BOREAS

DC Pro

PRECISION AIR CONDITIONER

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INTRODUCTION

Cooling data centers and other critical environments is a taxing task which can have constantly varying requirements. Boreas' innovative DC Pro DX series comprising a total of 11 models with cooling capacities ranging from 8-82 kW rise up to this challenge by providing uninterrupted system security with a focus on energy efficiency. Selecting the right type of cooling system is one of the most critical decisions in data center design. For preventing malfunctions and extending the useful life of IT equipment, expulsion of the heat manufactured by such devices out of data centers is of critical importance. These units that are widely known as Precision Air Conditioning (PAC) Control Units and Computer Room Air Conditioning (CRAC) Units have been designed for environments such as system rooms, data centers, and telecommunication centers, where maintaining temperature and humidity at the required levels is of critical importance.

NOMENCLATURE

The following nomenclature is used for selecting products from the standard DC Pro series. The nomenclature identifies all specifications of the product. Products that are offered on an optional basis in accordance with the specific precision air conditioning unit shall be actively selected. A DX model product has been chosen to demonstrate an example of nomenclature. The name that is created for a product with a capacity of 26 kW, with top suction and bottom discharge, for which electrical heater and steam humidifier options have not been selected, with a standard constant speed compressor, with G4 panel filter, with EC plug fan, and 400V/3ph/50hz electrical supply is the following:

DCPro-DX-26-UD00FG4EP1

Series	DCPro											DCPro
Model	DX(1)						CW(2)					DX
Capacity(1)	08	14	26	35	46	52	36	49	58	67	82	26
Capacity(2)	10		17		35		45		65	85	120	
Intake Direction	D (From the Bottom)			U (From the Top)			F (From the Front)					U
Discharge Direction	D (From the Bottom)			U (From the Top)			F (From the Front)					D
Electrical Heater	1 (Standard)						0 (Not installed)					0
Steam Humidifier	1 (Standard)						0 (Not installed)					0
Compressor Type(1)	F (Constant Speed)			I (Inverter)			IF (Constant + Inverter)					F
Valve Type(2)	0 (Not Installed)			2 (2-Way Proportional Valve)			3 (3-Way Proportional Valve)					
Filter Type	G4											G4
Indoor Unit Fan Type	EC Plug											E
Electrical Supply	P1 (400V/3ph/50hz)						P2 (460V/3ph/60hz)					P1

(1) Applies to selections made for DX models.
(2) Applies to selections made for CW models.

COMPONENTS

1. Casing

The casing is manufactured of aluminum material. Service doors and closure panels are manufactured of 1 mm galvanized sheet material and then treated with an electrostatic powder paint coating with code RAL9002 paint. The number of service doors and closure panels are increased by using joints depending on capacity in order to increase casing strength.

2. Compressors

a. Constant Speed Compressor

Constant speed scroll compressors which can reach high cooling capacities for little energy are compatible with operation with low GWP refrigerants. They are used as standard equipment in DCPro series units with a single refrigerant circuit. They are capable of operating effectively during changing outdoor temperatures thanks to its wide range.

Figure 1.
Constant Speed Compressor

b. Variable Speed Compressor

Variable speed control makes it possible to adjust operating frequency according to cooling requirement of the room. This makes it possible to provide only the required cooling capacity while saving energy and to maintain room return air temperatures at the fixed value without any fluctuations. The unit is compatible with operation with low GWP refrigerants. They are used as standard equipment in DCPro series units with double refrigerant circuits.

Figure 2.
Compressor with Inverter Control

3. Fan

a. Indoor Unit Fan Group

Plug fans manufactured of high performance composite material and equipped with EC motor technology meet high pressure and high air flow rate requirements in an optimum fashion by virtue of their special blade design. The special design of blades minimizes the operating nose of the fan, enabling the DCPro series to operate quite silently. The rotation speed information can be proportionally adjusted from the control panel according to the cooling requirement. The unit can operate at ambient temperatures ranging from -20 to +40 °C. It can facilitate substantial reduction in annual power consumption by virtue of its fan efficiency of up to 70%.

Figure 3.
Plug Fans Equipped with EC Motors

b. Outdoor Unit Fan Group

Axial fans are used. They facilitate fairly silent operation thanks to their special blade design. They can be proportionally adjusted from the control panel for a constant high pressure value, depending on the capacity needed at variable outdoor temperatures. For winter conditions, the speed of rotation slows considerably or stops depending on requirements. This prevents frost from occurring on the outdoor unit. In the event that the temperature exceeds the required design temperature during summer, the unit raises the speed of rotation even further, enabling the compressor to operate more efficiently. The unit can operate at ambient temperatures ranging from -35 to +70 °C.

Figure 4.
Axial Fans Equipped with EC Motors

4. Evaporator and Condenser

The evaporator and condenser are manufactured with copper tubes and aluminum fins. Fin spacing is between 1.8 and 2.5 mm. Fins are treated with hydrophilic coating to combat condensation that can occur on the evaporator. The droplets of condensed water drain down from the hydrophilic coated fins to the drain pan manufactured of stainless steel material that is found at the bottom of the evaporator. Copper tubes are manufactured to increase turbulence during the flow of refrigerant inside the tube, thus increasing the efficiency of heat transfer by making sure the refrigerant comes into contact with the entire internal surface of the tube. Fin spacing is between 2.1 and 2.5 mm in the condenser coil. Fins are epoxy coated to prevent corrosion that can occur due to the outside environment.

Figure 5.
DX Coil

5. Filter

ePM10 panel filters conforming to the EN ISO 16890 standard are used, and have an average efficiency of 80% to 90%. Casettes are manufactured from galvanized steel sheet as a standard for the DCPro series. The flame resistance of the filter medium is class F1 according to the DIN 53438 standard. Maximum operating temperatures can reach +70 °C.

Figure 6.
G4 Galvanized Cassette Filter

6. Electronic Expansion Valve

The electronic expansion valve that is commanded from the automation panel can adjust its aperture precisely according to the operating speed of the compressor. By keeping the superheat value fixed at the set value by virtue of its capability to provide the adequate amount of gas charge into the evaporator, the valve ensures that the refrigerant is fully vaporized inside the evaporator. It prevents flow back of liquid phase refrigerant to the compressor and minimizes the chances of compressor malfunctions.

Figure 7.
Electronic Expansion Valve

7. Electrical and Control Panel

All internal equipment is commanded from a single point via the PLC controlled automation system. The unit operation is managed by connecting the following equipment to the control system.

- Discharge Air Temperature and Humidity Sensor
- Return Air Temperature and Humidity Sensor
- Pressure Differential Sensor (Discharge Fan)
- High Pressure Sensor
- Low Pressure Sensor
- High/Low Pressure Switches
- Differential Pressure Switch (For filter dirtiness information)
- High Temperature Thermostat (For the electrical heater option)
- Water Leakage Detector
- Energy Analyzer (Optional)
- ATS (Optional)
- Steam humidifier control card (Optional)
- Gas circuit temperature circuit

12 Digital Inputs

- 10 24 Vac/dc
- 2 High Speed Counter (2 kHz)

12 Digital Outputs

- 2 SPDT Relay 1 A
- 3 SPST 3 A with the same common
- 3 SPST 3 A with the same common
- 2 SPST 3 A with the same common
- 2 SPST 3 A with independent common

12 Analogue Inputs

Configurable by pair

- 12 NTC or PT1000 (-100°C to 400°C
- or PTC
- or 0-20 mA or 0–10 V
- or Digital Input

6 Analogue Outputs

- 2 0-10 V or 4-20 mA
- 4 0-10 V

The control system provides the required cooling capacity by controlling the air flow rate generated by the fan based on the return air temperature. Two constant rpm compressors are controlled in DX systems with that have a a single circuit while one compressor with a frequency driver and one compressor with a constant rpm are controlled in DX systems with dual circuits. In order to protect the DX system, the compressors are disabled until the discharge fan is in operation and the DX circuit is protected by means of low/high pressure sensors/switches.

If there is more than one unit which needs to be operated with redundancy in a single space, the units are operated sequentially by communicating with each other and co-aging the units.

By using redundant systems on panels as an option, power supply to the PLC is not interrupted and the unit continues to transmit information in case of power outage.

a. Touch Screen

Operating information of the unit can be read off the touch screen located on the front cover. The unit is turned on/off from the touch screen.
The discharge temperature and relative humidity, return air temperature ad relative humidity of the room, air flow rate, fan operating information and alarm information are displayed on the main menu.

The 1st screen of the monitoring menu displays the name of the DCPro model, power consumption, fan operating information and the discharge and return temperature information.

The 2nd screen of the monitoring menu displays the low and high temperature values, low and high pressure values, lift and force line temperatures, and fan operating temperatures of compressors depending on the number of refrigerant circuits.

The settings menu shows the temperature set value, the air flow rate set value, and service settings. The service settings menu allows the operator to enter a temperature set value, and an air flow rate set value.

8. Pressure Switches

In closed circuit cooling systems, pressure switches are used as a safety measure on lift and force lines of compressors to automatically stop compressors for system safety. Power supply to the compressor is cut when the pressure exceeds the pre-determined standard lower and upper operating pressure limits. If the compressor were to operate at a pressure that is below the pre-determined lower limit for operating pressure, the compressor will not be able to take in an adequate amount of refrigerant gas, which will cause it to stay under vacuum and cause electrical windings to burn. If the compressor were to operate at a pressure that is above the pre-determined lower limit for operating pressure, the risk of overheating in the compressor will increase as well as the risk of gas leakage from pipes and equipment due to other equipment exceeding the limits of operating pressure.

Figure 8.
Low and High Gas Pressure Switches

9. Sensors

For DCPro series units with precision control, sensors are used to read system control, malfunction information, and operating values from the touch screen located on the front door.

a. Temperature and Humidity Sensor

Sensors that can measure temperature and humidity are used on intake and discharge sections of the unit to facilitate precise control.

b. Gas Circuit Temperature Sensor

The sensor is installed with contact to the copper tube, in order to measure the lift line temperature. It ensures system safety by sending a temperature data signal to the automation system to prevent compressor over-heating.

c. Air Flow Sensor

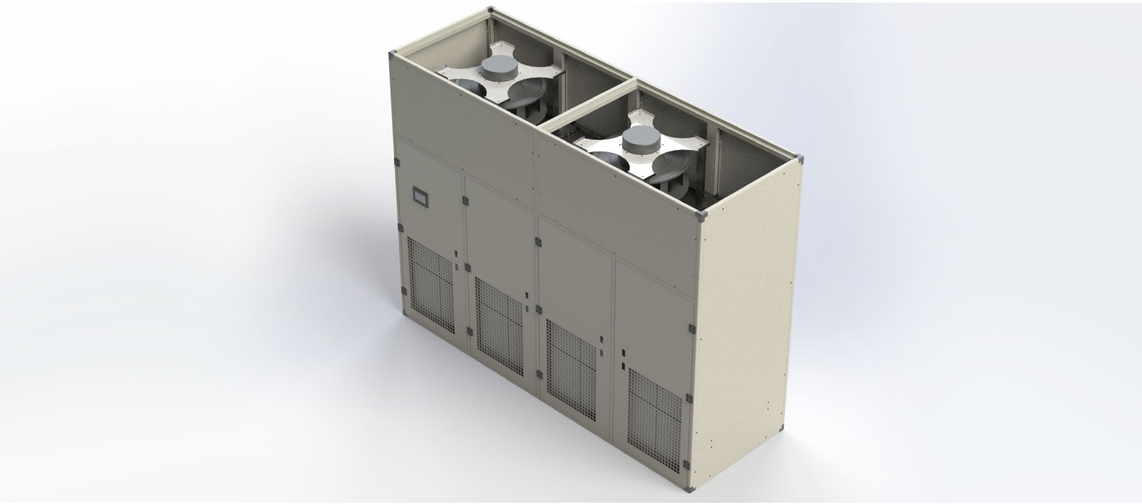
Air hoses are connected to the probe located on the negative pressure side of the fan section, and on the pressure relief valve located on the fan intake funnel. The air flow rate is calculated by multiplying the square root of the pressure differential that is read here with the coefficient shared by the fan manufacturer. Precise control is achieved by adjusting the fan rotation speed over the automation system to meet the cooling capacity needed to compensate for the thermal load that is generated inside the room.

d. Water Leakage Detector

Condensation occurs on the surface of the evaporator due to variations in humidity in the room. Water condensed on hydrophilic coated fins flow down to the drain pan. In moments when the condensation is very high or in the event of a clogged drainage hose, condensed water can accumulate in and overflow the drain pan, which can damage components. If water reaches a pre-determined level, the water leakage detector sends a signal to the automation system which cuts power supply to the unit. This component is used to ensure safe operation of the system.

e. Pressure sensors

Pressure sensors are connected on low and high pressure lines, and made to communicate with the automation system. The pressure information can be read off the main menu on the touch screen located on the front door. If the set low and high pressure values are exceeded, a signal is sent by the sensors to the automation system, and power supply to the compressors is cut. This component is used to ensure safe operation of the system.



TECHNICAL SPECIFICATIONS

1. Table of technical specifications for DX units with a single refrigerant circuit

		DCPro-DX-08	DCPro-DX-14	DCPro-DX-26	DCPro-DX-35	DCPro-DX-46	DCPro-DX-52
Air Intake Temperature	°C	24	24	24	24	24	24
Air Intake Relative Humidity	%	50	50	50	50	50	50
Air Flow Rate	m³/h	3000	5500	8500	9000	12000	15200
Air Flow Rate	m³/s	0.83	1.53	2.36	2.50	3.33	4.22
Total Cooling Capacity	kW	8.69	14.43	26.88	35.3	45.64	52.7
SHR		0.95	1.00	0.97	0.91	0.92	0.94
Net Sensible Cooling Capacity	kW	7.92	13.74	24.78	30.6	39.86	47.11
EER		3.91	3.80	3.76	3.90	3.86	3.86
Indoor Unit							
Number of Compressors		1	1	1	1	1	1
Compressor Type		On/Off	On/Off	On/Off	On/Off	On/Off	On/Off
Energy Consumption of Compressor	kW	1.9	3.16	5.75	7.55	9.77	10.98
Fan Type		EC Plug	EC Plug	EC Plug	EC Plug	EC Plug	EC Plug
Number of Fans		1	1	1	1	1	2
Energy Consumption of Fan(s)	kW	0.32	0.64	1.4	1.5	2.05	2.69
External Static Pressure	Pa	20	20	20	20	20	20
Steam Humidifier (Optional)	kg/h	3	3	8	8	8	8
Electrical Heater (Optional)	kW	4	6	6	9	12	12
Filter Type / Number of Filters		G4 / 1	G4 / 1	G4 / 1	G4 / 2	G4 / 3	G4 / 3
Length	mm	1990	1990	1990	1990	1990	1990
Width	mm	880	880	1000	1500	1750	1750
Depth	mm	700	700	870	870	870	870
Net Weight:	Kg	150	175	225	250	300	340
Outdoor Unit							
Number of Outdoor Units		1	1	1	1	1	1
Outdoor Temperature	°C	35	35	35	35	35	35
Number of Fans (For 1 Outdoor Unit)		1	1	2	2	3	3
Fan Type		EC Axial	EC Axial	EC Axial	EC Axial	EC Axial	EC Axial
Energy Consumption of Fan(s)	kW	0.27	0.81	1.11	1.6	1.93	2.23
Length	mm	975	1125	1735	2140	2540	2740
Width	mm	660	812	812	965	965	1066
Depth	mm	260	260	285	285	285	285
Net Weight	Kg	30	38	72	96	125	143

2. Table of technical specifications for DX units with dual refrigerant circuit

		DCPro-DX-36	DCPro-DX-49	DCPro-DX-58	DCPro-DX-67	DCPro-DX-82
Air Intake Temperature	°C	24	24	24	24	24
Air Intake Relative Humidity	%	50	50	50	50	50
Air Flow Rate	m³/h	9000	13000	15600	20000	24000
Air Flow Rate	m³/s	2.50	3.61	4.33	5.56	6.67
Total Cooling Capacity	kW	35.3	48.91	58.1	70.7	82.7
SHR		0.91	0.92	0.93	0.93	0.96
Net Sensible Cooling Capacity	kW	30.47	43.26	51.02	63.08	74.76
EER		3.66	3.85	3.69	4.01	3.68
Indoor Unit						
Number of Compressors		2	2	2	2	2
Compressor Type		On/Off +Inverter	On/Off + Inverter	On/Off + Inverter	On/Off + Inverter	On/Off + Inverter
Energy Consumption of Compressor	kW	8.02	10.91	12.95	14.89	18.11
Fan Type		EC Plug	EC Plug	EC Plug	EC Plug	EC Plug
Number of Fans		2	2	2	2	2
Energy Consumption of Fan(s)	kW	1.63	1.81	2.78	2.72	4.34
External Static Pressure	Pa	20	20	20	20	20
Steam Humidifier (Optional)	kg/h	8	8	10	15	15
Electrical Heater (Optional)	kW	9	12	12	15	18
Filter Type / Number of Filters		G4 / 2	G4 / 3	G4 / 3	G4 / 5	G4 / 5
Length	mm	1990	1990	1990	1990	1990
Width	mm	1500	1750	1900	2600	2600
Depth	mm	870	870	870	870	870
Net Weight	Kg	300	325	350	450	500
Outdoor Unit						
Number of Outdoor Units		2	2	2	2	2
Outdoor Temperature	°C	35	35	35	35	35
Number of Fans (For 1 Outdoor Unit)		1	2	2	2	3
Fan Type		EC Axial	EC Axial	EC Axial	EC Axial	EC Axial
Energy Consumption of Fan(s)	kW	0.87	0.89	1.05	1.75	1.3
Length	mm	1735	1735	2140	2140	2540
Width	mm	812	812	965	965	965
Depth	mm	285	285	285	285	285
Net Weight	Kg	58	72	96	96	125

3. Table of technical specifications for CW units

		DCPro-CW-10	DCPro-CW-17	DCPro-CW-35	DCPro-CW-45	DCPro-CW-65	DCPro-CW-85	DCPro-CW-120
Air Intake Temperature	°C	24	24	24	24	24	24	24
Air Intake Relative Humidity	%	50	50	50	50	50	50	50
Water Inlet Temperature	°C	7	7	7	7	7	7	7
Water Outlet Temperature	°C	12	12	12	12	12	12	12
Air Flow Rate	m³/h	3000	6750	8500	10000	15750	22000	27500
Air Flow Rate	m³/s	0.83	1.88	2.36	2.78	4.38	6.11	7.64
Total Cooling Capacity	Kw	13.37	26.74	37.06	42.66	78.58	115.1	149.25
Net Sensible Cooling Capacity	Kw	10.78	20.41	28.68	33.65	60.19	86.12	108.63
SHR		0.84	0.80	0.83	0.85	0.80	0.79	0.78
ERR		29.7	31.5	18.1	17.7	28.2	21.5	17.8
Fan Type		EC Plug	EC Plug	EC Plug	EC Plug	EC Plug	EC Plug	EC Plug
Number of Fans		1	1	1	2	2	2	3
Energy Consumption of Fan(s)	Kw	0.45	0.85	2.05	2.41	2.79	5.35	8.37
External Static Pressure	Pa	20	20	20	20	20	20	20
Steam Humidifier (Optional)	kg/h	3	3	8	8	10	15	15
Electrical Heater (Optional)	Kw	4	6	9	12	12	15	18
Filter Type / Number of Filters		G4 / 1	G4 / 2	G4 / 2	G4 / 2	G4 / 3	G4 / 4	G4 / 5
Length	mm	1990	1990	1990	1990	1990	1990	1990
Width	mm	800	1000	1000	1300	1750	2300	2600
Depth	mm	700	870	870	870	870	870	870
Net Weight	Kg	125	150	160	200	230	275	325

COMPONENTS

1. Steam Humidifier

The steam humidifer can be subjected to precision control in order to return the ambient air to the required level of humidity, should the humidity in the room drop.

Figure 9.
Steam Humidifier Tank

2. Electrical Heater

When the humidity in the room increases, the unit transitions into de-humidifying mode. The system's evaporation temperature is reduced and the cooling capacity is increased further. The resistors located on the air discharge area are activated. Humidity is reduced by incrementally heating the air until the desired dry bulb temperature is reached. Condensation that can occur inside the room can lead to oxidation on equipment, which can reduce operating efficiency and cause malfunctions.

Figure 10.
Electrical Heater

3. Water Drainage Pump

In cases where there is a difference in levels between the unit and the drainage area, a water drainage pump is used to pressurize the water that accumulates within the drain pan for drainage outside the unit. In spaces where excessive condensation is expected, this component is also used to facilitate uninterrupted operation of the water leakage detector system.

Figure 11.
Drainage Pump

4. Energy Analyzer

An energy analyzer is used to monitor the amount of power that is received by and the amount of power consumed by the unit. The unit's EER value can be monitored by using real-time power consumption information.

Figure 12.
Energy Analyzer

5. Automatic Transfer Switch (ATS)

In the event of a power outage during the operation of the unit, the required power is supplied by an UPS unit by means of an ATS. Continuous operation of the unit makes it possible to constantly maintain the set temperature inside the room. Thanks to the ATS, the unit is not affected by momentary power outages that occur on the mains supply line and an uninterrupted supply of power is provided by the UPS.

Figure 13.
Automatic Transfer Switch (ATS)

6. Pressure Independent Balancing Valve (For CW Units)

A pressure independent balancing and control valve with a linear control characteristic that is independent of the available pressure and setting. Make: Danfoss AB-QM or equivalent.
The pressure independent valve should have the following features:

- Automatic flow limitation function
- Membrane driven design for reduced clogging risk
- Modulating below 1% of set flow, regardless of the setting
- Maximum flow clearly marked on the valve
- Authority of 1 at all settings
- Ability to close against 16 Bar of differential pressure.
- Linear control characteristic
- Linear setting
- Control ratio 1:1000

Figure 14.

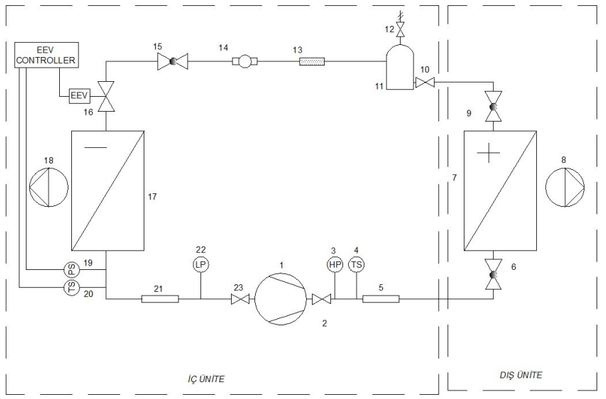
7. Base Frame

In data centers where raised floor is applied, base application can be made under the DCPro units in the dimension of the required height. If required, base application can be made on the floor. Except to air discharge side, all other sides can be closed with panels. Base colour is the same as unit which has RAL9002.

Figure 15.
Kaide

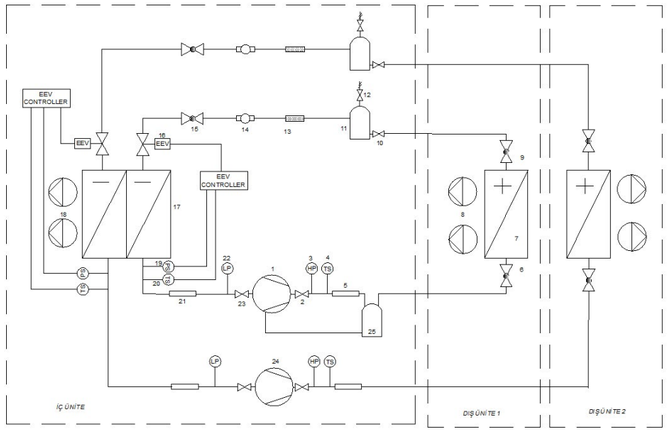
FLOW DIAGRAM

1. Flow Diagram of a Single Refrigerant Circuit



1	CONSTANT SPEED COMPRESSOR	13	DRYER FILTER
2	LIFT LINE ROTALOCK VALVE	14	INSPECTION WINDOW
3	HIGH PRESSURE SWITCH	15	LIQUID LINE BALL VALVE
4	PUMP LINE TEMPERATURE SENSOR	16	ELECTRONIC EXPANSION VALVE
5	PUMP LINE VIBRATION ATTENUATING PIPE	17	EVAPORATOR
6	OUTDOOR UNIT INTAKE BALL VALVE	18	INDOOR UNIT FAN
7	CONDENSER	19	ELECTRONIC EXPANSION VALVE PRESSURE SENSOR
8	OUTDOOR UNIT FAN	20	ELECTRONIC EXPANSION VALVE TEMPERATURE SENSOR
9	OUTDOOR UNIT DISCHARGE BALL VALVE	21	LIFT LINE VIBRATION ATTENUATING PIPE
10	LIQUID TANK ROTALOCK VALVE	22	LOW PRESSURE SWITCH
11	LIQUID TANK	23	LIFT LINE ROTALOCK VALVE
12	SAFETY VALVE		

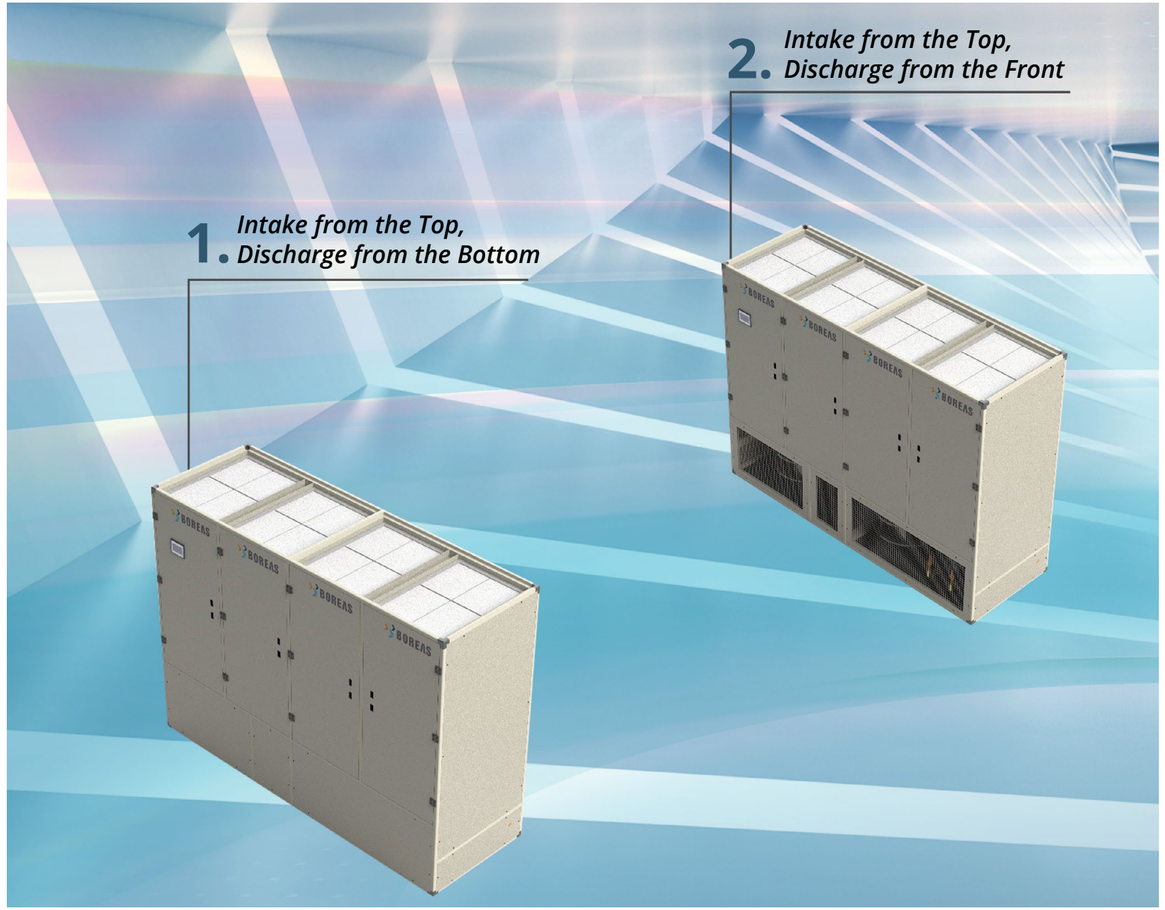
2. Flow Diagram of a Dual Refrigerant Circuit



1	CONSTANT SPEED COMPRESSOR	14	INSPECTION WINDOW
2	LIFT LINE ROTALOCK VALVE	15	LIQUID LINE BALL VALVE
3	HIGH PRESSURE SWITCH	16	ELECTRONIC EXPANSION VALVE
4	PUMP LINE TEMPERATURE SENSOR	17	EVAPORATOR
5	PUMP LINE VIBRATION ATTENUATING PIPE	18	INDOOR UNIT FAN
6	OUTDOOR UNIT INTAKE BALL VALVE	19	ELECTRONIC EXPANSION VALVE PRESSURE SENSOR
7	CONDENSER	20	ELECTRONIC EXPANSION VALVE TEMPERATURE SENSOR
8	OUTDOOR UNIT FAN	21	LIFT LINE VIBRATION ATTENUATING PIPE
9	OUTDOOR UNIT DISCHARGE BALL VALVE	22	LOW PRESSURE SWITCH
10	LIQUID TANK ROTALOCK VALVE	23	LIFT LINE ROTALOCK VALVE
11	LIQUID TANK	24	VARIABLE SPEED COMPRESSOR
12	SAFETY VALVE	25	OIL SEPARATOR
13	DRYER FILTER		

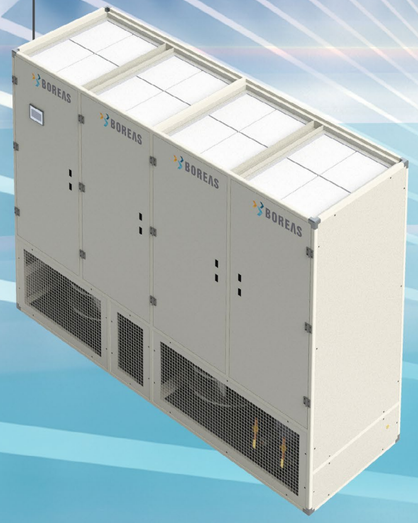
AIR DIRECTIONS

For DCPro series products, directions of air intake and discharge can be selected to suit the room in which the unit will be installed.



3. *Intake from the Bottom, Discharge from the Top*

4. *Intake from the Front, Discharge from the Top*



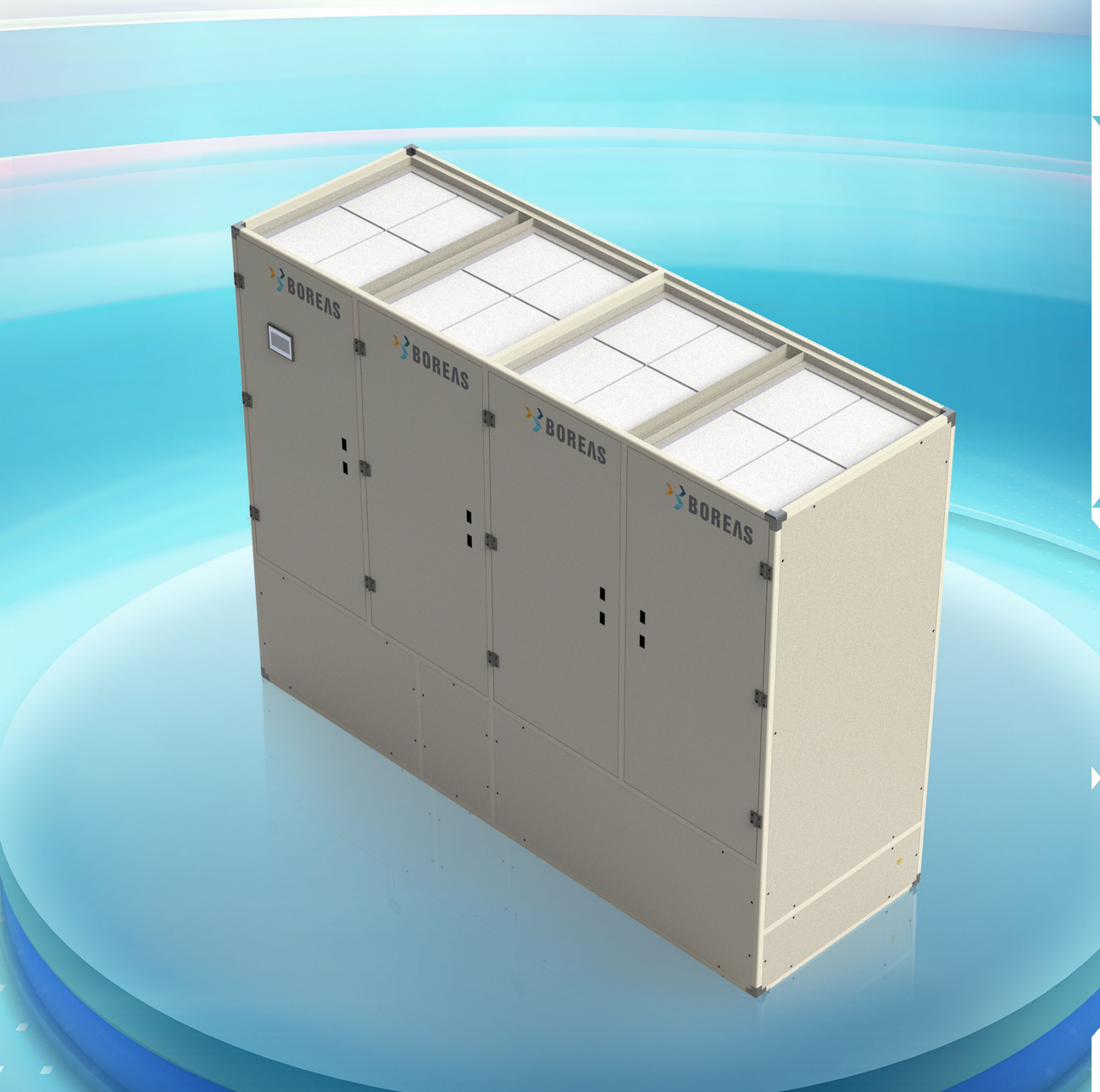
5. *Intake from the Bottom, Discharge from the Front*

6. *Intake from the Front, Discharge from the Front*

COPPER PIPING DISTANCES

Copper Pipe Diameter Selection Criteria		
Specifications	**Pump Line**	**Pump Line**
Horizontal Length	50 m	
Vertical Height	10 m	
Cooling Capacity	for all series capacities	
Evaporation Temperature	10°C	
Condensation Temperature	45°C	
Liquid Line Temperature	42°C	
Velocity of Refrigerant Gas	min. 5 m/s and above	between 0.75-1.5 m/s
Pressure Drop	under 1 bar	under 1 bar

Note: No pressure drop occurs for pipes laid to a length of less than 50 m. Therefore, the total length of pipework that will be laid between the indoor and outdoor unit should not exceed 50 meters. Pressure drop in each 1 m of pipe that will be built vertically is equal to that in 5 meters of pipe that will be built horizontally. A sample pipe diameter calculation: If you wish to build 4 meters of pipe vertically and 30 meters of pipe horizontally, 4 meters of vertical pipe will be equivalent to 20 meters of horizontal pipe and the total distance is calculated as 20+30=50 horizontally. The pipe diameter is selected as given in the table for pipe lengths up to 50 m.



Copper Pipe Diameters (mm)					
Single Circuit					
Model	**Capacity (kW)**	**Line**	**Up to 10 m**	**Up to 30 m**	**Up to 50 m**
DCPro-DX-08	8.5	Pump	12	12	16
		Liquid	10	10	10
DCPro-DX-14	14	Pump	16	16	16
		Liquid	12	12	12
DCPro-DX-26	26	Pump	19	19	22
		Liquid	16	16	16
DCPro-DX-35	35	Pump	19	22	22
		Liquid	16	16	16
DCPro-DX-46	46	Pump	22	22	28
		Liquid	16	19	19
DCPro-DX-52	52	Pump	22	28	28
		Liquid	19	19	19
Dual Circuit*					
Model	**Capacity (kW)**	**Line**	**Up to 10 m**	**Up to 30 m**	**Up to 50 m**
DCPro-DX-36	36	Pump	16	19	19
		Liquid	12	12	12
DCPro-DX-49	49	Pump	19	19	22
		Liquid	12	16	16
DCPro-DX-58	58	Pump	19	22	22
		Liquid	16	16	16
DCPro-DX-67	67	Pump	22	22	28
		Liquid	16	16	16
DCPro-DX-82	82	Pump	22	28	28
		Liquid	16	19	19

*Values specified in the dual circuit table applies to piping for the piping of each refrigerant circuit.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