QUANTECH	WATER-COOLED LIQUID CHILLERS HERMETIC SCROLL	
INSTALLATION, OPERATION, MAINTENANCE	Supersedes: QWC3-NM1 (1118)	Form: QWC3-NM1 (1120)

PART # 035-26707-000

QWC3050T-200T
WATER-COOLED LIQUID CHILLERS
STYLE A (60 HZ)
50 - 200 TONS
175KW THROUGH 700KW

R410A

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

Issue Date:
November 20, 2020

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 installation, operation maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: 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 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 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 this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

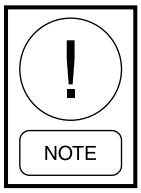
SAFETY SYMBOLS

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 Quantech's published specifications and must be performed only by a qualified electrician. Quantech 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/.

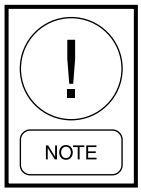
It is the responsibility of rigging, lifting, and operating/service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment 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
46,47	Physical Data table units updated
48-55	Electrical Data table units updated
171-181	Data maps updated

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 (QTC2015T-030T), disregard references to "System 2" which may appear in this manual. Any references to Sys 2 are applicable to QTC2015T-045T models.

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Unit Replacement Parts	QWC3--RP1
Unit Start-Up Checklist	QWC3-CL1
All Products - Replacement Parts Electrical Connectors	50.20-RP1
All Products - Replacement Parts Fittings	50.20-RP2

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SECTION 1 – GENERAL CHILLER INFORMATION AND SAFETY

INTRODUCTION

QWC3 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. This manual should be read thoroughly before attempting to operate or service the unit.

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

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

WARRANTY

Quantech warrants all equipment and materials against defects in workmanship and materials for a period of eighteen months from shipment unless 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. Labor warranty may be purchased as part of the contract. Labor warranty must be performed by Quantech Authorized technicians.

All warranty claims must specify the unit model, serial number, order number and run hours/starts. These details are 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 Quantech.

For warranty purposes, the following conditions must be satisfied:

- The initial start of the unit must be carried out by trained personnel from a Quantech Authorized Technician. *See SECTION 6 – COMMISSIONING*
- Only genuine Quantech approved spare parts, oils 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.*
- Failure to satisfy any of these conditions will automatically void the warranty.

SAFETY

Standards for Safety

QWC3 chillers are designed and built within an ISO 9002 accredited design and manufacturing organization. Products are designed, tested, rated and certified in accordance with, and installed in compliance with applicable sections of the following Standards and Codes:

1. ANSI/ASHRAE Standard 15 – Safety Code for Mechanical Refrigeration.
2. ASHRAE 90.1 – Energy Efficiency Compliance.
3. ANSI/NFPA – Standard 70 – National Electrical Code (N.E.C.)
4. ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
5. ASHRAE 34 – Number Designation and Safety Classification of Refrigerants.
6. ARI Standard 550/590 – Positive Displacement Compressors and Water Cooled Rotary Screw Water-Chilling Packages.
7. Conform to UL code 1995 for construction of chillers and provide ETL/cETL listing label.
8. Manufactured in facility registered to ISO 9001.
9. OSHA – Occupied Safety and Health Act.

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.

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

Emergency Shutdown

In case of emergency, the control panel is fitted with a Unit Switch to stop the unit in an emergency. When operated, it removes the low voltage 120 VAC electrical supply from the inverter system, thus shutting down the unit.

SECTION 2 – PRODUCT DESCRIPTION

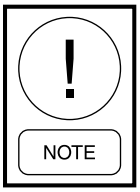
INTRODUCTION

Quantech QWC3 chillers are designed for water or water-glycol cooling.

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

The unit consists of up to 6 scroll compressors in a corresponding number of separate refrigerant circuits, a shell and tube DX evaporator, a water cooled condenser and oil separators for each circuit.

Before delivery, the unit is pressure tested, evacuated, and fully charged with environmentally friendly refrigerant (R410A) and Quantech oil in each of the independent refrigerant circuits.



Models QWC3050 to 0150 use POE synthetic "V"oil, Models QWC3170 to 200 use "PVE"oil.

After assembly, an operational test is performed with water flowing through the cooler to ensure that each refrigerant circuit operates correctly.

The unit framework is fabricated using heavy-gauge galvanized steel which is zinc phosphate pre-treated and powder coated to minimize corrosion.

COMPRESSORS

The chiller utilizes suction-gas cooled hermetic, scroll compressors. The QWC3 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. All compressors are mounted on isolator pads to reduce transmission of vibration to the rest of the unit.

REFRIGERANT CIRCUITS

Two independent refrigerant circuits are provided on each unit. Each circuit uses copper refrigerant pipe formed on computer controlled bending machines to reduce the number of brazed joints resulting in a pliable and leak resistant system.

Liquid line components include: a service valve with charging port, a high absorption removable core filter-drier, a solenoid valve, a sight glass with moisture indicator and a thermal expansion valve. Liquid lines between the expansion valve and the cooler are covered with flexible, closed-cell insulation.

Suction line components include: a pressure relief valve, a pressure transducer and a service valve. Optional isolation ball valves are available. Suction lines are covered with flexible, closed-cell insulation.

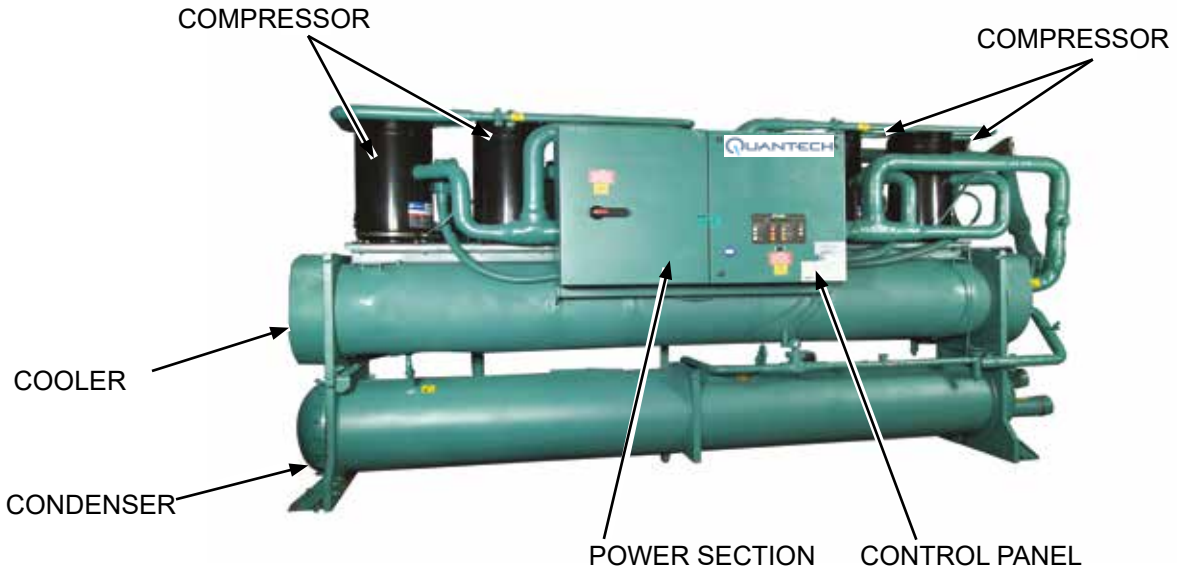


FIGURE 1 - QWC3 WATER COOLED LIQUID CHILLER

Discharge lines include service and isolation (ball) valves, two high-pressure cutout switches, a pressure transducer and a pressure relief valve.

EVAPORATOR

The dual-circuit evaporator will be the direct-expansion type, with refrigerant in the tubes and chilled liquid flowing through the baffled shell. The design working pressure of the shell (liquid) side will be 150 PSIG (10.3 bar), and 400 PSIG (27.6 bar) for the tube (refrigerant) side. The refrigerant side is protected by pressure relief valve(s).

The evaporator shall have water pass baffles fabricated from galvanized steel to resist corrosion. Removable heads are provided for access to internally enhanced, seamless, copper tubes. Water vent and drain connections are included. The cooler is insulated with 3/4" (19mm) flexible closed-cell foam.

Water Connection to the evaporator is via ANSI/ AWWA C-606 grooved connections. Flange connections are available as an option. The shell will be constructed and tested in accordance with Section VII, Division 1 of the ASME Pressure Vessel Code. The water side is exempt per paragraph U-1 (ºC) of Section VII, Division 1 of the ASME Pressure Vessel Code.

The evaporator is constructed and tested in accordance with applicable sections of the ASME Pressure Vessel Code, Section VIII, Division (1). The water side will be exempt per paragraph U-1, (ºC) (6).

A strainer with a mesh size between .5 and 1.5 mm (40 mesh) is recommended upstream of the evaporator to prevent clogging.

CONDENSER

The dual refrigerant circuit water-cooled condenser is a cleanable shell and tube type with seamless external finned copper tubes rolled into tube sheets. The design working pressures are 150 PSIG (10.3 barg), integral subcooling is part of the design on the waterside and 560 PSIG (38.6 barg) on the refrigerant side which is protected by pressure relief valve(s).

The condenser has removable steel water heads. The water nozzles are provided with grooves for victualic couplings.

The shell is constructed and tested in accordance with Section VII, Division 1 of ASME Pressure Vessel Code. The water side is exempt per paragraph U-1, (C), (6) of Section VII, Division 1 of ASME Pressure Vessel Code. The condenser is equipped with relief valves and will hold the full refrigerant charge for pumpdown.

REFRIGERANT CIRCUIT

Two independent refrigerant circuits will be furnished on each unit. All piping will be copper with brazed joints. The liquid line will include: a shutoff valve with charging port; sight-glass with moisture indicator; thermal expansion valve; solenoid valve; and high absorption removable-core filter drier. The entire suction line and the liquid line between the expansion valve and the cooler will be insulated with flexible, closed-cell, foam insulation.

MICROPROCESSOR CONTROL CENTER

All controls and motor starting equipment necessary for unit operation are factory wired and function tested. The panel enclosures are designed to NEMA 1 (IP 32) and manufactured from powder-painted galvanized steel.

- Two character Liquid Crystal Display with Light Emitting Diode backlighting for outdoor viewing:
    - Two display lines
    - Twenty characters per line
- Color coded 12-button non-tactile keypad with sections for:
    - Control supply fuses and connections for a remote emergency stop device.
    - ON/OFF rocker switch, microcomputer keypad and display, microprocessor board, I/O expansion board, relay boards, and 24V fused power supply board.
    - Customer terminal block for control inputs and liquid flow switch.

The microprocessor control includes:

- Automatic control of compressor start/stop, anticoincidence and anti-recycle timers, automatic pumpdown on shutdown, evaporator pump and unit alarm contacts. Automatic reset to normal chiller operation after power failure.
- Remote water temperature reset via a pulse width modulated (PWM) input signal or up to two steps of demand (load) limiting.
- Software stored in non-volatile memory (EPROM), with programmed setpoints retained in a lithium battery backed Real Time Clock (RTC) memory for a minimum of five years.
- Forty character liquid crystal display, with description available in five languages (English, French, German, Spanish or Italian).

Programmable setpoints

- Chilled liquid temperature setpoint and range
- Remote reset temperature range
- Set daily schedule/holiday for start/stop
- Manual override for servicing
- 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)

Displayed Data

- Return and leaving liquid temperature
- Low leaving liquid temperature cutout setting
- Metric or Imperial data
- Discharge and suction pressure cutout settings
- System discharge and suction pressure
- Anti-recycle timer status for each compressor
- Anti-coincident system start timer condition
- Compressor run status
- No cooling load condition
- Day, date and time
- Daily start/stop times
- Holiday status
- Automatic or manual system lead/lag control
- Lead system definition
- Compressor starts and operating hours (each compressor)
- Run permissive status
- Number of compressors running
- Liquid solenoid valve status
- Load and unload timer status
- Water pump status

System Safeties

Cause individual compressors to perform auto shut down and require manual reset in the event of three trips in a 90-minute time period:

- High discharge pressure
- Low suction pressure
- High pressure switches
- Motor protector

Unit Safeties

Unit Safeties are automatic reset and cause all compressors to shut down:

- Low leaving chilled liquid temperature
- Under voltage
- Loss of liquid flow (through flow switch)
- Low battery

Power and Control Panels

All power and controls are contained in an IP32 cabinet with hinged, latched and gasket sealed outer doors.

POWER PANEL

The power panel includes:

- A factory mounted Non-fused Disconnect Switch with external, lockable handle to enable connection of the unit power supply. The disconnect switch can be used to isolate the power for servicing.
- Factory mounted compressor contactors and manual motor starters to provide overload and short circuit protection.
- Factory mounted control transformer to convert the unit supply voltage to 115V, 1-phase, 60Hz for the control system.

ACCESSORIES AND OPTIONS

Power Options

Single Point Supply Terminal Block

The standard power wiring connection on all models is a single point power connection to a factory provided terminal block. Components included are the enclosure, terminal-block and interconnecting wiring to the compressors. Separate external protection must be supplied, by others, in the incoming 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.) (**Factory-Mounted**)

Single Point Non-Fused Disconnect Switch

An optional 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. (**Factory-Mounted**)

Single Point Circuit Breaker

An optional 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. (**Factory-Mounted**)

Multiple Point Circuit Breaker

Optional multipoint supply with independent system circuit breakers and locking external handles (in compliance with Article 440-14 of N.E.C) can be factory supplied. Selecting this option also selects optional compressor external overload for reduced MCA. **(Factory-Mounted)**.

Control Transformer

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

Compressor External Overloads

Optional compressor motor overloads can be factory mounted in the unit control/power panel. This option will reduce the chiller MCA (minimum circuit ampacity) and allow for reduced wire sizing to the unit. This option is not available for applications with Leaving Condenser Water Temperature (LCWT) greater than 110ºF (43ºC). (**Factory-Mounted**)

Controls Options

Building Automation System Interface

A standard feature of the QWC3 control panel to accept a pulse width modulated (PWM), 4 to 20 milliamp, or 0 to 10VDC input to reset the leaving chilled liquid temperature from a Building Automation System. (**Factory-Mounted**)

Language LED and Keypad

Standard display language and keypad is in English. Spanish, French, German, and Italian are available as an option. (**Factory-Mounted**)

Heat Exchanger Options

Flow Switch

An optional flow switch can be factory supplied for the evaporator. Vapor-proof SPDT, NEMA 3R switch, 150 PSIG (10.3 bar) DWP, 20°F to 250°F (-29°C to 121°C) with 1” NPT (IPS) connection for upright mounting in horizontal pipe. The flow switch or its equivalent must be furnished with each unit. (**Field mounted**)

Differential Pressure Switch

This is an alternative option to the paddle-type flow switch. It has a 3 to 45 PSIG (0.2 to 3 bar) range with ¼" NPTE pressure connections. (**Field Mounted**)

Pressure Vessel Codes

Evaporators and condensers are to be supplied (standard) in conformance with the A.S.M.E. pressure codes.

Raised Face Flange (ANSI/AWWA C-606 Type)

Consists of (4) flange adapters for grooved end pipe on evaporator and condenser (note: the 0056SE, 0064SE, and 0074SE units do not include condenser flanges). Standard 150 psi (10.3 bar).

(Field mounted, matching pipe flange by contractor.)

Double Thick Insulation

Double thick (1-1/2") insulation provided on the evaporator. (**Factory-Mounted**)

Chiller Options

Final Paint Overspray

Overspray painting of unit after assembly. (**Factory-Mounted**)

Service Isolation Valve

Service suction isolation valve added to unit per system in addition to the standard discharge service valve. (**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 evaporator. Hot gas by-pass is installed on only refrigerant system #2 on two-circuited units. (**Factory-Mounted**)

Chicago Code Relief Valves

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

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" (15mm) thickness; one layer of anti-vibrating heavy material thickness of 1/8" (3mm). Both are closed by two sheets of welded PVC, reinforced for temperature and UV resistance. (**Factory- Mounted**)

Non Reversing Heat Pump

Unit configured for optional operating mode controlled by leaving condenser water temperature. Temperature setpoint user adjust from 86°F to 122°F (30°C to 50°C), default 122°F (50°C). While operating in this mode, chiller will stage compressors to maintain heating setpoint provided there is sufficient cooling demand. Unit can be changed from heat pump to chiller mode locally or through BAS. Unit leaving evaporator water temperature will float based on heating output while in this mode, making this option ideal for applications that do not require a constant evaporator leaving temperature or for multiple (series) chiller install Option requires factory startup and adds one day startup labor for field configuration. Requires evaporator leaving temperature above 40°F (4°C) while heat pump is in operation. **(Factory-Mounted)**

Vibration Isolation

Elastometric Isolation

Recommended for normal installations. Provides very good performance in most applications for the least cost. (**Field-mounted**)

1" Spring Isolators

Level adjustable, spring and cage type isolators for mounting under the unit base rails. 1" nominal deflection may vary slightly by application. (**Field -Mounted**)

2" Seismic Isolators

Restrained Spring-flex Mountings incorporate a rugged welded steel housing with vertical and horizontal limit stops. Housings designed to withstand a minimum 1.0g accelerated force in all directions to 2". Level adjustable, deflection may vary slightly by application. (**Field-Mounted**)

CONTROL / POWER PANEL COMPONENTS

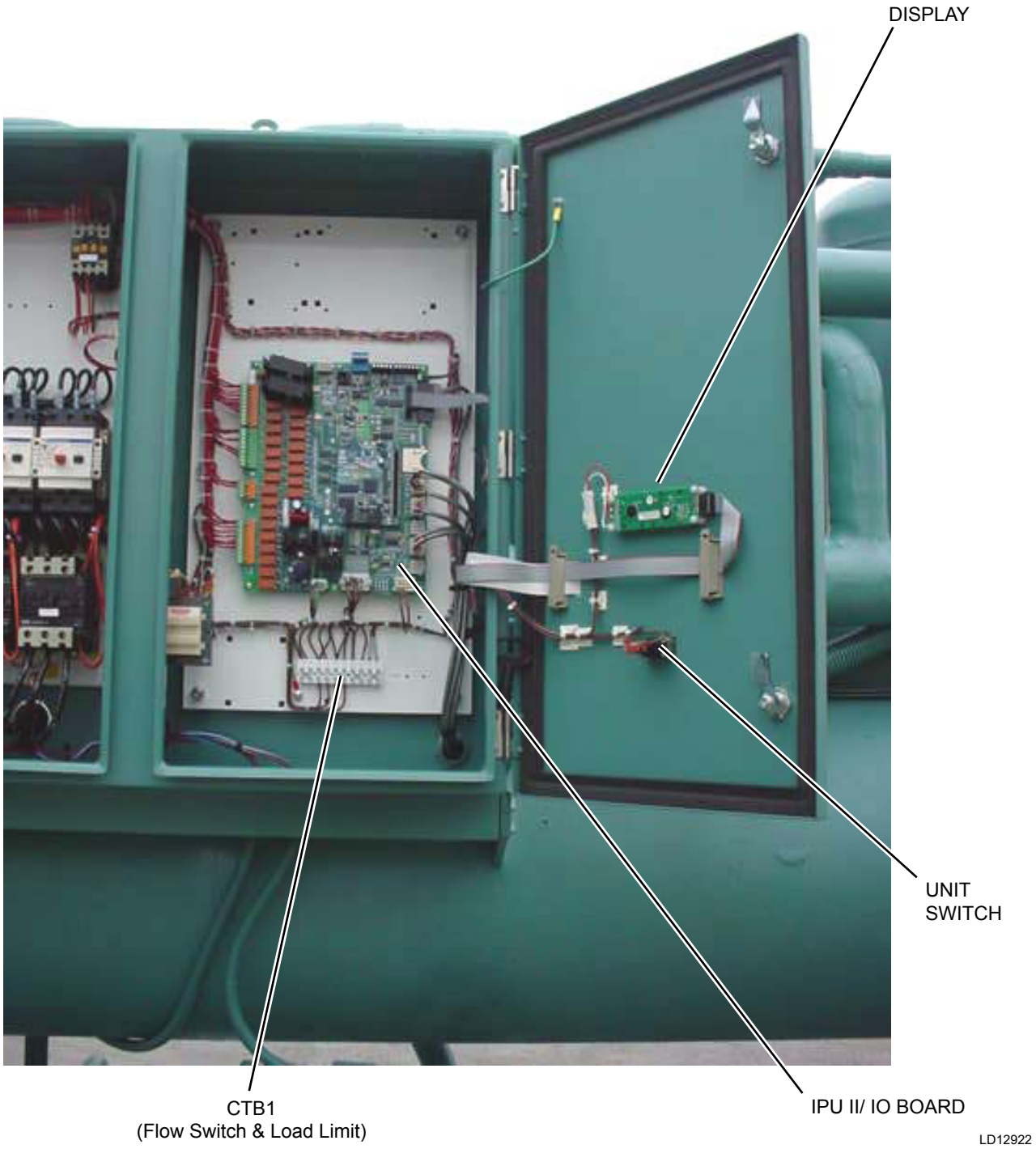


FIGURE 2 - CONTROL / PANEL COMPONENTS

CONTROL / POWER PANEL COMPONENTS (CONT'D)

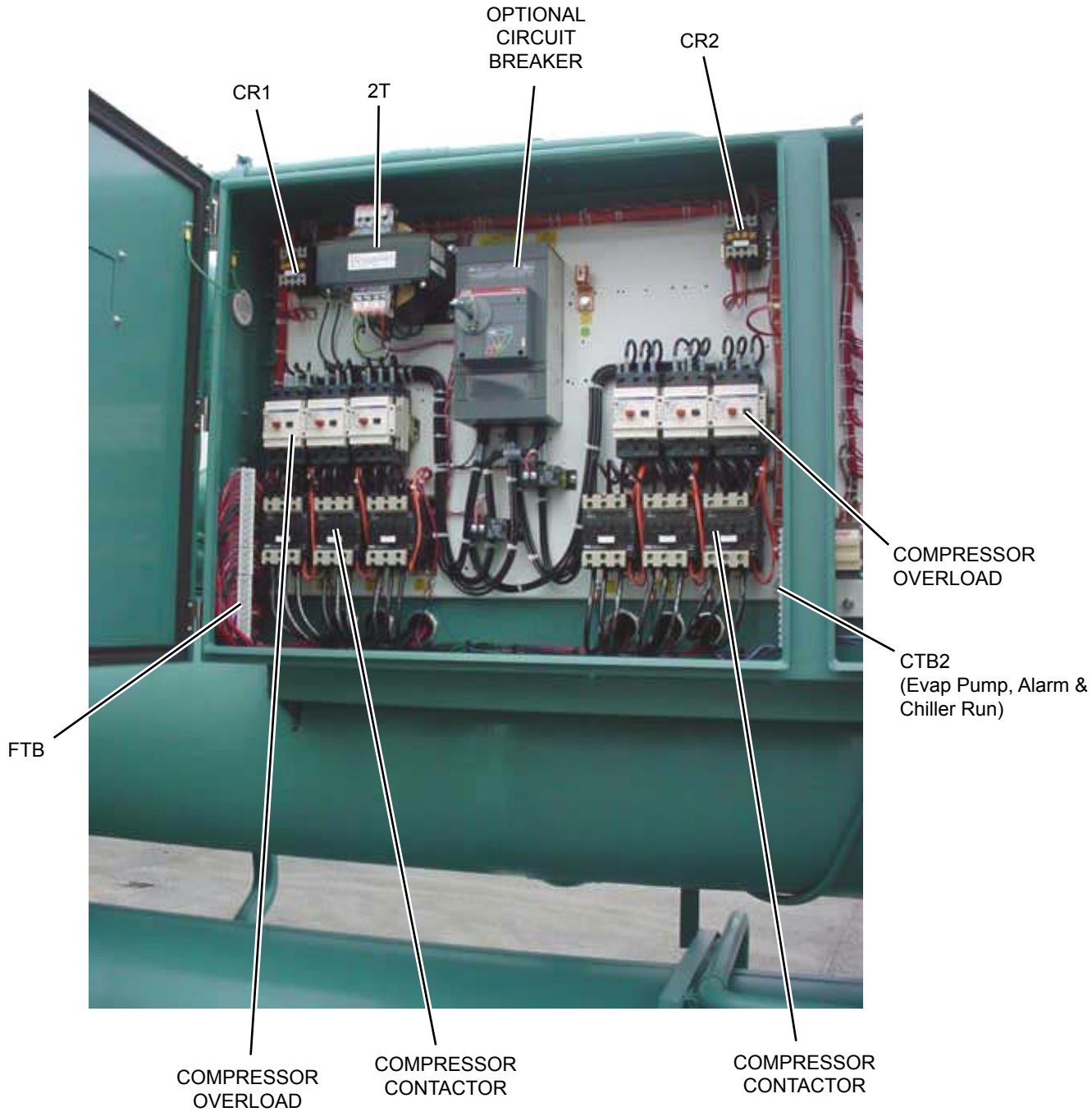


FIGURE 3 - CONTROL POWER PANEL COMPONENTS

UNIT COMPONENTS

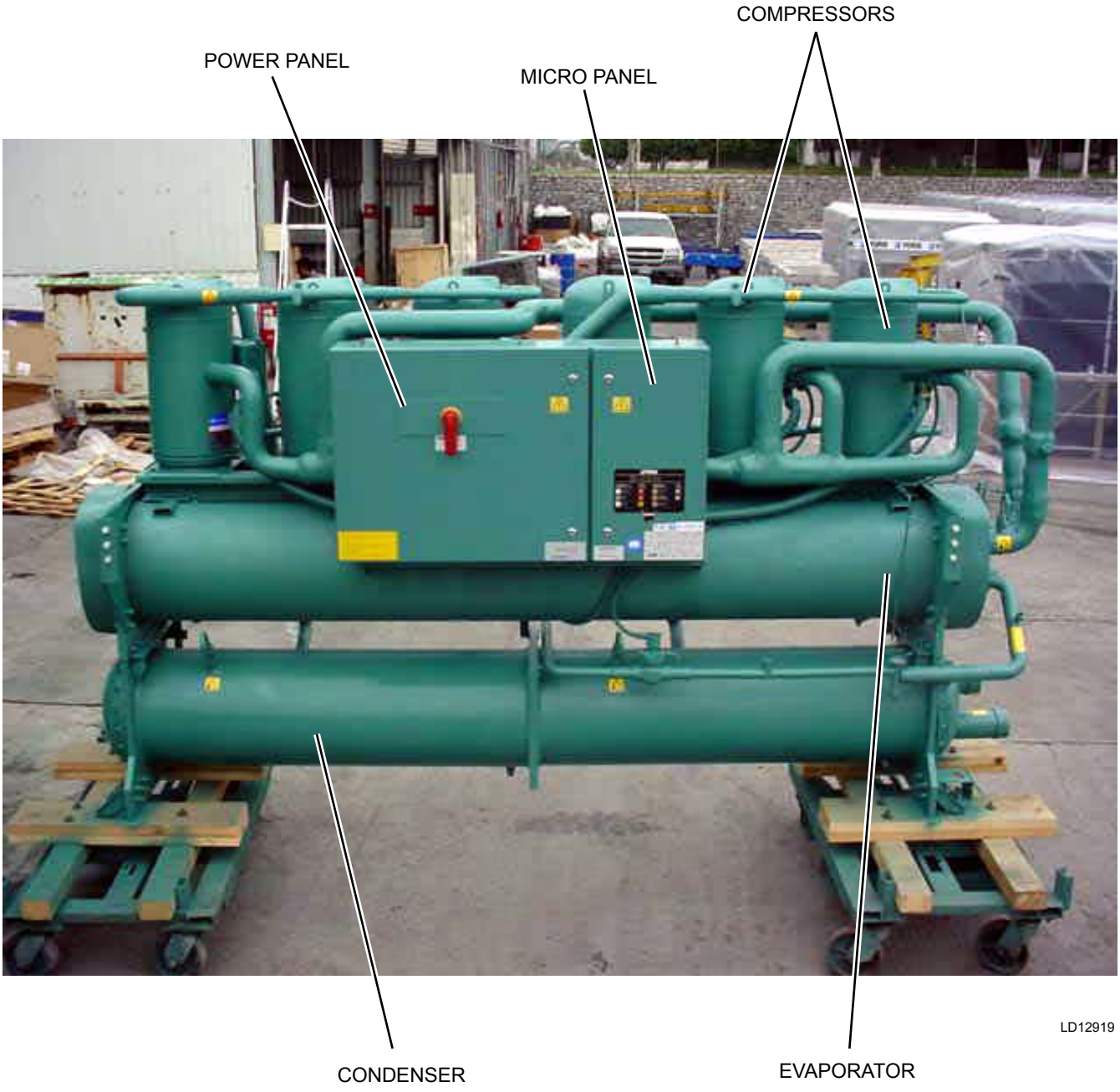


FIGURE 4 - UNIT COMPONENTS

UNIT COMPONENTS (CONT'D)

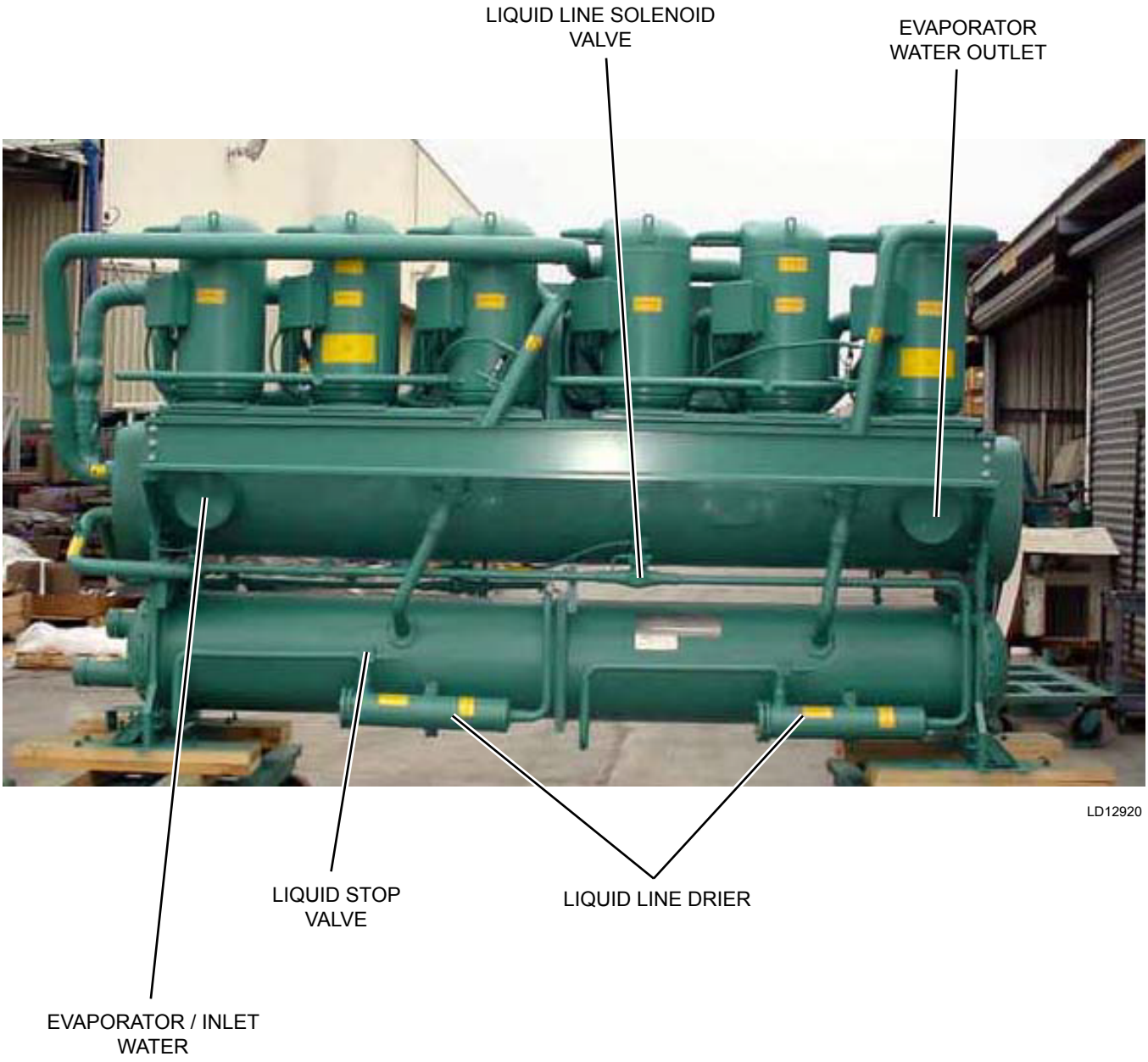


FIGURE 5 - CONTROL / POWER PANEL COMPONENTS DUAL SYSTEM UNITS

PRODUCT IDENTIFICATION NUMBER (PIN)

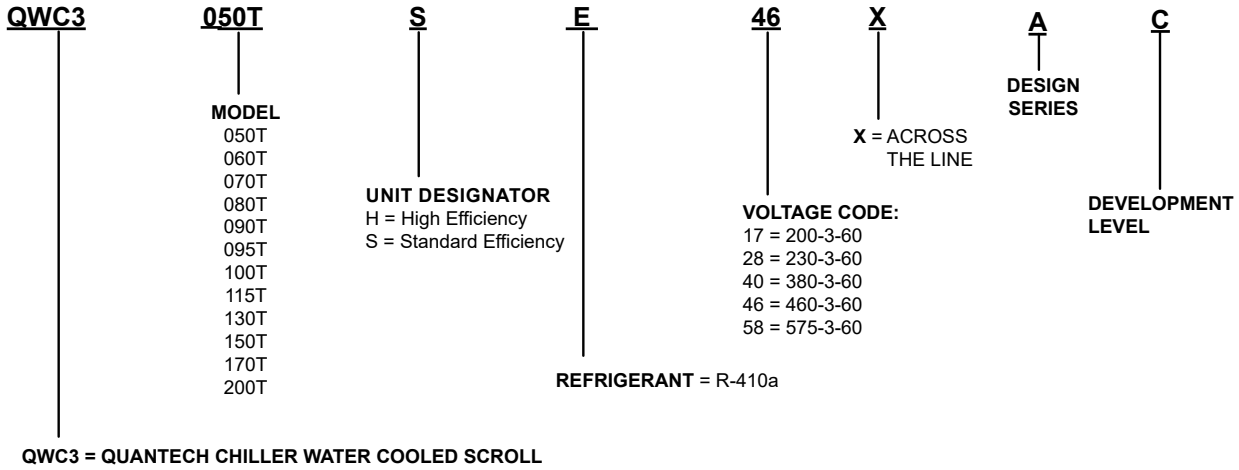


TABLE 1 - PRODUCT IDENTIFICATION NUMBER

FEATURE	FEATURE DESCRIPTION	OPTION	OPTION DESCRIPTION
CONTRACT	Contract Number	NUM	Contract Number = {CONTRACT/NUM}
ORDER	Order quantity	QTY	Order quantity = {ORDER/QTY}
MODEL	Model (PIN 1-4)	QWC3	QWC3
CAP	Capacity (PIN 5-8)	050T	050
		060T	060
		070T	070
		080T	080
		090T	090
		095T	095
		100T	100
		115T	115
		130T	130
		150T	150
		170T	170
		200T	200
UNIT	Unit Designator (PIN 9)	H	High Efficiency Unit
		S	Standard Efficiency Unit
REF	Refrigerant (PIN 10)	E	R-410A
VOLTS	Voltage (PIN 11 and 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 Start
		T	Soft Start
DESIGN	Design Series (PIN 14)	A	Design Series A
DEV	Development Level (PIN 15)	C	Development Level A, B, or C

TABLE 1 - PRODUCT IDENTIFICATION NUMBER (CONT'D)

FEATURE	FEATURE DESCRIPTION	OPTION	OPTION DESCRIPTION
POWER	Power Field (PIN 16 and 17)	XX	Standard Power Option (SP Supply Terminal Block)
		BX	SP Circuit Breaker w/ Lockable Handle
		SD	SP Supply NF Disconnect Switch
		MB	MP Supply w/Ind Sys CB and L Ext Handles
		QQ	Special Quote
TRANS	Control Transformer (PIN 18)	X	No option
		T	Control Transformer (factory)
		Q	Special Quote
PFC	Power Pin Capacitor (PIN 19)	X	No option
		C	Power Factor Capacitor
		Q	Special Quote
PIN20	PIN 20	X	No option
		Q	Special Quote
BAS	BAS Interface (PIN 21)	X	BAS/EMS Temp Reset/Offset (Standard)
		Q	Special Quote
		L	LON E-Link Kit (Factory)
LCD	Language (PIN 22)	X	Standard (English) LCD and Keypad Display
		F	French LCD and Keypad Display
		G	German LCD and Keypad Display
		I	Italian LCD and Keypad Display
		S	Spanish LCD and Keypad Display
		Q	Special Quote
RDOUT	Readout Kits (PIN 23)	X	Both Discharge and Suction Pressure Transducers / Readout (Standard)
		Q	Special Quote
SAFETY	Safety Codes (PIN 24)	C	European Safety Code (CE)
		L	N American Safety Code (cUL/cETL)
		Q	Special Quote
HPUMP	Heat pump (PIN 25)	X	No option
		H	Heat Pump
		Q	Special Quote
CTEMP	Condenser Water Temp (PIN 26 and 27)	XX	No option
		NUM	Leaving Condenser Water Temp = {CTEMP/NUM} degrees
		Q	Special Quote
PIN 28	PIN 28	X	No Sequence Kit
		Q	Special Quote
TEMP	Evaporator Water Temp (PIN 29 and 30)	NUM	Leaving Evaporator Water Temp = {TEMP/NUM} degrees
		Q	Special LST requirements

TABLE 1 - PRODUCT IDENTIFICATION NUMBER (CONT'D)

FEATURE	FEATURE DESCRIPTION	OPTION	OPTION DESCRIPTION
CHICAGO	Chicago Code Kit (PIN 31)	X	No option
		B	Both Service Isolation Valves (Suction) and Chicago Code Relief
		C	Chicago Relief Code Relief
		F	Both Suction Isolation Valves and Pressure Relief Service Kit
		G	Both Suction Isolation Valves and Dual Relief Valves
		P	Pressure Relief Service Kit
		R	Dual Relief Valves
		S	Service Isolation Valves (Suction)
		Q	Special Quote
VALVES	Valves (PIN 32)	X	Solenoid Valves (liquid line)
		E	Electronic Expansion Valve
		Q	Special Quote
HGBP	Hot Gas By-Pass (PIN 33)	X	No option
		1	Hot Gas By-Pass (1 circuit)
		Q	Special Quote
PIN34	(PIN 34)	X	No option
		Q	Special Quote
OVERLOAD	Compressor Overloads (PIN 35)	X	No option
		E	Compressor External Overloads
		Q	Special Quote
PRESSURE	Pressure Control (PIN 36)	X	No option
		Q	Special Quote
PIN 37	(PIN 37)	X	No option
		Q	Special Quote
DWP	DWP (PIN 38)	X	150psig DWP Waterside
		Q	Special Quote
INS	Insulation (PIN 39)	X	Single Thick Insulation
		D	Double Thick Insulation
		Q	Special Quote
FLANGES	Flanges (PIN 40)	X	No Flange Kit
		V	ANSI/AWWA C-606 Flange Kit
		Q	Special Quote
EVAPFLOW	Evap Flow Switch (PIN 41)	X	No Flow Switch
		D	One Differential Pressure Switch/chiller
		E	Two Differential Pressure Switches/chiller
		F	Three Differential Pressure Switches/chiller
		S	One Flow Switch/chiller
		T	Two Flow Switches/chiller
		U	Three Flow Switches/chiller
		Q	Special Quote
VESSEL	Vessel Codes (PIN 42)	A	ASME Pressure Vessel and Associated Codes
		E	European "CE" Pressure Vessel Directive
		Q	Special Quote

TABLE 1 - PRODUCT IDENTIFICATION NUMBER (CONT'D)

FEATURE	FEATURE DESCRIPTION	OPTION	OPTION DESCRIPTION
PIN43	(PIN 43)	X	No option
		Q	Special Quote
PIN44	(PIN 44)	X	No option
		Q	Special Quote
PIN 45	(PIN 45)	X	Copper Tubes
		Q	Special Quote
HEAT	Heat Recovery (PIN 46)	X	No option
		Q	Special Quote
CONDFLOW	Condenser Flow Switch (PIN 47)	X	No option
		Q	Special Quote
PIN48	(PIN 48)	X	No option
		Q	Special Quote
ACOUSTIC	Acoustical Arrgt. (PIN 49)	X	No Acoustic Enclosure
		B	Compressor Sound Blanket
		Q	Special Quote
SRDOCS	SR Documents (PIN 50)	X	No Documents Required
		A	Base, Material and Witness Documents
		B	Base Document
		M	Base and Material Documents
		W	Base and Witness Documents
		Q	Special Quote
FORM	Shipment Form (PIN 51)	X	Form 1 Shipment (complete unit with full charge)
		Q	Special Quote
PIN52	(PIN 52)	X	No option
		Q	Special Quote
PAINT	Overspray Paint (53)	X	No Final Overspray Paint
		S	Final Overspray Paint
		Q	Special Quote
ISOL	Isolators (PIN 54)	X	No Isolators
		1	1" Deflection
		N	Neoprene
		S	Seismic
		Q	Special Quote

REFRIGERANT FLOW

Refrigerant Flow Diagram

Low-pressure liquid refrigerant enters the evaporator tubes and is evaporated and superheated by the heat energy absorbed from the chilled liquid passing through the evaporator shell. Low-pressure vapor enters the compressor where pressure and superheat are increased. High-pressure vapor is passed through the condenser where heat is rejected to the condenser water passing through the tubes. The fully condensed and subcooled liquid leaves the condenser and enters the expansion valve, where pressure reduction and further cooling take place. The low pressure liquid refrigerant then returns to the evaporator.

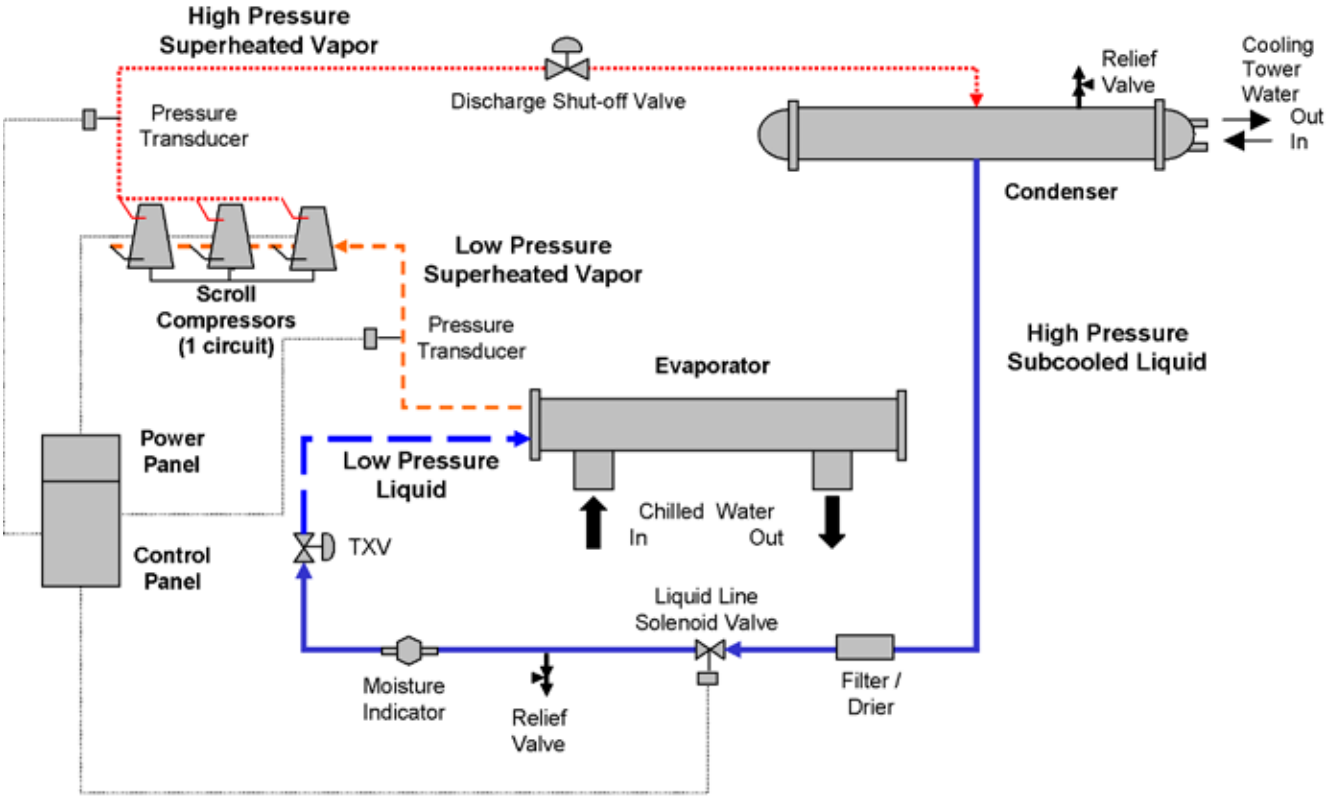


FIGURE 6 - REFRIGERANT FLOW DIAGRAM

QWC3

Low-pressure liquid refrigerant enters the cooler tubes and is evaporated and superheated by the heat energy absorbed from the chilled liquid passing through the cooler shell. Low-pressure vapor enters the compressors where pressure and superheat are increased. High pressure superheated refrigerant enters the condenser shell where heat is rejected to the condenser water passing through the tubes. The fully condensed and subcooled liquid leaves the condenser and enters the expansion valve, where pressure reduction and further cooling takes place. The low pressure liquid refrigerant then returns to the cooler.

QRC3

Low-pressure liquid refrigerant enters the cooler tubes and is evaporated and superheated by the heat energy absorbed from the chilled liquid passing through the cooler shell. Low-pressure vapor enters the compressor where pressure and superheat are increased. The high pressure superheat refrigerant enters the remote air cooled condenser where heat is rejected via the condenser coil and fans. The fully condensed and subcooled liquid leaves the remote air cooled condenser and enters the expansion valve, where pressure reduction and further cooling takes place. The low-pressure liquid refrigerant then returns to the cooler.

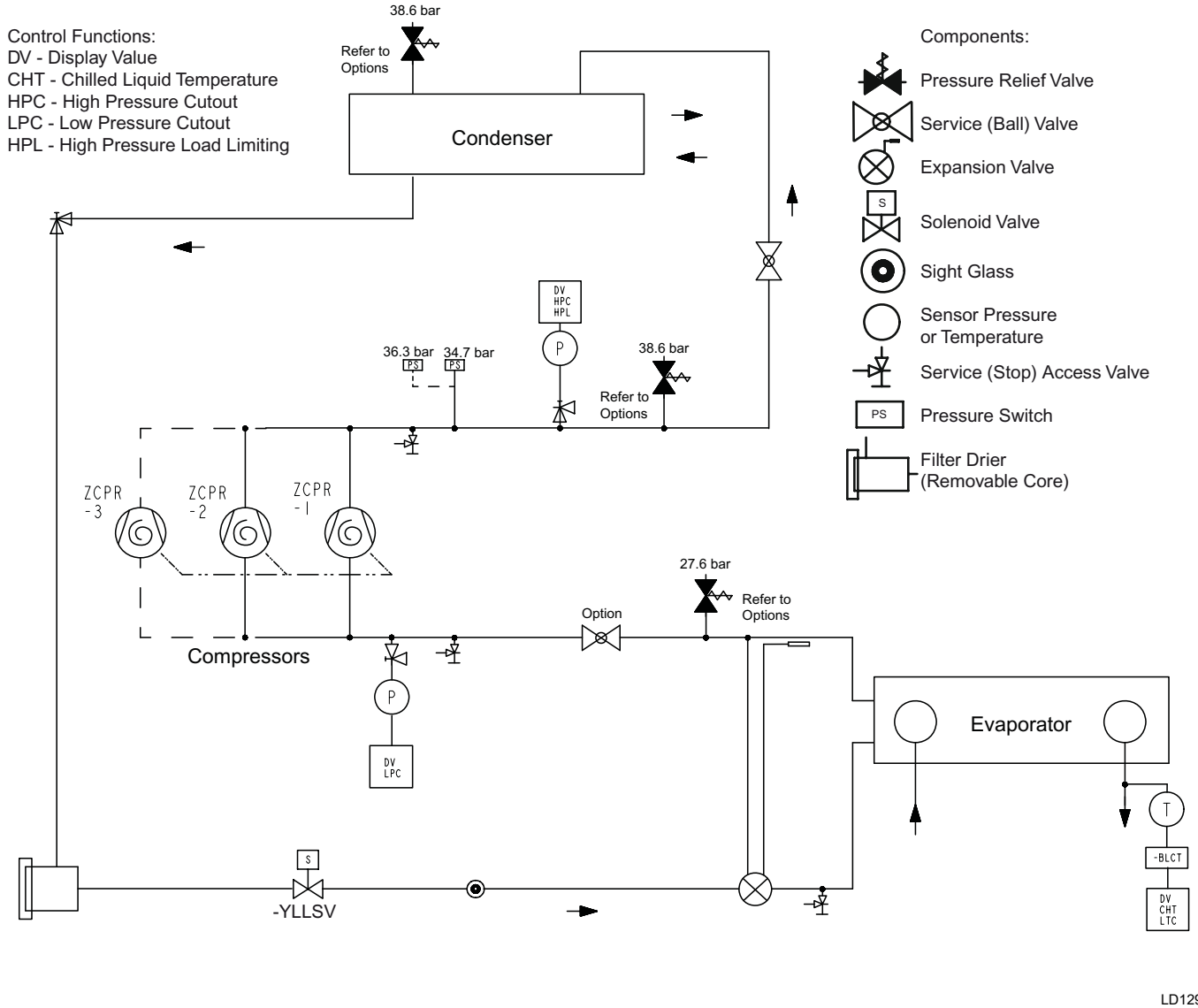


FIGURE 7 - PROCESS AND INSTRUMENTATION DIAGRAM

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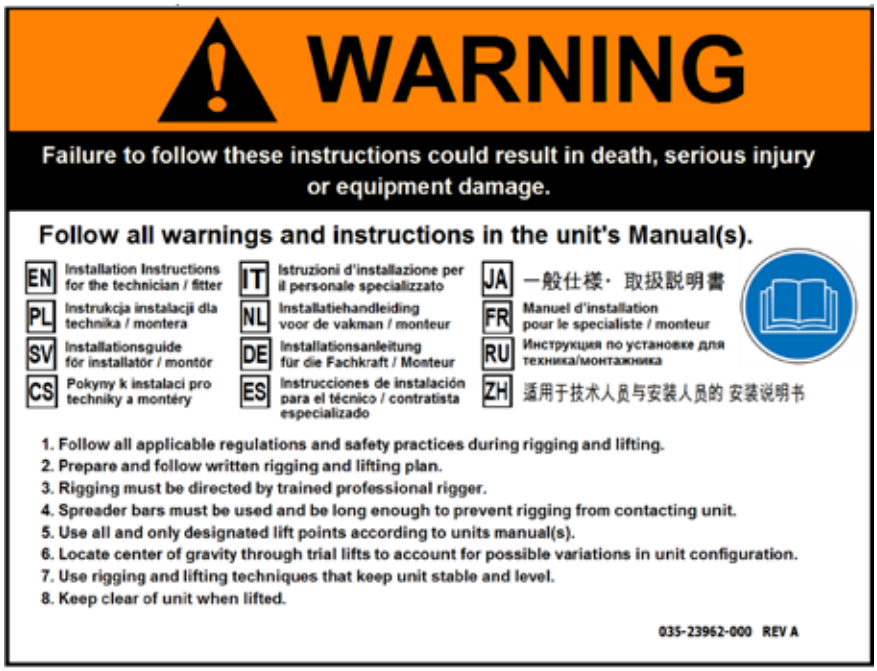
SECTION 3 – TRANSPORTATION, HANDLING AND STORAGE



DANGER

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

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 this has been specified on the Sales Order.

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

Refer to and comply with procedures noted in the document titled *Long-Term Storage Requirements General (Form 50.20-NM1)*.

Ensure that all openings, such as water connections, are securely capped.

Do not store where exposed to ambient air temperatures exceeding 107°F (42°C).

The unit should be stored in a location where there is minimal activity 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

Immediately upon receiving the unit, it should be inspected for possible damage which may have occurred during transit. If damage is evident, it should be noted in the carrier's freight bill.

Major damage must be reported immediately to your local Quantech representative.

MOVING THE UNIT

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

The units are designed to be lifted using either lifting chains or a fork lift.

Lifting by Crane / Hoist

A spreader frame should be used to prevent damage to the unit from the lifting chains *(see Figure 8 on page 30)*.

NOTE

The unit must only be lifted at the points provided.

LIFTING WEIGHTS

For details of weights and weight distribution see *Figure 8 on page 30.*

FIGURE 8 - CHILLER RIGGING AND LIFTING WEIGHTS

LIFTING WEIGHTS - STANDARD EFFICIENCY (SE)										
QWC3 MODEL - LBS. (KG)										
050TSE	060TSE	070TSE	080TE	090TSE	100TSE	115TSE	130TSE	150TSE	170TSE	200TSE
3515 (1594)	3883 (1761)	4061 (1842)	4489 (2036)	5023 (2278)	5157 (2339)	5155 (2338)	5603 (2541)	7189 (3261)	7318 (3319)	7673 (3480)

LIFTING WEIGHTS - HIGH EFFICIENCY (HE)							
QWC3 MODEL - LBS. (KG)							
060THE	070THE	080THE	090THE	095THE	115THE	130THE	150THE
4533 (2056)	4911 (2228)	5089 (2308)	5773 (2619)	6253 (2836)	5905 (2678)	7087 (3215)	6863 (3113)

SECTION 4 – INSTALLATION

To ensure warranty coverage, this equipment must be commissioned and serviced by an authorized Quantech 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

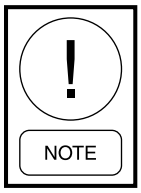
The following items, 1 through 5, must be checked before placing the units in operation.

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 *(see ASHRAE handbook Section 215 and 195).*
5. Check to see that the unit is installed and operated within limitations *(see LIMITATIONS in SECTION 5 – TECHNICAL DATA).*

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

LOCATION REQUIREMENTS

To achieve optimum performance and trouble-free service, it is essential that the proposed installation site meets with the location and space requirements for the model being installed. For dimensions, weight and space requirements, including service access details, see *SECTION 5 – TECHNICAL DATA.*



The clearances recommended are nominal for the safe operation and maintenance of the unit and power and control panels. Local health and safety regulations, or practical considerations for service replacement of large components, may require larger clearances than those given in Section 5.

Units should be installed indoors where they are not exposed to rain or water splash. Chillers should be located near a drain. The use of chillers in corrosive, dusty or explosive atmospheres should be avoided unless the unit is properly protected. A unit in a clean room will run best, require least maintenance, and last longest. Heat or ventilation may be required to maintain the ambient between 40°F and 115°F (4.4°C and 46.1°C).

Units are designed for indoor installation and not intended for wet, corrosive or explosive atmospheres. Installation should allow for water drain, ventilation and sufficient clearance for service, including tube cleaning.

UNIT ISOLATION (NOISE SENSITIVE LOCATION)

For installation in equipment rooms near noise-critical areas, common walls should be of adequate sound attenuating construction, all doors should be tightly gasketed, and the unit should have vibration isolators fitted.

FOUNDATION

The unit must be installed on a suitable flat and level concrete base that extends to fully support the unit base frame. The chiller foundation must be rigid to reduce vibration transmission to a minimum. All upper story installations should use vibration isolators under the unit base. To maintain isolator efficiency, no mechanical ties should be made to the building. Properly selected flexible connectors and piping isolators are recommended. All the above recommendations will help to reduce vibration transmission and ‘result in a quieter operation.

On basement foundations remove a portion of the basement floor so that a concrete base can be poured resting on the ground, with a corkboard installed on both sides, and a waterproof sealing compound.

The concrete base must capable of supporting 150% of the operating weight. In case of upper floors, the unit and piping should be isolated from walls and ceiling. The unit may be bolted to the foundation using 1/2" (13 mm) diameter holes in the base of the framework. When lower transmitted vibration levels are required optional anti-vibration isolators can be supplied loose for site installation.

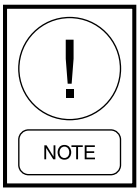
INSTALLATION OF VIBRATION ISOLATORS

An optional set of vibration isolators can he supplied loose with each unit *(see SECTION 5 – TECHNICAL DATA for details).*

PIPEWORK CONNECTION

General Requirements

The following piping 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.



The maximum flow rate and pressure drop for the cooler and condenser must not be exceeded at any time. See *SECTION 5 – TECHNICAL DATA* ***for details.***

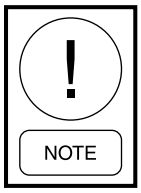
The water must enter the heat exchanger(s) by the inlet connection. *See SECTION 5 – TECHNICAL DATA for details.*

A flow switch or differential switch must be installed in the customer pipework at the outlet of the exchangers as shown in the arrangement diagrams, and wired back to the control panel using screened cable. There should be a straight horizontal run of at least five 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 *(see manufacturer's instructions furnished with the switch).* The switch is to be wired to terminals 13 – 14 of CTBl located in the control panel, as shown on the unit wiring diagram. This is to prevent damage to the exchanges caused inadequate liquid flow.

The flow switch used must have gold plated contacts for low voltage/current operation. Paddle type flow switches suitable for 150 PSIG (10 barg) working pressure and having 1" N.P.T. connection can be obtained from Quantech as an option for the unit.

- The liquid pump(s) installed in the pipework system(s) should discharged directly into the unit heat exchanger section of the system. The pump(s) require an auto-starter (by others) to be wired to the control panel. *For details, see Electrical Connection on page 37.*
- All chilled liquid piping should he 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.
- Pipework and fittings must he separately supported to prevent any loading on the heat exchanger(s). Flexible connections are recommended which will also minimize transmission of vibrations to the building. Flexible connections must he used if the unit is mounted on anti-vibration mounts as some movement of the unit can he expected in normal operation.
- Pipework and fittings immediately next to the heat exchangers should he readily de-mountable to enable cleaning prior to operation, and to facilitate visual inspection of the exchanger nozzles.
- Each heat exchanger must be protected by a strainer, preferably of 40 mesh, fitted as close as possible to the liquid inlet connection in both the evaporator and condenser water lines and provided with a means of local isolation.
- The heat exchanger(s) must not he exposed to flushing velocities or debris released during flushing. It is recommended that a suitably sized bypass and valve arrangement is installed to allow flushing of the pipework system. The bypass can he used during maintenance to isolate the heat exchanger with-out disrupting flow to other units.
- Thermometer and pressure gauge connections should he provided on the inlet and outlet connections of each heat exchanger.

- Drain and air vent connections should be provided at all low and high points in the pipework to permit drainage of the cooler and system, and to vent any air in the pipes.
- Liquid systems at risk of freezing, due to low ambient temperatures, should be protected using insulation and heater tape and/or a suitable glycol solution. The liquid pump(s) must also be used to ensure liquid is circulated when the ambient temperature approaches freezing point. Insulation should also he installed around the heat exchanger nozzles.
- A small valve or valves should 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 should be extended beyond the insulation to make them accessible.
- Piping must comply in all respects with applicable local plumbing codes and ordinances. In no case should the unit support the weight of connecting piping. Since elbows, tees, and valves increase pressure drop, all piping should be kept as simple as possible. Hand stop valves should be installed where required to facilitate servicing. Piping to the inlet and outlet connections of the evaporator and condenser may include high-pressure rubber hose or piping loops to ensure against water pump transmission of vibration.
- Facilities should be provided for measuring temperature and pressure in the evaporator and condenser field water piping. Drain connections should be provided at all low points to permit complete drainage of the evaporator(s), condenser(s), and system piping. This is especially important if the unit is located in an unheated room where freezing could prevail. Water lines subjected to ambient temperatures below freezing may require heater cables or antifreeze (by others).



Any debris left in the water pipework between the strainer and heat exchanger could cause serious damage to the tubes in the heat exchanger and must be avoided. The installer/user must also ensure that the quality of the water in circulation is adequate, without any dissolved gasses which can cause oxidation of steel parts within the heat exchanger(s).

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. It is recommended to interlock the auxiliary contacts of the pump contactor in series with the flow switch. The coil of the pump contactor must have a voltage suppressor installed across the terminals.

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

Liquid systems at risk of freezing, due to low ambient temperatures, should be protected using insulation and heater tape and/or a suitable glycol solution. The liquid pumps must also be used to ensure liquid is circulated when the ambient temperature approaches freezing point. Insulation should also be installed around the heat exchanger nozzles.

WATER TREATMENT

The unit performance given in the Design Guide is based on a fouling factor of 0.00025 ft^2/hr °F/BTU (0.44m^2 ºC/kW). Dirt, scale, grease and certain types of water treatment will adversely affect the heat exchanger surfaces and therefore unit performance. Foreign matter in the water system(s) can increase the heat exchanger pressure drop, reducing the flow rate and causing potential damage to the heat exchanger tubes.

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

Glycol Solutions

For unit operation with chilled liquid temperatures leaving the cooler at below 40°F (4.4°C), glycol solutions should be used to help prevent freezing. Section 9, gives recommended solution strength with water, as a percentage by weight, for the most common types of glycol. It is important to check glycol concentration regularly to ensure adequate concentration and avoid possible freeze-up in the cooler.

When using glycol solutions, pressure drops are higher than with water. Special care must be taken not to exceed the maximum pressure drop allowed.

OPTION FLANGES

One of two types of flanges may be fitted depending on the customer or local Pressure Vessel Code requirements. These are ANSI/AWWA C-606 adapter flanges or weld flanges. ANSI/AWWA C-606 adapter flanges are supplied loose for field installation and weld flanges are factory fitted. Flange dimensions are to ISO 7005 - NP10 (BS 4504 - NP10).

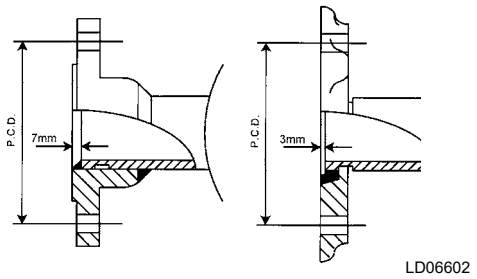


FIGURE 9 - ANSI/AWWA C-606 - ADAPTER FLANGES

REFRIGERANT RELIEF VALVE PIPING

The cooler and condenser are each protected against internal refrigerant overpressure by refrigerant relief valves.

It is recommended that each valve should be piped to the exterior of the building so that when the valve is activated the release of high pressure gas and liquid cannot be a danger or cause injury.

The size of any pipework attached to a relief valve must be of sufficient diameter so as not to cause resistance to the operation of the valve. *For piping size requirements and specifications, refer to ASHRE-15 (latest edition).*

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

Unless otherwise specified by local regulations, the internal diameter depends on the length of pipe required and is given by the following formula:

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

Where:

D = minimum pipe internal diameter (cm)

L = length of pipe (m)

The flow rate for the low side relief valve is 26.8 lb air/min.

The flow rate for the high side relief valve is 49.8 lb air/min.

CONDENSER COOLING LIQUID SYSTEMS

For primary cooling of units, condensers are usually piped in conjunction with a cooling tower, although in some cases they can be cooled by well water.

Direct Pressure Control (by others)

With liquid cooled units it is necessary to control coolant flow and/or temperature into the condenser to maintain refrigerant pressure as constant as possible to ensure satisfactory operation of the expansion valves. The refrigerant pressure can either be used to control cooling tower/dry cooler effectiveness by controlling fans or dampers on the tower, or to control condenser flow using a three way bypass valve.

The aim is to maintain a stable discharge pressure as low as possible, but at least 100 PSI above suction pressure. This can be done at a fixed value above the highest expected suction pressure, or by also measuring suction pressure and using differential control. In either case condenser cooling liquid flow and temperature limits must also be observed.

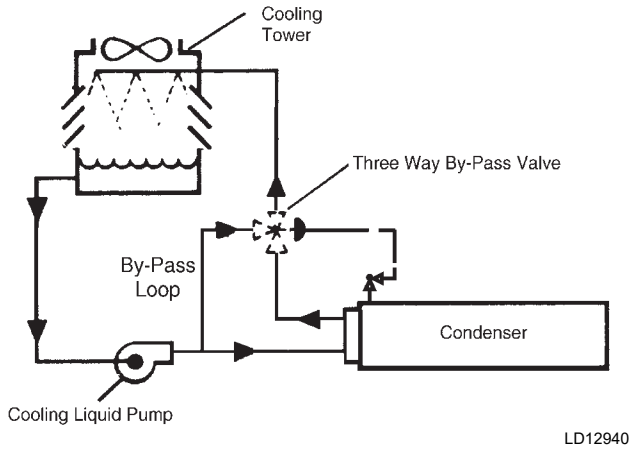


FIGURE 10 - DIRECT PRESSURE CONTROL DIAGRAM

Inlet Temperature Control (by others)

For a cooling tower/dry cooler system, the simplest forms of control are to use fan cycling, fan speed control, or air damper control, with the tower having a thermostat in its sump. This will ensure stable condenser cooling liquid temperature sensing at design conditions and should be adjusted to ensure a condenser cooling liquid entering temperature of not lower than 65°F (18°C).

If these methods are not available, or a cooling tower is not the source of cooling water, then a three way valve recirculation system can be used with control based on condenser inlet liquid temperature. In this case the objective is to maintain the inlet cooling liquid temperature as low as possible, although still observing the minimum limit of 65°F (18°C).

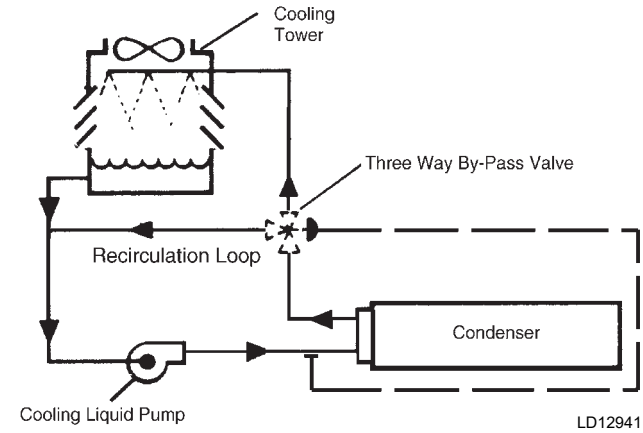


FIGURE 11 - INLET TEMPERATURE CONTROL DIAGRAM

PIPEWORK ARRANGEMENT

The following are suggested pipework arrangements for single unit installations, for multiple unit installations, each unit should be piped as shown in *Figure 12 on page 36 and Figure 13 on page 36.* **Recommendations of the Building Services Research Association.**

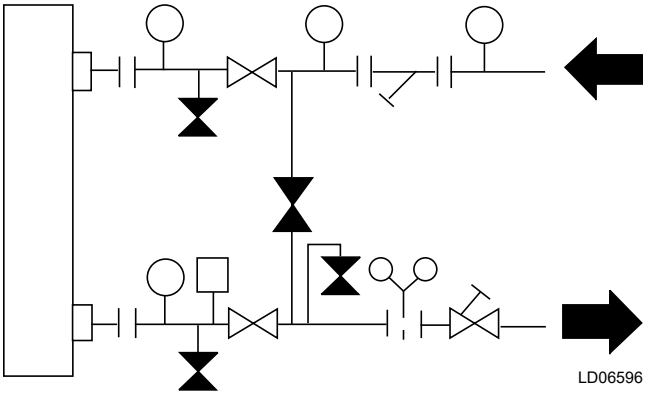


FIGURE 12 - CHILLED LIQUID SYSTEM

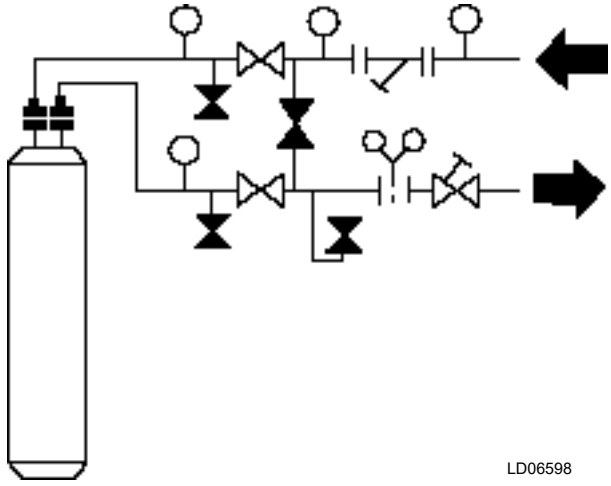


FIGURE 13 - CONDENSER COOLING LIQUID SYSTEM

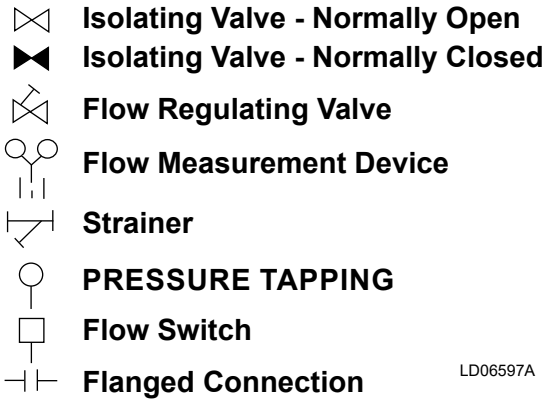


FIGURE 14 - PIPEWORK ARRANGEMENTS LEGEND

CONNECTION TYPES AND SIZES

For connection sizes relevant to individual models, see SECTION 9 – SERVICE AND TROUBLESHOOTING.

Cooler Connections

Standard chilled and condenser cooling liquid connections are of the ANSI/AWWA C-606 groove type.

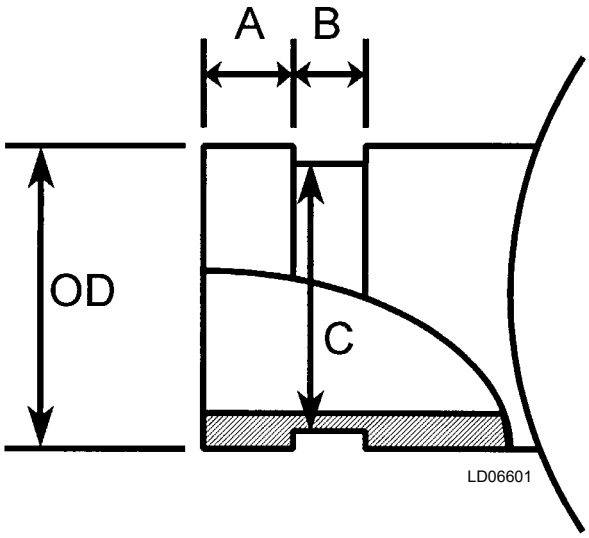


FIGURE 15 - COOLER CONNECTIONS

TABLE 2 - CONDENSER / COOLER CONNECTIONS

NOMINAL SIZE	OD	A	B	C
8”	8-5/8”	3/4 ±1/32”	7/16 ±1/32”	8.416”
6”	6-5/8”	5/8 ±1/32”	3/8 ±1/32”	6.433”
5”	5-9/16”	5/8 ±1/32”	3/8 1/32”	5.395

ELECTRICAL CONNECTION

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

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

Remote Emergency Stop Device (QRRSB)

A remote emergency stop device may be wired into the unit. This device should be rated at 8 amps, 230V.

The emergency stop device should be wired into terminals L and 5 of CTB2.

Chilled Liquid Pump (Evaporator Pump Start Contacts)

Terminals 23 and 24 on CTB1 close to start the chilled liquid pump. These terminals can be used as a master start/stop for the pump in conjunction with the daily start/stop schedule. If no schedule is set, and the customer has master control of the pump, the terminals must be used to override the customer master start/stop so that the unit can start the pump in the event of a low liquid temperature condition.

System Run Contacts

Terminals 25 and 26 (system 1) and 27 and 28 (system 2) on CTB2 close to indicate that a system is running. These terminals may be used to start the cooling liquid pump(s) for the condenser.

Alarm Contacts

Each refrigerant system has a voltage-free normally open contact that will close when control power is applied to the panel, if no fault conditions are present. When a fault occurs which locks a system out, or there is a power failure the contacts opens. To obtain a system alarm signal, connect the alarm circuit to terminals 29 and 30 for No. 1 system and terminals 31 and 32 for No. 2 system.

FIELD WIRING

All field wiring must comply with the National Electric Code and all applicable local codes. Quantech liquid chiller units are factory wired for optimum reliability. Therefore the unit controls must not be modified without expressed written consent by Quantech. The use of a simple switch or timer from a remote point is permitted; but it must be connected to the Quantech unit panel at points expressly indicated for that purpose.

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

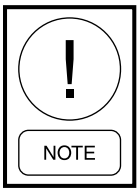
A 120-1-60, 15 amp source must be supplied for the control panel through a fused disconnect when a control panel transformer (optional) is not provided *(see Control Wiring).*

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.

CONTROL PANEL WIRING

All wiring to the control panel terminal block (CTB1) (nominal 30VDC) must be run in screened cable, with the screen earthed at the panel end only. Run screened cable separately from mains cable to avoid electrical noise pick-up.

The voltage free contacts connected to CTB1 must be suitable for 30VDC (gold contacts recommended). If the voltage free contacts form part of a relay or contactor, the coil of the device must be suppressed using a standard R/C suppressor. The above precautions must be taken to avoid electrical noise which could cause a malfunction or damage to the unit and its controls.



The length of cable to these terminals must not exceed 24 ft. (7.5 m).

Flow Switch (SF)

A chilled liquid flow switch of suitable type must be connected to terminals 13 and 14 to provide adequate protection against loss of liquid flow.

After connection, do not switch on mains power to the unit until it has been commissioned by Quantech Authorized personnel. Some internal components are live when mains is switched ON.

The unit ON/OFF rocker switch on the front of the control panel has been set in the OFF position at the factory.

This switch MUST remain in the OFF position until the unit is commissioned by Quantech Authorized personnel. If the switch is set to the ON position before commissioning then it must be reported to Quantech, otherwise the warranty may be invalidated.

Remote Start/stop

Remote Start and Stop is accomplished by a contact placed between Terminals 13 and 51 on the CTB1 terminal strip. If this function is not utilized, the terminals must be jumpered for the chiller to run.

POWER WIRING

All electrical wiring should be carried out in accordance with local regulations. Route properly sized cables to cable entries on the bottom of the control panel. *For wiring specifications, see SECTION 5 – TECHNICAL DATA.*

In accordance with National Electric Code (N.E.C.), it is the responsibility of the user to install overcurrent protection devices between the supply conductors and the power supply terminals on the unit.

To ensure that no eddy currents are set up in the metal gland plate the cables forming each 3-phase power supply must enter via the same hole in the gland plate. If separate entries for each cable forming the 3-phase supplies are used, the metal gland plate must be replaced by a non-metallic gland plate, with due regard given to sealing the panel to NEMA 1.

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

Units with Single-Point Power Supply Wiring

Models require one field provided 200 VAC, 3-phase, 60 Hz; 230VAC, 3-phase, 60 Hz; 380 VAC, 3-phase, 60 Hz; 460 VAC, 3-phase, 60 Hz; 575 VAC, 3-phase, 60 Hz, ground supply to the unit with circuit protection.

Connect the 3-phase supply to the terminal block or Non-fused Disconnect Switch located in the common input section using the wire sizes detailed in *SECTION 5 – TECHNICAL DATA.*

Connect the earth wire ground to the main protective earth terminal in the common input section.

Units with Multi Point Power Supply Wiring

Units require two field provided 200 VAC, 3-phase, 60 Hz; 230VAC, 3-phase, 60 Hz; 380 VAC, 3-phase, 60 Hz; 460 VAC, 3-phase, 60 Hz; 575 VAC, 3-phase, 60 Hz, supplies with circuit protection and a separate control supply with circuit protection (200 VAC, 3-phase, 60 Hz; 230VAC, 3-phase, 60 Hz; 380 VAC, 3-phase, 60 Hz; 460 VAC, 3-phase, 60 Hz; 575 VAC, 3-phase, 60 Hz, +ground).

Connect each of the 3-phase supplies to the door interlocked circuit breakers located in the power sections, using the wire sizes detailed in Section 5.

Connect each of the earth grounds to the main protective earth ground terminals in the power sections.

Connect the control supply to the door interlocked emergency stop device located in the common input section, using the wire sizes detailed in Section 5.

Connect the earth ground to the main protective earth terminal in the common input section.

Control Transformer Primary Voltage Tappings

It is important to check that the correct primary tapping has been used on the control transformer:

- With the supply to the unit isolated remove the lid to the transformer box.
- Check that the tapping used conforms to the site supply voltage. The two tappings are 342-424V and 360-440V.

COMPRESSOR HEATERS

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

RELIEF VALVES

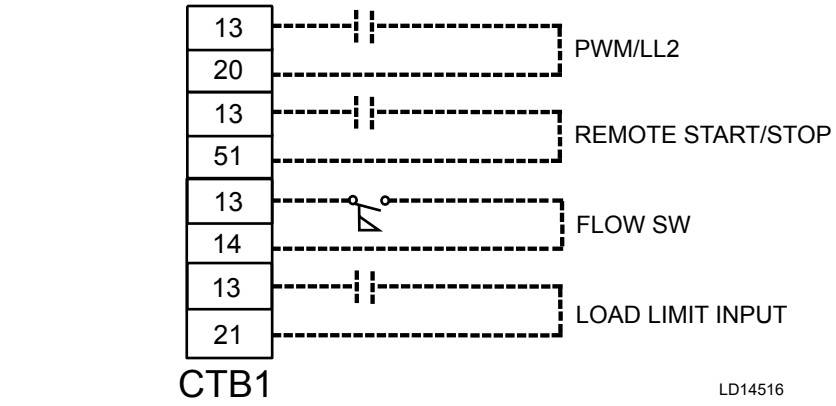
Relief valves are located on both the high and low pressure side of the piping. High side relief valve pressure setting is 560 PSIG.

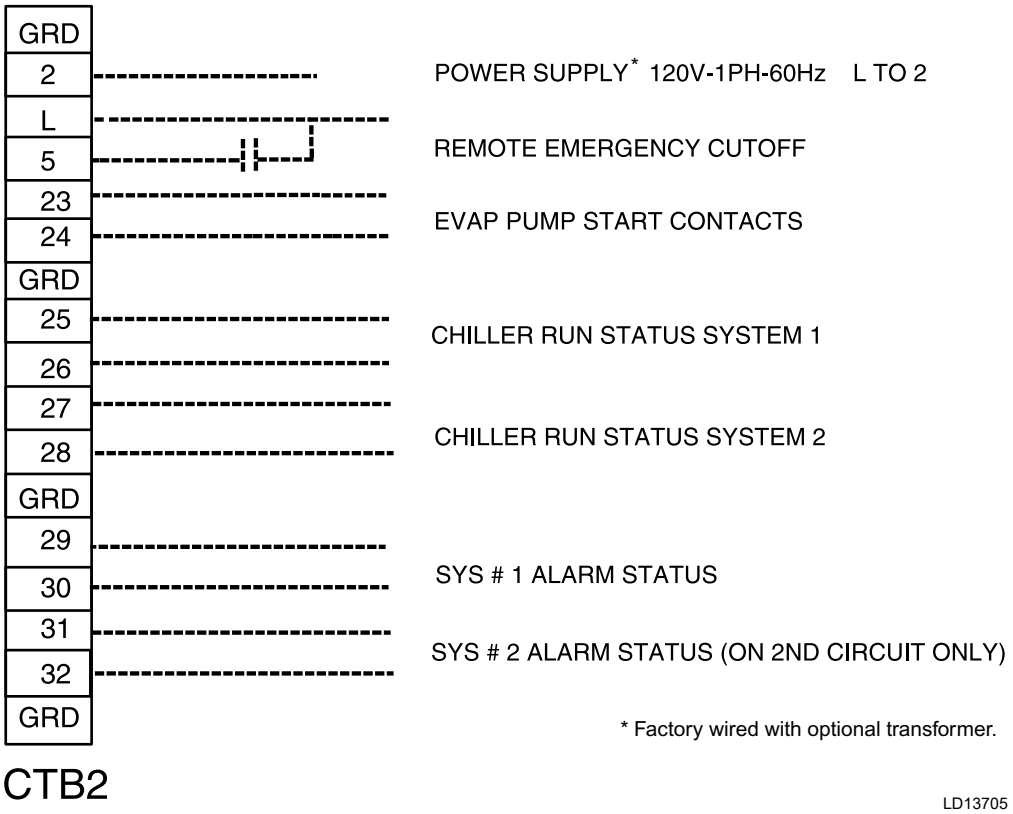
HIGH PRESSURE CUTOUT

On 60 Hz chillers, a high pressure cutout is installed in the discharge piping of each system. The cutout opens at 500 PSI plus or minus 8 PSIG and automatically closes at 375 PSIG plus or minus 10 PSIG.

On 50Hz chillers, all models will utilize a manual reset high pressure cutout of 503 PSIG (34.7 barg). On chillers with compressors exceeding a swept volume of 25L/sec, a second tool reset cutout is installed with a cutout of 532 PSIG (36.7 barg). These cutouts conform to relevant requirements of Pressure Equipment Directive PD 97/23/EC.

CONTROL WIRING





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, PRIOR to working on equipment.

The unit evaporator heater uses 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.

FIGURE 16 - CONTROL WIRING

SECTION 5 – TECHNICAL DATA
OPERATIONAL LIMITATIONS

TABLE 3 - TEMPERATURES AND FLOWS

DESIGN PARAMETERS - STANDARD EFFICIENCY (SE)										
MODEL	EVAPORATOR FLOW - GPM (LPS)		CONDENSER FLOW - GPM (LPS)		LEAVING EVAP. WATER TEMP. - °F (°C)		ENT. COND. WATER TEMP. - °F (°C)	LVG. COND. WATER TEMP. - °F (°C)	EQUIPMENT ROOM TEMP. - °F (°C)	
	MIN	MAX	MIN	MAX	MIN[1]	MAX[2]	MIN	MAX	MIN	MAX
050TSE	60 (3.8)	285 (18.0)	90 (5.7)	360 (22.7)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
060TSE	60 (3.8)	285 (18.0)	90 (5.7)	360 (22.7)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
070TSE	60 (3.8)	285 (18.0)	90 (5.7)	360 (22.7)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
080TSE	60 (3.8)	285 (18.0)	90 (5.7)	360 (22.7)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
090TSE	100 (6.3)	355 (22.4)	145 (9.1)	450 (28.4)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
100TSE	100 (6.3)	385 (24.3)	145 (9.1)	450 (28.4)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
115TSE	100 (6.3)	385 (24.3)	145 (9.1)	450 (28.4)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
130TSE	140 (8.8)	625 (39.4)	180 (11.4)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
150TSE	150 (9.5)	625 (39.4)	225 (14.2)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
170TSE	200 (12.6)	650 (41.0)	260 (16.4)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
200TSE	200 (12.6)	650 (41.0)	260 (16.4)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
DESIGN PARAMETERS - HIGH EFFICIENCY (HE)										
MODEL	EVAPORATOR FLOW - GPM (LPS)		CONDENSER FLOW - GPM (LPS)		LEAVING EVAP. WATER TEMP. - °F (°C)		ENT. COND. WATER TEMP. - °F (°C)	LVG. COND. WATER TEMP. - °F (°C)	EQUIPMENT ROOM TEMP. - °F (°C)	
	MIN	MAX	MIN	MAX	MIN[1]	MAX[2]	MIN	MAX	MIN	MAX
060THE	100 (6.3)	355 (22.4)	145 (9.1)	450 (28.4)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
070THE	140 (8.8)	625 (39.4)	145 (9.1)	450 (28.4)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
080THE	140 (8.8)	625 (39.4)	145 (9.1)	450 (28.4)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
090THE	140 (8.8)	625 (39.4)	225 (14.2)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
095THE	150 (9.5)	625 (39.4)	225 (14.2)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
115THE	140 (8.8)	625 (39.4)	225 (14.2)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
130THE	200 (12.6)	650 (41.0)	225 (14.2)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)
150THE	200 (12.6)	650 (41.0)	260 (16.4)	700 (44.2)	40 (4.4)	50 (10)	65 (18)	130 (54)	40 (4.4)	115 (46)

NOTES:
1. For leaving brine temperature below 40˚ (4.4˚C), contact your local Quantech Sales Representative for application requirements.
2. For leaving water temperature above 50˚ (10˚C), contact your local Quantech Sales Representative for application requirements.

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.

Voltage Limitations

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

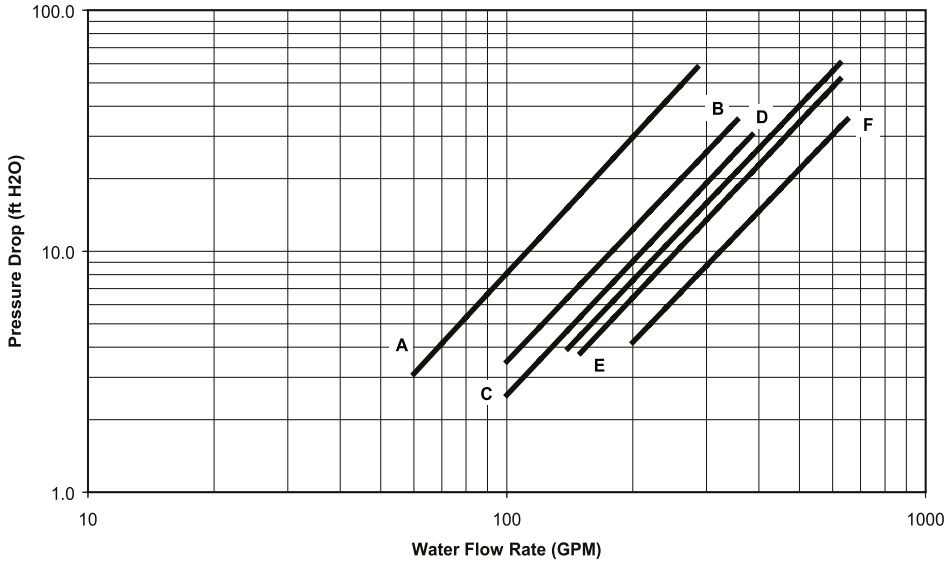
TABLE 4 - VOLTAGE LIMITATIONS

UNIT POWER	MIN.	MAX.
200-3-60	180	220
208-3-60	187	229
230-3-60	200	254
380-3-60	342	402
460-3-60	414	508
575-3-60	520	635

TECHNICAL DATA

EVAPORATOR PRESSURE DROP CHARTS

QWC3 Evaporator Pressure Drop (English Units)



QWC MODEL NUMBER	EVAP
050TSE, 060TSE, 070TSE, 080TSE	A
060THE, 090TSE	B
100TSE, 115TSE	C
070THE, 080THE, 090THE, 115THE, 130TSE	D
0095THE, 150TSE	E
130THE, 150THE, 200TSE	F

QWC3 Evaporator Pressure Drop (SI Units)

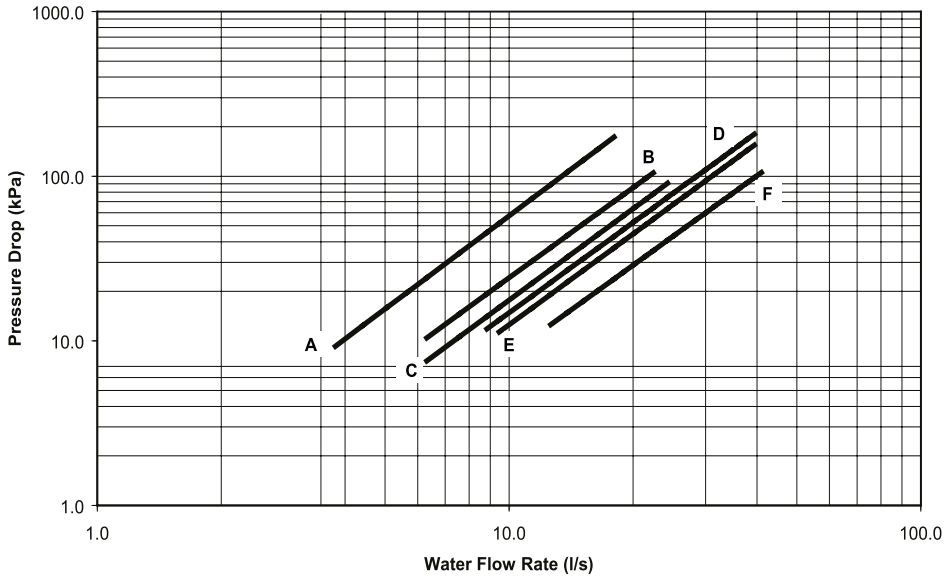
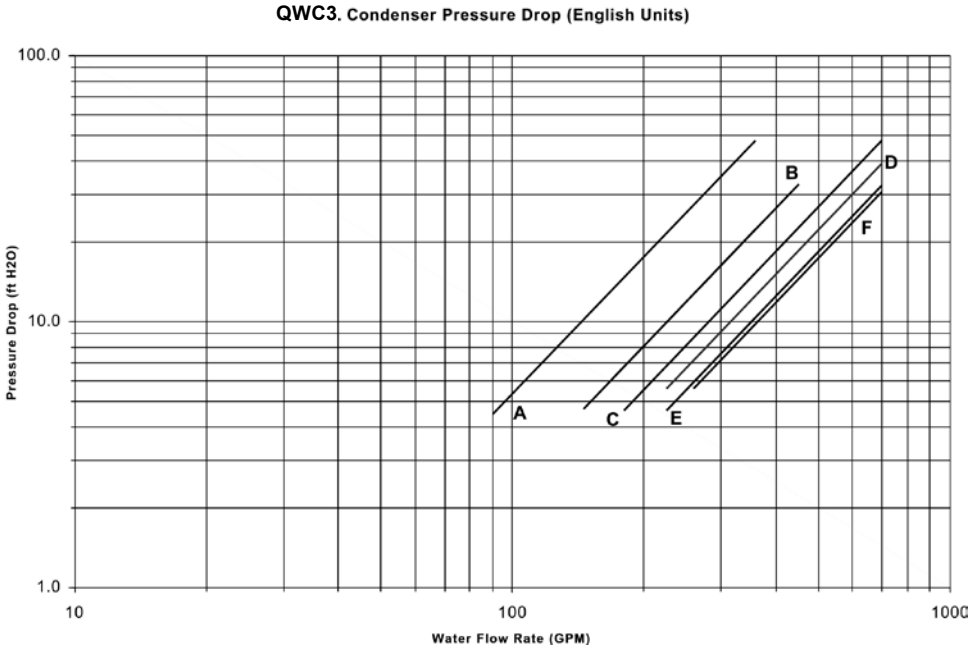


FIGURE 17 - EVAPORATOR WATER PRESSURE DROP CURVES

CONDENSER PRESSURE DROP CHARTS



QWC3 MODEL NUMBER	EVAP
050TSE, 060TSE, 070TSE, 080TSE	A
060THE, 090TSE	B
100TSE, 115TSE	C
070THE, 080THE, 090THE, 115THE, 130TSE	D
0095THE, 150TSE	E
130THE, 150THE, 200TSE	F

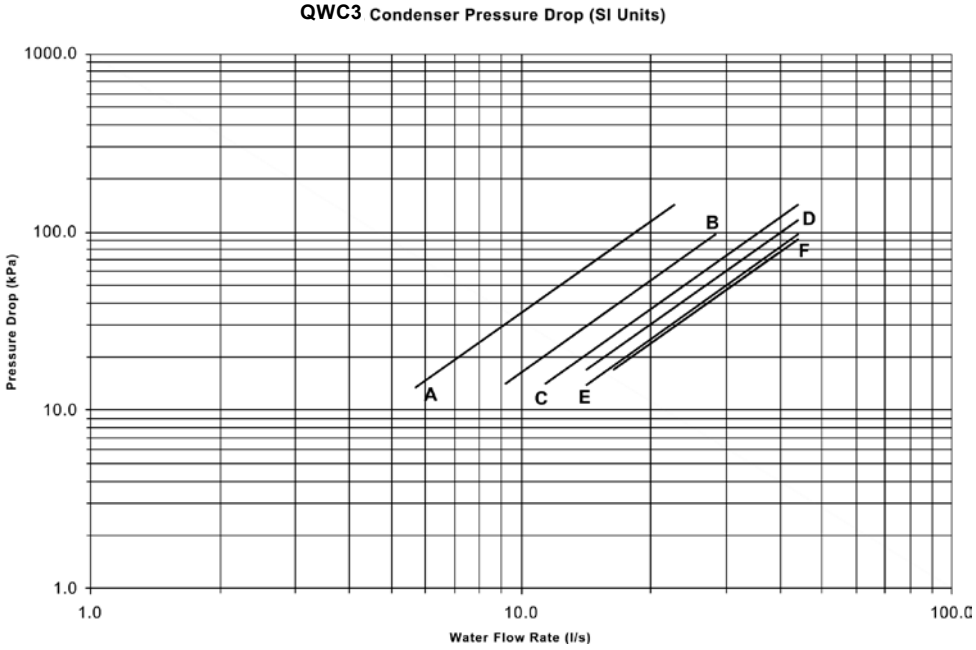


FIGURE 18 - CONDENSER WATER PRESSURE DROP CURVES

ETHYLENE AND PROPOLYNE GLYCOL CORRECTION FACTORS

Evaporator Pressure Drop

When using evaporator pressure drop to determine flow, error may result due to actual pressure drops that are below the published data. In all cases, the published values are worst case values. Errors of 10 to 25% below published values are not uncommon due to manufacturing differences. When attempting to operate with flow near the high end of the pressure drop curve, always use a flowmeter to avoid excessive flow through the evaporator, which will cause damage and premature failure.

Table 5 on page 45 lists glycol correction factors that should be used in conjunction with pressure drops. Pressure drop will increase at a given flow rate as the glycol concentration is increased.

TABLE 5 - ETHYLENE AND PROPOLYNE GLYCOL CORRECTION FACTORS

ETHYLENE GLYCOL					
% WEIGHT	TONS	COMPR KW	GPM	PRESS DROP	FREEZE PT
10	0.993	1.002	1.029	1.095	26
20	0.980	1.004	1.040	1.191	18
30	0.964	1.007	1.055	1.302	7
40	0.945	1.009	1.071	1.435	-8
50	0.922	1.013	1.091	1.599	-29
PROPYLENE GLYCOL					
% WEIGHT	TONS	COMPR KW	GPM	PRESS DROP	FREEZE PT
10	0.985	1.002	1.003	1.078	26
20	0.968	1.005	1.000	1.157	19
30	0.937	1.008	0.992	1.266	9
40	0.898	1.012	0.982	1.414	-6
50	0.862	1.019	0.985	1.605	-28

TABLE 6 - RECOMMENDED GLYCOL SOLUTION STRENGTHS

ETHYLENE GLYCOL LCHLT °C	PROPYLENE GLYCOL CONCENTRATION % W/W	CONCENTRATION % W/W
6	5	5
4	12	13
2	18	20
0	23	25
-2	28	30
-4	32	34
-6	35	38

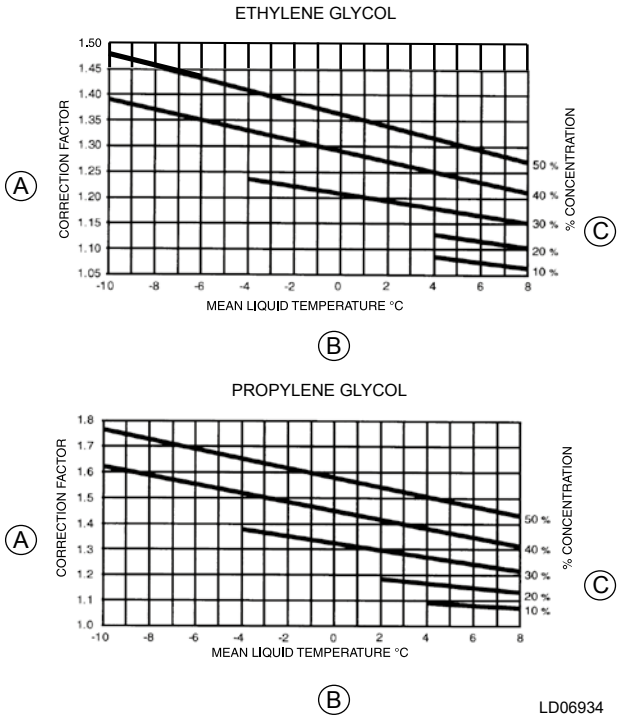
Pressure drop across the evaporator should only be used as a guide for setting up flow. When very accurate flows need to be measured, use a flowmeter. When gauges are used to measure pressure drop and calculate flow, always use a single gauge to measure the pressure drop at both inlet and outlet of the evaporator to avoid introducing more error into the measurement resulting from the use of two gauges.

NOTE

The cooler and condenser design allows for an increase in pressure drop of up to 15% above the design value given. Debris in the water may also cause additional pressure drop.

CAUTION

When using glycol solutions, pressure drops are higher than with water. Special care must be taken not to exceed the maximum allowed.



A = Correction Factor **B** = Temperature

C = Concentration % Through Cooler

FIGURE 19 - GLYCOL SOLUTION STRENGTHS

PHYSICAL DATA - STANDARD AND HIGH EFFICIENCY

STANDARD EFFICIENCY (SE)											
MODEL	**050TSE**	**060TSE**	**070TSE**	**080TSE**	**090TSE**	**100TSE**	**115TSE**	**130TSE**	**150TSE**	**170TSE**	**200TSE**
GENERAL UNIT DATA											
Nominal Unit Capacity - Tons (kW)	52.4 (184.2)	59.9 (210.6)	67.8 (238.4)	76.6 (269.3)	85.8 (301.7)	92.7 (325.9)	110.4 (388.5)	127.4 (448.0)	144.0 (506.4)	167.7 (589.3)	199.6 (701.4)
Number of Independent Refrigerant Circuits	2	2	2	2	2	2	2	2	2	2	2
Refrigerant Charge, R-410A, Ckt. 1/Ckt. 2 lbs. (kg)	60/60 (27.2/27.2)	60/60 (27.2/27.2)	60/60 (27.2/27.2)	70/70 (31.8/31.8)	65/65 (29.5/29.5)	80/80 (36.3/36.3)	80/80 (36.3/36.3)	130/130 (59/59)	170/170 (77.1/77.1)	195/195 (89/89)	195/195 (89/89)
Oil Chg., Ckt. 1/Ckt. 2, gal. (liters)	1.7/1.7 (6.4/6.4)	2.2/2.2 (8.3/8.3)	2.5/2.2 (9.5/8.3)	2.5/2.5 (9.5/9.5)	3.1/2.5 (11.7/9.5)	3.1/3.1 (11.7/11.7)	3.3/3.1 (12.5/11.7)	3.3/3.3 (12.5/12.5)	4.7/4.7 (17.8/17.8)	4.7/4.7 (17.7/17.7)	4.7/4.7 (17.7/17.7)
Shipping Weight lbs. (kg)	4067 (1845)	4067 (1845)	4337 (1967)	4860 (2204)	5317 (2412)	5333 (2419)	5363 (2433)	6006 (2724)	6626 (3006)	7777 (3528)	8132 (3689)
Operating Weight lbs. (kg)	4200 (1905)	4200 (1905)	4470 (2028)	5055 (2293)	5632 (2555)	5648 (2562)	5678 (2576)	6570 (2980)	7354 (3336)	8721 (3956)	9067 (4117)
COMPRESSORS, SCROLL											
Quantity per Chiller	4	4	4	4	4	4	4	4	4	5	6
Nominal Size Ckt. 1/ Ckt. 2 tons (kw)	13-13/ 13-13 (10-10/ 10-10)	15-15/ 15-15 (11-11/ 11-11)	20-20/ 15-15 (15-15/ 11-11)	20-20/ 20-20 (15-15/ 15-15)	25-25/ 20-20 (19-19/ 15-15)	25-25/ 25-25 (19-19/ 19-19)	32-32/ 25-25 (24-24/ 19-19)	32-32/ 32-32 (24-24/ 24-24)	35-35/ 35-35 (26-26/ 26-26)	32-32-32/ 32-32 (24-24-24/ 24-24)	32-32-32/ 32-32-32 (24-24-24/ 24-24-24)
CONDENSER											
Water Volume gal. (liters)	19.4 (73.4)	19.4 (73.4)	19.4 (73.4)	26.9 (101.8)	26.9 (101.8)	26.9 (101.8)	26.9 (101.8)	35.2 (133.2)	52.4 (198.4)	59.1 (223)	59.1 (223)
Maximum Water Side Pressure - psig (kPa)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)
Maximum Refrig Side Pressure - psig (kPa)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)
Dia. X Length in. X ft. (mm x m)	13” X 8’ (330 x 2.4)	13” X 8’ (330 x 2.4)	13” X 8’ (330 x 2.4)	14” X 8’ (356 x 2.4)	14” X 8’ (356 x 2.4)	14” X 8’ (356 x 2.4)	14” X 8’ (356 x 2.4)	16” X 8’ (406 x 2.4)	18” X 10’ (457 x 3.0)	18”x 10’ (460 X 3)	18”x 10’ (460 X 3)
Water Nozzle Connection Size, in.	4	4	4	4	4	4	4	5	5	5	5
EVAPORATOR											
Water Volume gal. (liters)	22.4 (84.8)	22.4 (84.8)	22.4 (84.8)	22.4 (84.8)	37.3 (141.2)	37.3 (141.2)	37.3 (141.2)	59.8 (226.4)	57.6 (218)	77.0 (291.0)	77.0 (291.0)
Maximum Water Side Pressure - psig (kPa)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)
Maximum Refrig Side Pressure - psig (kPa)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)
Dia. X Length in. X ft. (mm x m)	11” X 8’ (279 x 2.4)	11” X 8’ (279 x 2.4)	11” X 8’ (279 x 2.4)	11” X 8’ (279 x 2.4)	13” X 8’ (330 x 2.4)	14” X 8’ (356 x 2.4)	14” X 8’ (356 x 2.4)	16” X 8’ (406 x 2.4)	15” X 10’ (381 x 3.0)	17” x 10’ (43 X 3)	17” x 10’ (43 X 3)
Water Nozzle Connection Size, in.	6	6	6	6	6	6	6	8	8	8	8

PHYSICAL DATA - STANDARD AND HIGH EFFICIENCY - (CONT'D)

HIGH EFFICIENCY (HE)								
MODEL	**060THE**	**070THE**	**080THE**	**090THE**	**095THE**	**115THE**	**130THE**	**150THE**
GENERAL UNIT DATA								
Nominal Unit Capacity - Tons (kW)	62.4 (219.4)	72.7 (255.6)	82.6 (290.4)	89.4 (314.3)	94.6 (332.6)	117.2 (412.0)	132.1 (464.6)	148.5 (522.2)
Number of Independent Refrigerant Circuits	2	2	2	2	2	2	2	2
Refrigerant Charge, R-410A, Ckt. 1/Ckt. 2 lbs. (kg)	65/65 (29.5/29.5)	90/90 (40.9/40.9)	90/90 (40.9/40.9)	155/155 (70.3/70.3)	170/170 (77.1/77.1)	155/155 (70.3/70.3)	180/180 (81.6/81.6)	195/195 (88.5/88.5)
Oil Chg, Ckt. 1/Ckt. 2, gal. (liters)	2.2/2.2 (8.3/8.3)	2.5/2.2 (9.5/8.3)	2.5/2.5 (9.5/9.5)	3.1/2.5 (11.7/9.5)	3.3/3.3 (12.5/12.5)	3.3/3.1 (12.5/11.7)	3.7/3.7 (14/14)	4.7/4.7 (17.8/17.8)
Shipping Weight lbs. (kg)	4757 (2158)	5389 (2444)	5659 (2567)	6264 (2841)	6476 (2937)	6314 (2864)	7172 (3253)	7322 (3321)
Operating Weight lbs. (kg)	5072 (2301)	5884 (2669)	6154 (2791)	6903 (3131)	7204 (3268)	6953 (3154)	8060 (3656)	8266 (3749)
COMPRESSORS, SCROLL								
Quantity per Chiller	4	4	4	4	6	4	5	4
Nominal Size Ckt. 1/ Ckt. 2 tons (KW)	15-15/15-15 (11-11/11-11)	20-20/15-15 (15-15/11-11)	20-20/20-20 (15-15/15-15)	25-25/20-20 (19-19/15-15)	15-15-15/ 15-15-15 (11-11-11/ 11-11-11)	32-32/25-25 (24-24/19-19)	20-20-20/ 32-32 (15-15-15/ 23-23)	35-35/ 35-35 (26-26/ 26-26)
CONDENSER								
Water Volume gal. (liters)	26.9 (101.8)	26.9 (101.8)	26.9 (101.8)	44.1 (166.9)	52.4 (198.4)	44.1 (166.9)	52.4 (198.4)	59.1 (223.7)
Maximum Water Side Pressure psig (KPA)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)
Maximum Refrig Side Pressure psig (kPa)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)	560 (38.6)
Dia. X Length in. X ft. (mm x m)	14" X 8' (356 x 2.4)	14" X 8' (356 x 2.4)	14" X 8' (356 x 2.4)	18" X 8' (457 x 2.4)	18" X 10' (457 x 3)	18" X 8' (457 x 2.4)	18" X 10' (457 x 3)	18" X 10' (457 x 3)
Water Nozzle Connection Size, in.	4	4	4	5	5	5	5	5
EVAPORATOR								
Water Volume gals. (liters)	37.3 (141.2)	59.8 (226.4)	59.8 (226.4)	59.8 (226.4)	57.6 (218)	59.8 (226.4)	77 (291.5)	77 (291.5)
Maximum Water Side Pressure psig (kPa)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)	150 (10.3)
Maximum Refrig Side Pressure psig (kPa)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)	450 (31.0)
Dia. X Length in. X ft. (mm x m)	13" X 8' (330 x 2.4)	16" X 8' (406 x 2.4)	16" X 8' (406 x 2.4)	16" X 8' (406 x 2.4)	15" X 10' (381 x 3)	16" X 8' (406 x 2.4)	17" X 10' (432 x 3)	17" X 10' (432 x 3)
Water Nozzle Connection Size, in.	6	8	8	8	8	8	8	8

SINGLE POINT ELECTRICAL DATA

Standard Efficiency Without External Compressor Overloads

MODEL QWC3	VOLT	HZ	MINIMUM CIRCUIT AMPS (MCA)	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB	LUGS PER PHASE	
							TERMINAL BLOCK LUG SIZE (STD)	
							QTY/ ∅	LUG INFO
050TSE	208	60	206	400	250	250	1	# 10 - 300 KCM
	230	60	206	400	250	250	1	# 10 - 300 KCM
	380	60	117	150	125	125	1	#10 - 3/0AWG
	460	60	104	150	125	125	1	# 12 - 1 AWG
	575	60	74	100	90	90	1	# 12 - 1 AWG
060TSE	200	60	237	400	300	300	1	# 4 - 500 KCM
	230	60	237	400	300	300	1	# 4 - 500 KCM
	380	60	153	200	175	175	1	# 10 - 300 KCM
	460	60	114	150	125	125	1	# 10 - 300 KCM
	575	60	101	150	110	110	1	# 10 - 300 KCM
070TSE	200	60	278	400	300	350	1	# 4 - 500 KCM
	230	60	278	400	300	350	1	# 4 - 500 KCM
	380	60	158	200	175	175	1	# 10 - 300 KCM
	460	60	122	150	150	150	1	# 10 - 300 KCM
	575	60	103	150	110	125	1	# 10 - 300 KCM
080TSE	200	60	314	400	350	350	1	# 4 - 500 KCM
	230	60	314	400	350	350	1	# 4 - 500 KCM
	380	60	162	200	175	200	1	# 10 - 300 KCM
	460	60	129	150	150	150	1	# 10 - 300 KCM
	575	60	105	150	125	125	1	# 10 - 300 KCM
090TSE	200	60	348	400	400	400	2	# 10 - 300 KCM
	230	60	348	400	400	400	2	# 10 - 300 KCM
	380	60	199	250	225	250	1	# 10 - 300 KCM
	460	60	157	200	175	200	1	# 10 - 300 KCM
	575	60	121	150	150	150	1	# 10 - 300 KCM
100TSE	200	60	379	600	450	450	2	# 10 - 300 KCM
	230	60	379	600	450	450	2	# 10 - 300 KCM
	380	60	232	400	250	250	1	# 4 - 500 KCM
	460	60	182	200	200	225	1	# 4 - 500 KCM
	575	60	136	150	150	150	1	# 4 - 500 KCM
115TSE	208	60	380	600	450	450	2	# 10 - 300 KCM
	230	60	380	600	450	450	2	# 10 - 300 KCM
	380	60	230	400	250	250	1	# 4 - 500 KCM
	460	60	190	250	225	225	1	# 4 - 500 KCM
	575	60	152	200	175	175	1	# 4 - 500 KCM
130TSE	208	60	418	600	500	500	2	# 4 - 500 KCM
	230	60	418	600	500	500	2	# 4 - 500 KCM
	380	60	253	400	300	300	1	# 4 - 500 KCM
	460	60	209	400	250	250	1	# 4 - 500 KCM
	575	60	167	250	200	200	1	# 4 - 500 KCM
150TSE	208	60	453	600	500	500	2	# 4 - 500 KCM
	230	60	453	600	500	500	2	# 4 - 500 KCM
	380	60	275	400	300	300	2	# 4 - 500 KCM
	460	60	227	400	250	250	1	# 4 - 500 KCM
	575	60	181	250	200	200	1	# 4 - 500 KCM
170TSE	460	60	258	400	300	300	1	# 4 - 500 KCM
	575	60	206	250	225	225	1	# 4 - 500 KCM
200TSE	460	60	308	400	350	350	1	# 4 - 500 KCM
	575	60	246	400	250	250	1	# 4 - 500 KCM

SINGLE POINT ELECTRICAL DATA (CONT'D)

MODEL QWC3	SYSTEM # 1						SYSTEM # 2					
	COMPR 1		COMPR 2		COMPR 3		COMPR 1		COMPR 2		COMPR 3	
	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
050TSE	48.5	249	48.5	249			48.5	249	48.5	249		
	48.5	295	48.5	295			48.5	295	48.5	295		
	27.6	159	27.6	159			27.6	159	27.6	159		
	24.4	145	24.4	145			24.4	145	24.4	145		
	17.4	109	17.4	109			17.4	109	17.4	109		
060TSE	55.8	425	55.8	425			55.8	425	55.8	425		
	55.8	425	55.8	425			55.8	425	55.8	425		
	36.0	239	36.0	239			36.0	239	36.0	239		
	26.9	187	26.9	187			26.9	187	26.9	187		
	23.7	148	23.7	148			23.7	148	23.7	148		
070TSE	73.9	505	73.9	505			55.8	425	55.8	425		
	73.9	505	73.9	505			55.8	425	55.8	425		
	38.2	290	38.2	290			36.0	239	36.0	239		
	30.4	225	30.4	225			26.9	187	26.9	187		
	24.6	180	24.6	180			23.7	148	23.7	148		
080TSE	73.9	505	73.9	505			73.9	505	73.9	505		
	73.9	505	73.9	505			73.9	505	73.9	505		
	38.2	290	38.2	290			38.2	290	38.2	290		
	30.4	225	30.4	225			30.4	225	30.4	225		
	24.6	180	24.6	180			24.6	180	24.6	180		
090TSE	89.1	500	89.1	500			73.9	505	73.9	505		
	89.1	500	89.1	500			73.9	505	73.9	505		
	54.5	305	54.5	305			38.2	290	38.2	290		
	42.9	250	42.9	250			30.4	225	30.4	225		
	32.1	198	32.1	198			24.6	180	24.6	180		
100TSE	89.1	500	89.1	500			89.1	500	89.1	500		
	89.1	500	89.1	500			89.1	500	89.1	500		
	54.5	305	54.5	305			54.5	305	54.5	305		
	42.9	250	42.9	250			42.9	250	42.9	250		
	32.1	198	32.1	198			32.1	198	32.1	198		
115TSE	98.4	553	98.4	553			79.4	506	79.4	506		
	98.4	553	98.4	553			79.4	506	79.4	506		
	59.5	339	59.5	339			48.1	280	48.1	280		
	49.2	316	49.2	316			39.7	212	39.7	212		
	39.3	258	39.3	258			31.8	168	31.8	168		
130TSE	98.4	553	98.4	553			98.4	553	98.4	553		
	98.4	553	98.4	553			98.4	553	98.4	553		
	59.5	339	59.5	339			59.5	339	59.5	339		
	49.2	316	49.2	316			49.2	316	49.2	316		
	39.3	258	39.3	258			39.3	258	39.3	258		
150TSE	106.7	652	106.7	652			106.7	652	106.7	652		
	106.7	652	106.7	652			106.7	652	106.7	652		
	64.6	355	64.6	355			64.6	355	64.6	355		
	53.4	316	53.4	316			53.4	316	53.4	316		
	42.7	258	42.7	258			42.7	258	42.7	258		
170TSE	49.2	316	49.2	316	49.2	316	49.2	316	49.2	316		
	39.3	258	39.3	258	39.3	258	39.3	258	39.3	258		
200TSE	49.2	316	49.2	316	49.2	316	49.2	316	49.2	316	49.2	316
	39.3	258	39.3	258	39.3	258	39.3	258	39.3	258	39.3	258

SINGLE POINT ELECTRICAL DATA (CONT'D)

High Efficiency Without External Compressor Overloads

MODEL QWC3	VOLT	HZ	MINIMUM CIRCUIT AMPS (MCA)	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB	TERMINAL BLOCK LUG SIZE (STD)	
							QTY/ ∅	LUG INFO
060THE	208	60	245	400	300	300	1	# 4 - 500 KCM
	230	60	245	400	300	300	1	# 4 - 500 KCM
	380	60	131	200	150	150	1	# 10 - 300 KCM
	460	60	114	150	125	125	1	# 10 - 300 KCM
	575	60	91	150	100	100	1	# 10 - 300 KCM
070THE	200	60	270	400	300	350	1	# 4 - 500 KCM
	230	60	270	400	300	350	1	# 4 - 500 KCM
	380	60	155	200	175	175	1	# 10 - 300 KCM
	460	60	131	150	150	150	1	# 10 - 300 KCM
	575	60	105	150	110	125	1	# 10 - 300 KCM
080THE	208	60	292	400	350	350	1	# 4 - 500 KCM
	230	60	292	400	350	350	1	# 4 - 500 KCM
	380	60	177	250	200	200	1	# 10 - 300 KCM
	460	60	146	200	175	175	1	# 10 - 300 KCM
	575	60	117	150	125	125	1	# 10 - 300 KCM
090THE	208	60	316	400	350	350	2	# 10 - 300 KCM
	230	60	316	400	350	350	2	# 10 - 300 KCM
	380	60	191	250	225	225	1	# 10 - 300 KCM
	460	60	158	200	175	175	1	# 10 - 300 KCM
	575	60	127	200	150	150	1	# 10 - 300 KCM
095THE	208	60	361	600	400	400	2	#10 - 300 KCM
	230	60	361	600	400	400	2	#10 - 300 KCM
	380	60	193	250	250	250	1	# 4 - 500 KCM
	460	60	168	200	175	175	1	# 4 - 500 KCM
	575	60	134	200	150	150	1	# 4 - 500 KCM
115THE	208	60	380	600	450	450	2	#10 - 300 KCM
	230	60	380	600	450	450	2	#10 - 300 KCM
	380	60	230	400	250	250	1	# 4 - 500 KCM
	460	60	190	250	225	225	1	# 4 - 500 KCM
	575	60	152	200	175	175	1	# 4 - 500 KCM
130THE	208	60	428	600	500	500	2	# 4 - 500 KCM
	230	60	428	600	500	500	2	# 4 - 500 KCM
	380	60	259	400	300	300	2	#10 - 300 KCM
	460	60	214	400	250	250	1	# 4 - 500 KCM
	575	60	171	250	200	200	1	#10 - 300 KCM
150THE	208	60	453	600	500	500	2	# 4 - 500 KCM
	230	60	453	600	500	500	2	# 4 - 500 KCM
	380	60	275	400	300	300	2	#10 - 300 KCM
	460	60	227	400	250	250	1	# 4 - 500 KCM
	575	60	181	250	200	200	1	# 4 - 500 KCM

SINGLE POINT ELECTRICAL DATA (CONT'D)

MODEL QWC3	SYSTEM # 1						SYSTEM # 2					
	COMPR 1		COMPR 2		COMPR 3		COMPR 1		COMPR 2		COMPR 3	
	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
060THE	57.7	284	57.7	284			57.7	284	57.7	284		
	57.7	330	57.7	330			57.7	330	57.7	330		
	30.9	192	30.9	192			30.9	192	30.9	192		
	26.9	180	26.9	180			26.9	180	26.9	180		
	21.5	132	21.5	132			21.5	132	21.5	132		
070THE	68.8	324	68.8	324			57.7	324	57.7	324		
	68.8	359	68.8	359			57.7	359	57.7	359		
	41.6	253	41.6	253			30.9	253	30.9	253		
	34.4	213	34.4	213			26.9	213	26.9	213		
	27.5	162	27.5	162			21.5	162	21.5	162		
080THE	68.8	431	68.8	431			68.8	431	68.8	431		
	68.8	431	68.8	431			68.8	431	68.8	431		
	41.6	253	41.6	253			41.6	253	41.6	253		
	34.4	213	34.4	213			34.4	213	34.4	213		
	27.5	162	27.5	162			27.5	162	27.5	162		
090THE	79.4	506	79.4	506			68.8	431	68.8	431		
	79.4	506	79.4	506			68.8	431	68.8	431		
	48.1	280	48.1	280			41.6	253	41.6	253		
	39.7	212	39.7	212			34.4	213	34.4	213		
	31.8	168	31.8	168			27.5	162	27.5	162		
095THE	57.7	284	57.7	284	57.7	284	57.7	284	57.7	284	57.7	284
	57.7	330	57.7	330	57.7	330	57.7	330	57.7	330	57.7	330
	30.9	192	30.9	192	30.9	192	30.9	192	30.9	192	30.9	192
	26.9	180	26.9	180	26.9	180	26.9	180	26.9	180	26.9	180
	21.5	132	21.5	132	21.5	132	21.5	132	21.5	132	21.5	132
115THE	98.4	553	98.4	553			79.4	506	79.4	506		
	98.4	553	98.4	553			79.4	506	79.4	506		
	59.5	339	59.5	339			48.1	280	48.1	280		
	49.2	316	49.2	316			39.7	212	39.7	212		
	39.3	258	39.3	258			31.8	168	31.8	168		
130THE	68.8	431	68.8	431	68.8	431	98.4	553	98.4	553		
	68.8	431	68.8	431	68.8	431	98.4	553	98.4	553		
	41.6	253	41.6	253	41.6	253	59.5	339	59.5	339		
	34.4	213	34.4	213	34.4	213	49.2	316	49.2	316		
	27.5	162	27.5	162	27.5	162	39.3	258	39.3	258		
150THE	106.7	652	106.7	652			106.7	652	106.7	652		
	106.7	652	106.7	652			106.7	652	106.7	652		
	64.6	355	64.6	355			64.6	355	64.6	355		
	53.4	316	53.4	316			53.4	316	53.4	316		
	42.7	258	42.7	258			42.7	258	42.7	258		

SINGLE POINT ELECTRICAL DATA (CONT'D)

Standard Efficiency With Optional External Compressor Overloads

MODEL QWC3	VOLT	HZ	MINIMUM CIRCUIT AMPS (MCA) *	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB	LUGS PER PHASE			
							DISCONNECT SWITCH LUG SIZE (OPT)		CIRCUIT BREAKER LUG SIZE (OPT)	
							QTY/ ∅	LUG INFO	QTY/ ∅	LUG INFO
050TSE	208	60	139	200	150	150	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	230	60	121	150	125	125	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	380	60	73	100	90	90	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
	460	60	60	100	70	70	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
	575	60	48	60	50	50	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
060TSE	200	60	179	200	200	200	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	230	60	179	200	200	200	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	380	60	109	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	91	100	100	110	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
	575	60	74	100	80	90	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
070TSE	200	60	195	250	225	225	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	230	60	195	250	225	225	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	380	60	115	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	95	150	110	110	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	575	60	77	100	90	90	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
080TSE	200	60	209	250	225	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	230	60	209	250	225	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	380	60	120	150	150	150	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	99	150	110	110	1	# 2 - 4/0 AWG	1	# 14 - 1/0 AWG
	575	60	80	100	90	90	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
090TSE	200	60	228	250	250	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	230	60	228	250	250	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	380	60	132	150	150	150	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	109	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	575	60	87	100	100	100	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
100TSE	200	60	245	400	300	300	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	230	60	245	400	300	300	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	141	200	150	150	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	460	60	117	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	575	60	94	150	100	110	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
115TSE	208	60	299	400	350	350	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	230	60	260	400	300	300	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	157	200	175	175	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	460	60	130	200	150	150	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	575	60	104	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
130TSE	208	60	333	600	400	400	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	230	60	290	400	350	350	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	176	250	200	200	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	460	60	145	200	175	175	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	575	60	116	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
150TSE	208	60	387	600	450	450	2	# 250 - 500 KCM	2	# 250 - 500 KCM
	230	60	337	600	400	400	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	204	400	225	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	460	60	168	250	200	200	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	575	60	135	200	150	150	1	# 4 - 300 KCM	1	# 2 - 4/0 AWG
170TSE	208	60	412	600	450	450	2	# 250 - 500 KCM	2	# 250 - 500 KCM
	230	60	358	400	400	400	2	# 250 - 500 KCM	2	# 250 - 500 KCM
	380	60	217	400	250	250	1	# 250 - 500 KCM	1	# 6 - 350 KCM
	460	60	179	250	200	200	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	575	60	143	200	150	150	1	# 6 - 350 KCM	1	# 2 - 4/0 AWG
200TSE	208	60	490	600	500	500	2	# 250 - 500 KCM	2	# 250 - 500 KCM
	230	60	426	600	450	450	2	# 250 - 500 KCM	2	# 250 - 500 KCM
	380	60	258	400	300	300	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	460	60	213	250	225	225	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	575	60	171	200	175	175	1	# 6 - 350 KCM	1	# 4 - 300 KCM

SINGLE POINT ELECTRICAL DATA (CONT'D)

MODEL QWC3	SYSTEM # 1						SYSTEM # 2					
	COMPR 1		COMPR 2		COMPR 3		COMPR 1		COMPR 2		COMPR 3	
	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
050TSE	32.7	249	32.7	249			32.7	249	32.7	249		
	28.4	295	28.4	295			28.4	295	28.4	295		
	17.2	159	17.2	159			17.2	159	17.2	159		
	14.2	145	14.2	145			14.2	145	14.2	145		
	11.4	109	11.4	109			11.4	109	11.4	109		
060TSE	42.2	425	42.2	425			42.2	425	42.2	425		
	42.2	425	42.2	425			42.2	425	42.2	425		
	25.7	239	25.7	239			25.7	239	25.7	239		
	21.3	187	21.3	187			21.3	187	21.3	187		
	17.4	148	17.4	148			17.4	148	17.4	148		
070TSE	49.1	505	49.1	505			42.2	425	42.2	425		
	49.1	505	49.1	505			42.2	425	42.2	425		
	28.3	290	28.3	290			25.7	239	25.7	239		
	23.4	225	23.4	225			21.3	187	21.3	187		
	18.7	180	18.7	180			17.4	148	17.4	148		
080TSE	49.1	505	49.1	505			49.1	505	49.1	505		
	49.1	505	49.1	505			49.1	505	49.1	505		
	28.3	290	28.3	290			28.3	290	28.3	290		
	23.4	225	23.4	225			23.4	225	23.4	225		
	18.7	180	18.7	180			18.7	180	18.7	180		
090TSE	57.8	500	57.8	500			49.1	505	49.1	505		
	57.8	500	57.8	500			49.1	505	49.1	505		
	33.3	305	33.3	305			28.3	290	28.3	290		
	27.5	250	27.5	250			23.4	225	23.4	225		
	22.0	198	22.0	198			18.7	180	18.7	180		
100TSE	57.8	500	57.8	500			57.8	500	57.8	500		
	57.8	500	57.8	500			57.8	500	57.8	500		
	33.3	305	33.3	305			33.3	305	33.3	305		
	27.5	250	27.5	250			27.5	250	27.5	250		
	22.0	198	22.0	198			22.0	198	22.0	198		
115TSE	78.4	553	78.4	553			61.2	506	61.2	506		
	68.2	553	68.2	553			53.2	506	53.3	506		
	41.3	339	41.3	339			32.2	280	32.2	280		
	34.1	316	34.1	316			26.6	212	26.6	212		
	27.3	258	27.3	258			21.3	168	21.3	168		
130TSE	78.4	553	78.4	553			78.4	553	78.4	553		
	68.2	553	68.2	553			68.2	553	68.2	553		
	41.3	339	41.3	339			41.3	339	41.3	339		
	34.1	316	34.1	316			34.1	316	34.1	316		
	27.3	258	27.3	258			27.3	258	27.3	258		
150TSE	91.1	652	91.1	652			91.1	652	91.1	652		
	79.2	652	79.2	652			79.2	652	79.2	652		
	47.9	355	47.9	355			47.9	355	47.9	355		
	39.6	316	39.6	316			39.6	316	39.6	316		
	31.7	258	31.7	258			31.7	258	31.7	258		
170TSE	78.4	553	78.4	553	78.4	553	78.4	553	78.4	553		
	68.2	553	68.2	553	68.2	553	68.2	553	68.2	553		
	41.3	339	41.3	339	41.3	339	41.3	339	41.3	339		
	34.1	316	34.1	316	34.1	316	34.1	316	34.1	316		
	27.3	258	27.3	258	27.3	258	27.3	258	27.3	258		
200TSE	78.4	553	78.4	553	78.4	553	78.4	553	78.4	553	78.4	553
	68.2	553	68.2	553	68.2	553	68.2	553	68.2	553	68.2	553
	41.3	339	41.3	339	41.3	339	41.3	339	41.3	339	41.3	339
	34.1	316	34.1	316	34.1	316	34.1	316	34.1	316	34.1	316
	27.3	258	27.3	258	27.3	258	27.3	258	27.3	258	27.3	258

SINGLE POINT ELECTRICAL DATA (CONT'D)

High Efficiency With Optional External Compressor Overloads

MODEL QWC3	VOLT	HZ	MINIMUM CIRCUIT AMPS (MCA)*	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB	LUGS PER PHASE			
							DISCONNECT SWITCH LUG SIZE (OPT)		CIRCUIT BREAKER LUG SIZE (OPT)	
							QTY/ ∅	LUG INFO	QTY/ ∅	LUG INFO
060THE	208	60	170	250	200	200	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	230	60	148	200	175	175	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	380	60	90	150	100	100	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	74	100	90	90	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
	575	60	59	100	70	70	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
070THE	208	60	195	250	225	225	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	230	60	170	250	200	200	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	380	60	103	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	85	150	100	100	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	575	60	69	100	80	80	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
080THE	208	60	217	400	250	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	230	60	189	250	225	225	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	380	60	114	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	94	150	100	100	1	# 2 - 4/0 AWG	1	# 14 - 1/0 AWG
	575	60	76	100	90	90	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
090THE	208	60	240	400	300	300	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	230	60	209	400	250	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	380	60	126	200	150	150	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	460	60	104	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
	575	60	84	150	100	100	1	# 14 - 1/0 AWG	1	# 14 - 1/0 AWG
095THE	208	60	250	400	250	250	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	230	60	218	400	250	250	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	132	200	150	150	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	460	60	109	150	125	125	1	# 6 - 350 KCM	1	# 2 - 4/0 AWG
	575	60	87	150	100	100	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
115THE	208	60	299	400	350	350	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	230	60	260	400	300	300	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	157	200	175	175	1	# 6 - 350 KCM	1	# 4 - 300 KCM
	460	60	130	200	150	150	1	# 6 - 350 KCM	1	# 2 - 4/0 AWG
	575	60	104	150	125	125	1	# 2 - 4/0 AWG	1	# 2 - 4/0 AWG
130THE	208	60	330	600	400	400	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	230	60	287	400	350	350	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	174	250	200	200	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	460	60	143	200	175	175	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	575	60	115	150	125	125	1	# 4 - 300 KCM	1	# 2 - 4/0 AWG
150THE	208	60	387	600	450	450	2	# 250 - 500 KCM	2	# 250 - 500 KCM
	230	60	337	600	400	400	1	# 250 - 500 KCM	1	# 250 - 500 KCM
	380	60	204	400	250	250	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	460	60	168	250	200	200	1	# 6 - 350 KCM	1	# 6 - 350 KCM
	575	60	135	200	150	150	1	# 4 - 300 KCM	1	# 2 - 4/0 AWG

SINGLE POINT ELECTRICAL DATA (CONT'D)

MODEL QWC3	SYSTEM # 1						SYSTEM # 2					
	COMPR 1		COMPR 2		COMPR 3		COMPR 1		COMPR 2		COMPR 3	
	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
060THE	40	284	40	284			40	284	40	284		
	34.8	330	34.8	330			34.8	330	34.8	330		
	21.1	192	21.1	192			21.1	192	21.1	192		
	17.4	180	17.4	180			17.4	180	17.4	180		
	13.9	132	13.9	132			13.9	132	13.9	132		
070THE	51.1	431	51.1	431			40	284	40	284		
	44.4	431	44.4	431			34.8	330	34.8	330		
	26.9	253	26.9	253			21.1	192	21.1	192		
	22.2	213	22.2	213			17.4	180	17.4	180		
	17.8	162	17.8	162			13.9	132	13.9	132		
080THE	51.1	431	51.1	431			51.1	431	51.1	431		
	44.4	431	44.4	431			44.4	431	44.4	431		
	26.9	253	26.9	253			26.9	253	26.9	253		
	22.2	213	22.2	213			22.2	213	22.2	213		
	17.8	162	17.8	162			27.5	162	17.8	162		
090THE	61.2	506	61.2	506			51.1	431	51.1	431		
	53.2	506	53.2	506			44.4	431	44.4	431		
	32.2	280	32.2	280	`		26.9	253	26.9	253		
	26.6	212	26.6	212			22.2	213	22.2	213		
	21.3	168	21.3	168			17.8	162	17.8	162		
095THE	40	284	40	284	40	284	40	284	40	284	40	284
	34.8	330	34.8	330	34.8	330	34.8	330	34.8	330	34.8	330
	21.1	192	21.1	192	21.1	192	21.1	192	21.1	192	21.1	192
	17.4	180	17.4	180	17.4	180	17.4	180	17.4	180	17.4	180
	13.9	132	13.9	132	13.9	132	13.9	132	13.9	132	13.9	132
115THE	78.4	553	78.4	553			61.2	506	61.2	506		
	68.2	553	68.2	553			53.2	506	53.2	506		
	41.3	339	41.3	339			32.2	280	32.2	280		
	34.1	316	34.1	316			26.6	212	26.6	212		
	27.3	258	27.3	258			21.3	168	21.3	138		
130THE	51.1	431	51.1	431	51.1	431	78.4	553	78.4	553		
	44.4	431	44.4	431	44.4	431	68.2	553	68.2	553		
	26.9	253	26.9	253	26.9	253	41.3	339	41.3	339		
	22.2	213	22.2	213	22.2	213	34.1	316	34.1	316		
	17.8	162	17.8	162	17.8	162	27.3	258	27.3	258		
150THE	91.1	652	91.1	652			91.1	652	91.1	652		
	79.2	652	79.2	652			79.2	652	79.2	652		
	47.9	355	47.9	355			47.9	355	47.9	355		
	39.6	316	39.6	316			39.6	316	39.6	316		
	31.7	258	31.7	258			31.7	258	31.7	258		

DUAL POINT ELECTRICAL DATA

With External Compressor Overloads

MODEL	VOLT	HZ	SYSTEM 1 WIRING				SYSTEM 2 WIRING			
			MINIMUM CIRCUIT AMPS	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB	MINIMUM CIRCUIT AMPS	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB
050TSE	208	60	77	100	90	110	77	100	90	110
	230	60	77	100	90	110	77	100	90	110
	380	60	44	60	50	60	44	60	50	60
	460	60	37	60	45	50	37	60	45	50
	575	60	32	60	40	45	32	60	40	45
060TSE 060THE	208	60	95	100	110	125	95	100	110	125
	230	60	95	100	110	125	95	100	110	125
	380	60	58	60	70	80	58	60	70	80
	460	60	48	60	60	60	48	60	60	60
	575	60	39	60	45	50	39	60	45	50
070TSE 070THE	208	60	111	150	125	150	95	100	110	125
	230	60	111	150	125	150	95	100	110	125
	380	60	64	100	80	90	58	60	70	80
	460	60	53	60	60	70	48	60	60	60
	575	60	42	60	50	60	39	60	45	50
080TSE 080THE	208	60	111	150	125	150	111	150	125	150
	230	60	111	150	125	150	111	150	125	150
	380	60	64	100	80	90	64	100	80	90
	460	60	53	60	60	70	53	60	60	70
	575	60	42	60	50	60	42	60	50	60
090TSE 090THE	208	60	130	150	150	175	111	150	125	150
	230	60	130	150	150	175	111	150	125	150
	380	60	75	100	90	100	64	100	80	90
	460	60	62	100	70	80	53	60	60	70
	575	60	50	60	60	70	42	60	50	60
100TSE	208	60	130	150	150	175	130	150	150	175
	230	60	130	150	150	175	130	150	150	175
	380	60	75	100	90	100	75	100	90	100
	460	60	62	100	70	80	62	100	70	80
	575	60	50	60	60	70	50	60	60	70
115TSE 115THE	208	60	178	200	200	250	135	150	150	175
	230	60	178	200	200	250	130	150	150	175
	380	60	102	150	125	125	75	100	90	100
	460	60	85	100	100	110	62	100	70	80
	575	60	68	100	80	90	50	60	60	70
130TSE	208	60	178	200	200	250	178	200	200	250
	230	60	178	200	200	250	178	200	200	250
	380	60	102	150	125	125	102	150	125	125
	460	60	85	100	100	110	85	100	100	110
	575	60	68	100	80	90	68	100	80	90

DUAL POINT ELECTRICAL DATA (CONT'D)

VOLT	HZ	SYSTEM # 1								SYSTEM # 2							
		QTY./ Ø	CIRCUIT BREAKER LUG SIZES	COMPR 1		COMPR 2		COMPR 3		QTY./ Ø	CIRCUIT BREAKER LUG SIZES	COMPR 1		COMPR 2		COMPR 3	
				RLA	LRA	RLA	LRA	RLA	LRA			RLA	LRA	RLA	LRA	RLA	LRA
208	60	(1)	#14 - 1/0AWG	34.2	300	34.2	300			(1)	#14 - 1/0AWG	34.2	300	34.2	300		
230	60	(1)	#14 - 1/0AWG	34.2	300	34.2	300			(1)	#14 - 1/0AWG	34.2	300	34.2	300		
380	60	(1)	#14 - 1/0AWG	19.7	139	19.7	139			(1)	#14 - 1/0AWG	19.7	139	19.7	139		
460	60	(1)	#14 - 1/0AWG	16.3	150	16.3	150			(1)	#14 - 1/0AWG	16.3	150	16.3	150		
575	60	(1)	#14 - 1/0AWG	14.4	109	14.4	109			(1)	#14 - 1/0AWG	14.4	109	14.4	109		
208	60	(1)	#2 - 4/0AWG	42.2	425	42.2	425			(1)	#2 - 4/0AWG	42.2	425	42.2	425		
230	60	(1)	#2 - 4/0AWG	42.2	425	42.2	425			(1)	#2 - 4/0AWG	42.2	425	42.2	425		
380	60	(1)	#14 - 1/0AWG	25.7	239	25.7	239			(1)	#14 - 1/0AWG	25.7	239	25.7	239		
460	60	(1)	#14 - 1/0AWG	21.3	187	21.3	187			(1)	#14 - 1/0AWG	21.3	187	21.3	187		
575	60	(1)	#14 - 1/0AWG	17.4	148	17.4	148			(1)	#14 - 1/0AWG	17.4	148	17.4	148		
208	60	(1)	#2 - 4/0AWG	49.1	505	49.1	505			(1)	#2 - 4/0AWG	42.2	425	42.2	425		
230	60	(1)	#2 - 4/0AWG	49.1	505	49.1	505			(1)	#2 - 4/0AWG	42.2	425	42.2	425		
380	60	(1)	#14 - 1/0AWG	28.3	290	28.3	290			(1)	#14 - 1/0AWG	25.7	239	25.7	239		
460	60	(1)	#14 - 1/0AWG	23.4	225	23.4	225			(1)	#14 - 1/0AWG	21.3	187	21.3	187		
575	60	(1)	#14 - 1/0AWG	18.7	180	18.7	180			(1)	#14 - 1/0AWG	17.4	148	17.4	148		
208	60	(1)	#2 - 4/0AWG	49.1	505	49.1	505			(1)	#2 - 4/0AWG	49.1	505	49.1	505		
230	60	(1)	#2 - 4/0AWG	49.1	505	49.1	505			(1)	#2 - 4/0AWG	49.1	505	49.1	505		
380	60	(1)	#14 - 1/0AWG	28.3	290	28.3	290			(1)	#14 - 1/0AWG	28.3	290	28.3	290		
460	60	(1)	#14 - 1/0AWG	23.4	225	23.4	225			(1)	#14 - 1/0AWG	23.4	225	23.4	225		
575	60	(1)	#14 - 1/0AWG	18.7	180	18.7	180			(1)	#14 - 1/0AWG	18.7	180	18.7	180		
208	60	(1)	#6 - 350KCMIL	57.8	500	57.8	500			(1)	#2 - 4/0AWG	49.1	505	49.1	505		
230	60	(1)	#6 - 350KCMIL	57.8	500	57.8	500			(1)	#2 - 4/0AWG	49.1	505	49.1	505		
380	60	(1)	#14 - 1/0AWG	33.3	305	33.3	305			(1)	#14 - 1/0AWG	28.3	290	28.3	290		
460	60	(1)	#14 - 1/0AWG	27.5	250	27.5	250			(1)	#14 - 1/0AWG	23.4	225	23.4	225		
575	60	(1)	#14 - 1/0AWG	22.0	198	22.0	198			(1)	#14 - 1/0AWG	18.7	180	18.7	180		
208	60	(1)	#6 - 350KCMIL	57.8	500	57.8	500			(1)	#6 - 350KCMIL	57.8	500	57.8	500		
230	60	(1)	#6 - 350KCMIL	57.8	500	57.8	500			(1)	#6 - 350KCMIL	57.8	500	57.8	500		
380	60	(1)	#14 - 1/0AWG	33.3	305	33.3	305			(1)	#14 - 1/0AWG	33.3	305	33.3	305		
460	60	(1)	#14 - 1/0AWG	27.5	250	27.5	250			(1)	#14 - 1/0AWG	27.5	250	27.5	250		
575	60	(1)	#14 - 1/0AWG	22.0	198	22.0	198			(1)	#14 - 1/0AWG	22.0	198	22.0	198		
208	60	(1)	#6 - 350KCMIL	79.0	599	79.0	599	–	–	(1)	#6 - 350KCMIL	59.8	500	59.8	500		
230	60	(1)	#6 - 350KCMIL	79.0	599	79.0	599	–	–	(1)	#6 - 350KCMIL	57.8	500	57.8	500		
380	60	(1)	#2 - 4/0AWG	45.5	358	45.5	358	–	–	(1)	#14 - 1/0AWG	33.3	305	33.3	305		
460	60	(1)	#14 - 1/0AWG	37.6	310	37.6	310	–	–	(1)	#14 - 1/0AWG	27.5	250	27.5	250		
575	60	(1)	#14 - 1/0AWG	30.1	239	30.1	239	–	–	(1)	#14 - 1/0AWG	22.0	198	22.0	198		
208	60	(1)	#6 - 350KCMIL	79.0	599	79.0	599	–	–	(1)	#6 - 350KCMIL	79.0	599	79.0	599		
230	60	(1)	#6 - 350KCMIL	79.0	599	79.0	599	–	–	(1)	#6 - 350KCMIL	79.0	599	79.0	599		
380	60	(1)	#2 - 4/0AWG	45.5	358	45.5	358	–	–	(1)	#2 - 4/0AWG	45.5	358	45.5	358		
460	60	(1)	#14 - 1/0AWG	37.6	310	37.6	310	–	–	(1)	#14 - 1/0AWG	37.6	310	37.6	310		
575	60	(1)	#14 - 1/0AWG	30.1	239	30.1	239	–	–	(1)	#14 - 1/0AWG	30.1	239	30.1	239		

DUAL POINT ELECTRICAL DATA

WITH EXTERNAL COMPRESSOR OVERLOADS

MODEL	VOLT	HZ	SYSTEM 1 WIRING				SYSTEM 2 WIRING			
			MINIMUM CIRCUIT AMPS	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB	MINIMUM CIRCUIT AMPS	MIN N/F DISC SW	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB
095THE	208	60	137	150	150	175	137	150	150	175
	230	60	137	150	150	175	137	150	150	175
	380	60	84	100	90	100	84	100	90	100
	460	60	69	100	80	90	69	100	80	90
	575	60	57	100	70	70	57	100	70	70
130THE	208	60	166	200	200	200	178	200	200	250
	230	60	160	200	175	200	178	200	200	250
	380	60	92	100	100	110	102	150	125	125
	460	60	76	100	90	90	85	100	100	110
	575	60	61	100	70	70	68	100	80	90
150TSE 150THE	208	60	188	200	225	225	188	200	225	225
	230	60	188	200	225	225	188	200	225	225
	380	60	108	150	125	125	108	150	125	125
	460	60	89	100	100	110	89	100	100	110
	575	60	72	100	80	90	72	100	80	90

DUAL POINT ELECTRICAL DATA (CONT'D)

WITH EXTERNAL COMPRESSOR OVERLOADS

VOLT	HZ	SYSTEM # 1								SYSTEM # 2							
		QTY./ Ø	CIRCUIT BREAKER LUG SIZES	COMPR 1		COMPR 2		COMPR 3		QTY./ Ø	CIRCUIT BREAKER LUG SIZES	COMPR 1		COMPR 2		COMPR 3	
				RLA	LRA	RLA	LRA	RLA	LRA			RLA	LRA	RLA	LRA	RLA	LRA
208	60	(1)	#6 - 350KCMIL	42.2	425	42.2	425	42.2	425	(1)	#6 - 350KCMIL	42.2	425	42.2	425	42.2	425
230	60	(1)	#6 - 350KCMIL	42.2	425	42.2	425	42.2	425	(1)	#6 - 350KCMIL	42.2	425	42.2	425	42.2	425
380	60	(1)	#14 - 1/0AWG	25.7	239	25.7	239	25.7	239	(1)	#14 - 1/0AWG	25.7	239	25.7	239	25.7	239
460	60	(1)	#14 - 1/0AWG	21.3	187	21.3	187	21.3	187	(1)	#14 - 1/0AWG	21.3	187	21.3	187	21.3	187
575	60	(1)	#14 - 1/0AWG	17.4	148	17.4	148	17.4	148	(1)	#14 - 1/0AWG	17.4	148	17.4	148	17.4	148
208	60	(1)	#6 - 350KCMIL	49.1	505	49.1	505	49.1	505	(1)	#6 - 350KCMIL	49.1	505	49.1	505	49.1	505
230	60	(1)	#6 - 350KCMIL	49.1	505	49.1	505	49.1	505	(1)	#6 - 350KCMIL	49.1	505	49.1	505	49.1	505
380	60	(1)	#14 - 1/0AWG	28.3	290	28.3	290	28.3	290	(1)	#14 - 1/0AWG	28.3	290	28.3	290	28.3	290
460	60	(1)	#14 - 1/0AWG	23.4	225	23.4	225	23.4	225	(1)	#14 - 1/0AWG	23.4	225	23.4	225	23.4	225
575	60	(1)	#14 - 1/0AWG	18.7	180	18.7	180	18.7	180	(1)	#14 - 1/0AWG	18.7	180	18.7	180	18.7	180
208	60	(1)	#6 - 350KCMIL	51.1	505	51.1	505	51.1	505	(1)	#6 - 350KCMIL	79.0	599	79.0	599	–	–
230	60	(1)	#6 - 350KCMIL	49.1	505	49.1	505	49.1	505	(1)	#6 - 350KCMIL	79.0	599	79.0	599	–	–
380	60	(1)	#14 - 1/0AWG	28.3	290	28.3	290	28.3	290	(1)	#2 - 4/0AWG	45.5	358	45.5	358	–	–
460	60	(1)	#14 - 1/0AWG	23.4	225	23.4	225	23.4	225	(1)	#14 - 1/0AWG	37.6	310	37.6	310	–	–
575	60	(1)	#14 - 1/0AWG	18.7	180	18.7	180	18.7	180	(1)	#14 - 1/0AWG	30.1	239	30.1	239	–	–
208	60	(1)	#6 - 350KCMIL	57.8	500	57.8	500	57.8	500	(1)	#6 - 350KCMIL	57.8	500	57.8	500	57.8	500
230	60	(1)	#6 - 350KCMIL	57.8	500	57.8	500	57.8	500	(1)	#6 - 350KCMIL	57.8	500	57.8	500	57.8	500
380	60	(1)	#2 - 4/0AWG	33.3	305	33.3	305	33.3	305	(1)	#2 - 4/0AWG	33.3	305	33.3	305	33.3	305
460	60	(1)	#14 - 1/0AWG	27.5	250	27.5	250	27.5	250	(1)	#14 - 1/0AWG	27.5	250	27.5	250	27.5	250
575	60	(1)	#14 - 1/0AWG	22.0	198	22.0	198	22.0	198	(1)	#14 - 1/0AWG	22.0	198	22.0	198	22.0	198
208	60	(1)	# 250 - 500 KCM	90.5	599	90.5	599	–	–	(1)	# 4 - 300 KCM	90.5	599	90.5	599	–	–
230	60	(1)	# 250 - 500 KCM	78.7	599	78.7	599	–	–	(1)	# 4 - 300 KCM	78.7	599	78.7	599	–	–
380	60	(1)	#2 - 4/0AWG	47.7	358	47.7	358	–	–	(1)	#2 - 4/0AWG	47.7	358	47.7	358	–	–
460	60	(1)	#2 - 4/0AWG	39.4	310	39.4	310	–	–	(1)	#14 - 1/0AWG	39.4	310	39.4	310	–	–
575	60	(1)	#14 - 1/0AWG	31.5	239	31.5	239	–	–	(1)	#14 - 1/0AWG	31.5	239	31.5	239	–	–

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

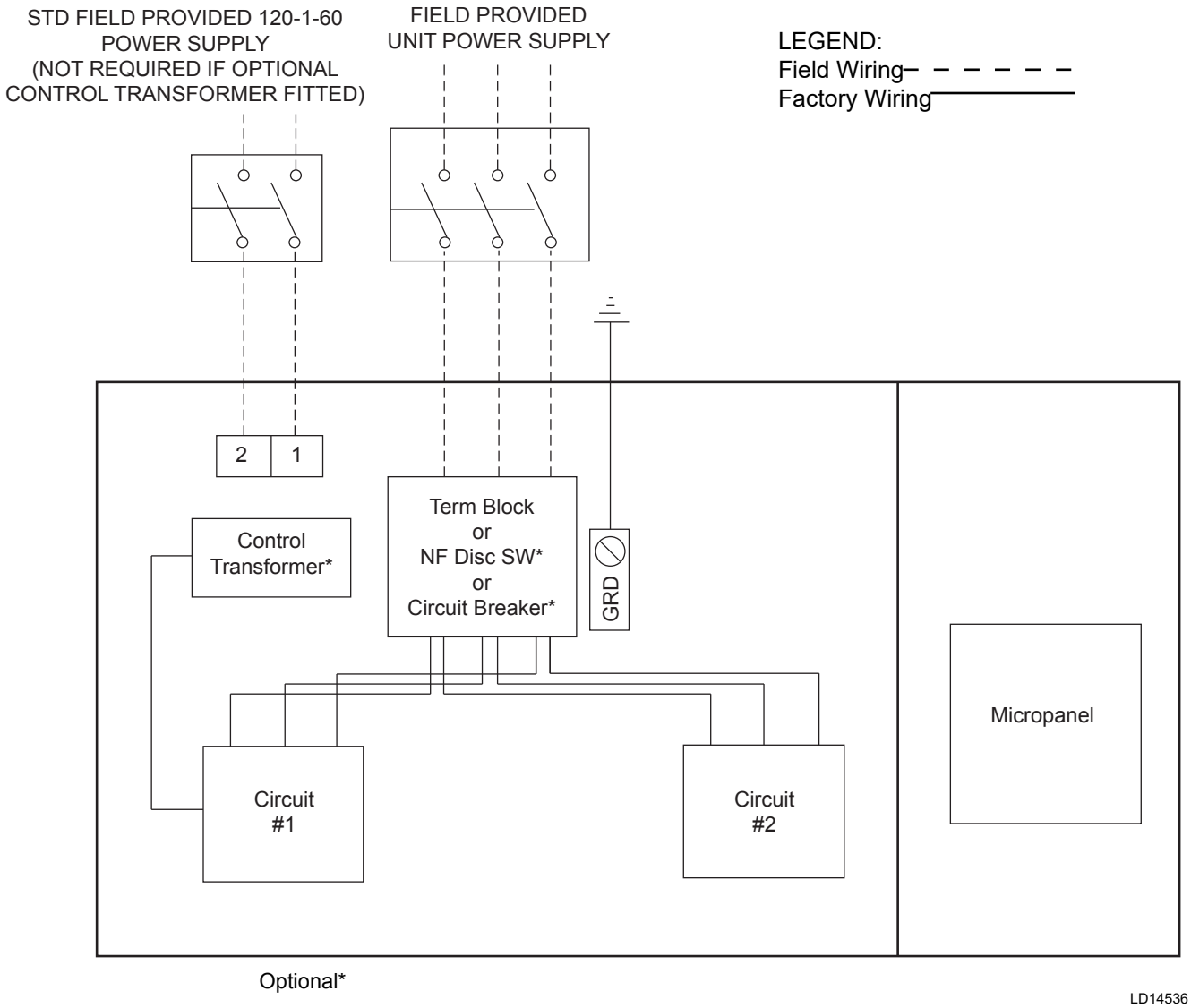


FIGURE 20 - SINGLE POINT POWER SUPPLY CONNECTION – STANDARD UNIT

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, PRIOR to working on equipment.

CAUTION

The unit evaporator heater uses 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.

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

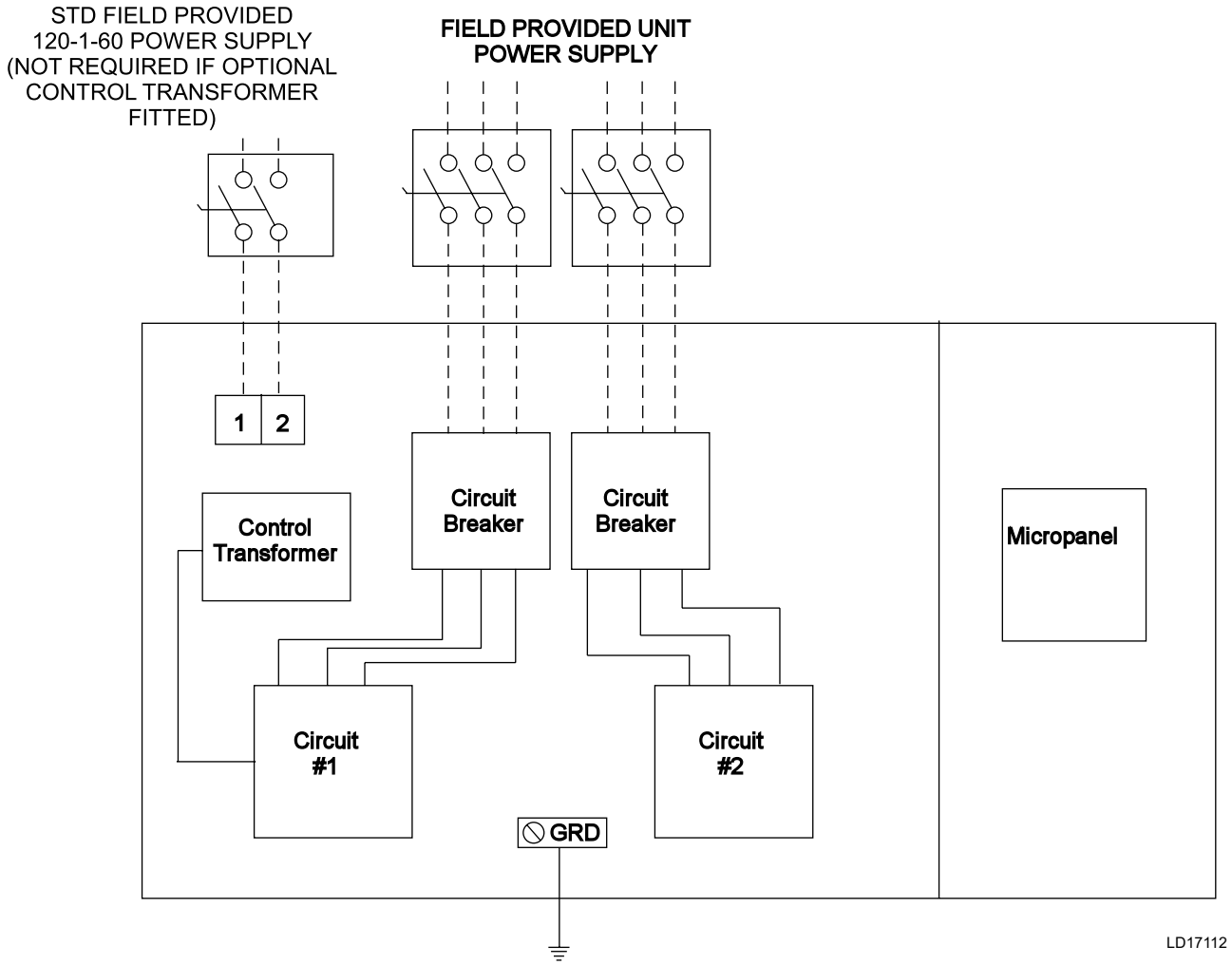


FIGURE 21 - DUAL POINT POWER SUPPLY CONNECTION – STANDARD UNIT

ELECTRICAL DATA

TABLE 7 - MICRO PANEL POWER SUPPLY

UNIT VOLTAGE	UNIT VOLTAGE	CONTROL POWER	MCA NOTE A	OVER CURRENT PROTECTION, *SEE NOTE B*		NF DISC SW
				MIN	MAX	
MODELS WITHOUT CONTROL TRANSFORMER		115-1-60/50	15A	10A	15A	30 A / 240V
MODELS WITH CONTROL TRANSFORMER	-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, PRIOR to working on equipment.

The unit evaporator heater uses 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.

TABLE 8 - VOLTAGE RANGE (LIMITATIONS)

VOLTAGE RANGE			
VOLTAGE CODE	UNIT POWER	MINIMUM	MAXIMUM
-17	200-3-60	180	220
-28	230-3-60	200	254
-40	380/415-3-60	342	402
-46	460-3-60	414	508
-50	380/415-3-50	342	440
-58	575-3-60	520	635

ELECTRICAL NOTES AND LEGEND

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 NF	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
ECWT	ENTERING CONDENSER WATER TEMPERATURE

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 43024. 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 amps.
2. MCA for units with optional external compressor overloads is calculated at 54/44 evaporator (water), 85/95 condenser (water) condition per UL1995. If unit is to be operated at higher temperatures, increase Service Wiring and Equipment accordingly.

   For Leaving Condenser Temperatures above 95°F (with maximum limit of 110°F) use the following formula:

   RMCA = MCA * (1 + (DLCT - 95)/100)

   DLCT is “Design Leaving Condenser Temperature”

   RMCA is “Recommended Minimum Circuit Ampacity”
3. 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.
4. 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 startup 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.
5. 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.
6. 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.
7. 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.
8. An equipment ground lug(s) is provided for the incoming power. Ground line sizing shall be in accordance with the current NEC Table 250-122.
9. 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.
10. Field Wiring by others which complies to the National Electrical Code & Local Codes.
11. Voltage Utilization Range

GROUND WIRE SIZING

GROUND LUG SIZING WITH OR WITHOUT OPTIONAL OVERLOADS		
NON FUSED DISCONNECT SWITCH OPTION		
RATING	**INCOMING WIRE**	**GROUND WIRE**
150A	# 14 - 1/0 AWG	# 8 - 2 AWG
150A	# 2 - 4/0 AWG	# 8 - 2 AWG
150A	# 4 - 300 KCM	# 8 - 2 AWG
225A	# 4 - 300 KCM	# 6 - 1/0 AWG
250A	# 6 - 350 KCM	# 4 - 3/0 AWG
400A	# 250 - 500 KCM	# 2 - 4/0 AWG
400A	(2) # 3/0 - 250 KCM	(2) # 6 - 1/0 AWG
600A	(2) # 250 - 500 KCM	(2) # 2 - 4/0 AWG
800A	(2) # 250 - 500 KCM	(2) # 2 - 4/0 AWG
800A	(3) # 2/0 - 400 KCM	(3) # 4 - 3/0 AWG
CIRCUIT BREAKER OPTION		
RATING	**INCOMING WIRE**	**GROUND WIRE**
60A	# 14 - 1/0 AWG	# 14 - 6 AWG
70A	# 14 - 1/0 AWG	# 14 - 6 AWG
80A	# 14 - 1/0 AWG	# 14 - 6 AWG
90A	# 14 - 1/0 AWG	# 14 - 6 AWG
100A	# 14 - 1/0 AWG	# 8 - 2 AWG
125A	# 14 - 1/0 AWG	# 8 - 2 AWG
125A	# 2 - 4/0 AWG	# 8 - 2 AWG
150A	# 2 - 4/0 AWG	# 8 - 2 AWG
175A	# 4 - 300 KCM	# 6 - 1/0 AWG
200A	# 4 - 300 KCM	# 6 - 1/0 AWG
225A	# 4 - 300 KCM	# 6 - 1/0 AWG
250A	# 6 - 350 KCM	# 4 - 3/0 AWG
400A	# 250 - 500 KCM	# 2 - 4/0 AWG
400A	(2) # 3/0 - 250 KCM	(2) # 6 - 1/0 AWG
600A	(2) # 250 - 500 KCM	(2) # 2 - 4/0 AWG
TERMINAL BLOCK OPTION		
RATING	**INCOMING WIRE**	**GROUND WIRE**
130A	# 12 - 1 AWG	# 8 - 2 AWG
165A	# 10 - 3/0 AWG	# 6 - 1/0 AWG
240A	# 10 - 300 KCM	# 4 - 3/0 AWG
320A	# 4 - 500 KCM	# 2 - 4/0 AWG
480A	(2) # 10 - 300 KCM	(2) # 4 - 3/0 AWG

Instructions:
1) Start in correct power option table (switch, breaker, terminal block)
2) Match engineering guide value for amperage
3) Match engineering guide value for wire range
4) Note corresponding ground wire range

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ELEMENTARY WIRING DIAGRAM

QWC3 050T, 060T, 070T, 080T, 090T, 100T, 115T and 130T STANDARD EFFICIENCY UNITS
QWC3 060T, 070T 080T, 090T, 095T and 115T HIGH EFFICIENCY UNITS

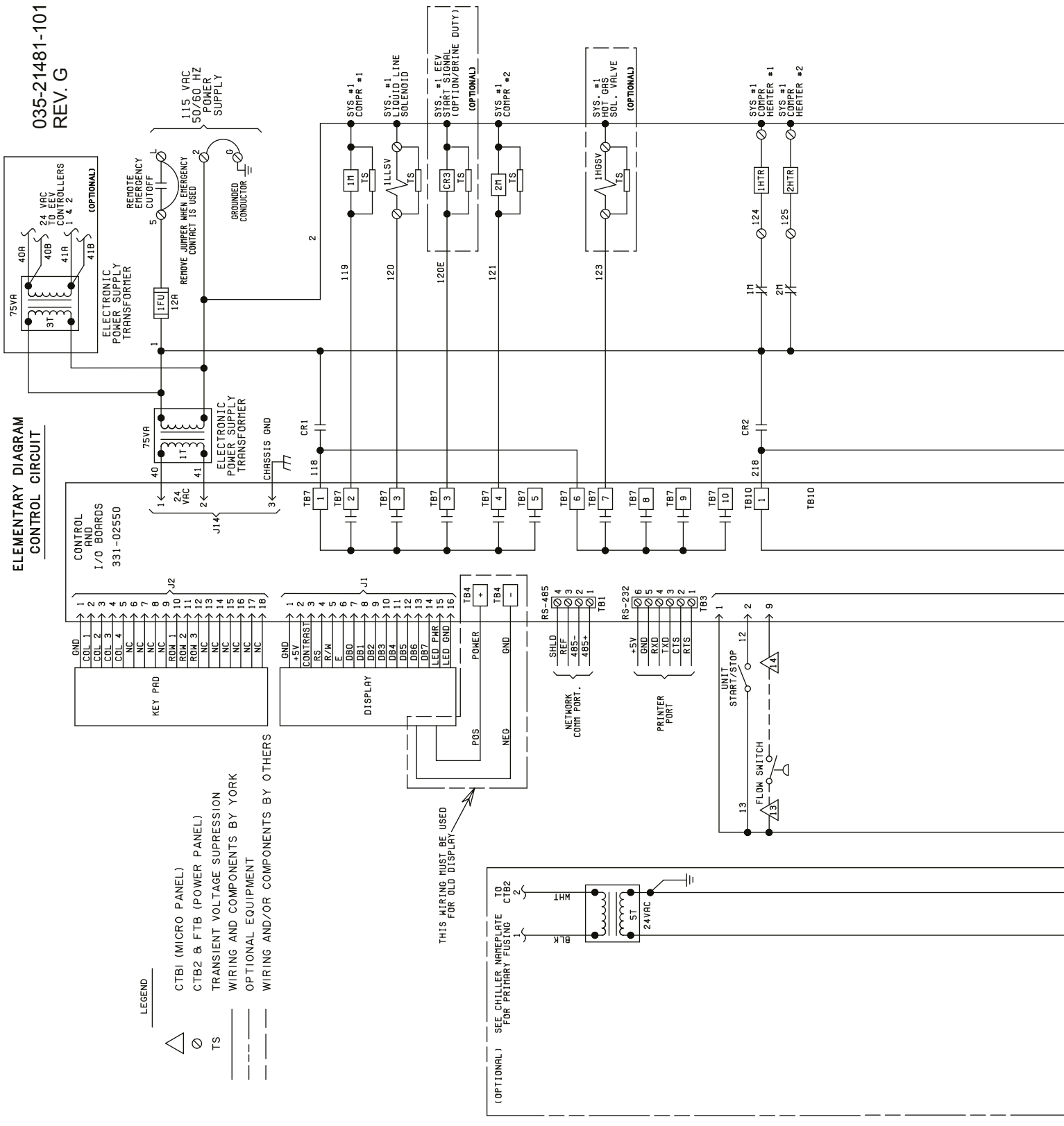

FIGURE 22 - CONTROL CIRCUIT, 4 COMPRESSOR

ELEMENTARY WIRING DIAGRAM (CONT'D)

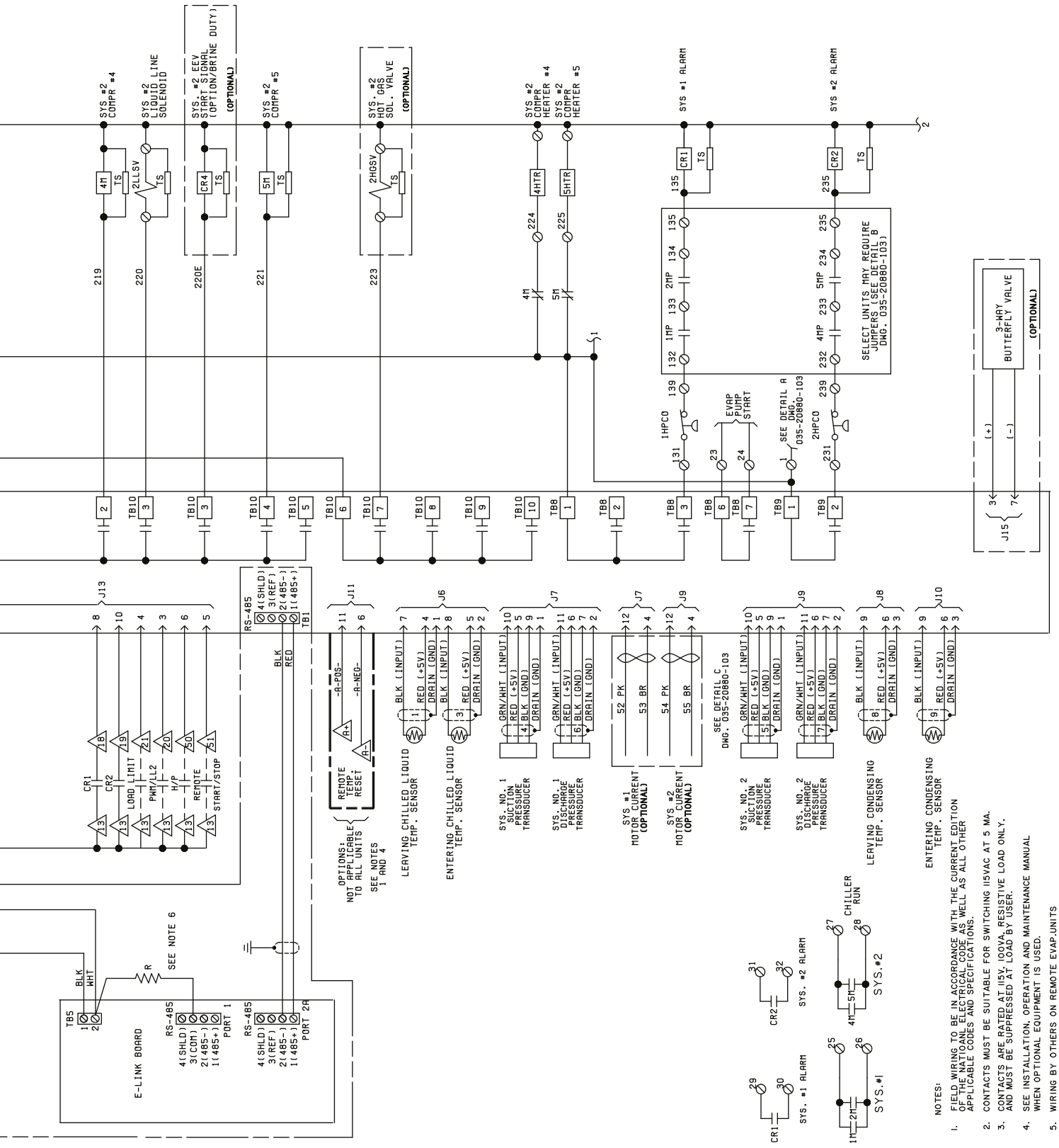

FIGURE 22 - CONTROL CIRCUIT, 4 COMPRESSOR (CONT'D)

ELEMENTARY WIRING DIAGRAM

QWC3 100T,115T, 130T, 150T, 170T, 200T STANDARD EFFICIENCY UNITS
QWC3 95T, 115T, 130T and 150T HIGH EFFICIENCY UNITS

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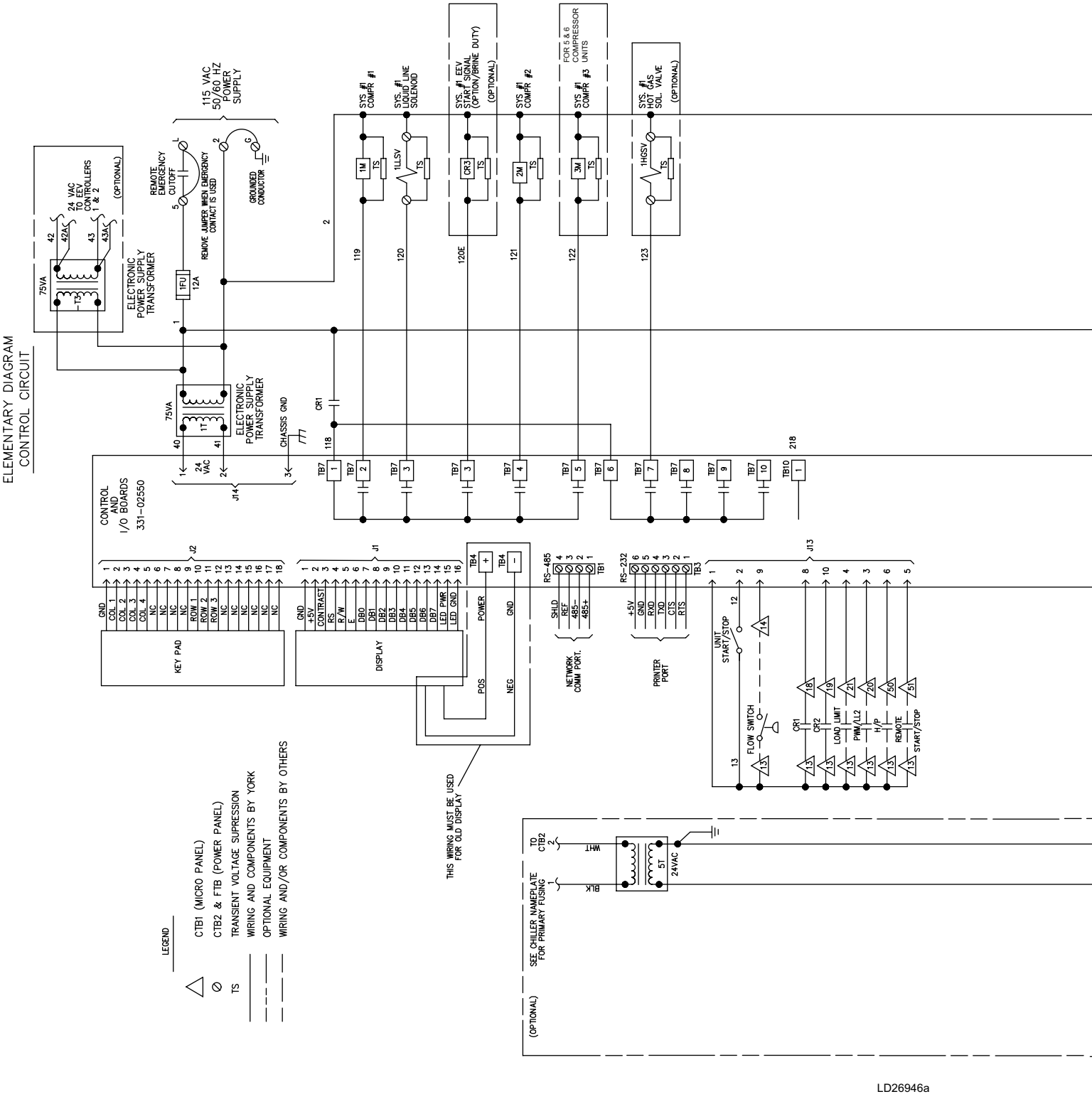

FIGURE 23 - CONTROL CIRCUIT, 5 AND 6 COMPRESSOR

ELEMENTARY WIRING DIAGRAM (CONT'D)

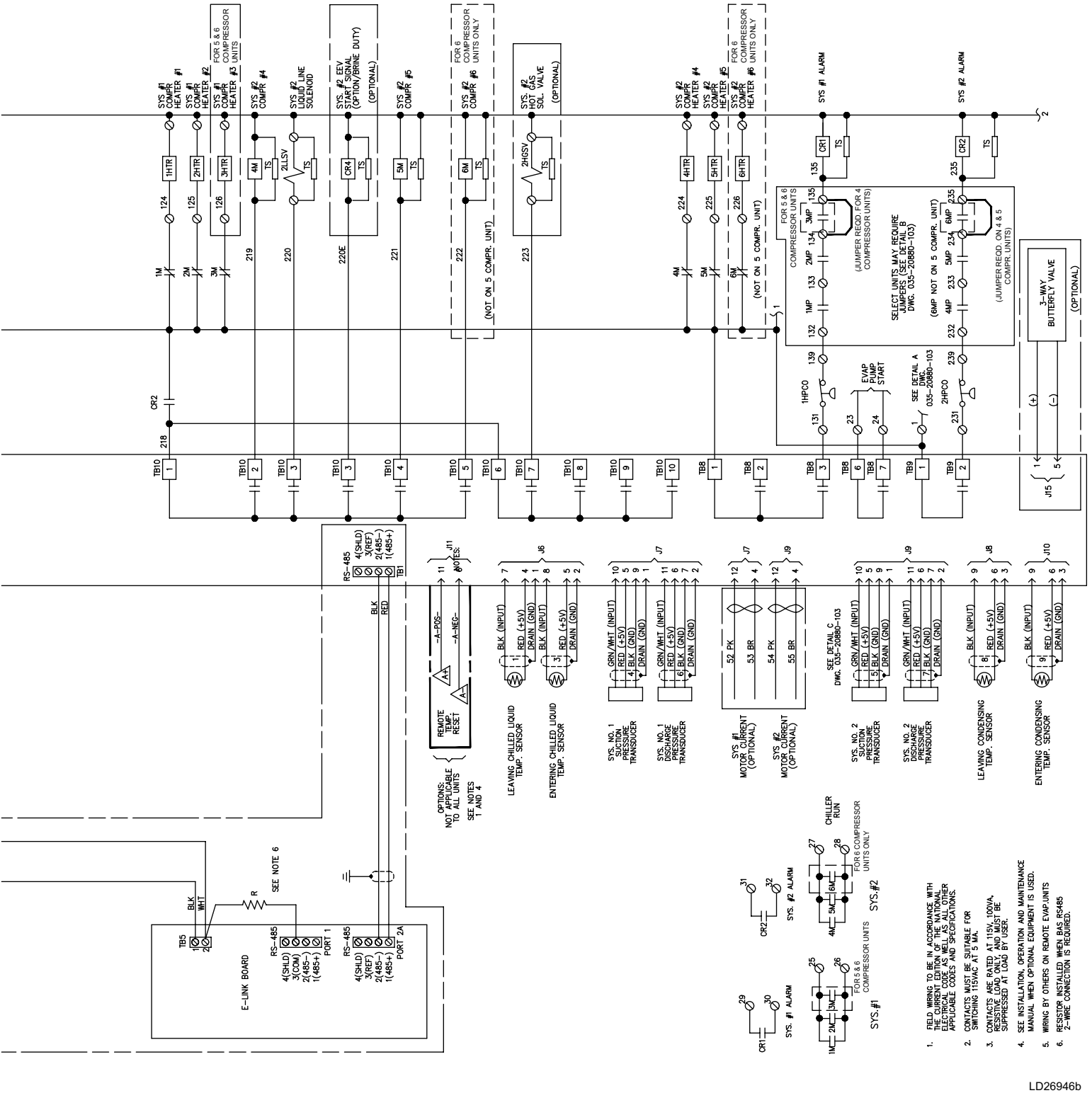

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FIGURE 23 - CONTROL CIRCUIT, 5 AND 6 COMPRESSOR (CONT'D)

ELEMENTARY WIRING DIAGRAM

QWC3 050T, 060T, 070T, 080T, 090T, 100T, 115T and 130T STANDARD EFFICIENCY UNITS
QWC3 060T, 070T, 080T, 090T, and 115T HIGH EFFICIENCY UNITS

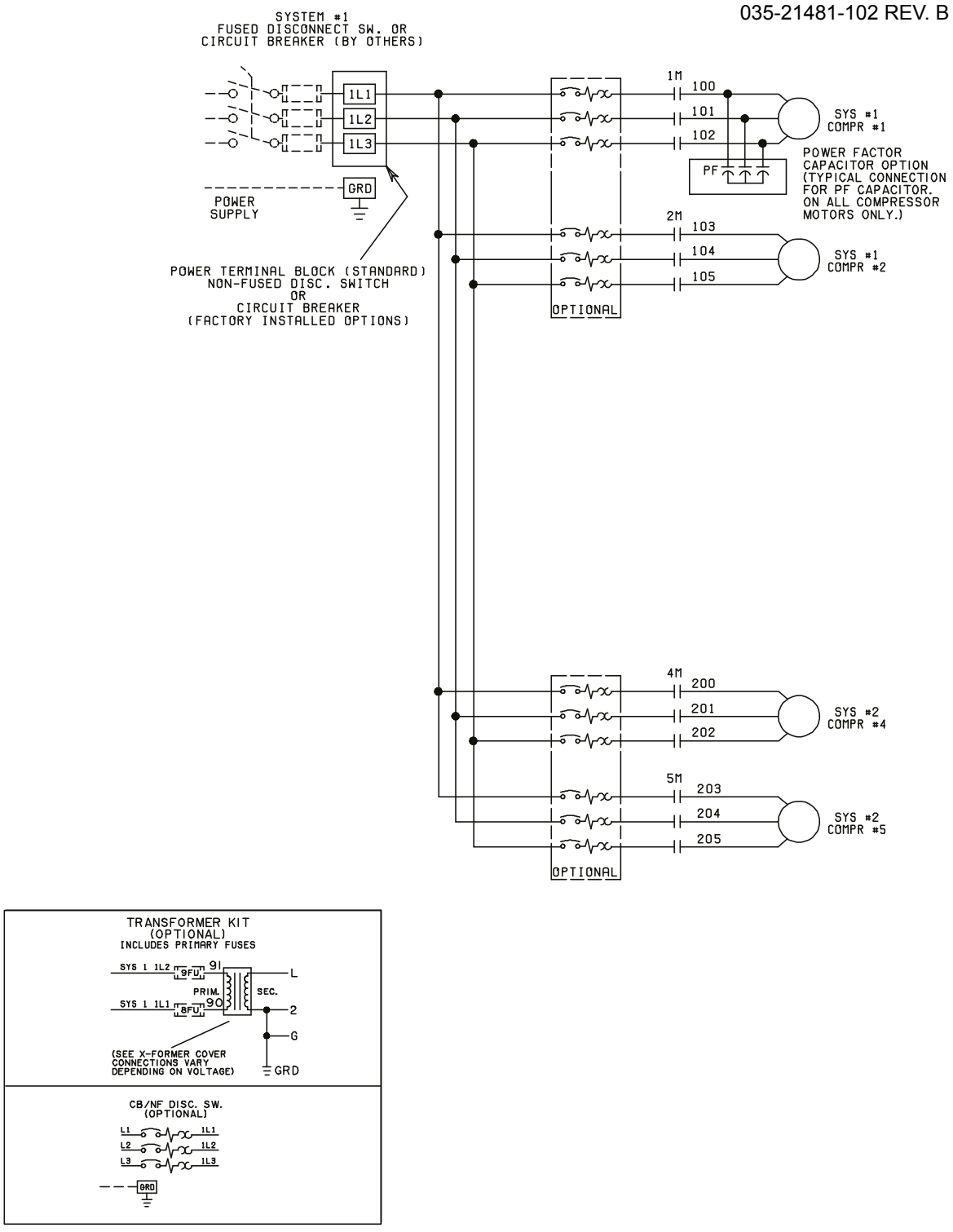

FIGURE 24 - POWER CIRCUIT, 4 COMPRESSOR WITH NON FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER

ELEMENTARY WIRING DIAGRAM

QWC3 050T, 060T, 070T, 080T, 090T, 100T, 115T and 130T STANDARD EFFICIENCY UNITS
QWC3 060T, 070T, 080T, 090T, and 115T HIGH EFFICIENCY UNITS

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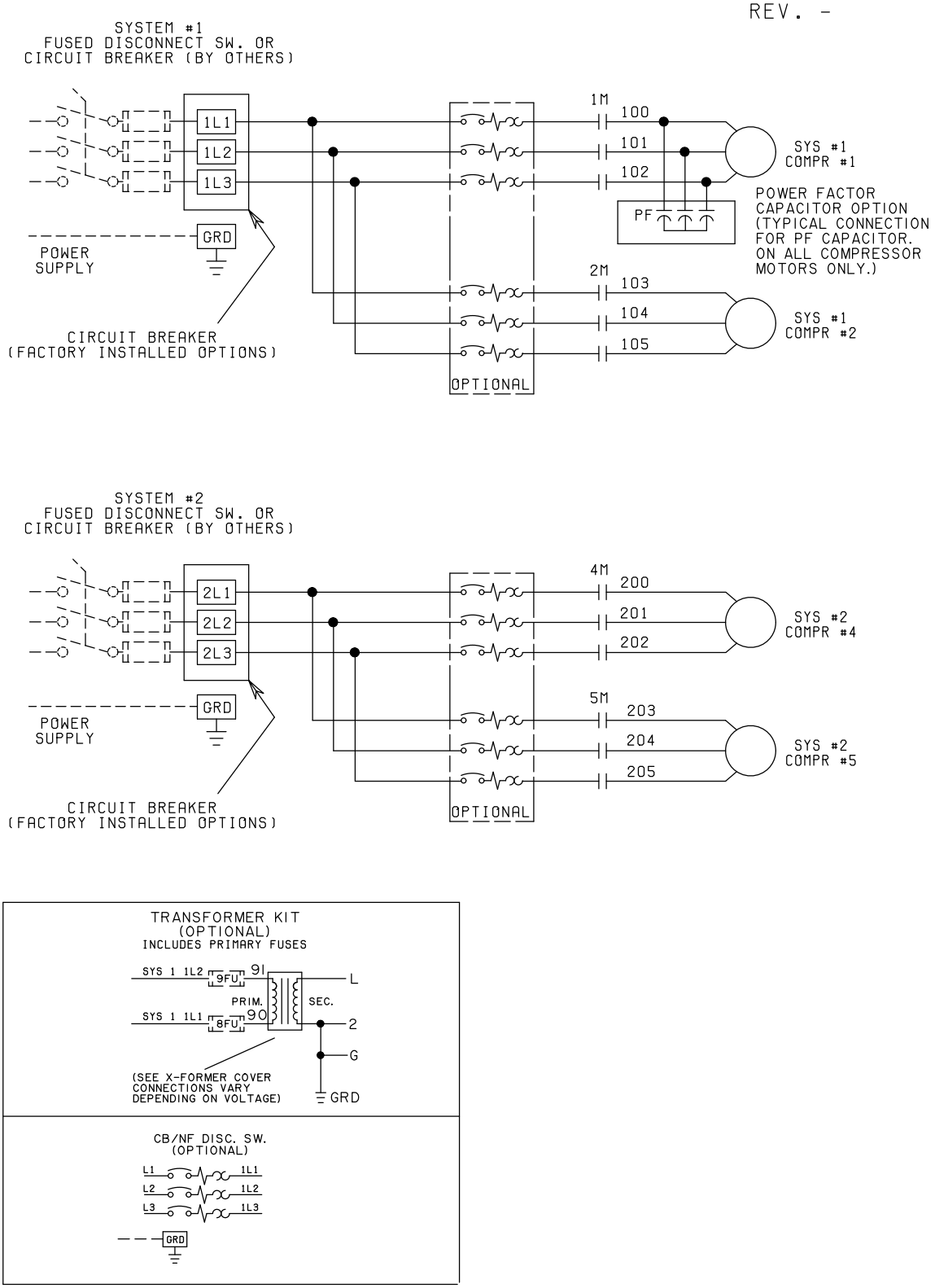


FIGURE 25 - POWER CIRCUIT, 4 COMPRESSOR WITH CIRCUIT BREAKER

ELEMENTARY WIRING DIAGRAM

QWC3100T, 115T, 150T, 170T and 200T STANDARD EFFICIENCY UNITS
QWC3095T, 130T and 150T HIGH EFFICIENCY UNITS

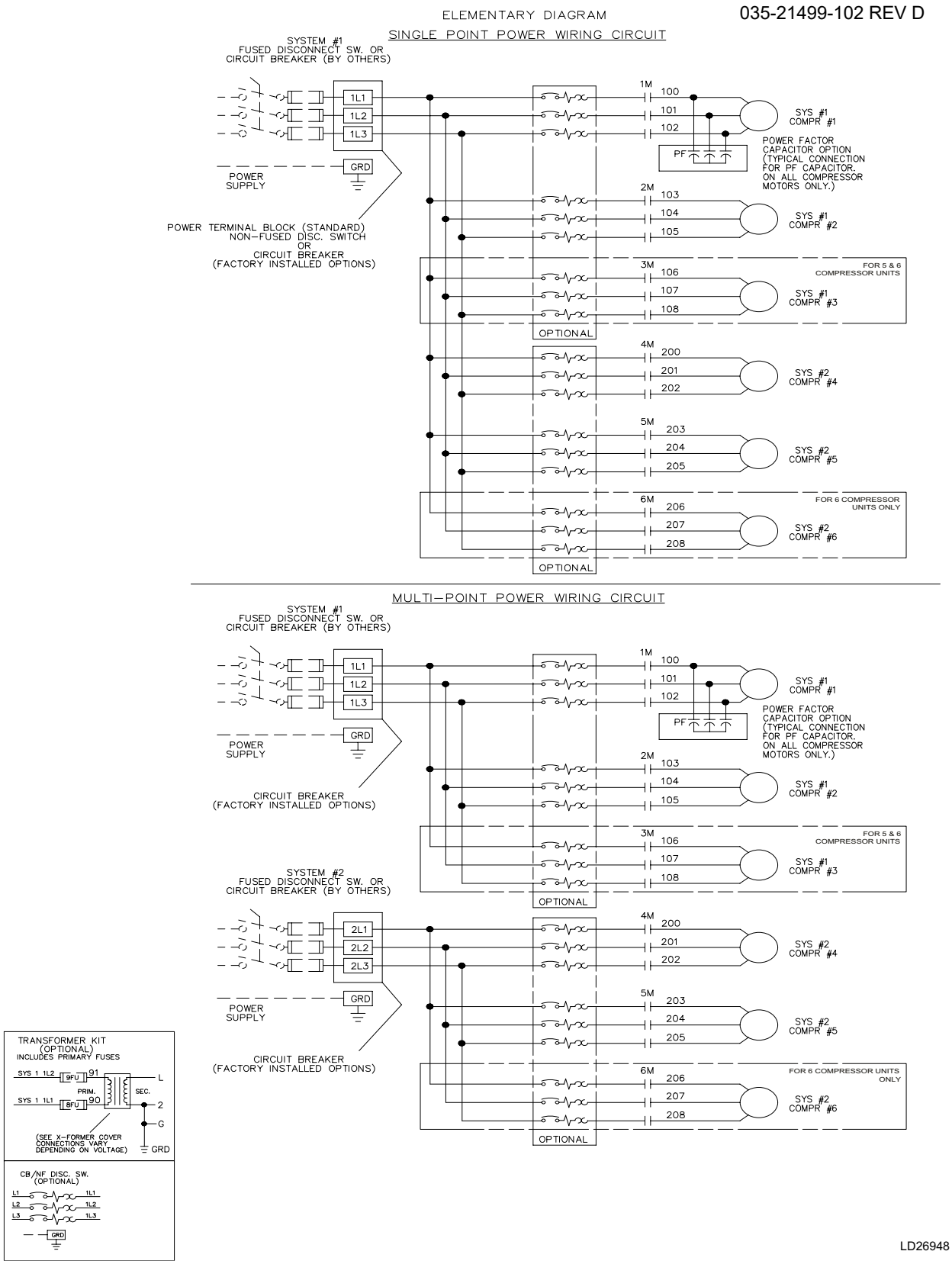


FIGURE 26 - POWER CIRCUIT, 5 AND 6 COMPRESSOR

ELEMENTARY WIRING DIAGRAM

QWC3100T, 115T, 170T and 200T STANDARD EFFICIENCY UNITS
QWC3095T, 130T and 150T HIGH EFFICIENCY UNITS

035-21499-302 REV -

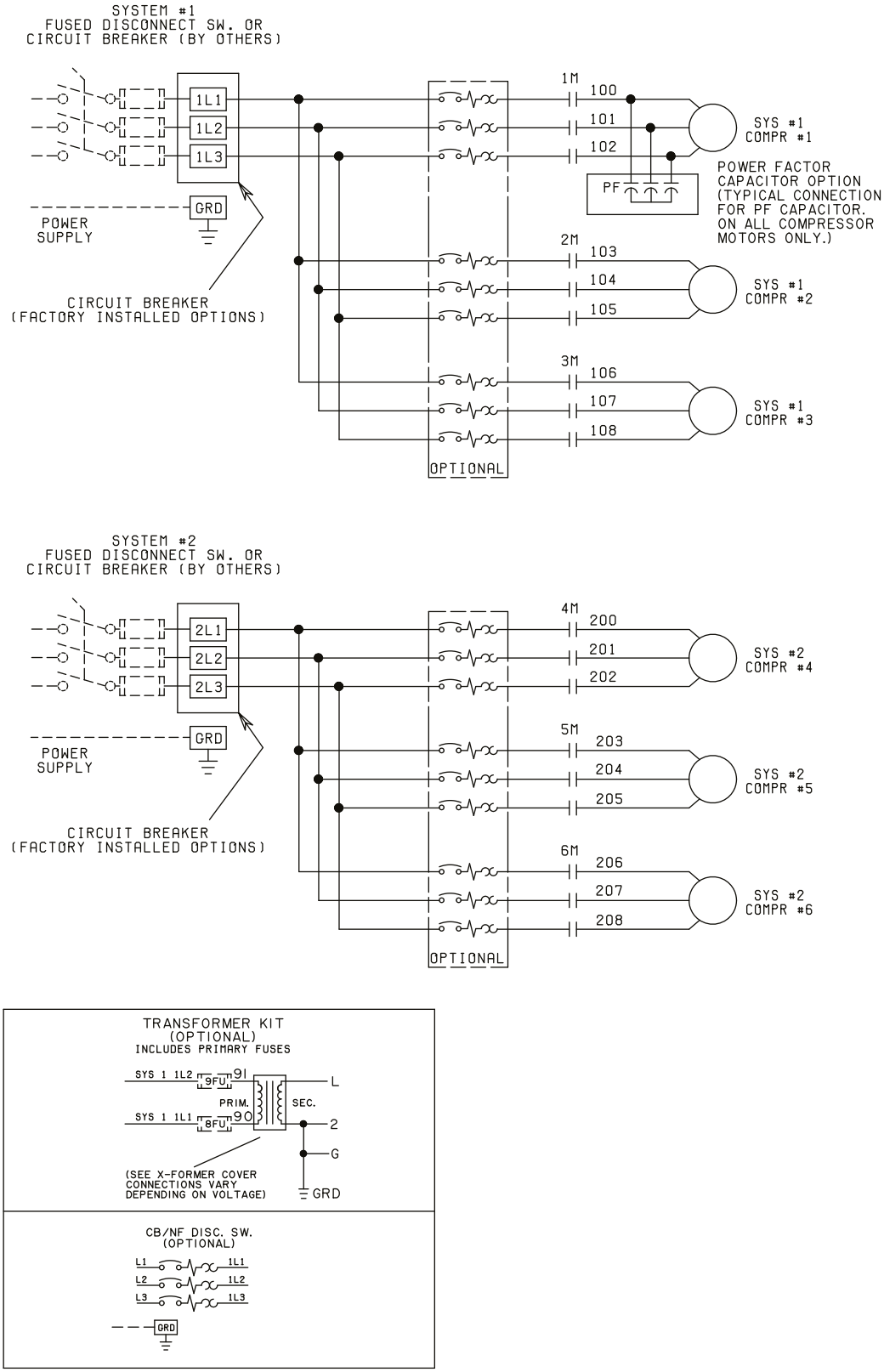


FIGURE 27 - POWER CIRCUIT, 6 COMPRESSOR

CONNECTION WIRING DIAGRAM

QWC3050T, 060T, 070T, 080T, 090T, 100T, 115T and 130T STANDARD EFFICIENCY UNITS
QWC3060T, 070T, 080T, 090T and 115T HIGH EFFICIENCY UNITS

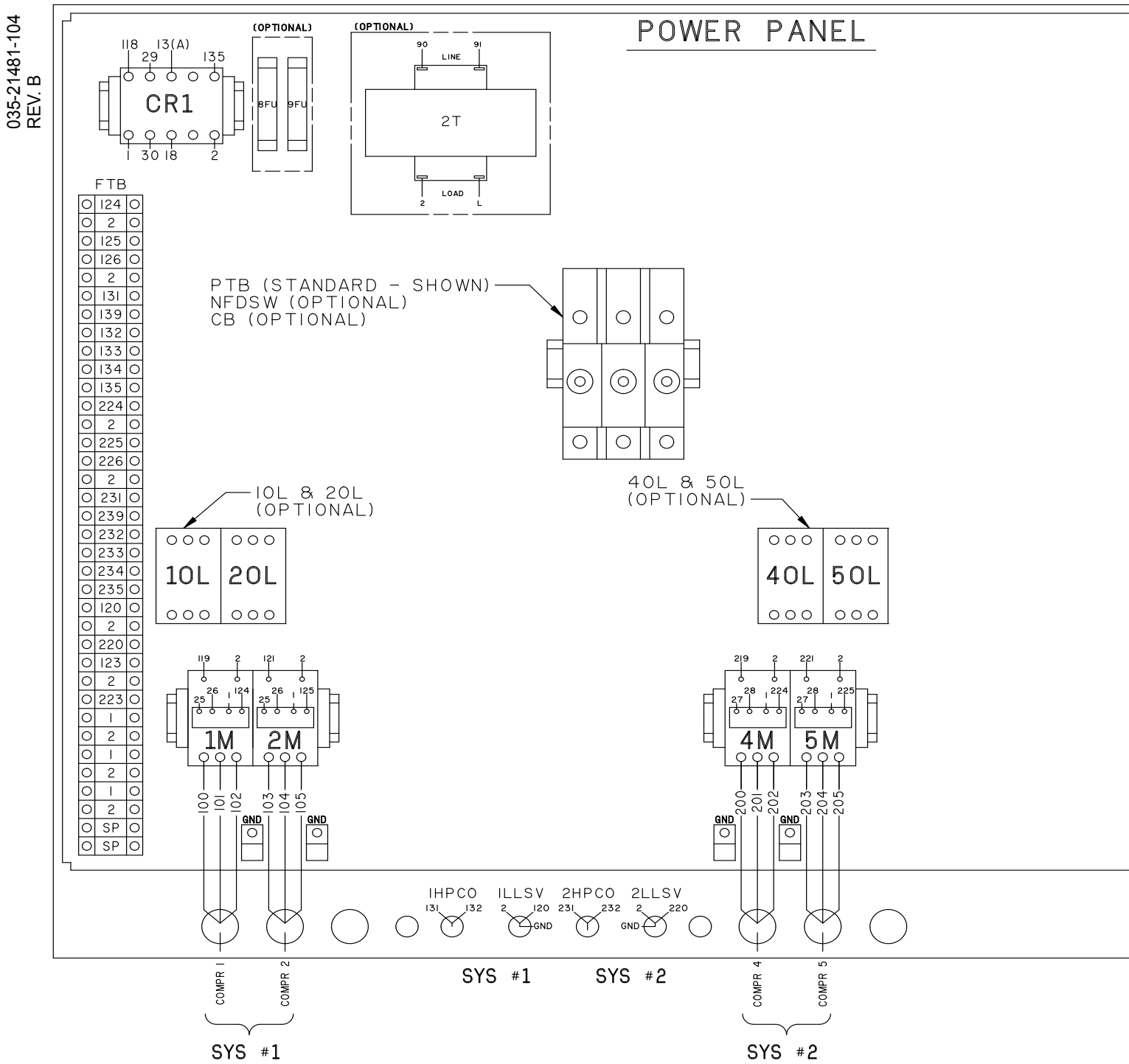


FIGURE 28 - CONNECTION WIRING DIAGRAM, 4 COMPRESSOR

CONNECTION WIRING DIAGRAM (CONT'D)

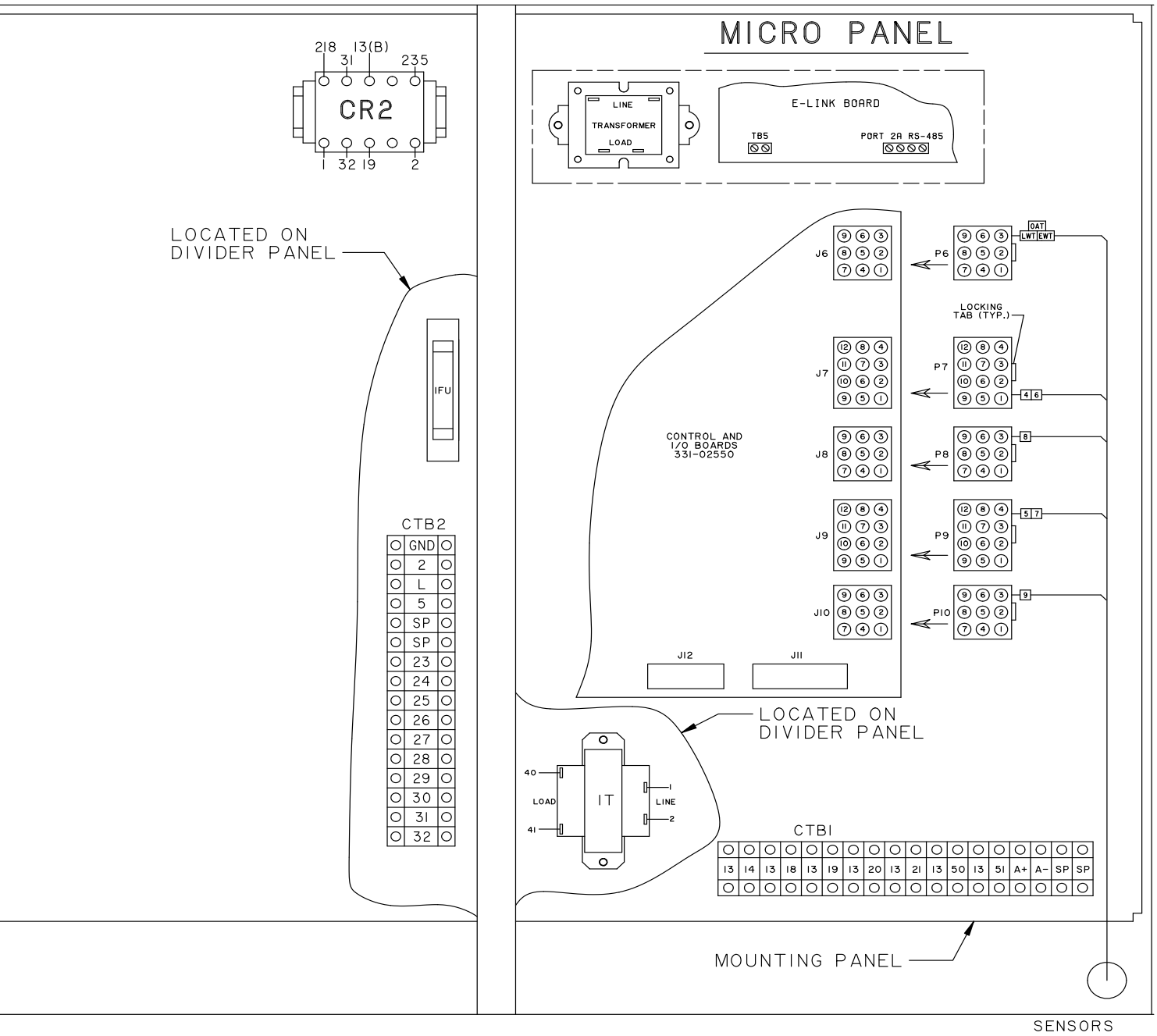


FIGURE 28 - CONNECTION WIRING DIAGRAM, 4 COMPRESSOR (CONT'D)

CONNECTION WIRING DIAGRAM

QWC3050, 060T , 070T, 080T, 090T, 100T, 115T and 130T STANDARD EFFICIENCY UNITS
QWC3060T, 070T, 080T, 090T and 115T HIGH EFFICIENCY UNITS

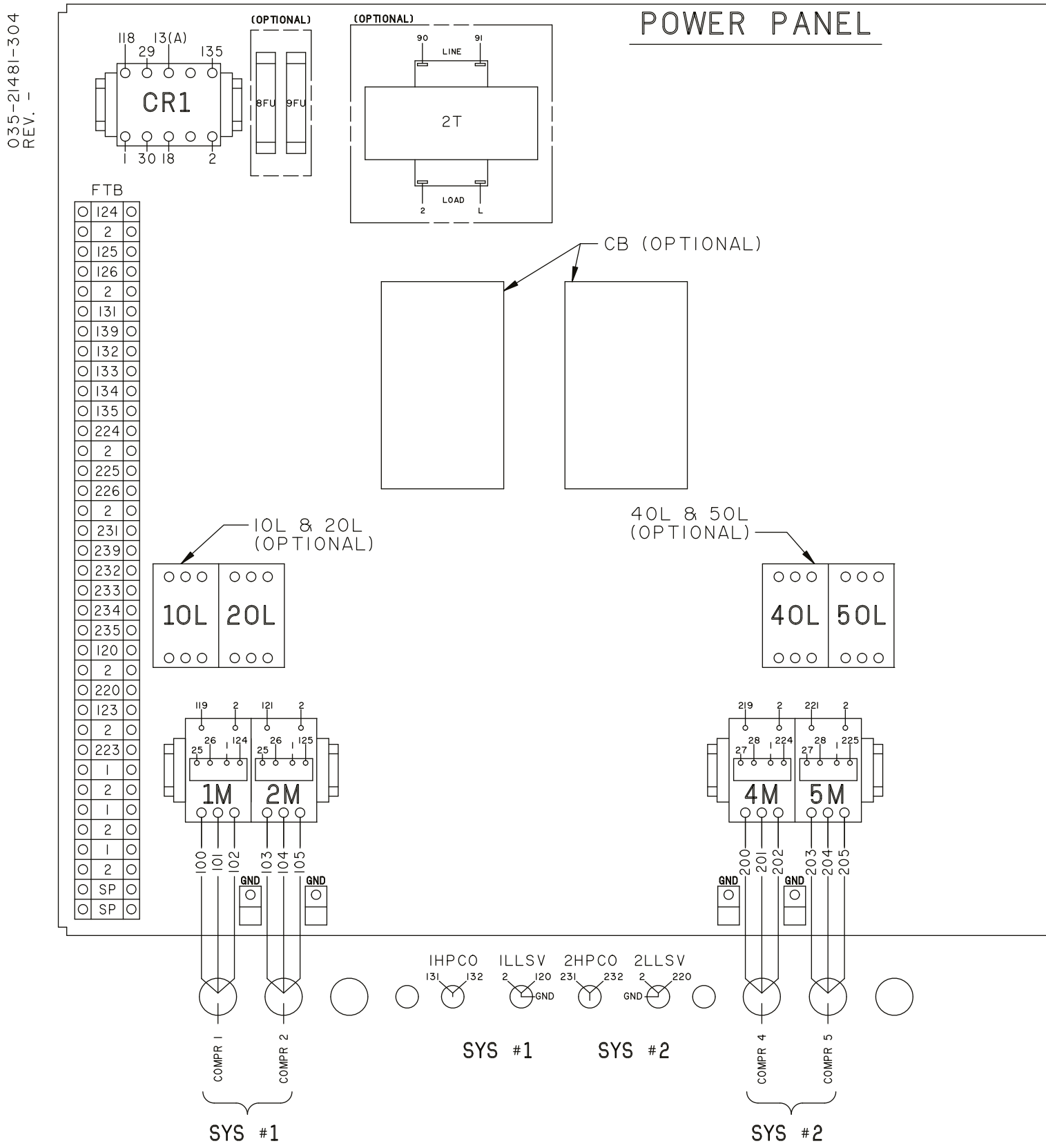


FIGURE 29 - CONNECTION WIRING DIAGRAM, 4 COMPRESSOR

CONNECTION WIRING DIAGRAM (CONT'D)

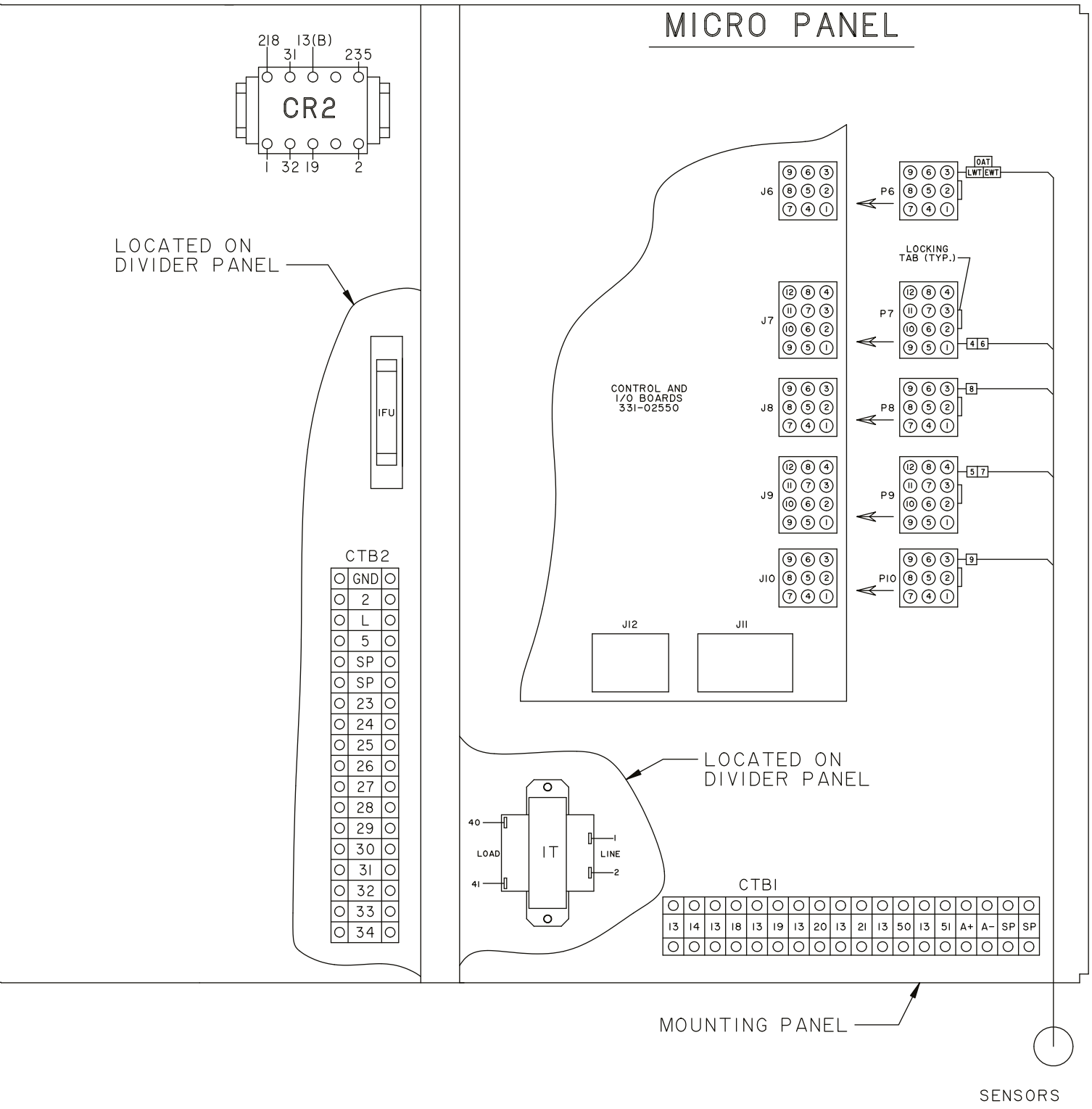


FIGURE 29 - CONNECTION WIRING DIAGRAM, 4 COMPRESSOR (CONT'D)

CONNECTION WIRING DIAGRAM

QWC3100T, 115T, 150T, 170T and 200T STANDARD EFFICIENCY UNITS
QWC3095T, 130T and 150T HIGH EFFICIENCY UNITS

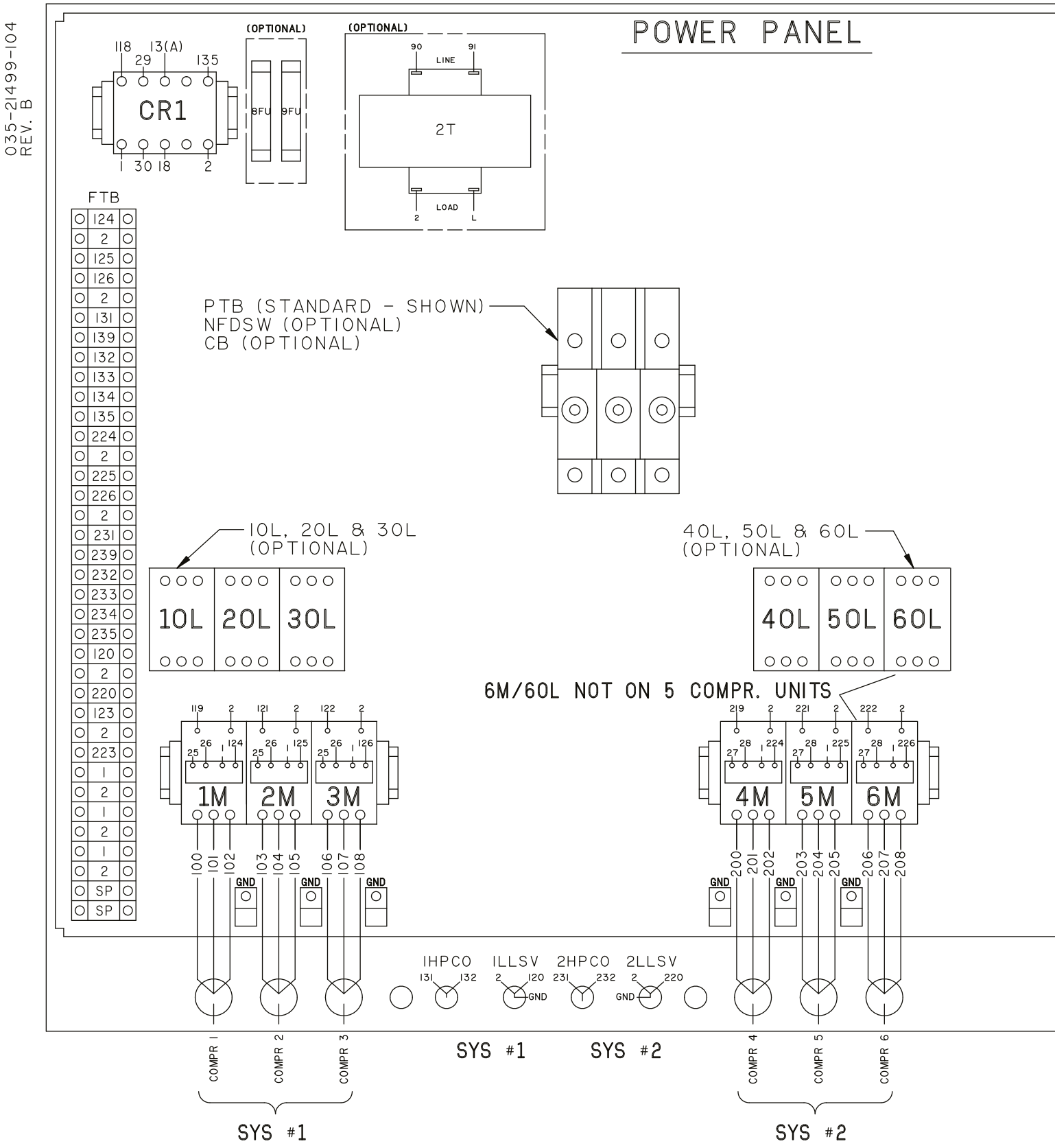


FIGURE 30 - CONNECTION WIRING DIAGRAM, 5 AND 6 COMPRESSOR

CONNECTION WIRING DIAGRAM (CONT'D)

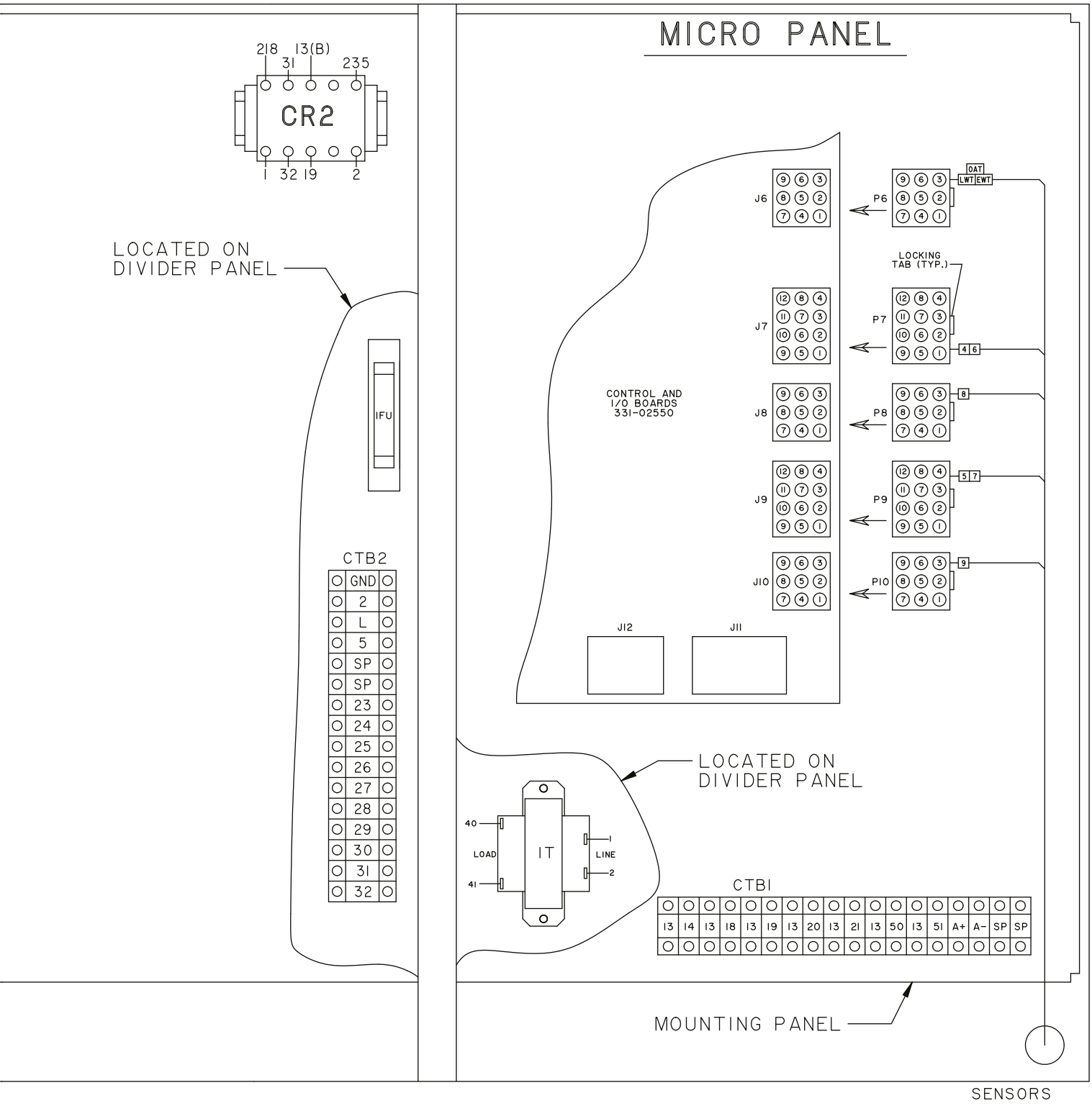


FIGURE 30 - CONNECTION WIRING DIAGRAM, 5 AND 6 COMPRESSOR (CONT'D)

CONNECTION WIRING DIAGRAM

QWC3100T, 115T, 170T and 200T STANDARD EFFICIENCY UNITS
QWC3095T, 130T and 150T HIGH EFFICIENCY UNITS

035-21499-104 REV E

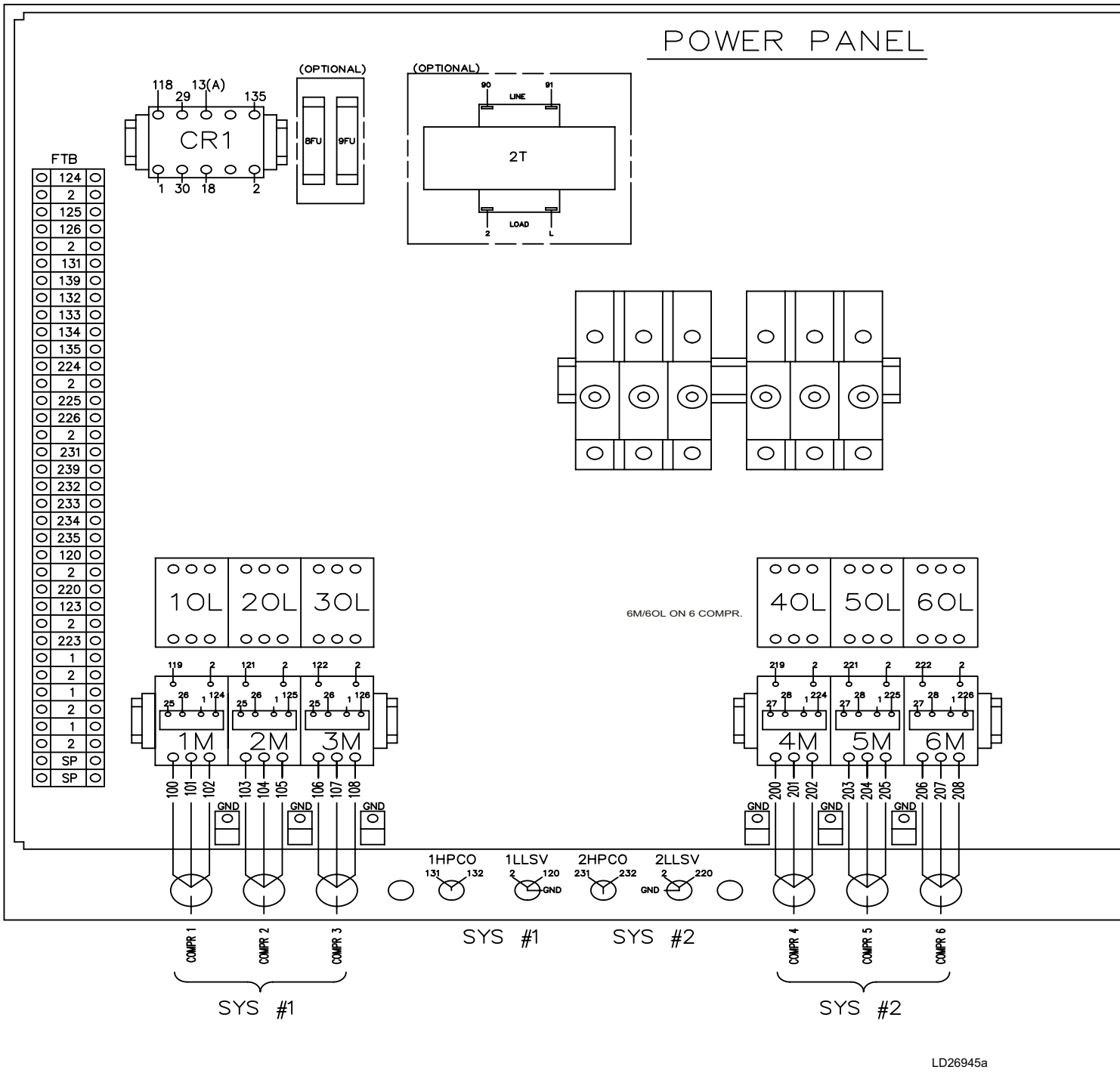
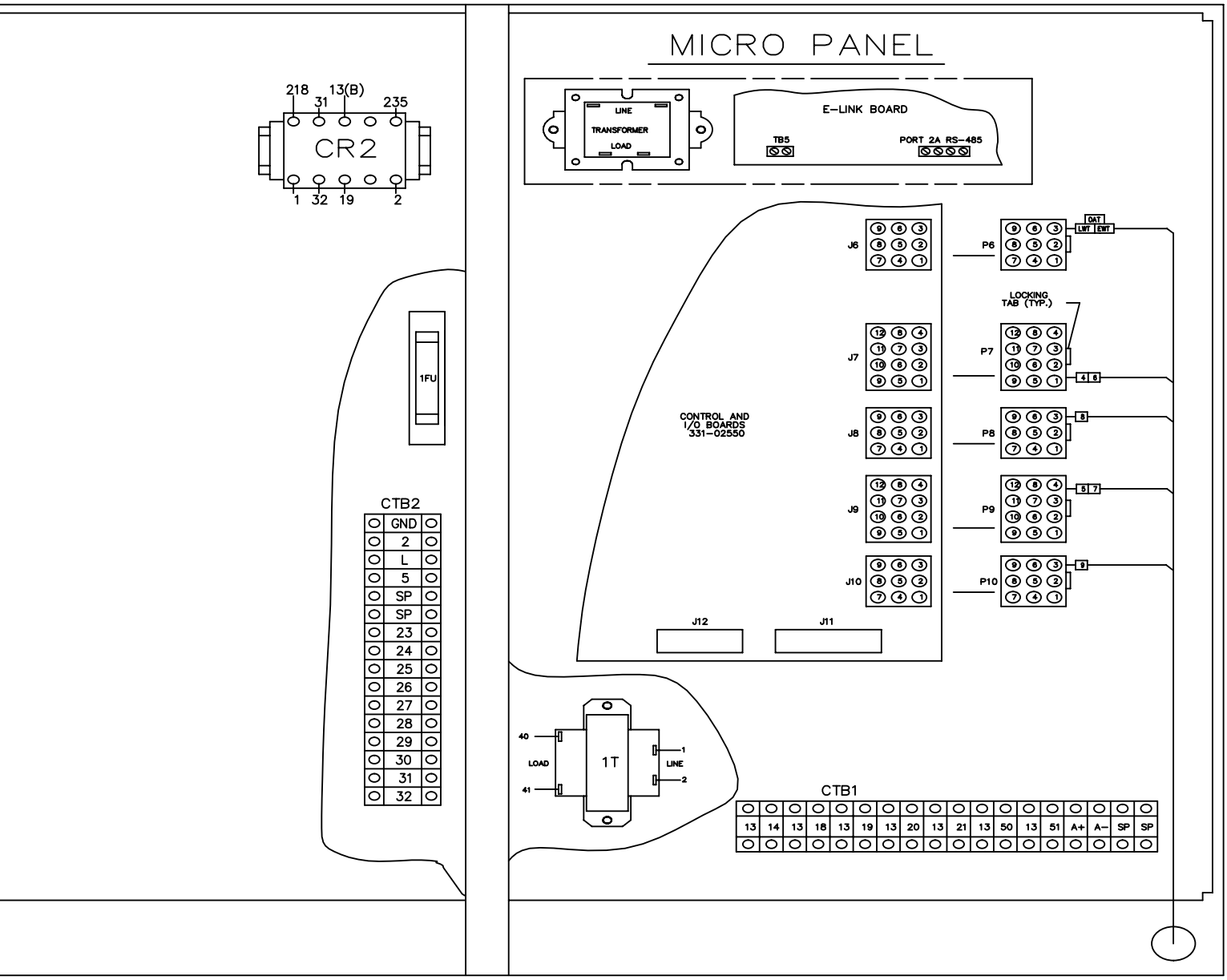


FIGURE 31 - CONNECTION WIRING DIAGRAM, 6 COMPRESSOR

CONNECTION WIRING DIAGRAM (CONT'D)



* Single HPCO - Standard for all panel (50Hz and 60Hz).
Jumpers are included in panel assembly. No jumpers required in dual HPCO.

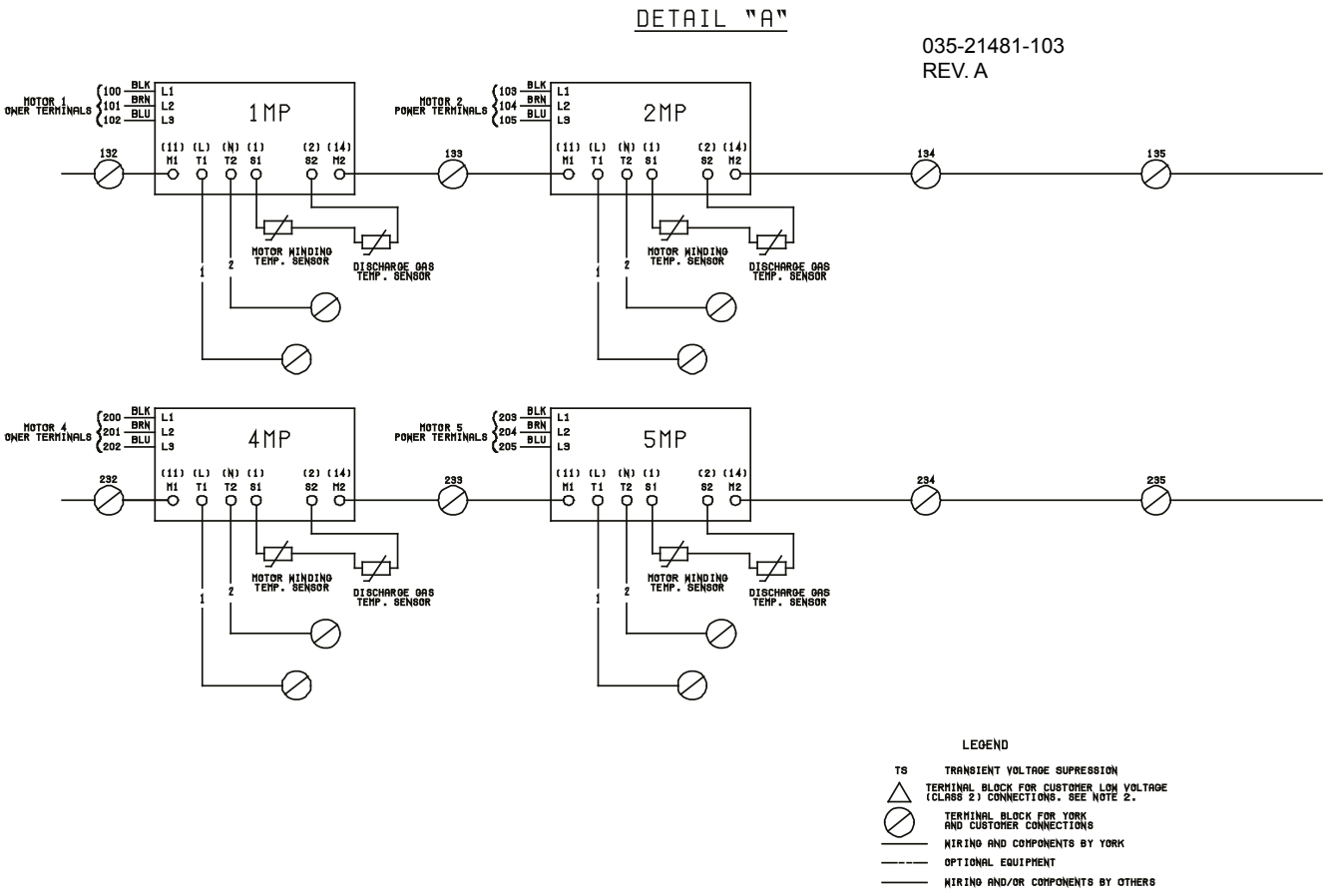
** For 4 and 5 compressor models. Jumpers are included in panel assembly.
No Jumpers required for 6 compressor models.

LD26945b

FIGURE 31 - CONNECTION WIRING DIAGRAM, 6 COMPRESSOR (CONT'D)

ELEMENTARY WIRING DIAGRAM DETAILS

QWC3050T, 060T, 070T, 080T, 090T, 100T, 115T and 130T STANDARD EFFICIENCY UNITS
QWC3060T, 070T, 080T, 095T and 115T HIGH EFFICIENCY UNITS



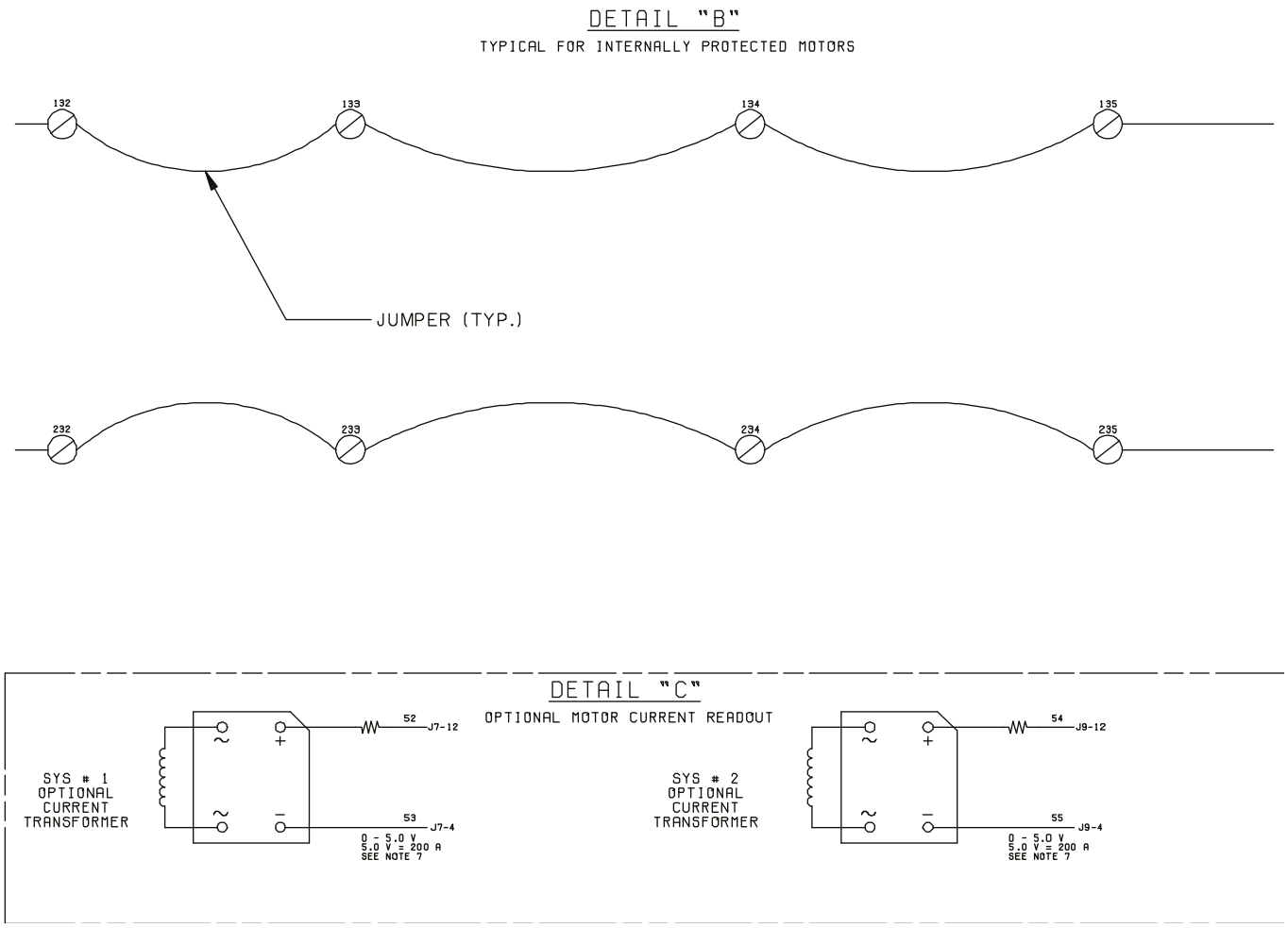
Notes:

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 24VDC, (gold contacts recommended).Wiring shall 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.

LD12928a

FIGURE 32 - ELEMENTARY WIRING DIAGRAM DETAILS, 4 COMPRESSOR

ELEMENTARY WIRING DIAGRAM DETAILS (CONT'D)

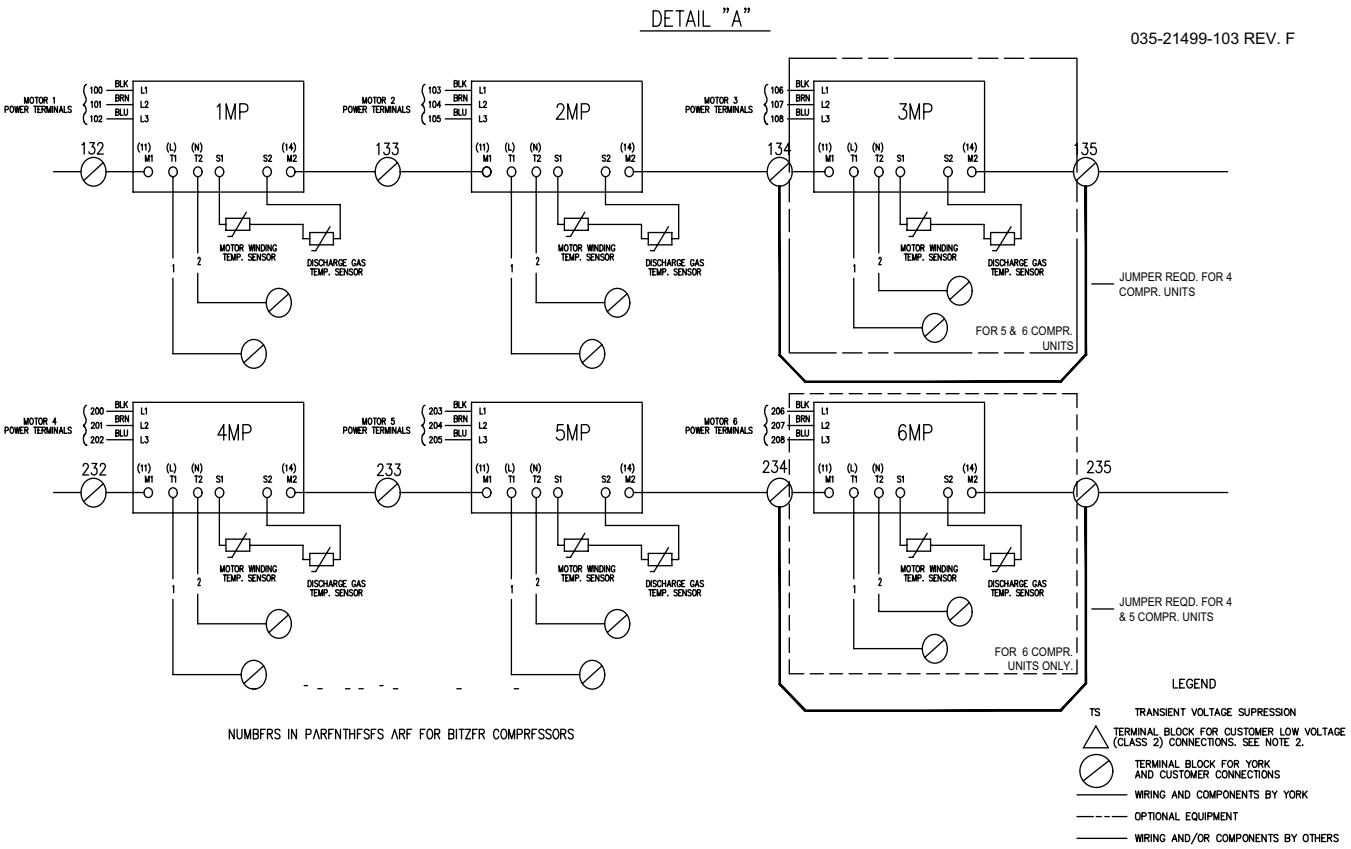


LD12929a

FIGURE 32 - ELEMENTARY WIRING DIAGRAM DETAILS, 4 COMPRESSOR (CONT'D)

ELEMENTARY WIRING DIAGRAM DETAILS

QWC3100T, 115T, 150T, 170T and 200T STANDARD EFFICIENCY UNITS
QWC3095T, 0130T and 150T HIGH EFFICIENCY UNITS



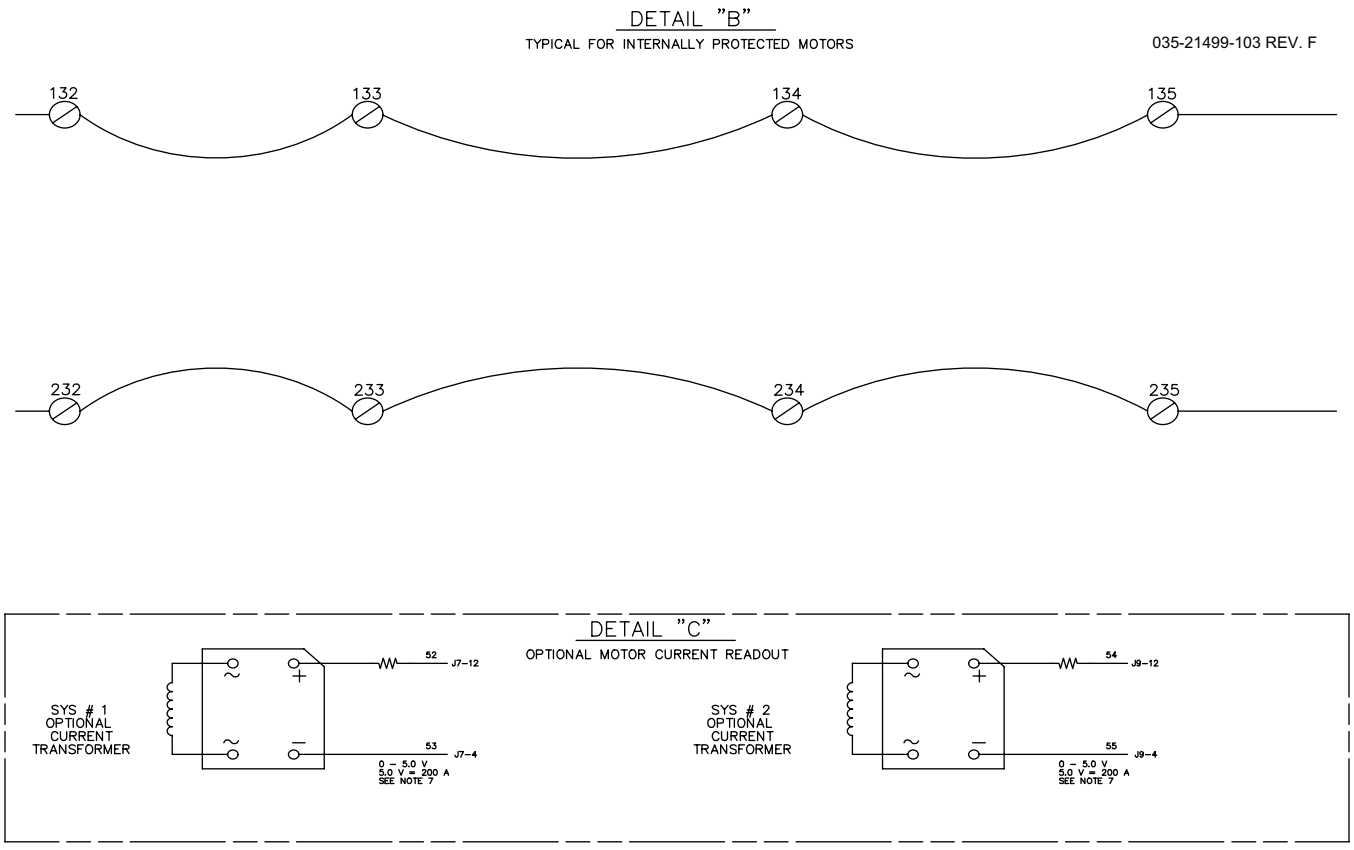
Notes:

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 24VDC, (gold contacts recommended).Wiring shall 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. Optional current readout. 5V = 200A.
7. 1MP thru 6MP are contained in their respective compressor junction boxes.

LD26944

FIGURE 33 - ELEMENTARY WIRING DIAGRAM DETAILS, 5 AND 6 COMPRESSOR

ELEMENTARY WIRING DIAGRAM DETAILS (CONT'D)



LD26944

FIGURE 33 - ELEMENTARY WIRING DIAGRAM DETAILS, 5 AND 6 COMPRESSOR (CONT'D)

ELEMENTARY WIRING DIAGRAM

QWC3100T, 115T, 150T, 170T and 200T STANDARD EFFICIENCY UNITS
QWC3095T, 0130T and 150T HIGH EFFICIENCY UNITS

ELEMENTARY DIAGRAM
EEV CONTROLLER

035-21499-105 REV-C

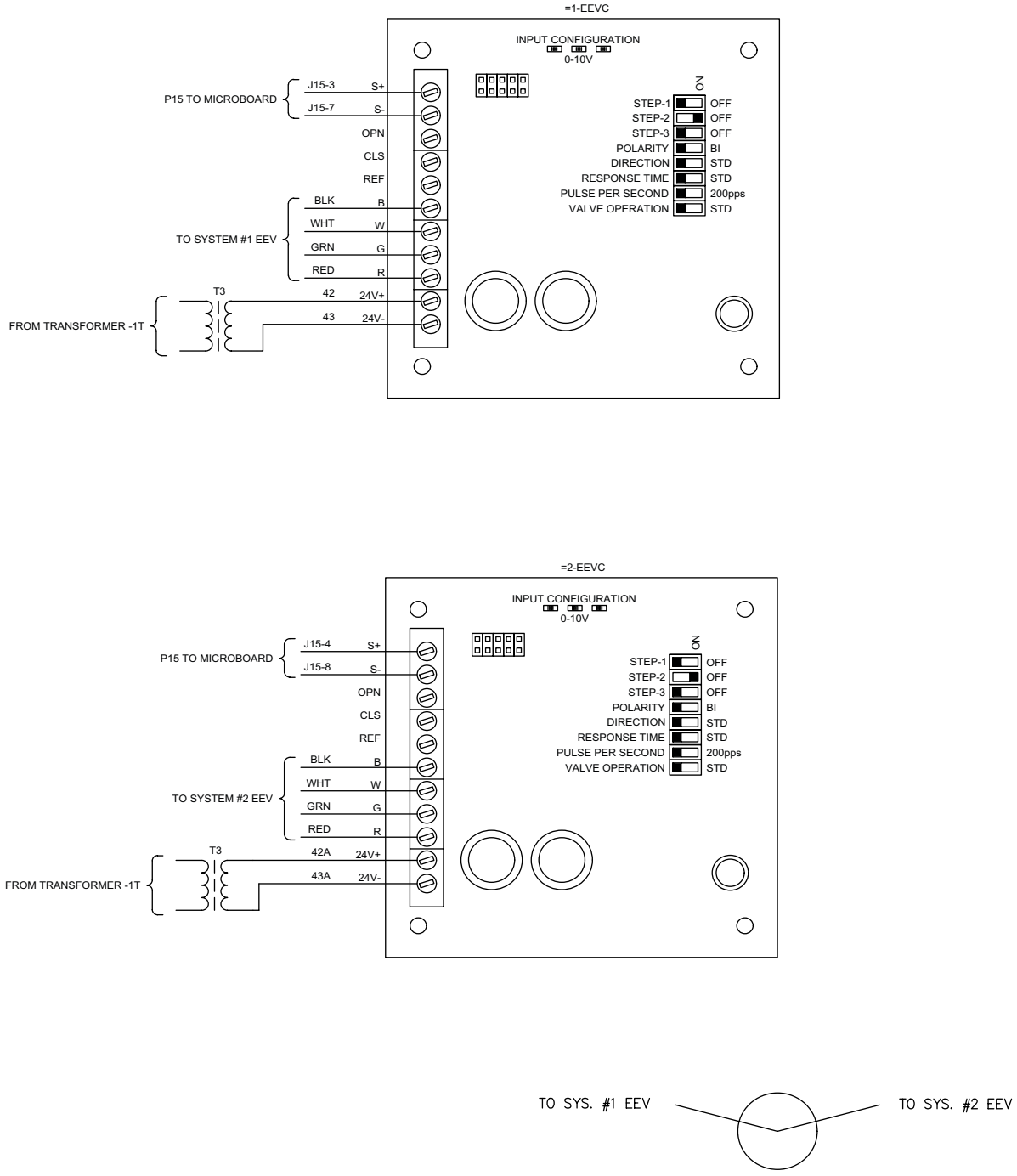


FIGURE 34 - ELEMENTARY WIRING DIAGRAM, EEV CONTROLLER, 4 AND 6 COMPRESSOR

UNITDIMENSIONS-FOURCOMPRESSOR

QWC3	STANDARD EFFICIENCY (SE)									HIGH EFFICIENCY (HE)					
	050TSE	060TSE	070TSE	080TSE	090TSE	100TSE	115TSE	130TSE	15TSE	060THE	070THE	080THE	090THE	115THE	150THE
W	34 5/8 (879.5)	34 5/8 (879.5)	33 13/16 (858.8)	33 13/16 (858.8)	33 13/16 (858.8)	33 13/16 (858.8)	33 13/16 (858.8)	33 13/16 (858.8)	34 13/16 (884.2)	33 13/16 (858.8)	33 13/16 (858.8)	33 13/16 (858.8)	33 27/32 (859.6)	33 27/32 (859.6)	34 13/16 (884.2)
H	64 15/32 (1637.5)	64 15/32 (1637.5)	68 29/32 (1750.2)	68 29/32 (1750.2)	72 9/32 (1835.9)	71 25/32 (1823.2)	71 25/32 (1823.2)	74 1/2 (1892.3)	76 17/32 (1943.9)	67 19/32 (1716.9)	74 5/8 (1895.5)	74 19/32 (1894.7)	76 19/32 (1945.5)	76 1/2 (1943.1)	77 9/32 (1962.9)
H*	– –	– –	70 1/2 (1790.7)	70 1/2 (1790.7)	– –	73 1/2 (1866.9)	73 1/2 (1866.9)	– –	– –	– –	75 (1905.0)	75 (1905.0)	– –	77 (1955.8)	– –
H**	– –	– –	70 1/2 (1790.7)	70 1/2 (1790.7)	– –	73 1/2 (1866.9)	75 (1866.9)	75 (1905.0)	– –	– –	75 (1905.0)	75 (1905.0)	– –	77 (1955.8)	76 (1930.4)
L	119 5/8 (3038.5)	119 5/8 (3038.5)	125 15/16 (3198.8)	125 15/16 (3198.8)	125 15/16 (3198.8)	124 1/8 (3152.8)	124 1/8 (3152.8)	123 5/16 (3132.1)	143 7/16 (3643.3)	124 3/8 (3159.1)	123 5/16 (3132.1)	125 11/16 (3192.5)	121 3/4 (3092.5)	123 5/16 (3132.1)	143 7/16 (3643.3)
A	14 1/2 (368.3)	14 1/2 (368.3)	14 1/2 (368.3)	14 1/2 (368.3)	14 1/2 (368.3)	14 1/2 (368.3)	14 1/2 (368.3)	14 1/2 (368.3)	15 (381.0)	14 1/2 (368.3)	14 1/2 (368.3)	14 1/2 (368.3)	15 (381.0)	15 (381.0)	15 (381.0)
B	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	30 (762.0)	29 (736.6)	29 (736.6)	29 (736.6)	30 (762.0)	30 (762.0)	30 (762.0)
C	4 1/2 (114.3)	4 1/2 (114.3)	4 1/2 (114.3)	4 1/2 (114.3)	4 1/2 (114.3)	4 1/2 (114.3)	4 1/2 (114.3)	5 9/16 (114.3)	5 9/16 (141.3)	4 1/2 (114.3)	4 1/2 (114.3)	4 1/2 (114.3)	5 9/16 (114.3)	5 9/16 (114.3)	5 9/16 (141.3)
D	15 17/32 (394.5)	15 17/32 (394.5)	15 17/32 (394.5)	15 17/32 (394.5)	11 25/32 (299.2)	15 17/32 (394.5)	15 17/32 (394.5)	16 1/32 (407.2)	16 1/32 (407.2)	11 25/32 (299.2)	16 1/32 (407.2)	16 1/32 (407.2)	16 1/32 (407.2)	16 1/32 (407.2)	16 1/32 (407.2)
E	6 5/8 (168.3)	6 5/8 (168.3)	6 5/8 (168.3)	6 5/8 (168.3)	6 5/8 (168.3)	6 5/8 (168.3)	6 5/8 (168.3)	8 5/8 (219.1)	8 5/8 (219.1)	6 5/8 (168.3)	8 5/8 (219.1)	8 5/8 (219.1)	8 5/8 (219.1)	8 5/8 (219.1)	8 5/8 (219.1)
F	35 15/32 (900.9)	35 15/32 (900.9)	35 15/32 (900.9)	35 15/32 (900.9)	35 15/32 (900.9)	38 1/2 (977.9)	38 1/2 (977.9)	40 (1016.0)	41 (1041.4)	35 15/32 (900.9)	40 (1016.0)	40 (1016.0)	42 (1066.8)	42 (1066.8)	41 (1041.4)
G	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)
J	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)
K	8 15/16 (227.0)	8 15/16 (227.0)	8 15/16 (227.0)	8 15/16 (227.0)	12 1/4 (311.2)	12 1/4 (311.2)	12 1/4 (311.2)	12 3/4 (323.9)	17 25/32 (451.6)	12 1/4 (311.2)	12 3/4 (323.9)	12 3/4 (323.9)	12 3/4 (323.9)	12 3/4 (323.9)	17 25/32 (451.6)
M	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	10 3/8 (263.5)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	10 3/8 (263.5)
N	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	10 3/8 (263.5)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	9 7/8 (250.8)	10 3/8 (263.5)
O	5 1/2 (139.8)	5 1/2 (139.8)	5 1/2 (139.8)	7 1/8 (181.1)	7 1/8 (181.1)	7 1/8 (181.1)	7 1/8 (181.1)	8 1/8 (206.5)	8 5/8 (219.2)	7 1/8 (181.1)	7 1/8 (181.1)	7 1/8 (181.1)	8 5/8 (219.2)	8 5/8 (219.2)	8 5/8 (219.2)
P	9 1/8 (230.2)	9 1/8 (230.2)	9 1/8 (230.2)	8 3/8 (209.6)	8 3/8 (209.6)	8 3/8 (209.6)	8 3/8 (209.6)	7 7/8 (196.9)	8 1/2 (215.9)	8 1/4 (209.6)	8 1/4 (209.6)	8 1/4 (209.6)	8 1/2 (215.9)	8 1/2 (215.9)	8 1/2 (215.9)
Q	5 1/8 (130.2)	5 1/8 (130.2)	5 1/8 (130.2)	5 1/8 (130.2)	5 1/8 (130.2)	5 1/8 (130.2)	5 1/8 (130.2)	5 7/32 (132.6)	5 3/16 (131.8)	5 1/8 (130.2)	5 1/8 (130.2)	5 1/8 (130.2)	5 3/16 (131.8)	5 3/16 (131.8)	5 3/16 (131.8)
R	84 1/2 (2146.3)	84 1/2 (2146.3)	84 1/2 (2146.3)	84 1/2 (2146.3)	85 (2159.0)	85 (2159.0)	85 (2159.0)	83 (2108.2)	102 (2590.8)	85 (2159.0)	83 (2108.2)	83 (2108.2)	83 (2108.2)	83 (2108.2)	102 (2590.8)
S	8 21/32 (219.9)	8 21/32 (219.9)	8 21/32 (219.9)	8 21/32 (219.9)	8 13/32 (213.5)	8 13/32 (213.5)	8 13/32 (213.5)	9 13/32 (238.9)	11 29/32 (302.4)	8 13/32 (213.5)	9 13/32 (238.9)	9 13/32 (238.9)	9 13/32 (238.9)	9 13/32 (238.9)	11 29/32 (302.4)
T	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	125 13/16 (3195.7)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	101 13/16 (2586.1)	125 13/16 (3195.7)
U	15 1/16 (382.6)	15 1/16 (382.6)	21 3/8 (542.9)	21 3/8 (542.9)	21 3/8 (542.9)	19 9/16 (496.9)	19 9/16 (496.9)	18 3/4 (476.2)	14 7/8 (377.8)	19 13/16 (503.2)	18 3/4 (476.2)	21 1/8 (536.6)	17 3/16 (436.5)	18 3/4 (476.2)	14 7/8 (377.8)
V	107 25/32 (2737.6)	107 25/32 (2737.6)	107 25/32 (2737.6)	107 25/32 (2737.6)	107 25/32 (2737.6)	107 25/32 (2737.6)	107 25/32 (2737.6)	108 7/32 (2748.8)	132 23/32 (3371.1)	107 25/32 (2737.6)	107 25/32 (2737.6)	107 25/32 (2737.6)	108 3/4 (2762.3)	108 3/4 (2762.3)	132 23/32 (3371.1)
X	30 3/8 (771.5)	30 3/8 (771.5)	30 3/8 (771.5)	30 3/8 (771.5)	32 (812.8)	32 (812.8)	32 (812.8)	33 1/4 (844.6)	36 1/4 (920.8)	32 (812.8)	33 1/4 (844.6)	33 1/4 (844.6)	35 1/4 (895.4)	35 1/4 (895.4)	36 1/4 (920.8)
AA	25 29/32 (658.0)	25 29/32 (658.0)	25 29/32 (658.0)	25 29/32 (658.0)	25 29/32 (658.0)	25 29/32 (658.0)	25 29/32 (658.0)	25 29/32 (658.0)	35 17/32 (902.5)	25 29/32 (658.0)	28 9/32 (718.3)	25 29/32 (658.0)	27 15/32 (697.7)	25 29/32 (658.0)	37 21/32 (956.5)
BB	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)	50 (1270.0)

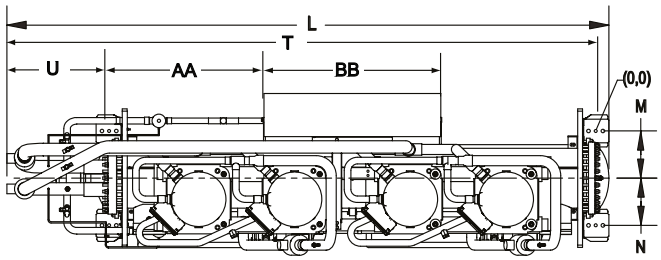
H* - for 200/230 volt units, which require a larger electrical enclosure

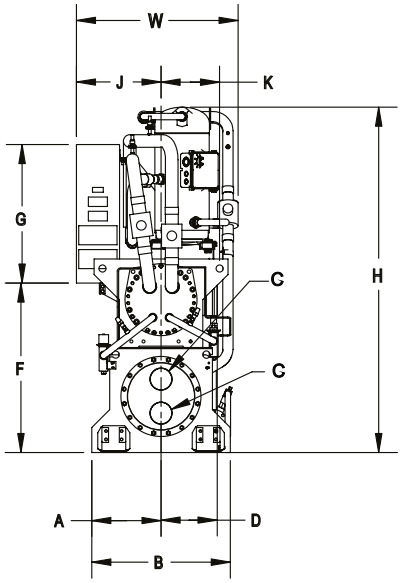
H** - for multiple point circuit breaker units, 200/230 volt, which require a larger electrical enclosure

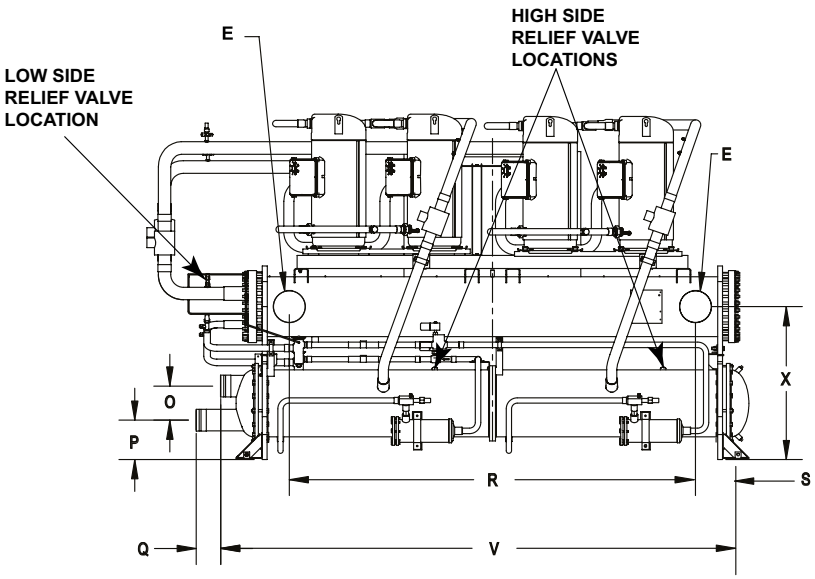
UNIT DIMENSIONS - FOUR COMPRESSOR (CONT'D)

NOTES:
1. Recommended service clearances.
   Rear to wall: 20" (508mm)
   Front to wall: 36" (915mm)
   Top: 43" (1092mm)
   Tube cleaning and removal: 132" (3353 mm) either end

2. Relief valve connection sizes.
   Low side (suction line): 1/2" flare
   High side (condenser): 5/8 " NPTI







UNIT DIMENSIONS - FIVE AND SIX COMPRESSOR

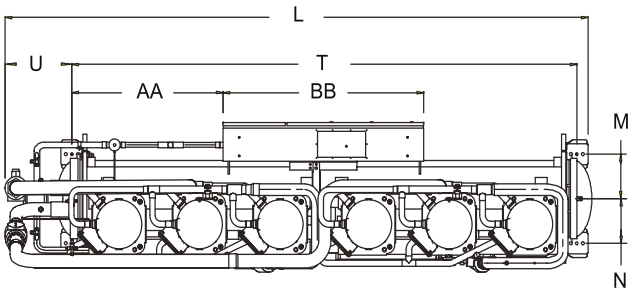
STANDARD EFFICIENCY (SE)			HIGH EFFICIENCY (HE)		
QWC3	**170TSE**	**200TSE**	**095THE**	**130THE**	**150THE**
W	34 13/16 (884.2)	34 13/16 (884.2)	35 1/16 (890.6)	34 13/16 (884.2)	34 13/16 (884.2)
H	77 9/32 (1962.9)	77 9/32 (1962.9)	72 5/32 (1832.8)	77 19/32 (1970.9)	77 9/32 (1962.9)
H*	– –	– –	– –	– –	– –
H**	76 (1930.4)	76 (1930.4)	76 (1930.4)	76 (1930.4)	76 (1930.4)
L	143 7/16 (3643.3)	143 7/16 (3643.3)	143 3/8 (3641.7)	145 7/32 (3688.6)	143 7/16 (3643.3)
A	15 (381)	15 (381)	15 (381)	15 (381)	15 (381)
B	30 (762)	30 (762)	30 (762)	30 (762)	30 (762)
C	5 9/16 (141.3)	5 9/16 (141.3)	5 9/16 (141.3)	5 9/16 (141.3)	5 9/16 (141.3)
D	16 1/32 (407.2)	16 1/32 (407.2)	16 1/32 (407.2)	16 1/32 (407.2)	16 1/32 (407.2)
E	8 5/8 (219.1)	8 5/8 (219.1)	8 5/8 (219.1)	8 5/8 (219.1)	8 5/8 (219.1)
F	41 (1041.4)	41 (1041.4)	41 (1041.4)	41 (1041.4)	41 (1041.4)
G	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)	29 (736.6)
J	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)	17 11/16 (449.3)
K	17 25/32 (451.6)	17 25/32 (451.6)	17 25/32 (451.6)	17 25/32 (451.6)	17 25/32 (451.6)
M	10 3/8 (263.5)	10 3/8 (263.5)	10 3/8 (263.5)	10 3/8 (263.5)	10 3/8 (263.5)
N	10 3/8 (263.5)	10 3/8 (263.5)	10 3/8 (263.5)	10 3/8 (263.5)	10 3/8 (263.5)
O	8 5/8 (219.2)	8 5/8 (219.2)	8 5/8 (219.2)	8 5/8 (219.2)	8 5/8 (219.2)
P	8 1/2 (215.9)	8 1/2 (215.9)	8 1/2 (215.9)	8 1/2 (215.9)	8 1/2 (215.9)
Q	5 3/16 (131.8)	5 3/16 (131.8)	5 3/16 (131.8)	5 3/16 (131.8)	5 3/16 (131.8)
R	102 (2590.8)	102 (2590.8)	102 (2590.8)	102 (2590.8)	102 (2590.8)
S	11 29/32 (302.4)	11 29/32 (302.4)	11 29/32 (302.4)	11 29/32 (302.4)	11 29/32 (302.4)
T	125 13/16 (3195.7)	125 13/16 (3195.7)	125 13/16 (3195.7)	125 13/16 (3195.7)	125 13/16 (3195.7)
U	14 7/8 (377.8)	14 7/8 (377.8)	14 13/16 (376.2)	16 21/32 (423.1)	14 7/8 (377.8)
V	132 23/32 (3371.1)	132 23/32 (3371.1)	132 23/32 (3371.1)	132 23/32 (3371.1)	132 23/32 (3371.1)
X	36 1/4 (920.8)	36 1/4 (920.8)	36 1/4 (920.8)	36 1/4 (920.8)	36 1/4 (920.8)
AA	37 21/32 (956.5)	37 21/32 (956.5)	37 21/32 (956.5)	34 31/32 (888.2)	37 21/32 (956.5)
BB	50 (1270)	50 (1270)	50 (1270)	50 (1270)	50 (1270)

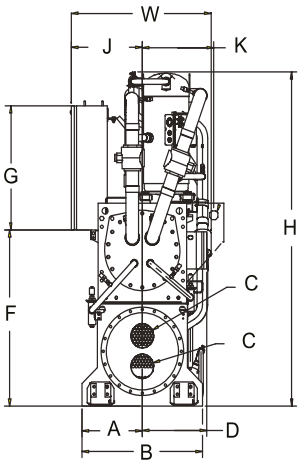
H* - for 200/230 volt units, which require a larger electrical enclosure
H** - for multiple point circuit breaker units, 200/230 volt, which require a larger electrical enclosure

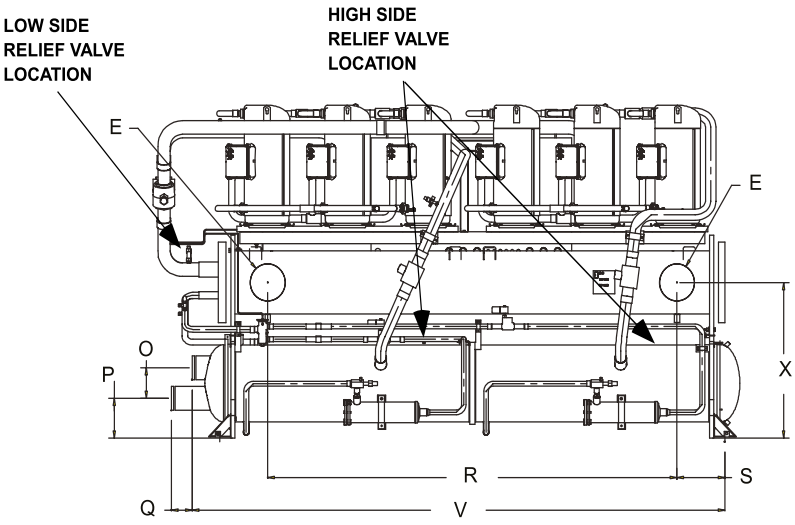
UNIT DIMENSIONS - FIVE AND SIX COMPRESSOR

NOTES:
1. Recommended service clearances.
   Rear to wall: 20" (508mm)
   Front to wall: 36" (915mm)
   Top: 43" (1092mm)
   Tube cleaning and removal: 132" (3353 mm) either end

2. Relief valve connection sizes.
   Low side (suction line): 1/2" flare
   High side (condenser): 5/8" NPTI

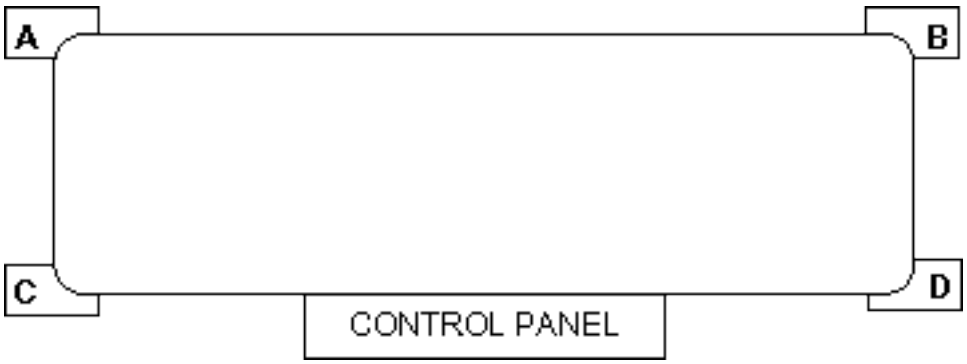






ISOLATOR SELECTION DATA

Units shipped on or after June 15, 2008

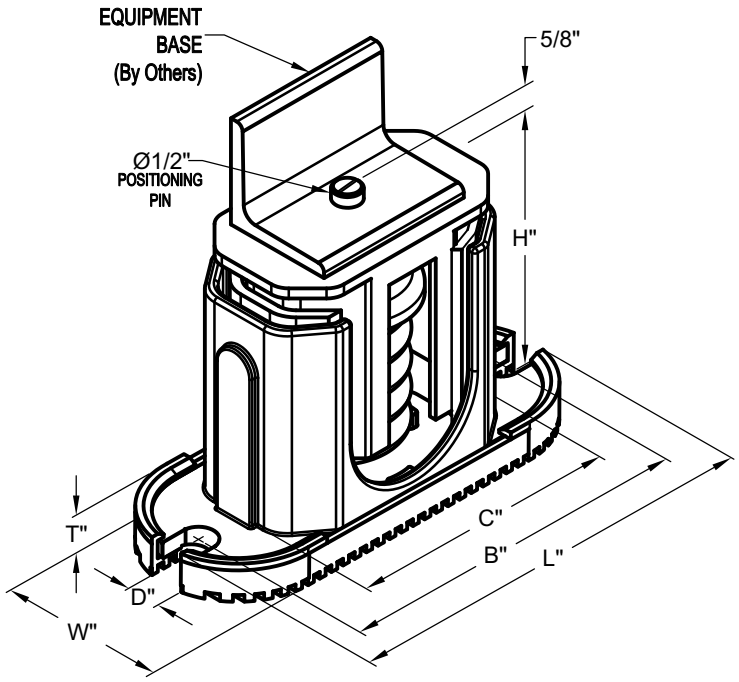


MODEL	EFFICIENCY	ELASTOMERIC ISOLATOR	1" DEFLECTION ISOLATOR	SEISMIC ISOLATOR
050T	SE	RD-4 Brick Red	CP-1D-1360 White	Red/Black
060T	SE	RD-4 Brick Red	CP-1D-1360 White	Pink
070T	SE	RD-4 Brick Red	CP-1D-1785N Gray/Red	Pink
080T	SE	RD-4 Brick Red	CP-2D-1800 Dark Green	Pink
090T	SE	RD-4 Brick Red	CP-1D-1785N Gray/Red	Pink
100T	SE	RD-4 Brick Red	CP-2D-1800 Dark Green	Pink
115T	SE	RD-4 Brick Red	CP-2D-1800 Dark Green	Pink
130T	SE	RD-4 Brick Red	C2P-1D-2400 Gray	Pink/Gray
150T	SE	RD-4 Charcoal	C2P-1D-2720 White	Pink/Gray/Orange
170T	SE	RD-4 Charcoal	C2P-1D-2720 White	Pink/Gray
200T	SE	RD-4 Charcoal	C2P-1D-3570 Gray/Red	Pink/Gray/Orange
060T	HE	RD-4 Brick Red	CP-1D-1785N Gray/Red	Pink
070T	HE	RD-4 Brick Red	CP-2D-1800 Dark Green	Pink
080T	HE	RD-4 Brick Red	CP-2D-1800 Dark Green	Pink/Gray
090T	HE	RD-4 Charcoal	C2P-1D-2400 Gray	Pink/Gray
095T	HE	RD-4 Charcoal	C2P-1D-2400 Gray	Pink/Gray
115T	HE	RD-4 Brick Red	C2P-1D-2400 Gray	Pink/Gray
130T	HE	RD-4 Charcoal	C2P-1D-2720 White	Pink/Gray
150T	HE	RD-4 Charcoal	C2P-1D-3570 Gray/Red	Pink/Gray/Orange

ONE INCH DEFLECTION SPRING ISOLATORS CROSS-REFERENCE

Units shipped on or after June 15, 2008

CPX-X-



LD13759A

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

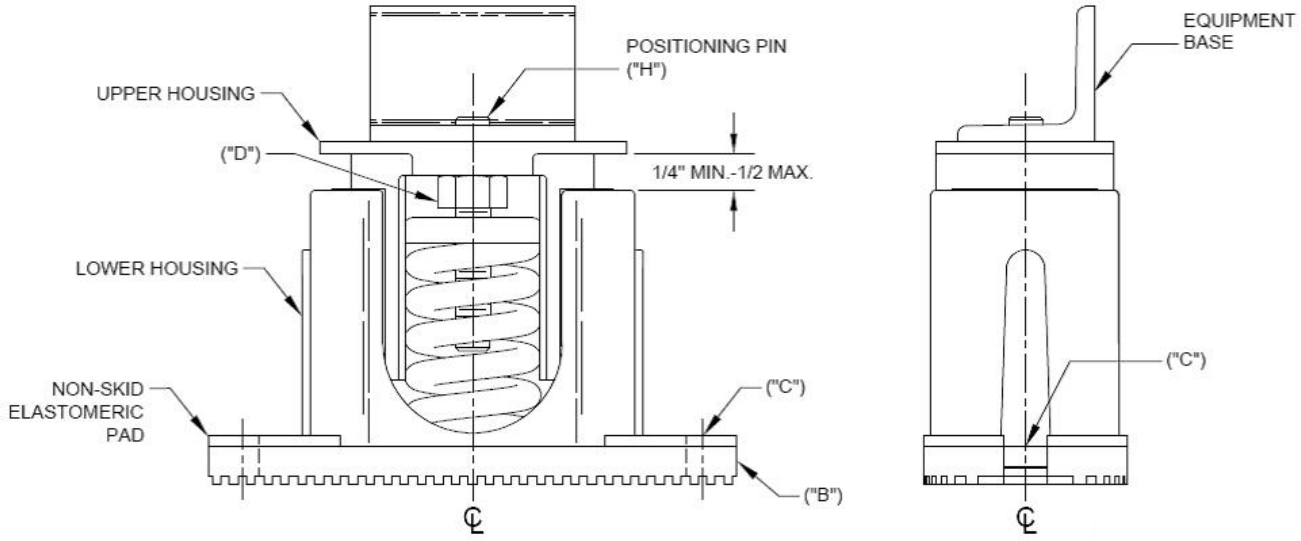
MODEL NUMBER	COLOR CODE	RATED CAPACITY (FOR UNITS WITH ALL LOAD POINTS LESS THAN 1785 LBS (810 KG)		QUANTECH P/N
		(LBS.)	(KG)	
CP-1D-510	BLACK	Up thru 434	Up thru 197	029-25334-002
CP-1D-900	DARK GREEN	435 thru 765	198 thru 347	029-25334-003
CP-1D-1200	GRAY	766 thru 1020	348 thru 463	029-25334-004
CP-1D-1360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

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

ONE INCH DEFLECTION SPRING ISOLATORS INSTALLATION INSTRUCTIONS

Units shipped on or after June 15, 2008

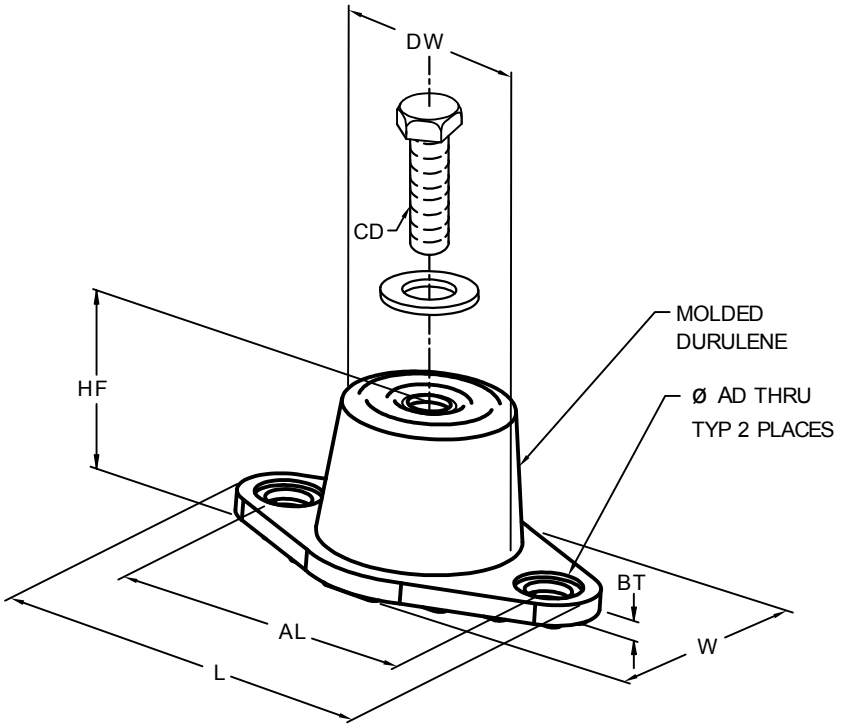
1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad or subbase, ensuring that all isolator centerlines match the equipment mounting holes. The VMC group recommends that the isolator base (“B”) be installed on a level surface. Shim or grout as required, leveling all isolator bases to the same elevation (1/4-inch 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" clearance is achieved between the lower housing and upper housing. *(See drawing below).*
9. Fine adjust isolators to level equipment.
10. Installation is complete.



ELASTOMETRIC ISOLATOR CROSS-REFERENCE

Units shipped on or after June 15, 2008

RD-Style Isolators



1. All dimensions are inches, interpreted per ANSI Y14.
2. See the 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 zinc-electroplated.

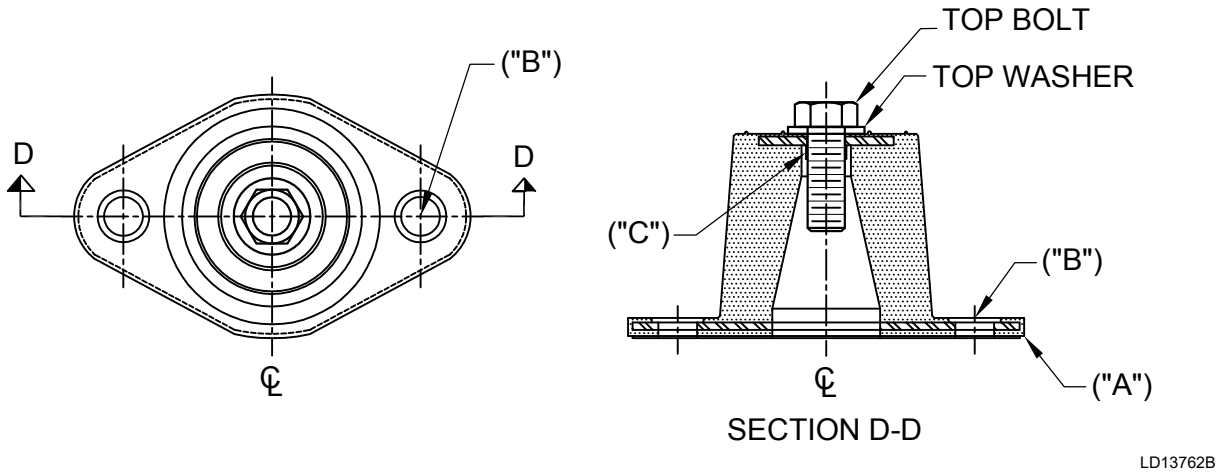
MOUNT TYPE	DIMENSION DATA (INCHES)							
	L	W	HF	AL	AD	BT	CD	DW
RD1-WR	3.13	1.75	1.25	2.38	0.34	0.19	5/16-18 UNC X 3/4	1.25
RD2-WR	3.88	2.38	1.75	3.00	0.34	0.22	3/8-16 UNC X 1	1.75
RD3-WR	5.50	3.38	2.88	4.13	0.56	0.25	1/2-13 UNC X 1	2.50
RD4-WR	6.25	4.63	2.75	5.00	0.56	0.38	1/2-13 UNC X 1	3.00

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

INSTALLATION OF ELASTOMETRIC VIBRATION ISOLATORS

Units shipped on or after June 15, 2008

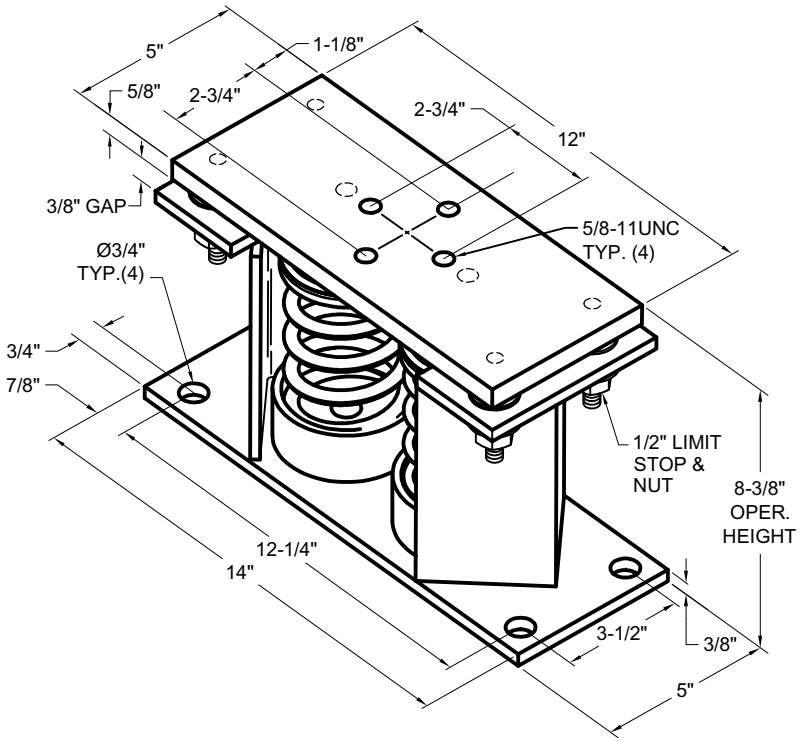
1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submitial drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad, or subbase, ensuring that all isolator centerlines match the equipment mounting holes. The VMC group recommends that the isolator base (“A”) be installed on a level surface. Shim or grout as required, leveling all isolator bases to the same elevation (1/32-inch 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.



TWO INCH DEFLECTION SEISMIC ISOLATOR CROSS-REFERENCE

Units shipped on or after June 15, 2008

Y2RS



1. All dimensions are in inches, interpret per ANSI Y14.
2. Standard finish: housing-powder coated (color, black), spring-powder coated (color, *see table below*) 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 the next page for installation instructions.
6. Consult factory for concrete installation.

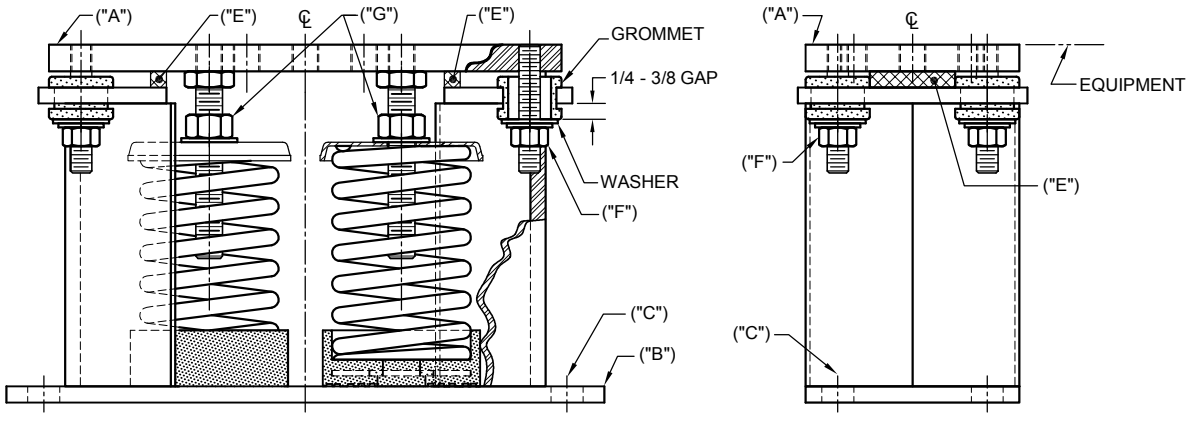
MODEL Y2RSI-2D SEISMICALLY RESTRAINED VIBRATION ISOLATOR FOR 2" DEFLECTION

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

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 centerlines 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 (1/4-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 3/8 fillet weld 2" long @ 4" 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) 5/8 UNC A325 grade 5 SAE bolts or weld equipment or bracket to the top plate (“A”) of isolator with a minimum of 3/8 fillet welds 2" long @ 3" on center for a minimum total weld of 10". (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 1/2".
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 1/4 of an inch to a 3/8-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.



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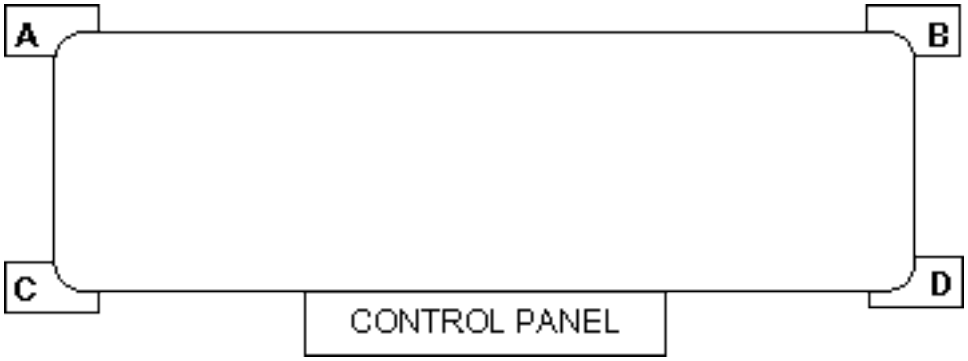
ISOLATORSELECTIONDATA

Units shipped on or after June 15, 2008



STANDARD EFFICIENCY - ENGLISH				
Weight Distribution by Model - Op. Weights (lbs)				
Model	**A**	**B**	**C**	**D**
QWC3050TSE	861	861	867	867
QWC3060TSE	994	994	918	918
QWC3070TSE	1058	1058	942	942
QWC3080TSE	1195	1195	1040	1040
QWC3090TSE	1318	1318	1121	1121
QWC3100TSE	1402	1402	1164	1164
QWC3115TSE	1383	1383	1156	1156
QWC3130TSE	1467	1467	1253	1253
QWC3150TSE	2102	2102	1556	1556

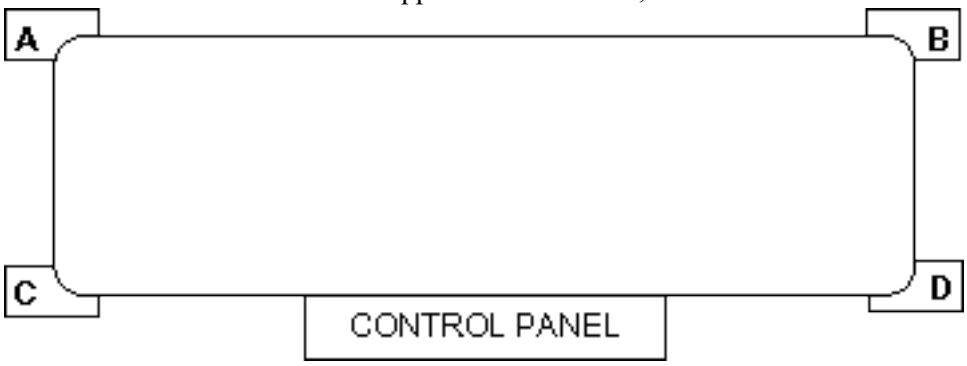
STANDARD EFFICIENCY - SI				
Weight Distribution by Model - Op. Weights (kg)				
Model	**A**	**B**	**C**	**D**
QWC3050TSE	391	391	393	393
QWC3060TSE	451	451	416	416
QWC3070TSE	480	480	427	427
QWC3080TSE	542	542	472	472
QWC3090TSE	598	598	508	508
QWC3100TSE	636	636	528	528
QWC3115TSE	627	627	524	524
QWC3130TSE	665	665	568	568
QWC3150TSE	953	953	706	706

HIGH EFFICIENCY - ENGLISH				
Weight Distribution by Model - Op. Weights (lbs)				
Model	**A**	**B**	**C**	**D**
QWC3060THE	1122	1122	1046	1046
QWC3070THE	1259	1259	1143	1143
QWC3080THE	1324	1324	1168	1168
QWC3090THE	1517	1517	1320	1320
QWC3095THE	1664	1664	1448	1448
QWC3115THE	1565	1565	1338	1338
QWC3130THE	1937	1937	1560	1560
QWC3150THE	2197	2197	1652	1652

HIGH EFFICIENCY - SI				
Weight Distribution by Model - Op. Weights (kg)				
Model	**A**	**B**	**C**	**D**
QWC3060THE	509	509	474	474
QWC3070THE	571	571	518	518
QWC3080THE	601	601	530	530
QWC3090THE	688	688	599	599
QWC3095THE	755	755	657	657
QWC3115THE	710	710	607	607
QWC3130THE	879	879	708	708
QWC3150THE	997	997	749	749

ISOLATOR SELECTION DATA (CONT'D)

Units shipped before June 15, 2008



1" Isolator Selections - CIP-				
Model	**A**	**B**	**C**	**D**
QWC3050TSE	B-Gray	B-Gray	B-Gray	B-Gray
QWC3060TSE	B-Gray	B-Gray	B-Gray	B-Gray
QWC3070TSE	B-Gray	B-Gray	B-Gray	B-Gray
QWC3080TSE	B-Black	B-Black	B-Black	B-Black
QWC3090TSE	B-Black	B-Black	B-Black	B-Black
QWC3100TSE	B-Black	B-Black	B-Black	B-Black
QWC3115TSE	B-Black	B-Black	B-Black	B-Black
QWC3130TSE	C-Black	C-Black	C-Black	C-Black
QWC3150TSE	C-Red w/ Red	C-Red w/ Red	C-Red w/ Red	C-Red w/ Red

1" Isolator Selections - CIP-				
Model	**A**	**B**	**C**	**D**
QWC3060THE	B-Black	B-Black	B-Black	B-Black
QWC3070THE	B-Black	B-Black	B-Black	B-Black
QWC3080THE	B-Black	B-Black	B-Black	B-Black
QWC3090THE	C-Yellow w/ Red	C-Yellow w/ Red	C-Yellow w/ Red	C-Yellow w/ Red
QWC3095THE	C-Yellow w/ Red	C-Yellow w/ Red	C-Yellow w/ Red	C-Yellow w/ Red
QWC3115THE	C-Yellow w/ Red	C-Yellow w/ Red	C-Yellow w/ Red	C-Yellow w/ Red
QWC3130THE	C-Yellow w/ Green	C-Yellow w/ Green	C-Yellow w/ Green	C-Yellow w/ Green
QWC3150THE	C-Red w/ Red	C-Red w/ Red	C-Red w/ Red	C-Red w/ Red

Elastometric Selections				
Model	**A**	**B**	**C**	**D**
QWC3050TSE	ND-D	ND-D	ND-D	ND-D
QWC3060TSE	ND-D	ND-D	ND-D	ND-D
QWC3070TSE	ND-D	ND-D	ND-D	ND-D
QWC3080TSE	ND-D	ND-D	ND-D	ND-D
QWC3090TSE	ND-D	ND-D	ND-D	ND-D
QWC3100TSE	ND-D	ND-D	ND-D	ND-D
QWC3115TSE	ND-D	ND-D	ND-D	ND-D
QWC3130TSE	ND-D	ND-D	ND-D	ND-D
QWC3150TSE	ND-DS	ND-DS	ND-DS	ND-DS

Elastometric Selections				
Model	**A**	**B**	**C**	**D**
QWC3060THE	ND-D	ND-D	ND-D	ND-D
QWC3070THE	ND-D	ND-D	ND-D	ND-D
QWC3080THE	ND-D	ND-D	ND-D	ND-D
QWC3090THE	ND-D	ND-D	ND-D	ND-D
QWC3095THE	ND-DS	ND-DS	ND-DS	ND-DS
QWC3115THE	ND-D	ND-D	ND-D	ND-D
QWC3130THE	ND-DS	ND-DS	ND-DS	ND-DS
QWC3150THE	ND-DS	ND-DS	ND-DS	ND-DS

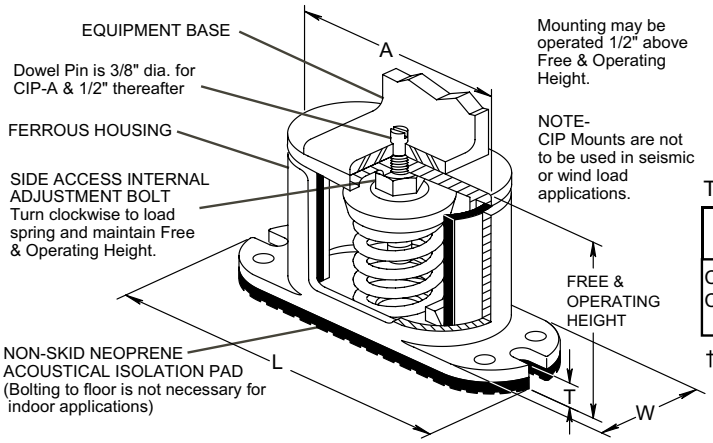
Seismic Isolator Selections - SLRS-2-C2-				
Model	**A**	**B**	**C**	**D**
QWC3050TSE	Green	Green	Green	Green
QWC3060TSE	Green	Green	Green	Green
QWC3070TSE	Gray	Gray	Gray	Gray
QWC3080TSE	Gray	Gray	Gray	Gray
QWC3090TSE	Gray	Gray	Gray	Gray
QWC3100TSE	Gray	Gray	Gray	Gray
QWC3115TSE	Gray	Gray	Gray	Gray
QWC3130TSE	Gray	Gray	Gray	Gray
QWC3150TSE	Gray w/ Red	Gray w/ Red	Gray w/ Red	Gray w/ Red

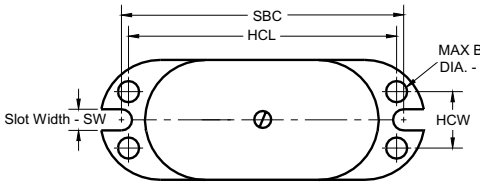
Seismic Isolator Selections - SLRS-2-C2-				
Model	**A**	**B**	**C**	**D**
QWC3060THE	Gray	Gray	Gray	Gray
QWC3070THE	Gray	Gray	Gray	Gray
QWC3080THE	Gray	Gray	Gray	Gray
QWC3090THE	Silver	Silver	Silver	Silver
QWC3095THE	Silver	Silver	Silver	Silver
QWC3115THE	Silver	Silver	Silver	Silver
QWC3130THE	Silver	Silver	Silver	Silver
QWC3150THE	Gray w/ Red	Gray w/ Red	Gray w/ Red	Gray w/ Red

ONE INCH DEFLECTION SPRING ISOLATORS CROSS-REFERENCE

Units shipped before June 15, 2008

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





BASE PLATE DIMENSIONS

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

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"

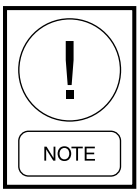
FOR UNITS WITH ALL POINT LOADS LESS THAN 1404 LBS (637 KG)			
Weight Range (lbs)	**Weight Range (kg)**	**Model Number**	**Color**
239 to 384 lbs	108 to 174 kg	CIP-B-	Red
384 to 639 lbs	174 to 290 kg	CIP-B-	White
639 to 851 lbs	290 to 386 kg	CIP-B-	Blue
851 to 1064 lbs	386 to 483 kg	CIP-B-	Gray
1064 to 1404 lbs	483 to 637 kg	CIP-B-	Black

FOR UNITS WITH ANY POINT LOAD ABOVE 1404 LBS (637 KG)			
Weight Range (lbs)	**Weight Range (kg)**	**Model Number**	**Color**
Up to 851 lbs	Up to 386 kg	CIP-C-	Black
851 to 1149 lbs	386 to 521 kg	CIP-C-	Yellow
1149 to 1489 lbs	521 to 675 kg	CIP-C-	Black
1489 to 1786 lbs	675 to 910 kg	CIP-C-	Yellow w/ Red
1786 to 2028 lbs	910 to 920 kg	CIP-C-	Yellow w/ Green
2028 to 2254 lbs	920 to 1022 kg	CIP-C-	Red w/ Red
2254 to 2936 lbs	1022 to 1332 kg	CIP-C-	Red w/ Green

INSTALLATION OF 1” DEFLECTION MOUNTS

Units shipped before June 15, 2008

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.

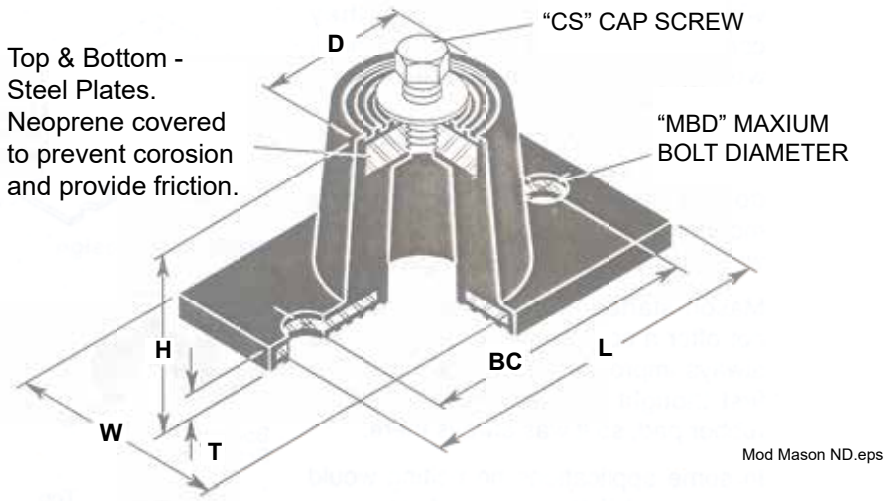


Isolators must be bolted to the substructure and the equipment must be bolted to the isolators when outdoor equipment is exposed to wind forces.

3. Lubricate the threads of adjusting bolt. Loosen the hold down bolts to allow for isolator adjustment.
4. Block the equipment 10mm (1/4") higher than the specified free height of the isolator. To use the isolator as blocking for the equipment, insert a 10mm (1/4") 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 (1/8") between resilient washer and underside of channel cap plate.
10. Installation is now complete.

ELASTOMETRIC ISOLATOR CROSS-REFERENCE

Units shipped before June 15, 2008

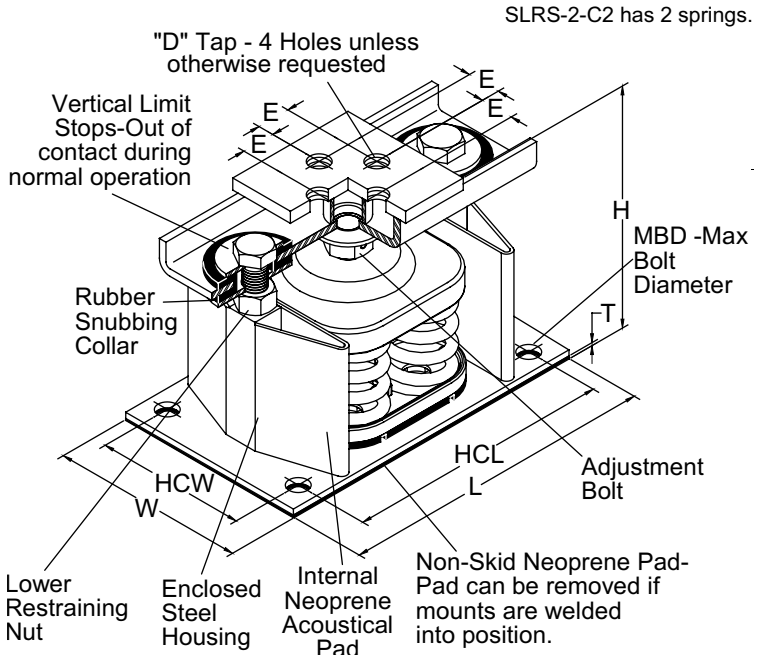


ENGLISH								
Size	**D**	**H**	**L**	**T**	**W**	**BC**	**CS**	**MBD**
ND-C	2 9/16 (65.1)	2 3/ 4 (69.9)	5 1/ 2 (139.7)	1/ 4 (6.4)	2 5/16 (58.7)	4 1/80 (101.9)	1/2- 13 x 1"	1/ 2 "
ND-D	3 3/ 8 (85.7)	2 3/ 4 (69.9)	6 1/ 4 (158.8)	5/16 (7.9)	4 (101.6)	5 (127)	1/2- 13 x 1"	1/ 2 "
ND-DS	4 1/ 2 (114.3)	4 3/ 4 (120.7)	7 3/ 8 (187.3)	1/ 4 (6.4)	5 1/80 (127.3)	6 1/80 (152.7)	1/2- 13 x 1"	1/ 2 "

Weight Range (lbs)	Weight Range (kg)	Model Number	Color
Up to 751 lbs	Up to 341 kg	ND-C	Yellow
751 to 1651 lbs	341 to 749 kg	ND-D	Yellow
1651 to 3226 lbs	749 to 1463 kg	ND-DS	Yellow

SLRS SEISMIC DEFLECTION SPRING ISOLATOR CROSS-REFERENCE

Units shipped before June 15, 2008



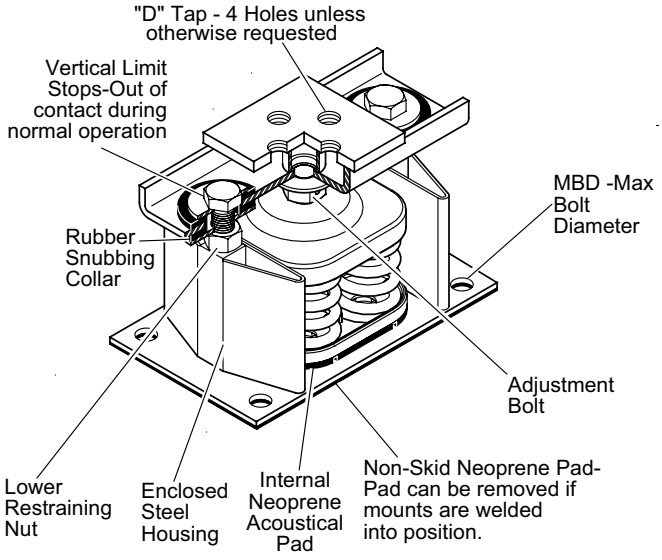
ENGLISH									
SIZE	**H**	**T**	**D**	**E**	**L**	**HCL**	**W**	**HCW**	**MBD**
2-C2	8 1/2 (215.9)	3/8 (9.5)	5/8 (15.9)	1 3/8 (34.9)	14 (355.6)	12 1/4 (311.2)	5 1/4 (133.4)	3 1/ 2 (88.9)	5/8 “

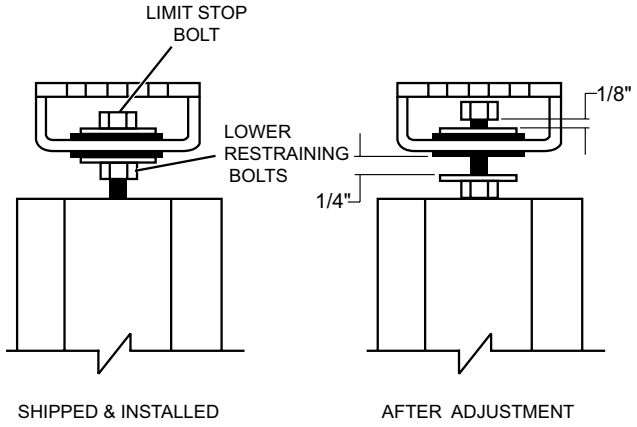
SLRS SEISMIC ISOLATOR INSTALLATION AND ADJUSTMENT

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 1/8" gap between the bolt head and the steel washer.
8. Turn adjustment bolt eight turns on each mount.
9. Take one additional complete turn on each adjustment bolt in sequence until the top plate lifts off of the lower restraining nuts. Take no additional turns on that mount. Continue with equal turns on the other mounts until the top plates lift off of the lower restraining nuts of all mounts.
10. Hold the limit stop bolt in place and turn the lower restraining nut clockwise and tighten it against the stanchion. Repeat the same procedure on all mounts.
11. Top plate should remain at a fixed elevation, plus or minus 1/8".





SECTION 6 – COMMISSIONING

Commissioning of this unit should only be carried out by Quantech 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 Pre-startup and Startup Checklist" (located in this section of the IOM) 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 hand oil pump (Part No. 470-10654-000) to the 1/4" oil charging connection on the compressors with a length of clean hose or copper line. Do not tighten the flare nut. Using clean oil of the correct type (Models QWC3050 to 0150 use POE synthetic "V" oil, Models QWC3170 to 200 use "PVE" 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 are 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.

JUMP LOCATION	INPUT SIGNAL
1	0-10 V

DIP SWITCH NUMBER	YLAA0230	ALL OTHER CHILLERS
1	OFF	OFF
2	OFF	ON
3	OFF	OFF

DIP SWITCH NUMBER	ALL CHILLERS
4	OFF
5	OFF
6	ON
7	OFF
8	OFF

LD23530

FIGURE 35 - EEV IB-G INTERFACE BOARD

Sporlan EEV Interface Board

Verify the jumper and dip switch settings, shown in *Figure 35 on page 106, during a chiller start-up for YLAA, YCWL and QWC3* chillers with Sporlan Electronic Expansion Valves.

With the IB-G unpowered, select the input signal of 0-10V by installing the supplied jumper to number 1 of the 5 pin locations shown in the left hand side of EEV board. Set numbers 1 to 3 of the DIP switches in accordance with the unit models. Set numbers 4 to 8 in accordance with the table shown in *Figure 35 on page 106*. For YLAA, YCWL and QWC3 chillers, DIP switch number 6 must be set to ON for a quicker EEV response.

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 Pre-startup and Startup Checklist" 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

Assure the chiller ON/OFF 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 the control panel display is illuminated. Assure 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 2 and 13 in the panel.

Temperature Sensor(s)

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

QUANTECH	QWC3050T - 200T STYLE A, 60 HZ, STARTUP CHECKLIST	
STARTUP CHECKLIST	NEW RELEASE	Form QWC3-CL1 (317)

STARTUP 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**: _____

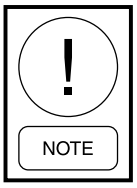
The work (as checked below) is in process and will be completed by: _____ / _____ / _____
Month Day Year

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

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

Unit Checks

1. Inspect the unit for shipping or installation damage ☐
2. Assure that all piping has been completed ..... ☐
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 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 (see "Operational Limitations" in IOM). Verify flow switch operation. ..... ☐



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 in electrical tables. ..... ☐
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 temps. 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%..... ☐

Power must be applied 24 hours prior to start-up

Each heater should draw approximately 0.5-1A.

C. POWER CHECKS
(POWER ON - UNIT SWITCHED 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 (see sections on Setpoints and Unit Keys in IOM for programming instruction) .

OPTIONS	
Display Language	
Sys 1 Switch	
Sys 2 Switch	
Chilled Liquid	
* Ambient Control	
Local/Remote Mode	
Control Mode	
Display Units	
* Lead/Lag Control	
* Fan Control	N/A
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	N/A
Fan Differential OFF Pressure	N/A
Total # of Compressors	
* Number of Fans/System	N/A
* Unit/Sys Voltage	
Unit ID	

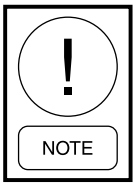
* Not on All Models

** Viewable Only

4. Put the unit into Service Mode (as described under the Control Service and Troubleshooting section) and cycle each condenser fan to ensure proper rotation. . ☐
5. Prior to this step, turn system 2 OFF and system 1 ON (refer to Option 2 under Unit Keys section for more information on system switches). 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,"

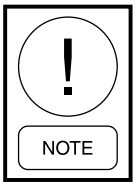
The chilled liquid setpoint may need to be temporarily lowered to ensure all compressors cycle ON.



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

6. Turn system 1 OFF and system 2 ON (refer to Option 2 under Unit Keys sections for more information on system switches).

   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.

6

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.

P.O. Box 1592, York, Pennsylvania USA 17405-1592

Form QWC3-CL1
Issue Date: March 13, 2017
Supersedes:New Release

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.

   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.
4. 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.
5. 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 SECTION 8 – UNIT OPERATION on Capacity Control for a detailed explanation of system and compressor staging.*
6. 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 SECTION 8 – UNIT OPERATION on Capacity Control for a detailed explanation.*
7. 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.

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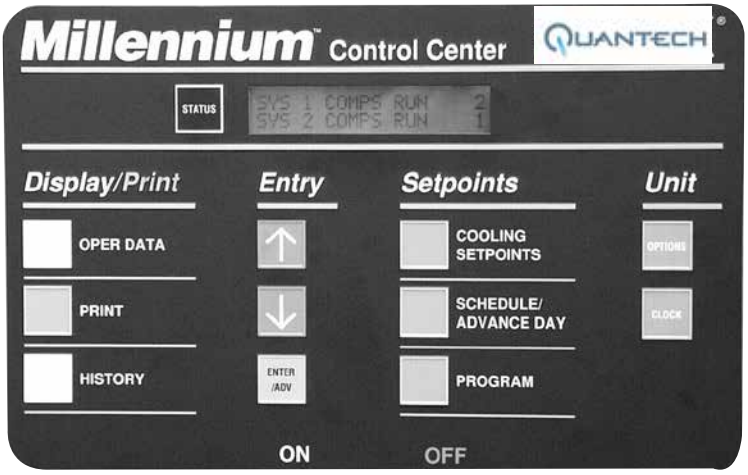
SECTION 7 – UNIT CONTROLS



INTRODUCTION

The Quantech 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:

1. IPU II and I/O Boards
2. Transformer
3. Display
4. 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 115 VAC 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 24 VAC from 75 VA, 120/24 VAC 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 (transducers and temp 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 to 10 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 (two 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 vitals 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 assure 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 75 VA, 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 powerup.

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

STATUS KEY

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, 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 UNIT switch 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 the BAS 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 the remote start/stop contact is open. 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.

```
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 assures 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 80 PSIG/5.52 Bar suction pressure cutout, the microprocessor would inhibit loading of the affected system with the suction pressure less than or equal to 1.15 * 80 PSIG/5.52 Bar = 92 PSIG/6.35 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, BAS 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

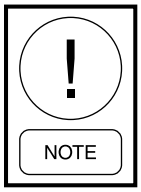
System safeties are faults that cause individual systems to be shut down if a safety threshold is exceeded for 3 seconds. They are auto reset faults in that the system will be allowed to restart automatically after the fault condition is no longer present. However, if three faults on the same system 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 assures 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 should 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 protect 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. On 60 Hz chillers, the mechanical HP switch opens at 500 PSIG plus or minus 8 PSIG and automatically closes at 375 PSIG plus or minus 10 PSIG.

On 50Hz chillers, the manual reset HP switch opens at 503 PSIG (34.7 barg). On systems with a second tool reset cutout, the tool reset HP switch opens at 532 PSIG (36.7 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 assure 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 three 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 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 Temp 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 Temp 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 assures 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 PROGRAM 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.

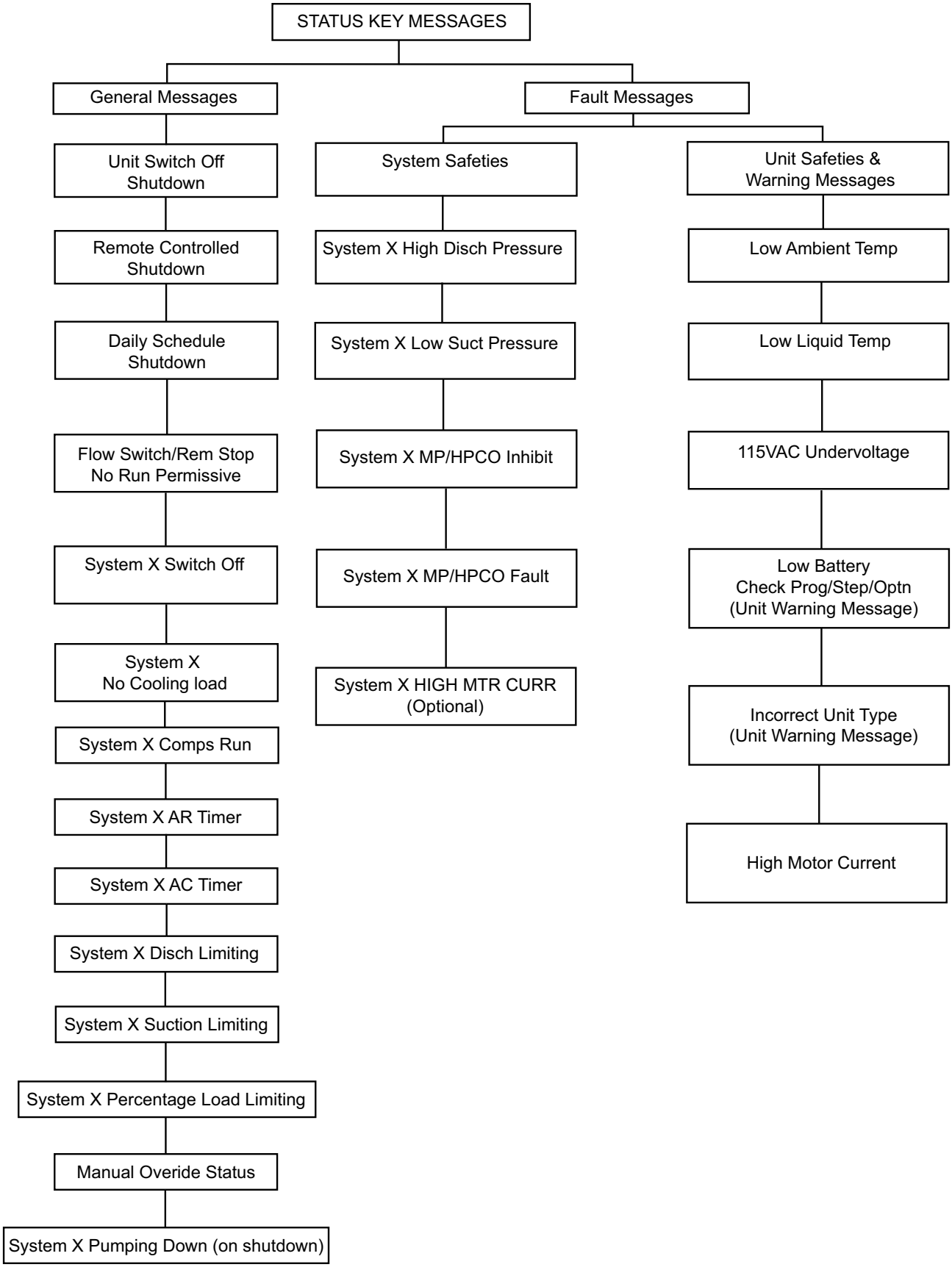
If a low battery is detected, it should be replaced as soon as possible. The programmed values will all be lost and the unit will be prevented from running on the next power interruption. The RTC/battery (031-00955-000) is located at U17 on the microboard.

```
INCORRECT
UNIT TYPE
```

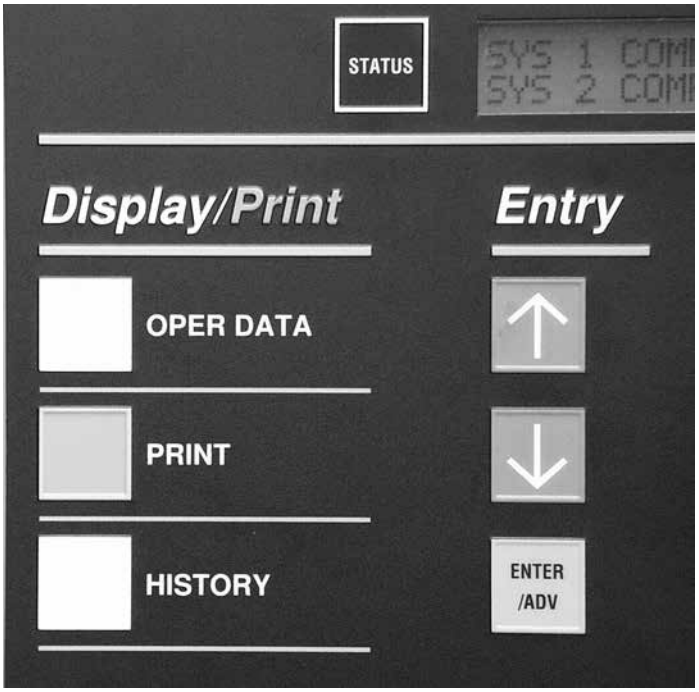
This indicates the condensing unit jumper is installed on J11-12. This jumper must be removed to operate the chiller.

STATUS KEY MESSAGES

TABLE 9 - STATUS KEY MESSAGES QUICK REFERENCE LIST



DISPLAY/PRINT KEYS

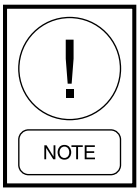


The DISPLAY/PRINT keys allow the user to retrieve system and unit information that is useful for monitoring chiller operation, diagnosing potential problems, troubleshooting, and commissioning the chiller.

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.

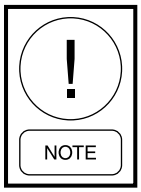
Oper Data Key

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.



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:



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:

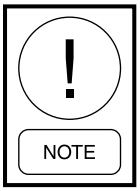
Suction Pressure: 400 PSIG (27.58 barg)

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.

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

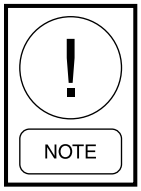
The display of COOLING DEMAND indicates the current “step” in the capacity control scheme when in Return Water Control Mode. The number of available steps are determined by how many compressors are in the unit. In the above display, the “2” does not mean that two compressor are running but only indicates 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. See *the programming under the “OPTIONS” key.* The Lead System display will only appear on a two system unit.



A unit utilizing hot gas bypass should 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 BAS.
- BAS – allows remote load limiting and temperature reset through a BAS 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. This message does not apply to QWC3 chillers and is displayed as a result of the use of software common to QWC chillers.

See *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:

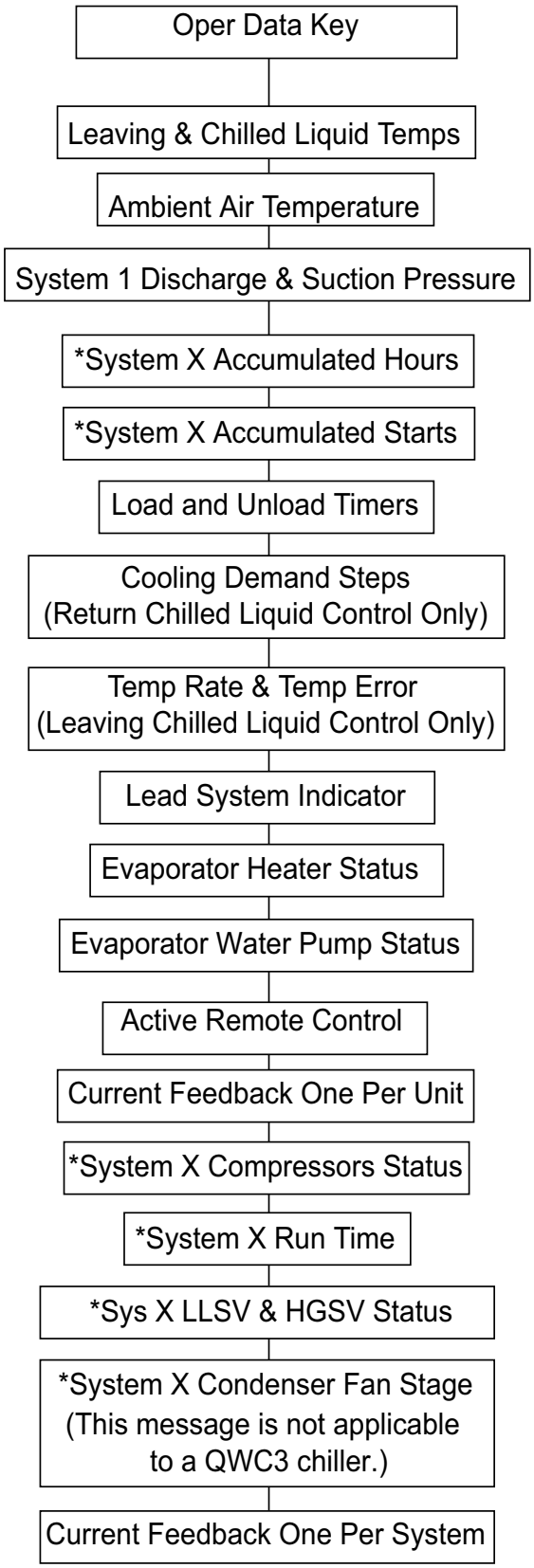
$$\frac{225A \times \text{Actual Volts}}{5 \text{ Volts}}$$

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 10 - OPERATION DATA



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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. Not all data applies to QWC3 chillers.)

QUANTECH INTERNATIONAL CORPORATION
MILLENNIUM LIQUID CHILLER
UNIT STATUS
2:04PM 01 JAN 10

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
QUANTECH 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

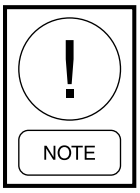
COMP STATUS	1=OFF 2=OFF 3=OFF
RUN TIME	0- 0- 0- 0 D-H-M-S
TIME YYYYYYY	0- 0- 0- 0 D-H-M-S
LAST STATE	YYYYYYY
SUCTION PRESSURE	105 PSIG
DISCHARGE PRESSURE	315 PSIG
SUCTION TEMPERATURE	46.0 DEGF
SAT SUCTION TEMP	34.0 DEGF
SUCTION SUPERHEAT	12.0 DEGF
COOLER INLET REFRIG	31.6 DEGF
DEFROST TEMPERATURE	52.8 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 Service and Troubleshooting section 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 nine 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 lock-out.

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 nine 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.

```
QUANTECH INTERNATIONAL CORPORATION
MILLENNIUM LIQUID CHILLER

SAFETY SHUTDOWN NUMBER 1
SHUTDOWN @ 3:56PM  09 JAN 10

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
```

```
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
```

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

Displays the programmed Low Ambient Cutout.

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

Displays the Leaving Liquid Temp. Cutout programmed.

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

Displays the programmed Fan On Pressure.

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

This message does not apply to a QWC3 chiller.

```
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 Temp. 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 Temp and Saturated Suction Temp 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
```

This message does not apply to a QWC3 chiller.

```
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 is covered under the STATUS, OPER DATA, COOLING SETPOINTS, PROGRAM, and OPTIONS keys.

Software Version

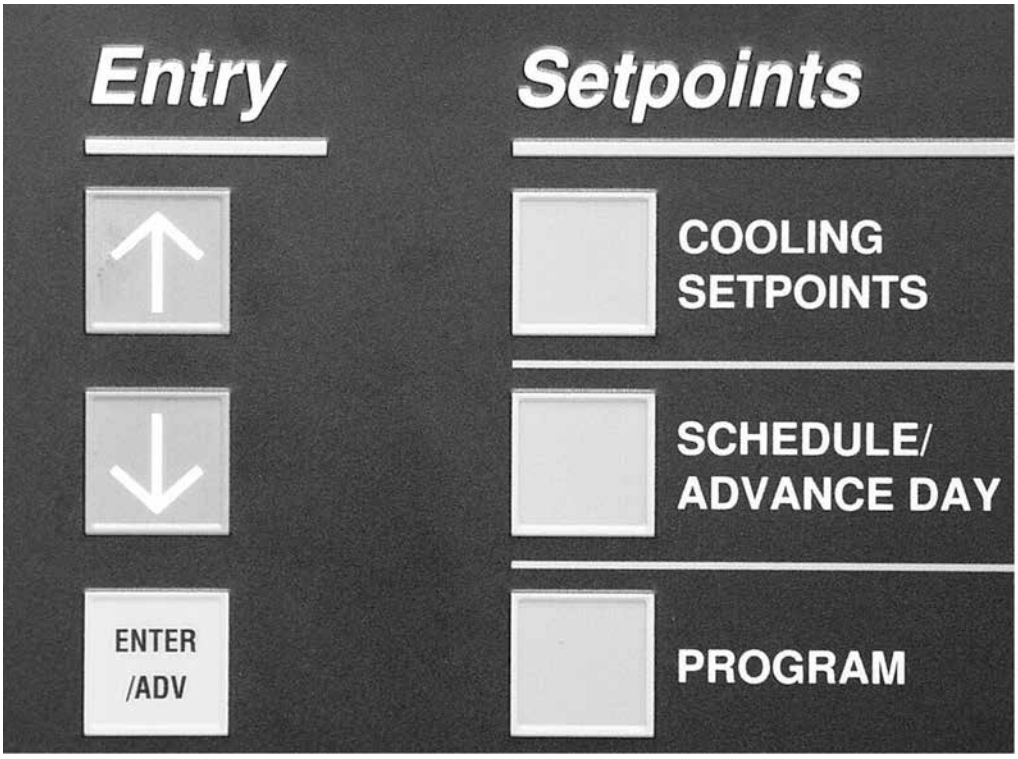
The software version may be viewed by first pressing the HISTORY key and then repeatedly pressing the ↓ (DOWN) arrow key until you scroll past the first history buffer choice.

```
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



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.

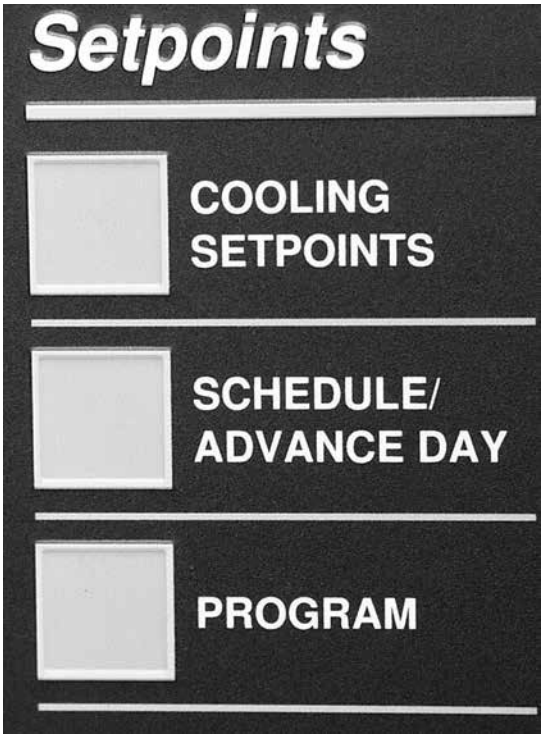
The ↑ (UP) arrow key, and ↓ (DOWN) arrow key are also used for programming the control panel such as changing numerical or text values when programming cooling setpoints, setting the daily schedule, changing safety setpoints, chiller options, and setting the clock.

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 should 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 .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 .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 +/- 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 13.

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 a BAS 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)

```
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 13.

Pressing the COOLING SETPOINTS 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 Temp 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 EMS-PWM Remote Temperature Reset in Section 8 of this IOM, for a detailed explanation of this feature.*

As with the other setpoints, the ↑ (UP) arrow and ↓ (DOWN) arrow keys are used to change the Temp 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.

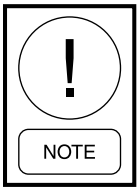
```
MON START = 00:00 AM
      STOP = 00:00 AM
```

TABLE 11 - 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
RETURN 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 1.1°C	40°F 22.2°C	20°F 11.1°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 Quantech Sales Representative for application guidelines.

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:

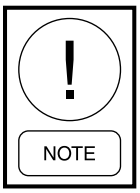
```
DISCHARGE PRESSURE
CUTOUT = 570 PSIG
```

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 should 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 should be set to 80 PSIG (5.52 Bars) form water cooling.



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 14.

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

The programmable anti-recycle timer assures 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 should 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
```

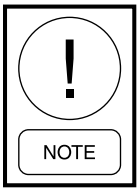
Does not apply to QWC3.

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

Does not apply to QWC3.

```
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. Dual system units may have 4 or 6 compressors.



This MUST be programmed correctly to assure proper chiller operation.

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

Does not apply to a QWC3 chiller.

```
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 read-out 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

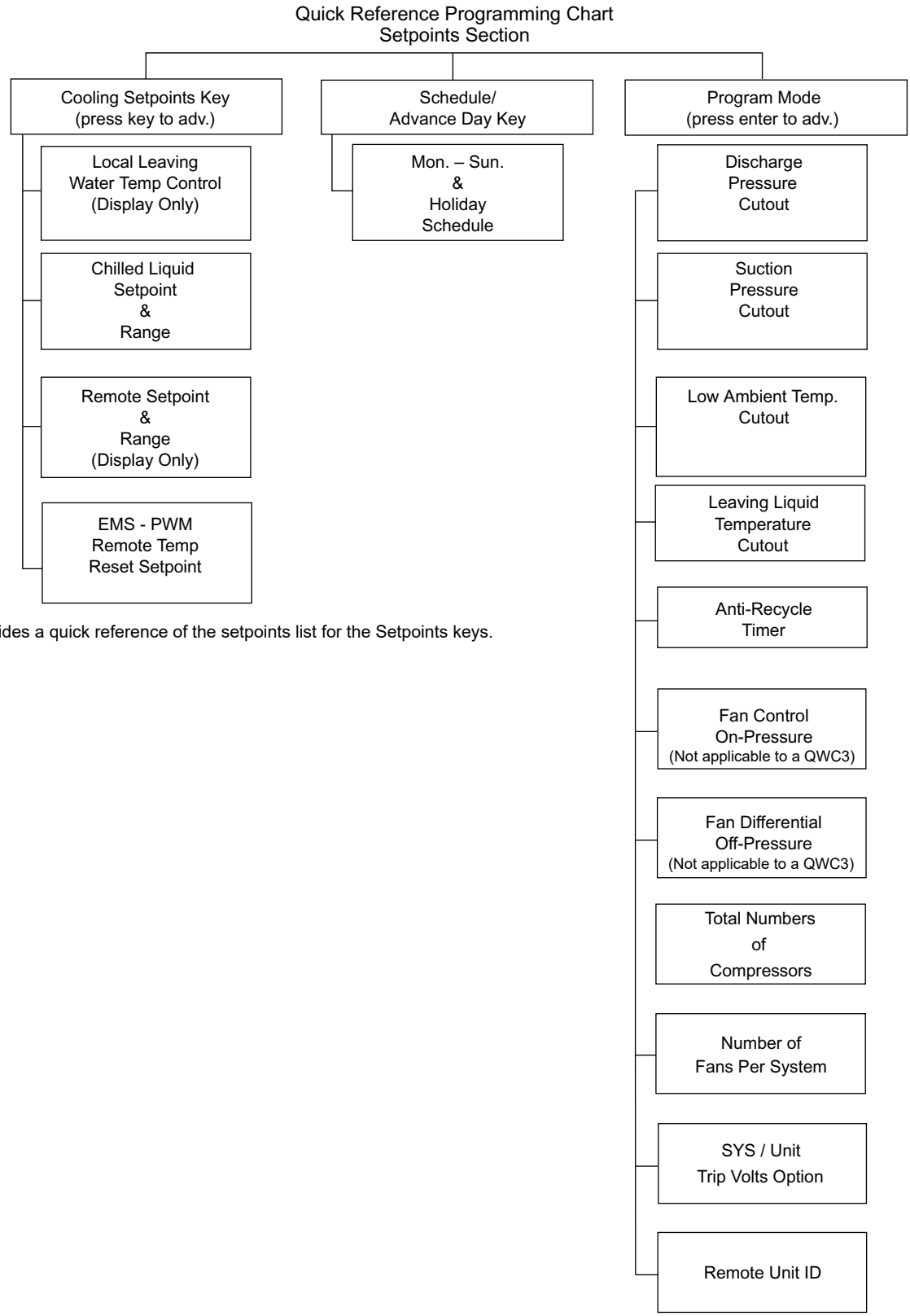
When communications is required with a BAS or OptiView Panel, individual unit IDs are necessary for communications with specific chillers on a single RS-485 line. ID 0-7 is selectable.

TABLE 12 - 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 TEMP. 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 TEMP. 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 QWC3)	—	360 PSIG	485 PSIG	385 PSIG
		24.8 BARG	33.4 BARG	26.5 BARG
FAN DIFFERENTIAL OFF PRESSURE (NOT APPLICABLE TO A QWC3)	—	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.

TABLE 13 - SETPOINTS QUICK REFERENCE LIST



Provides a quick reference of the setpoints list for the Setpoints keys.

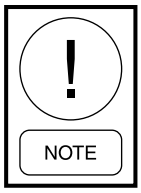
LD07404c

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.



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.

Figure 36 on page 143 shows the programmable options. Following are the displays in the order they appear:

Option 1 – Language

```
DISPLAY LANGUAGE
ENGLISH
```

English, Spanish, French, German, Italian, Portuguese, Hungarian, Polish, and Swedish can be programmed.

Option 2 – QWC3 Heat Pump Mode Select

```
MODE SELECT
CHILLER
```

This option will be displayed if the unit is programmed as a chiller under the Service Mode and local/remote is set to local.

```
MODE SELECT
HEATPUMP
```

This option will be displayed if the unit is programmed as a heatpump under the Service Mode and local/remote is set to local.

Option 3 – 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

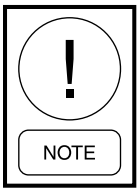
```
SYS 1 SWITCH OFF
SYS 2 SWITCH ON
```

This turns system 1 OFF

or

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

This turns systems 1 and 2 OFF



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

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). **On water cooled chillers, the low ambient control should be selected. The low ambient cutout should be programmed for 0.00°F.**

Option 5 – Local/Remote Control Type

```
LOCAL / REMOTE MODEL
LOCAL
```

When programmed for LOCAL, a BAS 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 a BAS or RCC control is to be used to control the chiller. This mode will allow the BAS to control the following items: Remote Start/Stop, Cooling Setpoint, Load Limit, and History Buffer Request. If the unit receives no valid BAS 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 temp. 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 – Units Type

```
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
```

Does not apply to a QWC3 chiller.

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

Does not apply to a QWC3 chiller.

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

```
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 – Compressor Soft Start

```
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 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.

If the unit is operating as a YCWL R-410a chiller, the following message will appear.

```
YCWL OPERATING
MODE CHILLER
```

If the unit is operating as YCWL R-410a heat pump, the following message will appear.

```
YCWL OPERATING
MODE HEATPUMP
```

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. Always use "Thermostatic" for valve type regardless of whether an EEV or TXV is used. This is required since the EEV controller is external to the chiller microprocessor.

Incorrect programming may cause damage to compressors.

Also see the UNIT KEYS PROGRAMMING QUICK REFERENCE LIST on Figure 36 on page 143.

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, assure the correct Flash Card was utilized. Incorrect chiller soft-

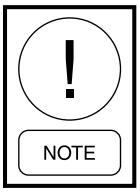
ware will cause an error. If this is not the case, the Flash Card is most likely defective or the IPU and I/O combo board is bad.

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 – 10.0VVDC
- 0.0 – 20.0mA
- 4.0 – 20.0mA



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

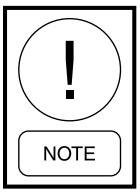
Option 19 – Pump Control

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 should be made in the Service Mode:

```
  HYDRO
KIT PUMPS          = 1
```

When HYDRO KIT PUMPS = 1 is displayed, 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.

Hydro Kit pumps = 1 should not be selected on a QWC3 chiller.

```
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 HYDRO KIT PUMPS = 1

The following option should not be selected.

```
  HYDRO
KIT PUMPS          = 2
```

Option 20 – Pump Selection

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

Option 21 – Hot Gas Bypass Type

The Hot Gas Bypass Type must be programmed based on the option installed. Some chillers will not have hot gas bypass installed. Others will have it installed on System #1, System #2 or both systems.

The selected option is only displayed under the OPTIONS key and must be programmed under the Service Mode.

```
HOT GAS BYPASS TYPE
NONE
```

When programmed for hot gas bypass type None, the unit will pump down and shutdown the lead system.

```
HOT GAS BYPASS TYPE
SYSTEM 1
```

When programmed for hot gas bypass type System 1, the unit will operate system 1 hot gas bypass if system 1 is the lead system.

```
HOT GAS BYPASS TYPE
SYSTEM 2
```

When programmed for hot gas bypass type System 2, the unit will operate system 2 hot gas bypass if system 2 is the lead system.

```
HOT GAS BYPASS TYPE
BOTH SYSTEMS
```

When programmed for hot gas bypass type Both Systems, the condensing units operating in suction pressure control operate independent of the lead/lag system.

Option 22 – Heatpump Unit

The heatpump display will appear if the heatpump mode is enabled under the Service Mode.

```
HEATPUMP UNIT
```

Option 23 – Flash Card Data Logging

When the following message appears, data logging is disabled.

```
DATALOG TO FLASHCARD
OFF
```

When the following message appears, data logging is enabled.

```
DATALOG TO FLASHCARD
ON
```

When the following message appears, data logging is enabled and is not logging unchanged data.

```
DATALOG TO FLASHCARD
SKIP UNCHANGED
```

Option 24 – Temperature Sensors Enable

```
DSCH TEMP SENSORS
ENABLED
```

When the following option is selected, the discharge temperature sensors are enabled for non-YCWL units and disabled on YCWL leaving liquid and return liquid hot temperature sensors.

```
YCWL TEMP SENSORS
ENABLED
```

When the following option is selected, the discharge temperature sensors are disabled.

```
DSCH TEMP SENSORS
DISABLED
```

Option 25 – Variable Water Outlet Mode

When the following option is selected, the variable water outlet mode is enabled.

```
VARIABLE OUTLET MODE
ENABLED
```

When the following option is selected, the variable water outlet mode is disabled.

```
VARIABLE OUTLET MODE
DISABLED
```

Clock

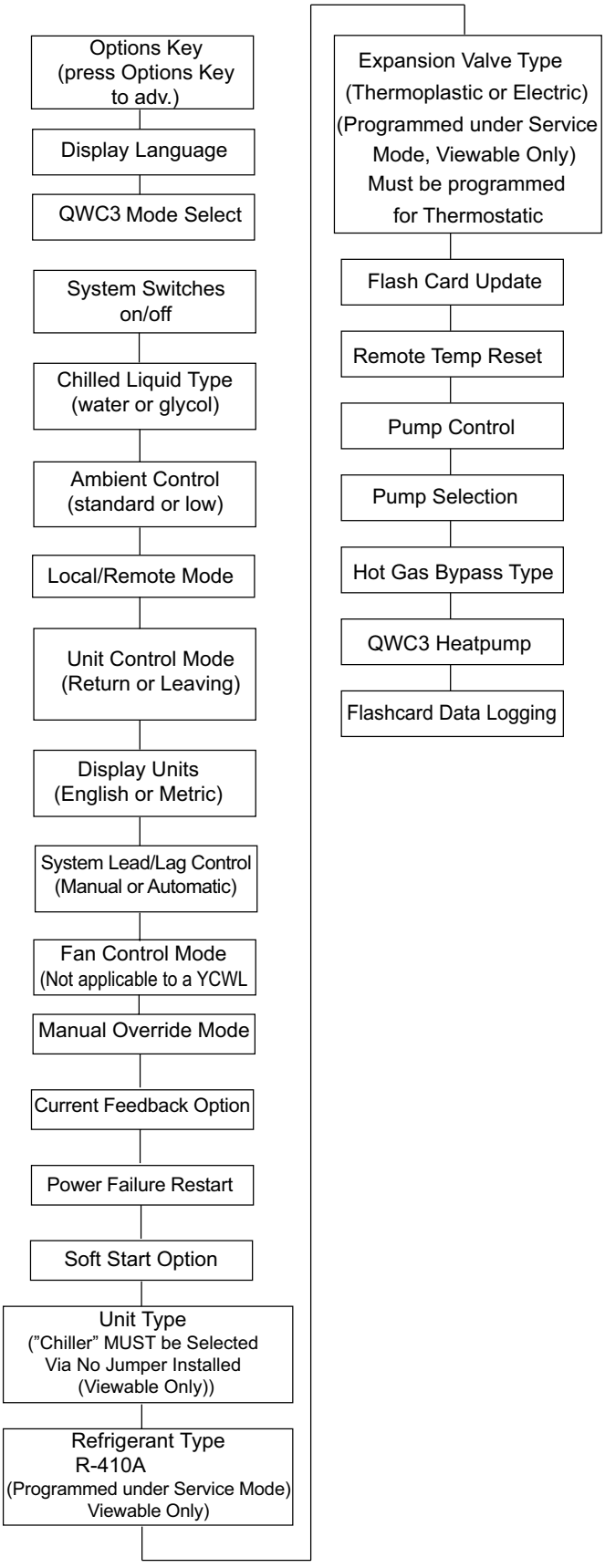
The CLOCK display shows the current day, time, and date. Pressing the CLOCK key will show the current day, time, and date.

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 should 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.



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Provides a quick reference list for the Unit key setpoints.

FIGURE 36 - UNIT KEYS OPTIONS PROGRAMMING QUICK REFERENCE LIST

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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 x 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 37 on page 146* 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/min. 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 (.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 (.28 °C) below the Setpoint Low Limit but not greater than 1.5 °F (.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 (.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 40.0ºF. For leaving chilled liquid temperature setpoint and control

range combinations that result in the low limit of the 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

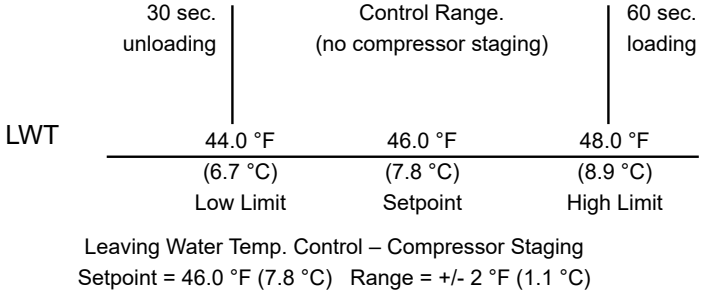


FIGURE 37 - LEAVING WATER TEMPERATURE CONTROL EXAMPLE

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 below, with a maximum value allowed of 50 °F (*See Figure 38 on page 146*).

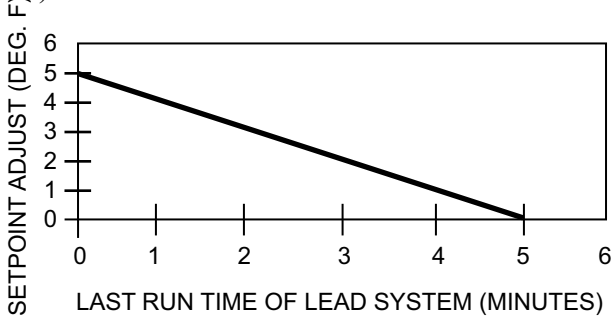


FIGURE 38 - SETPOINT ADJUST

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.

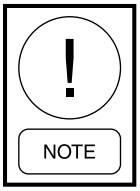
Each compressor in a system will be assigned an arbitrary priority number 1, 2, or 1, 2, 3. The non-running compressor within a system with the lowest priority number will always be the next compressor to start.

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 assures 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.

RETURN CHILLED LIQUID CONTROL

Return chilled liquid control is based on staging the compressors to match the cooling load. The chiller will be fully loaded when the return water temperature is equal to the Cooling Setpoint plus the Range. The chiller will be totally unloaded (all compressors OFF) when the return water temperature is equal to the Cooling Setpoint *(See sample in Table 14 on page 147).* At return water temperatures between the Cooling Setpoint and Cooling Setpoint plus Range, compressor loading and unloading will be determined by the formulas in *Table 15 on page 148*.



Return Chilled Liquid Control MUST only be used when constant chilled liquid flow is ensured.

The RANGE MUST always be programmed to equal the temperature drop across the evaporator when the chiller is "fully loaded". Otherwise, chilled liquid temperature will over or under shoot. Variable flow must never be used in return chilled liquid mode.

Normal loading will occur at intervals of 60 seconds according to the temperatures determined by the formulas. Unloading will occur at a rate of 30 seconds according to the temperatures determined in the formulas used to calculate the ON and OFF points for each step of capacity.

The return 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 4 °F to 20 °F (2.2° to 11.1 °C).

As an example of compressor staging *(see Table 17 on page 150)*, a chiller with six compressors using a Cooling Setpoint programmed for 45 °F (7.20 °C) and a Range Setpoint of 10 °F (5.56 °C). Using the formulas in Table 20, the control range will be split up into six (seven including hot gas) segments, with the Control Range determining the separation between segments. Note also that the Cooling Setpoint is the point at which all compressors are OFF, and Cooling Setpoint plus Range is the point all compressors are ON. Specifically, if the return water temperature is 55 °F (12.8 °C), then all compressors will be ON, providing full capacity. At nominal gpm, this would provide approximately 45 °F (7.2 °C) leaving water temperature out of the evaporator.

If the return water temperature drops to 53.4 °F (11.9 °C), one compressor would cycle OFF leaving five compressors running. The compressors would continue to cycle OFF approximately every 1.7 °F (.94 °C), with the exception of hot gas bypass. Notice that the hot gas bypass would cycle ON when the return water temperature dropped to 46.25 °F (7.9 °C). At this point one compressor would be running with hot gas.

Should the return water temperature rise from this point to 46.7 °F (8.2 °C), the hot gas bypass would shut OFF, still leaving one compressor running. As the load increased, the compressors would stage ON every 1.7 °F (.94 °C).

Also note that *Table 15 on page 148* not only provides the formulas for the loading (ON POINT) and unloading (OFF POINT) of the system, the "STEP" is also shown in the tables. The "STEP" is the increment in the sequence of the capacity control scheme that can be viewed under the OPER DATA key. *See the section on the DISPLAY/PRINT keys for specific information on the OPER DATA key.*

TABLE 14 - SAMPLE COMPRESSOR STAGING FOR RETURN WATER CONTROL

COMPRESSOR STAGING FOR RETURN WATER CONTROL						
4 COMPRESSOR COOLING SETPOINT = 45 °F (7.2 °C) RANGE = 10 °F(5.6 °C)						
# OF COMP ON	**0**	*** 1+HG**	**1**	**2**	**3**	**4**
RWT	45 °F (7.2 °C)	46.25 °F (7.9 °C)	47.5 °F (8.6 °C)	50.0 °F (10.0 °C)	52.5 °F (11.4 °C)	55.0 °F (12.8 °C)

*Unloading only

TABLE 15 - 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 16 on page 148*. 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 assures the same compressor does not repeatedly cycle ON and OFF.

TABLE 16 - 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.

ANTI-RECYCLE TIMER

The programmable anti-recycle timer assures that systems do not cycle. This timer is programmable under the PROGRAM key between 300 – 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. 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 assure compressors within a circuit or between systems, do not start simultaneously. The anti-coincidence timer assures there is at least a one minute delay between system starts on 2-circuit systems. This timer is NOT programmable. The load timers further assure that there is a minimum time between compressor starts within a system.

EVAPORATOR PUMP CONTROL AND HYDRO KIT PUMP CONTROL

The evaporator pump dry contacts (CTB2 – terminals 23 – 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 “HYDRO KIT PUMPS = 1” is selected under the OPTIONS key, the pump control will be as described above. DO NOT SELECT the option “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.

LOAD LIMITING

Load Limiting is a feature that prevents the unit from loading beyond the desired value. Four-compressor units can be load limited to 50%. This would allow only 1 compressor per system to run. 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. No other values of limiting are available.

There are two ways to load limit the unit. The first is through remote communication via the BAS. Load limit stages are sent through YORKtalk 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 and 21). Stage 1 load limiting involves closing the Load Limit input (13 and 21) with a dry contact. Load limiting is either 66% or 50%, depending on the number of compressors on the unit. A second step of load limiting on six-compressor chillers is available by closing the CTB1 terminals 13 and 20 with dry contact. This allows only a single compressor to run on each system, unloading the chiller to 33%. *Table 17 on page 150* shows the load limiting permitted for the various number of compressors. Only Stage 1 is available utilizing a dry contact.

TABLE 17 - COMPRESSOR OPERATION – LOAD LIMITING

COMPRESSORS IN UNIT	STAGE 1	STAGE 2
4	50%	-
6	66%	33%

NOTE

Simultaneous operation of Remote Load Limiting and EMS-PWM Temperature Reset (described on following pages) cannot occur.

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.

EMS-PWM REMOTE TEMPERATURE RESET

EMS PWM Remote Temperature Reset is a value that resets the Chilled Liquid Setpoint based on a PWM input (timed contact closure) to the microboard. This PWM input would typically be supplied by an Energy Management System.

A contact closure on the PWM Temp Reset input at CTB 1 terminals 13 - 20, will reset the chilled liquid setpoint based on the length of time the contacts remain closed. The maximum temperature reset is achieved at a contact closure of 11 seconds. This is the longest contact closure time allowed. One second is the shortest time allowed and causes the Chilled Liquid Setpoint to revert back to the Local programmed value. The reset value is always added to the Chilled Liquid Setpoint, meaning that this function never lowers the Chilled Liquid Setpoint below the locally programmed value, it can only reset to a higher value. The microboard must be refreshed between 30 seconds and 30 minutes. Any contact closure occurring sooner than 30 seconds will be ignored. If more than 30 minutes elapse before the next contact closure, the setpoint will revert back to the locally programmed value. The new chilled liquid setpoint is calculated by the following equations:

setpoint = local chilled liquid setpoint + °reset

$$°\text{reset} = (\text{Contact Closure} - 1) \times \left(\frac{*\text{Max. Reset Value}}{10}\right)$$

Example:

Local Chilled Liquid Setpoint = 45°F (7.22°C)

*Max Reset Value = 10°F (5.56°C)

Contact Closure Time = 6 Seconds.

(English)
(6 sec. - 1) (10°F/10) = 5°F Reset

So, the new chilled liquid setpoint = 45°F + 5°F= 50°F. This can be viewed by pressing the COOLING SETPOINTS key twice. The new value will be displayed as "REM SETP = 50.0°F."

(Metric)
(6 sec - 1) * (5.56°C/10) = 2.78°C
Reset Cooling Setpoint = 7.22°C + 2.78°C = 10.0°C

So, the new reset Cooling Setpoint = 7.22 °C + 2.78°C = 10°C. This can be viewed by pressing the COOLING SETPOINTS key twice. The new value will be displayed as "REM SETP = 10.0°C."

*Max Reset Value is the "Max EMS-PWM Remote Temp. Reset" setpoint value described in the programming section under Cooling Setpoints. Programmable values are from 2°F to 40°F (1.11°C to 22.22°C).

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 - 10VDC input, or a 4-20mA 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." This reset value is always added to the locally programmed chilled liquid setpoint, meaning this function never lowers the chilled liquid setpoint below the locally programmed value.

If a 0 - 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 Temp. 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).

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 20mA 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 = 12mA

(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

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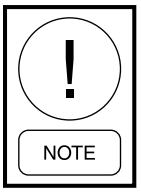
SECTION 9 – SERVICE AND TROUBLESHOOTING

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/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 (R410A), 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 (PROGRAM ↑↑ ↓↓), *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 temp. 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:

```
F L O W   S W / R E M   S T A R T
J 1 3 - 5   I S   O N
```

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

These tables 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 18 - I/O DIGITAL INPUTS

J13-2	Unit ON/OFF Switch
J13-3	Load Limit Stage 2 on 3, 5 and 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 19 - 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
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 (N/A)
TB7-9	SYS 1 Condenser Fan Output 2 (N/A)
TB7-10	SYS 1 Condenser Fan Output 3 (N/A)
TB10-8	SYS 2 Condenser Fan Output 1 (N/A)
TB10-9	SYS 2 Condenser Fan Output 2 (N/A)
TB10-10	SYS 2 Condenser Fan Output 3 (N/A)
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 20 - 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 QWC3 Condensing Unit = Jumper J11-12 to +24 VDC (Do NOT Use)
J7-11	SYS 1 Discharge Pressure Transducer (Optional)
J6-9	Ambient Air Temp. Sensor
J6-7	Leaving Chilled Liquid Temp. Sensor
J6-8	Return Chilled Liquid Temp. 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 21 - I/O ANALOG OUTPUTS

N/A	Not Applicable

MICROBOARD LAYOUT

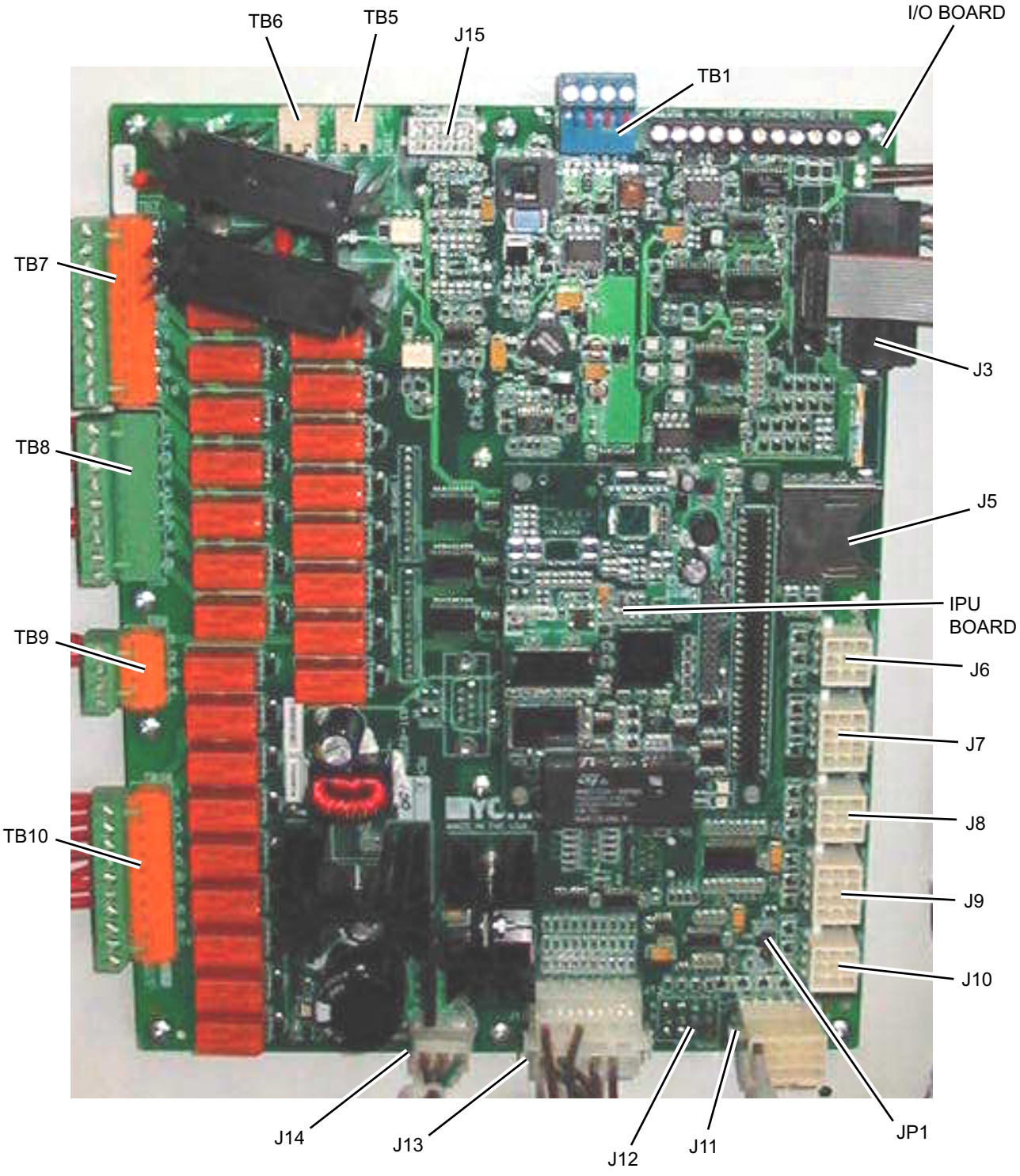


FIGURE 39 - MICROBOARD LAYOUT

CHECKING INPUTS AND OUTPUTS

Digital Inputs

See the *Elementary Wiring Diagram on page 66*. 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

See the *Elementary Wiring Diagram on page 66*. 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). The following pages show the connections for the temperature sensing inputs.

TABLE 22 - ENTERING/LEAVING CHILLED LIQUID TEMP. SENSOR, TEMPERATURE / VOLTAGE CORRELATION

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 22 on page 158*)

Entering Chilled Liquid Sensor

J6-5 = +5VDC regulated supply to sensor.

J6-8 = VDC input signal to the I/O board. *See Table 22 on page 158 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 22 on page 158 for voltage readings that correspond to specific liquid temperatures.*

J6-1 = drain (shield connection = 0VDC) Return

Analog Inputs – Pressure

See the *Elementary Wiring Diagram on page 66*. 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 QWC chillers. 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 650 PSIG (41.25 barg) range. Following is the formula that can be used to verify the voltage output of the transducer. All voltage readings are in reference to ground (unit case).

TABLE 23 - PRESSURE TRANSDUCERS

0-400 PSIG SUCTION PRESSURE TRANSDUCER		0-650 PSIG DISCHARGE PRESSURE TRANSDUCER	
PRESSURE PSIG	**VOLTAGE VDC**	**PRESSURE PSIG**	**VOLTAGE VDC**
0	0.5	0	0.5
50	1.0	81.25	1.0
100	1.5	162.5	1.5
150	2.0	243.75	2.0
200	2.5	325	2.5
250	3.0	406.25	3.0
300	3.5	487.75	3.5
350	4.0	568.75	4.0
400	4.5	650	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

$$V = (\text{Pressure in PSIG} \times .01) + .5$$

or

$$V = (\text{Pressure in barg} \times .145) + .5$$

where V = DC voltage output

Pressure = pressure sensed by transducer

The I/O board connections for the Discharge Transducers:

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).

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

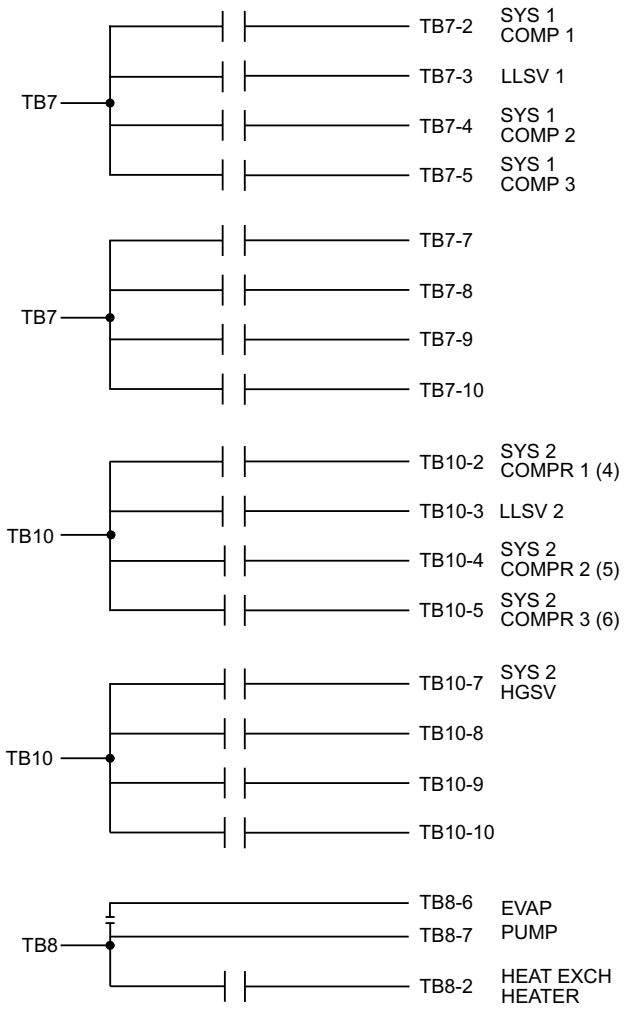
J9-5 = +5VDC regulated supply to transducer.
J9-10 = VDC input signal to the microboard. *See the formula above for voltage readings that correspond to specific suction pressures.*
J7-9 = +5VDC return.
J7-11 = drain (shield connection = 0VDC).

Digital Outputs

See the *Unit Wiring diagram and Figure 40 on page 160*. 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 40 on page 160).*

120VAC is supplied to the I/O board via connections at TB7-1, TB7-6, TB10-1, TB10-6, TB8-1 and TB9-1. *Figure 40 on page 160* illustrates the relay contact architecture on the microboard.



LD12722A

FIGURE 40 - I/O BOARD RELAY CONTACT ARCHITECTURE

OPTIONAL PRINTER INSTALLATION

ACCEPTABLE PRINTERS

The following printer can be used. Printers must be equipped with an RS-232 serial interface.

Okidata OKIPOS 441 Printer

- Dimensions:
  6.9 in. wide x 9.64 in. deep x 5.98 in. high
- Paper: 3.0 in. wide
- Type: Dot Matrix Impact
- Purchase: 800-OKIDATA
  Spare printer Ribbon Okidata 52119001 Black

The control center provides the required formatting control codes for the printers above when the printer is selected on the PRINTER screen in the instructions below. These codes are transmitted through the serial interface to the printer to provide a proper print format.

Different printers require different formatting control codes. Other printers might provide proper operation when connected to the control center. However, the print format may not be correct or as desired.

Proceed with caution, and use the following guidelines if an unlisted printer is selected:

1. All printers must be capable of RS-232 serial communications.
2. The primary differences between printers involve the formatting control codes required by the printer, which are sent from the control center to the printer. For example, Weigh-Tronix printers require a control code to select 40-column width. This same code is interpreted by the Okidata printer as an instruction to print wide characters. In some instances, a printer will ignore a code it cannot interpret.
3. The control center requires a busy signal from the printer when the printer receive buffer is full, which causes the control center to momentarily terminate the data transmission until the printer can accept more data. The busy signal polarity must be asserted low when busy.

PRINTER CONNECTIONS

Connect the printers to the control center microboard as follows. Only one printer can be connected at a time.

TABLE 24 - OKIDATA OKIPOS 441

MICROBOARD	PRINTER	FUNCTION
TB1-3	PIN 3	TX (Data to Printer)
TB1-2	PIN 20	DSR (Busy Signal from Printer)
TB1-5	PIN 7	Ground
Cabinet		Shield

Required Hardware:

Cable

- #18 AWG stranded 50 ft maximum length.

Connectors

Microboard

- None. Strip 1/4 in. insulation from wire and insert into screw terminal block.

Printers

- Okidata: 25 pin plug DB-25P or equivalent; Shell DB-C2-J9 or equivalent.

PRINTER SETUP

The printer must be configured as follows. Refer to the manual provided by the printer manufacturer.

Okidata OKIPOS 441 Printer

1. With the printer power turned off, remove the two screws, which hold the RS-232 Interface Module.
2. Pull the RS-232 Interface Module out of the printer.
3. Set the DIP switch SW2-2 to OFF to select 19200 BPS. Do not change any other switch settings.
4. Reinstall the RS-232 Interface Module and two mounting screws.
5. Load paper and install the printer ribbon into the printer.
6. Connect the printer cable to the printer and the microboard.
7. Connect the printer power cable to the printer and plug into a 100 to 240VAC power source.

Cancel printing by selecting the CANCEL PRINTING option. CHOOSE PRINT REPORT will display when the PRINT key is pressed.

PRINTING A REPORT

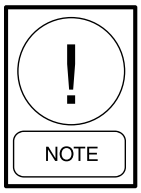
After pressing the PRINT key, press the ◄ or ► key until the desired printout is displayed. The available printout types are listed in *Table 25 on page 162.*

TABLE 25 - PRINTOUT TYPES

PRINTOUT TYPES
Operating Data (Default)
All History Buffers
Normal Shutdowns
History Buffer 1
History Buffer 2
History Buffer 3
History Buffer 4
History Buffer 5
History Buffer 6
History Buffer 7
History Buffer 8
History Buffer 9
History Buffer 10
Cancel Printing

Press the ✓ key to initiate the printout.

When OPERATING DATA is selected, the data at that instant will be temporarily stored in memory, and then transmitted through the print port. HISTORY BUFFER data is captured at the instant of that particular fault, and the selected buffer data is then transmitted through the print port.



Bold italic text below a line of print is not on the actual printout. It indicates information that may not be available on all printouts, or is additional information to help explain the difference in a two - circuit printout.

TROUBLESHOOTING

TABLE 26 - TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
NO DISPLAY ON PANEL UNIT WILL NOT OPERATE	1. No 115VAC 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 24VAC to Microboard.	2. Check wiring Control Transformer to Microboard.
	3. Control Transformer defective, no 24VAC output.	3. Replace Control Transformer.
	4. Short in wire to temp. sensors or pressure transducers.	4. Unplug connections at IPU II & IO board to isolate.
	5. Defective IPU II & I/O board or Display board.	5. Replace IPU II & IO board or the Display Board. NOTE: Contact Quantech Sales Representative 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. Improper suction pressure cutout 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 the Service section for pressure / voltage formula.
	7. LLSV defective.	7. Replace LLSV.

TABLE 26 - TROUBLESHOOTING (CONT'D)

PROBLEM	CAUSE	SOLUTION
HIGH DISCHARGE PRESSURE FAULT	1. Tower fans not operating	1. Check tower.
	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 the Service section for pressure/voltage formula.
	5. Dirty condenser tubes	5. Clean condenser tubes.
LOW LIQUID TEMP FAULT	1. Improperly adjusted leaving chilled liquid temp. cutout (glycol only).	1. Re-program the leaving chilled liquid temp. cutout.
	2. Micro panel setpoint/range values improperly programmed.	2. Re-adjust 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. (assure 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 Service section for temp./ 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 +/- 2 degrees. See the Service section for RWT/LWT temp./voltage table.
	3. Contactor/Overload failure.	3. Replace defective part.
	4. Compressor failure.	4. Diagnose cause of failure and replace.

TABLE 26 - TROUBLESHOOTING (CONT'D)

PROBLEM	CAUSE	SOLUTION
LACK OF COOLING EFFECT	1. Fouled evaporator surface Low suction pressure will be observed.	1. Contact the local Quantech Sales Representative.
	2. Improper 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.

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SECTION 10 – MAINTENANCE

It is the responsibility of the equipment owner to provide maintenance on the system.

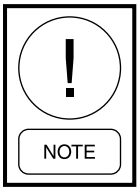
IMPORTANT

If system failure occurs due to improper maintenance during the warranty period, Quantech 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 Quantech. 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 visible in the oil sight glass.



At shutdown, the oil level should be between the bottom and middle of the oil sight glass. Models QWC3050 to 0150 use POE synthetic "V"oil, Models QWC3170 to 200 use "PVE"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.

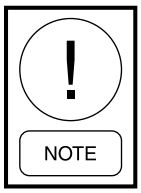
Never use the scroll compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor which will result in failure of compressor.

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 32K bram is installed.



Do not confuse JP1 on the IPU II (031-02630) board with JP1 on the I/O (031-02550) board.

Jumper provision may not be provided.

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 AND MODBUS DATA COMMUNICATIONS

Data can be read and in some cases modified using a serial communication BACnet or Modbus network connection. This information allows communications of chiller operating parameters and external control changes to setpoint, load limiting, and start/stop commands.

In some cases, BACnet parameters may need to be modified. Set the unit switch to OFF then, press 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 29 for error descriptions*

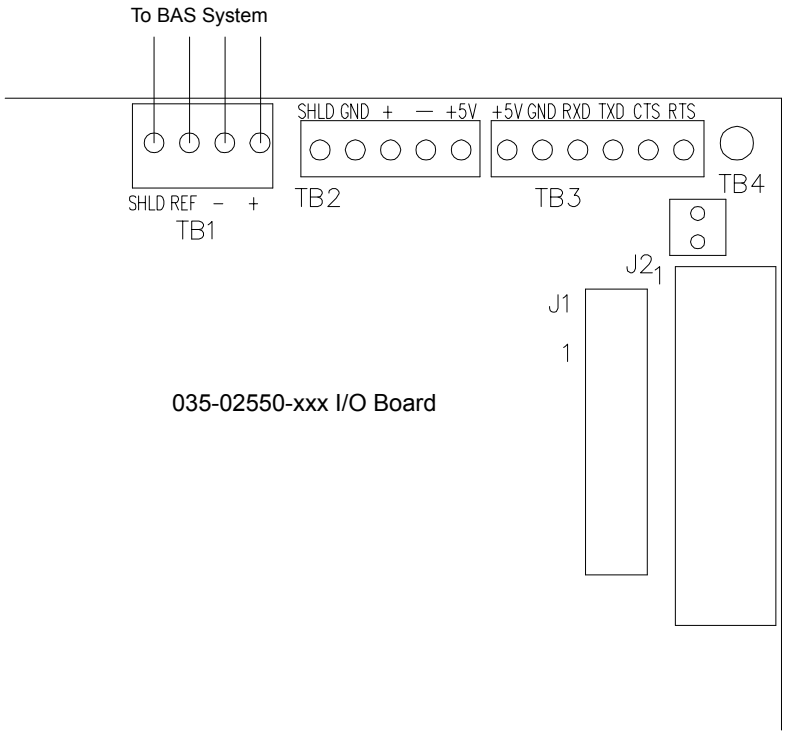


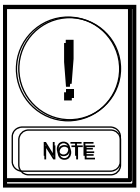
FIGURE 41 - MICRO PANEL CONNECTIONS

The table below shows set-up requirements for each communication protocol.

TABLE 27 - VALUES REQUIRED FOR BAS COMMUNICATION

SETTING DESCRIPTION	PROTOCOL			
	BACNET MS/TP	N2[6]	MODBUS RTU[5]	YORKTALK 2
CHILLER ID	N/A	N/A	N/A	0
DE MODIFIER ADDRESS	0 to 41943(3)	0 to 41943(3)	1	-1
DE MODIFIER OFFSET	0 to 99(4)	0 to 99(4)	0	N/A
P1 BAUD RATE	9600 To 76800 or Auto Selectable(1)	9600	N/A	N/A
P2 BAUD RATE	N/A	N/A	19,200(2)	N/A
P1 MANUAL MAC ADDRESS	0-127(1)	0-127(1)	N/A	N/A
P2 MANUAL MAC ADDRESS	N/A	N/A	0-127(1)	
P1 PARITY	None	NONE	N/A	N/A
P2 PARITY	N/A	N/A	None(2)	
P1 PROTOCOL	BACnet	N2	API	N/A
P2 PROTOCOL	N/A	N/A	Modbus	N/A
P1 STOP BITS	1	1	N/A	N/A
P2 STOP BITS	N/A	N/A	1	
P1 HW SELECT BIT	N/A	N/A	N/A	
P2 HW SELECT BIT	N/A	N/A	RS-485 or RS-232(1)	
RESET REAL TIME ERROR	N/A	N/A	N/A	N/A

[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 02 (C.MMC.13.02, C.MMC.14.02, Or C.MMC.16.02) Or higher required for MODBUS protocol functionality.
[6]Unit operating software version 04 (C.MMC.13.04, C.MMC.14.04, Or C.MMC.16.04) Or higher required for N2 protocol functionality.



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 28 - 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 #.

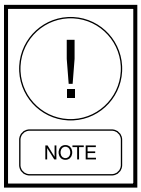
Analog Read Only Points

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 29 on page 171 for complete list of BACnet and Modbus registers.



The latest data map information is listed on the Quantech website.

Communications Data Map Notes:

(See *Table 29 on page 171*)

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, 1 = Analog Out, 2= Analog Value, 3= Binary In, 4 = Binary Output, 5= Binary Value, 8= Device, 15 = Alarm Notification (0 through 127 are reserved ASHRAE Objects).
3. WC= Inches of water column; CFM = Cubic Feet per Minute; FPM = Feet per Minute: PSI = Lbs per square inch; Pa = Pascals; kPa = Kilopascals; PPM = Part per Million; kJ/kg = Kilojoules per Kilogram.
4. Water Cooled Scroll units use the same firmware as Air Cooled Scroll units, ignoring Fan Control.

TABLE 29 - BACNET AND MODBUS COMMUNICATIONS DATA MAP

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				
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									
2	SP_REM_SP_S1	AV2	1027	03,06,16	Div 10	ADF 2	PSI	BAR	Sys 1 Remote Setpoint (SP Unit)	O									
3	LOAD_LIMIT	AV3	1028	03,06,16	Div 10	ADF 3	None	None	Load Limit Stage [0,1,2]	S									
4	REM_CR	AV4	1029	03,06,16	Div 10	ADF 4	°F	°C	Remote Cooling Range (DAT Unit)	O									
5	SP_REM_SP_S2	AV5	1030	03,06,16	Div 10	ADF 5	PSI	BAR	Sys 2 Remote Setpoint (SP Unit)	O									
6	REM_SP_HEAT	AV6	1031	03,06,16	Div 10	ADF 6	°F	°C	Remote Heating Setpoint (HP or YCWL HP)	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									
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									
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									
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									
ANALOG READ ONLY POINTS																			
11	LCHLT	AI1	514	03,04	x10	ADF 8	°F	°C	Leaving Chilled Liquid Temp	S									
12	RCHLT	AI2	515	03,04	x10	ADF 9	°F	°C	Entering Chilled Liquid Temp	S									
13	DAT	AI3	516	03,04	x10	ADF 10	°F	°C	Discharge Air Temp (DAT Unit)	O									
14	S1_SUCT_TEMP	AI4	517	03,04	x10	ADF 11	°F	°C	Sys 1 Suction Temp (EEV, Cond Units, R-410a)	O									
15	OAT	AI5	518	03,04	x10	ADF 12	°F	°C	Ambient Air Temp	S									
16	S1_SUCT_SH	AI6	519	03,04	x10	ADF 13	°F (diff)	°C (diff)	Sys 1 Suction Superheat (EEV)	S									
17	S1_RUN_TIME	AI7	520	03,04	x10	ADF 14	None	None	Sys 1 Run Time in seconds	S									
18	S1_SUCT_PR	AI8	521	03,04	**x10**	ADF 15	PSI	BAR	Sys 1 Suction Pressure	S									
19	S1_DSCH_PR	AI9	522	03,04	x10	ADF 16	PSI	BAR	Sys 1 Discharge Pressure	S									
20	S1_CIR_TEMP	AI10	523	03,04	x10	ADF 17	°F	°C	Sys 1 Cooler Inlet Refrigerant Temp (R-407c)	O									
21	S1_DEF_TEMP	AI11	524	03,04	x10	ADF 18	°F	°C	Sys 1 Defrost Temperature (HP)	O									
22	S1_EEV_OUT	AI12	525	03,04	x10	ADF 19	%	%	Sys 1 EEV Output % (EEV)	O									
23	S1_AR_TIMER	AI13	526	03,04	x10	ADF 20	None	None	Sys 1 Anti-Recycle Timer in seconds	S									
24	AC_TIMER	AI14	527	03,04	x10	ADF 21	None	None	Anti-Coincident Timer in seconds	S									
25	S2_SUCT_TEMP	AI15	528	03,04	x10	ADF 22	°F	°C	Sys 2 Suction Temperature (EEV)	S									
26	S2_RUN_TIME	AI16	529	03,04	x10	ADF 23	None	None	Sys 2 Run Time in seconds	S									
27	S2_SUCT_PR	AI17	530	03,04	**x10**	ADF 24	PSI	BAR	Sys 2 Suction Pressure	S									
28	S2_DSCH_PR	AI18	531	03,04	x10	ADF 25	PSI	BAR	Sys 2 Discharge Pressure	S									
29	S2_CIR_TEMP	AI19	532	03,04	x10	ADF 26	°F	°C	Sys 2 Cooler Inlet Refrigerant Temp (R-407c)	O									
30	S2_DEF_TEMP	AI20	533	03,04	x10	ADF 27	°F	°C	Sys 2 Defrost Temperature (HP)	O									
31	S2_SUCT_SH	AI21	534	03,04	x10	ADF 28	°F (diff)	°C (diff)	Sys 2 Suction Superheat	S									
32	S2_AR_TIMER	AI22	535	03,04	x10	ADF 29	None	None	Sys 2 Anti-Recycle Timer	S									
33	S2_EEV_OUT	AI23	536	03,04	x10	ADF 30	%	%	Sys 2 EEV Output % (EEV)	O									
34	NUM_COMPS	AI24	537	03,04	x1	ADF 31	None	None	Number of Compressors	S									

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									
36	S1_FLT_CODE	AI26	539	03,04	x1	ADF 33	None	None	Sys 1 Fault Code	S									
37	S2_OP_CODE	AI27	540	03,04	x1	ADF 34	None	None	Sys 2 Operational Code	S									
38	S2_FLT_CODE	AI28	541	03,04	x1	ADF 35	None	None	Sys 2 Fault Code	S									
39	S1_DBG_CODE	AI29	542	03,04	x1	ADF 36	None	None	Sys 1 Debug Code	N									
40	S1_FAN_STAGE	AI30	543	03,04	x1	ADF 37	None	None	Sys 1 Condenser Fan Stage	S									
41	S2_DBG_CODE	AI31	544	03,04	x1	ADF 38	None	None	Sys 2 Debug Code	N									
42	S2_FAN_STAGE	AI32	545	03,04	x1	ADF 39	None	None	Sys 2 Condenser Fan Stage	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									
44	AR_TIME	AI34	547	03,04	x1	ADF 41	None	None	Anti-Recycle Time Programmed	S									
45	LCHLT_CUT	AI35	548	03,04	x10	ADF 42	°F	°C	Leaving Chilled Liquid Temp Cutout	S									
46	LOW_AMB_CUT	AI36	549	03,04	x10	ADF 43	°F	°C	Low Ambient Temperature Cutout	S									
47	SUCT_P_CO_HT	AI37	550	03,04	**x10**	ADF 44	PSI	BAR	Low Suction Pressure Cutout Heating (HP)	O									
48	L_SUCT_P_CO	AI38	551	03,04	**x10**	ADF 45	PSI	BAR	Low Suction Pressure Cutout Cooling	S									
49	H_DSCH_P_CO	AI39	552	03,04	x10	ADF 46	PSI	BAR	High Discharge Pressure Cutout	S									
50	COOL_SETP	AI40	553	03,04	x10	ADF 47	°F	°C	Cooling Setpoint	S									
51	SP_SETP_S1	AI41	554	03,04	x10	ADF 48	PSI	BAR	Sys 1 Cooling Setpoint (SP Unit)	O									
52	CONTROL_RG	AI42	555	03,04	x10	ADF 49	°F	°C	Cooling Range	S									
53	SP_CTL_RG_S1	AI43	556	03,04	x10	ADF 50	PSI	BAR	Sys 1 Cooling Range (SP Unit)	O									
54	SP_SETP_S2	AI44	557	03,04	x10	ADF 51	PSI	BAR	Sys 2 Cooling Setpoint (SP Unit)	O									
55	HEAT_SETP	AI45	558	03,04	x10	ADF 52	°F	°C	Heating Setpoint (HP)	O									
56	SP_CTL_RG_S2	AI46	559	03,04	x10	ADF 53	PSI	BAR	Sys 2 Cooling Range (SP Unit)	O									
57	HEAT_RANGE	AI47	560	03,04	x10	ADF 54	°F	°C	Heating Range (HP)	O									
58	S1_DSCH_TEMP	AI48	561	03,04	x10	ADF 55	°F	°C	Sys 1 Discharge Temperature (EEV)	O									
59	S1_DSCH_SH	AI49	562	03,04	x10	ADF 56	°F (diff)	°C (diff)	Sys 1 Discharge Superheat (EEV)	O									
60	S2_DSCH_TEMP	AI50	563	03,04	x10	ADF 57	°F	°C	Sys 2 Discharge Temperature (EEV)	O									
61	S2_DSCH_SH	AI51	564	03,04	x10	ADF 58	°F (diff)	°C (diff)	Sys 2 Discharge Superheat (EEV)	O									
62	LEAVING_HOT	AI52	565	03,04	x10	ADF 59	°F	°C	Leaving Liquid Hot Temp (R-410a)	O									
63	RETURN_HOT	AI53	566	03,04	x10	ADF 60	°F	°C	Return Liquid Hot Temp (R-410a)	O									
64	R_COOL_SETP	AI54	567	03,04	x10	ADF 61	°F	°C	Remote Setpoint	S									
65	R_SP_SETP_S1	AI55	568	03,04	x10	ADF 62	PSI	BAR	Remote Setpoint 1 (SP Unit)	O									
66	R_SP_SETP_S2	AI56	569	03,04	x10	ADF 63	PSI	BAR	Remote Setpoint 2 (SP Unit)	O									
67	R_HEAT_SETP	AI57	570	03,04	x10	ADF 64	°F	°C	Remote Heating Setpoint (HP)	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									
69	S2_ALARM	BI2	1283	01,02,03	N/A	BD5	0/1	0/1	Sys 2 Alarm [0=No Alarm, 1=Alarm]	S									
70	EVAP_HTR	BI3	1284	01,02,03	N/A	BD6	0/1	0/1	Evaporator Heater Status	S									
71	EVAP_PUMP	BI4	1285	01,02,03	N/A	BD7	0/1	0/1	Evaporator Pump	S									
72	S1_C1_RUN	BI5	1286	01,02,03	N/A	BD8	0/1	0/1	Sys 1 Comp 1 Run	S									
73	S2_C1_RUN	BI6	1287	01,02,03	N/A	BD9	0/1	0/1	Sys 2 Comp 1 Run	S									
74	S1_LLSV	BI7	1288	01,02,03	N/A	BD10	0/1	0/1	Sys 1 Liquid Line Solenoid Valve	S									
75	S1_MODE_SV	BI8	1289	01,02,03	N/A	BD11	0/1	0/1	Sys 1 Mode Solenoid Valve (HP)	O									
76	S1_HGBV	BI9	1290	01,02,03	N/A	BD12	0/1	0/1	Sys 1 Hot Gas Bypass Valve	O									
77	S1_BHS	BI10	1291	01,02,03	N/A	BD13	0/1	0/1	Bivalent Heat Source (YLAE HP) Tray Heater (YLPA)	O									
78	S1_C2_RUN	BI11	1292	01,02,03	N/A	BD14	0/1	0/1	Sys 1 Comp 2 Run	S									
79	S2_C2_RUN	BI12	1293	01,02,03	N/A	BD15	0/1	0/1	Sys 2 Comp 2 Run	S									
80	S2_LLSV	BI13	1294	01,02,03	N/A	BD16	0/1	0/1	Sys 2 Liquid Line Solenoid Valve	S									
81	S2_MODE_SV	BI14	1295	01,02,03	N/A	BD17	0/1	0/1	Sys 2 Mode Solenoid Valve (HP)	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									
83	S1_C3_RUN	BI16	1297	01,02,03	N/A	BD19	0/1	0/1	Sys 1 Comp 3 Run	S									

TABLE 29 - 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									
85	CH_LIQ_TYPE	BI18	1299	01,02,03	N/A	BD21	0/1	0/1	Chilled Liquid Type [0=Water, 1=Glycol]	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									
87	CNTL_MODE	BI20	1301	01,02,03	N/A	BD23	0/1	0/1	Local Remote Control Mode [0=Manual, 1=Auto]	S									
88	DATA_UNIT	BI21	1302	01,02,03	N/A	BD24	0/1	0/1	Display Units [0=Imperial, 1=SI]	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									
90	S2_HGBV	BI23	1304	01,02,03	N/A	BD26	0/1	0/1	Sys 2 Hot Gas Bypass Valve	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	

TABLE 29 - 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	115 VAC Under Voltage
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		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	
32		32	
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	

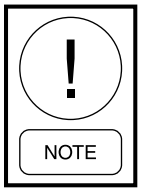
Yorktalk 2 Communications

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 30 on page 176 "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 30 on page 176 "Yorktalk 2 Communications Data Map" shows the data values and page listings for this unit.*



The latest point map information is listed on the Quantech website.

TABLE 30 - YORKTALK 2 COMMUNICATIONS DATA MAP

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.13.14, C.MMC.14.14, C.MMC.16.14	031-02755-001, -003	4800	Update
5				
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						
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						
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						
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						
P07	BV1	YT2_ S01_ P07	nviYTS01p007	SNVT_switch (95)	BD 1	0005	N/A	0/1	0/1	Start/Stop Command Sys 1 Start/Stop Command	S	S	S	S						
P08	BV2	YT2_ S01_ P08	nviYTS01p008	SNVT_switch (95)	BD 2	0006	N/A	0/1	0/1	Sys 2 Start/Stop Command	O	O	O	O						
P09	BV3	YT2_ S01_ P09	nviYTS01p009	SNVT_switch (95)	BD 3	0007					N	N	N	N						
P10	BV4	YT2_ S01_ P10	nviYTS01p010	SNVT_switch (95)	BD 4	0008	N/A	0/1	0/1	History Buffer Request	S	S	S	S						
P11	AV5	YT2_ S01_ P11	nvoYTS01p011	SNVT_count_f (51)	ADF 5	0009	x10	°F	°C	Leaving Chiller Liquid Temp	S	S	S	S						
P12	AV6	YT2_ S01_ P12	nvoYTS01p012	SNVT_count_f (51)	ADF 6	0010	x10	°F	°C	Entering Chilled Liquid Temp	S	S	S	S						
P13	AV7	YT2_ S01_ P13	nvoYTS01p013	SNVT_count_f (51)	ADF 7	0011	x10	°F	°C	Leaving Liquid Temp Hot (YCWL)	O	O	O	O						
P14	AV8	YT2_ S01_ P14	nvoYTS01p014	SNVT_count_f (51)	ADF 8	0012	x10	°F	°C	Discharge Air Temp (Cond Unit) Entering Liquid Temp Hot (YCWL)	O	O	O	O						
P15	AV9	YT2_ S01_ P15	nvoYTS01p015	SNVT_count_f (51)	ADF 9	0013	x10	°F	°C	Sys 1 Suction Temperature (EEV)	O	O	O	O						
P16	AV10	YT2_ S01_ P16	nvoYTS01p016	SNVT_count_f (51)	ADF 10	0014	x10	°F	°C	Ambient Air Temperature	S	S	S	S						
P17	AV11	YT2_ S01_ P17	nvoYTS01p017	SNVT_count_f (51)	ADF 11	0015	x10	°F (diff)	°C (diff)	Sys 1 Suction Superheat (EEV)	O	O	O	O						
P18	AV12	YT2_ S01_ P18	nvoYTS01p018	SNVT_count_f (51)	ADF 12	0016	x1	None	None	Sys 1 Run Time in seconds	S	S	S	S						
P19	AV13	YT2_ S01_ P19	nvoYTS01p019	SNVT_count_f (51)	ADF 13	0017	x10	PSI	BAR	Sys 1 Suction Pressure	S	S	S	S						
P20	AV14	YT2_ S01_ P20	nvoYTS01p020	SNVT_count_f (51)	ADF 14	0018	x10	PSI	BAR	Sys 1 Discharge Pressure	S	S	S	S						
P21	AV15	YT2_ S01_ P21	nvoYTS01p021	SNVT_count_f (51)	ADF 15	0019	x10	°F	°C	Sys 1 Suction Temperature (Cond Unit) Sys 1 Cooler Inlet Refrigerant Temp (R-407c)	O	O	O	O						
P22	AV16	YT2_ S01_ P22	nvoYTS01p022	SNVT_count_f (51)	ADF 16	0020	x10	°F	°C	Sys 1 Defrost Temperature (HP)	O	O	O	O						
P23	AV17	YT2_ S01_ P23	nvoYTS01p023	SNVT_count_f (51)	ADF 17	0021	x10	%	%	Sys 1 EEV Output % (EEV)	O	O	O	O						
P24	AV18	YT2_ S01_ P24	nvoYTS01p024	SNVT_count_f (51)	ADF 18	0022	x1	None	None	Sys 1 Anti-Recycle Timer in seconds	S	S	S	S						
P25	AV19	YT2_ S01_ P25	nvoYTS01p025	SNVT_count_f (51)	ADF 19	0023	x1	None	None	Anti-Coincident Timer in seconds	S	S	S	S						
P26	AV20	YT2_ S01_ P26	nvoYTS01p026	SNVT_count_f (51)	ADF 20	0024	x10	°F	°C	Sys 2 Suction Temperature (EEV)	O	O	O	O						

TABLE 30 - 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	0025	x1	None	None	Sys 2 Run Time in seconds	S	S	S	S						
P28	AV22	YT2_ S01_ P28	nvoYTS01p028	SNVT_count_f (51)	ADF 22	0026	x10	PSI	BAR	Sys 2 Suction Pressure	S	S	S	S						
P29	AV23	YT2_ S01_ P29	nvoYTS01p029	SNVT_count_f (51)	ADF 23	0027	x10	PSI	BAR	Sys 2 Discharge Pressure	S	S	S	S						
P30	AV24	YT2_ S01_ P30	nvoYTS01p030	SNVT_count_f (51)	ADF 24	0028	x10	°F	°C	Sys 2 Suction Temperature (Cond Unit) Sys 2 Cooler Inlet Refrigerant Temp (R-407c)	O	O	O	O						
P31	AV25	YT2_ S01_ P31	nvoYTS01p031	SNVT_count_f (51)	ADF 25	0029	x10	°F	°C	Sys 2 Defrost Temperature (HP)	O	O	O	O						
P32	AV26	YT2_ S01_ P32	nvoYTS01p032	SNVT_count_f (51)	ADF 26	0030	x10	°F (diff)	°C (diff)	Sys 2 Suction Superheat (EEV)	O	O	O	O						
P33	AV27	YT2_ S01_ P33	nvoYTS01p033	SNVT_count_f (51)	ADF 27	0031	x1	None	None	Sys 2 Anti-Recycle Timer in seconds	S	S	S	S						
P34	AV28	YT2_ S01_ P34	nvoYTS01p034	SNVT_count_f (51)	ADF 28	0032	x10	%	%	Sys 2 EEV Output % (EEV)	O	O	O	O						
P35	AV29	YT2_ S01_ P35	nvoYTS01p035	SNVT_count_f (51)	ADF 29	0033	x1	None	None	Number of Compressors	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						
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						
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						
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						
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						
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						
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						
P43	BV12	YT2_ S01_ P43	nvoYTS01p043	SNVT_switch (95)	BD 12	0072	N/A	0/1	0/1	Sys 1 Hot Gas Bypass Valve Bivalent Heat Source (YLAE HP) Tray Heater (YLPA HP)	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						
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						
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						
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						
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						
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						
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						
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						
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						
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						
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						
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						
P56	MV1	YT2_ S01_ P56	nvoYTS01p056	SNVT_count_f (51)	ADI 1	0030	x1	None	None	Sys 1 Operational Code	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						
P58	MV3	YT2_ S01_ P58	nvoYTS01p058	SNVT_count_f (51)	ADI 3	0032	x1	None	None	Sys 2 Operational Code	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						
P60	MV5	YT2_ S01_ P60	nvoYTS01p060	SNVT_count_f (51)	ADI 5	0034	x1	None	None	Sys 1 Debug Code	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						
P62	MV7	YT2_ S01_ P62	nvoYTS01p062	SNVT_count_f (51)	ADI 7	0036	x1	None	None	Sys 2 Debug Code	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						
P64	MV9	YT2_ S01_ P64	nvoYTS01p064	SNVT_count_f (51)	ADI 9	0038					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						
P66	AV30	YT2_ S01_ P66	nvoYTS01p066	SNVT_count_f (51)	ADF 30	0040	x1	None	None	Anti-Recycle Time Programmed	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						
P68	AV32	YT2_ S01_ P68	nvoYTS01p068	SNVT_count_f (51)	ADF 32	0042	x10	°F	°C	Low Ambient Temp Cutout	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						

TABLE 30 - 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						
P71	AV35	YT2_S01_P71	nvoYTS01p071	SNVT_count_f (51)	ADF 35	0045	x10	PSI	BAR	High Discharge Pressure Cutout	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						
P73	AV37	YT2_S01_P73	nvoYTS01p073	SNVT_count_f (51)	ADF 37	0047	x10	°F	°C	Cooling Range	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						
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						
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						
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						
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						
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						
P80	BV25	YT2_S01_P80	nvoYTS01p080	SNVT_switch (95)	BD 25	0085					N	N	N	N						
P81	BV26	YT2_S01_P81	nvoYTS01p081	SNVT_switch (95)	BD 26	0086					N	N	N	N						
P82	BV27	YT2_S01_P82	nvoYTS01p082	SNVT_switch (95)	BD 27	0087					N	N	N	N						
P83	BV28	YT2_S01_P83	nvoYTS01p083	SNVT_switch (95)	BD 28	0088					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						

TABLE 30 - YORKTALK 2 COMMUNICATIONS DATA MAP (CONT'D)

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						
P04	AV102	YT2_ S02_ P04	nviYTS02p004	SNVT_count_f (51)	ADF 45	0102					N	N	N	N						
P05	AV103	YT2_ S02_ P05	nviYTS02p005	SNVT_count_f (51)	ADF 46	0103					N	N	N	N						
P06	AV104	YT2_ S02_ P06	nviYTS02p006	SNVT_count_f (51)	ADF 47	0104					N	N	N	N						
P07	AV105	YT2_ S02_ P07	nviYTS02p007	SNVT_switch (95)	BD 30	0161					N	N	N	N						
P08	AV106	YT2_ S02_ P08	nviYTS02p008	SNVT_switch (95)	BD 31	0162					N	N	N	N						
P09	AV107	YT2_ S02_ P09	nviYTS02p009	SNVT_switch (95)	BD 32	0163					N	N	N	N						
P10	AV108	YT2_ S02_ P10	nviYTS02p010	SNVT_switch (95)	BD 33	0164					N	N	N	N						
P11	AV109	YT2_ S02_ P11	nvoYTS02p011	SNVT_count_f (51)	ADF 48	0105					N	N	N	N						
P12	AV110	YT2_ S02_ P12	nvoYTS02p012	SNVT_count_f (51)	ADF 49	0106					N	N	N	N						
P13	AV111	YT2_ S02_ P13	nvoYTS02p013	SNVT_count_f (51)	ADF 50	0107					N	N	N	N						
P14	AV112	YT2_ S02_ P14	nvoYTS02p014	SNVT_count_f (51)	ADF 51	0108					N	N	N	N						
P15	AV113	YT2_ S02_ P15	nvoYTS02p015	SNVT_count_f (51)	ADF 52	0109					N	N	N	N						
P16	AV114	YT2_ S02_ P16	nvoYTS02p016	SNVT_count_f (51)	ADF 53	0110					N	N	N	N						
P17	AV115	YT2_ S02_ P17	nvoYTS02p017	SNVT_count_f (51)	ADF 54	0111					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						
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						
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						
P21	AV119	YT2_ S02_ P21	nvoYTS02p021	SNVT_count_f (51)	ADF 58	0115					N	N	N	N						
P22	AV120	YT2_ S02_ P22	nvoYTS02p022	SNVT_count_f (51)	ADF 59	0116					N	N	N	N						
P23	AV121	YT2_ S02_ P23	nvoYTS02p023	SNVT_count_f (51)	ADF 60	0117					N	N	N	N						
P24	AV122	YT2_ S02_ P24	nvoYTS02p024	SNVT_count_f (51)	ADF 61	0118					N	N	N	N						
P25	AV123	YT2_ S02_ P25	nvoYTS02p025	SNVT_count_f (51)	ADF 62	0119					N	N	N	N						
P26	AV124	YT2_ S02_ P26	nvoYTS02p026	SNVT_count_f (51)	ADF 63	0120					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						
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						
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						
P30	AV128	YT2_ S02_ P30	nvoYTS02p030	SNVT_count_f (51)	ADF 67	0124					N	N	N	N						
P31	AV129	YT2_ S02_ P31	nvoYTS02p031	SNVT_count_f (51)	ADF 68	0125					N	N	N	N						
P32	AV130	YT2_ S02_ P32	nvoYTS02p032	SNVT_count_f (51)	ADF 69	0126					N	N	N	N						
P33	AV131	YT2_ S02_ P33	nvoYTS02p033	SNVT_count_f (51)	ADF 70	0127					N	N	N	N						
P34	AV132	YT2_ S02_ P34	nvoYTS02p034	SNVT_count_f (51)	ADF 71	0128					N	N	N	N						
P35	AV133	YT2_ S02_ P35	nvoYTS02p035	SNVT_count_f (51)	ADF 72	0129					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						
P37	BV106	YT2_ S02_ P37	nvoYTS02p037	SNVT_switch (95)	BD 35	0166					N	N	N	N						
P38	BV107	YT2_ S02_ P38	nvoYTS02p038	SNVT_switch (95)	BD 36	0167					N	N	N	N						
P39	BV108	YT2_ S02_ P39	nvoYTS02p039	SNVT_switch (95)	BD 37	0168					N	N	N	N						
P40	BV109	YT2_ S02_ P40	nvoYTS02p040	SNVT_switch (95)	BD 38	0169					N	N	N	N						
P41	BV110	YT2_ S02_ P41	nvoYTS02p041	SNVT_switch (95)	BD 39	0170					N	N	N	N						
P42	BV111	YT2_ S02_ P42	nvoYTS02p042	SNVT_switch (95)	BD 40	0171					N	N	N	N						
P43	BV112	YT2_ S02_ P43	nvoYTS02p043	SNVT_switch (95)	BD 41	0172					N	N	N	N						
P44	BV113	YT2_ S02_ P44	nvoYTS02p044	SNVT_switch (95)	BD 42	0173					N	N	N	N						
P45	BV114	YT2_ S02_ P45	nvoYTS02p045	SNVT_switch (95)	BD 43	0174					N	N	N	N						
P46	BV115	YT2_ S02_ P46	nvoYTS02p046	SNVT_switch (95)	BD 44	0175					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						

TABLE 30 - 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						
P49	BV118	YT2_ S02_ P49	nvoYTS02p049	SNVT_switch (95)	BD 47	0178					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						
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						
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						
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						
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						
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						
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]	N	S	S	S						
P57	MV102	YT2_ S02_ P57	nvoYTS02p057	SNVT_count_f (51)	ADI 26	0131					N	N	N	N						
P58	MV103	YT2_ S02_ P58	nvoYTS02p058	SNVT_count_f (51)	ADI 27	0132					N	N	N	N						
P59	MV104	YT2_ S02_ P59	nvoYTS02p059	SNVT_count_f (51)	ADI 28	0133					N	N	N	N						
P60	MV105	YT2_ S02_ P60	nvoYTS02p060	SNVT_count_f (51)	ADI 29	0134					N	N	N	N						
P61	MV106	YT2_ S02_ P61	nvoYTS02p061	SNVT_count_f (51)	ADI 30	0135					N	N	N	N						
P62	MV107	YT2_ S02_ P62	nvoYTS02p062	SNVT_count_f (51)	ADI 31	0136					N	N	N	N						
P63	MV108	YT2_ S02_ P63	nvoYTS02p063	SNVT_count_f (51)	ADI 32	0137					N	N	N	N						
P64	MV109	YT2_ S02_ P64	nvoYTS02p064	SNVT_count_f (51)	ADI 33	0138					N	N	N	N						
P65	MV110	YT2_ S02_ P65	nvoYTS02p065	SNVT_count_f (51)	ADI 34	0139					N	N	N	N						
P66	AV130	YT2_ S02_ P66	nvoYTS02p066	SNVT_count_f (51)	ADF 73	0140					N	N	N	N						
P67	AV131	YT2_ S02_ P67	nvoYTS02p067	SNVT_count_f (51)	ADF 74	0141					N	N	N	N						
P68	AV132	YT2_ S02_ P68	nvoYTS02p068	SNVT_count_f (51)	ADF 75	0142					N	N	N	N						
P69	AV133	YT2_ S02_ P69	nvoYTS02p069	SNVT_count_f (51)	ADF 76	0143					N	N	N	N						
P70	AV134	YT2_ S02_ P70	nvoYTS02p070	SNVT_count_f (51)	ADF 77	0144					N	N	N	N						
P71	AV135	YT2_ S02_ P71	nvoYTS02p071	SNVT_count_f (51)	ADF 78	0145					N	N	N	N						
P72	AV136	YT2_ S02_ P72	nvoYTS02p072	SNVT_count_f (51)	ADF 79	0146					N	N	N	N						
P73	AV137	YT2_ S02_ P73	nvoYTS02p073	SNVT_count_f (51)	ADF 80	0147					N	N	N	N						
P74	AV138	YT2_ S02_ P74	nvoYTS02p074	SNVT_count_f (51)	ADF 81	0148					N	N	N	N						
P75	AV139	YT2_ S02_ P75	nvoYTS02p075	SNVT_count_f (51)	ADF 82	0149					N	N	N	N						
P76	AV140	YT2_ S02_ P76	nvoYTS02p076	SNVT_count_f (51)	ADF 83	0150					N	N	N	N						
P77	AV141	YT2_ S02_ P77	nvoYTS02p077	SNVT_count_f (51)	ADF 84	0151					N	N	N	N						
P78	AV142	YT2_ S02_ P78	nvoYTS02p078	SNVT_count_f (51)	ADF 85	0152					N	N	N	N						
P79	AV143	YT2_ S02_ P79	nvoYTS02p079	SNVT_count_f (51)	ADF 86	0153					N	N	N	N						
P80	BV125	YT2_ S02_ P80	nvoYTS02p080	SNVT_switch (95)	BD 54	0185					N	N	N	N						
P81	BV126	YT2_ S02_ P81	nvoYTS02p081	SNVT_switch (95)	BD 55	0186					N	N	N	N						
P82	BV127	YT2_ S02_ P82	nvoYTS02p082	SNVT_switch (95)	BD 56	0187					N	N	N	N						
P83	BV128	YT2_ S02_ P83	nvoYTS02p083	SNVT_switch (95)	BD 57	0188					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						

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	
7	
8	
9	
10	

TABLE 30 - YORKTALK 2 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 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		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	
32		32	
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	

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

PSIG	TEMP °F	PSIG	TEMP °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 31 - 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

NOTES

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