Form No: MM0701D/ MM0702A

DB-AIRE

PRECISION ENVIRONMENTAL CONTROL UNIT

INSTALLATION, OPERATION & MAINTENANCE MANUAL

DB-TEMP SYSTEMS
DB-AIRE SYSTEMS

50/60 Hz

DB-Aire
(Indoor Unit)

R22
R407C

DB-Aire (Outdoor Unit)

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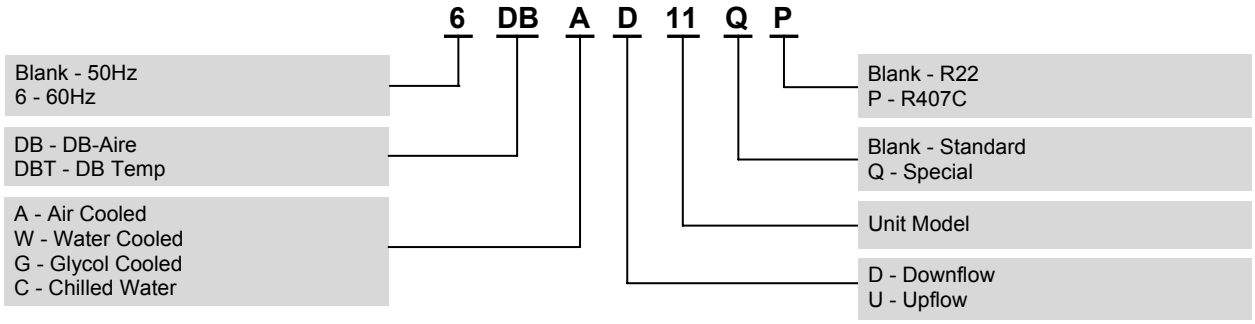
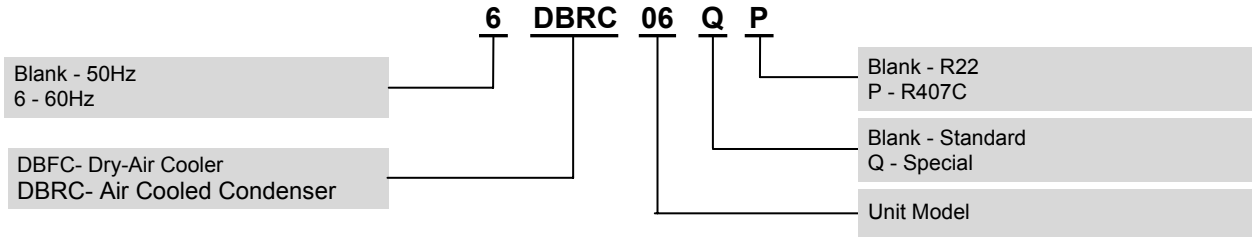
DB-AIRE & DB-TEMP SERIES - UP AND DOWN FLOW UNITS



AIR COOLED CONDENSER AND DRY FLUID COOLER



DB-TEMP AND DB-AIRE

Water-Cooled, Air-Cooled And Chilled-Water Systems Installation And Service Instructions

INSTALLATION

Congratulations on the selection of a DB-AIRE environmental control system.

The DB-AIRE water/ glycol-cooled, air-cooled and chilled-water series units are specifically designed to provide temperature, humidity, and dust control for computer-room installations.

This unit includes: A motor; a blower with belt drive; a humidifier (optional), reheat elements; a control package; chilled-water coil or evaporator coil with compressor and expansion valve (water-cooled units also include a condenser on each circuit).

TRANSPORTATION DAMAGE

Your DB-AIRE unit has been tested and inspected prior to shipment. To ensure that the unit has been received in excellent condition, perform a visual inspection of the outer crating immediately upon delivery, and note any external damage on the freight carrier's delivery forms. As soon as possible, inspect the unit itself for possible internal damage. File a claim with the shipping company if the shipment is damaged or incomplete. **Freight damage claims are the responsibility of the purchaser**.

RIGGING

Move the unit in an upright position to the installation site.

It is recommended that the unit be protected from damage to the decorative doors during any construction storage or moving. Removal of the decorative doors is easily accomplished and may be used as an alternative during moving. The shipping skid should be left in place if the unit is being moved with a forklift. If the unit is to be lifted, spreader bars must be used to prevent damage to the decorative panels.

LOCATING THE UNIT

Consult local building codes and the national electrical code for special installation requirements. When installing the unit, allow sufficient space for air-flow clearance, wiring and servicing of the unit. Each side and the front should have a clearance of at least 36 inches [914mm] for servicing the unit. No rear clearance is required, but it is suggested that one or two inches be provided. The unit may be set directly on top of a raised floor if the raised floor has sufficient load capacity.

The unit should not be placed near any corner of the room or at the end of a long, narrow room. For best air distribution, the unit should be centered against the longest wall and as close to the load(s) as possible. Place multiple units as far apart as possible. Before placing the unit directly on the raised floor, the proper openings should have already been cut.

FLOOR DISCHARGE GRILLS

Discharge area for grills or perforated panels should be selected to provide approximately 550 FPM velocity. The total of all grills or registers will handle approximately 75% of the unit design air flow. The remainder of the air flow passes through cable cutouts, cracks and other leakage areas. Air-flow problems may occur with floors less than 12 inches [305mm] high unless care is taken with piping and cable runs. **Turning vanes should be used on any floor less than 12 inches [305mm] high**.

AIR-COOLED PIPING

The interconnecting lines to the remote air-cooled condenser must be installed by a qualified refrigeration mechanic.

Prior to connecting the tubes, make sure to apply blind caps or water proof tape to prevent dust or water from getting into the tubes.

Max. Allowable Piping Length (L)	Elevation Difference Between Two Units
75ft [22.9m]	30ft [9.2m]

For length exceeding 75ft [22.9m], refer to Table 1, Note that the elevation difference between indoor and outdoor units must be followed.

To ensure adequate oil return to the compressor, use the following recommendations:

Approximate discharge and liquid-line sizing up to 200 equivalent feet [61 meter]: (See table 1)

1. Standard piping practice must be used to ensure oil return and to minimize pressure drops.
2. Piping sizes listed are for runs up to 200 equivalent feet [61 meter]. Qualified refrigeration installers may reduce the piping sizes for runs less than 200 equivalent feet [61 meter].

3. Discharge lines must be trapped at the bottom, the top and every 20 feet of vertical rise.
4. Discharge check valves are recommended on long pipe runs or in cold climates (not on drawing).
5. Piping located in the DB-AIRE unit will not match the above sizes.
6. Discharge line: Recommended pressure drop should be between three and six PSI. Minimum gas velocity for proper oil return is 1000 FPM.
7. Liquid line: Recommended pressure drop should be between two and four PSI. Liquid-line velocity from the condenser to the expansion valve should be between 200 and 300 FPM. For more information on pipe sizing, refer to ASHRAE standards or other common practice trade publications. The information herein should be used as a guideline.

TABLE 1 : RECOMMENDED LINE SIZING UP TO 200 EQUIVALENT FEET [61 METER] FOR SPLIT AIR COOLED SYSTEMS

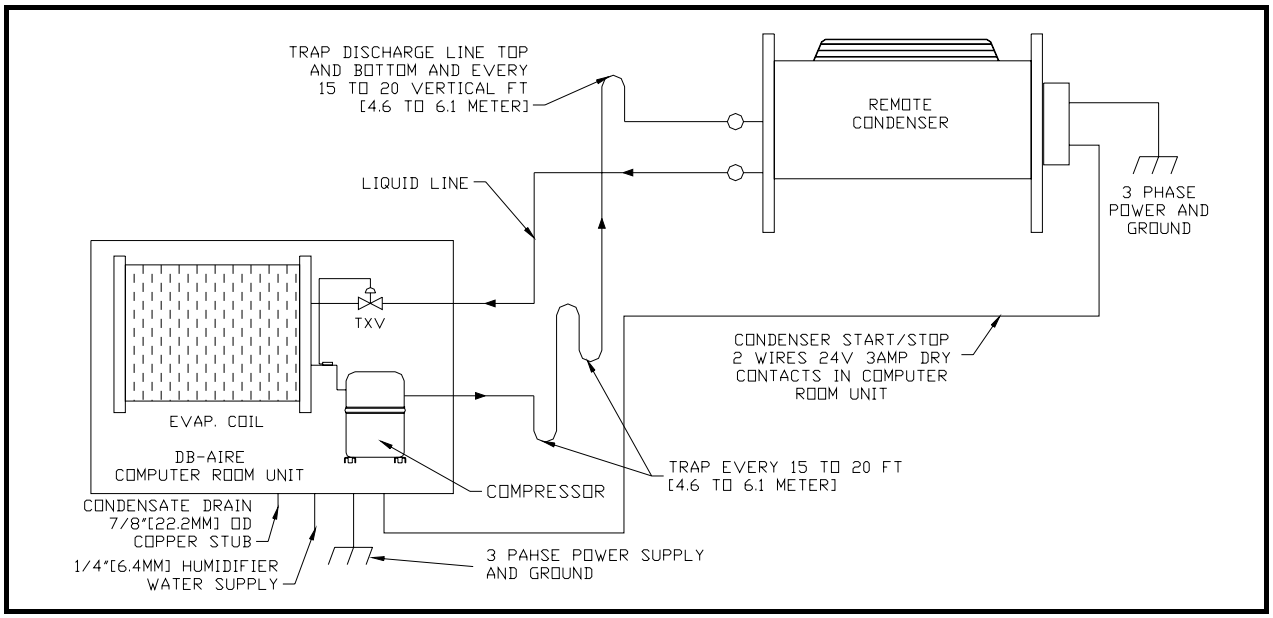
A: Hot Gas And Liquid Lines - Single Circuit Systems

UNIT TONNAGE	TONS PER CIRCUIT	50 EQUIV FEET [15 METER]		100 EQUIV FEET [31 METER]		150 EQUIV FEET [46 METER]		200 EQUIV FEET [61 METER]	
		HOT GAS	LIQUID	HOT GAS	LIQUID	HOT GAS	LIQUID	HOT GAS	LIQUID2
2	2	5/8 [15.9]	1/2 [12.7]	3/4 [19.1]	1/2 [12.7]	3/4 [19.1]	1/2 [12.7]	3/4 [19.1]	1/2 [12.7]
3	3	5/8 [15.9]	1/2 [12.7]	3/4 [19.1]	1/2 [12.7]	3/4 [19.1]	1/2 [12.7]	3/4 [19.1]	1/2 [12.7]
4	4	5/8 [15.9]	1/2 [12.7]	3/4 [19.1]	5/8 [15.9]	7/8 [22.2]	5/8 [15.9]	7/8 [22.2]	5/8 [15.9]
5	5	5/8 [15.9]	1/2 [12.7]	7/8 [22.2]	5/8 [15.9]	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]
7	7	7/8 [22.2]	1/2 [12.7]	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]
9	9	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	7/8 [22.2]	1 1/8 [28.6]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]
11	11	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	7/8 [22.2]	1 1/8 [28.6]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]
13	13	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]

B: Hot Gas And Liquid Lines - Dual Circuit Systems

UNIT TONNAGE	TONS PER CIRCUIT	50 EQUIV FEET [15 METER]		100 EQUIV FEET [31 METER]		150 EQUIV FEET [46 METER]		200 EQUIV FEET [61 METER]	
		HOT GAS	LIQUID	HOT GAS	LIQUID	HOT GAS	LIQUID	HOT GAS	LIQUID
9	4.5	5/8 [15.9]	1/2 [12.7]	7/8 [22.2]	5/8 [15.9]	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]
11	5.5	3/4 [19.1]	1/2 [12.7]	7/8 [22.2]	5/8 [15.9]	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]
13	6.5	7/8 [22.2]	1/2 [12.7]	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]
14	7	7/8 [22.2]	1/2 [12.7]	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]
16	8	7/8 [22.2]	1/2 [12.7]	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]	1 1/8 [28.6]	5/8 [15.9]
19	9.5	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	7/8 [22.2]	1 1/8 [28.6]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]
22	11	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]
26	13	7/8 [22.2]	5/8 [15.9]	1 1/8 [28.6]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]	1 3/8 [34.9]	7/8 [22.2]

FIGURE 1: FIELD PROVIDED PIPING AND WIRING



INSTALLATION

WATER-COOLED PIPING

The condenser water “in” and “out” connections are copper stubs, 1 1/8”[28.6mm] for models 2, 3, 4 and 5, 1 5/8”[41mm] for models 9, 11, 13 and 14 and 2 1/8”[54mm] for models 16, 19, 22 and 26. The sizes of the interconnecting lines between the units and the fluid coolers or towers may or may not be the same sizes as the connections on the units. This will depend on the total length and the number of fittings and valves used.

Shutoff valves should be used within a few feet of the inlet and the outlet of the unit to facilitate servicing. A fill valve with a hose-bib connection should also be used on the supply line or on the return line at the unit to allow the unit to be drained for servicing. The lowest point of the system should also have a hose-bib connection. This valve may be used to fill as well as to drain the system if necessary.

A strainer should be installed in the system and must be cleaned periodically.

One of the most common problems in the operation of the unit is air in the water (fluid) system. The presence of air will cause the pump to activate, resulting in high head pressures. It is mandatory that automatic air vents are installed in various locations in the piping system to remove air. (see Figure 2 for typical piping). Refer to ASHRAE standards or any other common practice trade publications.

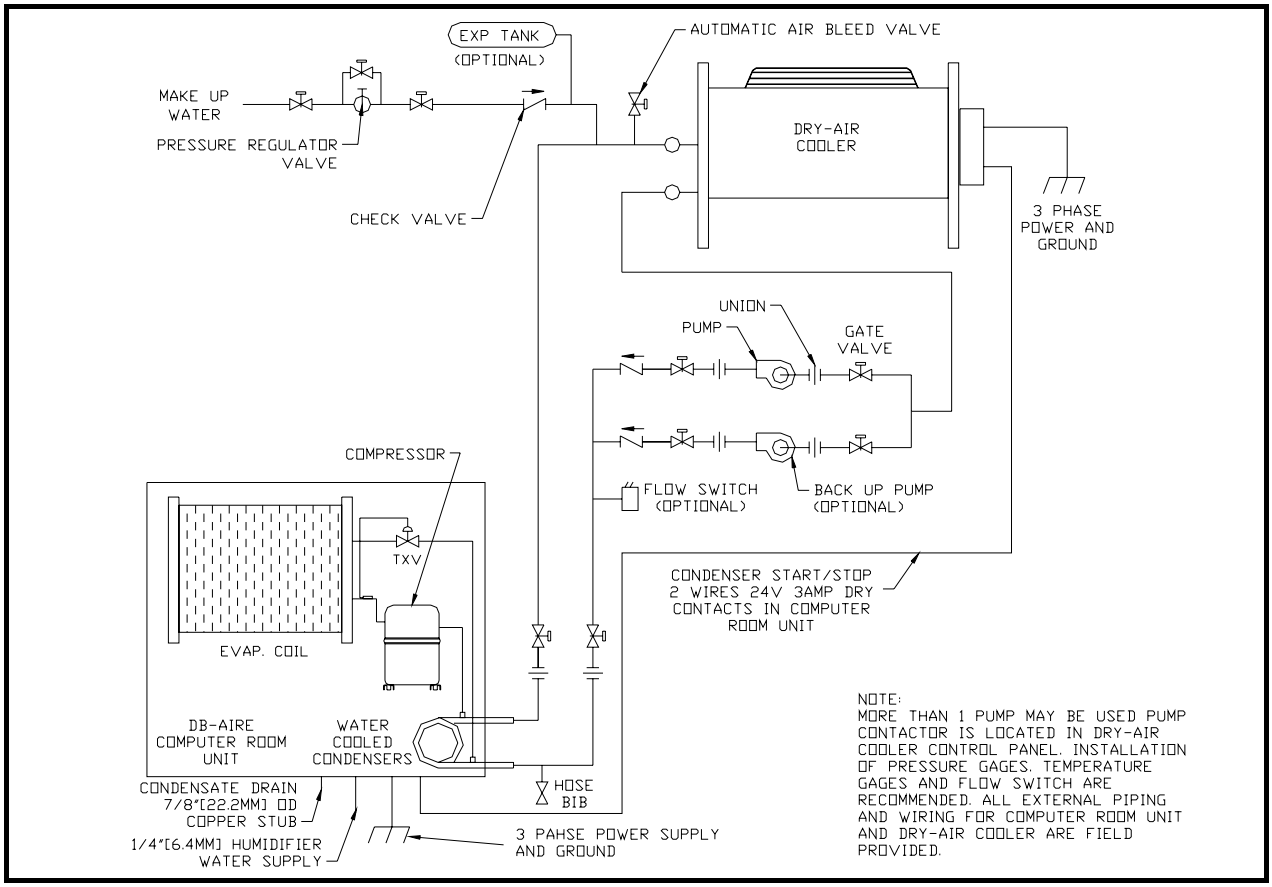
ENERGY-SAVER PIPING

Units with auxiliary chilled-water coils will also have chilled-water piping to be connected. Units with energy-saver coils will be factory piped to the condenser water piping. Sizes and conditions listed under water-cooled piping apply.

CHILLED-WATER PIPING

Chilled water inlet and outlet piping connections are 1 1/8”[29mm] for models 2, 3, 4, 5, 7, and 9, 1 3/8”[35mm] for model 11, 1 5/8”[41mm] for models 13, 15 and 18, 2 1/8”[54mm] for models 22, 26 and 30.

FIGURE 2: TYPICAL WATER/ GLYCOL PIPING WITH DRY-AIR COOLER. PUMP POWER CONNECTIONS NOT SHOWN



INSTALLATION

CONDENSATE-DRAIN PIPING

A 7/8 inch copper stub is provided on each unit for condensate removal. It is recommended that unions be installed in the drain line to permit ready disconnection from the unit for easy cleaning. Where local codes permit, PVC pipe may be used for drain lines. It is important that the drain line be installed with sufficient slope to permit easy draining. A trap should be built into the drain line to prevent backflow of air into the unit, drain lines should have a pitch, away from the unit, of not less than ¼ inch [6.4mm] for each 10 feet [3.1 meter] of run. Do not reduce the size of the drain line.

On some applications, in which a floor sink or other means of condensate disposal is not available, a condensate pump of adequate size must be used. There are several types of small pumps available, equipped with built-in floats for automatic condensate removal. The correct choice of pump depends greatly on the pressure head (vertical rise) that the pump must overcome. In some instances, in which the head is higher than the pump-head capacity, two pumps piped in series may be necessary. A check valve must be installed at the discharge side of all condensate pumps to reduce short cycling.

HUMIDIFIER PIPING

The standard humidifier supplied with all DB-Temp, and DB-Aire models is a steam generator. A 1/4-Inch [6.4mm] O.D. copper tubing should be used for makeup water.

A waterline shutoff valve must be provided outside the air conditioner for future disconnection and service. In addition, an in-line water-pressure regulator and a strainer should be installed in the makeup waterline. Water pressure should be set between 15 and 100 PSI [103kPa and 689kPa].

LEAK TESTING

Start-up by the installing contractor includes leak checking. No installation is complete until the entire system has been thoroughly checked for leaks. This includes checking refrigerant tubing, compressor rotalock valves, all flare fittings, pressure controls, all condenser and fluid-cooler fittings, condenser waterlines and pumps, humidifier makeup water, condensate lines, chilled-water lines, etc.

With all refrigeration system valves open, pressurize system to 150 PSI [1034kPa] with dry nitrogen and a tracer of freon. Leak check with an electronic leak detector. Tightening of fittings and valves is the responsibility of the installing contractor. After leak testing has been completed, dump test charge and evacuate system. After four hours, check gage readings. If pressure has increased, repeat leak check system. If pressure has not increased, break vacuum with freon and pull a second vacuum of 250 microns. Let stand for two hours. Pull a third vacuum to 250 microns prior to charging system.

ELECTRICAL CONNECTIONS

IMPORTANT: Before proceeding with the electrical connections, make certain that the volts, hertz, and phase correspond to that specified on the unit rating plate. Also, check to be sure that the service provided by the utility is sufficient to handle the additional load imposed by this equipment. Refer to the unit rating plate for equipment electrical requirements. The attached typical wiring diagrams show the proper field high- and low-voltage wiring. Make all electrical connections in accordance with national electrical code and any applicable local code ordinances. Use copper conductors only.

WARNING: The unit cabinet must have an uninterrupted electrical ground. An electrical ground wire of adequate size must be connected to the ground lug provided inside the control box. A ground wire is mandatory with microprocessor controls.

Supply voltage at the unit must be within 10% of the voltage indicated on the nameplate. Phase-to-phase imbalance must not exceed 3%. Local utility company should be contacted for correction of improper line voltage. Improper electrical power supply may cause premature failures, which will void unit warranties.

The computer-room unit, the condenser or fluid coolers, and the pumps each require individual power sources. The pump-motor contactor(s) is located in the fluid-cooler control panel. See electrical diagrams for details.

INSTALLATION

For auxiliary-equipment control wiring, such as for the remote condenser, bring NEC Class-2 wires to the control box and connect to the terminals indicated on the unit wiring diagram. Wiring terminal numbers will typically be the same in the computer-room unit and the remote heat exchanger. Verify terminal numbers on unit and heat exchanger wiring diagrams before connecting wiring.

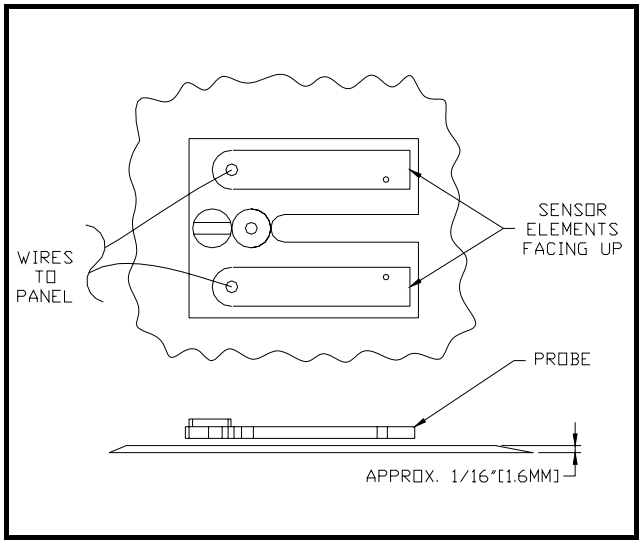
Verify that properly sized fuses or circuit breakers are installed in the remote-mounted disconnect switch. Fuse size and minimum circuit ampacity are listed on the unit nameplate.

Check the wiring connections in the unit control panel to ensure that they are tight. Wiring connections may become loose in transit.

UNDER-FLOOR WATER-DETECTION PROBE (OPTIONAL)

This control panel includes a condensate probe, which must be mounted below the unit against the floor area where water may collect. Place it below the unit as indicated below (Figure 3).

FIGURE 3: WATER DETECTION PROBE



REMOTE AIR COOLED CONDENSER AND DRY-AIR COOLER INSTALLATION

Rigging:

Move the unit to the installation location using a crane or fork lift. Each fan section has heavy steel leg supports with lifting holes at the top. Do not lift with a choke sling around the unit. Spreader bars are recommended for lifting multiple fan units. Under no circumstances should the coil headers or piping be used for lifting or moving the unit.

Leg Assembly:

The legs must be unbolted from the shipping position and extended prior to placing the unit on it's pad. Each leg extends down approximately 18 inches [457mm] and reattaches using the same bolts.

Locating The Unit:

The remote heat exchangers must be located in an area that will ensure free air flow into and out of the unit. The unit should not be placed closer than 36 inches [914mm] from any wall or other obstruction. When two or more units are used in the same area, space them apart by a minimum of 48 inches [1219mm].

Heat Exchanger Piping Connections

Piping must be supported within 36 inches [914mm] of the inlet and outlet connections.

The inlet connection is located on the top header on all units. The outlet connection is located on the bottom header of all units. See piping diagrams, figure 2 and 3 for details.

CHECK FOR CORRECT PHASING

The equipment should now be checked for correct phasing through the keypad. Switch the blower manual override to the "ON", then back to "OFF", or remove fuses from compressor high voltage circuit and push the "ON/OFF" button located on the front panel. A short start relay will take place as indicated on the screen. The blower motor will start, and it will be possible to determine blower rotation. Compressors, heaters and humidifiers are not affected by phasing. Disconnect power from the unit and reverse two of the three power wires to change rotation. Remote condenser and fluid cooler.

INSTALLATION

AIR COOLED CHARGING PROCEDURE

1. Connect the refrigerant drum to the low side and charge with vapor. Charge approximately three Lbs. per nominal ton.

   An easy way to run the blower and compressor is to turn on the blower and compressor manual override switches. All safety switches remain operational and all automatic control will be discontinued.
2. Start the unit. Observe the liquid sight glass indicator to check approximate charge for a normal refrigeration cycle. Bubbles in the sight glass can be caused by flashing due to excessive pressure drop from liquid-line piping, low subcooling or low charge.
3. The discharge pressure should be a minimum of 225 PSI [1551kPa] with the system stabilized.
4. Adjust refrigerant until the sight glass is cleared or exhibits only a slight number of bubbles with subcooling of approximately 8-10 degrees.
5. After the unit has stabilized, check the superheat temperature at the compressor suction line at least 6 inches [152mm] away from the compressor. Superheat should be between 6°F[3.34°C] and 14°F[7.78°C], 10°F [5.56°C] is recommended.
6. Check the crankcase (oil) temperature at the bottom of the compressor. The oil temperature must be at least 35°F[1.7°C] higher than the saturated suction temperature at all times. Smaller temperature difference indicates either that the system is overcharged or that the superheat is set too low, allowing liquid refrigerant to return to the compressor. Liquid return may result in compressor failures.

SYSTEM CHECK FOR OVERCHARGING

Because system reliability depends on proper refrigerant charge, it is very important that the system is thoroughly checked for superheat and oil temperature after the unit has stabilized. A final check should be made after the room is stabilized and the unit is fully loaded.

GLYCOL SYSTEM CONCENTRATION

IMPORTANT: Fill the system with water and sufficient antifreeze (ethylene glycol) to protect the system against winter freeze-up. Refer to the chart for amount of glycol.

FREEZING POINT	% GLYCOL BY VOLUME
32°F [0°C]	0
17°F [-8.3°C]	15
0°F [-17.8°C]	30
-20°F [-28.9°C]	45

in order to achieve the approximate glycol concentration, it is necessary to know the volume that the system contains. The total volume includes the amount of liquid required by the DB-AIRE unit, remote fluid cooler and the interconnecting piping. Glycol percentage must be checked after installation and on periodic intervals to ensure satisfactory freeze protection. Hydrometers are required to ensure an accurate reading.

WATER/GLYCOL-COOLED SYSTEMS CHECK FOR CHARGING

All water-cooled units are factory charged. Appropriate charge is at approximately 10°F [5.56°C] subcooling. Adjust water regulating valve to maintain 250 PSI [1724kPa] head pressure. Check superheat and oil (crankcase) temperature after the unit has stabilized. A clear sight glass should not be used solely to determine appropriate charge. Check superheat temperature at approximately 6 inches [152mm] away from the compressor suction-line connection. Superheat will range between 6°F [3.34°C] and 14°F[7.78°C]. 10°F[5.56°C] is recommended.

Some bubbles may be seen in sight glass due to changes in subcooling and discharge pressure. Slight bubbles in the sight glass are permissible as long as the crankcase oil temperature and superheat are within limits.

A slight overcharge will typically cause water and glycol units to trip off on high pressure soon after start-up.

DB ALARM PROCESSOR

CONTROL DESIGN

1. Microprocessor based single board
2. 1 MB memory (flash and static ram)
3. Nonvolatile program storage (flash) for all menu-programmed values and options
4. Volatile memory (battery backed-up static ram for component run times, alarm history and other data)
5. 12-bit 1/10°F [1/18°C] resolution analog to digital converter

LIQUID-CRYSTAL DISPLAY MONITOR

2 line with 16 characters (standard) 16 lines with 80 characters, high intensity back lit display (optional) the monitor displays temperature, humidity, all set points, cool 1, cool 2, humidification, dehumidification, heat 1, heat 2, heat 3, percentage of chilled-water capacity (valve opening), percentage of cooling capacity (compressors and energy saver), percentage of heating and humidification capacities, average percentage of all capacities for last hour of operation, component run times, alarm history, diagnostics and all alarms listed in alarm section.

Manual override, blower, cooling 1, cooling 2, heating 1, heating 2, heating 3, humidification and remote alarm operated via keypad.

CONTROL SWITCHES

Push-button on/off, push-button menu, push-button alarm silence/program set (see Figure 4).

FIGURE 4: DATA ALARM PROCESSOR

STANDARD ALARMS

High temp, low temp, high humid, low humid, manual override, under floor water detection, no air flow, dirty filters, humidifier failure, low-voltage warning, fire stat, compressor short cycle, power failure restart, humidity-sensor failure, temperature-sensor failure, maintenance required based on programmed run time, high pressure, low pressure, no water flow, smoke alarm, standby glycol pump operating, main fan motor overload. (NOTE: ADDITIONAL HARDWARE **MAY BE REQUIRED FOR STANDBY GLYCOL PUMP)** On energy-saver units, one programmable local alarm input (#3) is to be used to change from compressor operation to chilled-water operation.(This is not an alarm.) Display will switch to energy saver with percentage of valve-opening display on LCD. On units with compressors, option input (#1) is used for a high-pressure alarm.

SOFTWARE

Software has menu-driven programming. Password is required. Opening of unit door not required for the following:

Temperature set point, temperature dead band, temperature high and low alarm points, temperature sensor calibration, time delay between stages (sequential load activation), unit-start time delay, set tone of alarm buzzer, set DC voltage range for control valve, set hours of operation until appearance of maintenance-required alarm message, set power-failure restart method. Factory settings include periodic chilled-water or energy-saver coil flush, low-voltage dropout point 90%, predictive humidity control, temperature anticipation, automatic lead-lag rotation of compressors and reheat.

DATA COLLECTION

The microprocessor will log data for the following items: Run times of fan motor, cool 1, cool 2, heat 1, heat 2, heat 3, humidification, dehumidification, chilled-water operation and energy-saver operation. Temperature, humidity and capacity readings will be taken every three minutes and recorded on the unit data base for the past 24 hours. An alarm data base will be maintained for the last 10 alarms and the time since occurrence. All data may be displayed at the unit without any additional equipment.

COMMUNICATIONS

The unit can communicate over an RS 485 network using a twisted pair of wires in a token ring loop. All data may be transmitted to and displayed at an optional remote-mounted DB-Aire Network. Optional RS 485 or 232 card can be futted for modem or modbus communication protocol.

DIAGNOSTICS

All electronic circuitry contains built-in diagnostics. No additional external devices are required. Automatic self-diagnostics shall take place when power is applied to the unit. Manual diagnostics will be available with self-prompting instruction displays.

CONTROL LOGIC

COMPRESSOR COOLING LOGIC

1. Maximum frequency of primary compressor starts = 5 minutes start of same stage
2. Primary compressor stage minimum time off = 2 minutes stop to start of same stage
3. Secondary unloader stage minimum time off = 1 minute stop to start of same stage
4. Compressor staging sequence at each adjustment period:

   C1 On at temp set point + temp dead band

   C2 On at temp set point + temp dead band + 0.3°F [0.17°C]

   C2 Off at temperature set point + temperature dead band

   C1 Off at temperature set point

HEAT STRIP HEATING LOGIC

1. Minimum time between heat stage turn on = 1 minute stop to start of same stage or start to start of different stages.
2. Heat staging sequence:

   H1 on at temperature set point -Temperature dead band - 0.3°F [0.17°C]

   H2 on at temperature set point - Temperature dead band - 0.6°F [0.33°C]

   H3 on at temperature set point - Temperature dead band - 0.9°F [0.50°C]

   H3 off at temperature set point - Temperature dead band - 0.6°F [0.33°C]

   H2 off at temperature set point - Temperature dead band - 0.3°F [0.17°C]

   H1 off at temperature set point - Temperature dead band

HUMIDIFICATION LOGIC

1. All heat Off immediately during humidification
2. Minimum time stop to start = 1 minute
3. Minimum time between humidification / dehumidification changeover = 5 minutes
4. Humidification staging sequence:

   H1 on at humidity set point - humidity dead band

   H1 off at humidity set point - 1%

DEHUMIDIFICATION LOGIC

1. Dehumidification is not governed by the adjustment rate but will not violate compressor short-cycle times.
2. Heating stages are used to reheat the over-cooled but dehumidified air and heating short-cycle time will not be violated
3. Five minute minimum between humidification and dehumidification cycles
4. One minute minimum between stop to start of dehumidification
5. Dehumidification staging sequence: Energy-saver or chilled-water cooling proportionally increase or decrease as required, up to maximum valve opening if available.

   Compressorized units

   C1 On at humidity set point + humidity dead band

   C2 On at humidity set point + humidity dead band + 1%

   C2 Off at humidity set point + humidity dead band

   C1 Off at humidity set point

ENERGY-SAVER COOLING LOGIC

1. Energy saver function is always used any time programmable alarm point #3 has been set for energy - saver operation and is powered.
2. Compressors will not be used with energy saver to hold set point.
3. Energy-saver staging sequence:

   Water valve is On at temperature set point + temperature dead band. Water valve modulates every 60 seconds to maintain set point. Water valve is Off at temperature set point

CONTROL LOGIC

CHILLED-WATER COOLING LOGIC

Chilled-water staging sequence: water valve is on at temperature set point + temperature dead band. Water valve modulates every 60 seconds to maintain set point. Water valve is off at temperature set point.

AUTOMATIC, PERIODIC COIL-FLUSH LOGIC

Control will automatically flush chilled water or energy-saver coil and reheat coils. Control valves open 25% every 100 hours of operation for a period of 30 seconds.

HUMIDITY ANTICIPATION LOGIC

Control will automatically modify humidity set point to stop unnecessary humidification and dehumidification.

Humidity set point is modified based on return air temperature. This prevents humidification and dehumidification if not required based on changing temperature to 70°F [21°C].

MANUAL OVERRIDE LOGIC

Any manual override function will cause all automatic temperature and humidity control by the processor to be discontinued. This will allow installers to easily run each function during start-up.

TEMPERATURE AND HUMIDITY SENSOR FAILURE LOGIC

1. A temperature-sensor failure will cause the processor to activate all stages of cooling if the unit is operating at the time of failure. If self-test finds a bad sensor on start-up, the unit will not be allowed to start.
2. A humidity-sensor failure will cause the processor to discontinue all humidification and dehumidification control if the unit is operating at the time of failure. If self-test finds a bad sensor on start-up, the unit will not be allowed to start.

COMPRESSOR SHORT-CYCLE ALARM LOGIC

If the compressor has started 10 times within the last hour, the alarm sounds. The minimum time between primary compressor starts automatically increases from 5 to 6 minutes for the next hour of operation.

POWER-FAILURE RESTART ALARM LOGIC

Unit restarts based on program selection (see menu 31 below).

NO AIR FLOW ALARM LOGIC

A no air flow alarm will prevent unit operation of cool, heat, humidification or dehumidification, for unit to operate, microprocessor must have proven air flow.

PROGRAM SELECTIONS

Operate from front panel with door closed. After 60 seconds without an input, display will return to normal.

TECHNICAL SPECIFICATIONS

1.) DB-TEMP SYSTEMS

AIR COOLED/ GLYCOL COOLED PERFORMANCE DATA

PERFORMANCE AT 35°C (95°F) AMBIENT WITH SPECIFIED CONDENSER/DRY-AIR COOLER
NET CAPACITY KW AT STANDARD AIRFLOW

MODEL		DBTAD/U-02 DBTGD/U-02		DBTAD/U-03 DBTGD/U-03		DBTAD/U-04 DBTGD/U-04		DBTAD/U-05 DBTGD/U-05		DBTAD/U-07 DBTGD/U-07		DBTAD/U-09 DBTGD/U-09		DBTAD/U-11 DBTGD/U-11		DBTAD/U-13 DBTGD/U-13	
		TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.
R22																	
26.7DB/ 19.4WB	50% RH	10.3	8.0	12.8	10.2	14.9	13.1	18.5	16.7	26.1	22.3	38.8	32.8	43.3	39.0	50.4	45.4
24DB/ 17WB	50% RH	9.6	7.9	11.9	10.0	13.8	12.9	17.2	16.4	24.3	21.8	36.1	32.1	40.2	38.2	46.8	44.5
24DB/ 16WB	45% RH	9.4	8.4	11.6	10.7	13.6	13.6	16.7	16.7	23.8	23.4	35.3	34.4	39.4	39.4	45.9	45.9
22.2DB/ 15.5WB	50% RH	9.1	7.7	10.4	9.8	13.2	12.6	16.4	16.0	23.1	21.4	34.3	31.5	38.2	37.5	44.5	43.6
22.2DB/ 14.8WB	45% RH	8.7	8.2	10.8	10.5	12.6	12.6	15.7	15.7	22.1	22.1	32.9	32.9	36.7	36.7	42.7	42.7
R407C																	
26.7DB/ 19.4WB	50% RH	10.0	7.8	12.5	9.9	14.5	12.8	18.0	16.3	25.4	21.7	37.8	32.0	42.2	38.0	49.1	44.3
24DB/ 17WB	50% RH	9.4	7.7	11.6	9.8	13.5	12.6	16.8	16.0	23.7	21.3	35.2	31.3	39.2	37.2	45.6	43.4
24DB/ 16WB	45% RH	9.2	8.2	11.3	10.4	13.3	13.3	16.3	16.3	23.2	22.8	34.4	33.5	38.4	38.4	44.8	44.8
22.2DB/ 15.5WB	50% RH	8.9	7.5	10.1	9.6	12.9	12.3	16.0	15.6	22.5	20.9	33.4	30.7	37.2	36.6	43.4	42.5
22.2DB/ 14.8WB	45% RH	8.5	8.0	10.5	10.2	12.3	12.3	15.3	15.3	21.5	21.5	32.1	32.1	35.8	35.8	41.6	41.6

NET CAPACITY MBH AT STANDARD AIRFLOW

R22																	
80DB/ 67WB	50% RH	35.2	27.4	43.6	34.7	50.8	44.8	63.1	56.9	89.0	76.0	132.4	111.8	147.6	133.1	171.8	154.9
75DB/ 62.5WB	50% RH	32.7	26.8	40.5	34.1	47.2	43.9	58.7	55.8	82.8	74.5	123.1	109.6	137.3	130.4	159.7	151.8
75DB/ 61WB	45% RH	32.1	28.7	39.7	36.4	46.3	46.3	57.6	57.6	81.1	79.7	120.6	117.2	134.5	134.5	156.5	156.5
72DB/ 60WB	50% RH	31.1	26.3	35.5	33.4	44.9	43.0	55.8	54.7	78.7	73.0	117.0	107.4	130.4	127.8	151.8	148.7
72DB/ 58.6WB	45% RH	29.8	28.1	37.0	35.7	43.1	43.1	53.6	53.6	75.5	75.5	112.3	112.3	125.2	125.2	145.7	145.7
R407C																	
80DB/ 67WB	50% RH	34.3	26.7	42.5	33.8	49.5	43.7	61.5	55.5	86.8	74.1	129.1	109.0	143.9	129.8	167.5	151.0
75DB/ 62.5WB	50% RH	31.9	26.1	39.5	33.2	46.0	42.8	57.2	54.4	80.7	72.6	120.0	106.9	133.9	127.1	155.7	148.0
75DB/ 61WB	45% RH	31.3	28.0	38.7	35.5	45.1	45.1	56.2	54.2	79.1	77.7	117.6	114.3	131.1	131.1	152.6	152.6
72DB/ 60WB	50% RH	30.3	25.6	34.6	32.6	43.8	41.9	54.4	53.3	76.7	71.2	114.1	104.7	127.1	124.6	148.0	145.0
72DB/ 58.6WB	45% RH	29.1	27.4	36.1	34.8	42.0	42.0	52.3	52.3	73.6	73.6	109.5	109.5	122.1	122.1	142.1	142.1

WATER COOLED PERFORMANCE DATA

PERFORMANCE AT 29.4°C (85°F) ENTERING WATER TEMPERATURE
NET CAPACITY KW AT STANDARD AIRFLOW

MODEL		DBTWD/U-02		DBTWD/U-03		DBTWD/U-04		DBTWD/U-05		DBTWD/U-07		DBTWD/U-09		DBTWD/U-11		DBTWD/U-13	
		TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.
R22																	
26.7DB/ 19.4WB	50% RH	11.2	8.5	13.9	10.8	17.2	14.8	19.7	17.0	27.7	22.6	41.4	33.8	46.7	41.3	54.4	47.0
24DB/ 17WB	50% RH	10.5	8.3	12.9	10.6	16.0	14.5	18.3	16.6	25.8	22.2	38.5	33.1	43.5	40.4	50.6	46.0
24DB/ 16WB	45% RH	10.2	8.9	12.7	11.3	15.7	15.5	17.9	17.8	25.3	23.7	37.8	35.4	42.6	42.6	49.5	49.2
22.2DB/ 15.5WB	50% RH	9.9	8.2	12.3	10.4	15.1	14.2	17.4	16.3	24.5	21.7	36.6	32.4	41.3	39.6	48.0	45.1
22.2DB/ 14.8WB	45% RH	9.5	8.8	11.8	11.1	14.6	14.7	16.7	16.7	23.5	23.2	35.1	34.7	39.7	39.7	46.1	46.1
R407C																	
26.7DB/ 19.4WB	50% RH	10.9	8.3	13.6	10.5	16.8	14.4	19.2	16.6	27.0	22.0	40.4	33.0	45.5	40.3	53.0	45.8
24DB/ 17WB	50% RH	10.2	8.1	12.6	10.3	15.6	14.1	17.8	16.2	25.2	21.6	37.5	32.3	42.4	39.4	49.3	44.9
24DB/ 16WB	45% RH	9.9	8.7	12.4	11.0	15.3	15.1	17.5	17.4	24.7	23.1	36.9	34.5	41.5	41.5	48.3	48.0
22.2DB/ 15.5WB	50% RH	9.7	8.0	12.0	10.1	14.7	13.8	17.0	15.9	23.9	21.2	35.7	31.6	40.3	38.6	46.8	44.0
22.2DB/ 14.8WB	45% RH	9.3	8.6	11.5	10.8	14.2	14.3	16.3	16.3	22.9	22.6	34.2	33.8	38.7	38.7	44.9	44.9

NET CAPACITY MBH AT STANDARD AIRFLOW

R22																	
80DB/ 67WB	50% RH	38.3	29.1	47.4	36.9	58.6	50.6	67.1	57.9	94.6	77.2	141.3	115.3	159.5	140.8	185.5	160.2
75DB/ 62.5WB	50% RH	35.7	28.5	44.0	36.1	54.5	49.6	62.4	56.8	88.0	75.7	131.4	113.0	145.4	138.0	172.5	157.0
75DB/ 61WB	45% RH	34.9	30.5	43.2	38.6	53.4	53.0	61.1	60.8	86.2	81.0	128.8	120.9	145.4	145.4	169.0	168.0
72DB/ 60WB	50% RH	33.9	28.0	41.8	35.4	51.7	48.6	59.3	55.6	83.6	74.1	124.8	110.7	141.0	135.2	163.9	153.8
72DB/ 58.6WB	45% RH	32.5	29.9	40.2	37.9	49.7	49.7	56.9	56.9	80.2	79.3	119.8	118.5	135.3	135.3	157.3	157.3
R407C																	
80DB/ 67WB	50% RH	37.3	284.4	46.2	36.0	57.1	49.3	65.4	56.5	92.2	75.3	137.8	112.4	155.5	137.3	180.9	156.2
75DB/ 62.5WB	50% RH	34.8	27.8	42.9	35.2	53.1	48.4	60.8	55.4	85.8	73.8	128.1	110.4	141.9	134.6	168.2	153.1
75DB/ 61WB	45% RH	34.0	29.7	42.1	37.6	52.1	51.7	59.6	59.3	84.0	79.0	125.6	117.9	141.8	141.8	164.8	163.8
72DB/ 60WB	50% RH	33.1	27.3	40.8	34.5	50.4	47.4	57.8	54.2	81.5	72.2	121.7	107.9	137.5	131.8	159.8	150.0
72DB/ 58.6WB	45% RH	31.7	29.2	39.2	37.0	48.5	48.5	55.5	55.5	78.2	77.3	116.8	115.5	131.9	131.9	153.4	153.4

TECHNICAL SPECIFICATIONS

AIR COOLED, WATER/ GLYCOL COOLED

PHYSICAL DATA

MODEL		DBT*D/U-02	DBT*D/U-03	DBT*D/U-04	DBT*D/U-05	DBT*D/U-07	DBT*D/U-09	DBT*D/U-11	DBT*D/U-13
LENGTH	MM	902	902	902	902	1727	1727	1727	1727
	INS	35.5	35.5	35.5	35.5	68	68	68	68
WIDTH	MM	876	876	876	876	902	902	902	902
	INS	34.5	34.5	34.5	34.5	35.5	35.5	35.5	35.5
HEIGHT	MM	1880	1880	1880	1880	1956	1956	1956	1956
	INS	74	74	74	74	77	77	77	77
WEIGHT	KG	280	290	310	320	530	540	560	580
	LB	616	638	682	704	1166	1188	1232	1276

ADD 457MM(18 INCH) TO HEIGHT OF UNITS FOR DISCHARGE PLENUM - UP FLOW UNITS ONLY.

BLOWER DATA

STANDARD AIR VOLUME	CMH	1700	2550	3400	4250	6796	8500	10200	11050
	CFM	1000	1500	2000	2500	4000	5000	6000	6500
STANDARD FAN MOTOR	KW	0.75	0.75	0.75	1.12	1.5	2.2	3.0	4.0
	HP	1	1	1	1.5	2	3	4	5.5
OPTIONAL AIR VOLUME	CMH	2550	2800	4250	4590	8500	10200	11050	N/A
	CFM	1500	1650	2500	2700	5000	6000	6500	N/A
OPTIONAL FAN MOTOR	KW	1.12	1.12	1.12	1.5	2.2	3.0	4.0	N/A
	HP	1.5	1.5	1.5	2	3	4	5.5	N/A
EXT. STATIC PRESSURE	MM W.G.	7.6	7.6	7.6	7.6	12.7	12.7	12.7	N/A
	INS W.G.	0.3	0.3	0.3	0.3	0.5	0.5	0.5	N/A
SIZE (QUANTITY)	MM	254 x 254 (1)	254 x 254 (1)	254 x 254 (1)	254 x 254 (1)	381 x 381 (1)	381 x 381 (1)	381 x 381 (1)	381 x 381 (1)
	INS	10 x 10 (1)	10 x 10 (1)	10 x 10 (1)	10 x 10 (1)	15 x15 (1)	15 x15 (1)	15 x15 (1)	15 x15 (1)

COMPRESSOR DATA

MODEL		DBT*D/U-02	DBT*D/U-03	DBT*D/U-04	DBT*D/U-05	DBT*D/U-07	DBT*D/U-09	DBT*D/U-11	DBT*D/U-13
QUANTITY OF COMPRESSORS		1	1	1	1	1	1	1	1
HORSEPOWER	50HZ	4.0	5.1	6.0	7.0	8.0	12.0	13.0	15.0
	60HZ	N/A	N/A	5.8	6.0	7.0	11.0	10.0	13.0

EVAPORATOR DATA @ STANDARD AIRFLOW

FACE AREA	M^2	0.28	0.28	0.49	0.49	1.13	1.13	1.13	1.13
	FT^2	3.0	3.0	5.2	5.2	12.2	12.2	12.2	12.2
ROWS OF COIL		4	4	4	4	2	3	4	5
FACE VELOCITY	M/S	1.66	2.49	1.93	2.42	1.66	2.09	2.50	2.71
	FPM	327	490	381	476	327	409	491	532

REHEAT SECTION

STANDARD ELECTRIC	KW	6.0	12.0	12.0	12.0	15.0	15.0	15.0	15.0
	MBH	20.5	41.0	41.0	41.0	51.2	51.2	51.2	51.2

HUMIDIFIER SECTION (OPTIONAL)

STANDARD STEAM	KG/HR	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
GENERATOR CAPACITY	LB/HR	10	10	10	10	10	10	10	10
POWER	KW	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6

FILTERS STANDARD 50MM (2 INCH) THICK ASHRAE 52.2 MERV 8

610MM x 610MM (24 x 24) QTY	1	1	1	1	-	-	-	-

FILTERS STANDARD 100MM (4 INCH) THICK ASHRAE 52.2 MERV 8 (UPFLOW)

508MM x 635MM (20" x 25") QTY	-	-	-	-	2	2	2	2

FILTERS STANDARD 100MM (4 INCH) THICK ASHRAE 52.2 MERV 8 (DOWNFLOW)

406MM x 635MM (16" x 25") QTY	-	-	-	-	4	4	4	4

CONNECTION SIZE

LIQUID LINE O.D COPPER (1/UNIT)	INS	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8
HOT GAS LINE O.D COPPER (1/UNIT)	INS	5/8	5/8	5/8	5/8	7/8	7/8	7/8	7/8
CONDENSER WATER - IN OUT	INS	7/8	7/8	1 1/8	1 1/8	1 5/8	1 5/8	1 5/8	1 5/8
HUMIDIFIER SUPPLY	INS	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
CONDENSATE DRAIN	INS	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8

NOTE : REFER TO OPERATION AND MAINTENANCE FOR RECOMMENDED PIPE SIZING BETWEEN INDOOR AND OUTDOOR UNIT.

AIR COOLED

AIR COOLED CONDENSERS STD SELECTIONS AT 35°C (95°F) AMBIENT, SEA LEVEL*

MODEL NUMBER	DBRC-04	DBRC-04	DBRC-04	DBRC-06	DBRC-08	DBRC-10	DBRC-13	DBRC-17

*SEE 'REMOTE HEAT EXCHANGER' SECTION FOR MORE INFORMATION.

TECHNICAL SPECIFICATIONS

WATER COOLED

CONDENSER WATER REQUIREMENTS - MAXIMUM DESIGN WATER PRESSURE 1033 KPA

MODEL		DBTWD/U-02	DBTWD/U-03	DBTWD/U-04	DBTWD/U-05	DBTWD/U-07	DBTWD/U-09	DBTWD/U-11	DBTWD/U-13
29.4°C/85°F EWT	LPS/PD IN KPA	0.39/19.3	0.7/51.7	0.8/20.7	1.1/35.9	1.0/ 27.6	1.5/ 24.8	1.9/ 29.0	2.5/ 31.0
	GPM/PD IN PSI	6.2/2.8	11.4/7.5	12.0/3.0	17.0/5.2	15.8/ 4.0	24.0/ 3.6	30.0/ 4.2	40.0/ 4.5
23.9°C/75°F EWT	LPS/PD IN KPA	0.3/11.0	0.4/19.3	0.5/13.8	0.7/17.9	0.7/ 20.7	1.1/ 17.9	1.4/ 20.7	2.0/ 21.4
	GPM/PD IN PSI	4.0/1.6	6.2/2.8	8.3/2.0	10.4/2.6	11.1/ 3.0	17.3/ 2.6	22.0/ 3.0	31.3/ 3.1
18.3°C/65°F EWT	LPS/PD IN KPA	0.2/6.2	0.2/10.3	0.3/7.6	0.4/9.0	0.4/ 13.8	0.6/ 6.9	0.8/ 10.3	1.2/ 13.8
	GPM/PD IN PSI	2.6/0.9	3.9/1.5	5.2/1.1	6.5/1.3	7.1/ 2.0	10.0/ 1.0	13.2/ 1.5	19.0/ 2.0

GLYCOL COOLED

DRY-AIR COOLER SELECTION AT 35°C (95°F) AMBIENT, SEA LEVEL

MODEL		DBTGD/U-02	DBTGD/U-03	DBTGD/U-04	DBTGD/U-05	DBTGD/U-07	DBTGD/U-09	DBTGD/U-11	DBTGD/U-13
GLYCOL	LPS	0.4	0.7	0.7	0.9	1.3	1.7	1.9	2.2
FLOW RATE	GPM	6.4	11.0	11.7	15.0	21.0	27.0	30.0	35.0
PRESSURE DROP	KPA	21.4	49.0	23.4	31.0	24.1	20.0	25.5	21.4
	PSI	3.1	7.1	3.4	4.5	3.5	2.9	3.7	3.1
DRY-AIR COOLER		DBFC-05	DBFC-06	DBFC-09	DBFC-09	DBFC-11	DBFC-17	DBFC-21	DBFC-24

2.) DB-AIRE SYSTEMS

AIR COOLED/ GLYCOL COOLED PERFORMANCE DATA

PERFORMANCE AT 35°C (95°F) AMBIENT WITH SPECIFIED CONDENSER/ DRY-AIR COOLER

NET CAPACITY KW AT STANDARD AIRFLOW

MODEL		DBAD/U-09 DBGD/U-09		DBAD/U-11 DBGD/U-11		DBAD/U-13 DBGD/U-13		DBAD/U-14 DBGD/U-14		DBAD/U-16 DBGD/U-16		DBAD/U-19 DGAD/U-19		DBAD/U-22 DBGD/U-22		DBAD/U-26 DBGD/U-26	
		TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.
R22																	
26.7DB/19.4WB	50% RH	36.6	32.3	45.5	38.8	51.6	45.1	57.9	51.1	67.9	58.7	77.5	66.2	88.1	76.1	102.5	88.5
24.0DB/17.0WB	50% RH	34.1	31.7	42.3	38.1	48.0	44.2	53.8	50.1	63.2	57.5	72.1	64.9	81.9	74.5	95.3	86.8
24.0DB/16.0WB	45% RH	33.4	33.4	41.4	40.7	47.1	47.3	52.8	52.8	61.9	61.5	70.7	69.4	80.3	79.8	93.4	92.8
22.2DB/15.5WB	50% RH	32.4	31.1	40.2	37.3	45.6	43.3	51.1	49.1	60.0	56.4	68.5	63.6	77.8	73.1	90.6	85.0
22.2DB/14.8WB	45% RH	31.1	31.1	38.6	38.6	43.8	43.8	49.1	49.1	57.6	57.6	65.7	65.7	74.7	74.7	86.9	86.9
R407C																	
26.7DB/19.4WB	50% RH	35.5	31.3	44.1	37.6	50.1	43.7	56.2	49.6	65.9	56.9	75.2	64.2	85.5	73.8	99.4	85.8
24.0DB/17.0WB	50% RH	33.1	30.7	41.0	37.0	46.6	42.9	52.2	48.6	61.3	55.8	69.9	63.0	89.1	72.3	92.4	84.2
24.0DB/16.0WB	45% RH	32.4	32.4	40.2	39.5	45.7	45.9	51.2	51.2	60.0	59.7	68.6	67.3	77.9	77.4	90.6	90.0
22.2DB/15.5WB	50% RH	31.4	30.2	39.0	36.2	44.2	42.0	49.6	47.6	58.2	54.7	66.4	61.7	75.5	70.9	87.9	82.5
22.2DB/14.8WB	45% RH	30.2	30.2	37.4	37.4	42.5	42.5	47.6	47.6	55.9	55.9	63.7	63.7	72.5	72.5	84.3	84.3

NET CAPACITY MBH AT STANDARD AIRFLOW

R22																	
80DB/67.0WB	50% RH	125.0	110.3	155.1	132.5	176.2	153.9	197.5	174.3	231.8	200.2	264.5	225.9	300.5	259.5	349.7	302.0
75DB/62.5WB	50%RH	116.2	108.1	144.3	129.9	163.9	150.8	183.7	170.8	215.6	196.2	246.0	221.4	279.5	254.3	325.2	296.0
75DB/61.0WB	45%RH	113.9	113.9	141.4	138.9	160.6	161.3	180.0	180.0	211.3	209.9	241.1	236.9	273.9	272.1	318.8	316.7
72DB/60.0WB	50%RH	110.4	106.0	137.1	127.3	155.7	147.8	174.5	167.4	204.8	192.3	233.7	217.0	265.5	249.3	309.0	290.1
72DB/58.6WB	45%RH	106.0	106.0	131.6	131.6	149.5	149.5	167.5	167.5	196.6	196.6	224.3	224.3	254.9	254.9	296.6	296.6
R407C																	
80DB/67.0WB	50% RH	121.3	107.0	150.4	128.5	170.9	149.3	191.6	169.1	224.8	194.2	256.6	219.1	291.5	251.7	339.2	292.9
75DB/62.5WB	50%RH	112.7	104.9	140.0	126.0	159.0	146.3	178.2	165.7	209.1	190.3	238.6	214.8	271.1	246.7	315.4	287.1
75DB/61.0WB	45%RH	110.5	110.5	137.2	134.7	155.8	156.5	174.6	162.4	205.0	203.6	233.9	229.8	265.7	263.9	309.2	307.2
72DB/60.0WB	50%RH	107.1	102.8	133.0	123.5	151.0	143.4	169.3	162.5	198.7	186.5	226.7	210.5	257.5	241.8	299.7	281.4
72DB/58.6WB	45%RH	102.8	102.8	127.7	127.7	145.0	145.0	162.5	162.5	190.7	190.7	217.6	217.6	247.3	247.3	287.7	287.7

WATER COOLED PERFORMANCE DATA

PERFORMANCE AT 29.4°C (85°F) ENTERING WATER TEMPERATURE

NET CAPACITY KW AT STANDARD AIRFLOW

MODEL		DBWD/U-09		DBWD/U-11		DBWD/U-13		DBWD/U-14		DBWD/U-16		DBWD/U-19		DBWD/U-22		DBWD/U-26	
		TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.
R22																	
26.7DB/19.4WB	50% RH	38.6	33.0	48.0	41.0	54.4	46.0	61.0	52.1	71.4	59.6	82.0	67.7	92.6	77.4	107.7	90.0
24.0DB/17.0WB	50% RH	35.9	32.3	44.6	40.2	50.6	45.0	56.7	51.0	66.4	58.4	76.3	66.4	86.2	75.8	100.2	88.1
24.0DB/16.0WB	45% RH	35.2	34.6	43.8	43.0	49.6	48.2	55.6	54.6	65.1	62.5	74.8	71.0	84.4	81.1	98.2	94.3
22.2DB/15.5WB	50% RH	34.1	31.7	42.4	39.4	48.1	44.1	53.9	50.0	63.1	57.3	72.5	65.1	81.9	74.3	95.2	86.2
22.2DB/14.8WB	45% RH	32.7	30.7	40.7	38.2	46.2	42.8	51.7	48.5	60.6	55.6	69.6	63.1	78.6	72.1	91.4	83.8
R407C																	
26.7DB/19.4WB	50% RH	37.4	32.0	46.6	39.8	52.8	44.6	59.2	50.5	69.3	57.8	79.5	65.7	89.8	75.1	104.5	87.3
24.0DB/17.0WB	50% RH	34.8	31.3	43.3	39.0	49.1	43.7	55.0	49.5	64.4	56.6	74.0	64.4	83.6	73.5	97.2	85.5
24.0DB/16.0WB	45% RH	34.1	33.6	42.5	41.7	48.1	46.8	53.9	53.0	63.1	60.6	72.6	68.9	81.9	78.7	95.3	91.5
22.2DB/15.5WB	50% RH	33.1	30.7	41.1	38.2	46.7	42.8	52.3	48.5	61.2	55.6	70.3	63.1	79.4	72.1	92.3	83.7
22.2DB/14.8WB	45% RH	31.7	29.8	39.5	37.1	44.8	41.5	50.1	47.0	58.8	53.9	67.5	61.2	76.2	69.9	88.7	81.3

TECHNICAL SPECIFICATIONS

NET CAPACITY MBH AT STANDARD AIRFLOW

MODEL		DBWD/U-09		DBWD/U-11		DBWD/U-13		DBWD/U-14		DBWD/U-16		DBWD/U-19		DBWD/U-22		DBWD/U-26	
		TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.	TOTAL	SENS.
R22																	
80DB/67.0WB	50%RH	131.7	112.5	163.8	139.9	185.7	156.8	208.0	177.7	243.7	203.5	279.9	231.1	316.1	264.0	367.5	306.9
75DB/62.5WB	50%RH	122.5	110.2	152.3	137.1	172.7	153.7	193.5	174.1	226.6	199.4	260.3	226.5	294.0	258.7	341.7	300.7
75DB/61.0WB	45%RH	120.0	117.9	149.3	146.7	169.2	164.4	189.6	186.3	222.1	213.4	255.1	242.3	288.1	276.8	334.9	321.8
72DB/60.0WB	50%RH	116.3	108.0	144.7	134.4	164.0	150.6	183.8	170.6	215.3	195.4	247.3	222.0	279.3	253.5	324.7	294.7
72DB/58.6WB	45%RH	111.7	104.8	138.9	130.3	157.5	146.1	176.5	165.5	206.7	189.6	237.4	215.3	268.1	245.9	311.7	285.9
R407C																	
80DB/67.0WB	50%RH	127.7	109.1	158.9	135.7	179.9	152.1	201.8	172.4	236.4	197.4	271.5	224.2	306.6	256.1	356.5	297.7
75DB/62.5WB	50%RH	118.8	106.9	147.7	133.0	167.5	149.1	187.7	168.9	219.8	193.4	252.5	219.7	285.2	250.9	331.4	291.7
75DB/61.0WB	45%RH	116.4	114.4	144.8	142.3	164.1	159.5	183.9	180.7	215.4	207.0	247.4	235.0	279.5	268.5	324.9	312.1
72DB/60.0WB	50%RH	112.8	104.8	140.4	130.4	159.1	146.1	178.3	165.5	208.8	189.5	239.9	215.3	270.9	245.9	315.0	285.9
72DB/58.6WB	45%RH	108.3	101.7	134.7	126.4	152.8	141.7	171.2	160.5	200.5	183.9	230.3	208.8	260.1	238.5	302.3	277.3

AIR COOLED, WATER/ GLYCOL COOLED

PHYSICAL DATA

MODEL		DB*D/U-09	DB*D/U-11	DB*D/U-13	DB*D/U-14	DB*D/U-16	DB*D/U-19	DB*D/U-22	DB*D/U-26
LENGTH	MM	1727	1727	1727	2654	2654	2654	2654	2654
	INS	68	68	68	104.5	104.5	104.5	104.5	104.5
WIDTH	MM	902	902	902	902	902	902	902	902
	INS	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5
HEIGHT	MM	1956	1956	1956	1956	1956	1956	1956	1956
	INS	77	77	77	77	77	77	77	77
WEIGHT	KG	545	630	630	845	895	950	1030	1100
	LB	1200	1381	1381	1859	1969	2090	2266	2420

ADD 457MM(18 INCH) TO HEIGHT OF UNITS FOR DISCHARGE PLENUM - UP FLOW UNITS ONLY.
NOTE: REFER FACTORY FOR WATER/ GLYCOL COOLED UNIT SIZE.

BLOWER DATA

STANDARD AIR VOLUME	CMH	8500	10200	11000	13600	15300	17000	18700	22100
	CFM	5000	6000	6500	8000	9000	10000	11000	13000
STANDARD FAN MOTOR	KW	2.2	3.0	4.0	3.0	4.0	5.6	5.6	7.5
	HP	3.0	4.0	5.5	4.0	5.5	7.5	7.5	10
OPTIONAL AIR VOLUME	CMH	10200	11000	N/A	15300	17000	20400	22100	N/A
	CFM	6000	6500	N/A	9000	10000	12000	13000	N/A
OPTIONAL FAN MOTOR	KW	3.0	4.0	N/A	4.0	5.6	7.5	7.5	N/A
	HP	4.0	5.5	N/A	5.5	7.5	10.0	10.0	N/A
EXT. STATIC PRESSURE	MM W.G.	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
	INS W.G.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
SIZE (QUANTITY)	MM	381x381 (1)	381x381 (1)	381x381 (1)	381x381 (2)	381x381 (2)	381x381 (2)	381x381 (2)	381x381 (2)
	INS	15x15 (1)	15x15 (1)	15x15 (1)	15x15 (2)	15x15 (2)	15x15 (2)	15x15 (2)	15x15 (2)

COMPRESSOR DATA

MODEL		DB*D/U-09	DB*D/U-11	DB*D/U-13	DB*D/U-14	DB*D/U-16	DB*D/U-19	DB*D/U-22	DB*D/U-26
QUANTITY OF COMPRESSORS		2	2	2	2	2	2	2	2
HORSEPOWER EACH	50HZ	5.5	7.0	8.0	9.0	10.0	12.0	13.0	15.0
	60HZ	N/A	N/A	7.0	8.0	9.0	10.0	12.0	13.0

EVAPORATOR DATA @ STANDARD AIRFLOW

FACE AREA	M^2	1.13	1.13	1.13	2.27	2.27	2.27	2.27	2.27
	FT^2	12.2	12.2	12.2	24.4	24.4	24.4	24.4	24.4
ROWS OF COIL		3	4	5	3	3	4	4	4
FACE VELOCITY	M/S	2.09	2.50	2.71	1.67	1.88	2.09	2.29	2.71
	FPM	409	491	532	327	368	409	450	532

REHEAT SECTION

STANDARD ELECTRIC	KW	15.0	15.0	15.0	22.5	22.5	22.5	22.5	22.5
	MBH	51.2	51.2	51.2	76.8	76.8	76.8	76.8	76.8

HUMIDIFIER SECTION (OPTIONAL)

STANDARD STEAM	KG/HR	4.6	4.6	4.6	13.6	13.6	13.6	13.6	13.6
GENERATOR CAPACITY	LB/HR	10.0	10.0	10.0	30.0	30.0	30.0	30.0	30.0
POWER	KW	3.6	3.6	3.6	9.4	9.4	9.4	9.4	9.4

FILTERS STANDARD 100MM (4 INCH) THICK ASHRAE 52.2 MERV 8 (DOWNFLOW)

508MMx635MM (20"x 25")	QTY	-	-	-	5	5	5	5	5
406MMx635MM (16"x 25")	QTY	4	4	4	-	-	-	-	-

FILTERS STANDARD 100MM (4 INCH) THICK ASHRAE 52.2 MERV 8 (UPFLOW)

508MMx635MM (20"x 25")	QTY	2	2	2	4	4	4	4	4

TECHNICAL SPECIFICATIONS

CONNECTION SIZE

MODEL		DB*D/U-09	DB*D/U-11	DB*D/U-13	DB*D/U-14	DB*D/U-16	DB*D/U-19	DB*D/U-22	DB*D/U-26
LIQUID LINE O.D COPPER (2/UNIT)	INS	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8
HOT GAS LINE O.D COPPER (2/UNIT)	INS	5/8	3/4	7/8	7/8	7/8	7/8	7/8	7/8
CONDENSER WATER - IN OUT	INS	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8
HUMIDIFIER SUPPLY	INS	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
CONDENSATE DRAIN	INS	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8

NOTE : REFER TO OPERATION AND MAINTENANCE FOR RECOMMENDED PIPE SIZING BETWEEN INDOOR AND OUTDOOR UNIT.

AIR COOLED

AIR COOLED CONDENSERS STD SELECTIONS AT 35°C(95°F) AMBIENT, SEA LEVEL*

MODEL	DBAD/U-09	DBAD/U-11	DBAD/U-13	DBAD/U-14	DBAD/U-16	DBAD/U-19	DBAD/U-22	DBAD/U-26
MODEL NUMBER	DBRC-10	DBRC-13	DBRC-17	DBRC-17	DBRC-20	DBRC-20	DBRC-26	DBRC-30

*SEE 'REMOTE HEAT EXCHANGER' SECTION FOR MORE INFORMATION.

WATER COOLED

CONDENSER WATER REQUIREMENTS
MAXIMUM DESIGN WATER PRESSURE 1033 KPA

MODEL		DBWD/U-09	DBWD/U-11	DBWD/U-13	DBWD/U-14	DBWD/U-16	DBWD/U-19	DBWD/U-22	DBWD/U-26
29.4°C/85°F EWT	LPS/PD IN KPA	1.7 / 34.5	2.5 / 41.4	2.7 / 48.3	2.7 / 48.3	2.7 / 48.3	3.2 / 48.3	3.3 / 48.3	4.0 / 72.4
	GPM/PD IN PSI	26.2 / 5.0	40.0 / 6.0	42.0 / 7.0	42.0 / 7.0	43.0 / 7.0	50.7 / 7.0	52.5 / 7.0	62.6 / 10.5
23.9°C/75°F EWT	LPS/PD IN KPA	1.2 / 27.6	1.7 / 27.6	1.9 / 31.0	1.9 / 31.0	1.9 / 31.0	2.2 / 31.0	2.3 / 31.0	2.9 / 48.3
	GPM/PD IN PSI	18.6 / 4.0	27.3 / 4.0	29.7 / 4.5	29.7 / 4.5	30.7 / 4.5	35.5 / 4.5	37.1 / 4.5	46.4 / 7.0
18.3°C/65°F EWT	LPS/PD IN KPA	0.8 / 24.1	1.1 / 24.1	1.2 / 27.6	1.2 / 27.6	1.3 / 27.6	1.5 / 27.6	1.5 / 27.6	1.9 / 41.4
	GPM/PD IN PSI	11.9 / 3.5	17.0 / 3.5	19.0 / 4.0	19.0 / 4.0	20.0 / 4.0	23.0 / 4.0	23.8 / 4.0	29.7 / 6.0

GLYCOL COOLED

DRY-AIR COOLER SELECTION AT 35°C (95°F) AMBIENT, SEA LEVEL

MODEL		DBGD/U-09	DBGD/U-11	DBGD/U-13	DBGD/U-14	DBGD/U-16	DBGD/U-19	DBGD/U-22	DBGD/U-26
MODEL NUMBER FLUID COOLER		DBFC-17	DBFC-21	DBFC-24	DBFC-28	DBFC-30	DBFC-37	DBFC-40	DBFC-24(2)
GLYCOL FLOW RATE	LPS	1.7	1.9	2.2	2.5	3.5	3.9	4.4	5.0
	GPM	27	30	35	40	56	62	70	80
PRESSURE DROP	KPA	20.0	25.5	21.4	18.6	24.5	26.2	20.7	21.4
	PSI	2.9	3.7	3.1	2.8	3.5	3.8	3.0	3.1

3.) DB-TEMP CHILLED WATER SYSTEMS

CHILLED WATER PERFORMANCE DATA

PERFORMANCE WITH 7.2°C (45°F) CHILLED WATER AT SPECIFIED FLOW RATE
CAPACITY DATA (kW) AT 7.2 DEGREE CELSIUS CHILLED WATER

MODEL		DBTCD/U-02	DBTCD/U-03	DBTCD/U-04	DBTCD/U-05
26.7DB/19.4WB 50% RH	TOTAL	11.3	15.1	21.2	24.8
	SENSIBLE	7.9	11.0	15.3	18.3
	FLOW RATE L/SEC	0.5	0.6	0.9	1.1
	PRESSURE DROP KPA	20.7	33.8	15.2	20.0
23.9DB/16.9WB 50% RH	TOTAL	7.9	10.6	14.9	17.5
	SENSIBLE	6.8	9.5	13.1	15.8
	FLOW RATE L/SEC	0.3	0.5	0.6	0.8
	PRESSURE DROP KPA	11.0	18.6	8.3	11.0
23.9DB/16.1WB 45% RH	TOTAL	7.3	9.9	13.9	16.4
	SENSIBLE	7.1	9.9	13.7	16.4
	FLOW RATE L/SEC	0.3	0.4	0.6	0.7
	PRESSURE DROP KPA	9.7	16.5	6.9	9.7
22.2DB/15.6WB 50% RH	TOTAL	6.4	8.7	12.1	14.3
	SENSIBLE	6.2	8.7	12.0	14.3
	FLOW RATE L/SEC	0.3	0.4	0.5	0.6
	PRESSURE DROP KPA	8.3	13.1	5.5	7.6
22.2DB/14.8WB 45% RH	TOTAL	6.1	8.4	11.7	13.9
	SENSIBLE	6.1	8.4	11.7	13.9
	FLOW RATE L/SEC	0.3	0.4	0.5	0.6
	PRESSURE DROP KPA	7.6	12.4	5.5	6.9

TECHNICAL SPECIFICATIONS

NET CAPACITY MBH AT STANDARD AIRFLOW

MODEL		DBTCD/U-02	DBTCD/U-03	DBTCD/U-04	DBTCD/U-05
80DB/67WB 50% RH	TOTAL	38.6	51.4	72.5	84.7
	SENSIBLE	27.1	37.6	52.1	62.4
	FLOW RATE GPM	7.7	10.3	14.5	17.0
	PRESSURE DROP PSI	3.0	4.9	2.2	2.9
75DB/62.5WB 50% RH	TOTAL	27.0	36.2	50.8	59.7
	SENSIBLE	23.2	32.4	44.7	53.8
	FLOW RATE GPM	5.4	7.3	10.2	11.9
	PRESSURE DROP PSI	1.6	2.7	1.2	1.6
75DB/61WB 45% RH	TOTAL	24.9	33.8	47.3	55.9
	SENSIBLE	24.2	33.8	46.9	55.9
	FLOW RATE GPM	5.0	6.8	9.5	11.2
	PRESSURE DROP PSI	1.4	2.4	1.0	1.4
72DB/60WB 50% RH	TOTAL	21.9	29.6	41.4	48.8
	SENSIBLE	21.0	29.6	40.8	48.8
	FLOW RATE GPM	4.4	5.9	8.3	9.8
	PRESSURE DROP PSI	1.2	1.9	0.8	1.1
72DB/58.6WB 45% RH	TOTAL	20.9	28.7	39.9	47.3
	SENSIBLE	20.9	28.7	39.9	47.3
	FLOW RATE GPM	4.2	5.7	8.0	9.5
	PRESSURE DROP PSI	1.1	1.8	0.8	1.0

PHYSICAL DATA

MODEL		DBTCD/U-02	DBTCD/U-03	DBTCD/U-04	DBTCD/U-05
LENGTH	MM	902	902	902	902
	INS	35.5	35.5	35.5	35.5
WIDTH	MM	876	876	876	876
	INS	34.5	34.5	34.5	34.5
HEIGHT	MM	1880	1880	1880	1880
	INS	74	74	74	74
WEIGHT	KG	240	250	270	280
	LB	528	550	594	616

ADD 457MM(18 INCH) TO HEIGHT OF UNITS FOR DISCHARGE PLENUM - UP FLOW UNITS ONLY.

BLOWER DATA

STANDARD AIR VOLUME	CMH	1700	2550	3400	4250
	CFM	1000	1500	2000	2500
STANDARD FAN MOTOR	KW	0.75	0.75	0.75	1.12
	HP	1.00	1.00	1.00	1.50
OPTIONAL AIR VOLUME	CMH	2550	2800	4250	4590
	CFM	1500	1650	2500	2700
OPTIONAL FAN MOTOR	KW	1.12	1.12	1.12	1.50
	HP	1.50	1.50	1.50	2.00
EXT. STATIC PRESSURE	MM W.G.	7.6	7.6	7.6	7.6
	ING W.G.	0.3	0.3	0.3	0.3
SIZE (QUANTITY)	MM	254 x 254 (1)	254 x 254 (1)	254 x 254 (1)	254 x 254 (1)
	INS	10 x 10 (1)	10 x 10 (1)	10 x 10 (1)	10 x 10 (1)

CHILLED WATER COIL DATA @ STANDARD AIRFLOW

FACE AREA	M^2	0.28	0.28	0.46	0.46
	FT^2	3	3	5	5
ROWS OF COIL		4	4	4	4
FACE VELOCITY	M/S	1.69	2.54	2.03	2.54
	FPM	333	500	400	500

REHEAT SECTION

STANDARD ELECTRIC	KW	6.0	12.0	12.0	12.0
	MBH	20.5	41.0	41.0	41.0

HUMIDIFIER SECTION (OPTIONAL)

STANDARD STEAM	KG/HR	4.6	4.6	4.6	4.6
GENERATOR CAPACITY	LB/HR	10	10	10	10
POWER	KW	3.6	3.6	3.6	3.6

FILTERS STANDARD 50 MM (2 INCH) THICK ASHRAE 52.2 MERV 8 (UPFLOW)

610 x 610 (24 x 24)		1	1	1	1

CONNECTION SIZES

CHILLED WATER	INS(OD)	1 1/8	1 1/8	1 1/8	1 1/8
HUMIDIFIER	INS	1/4	1/4	1/4	1/4
CONDENSATE DRAIN	INS(OD)	7/8	7/8	7/8	7/8

U – UPFLOW D - DOWN FLOW

TECHNICAL SPECIFICATIONS

4.) DB-AIRE CHILLED WATER SYSTEMS

CHILLED WATER PERFORMANCE DATA

PERFORMANCE WITH 7.2°C(45°F) CHILLED WATER AT SPECIFIED FLOW RATE
NET CAPACITY KW AT STANDARD AIRFLOW

MODEL		DBCD/U-07	DBCD/U-09	DBCD/U-11	DBCD/U-13	DBCD/U-15	DBCD/U-18	DBCD/U-22	DBCD/U-26	DBCD-30
	TOTAL	39.8	56.3	66.7	74.9	88.3	112.5	138.0	153.6	183.9
26.7DB/19.4WB	SENSIBLE	32.2	42.5	47.6	51.5	64.9	78.7	94.0	105.9	124.3
50% RH	FLOW RATE L/SEC	1.7	2.4	2.9	3.2	3.8	4.9	6.0	6.6	7.9
	PRESSURE DROP KPA	14.5	22.8	31.7	40.7	47.6	80.7	129.0	35.9	53.1
	TOTAL	28.2	39.7	46.9	52.9	62.0	79.4	98.0	108.5	130.4
23.9DB/16.9WB	SENSIBLE	28.2	36.9	40.8	43.9	55.9	67.4	80.1	90.3	105.5
50% RH	FLOW RATE L/SEC	1.2	1.7	2.0	2.3	2.7	3.4	4.2	4.7	5.6
	PRESSURE DROP KPA	11.0	15.9	20.0	24.8	29.0	46.9	73.8	22.8	31.7
	TOTAL	27.2	37.5	43.6	48.6	57.9	73.0	89.4	99.7	119.0
23.9DB/16.1WB	SENSIBLE	27.2	37.5	42.8	45.5	57.9	70.0	82.7	93.9	108.9
45% RH	FLOW RATE L/SEC	1.2	1.6	1.9	2.1	2.5	3.1	3.9	4.3	5.1
	PRESSURE DROP KPA	11.0	14.5	18.6	22.8	26.2	41.4	64.2	20.7	28.3
	TOTAL	23.3	32.6	38.2	42.9	50.7	64.5	79.5	88.1	105.8
22.2DB/15.6WB	SENSIBLE	23.3	32.6	37.2	39.7	50.7	61.2	72.5	81.9	95.4
50% RH	FLOW RATE L/SEC	1.0	1.4	1.6	1.8	2.2	2.8	3.4	3.8	4.6
	PRESSURE DROP KPA	9.7	13.1	15.9	20.0	22.1	34.5	53.8	17.9	24.1
	TOTAL	23.3	31.9	36.8	40.7	48.9	61.2	74.6	83.5	99.0
22.2DB/14.8WB	SENSIBLE	23.3	31.9	36.8	40.7	48.9	61.2	74.6	83.5	99.0
45% RH	FLOW RATE L/SEC	1.0	1.4	1.6	1.8	2.1	2.6	3.2	3.6	4.3
	PRESSURE DROP KPA	9.7	13.1	15.9	18.6	21.4	32.4	20.6	16.6	22.8

NET CAPACITY MBH AT STANDARD AIRFLOW

	TOTAL	135.8	192.1	227.4	255.5	301.3	383.9	471.1	523.9	627.7
80DB/67WB	SENSIBLE	109.8	145.0	162.5	175.8	221.4	268.5	320.7	361.4	424.0
50% RH	FLOW RATE GPM	27.2	38.5	45.5	51.2	60.3	76.9	94.3	104.9	125.7
	PRESSURE DROP PSI	2.1	3.3	4.6	5.9	6.9	11.7	18.7	5.2	7.7
	TOTAL	96.2	135.3	160.1	180.6	211.5	270.8	334.2	370.2	445.0
75DB/62.5WB	SENSIBLE	96.2	125.8	139.3	149.9	190.7	230.0	273.2	308.1	360.1
50% RH	FLOW RATE GPM	19.3	27.1	32.0	36.1	42.3	54.2	66.9	74.1	89.1
	PRESSURE DROP PSI	1.6	2.3	2.9	3.6	4.2	6.8	10.7	3.3	4.6
	TOTAL	92.8	127.9	148.8	165.7	197.5	248.9	305.0	340.1	406.0
75DB/61WB	SENSIBLE	92.8	127.9	145.9	155.4	197.5	238.8	282.1	320.2	371.7
45% RH	FLOW RATE GPM	18.6	25.6	29.8	33.2	39.5	49.8	61.1	68.1	81.3
	PRESSURE DROP PSI	1.6	2.1	2.7	3.3	3.8	6.0	9.3	3.0	4.1
	TOTAL	79.6	111.1	130.5	146.5	173.0	220.1	271.3	300.6	360.8
72DB/60WB	SENSIBLE	79.6	111.1	127.0	135.6	173.0	208.9	247.4	279.4	325.6
50% RH	FLOW RATE GPM	15.9	22.2	26.1	29.3	34.6	44.1	54.3	60.2	72.2
	PRESSURE DROP PSI	1.4	1.9	2.3	2.9	3.2	5.0	7.8	2.6	3.5
	TOTAL	79.4	108.9	125.4	138.7	167.0	208.9	254.4	284.8	337.9
72DB/58.6WB	SENSIBLE	79.4	108.9	125.4	138.7	167.0	208.9	254.4	284.8	337.9
45% RH	FLOW RATE GPM	15.9	21.8	25.1	27.8	33.4	41.8	50.9	57.0	67.7
	PRESSURE DROP PSI	1.4	1.9	2.3	2.7	3.1	4.7	7.1	2.4	3.3

TECHNICAL SPECIFICATIONS

PHYSICAL DATA

MODEL		DBCD/U-07	DBCD/U-09	DBCD/U-11	DBCD/U-13	DBCD/U-15	DBCD/U-18	DBCD/U-22	DBCD/U-26	DBCD-30
LENGTH	MM INS	1245 49	1245 49	1245 49	1245 49	2172 85.5	2172 85.5	2172 85.5	2172 85.5	2578 101.5
WIDTH*	MM INS	902 35.5	902 35.5	902 35.5	902 35.5	902 35.5	902 35.5	902 35.5	902 35.5	1016 40
HEIGHT	MM INS	1956 77	1956 77	1956 77	1956 77	1956 77	1956 77	1956 77	1956 77	1956 77
WEIGHT	KG LB	400 880	420 924	440 968	460 1012	600 1320	640 1408	690 1518	730 1606	900 1980

BLOWER DATA

MODEL		DBCD/U-07	DBCD/U-09	DBCD/U-11	DBCD/U-13	DBCD/U-15	DBCD/U-18	DBCD/U-22	DBCD/U-26	DBCD-30
STANDARD AIR VOLUME	CMH CFM	8925 5250	10200 6000	10200 6000	10200 6000	16150 9500	17000 10000	18700 11000	21080 12400	23800 14000
STANDARD FAN MOTOR	KW HP	2.2 3.0	3.0 4.0	3.0 4.0	4.0 5.5	4.0 5.5	5.6 7.5	5.6 7.5	7.5 10.0	7.5 10.0
OPTIONAL AIR VOLUME	CMH CFM	10200 6000	11900 7000	11900 7000	11560 6800	18360 10800	19210 11300	20400 12000	23120 13600	N/A N/A
OPTIONAL FAN MOTOR	KW HP	3.0 4.0	4.0 5.5	4.0 5.5	5.6 7.5	5.6 7.5	7.5 10.0	7.5 10.0	7.5 10.0	N/A N/A
EXT. STATIC PRESSURE	MM WG INS WG	12.7 0.5	12.7 0.5	12.7 0.5	12.7 0.5	12.7 0.5	12.7 0.5	12.7 0.5	12.7 0.5	12.7 0.5
SIZE (QUANTITY)	MM INS	381x381(1) 15x15(1)	381x381(1) 15x15(1)	381x381(1) 15x15(1)	381x381(1) 15x15(1)	381x381(2) 15x15(2)	381x381(2) 15x15(2)	381x381(2) 15x15(2)	381x381(2) 15x15(2)	457x457(2) 18x18(2)

CHILLED WATER COIL DATA @ STANDARD AIRFLOW

FACE AREA	M² FT²	1.16 12.50	1.16 12.50	1.16 12.50	1.16 12.50	2.32 25.00	2.32 25.00	2.32 25.00	2.32 25.00	2.88 31.00
ROWS OF COIL		3	4	5	6	3	4	5	6	6
FACE VELOCITY	M/S FPM	2.14 420	2.44 480	2.44 480	2.44 480	1.93 380	2.03 400	2.24 440	2.52 496	2.30 452

CHILLED WATER CONTROLS (DESIGN PRESSURE 1722 KPA (HIGH PRESSURE OPTIONAL)

CONTROL METHOD		MODULATE								
VALVE BODY		3-WAY								
VALVE CV		10	10	16	25	25	40	40	40	40
VALVE SIZE	MM(IN)	25.4(1)	25.4(1)	32.1(1¼)	38.0(1½)	38.0(1½)	51.0(2)	51.0(2)	51.0(2)	51.0(2)

REHEAT SECTION

STANDARD ELECTRIC	KW MBH	15.0 51.2	15.0 51.2	15.0 51.2	15.0 51.2	22.5 76.8	22.5 76.8	22.5 76.8	22.5 76.8	22.5 76.8

HUMIDIFIER SECTION (OPTIONAL)

STANDARD STEAM	KG/HR	4.5	4.5	4.5	4.5	13.6	13.6	13.6	13.6	13.6
GENERATOR CAPACITY **POWER**	LB/HR KW	10 3.6	10 3.6	10 3.6	10 3.6	30 9.4	30 9.4	30 9.4	30 9.4	30 9.4

FILTERS STANDARD 100 MM (4INCH) THICK ASHRAE 52.2 MERV 8 (UPFLOW)

508x635 (20x25)		-	-	-	-	1	1	1	1	-
406x635 (16x25)		3	3	3	3	4	4	4	4	8

CONNECTION SIZES

CHILLED WATER	INS(OD)	1 1/8	1 1/8	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8
HUMIDIFIER	INS(OD)	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
CONDENSATE DRAIN	INS(OD)	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8

TECHNICAL SPECIFICATIONS

5.) REMOTE HEAT EXCHANGERS

CONDENSER/DRY-AIR COOLER DATA

CONDENSERS

MODEL	HEAT REJECTION		THR @ 35°C(95°F) AMB 52°C(125°F) COND		CONNECTION SIZE (INCH)	
	KW/°C	MBH/°F	KW	MBH	HOT GAS	LIQUID
DBRC 04	1.12	2.2	19.1	65.2	1 1/8	7/8
DBRC 06	1.62	3.1	27.5	93.9	1 1/8	7/8
DBRC 08	2.15	4.2	36.5	124.6	1 1/8	7/8
DBRC 10	2.51	4.9	42.7	145.8	1 1/8	7/8
DBRC 11	2.80	5.4	47.5	162.1	1 1/8	7/8
DBRC 13	3.19	6.2	54.2	185.2	1 1/8	7/8
DBRC 17	4.25	8.2	72.3	246.7	1 1/8	7/8
DBRC 20	5.06	9.8	86.0	293.5	1 1/8	7/8
DBRC 26	6.44	12.4	109.4	373.3	1 1/8	7/8
DBRC 30	7.51	14.5	127.7	435.6	1 3/8	7/8
DBRC 34	8.44	16.3	143.4	489.4	1 3/8	7/8
DBRC 40	10.07	19.5	171.2	584.1	1 5/8	1 1/8
DBRC 44	11.18	21.6	190.1	648.7	1 5/8	1 1/8

DRY-AIR COOLER (BASED ON 40% GLYCOL-SEE TABLE 1 FOR CORRECTION FACTORS)

MODEL	NOMINAL		PRESSURE DROP		THR @ 35°C (95°F) AMB 52°C (125°F) COND		NO. OF CIRCUIT	CONN. SIZE (INCH) (1 EA PER UNIT)	INTERNAL VOLUME	
	L/S	GPM	KPa	PSI	KW	MBH		INLET/OUTLET	LT	GAL
DBFC 05	0.38	6	10	1.5	11.9	40.6	8	1 3/8	8.3	2.2
DBFC 06	0.57	9	16	2.4	16.0	54.5	10	1 5/8	12.2	3.2
DBFC 09	0.95	15	30	4.4	24.9	84.9	12	1 5/8	18.4	4.8
DBFC 11	1.3	21	45	6.5	30.9	105.6	12	2 1/8	16.8	4.4
DBFC 15	1.6	25	43	6.3	40.7	139	16	2 1/8	22.5	5.9
DBFC 17	1.7	27	30	4.4	45.0	153.7	22	2 1/8	28.3	7.5
DBFC 21	1.9	30	38	5.5	55.8	190.6	22	2 1/8	30.6	8.1
DBFC 24	2.2	35	49	7.1	64.5	220.2	22	2 1/8	39.1	10.3
DBFC 28	2.5	40	37	5.4	71.7	244.8	28	2 1/8	47.6	12.6
DBFC 30	3.5	56	44	6.4	85.2	290.8	36	2 1/8	38.7	10.2
DBFC 37	3.9	62	34	5.0	95.3	325.3	44	2 1/8	50.0	13.2
DBFC 40	4.4	70	31	4.5	103.4	353.0	54	2 5/8	63.8	16.9

GLYCOL CORRECTION FACTORS

PERCENT GLYCOL	CAPACITY	PRESSURE DROP	FREEZE POINT	
0	1.07	0.88	0°C	32°F
10	1.05	0.91	-3.8	25
20	1.04	0.94	-9.4	15
30	1.02	0.97	-15.6	4
40	1.00	1.00	-23.3	-10
50	0.98	1.03	-35.6	-32

TECHNICAL SPECIFICATIONS

CONDENSER SELECTIONS

MODEL	THR		35°C(95°F)	37.8°C(100°F)	40.5°C(105°F)
	KW	MBH	CONDENSER	CONDENSER	CONDENSER
DBTA 02	11.7	40	DBRC 04	DBRC 04	DBRC 04
DBTA 03	14.7	50	DBRC 04	DBRC 04	DBRC 06
DBTA 04	17.6	60	DBRC 04	DBRC 06	DBRC 06
DBTA 05	21.4	73	DBRC 06	DBRC 06	DBRC 08
DBTA 07	29.3	100	DBRC 08	DBRC 08	DBRC 11
DBTA 09	43.7	149	DBRC 10	DBRC 13	DBRC 17
DBTA 11	50.7	173	DBRC 13	DBRC 17	DBRC 20
DBTA 13	57.2	202	DBRC 17	DBRC 17	DBRC 26
DBA 09	42.8	146	DBRC 10	DBRC 13	DBRC 17
DBA 11	53.1	181	DBRC 13	DBRC 17	DBRC 20
DBA 13	60.4	206	DBRC 17	DBRC 17	DBRC 26
DBA 14	67.4	230	DBRC 17	DBRC 20	DBRC 26
DBA 16	78.3	267	DBRC 20	DBRC 26	DBRC 26
DBA 19	87.1	297	DBRC 20	DBRC 26	DBRC 34
DBA 22	101.4	346	DBRC 26	DBRC 30	DBRC 34
DBA 26	118.1	403	DBRC 30	DBRC 30	DBRC 34

NOTE : SELECTIONS ARE BASED ON STANDARD AIR FLOWS, 125 DEGREE CONDENSING TEMPERATURE, RETURN AIR TEMPERATURE 75/62.5 OR LESS.

DRY-AIR COOLER SELECTIONS

MODEL	THR		FLOW RATE		35°C(95°F)		
	KW	MBH	L/S	GPM	COOLER	PD,KPa	PD, PSI
DBTG 02	11.7	40	0.38	6	DBFC 5	10	1.5
DBTG 03	14.7	50	0.57	9	DBFC 6	16	2.4
DBTG 04	17.6	60	0.76	12	DBFC 9	21	3.0
DBTG 05	21.4	73	0.95	15	DBFC 9	30	4.4
DBTG 07	29.3	100	130	21	DBFC 11	45	6.5
DBTG 09	43.7	149	170	27	DBFC 17	30	4.4
DBTG 11	50.7	173	190	30	DBFC 21	38	5.5
DBTG 13	59.2	202	2.20	35	DBFC 24	49	7.1
DBG 09	42.8	146	1.70	27	DBFC 17	30	4.4
DBG 11	53.1	181	1.90	30	DBFC 21	38	5.5
DBG 13	60.4	206	2.20	35	DBFC 24	49	7.1
DBG 14	67.4	230	2.50	40	DBFC 28	37	5.4
DBG 16	78.3	267	3.50	56	DBFC 30	44	6.4
DBG 19	87.1	297	3.90	62	DBFC 37	34	5.0
DBG 22	101.4	346	4.40	70	DBFC 40	31	4.5
DBG 26	118.1	403	5.00	80	(2)DBFC 24	49	7.1

ALL SELECTIONS ARE BASED ON THE FOLLOWING CONDITIONS :

RETURN AIR TEMPERATURE 75/62.5 OR LESS, STANDARD WATER FLOWS, STANDARD AIR FLOWS, 40 PERCENT GLYCOL, 125 DEGREE CONDENSING TEMPERATURE, 115 DEGREE AVERAGE FLUID TEMPERATURE. EXAMPLE :

SELECT DRY-AIR COOLER FOR DBTGD 11 AT 95 DEGREE AMBIENT FROM CHART, USE DBFC 21

DBTGD 11 (THR) TOTAL HEAT REJECTION IS = 173 MBH

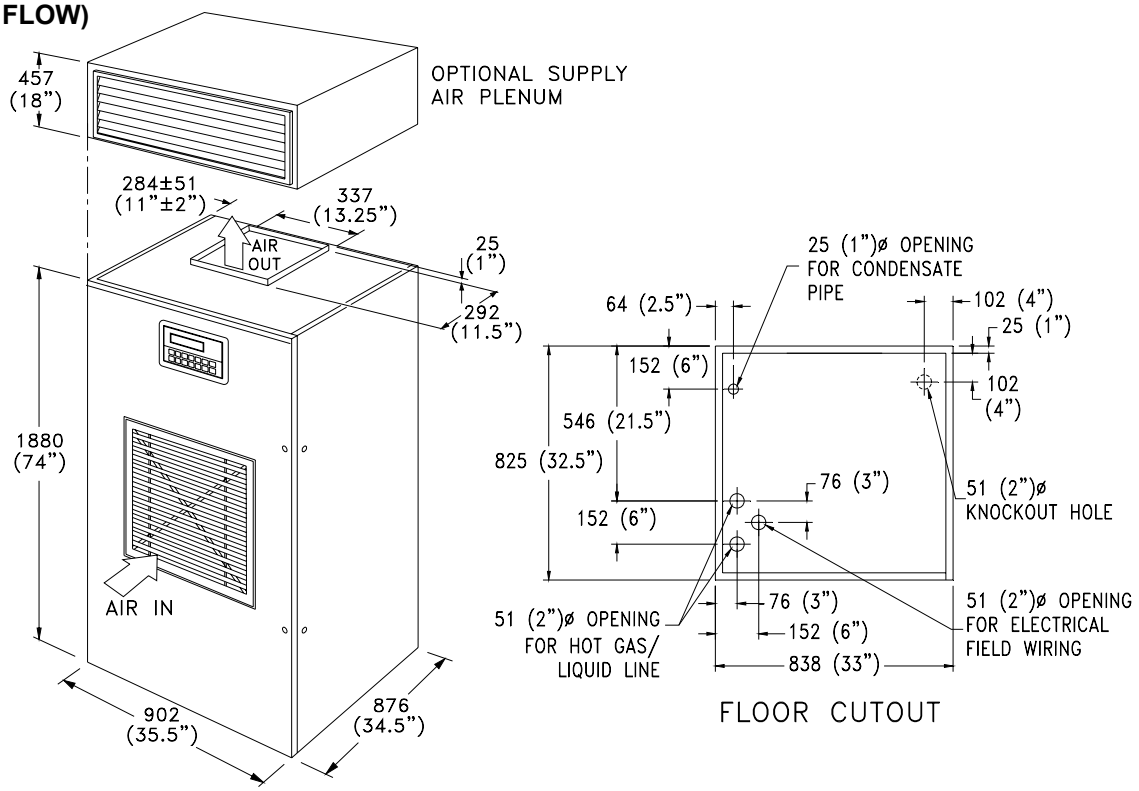
DBFC 21 (CAP) CAPACITY IS = 191 MBH

DBFC 21 (PD) PRESSURE DROP IS = 3.7 PSI AT 30 (GPM) GALLONS PER MIN.

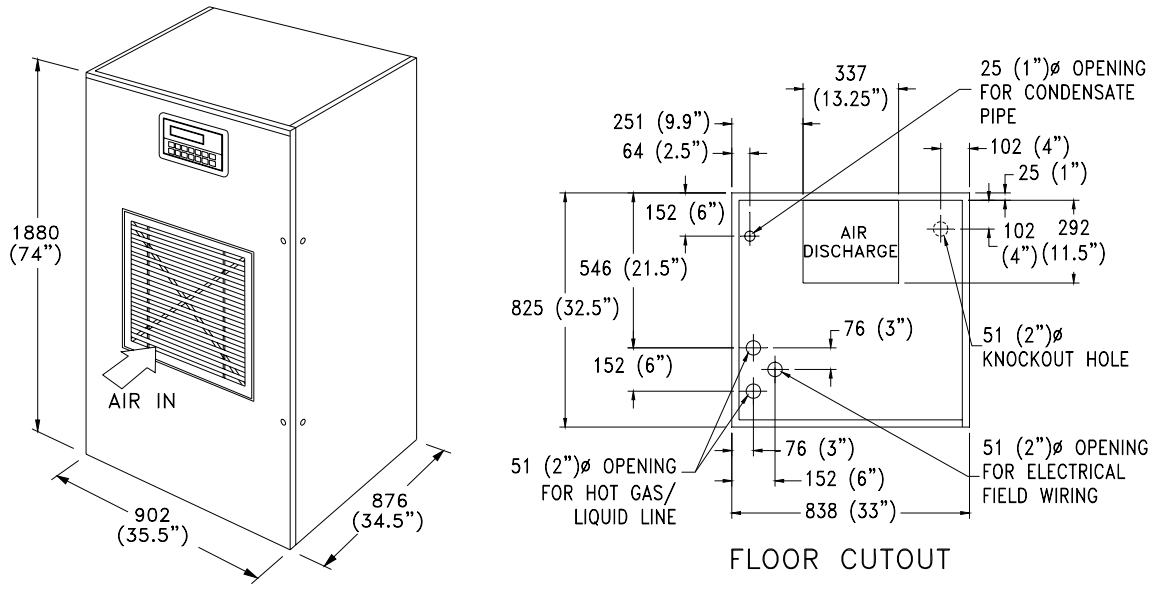
DIMENSIONAL DATA

DB-TEMP SYSTEMS - AIR COOLED, WATER/ GLYCOL COOLED/ CHILLED WATER

MODEL 02, 03, 04, 05 TON
(UP FLOW)



MODEL 02, 03, 04, 05 TON
(DOWN FLOW)

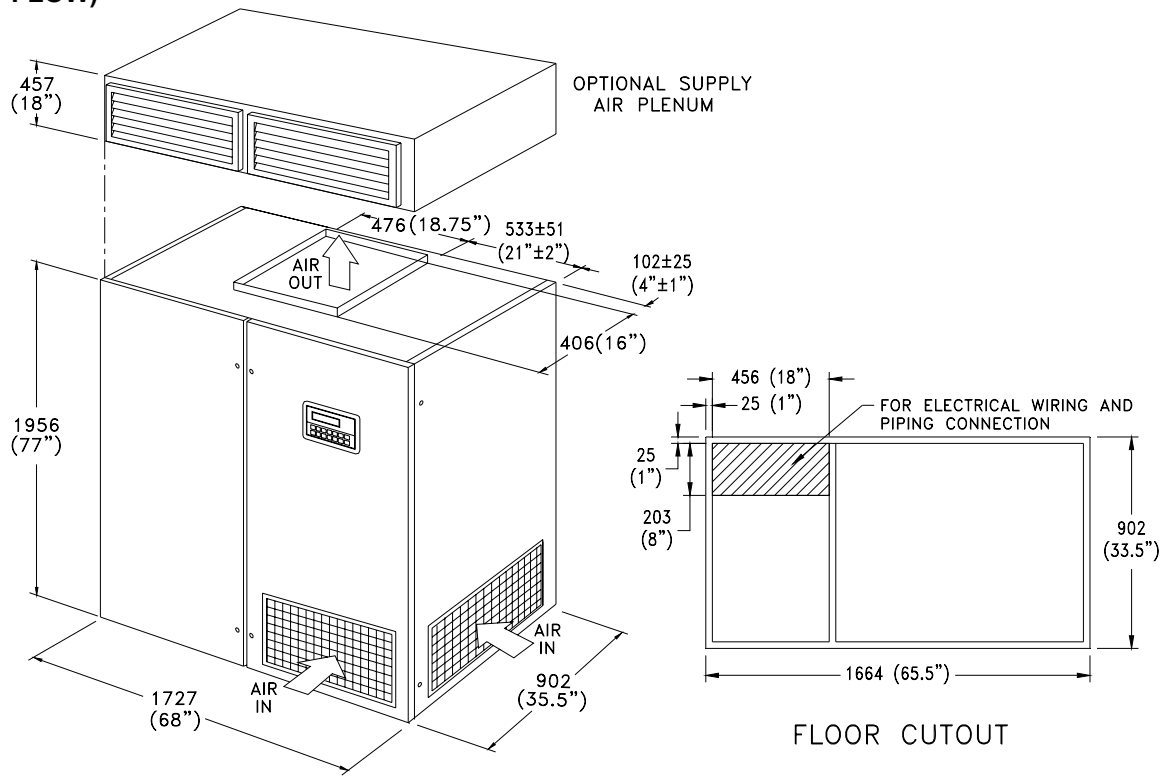


NOTES : 1.) MINIMUM SPACE REQUIRED IS 914MM (36") ON FRONT ,RIGHT AND LEFT SIDES FOR SERVICE ACCESS.
2.) ALL DIMENSIONS ARE IN MILLIMETER (INCHES).
3.) LENGTH IS 940MM (37") FOR WATER AND GLYCOL COOLED.

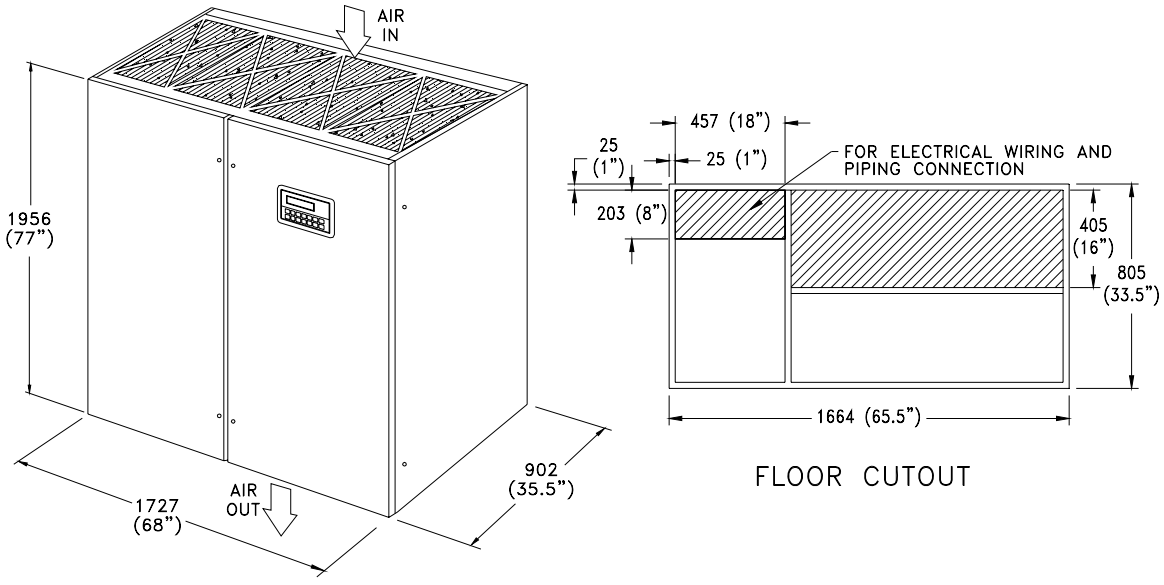
DIMENSIONAL DATA

DB-TEMP SYSTEMS - AIR COOLED, WATER/ GLYCOL COOLED

MODEL 07, 09, 11, 13 TON
(UP FLOW)



MODEL 07, 09, 11, 13 TON
(DOWN FLOW)

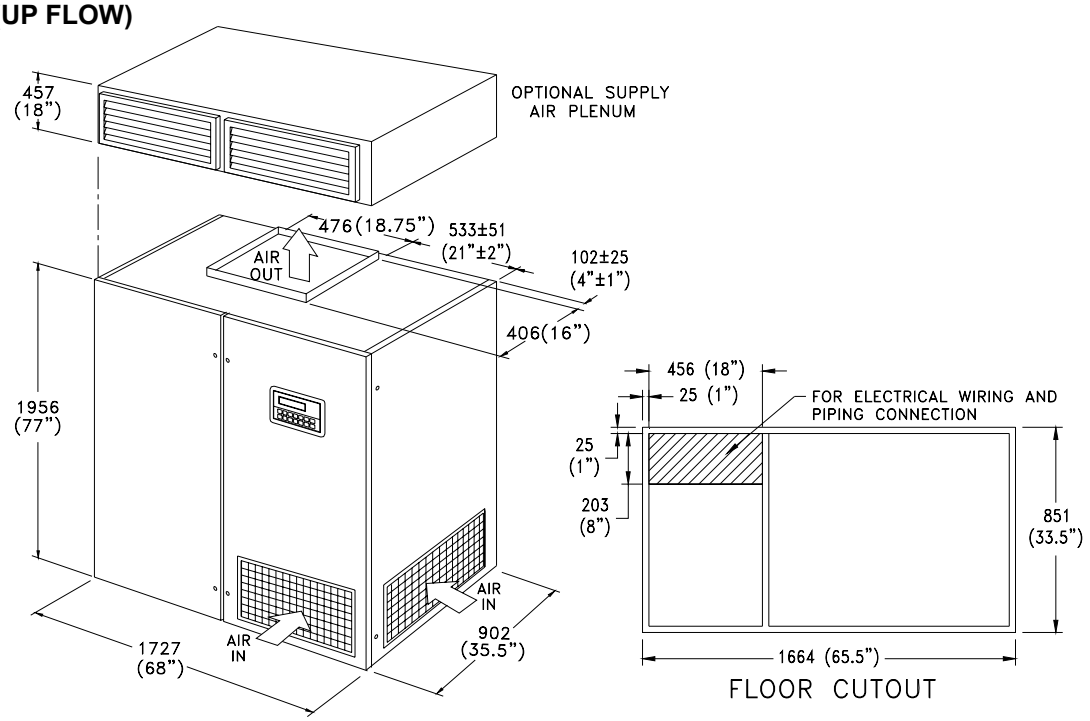


NOTES : 1.) MINIMUM SPACE REQUIRED IS 914MM (36") ON FRONT, RIGHT AND LEFT SIDES FOR SERVICE ACCESS.
2.) ALL DIMENSIONS ARE IN MILLIMETER (INCHES).

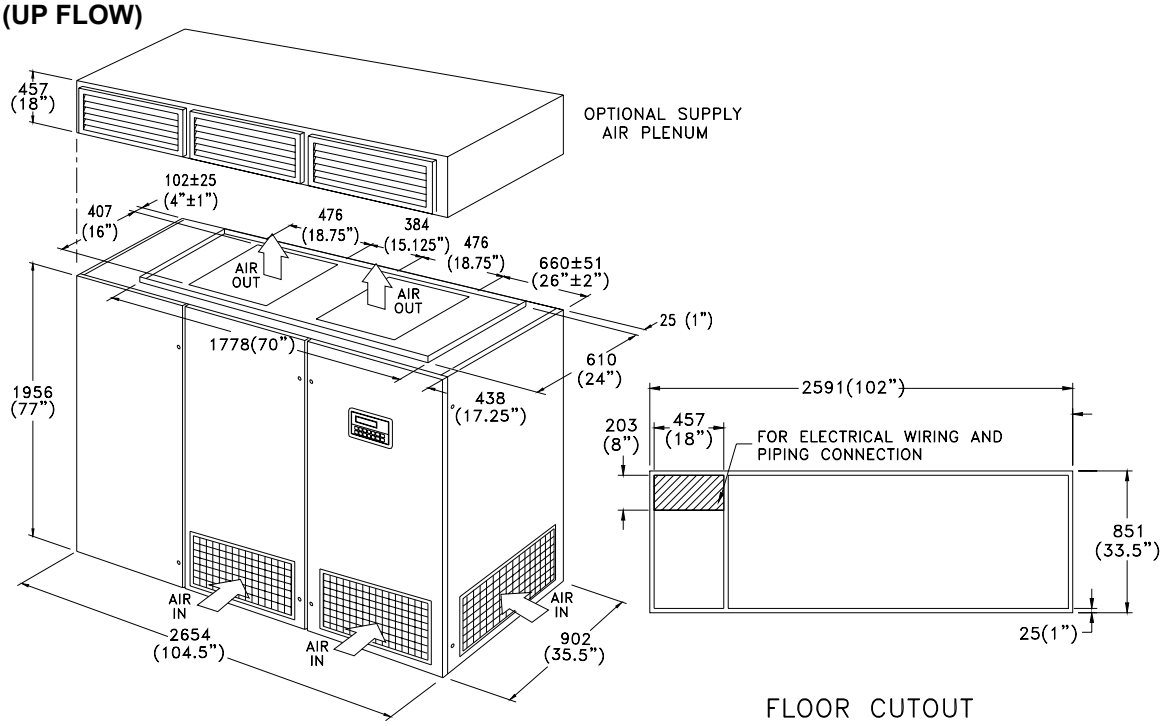
DIMENSIONAL DATA

DB-AIRE SYSTEMS - AIR COOLED, WATER/ GLYCOL COOLED

MODEL 09, 11, 13 TON
(UP FLOW)



MODEL 14, 16, 19, 22, 26 TON
(UP FLOW)

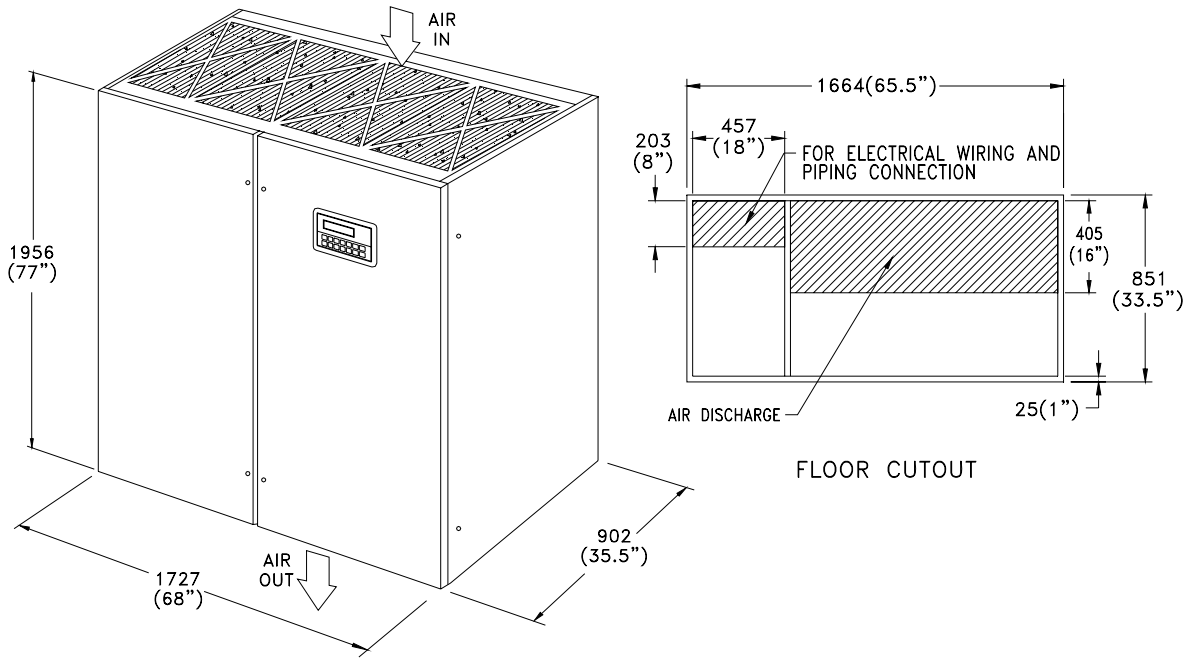


NOTES : 1.) MINIMUM SPACE REQUIRED IS 914MM (36") ON FRONT, RIGHT AND LEFT SIDES FOR SERVICE ACCESS.
2.) ALL DIMENSIONS ARE IN MILLIMETER (INCHES).

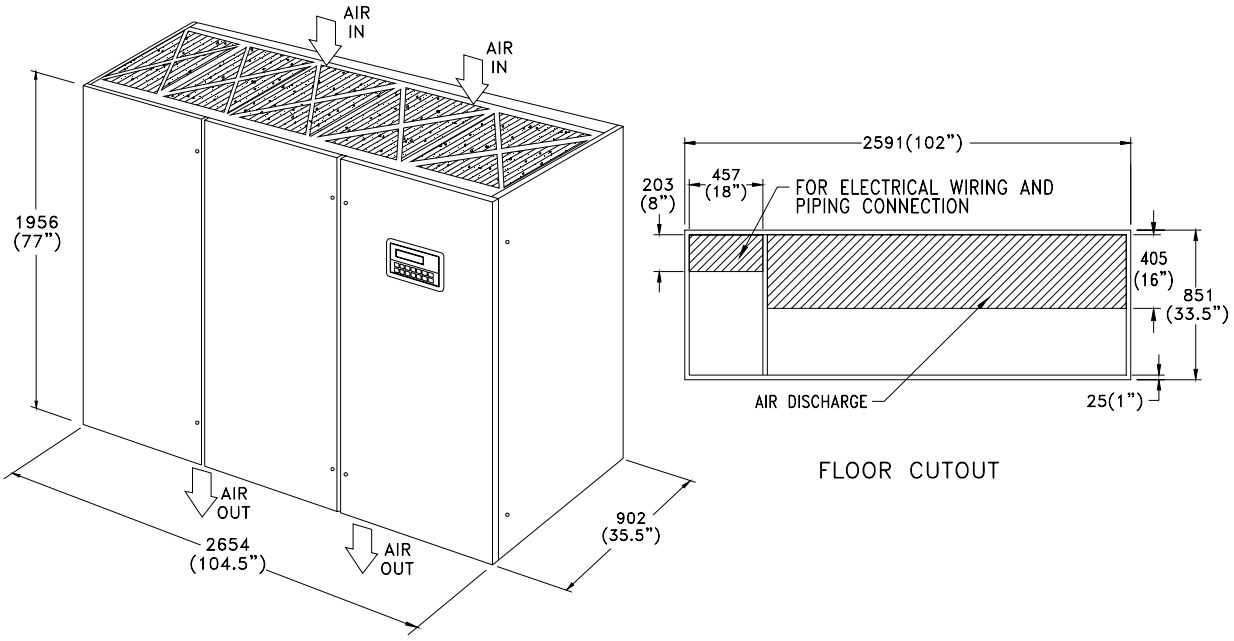
DIMENSIONAL DATA

DB-AIRE SYSTEMS - AIR COOLED, WATER/ GLYCOL COOLED

MODEL 09, 11, 13 TON
(DOWN FLOW)



MODEL 14, 16, 19, 22, 26 TON
(DOWN FLOW)

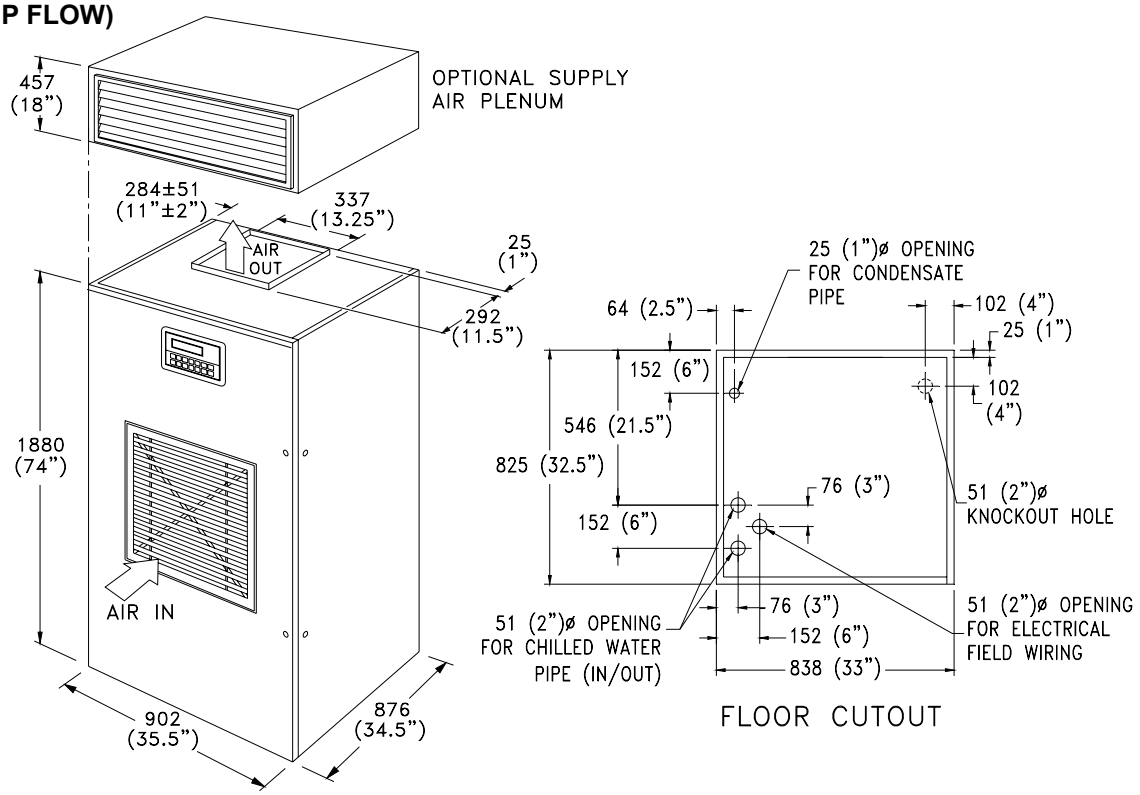


NOTES : 1.) MINIMUM SPACE REQUIRED IS 914MM (36") ON FRONT, RIGHT AND LEFT SIDES FOR SERVICE ACCESS.
2.) ALL DIMENSIONS ARE IN MILLIMETER (INCHES).

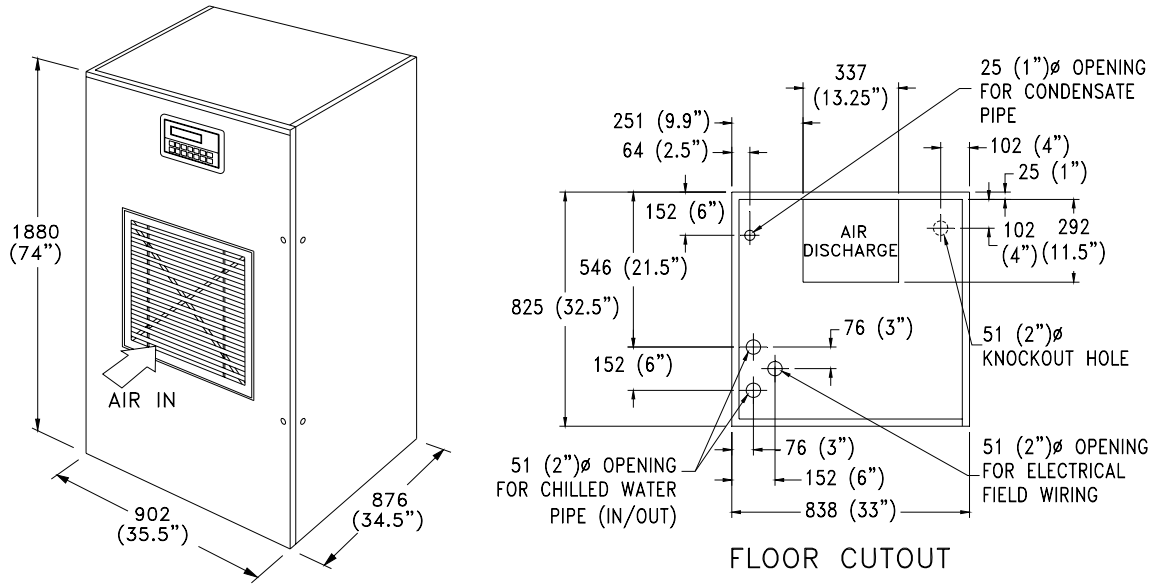
DIMENSIONAL DATA

DB-TEMP/ DB-AIRE CHILLED WATER SYSTEMS
- AIR COOLED, WATER/ GLYCOL COOLED/ CHILLED WATER

MODEL 02, 03, 04, 05 TON
(UP FLOW)



MODEL 02, 03, 04, 05 TON
(DOWN FLOW)



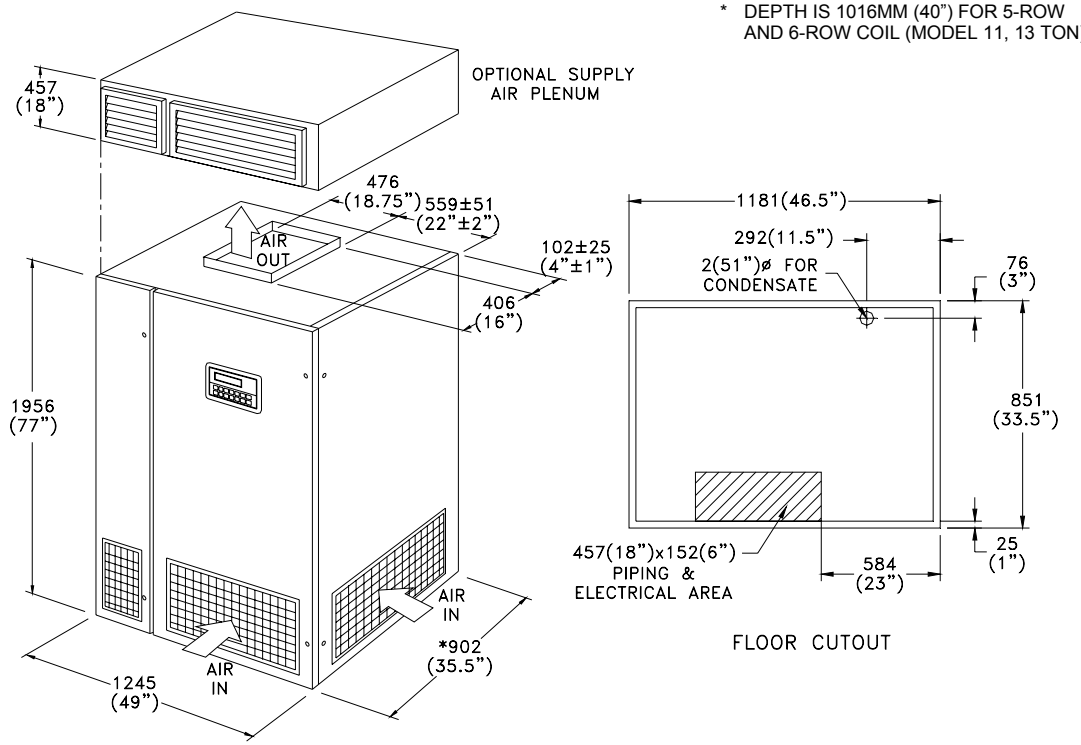
NOTES : 1.) MINIMUM SPACE REQUIRED IS 914MM (36") ON FRONT ,RIGHT AND LEFT SIDES FOR SERVICE ACCESS.
2.) ALL DIMENSIONS ARE IN MILLIMETER (INCHES).

DIMENSIONAL DATA

DB-TEMP/ DB-AIRE CHILLED WATER SYSTEMS

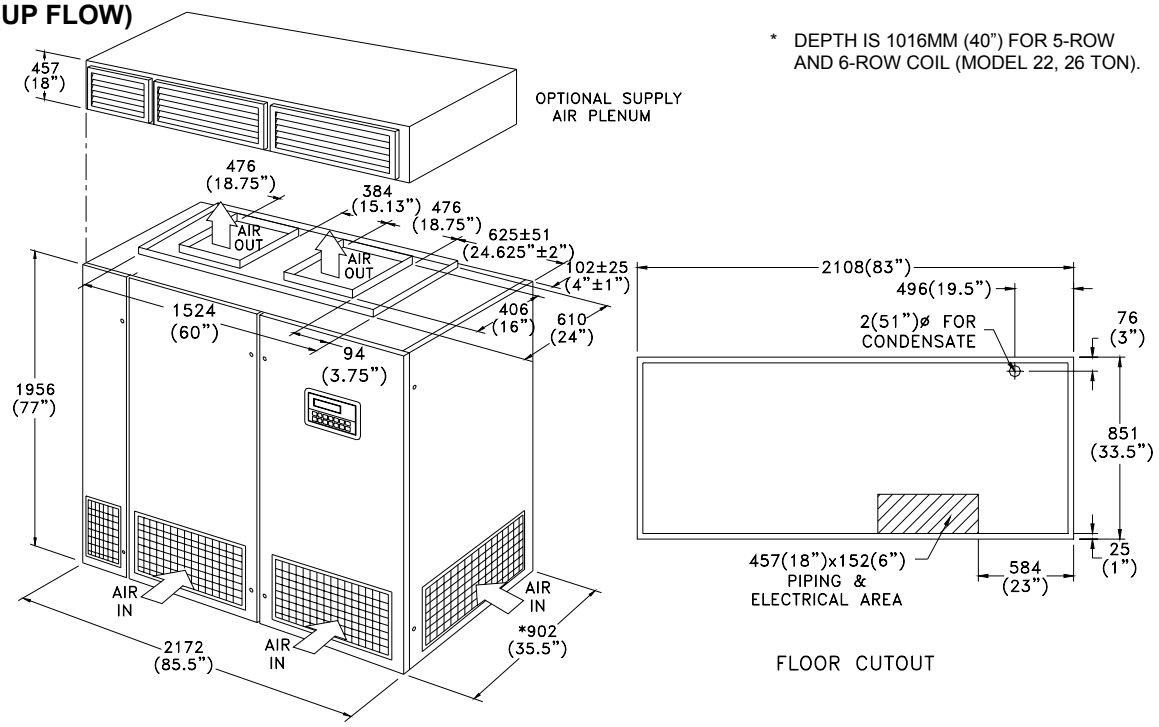
MODEL 07, 09, 11, 13 TON (UP FLOW)

* DEPTH IS 1016MM (40") FOR 5-ROW AND 6-ROW COIL (MODEL 11, 13 TON).



MODEL 15, 18, 22, 26 TON (UP FLOW)

* DEPTH IS 1016MM (40") FOR 5-ROW AND 6-ROW COIL (MODEL 22, 26 TON).

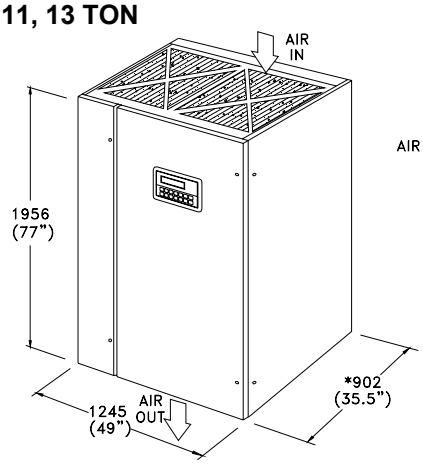


NOTES : 1.) MINIMUM SPACE REQUIRED IS 914MM (36") ON FRONT, RIGHT AND LEFT SIDES FOR SERVICE ACCESS.
2.) ALL DIMENSIONS ARE IN MILLIMETER (INCHES).

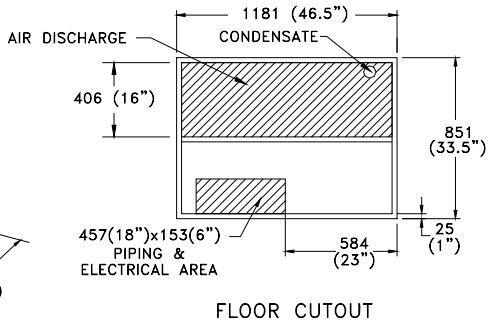
DIMENSIONAL DATA

DB-TEMP/ DB-AIRE CHILLED WATER SYSTEMS

MODEL 07, 09, 11, 13 TON (DOWN FLOW)

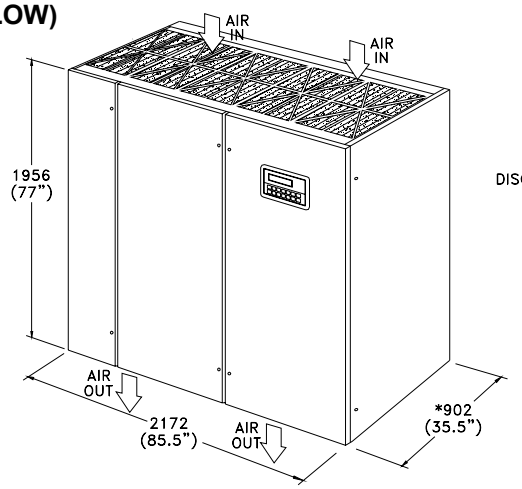


* DEPTH IS 1016MM (40") FOR 5-ROW AND 6-ROW COIL (MODEL 11, 13 TON).

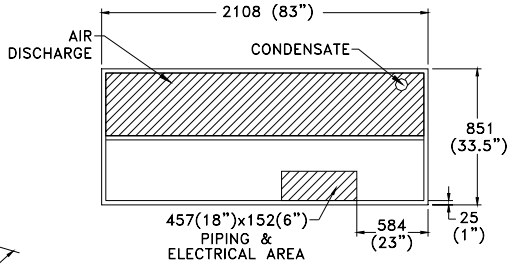


FLOOR CUTOUT

MODEL 15, 18, 22, 26 TON (DOWN FLOW)

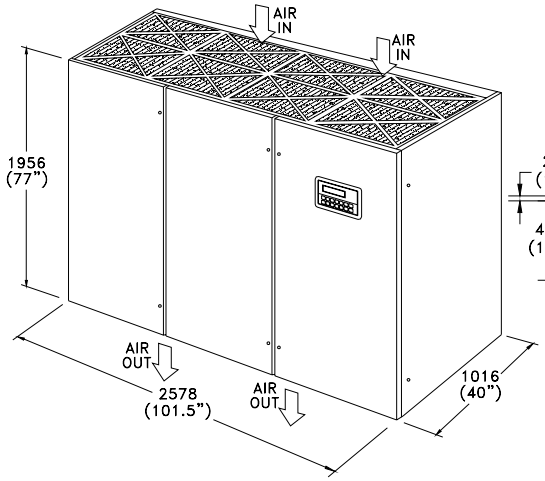


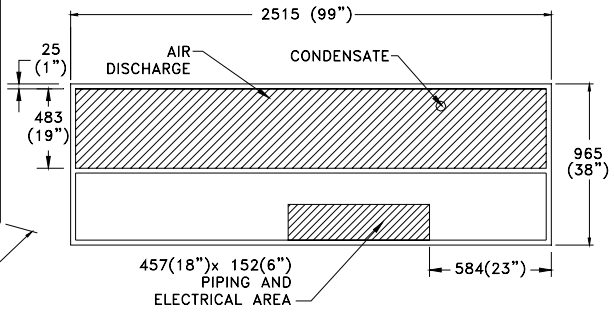
* DEPTH IS 1016MM (40") FOR 5-ROW AND 6-ROW COIL (MODEL 22, 26 TON).



FLOOR CUTOUT

MODEL 30 TON (DOWN FLOW)



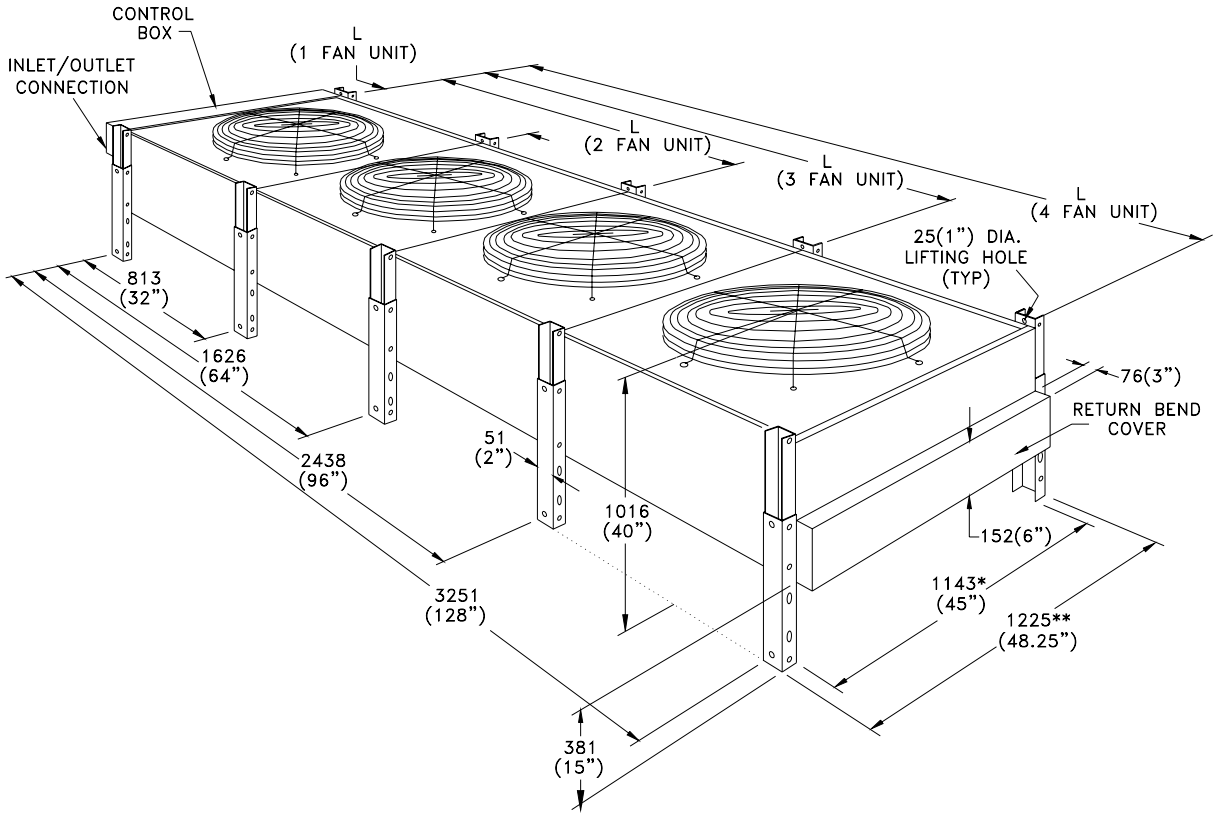


FLOOR CUTOUT

NOTES : 1.) MINIMUM SPACE REQUIRED IS 914MM (36") ON FRONT, RIGHT AND LEFT SIDES FOR SERVICE ACCESS.
2.) ALL DIMENSIONS ARE IN MILLIMETER (INCHES).

DIMENSIONAL DATA

REMOTE AIR-COOLED CONDENSERS

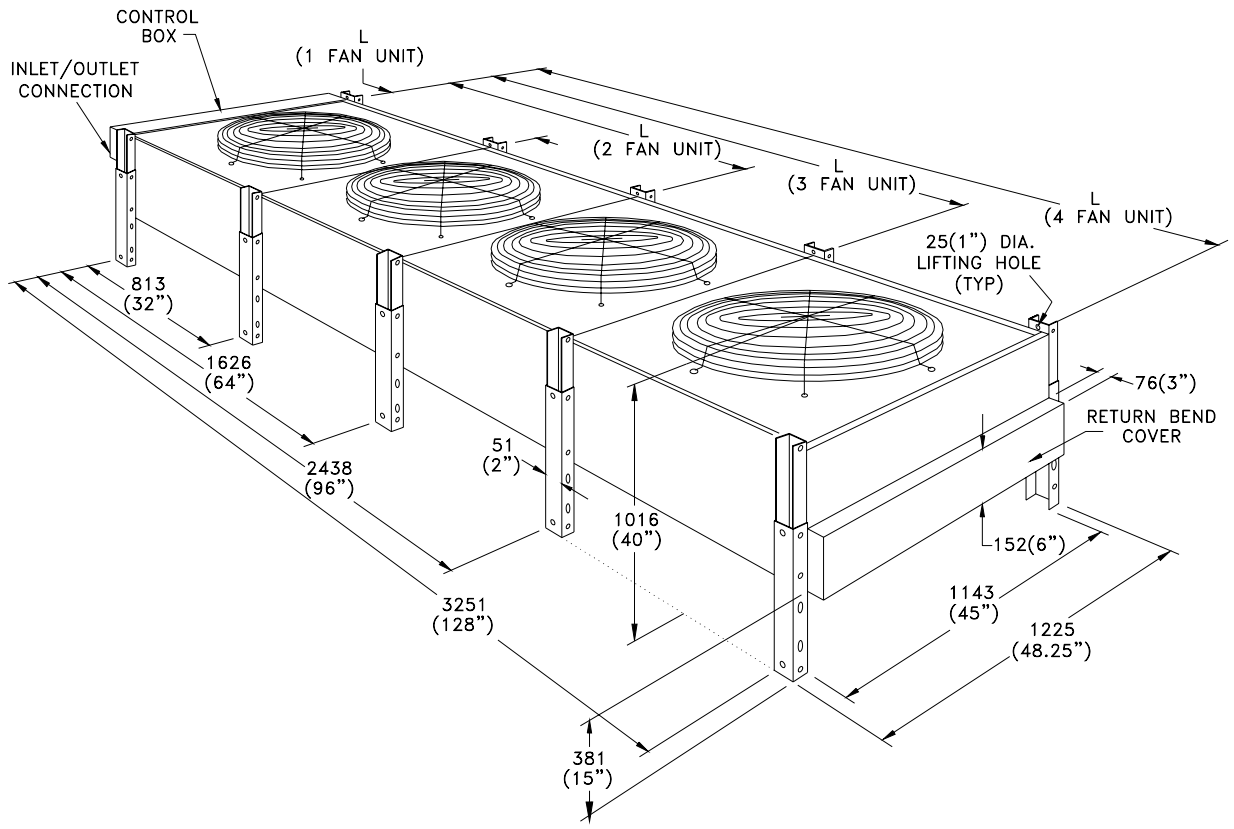


MODEL	PHYSICAL DATA				ELECTRICAL DATA						
	LENGTH 'L' MM (INS)	FANS		APPROX. WEIGHT KG(LBS)	MTR QTY	RPM		MTR FLA (3-PHASE)			
		QTY	TOTAL L/S (CFM)			50Hz	60Hz	380V (50Hz)	415V (50Hz)	208V (60Hz)	230V (60Hz)
DBRC 04	870 (34¼)	1	2030 (4300)	100 (220)	1	900	1080	-	-	-	-
DBRC 06	870 (34¼)	1	3210 (6800)	111 (244)	1	950	1075	2.0	1.8	3.6	3.3
DBRC 08	870 (34¼)	1	3210 (6800)	122 (268)	1	950	1075	2.0	1.8	3.6	3.3
DBRC 10	870 (34¼)	1	3210 (6800)	134 (295)	1	950	1075	2.0	1.8	3.6	3.3
DBRC 11	870 (34¼)	1	3210 (6800)	180 (400)	1	950	1075	2.0	1.8	3.6	3.3
DBRC 13	1683 (66¼)	2	6420 (13600)	190 (420)	2	950	1075	4.0	3.7	7.3	6.6
DBRC 17	1683 (66¼)	2	6420 (13600)	204 (450)	2	950	1075	4.0	3.7	7.3	6.6
DBRC 20	1683 (66¼)	2	6420 (13600)	265 (583)	2	950	1075	4.0	3.7	7.3	6.6
DBRC 26	2500 (98¼)	3	9630 (20400)	288 (634)	3	950	1075	6.0	5.5	10.9	9.9
DBRC 30	2500 (98¼)	3	9630 (20400)	320 (700)	3	950	1075	6.0	5.5	10.9	9.9
DBRC 34	2500 (98¼)	3	9630 (20400)	355 (780)	3	950	1075	6.0	5.5	10.9	9.9
DBRC 40	3308 (130¼)	4	12838 (27200)	380 (835)	4	950	1075	8.0	7.3	14.6	13.2
DBRC 44	3308 (130¼)	4	12838 (27200)	410 (900)	4	950	1075	8.0	7.3	14.6	13.2

NOTE: 1.) ALL DIMENSIONS ARE IN MM (INCHES).
2.) * = 889(35"), ** = 972(38.25") FOR DBRC-04
3.) MOTOR FLA FOR DBRC04 IS 1 PHASE 1.3A (220V) / 1.2A (240V) / 1.4A (208V) / 1.2A (230V).

DIMENSIONAL DATA

DRY-AIR COOLERS



MODEL	PHYSICAL DATA				ELECTRICAL DATA						
	LENGTH 'L' MM (INS)	FANS		APPROX. WEIGHT KG(LBS)	MTR QTY	RPM		MTR FLA (3-PHASE)			
		QTY	TOTAL L/S (CFM)			50Hz	60Hz	380V (50Hz)	415V (50Hz)	208V (60Hz)	230V (60Hz)
DBFC 05	870 (34¼)	1	3210 (6800)	111 (244)	1	950	1075	2.0	1.8	3.6	3.3
DBFC 06	870 (34¼)	1	3210 (6800)	122 (268)	1	950	1075	2.0	1.8	3.6	3.3
DBFC 09	870 (34¼)	1	3210 (6800)	134 (295)	1	950	1075	2.0	1.8	3.6	3.3
DBFC 11	1683 (66¼)	2	6420 (13600)	190 (420)	2	950	1075	4.0	3.7	7.3	6.6
DBFC 15	1683 (66¼)	2	6420 (13600)	204 (450)	2	950	1075	4.0	3.7	7.3	6.6
DBFC 17	1683 (66¼)	2	6420 (13600)	265 (583)	2	950	1075	4.0	3.7	7.3	6.6
DBFC 21	2500 (98¼)	3	9630 (20400)	288 (634)	3	950	1075	6.0	5.5	10.9	9.9
DBFC 24	2500 (98¼)	3	9630 (20400)	288 (634)	3	950	1075	6.0	5.5	10.9	9.9
DBFC 28	2500 (98¼)	3	9630 (20400)	320 (700)	3	950	1075	6.0	5.5	10.9	9.9
DBFC 30	2500 (98¼)	3	9630 (20400)	355 (780)	3	950	1075	6.0	5.5	10.9	9.9
DBFC 37	3308 (130¼)	4	12838 (27200)	380 (835)	4	950	1075	8.0	7.3	14.6	13.2
DBFC 40	3308 (130¼)	4	12838 (27200)	410 (900)	4	950	1075	8.0	7.3	14.6	13.2

NOTE: ALL DIMENSIONS ARE IN MM (INCHES).

CLOSED CONTROL UNIT FOR VISION2020i[1] AND VISION2020i[2]

Manufacturer Manual
Manual version 2.1 01 Dec 2004

Program code: FLCCU1314GEN0

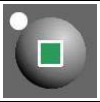
TABLE OF CONTENTS

Description **Page**

1.0 GENERAL INFORMATION

1.1 THE USER TERMINAL

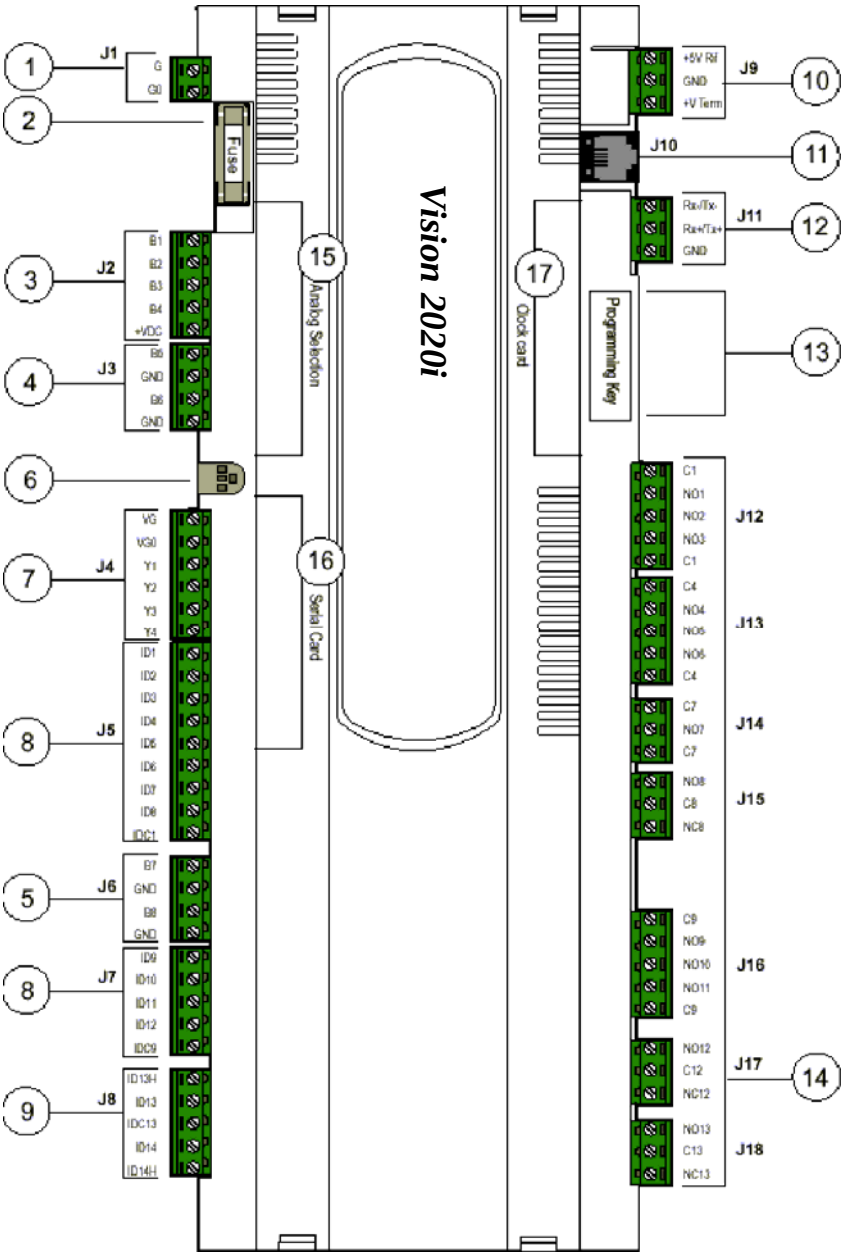
The provided terminal is equipped with LCD display (8 rows x 20 columns) external terminal with 15 buttons. The user terminal allows displaying the unit working conditions at any time and modifying the parameters.

Button		Description
	INPUT STATUS	Displays the analog inputs and digital inputs status measured by the probes/ sensors.
	OUTPUT STATUS	Displays the digital and analog outputs status.
	COMPRESSOR STATUS	Displays the status of compressor.
	SETPOINT	Displays the status of set points.
	CLOCK/SCHEDULE	Displays the date, time and date.
	ALARM HISTORY	Display the alarm history.
	*Not Used*	
	ON / OFF	To start or stop the unit. The permanent LED is on to indicate the machine is on; if the LED is off, the unit is OFF. If the LED blinking, it indicate the unit cannot be start due to various reason as indicated on the display.
	TECHNICIAN	Technician Control Changeable Settings.
	FACTORY	Factory Control Changeable Settings.
	MENU	Unit information / firmware version
	ALARM RESET	Display the alarms, to perform manual resets and to silence the buzzer.
	UP	Scroll the various screens when the cursor is in the top left of the display. If the cursor is inside a numeric field, the button increases or decreases the corresponding value. If the field is a selection, pressing the button displays the available options.
	DOWN	See the UP arrow
	ENTER	To move the cursor around the screens and to save the values of the set parameters

1.0 GENERAL INFORMATION

1.2 Vision2020i[1] MAIN CARD

The Vision2020i[1] card is described below, with reference to the general layout.



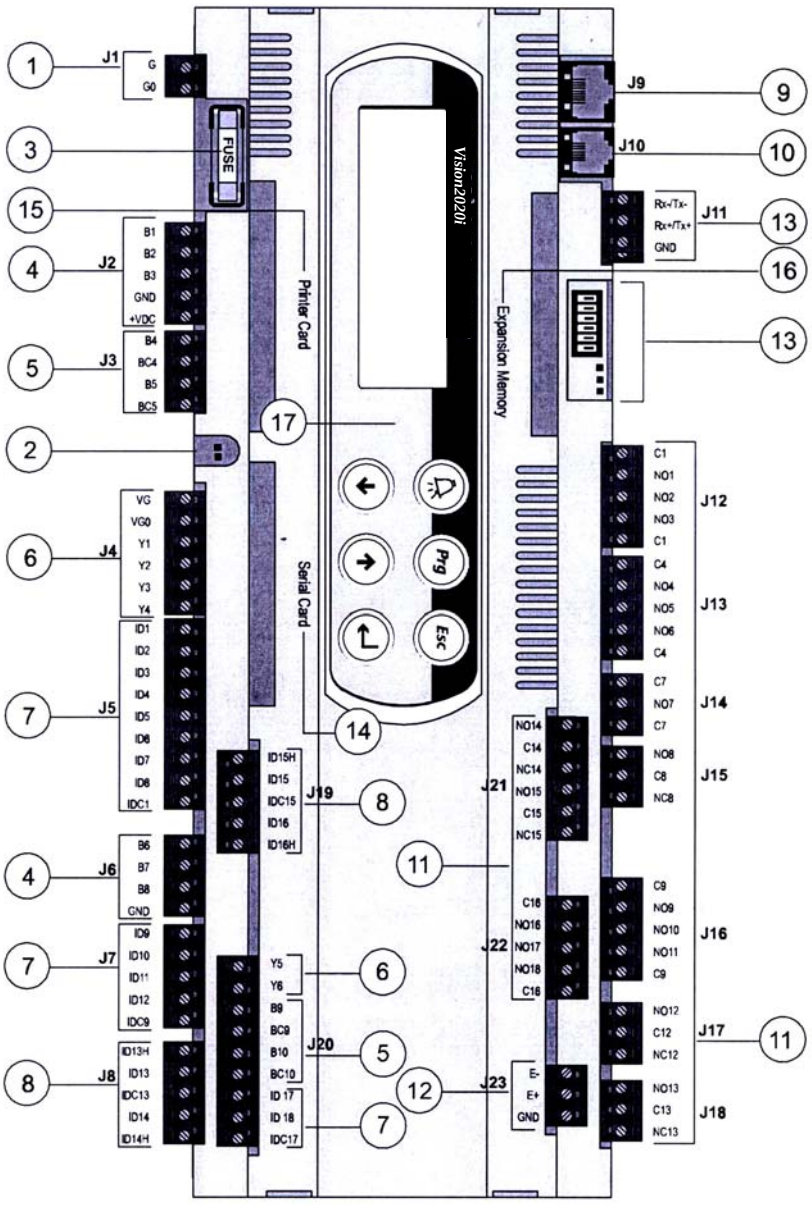
Key:

1. –G (+), G0 (-)- power supply connector
2. 250Vac fuse, 2nd delayed (T2 A)
3. NTC, 0/1V, 0/5V, 0/20mA, 4/20mA universal analog inputs
4. NTC and On-Off passive analog inputs
5. NTC passive analog inputs
6. Supply voltage yellow LED + 3 signaling LEDS
7. 0/10V analog outputs and cutting phase PWM outputs
8. 24Vac/Vdc digital inputs
9. 230Vac or 24Vac/Vdc digital inputs
10. Connector with Vrif for 5V radiometric probes feeding and V Term for terminal feeding
11. Connector for all Vision2020i* series standard terminals and for application program download
12. DBLAN local network connector
13. Programming key connector
14. Relay digital outputs
15. Port for analog inputs type selection
16. Port for serial card insertion (Rs485 for supervisor, Rs232 for modem, Gateway protocol inverter)
17. Port for clock card insertion

1.0 GENERAL INFORMATION

1.3 Vision2020i² MAIN CARD

The Vision2020i² card is described below, with reference to the general layout.



Key:

1. –G (+), G0 (-)- power supply connector
2. Supply voltage yellow LED and overload alarm red LED
3. 250Vac fuse, 2nd delayed (T2 A)
4. NTC, 0/1V, 0/10V, 0/20mA, 4/20mA universal analog inputs
5. NTC, PT1000, On-Off passive analog inputs
6. 0/10V analog outputs
7. 24Vac/Vdc digital inputs
8. 230Vac or 24Vac/Vdc digital inputs
9. Synoptic terminal connector (external panel with direct signaling)
10. Connector for all Vision2020i* series standard terminals and for application program download
11. Relay digital outputs
12. Expansion card connector
13. DBLAN local network connector, addressing and LED
14. Port for serial card insertion (Rs485 for supervision, Rs232 for modem or Echelon interfacing)
15. Port for parallel printer connection card insertion
16. Port for memory expansion or programming key card insertion
17. Built-in terminal (LCD, buttons and LEDS)

1.4 ACCESSORIES

1.4.1 HUMIDIFIER INTERFACE CARD (4030008278)

This interface allows controlling the basic quantities of the OEM humidifiers: level, feed water conductibility and current absorption. The Vision2020i¹ and Vision2020i² card directly controls all values. The interface transforms the humidifier signals into signals readable by the cards.

The cards relays directly control the humidifier functions and devices (water load, water drain and power contactor). As for connections, refer to the electrical drawing.

1.0 GENERAL INFORMATION

CONNECTIONS
The general connection diagram between the humidifier and the Vision2020i¹ is shown below.

POWER SUPPLY
The polarity of G and G0 on the interface card and on the Vision2020i¹ controller must be observed when the power is supplied by the same transformer.
The sensors measuring the "water level" or "conductivity " in the humidifier have no polarity, and therefore no special attention is required when connecting these to the board.
On board connectors explanation:

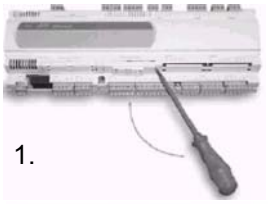
Terminals	Type	Description
G	G	24Vac
G0	G0	power supply ground
T1 T2	TAM	input 0-2Vac inductive
GND	GND	signal ground
C1 C2	"water conductivity" input	Resistive measurement made at 0-7Vac, 5 kHz
L1 L2	"high water level" input	Resistive measurement made at 0-7 ac, 5 kHz
01 02	"high water level" digital output	digital ON/OFF switch, optically isolated
Level	analogue "high water level" output	0-1Vdc 0-2000 µS/cm
Cond	"water conductivity" output	0-1Vdc 0-2000 µS/cm
TAM	TAM output	0-1Vdc 0-400% rated current
-	not used (n.c.)	

Dipswitch
As default the interface card is set to work with the Vision2020i¹ and Vision2020i². The four dipswitches are positioned towards the outside.
The dipswitches are placed under the lower door, to open it put a screwdriver under the edge and prize it open.

1.4.2 RS485 SERIAL CARDS

The RS485 serial card allows interfacing with Vision2020i¹ (4030003220) and Vision2020i²(4030003216) directly to a RS485 network. The maximum available baud-rate corresponds to 19,200 (programmable by parameter).

Connection with RS485 network is executed by connecting the extractible connector to the card terminals. As for connections, refer to the electrical drawing.


1.

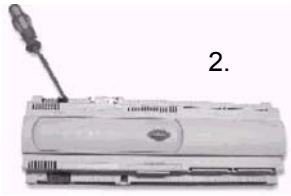

2.

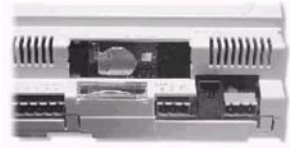

3.

1.4.3 CLOCK CARD

The option clock card (4030003232) allows managing the hour and date (day, month, year) for functions such as the hour bands. The clock card shall be inserted by removing the relevant port placed on its connector.


1.

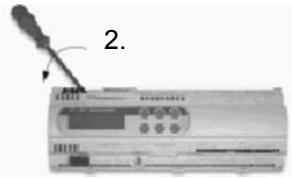

2.


3.

1.4.4 PROGRAMING KEY

The programming key (4030022233) allows downloading the application program to the Vision2020i² card in the place of the computer; furthermore, it also allows uploading the Flash memory contents to the key.


1.


2.


3.


4.

2.0 INTEGRATED HUMIDIFIER

Integrated management of a humidifier with immersed electrodes. The Vision2020i¹ - Vision2020i² cards manage all functions, from the reading of the humidifier parameters to the control of its devices (load, drain, power) by relay. The humidifier parameters (current, conductibility, level) are not read directly, but through an optional card (4030008278).The integrated humidifier is available for medium-size cards only and allows eliminating the electronic control normally fitted with the humidifier. The LCD terminal is provided with masks for humidifier control. Humidifiers from 1 to 42 Kg/h ,three-phase or single-phase, with supply voltage from 200 to 660 Volts (we suggest 220-240 Volts or 380-415 Volts) can be managed. The program controls steam capacity and humidifier working condition based on humidifier current and environmental humidity signals; furthermore, it manages and reports all states and alarms.

2.1 C0-C1 PARAMETERS SETTING TABLES

Among the humidifier parameters, C0 and C1 values vary depending on the connected humidifier model. The following tables report C0 and C1 values as a function of nominal capacity (columns) and supply voltage (rows).

Voltage	F200MA SINGLE-PHASE CYLINDERS					
	1 Kg/h		2 Kg/h		3 Kg/h	
	C0	C1	C0	C1	C0	C1
208	90	70	96	70	103	70
220	78	70	86	70	93	70
230	72	70	80	70	87	70
240	67	70	74	70	82	70

Voltage	F400TA THREE-PH. CYL.				E400TA THREE-PH. CYL.				I400TW THREE-PHASE CYL.					
	3 Kg/h		5 Kg/h		8 Kg/h		13 Kg/h		23 Kg/h		33 Kg/h		42 Kg/h	
	C0	C1	C0	C1	C0	C1	C0	C1	C0	C1	C0	C1	C0	C1
208	94	150	100	150	95	250	103	250	57	500	59	500	---	---
220	84	150	90	150	84	250	93	250	52	500	53	500	---	---
230	78	150	83	150	78	250	85	250	48	500	49	500	---	---
240	72	150	77	150	72	250	79	250	44	500	46	500	---	---
380	34	150	39	150	34	250	37	250	20	500	22	500	23	150
400	31	150	37	150	32	250	34	250	18	500	20	500	21	150
415	29	150	35	150	30	250	32	250	17	500	19	500	20	150
440	27	150	33	150	28	250	30	250	16	500	17	500	19	150
480	25	150	31	150	26	250	27	250	14	500	16	500	18	150
575	20	150	26	150	21	250	22	250	11	500	13	500	15	150

2.2 HUMIDIFIER SELECTION

To select the humidifier model, set the following 5 parameters in the masks under manufacturer's password:

- **NOMINAL CAPACITY:** maximum steam capacity delivered by the humidifier. Values from 1Kg/h to 42 Kg/h.
- **VOLTAGE:** electrical network supply voltage. Values from 0 Volt to 660 Volts can be set.
- **PHASES NO.:** phases of the supply electrical network. 1 or 3 phases (single-phase or three-phase) can be set.
- **TAM MODEL:** amperometric transformer model, that is the gauge measuring current among humidifier cylinder electrodes. 0= TAM 50, 1=TAM 100, 2=TAM 150, 3= TAM 300, 4=TAM 500, 5=TAM 700.
- **DRAIN ENABLING WITHOUT VOLTAGE:** during water drain, the humidifier turns off; this selection is extremely important in case the drained water pipes may come into contact with people, even indirectly, since the humidifier water is under voltage.

2.0 INTEGRATED HUMIDIFIER

2.3 HUMIDITY AND STEAM CAPACITY REGULATION

The humidifier steam capacity regulation depends on:

- Humidity regulation
- Capacity set by mask (value between 30% and 100% of nominal capacity)

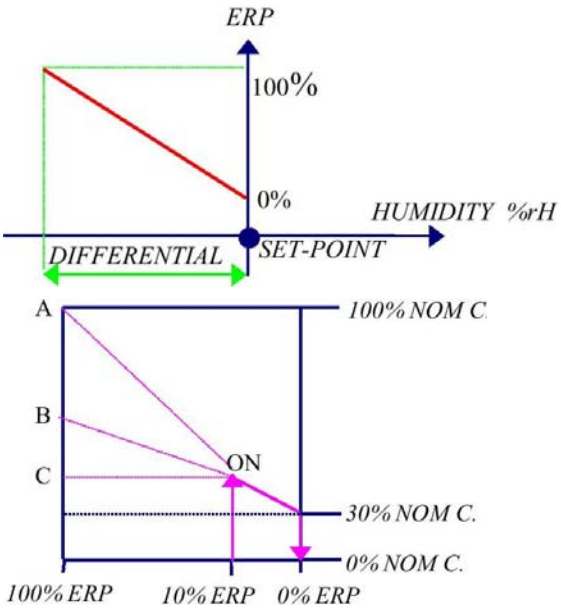
The program regulates humidity based on humidity probe reading, humidity set-point and differential. The program calculates the humidity proportional error (ERP):

The humidifier regulation graph is obtained based on nominal capacity, set capacity and ERP proportional error:

ERP = humidity proportional error

Set capacity: A = 100% nominal power
B = 75% nominal power
C = 45% nominal power

The humidifier minimum capacity corresponds to 30% of nominal power (due to technical reasons) when ERP = 0%; the more ERP increases the more capacity raises, until capacity set with ERP = 100% is obtained. The humidifier is managed so as not to be turned on with ERP minimum values, otherwise the minimum capacity (30% of nominal power) would increase humidity at a too high value. To obviate this problem, the humidifier turns on when ERP has at least 10% value.



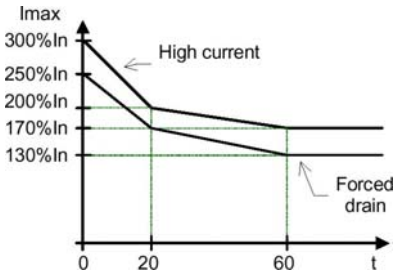
2.4 HUMIDIFIER ALARMS

MESSAGE	CRITERIA	ACTION	RELAY	BUZZER
Current lacking	Water level reaches the max. water level sensor and Im<5%In 1	**Cut power off** Empty the cylinder 2	YES	YES
Water lacking	Water load valve open for more than 20 minutes consecutively	Check LSI (level sensor) contact	YES	YES
High or low humidity	Humidity above or below the specified thresholds. Alarm signaled 20 min. after pushing button ON	None	YES	YES
Presence of foam	Foam identified inside cylinder. Presence of foam signaled in the humidifier masks	Situation managed until problem is solved with a particular procedure. (temporarily, max. capacity is not guaranteed)	NO	NO
Saturated cylinder	Cylinder saturated with limestone	It is suggested to replace the cylinder	NO	NO
High current	Current above the specified thresholds	Forced drain for 5”	YES	YES

2.4.1 HIGH CURRENT ALARM

Thresholds have been set to prevent current from increasing above the maximum allowed values. However, limits depend on time, as they shall allow momentary peaks at humidifier start.

Forced drain lasts for 5 seconds and is not signaled. The high current alarm makes water drain for 30 seconds and stops the humidifier.



3.0 FIRST INSTALLATION AND SOFTWARE UPDATING

At first installation, the cards shall be programmed by DOWNLOADING the application program to the Flash buffer memory; this operation can be executed by a computer or the hardware key.

3.1 PROGRAM DOWNLOAD BY PROGRAMMING KEY

For connecting the key to Vision2020i² – Vision2020i¹, operate as follows:

1. Shut Vision2020i² – Vision2020i¹ down and remove the "expansion memory" port by using a screwdriver.
2. Place the key selector on.
3. Insert the key into the relevant comb connector.
4. Push buttons Up and Down simultaneously and power the card.
5. Check that the key red LED switches on.
6. Wait until the upload request is displayed on the LCD, then release the buttons and confirm by pushing Enter; the data transfer operation will last for approximately 10 seconds.
7. Shut Vision2020i² – Vision2020i¹ down, remove the key, place the port in its original position and start the card again.
8. Now the card works with the program transferred by the key.

3.2 PROGRAM DOWNLOAD BY COMPUTER

To use WinLOAD 32 program, operate as follows:

1. Connect black inverter (RS232/RS485) to the mains by using the transformer provided together with the kit, then connect the transformer to the network
2. Connect inverter to a computer free serial port by using the serial cable provided together with the kit
3. Connect inverter to connector J10 of Vision2020i² – Vision2020i¹ by using a telephone cable (4030010191)
4. Start program WinLOAD32 by computer with card off
5. Key in the number of the PC serial port in text box "COMM" (1 for COM1, 2 for COM2)
6. Select value "0" in text box "Vision2020i² ADD."
7. Start the card
8. Wait for 30 seconds until text "OFF LINE" changes to "ON LINE" on WinLOAD32 program in the lower left or until the yellow LED close to the card dip switch starts blinking; now key in the card DBLAN address actual value in box "Vision2020i² ADD"
9. On WinLOAD32 program, select button "Upload" and then button "Application"
10. Select the folder containing the application program source files
11. Push button CTRL, then click on all IUP and BLB/BIN files, then release button CTRL
12. Click on button "UPLOAD" to start the files downloading procedure, that will last for approximately 1 to 5 minutes
13. Wait until message "Upload OK" appears in the bar displaying the procedure development state
14. Disconnect the telephone cable between card and inverter; if required, connect the external terminal (if any), then shut the card down and start it again

NOTE: If a DBLAN network with more cards is available, the program can be installed on the following cards too without repeating all operations: After installation on the first card, simply repeat steps from 8. to 14. , keying in the new card addresses one by one in field "Vision2020i² ADD" of WinLOAD32 program.

3.3 FACTORY PARAMETERS INSTALLATION

Factory parameters are the default values set by the application program main operative parameters. Parameters are assigned automatically when executing the DOWNLOAD operation as described above. Parameters indicate timing, set-points, differentials, etc… (refer to the complete list of factory values in para. 6.0).

After installing factory values, the parameters can be modified within the prescribed values range.

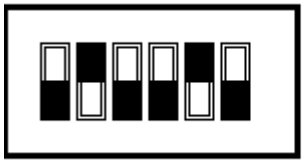
If required, parameters can also be installed manually by the user, at any time, by the external or built-in terminal.

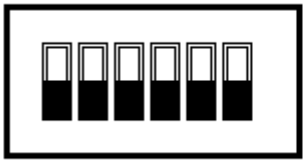
Operations to be carried out for factory parameters manual installation:

1. Push buttons MENU + PROG and key in the Manufacturer's password, then push Enter
2. By pushing button Down three times, move the cursor on "INITIALISATION" (last row), then push ENTER
3. The parameters installation mask is displayed; to install, push ENTER and key in the Manufacturer's password
4. **WARNING:** we recommend extreme care since this operation deletes all the installed parameters from the memory and replaces them by the factory parameters – after this operation, parameters cannot be restored.
5. After pushing ENTER, message "PLEASE WAIT" is displayed for some seconds.

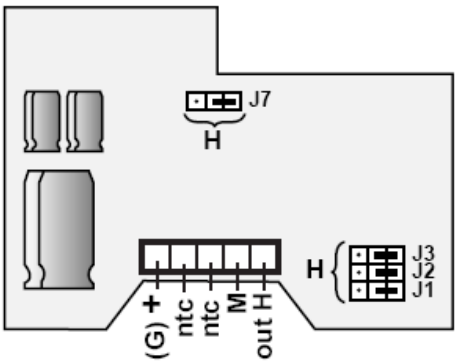
4.0 TEMPERATURE/HUMIDITY PROBE SETUP

4.1 Setup ‘Analog Selection’(on the Vision2020i) for temperature/humidity probe type as below diagram:





4.2 Setup the temperature/humidity probes as below:



4.3 Press ‘menu’ and ‘prog’ button together, key in manufacturer password.

4.4 Go to ‘Unit Configuration’ and look for mask and set accordingly.

Humidity probe: Y	
Type	0 ÷ 1 V
Threshold min.	010.0%
Threshold max.	090.0%

4.5 Press ‘menu’ to exit from the mask.

Firstly, please check that wiring and installation are correct. If everything is ok, you can power on the unit and follow the below steps to do initialization.

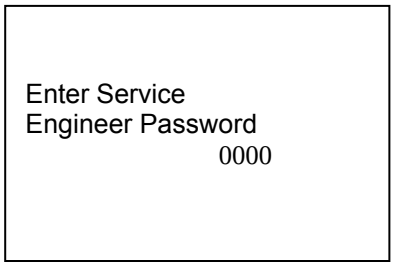
5.0 RESET ALARM HISTORY

5.1 RESET ALARM EVENTS

Before using the alarm logging function, it is necessary to clear the clock board memory. Please do this as shown below.

5.1.1 Enter Service Engineer Menu

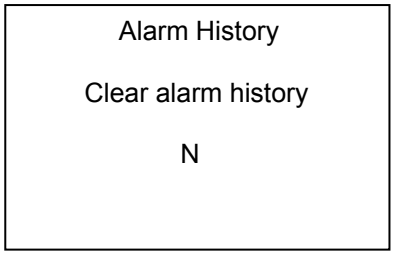
Press  key to enter maintenance menu and input service engineer password.



Press  or  key to input the service engineer password (****) and then press enter to confirm. If the password is correct, 'Right Password' will be shown on the bottom left hand corner, otherwise, 'Wrong Password' will be shown.

5.1.2 Reset Alarm History

Press  or  key to the following menu

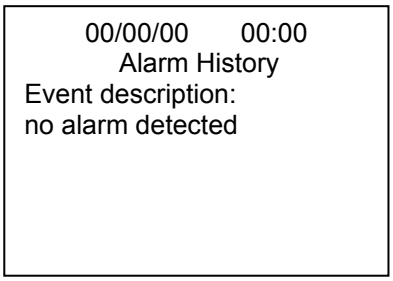


Reset events: Clear all alarm records
Reset memory: Clear clock board memory

5.1.3 Check Alarm Event

Enter alarm log menu

Press  key to enter the alarm log menu.



Press  or  key to check alarm events

6.0 SETUP DBLAN NETWORKING

6.1 PURPOSE

If there are more then one unit of DB-AIRE units need to be network (inter-connect) then below procedures need to be follow.

6.2 DB-AIRE Local Area Network (DBLAN)

Every DBLAN node must be addressed to be identified by the other nodes. Each address (an integer number) must be unique in the network for avoiding messages mismatch: in case two or more nodes have the same identifier address the network cannot work.

The max address number selectable is in the 1-31 for the Vision 2020i controller.

boards and 1-32 range for the Vision 2020i Terminals.

Example: if there are three units of DB-AIRE need to be network.

The three units combinations:

Controller with address of 1 connect to Terminal with address of 9

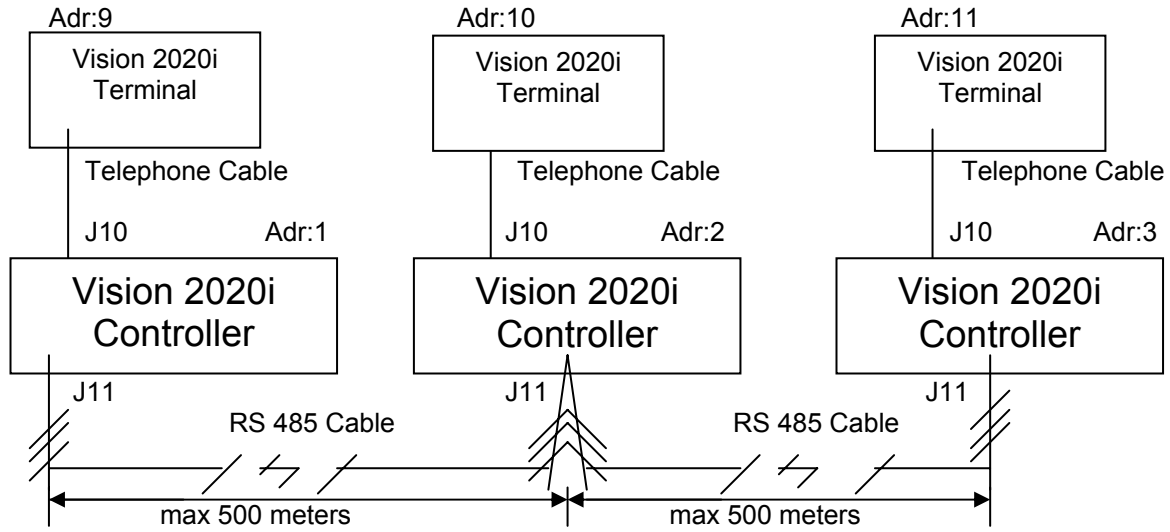
Controller with address of 2 connect to Terminal with address of 10

Controller with address of 3 connect to Terminal with address of 11

Follow the following steps:

6.3 NETWORK CONNECTION DIAGRAM

Figure 6.3 DBAIRE Master Slave Network Connection Diagram



The 6 core telephone cables (to J10 socket) are supply by the manufacturer.
The 3 core RS 485 data cables (to J11 socket) are supply by the customer.
Refer to the DB-AIRE's electrical wiring for the connection details.
Pay attention to the network polarity:
RX+/TX+ on one controller must be connected to RX+/TX+ on the other controller; the same is true for RX-/TX- and GND.

6.4 Example:

Unit 1:
Vision 2020i 'Controller':1
Vision 2020i 'Terminal':9

Unit 2:
Vision 2020i 'Controller':2
Vision 2020i 'Terminal':10
and so on.....

6.0 SETUP DBLAN NETWORKING

6.5 SOFTWARE SETTINGS FOR CONTROLLER & TERMINAL DISPLAY

Using the example from 6.4, if two units of DB-AIRE with master slave application, with one running and one standby.

Turn ON power supply to the Vision 2020i controller unit.

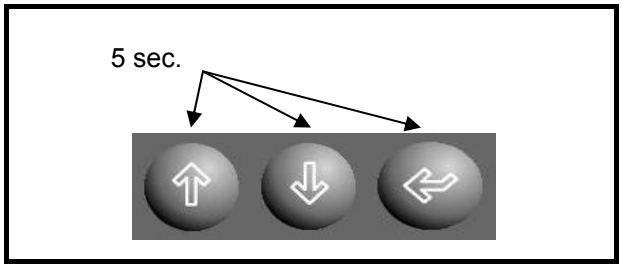
Vision 2020i 'Controller' will be display as 'I/O Board' on the LCD terminal.

Vision 2020i 'Terminal' will display as 'Terminal' on the LCD terminal.

At the 'First' unit of Vision 2020i terminal:

Push simultaneously the first three keys on the upper left corner of the Vision 2020i terminal keyboard. Push them for at least 5 seconds.

Vision 2020i



The display:

```
Terminal Adr: 9
I/O Board Adr: 01
```

Set the first line (Terminal Adr) to '9' allows you to select the Vision 2020i controller address (for first unit, it is '01') that you want to configure. Once you select the address then press 'enter' button.

The display:

```
        Terminal Config

        Press ENTER
        to continue
```

Push 'enter' to continue.

The display:

```
P:01  Adr      Priv / Shared
Trm1   09        Pr
Trm2   None      ---
Trm3   None      ---   Ok?  Y
```

The above address '9' for display terminal is exactly the correct setup for the DB-AIRE unit with the controller address of '1'

Set **Trm1**, to '**09'** and **'Pr'**,'' and **Trm2** and **Trm3** remain unchanged for '**None ---**', change the '**N**' to '**Y**'(to confirm and save) and press 'enter'.

Note: Pr = Private.

At the 'Second' unit Vision 2020i terminal:

Press the three buttons again.

The display:

```
Terminal Adr: 10
I/O Board Adr: 02
```

The above address '10' for display terminal is exactly the correct setup for the DB-AIRE unit with the controller address of '2'

The display:

```
        Terminal Config

        Press ENTER
        to continue
```

Set **Trm1**, to '**10'** and **'Pr'** and **Trm2** and **Trm3** remain unchanged for '**None ---**', change the '**N**' to '**Y**'(to confirm and save) and press 'enter'.

```
P:02    Adr      Priv / Shared
Trm1    10       Pr
Trm2    None     ---
Trm3    None     ---   Ok?  Y
```

With the above settings, terminal with address 9 will only work with the controller with address 1, terminal 10 will only work with the controller with address 2 and so on. Those terminal and controller's address are fixed and do not set to any other address.

6.0 SETUP DBLAN NETWORKING

6.6 Setup Auto-Change Over Rotation Scheduler:

Before perform any setting here, make sure steps 6.5 are done properly.

The below steps are for setup the auto change over rotation scheduling for DB-AIRE units that are interconnected via DBLAN address.

1. Go to Unit assigned with Terminal address 9 and I/O Board 1.
2. Press  and key in manufacturer password.
3. Go to 'Unit Configuration', press  look for mask 'Unit Configuration'. Then set 'Present/Rotation' for those DB-AIRE units that link in DBLAN network. Example here if there are only <u>two</u> DB-AIRE units in the network then set U1 and U2 to 'Present/Rotation'.
4. Press  and  to go to 'Global Parameters', and look for 'Rotation Type' and select the 'Timezones'.
5. Press  to move the cursor to the position, set the numbers of 'Stand-By Units' (in this example set to '1') and 'Rotation Time' for change over (minimal 1 hour).
6. Press  to move the cursor back to original top position, press  to go to next mask.
7. Press  to move the cursor to the position, set the 'Rotation Time' for change over (in 24 hours format) and the number of day for change over.
8. The above steps 1 to 7 are only apply to DB-AIRE unit with Terminal address '9' and I/O Board '1'(Master unit).Those masks will not display on other DB-AIRE unit (slave unit).

7.0 I/O TABLE

7.1 ANALOGUE INPUTS

Reference	Direct Expansion mode	Direct Expansion mode
	DB2 Medium Version	DB1 Standard Version
J2-B1	Room return air temperature (NTC)	Room pressure differential (4/20mA)
J2-B2	Room return air humidity (0/1Vdc or 4/20mA)	Room return air humidity (0/1Vdc or 4/20mA)
J2-B3	Not-Used	Current of humidifier (connected to 4030008278)
J2-B4	Not-Used	Conductivity of humidifier (connected to 4030008278)
J3-B5	Supply air temperature (NTC) (option for display only)	Room return air temperature (NTC)
J3-B6	Room pressure differential (4/20mA) (option)	Supply air temperature (NTC)
J6-B7	Current of humidifier (connected to 4030008278)	Not-Used
J6-B8	Conductivity of humidifier (connected to 4030008278)	Not-Used

7.2 DIGITAL INPUTS

Reference	Direct Expansion mode	Direct Expansion mode	Alarm Action
	DB2 Medium Version	DB1 Standard Version	
J5-ID1	Humidifier water level (connected to 4030008278)	Humidifier water level (connected to 4030008278)	
J5-ID2	Customer input alarm	Customer input alarm	Unit total switch off
J5-ID3	Unit remote on off	Unit remote on off	On / off unit
J5-ID4	Unit over heat	Unit over heat	Unit total switch off
J5-ID5	Indoor unit pressure differential switch	Indoor unit pressure differential switch	Unit total switch off
J5-ID6	Return air filter alarm	Return air filter alarm	Alarm message only
J5-ID7	Evaporator fan No. 1 overload	Evaporator fan No. 1 overload	Only two fan overload caused unit switch off
J5-ID8	Evaporator fan No. 2 overload	Evaporator fan No. 2 overload	Only two fan overload caused unit switch off
J7-ID9	Heater No. 1 overload	Heater No. 1 overload	Stop
J7-ID10	Heater No. 2 overload	Heater No. 2 overload	Stop
J7-ID11	Compressor No. 1 low pressure	Compressor No. 1 low pressure	Stop
J7-ID12	Compressor No. 2 low pressure	Compressor No. 2 low pressure	Stop
J8-ID13	Compressor No. 1 high pressure	Compressor No. 1 high pressure	Stop
J8-ID14	Compressor No. 2 high pressure or Chiller water flow switch	Compressor No. 2 high pressure or Chiller water flow switch	Stop

7.3 DIGITAL OUTPUTS

Reference	Direct Expansion mode	Direct Expansion mode
	DB2 Medium Version	DB1 Standard Version
J12-NO1	Evaporator fan No. 1	Evaporator fan No. 1
J12-NO2	Evaporator fan No. 2 (option)	Evaporator fan No. 2 (option)
J12-NO3	Humidifier power (select on off type, 0/10Vdc type or Carel Type)	Humidifier power (select on off type, 0/10Vdc type or Carel Type)
J13-NO4	Humidifier fill valve	Humidifier fill valve
J13-NO5	Humidifier drain valve	Humidifier drain valve
J13-NO6	Heater No. 1 (select two steps or three steps in binary)	Heater No. 1 (select two steps or three steps in binary)
J14-NO7	Heater No. 2	Heater No. 2
J15-NO8	General Alarm	General Alarm
J16-NO9	Not-Used	Not-Used
J16-NO10	Compressor No. 1 liquid solenoid valve	Compressor No. 1 liquid solenoid valve
J16-NO11	Compressor No. 2 liquid solenoid valve	Compressor No. 2 liquid solenoid valve
J17-NO12	Compressor No. 1 (pumpdown off)	Compressor No. 1 (pumpdown off)
J18-NO13	Compressor No. 2 (pumpdown off)	Compressor No. 2 (pumpdown off)

7.4 ANALOGUE OUTPUT

Reference	Direct Expansion mode	Direct Expansion mode
	DB2 Medium Version	DB1 Standard Version
J4-Y1	Humidifier 0/10Vdc (optional)	Humidifier 0/10Vdc (optional)
J4-Y2	Fresh air damper 0/10Vdc (optional)	Fresh air damper 0/10Vdc (optional)* or Chiller water (0 – 10 Vdc valve)**
J4-Y3	Chiller water (0 – 10 Vdc valve)	Not-Used
J4-Y4	Not-Used	Not-Used

* Activate if unit mode is not Chiller water mode (0 – 10 Vdc valve) and room pressure differential probe is enabled.
** Activate if unit mode is Chiller water mode (0 – 10 Vdc valve).

8.0 TERMINAL DISPLAY MASK

Remark: Below are the default masks, settings in bold may be need to be adjust, depend on job site requirement.

Press follow indicated button and  to go to next mask.

Text with [ ] are optional configuration.

Unit power up display:

```
Loading Readings
Please Wait….
```

```
 08:00          23/11/2004
Room Temperature        24.0 °C
Room Humidity           55.0 rh%
UNIT OFF by Keyboard
              SETPOINT
Temperature             24.0°C
Humidity                55.0rh%
- ALARM -
```

```
WORKING STATUS
* Fan    * Heat
* Cool
* Damper                00.0V
* Humid                 00.0 Vg/h
* Dehumid
```

```
Ambient Values

Supply Air Temperature
                    : 23.0 °C
Room Pressure
Differential:          46.2bar

          - ALARM -
```

```
Digital Inputs
1.Humidifier Fail       Close
2.Customer Alarm        Close
3.Rem On/Off            Close
4.Unit Air Flow         Close
5.Press Differ Sw       Close
6.Filter Alarm          Close
```

```
Digital Inputs
7.Evap. Fan1O/L         Close
8.Evap. Fan2O/L         Close
9.Heater 1 O/L          Close
10.Heater 2 O/L         Close
11.Comp1 L/P            Close
12.Comp2 L/P            Close
```

```
Digital Input
13.Comp1 H/P      Close
14.Comp2 H/P      Close
14.Chiller water
   flow switch    Close
```

```
Digital Output
1.Evap. Fan No.1        OFF
2.Evap. Fan No.2        OFF
3.Power Humid.          OFF
4.Fill                  OFF
5.Drain                 OFF
```

```
Digital Output
6.Heater No.1           OFF
7.Heater No.2           OFF
8.General Alarm         OFF
```

```
Digital Output
10.Comp1 Liq.Val.       OFF
11.Comp2 Liq.Val.       OFF
12.Compressor 1         OFF
13.Compressor 2         OFF
```

```
Digital Output
10.Comp1 Liq.Val.       OFF
11.Comp2 Liq.Val.       OFF
12.Compressor 1         OFF
13.Compressor 2         OFF
```

```
H1    00.0%          H2    00.0%
Current total steam
flow      000.0 Kg/h
Conduct   0000uS/cm
Nominal Values
Nom.prod. 000.0 Kg/h
Nom.current 000.0A
Voltage  200V  1-Ph
```

```
Cyl. 1  prod. 000.0Kg/h
Status:          Off
Activity:    Cyl.Off
Amps:          000.0A
Cyl.1 Cont.  Off
Cyl.1 Fill   Off
Cyl.1 Drain  Off
Water Level  Normal
```

```
Operating Hours
Unit                    000000
Compressor 1            000000
Compressor 2            000000
Main. Hour Threshold
Hours
Unit                    200X1000
Compressors             100X1000
```

```
              SETPOINT

Temperature        24.0°C

Humidity           55.0rh%
```

```
Compressor 1

High Pressure Cutout
Manual Reset
Reset ?
Low Pressure Cutout
Manual Reset
Reset ?
```

```
Compressor 2

High Pressure Cutout
Manual Reset
Reset ?
Low Pressure Cutout
Manual Reset
Reset ?
```

8.0 TERMINAL DISPLAY MASK

Regulation Parameters

Max.product. 000.0%

Setpoint 000.0%

Differential 000.0%

Enter User Password
0000

Clock & Date Setting

Time: 16:04

Date: 20/08/2005

Daily Time Zone

with Setpoint

Variation Setting N

Weekly Time Zone

With ON/OFF Unity

Enabled? N

Setting New
User Password: 0000

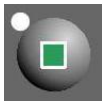
20/08/05 042 16:04

Alarm History
Event description:

no alarm detected

(Not used)

08:00 23/11/2004
Room Temperature 24.0 °C
Room Humidity 55.0 rh%
UNIT ON
SETPOINT
Temperature 24.0°C
Humidity 55.0rh%
- ALARM -



Probe Adjust

Room Temp. 0.0 °C

Supply Air T. 0.0 °C

Room Humid. 0.0 rh%

Probe Adjust
Room Pressure
Differential
0.0 bar

Probe Adjust
Room Pressure
Differential
0.0 bar

Running hours
Cylinder 1 000000h
Reset running hours
Cylinder 1 N

Cylinder 1
Pre-clean N
Total drain N

Manual Operation

Evaporator Fan 1 N

Manual Operation

Compressor 1 N

Comp1 Liq. Valve N

Manual Operation

Compressor 2 N

Comp2 Liq. Valve N

Manual Operation

Heater 1 N

Heater 2 N

Manual Operation
0-10V Humidifier N

Output Voltage 00.0V

8.0 TERMINAL DISPLAY MASK

Manual Operation
Humidifier N

Fill Valve N

Drain Valve N

Unit Overheat Alarm

Setpoint 30.0 °C

Delay time 005 secs

Is Room Pressure
Differential Probe
Available? Y

Is Supply Air Temp.
Probe Present? Y
(For Display Only)

Manual Operation

Air damper N

Output voltage 00.0V

Unit Delay On 00sec

Cust.Interlock 000sec
Unit air flow alarm delay time
000sec

Room Pressure

Differential Probe

4mA 00.0 bar

20mA 30.0 bar

Manual Operation
3-point valve
Open N
Close N

Air Damper
Minimum Output 00.0V
00.0 bar 00.0V
30.0 bar 10.0V

T.Min Setpoint 10 °C
T.Max Setpoint 50 ° C
H.Min Setpoint 40 rh%
H.Max Setpoint 70 rh%
Room Temp. Alarm
|High 30.0 °C
|Low 18.0 °C
Delay Time 00 mins

Enter Manufacturer
Password
0000

Air Damper

Working Mode

On if unit is on

Water Detector Alarm

Delay Time: 000 secs

Unit Configuration
Compressor
Global Parameters
Unit Initializat.

Fans
Nos of Fans 1

Delay On Time 030s

Delay Off Time 030s

Room Temp.Alarm

High 30.0 °C

Low 18.0 °C

Delay time 30 mins

Unit Configuration

DX mode

Heat control

Nos of Heaters 2(BIN)

Insertion Delay
03 sec

Room Humidity Alarm

High 70.0 rh%

Low 40.0 rh%

Delay time 30 mins

BMS Network N

Clock board Y

Humidity probe: Y

Type 0÷1V

Threshold min. 010.0%

Threshold max. 090.0%

8.0 TERMINAL DISPLAY MASK

Is Supply Air Temp.

Probe Present? **Y**

(For Display Only)

Humidifier Enable **Y**

Insertion Delay 000s

Humidifier Type

Carel

Enable heaters

Overload input Y

Enable evaporator fan overload input Y

Unit configurat.
U1:Present/Rotation
U2:Present/Rotation
U3:Not Present
U4:Not Present

Unit configurat.
U5:Not Present
U6:Not Present
U7:Not Present
U8:Not Present

Nos of Compressor **2**

Rotation Enable **Y**

Humidity

Comp. 1 (Dehumid)

Position : 250 %
Hysteres : 250 %

Humidity

Comp. 2 (Dehumid)

Position : 750 %
Hysteres : 250 %

Low pressure alarm delays

Startup delay 030s

Run delay 000s

Compressor Turn Of Min. Time 180 sec

Compressor Turn On Min. Time 180 sec

Time Between Starts Same Comp. 600 sec

Time Between Start Diff. Comp. 010 sec

Temperature Compressor 1

Position : 250 %
Hysteres : 250 %

Temperature Compressor 2

Position : 750 %
Hysteres : 250 %

Dehumid.Off Fan 2 No

No. of compressor **2**

used for dehumid.

Global Parameters

Rotation type

Timezones

Stand-by units 1

Timezones units

Rotation time 00:00
Every 0 days

Water flow switch delays

Startup delay 000s

Run delay 000s

Enable Manual Reset

High Pressure Yes
Low Pressure Yes

Disable config

Drain by low setp. N
Drain std-by hum. N
Cylinders message N

Humidifier Thresholds conduct.

Pre-alarm 0000uS/cm
Alarm 0000uS/cm

Humidifier Percentage timing

Drain (resp.H3) 000 %
Evap.(resp.H4) 000 %

8.0 TERMINAL DISPLAY MASK

Heaters
Heater 1

Position : 166 %
Hysterisis: 166 %

Heaters
Heater 2

Position : 498 %
Hysterisis: 166 %

Heaters
Heater 3

Position : 830 %
Hysterisis: 166 %

Heater 1
Dehum and Low Temp.

Position : 083 %
Hysterisis: 083 %

Heater 2
Dehum and Low Temp.

Position : 249 %
Hysterisis: 083 %

Heater 3
Dehum and Low Temp.

Position : 415 %
Hysterisis: 083 %

Dunham-Bush

DB-AIRE

Code: FLCCU1314G

Ver 2.1 14 August 05

-ALARM-
Comp.1 Current O/L
or
High Pressure

-ALARM-
Compressor 1
Low Pressure Cutout

-ALARM-
Room Humid Probe
Broken or
not Connected

ALARM-
Room Temperature
High Alarm Exceed

ALARM-
Room Temperature
Low Alarm Exceed

-ALARM-
Room Temp Probe
Broken or
not Connected

-ALARM-
Supply Air
Temp.Probe Broken
or not Connected

--ALARM-
Unit Running
Hours Threshold
Exceeded

-ALARM-
Compressor 1
Running Hours Threshold
Exceeded

-ALARM-
Clock Board not
Installed or Broken

-ALARM-
Evaporator Fan 1
Overload

-ALARM-
Evaporator Fan 2
Overload

8.0 TERMINAL DISPLAY MASK

-ALARM- Customer Interlock	-ALARM- Room pressure differ. probe broken or not connected	-ALARM- Compressor 2 Running Hours Threshold Exceeded
-ALARM- Eprom Broken or Absent Call Assistance	-ALARM- Unit Overheat	-ALARM- Chiller Water Flow Switch Alarm
-ALARM- Room High Humid.	-ALARM- Indoor unit pressure differential switch	-ALARM- Humidifier High Current
-ALARM- Room Low Humid.	-ALARM- Indoor unit Air Filter Dirty Call Service	-ALARM- Humidifier Lack Of Current
-ALARM- Heater No.1 Overload	-ALARM- Comp. 2 Current O/L or High Pressure	-ALARM- Humidifier Lack Of Water
-ALARM- Heater No.2 Overload	-ALARM- Compressor 2 Low Pressure Cutout	No Alarms Pending

MAINTENANCE INSTRUCTIONS

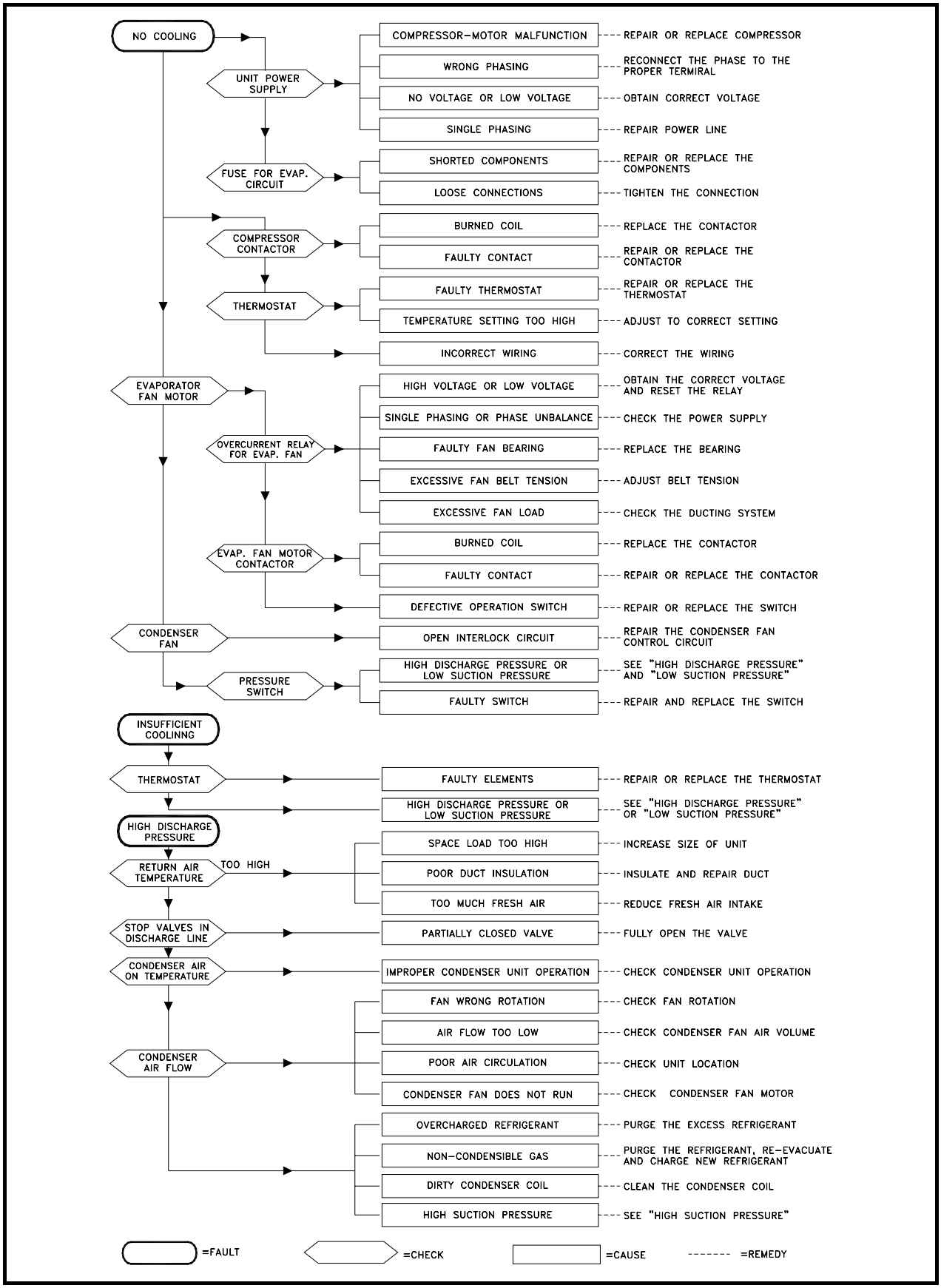
MAINTENANCE

These units are designed to provide years of services with minimum maintenance. Nonetheless, it is a good practice to carry out regular inspection and checking to ensure the unit's optimum performance.

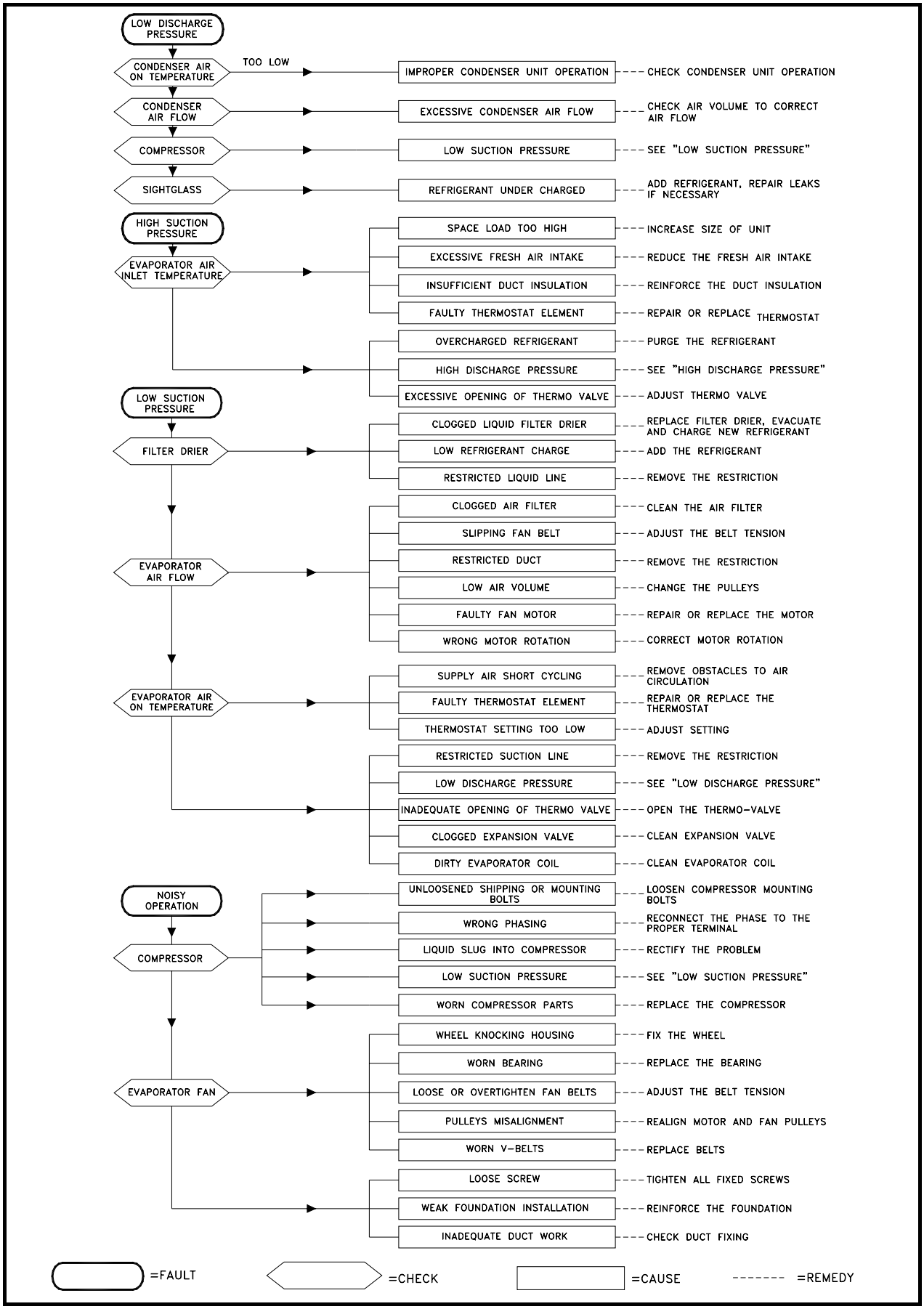
ITEM	MAINTENANCE PROCEDURE	RECOMMENDED SCHEDULE
Air Filters	1. Disposable type. 2. The filters should be checked and changed periodically. When they become dirty, an alarm is activated by the clogged filter switch. If the filters are dirty, they must be changed for efficient operation of the system. 3. To check the alarm indicator, cover approximately 75% of the return air opening; the alarm should energize. If the alarm energizes prematurely or does not energize when it should, adjust the filter switch. 4. All doors to machine should remain closed before determining whether an adjustment is necessary.	Spare filters should be kept in stock. Filters should be checked and replaced monthly or depending upon the condition of the circulated air
Belt	1. Belt tension should be checked every month to assure proper, efficient operation. 2. If retensioning is needed, slightly loosen the four motor-mounting bolts. Turn the adjusting screw (located in the end of the motor mounting channel) until the belt is properly adjusted. 3. Retighten the four mounting bolts.	Every months.
Pulley	1. Make sure the set screws are properly tightened and there is no crack on the pulley.	Once every six months.
Blower	1. Turn the blower manually. It should run smoothly and there is no excessive bearing noise.	Once every six months.
Bearing and Shaft	1. Check for evidence of wear.	Once a year.
Bolts, Screws and Nuts.	1. Tighten any loose components.	Once a year.
Coil	1. Check and remove clogged item between fins.	Once a year.
Paint	1. Check any evidence of corrosion.	Once a year.
Compressor	1. Check if there is any leakage.	Every six months.
Electrical	1. Check voltage, current and wiring. 2. Check connections.	Every two months.
Heating Elements	1. The heating elements are finned type and require no maintenance.	-
Humidifier	1. Replacement of the humidifier cylinder.	See humidifier manufacturer’s manual for details.
Drain Pan and Pipe	1. Pour some water into the drain pan and let the water run through. If the pipe is clogged, remove the dirt.	Every six months.
Piping	1. Inspect all piping for leaks and clearance. 2. Piping must be properly supported and must not be allowed to vibrate or rub against other pipes or structures.	Every six months.
Glycol	1. Check glycol concentration and inhibiter level. 2. Inhibiter level prevents corrosion and percent of glycol concentration prevents freezing. 3. Contact a local water-treatment company in the area for recommendations based on local water conditions.	Every six months.

MAINTENANCE INSTRUCTIONS

TROUBLESHOOTING CHART



MAINTENANCE INSTRUCTIONS



MAINTENANCE INSTRUCTIONS

SAMPLE LOG SHEET

SHEET NO......

DUNHAM-BUSH PRECISION AIR-COND UNIT

UNIT MODEL NO. ..... **UNIT NO.** ..... **VOLTS:** ..... **Hz**.....

UNIT SERIAL NO. .....

START UP : **DATE**..... **TIME**.....

DATE									
TIME									
COMP. NO.									
SUCTION PRESSURE	1.								
	2.								
	3.								
	4.								
SUCTION TEMPERATURE	1.								
	2.								
	3.								
	4.								
DISCHARGE PRESSURE	1.								
	2.								
	3.								
	4.								
DISCHARGE TEMPERATURE	1.								
	2.								
	3.								
	4.								
DISCHARGE SUPERHEAT (DISC. TEMP.-SAT. DISCH.)	1.								
	2.								
	3.								
	4.								
SUCTION SUPERHEAT (SAT. SUCT .- SUC. TEMP)	1.								
	2.								
	3.								
	4.								
RETURN AIR TEMPERATURE – DB/WB									
SUPPLY AIR TEMPERATURE – DB/WB									
AIR VOLUME									
AMBIENT AIR TEMPERATURE									
OFF CONDENSER AIR TEMPERATURE									
COMPRESSOR AMPS	1.								
	2.								
	3.								
	4.								
CONDENSER FAN AMPS									
EVAPORATOR FAN AMPS									
VOLTS									

This log sheet is provided as a recommendation of the readings that should be taken on a periodic basis. The actual readings taken and the frequency will depend upon the units application, hours of use, etc. This type of information can prove very useful in preventing and/ or solving problems that might occur during the life of the unit.

DUNHAM-BUSH

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