

TOPAIRE

AIR COOLED PACKAGED CHILLERS WITH HORIZONTAL SCREW COMPRESSOR

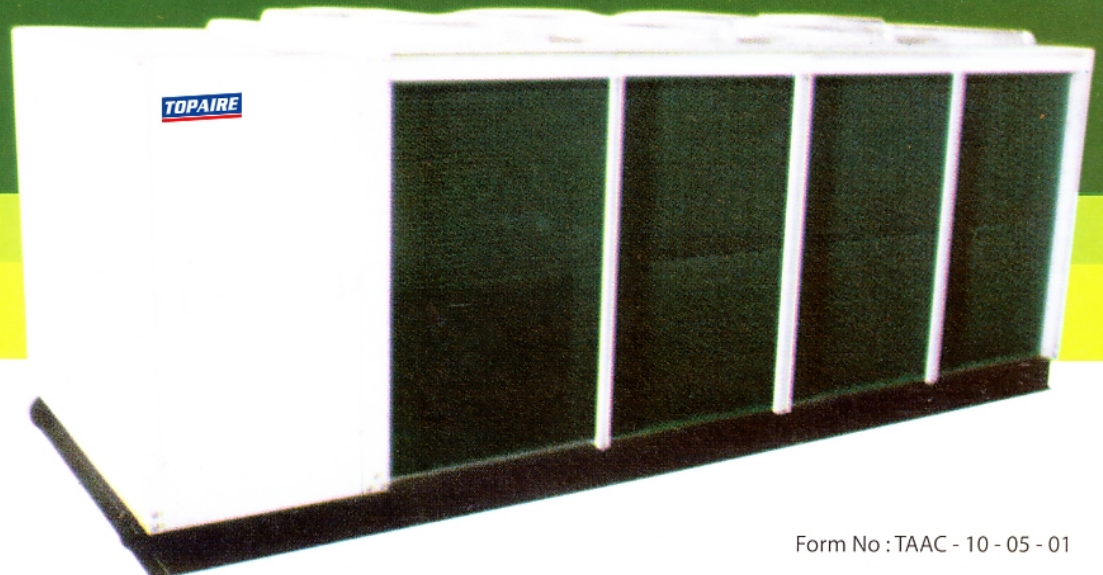
● 40 through 415 Tons

TAAC SERIES R22 & R407c

50Hz

Features:

- Reliable rotary screw compressor performance
 - 19 models to cover whole range of capacity
- Rated with HCFC-22



TOPAIRE
air conditioner

Form No : TAAC - 10 - 05 - 01

STANDARD FEATURES

Size Range

- ✦ 19 models from 40 to 415 tons (50 Hz)
- ✦ Rated with HCFC-22.

Compressor

- ✦ Semi-hermetic rotary screw type at 2950 RPM.
- ✦ Infinite variable slide valve unloading for precise load matching.
- ✦ Compressor cycling for maximum efficiency.

Evaporator

- ✦ Vessels constructed in accordance to the ASME CODES for unfired pressure vessels, the JKKP (the Malaysian DOSH), the Polish and the Chinese authorities.
- ✦ Topaire high efficiency inner-finned tubes design for compactness and weight reduction.

- ✦ 300 psig on refrigerant side design pressure.
- ✦ 200 psig on water side design pressure.
- ✦ Independent refrigerant circuits.

Condenser

- ✦ Seamless copper tubes with aluminum fins.
- ✦ 450 psig test pressure for condenser coils.
- ✦ Low noise fans - direct driven at 950 RPM at 50Hz.
- ✦ All fan motors are suitable for outdoor installations.
- ✦ Copper, hydrophilic and electro-tinned coils are available options.

Electrical/Control

- ✦ Advanced microcomputer control for all models.
- ✦ Chilled water pump control.
- ✦ Separate power and control panels.

UNIT FEATURES: EVAPORATORS

Evaporator

The evaporators incorporate the most advanced vessel technology available today, including the patented Inner-Finned construction of the CH and EX evaporators. Vessels are designed and constructed to meet the requirements of the ASME Code, Section VIII, Division 1 for unfired pressure vessels and are approved and certified by the JKKP (the Malaysian DOSH), as well as the Polish and the Chinese authorities.

The CH evaporators incorporate 1/2 inch (12.7 mm) copper tubes brazed into tube-sheets. The vessel is supplied with welded heads.

The EX evaporators incorporate 5/8 inch (15.9mm) copper tubes and removable heads for ease of tube maintenance. Vent and drain connections are included on all vessels.

Typical For 2 Circuit Evaporators

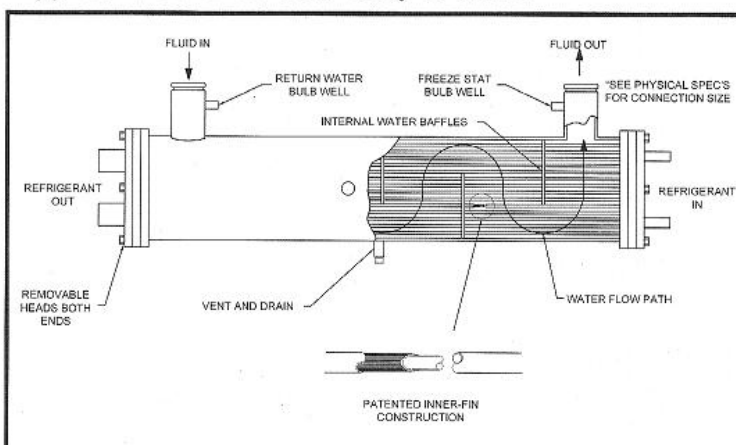


Table 1 : Vessel Design Pressure

Shell & Tube Heat Exchanger (Evaporator)	Water Side		Refrigerant Side	
	Design Pressure (Psig)(Kpa)	Test Pressure (Psig)(Kpa)	Design Pressure (Psig)(Kpa)	Test Pressure (Psig)(Kpa)
CH, EX	200 (1379)	260 (1793)	300 (2069)	330 (2275)

UNIT FEATURES: AIR-COOLED CONDENSERS

All units have direct driven propeller fans and motors. Close blade tip clearance with the fan venturi ensures smooth, quiet operation.

All air-cooled condensers are constructed with 3/8 inch (9.5 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

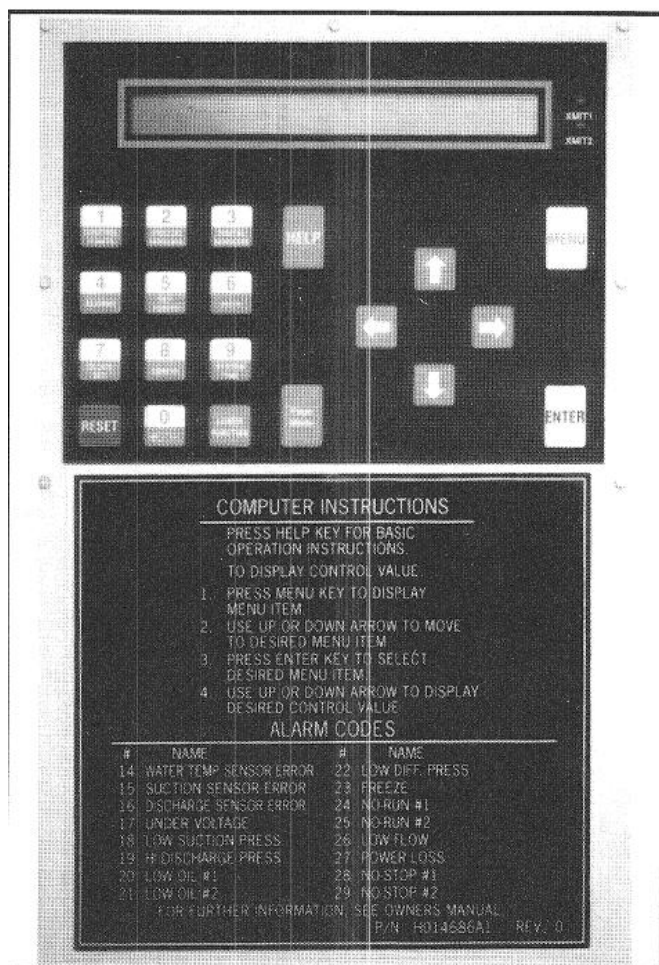
copper, sized for minimum pressure drop, brazed with inert gas in the tubes and tested after fabrication to 450 psig.

Partitions separate each fan section to eliminate possible back spin. The microcomputer NC 25-4 fan cycling control is able to decrease the minimum ambient temperature at which the package equipment will effectively start and operate.

All unit casing is constructed with heavy-gauge galvanized steel sheets. Powder-coat painting is applied for maximum protection and appearance.

UNIT FEATURES: MICROCOMPUTER CONTROL

Control Board



The advanced Microcomputer Control is a standard feature for all models.

Direct digital control (DDC) allows finger-tip user interaction. Its easy-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 allows remote reading of operating parameter updates. The Topaire microcomputer ensures its owner of state-of-the-art technology and unmatched reliability and efficiency.

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
- ✦ Evaporator 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

UNIT FEATURES: MICROCOMPUTER CONTROL

- ✦ 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 inaccurate thermometers.

Capacity Control

The 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 5V d.c. signal. Remote reset of compressor current limit may be accomplished in 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 to that, the microcomputer may be programmed with a seven-day operating cycle or other Topaire control packages may start and stop the system through inter-connecting wiring.

System Protection

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

- ✦ Low suction pressure
- ✦ High discharge pressure
- ✦ High motor temperature/ over current

- ✦ 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 eight latest alarm conditions complete with time of failure in an alarm history. This tool will aid service technicians in troubleshooting. This would minimize 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 phone modem to extended distance by phone system. This valuable enhancement to the refrigeration system allows serviceability. The microcomputer 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.

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.

Topaire has an open communications protocol policy with most BMS companies.

UNIT FEATURES: MICROPROCESSOR CONTROL

Microprocessor Control

The screw compressor chiller is provided with a microprocessor based controller including the following features:

- ✦ Inherent compressor anti-cycling timers
- ✦ Reliability of microprocessor circuitry
- ✦ Direct control from leaving water
- ✦ Optional ambient or return water reset of leaving water temperature at light load

Interface With Energy Management Systems

The unit, with microprocessor control, offers easy, low-cost interface with energy management and load shedding systems

- ✦ Proportional reset of chilled water temperature
- ✦ Multi compressor design allows for easy load shedding through optional, binary contacts

Control Centre

Topaire has designed the chiller control panel to ensure superior equipment reliability as well as full back-up and easy access in case maintenance is required.

Reliability

Although the screw compressor offers superior

incorporated reliability to reciprocating compressors, Topaire has more safety protection into the unit. These include:

- ✦ High pressure cutout, manual reset
- ✦ Low pressure cutout, manual reset
- ✦ Compressor, solid state, thermal sensing overloads, manual reset
- ✦ High refrigerant discharge temperature, manual reset
- ✦ Low water temperature freeze protection, manual reset
- ✦ Phase failure protection against low voltage, phase imbalance, or reversal
- ✦ Safety alarm contacts for high pressure or discharge temperature

The following "power" components provide greater unit reliability:

- ✦ Power terminal block and optional control transformer for single or dual source power
- ✦ Compressor contactors
- ✦ Condenser fan contactors and circuit breakers
- ✦ Inherent condenser fan overload protection

All the above components are mounted in a weatherproofed, gasketed control panel designed for outdoor installation. Reliability is even further insured by the completed factory run testing of every unit which guarantees trouble-free start-up and long term reliability.

UNIT OPTIONS

Options Installed At The Factory

- ✦ Microcomputer control (NC25-4) - A standard feature for all models.
- ✦ Microprocessor monitoring of return chilled water and leaving chilled water temperature.
- ✦ Heat reclaim condensers (desuperheaters) are available for special applications.
- ✦ Unit mounted disconnect for each compressor and control circuit with fuses and fuse block for 400 to 575 volt applications.

- ✦ Copper Condenser Fins- Copper fins offer maximum corrosion protection for severe conditions. In more corrosive environments, hydrophilic or electro-tinned fins would be more appropriate.
- ✦ Indicator Light Set - Provides indicator lights for control power, motor overload, high motor temperature and alarm status.
- ✦ Hot Gas Bypass - Consists of hot gas bypass regulator(s) and solenoid valve(s) for each circuit for applications with a minimum load which may dip below the unit's minimum unloaded capacity.

UNIT OPTIONS

- ✦ Control Circuit Transformer - appropriate KVA rating to power the 115/1/50 control circuit and compressor oil heaters off the service voltage.
- ✦ Chiller Heater Transformer - Appropriate KVA rating to power the 115/1/50 evaporator vessel heater tape.
- ✦ 115V Convenience Outlet - Duplex outlet located inside the control panel and protected by a 15 amp fuse.
- ✦ Over/Undervoltage and Phase Protection Relay - Protects against low or high incoming voltage conditions as well as phase loss, phase reversal and phase imbalance by opening the control circuit. It is an automatic reset device.
- ✦ Electronic Expansion Valves - For more precise control over a wider range of operation. Ideal for low ambient and wide operating ambient temperature range applications.
- ✦ Gauges - Includes suction and discharge pressure gauges for all unit models. These are not necessary with the microcomputer.
- ✦ Low Ambient Controls (LAC option) [Kindly refer to Low Ambient Operation/ Freeze Protection].
- ✦ Compressor Start Counter - One start counter provided for each compressor, located inside the control panel.
- ✦ Compressor Elapsed Time Meter - One elapsed time meter to register run hours per compressor, located inside the control panel.
- ✦ Three Phase Ammeter - Single analog ammeter with a 3 phase selector switch for indication, located inside the control panel.
- ✦ Three Phase Voltmeter - Single analog voltmeter installed with a 3 phase selector switch for indication, located inside the control panel.
- ✦ Entering Fluid Temperature Sensor - Temperature sensor and bulb installed in evaporator inlet connection to supplement the standard leaving (outlet) fluid temperature sensor.
- ✦ Condenser coil guard protects the condenser coils from harsh environments.

UNIT ACCESSORIES

Accessories shipped unmounted

- ✦ Water Flow Switch - Paddle type field adjustable flow switch available for all units, installed into the unit safety circuit so that the package will remain off until there is water flow. Helps to prevent evaporator from freezing. Vapor-proof enclosure, for use on water or glycol systems. The flow switch is to be shipped loose and installed at site.
- ✦ Rubber-in-shear Isolators - Designed for ease of installation, these rubber, one-piece, molded isolators are applicable for most installations.
- ✦ Spring Isolators - These housed spring assemblies have a neoprene friction pad at the bottom to prevent the passage of noise, and a spring locking levering bolt at the top. Neoprene inserts prevent contact between the steel upper and lower housings. Suitable for more critical applications as compared to rubber-in-shear isolators.

APPLICATION DATA

Low Ambient Operation / Freeze Protection

The heater strip must be wrapped around the evaporator shell as well as the water piping. If the unit is required to operate at an ambient temperature below 65°F (18.3°C), solenoid valves would have to be installed along the coil headers with the exception of the last running coil. If the unit is required to operate below 45°F (7.2°C). Both the solenoid coil control and VFD would have to be incorporated. An additional liquid receiver, wrapped with the heater strip, would have to be added for each refrigerant circuit if the required operating ambient temperature ranges between 0°F (-17.8°C) and 20°F (-6.7°C). In addition to the accessories mentioned, an additional electronic expansion valve is required for each refrigerant circuit if the operating ambient goes below 0°F (-17.8°C). Condenser pressure regulators would have to be incorporated as well to regulate the head pressure. The minimum operating ambient temperature is -20°F (-28.9°F). For low ambient applications, kindly consult factory as the unit would have to be redesigned to suit the customer's specific needs.

Desuperheaters

A hot gas desuperheater can be factory supplied for field installation. Tees in refrigerant lines with shut off valves can be supplied. Kindly consult factory for further details.

Water Circuit

Constant water flow required with a minimum of 3 gallons per ton (3.3 liters / kWo) increasing to 10 gallons (11 liters) for process, low load applications with small temperature range and/or vastly fluctuating load conditions.

Glycol Freeze Protection

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

If the equipment is being used for operating conditions below 42°F (5.5°C) with standard vessels or below 40°F (4.4°C) with optional 40°F (4.4°C) vessels, glycol should be used to prevent damage due to freezing. The freeze protection level should be 20°F (11°C) lower than the leaving brine temperature. The use of glycol penalizes the causes a performance as shown in Table 4 for ethylene glycol and Table 5 for propylene glycol and needs to be considered in the unit selection procedure.

Table 4 : Ethylene Glycol

% E. G. By Weight	Freeze Point		C1 Capacity Factor	K1 kW Rate	G1 Flow Factor	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	1.275
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 5 : Propylene Glycol

% P. G. By Weight	Freeze Point		C2 Capacity Factor	K2 kW Rate	G2 Flow Factor	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

LWT °F	MODEL TAAC	AMBIENT AIR TEMPERATURE °F							
		85		95		105		115	
		TONS	KWI	TONS	KWI	TONS	KWI	TONS	KWI
40	40S-5-S	39.4	41.5	36.6	45.7	33.3	50.5	29.5	56.1
	45S-5-S	44.4	45.6	41.3	50.3	37.6	55.6	33.2	61.8
	60S-5-S	60.0	59.3	55.8	65.3	50.8	72.3	44.9	80.2
	75S-5-S	75.6	74.4	70.2	81.9	63.9	90.6	56.5	100.7
	95S-5-S	94.6	95.3	87.9	105.0	80.0	116.1	70.7	128.9
	115S-5-S	113.7	111.2	105.6	122.5	96.1	135.5	85.0	150.5
	135S-5-S	132.8	131.2	123.3	144.5	112.2	159.9	99.3	177.7
	150S-5-S	146.2	144.0	135.8	158.6	123.6	175.5	109.3	195.0
	195S-5-S	191.0	186.3	177.4	205.2	161.5	227.0	142.8	252.2
	80D-5-S	78.8	83.0	73.2	91.4	66.6	101.0	58.9	112.2
	90D-5-S	88.8	91.2	82.5	100.6	75.1	111.2	66.5	123.6
	120D-5-S	120.1	118.6	111.5	130.6	101.5	144.6	89.8	160.4
	150D-5-S	151.1	148.8	140.4	163.8	127.8	181.2	113.0	201.4
	190D-5-S	189.2	190.6	175.7	210.0	160.0	232.2	141.5	257.8
	230D-5-S	227.4	222.4	211.2	245.0	192.2	271.0	170.0	301.0
	270D-5-S	265.6	262.4	246.6	289.0	224.5	319.8	198.6	355.4
	300D-5-S	292.4	288.0	271.5	317.2	247.1	351.0	218.6	390.0
42	385D-5-S	382.1	372.6	354.8	410.4	323.0	454.0	285.7	504.4
	415D-5-S	412.0	401.0	382.6	441.8	348.3	488.6	308.1	542.8
	40S-5-S	41.0	41.8	38.1	46.0	34.8	51.0	30.8	56.6
	45S-5-S	46.3	46.0	43.0	50.7	39.2	56.1	34.8	62.5
	60S-5-S	62.5	59.7	58.1	65.9	53.0	72.9	47.0	81.1
	75S-5-S	78.7	74.9	73.1	82.6	66.7	91.5	59.1	101.6
	95S-5-S	98.5	96.0	91.5	105.9	83.5	117.2	74.0	130.3
	115S-5-S	118.4	112.0	110.0	123.5	100.3	136.7	88.9	151.9
	135S-5-S	138.2	132.2	128.5	145.7	117.1	161.3	103.9	179.5
	150S-5-S	152.2	145.1	141.4	160.0	128.9	177.1	114.3	196.8
	195S-5-S	198.9	187.7	184.8	207.0	168.5	229.1	149.4	254.8
	80D-5-S	82.0	83.6	76.3	92.0	69.5	102.0	61.6	113.2
	90D-5-S	92.5	92.0	86.0	101.4	78.4	112.2	69.6	125.0
	120D-5-S	125.0	119.4	116.2	131.8	105.9	145.8	93.9	162.2
	150D-5-S	157.3	149.8	146.2	165.2	133.3	183.0	118.2	203.2
	190D-5-S	197.0	192.0	183.1	211.8	166.9	234.4	148.0	260.6
	230D-5-S	236.7	224.0	220.1	247.0	200.6	273.4	177.9	303.8
44	270D-5-S	276.5	264.4	257.0	291.4	234.2	322.6	207.7	359.0
	300D-5-S	304.3	290.2	282.9	320.0	257.9	354.2	228.7	393.6
	385D-5-S	397.7	375.4	369.7	414.0	337.0	458.2	298.8	509.6
	415D-5-S	428.9	404.0	398.6	445.4	363.4	493.2	322.2	548.2
	40S-5-S	42.7	42.1	40.0	46.4	36.3	51.4	32.2	57.3
	45S-5-S	48.1	46.3	45.0	51.1	40.9	56.6	36.3	62.9
	60S-5-S	65.0	75.4	60.5	66.4	55.2	73.6	49.1	81.8
	75S-5-S	81.9	75.4	76.1	83.3	69.5	92.3	61.8	102.7
	95S-5-S	102.5	96.7	95.3	106.7	87.0	118.3	77.4	131.6
	115S-5-S	123.2	112.8	115.0	124.5	104.6	138.0	93.0	153.6
	135S-5-S	148.8	133.1	135.0	146.9	122.2	162.8	108.6	181.1
	150S-5-S	158.3	146.1	150.0	161.2	134.5	178.7	119.5	198.9
	195S-5-S	206.9	189.0	195.0	208.6	175.7	231.2	156.2	257.3
	80D-5-S	85.4	84.2	80.0	92.8	72.5	102.8	64.4	114.6
	90D-5-S	96.3	92.6	90.0	102.2	81.8	113.2	72.7	125.8
	120D-5-S	130.1	150.8	121.0	132.8	110.5	147.2	98.2	163.6
	150D-5-S	163.7	150.8	152.3	166.6	139.0	184.6	123.6	205.4
	190D-5-S	205.0	193.4	190.7	213.4	174.1	236.6	154.7	263.2
	230D-5-S	246.3	225.6	230.0	249.0	209.2	276.0	185.9	307.2
	270D-5-S	297.7	266.2	270.0	293.8	244.3	325.6	217.1	362.2
	300D-5-S	316.7	292.2	300.0	322.4	269.0	357.4	239.1	397.8
	385D-5-S	413.8	378.0	390.0	417.2	351.5	462.4	312.4	514.6
	415D-5-S	446.3	406.8	415.2	449.0	379.0	497.6	335.9	553.8

NOTES: 1. The 'TON' and 'KWI' refer to the compressor capacity and the compressor power input respectively.
2. The fouling factor of the water flowing in the evaporator is assumed to be 0.0001 hr.sq ft.°F/Btu.

LWT °F	MODEL TAAC	AMBIENT AIR TEMPERATURE °F							
		85		95		105		115	
		TONS	KWI	TONS	KWI	TONS	KWI	TONS	KWI
46	40S-5-S	43.6	42.3	41.3	46.8	37.8	51.9	33.7	57.8
	45S-5-S	50.1	46.6	46.6	51.5	42.6	57.1	38.0	63.6
	60S-5-S	67.6	60.6	63.0	66.9	57.6	74.2	51.3	82.7
	75S-5-S	85.1	75.9	79.7	83.9	72.5	93.1	64.6	103.6
	95S-5-S	106.6	97.3	99.3	107.5	90.7	119.3	80.9	132.9
	115S-5-S	128.1	113.6	119.3	125.5	109.1	139.2	97.2	154.9
	135S-5-S	149.6	134.0	139.3	148.0	127.3	164.2	113.4	182.8
	150S-5-S	164.7	147.1	153.3	162.5	140.2	180.3	124.9	200.6
	195S-5-S	215.2	190.3	200.4	210.2	183.2	233.2	163.2	259.7
	80D-5-S	87.3	84.6	82.7	93.6	75.6	103.8	67.3	115.6
	90D-5-S	100.1	93.2	93.2	103.0	85.2	114.2	75.9	127.2
	120D-5-S	135.3	121.2	126.0	133.8	115.2	148.4	102.6	165.4
	150D-5-S	170.3	151.8	159.3	167.8	144.9	186.2	129.1	207.2
	190D-5-S	213.2	194.6	198.5	215.0	181.5	238.6	161.7	265.8
	230D-5-S	256.2	227.2	238.6	251.0	218.1	278.4	194.3	309.8
	270D-5-S	299.2	268.0	278.6	296.0	254.7	328.4	226.9	365.6
	300D-5-S	329.4	294.2	306.7	325.0	280.4	360.6	249.8	401.2
	385D-5-S	430.4	380.6	400.8	420.4	366.4	466.4	326.4	519.4
	415D-5-S	464.2	409.6	432.2	452.4	395.1	502.0	352.0	559.2
48	40S-5-S	46.2	42.6	43.0	47.1	39.4	52.3	35.2	58.4
	45S-5-S	51.2	46.9	48.5	51.9	44.4	57.6	39.7	64.3
	60S-5-S	70.3	60.9	65.5	67.4	59.9	74.8	53.6	83.4
	75S-5-S	88.5	76.4	82.5	84.5	75.5	93.9	67.4	104.6
	95S-5-S	110.8	97.9	103.3	108.3	94.5	120.3	84.4	134.0
	115S-5-S	133.2	114.3	124.1	126.4	113.6	140.3	101.5	156.5
	135S-5-S	155.5	134.8	144.9	149.1	132.7	165.6	118.5	184.5
	150S-5-S	171.2	148.0	159.6	163.7	146.1	181.7	130.4	202.6
	195S-5-S	223.8	191.5	208.5	211.8	190.9	235.1	170.5	262.0
	80D-5-S	92.3	85.2	86.0	94.2	78.8	104.6	70.3	116.8
	90D-5-S	102.4	93.8	97.0	103.8	88.8	115.2	79.3	128.6
	120D-5-S	140.6	121.8	131.1	134.8	119.8	149.6	107.1	166.8
	150D-5-S	177.0	152.8	165.0	169.0	151.0	187.8	134.9	209.2
	190D-5-S	221.7	195.8	206.6	216.6	189.1	240.6	168.9	268.0
	230D-5-S	266.4	228.6	248.2	252.8	227.3	280.6	202.9	313.0
	270D-5-S	311.1	269.6	289.9	298.2	265.4	331.2	236.9	369.0
	300D-5-S	342.5	296.0	319.1	327.4	292.1	363.4	260.9	405.2
	385D-5-S	447.5	383.0	417.0	423.6	381.8	470.2	340.9	524.0
	415D-5-S	482.6	412.2	449.7	455.8	411.7	506.2	367.6	564.2
50	40S-5-S	48.0	42.8	44.7	47.4	41.0	52.7	36.8	58.7
	45S-5-S	54.1	47.2	50.4	52.2	46.2	58.0	41.4	64.8
	60S-5-S	73.1	61.3	68.2	67.9	62.5	75.4	55.9	84.2
	75S-5-S	92.0	76.9	85.8	85.1	78.6	94.6	70.4	105.6
	95S-5-S	115.2	98.5	107.4	109.1	98.5	121.2	88.1	135.1
	115S-5-S	138.4	114.9	129.1	127.3	118.3	141.4	105.9	157.8
	135S-5-S	161.6	135.6	150.8	150.1	138.2	166.9	123.7	186.3
	150S-5-S	177.9	148.8	166.0	164.8	152.1	183.2	136.1	204.4
	195S-5-S	232.5	192.6	216.9	213.2	198.8	237.0	177.9	264.4
	80D-5-S	95.9	85.6	89.5	94.8	82.0	105.4	73.6	117.4
	90D-5-S	108.2	94.4	100.9	104.4	92.5	116.0	82.8	129.6
	120D-5-S	146.2	122.6	136.3	135.8	125.0	150.8	111.8	168.4
	150D-5-S	184.0	153.8	171.6	170.2	157.3	189.2	140.8	211.2
	190D-5-S	230.3	197.0	214.8	218.2	196.9	242.4	176.2	270.2
	230D-5-S	276.8	229.8	258.2	254.6	236.7	282.8	211.8	315.6
	270D-5-S	323.3	271.2	301.5	300.2	276.4	333.8	247.3	372.6
	300D-5-S	355.9	297.6	331.9	329.6	304.3	366.4	272.3	408.8
	385D-5-S	465.1	385.2	433.8	426.4	397.6	474.0	355.8	528.8
	415D-5-S	501.6	414.4	467.8	459.0	428.8	510.2	383.7	569.0

NOTES: 1. The 'TON' and 'KWI' refer to the compressor capacity and the compressor power input respectively.
2. The fouling factor of the water flowing in the evaporator is assumed to be 0.0001 hr.sq ft.°F/Btu.

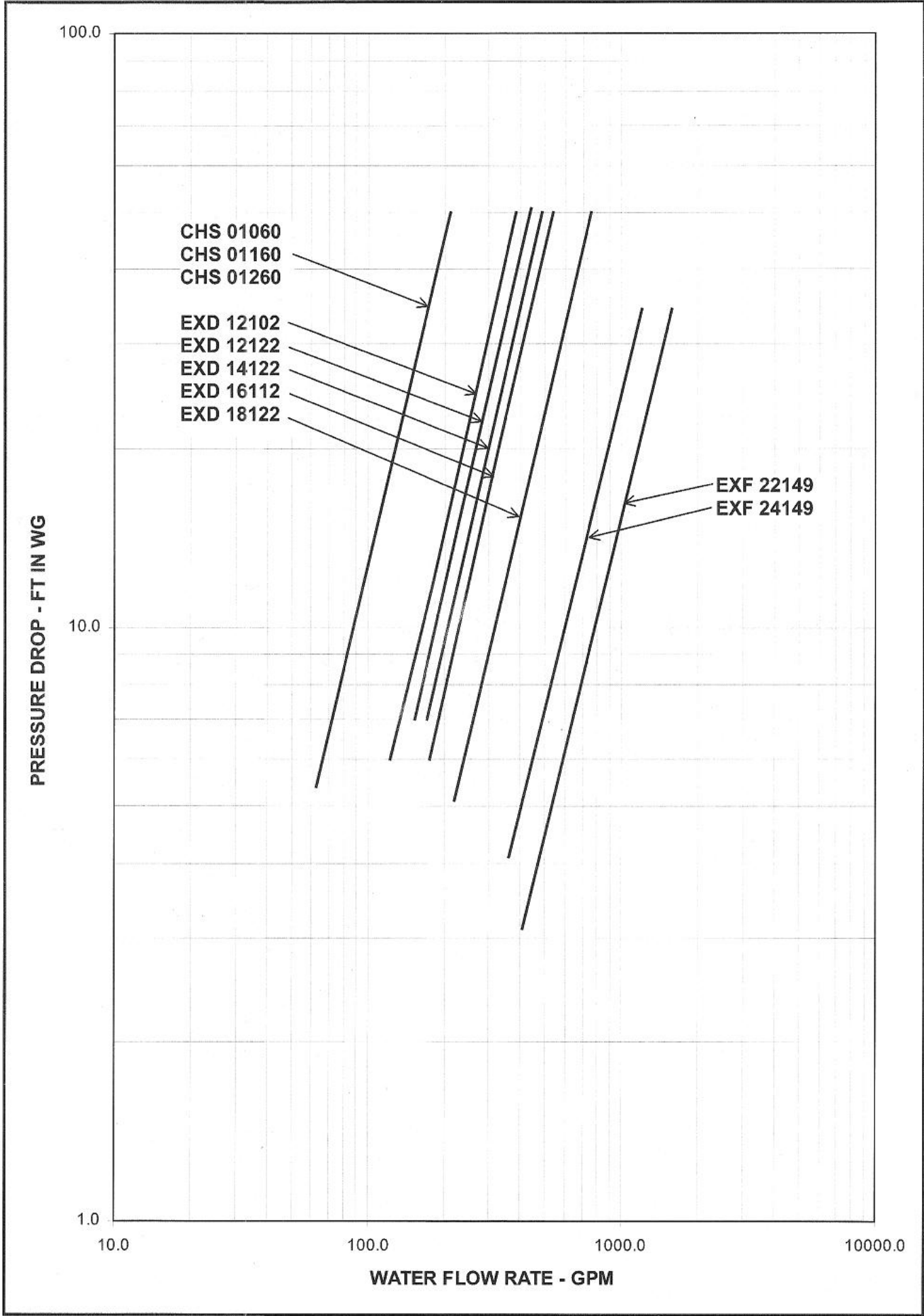
PHYSICAL DATA

MODEL	TAAC	40S-5-S	45S-5-S	60S-5-S	75S-5-S	95S-5-S	115S-5-S	135S-5-S	150S-5-S	195S-5-S	80D-5-S
COMPRESSOR											
MODEL (QTY)		HSC1309 (1)	HSC1311 (1)	HSC1509 (1)	HSC1512 (1)	HSC1709 (1)	HSC1711 (1)	HSC1811 (1)	HSC1813 (1)	HSC1816 (1)	HSC1309 (2)
MINIMUM % UNIT CAPACITY REDUCTION		25	25	25	25	25	25	25	25	25	12.5
MOTOR RLA,AMP (QTY)		73 (1)	80 (1)	104 (1)	130 (1)	167 (1)	195 (1)	230 (1)	252 (1)	326 (1)	73 (2)
CONDENSER											
COIL ROWS DEEP/ FACE AREA	SQ FT	3/86.7	3/86.7	3/130	3/141.2	3/141.2	3/188.2	4/188.2	4/188.2	3/282.3	3/141.2
FAN QTY		4	4	6	6	6	8	8	8	12	6
FAN DIA	MM	762	762	762	800	800	800	800	860	800	800
MOTOR HP (QTY)		1.5 (4)	1.5 (4)	1.5 (6)	1.5 (6)	1.5 (6)	1.5 (8)	1.5 (8)	3.0 (8)	1.5 (12)	1.5 (6)
MOTOR RLA,AMP (QTY)		2.7 (4)	2.7 (4)	2.7 (4)	3.2 (6)	3.2 (6)	3.2 (6)	3.2 (8)	5.3 (8)	3.2 (12)	3.2 (6)
MINIMUM AMBIENT TEMPERATURE AT MINIMUM LOAD	°F	65	65	65	65	65	65	65	65	65	65
EVAPORATOR											
MODEL		CHS 01060	CHS 01160	CHS 01260	EXD 12102	EXD 12122	EXD 14122	EXD 16112	EXD 16112	EXD 18122	EXD 12102
WATER CONNECTOR	INCH	4MPT	4MPT	4MPT	4FLG	4FLG	5FLG	6FLG	6FLG	8FLG	4FLG
NOMINAL WATER FLOW (GPM)/PD (FT IN WG)		96.1/ 11.7	108.1/ 14.5	144.2/ 24.3	180.2/ 11.8	228.3/ 15.0	276.3/ 17.5	324.4/ 20.6	360.4/ 24.9	468.5/ 20.4	192.2/ 13.3
MIN/MAX WATER FLOW	GPM	63/168	70/216	77/240	127/384	154/387	168/486	175/519	175/519	267/1060	127/384
MIN/MAX PD (FT IN WG)		5/32	7/50	8/60	6/46	7/39	7/48	6/50	6/50	4/43	6/46
ELECTRICAL											
NOMINAL POWER SUPPLY	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
UNIT RLA	AMP	84	91	120	149	186	221	256	294	364	165
UNIT MAX INRUSH	AMP	84	91	120	149	186	221	256	294	364	202
GENERAL											
UNIT LENGTH	INCH	101	101	141	149.5	149.5	191.5	191.5	191.5	302.5	149.5
UNIT WIDTH	INCH	86	86	86	88	88	88	88	88	88	88
UNIT HEIGHT	INCH	96	96	96	94	94	94	94	94	96	94
SHIPPING WEIGHT	LBS	3522	3622	5120	9040	10200	10612	12020	12530	17230	9500
OPERATING WEIGHT	LBS	3597	3697	5220	9144	10330	10750	12200	12725	17430	9605
OPERATING CHARGE R22	LBS	100	110	145	185	230	280	330	370	475	195

PHYSICAL DATA

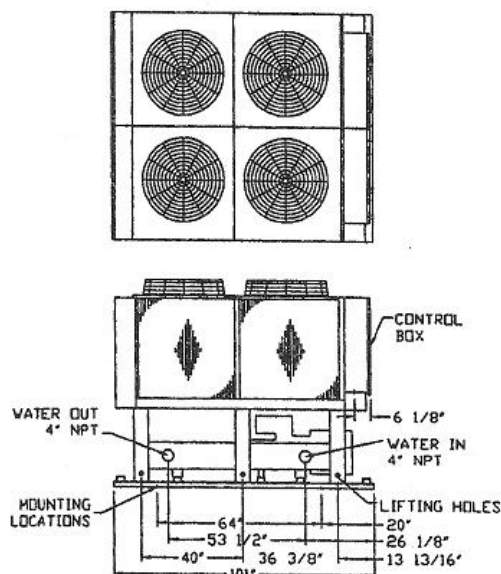
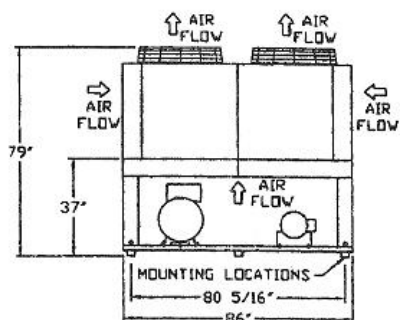
MODEL	TAAC	90D-5-S	120D-5-S	150D-5-S	190D-5-S	230D-5-S	270D-5-S	300D-5-S	385D-5-S	415D-5-S
COMPRESSOR										
MODEL (QTY)		HSC1311 (2)	HSC1509 (2)	HSC1512 (2)	HSC1709 (2)	HSC1711 (2)	HSC1811 (2)	HSC1813 (2)	HSC1816 (2)	HSC1917 (2)
MINIMUM % UNIT CAPACITY REDUCTION		12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
MOTOR RLA,AMP (QTY)		80 (2)	104 (2)	130 (2)	167 (2)	195 (2)	230 (2)	252 (2)	326 (2)	351 (2)
CONDENSER										
COIL ROWS DEEP/FACE AREA SQ FT		3/141.2	4/188.2	4/188.2	3/282.3	4/329.4	4/376.4	4/376.4	6/423.5	6/577.5
FAN QTY		6	8	8	12	14	16	16	18	18
FAN DIA MM		800	800	860	800	800	800	860	860	860
MOTOR HP (QTY)		1.5 (6)	1.5 (8)	3.0 (8)	1.5 (12)	1.5 (14)	1.5 (16)	3.0 (16)	3.0 (18)	4.0 (18)
MOTOR RLA (QTY)		3.2 (6)	3.2 (8)	5.3 (8)	3.2 (12)	3.2 (14)	3.2 (16)	5.3 (16)	5.3 (18)	7.0 (18)
MINIMUM AMBIENT TEMPERATURE AT MINIMUM LOAD °F		65	65	65	65	65	65	65	65	65
EVAPORATOR										
MODEL		EXD12122	EXD14122	EXD16112	EXD18122	EXF22149	EXF22149	EXF22149	EXF24149	EXF24149
WATER CONNECTOR (INCH)		4FLG	5FLG	6FLG	8FLG	10FLG	10FLG	10FLG	10FLG	10FLG
NOMINAL WATER FLOW (GPM)/PD (FT IN WG)		216.2/ 13.6	288.3/ 18.9	360.4/ 24.9	456.5/ 19.5	552.6/ 5.4	648.7/ 7.1	720.8/ 8.6	925.1/ 21.5	997.1/ 24.6
MIN/MAX WATER FLOW GPM		154/387	168/486	175/519	267/1060	409/1033	409/1033	409/1033	360/1206	360/1206
MIN/MAX PD (FT IN WG)		7/39	7/48	6/50	4/43	3/16	3/16	3/16	4/34	4/34
ELECTRICAL										
NOMINAL POWER SUPPLY V/ph/Hz		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
UNIT RLA AMP		179	234	302	372	435	505	589	747	828
UNIT MAX INRUSH AMP		243	302	407	454	553	625	809	976	1039
GENERAL										
UNIT LENGTH INCH		149.5	191.5	191.5	302.5	344.5	386.5	386.5	428.5	428.5
UNIT WIDTH INCH		88	88	88	88	88	88	88	88	88
UNIT HEIGHT INCH		94	94	94	96	96	96	96	98	120
SHIPPING WEIGHT LBS		10615	12420	13285	18210	19070	22955	23460	24040	35284
OPERATING WEIGHT LBS		10750	12600	13485	18480	19460	23300	23805	24430	36657
OPERATING CHARGE R22 LBS		220	290	365	465	560	660	730	940	1010

PRESSURE DROP

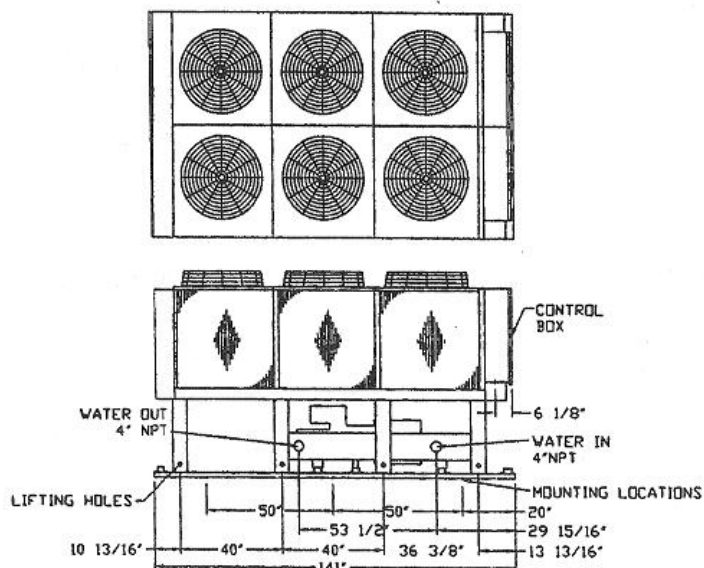
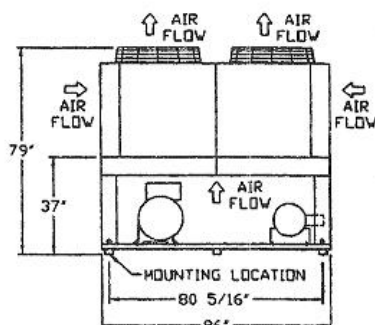


DIMENSIONAL DATA

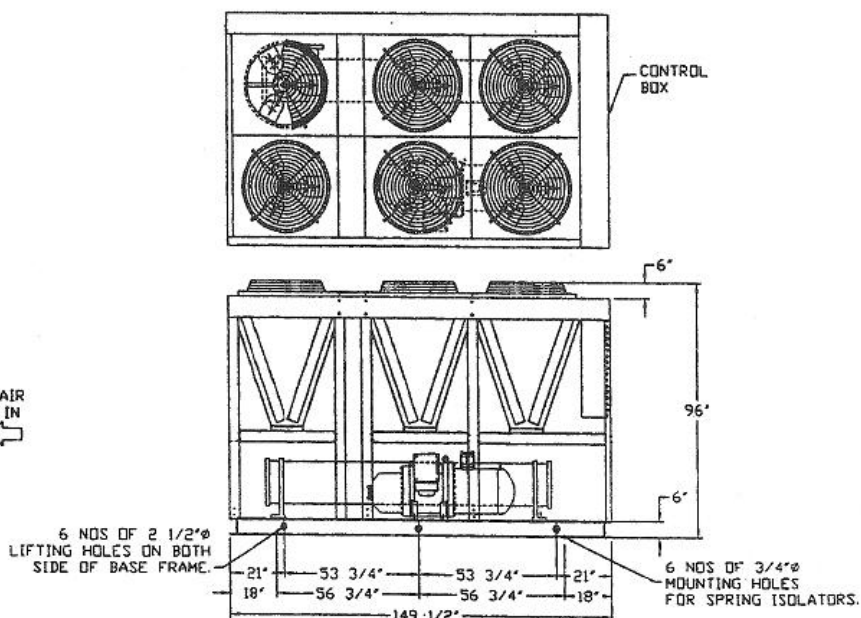
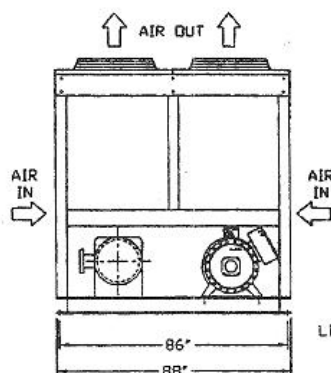
TAAC 40S, 45S



TAAC 60S



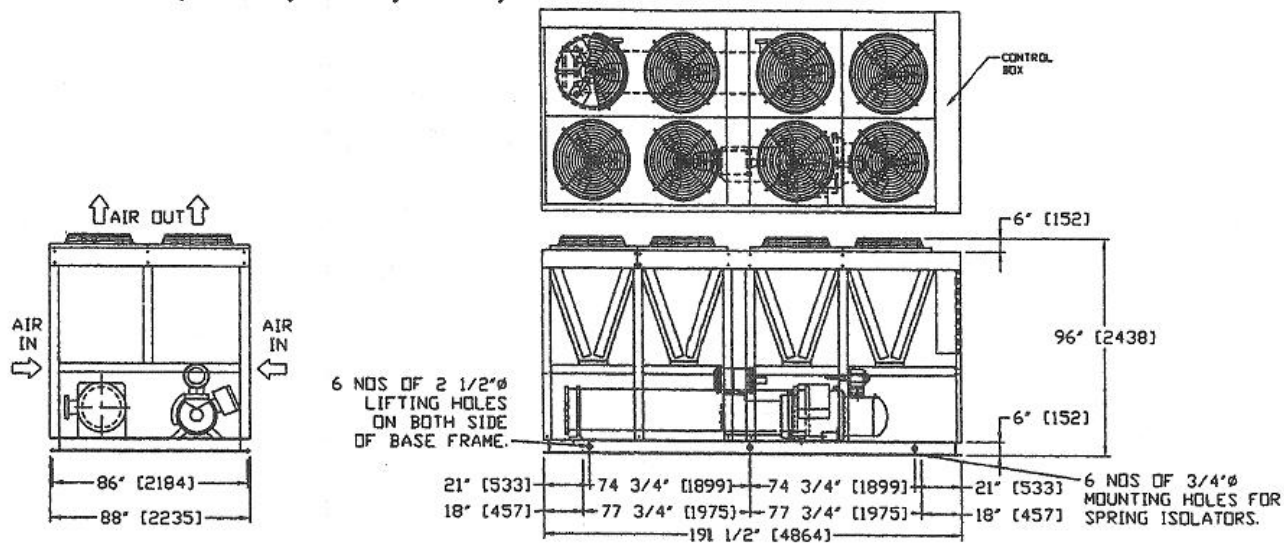
TAAC 75S, 80D, 90D, 95S



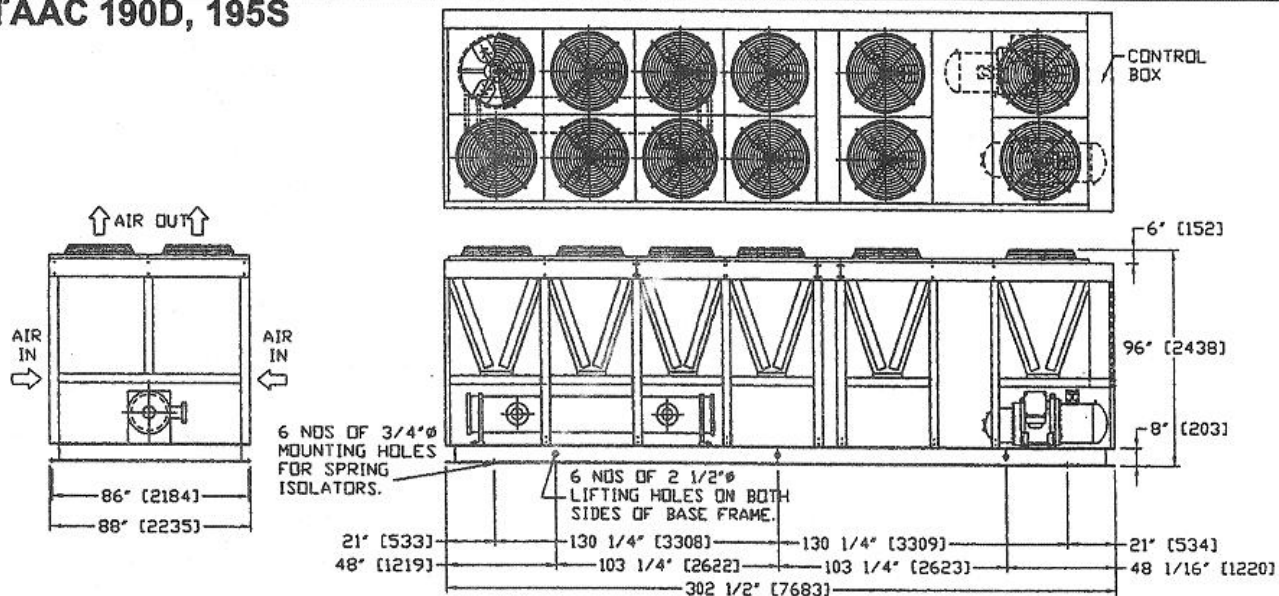
NOTE: ALL DIMENSIONS ARE IN INCHES.

DIMENSIONAL DATA

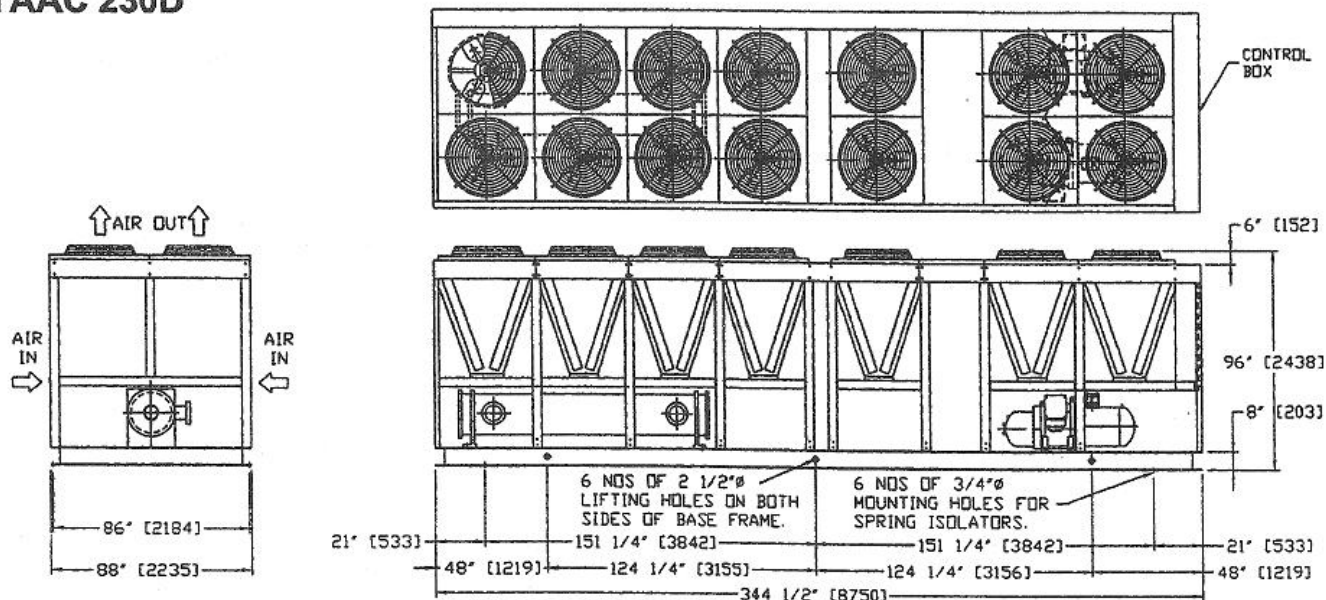
TAAC 115S, 120D, 135S, 150S, 150D



TAAC 190D, 195S



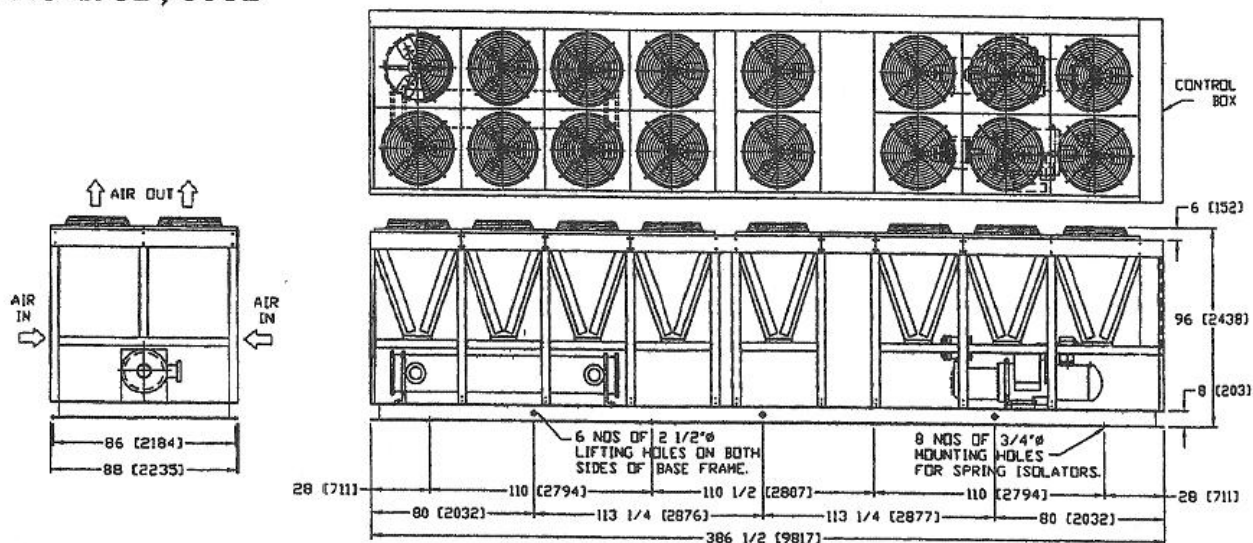
TAAC 230D



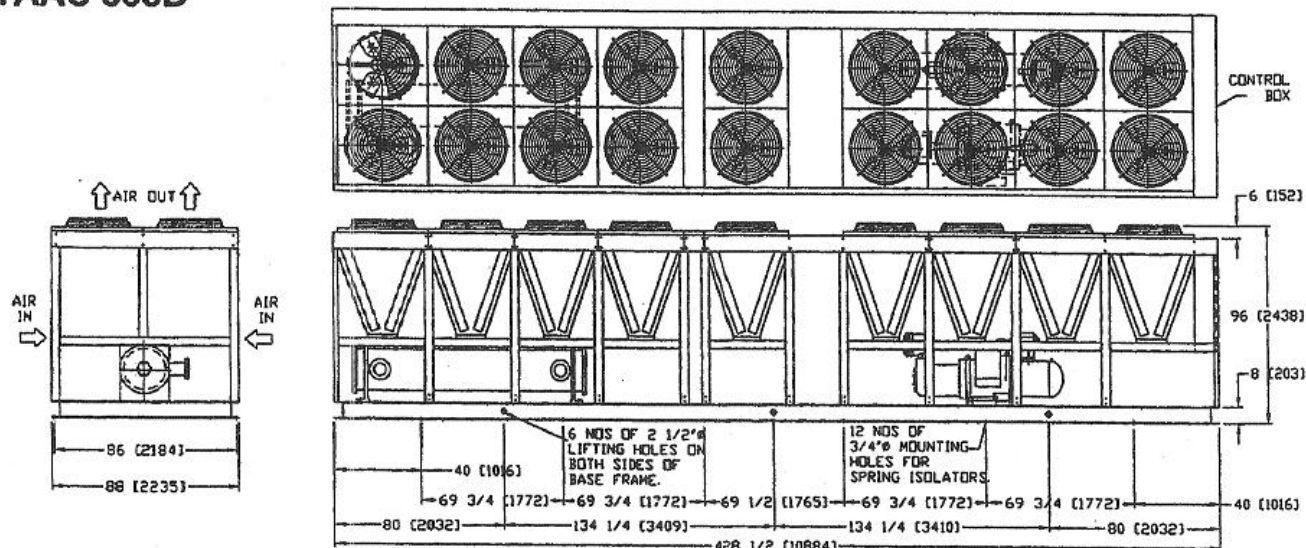
NOTE: ALL DIMENSIONS ARE IN INCHES.

DIMENSIONAL DATA

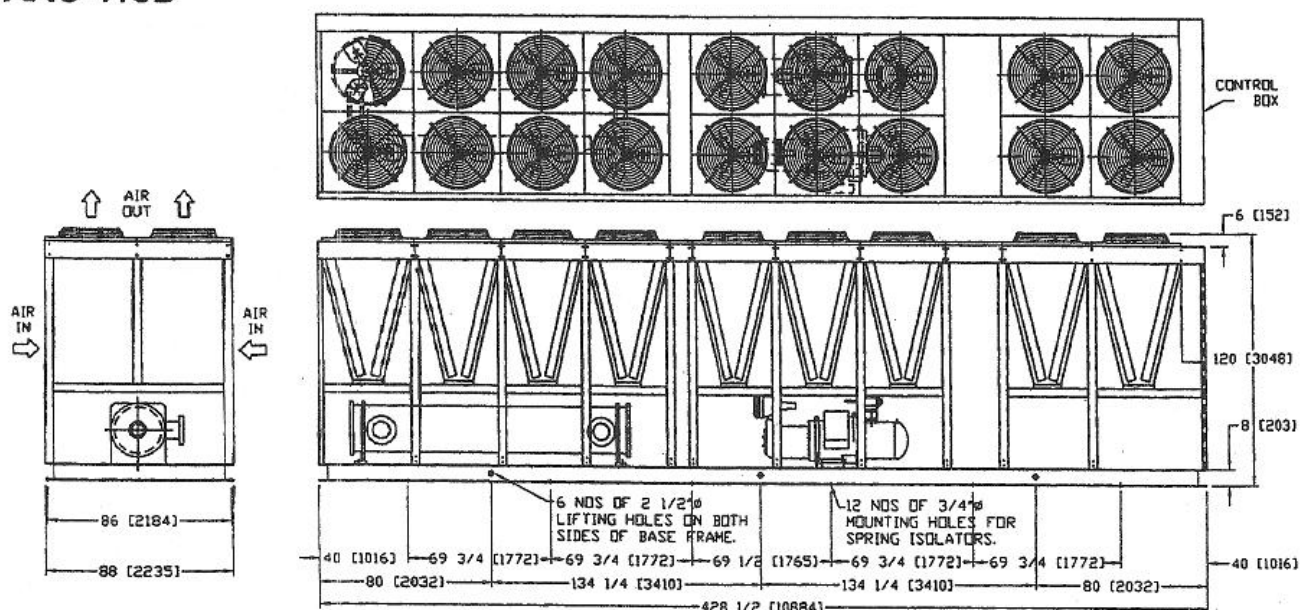
TAAC 270D, 300D



TAAC 385D



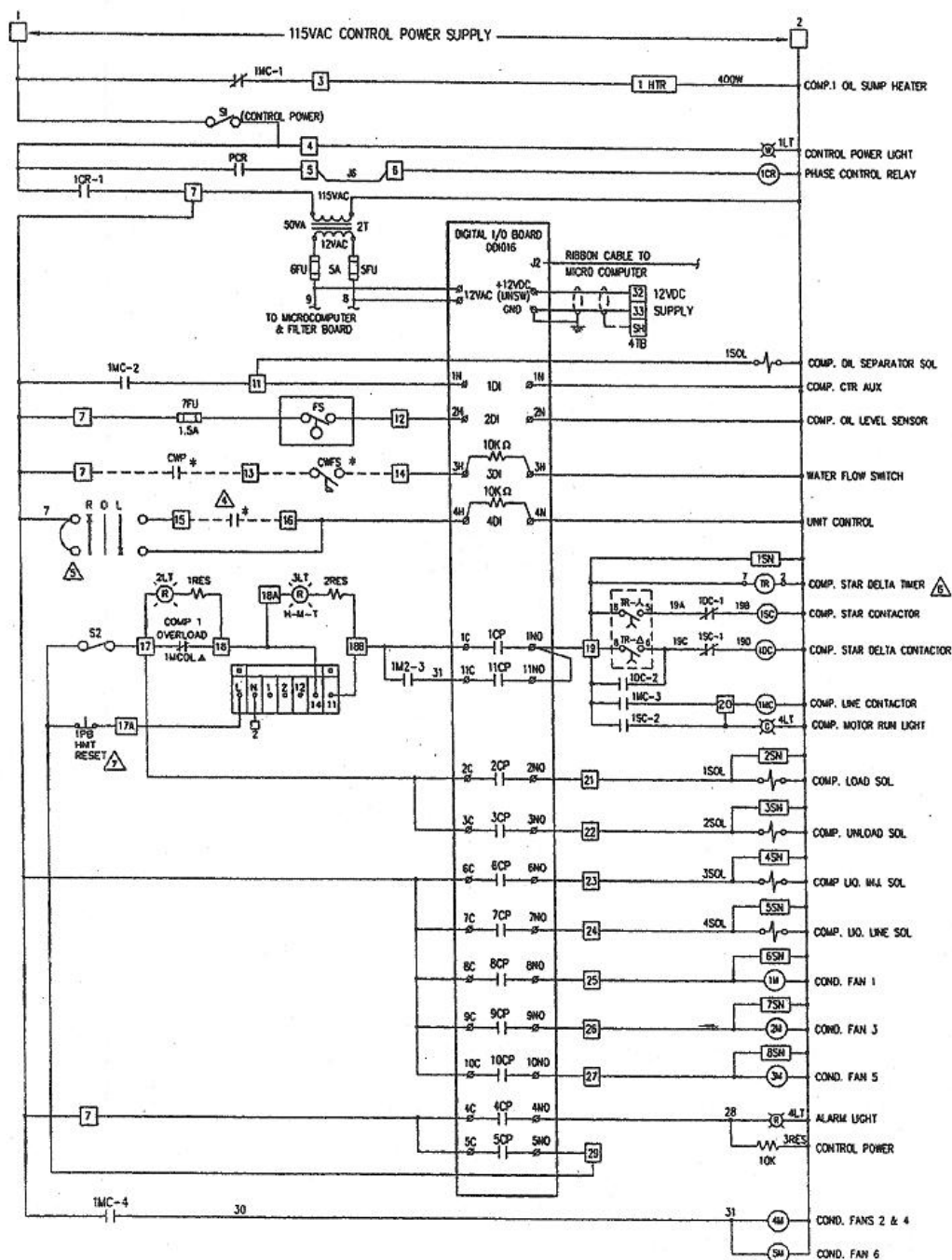
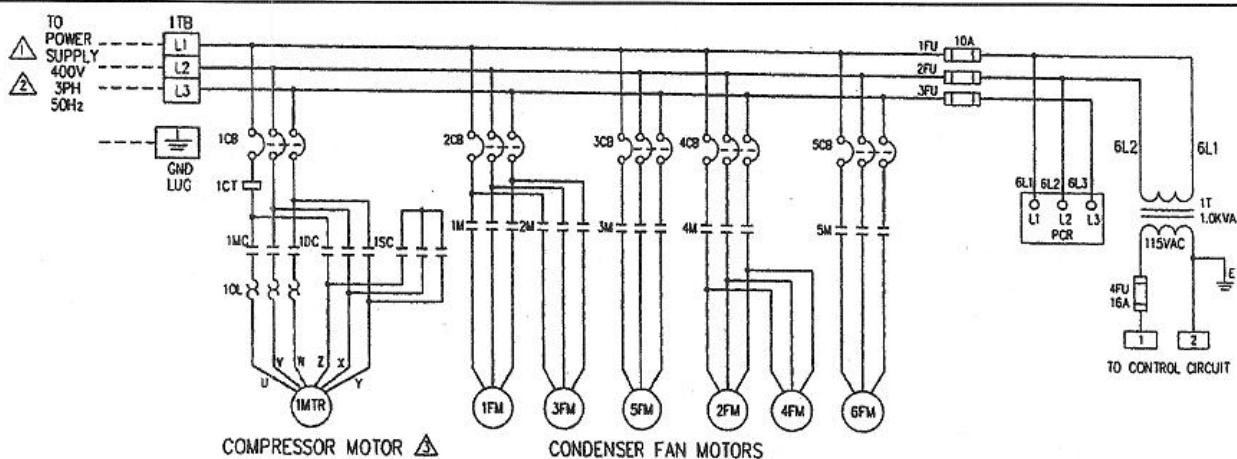
TAAC 415D



NOTE: ALL DIMENSIONS ARE IN INCHES.

TYPICAL WIRING SCHEMATIC

ONE COMPRESSOR



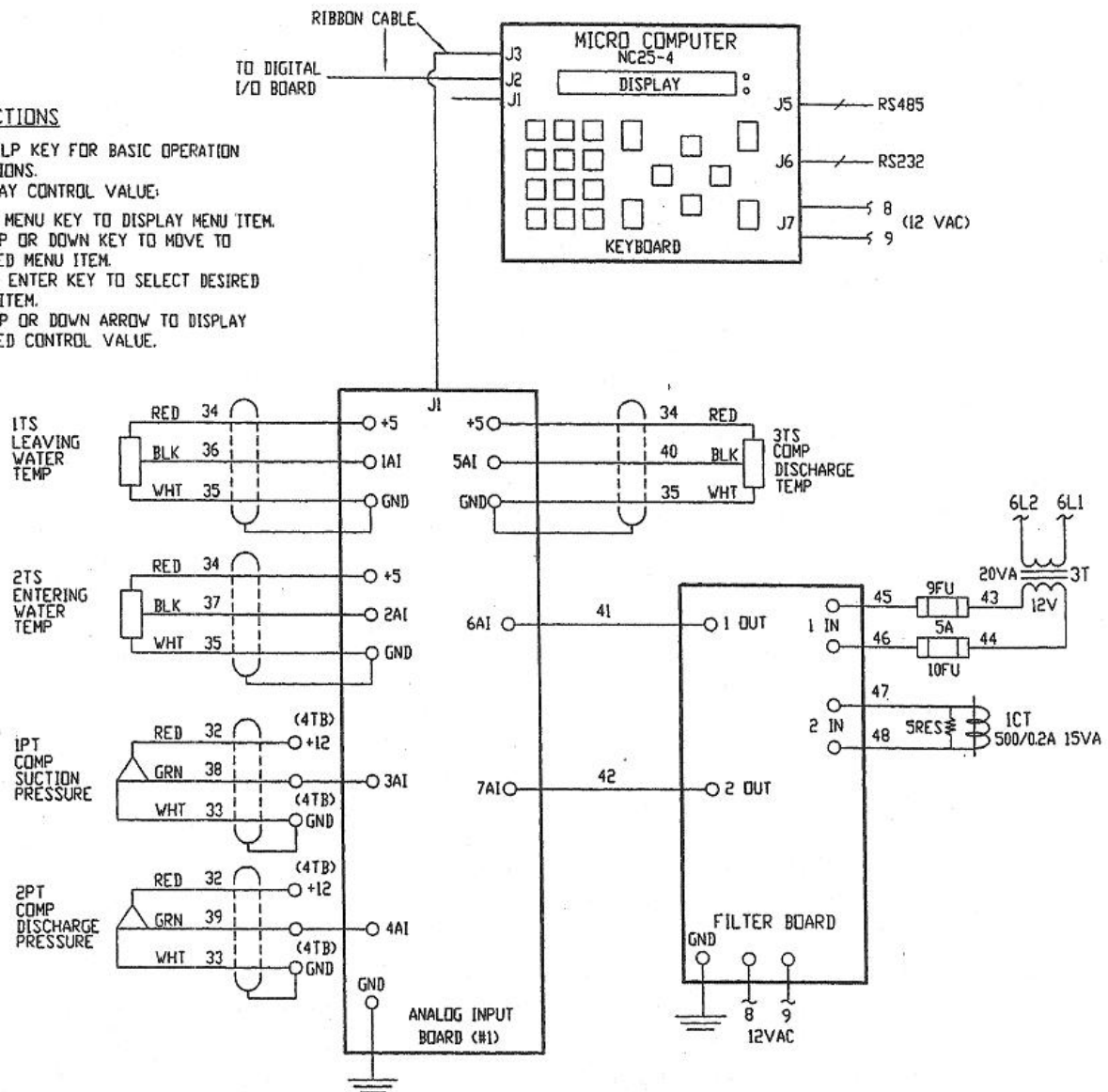
TYPICAL WIRING SCHEMATIC

INSTRUCTIONS

PRESS HELP KEY FOR BASIC OPERATION
INSTRUCTIONS.

TO DISPLAY CONTROL VALUE:

- 1) PRESS MENU KEY TO DISPLAY MENU ITEM.
- 2) USE UP OR DOWN KEY TO MOVE TO DESIRED MENU ITEM.
- 3) PRESS ENTER KEY TO SELECT DESIRED MENU ITEM.
- 4) USE UP OR DOWN ARROW TO DISPLAY DESIRED CONTROL VALUE.



LEGEND

AI - ANALOG INPUT
AUX - AUXILIARY
CB - CIRCUIT BREAKER
COMP - COMPRESSOR
COND - CONDENSER
CP - CONTROL POINT
CPR - CAPACITOR
CR - CONTROL RELAY
CT - CURRENT TRANSFORMER
CWFS - CHILLED WATER FLOW SWITCH
CWP - CHILLED WATER PUMP
DI - DIGITAL INPUT
FS - OIL FLOAT SWITCH
FU - FUSE
HLP - HIGH LOW PRESSURE

HMT - HIGH MOTOR TEMP
HOT - HIGH OIL TEMP
HP - HIGH PRESSURE SWITCH
HTR - HEATER
INJ - INJECTION
I/O - INPUT/OUTPUT
LT - LIGHT
M - CONTACTOR
MHA - MUST HOLD AMP
MTR - MOTOR
OL - OVERLOAD
PB - PUSH BUTTON
PCR - PHASE CONTROL RELAY
PT - PRESSURE TRANSDUCER
ROL - REMOTE-OFF-LOCAL SELECTOR SWITCH

RES - RESISTOR
SN - SNUBBER
SOL - SOLENOID
TAS - SOLID-STATE THERMOSTAT
TB - TERMINAL BLOCK
TH - THERMOSTAT
TS - TEMP. SENSOR
T - TRANSFORMER

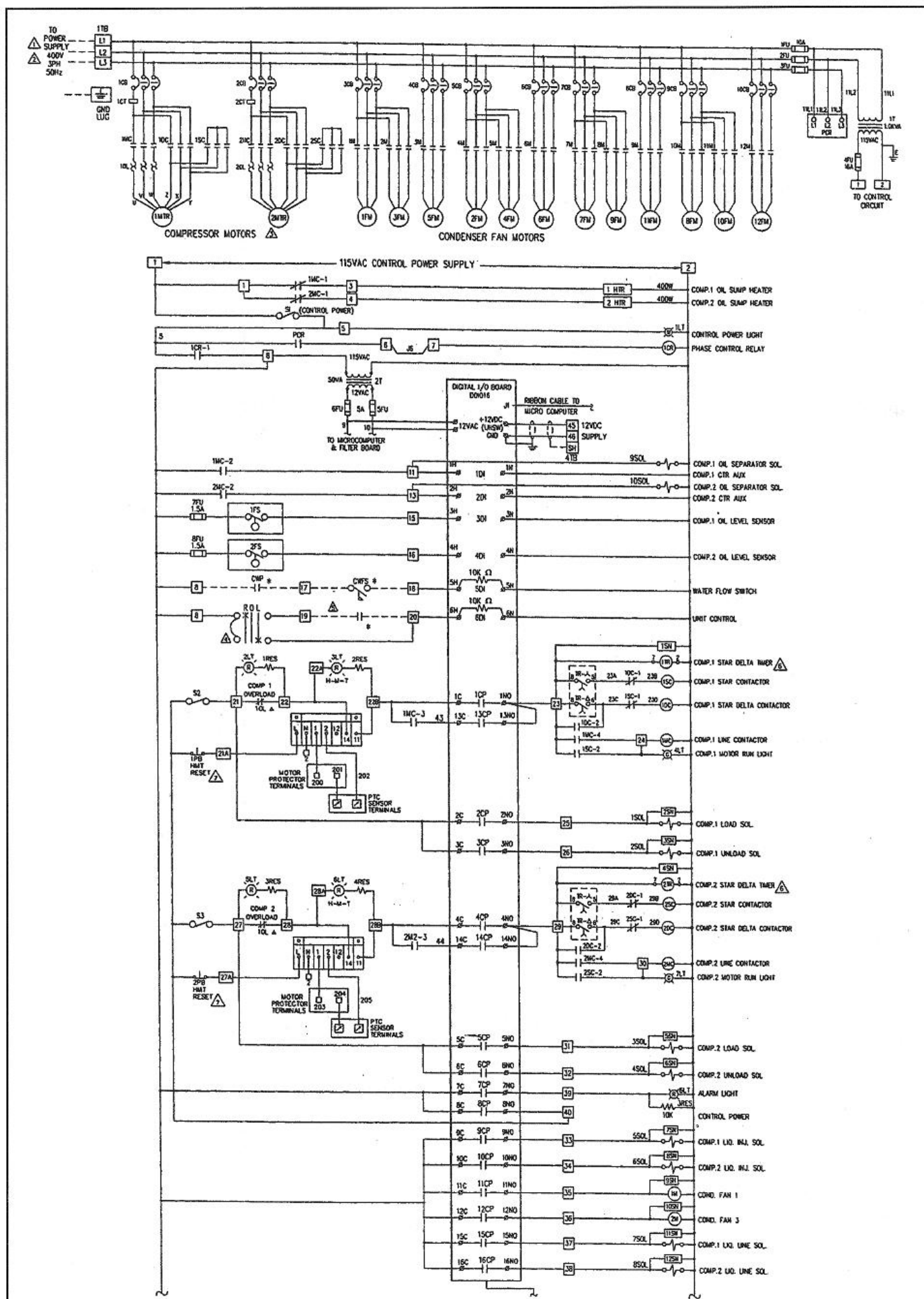
▲ - MANUAL RESET
* - FIELD SUPPLY
□ - FACTORY TERMINALS
— - FACTORY WIRE
--- - FIELD WIRE

NOTES:

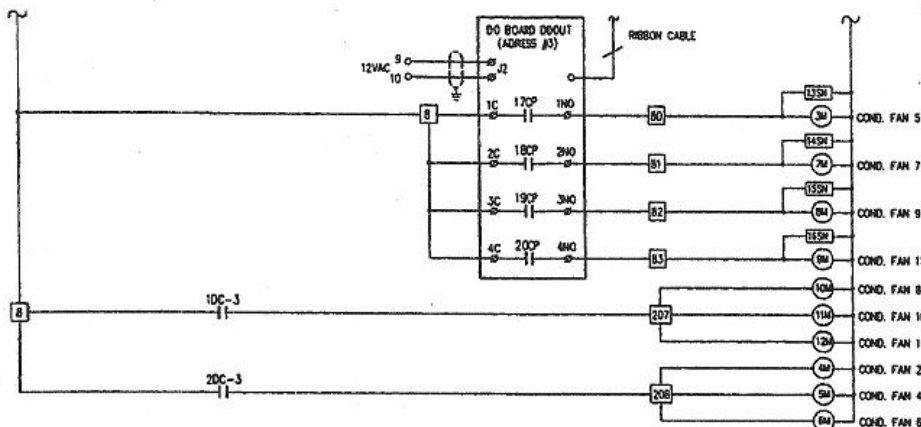
1. DISCONNECT MEANS & BRANCH CIRCUIT PROTECTION SHALL BE PROVIDED BY OTHERS.
2. USE COPPER CONDUCTOR ONLY.
3. IF POWER SUPPLY HAS BEEN INTERRUPTED FOR A PROLONGED PERIOD, OIL SUMP HEATERS MUST BE ENERGIZED FOR 24 HOURS MINIMUM BEFORE STARTING COMPRESSOR.
4. CUSTOMER CONTROL CONTACTS MUST BE WIRED BETWEEN TERMINAL 15 & 16. (SHIELD CABLE RECOMMENDED). SELECT POSITION 'R' FOR REMOTE START, POSITION 'D' FOR UNIT SHUT DOWN AND POSITION 'L' FOR LOCAL START.
5. THE SHIELDED CABLES ARE RECOMMENDED FOR FIELD INSTALLED CONTROL AND SIGNAL WIRING, CONNECT ONE END OF THE SHIELD TO GROUND.
6. STAR DELTA TRANSFER FOR COMPRESSOR 1 MUST BE SETTING AT MINIMUM 5SEC. TO MAXIMUM 10SEC.
7. TO RESET ITAS HOLD PB FOR 5 SECONDS.

TYPICAL WIRING SCHEMATIC

TWO COMPRESSOR



TYPICAL WIRING SCHEMATIC

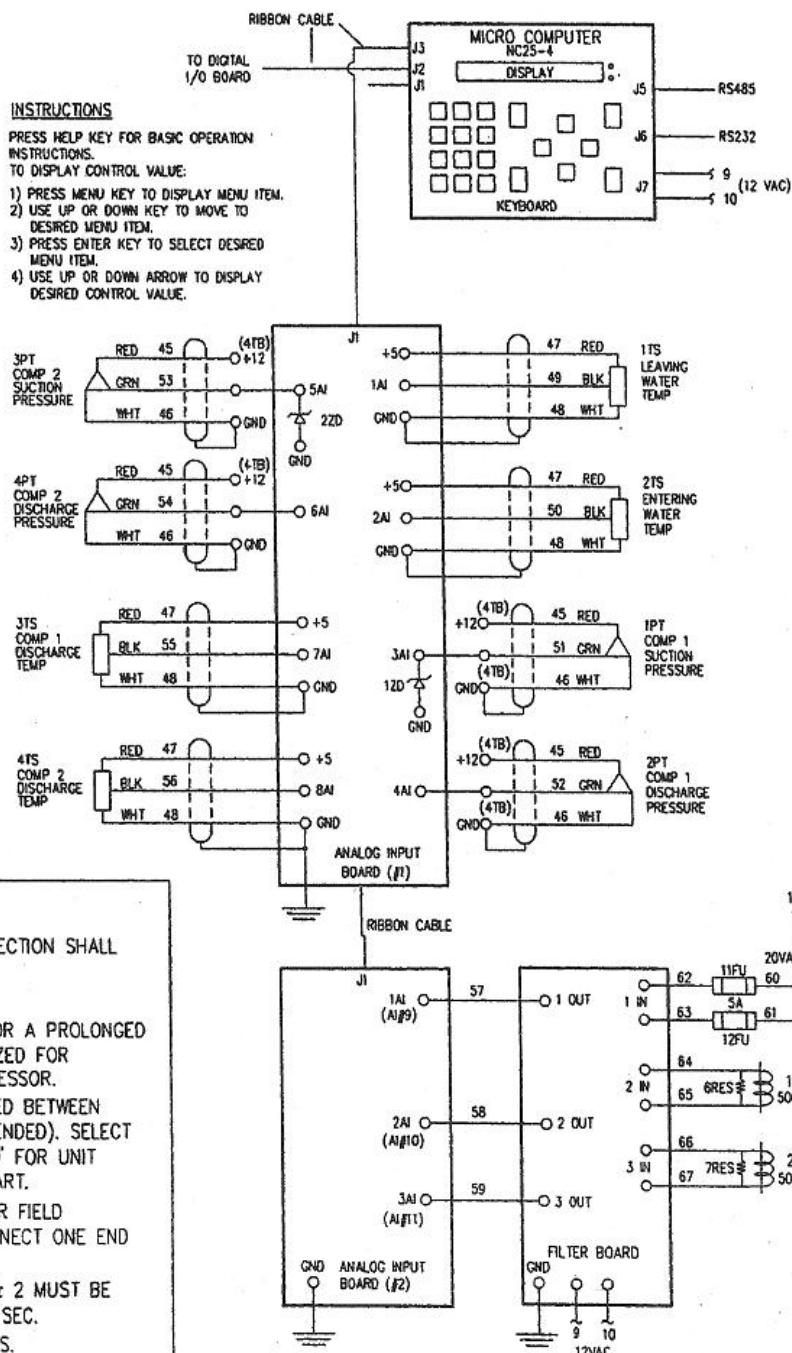


LEGEND

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COMP	- COMPRESSOR
COND	- CONDENSER
CP	- CONTROL POINT
CPR	- CAPACITOR
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T	- TRANSFORMER
▲	- MANUAL RESET
*	- FIELD SUPPLY
□	- FACTORY TERMINALS
---	- FACTORY WIRE
----	- FIELD WIRE

INSTRUCTIONS

PRESS HELP KEY FOR BASIC OPERATION INSTRUCTIONS.
TO DISPLAY CONTROL VALUE:
1) PRESS MENU KEY TO DISPLAY MENU ITEM.
2) USE UP OR DOWN KEY TO MOVE TO DESIRED MENU ITEM.
3) PRESS ENTER KEY TO SELECT DESIRED MENU ITEM.
4) USE UP OR DOWN ARROW TO DISPLAY DESIRED CONTROL VALUE.



NOTES:

1. DISCONNECT MEANS & BRANCH CIRCUIT PROTECTION SHALL BE PROVIDED BY OTHERS.
2. USE COPPER CONDUCTOR ONLY.
3. IF POWER SUPPLY HAS BEEN INTERRUPTED FOR A PROLONGED PERIOD, OIL SUMP HEATERS MUST BE ENERGIZED FOR 24 HOURS MINIMUM BEFORE STARTING COMPRESSOR.
4. CUSTOMER CONTROL CONTACTS MUST BE WIRED BETWEEN TERMINAL 19 & 20. (SHIELD CABLE RECOMMENDED). SELECT POSITION 'R' FOR REMOTE START, POSITION 'O' FOR UNIT SHUT DOWN AND POSITION 'L' FOR LOCAL START.
5. THE SHIELDED CABLES ARE RECOMMENDED FOR FIELD INSTALLED CONTROL AND SIGNAL WIRING, CONNECT ONE END OF THE SHIELD TO GROUND.
6. STAR DELTA TRANSFER FOR COMPRESSOR 1 & 2 MUST BE SETTING AT MINIMUM 5 SEC. TO MAXIMUM 10 SEC.
7. TO RESET 1TAS & 2TAS HOLD FOR 4 SECONDS.

TYPICAL CONTROL DATA

ONE COMPRESSOR

Item No	Control points (CP)	Digital In (DI)	Analog In (AI)	Set Point B	Set Point A	Alarm Codes	Item No
1	Comp 1	Comp 1	Lvg. Wtr. Temp.		Lvg. Wtr. Temp		1
2	Load 1	Oil Level Sensor	Ent. Wtr. Temp.	Lead			2
3	Unload 1	Flow Switch	C1 Suct. Pressure	Ramp Start	Ramp Rate		3
4	Alarm	Unit Control	C1 Disch. Pressure	Amp Limit 1	Amp Limit 1		4
5	Control Power		C1 Disch. Temp	Power Loss			5
6	Liq. Inj. Sol		Volts	Low Pressure	High Pressure		6
7	Liq. Line Sol.1		C1 Amps	Freeze	SDD		7
8	Cond. Fan 1		CW Reset (Opt)	Fan Stage 1 (off)	Fan Stage 1 (on)		8
9	Cond. Fan 3			Fan Stage 2 (off)	Fan Stage 2 (on)		9
10	Cond. Fan 5			Liquid Inj. (off)	Liquid Inj. (on)	No Run 1	10
11	C1 Pump Down			Low Volt	High Volt	Low Suct.1	11
12				Pumpdown	CW Reset	High disch.1	12
13						Low Different 1	13
14						Low Oil 1	14
15						Disch Sensor Error	15
16						Suct. Sensor Error	16
17						No Stop 1	17
18						Freeze	18
19						Temp. Error	19
20			Target %			Power Loss	20
21			% FLCP			Hi/Low Volt	21
22			FLA			Low Flow	22
23							23
24							24
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TWO COMPRESSOR

Item No	Control points (CP)	Digital In (DI)	Analog In (AI)	Set Point B	Set Point A	Alarm Codes	Item No
1	Comp 1	Comp 1	Lvg. Wtr. Temp.		Lvg. Wtr. Temp		1
2	Load 1	Comp 2	Ent. Wtr. Temp.	Lead			2
3	Unload 1	Oil Level 1	C1 Suct. Pressure	Ramp Start	Ramp Rate		3
4	Comp 2	Oil Level 2	C1 Disch. Pressure	Amp Limit 1	Amp Limit 1		4
5	Load 2	Flow Switch	C2 Suct. Pressure	Amp Limit 2	Amp Limit 2		5
6	Unload 2	Unit Control	C2 Disch. Pressure	Power Loss			6
7	Alarm		C1 Disch. Temp.	Low Pressure	High Pressure		7
8	Control Power		C2 Disch. Temp.	Freeze			8
9	C1 Liq. Inj. Sol.		Volts		CWR (Optional)		9
10	C2 Liq. Inj. Sol.		C1 Amps	Fan Stage 2 (off)	Fan Stage 2 (on)	No Run 1	10
11	Cond. Fan 1		C2 Amps	Fan Stage 3 (off)	Fan Stage 3 (on)	Low Suct.1	11
12	Cond. Fan 3		CW Reset (Opt)	Fan Stage 4 (off)	Fan Stage 4 (on)	High Disch.1	12
13	C1 Pump Down					Low Different 1	13
14	C2 Pump Down			Liquid Inj. (off)	Liquid Inj. (on)	Low Oil 1	14
15	C1 Liq. Line Sol.			Low Volt	High Volt	Sensor Error 1	15
16	C2 Liq. Line Sol.			Pumpdown		High Disch. Temp. 1	16
17	Cond. Fan 5					No Run 2	17
18	Cond. Fan 7					Low Suction 2	18
19	Cond. Fan 9					High Disch.2	19
20	Cond. Fan 11		Target %			Low Different 2	20
21			% FLCP C1			Low Oil 2	21
22			% FLCP C2			Sensor Error 2	22
23			C1 FLA			High Disch. Temp. 2	23
24			C2 FLA			No Stop 1	24
25						No Stop 2	25
26						Freeze	26
27						Temp. Error	27
28						Power Loss	28
29						Hi / Low Volt	29
30						Low Flow	30

MANUFACTURER RESERVES THE RIGHT TO CHANGE SPECIFICATION OR DESIGN AT ANY TIME WITHOUT PRIOR NOTICE.