



## DB-Aire III Systems 50/60Hz

Precision Environmental Control Unit  
Cooling Capacity: 3 to 32 TR (10 to 110 kW)



**DUNHAM-BUSH**<sup>®</sup>

Products that perform...By people who care

# DB-AIRE III

## Precision Environmental Control Systems

### For Technological Room Applications

## DB-AIRE III AIR-COOLED DX & CHILLED WATER SYSTEMS

Today's technology rooms require precise, stable environments and design in order for sensitive electronics to operate optimally. Precision air conditioning is designed for close temperature and humidity control. It provides high reliability operation with the ease of service, system flexibility and redundancy necessary to keep electronic equipment up and running 24 hours a day, 365 days a year.

DB-AIRE III: Another milestone series offers a wide range of capacities in superior compact, stylish, black themed and attractive furniture grade cabinets. Available in Upflow/ Downflow configuration to provide room-based cooling and perfect control of humidification and air filtration.

## GENERAL INFORMATION

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DB-Aire III units are precision environmental control systems that bring a new standard of compact, flexibility and reliable performance to the computer room. Because room requirements differ, DB-Aire III offers a wide range of sizes and styles.

### DB-AIRE III SYSTEMS

DBAIRE III comes in 3 systems; an air cooled DX, a chilled water coil and a dual coil system. The nominal capacity range is 3 to 32TR (10 to 110kW) of cooling.

### COMPUTER COMFORT

Computer rooms require air which is clean and properly distributed with precisely controlled temperatures and humidity. Building HVAC systems simply are not designed to meet these demands. But, DB-Aire III units easily accomplish these goals with top-rated efficiency, 24 hours per day 7 days a week! DB-Aire III units have been designed to meet the demanding requirements of the most advanced computer room.

Although building HVAC systems cool your staff, they fall short of your computer's comfort need. And they are unable to provide the close humidity control required in a modern data processing centre.

### DESIGN FEATURES

- Compact cabinet with anodized aluminum frame, stylish black powder coated panels of 25mm thickness with closed cell Polyethylene (PE) foam insulation.
- High efficiency VFD scroll compressor (Model 03-11) in single system and VFD + Fixed speed scroll compressor (Model 16-32) in dual system with

rotalock connection for ease of service (for air cooled DX systems).

- High-low pressure cutout to protect compressor (for air cooled DX systems).
- Specially built with non screw fixed panels where no special tools required, front access for easier service and maintenance.
- EC fan motor with high efficiency and variable speed modulation.
- Large faced area evaporator coil with hydrophilic fins.
- Deep pleated disposable filter of MERV 7 (Ashrae 52.2).
- Stainless steel finned tabular type electric heater.
- 3-way modulating valve provides accurate temperature control and dehumidification (for Chilled Water Systems).
- Integrated control system within the unit with panel mounting 4.3" graphical color touch screen for temperature/ humidity/alarm control and monitoring.
- Vision 2020i connectivity to BMS for telemonitoring.
- Electronic Expansion Valve (EEV) for efficient capacity modulation and improved performance.
- Hot Gas Reheat for air cooled DX systems (optional).
- Supply air plenum box for upflow model.
- Steam generator humidifier (optional).
- Floor water detection alarm (optional).

### HIGH PERFORMANCE LOW COST

DB-Aire III has been designed with premium features, a lavish look and advanced technology. It is undeniably a neat package with a competitive price.

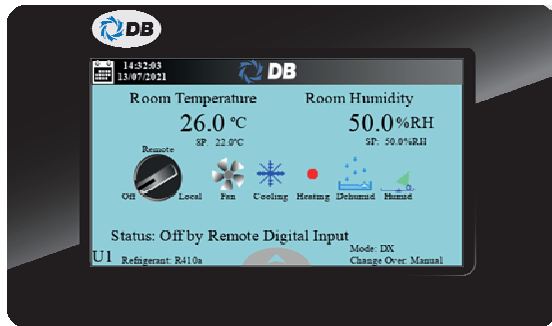
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# DB-AIRE III MONITORING/ CONTROL



## DB5+ VISION 2020i CONTROLLER

The Vision2020i is a microprocessor-based, programmable electronic controller come with DBGX terminal and optional remote management devices. These devices represent a powerful control system that can be easily interfaced with most Building Management Systems (BMS) available on the market. The Vision2020i controller has been developed by Dunham-Bush to provide solutions to precision air-conditioning in general. In a DBLAN network (Vision2020i Local Area Network) the Vision2020i can be performed as master and slave by connecting to other Vision2020i controllers. Up to 16 devices (DB5+ controllers and DBGX terminals) can be connected together, allowing highly efficient sharing of information. Each device in the DBLAN network can exchange digital or analogue data with all the others.

## DBGX 4.3" COLOR TOUCH SCREEN TERMINAL

The DBGX 4.3" graphic terminal is part of the family of touch screen terminals designed to simplify user interface with the Vision 2020i family for Dunham-Bush's application. The electronic technology used and the new 65K color display means high quality images and advanced functions are available for a superior appearance. The touch screen panel makes interaction between the user and the unit much easier by simplifying navigation between the various screens.

## OPERATION

DBG5 touch screen panel makes interaction between the user and the unit much easier by simplifying navigation between the various screens. Touch keypad on the DBG5 panel allows unit on/off operation, menu selection, operational information, diagnostics, historical data and trend graph. Multi-level authorization password feature prevents unauthorized access. Another feature is that all menu programmed information for basic system operation and alarm parameters is stored in a non-volatile EEPROM and FLASH-MEMORY where backup battery is not required.

## PROGRAMMABLE FUNCTIONS/ MONITORING

The user-friendly touch screen color display permits step-by-step programming and display of the following functions:

- Temperature Set Point 10 to 50°C (50°F- 122°F)
- Temperature Sensitivity 0.5 to 2.7°C (1°F- 5 °F)
- Humidity Set Point (40% - 60% RH)
- Humidity Sensitivity (1% - 10% RH)
- Temperature Alarm Set points
- Humidity Alarm Set points
- Unit Start Time Delay

Normal functions are monitored and displayed on the display panel and include, in addition to the above set points, the following:

- Current Temperature (°C or °F)
- Current Humidity (%RH)
- Cooling Stages 1, 2 as applicable
- Heating Stages 1, 2, 3
- Humidification
- Dehumidification

## ALARMS

Alarm conditions are also monitored on the display panel and are enunciated by an audible alarm. The alarm silence button will quiet the audible alarm but the display will continue to indicate the alarm condition until the problem is corrected.

The following alarms are standard:

- Compressor High/Low Pressure
- High and Low Temperature
- High and Low Humidity
- No Airflow
- Filters Blocked
- Humidifier Failure
- Power Failure Restart
- Compressor Short Cycle
- Temperature Sensor Error
- Humidity Sensor Error
- Local Alarm Customer Input Alarm
- Maintenance Due

With add-on optional sensors, the following alarm status can be monitored:

- Under the floor water detection
- No water flows
- Smoke alarm and etc.

In addition, incompatible control settings will be identified on the display panel.

## HISTORICAL DATA

In order to facilitate maintenance and service, component run times for fan motor, compressor operation, reheat stages, humidification and dehumidification can be recalled and displayed on the DBG5 display panel. The current temperature and humidity, with the minimum and maximum readings for the last 24 hours of operation, can be recalled and displayed. The last ten alarms and hours since occurrence can also be recalled and displayed. The historical data base is stored in FLASH-MEMORY which does not require backup battery in the event of power failure.

## DIAGNOSTICS

Automatic and manual diagnostic sequences simplify troubleshooting.

# DB-AIRE III MONITORING/ CONTROL

## PROGRAMMING KEY

The programming keys for the Vision 2020i controllers provide easy software updates during both end-of production testing and maintenance procedures.



## VISION 2020i BMS COMMUNICATION INTERFACES (Optional)

As technology become smarter and more intelligent. The Vision2020i offer BMS interfacing to provide important data and control from control room. Therefore, end user can easily control their needs. The Vision2020i comes with Modbus RTU protocol (RS485 communication) as a standard on J25 BMS2 port. The Modbus protocol is the most widely-used protocol in BMS system. Its character being very simple to implement in all development packages and featuring limited use of the system's hardware & software resources. Below are the available communication interface features of the DB5+ controller:

### 1) Ethernet/BACnet TCPIP Card



The Ethernet/BACnet TCPIP Card offer protocol option of:

- 1.1 Modbus TCPIP. The Modbus protocol is the most widely-used protocol in BMS system. Its character being very simple to implement in all development packages and featuring limited use of the system's hardware & software resources.
- 1.2 BACnet IP. The protocol used of IP communication. The protocol based on the standards defined by US association ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers). Implementation of the standards is verified at BTL laboratories (BACnet Testing Laboratories) operated by the BACnet association.
- 1.3 SNMP (Simple Network Management Protocol). The protocol for IP networks defined by the Internet Architecture Board (IAB), in order to define commands used to exchange information between different devices over the network.

### 2) BACnet MS/TP Card



The BACnet MS/TP Card is the BACnet protocol used of RS485 communication. The protocol based on the standards defined by US association ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers). Implementation of the standards is verified at BTL laboratories (BACnet Testing Laboratories) operated by the BACnet association.

### 3) LONWORKS Card



The LONWORKS Card is the protocol that was Created by Echelon Corp. The LONWORKS is a leading networking solution for building automation. The communication is based on the FTT10 electrical standard.

### 4) Modbus RTU Card



The Modbus RTU (RS485 communication) Card is a second Modbus RTU protocol available to select.



# DB-AIRE III DESIGN FEATURES

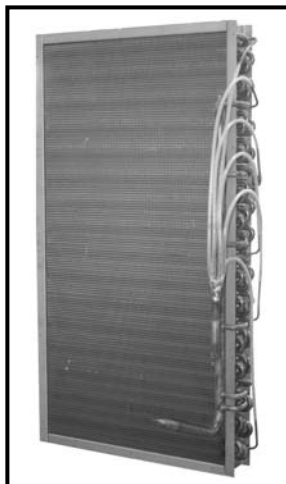
## FRAME AND CABINET



The cabinet comprises an anodized aluminium frame of epoxy powder coated black color paint with nylon corners and removable steel sheet panels. All panels shall be externally installed onto the cabinet by using special stopper system without using screws. The stopper system shall also facilitate removable panels for additional ease of field installation, service and maintenance on the system. All panels and access doors shall be fabricated from sturdy heavy gauge of 1.0mm steel sheets with epoxy powder coated oven baked black color paint to provide a durable finish. All panels shall be of 25mm (1 inch) thick single skin and lined with minimum 80kg/m<sup>3</sup> density thermal and acoustical closed cell Polyethylene (PE) foam insulation resistance of Class O (BS 476 Part 6, 7). The system shall be designed for front access only with hinged and lock type full height doors.

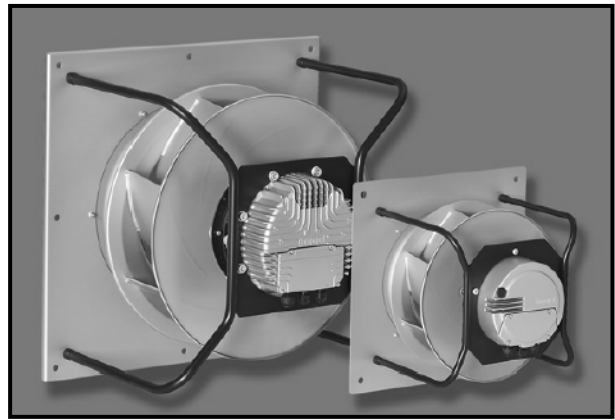
## COOLING COIL

Computer selected coil design, using interwoven coil surface increases unit efficiency at low loads. Air is drawn through the coil at low velocity providing effective surface exposure with minimum turbulence. This provides greater efficiency in the cooling and dehumidification process.



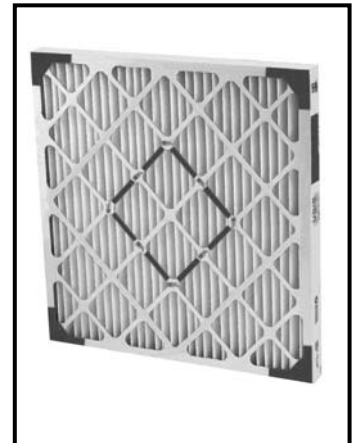
## FAN SECTION

The indoor unit are equipped with an electronically commutated (EC) plug fans to make sure the system are driven with 30% less energy compare to a conventional AC type. Capability to give higher part load efficiency due to the ability to precisely regulate the airflow according to the load demand makes an EC fan the right choice. The EC fan's impellers were welded with 7 backward curved blades made of aluminium to minimize the bearing load and at the same time maximizing the durability especially when work at high circumferential velocity.



## FILTERS

The system shall be provided with 2 inches (50mm) deep (for model 03-05) or 4 inches (100mm) deep (for model 09-32) extended surface pleated disposable type filters rated for MERV 7 efficiency to ASHRAE 52.2 standard. Filters shall be withdrawable from the front of the unit.



## ELECTRICAL REHEAT

The three stages stainless steel finned tubular reheat coils provide ample capacity to maintain room dry bulb conditions during a system call for dehumidification. Three equal stages give a more accurate controlled response to the requirements of the computer room. The heating elements are protected by thermal safety switches. The three stages of reheat create a noticeable lowering of energy use.

# DB-AIRE III DESIGN FEATURES

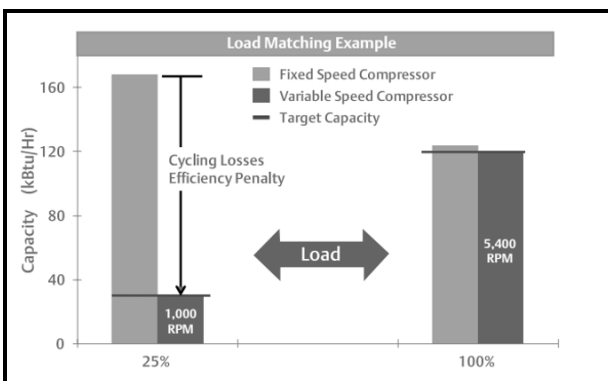
## COMPRESSOR



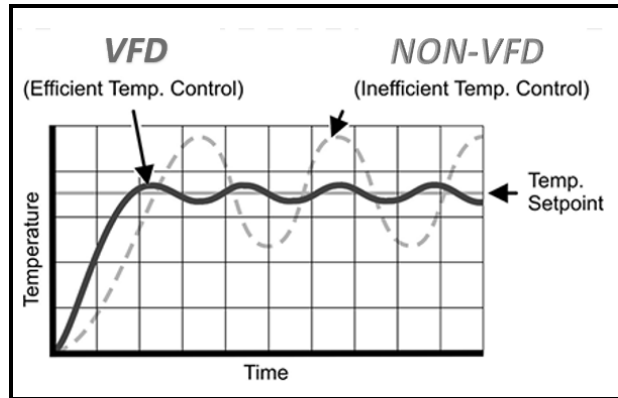
DB-Aire III offers the Variable Frequency Drive (VFD) compressor to satisfy the needs of high efficiency and low energy product. The capability to modulate the compressor speed will allow it to match the on-demand capacity while maintaining the optimum power usage. Significant energy saving can be expected during part load condition. The low start-up frequency is also contributing to the lower initial current peak that usually occur with conventional fix speed compressor.

The DB-Aire III dual compressors model, comes with a combination of one VFD and one fix speed compressor. At low load condition, one compressor will be stopped to allow a minimum energy usage.

VFD Advantage 1 – Precisely match the capacity demand thus optimize energy usage.



VFD Advantage 2 – Better temperature control compared to normal fix speed control.



## HOT GAS REHEAT (OPTIONAL)

The unit shall incorporate a hot gas reheat coil located downstream of the evaporator coil with modulating valve which is completely integrated to the unit's microprocessor control. For units with two refrigerant circuits, each circuit shall operate independently with its own modulating valve.

## HUMIDIFICATION (OPTIONAL)

The disposable cartridge electric steam generator humidifier provides humidification down stream of the cooling coil. The humidifier is designed to allow all units at any voltage to produce full rated steam output at an optimum low water level.

## ELECTRONIC EXPANSION VALVE (EEV)

The refrigerant circuit(s) shall be provided with an Electronic Expansion Valve (EEV) for evaporator to allow an efficient modulation control of refrigeration and consistent energy saving performances.

## DB-AIRE III HUMID INTERFACE

The DB-Aire III Humid interface allows the control of humidifiers directly from the DB-Aire III microprocessor controller.

## AIR COOLED SYSTEMS

A wide range of sizes of remote mounted air-cooled condensers are available from DB-Aire III in vertical discharge. Condensers are manufactured by DB-Aire III and include circuits sized to match the heat rejection of the corresponding compressors. The industrial duty design includes galvanised corrosion resistant housings, high efficiency aluminium finned (optional copper fins available), copper tube coils; coated fan guards, energy efficient thermally protected motors; and integral factory wired and tested control panel.

# PERFORMANCE AND TECHNICAL DATA

## AIR COOLED DX SYSTEM @ 35°C (95°F) AMBIENT TEMPERATURE - WITH OR WITHOUT HOT GAS REHEAT

MODEL			DBAD/U 03 DBRD/U 03	DBAD/U 05 DBRD/U 05	DBAD/U 09 DBRD/U 09	DBAD/U 11 DBRD/U 11	DBAD/U 14 DBRD/U 14	DBAD/U 16 DBRD/U 16	DBAD/U 19 DBRD/U 19	DBAD/U 22 DBRD/U 22	DBAD/U 26 DBRD/U 26	DBAD/U 29 DBRD/U 29	DBAD/U 32 DBRD/U 32	
Return Air 75F/62.5F/50% RH (24C/17C/50% RH)	Total Cooling Capacity	MBH (kW)	35.8 (10.5)	55.5 (16.3)	107.4 (31.5)	128.3 (37.6)	167.1 (49.0)	202.1 (59.2)	229.9 (67.4)	261.8 (76.7)	306.5 (89.8)	345.8 (101.3)	377.5 (110.6)	
	Sensible Cooling Capacity	MBH (kW)	33.0 (9.7)	51.6 (15.1)	102.3 (30.0)	121.1 (35.5)	148.5 (43.5)	178.3 (52.3)	219.4 (64.3)	233.7 (68.5)	268.6 (78.7)	314.2 (92.1)	354.4 (103.9)	
	Sensible Heat Ratio (SHR)		0.92	0.93	0.95	0.94	0.89	0.88	0.95	0.89	0.88	0.91	0.94	
Return Air 72F/60F/50% RH (22C/16C/50% RH)	Total Cooling Capacity	MBH (kW)	35.9 (10.5)	55.3 (16.2)	108.1 (31.7)	119.6 (35.1)	164.4 (48.2)	188.2 (55.2)	227.9 (66.8)	243.9 (71.5)	286.2 (83.9)	335.7 (98.4)	353.5 (103.6)	
	Sensible Cooling Capacity	MBH (kW)	33.2 (9.7)	51.2 (15.0)	101.5 (29.8)	109.9 (32.2)	139.5 (40.9)	171.6 (50.3)	218.0 (63.9)	224.9 (65.9)	262.6 (77.0)	294.1 (86.2)	346.6 (101.6)	
	Sensible Heat Ratio (SHR)		0.92	0.93	0.94	0.92	0.85	0.91	0.96	0.92	0.92	0.88	0.98	
Return Air 75F/52F Dew Point (24C/11C Dew Point)  Class 1 AHRI 1360 rating condition	Total Cooling Capacity	MBH (kW)	34.6 (10.1)	54.0 (15.8)	104.4 (30.6)	117.5 (34.4)	167.4 (49.1)	180.7 (53.0)	221.5 (64.9)	234.3 (68.7)	275.2 (80.7)	341.4 (100.1)	346.6 (101.6)	
	Sensible Cooling Capacity	MBH (kW)	33.4 (9.8)	52.3 (15.3)	102.4 (30.0)	117.5 (34.4)	150.6 (44.1)	175.1 (51.3)	221.5 (64.9)	226.6 (66.4)	264.3 (77.5)	318.4 (93.3)	346.6 (101.6)	
COMPRESSOR  VFD Compressor (Single)  VFD + Fix Compressor (Dual)	Number of Compressor(s)		1	1	1	1	2	2	2	2	2	2	2	
	Total Power Input (50Hz)	kW	2.4	4.1	8.6	9.0	13.9	14.6	18.7	18.2	23.4	30.0	28.1	
	Total Power Input (60Hz)	kW	2.6	4.3	8.8	9.2	14.1	15.4	19.2	19.1	24.4	31.0	28.0	
	Hot Gas; Liquid Lines, 50Hz	In	1/2 ; 3/8	1/2 ; 3/8	7/8 ; 5/8	7/8 ; 5/8	7/8 ; 5/8	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)
	Hot Gas; Liquid Lines, 60Hz	In	1/2 ; 3/8	1/2 ; 3/8	7/8 ; 5/8	7/8 ; 5/8	7/8 ; 5/8	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)	7/8(2) ; 5/8(2)
EC FAN  (INDOOR)	Fan Qty		1	1	1	2	2	2	2	2	3	3	3	
	Air Volume	CFM (m <sup>3</sup> /h)	1,500 (2,548)	2,500 (4,247)	5,000 (8,495)	6,000 (10,194)	8,000 (13,592)	10,000 (16,989)	11,000 (18,688)	11,000 (18,688)	13,000 (22,086)	15,000 (25,485)	18,000 (30,582)	
	ESP	in H <sub>2</sub> O (Pa)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	
	Fan Size OD	mm	355	355	500	355	355	500	500	500	500	500	500	
COIL (DX)	Face Area	ft <sup>2</sup> (m <sup>2</sup> )	5.6 (0.5)	5.6 (0.5)	12.2 (1.1)	12.2 (1.1)	23.9 (2.2)	23.9 (2.2)	23.9 (2.2)	23.9 (2.2)	23.9 (2.2)	33.1 (3.1)	33.1 (3.1)	
	Face Velocity	FPM (m/s)	270 (1.4)	450 (2.3)	409 (2.1)	491 (2.5)	335 (1.7)	419 (2.1)	461 (2.3)	461 (2.3)	544 (2.8)	453 (2.2)	544 (2.8)	
	Condensate Drain O.D	In	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	
FILTERS (ASHRAE 52.2 MERV 7)	20" x 20" x 2"	Qty	2	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	20" x 20" x 4"	Qty	N/A	N/A	4	4	6	6	6	6	6	4	4	
	20" x 25" x 4"	Qty	N/A	N/A	N/A	N/A	2	2	2	2	2	6	6	
REHEAT (Electric)	3-Stages (rated at 415V)	MBH (kW)	20.5 (6.0)	20.5 (6.0)	41.0 (12.0)	41.0 (12.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	
STEAM HUMIDIFIER (OPTIONAL)	Capacity (max.)	lbs/hr (kg/hr)	17 (8.0)	17 (8.0)	17 (8.0)	17 (8.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	
	Power Input (max.)	kW	6.0	6.0	6.0	6.0	11.3	11.3	11.3	11.3	11.3	11.3	11.3	
SOUND PRESSURE LEVEL (at 2m distance, free field, downflow)			dBA	61	57	60	62	65	68	73	74	70	72	



# PERFORMANCE AND TECHNICAL DATA

## CHILLED WATER SYSTEM @ WATER SUPPLY/ RETURN 7°C/ 12°C (44.6°F/ 53.6°F)

Model			DBCD/U 03	DBCD/U 05	DBCD/U 09	DBCD/U 11	DBCD/U 14	DBCD/U 16	DBCD/U 19	DBCD/U 22	DBCD/U 26	DBCD/U 29	DBCD/U 32	
<b>Return Air 75F/62.5F/50% RH (24C/17C/50% RH)</b>	Total Cooling Capacity	MBH (kW)	43.0 (12.6)	67.9 (19.9)	132.3 (38.8)	162.0 (47.5)	205.3 (60.2)	240.5 (70.5)	280.9 (82.3)	319.0 (93.5)	360.4 (105.6)	444.1 (130.2)	507.4 (148.7)	
	Sensible Cooling Capacity	MBH (kW)	37.1 (10.9)	61.0 (17.9)	118.6 (34.8)	145.3 (42.6)	184.9 (54.2)	221.9 (65.0)	255.5 (74.9)	277.1 (81.2)	318.1 (93.2)	385.7 (113.1)	448.3 (131.4)	
	Sensible Heat Ratio (SHR)		0.86	0.90	0.90	0.90	0.90	0.92	0.91	0.87	0.88	0.87	0.88	
	Water Flow Rate	GPM (m <sup>3</sup> /hr)	9.9 (2.2)	15.6 (3.5)	29.7 (6.7)	37.2 (8.4)	47.1 (10.7)	55.1 (12.5)	64.4 (14.6)	73.2 (16.6)	82.7 (18.8)	98.8 (22.4)	112.9 (25.6)	
	Water Pressure Drop	PSI (kPa)	5.5 (38.0)	2.7 (18.8)	10.1 (69.6)	4.1 (28.4)	2.3 (15.5)	3.0 (20.6)	2.7 (18.5)	6.5 (45.1)	8.1 (55.6)	6.9 (47.5)	8.7 (60.1)	
<b>Return Air 80°F/66.6°F/ 50% RH (26.6°C/19.2°C/ 50% RH)</b>	Total Cooling Capacity	MBH (kW)	64.1 (18.8)	98.8 (29.0)	188.4 (55.2)	235.2 (68.9)	300.5 (88.1)	351.2 (102.9)	409.2 (119.9)	461.3 (135.2)	520.7 (152.6)	602.1 (176.5)	687.4 (201.5)	
	Sensible Cooling Capacity	MBH (kW)	42.9 (12.6)	69.0 (20.2)	130.8 (38.3)	164.7 (48.3)	210.5 (61.7)	251.3 (73.7)	289.2 (84.8)	314.6 (92.2)	360.0 (105.5)	423.5 (124.1)	490.8 (143.8)	
	Sensible Heat Ratio (SHR)		0.67	0.70	0.69	0.70	0.70	0.72	0.71	0.68	0.69	0.70	0.71	
	Water Flow Rate	GPM (m <sup>3</sup> /hr)	14.3 (3.2)	22.0 (5.0)	41.9 (9.5)	52.3 (11.9)	66.8 (15.2)	78.1 (17.7)	91 (20.7)	102.6 (23.3)	115.8 (26.3)	134.0 (30.4)	152.9 (34.7)	
	Water Pressure Drop	PSI (kPa)	10.4 (71.4)	4.9 (34.1)	18.3 (125.8)	7.5 (51.7)	4.2 (28.7)	5.5 (37.7)	4.9 (34.1)	11.7 (81.0)	14.5 (99.8)	11.8 (81.3)	14.9 (102.8)	
<b>EC FAN (INDOOR)</b>	Fan Qty		1	1	1	2	2	2	2	2	3	3	4	
	Air Volume	CFM (m <sup>3</sup> /h)	1,500 (2,548)	2,500 (4,247)	5,000 (8,495)	6,000 (10,194)	8,000 (13,592)	10,000 (16,989)	11,000 (18,688)	11,000 (18,688)	13,000 (22,086)	15,000 (25,485)	18,000 (30,582)	
	External Static Pressure (ESP)	in H <sub>2</sub> O (Pa)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	1.5 (374)	
	Fan Size OD	mm	355	355	500	355	355	500	500	500	500	500	500	
<b>Coil (Chilled Water)</b>	Face Area	ft <sup>2</sup> (m <sup>2</sup> )	5.6 (0.5)	5.6 (0.5)	12.2 (1.1)	12.2 (1.1)	23.9 (2.2)	23.9 (2.2)	23.9 (2.2)	23.9 (2.2)	23.9 (2.2)	33.1 (3.1)	33.1 (3.1)	
	Face Velocity	FPM (m/s)	270 (1.4)	450 (2.3)	409 (2.1)	491 (2.5)	335 (1.7)	419 (2.1)	461 (2.3)	461 (2.3)	544 (2.8)	453 (2.2)	544 (2.8)	
	Condensate Drain O.D	Inch	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	
<b>Chilled Water Control</b>	3-Way Modulating Valve, Size	DN, mm	25	25	25	40	40	40	40	40	50	50	50	
		Kv, m <sup>3</sup> /h	10	10	10	16	16	16	16	16	25	25	25	
<b>Filters (ASHRAE 52.2 MERV 7)</b>	20" x 20" x 2"	Qty	2	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	20" x 20" x 4"	Qty	N/A	N/A	4	4	6	6	6	6	6	4	4	
	20" x 25" x 4"	Qty	N/A	N/A	N/A	N/A	2	2	2	2	2	6	6	
<b>Reheat (Electric)</b>	3-Stages (rated at 415V)	MBH (kW)	20.5 (6.0)	20.5 (6.0)	41.0 (12.0)	41.0 (12.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	61.4 (18.0)	
<b>Steam Humidifier (Optional)</b>	Capacity (max.)	lbs/hr (kg/hr)	17 (8.0)	17 (8.0)	17 (8.0)	17 (8.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	33 (15.0)	
	Power Input (max.)	kW	6.0	6.0	6.0	6.0	11.3	11.3	11.3	11.3	11.3	11.3	11.3	
<b>Sound Pressure Level (at 2m distance, free field, downflow)</b>			dBA	41	54	60	62	65	68	77	77	69	70	72

# DUAL COILS OPTION

## AIR COOLED DX & CHILLED WATER SYSTEMS

This system is a combination of both the Direct Expansion (DX) and Chilled Water (CW) system with 2 cooling coil. Cooling capacity and other parameters for DX and CW System are as stated on respective tables; except for the following.

Model	DBDD/U 03	DBDD/U 05	DBDD/U 09	DBDD/U 11	DBDD/U 14	DBDD/U 16	
Sound Pressure Level (at 2m distance, free field, downflow)	dBA	61	58	63	65	70	70

Model	DBDD/U 19	DBDD/U 22	DBDD/U 26	DBDD/U 29	DBDD/U 32	
Sound Pressure Level (at 2m distance, free field, downflow)	dBA	81	81	75	75	76

## CONDENSER SELECTION

Selections are to be based on standard airflow rate and return air temperature of 24°C / 17°C (75°F / 62.5°F) or lesser at sea level.

Model	DX-System	DBAD/U 03	DBAD/U 05	DBAD/U 09	DBAD/U 11	DBAD/U 14	DBAD/U 16
	Dual Coils System	DBDD/U 03	DBDD/U 05	DBDD/U 09	DBDD/U 11	DBDD/U 14	DBDD/U 16
	DX-System with Hot Gas Reheat	DBRD/U 03	DBRD/U 05	DBRD/U 09	DBRD/U 11	DBRD/U 14	DBRD/U 16
Total Heat Rejection (Nominal)	MBH (kW)	46 (14)	73 (21)	151 (44)	171 (50)	220 (64)	262 (77)
35°C (95°F) Ambient	-	DBRC04	DBRC06	DBRC10	DBRC13	DBRC17	DBRC20
37.8°C (100°F) Ambient	-	DBRC04	DBRC06	DBRC13	DBRC17	DBRC20	DBRC26
40.6°C (105°F) Ambient	-	DBRC06	DBRC08	DBRC17	DBRC20	DBRC26	DBRC26
43°C (110°F) Ambient	See Note 1	DBRC06	DBRC11	DBRC20	DBRC26	DBRC34	DBRC40
46°C (115°F) Ambient	See Note 1	DBRC11	DBRC17	DBRC34	DBRC40	DBRC44	DBRC30 x 2
49°C (120°F) Ambient	See Note 2	DBRC11	DBRC20	DBRC34	DBRC40	DBRC44	DBRC30 x 2
52°C (125°F) Ambient	See Note 3	DBRC13	DBRC26	DBRC40	DBRC44	DBRC26 x 2	DBRC30 x 2

Model	DX-System	DBAD/U 19	DBAD/U 22	DBAD/U 26	DBAD/U 29	DBAD/U 32
	Dual Coils System	DBDD/U 19	DBDD/U 22	DBDD/U 26	DBDD/U 29	DBDD/U 32
	DX-System with Hot Gas Reheat	DBRD/U 19	DBRD/U 22	DBRD/U 26	DBRD/U 29	DBRD/U 32
Total Heat Rejection (Nominal)	MBH (kW)	293 (86)	332 (97)	388 (114)	445 (130)	465 (136)
35°C (95°F) Ambient	-	DBRC20	DBRC26	DBRC30	DBRC34	DBRC34
37.8°C (100°F) Ambient	-	DBRC26	DBRC30	DBRC30	DBRC40	DBRC40
40.6°C (105°F) Ambient	-	DBRC34	DBRC34	DBRC34	DBRC44	DBRC44
43°C (110°F) Ambient	See Note 1	DBRC44	DBRC44	DBRC44	DBRC40 x 2	DBRC40 x 2
46°C (115°F) Ambient	See Note 1	DBRC30 x 2	DBRC40 x 2	DBRC40 x 2	DBRC40 x 2	DBRC40 x 2
49°C (120°F) Ambient	See Note 2	DBRC34 x 2	DBRC40 x 2	DBRC44 x 2	DBRC44 x 2	DBRC44 x 2
52°C (125°F) Ambient	See Note 3	DBRC34 x 2	DBRC44 x 2	DBRC44 x 2	DBRC44 x 2	DBRC44 x 2

Notes: 1.) Multiply Total Compressor Power Input by 1.05  
 2.) Multiply Cooling Capacity by 0.9. Multiply Total Compressor Power Input by 1.1  
 3.) Multiply Cooling Capacity by 0.9. Multiply Total Compressor Power Input by 1.2

# ELECTRICAL DATA

## AIR COOLED DX & CHILLED WATER SYSTEMS

### 1.) STANDARD - COOLING & ELECTRIC HEATERS

At 35°C (95°F) ambient; Return Air at 24°C/17°C/50 %RH (75°F/62.5°F/50 %RH)

Model	DBAD/U 03			DBAD/U 05			DBAD/U 09			DBAD/U 11			DBAD/U 14			DBAD/U 16		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	13.8	15	20	17.1	19	25	32.5	35.1	50	39.1	43	60	59.2	62	80	60.8	65	80
380V/ 3Ph/ 60Hz	13.8	15	20	17.1	19	25	32.5	35	50	39.1	43	60	59.1	62	80	61.2	66	80
460V/ 3Ph/ 60Hz	12.3	13	20	15.6	17	25	29.3	32	45	35.9	40	60	53.7	56	70	54.9	59	80

Model	DBAD/U 19			DBAD/U 22			DBAD/U 26			DBAD/U 29			DBAD/U 32		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	66.4	70	90	71.1	76	100	75.1	81	125	89.5	97	150	103.8	111	150
380V/ 3Ph/ 60Hz	64.9	69	80	73.5	79	100	78.5	85	110	94.0	102	150	103	111	150
460V/ 3Ph/ 60Hz	58.8	63	80	67	72	100	72	78	110	81.1	88	125	93.6	101	150

Return Air at 24°C/17°C/50 %RH (75°F/62.5°F/50 %RH)

Model	DBCD/U 03			DBCD/U 05			DBCD/U 09			DBCD/U 11			DBCD/U 14			DBCD/U 16		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	10.1	10	15	11.2	12	15	22.1	23	30	23.1	24	30	34.8	37	45	33.7	35	45
380V/ 3Ph/ 60Hz	10.1	10	15	11.2	12	15	22.1	23	30	23.1	24	30	34.8	37	45	33.7	35	40
460V/ 3Ph/ 60Hz	8.5	9	15	9.7	10	15	22.1	23	30	20	21	30	34.8	37	45	29	31	40

Model	DBCD/U 19			DBCD/U 22			DBCD/U 26			DBCD/U 29			DBCD/U 32		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	36.0	38	50	36.3	39	50	37.3	40	50	41.8	53	70	49.8	53	70
380V/ 3Ph/ 60Hz	36.0	38	45	36.3	39	45	37.3	40	45	41.8	45	60	49.8	53	60
460V/ 3Ph/ 60Hz	31.3	34	45	31.5	34	45	32.6	35	45	41.8	45	60	43.4	47	60

### 2.) STANDARD WITH OPTIONAL HUMIDIFIER

At 35°C (95°F) ambient; Return Air at 24°C/ 17°C/50 %RH (75°F/62.5°F/50 %RH)

Model	DBAD/U 03			DBAD/U 05			DBAD/U 09			DBAD/U 11			DBAD/U 14			DBAD/U 16		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	23.0	24	30	26.3	28	35	41.6	44	60	48.2	52	70	76.4	79	90	78.0	82	100
380V/ 3Ph/ 60Hz	23.0	24	25	26.3	28	35	41.6	44	60	48.2	52	70	76.3	79	90	78.4	83	100
460V/ 3Ph/ 60Hz	19.8	21	25	23.1	25	35	36.9	40	50	43.4	47	70	67.9	71	90	69.1	73	100

Model	DBAD/U 19			DBAD/U 22			DBAD/U 26			DBAD/U 29			DBAD/U 32		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	83.6	88	110	88.2	93	110	92.2	98	150	106.7	114	150	121.0	128	175
380V/ 3Ph/ 60Hz	82.1	86	100	90.7	96	110	95.6	102	125	111.1	120	150	120.2	128	150
460V/ 3Ph/ 60Hz	73.0	77	100	81.2	87	110	86.2	92	125	95.3	102	150	107.8	116	150

Note : RLA - Rated Load Amps

MCA - Minimum Circuit Amps

MFS - Maximum Fuse Size

Return Air at 24°C/17°C/50 %RH (75°F/62.5°F/50 %RH)

Model	DBCD/U 03			DBCD/U 05			DBCD/U 09			DBCD/U 11			DBCD/U 14			DBCD/U 16		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	19.2	19	20	20.4	21	25	31.2	32	40	32.2	33	40	52.0	54	70	50.9	52	60
380V/ 3Ph/ 60Hz	19.2	19	20	20.4	21	20	31.2	32	40	32.2	34	35	52.0	54	70	50.9	53	60
460V/ 3Ph/ 60Hz	16.0	16	20	17.2	18	20	29.6	31	35	27.5	29	35	49.0	51	60	43.1	45	60

Model	DBCD/U 19			DBCD/U 22			DBCD/U 26			DBCD/U 29			DBCD/U 32		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	53.2	55	70	53.5	56	70	54.5	57	70	59.0	63	80	67.0	70	90
380V/ 3Ph/ 60Hz	53.2	55	60	53.5	56	60	54.5	57	60	59.0	63	80	67.0	70	80
460V/ 3Ph/ 60Hz	45.5	48	60	45.7	48	60	46.8	49	60	56.0	60	80	57.6	61	80

# ELECTRICAL DATA

## AIR COOLED DUAL COILS (DX + CW) & DX WITH HOT GAS REHEAT SYSTEMS

### 1.) STANDARD - COOLING & ELECTRIC HEATERS

At 35°C (95°F) ambient; Return Air at 24°C/17°C/50 %RH (75°F/62.5°F/ 50 %RH)

Model	DBDD/U 03				DBDD/U 05				DBDD/U 09				DBDD/U 11				DBDD/U 14				DBDD/U 16			
	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS
380-415V/ 3Ph/ 50Hz	14.0	10.2	15	20	17.3	11.3	19	25	32.5	22.1	35	50	40.1	24.0	44	60	59.2	34.8	62	80	61.7	34.4	66	90
380V/ 3Ph/ 60Hz	14.0	10.2	15	20	17.3	11.3	19	25	32.5	22.1	35	50	40.1	24.0	44	60	59.1	34.8	62	80	62.2	34.4	84	80
460V/ 3Ph/ 60Hz	12.4	8.6	13	20	15.7	9.7	17	25	29.3	18.9	32	45	36.9	20.8	41	60	53.7	30.1	56	70	55.9	29.7	60	80

Model	DBDD/U 19				DBDD/U 22				DBDD/U 26				DBDD/U 29				DBDD/U 32							
	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS
380-415V/ 3Ph/ 50Hz	68.9	37.6	73	90	73.8	37.8	79	100	77.8	40.0	83	110	89.5	53.3	115	150	107.5	53.3	115	150				
380V/ 3Ph/ 60Hz	67.4	37.6	71	80	76.2	37.8	82	100	81.2	40.0	87	110	94.0	41.8	102	150	106.7	53.3	114	150				
460V/ 3Ph/ 60Hz	61.2	32.8	65	80	69.8	33.1	75	100	74.7	35.2	81	110	81.1	37.1	88	125	97.2	47.0	105	150				

### 2.) STANDARD WITH OPTIONAL HUMIDIFIER

At 35°C (95°F) ambient; Return Air at 24°C/17°C/50 %RH (75°F/62.5°F/ 50 %RH)

Model	DBDD/U 03				DBDD/U 05				DBDD/U 09				DBDD/U 11				DBDD/U 14				DBDD/U 16			
	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS
380-415V/ 3Ph/ 50Hz	23.1	19.3	24	30	26.4	20.4	28	35	41.6	31.2	44	60	49.2	33.1	53	70	76.4	52.0	79	90	78.9	51.6	83	100
380V/ 3Ph/ 60Hz	23.1	19.3	24	30	26.4	20.4	28	35	41.6	31.2	44	60	49.2	33.1	53	70	76.3	52.0	79	90	79.4	51.6	84	100
460V/ 3Ph/ 60Hz	19.9	16.1	21	30	23.2	17.3	25	35	36.9	26.4	40	50	44.4	28.4	49	70	67.9	44.2	71	90	70.0	43.9	74	100

Model	DBDD/U 19				DBDD/U 22				DBDD/U 26				DBDD/U 29				DBDD/U 32							
	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS	RLA (DX)	RLA (CHW)	MCA	MFS
380-415V/ 3Ph/ 50Hz	86.1	54.8	90	110	91.0	55.0	96	125	95.0	57.1	101	125	106.7	59.0	114	150	124.6	70.5	132	175				
380V/ 3Ph/ 60Hz	84.6	54.8	88	100	93.4	55.0	99	110	98.4	57.1	104	125	111.1	59.0	119	150	123.8	70.5	132	150				
460V/ 3Ph/ 60Hz	75.4	47.0	79	100	83.9	47.3	89	110	88.9	49.4	95	125	95.3	51.2	102	150	111.4	61.1	119	150				

Note : RLA - Rated Load Amps

MCA - Minimum Circuit Amps

MFS - Maximum Fuse Size

### 3.) COOLING & HOT GAS REHEAT

At 35°C (95°F) ambient; Return Air at 24°C/17°C/50 %RH (75°F/62.5°F/ 50 %RH)

Model	DBRD/U 03			DBRD/U 05			DBRD/U 09			DBRD/U 11			DBRD/U 14			DBRD/U 16		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	5.0	6	15	7.7	9	20	14.3	17	30	20.1	24	45	31.9	35	50	33.6	38	60
380V/ 3Ph/ 60Hz	5.0	6	15	7.7	9	20	14.3	17	30	20.1	24	45	31.8	35	50	34.1	38	60
460V/ 3Ph/ 60Hz	5.0	6	15	7.7	9	20	14.3	17	30	20.1	24	45	31.1	34	45	32.5	37	60

Model	DBRD/U 19			DBRD/U 22			DBRD/U 26			DBRD/U 29			DBRD/U 32		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	37.9	42	60	42.6	48	70	48.9	55	80	62.2	73	110	65.9	73	110
380V/ 3Ph/ 60Hz	36.4	40	60	45.0	50	70	52.3	58	80	66.6	74	110	65.1	73	110
460V/ 3Ph/ 60Hz	35.0	39	60	43.3	49	70	50.6	57	80	58.5	65	100	62.0	70	110

### 4.) COOLING & HOT GAS REHEAT WITH OPTIONAL HUMIDIFIER

At 35°C (95°F) ambient; Return Air at 24°C/17°C/50 %RH (75°F/62.5°F/ 50 %RH)

Model	DBRD/U 03			DBRD/U 05			DBRD/U 09			DBRD/U 11			DBRD/U 14			DBRD/U 16		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	14.1	15	20	16.8	18	25	23.4	26	40	29.2	33	50	49.1	52	70	50.8	55	80
380V/ 3Ph/ 60Hz	14.1	15	20	16.8	18	25	23.4	26	40	29.2	33	50	49.0	52	70	51.2	56	80
460V/ 3Ph/ 60Hz	12.6	14	15	15.2	17	25	21.8	24	35	27.6	32	50	45.3	48	60	46.7	51	80

Model	DBRD/U 19			DBRD/U 22			DBRD/U 26			DBRD/U 29			DBRD/U 32		
	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS	RLA	MCA	MFS
380-415V/ 3Ph/ 50Hz	55.1	59	80	59.7	65	90	66.0	72	100	79.3	87	125	83.0	90	125
380V/ 3Ph/ 60Hz	53.6	57	80	62.1	67	90	69.4	75	100	83.8	92	125	82.2	90	125
460V/ 3Ph/ 60Hz	49.2	53	80	57.5	63	90	64.7	71	100	72.7	80	110	76.2	84	125

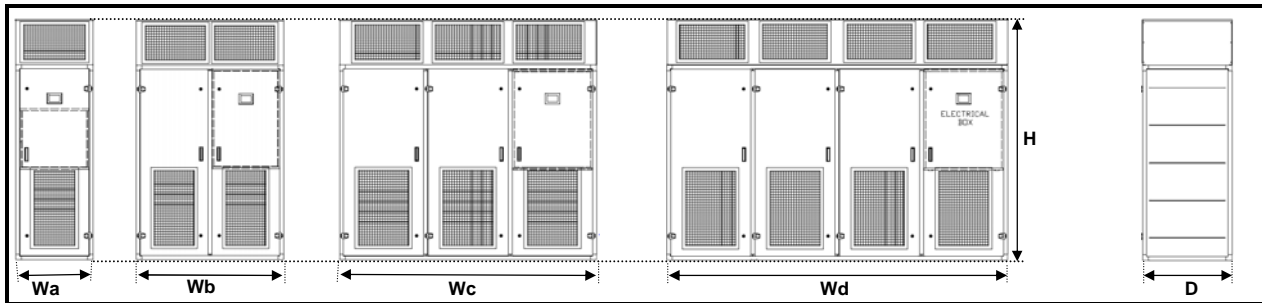
Note : RLA - Rated Load Amps

MCA - Minimum Circuit Amps

MFS - Maximum Fuse Size

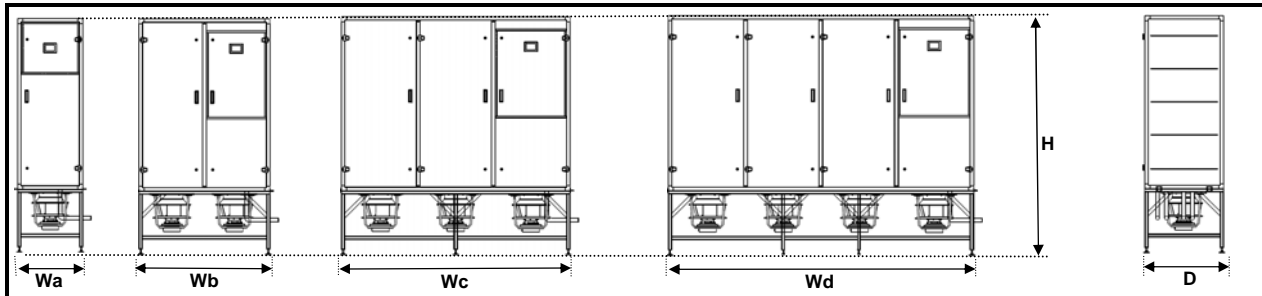
# DIMENSIONAL AND WEIGHT DATA

## UPFLOW



Model												Depth	Width			
DX System	Weight kg (lbs)	H, mm (inch)	CW System	Weight kg (lbs)	H, mm (inch)	Dual Coils System	Weight kg (lbs)	H, mm (inch)	DX with Hot Gas Reheat	Weight kg (lbs)	H, mm (inch)	D mm (inch)	Wa mm (inch)	Wb mm (inch)	Wc mm (inch)	Wd mm (inch)
DBAU03	278 (612)	2494 (98.2)	DBC03	246 (541)	2250 (88.6)	DBDU03	303 (667)	2494 (98.2)	DBRU03	292 (643)	2494 (98.2)	874 (34.4)	749 (29.5)			
DBAU05	282 (621)	2494 (98.2)	DBC05	263 (579)	2250 (88.6)	DBDU05	314 (692)	2494 (98.2)	DBRU05	296 (652)	2494 (98.2)	874 (34.4)	749 (29.5)			
DBAU09	472 (1039)	2250 (88.6)	DBC09	461 (1016)	2250 (88.6)	DBDU09	535 (1180)	2250 (88.6)	DBRU09	494 (1089)	2250 (88.6)	874 (34.4)		1464 (57.6)		
DBAU11	495 (1091)	2250 (88.6)	DBC11	468 (1032)	2250 (88.6)	DBDU11	558 (1230)	2250 (88.6)	DBRU11	517 (1139)	2250 (88.6)	874 (34.4)		1464 (57.6)		
DBAU14	791 (1742)	2250 (88.6)	DBC14	701 (1544)	2250 (88.6)	DBDU14	886 (1953)	2250 (88.6)	DBRU14	832 (1832)	2250 (88.6)	874 (34.4)			2554 (100.6)	
DBAU16	837 (1845)	2250 (88.6)	DBC16	735 (1619)	2250 (88.6)	DBDU16	932 (2056)	2250 (88.6)	DBRU16	878 (1935)	2250 (88.6)	874 (34.4)			2554 (100.6)	
DBAU19	836 (1843)	2250 (88.6)	DBC19	756 (1666)	2250 (88.6)	DBDU19	957 (2109)	2250 (88.6)	DBRU19	877 (1934)	2250 (88.6)	874 (34.4)			2554 (100.6)	
DBAU22	865 (1908)	2250 (88.6)	DBC22	769 (1694)	2250 (88.6)	DBDU22	986 (2174)	2250 (88.6)	DBRU22	906 (1998)	2250 (88.6)	874 (34.4)			2554 (100.6)	
DBAU26	920 (2027)	2250 (88.6)	DBC26	820 (1807)	2250 (88.6)	DBDU26	1042 (2297)	2250 (88.6)	DBRU26	961 (2118)	2250 (88.6)	874 (34.4)			2554 (100.6)	
DBAU29	1180 (2599)	2250 (88.6)	DBC29	1056 (2328)	2250 (88.6)	DBDU29	1298 (2859)	2250 (88.6)	DBRU29	1221 (2689)	2250 (88.6)	874 (34.4)				3394 (133.6)
DBAU32	1222 (2693)	2250 (88.6)	DBC32	1097 (2418)	2250 (88.6)	DBDU32	1340 (2953)	2250 (88.6)	DBRU32	1263 (2783)	2250 (88.6)	874 (34.4)				3394 (133.6)

## DOWNFLOW

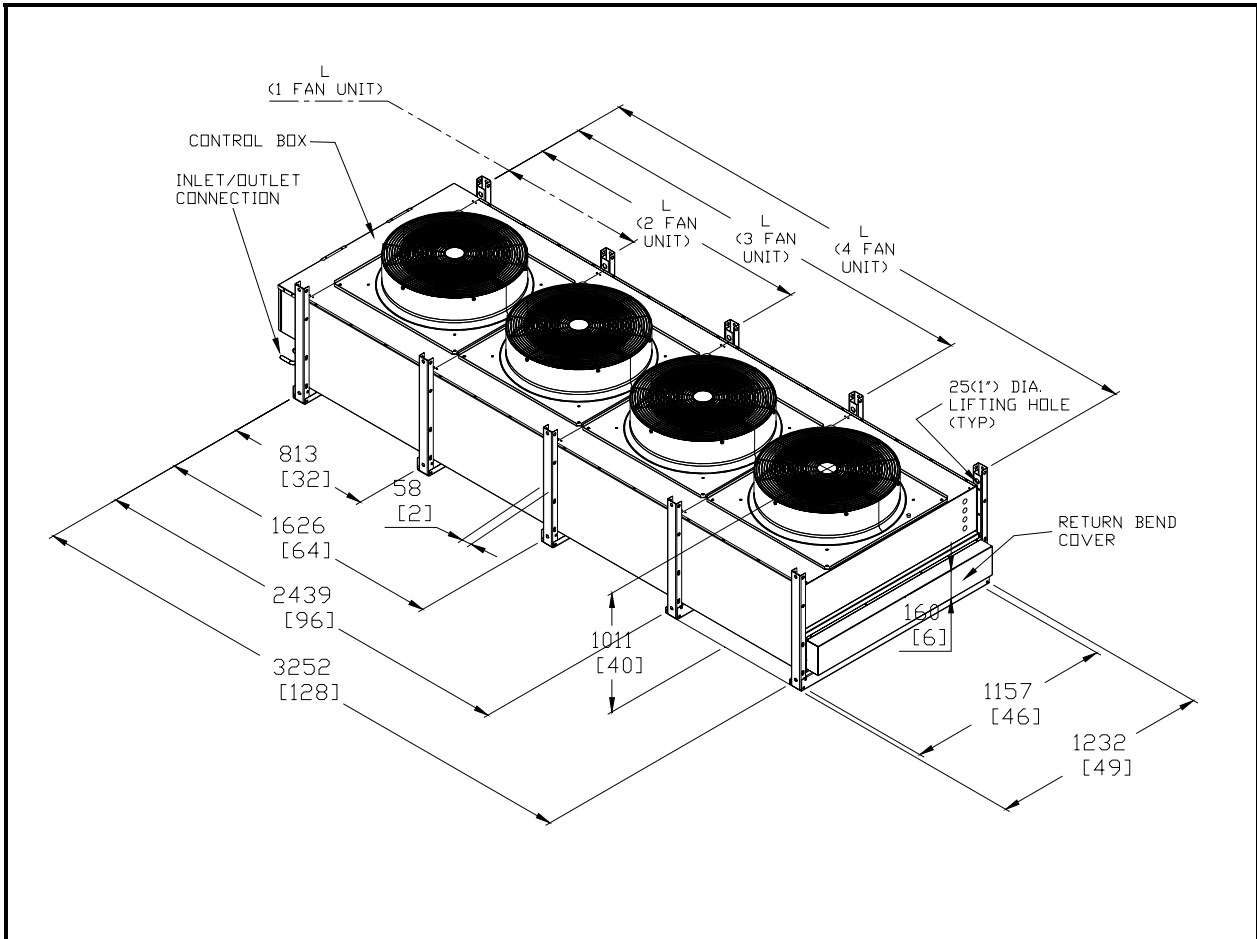


Model												Depth	Width			
DX System	Weight kg (lbs)	H, mm (inch)	CW System	Weight kg (lbs)	H, mm (inch)	Dual Coils System	Weight kg (lbs)	H, mm (inch)	DX with Hot Gas Reheat	Weight kg (lbs)	H, mm (inch)	D mm (inch)	Wa mm (inch)	Wb mm (inch)	Wc mm (inch)	Wd mm (inch)
DBAD03	258 (570)	2494 (98.2)	DBC03	226 (499)	2350 (92.5)	DBDD03	283 (625)	2494 (98.2)	DBRD03	272 (601)	2494 (98.2)	874 (34.4)	749 (29.5)			
DBAD05	262 (579)	2494 (98.2)	DBC05	243 (536)	2350 (92.5)	DBDD05	294 (649)	2494 (98.2)	DBRD05	276 (610)	2494 (98.2)	874 (34.4)	749 (29.5)			
DBAD09	441 (972)	2494 (98.2)	DBC09	430 (948)	2350 (92.5)	DBDD09	504 (1111)	2494 (98.2)	DBRD09	463 (1021)	2494 (98.2)	874 (34.4)		1464 (57.6)		
DBAD11	464 (1023)	2494 (98.2)	DBC11	437 (964)	2350 (92.5)	DBDD11	527 (1162)	2494 (98.2)	DBRD11	486 (1072)	2494 (98.2)	874 (34.4)		1464 (57.6)		
DBAD14	743 (1636)	2494 (98.2)	DBC14	653 (1438)	2350 (92.5)	DBDD14	838 (1847)	2494 (98.2)	DBRD14	784 (1726)	2494 (98.2)	874 (34.4)			2554 (100.6)	
DBAD16	789 (1739)	2494 (98.2)	DBC16	687 (1513)	2350 (92.5)	DBDD16	884 (1950)	2494 (98.2)	DBRD16	830 (1829)	2494 (98.2)	874 (34.4)			2554 (100.6)	
DBAD19	788 (1738)	2494 (98.2)	DBC19	708 (1560)	2350 (92.5)	DBDD19	909 (2003)	2494 (98.2)	DBRD19	829 (1828)	2494 (98.2)	874 (34.4)			2554 (100.6)	
DBAD22	817 (1802)	2494 (98.2)	DBC22	721 (1588)	2350 (92.5)	DBDD22	938 (2068)	2494 (98.2)	DBRD22	858 (1892)	2494 (98.2)	874 (34.4)			2554 (100.6)	
DBAD26	872 (1922)	2494 (98.2)	DBC26	772 (1701)	2350 (92.5)	DBDD26	994 (2191)	2494 (98.2)	DBRD26	913 (2012)	2494 (98.2)	874 (34.4)			2554 (100.6)	
DBAD29	1113 (2453)	2494 (98.2)	DBC29	990 (2182)	2350 (92.5)	DBDD29	1231 (2713)	2494 (98.2)	DBRD29	1154 (2543)	2494 (98.2)	874 (34.4)				3394 (133.6)
DBAD32	1155 (2547)	2494 (98.2)	DBC32	1031 (2272)	2350 (92.5)	DBDD32	1273 (2807)	2494 (98.2)	DBRD32	1196 (2637)	2494 (98.2)	874 (34.4)				3394 (133.6)

\*\*Model 16-22 is with 2 fans, model 26 is with 3 fans (Diagram only shows 3 fans)

# REMOTE AIR-COOLED CONDENSERS

## TECHNICAL DATA



Model	Physical Data				Electrical Data							
	Length 'L' mm (inches)	Fans		Approx. Weight kg (lbs)	Motor Qty	RPM		Motor FLA (3-Phase)				
		Qty	Total L/S (CFM)			50Hz	60Hz	380V 50Hz	400V 50Hz	415V 50Hz	460V 60Hz	208V-230V 60Hz
DBRC 04	870 (34¼)	1	3210 (6800)	100 (220)	1	925	1110	2	1.9	1.8	2.7	5.5
DBRC 06	870 (34¼)	1	3210 (6800)	111 (244)	1	925	1110	2	1.9	1.8	2.7	5.5
DBRC 08	870 (34¼)	1	3210 (6800)	122 (268)	1	925	1110	2	1.9	1.8	2.7	5.5
DBRC 10	870 (34¼)	1	3210 (6800)	134 (295)	1	925	1110	2	1.9	1.8	2.7	5.5
DBRC 11	870 (34¼)	1	3210 (6800)	180 (400)	1	925	1110	2	1.9	1.8	2.7	5.5
DBRC 13	1683 (66¼)	2	6420 (13600)	190 (420)	2	925	1110	4	3.8	3.6	5.4	11
DBRC 17	1683 (66¼)	2	6420 (13600)	204 (450)	2	925	1110	4	3.8	3.6	5.4	11
DBRC 20	1683 (66¼)	2	6420 (13600)	265 (583)	2	925	1110	4	3.8	3.6	5.4	11
DBRC 26	2500 (98¼)	3	9630 (20400)	288 (634)	3	925	1110	6	5.7	5.4	8.1	16.5
DBRC 30	2500 (98¼)	3	9630 (20400)	320 (700)	3	925	1110	6	5.7	5.4	8.1	16.5
DBRC 34	2500 (98¼)	3	9630 (20400)	355 (780)	3	925	1110	6	5.7	5.4	8.1	16.5
DBRC 40	3308 (130¼)	4	12838 (27200)	380 (835)	4	925	1110	8	7.6	7.2	10.8	22
DBRC 44	3308 (130¼)	4	12838 (27200)	410 (900)	4	925	1110	8	7.6	7.2	10.8	22

Note: All dimensions are in mm (inches).



# GUIDE SPECIFICATIONS

This specification describes requirements for precision air conditioning system. The system shall be designed to maintain precised temperature and humidity conditions for applications such as computer server rooms, telecommunication facilities, clean rooms, laboratories, etc. The precision environmental control system shall be factory assembled by Dunham-Bush Industries, Malaysia.

## DESIGN REQUIREMENTS

### (A) Direct Expansion (DX) System

- The system shall have a total cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW and a sensible cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW based on an entering air temperature of \_\_\_\_\_ °F / \_\_\_\_\_ °C DB and \_\_\_\_\_ °F / \_\_\_\_\_ °C WB.
- The system shall be designed based on \_\_\_\_\_ °F / \_\_\_\_\_ °C DB ambient temperature. For low ambient application, the system shall also be designed to operate at \_\_\_\_\_ °F / \_\_\_\_\_ °C DB ambient temperature.
- The unit shall be supplied with \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ (Volt/Phase/Hz) electrical service.
- The unit shall be of Upflow  / Downflow  configured model.

### (B) Chilled Water (CW) System

- The system shall have a total cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW and a sensible cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW based on an entering air temperature of \_\_\_\_\_ °F / \_\_\_\_\_ °C DB and \_\_\_\_\_ °F / \_\_\_\_\_ °C WB.
- The system shall be supplied with chilled water with an entering water temperature of \_\_\_\_\_ °F / \_\_\_\_\_ °C and leaving water temperature \_\_\_\_\_ °F / \_\_\_\_\_ °C.
- The unit shall be supplied with \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ (Volt/Phase/Hz) electrical service.
- The unit shall be of Upflow  / Downflow  configured model.

### (C) Dual Coils (DX + CW) System

- The system shall have a total cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW and a sensible cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW based on an entering air temperature of \_\_\_\_\_ °F / \_\_\_\_\_ °C DB and \_\_\_\_\_ °F / \_\_\_\_\_ °C WB.
- The DX system shall be designed based on \_\_\_\_\_ °F / \_\_\_\_\_ °C DB ambient temperature. For low ambient application, the system shall also be designed to operate at \_\_\_\_\_ °F / \_\_\_\_\_ °C DB ambient temperature.
- The CW system shall be supplied with chilled water with an entering water temperature of \_\_\_\_\_ °F / \_\_\_\_\_ °C and leaving water temperature \_\_\_\_\_ °F / \_\_\_\_\_ °C.
- The unit shall be supplied with \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ (Volt/Phase/Hz) electrical service.
- The unit shall be of Upflow  / Downflow  configured model.

### (D) Direct Expansion (DX) System with hot gas reheat

- The system shall have a total cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW and a sensible cooling capacity of \_\_\_\_\_ MBH / \_\_\_\_\_ kW based on an

entering air temperature of \_\_\_\_\_ °F / \_\_\_\_\_ °C DB and \_\_\_\_\_ °F / \_\_\_\_\_ °C WB.

- The system shall be designed based on \_\_\_\_\_ °F / \_\_\_\_\_ °C DB ambient temperature. For low ambient application, the system shall also be designed to operate at \_\_\_\_\_ °F / \_\_\_\_\_ °C DB ambient temperature.
- The unit shall be supplied with \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ (Volt/Phase/Hz) electrical service.
- The unit shall be of Upflow  / Downflow  configured model.

## 1 STANDARD FEATURES (ALL SYSTEMS, INDOOR UNIT)

### 1.1 Cabinet

The cabinet comprises an anodized aluminium frame of epoxy powder coated black color paint with nylon corners and removable steel sheet panels. All panels shall be externally installed onto the cabinet by using special stopper system without using screws. The stopper system shall also facilitate removable panels for additional ease of field installation, service and maintenance on the system. All panels and access doors shall be fabricated from sturdy heavy gauge of 1.0mm steel sheets with epoxy powder coated oven baked black color paint to provide a durable finish. All panels shall be of 25mm (1 inch) thick single skin and lined with minimum 2lbs/ft<sup>3</sup> density thermal and acoustical closed cell Polyethylene (PE) foam insulation with fire resistant of Class O (BS 476 Part 6, 7). The system shall be designed for front access only with hinged and lock type full height doors.

### 1.2 Filters

The system shall be provided with 2 inches (50mm) deep (for model 03-05) or 4 inches (100mm) deep (for model 09-32) extended surface pleated disposable type filters rated for MERV 7 efficiency to ASHRAE 52.2 standard. Filters shall be withdrawable from the front of the unit.

### 1.3 Fan Motor

The system are equipped with EC Fan Motor set for both upflow & downflow model.

### 1.4 Evaporator Air Discharge

#### 1.4.1 Up-Flow (Front Free Return)

The system shall be configured for up-flow pattern with front free evaporator return air and top evaporator air discharge. The system shall be supplied with grilles on the cabinet doors for front return air configuration. Up-flow systems are equipped with Discharge Plenum.

#### 1.4.2 Down-Flow (Top Free or Ducted Return)

The system shall be configured for down-flow pattern with top free or ducted evaporator return air and bottom evaporator air discharge through the raised floor.

### 1.5 Electric Reheat or Hot Gas Reheat

#### 1.5.1 For Direct Expansion (DX) System, Chilled Water (CW) System and Dual Coils (DX+CW) System only.

The electric reheat shall be factory installed low watt density finned-tubular nickel plated element heater with overheat safety controls. The electric reheat shall be of three equal stages

# GUIDE SPECIFICATIONS

giving a more accurate controlled response to the room requirement.

## 1.5.2 For Direct Expansion (DX) System with Hot Gas Reheat only

The unit shall incorporate a hot gas reheat coil located downstream of the evaporator coil with modulating valve which is completely integrated to the unit's microprocessor control. For units with two refrigerant circuits, each circuit shall operate independently with its own modulating valve.

## 1.6 Electrical Circuits

The system shall be provided with a factory installed electrical enclosure as per local code requirements. Control voltage of the system shall be 24Vac. The fan motor(s), compressor(s), electric heaters, humidifier (if applicable) shall have their own circuit breaker and contactor. The electrical circuit shall have provision for user to cut off control power during fire / emergency shutdown

## 1.7 Control System – Vision 2020i Controller

### 1.7.1 Controller and display

The unit shall be provided with Vision 2020i control system with the following features,

- The control algorithm and parameters shall be stored in flash memory and E<sup>2</sup>PROM of the controller and shall retain even in the event of power failures, without requiring a backup battery
- 4.3" graphical touch terminal with 65k color display
- Built in memory for data logging
- Temperature and humidity controlled
- Configurable by user
- Alarm status/display
- Analog input/output display
- Digital input/output status
- Remote start/stop input
- Digital input for customer input alarm
- General alarm output (dry contact)
- Self-diagnostics
- Security password access with multiple access level for advanced settings
- Unit status display with following information:
  - Current room temperature and temperature setpoint
  - Current room relative humidity and relative humidity setpoint
  - System ON/OFF
  - Operating mode (cooling/ heating/ humidifying/ dehumidifying)

### 1.7.2 Alarm Monitoring

When the system is in alarm condition, the system shall activate an audible buzzer and visual alarm message on the terminal display. A digital output (dry contact) shall be closed to indicate the alarm condition. The following alarm conditions shall be monitored by the controller:

- High room temperature
- Low room temperature
- High supply air temperature
- High room humidity
- Low room humidity
- No air flow/loss of air flow

- Filter dirty
- Sensor failure
- Evaporator fan overload alarm
- Customer interlock alarm
- Unit/ Compressor running hours threshold exceeded
- LAN network disconnected alarm
- High/Low refrigerant pressure alarm (DX models)
- Chilled water flow switch alarm (chilled water models)
- Humidity Alarms
- Under floor water detector alarm (optional)
- Smoke detector alarm (optional)

### 1.7.3 Master-Slave Sequencing Control

When more than one unit is present in the system, master-slave or duty-standby control of this group of units shall be done by just connecting controller of each unit in serial and require no additional controller.

### 1.7.4 BMS communications and remote monitoring

ModBus RTU RS485 communication port shall be a standard feature of the controller. On top of that, the following options shall be available for BMS communications and remote monitoring:

- ModBus TCP/IP
- BACnet TCP/IP / PTP / MSTP
- LONworks
- GSM Modem
- SNMP

## 2 DIRECT EXPANSION (DX) SPLIT SYSTEMS WITH REMOTE OUTDOOR AIR COOLED CONDENSER (DBRC MODELS)

### 2.1 Compressor

The VFD compressor body shall be fully hermetic sealed, scroll type vapor compression & utilize three-phase brushless permanent magnet (BPM) motors with positive displacement oil pump. It shall be supplied with a compatible driver and this driver shall convert the input supply voltage frequency into a variable frequency, depending on the needs. The compressor shall be mounted on the base via vibration isolators and shall be charged with polyolester oil and designed for use with R410A refrigerant. Crankcase heater shall be provided externally to protect compressor from being damaged due to refrigerant migration during off cycle.

Same goes for the fix speed & digital scroll compressor except that they do not need to have a driver. They shall use direct power supply.

Additionally for digital scroll compressor, it shall come with accessories such as modulating valve, discharge temperature sensor & controller to modulate the supply load.

These compressors shall be able to operate in ambient as high as 125°F (with bigger Condensing unit) and as low as 66°F. Lower than that, it shall be supported with the using of Low Ambient Kit.

### 2.2 Refrigeration Circuits

The refrigeration system shall be of the direct expansion type with one (Model 03-11) or two (Model 16-32) hermetic scroll compressors complete with

# GUIDE SPECIFICATIONS

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rotalock connections. All refrigeration circuit shall be pre-piped with copper tubing and include expansion valve with external equalizer, filter dryer, sight glass, refrigerant service valves, pressure fittings of manual reset high pressure control/auto reset low pressure safety cutouts and charging/access ports in each circuit.

## 2.3 Evaporator Coil

The evaporator coil shall be of draw through air design for uniform air distribution. The evaporator coil shall be a quality construction of seamless copper tube, mechanically bonded to hydrophilic aluminium fins with galvanized coil plates. The coil shall be factory leak and pressure tested to 650psig (45 bar) for R410A system and the refrigeration system shall be sealed prior to shipment. A galvanized and painted drain pan shall be provided to cover the entire coil area. The drain pan shall be designed to incorporate sloped gutter for complete condensate removal.

## 2.4 Remote Outdoor Air Cooled Condenser (DBRC Models)

The remote condenser shall be constructed from sturdy heavy gauge steel sheets with epoxy powder coated oven baked, factory standard beige color to provide a durable finish.

The remote condenser shall include direct driven propeller fans, condenser coil, fan guard, thermally protected rated IP55 motors, integral factory wired and tested control panel. The condenser coil shall be quality construction of seamless copper tube, mechanically bonded to aluminium fins with galvanized coil plates. The coil shall be factory leak and pressure tested to 650psig (45 bar) for R410A system and the refrigeration system shall be sealed prior to shipment.

The evaporator and condenser sections shall ship with a dry-nitrogen holding charge ready for field refrigerant charging.

## 3 CHILLED WATER (CW) SYSTEMS

### 3.1 Chilled Water Coil

The evaporator coil shall be of draw through air design for uniform air distribution. The chilled water coil shall be quality construction of seamless copper tube, mechanically bonded to hydrophilic aluminium fins with galvanized coil plates. The coil shall be factory leak and pressure tested to 450psig (31 bar) and sealed prior to shipment. Copper pipe for brazed connection shall be provided as standard. A galvanized and painted drain pan shall be provided to cover the entire coil area. The drain pan shall be designed to incorporate sloped gutter for complete condensate removal.

### 3.2 Chilled Water Control

The water circuit shall include 3-way forged brass valve and modulating actuators. The microprocessor positions the valve in response to room condition. Cooling capacity shall be controlled by bypassing chilled water around the coil.

## 4 OPTIONS

### 4.1 Stainless Steel Drain Pan

A stainless steel condensate drain pan shall be provided for the evaporator/chilled water coil in lieu of standard galvanized and painted drain pan.

### 4.2 Discharge Plenum (Up-flow Units only)

A discharge plenum box shall be provided for field installation on the top of the up-flow unit. The plenum box shall be 18 inches (457mm) high, insulated and painted to match the color of the indoor unit. The plenum box shall be fitted with double deflection grilles for room discharge of conditioned air.

### 4.3 Steam Generating Humidifier

Humidifier shall be factory installed inside the unit. The humidification system shall be an electrode cylinder type, complete with fill valve, drain valve, adjustable humidity output and automatic flush cycle activated on demand from the microprocessor control system.

### 4.4 Hot Gas Bypass (DX Systems only)

The refrigerant circuit(s) shall be provided with a hot gas bypass system for evaporator freeze-protection and capacity modulation during low load conditions.

### 4.5 Liquid Line Solenoid Valve (DX Systems only)

A factory fitted liquid line solenoid valve shall be provided for each refrigeration circuit as an option.

### 4.6 Double Skin Panels

All panels shall be provided with galvanized internal skin.

### 4.7 Hydrophilic or Copper Fin for Condenser Coil (DBRC)

Condenser coils shall be provided with hydrophilic or copper fins in lieu of aluminium.

### 4.8 Black Color Epoxy Powder Coating for Remote Condenser (DBRC)

The remote condenser DBRC shall be epoxy powder coated oven baked black color paint in lieu of standard beige color.

### 4.9 Under Floor Water Detector

A remote water leak detector shall be factory provided for field installation. When water leak is detected, cooling mode of the unit is off.

### 4.10 Smoke Detector

A smoke detector shall be supplied loose for remote mounting. The unit shall shut down when smoke alarm is triggered.

### 4.12 BMS communication cards

BMS communication card shall be factory installed to enable high level interfacing with BMS system. ModBus, BACnet, LONworks, SNMP communication protocols shall be available as option.

### 4.13 Low Ambient Kit

Fan cycling for better performance during low ambient.



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