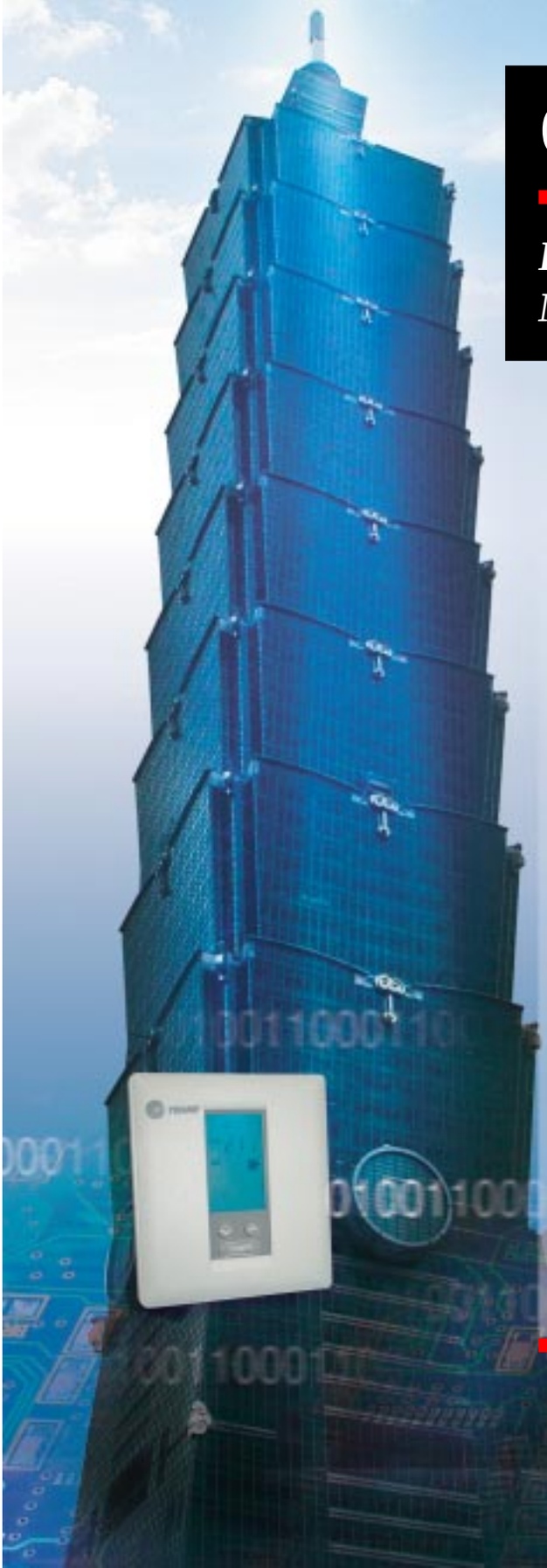
TRANE®

Chilled Water Fan Coil Unit

DCBL VAV Stepless FCU
Model : HFCA03~HFCA14



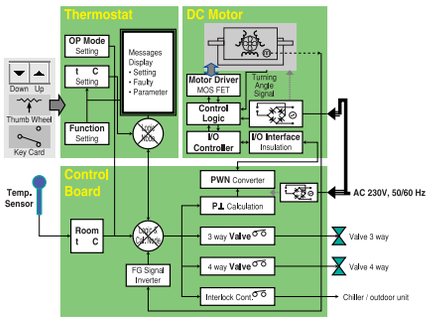
The Best Choice for Comfort

Features & Benefits

- Save energy / higher efficiency than typical FCU.
- Low electro magnetic noise DC fan motor.
- Step-less fan motor with real Variable Air Volume (VAV) function.
- Proportional Integration logic monitoring and controls.
- Comfortable room temperature.

New Features – Variable Airflow/Accurate Control

The model DCBL fan coil unit features variable airflow in addition to accurate temperature control; features not available in typical fan coil units. With a dedicated wall mounted, intelligent, liquid crystal display (LCD) thermostat and an advanced step-less DC fan motor, the advanced model DCBL fan coil unit uses unique control logic and smooth fan speed modulation to create real ambient comfort, achieving desired room temperature without excessive indoor moisture. Other advantages of a DC fan motor are low noise and high efficiency.



DCBL VAV FCU Control Logic Chart

Temperature Swings less than 0.5°C

A typical fan coil unit varies room temperature by water flow controls (on-off or modulating) plus specific fan speed selection (hi-medium-low). These always resulted in unstable room temperature (figure 1) and poor humidity control in occupied spaces. In contrast to the old-fashioned control method, model DCBL fan coil unit applies Proportional Integration (P-I) logic for modulation of fan speed and is able to stabilize room temperature within ± 0.5 Celsius degrees while operating in automatic mode.

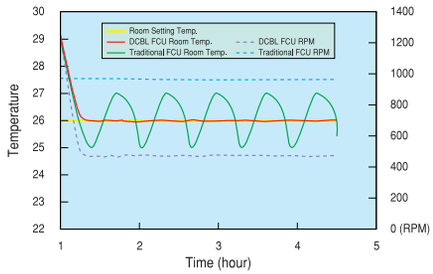


Figure 1

Low Noise with Gradual Changes

With P-I logic communications between the fan coil control board and the LCD thermostat, the feedback signal from the return air temperature sensor is scanned every second in order to verify the set temperature continuously. The fan coil control board commands the DC fan motor to maintain a continuous speed prior to receiving a new feedback signal. After examining five cycles of temperature measurement a new fan motor speed is set. The speed change is made linearly, increasing or decreasing fan motor speed about ten revolutions per second in order to reach the set temperature again. The linear change in motor speed allows gradual changes to room temperature and minimizes fan blade sudden impact noise (compared to 20~25% rps change with conventional control and old fashioned 3-speed motors).

Desired Airflow at Lower Speed Equals Energy Savings

The DC motor is able to deliver high torque and thus overcome airflow friction at a low speed, generating substantial external static pressure to deliver needed airflow. It also has less mechanical friction loss and therefore higher operating efficiency than a typical permanent split capacitor (PSC) motor. In other words, it achieves real energy savings.

In a figure 2, there are 2 models (HFCA08 and DCBL08) expressing electrical consumption (Watt) against specific range of speeds (600~950 RPM). The result is indicated that a DCBL08 saves energy about 30% at high speed and 60% at low speed beneath the same working conditions with HFCA08.

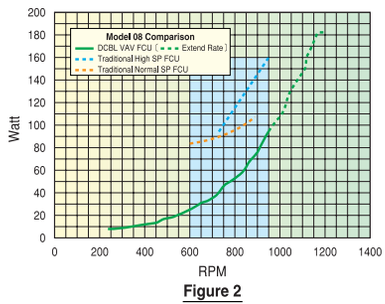


Figure 2

DCBL fan coil unit enables to deliver advance performance of airflow (green color curve with extension dash line) by excess power input, please consult Trane engineer for further technical support.

DCBL VAV FCU Nomenclature

H	F	C	A	03	A	N	A	1	N	A	N	B
1	2	3	4	5,6	7	8	9	10	11	12	13	14

DIGIT 1 - Position

H = Horizontal

DIGIT 2 - Unit Type

F = Fan Coil

DIGIT 3 - Casing

C = Concealed

W = Exposed

DIGIT 4 - Development Sequence

A = First

DIGIT 5.6 - Size / Nominal CFM

03 = 300 CFM

04 = 400 CFM

06 = 600 CFM

08 = 800 CFM

10 = 1000 CFM

12 = 1200 CFM

14 = 1400 CFM

DIGIT 7 - Coil Row, Connection Side

A = 2 Row Cooling, Right Hand

B = 2 Row Cooling, Left Hand

C = 3 Row Cooling, Right Hand

D = 3 Row Cooling, Left Hand

E = 4 Row Cooling, Right Hand

F = 4 Row Cooling, Left Hand

G = 2 Row Cooling, 1 Row Heating, Right Hand

H = 2 Row Cooling, 1 Row Heating, Left Hand

J = 3 Row Cooling, 1 Row Heating, Right Hand

K = 3 Row Cooling, 1 Row Heating, Left Hand

S = Special

DIGIT 8 - Electric Heat 115V / 220V (240V)

N = None

A = 1.0 (1.2) kW, Model 03~14

B = 1.5 (1.8) kW, Model 04~14

C = 2.0 (2.4) kW, Model 06~14

D = 2.5 (3.0) kW, Model 08~14

E = 3.0 (3.6) kW, Model 08~14

F = 3.5 (4.2) kW, Model 10~14

G = 4.0 (4.8) kW, Model 12~14

S = Special

* kW in bracket for 240V only

DIGIT 9 - Motor Type

A = DCBL Motor For Low ESP(0~40pa)

B = DCBL Motor For High ESP(40~100pa)

DIGIT 10 - Voltage/Hertz/Phase

1 = 220-240 / 50 / 1

2 = 220-240 / 60 / 1

5 = 115 / 60 / 1

S = Special

DIGIT 11 - Control Valve Package

N = Thread Connection / Without Valve Package

B = 2-Pipe System W / Single 2-Position 2-Way Valve

E = 2-Pipe System W / Single 2-Position 3-Way Valve

H = 4-Pipe System W / 2 Sets 2-Position 2-Way Valve

DIGIT 12 - Drain Pan

A = STD. Galvanized Steel / 5mm PE Insulation

B = Long Galvanized Steel / 5mm PE Insulation

C = STD. SUS / 5mm PE Insulation

D = Long SUS / 5mm PE Insulation

E = STD. Galvanized Steel / 6mm Non-Flammable BS476, Part7 Insulation

F = Long Galvanized Steel / 6mm Non-Flammable BS476, Part7 Insulation

G = STD. SUS / 6mm Non-Flammable BS476, Part7 Insulation

H = Long SUS / 6mm Non-Flammable BS476, Part7 Insulation

I = STD. Galvanized Steel / 10mm PE Insulation

J = Long Galvanized Steel / 10mm PE Insulation

K = STD. SUS / 10mm PE Insulation

L = Long SUS / 10mm PE Insulation

M = STD. Galvanized Steel / 15mm PE Insulation

O = Long Galvanized Steel / 15mm PE Insulation

P = STD. Galvanized Steel / 9mm Non-Flammable BS476, Part7 Insulation

Q = Long Galvanized Steel / 9mm Non-Flammable BS476, Part7 Insulation

R = STD. SUS / 15mm PE Insulation

T = Long SUS / 15mm PE Insulation

U = STD. Galvanized Steel / 15mm Non-Flammable BS476, Part7 Insulation

V = Long Galvanized Steel / 15mm Non-Flammable BS476, Part7 Insulation

W = STD. Galvanized Steel / 25mm Non-Flammable BS476, Part7 Insulation

X = Long Galvanized Steel / 25mm Non-Flammable BS476, Part7 Insulation

Y = STD. SUS / 25mm Non-Flammable BS476, Part7 Insulation

Z = Long SUS / 25mm Non-Flammable BS476, Part7 Insulation

S = Special

* Only A to V available for Exposed unit

DIGIT 13 - Plenum / Filters

N = Without Return Plenum / No Filter (Invalid to Exposed unit)

A = With Return Plenum / 4mm P.P. Nylon Filter

B = With Return Plenum / 12mm Aluminum Media

C = With Return Plenum / 12mm Foam Media

D = With Return Plenum / 20mm Aluminum Media

E = With Return Plenum / 20mm Foam Media

F = With Return Plenum / No Filter

G = With Return Plenum / 25mm Aluminum Media

I = With Return Plenum / 20mm P.P. Nylon Filter

K = With Return Plenum / 12mm Non-Woven

L = With Return Plenum / 20mm Non-Woven

P = With Return Plenum / 25mm Foam Media

S = Special

DIGIT 14 - Design Sequence

B = Second

Note:

1. HFCA will not support sweat connection for standard piping.
2. The wiring of thermostat or valves must be done on job site.
3. Non-flammable PU insulation meet the regulation of BS476 part7 class 1 and part6 class O.

Performance Data

Cooling Capacity (Example)

Cooling Capacity : kW	Cooling Rows : 3	SH : Sensible Cooling Capacity, kW
EAT : 26.0˚C / 60.0%	Motor Frequency : 50Hz / 60Hz	WPD : Water Pressure Drop, M
ESP : 30 / 60 Pa (Normal / Hi-Static) Applicable	TH : Total Cooling Capacity, kW	WFR : Water Flow Rate, L / S

Model	Nominal Airflow (CMH)	WTR (˚C)	Entering Water Temperature											
			5˚C				7˚C				9˚C			
			SH	TH	WFR	WPD	SH	TH	WFR	WPD	SH	TH	WFR	WPD
03	509	3.0	3.19	5.17	0.41	7.60	2.86	4.43	0.35	5.74	2.54	3.65	0.29	4.03
		5.0	2.92	4.55	0.22	2.47	2.59	3.78	0.18	1.77	2.30	3.02	0.14	1.18
		7.0	2.62	3.85	0.13	1.02	2.32	3.10	0.11	0.69	2.06	2.39	0.08	0.44
04	678	3.0	4.81	7.81	0.62	21.93	4.32	6.72	0.53	16.63	3.84	5.57	0.44	11.80
		5.0	4.45	7.02	0.33	7.35	3.97	5.87	0.28	5.31	3.52	4.74	0.23	3.60
		7.0	4.08	6.13	0.21	3.20	3.63	5.02	0.17	2.23	3.22	3.97	0.14	1.45
06	1018	3.0	5.32	8.58	0.68	9.38	4.78	7.35	0.58	7.06	4.24	6.05	0.48	4.96
		5.0	4.86	7.55	0.36	3.04	4.33	6.27	0.30	2.17	3.85	5.03	0.24	1.46
		7.0	4.39	6.41	0.22	1.26	3.90	5.16	0.18	0.86	3.46	3.99	0.14	0.54
08	1357	3.0	6.92	11.15	0.89	17.68	6.23	9.56	0.76	13.33	5.55	7.88	0.63	9.39
		5.0	6.38	9.90	0.47	5.80	5.69	8.24	0.39	4.16	5.06	6.63	0.32	2.81
		7.0	5.81	8.55	0.29	2.48	5.19	6.97	0.24	1.72	4.62	5.48	0.19	1.12
10	1696	3.0	8.42	13.48	1.07	4.87	7.56	11.50	0.91	3.64	6.71	9.40	0.75	2.53
		5.0	7.60	11.60	0.55	1.52	6.77	9.54	0.46	1.07	5.98	7.53	0.36	0.70
		7.0	6.66	9.27	0.32	0.57	5.85	7.15	0.24	0.36	5.12	5.15	0.18	0.20
12	2036	3.0	10.34	16.56	1.32	8.05	9.30	14.14	1.12	6.03	8.26	11.60	0.92	4.22
		5.0	9.41	14.41	0.69	2.56	8.40	11.93	0.57	1.82	7.46	9.53	0.45	1.21
		7.0	8.43	12.03	0.41	1.03	7.48	9.56	0.33	0.68	6.62	7.25	0.25	0.42
14	2366	3.0	11.19	17.92	1.43	14.15	10.06	15.06	1.24	11.51	8.93	13.15	1.05	8.21
		5.0	10.30	16.10	0.77	4.23	9.17	13.67	0.65	3.32	8.04	11.09	0.53	2.24
		7.0	9.35	14.08	0.48	2.15	8.21	11.49	0.39	1.40	7.13	8.89	0.30	0.91

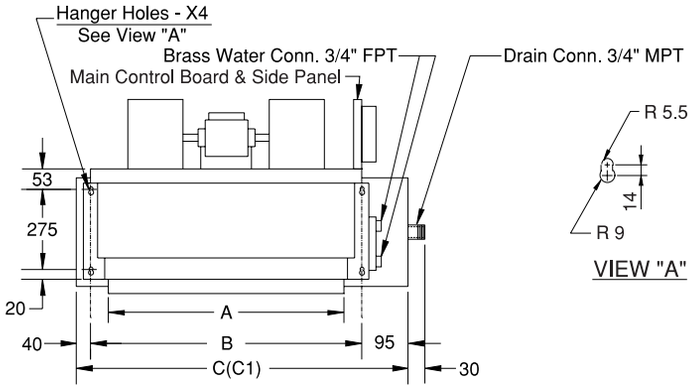
Spec./ Input Power

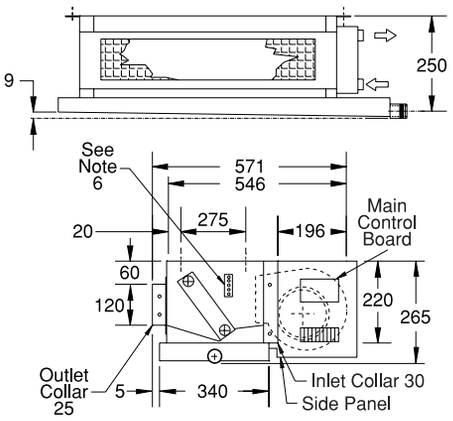
Model	03	04	06	08	10	12	14
Motor Input Power (Watts):							
Hi-Static Motor Max.	62.0	102.0	120.0	132.0	182.0	240.0	253.0
Hi-Static Motor Min.	12.9	16.7	20.5	24.3	33.4	41.0	48.6
Normal Motor Max.	49.0	61.0	98.0	104.5	147.0	186.0	198.6
Normal Motor Min.	11.2	14.5	17.4	19.5	28.6	34.8	39.0
Options:							
✻ Heat Capacity Type (kW)							
• Hot Water 1Row	2.86	3.71	4.95	6.16	6.91	7.94	9.26
	EWT=55˚C; EAT=21˚C; WFR=0.3L/S						
• Electric Sheathed Element	1.0	1.5	2	3	3.5	4	4
	Available with high temperature cutout						
✻ Plenum/Filters	Return air plenum with filters-washable foam, PP nylon or aluminium						

Note: It reserves the right to change design and specification without notice.

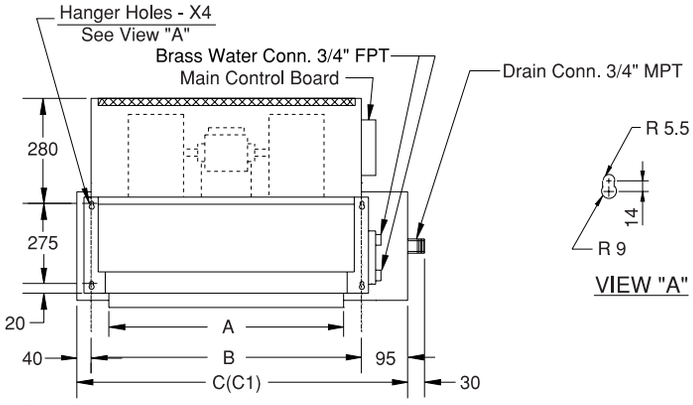
Dimension Data and Weight

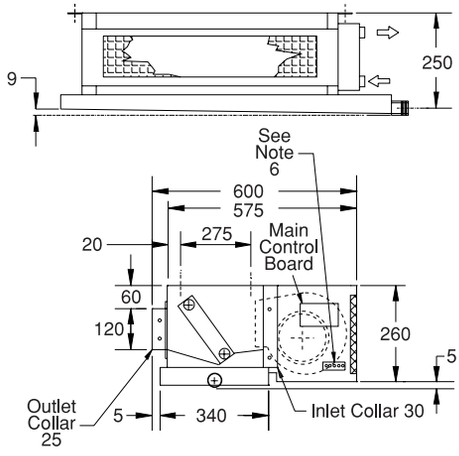
Model DCBL HFCA





Model DCBL HFCA with Return Plenum and Filter





Note :

1. Dimensions in mm.
2. C1 is the dimension of long drain pan.
3. Right hand coil connection shown.
4. Wiring connection same side as coil and drain connections.
5. Access door below unit required to service fan motor.
6. Wiring controls and junction box not supplied by Trane.
7. A terminal strip is supplied for main control board only.
8. An addition terminal strip for optional electric heater only.

Model Size	External Dimensions(mm)				Number of		Net Weight(Kg)			Net Weight-With Return plenum and Filter (Kg)			Operating Weight(Kg)			Operating Weight-With Return plenum and Filter (Kg)		
	A	B	C	C1	Fan(s)	Motor(s)	2Row	3Row	4Row	2Row	3Row	4Row	2Row	3Row	4Row	2Row	3Row	4Row
HFCA-03	480	530	665	964	1	1	19	20	21	22	23	24	19.7	21	22.3	22.7	24	26.3
HFCA-04	730	780	915	1164	2	1	23	25	26	27	29	30	24.7	26	28.3	28.7	30	32.3
HFCA-06	865	915	1050	1349	2	1	25	27	29	31	33	35	26.2	28.8	31.4	32.2	34.8	37.4
HFCA-08	1150	1200	1335	1624	2	1	30	33	35	38	41	43	31.6	35.4	38.1	39.6	43.4	46.1
HFCA-10	1320	1370	1505	1824	3	2	40	43	46	48	51	54	41.8	45.7	49.6	50.8	54.7	58.6
HFCA-12	1570	1620	1755	2074	4	2	44	48	52	55	58	63	46.2	51.2	56.3	57.2	61.2	67.3
HFCA-14	1650	1700	1835	2154	4	2	47	51	55	59	62	67	49.3	54.4	59.5	61.3	65.4	71.5

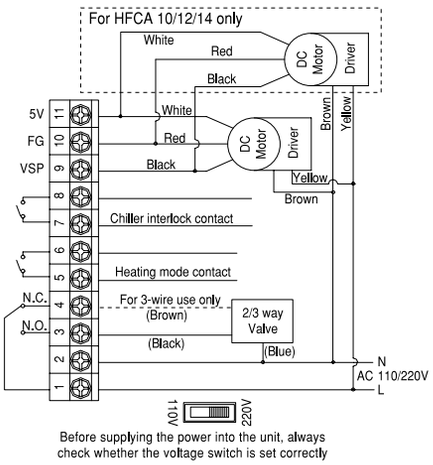
Sound Power Level

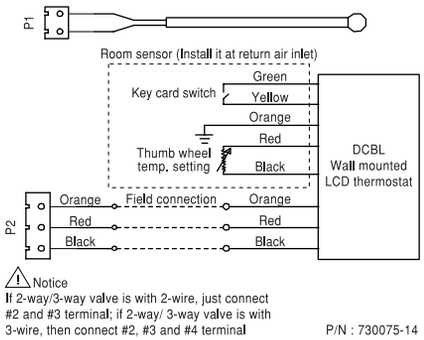
Motor Type		Normal									Hi-Static								
Model \ Hz		63	125	250	500	1000	2000	4000	8000	dBA	63	125	250	500	1000	2000	4000	8000	dBA
03	Rated	35	48	46	47	44	42	35	31	49.1	39	54	52	53	49	48	37	36	54.7
	Min	21	23	23	27	29	24	18	14	31.8	27	28	29	33	35	36	29	18	40.2
04	Rated	36	49	47	48	45	43	35	32	50.1	39	52	48	50	49	47	39	36	53.4
	Min	22	23	25	28	30	23	18	14	32.3	27	29	30	34	36	37	30	19	41.2
06	Rated	39	52	47	48	46	44	37	32	50.8	44	59	58	59	58	55	44	41	62.0
	Min	22	28	29	31	30	23	21	16	33.4	23	29	33	38	40	39	34	24	44.3
08	Rated	41	54	52	53	50	49	39	38	55.4	44	59	58	59	58	55	44	41	62.0
	Min	25	29	29	32	30	24	22	18	33.9	21	29	34	40	42	40	33	26	45.7
10	Rated	39	52	51	52	49	46	41	35	53.9	42	56	56	58	54	52	47	42	59.6
	Min	25	26	26	30	30	26	18	12	33.3	26	30	33	40	41	39	32	24	44.8
12	Rated	44	56	52	53	51	47	41	36	55.3	48	61	57	59	57	55	47	40	61.7
	Min	26	27	26	31	31	28	20	16	34.7	28	31	33	41	42	39	34	26	45.6
14	Rated	46	57	53	55	52	49	42	37	56.8	49	63	58	60	57	56	48	41	62.4
	Min	27	27	25	32	30	32	22	20	36.2	30	30	34	40	43	40	34	26	46.2

Notes : 1. Data referenced to 10^{-12} watts.

2. Above performance determined with both Normal static motor and Hi-static motor operating against 0 Pa ESP.

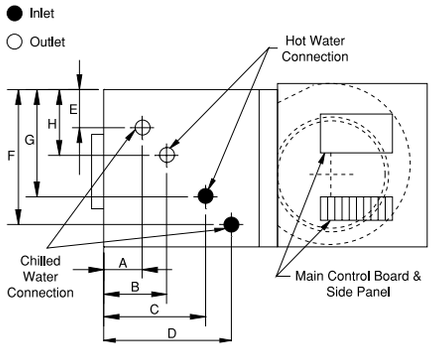
Wiring Diagram



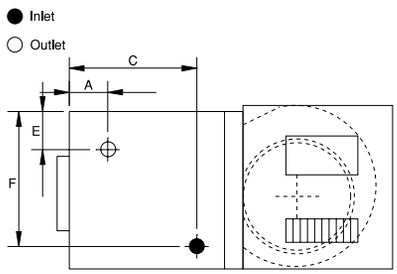


Connection / Piping

Model DCBL HFCA Coil Connections



Cooling & Heating Coil Connection Dimensions								
Unit Size	3 Row (2 Row Cooling / 1 Row Heating)							
	A	B	C	D	E	F	G	H
03~14 Left / Right Hand	69.6	104.2	138.8	173.6	59.8	171.3	134.2	97
Unit Size	4 Row (3 Row Cooling / 1 Row Heating)							
	A	B	C	D	E	F	G	H
03~14 Left / Right Hand	68.1	58.4	115.9	183.1	58.6	158.6	158.6	108.6



Cooling Connection Dimensions												
Unit Size	2 Row Coil				3 Row Coil				4 Row Coil			
	A	C	E	F	A	C	E	F	A	C	E	F
03~14 Left / Right Hand	57	178	51	181	57	178	51	181	41	174	60	176

Note:
1.Dimension in mm
2. 25.4 mm=1 in.

Product Specification

General

- Fabricated with a rigid galvanized steel casing.
- The DIDW centrifugal fans have balanced, galvanized steel, and forward curved blades.
- The fan board and the top of coil casing have insulation of 6mm thickness, 108 kg/m^3 high-density non-flammable PU foam.
- Interchangable coil direction to match water connections on the field.
- An optional return air plenum is available to allow the connection different types of filter.
- IEC 60335 safety certified.

Motor / Converter / Driver(Fan Motor Assembly)

- The direct current brush-less single phase motor (DC 300V) is ready for 220/240VAC at 50/60 Hertz, associates with converter and driver as entire DCBL fan motor assembly.
- A DC fan motor applies hall magnetic pole sensing element, which is offered maintenance free and longer operating cycle than carbon brush type fan motor.
- A DC fan motor is controlled by PWM (Pulse Width Modulation) for alternative speed.
- The motor is consisted with hermetic aluminum alloy casing, 8-pole coil, permanent magnet rotor, Cr-plating polishing shaft (S45C medium carbon steel), and permanently lubricated ball bearing.
- The motor has grade E class insulation; in additions of built-in thermal cutout, current overload and status scan by main control board.
- Default air volume setting (step-less) at ranges of 30% to 100% against nominal airflow of each model.
- The operating motor maintains low casing temperature (less thermal loss) and low noise (less friction).
- The motor lead-out wires are enclosed by flexible metal conduit and providing protection against damage.

Control Unit

- The control unit consists of Main Control Board at FCU side panel and wall mounted LCD Thermostat to achieve step-less control for fan motor.
- With microprocessor and applying PI (Proportional-Integration) logic for standalone control unit, which enables to deliver fast signal response and accurate controls.
- Applicable to either 2-pipe system (cooling only/ cooling and heating/ cooling and electric heater) or 4-pipe system (cooling and heating).

Main Control Board

- The main control board is served with 3 binary output contacts for 1) 2-way or 3-way on/off water valve, 2) 4-way valve for heat pump and 3) interlock for remote chiller.
- DIP switch for setting air volume (step-less) upon different ESP applications. There are 8 modes of adjustable air volume at ranges of 30% to 120% (default at 30% to 100%) available to suit different system requirements on the field.
- Maintain lowest fan speed at the set temperature.

LCD Thermostat

- Full features of 1) power on/off, 2) room temperature setting, 3) cool/ heat/ fan operating mode, 4) auto/ 3-speed fan mode, 5) timer on and off, and 6) sleep mode.
- The LCD thermostat able to display 1) room temperature, 2) set temperature, 3) status of fan mode and speed, and 4) failure codes for trouble-shooting and maintenance purpose.
- PCB DIP switch setting for 1) auto-restart function for fan motor operating again by resuming power, 2) Key-card function - stop or still operating beneath unoccupied mode at default setting temperature by remove keycard (the default setting temperature is adjustable at job site from 16~32 deg. C), and 3) customize thumb wheel (variable resistor/ analog signal) set temperature
- Customer wiring for unit remote on/off and control cable distance up to 100 meters.
- Optional back light of blue color.

Coil

- The coil can have 2,3 or 4 rows, with copper tubes mechanically bonded into slit aluminum fin collars.
- Water inlet / outlet connections are 3/4-inch female pipe thread (JIS B 0203-1966). Header assembly is a one-piece casting, which enables to connect steel pipe directly.
- Coil assembly is tested over 20 kg/cm^2.
- A manual air vent is fitted with a drain line to the drain pan to avoid any water drips when venting.
- A water drain is located at the bottom of the coil header.

Drain Pan

The drain pan is 25mm depth with 0.8mm thickness galvanized steel c/w internal epoxy resin coating.

For sure without leakage occur, the fabrication of drain pan by one-piece stamping process with seamless and no joint. The standard insulation material is 5mm thickness, 27 kg/m^3 density PE foam. The drain pan has one 3/4-inch male pipe thread (JIS B 0203-1966) connection.

Options

Heater

Two types of heating device are available: hot water and electric sheathed heating element. Please check technical data for such different types of heating capacity.
Meet Australia safety code AS 1668.1 (Section 2.9), and AS 3102.

Plenum & Filters

S430(Standard) / S304(Option) Stainless Steel Drain Pan

Blue Fin

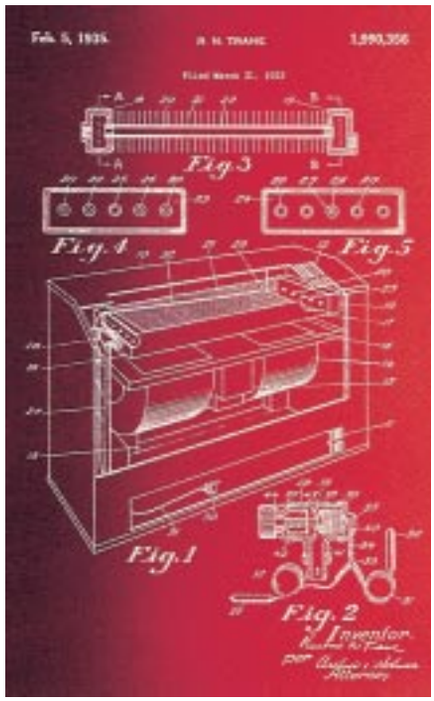
The blue fin with vinyl-epoxy-based coating that has been tested under ASTM B117, and thus of higher corrosion resistance than aluminum fin stock.

Factory-mounted Control Valve Package

Factory mounted and tested for options of 2way or 3way control valve package, and provision with or without thermostat.

Thermostat Back Light

The Trane Fan Coil...
...Invented by Trane
...Perfected by Trane



Since 1885, Trane has been at the technological forefront of air conditioning. The company's pioneering spirit, commitment to research and pursuit of quality have made it a world leader in the manufacture of water chillers.

Over 70 years ago Trane produced the first fan coil unit and in so doing created a product which is now built worldwide. The universal acceptance of this product has prompted Trane to focus the same engineering experience to the fan coil as given to the refrigeration products.

TRANE

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