



KAP Horizontal Product Coolers

PRODUCT DATA & INSTALLATION

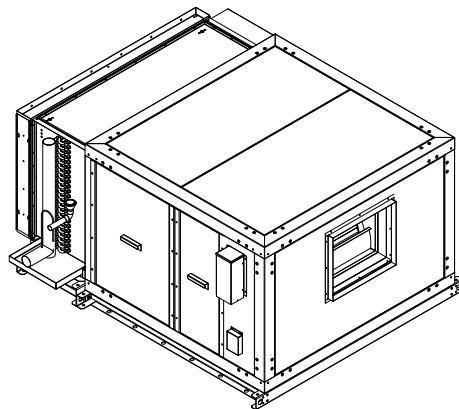
Bulletin K80-KAP-PDI-9e1
Part # 1097718

**Air Defrost for
Applications 35°F (1.6 °C)
(Electric and Hot Gas
Defrost Models Optional)**



| | | |
|--|---|-----------|
| | PRODUCT SUPPORT | scan: |
| | web: www.k-rp.com/kap | |
| | email: ahu@k-rp.com | |
| | call: 1-844-893-3222 x527 | |

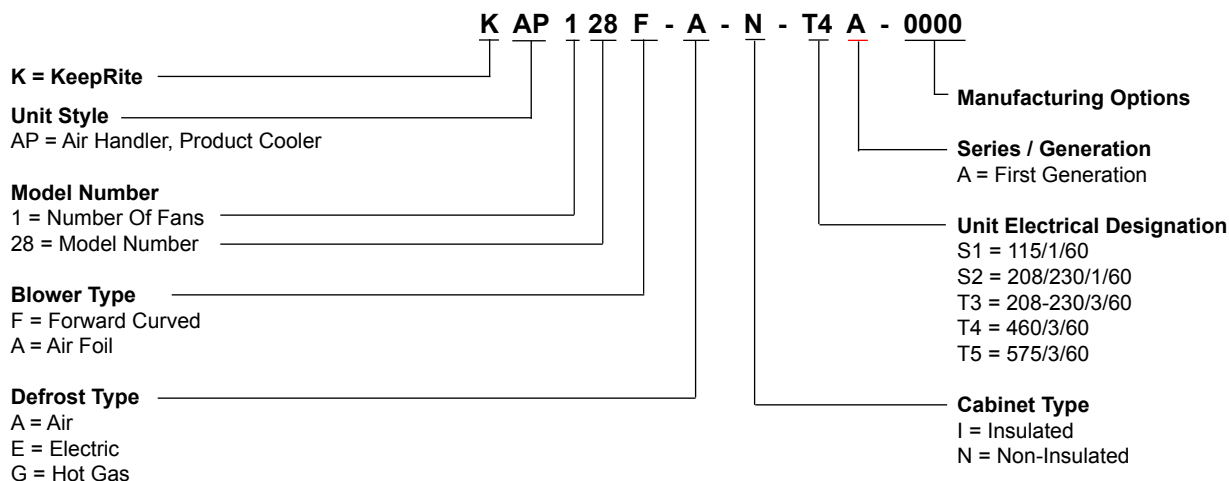
**Up to 30 Tons
Nominal Capacity**



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NOMENCLATURE



STANDARD FEATURES

- **Indoor Applications Only** ● Large Face Area Centrifugal Fan
 - “Bolt-On” Coil for Maximum Capacity in Minimum Space
 - Single Wall Heavy Gauge Galvanized Cabinet
- Full Size Access Doors for Easy Maintenance ● Efficient Forward Curved Blower
 - 10 Models ● Up to 6” Total Static Pressure ● UL Certification
 - Up to 44,000 CFM ● Internal Motor ● Up to 30 HP
 - Horizontal and Vertical Air Discharge
 - External Electrical Box Mounted to Cabinet
 - Extended Grease Lines with External Access
- Aluminum Fan Head Drain Pan (Models 137 thru 164, downblast configuration not available)

AVAILABLE OPTIONS (Factory Mounted)

- Double Wall Cabinet with 2” Mineral Wool Insulation
 - Internal Vibration Isolators
 - Airfoil (Up to 8” Total Static Pressure)
 - Disconnect Switch ● Flat Filter
 - Angle Filters
- Aluminum Fan Head Drain Pan (Models 108 thru 128, downblast configuration not available)

OTHER OPTIONS ARE AVAILABLE AT YOUR REQUEST. CONSULT FACTORY FOR PRICING.

Cooling Capacities - BTU/H °F T.D.⁽¹⁾ Based On 600 FPM (183m/min) Face Velocity

| MODEL KAP | CFM * @ 600 FPM (Litre/sec. @183m/min.) | FACE AREA SQ. FT. (m ²) | ROWS DEEP | COIL ENT. AIR FROM 32°F (0°C) to 35°F (1.6°C) | | | **COIL ENT. AIR BELOW 32°F (0°C) | |
|--------------|--|---|--------------|--|----------|----------|-------------------------------------|----------|
| | | | | FIN SPACING | | | FIN SPACING | |
| | | | | 8 FPI DX | 6 FPI DX | 4 FPI DX | 6 FPI DX | 4 FPI DX |
| 108 | 6340 (2992) | 10.5 (.975) | 4 | 3460 | 3210 | 2630 | 2870 | 2350 |
| | | | 6 | 4420 | 4120 | 3360 | 3800 | 3130 |
| | | | 8 | 5040 | 4670 | 3830 | 4480 | 3680 |
| | | | 10 | 5610 | 5200 | 4270 | 5020 | 4120 |
| 111 | 8500 (4012) | 14.1 (1.30) | 4 | 4630 | 4310 | 3520 | 3840 | 3150 |
| | | | 6 | 5920 | 5520 | 4510 | 5120 | 4200 |
| | | | 8 | 6750 | 6290 | 5130 | 6010 | 4930 |
| | | | 10 | 7500 | 6980 | 5730 | 6740 | 5510 |
| 114 | 10650 (5026) | 17.7 (1.64) | 4 | 5810 | 5400 | 4410 | 4820 | 3940 |
| | | | 6 | 7410 | 6940 | 5650 | 6400 | 5250 |
| | | | 8 | 8450 | 7880 | 6450 | 7530 | 6170 |
| | | | 10 | 9400 | 8740 | 7170 | 8440 | 6920 |
| 117 | 12800 (6041) | 21.3 (1.97) | 4 | 6980 | 6510 | 5310 | 5790 | 4750 |
| | | | 6 | 8940 | 8310 | 6800 | 7690 | 6330 |
| | | | 8 | 10160 | 9450 | 7750 | 9070 | 7410 |
| | | | 10 | 11300 | 10500 | 8620 | 10150 | 8290 |
| 122 | 15700 (7410) | 26.2 (2.43) | 4 | 8560 | 7960 | 6530 | 7120 | 5830 |
| | | | 6 | 10920 | 10180 | 8330 | 9420 | 7750 |
| | | | 8 | 12490 | 11560 | 9500 | 11100 | 9080 |
| | | | 10 | 13870 | 12890 | 10580 | 12450 | 10180 |
| 128 | 19600 (9250) | 32.6 (3.02) | 4 | 10480 | 9950 | 8120 | 8860 | 7270 |
| | | | 6 | 13630 | 12730 | 10400 | 11820 | 9660 |
| | | | 8 | 15560 | 14440 | 11820 | 13870 | 11360 |
| | | | 10 | 17260 | 16120 | 13180 | 15450 | 12720 |
| 137 | 26150 (12341) | 43.6 (4.05) | 4 | 14270 | 13240 | 10850 | 11880 | 9710 |
| | | | 6 | 18280 | 17000 | 13920 | 15750 | 12890 |
| | | | 8 | 20780 | 19290 | 15750 | 18480 | 15170 |
| | | | 10 | 23060 | 21470 | 17580 | 20660 | 16880 |
| 141 | 29800 (14064) | 49.6 (4.60) | 4 | 16250 | 15110 | 12310 | 13460 | 10990 |
| | | | 6 | 20760 | 19360 | 15770 | 17830 | 14630 |
| | | | 8 | 23660 | 21900 | 17950 | 21040 | 17150 |
| | | | 10 | 26270 | 24420 | 20050 | 23480 | 19240 |
| 150 | 34900 (16471) | 58.1 (5.39) | 4 | 19000 | 17650 | 14460 | 15790 | 12920 |
| | | | 6 | 24320 | 22610 | 18430 | 20980 | 17220 |
| | | | 8 | 27740 | 25750 | 21090 | 24610 | 20200 |
| | | | 10 | 30780 | 28600 | 23420 | 27600 | 22610 |
| 164 | 43600 (20577) | 72.6 (6.74) | 4 | 23700 | 22040 | 18050 | 19780 | 16090 |
| | | | 6 | 30450 | 28260 | 23040 | 26170 | 21520 |
| | | | 8 | 34680 | 32210 | 26320 | 30880 | 25220 |
| | | | 10 | 38480 | 35720 | 29360 | 34580 | 28240 |

* For Applications in room temperatures above 35°F (1.6°C) maximum face velocity should not exceed 500 FPM (152m/min) and capacities corrected accordingly (see table below for correction factors).

** These ratings are based on moderate coil frosting. For heavy frosting use factor of 0.95.

(1) "T.D." - Represents the difference between temperature of air entering cooling coil and coil refrigerant temperature.

Ratings for units using electric defrost may be determined by multiplying ratings in above table by 0.95

FACE VELOCITY CAPACITY CORRECTION FACTORS

| Face Velocity FPM (m/min.) | Rows Deep In Direction Of Airflow | | | |
|-------------------------------|-----------------------------------|-----|-----|-----|
| | 4 | 6 | 8 | 10 |
| 600 (183) | 1.0 | 1.0 | 1.0 | 1.0 |
| 500 (152) | .91 | .90 | .89 | .89 |
| 400 (122) | .80 | .78 | .76 | .73 |

FEATURES A NEW ADVANCED DYNAMIC DESIGN BLOWER SECTION

- HIGH EFFICIENCY FAN PERFORMANCE
- FANS TESTED PER AMCA CODE No. 210
 - MINIMUM FAN TIP SPEEDS
 - CLASS II CONSTRUCTION

The air handler blower section is a matched assembly combining advanced engineering techniques with the finest materials available.

Forward-curved centrifugal fans were designed specifically to operate at low tip-speeds with minimum power consumption. To meet the low noise level requirements of comfort air conditioning, fan outlet velocities have been reduced without sacrificing good fan performance. Blowers are fully performance tested and certified in accordance with DIN, ISO, BS and AMCA 210 standards. Blowers are rated for CLASS II operation and have bearings selected to guarantee a minimum L50 life time of 200,000 hours.

The fan section is complete with a rugged drive assembly. The heavy duty motor base is designed for quick and simple belt adjustment. All drives are furnished with matched V-belts.

EXCLUSIVE STEEL FRAME CONSTRUCTION

Sectionalized construction provides complete flexibility of unit arrangements with each individual section structurally designed to provide the absolute maximum in unit strength and rigidity. All static and dynamic forces are directly transmitted to the unit framework. The blowers are supported entirely by rigid frame members, eliminating all dynamic forces from the casing panel. Optional internal blower isolators are also available on all models.

For maximum durability, the entire cabinet assembly is fabricated of continuous galvanized steel. This heavy protective finish is maintained intact, completely undisturbed and is complimented with the use of corrosion resistant permanent fasteners. The positive fastening principle of a permanent fastener provides the rigidity and stability necessary for lifetime performance. Optional 2" insulated panels are available on all models. Outdoor construction is available on all models. These exclusive construction features offer you the ultimate in air handling design.

INTERNAL BLOWER CONSTRUCTION

All blower housings are manufactured in galvanized sheet steel. Impellers are also manufactured in galvanized sheet steel with tab locked blades. All impellers are balanced, both statically and dynamically, to an accuracy grade of G = 6.3 in accordance to DIN ISO 1940-1 and ANSI S2.19 – 1989. Bearings are self-aligning, single row, and deep groove ball type, in pillow block cast iron housings. All bearings have been selected to guarantee a minimum L50 life time of 200,000 hours. Operating temperatures range from -25°F to + 131°F (-31°C to +55°C) for all blowers. For operating temperatures outside these limits please consult factory. Extended lubrication lines are standard. Airfoil constructed blowers available for all models for static pressures above 6" – consult factory (models 103 & 104 excluded).

GENERAL

Certain basic factors must be predetermined prior to the selection of a central station air handler. The factors which will control the unit selection are applicable codes, ventilation requirements, heating and cooling space loads, acceptable temperature differentials, thermal media and installation limitations. The selection of the unit can then be resolved to 4 steps:

1. Unit type and size,
2. Cooling coil,
3. Accessories and,
4. Motor size.

SELECTION OF UNIT TYPE AND SIZE

With the overall system designed to minimize the number of units and the cooling and ventilation requirements for the various zones established, selection of the optimum unit size can be made based on the required air volume. The cooling load and ventilation requirement will establish a CFM need, any one of which may be the maximum.

The unit air volume for cooling is dependent upon the sensible space cooling load and the design dry bulb temperature differential. Normal temperature differentials for air conditioning are from 12 to 25°F. The minimum air volume is calculated using the following formula:

$$\text{CFM} = \frac{\text{Sensible Space Load (Btuh)}}{1.09 \times \text{Temp. Differential (°F)}}$$

The required air volume for ventilation is generally less than that for cooling. However, where toxic fumes or unusual contaminants are encountered, the ventilation requirements may establish a minimum air volume in excess of that determined for cooling.

The unit size can then be selected based on maximum air volume required. Usually more than one unit size can be selected to deliver the required air. Therefore, fan outlet velocity, coil face velocity, fan RPM and BHP should also be given consideration in the final selection. The fan performance tables are conveniently arranged with CFM, fan outlet velocity, coil face velocity, fan RPM and BHP in tabular form for simple selection of the optimum unit size.

SELECTION OF COILS

Having determined the unit size, the selection of the coil is resolved to three steps:

1. Choice of the face area coil for optimum face velocity,
2. Choice of the type of coil suited to the application, and
3. Determination of number of rows and fin series.

COOLING COIL

The coil size should be selected for maximum face velocity to obtain peak heat transfer efficiency and minimum cost. Generally 500 to 600 FPM is considered the optimum coil face velocity range for dehumidification application. Determination of the number of rows and fin spacing is made using the current cooling coil catalogues.

SELECTION OF ACCESSORIES

Accessories should be selected to provide a complete cooling unit with proper cleaning of the air. A complete line of filter accessories is available.

AIR CLEANING

A filter section should be selected to provide filter area such that the filter velocity will be compatible with the choice of filter media. Two filter sections are offered; flat, for units 108 thru 164 and angular, for units 114 thru 164.

SELECTION OF FAN MOTOR

The determination of the actual fan performance requires an accurate calculation of the resistance to air flow thru the entire system. This total resistance consists of two parts. The external static pressure of the distribution system, and the internal unit resistance.

The internal unit resistance is found by summing the resistances of the coils and filter sections. Filter Air Friction table located on page 9.

DETERMINATION OF FAN SPEED AND MOTOR HP REQUIREMENTS

Final determination of the actual fan performance requires an accurate calculation of the total resistance to air flow through the entire system. This total static pressure (TSP) will consist of two parts: (1) the external resistance due to air flow through the ducts, discharge grilles, diffusers, etc. of the distribution system, and (2) the internal resistance of the unit which results from air flow through the coils, filters, unit cabinet and other accessories. The method of calculating the resistance for the various components of the distribution system are well established. The internal resistances are easily determined from Blower Data table (see page 4) which tabulates the resistance values for the various unit components in increments of air volume. For the internal resistances as shown in Blower Data table (see page 4). The resistances of the cooling coil must be added. These may be obtained from the charts on page 4. After calculating the total static pressure, the fan speed and motor horsepower requirements can be accurately determined. With the unit model, CFM and TSP known, the fan RPM and BHP is easily determined from the Fan Performance Tables. (page 7-8)

FAN PERFORMANCE INFORMATION

This catalogue contains all of the blower data for central station air handlers. Units are equipped with forward curved fan wheels as standard.

SELECTION RULES

The fan performance calculation procedure is predicated on the fact that a fan is a constant volume machine, provided the RPM and static pressure do not change. This means the delivered air volume (CFM) will not change, even though the temperature may. The BHP required is inversely proportional to final air temperature and altitude; consequently BHP decreases with an increase in final air temperature or higher altitude and increases with a decrease in final air temperature or lower altitude. This requires that the static pressure be adjusted for any air conditions other than standard. After the calculation of RPM and BHP, only the BHP need be corrected to the specified conditions.

SELECTION PROCEDURE

The following data is required to determine the fan performance. The unit type, unit size, CFM, total static pressure, operating temperature and altitude.

1. From table below, obtain the temperature and altitude conversion factor.
2. Divide the specified total static pressure by the conversion factor to obtain a corrected total static pressure.
3. At the specified CFM and corrected total static pressure, determine the RPM and BHP. (pageS 7-8)
4. Multiply the BHP by the conversion factor to obtain the BHP required at the specified altitude and temperature.

EXAMPLE OF SELECTION PROCEDURE

KAP111 with 5000 CFM @ 1.0" total static pressure, 20°F air temp, 5000 feet elevation:

1. Conversion factor = 0.92
2. New TSP = 1.0" / 0.92 = 1.09"
3. 1.09" = 586 RPM and 1.35 BHP
4. New BHP = 1.35 x 0.92 = 1.24

Selection = 5000 CFM @ 586 RPM and 1.24 BHP

TEMPERATURE AND ALTITUDE CONVERSION FACTORS

| AIR TEMP. °F | ALTITUDE (FEET) | | | | | | | | |
|-----------------|-----------------|------|------|------|------|------|------|------|------|
| | 0 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 |
| -20 | 1.2 | 1.16 | 1.12 | 1.08 | 1.04 | 1 | 0.97 | 0.93 | 0.89 |
| 0 | 1.15 | 1.1 | 1.08 | 1.02 | 0.99 | 0.95 | 0.92 | 0.88 | 0.85 |
| 20 | 1.11 | 1.06 | 1.02 | 0.98 | 0.95 | 0.92 | 0.88 | 0.85 | 0.82 |
| 40 | 1.06 | 1.02 | 0.98 | 0.94 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 |
| 60 | 1.02 | 0.98 | 0.94 | 0.91 | 0.88 | 0.85 | 0.81 | 0.79 | 0.76 |
| 70 | 1 | 0.96 | 0.93 | 0.89 | 0.86 | 0.83 | 0.8 | 0.77 | 0.74 |
| 80 | 0.98 | 0.94 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 | 0.75 | 0.72 |
| 100 | 0.94 | 0.91 | 0.88 | 0.84 | 0.81 | 0.78 | 0.75 | 0.72 | 0.7 |
| 120 | 0.92 | 0.88 | 0.85 | 0.81 | 0.78 | 0.76 | 0.72 | 0.7 | 0.67 |
| 140 | 0.89 | 0.85 | 0.82 | 0.79 | 0.76 | 0.73 | 0.7 | 0.68 | 0.65 |

Fan RPM and Motor HP Requirements

| MODEL KAP | FACE VELOCITY FPM (m/min.) | CFM (litre/sec.) | TOTAL STATIC PRESSURE (Inches - Water Gauge) | | | | | | | | | | | | | | | | CABINET SP (In. W.G) |
|--------------|-------------------------------------|---------------------|--|-------|------|-------|------|-------|------|-------|-----|-------|------|-------|------|-------|------|-------|----------------------------|
| | | | 0.125 | | 0.25 | | 0.50 | | 0.75 | | 1.0 | | 1.25 | | 1.50 | | 1.75 | | |
| | | | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | |
| 108 | 400 (122) | 4220 (1992) | 380 | 0.57 | 421 | 0.66 | 502 | 0.84 | 580 | 1.01 | 654 | 1.2 | 727 | 1.4 | 797 | 1.62 | 863 | 1.86 | 0.08 |
| | 500 (152) | 5290 (2497) | 456 | 1.05 | 490 | 1.17 | 557 | 1.41 | 621 | 1.63 | 683 | 1.84 | 744 | 2.06 | 804 | 2.29 | 862 | 2.54 | 0.13 |
| | 600 (183) | 6340 (2992) | 533 | 1.74 | 562 | 1.88 | 619 | 2.17 | 674 | 2.46 | 728 | 2.72 | 780 | 2.98 | 832 | 3.24 | 882 | 3.5 | 0.18 |
| 111 | 400 (122) | 5670 (2676) | 316 | 0.64 | 359 | 0.75 | 435 | 1 | 504 | 1.26 | 568 | 1.52 | 629 | 1.8 | 688 | 2.09 | 744 | 2.39 | 0.05 |
| | 500 (152) | 7090 (3346) | 371 | 1.19 | 409 | 1.31 | 477 | 1.61 | 537 | 1.92 | 593 | 2.24 | 646 | 2.56 | 697 | 2.89 | 747 | 3.23 | 0.07 |
| | 600 (183) | 8500 (4012) | 429 | 2 | 462 | 2.12 | 524 | 2.45 | 579 | 2.82 | 629 | 3.19 | 677 | 3.57 | 722 | 3.95 | 767 | 4.34 | 0.1 |
| 114 | 400 (122) | 7100 (3351) | 372 | 1.19 | 409 | 1.31 | 477 | 1.61 | 537 | 1.92 | 594 | 2.25 | 646 | 2.56 | 697 | 2.89 | 747 | 3.23 | 0.05 |
| | 500 (152) | 8800 (4153) | 442 | 2.21 | 474 | 2.33 | 534 | 2.67 | 588 | 3.04 | 638 | 3.43 | 684 | 3.82 | 729 | 4.22 | 772 | 4.61 | 0.07 |
| | 600 (183) | 10650 (5026) | 521 | 3.87 | 548 | 3.98 | 602 | 4.33 | 650 | 4.76 | 695 | 5.21 | 737 | 5.68 | 777 | 6.15 | 816 | 6.62 | 0.1 |
| 117 | 400 (122) | 8540 (4030) | 431 | 2.03 | 464 | 2.14 | 525 | 2.48 | 580 | 2.85 | 630 | 3.22 | 678 | 3.6 | 723 | 3.99 | 767 | 4.38 | 0.04 |
| | 500 (152) | 10680 (5040) | 522 | 3.91 | 549 | 4.01 | 603 | 4.36 | 651 | 4.79 | 696 | 5.25 | 738 | 5.71 | 778 | 6.18 | 817 | 6.66 | 0.07 |
| | 600 (183) | 12800 (6041) | 615 | 6.7 | 638 | 6.78 | 684 | 7.11 | 728 | 7.57 | 769 | 8.08 | 807 | 8.62 | 843 | 9.17 | 878 | 9.73 | 0.09 |
| 122 | 400 (122) | 10480 (4946) | 350 | 1.98 | 376 | 2.14 | 429 | 2.54 | 481 | 3.01 | 531 | 3.52 | 580 | 4.04 | 627 | 4.58 | 673 | 5.14 | 0.06 |
| | 500 (152) | 13100 (6183) | 426 | 3.75 | 446 | 3.94 | 488 | 4.38 | 532 | 4.9 | 574 | 5.47 | 615 | 6.08 | 654 | 6.71 | 694 | 7.35 | 0.09 |
| | 600 (183) | 15700 (7410) | 504 | 6.35 | 519 | 6.57 | 554 | 7.06 | 590 | 7.62 | 626 | 8.23 | 662 | 8.9 | 696 | 9.6 | 735 | 8.57 | 0.13 |
| 128 | 400 (122) | 13060 (6164) | 300 | 2.32 | 323 | 2.56 | 370 | 3.15 | 415 | 3.77 | 459 | 4.39 | 502 | 5.04 | 544 | 5.7 | 585 | 6.39 | 0.03 |
| | 500 (152) | 16330 (7707) | 363 | 4.39 | 382 | 4.63 | 421 | 5.31 | 458 | 6.06 | 494 | 6.83 | 530 | 7.6 | 565 | 8.39 | 600 | 9.18 | 0.05 |
| | 600 (183) | 19600 (9250) | 428 | 7.49 | 444 | 7.73 | 477 | 8.44 | 508 | 9.28 | 540 | 10.18 | 570 | 11.1 | 600 | 12.02 | 630 | 12.96 | 0.07 |
| 137 | 400 (122) | 17440 (8231) | 274 | 3.54 | 293 | 3.8 | 335 | 4.53 | 374 | 5.36 | 411 | 6.2 | 447 | 7.04 | 482 | 7.88 | 516 | 8.74 | 0.05 |
| | 500 (152) | 21800 (10289) | 333 | 6.77 | 348 | 7.03 | 381 | 7.79 | 414 | 8.73 | 446 | 9.74 | 477 | 10.79 | 507 | 11.83 | 536 | 12.88 | 0.08 |
| | 600 (183) | 26150 (12341) | 394 | 11.58 | 406 | 11.83 | 433 | 12.58 | 461 | 13.57 | 489 | 14.69 | 516 | 15.89 | 542 | 17.13 | 567 | 18.37 | 0.12 |
| 141 | 400 (122) | 19860 (9373) | 222 | 3.28 | 243 | 3.62 | 283 | 4.46 | 320 | 5.39 | 356 | 6.36 | 391 | 7.34 | 424 | 8.34 | 458 | 9.36 | 0.07 |
| | 500 (152) | 24820 (11714) | 267 | 6.15 | 284 | 6.56 | 318 | 7.49 | 350 | 8.57 | 380 | 9.71 | 410 | 10.9 | 438 | 12.11 | 466 | 13.33 | 0.1 |
| | 600 (183) | 29800 (14064) | 314 | 10.38 | 328 | 10.9 | 358 | 11.95 | 385 | 13.11 | 412 | 14.39 | 438 | 15.74 | 463 | 17.13 | 487 | 18.55 | 0.15 |
| 150 | 400 (122) | 23250 (10973) | 200 | 4.03 | 213 | 4.28 | 248 | 5.01 | 283 | 5.97 | 315 | 7.04 | 346 | 8.17 | 376 | 9.35 | 404 | 10.58 | 0.07 |
| | 500 (152) | 29060 (13715) | 244 | 7.69 | 254 | 7.98 | 279 | 8.69 | 307 | 9.64 | 335 | 10.79 | 362 | 12.06 | 388 | 13.4 | 413 | 14.8 | 0.12 |
| | 600 (183) | 34900 (16471) | 289 | 13.15 | 297 | 13.5 | 316 | 14.26 | 337 | 15.16 | 361 | 16.29 | 385 | 17.6 | 408 | 19.04 | 430 | 20.56 | 0.17 |
| 164 | 400 (122) | 29060 (13715) | 166 | 4.16 | 185 | 4.66 | 221 | 6.03 | 252 | 7.44 | 280 | 8.84 | 308 | 10.23 | 334 | 11.65 | 359 | 13.09 | 0.09 |
| | 500 (152) | 36330 (17146) | 198 | 7.9 | 213 | 8.34 | 244 | 9.82 | 273 | 11.55 | 298 | 13.32 | 322 | 15.09 | 345 | 16.83 | 367 | 18.57 | 0.14 |
| | 600 (183) | 43600 (20577) | 232 | 13.52 | 244 | 13.87 | 271 | 15.29 | 296 | 17.21 | 320 | 19.3 | 342 | 21.42 | 363 | 23.53 | 383 | 25.65 | 0.2 |

Internal Airside Resistance - INCHES, W.G.

| COIL ROWS DEEP | COIL FACE VELOCITY FPM (m/min) | | | | | | | | |
|----------------------|--------------------------------|-----|-----|-----------|-----|-----|--------------|-----|-----|
| | 400 (122) | | | 500 (152) | | | 600 (183) ** | | |
| | FINS PER INCH | | | | | | | | |
| | 4 | 6 | 8 | 4 | 6 | 8 | 4 | 6 | 8 |
| 4 | .09 | .12 | .14 | .13 | .17 | .20 | .18 | .23 | .27 |
| 5 | .12 | .14 | .16 | .17 | .21 | .25 | .23 | .28 | .34 |
| 6 | .13 | .16 | .20 | .20 | .25 | .30 | .27 | .34 | .41 |
| 8 | .18 | .23 | .27 | .27 | .34 | .41 | .35 | .44 | .53 |
| 10 | .23 | .28 | .34 | .34 | .42 | .51 | .45 | .56 | .68 |

** Coil face velocity should not exceed 500 FPM (152 m/min.) for applications where room temperature is above 35°F (1.6 °C).

Wet Coil Correction Factor *

| Ent. Air Dew Point Minus Refr. Temp. | |
|--------------------------------------|-----------------------------|
| 10°F (5.5°C) or Less | 11°F (6.1°C) to 18°F (10°C) |
| 1.12 | 1.24 |

* For medium frosted coil, use factor of 1.3

Fan RPM and Motor HP Requirements

| MODEL KAP | FACE VELOCITY FPM (m/min.) | CFM (litre/sec.) | TOTAL STATIC PRESSURE (Inches - Water Gauge) | | | | | | | | | | | | | | | | CABINET SP (In. W.G) |
|--------------|-------------------------------------|---------------------|--|-------|------|-------|------|-------|------|-------|-----|-------|------|-------|------|-------|------|-------|----------------------------|
| | | | 0.125 | | 0.25 | | 0.50 | | 0.75 | | 1.0 | | 1.25 | | 1.50 | | 1.75 | | |
| | | | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | |
| 108 | 400 (122) | 4220 (1992) | 454 | 0.74 | 490 | 0.82 | 558 | 0.96 | 626 | 1.13 | 693 | 1.3 | 760 | 1.5 | 825 | 1.72 | 888 | 1.96 | 0.08 |
| | 500 (152) | 5290 (2497) | 555 | 1.4 | 583 | 1.5 | 637 | 1.68 | 691 | 1.87 | 746 | 2.07 | 800 | 2.28 | 854 | 2.5 | 908 | 2.74 | 0.13 |
| | 600 (183) | 6340 (2992) | 656 | 2.37 | 679 | 2.48 | 724 | 2.71 | 769 | 2.93 | 815 | 3.15 | 860 | 3.38 | 905 | 3.62 | 951 | 3.87 | 0.18 |
| 111 | 400 (122) | 5670 (2676) | 381 | 0.82 | 415 | 0.93 | 477 | 1.16 | 537 | 1.39 | 596 | 1.65 | 653 | 1.91 | 708 | 2.19 | 761 | 2.49 | 0.05 |
| | 500 (152) | 7090 (3346) | 462 | 1.53 | 489 | 1.67 | 541 | 1.94 | 590 | 2.22 | 639 | 2.52 | 686 | 2.82 | 733 | 3.14 | 779 | 3.46 | 0.07 |
| | 600 (183) | 8500 (4012) | 544 | 2.58 | 568 | 2.74 | 611 | 3.06 | 653 | 3.38 | 695 | 3.72 | 736 | 4.07 | 776 | 4.43 | 816 | 4.79 | 0.1 |
| 114 | 400 (122) | 7100 (3351) | 462 | 1.53 | 489 | 1.67 | 541 | 1.94 | 590 | 2.22 | 639 | 2.52 | 686 | 2.82 | 733 | 3.14 | 779 | 3.46 | 0.05 |
| | 500 (152) | 8800 (4153) | 562 | 2.85 | 584 | 3.02 | 627 | 3.34 | 668 | 3.68 | 708 | 4.03 | 748 | 4.39 | 789 | 4.75 | 825 | 5.13 | 0.07 |
| | 600 (183) | 10650 (5026) | 672 | 4.97 | 691 | 5.17 | 726 | 5.56 | 761 | 5.95 | 795 | 6.36 | 829 | 6.78 | 862 | 7.2 | 894 | 7.63 | 0.09 |
| 117 | 400 (122) | 8540 (4030) | 544 | 2.58 | 568 | 2.74 | 611 | 3.06 | 653 | 3.38 | 695 | 3.72 | 736 | 4.07 | 776 | 4.43 | 816 | 4.79 | 0.04 |
| | 500 (152) | 10680 (5040) | 672 | 4.97 | 691 | 5.17 | 726 | 5.56 | 761 | 5.95 | 795 | 6.36 | 829 | 6.78 | 862 | 7.2 | 894 | 7.63 | 0.07 |
| | 600 (183) | 12800 (6041) | 801 | 8.54 | 817 | 8.77 | 847 | 9.23 | 876 | 9.7 | 905 | 10.18 | 934 | 10.66 | 962 | 11.16 | 990 | 11.66 | 0.09 |
| 122 | 400 (122) | 10480 (4946) | 424 | 2.5 | 447 | 2.69 | 491 | 3.1 | 535 | 3.55 | 578 | 4.02 | 621 | 4.51 | 664 | 5.03 | 707 | 5.57 | 0.06 |
| | 500 (152) | 13100 (6183) | 520 | 4.76 | 539 | 4.99 | 574 | 5.48 | 609 | 5.99 | 644 | 6.54 | 679 | 7.11 | 714 | 7.7 | 749 | 8.31 | 0.09 |
| | 600 (183) | 15700 (7410) | 618 | 8.08 | 633 | 8.36 | 662 | 8.91 | 692 | 9.5 | 721 | 10.12 | 750 | 10.77 | 780 | 11.44 | 809 | 12.12 | 0.13 |
| 128 | 400 (122) | 13060 (6164) | 363 | 3.06 | 383 | 3.32 | 421 | 3.86 | 460 | 4.41 | 499 | 4.99 | 538 | 5.6 | 576 | 6.23 | 614 | 6.9 | 0.03 |
| | 500 (152) | 16330 (7707) | 446 | 5.81 | 462 | 6.14 | 492 | 6.79 | 523 | 7.46 | 554 | 8.14 | 585 | 8.85 | 616 | 9.57 | 647 | 10.32 | 0.05 |
| | 600 (183) | 19600 (9250) | 530 | 9.89 | 543 | 10.28 | 568 | 11.04 | 594 | 11.83 | 620 | 12.63 | 645 | 13.45 | 671 | 14.28 | 697 | 15.13 | 0.07 |
| 137 | 400 (122) | 17440 (8231) | 336 | 4.57 | 353 | 4.92 | 386 | 5.63 | 418 | 6.36 | 450 | 7.11 | 482 | 7.89 | 513 | 8.67 | 545 | 9.48 | 0.05 |
| | 500 (152) | 21800 (10289) | 413 | 8.69 | 427 | 9.12 | 453 | 9.98 | 479 | 10.86 | 505 | 11.77 | 531 | 12.7 | 556 | 13.64 | 581 | 14.6 | 0.08 |
| | 600 (183) | 26150 (12341) | 491 | 14.8 | 502 | 15.3 | 525 | 16.31 | 546 | 17.34 | 568 | 18.41 | 590 | 19.49 | 611 | 20.59 | 632 | 21.7 | 0.12 |
| 141 | 400 (122) | 19860 (9373) | 272 | 4.21 | 289 | 4.6 | 321 | 5.4 | 353 | 6.26 | 384 | 7.15 | 415 | 8.08 | 447 | 9.02 | 477 | 10 | 0.07 |
| | 500 (152) | 24820 (11714) | 333 | 7.97 | 347 | 8.44 | 372 | 9.4 | 398 | 10.42 | 423 | 11.47 | 449 | 12.57 | 474 | 13.68 | 499 | 14.82 | 0.1 |
| | 600 (183) | 29800 (14064) | 396 | 13.58 | 407 | 14.12 | 428 | 15.23 | 450 | 16.41 | 471 | 17.63 | 492 | 18.88 | 513 | 20.17 | 534 | 21.48 | 0.15 |
| 150 | 400 (122) | 23250 (10973) | 236 | 4.72 | 252 | 5.09 | 282 | 5.93 | 311 | 6.88 | 339 | 7.9 | 367 | 8.99 | 394 | 10.12 | 421 | 11.32 | 0.07 |
| | 500 (152) | 29060 (13715) | 289 | 9.01 | 301 | 9.43 | 325 | 10.37 | 349 | 11.44 | 373 | 12.59 | 396 | 13.82 | 418 | 15.1 | 441 | 16.43 | 0.12 |
| | 600 (183) | 34900 (16471) | 343 | 15.42 | 353 | 15.9 | 373 | 16.94 | 393 | 18.1 | 413 | 19.38 | 433 | 20.72 | 452 | 22.15 | 471 | 23.62 | 0.17 |
| 164 | 400 (122) | 29060 (13715) | 204 | 5.34 | 219 | 5.95 | 246 | 7.19 | 273 | 8.45 | 298 | 9.74 | 323 | 11.05 | 347 | 12.4 | 371 | 13.78 | 0.09 |
| | 500 (152) | 36330 (17146) | 249 | 10.06 | 261 | 10.8 | 284 | 12.29 | 306 | 13.85 | 327 | 15.41 | 347 | 17.01 | 368 | 18.62 | 388 | 20.25 | 0.14 |
| | 600 (183) | 43600 (20577) | 294 | 17.04 | 305 | 17.9 | 324 | 19.66 | 343 | 21.48 | 361 | 23.32 | 379 | 25.21 | 396 | 27.11 | 414 | 29.02 | 0.2 |

Internal Airside Resistance - INCHES, W.G.

| COIL ROWS DEEP | COIL FACE VELOCITY FPM (m/min) | | | | | | | | |
|----------------------|--------------------------------|-----|-----|-----------|-----|-----|--------------|-----|-----|
| | 400 (122) | | | 500 (152) | | | 600 (183) ** | | |
| | FINS PER INCH | | | | | | | | |
| | 4 | 6 | 8 | 4 | 6 | 8 | 4 | 6 | 8 |
| 4 | .09 | .12 | .14 | .13 | .17 | .20 | .18 | .23 | .27 |
| 5 | .12 | .14 | .16 | .17 | .21 | .25 | .23 | .28 | .34 |
| 6 | .13 | .16 | .20 | .20 | .25 | .30 | .27 | .34 | .41 |
| 8 | .18 | .23 | .27 | .27 | .34 | .41 | .35 | .44 | .53 |
| 10 | .23 | .28 | .34 | .34 | .42 | .51 | .45 | .56 | .68 |

** Coil face velocity should not exceed 500 FPM (152 m/min.) for applications where room temperature is above 35°F (1.6 °C).

Wet Coil Correction Factor *

| Ent. Air Dew Point Minus Refr. Temp. | |
|--------------------------------------|-----------------------------|
| 10°F (5.5°C) or Less | 11°F (6.1°C) to 18°F (10°C) |
| 1.12 | 1.24 |

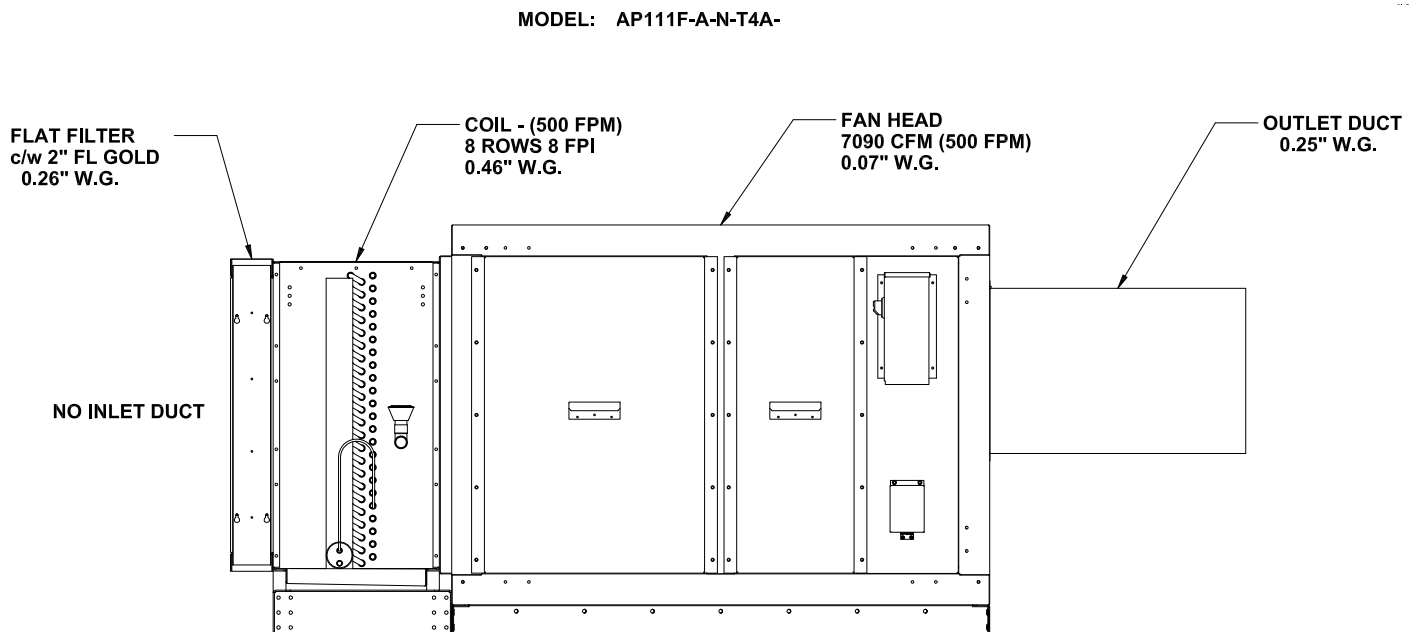
* For medium frosted coil, use factor of 1.3

CALCULATION OF TOTAL STATIC PRESSURE

Example #1

1. Select model based on CFM requirement and estimated static pressure.
2. Example model selected AP111F-A-N-T4A- : 7090 CFM or 500 FPM @ 0.25" ESP.
3. Verify total internal airside resistance using charts on page 7.
 - a) using coil of 8 rows deep and 8 FPI @ 500 FPM = 0.41" W.G.
 - b) using example of 40°F Evap. Temp.
 - c) using example of 45°F Ent. Air Dew Point.
 - d) Wet Coil correction factor = 1.12
 - e) therefore 0.41" x 1.12 = 0.46" is the total internal airside resistance.
4. For filter static pressure refer to page 9 - 0.26" @ 533 FPM.
5. For cabinet effect static pressure refer to Blower Data on pages 7-8 - 0.07"
6. Recalculate total static pressure - total now becomes 1.04" W.G

Note: this example does not allow for detailed velocity inlet and outlet pressure.



CALCULATE TOTAL STATIC PRESSURE (TSP)

$$\text{TSP: } 0.26" + 0.46" + 0.07" + 0.25" = 1.04" \text{ W.G.}$$

FROM BLOWER DATA CHART: 7090 CFM
2.27 BHP
600 RPM

FILTER AIR FRICTION (Inches Of Water)

| FILTER FACE VELOCITY | FARR 30/30 | | FARR 44 | FL GOLD | ALUM. MESH |
|----------------------|---------------|------|------------|----------------------|------------|
| | (throw-aways) | | (washable) | (metal / Renu frame) | (washable) |
| FPM | 2" | 4" | 2" | 2" | 2" |
| 250 | 0.1 | 0.08 | 0.03 | 0.1 | 0.08 |
| 300 | 0.14 | 0.12 | 0.05 | 0.13 | 0.1 |
| 350 | 0.17 | 0.15 | 0.06 | 0.15 | 0.12 |
| 400 | 0.21 | 0.19 | 0.07 | 0.18 | 0.15 |
| 450 | 0.26 | 0.23 | 0.09 | 0.21 | 0.18 |
| 500 | 0.31 | 0.27 | 0.11 | 0.25 | 0.21 |
| 550 | NR | NR | 0.14 | 0.29 | 0.24 |
| 600 | NR | NR | 0.16 | 0.33 | 0.27 |

To determine filter face velocity, divide the CFM by the filter area (see Physical Data table).
 NR = Not Recommended
 Ratings are at initial resistance.

SOUND DATA

SOUND

With the necessary attenuation analysis, which may include considerations of unit placement (away from occupied areas), acoustical insulation in the equipment room, duct silencers, or acoustical duct lining.

SOUND POWER LEVEL ESTIMATING

The following method of estimating centrifugal fan sound power level spectrums is taken from the latest ASHRAE sources. The method does not take into consideration such factors as cabinet attenuation or inefficient unit selection, but does provide conservative approximate values upon which to base an acoustical attenuation analysis.

Sound power levels in decibels are 10-12 watts in each of the eight octave bands may be estimated with the following formula:

$$dB = (\text{Base dB}) + (\text{System dB}) + (\text{Blade Passage Frequency dB})$$

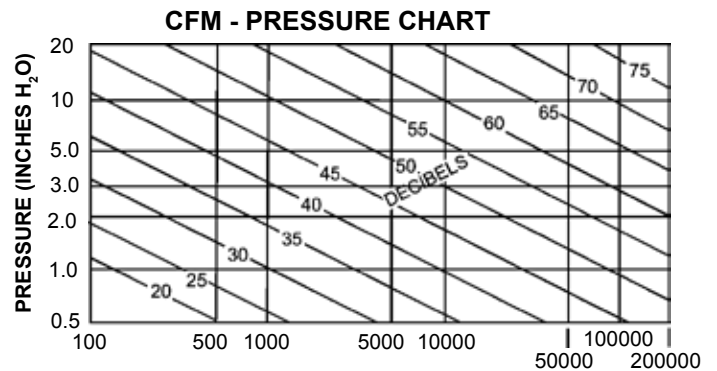
Base dB

The base dB is found in the table below by entering the octave band and reading the dB in the appropriate row.

| OCTAVE BAND CENTRE FREQUENCY | | | | | | | | |
|------------------------------|----|-----|-----|-----|------|------|------|------|
| Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| dB | 47 | 43 | 39 | 33 | 28 | 25 | 23 | 20 |

SYSTEM dB

The system dB is found in the chart below by entering the chart at the flow rate, rise vertically to the pressure of the system and read the decibels



BLADE PASSAGE FREQUENCY dB

The Blade Passage Frequently dB is found:

1. For forward curved fan wheel units - add 2 dB to the one octave band which contains the frequency equal to the RPM of the fan.
2. For airfoil units - add 3 dB to the one octave band which contains the frequency equal to the RPM of the fan.

| DESCRIPTION | | | MODEL KAP | | | | | | | | | |
|---------------------------------------|---------------------------------------|-------------------------------|--------------------------------------|---------------|----------------------------|----------------------------|---------------|----------------|----------------|----------------|-----------------------------|-----------------------------|
| | | | 108 | 111 | 114 | 117 | 122 | 128 | 137 | 141 | 150 | 164 |
| STANDARD FAN DATA | FORWARD CURVED | Outlet Area - Square Feet | 2.04 | 2.86 | 2.86 | 2.86 | 4.38 | 5.5 | 6.9 | 8.67 | 10.91 | 13.74 |
| | | Number - Diameter (in) - Type | 1 - 15 FC | 1 - 18 FC | 1 - 18 FC | 1 - 18 FC | 1 - 20 FC | 1 - 22 FC | 1 - 25 FC | 1 - 28 FC | 1 - 32 FC | 1 - 36 FC |
| | | Shaft and Bearing Size (in) | 1 3/16 | 1 7/16 | 1 7/16 | 1 7/16 | 1 11/16 | 2 | 2 7/16 | 2 7/16 | 2 3/16 | 2 7/16 |
| OPTIONAL FAN DATA | AIRFOIL | Outlet Area - Square Feet | 2.04 | 2.86 | 2.86 | 2.86 | 4.38 | 5.5 | 6.9 | 8.67 | 10.91 | 13.74 |
| | | Number - Diameter (in) - Type | 1 - 15 AF | 1 - 18 AF | 1 - 18 AF | 1 - 18 AF | 1 - 20 AF | 1 - 22 AF | 1 - 25 AF | 1 - 28 AF | 1 - 32 AF | 1 - 36 AF |
| | | Shaft and Bearing Size (in) | 1 7/16 | 1 1/2 | 1 1/2 | 1 1/2 | 1 11/16 | 2 | 2 | 2 3/16 | 2 3/16 | 2 7/16 |
| COIL FACE SIZE | | Inches | 34 1/2x44 1/8 | 34 1/2x59 1/8 | 34 1/2x74 1/8 | 34 1/2x89 1/8 | 40 1/2x93 1/8 | 40 1/2x116 1/8 | 52 1/2x116 1/4 | 61 1/2x116 1/4 | 72 x 116 1/4 | 90 x 116 1/4 |
| | | mm | 876 x 1118 | 876 x 1499 | 876 x 1880 | 876 x 2261 | 1029 x 2362 | 1029 x 2953 | 1334 x 2953 | 1562 x 2953 | 1829 x 2953 | 2286 x 2953 |
| COIL FACE AREA | | ft. ² | 10.5 | 14.1 | 17.7 | 21.3 | 26.2 | 32.6 | 43.6 | 49.6 | 58.1 | 72.6 |
| | | m ² | 0.975 | 1.3 | 1.64 | 1.97 | 2.43 | 3.02 | 4.05 | 4.6 | 5.39 | 6.74 |
| FILTER DATA | 2" FLAT FILTER SECTION | Number - Size (in) | 2 - 16x20x2 2 - 16x25x2 | 6 - 16x20x2 | 6 - 16x25x2 | 4 - 16x20x2 4 - 16x25x2 | 12 - 16x20x2 | 12 - 20x20x2 | 12 - 20x25x2 | 18 - 20x20x2 | 12 - 20x25x2 6 - 20x20x2 | 6 - 20x25x2 18 - 20x20x2 |
| | | Filter Area - Square Feet | 10 | 13.3 | 16.7 | 20 | 26.7 | 33.4 | 41.6 | 50.2 | 58.4 | 70.6 |
| | 4" FLAT FILTER SECTION | Number - Size (in) | 2 - 16x20x4 2 - 16x25x4 | 6 - 16x20x4 | 6 - 16x25x4 | 4 - 16x20x4 4 - 16x25x4 | 12 - 16x20x4 | 12 - 20x20x4 | 12 - 20x25x4 | 18 - 20x20x4 | 12 - 20x25x4 6 - 20x20x4 | 6 - 20x25x4 18 - 20x20x4 |
| | | Filter Area - Square Feet | 10 | 13.3 | 16.7 | 20 | 26.7 | 33.4 | 41.6 | 50.2 | 58.4 | 70.6 |
| | 2" ANGULAR FILTER SECTION | Number - Size (in) | N/A | N/A | 2 - 16x25x2 6 - 20x25x2 | 8 - 20x25x2 | 16 - 16x25x2 | 12 - 20x25x2 | 16 - 20x25x2 | 24 - 20x20x2 | 24 - 20x25x2 | 30 - 20x25x2 |
| | | Filter Area - Square Feet | | | 26.4 | 27.8 | 33.4 | 41.8 | 55.5 | 66.7 | 83.2 | 104 |
| | 2' COMBINATION ANGULAR FILTER SECTION | Number - Size (in) | 6 - 16x25x2 | 6 - 20x25x2 | 2 - 16x25x2 6 - 20x25x2 | 8 - 20x25x2 | 16 - 16x25x2 | 12 - 20x25x2 | 16 - 20x25x2 | 24 - 20x20x2 | 24 - 20x25x2 | 30 - 20x25x2 |
| | | Filter Area - Square Feet | 16.7 | 20.9 | 26.4 | 27.8 | 33.4 | 41.8 | 55.5 | 66.7 | 83.2 | 104 |
| METAL GAUGES | BLOWER SECTION | Frame | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| | | Non Insulated Panels | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| | | Insulated Panels | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | Base | 12 | 12 | 12 | 12 | 12 | 12 | 10 | 10 | 10 | 10 |
| | COOLING COIL SECTION | Frame | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| | | Non Insulated Panels | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| | | Insulated Panels | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | Base | 12 | 12 | 12 | 12 | 12 | 12 | 10 | 10 | 10 | 10 |
| MOTORS | MINIMUM HP | | 3/4 | 3/4 | 3/4 | 3/4 | 1 | 1-1/2 | 1-1/2 | 1-1/2 | 1-1/2 | 3 |
| | MAXIMUM FRAME SIZE | | 254T | 256T | 284T | 284T | 324T | 324T | 364T | 365T | 365T | 365T |
| ELECTRIC DEFROST * KW REQUIREMENTS | ROWS DEEP | 4 | 6.1 | 7.1 | 8.6 | 12.1 | 13.8 | 17.3 | 17.3 | 19.6 | 21.9 | 26.3 |
| | | 6 | 6.1 | 7.1 | 8.6 | 12.1 | 13.8 | 17.3 | 17.3 | 19.6 | 21.9 | 26.3 |
| | | 8 | 7.1 | 9.1 | 11.1 | 13.6 | 15.6 | 21.8 | 21.8 | 24.1 | 28.6 | 35.3 |
| | | 10 | 9.1 | 11.1 | 13.6 | 16.6 | 19.1 | 26.3 | 26.3 | 30.8 | 35.3 | 44.3 |
| HOT GAS DEFROST DRAIN PAN CONNECTIONS | | | ALL SIZES 1-5/8" (41 mm) O.D. COPPER | | | | | | | | | |

* Defrost heaters rated for 230, 460 or 575 volt operation.

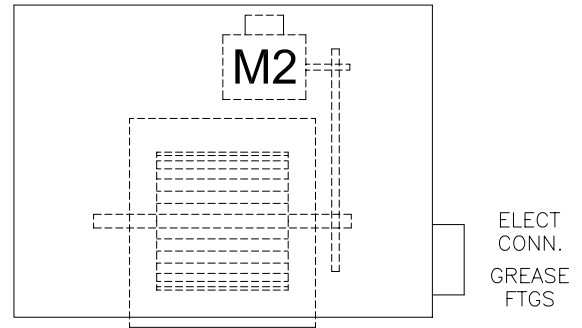
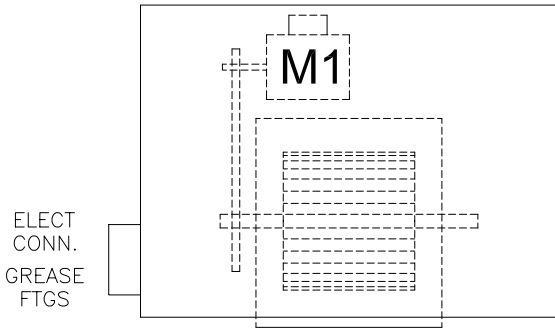
† Maximum current for each fused heater circuit must not exceed 48 amps (60 amp fuses).

NOTE: Total Amp calculations INCLUDE 3 Drain Pan Heaters of the same Voltage. Typical for all Models.

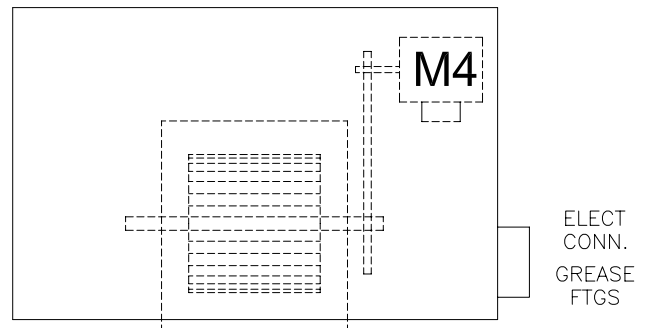
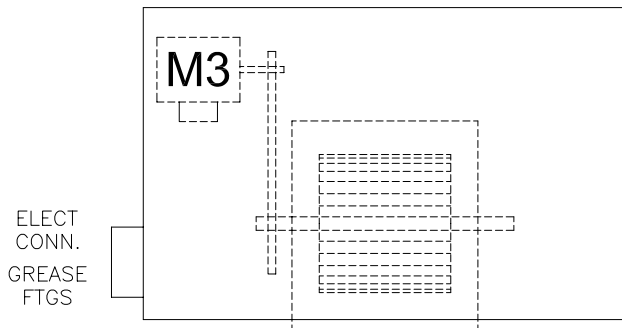
| MODEL KAP | COIL ROWS DEEP | COIL HEATER QTY | TOTAL WATTS | 230/3/60 | | | | | | | | | 460/3/60 | | | | | | 575/3/60 | | |
|--------------|----------------------|-----------------------|----------------|------------|------|-----|------------|------|-----|------------|------|-----|------------|------|-----|------------|------|-----|------------|------|-----|
| | | | | CIRCUIT #1 | | | CIRCUIT #2 | | | CIRCUIT #3 | | | CIRCUIT #1 | | | CIRCUIT #2 | | | CIRCUIT #1 | | |
| | | | | AMPS | MCA | MOP | AMPS | MCA | MOP | AMPS | MCA | MOP | AMPS | MCA | MOP | AMPS | MCA | MOP | AMPS | MCA | MOP |
| 108 | 4,5,6 | 5 | 6,020 | 15.1 | 18.9 | 20 | - | - | - | - | - | - | 7.6 | 9.5 | 15 | - | - | - | 6 | 7.5 | 15 |
| | 8 | 6 | 7,020 | 19.0 | 23.8 | 25 | - | - | - | - | - | - | 9.5 | 11.9 | 15 | - | - | - | 7.6 | 9.5 | 15 |
| | 10 | 8 | 9,020 | 22.7 | 28.4 | 30 | - | - | - | - | - | - | 11.3 | 14.1 | 15 | - | - | - | 9.1 | 11.4 | 15 |
| 111 | 4,5,6 | 6 | 7,275 | 19.0 | 23.8 | 25 | - | - | - | - | - | - | 9.5 | 11.9 | 15 | - | - | - | 8 | 10.0 | 15 |
| | 8 | 8 | 9,275 | 22.7 | 28.4 | 30 | - | - | - | - | - | - | 11.3 | 14.1 | 15 | - | - | - | 9.5 | 11.9 | 15 |
| | 10 | 10 | 11,275 | 30.5 | 38.1 | 40 | - | - | - | - | - | - | 15.1 | 18.9 | 20 | - | - | - | 12 | 15.0 | 20 |
| 114 | 4,5,6 | 6 | 9,030 | 24.7 | 30.9 | 35 | - | - | - | - | - | - | 12.4 | 15.5 | 20 | - | - | - | 9.9 | 12.4 | 15 |
| | 8 | 8 | 11,530 | 29.3 | 36.6 | 40 | - | - | - | - | - | - | 14.7 | 18.4 | 20 | - | - | - | 11.7 | 14.6 | 15 |
| | 10 | 10 | 14,030 | 37.7 | 47.1 | 50 | - | - | - | - | - | - | 18.8 | 23.5 | 25 | - | - | - | 15.1 | 18.9 | 20 |
| 117 | 4,5,6 | 7 | 12,285 | 33.9 | 42.4 | 45 | - | - | - | - | - | - | 16.9 | 21.1 | 25 | - | - | - | 13.6 | 17.0 | 20 |
| | 8 | 8 | 13,785 | 35.0 | 43.8 | 45 | - | - | - | - | - | - | 17.6 | 22.0 | 25 | - | - | - | 14 | 17.5 | 20 |
| | 10 | 10 | 16,785 | 45.2 | 56.5 | 60 | - | - | - | - | - | - | 23.1 | 28.9 | 30 | - | - | - | 18.1 | 22.6 | 25 |
| 122 | 4,5,6 | 7 | 14,110 | 39.5 | 49.4 | 50 | - | - | - | - | - | - | 19.8 | 24.8 | 25 | - | - | - | 15.8 | 19.8 | 20 |
| | 8 | 9 | 17,610 | 46.7 | 58.4 | 60 | - | - | - | - | - | - | 23.4 | 29.3 | 30 | - | - | - | 18.7 | 23.4 | 25 |
| | 10 | 11 | 21,110 | 26.8 | 33.5 | 35 | 26.4 | 32.9 | 35 | - | - | - | 26.6 | 33.3 | 35 | - | - | - | 21.3 | 26.6 | 30 |
| 128 | 4,5,6 | 7 | 18,000 | 25.9 | 32.4 | 35 | 25.9 | 32.4 | 35 | - | - | - | 25.4 | 31.8 | 35 | - | - | - | 20.3 | 25.4 | 30 |
| | 8 | 9 | 22,500 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | - | - | - | 29.8 | 37.3 | 40 | - | - | - | 23.8 | 29.8 | 30 |
| | 10 | 11 | 27,000 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | - | - | - | 33.9 | 42.4 | 45 | - | - | - | 27.1 | 33.9 | 35 |
| 137 | 4,5,6 | 7 | 18,000 | 25.9 | 32.4 | 35 | 25.9 | 32.4 | 35 | - | - | - | 25.4 | 31.8 | 35 | - | - | - | 20.3 | 25.4 | 30 |
| | 8 | 9 | 22,500 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | - | - | - | 29.8 | 37.3 | 40 | - | - | - | 23.8 | 29.8 | 30 |
| | 10 | 11 | 27,000 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | - | - | - | 33.9 | 42.4 | 45 | - | - | - | 27.1 | 33.9 | 35 |
| 141 | 4,5,6 | 8 | 20,250 | 25.9 | 32.4 | 35 | 33.9 | 42.4 | 45 | - | - | - | 25.4 | 31.8 | 35 | - | - | - | 20.3 | 25.4 | 30 |
| | 8 | 10 | 24,750 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | - | - | - | 33.9 | 42.4 | 45 | - | - | - | 27.1 | 33.9 | 35 |
| | 10 | 13 | 31,500 | 42.6 | 53.3 | 60 | 42.6 | 53.3 | 60 | - | - | - | 42.4 | 53.0 | 60 | - | - | - | 33.9 | 42.4 | 45 |
| 150 | 4,5,6 | 9 | 22,500 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | - | - | - | 29.8 | 37.3 | 40 | - | - | - | 23.8 | 29.8 | 30 |
| | 8 | 12 | 29,250 | 42.6 | 53.3 | 60 | 33.9 | 42.4 | 45 | - | - | - | 38.2 | 47.8 | 50 | - | - | - | 30.6 | 38.3 | 40 |
| | 10 | 15 | 36,000 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | 46.7 | 58.4 | 60 | - | - | - | 37.3 | 46.6 | 50 |
| 164 | 4,5,6 | 11 | 27,000 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | - | - | - | 33.9 | 42.4 | 45 | - | - | - | 27.1 | 33.9 | 35 |
| | 8 | 15 | 36,000 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | 33.9 | 42.4 | 45 | 46.7 | 58.4 | 60 | - | - | - | 37.3 | 46.6 | 50 |
| | 10 | 19 | 45,000 | 42.6 | 53.3 | 60 | 42.6 | 53.3 | 60 | 33.9 | 42.4 | 45 | 29.8 | 37.3 | 40 | 29.8 | 37.3 | 40 | 47.4 | 59.3 | 60 |

TOP VIEWS

**MOTOR LOCATIONS M1 & M2
FOR MODELS 108 through 128 ONLY**



**MOTOR LOCATIONS M3 & M4
FOR MODELS 137 through 164 ONLY**



**LOCATIONS ARE TYPICAL FOR ALL
AIR FLOW CONFIGURATIONS**

MOTOR CONSTRUCTION ARRANGEMENT

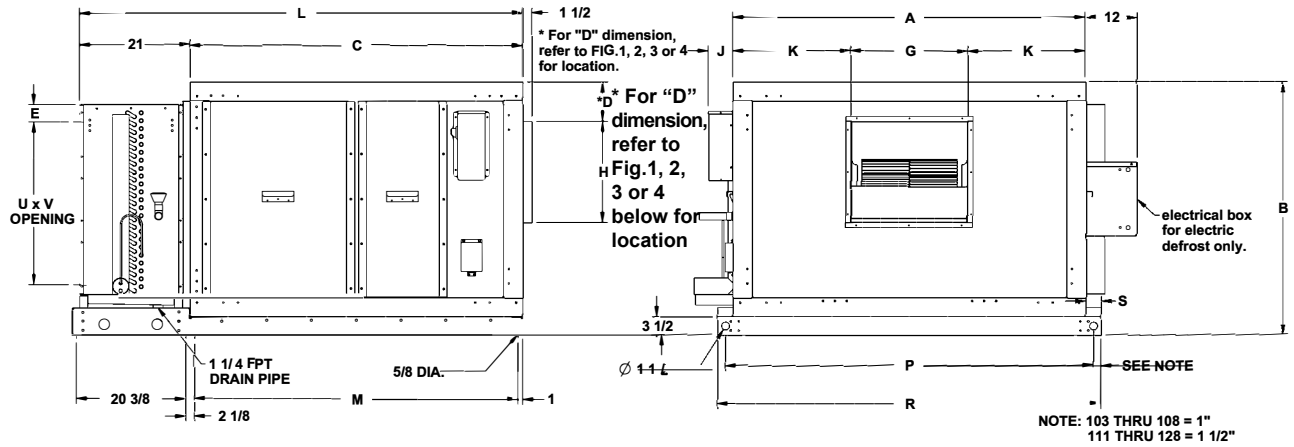
- M1 LOCATION, - F1
- M2 LOCATION, - F2
- M3 LOCATION, - F1
- M4 LOCATION, - F2

SEE MOTOR PART NUMBERS IN ELECTRICAL DATA TABLES

DRIVE INSTALLATION

- A. All motors are mounted on a heavy duty slide base located inside the cabinet.
- B. Drives are pre-set for desired RPM.
- C. Belt tension is factory set.

Models 108-128

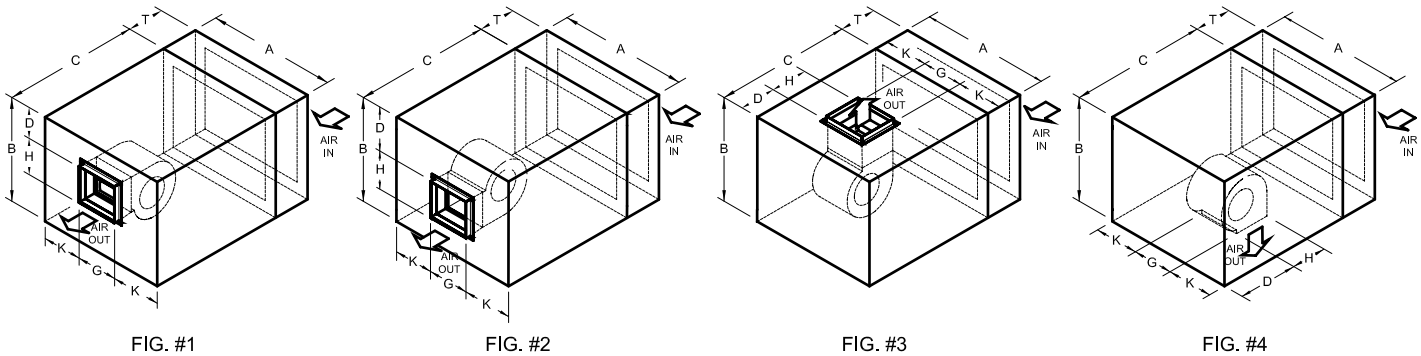


DIMENSIONS - IMPERIAL (inches)

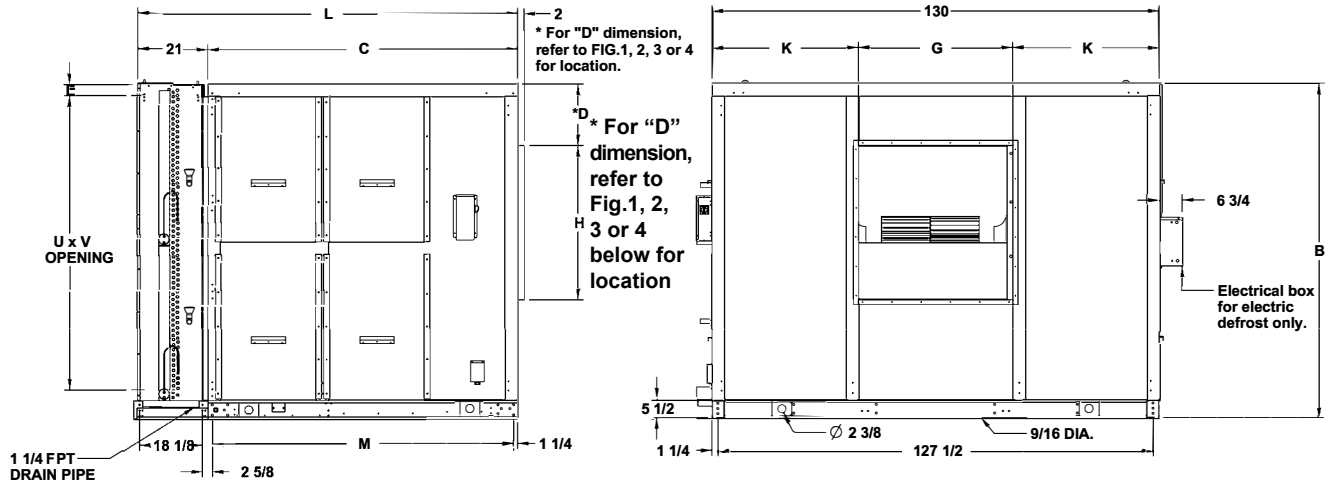
| UNIT SIZE | A | B | C | FIG. #1 D | FIG. #2 D | FIG. #3/4 D | E | G | H | J | K | L | M | P | R | S | U | V |
|-----------|---------|----|---------|-----------|-----------|-------------|-------|--------|--------|-------|----------|---------|---------|---------|---------|---------|--------|---------|
| 108 | 51 7/8 | 48 | 53 9/16 | 12 1/4 | 19 7/8 | 6 3/16 | 1 1/2 | 19 | 16 1/4 | 4 3/4 | 16 7/16 | 74 9/16 | 51 9/16 | 55 3/8 | 57 3/8 | 2 3/4 | 33 1/8 | 44 1/8 |
| 111 | 66 7/8 | 48 | 63 1/8 | 7 1/2 | 17 1/8 | 7 1/4 | 1 1/2 | 22 1/4 | 19 1/4 | 4 3/4 | 22 5/16 | 84 1/8 | 61 1/8 | 69 3/4 | 72 3/4 | 2 15/16 | 33 1/8 | 59 1/8 |
| 114 | 81 7/8 | 48 | 63 1/8 | 7 1/2 | 17 1/8 | 7 1/2 | 1 1/2 | 22 1/4 | 19 1/4 | 4 3/4 | 29 13/16 | 84 1/8 | 61 1/8 | 84 3/4 | 87 3/4 | 2 15/16 | 33 1/8 | 74 1/8 |
| 117 | 96 7/8 | 48 | 63 1/8 | 6 7/8 | 17 1/8 | 7 1/8 | 1 1/2 | 22 1/4 | 19 1/4 | 4 3/4 | 37 5/16 | 84 1/8 | 61 1/8 | 99 3/4 | 102 3/4 | 2 15/16 | 33 1/8 | 89 1/8 |
| 122 | 100 7/8 | 54 | 69 1/8 | 6 1/2 | 17 1/2 | 6 1/2 | 2 1/2 | 25 3/8 | 25 3/8 | 4 3/4 | 37 3/4 | 90 1/8 | 67 1/8 | 103 3/4 | 106 3/4 | 2 15/16 | 39 1/8 | 93 1/8 |
| 128 | 123 7/8 | 57 | 73 1/8 | 5 1/4 | 17 5/8 | 6 3/4 | 2 1/2 | 28 1/4 | 28 1/4 | 4 3/4 | 47 13/16 | 94 1/8 | 71 1/8 | 126 3/4 | 129 3/4 | 2 15/16 | 39 1/8 | 116 1/4 |

NOTE: All dimensions are approximate. Certified drawings available on request.

* NOTE: "D" DIMENSION VARIES BASED ON AIRFLOW CONFIGURATION



Models 137 - 164

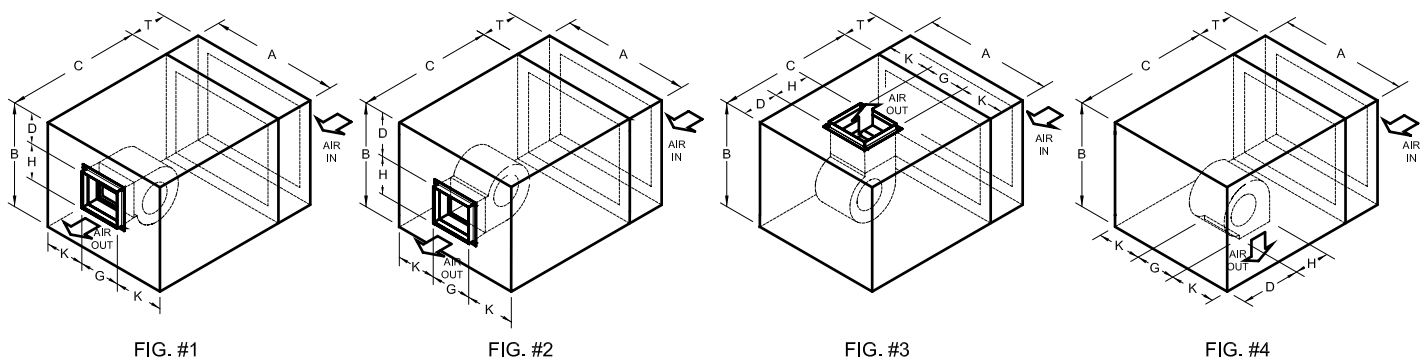


DIMENSIONS - IMPERIAL (inches)

| UNIT SIZE | A | B | C | FIG. #1 D | FIG. #2 D | FIG. #3/4 D | E | G | H | J | K | L | M | U | V |
|-----------|-----|--------|----|-----------|-----------|-------------|-------|--------|--------|-------|---------|-----|--------|--------|---------|
| 137 | 130 | 61 1/2 | 70 | 5 3/4 | 17 7/8 | 15 7/8 | 2 1/2 | 31 3/4 | 31 3/4 | 4 3/4 | 49 1/8 | 91 | 67 1/2 | 51 7/8 | 116 1/4 |
| 141 | 130 | 70 1/2 | 75 | 6 | 20 1/4 | 18 3/4 | 2 1/2 | 35 5/8 | 35 5/8 | 4 3/4 | 47 3/16 | 96 | 72 1/2 | 60 1/8 | 116 1/4 |
| 150 | 130 | 79 1/2 | 82 | 10 1/4 | 27 7/8 | 21 1/8 | 1 3/4 | 40 | 40 | 4 3/4 | 45 | 103 | 79 1/2 | 70 5/8 | 116 1/4 |
| 164 | 130 | 97 1/2 | 90 | 21 1/4 | 40 7/8 | 23 1/4 | 1 3/4 | 44 3/4 | 44 3/4 | 5 3/4 | 42 5/8 | 111 | 87 1/2 | 88 5/8 | 116 1/4 |

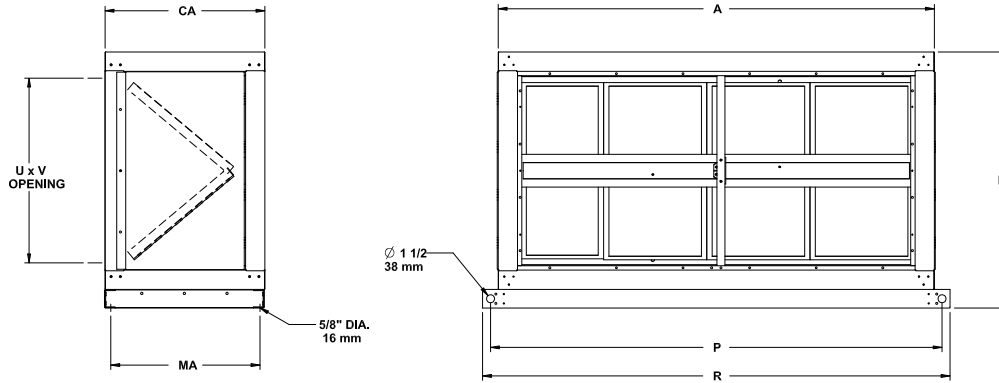
NOTE: All dimensions are approximate. Certified drawings available on request.

* NOTE: "D" DIMENSION VARIES BASED ON AIRFLOW CONFIGURATION



DIMENSIONAL DATA - ANGULAR FILTER SECTIONS

Note: Optional Duct Extension Flanges (1-1/2) available.



Note:
Models 114 through 128 have 12GA. "C" rails extended as shown.
Curb mount capability.
See Mounting Hole Locations on Page 18

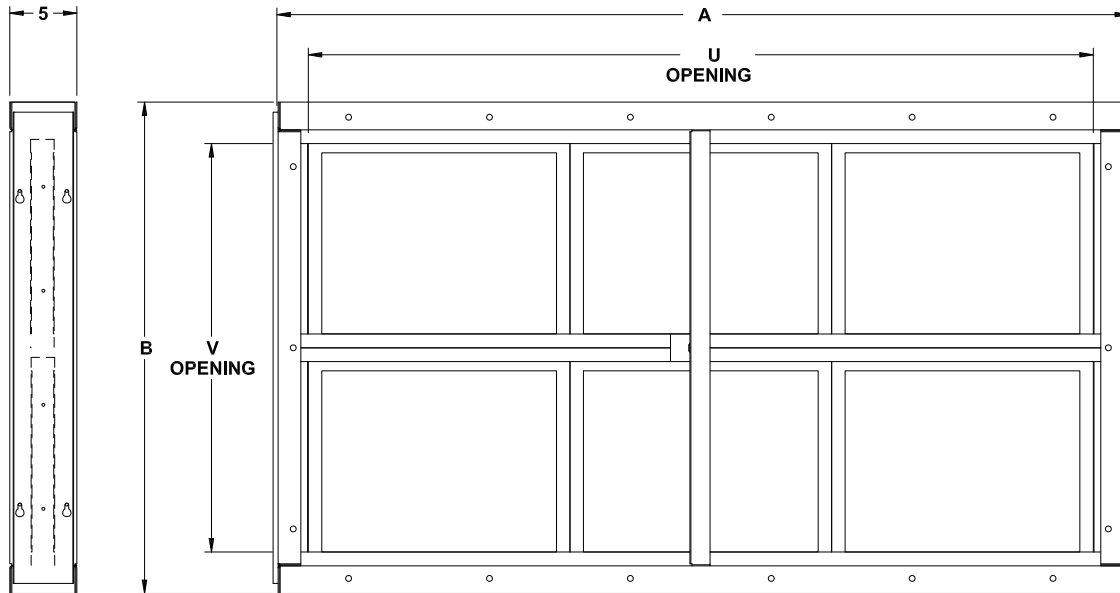
Note:
Models 137 through 164 have 10GA frame structure flush with cabinet.

DIMENSIONS - IMPERIAL (inches)

| UNIT SIZE | STANDARD WIDTH | | | STANDARD HEIGHT | ANGULAR FILTER LENGTH | | INLET OPENING | |
|-----------|----------------|---------|---------|-----------------|-----------------------|----|---------------|---------|
| | A | P | R | | B | CA | MA | U |
| 114 | 81 7/8 | 84 3/4 | 87 3/4 | 48 | 30 | 28 | 35 11/16 | 73 |
| 117 | 96 7/8 | 99 3/4 | 102 3/4 | 48 | 30 | 28 | 35 11/16 | 88 |
| 122 | 100 7/8 | 103 3/4 | 106 3/4 | 54 | 30 | 28 | 41 11/16 | 90 1/2 |
| 128 | 123 7/8 | 126 3/4 | 129 3/4 | 57 | 30 | 28 | 44 11/16 | 115 |
| 137 | 130 | - | 130 | 61 1/2 | 30 | 28 | 55 3/4 | 121 1/8 |
| 141 | 130 | - | 130 | 70 1/2 | 30 | 28 | 61 3/4 | 121 1/8 |
| 150 | 130 | - | 130 | 79 1/2 | 30 | 28 | 74 | 121 1/8 |
| 164 | 130 | - | 130 | 97 1/2 | 35 | 33 | 86 1/2 | 121 1/8 |

NOTE: All dimensions are approximate. Certified drawings available on request.

DIMENSIONAL DATA - FLAT FILTER BOLT-ON



*** AVAILABLE WITH 2" FILTERS ONLY**

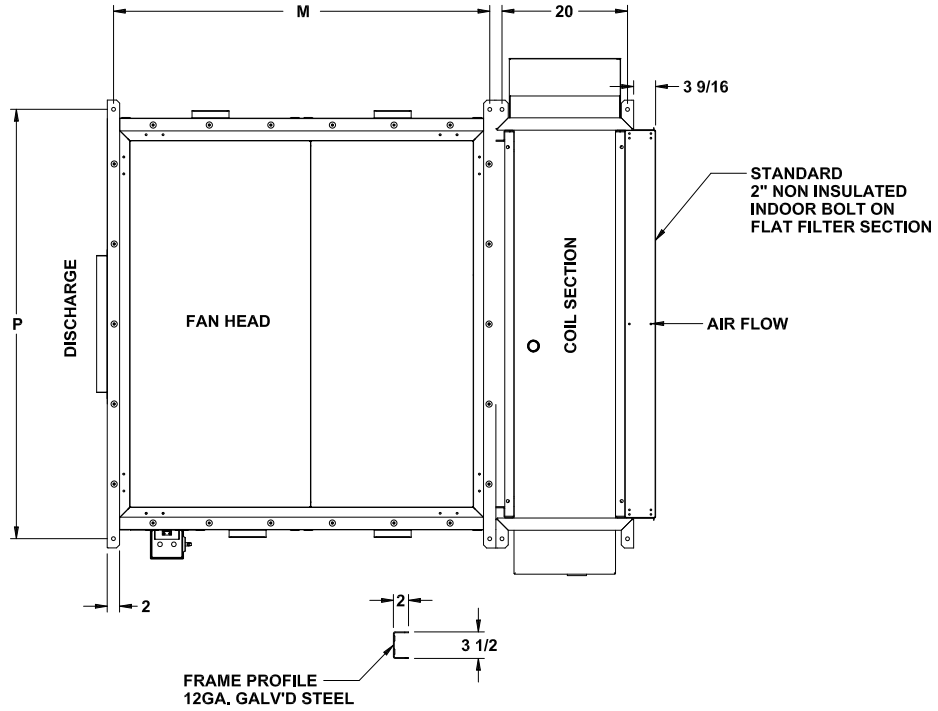
DIMENSIONS - IMPERIAL (inches)

| UNIT SIZE | A | B | INLET OPENING | |
|-----------|---------|--------|---------------|--------|
| | | | U | V |
| 108 | 48 | 36 5/8 | 44 5/8 | 32 1/2 |
| 111 | 63 | 36 5/8 | 59 5/8 | 32 1/2 |
| 114 | 78 | 36 5/8 | 74 5/8 | 32 1/2 |
| 117 | 93 | 36 5/8 | 89 5/8 | 32 1/2 |
| 122 | 97 | 43 5/8 | 93 5/8 | 40 1/8 |
| 128 | 120 | 43 5/8 | 116 5/8 | 40 1/8 |
| 137 | 119 3/8 | 55 1/8 | 116 5/8 | 50 1/8 |
| 141 | 119 3/8 | 63 3/8 | 116 5/8 | 60 1/8 |
| 150 | 119 3/8 | 73 1/8 | 116 5/8 | 70 1/8 |
| 164 | 119 3/8 | 91 1/8 | 116 5/8 | 85 1/4 |

NOTE: All dimensions are approximate. Certified drawings available on request.

MODELS 108 - 128

BOTTOM VIEW

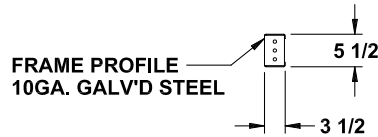
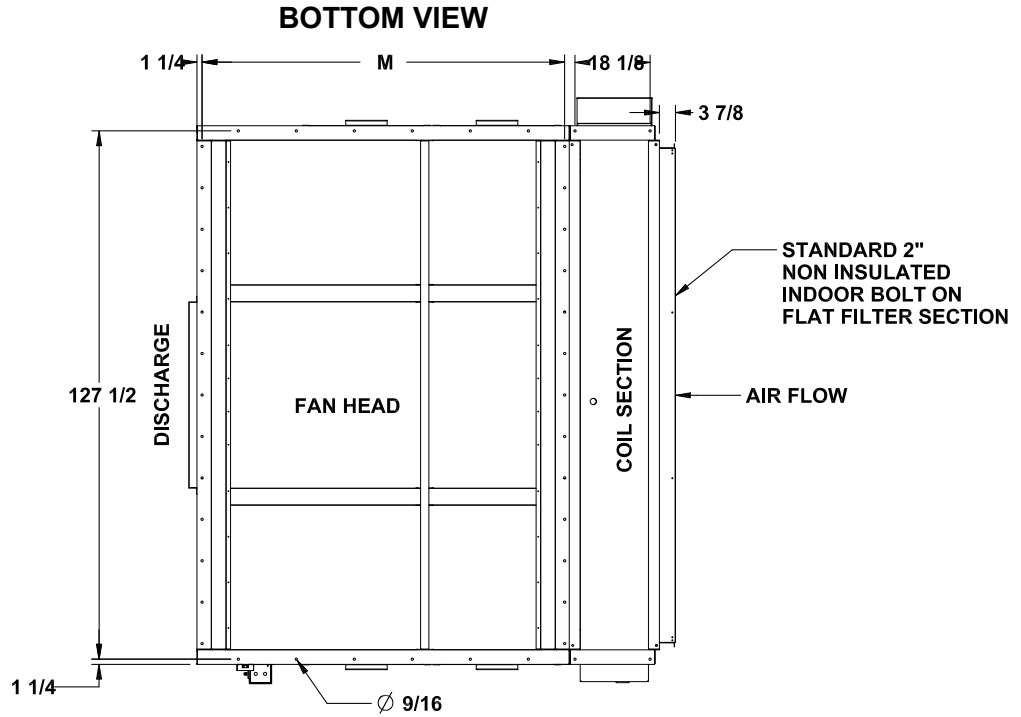


DIMENSIONS - IMPERIAL (inches)

| MODEL | STANDARD WIDTH | FAN HEAD |
|-------|----------------|----------|
| | P | M |
| 108 | 55 3/8 | 51 9/16 |
| 111 | 69 3/4 | 61 1/8 |
| 114 | 81 3/4 | 61 1/8 |
| 117 | 99 3/4 | 61 1/8 |
| 122 | 103 3/4 | 67 1/8 |
| 128 | 126 3/4 | 71 1/8 |

NOTE: All dimensions are approximate.
 Certified drawings available on request.

MODELS 137 - 164

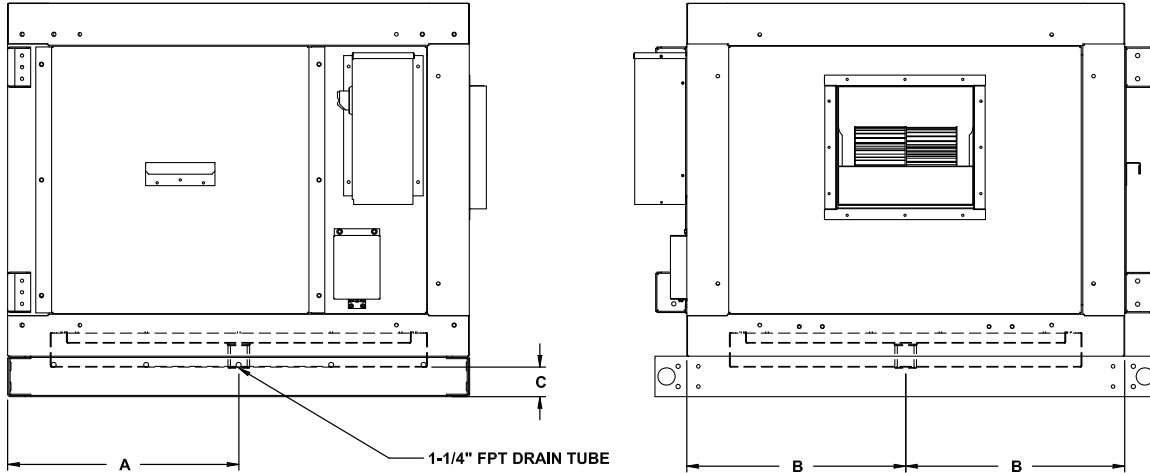


DIMENSIONS - IMPERIAL (inches)

| MODEL | FAN HEAD |
|-------|----------|
| | M |
| 137 | 67 1/2 |
| 141 | 72 1/2 |
| 150 | 79 1/2 |
| 164 | 87 1/2 |

NOTE: All dimensions are approximate.
 Certified drawings available on request.

MODELS "AP" 108 THRU 128



FOR CABINET DIMENSIONS
REF. PAGE 20.

NOTE: NOT AVAILABLE
WITH FIG.4 - DOWNBLAST.

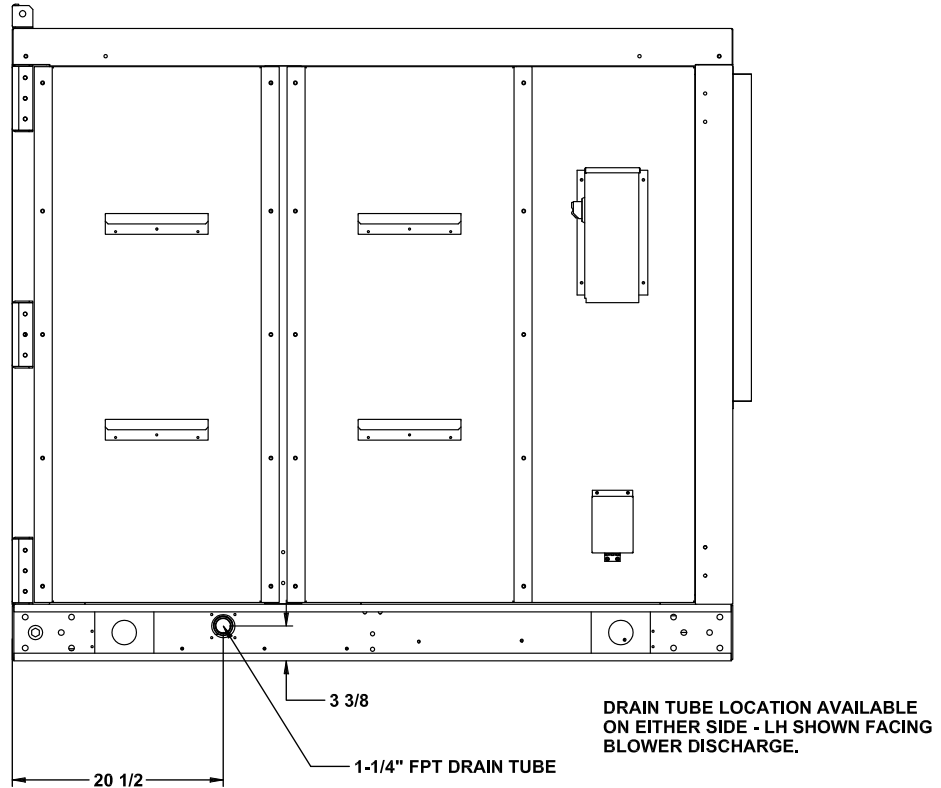
DIMENSIONS - IMPERIAL (inches)

| UNIT SIZE | A | B | C |
|-----------|--------|----------|---|
| 108 | 18 3/8 | 25 15/16 | 2 |
| 111 | 23 | 33 7/16 | 2 |
| 114 | 23 | 40 15/16 | 2 |
| 117 | 23 | 48 7/16 | 2 |
| 122 | 23 | 50 7/16 | 2 |
| 128 | 23 | 61 15/16 | 2 |

NOTE: All dimensions are approximate.
Certified drawings available on request.

**ACCESSORIES - DIMENSIONAL DATA -
FAN HEAD DRAIN PAN**

MODELS "AP" 137 THRU 164



**FOR CABINET DIMENSIONS
SEE PAGE 20.**

**NOTE: NOT AVAILABLE
WITH FIG.4 - DOWNBLAST.**

GENERAL

Furnish and install where shown on plans, Type AP Product Coolers. Sizes and performance shall be as indicated in the Unit Schedule. Each unit shall be complete with factory furnished components as shown on the plans.

Cabinets shall be of sectionalized construction, and all sheet metal parts including accessories shall be fabricated of continuous galvanized steel. The casing panels shall be removable for easy access to the interior of the unit. Care should be taken to ensure that sufficient access is available for servicing the unit.

All cooling coils shall be arranged within the coil section in a vertical position with the air passing horizontally through the coil to insure quick removal of the condensate from the coil surface. All product coolers must be installed level to ensure proper drainage of water from the pre-engineered drain pan.

FAN ASSEMBLY

Fans shall be forward curved and designed for Class II operation. Fan ratings shall be based on fan tests conducted in accordance with AMCA Code No. 210. Fan housings and wheels shall be continuous galvanized steel. All fan wheels shall be keyed to the fan shaft.

BEARINGS AND FAN SHAFT

The fan shaft shall be solid high carbon steel, fully sized throughout. The maximum rated fan RPM shall be well below the first critical fan shaft speed.

Bearing shall be self-aligning, grease lubricated, ball type (9-9 T2 through 28-28 T2) in pillow block cast iron housings, roller type (32-32 T2 through 40-40 T2) in pillow block split cast iron housings. Lubrication fittings shall be provided, and permanently lubricated bearings will be unacceptable.

COILS - GENERAL

Coils shall be constructed with 5/8" O.D. and or 1/2 " O.D. copper tubes and (aluminum) (copper) rippled-corrugated fins spaced (8) (10) (12) per inch. Tubes shall be arranged in a staggered tube pattern with respect to air flow. Fins shall have full drawn collars to provide a continuous secondary surface cover over the entire tube length.

Tubes shall be expanded into fins to provide a continuous primary to secondary compression contact over the entire finned length.

Coil casing shall be of continuous galvanized steel. Coil face velocity shall be as indicated on the unit schedule. The rows of coil shall be as required to produce the capacities as indicated in the performance schedule. All water coils shall be circulated to obtain optimum tube water velocity. No devices shall be used inside the coil tubes which interfere with the drainability or increase water pressure drop. Depending on applications, coils shall be tested with 300, 450 or 650 PSIG air under water.

DIRECT EXPANSION COILS

Cooling coils are designed for use with most common refrigerants. Sweat type copper suction connections shall be located at the bottom of the suction headers for gravity oil drainage. (Coils shall be circuited for (face control) (row control) capacity reduction.) Pressure type liquid distributors shall be used.

CHILLED WATER COILS

Cooling coils shall be designed for use with chilled water. With a vent connection at the highest point, and a drain connection at the lowest point. Headers shall be fabricated of copper tubes, and the connections shall be male pipe threaded with protective caps.

DEFROSTING

Product Coolers are obtainable with electric or hot gas defrost systems. On hot gas defrost units, the distributor on the evaporator coil is equipped with a side port connection to facilitate a hot gas connection.

A liquid line solenoid valve (supplied by others) should be used so that evaporator coil may be pumped out before each defrost cycle.

The following defrost control (supplied by others) methods may be used with Product Coolers.

(1) TIME INITIATED- TEMPERATURE TERMINATED

When using a time initiated - temperature terminated method of defrosting a Paragon Timer 8145-20 or equal is recommended for this application. Timer is used in conjunction with a defrost termination thermostat. For 3 phase applications, the timer must be used with a contactor. As well as the defrost termination thermostat, the timer will also have a fail safe feature built into unit.

The defrost termination thermostat should be set at approx. 35°F (1.6°C) and should be adjustable. Differential should be 5°F (2.8°C) or less. Bulb should be attached to a tube of the evaporator. As a part of this system, a fan delay thermostat should be used to provide a delay period between the end of the defrost and the start-up of the fan. The fan delay thermostat should be adjustable and set at 10-25°F (5.6 - 13.9°C) (depending on application) and bulb should be attached to evaporator tube. When installing thermostats, care should be taken to ensure that bulbs are not attached to evaporator heater tubes.

(2) TIME CONTROLLED OPERATION

Defrosting may also be carried out by a time controlled sequence. This system utilizes a timer and fan delay thermostat. Timer should have an adjustable length of defrost from 2-110 minutes and should be Paragon 8045-20 or equal. Fan delay thermostat should be as indicated in (1) above.

Initially, 4-30 minute defrost per day are recommended. However, it is important that the coil be completely cleared of defrost at the end of the cycle. Should coil not be cleared of all frost at the end of 30 minutes, more frequent defrost of shorter duration should be used.

WIRING

For suggested wiring of defrost heaters see Dwg. No. 1099000 & 1099001 furnished with the product cooler.

FILTER SECTION

Furnish factory built (flat) (angular) filter section complete with filters as specified herein. The filter area shall be as specified on the Unit Schedule. (Flat and Angular filter sections shall have access doors on both ends.)

FILTERS

Filters shall be (throwaway) (permanent) (permanent high velocity) type.

GENERAL

- A. The items should be carefully checked against the bills of lading to be sure all crates and cartons have been received. All units should be carefully inspected for damage when received. Visible or concealed damage should be reported immediately to the carrier and a claim filed for damage.
- B. Air Handler units are constructed of heavy gauge galvanized steel and are thoroughly inspected before leaving the plant. Care must be taken during installation to prevent damage to units.
- C. In order to insure long and trouble-free life, the units should have proper care and maintenance. Enough space should be left around the unit for filter removal, lubrication, and removal of coils if this should become necessary.
- D. Flexible connections should be used on the outlet connections and oil inlet duct connections of the unit.
- E. Special care should be taken when handling the blower section. All fans are dynamically balanced before leaving the plant. Rough handling, however, can cause misalignment of the drives. Sheaves should be carefully inspected before unit installation to make sure this has not happened.
- F. Screws, bolts, etc., for assembly of sections are supplied in a cloth bag attached to each section. Gasketing to be used between sections, when assembling, is supplied in rolls in the unit.
- G. Drain line from drain pan connection must be adequately pitched and must have a "water seal."

Some units are shipped in sections and must be assembled on the job.

A. HANDLING OF SECTIONS:

- 1. Lifting / Isolator rails are supplied for bottom lifting only. Models 108 thru 128.
- 2. Lifting rails are supplied with 5/8" dia. Holes, suitable for 1/2" rod.
- 3. If units are to be moved using just one hoist, a spreader bar should be used to prevent damage to the unit.
- 4. Models 137 thru 164 come with lifting gussets located in the base frame. Fig.6

B. GASKETING:

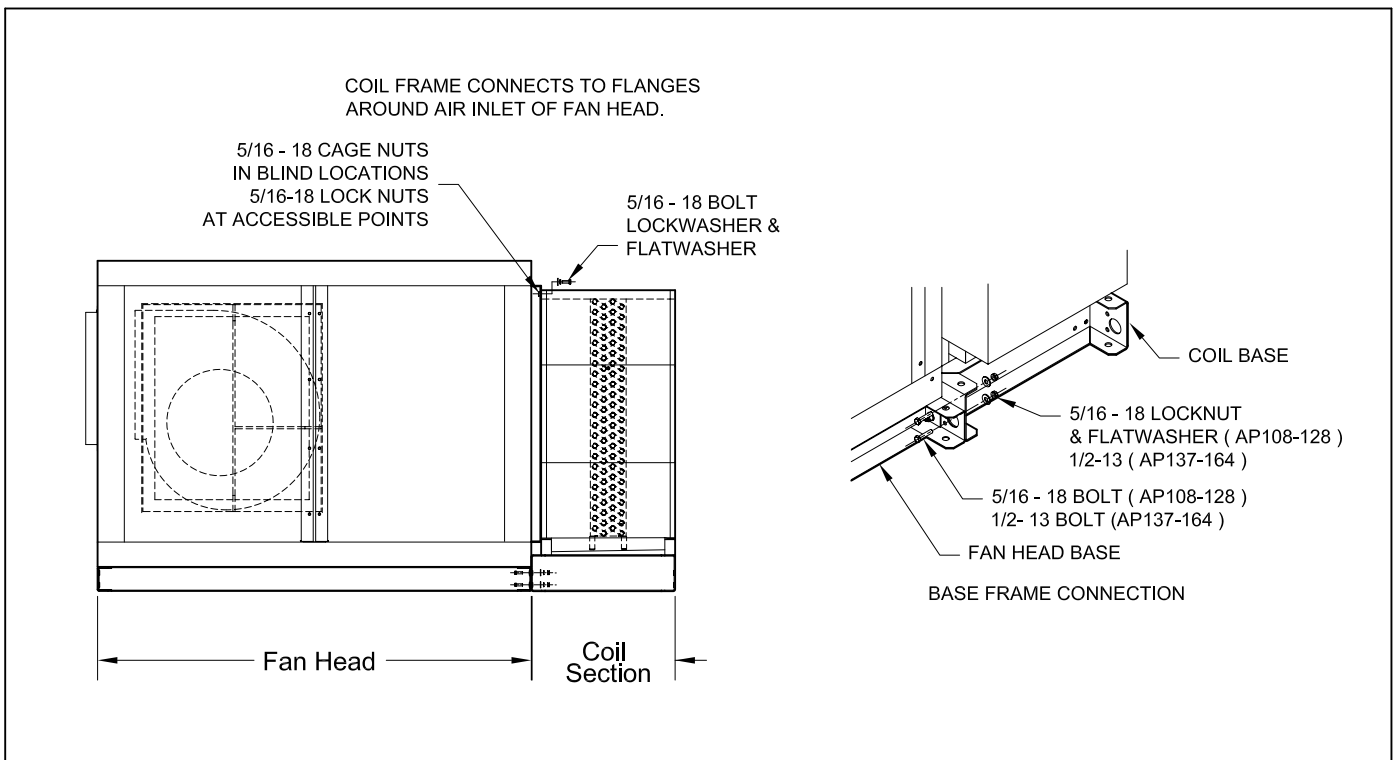
The gasketing is supplied with each section that has to be assembled on the job.

- 1. Gasket the perimeter of the section when necessary. Join ends tight to avoid air leakage. Fig. 2 & 3

C. FASTENING OF SECTIONS:

- 1. Figure 1 shows the typical attaching method used for fan head and heating and ventilating coil sections.
 - a. Gasket the perimeter of the coil section flange as outlined in "Gasketing". Fig. 2 & 3
 - b. Align the sections using the mounting brackets as shown in Fig.1.
 - c. Bolt the base frame as shown in Fig.1.

**Figure 1
TYPICAL ATTACHING METHOD**



GENERAL (cont'd)

D. MOUNTING OF SECTION

1. All models are to be moved into position using the bottom lifting rails (108 thru 128) or the base frame (137 thru 164). No units are to be lifted from the top.
2. When crane lifting, proper spreader bars should be used to avoid damage to the cabinet material. See Fig.4, 5, & 6.

Figure 2
BLOWER SECTION to COIL
and ACCESSORY SECTIONS
Models AP108 - 128

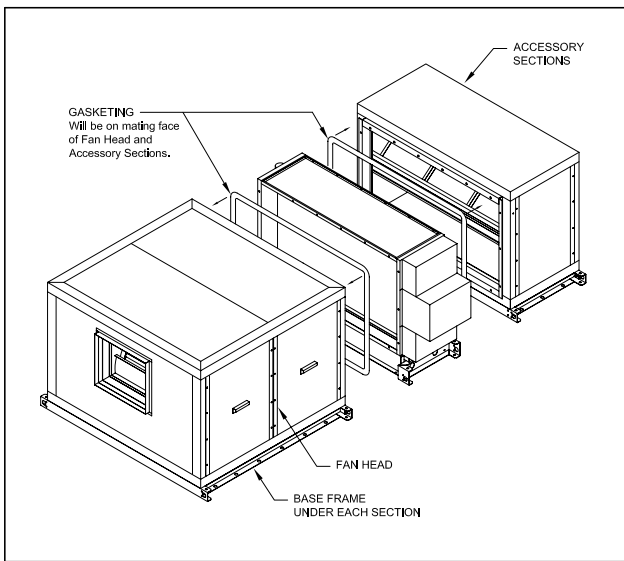
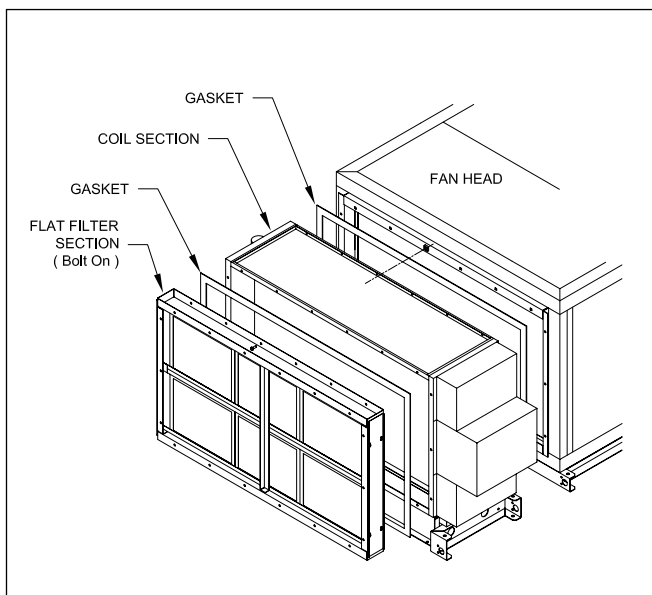


Figure 3
ANGULAR FILTER (Bolt-On Style) to COIL
or ACCESSORY SECTIONS - ALL MODELS



LOCATING AND INSTALLATION HINTS

IMPORTANT: Product Coolers AP137, AP141, AP150 and AP164 MUST be platform or floor mounted.

Product Coolers may be placed in any suitable manner in the room. However, low temperature units should not be located over entrance doors, because of the heavy frosting that will occur on the coils.

All Product Coolers must be installed level to ensure proper drainage of water from the pre-engineered drain pan.

Drain lines for all Product Cooler Models should be pitched 45° and should be as short as possible. To prevent drain line freezing problems the following recommendations should be carried out:

- (a) Use a drain line heater (supplied by others) with a density of 20 watts per foot. Six to eight feet of cable per foot of drain line is recommended.
- (b) Drain line heater should make at least a full turn round the outlet of the drain pan.
- (c) The heated drain line should be insulated.
- (d) The drain line should be provided with a trap (Fig.8 – pg.23) outside the freezer room. Traps should be filled with water before initial start-up.

WIRING

For suggested wiring of defrost heaters see Dwg. No. 46042 & 46043 furnished with the product cooler.

DRIVE INSTALLATION

- A. All motors are mounted on a heavy duty slide base located inside the cabinet.
- B. Drives are pre-set for desired RPM.
- C. Belt tension is factory set.

UNIT INSTALLATION

- A. Units 108 thru 128 come complete with lifting rails with 5/8" dia. mounting holes. Lifting rails are also designed to mount to roof curbs supplied by others. Lifting rails also allow for ceiling suspension with isolators – holes to allow 1/2 rod.
- B. Units 137 thru 164 come complete with 5-1/2" "C" channel designed for bottom mounting only.

IMPORTANT
Models AP137 through 164
are suitable for bottom mounting only.
In order to suspend equipment
from the ceiling, a field installed supporting
structure must be provided

LIFTING INSTRUCTIONS

Air handling units and associated sections are large, heavy, mechanical equipment and must be handled as such. A fully qualified and properly crew with necessary rigging should be engaged to set the components into position. Lifting holes have been provided along base frames for attaching lifting slings. Spreader bars must be used so that lifting forces are applied vertically.

Note:

- Coil sections, if shipped separately, will have base frames installed.
- Lifting lugs are provided on unit base rails
- Ensure that unit top side is stabilized to prevent tipping when lifting sections into place.
- Under no circumstances should coil connections, drains or weather covers be used for lifting.
- Base frames must be securely anchored to the building structure, sleeper, roof curb or concrete pad.
- the weight of the air handling unit and accessory sections alone is not enough to hold in place

Figure 4
FAN HEAD and ASSEMBLED SECTIONS -
Models AP108 - 164

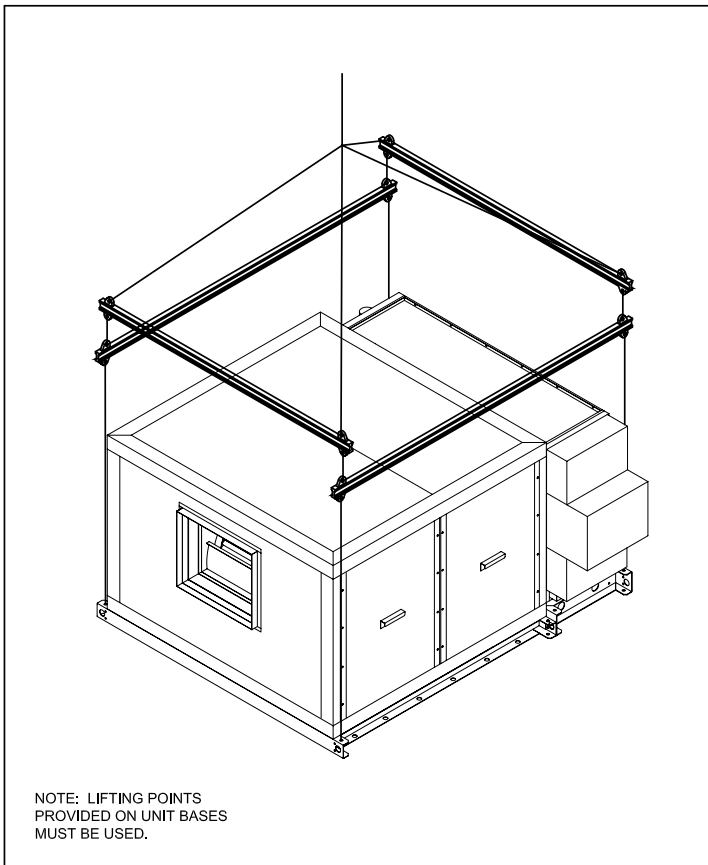


Figure 5
COILS MAY BE SHIPPED SEPARATELY

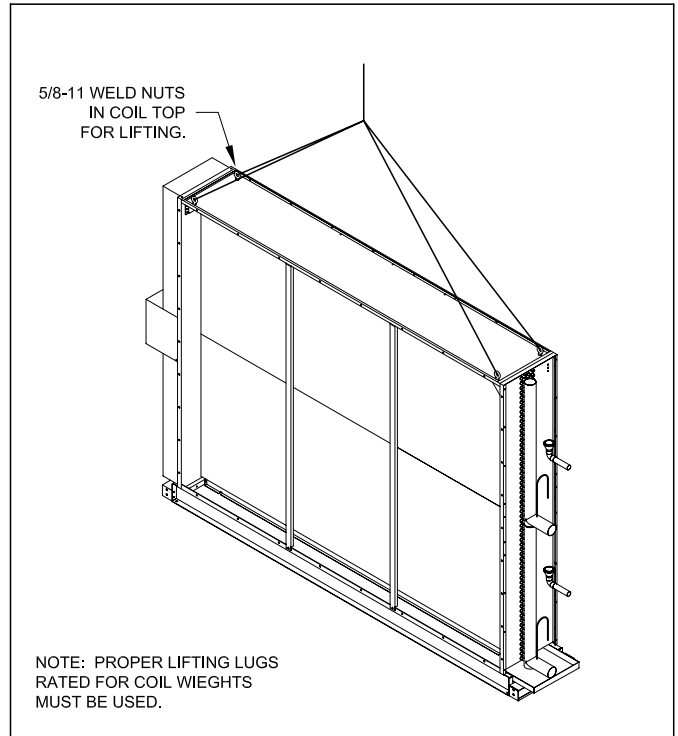
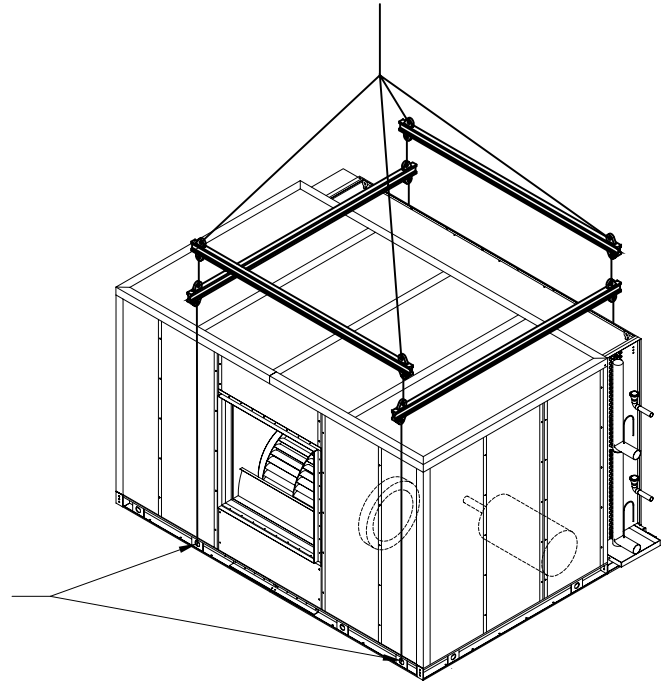


Figure 6
FAN HEAD and ASSEMBLED SECTIONS
Models AP137H - 164H

On models 137 through 164, motor and drive sizes can greatly off-set the unit centre of gravity. Welded lugs are positioned in base channels to provide available points for lifting units vertically. Care must be taken to locate motor position in unit before determining appropriate lifting points.



FIELD INSTALLATION OR REMOVAL OF COILS

In all cases, the end panel of the coil section is removable. You should have access to both ends of the unit for ease of installation and proper positioning of coil. In all cases, sections or duct work must be disconnected and removed to allow access of coil close-off hardware. The procedure outlined, is for installation of coils. To remove coils, reverse the procedure.

1. Cooling Coils
 Models AP 108-164, Fig. 13
 - a. Attach coil end plate holes to bottom coil brackets in drain pan .
 - b. Re-attach coil section if necessary.
 - c. Install piping and drain tube. See Fig.8 for proper P-Trap dimension reference.
2. Locate dimensionally the supply and return connections and drill holes in end panels of unit. Holes should be located very carefully.
3. Attach end panels to unit and slip grommets over connections to prevent air leakage.

Figure 7
AP COOLING COILS

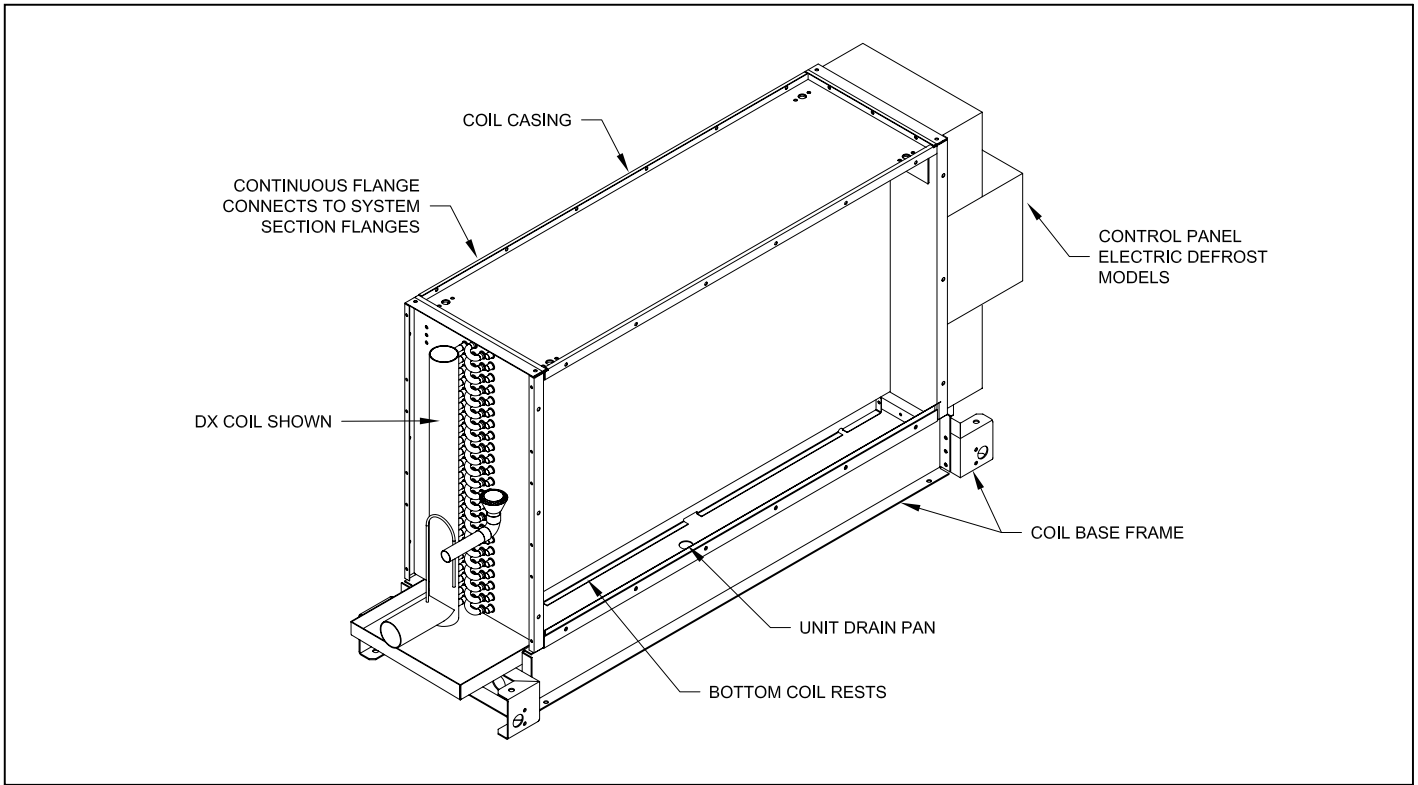
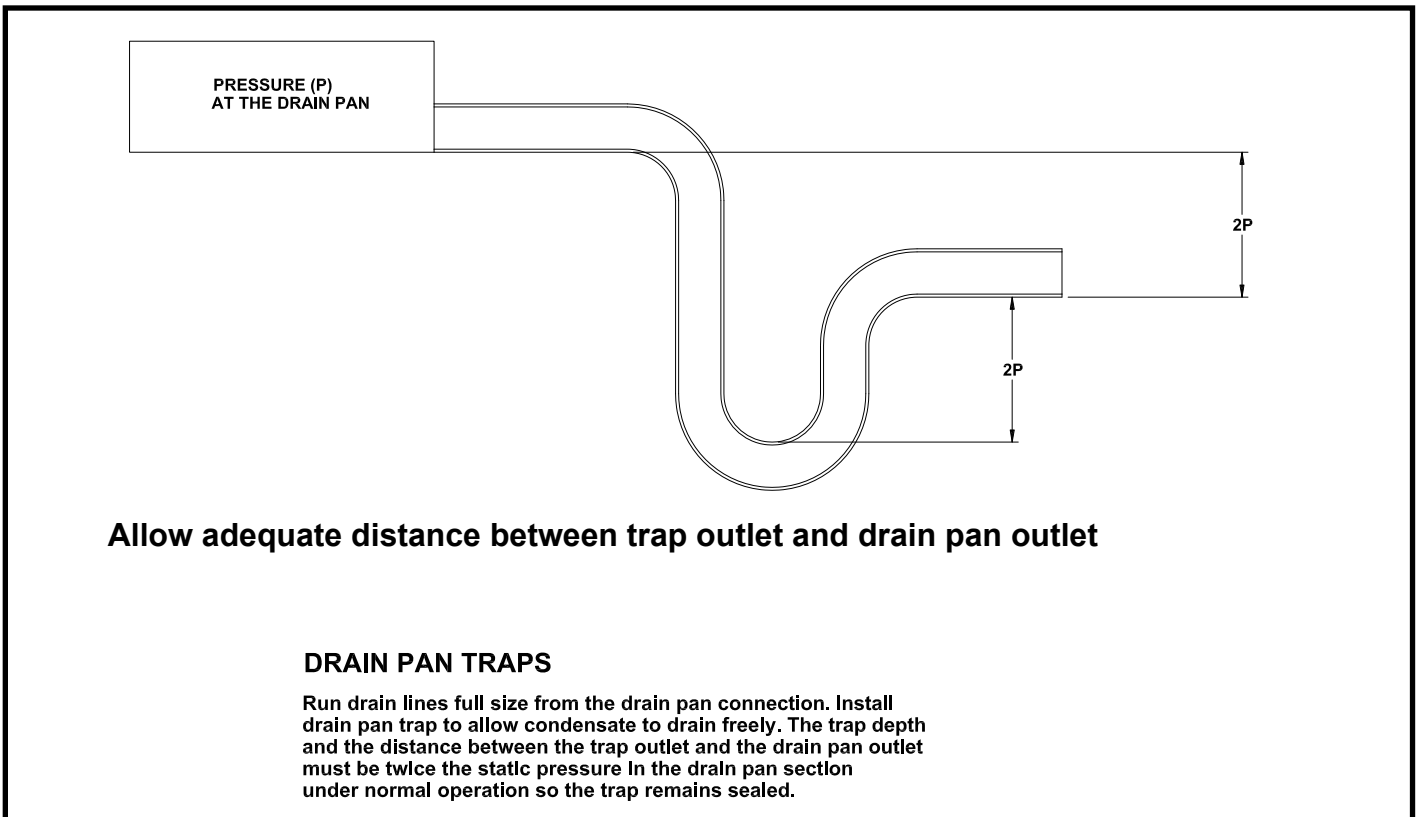
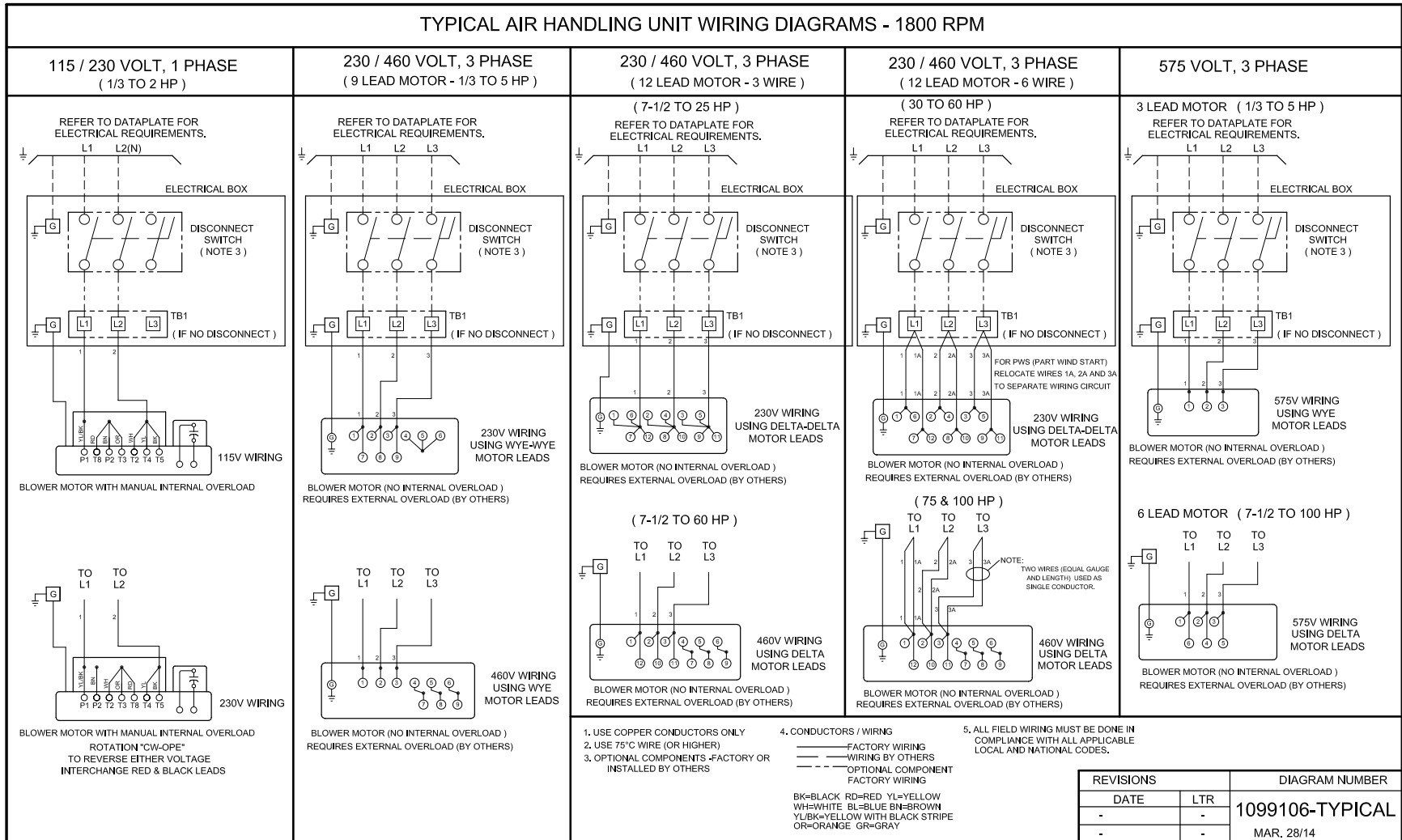


Figure 8
DRAIN PAN TRAPS



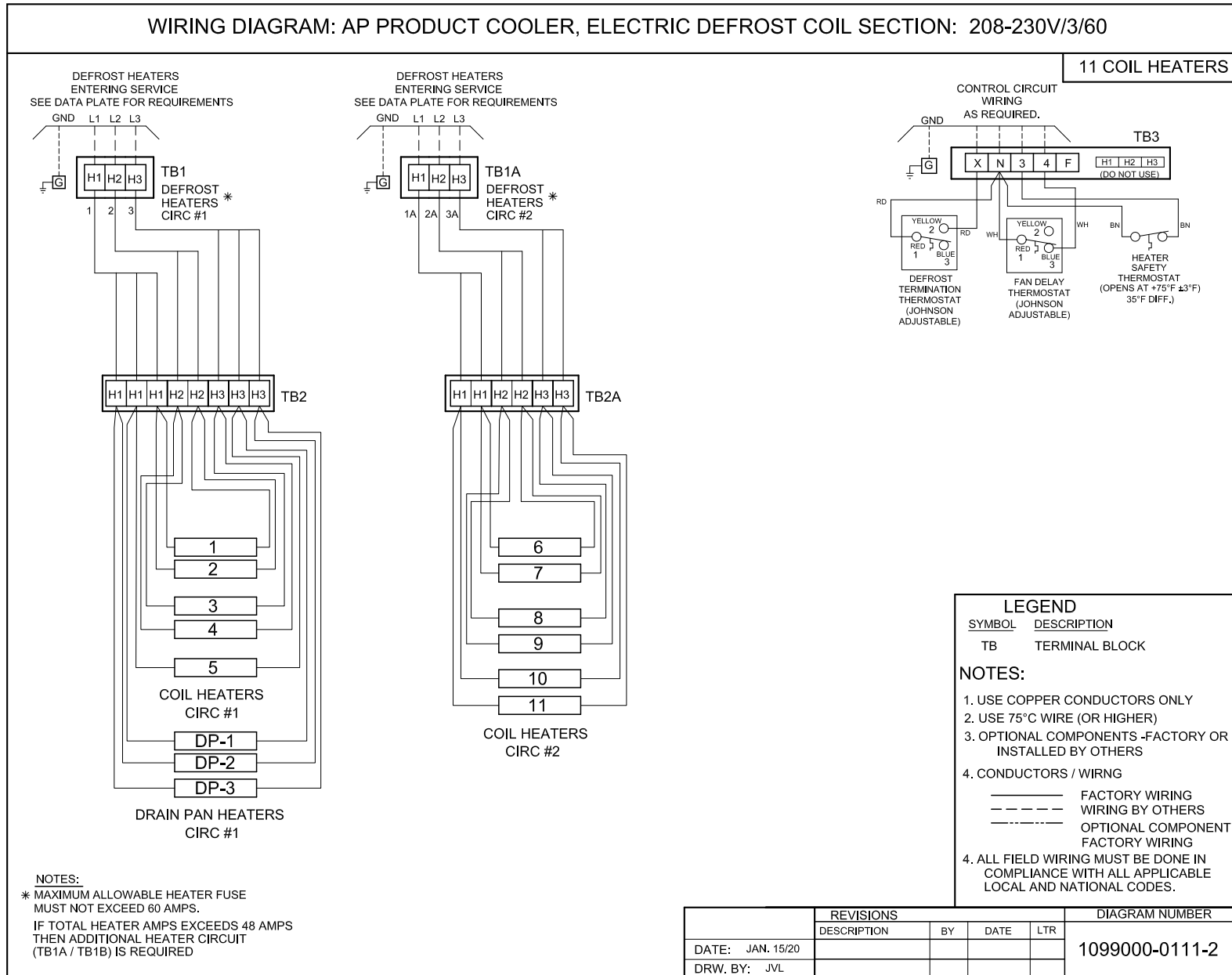
TYPICAL WIRING DIAGRAM - MOTORS - ALL MODELS



**ALL 1 PHASE MOTORS c/w
MANUAL THERMAL OVERLOAD**

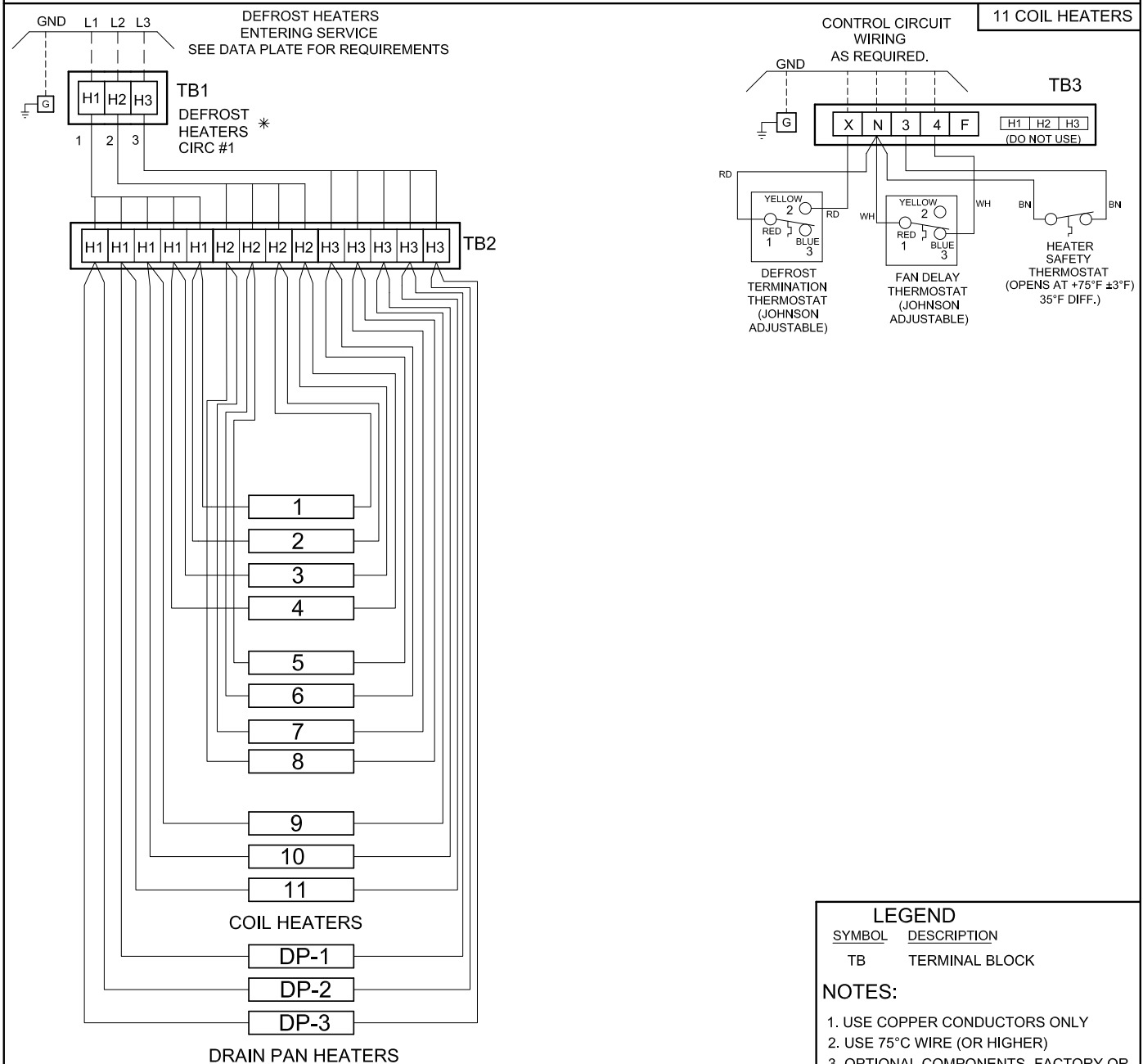
**ALL 3 PHASE MOTORS ARE NOT INTERNALLY OVERLOAD PROTECTED.
EXTERNAL MOTOR OVERLOAD MUST BE PROVIDED.**

TYPICAL WIRING DIAGRAM - ELECTRIC DEFROST - 208-230/3/60



TYPICAL WIRING DIAGRAM - ELECTRIC DEFROST - 460-575/3/60

WIRING DIAGRAM: AP PRODUCT COOLER, ELECTRIC DEFROST COIL SECTION: 460V/3/60 - 575V/3/60



NOTES:
 * MAXIMUM ALLOWABLE HEATER FUSE MUST NOT EXCEED 60 AMPS.
 IF TOTAL HEATER AMPS EXCEEDS 48 AMPS THEN ADDITIONAL HEATER CIRCUIT (TB1A) IS REQUIRED

LEGEND

| SYMBOL | DESCRIPTION |
|--------|----------------|
| TB | TERMINAL BLOCK |

NOTES:

- USE COPPER CONDUCTORS ONLY
- USE 75°C WIRE (OR HIGHER)
- OPTIONAL COMPONENTS -FACTORY OR INSTALLED BY OTHERS
- CONDUCTORS / WIRING
 - FACTORY WIRING
 - - - - - WIRING BY OTHERS
 - · · · · OPTIONAL COMPONENT FACTORY WIRING
- ALL FIELD WIRING MUST BE DONE IN COMPLIANCE WITH ALL APPLICABLE LOCAL AND NATIONAL CODES.

| | REVISIONS | | | | DIAGRAM NUMBER |
|------------------|-------------|----|------|-----|----------------|
| | DESCRIPTION | BY | DATE | LTR | |
| DATE: JAN. 21/20 | | | | | 1099001-0111 |
| DRW. BY: JVL | | | | | |

230/460 Volt Models - Motor: Nema Premium Efficiency NEMA 12-11 3 phase TEFC (1800 RPM) Service Factor = 1.15

| HP | RPM | FRAME | F1 Part # | F2 Part # | 230V | | | | | 460V | | | | | BORE DIA. |
|-----|------|-------|--------------------|--------------------|------|-----|------|-------|-----------------------------|------|-----|------|-------|-----------------------------|-----------|
| | | | | | FLA | LRA | MCA | * MOP | DISCONNECT SWITCH SIZE AMPS | FLA | LRA | MCA | * MOP | DISCONNECT SWITCH SIZE AMPS | |
| 1 | 1745 | 143T | 1093600-1-TRI-F1 | 1093600-1-TRI-F2 | 3 | 30 | 3.8 | 15 | 40 | 1.5 | 15 | 1.9 | 15 | 40 | 7/8 |
| 1.5 | 1750 | 145T | 1093600-1.5-TRI-F1 | 1093600-1.5-TRI-F2 | 4.6 | 40 | 5.8 | 15 | 40 | 2.3 | 20 | 2.9 | 15 | 40 | 7/8 |
| 2 | 1745 | 145T | 1093600-2-TRI-F1 | 1093600-2-TRI-F2 | 6 | 50 | 7.5 | 15 | 40 | 3 | 25 | 3.8 | 15 | 40 | 7/8 |
| 3 | 1760 | 182T | 1093600-3-TRI-F1 | 1093600-3-TRI-F2 | 8 | 64 | 10.0 | 15 | 40 | 4 | 32 | 5.0 | 15 | 40 | 1 1/8 |
| 5 | 1755 | 184T | 1093600-5-TRI-F1 | 1093600-5-TRI-F2 | 13.4 | 92 | 16.8 | 30 | 40 | 6.7 | 46 | 8.4 | 15 | 40 | 1 1/8 |
| 7.5 | 1770 | 213T | 1093600-7.5-TRI-F1 | 1093600-7.5-TRI-F2 | 19.2 | 126 | 24.0 | 40 | 40 | 9.6 | 63 | 12.0 | 20 | 40 | 1 3/8 |
| 10 | 1770 | 215T | 1093600-10-TRI-F1 | 1093600-10-TRI-F2 | 25 | 161 | 31.3 | 50 | 80 | 12.5 | 81 | 15.6 | 25 | 40 | 1 3/8 |
| 15 | 1770 | 254T | 1093600-15-TRI-F1 | 1093600-15-TRI-F2 | 37.4 | 232 | 46.8 | 80 | 80 | 18.7 | 116 | 23.4 | 40 | 40 | 1 5/8 |
| 20 | 1760 | 256T | 1093600-20-TRI-F1 | 1093600-20-TRI-F2 | 48 | 290 | 60.0 | 100 | 100 | 24 | 145 | 30.0 | 50 | 40 | 1 5/8 |
| 25 | 1775 | 284T | 1093600-25-TRI-F1 | 1093600-25-TRI-F2 | 60 | 364 | 75.0 | 135 | 100 | 30 | 182 | 37.5 | 60 | 40 | 1 7/8 |
| 30 | 1775 | 286T | 1093600-30-TRI-F1 | 1093600-30-TRI-F2 | 71 | 434 | 88.8 | 150 | 200 | 35.5 | 217 | 44.4 | 70 | 80 | 1 7/8 |

* MOP - NOTE: MOP value is for circuit wiring protection only. Actual motor protection must not exceed 1.15 x FLA

575 Volt Models - Motor: Nema Premium Efficiency NEMA 12-11 3 phase TEFC (1800 RPM) Service Factor = 1.15

| HP | RPM | FRAME | F1 Part # | F2 Part # | 575V | | | | | BORE DIA. |
|-----|------|-------|--------------------|--------------------|------|-----|------|-------|-------------------------------|-----------|
| | | | | | FLA | LRA | MCA | * MOP | DISCONNECT SWITCH SIZE - AMPS | |
| 1 | 1745 | 143T | 1093600-1-575-F1 | 1093600-1-575-F2 | 1.2 | 12 | 1.5 | 15 | 40 | 7/8 |
| 1.5 | 1750 | 145T | 1093600-1.5-575-F1 | 1093600-1.5-575-F2 | 1.9 | 16 | 2.4 | 15 | 40 | 7/8 |
| 2 | 1745 | 145T | 1093600-2-575-F1 | 1093600-2-575-F2 | 2.4 | 20 | 3.0 | 15 | 40 | 7/8 |
| 3 | 1760 | 182T | 1093600-3-575-F1 | 1093600-3-575-F2 | 3.2 | 26 | 4.0 | 15 | 40 | 1 1/8 |
| 5 | 1755 | 184T | 1093600-5-575-F1 | 1093600-5-575-F2 | 5.4 | 37 | 6.8 | 15 | 40 | 1 1/8 |
| 7.5 | 1770 | 213T | 1093600-7.5-575-F1 | 1093600-7.5-575-F2 | 7.7 | 50 | 9.6 | 15 | 40 | 1 3/8 |
| 10 | 1770 | 215T | 1093600-10-575-F1 | 1093600-10-575-F2 | 10 | 65 | 12.5 | 20 | 40 | 1 3/8 |
| 15 | 1770 | 254T | 1093600-15-575-F1 | 1093600-15-575-F2 | 15 | 93 | 18.8 | 30 | 40 | 1 5/8 |
| 20 | 1760 | 256T | 1093600-20-575-F1 | 1093600-20-575-F2 | 19.2 | 116 | 24.0 | 40 | 40 | 1 5/8 |
| 25 | 1775 | 284T | 1093600-25-575-F1 | 1093600-25-575-F2 | 24 | 146 | 30.0 | 50 | 40 | 1 7/8 |
| 30 | 1775 | 286T | 1093600-30-575-F1 | 1093600-30-575-F2 | 28.5 | 174 | 35.6 | 60 | 40 | 1 7/8 |

* MOP - NOTE: MOP value is for circuit wiring protection only. Actual motor protection must not exceed 1.15 x FLA

**Maximum Air Over Motor Temperature:
140°F / 60°C**

ELECTRICAL DATA - 3 Phase / .75 HP Models

230/460 Volt Models - Motor: General Purpose 3 phase TEFC (1800 RPM) Service Factor = 1.15

| HP | RPM | FRAME | F1 Part # | 230V | | | | | 460V | | | | | BORE DIA. |
|-----|------|-------|--------------------|------|------|-----|-----|-----------------------------|------|-----|-----|-------|-----------------------------|-----------|
| | | | | FLA | LRA | MCA | MOP | DISCONNECT SWITCH SIZE AMPS | FLA | LRA | MCA | * MOP | DISCONNECT SWITCH SIZE AMPS | |
| 1/3 | 1725 | 56HC | 1096305-.33-TRI-F1 | 1.7 | 8.6 | 2.2 | 15 | 40 | 0.8 | 4.3 | 1 | 15 | 40 | 5/8 |
| 1/2 | 1725 | 56HC | 1096305-.50-TRI-F1 | 2.2 | 12.4 | 2.8 | 15 | 40 | 1 | 6.2 | 1.3 | 15 | 40 | 5/8 |
| 3/4 | 1725 | 56HC | 1096305-.75-TRI-F1 | 3 | 19.6 | 3.8 | 15 | 40 | 1.4 | 9.8 | 1.8 | 15 | 40 | 5/8 |

* MOP - NOTE: MOP value is for circuit wiring protection only. Actual motor protection must not exceed 1.15 x FLA

575 Volt Models - Motor: General Purpose 3 phase TEFC (1800 RPM) Service Factor = 1.15

| HP | RPM | FRAME | F1 Part # | 575V | | | | | BORE DIA. |
|-----|------|-------|--------------------|------|-----|-----|-------|-----------------------------|-----------|
| | | | | FLA | LRA | MCA | * MOP | DISCONNECT SWITCH SIZE AMPS | |
| 1/3 | 1725 | 56HC | 1096305-.33-575-F1 | 0.6 | 3.6 | 0.8 | 15 | 40 | 5/8 |
| 1/2 | 1725 | 56HC | 1096305-.50-575-F1 | 0.8 | 4.9 | 1 | 15 | 40 | 5/8 |
| 3/4 | 1725 | 56HC | 1096305-.75-575-F1 | 1.1 | 7.8 | 1.4 | 15 | 40 | 5/8 |

* MOP - NOTE: MOP value is for circuit wiring protection only. Actual motor protection must not exceed 1.15 x FLA

ELECTRICAL DATA - 1 Phase / .75 to 2 HP Models

115/230 Volt Models - Motor: 1 phase TEFC w/ Manual Overload (1800 RPM) Service Factor = 1.15

| HP | RPM | FRAME | F1 (CH) Part # | 115V | | | | | 230V | | | | | BORE DIA. |
|-----|------|-------|-------------------|------|-----|------|-----|-----------------------------|------|-----|------|-----|-----------------------------|-----------|
| | | | | FLA | LRA | MCA | MOP | DISCONNECT SWITCH SIZE AMPS | FLA | LRA | MCA | MOP | DISCONNECT SWITCH SIZE AMPS | |
| 1/3 | 1725 | 56HC | 1096300-.33-DL-F1 | 6.6 | 60 | 8.3 | 15 | 40 | 3.3 | 33 | 4.2 | 15 | 40 | 5/8 |
| 1/2 | 1725 | 56HC | 1096300-.50-DL-F1 | 8.8 | 84 | 11 | 15 | 40 | 4.2 | 40 | 5.3 | 15 | 40 | 5/8 |
| 3/4 | 1725 | 56HC | 1096300-.75-DL-F1 | 11 | 105 | 13.8 | 20 | 40 | 5.5 | 50 | 6.9 | 15 | 40 | 5/8 |
| 1 | 1725 | 56HC | 1096300-1.0-DL-F1 | 13.6 | 125 | 17 | 30 | 40 | 6.8 | 65 | 8.5 | 15 | 40 | 5/8 |
| 1.5 | 1725 | 56HC | 1096300-1.5-DL-F1 | 15.2 | 140 | 19 | 30 | 40 | 7.6 | 75 | 9.5 | 15 | 40 | 5/8 |
| 2 | 1725 | 56HC | 1096300-2.0-DL-F1 | 20 | 180 | 25 | 45 | 40 | 11 | 95 | 13.8 | 20 | 40 | 5/8 |

**Maximum Air Over Motor Temperature:
140°F / 60°C**

BEFORE START UP CHECKS

- A. Check tightness on all bearing, sheave, and fan wheel set screws.
- B. If fan wheel set screws are loose, check to be sure wheel is not rubbing on housing.
- C. Leak test entire system to make sure all joints are tight.
- D. Ball bearings are prelubricated and do not need grease for start up.
- E. Rotate shaft by hand to be sure it is free.
- F. Check fan and motor for proper rotation and ensure motor overload protection is provided.
- G. Check alignment of fan and motor sheave and belt tension.

AFTER FIRST 48 HRS. OF OPERATION

- A. Check all points under BEFORE START UP CHECKS (above)
- B. Belts have acquired their permanent stretch. Readjust motor mount to take up slack in belts.

PERIODIC SERVICE & MAINTENANCE

- A. Check all moving parts for wear every six months.
- B. Check bearing collar set screws for tightness every six months.

BALL & SLEEVE BEARINGS

A. Ball Bearings

- 1. Motor bearings - All ball bearings are prelubricated and do not require addition of grease at time of installation. However, periodic cleaning out and renewal of grease is necessary. Please note that extreme care must be exercised to prevent foreign matter from entering the bearing. It is also important to avoid over-greasing. Only a high grade, clean mineral grease having the following characteristics should be used.
 - a. Consistency a little stiffer than that of vaseline, maintained over the operating temperature range; melting point preferably over 302°F (150°C), freedom from separation of oil and soap under operating and storage conditions; and freedom from abrasive matter, acid, alkali and moisture.
 - b. Specific greasing instructions are to be found on a tag attached to the motor and should generally be adhered to.

BALL & SLEEVE BEARINGS (cont'd)

- 2. Fan Shaft Bearings - All ball bearings are prelubricated and do not require addition of grease at time of installation. However, periodic cleaning out and renewal of grease is necessary. Internal bearings are accessible through access panel in cabinet. Units that are equipped with extended lube lines will have grease fittings for internal bearings on drive end panel of blower section. Apply grease while bearings are running, adding slowly until a slight bleeding of grease from the seals is noted. For greasing units with extended lube lines, remove access door so bearing can be viewed when greasing.

DO NOT OVER LUBRICATE

The lubrication interval varies with the period of operation and temperature of the ambient air. The following interval is recommended using Mobilgrease XHP 222 or equivalent:

| Temperature Range (°F) | Continuous Operation | 12 Hr./Day Operation |
|------------------------|----------------------|----------------------|
| 60 - 80 | 2 years | 4 years |
| 81 - 100 | 1 1/2 years | 3 years |
| 101 - 120 | 1 year | 2 years |
| 121 - 140 | 3/4 year | 1 1/4 years |

REPLACEMENT PARTS

When replacement parts are required, furnish factory with unit model number and serial number as shown on serial plate on drive end of blower section.

APPROXIMATE NET WEIGHTS (without Motor)

| DESCRIPTION | UNIT SIZE | | | | | | | | | |
|--------------------------------------|------------------------------------|-----|------|------|------|------|------|------|------|------|
| | 108 | 111 | 114 | 117 | 122 | 128 | 137 | 141 | 150 | 164 |
| | FAN HEAD | | | | | | | | | |
| SINGLE WALL - not insulated | 646 | 908 | 948 | 973 | 1156 | 1590 | 1650 | 1801 | 2059 | 2532 |
| | COOLING COILS ALUMINUM FINS | | | | | | | | | |
| 4 ROWS | 291 | 362 | 507 | 622 | 650 | 799 | 1556 | 1271 | 1420 | 1981 |
| 6 ROWS | 416 | 523 | 725 | 898 | 938 | 1150 | 1597 | 1835 | 2057 | 2484 |
| 8 ROWS | 546 | 682 | 952 | 1174 | 1217 | 1501 | 2059 | 2471 | 2674 | 3648 |
| 10 ROWS | 667 | 843 | 1171 | 1440 | 1509 | 1928 | 2532 | 2965 | 3299 | 4453 |
| FLAT FILTER SECTION (BOLT ON) | 86 | 118 | 140 | 161 | 189 | 232 | 278 | 303 | 342 | 416 |
| ANGULAR FILTER SECTION | N/A | N/A | 507 | 600 | 674 | 828 | 899 | 1113 | 1159 | 1426 |

APPROXIMATE MOTOR WEIGHTS

Motor: Premium Efficiency NEMA 12-11 3 phase TEFC (1800 RPM)

| HP | 1 | 1.5 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 |
|---------------|----|-----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Weight | 47 | 55 | 56 | 97 | 112 | 150 | 167 | 297 | 315 | 392 | 418 | 519 | 594 | 766 | 783 | 1058 |

Motor: General Purpose 3 phase TEFC

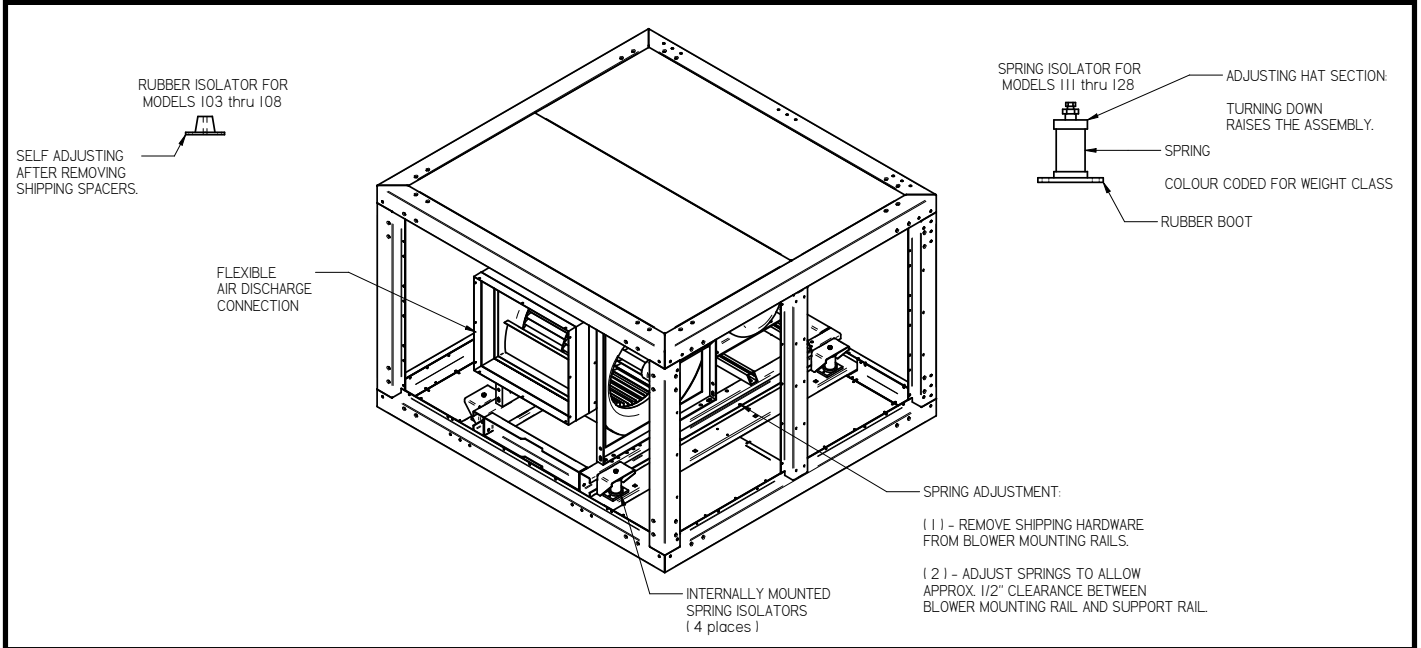
| HP | 1/3 | 1/2 | 3/4 |
|---------------|-----|-----|-----|
| WEIGHT | 22 | 24 | 25 |

Motor: 1 phase TEFC w/ Manual Overload

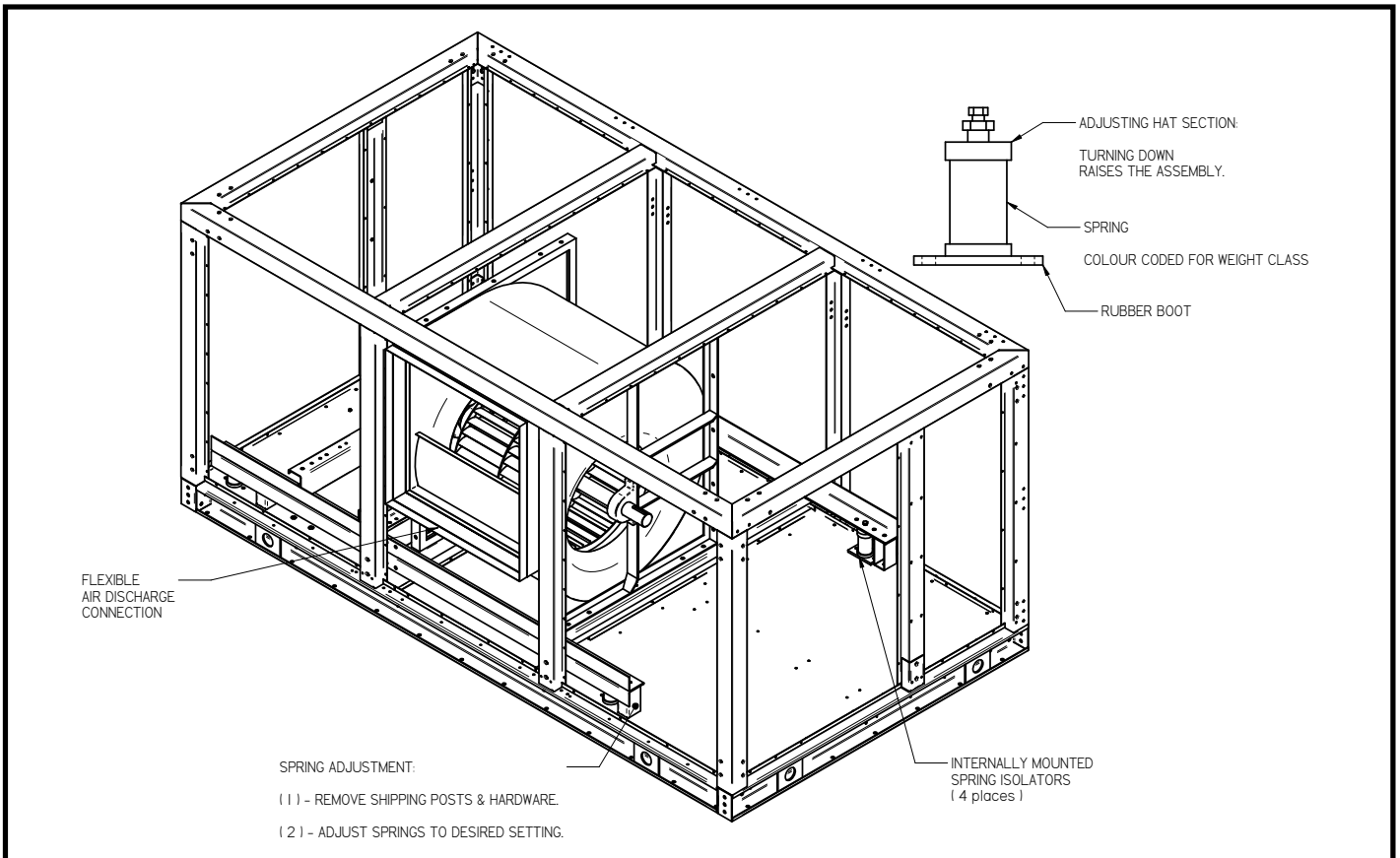
| HP | 3/4 | 1 | 1.5 | 2 |
|----------------------|-----|----|-----|----|
| Weight - lbs. | 30 | 33 | 41 | 51 |

CONSULT FACTORY FOR PROPER SPRING SELECTION

AP FAN HEAD: Models AP108 - AP128
Note: Rubber isolator style used on Model 108



AP FAN HEAD: Models AP137 - AP164



| | |
|-------------------|--------------------|
| System | |
| Model Number | Date of Start-Up |
| Serial Number | Service Contractor |
| Refrigerant | Phone |
| Electrical Supply | Email |

NOTES

| | |
|---|---|
|  PRODUCT SUPPORT | <p><i>web:</i> www.k-rp.com/kap <i>email:</i> ahu@k-rp.com <i>call:</i> 1-844-893-3222 x527</p> |
|  TROUBLESHOOTING | <p><i>email:</i> troubleshooting@k-rp.com <i>call:</i> 1-844-893-3222 x529</p> |
|  SERVICE PARTS | <p><i>web:</i> www.k-rp.com/parts <i>email:</i> parts@k-rp.com <i>call:</i> 1-844-893-3222 x504</p> |
|  WARRANTY | <p><i>web:</i> www.k-rp.com/warranty <i>email:</i> warranty@k-rp.com <i>call:</i> 1-844-893-3222 x507</p> |
|  ORDERS | <p><i>email:</i> orders@k-rp.com <i>call:</i> 1-844-893-3222 x501</p> |
|  SHIPPING | <p><i>email:</i> shipping@k-rp.com <i>call:</i> 1-844-893-3222 x503</p> |

“AS BUILT” SERVICE PARTS LIST

Service Parts List Label To Be Attached HERE



KeepRite Refrigeration
Brantford, ON • Longview, TX
1-800-463-9517 info@k-rp.com www.k-rp.com



Due to the manufacturer's policy of continuous product improvement, we reserve the right to make changes without notice.