

	AIR-COOLED SCREW CHILLER	
SERVICE	Supersedes: 150.76-M1 (1017)	Form 150.76-M1 (118)

035-26557-100

MODEL YSAA
AIR-COOLED SCREW CHILLERS
WITH MICROCHANNEL CONDENSER
STYLE A
(60 HZ)
65 - 135 TON
255 - 475 KW
(50 HZ)
55 - 115 TON
190 - 405 KW



R-134a



Issue Date:
January 31, 2018



IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

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

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

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

SAFETY SYMBOLS

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



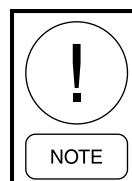
Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.



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



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



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



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

CHANGEABILITY OF THIS DOCUMENT

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

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

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

CHANGE BARS

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

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Long-Term Storage Requirements	50.20-NM1
Long-Term Storage Periodic Checklist and Logs	50.20-CL7

NOMENCLATURE

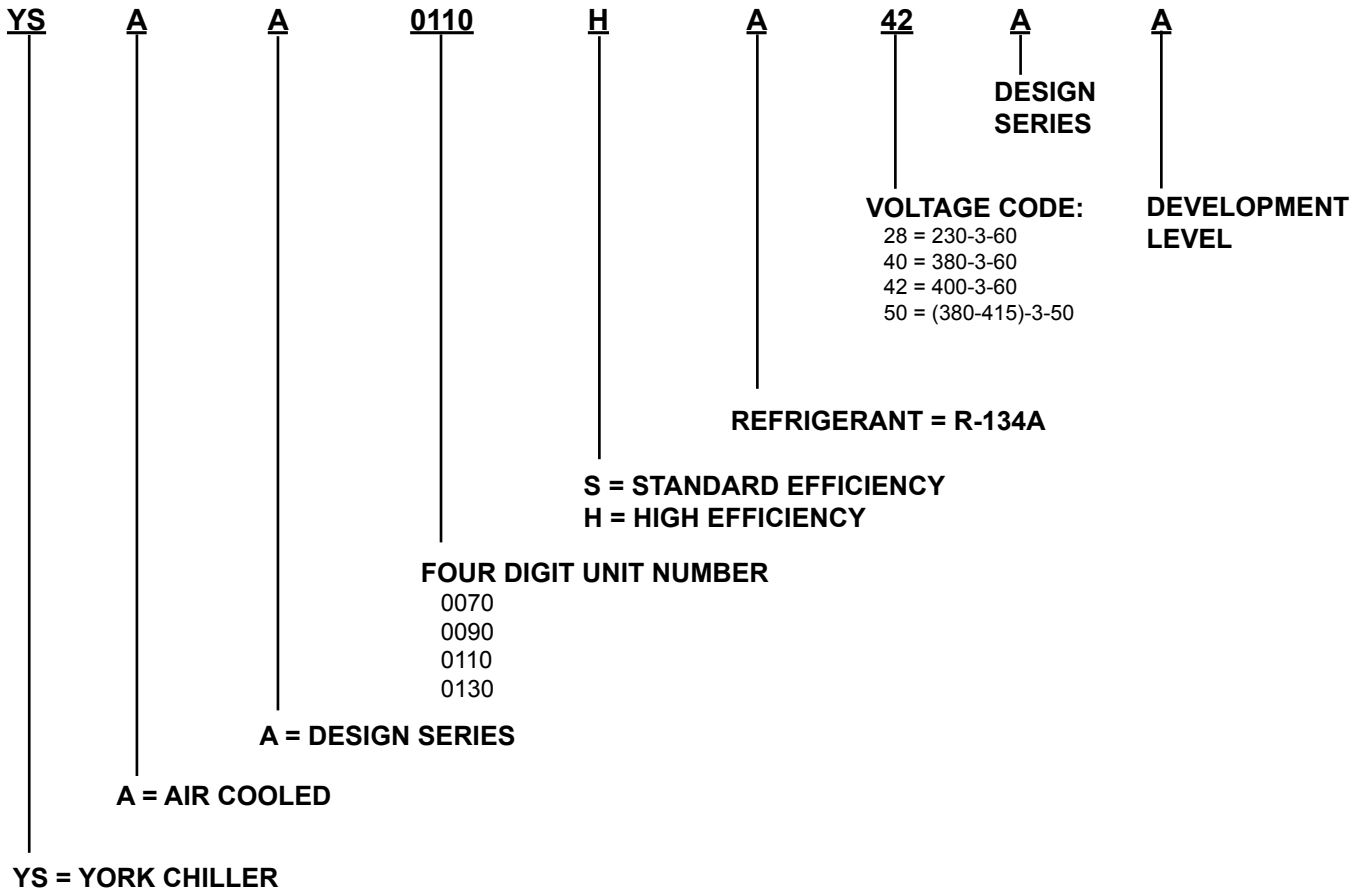


TABLE OF CONTENTS

SECTION 1 – GENERAL CHILLER INFORMATION AND SAFETY	11
Introduction.....	11
Warranty	11
Handling	11
Safety and Quality	11
About this Manual.....	12
Misuse of Equipment.....	12
AHRI Certification Program	13
 SECTION 2 – PRODUCT DESCRIPTION	 15
Introduction.....	15
General System Description.....	15
Lubrication Principle	17
Communications.....	20
Building Automation System Interface.....	20
Power Panel	21
Accessories and Options.....	21
Overview of Refrigerant Circuit	28
 SECTION 3 – HANDLING AND STORAGE	 29
Delivery and Storage	29
Inspection	29
Moving the Chiller.....	29
Lifting Using Lugs.....	30
Lifting Using Shackles	30
Lifting Weights	31
 SECTION 4 – INSTALLATION.....	 33
Installation Checklist.....	33
Startup/Commissioning	33
Location and Clearances.....	33
Spring Isolators (Optional).....	34
Compressor Mounting	34
Remote Cooler Option.....	34
Chilled Liquid Piping.....	34
Pipework Arrangement	35
Wiring	35
Relief Valves.....	36
High Pressure Cutout	36
Single-Point Supply Connection – Terminal Block, Non-Fused Disconnect Switch or Circuit Breaker	37

TABLE OF CONTENTS (CONT'D)

SECTION 5 – TECHNICAL DATA	41
Operational Limitations.....	41
Heat Exchanger Flow, GPM	41
Physical Data YSAA 60 Hz and 50 HZ.....	44
Electrical Data	45
Compressor Heaters	45
Electrical Notes	47
YSAA0070HA	75
YSAA0090HA	76
YSAA0110HA	77
YSAA0130HA	78
Weight Distribution and Isolator Mounting Positions	79
Clearances	81
Isolator Information.....	83
 SECTION 6 – COMMISSIONING.....	 89
Preparation – Power Off.....	89
Preparation – Power On.....	90
 SECTION 7 – UNIT CONTROLS	 95
Introduction.....	95
IPU II and I/O Boards	95
Transformer	96
Display.....	96
Keypad	96
Unit Switch	96
Battery Back-Up	96
Capacity Control.....	98
Compressor Start/Stop:.....	98
Slide Valve Control - Fuzzy Logic Control	99
Discharge and Suction Pressure Load Limiting	100
Status Key	102
Display/Print Keys	108
Entry Keys	117
Setpoints Keys	118
Schedule/Advance Day Key	119
Program Key	120
Unit Keys	125
BACNET, MODBUS, N2 Communications	129

TABLE OF CONTENTS (CONT'D)

SECTION 8 – UNIT OPERATION	137
Leaving Chilled Liquid Temperature Control.....	137
Fuzzy Logic Control.....	137
Capacity Control.....	137
System Lead/Lag	137
Loading and Unloading Logic.....	138
EEV Control.....	139
Anti-Recycle (AR) Timer.....	139
Anti-Coincidence Timer (Two System Units Only).....	139
Evaporator Pump Control and York Hydro Kit Pump Control	139
Evaporator Heater Control	139
Standard Condenser Fan Control	140
Load Limiting	142
Alarm Status.....	142
Remote BAS/EMS Temperature Reset Using a Voltage or Current Signal	143
 SECTION 9 – SERVICE AND TROUBLESHOOTING.....	 145
Clearing History Buffers.....	145
Service Mode	145
Service Mode – Outputs.....	145
Service Mode – Chiller Configuration.....	146
Service Mode – Analog and Digital Inputs.....	146
Control Inputs/Outputs	147
Checking Inputs and Outputs	149
Optional Printer Installation	152
EEV and Controller.....	153
EEV Valve and Wiring	153
EEVC Controller Setup.....	156
Tightening Torque List	157
Troubleshooting.....	162
 SECTION 10 – MAINTENANCE	 165
Compressors	165
Condenser Fan Motors.....	165
Condenser MCHX Cleaning	165
Operating Parameters	166
On-Board Battery Back-Up.....	166
Braze Plate Heat Exchanger (Evaporator) Heater	166
Overall Unit Inspection	166
Temperature	169

LIST OF FIGURES

FIGURE 1 - YSAA Air Cooled Screw Chiller.....	15
FIGURE 2 - GA Compressor Components.....	16
FIGURE 3 - Oil Flow.....	18
FIGURE 4 - Unit Components (Front).....	22
FIGURE 5 - Power Panel / Control Components	23
FIGURE 6 - Power Panel / Control Components (Optional).....	24
FIGURE 7 - Unit Control System.....	25
FIGURE 8 - Process and Instrumentation Diagram	28
FIGURE 9 - Unit Rigging/Lifting	29
FIGURE 10 - Warning	31
FIGURE 11 - Chilled Liquid System	35
FIGURE 12 - Single-Point Supply Connection – Terminal Block, Non-Fused Disconnect Switch or Circuit Breaker	37
FIGURE 13 - Control Wiring Inputs	38
FIGURE 14 - Control Wiring Outputs	39
FIGURE 15 - Pressure Drop Curve (English and Metric).....	42
FIGURE 16 - Elementary Wiring Diagram	50
FIGURE 17 - Power Elementary Wiring Diagram (3 - Contactor Fan Control).....	52
FIGURE 18 - EEV Controller	54
FIGURE 19 - Power Elementary Wiring Diagram (4 - Contactor Fan Control).....	56
FIGURE 20 - Power Panel Connection Wiring Diagram (3 - Contactor Fan Control)	58
FIGURE 21 - Power Panel Connection Wiring Diagram (4 - Contactor Fan Control)	60
FIGURE 22 - Elementary Wiring Diagram - Soft Starter	62
FIGURE 23 - Power Elementary Wiring Diagram - Soft Starter (3 - Contactor Fan Control)	64
FIGURE 24 - Power Elementary Wiring Diagram - Soft Starter (4 - Contactor Fan Control)	66
FIGURE 25 - Power Panel Connection Wiring Diagram - Soft Starter (3 - Contactor Fan Control).....	68
FIGURE 26 - Power Panel Connection Wiring Diagram - Soft Starter (4 - Contactor Fan Control).....	70
FIGURE 27 - Micro Panel Connection Wiring Diagram	72
FIGURE 28 - Low Ambient Wiring Diagram	74
FIGURE 29 - Unit Dimensions YSAA0070HA	75
FIGURE 30 - Unit Dimensions YSAA0090HA	76
FIGURE 31 - Unit Dimensions YSAA0110HA	77
FIGURE 32 - Unit Dimensions YSAA0130HA	78
FIGURE 33 - Isolator Locations - Four Fan.....	79
FIGURE 34 - Isolator Locations - Six Fan	80
FIGURE 35 - Isolator Locations - Eight Fan	80
FIGURE 36 - Unit Clearances – All Models.....	81
FIGURE 37 - Capacity Control Solenoid Valves.....	97
FIGURE 38 - Capacity Modulation Implementation.....	97
FIGURE 39 - Capacity Control Logic Flow	98
FIGURE 40 - Leaving Chilled Liquid Temperature Control.....	99
FIGURE 41 - Loading Control Logic.....	100
FIGURE 42 - Unloading Control Logic	101
FIGURE 43 - Status Key Messages Quick Reference List.....	107
FIGURE 44 - Operation Data	111
FIGURE 45 - Setpoints Quick Reference List	124

LIST OF FIGURES (CONT'D)

FIGURE 46 - Unit Keys Options Programming Quick Reference List.....	128
FIGURE 47 - Micro Panel Connections.....	130
FIGURE 48 - Condenser Fan Locations.....	140
FIGURE 49 - Discharge Pressure Load Limiting.....	142
FIGURE 50 - Suction Pressure Load Limiting.....	142
FIGURE 51 - Microboard Layout.....	148
FIGURE 52 - Printer to Microboard Electrical Connections.....	152
FIGURE 53 - Electronic Expansion Valve (EEV).....	153
FIGURE 54 - Wiring of EEV control.....	154
FIGURE 55 - EEVC Controller Setup.....	156
FIGURE 56 - Torque Values.....	157
FIGURE 57 - Suction Stainer and Oil Strainer.....	158

LIST OF TABLES

TABLE 1 - Canadian Registration Numbers	19
TABLE 2 - Complete Pin Number Description	26
TABLE 3 - Temperatures and Flows	41
TABLE 4 - Ethylene and Propylene Glycol Correction Factors	43
TABLE 5 - Physical Data (English) 60 Hz and 50 HZ	44
TABLE 6 - Voltage Range	45
TABLE 7 - Unit Electrical Data	45
TABLE 8 - Transformer Load	46
TABLE 9 - Fan Wiring Lugs	46
TABLE 10 - Capacity Control	97
TABLE 11 - YSAA Data Logging	112
TABLE 12 - Cooling Setpoint, Programmable Limits and Defaults	120
TABLE 13 - Program Key Limits and Default	122
TABLE 14 - Minimum, Maximum and Default Values	130
TABLE 15 - Values Required for BAS Communication	131
TABLE 16 - Real Time Error Numbers	132
TABLE 17 - Bacnet and Modbus Communications Data Map	133
TABLE 18 - YSAA Standard Condenser Fan Control Using Discharge Pressure Only (2, 3, or 4 Fans Per System)	141
TABLE 19 - I/O Analog Inputs	147
TABLE 20 - I/O Analog Outputs	147
TABLE 21 - I/O Digital Inputs	147
TABLE 22 - I/O Digital Outputs	147
TABLE 23 - Outdoor Air Sensor Temperature/Voltage/Correlation	149
TABLE 24 - Entering/Leaving Chilled Liquid Temp. Sensor, Temperature/Voltage Correlation	150
TABLE 25 - Pressure Transducers	151
TABLE 26 - Torque Values	157
TABLE 27 - Troubleshooting	162
TABLE 28 - Overall Unit Inspection	166
TABLE 29 - R-134a Saturation Temperatures as a Function of Saturation Pressures	168
TABLE 30 - SI Metric Conversion	169

SECTION 1 – GENERAL CHILLER INFORMATION AND SAFETY

INTRODUCTION

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

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

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

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

WARRANTY

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

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

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

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

For warranty purposes, the following conditions must be satisfied:

- The initial start of the unit must be carried out by trained personnel from an Authorized Johnson Controls Service Center (*see SECTION 6 – COMMISSIONING*).
- Only genuine YORK approved spare parts, oils, coolants, and refrigerants must be used.
- All the scheduled maintenance operations detailed in this manual must be performed at the specified times by suitably trained and qualified personnel (*see SECTION 10 – MAINTENANCE*).
- Failure to satisfy any of these conditions will automatically void the warranty (*see Warranty on this page*).

HANDLING

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

SAFETY AND QUALITY

Standards for Safety and Quality

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

- ANSI/ASHRAE Standard 15 - Safety Code for Mechanical Refrigeration.
- ANSI/NFPA Standard 70 - National Electrical Code (N.E.C.).
- ASME Boiler and Pressure Vessel Code - Section VIII Division 1.
- ARI Standard 550/590 - Positive Displacement Compressors and Air Cooled Rotary Screw Water Chilling Packages.
- ASHRAE 90.1 - Energy Efficiency compliance.

- Conform to Intertek Testing Services, formerly ETL, for construction of chillers and provide ETL/cETL listing label.
- Manufactured in facility registered to ISO 9002.
- OSHA – Occupational Safety and Health Act.

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

Responsibility for Safety

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

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

ABOUT THIS MANUAL

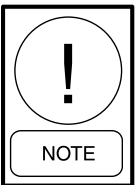
The following terms are used in this document to alert the reader to areas of potential hazard.



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



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



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

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

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

MISUSE OF EQUIPMENT

Suitability for Application

The unit is intended for cooling water 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, pipe work 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 duct work 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 120VAC electrical supply from the unit controller, thus shutting down the unit.

AHRI CERTIFICATION PROGRAM

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



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

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SECTION 2 – PRODUCT DESCRIPTION

INTRODUCTION

YORK YSAA Air-Cooled Screw Chillers provide chilled water for all air conditioning applications using central station air handling or terminal units. They are completely self-contained and are designed for outdoor (roof or ground level) installation. Each complete packaged unit includes hermetic screw compressors, a Braze Plate Heat Exchanger (BPHX) Evaporator, air cooled condenser, a charge of Refrigerant R-134a and a weather resistant microprocessor control center, all mounted on a rugged steel base.

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

Prior to delivery, the packaged unit is pressure-tested, evacuated, and fully charged with Refrigerant R-134a and oil. After assembly, a complete operational test is performed with water flowing through the cooler to assure that the refrigeration circuit operates correctly.

The unit structure is heavy-gauge, galvanized steel. This galvanized steel is coated with baked-on powder paint, which, when subjected to ASTM B117 1000 hour, salt spray testing, yields a minimum ASTM 1654 rating of “6”. Units are designed in accordance with NFPA 70 (National Electric Code), ASHRAE/ANSI 15

Safety code for mechanical refrigeration, ASME, and rated in accordance with ARI Standard 550/590.

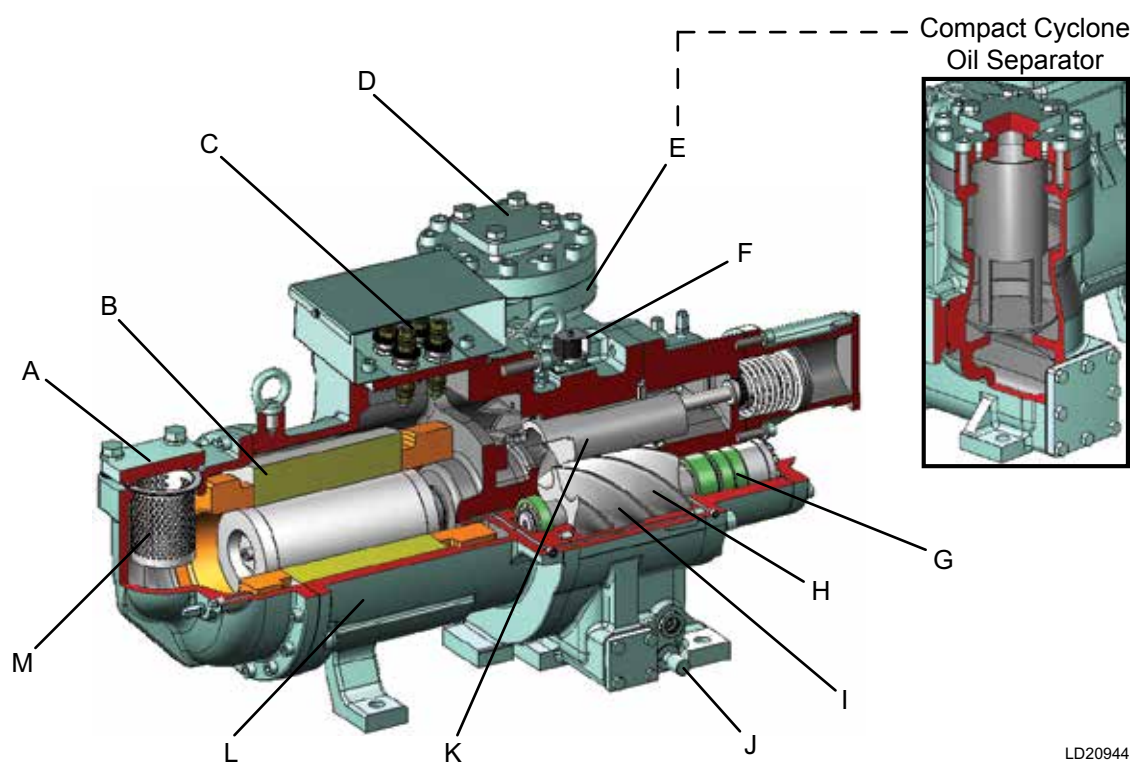
GENERAL SYSTEM DESCRIPTION

Overview of JCH GA Compressor

JCH GA series compressor contains 4 models per the size of motor, they are 30hp; 40hp; 50hp and 60hp. GA compressors are a hermetic fixed speed compressor with slide valves for capacity modulation. The 2-pole-motor is cooled by suction gas. An integrated centrifugal oil separator makes the compressor very compact. An oil sump is designed at the bottom of the oil separator. An oil heater drives the refrigerant away from the oil. There is no oil level switch designed for an oil level alarm, this can help prevent redundant trips by combining the good oil return from system. An oil sight glass monitors the oil level, 30 seconds is the maximum amount of time that there can be no oil in the oil sight glass while starting the compressor or under other unstable conditions. There is a high winding temperature thermostat to sense the temperature of motor winding. Once the winding temperature rises to 230°F (110°C), the thermostat opens and the compressor stops immediately. Refer to *Figure 2 on page 16*.



FIGURE 1 - YSAA AIR COOLED SCREW CHILLER



LD20944

A	Gas Inlet	H	Lubrite (Parkerizing)
B	2 Pole Motor (ø250x235L)	I	Screw Rotors
C	Power Bolt	J	Oil Heater
D	Gas Outlet	K	Capacity Control Slide Valve Type Infinite Control (25 100%)
E	Compact Cyclone Oil Separator	L	Cast Iron Housing
F	Solenoid Valve	M	Gas Strainer
G	Bearing		

FIGURE 2 - GA COMPRESSOR COMPONENTS

LUBRICATION PRINCIPLE

The refrigerant oil system which is used to lubricate each part is shown in *Figure 3 on page 18*.

Screw compressors use a lubrication system in which refrigerant oil accumulates in the oil sump on the high-pressure side, while oil is supplied to a sliding part using the pressure difference between the high-pressure and low-pressure sides in the screw compressor. Therefore, unlike a reciprocating compressor, no oil pump is required. After the refrigerant oil is collected in the main casing oil sump, it passes through an oil strainer and is supplied to the following three systems:

1. Oil supply to discharge side bearings.

Refrigerant oil supplied to the discharge side bearings of the male and female rotor lubricates the bearing and is suctioned in by the screw rotor.

The oil lubricates the screw rotors and is discharged with the refrigerant gas. The oil is then separated by the cyclone oil separator and collected in the main casing oil sump again.

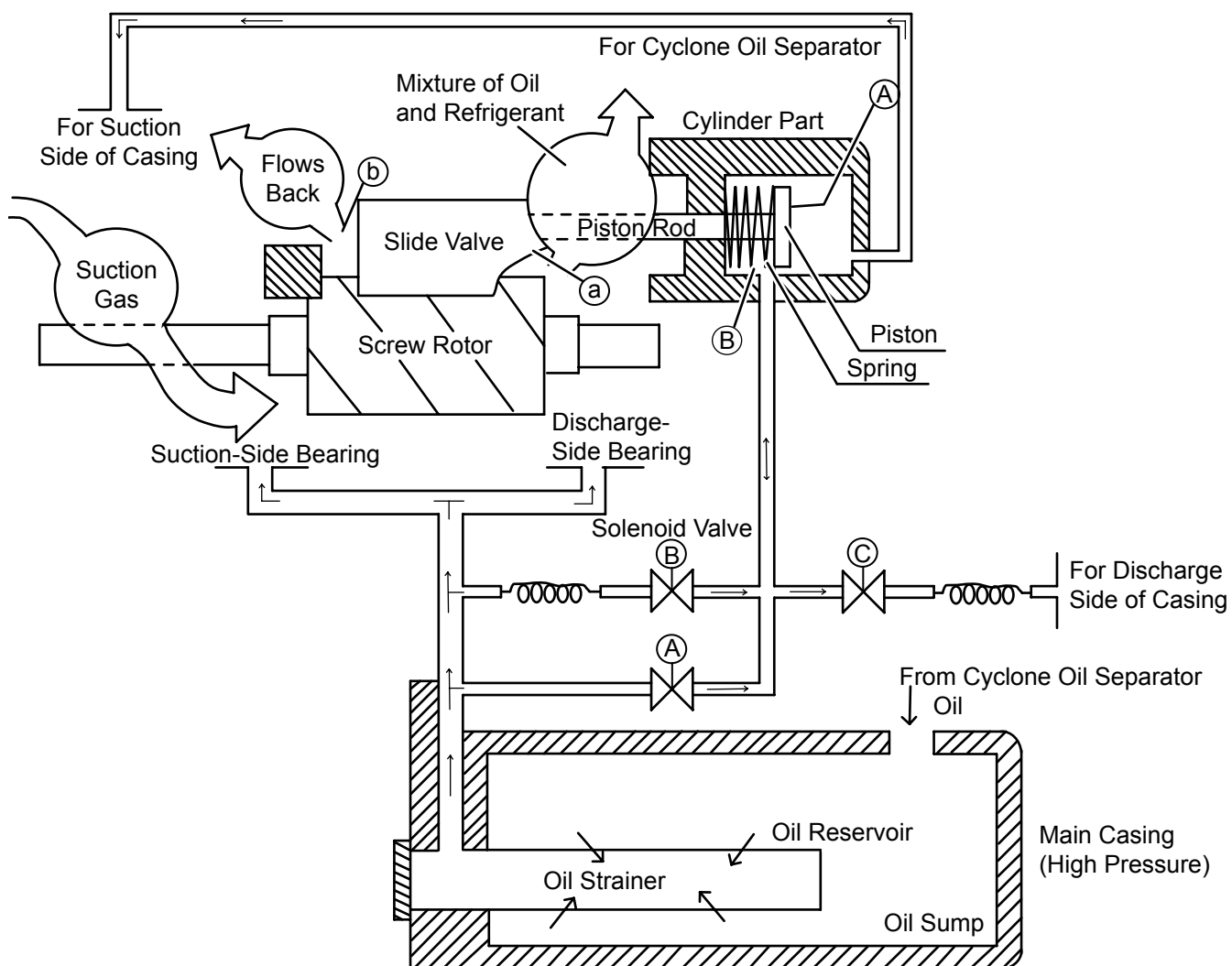
2. Oil supply to suction side bearings.

Refrigerant oil supplied to the suction side bearings of the male and female rotor lubricates the bearings and is suctioned in the rotor with the refrigerant oil circulating in the refrigeration cycle.

The oil lubricates the screw rotors and is discharged with the refrigerant gas. The oil is then separated by the cyclone oil separator and collected in the main casing oil sump again.

3. Oil supply to capacity control mechanism.

After oil is supplied through the capillary tube to the cylinder part and drives the piston, drained oil is returned to the suction side. Here it is suctioned in by the screw rotors and subsequently collected in the main casing oil sump again in the same way as in item (1) and (2) above.



LD21995

FIGURE 3 - OIL FLOW

Brazed Plate Evaporator

The compact, high efficiency Brazed Plate Heat Exchanger (BPHX) is constructed with 316L stainless steel corrugated channel plates with a filler material between each plate. It offers excellent heat transfer performance with a compact size and low weight, reducing structural steel requirements on the job site.

The heat exchanger is manufactured in a precisely controlled vacuum-brazing process that allows the filler material to form a brazed joint at every contact point between the plates, creating complex channels. The arrangement is similar to older plate and frame technology, but without gaskets and frame parts.

Water inlet and outlet connections are grooved for compatibility with field supplied ANSI/AWWA C-606 couplings.

The evaporator is equipped with a thermostat controlled heater. The heater provides freeze protection for the evaporator down to -20°F (-29°C) ambient. The evaporator is covered with 3/4" flexible, closed-cell, foam insulation (K=0.25). Optionally the customers can choose double thick insulation for better energy saving.

A 1/16" (1.6mm) mesh wye-strainer is provided as standard for installation upstream of the heat exchanger to prevent clogging from water system debris.

Canadian Registration Number (CRN) Application & Proof of Conformance

Since all YSAA brazed plate evaporators are categorized as pressure "H" fittings per CSA-B51, a CRN label or marking is not provided on the evaporator. According to the Canadian Standards Association's Boiler, Pressure Vessel, and Pressure Piping Code B-51 (2009 version), a product registered as a category "H" fitting does not require a label or marking displaying the CRN.

TABLE 1 - CANADIAN REGISTRATION NUMBERS

CANADIAN PROVINCE	CRN #
BC	0H2649.71
AB	N/A*
SK	0H2649.73
MB	0H2649.74
ON	0H2649.75
PQ	0H2649.76
NB	0H2649.77
NS	0H2649.78
PEI	0H2649.79
NF	0H2649.70
NU	0H2649.7N
NWT	0H2649.7T
YU	0H2649.7Y

Condenser

Microchannel Condenser (MCHX)

MCHX Condensers are made of a single material to avoid galvanic corrosion due to dissimilar metals. MCHX and headers are brazed as one piece. Integral sub cooling is included. The design working pressure of the MCHX is 375 PSIG (25.9 barg). MCHX Condenser is easily washable with clear water.

Fans

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

Motors

The fan motors are Totally Enclosed Air-Over, and are current protected. They feature ball bearings that are double sealed and permanently lubricated.

Control Center

All controls are contained in a NEMA 3/3R cabinet with hinged outer door and includes a Liquid Crystal Display with Light Emitting Diode backlighting for outdoor viewing:

- Two display lines
- Twenty characters per line

Display/Print Keys

- Color coded 12-button non-tactile keypad with sections for display and print of typical information:
- Chilled liquid temperatures
- Ambient temperature
- System pressures (each circuit)
- Operating hours and starts (each compressor)
- Print calls up to the liquid crystal display
- Operating data for the systems
- History of fault shutdown data for up to the last nine fault shutdown conditions.
- An RS-232 port, in conjunction with this press-to-print button, is provided to permit the capability of hard copy print-outs via a separate printer (by others).

Entry Keys

This section is used to enter setpoints or modify system values.

Setpoints Keys

Updating can be performed to:

- Chilled liquid temperature setpoint and range
- Remote reset temperature range
- Set daily schedule/holiday for start/stop
- Manual override for servicing
- Low and high ambient cutout
- Evaporator Temperature Cutout
- Low liquid temperature cutout
- Low suction pressure cutout
- High discharge pressure cutout
- System Superheat Cutout
- Anti-recycle timer (compressor start cycle time)
- Load/Unload Timer
- Load/Unload Pulse Gain
- Load/Unload Timer Gain
- Discharge Fan Control On Pressure
- Discharge Fan Differential Off Pressure
- Each system EEV opening
- 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
- Status of evaporator heater
- Fan operation
- Run permissive status
- Load and unload timer status
- Water pump status

Provisions are included for: optional remote chilled water temperature reset and two steps of demand load limiting from an external building automation system. Unit alarm contacts are standard.

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

Unit Keys

This section is used to:

- Set time
- Set unit options

Oper Data Key

The microprocessor control center is capable of displaying the following:

- Return and leaving liquid temperature
- Outdoor air temperature
- Each system suction pressure
- Each system saturated suction temp and Suction Sheat
- Each system Discharge pressure
- Each system saturated discharge temp and Disch Sheat

COMMUNICATIONS

- Native communication capability for BACnet (MS/TP), Modbus and N2.

BUILDING AUTOMATION SYSTEM INTERFACE

The Microprocessor Board can accept a 4 to 20 milliamp, or 0 to 10VDC input to reset the leaving chiller liquid temperature from a Building Automation System.

- The standard unit capabilities include remote start-stop, remote water temperature reset via a PWM 4 to 20 milliamp or 0 to 10VDC input signal or up to two stages of demand (load) limiting depending on model.
- The standard control panel can be directly connected to a Johnson Controls Building Automated System.

POWER PANEL

Each panel contains:

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

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

ACCESSORIES AND OPTIONS

Power Options

Compressor Power Connections

Single-point terminal block connection(s) are provided as standard. The following power connections are available as options. (See electrical data for specific voltage and options availability.) **(Factory-mounted)**

Single-Point Supply Terminal Block

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

Single-Point Circuit Breaker

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

Control Transformer

Converts unit power voltage to 115-1-60 (2.0 KVA capacity). Factory mounting includes primary and secondary wiring between the transformer and the control panel. **(Factory-mounted)**

Control Options

High Ambient Kit With Sunshield

Allows units to operate when the ambient temperature is above 115°F (46°C). This option includes sun shield panels only but need to combine the standard discharge pressure transducers and control to accomplish the function of high ambient application.

Language LCD and Keypad Display

Spanish, French, German, and Italian unit LCD controls and keypad display available. Standard language is English.

Compressor, Piping, Evaporator Options

Service Suction Isolation Valve

Service suction (ball-type) isolation valves are added to unit per system (discharge service ball-type isolation valve is standard on each circuit). **(Factory-Mounted)**

A evaporator relief valve will be added to the suction isolation valve if this option is chosen to prevent evaporator tolerate excessive pressure in some cases.

Flow Switch

A thermal dispersion type flow switch provides accurate, low maintenance flow proving and is included standard. It is factory wired and installed in the extension pipe between evaporator outlet and edge of chiller. The extension pipe is secured to the chiller frame for shipping to avoid risk of damage to evaporator and is easily attached to the evaporator at startup using the supplied ANSI/AWWA C-606 connector. The flow switch can be deleted if alternate or existing flow switch is field supplied.

Condenser and Cabinet Options

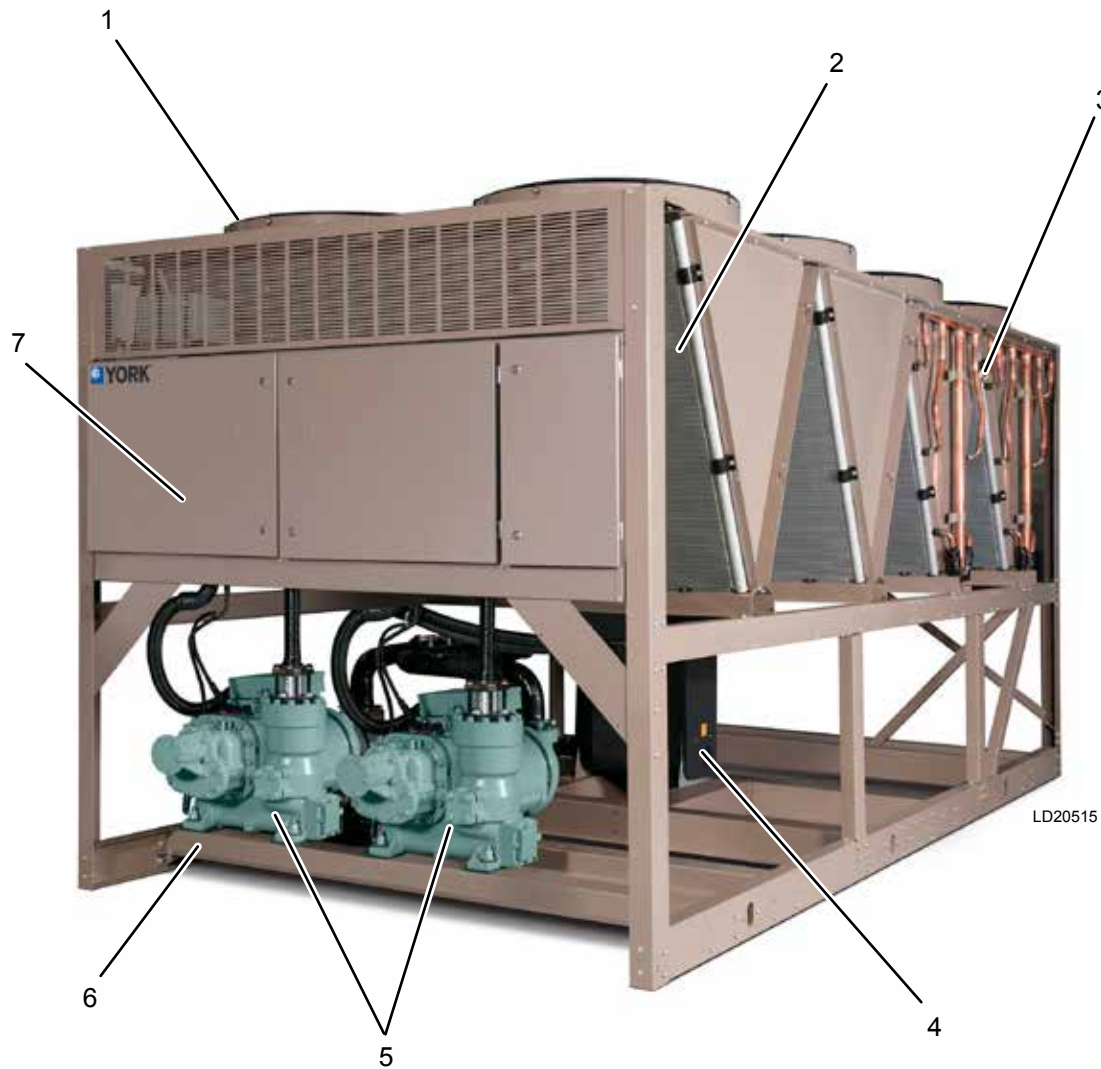
MCHX Condenser protection against corrosive environments is available by choosing any of the following options. For additional application recommendations, refer to FORM 150.12-ES1. **(Factory-Mounted)**

Post-Coated Dipped MCHX Condenser

The unit MCHX is constructed with post dipped-epoxy MCHX condenser. This is recommended for seashore and other corrosive applications (with the exception of strong alkalies, oxidizers and wet bromine, chlorine and fluorine in concentrations greater than 100 ppm).

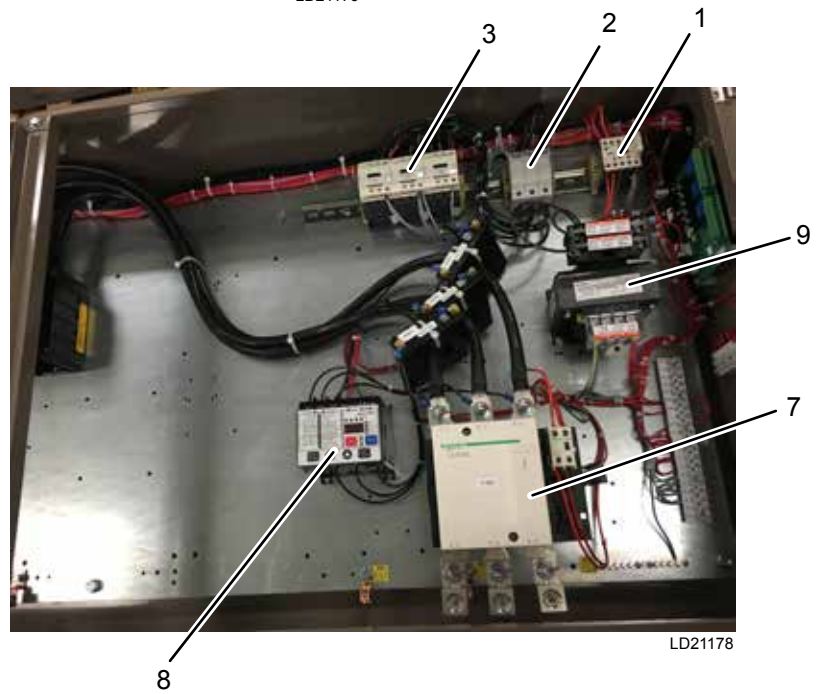
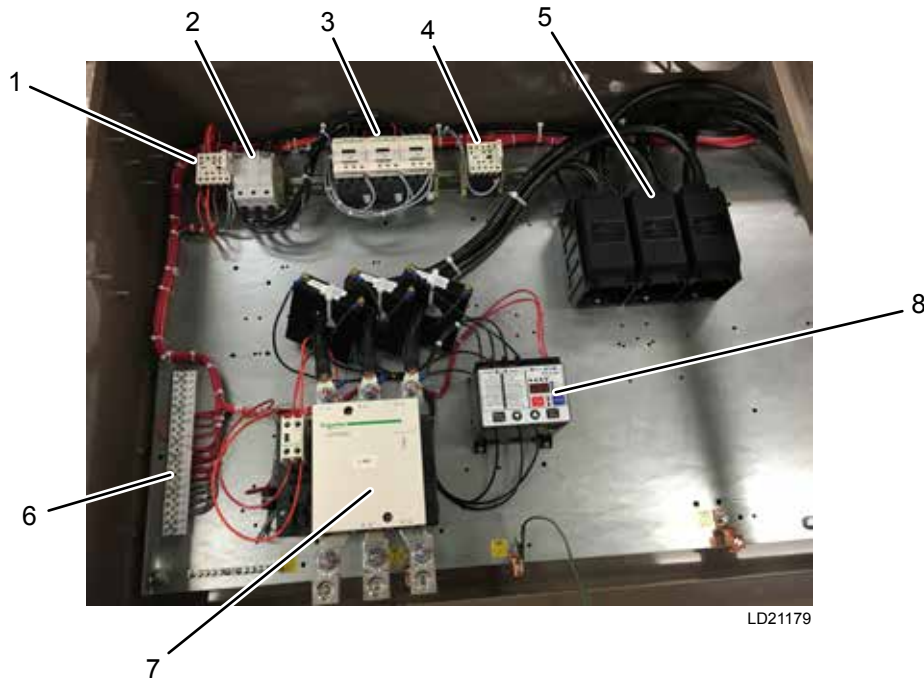
Vibration Isolators

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



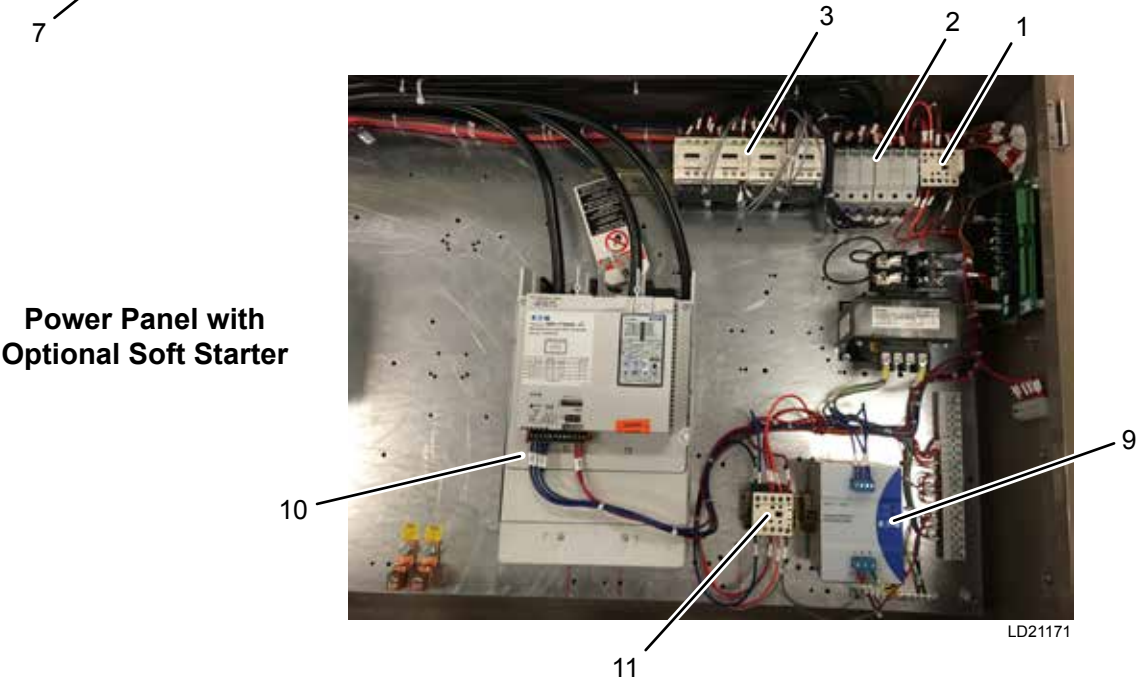
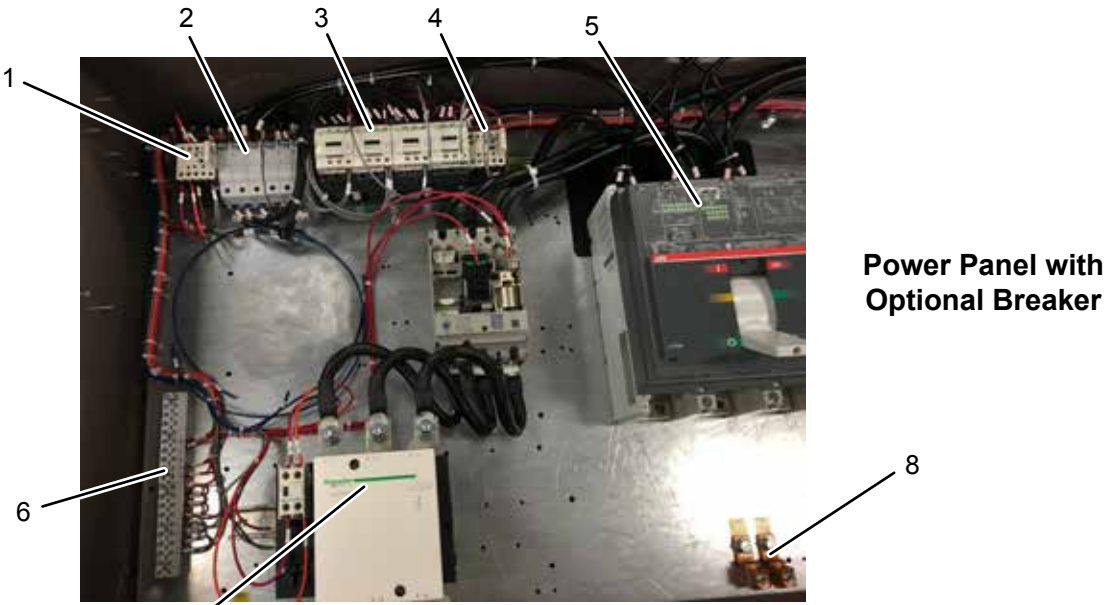
ITEM	DESCRIPTION
1	Fan Deck
2	Microchannel Coils
3	Coil Headers
4	Brazed Plate Evaporator
5	Compressors
6	Formed Steel Base Rails
7	Control and Power Panels

FIGURE 4 - UNIT COMPONENTS (FRONT)



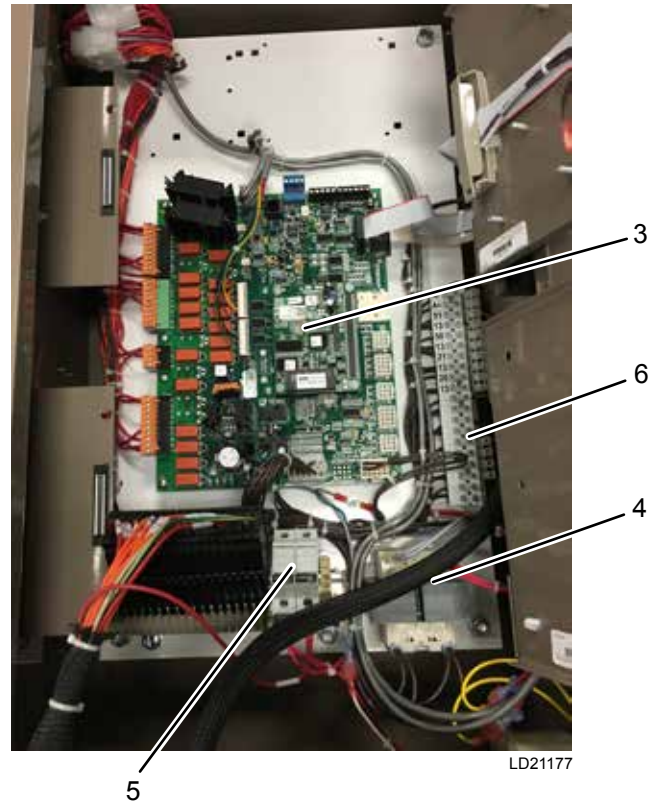
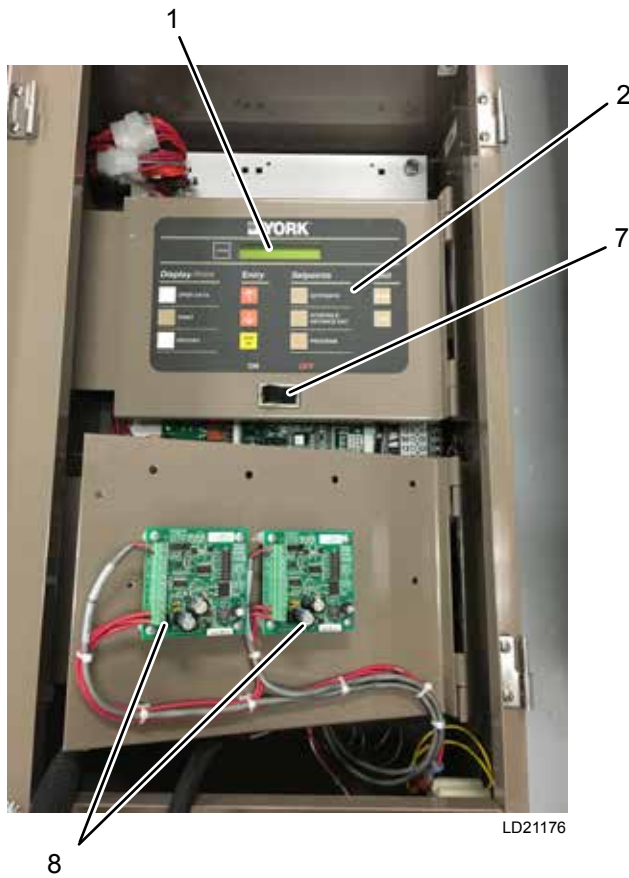
ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Control Relay for Alarm	6	XTBF1
2	Fan Fuses	7	Compressor Contactors
3	Fan Contactor	8	Compressor Overloads
4	Evaporator Heater Contactor	9	Transformer 230V/300VA
5	Terminal Block		

FIGURE 5 - POWER PANEL / CONTROL COMPONENTS



ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Control Relay for Alarm	7	Compressor Contactors
2	Fan Fuses	8	Ground Lug
3	Fan Contactor	9	24 VDC Power Supply
4	Evaporator Heater Contactor	10	Soft Starter
5	Disconnect Switch	11	Soft Starter Relay
6	XTBF1		

FIGURE 6 - POWER PANEL / CONTROL COMPONENTS (OPTIONAL)



ITEM	DESCRIPTION
1	Display
2	Keypad
3	Microboard
4	Control Transformer
5	Fuses
6	Terminal Block
7	On/Off Switch
8	EEV Drive

FIGURE 7 - UNIT CONTROL SYSTEM

TABLE 2 - COMPLETE PIN NUMBER DESCRIPTION

FEATURE	FEATURE DESCRIPTION	OPTION	OPTION DESCRIPTION
MODEL	Model (PIN 1-4)		YSAA
CAP	Capacity (PIN 5-8)	0110	0110
UNIT	Unit Designator (PIN 9)	H	High Efficiency
REF	Refrigerant (PIN 10)	A	R-134a
VOLTS	Voltage (PIN 11 & 12)	28	230/3/60
		40	380/3/60
		42	400/3/60
		50	380-415/3/50
STARTER	Starter (PIN 13)	X	Across the Line starter
		T	Soft Start
DESIGN	Design Series (PIN 14)	A	Design Series A (MicroChannel)
DEV	Development Level (PIN 15)	A	Development Level A
POWER	Power Field (PIN 16 & 17)	SX	SP Supply TB
		BX	SP Circuit Breaker w/ Lockable Handle
		QQ	Special Quote
TRANS	Cntrl Transformer (PIN 18)	T	Control Transformer Required
		Q	Special Quote
PFC	Power Factor Capacitor (19)	X	No Option
		Q	Special Quote
AMB	Ambient Kits (PIN 20)	H	High Ambient Kit Standard (factory)
		S	High Ambient Kit w/Sunshield (factory)
		Q	Special Quote
BAS	Bas Reset/Offset (PIN 21)	X	No Selection
		L	LON E-Link Kit
		S	SC-Equip Board
		Q	Special Quote
LCD	Language (PIN 22)	X	English
		Q	Special Quote
RDOUT	Readout Kits (PIN 23)	B	Both Discharge & Suction Pressure Transducer Read-out required
		Q	Special Quote
SAFETY	Safety Codes (PIN 24)	L	N American Safety Code (cUL/cETL)
		Q	Special Quote
SENSOR	PIN 25	X	No Option
		Q	Special Quote
PUMP	Motor Current Module (PIN 26)	X	No Option
		Q	Special Quote
REMOTE	Remote Panel (PIN 27)	X	No Option
		Q	Special Quote
SEQ	Sequence Kit (PIN 28)	X	No Option
		Q	Special Quote
TEMP	Leaving Water Temp (29 & 30)		
CHICAGO	Chicago Code Kit (PIN 31)	X	No Chicago Code Kit required
		S	Service Isolation Valves
		Q	Special Quote
VALVES	Valves (PIN 32)	E	Electronic Expansion Valve
		Q	Special Quote
HGBP	Hot Gas Bypass (PIN 33)	X	No Hot Gas Bypass required
		Q	Special Quote
GAUGE	PIN 34	X	No Option
		Q	Special Quote
OVERLOAD	PIN 35	X	No Option
		Q	Special Quote

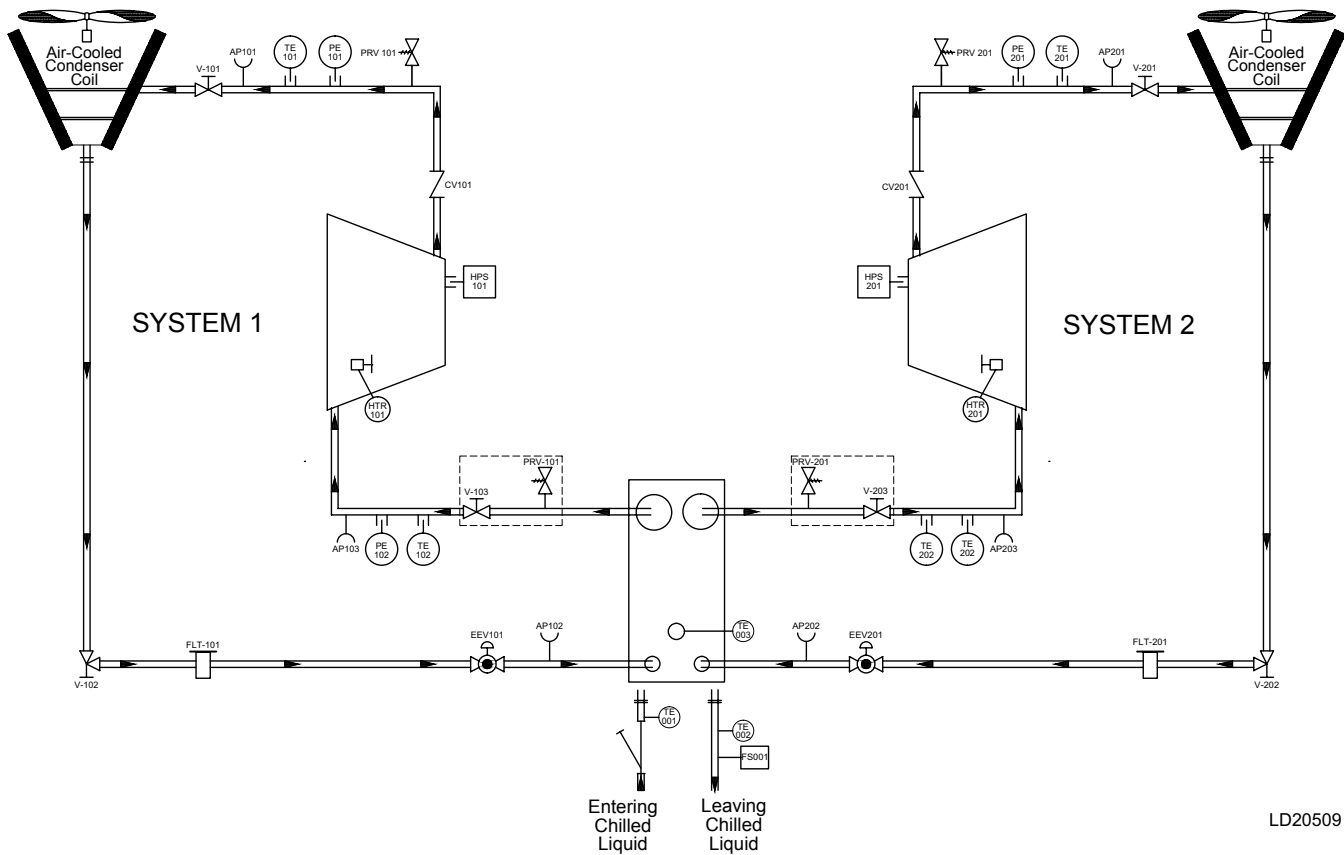
TABLE 2 - COMPLETE PIN NUMBER DESCRIPTION (CONT'D)

FEATURE	FEATURE DESCRIPTION	OPTION	OPTION DESCRIPTION
PIN36	PIN 36	X	No Option
		Q	Special Quote
HTR	Crankcase Heater (Pin 37)	H	Crankcase Heater Standard
		Q	Special Quote
DWP	DWP (PIN 38)	X	150psig DWP Waterside
		Q	Special Quote
INS	Insulation (PIN 39)	X	Standard Insulation
		D	Double Thick Insulation
		Q	Special Quote
FLANGES	Flanges (PIN 40)	X	No Flanges Required
		V	Victaulic Flanges required
		Q	Special Quote
FLOW	Flow Switch (PIN 41)	X	No Option
		Q	Special Quote
VESSEL	Vessel Codes (PIN 42)	A	ASME Pressure Vessel Codes
		Q	Special Quote
CLR	Cooler (PIN 43)	X	Standard Cooler required
		Q	Special Quote
PIN44	PIN 44	X	No Option
		Q	Special Quote
COILS	Coils (PIN 45)	X	Aluminum Coils
		P	Post-Coated Dipped Coils
		Q	Special Quote
HEAT	Heat Recovery (PIN 46)	X	No Option
		Q	Special Quote
FANMOTORS	Fan Motors (PIN 47)	X	TEAO Fan Motors
		Q	Special Quote
ENCL	Enclosure Panels (PIN 48)	X	No Option
		Q	Special Quote
ACOUSTIC	Acoustic Blanket (PIN 49)	X	No Option
		Q	Special Quote
SRDOCS	SR Documents (PIN 50)	X	No Documents Required
		A	Base, Material & Witness Documents
		B	Base Document
		M	Base & Material Documents
		W	Base & Witness Documents
		Q	Special Quote
BRANDING	Branding Kit (PIN 51)	X	Standard York/JCI Branding
		Q	Special Quote
FANS	Sound Fans (PIN 52)	F	Low Sound Fans required
		G	High Airflow Fans required
		Q	Special Quote
PAINT	PIN 53	X	No Option
		Q	Special Quote
ISOL	Vibration Isolators (PIN 54)	X	No Isolators required
		Q	Special Quote

OVERVIEW OF REFRIGERANT CIRCUIT

Low pressure liquid refrigerant enters the cooler and is evaporated and superheated by the heat energy absorbed from the chilled liquid passing through the cooler shell. Low pressure vapor enters at the compressor where pressure and superheat are increased. The

high pressure vapor is fed to the air cooled condenser coil and fans where the heat is removed. The fully condensed and subcooled liquid passes through the expansion valve where pressure is reduced and further cooling takes place before entering to the cooler.



LD20509

FIGURE 8 - PROCESS AND INSTRUMENTATION DIAGRAM

SECTION 3 – HANDLING AND STORAGE

DELIVERY AND STORAGE

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

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

- The chiller must be “blocked” so that the base is not permitted to sag or bow.
- Ensure that all openings, such as water connections, are securely capped.
- Do not store where exposed to ambient air temperatures exceeding 125 °F (51.6 °C).
- The condensers should be covered to protect the fins from potential damage and corrosion, particularly where building work is in progress.
- The unit should be stored in a location where there is minimal activity in order to limit the risk of accidental physical damage.
- To prevent inadvertent operation of the pressure relief devices the unit must not be steam cleaned.
- It is recommended that the unit is periodically inspected during storage.

For a complete list of long-term storage requirements, refer to the Long-term Storage Requirements (Form 50.20-NM1 and Form 50.20-CL7).

INSPECTION

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

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

MOVING THE CHILLER

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

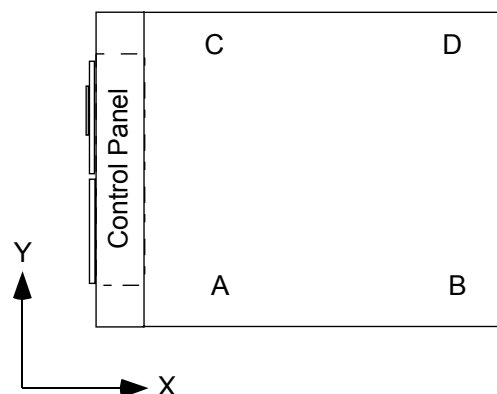
method will depend on job specific factors, such as the rigging equipment available and site needs. Therefore a professional rigger must determine the rigging and lifting method to be used, and it is beyond the scope of the manual to specify rigging and lifting details.

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



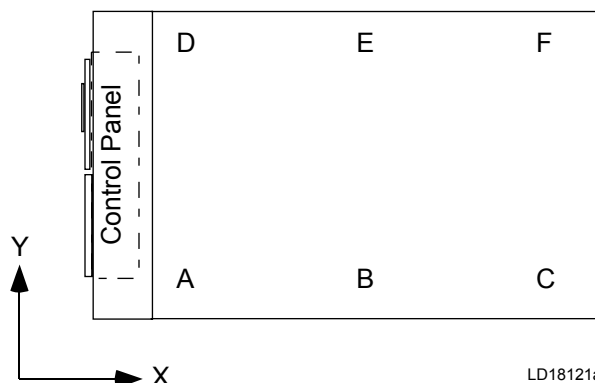
The unit must only be lifted by the base frame at the points provided. Never move the unit on rollers, or lift the unit using a forklift truck.

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



4 Fan Units

LD18120a



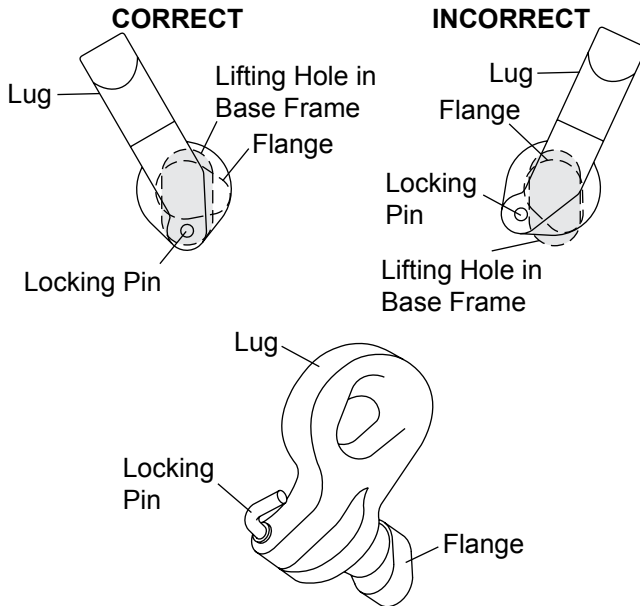
5 - 10 Fan Units

LD18121a

FIGURE 9 - UNIT RIGGING/LIFTING

LIFTING USING LUGS

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

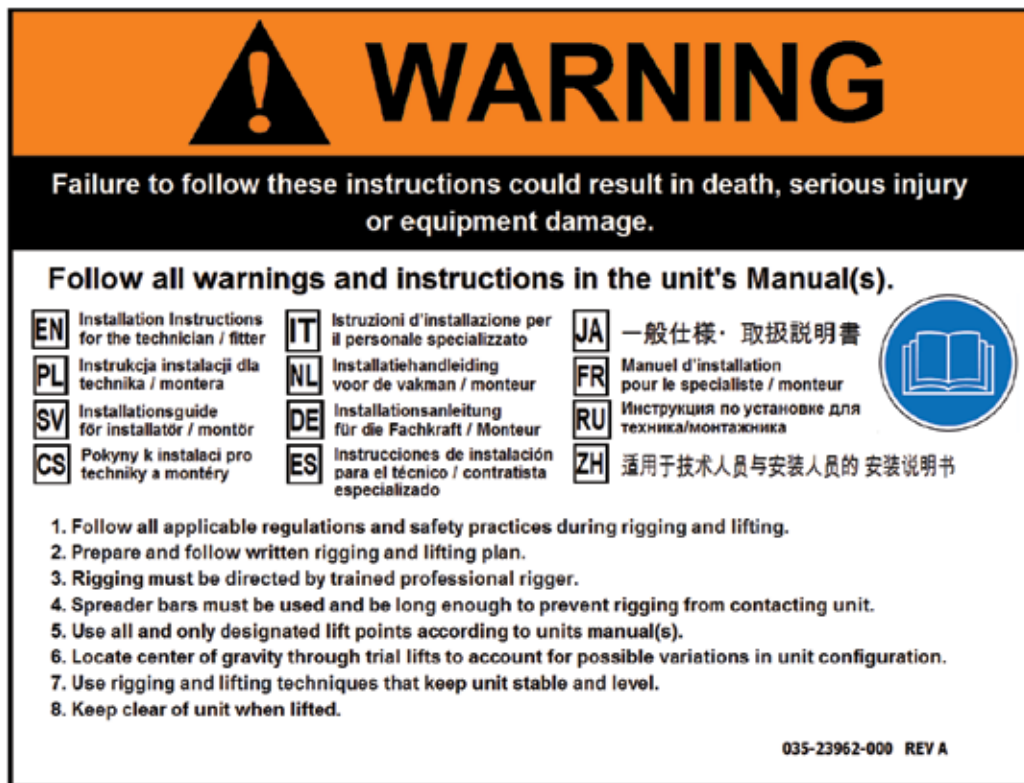


LIFTING USING SHACKLES

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

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

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



LD18119

FIGURE 10 - WARNING



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 the manual to specify rigging and lifting details.

LIFTING WEIGHTS

Refer to the unit nameplate for unit shipping weight. Note that weight may vary depending on unit configuration at the time of lifting. See *Table 5 on page 44* for further information regarding shipping and operating weights.

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SECTION 4 – INSTALLATION



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

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

INSTALLATION CHECKLIST

The following items, 1 through 6, must be checked before placing the units in operation.

4. Inspect the unit for shipping damage.
5. Rig unit using spreader bars.
6. 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.
7. Pipe unit using good piping practice (see ASHRAE handbook section 215 and 195).
8. Check to see that wiring is tight and meets NEC and local codes.
9. Check to see that the unit is installed and operated within limitations (Refer *Operational Limitations on page 41*).

STARTUP/COMMISSIONING

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

LOCATION AND CLEARANCES

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

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

Clearances are listed in *Figure 36 on page 81*.

Foundation

The unit should be mounted on a flat and level foundation, floor, or rooftop capable of supporting the entire operating weight of the equipment. See *Physical Data YSAA 60 Hz and 50 HZ on page 44* for operating weight. If the unit is elevated beyond the normal reach of service personnel, a suitable catwalk must be capable of supporting service personnel, their equipment, and the compressors.

Ground Level Locations

It is important that the units be installed on a substantial base that will not settle. A one piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab should not be tied to the main building foundations as noise and vibration may be transmitted. Mounting holes (5/8" dia.) are provided in the steel channel for bolting the unit to its foundation (see *Figure 31 on page 77*).

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

Rooftop Locations

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

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

Noise Sensitive Locations

Efforts should be made to assure that the chiller is not located next to occupied spaces or noise sensitive areas where chiller noise level would be a problem. Chiller noise is a result of compressor and fan operation.

SPRING ISOLATORS (OPTIONAL)

When ordered, isolators will be furnished. Identify the isolator, locate at the proper mounting point, and adjust per instructions.

COMPRESSOR MOUNTING

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

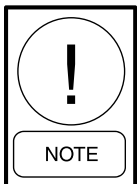
REMOTE COOLER OPTION

Not available at this time.

CHILLED LIQUID PIPING

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

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



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

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

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

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

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.

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

1. It is recommended that the chilled liquid piping system be laid out so that the circulating pump discharges directly into the cooler. The suction for this pump should be taken from the piping system return line and not the cooler.
2. The inlet and outlet cooler connection sizes are provided in *Table 5 on page 44* (Physical Data).
3. A 1/16" mesh strainer is provided at the cooler inlet line just ahead of the cooler. This is important to protect the cooler from entrance of large particles which could cause damage to the evaporator.
4. All chilled liquid piping should be thoroughly flushed to remove foreign material before the system is placed into operation. Use care not to flush any foreign material into or through the cooler.
5. As an aid to servicing, thermometers and pressure gauges should be installed in the inlet and outlet water lines.
6. The chilled water lines that are exposed to outdoor ambients should be wrapped with supplemental heater cable and insulated to protect against freeze-up during low ambient periods, and to prevent formation of condensation on lines in warm humid locations. As an alternative, ethylene glycol should be added to protect against freeze-up during low ambient periods.
7. A chilled water flow switch, (either by YORK or others) **MUST** be installed in the leaving water piping of the cooler. If the factory wired flow switch and extension pipe kit is not selected, the field installed flow switch must be installed so there is a straight horizontal run of at least 5 diameters on each side of the switch. Adjust the flow switch paddle to the size of the pipe in which it is to be installed (see manufacturer's instructions furnished with the switch). The switch is to be wired to Terminals 13 and 14 of XTBC1 located in the control panel, as shown on the unit wiring diagram.

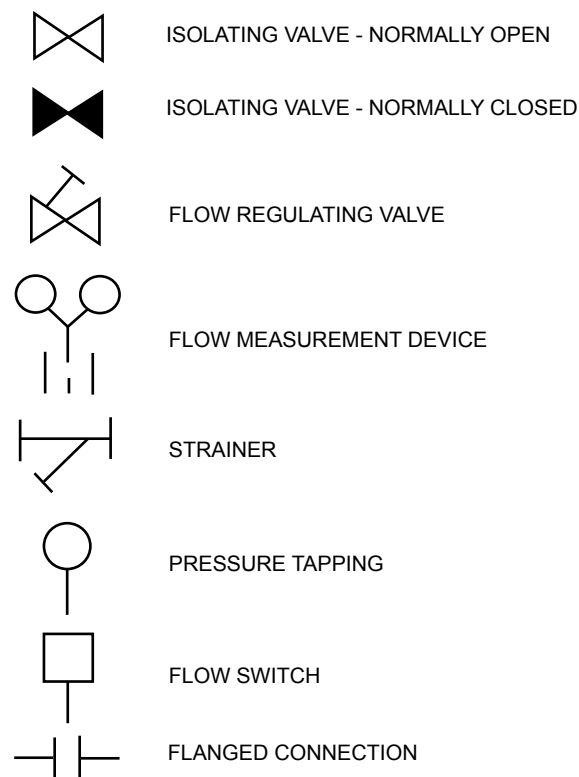
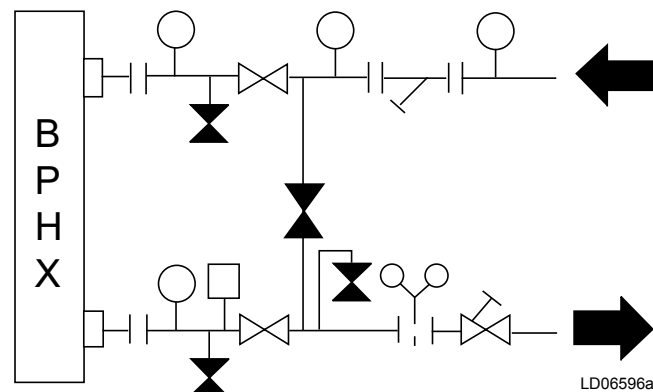


The Flow Switch MUST NOT be used to start and stop the chiller (i.e. starting and stopping the chilled water pump). It is intended only as a safety switch.

PIPEWORK ARRANGEMENT

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

Recommendations of the Building Services Research Association.



LD06596a

LD06597b

FIGURE 11 - CHILLED LIQUID SYSTEM

Fan Discharge Ducting

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

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

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

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

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

WIRING

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

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

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.

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. Refer to *SECTION 8 – UNIT OPERATION* for a detailed description of operation concerning aforementioned contacts and inputs.

RELIEF VALVES

Relief valves are located on both the high and low pressure side of the piping. High side relief valve pressure setting is 292 PSIG. Low side relief valve is available only when suction service valve option is chosen. Low side relief valve pressure setting is 292 PSIG as well.

HIGH PRESSURE CUTOUT

A high pressure cutout is installed in the discharge piping of each system. The cutout opens at 262 PSIG.

Evaporator Pump Start Contacts

Terminal block XTBC2 – Terminals 23 (115VAC) to 24, are normally- open contacts that can be used to switch field supplied power to provide a start signal to the evaporator pump contactor. The contacts will be closed when any of the following conditions occur:

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

The pump will not run if the micro panel has been powered up for less than 30 seconds, or if the pump has run in the last 30 seconds, to prevent pump motor overheating. Refer to *Figure 14 on page 39* and unit wiring diagram.

System Run Contacts

Contacts are available to monitor system status. Normally-open auxiliary contacts from each compressor contactor are wired in parallel with XTBC2 – Terminals 25 to 26 for system 1, and XTBC2 – Terminals 27 to 28 for system 2. Refer to *Figure 7 on page 25*, *Figure 14 on page 39* and unit wiring diagram.

Alarm Status Contacts

Normally-open contacts are available for each refrigerant system. These normally-open contacts close when the system is functioning normally. The respective contacts will open when the unit is shut down on a unit fault, or locked out on a system fault. Field connections are at XTBC2 - Terminals 29 to 30 (system 1), and Terminals 31 to 32 (system 2).

Remote Start/Stop Contacts

To remotely start and stop the chiller, dry contacts can be wired across terminals 13 and 51 on XTBC1. Refer to *Figure 7 on page 25*, *Figure 13 on page 38* and unit wiring diagram.

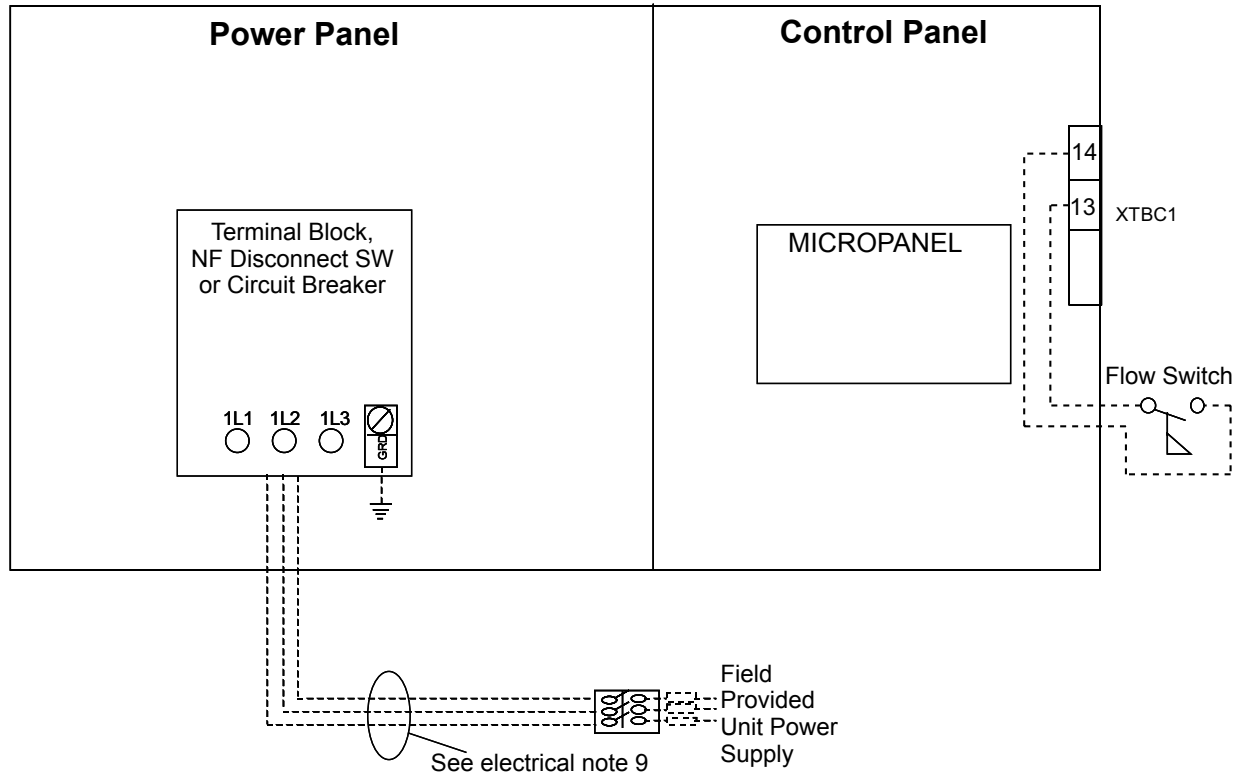
Remote Emergency Cutoff

Immediate shutdown of the chiller can be accomplished by opening a field-installed dry contact to break the electrical circuit between Terminals 5 to L on terminal block XTBC2. The unit is shipped with a factory jumper installed between Terminals 5 to L, which must be removed if emergency shutdown contacts are installed. Refer to *Figure 13 on page 38* and unit wiring diagram.

Remote Temp Reset Input

The Remote Temp Reset input allows reset of the chilled liquid setpoint by supplying a voltage or current signal field wiring should be connected to XTBC1 – Terminals A+ to A-. A detailed explanation is provided in *SECTION 7 – UNIT CONTROLS*. Refer to *Figure 5 on page 23*, *Figure 7 on page 25* and unit wiring diagram.

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

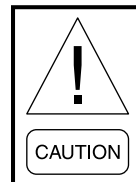


NOTE: Refer to *Electrical Notes* on page 47.

LD13141b



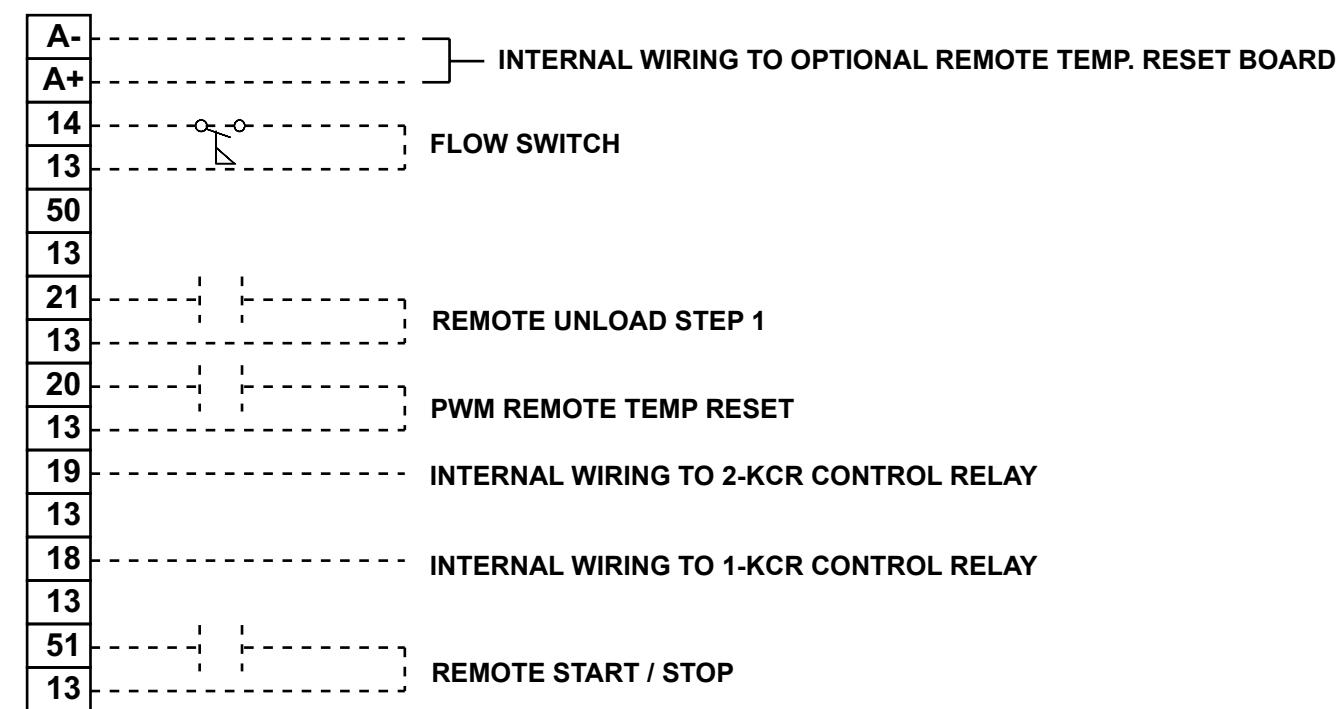
It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, PRIOR to working on equipment.



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.

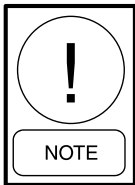
FIGURE 12 - SINGLE-POINT SUPPLY CONNECTION – TERMINAL BLOCK, NON-FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER

USER CONTROL WIRING INPUTS



XTBC1

LD13130a



All externally supplied contacts must be capable of switching 24VDC / 115 VAC. Gold contacts are recommended. If supplied contacts are from a Relay / Contactor (Inductive Load), the coil of the Relay / Contactor must be suppressed. Typical suppressor is P/N 031-00808-000.



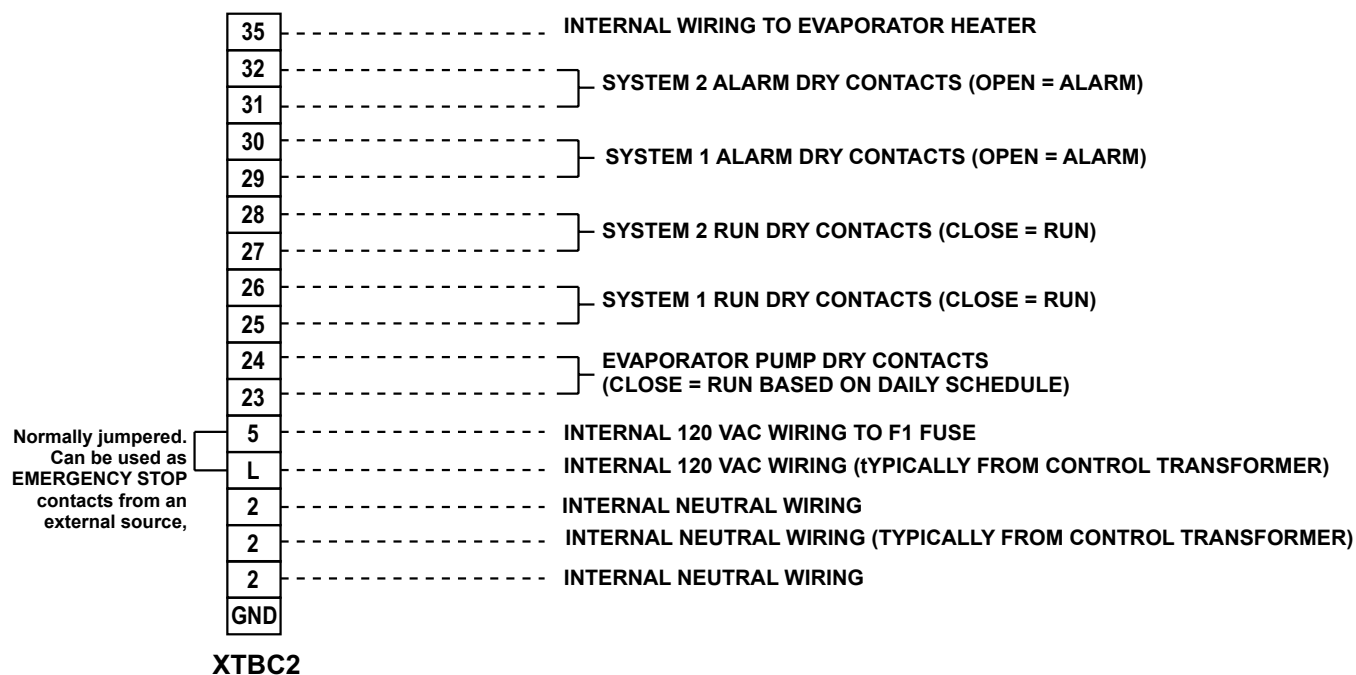
The unit evaporator heater uses 120VAC. Disconnecting 120VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.



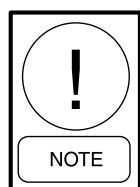
It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, PRIOR to working on equipment.

FIGURE 13 - CONTROL WIRING INPUTS

USER CONTROL WIRING OUTPUTS



LD13242b



All chiller supplied contacts are rated at 115VAC, 100VA, resistive load only, and must be suppressed at the load by user if powering an inductive load (Relay / Contactor Coil). Typical suppressor P/N is 031-00808-000.



*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 14 - CONTROL WIRING OUTPUTS

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SECTION 5 – TECHNICAL DATA

OPERATIONAL LIMITATIONS

HEAT EXCHANGER FLOW, GPM

TABLE 3 - TEMPERATURES AND FLOWS

NOMINAL EVAPORATOR WATER FLOW						
YSA A	TEMPERATURE °F (°C)		WATER FLOW GPM (L/S)		AIR ON CONDENSER °F (°C)	
	MIN	MAX ¹	MIN	MAX	MIN ²	MAX ³
HIGH EFFICIENCY						
0070HA	40 (4.4)	60 (15.5)	60 (3.8)	350 (22.08)	0 (-17.8)	125 (52)
0090HA	40 (4.4)	60 (15.5)	70 (4.4)	350 (22.08)	0 (-17.8)	125 (52)
0110HA	40 (4.4)	60 (15.5)	80 (5.0)	350 (22.08)	0 (-17.8)	125 (52)
0130HA	40 (4.4)	60 (15.5)	90 (5.7)	400 (25.2)	0 (-17.8)	125 (52)

NOTES:

- For leaving liquid temperature higher than 60°F (15.6°C), contact the nearest Johnson Controls Office for application guidelines.
- Standard units will operate to 30°F (-1°C). This accessory includes all necessary components to permit chiller operation to 0°F (-18°C). For proper head pressure control in applications below 30°F (-1°C) where wind gusts may exceed 5 mph, it is recommended that optional condenser louvered enclosure panels also be included.
- For operation at temperatures above 115°F (46°C), the optional High Ambient Kit will need to be installed on the system.

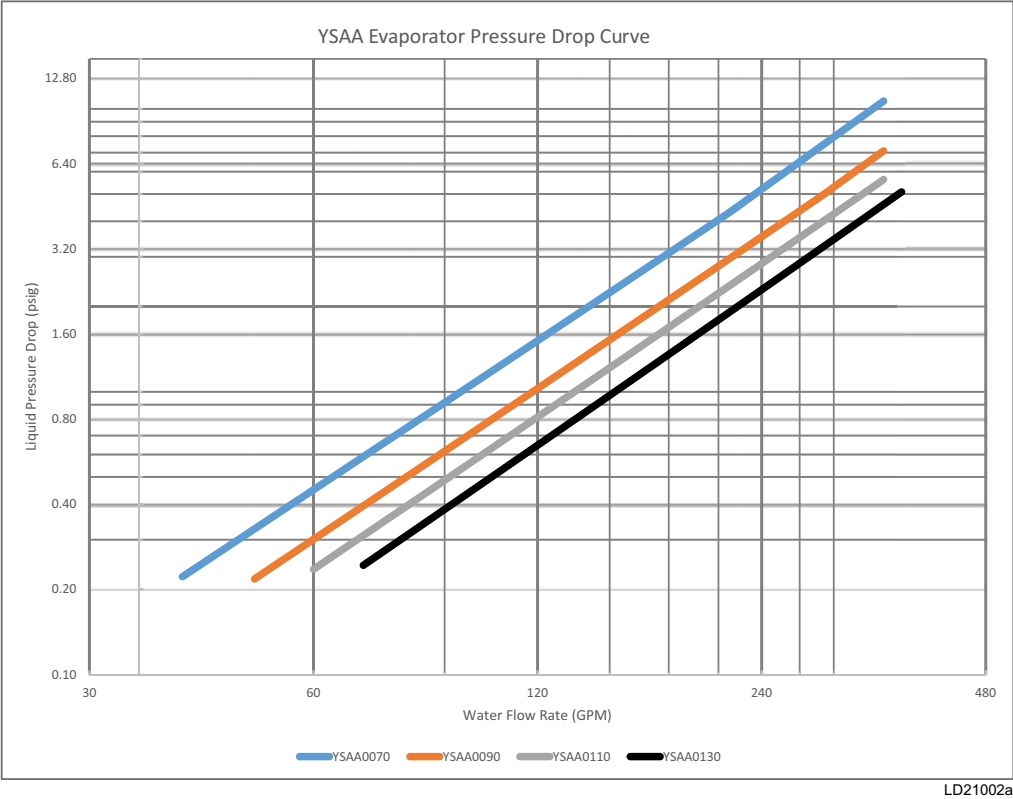


Excessive flow will cause damage to the cooler. Do not exceed maximum cooler flow. Special care should be taken when multiple chillers are fed by a single pump.



Inadequate flow potentially cause freezing up to the cooler. Do not operate chiller with flow rate to be less than the minimum.

EVAPORATOR PRESSURE DROP CURVE (ENGLISH)



EVAPORATOR PRESSURE DROP CURVE (METRIC)

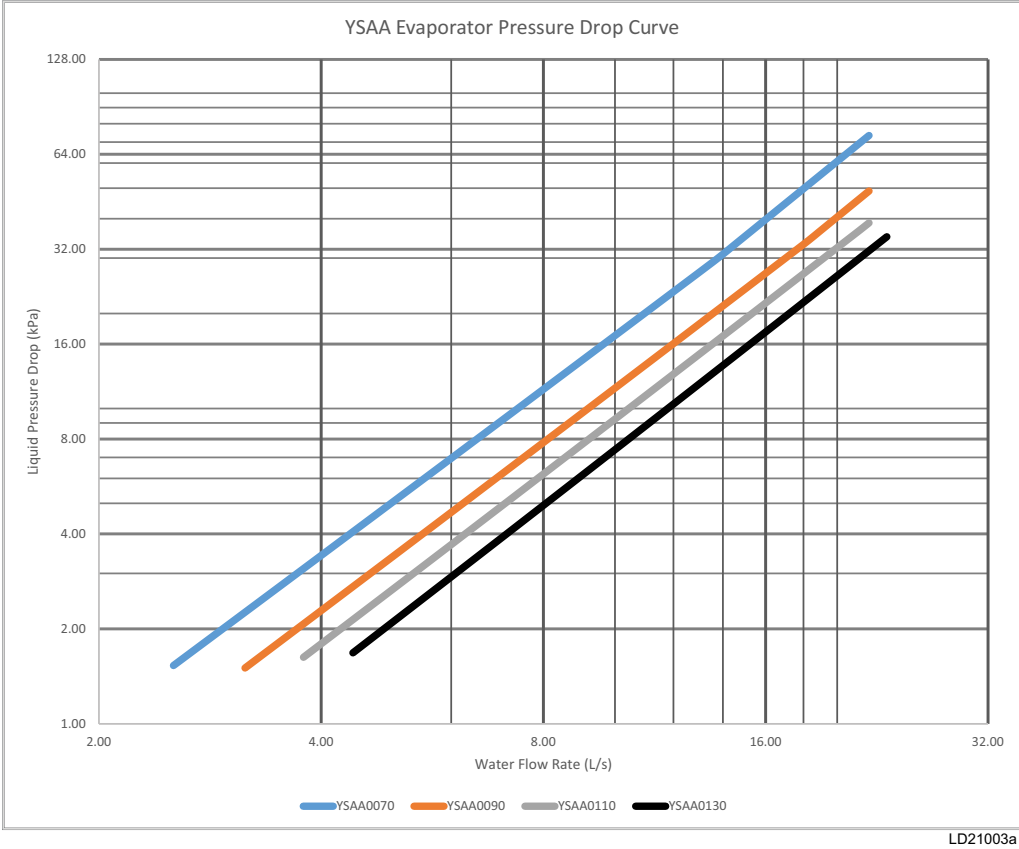


FIGURE 15 - PRESSURE DROP CURVE (ENGLISH AND METRIC)

TABLE 4 - ETHYLENE AND PROPYLENE GLYCOL CORRECTION FACTORS

ETHYLENE GLYCOL					
% WEIGHT	TONS	COMPRESSOR KW	GPM F/TON	PRESSURE DROP	FREEZE PT °F (°C)
10.0	1.0	1.0	24.3	1.0	26.2 (-3.2)
20.0	1.0	1.0	25.1	1.1	17.9 (-7.8)
30.0	1.0	1.0	25.9	1.2	6.7 (-14.1)
40.0	1.0	1.0	26.9	1.4	-8.1 (-22.3)
50.0	1.0	1.0	28.0	1.6	-28.9 (-33.8)
PROPYLENE GLYCOL					
% WEIGHT	TONS	COMPRESSOR KW	GPM F/TON	PRESSURE DROP	FREEZE PT °F (°C)
10.0	1.0	1.0	24.0	1.0	26.0 (-3.3)
20.0	1.0	1.0	24.3	1.1	19.0 (-6.7)
30.0	1.0	1.0	24.9	1.3	9.0 (-12.8)
40.0	1.0	1.0	25.6	1.4	-6.0 (-21.1)
50.0	0.9	1.0	26.6	1.7	-28.0 (-33.3)

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

PHYSICAL DATA YSAA 60 HZ AND 50 HZ**TABLE 5 - PHYSICAL DATA (ENGLISH) 60 HZ AND 50 HZ**

REFRIGERANT R-134A		YSAA							
		HIGH EFFICIENCY UNITS							
		0070		0090		0110		0130	
NOMINAL RATINGS									
TONS 60Hz		67.31		86.28		108.9		127.28	
TONS 50Hz		57.81		73.89		94.37		111.0	
EER 60Hz		10.55		10.74		10.71		10.04	
EER 50Hz		10.23		11.32		11.31		10.9	
IPLV 60Hz		14.35		14.04		14.92		15.41	
IPLV 50Hz		14.61		14.30		15.08		16.12	
EVAPORATOR									
Min Flow Rate Water, gpm (L/S)		60 (3.8)		70 (4.4)		80 (5.0)		90 (5.7)	
Max Flow Rate Water, gpm (L/S)		350 (22.08)		350 (22.08)		350 (22.08)		400 (25.2)	
Water Volume, gallons (liters)		9.65 (36.53)		12.87 (48.72)		15.48 (58.60)		18.93 (71.66)	
Maximum Water Side Pressure, psig (bar)		333 (23)		333 (23)		333 (23)		333 (23)	
COMPRESSORS									
Type		Semi-Hermetic Screw							
Circuit#		2							
Compressor#		2							
Refrigerant Type		R-134a							
R-134a Refrigerant Charge, lbs./kg.	Hz	50	60	50	60	50	60	50	60
	System 1	32.0/14.5	31.0/14.1	44.0/20.0	42.5/19.3	56.0/25.4	54.5/24.7	60/27.22	59/26.76
	System 2	34.5/15.6	33.5/15.2	47.5/21.5	46.0/20.9	58.5/26.5	57.0/25.9	62.5/28.35	61.5/27.90
	Total Charge	66.5/30.2	64.5/29.3	91.5/41.5	88.5/40.1	114.5/51.9	111.5/50.6	122.5/55.57	120.5/54.66
Oil Charge Per System, gal (liters)		1.7 (6.5)		2.0 (7.5)		2.2 (8.5)		2.2 (8.5)	
CONDENSER FANS									
# of Fans Sys1/Sys2		2/2		3/3		4/4		4/4	
Fan Power, 50Hz (kW)		6.7		10.1		13.4		13.4	
Fan Power, 60HZ (kW)		6.7		10.1		13.4		13.4	
Air Flow, CFM (50Hz Units)		49,032		73,548		98,064		98,064	
Air Flow, CFM (60Hz Units)		50,000		75,000		100,000		100,000	
PHYSICAL DATA									
Unit Length, inches (mm)		116.2 (2951.3)		143.5 (3645.4)		187.8 (4769.4)		187.8 (4769.4)	
Unit Width, inches (mm)		88.8 (2255.4)		88.8 (2255.4)		88.8 (2255.4)		88.8 (2255.4)	
Unit Height, inches (mm)		94.5 (2400.8)		94.5 (2400.8)		94.5 (2400.8)		94.5 (2400.8)	
Shipping Weight, lbs (kg)		4415 (2002.6)		5226 (2370.5)		6441.0 (2921.6)		6631 (3007)	
Operation Weight, lbs (kg)		4594 (2083.8)		5432 (2463.9)		6669.0 (3025.0)		6888 (3124)	

ELECTRICAL DATA

Voltage Limitations

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

TABLE 6 - VOLTAGE RANGE

VOLTAGE RANGE			
VOLTAGE CODE	UNIT POWER	MIN.	MAX.
-28	230/3/60	207	253
-40	380/3/60	342	440
-42	400/3/60	342	440
-50	380-415/3/50	342	440

COMPRESSOR HEATERS

Compressor heaters are standard. Each compressor utilizes a 150W heater. If power is OFF more than two hours, the crankcase heaters must be energized for 18 – 24 hours prior to restarting a compressor. This will assure that liquid slugging and oil dilution does not damage the compressors on start.

TABLE 7 - UNIT ELECTRICAL DATA

CHILLER MODEL	VOLTAGE CODE	MIN CKT. AMPS.	MIN DUAL ELEM FUSE & MIN CB	MAX DUAL ELEM FUSE & MAX CB	COMPR 1		COMPR 2		STD FLOW FAN		
					RLA	LRA	RLA	LRA	QTY	FLA	LRA
YSAA0070	28	358	500	500	142.1	935	142.1	935	4	7.4	37
	40	215	300	300	85.3	405	85.3	405	4	4.5	23.1
	42	205	250	250	80.9	426	80.9	426	4	4.5	23.1
	50	199	250	250	78.9	362	78.9	362	4	4	19
YSAA0090	28	466	600	600	183.6	1075	183.6	1075	6	7.4	37
	40	268	350	350	104.8	510	104.8	510	6	4.5	23.1
	42	267	350	350	104.5	536	104.5	536	6	4.5	23.1
	50	264	350	350	104.6	466	104.6	466	6	4	19
YSAA0110	28	607	800	800	239.7	1261	239.7	1261	8	7.4	37
	40	354	450	450	138.9	665	138.9	665	8	4.5	23.1
	42	348	450	450	136.5	721	136.5	721	8	4.5	23.1
	50	347	450	450	137.7	564	137.7	564	8	4	19
YSAA0130	28	702	800	800	281.9	1258	281.9	1258	8	7.4	37
	40	427	500	500	171.3	828	171.3	828	8	4.5	23.1
	42	427	500	500	171.3	828	171.3	828	8	4.5	23.1
	50	344	450	450	136.6	753	136.6	753	8	4	19

NOTE:

- Reference PIN 59 for Pump Model.
- Use this table along with Table 8 Pump Electrical Data to determine electrical data of the unit plus the pump.
- Does not include Control Transformer.

TABLE 8 - TRANSFORMER LOAD

	VA
VOLT	2000
208	9.6
230	8.7
380	5.3
460	4.3
575	3.5

TABLE 9 - FAN WIRING LUGS

YSAA MODEL	CAPACITY (RT)	VOLTS	HZ	STANDARD FAN			
				TERMINAL BLOCK		CIRCUIT BREAKER	
				WIRE PER PHASE	LUG WIRE RANGE	WIRE PER PHASE	LUG WIRE RANGE
YSAA0070	70	230	60	2	#6 - 500 kcmil	2	250 - 500 kcmil
	70	380	60	1	#6 - 500 kcmil	2	3/0-250 kcmil
	70	400	50	1	#6 - 500 kcmil	2	3/0-250 kcmil
YSAA0090	90	230	60	2	#6 - 500 kcmil	2	250 - 500 kcmil
	90	380	60	2	#6 - 500 kcmil	2	250 - 500 kcmil
	90	400	50	2	#6 - 500 kcmil	2	250 - 500 kcmil
YSAA0110	110	230	60	4	4/0 - 500 kcmil	4	4/0 - 500 kcmil
	110	380	60	2	#6 - 500 kcmil	2	250 - 500 kcmil
	110	400	50	2	#6 - 500 kcmil	2	250 - 500 kcmil
YSAA0130	130	230	60	4	4/0 - 500 kcmil	4	4/0 - 500 kcmil
	130	380	60	2	#6 - 500 kcmil	2	250 - 500 kcmil
	130	400	50	2	#6 - 500 kcmil	2	250 - 500 kcmil

NOTE: Alternate lugs are provided in the panel for field electricians and contractors, should there be a need for other lug arrangements that the installed lugs on the non-fused disconnect switch and circuit breaker panels.

ELECTRICAL NOTES

NOTES

1. 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.
2. Minimum fuse size is based upon 150% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit to avoid nuisance trips at start-up due to lock rotor amps. It is not recommended in applications where brown outs, frequent starting and stopping of the unit, and/or operation at ambient temperatures in excess of 95°F (35°C) is anticipated.
3. 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.
4. 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, 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.

5. 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.
6. A ground lug is provided for each compressor system to accommodate a field grounding conductor per N.E.C. Table 250-95. A control circuit grounding lug is also supplied.
7. 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.
8. Field Wiring by others which complies to the National Electrical Code & Local Codes.

LEGEND

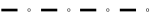
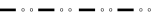
ACR-LINE	ACROSS THE LINE START
C.B.	CIRCUIT BREAKER
D.E.	DUAL ELEMENT FUSE
DISC SW	DISCONNECT SWITCH
FACT MOUNT CB	FACTORY MOUNTED CIRCUIT BREAKER
FLA	FULL LOAD AMPS
HZ	HERTZ
MAX	MAXIMUM
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
MIN NF	MINIMUM NON FUSED
RLA	RATED LOAD AMP
S.P. WIRE	SINGLE POINT WIRING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

VOLTAGE CODE

-40 = 380-3-60

ELECTRICAL NOTES AND LEGEND FOR WIRING DIAGRAM

DESIGNATION	DESCRIPTION
ACC	ACCESSORY
- ADIS	DISPLAY BOARD
- AMB	MICRO BOARD
- AUX	AUXILIARY SWITCH
- BAMB	AMBIENT
- BDP	DISCHARGE PRESSURE
- BECT	ENTERING CHILLED TEMPERATURE
- BLCT	LEAVING CHILLED TEMPERATURE
- BMP	MOTOR PROTECTOR COMPRESSOR
- BSP	SUCTION PRESSURE
BST	SUCTION TEMPERATURE
CT	CURRENT TRANSFORMER
- ECH	CRANKCASE HEATER
- EEH	EVAPORATOR HEATER
- EEV	ELECTRONIC EXPANSION VALVE
- EEVC	ELEC. EXPAN. VALVE CONTROLLER
- EHRH	HEAT RECOVERY HEATER
- EPH	PUMP HEATER
- ETXVH	EXPANSION VALVE HEATER
- ETH	TRACE HEATER
- EXT	EXTERNAL TO CONTROL PANEL
- F	FUSE
- FSC	FAN SPEED CONTROLLER
- FSI	FAN SPEED INHIBIT
GND	GROUND
G/Y	GREEN / YELLOW
- HPCO	HIGH PRESSURE CUTOUT
J	PLUG BOARD CONNECTOR
- K	CIRCUIT BOARD RELAY
- KF	FAN CONTACTOR (INCLUDING COIL SUPPRESSOR)
- KFOL	FAN OVERLOAD
- KH	HEATER RELAY
- KM	COMPRESSOR CONTACTOR (INCLUDING COIL SUPPRESSOR)
- KCR	CONTROL RELAY
- KP	PUMP CONTACTOR PART (INCLUDING COIL SUPPRESSOR)
- KSS	SOFT STARTER RELAY
- KT	RELAY TIMER
- M	COMPRESSOR MOTOR
- MF	MOTOR FAN
- MP	MOTOR PUMP
NU	NOT USED

DESIGNATION	DESCRIPTION
PE	PROTECTIVE EARTH
PWM	PULSE WIDTH MODULATION TEMP
OVL	ELECTRONIC OVERLOAD
- QCB	CIRCUIT BREAKER
- QMMSP	MANUAL MOTOR STARTER PUMP
- QSD	SWITCH DISCONNECT
R	RESISTOR
RED	RED
RP	RUN PERMISSIVE
RU	REMOTE UNLOAD 1st STEP
SCH	THERMOSTAT CRANKCASE HEATER
SCR	SCREEN
- SF	FLOW SWITCH
- SFE	FLOW SWITCH ELECTRONIC
- SKP	KEYPAD
- SS	SOFT STARTER
- SOA	SWITCH OFF AUTO
- SZT	ZONE THERMOSTAT
- T	TRANSFORMER
- TC	TRANSFORMER CURRENT
TXV	THERMAL EXPANSION VALVE
- UBR	BRIDGE RECTIFIER
- WHT	WHITE
- XP	PLUGS BETWEEN POW./MICRO. SECTION
- XTBC	TERMINAL BLOCK CUSTOMER
- XTBF	TERMINAL BLOCK FACTORY
- XTBM	TERMINAL BLOCK MOTOR FAN TRIP
- YESV	EVAPORATOR SOLENOID VALVE
- YHGSV	HOT GAS SOLENOID VALVE (INCLUDING COIL SUPPRESSOR)
- YLLSV	LIQUID LINE SOLENOID VALVE FIELD MOUNTED AND WIRED ON REMOTE
- ZCPR	COMPRESSOR
	NOTE WELL {SEE NOTE}
	WIRING AND ITEMS SHOWN THUS ARE STANDARD YORK ACCESSORIES
	WIRING AND ITEMS SHOWN THUS ARE NOT SUPPLIED BY YORK
	ITEMS THUS ENCLOSED FORM A COMPONENTS OR SETS OF COMPONENTS

ELECTRICAL NOTES AND LEGEND FOR WIRING DIAGRAM (CONT'D)

035-26288-001 REV B

	GENERAL
a.	This drawing is based on IEC symbols.
b.	Field wiring to be in accordance with the relevant electrical code as well as all other applicable codes and specifications.
c.	All sources of supply shown on this diagram to be taken from one main isolator, not shown or supplied by YORK.
d.	Green and yellow wire is used for earth, multi-colored cable used for low voltage. Red wire used for A.C. control, blue wire for neutral, black wire for A.C. and D.C. power. Orange wire should be used for interlock control wiring supplied by external source.
e.	Legend designation depicts component abbreviations. Number prefix located, if applicable, on schematic circuit, refers to system thereon, E.G. = 1-FHP2 refers to high pressure cutout no 2 on system no 1.
f.	All wiring to control section voltage free contacts requires a supply provided by the customer maximum voltage 240 volts. The customer must take particular care when deriving the supplies for the voltage free terminals with regard to a common point of isolation. Thus, these circuits when used must be fed via the common point of isolation. The voltage to these circuits is removed when the common point of isolation to the unit is opened. This common point of isolation is not supplied by YORK. The YORK voltage free contacts are rated at 100VA. All inductive devices {relays} switch by the YORK voltage free contacts must have their coil suppressed using standard R/C suppressors.
g.	Customer voltage free contacts connected to terminal 13 must be rated at 30V 5ma.
h.	No controls {relays etc.} Should be mounted in any section of the control panel. Additionally, control wiring not connected to the YORK control panel should not be run through the panel. If these precautions are not followed, electrical noise could cause malfunctions or damage to the unit and its controls.
i.	 120/14.3 - (Signal IN/OUT) I.E. 120 is wire # and 14.3 refers to SHT. 14 column 3.
	NOTES
1	Fitting on units with low ambient option only.
2	Fitting on units with more than 4 fans.

WIRING DIAGRAMS

ELEMENTARY WIRING DIAGRAMS

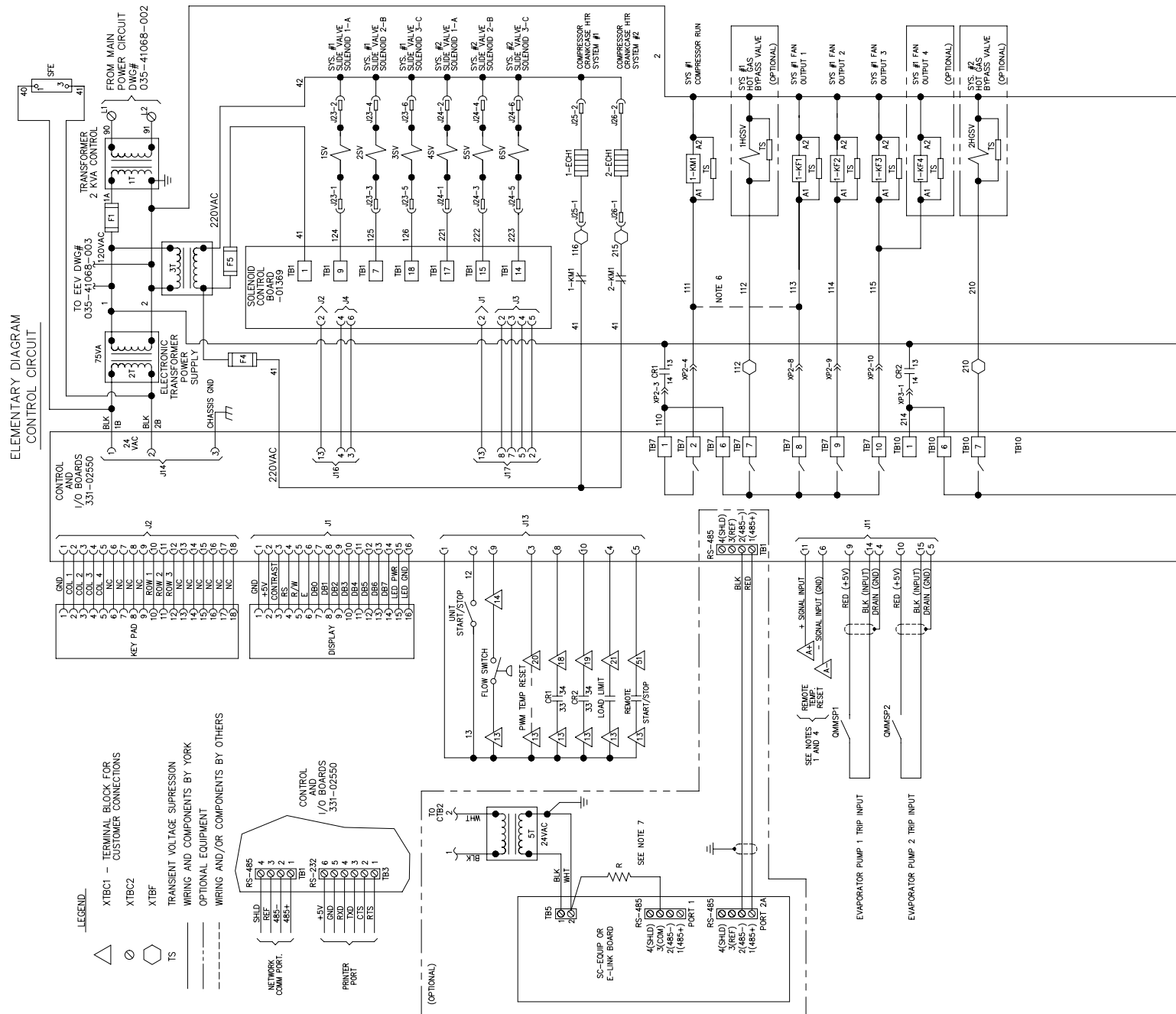


FIGURE 16 - ELEMENTARY WIRING DIAGRAM

035-41068-001
REV E

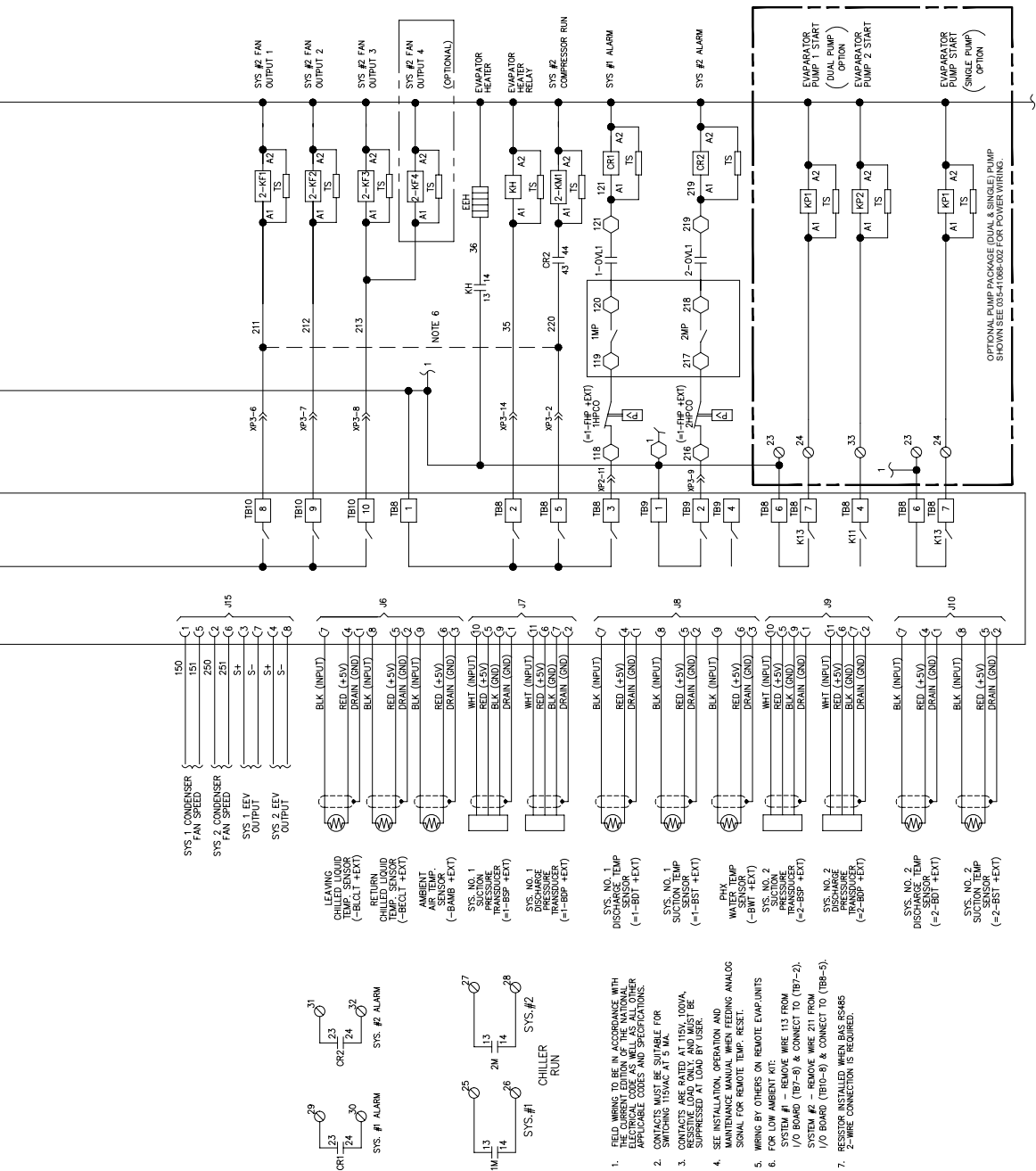


FIGURE 16 - ELEMENTARY WIRING DIAGRAM (CONT'D)



FIGURE 17 - POWER ELEMENTARY WIRING DIAGRAM (3 - CONTACTOR FAN CONTROL)

5

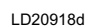
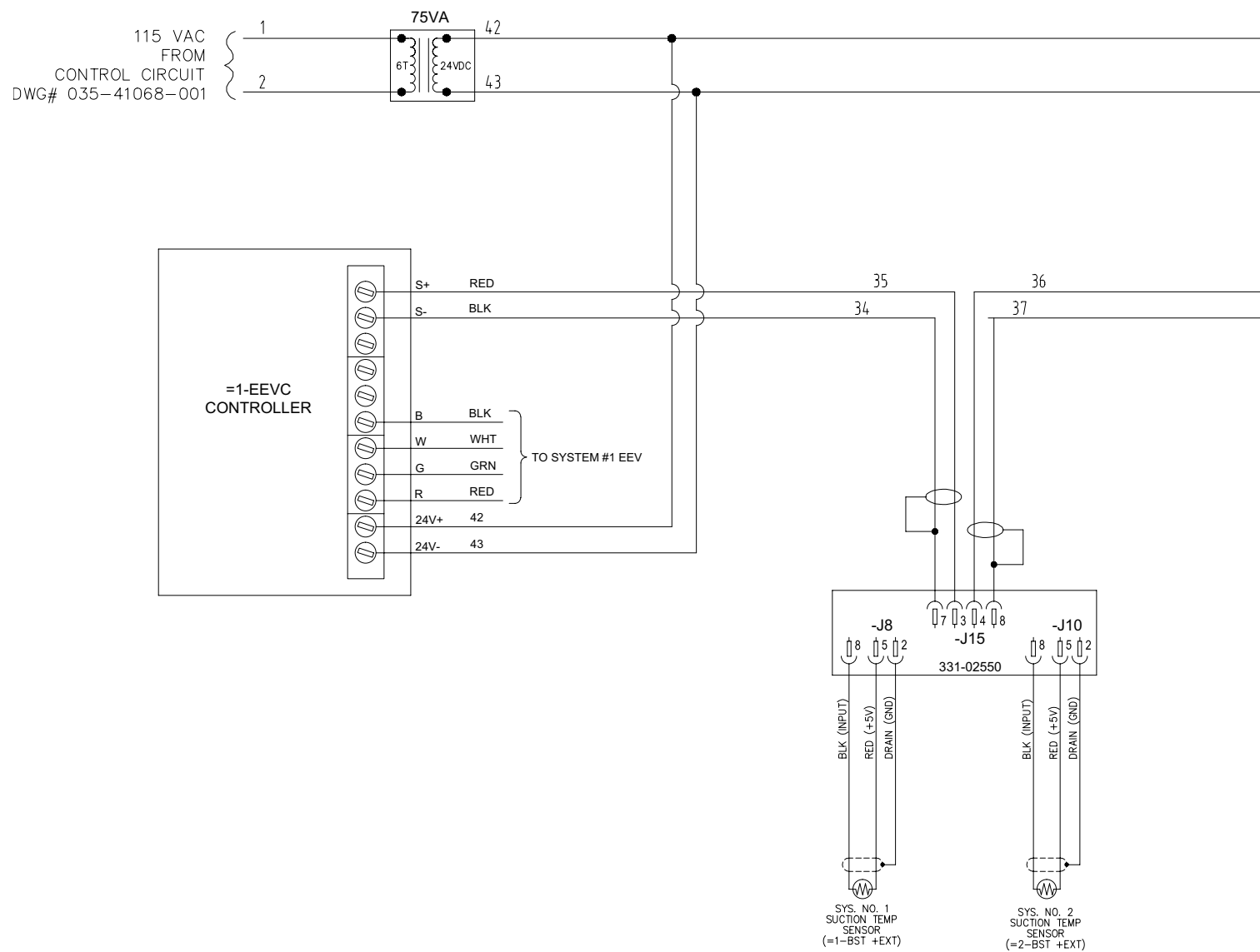


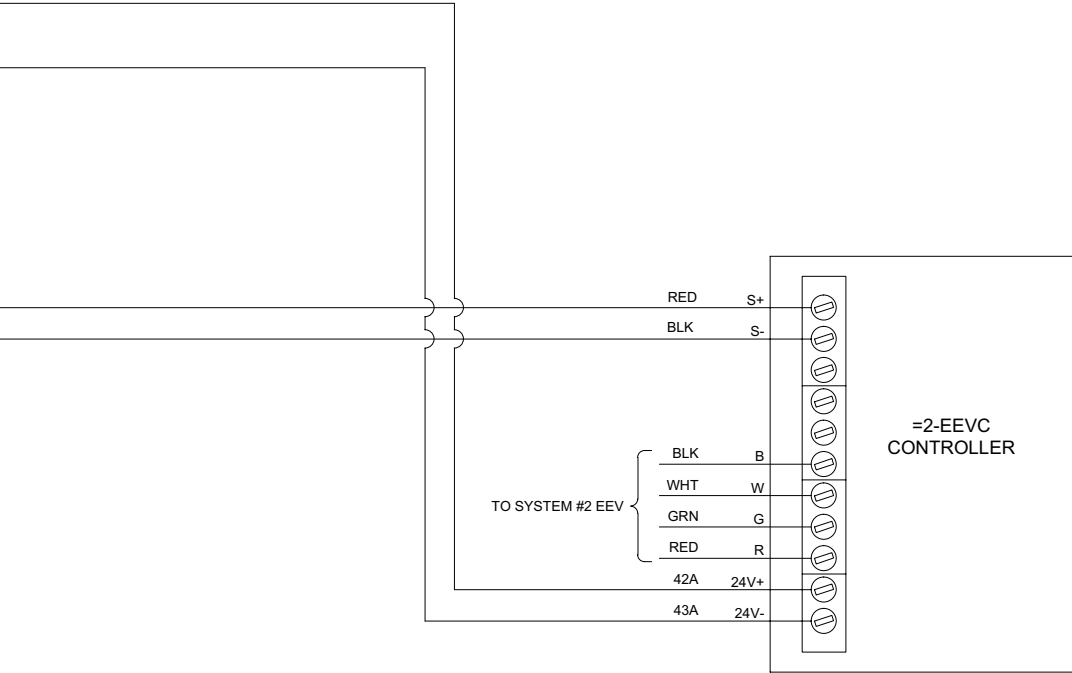
FIGURE 17 - POWER ELEMENTARY WIRING DIAGRAM (3 - CONTACTOR FAN CONTROL) (CONT'D)



LD23310a

FIGURE 18 - EEV CONTROLLER

035-41068-003
REV -



5

LD23310b

FIGURE 18 - EEV CONTROLLER (CONT'D)

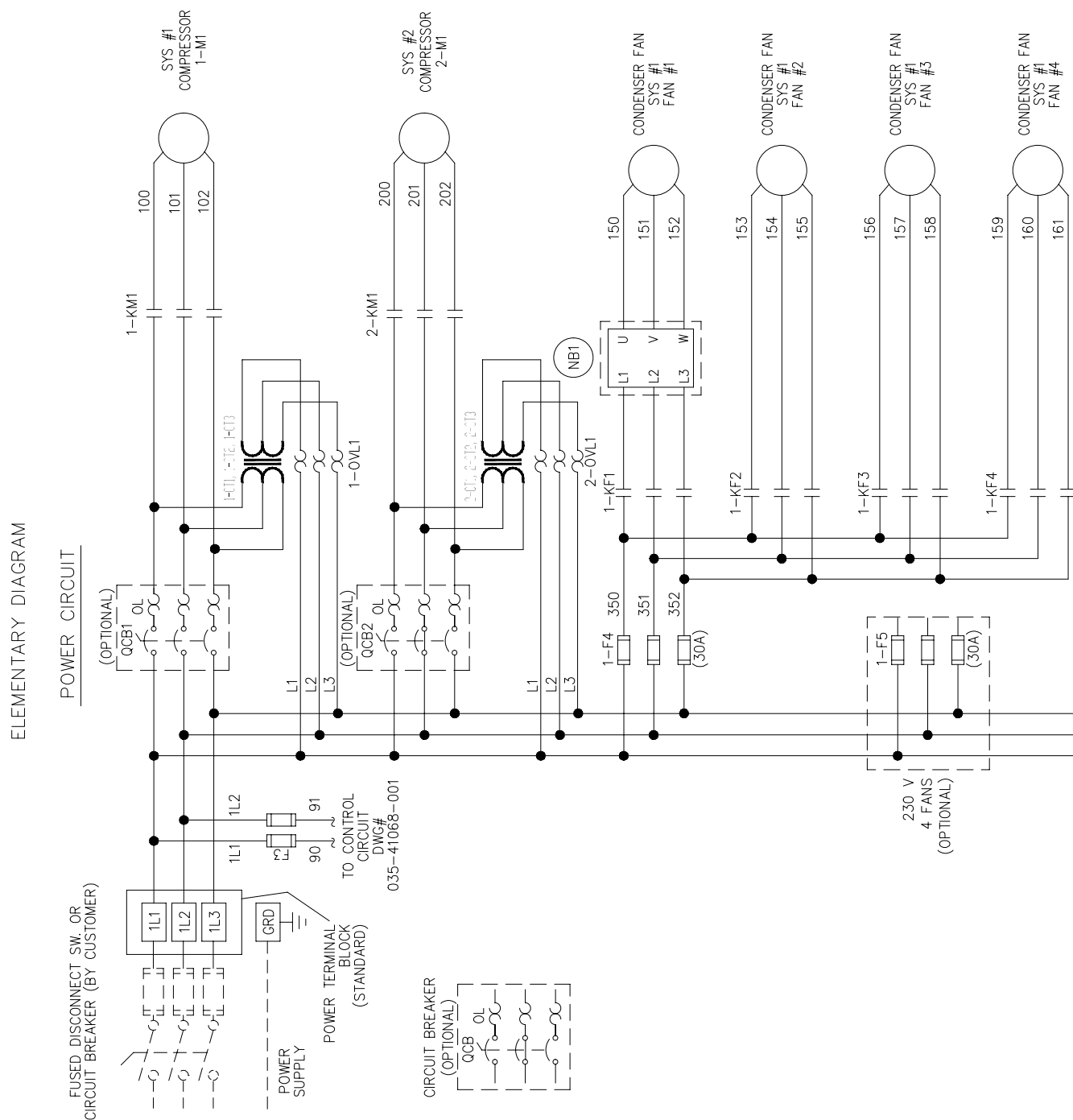


FIGURE 19 - POWER ELEMENTARY WIRING DIAGRAM (4 - CONTACTOR FAN CONTROL)

5



FIGURE 19 - POWER ELEMENTARY WIRING DIAGRAM (4 - CONTACTOR FAN CONTROL) (CONT'D)



JOHNSON CONTROLS

5

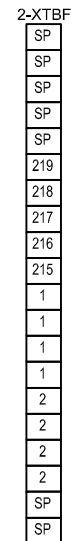
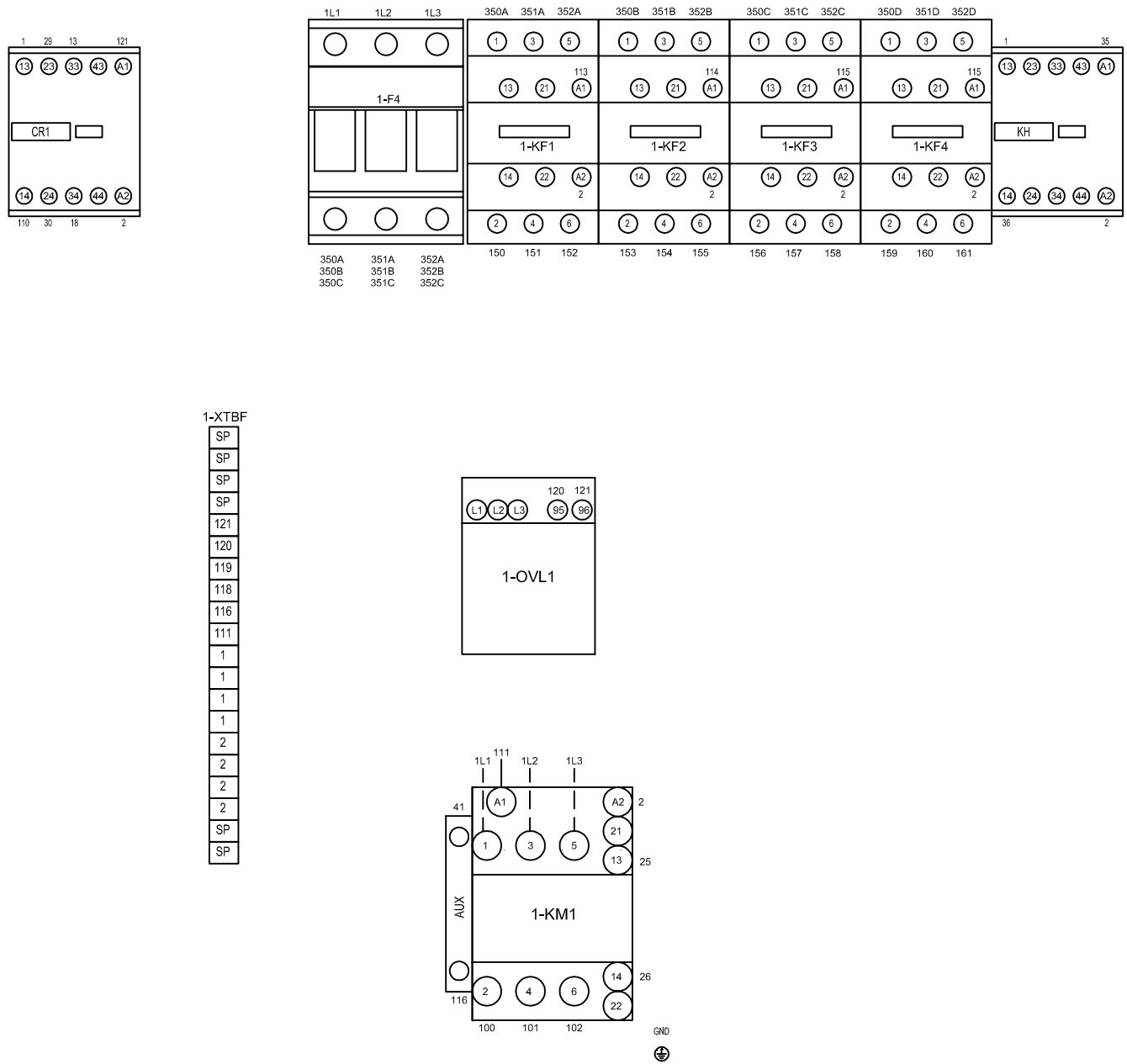


FIGURE 20 - POWER PANEL CONNECTION WIRING DIAGRAM (3 - CONTACTOR FAN CONTROL) (CONT'D)



LD20921c

FIGURE 21 - POWER PANEL CONNECTION WIRING DIAGRAM (4 - CONTACTOR FAN CONTROL)

035-41068-007
REV C

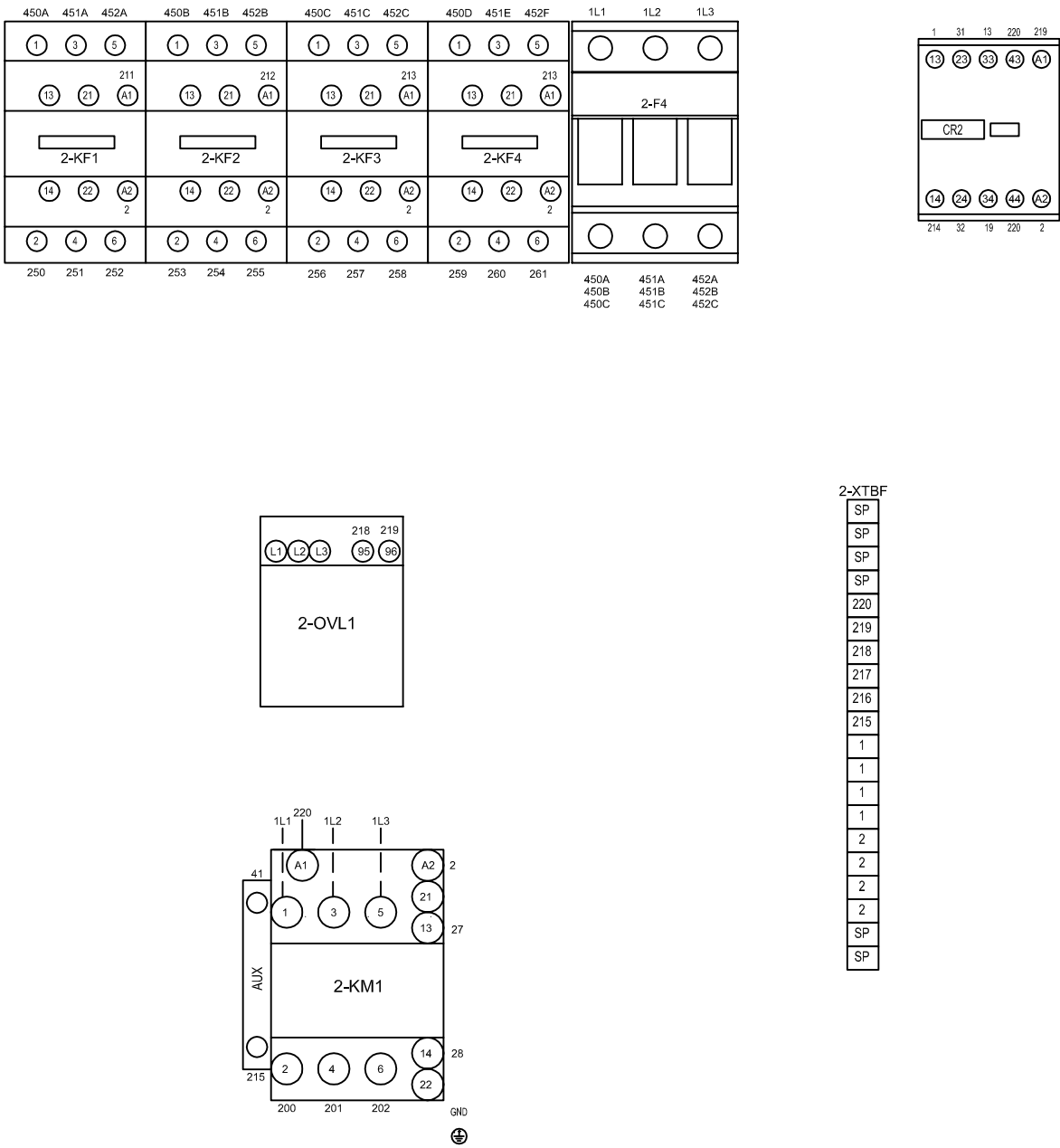


FIGURE 21 - POWER PANEL CONNECTION WIRING DIAGRAM (4 - CONTACTOR FAN CONTROL) (CONT'D)



FIGURE 22 - ELEMENTARY WIRING DIAGRAM - SOFT STARTER

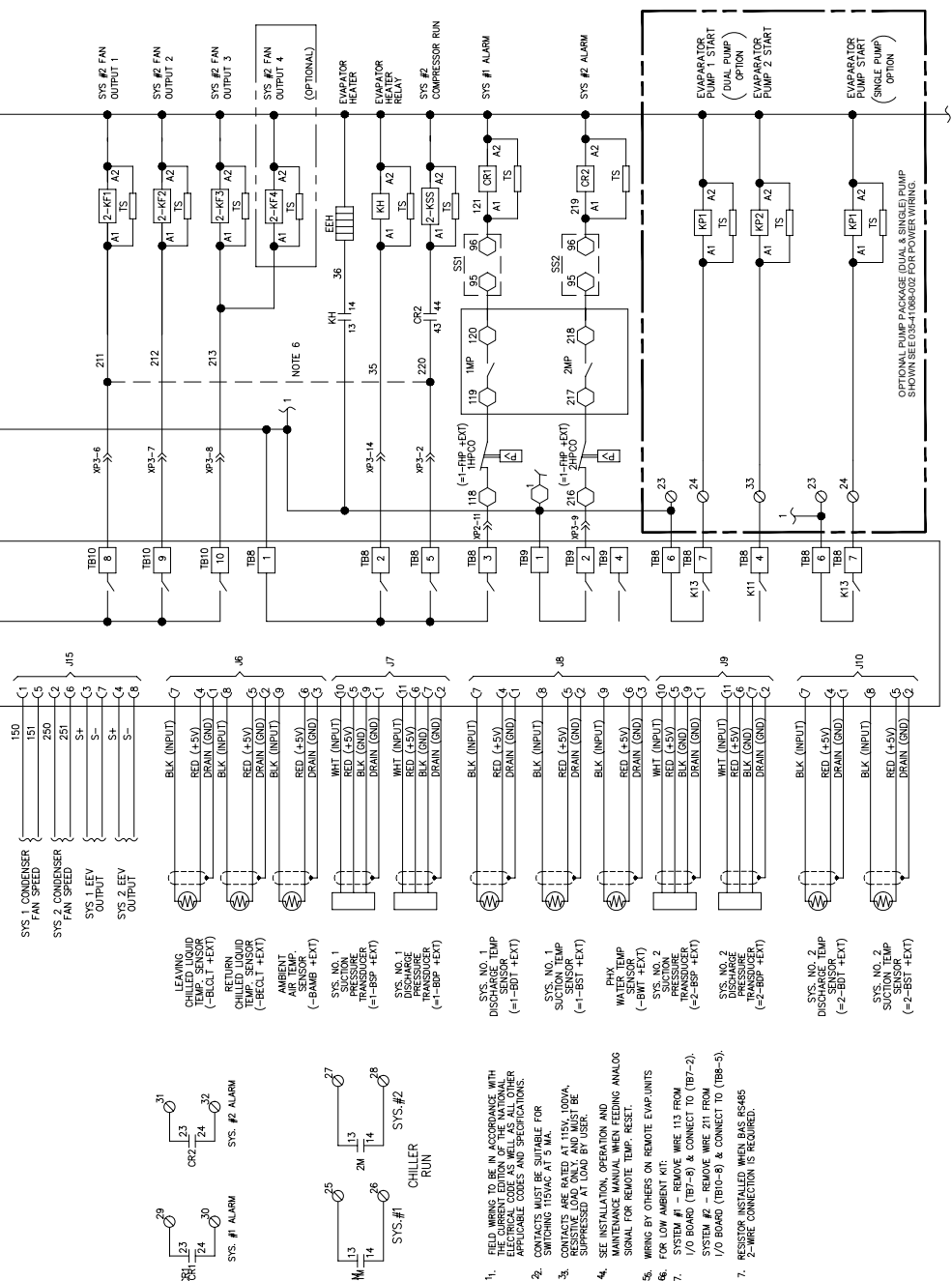
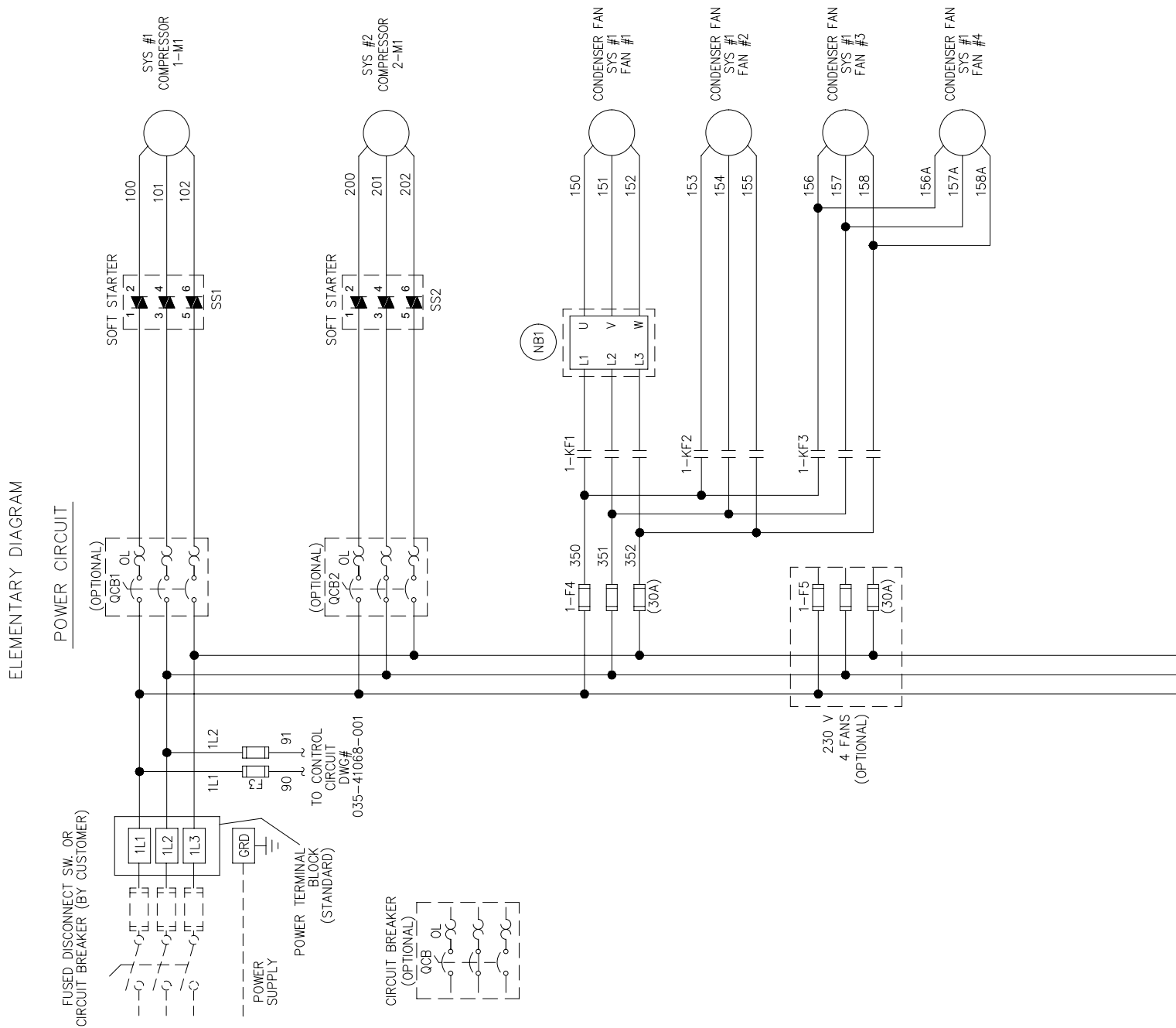


FIGURE 22 - ELEMENTARY WIRING DIAGRAM - SOFT STARTER (CONT'D)



LD20928c

FIGURE 23 - POWER ELEMENTARY WIRING DIAGRAM - SOFT STARTER (3 - CONTACTOR FAN CONTROL)

035-41068-010
REV -

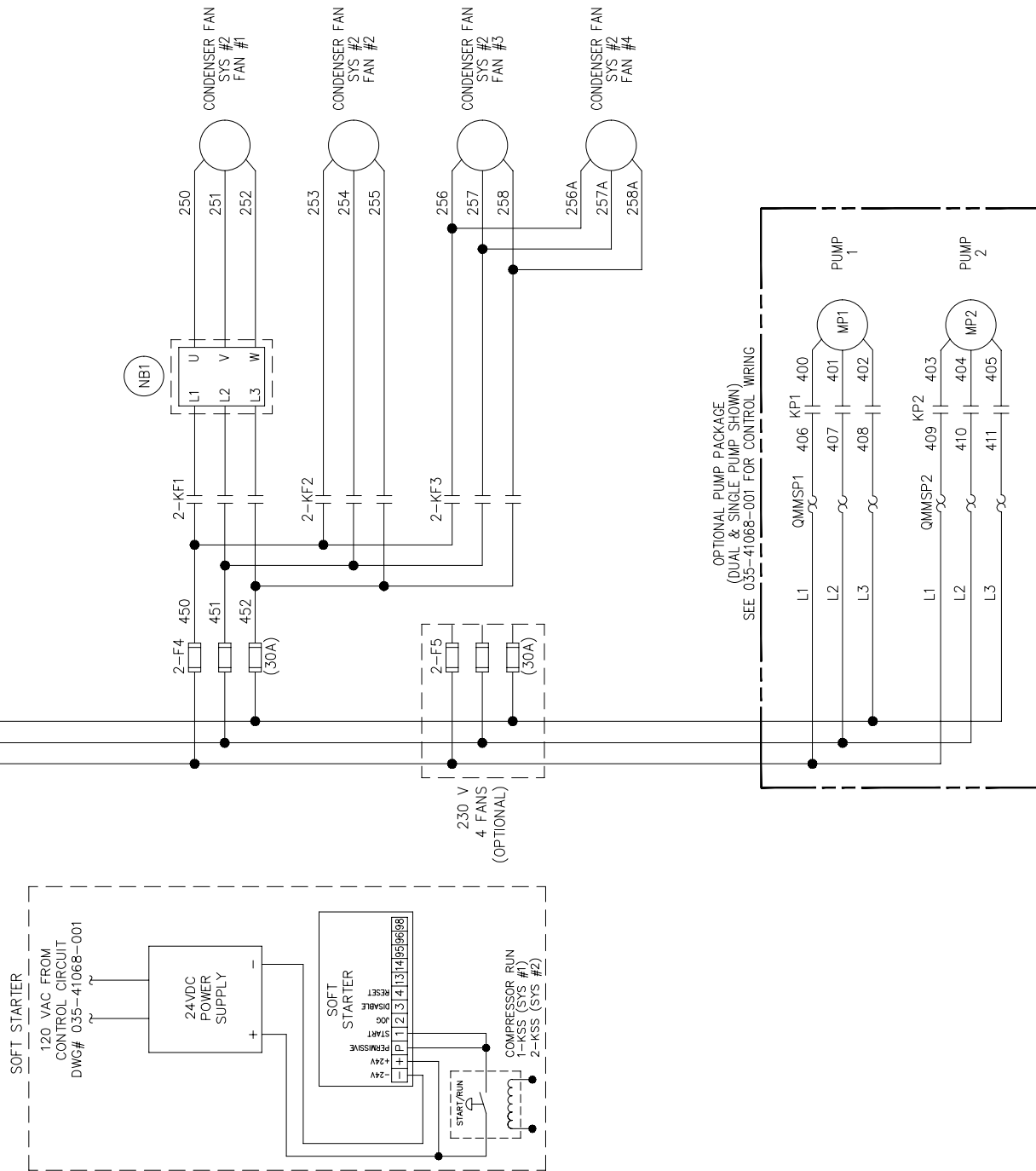
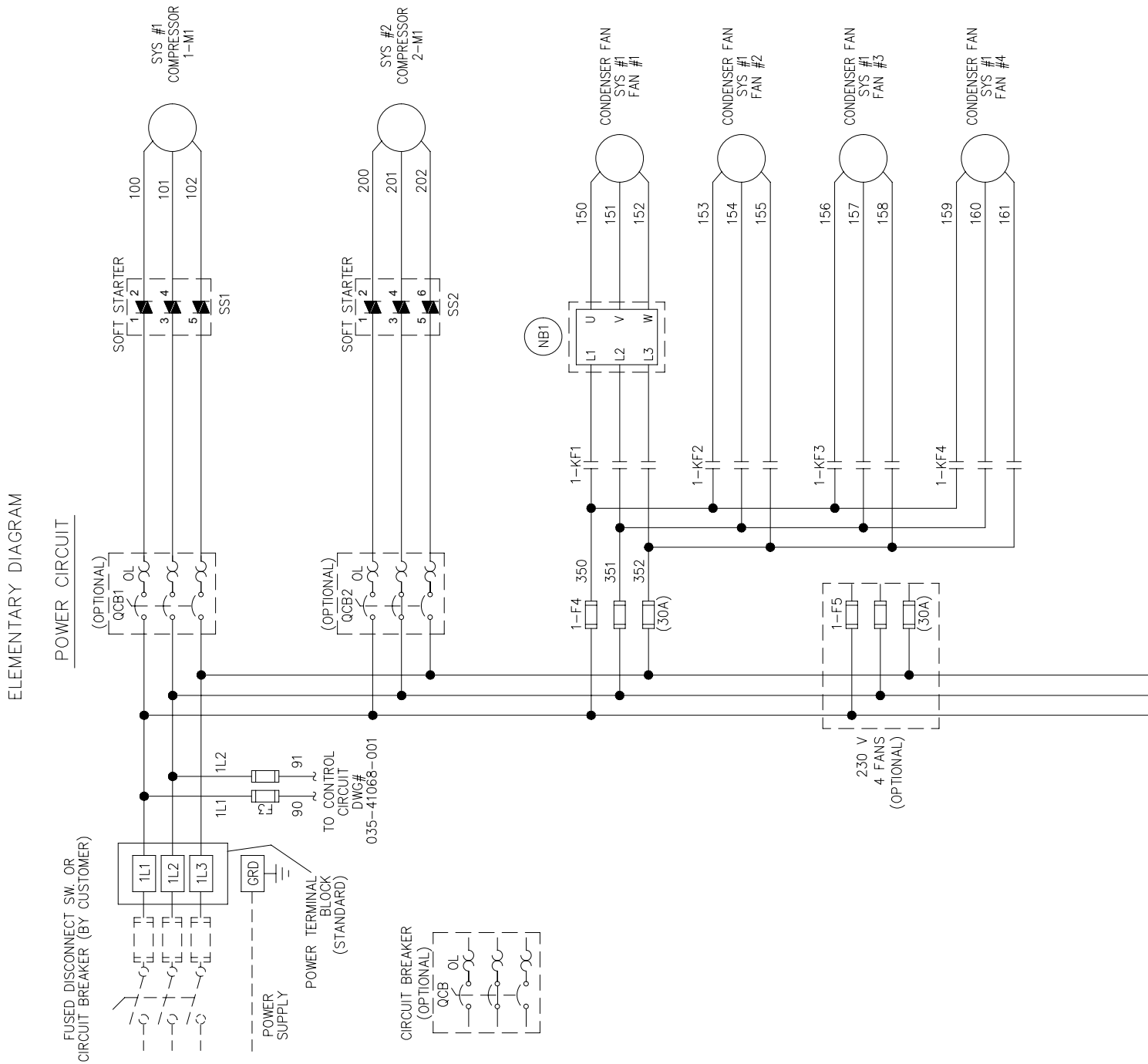


FIGURE 23 - POWER ELEMENTARY WIRING DIAGRAM - SOFT STARTER (3 - CONTACTOR FAN CONTROL) (CONT'D)



LD20929a

FIGURE 24 - POWER ELEMENTARY WIRING DIAGRAM - SOFT STARTER (4 - CONTACTOR FAN CONTROL)

035-41068-011
REV -

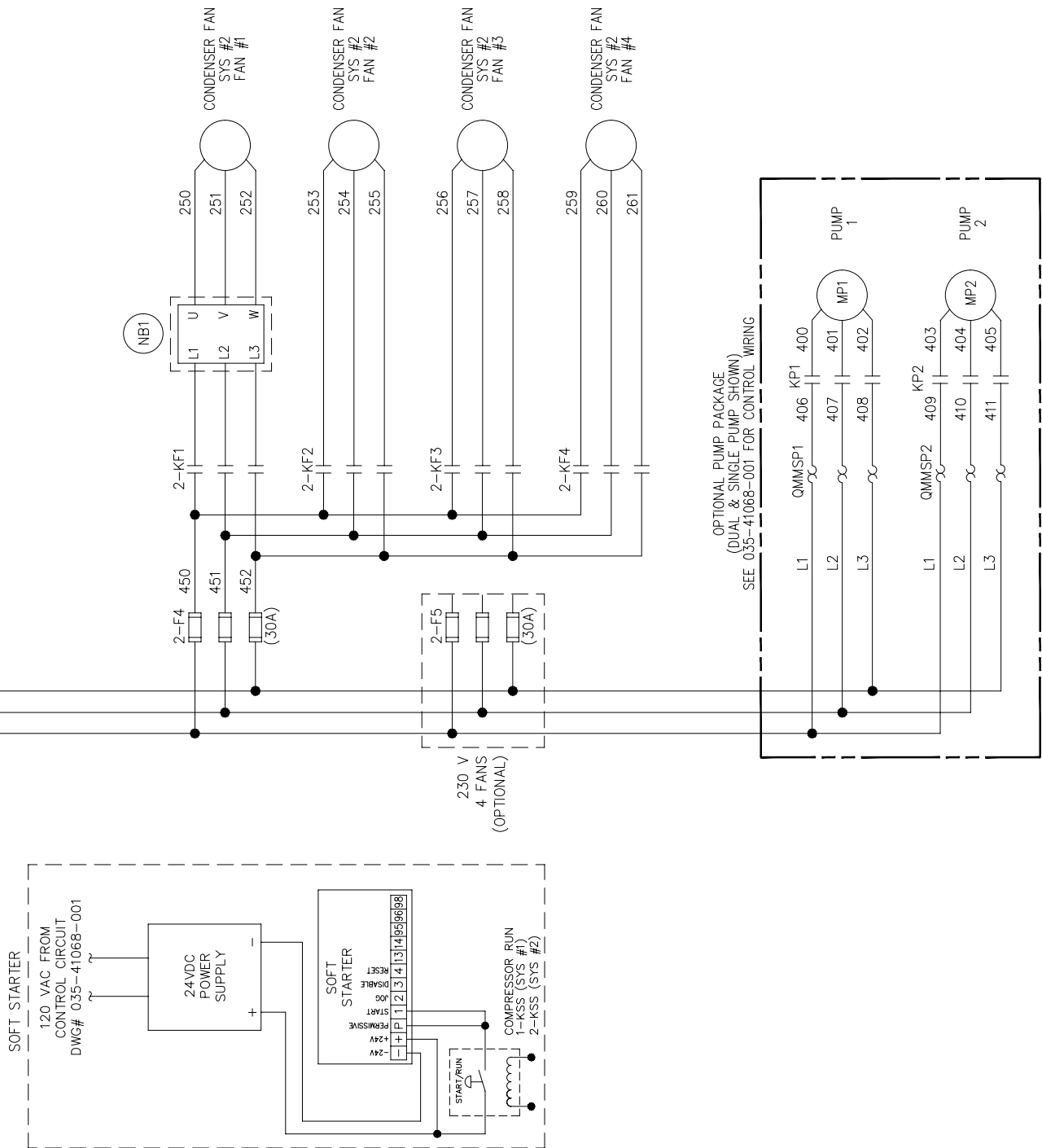
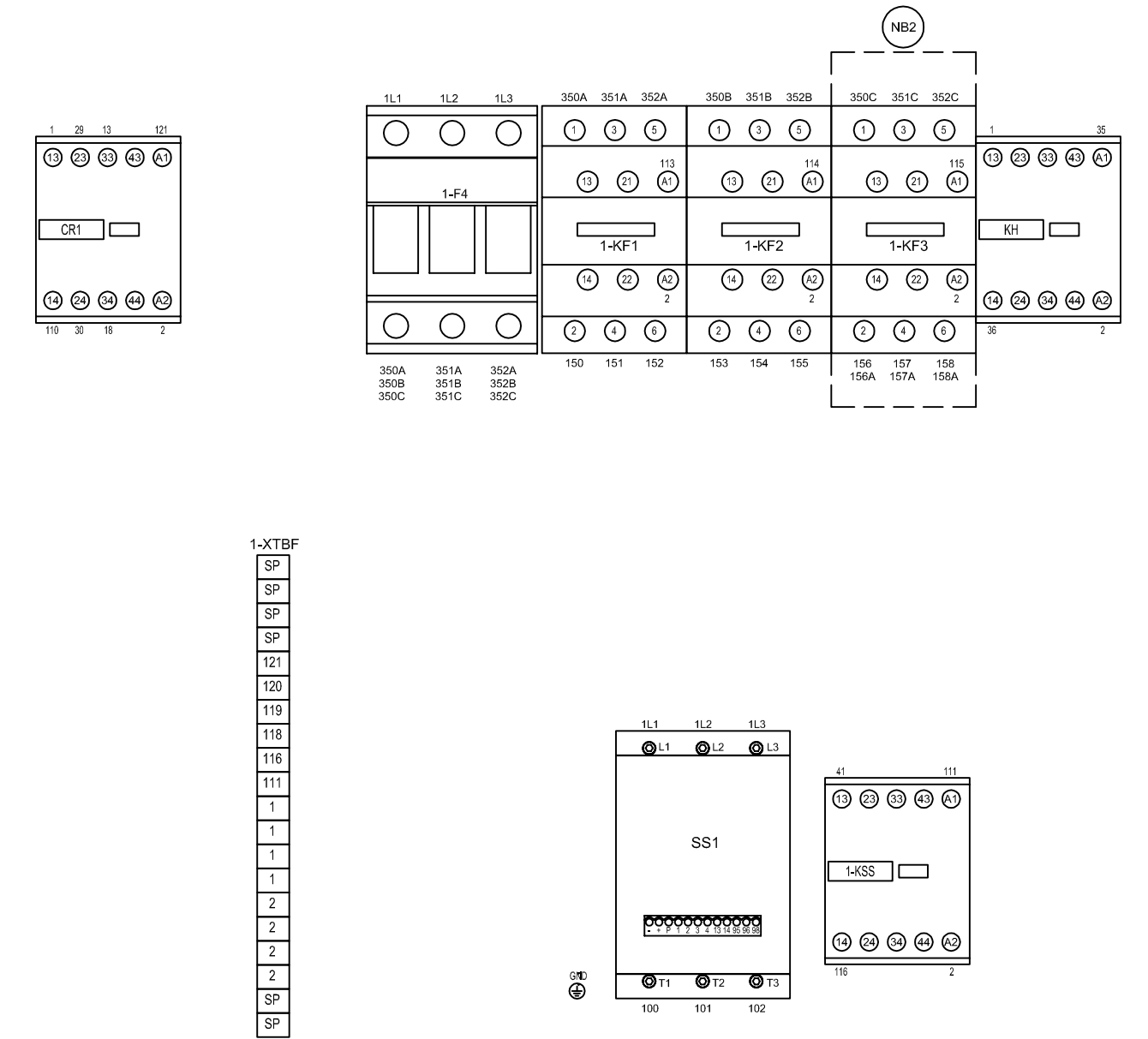


FIGURE 24 - POWER ELEMENTARY WIRING DIAGRAM - SOFT STARTER (4 - CONTACTOR FAN CONTROL) (CONT'D)



LD20930c

FIGURE 25 - POWER PANEL CONNECTION WIRING DIAGRAM - SOFT STARTER (3 - CONTACTOR FAN CONTROL)

035-41068-012
REV C

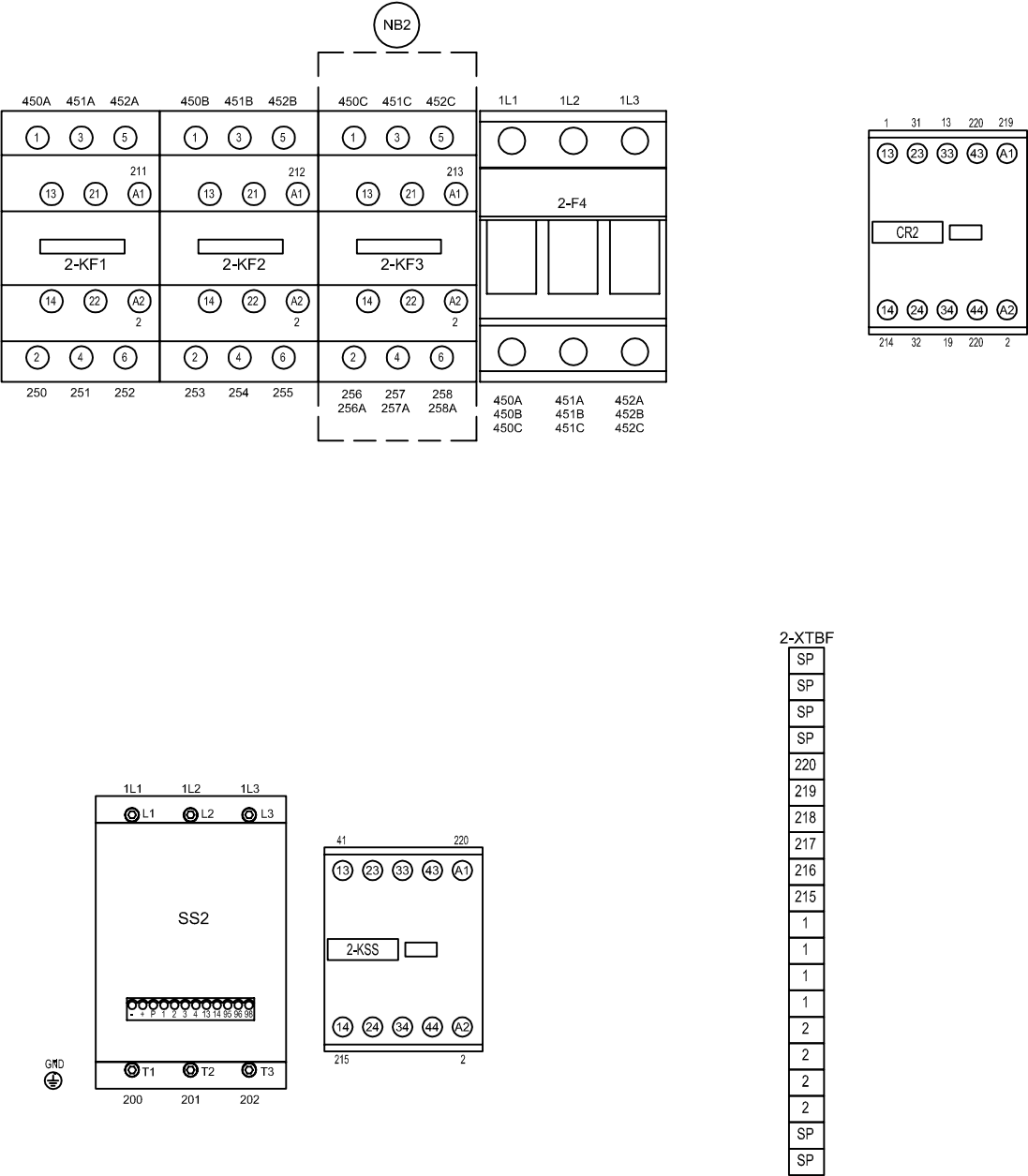
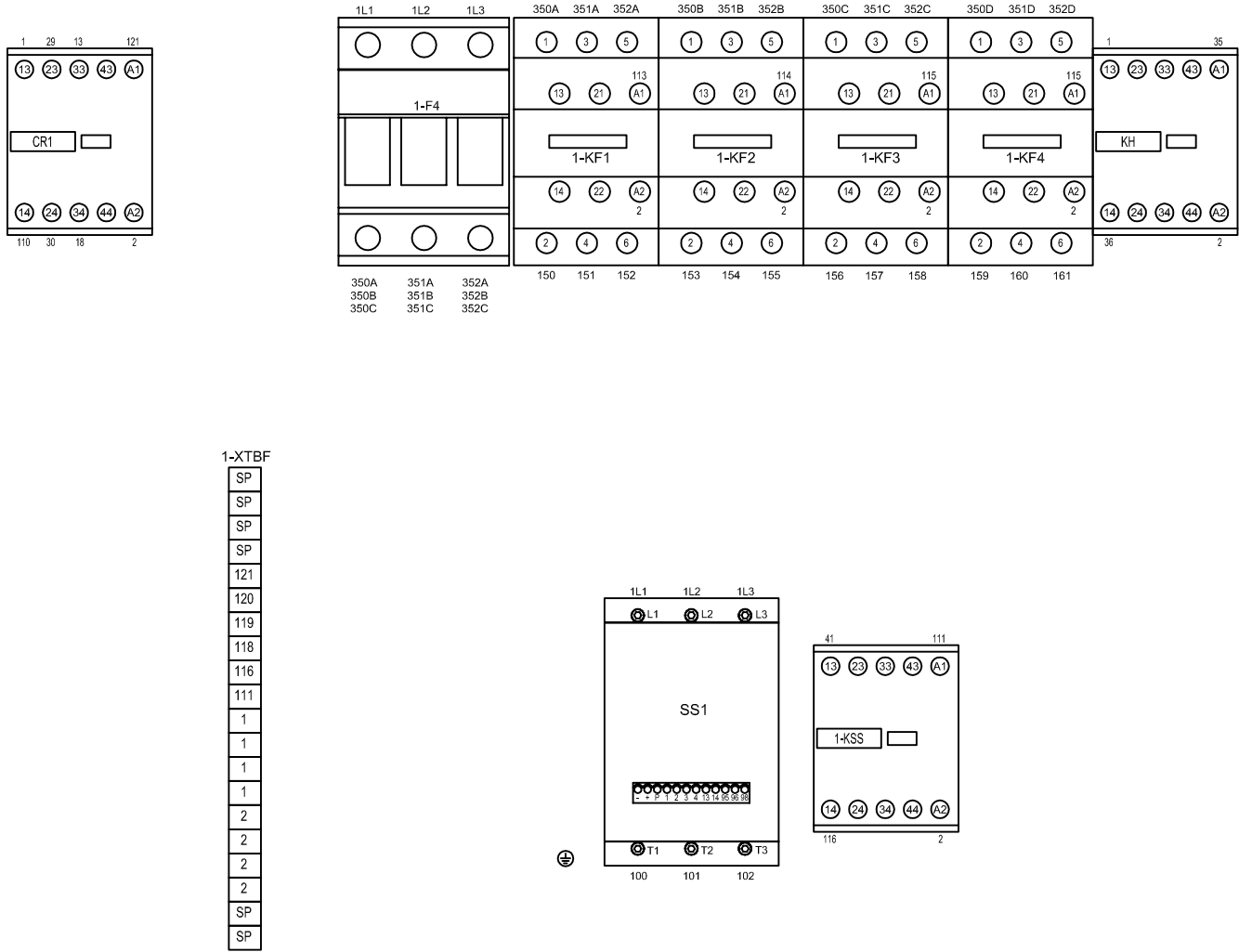


FIGURE 25 - POWER PANEL CONNECTION WIRING DIAGRAM - SOFT STARTER (3 - CONTACTOR FAN CONTROL) (CONT'D)



LD20931c

FIGURE 26 - POWER PANEL CONNECTION WIRING DIAGRAM - SOFT STARTER (4 - CONTACTOR FAN CONTROL)

035-41068-013
REV B

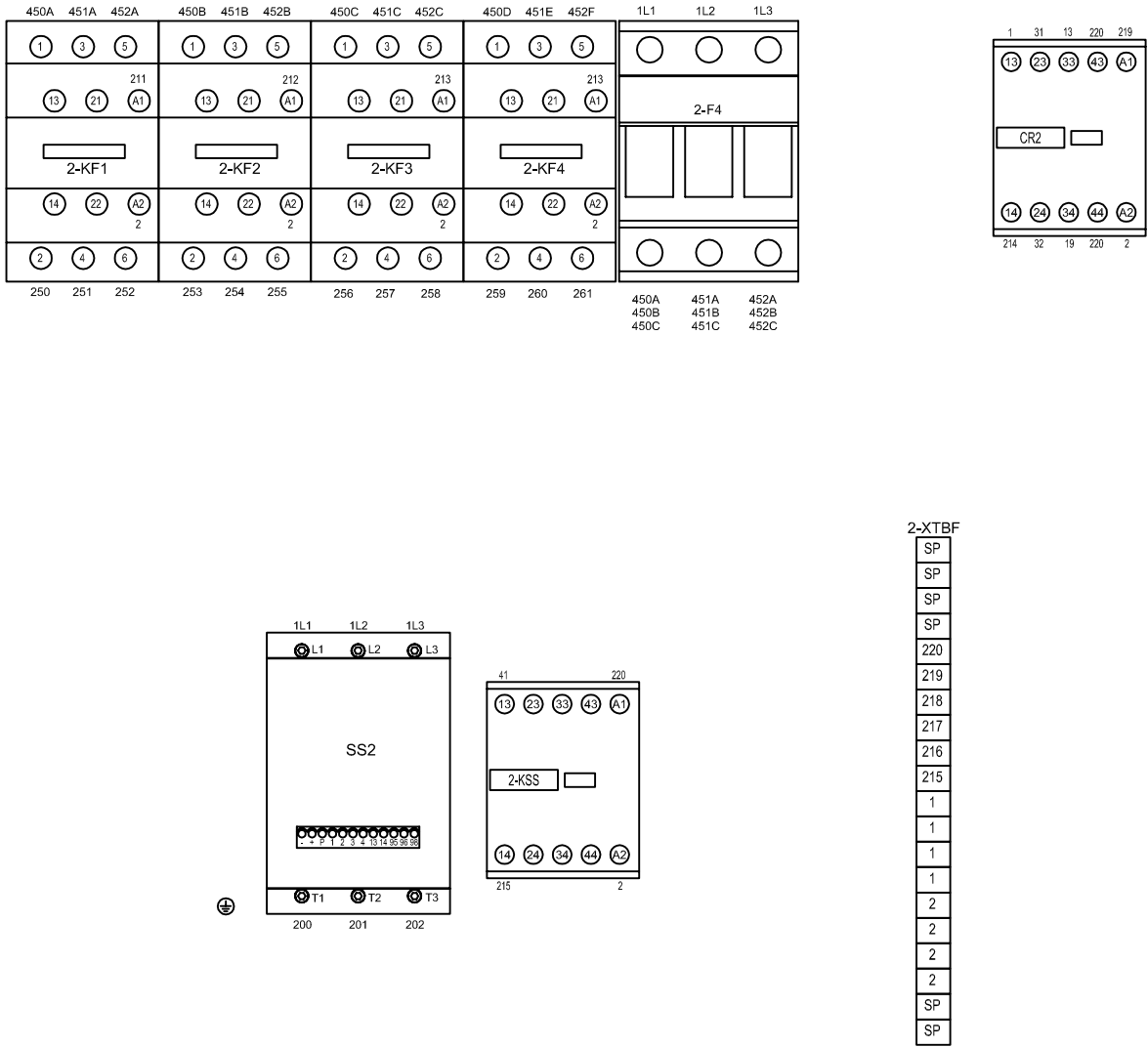
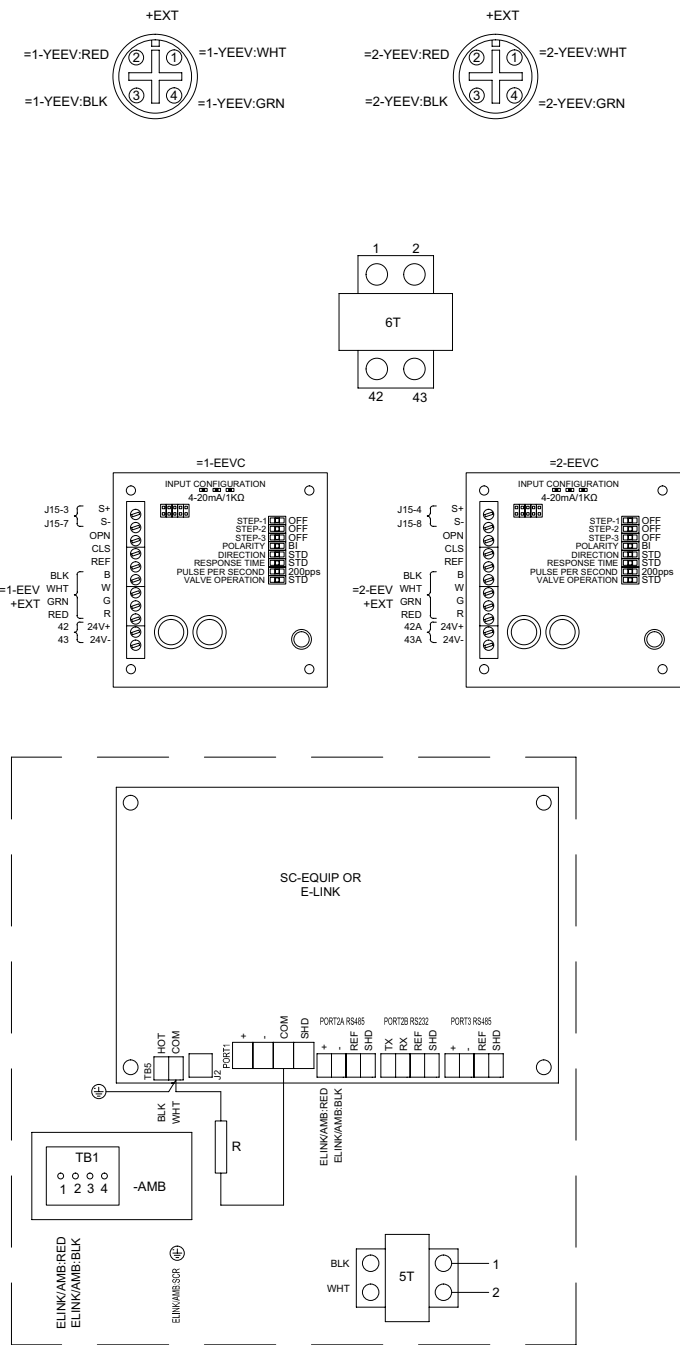


FIGURE 26 - POWER PANEL CONNECTION WIRING DIAGRAM - SOFT STARTER (4 - CONTACTOR FAN CONTROL) (CONT'D)



LD20932a

FIGURE 27 - MICRO PANEL CONNECTION WIRING DIAGRAM

035-41068-004
REV -

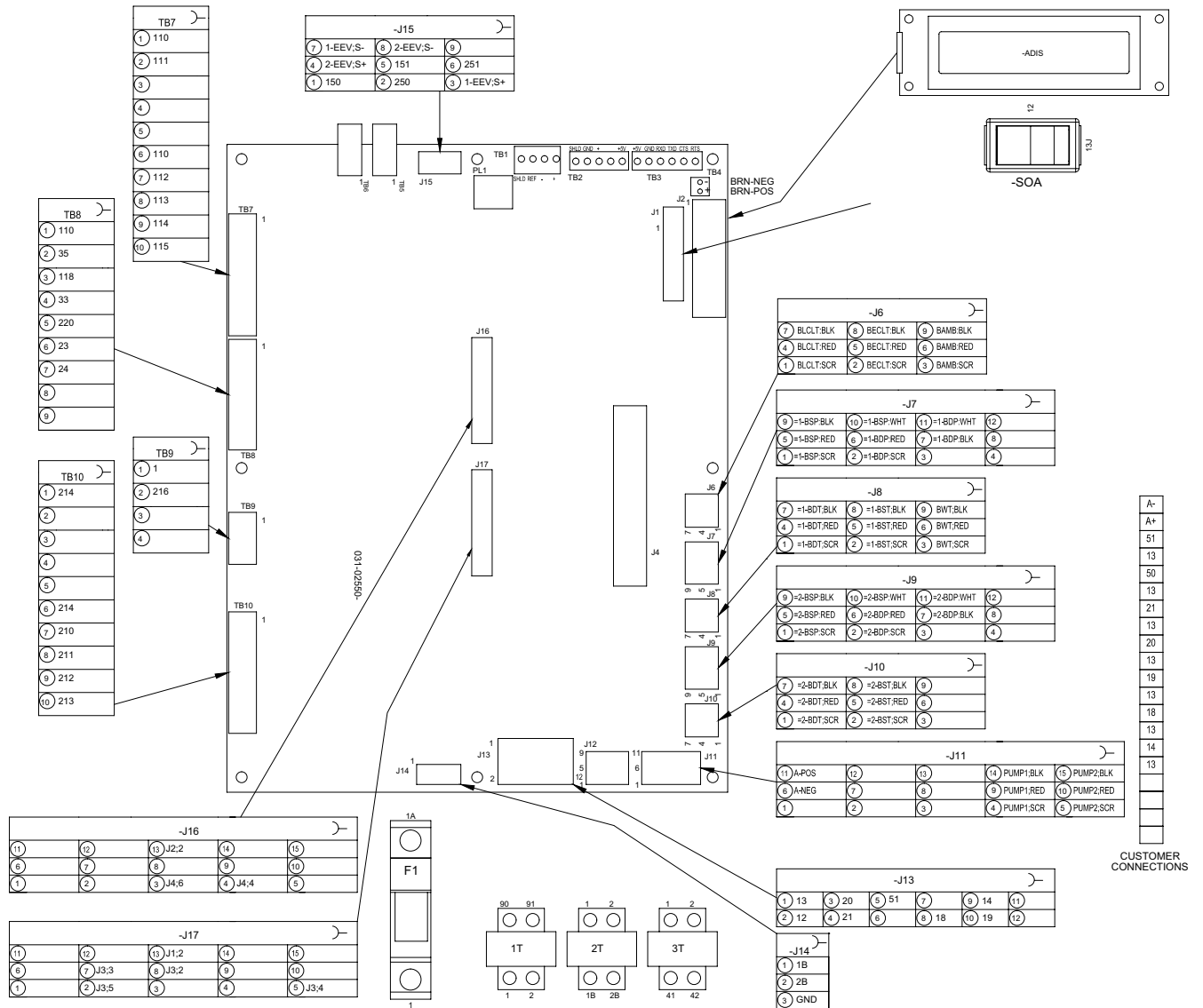
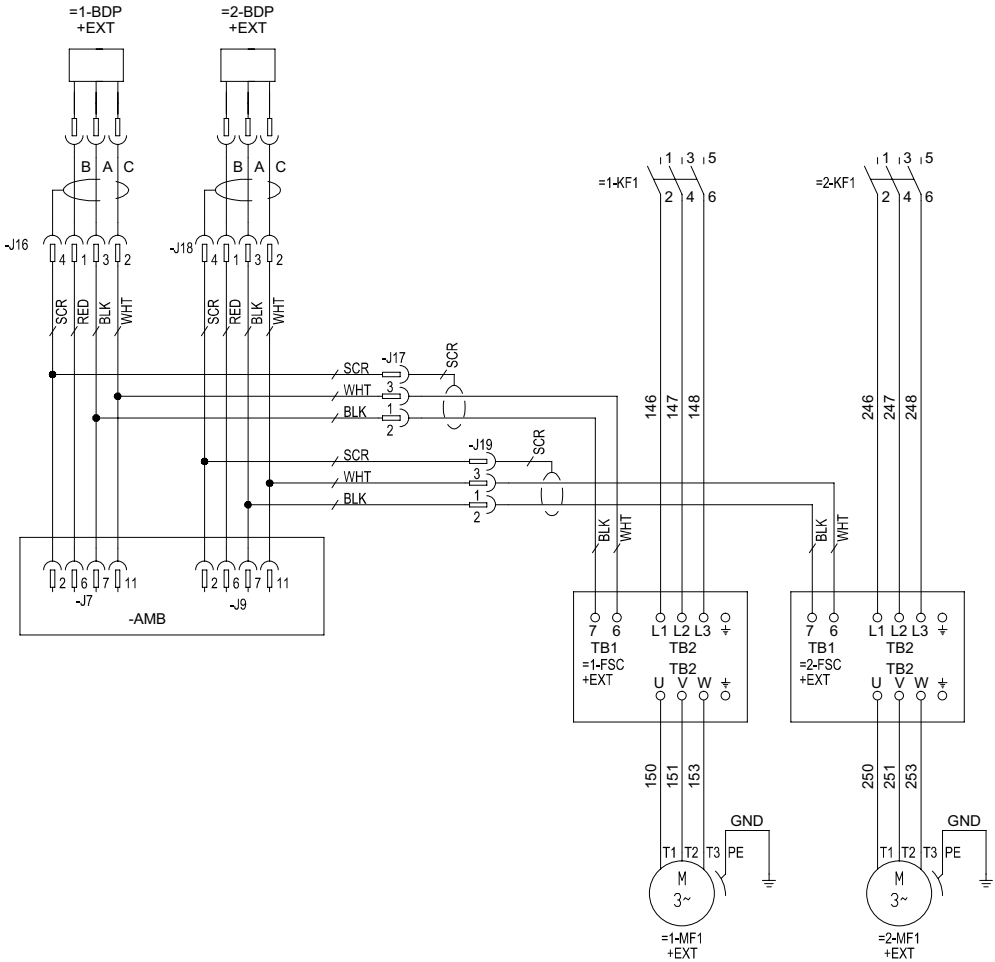


FIGURE 27 - MICRO PANEL CONNECTION WIRING DIAGRAM (CONT'D)

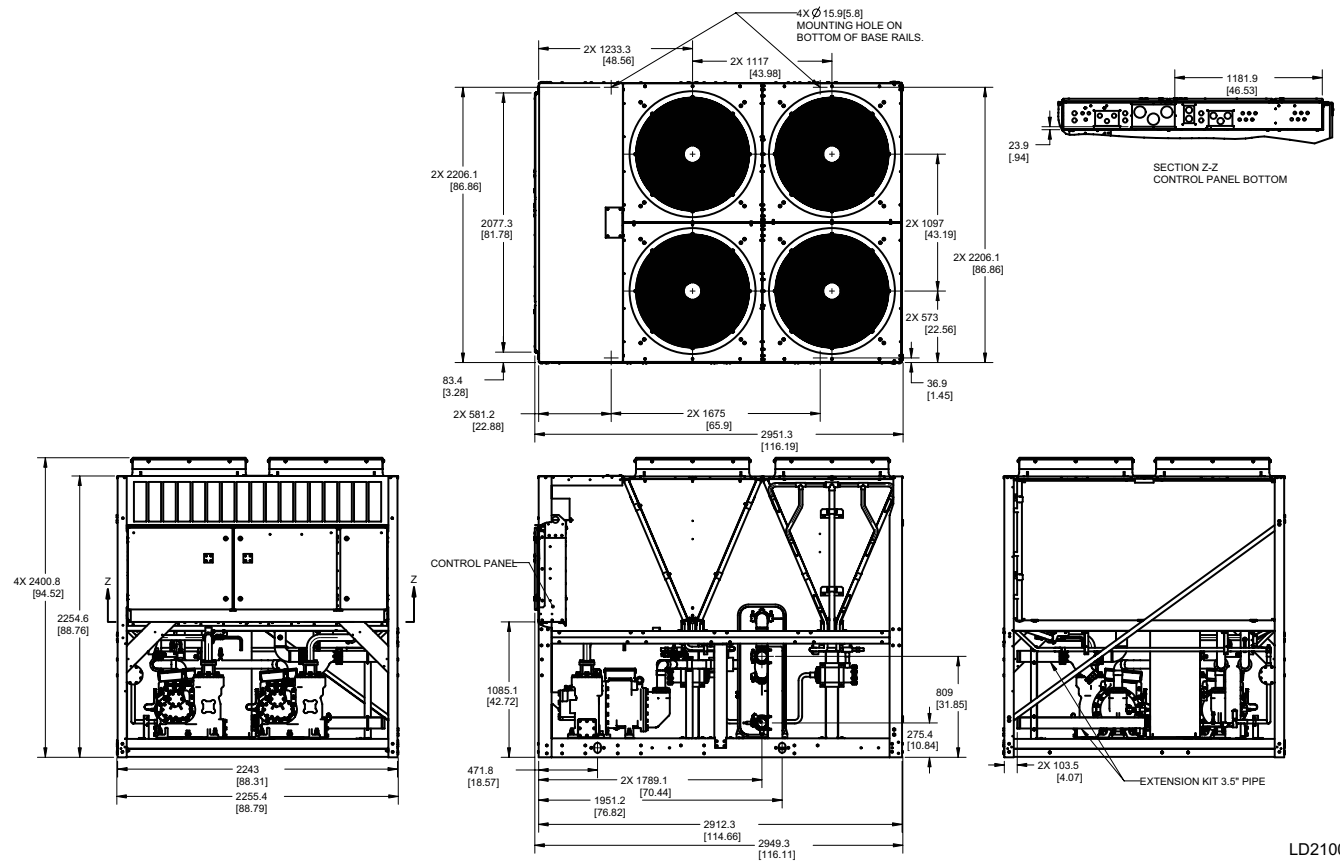
035-41068-008
REV -



LD20927

FIGURE 28 - LOW AMBIENT WIRING DIAGRAM

YSAA0070HA

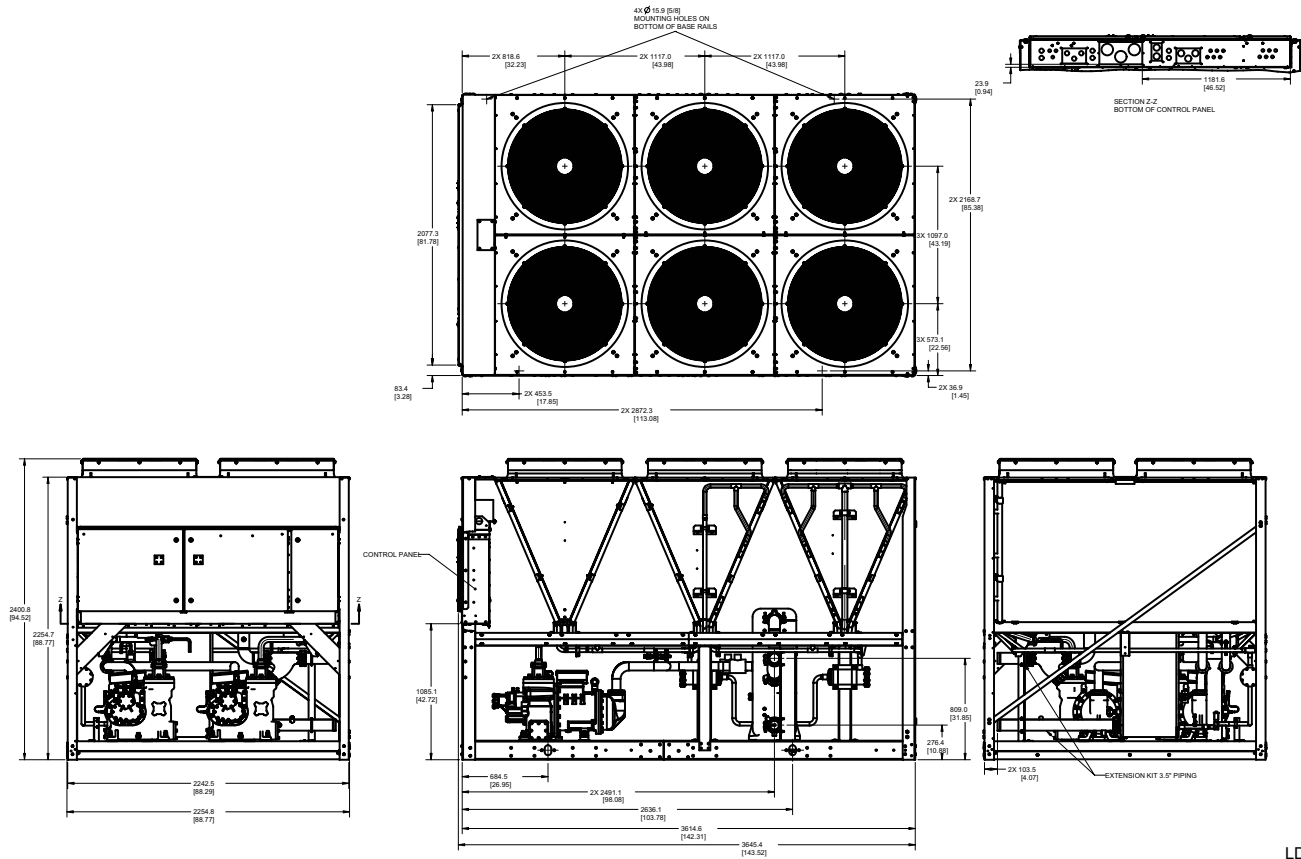


5

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. The unit controls will optimize operation without nuisance high-pressure safety cut-outs; however, the system designer must consider potential performance degradation. Access to the unit control center assumes the unit is no higher than on spring isolators. Recommended minimum clearances: Side to wall – 6'; rear to wall – 6'; control panel to end wall – 4'0"; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit.

FIGURE 29 - UNIT DIMENSIONS YSAA0070HA

YSAA0090HA

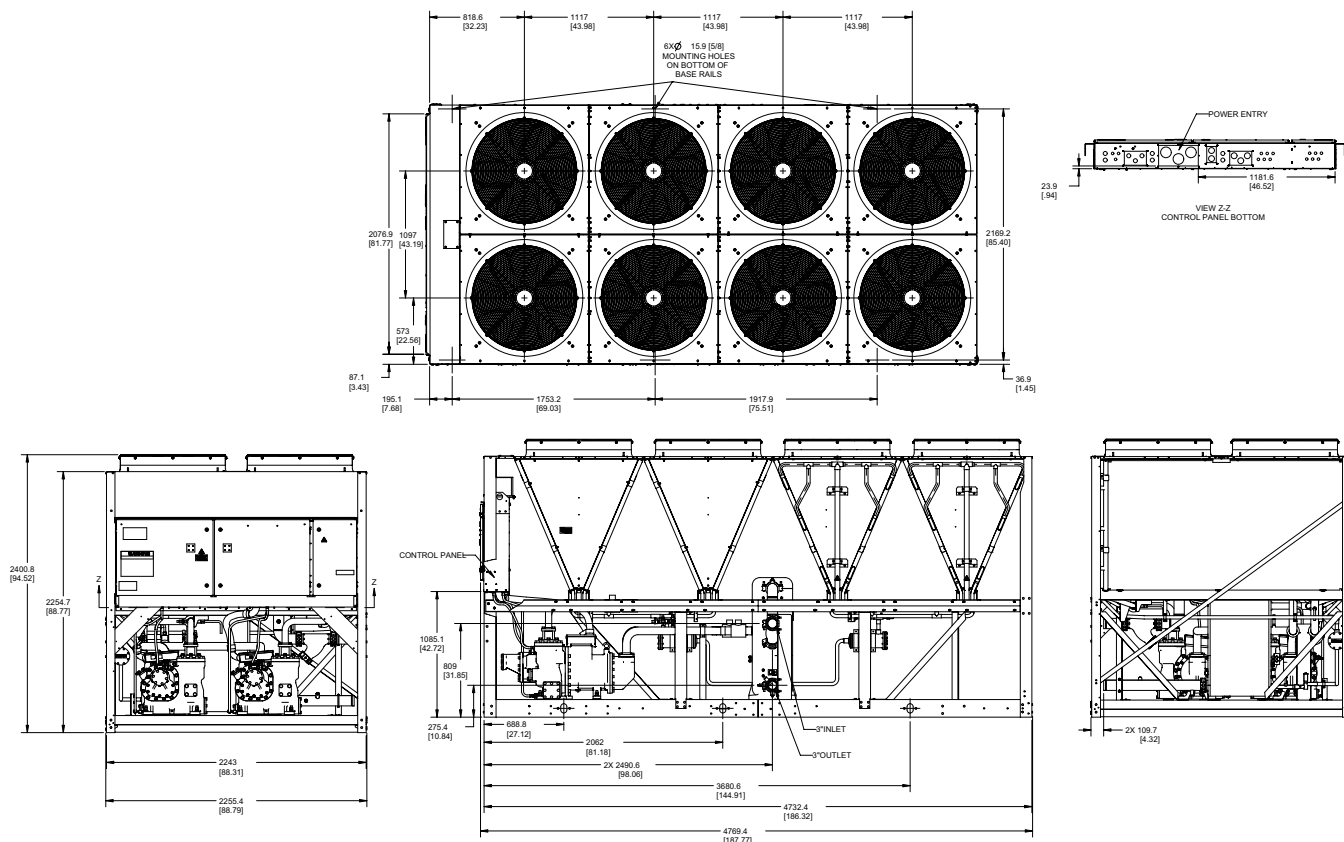
LD21005

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. The unit controls will optimize operation without nuisance high-pressure safety cut-outs; however, the system designer must consider potential performance degradation. Access to the unit control center assumes the unit is no higher than on spring isolators. Recommended minimum clearances: Side to wall – 6'; rear to wall – 6'; control panel to end wall – 4'0"; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit.

FIGURE 30 - UNIT DIMENSIONS YSAA0090HA

YSAA0110HA



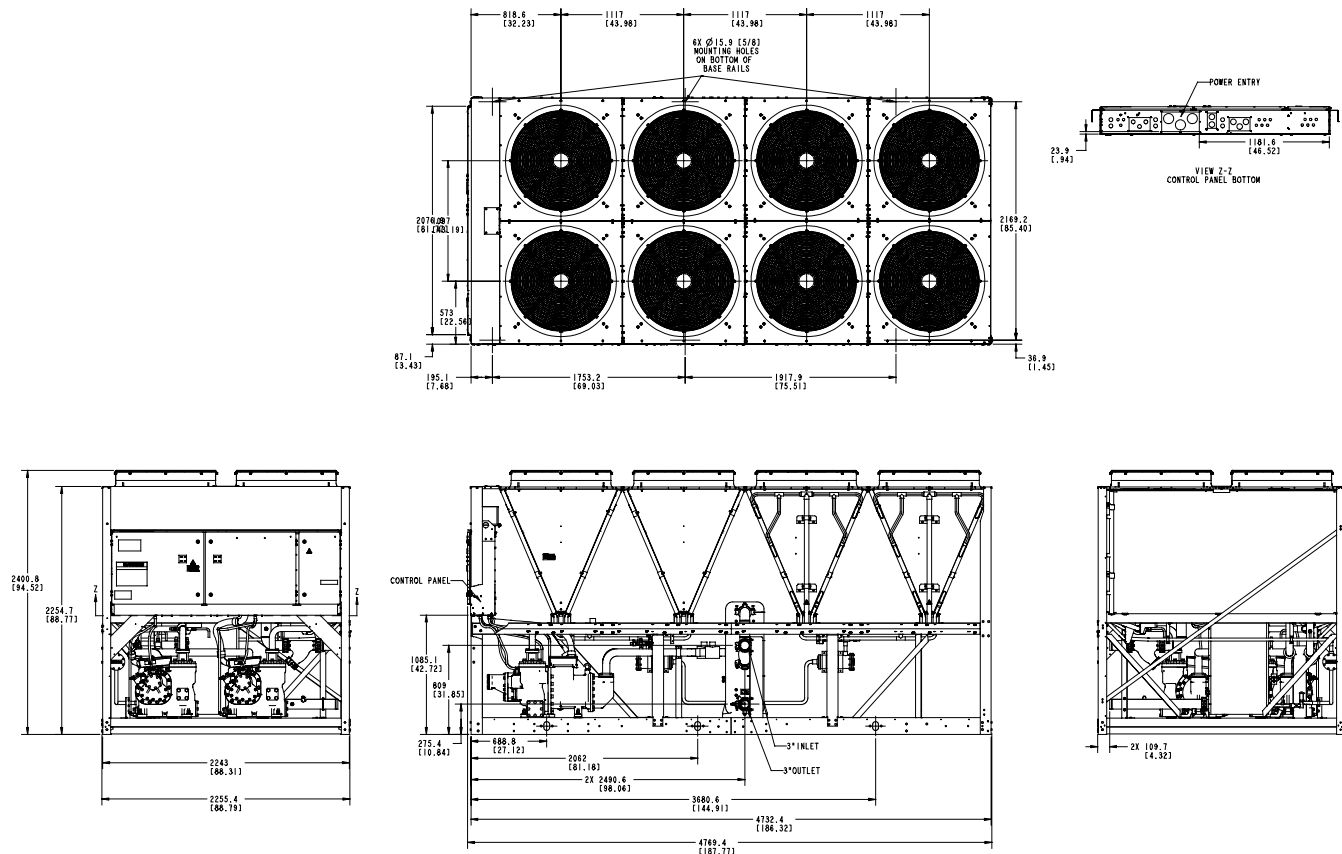
LD20510

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. The unit controls will optimize operation without nuisance high-pressure safety cut-outs; however, the system designer must consider potential performance degradation. Access to the unit control center assumes the unit is no higher than on spring isolators. Recommended minimum clearances: Side to wall – 6'; rear to wall – 6'; control panel to end wall – 4'0"; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit.

FIGURE 31 - UNIT DIMENSIONS YSAA0110HA

YSAA0130HA



LD22065

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. The unit controls will optimize operation without nuisance high-pressure safety cut-outs; however, the system designer must consider potential performance degradation. Access to the unit control center assumes the unit is no higher than on spring isolators. Recommended minimum clearances: Side to wall – 6'; rear to wall – 6'; control panel to end wall – 4'0"; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit.

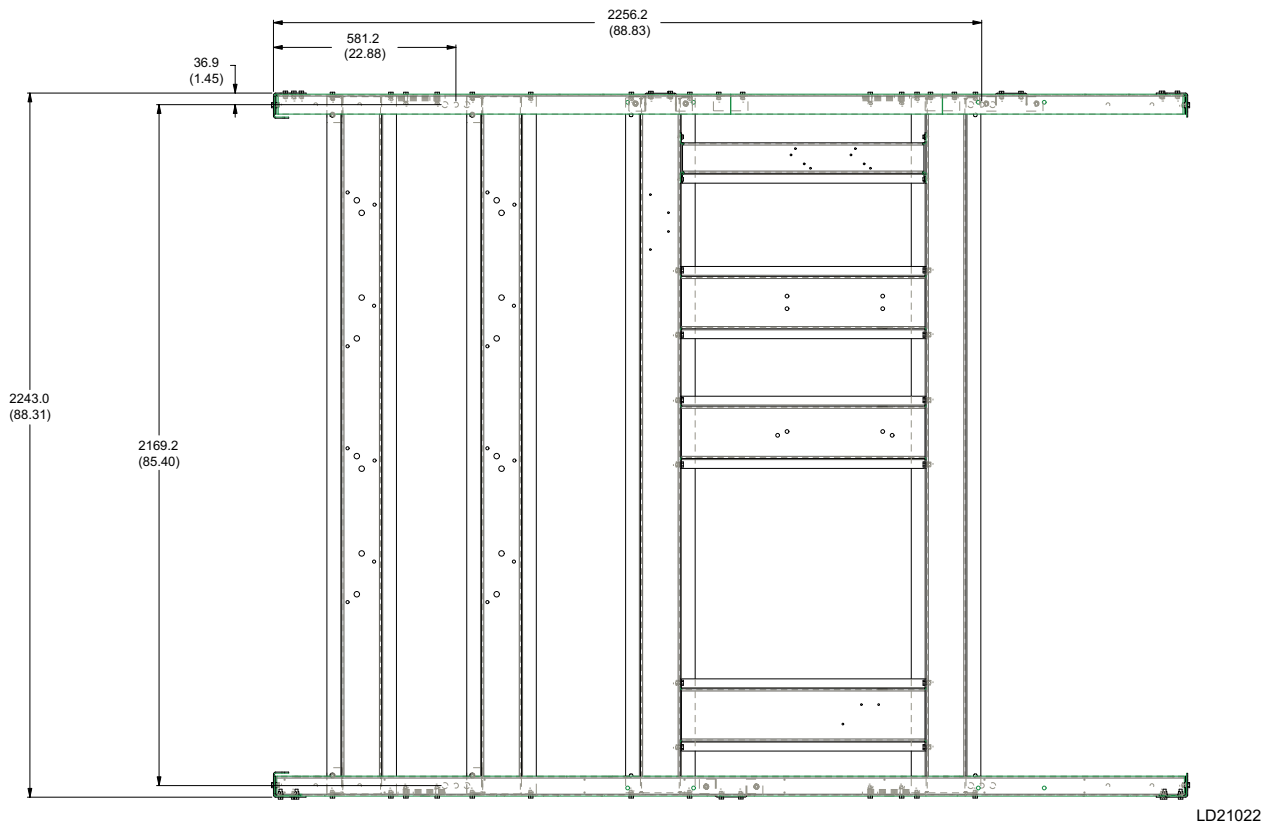
FIGURE 32 - UNIT DIMENSIONS YSAA0130HA

WEIGHT DISTRIBUTION AND ISOLATOR MOUNTING POSITIONS

General

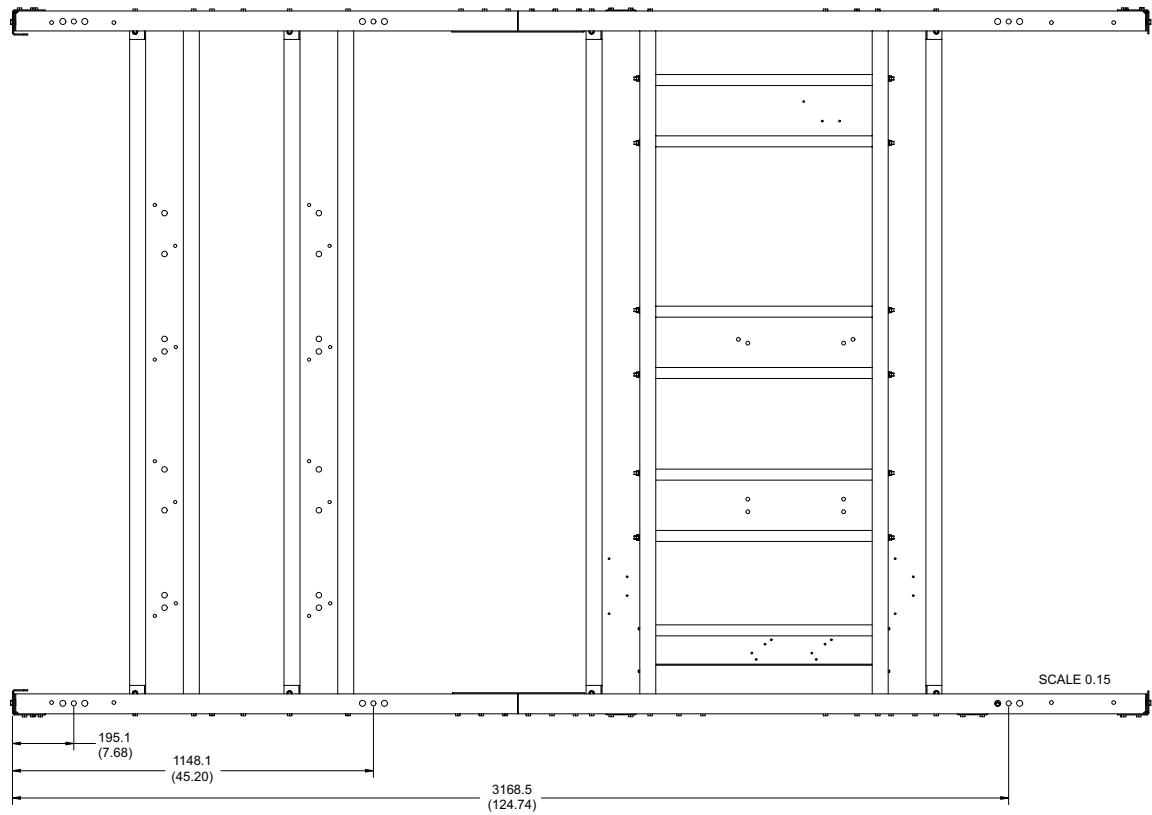
Weights of specific chiller models vary significantly as options are added. As a result, total weights, weights at individual isolator positions, and actual isolator selection at each position cannot be published due to the vast number of possible combinations. This information will be available when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

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



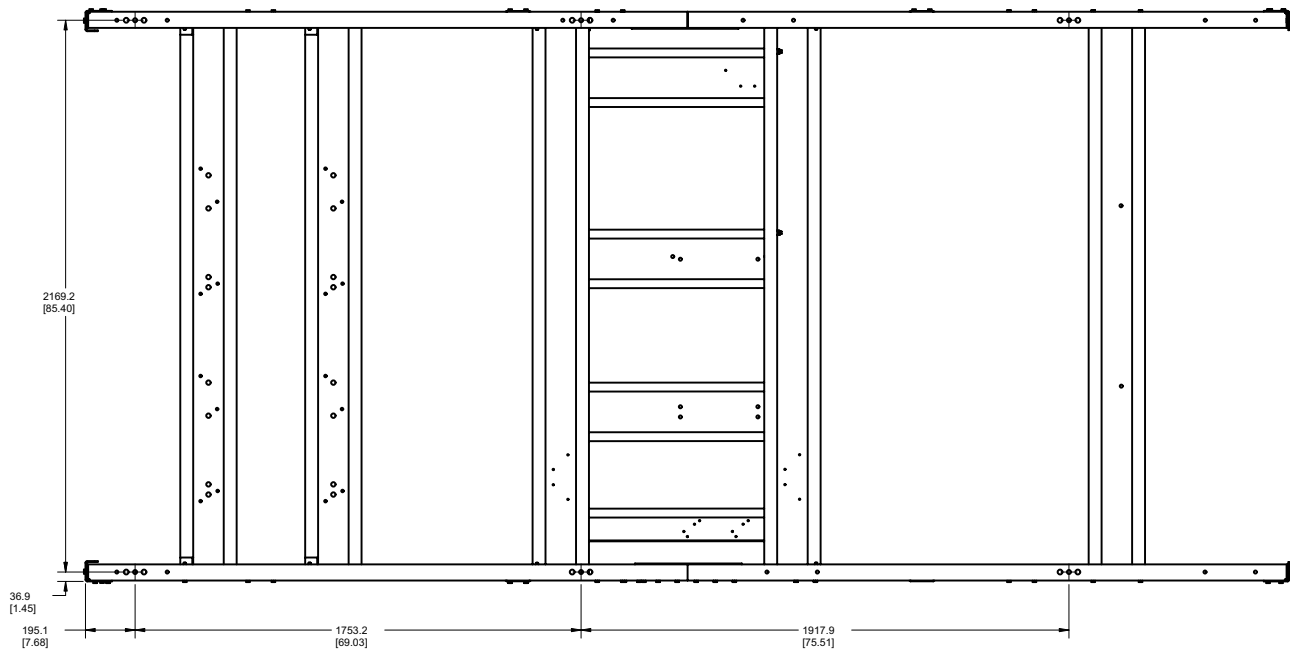
All dimensions are inches unless otherwise specified.
Dimensions indicate isolator mounting centerlines.

FIGURE 33 - ISOLATOR LOCATIONS - FOUR FAN



All dimensions are inches unless otherwise specified.
Dimensions indicate isolator mounting centerlines.

FIGURE 34 - ISOLATOR LOCATIONS - SIX FAN

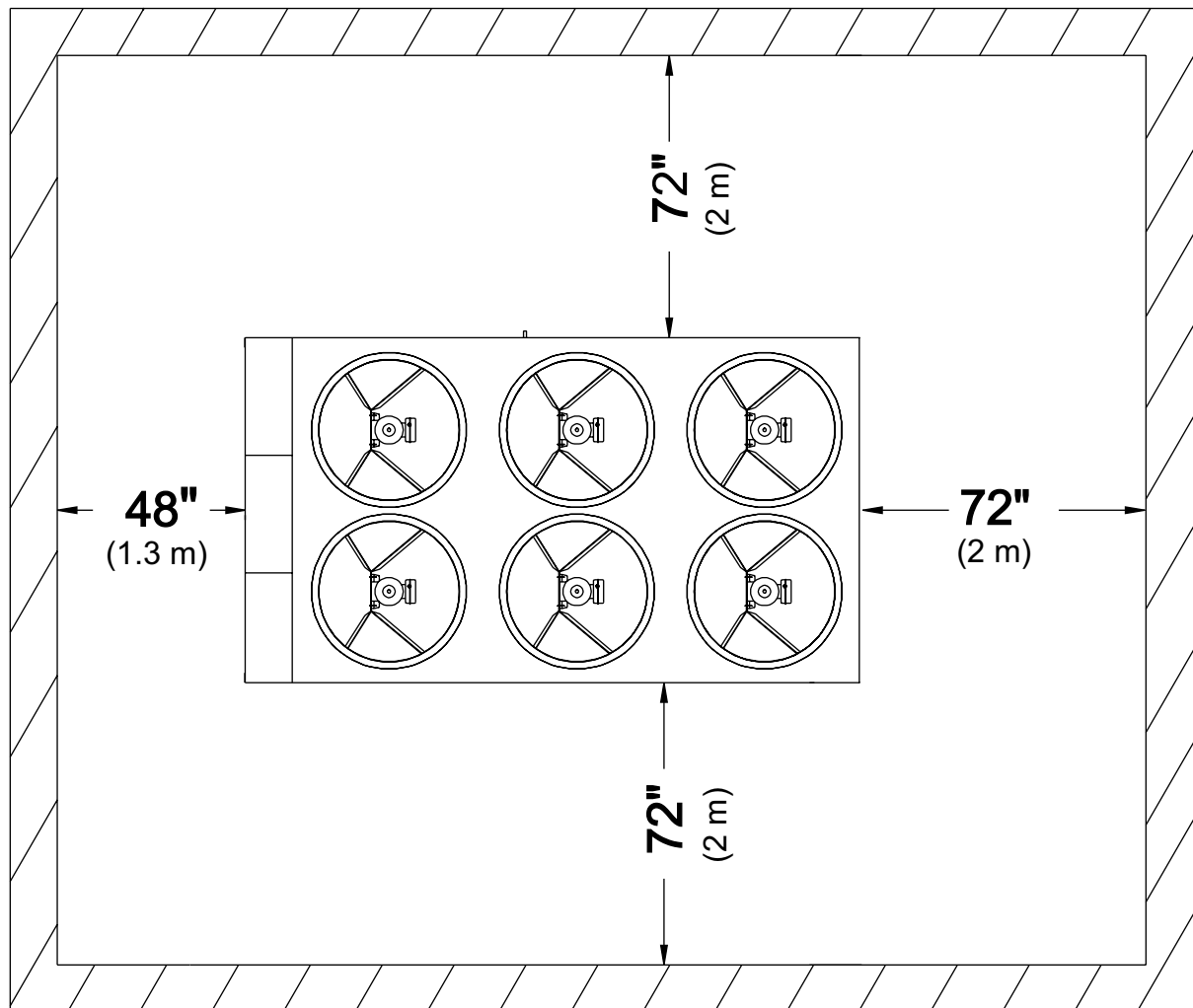


All dimensions are inches unless otherwise specified.
Dimensions indicate isolator mounting centerlines.

FIGURE 35 - ISOLATOR LOCATIONS - EIGHT FAN

CLEARANCES

To ensure proper airflow and serviceability around the unit, the figure below displays the minimum clearances for all YSAA units.



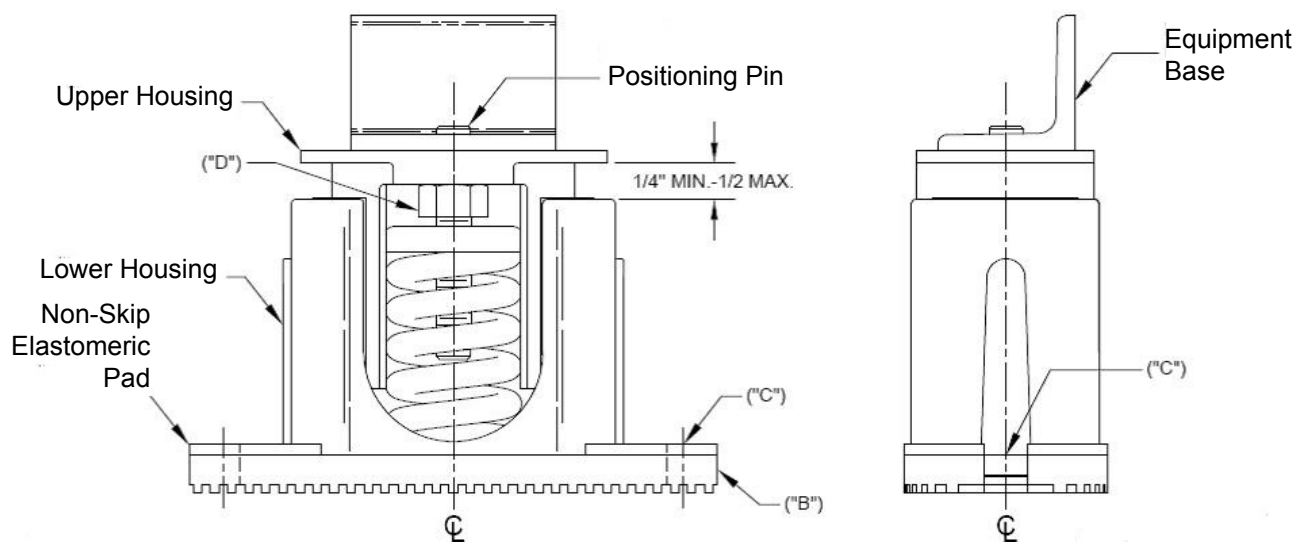
NOTES:

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

FIGURE 36 - UNIT CLEARANCES – ALL MODELS

ONE INCH DEFLECTION SPRING ISOLATORS INSTALLATION INSTRUCTIONS

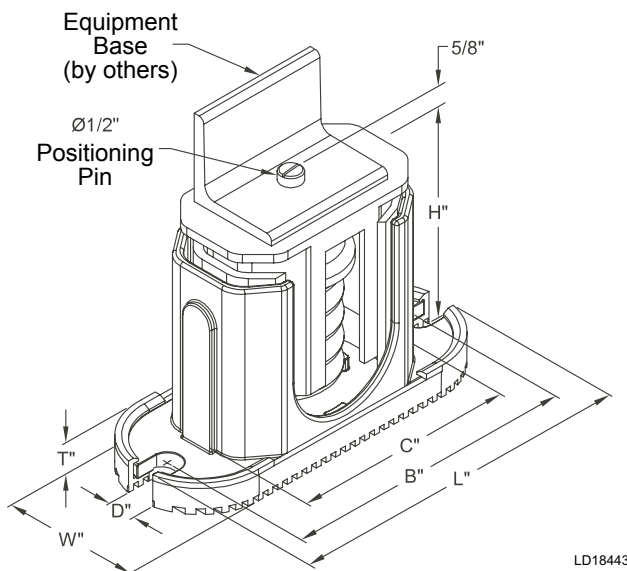
1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad or sub-base, ensuring that all isolators centerlines 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.



LD21001

ISOLATOR INFORMATION

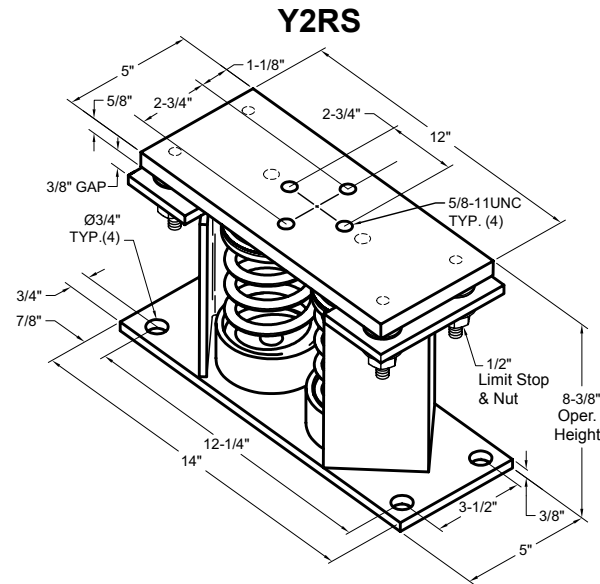
ONE INCH DEFLECTION SPRING ISOLATOR (CPX-X-)



MOUNT	DIMENSION DATA INCHES (MM)						
	W	D	L	B	C	T	H
CP1	3 (76)	0.625 (16)	7.75 (197)	6.5 (165)	4.75 (121)	0.5 (13)	4.625 (117)
CP2	3 (76)	0.625 (16)	10.5 (267)	9.25 (235)	7.75 (197)	0.5625 (14)	6 (152)

MOUNT	RATED CAPACITY LBS (KG)	DEFLECTION RATED IN (MM)	COLOR CODE
CP1-1D-85	85 (39)	1020 (463)	LT. PURPLE
CP1-1D-120	120 (54)	1.2 (30)	DK. YELLOW
CP1-1D-175	175 (79)	1.17 (30)	DK. BLUE
CP1-1D-250	250 (113)	1.4 (36)	YELLOW
CP1-1D-340	340 (154)	1.13 (29)	RED
CP1-1D-510	510 (231)	1.02 (26)	BLACK
CP1-1D-675	675 (306)	1.32 (34)	DK. PURPLE
CP1-1D-900	900 (408)	1.02 (26)	DK. GREEN
CP1-1D-1200	1200 (544)	0.9 (23)	GRAY
CP1-1D-1360	1360 (617)	0.77 (20)	WHITE
CP1-1D-1785N	1785 (810)	0.88 (22)	GRAY/RED

MOUNT	RATED CAPACITY LBS (KG)	DEFLECTION RATED IN (MM)	COLOR CODE
CP2-1D-1020	1020 (463)	1.020 (46)	BLACK
CP2-1D-1350	1350 (612)	1.32 (34)	DK. PURPLE
CP2-1D-1800	1800 (816)	1.02 (26)	DK. GREEN
CP2-1D-2400	2400 (1089)	0.9 (23)	GRAY
CP2-1D-2720	2720 (1234)	0.77 (20)	WHITE
CP2-1D-3570N	3570 (1619)	0.88 (22)	GRAY/RED

2" DEFLECTION ISOLATOR CROSS-REFERENCE

LD13761A

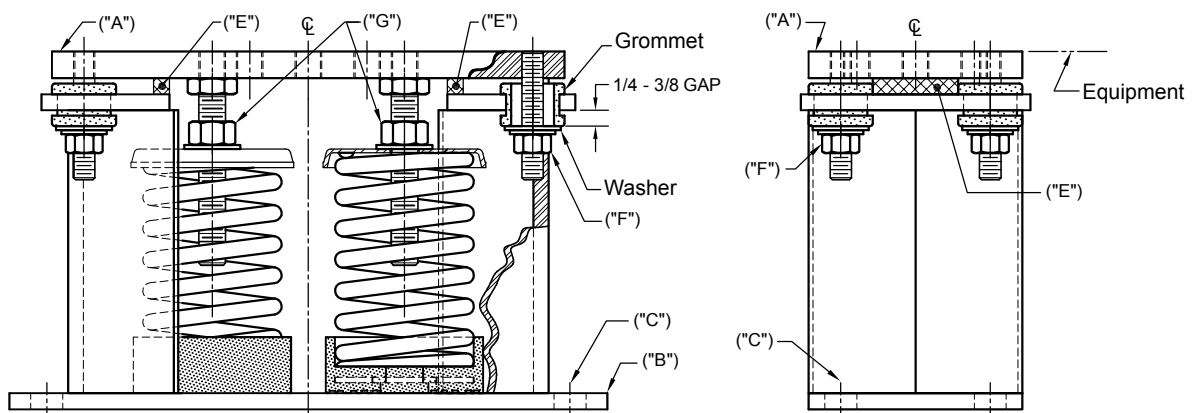
1. All dimensions are in inches, interpret per ANSI Y14.
2. Standard finish: housing-powder coated (color, black), spring-powder coated (color, see table below) hardware - zinc-electroplate.
3. Equipment must be bolted or welded to the top plate to meet allowable seismic ratings.
4. All springs are designed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

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

SEISMIC MOUNT SIZE	RATED LOAD (LBS)	RATED DEFLECTION (IN)	SPRING RATE (LBS/IN)	SOLID LOAD (LBS)	COLOR CODE	ALLOWABLE G RATING HORIZONTAL
Y2RSI-2D-150	150	2.4	62	234	WHITE	34.7
Y2RSI-2D-320	320	2.3	140	490	YELLOW	16.3
Y2RSI-2D-460	460	2.3	200	688	GREEN	11.3
Y2RSI-2D-710	710	2.2	330	1072	DK BROWN	7.3
Y2RSI-2D-870	870	1.9	460	1312	RED	6
Y2RSI-2D-1200N	1200	1.9	638	1818	RED/BLACK	4.3
Y2RSI-2D-1450	1450	1.8	900	2450	TAN	3.6
Y2RSI-2D-1690	1690	1.7	1140	2892	PINK	3.1
Y2RSI-2D-2000N	2000	1.7	1318	3342	PINK/BLACK	2.6
Y2RSI-2D-2640N	2640	1.5	1854	4283	PINK/GRAY	2
Y2RSI-2D-2870N	3080	1.5	2004	4629	PINK/GRAY/ ORANGE	1.7
Y2RSI-2D-3280N	3740	1.8	2134	4930	PINK/GRAY/DK BROWN	1.4

2" DEFLECTION ISOLATOR INSTALLATION AND ADJUSTMENT

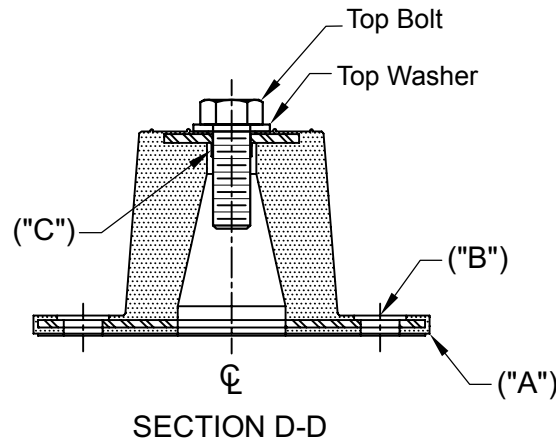
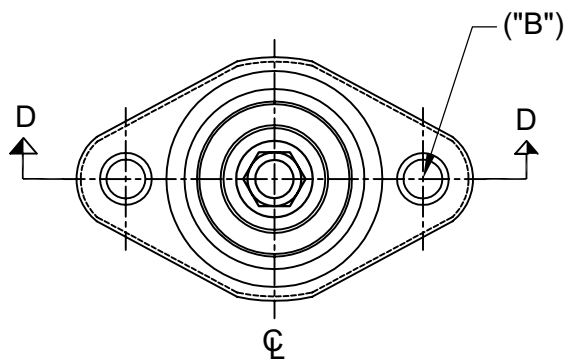
1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad, or sub-base, ensuring that all isolator centerlines match the equipment mounting holes. The VMC group recommends that the isolator base 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 a 1/4 to 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.



LD13763B

INSTALLATION OF NEOPRENE VIBRATION ISOLATORS

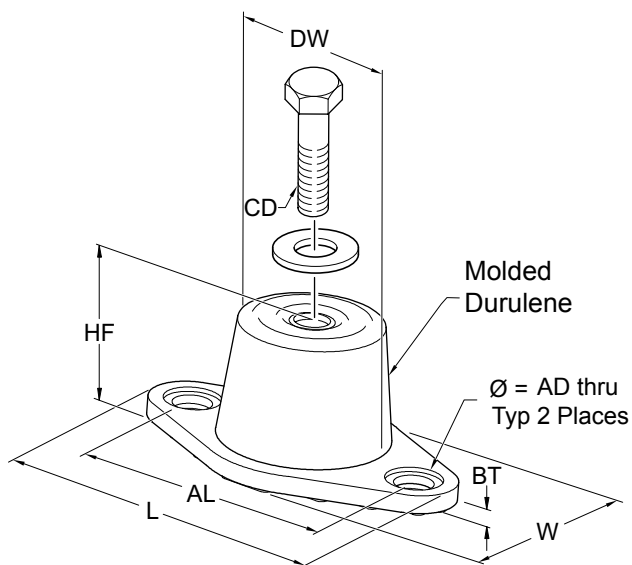
1. Read instructions in their entirety before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad, or sub-base, ensuring that all isolator centerlines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



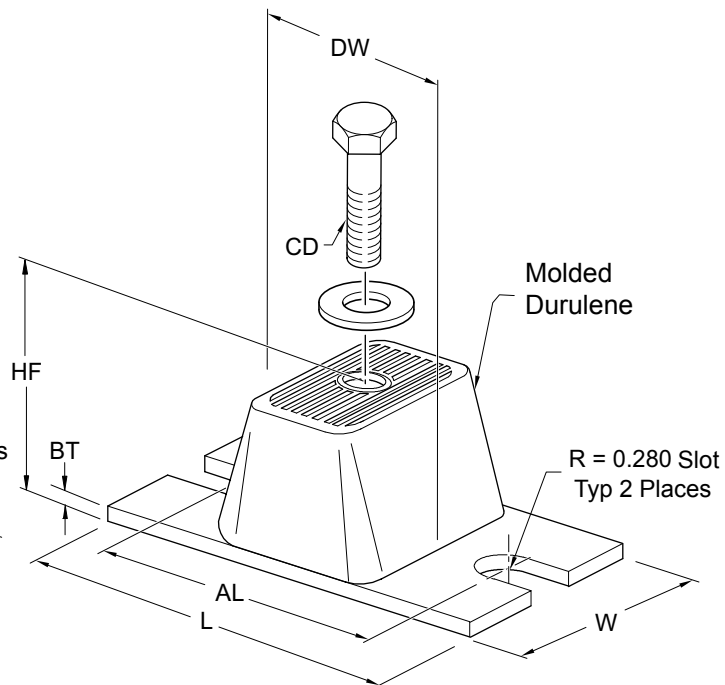
LD13762B

ELASTOMERIC ISOLATOR

RD3 ISOLATORS



RD4 ISOLATORS



LD17304

MOUNT TYPE	DIMENSION DATA INCHES (MM)							
	L	W	HF	AL	AD	BT	CD	DW
RD3-WR	5.5 (139.7)	3.38 (85.85)	2.88 (73.15)	4.13 (104.90)	0.56 (14.22)	0.25 (6.35)	1/2-13 UNC X 1	2.5 (63.5)
RD4-WR	6.25 (158.7)	4.63 (117.60)	2.75 (69.85)	5 (127)	0.56 (14.22)	0.38 (9.65)	1/2-13 UNC X 1	3 (76.2)

RD3	RATED CAPACITY LBS (KG)	RATED DEFLECTION INCHES (MM)	DURO (± 5)
RD3-BROWN-WR	250 (113)	0.5 (12)	40
RD3-BRICK RED-WR	525 (238)	0.5 (12)	50
RD3-LIME-WR	750 (340)	0.5 (12)	60
RD3-CHARCOAL-WR	1100 (499)	0.5 (12)	70

RD4	RATED CAPACITY LBS (KG)	RATED DEFLECTION INCHES (MM)	DURO (± 5)
RD4-BROWN-WR	1500 (680)	0.5 (12)	40
RD4-BRICK RED-WR	2250 (1021)	0.5 (12)	50
RD4-LIME-WR	3000 (1361)	0.5 (12)	60
RD4-CHARCOAL-WR	4000 (1814)	0.5 (12)	70

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SECTION 6 – COMMISSIONING



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

Commissioning personnel should be thoroughly familiar with the information contained in this literature.

Perform the commissioning using the detailed checks outlined. Refer to *Equipment Pre-Startup And Startup Checklist (Form 150.72-CL1)* as the commissioning procedure is carried out.

PREPARATION – POWER OFF

The power to the unit must be OFF before the checks listed are done.

Inspection

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

Refrigerant Charge

Packaged units are normally shipped with a full refrigerant operating charge. Check that refrigerant pressure is present in both systems. Make sure there are no leaks.

Perform a leak test if there is no pressure in the system. Locate and repair any leaks found.

All units and remote systems are shipped with Nitrogen holding charge. The Nitrogen gas must be removed. Use a vacuum pump/recovery unit to leave less than .500 microns in each unit.

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 *SECTION 5 – TECHNICAL DATA*.

Service and Oil Line Valves

Open each compressor suction, economizer, and discharge service valve. If valves are of the back-seat type, turn them (counterclockwise) until they are completely open. Then, close one turn of the stem to be sure operating pressure is fed to pressure transducers. Completely open the liquid line service valve and the oil return line ball valve in each system.

Compressor Oil

To add oil to a circuit, connect a Johnson Controls hand oil pump (Part No. 470-10654-000) to the oil charging connection on the compressors with a length of clean hose or copper line, but do not tighten the flare nut.

Using clean oil of the correct type (Ze-GLES RB68 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. Do not overcharge or less charge oil, charge oil based on the specified in *Table 5 on page 44*.

Oil levels in compressor sight glass should be between the bottom and the top of the sight glass when the system is stable. High oil levels may cause excessive oil carryover in the system.

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.

30 seconds is the maximum amount of time that there can be no oil in the oil sight glass when starting the compressor or under other unstable conditions.

Fans

Check that all fans are not damaged and able to rotate. Ensure blades are at the same height. Securely fix all fan guards.

Isolation / Protection

Verify that all sources of electrical supply to the unit are taken from a single point of isolation. Check that fuses larger than the maximum recommended size are not used. Refer to *SECTION 5 – TECHNICAL DATA* for more information.

Control Panel

Check the panel to see that it is free of foreign materials (wire, metal chips, etc.). Clean it if needed.

Power Connections

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

Grounding

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

Supply Voltage

Check that the site voltage supply corresponds to the unit requirement. Refer to *SECTION 5 – TECHNICAL DATA* for information on the voltage supply limits.

Water System

Verify the chilled liquid system has been installed correctly. It must be 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 extension pipe.

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

If the main 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 cold 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, the valves should be opened and the power turned 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

Check that a chilled water flow switch is correctly fitted in the extension pipe kit on the cooler outlet. It must be wired into the control panel correctly using shielded cable.

There should be a straight run of at least 5 pipe diameters on either side of the flow switch. The flow switch should be connected to terminals 13 and 14 of XTBC1 on the panel.

Temperature Sensor(s)

Ensure the leaving liquid temperature sensor is coated with heat conductive compound (Part No. 013-00890-000). It must also be 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.

PREPARATION – POWER ON



Perform the commissioning using the detailed checks outlined. Refer to Equipment Pre-Startup And Startup Checklist (Form 150.72-CL1) 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 OFF/ON UNIT switch at the bottom of the keypad is OFF. Place the optional circuit breaker handle on the panel door to ON. The customer's disconnection devices can now be set to ON.

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

Compressor Heaters

Verify the compressor heaters have power. 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.

 YORK®	YSAA	
INSTALLATION CHECKLIST	New Release	Form 150.76-CL1 (616)

INSTALLATION CHECKLIST AND REQUEST FOR AUTHORIZED STARTUP ENGINEER

CUSTOMER: _____

ADDRESS: _____

PHONE: _____

JCI TEL NO: _____

JCI ORDER NO: _____

JCI CONTRACT NO: _____

JOB NAME: _____

LOCATION: _____

CUSTOMER ORDER 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. PRE-STARTUP

Unit Checks (No Power)

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

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 the sight glass when fully loaded. At shutdown, the oil level should be between the bottom and middle of the oil equalizing sight glass. ☐
6. Assure water pumps are ON. Check and adjust water pump flow rate and pressure drop across the cooler (see "Operational Limitations" (English)). Verify flow switch operation..... ☐
7. **NOTE:** Excessive flow may cause catastrophic damage to the heat exchanger (evaporator)
8. Check the control panel to ensure it is free of foreign material (wires, metal chips etc.) ☐
9. Visually inspect wiring (power and control) Wiring MUST meet N.E.C. and local codes. ☐
10. Check tightness of power wiring inside the power panel on both sides of the motor contactors and overloads ☐

11. Check for proper size fuses in main and control circuits, and verify overload setting corresponds with RLA and FLA values in electrical tables (see Table 8 and Table) ☐
12. Assure 120VAC (110VAC for 50Hz units) Control Power to TB1 has 15 amp minimum capacity. ☐
13. Be certain all water temp sensors are inserted completely in their respective wells and are coated with heat conductive compound ☐
14. Assure that suction temp sensors are correctly installed. ☐
15. Visually check water quality to make sure the water is not muddy but clear, make sure a liquid strainer is provided and in work. ☐

B. COMPRESSOR HEATER (Power On - 24 Hours Prior To Start)

C. STARTUP

Panel checks (Power On - Both unit switch Off)

1. Apply 3-phase power and verify its value. Voltage imbalance should be no more than 2% of the average voltage. ☐
2. Apply 120VAC (110VAC for 50Hz units) and verify its value on the terminal block in the Power Panel. Make the measurement between Terminals 5 and 2 of XTBC2. The voltage should be 120VAC plus or minus 10% ☐
3. Program/verify the Cooling Setpoints, Program Setpoints, and unit Options. Record the values in the following table (see "SETPOINTS KEYS" and "UNIT KEYS" in Section 7 of Form 150.76-ICOM1 for programming instruction). ☐

FORM 150.76-CL1
ISSUE DATE: 6/30/2016

SETPOINTS ENTRY LIST

OPTIONS	
Display Language	
Sys 1 switch	
Sys 2 switch	
Chilled Liquid	
Local / Remote Mode	
Display Units	
Lead / Lag Control	
Manual Override	
Flash Card Update	
Remote Temperature Reset	
Pump Control	
Pump Selection	
Flash Card Data Logging	
COOLING SETPOINTS	
Setpoints	
Range	
Remote Setpoint	
Range	
Maximum Remote Temp Reset	
PROGRAM	
Discharge Pressure Cutout	
Suction Pressure Cutout	
Low Ambient Temp Cutout	
Leaving Liquid Temp Cutout	
Evaporator Temp Cutout	
Anti Recycle Time	
Fan Control ON Pressure	
Fan Differential OFF Pressure	
Sys 1 Number of Fans	
Sys 2 Number of Fans	
Remote Unit ID Programmed	
Sys 1 Suct Superheat Setpoint	
Sys 2 Suct Superheat Setpoint	
Load Timer	
Unload Timer	
Load Pulse Gain	
Unload Pulse Gain	
Load Timer Gain	
Unload Timer Gain	
Discharge Pressure Diff	

4. Put the unit into Service Mode (see "SERVICE MODE" in Section 9 of Form 150.76-ICOM1) and cycle each condenser fan to ensure proper rotation. ☐

5. Prior to this step, turn system 2 OFF. Connect a manifold gauge to system 1 suction and discharge service valves. ☐

Place the Unit Switch in the control panel to the ON position.

As 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."

NOTE: This unit uses screw 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..... ☐

Place the Unit Switch in the control panel to the ON position.

As 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.

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. - 83 °F
Subcooling = 18 °F

The subcooling should be adjusted to 18 °F (-8 °C) 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 has been pulled down to the required leaving water temperature, and the unit is running in a fully loaded condition. Correct superheat setting for a system is 10 °F to 15 °F (5.56 °C to 8.33 °C) 18" (46 cm) from the heat exchanger.

Superheat should typically be set for no 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

FORM 150.76-CL1
ISSUE DATE: 6/30/2016

Assure that superheat is set at a proper value, default is recommended.

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

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

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.

Owner's operating personnel:

Name: _____

Phone Number: _____

Name: _____

Phone Number: _____

E. Leak Checking

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

Name: _____

Phone Number: _____

CONTRACTOR'S RESPONSIBILITIES AND INSTRUCTIONS TO USE FORM

This installation checklist provides a quick way to check if all necessary installation work was completed in accordance with all applicable installation instructions in Form 150.76-ICOM1, and when completed, acts as a request for Johnson Controls to furnish start-up supervision.

Complete this form as follows:

1. Fill out the top of the page.
2. Check off each item as required. Cross out (x) items that do not apply.
3. Enter names, initials, and date of the operating personnel who completed the checklist.
4. **Bottom of Form:** Enter the date that the Johnson Controls start-up technician should be at the job site and the name(s) of the supervisor(s) to be contacted.
5. Retain one copy in files and send one copy to customer.

With reference to the terms of the above contract, we are requesting the presence of your JCI Authorized Representative at the job site on _____ / _____ / _____ to start the system and instruct operating personnel. Have the JCI representative contact: _____
Month Day Year Name/Phone

We understand that the services of the Johnson Controls Authorized Representative will be furnished in accordance with the contract for a period of time of not more than _____ consecutive normal working hours, and we agree that a charge of _____ per diem plus travel expenses will be made to Johnson Controls if services are required for longer than _____ consecutive normal hours or if repeated calls are required, through no fault of Johnson Controls.

Customer/Contractor Signature: _____

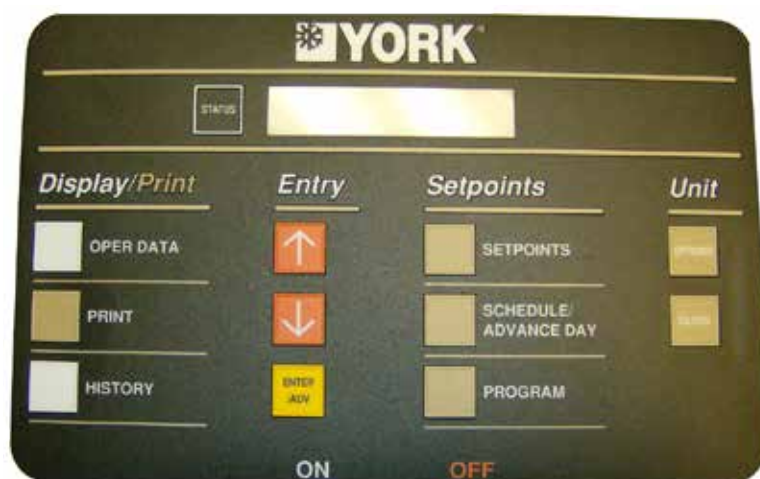
Title: _____

Form Completed by: _____



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SECTION 7 – UNIT CONTROLS



LD13283

INTRODUCTION

The YORK 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 activates or deactivates the unit.

IPU II AND I/O BOARDS

The IPU and I/O boards are assembled to function as a single microprocessor controller. The IPU II board contains a microprocessor and is the controller. 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 constantly scans inputs to monitor the chiller operating conditions. The input values are transmitted the IPU II microprocessor board. From this information, the IPU II then issues commands to the I/O board relay outputs to control contactors, solenoids, etc. for Chilled Liquid Temperature Control and to react to safety conditions. The I/O board converts logic signals to operate relay outputs to 115VAC levels used by motor contactors, fan contactors, solenoid valves, etc. to control system operation. The low voltage side of all relay coils on the I/O board are powered by +12V.

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

The on-board power supply converts 24VAC from 75VA, 120/24VAC 50/60Hz UL listed class 2 power transformer to +12V, +5V and +3.3V using switching and linear voltage regulators located on the I/O and IPU II boards. These voltages are used to operate integrated circuitry on the board. The 40 character display and unit sensors (transducers and temp sensors) are sup-

plied power for the micro board +5V supply. 24VAC is rectified, but not regulated, to provide unregulated +30VDC to supply all of the digital inputs.

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 10VDC as the input type on the remote temperature reset analog input.

TRANSFORMER

A 75VA, 120/240VAC, 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.

DISPLAY

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

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 that you become familiar with the use of the keypad and display. This allows you to make full use of the capabilities and diagnostic features available.

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.

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.

Capacity Control

GA compressor modulate the capacity to meet the coolant temperature setting by a slide valve. The movement of the slide valve is controlled by 3 solenoid valves. They are as indicated in *Figure 37 on page 97*, A: “Mini Load Valve”, B: “Unload Solenoid Valve” and C: “Load Solenoid Valve”. All 3 solenoid valves are NC (Normal Closed) valves.

There are 4 different combinations using these 3 valves. Each combination indicates an implementation of a slide valve. If only SV-C (Solenoid Valve C) is energized, the compressor is loading. If only SV-B is ON, the compressor is unloading. If only A is ON, the compressor operates at minimum capacity. When all three SVs are OFF, the capacity of the compressor remains constant. SV-A is very useful to quickly unload the capacity to the minimum immediately before the compressor stops or starts. See the purpose of slide valve for different solenoid valve status see *Table 10 on page 97*.

Refer to *Figure 38 on page 97* to learn how the slide valve controls the capacity of the compressor.

To load, with SV-C ON and SV-A and SV-B OFF, the oil from the slide valve cylinder goes through SV-C and the load capillary tube to the suction side. So, the slide valve moves towards the suction end. Then, compressor capacity increases.

To unload, with SV-B ON and SV-A and SV-C OFF, the oil from the oil separator goes through SV-B and the unload capillary tube to the slide valve cylinder. So, the slide valve moves towards the discharge end. Then, the compressor capacity decreases.

To keep capacity constant, all 3 of the SVs are OFF. No volume change to the oil inside the slide valve cylinder. So, the slide valve stops at the current position with no capacity change.

To quickly unload to minimum capacity, with SV-A ON and SV-B and SV-C OFF, the oil from the oil separator goes through SV-A to the slide valve cylinder. Without the capillary tube, the slide valve moves quickly towards the discharge end. The compressor capacity decreases to minimum.

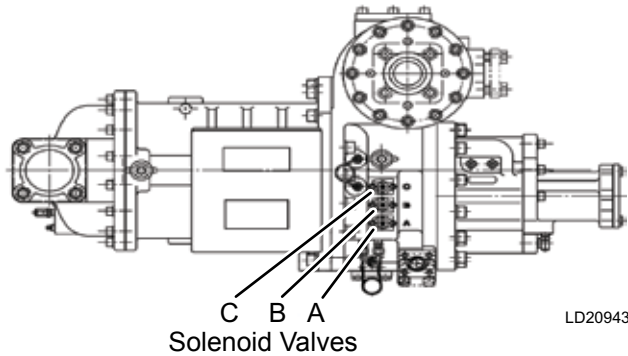


FIGURE 37 - CAPACITY CONTROL SOLENOID VALVES

TABLE 10 - CAPACITY CONTROL

		SV (SOLENOID VALVE)		
		(A)	(B)	(C)
CAPACITY CONTROL	Up	OFF	OFF	ON
	Down	OFF	ON	OFF
	Constant	OFF	OFF	OFF
	Min.(Start/Stop)	ON	OFF	OFF

SV-A (Solenoid Valve A): Minimum Capacity SV;
SV-B (Solenoid Valve B): Capacity Unloading SV;
SV-C (Solenoid Valve C): Capacity Loading SV;
All 3 SVs are Normally Closed (NC); NC means the SV is shut off when the solenoid coil is de-energized.

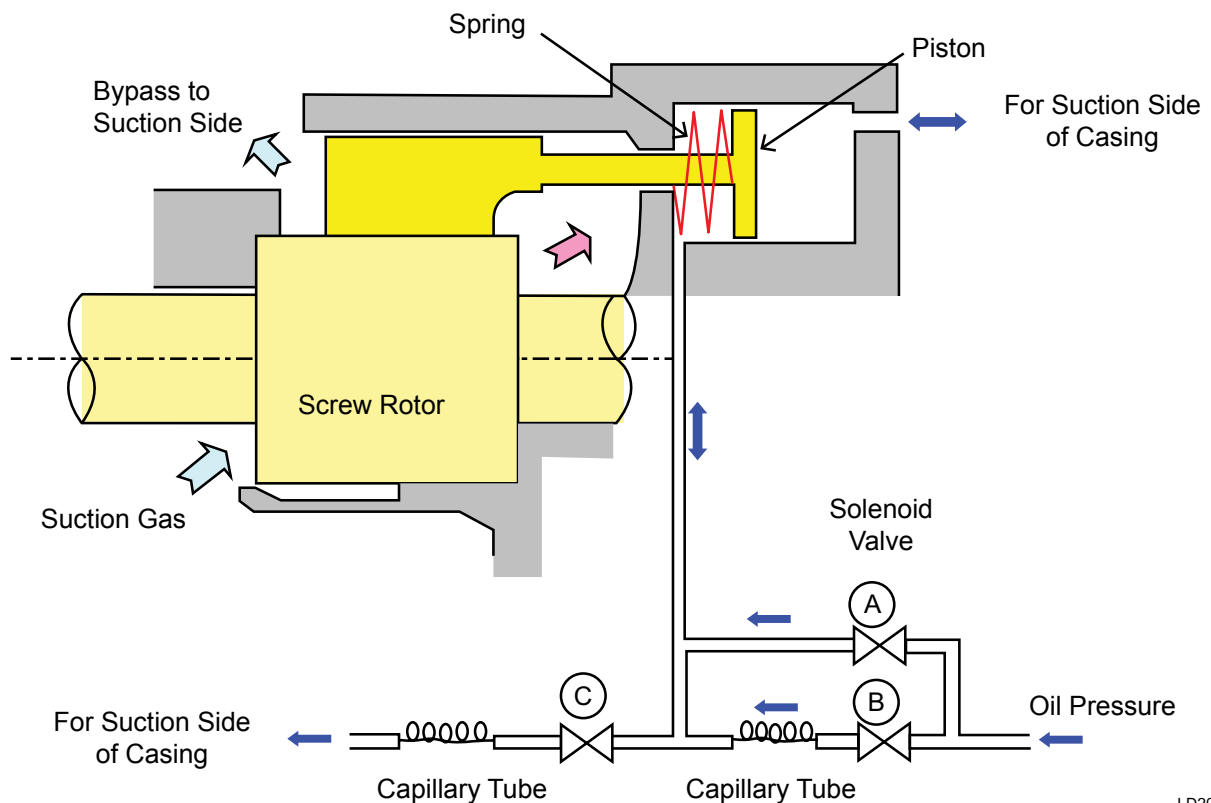


FIGURE 38 - CAPACITY MODULATION IMPLEMENTATION

CAPACITY CONTROL

The purpose of capacity control is to regulate the chilled liquid temperature to meet the desired setpoint on a chiller.

Capacity control include “Compressor Start/Stop” and “Slide Valve Control”. Compressor Start/Stop is handled by the Capacity Control Routine. The Slide Valve Control is managed by Fuzzy Logic Control Routine.

COMPRESSOR START/STOP:

Once the chiller’s control board is powered up, the SV-A will be ON for three minutes. During this time, the unit will not be allowed to start.

Before starting the compressor, ensure the following:

1. Run Permissive;
2. No unit or system faults exist;
3. No unit or system inhibits exist;
4. Daily schedule is ON;
5. Remote run is closed;

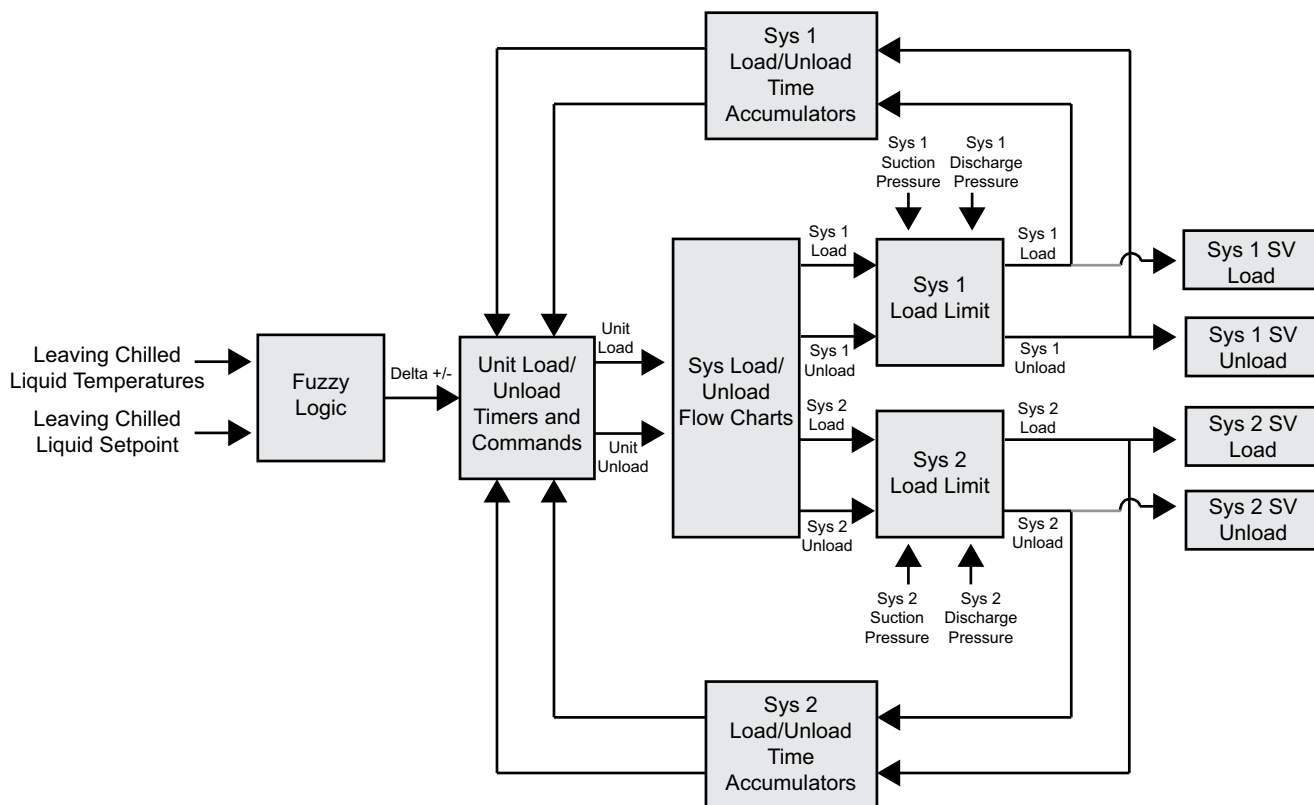
6. Flow Switch is closed;

7. Capacity control routine is calling for a compressor to start.

Each unit has two systems. Each system has only one compressor. The control board will determine which compressor should start/stop first based on the Lead/Lag control logic. In automatic Lead/Lag, the control board determines the first available system to start. If both are available, the system with fewer running hours will start first. Only when the manual lead system is not available to start, can the lag system start if it is available. “Automatic” or “Manual” can be set in the panel as a Lead/Lag setting.

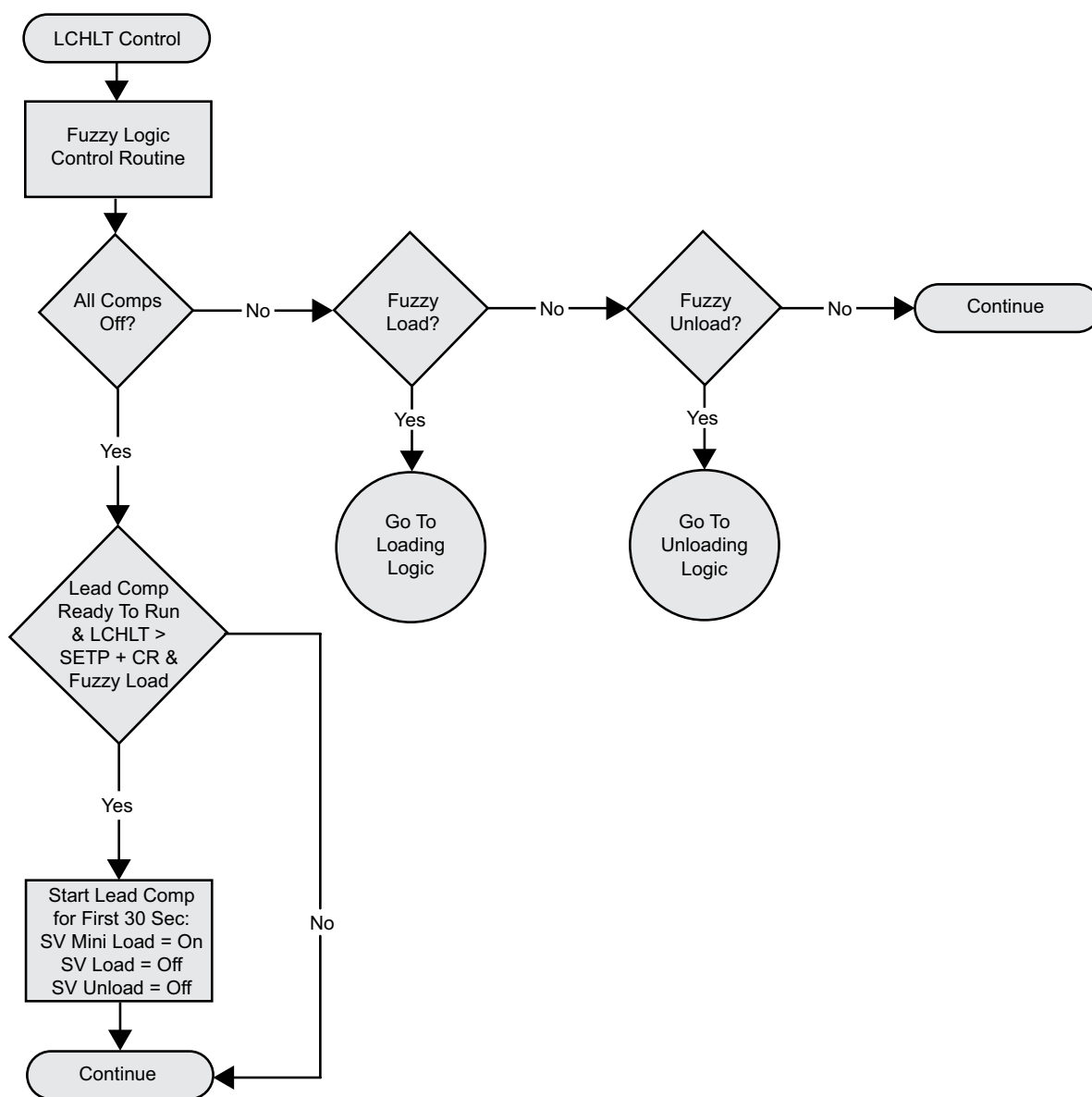
After the compressor starts or before the compressor stops normally, the SV-A (Min Capacity SV) will be ON continuously for 30 seconds. The compressor can load or stop only after this time has expired.

Figure 39 on page 98 and Figure 40 on page 99 show the control flow chart.



LD20797

FIGURE 39 - CAPACITY CONTROL LOGIC FLOW



LD20798

FIGURE 40 - LEAVING CHILLED LIQUID TEMPERATURE CONTROL

SLIDE VALVE CONTROL - FUZZY LOGIC CONTROL

The Fuzzy Logic Control Algorithm is used to maintain the Chilled Liquid Temperature within the programmed Setpoint and Control Range (CR). Regulating the LCHLT within the desired CR is done through control of the compressor's slide valve. A series of load and unload pulses are sent to the compressor slide valve to maintain LCHLT within a desired range. The control algorithm combines system parameters and internal timers to maintain chilled liquid temperatures and minimize cycling of the two compressors. This method of control is suitable for water. Control Setpoints and CR are programmed into the panel to establish the desired range of leaving chilled operating temperatures.

The output of the fuzzy logic routine will be the unscaled load/unload pulse in second. It is determined by the Chilled Liquid Temperature Error & Temperature Rate, The Error is defined as "Chilled Liquid Temperature"-"Active Cooling Setpoint" and the Rate is Chilled Liquid Temperature Variation in a unit time.

The accumulated load/unload time is used to identify the capacity level, Fully load means Accumulated load time is at its Maximum Value and Fully unloaded means Accumulated Unload Time is at its Maximum Value. Both Load/Unload Maximum Values can be programmed in control panel (Limited to Max of 120s).

The intention of Load/Unload is accomplished by output the pulse to solenoid valves (SV-A, SV-B and SV-C).

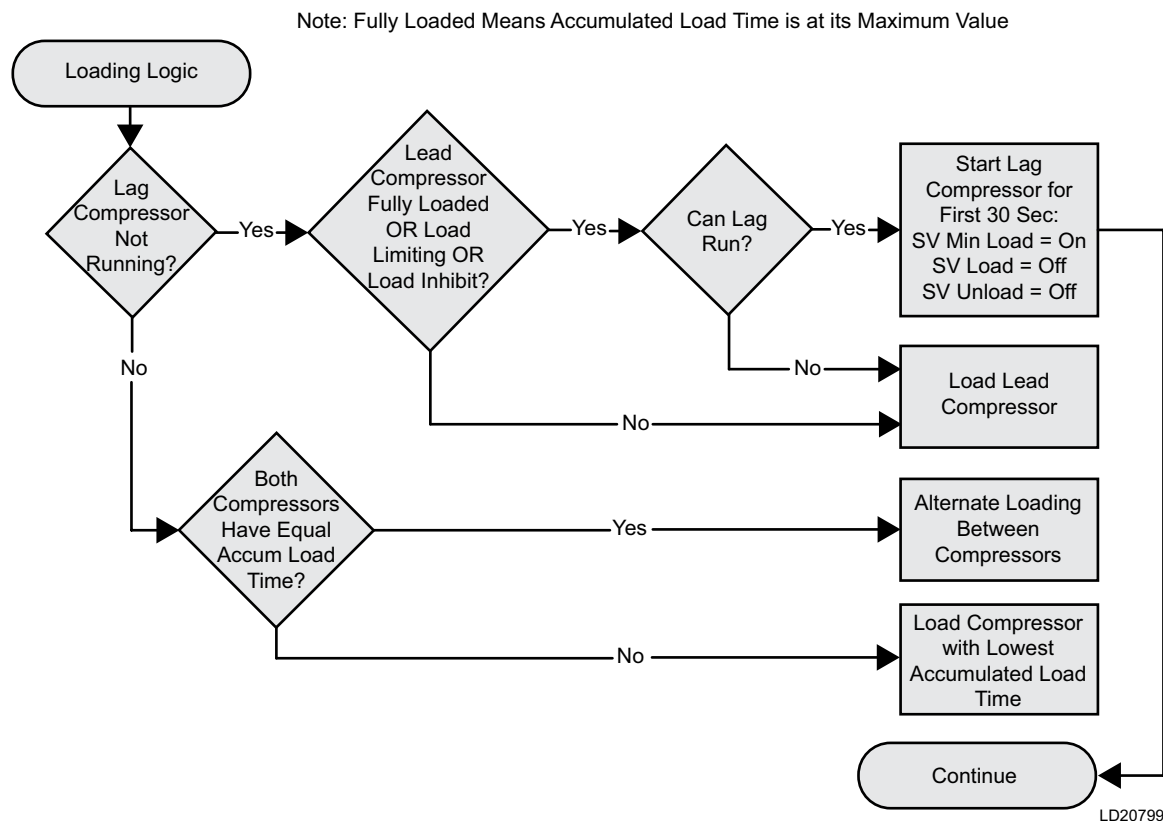
**FIGURE 41 - LOADING CONTROL LOGIC**

Figure 41 on page 100 and Figure 42 on page 101 shows the control process of Capacity Load and Unload.

When the output of the fuzzy logic routine indicates a hold (Fuzzy Logic Output = 0), the Slide Valve Load, Slide Valve Unload and Slide Valve Min Load of the running compressor(s) are all set to off. This occurs when both the load and unload timers have expired.

DISCHARGE AND SUCTION PRESSURE LOAD LIMITING

Load Limiting is designed to stop loading or to unload the compressor to prevent tripping on a safety. Load Limiting is done based on Suction Pressure and Discharge Pressure.

The load limiting routine is executed every program loop. Load limiting is evaluated for each limit value for each system. The value with the highest amount of limiting per system is used for load limiting that system.

“High Discharge Pressure Cutout” and “Discharge Pressure Differential” can be programmed in panel. When DP exceeds “High Discharge Pressure Cutout”, system will trip and present an alarm. When “High Discharge Pressure Cutout” > DP > “High Discharge Pressure Cutout-Discharge Pressure Differential”, this system will unload. When “High Discharge Pressure Cutout-Discharge Pressure Differential” > DP > “High Discharge Pressure Cutout-Discharge Pressure Differential-5psig”, load is prohibited in this system. Only when DP < “High Discharge Pressure Cutout-Discharge Pressure Differential-5psig”, can the system modulate the capacity regularly.

Based on the programmed “Suction Pressure Cutout”, when SP > “Suction Pressure Cutout +2psi”, regular capacity modulation is allowed. When “Suction Pressure Cutout” < SP < “Suction Pressure Cutout +2psig”, Load is prohibited in this system. When “Suction Pressure Cutout - 10psig” < SP < “Suction Pressure Cutout”, Unload must be made to this system. When SP less than “Suction Pressure Cutout” for 30s, the system will trip and alarm.

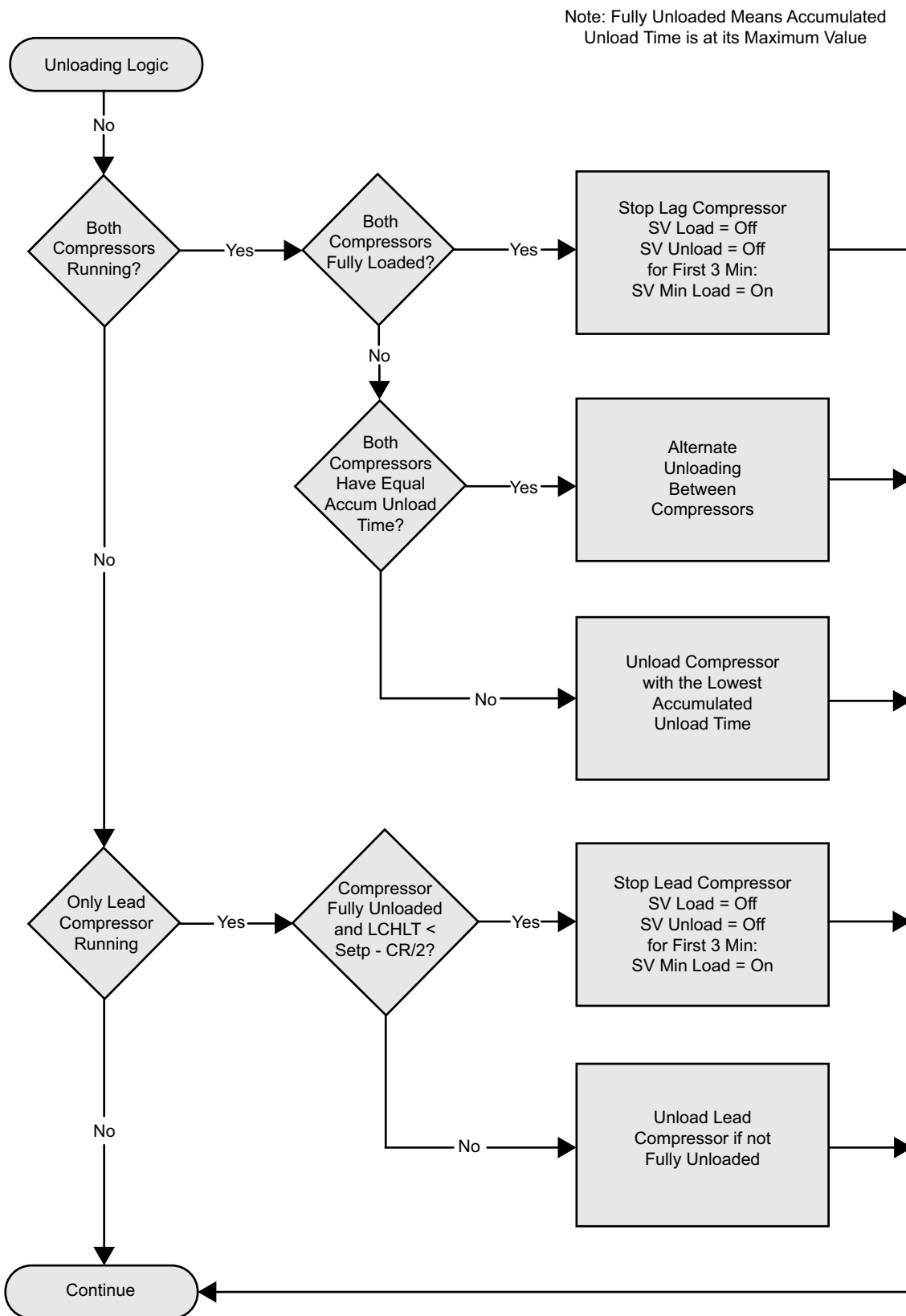


FIGURE 42 - UNLOADING CONTROL LOGIC

LD20800

STATUS KEY



LD20952

Unit Status

Pressing the STATUS key allows the operator to determine the current chiller operating status. The messages displayed include running status, cooling demand, fault status, and external cycling device status. The display is 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 display when the STATUS key is pressed. Following each 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 both display 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 you 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 an ISN system or RCC has turned the unit OFF, not allowing it to run.

**DAILY SCHEDULE
SHUTDOWN**

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

**REMOTE STOP
NO RUN PERM**

REMOTE STOP NO RUN PERM shows that a remote start/stop contact is open in series with the flow switch. These contacts are connected to Terminals 51 and 13 of XTBC1. A 3-second delay is built into the software to prevent nuisance shutdowns due to erroneous signals on the run permissive input.

**FLOW SWITCH
OPEN**

FLOW SWITCH OPEN indicates the flow switch contacts connected to Terminals 13 and 14 of XTBC1 are open. A 3-second delay is built into software to prevent nuisance shutdowns due to erroneous signals from the flow switch.

**SYS 1 SYS SWITCH OFF
SYS 2 SYS SWITCH OFF**

SYS SWITCH OFF tells you 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 lets you know 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 displays this message until the loading sequence is ready for the lag system to start.

SYS 1 COMPRESSOR ON
SYS 2 COMPRESSOR OFF

The COMPRESSOR ON message indicates that the respective system is running due to demand.

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-coincident timer is a software feature that guards against two systems starting simultaneously. This assures instantaneous starting current does not become excessively high due to simultaneous starts.

The control limits the time between compressor starts to 1 minute regardless of demand of the anti-recycle timer being timed out.

SYS 1 DSCH LIMITING
SYS 2 DSCH LIMITING

When this message appears, discharge pressure limiting is in effect.

SYS 1 SUCT LIMITING
SYS 2 SUCT LIMITING

When this message appears, suction pressure limiting is in effect.

MANUAL
OVERRIDE

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

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 shut down. Following are display messages and explanations.

System Safeties

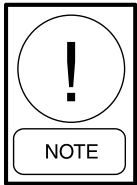
System safeties are faults that cause individual systems to be shut down if a safety threshold is exceeded for 3 seconds. They are auto reset faults in that the system restarts automatically after the fault condition is no longer present. However, if 3 faults on the same system occur within 90 minutes, that system is locked out on the last fault. A manual reset is required. Turn the system switch (under OPTIONS key) OFF and then back on to clear the lockout fault. Fault messages display when a system is locked out.

SYS 1 HIGH DSCH PRES
SYS 2 HIGH DSCH PRES

The discharge pressure cutout is a programmed software cutout. It is backed-up by a mechanical high pressure cutout located in the refrigerant circuit. The system shuts down when the programmable cutout is exceeded for 0.5 seconds. It restarts when the discharge pressure falls below the cutout minus programmed discharge pressure differential and demand allows.

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. It is triggered if the system attempts to run with a low refrigerant charge or a restriction in the refrigerant circuit.



Repeated starts after resetting a low suction pressure fault causes 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 stops. This cutout is completely ignored for the first 30 seconds of system run time to avoid nuisance shutdowns, especially on units that use 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” activates. 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 the 30 seconds the suction pressure falls below the ramped cutout, the system stops.

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

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

The motor protector/high pressure cutout protects the motor from overheating or the system from experiencing dangerously high discharge pressure. This fault condition is present when CR1 (system 1) or CR2 (system 2) opens causing 0 volts to be read on the input. The fault condition clears and allows restart when a 30V signal is restored to the input by CR1 or CR2 closing. This fault shuts down the system 0.5 seconds after the relay opens. This fault only occurs when a system is running.

The motor protector/high pressure cutout inhibit prevents the system from trying to start when a motor protector is faulted or the mechanical high pressure cutout is open. This inhibit condition is present when CR1 (sys 1) or CR2 (sys 2) opens causing 0 volts to be read on the input. The inhibit condition clears and allows the system to start when a 30V signal is restored to the input by CR1 or CR2 closing. This inhibit only occurs when a system is not running.

SYS1	LOWSUCTION	SHEAT
SYS2	LOWSUCTION	SHEAT

The low superheat cutout protects the compressor(s) from a liquid flood back due to low suction superheat. This safety is ignored for the first 15 seconds of system run time. This safety occurs when the suction superheat < 2.0°F for 10 seconds.

SYS1	SENSOR	FAILURE
SYS2	SENSOR	FAILURE

The sensor failure cutout prevents the chiller from running when the sensors are not functioning properly. This safety shuts down a system if either the suction pressure or discharge pressure sensors read out of range high or low. This condition must exist for 3 seconds to cause a system shutdown. This safety locks out a system the first time and does not allow an automatic restart.

SYS1	HIGH	DSCH	TEMP
SYS2	HIGH	DSCH	TEMP

The high discharge temperature cutout protects the system motor from overheating. This safety occurs when the discharge temperature rises above 245°F. When the discharge temperature is above 195°F, the system is inhibited from starting.

SYS1	LOW	DSCH	SHEAT
SYS2	LOW	DSCH	SHEAT

The low discharge superheat cutout protects against excessive liquid refrigerant carry over from the evaporator in cases, which may be a result of overcharge of refrigerant or other problems. This safety is ignored for the first 10 minutes of system run time. This safety occurs when the discharge superheat falls below 5.0°F for 5 minutes.

SYS 1 LOW DSCH PRESS
SYS 2 LOW DSCH PRESS

This safety makes sure the system discharge pressure is always above the lower bound of the compressor operating boundary. This safety is ignored for the first 60 seconds of run time. The system shuts down if the discharge pressure drops below the “Low Discharge Pressure Threshold” for more than 15 seconds.

If Suction Pressure $\leq$ 14.4 PSIG:

Low Discharge Pressure Threshold=57.3 PSIG

If Suction Pressure $>$ 14.4 PSIG:

Low Discharge Pressure Threshold=(1.036*Suction Pressure in PSIG)+42.36 PSIG

SYS 1 ATV SUCT PRESS
SYS 2 ATV SUCT PRESS

When anti-vacuum protection is enabled, the following safety shall be active. This safety does not allow a system to start when the suction pressure is below 5.0 PSIG. This safety shuts down a system when the suction pressure falls below 5.0 PSIG for more than 3 seconds. This safety locks out a system the first time and does not allow an automatic restart.

Unit Safeties

Unit safeties are faults that cause all running compressors to shut down. Unit faults are auto reset faults in that the unit restarts 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 shuts down. Restart occurs when temperature rises 2 °F above the cutoff.

UNIT FAULT :
LOW LIQUID TEMP

The Low Leaving Chilled Liquid Temp Cutout protects the chiller from an evaporator freeze-up if the chilled liquid temperature drops below freezing. This situation can occur under low flow conditions or if the micro panel setpoint values are improperly programmed. Anytime the leaving chilled liquid temperature (water) drops below the cutout point, the chiller shuts down. Restart occurs when chilled liquid temperature rises 4 °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 :
PUMP FAIL MAKE FLOW

When the unit is programmed for hydro pumps 1 or hydro pumps 2, the following safety is active.

When unit is programmed for hydro pumps 1 or hydro pumps 2 (manual pump operation), if the flow switch fails to close digital input J13-9 within 10 seconds of the evaporator pump output closing, the unit locks out and turns off the pump output. Restart happens after the unit switch resets. When unit is programmed for hydro pumps 2 (automatic pump operation), if the flow switch fails to close digital input J13-9 within 10 seconds of the duty pump output closing, stop duty pump and start standby pump. If after 10 seconds of standby pump operation the flow switch fails to close, the unit locks out and turns off the pump output. Restart happens after unit switch reset.

**UNIT FAULT :
PUMP TRIP**

When the unit is programmed for hydro pumps 1 or hydro pumps 2, the above safety is active.

When unit is programmed for hydro pumps 1, if input J11-14 reads 0V the unit shuts down and turns off the pump output. The unit restarts after the anti-recycle timers have finished counting down.

OR, when unit is programmed for hydro pumps 2 manual pump selection, if input J11-14 (pump1) or input J11-15 (pump2) reads 0V for the selected pump, the unit shuts down and turns off the appropriate pump output. When pump selection is automatic, if input J11-14 and input J11-15 both read 0V, the unit shuts down and turns off the pump outputs. Restart happens after anti-recycle timers have finished counting down.

**UNIT FAULT :
FLOW SWITCH OPEN**

When the unit is programmed for external evaporator pump and the flow switch input J13-9 is open for more than 3 seconds, the unit stops. The fault recorded into history does not activate the alarms. Restart is allowed after the flow switch is closed and the anti-recycle timers have finished counting down.

**UNIT FAULT :
HIGH AMBIENT TEMP**

The high ambient temperature cutout is a safety shutdown designed to protect the chiller from operating in a high ambient condition. If the ambient exceeds 135.0°F (57.2 °C) the chiller shuts down. Restart occurs, if demand allows, when the temperature falls below 133.0°F (56.1°C).

**UNIT FAULT :
LOW EVAPORATOR TEMPERATURE**

The Low Evaporator Temperature Cutout is a safety shutdown designed to protect the chiller from an evaporator freeze-up should the evaporator temperature drop below the programmed freeze point. Restart occurs, if demand allows, when evaporator temperature rises 4°F above the programmed freeze point.

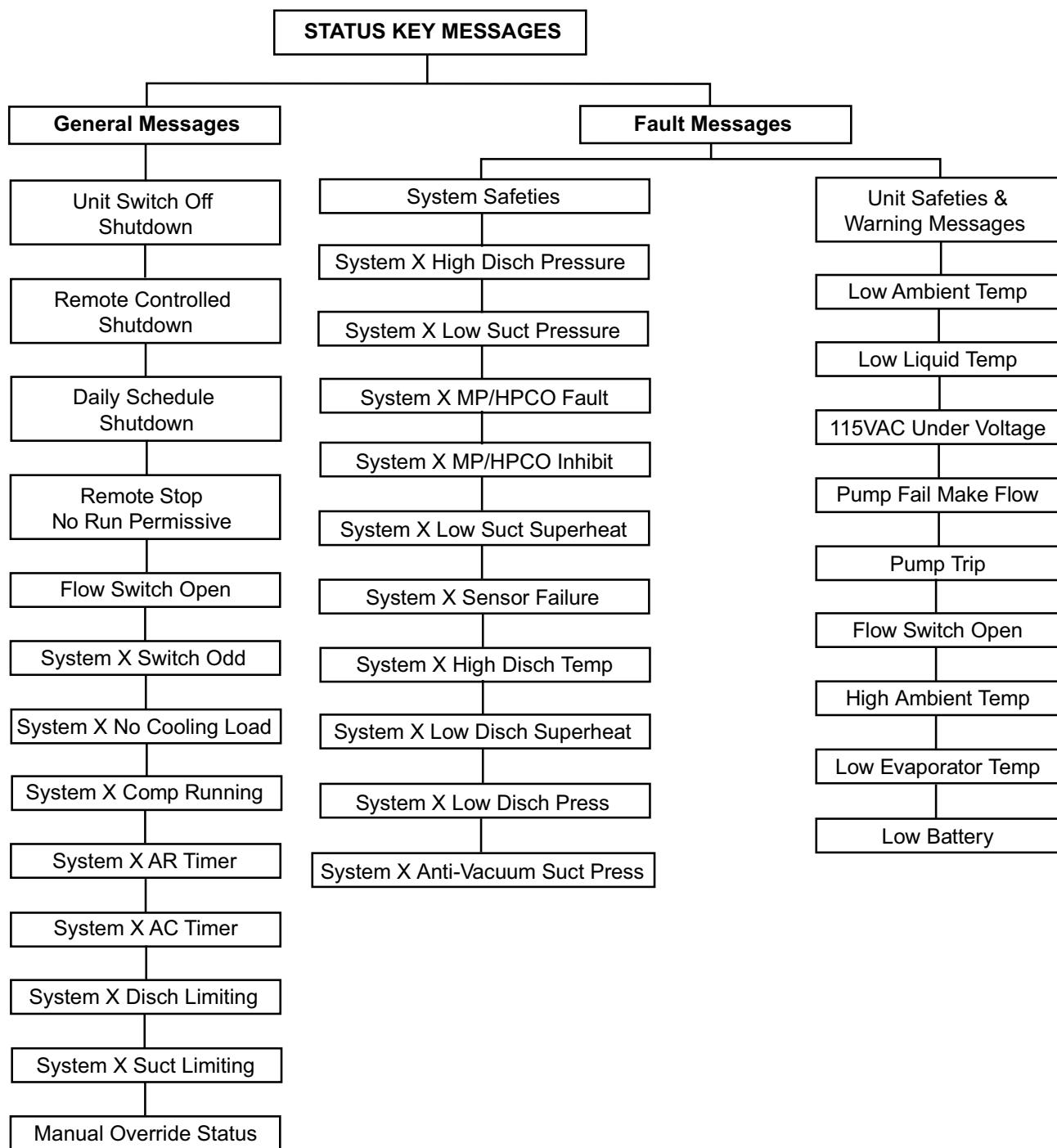
Unit Warning

The following messages are not unit safeties and will not be logged to the history buffer. They are unit warnings. There is no auto-restart. Operator intervention is required to allow a restart of the chiller.

**!! LOW BATTERY !!
CHECK PROG / SET P / OPT N**

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 all reset to their default values. You will need to re-program your desired operating values. Once a faulty battery is detected, the unit will not run until the PROGRAM key is pressed. Once the PROGRAM key is pressed the anti-recycle timers are set to the programmed anti-recycle time. This gives you time to check setpoints, and, if necessary, reprogram programmable values and options.

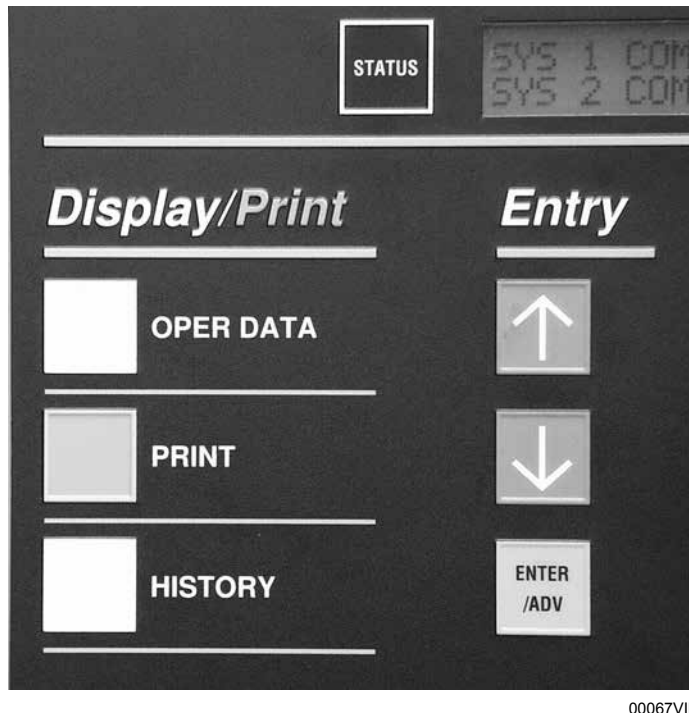
If a low battery is detected, replace it with a fresh one as soon as possible. The programmed values will all be lost and the unit not run after the next power interruption. The RTC/battery is located at U17 on the control board.



LD20904

FIGURE 43 - STATUS KEY MESSAGES QUICK REFERENCE LIST

DISPLAY/PRINT KEYS

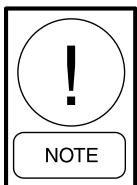


The Display/Print keys allow you to retrieve system and unit information that is useful for monitoring chiller operation, diagnosing potential problems, troubleshooting, and commissioning the chiller.

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.

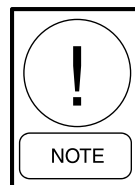
Oper Data Key

The OPER DATA key gives you access to unit and system operating parameters. Press the OPER DATA key to display system parameters. They remain on the display until another key is pressed. After you press 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 in 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 from J11-7 to J11-12 on the I/O Board), 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 from J11-7 to J11-12 on the I/O Board). 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).

```
S Y S   X   S P   =   7 2 . 1   P S I G
                D P   =   2 2 7 . 0   P S I G
```

These displays show suction and discharge pressures for each system.

```
S Y S X   S U C T = X X X . X ° F
S A T S U C T = X X X . X ° F
```

These displays show the suction temperature and saturated suction temperature, which can be used to calculate the suction superheat in this system.

```
S Y S X   D S C H = X X X . X ° F
S A T D S C H = X X X . X ° F
```

These displays show the discharge temperature and saturated discharge temperature, which can be used to calculate the discharge superheat in this system.

```
S Y S X   D I S C H A R G E
S H E A T = X X X . X ° F
```

The display of “Discharge Superheat” indicate the current value, which is a very critical parameter for normal oil separation and reflect the suction status of liquid carryover.

```
S Y S X           E E V = X X X . X ° F
S U C T S H E A T = X X X . X ° F
```

These displays show the opening of EEV and suction superheat, EEV will open or close an opening per the variation of suction superheat, EEV always keep tracking and control the suction superheat to meet the set point of suction superheat.

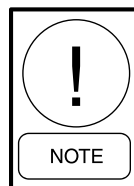
```
S Y S X           E E V = X X X . X ° F
A C T S H S E T P = X X X . X ° F
```

These displays show the current EEV command and active setpoint of suction superheat, “X” shall replaced with numbers.

```
S Y S   1   H O U R S = X X X X X
S Y S   2   H O U R S = X X X X X
```

```
S Y S   1   S T A R T S = X X X X X
S Y S   2   S T A R T S = X X X X X
```

The above 2 messages display the accumulative running hours and total number of starts for the compressor on each system.



Run times and starts only display 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”.

```
L O A D   T I M E R       X X X   S E C
U N L O A D   T I M E R       X X X   S E C
```

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.

```
L E A D   S Y S T E M   I S
S Y S T E M   N U M B E R   X
```

This display indicates the current LEAD system. In this example system 2 is the LEAD system, making system 1 the LAG system. The LEAD system can be manually selected or automatic. Refer to the programming under the *Options Key on page 125*. The Lead System display will only appear on a two system unit.

```
E V A P O R A T O R   H E A T E R
S T A T U S   I S           = X X X
```

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 turns ON. When the temperature rises above 45 °F the heater turns OFF. An under voltage condition keeps the heater OFF until full voltage is restored to the system.

```
E V A P O R A T O R   W A T E R
P U M P           S T A T U S       = X X X X
```

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 control or monitor the unit. The following messages indicate the type of remote control mode active:

NONE – no remote control active. Remote monitoring may be via ISN.

ISN – YORK Talk via ISN allows remote load limiting and temperature reset through an ISN system.

LOAD LIM – Load limiting enabled using contact closure.

PWM TEMP – EMS temperature reset

**Refer to Remote BAS/EMS Temperature Reset Using a Voltage or Current Signal on page 143.*

```
SYS X COMPRESSOR XXX
MIN,U,L      XXX.XXX.XXX
```

This display indicates the current status of compressor, mini load SV (Solenoid Valve), unload SV and load SV. “XXX” will be replaced with “ON” or “OFF”. MIN=Slide Valve Mini Load, U=Slide Valve Unload, L=Slide Valve Load.

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

This message indicates the system run time in days-hours-minutes-seconds. Note that this is not accumulated run time. It pertains only to the current system cycle.

```
SYS X LAT = XXX SEC
      UAT = XXX SEC
```

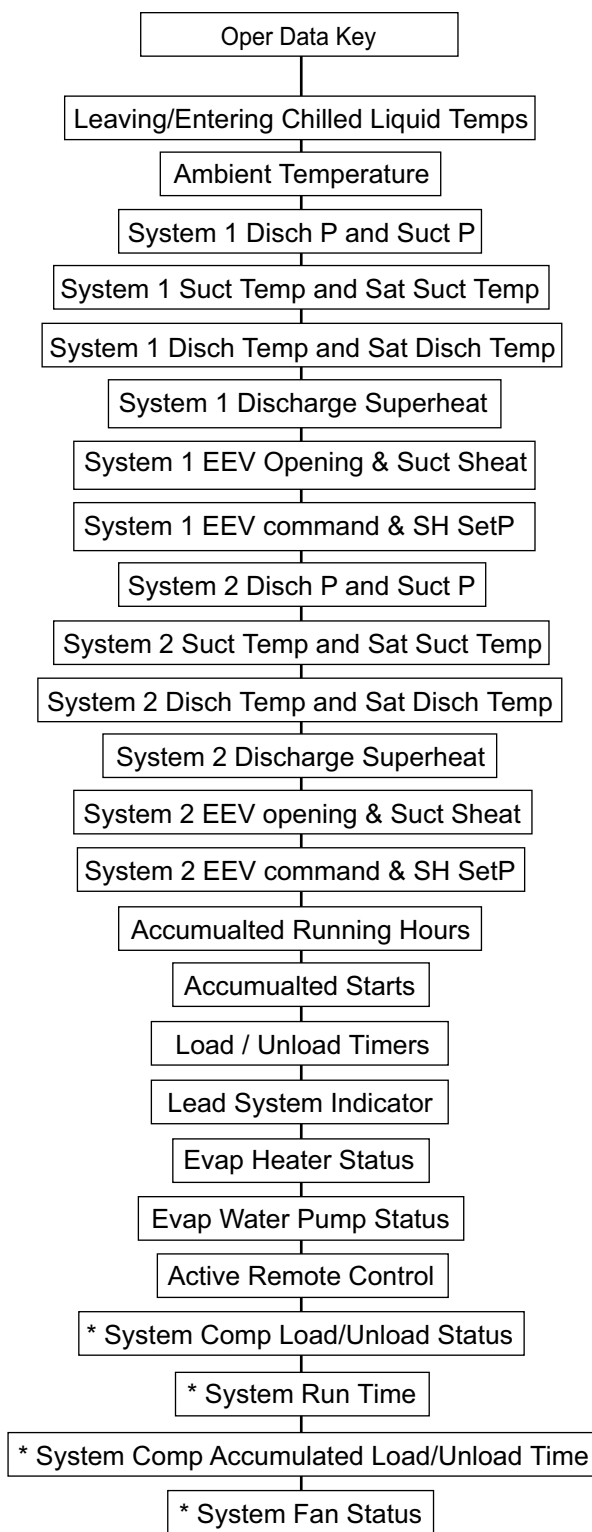
This message displays the compressor accumulated load time and accumulated unload time in second, LAT= Load Accumulated Time and UAT= Unload Accumulated Time.

```
SYS X FAN STAGE
XXX
```

This display indicates the current status of fans in this system, “XXX” will be replaced with the fan stage number.

Oper Data Quick Reference List

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



* Block of information repeat for each system

FIGURE 44 - OPERATION DATA

LD20901

TABLE 11 - YSAA DATA LOGGING

DATA NUMBER	DATA NAME	HEADER TEXT	DATA FORMAT
1	Year	YEAR	YYYY
2	Month	MONTH	MM
3	Day	DAY	DD
4	Hour	HOUR	hh
5	Minute	MINUTE	mm
6	Second	SECOND	ss
7	Leaving Chilled Liquid Temperature	LCHLT	xxx.x
8	Entering Chilled Liquid Temperature	ECHLT	xxx.x
9	Evaporator Liquid Temperature	EVL	xxx.x
10	Ambient Air Temperature	OAT	xxx.x
11	Evaporator Heater Status (0=Off, 1=On)	EVAP HTR	x
12	Evaporator Pump 1 Status (0=Off, 1=On)	EVAP PUMP1	x
13	Evaporator Pump 2 Status (0=Off, 1=On)	EVAP PUMP2	x
14	Cooling Setpoint	COOLING SETP	xxx.x
15	Lead System (0=Sys 1, 1=Sys 2)	LEAD	x
16	Lead/Lag Control Mode (0=Manual, 1=Auto)	AUTO LEAD LAG	x
17	Load Timer	LOAD TMR	xxx
18	Unload Timer	UNLOAD TMR	xxx
19	(Reserved, Future)	UNIT R1	0
20	(Reserved, Future)	UNIT R2	0
21	(Reserved, Future)	UNIT R3	0
22	(Reserved, Future)	UNIT R4	0
23	(Reserved, Future)	UNIT R5	0
24	(Reserved, Future)	UNIT R6	0
25	Sys 1 Run Time (seconds)	S1 RUN TIME	ssssssss
26	Sys 1 Compressor Run (0=Off, 1=On)	S1 COMP RUN	x
27	Sys 1 Slide Valve Min Load (0=Off, 1=On)	S1 SV MIN	x
28	Sys 1 Slide Valve Unload (0=Off, 1=On)	S1 SV UNLOAD	x
29	Sys 1 Slide Valve Load (0=Off, 1=On)	S1 SV LOAD	x
30	Sys 1 Suction Pressure	S1 SUCT PRESS	xxx.x
31	Sys 1 Discharge Pressure	S1 DSCH PRESS	xxx.x
32	Sys 1 Suction Temperature	S1 SUCT TEMP	xxx.x
33	Sys 1 Discharge Temperature	S1 DSCH TEMP	xxx.x
34	Sys 1 Hot Gas Solenoid Valve (Reserved, Future)	S1 HGBV	0
35	*Sys 1 Operational Code	S1 OP CODE	xx
36	*Sys 1 Fault Code	S1 FAULT CODE	xx
37	Sys 1 Condenser Fan Stage	S1 FAN STAGE	x
38	Sys 1 VSD Fan Speed	S1 FAN SPEED	xxx.x
39	Sys 1 EEV output%	S1 EEV CMD	xxx.x
40	Sys 1 Suction Superheat	S1 SUCT SHEAT	xxx.x
41	Sys 1 Discharge Superheat	S1 DSCH SHEAT	xxx.x
42	Sys 1 Load Time Accumulated	LT ACC	xxx
43	Sys 1 Unload Time Accumulated	UT ACC	xxx
44	Sys 1 Active Superheat Setpoint	S1 ACT SH SETP	xx.x
45	Sys 1 EEV State	S1 EEV STATE	x
46	(Reserved, Future)	S1 R1	0
47	(Reserved, Future)	S1 R2	0
48	Sys 2 Run Time (seconds)	S2 RUN TIME	ssssssss
49	Sys 2 Compressor Run (0=Off, 1=On)	S2 COMP RUN	x
50	Sys 2 Slide Valve Min Load (0=Off, 1=On)	S2 SV MIN	x
51	Sys 2 Slide Valve Unload (0=Off, 1=On)	S2 SV UNLOAD	x
52	Sys 2 Slide Valve Load (0=Off, 1=On)	S2 SV LOAD	x
53	Sys 2 Suction Pressure	S2 SUCT PRESS	xxx.x
54	Sys 2 Discharge Pressure	S2 DSCH PRESS	xxx.x
55	Sys 2 Suction Temperature	S2 SUCT TEMP	xxx.x
56	Sys 2 Discharge Temperature	S2 DSCH TEMP	xxx.x
57	Sys 2 Hot Gas Solenoid Valve (Reserved, Future)	S2 HGBV	0
58	*Sys 2 Operational Code	S2 OP CODE	xx
59	*Sys 2 Fault Code	S2 FAULT CODE	xx
60	Sys 2 Condenser Fan Stage	S2 FAN STAGE	x
61	Sys 2 VSD Fan Speed	S2 FAN SPEED	xxx.x
62	Sys 2 EEV output%	S2 EEV CMD	xxx.x
63	Sys 2 Suction Superheat	S2 SUCT SHEAT	xxx.x
64	Sys 2 Discharge Superheat	S2 DSCH SHEAT	xxx.x
65	Sys 2 Load Time Accumulated	S2 LT ACC	xxx
66	Sys 2 Unload Time Accumulated	S2 UT ACC	xxx
67	Sys 2 Active Superheat Setpoint	S2 ACT SH SETP	xx.x
68	Sys 2 EEV State	S2 EEV STATE	x
69	(Reserved, Future)	S2 R1	0
70	(Reserved, Future)	S2 R2	0

Print Key

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

SCREW CHILLER	
UNIT STATUS	
2:04PM 18 FEB 16	
SYS 1	NO COOLING LOAD
SYS 2	COMPRESSOR RUNNING
OPTIONS	
CHILLED LIQUID	WATER
LOCAL / REMOTE MODE	REMOTE
CONTROL MODE	LEAVING LIQUID(R, F)
LEAD / LAG CONTROL	AUTOMATIC
CURRENT FEEDBACK	NONE
REMOTE TEMP RESET	4 TO 20 MA
HYDRO KIT PUMPS	1
HOT GAS BYPASS TYPE	XXXXXXXXXX(R, F)
PROGRAM VALUES	
DSCH PRESS CUTOUT	395 PSIG
SUCT PRESS CUTOUT	44 PSIG
LOW AMBIENT CUTOUT	.0 DEGF
LEAVING LIQUID CUTOUT	.0 DEGF
ANTI RECYCLE TIME	600 SECS
FAN CONTROL ON PRESS	0 PSIG
FAN DIFF OFF PRESS	80 PSIG
SYS1 NUMBER OF FANS	4
SYS2 NUMBER OF FANS	4
FAN RAMP SPEED	XX.X %/SEC (R, F)
UNIT TRIP VOLTS	3.0 (R, F)
REFRIGERANT TYPE	R-134a (R, F)
UNIT DATA	
ENTERING LIQUID TEMP	58.2 DEGF
LEAVING LIQUID TEMP	53.0 DEGF
EVAPORATOR TEMP	121.0 DEGF
DISCHARGE GAS TEMP	55.3 DEGF
COOLING RANGE	42.0 +/- 2.0 DEGF
SYS 1 SETPOINT	70 +/- 3 PSIG
SYS 2 SETPOINT	70 +/- 3 PSIG
REMOTE SETPOINT	44.0 DEGF
SYS 1 REMOTE SETPOINT	70.0 DEGF
SYS 2 REMOTE SETPOINT	70.0 DEGF
AMBIENT AIR TEMP	74.8 DEGF
LEAD SYSTEM	SYS 2
EVAPORATOR PUMP	ON

EVAPORATOR HEATER	OFF	
ACTIVE REMOTE CONTROL	NONE	
UNIT	XXX.X AMPS	X.X VOLTS
EVAP PIMP TOTAL RUN HOURS	XXXXX	
FAN RAMP SPEED	X.X %/S	
SOFTWARE VERSION	Y.A01.50.00	

SYSTEM 1 DATA

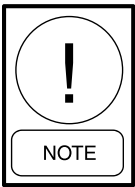
COMP RUN	OFF	
SLIDE VALVE MIN LOAD	OFF	
SLIDE VALVE UNLOAD	OFF	
SLIDE VALVE LOAD	OFF	
RUN TIME	0- 0- 0- 0-	D-H-M-S
SUCTION PRESSURE	66.0 PSIG	
DISCHARGE PRESSURE	219.2 PSIG	
SUCTION TEMPERATURE	52.8 DEGF	
DISCHARGE TEMPERATURE	151.7 DEGF	
SAT SUCTION TEMP	40.8 DEGF	
SAT DISCHARGE TEMP	136.8 DEGF	
SUCTION SUPERHEAT	12.0 DEGF	
DISCHARGE SUPERHEAT	22.9 DEGF	
HOT GAS BYPASS VALVE	OFF	
CONDENSER FAN STAGE	OFF	
FAN VSD SIGNAL	XXX.X %	
EEV OUTPUT	0.0 %	
SYSTEM	XXX.X AMPS	X.X VOLTS

SYSTEM 2 DATA

COMP RUN	OFF	
SLIDE VALVE MIN LOAD	OFF	
SLIDE VALVE UNLOAD	OFF	
SLIDE VALVE LOAD	OFF	
RUN TIME	0- 0- 0- 0-	D-H-M-S
SUCTION PRESSURE	66.0 PSIG	
DISCHARGE PRESSURE	219.2 PSIG	
SUCTION TEMPERATURE	52.8 DEGF	
DISCHARGE TEMPERATURE	151.7 DEGF	
SAT SUCTION TEMP	40.8 DEGF	
SAT DISCHARGE TEMP	136.8 DEGF	
SUCTION SUPERHEAT	12.0 DEGF	
DISCHARGE SUPERHEAT	22.9 DEGF	
HOT GAS BYPASS VALVE	OFF	
CONDENSER FAN STAGE	OFF	
FAN VSD SIGNAL	XXX.X %	
EEV OUTPUT	0.0 %	
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 Optional Printer Installation on page 152 for Printer Installation information.

History Printout

Pressing the PRINT key and then the HISTORY key allows you to obtain a printout of information relating to the last 9 Safety Shutdowns which occurred. The information is stored at the instant of the fault, regardless of whether the fault caused a lockout to occur. The information is also not affected by power failures (long-term internal memory battery backup is built into the circuit board) or a manual reset 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 9 Safety Shutdowns buffers. The printout begins with the most recent fault that occurred. The most recent fault is always stored as Safety Shutdown No. 1. Identically formatted fault information is then 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 of a history buffer printout follows. The data part of the printout is exactly the same as the operational data print so it is not repeated here. The difference is that the Daily Schedule does not print in the history print and the header is as follows.

```
YORK INTERNATIONAL CORPORATION
MILLENNIUM LIQUID CHILLER
SAFETY SHUTDOWN NUMBER 1
SHUTDOWN @ 3:56PM 29 SEP 07
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 displays.

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

While this message displays, 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 9 is the oldest safety shutdown that was saved.

After selecting the shutdown number, press the ENTER key to display the following message. It shows when the shutdown occurred.

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

The ↑ (UP) and ↓ (DOWN) arrow keys 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:

```
SYS1    NO FAULT
SYS2    LOWSUCTPRESS
```

Note that this display is only an example. The display contains either the system or unit fault that caused the shutdown. There are many possible message combinations.

```
UNIT TYPE
LIQUID CHILLER
```

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

```
CHILLED LIQUID
XXXXX
```

Displays the chilled liquid type which is water.

```
LOCAL / REMOTE MODE
XXXXXXXXXX
```

Displays Local or Remote control selection.

**CONTROL MODE
LEAVING LIQUID**

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

**LEAD / LAG CONTROL
XXXXXXXXXX**

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

**MANUAL OVERRIDE MODE
XXXXXXXXXX**

Displays whether Manual Override was Enabled or Disabled.

**DISCHARGE PRESSURE
CUTOUT = XXXX PSIG**

Displays the programmed Discharge Pressure Cutout.

**SUCTION PRESSURE
CUTOUT = XXXX PSIG**

Displays the programmed Suction Pressure Cutout.

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

Displays the programmed Low Ambient Cutout.

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

Displays the Leaving Liquid Temp. Cutout programmed.

**FAN CONTROL ON
PRESSURE = XXX PSIG**

Displays the programmed Fan On Pressure.

**FAN DIFFERENTIAL OFF
PRESSURE = PSIG**

Displays the programmed Fan Off Differential.

**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.

**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.

**SYS X COMPRESSOR XXX
MIN,U,L XXX,XXX,XXX**

Displays whether the compressor is running or not, and the status of capacity control solenoid valves including Mini load SC, Unload SV and Load SV.

```
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 for EEV operation.

```
SYS X DSCH = XXX.X °F
SAT DSCH = XXX.XX °F
```

Display discharge temperature and saturated discharge temperature.

```
SYS X DISCHARGE
SHEAT = XXX.XX °F
```

Display discharge superheat, which is calculated with the discharge temperature and saturated discharge temperature.

```
SYS X EEV = XXX.X %
SUCTION SHEAT = XX.XX °F
```

Display the opening of EEV and suction superheat.

```
SYS X FAN STAGE XXX
```

Display the fan stage.

Display for System 1 starting with SYS X COMPRESSOR XXX MIN, U, L, XXX, XXX, XXX through SYS X FANS 1=XXX, 2=XXX, 3=XXX will be displayed first, followed by displays for system 2.

Further explanation of the above display 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 (1 TO 9)
```

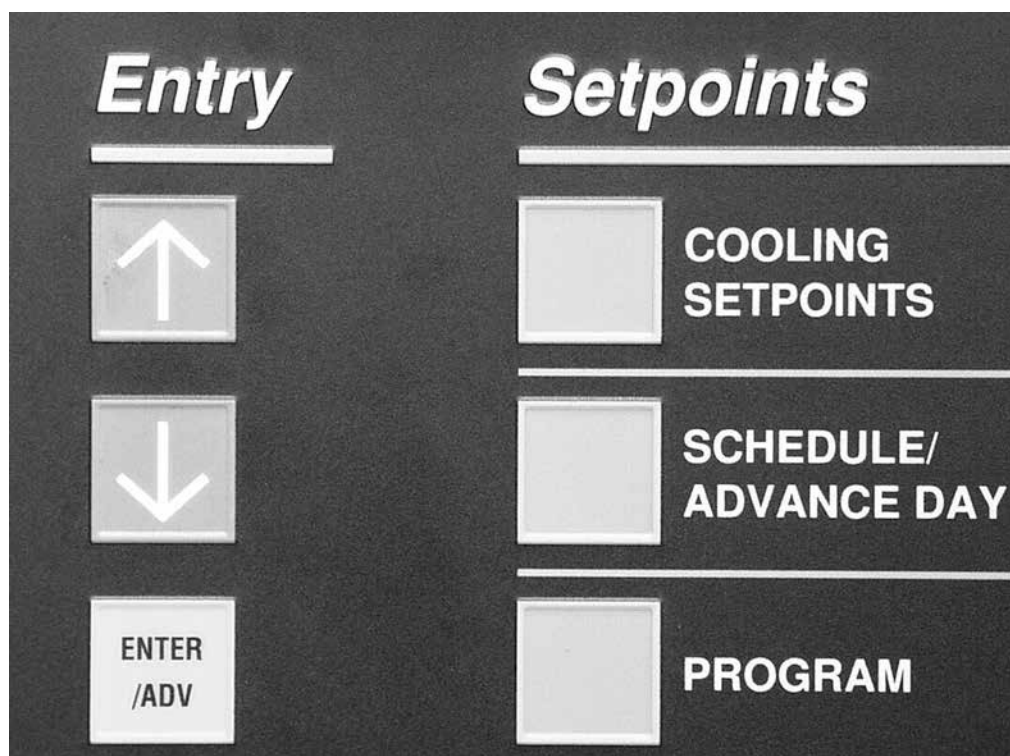
After the ↓ (DOWN) arrow key is pressed again, the software version will appear.

```
I/O C.MMC.18.02
```

and

```
CC 5 0.0 . 8
```

ENTRY KEYS



00068VIP

7

The Entry Keys allow you to view and 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 you to scroll through the various data screens. Refer to *Display/Print Keys on page 108* for specific information on the displayed information and specific use of the ↑ (UP) and ↓ (DOWN) arrow keys.

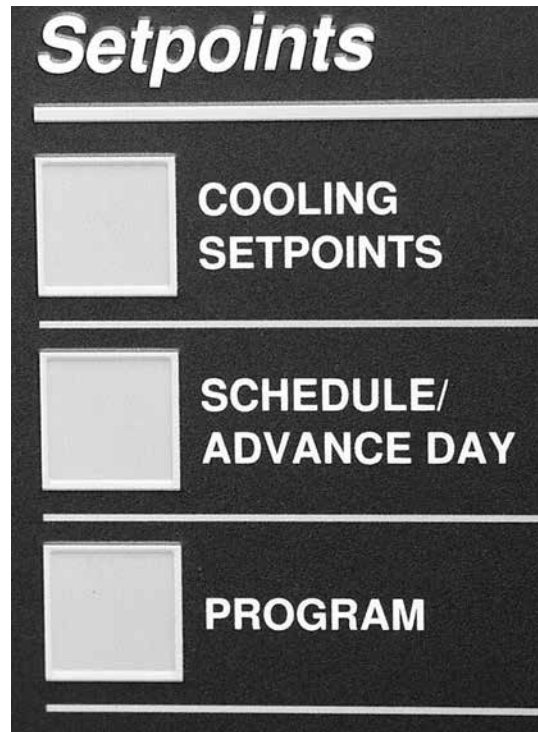
The ↑ (UP) arrow key, and ↓ (DOWN) arrow key are also used for programming the control panel. You can change numeric or text values when programming cooling setpoints, setting the daily schedule, changing safety setpoints, chiller options, and setting the clock.

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



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Programming of the cooling setpoints, daily schedule, and safeties is done by using the keys located in the SETPOINTS section.

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

Use the following instructions to program the respective setpoints. The same instructions 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) displays for a few seconds. Then, the setpoint display entry screen appears.

Leaving Chilled Liquid Control

SETPOINT = 45.0 °F
RANGE = +/- 2.0 °F

The message shown above is the current chilled water temperature SETPOINT at 45.0 °F (notice the cursor positioned under the number 0). Press either the ↑ (UP) or ↓ (DOWN) arrow to change the setpoint in .5 °F increments. After using the ↑ (UP) or ↓ (DOWN) arrow keys to adjust to the desired setpoint, press the ENTER/ADV key to enter this number into memory and advance to the RANGE SETPOINT.

Entry of the setpoint is 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 you adjust the setpoint, press the ENTER/ADV key 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.

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

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.

Remote Setpoint Control

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

The following messages illustrate leaving chilled liquid control.

```
REM  SETP  =  44 . 0 ° F
RANGE  =  + / - 2 . 0 ° F
```

(leaving chilled liquid control)

The low limit, high limit, and default values for the keys under “SETPOINTS” are listed in *Table 12 on page 120*.

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

```
MAXIMUM REMOTE
TEMP RESET  =  + XX ° 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 *Remote BAS/EMS Temperature Reset Using a Voltage or Current Signal on page 143* 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, press the ENTER/ADV key 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 runs 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.

TABLE 12 - COOLING SETPOINT, PROGRAMMABLE LIMITS AND DEFAULTS

SETPOINT VALUE	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
Leaving Chilled Liquid Setpoint (0.5°F Inc. / Dec.)	Water Cooling	40.0 °F	70.0 °F	44.0 °F
		4.4 °C	21.1 °C	6.7 °C
Leaving Chilled Liquid Control Range	Chiller	1.5 °F	2.5 °F	2.0 °F
		0.8 °C	1.4 °C	1.1 °C
Maximum Remote Temp Reset	/	2 °F	40 °F	20 °F
		1 °C	22 °C	11 °C

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

```

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

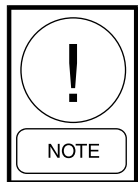
```

```

S _ M T W T F S
HOLIDAY NOTED BY *

```

The line under the 0 is the cursor. If the value is wrong, it may be changed. Use the ↑ (UP) and ↓ (DOWN) arrow keys until correct. Press the ENTER/ADV key to enter the times and move the cursor to the minute box. Repeat the operation if necessary. Follow this process 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, press the ENTER/ADV key to 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 you must reprogram the other days to the desired schedule.

To page to a specific day, press the SCHEDULE/ADVANCE DAY key until you see the desired day. 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

```

Use the same procedure as described above to program the days of the week. After you change the meridian of the stop time, press the ENTER/ADV key to advance the schedule to the following display:

The line below the empty space next to the S is the cursor. It moves to the next empty space when you press the ENTER/ADV key. To set the Holiday, move the cursor to the space following the day of the week of the holiday. Press the ↑ (UP) arrow key. An * will appear in the space signifying that day as a holiday. Press the ↓ (DOWN) arrow key to remove the *.

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*. Continue to press the ENTER/ADV key to display each operating parameter. While a particular parameter displays, use the ↑ (UP) and ↓ (DOWN) arrow keys to change the value. After the value is changed, press the ENTER/ADV key to enter the data into memory. *Table 13 on page 122* shows the programmable limits and default values for each operating parameter.

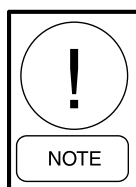
Following are the displays for the programmable values in the order they appear:

D I S C H A R G E P R E S S U R E
C U T O U T = 2 5 2 P S I G

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 the set “Discharge Pressure Differential (default is 15 psig)” below the cutout point.

S U C T I O N P R E S S U R E
C U T O U T = 2 5 P S I G

The SUCTION PRESSURE CUTOUT protects the chiller from an evaporator freeze-up. If the suction pressure drops below the cutout point, the system shuts down. Typically, the cutout should be set to 25 psig (1.72 Bars) for 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.

L O W A M B I E N T T E M P
C U T O U T = 2 5 . 0 ° F

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

L E A V I N G L I Q U I D T E M P
C U T O U T = 3 6 . 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 is 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.

E V A P O R A T O R T E M P
C U T O U T = X X X . X ° F

The EVAPORATOR 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.

A N T I R E C Y C L E T I M E R
= 6 0 0 S E C

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.

F A N C O N T R O L O N
P R E S S U R E = X X X P S I G

The Fan Control On Pressure is the programmed pressure value that is used to stage the condenser fans on, in relation to discharge pressure. Refer to *Standard Condenser Fan Control on page 140* in **SECTION 7 – UNIT CONTROLS** and *Table 18 on page 141*.

F A N D I F F E R E N T I A L O F F
P R E S S U R E = X X X P S I G

The Fan Differential Off Pressure is the programmed differential pressure value that is used to stage the condenser fans OFF, in relation to discharge pressure. Refer to *Standard Condenser Fan Control on page 140* in **SECTION 8 – UNIT OPERATION** and *Table 18 on page 141*.

TABLE 13 - PROGRAM KEY LIMITS AND DEFAULT

PROGRAM VALUE	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
Discharge Pressure Cutout (1 PSIG Inc./Dec.)	--	195 PSIG	252 PSIG	252 PSIG
		13.4 BARG	17.4 BARG	17.4 BARG
Suction Pressure Cutout (1 PSIG Inc./Dec.)	Water Cooling	24.0 PSIG	36.0 PSIG	25.0 PSIG
		1.65 BARG	2.48 BARG	1.70 BARG
Low Ambient Air Temperature Cutout (1.0 °F Inc./Dec.)	Low	0 °F	60.0 °F	25.0 °F
	Ambient	-17.8 °C	15.6 °C	-3.9 °C
Leaving Chilled Liquid Temperature Cutout (1.0 °F Inc./Dec.)	Water Cooling	--	--	36.0 °F
		--	--	2.2 °C
Evaporator Temperature Cutout (0.5 °F Inc./Dec.)	Water Cooling	34.0 °F	38.0 °F	36.0 °F
		1.1 °C	3.3 °C	2.2 °C
Anti-Recycle Time (15 Second Inc./Dec.)	--	180 sec	600 sec	180 sec
Discharge Fan Control On Pressure (5 PSIG Inc./Dec.)	--	120 PSIG	165 PSIG	150 PSIG
		8.3 BARG	11.4 BARG	10.3 BARG
Discharge Fan Differential Off Pressure (5 PSIG Inc./Dec.)	--	15 PSID	60 PSID	40 PSID
		1.0 BARD	4.1 BARD	2.8 BARD
Number of Fans per System (1 Inc./Dec.)	--	2 fans	6 fans	3 fans
Unit Id (1 Inc./Dec.)	--	0	7	0
System 1 Superheat Setpoint (0.5 °F Inc./Dec.)	--	5.0 °F	18.0 °F	9.0 °F
		2.8 °C	10.0 °C	5.0 °C
System 2 Superheat Setpoint (0.5 °F Inc./Dec.)	--	5.0 °F	18.0 °F	9.0 °F
		2.8 °C	10.0 °C	5.0 °C
Duty/Standby Pump Change Over (1 Inc./Dec.)	--	1	30	30
Load Timer (5 Second Inc./Dec.)	--	30 Sec	180 Sec	60 Sec
Unload Timer (5 Second Inc./Dec.)	--	30 Sec	180 Sec	45 Sec
Load Pulse Gain (1 Inc./Dec.)	--	1	10	1
Unload Pulse Gain (1 Inc./Dec.)	--	1	10	1
Load Timer Gain (1 Inc./Dec.)	--	1	5	1
Unload Timer Gain (1 Inc./Dec.)	--	1	5	1
Discharge Pressure Differential (1.0 PSID Inc./Dec.)	--	5 PSID	20 PSID	15 PSID
		0.3 BARD	1.4 BARD	1.0 BARD

* The minimum discharge pressure allowed is 105 PSIG. The Fan Differential Off Pressure High Limit will be lowered (reduced) to prevent going below 105 PSIG based on where the fan control On Pressure is programmed.

The Number of Fans Per System must be programmed as needed to match the number of fans on each system.

S Y S X N U M B E R O F F A N S
= X

R E M O T E U N I T I D
P R O G R A M M E D = 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.

L S Y S X S U C T S U P E R H E A T
S E T P O I N T = X X . X ° F

The programmed SYS SUCT SUPERHEAT SETPOINT is used for EEV control.

D U T Y / S T A N D B Y P U M P
C H A N G E O V E R = X X D A Y S

The programmed DUTY/STANDBY PUMP CHANGE OVER is used to switch over the pump between the duty and standby at every programmed days to balance the running time of pumps.

L O A D T I M E R
= X X X S E C S

U N L O A D T I M E R
= X X X S E C S

L O A D P U L S E G A I N
= X X

U N L O A D P U L S E G A I N
= X X

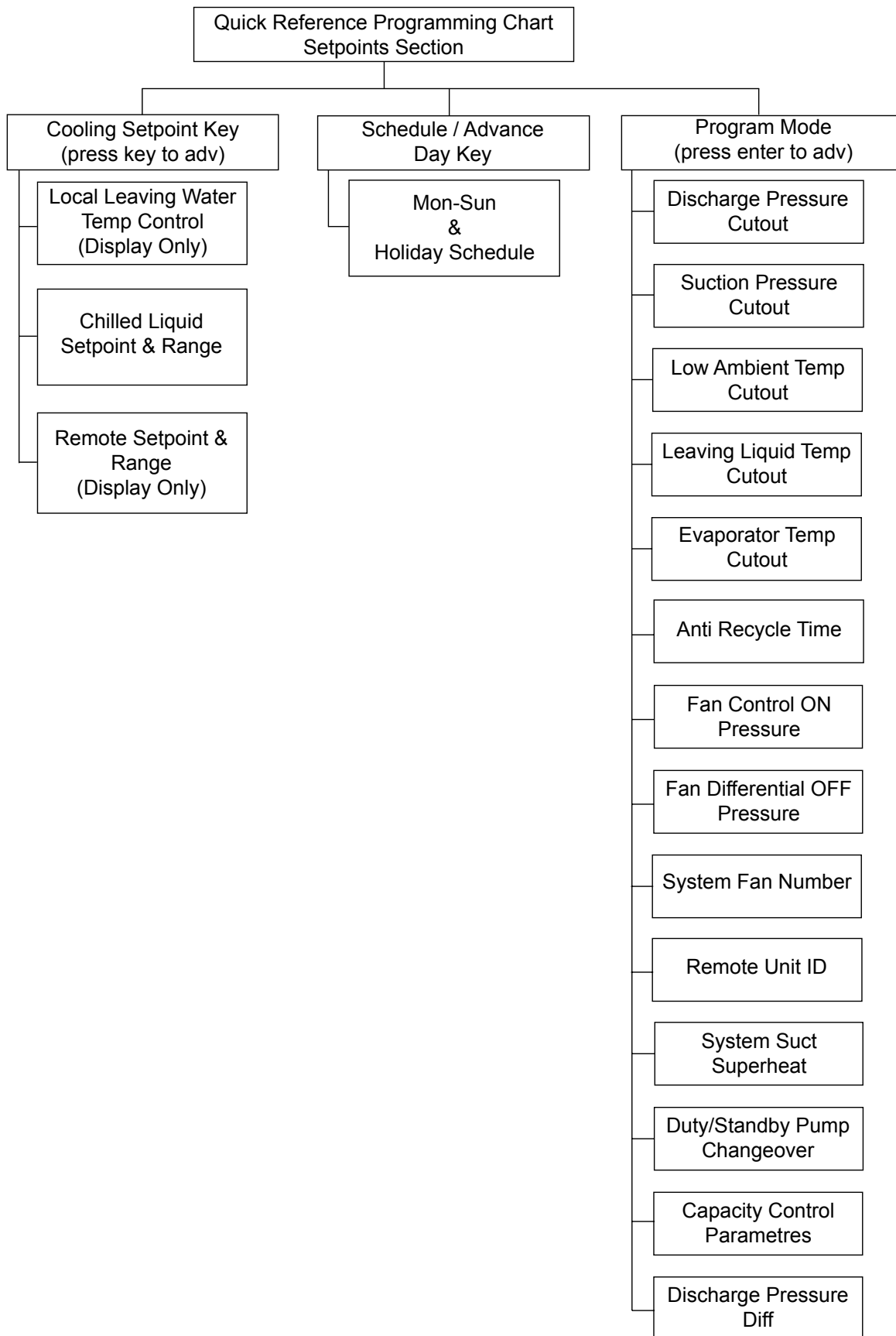
L O A D T I M E R G A I N
= X X

U N L O A D T I M E R G A I N
= X X

The above 6 programmable values are used to calculate the LOAD TIMER and UNLOAD TIMER and to adjust the energized time of solenoid valves in compressor capacity control.

D I S C H A R G E P R E S S U R E
D I F F = X X X X P S I G

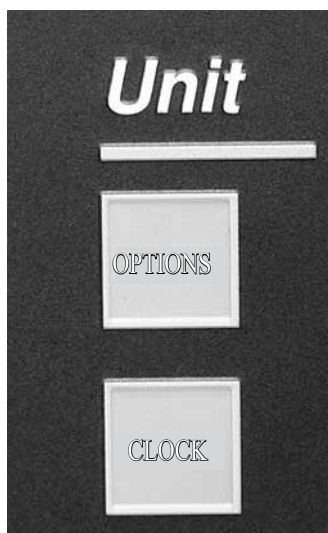
This programmable valve is used to determine the zone for capacity limit by combining with the DISCHARGE PRESSURE CUTOUT.



LD20905

FIGURE 45 - SETPOINTS QUICK REFERENCE LIST

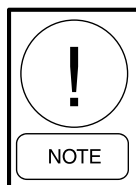
UNIT KEYS



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, press the ENTER/ADV key 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 46 on page 128 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 – 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.

Option 3 – Chilled Liquid Cooling Type

C H I L L E D L I Q U I D
W A T E R

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

or

C H I L L E D L I Q U I D
G L Y C O L

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

Option 4 – Local/Remote Control Type

L O C A L / R E M O T E M O D E
L O C A L

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

or

L O C A L / R E M O T E M O D E
R E M O T E

This mode should be selected when an ISN or RCC control is to be used to control the chiller. This mode will allow the ISN to control the following items: Remote Start/Stop, Cooling Setpoint, Load Limit, and History Buffer Request. If the unit receives no valid ISN transmission for 5 minutes, it will revert back to the locally programmed values.

Option 5 – Display Units

D I S P L A Y U N I T S
I M P E R I A L

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

or

D I S P L A Y U N I T S
S I

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

Option 6 – Lead/Lag Type (two system units only)

L E A D / L A G C O N T R O L
M A N U A L S Y S 1 L E A D

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

or

L E A D / L A G C O N T R O L
M A N U A L S Y S 2 L E A D

SYS 2 selected as lead compressor.

or

L E A D / L A G C O N T R O L
A U T O M A T I C

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 7 – Manual Override Mode

M A N U A L O V E R R I D E M O D E
D I S A B L E D

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

or

M A N U A L O V E R R I D E M O D E
E N A B L E D

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 8 – 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

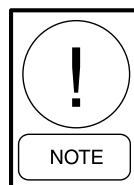
If the update resulted in an error, the original program will still be active. When an error occurs, assure the correct Flash Card was utilized. Incorrect chiller software will cause an error. If this is not the case, the Flash Card is most likely defective or the IPU and I/O combo board is bad.

Option 9 – Remote Temperature Reset

REMOTE TEMP RESET
INPUT XXXXXXXXXXXXXXXX

Remote Temp Reset input selection is programmable according to the type of input utilized. The following options are available:

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



The options display message for Remote Temp Reset Input only appears if the Temp Reset Option is enabled under Service Mode. The option must be enabled under the Service Mode for the Remote Temperature Reset to operate.

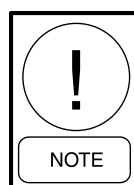
Option 10 – Pump Control

Pump Control is utilized to operate the optional on-board pump kit or to control an external pump through dry contacts 23 and 24 on Terminal Block XTBC2. To use this option, the following selection should be made in the Service Mode:

YORK HYDRO
KIT PUMPS = 1

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

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



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

EXTERNAL
EVAP PUMP

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

The following option should not be selected.

YORK HYDRO
KIT PUMPS = 2

Option 11 – Pump Selection

The display for this PUMP SELECTION option should only appear if “KYDRO KIT PUMPS = 2” are selected under Option 10. Presently, this option should not be used.

Option 12 - Flash Card Data Logging

D A T A L O G T O F L A S H C A R D
O F F

Data logging to flashcard is disabled.

D A T A L O G T O F L A S H C A R D
O N

Data logging to flashcard is enabled.

D A T A L O G T O F L A S H C A R D
S K I P U N C H A N G E D

Data logging to flashcard is enabled but does not log unchanged data.

Clock

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

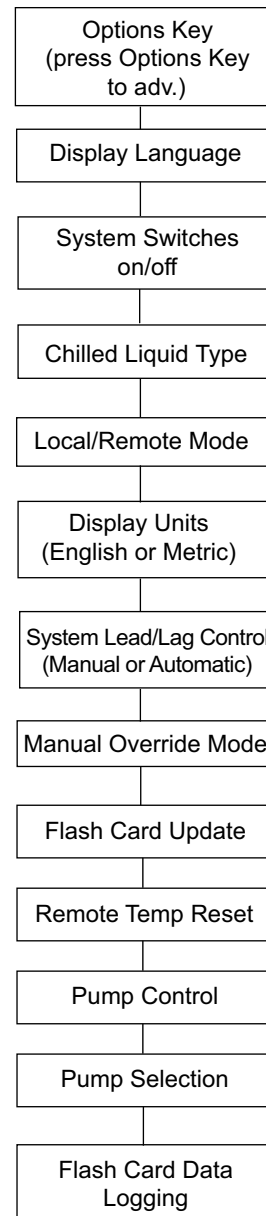
It is important that the date and time be correct, otherwise the daily schedule will not function as desired if programmed. In addition, for ease of troubleshooting via the History printouts, the day, time, and date should be correct.

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

T O D A Y I S E R I 0 8 : 5 1 A M
2 5 J A N 0 2

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 display. Press the ENTER/ADV key to save the value and move the cursor on to the next programmable variable.



LD20906

This provides a quick reference list for the Unit key setpoints.

**FIGURE 46 - UNIT KEYS OPTIONS
PROGRAMMING QUICK REFERENCE LIST**

BACNET, MODBUS, N2 COMMUNICATIONS

Data can be read and in some cases modified using a serial communication BACnet, Modbus or YorkTalk 2 network connection. This information allows communications of chiller operating parameters and external control changes to setpoint, load limiting, and start/stop commands.

BACnet and N2 RS485 networks are wired to the + and - terminals of TB1 for port 1 communications and additionally wired to REF terminal of TB1 for N2. Modbus network connection has the option of RS232 or RS485 connection for port 2 communications. Modbus network is wired to either TB2 or TB3 as follows:

- RS-485: connect to TB2 - Network (-1) to TB2 (-1); Network (+1) to TB2 (+1)
- RS-232: connect to TB3 - Network (RX) to TB3 (TXD); Network (TX) to TB3 (RXD); Network (GND) to TB3 (GND)

Refer to Figure 47 on page 130 for TB1, TB2 and TB3 locations.

In most cases, communication parameters will need to be modified. Table 30 on page 131 lists setup parameters for the available protocols. Modification is accomplished by pressing the PROGRAM, DOWN ARROW, DOWN ARROW, DOWN ARROW, DOWN ARROW, and ENTER keys in sequence. The list below shows the displays for the values that may be modified:

DE MODIFIER ADDRESS XXXXX	P2 PROTOCOL XXXXXXXXXX
DE MODIFIER OFFSET XX	P2 MANUAL MAC ADDRESS XXX
P1 PROTOCOL XXXXXX	P2 BAUD RATE XXXXX
P1 MANUAL MAC ADDRESS XXX	P2 PARITY XXXXX
P1 BAUD RATE XXXXX	P2 STOP BITS X
P1 PARITY XXXXX	P2 HW SELECT BIT XXXXX
P1 STOP BITS X	REAL TIME ERROR ## RESET 1 = YES, 0 = NO 0

Note: See Table 16 on page 132 for error descriptions

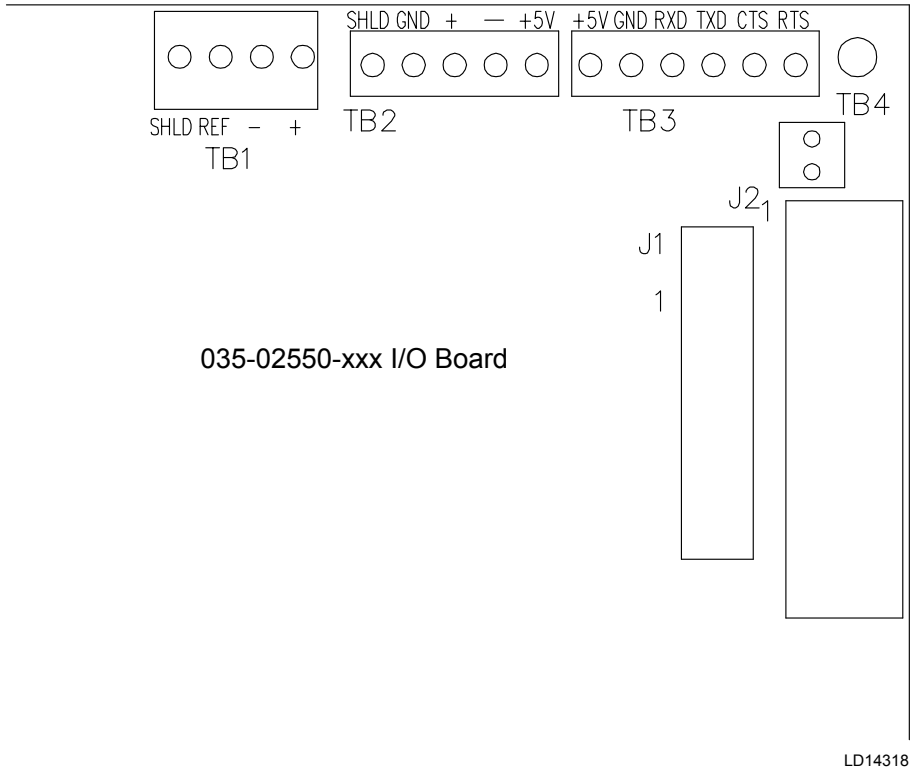


FIGURE 47 - MICRO PANEL CONNECTIONS

The table below shows the minimum, maximum, and default values.

TABLE 14 - MINIMUM, MAXIMUM AND DEFAULT VALUES

DESCRIPTION	MINIMUM	MAXIMUM	DEFAULT
DE MODIFIER ADDRESS	-1	41943	-1
DE MODIFIER OFFSET	-1	99	-1
P1 BAUD RATE	1200	76800	4800
	1200, 4800, 9600, 19200, 38400, 76800, AUTO SELECTABLE		
P2 BAUD RATE	1200	57600	1200
	1200, 4800, 9600, 19200, 38400, 57600 SELECTABLE		
P1, P2 MANUAL Mac ADDRESS	-1	127	-1
P1, P2 PARITY	NONE	IGNORE	NONE
	NONE, EVEN, ODD, IGNORE SELECTABLE		
P1 PROTOCOL	BACNET	API	BACNET
	BACNET, API SELECTABLE		
P2 PROTOCOL	TERMINAL	MODBUS CLIENT	API
	TERMINAL, MODBUS IO, MODBUS SERVER, API, MODBUS CLIENT SELECTABLE		
P1, P2 STOP BITS	1	2	1
RESET REAL TIME ERROR	NO	YES	NO

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

TABLE 15 - VALUES REQUIRED FOR BAS COMMUNICATION

SETTING DESCRIPTION	PROTOCOL			
	BACNET MS/TP	MODBUS RTU ⁵	YORKTALK 2	N2 ⁶
DE MODIFIER ADDRESS	0 to 41943 ³	1	-1	0 to 41943 ³
DE MODIFIER OFFSET	0 to 99 ⁴	0	N/A	0 to 99 ⁴
P1 PROTOCOL	BACNET	N/A	N/A	9n2
P1 MANUAL MAC ADDRESS	0-127 ¹	N/A	N/A	0-127 ¹
P1 BAUD RATE	9600 To 76800 or Auto Selectable ¹	N/A	N/A	9600
P1 PARITY	NONE	N/A	N/A	NONE
P1 STOP BITS	1	N/A	N/A	1
P2 PROTOCOL	N/A	MODBUS SVR	N/A	N/A
P2 MANUAL MAC ADDRESS	N/A	0-127 ¹	N/A	N/A
P2 BAUD RATE	N/A	19,200 ²	N/A	N/A
P2 PARITY	N/A	NONE ²	N/A	N/A
P2 STOP BITS	N/A	1	N/A	N/A
P2 HW SELECT BIT	N/A	RS-485 or RS-232 ¹	N/A	N/A
RESET REAL TIME ERROR	N/A	N/A	N/A	N/A
P1 HW SELECT BIT	N/A	N/A	N/A	N/A
CHILLER ID	N/A	N/A	0	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 C.Mmc.13.03 or later required for Modbus Protocol.

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.

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 #.

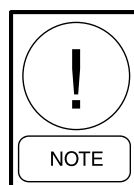
Analog Read Only Points

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 #.

Refer to Table 17 on page 133 for complete list of BACnet and Modbus registers.



The latest data map information is listed on the Johnson Controls Equipment Integration website.

Communications Data Map Notes*(See Table 17)*

1. IPU II based units are configured for Native BACnet MS/TP and Modbus RTU communications. E-Link Gateway not required for these two communication protocols.

2. BACnet Object Types:

0 = Analog In	5 = Binary Value
1 = Analog Out	8 = Device
2 = Analog Value	15 = Alarm Notification (0 through 127 are reserved ASHRAE Objects).
3 = Binary In	
4 = Binary Output	

- 3.

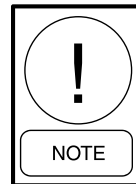
WC= Inches of water column	Pa = Pascals
CFM = Cubic Feet per Minute	kPa = Kilopascals
FPM = Feet per Minute	PPM = Part per Million
PSI = Lbs per square inch	kJ/kg = Kilojoules per Kilogram.

4. Water Cooled screw units use the same firmware as Air Cooled screw units, ignoring Fan Control.

The Table 16 on page 132 shows the real time error numbers that may be encountered during communication setup and a description of each.

TABLE 16 - 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



Reboot required (cycle power) after settings are changed.

TABLE 17 - BACNET AND MODBUS COMMUNICATIONS DATA MAP

YSAA			MODBUS, BACNET MS/TP, N2 DATA MAP		MICRO BOARD: 031-02550-000															
ITEM	VERSION	DATE	YORK P/N	NATIVE	COMMENTS															
1	YACS 50.01		031-03635-XXX		NEW RELEASE															
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
ITEM REF NUM	BACNET NAME	BACNET OBJECT INSTANCE	MODBUS ADDRESS	MODBUS DATA TYPE SUPPORTED	MODBUS SCALING	N2 METASYS ADDRESS	ENG UNITS	POINT LIST CODE: S = STANDARD O = OPTIONAL												
							IMPER	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	div10	ADF 1	°F	°C												
2	SP_REM_SP_S1	AV2	1027	03.06.16	div10	ADF 2	PSIG	BARG												
3	REM_CR	AV3	1028	03.06.16	X1	ADF 3	°F	°C												
4	SP_REM_SP_S2	AV4	1029	03.06.16	div10	ADF 4	PSIG	BARG												
BINARY WRITE POINTS																				
5	START_STOP	BV1	1538	01.03.05.15.06	n/a	BD 1	0/1	0/1												
6	SS_SYS1	BV2	1539	01.03.05.15.06	n/a	BD 2	0/1	0/1												
7	SS_SYS2	BV3	1540	01.03.05.15.06	n/a	BD 3	0/1	0/1												
ANALOG READ ONLY POINTS																				
8	LCHLT	AI1	514	03.04	X10	ADF5	°F	°C												
9	ECHLT	AI2	515	03.04	X10	ADF6	°F	°C												
10	ELT	AI3	516	03.04	X10	ADF 7	°F	°C												
11	DAT	AI4	517	03.04	X10	ADF 8	°F	°C												
12	S1_SUCT_TEMP	AI5	518	03.04	X10	ADF 9	°F	°C												
13	OAT	AI6	519	03.04	X10	ADF 10	°F	°C												
14	S1_SUCT_SH	AI7	520	03.04	X10	ADF 11	°F	°C												
15	S1_RUN_TIME	AI8	521	03.04	X10	ADF 12	Sec	Sec												
16	S1_SUCT_PR	AI9	522	03.04	X10	ADF 13	PSIG	BARG												
17	S1_DSCH_PR	AI10	523	03.04	X10	ADF 14	PSIG	BARG												
18	S1_EEV_CMD	AI11	524	03.04	X10	ADF 15	°F	°C												
19	S1_AR_TIMER	AI12	525	03.04	X10	ADF 16	Sec	Sec												
20	AC_TIMER	AI13	526	03.04	X10	ADF 17	Sec	Sec												
21	S2_SUCT_TEMP	AI14	527	03.04	X10	ADF 18	°F	°C												
22	S2_RUN_TIME	AI15	528	03.04	X10	ADF 19	Sec	Sec												
23	S2_SUCT_PR	AI16	529	03.04	X10	ADF 20	PSIG	BARG												
24	S2_DSCH_PR	AI17	530	03.04	X10	ADF 21	PSIG	BARG												
25	S2_SUCT_SH	AI18	531	03.04	X10	ADF 22	°F	°C												
26	S2_AR_TIMER	AI19	532	03.04	X10	ADF 23	Sec	Sec												
27	S2_EEV_CMD	AI20	533	03.04	X10	ADF 24	%	%												
28	S1_OP_CODE	AI21	534	03.04	X1	ADF 25	index	index												
29	S1_FLT_CODE	AI22	535	03.04	X1	ADF 26	index	index												
30	S2_OP_CODE	AI23	536	03.04	X1	ADF 27	index	index												
31	S2_FLT_CODE	AI24	537	03.04	X1	ADF 28	index	index												
32	S1_FAN_STAGE	AI25	538	03.04	X1	ADF 29	count	count												
33	S2_FAN_STAGE	AI26	539	03.04	X1	ADF 30	count	count												
34	CONTROL_MODE	AI27	540	03.04	X1	ADF 31	index	index												
35	AR_TIMER	AI28	541	03.04	X10	ADF 32	Sec	Sec												
36	LCHLT_CUT	AI29	542	03.04	X10	ADF 33	°F	°C												
37	LOW_AMB_CUT	AI30	543	03.04	X10	ADF 34	°F	°C												
38	L_SUCT_P_CO	AI31	544	03.04	X10	ADF 35	PSIG	BARG												
39	H_DSCH_P_CO	AI32	545	03.04	X10	ADF 36	PSIG	BARG												
40	COOL_SETP	AI33	546	03.04	X10	ADF 37	°F	°C												
41	SP_SETP_S1	AI34	547	03.04	X10	ADF 38	PSIG	BARG												

TABLE 17 - BACNET AND MODBUS COMMUNICATIONS DATA MAP (CONT'D)

NOTE: The YVFA Status Code Tables Should Accompany this Document

ITEM REF NUM	BACNET NAME	BACNET OBJECT & INSTANCE	MODBUS ADDRESS	MODBUS DATA TYPE SUPPORTED	MODBUS SCALING	N2 METASYS ADDRESS	ENG UNITS		POINT LIST CODE: S = STANDARD O = OPTIONAL N = NOT AVAILABLE									
							IMPER	SI										
ANALOG READ ONLY POINTS																		
					SEE NOTE 1													
39	CONTROL_RG	AI35	548	03.04	X10	ADF 39	°F	°C	Cooling Range	S								
40	SP_CTL_RG_S1	AI36	549	03.04	X10	ADF 40	PSIG	BARG	Cooling Range 1 (SP Control)	S								
41	SP_SETP_S2	AI37	550	03.04	X10	ADF41	PSIG	BARG	Setpoint 2 (SP Control)	S								
42	SP_CTL_RG_S2	AI38	551	03.04	X10	ADF 42	PSIG	BARG	Cooling Range 2 (SP Control)	S								
43	S1_DSCH_TEMP	AI39	552	03.04	X10	ADF 43	°F	°C	Sys 1 Discharge Temperature	S								
44	S1_DSCH_SH	AI40	553	03.04	X10	ADF 44	°F	°C	Sys 1 Discharge Superheat	S								
45	S2_DSCH_TEMP	AI41	554	03.04	X10	ADF 45	°F	°C	Sys 2 Discharge Temperature	S								
46	S2_DSCH_SH	AI42	555	03.04	X10	ADF 46	°F	°C	Sys 2 Discharge Superheat	S								
47	R_COOL_SETP	AI43	556	03.04	X10	ADF 47	°F	°C	Remote Setpoint	S								
48	R_SP_SETP_S1	AI44	557	03.04	X10	ADF 48	PSIG	BARG	Remote Setpoint 1 (SP Control)	S								
49	R_SP_SETP_S2	AI45	558	03.04	X10	ADF 49	PSIG	BARG	Remote Setpoint 2 (SP Control)	S								
BINARY READ ONLY POINTS																		
64	S1_ALARM	BI1	1282	01,02,03	n/a	BD 4	0/1	0/1	Sys 1 Alarm	S								
65	S2_ALARM	BI2	1283	01,02,03	n/a	BD 5	0/1	0/1	Sys 2 Alarm	S								
66	EVAP_HTR	BI3	1284	01,02,03	n/a	BD 6	0/1	0/1	Evaporator Heater	S								
67	EVAP_PUMP1	BI4	1285	01,02,03	n/a	BD 7	0/1	0/1	Evaporator Pump 1	S								
68	EVAP_PUMP2	BI5	1286	01,02,03	n/a	BD 8	0/1	0/1	Evaporator Pump 2	S								
69	S1_C_RUN	BI6	1287	01,02,03	n/a	BD 9	0/1	0/1	Sys 1 Comp Run	S								
70	S1_SV_MIN_LOAD	BI7	1288	01,02,03	n/a	BD 10	0/1	0/1	Sys 1 Slide Valve Min Load	S								
71	S1_SV_UNL	BI8	1289	01,02,03	n/a	BD 11	0/1	0/1	Sys 1 Slide Valve Unload	S								
72	S1_SV_LD	BI9	1290	01,02,03	n/a	BD 12	0/1	0/1	Sys 1 Slide Valve Load	S								
73	S2_C_RUN	BI10	1291	01,02,03	n/a	BD 13	0/1	0/1	Sys 2 Comp Run	S								
74	S2_SV_MIN_LOAD	BI11	1292	01,02,03	n/a	BD 14	0/1	0/1	Sys 2 Slide Valve Min Load	S								
75	S2_SV_UNL	BI12	1293	01,02,03	n/a	BD 15	0/1	0/1	Sys 2 Slide Valve Unload	S								
76	S2_SV_LD	BI13	1294	01,02,03	n/a	BD 16	0/1	0/1	Sys 2 Slide Valve Load	S								
77	LEAD_SYS	BI14	1295	01,02,03	n/a	BD 17	0/1	0/1	Lead System (0 = Sys 1, 1 = Sys 2)	S								
78	CH_LIQ_TYPE	BI15	1296	01,02,03	n/a	BD 18	0/1	0/1	Chilled Liquid Type (0=Water, 1=Glycol)	S								
79	CNTL_MODE	BI16	1297	01,02,03	n/a	BD 19	0/1	0/1	Local/Remote Control Mode (0=Local, 1=Remote)	S								
80	DATA_UNIT	BI17	1298	01,02,03	n/a	BD 20	0/1	0/1	Units (0=Imperial, 1=SI)	S								
81	AUTO_LL	BI18	1299	01,02,03	n/a	BD 21	0/1	0/1	Lead/Lag Control Mode (0=Manual, 1=Auto)	S								
82	S1_HGBV	BI19	1300	01,02,03	n/a	BD 22	0/1	0/1	Sys 1 Hot Gas Bypass Valve	S								
83	S2_HGBV	BI20	1301	01,02,03	n/a	BD 23	0/1	0/1	Sys 2 Hot Gas Bypass Valve	S								
NOTES																		
1 IPU II (P/N 031-02550-xxx) based equipment are configured for Native BACnet MSTP and Modbus RTU and N2 communications. No external Gateway is required for these interfaces.																		
2 BACnet Object Types: 0=Analog In, 1=Analog Out, 2= Analog Value, 3=Binary In, 4=Binary Out, 5=Binary Value, 8=Device, 15=Alarm Notification (0-127 are reserved ASHRAE Objects)																		
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 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 10X BOLD indicate that scaling in Metric is X100. Scaling and signing may not be modified in the field.																		
NOTE: The YSAA Status Code Tables Should Accompany this Document																		

NOTES

- 1 IPU II (P/N 031-02550-xxx) based equipment are configured for Native BACnet MS/TP and Modbus RTU and N2 communications. No external Gateway is required for these interfaces.
- 2 BACnet Object Types: 0=Analog In, 1=Analog Out, 2=Analog Value, 3=Binary In, 4=Binary Out, 5=Binary Value, 8=Device, 15=Alarm Notification (0-127 are reserved ASHRAE Objects)
- 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 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 10X BOLD indicate that scaling in Metric is X100. Scaling and signing may not be modified in the field.

NOTE: The YSAA Status Code Tables Should Accompany this Document

TABLE 17 - BACNET AND MODBUS COMMUNICATIONS DATA MAP (CONT'D)

STATUS CODE			
Code Value	Operational Code	Code Value	Fault/Inhibit Code
	OPER. CODE		FAULT/INHIBIT. CODE
0	No Abnormal Condition	0	No Fault
1	Unit Switch Off	1	VAC Under Voltage
2	System Switch Off	2	Low Ambient Temperature
3	Lock - Out	3	High Ambient Temperature
4	Unit Fault	4	Low Leaving Chilled Liquid Temp
5	System Fault	5	High Discharge Pressure
6	Remote Shutdown	6	High Differential Oil Pressure
7	Daily Schedule Shutdown	7	Low Suction Pressure
8	No Run Permissive	8*	High Motor Current
9	No Cool Load	9*	LLSV Not On
10	Anti-Coincidence Timer Active	10	Low Battery Warning
11	Anti-Recycle Timer Active	11*	High Oil Temperature
12	Manual Override	12	High Discharge Temperature
13	Suction Limiting	13*	Improper Phase Rotation
14	Discharge Limiting	14*	Low Motor Current / MP / HPCO
15*	Current Limiting	15*	Motor Current Unbalanced
16	Load Limiting	16*	Low Differential Oil Pressure
17	Compressor Running	17*	Ground Fault
18*	Heat pump Load Limiting	18	MP/HPCO Fault
19	Flow Switch Shutdown	19	Low Evaporator Temperature
		20	Incorrect Refrigerant Programmed
		21	Power Failure, Manual Reset Required
		22	Unit Motor Current
		23	Low Suction Superheat
		24	Sensor Fault
		25	Discharge Inhibit
		26	MP/HPCO Inhibit
		27	Pump Trip
		28	Pump Fail Make Flow
		29	High Ambient Temperature
		30	Anti-Vacuum Low Pressure Cutout
		31	Low Discharge Superheat
		32	Low Discharge Pressure

NOTES:

The Operation Codes and Fault Codes with “*” are not applicable to YSAA

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SECTION 8 – UNIT OPERATION

LEAVING CHILLED LIQUID TEMPERATURE CONTROL

The following must be true in order for a system to start:

- Run permissive inputs must be satisfied
- No unit or system faults exist
- No unit or system start inhibits exist
- Daily schedule is ON
- Remote run is closed
- Flow switch is closed
- Capacity control routine is calling for a compressor to start

The setpoint in leaving chilled liquid control is the temperature the unit will control to within +/- the cooling range. The setpoint high limit is the setpoint plus the cooling range. The setpoint low limit is the setpoint minus the cooling range.

If the leaving chilled liquid temperature is above the setpoint high limit, a compressor will start. Upon energizing any compressor, the 60 second anti-coincidence timer will begin.

Starting and stopping of compressors will be handled by the capacity control routine. Loading and unloading will be controlled by the fuzzy logic control routine.

FUZZY LOGIC CONTROL

The fuzzy logic control is the same as current production air cooled screws and is called every control loop.

The output of the fuzzy logic routine will be the unscaled load/unload pulse (in seconds).

The fuzzy logic control algorithm shall be used to maintain the chilled liquid temperature within the programmed setpoint and control range (CR). Regulating the LCHLT (leaving chilled liquid temperature) within the desired CR is done through control of the compressor's slide valve. A series of load and unload pulses are sent to the compressor slide valve to maintain LCHLT within a desired range. The control algorithm combines system parameters and internal timers to maintain chilled liquid temperatures and minimize cycling of the two compressors. This method of control is suitable for water.

Control setpoints and CR are programmed into the panel to establish the desired range of leaving chilled operating temperatures.

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.

On power up of the control board, the slide valve minimum load solenoid shall be on for three minutes. During this time, the unit will not start.

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 contacts (Terminals 23 and 24 of XTBC2) 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 (Terminals 23 and 24 of XTBC2) are not required 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 then regulating the leaving or return chilled liquid temperature to meet that desired setpoint.

SYSTEM LEAD/LAG

Use the lead/lag option setting to determine if the system is in automatic lead/lag or manual lead/lag.

Evaluate if each system is available to run; check run permissive and system switch, and verify if the system is locked out/faulted, currently running, or the system timer active.

If in automatic lead/lag, determine the first available system to start. If all systems are available, use the system with less accumulated run hours.

If in manual lead/lag, determine if the manual lead system is available to start. If the manual lead system is not able to start, swap the lag into the lead.

LOADING AND UNLOADING LOGIC

Fuzzy Logic Output

Use the output of the fuzzy logic routine to determine load, unload, or hold commands as follows.

When fuzzy logic output > 0 (1 to 10):

Slide Valve Load Pulse (seconds) = [(Fuzzy Logic Output * Programmed Load Pulse Gain)]

When fuzzy logic output is < 0 (-10 to -1):

Slide Valve Unload Pulse (seconds) = [(-Fuzzy Logic Output * Programmed Unload Pulse Gain)]

When fuzzy logic output is 0:

Hold: Slide Valve Load Pulse = 0 seconds
Slide Valve Unload Pulse = 0 seconds

Loading Logic

When the temperature control routine indicates a compressor should start, energize the compressor run output and the slide valve minimum load. The slide valve minimum load shall remain on for thirty seconds.

After the thirty second minimum load time has expired and the fuzzy logic output indicates to load, pulse the slide valve load for the number of seconds calculated in “Fuzzy Logic Output”. This value is the amount of time the slide valve load will be energized when the load timer expires.

Unloading Logic

When the output of the fuzzy logic routine indicates to unload, pulse the slide valve unload of the compressor for the number of seconds calculated in “Fuzzy Logic Output”. This value is the amount of time the slide valve unload will be energized when the unload timer expires.

When stopping a compressor, de-energize the compressor and turn on the Slide Valve Minimum Load for three minutes.

Hold

When the output of the fuzzy logic routine indicates a hold (Fuzzy Logic Output = 0), the running compressor or slide valve load, slide valve unload, and slide valve minimum load are all set to off. This will occur when both the load and unload timers have expired.

Load and Unload Timers

The load and unload timers are unit timers. The load and unload timers are set to the programmed value as specified in the capacity control. The load and unload timers shall be adjusted by the fuzzy logic routine as follows.

When the load timer expires and the output of the fuzzy logic routine is (1 – 10) indicating to load, set the load timer as follows.

Load Timer (seconds) = Programmed Load Timer Value-

(Fuzzy Logic Output * Programmed Load Timer Gain)

When the unload timer expires and the output of the fuzzy logic routine is (-10 to -1) indicating to unload, set the unload timer as follows.

Unload Timer (seconds) = Programmed Unload Timer Value+

(Fuzzy Logic Output * Programmed Unload Timer Gain)

When the output of the fuzzy logic routine is 0, the load and unload timers are not modified from their programmed values.

Compressor Fully Loaded/Unloaded Logic

Use the following logic to determine when the compressor is fully loaded or fully unloaded.

When the slide valve unload output is energized:

Set the accumulated load time = 0

The accumulated unload time += unload pulse (limit to max of 120 seconds)

Compressor is fully unloaded when the accumulated unload time is 120 seconds.

When the slide valve load output is energized:

Set accumulated unload time = 0

The accumulated load time += load pulse (limit to max of 200 seconds)

Compressor is fully loaded when the accumulated load time is 200 seconds.

When the compressor is not running:

Set accumulated load time = 0

Set accumulated unload time = 0

EEV CONTROL

EEV control is always trying to keep the “Actual Suct Sheat” (Suction Superheat) the same as the “Setpoint of Suct Sheat”. To achieve this purpose, the EEV controller need to collect the parameters of “Suct Pressure”, “Suct Temp”, “Disch Pressure”, “Disch Temp,” and “Setpoint of Suct Sheat”.

Actual Suct Sheat = Current Suct Temp - Current Saturated Suct Temp

The EEV controller determines when to open or close the EEV and how many steps to open or close by combining two factors:

1. The error between “Actual Suct Sheat” and “Setpoint of Suct Sheat”;

Error = “Actual Suct Sheat” - “Setpoint of Suct Sheat”

If the error is above “0”, the EEV will extend an opening depending on the error. If the error is less, it will open the EEV will open less, if more then more; however, if the error is under “0”, the EEV will shut closing depending on the error. If the error is less, then the EEV will close less, if its more, it will close more. If the error equals to “0”, the EEV will keep the current open.

2. The Slope of the Curve for the Change in Suct Sheat, the slope reflects the Suct Sheat Change Rate in a short time (such as 10s). If the slope is above “0”, the Suct Sheat is increasing. The EEV will close an opening, otherwise, it will open an opening; the opening for each implementation depends on how fast the Suct Sheat changes (or how big the slope is).

Disch Sheat = Disch Temp - Saturated Disch Temp

The EEV controller will continuously monitor the Disch Sheat. If the Disch Sheat is too low, the EEV will close quickly to prevent the compressor from liquid carryover; if Disch Sheat is too high, the Active Suct Sheat will decrease from the Suct Sheat Setpoint, so the EEV will open gradually to prevent the compressor from high Disch Temp Trip.

ANTI-RECYCLE (AR) TIMER

The programmable anti-recycle timer allows the user to select the compressor anti-recycle time. The timer will be set to ten minutes once the compressor is started. This will allow only six starts per hour, as required by

the compressor manufacturer. Upon compressor stop, the anti-recycle timer will be set to the programmable AR time if the present value of the timer is less than the programmable AR time. The anti-recycle timers shall be decremented with a minimum of zero seconds any time they are non-zero. Upon boot up of the control board, the minimum anti-recycle time shall be three minutes.

ANTI-COINCIDENCE TIMER (TWO SYSTEM UNITS ONLY)

The anti-coincident timer is not present on single system units. It is only present on two system units. The anti-coincidence timer assures that two systems can never start simultaneously, which limits excessive current demand. A one-minute time delay will always separate system starts. This timer is not programmable.

EVAPORATOR PUMP CONTROL AND YORK HYDRO KIT PUMP CONTROL

The evaporator pump dry contacts (XTBC2 – Terminals 23 and 24) are energized when any of the following conditions are true:

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

To prevent pump motor from overheating, the pump will not run if the microprocessor panel has been powered up for less than 30 seconds or the pump has run in the last 30 seconds.

Whenever the option “HYDRO KIT PUMPS = 1” is selected under the OPTIONS key, the pump control will be as described above. DO NOT SELECT “HYDRO KIT PUMPS = 2” except that the dual pump kit is provided with chiller. If “HYDRO KIT PUMPS = 2” is selected under the OPTIONS key, the controller will set duty pump based on lowest run hours for pumps. Switch duty pump when the pumps are off or if the duty pump run hours are greater than the standby pump, by the programmed change over days.

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.

STANDARD CONDENSER FAN CONTROL

Condenser fan operation must be programmed with the OPTIONS key under “Fan Control.” Condenser fan must be selected for Discharge Pressure only. Fan control by discharge pressure will work according to the tables on the following pages (see *Table 18 on page 141*). The fan control on pressure and fan differential off-pressure are programmable under the PROGRAM key.

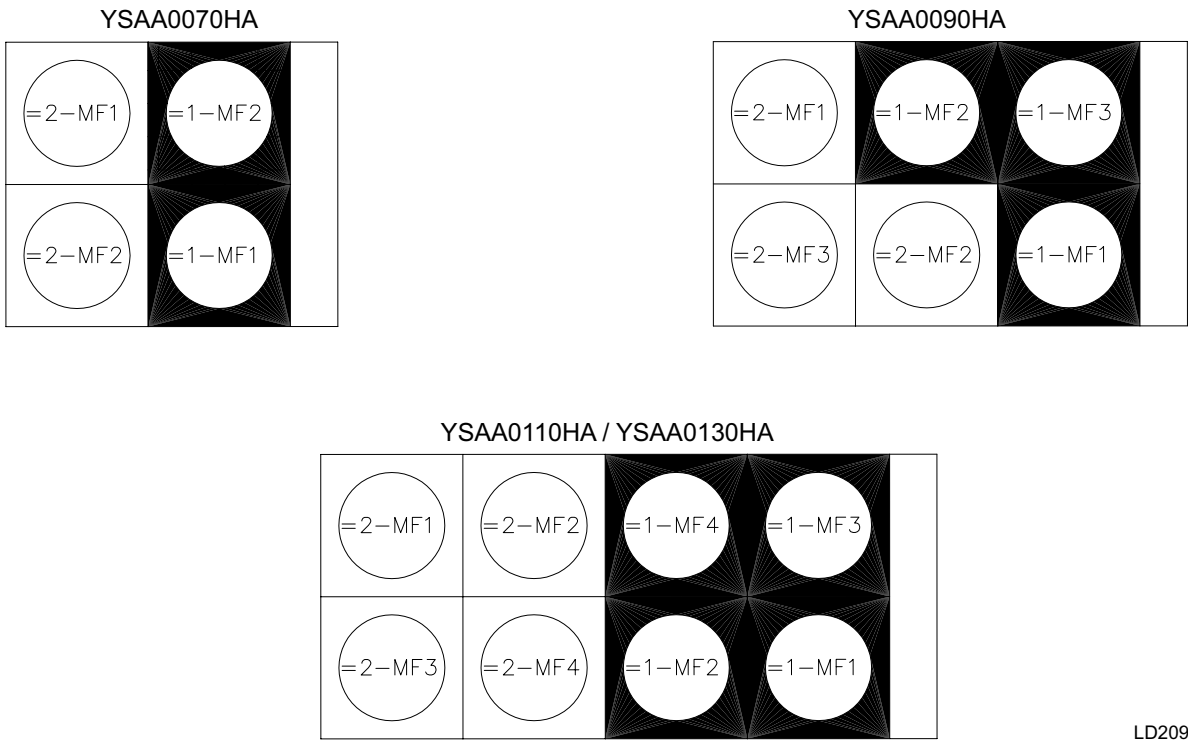
The delay between turning ON and OFF fan stages is always fixed at 5 seconds.

When a fan stage is turned ON by pressure, the on pressure for the next stage is increased 20PSIG and

ramped back to the programmed on pressure over the next 20 seconds. Typically, standard ambient control on pressure should be programmed at 150PSIG with a difference of 40PSIG.

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

Condenser fan locations are shown in *Figure 48 on page 140*. Detailed Standard Fan Control operation is shown in *Table 18 on page 141*.



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FIGURE 48 - CONDENSER FAN LOCATIONS

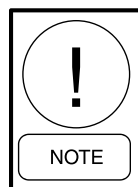
TABLE 18 - YSAA STANDARD CONDENSER FAN CONTROL USING DISCHARGE PRESSURE ONLY (2, 3, OR 4 FANS PER SYSTEM)

FAN STAGE	ON	OFF	IPUI I/O OUTPUT		FAN CONTACTOR		FAN #	
			SYS 1	SYS 2	SYS 1	SYS 2	SYS 1	SYS 2
0	N/A	N/A	TB7-8 (OFF) TB7-9 (OFF) TB7-10 (OFF)	TB10-8 (OFF) TB10-9 (OFF) TB10-10 (OFF)	1-KF1 (OFF) 1-KF2 (OFF) 1-KF3 (OFF) 1-KF4 (OFF)	2-KF1 (OFF) 2-KF2 (OFF) 2-KF3 (OFF) 2-KF4 (OFF)	1-MF1 (OFF) 1-MF2 (OFF) 1-MF3 (OFF) 1-MF4 (OFF)	2-MF1 (OFF) 2-MF2 (OFF) 2-MF3 (OFF) 2-MF4 (OFF)
1	DP> Programmed Fan Control On Pressure and No Fan is Running	DP< Programmed Fan Control On Pressure Minus Programmed Differential Pressure and One Fan is Running	TB7-8 (ON) TB7-9 (OFF) TB7-10 (OFF)	TB10-8 (ON) TB10-9 (OFF) TB10-10 (OFF)	1-KF1 (ON) 1-KF2 (OFF) 1-KF3 (OFF) 1-KF4 (OFF)	2-KF1 (ON) 2-KF2 (OFF) 2-KF3 (OFF) 2-KF4 (OFF)	1-MF1 (ON) 1-MF2 (OFF) 1-MF3 (OFF) 1-MF4 (OFF)	2-MF1 (ON) 2-MF2 (OFF) 2-MF3 (OFF) 2-MF4 (OFF)
2	DP> Programmed Fan Control On Pressure and One Fan is Running	DP< Programmed Fan Control On Pressure Minus Programmed Differential Pressure, and 2 Fans are Running	TB7-8 (ON) TB7-9 (ON) TB7-10 (OFF)	TB10-8 (ON) TB10-9 (ON) TB10-10 (OFF)	1-KF1 (ON) 1-KF2 (ON) 1-KF3 (OFF) 1-KF4 (OFF)	2-KF1 (ON) 2-KF2 (ON) 2-KF3 (OFF) 2-KF4 (OFF)	1-MF1 (ON) 1-MF2 (ON) 1-MF3 (OFF) 1-MF4 (OFF)	2-MF1 (ON) 2-MF2 (ON) 2-MF3 (OFF) 2-MF4 (OFF)
3	DP> Programmed Fan Control On Pressure and 2 Fans are Running	DP< Programmed Fan Control On Pressure Minus Programmed Differential Pressure and 3 Fans are Running	TB7-8 (ON) TB7-9 (OFF) TB7-10 (ON)	TB10-8 (ON) TB10-9 (OFF) TB10-10 (ON)	1-KF1 (ON) 1-KF2 (OFF) 1-KF3 (ON) 1-KF4 (ON)	2-KF1 (ON) 2-KF2 (OFF) 2-KF3 (ON) 2-KF4 (ON)	1-MF1 (ON) 1-MF2 (OFF) 1-MF3 (ON) 1-MF4 (ON)	2-MF1 (ON) 2-MF2 (OFF) 2-MF3 (ON) 2-MF4 (ON)
4	DP> Programmed Fan Control On Pressure and 3 Fans are Running	DP< Programmed Fan Control On Pressure Minus Programmed Differential Pressure and 4 Fans are Running	TB7-8 (ON) TB7-9 (ON) TB7-10 (ON)	TB10-8 (ON) TB10-9 (ON) TB10-10 (ON)	1-KF1 (ON) 1-KF2 (ON) 1-KF3 (ON) 1-KF4 (ON)	2-KF1 (ON) 2-KF2 (ON) 2-KF3 (ON) 2-KF4 (ON)	1-MF1 (ON) 1-MF2 (ON) 1-MF3 (ON) 1-MF4 (ON)	2-MF1 (ON) 2-MF2 (ON) 2-MF3 (ON) 2-MF4 (ON)

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

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

*** The maximum fan stage is determined by total fan number in the system, for instance, fan stage 3 and 4 is not applicable to 2 fans system.



The time delay (fan delay timer) between turning fan stages on and off is fixed at 5 seconds.

LOAD LIMITING

Load limiting is designed to stop loading or unload the compressor to prevent tripping on a safety. Load limiting is done based on suction pressure and discharge pressure. The load limiting routine will be executed every program loop. Load limiting is evaluated for each limit value for each system. The value with the highest amount of limiting per system is used for load limiting that system. When in load limiting, the unload solenoid will be set to on until the system is out of the UNLOADING region in the figures below. Upon exiting load limiting, the load and unload timers will be set to the programmed values. Load limiting prevents capacity control from loading when the limit value is between an ‘X’ point and a ‘Y’ point. Capacity control is allowed to unload as needed when the limit value is between these points. Prior to reaching the ‘X’ point, the load shall be limited to a maximum of a one second load pulse when between ‘X’ to ‘X – 10 PSIG’, a two second load pulse when between ‘X – 10 PSIG’ to ‘X – 20 PSIG’, a three second load pulse when between ‘X – 20 PSIG’ to ‘X – 30 PSIG’ and a four second load pulse when between ‘X – 30 PSIG’ to ‘X – 40 PSIG’. When the limit value is between a ‘Y’ point and a ‘Z’ point capacity control is overridden and the compressor is unloaded by load limiting and indicated on the status display.

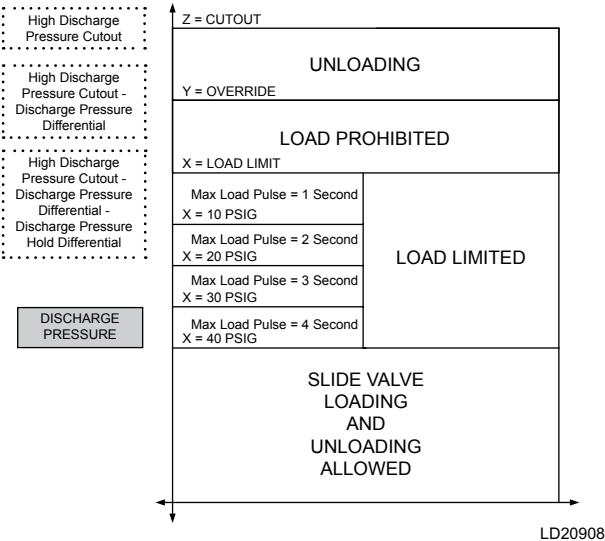


FIGURE 49 - DISCHARGE PRESSURE LOAD LIMITING

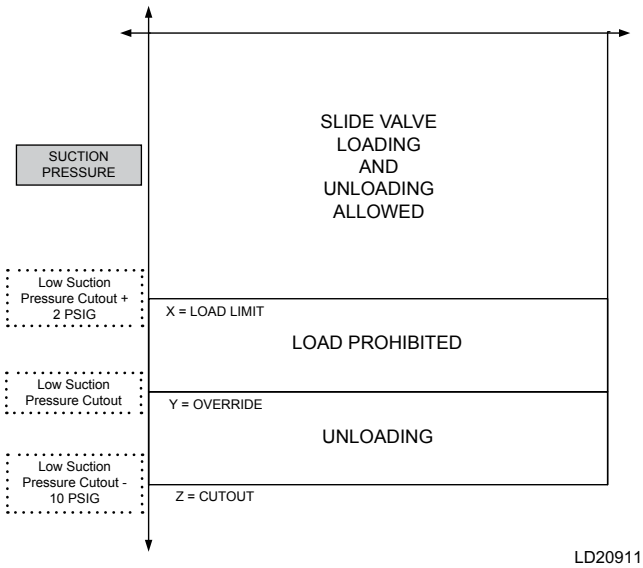


FIGURE 50 - SUCTION PRESSURE LOAD LIMITING

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 XTBC2 – Terminals 29 to 30. System 2 alarm contacts are located at XTBC2 – 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.

REMOTE BAS/EMS TEMPERATURE RESET USING A VOLTAGE OR CURRENT SIGNAL

The remote cooling setpoint can be set via the remote temperature reset analog input. A zero signal input (0% input) equates to a 0°F offset to the local cooling setpoint. A full scale signal input (100% input) equates to an offset to the local cooling setpoint equal to the programmable maximum remote temperature reset. The offset is linear between the 0% and 100% points. The maximum setpoint allowed is the maximum programmable local cooling setpoint and will be capped at this value if the calculated setpoint with offset is over this value.

This input will be used either in local or remote control mode. This input will be ignored if the remote temperature reset is disabled under the “OPTIONS” key or if there are valid BAS (ISN) communications while in remote control mode. Once a change to the input is registered, a timer is set to the value of the remote inputs service time as programmable under unit setup mode. The remote input will be ignored until this timer expires.

Control board jumper JP1 must be positioned correctly to receive either a voltage (0-10VDC or 2-10VDC) or current (0-20mA or 4-20mA) signal. The software must be configured under the “OPTIONS” key for the type of input signal to be used.

The maximum temperature reset is achieved at either 10 VDC or 20 mA. Sending the minimum signal (0 VDC, 2 VDC, 0 mA, or 4 mA based on the “OPTIONS” key setting) causes the setpoint to revert back to its local programmed value. If the setpoint reset causes the setpoint to go over the maximum programmable value, it will be set to the maximum programmable setpoint.

0 – 10 VDC Input

A 0 VDC signal produces a 0°F reset. A 10 VDC signal produces the maximum remote temperature reset (programmable under the “SETPOINTS” key). The setpoint reset is ramped linearly between these limits as the input varies between 0 VDC and 10 VDC. In order for this input to work properly, the remote temperature reset must be programmed for 0 – 10 VDC input (“OPTIONS” key) and control board jumper JP1 set in the “V” position.

2 – 10 VDC Input

A 0 - 2 VDC signal produces a 0°F reset. A 10 VDC signal produces the maximum remote temperature reset (programmable under the “SETPOINTS” key). The setpoint reset is ramped linearly between these limits as the input varies between 2 VDC and 10 VDC. In order for this input to work properly, the remote temperature reset must be programmed for 2 – 10 VDC input (“OPTIONS” key) and control board jumper JP1 set in the “V” position.

0 – 20 mA Input

A 0 mA signal produces a 0°F reset. A 20 mA signal produces the maximum remote temperature reset (programmable under the “SETPOINTS” key). The setpoint reset is ramped linearly between these limits as the input varies between 0 mA and 20 mA. In order for this input to work properly, the remote temperature reset must be programmed for 0 – 20 mA input (“OPTIONS” key) and control board jumper JP1 set in the “mA” position.

4 – 20 mA Input

A 0 - 4 mA signal produces a 0°F reset. A 20 mA signal produces the maximum remote temperature reset (programmable under the “SETPOINTS” key). The setpoint reset is ramped linearly between these limits as the input varies between 4 mA and 20 mA. In order for this input to work properly, the remote temperature reset must be programmed for 4 – 20 mA input (“OPTIONS” key) and control board jumper JP1 set in the “mA” position.

If a **0 to 10VDC** signal is supplied, it is applied to XTBC1 terminal A+ and A-, and Jumper JP1 on the I/O board must be set in the position of “10V”. To calculate the reset chilled liquid setpoint for values between 0VDC and 10VDC use the following formula:

$$\text{Setpoint} = \text{Local Chilled Liquid Setpoint} + \text{°Reset}$$

$$\text{°Reset} = \frac{(\text{DC Voltage Signal}) \times (\text{*Max Reset Value})}{10}$$

Example:

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

*Max Reset Value = 20 °F (11.11 °C)

Input Signal = 6VDC

(English)

$$^{\circ}\text{Reset} = \frac{6\text{VDC} \times 20^{\circ}\text{F}}{10} = 12^{\circ}\text{F Reset}$$

New Setpoint = 45 °F + 12 °F = 57 °F

(Metric)

$$^{\circ}\text{Reset} = \frac{6\text{VDC} \times 11.11^{\circ}\text{C}}{10} = 6.67^{\circ}\text{C Reset}$$

New Setpoint = 7.22 °C + 6.67 °C = 13.89 °C

If a **2 to 10VDC** signal is supplied, it is applied to XTBC1 terminal A+ and A-, and Jumper JP1 on the I/O board must be set in the position of “10V”. To calculate the reset chilled liquid setpoint for values between 0VDC and 10VDC use the following formula:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$^{\circ}\text{Reset} = \frac{(\text{DC Voltage Signal} - 2) \times (*\text{Max Reset Value})}{8}$$

Example:

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

*Max Reset Value = 20 °F (11.11 °C)

Input Signal = 6VDC

(English)

$$^{\circ}\text{Reset} = \frac{(6\text{VDC} - 2) \times 20^{\circ}\text{F}}{8} = 10^{\circ}\text{F Reset}$$

New Setpoint = 45 °F + 10 °F = 55 °F

(Metric)

$$^{\circ}\text{Reset} = \frac{(6\text{VDC} - 2) \times 11.11^{\circ}\text{C}}{8} = 5.56^{\circ}\text{C Reset}$$

New Setpoint = 7.22 °C + 5.56 °C = 12.78 °C

* Max Reset Value is the “Max EMS-PWM Remote Temp. Reset” setpoint value described in *Remote Setpoint Control* on page 119 under Cooling Setpoints. Programmable values are from 2 °F to 40 °F (1.11 °C to 11.11 °C).

If a **0 to 20mA** signal is supplied, it is applied to XTBC1 terminal A+ and A-, and Jumper JP1 on the I/O board must be set in the position of “20mA”. To calculate the reset chilled liquid setpoint for values between 0 and 20mA use the following formula:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$^{\circ}\text{Reset} = \frac{(\text{mA Signal}) \times (*\text{Max Reset Value})}{20}$$

Example:

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

*Max Reset Value = 10 °F (5.56 °C)

Input Signal = 12 mA

(English)

$$^{\circ}\text{Reset} = \frac{12\text{mA} \times 10^{\circ}\text{F}}{20} = 6^{\circ}\text{F Reset}$$

New Setpoint = 45 °F + 6 °F = 51 °F

(Metric)

$$^{\circ}\text{Reset} = \frac{12\text{mA} \times 5.56^{\circ}\text{C}}{20} = 3.34^{\circ}\text{C Reset}$$

New Setpoint = 7.22 °C + 3.34 °C = 10.56 °C

If a **4 to 20mA** signal is supplied, it is applied to XTBC1 terminal A+ and A-, and Jumper JP1 on the I/O board must be set in the position of “20mA”. To calculate the reset chilled liquid setpoint for values between 0 and 20mA use the following formula:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$^{\circ}\text{Reset} = \frac{(\text{mA Signal} - 4) \times (*\text{Max Reset Value})}{16}$$

Example:

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

*Max Reset Value = 10 °F (5.56 °C)

Input Signal = 12mA

(English)

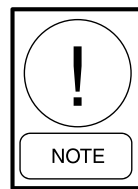
$$^{\circ}\text{Reset} = \frac{(12\text{mA} - 4) \times 10^{\circ}\text{F}}{16} = 5^{\circ}\text{F Reset}$$

New Setpoint = 45 °F + 5 °F = 50 °F

(Metric)

$$^{\circ}\text{Reset} = \frac{(12\text{mA} - 4) \times 5.56^{\circ}\text{C}}{16} = 2.78^{\circ}\text{C Reset}$$

New Setpoint = 7.22 °C + 2.78 °C = 10.00 °C



A 240 to 24 Volt Ratio Transformer (T3) is used to derive nominal 12 volt output from the 120 volt supply.

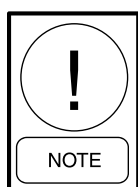
SECTION 9 – SERVICE AND TROUBLESHOOTING

CLEARING HISTORY BUFFERS

The history buffers may be cleared by pressing the HISTORY key and then repeatedly pressing the UP arrow key until you scroll past the last history buffer choice. The following message will be displayed:

```
INITIALIZE HISTORY
ENTER = YES
```

Pressing the ENTER/ADV key at this display will cause the history buffers to be cleared. Pressing any other key will cancel the operation.



DO NOT CLEAR BUFFERS. Important information may be lost. Contact factory service.

SERVICE MODE

Service Mode is a mode that allows the user to enable or disable all of the outputs (except compressors) on the unit, change chiller configuration setup parameters and view all the inputs to the microboard.

To enter Service Mode, turn the Unit Switch OFF and press the following keys in the sequence shown:

- PROGRAM
- UP ARROW
- UP ARROW
- DOWN ARROW
- DOWN ARROW
- ENTER

Service Mode will time out after 30 minutes and return to normal control mode, if the panel is accidentally left in this mode. Otherwise, turning the unit switch ON will take the panel out of Service Mode.

SERVICE MODE – OUTPUTS

After pressing the key sequence as described, the control will enter Service Mode permitting the outputs (except compressors), operating hours, refrigerant type, expansion valve type, and start/hour counters to be viewed/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 STATUS TB7-2 IS:
  SPARE DO TB7-3 IS:
SYS 1 SV MIN LOAD TB7-4 IS:
  SPARE DO TB7-5 IS:
SYS 2 SV MIN LOAD TB10-2 IS:
  SPARE DO TB10-3 IS:
SYS 2 SV UNLOAD TB10-4 IS:
  SPARE DO 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:
  SPARE DO TB10-7 IS:
EVAP PUMP 2 STATUS TB8-4 IS:
SYS 2 COMP STATUS TB8-5 IS:
  SPARE DO TB9-4 IS:
  SPARE AO TB5-1,2 = :
  SPARE AO TB6-1,2 = :
  SPARE AO J15-1,5 X.X V = :
  SPARE AO J15-2,6 X.X V = :
SYS 1 EEV OUTPUT J15-3,7 = :
SYS 2 EEV OUTPUT J15-4,8 = :
```

Each display will also show the output connection on the microboard for the respective output status shown. For example:

```
SYS 1 FAN OUTPUT 1
TB7-8 IS ON
```

This display indicates that the system 1 output 1 for fan control is ON, and the output connection from microboard is coming from terminal block 7 - pin 8.

Pressing the ↑ (UP) arrow key will energize the liquid line solenoid valve and OFF will change to ON in the display as the FAN OUTPUT 1 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, pump control selection and run hours must be programmed to match actual chiller configuration.



*Unit configuration **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 1=ON, 0=OFF :

DATA LOGGING TIMER :

SYS 1 FAN TEST STAGE = :

SYS 2 FAN TEST STAGE = :

REMOTE TEMP RESET OPTION :

REMOTE INPUT SERVICE TIME = :

HYDRO PUMP SELECTION :

EVAP PUMP TOTAL RUN HOURS = :

SYS 1 HOURS = :

SYS 2 HOURS = :

SYS 1 STARTS = :

SYS 2 STARTS = :

ANTI-VACUUM SAFETY :

The SYS # HOURS & SYS # STARTS 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:

SYS 1 SUCT PR J7-10 X.X VDC = :
 SPARE AI J11-12 X.X VDC :
 SYS 1 DSCH PR J7-11 X.X VDC = :
 REM TEMP RESET J11-11 X.X VDC :
 SYS 1 DSCH TEMP J8-7 X.X VDC = :
 SYS 2 DSCH TEMP J10-7 X.X VDC = :
 SYS 1 SUCT TEMP J8-8 X.X VDC = :
 SYS 2 SUCT TEMP J10-8 X.X VDC = :
 AMBIENT AIR J6-9 X.X VDC = :
 LEAVING LIQUID J6-7 X.X VDC = :
 ENTERING LIQUID J6-8 X.X VDC = :
 SYS 2 SUCT PR J9-10 X.X VDC = :
 SPARE AI J11-13 X.X VDC :
 SYS 2 DSCH PR J9-11 X.X VDC = :
 SPARE AI J7-12 X.X VDC :
 SPARE AI J9-12 X.X VDC :
 PUMP TRIP 1 J11-14 X.X VDC :
 PUMP TRIP 2 J11-15 X.X VDC :
 EVAPORATOR TEMP J8-9 X.X VDC = :
 SPARE AI J10-9 X.X VDC :
 SPARE AI J12-9 X.X VDC :
 SPARE AI J12-10 X.X VDC :
 SPARE AI J12-11 X.X VDC :
 SPARE AI J12-12 X.X VDC :
 SPARE DI J13-3 IS :
 SPARE DI J13-4 IS :
 REMOTE STOP J13-5 IS :
 SPARE J13-6 IS :
 SPARE J13-7 IS :
 SYS 1 MP/HPCO INPUT J13-8 IS :
 SYS 2 MP/HPCO INPUT J13-10 IS :
 FLOW SWITCH J13-9 IS :
 SPARE DI J13-11 IS :

The analog inputs will display the input connection, the temperature or pressure, and corresponding input voltage such as:

S Y S 1 S U C T P R J 7 - 1 0
2 . 1 V D C = 8 1 P S I G

This example indicates that the system 1 suction pressure input is connected to plug 7 – pin 10 (J7-10) on the I/O board. It indicates that the voltage is 2.1VDC which corresponds to 81 PSIG (5.6 bars) suction pressure.

The digital inputs will display the input connection and ON/OFF status such as:

FLOW SWITCH
J13 - 9 IS OFF

This indicates that the flow switch is connected to plug 13 - pin 9 (J13 - 9) on the microboard and is OFF.

CONTROL INPUTS/OUTPUTS

Table 19 on page 147 through Table 22 on page 147 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 19 - I/O ANALOG INPUTS

J6-7	Leaving Chilled Liquid Temperature Sensor
J6-8	Entering Chilled Liquid Temperature Sensor
	Discharge Air Temperature Sensor (Future)
J7-12	Spare
	Unit/Sys 1 Voltage (Future)
J8-9	Evaporator Temperature Sensor (Freeze Protection)
J9-10	Sys 2 Suction Pressure Transducer
J9-11	Sys 2 Discharge Pressure Transducer
J9-12	Spare
	Sys 2 Voltage (Future)
J10-9	Spare
J11-13	Spare
J11-14	Evaporator Pump 1 Trip Input
J11-15	Evaporator Pump 2 Trip Input
J12-9	Spare
	Sys 1 Slide Valve Limit (Pressure, Future)
J12-10	Spare
	Sys 2 Slide Valve Limit (Pressure, Future)
J12-11	Spare
J12-12	Spare

TABLE 20 - I/O ANALOG OUTPUTS

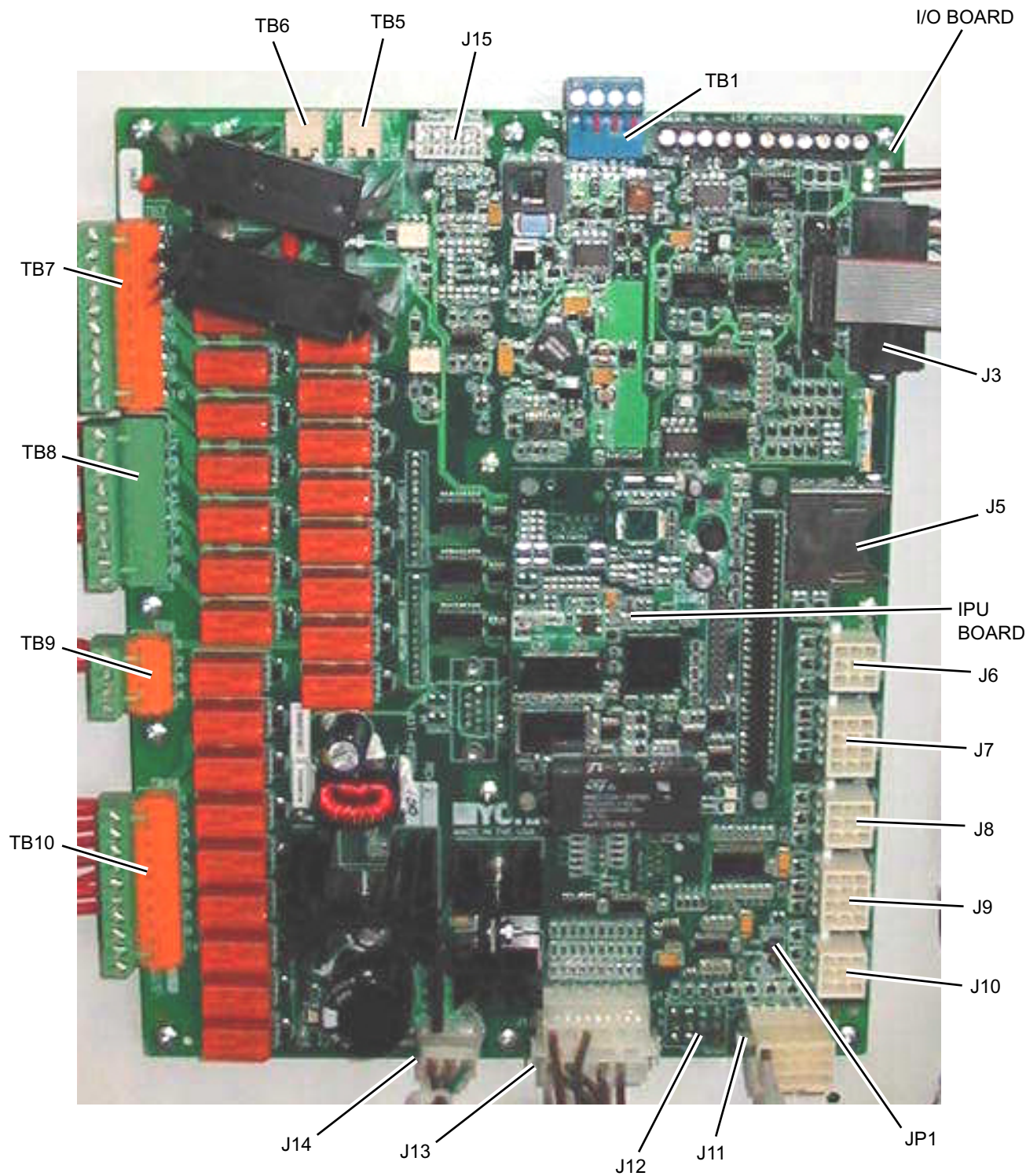
TB5-1&2	Spare
TB6-1&2	Spare
J15-1&5	Sys 1 Condenser Fan Speed (Future)
J15-2&6	Sys 2 Condenser Fan Speed (Future)
J15-3,7	Sys 1 EEV Command
J15-4,8	Sys 2 EEV Command

TABLE 21 - I/O DIGITAL INPUTS

J13-2	Unit Switch
J13-3	Spare
J13-4	Spare
J13-5	Remote Start/Stop
	Suction Pressure Control Sys 1 Zone Thermostat (Future)
J13-6	Spare
	Suction Pressure Control Sys 2 Zone Thermostat (Future)
J13-7	Spare
	Single System Select (Jumper = One System, No Jumper = Two Systems, Future)
J13-8	Sys 1 MP/HPCO
J13-9	Flow Switch
J13-10	Sys 2 MP/HPCO
J13-11	Spare
	Fan Full Speed Inhibit Input (Future)

TABLE 22 - I/O DIGITAL OUTPUTS

TB7-2	Sys 1 Compressor Run
TB7-3	Spare
TB7-4	Sys 1 Slide Valve Min Load
TB7-5	Sys 1 Slide Valve Unload
TB7-7	Spare
	Sys 1 Hot Gas Bypass Valve (Future)
TB7-8	Sys 1 Condenser Fan Output 1
TB7-9	Sys 1 Condenser Fan Output 2
TB7-10	Sys 1 Condenser Fan Output 3
TB8-2	Evaporator Heater
TB8-3	Sys 1 Alarm
TB8-4	Evaporator Pump Starter 2
TB8-5	Sys 2 Compressor Run
TB8-6&7	Evaporator Pump Starter
TB8-9	Sys 1 Slide Valve Load
TB9-4	Spare
TB9-2	Sys 2 Alarm
TB10-2	Sys 2 Slide Valve Min Load
TB10-3	Spare
TB10-4	Sys 2 Slide Valve Unload
TB10-5	Sys 2 Slide Valve Load
TB10-7	Spare
	Sys 2 Hot Gas Bypass Valve (Future)
TB10-8	Sys 2 Condenser Fan Output 1
TB10-9	Sys 2 Condenser Fan Output 2
TB10-10	Sys 2 Condenser Fan Output 3



LD12721

FIGURE 51 - MICROBOARD LAYOUT

CHECKING INPUTS AND OUTPUTS

Digital Inputs

Refer to the unit wiring diagram. All digital inputs are connected to J13 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 9 (J13-9) of the I/O board. If the flow switch is open, 0VDC will then be present at J13-9.

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 XTBC1, Terminal 13. Any switch or contact used as a digital input would be connected to this terminal, with the other end connecting to its respective digital input on the microboard. Any time a switch or contact is closed, 30VDC would be applied to that particular digital input. Any time a switch or contact is open, 0VDC would be applied to that particular digital input.

Typically, voltages of 24 to 36VDC could be measured for the DC voltage on the digital inputs. This voltage is in reference to ground. The unit case should be sufficient as a reference point when measuring digital input voltages.

Analog Inputs – Temperature

Refer to the unit wiring diagram. Temperature inputs are connected to the microboard on plug J6. These analog inputs represent varying DC signals corresponding to varying temperatures. All voltages are in reference to the unit case (ground). Following are the connections for the temperature sensing inputs.

Outside Air Sensor

J6-6 = +5VDC regulated supply to sensor.

J6-9 = VDC input signal to the microboard.

See *Table 23 on page 149* for voltage readings that correspond to specific outdoor temperatures.

J6-3 = drain (shield connection = 0VDC) return.

**TABLE 23 - OUTDOOR AIR SENSOR
TEMPERATURE/VOLTAGE/
CORRELATION**

TEMP °F	VOLTAGE (SIGNAL INPUT TO RETURN)	TEMP °C
0	0.7	-18
5	0.8	-15
10	0.9	-12
15	1.0	-9
20	1.1	-7
25	1.2	-4
30	1.4	-1
35	1.5	2
40	1.7	4
45	1.8	7
50	2.0	10
55	2.2	13
60	2.3	16
65	2.5	18
70	2.6	21
75	2.8	24
80	2.9	27
85	3.1	29
90	3.2	32
95	3.4	35
100	3.5	38
105	3.6	41
110	3.7	43
115	3.8	46
120	3.9	49
125	4.0	52
130	4.1	54

Liquid and Refrigerant Sensor Test Points**Entering Chilled Liquid Sensor**

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

J6-8 = VDC input signal to the I/O board. See *Table 24 on page 150* 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 24 on page 150* for voltage readings that correspond to specific liquid temperatures.

J6-1 = drain (shield connection = 0VDC) return.

Analog Inputs – Pressure

Refer to the unit wiring diagram. Pressure inputs are connected to the microboard on plugs J7 and J9. These analog inputs represent varying DC signals corresponding to varying pressures. All voltages are in reference to the unit case (ground).

System 1 discharge and suction pressures will be connected to J7 of the microboard. System 2 discharge and suction pressure transducers will be connected to J9 of the microboard.

The discharge and suction pressure transducers are standard on all YSAA's. The suction pressure transducers have a range of 0 to 125 PSIG. The output will be linear from 0.5VDC to 4.5VDC over the 125 PSIG (8.62 barg) range.

The discharge transducers have a range from 0 to 400 PSIG. The output will be linear from 0.5VDC to 4.5VDC over the 400 PSIG (27.58 barg) range. Following is the formula that can be used to verify the voltage output of the transducer. All voltage reading are in reference to ground (unit case).

TABLE 24 - 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

TABLE 25 - PRESSURE TRANSDUCERS

0-125 PSIG SUCTION PRESSURE TRANSDUCER		0-400 PSIG DISCHARGE PRESSURE TRANSDUCER	
PRESSURE PSIG	VOLTAGE VDC	PRESSURE PSIG	VOLTAGE VDC
0	0.5	0	0.5
16	1.0	50	1.0
31	1.5	100	1.5
47	2.0	150	2.0
63	2.5	200	2.5
78	3.0	250	3.0
94	3.5	300	3.5
109	4.0	350	4.0
125	4.5	400	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

$$V = (\text{PRESSURE in PSIG} \times 0.01) + 0.5$$

or

$$V = (\text{PRESSURE in BARG} \times 0.145) + 0.5$$

where V = DC voltage input to microprocessor

Pressure = pressure sensed by transducer

The I/O board connections for the Discharge Transducers are as follows.

System 1 Discharge Transducer

J7-6 = +5VDC regulated supply to transducer.

J7-11 = VDC input signal to the microboard. See the formula above for voltage readings that correspond to specific discharge pressures.

J7-7 = +5VDC return

J7-2 = drain (shield connection = 0VDC)

System 2 Discharge Transducer

J9-6 = +5VDC regulated supply to transducer.

J9-11 = VDC input signal to the microboard. See the formula above for voltage readings that correspond to specific discharge pressures.

J9-7 = +5VDC return

J9-2 = drain (shield connection = 0VDC)

The suction transducers have a range from 0 to 125 PSIG (8.6 barg). The output will be linear from 0.5VDC to 4.5VDC over the 125 PSIG (8.6 barg) range. Following is a formula that can be used to verify the voltage output of the transducer. All voltage readings are in reference to ground (unit case).

$$V = (\text{PRESSURE in PSIG} \times 0.032) + 0.5$$

or

$$V = (\text{PRESSURE in BARG} \times 0.464) + 0.5$$

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.

J9-9 = +5VDC return

J9-1 = drain (shield connection = 0 VDC)

Digital Outputs

Refer to the unit wiring diagram and *Figure 52 on page 152*. 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.

120VAC is supplied to the I/O board via connections at TB7-1, TB7-6, TB10-1, TB10-6, TB8-1 and TB9-1.

OPTIONAL PRINTER INSTALLATION

The micro panel is capable of supplying a printout of chiller conditions or fault shutdown information at any given time. This allows operator and service personnel to obtain data and system status with the touch of the keypad. In addition to manual print selection, the micro panel will provide an automatic printout whenever a fault occurs. Detailed explanation of the print function is given under *Print Key on page 113*.

Johnson Controls recommends the field tested WEIGH-TRONIX model 1220 printer (or former IMP 24). This is a compact low cost printer that is ideal for service work and data logging.

The WEIGH-TRONIX printer can be obtained by contacting WEIGH-TRONIX for purchase information at:

WEIGH-TRONIX

2320 Airport Blvd.

Santa Rosa, CA 95402

Phone: 1-800-982-6622 or 1-707-527-5555

(International Orders Only)

The part number for the printer that is packaged specifically for YORK is P/N 950915576. The cable to connect the printer can either be locally assembled from the parts listed, or ordered directly from WEIGH-TRONIX under part number 287-040018.

Parts

The following parts are required:

1. WEIGH-TRONIX model 1220 printer.
2. Desk top calculator paper, 2.25" (5.7cm) wide.
3. Twisted Pair Shielded Cable (minimum 3 conductor), #18 AWG stranded, 300V minimum insulation, 25 ft. (7.62m) maximum length.
4. One 25 pin Cannon connector and shell.
5. Cannon P/N DB-25P connector, or equivalent.
6. Cannon P/N DB-C2-J9 shell.

Assembly and Wiring

All components should be assembled and wired as shown in Figure 52. Strip the outside insulation back several inches and individual wires about 3/8" (9.5 mm) to connect the cable at the Microboard. Do not connect the shield at the printer-end of the cable.

Obtaining a Printout

A printout is obtained by pressing the PRINT key on the keypad and then pressing either the OPER DATA key or HISTORY key.

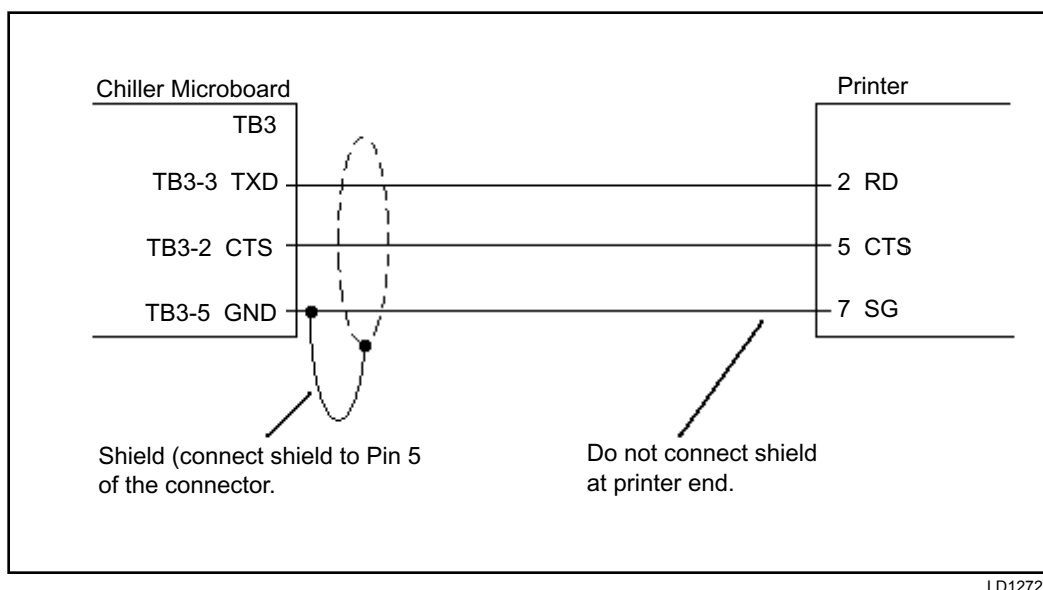


FIGURE 52 - PRINTER TO MICROBOARD ELECTRICAL CONNECTIONS

EEV AND CONTROLLER

In the product of YSAA, Electronic Expansion Valves (EEVs) are selected as the expansion device, which now rated at full stroke (100% open) with no reserve capacity, can control refrigerant flow down to 10% of rated capacity. Sporlan EEVs are designed for compatibility with all current halocarbon refrigerants (HCFCs and HFCs including R-410A), in addition to subcritical CO₂.

The EEV is driven by a step motor. All valves currently offer 2500 steps of stroke. In current designs, the electronics controlling the valve are separate from the valve itself.

EEV VALVE AND WIRING

EEV is a device to control the flow rate of liquid refrigerant so that the set suction superheat can be achieved when compressor is running. The EEV is driven by a step motor. The torque is transitted and enlarged by a set of gears to a lead screw that drive a valve core to open/close a valve port. The sight glass can be used to check the refrigerant charge and observe the movement of valve core.

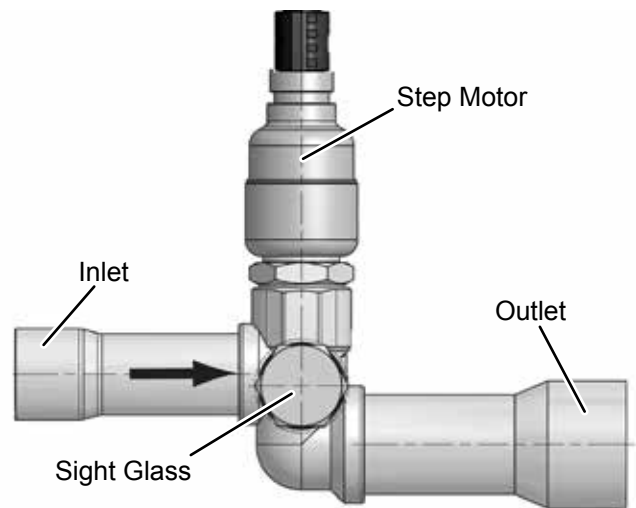
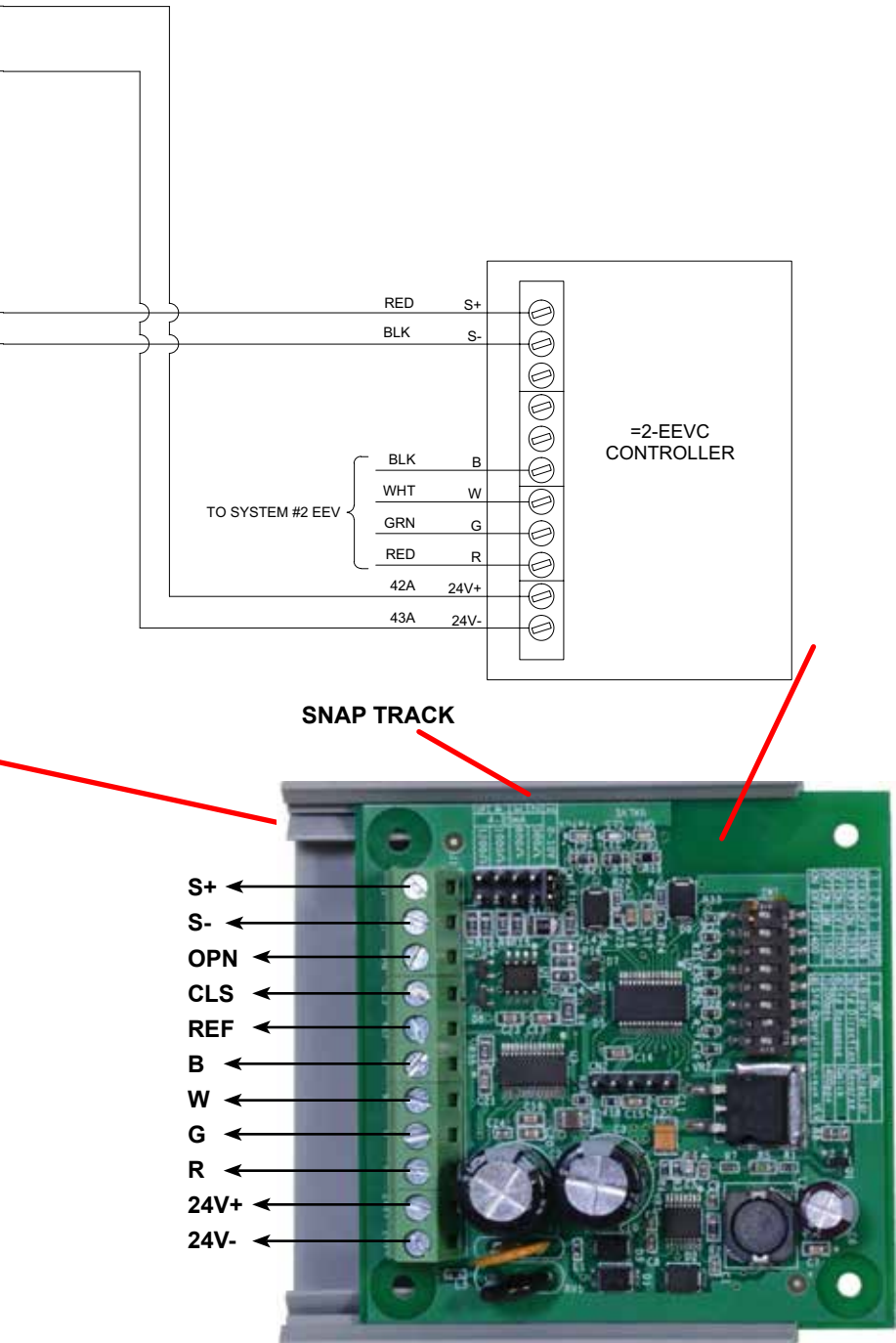


FIGURE 53 - ELECTRONIC EXPANSION VALVE (EEV)

The microboard senses the respective suction temperature and suction pressure in different system to calculate the respective suction superheat, comparing with setpoint of suction superheat, signal to EEVC controllers with J15-3 and J15-7 to system #1 and J15-4 and J15-8 to system #2, EEVC controller convey the pulses to EEV through 4 wires to control the valve's opening and closing. both system EEVC controller share a common transformer. see the wiring diagram of EEV control for the detail.

[illegible]

FIGURE 54 - WIRING OF EEV CONTROL



LD20913a

FIGURE 54 - WIRING OF EEV CONTROL (CONT'D)

EEVC CONTROLLER SETUP

The IB-G can accept 4-20 milliamp or 0-10 volt DC analog input signals and is designed to allow externally supplied control signals to control one or two step motor valves including SEI/SER/SEH/SEV/ESX* electric expansion valves. New features include LED indicators for power and valve position and a valve open or closed feature.

Set the DIP switches in accordance with your valve and desired operation. The ON position is the UP location of the switch, when the terminal strip is located at the bottom of the board. There is also a set of jumpers to select a 0-10V signal and impedance when using a 4-20mA signal. Default settings are highlighted. If an invalid valve configuration is set, the LED's will flash and the valve will not move.

On power-up, the board will initialize by giving the valve a large number of steps to assure that the valve is fully shut. The valve will not respond to input signals during this time. If the valve is required to shut during operation, the CLS and REF terminals should be used.

Supplying a signal to OPN and REF will cause the valve to open to 100%, once removed the valve will resume normal operation.

If power is lost to the EEVC Controller or wire to the valve severed, the valve will remain in its last position. Solenoid valves may be desired before the step motor valve on critical applications. To force the valve shut during operation for test purposes, turn switch 8 to the ON position. To resume normal operation, turn switch 8 OFF.

The EEVC Controller has three LEDs to notify the user of the status of the valve and board. The RED LED is a status LED and will be on when that EEVC Controller has power. The YELLOW LED is the Close Valve LED, it will only be on when the valve is fully closed. The GREEN LED is the Valve Open LED and will flash in different sequences depending on valve position. The GREEN LED will flash once for valve positions >0% and including 10%, twice for valve positions >10% and including 20%, etc. The GREEN LED will remain on when the valve is fully open.

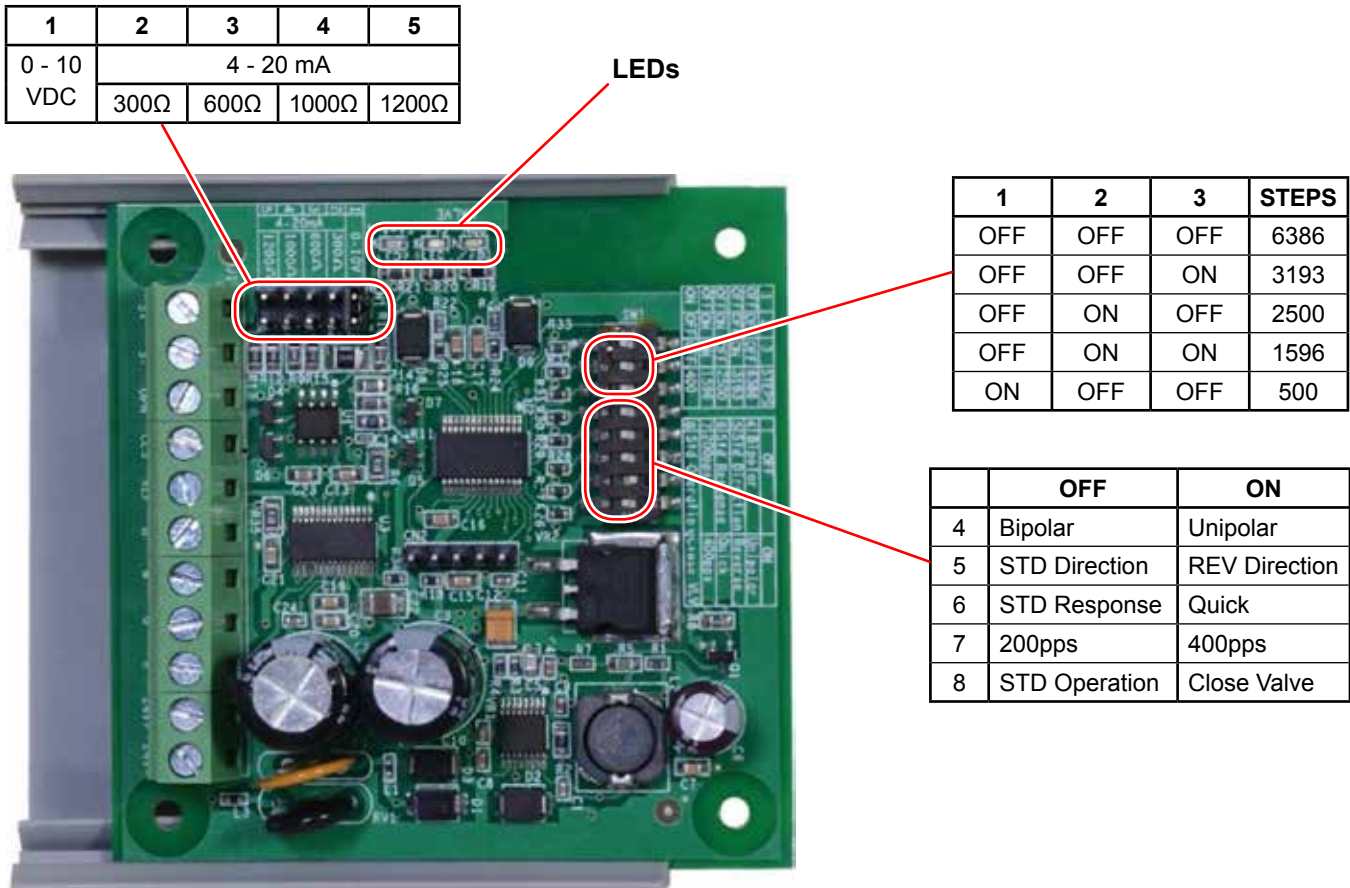


FIGURE 55 - EEVC CONTROLLER SETUP

TIGHTENING TORQUE LIST

Tighten the bolts and nuts in the screw compressor according to the standard tightening torques in the table below.

TABLE 26 - TORQUE VALUES

ITEM	APPLICABLE PART	SIZE	TORQUE (LBF/FT)	ITEM	APPLICABLE PART	SIZE	TORQUE (LBF/FT)
1	Solenoid Valve (Coil)	M5	2.95	13	Tank Cover	M12	73.75
2	Terminal Cover	M6	5.90	14	Terminal Cover	M12	73.75
3	Solenoid Valve (Body)	M6	7.37	15	Rod	M14	44.25
4	Oil Strainer	M10	36.87	16	Discharge Flange	M16	73.75
5	Side Cover	M10	36.87	17	Discharge Casing	M16	147.49
6	Motor Rotor	M10	47.94	18	Cyclone Cover	M16	147.49
7	Flange	M12	36.87	19	Motor Casing	M16	147.49
8	Nut 1	M12	22.12	20	Suction Flange	M18	110.62
9	Nut 2	M12	22.12	21	Power Terminal Bolt	1 1/8-18UNF	36.87
10	Piston	M12	25.81	22	Sight Glass	1 1/8-18UNF	36.87
11	Side Case	M12	73.75	23	Flange	M16	73.75
12	Motor Cover	M12	73.75				

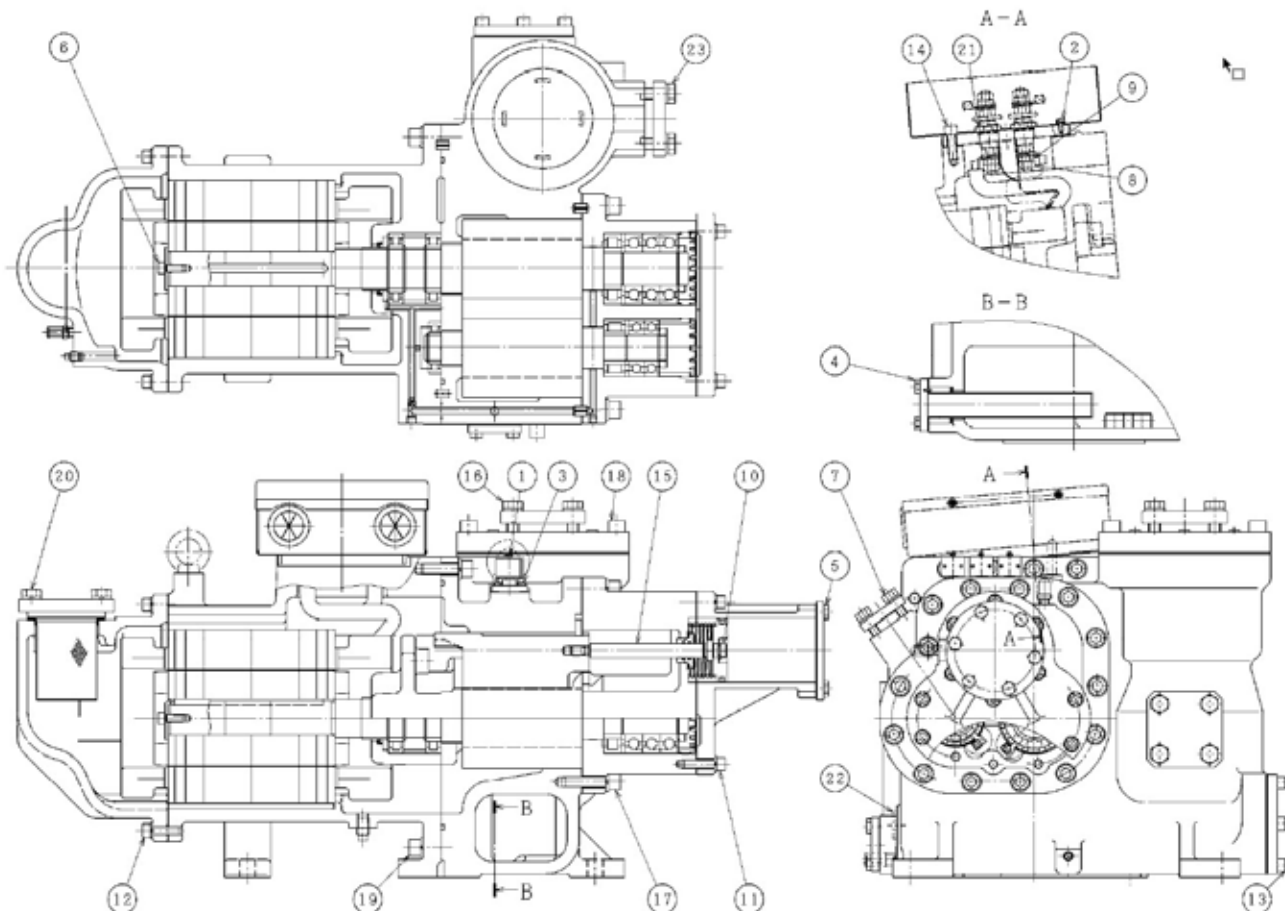
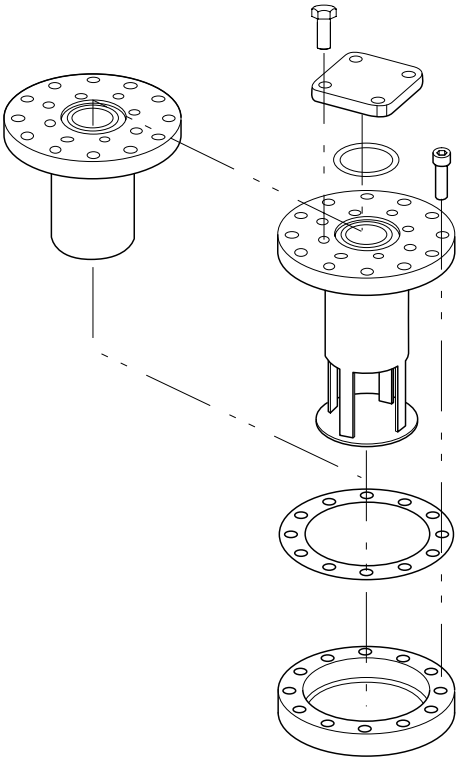
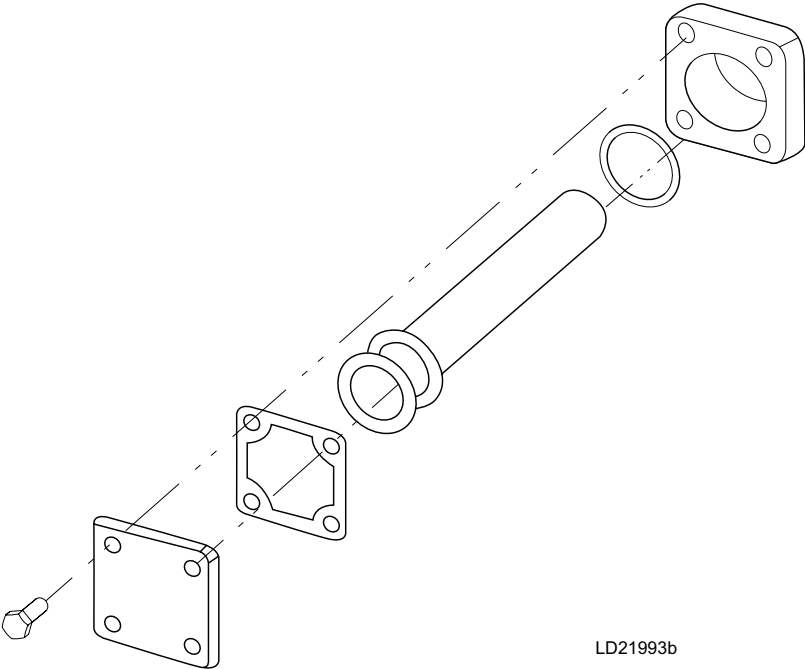


FIGURE 56 - TORQUE VALUES



LD21993a

SUCTION STRAINER



LD21993b

OIL STRAINER

FIGURE 57 - SUCTION STAINER AND OIL STRAINER

Removing the Suction Flange and Gas Strainer

Required Tools: Spanner (1.063 inch)

Procedure:

1. Remove suction flange #100.
2. Remove gas strainer #097.



LD21958



Since the bolts that are removed have the same diameters but different lengths, please carefully sort the bolts and washers by part as they are removed.

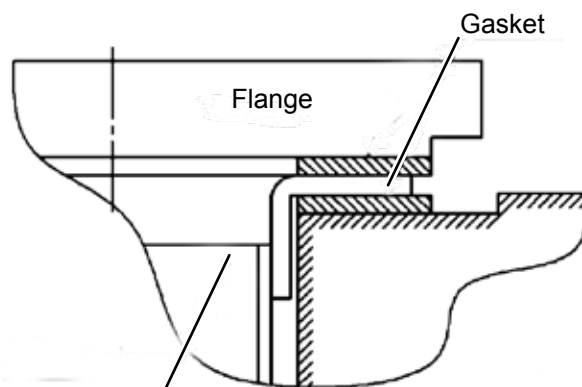
Inserting the Gas Strainer

Required Tools: Spanner (1.063 inch) and Refrigerant oil

Procedure:

1. Attach gasket #098 to gas strainer #097.
2. Add gasket #099 to gas strainer.
3. Attach flange #100 to gas strainer.

Be sure to apply refrigerant oil to the gaskets #098 and #099



LD21959

Suction Side Structure



LD21957

Purging the Oil

Required Tools: Monkey wrench, Hexagon wrench (0.394 inch) Steel pipe or torque wrench Stud bolt (M12, 2 pcs.), Box wrench (0.669 inch) Oil pan, and Rag



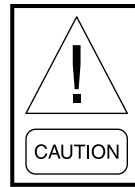
Record the total volume of all oil that comes out of the compressor. When charging oil after reassembly, charge the same volume of new oil as the total amount of purged oil.

Procedure:

1. Place the oil pan under the motor casing #061, remove the 3/8" plug #066, and purge refrigerant oil.
2. When removing the oil strainer cover #074, refrigerant oil will flow out. Make sure the oil pan has been placed under the cover.
3. Remove the four bolts #076 securing the oil strainer cover #074. To prevent the cover from falling, first remove two bolts, then remove the cover after attaching two stud bolts.



LD21960



When removing the cover, use a marker to mark the top, bottom, left and right to facilitate reassembly.

4. Place the oil pan under the oil strainer cover #074. Pay attention to prevent an excessive oil flow when removing the cover. Remove the oil strainer #072 by hand after removing the cover. Also, remove the O-ring #073 inside the oil strainer #072.
5. Remove the tank cover #069 on the back of the compressor. At this time, place the oil pan or a rag under the tank cover to prevent excessive oil flow and spillage on the floor.



LD21991



When removing the oil strainer #072, be careful to prevent it from hitting the casing.

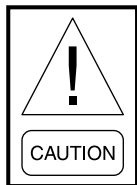
Perform a visual inspection of the sight glass #060. If normal, the sight glass need not be removed.

Attaching the Oil Strainer, Plug and Tank Cover

Required Tools: Box wrench (0.669 inch), Hexagon wrench (0.394 inch) Torque wrench, and Refrigerant oil sealing tape

Procedure:

1. Apply refrigerant oil on the new O-ring #073.
2. Replace the O-ring #073 in the oil strainer hole of the main casing with a new one.
3. Turning the notch of the oil strainer #072 upward, insert the oil strainer into the main casing.
4. Apply refrigerant oil on the new gasket #075.
5. Attach the oil strainer cover #074 with gasket #075 to the main casing, as indicated by the mark.
6. Tighten the M10 bolts #076 securing the oil strainer to a tightening torque of 36.87 lbf/ft.
7. Wind sealing tape around the thread of the oil purge plug #066 and screw the plug into the hole in the motor casing #061.
8. Apply refrigerant oil on the new gasket #070.
9. Attach the gasket #070 to the main casing.
10. Using the bolts #071, attach the tank cover #069 with the gasket #070 to the motor casing. The tightening torque should be 73.75 lbf/ft.



The oil strainer cover #074 is equipped with a pin on the inside of the cover. The pin should be inserted into the notch of the oil strainer, and the pin must be turned to the upward position. This is very important to allow refrigerant oil to circulate in the compressor. If the position of the oil strainer is incorrect, refrigerant oil cannot circulate. Reconfirm the pin position after attaching the oil strainer cover



LD21992

TROUBLESHOOTING

TABLE 27 - TROUBLESHOOTING

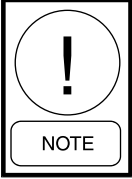
PROBLEM	CAUSE	SOLUTION
NO DISPLAY ON PANEL. UNIT WILL NOT OPERATE	1. No 115VAC to 24VAC Transformer. 2. No 24VAC to Microboard. 3. Control Transformer defective, no 24VAC output. 4. Short in wire to temp. sensors or pressure transducers. 5. Defective IPU II & I/O Board or the Display Board.	1a. Check wiring and fuse 1FU. 1b. Check wiring emergency stop contacts 5 to L of XTBC2 Terminal Block. 1c. Replace Control Transformer. 2. Check wiring Control Transformer to Microboard. 3. Replace Control Transformer. 4. Unplug connections at IPU II & I/O Board to isolate. 5. Replace IPU II & I/O Board or the Display Board.  Contact Johnson Controls Service before replacing circuit Boards!
FLOW SWITCH/REM STOP NO RUN PERMISSIVE	1. No chilled liquid flow. 2. Flow switch improperly installed. 3. Defective flow switch. 4. Remote cycling device open.	1. Check chilled liquid flow. 2. Check that the flow switch is installed according to manufacturer's instructions. 3. Replace flow switch. 4. Check cycling devices connected to terminals 13 and 14 of the XTBC1 Terminal Block.
LOW SUCTION PRESSURE FAULT	1. Improper suction pressure cutouts adjustment. 2. Low refrigerant charge. 3. Fouled filter dryer. 4. EEV defective. 5. EEV drive board defective. 6. Wiring loose between Microboard, EEV drive board and EEV. 7. Less chilled liquid flow rate. 8. Suction press transducer defective. 9. Suction/Discharge temperature sensor defective. 10. Muddy liquid and sediment inside of evaporator. 11. Fan control cycling. 12. Low liquid temperature. 13. High oil content in system.	1. Adjust per recommended setting. 2. Hunting and repairing well the leak, and charge refrigerant as nameplate. 3. Clean the screen inside and change the dryer core. 4. Replace EEV. 5. Replace EEV drive board. 6. Check and redo the wiring. 7. Check the strainer clog, valve opening, pump flow rate and head, pump status and correct. 8. Replace suction press transducer. 9. Replace suction/discharge temp sensor. 10. Ask customer to change liquid. 11. Adjusting fan control setting. 12. Check and replace the liquid temperature sensor. 13. Check the discharge superheat and oil charge.

TABLE 27 - TROUBLESHOOTING (CONT'D)

PROBLEM	CAUSE	SOLUTION
HIGH DISCHARGE PRESSURE FAULT	1. Condenser fans not operating or operating backwards. 2. Too much refrigerant. 3. Air in refrigerant system. 4. Defective discharge pressure transducer. 5. Condenser coil is too dirty.	1. Check fan motor, and contactors. Assure fan blows air upward. 2. Remove refrigerant. 3. Evacuate and recharge system. 4. Replace discharge pressure transducer. Refer to <i>SECTION 9 – SERVICE AND TROUBLESHOOTING</i> for pressure/voltage formula on <i>page 151</i>. 5. Clean the coil.
LOW LIQUID TEMP FAULT	1. Improperly adjusted leaving chilled liquid temp. cutout. 2. Micro panel setpoint/range values improperly programmed. 3. Chilled liquid flow too low. 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).	1. Re-program the leaving chilled liquid temp. cutout. 2. Re-adjust setpoint/range. 3. Increase chilled liquid flow. Refer to <i>Operational Limitations on page 41</i>). 4. Compare sensor against a known good Temperature sensing device. Refer to <i>Table 24 on page 150</i>
MP / HPCO FAULT	1. Compressor internal motor protector (MP) open. 2. External overload tripped. 3. HPCO switch open. 4. Defective HPCO switch. 5. Defective CR relay.	1. Verify refrigerant charge is not low. Verify superheat setting of 10 °F to 15 °F (5.6 °C to 8.3 °C). Verify correct compressor rotation. Verify compressor is not overloaded. 2. Determine cause and reset. 3. See High Press. Disch. Fault. 4. Replace HPCO switch. 5. Replace relay.
COMPRESSOR(S) WON'T START	1. Demand not great enough. 2. Defective water temperature sensor. 3. Contactor/Overload failure. 4. Compressor failure. 5. In OPTION Sysem Switch is set OFF.	1. No problem. <i>Consult Installation Manual to aid in understanding compressor operation and capacity control.</i> 2. Compare the display with a thermometer. Should be within plus or minus 2 degrees. Refer to <i>Table 24 on page 150 for RWT/LWT temp./voltage table.</i> 3. Replace defective part. 4. Diagnose cause of failure and replace. 5. Set the System Switch ON;
LACK OF COOLING EFFECT	1. Fouled evaporator surface. Low suction pressure will be observed. 2. Improper flow through the evaporator. 3. Low refrigerant charge. Low suction pressure will be observed.	1. Contact the local Johnson Controls service representative. 2. Reduce flow to within chiller design specs. See <i>Operational Limitations on page 41</i>). 3. Check subcooling and add charge as needed.
HIGH DISCHARGE TEMPERATURE	1. Discharge temperature sensor defective. 2. Lack refrigerant. 3. Too low suction press. 4. Too high suction superheat. 5. Too Low supply voltage.	1. Replace the discharge temperature sensor. 2. Charge refrigerant to meet the requirement. 3a. Check the leaving liquid temperature setting and reading, adjust setting or replace sensor. 3b. EEV cannot open. 4. Check suction/discharge temperature sensors. 5. Ask customer to make correction.

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SECTION 10 – MAINTENANCE

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

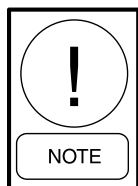
Important

If system failure occurs due to improper maintenance during the warranty period, Johnson Controls will not be liable for costs incurred to return the system to satisfactory operation. The following is intended only as a guide and covers only the chiller unit components. It does not cover other related system components which may or may not be furnished by Johnson Controls. 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 must be observed in sight glass of compressor at any time when compressor is running, if the level is under the sight glass, the compressor cannot run for long time. At shutdown, it is acceptable if the oil level falls to the bottom limit of the oil sight glass.



Use type of Ze-GLES-RB68 oil (P/N: 011-01206-000, SAP #: 5255045) when adding oil only.

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.



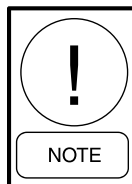
Never use the screw compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor which will result in failure of compressor.

CONDENSER FAN MOTORS

Condenser fan motors are permanently lubricated and require no maintenance.

Condenser MCHX

Dirt should not be allowed to accumulate on the MCHX condenser surfaces. Cleaning should be as often as necessary to keep coils clean.



Exercise care when cleaning the MCHX so that the fins are not damaged.

CONDENSER MCHX CLEANING

The cleaning procedure for the condenser MCHX is significantly different than tube and fin type MCHX. Care must be taken to understand the differences to avoid damage to the MCHX. These differences require a number of DO NOT's that must be observed:

- DO NOT use coil cleaners or any chemical on a MCHX. This can cause severe damage to the coils.
- DO NOT use a pressure washer to clean the MCHX. While it is possible to clean a the MCHX with a pressure washer, it's also possible to destroy it.
- DO NOT contact the MCHX with a hard surface such as a hose nozzle or metal vacuum nozzle or any other tool.

Follow the three steps below for cleaning the MCHX:

1. Remove surface debris such as dirt, leaves, insects, fibers, etc. with a vacuum cleaner having a soft attachment rather than a metal tube. Compressed air blown from the inside out can also be used. When brushing debris off the face of the MCHX a soft bristle (not wire) brush can be used. Do not scrape the MCHX with the vacuum nozzle, air nozzle, or any other tool.

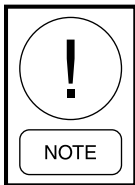
2. Rinse the MCHX with tap water. Do not use MCHX cleaners. Rinse the coil from the inside out, running water through every passage in the heat exchanger surface until it is clean. Use a gentle spray from a spray nozzle with a plastic end or put your finger on the end of the spray nozzle to reduce impact and provide a gentle spray.
3. Because of the fin geometry, the condenser MCHX retain water more than tube and fin style. It is generally recommended to blow or vacuum out the rinse water from the MCHX to speed drying and prevent water pooling.

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. Refer to *SECTION 8 – UNIT OPERATION*, *SECTION 6 – COMMISSIONING*, and *SECTION 4 – INSTALLATION* of this manual.

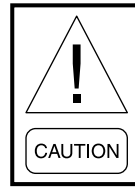
ON-BOARD BATTERY BACK-UP

The Real Time Clock chip (U5) located on the 031-02630 IPU II board that maintains the date/time and stores customer programmed setpoints.



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

BRAZED PLATE HEAT EXCHANGER (EVAPORATOR) HEATER



The internal power supply to the Evaporator Heater is 120VAC. Disconnecting 120VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

OVERALL UNIT INSPECTION

In addition to the checks listed on this page, periodic overall inspections of the unit should be accomplished to ensure proper equipment operation. Items such as loose hardware, component operation, refrigerant leaks, unusual noises, etc. should be investigated and corrected immediately.

TABLE 28 - OVERALL UNIT INSPECTION

PROCEDURE	WEEKLY	QUARTERLY	SEMI-ANNUALLY	YEARLY
Check oil level in oil separator sight glass.	X			
Check liquid line sight glass on EEV.	X			
Record system operating pressures and temperatures.	X			
Fans running check.		X		
Check the programmable operating setpoints and safety cutouts.	X			
Check the condenser coils for dirt/debris and clean if necessary.	X			
Check suction/discharge superheat for EEV control.			X	
Check compressor/evaporator heater for operation.		X		
Sample compressor oil for acid lab analysis, and replace oil if necessary.				X
Visibly leak check the chiller system				X
Disconnect power source and lock out, check the tightness of power wiring connections.				X

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

TABLE 29 - R-134A SATURATION TEMPERATURES AS A FUNCTION OF SATURATION PRESSURES

PRESSURE (PSIG)	DEW POINT TEMP. (°F)	PRESSURE (PSIG)	DEW POINT TEMP. (°F)	PRESSURE (PSIG)	DEW POINT TEMP. (°F)
0	-14.9	135	105.0	270	152.0
5	-3.1	140	107.2	275	153.4
10	6.6	145	109.4	280	154.7
15	14.9	150	111.5	285	156.1
20	22.2	155	113.6	290	157.4
25	28.7	160	115.6	295	158.7
30	34.5	165	117.6	300	160.0
35	39.9	170	119.5	305	161.3
40	44.9	175	121.5	310	162.5
45	49.6	180	123.3	315	163.8
50	54.0	185	125.1	320	165.0
55	58.1	190	126.9	325	166.2
60	62.0	195	128.7	330	167.4
65	65.7	200	130.4	335	168.6
70	69.2	205	132.1	340	169.8
75	72.6	210	133.8	345	171.0
80	75.9	215	135.5	350	172.1
85	79.0	220	137.1	355	173.3
90	82.0	225	138.7	360	174.4
95	84.9	230	140.2	365	175.5
100	87.7	235	141.8	370	176.6
105	90.4	240	143.3	375	177.7
110	93.0	245	144.8	380	178.8
115	95.5	250	146.3	385	179.9
120	98.0	255	147.7	390	180.9
125	100.4	260	149.2	395	182.0
130	102.7	265	150.6	400	183.0

Source: REFPROP 9.1, data generated 5/29/16, by Satheesh Kulankara

The following factors can be used to convert from English to the most common SI Metric values.

TABLE 30 - 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: $(45.0^{\circ}\text{F} - 32^{\circ}) \times 0.5556 = 7.22^{\circ}\text{C}$

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

Example: $10.0^{\circ}\text{F range} \times 0.5556 = 5.6^{\circ}\text{C range}$



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