DUCTED FAN COIL UNITS

FEATURES & BENERITS

AZAR NASIM ducted fan-coil units are designed to deliver reliable conditoned air in a wide range of capacites.
With delivery rates of 1400 m^3/hr to 5000 m^3/hr these units can meet the air conditoning demands of a variety of multiroom appliicaons such as apartments, office buildings, hotels and hospitals. For cooling applicatons , units are available with capaciies ranging from 5.8 to 30 KW and for heatng units with capacites of 17.5 to 58.5 KW at standard conditions (27 °C DB , 19.5 °C WB) can be utlized, with 3 different models and seven basic sizes in each model along with the choice of vertical or horizontal type.
The wide selecton range offers considerable design versatlity .

EASE OF INSTALLATION & MAINTENANCE

Horizontal models can be used in cabinet (Exposed) or furred-in (Concealed) applicatons.
vertical models are built only in exposed free standing models. The low high dimension associated with the horizontal types facilitates easy installaton within double ceilings or concealed locations.
Supply air duct collar simplifies field connection to new or existing supply ductwork. Mounting brackets on each side of the unit allow swift suspension from the ceiling. All wiring and piping connectons are located at accessible locations on the unit. Removable bottom panels permit full width access to the mixing box and blower units. Motor-blower unit can be removed in order to expose the entering face of the coil for cleaning purposes. The following design features are incorporated in the constructon of AZAR NASIM ducted Fan-coil units.

CABINET

All cabinets are constructed of 1.25 mm galvanized steel sheet with additonal paint coating. Panels are insulated with 10 mm polyethylene insulation panel.

FILTERS

Standard filter is removable 2.5cm aluminum washable filter.

CONDENSATE DRAIN PAN

Condensate drain pan is constructed of heavy gauge galvanized sheet metal with the underside insulated by 3 mm Polyethylene foam. The condensate drain outlet is 20 mm O.D. copper tube, brazed into the condensate drain pan.

COILS

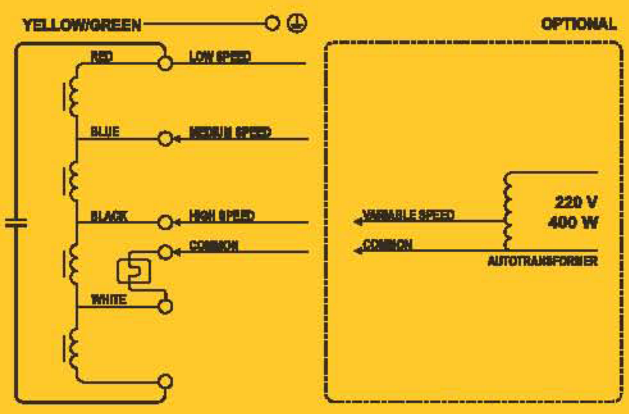
Coils are constructed of 16mm O.D. copper tubes with waffled and rippled edge aluminum or copper fins mechanically bonded to the tubes. All coils are leak tested under water with 22 bar_g air in accordance with ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeraton.
The coils for hot water applicatons are identical to chilled water coils available in 4 or 6 rows.
All DX coils are evacuated and backfilled with 35KPa_g dry nitrogen prior to shipment.
Electrical coils could also be mounted on any unit. They shall be protected against overheating.

FANS

The fans are direct driven, centrifugal, forward curved, double width wheels. (DWDI) Fans of The units have three speeds level adjusting: Low, Medium and High.

MOTORS

Motors are three speeds, 4 poles, single phase-50 cycles-220 V with external rotor-motor. All motors are equipped with thermal overload protecton. Motors are split phase type with a capacitor. They possess four connection wires: one in common and three connection wires for three different speeds. If there is a need for more than three different speeds, an autotransformer can be used. (Transformer or any other device should make no change in the shape of the electrical sinus wave.) The following wiring diagram can be used.



PACKING

Units finally shall be wrapped up with plastic tissue, fastened with polyethylene belts and placed on wooden palette, although they should be stored in an indoor storage.

*All components in AZAR NASIM Ducted Fan coils are selected of reliable and recognized international brand names or designed and constructed and checked under the standard of the air-conditioning and refrigeration industry.

* The units are manufactured under Azar Nasim's own Quality Assurance System and also Azar Nasim Standard Engineering Specification (SES).

* For any special applications please consult Azar Nasim's Sale Office.

Table 1	PHYSICAL DATA													
Physical Data and Sound Ratings														
Model	Nominal Air Flow m^3/hr	Coil					Blower & motor					Sound Ratings (dB) (Sound Pressure Level at 1 m)		
		Face area (m^2) Water	Face area (m^2) DX	Finned Length(mm) Water	Finned Length(mm) DX	Tube High	No.	Blower Type	Motor (each) (Watt)	Motor (each) RPM	Motor (each) (Ampere*)	Low	Medium	High
DF 1400	1400	0.19	0.15	500	400	10	1	9/7	350	450~1425	0.85~3.2	56	60	64
DF 1700	1700	0.23	0.19	600	500	10	1	9/9	350	450~1425	0.85~3.2	51	57	60
DF 2000	2000	0.27	0.27	700	700	10	2	9/7	350	450~1425	0.85~3.2	59	63	67
DF 2400	2400	0.30	0.27	800	700	10	2	9/7	350	450~1425	0.85~3.2	59	63	67
DF 2700	2700	0.34	0.3	900	800	10	2	9/7	350	450~1425	0.85~3.2	59	63	67
DF 3000	3000	0.40	0.36	1050	950	10	2	9/9	350	450~1425	0.85~3.2	54	60	63
DF 3400	3400	0.46	0.42	1200	1100	10	2	9/9	350	450~1425	0.85~3.2	54	60	63

* Electrical motor consumption is in the range of 0.85 to 3.2 amps when its rotational speed changes respectively from450 to 1425 rpm. Any selection should be based on maximum electrical current i.e. 3.2 amp.

Table 2	UNIT AIR FLOW										
with 4 Row Coils											
Model	Fin Pitch/cm	Low External Pressure Pa		Medium External Pressure Pa						High External Pres. Drop Pa	
		0.0	125	0.0	25	50	75	100	125	0.0	125
DF 1400	3.15	1100	1020	1750	1715	1680	1650	1600	1550	2210	1950
	5.51	1070	985	1700	1660	1690	1580	1530	1480	2125	1790
DF 1700	3.15	1275	1100	1955	1940	1920	1890	1835	1785	2630	2295
	5.51	1240	1070	1920	1900	1870	1820	1770	1700	2460	2125
DF 2000	3.15	2140	1900	3200	3100	3010	2930	2840	2685	3740	3140
	5.51	2100	1835	2970	2890	2735	2670	2530	2380	3400	2800
DF 2400	3.15	2160	1950	3315	3260	3180	3075	2990	2890	4080	3480
	5.51	2140	1900	3160	3075	2970	2890	2790	2635	3740	3060
DF 2700	3.15	2175	1990	3430	3365	3280	3210	3110	3010	4335	3650
	5.51	2160	1955	3295	3210	3125	3040	2940	2855	3990	3400
DF 3000	3.15	2465	2140	3875	3800	3740	3670	3550	3430	4930	4250
	5.51	2410	2090	3755	3690	3590	3480	3380	3200	4670	3910
DF 3400	3.15	2500	2210	3910	3875	3820	3760	3690	3570	5180	4590
	5.51	2465	2160	3860	3790	3740	3640	3535	3430	4930	4160

Cont

Table 2	UNIT AIR FLOW										
with 6 Row Coils											
Model	Fin Pitch/cm	Low External Pressure Pa		Medium External Pressure Pa						High External Pres. Drop Pa	
		0.0	125	0.0	25	50	75	100	125	0.0	125
DF 1400	3.15	1085	985	1700	1640	1600	1550	1500	1460	2090	1750
	5.51	1070	935	1580	1550	1495	1460	1410	1360	1885	1565
DF 1700	3.15	1225	1070	1920	1885	1850	1800	1750	1700	2430	2040
	5.51	1190	1020	1870	1800	1750	1700	1630	1530	2345	1820
DF 2000	3.15	2090	1785	2940	2850	2720	2600	2465	2330	3430	2720
	5.51	1990	1700	2600	2500	2380	2280	2160	2040	2920	2210
DF 2400	3.15	2125	1870	3110	3025	2940	2855	2720	2550	3720	3010
	5.51	2070	1785	2890	2750	2650	2530	2400	2280	3260	2615
DF 2700	3.15	2160	1920	3260	3180	3075	2990	2890	2770	3960	3290
	5.51	2125	1870	3025	2960	2870	2750	2630	2500	3570	2890
DF 3000	3.15	2380	2070	3740	3640	3535	3430	3300	3125	4590	3740
	5.51	2330	1990	3480	3400	3260	3125	3010	2800	4080	3160
DF 3400	3.15	2460	2125	3825	3755	3700	3585	3480	3360	4880	4080
	5.51	2380	2075	3690	3585	3480	3400	3245	3075	4420	3655

Fans have three speeds level adjusting's: Low, Medium and High.
Flow rate has been calculated under wet condition of the coil at sea level condition.

SELECTION PROCEDURE

Example (General):

Unit Selection Procedure:

1- Determining exact unit airflow: Enter Table 2. Select the nearest Model.

2- Calculate the face velocity, FV using the face area, FA from Table 1:

$$FV = \frac{\text{Air flow}}{FA}$$

3- Determine the appropriate correction factors. (Table 7, 8, 9 and 10), (Figures 1, 2 and 3), (Interpolation is allowed when needed.)

4- Correct the specified total capacity.

$$Q = \frac{\text{Required Total or Sensible Load}}{\text{Correction Factors}}$$

5- Enter the tables of ratings with Q (Tables 3, 4, 5 and 6) and check out for the selected model. (Repeat steps 1 to 5 to find the suitable unit.)

6- Find the actual ratings (Net real working capacity in the location and conditions of the project.)

Q_{actual} = Table Ratings × Correction Factors

[There is one exception:
C_5 is always applied to both Total and Sensible load but when C_5 is used only for correcting the wet bulb temperature (not water temp. or evaporating temp.), it is applied only to Total load.]

7-
a) Determining water flow rate (m^3/hr)
b) Determining leaving air dry bulb (LDB)
c) Determining leaving air enthalpy (H_2) (By having H_1 from Table 11)
d) Determining leaving air wet bulb temp. (LWB)

$$\text{a) Water Flow Rate } m^3/hr = \frac{Q_T}{4200 \times \Delta T} \times 3600$$

b) $Q_s = 0.0204\ (m^3/min)\ (EDB - LDB)$ KW
c) $QT = 0.02\ (m^3/min)\ (H_1 - H_2)$ KW
d) Interpolating in Table 11 (by having H_2) for leaving air wet bulb temp. (LWB)

Example 1:

Summer System Requirement Given:

Air Flow Rate..1700 m^3/hr
External Static Pre..75 Pa
Total / Sensible Load .... 8 / 5.6 KW.
Altitude of Installation 1250m
Entering Air Temperature.................. 26.5°C DB/ 21°C WB
Entering/Leaving Water Temperature(EWT/LWT)......7/13°C

Solution:

1- Table 2: Based on airflow, selecting Model DF 1700: 4 Rows, 3.15 fin/cm Air flow = 1890 m^3/hr (Selection is based on "Medium" condition in order to account for additional capacity.)

$$2\text{- } FV = \frac{\text{Air Flow}}{FA} = \frac{1890}{0.23\ m^2} = 8217\ m/hr = 137 m/min$$

3- Correction factors:
(T.7) Total load correction factor = C_T = 1.055
(T.7) Sensible load correction factor = C_S = 1.065
(T.8) Altitude correction factor = C_2 = 0.95
(T.9) Fin material correction factor = C_3 = 1.0
(T.10) Refrigerant correction factor = C_4 = 1.0
(F.1) Air wet bulb correction factor = C_5 = 1.15
4- Correcting the required load

$$Q_T = \frac{\text{Total Load}}{C_T \times C_2 \times C_5} = \frac{8\ KW}{1.06 \times 0.95 \times 1.15} = 6.91\ KW$$

$$Q_s = \frac{\text{Selection Load}}{C_s \times C_2} = \frac{5.6KW}{1.07 \times 0.95} = 5.51\ KW$$

(For correcting the wet bulb temp. Only, C_5 is applied just to total load.)
5- Entering the table 3 Model DF 1700: 26.5°C DB/ 19.5°C WB, 4 rows, 3.15fin/cm :
Q_T : 7.68KW > 6.91 KW (required)
Q_S : 6.17KW > 5.51KW (required)

So DF-1700 (4 rows, 3.15fin/cm, and half Cir.) is approved.

6- Actual ratings: Total: $Q_T = 7.68 \times 1.06 \times 1.15 \times 0.95 = 8.9$ KW
Sensible: $Q_s = 6.17 \times 1.07 \times 0.95 = 6.27$ KW

$$7\text{-a) Water flow} = \frac{8.9}{4200 \times 6} \times 3600 = 1.27 m^3/hr$$

$$b)\ LDB = 26.5 - \frac{6.17}{0.0204 \times 1890/60} = 16.9\ °C$$

$$c)\ H2 = 85.8 - \frac{8.9}{0.02 \times 1890/60} = 71.7\ KJ/kg$$

d) On Table 11 by H 2 and Altitude of 1250m and Interpolation LWB = 17.5 °C

(Because of the correction factor approximations, the exact temperature sometimes is obtained a little different. The LWB is about 17°C in this case.)

Example 2 :

Summer System Requirement (DX Coil) Given:

Air Flow Rate...2700 m^3 /hr
External Static Pressure ....1400 Pa
Total / Sensible Load ....12.5 / 9 KW
Altitude of Installation 1250m
Entering Air Temperature (EAT) ....26.5°C DB/19.5°C WB
Evaporating Temperature .... 10°C

Solution:

1- Table 2: Based on airflow, selecting Model DF 2000: 4rows, 5.51fin/cm: Air flow = 2735 m^3 /hr (Selection is based on "Medium" condition in order to account for additional capacity.)

2- $FV = \frac{\text{Air flow}}{FA} = \frac{2735\ m^3/hr}{0.27\ m^2}$ = 10129 m/hr =168.8 m/min

3- Correction factors: (Interpolation is required)
(T.7) Total load correction factor = C_T = 1.19
(T.7) Sensible load correction factor = C_S = 1.25
(T.8) Altitude correction factor = C_2 = 0.95
(T.9) Fin material correction factor = C_3 = 1.0
(T.10) Refrigerant correction factor = C_4 = 1.0
(F.3) Evaporating Temp. corr. Fac. = C_5 = 0.85

4- Correcting the required load

$$Q_T = \frac{\text{Total Load}}{C_T \times C_2 \times C_5} = \frac{12.5\ KW}{1.19 \times 0.95 \times 0.85} = 13\ KW$$

$$Q_s = \frac{\text{Selection Load}}{C \times C \times C} = \frac{9\ KW}{1.07 \times 0.95} = 8.85\ KW$$

5- Entering the table 4
Model DF 2000: 26.5°C DB/ 19.5°C WB, 4 rows, 5.51fin/cm:
Q_T : 10.55 < 13 KW (required)
Q_S : 8 < 8.85KW (required)
So DF-2000 (4 rows, 5/51fin/cm and Half Cir. failed.)
Repeating steps 1 to 5:
For DF-2000 (6 rows, 3.15fin/cm and half Cir.):
Q_T: 10.93KW < 13KW (required)
Q_S: 8.47 < 8.85 KW. (required)

So DF2000 (6 rows, 3.15fin/cm and half Cir.) failed.
DF2000 (6 rows, 5.51fin/cm and half Cir.) failed.
DF2400 (4 rows, 3.15fin/cm and half Cir.) failed.
DF2400 (6 rows, 3.15fin/cm and half Cir.) failed.
Q_T : 14.27 KW> 13 KW (required)
Q_S: 10.76KW > 8.85 KW (required)
DF2400 (6 rows, 5.51fin/cm and half Cir.) is approved.
(The actual air flow is 2650 m^3 /hr at Medium rotational speed of the fan.)

6- Actual ratings for DF2400 (6 rows, 5.51fin/cm & half Cir.):
Q_T = 14.27 × 1.15 × 0.85 × 0.95 = 13.25 KW
Q_s = 10.76 × 1.19 × 0.85 × 0.95 = 10.34 KW

7- a) Water flow $m^3/hr = \frac{13.25}{4200 \times 6} \times 3600 = 1.89\ m^3/hr$

b) $LDB = 26.5 - \frac{10.34}{0.0204 \times 2650/60} = 11.48^\circ C$

c) $H_2 = 79.4 - \frac{13.25}{0.02 \times 2650/60} = 64.4$ KJ/Kg.

d) On Table 11 by H_2 and Altitude of 1250m
LWB = 15°C

(Because of the correction factor approximations, the exact temperature sometimes is obtained alittle different. The LWB is about 15°C in this case.)

Example 3:

Winter System Requirement (Hot water Coil)
Given:
Air Flow Rate .... 3000 m^3 /hr
External Static Pressure .... 75 Pa
Heating Load .... 44 KW
Altitude of Installation 0m
Entering Air Temperature (EAT) .... 26.5°C DB
Entering/Leaving Water Temperature .... 82/171°C

Solution:

1- Table 2: Based on airflow, selecting Model DF 2700:
4 Rows, 5.51fin/cm: Air flow = 2990 m^3 /hr (Selection is based on "Medium" condition in order to account for additional capacity.)

2- $FV = \frac{\text{Air Flow}}{FA} = \frac{3000 m^3/hr}{0.34\ m^2}$ = 8823m/hr = 147m/min

3- Correction factors:
(T.7) Total load correction factor = CT = 1.07
(T.8) Altitude correction factor = C2 = 1.0
(T.9) Fin material correction factor = C3 = 1.0

4- Correcting the required load

$$Q_T = \frac{\text{Total Load}}{C_T \times C_2 \times C_S} = \frac{44}{1.07 \times 1.0 \times 1.0} = 41.12\ KW$$

5- Entering the table 5
Model DF 2700: 26.5°C DB, 4 rows, 5.51fin/cm half circuit:
QT : 43.9 KW > 41.12 KW (required)
So DF2700(4 rows, 5.51 fin/cm & Half Cir.) is approved.
6- Actual ratings for DF2700 (4 rows, 5.51 fin/cm & half Cir.):
Q_T = 43.9 × 1.07 × 1.0 × 1.0 = 46.97 KW

7- a) Water flow $GPM = \frac{46.97}{4200 \times 11} \times 3600 = 3.66\ m^3/hr$

b) $LDB = 26.5 + \frac{46.97}{0.0204 \times 2990/60} = 72.7^\circ C$

Table 3	CHILLED WATER COOLING COIL RATINGS (EWT 7°C, LWT 13°C)												
Model	Nominal Air Flow m^3/hr	Entering Dry Bulb Temp.(°C)	Entering Wet Bulb Temp. (°C)	Fin Pitch/cm	Circuit	4 Rows				6 Rows			
						Total Cooling Capacity (KW.)	Sensible Cooling Capacity (KW.)	Water Flow (m^3/hr)	Water Pressure Dop KPa	Total Cooling Capacity (KW)	Sensible Cooling Capacity (KW.)	Water Flow (m^3/hr)	Water Pressure Dop KPa
DF 1400	1400	24	17	3.15	Half	4.07	4.09	0.64	0.75	5.77	5.01	0.91	1.79
				5.51	Half	5.07	4.81	0.8	1.2	7.12	5.72	1.11	2.69
		26.5	19.5	3.15	Half	5.71[1]	4.78	0.89	1.5	8.47	6.1	1.32	3.89
				5.51	Half	7.33	5.72	1.14	2.09	10.08	6.92	1.57	5.08
DF 1700	1700	24	17	3.15	Half	5.27[2]	5.27	0.82	1.2	7.47	6.36	1.16	3.29
				5.51	Half	6.74	6.15	1.05	1.8	9.23	7.27	1.43	4.78
		26.5	19.5	3.15	Half	7.68	6.17	1.18	2.39	11	7.8	1.7	6.28
				5.51	Half	9.73	7.36	1.5	3.59	13.07	8.82	2.02	8.67
DF 2000	2000	24	17	3.15	Full	5.22	5.22	0.82	0.24	7.41	7	1.16	0.6
					Half	6.45	6.21	1	1.8	9.29	7.77	1.43	5.08
				5.51	Full	6.51	6.51	1	0.3	9.26	7.97	1.43	0.9
					Half	8.47	7.53	1.32	3	11.46	8.91	1.77	7.17
		26.5	19.5	3.15	Full	6.89	6.51	1.07	0.3	10.79	8.38	1.68	1.2
					Half	9.79	7.56	1.52	3.9	13.66	9.52	2.11	9.86
				5.51	Full	8.85	7.77	1.36	0.6	13.22	9.58	2.04	1.5
					Half	12.31	9.09	1.91	6	16.18	36.8	2.5	13.45
DF 2400	2400	24	17	3.15	Full	6.39	6.39	1	0.3	9.08	8.35	1.41	0.9
					Half	7.77	7.33	1.2	2.7	11.08	9.17	1.73	7.17
				5.51	Full	7.97	7.97	1.23	0.6	11.28	9.53	1.75	1.2
					Half	10.3	10.3	1.59	4.5	13.63	10.49	2.11	10.46
		26.5	19.5	3.15	Full	8.53	7.74	1.32	0·6	13.22	10.02	2.04	1.5
					Half	11.84	8.97	1.84	6	16.24	11.22	2.52	14.35
				5.51	Full	11.1	9.32	1.73	0·9	16.06	11.43	2.5	2.39
					Half	15	10.84	2.32	9.0	19.37	12.81	3	19.73
DF 2700	2700	24	17	3.15	Full	7.6	7.6	1.18	0.2	10.79	9.07	1.68	1.2
					Half	9.09	8.47	1.41	1.3	13.16	10.67	2.04	10.16
				5.51	Full	9.47	9.47	1.48	0.2	13.3	11.05	49.6	1.8
					Half	12.07	10.35	1.86	2.1	15.88	12.13	2.45	14.35
		26.5	19.5	3.15	Full	10.29	9.03	1.59	0.3	15.8	11.72	2.45	2.39
					Half	13.92	10.4	2.16	2.7	18.93	12.98	2.93	19.73
				5.51	Full	13.31	10.93	2.07	0.4	19.11	13.36	2.98	3.29
					Half	17.67	12.57	2.75	4.5	22.57	14.83	3.5	27.2
DF 3000	3000	24	17	3.15	Full	9.08	9.08	1.41	0.2	12.84	11.22	2	1.79
					Half	10.93	10.08	1.81.	2.1	15.47	12.28	2.41	14.65
				5.51	Full	11.37	10.79	1.77	0.4	15.91	12.84	2.48	2.69
					Half	14.33	11.96	2.23	3.1	18.61	13.98	2.88	20.62
		26.5	19.5	3.15	Full	12.81	10.64	1.98	0.4	18.84	13.63	2.93	3.59
					Half	16.5	12.07	2.57	4.0	22.07	14.95	3.43	28.1
				5.51	Full	16.41	12.84	2.54	0.7	22.63	15.5	3.5	4.78
					Half	20.9	14.59	3.22	6.1	26.2	17.03	4.07	38.26

Cont.

Cont.

Table 3 — CHILLED WATER COOLING COIL RATINGS (EWT 7°C, LWT 13°C)

Model	Nominal Air Flow m³/hr	Entering Dry Bulb Temp.(°C)	Entering Wet Bulb Temp. (°C)	Fin Pitch/cm	Circuit	4 Rows Total Cooling Capacity (KW.)	4 Rows Sensible Cooling Capacity (KW.)	4 Rows Water Flow (m³/hr)	4 Rows Water Pressure Dop KPa	6 Rows Total Cooling Capacity (KW)	6 Rows Sensible Cooling Capacity (KW.)	6 Rows Water Flow (m³/hr)	6 Rows Water Pressure Dop (Kpa)
DF 3400	3400	24	17	3.15	Full	10.58	10.58	1.64	0.3	14.92	12.72	2.32	2.39
					Half	13.04	3.32	2.02	2.8	17.79	13.92	2.75	20.33
				5.51	Full	3.94	12.31	2.09	0.5	18.43	14.59	2.86	3.59
					Half	16.53	13.57	2.57	4.2	21.36	15.83	3.32	28.1
		26.5	19.5	3.15	Full	15.36	12.28	2.38	0.6	22.01	15.59	3.41	4.78
					Half	19.14	13.77	2.97	5.5	25.12	16.88	3.89	37.66
				5.51	Full	19.43	14.71	3	1.0	26.14	17.67	4.04	6.58
					Half	24.15	16.59	3.75	8.4	29.72	19.2	4.61	51.1 4

- Shaded regions show that water velocity /air face velocity is out of standard ARI 410 & 440 limits. (0.3~2.44 m/s) (1~4 m/s)
1 2 3 4 : Under this condition, if the actual airflow is more than respectively 1500, 2200, 3400 and 3750 m³/hr, then the velocity will be in the range of valid (ARI)
- All the ratings are calculated at altitude o (sea level)

Table 4 — DX COIL RATINGS (7°C Ev aporating Temp.) (Half circuit)

Model	Nominal Air Flow m³/hr	Entering Dry Bulb Temp.(°C)	Entering Wet Bulb Temp. (°C)	Fin Pitch/cm	4 Rows Total Cooling Capacity (KW)	4 Rows Sensible Cooling Capacity (KW)	4 Rows Leaving Air Dry Bulb Temp. (°C)	6 Rows Total Cooling Capacity (KW)	6 Rows Sensible Cooling Capacity (KW.)	6 Rows Leaving Air Dry Bulb Temp. (°C)
DF 1400	1400	24	17	3.15	3.78	3.46	16.3	4.66	4.04	15
				5.51	4.57	4.07	15	5.63	4.78	13.5
		26.5	19.5	3.15	5.07	4.25	17.4	6.18	4.95	15.8
				5.51	6.04	4.75	16.3	7.33	5.54	14.5
DF 1700	1700	24	17	5.51	4.87	4.57	15.9	5.95	5.33	14.5
				3.15	5.8	5.33	14.5	7.09	6.24	13
		26.5	19.5	5.51	6.6	5.54	17	7.94	6.48	15.4
				3.15	7.8	6.15	15.8	9.41	7.18	14
DF 2000	2000	24	17	3.15	7.74	6.07	15	8.12	7.18	13.4
				5.51	7.77	6.89	13.8	9.64	8.15	12
		26.5	19.5	3.15	9	7.27	16	10.93	8.47	14.3
				5.51	10.55	8	15	12.84	9.32	13
DF 2400	2400	24	17	5.51	7.24	6.86	15.3	9.06	8.06	13.9
				3.15	8.68	7.94	14	10.84	9.35	12.2
		26.5	19.5	5.51	9.94	8.32	16.2	12	9.7	14.5
				3.15	11.81	9.23	15.1	14.27	10.76	13.2
DF 2700	2700	24	17	3.15	8.65	8.12	15	10.81	9.55	13.4
				5.51	10.32	9.32	13.7	12.92	10.96	11.8
		26.5	19.5	3.15	11.87	9.76	16	14.95	11.66	13.9
				5.51	14.07	10.84	14.8	17.73	12.95	12.4
DF 3000	3000	24	17	5.51	10.4	9.55	14.6	13	11.22	13
				3.15	12.28	10.79	13.4	15.33	12.66	11.6
		26.5	19.5	5.51	14.13	11.34	15.6	17.61	13.48	13.5
				3.15	16.73	12.57	14.4	20.87	14.92	12
DF 3400	3400	24	17	3.15	12.57	11.22	14	15.71	13.19	12.4
				5.51	14.8	12.54	12.9	18.49	14.74	11
		26.5	19.5	3.15	16.97	13.22	15	21.19	15.56	13
				5.51	20.08	14.62	13.8	25.1	17.23	11.5

- All the ratings are calculated at altitude 0 (Sea Level) with Aluminums fins (corrugated plate fins) and based on ARI standard 410. For other Altitudes or Fin Material please refer to Correction Factor Tables.
Velocities.
- All the ratings are calculated at altitude 0 (sea level)

Table 5	HOT WATER COIL RATNGS (same cooling coils with hot water ratings) (EWT 82°C, LWT 71°C)											
Model	Nominal Air Flow m³/hr	Entering Dry Bulb Temp.(°C)	Fin Pitch/cm	Circuit	4 Rows: Total Heating Capacity KW	4 Rows: Leaving Air Dry Bulb Temp. (°C)	4 Rows: Water Flow m³/hr	4 Rows: Water Pressure Drop (KPa)	6 Rows: Total Heating Capacity KW	6 Rows: Leaving Air Dry Bulb Temp. (°C)	6 Rows: Water Flow m³/hr	6 Rows: Water Pressure Drop (KPa)
DF 1400	1400	10	3.15	Half	24.24	62.8	1.9	4.42	28.6	72.4	2.27	2.7
			5.51	Half	29	73.1	2.3	6	31.65	79	2.52	3.3
		15.5	3.15	Half	22.16	63.8	1.8	3.9	26.26	72.8	2.09	2.3
			5.51	Half	26.52	73.4	2.1	5.1	29.13	79	2.32	2.8
		21	3.15	Half	20.11	64.9	1.6	3.3	23.89	73.2	1.91	2.0
			5.51	Half	24.1	73.7	1.9	4.5	26.58	79	2.11	2.4
		10	3.15	Half	17.97	65.9	1.4	2.7	21.51	73.6	1.73	1.6
			5.51	Half	21.66	73.9	1.7	3.6	24.03	79	1.91	2.0
DF 1700	1700	26.5	3.15	Half	30.22	62.7	2.4	6.8	35.7	72.3	2.84	4.3
			5.51	Half	36.22	73.2	2.9	9.6	39.59	79	3.16	5.2
		15.5	3.15	Half	27.67	63.8	2.2	6	32.77	72.7	2.61	3.7
			5.51	Half	33.23	73.5	2.7	8.4	36.43	79.1	2.91	4.5
		21	3.15	Half	25.09	64.9	2	5.1	29.83	73.2	2.38	3.1
			5.51	Half	30.22	73.8	2.5	6.9	33.26	79.1	2.66	3.8
		26.5	3.15	Half	22.51	66	1.8	4.2	26.9	73.6	2.14	2.6
			5.51	Half	27.2	74.1	2.2	5.7	30.1	79.2	2.41	3.2
DF 2000	2000	10	3.15	Full	34.73	60.4	2.8	1.8	41.73	70.7	3.32	1.0
				Half	36.28	62.7	2.9	10.2	42.79	72.2	3.41	6.3
			5.51	Full	41.97	71	3.3	2.4	46.75	78	3.73	1.2
				Half	43.58	73.3	3.5	14	47.54	79.1	3.8	7.6
		15.5	3.15	Full	31.68	61.5	2.5	1.5	38.25	71.1	3.05	0.9
				Half	33.21	63.8	2.6	8.7	39.3	72.7	3.13	5.4
			5.51	Full	38.36	71.33	3.1	2.1	42.94	78	3.43	1.1
				Half	40	73.67	3.2	12.3	43.76	79.1	3.47	6.6
		21	3.15	Full	28.6	62.7	2.3	1.2	34.73	71.6	2.77	0.7
				Half	30.13	64.9	2.4	7.2	35.78	73.1	2.84	4.6
			5.51	Full	34.76	71.6	2.8	1.8	39.13	77.9	3.11	0.9
				Half	36.37	74	2.9	10.2	39.95	79.2	3.18	5.6
		26.5	3.15	Full	25.56	63.8	2	0.9	31.21	72	2.5	0.6
				Half	27	66	2.2	6	32.27	73.6	2.57	3.8
			5.51	Full	31.15	72	2.5	1.5	35.29	78	2.82	0.8
				Half	32.77	74.3	2.6	8.4	36.17	79.22	2.88	4.7
DF 2400	2400	10	3.15	Full	40.68	60.7	3.3	2.4	48.8	70.8	3.89	1.4
				Half	42.32	62.7	3.4	14	49.91	72.2	3.98	8.8
			5.51	Full	49.24	71.3	3.9	3.3	54.66	78.1	4.36	1.7
				Half	50.91	73.4	4	19.7	55.51	79.1	4.43	10.6
		15.5	3.15	Full	37.13	61.8	3	2.1	44.72	71.3	3.57	1.2
				Half	38.74	63.8	3.1	12	45.84	72.7	3.66	7.5
			5.51	Full	45.05	71.7	3.6	2.7	50.23	78.1	4	1.5
				Half	46.72	73.7	3.7	16.7	51.08	79.2	4.07	9.2
		21	3.15	Full	33.59	62.9	2.7	1.5	40.65	71.8	3.25	1.0
				Half	35.2	65	2.8	10.2	41.76	73.1	3.32	6.4
			5.51	Full	40.85	72	3.2	2.4	45.81	78.2	3.66	1.3
				Half	42.52	74	3.4	14.4	46.66	79.2	3.73	7.8
		26.5	3.15	Full	30.04	64	2.4	1.2	36.58	72.2	2.91	0.8
				Half	31.62	66	2.5	8.4	37.69	73.6	3	5.3
			5.51	Full	36.63	72.3	2.9	1.8	41.35	78.2	3.3	1.0
				Half	38.3	74.4	3	11.7	42.23	79.3	3.36	6.5

- All the ratings are calculated at altitude 0 (Sea Level) with Aluminium fins (corrugated plate fins) and based on ARI standard 410. For other Altitudes or Fin Materials please refer to Correction Factor Tables.

Cont.

- All the ratings are calculated at altitude o (sea level)

Table 5	HOT WATER COIL RATINGS (same cooling coils with hot water ratings) (EWT 82°C, LWT 71°C)											
					4 Rows				6 Rows			
Model	Nominal Air Flow m³/hr	Entering Dry Bulb Temp.(°C)	Fin Pitch/cm	Circuit	Total Heating Capacity KW	Leaving Air Dry Bulb Temp. (°C)	Water Flow m³/hr	Water Pressure Drop (KPa)	Total Heating Capacity KW	Leaving Air Dry Bulb Temp. (°C)	Water Flow m³/hr	Water Pressure Drop (KPa)
DF 2700	2700	10	25	Full	47	61	4	3	56	71	4	6
				Half	48	63	4	19	57	72	5	35
			44	Full	56	72	5	5	63	78	5	7
				Half	58	74	5	27	63	79	5	43
		15.5	25	Full	43	62	3	3	51	71	4	5
				Half	44	64	4	16	52	73	4	31
			44	Full	52	72	4	4	58	78	5	6
				Half	53	74	4	23	58	79	5	37
		21	25	Full	39	63	3	2	47	72	4	4
				Half	40	65	3	14	48	73	4	26
			44	Full	47	72	4	3	52	78	4	5
				Half	49	74	4	19	53	79	4	32
		26.5	25	Full	35	64	3	2	42	72	3	3
				Half	36	66	3	11	43	74	3	22
			44	Full	42	73	3	3	47	78	4	4
				Half	44	75	4	16	48	79	4	26
DF 3000	3000	10	25	Full	54	62	4	4	64	72	5	8
				Half	55	64	4	26	6	73	5	48
			44	Full	65	73	5	6	71	79	6	9
				Half	66	74	5	36	72	80	6	58
		15.5	25	Full	49	63	4	4	58	72	5	7
				Half	51	65	4	22	60	73	5	41
			44	Full	59	73	5	5	65	79	5	8
				Half	61	75	5	31	66	80	5	50
		21	25	Full	44	64	4	3	53	73	4	5
				Half	46	66	4	18	54	74	4	35
			44	Full	54	73	4	4	60	79	5	7
				Half	55	75	4	26	60	80	5	42
		26.5	25	Full	40	65	3	2	48	73	4	5
				Half	41	67	3	15	49	74	4	29
			44	Full	48	74	4	4	54	79	4	6
				Half	50	75	4	22	55	80	4	35
DF 3400	3400	10	25	Full	60	63	5	5	71	72	6	10
				Half	62	64	5	34	72	73	6	63
			44	Full	72	73	6	8	79	79	6	12
				Half	74	75	6	47	80	80	6	75
		15.5	25	Full	55	64	4	5	66	73	5	8
				Half	57	65	5	29	67	74	5	54
			44	Full	66	74	5	7	73	79	6	10
				Half	68	75	5	40	74	80	6	65
		21	25	Full	50	65	4	4	60	73	5	7
				Half	52	66	4	25	61	74	5	46
			44	Full	61	74	5	5	67	79	5	9
				Half	62	75	5	34	67	80	5	55
		26.5	25	Full	45	66	4	3	54	74	4	6
				Half	47	67	4	20	55	75	4	38
			44	Full	54	74	4	5	60	79	5	7
				Half	56	76	4	28	61	80	5	46

- All the ratings are calculated at altitude 0 (Sea Level) with Aluminium fins (corrugated plate fins) and based on ARI standard 410. For other Altitudes or Fin Materials please refer to Correction Factor Tables.

- All the ratings are calculated at altitude o (sea level)

Table 6	ELECTRICAL COIL																
Model	Nominal Air Flow m^3/hr	Air Temperature Rise* (ΔT)															
		3°C					5.5°C					11°C					
		Heating Capacity (KW)	Phase	Line Curr. (Amp.)	No. of Contr. Steps	No. and Cap.(KW) of Elem.	Heating Capacity (KW)	Phase	Line Curr. (Amp.)	No. of Contr. Steps	No. and Cap.(KW) of Elem.	Heating Capacity (KW)	Phase	Line Curr. (Amp.)	No. of Contr. Steps	No. and Cap. (kw) of Elem.
DF 1400	1400	1.5	1	7	1	1×1.5	3.0	1	14	2	2×1.5	5.5	1	25	3	2+2+1.5
DF 1700	1700	1.5	1	7	1	1×1.5	3.0	1	14	2	2×1.5	7.0	1	32	3	3+2+2
DF 2000	2000	2.0	1	9	1	1×2	4.0	1	18	2	2+2	8.0	1	36	3	3+3+2
DF 2400	2400	2.0	1	9	1	1×2	5.0	1	23	2	2+3	9.0	1/3	41/24	3	3×3
DF 2700	2700	3.0	1	14	2	2×1.5	5.0	1	23	2	2+3	10.5	1	48	3	3×3 + 1.5
DF 3000	3000	3.0	1	14	2	2×1.5	6.0	1/3	27/16	3	3×2	12.0	1/3	55/32	3	3×4
DF 3400	3400	3.0	1	14	2	2×1.5	7.0	1	32	3	2+2+3	13.5	1	61	3	3×4+1.5

* air temperature leaving the electrical coil = entering air temperature (before the coil) + ΔT (3 / 5.5 / 11 °C)
+ Azar Nasim does not provide any control device for electrical heater except air flow switch.

Table 7	COIL FACE VELOCITY CORRECTION FACTOR												
Model	Correction type	Face Velocity (m/min)											
		190	105	115	120	130	140	145	150	160	170	180	200
DF 1400	Total	0.82	0.94	0.98	1.01	1.05	1.08	1.12	1.15	1.18	1.20	1.26	1.32
	Sensible	0.83	0.92	0.97	1.01	1.05	1.10	1.15	1.19	1.23	1.27	1.34	1.42
DF 1700	Total	0.83	0.92	0.96	0.99	1.03	1.06	1.09	1.13	1.16	1.19	1.24	1.30
	Sensible	0.80	0.90	0.94	0.99	1.04	1.07	1.12	1.16	1.20	1.23	1.31	1.38
DF 2000	Total	0.81	0.90	0.93	0.97	1.01	1.04	1.07	1.10	1.13	1.16	1.22	1.28
	Sensible	0.78	0.88	0.92	0.97	1.01	1.05	190	1.13	1.17	1.21	1.28	1.35
DF 2400	Total	0.80	0.88	0.92	0.96	1.00	1.03	1.06	1.09	1.13	1.16	1.22	1.27
	Sensible	0.77	0.87	0.91	0.96	1.00	1.04	1.08	1.12	1.16	1.20	1.26	1.33
DF 2700	Total	0.79	0.88	0.91	0.95	0.99	1.03	1.06	1.09	1.12	1.15	1.21	1.27
	Sensible	0.77	0.86	0.90	0.94	0.99	1.03	1.07	1.10	1.14	1.18	1.25	1.32
DF 3000	Total	0.81	0.90	0.94	0.98	1.01	1.05	1.09	1.12	1.16	1.18	1.25	1.30
	Sensible	0.79	0.88	0.93	0.97	1.01	1.06	1.10	1.14	1.18	1.21	1.29	1.36
DF 3400	Total	0.82	0.91	0.95	0.99	1.04	1.07	1.11	1.14	1.17	1.21	1.27	1.33
	Sensible	0.80	0.90	0.94	0.99	1.02	1.08	1.12	1.16	1.20	1.24	1.31	1.39

Use these correction factors as multipliers to the capacity ratings offered in the tables.

$$\text{Real Capacity KW} = \begin{bmatrix}\text{Table Ratings KW}\end{bmatrix} \times C_1 \times C_2 \times C_3 \times C_4 \times C_5$$

Table Ratings: Capacity from Tables 3 ~ 6
C_1: (C_T or C_S) Coil Face Velocity Correction Factor from Table 7
C_2: (C_A) Altitude Correction Factor from Table 8
C_3: Fin Material Correction Factor from Table 9
C_4: Refrigerant Correction Factor from Table 10
C_5: (C_{WB}) Air Wet Bulb or Entering Water or Evaporating Temperature Correction Factor from figures 1~3

or
Divide your required capacity by these correction factors before you go through the tables.

TABLE 8	ALTITUDE CORRCTION FACTOR (C2)
m	Capacity Factor
0	1
760	0.97
1500	0.94
2300	0.91
3050	0.88

TABLE 9	FIN MATERIAL CORRECTION FACTOR (C3)
Fin Material	Correction Factor
Al	1
Cu	1.05

TABLE 10	REFRIGERANT CORRECTION FACTOR (C4)
Refrigerant (Dx Coil)	Correction Factor
R22	1
R134a	0.88
R407c	0.99

CAPACITY CORRECTION FACTOR

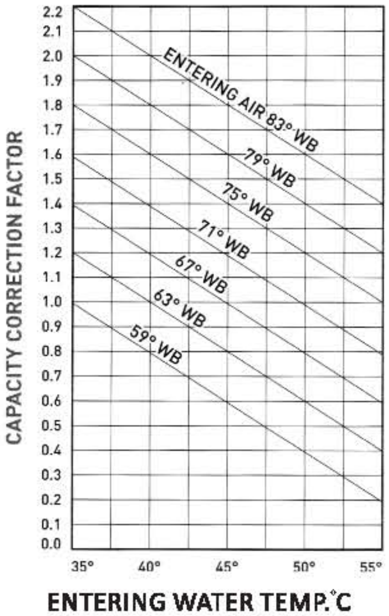


FIGURE 1. CHILLED WATER COIL CORRECTION FACTOR

Corrected load = load from table 3 × correction factor from figure 1 All correction factors are Based on 27/19.5 °C entering dry and wet bulb temp.

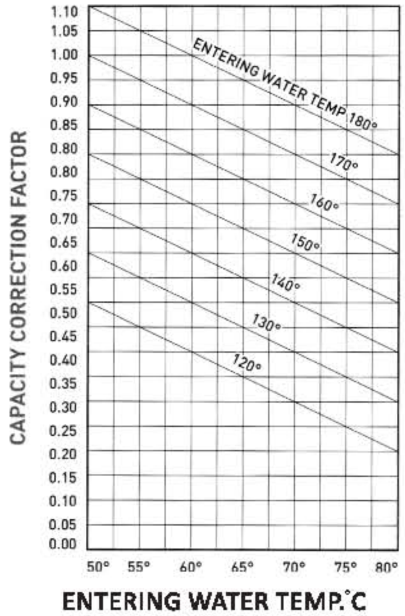


FIGURE 2. HOT WATER COIL CORRECTION FACTOR

Corrected load = load from table 5 × correction factor from figure 2 All correction factors are based on entering air dry bulb = 15.5°C and entering water = 82°C

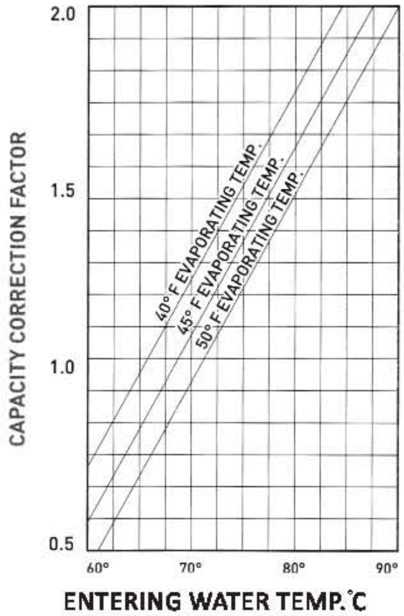


FIGURE 3. DX COIL CORRECTION FACTOR

Corrected load = load from table4 × correction factor from figure 3 All correction factors are based on 27/19.5 Entering dry and wet bulb temp. at 7°C Evaporating temp.

CONTROL FEATURES

There are different ways of controlling fan coils:

1- Fan Speed Control

a) Manual : The units are provided with a manual three- fan speed control. (Unit or wall mounted)

b) Automatic: The fans could be switched ON/OFF while has been set to one of the three different working condition (Low, Medium or High) by a single-stage thermostat. (Not included) A Four-stage thermostat (including OFF) could also control the fan speed automatically. (Not included)

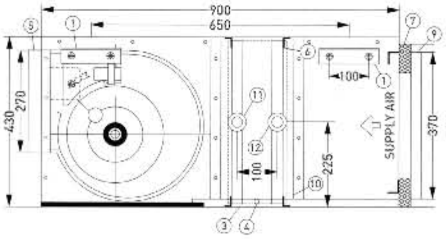
2- Water Control Valves

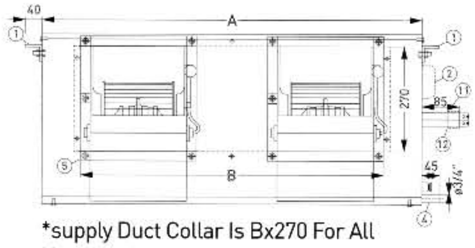
a) Manual: By having hand-operated valves installed in the supply or return water circuit, each unit could be isolated from the whole water system. (Not included)

b) Automatic: Valves could be either solenoid or motor operated. Two or Three way valves also could be used. (Not Included) Thermostat could control a solenoid valve or also two-way or Three-way water Valve to set the suitable flow rate of water. (Not Included)

3- Electrical Coil Safety Temperature Control

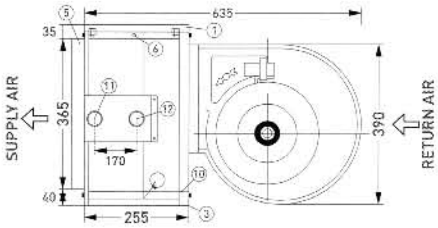
An optional control device could turn off the electrical coil if its temperature rises above a defined limit. (Not included)

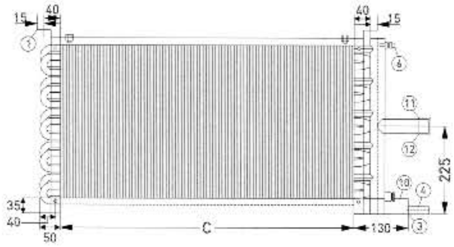




*supply Duct Collar Is Bx270 For All Horizontal Models.

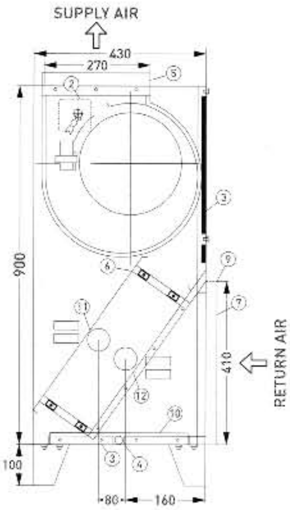
FIGURE 4. EXPOSED HORIZENTAL MODELS



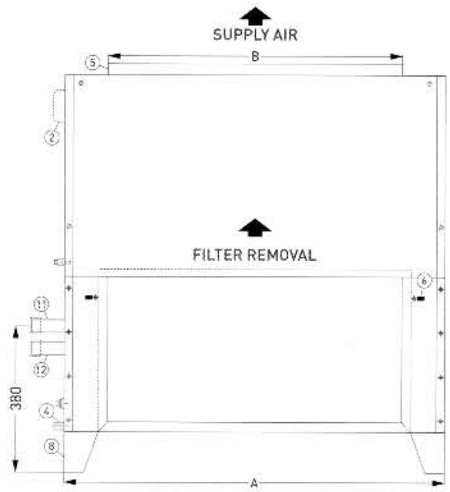


*supply Duct Collar Is Cx365 For All Concealed Horizontal Models.

FIGURE 5. CONCEALED HORIZENTAL MODELS



1. MOUNTING BRACKET
2. MOTOR JUNCTION BOX
3. FOAM INSULATION
4. DRAIN CONNECTION
5. SUPPLY DUCT COLLAR
6. AIR VENT
7. FILTER (OPTIONAL)
8. MOUNTING LEGS (OPTIONAL)
9. RETURN DUCT COLLAR
10. DRAIN PAN
11. COIL WATER INLET
12. COIL WATER OUTLET



*supply Duct Collar Is Bx270 For All Vertical Models.

FIGURE 6. EXPOSED VERTICAL FREE STANDING MODELS

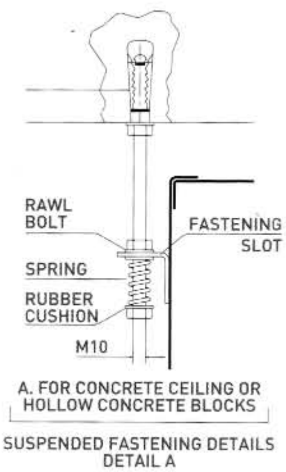
EXPOSED VERTICAL FREE STANDING MODELS ENGINEERING DATA

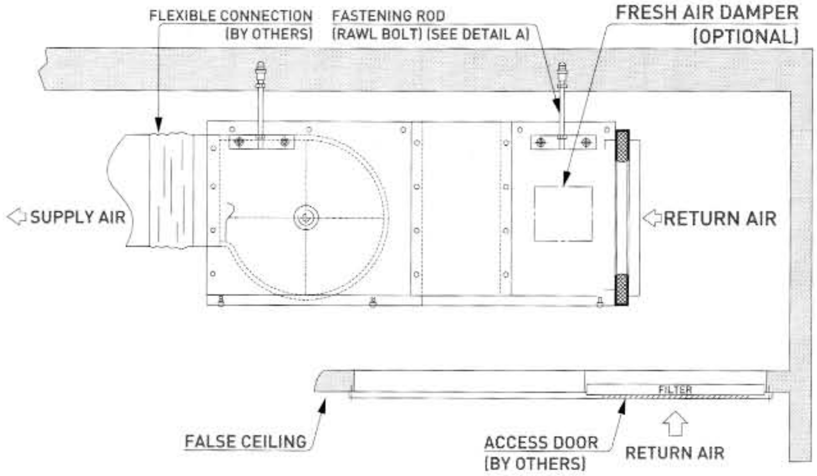
Model	Nominal Air Flow m^3/hr	Number of Fans	A mm	B mm	C mm	Inlet mm	Outlet mm	Drain mm	Weight(Kg) Net	Weight(Kg) Oper.
DF 1400	1400	1	650	285	500				67	70
DF 1700	1700	1	750	345	600				72	75
DF 2000	2000	1	850	750	700				96	90
DF 2400	2400	2	950	750	800				96	100
DF 2700	2700	2	1050	805	900	25	25	20	103	105
DF 3000	3000	2	1200	870	1050				112	118
DF 3400	3400	2	1350	960	1200				120	127

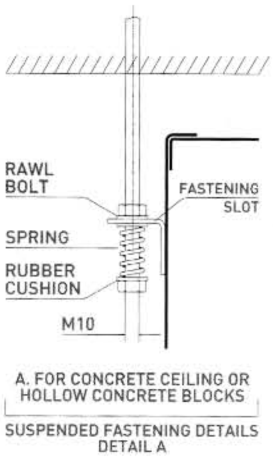
***All dimensions in mm except as specified**

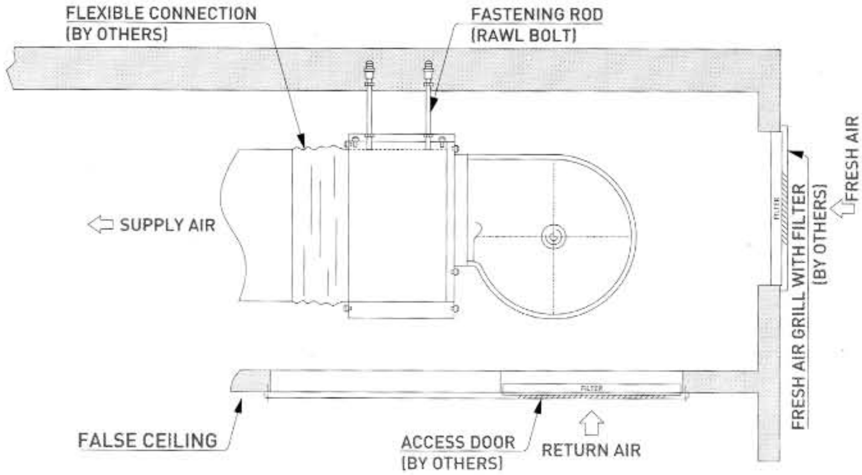
***All dimensions ± 5 mm**

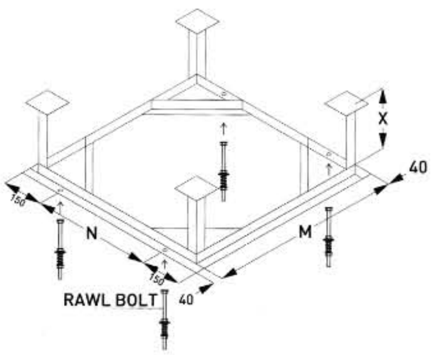
***All dimensions are subject to change without notice**

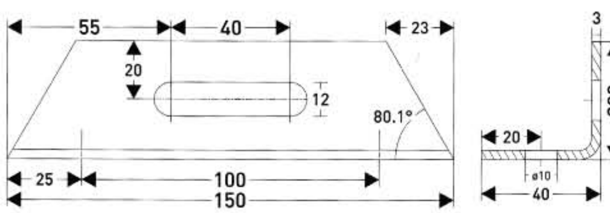


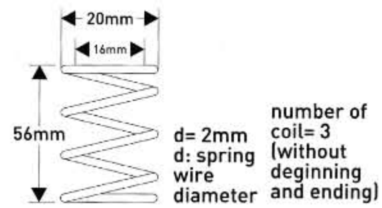












* The frame above is not included with units.
* All dimensions are in mm.
* The units are fastened to the Rawl bolts.
* The square metal plates in the end of hanger will be placed inside concrete before concrete pouring.
* M for Exposed Horizontal models is equal to A in dimension tables on page 13 and for Concealed
* Hori2ontal models is equal to C on the same page.
* N for Exposed Horizontal models is 650 mm and for
* Concealed Horizontal models is 155 mm.
* X should be determined according to ceiling dimentions.
* The thickness of metal angles (profiles) is at least 2 mm.
* 4 fastening rods for each unit are required.

* Using of springs to avoid transmission of vibration to the building is strongly recommended.
* For each spring it is recommended that k = 9 N/mm
* Various types of springs could have a k of 9 N/mm. A common example could be as in the figure

TABLE 11	AIR ENTHALPY VS. ALTITUDE					
Wet Bulb Temp °C	Altitude					
	0	315(m)	625(m)	940(m)	1250(m)	1560(m)
	Enthalpy of Air (KJ/Kg)					
1.5	30.2	30.7	31.1	31.5	32	32.4
5	36.5	37	37.5	38.1	38.7	39.3
10	47.20	47.9	48.7	49.5	50.3	51.2
15	60	61	62	63.1	64.3	65.5
20	75.36	76.8	78.3	79.9	81.5	83.2
25	94.27	96.3	98.4	100.5	102.7	105

TABLE 12	AIR DENSITY vs. ALTITUDE	
Altitude (meters)	Density	Press.
	Kg/m^3	KPa_g
0	1.2	7.45
150	1.18	7.32
310	1.17	7.19
460	1.15	7.06
610	1.13	6.93
770	1.12	6.8
920	1.1	6.68
1070	1.08	6.56
1220	1.07	6.44
1400	1.05	6.32
1550	1.035	6.2
1700	1.02	6.08
1850	1.004	5.97
2000	0.996	5.85
2150	0.974	5.75
2300	0.959	5.64
25000	0.94	5.53