ACDX-B

Screw Compressor Air Cooled Chillers

48 THROUGH 208 TONS

MANUFACTURER CERTIFIED TO ARI AS COMPLYING WITH CERTIFICATION SECTIONS OF ARI STANDARD 550/590 — WATER CHILLING PACKAGES USING THE VAPOR COMPRESSION CYCLE

c ETL LISTED ®

FEATURES

- Reliable rotary screw compressor performance
- Compatible with new HFC refrigerants
- Advanced proactive microcomputer
- Reduced overall length
- Rated with HCFC-22
- Quiet operation

DUNHAM-BUSH®

Form No. 6022A

INTRODUCTION

Over thirty-five years ago Dunham-Bush pioneered the development and manufacturing of rotary screw compressors for comfort cooling and industrial refrigeration. Since then, we have successfully provided over 25,000 worldwide installations with our durable screw compressor chillers. In fact, many of our earliest installations are still in operation today with the original compressors.

Our commitment to continuous product improvement now leads us to our latest generation screw compressor, the MSC-110 Series. To take full advantage of this compressor's features, it is proudly incorporated into the design of our new generation of Air Cooled Screw Compressor Package Chillers, the ACDX-B. As a result, the ACDX-B boasts higher efficiency, smaller footprint, and lower noise levels than previous generations.

A feature unique in the industry is the packaging flexibility of the ACDX-B. Four standard configurations are available:

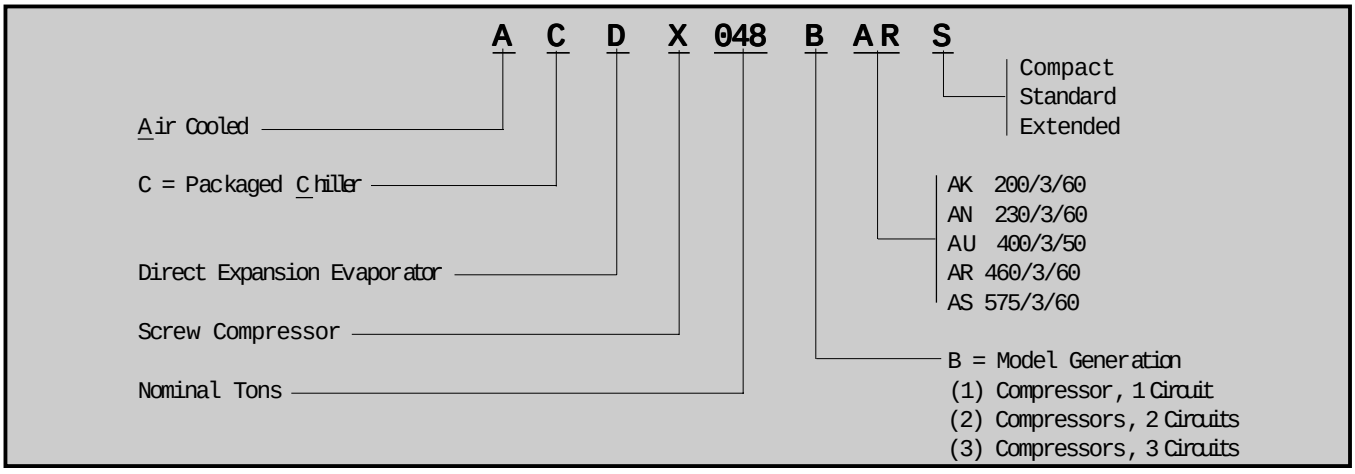
- Compact - For the smallest footprint, and the most economical first cost.
- Standard - The ideal selection for most applications.
- Extended - For applications where maximum operating efficiency is critical.
- Extra Quiet - An additional option for the Standard and Extended models to reach a new level of quiet operation.

Easy integration from our standard advanced microcomputer to a building management system is now available through our optional **Chiller*LINK*** device.

As an added benefit, the ACDX-B chillers carry an industry-leading standard **two-year** parts warranty on the compressors. As always, a full factory run test is provided to insure smooth operation.

TABLE OF CONTENTS

NOMENCLATURE



STANDARD FEATURES

Size Range

- Rated in accordance with ARI Standard 550/590-98
- 14 Models from 48 to 208 Tons
- Compact, Standard, Extended, and Extra Quiet Versions Available
- Rated with HCFC-22 and Compatible with HFC-134a and HFC-407C
- Painted external panels meet or exceed 500 hour salt spray per ASTM 117

Quiet Operation

- Standard and extended “Extra Quiet” units are supplied with 855 RPM quiet fans
- Extra Quiet fan option provides 6-8 dBa lower noise levels

Compressor

- Reliable Hermetic Rotary Screw Type at 3550 RPM
- Independent Refrigerant Circuits
- Infinitely Variable Slide Valve Unloading for Precise Load Matching
- Compressor Cycling for Maximum Efficiency

Cooler

- ASME/CRN Stamped for Safety
- Dunham-Bush High Efficiency Inner Fin Design for Compactness and Weight Reduction
- 300 PSIG on CH Series and 250 PSIG on EX Series Refrigerant Side Design Pressure
- 200 PSIG on Water Side Design Pressure

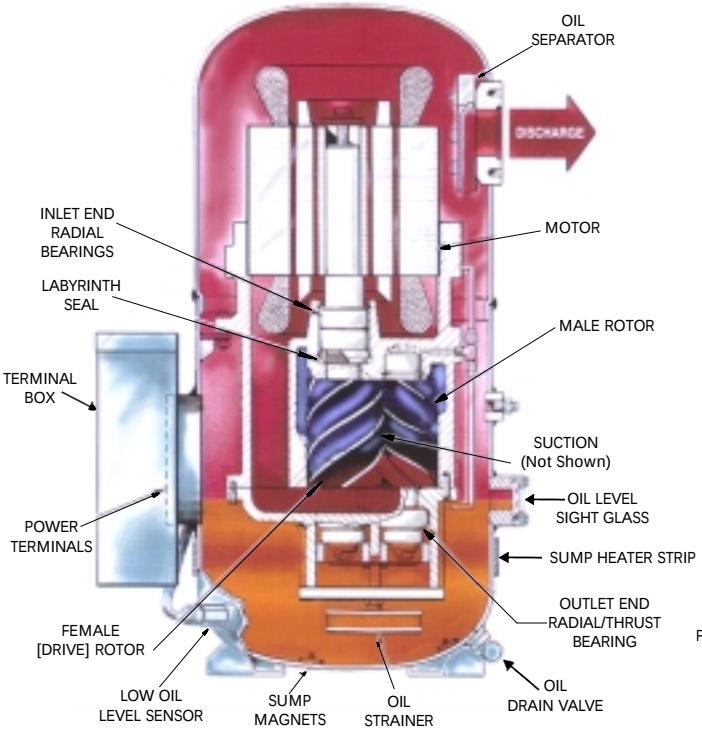
Condenser

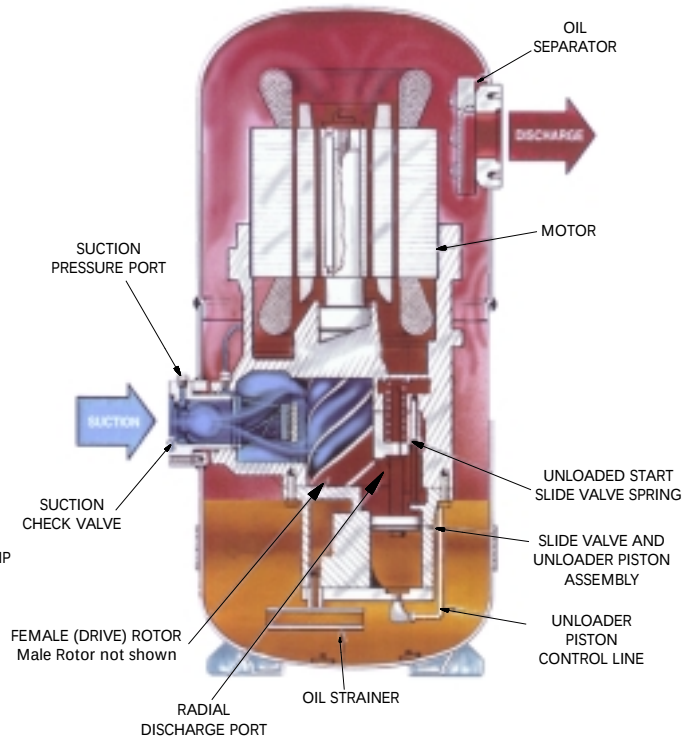
- Long Life Copper Tubes with Aluminum Fins
- Sub-Cooling Circuit for Efficiency
- 450 PSIG Test Pressure
- Low Noise 30" Diameter Fans - Direct Drive at 1140 RPM (Optional 855 RPM Quiet Fans)
- All Fan Motors Open Drip Proof with Rain Shield for Safety and Low Maintenance

Electrical/Control

- Advanced Microcomputer for Precise Control
- Chilled Water Pump Control
- Separated Power and Control Panels
- ETL Unit Approval (IEC Control Panel Available)
- Certified to CAN/CSA C22.2 No. 236
- MEA Unit Approval

Operating Benefits: Rotary Screw Compressor





Compressor Assembly
The Dunham-Bush rotary screw compressor is a positive displacement helical-axial design for use with high pressure refrigerants.

- The compressor consists of two intermeshing helical grooved rotors, a female drive rotor and a male driven rotor, in a stationary housing with suction and discharge gas ports.
- Uniform gas flow, even torque and positive displacement, all provided by pure rotary motion contributes to vibration-free operation over a wide range of operating conditions. Intake and discharge cycles overlap, effectively producing a smooth, continuous flow of gas.
- No oil pump is required for lubrication or sealing purposes. Oil is distributed throughout the compressor by the pressure differential between the suction and the discharge cavities.

Simplified Capacity Control
The slide valve mechanism for capacity modulation and part-load operation is an outstanding feature.

- The moving parts are simple, rugged and trouble-free. The slide mechanism is hydraulically actuated.
- Package capacity reduction can be down to as low as 10% without HGBP by progressive movement of slide valves away from their stops.
- Capacity reduction is programmed by an exclusive electronically initiated, hydraulically actuated control arrangement.

Positive Displacement Direct Connected
The compressor is directly connected to the motor without any complicated gear systems to speed up the compressor and thus detract from the overall unit reliability.

Oil Separation
Each compressor is provided with an integral oil separator located adjacent to the discharge gas port.

- The oil drains into the sump and the discharge gas passes through the oil separator. An oil drain valve is located near the bottom of the oil sump.

Main Bearings
Each rotor is fitted with a set of anti-friction tapered roller bearings. They carry both radial and thrust loads.

Rotors
The latest asymmetrical rotor profiles designed exclusively by Dunham-Bush assure operation at highest efficiencies. Rotors are precision machined.

Castings
All housings are manufactured of high grade, low porosity, cast iron.

Solid State Motor Protection
The motor winding protection module used in conjunction with sensors embedded in the compressor motor windings is designed to prevent the motor from operating at unsafe operating temperatures. The overloads for the motor are also solid state.

Warranty
The compressor(s) is covered by an industry-leading **two-year** warranty as standard.

FIG A

FIG B

FIG C

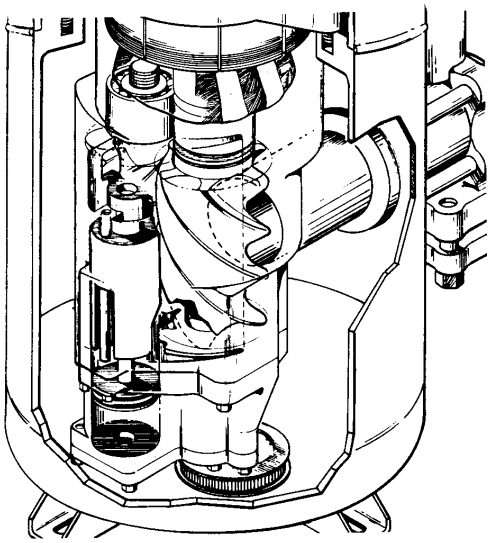
FIG D

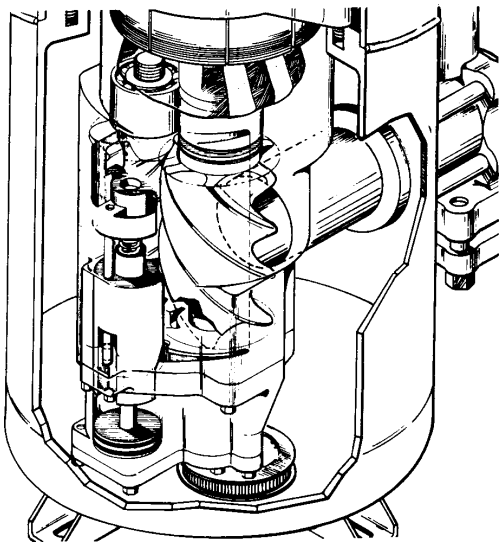
Compressor Operation
Note: For clarity reasons, the following account of the compressor operation will be limited to one lobe on the male rotor and one interlobe space of the female rotor. In actual operation, as the rotors revolve, all of the male lobes and female interlobe spaces interact similarly with resulting uniform, non-pulsating gas flow.

Suction Phase
As a lobe of the male rotor begins to unmesh from an interlobe space in the female rotor, a void is created and gas is drawn in tangentially through the inlet port — Fig. A. — as the rotors continue to turn the interlobe space increases in size — Fig. B — and gas flows continuously into the compressor. Just prior to the point at which the interlobe space leaves the inlet port, the entire length of the interlobe space is completely filled with drawn in gas — Fig. C.

Compression Phase
As rotation continues, the gas in the interlobe space is carried circumferentially around the compressor housing. Further rotation meshes a male lobe with the interlobe space on the suction end and squeezes (compresses) the gas in the direction of the discharge port. Thus the occupied volume of the trapped gas within the interlobe space is decreased and the gas pressure consequently increased.

Discharge Phase
At a point determined by the designed "built-in" compression ratio, the discharge port is covered and the compressed gas is discharged by further meshing of the lobe and interlobe space — Fig. D. While the meshing point of a pair of lobes is moving axially, the next charge is being drawn into the unmeshed portion and the working phases of the compressor cycle are repeated.





Slide Valve Control
Movement of the slide valve is programmed by an exclusive Dunham-Bush electrically initiated (by variations in leaving chilled water temperature) hydraulically actuated control arrangement. When the compressor is fully loaded, the slide valve is in the closed position. Unloading starts when the slide valve is moved back away form the valve stop. Movement of the valve creates an opening in the side of the rotor housing.

Suction gas can then pass back from the rotor housing to the inlet port area before it has been compressed. Since no significant work has been done on this return gas, no appreciable power losses are incurred. Reduced compressor capacity is obtained from the gas remaining in the rotors which is compressed in the ordinary manner. Enlarging the opening in the rotor housing effectively reduces compressor displacement.

UNIT FEATURES: COOLERS

Water Coolers

The water coolers employ the most advanced vessel technology available today, including the patented Inner-Fin construction of the CH and EX coolers. Vessels are designed and constructed to meet the requirements of the ASME Code, Section VIII, Division 1 for unfired pressure vessels and are stamped accordingly.

The CH coolers incorporate 1/2 inch (12.7 mm) copper tubes brazed into tubesheets. The vessel is supplied with welded heads.

The EX coolers incorporate 5/8 inch (15.9 mm) rolled copper tubes and removable heads for ease of tube maintenance.

Vent and drain connections are included on all vessels.

See Table 7A below for appropriate pressure ratings, physical specifications for connection sizes, and page 16 for pressure drop data.

Typical for 2 Circuit Coolers

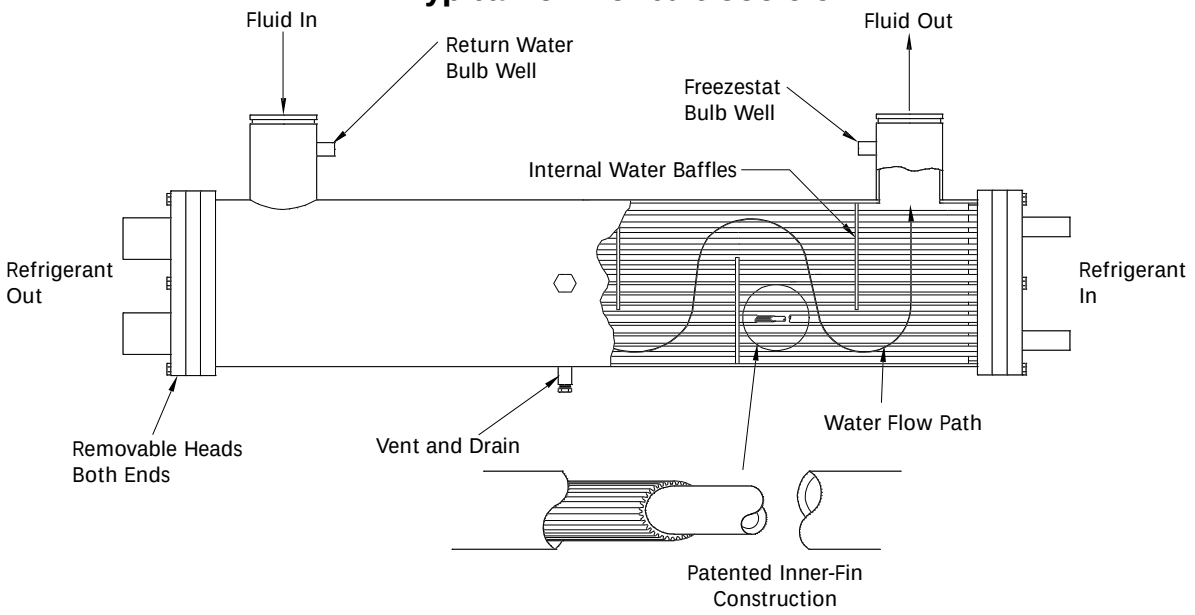


Table 7A

Shell & Tube Heat Exchanger	Water Side		Refrigerant Side	
	Design Pressure (PSIG) (kPa)	Test Pressure (PSIG) (kPa)	Design Pressure (PSIG) (kPa)	Test Pressure (PSIG) (kPa)
Water Cooler				
CH	200 (1379)	300 (2068)	300 (2068)	375 (2586)
EX	200 (1379)	300 (2068)	250 (1724)	312 (2151)

UNIT FEATURES: AIR-COOLED CONDENSERS

All units have direct drive propeller fans and motors. Close blade tip clearance with the fan venturis assure smooth, quiet operation. Low noise 30" diameter fans—direct drive at 1140 RPM (optional 855 RPM extra quiet fans). See standard and extra quiet fan sound data on page 15. See the electrical data on page 44 for information on motor specifications.

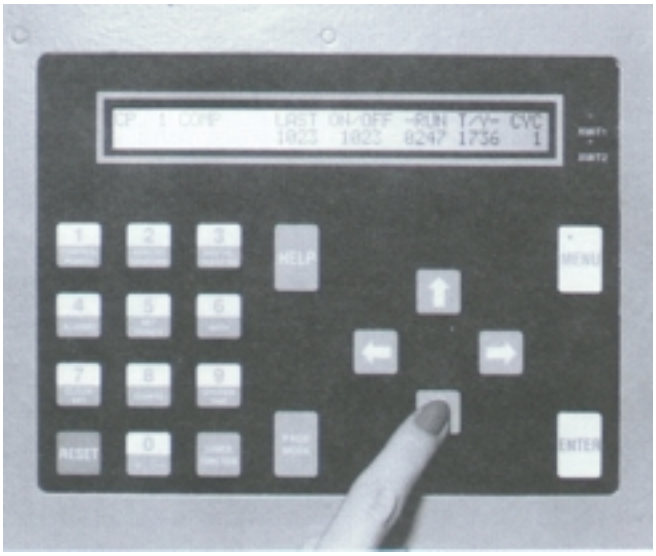
All air-cooled condensers are formed of 3/8 inch (9.53 mm) diameter copper tubes mechanically expanded into aluminum fins for maximum efficiency of heat transfer between the circulating refrigerant and air. The fins have full-spacing collars which completely cover each tube. The staggered tube design improves the thermal efficiency of the coil and eliminates bypassing of air around the tubes. The return bends, headers and nipples are all copper, sized for minimum pressure drop, brazed with inert gas in the tubes and tested after fabrication to 450 psig (3103kPa).

A separate subcooling circuit is standard on all units to maximize energy efficiency.

Partitions separate each fan section to eliminate possible back spin. Fan cycling control is supplied as standard. This lowers the minimum ambient temperature at which the package equipment will effectively start and operate. For lower ambient requirements than standard, variable speed options are available.

All unit cabinetry is heavy-gauge galvanized steel construction with aluminum tube sheets. Control panels, condenser fan discharge panels, and unit end panels are finished with baked enamel paint.

UNIT FEATURES: MICROCOMPUTER CONTROL



Advanced Microcomputer Control is a standard feature on all Dunham-Bush Rotary Screw Air Cooled Chillers monitoring analog and digital inputs to achieve precise control of the major operational and protective functions of the unit.

Direct digital control (DDC) allows finger-tip user interaction. Its simple-to-use push button keyboard and menu-driven software provide access to operating conditions, control setpoints and alarm history clearly displayed on a prominent multi-line 80 character alphanumeric display.

An easy-to-install, inexpensive modem option allows remote reading of operating parameter updates. The Dunham-Bush microcomputer insures its owner state-of-the-art efficiency and reliability.

Display Information

The 80 character alphanumeric liquid crystal display utilizes easy-to-understand menu-driven software. Inexperienced operators can quickly work through these menus to obtain the information they require or to modify control parameters. More experienced operators can bypass the menu systems, if desired, and move directly to their requested control function. At all times, assistance is available to the operator by simply pressing the help key. Easily accessible measurements include:

- Leaving chilled water temperature
- Cooler pressure of each refrigerant circuit
- Condenser pressure of each refrigerant circuit
- Amp draw of each compressor motor
- Elapsed run time of each compressor
- Percent of full load capacity of each compressor
- Fan on/off status
- Ambient temperature
- Number of compressor starts
- Compressor status
- Remote chilled water reset value
- Demand current limit reset value
- Water flow switch status
- External start/stop command status
- Alarm status and history
- System time, day and date for unit scheduling

Optional entering chilled water temperature sensor is available. With this option the operator can quickly and accurately read the significant water temperatures and eliminate the need for often inaccurate thermometers.

Capacity Control

Leaving chilled water temperature control is accomplished by entering the water temperature setpoint and placing the microcomputer in automatic control. The unit will monitor all control functions and move the slide valve to the required operating position. The compressor ramp (loading) cycle is programmable and may be set for specific building requirements. Remote adjustment of the leaving chilled water setpoint is accomplished through either direct connection via terminal or modem connected to the RS232 communication port, or from an external Building Automation System supplying a simple 0 to 5VDC signal. Remote reset of compressor current limit may be accomplished in a similar fashion.

System Control

The unit may be started or stopped manually or through the use of an external signal from a Building Automation System. In addition, the microcomputer may be programmed with a seven-day operating cycle or other Dunham-Bush control packages may start and stop the system through inter-connecting wiring.

System Protection

The following system controls will automatically act to insure system protection:

- Low suction pressure
- High discharge pressure
- High motor temperature/overcurrent
- Freeze protection
- Compressor run error

- Low oil level
- Power loss
- Chilled water flow loss
- Sensor error
- Anti-recycle time delay

The microcomputer will retain the latest eight alarm conditions complete with time of failure in an alarm history. This tool will aid service technicians in troubleshooting tasks enabling downtime and nuisance trip-outs to be minimized.

Proactive Control

The advanced microcomputer will minimize nuisance shutdowns by automatically unloading the compressor(s) as the following limits are approached:

- High discharge pressure
- Low suction pressure
- Over current

Remote Monitoring and Controlling Capability

The microcomputer is complete with an RS232 communications port and all hardware and software necessary to remotely monitor and control the packaged chiller up to 50 feet away (hard wired) or by optional phone modem to extended distance by phone system. This valuable enhancement to the refrigeration system allows the ultimate in serviceability. The microcomputer as standard is additionally equipped with history files and may be used to take logs which may be retrieved via the phone modem periodically. Now owners of multiple buildings have a simple and inexpensive method of investigating potential problems quickly and in a highly cost effective manner.

There are four optional control accessories for remote monitoring and controlling of our package chillers.

1) RMDT - Remote Monitor Display Terminal

The RMDT (Remote Monitor Display Terminal) can be hard wired up to 50 feet away from the chiller for remote monitoring and operating of multiple chillers. The RMDT is supplied with a 14" monitor, two RS232 serial ports, a 6 foot 115 volt power cord and an enhanced PC keyboard.

This accessory allows remote start-stop, chilled water set-point changes, and reading of all microcomputer screens including operating conditions, faults and fault history.

2) IBM PC Compatible Computer Terminal

A customer-supplied IBM PC compatible computer with communication software installed (simple terminal) can interface with the chiller in the same manner as the RMDT (Remote Monitor Display Terminal). Again, this method of communication interfaces with the chiller microcomputer CPU and provides the same level of communication.

3) BMS - Building Management System Terminal

A BMS (Building Management System) may interface with the chiller microcomputer and provide the same level of monitoring and operating control as above, when the BMS company has implemented the communications protocol.

Dunham-Bush has an open communications protocol policy with most BMS companies.

4) CHLK - Chiller*LINK*

Dunham-Bush has always been a strong advocate of open systems communications. In addition to BACnet, the modular design of our Chiller*LINK* also supports Modbus protocol. Consult with Dunham-Bush to verify compatibility with other protocols.

Dunham-Bush's Chiller*LINK* is a microprocessor-based communication device designed to provide seamless, two-way translation between a Dunham-Bush microcomputer and a BACnet compliant network or work station. Chiller*LINK* devices are available for a variety of Data Link/Physical Layer configurations including PTP (point-to-point) via EIA-232 standard approved for BACnet.

In addition to providing seamless interoperability with BACnet systems, Chiller*LINK* can be specially designed for full custom programmability of the data flowing between the Dunham-Bush/BACnet networks.

UNIT OPTIONS

Options are installed at the factory.

Indicator Light Set (OSL)—Provides indicator lights for control power, motor overload, high motor temperature and alarm status.

Control Circuit Transformer (TSF)—Appropriate KVA rating to power the 115/1/60 control circuit and compressor oil heaters off the service voltage.

Chiller Heater Transformer (CHT)—Appropriate KVA rating to power the 115/1/60 evaporator vessel heater tape.

115V Convenience Outlet (CON)—Duplex outlet located inside the control panel and protected by a 15 amp fuse.

Over/Undervoltage and Phase Protection Relay (UVR2)—Protects against high and low incoming voltage conditions as well as phase loss, phase reversal and phase imbalance by opening the control circuit. It is an automatic reset device.

Fin Guard—1" X 3.75" (25.4 mm x 95.3 mm) mesh PVC dipped wire coil guard

Upper - covers vertical coils only (FGT)

Lower - encloses piping and evaporator only (FGB)

Painted Steel Louvers (LUV)—For complete unit closure and general mechanical security.

Painted Grill (GRL)—Similar to the louver option except manufactured of aluminum with 3/8" x 3 1/2" (9.5 mm x 88.9 mm) slots instead of louvers.

Electronic Expansion Valves (EEV)—For more precise control over a wider range of operation.

Gauges (GAG)—Includes suction, discharge pressure gauges for all unit models. There will be redundant suction and discharge readings through the microcomputer.

Low Ambient Controls (LAC) (To 0°F (-17.8°C) min. ambient)—Provides variable speed fans in conjunction with standard fan cycling. Compressor insulation is also included.

Extra Low Ambient Controls (ELAC) (To -20°F (28.9°C) min. ambient)—Includes 0°F low ambient option (LAC) plus electronic expansion valve. 50% glycol and 50% minimum load with a maximum 5 MPH wind are required.

Phone Modem (MOD)—Allows the system to be controlled, monitored, logs retrieved, and potential problems quickly investigated and in a cost effective manner from a remote computer. The modem requires a telephone line.

Polycoated Condenser Fins (PCF)—Applicable for corrosion resistance in salt atmosphere conditions.

Copper Condenser Fins (CUF)—Copper fins offer maximum corrosion protection for severe conditions.

Compressor Sound Blanket (SBL)—Removable attenuation blanket which provides compressor noise reduction for ultra-quiet compressor operation.

Extra Quiet Fans—855 RPM fan motors to lower unit noise level. This option will lower unit sound transmission levels 6 to 7 dBa.

Compressor Service Valves (CSV)—Manual suction and discharge valves to provide for compressor isolation. Liquid injection shut-off valve is standard.

Compressor Start Counter (CSC)—One start counter provided per compressor, located inside the control panel. (Redundant information supplied by the micro.)

Compressor Elapsed Time Meter (ETM)—One elapsed time meter to register run hours per compressor, located inside the control panel. (Redundant information supplied by the micro.)

Unit Paint (PNT)—Provides all components coated with standard grey outdoor quality paint. This special high-grade outdoor quality paint is tested to maintain integrity under the ASTM-B-117 specification on all painted components.

Hot Gas Bypass (HGB1 & HGB2)—Consists of factory piped and installed hot gas bypass valve and solenoid valve to provide operation below minimum slide valve position. Available on a single refrigerant circuit (HGBP1) or on all refrigerant circuits (HGBP2).

Three Phase Ammeter (AM3)—Single analog ammeter with a 3 phase selector switch for indication, located inside the control panel.

Three Phase Voltmeter (VM3)—Single analog voltmeter installed with a 3 phase selector switch for indication, located inside the control panel.

UNIT OPTIONS (CONT.)

Entering Fluid Temperature Sensor (SEN)—Temperature sensor and bulb installed in cooler inlet connection to supplement the standard leaving (outlet) fluid temperature sensor.

Electrical Panel Door Latch Solenoids (DLS)—Automatically disallows access to the control panel and high voltage panel when the main power is supplied to the unit. This protection can be overridden on the control panel side with a key actuated switch.

Compressor Circuit Breakers (CB1)—Available with interlocking handles on models 48, 58, and 68 for all published voltages. Available without interlocking handles on models 98 through 208 for 460V and 575V units (standard on 200V and 230V units).

Non-fused Disconnect:

(UMD1)—Use CB1 above for unit models 48, 58 and 68, all voltages.

(UMD2)—Unit mounted disconnect with interlocking handle for Models 098 through 208, 460V and 575V only. See unit accessories for 200V and 230V units.

Chiller*LINK* (CHLK)—Communications device. See page 10 for description.

UNIT ACCESSORIES

Accessories are shipped unmounted.

Remote Monitor Display Terminal (RMDT)—Includes a terminal for remote monitoring and enabling/disabling unit control plus reading of all microcomputer screens up to 50 feet (15.2 meters) of wire length away. (See Page 9 for description.)

Water Flow Switch (WFS)—Paddle type field adjustable flow switch available for all units, tied into the unit safety circuit so that the package will remain off until water flow is proven. Helps prevent cooler freeze up. Vapor-proof enclosure, for use on water or glycol systems.

Rubber-in-shear Isolators (RIS)—Designed for ease of installation, these rubber, one piece, molded isolators have skid resistant baseplates. Applicable for most installations.

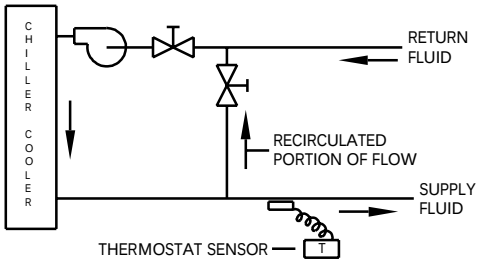
Spring Isolators (SPG)—Designed for 1" deflection, these housed spring assemblies have a neoprene friction pad on the bottom to help prevent the passage of noise and a spring locking leveling bolt at the top. Neoprene inserts prevent contact between the steel upper and lower housings. Suitable for more critical applications than RIS isolators.

Non-fused Disconnects (NFD)—Shipped loose for models 98 through 208 for 200V and 230V units only.

Cooler Design Data

1. ***Maximum***—(LCFT) Leaving Chilled Fluid Temperature is 50°F (10°C). The unit can start and pull down with up to 80°F (27°C) entering-water temperature. For sustained operation, it is recommended that the entering water temperature not exceed 70°F (21°C).
2. ***Minimum***—(LCFT) Leaving Chilled Fluid Temperature is 40°F (4.4°C) for all unit models except compact sizes 048 through 108 for water applications. Some unit models will require oversized coolers for water temperatures below 44°F (6.7°C). Refer to the physical Specifications section of this catalog to determine which untis will require oversized evaporators.
3. Minimum/Maximum Flow Rates and Vessel Fluid Volume—refer to Physical Specifications.
4. Pressure Drop Data—refer to Figure 16, page 16 and glycol correction factors, Tables 17A and 17B.
5. Wide Range ΔT—Low Flow Applications
   a. Multiple smaller chillers may be applied in series, each providing a portion of the design temperature range of roughly 10°F (5.5°C) each.
   b. Special cooler baffling may be provided from the factory for applications from 12.5°F to 20°F (7°C to 11°C) chiller fluid ranges.
   c. Chilled fluid may be recirculated through the cooler as shown below to allow the chiller to operate with acceptable flow rates and temperature ranges (Figure 12A).

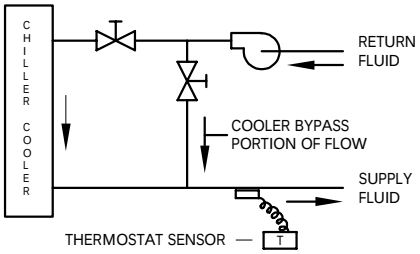
Figure 12A



The mixed fluid temperature range through the cooler for units with standard coolers, should not be less than 7.5°F (4.2°C).

6. Narrow Range ΔT - High Flow Applications
   a. Special cooler baffling is available from the factory for 5°F to 7.5°F (2.7°C to 4.2°C) ΔT applications.
   b. For Extra-Narrow Range ΔT applications a partial cooler bypass piping and valve configuration can be used as shown below. This permits a higher ΔT and lower ΔP (pressure drop) through the cooler (Figure 12B). Contact your local Dunham-Bush sales office when using this arrangement.

Figure 12B



The fluid mixes after the cooler.

Chilled Fluid Loop Volume (CFLV)

Careful consideration needs to be given to the "Chilled Fluid Loop Volume" (CFLV) or System / Inertia to maintain an acceptable leaving fluid temperature.

Small loop Volume Systems may have temperature control problems due to the small fluid volume in the system. This "System Inertia Problem" is exaggerated at low load conditions and causes chiller short cycling. The small fluid volume in the system will be pulled down to setpoint in a very short period of time, and the chiller will be shut down. The chiller's anti-recycle timer limits the number of starts to three per hour. The system loop temperature will warm up during this off-cycle and may require cooling before the anti-recycle timer has timed out. Once the anti-recycle timer has timed out, the unit will restart and the chiller will again load up possibly to 100% and pull the loop down again repeating the short cycle pattern.

The **System Loop Volume** should be sized to limit the temperature rise that can occur during the off cycle.

Air Conditioning Applications

The chilled fluid loop volume must equal or exceed 3 gallons per nominal ton of cooling (3.25 L per kW).

Process & Special Air Conditioning Applications

Where leaving fluid temperature is often more critical, the chilled fluid loop volume should be increased to 6 to 10 gallons per ton minimum (6.5 to 10.8 L per KW).

Table 13A **Minimum Chilled Fluid Loop Volume***

ACDX-B Model	Air Conditioning Applications		Process Applications				
	Gallons	Liters	Gallons	Liters		Gallons	Liters
048	140	529	280	1058	To	466	1764
058	172	652	344	1304	To	574	2173
068	206	778	411	1556	To	685	2593
098	275	1039	549	2078	To	915	3463
108	313	1183	625	2366	To	1042	3944
118	347	1315	695	2630	To	1158	4383
128	376	1423	752	2846	To	1253	4743
138	407	1540	814	3079	To	1356	5132
148	420	1590	840	3179	To	1400	5299
158	447	1691	893	3382	To	1489	5636
178	506	1914	1012	3829	To	1686	6382
188	533	2017	1066	4033	To	1776	6722
198	588	2227	1177	4453	To	1961	7422
208	618	2338	1235	4676	To	2059	7793

*Values calculated for ARI Conditions of Service (C.O.S.)

Type of Application	Gal/Ton	L/KW
Normal Air Conditioning	3	3.25
Process Cooling	6 - 10	6.5 - 10.8

Gallons = Gal/Ton x ARI Capacity in Tons

Liters = L/KW x ARI capacity in KW

For applications with other than ARI C.O.S., calculate the system loop volume based on the adjusted or corrected unit capacity.

Tanks for System Volume Enhancement

It may be necessary to install a tank in the system to provide sufficient system fluid volume, as shown below.

Figure 13A Single Loop System with Storage Tank to Increase Loop Volume

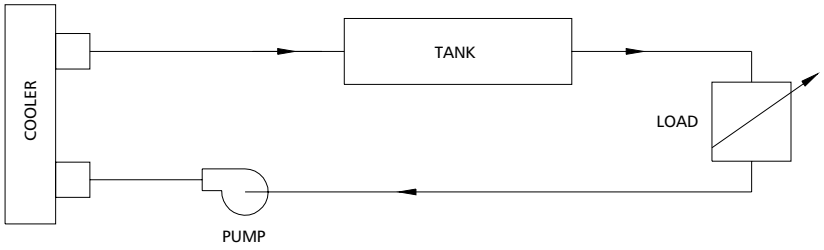
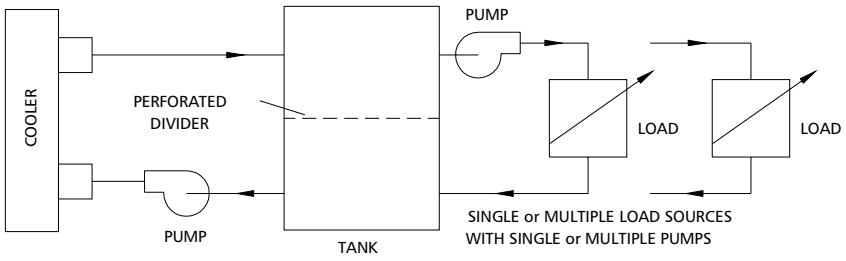


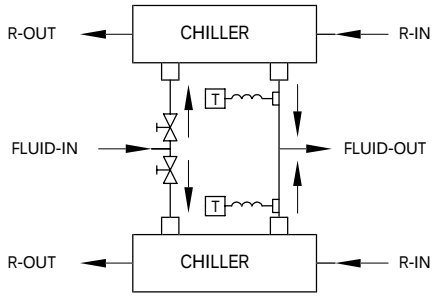
Figure 13B Primary and Secondary Loop Systems are normally used where the secondary system has variable flow and/or multiple loads. See example below.



Multiple Chillers Per Chilled Water System

1. Where the load is greater than one **ACDX-B** can supply or where standby capacity is required or the load profile dictates, multiple chillers may be piped in parallel. Units of equal size help to ensure fluid flow balance, but balancing valves ensure balanced flows even with dissimilar chillers. Temperature controller sensors may or may not need to be moved to the common fluid piping depending on the specific application.
2. Parallel Chiller Applications (Figure 14A). Both units operate simultaneously modulating with load variations. Each unit operates independently sensing its own leaving water temperature. The set point of each thermostat is set to maintain the desired loading scheme.

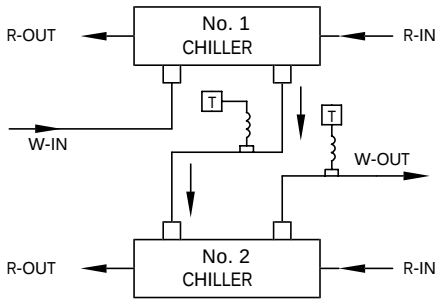
Figure 14A



3. Series Chiller Applications (Figure 14B)

   Where a large temperature range is required (over 25°F [13.9°C]), the chiller may be piped in series. In this case the units are controlled independently. The load is progressive by temperature so the chiller selections are critical.

Figure 14B



Oversizing Chillers

Oversizing of chillers more than 5-10% is not recommended. Oversizing causes energy inefficiency and shortened compressor life due to excessive compressor cycling. Larger future load requirements may cause temporary oversizing of equipment which will require careful unit selection. It may be better to properly size for the present load and add another unit later for future expansion. It is also recommended using multiple units where operation at minimum load is critical. Fully loaded equipment operates better and more efficiently than large equipment running at or near minimum capacity.

Hot gas bypass should not be a means to allow oversizing of chillers. Hot gas bypass should only be used where the equipment is sized properly for full load but the load turn down is less than the minimum unloading available.

Water (Fluid) Strainers

It is recommended that 40-mesh strainers be installed in the fluid piping as close to the unit cooler as possible.

Low Ambient Operation/Freeze Protection

If unit is required to operate below 20°F (-7°C), optional head pressure control is required. Though heater tape is provided on vessel, all water piping must also be protected by heater tape. Glycol is recommended for added protection. If wind in area is over 5 mph (8 kph), a wind barrier is recommended.

Desuperheaters

A hot gas desuperheater can be factory mounted or supplied for field installation. Tees in refrigerant lines with shut off valves can be supplied for field installed desuperheaters. Consult factory for further details.

SOUND DATA

Dunham-Bush has always offered the quietest Air Cooled Screw Compressor Chillers in the industry. Although this still holds true today for our standard line of ACDX-B machines, we are proud to offer an ***EXTRA QUIET*** option, for those super-critical low noise installations. This is accomplished through the use of specially designed condenser fans which operate at a softer, quieter, 855 RPM instead of the standard 1140 RPM speed.

Listed in the table below is the "A" weighted sound pressure data measured at 30 ft. distance for our standard line of chillers (1140 RPM fans), as well as for our optional ***EXTRA QUIET*** models (which are available for 60 Hz. power only).

Consult factory for detailed sound pressure rating across the frequency band, and at a specified distance from the chiller. *Sound power data is also available.*

Table 15

Standard and EXTRA QUIET Unit Sound Data

Model	dBa @ 30 Feet SOUND PRESSURE LEVELS		
	Standard Fans		*Extra Quiet* Fans
	60 Hz	50 Hz	60 Hz
48S	68	64	61
48E	70	66	63
58C	68	64	N/A
58S	70	66	63
58E	71	67	64
68C	68	64	N/A
68S	70	66	63
68E	71	67	64
98C	70	66	N/A
98S	71	67	64
98E	72	68	65
108C	70	66	N/A
108S	71	67	64
108E	72	68	65
118C	71	67	N/A
118S	72	68	65
118E	72	69	66
128C	71	67	N/A
128S	72	68	65
128E	72	69	66
138C	72	68	N/A
138S	72	69	66
138E	73	69	67
148C	72	69	66
148S	73	69	67
148E	74	70	68
158C	72	69	66
158S	73	69	67
158E	74	70	68
178C	72	69	66
178S	73	69	67
178E	74	70	68
188C	72	69	66
188S	73	69	67
188E	74	70	68
198C	73	69	67
198S	74	70	67
198E	74	70	68
208C	73	69	67
208S	74	70	67
208E	74	70	68

C = Compact Models
S = Standard Models
E = Extended Models

Overall "A" Weighted Sound Pressure Level data listed above is based on sound power readings taken in accordance with ARI 370 Standard Sound Ratings of Large Outdoor Refrigerating and Air Conditioning Equipment. Measurements based at 30 feet distance from side of unit, and 5 feet above ground.

COOLER: WATER SIDE PRESSURE DROP

Figure 16

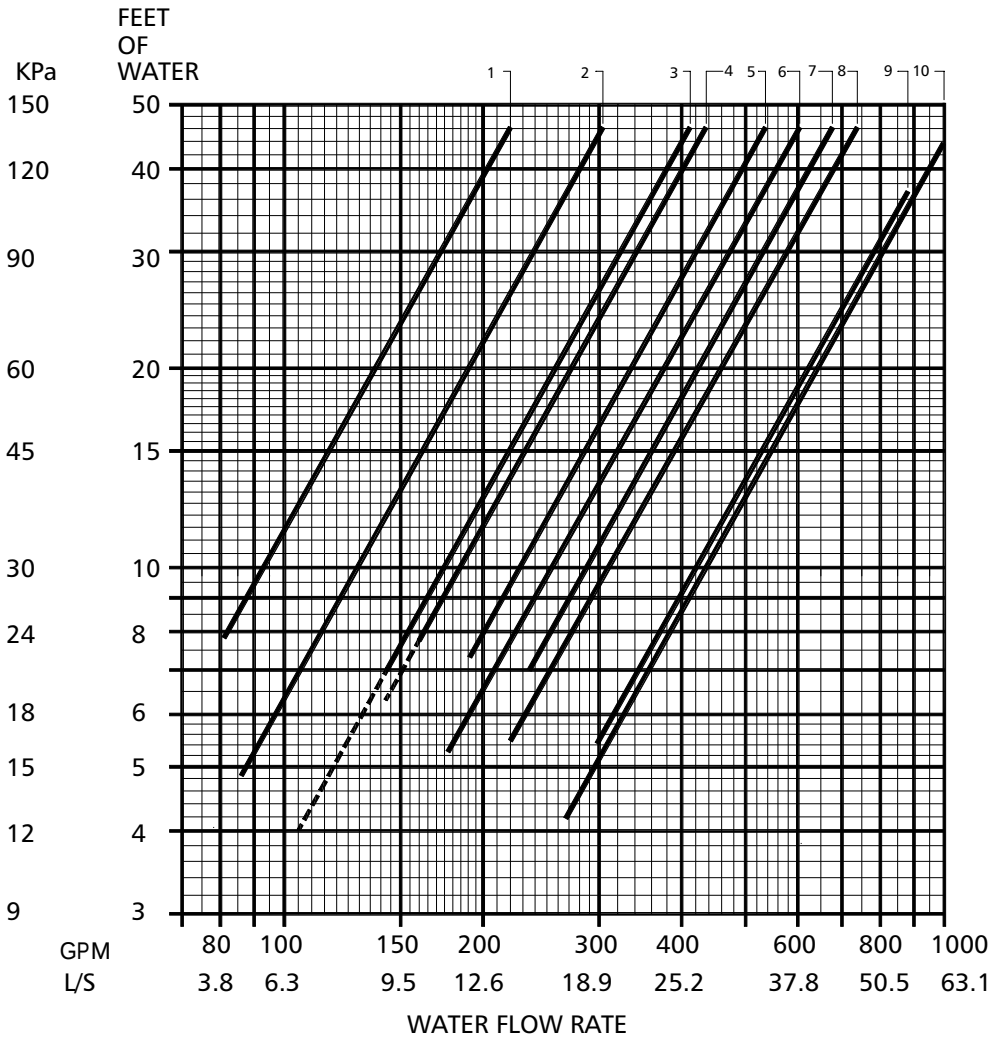


Table 16

		ENGLISH I.P. UNITS		METRIC S.I. UNITS	
Cooler Model	**Curve No.**	**Minimum GPM**	**Maximum GPM**	**Minimum Lit./Sec.**	**Maximum Lit./Sec.**
CHS013601A	1	81	220	5.11	13.88
CHS011601B	2	86	304	5.43	19.18
CHS013601B	3	101	407	6.37	25.68
EXD16112J11DVR0		145	417	9.15	26.31
EXD14102J09DVR0	4	140	428	8.83	27.76
EXD16122J11DVR0		159	443	10.03	27.95
EXD16122J09DVR0	5	191	536	12.05	33.82
EXD18122J11DVR0	6	177	604	11.17	38.11
EXD16122J07DVR0	7	236	677	14.89	42.71
EXT20122J11DVR0		183	600	11.55	37.85
EXT20122J09DVR0	8	220	738	13.88	46.56
EXT20122J07DVR0	9	298	881	18.80	55.58
EXT18122J07DVR0	10	267	1030	16.85	64.98

▬ ▬ ▬ ▬ Refer to Table for Minimum GPM

GLYCOL CORRECTION FACTORS

Glycol Freeze Protection

If the chiller or fluid piping may be exposed to temperatures below freezing, glycol protection is recommended. The recommended protection is 15°F (8.3°C) below the minimum ambient temperature. Use only glycol solutions approved for heat exchanger duty. The use of automotive anti-freeze is not recommended because they have short-lived inhibitors and fouling of the coolers will occur. If the equipment is exposed to freezing temperature and not being used, the vessels and piping should be drained.

Cooler heaters are provided for protection down to -20°F (-29°C) minimum ambient but piping must be protected. A separate 115V service is required for this protection.

If the equipment is being used for operating conditions below the water rated vessel capability, glycol should be used to prevent freeze damage. The freeze protection level should be 20°F (11°C) lower than the leaving brine temperature. The use of glycol causes a performance derate as shown below in Table 17A for ethylene glycol and Table 17B for propylene glycol and needs to be included in the unit selection procedure.

Table 17A **Ethylene Glycol**

% E.G.	FREEZE POINT		C1 CAPACITY FACTOR	K1 kW FACTOR	G1 FLOW RATE	P1 P.D. FACTOR
	°F	°C				
10	26.2	-3.2	0.995	0.998	1.019	1.050
15	22.4	-5.3	0.991	0.997	1.030	1.083
20	17.8	-7.9	0.988	0.996	1.044	1.121
25	12.6	-10.8	0.984	0.995	1.060	1.170
30	6.7	-14.1	0.981	0.994	1.077	1.219
35	0.0	-17.8	0.977	0.992	1.097	12.75
40	-8.0	-25.8	0.973	0.991	1.116	1.331
45	-17.5	-27.5	0.968	0.990	1.138	1.398
50	-28.9	-33.8	0.964	0.989	1.161	1.466

Table 17B **Propylene Glycol**

% P.G.	FREEZE POINT		C2 CAPACITY FACTOR	K2 kW FACTOR	G2 FLOW RATE	P2 P.D. FACTOR
	°F	°C				
10	26.1	-3.3	0.988	0.994	1.005	1.019
15	22.8	-5.1	0.984	0.992	1.008	1.031
20	19.1	-7.2	0.978	0.990	1.010	1.051
25	14.5	-9.7	0.970	0.988	1.015	1.081
30	8.9	-12.8	0.962	0.986	1.021	1.120
35	2.1	-16.6	0.952	0.981	1.033	1.163
40	-6.4	-21.3	0.943	0.978	1.043	1.213
45	-16.6	-27.0	0.933	0.975	1.057	1.269
50	-28.9	-33.8	0.924	0.972	1.073	1.326

SELECTION PROCEDURE: ENGLISH I.P. UNITS 60 HZ

Design Requirements

The following design requirements must be known in order to select a packaged chiller.

*1. Required cooling capacity in tons or kWo
2. Cooler outlet water temperature °F or °C
*3. GPM or L/S of chilled water to be circulated
*4. Chilled water cooling range (water in °F or °C - minus water outlet °F or °C)
5. Fluid type
6. Cooler fouling factor hr-ft-°F/Btu or m^2 °C kW^{-1}
7. Design ambient temperature °F or °C. Minimum starting/operating ambient temperature °F or °C.
8. Elevation (feet or meters)
9. Electrical power characteristics
10. Special codes (state, city or local) with which unit must comply

*Any 2 out of 3 must be known

EXAMPLE 1 (English I.P. Units)
Select an air cooled packaged chiller for the following conditions:

100 tons at 54°F entering, 44°F leaving chilled water. Design ambient is 95°F. Minimum operating ambient is +0°F. Altitude is 2000 feet. Cooler fouling factor .0005. Electrical characteristics 460v/3ph/60 Hz with single power connection.

Step 1 - Unit Selection

For 2000 feet elevation divide the specified tonnage by the capacity correction factor from Table 18A.

$$\frac{100 \text{ tons}}{.99} = 101.0 \text{ Tons}$$

For .0005 fouling factor divide the required tonnage at 2000 feet by the capacity correction factor from Table 18B.

$$\frac{101.0 \text{ Tons}}{.981} = 102.96 \text{Tons}$$

Entering the performance data from Table 19A on page 19 we see that an ACDX-B 108 Standard Length unit for water at sea level has a capacity of 104.2 tons, drawing 123.7 compressor kW. The kW correction factors from Table 18A and 18B will be applied to the compressor kW below. For the conditions specified, the unit will do:

Capacity = 104.2 x .99 x .981 = 101.2 Tons
Compressor kW = 123.7 x 1.01 x .994 = 124.2 kW

Step 2 - Cooler GPM and Pressure Drop

$$\text{GPM} = \frac{\text{Specified Tons x 24}}{\text{Cooling Range}} = \frac{100 \text{ x } 24}{10} = 240 \text{ GPM}$$

Referring to page 20 for the physical specifications, we note that the ACDX-B 108 Standard Length unit utilizes the Evaporator Model EXD16122J11 for the above conditiong of service. Consulting the pressure drop curves, Figure 16 on page 16, we note a pressure drop (using curve 4) of 15.6 ft. of water at 240 GPM.

Step 3 - Chilled Water Pump Selection
To the pressure drop calculated in Step 2, add the pressure drop through the chilled water loop piping, valves and equipment. This will be the foundation of your pump selection criteria.

Step 4 - Head Pressure Control Selection
To select the proper head pressure control for an ACDX-B 108, use the Physical Data Table found on page 20. Note that the standard ambient with fan cycling is 20°F. Since requirement is for 0°F, the optional variable speed fan must be used.

Step 5 - Electrical Wire and Disconnect Sizing
Using the Electrical Data found on page 39 for an ACDX-B 108 Standard Length unit operating on 460/3/60 service with single power connection, we find the following:
Unit Minimum Circuit Ampacity: 229
Unit Maximum Fuse Size : 300

Table 18A

Elevation above Sea Level		Capacity Correction Factor	kW Correction Factor
Feet	Meters		
0	0	1.00	1.00
2000	600	.99	1.01
4000	1200	.98	1.02
6000	1800	.97	1.03

Table 18B

Fouling Factor		Capacity Correction Factor	kW Correction Factor
(hr-ft. - °F/BTU)	(m^2 °C kW^{-1})		
.00010	.0176	1.000	1.000
.00025	.044	.993	.998
.00050	.088	.981	.994
.00100	.176	.958	.986

PERFORMANCE DATA: ENGLISH I. P. UNITS 60 HZ

Performance ratings shown below are based on ARI Standard 550/590-98 with water entering at 54°F and leaving at 44°F with .001 fouling factor while operating at 95°F ambient

Other operating performance information is available from your sales representative and the Dunham-Bush Electronic Catalog.

Table 19A

ACDX-B Model	Compact Length				Standard Length				Extended Length			
	Tons	kW	EER	NPLV	Tons	kW	EER	NPLV	Tons	kW	EER	NPLV
48	N/A	N/A	N/A	N/A	46.6	53.3	9.4	11.5	47.1	50.6	9.4	11.3
58	55.3	69.5	8.8	13.0	57.4	63.2	9.5	13.1	58.4	60.2	9.6	12.9
68	64.9	85.8	8.4	13.0	68.5	77.3	9.5	13.3	69.3	73.2	9.7	13.2
98	89.1	112.2	8.8	11.4	91.5	106.0	9.2	11.3	92.2	102.7	9.3	11.2
108	97.7	133.3	8.2	11.0	104.2	123.7	9.2	11.3	106.0	118.1	9.5	11.3
118	113.1	140.1	8.9	13.0	115.8	132.3	9.4	12.4	117.5	127.3	9.6	13.0
128	121.2	155.7	8.6	11.7	125.3	146.7	9.2	11.8	126.9	140.9	9.5	11.8
138	134.1	160.8	9.1	12.7	135.6	154.1	9.4	12.3	136.5	149.5	9.5	12.3
148	139.2	159.6	9.3	10.3	140.0	156.3	9.4	10.2	140.9	151.7	9.4	10.6
158	148.2	175.9	9.1	11.0	148.9	172.6	9.2	11.0	151.4	164.3	9.4	10.8
178	166.1	208.5	8.8	12.5	168.6	200.8	9.1	12.5	172.3	189.6	9.5	11.5
188	174.0	223.7	8.6	12.2	177.6	214.9	9.0	12.3	181.2	202.8	9.4	11.1
198	193.8	232.3	9.1	11.5	196.1	225.9	9.4	12.2	197.6	219.1	9.6	10.9
208	202.1	248.1	9.0	11.3	205.9	239.6	9.3	12.1	207.4	232.8	9.5	12.5

EXTRA QUIET UNITS

Table 19B

ACDX-B Model	Standard Length Extra Quiet				Extended Length Extra Quiet			
	Tons	kW	EER	NPLV	Tons	kW	EER	NPLV
48	46.0	55.5	9.5	12.5	46.9	51.8	10.1	12.6
58	56.4	66.1	9.7	14.0	57.7	62.3	10.3	14.1
68	67.6	81.3	9.5	13.6	68.7	76.1	10.2	13.8
98	90.3	110.3	9.4	12.0	91.5	105.8	9.8	11.8
108	100.3	130.7	8.9	11.8	104.3	123.4	9.7	12.0
118	113.3	139.7	9.3	13.7	115.4	133.3	9.9	13.2
128	121.4	155.2	9.0	12.0	125.0	147.8	9.7	12.7
138	133.8	162.1	9.5	14.2	135.2	156.1	9.9	13.1
148	138.7	161.7	9.8	11.6	140.2	155.3	10.1	11.1
158	145.3	180.4	9.2	11.7	149.9	169.6	10.0	11.1
178	163.2	212.7	8.9	12.7	169.4	198.4	9.7	13.3
188	171.2	227.9	8.7	12.3	178.4	212.6	9.6	13.0
198	189.4	238.6	9.2	12.5	194.8	230.2	9.7	12.9
208	199.3	253.4	9.1	12.3	204.7	244.9	9.6	12.7

NOTES: (1) Ratings based on ARI Standard 550/590-98, 44°F evaporator leaving water, 10°F water range, 95°F ambient and .0001 evaporator fouling factor.
(2) KW is for compressor only. EER is for entire unit. See physical specs for fan kW.
(3) For other conditions of service, contact the local representative.

PHYSICAL SPECIFICATIONS: ENGLISH I.P. UNITS

ACDX-B 48, 58, 68, 98, 108

ACDX-B MODEL	48	58	68	98	108
COMPRESSORS					
Model (Qty.)	1111(1)	1113(1)	1117(1)	1111(2)	1111(1) 1113(1)
Oil Charge per Compressor (Gal)	5.8	5.8	5.8	5.8	5.8
Oil Type	Dunham-Bush Karlube #2				
Oil Lubrication	Differential Pressure				
% Capacity Reduction	20%	20%	20%	10%	10%
Crankcase Heater Watts/Compr.	400W	400W	400W	400W	400W
STANDARD EVAPORATOR	CHSO11601B	CHSO11601B	CHSO13601B	EXD14102J09	EXD16122J11(6)
Water Volume, Gallons	11	11	17	30	46
Minimum Flow Rate, GPM	86	86	101	140	159
Maximum Flow Rate, GPM	304	304	407	428	443
Water Conn. Size In/Out (Type)	4" (NPT)	4" (NPT)	4" (NPT)	5" (VIC)	6" (VIC)
EVAPORATOR FOR 42°F LWT	CHSO11601B	CHSO13601B	CHSO13601B	EXD14102J09	EXD16122J11(6)
Water Volume, Gallons	11	17	17	30	46
Minimum Flow Rate, GPM	86	101	101	140	159
Maximum Flow Rate, GPM	304	407	407	428	443
Water Conn. Size In/Out (Type)	4" (NPT)	4" (NPT)	4" (NPT)	5" (VIC)	6" (VIC)
EVAPORATOR FOR 40°F LWT	CHSO13601A	CHSO13601B	CHSO13601B	EXD16122J11(5)	EXD16122J11(5)
Water Volume, Gallons	17	17	17	46	46
Minimum Flow Rate, GPM	81	101	101	159	159
Maximum Flow Rate, GPM	220	407	407	443	443
Water Conn. Size In/Out (Type)	4" (NPT)	4" (NPT)	4" (NPT)	6" (VIC)	6" (VIC)
CONDENSER					
Compact Length Model - Fan Quantity(1)	N/A	4	4	6	6
Standard Length Model - Fan Quantity(1)	4	6	6	8	8
Extended Length Model - Fan Quantity(1)	6	8	8	10	10
Nominal RPM(2) 60 Hz	1140	1140	1140	1140	1140
Nominal Motor HP (each)(2)	1.5	1.5	1.5	1.5	1.5
Nominal Motor kW (each)(2)	1.45	1.45	1.45	1.45	1.45
GENERAL					
Minimum Starting/Operating Ambient °F(3)	20	20	20	20	20
w/Low Ambient Option, °F (VAR SPD)(3)	0	0	0	0	0
w/Extra Low Ambient Option, °F(4)	-20	-20	-20	-20	-20
Number of Circuits	1	1	1	2	2
Refrigerant Charge, lbs. R-22	119	152	172	242	270
COMPACT (C) UNIT WEIGHTS					
Shipping Weight, lbs. (AL Fin/CU Fin)	N/A	3922/4424	4085/4587	6454/7216	6971/7733
Operating Weight, lbs. (AL Fin/CU Fin)	N/A	4015/4517	4219/4721	6704/7466	7324/8086
STANDARD (S) UNIT WEIGHTS					
Shipping Weight, lbs. (AL Fin/CU Fin)	3840/4342	4735/5493	4929/5815	7400/8410	7917/8307
Operating Weight, lbs. (AL Fin/CU Fin)	3915/4417	4828/5586	5063/5949	7650/8660	8270/8660
EXTENDED (E) UNIT WEIGHTS					
Shipping Weight, lbs. (AL Fin/CU Fin)	4584/5342	5809/6819	6071/6982	8714/9986	8611/9883
Operating Weight, lbs. (AL Fin/CU Fin)	4659/5417	5902/6912	6205/7116	8964/10236	8964/10236

NOTES:
(1) Low Ambient option utilizes two (2) variable speed fan motors in place of standard motors.
(2) *Extra Quiet* Models utilize 855 RPM fan motors rated at 1.0 HP and .88kW.
(3) Min. Starting/Operating Ambient assumes a 5 MPH max. wind and a 50% min. chiller load.
(4) Same as note (3) except the use of an Electronic Expansion Valve is required.
(5) Not available for compact models in this size. (Consult Factory)
(6) EXD16112J11DVRO used on compact unit; water volume = 43 gallons, min. flow = 175 GPM, max flow = 519 GPM

PHYSICAL SPECIFICATIONS: ENGLISH I.P. UNITS

ACDX-B 118, 128, 138, 148, 158

ACDX-B MODEL	118	128	138	148	158
COMPRESSORS					
Model (Qty.)	1113(2)	1111(1) 1113(1)	1117(2)	1111(3)	1111(2) 1113(1)
Oil Charge per Compressor (Gal)	5.8	5.8	5.8	5.8	5.8
Oil Type	Dunham-Bush Karlube #2				
Oil Lubrication	Differential Pressure				
% Capacity Reduction	10%	10%	10%	8%	8%
Crankcase Heater Watts/Compr.	400W	400W	400W	400W	400W
STANDARD EVAPORATOR	EXD16122J09	EXD16122J09	EXD16122J07	EXT18122J07	EXT18122J07
Water Volume, Gallons	46	46	46	60	60
Minimum Flow Rate, GPM	191	191	236	267	267
Maximum Flow Rate, GPM	536	536	677	1030	1030
Water Conn. Size In/Out (Type)	6" (VIC)	6" (VIC)	6" (VIC)	8" (VIC)	8" (VIC)
EVAPORATOR FOR 42°F LWT	EXD16122J09	EXD16122J09	EXD16122J07	EXT18122J07	EXT18122J07
Water Volume, Gallons	46	46	46	60	60
Minimum Flow Rate, GPM	191	191	236	267	267
Maximum Flow Rate, GPM	536	536	677	1030	1030
Water Conn. Size In/Out (Type)	6" (VIC)	6" (VIC)	6" (VIC)	8" (VIC)	8" (VIC)
EVAPORATOR FOR 40°F LWT	EXD16122J11	EXD18122J11	EXD18122J11	EXT20122J11	EXT20122J09
Water Volume, Gallons	46	60	60	68	68
Minimum Flow Rate, GPM	159	177	177	183	220
Maximum Flow Rate, GPM	443	604	604	604	738
Water Conn. Size In/Out (Type)	6" (VIC)	8" (VIC)	8" (VIC)	10" (VIC)	10" (VIC)
CONDENSER					
Compact Length Model - Fan Quantity(1)	8	8	10	12	12
Standard Length Model - Fan Quantity(1)	10	10	12	14	14
Extended Length Model - Fan Quantity(1)	12	12	14	18	18
Nominal RPM(2) 60 Hz	1140	1140	1140	1140	1140
Nominal Motor HP (each)(2)	1.5	1.5	1.5	1.5	1.5
Nominal Motor kW (each)(2)	1.45	1.45	1.45	1.45	1.45
GENERAL					
Minimum Starting/Operating Ambient °F(3)	20	20	20	20	20
w/Low Ambient Option, °F (VAR SPD)(3)	0	0	0	0	0
w/Extra Low Ambient Option, °F(4)	-20	-20	-20	-20	-20
Number of Circuits	2	2	2	3	3
Refrigerant Charge, lbs. R-22	302	317	342	385	411
COMPACT (C) UNIT WEIGHTS					
Shipping Weight, lbs. (AL Fin/CU Fin)	8045/9053	8045-9053	8759/10031	11016/12550	11016/12550
Operating Weight, lbs. (AL Fin/CU Fin)	8430/9438	8430/9438	9144/10416	11530/13064	11530/13064
STANDARD (S) UNIT WEIGHTS					
Shipping Weight, lbs. (AL Fin/CU Fin)	8759/10031	8759/10031	9313/10841	11690/13480	11690/13480
Operating Weight, lbs. (AL Fin/CU Fin)	9144/10416	9144/10416	9698/11226	12204/13994	12204/13394
EXTENDED (E) UNIT WEIGHTS					
Shipping Weight, lbs. (AL Fin/CU Fin)	9313/10841	9313/10841	10062/11829	12890/15192	12890/15192
Operating Weight, lbs. (AL Fin/CU Fin)	9698/11226	9698/11226	10447/12214	13404/15706	13404/15706

NOTES: (1) Low Ambient option utilizes two (2) variable speed fan motors in place of standard motors.
(2) *Extra Quiet* Models utilize 855 RPM fan motors rated at 1.0 HP and .88kW.
(3) Min. Starting/Operating Ambient assumes a 5 MPH max. wind and a 50% min. chiller load.
(4) Same as note (3) except the use of an Electronic Expansion Valve is required.

PHYSICAL SPECIFICATIONS: ENGLISH I.P. UNITS

ACDX-B 178, 188, 198, 208

ACDX-B MODEL	178	188	198	208
COMPRESSORS				
Model (Qty.)	1113(3)	1113(2) 1117(1)	1117(2) 1113(1)	1117(3)
Oil Charge per Compressor (Gal)	5.8	5.8	5.8	5.8
Oil Type	Dunham-Bush Karlube #2			
Oil Lubrication	Differential Pressure			
% Capacity Reduction	8%	8%	8%	8%
Crankcase Heater Watts/Compr.	400W	400W	400W	400W
STANDARD EVAPORATOR	EXT18122J07	EXT18122J07	EXT20122J07	EXT20122J07
Water Volume, Gallons	60	60	68	68
Minimum Flow Rate, GPM	267	267	298	298
Maximum Flow Rate, GPM	1030	1030	881	881
Water Conn. Size In/Out (Type)	8" (VIC)	8" (VIC)	10" (VIC)	10" (VIC)
EVAPORATOR FOR 42°F LWT	EXT18122J07	EXT18122J07	EXT20122J07	EXT20122J07
Water Volume, Gallons	60	60	68	68
Minimum Flow Rate, GPM	267	267	298	298
Maximum Flow Rate, GPM	1030	1030	881	881
Water Conn. Size In/Out (Type)	8" (VIC)	8" (VIC)	10" (VIC)	10" (VIC)
EVAPORATOR FOR 40°F LWT	EXT20122J09	EXT20122J09	EXT20122J07	EXT20122J07
Water Volume, Gallons	68	68	68	68
Minimum Flow Rate, GPM	220	220	298	298
Maximum Flow Rate, GPM	738	738	881	881
Water Conn. Size In/Out (Type)	10” (VIC)	10” (VIC)	10” (VIC)	10” (VIC)
CONDENSER				
Compact Length Model - Fan Quantity(1)	12	12	14	14
Standard Length Model - Fan Quantity(1)	14	14	16	16
Extended Length Model - Fan Quantity(1)	18	18	18	18
Nominal RPM(2) 60 Hz	1140	1140	1140	1140
Nominal Motor HP (each)(2)	1.5	1.5	1.5	1.5
Nominal Motor kW (each)(2)	1.45	1.45	1.45	1.45
GENERAL				
Minimum Starting/Operating Ambient °F(3)	20	20	20	20
w/Low Ambient Option, °F (VAR SPD)(3)	0	0	0	0
w/Extra Low Ambient Option, °F(4)	-20	-20	-20	-20
Number of Circuits	2	2	2	3
Refrigerant Charge, lbs. R-22	463	489	515	541
COMPACT (C) UNIT WEIGHTS				
Shipping Weight, lbs. (AL Fin/CU Fin)	11016/12550	11016/12550	11589/13379	11589/13378
Operating Weight, lbs. (AL Fin/CU Fin)	11530/13064	11530/13064	12204/13994	12204/13994
STANDARD (S) UNIT WEIGHTS				
Shipping Weight, lbs. (AL Fin/CU Fin)	11690/13480	11690/13480	12191/14237	12191/14237
Operating Weight, lbs. (AL Fin/CU Fin)	12204/13994	12204/13394	12806/14852	12806/14852
EXTENDED (E) UNIT WEIGHTS				
Shipping Weight, lbs. (AL Fin/CU Fin)	12890/15192	12890/15192	12789/15091	12789/15091
Operating Weight, lbs. (AL Fin/CU Fin)	13404/15706	13404/15706	13404/15706	13404/15706

NOTES: (1) Low Ambient option utilizes two (2) variable speed fan motors in place of standard motors.
(2) *Extra Quiet* Models utilize 855 RPM fan motors rated at 1.0 HP and .88kW.
(3) Min. Starting/Operating Ambient assumes a 5 MPH max. wind and a 50% min. chiller load.
(4) Same as note (3) except the use of an Electronic Expansion Valve is required.

EXAMPLE 2 (S.I. Units)
Select an air cooled packaged chiller for the following conditions:

230 kWo at 13°C entering 6.67°C leaving chilled water. Design ambient is 35°C. Minimum operating ambient is 10°C. Altitude is 600 meters. Cooler fouling factor 0.0176. Electrical characteristics 575v/3ph/60Hz with a single connection required. Brine loop to be 40% Ethylene Glycol by weight.

Step 1 - Unit Selection
For 600 meter elevation divide the required tonnage by the altitude correction factor from Table 23A.

$$\frac{230}{.99} = 232.3 \text{ kWo}$$

To correct for evaporator fouling, consult Table 23b. In this example the fouling factor is 0.0176 which has a capacity and kW correction factor of 1.00, so no correction is necessary.

To correct for 40% E.G., consult Table 17A for a capacity correction factor "C1", and make the following adjustment.

$$\frac{232.3}{.973} = 238.8 \text{ kWo}$$

The input power kWi is adjusted by K1, the kW factor.

Entering the Table 24A on page 24, we see that an ACDX-B 68 Standard Length unit for water at sea level has a capacity of 240.9 kWo drawing 77.3 compressor kWi. The input power kWi will be adjusted by the kW correction factor from Table 23A and by K1, as metnioned above. The unit will do:

Capacity = 240.9 x .99 x .973 = 232.05 kWo
Compressor kW = 77.3 x 1.01 x .991 = 77.37 kWi

Step 2 - Evaporator L/S and Pressure Drop

$$L/S = \frac{\text{Original kWo}}{4.187 \times \text{Range}} = \frac{230}{4.187 \times 6} = 9.16$$

Correcting for glycol from Table 17A using G1 flow rate adjustment.

L/S = 9.16 x 1.116 = 10.2 (E.G.) L/S

Referring to page 25 for the physical specifications, we note that the ACDX-B 68 Standard Length unit utilizes the evaporator model CHS013601B for the above conditions of service. Consulting the pressure drop curves, Figure 16 on page 16, we note a pressure drop (using curve 3) of 26.2 kPa. Correcting for glycol from Table 17A using P2 pressure drop factor.

P.D.(E.G.) = 26.2 x 1.331 = 34.9 kPa

Step 3 - Chilled Water Pump Selection

To the pressure drop calculated in Step 2, add the pressure drop through the chilled water loop piping, valves and equipment. This will be the foundation of your pump selection criteria.

Step 4 - Head Pressure Control

Refer to Physical Data for ACDX-B 68. Since standard fan cycling is applicable to -7°C and requirement is for 10°C, no additional control is required.

Step 5 - Electrical Wire and Disconnect Sizing

Using the Electrical Data found on page 39 for an ACDX-B 68 Standard Length unit operating on 575/3/60 service with single power connection, we find:

Unit Minimum Circuit Ampacity: 130
Unit Maximum Fuse Size: 200

Table 23A

Elevation above Sea Level		Capacity Correction Factor	kW Correction Factor
Feet	Meters		
0	0	1.00	1.00
2000	600	.99	1.01
4000	1200	.98	1.02
6000	1800	.97	1.03

Table 23B

Fouling Factor		Capacity Correction Factor	kW Correction Factor
(hr-ft. - °F/BTU)	(m^2 °c kW^{-1})		
.00010	.0176	1.000	1.000
.00025	.044	.993	.998
.00050	.088	.981	.994
.00100	.176	.958	.986

PERFORMANCE DATA: S.I. UNITS 60 HZ

Performance ratings shown below are based on ARI Standard 550/590-98 with water entering at 12.2°C and leaving at 6.7°C with .176 fouling factor while operating at 35°C ambient

Other operating performance information is available from your sales representative and the Dunham-Bush Electronic Catalog.

Table 24A

ACDX-B Model	Compact Length			Standard Length			Extended Length		
	kWo	kWi	COP	kWo	kWi	COP	kWo	kWi	COP
48	NA	NA	NA	163.9	53.3	2.8	165.7	50.6	2.8
58	194.5	69.5	2.6	201.9	63.2	2.8	205.4	60.2	2.8
68	228.3	85.8	2.5	240.9	77.3	2.8	243.7	73.2	2.8
98	313.4	112.2	2.6	321.8	106.0	2.7	324.3	102.7	2.7
108	343.6	133.3	2.4	366.5	123.7	2.7	372.8	118.1	2.8
118	397.8	140.1	2.6	407.3	132.3	2.8	413.2	127.3	2.8
128	426.3	155.7	2.5	440.7	146.7	2.7	446.3	140.9	2.8
138	471.6	160.8	2.7	476.9	154.1	2.8	480.1	149.5	2.8
148	489.6	159.6	2.7	492.4	156.3	2.8	495.5	151.7	2.8
158	521.2	175.9	2.7	523.7	172.6	2.7	532.5	164.3	2.8
178	584.2	208.5	2.6	593.0	200.8	2.7	606.0	189.6	2.8
188	612.0	223.7	2.5	624.6	214.9	2.6	637.3	202.8	2.8
198	681.6	232.3	2.7	689.7	225.9	2.8	695.0	219.1	2.8
208	710.8	248.1	2.6	724.2	239.6	2.7	729.4	232.8	2.8

EXTRA QUIET UNITS

Table 24B

ACDX-B Model	Standard Length Extra Quiet			Extended Length Extra Quiet		
	kWo	kWi	COP	kWo	kWi	COP
48	161.8	55.5	2.8	164.9	51.8	3.0
58	198.4	66.1	2.8	202.9	62.3	3.0
68	237.7	81.3	2.8	241.6	76.1	3.0
98	317.6	110.3	2.8	321.8	105.8	2.9
108	352.8	130.7	2.6	366.8	123.4	2.8
118	398.5	139.7	2.7	405.9	133.3	2.9
128	427.0	155.2	2.6	439.6	147.8	2.8
138	470.6	162.1	2.8	475.5	156.1	2.9
148	487.8	161.7	2.9	493.1	155.3	3.0
158	511.0	180.4	2.7	527.2	169.6	2.9
178	574.0	212.7	2.6	595.8	198.4	2.8
188	602.1	227.9	2.5	627.4	212.6	2.8
198	666.1	238.6	2.7	685.1	230.2	2.8
208	700.9	253.4	2.7	719.9	244.9	2.8

NOTES: (1) Ratings based on ARI Standard 550/590-98, 6.67°C evaporator leaving water, 5.6°C water range, 35°C ambient and .018 evaporator fouling factor.
(2) KW is for compressor only. COP is for entire unit. See physical specs for fan kW.
(3) For other conditions of service, contact the local representative.

PHYSICAL SPECIFICATIONS: S.I. UNITS

ACDX-B 48, 58, 68, 98, 108

ACDX-B MODEL	48	58	68	98	108
COMPRESSORS					
Model (Qty.)	1111(1)	1113(1)	1117(1)	1111(2)	1111(1) 1113(1)
Oil Charge per Compressor (Liters)	5.8	5.8	5.8	5.8	5.8
Oil Type	Dunham-Bush Karlube #2				
Oil Lubrication	Differential Pressure				
% Capacity Reduction	20%	20%	20%	10%	10%
Crankcase Heater Watts/Compr.	400W	400W	400W	400W	400W
STANDARD EVAPORATOR	CHSO11601B	CHSO11601B	CHSO13601B	EXD14102J09	EXD16122J11(6)
Water Volume, Liters	41.6	41.6	64.3	113.6	174.1
Minimum Flow Rate, Liters/Sec.	5.43	5.43	6.47	8.83	10.03
Maximum Flow Rate, Liters/Sec.	19.18	19.18	25.68	27.00	27.95
Water Conn. Size In/Out mm (Type)	101.6 (NPT)	101.6 (NPT)	101.6 (NPT)	127.0 (VIC)	152.4 (VIC)
EVAPORATOR FOR 5.6°C LWT	CHSO11601B	CHSO13601B	CHSO13601B	EXD14102J09	EXD16122J11
Water Volume, Liters	41.6	64.3	64.3	113.6	174.11
Minimum Flow Rate, Liters/Sec.	5.43	6.37	6.37	8.83	10.03
Maximum Flow Rate, Liters/Sec.	19.18	25.68	25.68	27.00	27.95
Water Conn. Size In/Out (Type)	101.6 (NPT)	101.6 (NPT)	101.6 (NPT)	127.0 (VIC)	152.4 (VIC)
EVAPORATOR FOR 4.4°C LWT	CHSO13601A	CHSO13601B	CHSO13601B	EXD16122J11(5)	EXD16122J11(5)
Water Volume, Liters	64.3	64.3	64.3	174.1	174.1
Minimum Flow Rate, Liters/Sec.	5.12	6.37	6.37	10.03	10.03
Maximum Flow Rate, Liters/Sec.	13.90	25.68	25.68	27.95	27.95
Water Conn. Size In/Out mm (Type)	101.6 (NPT)	101.6 (VIC)	101.6 (VIC)	152.4 (VIC)	152.4 (VIC)
CONDENSER					
Compact Length Model - Fan Quantity(1)	N/A	4	4	6	6
Standard Length Model - Fan Quantity(1)	4	6	6	8	8
Extended Length Model - Fan Quantity(1)	6	8	8	10	10
Nominal RPM(2) 60 Hz	1140	1140	1140	1140	1140
Nominal Motor kWi (each)(2)	1.45	1.45	1.45	1.45	1.45
GENERAL					
Minimum Starting/Operating Ambient °C(3)	-6.7	-6.7	-6.7	-6.7	-6.7
w/Low Ambient Option, °C (VAR SPD)(3)	-17.8	-17.8	-17.8	-17.8	-17.8
w/Extra Low Ambient Option, °C(4)	-28.9	-28.9	-28.9	-28.9	-28.9
Number of Circuits	1	1	1	2	2
Refrigerant Charge, lbs. R-22	54	69	78	110	123
COMPACT (C) UNIT WEIGHTS					
Shipping Weight, kg (AL Fin/CU Fin)	N/A	1780/2008	1855/2082	2930/3276	3165/3511
Operating Weight, kg (AL Fin/CU Fin)	N/A	1823/2051	1915/2143	3044/3390	3325/3671
STANDARD (S) UNIT WEIGHTS					
Shipping Weight, kg (AL Fin/CU Fin)	1743/1971	2150/2494	2238/2640	3360/3818	3594/3771
Operating Weight, kg (AL Fin/CU Fin)	1777/2005	2192/2536	2299/2701	3473/3932	3755/3932
EXTENDED (E) UNIT WEIGHTS					
Shipping Weight, kg (AL Fin/CU Fin)	2081/2425	2637/3096	2756/3170	3956/4534	3909/4487
Operating Weight, kg (AL Fin/CU Fin)	2115/2459	2680/3138	2817/3231	4070/4647	4070/4647

NOTES:
(1) Low Ambient option utilizes two (2) variable speed fan motors in place of standard motors.
(2) *Extra Quiet* Models utilize 855 RPM fan motors rated at .746 kWo and .88kWi.
(3) Min. Starting/Operating Ambient assumes a 5 MPH max. wind and a 50% min. chiller load.
(4) Same as note (3) except the use of an Electronic Expansion Valve is required.
(5) Not available for compact models in this size. (Consult Factory)
(6) EXD16112J11DVRO used on compact unit; water volume = 162.8 Liters, min. flow = 11.0 Liters/Sec., max flow = 32.7 Liters/Sec.

PHYSICAL SPECIFICATIONS: S.I. UNITS

ACDX-B 118, 128, 138, 148, 158

ACDX-B MODEL	118	128	138	148	158
COMPRESSORS					
Model (Qty.)	1113(2)	1113(1) 1117(1)	1117(2)	1111(3)	1111(2) 1113(1)
Oil Charge per Compressor (Liters)	22	22	22	22	22
Oil Type	Dunham-Bush Karlube #2				
Oil Lubrication	Differential Pressure				
% Capacity Reduction	10%	10%	10%	8%	8%
Crankcase Heater Watts/Compr.	400W	400W	400W	400W	400W
STANDARD EVAPORATOR	EXD16122J09	EXD16122J09	EXD16122J07	EXT18122J07	EXT18122J07
Water Volume, Liters	174.1	174.1	174.1	227.1	227.1
Minimum Flow Rate, Liters/Sec.	12.05	12.05	14.89	16.85	16.85
Maximum Flow Rate, Liters/Sec.	33.82	33.82	42.71	64.98	64.98
Water Conn. Size In/Out mm (Type)	152.4 (VIC)	152.4 (VIC)	152.4 (VIC)	203.2 (NPT)	203.2 (NPT)
EVAPORATOR FOR 5.6°C LWT	EXD16122J09	EXD16122J09	EXD16122J07	EXT18122J07	EXT18122J07
Water Volume, Liters	174.11	174.1	174.1	227.1	227.1
Minimum Flow Rate, Liters/Sec.	12.05	12.05	14.89	16.85	16.85
Maximum Flow Rate, Liters/Sec.	33.82	33.82	42.71	64.98	64.98
Water Conn. Size In/Out (Type)	152.4 (VIC)	203.2 (VIC)	203.2 (VIC)	203.2 (NPT)	203.2 (NPT)
EVAPORATOR FOR 4.4°C LWT	EXD16122J11	EXD18122J11	EXD18122J11	EXT20122J11	EXT20122J09
Water Volume, Liters	174.1	227.1	227.1	257.4	257.4
Minimum Flow Rate, Liters/Sec.	10.03	11.17	11.17	11.55	13.88
Maximum Flow Rate, Liters/Sec.	27.95	38.11	38.11	37.85	46.56
Water Conn. Size In/Out mm (Type)	152.4 (VIC)	203.2 (VIC)	203.2 (VIC)	254 (VIC)	254 (VIC)
CONDENSER					
Compact Length Model - Fan Quantity(1)	8	8	10	12	12
Standard Length Model - Fan Quantity(1)	10	10	12	14	14
Extended Length Model - Fan Quantity(1)	12	12	14	18	18
Nominal RPM(2) 60 Hz	1140	1140	1140	1140	1140
Nominal Motor kWi (each)(2)	1.45	1.45	1.45	1.45	1.45
GENERAL					
Minimum Starting/Operating Ambient °C(3)	-6.7	-6.7	-6.7	-6.7	-6.7
w/Low Ambient Option, °C (VAR SPD)(3)	-17.8	-17.8	-17.8	-17.8	-17.8
w/Extra Low Ambient Option, °C(4)	-28.9	-28.9	-28.9	-28.9	-28.9
Number of Circuits	2	2	2	3	3
Refrigerant Charge, lbs. R-22	137	144	155	175	187
COMPACT (C) UNIT WEIGHTS					
Shipping Weight, kg (AL Fin/CU Fin)	3652/4110	3652/4110	3977/4554	4497/5693	4497/5693
Operating Weight, kg (AL Fin/CU Fin)	3827/4285	3827/4285	4152/4728	5230/5926	5230/5926
STANDARD (S) UNIT WEIGHTS					
Shipping Weight, kg (AL Fin/CU Fin)	3977/4554	3977/4554	4228/4922	5303/6115	5303/6115
Operating Weight, kg (AL Fin/CU Fin)	4153/4728	4153/4728	4403/5097	5537/6348	5537/6348
EXTENDED (E) UNIT WEIGHTS					
Shipping Weight, kg (AL Fin/CU Fin)	4228/4922	4228/4922	4568/5370	5847/6891	5847/6891
Operating Weight, kg (AL Fin/CU Fin)	4403/5097	4403/5097	4743/5545	6080/7124	6080/7124

NOTES:
(1) Low Ambient option utilizes two (2) variable speed fan motors in place of standard motors.
(2) *Extra Quiet* Models utilize 855 RPM fan motors rated at .746 kWo and .88kWi.
(3) Min. Starting/Operating Ambient assumes a 5 MPH max. wind and a 50% min. chiller load.
(4) Same as note (3) except the use of an Electronic Expansion Valve is required.

PHYSICAL SPECIFICATIONS: S.I. UNITS

ACDX-B 178, 188, 198, 208

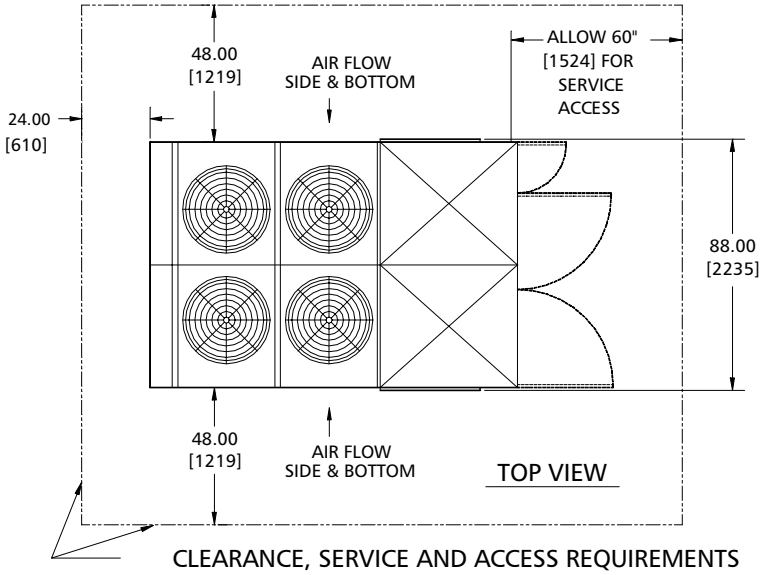
ACDX-B MODEL	178	188	198	208
COMPRESSORS				
Model (Qty.)	1113(3)	1113(2) 1117(1)	1117(2) 1113(1)	1117(3)
Oil Charge per Compressor (Litersl)	22	22	22	22
Oil Type	Dunham-Bush Karlube #2			
Oil Lubrication	Differential Pressure			
% Capacity Reduction	8%	8%	8%	8%
Crankcase Heater Watts/Compr.	400W	400W	400W	400W
STANDARD EVAPORATOR	EXT18122J07	EXT18122J07	EXT20122J07	EXT20122J07
Water Volume, Liters	227.1	227.1	257.4	257.4
Minimum Flow Rate, Liters/Sec.	16.85	16.85	18.80	18.80
Maximum Flow Rate, Liters/Sec.	64.98	64.98	55.58	55.58
Water Conn. Size In/Out mm (Type)	203.2 (NPT)	203.2 (VIC)	254 (VIC)	254 (VIC)
EVAPORATOR FOR 5.6°C LWT	EXT18122J07	EXT18122J07	EXT20122J07	EXT20122J07
Water Volume, Liters	227.1	227.1	257.4	257.4
Minimum Flow Rate, Liters/Sec.	16.85	16.85	18.80	18.80
Maximum Flow Rate, Liters/Sec.	64.98	64.98	55.58	55.58
Water Conn. Size In/Out mm (Type)	203.2 (NPT)	203.2 (VIC)	254 (VIC)	254 (VIC)
EVAPORATOR FOR 4.4°C LWT	EXT20122J09	EXT20122J09	EXT20122J07	EXT20122J07
Water Volume, Liters	257.4	257.4	257.4	257.4
Minimum Flow Rate, Liters/Sec.	13.88	13.88	18.80	18.80
Maximum Flow Rate, Liters/Sec.	46.56	46.56	55.58	55.58
Water Conn. Size In/Out (mm Type)	254 (VIC)	254 (VIC)	254 (VIC)	254 (VIC)
CONDENSER				
Compact Length Model - Fan Quantity(1)	12	12	14	14
Standard Length Model - Fan Quantity(1)	14	14	16	16
Extended Length Model - Fan Quantity(1)	18	18	18	18
Nominal RPM(2) 60 Hz	1140	1140	1140	1140
Nominal Motor kWi (each)(2)	1.45	1.45	1.45	1.45
GENERAL				
Minimum Starting/Operating Ambient °C(3)	-6.7	-6.7	-6.7	-6.7
w/Low Ambient Option, °C (VAR SPD)(3)	-17.8	-17.8	-17.8	-17.8
w/Extra Low Ambient Option, °C(4)	-28.9	-28.9	-28.9	-28.9
Number of Circuits	3	3	3	3
Refrigerant Charge, kg R-22	210	222	234	246
COMPACT (C) UNIT WEIGHTS				
Shipping Weight, kg (AL Fin/CU Fin)	4997/5693	4997/5693	5257/6069	5257/6069
Operating Weight, kg (AL Fin/CU Fin)	5230/5926	5230/5926	5536/6348	5536/6348
STANDARD (S) UNIT WEIGHTS				
Shipping Weight, kg. (AL Fin/CU Fin)	5303/6115	5303/6115	5530/6458	5530/6458
Operating Weight, kg (AL Fin/CU Fin)	5537/6348	5537/6348	5809/6737	5809/6737
EXTENDED (E) UNIT WEIGHTS				
Shipping Weight, kg (AL Fin/CU Fin)	5847/6891	5847/6891	5801/6846	5801/6846
Operating Weight, kg (AL Fin/CU Fin)	6080/7124	6080/7124	6080/7125	6080/7125

NOTES:
(1) Low Ambient option utilizes two (2) variable speed fan motors in place of standard motors.
(2) *Extra Quiet* Models utilize 855 RPM fan motors rated at .746 kWo and .88kWi.
(3) Min. Starting/Operating Ambient assumes a 5 MPH max. wind and a 50% min. chiller load.
(4) Same as note (3) except the use of an Electronic Expansion Valve is required.

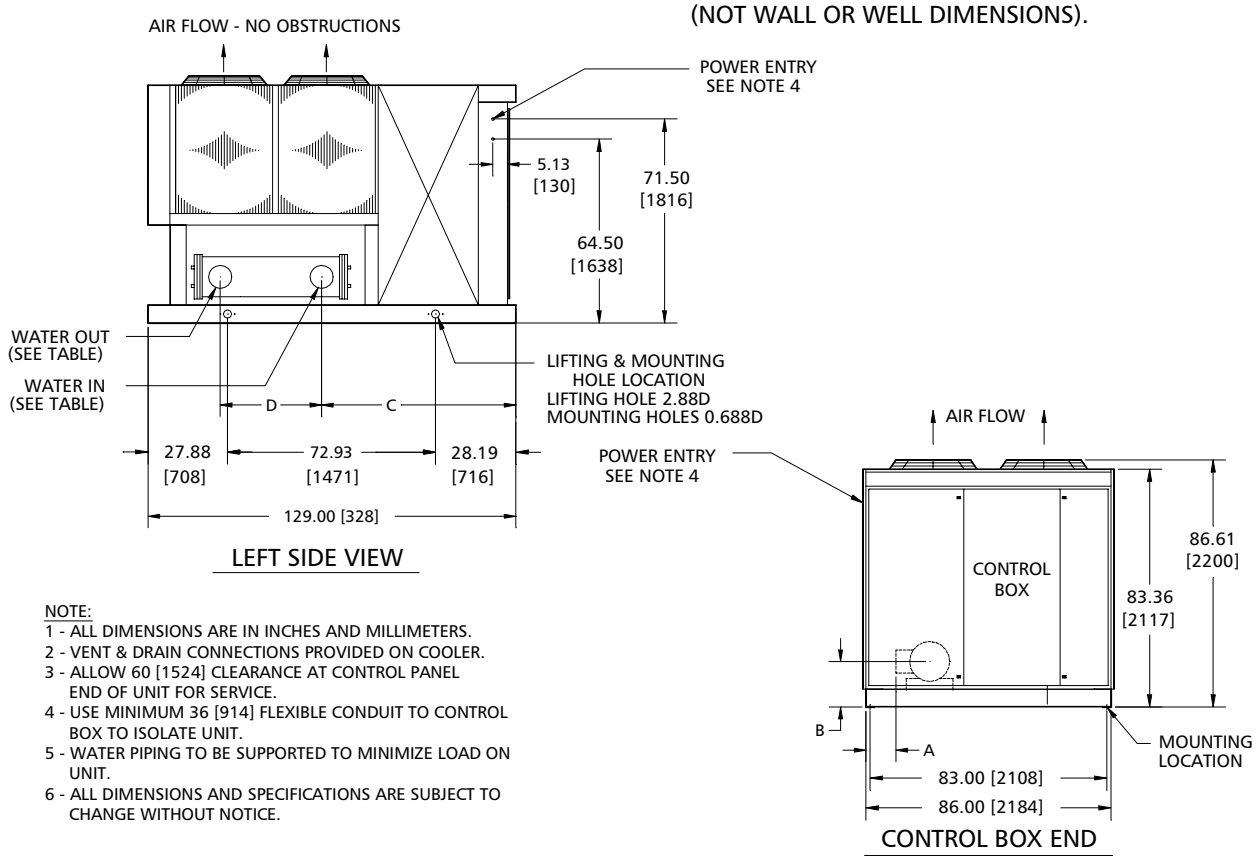
DIMENSIONAL DATA

✓	4-FAN UNIT
	ACDX1B-048S
	ACDX1B-058C
	ACDX1B-068C

✓	CHILLER	CONN	A	B	C	D
	CHSO1160	4" NPT	10.29 [261]	14.80 [376]	57.00 [1448]	53.50 [1359]
	CHSO1360	4" NPT	9.07 [230]	15.93 [404]	57.00 [1448]	53.50 [1359]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS
(NOT WALL OR WELL DIMENSIONS).



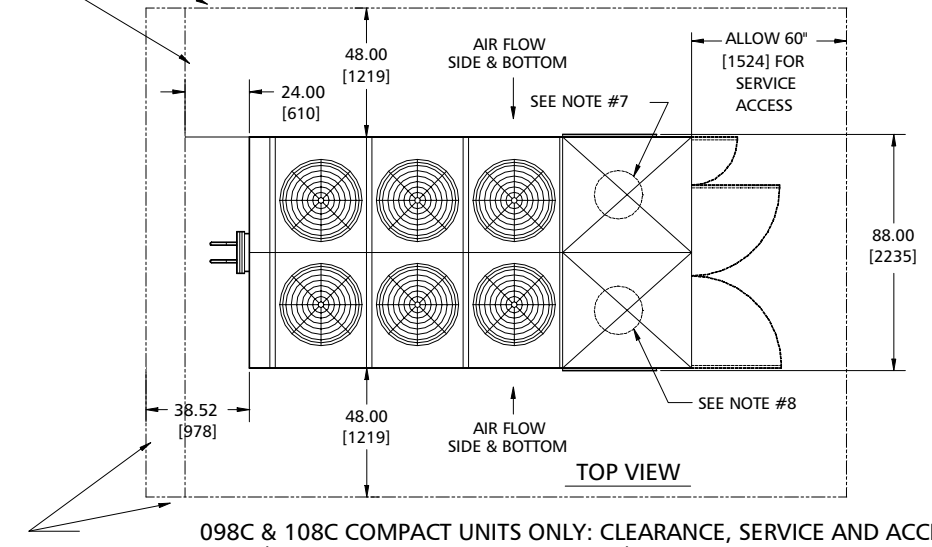
NOTE:
1 - ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS.
2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

DIMENSIONAL DATA

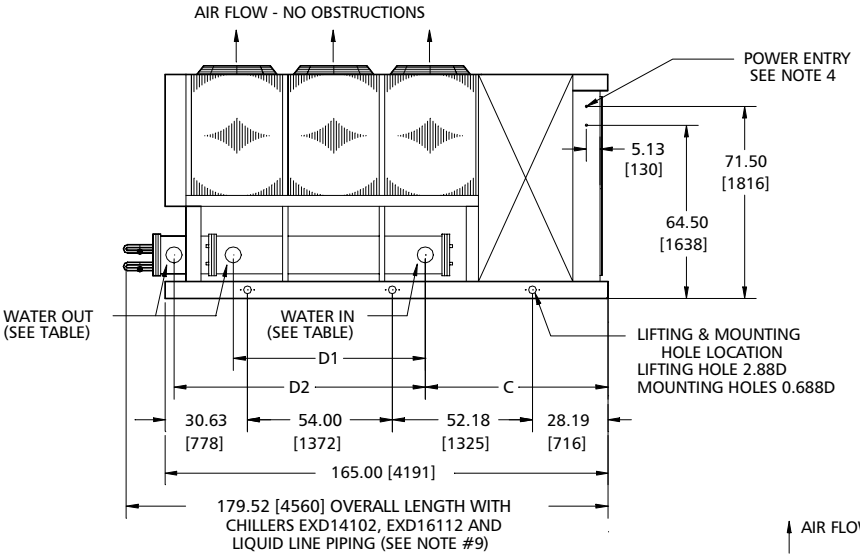
✓	6-FAN UNIT
	ACDX1B-048E
	ACDX1B-058S
	ACDX1B-068S
	ACDX1B-098C
	ACDX1B-108C

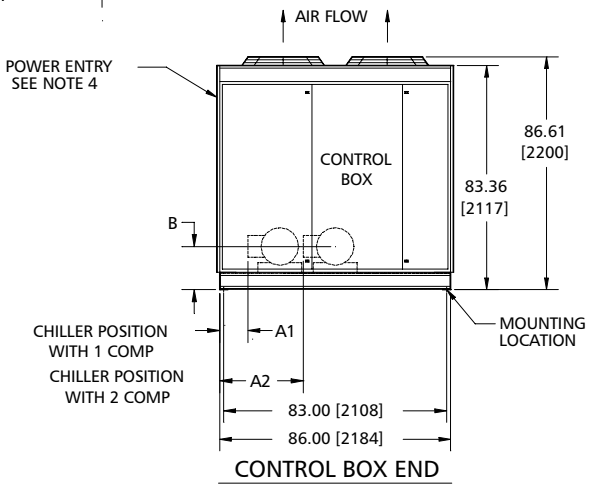
✓	CHILLER	CONN	A1 (1 COMP)	A2 (2 COMP)	B	C	D1	D2
	CHSO1160	4" NPT	10.29 [261]	N/A	14.80 [376]	80.51 [2045]	53.50 [1359]	N/A
	EXS12084	4" VIC	10.00 [254]	N/A	15.55 [395]	69.12 [1756]	73.63 [1870]	N/A
	CHSO1360	4" NPT	9.07 [230]	N/A	15.93 [404]	80.51 [2045]	53.50 [1359]	N/A
	EXD14102	5" VIC	N/A	28.87 [733]	16.17 [411]	71.95 [1826]	N/A	90.63 [2302]
	EXD16112	6" VIC	N/A	30.00 [762]	17.17 [436]	62.00 [1575]	N/A	99.75 [2534]

CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS) FOR CHILLERS CHSO1160, CHSO1360 & EXS12084.



098C & 108C COMPACT UNITS ONLY: CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS) FOR CHILLERS EXD14102 & EXD16112.



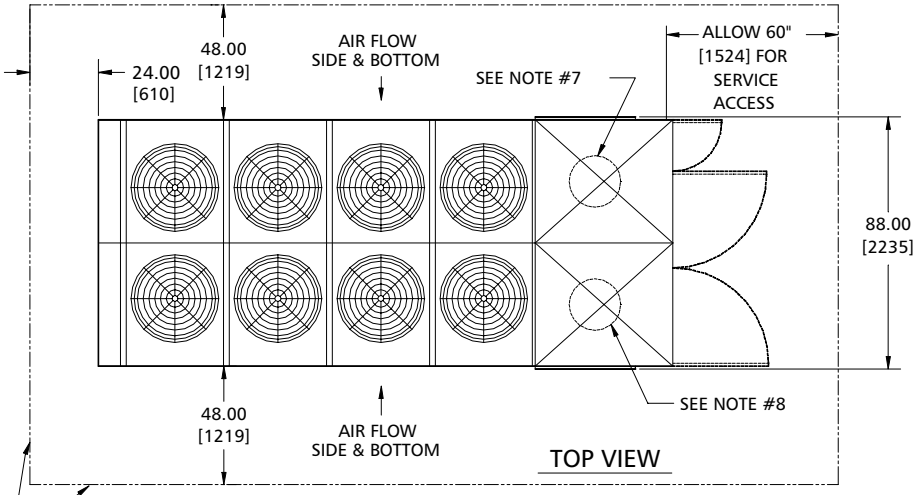


NOTE:
1 - ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS.
2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.
7 - COMP #2 ON TWO COMP UNIT. COMP #1 ON SINGLE COMP UNIT.
8 - COMP #1 ON TWO COMP UNIT.
9 - CHILLERS USED IN THE 098C AND 108C COMPACT UNITS (EXD14102 & EXD16112) WILL EXTEND OUTSIDE THE UNIT. THESE CHILLERS WILL EXTEND PAST THE BACK RAIL 4.52" [115], WITH AN ADDITIONAL 10" [254] OF COPPER PIPING NEEDED FOR THE LIQUID LINES. **WATER OUTLET WILL BE OUTSIDE REAR LEG. OPTIONAL** LOUVER GRILLE AND ALUMINUM GRILLE ARE NOT AVAILABLE ON THESE UNITS.

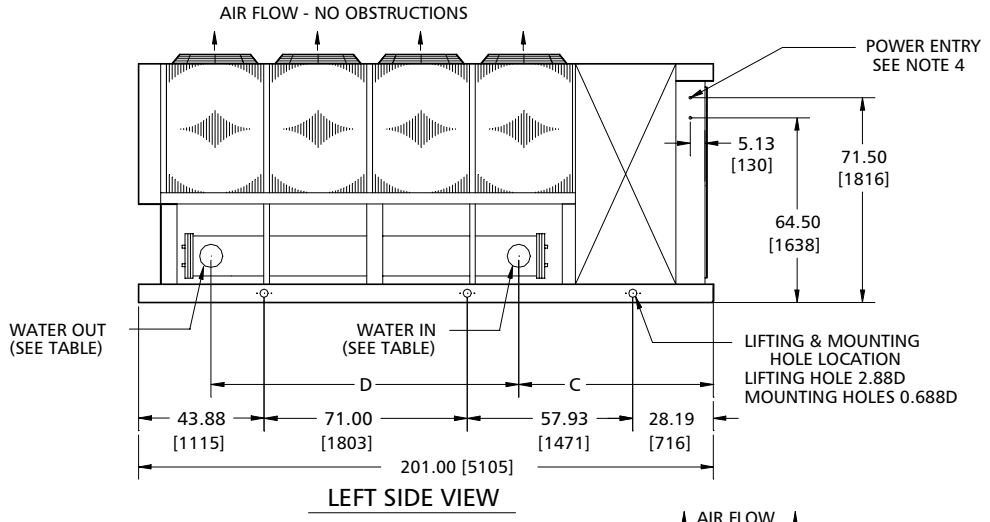
DIMENSIONAL DATA

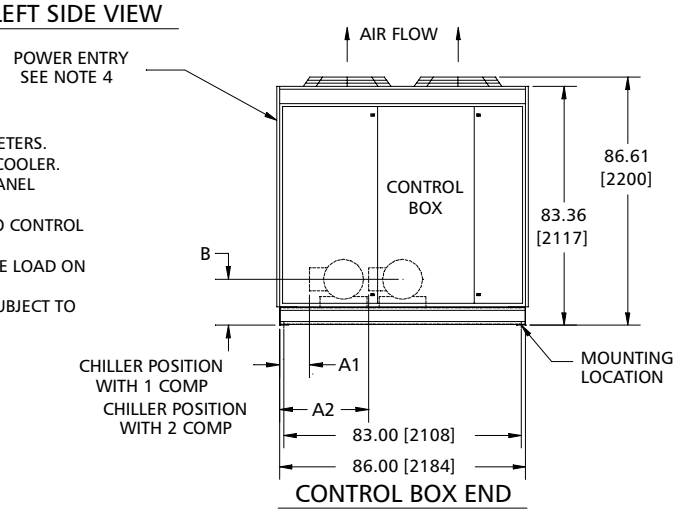
✓	8-FAN UNIT
	ACDX1B-058E
	ACDX1B-068E
	ACDX1B-098S
	ACDX1B-108S
	ACDX1B-118C
	ACDX1B-128C

✓	CHILLER	CONN	A1 (1 COMP)	A2 (2 COMP)	B	C	D
	CHSO1160	4" NPT	10.29 [261]	N/A	14.80 [376]	71.51 [1816]	53.50 [1359]
	EXS12084	4" VIC	10.00 [254]	N/A	15.55 [395]	76.94 [1954]	73.63 [1870]
	CHSO1360	4" NPT	9.07 [230]	N/A	15.93 [404]	71.51 [1816]	53.50 [1359]
	EXD14102	5" VIC	N/A	28.87 [733]	16.17 [411]	68.45 [1739]	90.63 [2302]
	EXD16112	6" VIC	N/A	30.00 [762]	17.17 [436]	76.38 [1940]	99.75 [2534]
	EXD16122	6" VIC	N/A	30.00 [762]	17.17 [436]	71.39 [1813]	109.75 [2788]
	EXD18122	8" VIC	N/A	28.00 [711]	18.17 [462]	73.45 [1866]	105.50 [2680]
	EXD20122	10" VIC	N/A	27.12 [689]	19.17 [487]	74.82 [1900]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).



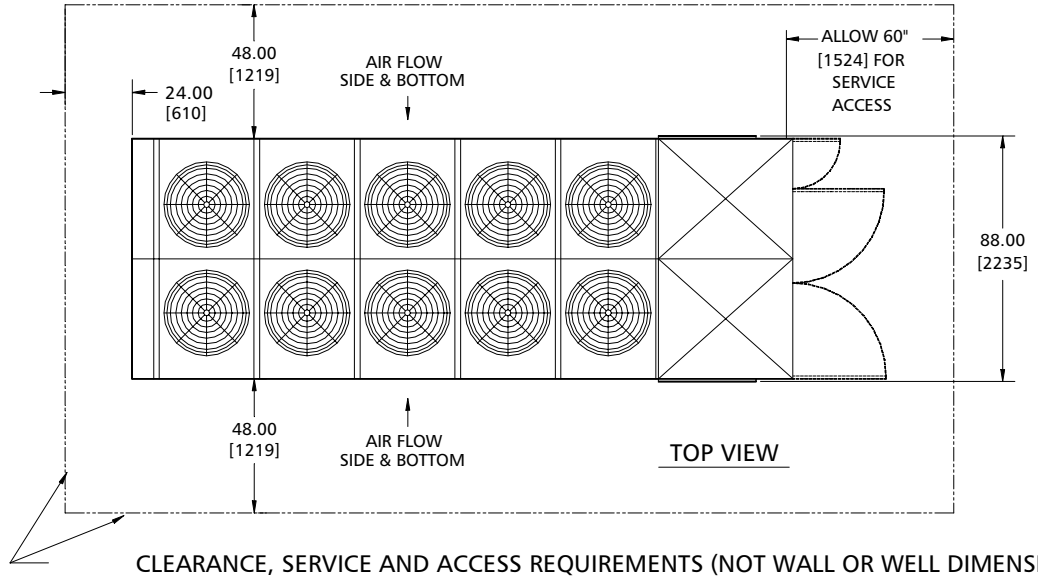


NOTE:
1 - ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS.
2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.
7 - COMP #2 ON TWO COMP UNIT.
COMP #1 ON SINGLE COMP UNIT.
8 - COMP #1 ON TWO COMP UNIT.

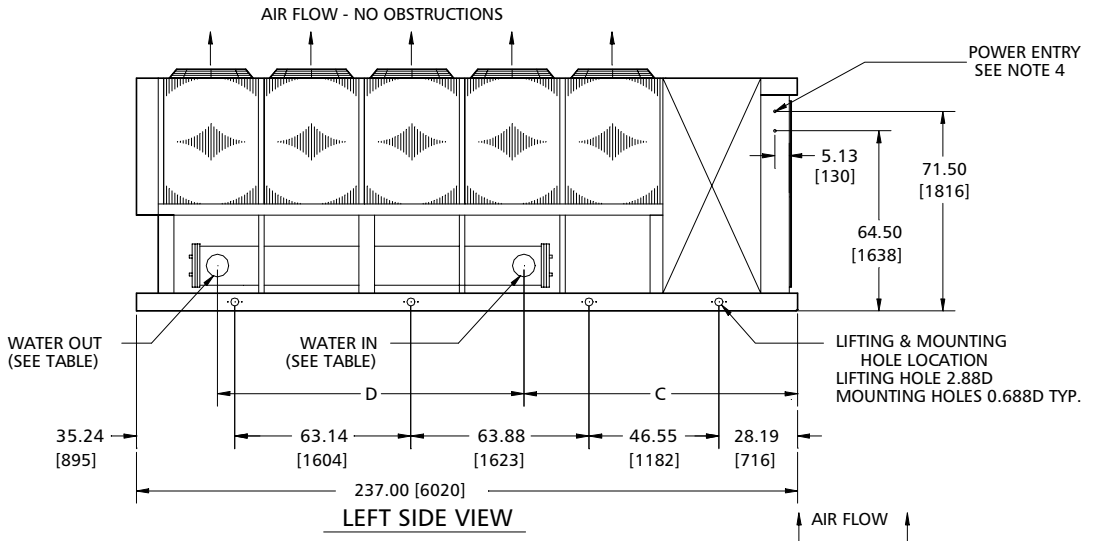
DIMENSIONAL DATA

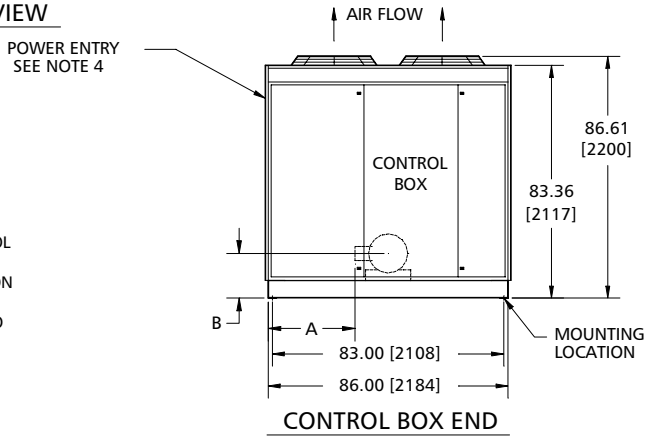
✓	10-FAN UNIT
	ACDX1B-098E
	ACDX1B-108E
	ACDX1B-118S
	ACDX1B-128S
	ACDX1B-138C

✓	CHILLER	CONN	A	B	C	D
	EXD14102	5" VIC	28.87 [733]	16.17 [411]	94.81 [2408]	90.63 [2302]
	EXD16112	6" VIC	30.00 [762]	17.17 [436]	93.74 [2381]	99.75 [2534]
	EXD16122	6" VIC	30.00 [762]	17.17 [436]	88.75 [2254]	109.75 [2788]
	EXD18122	8" VIC	28.00 [711]	18.17 [462]	90.81 [2307]	105.50 [2680]
	EXD20122	10" VIC	27.12 [689]	19.17 [487]	92.18 [2341]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).





NOTE:
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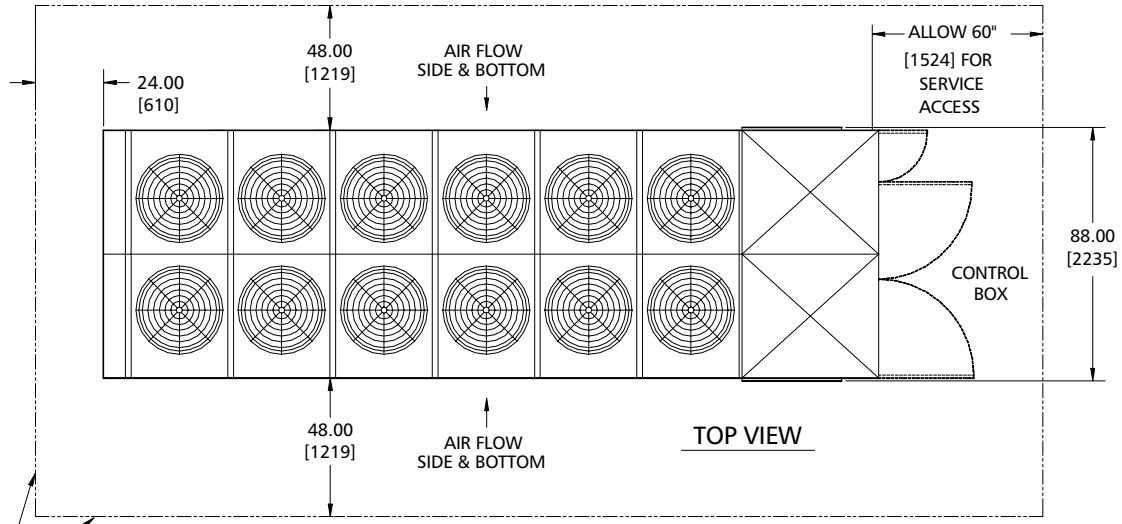
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

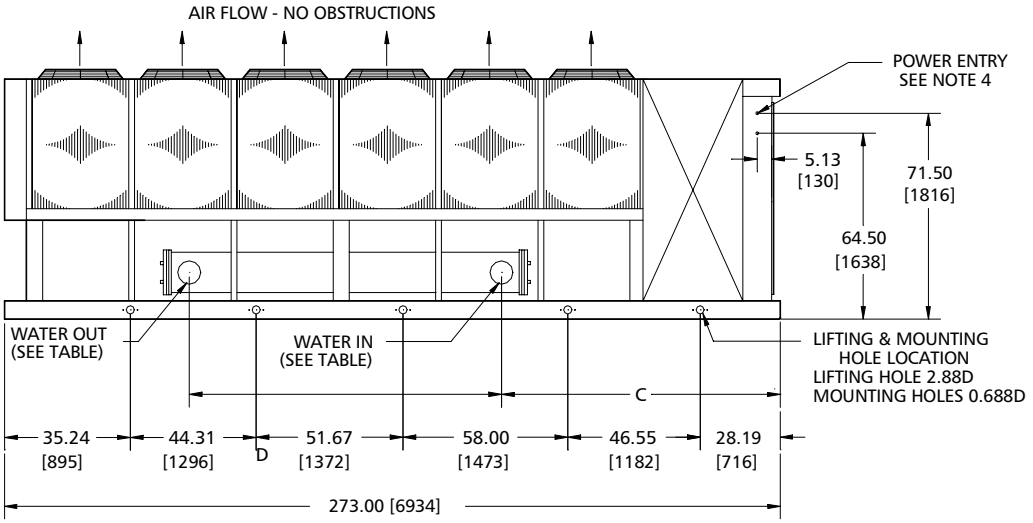
DIMENSIONAL DATA

✓	12-FAN UNIT
	ACDX1B-118E
	ACDX1B-128E
	ACDX1B-138S

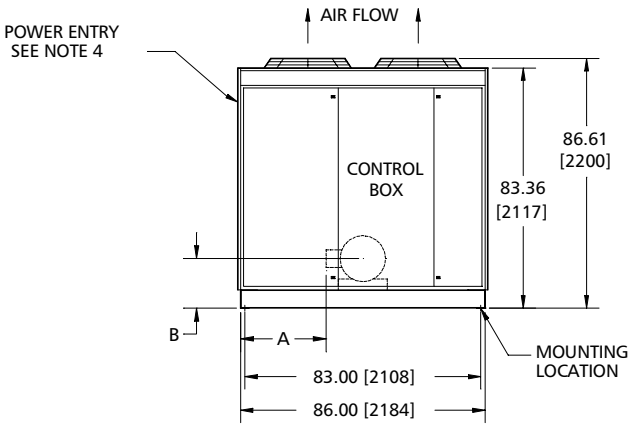
✓	CHILLER	CONN	A	B	C	D
	EXD16122	6" VIC	30.00 [762]	17.17 [436]	102.38 [2600]	109.75 [2788]
	EXD18122	8" VIC	28.00 [711]	18.17 [462]	104.00 [2642]	105.50 [2680]
	EXD20122	10" VIC	27.12 [689]	19.17 [487]	105.81 [2688]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).



LEFT SIDE VIEW



CONTROL BOX END

NOTE:
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3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
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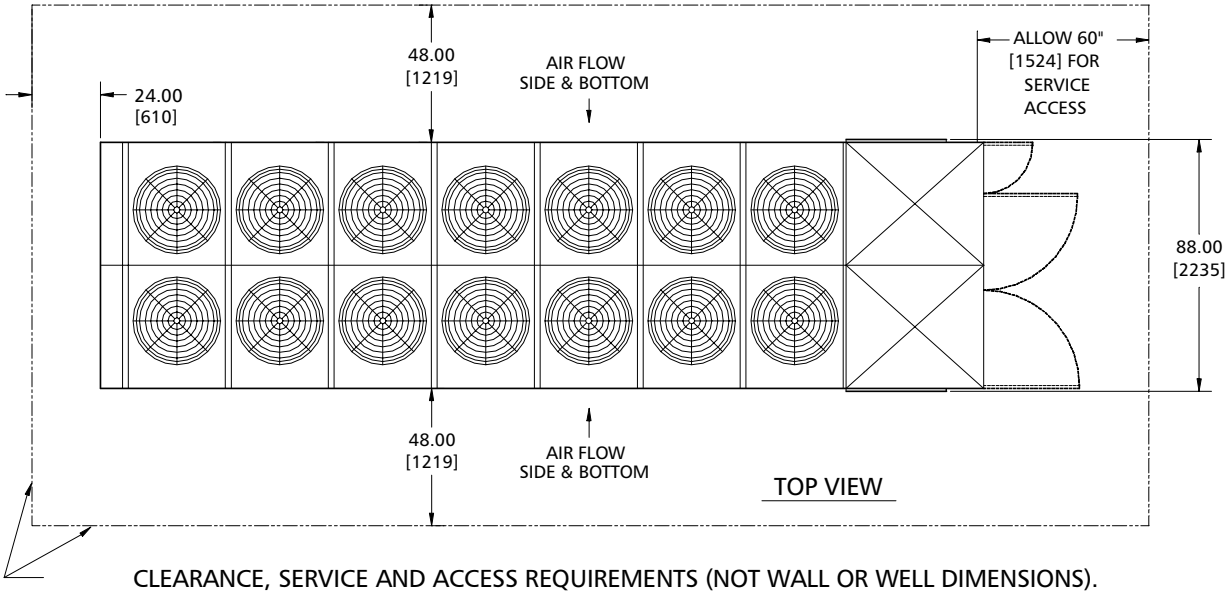
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

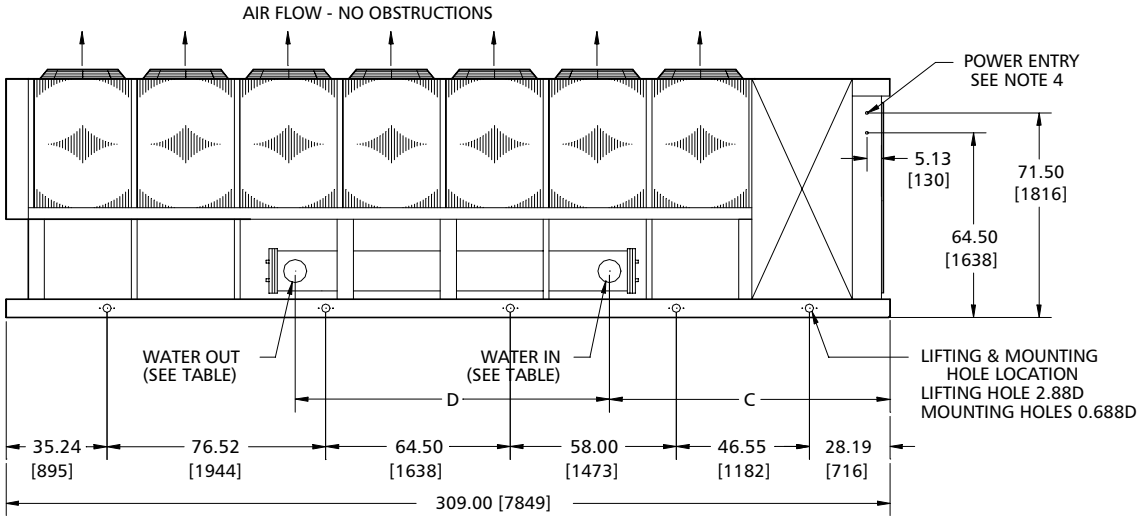
DIMENSIONAL DATA

✓	14-FAN UNIT
	ACDX1B-138E

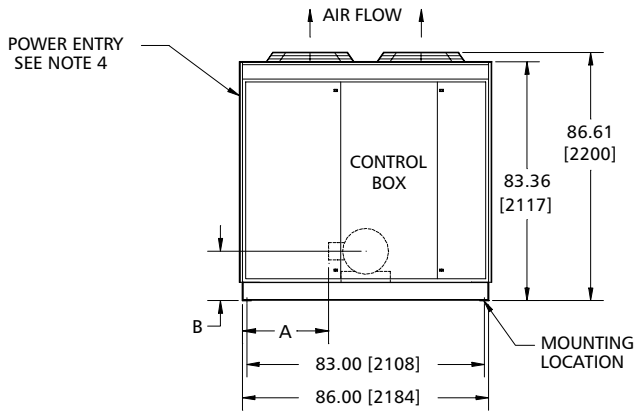
✓	CHILLER	CONN	A	B	C	D
	EXD16122	6" VIC	30.00 [762]	17.17 [436]	101.89 [2588]	109.75 [2788]
	EXD18122	8" VIC	28.00 [711]	18.17 [462]	104.00 [2642]	105.5 [2680]
	EXD20122	10" VIC	27.12 [689]	19.17 [487]	105.32 [2675]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).



LEFT SIDE VIEW



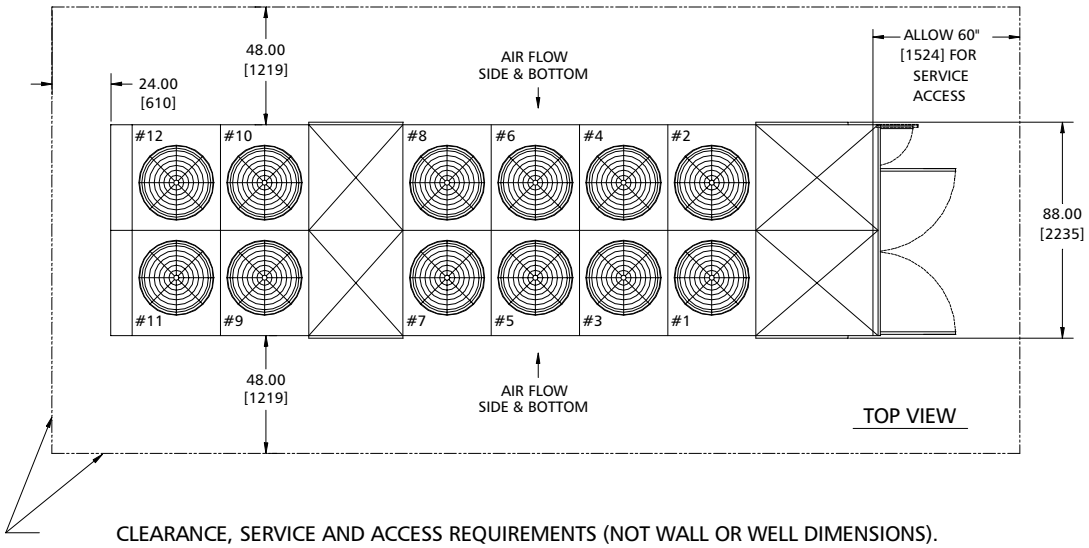
CONTROL BOX END

NOTE:
1 - ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS.
2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

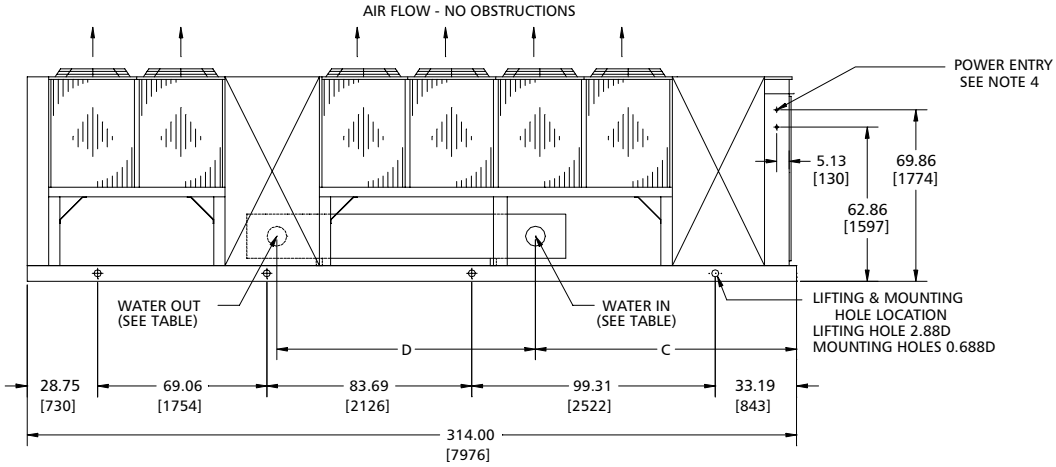
DIMENSIONAL DATA

	12-FAN UNIT
	ACDX1B-148C
	ACDX1B-158C
	ACDX1B-178C
	ACDX1B-188C

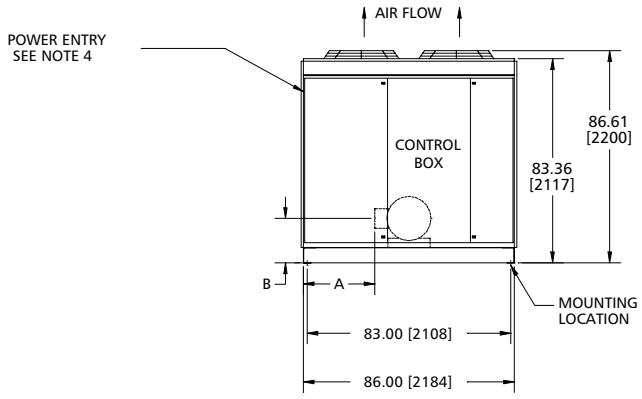
	CHILLER	CONN	A	B	C	D
	EXT18122	8" VIC	29.12 [740]	18.17 [462]	106.44 [2704]	105.50 [2680]
	EXT20122	10" VIC	26.45 [672]	19.17 [487]	107.81 [2738]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).



LEFT SIDE VIEW



CONTROL BOX END

NOTE:
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2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
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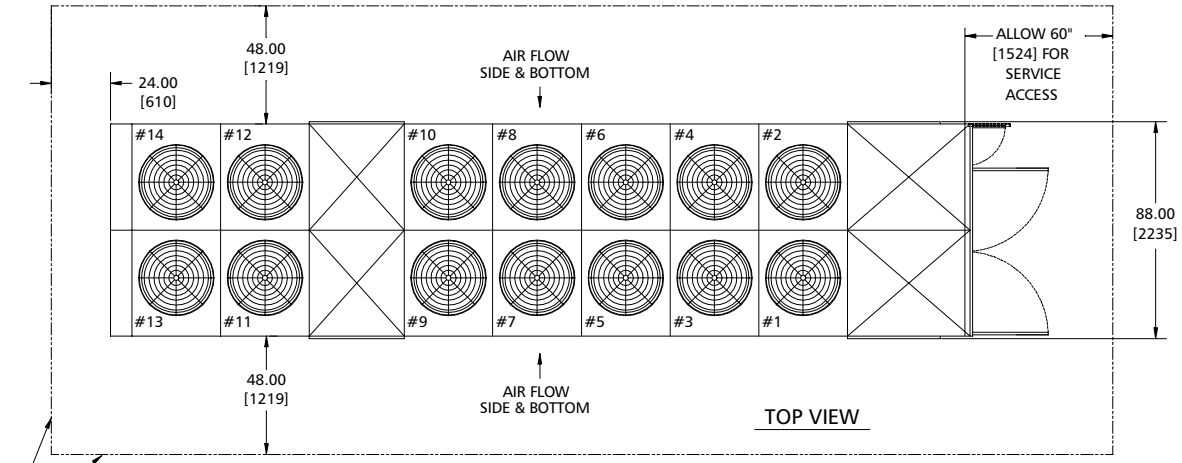
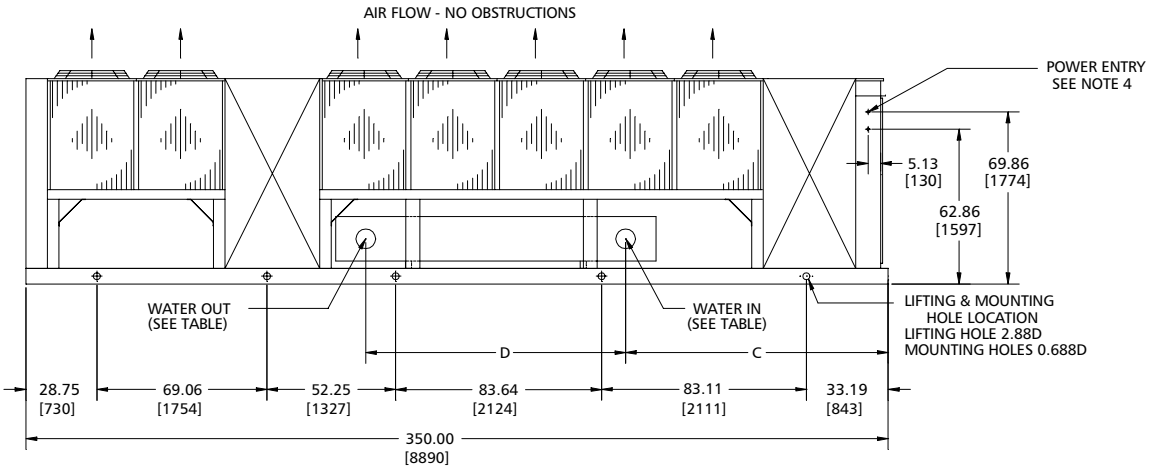
DIMENSIONAL DATA

	14-FAN UNIT
	ACDX1B-198C
	ACDX1B-208C
	ACDX1B-148S
	ACDX1B-158S
	ACDX1B-178S
	ACDX1B-188S

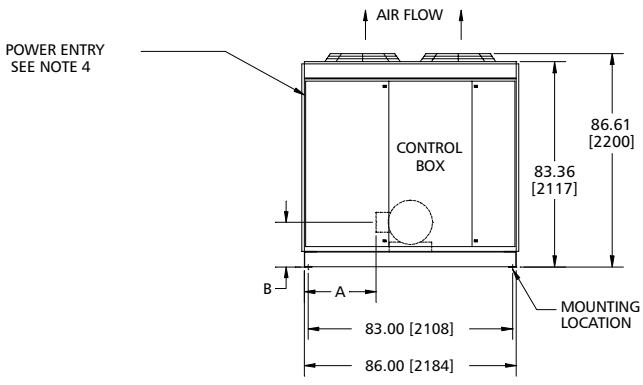
	CHILLER	CONN	A	B	C	D
	EXT18122	8" VIC	29.12 [740]	18.17 [462]	106.44 [2704]	105.50 [2680]
	EXT20122	10" VIC	26.45 [672]	19.17 [487]	107.81 [2738]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).



LEFT SIDE VIEW



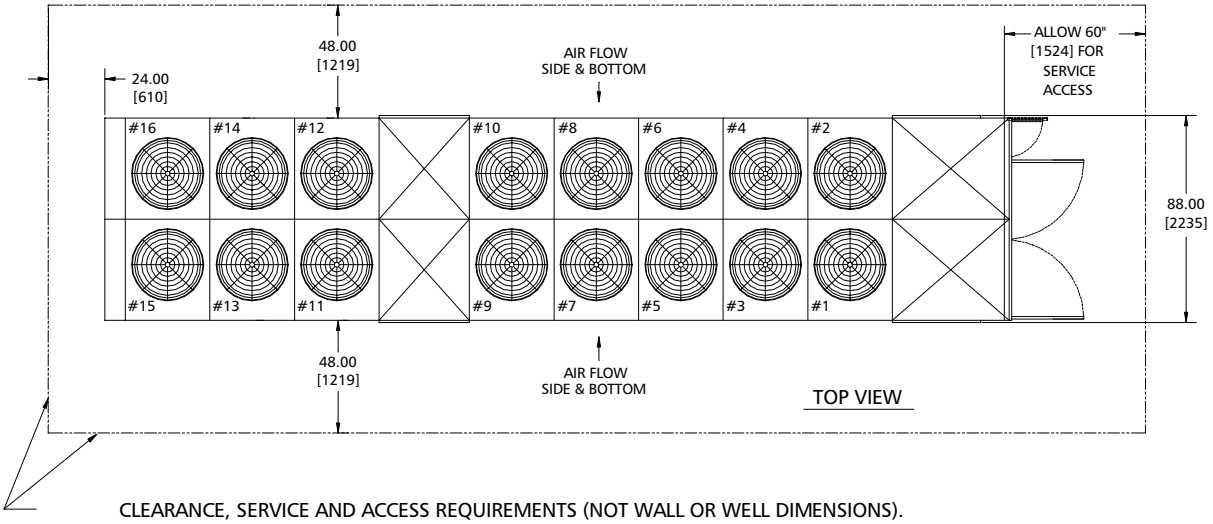
CONTROL BOX END

NOTE:
1 - ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS.
2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

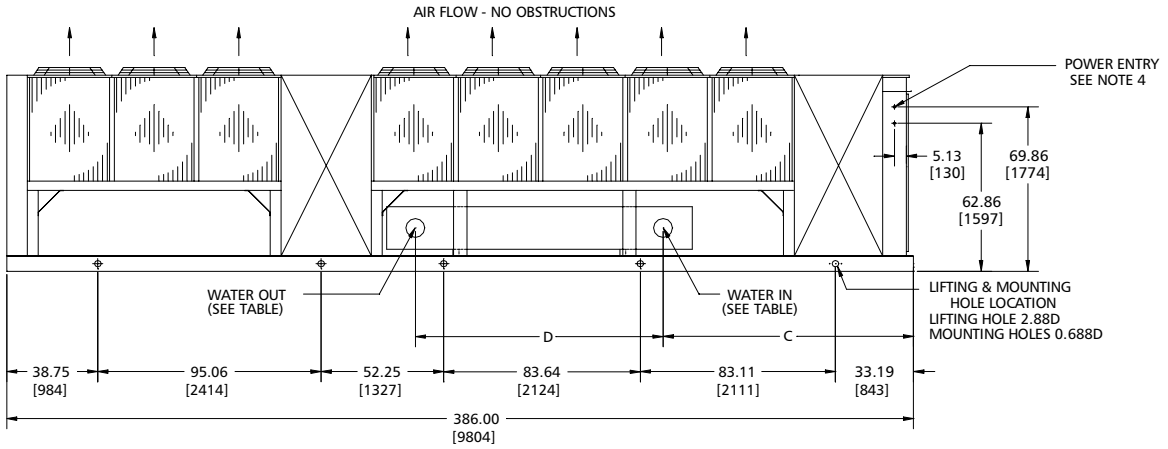
DIMENSIONAL DATA

16-FAN UNIT
ACDX1B-198S
ACDX1B-208S

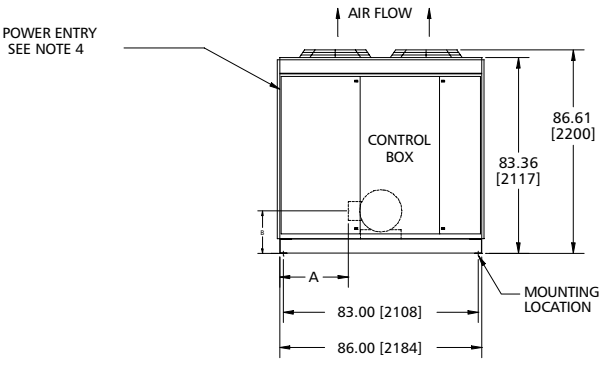
CHILLER	CONN	A	B	C	D
EXT18122	8" VIC	29.12 [740]	18.17 [462]	106.44 [2704]	105.50 [2680]
EXT20122	10" VIC	26.45 [672]	19.17 [487]	107.81 [2738]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).



LEFT SIDE VIEW



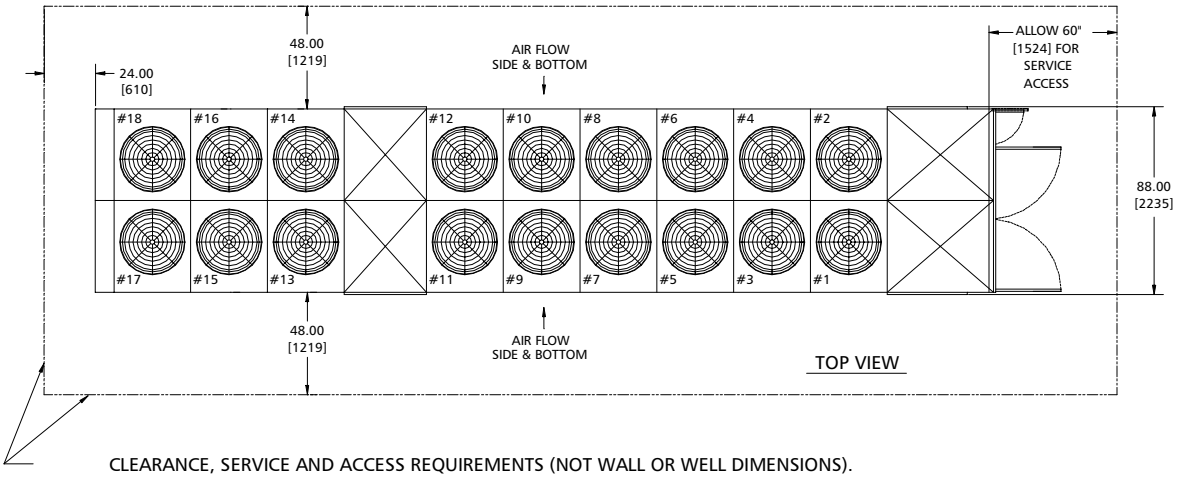
CONTROL BOX END

NOTE:
1 - ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS.
2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

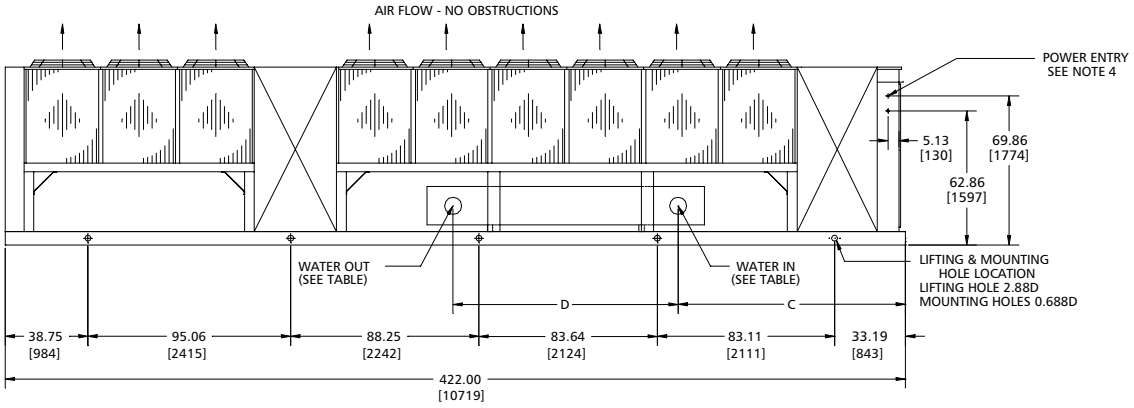
DIMENSIONAL DATA

	18-FAN UNIT
	ACDX1B-148E
	ACDX1B-158E
	ACDX1B-178E
	ACDX1B-188E
	ACDX1B-198E
	ACDX1B-208E

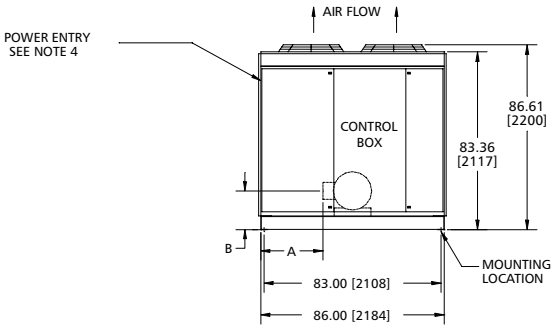
	CHILLER	CONN	A	B	C	D
	EXT18122	8" VIC	29.12 [740]	18.17 [462]	106.44 [2704]	105.50 [2680]
	EXT20122	10" VIC	26.45 [672]	19.17 [487]	107.81 [2738]	102.88 [2613]



CLEARANCE, SERVICE AND ACCESS REQUIREMENTS (NOT WALL OR WELL DIMENSIONS).



LEFT SIDE VIEW



CONTROL BOX END

NOTE:
1 - ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS.
2 - VENT & DRAIN CONNECTIONS PROVIDED ON COOLER.
3 - ALLOW 60 [1524] CLEARANCE AT CONTROL PANEL END OF UNIT FOR SERVICE.
4 - USE MINIMUM 36 [914] FLEXIBLE CONDUIT TO CONTROL BOX TO ISOLATE UNIT.
5 - WATER PIPING TO BE SUPPORTED TO MINIMIZE LOAD ON UNIT.
6 - ALL DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

ELECTRICAL DATA: UNIT & COMPRESSORS

COMPACT LENGTH

				Unit		Compressors							
ACDX-B Model	Voltage	PH	HZ	MCA	MFS	Qty.	Model	RLA ea.	LRA ea.	Qty.	Model	RLA	LRA
Compact 58	200	3	60	305	500	1	1113	225	1415	NA	NA	NA	NA
	230	3	60	269	450	1	1113	196	1210	NA	NA	NA	NA
	400	3	50	135	225	1	1113	98	605	NA	NA	NA	NA
	460	3	60	135	225	1	1113	98	605	NA	NA	NA	NA
	575	3	60	106	175	1	1113	78	484	NA	NA	NA	NA
Compact 68	200	3	60	360	600	1	1117	269	1560	NA	NA	NA	NA
	230	3	60	316	500	1	1117	234	1415	NA	NA	NA	NA
	400	3	50	158	250	1	1117	117	710	NA	NA	NA	NA
	460	3	60	158	250	1	1117	117	710	NA	NA	NA	NA
	575	3	60	126	200	1	1117	94	575	NA	NA	NA	NA
Compact 98	200	3	60	461	600	1	1111	189	1210	1	1111	189	1210
	230	3	60	404	500	1	1111	164	1025	1	1111	164	1025
	400	3	50	203	250	1	1111	82	515	1	1111	82	515
	460	3	60	203	250	1	1111	82	515	1	1111	82	515
	575	3	60	161	225	1	1111	66	415	1	1111	66	415
Compact 108	200	3	60	506	700	1	1111	189	1210	1	1113	225	1415
	230	3	60	444	600	1	1111	164	1025	1	1113	196	1210
	400	3	50	223	300	1	1111	82	515	1	1113	98	605
	460	3	60	223	300	1	1111	82	515	1	1113	98	605
	575	3	60	176	250	1	1111	66	415	1	1113	78	484
Compact 118	200	3	60	558	700	1	1113	227	1415	1	1113	227	1415
	230	3	60	488	600	1	1113	196	1210	1	1113	196	1210
	400	3	50	245	300	1	1113	98	605	1	1113	98	605
	460	3	60	245	300	1	1113	98	605	1	1113	98	605
	575	3	60	192	250	1	1113	78	484	1	1113	78	484
Compact 128	200	3	60	608	800	1	1113	225	1415	1	1117	269	1560
	230	3	60	536	700	1	1113	196	1210	1	1117	234	1415
	400	3	50	268	350	1	1113	98	605	1	1117	117	710
	460	3	60	268	350	1	1113	98	605	1	1117	117	710
	575	3	60	212	300	1	1113	78	484	1	1117	94	575
Compact 138	200	3	60	664	800	1	1117	269	1560	1	1117	269	1560
	230	3	60	586	800	1	1117	234	1415	1	1117	234	1415
	400	3	50	293	400	1	1117	117	710	1	1117	117	710
	460	3	60	293	400	1	1117	117	710	1	1117	117	710
	575	3	60	233	300	1	1117	94	575	1	1117	94	575
Compact 148	200	3	60	790	1000	2	1111	221	1210	1	1111	221	1210
	230	3	60	637	800	2	1111	174	1025	1	1111	174	1025
	400	3	50	319	400	2	1111	87	515	1	1111	87	515
	460	3	60	319	400	2	1111	87	515	1	1111	87	515
	575	3	60	240	300	2	1111	66	415	1	1111	66	415
Compact 158	200	3	60	785	1000	2	1111	216	1210	1	1113	225	1415
	230	3	60	644	800	2	1111	164	1025	1	1113	196	1210
	400	3	50	323	400	2	1111	82	515	1	1113	98	605
	460	3	60	323	400	2	1111	82	515	1	1113	98	605
	575	3	60	259	300	2	1111	66	415	1	1113	81	484
Compact 178	200	3	60	803	1000	2	1113	225	1415	1	1113	225	1415
	230	3	60	790	1000	2	1113	221	1210	1	1113	221	1210
	400	3	50	355	450	2	1113	98	605	1	1113	98	605
	460	3	60	355	450	2	1113	98	605	1	1113	98	605
	575	3	60	279	350	2	1113	78	484	1	1113	78	484
Compact 188	200	3	60	899	1000	2	1113	240	1415	1	1117	278	1560
	230	3	60	774	1000	2	1113	205	1210	1	1117	234	1415
	400	3	50	379	450	2	1113	98	605	1	1117	117	710
	460	3	60	379	450	2	1113	98	605	1	1117	117	710
	575	3	60	299	350	2	1113	78	484	1	1117	94	575
Compact 198	200	3	60	934	1200	2	1117	278	1560	1	1113	225	1415
	230	3	60	806	1000	2	1117	234	1415	1	1113	196	1210
	400	3	50	404	500	2	1117	117	710	1	1113	98	605
	460	3	60	404	500	2	1117	117	710	1	1113	98	605
	575	3	60	319	400	2	1117	94	575	1	1113	78	484
Compact 208	200	3	60	957	1200	2	1117	269	1560	1	1117	269	1560
	230	3	60	844	1000	2	1117	234	1415	1	1117	234	1415
	400	3	50	423	500	2	1117	117	710	1	1117	117	710
	460	3	60	423	500	2	1117	117	710	1	1117	117	710
	575	3	60	335	400	2	1117	94	575	1	1117	94	575

Notes: (1) MCA - Minimum Circuit Ampacity per NEC440-33
(2) MFS - Maximum Fuse Size per NEC440-22

ELECTRICAL DATA: UNIT & COMPRESSORS

STANDARD LENGTH

				Unit		Compressors							
ACDX-B Model	Voltage	PH	HZ	MCA	MFS	Qty.	Model	RLA ea.	LRA ea.	Qty.	Model	RLA	LRA
Standard 48	200	3	60	260	400	1	1111	189	1210	NA	NA	NA	NA
	230	3	60	229	350	1	1111	164	1025	NA	NA	NA	NA
	400	3	50	115	175	1	1111	87	515	NA	NA	NA	NA
	460	3	60	115	175	1	1111	87	515	NA	NA	NA	NA
	575	3	60	91	150	1	1111	66	415	NA	NA	NA	NA
Standard 58	200	3	60	317	500	1	1113	225	1415	NA	NA	NA	NA
	230	3	60	280	450	1	1113	196	1210	NA	NA	NA	NA
	400	3	50	141	225	1	1113	98	605	NA	NA	NA	NA
	460	3	60	141	225	1	1113	98	605	NA	NA	NA	NA
	575	3	60	110	175	1	1113	78	484	NA	NA	NA	NA
Standard 68	200	3	60	372	600	1	1117	269	1560	NA	NA	NA	NA
	230	3	60	328	500	1	1117	234	1415	NA	NA	NA	NA
	400	3	50	164	250	1	1117	117	710	NA	NA	NA	NA
	460	3	60	164	250	1	1117	117	710	NA	NA	NA	NA
	575	3	60	130	200	1	1117	94	575	NA	NA	NA	NA
Standard 98	200	3	60	472	600	1	1111	189	1210	1	1111	189	1210
	230	3	60	416	500	1	1111	164	1025	1	1111	164	1025
	400	3	50	209	250	1	1111	82	515	1	1111	82	515
	460	3	60	209	250	1	1111	82	515	1	1111	82	515
	575	3	60	165	225	1	1111	66	415	1	1111	66	415
Standard 108	200	3	60	517	700	1	1111	189	1210	1	1113	225	1415
	230	3	60	456	600	1	1111	164	1025	1	1113	196	1210
	400	3	50	229	300	1	1111	82	515	1	1113	98	605
	460	3	60	229	300	1	1111	82	515	1	1113	98	605
	575	3	60	180	250	1	1111	66	415	1	1113	78	484
Standard 118	200	3	60	570	700	1	1113	227	1415	1	1113	227	1415
	230	3	60	500	600	1	1113	196	1210	1	1113	196	1210
	400	3	50	251	300	1	1113	98	605	1	1113	98	605
	460	3	60	251	300	1	1113	98	605	1	1113	98	605
	575	3	60	197	250	1	1113	78	484	1	1113	78	484
Standard 128	200	3	60	620	800	1	1113	225	1415	1	1117	269	1560
	230	3	60	548	700	1	1113	196	1210	1	1117	234	1415
	400	3	50	274	350	1	1113	98	605	1	1117	117	710
	460	3	60	274	350	1	1113	98	605	1	1117	117	710
	575	3	60	217	300	1	1113	78	484	1	1117	94	575
Standard 138	200	3	60	676	800	1	1117	269	1560	1	1117	269	1560
	230	3	60	597	800	1	1117	234	1415	1	1117	234	1415
	400	3	50	299	400	1	1117	117	710	1	1117	117	710
	460	3	60	299	400	1	1117	117	710	1	1117	117	710
	575	3	60	237	300	1	1117	94	575	1	1117	94	575
Standard 148	200	3	60	801	1000	2	1111	221	1210	1	1111	221	1210
	230	3	60	649	800	2	1111	174	1025	1	1111	174	1025
	400	3	50	325	400	2	1111	87	515	1	1111	87	515
	460	3	60	325	400	2	1111	87	515	1	1111	87	515
	575	3	60	244	300	2	1111	66	415	1	1111	66	415
Standard 158	200	3	60	796	1000	2	1111	216	1210	1	1113	225	1415
	230	3	60	656	800	2	1111	164	1025	1	1113	196	1210
	400	3	50	329	400	2	1111	82	515	1	1113	98	605
	460	3	60	329	400	2	1111	82	515	1	1113	98	605
	575	3	60	263	300	2	1111	66	415	1	1113	81	484
Standard 178	200	3	60	814	1000	2	1113	225	1415	1	1113	225	1415
	230	3	60	801	1000	2	1113	221	1210	1	1113	221	1210
	400	3	50	361	450	2	1113	98	605	1	1113	98	605
	460	3	60	361	450	2	1113	98	605	1	1113	98	605
	575	3	60	283	350	2	1113	78	484	1	1113	78	484
Standard 188	200	3	60	910	1000	2	1113	240	1415	1	1117	278	1560
	230	3	60	785	1000	2	1113	205	1210	1	1117	234	1415
	400	3	50	385	450	2	1113	98	605	1	1117	117	710
	460	3	60	385	450	2	1113	98	605	1	1117	117	710
	575	3	60	303	350	2	1113	78	484	1	1117	94	575
Standard 198	200	3	60	945	1200	2	1117	278	1560	1	1113	225	1415
	230	3	60	817	1000	2	1117	234	1415	1	1113	196	1210
	400	3	50	410	500	2	1117	117	710	1	1113	98	605
	460	3	60	410	500	2	1117	117	710	1	1113	98	605
	575	3	60	323	400	2	1117	94	575	1	1113	78	484
Standard 208	200	3	60	969	1200	2	1117	269	1560	1	1117	269	1560
	230	3	60	855	1000	2	1117	234	1415	1	1117	234	1415
	400	3	50	429	500	2	1117	117	710	1	1117	117	710
	460	3	60	429	500	2	1117	117	710	1	1117	117	710
	575	3	60	339	400	2	1117	94	575	1	1117	94	575

Notes: (1) MCA - Minimum Circuit Ampacity per NEC440-33
(2) MFS - Maximum Fuse Size per NEC440-22

ELECTRICAL DATA: UNIT & COMPRESSORS

EXTENDED LENGTH

				Unit		Compressors							
ACDX-B Model	Voltage	PH	HZ	MCA	MFS	Qty.	Model	RLA ea.	LRA ea.	Qty.	Model	RLA	LRA
Extended 48	200	3	60	272	450	1	1111	189	1210	NA	NA	NA	NA
	230	3	60	240	400	1	1111	164	1025	NA	NA	NA	NA
	400	3	50	121	200	1	1111	87	515	NA	NA	NA	NA
	460	3	60	121	200	1	1111	87	515	NA	NA	NA	NA
	575	3	60	95	150	1	1111	66	415	NA	NA	NA	NA
Extended 58	200	3	60	328	500	1	1113	225	1415	NA	NA	NA	NA
	230	3	60	292	450	1	1113	196	1210	NA	NA	NA	NA
	400	3	50	147	225	1	1113	98	605	NA	NA	NA	NA
	460	3	60	147	225	1	1113	98	605	NA	NA	NA	NA
	575	3	60	114	175	1	1113	78	484	NA	NA	NA	NA
Extended 68	200	3	60	383	600	1	1117	269	1560	NA	NA	NA	NA
	230	3	60	340	500	1	1117	234	1415	NA	NA	NA	NA
	400	3	50	170	250	1	1117	117	710	NA	NA	NA	NA
	460	3	60	170	250	1	1117	117	710	NA	NA	NA	NA
	575	3	60	134	225	1	1117	94	575	NA	NA	NA	NA
Extended 98	200	3	60	484	600	1	1111	189	1210	1	1111	189	1210
	230	3	60	428	500	1	1111	164	1025	1	1111	164	1025
	400	3	50	215	250	1	1111	82	515	1	1111	82	515
	460	3	60	215	250	1	1111	82	515	1	1111	82	515
	575	3	60	170	225	1	1111	66	415	1	1111	66	415
Extended 108	200	3	60	529	700	1	1111	189	1210	1	1113	225	1415
	230	3	60	468	600	1	1111	164	1025	1	1113	196	1210
	400	3	50	235	300	1	1111	82	515	1	1113	98	605
	460	3	60	235	300	1	1111	82	515	1	1113	98	605
	575	3	60	185	250	1	1111	66	415	1	1113	78	484
Extended 118	200	3	60	582	800	1	1113	227	1415	1	1113	227	1415
	230	3	60	512	700	1	1113	196	1210	1	1113	196	1210
	400	3	50	257	350	1	1113	98	605	1	1113	98	605
	460	3	60	257	350	1	1113	98	605	1	1113	98	605
	575	3	60	201	250	1	1113	78	484	1	1113	78	484
Extended 128	200	3	60	632	800	1	1113	225	1415	1	1117	269	1560
	230	3	60	559	700	1	1113	196	1210	1	1117	234	1415
	400	3	50	280	350	1	1113	98	605	1	1117	117	710
	460	3	60	280	350	1	1113	98	605	1	1117	117	710
	575	3	60	221	300	1	1113	78	484	1	1117	94	575
Extended 138	200	3	60	688	800	1	1117	269	1560	1	1117	269	1560
	230	3	60	609	800	1	1117	234	1415	1	1117	234	1415
	400	3	50	305	400	1	1117	117	710	1	1117	117	710
	460	3	60	305	400	1	1117	117	710	1	1117	117	710
	575	3	60	241	300	1	1117	94	575	1	1117	94	575
Extended 148	200	3	60	825	1000	2	1111	221	1210	1	1111	221	1210
	230	3	60	672	800	2	1111	174	1025	1	1111	174	1025
	400	3	50	337	400	2	1111	87	515	1	1111	87	515
	460	3	60	337	400	2	1111	87	515	1	1111	87	515
	575	3	60	253	300	2	1111	66	415	1	1111	66	415
Extended 158	200	3	60	820	1000	2	1111	216	1210	1	1113	225	1415
	230	3	60	680	800	2	1111	164	1025	1	1113	196	1210
	400	3	50	341	400	2	1111	82	515	1	1113	98	605
	460	3	60	341	400	2	1111	82	515	1	1113	98	605
	575	3	60	271	350	2	1111	66	415	1	1113	81	484
Extended 178	200	3	60	838	1000	2	1113	225	1415	1	1113	225	1415
	230	3	60	825	1000	2	1113	221	1210	1	1113	221	1210
	400	3	50	373	450	2	1113	98	605	1	1113	98	605
	460	3	60	373	450	2	1113	98	605	1	1113	98	605
	575	3	60	292	350	2	1113	78	484	1	1113	78	484
Extended 188	200	3	60	934	1200	2	1113	240	1415	1	1117	278	1560
	230	3	60	809	1000	2	1113	205	1210	1	1117	234	1415
	400	3	50	397	500	2	1113	98	605	1	1117	117	710
	460	3	60	397	500	2	1113	98	605	1	1117	117	710
	575	3	60	312	400	2	1113	78	484	1	1117	94	575
Extended 198	200	3	60	957	1200	2	1117	278	1560	1	1113	225	1415
	230	3	60	829	1000	2	1117	234	1415	1	1113	196	1210
	400	3	50	416	500	2	1117	117	710	1	1113	98	605
	460	3	60	416	500	2	1117	117	710	1	1113	98	605
	575	3	60	328	400	2	1117	94	575	1	1113	78	484
Extended 208	200	3	60	981	1200	2	1117	269	1560	1	1117	269	1560
	230	3	60	867	1000	2	1117	234	1415	1	1117	234	1415
	400	3	50	435	500	2	1117	117	710	1	1117	117	710
	460	3	60	435	500	2	1117	117	710	1	1117	117	710
	575	3	60	344	400	2	1117	94	575	1	1117	94	575

Notes: (1) MCA - Minimum Circuit Ampacity per NEC440-33
(2) MFS - Maximum Fuse Size per NEC440-22

ELECTRICAL DATA: UNIT & COMPRESSORS

STANDARD LENGTH *EXTRA QUIET*

				Unit		Compressors							
ACDX-B Model	Voltage	PH	HZ	MCA	MFS	Qty.	Model	RLA ea.	LRA ea.	Qty.	Model	RLA	LRA
Standard Extra Quiet 48	200	3	60	257	400	1	1111	189	1210	NA	NA	NA	NA
	230	3	60	226	350	1	1111	164	1025	NA	NA	NA	NA
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	113	175	1	1111	87	515	NA	NA	NA	NA
	575	3	60	91	150	1	1111	66	415	NA	NA	NA	NA
Standard Extra Quiet 58	200	3	60	313	500	1	1113	225	1415	NA	NA	NA	NA
	230	3	60	277	450	1	1113	196	1210	NA	NA	NA	NA
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	139	225	1	1113	98	605	NA	NA	NA	NA
	575	3	60	110	175	1	1113	78	484	NA	NA	NA	NA
Standard Extra Quiet 68	200	3	60	368	600	1	1117	269	1560	NA	NA	NA	NA
	230	3	60	324	500	1	1117	234	1415	NA	NA	NA	NA
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	162	250	1	1117	117	710	NA	NA	NA	NA
	575	3	60	130	200	1	1117	94	575	NA	NA	NA	NA
Standard Extra Quiet 98	200	3	60	468	600	1	1111	189	1210	1	1111	189	1210
	230	3	60	411	500	1	1111	164	1025	1	1111	164	1025
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	206	250	1	1111	82	515	1	1111	82	515
	575	3	60	165	225	1	1111	66	415	1	1111	66	415
Standard Extra Quiet 108	200	3	60	513	700	1	1111	189	1210	1	1113	225	1415
	230	3	60	451	600	1	1111	164	1025	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	226	300	1	1111	82	515	1	1113	98	605
	575	3	60	180	250	1	1111	66	415	1	1113	78	484
Standard Extra Quiet 118	200	3	60	564	700	1	1113	227	1415	1	1113	227	1415
	230	3	60	494	600	1	1113	196	1210	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	248	300	1	1113	98	605	1	1113	98	605
	575	3	60	197	250	1	1113	78	484	1	1113	78	484
Standard Extra Quiet 128	200	3	60	614	800	1	1113	225	1415	1	1117	269	1560
	230	3	60	542	700	1	1113	196	1210	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	271	350	1	1113	98	605	1	1117	117	710
	575	3	60	217	300	1	1113	78	484	1	1117	94	575
Standard Extra Quiet 138	200	3	60	669	800	1	1117	269	1560	1	1117	269	1560
	230	3	60	590	800	1	1117	234	1415	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	296	400	1	1117	117	710	1	1117	117	710
	575	3	60	237	300	1	1117	94	575	1	1117	94	575
Standard Extra Quiet 148	200	3	60	793	1000	2	1111	221	1210	1	1111	221	1210
	230	3	60	640	800	2	1111	174	1025	1	1111	174	1025
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	321	400	2	1111	87	515	1	1111	87	515
	575	3	60	244	300	2	1111	66	415	1	1111	66	415
Standard Extra Quiet 158	200	3	60	788	1000	2	1111	216	1210	1	1113	225	1415
	230	3	60	648	800	2	1111	164	1025	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	325	400	2	1111	82	515	1	1113	98	605
	575	3	60	263	300	2	1111	66	415	1	1113	81	484
Standard Extra Quiet 178	200	3	60	806	1000	2	1113	225	1415	1	1113	225	1415
	230	3	60	793	1000	2	1113	221	1210	1	1113	221	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	357	450	2	1113	98	605	1	1113	98	605
	575	3	60	283	350	2	1113	78	484	1	1113	78	484
Standard Extra Quiet 188	200	3	60	902	1000	2	1113	240	1415	1	1117	278	1560
	230	3	60	777	1000	2	1113	205	1210	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	380	450	2	1113	98	605	1	1117	117	710
	575	3	60	303	350	2	1113	78	484	1	1117	94	575
Standard Extra Quiet 198	200	3	60	936	1200	2	1117	278	1560	1	1113	225	1415
	230	3	60	808	1000	2	1117	234	1415	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	405	500	2	1117	117	710	1	1113	98	605
	575	3	60	324	400	2	1117	94	575	1	1113	78	484
Standard Extra Quiet 208	200	3	60	959	1200	2	1117	269	1560	1	1117	269	1560
	230	3	60	846	1000	2	1117	234	1415	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	424	500	2	1117	117	710	1	1117	117	710
	575	3	60	340	400	2	1117	94	575	1	1117	94	575

Notes: (1) MCA - Minimum Circuit Ampacity per NEC440-33
(2) MFS - Maximum Fuse Size per NEC440-22

ELECTRICAL DATA: UNIT & COMPRESSORS

EXTENDED LENGTH *EXTRA QUIET*

				Unit		Compressors							
ACDX-B Model	Voltage	PH	HZ	MCA	MFS	Qty.	Model	RLA ea.	LRA ea.	Qty.	Model	RLA	LRA
Extended Extra Quiet 48	200	3	60	268	450	1	1111	189	1210	NA	NA	NA	NA
	230	3	60	237	400	1	1111	164	1025	NA	NA	NA	NA
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	119	200	1	1111	87	515	NA	NA	NA	NA
	575	3	60	95	150	1	1111	66	415	NA	NA	NA	NA
Extended Extra Quiet 58	200	3	60	324	500	1	1113	225	1415	NA	NA	NA	NA
	230	3	60	287	450	1	1113	196	1210	NA	NA	NA	NA
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	144	225	1	1113	98	605	NA	NA	NA	NA
	575	3	60	114	175	1	1113	78	484	NA	NA	NA	NA
Extended Extra Quiet 68	200	3	60	379	600	1	1117	269	1560	NA	NA	NA	NA
	230	3	60	335	500	1	1117	234	1415	NA	NA	NA	NA
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	168	250	1	1117	117	710	NA	NA	NA	NA
	575	3	60	134	225	1	1117	94	575	NA	NA	NA	NA
Extended Extra Quiet 98	200	3	60	478	600	1	1111	189	1210	1	1111	189	1210
	230	3	60	422	500	1	1111	164	1025	1	1111	164	1025
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	211	250	1	1111	82	515	1	1111	82	515
	575	3	60	170	225	1	1111	66	415	1	1111	66	415
Extended Extra Quiet 108	200	3	60	523	700	1	1111	189	1210	1	1113	225	1415
	230	3	60	462	600	1	1111	164	1025	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	232	300	1	1111	82	515	1	1113	98	605
	575	3	60	185	250	1	1111	66	415	1	1113	78	484
Extended Extra Quiet 118	200	3	60	574	800	1	1113	227	1415	1	1113	227	1415
	230	3	60	505	700	1	1113	196	1210	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	253	350	1	1113	98	605	1	1113	98	605
	575	3	60	201	250	1	1113	78	484	1	1113	78	484
Extended Extra Quiet 128	200	3	60	625	800	1	1113	225	1415	1	1117	269	1560
	230	3	60	552	700	1	1113	196	1210	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	277	350	1	1113	98	605	1	1117	117	710
	575	3	60	221	300	1	1113	78	484	1	1117	94	575
Extended Extra Quiet 138	200	3	60	679	800	1	1117	269	1560	1	1117	269	1560
	230	3	60	601	800	1	1117	234	1415	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	301	400	1	1117	117	710	1	1117	117	710
	575	3	60	241	300	1	1117	94	575	1	1117	94	575
Extended Extra Quiet 148	200	3	60	814	1000	2	1111	221	1210	1	1111	221	1210
	230	3	60	661	800	2	1111	174	1025	1	1111	174	1025
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	332	400	2	1111	87	515	1	1111	87	515
	575	3	60	253	300	2	1111	66	415	1	1111	66	415
Extended Extra Quiet 158	200	3	60	809	1000	2	1111	216	1210	1	1113	225	1415
	230	3	60	669	800	2	1111	164	1025	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	336	400	2	1111	82	515	1	1113	98	605
	575	3	60	271	350	2	1111	66	415	1	1113	81	484
Extended Extra Quiet 178	200	3	60	827	1000	2	1113	225	1415	1	1113	225	1415
	230	3	60	814	1000	2	1113	221	1210	1	1113	221	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	368	450	2	1113	98	605	1	1113	98	605
	575	3	60	292	350	2	1113	78	484	1	1113	78	484
Extended Extra Quiet 188	200	3	60	923	1200	2	1113	240	1415	1	1117	278	1560
	230	3	60	798	1000	2	1113	205	1210	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	391	500	2	1113	98	605	1	1117	117	710
	575	3	60	312	400	2	1113	78	484	1	1117	94	575
Extended Extra Quiet 198	200	3	60	946	1200	2	1117	278	1560	1	1113	225	1415
	230	3	60	818	1000	2	1117	234	1415	1	1113	196	1210
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	410	500	2	1117	117	710	1	1113	98	605
	575	3	60	328	400	2	1117	94	575	1	1113	78	484
Extended Extra Quiet 208	200	3	60	970	1200	2	1117	269	1560	1	1117	269	1560
	230	3	60	856	1000	2	1117	234	1415	1	1117	234	1415
	400	3	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	460	3	60	429	500	2	1117	117	710	1	1117	117	710
	575	3	60	344	400	2	1117	94	575	1	1117	94	575

Notes: (1) MCA - Minimum Circuit Ampacity per NEC440-33
(2) MFS - Maximum Fuse Size per NEC440-22

ELECTRICAL DATA: COMPRESSOR CRANKCASE & CHILLER VESSEL HEATERS

ACDX-B Model	Crankcase Heater			Chiller Vessel Heater			
	No.	Watts Ea.	FLA Ea.	Chiller	Qty.	Watts Ea.	FLA Ea.
48	1	400	3.3	Std.	1	420	3.7
				42° Opt.	1	420	3.7
				40° Opt.	1	560	4.9
58	1	400	3.3	Std.	1	420	3.7
				42° Opt.	1	560	4.9
				40° Opt.	1	560	4.9
68	1	400	3.3	Std.	1	560	4.9
				42° Opt.	1	560	4.9
				40° Opt.	1	560	4.9
98	2	400	3.3	Std.	2	420	3.7
				42° Opt.	2	420	3.7
				40° Opt.	2	560	4.9
108	2	400	3.3	Std.	2	560	4.9
				42° Opt.	2	560	4.9
				40° Opt.	2	560	4.9
118	2	400	3.3	Std.	2	560	4.9
				42° Opt.	2	560	4.9
				40° Opt.	2	560	3.7
128	2	400	3.3	Std.	2	560	4.9
				42° Opt.	2	560	4.9
				40° Opt.	2	560	3.7
138	2	400	3.3	Std.	2	560	4.9
				42° Opt.	2	560	4.9
				40° Opt.	2	560	3.7
148	3	400	3.3	Std.	3	420	3.7
				42° Opt.	3	420	3.7
				40° Opt.	3	420	3.7
158	3	400	3.3	Std.	3	420	3.7
				42° Opt.	3	420	3.7
				40° Opt.	3	420	3.7
178	3	400	3.3	Std.	3	420	3.7
				42° Opt.	3	420	3.7
				40° Opt.	3	420	3.7
188	3	400	3.3	Std.	3	420	3.7
				42° Opt.	3	420	3.7
				40° Opt.	3	420	3.7
198	3	400	3.3	Std.	3	420	3.7
				42° Opt.	3	420	3.7
				40° Opt.	3	420	3.7
208	3	400	3.3	Std.	3	420	3.7
				42° Opt.	3	420	3.7
				40° Opt.	3	420	3.7

Note: (1) All heaters are 115 volt, single phase.

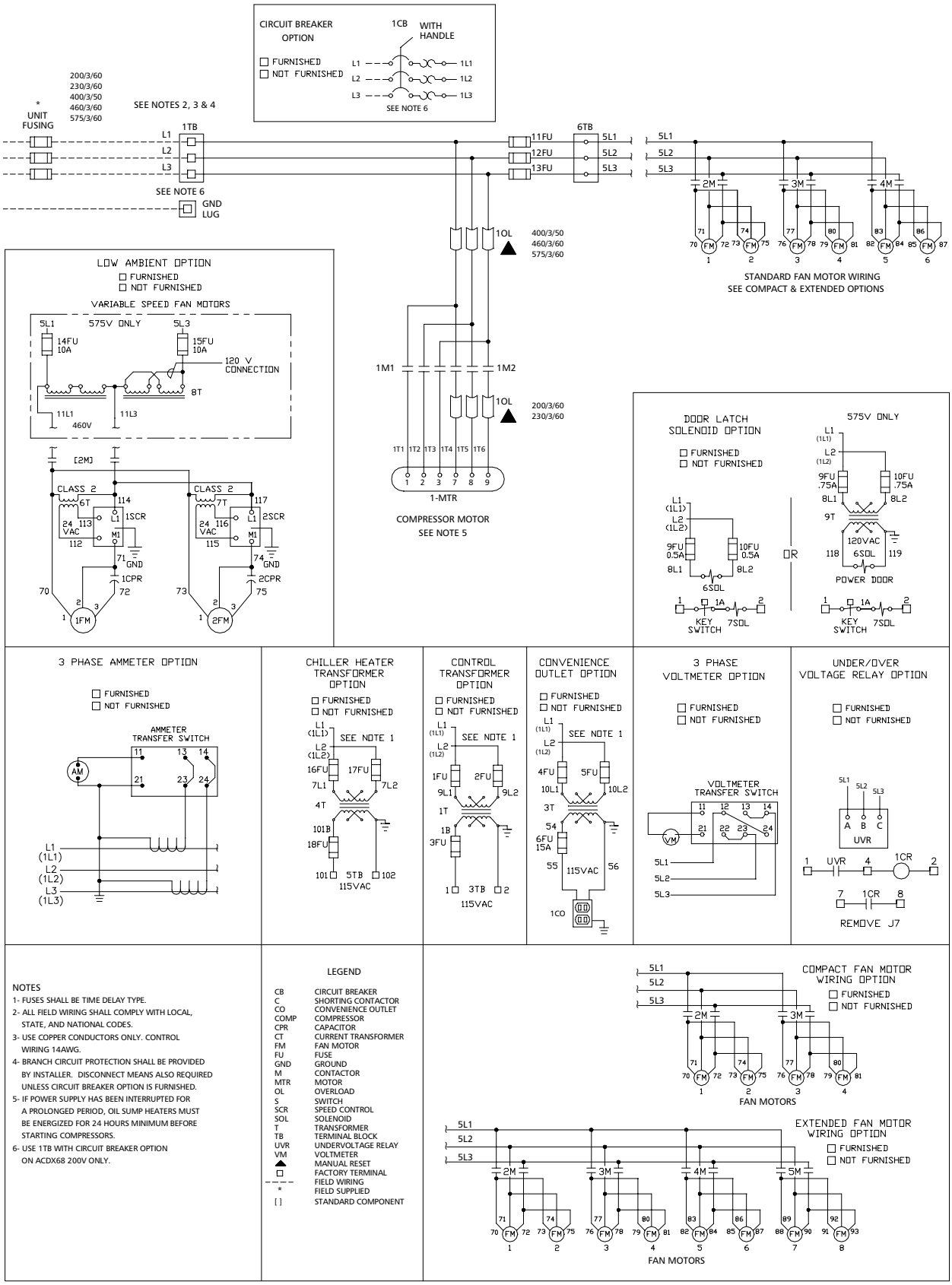
ELECTRICAL DATA: TERMINAL BLOCKS/FANS

ACDX-B MODEL	Volts	PH	HZ	Terminal Block Wire Range (1)	Fan Quantity: Compact Option Qty (*)	Fan Quantity: Standard Qty (*)	Fan Quantity: Extended Option Qty (*)	Fan Motor: 1.5 HP FLA	Fan Motor: 1.5 HP Volts/PH/Hz	Low Ambient Option: 1.0 HP Qty	Low Ambient Option: 1.0 HP FLA	Low Ambient Option: 1.0 HP Volts/PH/Hz	Quiet Fan Motor Option: 1.0 HP FLA	Quiet Fan Motor Option: 1.0 HP Volts/PH/HZ
48	200	3	60	(1) #6 - 400MCM	—	4(2)	6(4)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(1) #6 - 400MCM	—	4(2)	6(4)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #12 - 2/0	—	4(2)	6(4)	3.0	400/3/50	2	2.4	400/1/60	N/A	N./A
	460	3	60	(1) #12 - 2/0	—	4(2)	6(4)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #12 - 2/0	—	4(2)	6(4)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
58	200	3	60	(1) #4 - 500MCM	4(2)	6(4)	8(6)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(1) #6 - 400MCM	4(2)	6(4)	8(6)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #12 - 2/0	4(2)	6(4)	8(6)	3.0	400/3/50	2	2.4	400/1/60	N/A	N/A
	460	3	60	(1) #12 - 2/0	4(2)	6(4)	8(6)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #12 - 2/0	4(2)	6(4)	8(6)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
68	200	3	60	(1) #4 - 500MCM	4(2)	6(4)	8(6)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(1) #4 - 500MCM	4(2)	6(4)	8(6)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #6 - 400MCM	4(2)	6(4)	8(6)	3.0	400/3/50	2	2.4	400/1/60	N/A	N/A
	460	3	60	(1) #6 - 400MCM	4(2)	6(4)	8(6)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #6 - 400MCM	4(2)	6(4)	8(6)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
98	200	3	60	(2) 1/0 - 600MCM	6(4)	8(6)	10(8)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(2) 1/0 - 600MCM	6(4)	8(6)	10(8)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #4 - 500MCM	6(4)	8(6)	10(8)	3.0	400/3/50	2	2.4	400/1/60	N/A	N/A
	460	3	60	(1) #4 - 500MCM	6(4)	8(6)	10(8)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #4 - 500MCM	6(4)	8(6)	10(8)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
108	200	3	60	(2) 1/0 - 600MCM	6(4)	8(6)	10(8)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(2) 1/0 - 600MCM	6(4)	8(6)	10(8)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #4 - 500MCM	6(4)	8(6)	10(8)	3.0	400/3/50	2	2.4	400/1/60	N/A	N/A
	460	3	60	(1) #4 - 500MCM	6(4)	8(6)	10(8)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #4 - 500MCM	6(4)	8(6)	10(8)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
118	200	3	60	(2) 1/0 - 600MCM	8(6)	10(8)	12(10)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(2) 1/0 - 600MCM	8(6)	10(8)	12(10)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #4 - 500MCM	8(6)	10(8)	12(10)	3.0	400/3/50	2	2.4	400/1/60	N/A	N/A
	460	3	60	(1) #4 - 500MCM	8(6)	10(8)	12(10)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #4 - 500MCM	8(6)	10(8)	12(10)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
128	200	3	60	(2) 1/0 - 600MCM	8(6)	10(8)	12(10)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(2) 1/0 - 600MCM	8(6)	10(8)	12(10)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #4 - 500MCM	8(6)	10(8)	12(10)	3.0	400/3/50	2	2.4	400/1/60	N/A	N/A
	460	3	60	(1) #4 - 500MCM	8(6)	10(8)	12(10)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #4 - 500MCM	8(6)	10(8)	12(10)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
138	200	3	60	(2) 1/0 - 600MCM	10(6)	12(10)	14(12)	5.9	200/3/60	2	4.8	200/1/60	5.3	200/3/60
	230	3	60	(2) 1/0 - 600MCM	10(6)	12(10)	14(12)	5.9	230/3/60	2	4.8	230/1/60	5.3	230/3/60
	400	3	50	(1) #4 - 500MCM	10(6)	12(10)	14(12)	3.0	400/3/50	2	2.4	400/1/60	N/A	N/A
	460	3	60	(1) #4 - 500MCM	10(6)	12(10)	14(12)	3.0	460/3/60	2	2.4	460/1/60	2.7	460/3/60
	575	3	60	(1) #4 - 500MCM	10(6)	12(10)	14(12)	2.1	575/3/60	2	2.4	575/1/60	2.1	575/3/60
148	200	3	60	(3) 1/0 - 500 MCM	12 (8)	14 (10)	18 (14)	5.9	200/3/60	4	4.8	200/3/60	5.3	200/3/60
	230	3	60	(2) 1/0 - 600 MCM	12 (8)	1 (10)	18 (14)	5.9	230/3/60	4	4.8	230/3/60	5.3	230/3/60
	400	3	50	(2) 1/0 - 600 MCM	12 (8)	1 (10)	18 (14)	3.0	400/3/50	4	2.4	400/3/50	N/A	N/A
	460	3	60	(2) 1/0 - 600 MCM	12 (8)	1 (10)	18 (14)	3.0	460/3/60	4	2.4	460/3/60	2.7	460/3/60
	575	3	60	(1) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	2.1	575/3/60	4	2.4	460/3/60	2.1	575/3/60
158	200	3	60	(3) 1/0 - 500 MCM	12 (8)	14 (10)	18 (14)	5.9	200/3/60	4	4.8	200/3/60	5.3	200/3/60
	230	3	60	(2) 1/0 - 600 MCM	12 (8)	1 (10)	18 (14)	5.9	230/3/60	4	4.8	230/3/60	5.3	230/3/60
	400	3	50	(2) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	3.0	400/3/50	4	2.4	400/3/50	N/A	N/A
	460	3	60	(2) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	3.0	460/3/60	4	2.4	460/3/60	2.7	460/3/60
	575	3	60	(1) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	2.1	575/3/60	4	2.4	460/3/60	2.1	575/3/60
178	200	3	60	(3) 1/0 - 500 MCM	12 (8)	14 (10)	18 (14)	5.9	200/3/60	4	4.8	200/3/60	5.3	200/3/60
	230	3	60	(3) 1/0 - 500 MCM	12 (8)	1 (10)	18 (14)	5.9	230/3/60	4	4.8	230/3/60	5.3	230/3/60
	400	3	50	(2) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	3.0	400/3/50	4	2.4	400/3/50	N/A	N/A
	460	3	60	(2) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	3.0	460/3/60	4	2.4	460/3/60	2.7	460/3/60
	575	3	60	(1) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	2.1	575/3/60	4	2.4	460/3/60	2.1	575/3/60
188	200	3	60	(3) 1/0 - 500 MCM	12 (8)	14 (10)	18 (14)	5.9	200/3/60	4	4.8	200/3/60	5.3	200/3/60
	230	3	60	(3) 1/0 - 500 MCM	12 (8)	1 (10)	18 (14)	5.9	230/3/60	4	4.8	230/3/60	5.3	230/3/60
	400	3	50	(2) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	3.0	400/3/50	4	2.4	400/3/50	N/A	N/A
	460	3	60	(2) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	3.0	460/3/60	4	2.4	460/3/60	2.7	460/3/60
	575	3	60	(1) #4 - 500 MCM	12 (8)	1 (10)	18 (14)	2.1	575/3/60	4	2.4	460/3/60	2.1	575/3/60
198	200	3	60	(3) 1/0 - 500 MCM	14 (10)	16 (12)	18 (14)	5.9	200/3/60	4	4.8	200/3/60	5.3	200/3/60
	230	3	60	(3) 1/0 - 500 MCM	14 (10)	16 (12)	18 (14)	5.9	230/3/60	4	4.8	230/3/60	5.3	230/3/60
	400	3	50	(2) #4 - 500 MCM	14 (10)	16 (12)	18 (14)	3.0	400/3/50	4	2.4	400/3/50	N/A	N/A
	460	3	60	(2) #4 - 500 MCM	14 (10)	16 (12)	18 (14)	3.0	460/3/60	4	2.4	460/3/60	2.7	460/3/60
	575	3	60	(1) #4 - 500 MCM	14 (10)	16 (12)	18 (14)	2.1	575/3/60	4	2.4	460/3/60	2.1	575/3/60
208	200	3	60	(3) 1/0 - 500 MCM	14 (10)	16 (12)	18 (14)	5.9	200/3/60	4	4.8	200/3/60	5.3	200/3/60
	230	3	60	(3) 1/0 - 500 MCM	14 (10)	16 (12)	18 (14)	5.9	230/3/60	4	4.8	230/3/60	5.3	230/3/60
	400	3	50	(2) #4 - 500 MCM	14 (10)	16 (12)	18 (14)	3.0	400/3/50	4	2.4	400/3/50	N/A	N/A
	460	3	60	(2) #4 - 500 MCM	14 (10)	16 (12)	18 (14)	3.0	460/3/60	4	2.4	460/3/60	2.7	460/3/60
	575	3	60	(2) #4 - 500 MCM	14 (10)	16 (12)	18 (14)	2.1	575/3/60	4	2.4	460/3/60	2.1	575/3/60

*Number in parenthesis is the number of 1.5 HP fans provided if low ambient option is selected.

Notes: (1) Copper Conductors only.

TYPICAL POWER WIRING DIAGRAM (SINGLE COMPRESSOR MODEL)



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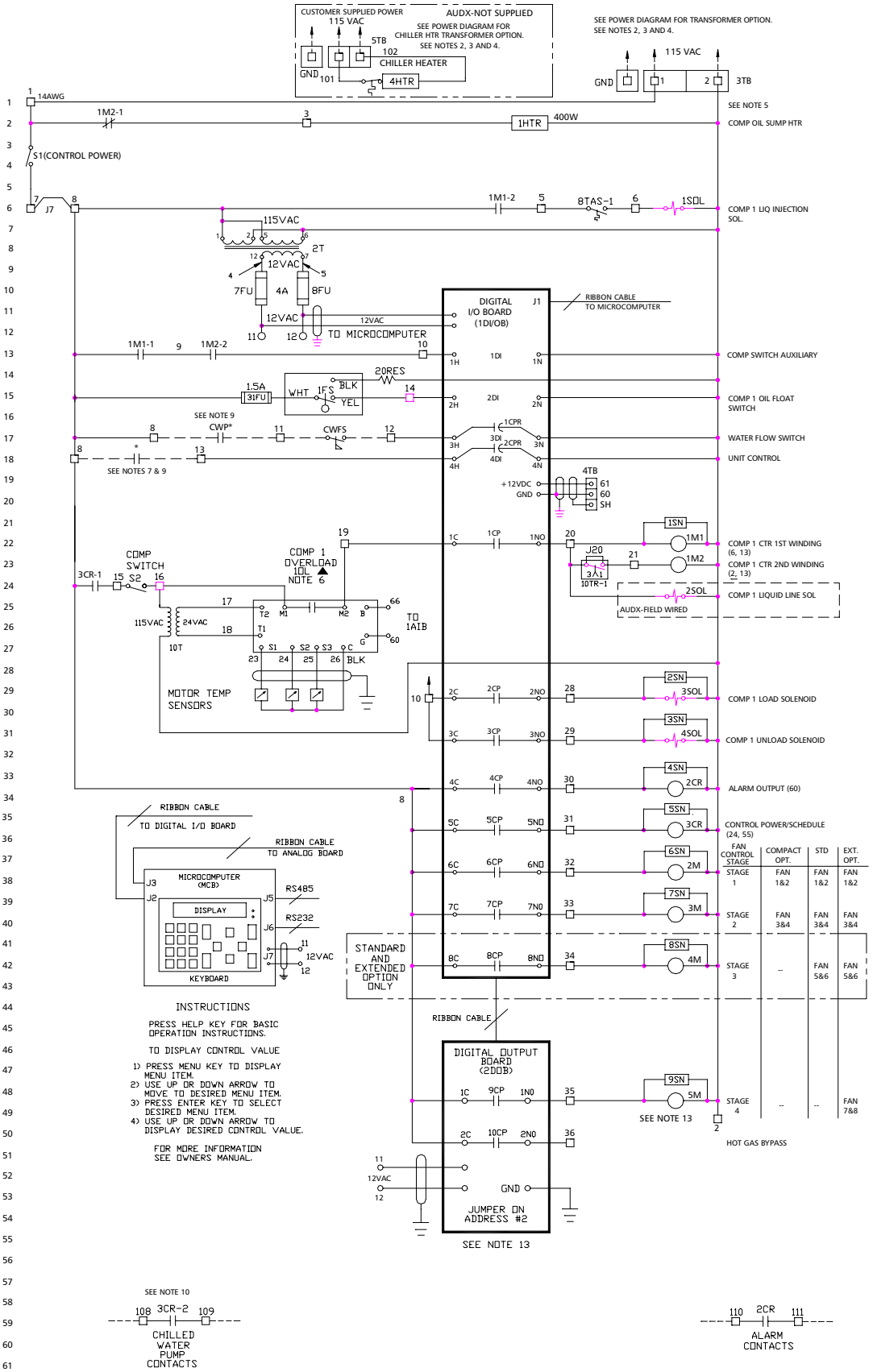
TYPICAL CONTROL WIRING DIAGRAM (SINGLE COMPRESSOR MODEL)



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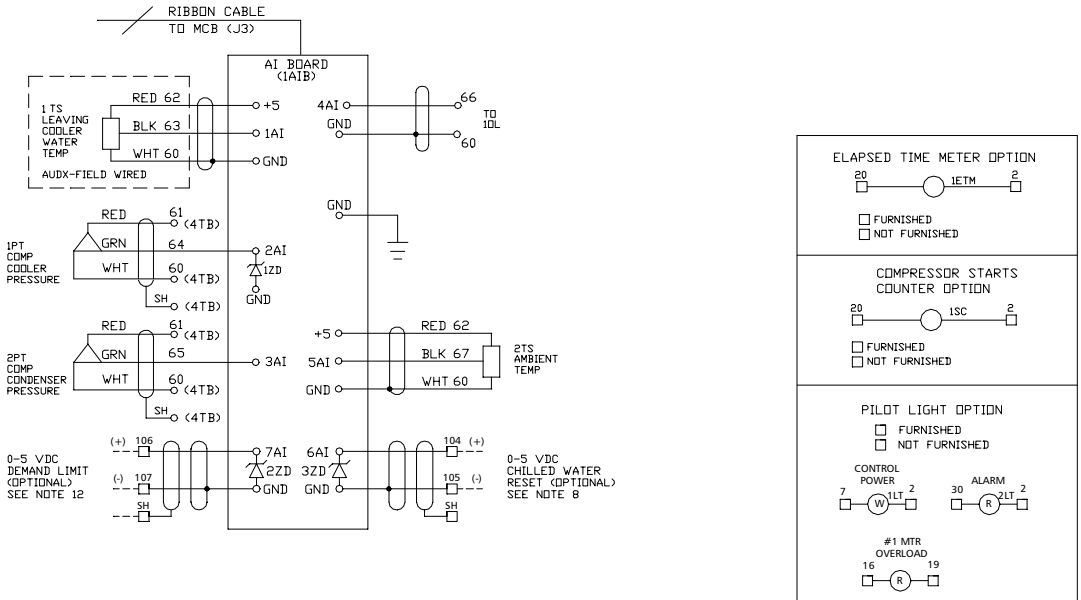
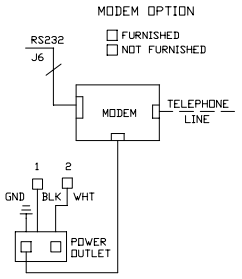
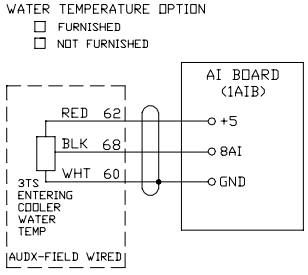
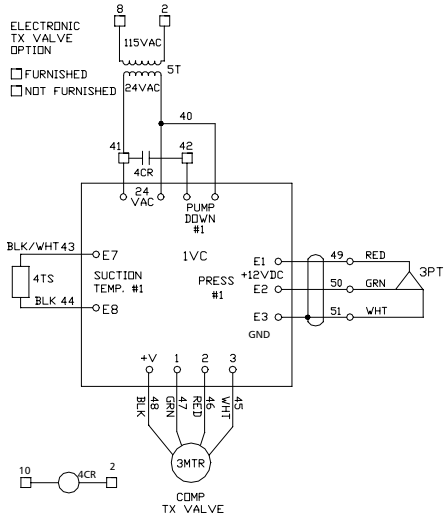
TYPICAL CONTROL WIRING DIAGRAM (SINGLE COMPRESSOR MODEL) (CONT.)•









LEGEND

AI	ANALOG INPUT
AMB	AMBIENT
COMP	COMPRESSOR
CP	CONTROL POINT
CPR	CAPACITOR
CR	CONTROL RELAY
CT	CURRENT TRANSFORMER
CTR	CONTACTOR
CWFS	CHILLED WATER FLOW SWITCH
CWP	CHILLED WATER PUMP
CWR	CHILLED WATER RESET
DI	DIGITAL INPUT
ETM	ELAPSED TIME METER
EXT	EXTENDED
FU	FUSE
GND	GROUND
H-O-T	HIGH OIL TEMP
H-M-T	HIGH MOTOR TEMP
HTR	HEATER
I/O	INPUT/OUTPUT
LT	LIGHT
M	CONTACTOR
MTR	MOTOR
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OL	OVERLOAD
PT	PRESSURE TRANSDUCER
RES	RESISTOR
RLY	RELAY
S	SWITCH
SC	START COUNTER
SH	SHIELD
SN	SNUBBER
SOL	SOLENOID
STD	STANDARD
TAS	THERMOSTAT
TB	TERMINAL BLOCK
TLW	TEMP LEAVING WATER
TR	TIMER
TS	TEMP. SENSOR
UVR	UNDERVOLTAGE RELAY
ZD	ZENER DIODE
▲	MANUAL RESET
□	FACTORY TERMINAL
— — —	FIELD WIRING
*	FIELD SUPPLIED

WARNING

CHECK SETPOINTS BEFORE STARTING UNIT. DO NOT SET THE SETPOINTS IN THE TABLE TO A VALUE LOWER THAN THAT INDICATED FOR YOUR GLYCOL CONCENTRATION. TO DO SO WILL VOID THE WARRANTY.

SET POINTS

	NAME	A	B
1	LV WTR SP.	TLW °F	
2	LEAD		0.0
3	RAMP UP	0.2	30.0
4	AMP LIMIT	(UNLOAD)	(HOLD)
5	PWR LOSS		0.0
6	HI/LO PRESSURE	360 PSIG	SEE TABLE
7	FREEZE		SEE TABLE
8	HOT GAS BYPASS	80.0%	45.0%
9	LO AMB	20.0°F	NOTE 11
10	SUCTION LIMIT	SEE TABLE	SEE TABLE
11	DISCHARGE LIMIT	355 PSIG	345 PSIG
12	FAN STAGE 1	230 PSIG	100 PSIG
13	FAN STAGE 2	240 PSIG	140 PSIG
14	FAN STAGE 3	250 PSIG	160 PSIG
15	FAN STAGE 4	260 PSIG	170 PSIG
16	DMND LMT/CWR	0.0	0.0
	ANTIRECYCLE 10TR-1		15 MIN. 1 SEC
		OPEN	CLOSE
	8TAS-1	165 °F	175 °F

SETPOINT TABLE

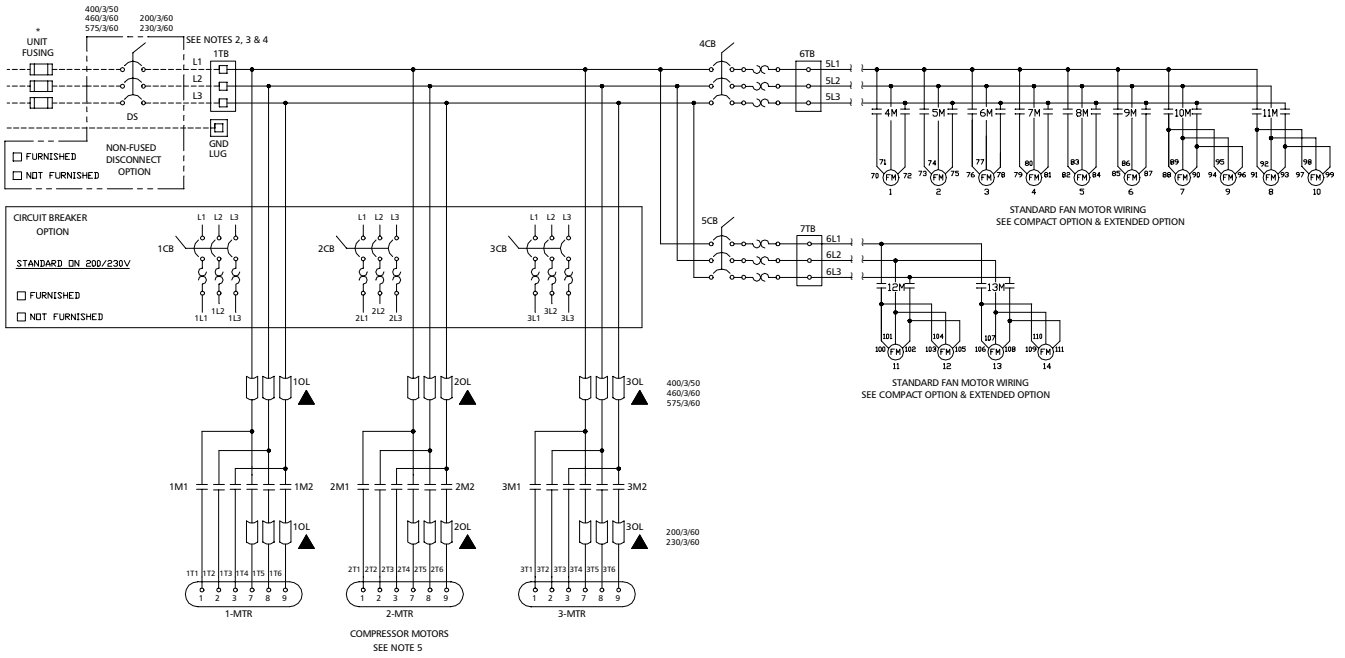
% ETHYLENE GLYCOL	MIN. LOW P. [6B] (PSIG)	MIN. TLW [1A] (°F)	MIN. FREEZE [7B] (°F)	SUCTION LIMIT [10A] (PSIG)	SUCTION LIMIT [10B] (PSIG)
0	58	42	38	60	62
10	52	37	24	54	56
20	41	28	24	43	45
30 - 60	30	20	9	32	34

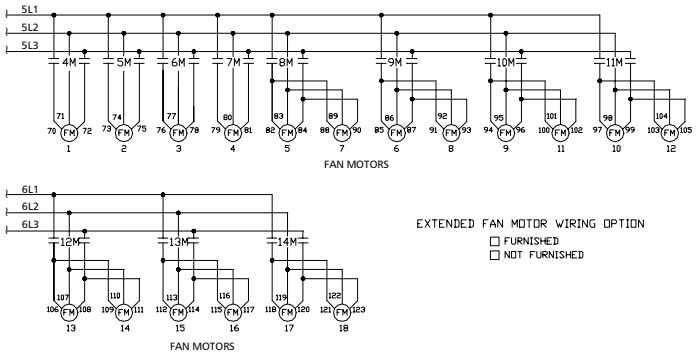
% PROPYLENE GLYCOL	MIN. LOW P. [6B] (PSIG)	MIN. TLW [1A] (°F)	MIN. FREEZE [7B] (°F)	SUCTION LIMIT [10A] (PSIG)	SUCTION LIMIT [10B] (PSIG)
0	58	42	38	60	62
10	51	37	32	53	55
20	43	29	25	45	47
30 - 60	32	20	14	34	36

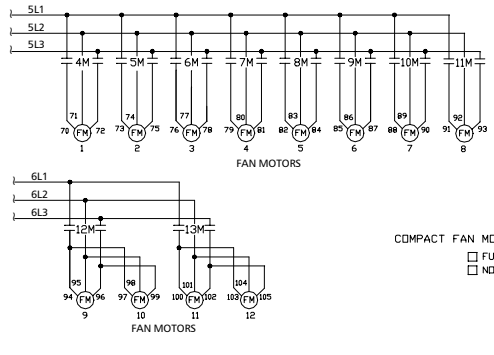
NOTES

1- FUSES SHALL BE TIME DELAY TYPE.
2- ALL FIELD WIRING SHALL COMPLY WITH LOCAL, STATE AND NATIONAL CODES.
3- USE COPPER CONDUCTORS ONLY. CONTROL WIRING 14AWG WITH MAX. 15A OVERCURRENT PROTECTION. USE TERMINALS 2 AND 102 FOR NEUTRAL CONNECTIONS.
4- DISCONNECT MEANS AND BRANCH CIRCUIT PROTECTION SHALL BE PROVIDED BY INSTALLER IF NOT SUPPLIED.
5- IF POWER SUPPLY HAS BEEN INTERRUPTED FOR A PROLONGED PERIOD, OIL SUMP HEATERS MUST BE ENERGIZED FOR 24 HOURS MINIMUM BEFORE STARTING COMPRESSORS.
6- TO RESET OVERLOAD TURN COMPRESSOR SWITCH OFF FOR 5 SECONDS.
7- CUSTOMER CONTROL CONTACTS MUST BE WIRED BETWEEN TERMINALS 8&13.
8- IF 0-5 VDC CWR IS USED, SET SETPOINT 16B TO RESET DESIRED AT +5VDC INPUT. CAUTION: DO NOT SUPPLY OVER 5.0VDC TO 6AI.
9- SHIELDED CABLE IS RECOMMENDED FOR CUSTOMER SUPPLIED CONTACT WIRING. GROUND ON SUBPANEL.
10- CONTACT RATING IS 10A AT 125 VAC AND 5A AT 250 VAC (1/2 HP).
11- LOW AMBIENT SETPOINT 9A CAN BE SET TO A MINIMUM OF 0°F (-17°C) IF LOW AMBIENT OPTION IS SUPPLIED, OR -20°F (-29°C) IF BOTH LOW AMBIENT AND ELECTRONIC TX VALVE OPTIONS ARE SUPPLIED.
12- IF 0-5 VDC DEMAND LIMIT IS USED, SET SETPOINT 16A TO THE DESIRED DEMAND LIMIT AT +5 VDC INPUT. THERE IS NO DEMAND LIMITING AT 0 VDC INPUT. CAUTION: DO NOT SUPPLY OVER 5.0 VDC TO 7AI.
13- 5M IS USED IN THE EXTENDED OPTION ONLY. DDOUT BRD (2DOB) IS USED IN EITHER THE EXTENDED OPTION AND/OR HOT GAS BYPASS OPT.

TYPICAL POWER WIRING DIAGRAM (THREE COMPRESSOR MODEL)







NOTES

1- FUSES SHALL BE TIME DELAY TYPE.
2- ALL FIELD WIRING SHALL COMPLY WITH LOCAL, STATE, AND NATIONAL CODES.
3- USE COPPER CONDUCTORS ONLY. CONTROL WIRING 14AWG.
4- DISCONNECT MEANS AND BRANCH CIRCUIT PROTECTION SHALL BE PROVIDED BY INSTALLER UNLESS DISCONNECT OPTION IS FURNISHED.
5- IF POWER SUPPLY HAS BEEN INTERRUPTED FOR A PROLONGED PERIOD, OIL SUMP HEATERS MUST BE ENERGIZED FOR 24 HOURS MINIMUM BEFORE STARTING COMPRESSORS.

LEGEND

CB	CIRCUIT BREAKER
C	SHORTING CONTACTOR
CO	CONVENIENCE OUTLET
COMP	COMPRESSOR
CPR	CAPACITOR
CT	CURRENT TRANSFORMER
DS	DISCONNECT SWITCH
FM	FAN MOTOR
FU	FUSE
GND	GROUND
M	CONTACTOR
MTR	MOTOR
OL	OVERLOAD
S	SWITCH
SCR	SPEED CONTROL
SOL	SOLENOID
T	TRANSFORMER
TB	TERMINAL BLOCK
UVR	UNDERVOLTAGE RELAY
VM	VOLTMETER
▲	MANUAL RESET
□	FACTORY TERMINAL
– – – –	FIELD WIRING
*	FIELD SUPPLIED
[ ]	STANDARD COMPONENT

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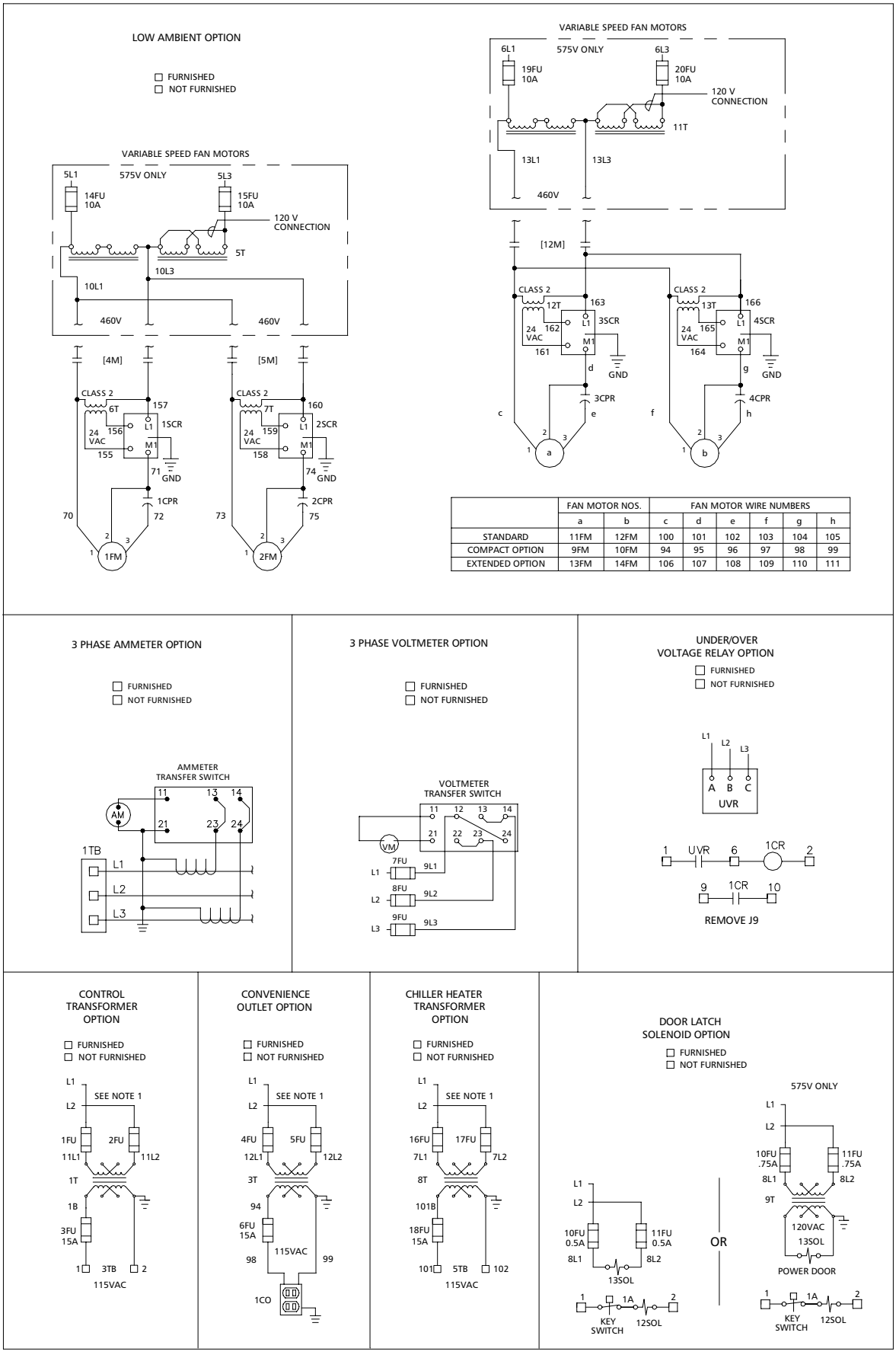
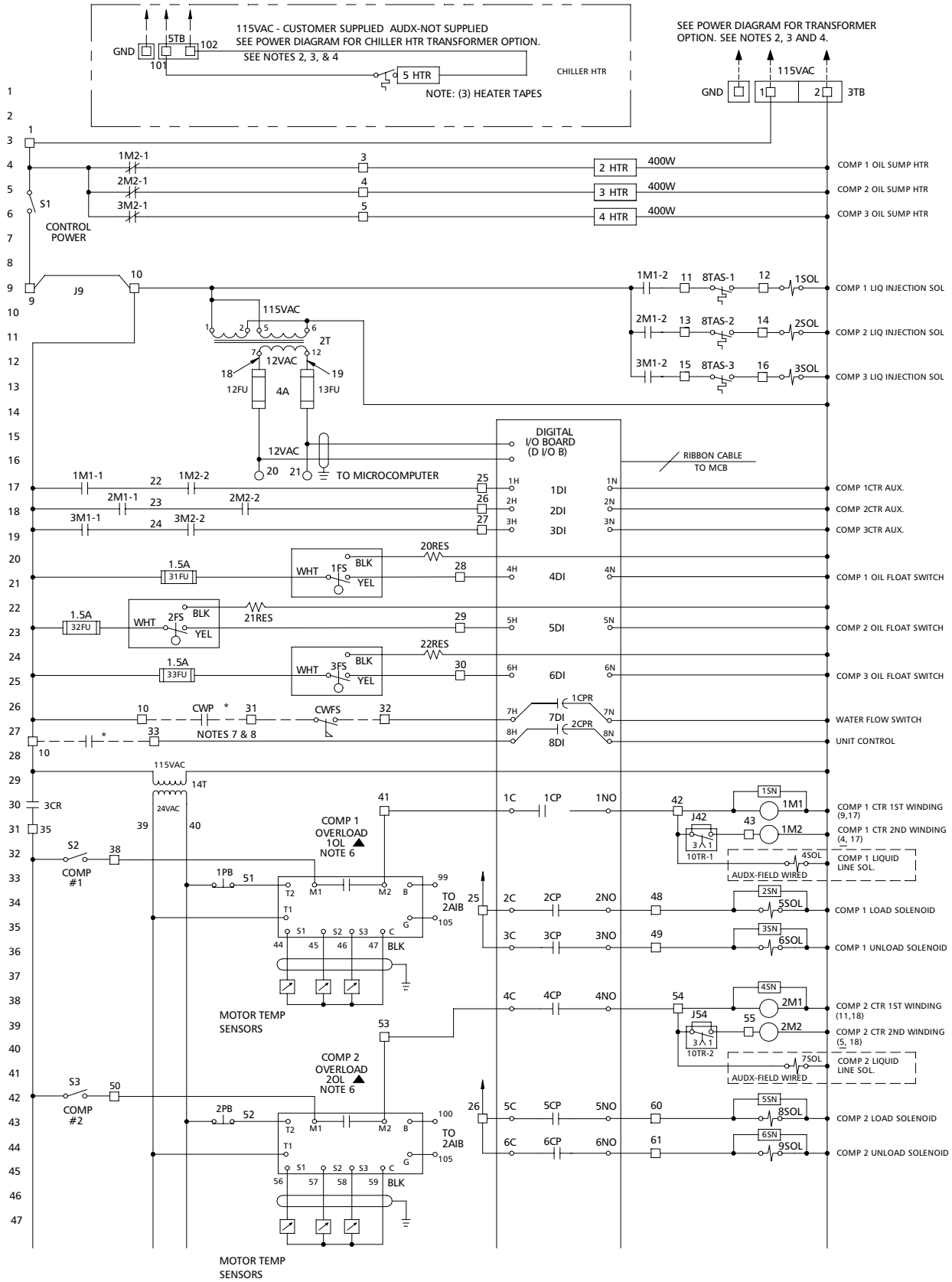
TYPICAL POWER WIRING DIAGRAM (THREE COMPRESSOR MODEL) (CONT.)

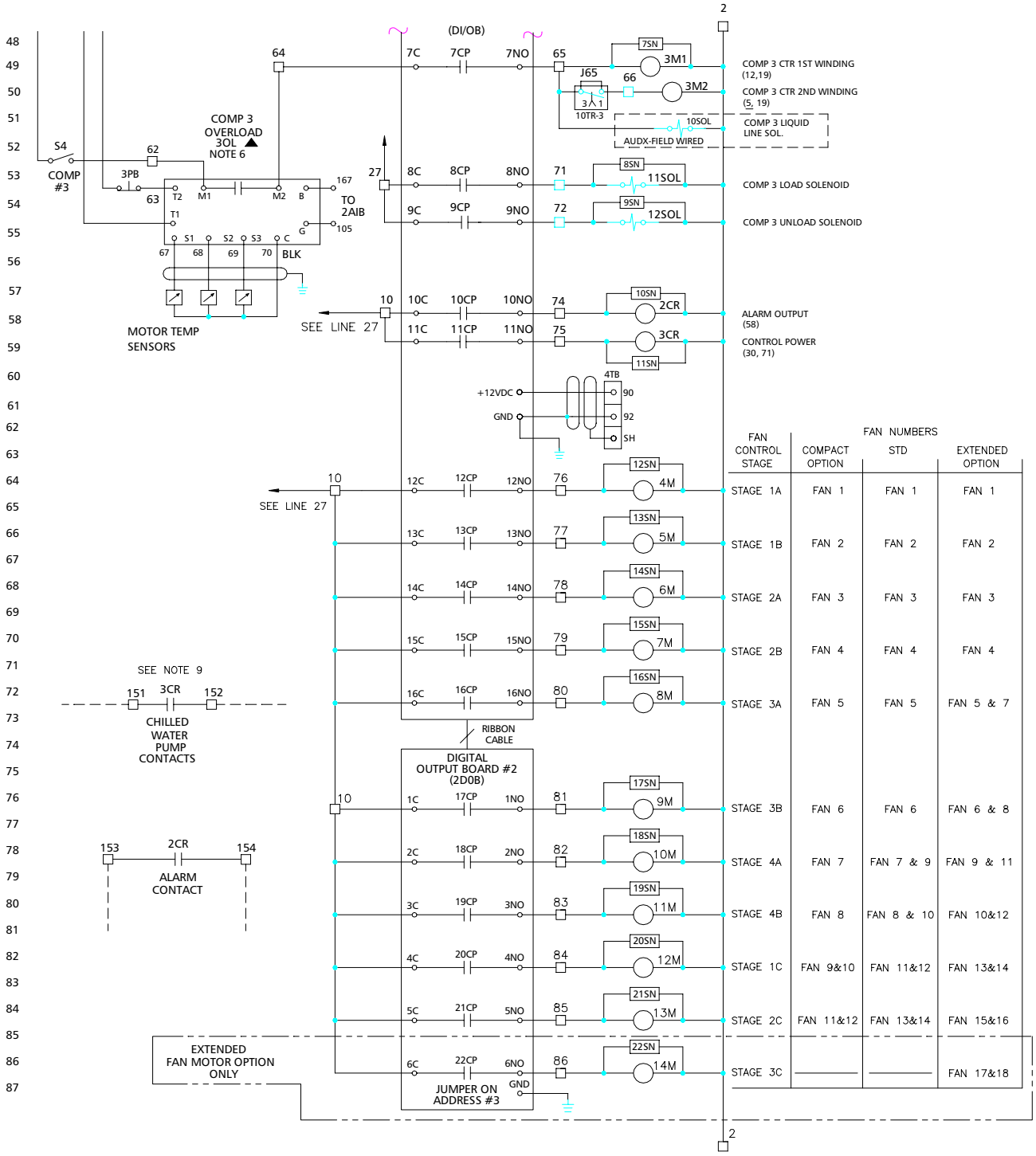


	FAN MOTOR NOS.		FAN MOTOR WIRE NUMBERS					
	a	b	c	d	e	f	g	h
STANDARD	11FM	12FM	100	101	102	103	104	105
COMPACT OPTION	9FM	10FM	94	95	96	97	98	99
EXTENDED OPTION	13FM	14FM	106	107	108	109	110	111

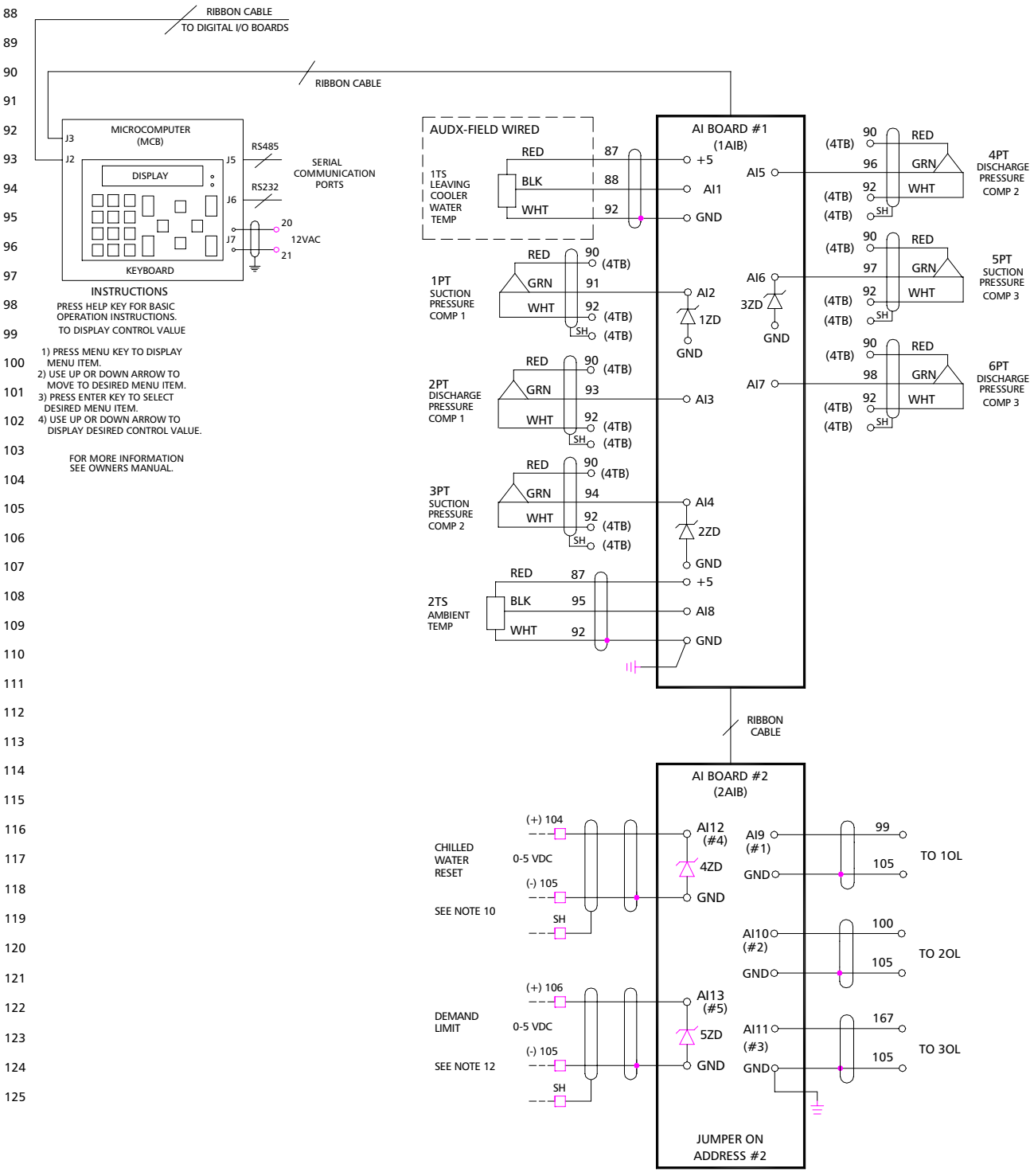
TYPICAL CONTROL WIRING DIAGRAM (THREE COMPRESSOR MODEL)



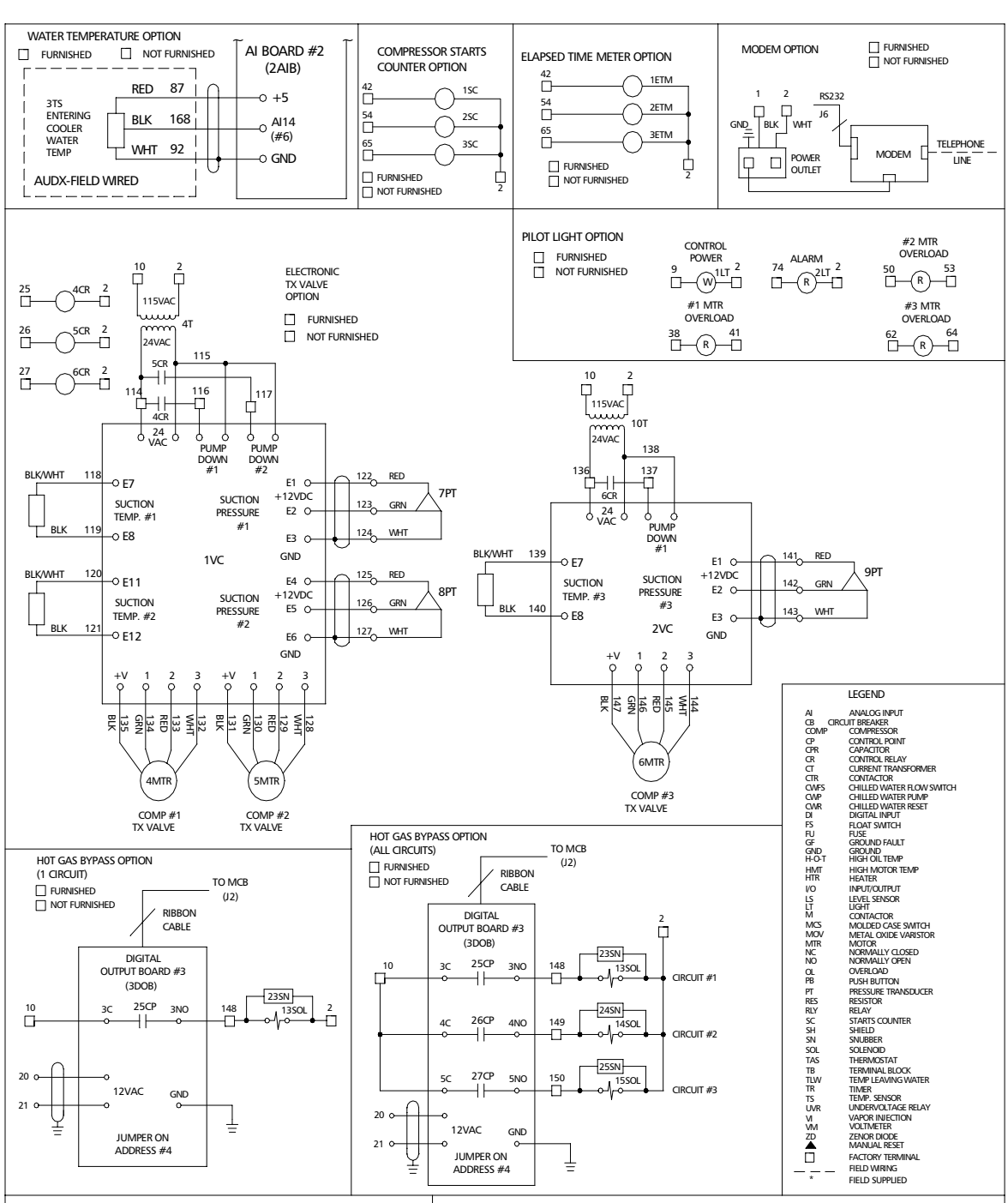
TYPICAL CONTROL WIRING DIAGRAM (THREE COMPRESSOR MODEL) (CONT.)• •



TYPICAL CONTROL WIRING DIAGRAM (THREE COMPRESSOR MODEL) (CONT.)• •



TYPICAL CONTROL WIRING DIAGRAM (THREE COMPRESSOR MODEL) (CONT.)• •



NOTES

1- FUSES TO BE TIME DELAY TYPE.
2- ALL FIELD WIRING SHALL COMPLY WITH LOCAL, STATE AND NATIONAL CODES.
3- USE COPPER CONDUCTORS ONLY. CONTROL WIRING 14AWG. WITH MAX. 15A OVERCURRENT PROTECTION, USE TERMINALS 2 AND 102 FOR NEUTRAL CONNECTIONS.
4- DISCONNECT MEANS AND BRANCH CIRCUIT PROTECTION SHALL BE PROVIDED BY INSTALLER
5- I F POWER SUPPLY HAS BEEN INTERRUPTED FOR A PROLONGED PERIOD, OIL SUMP HEATERS MUST BE ENERGIZED 24 HOURS MINIMUM BEFORE STARTING COMPRESSORS.
6- TO RESET OVERLOAD, PRESS CORRESPONDING PUSH BUTTON.
7– CUSTOMER CONTROL CONTACTS MUST BE WIRED BETWEEN TERMINALS 10 AND 33.
8- SHIELDED CABLE IS RECOMMENDED FOR FLOW SWITCH AND CUSTOMER CONTROL FIELD WIRING.
9- CONTACT RATING IS 10A AT 125VAC AND 5A AT 250VAC (1/2HP).
10- IF 0-5 VDC CWR IS USED, SET SETPOINT 16B TO RESET DESIRED AT +5VDC INPUT. CAUTION: DO NOT SUPPLY OVER 5.0 VDC TO AI10.
11- LOW AMBIENT SETPOINT 16A CAN BE SET TO A MINIMUM OF 0°F (-17°C) IF LOW AMBIENT OPTION IS SUPPLIED, OR -20°F (-29°C) IF BOTH LOW AMBIENT AND ELECTRONIC TX VALVE OPTIONS ARE SUPPLIED.
LIMIT AT +5 VDC INPUT. THERE IS NO DEMAND LIMITING AT 0 VDC INPUT.
CAUTION: DO NOT SUPPLY OVER 5.0 VDC TO AI11.
12- IF 0-5 VDC DEMAND LIMIT IS USED, SET SETPOINT 17A TO THE DESIRED DEMAND

SET POINTS

		A	B
1	LV. WTR. SP.	TLW F °	
2	LEAD		0.0
3	RAMP UP	0.2	30 %
4	AMP LIMIT 1	(UNLOAD)	(HOLD)
5	AMP LIMIT 2	(UNLOAD)	(HOLD)
6	AMP LIMIT 3	(UNLOAD)	(HOLD)
7	PWR LOSS		0.0
8	HI/LO PRESS	360PSIG	SEE TABLE
9	FREEZE		SEE TABLE
10	FAN STAGE 1	230PSIG	100 PSIG
11	FAN STAGE 2	240PSIG	140 PSIG
12	FAN STAGE 3	250PSIG	160 PSIG
13	FAN STAGE 4	260PSIG	170 PSIG
14	H G BYPASS	80%	45%
15	DISCHARGE LIMIT	355PSIG	345PSIG
16	LO AMB	20.0°F	SEE NOTE 11
17	DMND LMT/CWR	0.0	0.0
18	SUCTION LIMIT	SEE TABLE	SEE TABLE
	10TR-1,2 ANTIRECYCLE		1 SEC. 15 MIN.
		OPEN	CLOSE
	8TAS-1, 2, 3	165°F	175°F

SET POINT TABLE

% ETHYLENE GLYCOL	MIN. LOW P. [8B] (PSIG)	MIN. TLW [1A] (°F)	MIN. FREEZE [9B] (°F)	SUCTION LIMIT [18A] (PSIG)	SUCTION LIMIT [18B] (PSIG)
0	58	42	38	60	62
10	52	37	24	54	56
20	41	28	24	43	45
30-60	30	20	9	32	34

% PROPYLENE GLYCOL	MIN. LOW P. [8B] (PSIG)	MIN. TLW [1A] (°F)	MIN. FREEZE [9B] (°F)	SUCTION LIMIT [18A] (PSIG)	SUCTION LIMIT [18B] (PSIG)
0	58	42	38	60	62
10	51	37	32	53	55
20	43	29	25	45	47
30-60	32	20	14	34	36

WARNING

CHECK SETPOINTS BEFORE STARTING UNIT. DO NOT SET THE SETPOINTS IN THE TABLE TO A VALUE LOWER THAN THAT INDICATED FOR YOUR GLYCOL CONCENTRATION. TO DO SO WILL VOID THE WARRANTY.

GUIDE SPECIFICATIONS

Part 1: General

1.01 Work Included

A. Provide a complete Air Cooled Packaged Chiller utilizing rotary screw compressors suitable for outdoor installation and be controlled by a Full Function Microcomputer Controller. Contractor shall furnish and install chillers as shown and scheduled on the drawings. Units shall be installed in accordance with this specification.

B. Chillers shall be selected for use with water / (___% ethylene or propylene glycol).

1.02 Quality Assurance

A. Unit construction shall be designed to conform to ANSI / ASHRAE 15 latest version safety standards, NEC (USA), and ASME Section VIII (USA) applicable codes.

B. Unit shall have ETL (USA) and cETL (Canadian) approval (60Hz)

C. The unit shall comply with all local codes.

D. Unit efficiency shall meet or exceed ASHRAE Standard 90.1 (1989)

E. The unit shall be rated in accordance with ARI Standard 550/590 latest version.

F. The unit shall be fully tested at the factory with all options mounted and wired.

1.03 Design Base

A. The construction drawings indicate a system based on a selected manufacturer of equipment and the design data available to the Engineer during construction document preparation. Electrical services, size, configuration and space allocations are consistent with that manufacturer's recommendations and requirements.

B. Other listed or approved manufacturers are encouraged to provide equipment on this project; however, it shall be the Contractor and/or Supplier's responsibility to assure the equipment is consistent with the design base. No compensation will be approved for revisions required by the design base or other manufacturers for any different services, space, clearances, etc.

1.04 Related Work Specified Elsewhere

A. General Provisions: Section 15XXX

B. General Completion and Startup: Section 15XXX

C. Equipment & Pipe Identification: Section 15XXX

D. Tests: Section 15XXX

E. Vibration Isolation: Section 15XXX

F. Chilled Water System: Section 15XXX

1.05 Submittals

A. Submit shop drawings on each piece of equipment specified in accordance with Specifications Section 51010, General Provisions.

B. Furnish three (3) sets of Operations and Maintenance Data.

1.06 Delivery and Handling

A. The unit shall be delivered to the job site completely assembled and charged with refrigerant and oil by the manufacturer.

B. Delivery and handling shall comply with the manufacturer's instruction for rigging and handling.

C. The unit controls shall be capable of withstanding 150°F (66°C) - storage temperature in the control panel for an indefinite period of time

1.07 Start-Up

A. The contractor shall provide labor to accomplish the check, test and startup procedure as recommended by the unit manufacturer.

B. The startup serviceman shall provide and complete the manufacturers check, test and start forms. One copy shall be sent to the engineer and one copy to the manufacturer's factory.

C. The unit manufacturer shall provide a factory-trained serviceman to supervise the original startup of the units for final operation.

1.08 Warranty

A. The equipment supplier shall provide a warranty on the entire refrigeration system exclusive of refrigerant for a period of one (1) year from date of start-up or 18 months from date of shipment, whichever occurs first. Compressors shall have, as standard, an additional one (1) year warranty, **2 years total.**

B. (Provide an optional extended three - (3) year warranty on the compressors only, 5 years total).

C. The start-up date shall be certified by the Mechanical Contractor, and provided to the Manufacturer, Engineer and Owner.

D. (During the warranty period, the equipment supplier shall furnish the services of an authorized service agency for all labor associated with parts replacement or repair, and start-up of the refrigeration equipment at the beginning of each cooling season. The equipment supplier shall also furnish the services of an authorized service agent for one maintenance visit during winter months of operation, the Owner shall designate such time.)

1.09 Maintenance

Maintenance of the chillers shall be the responsibility of the owner and performed in accordance with the manufacturer's instructions.

Part 2: Products

2.01 Air Cooled Rotary Screw Water Chillers

2.02 Acceptable Manufacturers

A. Dunham-Bush, Inc.

B. (Approved equal)

2.03 General

A. Furnish and install as shown on the plans, an air-cooled, twin rotor, screw compressor water chiller with infinite capacity control. Units shall be Dunham-Bush Model ACDX-B or equal.

B. The units are to be completely factory assembled and wired in a single package complete with Twin Rotor Screw compressor, evaporator, condenser, starting controls, safety controls and operating controls. The unit is to be given a complete factory operating and control sequence test under load conditions with fluid hooked up, and is to be shipped with full operating charge of refrigerant and oil.

C. The units shall be built in accordance with all applicable national and local codes including the ANSI safety code; the National Electrical Code and applicable ASME Code for Unfired Pressure Vessels.

D. The Standard and Extended unit shall meet or exceed the latest ASHRAE standard 90.1 Energy Efficiency Code.

E. The units transmitted sound level shall not exceed (_____) dBa overall "A" weighted sound pressure level based on sound power readings taken in accordance with ARI 370 Standard Sound Ratings of Large Outdoor Refrigerating and Air Conditioning Equipment. Measurements are based at 30 feet distance from side unit and 5 feet above ground.

2.04 Performance

The units shall be furnished as shown on capacity schedules and drawings. Unit performance shall be rated in accordance with ARI Standard 550/590, latest revision.

2.05 Construction

The unit will be designed for maximum corrosion protection being of heavy gauge, G90 approved galvanized steel construction. The base shall be manufactured of formed, 8 gauge, galvanized steel channel. Frame members and legs are constructed of 12 gauge, galvanized steel. The unit control center, end enclosure panels and fan decking shall be constructed of 16 gauge galvanized steel and be finished with a baked power high grade outdoor quality coating system which exceeds 500 hour salt spray requirements when tested in accordance with the ASTM-B-117 specifications.

2.06 Evaporator

The evaporator shall be direct expansion, shell and tube type. The shell shall be fabricated from carbon steel, with enhanced inner fin construction inside seamless copper tubes. The tube sheets shall be heavy gauge copper in welded head vessels, or heavy carbon plate steel in removable head vessels. The tubes shall be roller-expanded or brazed into the tube sheets. Water control baffles shall be heavy gauge copper up to 13" diameter vessels, and cold-rolled steel, over 13" diameter. The heads shall be constructed of carbon steel. Evaporators shall be designed, constructed and inspected to comply with latest edition ASME code for unfired pressure vessels. Shell side (water) design working pressure shall be minimum 200 PSIG and tube side (refrigerant) design working pressure shall be minimum 250 PSIG for "EX type" removable head vessels and 300 PSIG for "CH type" welded head vessels.

A thermostatically controlled electric resistance heater cable shall be wrapped around the shell to prevent freezing down to -20°F ambient temperature. The evaporator shell be insulated with ¾" thick closed-cell urethane insulation with a .28 K factor at 75° F. mean temperature.

2.07 Condenser

The condenser coil is to be constructed of copper tubes and die formed aluminum (copper) (poly-coat) fins having self-spacing collars. Fins shall be mechanically bonded to the tubes. An integral sub-cooling loop shall be incorporated into the coil. Condenser divider baffles shall fully separate each condenser fan section to control the airflow to maintain proper head pressure control.

2.08 Fans

The fans shall be heavy duty, aluminum blade, direct drive propeller type. Motors shall be three phase (single phase, variable speed motor used on the lead fan of each refrigerant circuit for optional low ambient) with internal overloads and are to be permanently lubricated.

2.09 Compressor

A. Provide a positive displacement, twin rotor, screw compressor with infinite capacity control. All compressors shall be direct driven with a 3500 RPM integral hermetic motor. Each compressor shall have a NEMA 3R terminal box.

B. Each compressor shall include an integral oil separation system, oil sump, oil sight glass and oil filter. The oil temperature shall be controlled during operation to maintain proper oil temperature throughout the lubrication system.

C. Each compressor shall be fitted with a crankcase heater to maintain oil temperature during shutdown period.

D. Each compressor shall have a suction check valve, suction filter and a discharge check valve. (In addition, each compressor shall be furnished with a suction and discharge service valve permitting isolation of the complete refrigerant charge in the condenser.)

E. The compressor capacity control shall be obtained by an electrically initiated, hydraulically actuated, slide valve to provide infinite capacity control.

F. The compressor shall have a standard **Two Year Warranty**.

2.10 Capacity Control

A. An infinitely variable capacity control system that is capable of matching the demand requirement of the system.

B. A microcomputer-based controller shall modulate a compressor slide valve, in response to supply water temperature and maintain water temperature within ½° F of set point. This system is to provide precise and stable control of supply water temperature over the complete range of operating conditions. It shall be capable of a system capacity control range of 100% to __% at specified conditions. (Provide hot gas bypass to provide capacity control to approximately 50% of the minimum unit slide valve unloading capability).

2.11 Refrigerant Circuit

A. The unit shall be provided with fully independent refrigerant circuits per compressor.

B. Multiple compressor units shall be provided with a multi-circuited direct expansion evaporator and air cooled condenser.

C. The packaged chiller shall use a positive pressure refrigerant that will not require a purge system.

D. Each refrigerant circuit shall include thermal (electronic expansion) expansion valve, sight glass, moisture indicator, solenoid valve, replaceable core filter-drier, liquid line shut off valves, high pressure relief valves, charging and gauge connections.

2.12 Control Center

A. Control Center shall be fully enclosed in baked powder coated steel, control panel with hinged access doors. Dual compartments, separating the safety and operating controls from the power controls, are to be provided. Controls shall include:

1. Separate terminal blocks for main power, 115 VAC control power and 115 VAC chiller heater power
2. Compressor starting contactors for across the line or delta/delta incremental start.
3. Solid state motor protection module providing phase loss, current unbalance, phase reversal, current sensing and thermal overload protection
4. Complete labeling of all control components
5. Numbering of wires and terminal strips for easier wire tracing
6. Terminals for customer digital input to enable/disable unit
7. Dry contacts for chiller water pump control
8. Dry contacts for unit alarm
9. Condenser fan control contactors
10. Fuses/circuit breakers in the fan circuit
11. Condenser pressure sensing fan cycling control for start-up and operation down to 20°F. ambient
12. (Control transformer)
13. (Convenience outlet)
14. (Chiller heater transformer)
15. (Over/under voltage relay)
16. (Operation and safety lights visible from unit exterior including: power on; alarm; compressor overload)
17. (Control panel door latch solenoid to prevent door opening before turning off power to the unit)
18. (Analog ammeter with 3-phase selector switch)
19. (Analog voltmeter with 3-phase selector switch)
20. (Compressor elapsed time meter)
21. (Compressor cycle counter)
22. (Entering chilled water temperature sensor)

B. Control Center's individual Microcomputer shall provide compressor staging based on leaving water temperature and maintain equal loading of multiple compressors throughout the full range of operation. It shall have a two-line 80 character alphanumeric Liquid Crystal display utilizing an easy-to-understand menu driven software. It shall be proactive in control and accommodate system anomalies such as high condensing pressure, low suction pressure, and high compressor amp draw by controlling loading to keep the unit running but at reduced capacity until the fault is fixed. Battery backed-up real time clock and memory with over 10 years life and automatic recharge of lithium ion battery that requires no service.

C. Microcomputer: individual chiller controller shall provide for:

1. **Unit control:**
   a. Staging of compressors
   b. Loading and unloading of compressors based on leaving water temperature
   c. Activating condenser fan relays for fan cycling head pressure control
   d. Seven-day time clock with schedules for machine control
   e. Proactive control to unload the compressors based on high pressure, low pressure, and high amp draw too reduce nuisance trips
   f. (Control of hot gas bypass circuit)
   g. Dry contacts for chilled water pump control
   h. Terminals for customer enable/disable of unit
   i. Dry contacts for unit alarm
2. **Unit Protection:**
   a. Low pressure protection
   b. High pressure protection
   c. Automatic re-start from power outage
   d. Evaporator freeze protection
   e. Compressor current limiting
   f. Anti-recycling protection
   g. Sensor error
   h. Motor high temperature protection
   i. Low oil
   j. Dry contacts for chilled water pump control
   k. Over current protection
   l. Phase loss, phase reversal and phase imbalance
   m. Ramp control for timed unit loading when the return water temperature is 5° F. above leaving water set point
3. **Microcomputer** - **Readouts** shall provide the following:
   a. Compressor run time and cycles
   b. Leaving liquid temperature
   c. (Entering liquid temperature)
   d. Compressor ampere draw
   e. Suction pressure each compressor
   f. Discharge pressure each compressor
   g. Unit control contacts
   h. Water flow switch
   i. Chilled water reset
   j. Digital Outputs
   k. Compressor control status
   l. Unloader control status
   m. Liquid line solenoid control status
   n. Condenser fan control status
   o. Alarm control status
   p. Control power status
   q. Ambient temperature
   r. Chilled water pump control
   s. Utility demand limit

4. **Microcomputer** - **Set-points** shall provide the following:
   a. High discharge pressure
   b. Low suction pressure
   c. Freeze protection temperature
   d. Leaving water temperature
   e. Condenser fan control
   f. Low suction unload
   g. High discharge unload
   h. High & low compressor amperes
   i. Chilled water reset
   j. Demand limit reset
   k. Low ambient lock-out
5. **Microcomputer - Alarm History** shall provide the following:
   a. The 8 most recent alarms can be displayed
   b. Low suction pressure of all circuits
   c. High discharge pressure of all circuits
   d. Freeze protection cutout
   e. No run
   f. No stop
   g. Loss of water flow
   h. Power failure
   i. Temperature sensor error
   j. Hi/Low pressure error
   k. Low oil
6. **Microcomputer Remote Monitoring Capabilities:**
   a. **Telephone Modem (option):**
      The microcomputer is complete with an RS232 communications port and all hardware and software necessary to remotely monitor and control the packaged chiller through the optional phone modem. This option requires a dedicated phone line.
   b. **Remote Monitor Display Terminal (RMDT option):**
      The Remote Monitor Display Terminal is supplied with a 14" monitor, two (2) RS232 serial ports, 6 foot 115 volt power cord and an enhanced PC keyboard. The RMDT can be hard wired up to 50 feet away from the chiller for remote monitoring and operating of the one or multiple units. This option allows remote start-stop, chilled water set-point changes, and reading of all microcomputer screens including operating condition, faults, and fault history.
   c. **BMS - Building Management System Terminal:**
      A BMS (Building Management System) may interface with the chiller microcomputer and provide the same level of monitoring and operating control as above, when the BMS company has implemented the communications protocol. Dunham-Bush has an open communications protocol policy with most BMS companies.
   d. **(Chiller*LINK* {CHLK option}):**
      The Chiller*LINK* shall be supplied for communication from the Chiller (or Chiller Network) to the BMS (Building Management System) through BACnet or MODBUS communicating systems)

2.13 Starting Equipment:

A. Unit mounted Compressor starting contactors for across the line or delta/delta closed transition incremental start.

B. Solid state motor protection module providing phase loss, current imbalance, phase reversal, current sensing and thermal overload protection.

C. (Non-fused disconnect switch with through-the-door interlocking handle – multiple compressor 460 & 575/3/60 volt only.)

D. (Non-fused disconnect switch shipped loose for field mounting and wiring – multiple compressor 200 & 230/3/60 volt only)

E. (Compressor circuit breakers)

2.14 Additional Equipment

A. (Copper Fin/Copper Tube condenser coil)

B. (Silicone polyester Poly-Coat condenser fin coating for maximum salt spray and corrosion resistance)

C. (Control circuit transformer)

D. (Evaporator heater transformer)

E. (Convenience Outlet 115 volt AC powered dual 3 prong ground fault receptacle powered by dedicated transformer and fused for 15 amps)

F. (Hot gas bypass valve to permit operation down to 50% of unit minimum mechanical unloading capability)

G. (Low ambient control to 0°F (-17.8°C) minimum starting ambient)

H. (Extra low ambient control to -20°C) minimum starting ambient)

I. (Gauges include suction, and discharge for each refrigerant circuit in addition to the readings through the microcomputer)

J. (Compressor sound blanket)

K. (Over and under voltage protection relay protects against high and low incoming voltage conditions as well as single phasing, phase reversal and phase imbalance)

L. (Circuit Breakers to provide branch circuit protection)

M. (Fully Painted Unit meets the requirements for outdoor unit application of 500 Hour Salt Spray Paint tested in accordance with ASTM-B-117)

N. (Steel Painted Louvers for complete unit enclosure for general mechanical security and unit aesthetics)

O. (Aluminum Painted Grills similar to louvers except manufactured of aluminum with 3/8" x 3 1/2" slots instead of louvers for hail damage protection and unit aesthetics)

P. (Fin Guards Top only (1" x 4" wire mesh) for vertical side condenser coil protection)

Q. (Fin Guards Bottom only (1" x 4" wire mesh) for general unit mechanical security for the lower portion of the unit)

R. (Flow Switch shipped loose for field mounting and wiring)

S. (Vibration isolators shipped loose: spring or rubber-in-shear)

Part 3: Execution

3.01 Installation Work By Mechanical Contractor

A. Install on a flat surface level within 1/8 inch and of sufficient strength to support concentrated loading. Place vibration isolators under the unit.

B. Assemble and install all components furnished loose by manufacturer as recommended by the manufacturer's literature.

C. Complete all water and electrical connections so unit water circuits and electrical circuits are serviceable.

D. Provide and install valves in water piping upstream and downstream of the evaporator water connections to provide means of isolating evaporator for maintenance and to balance and trim system.

E. Provide soft sound and vibration eliminator connections to the cooler water inlet and outlet as well as electrical connections to the unit.

F. Interlock chillers through a flow switch in the chilled water line to the chilled water pump to ensure the unit can operate only when water flow is established.

G. Furnish and install taps for thermometers and pressure gauges in water piping adjacent to inlet and outlet connections of the evaporator.

H. Provide and install drain valves with capped hose ends to each cooler shell.

I. Install vent cocks to each cooler shell.

J. Provide a separate 115 volt electrical service to power the cooler heater for winter freeze protection. (provide chiller heater transformer)

3.03 Work By Temperature Control Contractor

A. Furnish interlock wiring per manufacturer's recommendations and install loose control components furnished by chiller manufacturer.

3.04 Work By Electrical Contractor

A. Furnish power wiring to chiller control panel and obtain required code approval.

B. Furnish and install approved disconnect switch.

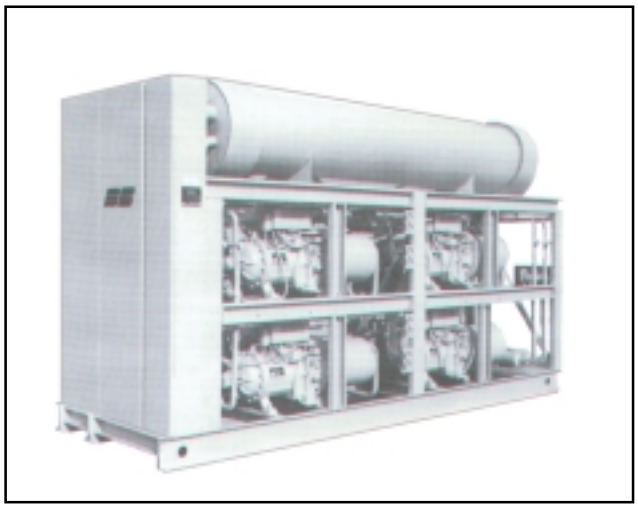
END OF SECTION

Specification subject to change without notice

DUNHAM-BUSH®

ECDX Evaporatively-Cooled Chiller with Rotary Screw Compressor and Direct Expansion Evaporator

DUNHAM-BUSH®



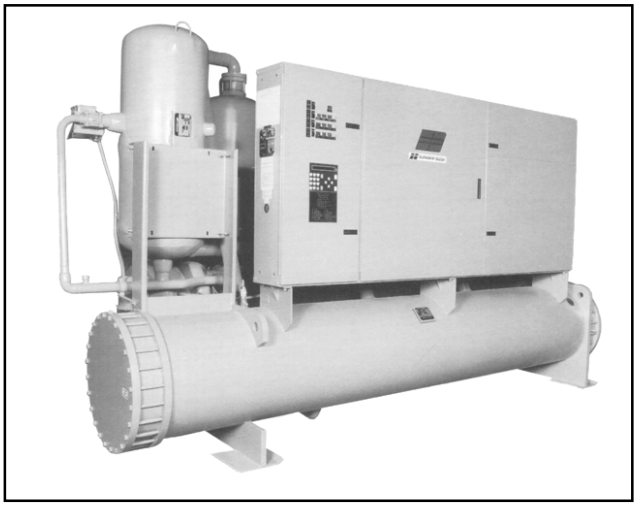
HWSC Rotary Screw Water-Cooled Chiller

DUNHAM-BUSH®

ACDRB Air-Cooled Chiller with Reciprocating Compressor

DUNHAM-BUSH®

WCFX Water-Cooled Multiple Screw Compressor Chiller



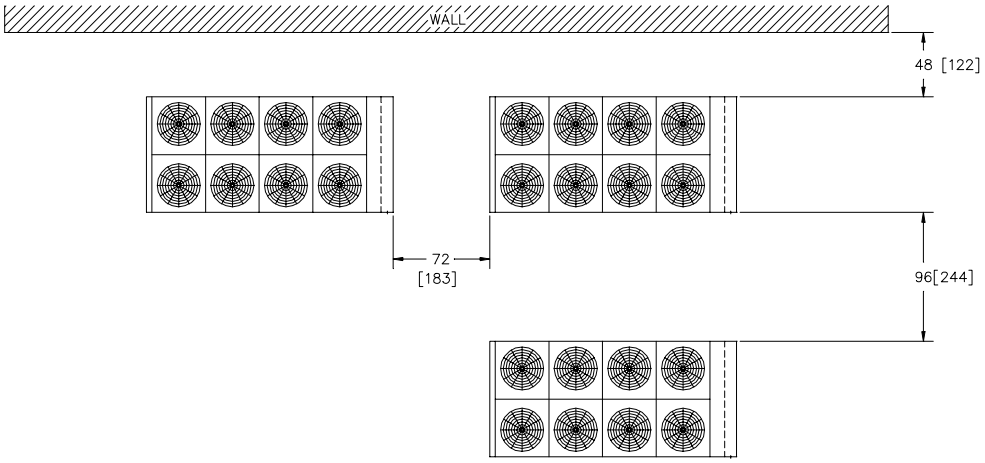
DUNHAM-BUSH®

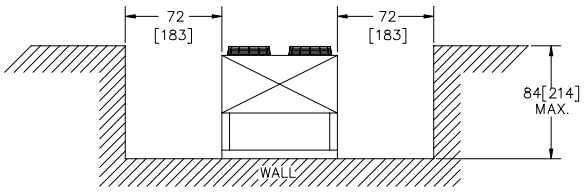
PCXi **Water-Cooled Screw Compressor Chiller**

DUNHAM-BUSH®

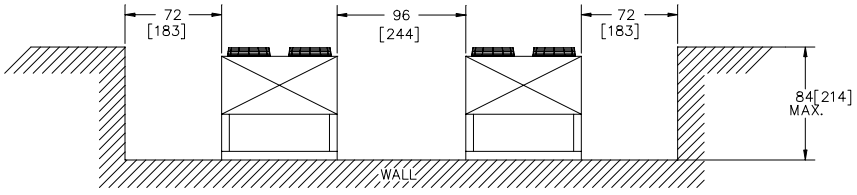
Ice-Cel® Integrated System with ACDR Air-Cooled Chiller

ACDX/AUDX CONDENSER CLEARANCE

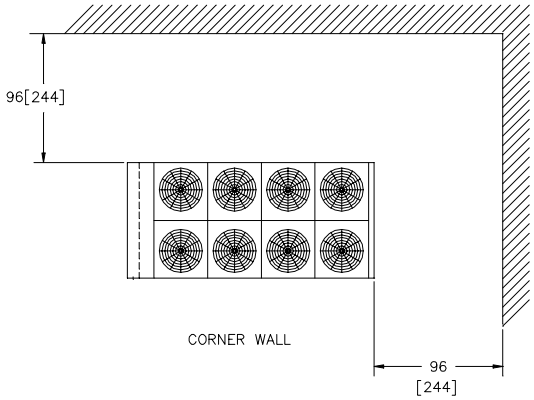




SINGLE PIT
(SEE NOTE 2)



DOUBLE PIT
(SEE NOTE 2)



NOTE:

1) ALL DIMENSIONS ARE MINIMAL, UNLESS OTHERWISE NOTED.
2) PIT INSTALLATIONS ARE NOT RECOMMENDED. RE-CIRCULATION OF HOT CONDENSER AIR IN COMBINATION WITH SURFACE AIR TURBULENCE CANNOT BE PREDICTED. HOT AIR RE-CIRCULATION WILL SEVERELY AFFECT UNIT EFFICIENCY (EER) AND CAN CAUSE HI PRESSURE TRIPS OR FAN MOTOR TEMPERATURE TRIPS. DUNHAM-BUSH WILL NOT BE REPSONSIBLE FOR DUCTING FANS TO A HIGHER LEVEL TO ALLEVIATE THE ABOVE MENTIONED CONDITIONS.

DUNHAM-BUSH®

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