Pearl Air Handling Unit Product Catalogue

For Wide Range Of Commercial Application
Model: LPCP
1,000-25,000 CFM (0.5-11.8 m^3/s)
33-1,000 MBH (10-293 kw)

July 2002 CFH-CS-5T-0702

Model Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
L	P	C	P	0	8	A	D	A	R	E	D	A	A	0	0	0	0	A	0	0	A

Digits 1, 2, 3 - Unit Model
LPC = Low Pressure Climate Changer

Digit 4 - Development sequence
P = "P" Development sequence

Digit 5, 6 - Unit size
02 = 2 Square feet of coil
03 = 3 Square feet of coil
04 = 4 Square feet of coil
06 = 6 Square feet of coil
08 = 8 Square feet of coil
10 = 10 Square feet of coil
12 = 12 Square feet of coil
14 = 14 Square feet of coil
17 = 17 Square feet of coil
21 = 21 Square feet of coil
25 = 25 Square feet of coil
31 = 31 Square feet of coil
35 = 35 Square feet of coil
40 = 40 Square feet of coil
45 = 45 Square feet of coil
50 = 50 Square feet of coil

Digit 7 - Unit Configuration
(Fan Arrangemet)
A = Horizontal - Arrangement 1 (LPCP02-50)
B = Horizontal - Arrangement 2 (LPCP02-50)
C = Horizontal - Arrangement 3 (LPCP02-50)
D = Vertical - Arrangement 4 (LPCP02-40)
E = Vertical - Arrangement 5 (LPCP02-40)
F = Vertical - Arrangement 6 (LPCP02-40)
G = Vertical - Arrangement 7 (LPCP02-40)

Digit 8 - Unit voltage (Motor Electical Rating)
0 = No motor, No controls
D = 380 - 415 V / 3 Ph / 50 Hz
J = 460 V / 3 Ph / 60 Hz

Digit 9 - Design sequence
A = Design sequence

Digit 10 - Coil and Drain connection
R = Right hand coil and drain connection
L = Left hand coil and drain connection.

Digit 11 - Unit coil type
A = 2 row, 108 FPF
B = 2 row, 144 FPF
C = 2 row, 168 FPF
D = 4 row, 108 FPF
E = 4 row, 144 FPF
F = 4 row, 168 FPF
G = 6 row, 108 FPF
H = 6 row, 144 FPF
Y = 6 row, 168 FPF
J = 8 row, 108 FPF
K = 8 row, 144 FPF
L = 8 row, 168 FPF

Digit 12 - Motor Horsepower
0 = No motor
A = 1/2 HP (0.37 kW)
B = 1.0 HP (0.75 kW)
D = 2 HP (1.5 kW)
E = 3 HP (2.2 kW)
G = 5 HP (3.7 kW)
J = 7 1/2 HP (5.5 kW)
K = 10 HP (7.5 kW)
L = 15 HP (11 kW)
M = 20 HP (15 kW)
N = 25 HP (18.5 kW)
P = 30 HP (22 kW)
Q = 40 HP (30 kW)

Digit 13 - Drive
A = Classical (Std)
B = Variable pitch

Digit 14 - Filter
0 = No filter (Std)
A = 2" Washable Aluminum
B = 2" Washable Synthetic
C = 2" Throwaway

Digit 15 - Mixing Box
0 = Without mixing box (Std)
A = With mixing box

Digit 16 - Painting
0 = Unpainted casing
A = Painted casing

Digit 17 - Electric Heater
0 = No electric heater
A = With electric heater

Digit 18 - Drip Eliminator
0 = No drip eliminator
A = With drip eliminator

Digit 19 - Casing Insulation
A = Standard insulation - fiberglass
B = Elastomeric Close Cell Insulation - 1" thk

Digit 20, 21 - Future Option
0 = Future option

Digit 22 - Service digit
A = Present sercive digit

Contents

Features and Benefits

Economical design to suite for commercial application
The fully assembled LPCP air handler offers a large selection of configuration to meet a wide range of cooling and ventilating requirements. LPCP is ideally suite for stores, office buildings, schools or other commercial establishments.

High efficiency performance
Trane engineered fan and heat transfer system provides maximum cooling and airflow while minimizing vibration, acoustic level and power consumption.

Complete product selection program
LPCP is furnished with complete product selection program to ease the product selection process and also generates performance data in professional format for project submission.

Minimum installation cost
The modular casing concept creates an easy way for installation, which will help to minimize field labor cost.

Suitable for retrofit, renovation and replacement
LPCP is designed to have compact casing to suite the need for retrofit, renovation and replacement market. Small footprint also ensures economical use of building space.

Excellent condensate management
Sloping drainpan allows for total condensate removal. A unique feature developed to prevent stagnant water in air handling unit.

Sturdy construction
LPCP is sturdily constructed based on a specially designed rigid frame and reinforcement. This means modules can be stacked in a vertical air handler configuration, but also allows removal of panel for unlimited access.

Optimized coil
The coil is manufactured of 1/2 inch OD coppers tubes, aluminum fins, steel header and galvanized steel coil casing. All coils are selected and optimized for application pressure drop and capacity requirements.

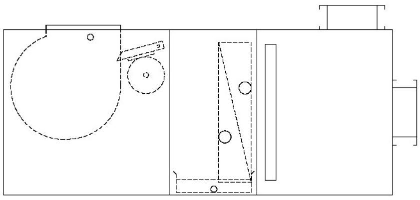
Ease of servicing
The coils, motors and drives are easily accessible for service through the removable panels provided on both sides of the units.

Quality assurance
Trane combines comprehensive performance with laboratory testing and advanced manufacturing method to assure performance and commitment to quality. Together, these elements help assure that each LPCP operates predictably and reliably throughout the life of the unit.

Application Consideration

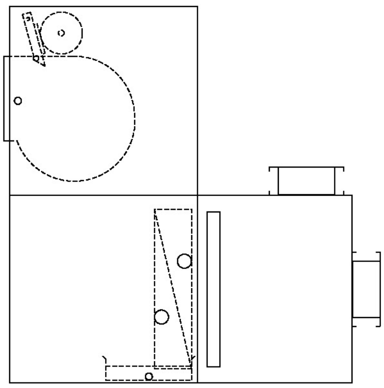
Basic Unit Style

Trane LPCP air handling units (AHU) are available in two basic styles: the Horizontal Draw Thru and the Vertical Draw Thru.

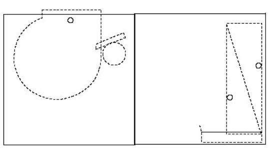


Horizontal Draw Thru

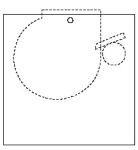
Horizontal Draw Thru (HDT) and Vertical Draw Thru (VDT) LPCP are applied in cooling (Chilled Water) applications. The LPCP cooling coil section is equipped with a sloping drain pan. Trane can offer multiple choices in fan arrangements to suit project requirements. Cabinet fans are generally used as ventilating units. They are available with forward curved fans, and are generally easier to install compared to a bare centrifugal fan.



Vertical Draw - Thru



Fan & Coil



Cabinet Fan

Air Handling Unit Selection

The selection of Trane LPCP air handlers is generally done using the Trane selection program. This software is installed in all Trane Sales Offices and can provide you with fast and accurate selections based on your project's design specifications.

Standard FC fan performance are designed in accordance to AMCA 99 and coil performances are rated in accordance to ARI 410 respectively. Fan performance ratings include effects for the air handling unit casing as compared to bare centrifugal fan performance, where the designer would need to derate the fan performance to account for the casing effects. The Trane selection program accounts for casing losses and thus gives more accurate performance estimation of the AHU fan.

Ductwork Considerations

Catalogued fan performance is based on specific fan testing methods in AMCA. The system designer should be aware that all air-handling units are not the same and their performance once installed may differ from the quoted performance depending on how the unit is installed. Since the Trane LPCP fan are tested and rated as complete air handling units, the effects of inlet conditions of the fan are already accounted for in the ratings.

Discharge conditions in a Draw-Thru air handler can abnormally affect performance and should be considered in system design. Performance reduction is a function of the type of discharge connection and the velocity pressure.

Fan performance reduction of fan static pressure reduction for discharge conditions other than a straight run of ductwork can be expressed as a function of fan outlet velocity:

$$SP_L\,[Pa] = C_0 \times 0.5 \times \rho \times (V_0)^2$$

Where:

C_0 = fan system loss coefficient
ρ = air density [kg/m^3]
V_0 = fan outlet velocity [m^3/s]

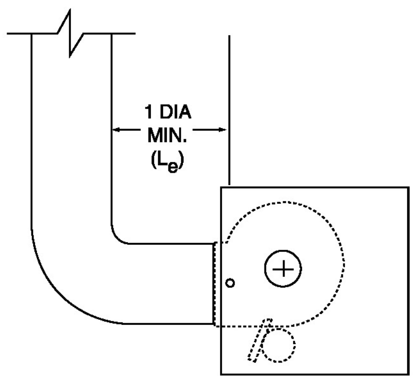
C_0 factors can be obtained from duct design manuals or from the ASHRAE Handbook of Fundamentals.

In order to obtain the rated performance of the fan, the length of straight duct connected to the fan outlet must be at least 100% of the effective duct length (L_e). Where

$V_0 > 13$ m/s, $L_0 = V_0\,(A_0) / 4500$
$V_0 < 13$ m/s, $L_0 = (A_0) / 350$

V_0 = duct velocity [m/s]
L_0 = effective duct length [m]
A_0 = duct area [mm^2]

However, due to site conditions, an elbow is often installed near the fan discharge. Trane recommends that elbows should be in the direction of fan rotation to reduce fan performance loss.



Elbows Near Fan Discharge

Application Consideration

Trane LPCP air handling units offer a comprehensive variety of discharge arrangements to suit jobsite conditions. The system designer can select any of these discharge arrangements with the knowledge that the first elbow should match the direction of fan rotation and should ideally be a distance of L_e from the discharge. If this is not done, a correction factor should be applied to account for fan system effect loss.

Air Density Correction

Fan curves and tables are rated in standard air at sea level. Jobsite locations could have different air densities due to the elevation of that location. The elevation that above 1000ft is considered to be an impact to the calculation. In order to achieve the same airflow and static pressure at the design elevation, the static pressure has to be converted to standard air before the fan curves and tables can be used.

From fan laws, we know that:

For $Q_s = Q_a$, we have

$(\rho_s / \rho_a) = (kW_s / kW_a) = (SP_s / Sp_a)$

Where
Q = airflow [L/s]
ρ = air density [kg/m3]
kW = fan shaft power [kW]
SP = fan static pressure [Pa]

Subscript (a) for actual air and subscript (s) for standard air at sea level.

Once the standard air shaft power and rpm are determined, the shaft power has to be converted from standard air to actual conditions using the fan laws equation above. The fan speed in rpm will remain the same.

Occasionally air-handling units will be used to handle cooler air than design.

For example, a Trane LPCP selected to handle 45 ^{0}C air. Since fans are constant volume devices, the heavier 15 ^{0}C air will require more shaft power to move the air. The designer can use the fan law equation above or approximate this change by:

$(kW_s/kW_a) = \{288/ (\text{Actual Temp} +273)\}$

Where Actual temperature is in ^{0}C

Fan Heat

The fan adds energy to the air stream. The amount of energy added is equal to the fan work, which is directly related to the shaft power. Much of this energy is converted to velocity and static pressure, while a small amount of energy is converted to heat energy within the system. This fan heat will increase the temperature of the supply air. Trane LPCP have motors and drive inside the air stream, and since they are Draw-Thru air handling units, the fan heat is added to the supply air temperature.

The addition of fan heat to the air stream temperature can be calculated as follows:

$T\,(fan) = (1 - \eta_f)\,(SP + VP) / 1230$

Where

T (fan) = Temp rise across fan [K]
η_f = fan mechanical efficiency
SP = fan static pressure [Pa]
VP = fan velocity pressure [Pa]
= $0.5\, \rho_a V_o^2$

Motor Heat

Electric motors are used to drive the fans to produce air movement. Heat given out by electric motors due to their inefficiencies can raise the temperature of the air stream. Trane LPCP air handling units has internally mounted motor; thus the motor heat will raise the temperature of the supply air stream. This increase in temperature can be estimated as follows:

$T\,(motor) = (1-\eta_m)\,(W) / 1230$

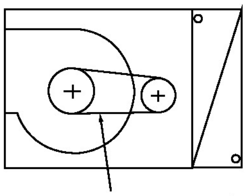
Where
T (motor) = Temp rise due to motor heat [K]
η_m = motor efficiency at operating point
W = consumed power [W]

Application Consideration

The Effect of Drive Losses

The effect of drive component losses is rarely considered in fan selections. However, actual test conditions where catalogued and selection ratings are done with the fan driven by a dynamometer, which measures shaft power. This test setup has no drive component losses.

In actual installations, the fans are belts driven by an electric motor. Belt losses are a function of the type of belts used, the number of belts, belt tension etc. Typical belt drive losses are in the order of 2 to 6%, the average being 3%. When selecting a motor at or near its nameplate rating, this should be taken into account. The fan heat, motor heat and drive looses are not considered in AHU fan selections. It is designer's judgement to add on if he or she thinks fit.



Drive Losses approx3%

Drive Losses

Motor Sizing

When sizing a motor for fan applications, the shaft power and drive losses are not the only considerations. The designer also must consider fan characteristics depending on whether the fan wheel is forward curved or backward curved, as well as air pressure drops of accessories such as filters and mixing boxes. Once the airflow and total static pressure requirement is determined , the designer can proceed to select the motor size. General fan motor sizing guidelines are as follows:

If $W < 10$ kW, then $W_m = W \times 1.20$
If $W > 10$ kW, then $W_m = W \times 1.15$

Where

W = fan shaft power [W]
W_m = required motor power [W]

AHU Components

LPCP air handlers adopt a modular approach to air handler design.

Each module contains one or more components that serve a specific purpose unique to each application. The air-handling functions needed, along with the desired layout and arrangement, ultimately determine what modules the air handler must include.

The rest of this section briefly summarizes the general purpose and application considerations associated with each LPCP type. Make sure the selected modules and final air handler design diligently address your need in manner that optimizes the unit's footprint and performance characteristics. Also bear in mind that a factory-packaged air handling system is typically more efficient, more cost-effective and less prone to misapplication than a comparable "built-up" system.

Mixing Box Module

The mixing box module typically combines the incoming outdoor air with recalculated return air collected from the occupied space, and is commonly included in an air handler's design to control the mixture of outdoor and recalculated return airflow. Standard mixing box shall have one damper mounted on top and the other one mounted at the back.

Filter Module

Containing particulate filtering media. This module removes contaminants from the passing air stream to improve indoor air quality.

Application considerations:
Exceeding the filter's face velocity limit will increase its resistance (as well as fan energy consumption) and necessitate more frequent maintenance or replacement.

Coil Module

Coil modules temper all (full-face) of the passing air stream by cooling or dehumidifying with a factory-mounted coil.
Unit coils are designed exclusively for use in LPCP air handlers. They have $^1/_2$ inch OD tubes : specify 2 to 8 rows.

Application considerations for chilled water:

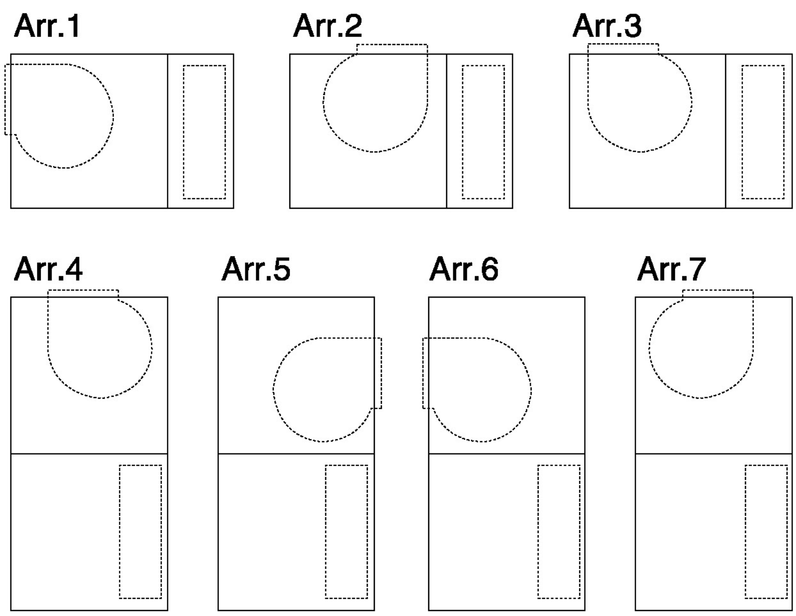
- Size the coil to prevent moisture carryover due to high airflow velocities.
- Properly size the condensate U-trap to provide positive drainage.
- Sloped drain pans to eliminate level seams and promote condensate flow directly to the drain outlet.

Application Consideration

Fan Module

Fan size designers can choose from various fan sizes to tailor the air handler's performance to application requirements; Table summarizes the characteristics and application consideration of the FC fans.

	FC Fan
Fan type	Centrifugal, housed
Inlet direction	Double
Airflow direction	Radial
Optimal static pressure range	Low to medium (0 - 4 in.wg)
Operating cost (Relative)	Low
Blade shape	Curved
Acoustical characteristics	Significant air turbulence that quickly abates: little blade-tone noise
	Low noise
Suggested source attenuation	Add a discharge plenum
Last solution	Add sound attenuator
Motor overloading characteristic	Overloading- sensitive to the change of operating conditions
When to use?	Low-to medium pressure applications



Fan Arrangement

Note:
LPCP 45 and LPCP50 are available for HDT (Arr.1-3) only.

Quick Select
English Version

The LPCP air handling unit is easy to select. Just follow the 4-step selection procedures below!

Selection procedure

Step 1 Determine what is the optimum coil face velocity.
Step 2 Using the given design airflow and table below. You can determine the unit size picking the unit closest airflow.
Step 3 Configure your unit with the option and dimension on “unit sizes” section in the book. For quick selection unit, refer to the following table.
Step 4 Finalize all fan coil selections using the Computer Program.

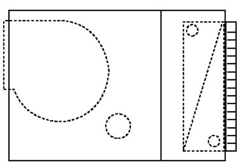
Example Optimum coil face velocity = 500 fpm
Design air flow = 15600 cfm

Using table below, the optimum size is LPCP 31.

LPCP Quick Selection Guide

Unit Model	Coil Face Area	Air flow at 500 fpm	Total Cooling Capacity		External Static Pressure	Dimension (HDT unit)			Shipping Weight	Water Pressure Drop	Water Flow Rate	Std Motor Power
						L	W	H				
Unit Size	ft^2	cfm	MBH	Tons	in.wg.	inch	inch	inch	lbs.	ft.wg.	GPM	hp
LPCP02	2.08	1,040	33.3	2.8	1.2	34.1	34.3	20.0	293	1.2	6.6	1.0
LPCP03	3.00	1,500	47.1	3.9	1.2	40.6	31.9	26.5	299	0.8	9.4	2.0
LPCP04	4.00	2,000	66.1	5.5	1.2	40.6	39.0	26.5	408	2.1	13.2	2.0
LPCP06	5.99	2,995	102.2	8.5	1.2	44.6	44.7	30.5	557	3.7	20.4	3.0
LPCP08	8.00	4,000	106.4	8.9	1.2	44.6	56.3	30.5	686	1.4	21.3	5.0
LPCP10	10.00	5,000	138.3	11.5	1.2	48.0	59.1	37.9	820	1.5	27.7	5.0
LPCP12	11.67	5,835	162.5	13.5	1.2	48.0	59.1	43.1	990	1.5	32.5	7.5
LPCP14	13.61	6,805	205.5	17.1	1.2	48.0	66.9	43.1	1074	2.5	41.1	7.5
LPCP17	16.53	8,265	267.5	22.3	1.2	51.2	79.0	44.9	1272	4.6	53.5	7.5
LPCP21	20.42	10,210	348.0	29.0	2.0	51.2	95.0	44.9	1482	8.5	69.6	10.0
LPCP25	25.00	12,500	440.9	36.7	2.0	61.0	109.1	44.5	1839	12.3	88.2	15.0
LPCP31	30.00	15,000	521.6	43.5	2.0	62.2	109.1	53.2	2240	11.5	104.3	20.0
LPCP35	35.00	17,500	610.5	50.9	2.0	66.9	109.1	59.6	2467	11.8	122.1	20.0
LPCP40	40.00	20,000	701.3	58.4	2.0	66.9	109.1	67.1	2690	12.9	140.3	25.0
LPCP45	45.40	22,500	829.6	69.1	2.0	98.4	109.1	80.6	3527	21.0	165.9	25.0
LPCP50	50.40	25,000	887.7	74.0	2.0	98.4	109.1	86.9	3807	12.5	177.5	30.0

Note:
1. Above cooling capacities based on standard air flow rate and following conditions:
Chilled water temperature: Entering 45°F and leaving 55°F.
Entering air condition: 80°FDB/67°FWB.
2. Above unit weight shall include forward curved fan section, 4 row 144 fin/foot cooling coil section (1/2” copper tube/ aluminium fin), flat filter section (include media).
3. LPCP02-06 are based on coils with turbulators.



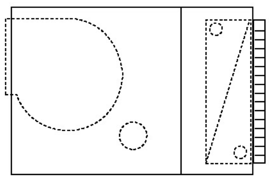
Unit Configuration: Fan section+Coil Section+Flat filter Frame

Quick Select
Metric Version

LPCP Quick Selection Guide

Unit Model	Coil Face Area	Air flow at 500 fpm	Total Cooling Capacity	External Static Pressure	Dimension (HDT unit)			Shipping Weight	Water Pressure Drop	Water Flow Rate	Std Motor Power
					L	W	H				
Unit Size	m2	m3/s	kW(refrig. effect)	Pa	mm	mm	mm	Kg	kPa	l/s	kW
LPCP02	0.19	0.49	9.8	300	866	870	508	133	3.5	0.4	0.75
LPCP03	0.28	0.71	13.8	300	1031	810	673	136	2.3	0.6	1.50
LPCP04	0.37	0.94	19.4	300	1031	990	673	185	6.1	0.8	1.50
LPCP06	0.56	1.41	29.9	300	1133	1135	775	253	10.7	1.3	2.20
LPCP08	0.74	1.89	31.2	300	1133	1430	775	311	4.2	1.3	3.70
LPCP10	0.93	2.36	40.5	300	1220	1500	963	372	4.5	1.7	3.70
LPCP12	1.09	2.75	47.6	300	1220	1500	1095	449	4.3	2.1	5.50
LPCP14	1.27	3.21	60.2	300	1220	1700	1095	487	7.3	2.6	5.50
LPCP17	1.54	3.90	78.4	300	1300	2007	1140	577	13.2	3.4	5.50
LPCP21	1.90	4.82	102.0	500	1300	2413	1140	672	24.5	4.4	7.50
LPCP25	2.33	5.90	129.2	500	1549	2770	1130	834	35.5	5.6	11.00
LPCP31	2.79	7.08	152.8	500	1580	2770	1350	1016	33.3	6.6	15.00
LPCP35	3.26	8.26	178.9	500	1700	2770	1514	1119	34.2	7.7	15.00
LPCP40	3.72	9.44	205.5	500	1700	2770	1704	1220	37.3	8.8	18.50
LPCP45	4.22	10.62	243.1	500	2500	2770	2047	1600	60.6	10.5	18.50
LPCP50	4.69	11.80	260.1	500	2500	2770	2207	1727	36.3	11.2	22.00

Note:
1. Above cooling capacities based on standard airflow rate and following conditions:
   Chilled water temperature: Entering 7.2°C and leaving 12.8°C.
   Entering air condition: 26.7°CDB/19.4°CWB.
2. Above unit weight shall include forward curved fan section, 4 row 473 fin/meter cooling coil section (1/2” copper tube/ aluminium fin). Flat filter section (include media).
3. LPCP02-06 are based on coils with turbulators.



Unit Configuration: Fan section+Coil Section+Flat filter Frame

General Data
Casing & Fans

Casing Type

- The casing structural components are constructed of heavy gage galvanized steel.
- All sections are insulated with 1-inch aluminum foil-faced fiberglass with density of 32 kg/m^3.
- Casing access panels provide generous access to the fans, motor and drive from both sides of the air handler.
- Access panels are easily and quickly removed for maintenance and cleaning.
- LPCP are designed to suit the technical requirements of each application. The modular and compact casing is especially suitable for replacement projects.

Fan

LPCP air handling units are supplied with double inlet, double width (DIDW) centrifugal blowers with Forward Curved Blade (FC).

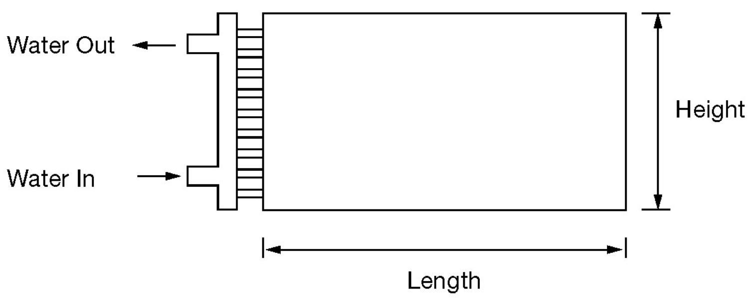
Construction

- Fan casings are constructed of galvanized steel with series of punched holes or nutserts allowing the fixing of accessories such as frames or support structure thus providing a variety of discharge positions.
- The impeller (blade) is galvanized steel finish and securely fixed to the solid straight shaft.
- All fan impellers are statically and dynamically balanced by the fan supplier up to grade 6.3 per ISO 1940. In addition, to ensure quality, complete fan assembly balancing procedure is performed on every air handler before shipment. The entire unit include fan wheel, fan shaft, fan pulley, motor pulley, belts and motor is vibration balanced at the operating rpm. All these extra effort pays off with longer unit life and less quality issues at jobsite.
- Fan shafts are of carbon steel (C40) grade and machined to close tolerances (G6 grade).
- The fan has been designed for clean air within the temperature limits from -20 deg ^{o}C to +85 deg ^{o}C.

General Data
Coil

Chilled Water Coil Dimension

LPCP Size	Coil Face Area (ft.)	Nominal Fin Height (in)	Fin Length (in) (in)
02	2.08	12.6	24.2
03	3.00	20.1	21.9
04	4.00	20.1	28.9
06	5.99	25.1	34.7
08	8.00	25.1	46.3
10	10.00	30.1	48.2
12	11.67	35.1	48.2
14	13.61	35.1	56.1
17	16.53	35.1	68.2
21	20.42	35.1	84.2
25	25.00	37.6	96.7
31	30.00	45.1	96.7
35	35.00	52.6	96.7
40	40.00	60.1	96.7
45	45.40	67.6	96.7
50	50.40	75.1	96.7



General Data
Mixing Box

Air Pressure Drop for Mixing Box Dampers (Pa)

Model	Damper Face Velocity m/s (FPM)								
LPCP	2.0 (400)	2.5 (500)	3.1 (600)	3.6 (700)	4.1 (800)	4.6 (900)	5.1 (1000)	5.6 (1100)	6.1 (1200)
02	19	20	20	23	25	25	28	30	30
03	19	20	20	23	25	25	28	30	30
04	19	20	20	23	25	25	28	30	30
06	19	20	20	23	25	25	28	30	30
08	19	20	20	23	25	25	28	30	30
10	19	20	20	23	25	25	28	30	30
12	19	20	20	23	25	25	28	30	30
14	19	20	20	23	25	25	28	30	30
17	19	20	20	23	25	25	28	30	30
21	19	20	20	23	25	25	28	30	30
25	19	20	20	23	25	25	28	30	30
31	19	20	20	23	25	25	28	30	30
35	19	20	20	23	25	25	28	30	30
40	19	20	20	23	25	25	28	30	30
45	19	20	20	23	25	25	28	30	30
50	19	20	20	23	25	25	28	30	30

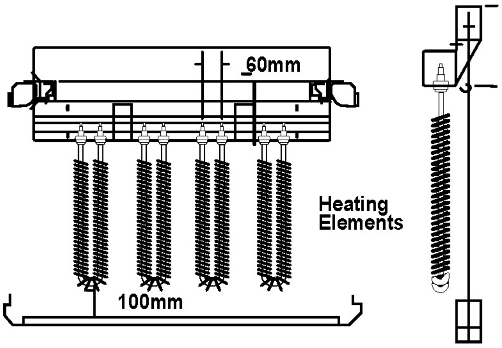
General Data
Filter

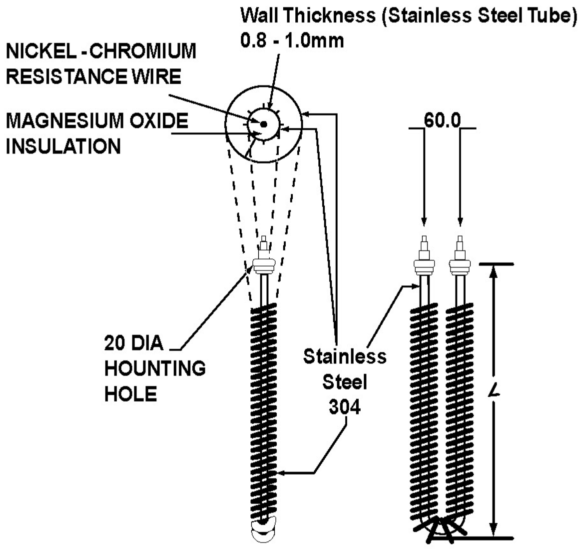
Filter Dimension and Arrangement

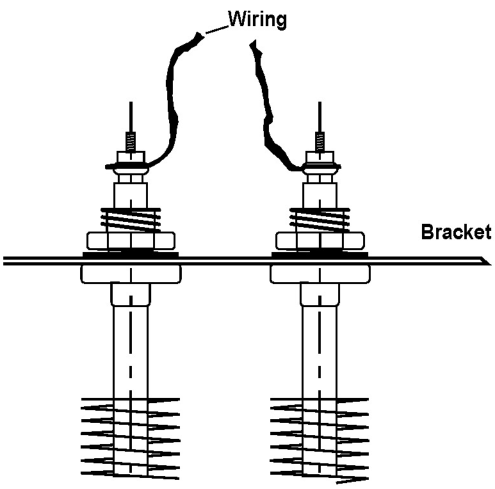
Model	Dimension	Filter Arrangement	Model	Dimension	Filter Arrangement
02	25" X 15" (635 X 381)	15 25	17	70" X 40" (1778 X 1016)	20 20 20 25 25
03	24" X 24" (610 X 610)	24 24	21	85" X 40" (2159 X 1016)	20 20 20 20 20 25
04	32" X 24" (813 X 610)	24 16 16	25	102" X 40" (2591 X 1016)	20 20 15 15 16 16 20 20
06	36" X 25" (914.5 X 635)	25 16 20	31	102" X 50" (2591 X 1270)	25 25 15 15 16 16 20 20
08	48" X 25" (1219 X 635)	25 16 16 16	35	102" X 56" (2591 X 1422)	25 25 25 25 16 20 20 15 15 16 16 20 20
10	52" X 35" (1321 X 889)	20 15 15 15 20 20 16 16	40	102" X 61" (2591 X 1549)	25 25 25 25 16 25 20 15 15 16 16 20 20
12	52" X 40" (1321 X 1016)	15 20 20 16 16	45	102" X 70" (2591 X 1778)	20 25 25 15 15 16 16 20 20
14	60" X 40" (1524 X 1016)	20 20 15 15 15 15	50	102" X 76" (2591 X 1930)	25 25 25 25 16 20 20 20 15 15 16 16 20 20

General Data
Electric Heater

Electric Element Construction & Wiring Point







Basic formula for Electric Heating Calculation

a). Heating capacity (kw)

$$Kw = \frac{CFM \times \text{Temperature Rise (F)}}{3000}$$

Eg. Given CFM = 15,000,15 F Differential Temperature Rise

Calculate the Heating Capacity?

Answer:

$$\text{Capacity kW} = \frac{15{,}000 \times 15}{3000} = 75 \text{ kw}$$

b). Full load Current (Amp).I

Power Watt = (3) x I (Amp) x V (supply voltage)

Or P = (3) x I x V

Eg. Given the Total heating capacity = 30 kw and supply voltage = 415V

Answer:
I = P/ (Sqrt. 3 x 415V)
I = 30,000/(Sqrt. 3 x 415V)
I = 41.7 Amp

c) Phase Current (Amp)

Power Watt = (Amp) x V (supply voltage)

d) Stage Current (Amp) is

$$\text{Stage current, I} = \frac{\text{Full load current Amp, I}}{\text{Numbers of steps of control}}$$

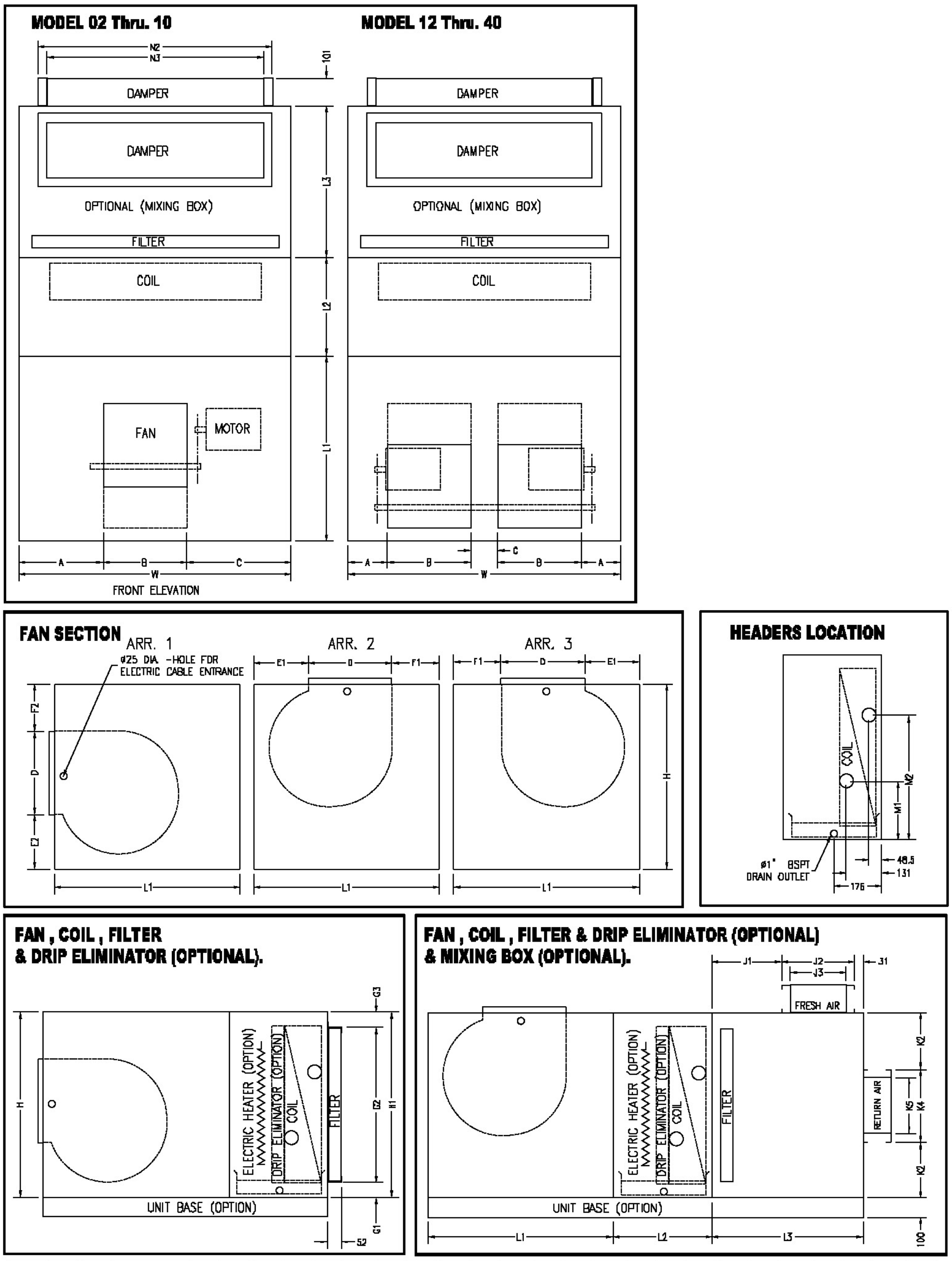
Eg. Given the Total Heating Capacity = 30 kW
Numbers of steps of control = 3
Supply voltage = 415V
What is the current Amp draw?

Answer:
= P/ (Sqrt.3 x 415V)
= 30,000 (sqrt 3 x 415)
= 41.7 Amp (Full load current)

Stage current, Is = 41.7/3
Is = 13.9 Amp

Dimensional Data
HDT

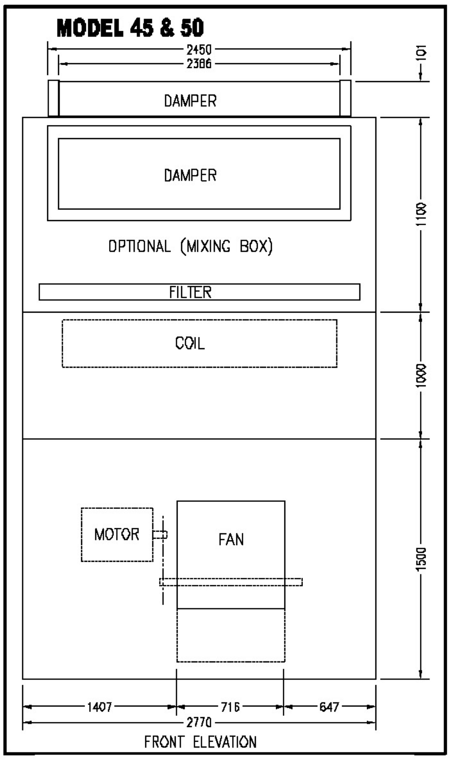
LPCP 02-40
(All dimensions are in mm.)

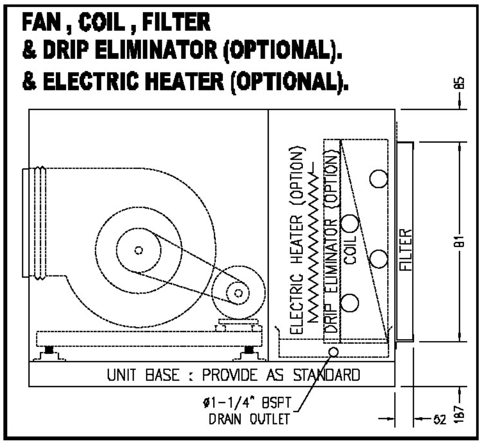


MODEL	H	W	Fan Size	A	B	C	D	E1	E2	F1	F2	G1	G2	H1	J1	J2	J3	K2	K4	K5	L1	L2	L3	M1	M2	N2	N3
02	508	870	KAT 7-7 S	235	238	397	214	147	147	147	147	77	374	508	212	266	202	121	266	202	508	358	510	166	366	610	546
03	674	810	KAT 9-7 S	162	238	410	268	242	242	164	164	45.5	602	674	378	266	202	204	266	202	674	358	675	246.5	446.5	564	500
04	674	990	KAT 9-9 S	325	303	362	268	250	250	156	156	45.5	602	674	378	266	202	204	266	202	674	358	675	246.5	446.5	730	666
06	774	1138	KAT 12-9 S	381.5	313	461.5	344	274	274	158	156	83	828	774	477	268	202	203	368	303	774	358	775	297	497	876	812
08	774	1430	KAT 12-12 S	514.5	401	514.5	344	274	274	158	156	83	828	774	477	268	202	203	368	303	774	358	775	297	497	1170	1106
10	962	1500	KAT 15-15 S	514.5	471	514.5	407	285	454	28	101	63.5	875	962	477	266	202	297	368	303	720	500	776	371	611	1220	1156
12	1095	1500	KAT 12-9 S2	316.5	313	241	344	286	669.5	90	81	56	1002	1095	551	266	202	363.5	368	303	720	500	850	437.5	677.5	1220	1156
14	1095	1700	KAT 15-11 S2	328	378	288	409	273.5	623	37.5	63	56	1002	1095	551	266	202	363.5	368	303	720	500	850	437.5	677.5	1420	1356
17	1140	2007	KAT 15-11 S2	481.5	378	288	409	353.5	647.5	37.5	83.5	79	1002	1140	551	266	202	386	368	303	800	500	850	460	700	1727	1663
21	1140	2414	KAT 18-13 S2	604.5	433	339	483	281	598	36	59	79	1002	1140	551	266	202	336	468	404	800	500	850	460	700	2133	2069
25	1130	2770	FDA 355 T2	676.5	510	397	510	264	561	76	59	71.5	1006	1130	551	266	202	331	468	404	850	700	850	454	694.5	2450	2386
31	1350	2770	FDA 400 T2	676.5	510	397	510	322.5	761	47.5	79	55.5	1259	1350	701	268	202	441	468	404	880	700	1000	250.5	490.5	2450	2388
35	1330	2770	FDA 400 T2	492.5	843	495	643	310.5	827	46.5	60	50	1415	1515	801	268	202	473	569	505	1000	700	1100	274	514	2450	2388
40	1330	2770	FDA 450 T2	492.5	643	495	643	310.5	627	46.5	60	87	1631	1704	699	368	303	517	670	606	1000	700	1100	319	569	2450	2386

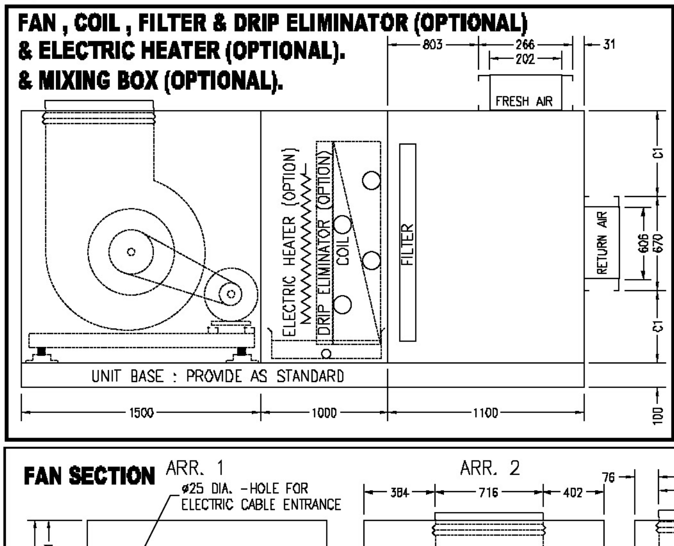
Dimensional Data
HDT

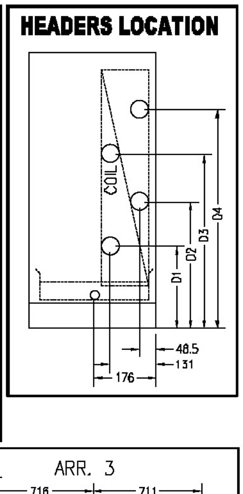
LPCP 45-50
(All dimensions are in mm.)

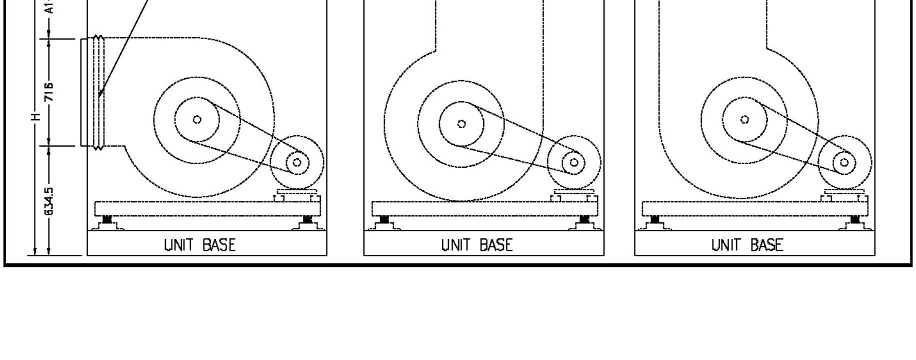




MODEL	H	Fan Size	A1	B1	C1	D1	D2	D3	D4
45	2046	FDA 560 X	693.5	1774	636.5	513	713	1411	1651
50	2206	FDA 560 X	854.5	1934	716.5	561	801	1553.5	1793.5

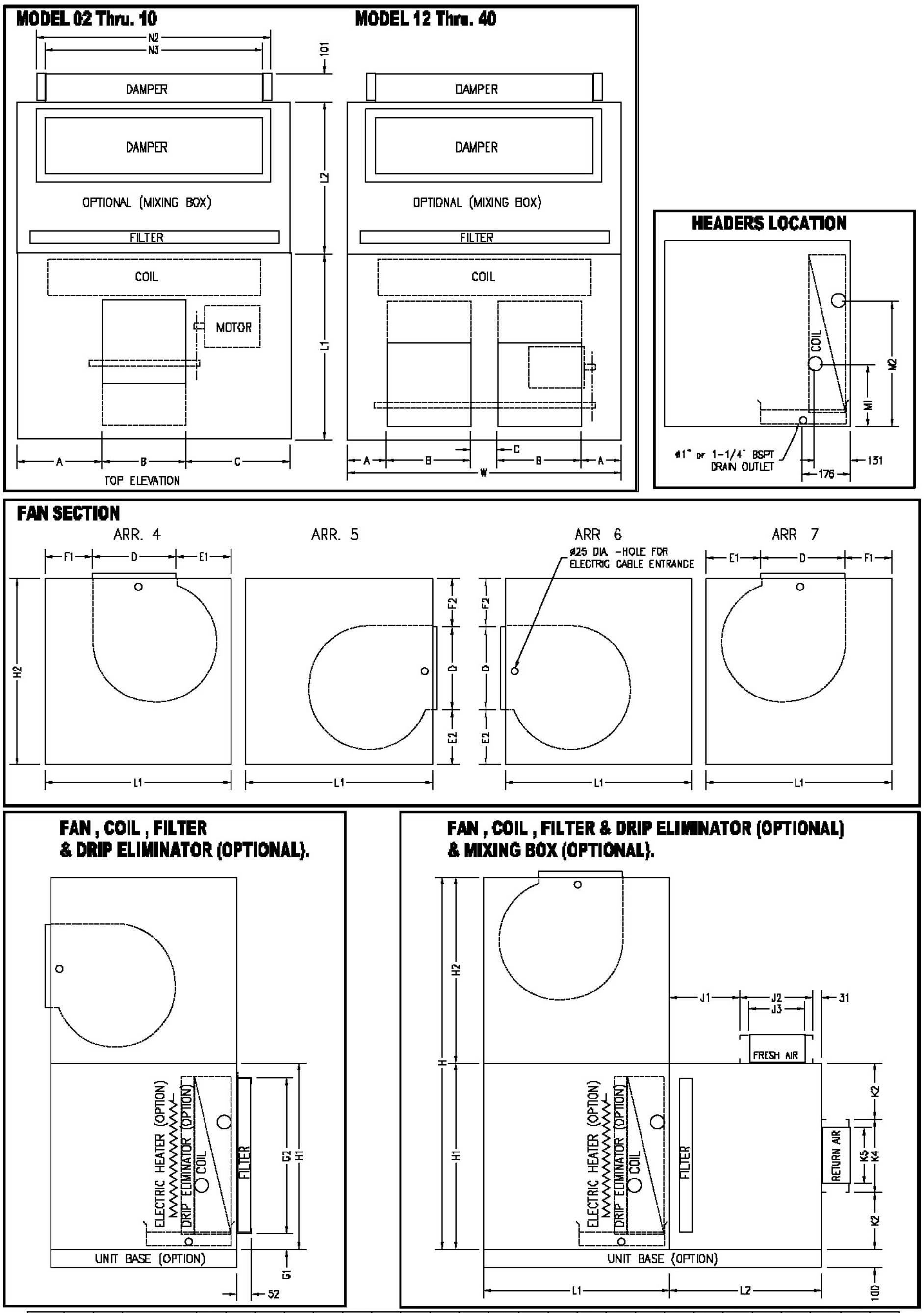






Dimensional Data
VDT

LPCP 02-40
(All dimensions are in mm.)



MODEL	H	W	Fan Size	A	B	C	D	E1	E2	F1	F2	G1	G2	H1	H2	J1	J2	J3	K2	K4	K5	L1	L2	M1	M2	N2	N3
02	1016	870	KAT 7-7 S	235	238	397	214	147	147	147	147	77	374	508	508	212	266	202	121	266	202	508	510	166	366	610	546
03	1348	810	KAT 9-7 S	162	238	410	268	242	242	164	164	45.5	602	674	674	378	266	202	204	266	202	674	675	246.5	446.5	564	500
04	1348	990	KAT 9-9 S	325	303	362	268	250	250	156	156	45.5	602	674	674	378	266	202	204	266	202	674	675	246.5	446.5	730	666
06	1548	1136	KAT 12-9 S	361.5	313	461.5	344	274	274	156	156	83	628	774	774	477	266	202	203	368	303	774	775	297	497	876	812
08	1548	1430	KAT 12-12 S	514.5	401	514.5	344	274	274	156	156	83	628	774	774	477	266	202	203	368	303	774	775	297	497	1170	1106
10	1924	1500	KAT 15-15 S	514.5	471	514.5	407	285	454	28	101	53.5	875	962	962	477	266	202	297	368	303	720	775	371	611	1220	1156
12	2190	1500	KAT 12-9 S2	316.5	313	241	344	286	669.5	90	81	56	1002	1095	1095	551	266	202	363.5	368	303	720	850	437.5	677.5	1220	1156
14	2190	1700	KAT 15-11 S2	328	378	288	409	273.5	623	37.5	63	56	1002	1095	1095	551	266	202	363.5	368	303	720	850	437.5	677.5	1420	1356
17	2280	2007	KAT 15-11 S2	481.5	378	288	409	353.5	647.5	37.5	83.5	79	1002	1140	1140	551	266	202	386	368	303	800	850	460	700	1727	1663
21	2280	2414	KAT 18-13 S2	604.5	433	339	483	281	598	36	59	79	1002	1140	1140	551	266	202	336	468	404	800	850	460	700	2133	2069
25	2260	2770	FDA 355 T2	676.5	510	397	510	264	361	76	59	71.5	1006	1130	1130	551	266	202	331	468	404	850	850	454	694.5	2450	2386
31	2700	2770	FDA 400 T2	676.5	510	387	510	322.5	761	47.5	79	56.5	1259	1350	1350	701	266	202	441	468	404	880	1000	250.5	490.5	2450	2386
35	2845	2770	FDA 400 T2	492.5	643	485	643	310.5	627	46.5	60	50	1415	1515	1330	801	266	202	473	569	505	1000	1100	274	514	2450	2386
40	3034	2770	FDA 450 T2	492.5	843	485	843	310.5	827	46.5	60	87	1531	1704	1330	888	388	303	517	870	606	1000	1100	319	558	2450	2386

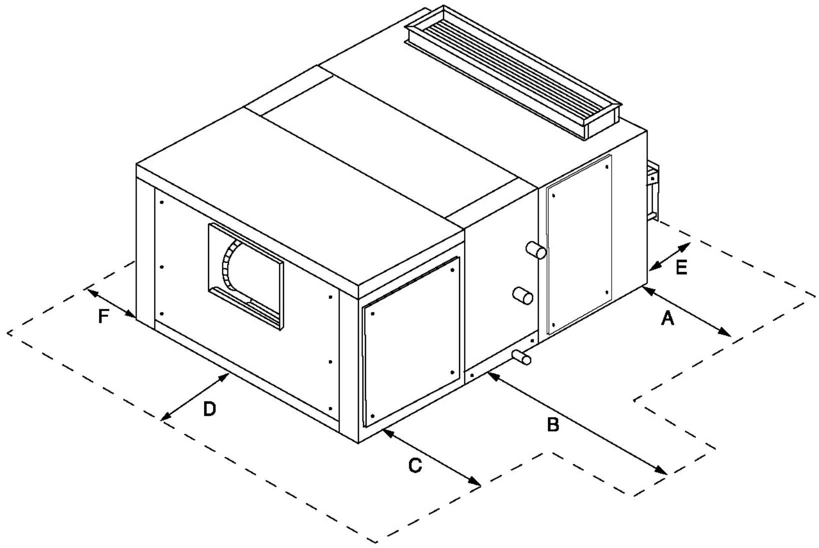
Installation Consideration
Service Clearance

The purpose of this section is to provide LPCP jobsite installation considerations.

When selecting and preparing the unit site, follow these guidelines:

1. Ensure that the site can support the total weight of the unit.
2. Allow sufficient space for service access.
   Figure below give the recommended space allowances for filters, coil removal, fan shaft removal and motor starter maintenance. As unit configurations will vary, refer to unit submittals for specific location of access doors, accessories, motor starter, etc.
3. Confirm that the foundation of the mounting platform is large enough to include the unit dimensions plus service access. Refer to unit submittals for specific dimension.

   Certain units may be suspended from the ceiling. The recommended method for ceiling suspending LPCP air handlers is with structural channels that run the full length of the unit. Do not suspend LPCP air handlers from the top of the unit. Serious safety risks exist if the unit is not suspended in the proper manner.
4. The floor or foundation must be level for proper coil drainage and condensate flow.
5. Allow the proper height for coil piping and condensate drain requirements. It may be necessary to elevate the unit when piping the condensate drain. Insufficient height could inhibit condensate drainage and result in flooding the unit or equipment room.
6. Provide adequate lighting for maintenance personnel to perform maintenance duties.
7. Provide permanent power outlets in close proximity of the unit for installation and maintenance.
8. Ventilate the equipment room and verify that it is free from standing water.



LPCP Size	Filter Mixing Box A		Coil Removal B		Fan C		Front D		Back E		Side F	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
02	600	24	1500	59	600	24	600	24	600	24	600	24
03	600	24	1500	59	600	24	600	24	600	24	600	24
04	600	24	1600	63	700	28	600	24	600	24	600	24
06	600	24	1750	69	700	28	600	24	600	24	600	24
08	600	24	2050	81	800	32	600	24	600	24	600	24
10	600	24	2100	83	900	36	600	24	600	24	600	24
12	600	24	2100	83	1300	51	600	24	600	24	600	24
14	600	24	2300	91	1600	63	600	24	600	24	600	24
17	600	24	2600	102	1600	63	600	24	600	24	600	24
21	600	24	3050	120	1800	71	600	24	600	24	600	24
25	600	24	3400	134	2200	87	600	24	600	24	600	24
31	600	24	3400	134	2400	95	600	24	600	24	600	24
35	600	24	3400	134	2600	102	600	24	600	24	600	24
40	600	24	3400	134	2600	102	600	24	600	24	600	24
45	600	24	4000	157	3000	118	600	24	600	24	600	24
50	600	24	4000	157	3000	118	600	24	600	24	600	24

Mechanical Specifications

General

The LPCP product line consists of horizontal and vertical cabinets. Both configurations have the option of either a horizontal or vertical discharge. The units are also available (as option) with mixing box and 2"flat filter.

The units must be rigged and lifted in strict accordance with the Installation Operation Diagnostic.

Casing

The casing structural components are constructed of heavy gage galvanized steel. All section is insulated with aluminum foil-faced 32-kg/m3 density fiberglass insulation. Access panels are located on both sides of the unit and allow easy access to the fan, motor and drive from both sides of the air handler.

Coil Module

All coils are highly efficient aluminum fins, which are mechanically bonded to 1/2 inch seamless copper tubing. Coils are available with 108, 144 and 168 fins per foot.

Capacity, pressure drop and selection procedure shall be designed in accordance with ARI Standard 410. Coil casing shall be galvanized steel. The coil working pressure shall not exceed the leak test value given below.

Supply and return headers shall be clearly labeled on the outside of the unit to ensure that direction of coil water flow in counter of direction of unit airflow. Coils shall be proof tested to 375 psig (26 bar) and leak tested under water to 250 psig (17 bar). The header shall be constructed of round steel pipe with BSPT external threaded. All headers shall be fitted with air venting and water drainable plug.

Drainpan

Coil shall be provided with an insulated galvanized sloping drain pan to allow for proper condensate removal. The galvanized drain pan shall be light gray powder-painted for corrosion protection.

Fan Module

The vibration levels of the complete fan assembly (fan wheel, motor and drives assembled as a whole system) shall be checked and dynamically balanced excessive vibration (including that caused by fan imbalance) shall be eliminated in the factory. The testing and rating standard shall be Trane's developed standard and is ISO 1940 equivalent. Fan shaft shall be properly sized and protectively coated. Fan wheels shall be keyed to fan shaft to prevent slipping. Fan shafts shall be solid and designed so that fan shaft does not pass through its first critical speed as the units comes up to its rated rpm. Fan modules shall be provided with an access door on fan side of fan.

Fan shall be double-width, double-inlet, and multiblade type as produced by the unit manufacturer. Fan shall be forward curved (FC) as required for stable operation, low noise and optimum energy efficiency. Fan shall be equipped with bearings with an L-50 life (average life) of 200,000 hours. The multiblade shall be made of galvanized steel and the solid shaft shall be made of carbon steel: C40, zinc plated with additional lacquer protection. The fans shall be designed in accordance to AMCA standard 99-009876R20. The noise level data (Sound Power Level) shall be measured in laboratory and in accordance with MAC Standard 300 Figure 2 configuration A.

Mechanical Specifications

Drives

The units are available with either fixed pitch or variable pitch V-belt sheaves.

Variable Pitch (Option) Drives shall be variable pitch, suitable for adjustment within +5 percent of specified rpm. Drives shall be limited to two grooves maximum to ensure good alignment. This option shall only use for install motor power that below 25Hp or 18.7 kW due to design limitation.

Fixed Pitch Drives shall be constant speed with fixed pitch sheaves.

1.5 Service Factor Drives shall be selected at 1.5 service factor.

Motors

Motor shall be mounted integral to a fan assembly furnished by the unit manufacturer. Motor shall be mounted inside the unit casing on a slide base to permit adjustment of drive belt tension.

Totally Enclosed Fan-Cooled (TEFC) Motor shall be Horizontal Foot Mounting. Induction motor, squirrel cage, totally enclosed fan-cooled with size, type and electrical characteristics as shown on equipment schedule.

Motor Options
- 380-415 Volt/3 Ph/ 50 Hz (Standard)
- 460 Volt/3 Ph/60 Hz

Filter (Option)

Filters are available with 2 inch flat, throwaway and washable type with dust spot efficiency of 20-25%.

Throwaway filters shall be of throwaway type and shall have 2 inch fiberglass media contained in a rigid paper board frame. Filters shall have a rigid supporting maze across both the entering and leaving faces of the media. Filters shall be sized so as not to exceed scheduled face velocities.

Washable or Permanent filters shall be 2-inch synthetic fibers or aluminium wire mesh capable of operating up to 600-fpm face velocity without loss of filter efficiency and holding capacity. Filter media shall be layers of cleanable wire maze.

Mixing Section (Option)

The mixing sections are constructed of heavy gauge galvanized steel with two inlets (with dampers).

Mixing section also include two side access panel as standard to provide access to the internal components.

Options

Besides the optional mixing section, other options are also available as listed:
- Painted Casing
- Drip Eliminator
- Filter Media
- Electric Heater
- Elastrometric Close Cell Insulation

Note

Note

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QUALITY ASSURED FIRM ISO 9002 SGS

UKAS QUALITY MANAGEMENT 005

NAC THAILAND

Literature Order Number:	CFH-CS-5T-0702
Supersedes:	CFH-CS-5T-0101
Stocking Location:	Bangkok, Thailand