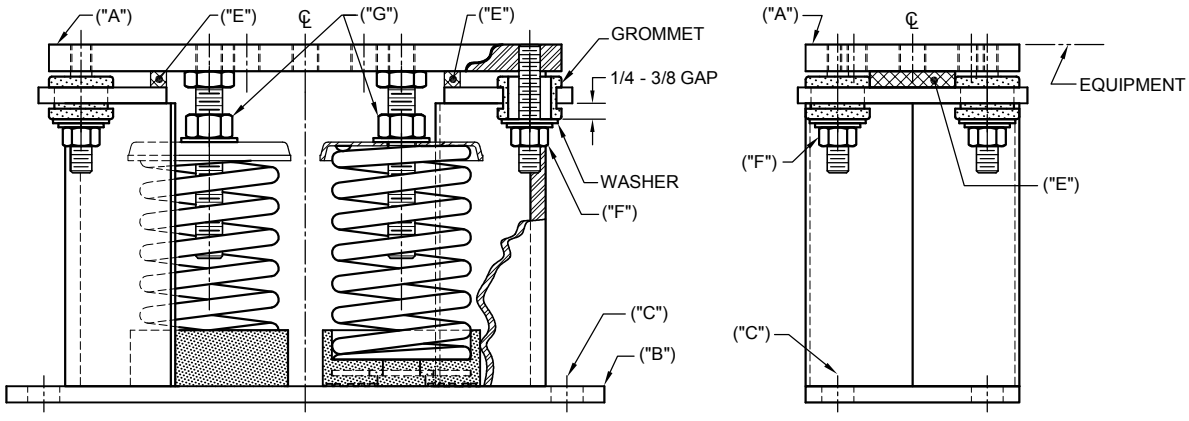
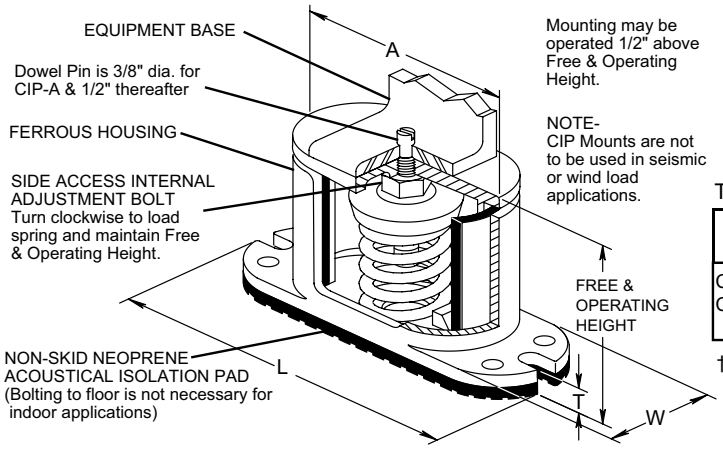


FIGURE 36 - SEISMIC ISOLATOR INSTALLATION AND ADJUSTMENT

ISOLATOR DETAILS - UNITS SHIPPED BEFORE JUNE 15, 2008

ONE INCH DEFLECTION SPRING ISOLATOR CROSS-REFERENCE

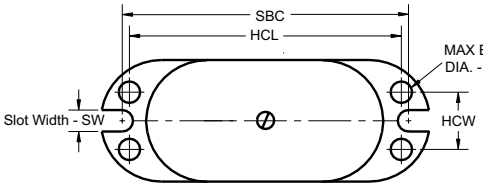
Illustration shows single spring CIP-B or CIP-C mount.



TYPE CIP DIMENSIONS (inches)†

Size	A	L	T	W	SW	HCL	HCW	MBD	SBC	Free Ht.	Min Ht.
CIP-B	5 3/4	8 1/4	1/2	2 3/4	7/16	6 1/2	1 1/2	3/8	7 1/4	6 1/8	5 1/4
CIP-C	6 5/8	8 7/8	9/16	3 1/2	7/16	7 1/4	1 3/4	3/8	7 7/8	6 3/4	6 3/4

†Casting dimensions may vary ±1/8"



All springs have additional travel to solid equal to 50% of the rated deflection.

BASE PLATE DIMENSIONS

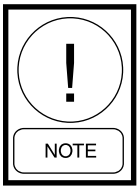
FOR UNITS WITH ALL POINT LOADS LESS THAN 1404 LB (637 KG)				
WEIGHT RANGE (LB)	**WEIGHT RANGE (KG)**	**MODEL NUMBER**	**COLOR**	**YORK P/N**
239 to 384 lb	108 to 174 kg	CIP-B-	Red	029-24583-002
384 to 639 lb	174 to 290 kg	CIP-B-	White	029-24583-003
639 to 851 lb	290 to 386 kg	CIP-B-	Blue	029-24583-004
851 to 1064 lb	386 to 483 kg	CIP-B-	Gray	029-24583-005
1064 to 1404 lb	483 to 637 kg	CIP-B-	Black	029-24583-006

FOR UNITS WITH ANY POINT LOAD ABOVE 1404 LB (637 KG)				
WEIGHT RANGE (LB)	**WEIGHT RANGE (KG)**	**MODEL NUMBER**	**COLOR**	**YORK P/N**
Up to 851 lb	Up to 386 kg	CIP-C-	Black	029-24583-007
851 to 1149 lb	386 to 521 kg	CIP-C-	Yellow	029-24583-008
1149 to 1489 lb	521 to 675 kg	CIP-C-	Red w/Black	029-24583-009
1489 to 1786 lb	675 to 910 kg	CIP-C-	Yellow w/ Red	029-24583-010
1786 to 2028 lb	910 to 920 kg	CIP-C-	Green w/ Yellow	029-24583-011
2028 to 2254 lb	920 to 1022 kg	CIP-C-	Red w/ Red	029-24583-012
2254 to 2936 lb	1022 to 1332 kg	CIP-C-	Green w/ Red	029-24583-013

FIGURE 37 - ONE INCH DEFLECTION SPRING ISOLATOR CROSS-REFERENCE (CIP-X)

INSTALLATION OF 1 IN. DEFLECTION MOUNTS

1. Floor or steel frame should be level and smooth.
2. For pad installations, isolators do not normally require bolting. If necessary, anchor isolators to floor through bolt holes in the base plate.



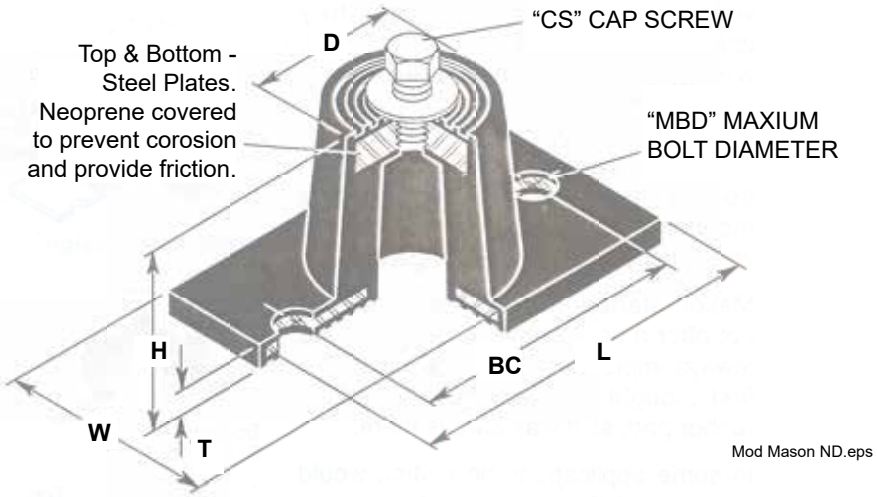
Isolators must be bolted to the substructure and the equipment must be bolted to the isolators when outdoor equipment is exposed to wind forces.

3. Lubricate the threads of adjusting bolt. Loosen the hold down bolts to allow for isolator adjustment.
4. Block the equipment 10mm (1/4th of an inch) higher than the specified free height of the isolator. To use the isolator as blocking for the equipment, insert a 10mm (1/4th of an inch) shim between the upper load plate and vertical uprights. Lower the equipment on the blocking or shimmed isolators.
5. Complete piping and fill equipment with water, refrigerant, etc.
6. Turn leveling bolt of first isolator four full revolutions and proceed to each mount in turn.
7. Continue turning leveling bolts until the equipment is fully supported by all mountings and the equipment is raised free of the spacer blocks or shims. Remove the blocks or shims.
8. Turn the leveling bolt of all mountings in either direction in order to level the installation.
9. Tighten the nuts on hold down bolts to permit a clearance of 2mm (1/8th of an inch) between resilient washer and underside of channel cap plate.
10. Installation is now complete.

NEOPRENE ISOLATOR CROSS-REFERENCE

Units shipped before June 15, 2008

ND-X



ENGLISH (Inches)								
SIZE	**D**	**H**	**L**	**T**	**W**	**BC**	**CS**	**MBD**
ND-C	2-9/16	2-3/ 4	5-1/ 2	1/4	2-5/16	4-1/8	1/2-13 X 1	1/ 2
ND-D	3-3/8	2-3/4	6-1/4	5/16	4	5	1/2-13 X 1	1/ 2
ND-DS	3-3/8	2-3/4	6-1/4	5/16	4	5	1/2-13 X 1	1/ 2

SI (mm)								
ND-C	65.1	69.9	139.7	6.4	58.7	101.9	1/2- 13 X 1"	12.7
ND-D	85.7	69.9	158.8	7.9	101.6	127.0	1/2- 13 X 1"	12.7
ND-DS	85.7	69.9	158.8	7.9	101.6	127.0	1/2- 13 X 1"	12.7

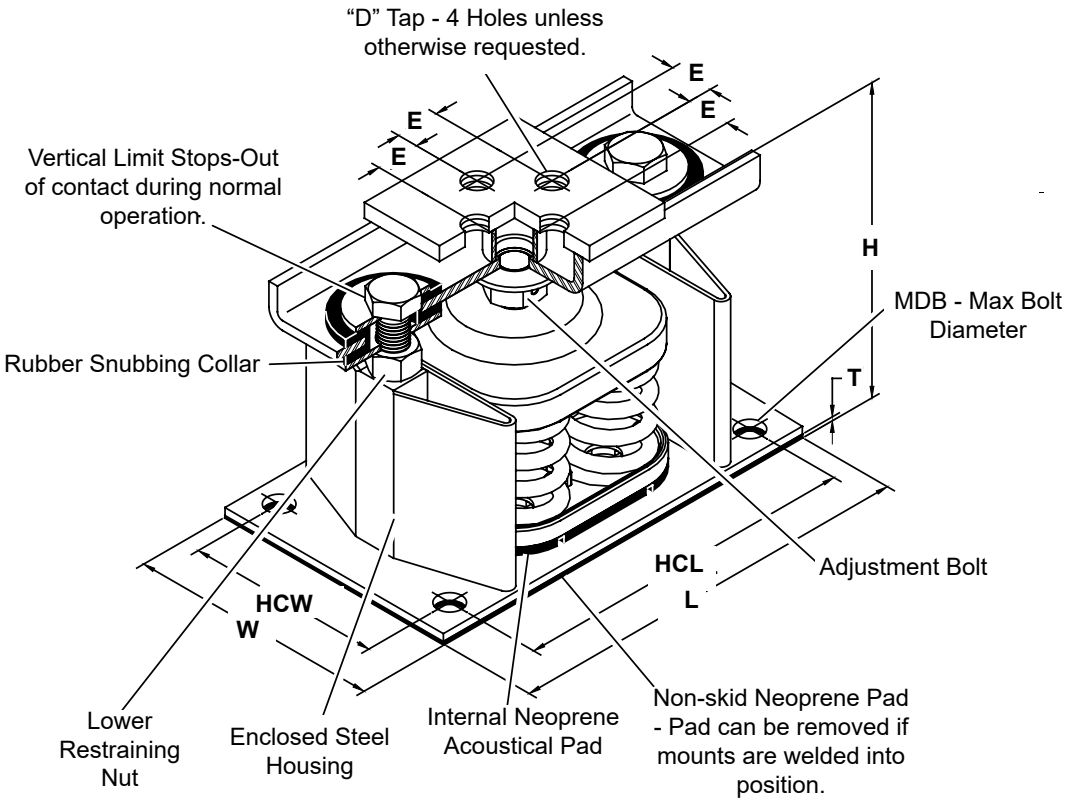
WEIGHT RANGE (LBS)	WEIGHT RANGE (KG)	MODEL NUMBER	COLOR	YORK P/N
UP TO 751 LBS	UP TO 341 KG	ND-C	YELLOW	029-24584-001
751 TO 1651 LBS	341 TO 749 KG	ND-D	YELLOW	029-24584-002
1651 TO 3226 LBS	749 TO 1463 KG	ND-DS	YELLOW	029-24584-004

FIGURE 38 - NEOPRENE ISOLATOR CROSS-REFERENCE

TWO INCH DEFLECTION, SEISMIC SPRING ISOLATOR CROSS-REFERENCE

Units shipped before June 15, 2008

SLRS



NOTES: Illustration above shows a SLRS-4-C2 (4 springs). SLRS-8-2 and C2 have 1 spring, and SLRS-2-C2 has two springs. SLRS-6-C2 has six springs and SLRS-9-C2 has nine springs.

ENGLISH									
SIZE	**H**	**T**	**D**	**E**	**L**	**HCL**	**W**	**HCW**	**MBD**
2-C2	8-1/2"	3/8"	5/8"	1-3/8"	14"	12-1/4"	5-1/4"	3-1/ 2"	5/8"

SI									
SIZE	**H**	**T**	**D**	**E**	**L**	**HCL**	**W**	**HCW**	**MBD**
2-C2	215.9	9.5	15.9	34.9	355.6	311.2	133.4	88.9	5/8"

*WEIGHT RANGE (LBS)	WEIGHT RANGE (KG)	MODEL NUMBER	COLOR	YORK P/N
UP TO 358 LBS	UP TO 162 KG	SLRS-2-C2-	RED	029-24585-006
358 TO 443 LBS	162 TO 201 KG	SLRS-2-C2-	WHITE	029-24585-007
443 TO 582 LBS	201 TO 264 KG	SLRS-2-C2-	BLACK	029-24585-008
582 TO 783 LBS	264 TO 335 KG	SLRS-2-C2-	BLUE	029-24585-009
783 TO 1038 LBS	335 TO 471 KG	SLRS-2-C2-	GREEN	029-24585-010
1038 TO 1497 LBS	471 TO 679 KG	SLRS-2-C2-	GRAY	029-24585-011
1497 TO 2058 LBS	679 TO 933 KG	SLRS-2-C2-	SILVER	029-24585-012
2058 TO 2619 LBS	933 TO 1188 KG	SLRS-2-C2-	GRAY W/ RED	029-24585-013
2619 TO 3180 LBS	1188 TO 1442 KG	SLRS-2-C2-	SILVER W/ RED	029-24585-014

*Value is de-rated by 15%

FIGURE 39 - TWO INCH DEFLECTION, SEISMIC SPRING ISOLATOR CROSS-REFERENCE

SLRS SEISMIC ISOLATOR INSTALLATION AND ADJUSTMENT

Units shipped before June 15, 2008

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 1/8th of a 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 1/8th of an inch.

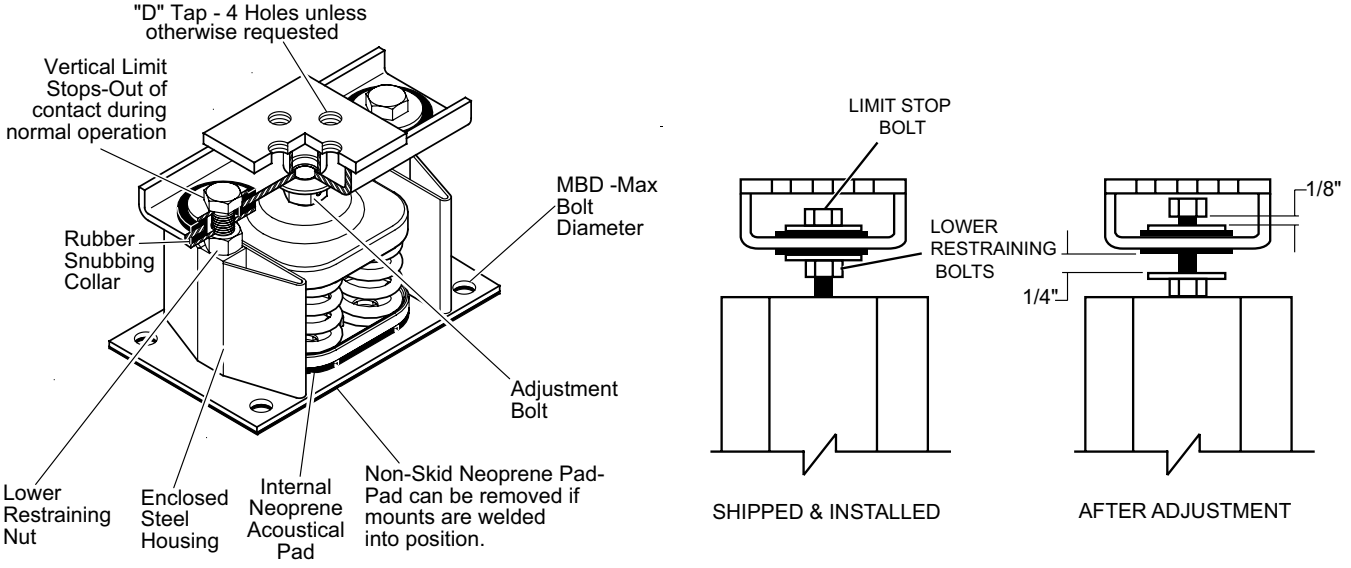


FIGURE 40 - SLRS SEISMIC ISOLATOR INSTALLATION AND ADJUSTMENT

SECTION 6 – COMMISSIONING

COMMISSIONING

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

Commissioning personnel should be thoroughly familiar with the information contained in this literature, in addition to this section.

Perform the commissioning using the detailed checks outlined in the Equipment Start-Up Check List (Page 149) as the commissioning procedure is carried out.

PREPARATION – POWER OFF

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

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. Remote systems and units are supplied with a nitrogen holding charge. These systems must be evacuated with a suitable vacuum pump/recovery unit as appropriate to below 500 microns.

Do not liquid charge with static water in the cooler. Care must also be taken to liquid charge slowly to avoid excessive thermal stress at the charging point. Once the vacuum is broken, charge into the condenser coils with the full operating charge as given in the Technical Data Section.

Service and Oil Line Valves

Open each compressor suction, economizer, and discharge service valve. 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. Open the liquid line service valve and oil return line ball valve fully in each system.

Compressor Oil

To add oil to a circuit – connect a YORK hand oil pump (Part No. 470-10654-000) to the 1/4 in. oil charging connection on the compressors with a length of clean hose or copper line, but do not tighten the flare nut. Using clean oil of the correct type (“T” 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. Approximately 1.8 to 2.3 gallons is present in the each refrigerant system. Oil levels in the oil equalizing line sight glass should be between the bottom and the middle of the sight glass with the system off. High oil levels 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 and resultant liquid overfeed and subsequent damage to the compressor. While running, a visible sign of oil splashing in the sight glass is normal.

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.

Supply Voltage

Verify that the site voltage supply corresponds to the unit requirement and is within the limits given in the Technical Data Section.

PREPARATION – POWER ON

Perform the commissioning using the detailed checks outlined in the Equipment Start-Up Check List as the commissioning procedure is carried out.

Apply power to the chiller. Turn on the option panel circuit breaker if supplied.

The machine is now live!

Switch Settings

Ensure that the chiller OFF/ON Unit Switch at the bottom of the keypad is OFF. Place the optional circuit breaker handle on the panel door to ON. The customer's disconnection devices can now be set to ON.

Verify that the control panel display is illuminated. Ensure that the system switches under the SYSTEM SWITCHES key are in the OFF position.

Compressor Heaters

Verify the compressor heaters are energized. If the ambient temperature is above 96°F (36°C) the compressor heaters must be ON for at least 8 hours before start-up to ensure all refrigerant liquid is driven out of the compressor and the oil. If the ambient temperature is below 86°F (30°C), allow 24 hours.

Water System

Verify the chilled liquid system has been installed correctly, and has been commissioned with the correct direction of water flow through the cooler. The inlet should be at the refrigerant piping connection end of the cooler. Purge air from the top of the cooler using the plugged air vent mounted on the top of the cooler body.

Flow rates and pressure drops must be within the limits given in the Technical Data Section. Operation outside of these limits is undesirable and could cause damage.

If mains power must be switched OFF for extended maintenance or an extended shutdown period, the compressor suction, discharge and economizer service stop valves should be closed (clockwise). If there is a possibility of liquid freezing due to low ambient temperatures, the coolers should be drained or power should be applied to the chiller. This will allow the cooler heater to protect the cooler from freezing down to –20°F. 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.

Flow Switch

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

There should be a straight run of at least 5 pipe diameters on either side of the flow switch. The flow switch should be connected to terminals 13 and 14 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 cooler. This sensor also provides some freeze protection and must always be fully inserted in the water outlet sensor well.

EQUIPMENT START-UP CHECKLIST

Supersedes: 150.67-CL1 (309)

Form 150.67-CL1 (115)

YORK BY JOHNSON CONTROLS

YCAL0019-0066 60 HZ STYLE E
YCAL0043-0377 50 HZ STYLE E

START-UP CHECKLIST

CUSTOMER: _____ JOB NAME: _____

ADDRESS: _____ LOCATION: _____

PHONE: _____ CUSTOMER ORDER NO: _____

JCI TEL NO: _____ JCI ORDER NO: _____ JCI CONTRACT NO: _____

CHILLER MODEL NO: _____ **UNIT SERIAL NO**: _____

The work (as checked below) is in process and will be completed by: _____ / _____ / _____
Month Day Year

The following work must be completed in accordance with installation instructions:

A. CHECKING THE SYSTEM PRIOR TO INITIAL START (NO POWER)

Unit Checks

1. Unit checked for shipping damage. ..... ☐

   NOTE: Any damage MUST be reported to Johnson Controls immediately for inspection.

   Initials: _____

   Company Name: _____

   Date: _____
2. Unit assembled (if shipped dismantled) and refrigerant piping installed. ..... ☐
3. Visually check for refrigerant piping leaks. ..... ☐
4. Open suction line ball valve, discharge line ball valve, and liquid line valve for each system. ..... ☐
5. The compressor oil level should be maintained so that an oil level is visible or splashing in the sight glass when fully loaded. At shutdown, the oil level should be between the bottom and middle of the oil equalizing sight glass. ..... ☐
6. Assure water pumps are on. Check and adjust water pump flow rate and pressure drop across the cooler. Verify flow switch operation. ..... ☐

NOTE

Excessive flow may cause catastrophic damage to the heat exchanger (evaporator).

7. Check the control panel to ensure it is free of foreign material (wires, metal chips, etc.). ..... ☐
8. Visually inspect wiring (power and control). Wiring MUST meet N.E.C. and local codes. ..... ☐
9. Check tightness of power wiring inside the power panel on both sides of the motor contactors and overloads. . ..... ☐
10. Check for proper size fuses in main and control circuits, and verify overload setting corresponds with RLA and FLA values. *Refer to Electrical Tables in the IOM (160.67-NM1 60 HZ or 160.67-NM2 50 HZ) or unit nameplate.* ..... ☐
11. Assure 120VAC Control Power to TB1 has 15 amp minimum capacity. ..... ☐
12. Be certain all water temp sensors are inserted completely in their respective wells and are coated with heat conductive compound. ..... ☐
13. Assure that evaporator TXV bulbs are strapped onto the suction lines at 4 or 8 o'clock positions or suction temp. sensors if EEVs are installed. .. ☐

B. COMPRESSOR HEATERS (POWER ON – 24 HOURS PRIOR TO START)

Apply 120VAC and verify its value between terminals 5 and 2 of CTB2. The voltage should be 120VAC +/- 10%. ..... ☐

NOTE: Power must be applied 24 hours prior to start-up. Each heater should draw approximately 0.5-1A.

C. PANEL CHECKS
(POWER ON - BOTH UNIT SWITCH OFF)

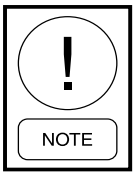
1. Apply 3-phase power and verify its value. Voltage imbalance should be no more than 2% of the average voltage. ..... ☐
2. Apply 120VAC and verify its value on the terminal block in the Power Panel. Make the measurement between terminals 5 and 2 of CTB2. The voltage should be 120VAC +/- 10% ..... ☐
3. Program/verify the Cooling Setpoints, Program Setpoints, and Unit Options. Record the values below. ..... ☐

OPTIONS	
Display Language	
Sys 1 Switch	
Sys 2 Switch	
Chilled Liquid	
* Ambient Control	
Local/Remote Mode	
Control Mode	
Display Mode	
* Lead/Lag Control	
* Fan Control	
Manual Override	
Current Feedback	
** Soft Start	
** Unit Type	
** Refrigerant Type	
** Expansion Valve Type	
COOLING SETPOINTS	
Cooling Setpoint	
Range	
EMS-PWM Max. Setpoint	
PROGRAM	
Discharge Pressure Cutout	
Suct. Pressure Cutout	
Low Amb. Temp. Cutout	
Leaving Liquid Temp. Cutout	
Anti-Recycle Time	
Fan Control On Pressure	
Fan Differential Off Pressure	
Total # of Compressors	
* Number of Fans/System	
* Unit/Sys Voltage	
Unit ID	

* Not on all models. ** Viewable only.

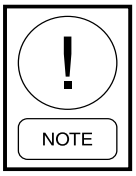
4. Put the unit into Service Mode and cycle each condenser fan to ensure proper rotation. ..... ☐
5. Prior to this main step, turn system 2 off. Connect a manifold gauge to system 1 suction and discharge service valves.
   Place the Unit Switch in the control panel to the "ON" position. As each compressor cycles on, ensure that the discharge pressure rises and the suction pressure decreases. If this does not occur, the compressor being tested is operating in the reverse direction and must be corrected. After verifying proper compressor rotation, turn the Unit Switch to "OFF" ..... ☐

The chilled liquid setpoint may need to be temporarily lowered to ensure all compressors cycle "ON".



This unit uses scroll compressors which can only operate in one direction. Failure to observe this will lead to compressor failure.

6. YCAL0043 – YCAL0066 units only – Turn system 1 "OFF" and system 2 "ON"
   Place the Unit Switch in the control panel to the "ON" position. As each compressor cycles "ON", ensure that the discharge pressure rises and the suction pressure decreases. If this does not occur, the compressor being tested is operating in the reverse direction and must be corrected. After verifying proper compressor rotation, turn the Unit Switch to "OFF" ..... ☐



This unit uses scroll compressors which can only operate in one direction. Failure to observe this will lead to compressor failure.

D. CHECKING SUPERHEAT AND SUBCOOLING

The subcooling temperature of each system can be calculated by recording the temperature of the liquid line at the outlet of the condenser and subtracting it from the liquid line saturation temperature at the liquid stop valve (liquid line saturation temp. is converted from a temperature/pressure chart).

Example:

Liquid line pressure =
325 PSIG converted to temp. 101 °F
Minus liquid line temp. -86 °F
Subcooling = 15 °F

The subcooling should be adjusted to 15 °F at design conditions.

1. Record the liquid line pressure and its corresponding temperature, liquid line temperature and subcooling below: ..... ☐

	SYS 1	SYS 2	
Liq Line Press =	———	———	PSIG
Saturated Temp =	———	———	°F
Liq Line Temp =	———	———	°F
Subcooling =	———	———	°F

After the subcooling is verified, the suction superheat should be checked. The superheat should be checked only after steady state operation of the chiller has been established, the leaving water temperature, and the unit is running in a fully loaded condition. Correct superheat setting for a system is 10°F - 15°F (5.56°C - 8.33 °C) 18" (46 cm) from the heat exchanger.

Superheat should typically be set for not less than 10°F with only a single compressor running on a circuit. The superheat is calculated as the difference between the actual temperature of the returned refrigerant gas in the suction line entering the compressor and the temperature corresponding to the suction pressure as shown in a standard pressure/temperature chart.

Example:

Suction Temp = 46 °F
minus Suction Press
105 PSIG converted to Temp -34 °F
Superheat = 12 °F

When adjusting the expansion valve (TXV only), the adjusting screw should be turned not more than one turn at a time, allowing sufficient time (approximately 15 minutes) between adjustments for the system and the thermal expansion valve to respond and stabilize.

Assure that superheat is set at a minimum of 10°F (5.56 °C) with a single compressor running on each circuit.

2. Record the suction temperature, suction pressure, suction saturation temperature, and superheat of each system below:

	SYS 1	SYS 2	
Suction Temp =	———	———	PSIG
Suction Pressure =	———	———	°F
Saturation Temp =	———	———	°F
Superheat =	———	———	°F

E. LEAK CHECKING

Leak check compressors, fittings, and piping to ensure no leaks. ..... ☐

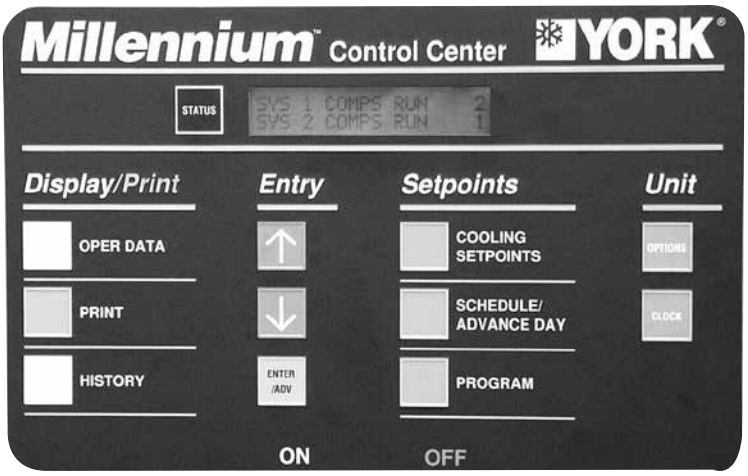
If the unit is functioning satisfactorily during the initial operating period, no safeties trip and the compressors cycle to control water temperature to setpoint, the chiller is ready to be placed into operation.

UNIT OPERATING SEQUENCE

The operating sequence described below relates to operation on a hot water start after power has been applied, such as start-up commissioning. When a compressor starts, internal timers limit the minimum time before another compressor can start to 1 minute.

1. For the chiller system to run, the Flow Switch must be closed, any remote cycling contacts must be closed, the Daily Schedule must not be scheduling the chiller OFF, and temperature demand must be present.
2. When power is applied to the system, the microprocessor will start a 2 minute timer. This is the same timer that prevents an instantaneous start after a power failure.
3. At the end of the 2 minute timer, the microprocessor will check for cooling demand. If all conditions allow for start, a compressor on the lead system will start and the liquid line solenoid will open. Coincident with the start, the anti-coincident timer will be set and begin counting downward from “60” seconds to “0” seconds.
4. If the unit is programmed for Auto Lead/Lag, the system with the shortest average run-time of the compressors will be assigned as the “lead” system. A new lead/lag assignment is made whenever all systems shut down.
5. Several seconds after the compressor starts, that systems first condenser fan will be cycled ON (outdoor air temperature more than 25°F (-4°C) or discharge pressure). See the section on Operating Controls for details concerning condenser fan cycling.
6. After 1 minute of compressor run time, the next compressor in sequence will start when a system has to load. Additional compressors will be started at 60 second intervals as needed to satisfy temperature setpoint.
7. If demand requires, the lag system will cycle on with the same timing sequences as the lead system after the lead system has run for five minutes. See the section on *Capacity Control* for a detailed explanation of system and compressor staging.
8. As the load decreases below setpoint, the compressors will be shut down in sequence. This will occur at intervals of either 60, 30, or 20 seconds based on water temperature as compared to setpoint, and control mode. See the section on *Capacity Control* for a detailed explanation.
9. When the last compressor in a “system” (two or three compressors per system), is to be cycled OFF, the system will initiate a pump-down. Each “system” has a pump-down feature upon shut-off. On a non-safety, non-unit switch shutdown, the LLSV will be turned OFF and the last compressor will be allowed to run until the suction pressure falls below the suction pressure cutout or for 180 seconds, whichever comes first.

SECTION 7 – UNIT CONTROLS



00065VIP

INTRODUCTION

The YORK Millennium MicroComputer Control Center is a microprocessor based control system designed to provide the entire control for the liquid chiller. The control logic embedded in the microprocessor based control system will provide control for the chilled liquid temperatures, as well as sequencing, system safeties, displaying status, and daily schedules. The MicroComputer Control Center consists of four basic components:

- IPU II and I/O Boards
- Transformer
- Display
- Keypad

The keypad allows programming and accessing setpoints, pressures, temperatures, cutouts, daily schedule, options, and fault information.

Remote cycling, demand limiting and chilled liquid temperature reset can be accomplished by field supplied contacts.

Compressor starting/stopping and loading/unloading decisions are performed by the Microprocessor to maintain leaving or return chilled liquid temperature. These decisions are a function of temperature deviation from setpoint.

A Master ON/OFF switch is available to activate or deactivate the unit.

IPU II AND I/O BOARDS

The IPU and I/O boards are assembled to function as a single microprocessor controller requiring no additional hardware. The IPU II board contains a coldfire microprocessor and is the controller and decision maker in the control panel. The I/O board handles all of the chiller I/O (Inputs and Outputs). System inputs from pressure transducers and temperature sensors are connected to the I/O board. The I/O board contains a processor capable of reading the inputs and controlling the outputs. It communicates through the transition header with the IPU II microprocessor.

The I/O board circuitry multiplexes the analog inputs, digitizes them, and constantly scans them to keep watch on the chiller operating conditions. The input values are transmitted serially to the IPU II microprocessor board. From this information, the IPU II then issues commands to the I/O board relay outputs to control contactors, solenoids, etc. for Chilled Liquid Temperature Control and to react to safety conditions. The I/O board converts logic signals to operate relay outputs to 115VAC levels used by motor contactors, fan contactors, solenoid valves, etc. to control system operation. The low voltage side of all relay coils on the I/O board are powered by +12V.

Keypad commands are actuated upon by the microprocessor to change setpoints, cutouts, scheduling, operating requirements, and to provide displays. The keypad and display are connected to the I/O board.

The on-board power supply converts 24VAC from 75VA, 120/24VAC 50/60Hz UL listed class 2 power transformer to +12V, +5V and +3.3V using switching and linear voltage regulators located on the I/O and IPU II boards. These voltages are used to operate integrated circuitry on the board. The 40 character display and unit sensors (transducer and temperature sensors) are supplied power for the micro board +5V supply. 24VAC is rectified, but not regulated, to provide unregulated +30 VDC to supply all of the digital inputs.

The IPU II board contains one green "Power" LED to indicate that the board is powered up and one red "Status" LED to indicate by blinking that the processor is operating.

The I/O board contains one green "Power" LED to indicate that the board is powered up and one red "Status" LED to indicate by blinking that the processor is operating. The I/O board also contains two sets of Receiver/Transmit LED's, one for each available serial communication port. The receive LED's are green, and the Transmit LED's are red.

A jumper on the I/O board selects 4 to 20mA or 0 to10 VDC as the input type on the remote temperature reset analog input.

Unit Switch

A unit ON/OFF switch is just underneath the keypad. This switch allows the operator to turn the entire unit OFF if desired. The switch must be placed in the ON position for the chiller to operate.

Display

The 40 Character Display (2 lines of 20 characters) is a liquid crystal display used for displaying system parameters and operator messages.

The display in conjunction with the keypad, allows the operator to display system operating parameters as well as access programmed information already in memory. The display has a lighted background for night viewing and for viewing in direct sunlight.

When a key is pressed, such as the OPER DATA key, system parameters will be displayed and will remain on the display until another key is pressed. The system parameters can be scrolled with the use of the ↑ (up) and ↓ (down) arrow keys. The display will update all information at a rate of about 1 a second.

Display Messages may show characters indicating "greater than" (>) or "less than" (<). These characters indicate the actual values are greater than or less than the limit values which are being displayed.

Keypad

The 12 button non-tactile keypad allows the user to retrieve vital system parameters such as system pressures, temperatures, compressor running times and starts, option information on the chiller, and system setpoints. This data is useful for monitoring chiller operation, diagnosing potential problems, troubleshooting, and commissioning the chiller.

It is essential the user become familiar with the use of the keypad and display. This will allow the user to make full use of the capabilities and diagnostic features available.

Battery Back-up

The IPU II contains a Real Time Clock integrated circuit chip with an internal battery backup. The purpose of this battery backup is to ensure any programmed values (setpoints, clock, cutouts, etc.) are not lost during a power failure regardless of the time involved in a power cut or shutdown period.

Transformer

A 75VA, 120/24VAC 50/60Hz transformer is provided to supply power to the Microprocessor Board, which in turn rectifies, filters, and regulates as necessary to supply power to the display, sensors, and transducers.

Single System Select and Programming # of Compressors

The control software is common between single (1) and dual (2) system units. A jumper is installed between terminals 13 and 17 on the user terminal block to configure a unit for a single system. Dual (2) system chillers do not have a jumper installed. The jumper is only checked by the microprocessor on power-up.

The total number of compressors is programmable under the PROGRAM key. Single (1) system chillers can have 2 or 3 compressors. Dual (2) system chillers can have 4, 5, or 6 compressors.

STATUS KEY

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Unit Status

Pressing the STATUS key will enable the operator to determine current chiller operating status. The messages displayed will include running status, cooling demand, fault status and external cycling device status. The display will be a single message relating to the highest priority message as determined by the microprocessor. Status messages fall into the categories of General Status and Fault Status.

The following General, Safety, and Warning messages are displayed when the STATUS key is pressed. Following each displayed message is an explanation pertaining to that particular message.

General Status Messages

In the case of messages which apply to individual systems, SYS 1 and SYS 2 messages will both be displayed and may be different. In the case of single system units, all SYS 2 messages will be blank.

```
UNIT SWITCH OFF
SHUTDOWN
```

This message informs the operator that the 0 on the control panel is in the OFF position which will not allow the unit to run.

```
REMOTE CONTROLLED
SHUTDOWN
```

The REMOTE CONTROLLED SHUTDOWN message indicates that either an ISN system or RCC has turned the unit OFF, not allowing it to run.

```
DAILY SCHEDULE
SHUTDOWN
```

The DAILY SCHEDULE SHUTDOWN message indicates that the daily/holiday schedule programmed is keeping the unit from running.

```
REMOTE STOP
NO RUN PERM
```

REMOTE STOP NO RUN PERM shows that either the flow switch is open or a remote start/stop contact is open in series with the flow switch. These contacts are connected to J13-5. A 3-second delay is built into the software to prevent nuisance shutdowns due to erroneous signals on the run permissive input.

```
SYS 1 SYS SWITCH OFF
SYS 2 SYS SWITCH OFF
```

SYS SWITCH OFF tells that the system switch under OPTIONS is turned OFF. The system will not be allowed to run until the switch is turned back ON.

```
SYS 1 NO COOL LOAD
SYS 2 NO COOL LOAD
```

This message informs the operator that the chilled liquid temperature is below the point (determined by the setpoint and control range) that the microprocessor will bring on a system or that the microprocessor has not loaded the lead system far enough into the loading sequence to be ready to bring the lag system ON. The lag system will display this message until the loading sequence is ready for the lag system to start.

```
SYS 1 COMPS RUN X
SYS 2 COMPS RUN X
```

The COMPS RUNNING message indicates that the respective system is running due to demand. The “X” will be replaced with the number of compressors in that system that are running.

7

SYS 1 AR TIMER XX S
SYS 2 AR TIMER XX S

The anti-recycle timer message shows the amount of time left on the respective systems anti-recycle timer. This message is displayed when the system is unable to start due the anti-recycle timer being active.

SYS 1 AC TIMER XX S
SYS 2 AC TIMER XX S

The anti-coincidence timer is a software feature that guards against 2 systems starting simultaneously. This ensures instantaneous starting current does not become excessively high due to simultaneous starts. The microprocessor limits the time between compressor starts to 1 minute regardless of demand or the anti-recycle timer being timed out. The anti-coincidence timer is only present on two system units.

SYS 1 DSCH LIMITING
SYS 2 DSCH LIMITING

When this message appears, discharge pressure limiting is in effect. The Discharge Pressure Limiting feature is integral to the standard software control; however the discharge transducer is optional on some models. Therefore, it is important to keep in mind that this control will not function unless the discharge transducer is installed in the system.

The limiting pressure is a factory set limit to keep the system from faulting on the high discharge pressure cutout due to high load or pull down conditions. When the unload point is reached, the microprocessor will automatically unload the affected system by de energizing one compressor. The discharge pressure unload will occur when the discharge pressure gets within 10 psig (0.69 barg) of the programmed discharge pressure cutout. This will only happen if the system is fully loaded and will shut only one compressor OFF. If the system is not fully loaded, discharge limiting will not go into effect. Reloading the affected system will occur when the discharge pressure drops to 85% of the unload pressure and 10 minutes have elapsed.

SYS 1 SUCT LIMITING
SYS 2 SUCT LIMITING

When this message appears, suction pressure limiting is in effect. The suction pressure limit is a control point that limits the loading of a system when the suction pressure drops to within 15% above the suction pressure cutout. On a standard system programmed for 44 psig (3.0 Bar) suction pressure cutout, the microprocessor would inhibit loading of the affected system with the suction pressure less than or equal to 1.15 times 44 psig (3.0 Bar), which equals 50 psig (3.5 Bar). The system will be allowed to load after 60 seconds and after the suction pressure rises above the suction pressure load limit point.

SYS 1 LOAD LIMIT XX%
SYS 2 LOAD LIMIT XX%

This message indicates that load limiting is in effect and the percentage of the limiting in effect. This limiting could be due to the load limit/PWM input, ISN or RCC controller sending a load limit command.

MANUAL
OVERRIDE

If MANUAL OVERRIDE mode is selected, the STATUS display will display this message. This will indicate that the Daily Schedule is being ignored and the chiller will start-up 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.

SYS 1 PUMPING DOWN
SYS 2 PUMPING DOWN

The PUMPING DOWN message indicates that a compressor in the respective system is presently in the process of pumping the system down. When pumpdown is initiated on shutdown, the liquid line solenoid or EEV will close and a compressor will continue to run. When the suction pressure decreases to the suction pressure cutout setpoint or runs for 180 seconds, whichever comes first, the compressor will cycle OFF.

Fault Safety Status Messages

Safety Status messages appear when safety thresholds in the unit have been exceeded. Safeties are divided into two categories – System Safeties and Unit Safeties. System safeties are faults that cause the individual system to be shut down. Unit safeties are faults that cause all running compressors to be shut down. Following are display messages and explanations.

System Safeties

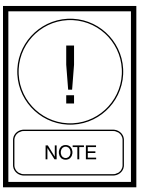
System safeties are faults that cause individual systems to be shut down if a safety threshold is exceeded for 3 seconds. They are auto reset faults in that the system will be allowed to restart automatically after the fault condition is no longer present. However, if 3 faults on the same system occur within 90 minutes, that system will be locked out on the last fault. This condition is then a manual reset. The system switch (under OPTIONS key) must be turned OFF and then back ON to clear the lockout fault. Fault messages will be displayed whenever a system is locked out.

```
SYS 1 HIGH DSCH PRES
SYS 2 HIGH DSCH PRES
```

The Discharge Pressure Cutout is a software cutout in the microprocessor and is backed-up by a mechanical high pressure cutout switch located in the refrigerant circuit. It ensures that the system pressure does not exceed safe working limits. The system will shutdown when the programmable cutout is exceeded and will be allowed to restart when the discharge pressure falls 40 psig below the cutout. *Discharge transducers must be installed for this function to operate.*

```
SYS 1 LOW SUCT PRESS
SYS 2 LOW SUCT PRESS
```

The Suction Pressure Cutout is a software cutout that helps protect the chiller from an evaporator freeze-up should the system attempt to run with a low refrigerant charge or a restriction in the refrigerant circuit.



Repeated starts after resetting a low suction pressure fault will cause evaporator freeze-up. Whenever a system locks out on this safety or any safety, immediate steps must be taken to identify the cause.

At system start, the cutout is set to 10% of programmed value. During the next 3 minutes the cutout point is ramped up to the programmed cutout point. If at any time during this 3 minutes the suction pressure falls below the ramped cutout point, the system will stop. This cutout is completely ignored for the first 30 seconds of system run time to avoid nuisance shutdowns, especially on units that utilize a low pressure switch in place of the suction pressure transducer.

After the first 3 minutes, if the suction pressure falls below the programmed cutout setting, a "transient protection routine" is activated. This sets the cutout at 10% of the programmed value and ramps up the cutout over the next 30 seconds. If at any time during this 30 seconds the suction pressure falls below the ramped cutout, the system will stop.

```
SYS 1 MP / HPCO FAULT
SYS 2 MP / HPCO FAULT
```

```
SYS 1 MP / HPCO INHIB
SYS 2 MP / HPCO INHIB
```

The Motor Protector/Mechanical High Pressure Cutout protects the compressor motor from overheating or the system from experiencing dangerously high discharge pressure.

This fault condition is present when CR1 (SYS 1) or CR2 (SYS 2) relays de-energize due to the HP switch or motor protector opening. This causes the respective CR contacts to open causing 0VDC to be read on the inputs to the microboard. The fault condition is cleared when a 30VDC signal is restored to the input.

The internal motor protector opens at 185°F to 248°F (85°C to 120°C) and auto resets. The mechanical HP switch opens at 585 psig plus or minus 10 psig (27.92 barg plus or minus .69 barg) and closes at 330 psig plus or minus 25 psig (22.75 barg plus or minus 1.72 barg).

The compressor is also equipped with a discharge temperature sensor for the purpose of sensing internal scroll temperature. This sensor protects the scrolls from overheating due to inadequate cooling that may occur when refrigerant charge is low, or superheat is too high.

When the sensor senses a high temperature, it opens the motor protector circuit in the compressor causing the compressor to shut down.

During the first two faults an MP/HP INHIBIT message will be displayed and the system will not be locked out. Only after the third fault in 90 minutes will the MP/HPCO FAULT message be displayed.

Whenever the motor protector or discharge sensor shuts down a compressor and the system, the internal compressor contacts will open for a period of 30 minutes to ensure that the motor or scroll temperatures have time to dissipate the heat and cool down. The MP/HP INHIBIT message will be displayed while these contacts are open or when the HPCO is open. While this message is displayed, the compressors will not be permitted to start.

After 30 minutes, the contacts will close and the system will be permitted to restart. The microprocessor will not try to restart the compressors in a system that shuts down on this safety for a period of 30 minutes to allow the internal compressor to time out.

During the 30 minute timeout, the MP/HPCO INHIB message will be displayed. The MP/HPCO fault will only be displayed after 3 shutdowns in 90 minutes, indicating the system is locked out and will not restart.

```
SYS 1 HIGH MTR CURR
SYS 2 HIGH MTR CURR
```

When the System Current Feedback option is installed and selected (Option 11 under OPTIONS key Current Feedback), this safety will operate as follows. If the actual feedback voltage of the system proportional to currents exceeds the programmed trip voltage for 5 seconds, the system will shutdown.

This safety will shut down a system if either the suction temperature or suction pressure sensors read out of range high or low. This condition must be present for 3 seconds to cause a system shutdown. The safety locks out a system after the first fault and will not allow automatic restarting.

Unit Safeties

Unit safeties are faults that cause all running compressors to be shut down. Unit faults are auto reset faults in that the unit will be allowed to restart automatically after the fault condition is no longer present.

```
UNIT FAULT:
LOW AMBIENT TEMP
```

The Low Ambient Temperature Cutout is a safety shutdown designed to protect the chiller from operating in a low ambient condition. If the outdoor ambient temperature falls below the programmable cutout, the chiller will shut down. Restart can occur when temperature rises 2°F above the cutoff.

```
UNIT FAULT:
LOW LIQUID TEMP
```

The Low Leaving Chilled Liquid Temperature Cutout protects the chiller form an evaporator freeze-up should the chilled liquid temperature drop below the freeze point. This situation could occur under low flow conditions or if the micro panel setpoint values are improperly programmed. Anytime the leaving chilled liquid temperature (water or glycol) drops below the cutout point, the chiller will shutdown. Restart can occur when chilled liquid temperature rises 2°F above the cutout.

```
UNIT FAULT:
115VAC UNDER VOLTAGE
```

The Under Voltage Safety ensures that the system is not operated at voltages where malfunction of the microprocessor could result in system damage. When the 115VAC to the micro panel drops below a certain level, a unit fault is initiated to safely shut down the unit. Restart is allowed after the unit is fully powered again and the anti-recycle timers have finished counting down.

```
UNIT FAULT:
HIGH MTR CURR
```

When the CURRENT FEEDBACK ONE PER UNIT option is selected under the OPTIONS key, the unit will shut down when the voltage exceeds the programmed trip voltage for 5 seconds.

The trip voltage is programmed at the factory according to compressor or unit RLA.

Restart will occur after the anti-recycle timer times out.

Unit Warning

The following messages are not unit safeties and will not be logged to the history buffer. They are unit warnings and will not auto-restart. Operator intervention is required to allow a restart of the chiller.

```
!! LOW BATTERY !!
CHECK PROG/SETP/OPTN
```

The Low Battery Warning can only occur at unit power-up. On micro panel power-up, the RTC battery is checked. If a low battery is found, all programmed setpoints, program values, options, time, schedule, and history buffers will be lost. These values will all be reset to their default values which may not be the desired operating values. Once a faulty battery is detected, the unit will be prevented from running until the PROGRAM key is pressed. Once the PROGRAM key is pressed the anti-recycle timers will be set to the programmed anti-recycle time to allow the operator time to check setpoints, and if necessary, reprogram programmable values and options.

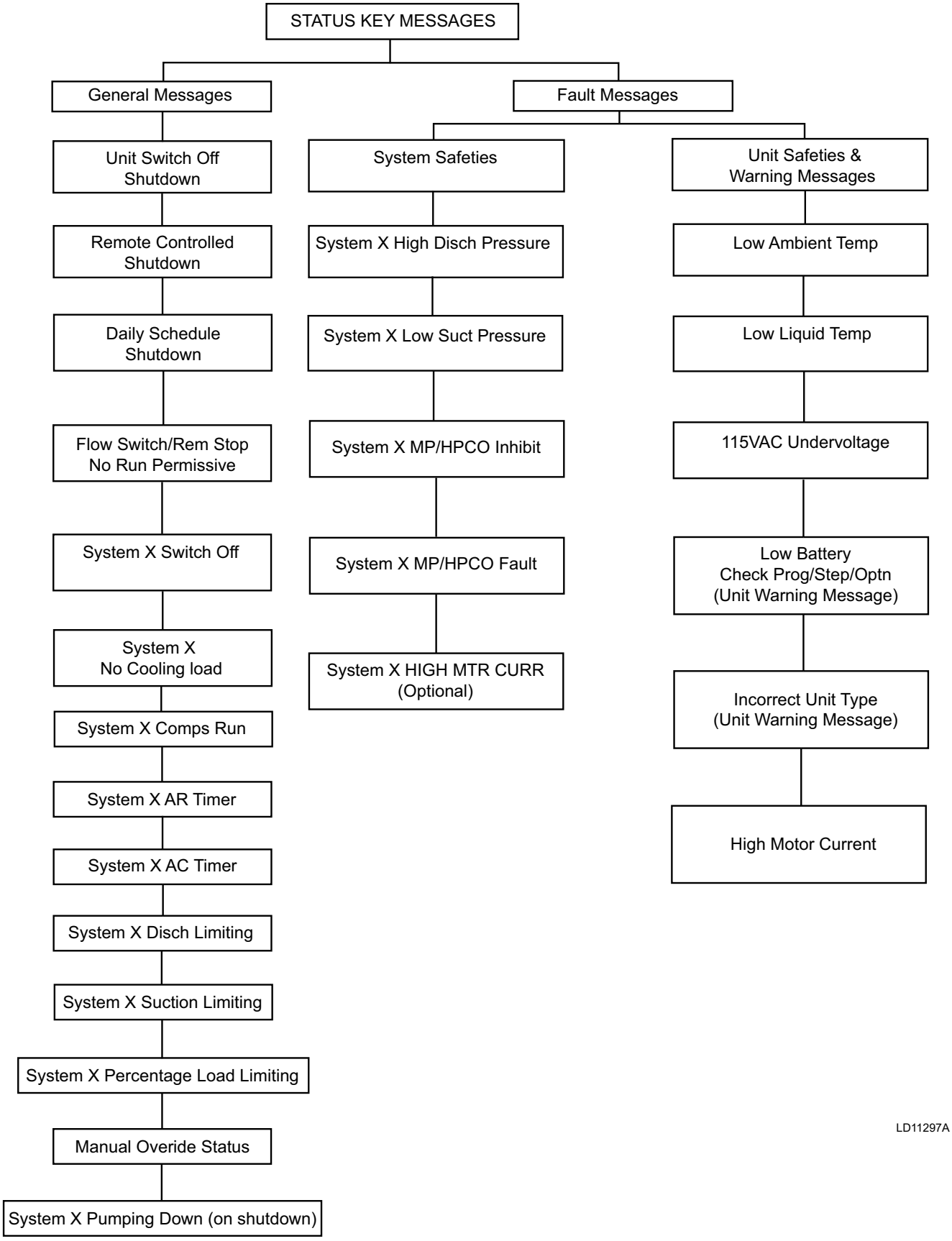
If a low battery is detected, it must be replaced as soon as possible. The programmed values will all be lost and the unit will be prevented from running on the next power interruption. The RTC/battery (031-00955-000) is located at U17 on the microboard.

```
INCORRECT
UNIT TYPE
```

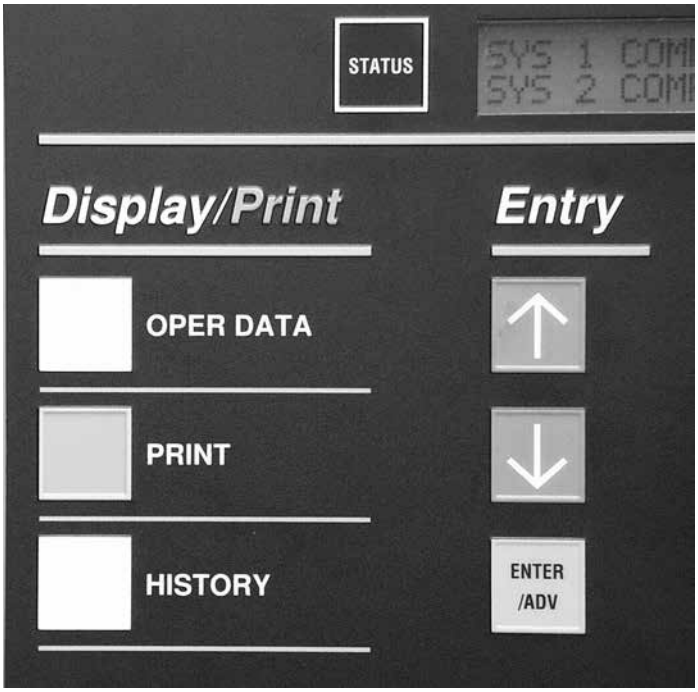
This indicates the condensing unit jumper is installed on J11-12. This jumper must be removed to operate the chiller.

Status Key Messages

TABLE 10 - STATUS KEY MESSAGES QUICK REFERENCE LIST



DISPLAY/PRINT KEYS



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The Display/Print keys allow the user to retrieve system and unit information that is useful for monitoring chiller operation, diagnosing potential problems, troubleshooting, and commissioning the chiller.

System and unit information, unit options, setpoints, and scheduling can also be printed out with the use of a printer. Both real-time and history information are available.

Oper Data Key

The OPER DATA key gives the user access to unit and system operating parameters. When the OPER DATA key is pressed, system parameters will be displayed and remain on the display until another key is pressed. After pressing the OPER DATA key, the various operating data screens can be scrolled through by using the ↑ (UP) and ↓ (DOWN) arrow keys or the ENTER/ADV key located under the "ENTRY" section.

NOTE

System 2 information will only be displayed for 2 system units.

With the UNIT TYPE set as a liquid chiller (no jumper to J11-12), the following list of operating data screens are viewable under the Oper Data key in the order that they are displayed. The ↓ (DOWN) arrow key scrolls through the displays in the order they appear below:

NOTE

The chiller MUST be set to be a liquid chiller (no jumper to J11-12). DO NOT operate the chiller if not properly set up.

```
LCHLT  =  46.2°F
RCHLT  =  57.4°F
```

This display shows chilled leaving and return liquid temperatures. The minimum limit on the display for these parameters are 2.2°F (-19°C). The maximum limit on the display is 140°F (60°C).

```
AMBIENT AIR TEMP
     =  87.5°F
```

This display shows the ambient air temperature. The minimum limit on the display is 0.4°F (-17.6°C). The maximum limit on the display is 131.2°F (55.1°C).

```
SYS X SP = 72.1 PSIG
      DP =227.0 PSIG
```

These displays show suction and discharge pressures for each system. The discharge pressure transducer is optional on some models.

If the optional discharge transducer is not installed, the discharge pressure would display 0 psig (0 barg).

The minimum limits for the display are:

- Suction Pressure: 0 psig (0 barg)
- Discharge Pressure: 0 psig (0 barg)

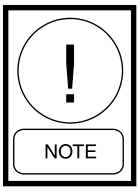
The maximum limits for the display are:

- Suction Pressure: 400 psig (27.58 barg)
- Discharge Pressure: 650 psig (44.82 barg)

```
SYS X HOURS 1=XXXXX
     2=XXXXX, 3=XXXXX
```

```
SYS X STARTS 1=XXXXX
     2=XXXXX, 3=XXXXX
```

The above two messages will appear sequentially for each system. The first display shows accumulated running hours of each compressor for the specific system. The second message shows the number of starts for each compressor on each system.



Run times and starts will only be displayed for the actual number of systems and compressors on the unit.

A total of 99,999 hours and starts can be logged before the counter rolls over to “0”.

```
  LOAD TIMER  58 SEC
UNLOAD TIMER   0 SEC
```

This display of the load and unload timers indicate the time in seconds until the unit can load or unload. Whether the systems loads or unloads is determined by how far the actual liquid temperature is from setpoint. A detailed description of unit loading and unloading is covered under the topic of “Capacity Control” located in Section 8, Unit Operation.

```
COOLING DEMAND
2 OF 8 STEPS
```

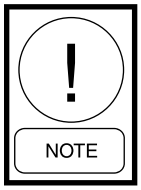
The display of COOLING DEMAND indicates the current “step” in the capacity control scheme when in Return Water Control Mode. The number of available steps are determined by how many compressors are in the unit. In the above display, the “2” does not mean that two compressor are running but only indicates that the capacity control scheme is on step 2 of 8. Capacity Control is covered in more detail in this publication which provides specific information on compressor staging (for Return Water Control only).

```
TEMP ERROR XXX.X°F
TEMP RATE  XXX.X°F/M
```

The COOLING DEMAND message will be replaced with this message when Leaving Chilled Liquid Control is selected. This message indicates the temperature error and the rate of change of the chilled liquid temperature.

```
LEAD SYSTEM IS
SYSTEM NUMBER 2
```

This display indicates the current LEAD system. In this example system 2 is the LEAD system, making system 1 the LAG system. The LEAD system can be manually selected or automatic. Refer to the programming under the OPTIONS key. The Lead System display will only appear on a two system unit.



A unit utilizing hot gas bypass must be programmed for MANUAL with system 1 as the lead system. Failure to do so will prevent hot gas operation if system 2 switches to the lead system when programmed for AUTOMATIC LEAD/LAG.

```
EVAPORATOR HEATER
STATUS IS      =XXX
```

This display indicates the status of the evaporator heater. The evaporator heater is controlled by ambient air temperature. When the ambient temperature drops below 40°F the heater is turned ON. When the temperature rises above 45°F the heater is turned OFF. An under voltage condition will keep the heater OFF until full voltage is restored to the system.

```
EVAPORATOR WATER
PUMP     STATUS     =XXXX
```

The evaporator pump dry contacts are energized when any compressor is running, or the unit is not OFF on the daily schedule and the Unit Switch is ON, or the unit has shutdown on a Low Leaving Chilled Liquid fault. However, even if one of above is true, the pump will not run if the micro 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.

```
EVAP PUMP TOTAL RUN
HOURS                =XXXXX
```

The Evaporator Pump Total Run Hours display indicates the total pump run hours. Total hours continually increments similar to Compressor Run Hours. If dual pumps are fitted, run hours indicates total hours on both pumps.

```
ACTIVE REMOTE CTRL
        NONE
```

There are several types of remote systems that can be used to control or monitor the unit. The following messages indicate the type of remote control mode active:

- NONE – no remote control active. Remote monitoring may be via ISN.
- ISN – York Talk via ISN allows remote load limiting and temperature reset through an ISN system.
- LOAD LIM – Load limiting enabled using contact closure.
- PWM TEMP – EMS temperature reset

If the microprocessor is programmed for CURRENT FEEDBACK ONE PER UNIT under the OPTIONS key, the display will show up as the first display prior to the SYS 1 displays. Total chiller current is displayed as shown below:

```
UNIT   AMPS = 54.0
       VOLTS =  1.2
```

If the microprocessor is programmed for CURRENT FEEDBACK NONE, no current display will appear.

```
SYS X COMP STATUS
1=XXX 2=XXX 3=XXX
```

```
SYS X RUN   TIME
XX-XX-XX-XX D-H-M-S
```

```
SYS X LLSV IS ON
HOT GAS SOL IS OFF
```

```
SYS X FAN STAGE 3
```

```
SYS X AMPS = 36.0
     VOLTS =  0.8
```

The preceding five messages will appear sequentially, first for system 1, then for system 2.

The first message indicates the system and the associated compressors which are running.

The second message indicates the system run time in days – hours – minutes – seconds. Please note that this is not accumulated run time but pertains only to the current system cycle.

The third message indicates the system, and whether the liquid line solenoid or EEV pilot solenoid and hot gas solenoid are being turned on by the microboard. Please note that hot gas is not available for system 2, so there is no message pertaining to the hot gas solenoid when system 2 message is displayed.

The fourth message indicates the stage of condenser fan operation that is active.

See the section on Condenser Fan Control in *SECTION 8 – UNIT OPERATION* for more information.

The fifth message displays current as sensed by the optional current feedback circuitry. The display reads out in amps along with the DC feedback voltage from the module. Current is calculated by:

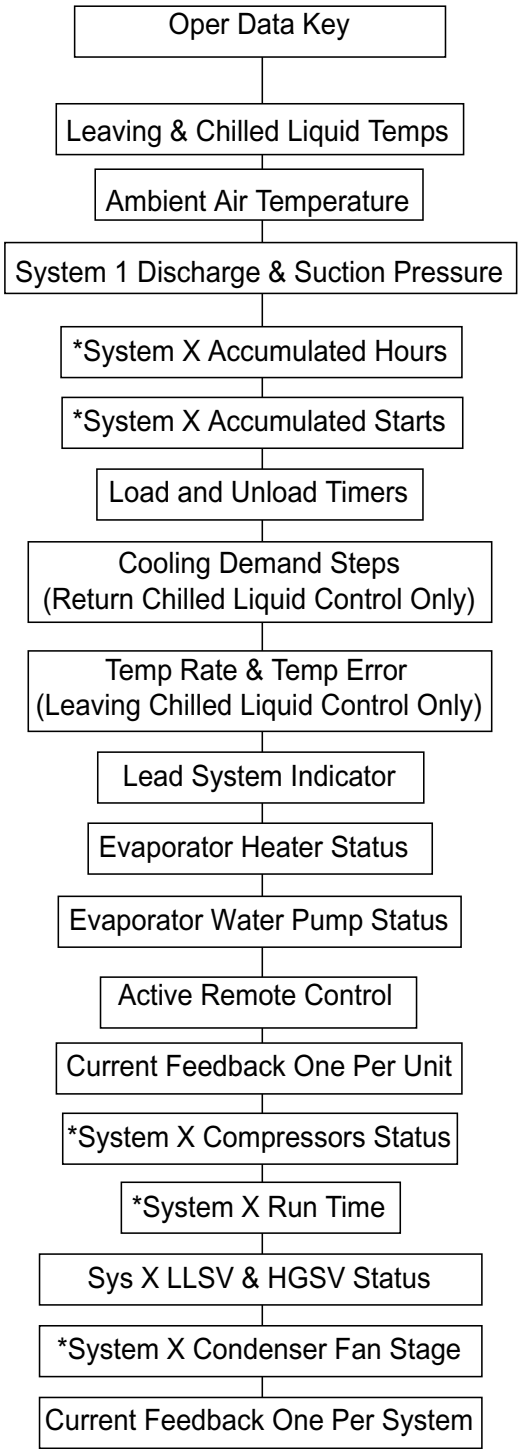
$$\frac{225\text{A} \times \text{Actual Volts}}{5\ \text{Volts}}$$

Individual displays will be present for each system, if CURRENT FEEDBACK ONE PER SYSTEM is programmed under the OPTIONS key. Combined compressor current for each system is displayed.

Oper Data Quick Reference List

The following table is a quick reference list for information available under the OPER DATA key.

TABLE 11 - OPERATION DATA



* Block of information repeats for each system

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Print Key

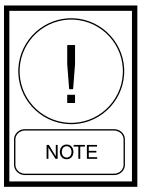
The PRINT key allows the operator to obtain a printout of real-time system operating data or a history printout of system data at the "instant of the fault" on the last six faults which occurred on the unit. An optional printer is required for the printout.

Operating Data Printout

Pressing the PRINT key and then OPER DATA key allows the operator to obtain a printout of current system operating parameters. When the OPER DATA key is pressed, a snapshot will be taken of system operating conditions and panel programming selections. This data will be temporarily stored in memory and transmission of this data will begin to the printer. A sample Operating Data printout is shown below. (Note: Not all values are printed for all models.)

```
   YORK INTERNATIONAL CORPORATION
     MILLENNIUM LIQUID CHILLER

            UNIT STATUS
          2:04PM 01 JAN 09

SYS 1              NO COOLING LOAD
SYS 2       COMPRESSORS RUNNING 2

              OPTIONS
CHILLED LIQUID                WATER
AMBIENT CONTROL            STANDARD
LOCAL/REMOTE MODE            REMOTE
CONTROL MODE         LEAVING LIQUID
LEAD/LAG CONTROL          AUTOMATIC
FAN CONTROL       AMB & DSCH PRESS
CURRENT FEEDBACK               NONE
POWER FAILURE RESTART     AUTOMATIC
SOFT START                  ENABLED
EXPANSION VALVE       THERMOSTATIC
REMOTE TEMP RESET          4 TO 20 MA

           PROGRAM VALUES
DSCH PRESS CUTOUT          570 psig
SUCT PRESS CUTOUT           80 psig
SUCT PRESS CUT COOLING      42 psig
SUCT PRESS CUT HEATING      31 psig
LOW AMBIENT CUTOUT        25.0 DEGF
LEAVING LIQUID CUTOUT     25.0 DEGF
ANTI RECYCLE TIME          600 SECS
FAN CONTROL ON PRESS       425 psig
FAN DIFF OFF PRESS         125 psig
NUMBER OF COMPRESSORS            6
NUMBER OF FANS PER SYSTEM        4
UNIT TRIP VOLTS                3.0
REFRIGERANT TYPE               R-22
DEFROST INIT TEMP        41.0 DEGF
DEFROST INITIATION TIME      60MIN
DEFROST TERMINATION TIME      3MIN
BIVALENT HEAT DELAY TIME   30 MIN
REMOTE UNIT ID PROGRAMMED        2
YORK HYDRO KIT PUMPS      1 (410a)
PUMP TOTAL RUN HOURS XXXXX (410a)
```

```
              UNIT DATA
RETURN LIQUID TEMP        58.2 DEGF
LEAVING LIQUID TEMP       53.0 DEGF
DISCHARGE AIR TEMP        55.3 DEGF
COOLING RANGE   42.0 +/- 2.0 DEGF
HEATING RANGE  122.0 +/- 2.0 DEGF
SYS 1 SETPOINT     70 +/- 3 psig
SYS 2 SETPOINT     70 +/- 3 psig
REMOTE SETPOINT         44.0 DEGF
AMBIENT AIR TEMP        74.8 DEGF
LEAD SYSTEM                SYS 2
EVAPORATOR PUMP              ON
EVAPORATOR HEATER           OFF
ACTIVE REMOTE CONTROL      NONE
LAST DEFROST SYS X DURATION XXXS
TIME TO SYS X DEFROST     XX MIN
BIVALENT DELAY REMAINING XX MIN
UNIT  XXX.X AMPS       X.X VOLTS
SOFTWARE VERSION     C.M02.13.00

          SYSTEM 1 DATA
COMP STATUS   1=OFF 2=OFF 3=OFF
RUN TIME     0- 0- 0- 0 D-H-M-S
TIME YYYYYYY 0- 0- 0- 0 D-H-M-S
LAST STATE                YYYYYYY
SUCTION PRESSURE        105 psig
DISCHARGE PRESSURE      315 psig
SUCTION TEMPERATURE    46.0 DEGF
SAT SUCTION TEMP       34.0 DEGF
SUCTION SUPERHEAT      12.0 DEGF
COOLER INLET REFRIG    31.6 DEGF
DEFROST TEMPERATURE    52.8 DEGF
LIQUID LINE SOLENOID         OFF
MODE SOLENOID                OFF
HOT GAS BYPASS VALVE         OFF
CONDENSER FAN STAGE          OFF
EEV OUTPUT                 0.0 %
SYSTEM     XXX.X AMPS X.X VOLTS

          SYSTEM 2 DATA
COMP STATUS   1=ON, 2=OFF, 3=ON
RUN TIME       0-0-1-46 D-H-M-S
TIME YYYYYYY    0-0-0-0 D-H-M-S
LAST STATE                YYYYYYY
SUCTION PRESSURE        110 psig
DISCHARGE PRESSURE      320 psig
SUCTION TEMPERATURE    49.3 DEGF
SAT SUCTION TEMP       36.0 DEGF
SUCTION SUPERHEAT      13.3 DEGF
COOLER INLET REFRIG    31.6 DEGF
DEFROST TEMPERATURE    52.8 DEGF
LIQUID LINE SOLENOID          ON
MODE SOLENOID                 ON
CONDENSER FAN STAGE            3
EEV OUTPUT                 63.2%
SYSTEM    XXX.X AMPS  X.X VOLTS

         DAILY SCHEDULE
S M T W T F S          *=HOLIDAY
SUN  START=00:00AM  STOP=00:00AM
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
```



See SECTION 9 – SERVICE AND TROUBLESHOOTING for Printer Installation information.

History Printout

Pressing the PRINT key and then the HISTORY key allows the operator to obtain a printout of information relating to the last 9 Safety Shutdowns which occurred. The information is stored at the instant of the fault, regardless of whether the fault caused a lockout to occur. The information is also not affected by power failures (long-term internal memory battery backup is built into the circuit board) or manual resetting of a fault lockout.

When the HISTORY key is pressed, a printout is transmitted of all system operating conditions which were stored at the "instant the fault occurred" for each of the 9 Safety Shutdowns buffers. The printout will begin with the most recent fault which occurred. The most recent fault will always be stored as Safety Shutdown No. 1. identically formatted fault information will then be printed for the remaining safety shutdowns.

Information contained in the safety shutdown buffers is very important when attempting to troubleshoot a system problem. This data reflects the system conditions at the instant the fault occurred and often reveals other system conditions which actually caused the safety threshold to be exceeded.

The history printout is similar to the operational data printout shown in the previous section. The differences are in the header and the schedule information. The daily schedule is not printed in a history print.

One example history buffer printout is shown following. The data part of the printout will be exactly the same as the operational data print so it is not repeated here. The difference is that the Daily Schedule is not printed in the history print and the header will be as follows.

```
YORK INTERNATIONAL CORPORATION
MILLENNIUM LIQUID CHILLER

SAFETY SHUTDOWN NUMBER 1
SHUTDOWN @ 3:56PM  29 JAN 09

SYS 1   HIGH DSCH PRESS SHUTDOWN
SYS 2                  NO FAULTS
```

History Displays

The HISTORY key gives the user access to many unit and system operating parameters at the time of a unit or system safety shutdown. When the HISTORY key is pressed the following message is displayed.

```
DISPLAY SAFETY SHUT-
DOWN NO. 1 (1 TO 9)
```

While this message is displayed, the ↑ (UP) arrow key can be used to select any of the six history buffers. Buffer number 1 is the most recent, and buffer number 6 is the oldest safety shutdown that was saved.

After selecting the shutdown number, pressing the ENTER key displays the following message which shows when the shutdown occurred.

```
SHUTDOWN OCCURRED
03:56 PM 29 JAN 02
```

The ↑ (UP) and ↓ (DOWN) arrow keys are used to scroll forward and backward through the history buffer to display the shutdown conditions stored at the instant the fault occurred. The ↓ (DOWN) arrow key scrolls through the displays in the order they appear below:

```
UNIT FAULT:
LOW LIQUID TEMP
```

Displays the type of fault that occurred.

```
UNIT TYPE
LIQUID CHILLER
```

Displays the type of chiller; Liquid, Condensing Unit or Heat Pump.

```
CHILLED LIQUID
XXXXX
```

Displays the chilled liquid type; Water or Glycol.

```
AMBIENT CONTROL
XXXXXXXXXX
```

Displays the type of Ambient Control; Standard or Low Ambient.

```
LOCAL/REMOTE MODE
XXXXXXXXX
```

Displays Local or Remote control selection.

```
CONTROL MODE
LEAVING LIQUID
```

Displays the type of chilled liquid control; Leaving or Return.

```
LEAD/LAG CONTROL
XXXXXXXX
```

Displays the type of lead/lag control; Manual System 1, Manual System 2 or Automatic. This is only selectable on 2-system chillers.

```
FAN CONTROL
DISCHARGE PRESSURE
```

Displays the type of fan control; Discharge Pressure or Ambient and Discharge Pressure.

```
MANUAL OVERRIDE MODE
XXXXXXXXX
```

Displays whether Manual Override was Enabled or Disabled.

```
CURRENT FEEDBACK
XXXXXXXXXXXXXXXX
```

Displays type of Current Feedback utilized.

```
SOFT START
XXXXXXX
```

Displays whether the optional European Soft Start was installed and selected.

```
DISCHARGE PRESSURE
CUTOUT = XXXX PSIG
```

Displays the programmed Discharge Pressure Cutout.

```
SUCTION PRESSURE
CUTOUT = XXXX PSIG
```

Displays the programmed Suction Pressure Cutout.

```
LOW AMBIENT TEMP
CUTOUT = XXX.X °F
```

Displays the programmed Low Ambient Cutout.

```
LEAVING LIQUID TEMP
CUTOUT = XXX.X °F
```

Displays the Leaving Liquid Temperature Cutout programmed.

```
FAN CONTROL ON
PRESSURE=XXX PSIG
```

Displays the programmed Fan On Pressure.

```
FAN DIFFERENTIAL OFF
PRESSURE=PSIG
```

Displays the programmed Fan Off Differential.

```
SYS 1 TRIP VOLTS
= X.X VOLTS
```

Displays the programmed High Current Trip Voltage.

```
SYS 2 TRIP VOLTS
= X.X VOLTS
```

Displays the programmed High Current Trip Voltage.

```
YORK HYDRO
KIT PUMPS =X
```

Indicates the Pump Control option is selected.

```
LCHLT = XXX.X °F
RCHLT = XXX.X °F
```

Displays the Leaving and Return Chilled Liquid Temperature at the time of the fault.

```
SETPOINT = XXX.X °F
RANGE = +/- °F
```

Displays the programmed Setpoint and Range, if the chiller is programmed for leaving chilled liquid control.

```
SETPOINT = XXX.X °F
RANGE = +XX.X °F
```

Displays the programmed Setpoint and Range, if the chiller is programmed for return chilled liquid control.

```
AMBIENT AIR TEMP
= XXX.X °F
```

Displays the Ambient Temperature at the time of the fault.

```
LEAD SYSTEM IS
SYSTEM NUMBER X
```

Displays which system is in the lead at the time of the fault.

```
EVAPORATOR HEATER
STATUS IS XXX
```

Displays status of the Evaporator Heater at the time of the fault.

```
EVAPORATOR WATER
PUMP STATUS XXXX
```

Displays status of Evaporator Water Pump at the time of fault. Status may read ON, OFF or trip.

```
EVAP PUMP TOTAL RUN
HOURS =XXXX
```

Evap Pump total run hours at the time of fault.

```
ACTIVE REMOTE CTRL
XXXX
```

Displays whether Remote Chiller Control was active when the fault occurred.

```
UNIT ACTUAL AMPS
=XXX.X AMPS
```

This is only displayed when the Current Feedback Option is one per unit.

```
SYS X COMP STATUS
1=XXX 2=XXX 3=XXX
```

Displays which Compressors were running in the system when the fault occurred.

```
SYS X RUN TIME
XX-XX-XX-XX D-H-M-S
```

Displays the system run time when the fault occurred.

```
SYS X SP = XXXX PSIG
      DP = XXXX PSIG
```

Displays the system Suction and Discharge Pressure of the time of the fault.

```
SYS X SUCT = XXX.X°F
  SAT SUCT = XXX.X°F
```

Displays the System Suction Temperature and Saturated Suction Temperature when an EEV is installed.

```
 SYS X LLSV IS XXX
HOT GAS SOL IS XXX
```

Displays whether the System Liquid Line Solenoid or Hot Gas Solenoid was energized at the time of the fault.

```
SYS X FAN STAGE XXX
```

Displays the number of Fan Stages in the system active at the time of the fault.

```
SYS X ACTUAL AMPS
     =XXX.X AMPS
```

Displays the System Amperage (calculated approximately) at the time of the fault.

For this message to appear, CURRENT FEEDBACK ONE PER SYSTEM must be programmed under the OPTIONS key. If the microprocessor is programmed as one CURRENT FEEDBACK ONE PER UNIT under the PROGRAM key, the display will be the first display prior to the SYS 1 info. If the microprocessor is programmed for CURRENT FEEDBACK NONE, no current display will appear.

Displays for System 1 starting with SYS X NUMBER OF COMPS RUNNING X through SYS X AMPS = XXX.X VOLTS = X.X will be displayed first, followed by displays for System 2.

Further explanation of the above displays are covered under the STATUS, OPER DATA, COOLING SETPOINTS, PROGRAM, and OPTIONS keys.

Software Version

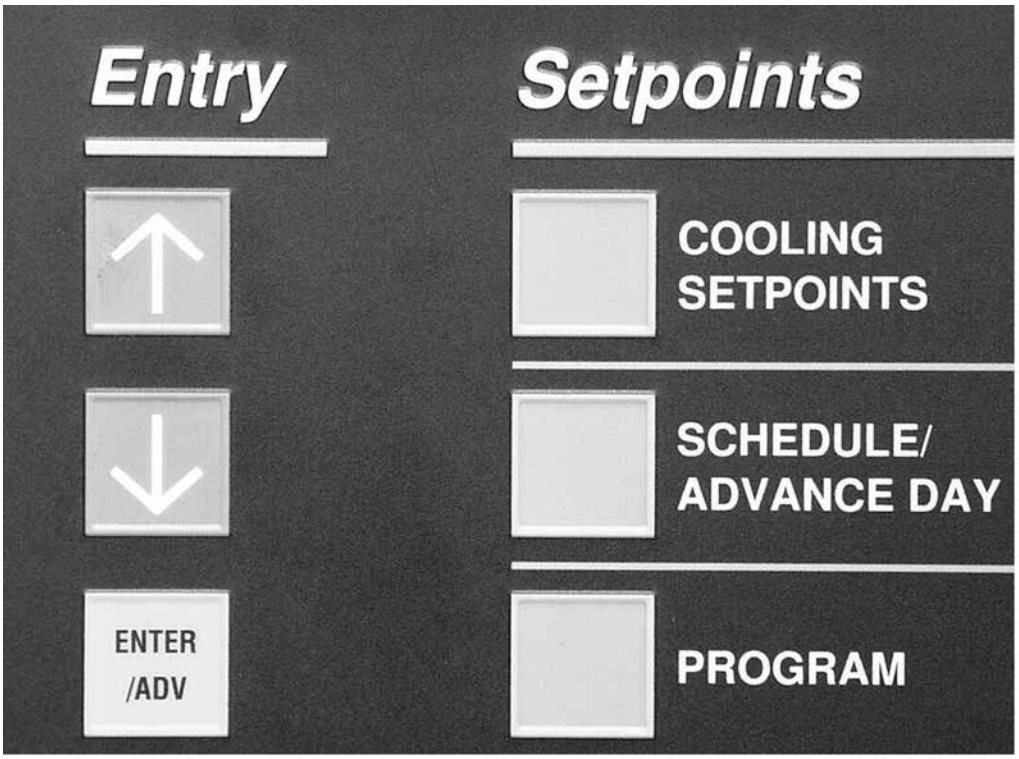
The software version may be viewed by first pressing the HISTORY key and then repeatedly pressing the ↓ (DOWN) arrow key until you scroll past the first history buffer choice.

```
DISPLAY SAFETY SHUT-
DOWN NO.1 (1TO6)
```

After the ↓ (DOWN) arrow key is pressed again, the software version will appear.

```
CONTROL          C.MXX.ZZ.YY
 I/O             C.MXX.18.YY
```

ENTRY KEYS



00068VIP

The Entry Keys allows the user to view, change programmed values. The ENTRY keys consist of an ↑ (UP) arrow key, ↓ (DOWN) arrow key, and an ENTER/ADV key.

Up and Down Arrow Keys

Used in conjunction with the OPER DATA, HISTORY, COOLING SETPOINTS, SCHEDULE/ADVANCE DAY, OPTIONS and CLOCK keys, the ↑ (UP) and ↓(DOWN) arrow keys allow the user to scroll through the various data screens. See the section on *DISPLAY/ PRINT KEYS* for specific information on the displayed information and specific use of the ↑ (UP) and ↓ (DOWN) arrow keys.

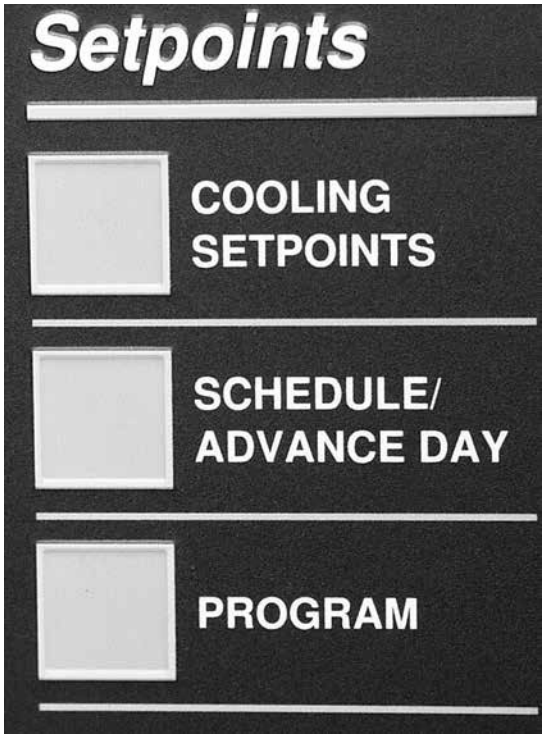
The ↑ (UP) arrow key, and ↓ (DOWN) arrow key are also used for programming the control panel such as changing numerical or text values when programming cooling setpoints, setting the daily schedule, changing safety setpoints, chiller options, and setting the clock.

Enter/Adv Key

The ENTER/ADV key must be pushed after any change is made to the cooling setpoints, daily schedule, safety setpoints, chiller options, and the clock. Pressing this key “enters” the new values into memory. If the ENTER/ADV key is not pressed after a value is changed, the changes will not be “entered” and the original values will be used to control the chiller.

Programming and a description on the use of the ↑ (UP) arrow key, and ↓ (DOWN) arrow, and ENTER/ADV keys are covered in detail under the SETPOINTS, and UNIT keys.

SETPOINTS KEYS



00069VIP

Programming of the cooling setpoints, daily schedule, and safeties is accomplished by using the keys located under the Setpoints section.

The three keys involved are labeled COOLING SETPOINTS, SCHEDULE/ADVANCE DAY, and PROGRAM.

Following are instructions for programming the respective setpoints. The same instruction must be used to view the setpoints with the exception that the setpoint will not be changed.

Cooling Setpoints

The Cooling Setpoint and Range can be programmed by pressing the COOLING SETPOINTS key. The cooling mode (leaving chilled liquid or return chilled liquid) will be displayed for a few seconds, and the setpoint display entry screen will appear.

Leaving Chilled Liquid Control

```
SETPOINT = 45.0°F
RANGE = +/- 2.0°F
```

The above message shows the current chilled water temperature Setpoint at 45.0°F (notice the cursor positioned under the number 0). Pressing either the ↑ (UP) or ↓ (DOWN) arrow will change the setpoint in 0.5°F increments. After using the ↑ (UP) or ↓ (DOWN) arrow keys to adjust to the desired setpoint, the ENTER/ADV key must be pressed to enter this number into memory and advance to the RANGE SETPOINT.

Entry of the setpoint will be indicated by the cursor moving under the current RANGE setpoint. The ↑ (UP) and ↓ (DOWN) arrow keys are used to set the RANGE, in 0.5°F increments, to the desired RANGE setpoint. After adjusting the setpoint, the ENTER/ADV key must be pressed to enter the data into memory.

Notice that the RANGE was programmed for plus or minus X.X° F. This indicates the SETPOINT to be in the center of the control range. If the control mode has been programmed for RETURN LIQUID control, the message below would be displayed in place of the previous message.

When in leaving chilled liquid temperature control, the microprocessor will attempt to control the leaving water temperature within the temperature range of the setpoint plus or minus the range. In the above example, control will be in the range of 43 to 47°F.

Return Chilled Liquid Control

```
SETPOINT = 45.0 °F
   RANGE = +10.0 °F
```

In return chilled liquid control, the range no longer has a plus or minus X.X°F, but only a plus X.X°F RANGE setpoint. This indicates that the setpoint is not centered within the RANGE but could be described as the bottom of the control range. A listing of the limits and the programmable values for the COOLING SETPOINTS are shown in *Table 12*.

The SETPOINT and RANGE displays just described were based on LOCAL control. If the unit was programmed for REMOTE control (under the OPTIONS key), the above programmed setpoints would have no effect.

When in return chilled liquid temperature control, the microprocessor will turn all compressors OFF at setpoint and will turn compressors on as return chilled liquid temperature rises. All compressors will be ON at setpoint plus the range. If the range equals the temperature drop across the evaporator when fully loaded, the leaving chilled liquid temperature will remain near the setpoint plus or minus a few degrees as the chiller loads and unloads according to return chilled liquid temperature.

Both LEAVING and RETURN control are described in detail under the section on Capacity Control.

Remote Setpoint Control

Pressing the COOLING SETPOINTS key a second time will display the remote setpoint and cooling range. This display automatically updates about every 2 seconds. Notice that these setpoints are not “locally” programmable, but are controlled by a remote device such as an ISN control, remote reset option board, or remote PWM signal. These setpoints would only be valid if the unit was operating in the REMOTE mode.

The following messages illustrate both leaving chilled liquid control and return chilled liquid control respectively.

```
REM SETP = 44.0 °F
RANGE = +/-2.0 °F
```

(leaving chilled liquid control)

7

TABLE 12 - COOLING SETPOINTS, PROGRAMMABLE LIMITS AND DEFAULTS

SETPOINT KEY	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
LEAVING CHILLED LIQUID SETPOINT	WATER COOLING	40.0°F 4.4°C	**70.0°F 21.1°C	44.0°F 6.7°C
	GLYCOL COOLING	*10.0°F -12.2°C	**70.0°F 21.1°C	44.0°F 6.7°C
LEAVING CHILLED LIQUID CONTROL RANGE	—	1.5°F 0.8°C	2.5°F 1.4°C	2.0°F 1.1°C
RETURNED CHILLED LIQUID SETPOINT	WATER COOLING *	40.0°F 4.4°C	70.0°F 21.1°C	44.0°F 6.7°C
	GLYCOL COOLING *	10.0°F -12.2°C	70.0°F 21.1°C	44.0°F 6.7°C
RETURN CHILLED LIQUID CONTROL RANGE	—	4.0°F 2.2°C	20.0°F 11.1°C	10.0°F 5.6°C
MAX EMS-PWM REMOTE TEMPERATURE RESET	—	2°F 1.0°C	40°F 22.0°C	20°F 11.0°C

* Refer to Engineering Guide for operation below 30°F (-1.1°C). Alternate thermal expansion valves must be used below 30°F (-1.1°C).

* When using glycol, Leaving Chilled Liquid Setpoint should not be set below 20°F (-6.7°C).

** Do not exceed 55°F (12.8°C) setpoint before contacting the nearest Johnson Controls Office for application guidelines.

```
REM SETP = 44.0°F
    RANGE = +10.0°F
```

(return chilled liquid control)

The low limit, high limit, and default values for the keys under "SETPOINTS" are listed in *Table 12*.

Pressing the COOLING SETPOINTS key a third time will bring up the display that allows the Maximum EMS-PWM Temperature Reset to be programmed. This message is shown below.

```
MAX EMS-PWM REMOTE
TEMP RESET = +20°F
```

The Temperature Reset value is the maximum allowable remote reset of the temperature setpoint. The setpoint can be reset upwards by the use of an Energy Management System or from the Temperature Reset Option Board. See page 195 for a detailed explanation of this feature.

As with the other setpoints, the ↑ (Up) arrow and ↓ (Down) arrow keys are used to change the Temperature Reset value. After using the ↑ (UP) and ↓ (DOWN) arrows to adjust to the desired setpoint, the ENTER/ADV key must be pressed to enter this number into memory.

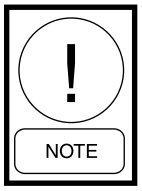
SCHEDULE/ADVANCE DAY KEY

The "Schedule" is a seven day daily schedule that allows one start/stop time per day. The schedule can be programmed Monday through Sunday with an alternate holiday schedule available. If no start/stop times are programmed, the unit will run on demand, providing the chiller is not shut off on a unit or system shutdown. The daily schedule is considered "not programmed" when the times in the schedule are all zeros (00:00 AM).

To set the schedule, press the SCHEDULE/ADVANCE DAY key. The display will immediately show the following display.

```
MON START = 00:00 AM
      STOP = 00:00 AM
```

The line under the 0 is the cursor. If the value is wrong, it may be changed by using the ↑ (UP) and ↓ (DOWN) arrow keys until correct. Pressing the ENTER/ADV key will enter the times and then move the cursor to the minute box. The operation is then repeated if necessary. This process may be followed until the hour, minutes, and meridian (AM or PM) of both the START and STOP points are set. After changing the meridian of the stop time, pressing the ENTER/ADV key will advance the schedule to the next day.



Whenever the daily 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 page to a specific day, press the SCHEDULE/ADVANCE DAY key until the desired day appears. The start and stop time of each day may be programmed differently using the ↑ (UP) and ↓ (DOWN) arrow, and ENTER/ADV keys.

After SUN (Sunday) schedule appears on the display a subsequent press of the SCHEDULE/ADVANCE DAY key will display the Holiday schedule. This is a two part display. The first reads:

```
HOL START = 00:00 AM
      STOP = 00:00 AM
```

The times may be set using the same procedure as described above for the days of the week. After changing the meridian of the stop time, pressing the ENTER/ADV key will advance the schedule to the following display:

```
S_M T W T F S
HOLIDAY NOTED BY *
```

The line below the empty space next to the S is the cursor and will move to the next empty space when the ENTER/ADV key is pressed. To set the Holiday, the cursor is moved to the space following the day of the week of the holiday and the ↑ (UP) arrow key is pressed. An * will appear in the space signifying that day as a holiday. The * can be removed by pressing the ↓ (DOWN) arrow key.

The Holiday schedule must be programmed weekly – once the Holiday schedule runs, it will revert to the normal daily schedule.

PROGRAM KEY

There are several operating parameters under the PROGRAM key that are programmable. These setpoints can be changed by pressing the PROGRAM key, and then the ENTER/ADV key to enter Program Mode. Continuing to press the ENTER/ADV key will display each operating parameter. While a particular parameter is being displayed, the ↑ (UP) and ↓ (DOWN) arrow keys can be used to change the value. After the value is changed, the ENTER/ADV key must be pressed to enter the data into memory. *Table 14* shows the programmable limits and default values for each operating parameter.

Following are the displays for the programmable values in the order they appear:

```
DISCHARGE  PRESSURE
CUTOUT = 395 PSIG
```

DISCHARGE PRESSURE CUTOUT is the discharge pressure at which the system will shutdown as monitored by the optional discharge transducer. This is a software shutdown that acts as a backup for the mechanical high pressure switch located in the refrigerant circuit. The system can restart when the discharge pressure drops 40 psig (2.76 barg) below the cutout point.

If the optional discharge pressure transducer is not installed, this programmable safety would not apply. It must be noted that every system has a mechanical high pressure cutout that protects against excessive high discharge pressure regardless of whether or not the optional discharge pressure is installed.

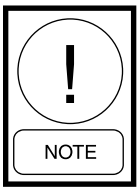
```
SUCTION  PRESSURE
CUTOUT = 80.0 PSIG
```

The SUCTION PRESSURE CUTOUT protects the chiller from an evaporator freeze-up. If the suction pressure drops below the cutout point, the system will shut down. Typically, the cutout must be set to 80 psig (5.52 Bars) form water cooling.

TABLE 13 - PROGRAM KEY LIMITS AND DEFAULT

PROGRAM VALUE	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
DISCHARGE PRESSURE CUTOUT	—	325 PSIG	575 PSIG	570 PSIG
		22.4 BARG	39.6 BARG	39.3 BARG
SUCTION PRESSURE CUTOUT	WATER COOLING	80.0 PSIG	120.0 PSIG	80.0 PSIG
		5.52 BARG	8.27 BARG	5.52 BARG
	GLYCOL COOLING	42.0 PSIG	70.0 PSIG	44.0 PSIG
		2.9 BARG	4.83 BARG	3.03 BARG
LOW AMBIENT TEMPERATURE CUTOUT	STANDARD AMBIENT	25.0°F	60.0°F	25.0°F
		-3.9°C	15.6°C	-3.9°C
	LOW AMBIENT	0°F	60.0°F	25.0°F
		-17.8°C	15.6°C	-3.9°C
LEAVING CHILLED LIQUID TEMPERATURE CUTOUT	WATER COOLING	—	—	36°F
				2.2°C
	GLYCOL COOLING	-1.0°F	36.0°F	36.0°F
		-18.3°C	2.2°C	2.2°C
ANTI-RECYCLE TIMER	—	300 SEC.	600 SEC.	600 SEC.
FAN CONTROL ON PRESSURE (NOT APPLICABLE TO A YCRL)	—	360 PSIG	485 PSIG	385 PSIG
		24.8 BARG	33.4 BARG	26.5 BARG
FAN DIFFERENTIAL OFF PRESSURE	—	80 PSID	160 PSID	125 PSID
		5.51 BARD	11.03 BARD*	8.62 BARD
TOTAL NUMBER OF COMPRESSORS	SINGLE SYSTEM	2	3	3
	DUAL SYSTEM	4	6	6
NUMBER OF FANS PER SYSTEM		2	4	3
UNIT/SYSTEM TRIP VOLTS	CURRENT FEEDBACK	0.5 VOLTS	4.5 VOLTS	2.5 VOLTS
REMOTE UNIT ID	—	0	7	0

* The minimum discharge pressure allowed is 235 psig. The Fan Differential Off Pressure High Limit will be lowered (reduced) to prevent going below 235 psig based on where the fan control On Pressure is programmed.



There are some exceptions when the suction pressure is permitted to temporarily drop below the cutout point. Details are explained under the topic of System Safeties.

```
LOW AMBIENT TEMP
CUTOUT = 25.0°F
```

The LOW AMBIENT TEMP CUTOUT allows the user to select the chiller outside ambient temperature cutout point. If the ambient falls below this point, the chiller will shut down. Restart can occur when temperature rises 2°F (1.11°C) above the cutout setpoint.

```
LEAVING LIQUID TEMP
CUTOUT = 36.0°F
```

The LEAVING LIQUID TEMP CUTOUT protects the chiller from an evaporator freeze-up. Anytime the leaving chilled liquid temperature drops to the cutout point, the chiller shuts down. Restart will be permitted when the leaving chilled liquid temperature rises 2°F (1.11°C) above the cutout setpoint.

When water cooling mode is programmed (OPTIONS key), the value is fixed at 36.0°F (2.22°C) and cannot be changed. Glycol cooling mode can be programmed to values listed in *Table 12*.

```
ANTI RECYCLE TIMER
= 600 SEC
```

The programmable anti-recycle timer ensures that systems do not short cycle, and the compressor motors have sufficient time to dissipate heat after a start. This timer is programmable under the PROGRAM key between 300 and 600 seconds. Whenever possible, to reduce cycling and motor heating, the anti-recycle timer must be adjusted as high as possible. The programmable anti-recycle timer starts the timer when the first compressor in a system starts. The timer begins to count down. If all the compressors in the circuit cycle OFF, a compressor within the circuit will not be permitted to start until the anti-recycle timer has timed out. If the lead system has run for less than 5 minutes, 3 times in a row, the anti-recycle timer will be extended to 10 minutes, if currently programmed for less than 10 minutes.

```
FAN CONTROL ON
PRESSURE = XXX PSIG
```

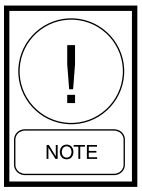
The FAN CONTROL ON-PRESSURE is the programmed pressure value that is used to stage the condenser fans ON, in relation to discharge pressure. See Condenser Fan Control in *SECTION 8 – UNIT OPERATION* and *Table 17, Table 18, Table 19, and Table 20*.

```
FAN DIFFERENTIAL OFF
PRESSURE = XXX PSIG
```

The FAN DIFFERENTIAL OFF PRESSURE is the programmed differential pressure value that is used to stage the condenser fans OFF, in relation to discharge pressure. See Condenser Fan Control in *SECTION 8 – UNIT OPERATION* and *Table 17, Table 18, Table 19, and Table 20*.

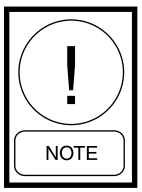
```
TOTAL NUMBER OF
COMPRESSORS = 6
```

The TOTAL NUMBER OF COMPRESSORS is the total quantity of compressors in the chiller, and determines the stages of cooling available. Note in *Table 12*, the chiller may have single or dual systems. Single system units can have 2 or 3 compressors, while dual system units may have 4 or 6 compressors.



This MUST be programmed correctly to ensure proper chiller operation.

A single system chiller MUST have a jumper between terminals J9-7 and +24V on the I/O board. This connection can be made between terminals 13 and 17 on terminal block CTB1. If the jumper is not installed, the unit will act as a 2-system chiller. The jumper is only checked by the microprocessor at unit power-up. If the jumper is removed, power must be removed and re-applied to register the change in memory.



This MUST be programmed correctly to ensure proper chiller operation.

```
NUMBER OF FANS
PER SYSTEM          =X
```

The NUMBER OF FANS PER SYSTEM must be programmed as needed to match the number of fans on each system.

```
SYS X TRIP VOLTS
          =X.X VOLTS
```

```
UNIT TRIP VOLTS
        =X.X VOLTS
```

Depending on the option, the trip voltage for a specific system or unit high current trip can be programmed. It also calibrates the current readout under the OPER DATA key. The approximate programmed value is calculated using the following formulas.

System Trip Volts

For individual system high current trip programming on chillers:

- Add the sum of the compressor and fan RLA's in the system.
- Multiply the sum by 1.25.
- Divide by 225A.
- The resulting voltage is the value that should be programmed.

For example, if fan and compressor RLA's total 100A:

$$\frac{5V \times 100A}{225A} \times 1.25 = \frac{625VA}{225A} = 2.8V$$

The programmed value will be 2.8V. A similar calculation and programming will be necessary for the other system in a 2-system chiller.

Unit Trip Volts

For total chiller high current trip programming on 460VAC chillers:

- Add the sum of all the compressor and fan RLA's in the chiller.
- Multiply the sum by 1.25.
- Divide by 225A.
- The resulting voltage is the value that should be programmed.

For example, if fan and compressor RLA's total 180A:

$$\frac{5V \times 180A}{225A} \times 1.25 = \frac{1125VA}{225A} = 5.0V$$

The programmed value will be 5.0V.

```
  REMOTE UNIT ID
PROGRAMMED = X
```

When communications is required with a BAS or OptiView Panel, individual unit IDs are necessary for communications with specific chillers on a single RS-485 line. ID 0-7 is selectable.

TABLE 14 - SETPOINTS QUICK REFERENCE LIST

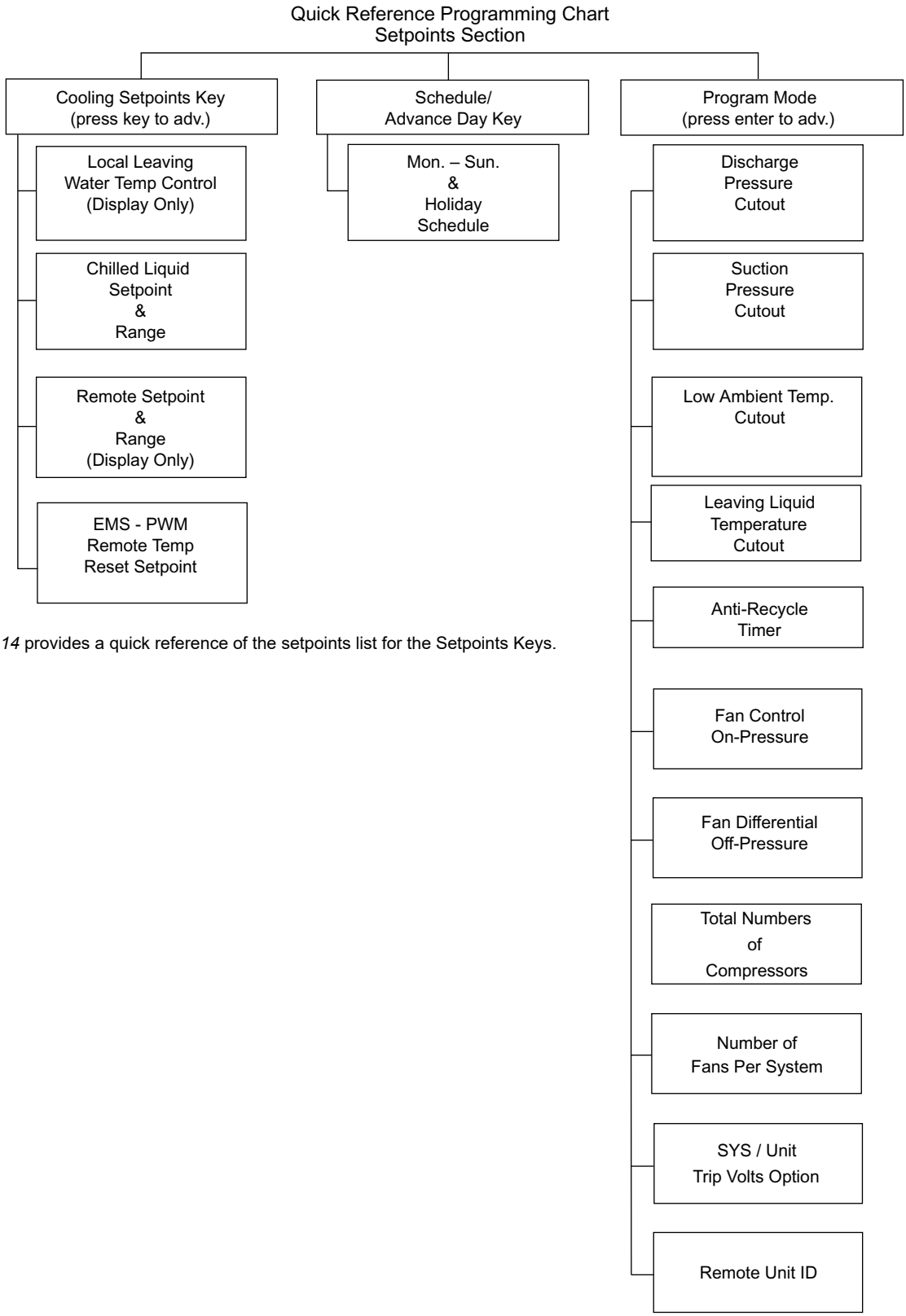


Table 14 provides a quick reference of the setpoints list for the Setpoints Keys.

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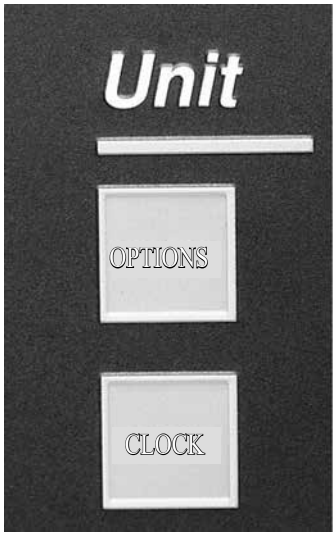
UNIT KEYS



00070VIP

Options Key

There are many user programmable options under the OPTIONS key. The OPTIONS key is used to scroll through the list of options by repeatedly pressing the OPTIONS key. After the selected option has been displayed, the ↑ (UP) and ↓ (DOWN) arrow keys are then used to change that particular option. After the option is changed, the ENTER/ADV key must be pressed to enter the data into memory.

NOTE

Many of the "Options" displayed are only programmable under the "Service Mode" and not under the OPTIONS key. Options only programmable under the "Service Mode"are noted in the details describing the option.

Table 15 shows the programmable options. Following are the displays in the order they appear:

Option 1 – Language

```
DISPLAY LANGUAGE
ENGLISH
```

English, Spanish, French, German, and Italian can be programmed.

Option 2 – System Switches: (two system units only)

(Single System Display is similar)

```
SYS 1 SWITCH ON
SYS 2 SWITCH ON
```

This allows both systems to run.

or

```
SYS 1 SWITCH ON
SYS 2 SWITCH OFF
```

This turns system 2 OFF.

```
SYS 1 SWITCH OFF
SYS 2 SWITCH ON
```

This turns system 1 OFF.

or

```
SYS 1 SWITCH OFF
SYS 2 SWITCH OFF
```

This turns systems 1 and 2 OFF.

NOTE

Turning a system OFF with its system switch allows a pumpdown to be performed prior to shutdown.

Option 3 – Chilled Liquid Cooling Type:

```
CHILLED LIQUID
WATER
```

The chilled liquid is water. The Cooling Setpoint can be programmed from 40°F to 70°F (4.4°C to 21.1°C).

or

```
CHILLED LIQUID
GLYCOL
```

7

The chilled liquid is glycol. The Cooling Setpoint can be programmed from 10°F to 70°F (-12.2°C to 21.1°C).

Option 4 – Ambient Control Type

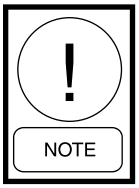
```
AMBIENT CONTROL
STANDARD
```

The low ambient cutout is adjustable from 25°F to 60°F (-3.9°C to 15.6°C).

or

```
AMBIENT CONTROL
LOW AMBIENT
```

The low ambient cutout is programmable down to 0°F (-17.8°C).



A low ambient kit MUST be installed for this option to be chosen. If the kit is NOT installed, and low ambient is selected, low pressure faults and compressor damage may occur.

Option 5 – Local/Remote Control Type

```
LOCAL / REMOTE MODEL
LOCAL
```

When programmed for LOCAL, an ISN or RCC control can be used to monitor only. The micro panel will operate on locally programmed values and ignore all commands from remote devices, or through the RS-485 inputs. The chiller will communicate and send data to the remote monitoring devices.

or

```
LOCAL/REMOTE MODE
REMOTE
```

This mode should be selected when an ISN or RCC control is to be used to control the chiller. This mode will allow the ISN to control the following items:

- Remote Start/Stop
- Cooling Setpoint
- Load Limit
- History Buffer Request

If the unit receives no valid ISN transmission for 5 minutes, it will revert back to the locally programmed values.

Option 6 – Unit Control Mode

```
CONTROL MODE
RETURN LIQUID
```

Unit control is based on return chilled liquid temperature. Return Chilled Liquid Control can only be selected on units that have 4 to 6 compressors (dual system units).

or

```
CONTROL MODE
LEAVING LIQUID
```

Option 7 – Display Units

```
DISPLAY UNITS
IMPERIAL
```

This mode displays system operating values in Imperial units of°F or psig.

or

```
DISPLAY UNITS
SI
```

This mode displays system operating values in Scientific International Units of°C or barg.

Option 8 – Lead/Lag Type (two system units only)

```
LEAD/LAG CONTROL
MANUAL SYS 1 LEAD
```

SYS 1 selected as lead compressor. SYS 1 lead option **must** be chosen if Hot Gas Bypass is installed.

or

```
LEAD/LAG CONTROL
MANUAL SYS 2 LEAD
```

SYS 2 selected as lead compressor.

or

```
LEAD/LAG CONTROL
AUTOMATIC
```

Lead/Lag between systems may be selected to help equalize average run hours between systems on chillers with 2 refrigerant systems. Auto lead/lag allows automatic lead/lag of the two systems based on an average run hours of the compressors in each system. A new

lead/lag assignment is made whenever all compressors shut down. The microprocessor will then assign the "lead" to the system with the shortest average run time.

Option 9 – Condenser Fan Control Mode

```
FAN CONTROL
DISCHARGE PRESSURE
```

Condenser fans are controlled by discharge pressure only. This mode must be chosen.

or

```
FAN CONTROL
AMBIENT & DSCH PRESS
```

Do not select this option on R-410A chillers.

Option 10 – Manual Override Mode

```
MANUAL OVERRIDE MODE
DISABLED
```

This option allows overriding of the daily schedule that is programmed. MANUAL OVERRIDE MODE – DISABLED indicates that override mode has no effect.

or

```
MANUAL OVERRIDE MODE
ENABLED
```

Manual Override Mode is enabled. This is a service function and when enabled, will allow the unit to start when shut down on the daily schedule. It will automatically be disabled after 30 minutes.

Option 11 – Current Feedback Options Installed:

```
CURRENT FEEDBACK
NONE
```

This mode should be selected when the panel is not equipped with current sensing capability.

or

```
CURRENT FEEDBACK
ONE PER UNIT
```

This mode should be selected when an optional 2ACE Module is installed to allow combined current monitoring of all systems by sensing current on the incoming line.

or

```
CURRENT FEEDBACK
ONE PER SYSTEM
```

This mode should be selected when an optional 2ACE module is installed to allow individual current monitoring of each system. SYS 1 input is to J7 of the I/O. SYS 2 input is to J8 of the I/O.

Option 12 – Power Fail Restart

```
POWER FAIL RESTART
AUTOMATIC
```

Chiller auto restarts after a power failure.

```
POWER FAIL RESTART
MANUAL
```

After a power failure, the Unit Switch must be toggled before restart at the unit is allowed. NORMALLY MANUAL RESTART should NOT BE SELECTED.

Option 13 – Soft Start Enable/Disable

```
SOFT START
DISABLED
```

SOFT START "DISABLED" **must** be selected on all chillers.

This message may not be viewable on non-European chillers.

Option 14 – Unit Type

```
UNIT TYPE
LIQUID CHILLER
```

The UNIT TYPE message cannot be modified under the unit keys.

"LIQUID CHILLER" must be displayed, or damage to compressors or other components will occur if operated in the HEAT PUMP or CONDENSING UNIT modes.

If unit type needs to be changed to make the unit a liquid chiller, remove power and then remove the jumper on J11-12. Reapply power to the micropanel and the microprocessor will store the change.

Option 15 – Refrigerant Type

```
REFRIGERANT TYPE
R-410A
```

Refrigerant type R-410A must be selected under Service Mode. Refrigerant type is displayed under the OPTIONS key, but is only programmable in Service Mode.

Incorrect programming may cause damage to compressors.

Option 16 – Expansion Valve Type

```
EXPANSION VALVE TYPE
THERMOSTATIC
```

Expansion valve type, thermostatic or electronic may be selected under Service Mode. Expansion valve type is displayed under the OPTIONS key, but is only programmable in Service Mode. YCAL 0019 through YCAL 0066 chillers will typically always be equipped with thermostatic expansion valves.

Incorrect programming may cause damage to compressors.

Also see the Unit Keys Programming Quick Reference List in *Table 15*.

Option 17 – Flash Card Update

```
FLASH CARD UPDATE
DISABLED
```

A Flash Card is used to input the operating program into the chiller IPU. A Flash Card is used instead of an EPROM. Normally, a Flash Card update is not required and the message above will be displayed.

If the operating software is to be updated, insert the Flash Card into the Flash Card input port. Turn off the Unit Switch and set the FLASH CARD UPDATE TO "ENABLED" using the ↑ and ↓ keys.

```
FLASH CARD UPDATE
ENABLED
```

Press the ENTER key and the following message will be displayed until the update has been completed. The keypad and display will not respond during the update. DO NOT reset or power down the chiller until the update is completed.

```
FLASH CARD UPDATING
PLEASE WAIT...
```

After the update is completed, an automatic reboot will occur. If an error occurred, the following message will appear with the error code and no reboot will occur:

```
FLASH CARD UPDATE
ERROR                XXXXX
```

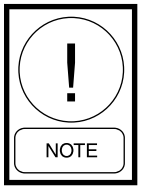
If the update resulted in an error, the original program will still be active. When an error occurs, ensure the correct Flash Card was utilized. Incorrect chiller software will cause an error. If this is not the case, the Flash Card is most likely defective or the IPU and I/O combo board is bad.

Option 18 – Remote Temperature Reset

```
REMOTE TEMP RESET
INPUT          XXXXXXXXXXXXXX
```

REMOTE TEMP RESET INPUT selection is programmable according to the type of input utilized. The following options are available:

- DISABLED (default)
- 0.0 – 10.0VDC
- 2.0 – 10.0VDC
- 0.0 – 20.0mA
- 4.0 – 20.0mA



The options display message for Remote Temperature Reset Input only appears if the Temperature Reset Option is enabled under Service Mode.

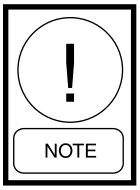
Option 19 – Pump Control

Pump Control is utilized to operate the optional on-board pump kit or to control an external pump through dry contacts 23 and 24. To use this option, the following selection must be made in the Service Mode:

```
      YORK HYDRO
KIT   PUMPS          = 1
```

When YORK HYDRO KIT PUMPS = 1, the controls will be closed to run the pumps whenever any one of the following conditions are true:

- Low Leaving Chilled Liquid Fault
- Any compressor is running
- Daily Schedule is ON and Remote Stop is closed.



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

```
      EXTERNAL
     EVAP PUMP
```

EXTERNAL EVAP PUMP should be selected if an external pump is being controlled with the chiller pump contacts. The operation will be the same as YORK HDRO KIT PUMPS = 1

The following option should not be selected.

```
      YORK HYDRO
KIT   PUMPS          = 2
```

Option 20 – Pump Selection

The displays for this PUMP SELECTION option should only appear if "YORK HYDRO KIT PUMPS = 2" are selected under Option 19. Presently, this option should not be used.

CLOCK

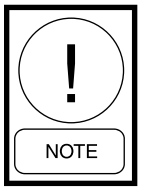
The CLOCK display shows the current day, time, and date. Pressing the CLOCK key will show the current day, time, and date.

It is important that the date and time be correct, otherwise the daily schedule will not function as desired if programmed. In addition, for ease of troubleshooting via the History printouts, the day, time, and date must be correct.

To change the day, time, and date press the CLOCK key. The display will show something similar to the following:

```
TODAY IS FRI 08:51AM
      25 JAN 02
```

The line under the F is the cursor. If the day is correct, press the ENTER/ADV key. The cursor will move under the 0 in 08 hours. If the day is incorrect, press the ↑ (UP) or ↓ (DOWN) arrow keys until the desired day is displayed and then press the ENTER/ADV key at which time the day will be accepted and the cursor will move under the first digit of the "2 digit hour". In a similar manner, the hour, minute, meridian, month, day, and year may be programmed, whenever the cursor is under the first letter/numeral of the item. Press the ↑ (UP) or ↓ (DOWN) arrow keys until the desired hour, minute, meridian; day, month, and year are displayed. Pressing the ENTER/ADV key will save the valve and move the cursor on to the next programmable variable.



Jumper J11 on the microboard must be set to the "CLKON" position to turn on the clock. If this is not done, the clock will not function.

TABLE 15 - UNIT KEYS OPTIONS PROGRAMMING QUICK REFERENCE LIST

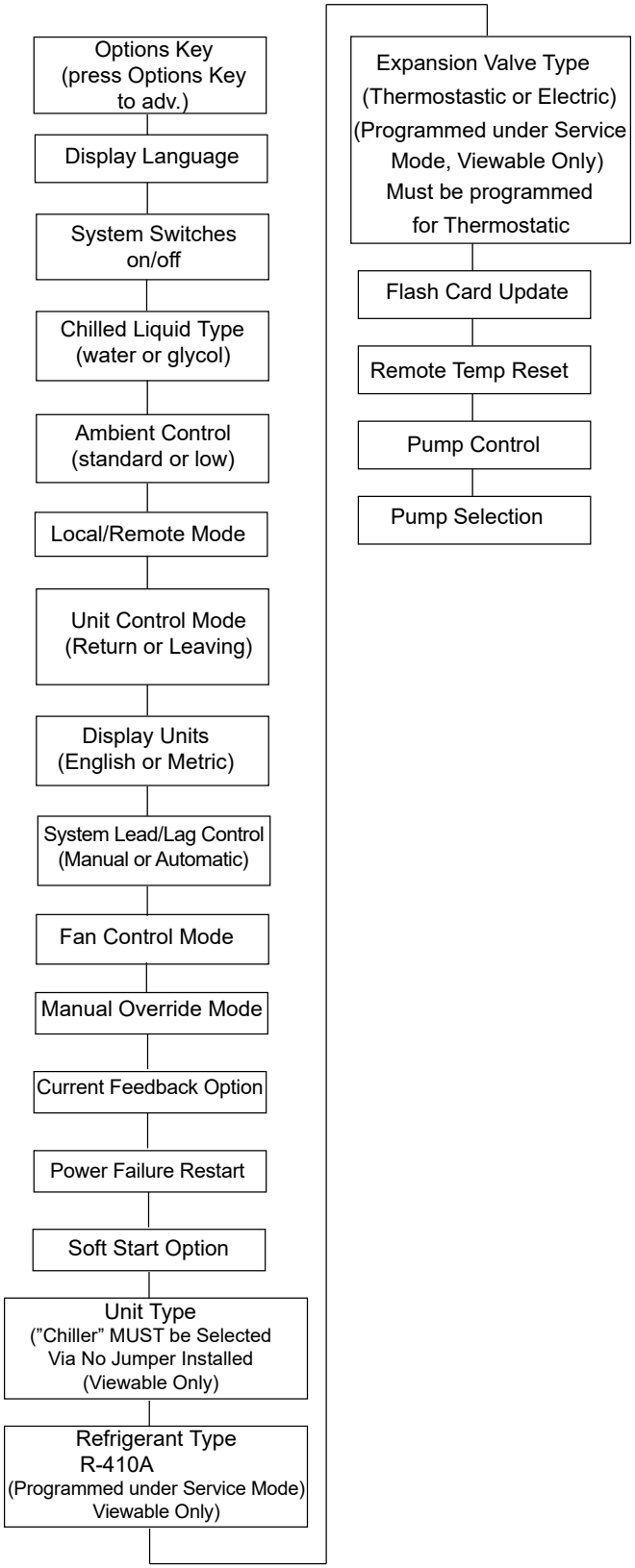


Table 15 provides a quick reference list for the Unit key setpoints.

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SECTION 8 – UNIT OPERATION

CAPACITY CONTROL

To initiate the start sequence of the chiller, all run permissive inputs must be satisfied (flow/remote start/stop switch), and no chiller or system faults exist.

The first phase of the start sequence is initiated by the Daily Schedule Start or any Remote Cycling Device. If the unit is shut down on the daily schedule, the chilled water pump microboard contacts (TB8-6 and 7) will close to start the pump when the daily schedule start time has been reached. Once flow has been established and the flow switch closes, capacity control functions are initiated, if the remote cycling contacts wired in series with the flow switch are closed.

It should be noted that the chilled water pump contacts (TB8-6 and 7) are not required to be used to cycle the chilled water pump. However, in all cases the flow switch must be closed to allow unit operation.

The control system will evaluate the need for cooling by comparing the actual leaving or return chilled liquid temperature to the desired setpoint, and regulate the leaving or return chilled liquid temperature to meet that desired setpoint.

SUCTION PRESSURE LIMIT CONTROLS

The anticipatory controls are intended to prevent the unit from ever actually reaching a low-pressure cutout. Loading is prevented, if the suction pressure drops below 1.15 times suction pressure cutout (15% below the cutout). Loading may reoccur after suction pressure rises above the unload point and a period of one minute elapses. This control is only operable if the optional suction pressure transducers are installed.

DISCHARGE PRESSURE LIMIT CONTROLS

The discharge pressure limit controls unload a system before it reaches a safety limit due to high load or dirty condenser coils. The microprocessor monitors discharge pressure and unloads a system, if fully loaded, by one compressor when discharge pressure exceeds the programmed cutout minus 10 psig (0.69 barg). Reloading will occur when the discharge pressure on the affected system drops to 85% of the unload pressure and 10 minutes have elapsed.

This control is only applicable if optional discharge pressure transducers are installed.

LEAVING CHILLED LIQUID CONTROL

The setpoint, when programmed for Leaving Chilled Liquid Control, is the temperature the unit will control to within plus or minus the (control) cooling range. The Setpoint High Limit is the Setpoint plus the Cooling Range. The Setpoint Low Limit is the Setpoint minus the Cooling Range. Figure 41 should be utilized to aid in understanding the following description of Leaving Chilled Liquid Control.

If the leaving chilled liquid temperature is above the Setpoint High Limit, the lead compressor on the lead system will be energized along with the liquid line solenoid. Upon energizing any compressor, the 60 second Anti-Coincidence timer will be initiated to prevent multiple compressors from turning ON.

If after 60 seconds of run-time the leaving chilled liquid temperature is still above the Setpoint High Limit, the next compressor in sequence will be energized. Additional compressors will be energized at a rate of once every 60 seconds if the chilled liquid temperature remains above the Setpoint High Limit and the chilled liquid temperature is dropping less than 3°F per minute. The lag system will not be allowed to start a compressor until the lead system has run for 5 minutes.

If the chilled liquid temperature falls below the Setpoint High Limit but is greater than the Setpoint Low Limit, loading and unloading do not occur. This area of control is called the control range.

If the chilled liquid temperature drops to between Setpoint Low Limit and 0.5°F (0.28°C) below the Setpoint Low Limit, unloading (a compressor turns OFF) occurs at a rate of 1 every 30 seconds. If the chilled liquid temperature falls to a value greater than 0.5°F (0.28°C) below the Setpoint Low Limit but not greater than 1.5°F (0.83°C) below the Setpoint Low Limit, unloading occurs at a rate of 20 seconds. If the chilled liquid temperature falls to a value greater than 1.5°F (0.83°C) below the Setpoint Low Limit, unloading occurs at a rate of 10 seconds. If the chilled liquid temperature falls below 1°F above the low chilled liquid temperature cutout, unloading occurs at a rate of 10 seconds if it is greater than 10 seconds.

In water cooling mode on R-410A chillers, the minimum low limit of the control range will be 40.0 ºF. For leaving chilled liquid temperature setpoint and control range combinations that result in the low limit of the

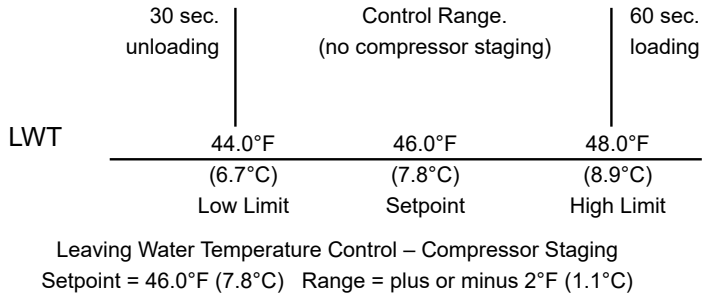

FIGURE 41 - LEAVING WATER TEMPERATURE CONTROL EXAMPLE

control range being below 40.0ºF, the low limit will be reset to 40.0ºF and the difference will be added to the high limit. This will result in a control range the same size as programmed but not allow the unit to run below 40.0ºF. This control will not affect glycol chillers.

Hot gas, if present, will be the final step of capacity. Hot gas is energized when only a single compressor is running and LWT is less than SP. Hot gas is turned OFF as temperature rises when LWT is more than SP plus CR/2. If temperature remains below the setpoint low limit on the lowest step of capacity, the microprocessor will close the liquid line solenoid, after turning off hot gas, and pump the system down before turning off the last compressor in a system.

The leaving chilled liquid setpoint is programmable from 40°F to 70°F (4.4°C to 21.1°C) in water chilling mode and from 10°F to 70°F (-12.2°C to 21.1°C) in glycol chilling mode. In both modes, the cooling range can be from plus or minus 1.5°F to plus or minus 2.5°F (plus or minus 0.83°C to 1.39°C) leaving chilled liquid control.

LEAVING CHILLED LIQUID CONTROL OVERRIDE TO REDUCE CYCLING

To avoid compressor cycling the microprocessor will adjust the setpoint upward temporarily. The last run time of the system will be saved. If the last run time was greater than 5 minutes, no action is to be taken. If the last run time for the lead system was less than 5 minutes, the microprocessor will increase the setpoint high limit according to the chart at right, with a maximum value allowed of 50°F (See *Figure 42*).

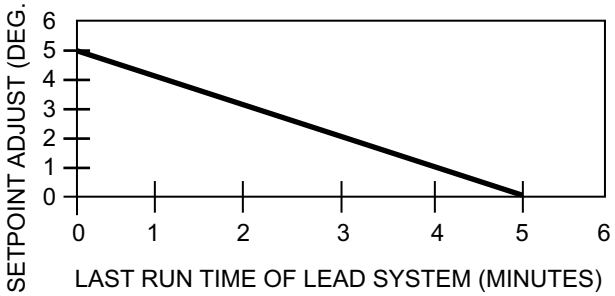

FIGURE 42 - SETPOINT ADJUST

If adding the setpoint adjust value to the setpoint high limit causes the setpoint high limit to be greater than 50°F, the setpoint high limit will be set to 50°F, and the difference will be added to the setpoint low limit.

Once a system runs for greater than 5 minutes, the setpoint adjust will be set back to 0. This will occur while the system is still running.

LEAVING CHILLED LIQUID SYSTEM LEAD/ LAG AND COMPRESSOR SEQUENCING

A Lead/Lag option may be selected to help equalize average run hours between systems with 2 refrigerant systems. This may be programmed under the OPTIONS key. Auto Lead/Lag allows automatic Lead/ Lag of the two systems based on average run hours of the compressors in each system. Manual Lead/Lag selects specifically the sequence which the microprocessor starts systems.

On a hot water start, once a system starts, it will turn on all compressors before the next system starts a compressor. The microprocessor will sequence compressors within each circuit to maximize individual compressor run time on individual compressors within a system to prevent short cycling.

Each compressor in a system will be assigned an arbitrary priority number 1, 2, or 1, 2, 3. The non-running compressor within a system with the lowest priority number will always be the next compressor to start. The running compressor with priority number 1 will always be the next to shut off. Whenever a compressor is shut off, the priority numbers of all compressors will be decreased by 1 with wrap-around. This control scheme ensures the same compressor does not repeatedly cycle ON and OFF.

Once the second system starts a compressor on a 2 system chillers, the microprocessor will attempt to equally load each system as long as the system is not limiting or pumping down. Once this occurs, loading and unloading will alternate between systems, loading the lead system first or unloading the lag system first.

TABLE 16 - RETURN CHILLED LIQUID CONTROL FOR 4 COMPRESSORS (6 STEPS)

*STEP	COMPRESSOR	COMPRESSOR ON POINT	COMPRESSOR OFF POINT
0	0	SETPOINT	SETPOINT
1	1 W/HGB	SP + CR/8 (NOTE 1)	SETPOINT
2	1 NO HGB	SP + CR/4	SP + CR/8
3	2	SP + 2*CR/4 (NOTE 2)	SP + CR/4
4	2	SP + 2*CR/4	SP + CR/4 (NOTE 3)
5	3	SP + 3*CR/4	SP + 2*CR/4
6	4	SP + CR	SP + 3*CR/4

Notes:

1. Step 1 is Hot Gas Bypass and is skipped when loading occurs. Hot Gas Bypass operation is inhibited during pumpdown.
2. Step 3 is skipped when loading occurs.
3. Step 4 is skipped when unloading occurs.

* STEP can be viewed using the OPER DATA key and scrolling to COOLING DEMAND.

RETURN CHILLED LIQUID SYSTEM LEAD/ LAG AND COMPRESSOR SEQUENCING

A lead/Lag option may be selected to help equalize average run hours between systems with 2 refrigerant systems. This may be programmed under the OPTIONS key. Auto Lead/Lag of the 2 systems based on average run hours of the compressors in each system. Manual Lead/Lag selects specifically the sequence which the microprocessor starts the systems.

The microprocessor will sequence compressors load and unload systems according to *Table 17*. The microprocessor will lead/lag compressors within each circuit to maximize individual compressor run time for the purpose of lubrication. It will also prevent the same compressor from starting 2 times in a row. The microprocessor will not attempt to equalize run time on individual compressors within a system.

Each compressor in a system will be assigned an arbitrary number 1, or 2. The non-running compressor within a system with the lowest priority number will always be the next compressor to start. The running compressor with priority number 1 will always be the next compressor to shut off. Whenever a compressor is shut off, the priority numbers of all compressors in each system will be decreased by 1 with the wrap around. This control scheme ensures the same compressor does not repeatedly cycle ON and OFF.

ANTI-RECYCLE TIMER

The programmable anti-recycle timer ensures that systems do not cycle. This timer is programmable under the PROGRAM key between 300 and 600 seconds. Whenever possible, to reduce cycling and motor heating, the anti-recycle timer should be adjusted to 600 seconds. The programmable anti-recycle timer starts the timer when the first compressor in a system starts.

TABLE 17 - RETURN CHILLED LIQUID CONTROL FOR 4 COMPRESSORS (6 STEPS)

	LEAD SYSTEM				LAG SYSTEM		
STEP	**COMP 1**	**COMP 2**	**-**		**COMP 1**	**COMP 2**	**-**
0	OFF	OFF	-		OFF	OFF	-
1	ON + HG	OFF	-	SEE NOTE 1	OFF	OFF	-
2	ON	OFF	-		OFF	OFF	-
3	ON	OFF	-	SEE NOTE 2	ON	OFF	-
4	ON	ON	-	SEE NOTE 3	OFF	OFF	-
5	ON	ON	-		ON	OFF	-
6	ON	ON	-		ON	ON	-

NOTES

1. Step is Hot Gas Bypass and is skipped when loading occurs. Hot Gas Bypass operation is inhibited during pumpdown. For Leaving Chilled Liquid Control the Hot Gas Bypass solenoid is energized only when the lead compressor is running and the LWT less than SP, the Hot Gas Bypass solenoid is turned OFF when the LWT more than SP plus CR/2.
2. Step 3 is skipped when loading occurs.
3. Step 4 is skipped when unloading occurs.

The timer begins to count down. If all of the compressors in a circuit cycle OFF, a compressor within the circuit will not be permitted to start until the anti-recycle timer has timed out. If the lead system has run for less than 5 minutes, 3 times in a row, the anti-recycle timer will be extended to 10 minutes.

ANTI-COINCIDENCE TIMER

This timer is not present on single-system units. Two timing controls are present in software to ensure compressors within a circuit or between systems, do not start simultaneously. The anti-coincidence timer ensures there is at least a one minute delay between system starts on 2-circuit systems. This timer is NOT programmable. The load timers further ensure that there is a minimum time between compressor starts within a system.

EVAPORATOR PUMP CONTROL AND YORK HYDRO KIT PUMP CONTROL

The evaporator pump dry contacts (CTB2 – terminals 23 and 24) are energized when any of the following conditions are true:

1. Low Leaving Chilled Liquid Fault.
2. Any compressor is running.
3. Daily Schedule is ON, Unit Switch is ON and Remote Stop is closed.

The pump will not run if the micro 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.

Whenever the option "YORK HYDRO KIT PUMPS = 1" is selected under the OPTIONS key, the pump control will be as described above. DO NOT SELECT the option "YORK HYDRO KIT PUMPS = 2" under the OPTIONS key. If a dual pump option is installed, the active pump is selected by the selector switch.

EVAPORATOR HEATER CONTROL

The evaporator heater is controlled by ambient air temperature. When the ambient temperature drops below 40°F (4.4°C) the heater is turned ON. When the temperature rises above 45°F (7.2°C) the heater is turned OFF. An under voltage condition will keep the heater OFF until full voltage is restored to the system.

PUMPDOWN CONTROL

Each system has a pump-down feature upon shut-off. Manual pumpdown from the keypad is not possible. On a non-safety, non-unit switch shutdown, all compressors but one in the system will be shut OFF. The LLSV will also be turned OFF. The final compressor will be allowed to run until the suction pressure falls below the cutout, or for 180 seconds, whichever comes first.

STANDARD CONDENSER FAN CONTROL

Condenser fan operation must be programmed with the OPTIONS key under "Fan Control." Condenser fan control can be selected for Ambient Temperature and Discharge Pressure, or Discharge Pressure only.

The condenser fan control by "Ambient Temperature and Discharge Pressure" is a feature that is integral to the standard software control. If the optional discharge transducer is not installed, the condenser fans will operate based on outdoor ambient temperature only. See the following pages for model specific details.

The condenser fan control by "Discharge Pressure" is a feature that can be selected if the discharge pressure transducer is installed and fan cycling is not a concern. Fan control by discharge pressure will work according to the tables on the following pages. The fan control on-pressure and fan differential off-pressure are programmable under the PROGRAM key.

The delay between turning ON and OFF fan stages is always fixed at 5 seconds.

When a fan stage is turned ON by pressure, the on pressure for the next stage is increased 20 psig and ramped back to the programmed on pressure over the next 20 seconds. Typically, standard ambient control on pressure should be programmed at 385 psig with a differential of 125 psig.

When a fan stage is turned OFF (programmed on pressure minus programmed differential), the off pressure for the next stage is decreased 20 psig and ramped back to the programmed off pressure minus the differential over the next 20 seconds.

A low ambient kit MUST be installed when "AMBIENT CONTROL LOW AMBIENT" is selected under the OPTIONS key.

Compressor damage could occur if programming does not match installed hardware.

Detailed Standard Fan Control operation is shown in *Table 18* and *Table 19*.

STANDARD CONDENSER FAN CONTROL – YCAL0019 – YCAL0033

TABLE 18 - YCAL0019 – YCAL0033 CONDENSER FAN CONTROL USING DISCHARGE PRESSURE

FAN STAGE	ON*	OFF*	CONTACTOR	MICROBOARD OUTPUT	FAN #
			SYS 1	SYS 1	SYS 1
1	DP> FAN CRTL ON PRESS	DP < FAN CTRL ON PRESS – DIFF.PRESS	7M	TB7-9	1
2	*DP > FAN CTRL ON PRESS AND FAN STAGE 1 IS ENERGIZED	**DP < FAN CTRL ON PRESS – DIFF. PRESS	7M & 8M	TB7-9 & TB7-10	1 & 3

TABLE 19 - YCAL0019 – YCAL0033 CONDENSER FAN CONTROL USING DISCHARGE PRESSURE ONLY

FAN STAGE	ON	OFF	CONTACTOR	MICROBOARD OUTPUT	FAN #
			SYS 1	SYS 1	SYS 1
1	DP > FAN CTRL ON PRESS	DP < FAN CTRL ON PRESS – (DIFF. PRESS.)	7M	TB7-9	1
2	DP > FAN CTRL ON PRESS AND FAN STAGE 1 IS ENERGIZED	**DP < FAN CTRL ON PRESS – DIFF. PRESS.	7M & 8M	TB7-9 & TB7-10	1 & 3

* When a fan stage is turned ON, the on pressure for the next stage is increased 20 psig and ramped back to the programmed on pressure over the next 20 seconds.

** When a fan stage is turned OFF (programmed on pressure minus differential), the off pressure for the next stage is decreased 20 psig and ramped back to the programmed off pressure minus the differential.

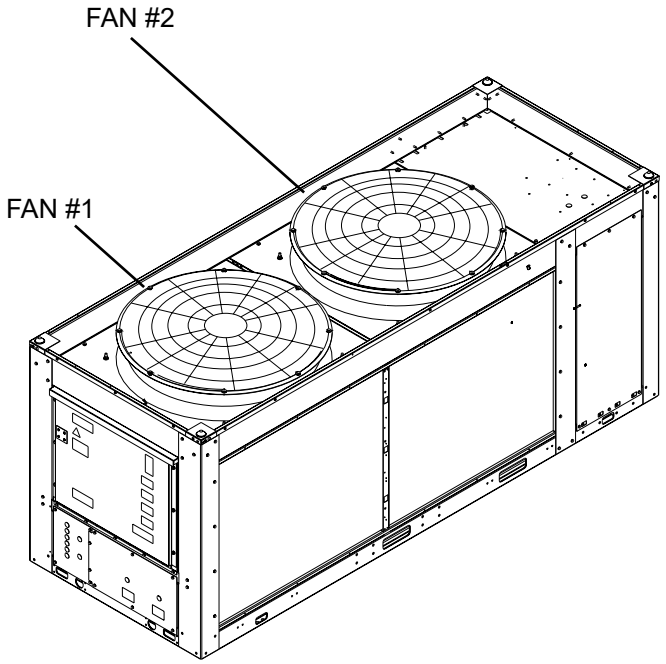

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FIGURE 43 - YCAL0019 – YCAL0033 FAN LOCATION (TYPICAL)

STANDARD CONDENSER FAN CONTROL – YCAL0043 – YCAL0066

TABLE 20 - YCAL0043 – YCAL0066 CONDENSER FAN CONTROL USING DISCHARGE PRESSURE

FAN STAGE	ON*	OFF*	CONTACTOR		MICRO BOARD OUTPUT		FAN #	
			SYS 1	SYS 2	SYS 1	SYS 2	SYS 1	SYS 2
1	DP> FAN CRTL ON PRESS	DP < FAN CTRL ON PRESS – DIFF.PRESS	7M	10M	TB7-9	TB10-9	1	2
2	DP > FAN CTRL ON PRESS AND FAN STAGE 1 IS ENERGIZED	DP < FAN CTRL ON PRESS – DIFF. PRESS	7M & 8M	10M & 11M	TB7-9 & TB7-10	TB10-9 & TB10-10	1 & 3	2 & 4

TABLE 21 - YCAL0043 – YCAL0066 CONDENSER FAN CONTROL USING DISCHARGE PRESSURE ONLY

FAN STAGE	ON	OFF	CONTACTOR		MICRO BOARD OUTPUT		FAN #	
			SYS 1	SYS 2	SYS 1	SYS 2	SYS 1	SYS 2
1	DP > FAN CTRL ON PRESS	DP < FAN CTRL ON PRESS – DIFF. PRESS.	7M	10M	TB7-9	TB10-9	1	2
2	DP > FAN CTRL ON PRESS AND FAN STAGE 1 IS ENERGIZED	DP < FAN CTRL ON PRESS – DIFF. PRESS.	7M & 8M	10M & 11M	TB7-9 & TB7-10	TB10-9 & TB10-10	1 & 3	2 & 4

* When a fan stage is turned ON, the on pressure for the next stage is increased 20 psig and ramped back to the programmed on pressure over the next 20 seconds.

** When a fan stage is turned OFF (programmed on pressure minus differential), the off pressure for the next stage is decreased 20 psig and ramped back to the programmed off pressure minus the differential.

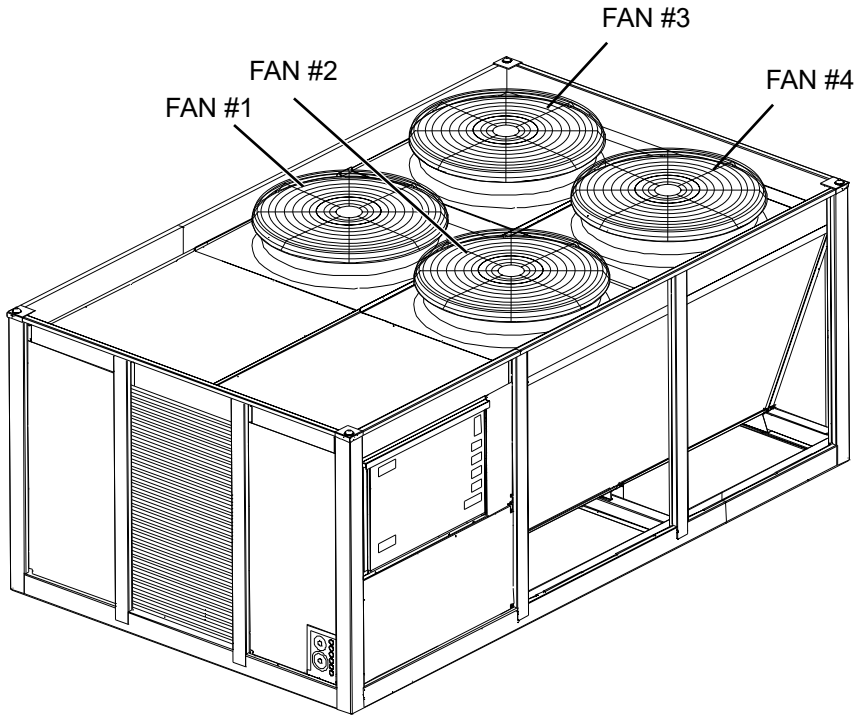

FIGURE 44 - YCAL0043 – YCAL0066 FAN LOCATION (TYPICAL)

YCAL0019-0028 LOW AMBIENT FAN CONTROL OPTION

General

The low ambient option consists of a single phase Variable Frequency Drive (VFD) that controls the speed of the first fan (Fan 1) in the fan staging sequence. The VFD is located in the control panel. An example of the VFD location is shown in *Figure 45*.

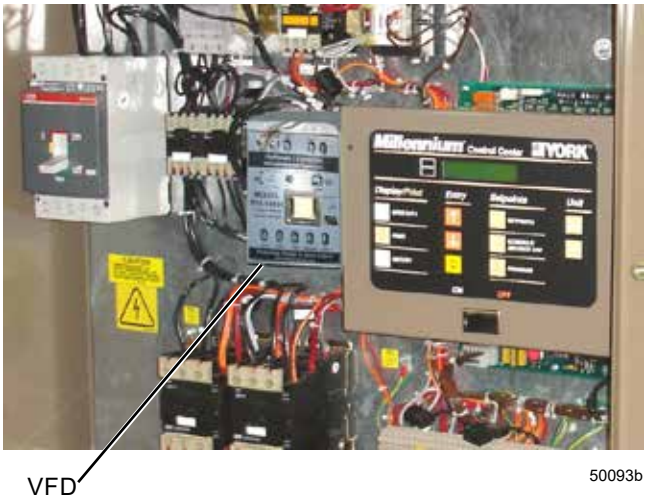

FIGURE 45 - TYPICAL VFD LOCATION

The VFD will control fan speed based on the liquid temperature of the system. As liquid line temperature rises and falls, the fan speed will operate between minimum and full speed RPM.

As liquid temperature rises, the VFD will ramp the speed of the fan from a minimum speed of about 200 Hz to maximum RPM while attempting to control liquid line temperature between 65 and 75° F. If the liquid temperature is below 65 to 75° F, the VFD will shut off the motor even though the VFD is powered by 7M.

The VFD control signal is sent from a liquid temperature sensor connected to a condenser coil return bend. The sensor is connected to S1 and COM terminals of the VFD in the control panel. The sensor must always be insulated. The location of the sensor is shown in *Figure 46*.

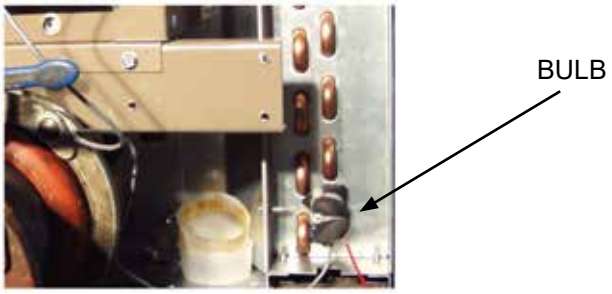

FIGURE 46 - LIQUID LINE SENSING BULB LOCATION

The VFD will not only control fan speed in low ambient conditions, but in all ambients based on the liquid line temperature. Speed control of the fan will occur whenever the liquid line solenoid is energized.

Potentiometer Configuration

The VFD is pre-configured from the factory prior to shipping and should be ready for operation when the chiller arrives on site. Potentiometers allow adjustment of the minimum speed and for selection of the temperature control range. A quick check of the potentiometer setting is recommended. The potentiometer settings should be in the position shown in *Figure 47*.

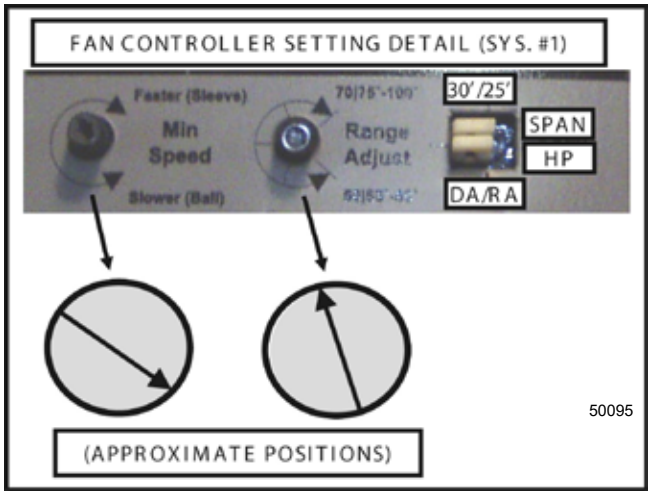

FIGURE 47 - POTENTIOMETER SETTINGS

Wiring

VFD wiring is simple and requires only single phase power in, single phase power out and a 2-wire signal from the liquid line temperature sensor. No start, stop or other alternate power requirements are needed to operate the VFD. Figure 48 shows the power and control wiring schematically as well as the actual connections.

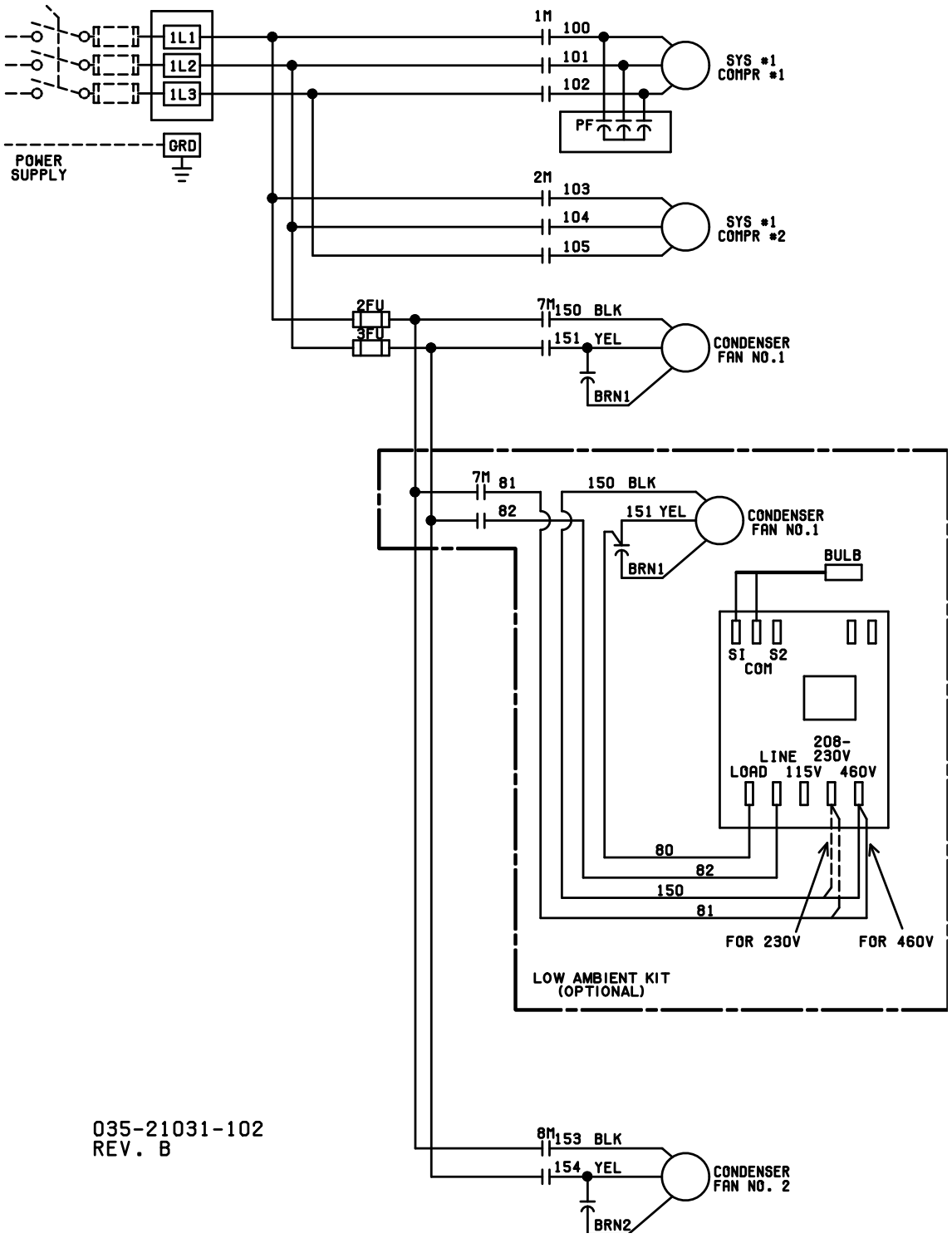

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FIGURE 48 - WIRING

TABLE 22 - YCAL0019 – 0028 VFD LOW AMBIENT OPTION – CONDENSER FAN CONTROL OPERATION

FAN STAGE	ON	OFF	CONTACTOR	MICROBOARD	FAN #
			SYS 1	SYS 1	SYS 1
1: VFD CONTROL (1 FAN VARIABLE SPEED)	FAN SPEED IS A FUNCTION OF LIQUID TEMPERATURE FAN WILL TURN ON WHEN LIQUID LINE TEMPERATURE IS ABOVE 65º F. SPEED INCREASES WITH TEMPERATURE,	FAN WILL TURN OFF WHEN LIQUID TEMPERATURE DROPS BELOW 65°F	7M	TB7-3	1
2: 1 FAN VFD CONTROL 2ND FAN FULL SPEED UNDER CONTACTOR CONTROL	385 PSIG, BOTH FANS WILL BE RUNNING FULL SPEED	DISCHARGE PRESSURE < 260 PSIG (PRESSURE IS < FAN CONTROL ON PRESSURE OF 385 PSIG MINUS FAN DIFFERENTIAL PRESSURE OF 125 PSIG = 260 PSIG) FAN 1 WILL STILL BE RUNNING	7M & 8M	TB7- 3 & TB7-10	1 & 3

PROGRAMMING - YCAL0019 – 0028

Condenser fan control type must be programmed under both the OPTIONS and PROGRAM keys when a VFD is installed on the chiller. Under the OPTIONS key, FAN CONTROL must be programmed for DISCHARGE PRESSURE CONTROL only. This will ensure condenser fan control of the chiller is solely by discharge pressure, with no ambient control.

NOTE

Under the PROGRAM key, the FAN CONTROL ON PRESSURE should be programmed for 385 psig and the FAN DIFFERENTIAL OFF PRESSURE must be programmed for 125 psig.

Programming as suggested ensures the chiller control points for the second fan in the fan staging sequence and the inverter control points are matched for optimum control of the fans at reduced ambient temperatures, assuring superheat and oil control is not compromised. When the chiller and VFD fan control points are programmed properly, the fans will operate as outlined in *Table 22*.

YCAL0033 Low Ambient Fan Control Option

General

The low ambient option consists of a VFD (Variable Frequency Drive) that controls the speed of the first fan (Fan 1) in the fan staging sequence. The VFD is located on the top of chiller above the compressor section. Examples of the typical VFD location and enclosure mountings are shown in Figures 49 and 50.

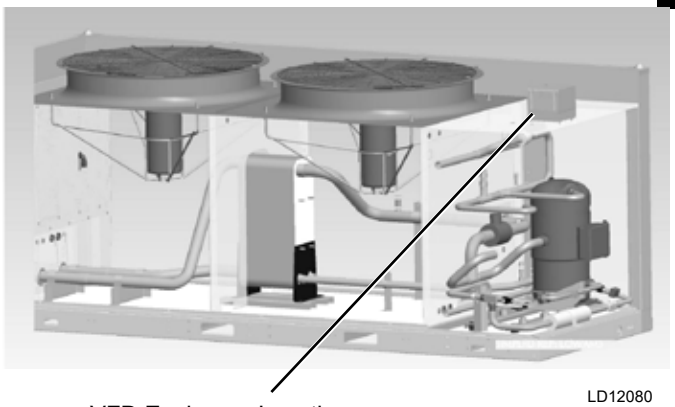

FIGURE 49 - TYPICAL VFD ENCLOSURE LOCATIONS

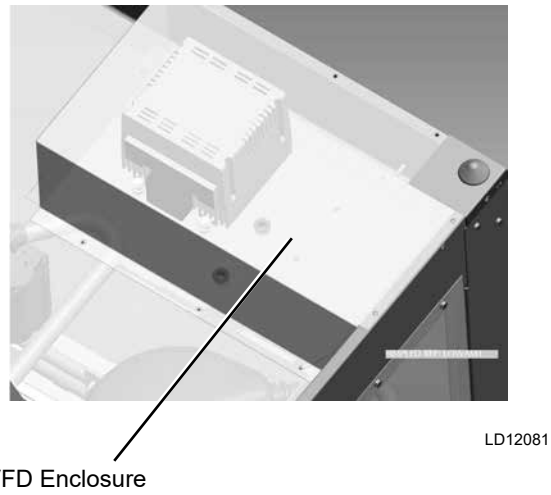

FIGURE 50 - TYPICAL VFD ENCLOSURE CONFIGURATIONS

The VFD will control fan speed when only a single fan is running on a system. As discharge pressure rises and falls, the fan speed will be increased from zero RPM to full speed. As discharge pressure continues to rise, the VFD will operate the fan at full speed and the second fan will be brought on in a system, if needed. Whenever the second fan is brought on, the inverter will already be running the first fan at full speed. When discharge pressure falls, the chiller microprocessor will turn the second fan OFF by de-energizing the fan contactor.

If pressure continues to fall, VFD speed will decrease in an effort to maintain discharge pressure. Speed may drop to the point where the VFD turns the fan completely OFF or virtually OFF with a continued drop in pressure.

The VFD control input signal is from the discharge pressure transducer in the respective system. The transducer signal feeds both the chiller microprocessor board and the VFD. The VFD controls the fan speed based on discharge pressure.

The VFD will control the fan speed not only in low ambient conditions, but in all ambients based on discharge pressure. Speed control of the respective system will occur whenever high voltage power is applied to the VFD power inputs through the 7M contactor. The chiller microprocessor will energize the 7M and 10M contactors whenever the system liquid line solenoid is energized.

The VFD controls the speed of the fan based on a discharge pressure setpoint and a differential control range. When a compressor starts in a system, the inverter is activated through the 7M contactor, which is controlled from the respective liquid line solenoid valve control signal. At discharge pressures below 260 psig, the VFD will turn the fan OFF or speed will be reduced to all but small movements in fan rotation.

NOTE

The pressures indicated in this section describing the VFD control will vary from VFD to VFD. Expect tolerances for the entire pressure range of control to potentially shift -0 psig/+24 psig.

The VFD will ramp up the speed of the fan as pressure rises above the low end of the speed control range. Throughout the pressure control range, the VFD controls the speed of the fan based on a discharge pressure in the range of approximately 260 psig to 292 psig. At pressures above 292 psig, the VFD will run the system fan at full speed.

As pressure drops below 292 psig, the VFD will slow the speed of the fan to try to maintain discharge pressure within the control range. The VFD will try to maintain pressure in the range of 260 psig to 292 psig by raising and lowering the speed of the fan. If pressure drops below 260 psig, the VFD will virtually turn the system fan completely OFF. Some slight fan movement or very slow rotation may be noted, although the fan may appear to stop completely.

CONFIGURATION (JUMPERS AND POTENTIOMETERS)

Each VFD is pre-configured at the factory prior to shipping and should be ready for operation when it arrives onsite. A quick check of the settings is recommended. The jumpers must be in the positions shown in *Table 23*.

TABLE 23 - VFD JUMPERS

JUMPER	60 HZ	50 HZ
J2	REMOVE	—
J3	IN	—
J4	REMOVE	—
J5	IN	—
J6	IN	—
J7	IN	—
J8	IN	—
J9	IN	REMOVE

POTENTIOMETER SETTINGS	
P1	P2
292 PSI	32 PSI

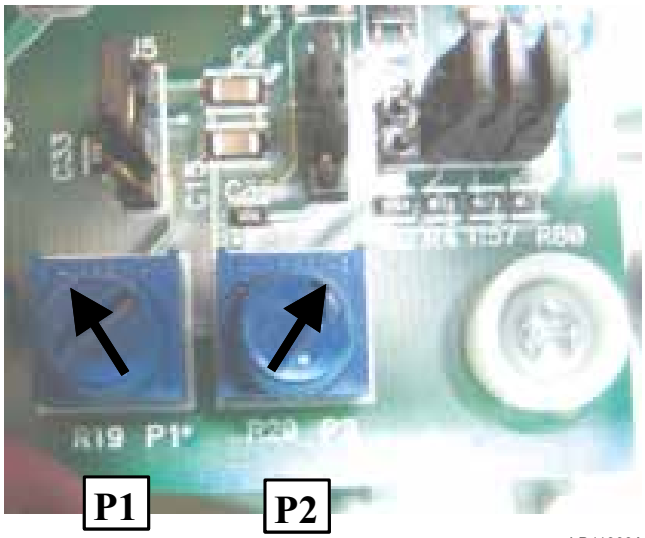

FIGURE 51 - POTENTIOMETER SETTINGS

Potentiometer settings are also preset at the factory. The potentiometers should be in the positions shown in Figure 51. The pots do not have numerical settings and are set according to the arrow positions indicated. DO NOT change the potentiometer settings unless they do not match the positioning of the potentiometers shown in Figure 51. The position of the potentiometers are as follows:

- P1 should be full CW (292 psig)
- P2 should be full CCW (32 psig).

Modifying these settings may cause damage to the chiller or control problems.

The P1 pot sets the setpoint which is the top end of the control range. This setting is the discharge pressure at which the fan will be operating at full speed. The P2 pot sets the range. This is the range of pressure where the VSD modulates the fan speed from 0 RPM to full speed. The range is subtracted from the setpoint to calculate the 0 RPM pressure.

Wiring

VFD wiring is simple and requires only 3-phase power in, 3-phase power out, and a 2-wire signal from the transducer. No start, stop, or other alternate power requirements are needed to run the VFD. Figure's 52 and 51 show the power and control wiring schematically as well as the actual connections. The VFD controlled fan will operate whenever the liquid line solenoid on the respective system is energized.

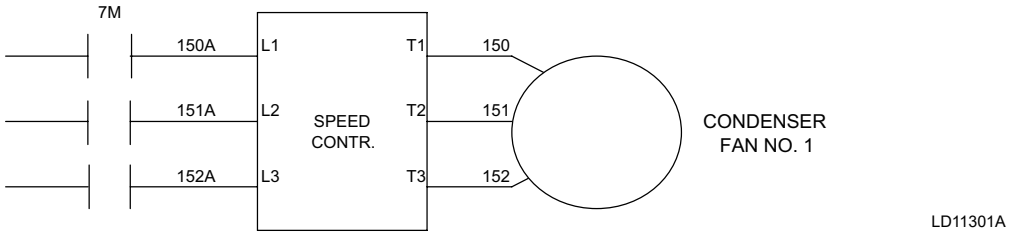

FIGURE 52 - INVERTER POWER WIRING SCHEMATIC

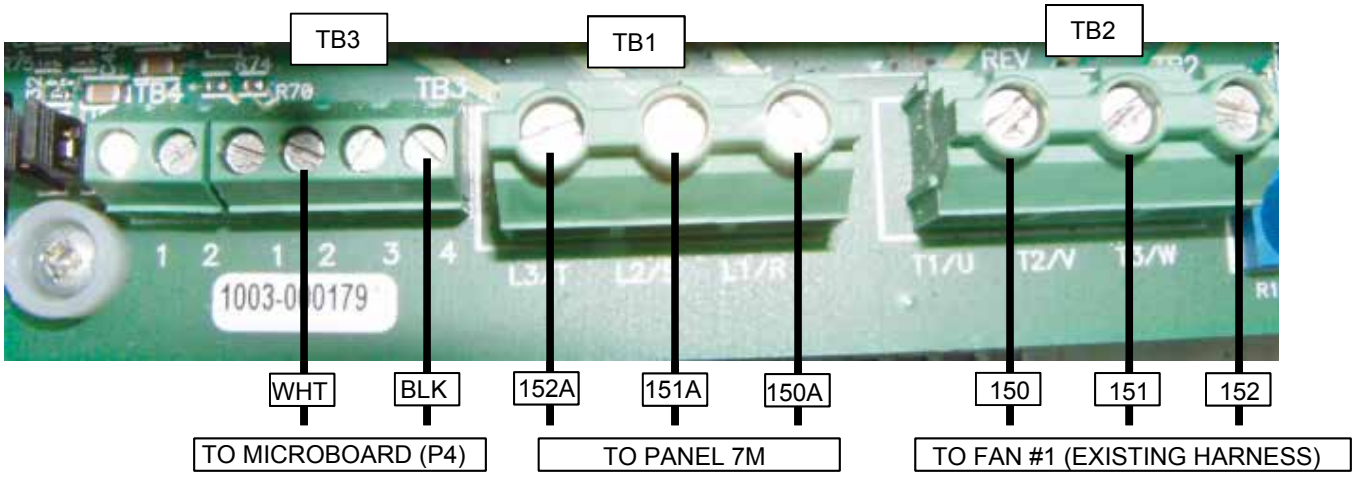

FIGURE 53 - INVERTER WIRING

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YCAL0033 PROGRAMMING

Condenser fan control type must be programmed under both the OPTIONS and PROGRAM keys when an VFD is installed on the chiller. Under the OPTIONS key, FAN CONTROL must be programmed for DISCHARGE PRESSURE CONTROL only. This will ensure the condenser fan control is solely by discharge pressure with no ambient control.

Under the PROGRAM key, the FAN CONTROL ON PRESSURE should be programmed for 425 psig and the FAN DIFFERENTIAL OFF PRESSURE should be programmed for 125 psig.

Programming as suggested ensures the chiller control points for the second fan in the fan staging sequence and the inverter control points are matched for optimum control of the fans at reduced ambient temperatures, assuring superheat and oil control is not compromised. When the chiller and VFD fan control points are programmed properly, the fans will operate as outlined in *Table 24*.

TABLE 24 - YCAL033 VFD LOW AMBIENT OPTION – CONDENSER FAN CONTROL OPERATION

FAN STAGE	ON	OFF	CONTACTOR	MICRO BOARD	FAN #
			SYS 1	SYS 1	SYS 1
1: VFD CONTROL (1 FAN VARIABLE SPEED)	FAN SPEED IS A FUNCTION OF DISCHARGE PRESSURE. WHEN THE LIQUID LINE SOLENOID IS ENERGIZED. SPEED INCREASES WITH PRESSURE	FAN WILL TURN OFF OR TURN VERY SLOWLY WHEN PRESSURE DROPS BELOW 260 PSIG.	7M	TB7-3	1
2: 1 FAN VFD CONTROL 2ND FAN FULL SPEED UNDER CONTACTOR CONTROL	425 PSIG, BOTH FANS WILL BE RUNNING FULL SPEED	DISCHARGE PRESSURE < 260 PSIG (PRESSURE IS < FAN CONTROL ON PRESSURE OF 425 PSIG MINUS FAN DIFFERENTIAL PRESSURE OF 125 PSIG = 300 PSIG)	7M & 8M	TB7-3 & TB7-10	3

YCAL0043 – 0066 LOW AMBIENT FAN CONTROL OPTION

General

The low ambient option consists of a VFD (Variable Frequency Drive) for each system that controls the speed of the first fan (Fan 1, Sys #1 or Fan 2, Sys # 2) in the fan staging sequence. The VFD's are located in an enclosure in the compressor/piping/heat exchanger section on (2) compressor chillers. System # 1 VFD is located on the bottom and System # 2 is on the top. Single system chillers have the VFD installed on the top of chiller above the compressor section. Examples of the typical VFD location and enclosure mountings are shown in Figures 54 and 55.

The VFD will control fan speed when only a single fan is running on a system. As discharge pressure rises, the fan speed will be increased from zero RPM to full speed. As discharge pressure continues to rise, the VFD will operate the fan at full speed and the second fan will be brought ON in a system, if needed. Whenever the second fan is brought ON, the inverter will already be running the first fan at full speed.

If discharge pressure falls, the chiller microprocessor will turn the second fan OFF by de-energizing the fan contactor. If pressure continues to fall, VFD speed will decrease in an effort to maintain discharge pressure. Speed may drop to the point where the VFD turns the fan completely OFF or virtually OFF with a continued drop in pressure.

The VFD control input signal is from the discharge pressure transducer in the respective system. The transducer signal feeds both the chiller microprocessor board input and the VFD.

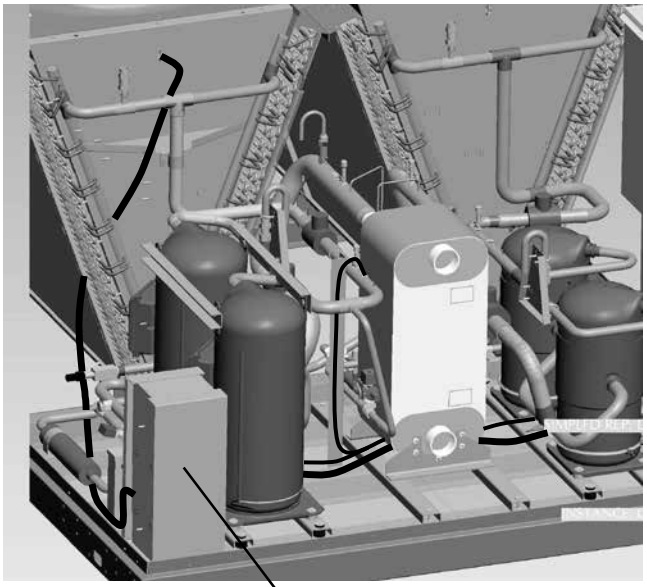
The VFD will control the fan speed not only in low ambient conditions, but in all ambients based on discharge pressure. Speed control of the respective system will occur whenever high voltage power is applied to the VFD power inputs through the 7M (Sys 1) or 10M (Sys 2) contactors. The chiller microprocessor will energize the 7M and 10M contactors whenever the respective system liquid line solenoid is energized.

The VFD controls the speed of the fan based on a discharge pressure setpoint and a differential control range. When a compressor starts in a system, the inverter is activated through the 7M (Sys 1) or 10 M (Sys 2) contactor, which is controlled from the respective liquid line solenoid valve control signal. At discharge pressures below 260 psig, the VFD will turn the fan OFF or speed will be reduced to small movements in fan rotation.

NOTE

The pressures indicated in this section describing the VFD control will vary from VFD to VFD. Expect tolerances for the entire pressure range of control to potentially shift -0 psig/+24 psig.

The VFD will ramp up the speed of the fan as pressure rises above the low end of the speed control range. Throughout the pressure control range, the VFD controls the speed of the fan based on discharge pressure in the range of approximately 260 to 292 psig. At pressures above 260 psig, the VFD will run the system fan at full speed.



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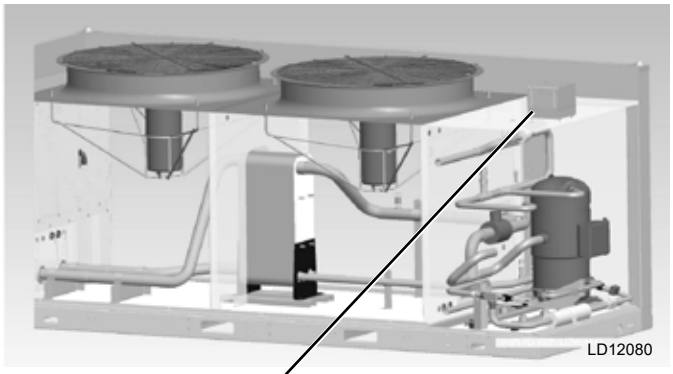
Dual System VFD Enclosure Location



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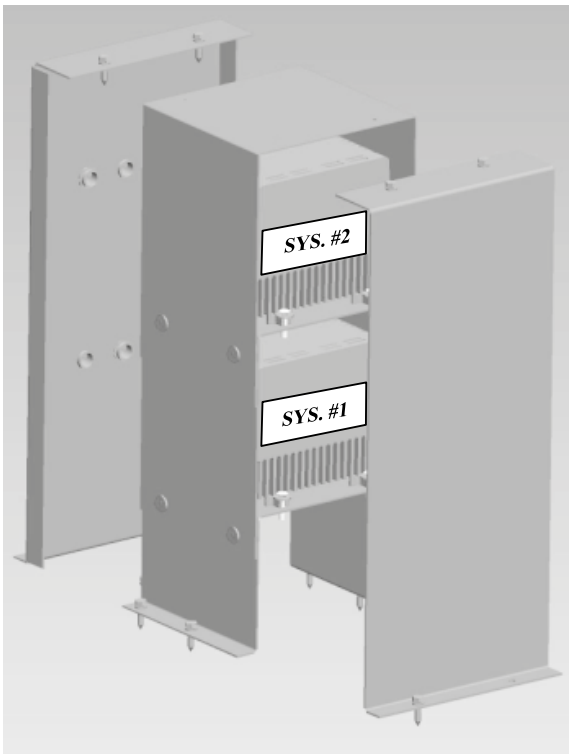
Single System VFD Enclosure Location

FIGURE 54 - TYPICAL VFD ENCLOSURE LOCATIONS



Dual System VFD Enclosure

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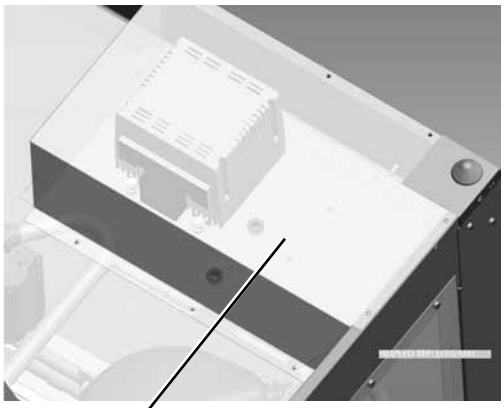

LD12081

Single System VFD Enclosure

FIGURE 55 - TYPICAL VFD ENCLOSURE CONFIGURATIONS

As pressure drops below 292 psig, the VFD will slow the speed of the fan to try to maintain discharge pressure within the control range. The VFD will try to maintain pressure in the range of 260 to 292 psig by raising and lowering the speed of the fan. If pressure drops below 260 psig, the VFD will virtually turn the system fan completely OFF. Some slight fan movement or very slow rotation may be noted, although the fan may appear to stop completely.

CONFIGURATION (JUMPERS AND POTENTIOMETERS)

Each VFD is pre-configured at the factory prior to shipping and should be ready for operation when it arrives onsite. A quick check of the settings is recommended. The jumpers must be in the positions shown in *Table 25*.

TABLE 25 - VFD JUMPERS

JUMPER	60 HZ	50 HZ
J2	REMOVE	—
J3	IN	—
J4	REMOVE	—
J5	IN	—
J6	IN	—
J7	IN	—
J8	IN	—
J9	IN	REMOVE

Potentiometer settings are also preset at the factory. The potentiometers should be in the positions shown in Figure 57. The pots do not have numerical settings and are set according to the arrow positions indicated. DO NOT change the potentiometer settings unless they do not match the positioning of the potentiometers shown in Figure 57. The position of the potentiometers are as follows:

- P1 should be full CW (260 psig)
- P2 should be full CCW (32 psig).

Modifying these settings may cause damage to the chiller or control problems.

The P1 pot sets the setpoint which is the top end of the control range. This setting is the discharge pressure at which the fan will be operating at full speed. The P2 pot sets the range. This is the range of pressure where the VSD modulates the fan speed from 0 RPM to full speed. The range is subtracted from the setpoint to calculate the 0 RPM pressure.

Wiring

VFD wiring is simple and requires only 3-phase power in, 3-phase power out, and a 2-wire signal from the transducer. No start, stop, or other alternate power re-

quirements are needed to run the VFD. Figure's 56 and 57 show the power and control wiring schematically as well as the actual connections. The VFD controlled fan will operate whenever the liquid line solenoid on the respective system is energized.

PROGRAMMING

Condenser fan control type must be programmed under both the OPTIONS and PROGRAM keys when a VFD is installed on the chiller. Under the OPTIONS key, FAN CONTROL must be programmed for DISCHARGE PRESSURE CONTROL only. This will ensure condenser fan control of the chiller is solely by discharge pressure, with no ambient control.

NOTE

Under the PROGRAM key, the FAN CONTROL ON PRESSURE should be programmed for 425 psig and the FAN DIFFERENTIAL OFF PRESSURE must be programmed for 125 psig.

Programming as suggested ensures the chiller control points for the second fan in the fan staging sequence and the inverter control points are matched for optimum control of the fans at reduced ambient temperatures. When the chiller and VFD fan control points are programmed properly, the fans will operate as outlined in *Table 26*.

POTENTIOMETER SETTINGS	
P1	P2
292 PSI	32 PSI

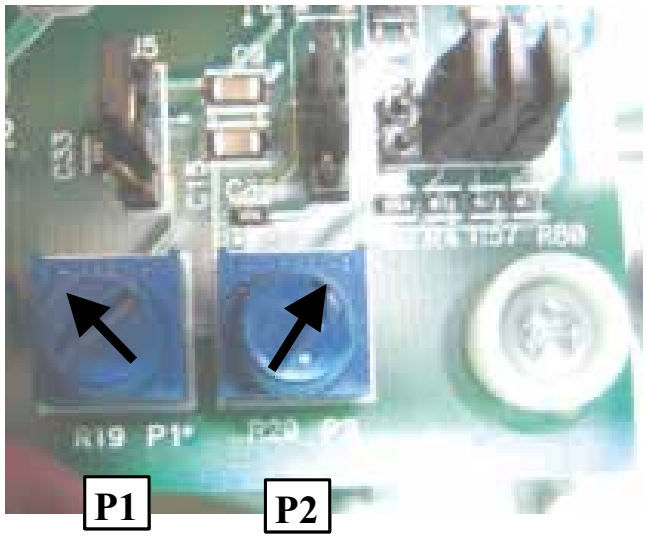

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FIGURE 57 - POTENTIOMETER SETTINGS

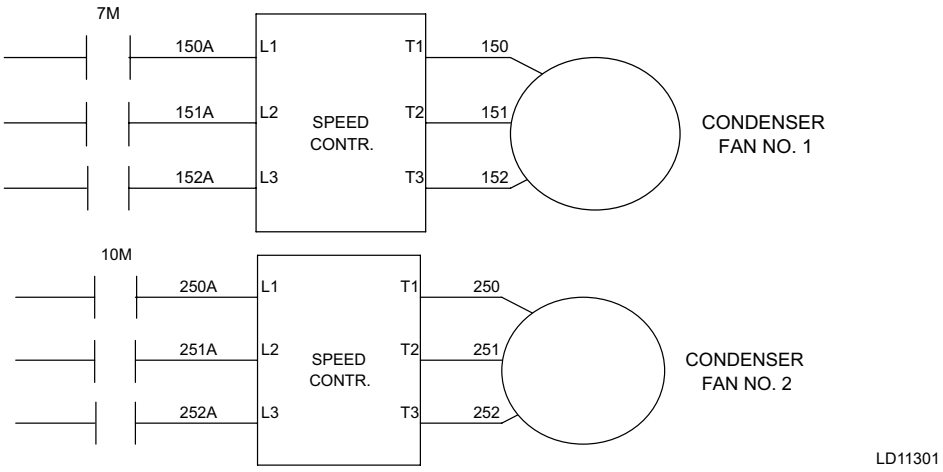

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FIGURE 56 - INVERTER POWER WIRING SC

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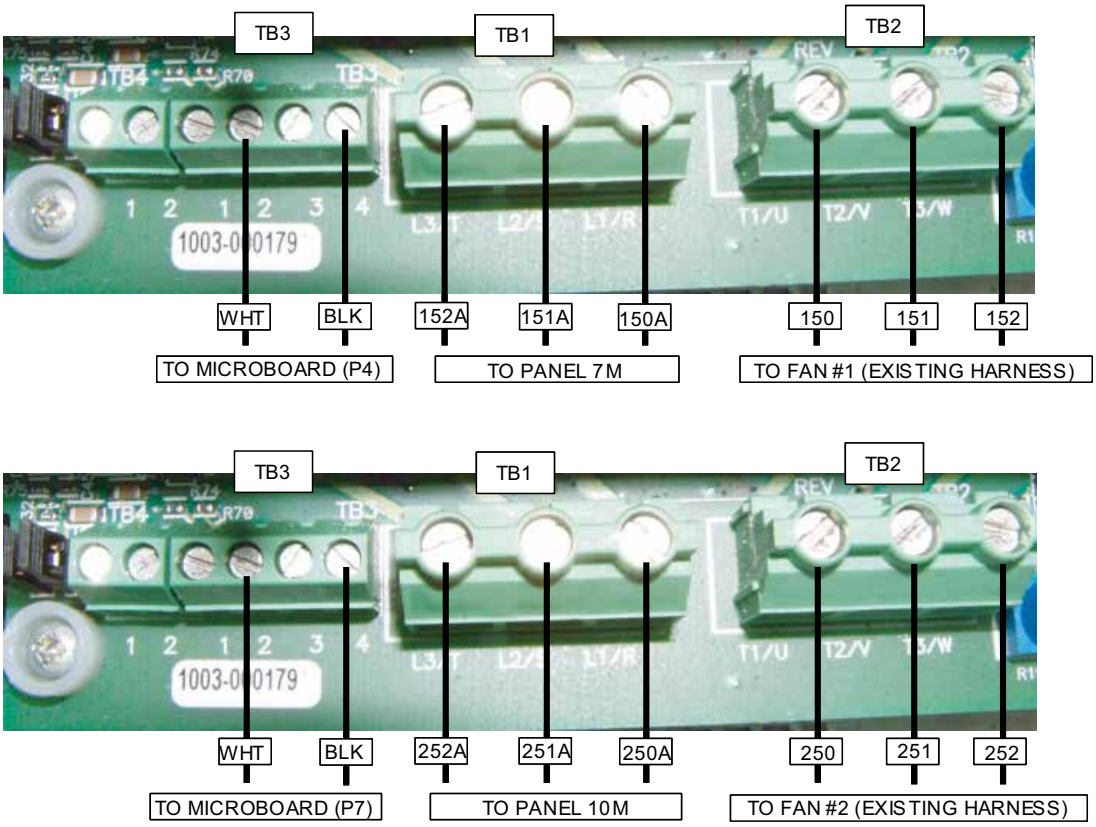


FIGURE 58 - INVERTER WIRING

TABLE 26 - YCAL0043-0066 VFD LOW AMBIENT OPTION – CONDENSER FAN CONTROL OPERATION

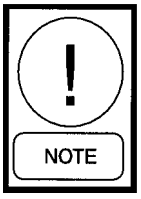
FAN STAGE	ON	OFF	CONTACTOR		MICROBOARD		FAN #	
			SYS 1	SYS 2	SYS 1	SYS 2	SYS 1	SYS 2
1: VFD CONTROL (1 FAN VARIABLE SPEED)	FAN SPEED IS A FUNCTION OF DISCHARGE PRESSURE. WHEN THE LIQUID LINE SOLENOID IS ENERGIZED, SPEED INCREASES WITH PRESSURE	FAN WILL TURN OFF OR TURN VERY SLOWLY WHEN PRESSURE DROPS BELOW 260 PSIG.	7M	10M	TB7-3	TB10-9	1	2
2: 1 FAN VFD CONTROL 2ND FAN FULL SPEED UNDER CONTACTOR CONTROL	425 PSIG, BOTH FANS WILL BE RUNNING FULL SPEED	DISCHARGE PRESSURE < 260 PSIG (PRESSURE IS < FAN CONTROL ON PRESSURE OF 425 PSIG MINUS FAN DIFFERENTIAL PRESSURE OF 125 PSIG = 300 PSIG)	7M & 8M	10M & 11M	TB7-3 AND TB7-10	TB10-9 AND TB10-10	1 & 3	2 & 4

LOAD LIMITING

Load Limiting is a feature that prevents the unit from loading beyond the desired value. Two and Four compressor units can be load limited to 50%. This would allow only 1 compressor per system to run. Three and six compressor units can be load limited to 33% or 66%. The 66% limit would allow up to 2 compressors per system to run, and the 33% limit would allow only 1 compressor per system to run. Five compressor units may be load limited to 40% (1 compressor per system runs) or 80% (up to 2 compressors per system) are permitted to run. No other values of limiting are available.

There are two ways to load limit the unit. The first is through remote communication via an ISN. Load limit stages are sent through YORK Talk on pages 9 and 10 of feature 54. Page 9 is stage 1 load limit and page 10 is stage 2 load limit.

A second method of load limiting the unit is through closing dry contacts connected to the Load Limit (CTB1 – Terminals 13 to 21). Load limiting involves closing the Load Limit input with a dry contact. Load limiting is either 80%, 66% or 50%, depending on the number of compressors on the unit. *Table 27* shows the load limiting permitted for the various number of compressors. Only Stage 1 is available utilizing a dry contact.



Simultaneous operation of Remote Load Limiting and EMS-PWM Temperature Reset (described on following pages) cannot occur.

TABLE 27 - COMPRESSOR OPERATION – LOAD LIMITING

COMPRESSORS IN UNIT	STAGE 1	STAGE 2
2	50%	-
3	66%	33%
4	50%	-
5	80%	40%
6	66%	33%

COMPRESSOR RUN STATUS

Compressor run status is indicated by closure of contacts at CTB2 – terminals 25 to 26 for system 1 and CTB2 – terminals 27 to 28 for system 2.

ALARM STATUS

System or unit shutdown is indicated by normally open alarm contacts opening whenever the unit shuts down on a unit fault, locks out on a system fault, or experiences a loss of power to the chiller electronics . System 1 alarm contacts are located at CTB2 – terminals 29 to 30. System 2 alarm contacts are located at CTB2 – terminals 31 to 32. The alarm contacts will close when conditions allow the unit to operate, or the fault is reset during a loss of power, the contacts will remain open until power is reapplied and no fault conditions exist.

BAS/EMS TEMPERATURE RESET USING A VOLTAGE OR CURRENT SIGNAL

The Remote Reset Option allows the Control Center of the unit to reset the chilled liquid setpoint using a 0 to 10VDC input, or a 4 to 20mA input connected to CTB1 terminals A- and A+. Whenever a reset is called for, the change may be noted by pressing the Cooling Setpoints key twice. The new value will be displayed as "REM SETP = XXX°F."

If a 0 to 10VDC signal is supplied, it is applied to terminals A+ and A-, and jumper JP1 on the I/O board must be inserted between pins 2 and 3. To calculate the reset chilled liquid setpoint for values between 0VDC and 10VDC use the following formula:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$°\text{Reset} = \frac{(\text{DC voltage signal}) \times (*\text{Max Reset Value})}{10}$$

Example:
Local Chilled Liquid Setpoint = 45°F (7.22°C)
*Max Reset Value = 20°F (11.11°C)
Input Signal = 6VDC

(English)

$$°\text{Reset} = \frac{6\text{VDC} \times 20°\text{F}}{10} = 12°\text{F Reset}$$

New Setpoint = 45°F + 12°F = 57°F

(Metric)

$$°\text{Reset} = \frac{6\text{VDC} \times 11.11°\text{C}}{10} = 6.67°\text{C Reset}$$

New Setpoint = 7.22°C + 6.67°C = 13.89°C

* Max Reset Value is the "Max EMS-PWM Remote Temperature Reset" setpoint value described in the programming section under Cooling Setpoints. Programmable values are from 2°F to 40°F (1.11°C to 11.11°C).

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If a **4-20mA signal is supplied,** it is applied to terminals A+ and A- and **jumper JP1 on the I/O board must be installed between pin 1 and 2**. To calculate the chilled liquid setpoint for values between 4mA and 20 mA use the following formula:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$°\text{Reset} = \frac{(\text{mA signal} - 4) \times (*\text{Max Reset Value})}{16}$$

Example:
Local Chilled Liquid Setpoint = 45° (7.22°C)
*Max Reset Value = 10°F (5.56°C)
Input Signal = 12 mA

(English)

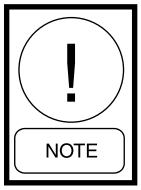
$$°\text{Reset} = \frac{8\text{mA} \times 10°\text{F}}{16} = 5°\text{F Reset}$$

Setpoint = 45°F + 5°F = 50°F

(Metric)

$$°\text{Reset} = \frac{8\text{mA} \times 5.56°\text{C}}{16} = 2.78°\text{C Reset}$$

Setpoint = 7.22°C + 2.78°C = 10.0°C



A 240-24 Volt Ratio Transformer (T3) is used to derive nominal 12 volt output from the 120 volt supply.

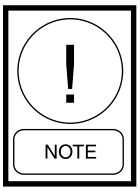
SECTION 9 – SERVICE AND TROUBLESHOOTING

CLEARING HISTORY BUFFERS

The history buffers may be cleared by pressing the HISTORY key and then repeatedly pressing the UP arrow key until you scroll past the last history buffer choice. The following message will be displayed:

```
INITIALIZE HISTORY
ENTER = YES
```

Pressing the ENTER/ADV key at this display will cause the history buffers to be cleared. Pressing any other key will cancel the operation.



DO NOT CLEAR BUFFERS. Important information may be lost. Contact factory service.

SERVICE MODE

Service Mode is a mode that allows the user to enable or disable all of the outputs (except compressors) on the unit, change chiller configuration setup parameters and view all the inputs to the microboard.

To enter Service Mode, turn the Unit Switch OFF and press the following keys in the sequence shown; PROGRAM, UP ARROW, UP ARROW, DOWN ARROW, DOWN ARROW, ENTER. Service Mode will time out after 30 minutes and return to normal control mode, if the panel is accidentally left in this mode. Otherwise, turning the Unit Switch ON will take the panel out of Service Mode.

SERVICE MODE – OUTPUTS

After pressing the key sequence as described, the control will enter Service Mode permitting the outputs (except compressors), operating hours, refrigerant type, expansion valve type, and start/hour counters to be viewed and or modified. The ENTER/ADV key is used to advance through the outputs. Using the ↑ and ↓ (UP/DOWN) arrow keys will turn the respective digital output ON/OFF or modify the value.

Following is the order of outputs that will appear as the ENTER/ADV key is pressed:

SYS 1 COMP 1 STATUS TB7-2 IS:
SYS 1 LLSV STATUS TB7-3 IS:
SYS 1 COMP 2 STATUS TB7-4 IS:
SYS 1 COMP 3 STATUS TB7-5 IS:
SYS 1 HGBP STATUS TB7-7 IS:
SYS 2 COMP 1 STATUS TB10-2 IS:
SYS 2 LLSV STATUS TB10-3 IS:
SYS 2 COMP 2 STATUS TB10-4 IS:
SYS 2 COMP 3 STATUS TB10-5 IS:
SYS 1 FAN OUTPUT 1 TB7-8 IS:
SYS 1 FAN OUTPUT 2 TB7-9 IS:
SYS 1 FAN OUTPUT 3 TB7-10 IS:
SYS 2 FAN OUTPUT 1 TB10-8 IS:
SYS 2 FAN OUTPUT 2 TB10-9 IS:
SYS 2 FAN OUTPUT 3 TB10-10 IS:
EVAP HEATER STATUS TB8-2 IS:
SYS 1 ALARM STATUS TB8-3 IS:
SYS 2 ALARM STATUS TB9-2 IS:
EVAP PUMP STATUS TB8-6,7 IS:
SYS 2 HGBV STATUS TB10-7 IS:
SPARE DO TB8-4 IS:
SPARE DO TB8-5 IS:
SPARE DO TB8-8, 9 IS:
SPARE DO TB9-4 IS:
SYS 1 EEV OUTPUT TB5-1, 2 = XXX%
SYS 2 EEV OUTPUT TB6-1, 2 = XXX%
SYS 1 COND FAN SPEED J15-1,5 = XXX%
SYS 2 COND FAN SPEED J15-2,6 = XXX%
SPARE AO J15-3,7 = XXX%
SPARE AO J15-4,8 = XXX%
DATA LOGGING MODE 1 = ON, 0 = OFF
DATA LOGGING TIMER X SECS
SOFT START (disabled)
REFRIGERANT TYPE (R410A only)
EXPANSION VALVE TYPE (Thermostatic Only)
REMOTE TEMP RESET OPTION =
REMOTE INPUT SERVICE TIME =
"NORTH AMERICAN FEATURE SET ENABLED"
HYDRO PUMP SELECTION
EVAP PUMP TOTAL RUN HOURS
SYS 1 HOURS
SYS 2 HOURS
SYS 1 STARTS
SYS 2 STARTS

Each display will also show the output connection on the microboard for the respective output status shown. For example:

```
SYS 1 LLSV STATUS
TB10-3 IS OFF
```

This display indicates that the system 1 liquid line solenoid valve is OFF, and the output connection from the microboard is coming from terminal block 10 – pin 3.

Pressing the ↑ (UP) arrow key will energize the liquid line solenoid valve and OFF will change to ON in the display as the LLSV is energized. Energizing and de-energizing outputs may be useful during troubleshooting.

SERVICE MODE – CHILLER CONFIGURATION

After the Outputs are displayed, the next group of displays relate to chiller configuration and start/hour counters. Data logging, soft start, refrigerant type, pump control selection and expansion valve type all must be programmed to match actual chiller configuration.

Soft start (disabled), Refrigerant Type (R-410A), and Expansion Valve Type (Thermostatic), and North American Feature (Enabled) MUST be properly programmed or damage to compressors and other system components may result.

Following is a list of chiller configuration selections, in order of appearance:

DATA LOGGING MODE = : DO NOT MODIFY
DATA LOGGING TIMER = : DO NOT MODIFY
SOFT START
REFRIGERANT TYPE
EXPANSION VALVE TYPE
REMOTE TEMP RESET OPTION
REMOTE INPUT SERVICE TIME
FEATURE SET
PUMP CONTROL SELECTION
SYS 1 HOURS
SYS 2 HOURS
SYS 1 STARTS
SYS 2 STARTS

The last displays shown on the above list are for the accumulated run and start timers for each system. All values can also be changed using the ↑ (UP) and ↓ (Down) arrow keys, but under normal circumstances would not be required or advised. After the last start display, the microprocessor will display the first programmable value under the PROGRAM key.

SERVICE MODE – ANALOG AND DIGITAL INPUTS

After entering Service Mode (press PROGRAM ↑↑ ↓↓ ENTER), all digital and analog inputs to the microboard can be viewed by pressing the OPER DATA key. After pressing the OPER DATA key, the ↑ (UP) arrow and ↓ (DOWN) arrow keys are used to scroll through the analog and digital inputs.

Following is the order of analog and digital inputs that will appear when sequenced with the ↓ (Down) arrow key:

(analog inputs)
SYS 1 SUCT PRESSURE
UNIT TYPE
SYS 1 *DISCH PRESSURE
SYS 1** SUCTION TEMP.
SYS 2** SUCTION TEMP.
AMBIENT AIR TEMP.
LEAVING LIQUID TEMP.
RETURN LIQUID TEMP.
SYS 2 SUCTION PRESSURE
SYS 2 SPARE
SYS 2 *DISCH PRESSURE
SYS 1 MTR VOLTS
SYS 2 MTR VOLTS
(digital inputs)
PWM TEMP RESET INPUT
LOAD LIMIT INPUT
FLOW SW / REM START
SPARE
SINGLE SYSTEM SELECT
SYS 1 MP / HPCO INPUT
SYS 2 MP / HPCO INPUT

* The discharge pressure transducer is optional on some models.
** The suction temperature sensor is on EEV units only.

The analog inputs will display the input connection, the temperature or pressure, and corresponding input voltage such as:

```
SYS 1 SUCT PR J7-10
2.1 VDC = 81 PSIG
```

This example indicates that the system 1 suction pressure input is connected to plug 7 – pin 10 (J7-10) on the I/O board. It indicates that the voltage is 2.1VDC which corresponds to 81 psig (5.6 bars) suction pressure.

The digital inputs will display the input connection and ON/OFF status such as:

```
FLOW SW/REM START
J13-5 IS ON
```

This indicates that the flow switch/remote start input is connected to plug 13- pin 5 (J13-5) on the microboard, and is ON (ON = +30VDC unregulated input, OFF = 0VDC input on digital inputs).

CONTROL INPUTS/OUTPUTS

Table 28 to *Table 31* are a quick reference list providing the connection points and a description of the inputs and outputs respectively. All input and output connections pertain to the connections at the microboard.

TABLE 28 - I/O DIGITAL INPUTS

J13-2	Unit ON/OFF Switch
J13-3	Load Limit Stage 2 on 3, 5 & 6 Comp. Units
J13-4	Load Limit Stage 1
J13-5	Flow Switch and Remote Start/Stop
J13-6	Spare
J13-7	Single System Select (Jumper = Single Sys, No Jumper = Two Sys)
J13-8	CR1 (Sys 1 Motor Protector/High Pressure Cutout)
J13-10	CR2 (Sys 2 Motor Protector/High Pressure Cutout)

TABLE 29 - I/O DIGITAL OUTPUTS

TB7-2	SYS 1 Compressor 1
TB7-3	SYS 1 Liquid Line Solenoid Valve
TB7-4	SYS 1 Compressor 2
TB7-5	SYS 1 Compressor 3
TB7-7	SYS 1 Hot Gas Bypass Valve
TB10-2	SYS 2 Compressor 1

TABLE 29 - I/O DIGITAL OUTPUTS (CONT'D)

TB10-3	SYS 2 Liquid Line Solenoid Valve
TB10-4	SYS 2 Compressor 2
TB10-5	SYS 2 Compressor 3
TB7-8	SYS 1 Condenser Fan Output 1
TB7-9	SYS 1 Condenser Fan Output 2
TB7-10	SYS 1 Condenser Fan Output 3
TB10-8	SYS 2 Condenser Fan Output 1
TB10-9	SYS 2 Condenser Fan Output 2
TB10-10	SYS 2 Condenser Fan Output 3
TB8-2	Evaporator Heater
TB8-3	SYS 1 Alarm
TB9-2	SYS 2 Alarm
TB8-6 & 7	Evaporator Pump Starter
TB10-7	SYS 2 Hot Gas Bypass Valve

TABLE 30 - I/O ANALOG INPUTS

J7-10	SYS 1 Suction Transducer -or- SYS 1 Low Pressure Switch
J11-12	Unit Type: Chiller = NO Jumper J11-12 to +24 VDC YCUL Condensing Unit = Jumper J11-12 to +24 VDC (Do NOT Use)
J7-11	SYS 1 Discharge Pressure Transducer (Optional)
J6-9	Ambient Air Temperature Sensor
J6-7	Leaving Chilled Liquid Temperature Sensor
J6-8	Return Chilled Liquid Temperature Sensor
J9-10	SYS 2 Suction Pressure Transducer -or- SYS 2 Low Pressure Switch
J9-11	SYS 2 Discharge Pressure Transducer (Optional)
J7-12	Unit/SYS 1 Voltage
J9-12	SYS 2 Voltage
J11-11	Remote Temperature Reset

TABLE 31 - I/O ANALOG OUTPUTS

N/A	Not Applicable

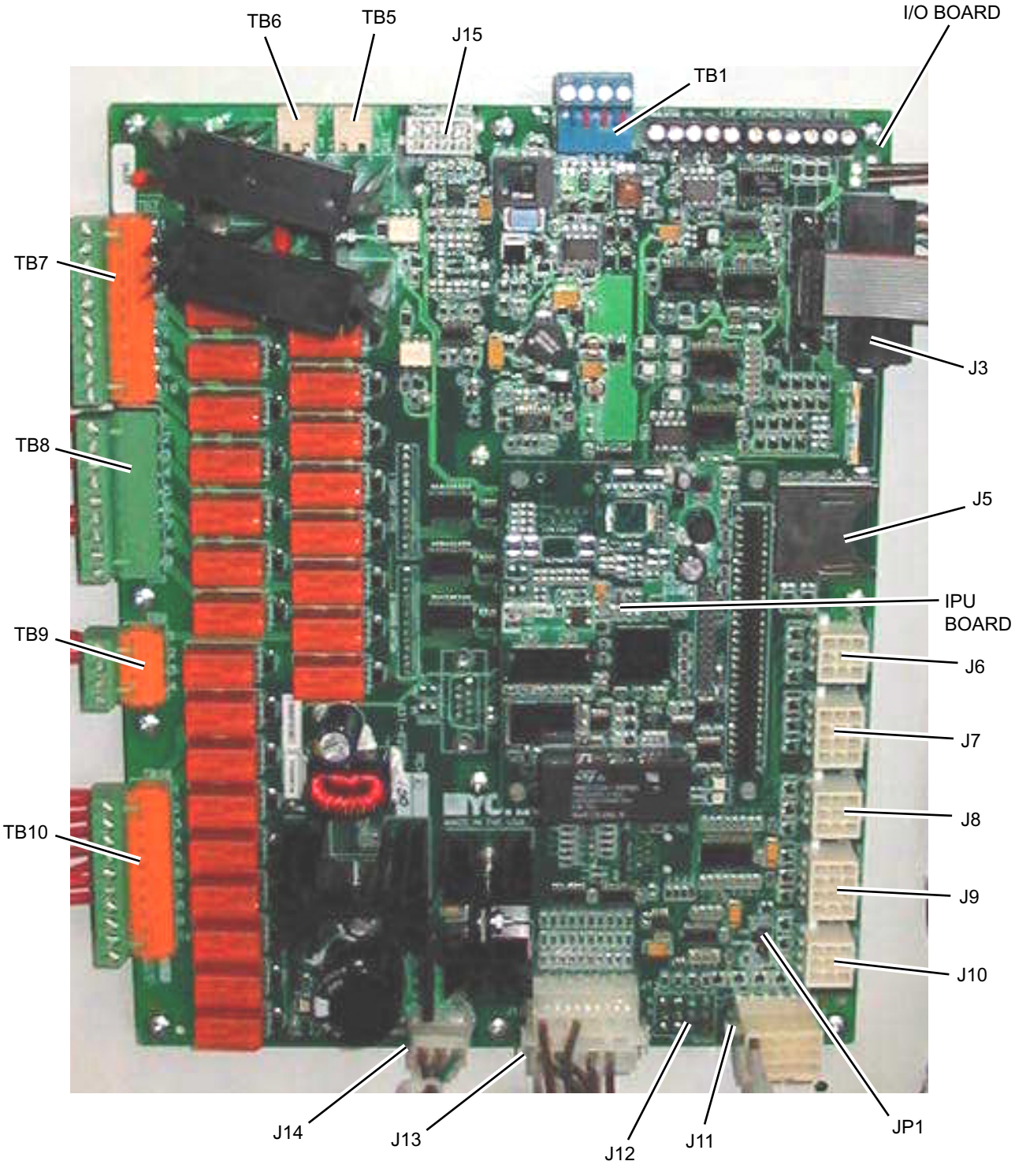


FIGURE 59 - MICROBOARD LAYOUT

CHECKING INPUTS AND OUTPUTS

Digital Inputs

Refer to the unit wiring diagram. All digital inputs are connected to J13-1 of the I/O board. The term "digital" refers to two states – either ON or OFF. As an example, when the flow switch is closed, 30VDC will be applied to J13, pin 5 (J13-5) of the I/O board. If the flow switch is open, 0VDC will then be present at J13-5.

Pin 1 of J13 is an ***unregulated 30VDC source*** used to supply the DC voltage to the various user contacts, unit switch, flow switch, etc. This DC source is factory wired to CTB1, terminal 13. Any switch or contact used as a digital input would be connected to this terminal, with the other end connecting to its respective digital input on the microboard. Any time a switch or contact is closed, 30VDC would be applied to that particular digital input. Any time a switch or contact is open, 0VDC would be applied to that particular digital input.

Typically, voltages of 24 to 36VDC could be measured for the DC voltage on the digital inputs. This voltage is in reference to ground. The unit case should be sufficient as a reference point when measuring digital input voltages.

Analog Inputs – Temperature

Refer to the unit wiring diagram. Temperature inputs are connected to the microboard on plug J6. These analog inputs represent varying DC signals corresponding to varying temperatures. All voltages are in reference to the unit case (ground). Following are the connections for the temperature sensing inputs:

Outside Air Sensor

J6-6 = +5VDC regulated supply to sensor.

J6-9 = VDC input signal to the microboard.

See *Table 32* for voltage readings that correspond to specific outdoor temperatures.

J6-3 = drain (shield connection = 0VDC) Return

TABLE 32 - OUTDOOR AIR SENSOR TEMPERATURE/VOLTAGE / CORRELATION

TEMP°F	VOLTAGE (SIGNAL INPUT TO RETURN)	TEMP°C
0	0.7	-18
5	0.8	-15
10	0.9	-12
15	1.0	-9
20	1.1	-7
25	1.2	-4
30	1.4	-1
35	1.5	2
40	1.7	4
45	1.8	7
50	2.0	10
55	2.2	13
60	2.3	16
65	2.5	18
70	2.6	21
75	2.8	24
80	2.9	27
85	3.1	29
90	3.2	32
95	3.4	35
100	3.5	38
105	3.6	41
110	3.7	43
115	3.8	46
120	3.9	49
125	4.0	52
130	4.1	54

TABLE 33 - ENTERING/LEAVING CHILLED LIQUID TEMPERATURE SENSOR

TEMP°F	VOLTAGE (SIGNAL INPUT TO RETURN)	TEMP°C
10	1.33	-12
12	1.39	-11
14	1.46	-10
16	1.51	-9
18	1.58	-8
20	1.65	-7
22	1.71	-6
24	1.78	-4
26	1.85	-3
28	1.91	-2
30	1.98	-1
32	2.05	0
34	2.12	1
36	2.19	2
38	2.26	3
40	2.33	4
42	2.40	6
44	2.47	7
46	2.53	8
48	2.60	9
50	2.65	10
52	2.73	11
54	2.80	12
56	2.86	13
58	2.92	14
60	2.98	16
62	3.05	17
64	3.11	18
66	3.17	19
68	3.23	20
70	3.29	21
72	3.34	22
74	3.39	23
76	3.45	24
78	3.5	26
80	3.54	27

Liquid and Refrigerant Sensor Test Points

(*Table 33*)

Entering Chilled Liquid Sensor

J6-5 = +5VDC regulated supply to sensor.

J6-8 = VDC input signal to the I/O board. See *Table 33* for voltage readings that correspond to specific liquid temperatures.

J6-2 = Drain (shield connection = 0VDC) Return.

Leaving Chilled Liquid Temperature Sensor

J6-4 = +5VDC regulated supply to sensor.

J6-7 = VDC input signal to the microboard. See *Table 33* for voltage readings that correspond to specific liquid temperatures.

J6-1 =drain (shield connection = 0VDC) Return.

Analog Inputs – Pressure

Refer to the unit wiring diagram. Pressure inputs are connected to the microboard on plugs J7 and J9. These analog inputs represent varying DC signals corresponding to varying pressures. All voltages are in reference to the unit case (ground).

System 1 discharge and suction pressures will be connected to J7 of the microboard. System 2 discharge and suction pressure transducers will be connected to J9 of the microboard.

The discharge transducers are optional on all units. If the discharge transducers are not installed, no connections are made to the microboard and the discharge pressure readout on the display would be zero.

The suction pressure transducers are standard on all YCAL's. The suction pressure transducers have a range of 0 to 400 psig. The output will be linear from 0.5VDC to 4.5VDC over the 400 psig (27.5 barg) range.

The discharge transducers have a range from 0 to 650 psig. The output will be linear from 0.5VDC to 4.5VDC over the 600 psig (41.25 barg) range. Following is the formula that can be used to verify the voltage output of the transducer. All voltage reading are in reference to ground (unit case).

TABLE 34 - PRESSURE TRANSDUCERS

0-400 PSIG SUCTION PRESSURE TRANSDUCER		0-600 PSIG DISCHARGE PRESSURE TRANSDUCER	
PRESSURE PSIG	**VOLTAGE VDC**	**PRESSURE PSIG**	**VOLTAGE VDC**
0	0.5	0	0.5
50	1.0	75	1.0
100	1.5	150	1.5
150	2.0	225	2.0
200	2.5	300	2.5
250	3.0	375	3.0
300	3.5	450	3.5
350	4.0	525	4.0
400	4.5	600	4.5

RED WIRE = 5V, BLACK WIRE = 0V, WHITE/GREEN WIRE = SIGNAL

TEST POINTS:

Suction Pressure:

System 1: ·····Microboard J7-10 to J7-9

System 2: ·····Microboard J9-10 to J9-9

Discharge Pressure:

System 1: ·····Microboard J7-11 to J7-7

System 2: ·····Microboard J9-11 to J9-7

V = (Pressure in psig x .01) + .5
or
V = (Pressure in BARG x .145) + .5

where V = DC voltage output
Pressure = pressure sensed by transducer

The I/O board connections for the Discharge Transducers are as follows.

System 1 Discharge Transducer

J7-6 = +5VDC regulated supply to transducer.

J7-11 = VDC input signal to the microboard. See the formula above for voltage readings that correspond to specific discharge pressures.

J7-7 = +5VDC return.

J7-2 = Drain (shield connection = 0VDC).

System 2 Discharge Transducer

J9-6 = +5VDC regulated supply to transducer.

J9-11 = VDC input signal to the microboard. See the formula above for voltage readings that correspond to specific discharge pressures.

J9-7 = +5VDC return.

J9-2 = Drain (shield connection = 0VDC).

9

The suction transducers have a range from 0 to 400 psig (27.5 barg). The output will be linear from 0.5VDC to 4.5VDC over the 400 psig (27.5 barg) range. Following is a formula that can be used to verify the voltage output of the transducer. All voltage reading are in reference to ground (unit case).

V = (Pressure in psig x .02) + .5
or
V = (Pressure in barg x .29) + .5

where V = DC voltage input to microprocessor
Pressure = pressure sensed by transducer

Following are the I/O board connections for the Suction Transducer.

System 1 Suction Transducer

J7-5 = +5VDC regulated supply to transducer.

J7-10 = VDC input signal to the microboard.

See the formula above for voltage readings that correspond to specific suction pressures.

J7-9 = +5VDC return.

J7-1 = Drain (shield connection = 0VDC).

System 2 Suction Transducer

J9-5 = +5VDC regulated supply to transducer.

J9-10 = VDC input signal to the microboard.

See the formula above for voltage readings that correspond to specific suction pressures.

J7-9 = +5VDC return.

J7-11 = Drain (shield connection = 0VDC).

Digital Outputs

Refer to the unit wiring diagram and *Figure 60*. The digital outputs are located on TB7, TB8, and TB9 and TB-10 of the microboard. ALL OUTPUTS ARE 120VAC with the exception of TB8-6 to TB8-7 which are the contacts that can be used for a remote evaporator pump start signal. The voltage applied to either of these terminals would be determined by field wiring.

Each output is controlled by the microprocessor by switching 120VAC to the respective output connection energizing contactors, evaporator heater, and solenoids according to the operating sequence (see *Figure 60*).

The I/O board is supplied with 120VAC via connections at TB7-1, TB7-6, TB10-1, TB10-6, TB8-1 and TB9-1. Figure 60 illustrates the relay contact architecture on the microboard.

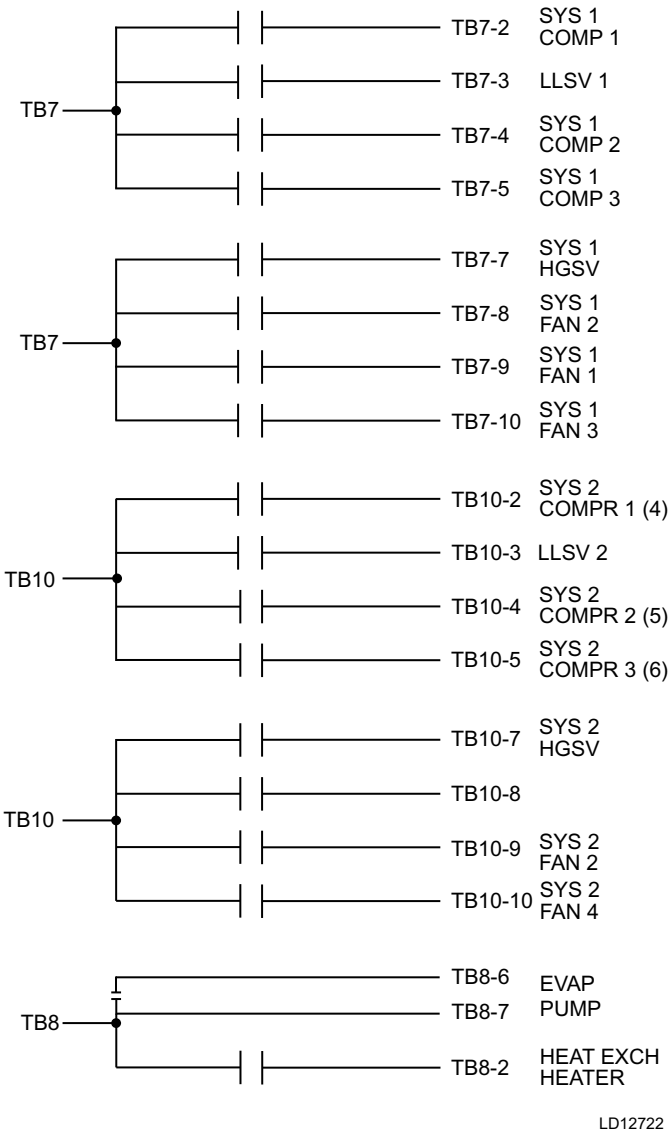


FIGURE 60 - I/O BOARD RELAY CONTACT ARCHITECTURE

OPTIONAL PRINTER INSTALLATION

The micro panel is capable of supplying a printout of chiller conditions or fault shutdown information at any given time. This allows operator and service personnel to obtain data and system status with the touch of the keypad. In addition to manual print selection, the micro panel will provide an automatic printout whenever a fault occurs. Detailed explanation of the print function is given under PRINT key located in the Keypad and Display section.

YORK recommends the field tested WEIGH-TRONIX model 1220 printer (or former IMP 24). This is a compact low cost printer that is ideal for service work and data logging.

The WEIGH-TRONIX printer can be obtained by contacting WEIGH-TRONIX for purchase information at:

WEIGH-TRONIX

2320 Airport Blvd.

Santa Rosa, CA 95402

Phone: 1-800-982-6622 or 1-707-527-5555
(International Orders Only)

The part number for the printer that is packaged specifically for YORK is P/N 950915576. The cable to connect the printer can either be locally assembled from the parts listed, or ordered directly from WEIGH-TRONIX under part number 287-040018.

Parts

The following parts are required:

1. WEIGH-TRONIX model 1220 printer.
2. Wide desk top calculator paper, 2.25 in. (5.7cm).
3. Twisted Pair Shielded Cable (minimum 3 conductor), #18 AWG stranded, 300V minimum insulation, 25 ft. (7.62m) maximum length.
4. One 25 pin Cannon connector and shell. Connector: Cannon P/N DB-25P or equivalent. Shell: Cannon P/N DB-C2-J9.

Assembly and Wiring

All components should be assembled and wired as shown in Figure 61. Strip the outside insulation back several inches and individual wires about 3/8 in. (9.5 mm) to connect the cable at the Microboard. Do not connect the shield at the printer-end of the cable.

Obtaining a Printout

A printout is obtained by pressing the PRINT key on the keypad and then pressing either the OPER DATA key or HISTORY key.

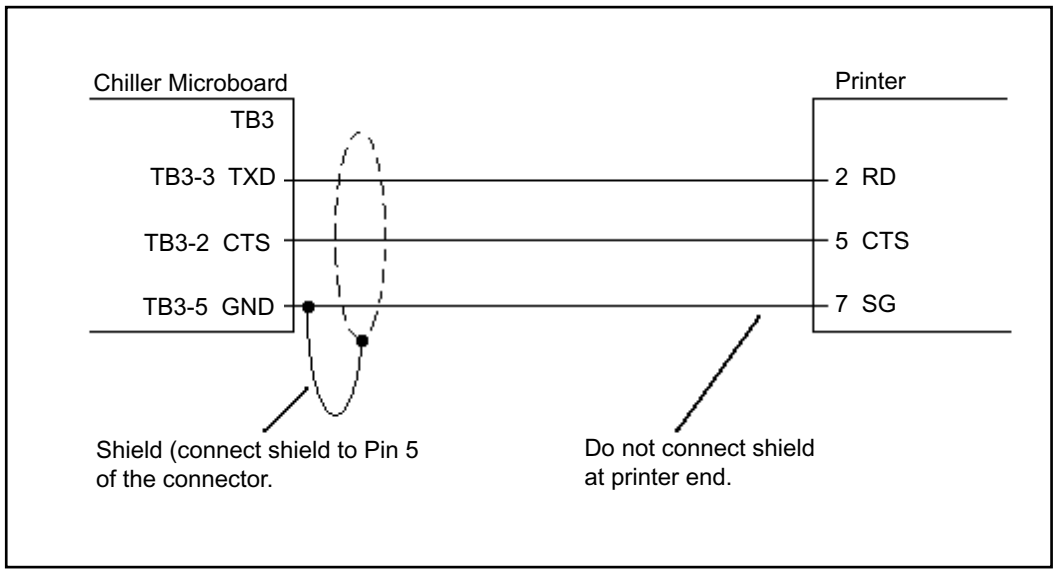


FIGURE 61 - PRINTER TO MICROBOARD ELECTRICAL CONNECTIONS

TABLE 35 - TROUBLESHOOTING

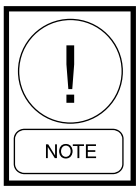
PROBLEM	CAUSE	SOLUTION
NO DISPLAY ON PANEL UNIT WILL NOT OPERATE	1. No 115 VAC to 24 VAC Transformer.	1a. Check wiring and fuse 1FU. 1b. Check wiring emergency stop contacts 5 to L of TB1 terminal block. 1c. Replace Control Transformer.
	2. No 24 VAC to Microboard.	2. Check wiring Control Transformer to Microboard.
	3. Control Transformer defective, no 24 VAC output.	3. Replace Control Transformer.
	4. Short in wire to temperature sensors or pressure transducers.	4. Unplug connections at IPU II and I/O board to isolate.
	5. Defective IPU & I/O board or the Display board.	5. Replace IPU & I/O board or the Display board.  ***Contact Johnson Controls Service before replacing circuit boards.***
FLOW SWITCH/REM STOP NO RUN PERMISSIVE	1. No chilled liquid flow.	1. Check chilled liquid flow.
	2. Flow switch improperly installed.	2. Check that the flow switch is installed according to manufacturer's instructions.
	3. Defective flow switch.	3. Replace flow switch.
	4. Remote cycling device open.	4. Check cycling devices connected to terminals 13 and 14 of the CTB1 terminal block.
LOW SUCTION PRESSURE FAULT	1. Incorrect suction pressure cutouts adjustments.	1. Adjust per recommended settings.
	2. Low refrigerant charge.	2. Repair leak if necessary and add refrigerant.
	3. Fouled filter dryer.	3. Change dryer/core.
	4. TXV defective.	4. Replace TXV.
	5. Reduced flow of chilled liquid through the cooler.	5. Check GPM (See *Limitations* in *SECTION 4 – INSTALLATION*). Check operation of pump, clean pump strainer, purge chilled liquid system of air.
	6. Defective suction pressure transducer/ low pressure switch or wiring.	6. Replace transducer/low pressure switch or faulty wiring. See *SECTION 9 – SERVICE AND TROUBLESHOOTING* for pressure/voltage formula.
	7. LLSV defective.	7. Replace LLSV.

TABLE 35 - TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
HIGH DISCHARGE PRESSURE FAULT	1. Condenser fans not operating or operating backwards.	1. Check fan motor, fuses and contactors. Ensure that fan blows air upward.
	2. Too much refrigerant.	2. Remove refrigerant.
	3. Air in refrigerant system.	3. Evacuate and recharge system.
	4. Defective discharge pressure transducer.	4. Replace discharge pressure transducer. See *SECTION 9 – SERVICE AND TROUBLESHOOTING* for pressure/voltage formula.
LOW LIQUID TEMP FAULT	1. Improperly adjusted leaving chilled liquid temperature cutout (glycol only).	1. Reprogram the leaving chilled liquid temperature cutout.
	2. Micro panel setpoint/range values improperly programmed.	2. Readjust setpoint/range.
	3. Chilled liquid flow too low.	3. Increase chilled liquid flow – *see Limitations in SECTION 4 – INSTALLATION*.
	4. Defective LWT or RWT sensor. (ensure the sensor is properly installed in the bottom of the well with a generous amount of heat conductive compound).	4. Compare sensor against a known good temperature sensing device. See *SECTION 9 – SERVICE AND TROUBLESHOOTING for temperature/ voltage table.*
MP / HPCO FAULT	1. Compressor internal motor protector (MP) open.	1. Verify refrigerant charge is not low. Verify superheat setting of 10° - 15°F (5.6° - 8.3°C). Verify correct compressor rotation. Verify compressor is not over loaded.
	2. External overload tripped.	2. Determine cause and reset.
	3. HPCO switch open.	3. See High Press. Disch. fault.
	4. Defective HPCO switch.	4. Replace HPCO switch.
	5. Defective CR relay.	5. Replace relay.
COMPRESSOR(S) WON'T START	1. Demand not great enough.	1. No problem. *Consult Installation Manual to aid in understanding compressor operation and capacity control.*
	2. Defective water temperature sensor.	2. Compare the display with a thermometer. Should be within plus or minus 2 degrees. See *SECTION 9 – SERVICE AND TROUBLESHOOTING for RWT/ LWT temperature/voltage table.*
	3. Contactor/Overload failure.	3. Replace defective part.
	4. Compressor failure.	4. Diagnose cause of failure and replace.

TROUBLESHOOTING (CONT'D)

TABLE 35 - TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
LACK OF COOLING EFFECT	1. Fouled evaporator surface. Low suction pressure will be observed.	1. Contact the local Johnson Controls Service representative.
	2. Incorrect flow through the evaporator.	2. Reduce flow to within chiller design specs. See *Limitations* in *SECTION 4 – INSTALLATION*
	3. Low refrigerant charge. Low suction pressure will be observed.	3. Check subcooling and add charge as needed.

SECTION 10 – MAINTENANCE

It is the responsibility of the equipment owner to provide maintenance on the system.

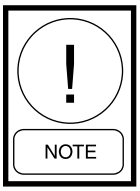
IMPORTANT

If system failure occurs due to improper maintenance during the warranty period, Johnson Controls will not be liable for costs incurred to return the system to satisfactory operation. The following is intended only as a guide and covers only the chiller unit components. It does not cover other related system components which may or may not be furnished by YORK. System components should be maintained according to the individual manufacture's recommendations as their operation will affect the operation of the chiller.

COMPRESSORS

Oil Level Check

The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running at stabilized conditions, the oil level must be between 1/4 and 3/4 in the oil sight glass.



At shutdown, the oil level can fall to the bottom limit of the oil sight glass. Use YORK "V" oil when adding oil.

Oil Analysis

The oil used in these compressors is pale yellow in color (POE oil). If the oil color darkens or exhibits a change in color, this may be an indication of contaminants in the refrigerant system. If this occurs, an oil sample should be taken and analyzed. If contaminants are present, the system must be cleaned to prevent compressor failure.

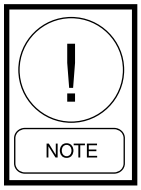
Never use the scroll compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor which will result in failure of compressor.

CONDENSER FAN MOTORS

Condenser fan motors are permanently lubricated and require no maintenance.

CONDENSER COILS

Dirt should not be allowed to accumulate on the condenser coil surfaces. Cleaning should be as often as necessary to keep coils clean.



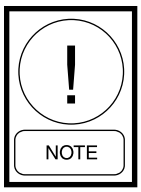
Exercise care when cleaning the coil so that the coil fins are not damaged.

OPERATING PARAMETERS

Regular checks of the system should be preformed to ensure that operating temperatures and pressures are within limitations, and that the operating controls are set within proper limits. See the Operation, Start-Up, and Installation sections of this manual.

ON-BOARD BATTERY BACK-UP

The Real Time Clock chip (U5) is located on the 031-02630 IPU II board that maintains the date/time and stores customer programmed setpoints. The Real Time Clock is a 128K bram, P/N 031-02565-000. The IPU II board must have JP1 installed when the 128K bram is installed.



Do not confuse JP1 on the IPU II (031-02630) board with JP1 on the I/O (031-02550) board.

PLATE AND FRAME HEAT EXCHANGER (EVAPORATOR) HEATER

The Plate and Frame Heat Exchanger (evaporator) heater is 120VAC. Disconnecting 120VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

OVERALL UNIT INSPECTION

In addition to the checks listed on this page, periodic overall inspections of the unit should be accomplished to ensure proper equipment operation. Items such as loose hardware, component operation, refrigerant leaks, unusual noises, etc., should be investigated and corrected immediately.

BACNET, MODBUS AND YORKTALK 2 COMMUNICATIONS

Data can be read and in some cases modified using a serial communication BACnet, Modbus or YorkTalk 2 network connection. This information allows communications of chiller operating parameters and external control changes to setpoint, load limiting, and start/stop commands.

BACnet and YorkTalk 2 RS485 networks are wired to the + and - terminals of TB1 for port 1 communications. Modbus network connection has the option of RS232 or RS485 connection for port 2 communications. Modbus network is wired to either TB2 or TB3 as follows:

- (-1); Network (+1) to TB2 (+1)
- RS-232: connect to TB3 - Network (RX) to TB3 (TXD); Network (TX) to TB3 (RXD); Network (GND) to TB3 (GND)

See *Figure 62* for TB1, TB2 and TB3 locations.

In most cases, communication parameters will need to be modified. *Table 37* "Values Required for BAS Communication" lists setup parameters for the available protocols. Modification is accomplished by pressing the PROGRAM, DOWN ARROW, DOWN ARROW, DOWN ARROW, DOWN ARROW, and ENTER keys in sequence. The list below shows the displays for the values that may be modified:

DE MODIFIER ADDRESS XXXXX	P2 PROTOCOL XXXXXXXXXX
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 36* for error descriptions

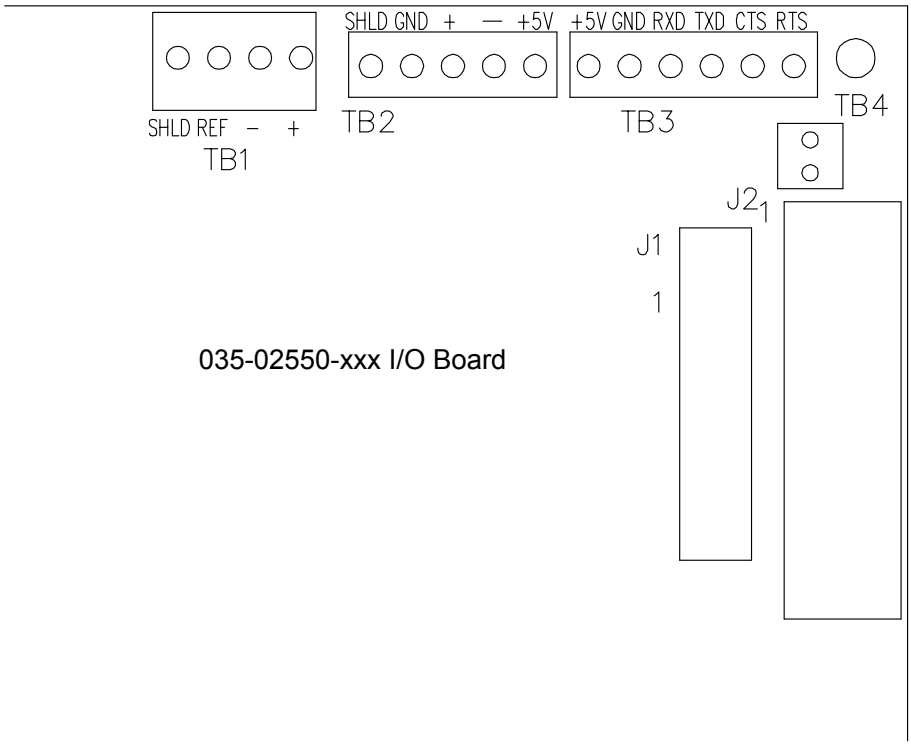


FIGURE 62 - MICRO PANEL CONNECTIONS

The table below shows the minimum, maximum, and default values.

TABLE 36 - MINIMUM, MAXIMUM AND DEFAULT VALUES

DESCRIPTION	MINIMUM	MAXIMUM	DEFAULT
DE MODIFIER ADDRESS	-1	41943	-1
DE MODIFIER OFFSET	-1	99	-1
P1 BAUD RATE	1200	76800	4800
	1200, 4800, 9600, 19200, 38400, 76800, AUTO SELECTABLE		
P2 BAUD RATE	1200	57600	1200
	1200, 4800, 9600, 19200, 38400, 57600 SELECTABLE		
P1, P2 MANUAL MAC ADDRESS	-1	127	-1
P1, P2 PARITY	NONE	IGNORE	NONE
	NONE, EVEN, ODD, IGNORE SELECTABLE		
P1 PROTOCOL	BACNET	API	BACNET
	BACNET, API SELECTABLE		
P2 PROTOCOL	TERMINAL	MODBUS CLIENT	API
	TERMINAL, MODBUS IO, MODBUS SERVER, API, MODBUS CLIENT selectable		
P1, P2 STOP BITS	1	2	1
RESET REAL TIME ERROR	NO	YES	NO

TABLE 37 - VALUES REQUIRED FOR BAS COMMUNICATION

SETTING DESCRIPTION	PROTOCOL		
	BACNET MS/TP	MODBUS RTU[5]	YORKTALK 2
DE MODIFIER ADDRESS	0 TO 41943(3)	1	-1
DE MODIFIER OFFSET	0 TO 99(4)	0	N/A
P1 PROTOCOL	BACNET	N/A	N/A
P1 MANUAL MAC ADDRESS	0-127(1)	N/A	N/A
P1 BAUD RATE	9600 To 76800 or Auto Selectable(1)	N/A	N/A
P1 PARITY	NONE	N/A	N/A
P1 STOP BITS	1	N/A	N/A
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
P1 HW SELECT BIT	N/A	N/A	N/A
CHILLER ID	N/A	N/A	0

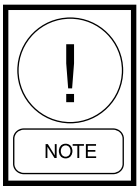
[1]as Required By Network

[2]or Other As Required By Network

[3]number Is Multiplied By 100, Set As Required By Network

[4]number Is Added To De Modifier Address, Set As Required By Network

[5]unit Operating Software Version C.Mmc.13.03 Or Later Required For Modbus Protocol



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 38 - 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	BRAM INVALID
15	BACNET SETUP FAILED

BACnet and Modbus Communications

Chiller data that can be read and modified using specific BACnet or Modbus Register Addresses; and the data associated with the addresses, is outlined in the following description:

Analog Write Points

This data can be read and modified using a BACnet or Modbus network connection. The Modbus Register Address for these points is 1025 + AV #.

Binary Write Points

This data can be read and modified using a BACnet or Modbus network connection. The Modbus Register Address for these points is 1537 + BV #.

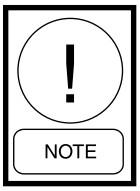
Analog Read Only Points

This data can be read using a BACnet or Modbus network connection and can NOT be modified using this connection. The Modbus Register Address for these points is 513 + AI #.

Binary Monitor Only Points

This data can be read using a BACnet or Modbus network connection and can NOT be modified using this connection. The Modbus Register Address for these points is 1281 + BI #.

See *Table 39* for complete list of BACnet and Modbus registers.



The latest data map information is listed on the Johnson Controls Equipment Integration website.

Communications Data Map Notes:

(See *Table 39*)

1. IPU II based units are configured for Native BACnet MS/TP and Modbus RTU communications. Microgateway or E-Link not required for these two communication protocols.
2. BACnet Object Types:

0 = Analog In	5 = Binary Value
1 = Analog Out	8 = Device
2 = Analog Value	15 = Alarm Notification (0 through 127 are reserved ASHRAE Objects).
3 = Binary In	
4 = Binary Output	

3. Abbreviations:

WC= Inches of water column	Pa = Pascals
	kPa = Kilopascals
CFM = Cubic Feet per Minute	PPM = Part per Million
FPM = Feet per Minute	kJ/kg = Kilojoules per Kilogram.
PSI = Lbs per square inch	

4. Water Cooled Scroll units use the same firmware as Air Cooled Scroll units, ignoring Fan Control.

TABLE 39 - BACNET AND MODBUS COMMUNICATIONS DATA MAP

04/29/2020

SCROLL CHILLER/HEATPUMP/CONDENSING UNIT			Modbus RTU, BACnet MS/TP, N2 Data Map	Board: 031-02550
Item	Version	York P/N	Comments	
1	C.MMC.13.11, C.MMC.14.11, C.MMC.16.12	031-02755-001, -003, -004	New	
2	C.MMC.13.11, C.MMC.14.11, C.MMC.16.13	031-02755-001, -003, -004	Update Unit Control Mode	
3	C.MMC.13.23, C.MMC.14.23, C.MMC.16.23	031-02755-001, -003, -004	V14 add op code 19, fault code 31; V18 add R-454B; V21 rem tray heater, mod BD13 and BI10; V23 fc 32 added	
4				
5				
6				
7				
8				
9				
10				

Item Ref Num	BACnet Name	BACnet Object Instance	Modbus Address	Modbus Data Type Supported	Modbus Scaling (See Note 5)	N2 Metasys	Engineering Units		Point List Code: S = Standard O = Optional N = Not Available										
							Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
ANALOG WRITE POINTS																			
1	REM_SETP	AV1	1026	03,06,16	Div 10	ADF 1	°F	°C	Remote Setpoint [99=Auto]	S	S	S							
2	SP_REM_SP_S1	AV2	1027	03,06,16	Div 10	ADF 2	PSI	BAR	Sys 1 Remote Setpoint (SP Unit)	O	O	O							
3	LOAD_LIMIT	AV3	1028	03,06,16	Div 10	ADF 3	None	None	Load Limit Stage [0,1,2]	S	S	S							
4	REM_CR	AV4	1029	03,06,16	Div 10	ADF 4	°F	°C	Remote Cooling Range (DAT Unit)	O	O	O							
5	SP_REM_SP_S2	AV5	1030	03,06,16	Div 10	ADF 5	PSI	BAR	Sys 2 Remote Setpoint (SP Unit)	O	O	O							
6	REM_SP_HEAT	AV6	1031	03,06,16	Div 10	ADF 6	°F	°C	Remote Heating Setpoint (HP or YCWL HP)	O	O	O							
7	HP_MODE	AV7	1032	03,06,16	Div 10	ADF 7	None	None	Remote Heatpump Mode [0=Pnl, 1=Cool, 2=Heat] (HP or YCWL HP)	O	O	O							
BINARY WRITE POINTS																			
8	START_STOP	BV1	1538	01,03,05,06,15	N/A	BD 1	0/1	0/1	Remote Start/Stop Command [0=Stop, 1=Run]	S	S	S							
9	SS_SYS1	BV2	1539	01,03,05,06,15	N/A	BD 2	0/1	0/1	Sys 1 Remote Start/Stop (SP Unit)	N	N	N							
10	SS_SYS2	BV3	1540	01,03,05,06,15	N/A	BD 3	0/1	0/1	Sys 2 Remote Start/Stop (SP Unit)	N	N	N							
ANALOG READ ONLY POINTS																			
11	LCHLT	AI1	514	03,04	x10	ADF 8	°F	°C	Leaving Chilled Liquid Temp	S	S	S							
12	RCHLT	AI2	515	03,04	x10	ADF 9	°F	°C	Entering Chilled Liquid Temp	S	S	S							
13	DAT	AI3	516	03,04	x10	ADF 10	°F	°C	Discharge Air Temp (DAT Unit)	O	O	O							
14	S1_SUCT_TEMP	AI4	517	03,04	x10	ADF 11	°F	°C	Sys 1 Suction Temp (EEV, Cond Units, R-410a/R-454B)	O	O	O							
15	OAT	AI5	518	03,04	x10	ADF 12	°F	°C	Ambient Air Temp	S	S	S							
16	S1_SUCT_SH	AI6	519	03,04	x10	ADF 13	°F (diff)	°C (diff)	Sys 1 Suction Superheat (EEV)	S	S	S							
17	S1_RUN_TIME	AI7	520	03,04	x10	ADF 14	None	None	Sys 1 Run Time in seconds	S	S	S							
18	S1_SUCT_PR	AI8	521	03,04	**x10**	ADF 15	PSI	BAR	Sys 1 Suction Pressure	S	S	S							
19	S1_DSCH_PR	AI9	522	03,04	x10	ADF 16	PSI	BAR	Sys 1 Discharge Pressure	S	S	S							
20	S1_CIR_TEMP	AI10	523	03,04	x10	ADF 17	°F	°C	Sys 1 Cooler Inlet Refrigerant Temp (R-407c)	O	O	O							
21	S1_DEF_TEMP	AI11	524	03,04	x10	ADF 18	°F	°C	Sys 1 Defrost Temperature (HP)	O	O	O							
22	S1_EEV_OUT	AI12	525	03,04	x10	ADF 19	%	%	Sys 1 EEV Output % (EEV)	O	O	O							
23	S1_AR_TIMER	AI13	526	03,04	x10	ADF 20	None	None	Sys 1 Anti-Recycle Timer	S	S	S							
24	AC_TIMER	AI14	527	03,04	x10	ADF 21	None	None	Anti-Coincident Timer in seconds	S	S	S							
25	S2_SUCT_TEMP	AI15	528	03,04	x10	ADF 22	°F	°C	Sys 2 Suction Temp (EEV, Cond Units, R-410a/R-454B)	S	S	S							
26	S2_RUN_TIME	AI16	529	03,04	x10	ADF 23	None	None	Sys 2 Run Time in seconds	S	S	S							
27	S2_SUCT_PR	AI17	530	03,04	**x10**	ADF 24	PSI	BAR	Sys 2 Suction Pressure	S	S	S							
28	S2_DSCH_PR	AI18	531	03,04	x10	ADF 25	PSI	BAR	Sys 2 Discharge Pressure	S	S	S							
29	S2_CIR_TEMP	AI19	532	03,04	x10	ADF 26	°F	°C	Sys 2 Cooler Inlet Refrigerant Temp (R-407c)	O	O	O							
30	S2_DEF_TEMP	AI20	533	03,04	x10	ADF 27	°F	°C	Sys 2 Defrost Temperature (HP)	O	O	O							
31	S2_SUCT_SH	AI21	534	03,04	x10	ADF 28	°F (diff)	°C (diff)	Sys 2 Suction Superheat (EEV)	S	S	S							
32	S2_AR_TIMER	AI22	535	03,04	x10	ADF 29	None	None	Sys 2 Anti-Recycle Timer	S	S	S							
33	S2_EEV_OUT	AI23	536	03,04	x10	ADF 30	%	%	Sys 2 EEV Output % (EEV)	O	O	O							
34	NUM_COMPS	AI24	537	03,04	x1	ADF 31	None	None	Number of Compressors	S	S	S							

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TABLE 39 - BACNET AND MODBUS COMMUNICATIONS DATA MAP (CONT'D)

04/29/2020

Item Ref Num	BACnet Name	BACnet Object Instance	Modbus Address	Modbus Data Type Supported	Modbus Scaling (See Note 5)	N2 Metasys	Engineering Units		Point List Code: S = Standard O = Optional N = Not Available										
							Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
35	S1_OP_CODE	AI25	538	03,04	x1	ADF 32	None	None	Sys 1 Operational Code	S	S	S							
36	S1_FLT_CODE	AI26	539	03,04	x1	ADF 33	None	None	Sys 1 Fault Code	S	S	S							
37	S2_OP_CODE	AI27	540	03,04	x1	ADF 34	None	None	Sys 2 Operational Code	S	S	S							
38	S2_FLT_CODE	AI28	541	03,04	x1	ADF 35	None	None	Sys 2 Fault Code	S	S	S							
39	S1_DBG_CODE	AI29	542	03,04	x1	ADF 36	None	None	Sys 1 Debug Code	N	N	N							
40	S1_FAN_STAGE	AI30	543	03,04	x1	ADF 37	None	None	Sys 1 Condenser Fan Stage	S	S	S							
41	S2_DBG_CODE	AI31	544	03,04	x1	ADF 38	None	None	Sys 2 Debug Code	N	N	N							
42	S2_FAN_STAGE	AI32	545	03,04	x1	ADF 39	None	None	Sys 2 Condenser Fan Stage	S	S	S							
43	CONTROL_MODE	AI33	546	03,04	x1	ADF 40	None	None	Unit Control Mode [1=LW, 2=RW, 3=DA, 4=SP, 5=HC, 6=HP]	S	S	S							
44	AR_TIME	AI34	547	03,04	x1	ADF 41	None	None	Anti-Recycle Time Programmed	S	S	S							
45	LCHLT_CUT	AI35	548	03,04	x10	ADF 42	°F	°C	Leaving Chilled Liquid Temp Cutout	S	S	S							
46	LOW_AMB_CUT	AI36	549	03,04	x10	ADF 43	°F	°C	Low Ambient Temperature Cutout	S	S	S							
47	SUCT_P_CO_HT	AI37	550	03,04	**x10**	ADF 44	PSI	BAR	Low Suction Pressure Cutout Heating (HP)	O	O	O							
48	L_SUCT_P_CO	AI38	551	03,04	**x10**	ADF 45	PSI	BAR	Low Suction Pressure Cutout Cooling	S	S	S							
49	H_DSCH_P_CO	AI39	552	03,04	x10	ADF 46	PSI	BAR	High Discharge Pressure Cutout	S	S	S							
50	COOL_SETP	AI40	553	03,04	x10	ADF 47	°F	°C	Cooling Setpoint	S	S	S							
51	SP_SETP_S1	AI41	554	03,04	x10	ADF 48	PSI	BAR	Sys 1 Cooling Setpoint (SP Unit)	O	O	O							
52	CONTROL_RG	AI42	555	03,04	x10	ADF 49	°F	°C	Cooling Range	S	S	S							
53	SP_CTL_RG_S1	AI43	556	03,04	x10	ADF 50	PSI	BAR	Sys 1 Cooling Range (SP Unit)	O	O	O							
54	SP_SETP_S2	AI44	557	03,04	x10	ADF 51	PSI	BAR	Sys 2 Cooling Setpoint (SP Unit)	O	O	O							
55	HEAT_SETP	AI45	558	03,04	x10	ADF 52	°F	°C	Heating Setpoint (HP)	O	O	O							
56	SP_CTL_RG_S2	AI46	559	03,04	x10	ADF 53	PSI	BAR	Sys 2 Cooling Range (SP Unit)	O	O	O							
57	HEAT_RANGE	AI47	560	03,04	x10	ADF 54	°F	°C	Heating Range (HP)	O	O	O							
58	S1_DSCH_TEMP	AI48	561	03,04	x10	ADF 55	°F	°C	Sys 1 Discharge Temperature (EEV)	O	O	O							
59	S1_DSCH_SH	AI49	562	03,04	x10	ADF 56	°F (diff)	°C (diff)	Sys 1 Discharge Superheat (EEV)	O	O	O							
60	S2_DSCH_TEMP	AI50	563	03,04	x10	ADF 57	°F	°C	Sys 2 Discharge Temperature (EEV)	O	O	O							
61	S2_DSCH_SH	AI51	564	03,04	x10	ADF 58	°F (diff)	°C (diff)	Sys 2 Discharge Superheat (EEV)	O	O	O							
62	LEAVING_HOT	AI52	565	03,04	x10	ADF 59	°F	°C	Leaving Liquid Hot Temp (R-410a/R-454B)	O	O	O							
63	RETURN_HOT	AI53	566	03,04	x10	ADF 60	°F	°C	Return Liquid Hot Temp (R-410a/R-454B)	O	O	O							
64	R_COOL_SETP	AI54	567	03,04	x10	ADF 61	°F	°C	Remote Setpoint	S	S	S							
65	R_SP_SETP_S1	AI55	568	03,04	x10	ADF 62	PSI	BAR	Remote Setpoint 1 (SP Unit)	O	O	O							
66	R_SP_SETP_S2	AI56	569	03,04	x10	ADF 63	PSI	BAR	Remote Setpoint 2 (SP Unit)	O	O	O							
67	R_HEAT_SETP	AI57	570	03,04	x10	ADF 64	°F	°C	Remote Heating Setpoint (HP)	O	O	O							
BINARY READ ONLY POINTS																			
68	S1_ALARM	BI1	1282	01,02,03	N/A	BD4	0/1	0/1	Sys 1 Alarm [0=No Alarm, 1=Alarm]	S	S	S							
69	S2_ALARM	BI2	1283	01,02,03	N/A	BD5	0/1	0/1	Sys 2 Alarm [0=No Alarm, 1=Alarm]	S	S	S							
70	EVAP_HTR	BI3	1284	01,02,03	N/A	BD6	0/1	0/1	Evaporator Heater Status	S	S	S							
71	EVAP_PUMP	BI4	1285	01,02,03	N/A	BD7	0/1	0/1	Evaporator Pump	S	S	S							
72	S1_C1_RUN	BI5	1286	01,02,03	N/A	BD8	0/1	0/1	Sys 1 Comp 1 Run	S	S	S							
73	S2_C1_RUN	BI6	1287	01,02,03	N/A	BD9	0/1	0/1	Sys 2 Comp 1 Run	S	S	S							
74	S1_LLSV	BI7	1288	01,02,03	N/A	BD10	0/1	0/1	Sys 1 Liquid Line Solenoid Valve	S	S	S							
75	S1_MODE_SV	BI8	1289	01,02,03	N/A	BD11	0/1	0/1	Sys 1 Mode Solenoid Valve (HP)	O	O	O							
76	S1_HGBV	BI9	1290	01,02,03	N/A	BD12	0/1	0/1	Sys 1 Hot Gas Bypass Valve	O	O	O							
77	S1_BHS	BI10	1291	01,02,03	N/A	BD13	0/1	0/1	Bivalent Heat Step (YLAE HP) Compressor Heater (R-410a/R-454B chillers, YCWL chillers)	O	O	O							
78	S1_C2_RUN	BI11	1292	01,02,03	N/A	BD14	0/1	0/1	Sys 1 Comp 2 Run	S	S	S							
79	S2_C2_RUN	BI12	1293	01,02,03	N/A	BD15	0/1	0/1	Sys 2 Comp 2 Run	S	S	S							
80	S2_LLSV	BI13	1294	01,02,03	N/A	BD16	0/1	0/1	Sys 2 Liquid Line Solenoid Valve	S	S	S							
81	S2_MODE_SV	BI14	1295	01,02,03	N/A	BD17	0/1	0/1	Sys 2 Mode Solenoid Valve (HP)	O	O	O							
82	LEAD_SYS	BI15	1296	01,02,03	N/A	BD18	0/1	0/1	Lead System [0=Sys 1, 1=Sys 2]	S	S	S							
83	S1_C3_RUN	BI16	1297	01,02,03	N/A	BD19	0/1	0/1	Sys 1 Comp 3 Run	S	S	S							

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TABLE 39 - BACNET AND MODBUS COMMUNICATIONS DATA MAP (CONT'D)

Item Ref Num	BACnet Name	BACnet Object Instance	Modbus Address	Modbus Data Type Supported	Modbus Scaling (See Note 5)	N2 Metasys	Engineering Units		Point List Code: S = Standard O = Optional N = Not Available										
							Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
84	S2_C3_RUN	BI17	1298	01,02,03	N/A	BD20	0/1	0/1	Sys 2 Comp 3 Run	S	S	S							
85	CH_LIQ_TYPE	BI18	1299	01,02,03	N/A	BD21	0/1	0/1	Chilled Liquid Type [0=Water, 1=Glycol]	S	S	S							
86	AMB_MODE	BI19	1300	01,02,03	N/A	BD22	0/1	0/1	Ambient Control Mode [0=Std Amb, 1=Low Amb]	S	S	S							
87	CNTL_MODE	BI20	1301	01,02,03	N/A	BD23	0/1	0/1	Local Remote Control Mode [0=Manual, 1=Auto]	S	S	S							
88	DATA_UNIT	BI21	1302	01,02,03	N/A	BD24	0/1	0/1	Display Units [0=Imperial, 1=SI]	S	S	S							
89	AUTO_LL	BI22	1303	01,02,03	N/A	BD25	0/1	0/1	Lead Lag Control Mode [0=Manual, 1=Auto]	S	S	S							
90	S2_HGBV	BI23	1304	01,02,03	N/A	BD26	0/1	0/1	Sys 2 Hot Gas Bypass Valve	O	O	O							

NOTES	
1	Units have Native BACnet MS/TP, Modbus RTU, and N2 communications. No external Gateway is required for these interfaces unless the customer is using Connected Services.
2	BACnet Object Types: 0 = Analog In, 1 = Analog Out, 2 = Analog Value, 3 = Binary In, 4 = Binary Out, 8 = Device, 15 = Alarm Notification (0-127 are reserved ASHRAE Objects)
3	WC = Inches of water Column, CFM = Cubic Feet per Minute, FPM = Feet Per Minute, PSI = Pounds per Square Inch, Pa = Pascals, kPa = kiloPascals, PPM = Parts Per Million, kJ/kg = kiloJoules per kilogram
4	Values that are not applicable due to unit configuration and options will be sent as zero (0).
5	Modbus values are all of type signed. Scaling values in **x10** (Bold) indicate scaling in metric is x100. Scaling and signing may not be modified in the field.
6	
7	
8	
9	
10	

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TABLE 39 - BACNET AND MODBUS COMMUNICATIONS DATA MAP (CONT'D)

Code Value	Operational Code	Code Value	Fault/Inhibit Code
0	No Abnormal Condition	0	No Fault Code
1	Unit Switch OFF	1	
2	System Switch OFF	2	Low Ambient Temperature
3	Lockout	3	
4	Unit Fault	4	Low Leaving Chilled Liquid Temperature
5	System Fault	5	High Discharge Pressure
6	Remote Shutdown	6	
7	Daily Schedule Shutdown	7	Low Suction Pressure
8	No Run Permissive	8	
9	No Cool Load	9	
10	Anti-Coincidence Timer Active	10	
11	Anti-Recycle Timer Active	11	
12	Manual Override	12	
13	Suction Limiting	13	
14	Discharge Limiting	14	
15		15	
16	Load Limiting	16	
17	Compressor(s) Running	17	
18	Heatpump Load Limiting	18	MP/HPCO Fault
19	Pumping Down	19	Low Evaporator Temperature
20		20	
21		21	
22		22	Unit Motor Current
23		23	Low Superheat
24		24	Sensor Fault
25		25	Discharge Inhibit
26		26	MP/HPCO Inhibit
27		27	Pump Trip
28		28	Pump Fail Make Flow
29		29	High Ambient Temperature
30		30	Anti-Vacuum Low Pressure Cutout
31		31	Flow Switch Open
32		32	Leaving Chilled Liquid Temperature Sensor Fault
33		33	
34		34	
35		35	
36		36	
37		37	
38		38	
39		39	
40		40	
41		41	
42		42	
43		43	
44		44	
45		45	
46		46	
47		47	
48		48	
49		49	
50		50	

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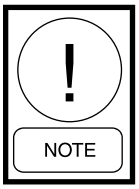
YorkTalk 2 Communications

Received Data (Control Data)

The unit receives eight data values from the MicroGateway or E-Link. 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. *Table 40* "Yorktalk 2 Communications Data Map" lists the control parameters. These values are found under feature 54 in the MicroGateway or E-Link.

Transmitted Data

After receiving a valid transmission from the MicroGateway or E-Link, 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 40* "Yorktalk 2 Communications Data Map" shows the data values and page listings for this unit.



The latest point map information is listed on the Johnson Controls Equipment Integration website.

04/29/2020

SCROLL CHILLER/HEATPUMP/CONDENSING UNIT			York Talk 2 (eLink)	Board: 031-02550
Item	**Version**	**York P/N**	**Baud**	**Comments**
1	C.MMC.13.05, C.MMC.14.05, C.MMC.16.07	031-02755-001, -003	4800	New
2	C.MMC.13.11, C.MMC.14.11, C.MMC.16.11	031-02755-001, -003	4800	Update: add SCC, section 2
3	C.MMC.16.12	031-02755-004	4800	Update: -004 release
4	C.MMC.13.19, C.MMC.14.19, C.MMC.16.19	031-02755-001, -003	4800	Update: V14 add op code 19 and fault code 31; V18 R-454B added as selection Section 2, P56
5	C.MMC.13.23, C.MMC.14.23, C.MMC.16.23	031-02755-001, -003	4800	Update: V21 Move Bivalent Heat Step from P43 to P80, Tray heater removed; V23 add fault code 32
6				
7				
8				
9				
10				

SECTION 1

Eng Page Ref	BACnet Object Typ/Ins	BACnet Object Name	LON Profile Name	LON SNVT Type	N2 Metasys	Modbus		Engineering Units		Point List Code: S = Standard O = Optional N = Not Available											
						Address	Scale	Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
P03	AV1	YT2_S01_P03	nviYTS01p003	SNVT_count_f (51)	ADF 1	0001	x10	°F PSI	°C BAR	Remote Setpoint [99=Auto] Sys 1 Remote Setpoint (SP Unit)	S	S	S	S	S					
P04	AV2	YT2_S01_P04	nviYTS01p004	SNVT_count_f (51)	ADF 2	0002	x1	None	None	Load Limit Stage [0, 1, 2] Sys 1 Load Limit Stage [0, 1, 2]	S	S	S	S	S					
P05	AV3	YT2_S01_P05	nviYTS01p005	SNVT_count_f (51)	ADF 3	0003	x10	°F °F PSI	°C °C BAR	Remote Heating Setpoint (HP or YCWL HP) Remote Cooling Range (DAT Unit) Sys 2 Remote Setpoint (SP Unit)	O	O	O	O	O					
P06	AV4	YT2_S01_P06	nviYTS01p006	SNVT_count_f (51)	ADF 4	0004	x1	None	None	Remote Heatpump Mode [0=Pnl, 1=Cool, 2=Heat] (HP or YCWL HP) Sys 2 Load Limit Stage [0, 1, 2]	O	O	O	O	O					
P07	BV1	YT2_S01_P07	nviYTS01p007	SNVT_switch (95)	BD 1	0061	N/A	0/1	0/1	Start/Stop Command Sys 1 Start/Stop Command	S	S	S	S	S					
P08	BV2	YT2_S01_P08	nviYTS01p008	SNVT_switch (95)	BD 2	0062	N/A	0/1	0/1	Sys 2 Start/Stop Command	O	O	O	O	O					
P09	BV3	YT2_S01_P09	nviYTS01p009	SNVT_switch (95)	BD 3	0063					N	N	N	N	N					
P10	BV4	YT2_S01_P10	nviYTS01p010	SNVT_switch (95)	BD 4	0064	N/A	0/1	0/1	History Buffer Request	S	S	S	S	S					
P11	AV5	YT2_S01_P11	nvoYTS01p011	SNVT_count_f (51)	ADF 5	0005	x10	°F	°C	Leaving Chiller Liquid Temp	S	S	S	S	S					
P12	AV6	YT2_S01_P12	nvoYTS01p012	SNVT_count_f (51)	ADF 6	0006	x10	°F	°C	Entering Chilled Liquid Temp	S	S	S	S	S					
P13	AV7	YT2_S01_P13	nvoYTS01p013	SNVT_count_f (51)	ADF 7	0007	x10	°F	°C	Leaving Liquid Temp Hot (YCWL)	O	O	O	O	O					
P14	AV8	YT2_S01_P14	nvoYTS01p014	SNVT_count_f (51)	ADF 8	0008	x10	°F	°C	Discharge Air Temp (Cond Unit) Entering Liquid Temp Hot (YCWL)	O	O	O	O	O					
P15	AV9	YT2_S01_P15	nvoYTS01p015	SNVT_count_f (51)	ADF 9	0009	x10	°F	°C	Sys 1 Suction Temperature (EEV)	O	O	O	O	O					
P16	AV10	YT2_S01_P16	nvoYTS01p016	SNVT_count_f (51)	ADF 10	0010	x10	°F	°C	Ambient Air Temperature	S	S	S	S	S					
P17	AV11	YT2_S01_P17	nvoYTS01p017	SNVT_count_f (51)	ADF 11	0011	x10	°F (diff)	°C (diff)	Sys 1 Suction Superheat (EEV)	O	O	O	O	O					
P18	AV12	YT2_S01_P18	nvoYTS01p018	SNVT_count_f (51)	ADF 12	0012	x1	None	None	Sys 1 Run Time in seconds	S	S	S	S	S					
P19	AV13	YT2_S01_P19	nvoYTS01p019	SNVT_count_f (51)	ADF 13	0013	x10	PSI	BAR	Sys 1 Suction Pressure	S	S	S	S	S					
P20	AV14	YT2_S01_P20	nvoYTS01p020	SNVT_count_f (51)	ADF 14	0014	x10	PSI	BAR	Sys 1 Discharge Pressure	S	S	S	S	S					
P21	AV15	YT2_S01_P21	nvoYTS01p021	SNVT_count_f (51)	ADF 15	0015	x10	°F	°C	Sys 1 Suction Temperature (Cond Unit) Sys 1 Cooler Inlet Refrigerant Temp (R-407c)	O	O	O	O	O					
P22	AV16	YT2_S01_P22	nvoYTS01p022	SNVT_count_f (51)	ADF 16	0016	x10	°F	°C	Sys 1 Defrost Temperature (HP)	O	O	O	O	O					
P23	AV17	YT2_S01_P23	nvoYTS01p023	SNVT_count_f (51)	ADF 17	0017	x10	%	%	Sys 1 EEV Output % (EEV)	O	O	O	O	O					
P24	AV18	YT2_S01_P24	nvoYTS01p024	SNVT_count_f (51)	ADF 18	0018	x1	None	None	Sys 1 Anti-Recycle Timer	S	S	S	S	S					
P25	AV19	YT2_S01_P25	nvoYTS01p025	SNVT_count_f (51)	ADF 19	0019	x1	None	None	Anti-Coincident Timer in seconds	S	S	S	S	S					
P26	AV20	YT2_S01_P26	nvoYTS01p026	SNVT_count_f (51)	ADF 20	0020	x10	°F	°C	Sys 2 Suction Temperature (EEV)	O	O	O	O	O					

TABLE 40 - YORKTALK 2 COMMUNICATIONS DATA MAP (CONT'D)

Eng Page Ref	BACnet Object Typ/Ins	BACnet Object Name	LON Profile Name	LON SNVT Type	N2 Metasys	Modbus		Engineering Units		Point List Code: S = Standard O = Optional N = Not Available											
						Address	Scale	Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
P27	AV21	YT2_S01_P27	nvoYTS01p027	SNVT_count_f (51)	ADF 21	0021	x1	None	None	Sys 2 Run Time in seconds	S	S	S	S	S					
P28	AV22	YT2_S01_P28	nvoYTS01p028	SNVT_count_f (51)	ADF 22	0022	x10	PSI	BAR	Sys 2 Suction Pressure	S	S	S	S	S					
P29	AV23	YT2_S01_P29	nvoYTS01p029	SNVT_count_f (51)	ADF 23	0023	x10	PSI	BAR	Sys 2 Discharge Pressure	S	S	S	S	S					
P30	AV24	YT2_S01_P30	nvoYTS01p030	SNVT_count_f (51)	ADF 24	0024	x10	°F	°C	Sys 2 Suction Temperature (Cond Unit) Sys 2 Cooler Inlet Refrigerant Temp (R-407c)	O	O	O	O	O					
P31	AV25	YT2_S01_P31	nvoYTS01p031	SNVT_count_f (51)	ADF 25	0025	x10	°F	°C	Sys 2 Defrost Temperature (HP)	O	O	O	O	O					
P32	AV26	YT2_S01_P32	nvoYTS01p032	SNVT_count_f (51)	ADF 26	0026	x10	°F (diff)	°C (diff)	Sys 2 Suction Superheat (EEV)	O	O	O	O	O					
P33	AV27	YT2_S01_P33	nvoYTS01p033	SNVT_count_f (51)	ADF 27	0027	x1	None	None	Sys 2 Anti-Recycle Timer	S	S	S	S	S					
P34	AV28	YT2_S01_P34	nvoYTS01p034	SNVT_count_f (51)	ADF 28	0028	x10	%	%	Sys 2 EEV Output % (EEV)	O	O	O	O	O					
P35	AV29	YT2_S01_P35	nvoYTS01p035	SNVT_count_f (51)	ADF 29	0029	x1	None	None	Number of Compressors	S	S	S	S	S					
P36	BV5	YT2_S01_P36	nvoYTS01p036	SNVT_switch (95)	BD 5	0065	N/A	0/1	0/1	Sys 1 Alarm [0=No Alarm, 1=Alarm]	S	S	S	S	S					
P37	BV6	YT2_S01_P37	nvoYTS01p037	SNVT_switch (95)	BD 6	0066	N/A	0/1	0/1	Sys 2 Alarm [0=No Alarm, 1=Alarm]	S	S	S	S	S					
P38	BV7	YT2_S01_P38	nvoYTS01p038	SNVT_switch (95)	BD 7	0067	N/A	0/1	0/1	Evaporator Heater Status	S	S	S	S	S					
P39	BV8	YT2_S01_P39	nvoYTS01p039	SNVT_switch (95)	BD 8	0068	N/A	0/1	0/1	Evaporator Pump Status	S	S	S	S	S					
P40	BV9	YT2_S01_P40	nvoYTS01p040	SNVT_switch (95)	BD 9	0069	N/A	0/1	0/1	Sys 1 Comp 1 Run	S	S	S	S	S					
P41	BV10	YT2_S01_P41	nvoYTS01p041	SNVT_switch (95)	BD 10	0070	N/A	0/1	0/1	Sys 2 Comp 1 Run	S	S	S	S	S					
P42	BV11	YT2_S01_P42	nvoYTS01p042	SNVT_switch (95)	BD 11	0071	N/A	0/1	0/1	Sys 1 Liquid Line Solenoid Valve Sys 1 Mode Solenoid Valve (HP)	S	S	S	S	S					
P43	BV12	YT2_S01_P43	nvoYTS01p043	SNVT_switch (95)	BD 12	0072	N/A	0/1	0/1	Sys 1 Hot Gas Bypass Valve	S	S	S	S	S					
P44	BV13	YT2_S01_P44	nvoYTS01p044	SNVT_switch (95)	BD 13	0073	N/A	0/1	0/1	Sys 1 Comp 2 Run	S	S	S	S	S					
P45	BV14	YT2_S01_P45	nvoYTS01p045	SNVT_switch (95)	BD 14	0074	N/A	0/1	0/1	Sys 2 Comp 2 Run	S	S	S	S	S					
P46	BV15	YT2_S01_P46	nvoYTS01p046	SNVT_switch (95)	BD 15	0075	N/A	0/1	0/1	Sys 2 Liquid Line Solenoid Valve Sys 2 Mode Solenoid Valve (HP)	S	S	S	S	S					
P47	BV16	YT2_S01_P47	nvoYTS01p047	SNVT_switch (95)	BD 16	0076	N/A	0/1	0/1	Lead System [0=Sys1, 1=Sys2]	S	S	S	S	S					
P48	BV17	YT2_S01_P48	nvoYTS01p048	SNVT_switch (95)	BD 17	0077	N/A	0/1	0/1	Sys 1 Comp 3 Run	S	S	S	S	S					
P49	BV18	YT2_S01_P49	nvoYTS01p049	SNVT_switch (95)	BD 18	0078	N/A	0/1	0/1	Sys 2 Comp 3 Run	S	S	S	S	S					
P50	BV19	YT2_S01_P50	nvoYTS01p050	SNVT_switch (95)	BD 19	0079	N/A	0/1	0/1	Chilled Liquid Type [0=Water, 1=Glycol]	S	S	S	S	S					
P51	BV20	YT2_S01_P51	nvoYTS01p051	SNVT_switch (95)	BD 20	0080	N/A	0/1	0/1	Ambient Control Mode [0=Std Amb, 1=Low Amb]	S	S	S	S	S					
P52	BV21	YT2_S01_P52	nvoYTS01p052	SNVT_switch (95)	BD 21	0081	N/A	0/1	0/1	Local/Remote Control Mode [0=Local, 1=Remote]	S	S	S	S	S					
P53	BV22	YT2_S01_P53	nvoYTS01p053	SNVT_switch (95)	BD 22	0082	N/A	0/1	0/1	Units [0=Imperial, 1=SI]	S	S	S	S	S					
P54	BV23	YT2_S01_P54	nvoYTS01p054	SNVT_switch (95)	BD 23	0083	N/A	0/1	0/1	Lead/Lag Control Mode [0=Manual, 1=Auto]	S	S	S	S	S					
P55	BV24	YT2_S01_P55	nvoYTS01p055	SNVT_switch (95)	BD 24	0084	N/A	0/1	0/1	Sys 2 Hot Gas Bypass Valve	O	O	O	O	O					
P56	MV1	YT2_S01_P56	nvoYTS01p056	SNVT_count_f (51)	ADI 1	0030	x1	None	None	Sys 1 Operational Code	S	S	S	S	S					
P57	MV2	YT2_S01_P57	nvoYTS01p057	SNVT_count_f (51)	ADI 2	0031	x1	None	None	Sys 1 Fault Code	S	S	S	S	S					
P58	MV3	YT2_S01_P58	nvoYTS01p058	SNVT_count_f (51)	ADI 3	0032	x1	None	None	Sys 2 Operational Code	S	S	S	S	S					
P59	MV4	YT2_S01_P59	nvoYTS01p059	SNVT_count_f (51)	ADI 4	0033	x1	None	None	Sys 2 Fault Code	S	S	S	S	S					
P60	MV5	YT2_S01_P60	nvoYTS01p060	SNVT_count_f (51)	ADI 5	0034	x1	None	None	Sys 1 Debug Code	N	N	N	N	N					
P61	MV6	YT2_S01_P61	nvoYTS01p061	SNVT_count_f (51)	ADI 6	0035	x1	None	None	Sys 1 Condenser Fan Stage	S	S	S	S	S					
P62	MV7	YT2_S01_P62	nvoYTS01p062	SNVT_count_f (51)	ADI 7	0036	x1	None	None	Sys 2 Debug Code	N	N	N	N	N					
P63	MV8	YT2_S01_P63	nvoYTS01p063	SNVT_count_f (51)	ADI 8	0037	x1	None	None	Sys 2 Condenser Fan Stage	S	S	S	S	S					
P64	MV9	YT2_S01_P64	nvoYTS01p064	SNVT_count_f (51)	ADI 9	0038					N	N	N	N	N					
P65	MV10	YT2_S01_P65	nvoYTS01p065	SNVT_count_f (51)	ADI 10	0039	x1	None	None	Unit Control Mode [0=LW, 1=RW, 2=DA, 3=SP, 4=CL, 5=HT]	S	S	S	S	S					
P66	AV30	YT2_S01_P66	nvoYTS01p066	SNVT_count_f (51)	ADF 30	0040	x1	None	None	Anti-Recycle Time Programmed	S	S	S	S	S					
P67	AV31	YT2_S01_P67	nvoYTS01p067	SNVT_count_f (51)	ADF 31	0041	x10	°F	°C	Leaving Chilled Liquid Temp Cutout	S	S	S	S	S					
P68	AV32	YT2_S01_P68	nvoYTS01p068	SNVT_count_f (51)	ADF 32	0042	x10	°F	°C	Low Ambient Temp Cutout	S	S	S	S	S					
P69	AV33	YT2_S01_P69	nvoYTS01p069	SNVT_count_f (51)	ADF 33	0043	x10	PSI	BAR	Low Suction Pressure Cutout Heating (HP)	S	S	S	S	S					

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TABLE 40 - YORKTALK 2 COMMUNICATIONS DATA MAP (CONT'D)

Eng Page Ref	BACnet Object Typ/Ins	BACnet Object Name	LON Profile Name	LON SNVT Type	N2 Metasys	Modbus		Engineering Units		Point List Code: S = Standard O = Optional N = Not Available										
						Address	Scale	Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
P70	AV34	YT2_ S01_ P70	nvoYTS01p070	SNVT_count_f (51)	ADF 34	0044	x10	PSI	BAR	Low Suction Pressure Cutout Cooling	S	S	S	S	S					
P71	AV35	YT2_ S01_ P71	nvoYTS01p071	SNVT_count_f (51)	ADF 35	0045	x10	PSI	BAR	High Discharge Pressure Cutout	S	S	S	S	S					
P72	AV36	YT2_ S01_ P72	nvoYTS01p072	SNVT_count_f (51)	ADF 36	0046	x10	°F	°C	Remote Setpoint	S	S	S	S	S					
P73	AV37	YT2_ S01_ P73	nvoYTS01p073	SNVT_count_f (51)	ADF 37	0047	x10	°F	°C	Cooling Range	S	S	S	S	S					
P74	AV38	YT2_ S01_ P74	nvoYTS01p074	SNVT_count_f (51)	ADF 38	0048	x10	PSI °F	BAR °C	Remote Setpoint 2 (SP) Remote Heating Setpoint (HP and YCWL HP)	O	O	O	O	O					
P75	AV39	YT2_ S01_ P75	nvoYTS01p075	SNVT_count_f (51)	ADF 39	0049	x10	PSI °F	BAR °C	Cooling Range 2 (SP) Heating Range (HP and YCWL HP)	O	O	O	O	O					
P76	AV40	YT2_ S01_ P76	nvoYTS01p076	SNVT_count_f (51)	ADF 40	0050	x10	°F	°C	Sys 1 Discharge Temperature (EEV)	O	O	O	O	O					
P77	AV41	YT2_ S01_ P77	nvoYTS01p077	SNVT_count_f (51)	ADF 41	0051	x10	°F (diff)	°C (diff)	Sys 1 Discharge Superheat (EEV)	O	O	O	O	O					
P78	AV42	YT2_ S01_ P78	nvoYTS01p078	SNVT_count_f (51)	ADF 42	0052	x10	°F	°C	Sys 2 Discharge Temperature (EEV)	O	O	O	O	O					
P79	AV43	YT2_ S01_ P79	nvoYTS01p079	SNVT_count_f (51)	ADF 43	0053	x10	°F (diff)	°C (diff)	Sys 2 Discharge Superheat (EEV)	O	O	O	O	O					
P80	BV25	YT2_ S01_ P80	nvoYTS01p080	SNVT_switch (95)	BD 25	0085	N/A	0/1	0/1	Bivalent Heat Step (YLAE HP) Compressor Heater (R-410a/R-454B chillers, YCWL chillers)	N	N	N	N	O					
P81	BV26	YT2_ S01_ P81	nvoYTS01p081	SNVT_switch (95)	BD 26	0086					N	N	N	N	N					
P82	BV27	YT2_ S01_ P82	nvoYTS01p082	SNVT_switch (95)	BD 27	0087					N	N	N	N	N					
P83	BV28	YT2_ S01_ P83	nvoYTS01p083	SNVT_switch (95)	BD 28	0088					N	N	N	N	N					
P84	BV29	YT2_ S01_ P84	nvoYTS01p084	SNVT_switch (95)	BD 29	0089	N/A	0/1	0/1	SCC Auto Detect Available	N	S	S	S	S					

SECTION 2

Eng Page Ref	BACnet Object Typ/Ins	BACnet Object Name	LON Profile Name	LON SNVT Type	N2 Metasys	Modbus		Engineering Units		Point List Code: S = Standard O = Optional N = Not Available										
						Address	Scale	Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
P03	AV101	YT2_S02_P03	nviYTS02p003	SNVT_count_f (51)	ADF 44	0101					N	N	N	N	N					
P04	AV102	YT2_S02_P04	nviYTS02p004	SNVT_count_f (51)	ADF 45	0102					N	N	N	N	N					
P05	AV103	YT2_S02_P05	nviYTS02p005	SNVT_count_f (51)	ADF 46	0103					N	N	N	N	N					
P06	AV104	YT2_S02_P06	nviYTS02p006	SNVT_count_f (51)	ADF 47	0104					N	N	N	N	N					
P07	AV105	YT2_S02_P07	nviYTS02p007	SNVT_switch (95)	BD 30	0161					N	N	N	N	N					
P08	AV106	YT2_S02_P08	nviYTS02p008	SNVT_switch (95)	BD 31	0162					N	N	N	N	N					
P09	AV107	YT2_S02_P09	nviYTS02p009	SNVT_switch (95)	BD 32	0163					N	N	N	N	N					
P10	AV108	YT2_S02_P10	nviYTS02p010	SNVT_switch (95)	BD 33	0164					N	N	N	N	N					
P11	AV109	YT2_S02_P11	nvoYTS02p011	SNVT_count_f (51)	ADF 48	0105					N	N	N	N	N					
P12	AV110	YT2_S02_P12	nvoYTS02p012	SNVT_count_f (51)	ADF 49	0106					N	N	N	N	N					
P13	AV111	YT2_S02_P13	nvoYTS02p013	SNVT_count_f (51)	ADF 50	0107					N	N	N	N	N					
P14	AV112	YT2_S02_P14	nvoYTS02p014	SNVT_count_f (51)	ADF 51	0108					N	N	N	N	N					
P15	AV113	YT2_S02_P15	nvoYTS02p015	SNVT_count_f (51)	ADF 52	0109					N	N	N	N	N					
P16	AV114	YT2_S02_P16	nvoYTS02p016	SNVT_count_f (51)	ADF 53	0110					N	N	N	N	N					
P17	AV115	YT2_S02_P17	nvoYTS02p017	SNVT_count_f (51)	ADF 54	0111					N	N	N	N	N					
P18	AV116	YT2_S02_P18	nvoYTS02p018	SNVT_count_f (51)	ADF 55	0112	x1	None	None	Sys 1 Comp 1 Run Hours	N	S	S	S	S					
P19	AV117	YT2_S02_P19	nvoYTS02p019	SNVT_count_f (51)	ADF 56	0113	x1	None	None	Sys 1 Comp 2 Run Hours	N	S	S	S	S					
P20	AV118	YT2_S02_P20	nvoYTS02p020	SNVT_count_f (51)	ADF 57	0114	x1	None	None	Sys 1 Comp 3 Run Hours	N	S	S	S	S					
P21	AV119	YT2_S02_P21	nvoYTS02p021	SNVT_count_f (51)	ADF 58	0115					N	N	N	N	N					
P22	AV120	YT2_S02_P22	nvoYTS02p022	SNVT_count_f (51)	ADF 59	0116					N	N	N	N	N					
P23	AV121	YT2_S02_P23	nvoYTS02p023	SNVT_count_f (51)	ADF 60	0117					N	N	N	N	N					
P24	AV122	YT2_S02_P24	nvoYTS02p024	SNVT_count_f (51)	ADF 61	0118					N	N	N	N	N					
P25	AV123	YT2_S02_P25	nvoYTS02p025	SNVT_count_f (51)	ADF 62	0119					N	N	N	N	N					
P26	AV124	YT2_S02_P26	nvoYTS02p026	SNVT_count_f (51)	ADF 63	0120					N	N	N	N	N					
P27	AV125	YT2_S02_P27	nvoYTS02p027	SNVT_count_f (51)	ADF 64	0121	x1	None	None	Sys 2 Comp 1 Run Hours	N	S	S	S	S					
P28	AV126	YT2_S02_P28	nvoYTS02p028	SNVT_count_f (51)	ADF 65	0122	x1	None	None	Sys 2 Comp 2 Run Hours	N	S	S	S	S					
P29	AV127	YT2_S02_P29	nvoYTS02p029	SNVT_count_f (51)	ADF 66	0123	x1	None	None	Sys 2 Comp 3 Run Hours	N	S	S	S	S					
P30	AV128	YT2_S02_P30	nvoYTS02p030	SNVT_count_f (51)	ADF 67	0124					N	N	N	N	N					
P31	AV129	YT2_S02_P31	nvoYTS02p031	SNVT_count_f (51)	ADF 68	0125					N	N	N	N	N					
P32	AV130	YT2_S02_P32	nvoYTS02p032	SNVT_count_f (51)	ADF 69	0126					N	N	N	N	N					
P33	AV131	YT2_S02_P33	nvoYTS02p033	SNVT_count_f (51)	ADF 70	0127					N	N	N	N	N					
P34	AV132	YT2_S02_P34	nvoYTS02p034	SNVT_count_f (51)	ADF 71	0128					N	N	N	N	N					
P35	AV133	YT2_S02_P35	nvoYTS02p035	SNVT_count_f (51)	ADF 72	0129					N	N	N	N	N					
P36	BV105	YT2_S02_P36	nvoYTS02p036	SNVT_switch (95)	BD 34	0165	N/A	0/1	0/1	Option Indicator [0=Disabled, 1=Enabled]	N	S	S	S	S					
P37	BV106	YT2_S02_P37	nvoYTS02p037	SNVT_switch (95)	BD 35	0166					N	N	N	N	N					
P38	BV107	YT2_S02_P38	nvoYTS02p038	SNVT_switch (95)	BD 36	0167					N	N	N	N	N					
P39	BV108	YT2_S02_P39	nvoYTS02p039	SNVT_switch (95)	BD 37	0168					N	N	N	N	N					
P40	BV109	YT2_S02_P40	nvoYTS02p040	SNVT_switch (95)	BD 38	0169					N	N	N	N	N					
P41	BV110	YT2_S02_P41	nvoYTS02p041	SNVT_switch (95)	BD 39	0170					N	N	N	N	N					
P42	BV111	YT2_S02_P42	nvoYTS02p042	SNVT_switch (95)	BD 40	0171					N	N	N	N	N					
P43	BV112	YT2_S02_P43	nvoYTS02p043	SNVT_switch (95)	BD 41	0172					N	N	N	N	N					
P44	BV113	YT2_S02_P44	nvoYTS02p044	SNVT_switch (95)	BD 42	0173					N	N	N	N	N					
P45	BV114	YT2_S02_P45	nvoYTS02p045	SNVT_switch (95)	BD 43	0174					N	N	N	N	N					
P46	BV115	YT2_S02_P46	nvoYTS02p046	SNVT_switch (95)	BD 44	0175					N	N	N	N	N					
P47	BV116	YT2_S02_P47	nvoYTS02p047	SNVT_switch (95)	BD 45	0176	N/A	0/1	0/1	Expansion Valve Type [0=TXV, 1=EEV]	N	S	S	S	S					

TABLE 40 - YORKTALK 2 COMMUNICATIONS DATA MAP (CONT'D)

Eng Page Ref	BACnet Object Typ/Ins	BACnet Object Name	LON Profile Name	LON SNVT Type	N2 Metasys	Modbus		Engineering Units		Point List Code: S = Standard O = Optional N = Not Available										
						Address	Scale	Imperial	SI	Point List Description	1	2	3	4	5	6	7	8	9	10
P48	BV117	YT2_S02_P48	nvoYTS02p048	SNVT_switch (95)	BD 46	0177	N/A	0/1	0/1	YCWL Mode [0=Chiller, 1=Heatpump]	N	O	O	O	O					
P49	BV118	YT2_S02_P49	nvoYTS02p049	SNVT_switch (95)	BD 47	0178					N	N	N	N	N					
P50	BV119	YT2_S02_P50	nvoYTS02p050	SNVT_switch (95)	BD 48	0179	N/A	0/1	0/1	SCC Auto Detect Digit 1	N	S	S	S	S					
P51	BV120	YT2_S02_P51	nvoYTS02p051	SNVT_switch (95)	BD 49	0180	N/A	0/1	0/1	SCC Auto Detect Digit 2	N	S	S	S	S					
P52	BV121	YT2_S02_P52	nvoYTS02p052	SNVT_switch (95)	BD 50	0181	N/A	0/1	0/1	SCC Auto Detect Digit 3	N	S	S	S	S					
P53	BV122	YT2_S02_P53	nvoYTS02p053	SNVT_switch (95)	BD 51	0182	N/A	0/1	0/1	SCC Auto Detect Digit 4	N	S	S	S	S					
P54	BV123	YT2_S02_P54	nvoYTS02p054	SNVT_switch (95)	BD 52	0183	N/A	0/1	0/1	SCC Auto Detect Digit 5	N	S	S	S	S					
P55	BV124	YT2_S02_P55	nvoYTS02p055	SNVT_switch (95)	BD 53	0184	N/A	0/1	0/1	SCC Auto Detect Digit 6	N	S	S	S	S					
P56	MV101	YT2_S02_P56	nvoYTS02p056	SNVT_count_f (51)	ADI 25	0130	x1	None	None	Refrigerant [0=R-22, 1=R-407c, 2=R-410a, 3=R-454B]	N	S	S	S	S					
P57	MV102	YT2_S02_P57	nvoYTS02p057	SNVT_count_f (51)	ADI 26	0131					N	N	N	N	N					
P58	MV103	YT2_S02_P58	nvoYTS02p058	SNVT_count_f (51)	ADI 27	0132					N	N	N	N	N					
P59	MV104	YT2_S02_P59	nvoYTS02p059	SNVT_count_f (51)	ADI 28	0133					N	N	N	N	N					
P60	MV105	YT2_S02_P60	nvoYTS02p060	SNVT_count_f (51)	ADI 29	0134					N	N	N	N	N					
P61	MV106	YT2_S02_P61	nvoYTS02p061	SNVT_count_f (51)	ADI 30	0135					N	N	N	N	N					
P62	MV107	YT2_S02_P62	nvoYTS02p062	SNVT_count_f (51)	ADI 31	0136					N	N	N	N	N					
P63	MV108	YT2_S02_P63	nvoYTS02p063	SNVT_count_f (51)	ADI 32	0137					N	N	N	N	N					
P64	MV109	YT2_S02_P64	nvoYTS02p064	SNVT_count_f (51)	ADI 33	0138					N	N	N	N	N					
P65	MV110	YT2_S02_P65	nvoYTS02p065	SNVT_count_f (51)	ADI 34	0139					N	N	N	N	N					
P66	AV130	YT2_S02_P66	nvoYTS02p066	SNVT_count_f (51)	ADF 73	0140					N	N	N	N	N					
P67	AV131	YT2_S02_P67	nvoYTS02p067	SNVT_count_f (51)	ADF 74	0141					N	N	N	N	N					
P68	AV132	YT2_S02_P68	nvoYTS02p068	SNVT_count_f (51)	ADF 75	0142					N	N	N	N	N					
P69	AV133	YT2_S02_P69	nvoYTS02p069	SNVT_count_f (51)	ADF 76	0143					N	N	N	N	N					
P70	AV134	YT2_S02_P70	nvoYTS02p070	SNVT_count_f (51)	ADF 77	0144					N	N	N	N	N					
P71	AV135	YT2_S02_P71	nvoYTS02p071	SNVT_count_f (51)	ADF 78	0145					N	N	N	N	N					
P72	AV136	YT2_S02_P72	nvoYTS02p072	SNVT_count_f (51)	ADF 79	0146					N	N	N	N	N					
P73	AV137	YT2_S02_P73	nvoYTS02p073	SNVT_count_f (51)	ADF 80	0147					N	N	N	N	N					
P74	AV138	YT2_S02_P74	nvoYTS02p074	SNVT_count_f (51)	ADF 81	0148					N	N	N	N	N					
P75	AV139	YT2_S02_P75	nvoYTS02p075	SNVT_count_f (51)	ADF 82	0149					N	N	N	N	N					
P76	AV140	YT2_S02_P76	nvoYTS02p076	SNVT_count_f (51)	ADF 83	0150					N	N	N	N	N					
P77	AV141	YT2_S02_P77	nvoYTS02p077	SNVT_count_f (51)	ADF 84	0151					N	N	N	N	N					
P78	AV142	YT2_S02_P78	nvoYTS02p078	SNVT_count_f (51)	ADF 85	0152					N	N	N	N	N					
P79	AV143	YT2_S02_P79	nvoYTS02p079	SNVT_count_f (51)	ADF 86	0153					N	N	N	N	N					
P80	BV125	YT2_S02_P80	nvoYTS02p080	SNVT_switch (95)	BD 54	0185					N	N	N	N	N					
P81	BV126	YT2_S02_P81	nvoYTS02p081	SNVT_switch (95)	BD 55	0186					N	N	N	N	N					
P82	BV127	YT2_S02_P82	nvoYTS02p082	SNVT_switch (95)	BD 56	0187					N	N	N	N	N					
P83	BV128	YT2_S02_P83	nvoYTS02p083	SNVT_switch (95)	BD 57	0188					N	N	N	N	N					
P84	BV129	YT2_S02_P84	nvoYTS02p084	SNVT_switch (95)	BD 58	0189	N/A	0/1	0/1	Units [0=Imperial, 1=Metric]	N	S	S	S	S					

NOTES	
1	LON SNVTs used: SNVT_count_f (51) and SNVT_switch (95). Must use LON eLink.
2	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, 06, 15, 16; ENG P36-P55 & P80-84 = 01, 02, 03
3	BACnet engineering units shown with an Asterisk (*) will be assigned a BACnet engineering unit type of 95 - No Units.
4	Status codes: Special display characters such as ( ) [ ] { } / \ % < > are not compatible with eLink N2 formats. Substitute text strings "-", PCT, GTN will be used. String lengths are limited to 60 total characters, including spaces.
5	
6	
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TABLE 40 - YORKTALK 2 COMMUNICATIONS DATA MAP (CONT'D)

04/29/2020

Code Value	Operational Code	Code Value	Fault/Inhibit Code
0	No Abnormal Condition	0	No Fault Code
1	Unit Switch Off	1	
2	System Switch Off	2	Low Ambient Temperature
3	Lockout	3	
4	Unit Fault	4	Low Leaving Chilled Liquid Temp
5	System Fault	5	High Discharge Pressure
6	Remote Shutdown	6	
7	Daily Schedule Shutdown	7	Low Suction Pressure
8	No Run Permissive	8	
9	No Cool Load	9	
10	Anti-Coincidence Timer Active	10	
11	Anti-Recycle Timer Active	11	
12	Manual Override	12	
13	Suction Limiting	13	
14	Discharge Limiting	14	
15		15	
16	Load Limiting	16	
17	Compressor(s) Running	17	
18	Heatpump Load Limiting	18	MP/HPCO Fault
19	Pumping Down	19	Low Evaporator Temperature
20		20	
21		21	
22		22	Unit Motor Current
23		23	Low Superheat
24		24	Sensor Fault
25		25	Discharge Inhibit
26		26	MP/HPCO Inhibit
27		27	Pump Trip
28		28	Pump Fail Make Flow
29		29	High Ambient Temperature
30		30	Anti-Vacuum Low Pressure Cutout
31		31	Flow Switch Open
32		32	Leaving Chilled Liquid Temperature Sensor Fault
33		33	
34		34	
35		35	
36		36	
37		37	
38		38	
39		39	
40		40	
41		41	
42		42	
43		43	
44		44	
45		45	
46		46	
47		47	
48		48	
49		49	
50		50	

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TEMPERATURE CONVERSION CHART

Temperature Conversion Chart - Actual Temperatures

° F	=	° C	°C	=	°F
0		-17.8	-18		-0.4
4		-15.6	-16		3.2
8		-13.3	-14		6.8
12		-11.1	-12		10.4
16		-8.9	-10		14
20		-6.7	-8		17.6
24		-4.4	-6		21.2
28		-2.2	-4		24.8
32		0.0	-2		28.4
36		2.2	0		32
40		4.4	2		35.6
44		6.7	4		39.2
48		8.9	6		42.8
52		11.1	8		46.4
56		13.3	10		50
60		15.6	12		53.6
64		17.8	14		57.2
68		20.0	16		60.8
72		22.2	18		64.4
76		24.4	20		68
80		26.7	22		71.6
84		28.9	24		75.2
88		31.1	26		78.8
92		33.3	28		82.4
96		35.6	30		86
100		37.8	32		89.6
104		40.0	34		93.2
108		42.2	36		96.8
112		44.4	38		100.4
116		46.7	40		104
120		48.9	42		107.6
124		51.1	44		111.2
128		53.3	46		114.8
132		55.6	48		118.4
136		57.8	50		122
140		60.0	52		125.6
144		62.2	54		129.2
148		64.4	56		132.8
152		66.7	58		136.4
156		68.9	60		140
160		71.1	62		143.6
164		73.3	64		147.2
168		75.6	66		150.8
172		77.8	68		154.4
176		80.0	70		158
180		82.2	72		161.6
184		84.4	74		165.2
188		86.7	76		168.8
192		88.9	78		172.4
196		91.1	80		176
200		93.3	82		179.6
204		95.6	84		183.2
208		97.8	86		186.8
212		100.0	88		190.4
216		102.2	90		194
220		104.4	92		197.6
224		106.7	94		201.2
228		108.9	96		204.8
232		111.1	98		208.4
236		113.3	100		212
240		115.6	102		215.6
244		117.8	104		219.2

Temperature Conversion Chart - Differential Temperatures

° F	=	° C	°C	=	°F
0		0	0		0
4		2.2	2		3.6
8		4.4	4		7.2
12		6.7	6		10.8
16		8.9	8		14.4
20		11.1	10		18
24		13.3	12		21.6
28		15.6	14		25.2
32		17.8	16		28.8
36		20	18		32.4
40		22.2	20		36
44		24.4	22		39.6
48		26.7	24		43.2
52		28.9	26		46.8
56		31.1	28		50.4
60		33.3	30		54

Pressure Conversion Chart - Gauge or Differential

PSI	=	BAR	BAR	=	PSI
20		1.38	1.5		21.8
30		2.07	2		29
40		2.76	2.5		36.3
50		3.45	3		43.5
60		4.14	3.5		50.8
70		4.83	4		58
80		5.52	4.5		65.3
90		6.21	5		72.5
100		6.9	5.5		79.8
110		7.59	6		87
120		8.28	6.5		94.3
130		8.97	7		101.5
140		9.66	7.5		108.8
150		10.34	8		116
160		11.03	8.5		123.3
170		11.72	9		130.5
180		12.41	9.5		137.8
190		13.1	10		145
200		13.79	10.5		152.3
210		14.48	11		159.5
220		15.17	11.5		166.8
230		15.86	12		174
240		16.55	12.5		181.3
250		17.24	13		188.5
260		17.93	13.5		195.8
270		18.62	14		203
280		19.31	14.5		210.3
290		20	15		217.5
300		20.69	15.5		224.8
310		21.38	16		232
320		22.07	16.5		239.3
330		22.76	17		246.5
340		23.45	17.5		253.8
350		24.14	18		261
360		24.83	18.5		268.3
370		25.52	19		275.5
380		26.21	19.5		282.8
390		26.9	20		290
400		27.59	20.5		297.3

R410-A PRESSURE TEMPERATURE CHART

ADDING REFRIGERANT CHARGE AFTER COMMISSIONING

This unit utilizes HFC 410A refrigerant. HFC 410 A is a blend refrigerant containing both HFC-32 and HFC-125 (50/50 wt %). As this blend performs very much like a single component refrigerant due to the closeness of the individual refrigerant boiling points, any change in composition due to a leak will be minimal. For this reason, you may add to the charge at any time. It is not necessary to remove the entire charge and weigh a new charge in. It is important to remember to add this additional charge as a liquid following all applicable safety procedures, and only after identifying and properly repairing any leak found.

PSIG	TEMPERATURE °F	PSIG	TEMPERATURE °F
0	-60	78	20
2	-58	80	21
4	-54	85	24
6	-50	90	26
8	-46	95	29
10	-42	100	32
12	-39	105	34
14	-36	110	36
16	-33	115	39
18	-30	120	41
20	-28	125	43
22	-26	130	45
24	-24	135	47
26	-20	140	49
28	-18	145	51
30	-16	150	53
32	-14	160	57
34	-12	170	60
36	-10	180	64
38	-8	190	67
40	-6	200	70
42	-4	210	73
44	-3	220	76
46	-2	225	78
48	0	235	80
50	1	245	83
52	3	255	85
54	4	265	88
56	6	275	90
58	7	285	92
60	8	295	95
62	10	305	97
64	11	325	101
66	13	355	108
68	14	375	112
70	15	405	118
72	16	500	134
74	17	600	149
76	19	700	159

The following factors can be used to convert from English to the most common SI Metric values.

TABLE 41 - SI METRIC CONVERSION

MEASUREMENT	MULTIPLY ENGLISH UNIT	BY FACTOR	TO OBTAIN METRIC UNIT
Capacity	Tons Refrigerant Effect (ton)	3.516	Kilowatts (kW)
Power	Horsepower	0.7457	Kilowatts (kW)
Flow Rate	Gallons / Minute (gpm)	0.0631	Liters / Second (l/s)
Length	Feet (ft)	0.3048	Meters (m)
	Inches (in)	25.4	Millimeters (mm)
Weight	Pounds (lbs)	0.4536	Kilograms (kg)
Velocity	Feet / Second (fps)	0.3048	Meters / Second (m/s)
Pressure Drop	Feet of Water (ft)	2.989	Kilopascals (kPa)
	Pounds / Square Inch (psi)	6.895	Kilopascals (kPa)

TEMPERATURE

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

Example: (45.0°F - 32°) x 0.5556 = 7.22°C

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

Example: 10.0°F range x 0.5556 = 5.6 °C range

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