

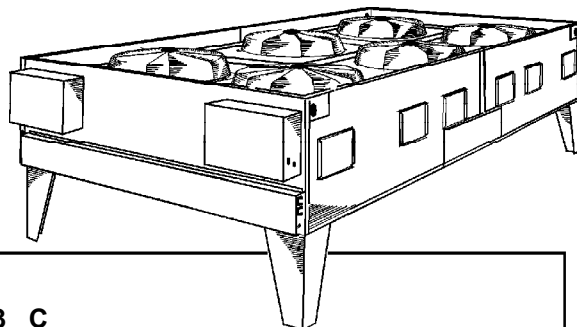
# BVC Direct Drive Air-Cooled Condenser

## PRODUCT DATA & INSTALLATION

Bulletin B50-BVC-PDI-10

1068833

## One to Twelve Fan Motors



### NOMENCLATURE

#### Model

BVC = Bally Vertical air flow Condenser  
BCH = Bally Horizontal air flow Condenser

#### Tubing

1 = 3/8 OD smooth      2 = 1/2 OD smooth

#### Motor & Fan Type

A = 30" fan with 850 RPM motor (Standard)  
B = 30" fan with 550 RPM motor  
C = 30" fan with 1140 RPM motor

#### Fan Configuration

First number = number of fans wide  
Second number = number of fans in length  
26 = 2 fans wide x 6 fans length (total 12 fans)  
11 = 1 fan wide x 1 fan length (total 1 fan)

**BVC 2 A 26 206 A - T3 C**

#### Generation

C = Latest series (A, B older series)

#### Electrical Code

S2 = 208-230/1/60      S6 = 200-220/1/50  
T3 = 208-230/3/60      T7 = 200-220/3/50  
T4 = 460/3/60      T9 = 380-400/3/50  
T5 = 575/3/60

#### Fin Material & Spacing

A = Aluminum 12 FPI (Standard), B = 10, C = 8  
D = Gold Coat Alum 12 FPI, E = 10, F = 8  
G = Copper 12 FPI, H = 10, J = 8  
K = Heresite Coat Alum 12 FPI, L = 10, M = 8

#### Nominal Capacity (Tons - THR)

Rated at 25°F (14 °C) TD, 30" Fan / 850 RPM Motor,  
12" FPI, smooth tubing, 0° Subcooling, Sea Level, 60 Hz

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- **THERMOSPAN™** coil design feature eliminates tube failure on tube sheets.
- **Standard 850 RPM** quiet low speed dual voltage (230/460) fan motors with male electrical plug, moisture slinger, and rainshield for complete weather protection.
- **Optional 550 ultra low and 1140 RPM high speed** motors available.
- **Rugged heavy-gauge** galvanized steel rail motor mounts/support.
- **All fan sections individually baffled** with full height partitions, and clean-out panels.
- **Complete selection** of electrical fan cycling and speed control options.
- **Heavy-gauge** galvanized steel cabinet construction assembled with zinc plated huck bolts supported on heavy-duty legs.

# CAPACITY DATA - 850 RPM MODELS - R22

| BVC<br>MODEL<br>NUMBER | Fan Rows | TOTAL HEAT OF REJECTION CAPACITY (MBH) |                  |                 |                  |                  |                 |                 | Maximum<br>No. of<br>Feeds | MBH<br>@ 1° F TD<br>Per Feed<br>(12 FPI) |
|------------------------|----------|----------------------------------------|------------------|-----------------|------------------|------------------|-----------------|-----------------|----------------------------|------------------------------------------|
|                        |          | TEMPERATURE DIFFERENCE (TD)            |                  |                 |                  |                  |                 |                 |                            |                                          |
|                        |          | 12 FPI                                 |                  |                 |                  |                  | 10 FPI          | 8 FPI           |                            |                                          |
|                        |          | 1°F<br>(0.56°C)                        | 10°F<br>(5.56°C) | 15°F<br>(8.3°C) | 20°F<br>(11.1°C) | 30°F<br>(16.7°C) | 1°F<br>(0.56°C) | 1°F<br>(0.56°C) |                            |                                          |
| Single Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 007                    | 1 x 1    | 3.165                                  | 31.7             | 47.5            | 63.3             | 95.0             | 2.912           | 2.595           | 7                          | 0.45                                     |
| 009                    | 1 x 1    | 4.135                                  | 41.4             | 62.0            | 82.7             | 124              | 3.846           | 3.515           | 8                          | 0.52                                     |
| 010                    | 1 x 1    | 4.655                                  | 46.6             | 69.8            | 93.1             | 140              | 4.329           | 3.957           | 9                          | 0.52                                     |
| 011                    | 1 x 1    | 5.365                                  | 53.7             | 80.5            | 107              | 161              | 5.097           | 4.721           | 12                         | 0.45                                     |
| 012                    | 1 x 1    | 5.875                                  | 58.8             | 88.1            | 118              | 176              | 5.581           | 5.170           | 12                         | 0.49                                     |
| 013                    | 1 x 1    | 6.465                                  | 64.7             | 97.0            | 129              | 194              | 6.336           | 5.948           | 15                         | 0.43                                     |
| 017                    | 1 x 2    | 8.265                                  | 82.7             | 124             | 165              | 248              | 7.686           | 7.025           | 14                         | 0.59                                     |
| 019                    | 1 x 2    | 9.265                                  | 92.7             | 139             | 185              | 278              | 8.616           | 7.875           | 18                         | 0.51                                     |
| 022                    | 1 x 2    | 10.74                                  | 107              | 161             | 215              | 322              | 10.20           | 9.447           | 24                         | 0.45                                     |
| 024                    | 1 x 2    | 11.77                                  | 118              | 176             | 235              | 353              | 11.18           | 10.35           | 24                         | 0.49                                     |
| 027                    | 1 x 2    | 12.94                                  | 129              | 194             | 259              | 388              | 12.68           | 11.90           | 30                         | 0.43                                     |
| 029                    | 1 x 3    | 13.97                                  | 140              | 209             | 279              | 419              | 12.90           | 11.87           | 27                         | 0.52                                     |
| 034                    | 1 x 3    | 16.07                                  | 161              | 241             | 321              | 482              | 15.26           | 14.14           | 36                         | 0.45                                     |
| 037                    | 1 x 3    | 17.64                                  | 176              | 265             | 353              | 529              | 16.75           | 15.52           | 36                         | 0.49                                     |
| 041                    | 1 x 3    | 19.40                                  | 194              | 291             | 388              | 582              | 19.01           | 17.85           | 45                         | 0.43                                     |
| 043                    | 1 x 3    | 20.64                                  | 206              | 310             | 413              | 619              | 19.61           | 18.17           | 36                         | 0.57                                     |
| 048                    | 1 x 3    | 23.01                                  | 230              | 345             | 460              | 690              | 22.55           | 21.17           | 45                         | 0.51                                     |
| 056                    | 1 x 4    | 26.34                                  | 263              | 395             | 527              | 790              | 24.50           | 22.39           | 22                         | 1.20                                     |
| 063                    | 1 x 4    | 30.29                                  | 303              | 454             | 606              | 909              | 28.77           | 26.65           | 30                         | 1.01                                     |
| 068                    | 1 x 4    | 32.55                                  | 326              | 488             | 651              | 977              | 31.90           | 29.95           | 37                         | 0.88                                     |
| 079                    | 1 x 5    | 37.95                                  | 379              | 569             | 759              | 1138             | 36.05           | 33.39           | 30                         | 1.26                                     |
| 085                    | 1 x 5    | 40.70                                  | 407              | 610             | 814              | 1221             | 39.88           | 37.44           | 37                         | 1.10                                     |
| 095                    | 1 x 6    | 45.54                                  | 455              | 683             | 911              | 1366             | 43.26           | 40.07           | 30                         | 1.52                                     |
| 103                    | 1 x 6    | 48.84                                  | 488              | 733             | 977              | 1465             | 47.85           | 44.93           | 37                         | 1.32                                     |
| Double Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 039                    | 2 x 2    | 18.60                                  | 186              | 279             | 372              | 558              | 17.30           | 15.81           | 36                         | 0.52                                     |
| 045                    | 2 x 2    | 21.47                                  | 215              | 322             | 429              | 644              | 20.39           | 18.89           | 48                         | 0.45                                     |
| 049                    | 2 x 2    | 23.50                                  | 235              | 353             | 470              | 705              | 22.33           | 20.68           | 48                         | 0.49                                     |
| 054                    | 2 x 2    | 25.84                                  | 258              | 388             | 517              | 775              | 25.32           | 23.77           | 60                         | 0.43                                     |
| 058                    | 2 x 3    | 27.90                                  | 279              | 419             | 558              | 837              | 25.95           | 23.72           | 54                         | 0.52                                     |
| 067                    | 2 x 3    | 32.17                                  | 322              | 482             | 643              | 965              | 30.56           | 28.31           | 72                         | 0.45                                     |
| 073                    | 2 x 3    | 35.24                                  | 352              | 529             | 705              | 1057             | 33.47           | 31.01           | 72                         | 0.49                                     |
| 081                    | 2 x 3    | 38.77                                  | 388              | 581             | 775              | 1163             | 37.99           | 35.66           | 90                         | 0.43                                     |
| 086                    | 2 x 3    | 41.29                                  | 413              | 619             | 826              | 1239             | 39.22           | 36.33           | 72                         | 0.57                                     |
| 096                    | 2 x 3    | 46.02                                  | 460              | 690             | 920              | 1381             | 45.10           | 42.34           | 90                         | 0.51                                     |
| 112                    | 2 x 4    | 53.89                                  | 539              | 808             | 1078             | 1617             | 50.11           | 45.80           | 45                         | 1.20                                     |
| 126                    | 2 x 4    | 60.57                                  | 606              | 909             | 1211             | 1817             | 57.54           | 53.30           | 60                         | 1.01                                     |
| 137                    | 2 x 4    | 65.99                                  | 660              | 990             | 1320             | 1980             | 64.67           | 60.71           | 75                         | 0.88                                     |
| 158                    | 2 x 5    | 75.90                                  | 759              | 1138            | 1518             | 2277             | 72.10           | 66.79           | 60                         | 1.26                                     |
| 172                    | 2 x 5    | 82.50                                  | 825              | 1237            | 1650             | 2475             | 80.85           | 75.90           | 75                         | 1.10                                     |
| 190                    | 2 x 6    | 91.08                                  | 911              | 1366            | 1822             | 2732             | 86.52           | 80.15           | 60                         | 1.52                                     |
| 206                    | 2 x 6    | 98.99                                  | 990              | 1485            | 1980             | 2970             | 97.01           | 91.07           | 75                         | 1.32                                     |

## Correction Factors for Other refrigerants - Use R22 Values Multiplied By

| R134a | R12  | R507 | R404A | R407A | R407B | R502 | R407C |
|-------|------|------|-------|-------|-------|------|-------|
| 0.94  | 0.95 | 0.97 | 0.97  | 0.97  | 0.97  | 0.98 | 1.00  |

- NOTES:**
- (1) Above capacity data based on 0°F subcooling and at sea level.
  - (2) TD = Condensing temperature - ambient temperature
  - (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
  - (4) For High Altitude applications apply the following correction factors:  
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
  - (5) For 50Hz capacity multiply by 0.92.

# CAPACITY DATA - 850 RPM MODELS - R404A

| BVC<br>MODEL<br>NUMBER | Fan Rows | TOTAL HEAT OF REJECTION CAPACITY (MBH) |                  |                 |                  |                  |                 |                 | Maximum<br>No. of<br>Feeds | MBH<br>@ 1° F TD<br>Per Feed<br>(12 FPI) |
|------------------------|----------|----------------------------------------|------------------|-----------------|------------------|------------------|-----------------|-----------------|----------------------------|------------------------------------------|
|                        |          | TEMPERATURE DIFFERENCE (TD)            |                  |                 |                  |                  |                 |                 |                            |                                          |
|                        |          | 12 FPI                                 |                  |                 |                  |                  | 10 FPI          | 8 FPI           |                            |                                          |
|                        |          | 1°F<br>(0.56°C)                        | 10°F<br>(5.56°C) | 15°F<br>(8.3°C) | 20°F<br>(11.1°C) | 30°F<br>(16.7°C) | 1°F<br>(0.56°C) | 1°F<br>(0.56°C) |                            |                                          |
| Single Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 007                    | 1 x 1    | 3.070                                  | 30.7             | 46.1            | 61.4             | 92.1             | 2.825           | 2.517           | 7                          | 0.44                                     |
| 009                    | 1 x 1    | 4.011                                  | 40.1             | 60.2            | 80.2             | 120              | 3.731           | 3.410           | 8                          | 0.50                                     |
| 010                    | 1 x 1    | 4.515                                  | 45.2             | 67.7            | 90.3             | 135              | 4.199           | 3.838           | 9                          | 0.50                                     |
| 011                    | 1 x 1    | 5.204                                  | 52.0             | 78.1            | 104              | 156              | 4.944           | 4.579           | 12                         | 0.43                                     |
| 012                    | 1 x 1    | 5.699                                  | 57.0             | 85.5            | 114              | 171              | 5.414           | 5.015           | 12                         | 0.47                                     |
| 013                    | 1 x 1    | 6.271                                  | 62.7             | 94.1            | 125              | 188              | 6.146           | 5.770           | 15                         | 0.42                                     |
| 017                    | 1 x 2    | 8.017                                  | 80.2             | 120             | 160              | 241              | 7.455           | 6.814           | 14                         | 0.57                                     |
| 019                    | 1 x 2    | 8.987                                  | 89.9             | 135             | 180              | 270              | 8.358           | 7.639           | 18                         | 0.50                                     |
| 022                    | 1 x 2    | 10.41                                  | 104              | 156             | 208              | 312              | 9.892           | 9.164           | 24                         | 0.43                                     |
| 024                    | 1 x 2    | 11.41                                  | 114              | 171             | 228              | 342              | 10.84           | 10.04           | 24                         | 0.48                                     |
| 027                    | 1 x 2    | 12.55                                  | 125              | 188             | 251              | 376              | 12.30           | 11.54           | 30                         | 0.42                                     |
| 029                    | 1 x 3    | 13.55                                  | 135              | 203             | 271              | 406              | 12.51           | 11.51           | 27                         | 0.50                                     |
| 034                    | 1 x 3    | 15.58                                  | 156              | 234             | 312              | 467              | 14.80           | 13.71           | 36                         | 0.43                                     |
| 037                    | 1 x 3    | 17.11                                  | 171              | 257             | 342              | 513              | 16.25           | 15.05           | 36                         | 0.48                                     |
| 041                    | 1 x 3    | 18.82                                  | 188              | 282             | 376              | 565              | 18.44           | 17.31           | 45                         | 0.42                                     |
| 043                    | 1 x 3    | 20.02                                  | 200              | 300             | 400              | 601              | 19.02           | 17.62           | 36                         | 0.56                                     |
| 048                    | 1 x 3    | 22.32                                  | 223              | 335             | 446              | 670              | 21.87           | 20.53           | 45                         | 0.50                                     |
| 056                    | 1 x 4    | 25.55                                  | 256              | 383             | 511              | 767              | 23.77           | 21.72           | 22                         | 1.16                                     |
| 063                    | 1 x 4    | 29.38                                  | 294              | 441             | 588              | 881              | 27.91           | 25.85           | 30                         | 0.98                                     |
| 068                    | 1 x 4    | 31.58                                  | 316              | 474             | 632              | 947              | 30.94           | 29.05           | 37                         | 0.85                                     |
| 079                    | 1 x 5    | 36.81                                  | 368              | 552             | 736              | 1104             | 34.97           | 32.39           | 30                         | 1.23                                     |
| 085                    | 1 x 5    | 39.48                                  | 395              | 592             | 790              | 1184             | 38.69           | 36.32           | 37                         | 1.07                                     |
| 095                    | 1 x 6    | 44.17                                  | 442              | 663             | 883              | 1325             | 41.96           | 38.87           | 30                         | 1.47                                     |
| 103                    | 1 x 6    | 47.37                                  | 474              | 711             | 947              | 1421             | 46.41           | 43.58           | 37                         | 1.28                                     |
| Double Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 039                    | 2 x 2    | 18.04                                  | 180              | 271             | 361              | 541              | 16.78           | 15.34           | 36                         | 0.50                                     |
| 045                    | 2 x 2    | 20.82                                  | 208              | 312             | 416              | 625              | 19.78           | 18.32           | 48                         | 0.43                                     |
| 049                    | 2 x 2    | 22.80                                  | 228              | 342             | 456              | 684              | 21.66           | 20.06           | 48                         | 0.47                                     |
| 054                    | 2 x 2    | 25.06                                  | 251              | 376             | 501              | 752              | 24.56           | 23.05           | 60                         | 0.42                                     |
| 058                    | 2 x 3    | 27.06                                  | 271              | 406             | 541              | 812              | 25.17           | 23.00           | 54                         | 0.50                                     |
| 067                    | 2 x 3    | 31.20                                  | 312              | 468             | 624              | 936              | 29.64           | 27.46           | 72                         | 0.43                                     |
| 073                    | 2 x 3    | 34.18                                  | 342              | 513             | 684              | 1025             | 32.47           | 30.08           | 72                         | 0.47                                     |
| 081                    | 2 x 3    | 37.60                                  | 376              | 564             | 752              | 1128             | 36.85           | 34.59           | 90                         | 0.42                                     |
| 086                    | 2 x 3    | 40.05                                  | 400              | 601             | 801              | 1201             | 38.04           | 35.24           | 72                         | 0.56                                     |
| 096                    | 2 x 3    | 44.64                                  | 446              | 670             | 893              | 1339             | 43.75           | 41.07           | 90                         | 0.50                                     |
| 112                    | 2 x 4    | 52.27                                  | 523              | 784             | 1045             | 1568             | 48.61           | 44.43           | 45                         | 1.16                                     |
| 126                    | 2 x 4    | 58.75                                  | 588              | 881             | 1175             | 1763             | 55.82           | 51.70           | 60                         | 0.98                                     |
| 137                    | 2 x 4    | 64.01                                  | 640              | 960             | 1280             | 1920             | 62.73           | 58.88           | 75                         | 0.85                                     |
| 158                    | 2 x 5    | 73.62                                  | 736              | 1104            | 1472             | 2209             | 69.94           | 64.78           | 60                         | 1.23                                     |
| 172                    | 2 x 5    | 80.02                                  | 800              | 1200            | 1600             | 2401             | 78.42           | 73.62           | 75                         | 1.07                                     |
| 190                    | 2 x 6    | 88.34                                  | 883              | 1325            | 1767             | 2650             | 83.93           | 77.74           | 60                         | 1.47                                     |
| 206                    | 2 x 6    | 96.02                                  | 960              | 1440            | 1920             | 2881             | 94.10           | 88.34           | 75                         | 1.28                                     |

To calculate capacities with other refrigerants, multiply the R22 capacity by the appropriate correction factor. Refer to the table accompanying each of the R22 tables.

## NOTES:

- (1) Above capacity data based on 0°F subcooling and at sea level.
- (2) TD = Condensing temperature - ambient temperature
- (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
- (4) For High Altitude applications apply the following correction factors:  
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
- (5) For 50Hz capacity multiply by 0.92.

# GENERAL SPECIFICATIONS - 850 RPM MODELS

| BVC<br>MODEL<br>NUMBER | Total<br>No. of<br>Feeds | R22 Refrigerant Charge <sup>(1)</sup> |      |                         |      | Air Flow Rate <sup>(4)</sup> |        | Sound<br>Level <sup>(5)</sup> | Piping Connections |           | Condenser<br>Weight <sup>(6)</sup> |      |
|------------------------|--------------------------|---------------------------------------|------|-------------------------|------|------------------------------|--------|-------------------------------|--------------------|-----------|------------------------------------|------|
|                        |                          | Normal <sup>(2)</sup>                 |      | 90% FULL <sup>(3)</sup> |      |                              |        |                               | Inlet              | Outlet    |                                    |      |
|                        |                          | lbs                                   | kg   | lbs                     | kg   | CFM                          | m³/h   | dBA                           | Qty - OD           | Qty - OD  | lbs                                | kg   |
| Single Row Models      |                          |                                       |      |                         |      |                              |        |                               |                    |           |                                    |      |
| 1A11007                | 7                        | 1.7                                   | 0.8  | 11.0                    | 5.2  | 7150                         | 12200  | 63.5                          | 1 - 1 1/8          | 1 - 7/8   | 360                                | 163  |
| 1A11009                | 8                        | 2.2                                   | 1.0  | 17.0                    | 7.5  | 6280                         | 10700  | 63.5                          | 1 - 1 3/8          | 1 - 7/8   | 375                                | 170  |
| 1A11010                | 9                        | 2.8                                   | 1.3  | 21.0                    | 9.5  | 7150                         | 12200  | 63.5                          | 1 - 1 3/8          | 1 - 7/8   | 420                                | 191  |
| 1A11011                | 12                       | 3.9                                   | 1.8  | 27.0                    | 12.0 | 6880                         | 11700  | 63.5                          | 1 - 1 3/8          | 1 - 1 1/8 | 440                                | 200  |
| 1A11012                | 12                       | 4.3                                   | 2.0  | 31.0                    | 14.0 | 7200                         | 12200  | 63.5                          | 1 - 1 3/8          | 1 - 1 1/8 | 480                                | 218  |
| 1A11013                | 15                       | 5.2                                   | 2.4  | 39.0                    | 18.0 | 6930                         | 11800  | 63.5                          | 1 - 1 5/8          | 1 - 1 1/8 | 505                                | 229  |
| 1A12017                | 14                       | 4.1                                   | 1.9  | 31.0                    | 14.0 | 12500                        | 21300  | 66.5                          | 1 - 1 5/8          | 1 - 1 1/8 | 565                                | 256  |
| 1A12019                | 18                       | 6.1                                   | 2.8  | 44.0                    | 20.0 | 14300                        | 24300  | 66.5                          | 1 - 2 1/8          | 1 - 1 3/8 | 630                                | 286  |
| 1A12022                | 24                       | 7.4                                   | 3.4  | 55.0                    | 25.0 | 13700                        | 23300  | 66.5                          | 1 - 2 1/8          | 1 - 1 3/8 | 675                                | 306  |
| 1A12024                | 24                       | 8.3                                   | 3.8  | 62.0                    | 28.0 | 14400                        | 24500  | 66.5                          | 1 - 2 1/8          | 1 - 1 3/8 | 740                                | 336  |
| 1A12027                | 30                       | 10.0                                  | 4.5  | 75.0                    | 34.0 | 13900                        | 23600  | 66.5                          | 1 - 2 1/8          | 1 - 1 3/8 | 790                                | 358  |
| 1A13029                | 27                       | 9.0                                   | 4.1  | 61.0                    | 28.0 | 21400                        | 36400  | 67.7                          | 1 - 2 1/8          | 1 - 1 5/8 | 840                                | 381  |
| 1A13034                | 36                       | 10.0                                  | 4.5  | 78.0                    | 35.0 | 20600                        | 35000  | 67.7                          | 1 - 2 1/8          | 1 - 1 5/8 | 905                                | 410  |
| 1A13037                | 36                       | 12.0                                  | 5.4  | 94.0                    | 42.0 | 21600                        | 36700  | 67.7                          | 1 - 2 5/8          | 1 - 1 5/8 | 1000                               | 454  |
| 1A13041                | 45                       | 14.0                                  | 6.4  | 113                     | 51.0 | 20800                        | 35400  | 67.7                          | 1 - 2 5/8          | 1 - 1 5/8 | 1070                               | 485  |
| 1A13043                | 36                       | 17.5                                  | 7.9  | 128                     | 57.8 | 26500                        | 45100  | 67.7                          | 1 - 2 5/8          | 1 - 1 5/8 | 1055                               | 479  |
| 1A13048                | 45                       | 20.5                                  | 9.3  | 152                     | 68.9 | 25800                        | 43800  | 67.7                          | 1 - 2 5/8          | 1 - 1 5/8 | 1150                               | 522  |
| 2A14056                | 22                       | 25.9                                  | 11.8 | 183                     | 83.2 | 35900                        | 61000  | 69                            | 1 - 2 5/8          | 1 - 2 1/8 | 1600                               | 726  |
| 2A14063                | 30                       | 32.5                                  | 14.7 | 239                     | 108  | 35300                        | 59900  | 69                            | 1 - 2 5/8          | 1 - 2 1/8 | 1650                               | 748  |
| 2A14068                | 37                       | 38.0                                  | 17.2 | 286                     | 130  | 34300                        | 58300  | 69                            | 1 - 2 5/8          | 1 - 2 1/8 | 1750                               | 794  |
| 2A15079                | 30                       | 38.5                                  | 17.5 | 290                     | 131  | 44100                        | 74900  | 70.3                          | 1 - 2 5/8          | 1 - 2 1/8 | 2063                               | 936  |
| 2A15085                | 37                       | 48.8                                  | 22.2 | 356                     | 161  | 42900                        | 72900  | 70.3                          | 1 - 2 5/8          | 1 - 2 5/8 | 2188                               | 992  |
| 2A16095                | 30                       | 53.5                                  | 24.3 | 365                     | 165  | 52900                        | 89900  | 71                            | 1 - 3 1/8          | 1 - 3 1/8 | 2475                               | 1123 |
| 2A16103                | 37                       | 61.2                                  | 27.7 | 436                     | 198  | 51500                        | 87500  | 71                            | 1 - 3 1/8          | 1 - 3 1/8 | 2625                               | 1191 |
| Double Row Models      |                          |                                       |      |                         |      |                              |        |                               |                    |           |                                    |      |
| 1A22039                | 36                       | 16.0                                  | 7.3  | 104                     | 47.0 | 28600                        | 48600  | 69.5                          | 2 - 2 1/8          | 2 - 1 3/8 | 1060                               | 481  |
| 1A22045                | 48                       | 19.0                                  | 8.6  | 126                     | 57.0 | 27500                        | 46800  | 69.5                          | 2 - 2 1/8          | 2 - 1 3/8 | 1145                               | 519  |
| 1A22049                | 48                       | 21.0                                  | 9.5  | 141                     | 64.0 | 28800                        | 49000  | 69.5                          | 2 - 2 1/8          | 2 - 1 3/8 | 1255                               | 569  |
| 1A22054                | 60                       | 23.0                                  | 10.0 | 167                     | 76.0 | 27700                        | 47100  | 69.5                          | 2 - 2 1/8          | 2 - 1 3/8 | 1350                               | 612  |
| 1A23058                | 54                       | 22.0                                  | 10.0 | 141                     | 64.0 | 42800                        | 72800  | 71                            | 2 - 2 1/8          | 2 - 1 5/8 | 1420                               | 644  |
| 1A23067                | 72                       | 26.0                                  | 12.0 | 174                     | 79.0 | 41200                        | 70000  | 71                            | 2 - 2 1/8          | 2 - 1 5/8 | 1550                               | 703  |
| 1A23073                | 72                       | 30.0                                  | 14.0 | 212                     | 96.0 | 43200                        | 73400  | 71                            | 2 - 2 5/8          | 2 - 1 5/8 | 1710                               | 776  |
| 1A23081                | 90                       | 35.0                                  | 16.0 | 251                     | 114  | 41600                        | 70700  | 71                            | 2 - 2 5/8          | 2 - 1 5/8 | 1865                               | 846  |
| 1A23086                | 72                       | 35.0                                  | 16.0 | 255                     | 116  | 53000                        | 90100  | 71                            | 2 - 2 5/8          | 2 - 1 5/8 | 2110                               | 957  |
| 1A23096                | 90                       | 41.0                                  | 19.0 | 304                     | 138  | 51500                        | 87600  | 71                            | 2 - 2 5/8          | 2 - 1 5/8 | 2300                               | 1043 |
| 2A24112                | 45                       | 53.0                                  | 24.0 | 375                     | 170  | 71800                        | 122100 | 72.5                          | 2 - 2 5/8          | 2 - 2 1/8 | 3200                               | 1451 |
| 2A24126                | 60                       | 65.0                                  | 30.0 | 477                     | 217  | 70500                        | 119900 | 72.5                          | 2 - 2 5/8          | 2 - 2 1/8 | 3300                               | 1497 |
| 2A24137                | 75                       | 77.0                                  | 35.0 | 579                     | 263  | 68600                        | 116600 | 72.5                          | 2 - 2 5/8          | 2 - 2 1/8 | 3500                               | 1588 |
| 2A25158                | 60                       | 77.0                                  | 35.0 | 579                     | 263  | 88100                        | 149800 | 73.3                          | 2 - 2 5/8          | 2 - 2 1/8 | 4125                               | 1871 |
| 2A25172                | 75                       | 99.0                                  | 45.0 | 721                     | 327  | 85800                        | 145800 | 73.3                          | 2 - 2 5/8          | 2 - 2 5/8 | 4375                               | 1984 |
| 2A26190                | 60                       | 107.0                                 | 49.0 | 729                     | 331  | 106000                       | 179800 | 74                            | 2 - 3 1/8          | 2 - 3 1/8 | 4950                               | 2245 |
| 2A26206                | 75                       | 124.0                                 | 56.0 | 883                     | 401  | 102900                       | 174900 | 74                            | 2 - 3 1/8          | 2 - 3 1/8 | 5250                               | 2381 |

- (1) For R407A, R507 use R22 Charge x 0.87. For R407-C use R22 Charge x 0.97.  
For R134a and R502 use R22 Charge. For R12 use R22 Charge X 1.1.
- (2) Normal Charge is the refrigerant charge for warm ambient or summer operation. For low ambient or winter charge with flooded head pressure control and fan cycling see Page 33 and Page 34.
- (3) 90% FULL is the liquid refrigerant weight at 90% of internal volume and is for reference ONLY.
- (4) For 50Hz Fan Data use 60Hz CFM (m³/h) X 0.83.
- (5) Sound Pressure Level at ten meter distance.
- (6) Less weight of refrigerant charge.

## ELECTRICAL DATA - 850 RPM MODELS 60Hz

| NO.<br>OF<br>FANS | 208-230/1/60* |      |     | 208-230/3/60 |      |     | 460/3/60     |      |     | 575/3/60     |      |     |
|-------------------|---------------|------|-----|--------------|------|-----|--------------|------|-----|--------------|------|-----|
|                   | TOTAL<br>FLA  | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP |
| 1                 | 3.4           | 4.3  | 15  | 5.9          | 7.4  | 15  | 2.9          | 3.6  | 15  | 2.3          | 2.9  | 15  |
| 2                 | 6.8           | 7.7  | 15  | 11.8         | 13.3 | 20  | 5.8          | 6.5  | 15  | 4.6          | 5.2  | 15  |
| 3                 | 10.2          | 11.1 | 15  | 17.7         | 19.2 | 25  | 8.7          | 9.4  | 15  | 6.9          | 7.5  | 15  |
| 4                 | 13.6          | 14.5 | 20  | 23.6         | 25.1 | 30  | 11.6         | 12.3 | 15  | 9.2          | 9.8  | 15  |
| 5                 | N/A           | N/A  | N/A | 29.5         | 35.1 | 40  | 14.5         | 15.2 | 20  | 11.5         | 12.1 | 15  |
| 6                 | 20.4          | 21.3 | 30  | 35.4         | 36.9 | 45  | 17.4         | 18.1 | 25  | 13.8         | 14.4 | 20  |
| 8                 | NA            | NA   | NA  | 47.2         | 48.7 | 60  | 23.2         | 23.9 | 30  | 18.4         | 19.0 | 25  |
| 10                | NA            | NA   | NA  | 59           | 60.5 | 70  | 29           | 29.7 | 40  | 23           | 23.6 | 30  |
| 12                | NA            | NA   | NA  | 70.8         | 72.3 | 80  | 34.8         | 35.5 | 45  | 27.6         | 28.2 | 40  |

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

\* Not available on 4 and 5 fan single row models and 6 fan models 183" and longer.

## ELECTRICAL DATA - 850 (700) RPM MODELS 50Hz

| NO.<br>OF<br>FANS | 200-220/1/50 |      |     | 200-220/3/50* |      |     | 380-400/3/50 |      |     |
|-------------------|--------------|------|-----|---------------|------|-----|--------------|------|-----|
|                   | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA  | MCA  | MOP | TOTAL FLA    | MCA  | MOP |
| 1                 | 3.6          | 4.5  | 15  | 6.5           | 8.1  | 15  | 2.7          | 3.4  | 15  |
| 2                 | 7.2          | 8.1  | 15  | 13            | 14.6 | 20  | 5.4          | 6.1  | 15  |
| 3                 | 10.8         | 11.7 | 15  | 19.5          | 21.1 | 25  | 8.1          | 8.8  | 15  |
| 4                 | 14.4         | 15.3 | 20  | 26            | 27.6 | 40  | 10.8         | 11.5 | 15  |
| 5                 | N/A          | N/A  | N/A | 32.5          | 34.1 | 40  | 13.5         | 15.1 | 20  |
| 6                 | 21.6         | 22.5 | 30  | 39            | 40.6 | 45  | 16.2         | 16.9 | 20  |
| 8                 | NA           | NA   | NA  | 52            | 53.6 | 60  | 21.6         | 22.3 | 30  |
| 10                | NA           | NA   | NA  | 65            | 66.6 | 80  | 27           | 27.7 | 40  |
| 12                | NA           | NA   | NA  | 78            | 79.6 | 90  | 32.4         | 33.1 | 45  |

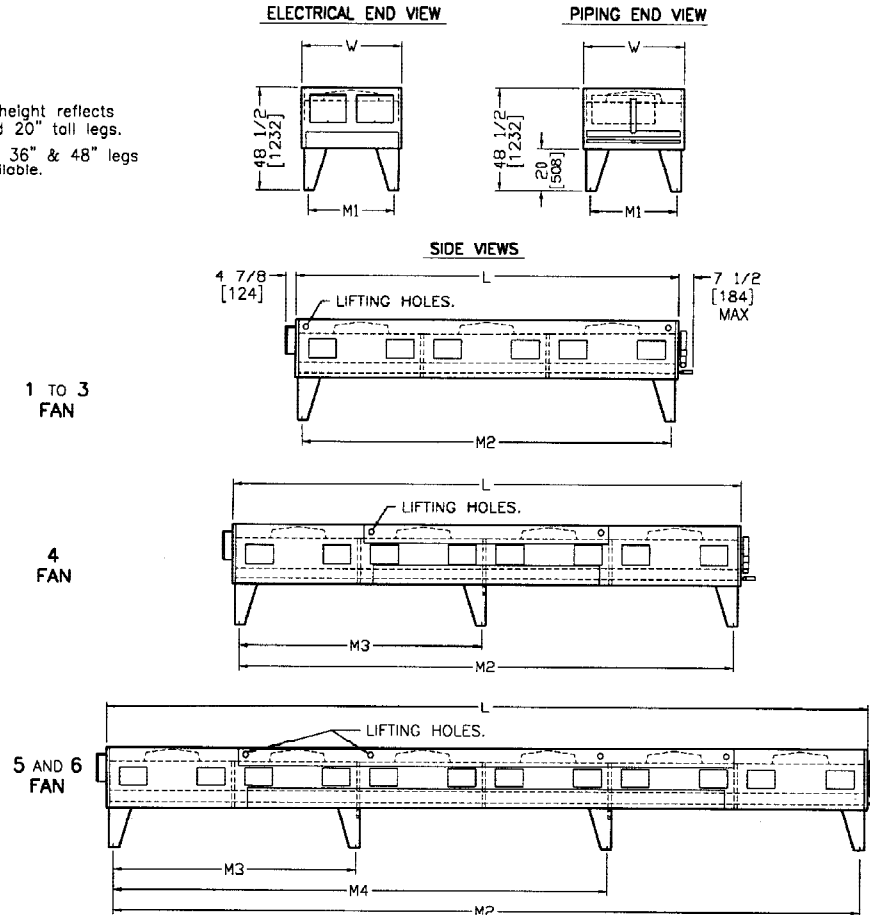
M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

\* Not available on 4 and 5 fan single row models and 6 fan models 183" and longer.

# DIMENSIONAL DATA - SINGLE ROW BVC MODELS

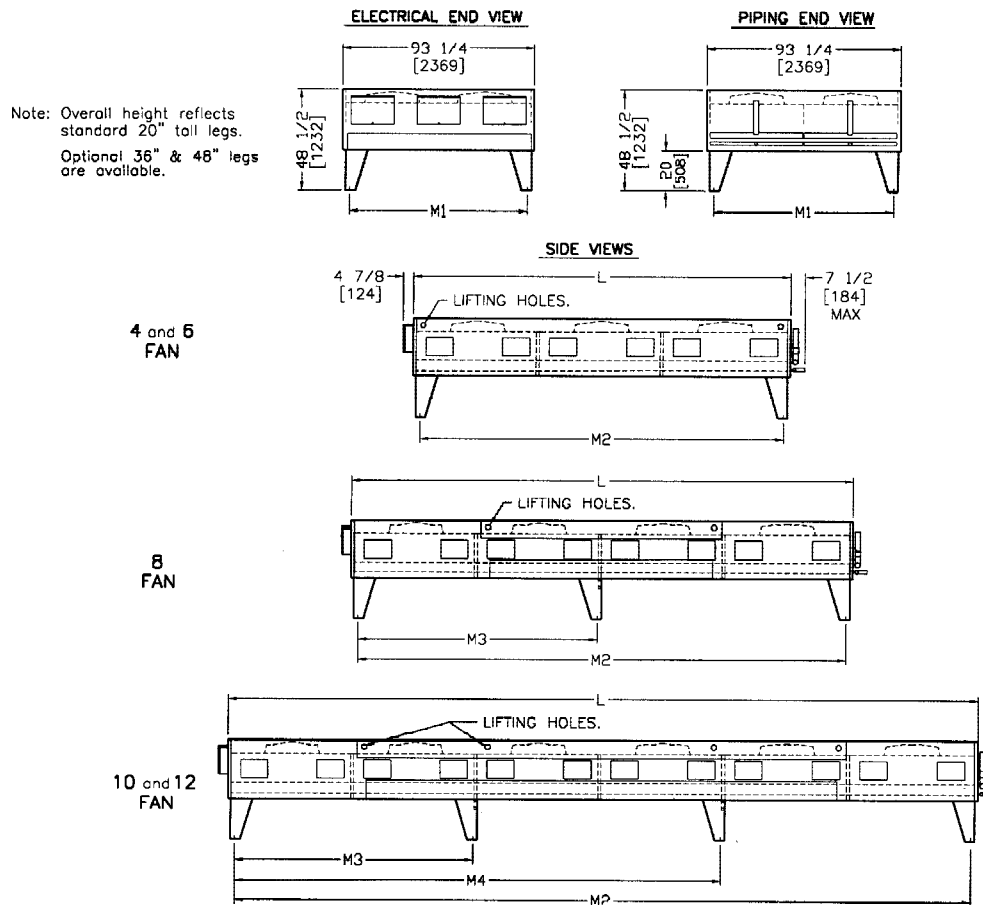
Note: Overall height reflects standard 20" tall legs.  
Optional 36" & 48" legs are available.



## DIMENSIONS - Inches (mm)

| SINGLE ROW MODEL | WIDTH W       | LENGTH L       | MOUNTING LEG CENTRES |                  |                 |                  |
|------------------|---------------|----------------|----------------------|------------------|-----------------|------------------|
|                  |               |                | M1                   | M2               | M3              | M4               |
| 11 007           | 38 1/8 (968)  | 43 (1092)      | 31 1/8 (791)         | 36 (914)         | -               | -                |
| 11 009           | 38 1/8 (968)  | 43 (1092)      | 31 1/8 (791)         | 36 (914)         | -               | -                |
| 11 010           | 48 1/8 (1222) | 43 (1092)      | 41 1/8 (1045)        | 36 (914)         | -               | -                |
| 11 011           | 48 1/8 (1222) | 43 (1092)      | 41 1/8 (1045)        | 36 (914)         | -               | -                |
| 11 012           | 48 1/8 (1222) | 50 (127)       | 41 1/8 (1045)        | 43 (1092)        | -               | -                |
| 11 013           | 48 1/8 (1222) | 50 (127)       | 41 1/8 (1045)        | 43 (1092)        | -               | -                |
| 12 017           | 38 1/8 (968)  | 83 1/8 (2111)  | 31 1/8 (791)         | 76 1/8 (1934)    | -               | -                |
| 12 019           | 48 1/8 (1222) | 83 1/8 (2111)  | 41 1/8 (1045)        | 76 1/8 (1934)    | -               | -                |
| 12 022           | 48 1/8 (1222) | 83 1/8 (2111)  | 41 1/8 (1045)        | 76 1/8 (1934)    | -               | -                |
| 12 024           | 48 1/8 (1222) | 97 1/8 (2467)  | 41 1/8 (1045)        | 90 1/8 (2289)    | -               | -                |
| 12 027           | 48 1/8 (1222) | 97 1/8 (2467)  | 41 1/8 (1045)        | 90 1/8 (2289)    | -               | -                |
| 13 029           | 48 1/8 (1222) | 123 1/4 (3131) | 41 1/8 (1045)        | 116 1/4 (2953)   | -               | -                |
| 13 034           | 48 1/8 (1222) | 123 1/4 (3131) | 41 1/8 (1045)        | 116 1/4 (2953)   | -               | -                |
| 13 037           | 48 1/8 (1222) | 144 1/4 (3664) | 41 1/8 (1045)        | 137 1/4 (3486)   | -               | -                |
| 13 041           | 48 1/8 (1222) | 144 1/4 (3664) | 41 1/8 (1045)        | 137 1/4 (3486)   | -               | -                |
| 13 043           | 48 1/8 (1222) | 183 (4648)     | 41 1/8 (1045)        | 176 1/4 (4477)   | -               | -                |
| 13 048           | 48 1/8 (1222) | 183 (4648)     | 41 1/8 (1045)        | 176 1/4 (4477)   | -               | -                |
| 14 056           | 48 1/8 (1222) | 243 (6172)     | 41 1/8 (1045)        | 236 5/16 ( 6002) | 116 3/16 (2951) | -                |
| 14 063           | 48 1/8 (1222) | 243 (6172)     | 41 1/8 (1045)        | 236 5/16 ( 6002) | 116 3/16 (2951) | -                |
| 14 068           | 48 1/8 (1222) | 243 (6172)     | 41 1/8 (1045)        | 236 5/16 ( 6002) | 116 3/16 (2951) | -                |
| 15 079           | 48 1/8 (1222) | 303 (7696)     | 41 1/8 (1045)        | 296 5/16 (7526)  | 116 3/16 (2951) | 176 3/16 (4475)  |
| 15 085           | 48 1/8 (1222) | 303 (7696)     | 41 1/8 (1045)        | 296 5/16 (7526)  | 116 3/16 (2951) | 176 3/16 (4475)  |
| 16 095           | 48 1/8 (1222) | 363 (9220)     | 41 1/8 (1045)        | 356 5/16 (9050)  | 116 3/16 (2951) | 236 3/16 ( 5999) |
| 16 103           | 48 1/8 (1222) | 363 (9220)     | 41 1/8 (1045)        | 356 5/16 (9050)  | 116 3/16 (2951) | 236 3/16 ( 5999) |

# DIMENSIONAL DATA - DOUBLE ROW BVC MODELS



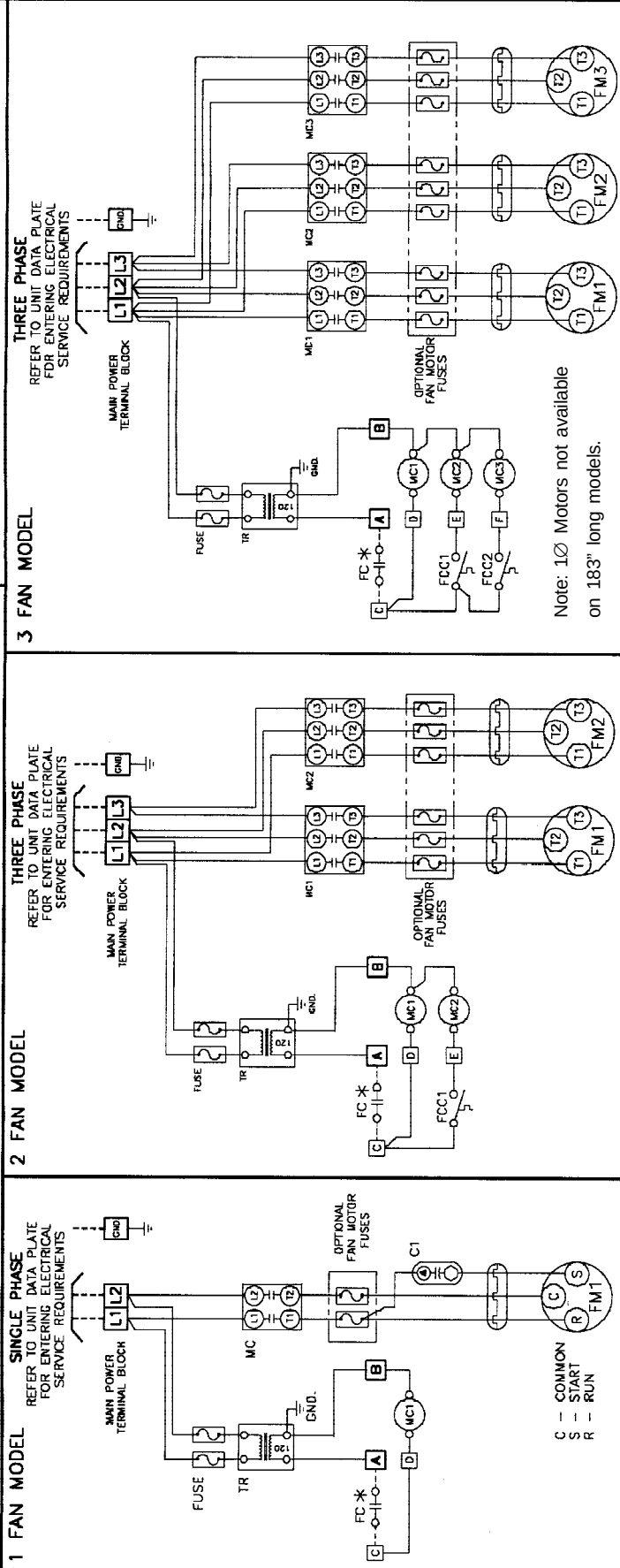
## DIMENSIONS - Inches (mm)

| DOUBLE ROW MODEL | LENGTH L       | MOUNTING LEG CENTRES |                  |                 |                  |
|------------------|----------------|----------------------|------------------|-----------------|------------------|
|                  |                | M1                   | M2               | M3              | M4               |
| 22 039           | 83 1/8 (2111)  | 86 1/8 (2188)        | 76 1/8 (1934)    | -               | -                |
| 22 045           | 83 1/8 (2111)  | 86 1/8 (2188)        | 76 1/8 (1934)    | -               | -                |
| 22 049           | 97 1/8 (2467)  | 86 1/8 (2188)        | 90 1/8 (2289)    | -               | -                |
| 22 054           | 97 1/8 (2467)  | 86 1/8 (2188)        | 90 1/8 (2289)    | -               | -                |
| 23 058           | 123 1/4 (3131) | 86 1/8 (2188)        | 116 1/4 (2953)   | -               | -                |
| 23 067           | 123 1/4 (3131) | 86 1/8 (2188)        | 116 1/4 (2953)   | -               | -                |
| 23 073           | 144 1/4 (3664) | 86 1/8 (2188)        | 137 1/4 (3486)   | -               | -                |
| 23 081           | 144 1/4 (3664) | 86 1/8 (2188)        | 137 1/4 (3486)   | -               | -                |
| 23 086           | 183 (4648)     | 86 7/16 (2196)       | 176 1/4 (4477)   | -               | -                |
| 23 096           | 183 (4648)     | 86 7/16 (2196)       | 176 1/4 (4477)   | -               | -                |
| 24 112           | 243 (6172)     | 86 7/16 (2196)       | 236 5/16 ( 6002) | 116 3/16 (2951) | -                |
| 24 126           | 243 (6172)     | 86 7/16 (2196)       | 236 5/16 ( 6002) | 116 3/16 (2951) | -                |
| 24 137           | 243 (6172)     | 86 7/16 (2196)       | 236 5/16 ( 6002) | 116 3/16 (2951) | -                |
| 25 158           | 303 (7696)     | 86 7/16 (2196)       | 296 5/16 (7526)  | 116 3/16 (2951) | 176 3/16 (4475)  |
| 25 172           | 303 (7696)     | 86 7/16 (2196)       | 296 5/16 (7526)  | 116 3/16 (2951) | 176 3/16 (4475)  |
| 26 190           | 363 (9220)     | 86 7/16 (2196)       | 356 5/16 (9050)  | 116 3/16 (2951) | 236 3/16 ( 5999) |
| 26 206           | 363 (9220)     | 86 7/16 (2196)       | 356 5/16 (9050)  | 116 3/16 (2951) | 236 3/16 ( 5999) |

# WIRING DIAGRAMS (SINGLE ROW MODELS)

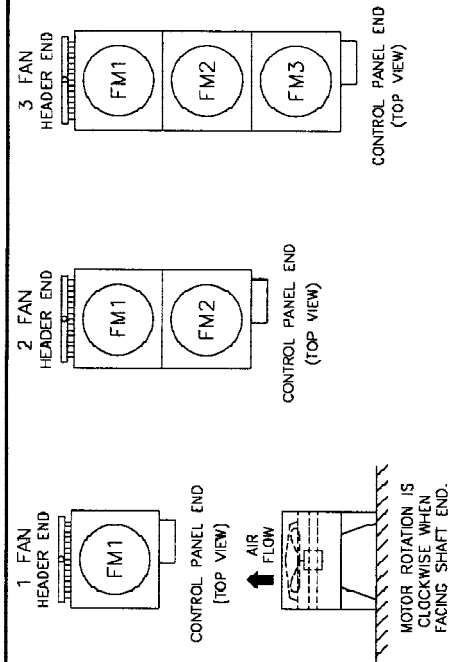
## TYPICAL SINGLE ROW 1, 2 & 3 FAN. 1 $\phi$ & 3 $\phi$ WIRING DIAGRAM FAN CYCLING OPTION

OPTIONAL INDIVIDUAL FAN MOTOR FUSING AND  
STANDARD 120 VOLT CONTROL CIRCUIT SHOWN



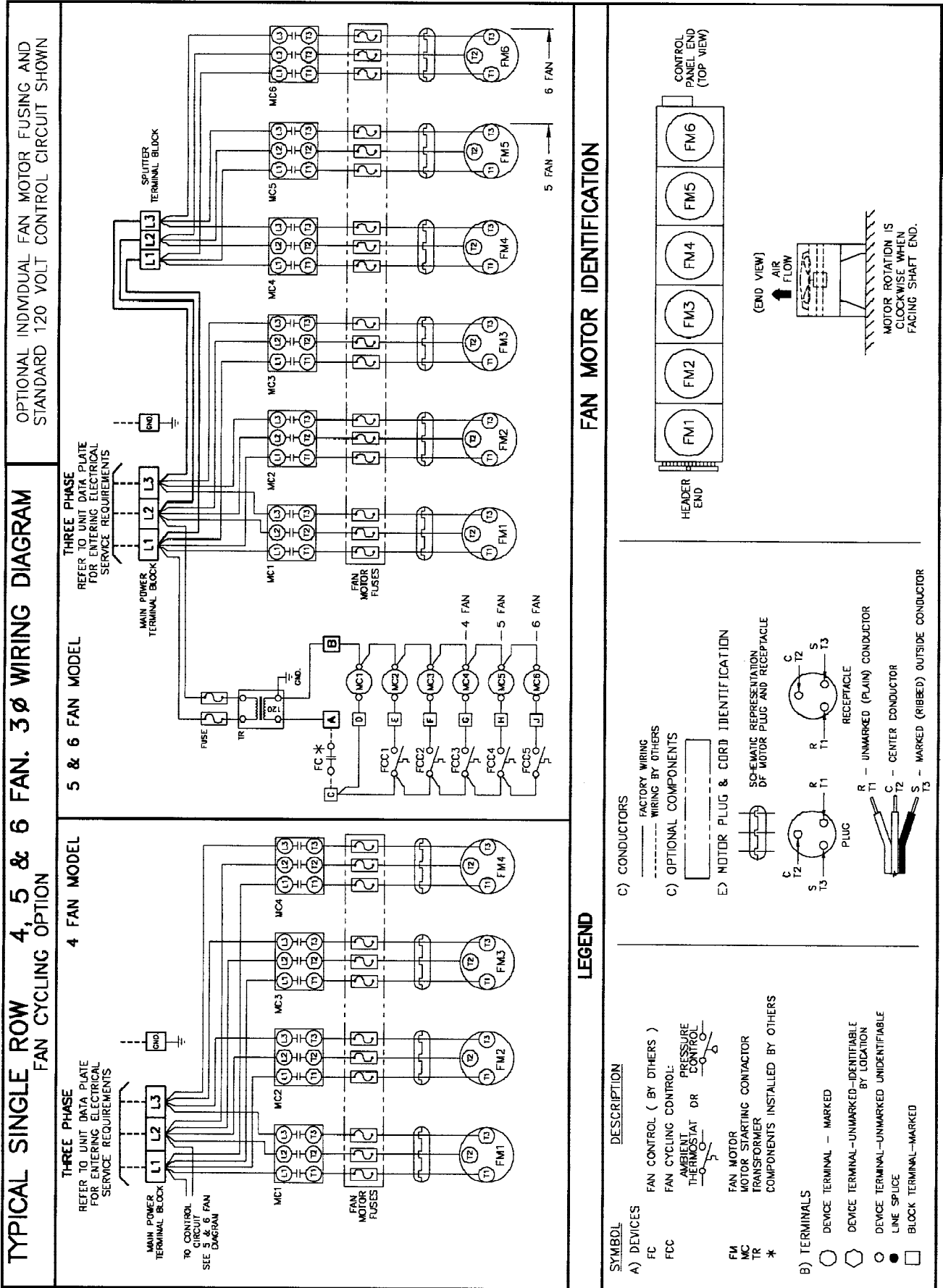
| LEGEND                              |                                                                |
|-------------------------------------|----------------------------------------------------------------|
| <b>SYMBOL</b>                       | <b>DESCRIPTION</b>                                             |
| A) DEVICES                          |                                                                |
| FC                                  | FAN CONTROL ( BY OTHERS )                                      |
| FCC                                 | FAN CYCLING CONTROL:<br>AMBIENT THERMOSTAT OR PRESSURE CONTROL |
| FM                                  | FAN MOTOR                                                      |
| MC                                  | MOTOR STARTING CONTACTOR                                       |
| TR                                  | TRANSFORMER                                                    |
| *                                   | COMPONENTS INSTALLED BY OTHERS                                 |
| B) TERMINALS                        |                                                                |
| ○                                   | DEVICE TERMINAL - MARKED                                       |
| ◻                                   | DEVICE TERMINAL - UNMARKED - IDENTIFIABLE BY LOCATION          |
| ●                                   | DEVICE TERMINAL - UNMARKED UNIDENTIFIABLE                      |
| ○                                   | LINE SPLICE                                                    |
| □                                   | BLOCK TERMINAL - MARKED                                        |
| C) CONDUCTORS                       |                                                                |
| ---                                 | FACTORY WIRING                                                 |
| ---                                 | WIRING BY OTHERS                                               |
| □                                   | OPTIONAL COMPONENTS                                            |
| E) MOTOR PLUG & CORD IDENTIFICATION |                                                                |
|                                     | SCHEMATIC REPRESENTATION OF MOTOR PLUG AND RECEPTACLE          |
|                                     | PLUG                                                           |
|                                     | RECEPTACLE                                                     |
|                                     | R - UNMARKED (PLAIN) CONDUCTOR                                 |
|                                     | C - CENTER CONDUCTOR                                           |
|                                     | T1 - MARKED (RIBBED) OUTSIDE CONDUCTOR                         |
|                                     | T2 - MARKED (RIBBED) OUTSIDE CONDUCTOR                         |
|                                     | T3 - MARKED (RIBBED) OUTSIDE CONDUCTOR                         |

## FAN MOTOR IDENTIFICATION





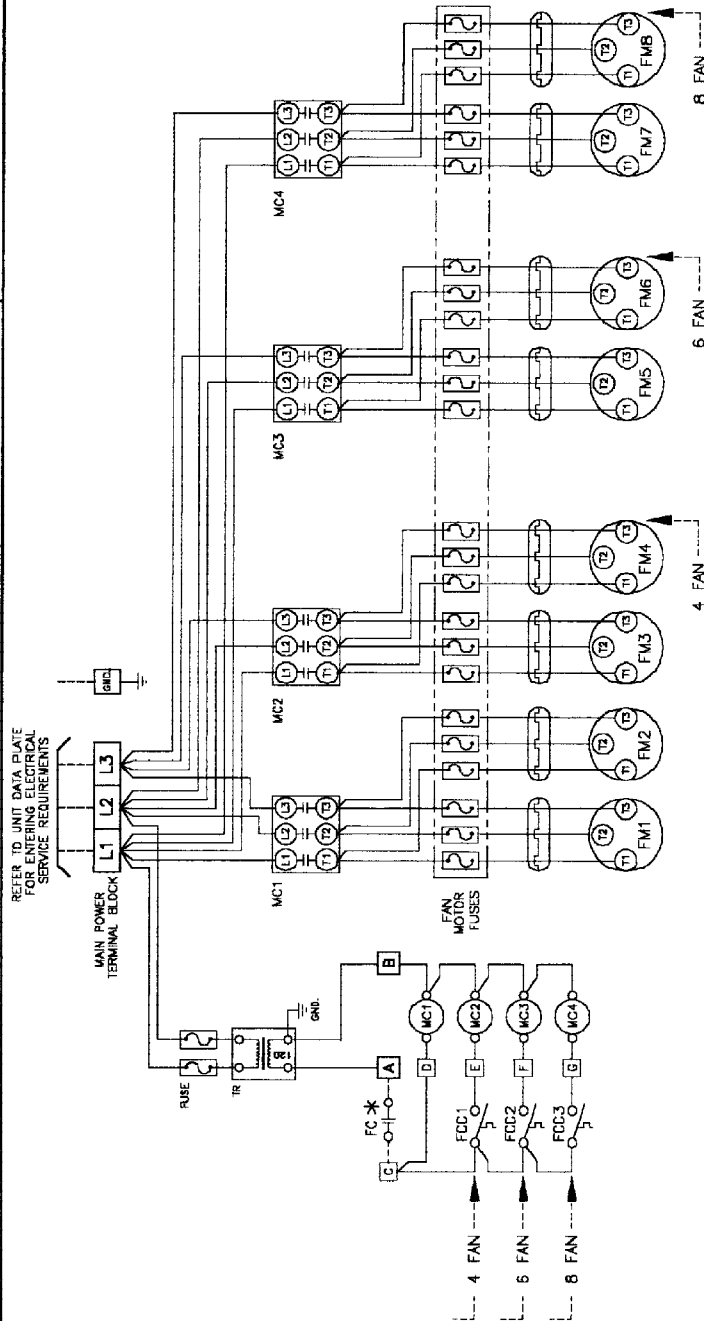
# WIRING DIAGRAMS (SINGLE ROW MODELS)



## WIRING DIAGRAMS (DOUBLE ROW MODELS)

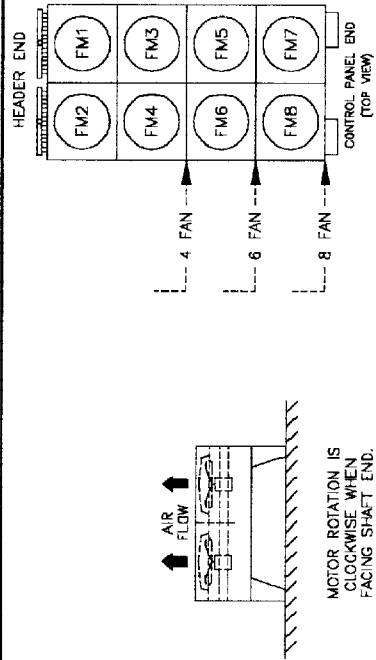
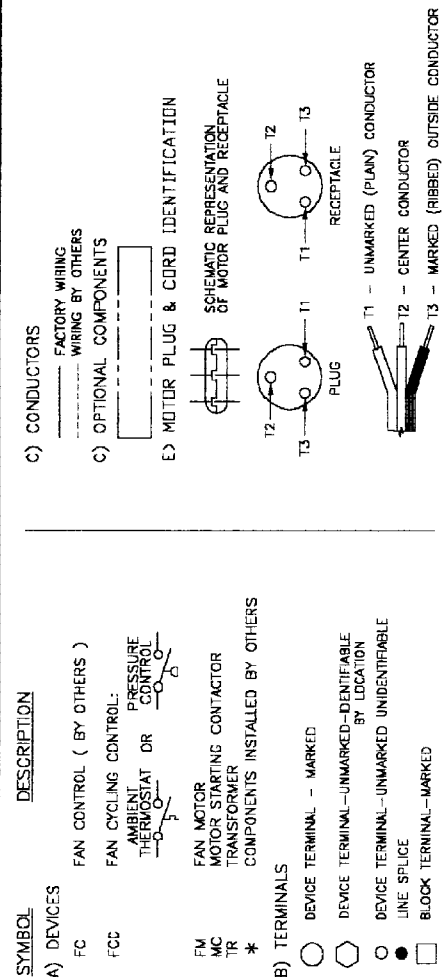
**TYPICAL 4, 6 & 8 FAN. 3Ø WIRING DIAGRAM**  
FAN CYCLING OPTION

OPTIONAL INDIVIDUAL FAN MOTOR FUSING AND  
STANDARD 120 VOLT CONTROL CIRCUIT SHOWN



## LEGEND

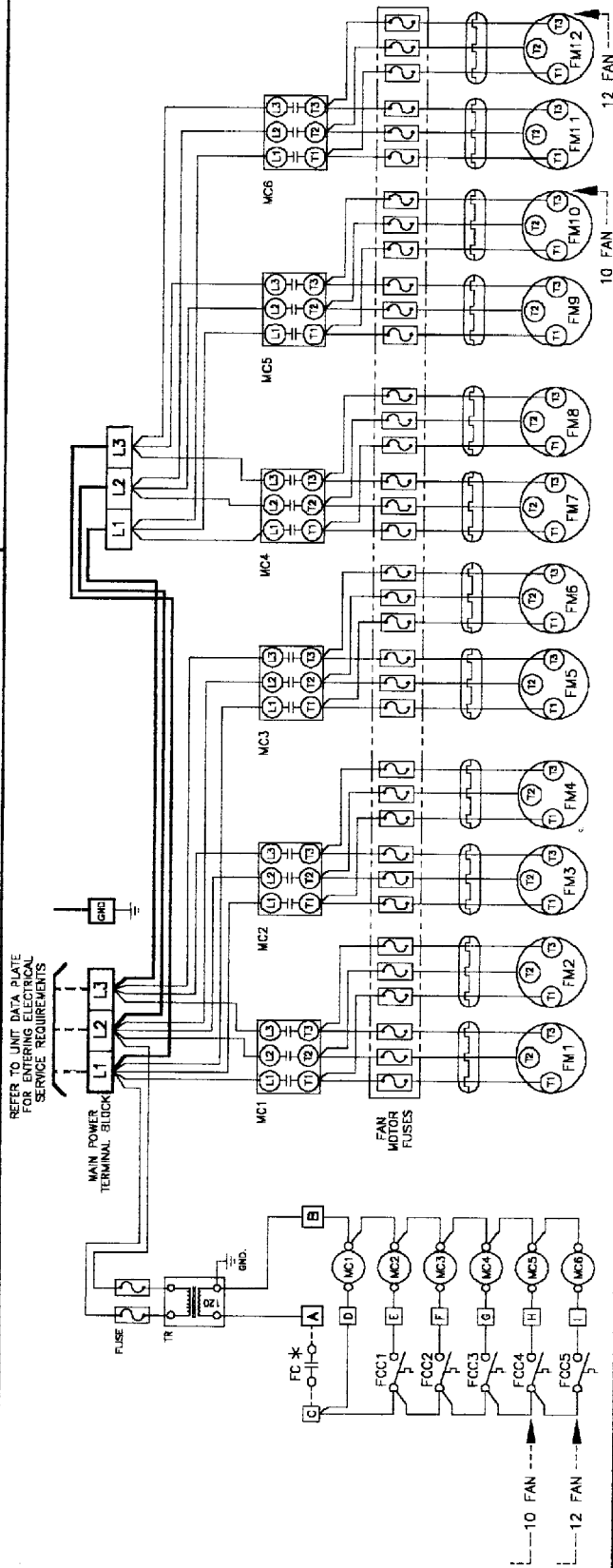
### FAN MOTOR IDENTIFICATION



# WIRING DIAGRAMS (DOUBLE ROW MODELS)

## TYPICAL 10 & 12 FAN, 3Ø WIRING DIAGRAM FAN CYCLING OPTION

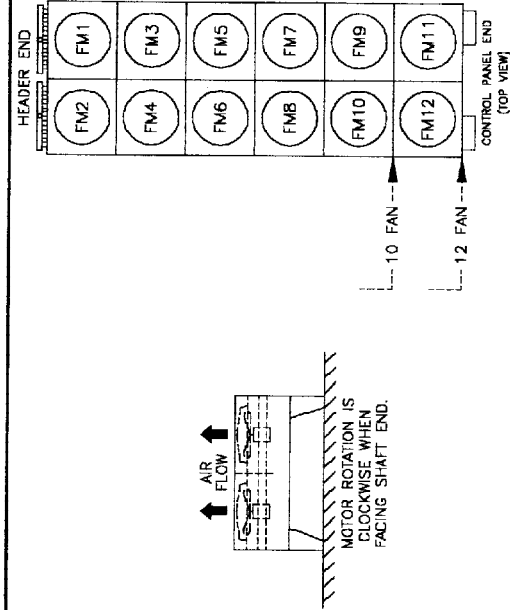
OPTIONAL INDIVIDUAL FAN MOTOR FUSING AND  
STANDARD 120 VOLT CONTROL CIRCUIT SHOWN



### LEGEND

- A) DEVICES**
- FC FAN CONTROL ( BY OTHERS )
  - FCC FAN CYCLING CONTROL: AMBIENT THERMOSTAT OR PRESSURE CONTROL
  - FM FAN MOTOR
  - MC MOTOR STARTING CONTACTOR
  - TR TRANSFORMER
  - \* COMPONENTS INSTALLED BY OTHERS
- B) TERMINALS**
- DEVICE TERMINAL - MARKED
  - ◊ DEVICE TERMINAL-UNMARKED-IDENTIFIABLE BY LOCATION
  - DEVICE TERMINAL-UNMARKED UNIDENTIFIABLE
  - LINE SPLICE
  - BLOCK TERMINAL-MARKED

### FAN MOTOR IDENTIFICATION



# CAPACITY DATA - 550 RPM MODELS - R22

| BVC<br>MODEL<br>NUMBER | Fan Rows | TOTAL HEAT OF REJECTION CAPACITY (MBH) |                  |                 |                  |                  |                 |                 | Maximum<br>No. of<br>Feeds | MBH<br>@ 1° F TD<br>Per Feed<br>(12 FPI) |
|------------------------|----------|----------------------------------------|------------------|-----------------|------------------|------------------|-----------------|-----------------|----------------------------|------------------------------------------|
|                        |          | TEMPERATURE DIFFERENCE (TD)            |                  |                 |                  |                  |                 |                 |                            |                                          |
|                        |          | 12 FPI                                 |                  |                 |                  |                  | 10 FPI          | 8 FPI           |                            |                                          |
|                        |          | 1°F<br>(0.56°C)                        | 10°F<br>(5.56°C) | 15°F<br>(8.3°C) | 20°F<br>(11.1°C) | 30°F<br>(16.7°C) | 1°F<br>(0.56°C) | 1°F<br>(0.56°C) |                            |                                          |
| Single Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 007                    | 1 x 1    | 2.540                                  | 25.4             | 38.1            | 50.8             | 76.2             | 2.324           | 2.059           | 4                          | 0.63                                     |
| 009                    | 1 x 1    | 3.162                                  | 31.6             | 47.4            | 63.2             | 94.8             | 3.011           | 2.760           | 8                          | 0.40                                     |
| 010                    | 1 x 1    | 3.523                                  | 35.2             | 52.8            | 70.5             | 106              | 3.312           | 3.014           | 9                          | 0.39                                     |
| 011                    | 1 x 1    | 3.949                                  | 39.5             | 59.2            | 79.0             | 118              | 3.822           | 3.568           | 8                          | 0.49                                     |
| 012                    | 1 x 1    | 4.298                                  | 43.0             | 64.5            | 86.0             | 129              | 4.104           | 3.835           | 8                          | 0.54                                     |
| 013                    | 1 x 1    | 4.580                                  | 45.8             | 68.7            | 91.6             | 137              | 4.503           | 4.288           | 10                         | 0.46                                     |
| 017                    | 1 x 2    | 6.316                                  | 63.2             | 94.7            | 126              | 189              | 6.015           | 5.514           | 14                         | 0.45                                     |
| 019                    | 1 x 2    | 7.008                                  | 70.1             | 105             | 140              | 210              | 6.589           | 5.997           | 18                         | 0.39                                     |
| 022                    | 1 x 2    | 7.898                                  | 79.0             | 118             | 158              | 237              | 7.644           | 7.136           | 18                         | 0.44                                     |
| 024                    | 1 x 2    | 8.603                                  | 86.0             | 129             | 172              | 258              | 8.215           | 7.677           | 18                         | 0.48                                     |
| 027                    | 1 x 2    | 9.159                                  | 91.6             | 137             | 183              | 275              | 9.006           | 8.575           | 18                         | 0.51                                     |
| 029                    | 1 x 3    | 10.56                                  | 106              | 158             | 211              | 317              | 9.930           | 9.037           | 18                         | 0.59                                     |
| 034                    | 1 x 3    | 11.82                                  | 118              | 177             | 236              | 355              | 11.44           | 10.68           | 24                         | 0.49                                     |
| 037                    | 1 x 3    | 12.89                                  | 129              | 193             | 258              | 387              | 12.31           | 11.51           | 24                         | 0.54                                     |
| 041                    | 1 x 3    | 13.73                                  | 137              | 206             | 275              | 412              | 13.50           | 12.86           | 30                         | 0.46                                     |
| 043                    | 1 x 3    | 15.24                                  | 152              | 229             | 305              | 457              | 14.17           | 13.32           | 36                         | 0.42                                     |
| 048                    | 1 x 3    | 16.20                                  | 162              | 243             | 324              | 486              | 15.59           | 14.92           | 45                         | 0.36                                     |
| 056                    | 1 x 4    | 20.23                                  | 202              | 303             | 405              | 607              | 19.02           | 17.32           | 15                         | 1.35                                     |
| 063                    | 1 x 4    | 22.53                                  | 225              | 338             | 451              | 676              | 21.52           | 20.10           | 20                         | 1.13                                     |
| 068                    | 1 x 4    | 23.66                                  | 237              | 355             | 473              | 710              | 23.26           | 22.15           | 25                         | 0.95                                     |
| 079                    | 1 x 5    | 28.24                                  | 282              | 424             | 565              | 847              | 26.97           | 25.19           | 30                         | 0.94                                     |
| 085                    | 1 x 5    | 29.18                                  | 292              | 438             | 592              | 887              | 28.69           | 27.32           | 37                         | 0.79                                     |
| 095                    | 1 x 6    | 33.88                                  | 339              | 508             | 678              | 1017             | 32.36           | 30.23           | 30                         | 1.13                                     |
| 103                    | 1 x 6    | 35.02                                  | 350              | 525             | 710              | 1065             | 34.42           | 32.78           | 37                         | 0.95                                     |
| Double Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 039                    | 2 x 2    | 14.06                                  | 141              | 211             | 281              | 422              | 13.22           | 12.03           | 27                         | 0.52                                     |
| 045                    | 2 x 2    | 15.79                                  | 158              | 237             | 316              | 474              | 15.28           | 14.27           | 36                         | 0.44                                     |
| 049                    | 2 x 2    | 17.18                                  | 172              | 258             | 344              | 515              | 16.40           | 15.33           | 36                         | 0.48                                     |
| 054                    | 2 x 2    | 18.29                                  | 183              | 274             | 366              | 549              | 17.98           | 17.12           | 45                         | 0.41                                     |
| 058                    | 2 x 3    | 21.09                                  | 211              | 316             | 422              | 633              | 19.83           | 18.05           | 36                         | 0.59                                     |
| 067                    | 2 x 3    | 23.66                                  | 237              | 355             | 473              | 710              | 22.90           | 21.37           | 48                         | 0.49                                     |
| 073                    | 2 x 3    | 25.76                                  | 258              | 386             | 515              | 773              | 24.60           | 22.99           | 48                         | 0.54                                     |
| 081                    | 2 x 3    | 27.44                                  | 274              | 412             | 549              | 823              | 26.98           | 25.69           | 60                         | 0.46                                     |
| 086                    | 2 x 3    | 30.48                                  | 305              | 457             | 610              | 914              | 28.34           | 26.63           | 72                         | 0.42                                     |
| 096                    | 2 x 3    | 32.39                                  | 324              | 486             | 648              | 972              | 31.18           | 29.85           | 90                         | 0.36                                     |
| 112                    | 2 x 4    | 40.46                                  | 405              | 607             | 809              | 1214             | 38.03           | 34.63           | 30                         | 1.35                                     |
| 126                    | 2 x 4    | 45.07                                  | 451              | 676             | 901              | 1352             | 43.04           | 40.20           | 40                         | 1.13                                     |
| 137                    | 2 x 4    | 47.32                                  | 473              | 710             | 946              | 1420             | 46.52           | 44.29           | 50                         | 0.95                                     |
| 158                    | 2 x 5    | 56.47                                  | 565              | 847             | 1129             | 1694             | 53.93           | 50.38           | 60                         | 0.94                                     |
| 172                    | 2 x 5    | 59.16                                  | 592              | 887             | 1183             | 1775             | 58.15           | 55.37           | 75                         | 0.79                                     |
| 190                    | 2 x 6    | 67.77                                  | 678              | 1017            | 1355             | 2033             | 64.72           | 60.45           | 60                         | 1.13                                     |
| 206                    | 2 x 6    | 70.98                                  | 710              | 1065            | 1420             | 2129             | 69.78           | 66.44           | 75                         | 0.95                                     |

## Correction Factors for Other refrigerants - Use R22 Values Multiplied By

| R134a | R12  | R507 | R404A | R407A | R407B | R502 | R407C |
|-------|------|------|-------|-------|-------|------|-------|
| 0.94  | 0.95 | 0.97 | 0.97  | 0.97  | 0.97  | 0.98 | 1.00  |

- NOTES:**
- (1) Above capacity data based on 0°F subcooling and at sea level.
  - (2) TD = Condensing temperature - ambient temperature
  - (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
  - (4) For High Altitude applications apply the following correction factors:  
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
  - (5) For 50Hz capacity multiply by 0.92.

# CAPACITY DATA - 550 RPM MODELS - R404A

| BVC<br>MODEL<br>NUMBER | Fan Rows | TOTAL HEAT OF REJECTION CAPACITY (MBH) |                  |                 |                  |                  |                 |                 | Maximum<br>No. of<br>Feeds | MBH<br>@ 1° F TD<br>Per Feed<br>(12 FPI) |
|------------------------|----------|----------------------------------------|------------------|-----------------|------------------|------------------|-----------------|-----------------|----------------------------|------------------------------------------|
|                        |          | TEMPERATURE DIFFERENCE (TD)            |                  |                 |                  |                  |                 |                 |                            |                                          |
|                        |          | 12 FPI                                 |                  |                 |                  |                  | 10 FPI          | 8 FPI           |                            |                                          |
|                        |          | 1°F<br>(0.56°C)                        | 10°F<br>(5.56°C) | 15°F<br>(8.3°C) | 20°F<br>(11.1°C) | 30°F<br>(16.7°C) | 1°F<br>(0.56°C) | 1°F<br>(0.56°C) |                            |                                          |
| Single Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 007                    | 1 x 1    | 2.464                                  | 24.6             | 37.0            | 49.3             | 73.9             | 2.254           | 1.998           | 4                          | 0.62                                     |
| 009                    | 1 x 1    | 3.067                                  | 30.7             | 46.0            | 61.3             | 92.0             | 2.921           | 2.677           | 8                          | 0.38                                     |
| 010                    | 1 x 1    | 3.417                                  | 34.2             | 51.3            | 68.3             | 103              | 3.213           | 2.924           | 9                          | 0.38                                     |
| 011                    | 1 x 1    | 3.830                                  | 38.3             | 57.5            | 76.6             | 115              | 3.707           | 3.461           | 8                          | 0.48                                     |
| 012                    | 1 x 1    | 4.169                                  | 41.7             | 62.5            | 83.4             | 125              | 3.981           | 3.720           | 8                          | 0.52                                     |
| 013                    | 1 x 1    | 4.442                                  | 44.4             | 66.6            | 88.8             | 133              | 4.368           | 4.159           | 10                         | 0.44                                     |
| 017                    | 1 x 2    | 6.126                                  | 61.3             | 91.9            | 123              | 184              | 5.834           | 5.348           | 14                         | 0.44                                     |
| 019                    | 1 x 2    | 6.798                                  | 68.0             | 102             | 136              | 204              | 6.391           | 5.817           | 18                         | 0.38                                     |
| 022                    | 1 x 2    | 7.661                                  | 76.6             | 115             | 153              | 230              | 7.415           | 6.922           | 18                         | 0.43                                     |
| 024                    | 1 x 2    | 8.345                                  | 83.5             | 125             | 167              | 250              | 7.969           | 7.447           | 18                         | 0.46                                     |
| 027                    | 1 x 2    | 8.885                                  | 88.8             | 133             | 178              | 267              | 8.736           | 8.318           | 18                         | 0.49                                     |
| 029                    | 1 x 3    | 10.24                                  | 102              | 154             | 205              | 307              | 9.632           | 8.766           | 18                         | 0.57                                     |
| 034                    | 1 x 3    | 11.46                                  | 115              | 172             | 229              | 344              | 11.09           | 10.36           | 24                         | 0.48                                     |
| 037                    | 1 x 3    | 12.51                                  | 125              | 188             | 250              | 375              | 11.94           | 11.16           | 24                         | 0.52                                     |
| 041                    | 1 x 3    | 13.32                                  | 133              | 200             | 266              | 400              | 13.10           | 12.47           | 30                         | 0.44                                     |
| 043                    | 1 x 3    | 14.78                                  | 148              | 222             | 296              | 443              | 13.75           | 12.92           | 36                         | 0.41                                     |
| 048                    | 1 x 3    | 15.71                                  | 157              | 236             | 314              | 471              | 15.12           | 14.48           | 45                         | 0.35                                     |
| 056                    | 1 x 4    | 19.19                                  | 192              | 288             | 392              | 589              | 18.44           | 16.80           | 15                         | 1.28                                     |
| 063                    | 1 x 4    | 21.86                                  | 219              | 328             | 437              | 656              | 20.87           | 19.50           | 20                         | 1.09                                     |
| 068                    | 1 x 4    | 22.64                                  | 226              | 340             | 459              | 689              | 22.56           | 21.48           | 25                         | 0.91                                     |
| 079                    | 1 x 5    | 27.39                                  | 274              | 411             | 548              | 822              | 26.16           | 24.43           | 30                         | 0.91                                     |
| 085                    | 1 x 5    | 28.31                                  | 283              | 425             | 574              | 861              | 27.82           | 26.50           | 37                         | 0.77                                     |
| 095                    | 1 x 6    | 32.87                                  | 329              | 493             | 657              | 986              | 31.39           | 29.32           | 30                         | 1.10                                     |
| 103                    | 1 x 6    | 33.97                                  | 340              | 510             | 689              | 1033             | 33.39           | 31.80           | 37                         | 0.92                                     |
| Double Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 039                    | 2 x 2    | 13.64                                  | 136              | 205             | 273              | 409              | 12.82           | 11.67           | 27                         | 0.51                                     |
| 045                    | 2 x 2    | 15.31                                  | 153              | 230             | 306              | 459              | 14.82           | 13.84           | 36                         | 0.43                                     |
| 049                    | 2 x 2    | 16.66                                  | 167              | 250             | 333              | 500              | 15.91           | 14.87           | 36                         | 0.46                                     |
| 054                    | 2 x 2    | 17.74                                  | 177              | 266             | 355              | 532              | 17.44           | 16.61           | 45                         | 0.39                                     |
| 058                    | 2 x 3    | 20.46                                  | 205              | 307             | 409              | 614              | 19.24           | 17.51           | 36                         | 0.57                                     |
| 067                    | 2 x 3    | 22.95                                  | 229              | 344             | 459              | 688              | 22.21           | 20.73           | 48                         | 0.48                                     |
| 073                    | 2 x 3    | 24.99                                  | 250              | 375             | 500              | 750              | 23.86           | 22.30           | 48                         | 0.52                                     |
| 081                    | 2 x 3    | 26.62                                  | 266              | 399             | 532              | 799              | 26.17           | 24.92           | 60                         | 0.44                                     |
| 086                    | 2 x 3    | 29.57                                  | 296              | 443             | 591              | 887              | 27.49           | 25.83           | 72                         | 0.41                                     |
| 096                    | 2 x 3    | 31.42                                  | 314              | 471             | 628              | 943              | 30.24           | 28.95           | 90                         | 0.35                                     |
| 112                    | 2 x 4    | 39.24                                  | 392              | 589             | 785              | 1177             | 36.89           | 33.59           | 30                         | 1.31                                     |
| 126                    | 2 x 4    | 43.72                                  | 437              | 656             | 874              | 1311             | 41.75           | 38.99           | 40                         | 1.09                                     |
| 137                    | 2 x 4    | 45.90                                  | 459              | 689             | 918              | 1377             | 45.12           | 42.96           | 50                         | 0.92                                     |
| 158                    | 2 x 5    | 54.78                                  | 548              | 822             | 1096             | 1643             | 52.32           | 48.86           | 60                         | 0.91                                     |
| 172                    | 2 x 5    | 57.38                                  | 574              | 861             | 1148             | 1722             | 56.41           | 53.71           | 75                         | 0.77                                     |
| 190                    | 2 x 6    | 65.74                                  | 657              | 986             | 1315             | 1972             | 62.78           | 58.64           | 60                         | 1.10                                     |
| 206                    | 2 x 6    | 68.85                                  | 689              | 1033            | 1377             | 2066             | 67.68           | 64.45           | 75                         | 0.92                                     |

To calculate capacities with other refrigerants, multiply the R22 capacity by the appropriate correction factor. Refer to the table accompanying each of the R22 tables.

## NOTES:

- (1) Above capacity data based on 0°F subcooling and at sea level.
- (2) TD = Condensing temperature - ambient temperature
- (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
- (4) For High Altitude applications apply the following correction factors:  
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
- (5) For 50Hz capacity multiply by 0.92.

# GENERAL SPECIFICATIONS - 550 RPM MODELS - R22

| BVC<br>MODEL<br>NUMBER | Total No.<br>of Feeds | R22 Refrigerant Charge <sup>(1)</sup> |      |                         |      | Air Flow Rate <sup>(4)</sup> |        | Piping Connections |           | Condenser Weight <sup>(5)</sup> |      |
|------------------------|-----------------------|---------------------------------------|------|-------------------------|------|------------------------------|--------|--------------------|-----------|---------------------------------|------|
|                        |                       | Normal <sup>(2)</sup>                 |      | 90% FULL <sup>(3)</sup> |      |                              |        | Inlet              | Outlet    |                                 |      |
|                        |                       | lbs                                   | kg   | lbs                     | kg   | CFM                          | m³/h   | Qty - OD           | Qty - OD  | lbs                             | kg   |
| Single Row Models      |                       |                                       |      |                         |      |                              |        |                    |           |                                 |      |
| 1B11007                | 4                     | 1.7                                   | 0.8  | 11.0                    | 5.2  | 4630                         | 7900   | 1 - 1 1/8          | 1 - 7/8   | 360                             | 163  |
| 1B11009                | 8                     | 2.2                                   | 1.0  | 17.0                    | 7.5  | 4060                         | 6900   | 1 - 1 3/8          | 1 - 7/8   | 375                             | 170  |
| 1B11010                | 9                     | 2.8                                   | 1.3  | 21.0                    | 9.5  | 4630                         | 7900   | 1 - 1 3/8          | 1 - 7/8   | 420                             | 191  |
| 1B11011                | 8                     | 3.9                                   | 1.8  | 27.0                    | 12.0 | 4450                         | 7600   | 1 - 1 3/8          | 1 - 1 1/8 | 440                             | 200  |
| 1B11012                | 8                     | 4.3                                   | 2.0  | 31.0                    | 14.0 | 4660                         | 7900   | 1 - 1 3/8          | 1 - 1 1/8 | 480                             | 218  |
| 1B11013                | 10                    | 5.2                                   | 2.4  | 39.0                    | 18.0 | 4480                         | 7600   | 1 - 1 5/8          | 1 - 1 1/8 | 505                             | 229  |
| 1B12017                | 14                    | 4.1                                   | 1.9  | 31.0                    | 14.0 | 8100                         | 13800  | 1 - 1 5/8          | 1 - 1 1/8 | 565                             | 256  |
| 1B12019                | 18                    | 6.1                                   | 2.8  | 44.0                    | 20.0 | 9300                         | 15700  | 1 - 2 1/8          | 1 - 1 3/8 | 630                             | 286  |
| 1B12022                | 18                    | 7.4                                   | 3.4  | 55.0                    | 25.0 | 8900                         | 15100  | 1 - 2 1/8          | 1 - 1 3/8 | 675                             | 306  |
| 1B12024                | 18                    | 8.3                                   | 3.8  | 62.0                    | 28.0 | 9300                         | 15800  | 1 - 2 1/8          | 1 - 1 3/8 | 740                             | 336  |
| 1B12027                | 18                    | 10.0                                  | 4.5  | 75.0                    | 34.0 | 9000                         | 15300  | 1 - 2 1/8          | 1 - 1 3/8 | 790                             | 358  |
| 1B13029                | 18                    | 9.0                                   | 4.1  | 61.0                    | 28.0 | 13800                        | 23500  | 1 - 2 1/8          | 1 - 1 5/8 | 840                             | 381  |
| 1B13034                | 24                    | 10.0                                  | 4.5  | 78.0                    | 35.0 | 13300                        | 22700  | 1 - 2 1/8          | 1 - 1 5/8 | 905                             | 410  |
| 1B13037                | 24                    | 12.0                                  | 5.4  | 94.0                    | 42.0 | 14000                        | 23800  | 1 - 2 5/8          | 1 - 1 5/8 | 1000                            | 454  |
| 1B13041                | 30                    | 14.0                                  | 6.4  | 113                     | 51.0 | 13500                        | 22900  | 1 - 2 5/8          | 1 - 1 5/8 | 1070                            | 485  |
| 1B13043                | 36                    | 17.5                                  | 7.9  | 128                     | 57.8 | 17100                        | 29200  | 1 - 2 5/8          | 1 - 1 5/8 | 1055                            | 479  |
| 1B13048                | 45                    | 20.5                                  | 9.3  | 152                     | 68.9 | 16700                        | 28300  | 1 - 2 5/8          | 1 - 1 5/8 | 1150                            | 522  |
| 2B14056                | 15                    | 25.9                                  | 11.8 | 183                     | 83.2 | 23200                        | 39500  | 1 - 2 5/8          | 1 - 2 1/8 | 1600                            | 726  |
| 2B14063                | 20                    | 32.5                                  | 14.7 | 239                     | 108  | 22800                        | 38800  | 1 - 2 5/8          | 1 - 2 1/8 | 1650                            | 748  |
| 2B14068                | 25                    | 38.0                                  | 17.2 | 286                     | 130  | 22200                        | 37700  | 1 - 2 5/8          | 1 - 2 1/8 | 1750                            | 794  |
| 2B15079                | 30                    | 38.5                                  | 17.5 | 290                     | 131  | 28500                        | 48500  | 1 - 2 5/8          | 1 - 2 1/8 | 2063                            | 936  |
| 2B15085                | 37                    | 48.8                                  | 22.2 | 356                     | 161  | 27700                        | 47200  | 1 - 2 5/8          | 1 - 2 5/8 | 2188                            | 992  |
| 2B16095                | 30                    | 53.5                                  | 24.3 | 365                     | 165  | 34200                        | 58200  | 1 - 3 1/8          | 1 - 3 1/8 | 2475                            | 1123 |
| 2B16103                | 37                    | 61.2                                  | 27.7 | 436                     | 198  | 33300                        | 56600  | 1 - 3 1/8          | 1 - 3 1/8 | 2625                            | 1191 |
| Double Row Models      |                       |                                       |      |                         |      |                              |        |                    |           |                                 |      |
| 1B22039                | 27                    | 16.0                                  | 7.3  | 104                     | 47.0 | 18500                        | 31500  | 2 - 2 1/8          | 2 - 1 3/8 | 1060                            | 481  |
| 1B22045                | 36                    | 19.0                                  | 8.6  | 126                     | 57.0 | 17800                        | 30300  | 2 - 2 1/8          | 2 - 1 3/8 | 1145                            | 519  |
| 1B22049                | 36                    | 21.0                                  | 9.5  | 141                     | 64.0 | 18600                        | 31700  | 2 - 2 1/8          | 2 - 1 3/8 | 1255                            | 569  |
| 1B22054                | 45                    | 23.0                                  | 10.0 | 167                     | 76.0 | 17900                        | 30500  | 2 - 2 1/8          | 2 - 1 3/8 | 1350                            | 612  |
| 1B23058                | 36                    | 22.0                                  | 10.0 | 141                     | 64.0 | 27700                        | 47100  | 2 - 2 1/8          | 2 - 1 5/8 | 1420                            | 644  |
| 1B23067                | 48                    | 26.0                                  | 12.0 | 174                     | 79.0 | 26700                        | 45300  | 2 - 2 1/8          | 2 - 1 5/8 | 1550                            | 703  |
| 1B23073                | 48                    | 30.0                                  | 14.0 | 212                     | 96.0 | 28000                        | 47500  | 2 - 2 5/8          | 2 - 1 5/8 | 1710                            | 776  |
| 1B23081                | 60                    | 35.0                                  | 16.0 | 251                     | 114  | 26900                        | 45800  | 2 - 2 5/8          | 2 - 1 5/8 | 1865                            | 846  |
| 1B23086                | 72                    | 35.0                                  | 16.0 | 255                     | 116  | 34300                        | 58300  | 2 - 2 5/8          | 2 - 1 5/8 | 2110                            | 957  |
| 1B23096                | 90                    | 41.0                                  | 19.0 | 304                     | 138  | 33300                        | 56700  | 2 - 2 5/8          | 2 - 1 5/8 | 2300                            | 1043 |
| 2B24112                | 30                    | 53.0                                  | 24.0 | 375                     | 170  | 46500                        | 79000  | 2 - 2 5/8          | 2 - 2 1/8 | 3200                            | 1451 |
| 2B24126                | 40                    | 65.0                                  | 30.0 | 477                     | 217  | 45600                        | 77600  | 2 - 2 5/8          | 2 - 2 1/8 | 3300                            | 1497 |
| 2B24137                | 50                    | 77.0                                  | 35.0 | 579                     | 263  | 44400                        | 75500  | 2 - 2 5/8          | 2 - 2 1/8 | 3500                            | 1588 |
| 2B25158                | 60                    | 77.0                                  | 35.0 | 579                     | 263  | 57000                        | 96900  | 2 - 2 5/8          | 2 - 2 1/8 | 4125                            | 1871 |
| 2B25172                | 75                    | 99.0                                  | 45.0 | 721                     | 327  | 55500                        | 94300  | 2 - 2 5/8          | 2 - 2 5/8 | 4375                            | 1984 |
| 2B26190                | 60                    | 107.0                                 | 49.0 | 729                     | 331  | 68400                        | 116300 | 2 - 3 1/8          | 2 - 3 1/8 | 4950                            | 2245 |
| 2B26206                | 75                    | 124.0                                 | 56.0 | 883                     | 401  | 66600                        | 113200 | 2 - 3 1/8          | 2 - 3 1/8 | 5250                            | 2381 |

## NOTES:

- (1) For R407A, R507 use R22 Charge x 0.87. For R407-C use R22 Charge x 0.97.  
For R134a and R502 use R22 Charge. For R12 use R22 Charge x 1.1.
- (2) Normal Charge is the refrigerant charge for warm ambient or summer operation. For low ambient or winter charge with flooded head pressure control and fan cycling see Page 33 and Page 34.
- (3) 90% FULL is the liquid refrigerant weight at 90% of internal volume and is for reference ONLY.
- (4) For 50Hz Fan data use 60Hz CFM (m³/h) x 0.83.capacity multiply by 0.92.
- (5) Less weight pf refrigerant charge.

## ELECTRICAL DATA - 550 RPM MODELS 60Hz

| NO.<br>OF<br>FANS | 208-230/3/60 |      |     | 460/3/60     |      |     | 575/3/60     |      |     |
|-------------------|--------------|------|-----|--------------|------|-----|--------------|------|-----|
|                   | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP |
| 1                 | 2.8          | 3.5  | 15  | 1.3          | 1.6  | 15  | 1.1          | 1.4  | 15  |
| 2                 | 5.6          | 6.3  | 15  | 2.6          | 2.9  | 15  | 2.2          | 2.5  | 15  |
| 3                 | 8.4          | 9.1  | 15  | 3.9          | 4.2  | 15  | 3.3          | 3.6  | 15  |
| 4                 | 11.2         | 11.9 | 15  | 5.2          | 5.5  | 15  | 4.4          | 4.7  | 15  |
| 5                 | 14.0         | 16   | 20  | 6.5          | 6.8  | 15  | 5.5          | 5.8  | 15  |
| 6                 | 16.8         | 21   | 25  | 7.8          | 8.1  | 15  | 6.6          | 6.9  | 15  |
| 8                 | 22.4         | 26   | 30  | 10.4         | 10.7 | 15  | 8.8          | 9.1  | 15  |
| 10                | 28.0         | 31   | 35  | 13           | 16   | 20  | 11           | 11.3 | 15  |
| 12                | 33.6         | 41   | 45  | 15.6         | 15.9 | 20  | 13.2         | 16   | 20  |

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

## ELECTRICAL DATA - 550 (450) RPM MODELS 50Hz

| NO.<br>OF<br>FANS | 200-220/3/50 |      |     | 380-400/3/50 |     |     |
|-------------------|--------------|------|-----|--------------|-----|-----|
|                   | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA | MOP |
| 1                 | 2.2          | 2.7  | 15  | 1            | 1.2 | 15  |
| 2                 | 4.4          | 4.9  | 15  | 2            | 2.2 | 15  |
| 3                 | 6.5          | 7.1  | 15  | 2.9          | 3.2 | 15  |
| 4                 | 8.7          | 9.3  | 15  | 3.9          | 4.2 | 15  |
| 5                 | 10.9         | 11.4 | 15  | 4.9          | 5.1 | 15  |
| 6                 | 13.1         | 16   | 20  | 5.9          | 6.1 | 15  |
| 8                 | 17.4         | 21   | 25  | 7.8          | 8.1 | 15  |
| 10                | 17.4         | 21   | 25  | 7.8          | 8.1 | 15  |
| 12                | 26.2         | 31   | 35  | 11.8         | 12  | 15  |

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

# CAPACITY DATA - 1140 RPM MODELS - R22

| BVC<br>MODEL<br>NUMBER | Fan Rows | TOTAL HEAT OF REJECTION CAPACITY (MBH) |                  |                 |                  |                  |                 |                 | Maximum<br>No. of<br>Feeds | MBH<br>@ 1° F TD<br>Per Feed<br>(12 FPI) |
|------------------------|----------|----------------------------------------|------------------|-----------------|------------------|------------------|-----------------|-----------------|----------------------------|------------------------------------------|
|                        |          | TEMPERATURE DIFFERENCE (TD)            |                  |                 |                  |                  |                 |                 |                            |                                          |
|                        |          | 12 FPI                                 |                  |                 |                  |                  | 10 FPI          | 8 FPI           |                            |                                          |
|                        |          | 1°F<br>(0.56°C)                        | 10°F<br>(5.56°C) | 15°F<br>(8.3°C) | 20°F<br>(11.1°C) | 30°F<br>(16.7°C) | 1°F<br>(0.56°C) | 1°F<br>(0.56°C) |                            |                                          |
| Single Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 007                    | 1 x 1    | 3.627                                  | 36.3             | 54.4            | 72.5             | 109              | 3.303           | 2.911           | 7                          | 0.52                                     |
| 009                    | 1 x 1    | 4.989                                  | 49.9             | 74.8            | 100              | 150              | 4.677           | 4.220           | 8                          | 0.62                                     |
| 010                    | 1 x 1    | 5.516                                  | 55.2             | 82.7            | 110              | 165              | 5.094           | 4.572           | 9                          | 0.61                                     |
| 011                    | 1 x 1    | 6.446                                  | 64.5             | 96.7            | 129              | 193              | 6.118           | 5.589           | 12                         | 0.54                                     |
| 012                    | 1 x 1    | 7.157                                  | 71.6             | 107             | 143              | 215              | 6.710           | 6.114           | 12                         | 0.60                                     |
| 013                    | 1 x 1    | 7.985                                  | 79.9             | 120             | 160              | 240              | 7.678           | 7.095           | 15                         | 0.53                                     |
| 017                    | 1 x 2    | 9.971                                  | 100              | 150             | 199              | 299              | 9.348           | 8.434           | 14                         | 0.71                                     |
| 019                    | 1 x 2    | 10.98                                  | 110              | 165             | 220              | 329              | 10.14           | 9.100           | 18                         | 0.61                                     |
| 022                    | 1 x 2    | 12.90                                  | 129              | 194             | 258              | 387              | 12.25           | 11.19           | 24                         | 0.54                                     |
| 024                    | 1 x 2    | 14.34                                  | 143              | 215             | 287              | 430              | 13.44           | 12.25           | 24                         | 0.60                                     |
| 027                    | 1 x 2    | 15.98                                  | 160              | 240             | 320              | 479              | 15.37           | 14.20           | 30                         | 0.53                                     |
| 029                    | 1 x 3    | 16.55                                  | 166              | 248             | 331              | 497              | 15.29           | 13.72           | 27                         | 0.61                                     |
| 034                    | 1 x 3    | 19.31                                  | 193              | 290             | 386              | 579              | 18.33           | 16.74           | 36                         | 0.54                                     |
| 037                    | 1 x 3    | 21.49                                  | 215              | 322             | 430              | 645              | 20.15           | 18.36           | 36                         | 0.60                                     |
| 041                    | 1 x 3    | 23.96                                  | 240              | 359             | 479              | 719              | 23.04           | 21.29           | 45                         | 0.53                                     |
| 043                    | 1 x 3    | 25.40                                  | 254              | 381             | 508              | 762              | 24.03           | 21.94           | 36                         | 0.71                                     |
| 048                    | 1 x 3    | 28.48                                  | 285              | 427             | 570              | 854              | 27.14           | 25.19           | 45                         | 0.63                                     |
| 056                    | 1 x 4    | 31.01                                  | 310              | 465             | 620              | 930              | 28.64           | 25.71           | 22                         | 1.41                                     |
| 063                    | 1 x 4    | 36.76                                  | 368              | 551             | 735              | 1103             | 34.77           | 31.76           | 30                         | 1.23                                     |
| 068                    | 1 x 4    | 40.34                                  | 403              | 605             | 807              | 1210             | 38.44           | 35.67           | 37                         | 1.09                                     |
| 079                    | 1 x 5    | 46.06                                  | 461              | 691             | 921              | 1382             | 43.57           | 39.79           | 30                         | 1.54                                     |
| 085                    | 1 x 5    | 50.43                                  | 504              | 756             | 1009             | 1513             | 48.06           | 44.59           | 37                         | 1.36                                     |
| 095                    | 1 x 6    | 55.27                                  | 553              | 829             | 1105             | 1658             | 52.29           | 47.75           | 30                         | 1.84                                     |
| 103                    | 1 x 6    | 60.51                                  | 605              | 908             | 1210             | 1815             | 57.66           | 53.51           | 37                         | 1.64                                     |
| Double Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 039                    | 2 x 2    | 22.04                                  | 220              | 331             | 441              | 661              | 20.35           | 18.27           | 36                         | 0.61                                     |
| 045                    | 2 x 2    | 25.79                                  | 258              | 387             | 516              | 774              | 24.48           | 22.37           | 48                         | 0.54                                     |
| 049                    | 2 x 2    | 28.63                                  | 286              | 429             | 573              | 859              | 26.84           | 24.45           | 48                         | 0.60                                     |
| 054                    | 2 x 2    | 31.92                                  | 319              | 479             | 638              | 957              | 30.69           | 28.36           | 60                         | 0.53                                     |
| 058                    | 2 x 3    | 33.06                                  | 331              | 496             | 661              | 992              | 30.53           | 27.40           | 54                         | 0.61                                     |
| 067                    | 2 x 3    | 38.65                                  | 386              | 580             | 773              | 1159             | 36.69           | 33.52           | 72                         | 0.54                                     |
| 073                    | 2 x 3    | 42.93                                  | 429              | 644             | 859              | 1288             | 40.25           | 36.67           | 72                         | 0.60                                     |
| 081                    | 2 x 3    | 47.89                                  | 479              | 718             | 958              | 1437             | 46.05           | 42.55           | 90                         | 0.53                                     |
| 086                    | 2 x 3    | 50.80                                  | 508              | 762             | 1016             | 1524             | 48.06           | 43.89           | 72                         | 0.71                                     |
| 096                    | 2 x 3    | 56.97                                  | 570              | 854             | 1139             | 1709             | 54.29           | 50.38           | 90                         | 0.63                                     |
| 112                    | 2 x 4    | 63.44                                  | 634              | 952             | 1269             | 1903             | 58.58           | 52.58           | 45                         | 1.41                                     |
| 126                    | 2 x 4    | 73.52                                  | 735              | 1103            | 1470             | 2205             | 69.55           | 63.51           | 60                         | 1.23                                     |
| 137                    | 2 x 4    | 81.76                                  | 818              | 1226            | 1635             | 2453             | 77.92           | 72.30           | 75                         | 1.09                                     |
| 158                    | 2 x 5    | 92.12                                  | 921              | 1382            | 1842             | 2764             | 87.15           | 79.59           | 60                         | 1.54                                     |
| 172                    | 2 x 5    | 102.2                                  | 1022             | 1533            | 2044             | 3067             | 97.41           | 90.39           | 75                         | 1.36                                     |
| 190                    | 2 x 6    | 110.5                                  | 1105             | 1658            | 2211             | 3316             | 104.6           | 95.50           | 60                         | 1.84                                     |
| 206                    | 2 x 6    | 122.7                                  | 1227             | 1840            | 2453             | 3680             | 116.9           | 108.5           | 75                         | 1.64                                     |

## Correction Factors for Other refrigerants - Use R22 Values Multiplied By

| R134a | R12  | R507 | R404A | R407A | R407B | R502 | R407C |
|-------|------|------|-------|-------|-------|------|-------|
| 0.94  | 0.95 | 0.97 | 0.97  | 0.97  | 0.97  | 0.98 | 1.00  |

- NOTES:**
- (1) Above capacity data based on 0°F subcooling and at sea level.
  - (2) TD = Condensing temperature - ambient temperature
  - (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
  - (4) For High Altitude applications apply the following correction factors:  
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
  - (5) For 50Hz capacity multiply by 0.92.



# CAPACITY DATA - 1140 RPM MODELS - R404A

| BVC<br>MODEL<br>NUMBER | Fan Rows | TOTAL HEAT OF REJECTION CAPACITY (MBH) |                  |                 |                  |                  |                 |                 | Maximum<br>No. of<br>Feeds | MBH<br>@ 1° F TD<br>Per Feed<br>(12 FPI) |
|------------------------|----------|----------------------------------------|------------------|-----------------|------------------|------------------|-----------------|-----------------|----------------------------|------------------------------------------|
|                        |          | TEMPERATURE DIFFERENCE (TD)            |                  |                 |                  |                  |                 |                 |                            |                                          |
|                        |          | 12 FPI                                 |                  |                 |                  |                  | 10 FPI          | 8 FPI           |                            |                                          |
|                        |          | 1°F<br>(0.56°C)                        | 10°F<br>(5.56°C) | 15°F<br>(8.3°C) | 20°F<br>(11.1°C) | 30°F<br>(16.7°C) | 1°F<br>(0.56°C) | 1°F<br>(0.56°C) |                            |                                          |
| Single Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 007                    | 1 x 1    | 3.518                                  | 35.2             | 52.8            | 70.4             | 106              | 3.204           | 2.824           | 7                          | 0.50                                     |
| 009                    | 1 x 1    | 4.839                                  | 48.4             | 72.6            | 96.8             | 145              | 4.537           | 4.093           | 8                          | 0.60                                     |
| 010                    | 1 x 1    | 5.351                                  | 53.5             | 80.3            | 107              | 161              | 4.941           | 4.435           | 9                          | 0.59                                     |
| 011                    | 1 x 1    | 6.252                                  | 62.5             | 93.8            | 125              | 188              | 5.935           | 5.422           | 12                         | 0.52                                     |
| 012                    | 1 x 1    | 6.943                                  | 69.4             | 104             | 139              | 208              | 6.509           | 5.930           | 12                         | 0.58                                     |
| 013                    | 1 x 1    | 7.746                                  | 77.5             | 116             | 155              | 232              | 7.448           | 6.882           | 15                         | 0.52                                     |
| 017                    | 1 x 2    | 9.672                                  | 96.7             | 145             | 193              | 290              | 9.068           | 8.181           | 14                         | 0.69                                     |
| 019                    | 1 x 2    | 10.65                                  | 106              | 160             | 213              | 319              | 9.834           | 8.827           | 18                         | 0.59                                     |
| 022                    | 1 x 2    | 12.52                                  | 125              | 188             | 250              | 375              | 11.88           | 10.85           | 24                         | 0.52                                     |
| 024                    | 1 x 2    | 13.91                                  | 139              | 209             | 278              | 417              | 13.04           | 11.88           | 24                         | 0.58                                     |
| 027                    | 1 x 2    | 15.50                                  | 155              | 233             | 310              | 465              | 14.91           | 13.77           | 30                         | 0.52                                     |
| 029                    | 1 x 3    | 16.06                                  | 161              | 241             | 321              | 482              | 14.83           | 13.31           | 27                         | 0.59                                     |
| 034                    | 1 x 3    | 18.73                                  | 187              | 281             | 375              | 562              | 17.78           | 16.24           | 36                         | 0.52                                     |
| 037                    | 1 x 3    | 20.85                                  | 208              | 313             | 417              | 625              | 19.54           | 17.81           | 36                         | 0.58                                     |
| 041                    | 1 x 3    | 23.24                                  | 232              | 349             | 465              | 697              | 22.35           | 20.65           | 45                         | 0.52                                     |
| 043                    | 1 x 3    | 24.64                                  | 246              | 370             | 493              | 739              | 23.31           | 21.29           | 36                         | 0.68                                     |
| 048                    | 1 x 3    | 27.63                                  | 276              | 414             | 553              | 829              | 26.33           | 24.43           | 45                         | 0.61                                     |
| 056                    | 1 x 4    | 30.08                                  | 301              | 451             | 602              | 903              | 27.78           | 24.93           | 22                         | 1.37                                     |
| 063                    | 1 x 4    | 35.65                                  | 357              | 535             | 713              | 1070             | 33.73           | 30.80           | 30                         | 1.19                                     |
| 068                    | 1 x 4    | 39.13                                  | 391              | 587             | 783              | 1174             | 37.29           | 34.60           | 37                         | 1.06                                     |
| 079                    | 1 x 5    | 44.68                                  | 447              | 670             | 894              | 1340             | 42.27           | 38.60           | 30                         | 1.49                                     |
| 085                    | 1 x 5    | 48.92                                  | 489              | 734             | 978              | 1467             | 46.61           | 43.26           | 37                         | 1.32                                     |
| 095                    | 1 x 6    | 53.61                                  | 536              | 804             | 1072             | 1608             | 50.72           | 46.32           | 30                         | 1.79                                     |
| 103                    | 1 x 6    | 58.69                                  | 587              | 880             | 1174             | 1761             | 55.93           | 51.90           | 37                         | 1.59                                     |
| Double Row Models      |          |                                        |                  |                 |                  |                  |                 |                 |                            |                                          |
| 039                    | 2 x 2    | 21.38                                  | 214              | 321             | 428              | 641              | 19.74           | 17.72           | 36                         | 0.59                                     |
| 045                    | 2 x 2    | 25.02                                  | 250              | 375             | 500              | 751              | 23.75           | 21.70           | 48                         | 0.52                                     |
| 049                    | 2 x 2    | 27.77                                  | 278              | 417             | 555              | 833              | 26.03           | 23.72           | 48                         | 0.58                                     |
| 054                    | 2 x 2    | 30.96                                  | 310              | 464             | 619              | 929              | 29.77           | 27.51           | 60                         | 0.52                                     |
| 058                    | 2 x 3    | 32.07                                  | 321              | 481             | 641              | 962              | 29.61           | 26.58           | 54                         | 0.59                                     |
| 067                    | 2 x 3    | 37.49                                  | 375              | 562             | 750              | 1125             | 35.59           | 32.51           | 72                         | 0.52                                     |
| 073                    | 2 x 3    | 41.64                                  | 416              | 625             | 833              | 1249             | 39.04           | 35.57           | 72                         | 0.58                                     |
| 081                    | 2 x 3    | 46.45                                  | 465              | 697             | 929              | 1394             | 44.66           | 41.27           | 90                         | 0.52                                     |
| 086                    | 2 x 3    | 49.28                                  | 493              | 739             | 986              | 1478             | 46.62           | 42.57           | 72                         | 0.68                                     |
| 096                    | 2 x 3    | 55.26                                  | 553              | 829             | 1105             | 1658             | 52.66           | 48.86           | 90                         | 0.61                                     |
| 112                    | 2 x 4    | 61.53                                  | 615              | 923             | 1231             | 1846             | 56.82           | 51.00           | 45                         | 1.37                                     |
| 126                    | 2 x 4    | 71.31                                  | 713              | 1070            | 1426             | 2139             | 67.46           | 61.61           | 60                         | 1.19                                     |
| 137                    | 2 x 4    | 79.31                                  | 793              | 1190            | 1586             | 2379             | 75.58           | 70.14           | 75                         | 1.06                                     |
| 158                    | 2 x 5    | 89.36                                  | 894              | 1340            | 1787             | 2681             | 84.53           | 77.20           | 60                         | 1.49                                     |
| 172                    | 2 x 5    | 99.15                                  | 992              | 1487            | 1983             | 2975             | 94.49           | 87.68           | 75                         | 1.32                                     |
| 190                    | 2 x 6    | 107.2                                  | 1072             | 1608            | 2145             | 3217             | 101.4           | 92.64           | 60                         | 1.79                                     |
| 206                    | 2 x 6    | 119.0                                  | 1190             | 1785            | N/A              | N/A              | 113.4           | 105.2           | 75                         | 1.59                                     |

To calculate capacities with other refrigerants, multiply the R22 capacity by the appropriate correction factor. Refer to the table accompanying each of the R22 tables.

## NOTES:

- (1) Above capacity data based on 0°F subcooling and at sea level.
- (2) TD = Condensing temperature - ambient temperature
- (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
- (4) For High Altitude applications apply the following correction factors:  
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
- (5) For 50Hz capacity multiply by 0.92.

# GENERAL SPECIFICATIONS - 1140 RPM MODELS

| BVC<br>MODEL<br>NUMBER | Total No.<br>of Feeds | R22 Refrigerant Charge <sup>(1)</sup> |      |                         |      | Air Flow Rate <sup>(4)</sup> |        | Piping Connections |                    | Condenser Weight <sup>(5)</sup> |      |
|------------------------|-----------------------|---------------------------------------|------|-------------------------|------|------------------------------|--------|--------------------|--------------------|---------------------------------|------|
|                        |                       | Normal <sup>(2)</sup>                 |      | 90% FULL <sup>(3)</sup> |      |                              |        | Inlet<br>Qty - OD  | Outlet<br>Qty - OD |                                 |      |
|                        |                       | lbs                                   | kg   | lbs                     | kg   | CFM                          | m³/h   |                    |                    | lbs                             | kg   |
| Single Row Models      |                       |                                       |      |                         |      |                              |        |                    |                    |                                 |      |
| 1C11007                | 7                     | 1.7                                   | 0.8  | 11.0                    | 5.2  | 9590                         | 16300  | 1 - 1 1/8          | 1 - 7/8            | 360                             | 163  |
| 1C11009                | 8                     | 2.2                                   | 1.0  | 17.0                    | 7.5  | 8420                         | 14300  | 1 - 1 3/8          | 1 - 7/8            | 375                             | 170  |
| 1C11010                | 9                     | 2.8                                   | 1.3  | 21.0                    | 9.5  | 9590                         | 16300  | 1 - 1 3/8          | 1 - 7/8            | 420                             | 191  |
| 1C11011                | 12                    | 3.9                                   | 1.8  | 27.0                    | 12.0 | 9230                         | 15700  | 1 - 1 3/8          | 1 - 1 1/8          | 440                             | 200  |
| 1C11012                | 12                    | 4.3                                   | 2.0  | 31.0                    | 14.0 | 9660                         | 16400  | 1 - 1 3/8          | 1 - 1 1/8          | 480                             | 218  |
| 1C11013                | 15                    | 5.2                                   | 2.4  | 39.0                    | 18.0 | 9290                         | 15800  | 1 - 1 5/8          | 1 - 1 1/8          | 505                             | 229  |
| 1C12017                | 14                    | 4.1                                   | 1.9  | 31.0                    | 14.0 | 16800                        | 28500  | 1 - 1 5/8          | 1 - 1 1/8          | 565                             | 256  |
| 1C12019                | 18                    | 6.1                                   | 2.8  | 44.0                    | 20.0 | 19200                        | 32600  | 1 - 2 1/8          | 1 - 1 3/8          | 630                             | 286  |
| 1C12022                | 24                    | 7.4                                   | 3.4  | 55.0                    | 25.0 | 18400                        | 31200  | 1 - 2 1/8          | 1 - 1 3/8          | 675                             | 306  |
| 1C12024                | 24                    | 8.3                                   | 3.8  | 62.0                    | 28.0 | 19300                        | 32800  | 1 - 2 1/8          | 1 - 1 3/8          | 740                             | 336  |
| 1C12027                | 30                    | 10.0                                  | 4.5  | 75.0                    | 34.0 | 18600                        | 31700  | 1 - 2 1/8          | 1 - 1 3/8          | 790                             | 358  |
| 1C13029                | 27                    | 9.0                                   | 4.1  | 61.0                    | 28.0 | 28700                        | 48800  | 1 - 2 1/8          | 1 - 1 5/8          | 840                             | 381  |
| 1C13034                | 36                    | 10.0                                  | 4.5  | 78.0                    | 35.0 | 27600                        | 47000  | 1 - 2 1/8          | 1 - 1 5/8          | 905                             | 410  |
| 1C13037                | 36                    | 12.0                                  | 5.4  | 94.0                    | 42.0 | 29000                        | 49200  | 1 - 2 5/8          | 1 - 1 5/8          | 1000                            | 454  |
| 1C13041                | 45                    | 14.0                                  | 6.4  | 113                     | 51.0 | 27900                        | 47400  | 1 - 2 5/8          | 1 - 1 5/8          | 1070                            | 485  |
| 1C13043                | 36                    | 17.5                                  | 7.9  | 128                     | 57.8 | 35500                        | 60400  | 1 - 2 5/8          | 1 - 1 5/8          | 1055                            | 479  |
| 1C13048                | 45                    | 20.5                                  | 9.3  | 152                     | 68.9 | 34500                        | 58700  | 1 - 2 5/8          | 1 - 1 5/8          | 1150                            | 522  |
| 2C14056                | 22                    | 25.9                                  | 11.8 | 183                     | 83.2 | 48100                        | 81900  | 1 - 2 5/8          | 1 - 2 1/8          | 1600                            | 726  |
| 2C14063                | 30                    | 32.5                                  | 14.7 | 239                     | 108  | 47300                        | 80400  | 1 - 2 5/8          | 1 - 2 1/8          | 1650                            | 748  |
| 2C14068                | 37                    | 38.0                                  | 17.2 | 286                     | 130  | 46000                        | 78200  | 1 - 2 5/8          | 1 - 2 1/8          | 1750                            | 794  |
| 2C15079                | 30                    | 38.5                                  | 17.5 | 290                     | 131  | 59100                        | 100500 | 1 - 2 5/8          | 1 - 2 1/8          | 2063                            | 936  |
| 2C15085                | 37                    | 48.8                                  | 22.2 | 356                     | 161  | 57500                        | 97800  | 1 - 2 5/8          | 1 - 2 5/8          | 2188                            | 992  |
| 2C16095                | 30                    | 53.5                                  | 24.3 | 365                     | 165  | 70900                        | 120600 | 1 - 3 1/8          | 1 - 3 1/8          | 2475                            | 1123 |
| 2C16103                | 37                    | 61.2                                  | 27.7 | 436                     | 198  | 69000                        | 117300 | 1 - 3 1/8          | 1 - 3 1/8          | 2625                            | 1191 |
| Double Row Models      |                       |                                       |      |                         |      |                              |        |                    |                    |                                 |      |
| 1C22039                | 36                    | 16.0                                  | 7.3  | 104                     | 47.0 | 38400                        | 65200  | 2 - 2 1/8          | 2 - 1 3/8          | 1060                            | 481  |
| 1C22045                | 48                    | 19.0                                  | 8.6  | 126                     | 57.0 | 36900                        | 62700  | 2 - 2 1/8          | 2 - 1 3/8          | 1145                            | 519  |
| 1C22049                | 48                    | 21.0                                  | 9.5  | 141                     | 64.0 | 38600                        | 65700  | 2 - 2 1/8          | 2 - 1 3/8          | 1255                            | 569  |
| 1C22054                | 60                    | 23.0                                  | 10.0 | 167                     | 76.0 | 37200                        | 63200  | 2 - 2 1/8          | 2 - 1 3/8          | 1350                            | 612  |
| 1C23058                | 54                    | 22.0                                  | 10.0 | 141                     | 64.0 | 57400                        | 97600  | 2 - 2 1/8          | 2 - 1 5/8          | 1420                            | 644  |
| 1C23067                | 72                    | 26.0                                  | 12.0 | 174                     | 79.0 | 55300                        | 93900  | 2 - 2 1/8          | 2 - 1 5/8          | 1550                            | 703  |
| 1C23073                | 72                    | 30.0                                  | 14.0 | 212                     | 96.0 | 57900                        | 98500  | 2 - 2 5/8          | 2 - 1 5/8          | 1710                            | 776  |
| 1C23081                | 90                    | 35.0                                  | 16.0 | 251                     | 114  | 55800                        | 94800  | 2 - 2 5/8          | 2 - 1 5/8          | 1865                            | 846  |
| 1C23086                | 72                    | 35.0                                  | 16.0 | 255                     | 116  | 71100                        | 120800 | 2 - 2 5/8          | 2 - 1 5/8          | 2110                            | 957  |
| 1C23096                | 90                    | 41.0                                  | 19.0 | 304                     | 138  | 69100                        | 117400 | 2 - 2 5/8          | 2 - 1 5/8          | 2300                            | 1043 |
| 2C24112                | 45                    | 53.0                                  | 24.0 | 375                     | 170  | 96300                        | 163700 | 2 - 2 5/8          | 2 - 2 1/8          | 3200                            | 1451 |
| 2C24126                | 60                    | 65.0                                  | 30.0 | 477                     | 217  | 94600                        | 160700 | 2 - 2 5/8          | 2 - 2 1/8          | 3300                            | 1497 |
| 2C24137                | 75                    | 77.0                                  | 35.0 | 579                     | 263  | 92000                        | 156400 | 2 - 2 5/8          | 2 - 2 1/8          | 3500                            | 1588 |
| 2C25158                | 60                    | 77.0                                  | 35.0 | 579                     | 263  | 118200                       | 200900 | 2 - 2 5/8          | 2 - 2 1/8          | 4125                            | 1871 |
| 2C25172                | 75                    | 99.0                                  | 45.0 | 721                     | 327  | 115000                       | 195500 | 2 - 2 5/8          | 2 - 2 5/8          | 4375                            | 1984 |
| 2C26190                | 60                    | 107.0                                 | 49.0 | 729                     | 331  | 141800                       | 241100 | 2 - 3 1/8          | 2 - 3 1/8          | 4950                            | 2245 |
| 2C26206                | 75                    | 124.0                                 | 56.0 | 883                     | 401  | 138000                       | 234600 | 2 - 3 1/8          | 2 - 3 1/8          | 5250                            | 2381 |

## NOTES:

- (1) For R407A, R507 use R22 Charge x 0.87. For R407-C use R22 Charge x 0.97. For R134a and R502 use R22 Charge. For R12 use R22 Charge x 1.1.
- (2) Normal Charge is the refrigerant charge for warm ambient or summer operation. For low ambient or winter charge with flooded head pressure control and fan cycling see Page 33 and Page 34.
- (3) 90% FULL is the liquid refrigerant weight at 90% of internal volume and is for reference ONLY.
- (4) For 50Hz Fan data use 60Hz CFM (m³/h) x 0.83.capacity multiply by 0.92.
- (5) Less weight pf refrigerant charge.

## ELECTRICAL DATA - 1140 RPM MODELS 60Hz

| NO.<br>OF<br>FANS | 208-230/3/60 |      |     | 460/3/60     |      |     | 575/3/60     |      |     |
|-------------------|--------------|------|-----|--------------|------|-----|--------------|------|-----|
|                   | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP |
| 1                 | 6.6          | 8.3  | 15  | 3.1          | 3.9  | 15  | 2.5          | 3.1  | 15  |
| 2                 | 13.2         | 14.9 | 20  | 6.2          | 7    | 15  | 5            | 5.6  | 15  |
| 3                 | 19.8         | 21.5 | 25  | 9.3          | 10.1 | 15  | 7.5          | 8.1  | 15  |
| 4                 | 26.4         | 31   | 35  | 12.4         | 13.2 | 15  | 10           | 10.6 | 15  |
| 5                 | 33           | 34.7 | 40  | 15.5         | 16.3 | 20  | 12.5         | 13.1 | 15  |
| 6                 | 39.6         | 46   | 50  | 18.6         | 21   | 25  | 15           | 15.6 | 20  |
| 8                 | 52.8         | 61   | 70  | 24.8         | 25.6 | 30  | 20           | 20.6 | 25  |
| 10                | 66           | 71   | 80  | 31           | 36   | 40  | 25           | 25.6 | 30  |
| 12                | 79.2         | 91   | 100 | 37.2         | 41   | 45  | 30           | 36   | 40  |

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

## ELECTRICAL DATA - 1140 (950) RPM MODELS 50Hz

| NO.<br>OF<br>FANS | 200-220/3/50 |      |     | 380-400/3/50 |      |     |
|-------------------|--------------|------|-----|--------------|------|-----|
|                   | TOTAL<br>FLA | MCA  | MOP | TOTAL<br>FLA | MCA  | MOP |
| 1                 | 5.9          | 7.4  | 15  | 2.7          | 3.4  | 15  |
| 2                 | 11.8         | 13.3 | 15  | 5.4          | 6    | 15  |
| 3                 | 17.7         | 19.1 | 25  | 8.0          | 8.7  | 15  |
| 4                 | 23.6         | 25   | 30  | 10.7         | 11.4 | 15  |
| 5                 | 29.5         | 36   | 40  | 13.4         | 16   | 20  |
| 6                 | 35.3         | 41   | 45  | 16.1         | 16.8 | 20  |
| 8                 | 47.1         | 51   | 60  | 21.4         | 26   | 30  |
| 10                | 58.9         | 71   | 80  | 26.8         | 31   | 35  |
| 12                | 70.7         | 81   | 90  | 32.2         | 36   | 40  |

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

## CONDENSER THEORY

The purpose of a refrigeration system is to absorb heat from an area where it is not wanted and reject this heat to an area where it is unobjectionable. By referring to the diagram below, it can be seen that only a few components are required to perform this task.

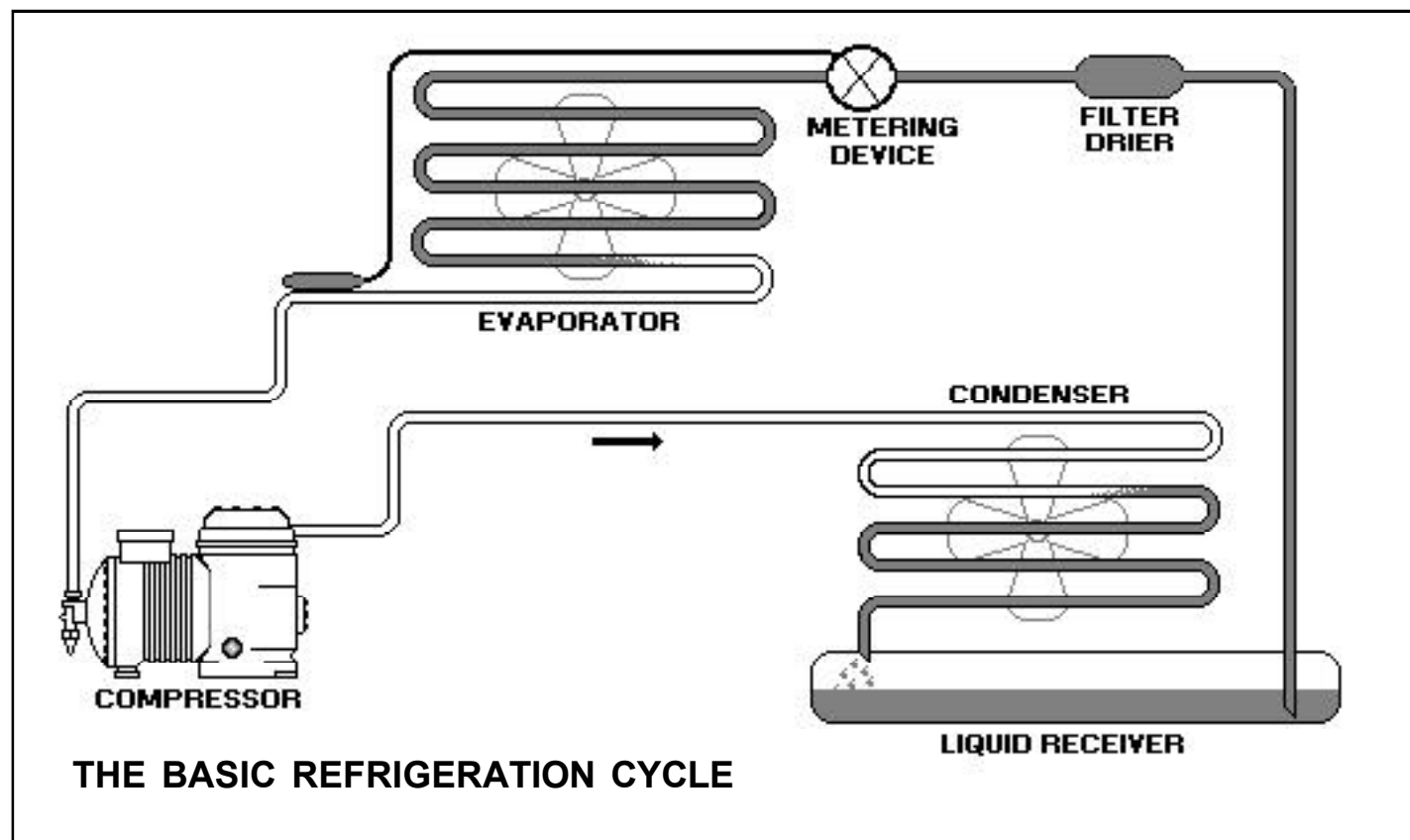
High pressure/high temperature vapor leaves the compressor and is forced into the condenser via the discharge line. The condenser first desuperheats the vapor down to its saturation point. This saturation point can be expressed as the condensing temperature of the refrigerant and varies with condenser size, load and ambient temperature.

Now the condenser must remove the latent heat of condensation from the refrigerant so that it may fully condense. After the refrigerant has fully condensed, it will be subcooled to some extent.

The liquid leaving the condenser is still at a high pressure but at a much lower temperature and drains into the receiver. As the liquid level in the receiver increases, the vapor is allowed to vent back up to the condenser via the condensate line.

Because the dip tube almost reaches the bottom of the receiver, only liquid will enter the liquid line. This liquid now passes through the metering device where its pressure is reduced to the evaporating pressure. The temperature will drop with pressure since the refrigerant will always attempt to meet its saturation point during a change of state.

The condensing temperature decreases as the ambient temperature drops and/or as the condenser surface increases.



# GLOSSARY OF TERMS

**Balance point** - after a system stabilizes, the heat added to the refrigerant during the refrigeration cycle will equal the heat rejected at the condenser. The balance point usually refers to the actual TD that the system is operating at. The balance point could refer to a low side balance or a high side balance. For example, a system operating with a 120 °F condensing temperature in a 90 °F ambient will have a condenser balance point of 30 °F TD.

**Circuit** - a circuit can be considered a group of feeds. A condenser may be sized to handle several refrigeration systems at one time. Each system is considered one circuit and the number of feeds required for each circuit depends on the THR for that particular system. Each circuit has its own inlet and outlet header. The number of circuits on a condenser can not exceed the total number of feeds available.

**Compression Ratio** - Compression ratio equals the discharge pressure in pounds per square inch absolute (psia) divided by the suction pressure in psia. The compression ratio in a compressor increases as suction pressure decreases and as discharge pressure increases. (at sea-level, psia is equal to psig plus 14.7).

**Compressor Capacity** - can be defined as the actual refrigerating capacity available at the evaporator and suction line after considering the overall system balance point. Compressor capacity is mainly affected by the evaporating and condensing temperatures of the system.

**Condensate Line** - (also called "Drain Leg") is a term that describes the refrigerant line between the condenser and the receiver. The condensate line should drop vertically and is typically larger than the liquid line. This is to promote free draining of the refrigerant from the condenser to the receiver.

**Condenser Temperature Difference (TD)** - is the difference between the condensing temperature of the refrigerant and the temperature of the air entering the condenser.

**Condensing Temperature (CT)** - is the temperature where the refrigerant vapor condenses back to a liquid. This temperature varies with condenser size. Condensing temperature should be kept as low as possible to maintain higher refrigerating capacity and system efficiency

**Desuperheat** - refers to the lowering of refrigerant superheat. Hot vapor entering a condenser must first be desuperheated before any condensing of the refrigerant can take place.

**Evaporating Temperature** - the temperature at which heat is absorbed in the evaporator, at this temperature, the refrigerant changes from a liquid to a vapor. This evaporating temperature is dependent on pressure and must be lower than the surrounding temperature for heat transfer to take place.

**Feed** - a single path for refrigerant flow inside a condenser. This path begins at the inlet header and terminates at the condenser's outlet header. These feeds can be grouped together to accommodate one or more circuits.

**Heat of Compression** - heat is added to the refrigerant as it is compressed. Evidence of this can be observed on the pressure-enthalpy diagram for the refrigerant being used. The amount of this heat is dependent on the refrigerant type and compression ratio.

Additional heat from friction also increases the heat of compression. All of this heat along with the heat absorbed in the evaporator, suction line and any motor heat must be rejected by the condenser.

**Latent Heat of Vaporization** (also Latent Heat of Condensation) - refers to the heat required to fully vaporize or condense a refrigerant. This latent heat varies with temperature and pressure. Latent heat is often referred to as *hidden heat* since adding heat to a saturated liquid or removing heat from a saturated vapor will result in a *change of state and heat content* but not a change in temperature.

**Liquid Line** - is the piping between the receiver and the metering device. On systems without a receiver, the liquid line runs between the condenser and the metering device.

# GLOSSARY OF TERMS

**Open Drive** - This term is given to a compressor where its driving motor is separate from the compressor. In this type of compressor, motor heat is not transferred to the refrigerant.

**Refrigerating Effect** - the total amount of heat absorbed by the evaporator. This heat includes both *latent heat* and *superheat*. This value is usually expressed in BTU/Hour, (BTUH), or 1000 BTU/Hour (MBH)

**Saturation** - occurs whenever the refrigerant exists in both a vapor and liquid state, example: a cylinder of refrigerant is in a saturated condition or state of equilibrium. Any heat removed from a saturated vapor will result in condensation. Conversely, any heat added to a saturated liquid will result in evaporation of the refrigerant. Temperature pressure charts for the various refrigerants indicate saturation values. For a single component refrigerant, each temperature value can only have one pressure when the refrigerant is either a saturated vapor or saturated liquid. A single component refrigerant can not change state until it approaches its saturation temperature or pressure. For refrigerant blends, the pressure-temperature relationship is more complex. Simply

stated, Dew point temperature (saturation point in evaporator-low side) and Bubble point temperature (saturation point in condenser-high side) are used to define their saturated condition.

**Subcool** - to reduce a refrigerant's temperature below its saturation point or bubble point. Subcooling of the refrigerant is necessary in order to maintain a solid column of liquid at the inlet to the metering device. Subcooling can take place naturally (in the condenser) or it can be accomplished by a suction liquid heat exchanger or a mechanical sub-cooler (separate refrigeration system).

**Superheat** - to heat a refrigerant above its saturation point or dew point. The "amount of superheat" is the *difference* between the actual refrigerant temperature and its saturation temperature. This value is usually expressed in degrees Fahrenheit or degrees Celsius.

**Total Heat of Rejection (THR)** is the heat absorbed at the evaporator plus the heat picked up in the suction line plus the heat added to the refrigerant in the compressor. Condensers are sized according to the required THR. Compressor capacity and the heat of compression are usually enough to determine the THR.

# CONDENSER SELECTION

During a condenser selection process, the application engineer should choose a condenser which is large enough to reject all of the heat added to the refrigerant during the refrigerating cycle. When the condenser is sized to equal the total heat of rejection (THR) at design conditions, enough heat will be rejected to maintain the required condensing temperature. This will ensure that sufficient refrigeration capacity will be maintained at the evaporator during the warm summer period when it is needed the most.

If a condenser is undersized, the condensing temperature (CT) will be driven upwards. This naturally occurs as the system seeks its new balance point. As the CT increases, the operating temperature difference (TD) °F the condenser also increases. Even though the capacity of the condenser increases with the higher TD, the refrigerating capacity of the compressor will decrease due to the higher condensing temperature. An undersized condenser may perform satisfactorily when ambient temperatures are below design, but the overall system capacity will not be high enough during the warmer periods.

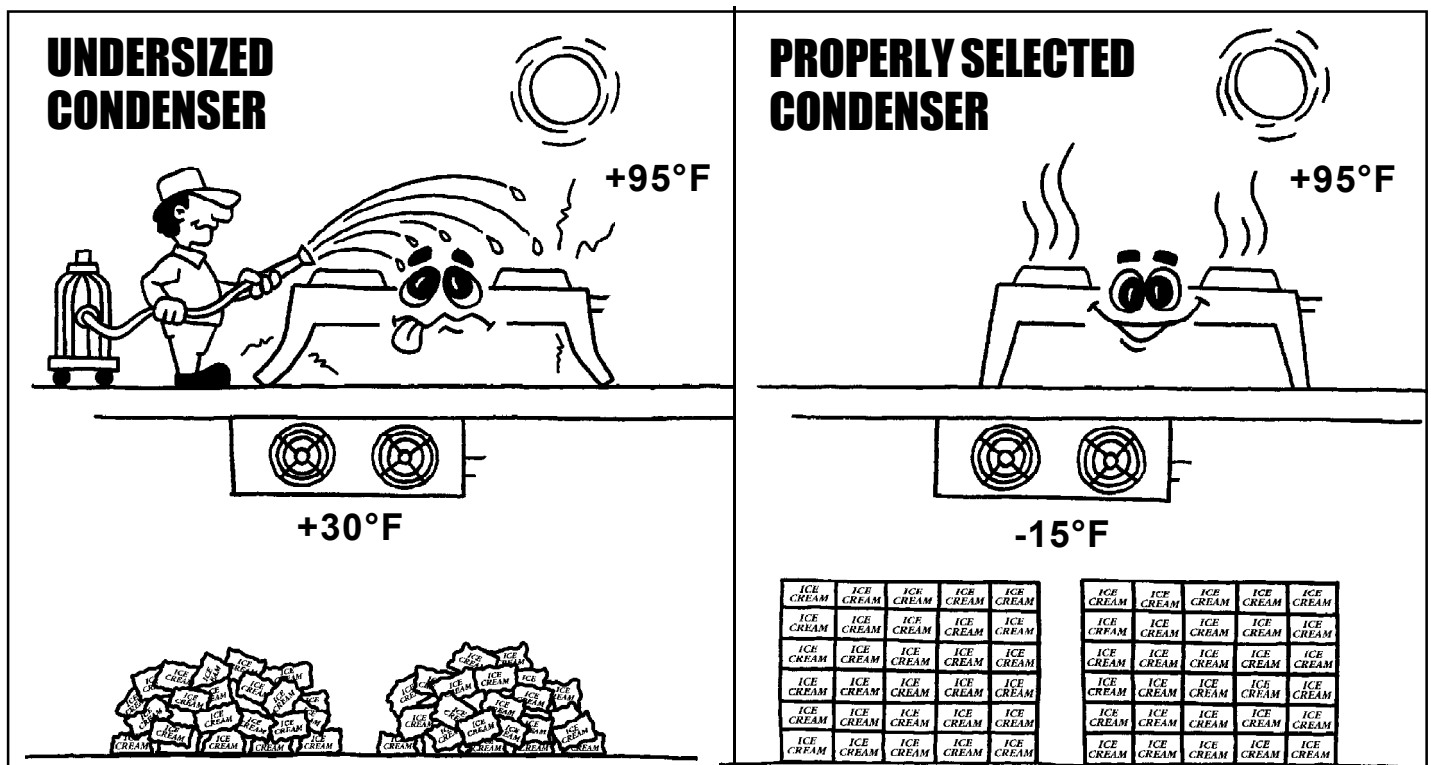
Oversizing a condenser increases project costs and can also lead to undesirable operating conditions.

Low ambient control devices such as pressure regulators and fan cycling switches operate to maintain a sufficient pressure in the condenser during low ambient periods.

On systems utilizing a receiver and flooding type of head pressure control, more refrigerant will be required to flood the condenser in order to achieve the desired condensing pressure.

Consider an air conditioning system with an oversized condenser which is only used during the summer time and does not have any type of head pressure control. This particular system may experience problems due to a lack of subcooling. Since the condenser was oversized the amount of natural subcooling available is less. *The maximum amount of natural subcooling possible is the difference between the condensing temperature and the ambient temperature.* If this amount of subcooling is not enough to offset the pressure losses in the liquid line, then flashing is certain to occur.

Flashing produces vapor at the metering device which was designed to meter 100% liquid. One cure for this is to apply head pressure control devices to the system that will increase the head pressure and ensure adequate liquid subcooling.



# CONDENSER SELECTION

## PRELIMINARY DATA REQUIREMENTS

There are several factors that influence the size of an air cooled condenser. Before a condenser can be properly selected, this information must be obtained. It may be convenient for you to refer to the calculation worksheets (P. 26 and 27) as you read through the following information.

### **1. What are the Desired Evaporating and Condensing Temperatures?**

The evaporating temperature is needed to determine the THR (total heat of rejection) of the condenser. As the evaporating temperature is lowered, the heat of compression increases due to the higher compression ratio. This affects THR.

The required condensing temperature (CT) must be known before the temperature difference can be determined. This is necessary since condenser capacity varies with temperature difference. The required compressor capacity will determine the maximum CT since the compressor can only provide this capacity at certain operating conditions. You could also refer to Table 1 for CT recommendations. The heat of compression varies with compression ratio. Both evaporating and condensing temperatures affect the compression ratio.

Often customers may request a specified TD value (i.e 10, 15 etc.). The condensing temperature is then established as being the sum of this TD value and the design ambient temperature. (i.e  $10 + 95 = 105^{\circ}\text{F}$ )

### **2. Compressor Capacity**

Determine the capacity of the compressor at the desired evaporating and condensing conditions. Remember, *tons refrigeration* does not necessarily equal *horsepower*. As the evaporating temperature decreases and/or the condensing temperature increases, *tons refrigeration* per horsepower decreases. One ton refrigeration equals 12000 Btuh.

### **3. Condenser Ambient Design Temperature**

This will be the maximum design temperature of the air entering the condenser. It is typical to add about  $5^{\circ}\text{F}$  to the maximum outdoor design temperature in some instances to compensate for radiation from a dark surface such as a black roof.

### **4. Type of Compressor**

It is necessary to identify the type of compressor to be utilized in the application so that accurate heat of rejection information may be obtained. For example, open-drive compressors can be belt driven or direct coupled to the motor. Electrical energy from the motor is converted to heat energy which is not transferred to the refrigerant as in a refrigerant cooled compressor.

In a hermetic refrigerant cooled compressor, the cool

suction vapor picks up heat as it travels through the warm motor windings. The condenser must be sized to reject this heat along with any other heat absorbed by the refrigerant. It can be observed in Table 2 that hermetic refrigerant cooled compressors have higher heat of rejection factors.

### **5. Heat of Compression**

As the refrigerant is compressed in the compressor, its heat content increases due to the physical and thermodynamic properties of the refrigerant. Additional heat from friction between moving parts in the compressor also increases the heat content of the refrigerant. The amount of heat added to the refrigerant is dependent on the refrigerant type, the compression ratio and the type of compressor.

Accurate THR or heat of compression factors may be available from the compressor manufacturer. Always attempt to access this information prior to using other methods. If this information is not available, refer to the heat of rejection factors in Table 2.

However, in situations where your application exceeds the limits of this table, such as in compound compression and cascade systems, one of the following calculations may be performed.

For OPEN DRIVE COMPRESSORS:

**Total heat of Rejection = Compressor Capacity (Btuh) + (2545 x BHP)**  
(BHP - Brake Horsepower of the motor)

For SUCTION COOLED COMPRESSORS:

**Total heat Rejection = Compressor Capacity (Btuh) + (3413 x KW)**  
(KW may be obtained from the power input curve for that compressor)

### **6. What is the Refrigerant Type?**

A condenser's capacity can vary by 8 to 10% due to differences in physical and thermodynamic properties. Refer to the correct refrigerant capacity table or use factor as indicated. (see P. 2)

### **7. Altitude**

The volume of a given mass of air increases as it rises above sea level. As its volume increases, its density decreases. As the air becomes less dense, its heat capacity decreases. Therefore, more air volume would have to be forced through the condenser at 6,000 feet *above* sea level than *at* sea level.

Since condenser capacities are based on operation at sea level, an altitude correction factor must be applied to the total heat of rejection. Basically, the load on the condenser will be increased to a point which will compensate for the higher altitude.



# CONDENSER SELECTION

## 8. Are you Replacing a Water Cooled Condenser with a Remote Air Cooled Condenser?

If this is the case, it should be remembered that the compressor will operate at a higher discharge pressure after converting to air cooled. To help minimize the resulting loss in capacity, the condenser should be sized generously. In other words, you may consider keeping the balance point of the condenser as low as possible.

## 9. Is this an application for multiple circuits?

If you wish to utilize the condenser for multiple circuits, then all of the above data must be obtained for EACH circuit. After obtaining this information, proceed to the MULTIPLE CIRCUIT WORKSHEET (P. 27) (for single circuit applications refer to the SINGLE CIRCUIT WORKSHEET (P. 26)).

### TABLE 1 - CONDENSING TEMPERATURE GUIDELINES

| Evaporating Temperature                                   | Condensing Temperature Guidelines<br>(at 85° to 105° Ambient Temperature) |            |            |            |            | TD*   |
|-----------------------------------------------------------|---------------------------------------------------------------------------|------------|------------|------------|------------|-------|
|                                                           | 85 °F                                                                     | 90 °F      | 95 °F      | 100 °F     | 105 °F     |       |
| Low Temp Systems<br>(-40 °F to +9 °F Evap Temps)          | 95-100 °F                                                                 | 100-105 °F | 105-110 °F | 110-115 °F | 115-120 °F | 10-15 |
| Medium Temp Systems<br>(+10 °F to +34 °F Evap Temps)      | 100-105 °F                                                                | 105-110 °F | 110-115 °F | 115-120 °F | 120-125 °F | 15-20 |
| High Temp Systems<br>(+35 °F to +50 °F Evap Temps)        | 105-110 °F                                                                | 110-115 °F | 115-120 °F | 120-125 °F | 125-130 °F | 20-25 |
| Air Conditioning Systems<br>(+40 °F to +50 °F Evap Temps) | 110-115 °F                                                                | 115-120 °F | 120-125 °F | 125-130 °F | 130-135 °F | 25-30 |

\* TD - Condenser TD guideline

### TABLE 2 - HEAT OF REJECTION FACTORS

| EVAPORATOR TEMPERATURE |     | CONDENSING TEMPERATURE |             |              |             |              |             |              |             |              |             |              |             |              |             |              |             |
|------------------------|-----|------------------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|
|                        |     | 90°F (32°C)            |             | 100°F (38°C) |             | 105°F (41°C) |             | 110°F (43°C) |             | 115°F (46°C) |             | 120°F (49°C) |             | 130°F (55°C) |             | 140°F (60°C) |             |
| °F                     | °C  | OPEN                   | HERM        | OPEN         | HERM        | OPEN         | HERM        | OPEN         | HERM        | OPEN         | HERM        | OPEN         | HERM        | OPEN         | HERM        | OPEN         | HERM        |
| -40                    | -40 | *                      | <b>1.66</b> | *            | <b>1.73</b> | *            | <b>1.76</b> | *            | <b>1.80</b> | *            | <b>1.90</b> | *            | <b>2.00</b> | *            | *           | *            | *           |
| -30                    | -34 | 1.37                   | <b>1.57</b> | 1.42         | <b>1.62</b> | 1.44         | <b>1.65</b> | 1.47         | <b>1.68</b> | *            | <b>1.74</b> | *            | <b>1.80</b> | *            | *           | *            | *           |
| -20                    | -29 | 1.33                   | <b>1.49</b> | 1.37         | <b>1.53</b> | 1.39         | <b>1.55</b> | 1.42         | <b>1.58</b> | 1.44         | <b>1.61</b> | 1.47         | <b>1.65</b> | *            | *           | *            | *           |
| -10                    | -23 | 1.28                   | <b>1.42</b> | 1.32         | <b>1.46</b> | 1.34         | <b>1.48</b> | 1.37         | <b>1.50</b> | 1.39         | <b>1.53</b> | 1.42         | <b>1.57</b> | 1.47         | <b>1.64</b> | *            | *           |
| 0                      | -18 | 1.24                   | <b>1.36</b> | 1.28         | <b>1.40</b> | 1.30         | <b>1.42</b> | 1.32         | <b>1.44</b> | 1.34         | <b>1.47</b> | 1.37         | <b>1.50</b> | 1.41         | <b>1.56</b> | 1.47         | <b>1.62</b> |
| 10                     | -12 | 1.21                   | <b>1.31</b> | 1.24         | <b>1.34</b> | 1.26         | <b>1.36</b> | 1.28         | <b>1.38</b> | 1.30         | <b>1.40</b> | 1.32         | <b>1.43</b> | 1.36         | <b>1.49</b> | 1.42         | <b>1.55</b> |
| 20                     | -7  | 1.17                   | <b>1.26</b> | 1.20         | <b>1.29</b> | 1.22         | <b>1.31</b> | 1.24         | <b>1.33</b> | 1.26         | <b>1.35</b> | 1.28         | <b>1.37</b> | 1.32         | <b>1.43</b> | 1.37         | <b>1.49</b> |
| 30                     | -1  | 1.14                   | <b>1.22</b> | 1.17         | <b>1.25</b> | 1.18         | <b>1.26</b> | 1.20         | <b>1.28</b> | 1.22         | <b>1.30</b> | 1.24         | <b>1.32</b> | 1.27         | <b>1.37</b> | 1.32         | <b>1.42</b> |
| 40                     | 4   | 1.12                   | <b>1.18</b> | 1.15         | <b>1.21</b> | 1.16         | <b>1.23</b> | 1.17         | <b>1.24</b> | 1.18         | <b>1.25</b> | 1.20         | <b>1.27</b> | 1.23         | <b>1.31</b> | 1.28         | <b>1.35</b> |
| 50                     | 10  | 1.09                   | <b>1.14</b> | 1.12         | <b>1.17</b> | 1.13         | <b>1.19</b> | 1.14         | <b>1.20</b> | 1.16         | <b>1.22</b> | 1.17         | <b>1.23</b> | 1.20         | <b>1.26</b> | 1.24         | <b>1.29</b> |

OPEN - Direct Drive or Belt Drive open compressors

HERM - Hermetic or semi-Hermetic, Refrigerant (suction) cooled motor compressors.

# WORKSHEETS - SINGLE CIRCUIT

## SINGLE CIRCUIT WORKSHEET

(REFER TO P. 24 FOR GUIDELINES, SEE SAMPLE SELECTION ON P. 28)

JOB REF: \_\_\_\_\_

### 1. SYSTEM DATA REQUIREMENTS

EVAP TEMP = \_\_\_\_\_ °F

COND TEMP = \_\_\_\_\_ °F

COMPR. CAPACITY = \_\_\_\_\_ Btuh / 1000 = \_\_\_\_\_ MBH

COND. DESIGN AMBIENT TEMP = \_\_\_\_\_ (AT) °F

TD = \_\_\_\_\_ (Cond. Temp. - Ambient Temp)

COMPRESSOR TYPE = ☐ OPEN ☐ HERMETIC (Refrigerant cooled)

REFRIGERANT = R \_\_\_\_\_ REF. FACTOR = \_\_\_\_\_ (see P. 2)

ALTITUDE = ☐ AT SEA LEVEL

or \_\_\_\_\_ FEET

ALT. FACTOR = \_\_\_\_\_  
(See P.2)

### 2. THR (Total Heat of Rejection) CALCULATION

COMPR. CAPACITY (MBH) X HR f X ALT f X REF f = THR (MBH)

\_\_\_\_\_ X \_\_\_\_\_ X \_\_\_\_\_ X \_\_\_\_\_ = \_\_\_\_\_

Where HR f = Heat of rejection factor (see Table 2, P. 25)

ALT f = Altitude/elevation factor (Sea level=1, or above factor)

REF f = Refrigerant Correction factor (R22 = 1)

Alternate refrigerant based on factors from P. 2

R12 = 1/.95 = 1.05, R134a = 1/.94 = 1.06,

R502 = 1/.98 = 1.02, R404A/R507/R407A/B = 1/.97 = 1.03

THR = Total Heat of Rejection (MBH, factored in R22) to be rejected by condenser

### 3. CONDENSER MODEL SELECTION

Refer to the R22 CAPACITY section (P. 2) and select a condenser at the TD (required above) that will closely match the above calculated THR value. (NOTE: use the R22 capacity Table. The above calculation has already been adjusted for alternate types).

COND. MODEL # \_\_\_\_\_ For the model selected  
record the THR PER 1°F TD value = \_\_\_\_\_ (B) (see P. 2)

### 4. ACTUAL CONDENSING TEMP CALCULATION

THR (from sec. 2) / value (B) = ATD (actual Temperature Difference)

\_\_\_\_\_ / \_\_\_\_\_ = \_\_\_\_\_

To find the Actual Condensing Temp. (ACT) just add the Actual Temperature Difference (ATD) to the design Ambient Temperature (AT).

ATD + AT = ACT

\_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_ °F

NOTE: The Actual Condensing Temp. MUST EQUAL or BE LESS THAN the condensing temp recorded in section 1 above. This ensures the compressor capacity is maintained when operating the condenser at the designed ambient temperature.

For further assistance please contact your local BALLY sales representative.

# WORKSHEETS - MULTIPLE CIRCUITS

## MULTIPLE CIRCUIT WORKSHEET

(REFER TO P. 24 FOR GUIDELINES & SEE SAMPLE SELECTION ON P. 29)

### 1. SYSTEM DATA REQUIREMENTS

JOB REF: \_\_\_\_\_

CONDENSER DESIGN AMBIENT TEMP = \_\_\_\_\_ (AT) °F  
 ALTITUDE = ☐ SEA LEVEL or \_\_\_\_\_ FEET FACTOR = \_\_\_\_\_ (See P. 2)

#### CIRCUIT INFORMATION

|          | CIRC # 1                 | CIRC # 2                 | CIRC # 3                 | CIRC # 4                 |
|----------|--------------------------|--------------------------|--------------------------|--------------------------|
| OPEN     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| HERMETIC | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

|                    |       |       |       |       |
|--------------------|-------|-------|-------|-------|
| EVAP. TEMP °F =    | _____ | _____ | _____ | _____ |
| CONDENSING TEMP =  | _____ | _____ | _____ | _____ |
| COMPR CAP. (MBH) = | _____ | _____ | _____ | _____ |
| REFRIGERANT =      | _____ | _____ | _____ | _____ |
| TD =               | _____ | _____ | _____ | _____ |
| (Cond Temp - Amb.) |       |       |       |       |

### 2. THR (Total Heat of Rejection) CALCULATION

COMPR CAPACITY (MBH) X HRf X ALTf X REFf = THR (MBH) / TD = CL

|                                            |       |   |       |   |       |   |       |   |       |   |       |   |       |
|--------------------------------------------|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|
| CIRC # 1                                   | _____ | X | _____ | X | _____ | X | _____ | = | _____ | / | _____ | = | _____ |
| CIRC # 2                                   | _____ | X | _____ | X | _____ | X | _____ | = | _____ | / | _____ | = | _____ |
| CIRC # 3                                   | _____ | X | _____ | X | _____ | X | _____ | = | _____ | / | _____ | = | _____ |
| CIRC # 4                                   | _____ | X | _____ | X | _____ | X | _____ | = | _____ | / | _____ | = | _____ |
| TOTAL THR Capacity (MBH / 1 °F TD) = _____ |       |   |       |   |       |   |       |   |       |   |       |   |       |

Where HR f = Heat of rejection factor (see Table 2, P. 25)

ALT f = Altitude/elevation factor (Sea level=1, see P. 2 for Higher)

REF f = Refrigerant Correction factor (R22 = 1)

R12 = 1/95 = 1.05, R134a = 1/94 = 1.06,

R502 = 1/98 = 1.02, R404A / R507 / R407A/B = 1/97 = 1.03

Alternate refrigerant based on factors from P. 2

THR = Total Heat of Rejection (MBH) to be rejected by condenser (R22 capacity)

TD = Condensing Temp - Ambient Temperature

CL = Circuit loading per 1°F TD

### 3. CONDENSER SELECTION

Refer to the R22 CAPACITY selection (P.2) and select a condenser at the 1°F TD that will closely match the above Total THR Capacity (MBH/ 1°F TD).

COND. MODEL# \_\_\_\_\_ For the model selected, refer to P. 2 and enter...

Max no. of Feeds = \_\_\_\_\_ (A)

MBH @ 1°F TD per feed = \_\_\_\_\_ (B)

calculate the number of feeds required for each circuit.

|          |                     |           |                                                              |
|----------|---------------------|-----------|--------------------------------------------------------------|
|          | CL (MBH / 1°F TD) / | (B) value | = NF number of feeds required (round off to nearest whole #) |
| CIRC # 1 | _____ /             | _____     | = _____                                                      |
| CIRC # 2 | _____ /             | _____     | = _____                                                      |
| CIRC # 3 | _____ /             | _____     | = _____                                                      |
| CIRC # 4 | _____ /             | _____     | = _____                                                      |

Total number of feeds required NF = \_\_\_\_\_

(must not exceed value (A))

If number of feeds required exceeds number of feeds available then select the next larger size condenser model that can handle the number and repeat above process.

### 4. ACTUAL CONDENSING TEMP (per circuit) CALCULATION

ATD

First calculate the ATD (Actual TD) as follows: { THR (from sec. 2) / NF value } / value (B) = (Actual Temperature Difference)

|          |                   |   |       |   |       |
|----------|-------------------|---|-------|---|-------|
| CIRC # 1 | { _____ / _____ } | / | _____ | = | _____ |
| CIRC # 2 | { _____ / _____ } | / | _____ | = | _____ |
| CIRC # 3 | { _____ / _____ } | / | _____ | = | _____ |
| CIRC # 4 | { _____ / _____ } | / | _____ | = | _____ |

To find the Actual Condensing Temperature (ACT) just add the Actual Temperature Difference (ATD) to the design ambient (AT)

|          | ATD   | + | AT    | = | ACT     |
|----------|-------|---|-------|---|---------|
| CIRC # 1 | _____ | + | _____ | = | _____°F |
| CIRC # 2 | _____ | + | _____ | = | _____°F |
| CIRC # 3 | _____ | + | _____ | = | _____°F |
| CIRC # 4 | _____ | + | _____ | = | _____°F |

NOTE: The Actual Condensing Temp. MUST EQUAL or BE LESS THAN the condensing temp recorded in section 1 above.

This ensures the compressor capacity is maintained when operating the condenser at the design ambient temperature.

For further assistance please contact your local BALLY sales representative.

# WORKSHEETS - SAMPLE SELECTION #1

Preliminary Data Given:

1. Evaporating temp = -20 °F
2. Condensing temp = 105 °F
3. Compressor capacity = 300,000 Btuh
4. Design ambient = 90 °F

Use WORKSHEET - SINGLE CIRCUIT (P 26) to complete selection of condenser

JOB REF: TC 1500

## 1. SYSTEM DATA REQUIREMENTS

EVAP TEMP = -20 °F COND TEMP = 105 °F

COMPR. CAPACITY = 300,000 Btuh / 1000 = 300 MBH

COND. DESIGN AMBIENT TEMP = 90 (AT) °F TD = 15 (Cond. Temp. - Ambient Temp)

COMPRESSOR TYPE = ☐ OPEN ☒ HERMETIC (Refrigerant cooled)

REFRIGERANT = R 22 REF. FACTOR = 1 (see P. 2)

ALTITUDE = ☒ AT SEA LEVEL or \_\_\_\_\_ FEET ALT. FACTOR = 1  
(See P.2)

## 2. THR (Total Heat of Rejection) CALCULATION

COMPR. CAPACITY (MBH) X HR f X ALT f X REF f = THR (MBH)  
300 X 1.55 X 1 X 1 = 465

## 3. CONDENSER MODEL SELECTION

COND. MODEL # BVC1A23067 For the model selected  
record the THR PER 1°F TD value = 32.165 (B) (see P. 2)

## 4. ACTUAL CONDENSING TEMP CALCULATION

THR (from sec. 2) / value (B) = ATD (actual Temperature Difference)  
465 / 32.165 = 14.5 °F

To find the Actual Condensing Temp. (ACT) just add the Actual Temperature Difference (ATD)  
to the design Ambient Temperature (AT).

ATD + AT = ACT

14.5 + 90 = 104.5 °F

Above selection using condenser model BVC1A23067 ensures condensing temperature will be at 105 °F or below during design ambient conditions. See SAMPLE SELECTION # 2 for multiple circuit selections.

# WORKSHEETS - SAMPLE SELECTION # 2

Preliminary Data Given:

1. Location at Reno, Nevada, 95 °F design ambient and 4,000 feet elevation.
2. Multiple circuits required with evaporating temperatures, condensing temperatures, compressor capacities and refrigerant types as listed below.

Use WORKSHEET-MULTIPLE CIRCUITS (P. 27) to complete selection of condenser.

## 1. SYSTEM DATA REQUIREMENTS

CONDENSER DESIGN AMBIENT TEMP = 95 (AT) °F  
 ALTITUDE = ☐ SEA LEVEL or 4,000 FEET  
 (See P. 2)

JOB REF: TC2000

FACTOR = 1.14

|                    | CIRC #1                             | CIRC #2                             | CIRC #3                             | CIRC #4                             |
|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| OPEN<br>HERMETIC   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| EVAP. TEMP °F =    | <u>+20</u>                          | <u>+10</u>                          | <u>-10</u>                          | <u>-20</u>                          |
| CONDENSING TEMP =  | <u>110</u>                          | <u>110</u>                          | <u>105</u>                          | <u>105</u>                          |
| COMPR CAP. (MBH) = | <u>13</u>                           | <u>25</u>                           | <u>4.6</u>                          | <u>31.5</u>                         |
| REFRIGERANT =      | <u>22</u>                           | <u>22</u>                           | <u>404A</u>                         | <u>404A</u>                         |
| TD =               | <u>15</u>                           | <u>15</u>                           | <u>10</u>                           | <u>10</u>                           |
| (Cond Temp - Amb.) |                                     |                                     |                                     |                                     |

## 2. THR (Total Heat of Rejection) CALCULATION

| COMPR CAPACITY (MBH)                 | X | HRf         | X | ALTf        | X | REFf        | = THR (MBH)    | / TD        | = CL           |
|--------------------------------------|---|-------------|---|-------------|---|-------------|----------------|-------------|----------------|
| CIRC #1 <u>13</u>                    | X | <u>1.33</u> | X | <u>1.14</u> | X | <u>1</u>    | = <u>19.71</u> | / <u>15</u> | = <u>1.314</u> |
| CIRC #2 <u>25</u>                    | X | <u>1.38</u> | X | <u>1.14</u> | X | <u>1</u>    | = <u>39.33</u> | / <u>15</u> | = <u>2.622</u> |
| CIRC #3 <u>4.6</u>                   | X | <u>1.48</u> | X | <u>1.14</u> | X | <u>1.03</u> | = <u>7.99</u>  | / <u>10</u> | = <u>.799</u>  |
| CIRC #4 <u>31.5</u>                  | X | <u>1.55</u> | X | <u>1.14</u> | X | <u>1.03</u> | = <u>57.33</u> | / <u>10</u> | = <u>5.733</u> |
| TOTAL THR Capacity (MBH / 1 °F TD) = |   |             |   |             |   |             | <u>10.468</u>  |             |                |

## 3. CONDENSER SELECTION

Refer to the R22 CAPACITY selection (P. 2) and select a condenser at the 1°F TD that will closely match the above Total THR Capacity (MBH/ 1°F TD).

COND. MODEL # BVC1A12022

For the model selected, refer to P. 2 and enter...

Max no. of Feeds = 24 (A)

MBH @ 1°F TD per feed = .447 (B)

calculate the number of feeds required for each circuit.

| CL (MBH / 1°F TD)    | / | (B) value   | = NF number of feeds required (round off to nearest whole #) |
|----------------------|---|-------------|--------------------------------------------------------------|
| CIRC #1 <u>1.314</u> | / | <u>.447</u> | = <u>(2.93) 3</u>                                            |
| CIRC #2 <u>2.622</u> | / | <u>.447</u> | = <u>(5.86) 6</u>                                            |
| CIRC #3 <u>.799</u>  | / | <u>.447</u> | = <u>(1.78) 2</u>                                            |
| CIRC #4 <u>5.733</u> | / | <u>.447</u> | = <u>(12.82) 13</u>                                          |

Total number of feeds required NF = 24

(must not exceed value (A))

If number of feeds required exceeds number of feeds available then select the next larger size condenser model that can handle the number and repeat above process.

## 4. ACTUAL CONDENSING TEMP (per circuit) CALCULATION

First calculate the ATD (Actual TD) as follows: {THR (from sec. 2) / NF value} / value (B) = ATD (Actual Temperature Difference)

|         |                              |               |               |
|---------|------------------------------|---------------|---------------|
| CIRC #1 | { <u>19.71</u> / <u>3</u> }  | / <u>.447</u> | = <u>14.7</u> |
| CIRC #2 | { <u>39.33</u> / <u>6</u> }  | / <u>.447</u> | = <u>14.7</u> |
| CIRC #3 | { <u>7.99</u> / <u>2</u> }   | / <u>.447</u> | = <u>8.9</u>  |
| CIRC #4 | { <u>57.33</u> / <u>13</u> } | / <u>.447</u> | = <u>9.9</u>  |

To find the Actual Condensing Temperature (ACT) just add the Actual Temperature Difference (ATD) to the design ambient (AT)

|         |             |   |           |   |                 |
|---------|-------------|---|-----------|---|-----------------|
|         | ATD         | + | AT        | = | ACT             |
| CIRC #1 | <u>14.7</u> | + | <u>95</u> | = | <u>109.7</u> °F |
| CIRC #2 | <u>14.7</u> | + | <u>95</u> | = | <u>109.7</u> °F |
| CIRC #3 | <u>8.9</u>  | + | <u>95</u> | = | <u>103.9</u> °F |
| CIRC #4 | <u>9.9</u>  | + | <u>95</u> | = | <u>104.9</u> °F |

# LOW AMBIENT OPERATION

## GENERAL

When a remote air cooled condenser is installed outdoors, it will be subjected to varying temperatures. Within many areas, winter to summer annual temperatures swings can be as high as 120 °F or so, this will have a major impact on the performance of the condenser. As the ambient temperature drops, the condenser capacity increases due to the wider temperature difference between ambient and condensing. As this happens, the condensing temperature also drops as the system finds a new balance point. Although the overall system capacity will be higher at lower condensing temperatures, other problems can occur. The capacity of an expansion valve is affected by both the liquid temperature entering the valve and the pressure drop across it. As the condensing temperature decreases, the pressure drop across the metering device also decreases. A lower pressure drop decreases the capacity of the valve. Although lower liquid temperatures increase the capacity of the metering device, the increase is not large enough to offset the loss due to the lower pressure drop. The following three sections cover the various options used to control condensing temperatures.

### **(i) Fan Cycling**

Cycling of the condenser fans helps control the condensing temperature. With this approach to solving low ambient problems, fans are taken off-line either one at a time, or in pairs. It is not recommended that multiple fan condensers cycle more than two fans per step. The reason for this is that the pressure in the condenser will increase drastically as several fans are taken off-line at the same time. This will result in erratic operation of the refrigeration system and applies additional stress to the condenser tubes. It is preferable to control the condensing temperature as smoothly as possible. Fans should be cycled independently on a condenser where the fans are all in a single row. On two row condensers, the fans should be cycled in pairs.

Ambient temperature sensing controls can be set to bring on certain fans when the outdoor temperature reaches a predetermined setpoint. Pressure sensing controls are set to bring on certain fans when the condensing pressure reaches the setpoint on the control. Temperature or pressure setpoints and differentials should be set in such a way as to prevent short cycling of the fans. Constant short cycling will produce a volatile condensing pressure while decreasing the life of the fan motors.

For recommended fan cycling switch settings, refer to Table 4. Differential settings on fan cycling temperature controls should be about 5 °F (2.8 °C). On fan cycling pressure controls, a differential of approximately 35 psig is recommended. On supermarket applications (using 6-12 Fan models) condenser fans may be cycled individually (not in pairs) and therefore lower differential settings may apply and will depend on the specific application.

Fans closest to the inlet header should be permitted to run whenever the compressor is running. If these initial fans are wired through a cycling control, the life of the condenser may be shortened due to the additional stress placed on the tubes and headers. Table 3 shows the fan cycling options available for all condenser models.

### **(ii) Variable Motor Speed Control**

If additional head pressure control is required beyond the last step of fan cycling variable fan motor speed may be used. Variable motor speed is optional on all condenser models. A varying motor speed may be accomplished using a modulating temperature or modulating pressure control. A variable speed controller can be an electronic or solid state device which varies the voltage going to the motor depending on the temperature or pressure of the medium being sensed.

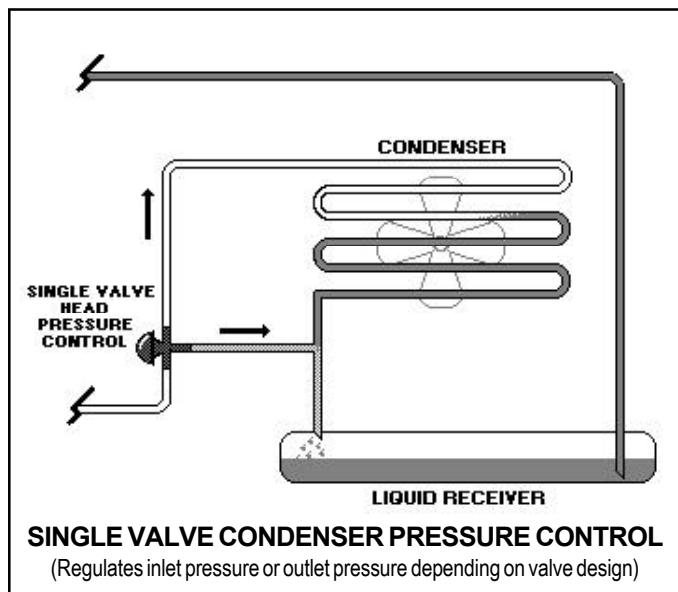
### **(iii) Refrigerant Regulating Controls**

Pressure regulating controls are available from a number of valve manufacturers. The purpose of such a control is to regulate the refrigerant flow in such a way as to maintain a pre-selected condensing pressure. In lower ambient temperatures, these valves throttle to maintain the desired pressure and in doing so, flood the condenser with liquid refrigerant.

The larger the condenser surface is, the higher its capacity will be. When a condenser is flooded, its useful condensing surface is reduced. This is because the refrigerant occupies the space which would otherwise be used for condensing.

Some control/check valve combinations will regulate refrigerant flow depending on the pressure at the inlet of the condenser. These are often referred to as *inlet regulators*. As the valve closes, hot gas bypasses the condenser through a differential check valve to increase the pressure at the receiver.

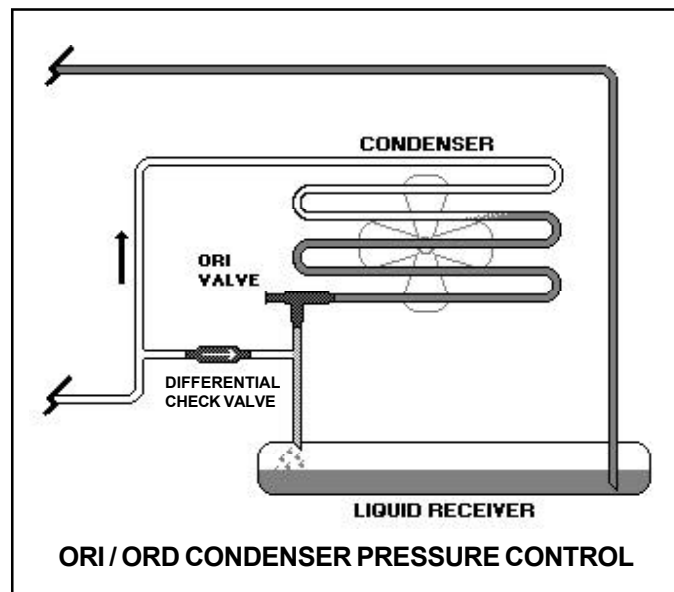
# LOW AMBIENT OPERATION



This will flood the condenser until the condensing pressure increases to a point which will again open the valve. Other valves regulate the refrigerant at the outlet of the condenser to provide a similar effect. These are commonly referred to as *outlet regulators*. There are also combination inlet/outlet regulators with a differential check valve or other type of condenser bypass arrangement incorporated within the valve.

Controls which regulate the flow of refrigerant based on condenser inlet pressure are typically used in conjunction with a check valve having a minimum opening differential across the condenser. Outlet regulators typically require a check valve with a fixed pressure differential setting of between 20 and 35 psi. The differential is needed to compensate for pressure drop through the condenser during flooding and associated discharge piping.

Systems equipped with a condenser flooding arrangement should always use a receiver having sufficient liquid holding capacity. Additional liquid required for flooding is only required during the winter low ambients and must be stored somewhere in the system at the higher ambients. Failure to use an adequately sized receiver will result in liquid back-up in the condenser during the warmer summer months. This will cause the system to develop very high pressures in the high side resulting in a high pressure safety control trip.



## Determining Additional Flooded Refrigerant Charge

Additional charge will vary with the condenser design TD and the coldest expected ambient temperature. Condensers designed for low TD applications (low temperature evaporators) and operating in colder ambients will require more additional charge than those designed for higher TD applications (high temperature evaporators) and warmer ambients.

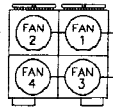
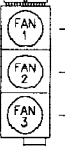
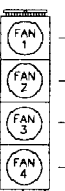
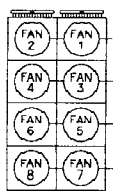
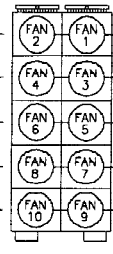
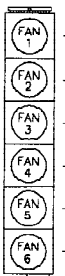
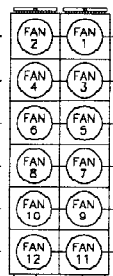
Refer to Table 5 to determine the required added refrigerant charge at the selected TD and ambient temperatures.

These charges are based on condensers using Fan Cycling options with their last fan (Single Row Fan Models) running or last pair of fans running (Double Row Fan models).

**WARNING:** Do not over charge when charging by a sightglass. Liquid lines feeding the TXV at the evaporator must have a solid column of liquid (no bubbles) however bubbles at the sightglass (located adjacent to the receiver) may be normal due to the result of a higher pressure drop at that point. Bubbles could also appear in the glass whenever the regulating valves start to flood the condenser. Always record the number of drums or the weight of refrigerant that has been added or removed in the system. Overcharged systems may result in compressor failure as well as other serious mechanical damage to the system components.

# LOW AMBIENT OPERATION

**TABLE 3 - FAN CYCLING CONTROL SCHEDULE**

| FAN ARRANGEMENT                                                                                                                                                              |                                                                                                                                            | FANS CYCLED | FANS IN CONSTANT OPERATION | FANS AVAILABLE FOR VARIABLE SPEED CONTROL |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------|-------------------------------------------|
| SINGLE ROW                                                                                                                                                                   | DOUBLE ROW                                                                                                                                 |             |                            |                                           |
| 1 FAN<br>HEADER END<br><br>CONTROL PANEL END                                                |                                                                                                                                            |             | •                          | •                                         |
| 2 FAN<br>                                                                                   | 4 FAN<br><br>• 1 STAGE                                    |             | •                          | •                                         |
| 3 FAN<br>                                                                                   | 6 FAN<br><br>• 2'ND STAGE<br>• 1'ST STAGE                 |             | •                          | •                                         |
| 4 FAN<br>                                                                                   | 8 FAN<br><br>• 3'RD STAGE<br>• 2'ND STAGE<br>• 1'ST STAGE |             | •                          | •                                         |
| 5 FAN<br>                                                                                   |                                                                                                                                            |             |                            |                                           |
| 10 FAN<br><br>• 4'TH STAGE<br>• 3'RD STAGE<br>• 2'ND STAGE<br>• 1'ST STAGE                 |                                                                                                                                            |             | •                          | •                                         |
| 6 FAN<br>                                                                                   |                                                                                                                                            |             |                            |                                           |
| 12 FAN<br><br>• 5'TH STAGE<br>• 4'TH STAGE<br>• 3'RD STAGE<br>• 2'ND STAGE<br>• 1'ST STAGE |                                                                                                                                            |             | •                          | •                                         |

**TABLE 4 - AMBIENT FAN CYCLING THERMOSTAT SETTINGS**

| Number of Fans on Condenser |                   | Design T.D. °F (°C) | Thermostat Setting * °F (°C) |           |           |           |           |
|-----------------------------|-------------------|---------------------|------------------------------|-----------|-----------|-----------|-----------|
| Single Row Models           | Double Row Models |                     | 1st Stage                    | 2nd Stage | 3rd Stage | 4th Stage | 5th Stage |
| 2                           | 4                 | 30 (16.7)           | 60 (15.6)                    |           |           |           |           |
|                             |                   | 25 (13.9)           | 65 (18.3)                    |           |           |           |           |
|                             |                   | 20 (11.1)           | 70 (21.1)                    |           |           |           |           |
|                             |                   | 15 (8.3)            | 75 (23.9)                    |           |           |           |           |
|                             |                   | 10 (5.6)            | 80 (26.7)                    |           |           |           |           |
| 3                           | 6                 | 30 (16.7)           | 60 (15.6)                    | 40 (4.4)  |           |           |           |
|                             |                   | 25 (13.9)           | 65 (18.3)                    | 55 (12.8) |           |           |           |
|                             |                   | 20 (11.1)           | 70 (21.1)                    | 60 (15.6) |           |           |           |
|                             |                   | 15 (8.3)            | 75 (23.9)                    | 65 (18.3) |           |           |           |
|                             |                   | 10 (5.6)            | 80 (26.7)                    | 75 (23.9) |           |           |           |
| 4                           | 8                 | 30 (16.7)           | 60 (15.6)                    | 50 (10.0) | 30 (-1.1) |           |           |
|                             |                   | 25 (13.9)           | 65 (18.3)                    | 55 (12.8) | 40 (4.4)  |           |           |
|                             |                   | 20 (11.1)           | 70 (21.1)                    | 65 (18.3) | 50 (10.0) |           |           |
|                             |                   | 15 (8.3)            | 75 (23.9)                    | 70 (21.1) | 60 (15.6) |           |           |
|                             |                   | 10 (5.6)            | 80 (26.7)                    | 75 (23.9) | 70 (21.1) |           |           |
| 5                           | 10                | 30 (16.7)           | 60 (15.6)                    | 55 (12.8) | 45 (7.2)  | 30 (-1.1) |           |
|                             |                   | 25 (13.9)           | 65 (18.3)                    | 60 (15.6) | 50 (10.0) | 35 (1.7)  |           |
|                             |                   | 20 (11.1)           | 70 (21.1)                    | 65 (18.3) | 60 (15.6) | 40 (4.4)  |           |
|                             |                   | 15 (8.3)            | 75 (23.9)                    | 70 (21.1) | 65 (18.3) | 55 (12.8) |           |
|                             |                   | 10 (5.6)            | 80 (26.7)                    | 75 (23.9) | 70 (21.1) | 65 (18.3) |           |
| 6                           | 12                | 30 (16.7)           | 55 (12.8)                    | 50 (10.0) | 40 (4.4)  | 30 (-1.1) | 25 (-3.9) |
|                             |                   | 25 (13.9)           | 65 (18.3)                    | 60 (15.6) | 55 (12.8) | 45 (7.2)  | 35 (1.7)  |
|                             |                   | 20 (11.1)           | 70 (21.1)                    | 65 (18.3) | 60 (15.6) | 50 (10.0) | 40 (4.4)  |
|                             |                   | 15 (8.3)            | 75 (23.9)                    | 70 (21.1) | 65 (18.3) | 60 (15.6) | 50 (10.0) |
|                             |                   | 10 (5.6)            | 80 (26.7)                    | 75 (23.9) | 70 (21.1) | 65 (18.3) | 60 (15.6) |

\* NOTE: These are typical settings. Further adjustments may be necessary to suit actual field conditions.



# LOW AMBIENT OPERATION

TO DETERMINE WINTER CHARGE, ADD THE SUM OF THE NORMAL CHARGE  
AND ADDITIONAL WINTER CHARGE

**TABLE 5**

## R22 WINTER OPERATION CHARGE - Lbs • Deg °F

Flooded Condensers with Fan Cycling

| MODEL            | TOTAL<br>No OF<br>FEEDS | NORMAL<br>CHARGE<br>Lbs | ADDITIONAL CHARGE FOR WINTER OPERATION (LBS) |     |     |     |     |                        |     |     |     |     |                        |     |     |     |     |                        |     |     |     |     |
|------------------|-------------------------|-------------------------|----------------------------------------------|-----|-----|-----|-----|------------------------|-----|-----|-----|-----|------------------------|-----|-----|-----|-----|------------------------|-----|-----|-----|-----|
|                  |                         |                         | Design TD = 10 (Deg F)                       |     |     |     |     | Design TD = 15 (Deg F) |     |     |     |     | Design TD = 20 (Deg F) |     |     |     |     | Design TD = 25 (Deg F) |     |     |     |     |
|                  |                         |                         | Ambient (Deg F)                              |     |     |     |     | Ambient (Deg F)        |     |     |     |     | Ambient (Deg F)        |     |     |     |     | Ambient (Deg F)        |     |     |     |     |
|                  |                         |                         | 40                                           | 20  | 0   | -20 | -40 | 40                     | 20  | 0   | -20 | -40 | 40                     | 20  | 0   | -20 | -40 | 40                     | 20  | 0   | -20 | -40 |
| 1A 11 <b>007</b> | 7                       | 1.7                     | 3.5                                          | 3.8 | 4.0 | 4.1 | 4.2 | 3.0                    | 3.5 | 3.7 | 3.9 | 4.0 | 2.5                    | 3.1 | 3.5 | 3.7 | 3.8 | 2.0                    | 2.8 | 3.2 | 3.4 | 3.6 |
| 1A 11 <b>009</b> | 8                       | 2.2                     | 5.2                                          | 5.7 | 5.9 | 6.1 | 6.2 | 4.5                    | 5.2 | 5.5 | 5.7 | 5.9 | 3.7                    | 4.6 | 5.1 | 5.4 | 5.6 | 3.0                    | 4.1 | 4.7 | 5.1 | 5.4 |
| 1A 11 <b>010</b> | 9                       | 2.8                     | 6.7                                          | 7.3 | 7.6 | 7.8 | 7.9 | 5.8                    | 6.6 | 7.1 | 7.4 | 7.6 | 4.8                    | 6.0 | 6.6 | 7.0 | 7.2 | 3.8                    | 5.3 | 6.1 | 6.6 | 6.9 |
| 1A 11 <b>011</b> | 12                      | 3.9                     | 8.9                                          | 9.7 | 10  | 10  | 11  | 7.6                    | 8.8 | 9.4 | 9.8 | 10  | 6.4                    | 7.9 | 8.8 | 9.3 | 9.6 | 5.1                    | 7.0 | 8.1 | 8.7 | 9.2 |
| 1A 11 <b>012</b> | 12                      | 4.3                     | 10                                           | 11  | 12  | 12  | 12  | 8.9                    | 10  | 11  | 11  | 12  | 7.4                    | 9.3 | 10  | 11  | 11  | 6.0                    | 8.3 | 9.5 | 10  | 11  |
| 1A 11 <b>013</b> | 15                      | 5.2                     | 13                                           | 14  | 15  | 15  | 15  | 11                     | 13  | 14  | 14  | 15  | 9.3                    | 12  | 13  | 14  | 14  | 7.4                    | 10  | 12  | 13  | 13  |
| 1A 12 <b>017</b> | 14                      | 4.1                     | 10                                           | 12  | 13  | 14  | 15  | 6.4                    | 9.3 | 11  | 12  | 13  | 4.0                    | 7.5 | 9.4 | 11  | 12  | 0                      | 5.1 | 7.6 | 9.2 | 10  |
| 1A 12 <b>019</b> | 18                      | 6.1                     | 15                                           | 18  | 20  | 21  | 23  | 9.4                    | 14  | 16  | 18  | 20  | 6.0                    | 11  | 14  | 16  | 17  | 0                      | 7.6 | 11  | 14  | 15  |
| 1A 12 <b>022</b> | 24                      | 7.4                     | 17                                           | 21  | 24  | 26  | 27  | 11                     | 17  | 20  | 22  | 23  | 7.0                    | 13  | 17  | 19  | 21  | 0                      | 9.2 | 14  | 14  | 18  |
| 1A 12 <b>024</b> | 24                      | 8.3                     | 20                                           | 24  | 27  | 29  | 30  | 13                     | 19  | 22  | 24  | 26  | 9.0                    | 15  | 19  | 21  | 23  | 0                      | 10  | 15  | 18  | 21  |
| 1A 12 <b>027</b> | 30                      | 10                      | 23                                           | 28  | 31  | 34  | 36  | 15                     | 22  | 26  | 29  | 31  | 12                     | 18  | 22  | 25  | 28  | 0                      | 12  | 18  | 22  | 24  |
| 1A 13 <b>029</b> | 27                      | 8.6                     | 19                                           | 24  | 27  | 30  | 31  | 11                     | 18  | 22  | 25  | 27  | 0                      | 11  | 17  | 20  | 23  | 0                      | 2.6 | 12  | 17  | 20  |
| 1A 13 <b>034</b> | 36                      | 10                      | 23                                           | 29  | 33  | 36  | 38  | 13                     | 22  | 27  | 30  | 33  | 0                      | 13  | 20  | 25  | 28  | 0                      | 3.2 | 15  | 20  | 24  |
| 1A 13 <b>037</b> | 36                      | 12                      | 27                                           | 34  | 39  | 42  | 45  | 15                     | 26  | 32  | 35  | 38  | 0                      | 15  | 24  | 29  | 33  | 0                      | 3.8 | 18  | 24  | 28  |
| 1A 13 <b>041</b> | 45                      | 14                      | 32                                           | 40  | 46  | 50  | 53  | 18                     | 31  | 37  | 42  | 45  | 0                      | 18  | 28  | 34  | 38  | 0                      | 4.4 | 21  | 28  | 33  |
| 2A 13 <b>043</b> | 36                      | 18                      | 39                                           | 49  | 56  | 61  | 64  | 22                     | 37  | 46  | 51  | 55  | 0                      | 22  | 35  | 42  | 47  | 0                      | 6   | 25  | 35  | 41  |
| 2A 13 <b>048</b> | 45                      | 21                      | 45                                           | 57  | 65  | 70  | 75  | 26                     | 43  | 53  | 59  | 64  | 0                      | 26  | 40  | 49  | 55  | 0                      | 6   | 29  | 40  | 47  |
| 2A 14 <b>056</b> | 22                      | 26                      | 51                                           | 69  | 80  | 88  | 94  | 3                      | 46  | 62  | 71  | 79  | 0                      | 14  | 43  | 57  | 66  | 0                      | 0   | 19  | 42  | 53  |
| 2A 14 <b>063</b> | 30                      | 33                      | 64                                           | 87  | 100 | 110 | 117 | 4                      | 58  | 77  | 89  | 98  | 0                      | 18  | 54  | 71  | 82  | 0                      | 0   | 24  | 52  | 67  |
| 2A 14 <b>068</b> | 37                      | 38                      | 74                                           | 101 | 116 | 127 | 136 | 5                      | 67  | 89  | 104 | 114 | 0                      | 20  | 63  | 82  | 95  | 0                      | 0   | 27  | 60  | 77  |
| 2A 15 <b>079</b> | 30                      | 39                      | 64                                           | 97  | 114 | 127 | 136 | 0                      | 48  | 81  | 99  | 111 | 0                      | 0   | 48  | 75  | 91  | 0                      | 0   | 12  | 55  | 75  |
| 2A 15 <b>085</b> | 37                      | 49                      | 80                                           | 122 | 145 | 160 | 172 | 0                      | 60  | 102 | 125 | 140 | 0                      | 0   | 60  | 95  | 115 | 0                      | 0   | 15  | 70  | 95  |
| 2A 16 <b>095</b> | 30                      | 54                      | 66                                           | 126 | 154 | 172 | 186 | 0                      | 66  | 113 | 137 | 154 | 0                      | 0   | 29  | 88  | 116 | 0                      | 0   | 0   | 54  | 92  |
| 2A 16 <b>103</b> | 37                      | 61                      | 76                                           | 145 | 177 | 197 | 213 | 0                      | 76  | 129 | 157 | 177 | 0                      | 0   | 33  | 101 | 133 | 0                      | 0   | 0   | 62  | 105 |
| 1A 22 <b>039</b> | 36                      | 16                      | 38                                           | 47  | 53  | 57  | 60  | 25                     | 37  | 43  | 48  | 52  | 15                     | 30  | 37  | 42  | 46  | 0                      | 20  | 30  | 36  | 41  |
| 1A 22 <b>045</b> | 48                      | 19                      | 44                                           | 54  | 61  | 65  | 69  | 29                     | 42  | 50  | 55  | 60  | 18                     | 34  | 43  | 49  | 53  | 0                      | 23  | 35  | 42  | 47  |
| 1A 22 <b>049</b> | 48                      | 21                      | 48                                           | 59  | 66  | 72  | 76  | 32                     | 46  | 55  | 61  | 65  | 19                     | 37  | 47  | 53  | 58  | 0                      | 25  | 38  | 45  | 51  |
| 1A 22 <b>054</b> | 60                      | 23                      | 55                                           | 68  | 76  | 82  | 87  | 36                     | 53  | 62  | 69  | 75  | 22                     | 43  | 53  | 61  | 66  | 0                      | 29  | 43  | 52  | 58  |
| 1A 23 <b>058</b> | 54                      | 22                      | 49                                           | 62  | 70  | 76  | 81  | 28                     | 47  | 57  | 64  | 70  | 0                      | 28  | 43  | 53  | 59  | 0                      | 6.8 | 32  | 43  | 51  |
| 1A 23 <b>067</b> | 72                      | 26                      | 57                                           | 72  | 82  | 89  | 95  | 32                     | 55  | 67  | 75  | 81  | 0                      | 32  | 51  | 62  | 69  | 0                      | 8.0 | 37  | 51  | 60  |
| 1A 23 <b>073</b> | 72                      | 30                      | 66                                           | 84  | 96  | 104 | 111 | 38                     | 64  | 78  | 88  | 95  | 0                      | 38  | 59  | 72  | 81  | 0                      | 9.3 | 43  | 59  | 70  |
| 1A 23 <b>081</b> | 90                      | 35                      | 76                                           | 97  | 110 | 119 | 127 | 43                     | 73  | 89  | 100 | 109 | 0                      | 43  | 68  | 82  | 92  | 0                      | 11  | 50  | 68  | 80  |
| 1A 23 <b>086</b> | 72                      | 35                      | 77                                           | 98  | 111 | 121 | 128 | 44                     | 74  | 91  | 102 | 110 | 0                      | 44  | 69  | 83  | 94  | 0                      | 11  | 50  | 69  | 81  |
| 1A 23 <b>096</b> | 90                      | 41                      | 89                                           | 114 | 129 | 140 | 149 | 51                     | 86  | 105 | 118 | 128 | 0                      | 51  | 80  | 97  | 109 | 0                      | 12  | 58  | 80  | 94  |
| 2A 24 <b>112</b> | 45                      | 53                      | 104                                          | 142 | 164 | 180 | 192 | 6.4                    | 94  | 126 | 146 | 161 | 0                      | 29  | 88  | 116 | 135 | 0                      | 0   | 38  | 85  | 109 |
| 2A 24 <b>126</b> | 60                      | 65                      | 127                                          | 173 | 200 | 219 | 234 | 7.8                    | 115 | 154 | 178 | 196 | 0                      | 35  | 108 | 142 | 164 | 0                      | 0   | 47  | 103 | 133 |
| 2A 24 <b>137</b> | 75                      | 77                      | 149                                          | 204 | 235 | 258 | 275 | 9.2                    | 135 | 181 | 210 | 231 | 0                      | 41  | 127 | 167 | 193 | 0                      | 0   | 55  | 121 | 157 |
| 2A 25 <b>158</b> | 60                      | 77                      | 127                                          | 193 | 228 | 253 | 271 | 0                      | 95  | 161 | 197 | 221 | 0                      | 0   | 95  | 149 | 181 | 0                      | 0   | 23  | 109 | 149 |
| 2A 25 <b>172</b> | 75                      | 99                      | 163                                          | 248 | 294 | 325 | 348 | 0                      | 122 | 207 | 253 | 284 | 0                      | 0   | 122 | 192 | 233 | 0                      | 0   | 30  | 141 | 192 |
| 2A 26 <b>190</b> | 60                      | 107                     | 132                                          | 252 | 308 | 344 | 371 | 0                      | 132 | 225 | 274 | 308 | 0                      | 0   | 57  | 176 | 232 | 0                      | 0   | 0   | 108 | 183 |
| 2A 26 <b>206</b> | 75                      | 124                     | 154                                          | 293 | 358 | 400 | 432 | 0                      | 154 | 261 | 318 | 358 | 0                      | 0   | 66  | 205 | 270 | 0                      | 0   | 0   | 126 | 213 |

Note: For R134a and R502 use R22 charge  
For R404A and R507 use R22 charge x 0.87  
For R407C use R22 charge x 0.97  
For R12 use R22 charge x 1.10  
For 90% full volume charge see P. 4

# LOW AMBIENT OPERATION

TO DETERMINE WINTER CHARGE, ADD THE SUM OF THE NORMAL CHARGE  
AND ADDITIONAL WINTER CHARGE

**TABLE 5A**

**R22 WINTER OPERATION CHARGE - Kg • Deg °C**

**Flooded Condensers with Fan Cycling**

| MODEL     | TOTAL<br>No OF<br>FEEDS | NORMAL<br>CHARGE<br>Kg | ADDITIONAL CHARGE FOR WINTER OPERATION (Kg) |      |       |       |       |                         |      |       |       |       |                          |      |       |       |       |                          |      |       |       |       |
|-----------|-------------------------|------------------------|---------------------------------------------|------|-------|-------|-------|-------------------------|------|-------|-------|-------|--------------------------|------|-------|-------|-------|--------------------------|------|-------|-------|-------|
|           |                         |                        | Design TD = 5.6 (Deg C)                     |      |       |       |       | Design TD = 8.3 (Deg C) |      |       |       |       | Design TD = 11.1 (Deg C) |      |       |       |       | Design TD = 13.9 (Deg C) |      |       |       |       |
|           |                         |                        | Ambient (Deg C)                             |      |       |       |       | Ambient (Deg C)         |      |       |       |       | Ambient (Deg C)          |      |       |       |       | Ambient (Deg C)          |      |       |       |       |
|           |                         |                        | 4.4                                         | -6.7 | -17.8 | -28.9 | -40.0 | 4.4                     | -6.7 | -17.8 | -28.9 | -40.0 | 4.4                      | -6.7 | -17.8 | -28.9 | -40.0 | 4.4                      | -6.7 | -17.8 | -28.9 | -40.0 |
| 1A 11 007 | 7                       | 0.8                    | 1.6                                         | 1.7  | 1.8   | 1.9   | 1.9   | 1.4                     | 1.6  | 1.7   | 1.8   | 1.8   | 1.1                      | 1.4  | 1.6   | 1.7   | 1.7   | 0.9                      | 1.3  | 1.4   | 1.6   | 1.6   |
| 1A 11 009 | 8                       | 1.0                    | 2.4                                         | 2.6  | 2.7   | 2.8   | 2.8   | 2.0                     | 2.3  | 2.5   | 2.6   | 2.7   | 1.7                      | 2.1  | 2.3   | 2.5   | 2.6   | 1.4                      | 1.9  | 2.1   | 2.3   | 2.4   |
| 1A 11 010 | 9                       | 1.3                    | 3.0                                         | 3.3  | 3.5   | 3.5   | 3.6   | 2.6                     | 3.0  | 3.2   | 3.4   | 3.4   | 2.2                      | 2.7  | 3.0   | 3.2   | 3.3   | 1.7                      | 2.4  | 2.8   | 3.0   | 3.1   |
| 1A 11 011 | 12                      | 1.8                    | 4.0                                         | 4.4  | 4.6   | 4.7   | 4.8   | 3.5                     | 4.0  | 4.3   | 4.5   | 4.6   | 2.9                      | 3.6  | 4.0   | 4.2   | 4.4   | 2.3                      | 3.2  | 3.7   | 4.0   | 4.2   |
| 1A 11 012 | 12                      | 1.9                    | 4.7                                         | 5.1  | 5.4   | 5.5   | 5.6   | 4.1                     | 4.7  | 5.0   | 5.2   | 5.4   | 3.4                      | 4.2  | 4.7   | 4.9   | 5.1   | 2.7                      | 3.7  | 4.3   | 4.6   | 4.9   |
| 1A 11 013 | 15                      | 2.4                    | 5.9                                         | 6.4  | 6.7   | 6.9   | 7.0   | 5.1                     | 5.8  | 6.3   | 6.5   | 6.7   | 4.2                      | 5.3  | 5.8   | 6.2   | 6.4   | 3.4                      | 4.7  | 5.4   | 5.8   | 6.1   |
| 1A 12 017 | 14                      | 1.9                    | 4.4                                         | 5.4  | 6.1   | 6.6   | 6.9   | 2.9                     | 4.2  | 5.0   | 5.5   | 6.0   | 1.8                      | 3.4  | 4.3   | 4.9   | 5.3   | 0                        | 2.3  | 3.5   | 4.2   | 4.7   |
| 1A 12 019 | 18                      | 2.8                    | 6.6                                         | 8.0  | 9.0   | 9.7   | 10    | 4.3                     | 6.3  | 7.4   | 8.2   | 8.9   | 2.7                      | 5.1  | 6.3   | 7.2   | 7.9   | 0                        | 3.5  | 5.1   | 6.2   | 6.9   |
| 1A 12 022 | 24                      | 3.4                    | 7.9                                         | 9.7  | 11    | 12    | 12    | 5.1                     | 7.5  | 8.9   | 9.9   | 11    | 3.2                      | 6.1  | 7.6   | 8.7   | 9.5   | 0                        | 4.2  | 6.2   | 7.4   | 8.4   |
| 1A 12 024 | 24                      | 3.8                    | 8.9                                         | 11   | 12    | 13    | 14    | 5.8                     | 8.4  | 10    | 11    | 12    | 4.1                      | 6.8  | 8.5   | 9.7   | 11    | 0                        | 4.7  | 6.9   | 8.3   | 9.3   |
| 1A 12 027 | 30                      | 4.4                    | 10                                          | 13   | 14    | 15    | 16    | 6.8                     | 9.9  | 12    | 13    | 14    | 5.3                      | 8.0  | 10    | 11    | 13    | 0                        | 5.5  | 8.1   | 9.8   | 11    |
| 1A 13 029 | 27                      | 3.9                    | 8.5                                         | 11   | 12    | 13    | 14    | 4.9                     | 8.2  | 10    | 11    | 12    | 0                        | 4.9  | 7.6   | 9.2   | 10    | 0                        | 1.2  | 5.6   | 7.6   | 9.0   |
| 1A 13 034 | 36                      | 4.8                    | 10                                          | 13   | 15    | 16    | 17    | 5.9                     | 10   | 12    | 14    | 15    | 0                        | 5.9  | 9.3   | 11    | 13    | 0                        | 1.5  | 6.8   | 9.3   | 11    |
| 1A 13 037 | 36                      | 5.6                    | 12                                          | 15   | 18    | 19    | 20    | 6.9                     | 12   | 14    | 16    | 17    | 0                        | 6.9  | 11    | 13    | 15    | 0                        | 1.7  | 8.0   | 11    | 13    |
| 1A 13 041 | 45                      | 6.6                    | 14                                          | 18   | 21    | 23    | 24    | 8.2                     | 14   | 17    | 19    | 21    | 0                        | 8.2  | 13    | 16    | 17    | 0                        | 2.0  | 9.4   | 13    | 15    |
| 2A 13 043 | 36                      | 8.0                    | 18                                          | 22   | 25    | 28    | 29    | 10                      | 17   | 21    | 23    | 25    | 0                        | 10   | 16    | 19    | 21    | 0                        | 2.5  | 11    | 16    | 18    |
| 2A 13 048 | 45                      | 9.0                    | 20                                          | 26   | 29    | 32    | 34    | 12                      | 20   | 24    | 27    | 29    | 0                        | 12   | 18    | 22    | 25    | 0                        | 2.7  | 13    | 18    | 21    |
| 2A 14 056 | 22                      | 11.8                   | 23                                          | 32   | 36    | 40    | 43    | 1.4                     | 21   | 28    | 32    | 36    | 0                        | 6.4  | 20    | 26    | 30    | 0                        | 0    | 8.4   | 19    | 24    |
| 2A 14 063 | 30                      | 14.8                   | 29                                          | 39   | 46    | 50    | 53    | 1.8                     | 26   | 35    | 41    | 45    | 0                        | 8.0  | 25    | 32    | 37    | 0                        | 0    | 11    | 23    | 30    |
| 2A 14 068 | 37                      | 17.3                   | 33                                          | 46   | 53    | 58    | 62    | 2.1                     | 30   | 41    | 47    | 52    | 0                        | 9.2  | 29    | 37    | 43    | 0                        | 0    | 12    | 27    | 35    |
| 2A 15 079 | 30                      | 17.5                   | 29                                          | 44   | 52    | 58    | 62    | 0                       | 22   | 37    | 45    | 50    | 0                        | 0    | 22    | 34    | 41    | 0                        | 0    | 5.2   | 25    | 34    |
| 2A 15 085 | 37                      | 22.2                   | 37                                          | 56   | 66    | 73    | 78    | 0                       | 27   | 46    | 57    | 64    | 0                        | 0    | 27    | 43    | 52    | 0                        | 0    | 6.7   | 32    | 43    |
| 2A 16 095 | 30                      | 24.3                   | 30                                          | 57   | 70    | 78    | 84    | 0                       | 30   | 51    | 62    | 70    | 0                        | 0    | 13    | 40    | 53    | 0                        | 0    | 0     | 25    | 42    |
| 2A 16 103 | 37                      | 27.8                   | 35                                          | 66   | 80    | 90    | 97    | 0                       | 35   | 59    | 71    | 80    | 0                        | 0    | 15    | 46    | 61    | 0                        | 0    | 0     | 28    | 48    |
| 1A 22 039 | 36                      | 7.4                    | 17                                          | 21   | 24    | 26    | 27    | 11                      | 17   | 20    | 22    | 24    | 6.8                      | 13   | 17    | 19    | 21    | 0                        | 9.2  | 14    | 16    | 18    |
| 1A 22 045 | 48                      | 8.5                    | 20                                          | 25   | 28    | 30    | 31    | 13                      | 19   | 23    | 25    | 27    | 8.2                      | 15   | 19    | 22    | 24    | 0                        | 11   | 16    | 19    | 21    |
| 1A 22 049 | 48                      | 9.3                    | 22                                          | 27   | 30    | 32    | 34    | 14                      | 21   | 25    | 27    | 30    | 8.6                      | 17   | 21    | 24    | 26    | 0                        | 12   | 17    | 21    | 23    |
| 1A 22 054 | 60                      | 11                     | 25                                          | 31   | 34    | 37    | 39    | 16                      | 24   | 28    | 31    | 34    | 10                       | 19   | 24    | 28    | 30    | 0                        | 13   | 20    | 24    | 27    |
| 1A 23 058 | 54                      | 10                     | 22                                          | 28   | 32    | 35    | 37    | 13                      | 21   | 26    | 29    | 32    | 0                        | 13   | 20    | 24    | 27    | 0                        | 3.1  | 14    | 20    | 23    |
| 1A 23 067 | 72                      | 12                     | 26                                          | 33   | 37    | 41    | 43    | 15                      | 25   | 30    | 34    | 37    | 0                        | 15   | 23    | 28    | 31    | 0                        | 3.6  | 17    | 23    | 27    |
| 1A 23 073 | 72                      | 14                     | 30                                          | 38   | 44    | 47    | 50    | 17                      | 29   | 35    | 40    | 43    | 0                        | 17   | 27    | 33    | 37    | 0                        | 4.2  | 20    | 27    | 32    |
| 1A 23 081 | 90                      | 16                     | 34                                          | 44   | 50    | 54    | 58    | 20                      | 33   | 41    | 46    | 49    | 0                        | 20   | 31    | 37    | 42    | 0                        | 4.8  | 23    | 31    | 36    |
| 1A 23 086 | 72                      | 16                     | 35                                          | 44   | 50    | 55    | 58    | 20                      | 34   | 41    | 46    | 50    | 0                        | 20   | 31    | 38    | 43    | 0                        | 4.9  | 23    | 31    | 37    |
| 1A 23 096 | 90                      | 19                     | 40                                          | 52   | 59    | 64    | 68    | 23                      | 39   | 48    | 54    | 58    | 0                        | 23   | 36    | 44    | 49    | 0                        | 5.7  | 26    | 36    | 43    |
| 2A 24 112 | 45                      | 24                     | 47                                          | 64   | 75    | 82    | 87    | 2.9                     | 43   | 57    | 66    | 73    | 0                        | 13   | 40    | 53    | 61    | 0                        | 0    | 17    | 38    | 50    |
| 2A 24 126 | 60                      | 30                     | 58                                          | 78   | 91    | 99    | 106   | 3.5                     | 52   | 70    | 81    | 89    | 0                        | 16   | 49    | 64    | 74    | 0                        | 0    | 21    | 47    | 60    |
| 2A 24 137 | 75                      | 35                     | 68                                          | 92   | 107   | 117   | 125   | 4.2                     | 61   | 82    | 95    | 105   | 0                        | 19   | 58    | 76    | 88    | 0                        | 0    | 25    | 55    | 71    |
| 2A 25 158 | 60                      | 35                     | 58                                          | 88   | 104   | 115   | 123   | 0                       | 43   | 73    | 89    | 100   | 0                        | 0    | 43    | 68    | 82    | 0                        | 0    | 11    | 50    | 68    |
| 2A 25 172 | 75                      | 45                     | 74                                          | 113  | 133   | 147   | 158   | 0                       | 55   | 94    | 115   | 129   | 0                        | 0    | 55    | 87    | 106   | 0                        | 0    | 14    | 64    | 87    |
| 2A 26 190 | 60                      | 48                     | 60                                          | 114  | 140   | 156   | 169   | 0                       | 60   | 102   | 124   | 140   | 0                        | 0    | 26    | 80    | 105   | 0                        | 0    | 0     | 49    | 83    |
| 2A 26 206 | 75                      | 56                     | 70                                          | 133  | 162   | 182   | 196   | 0                       | 70   | 119   | 145   | 162   | 0                        | 0    | 30    | 93    | 123   | 0                        | 0    | 0     | 57    | 97    |

Note: For R134a and R502 use R22 charge  
For R404A and R507 use R22 charge x 0.87  
For R407C use R22 charge x 0.97  
For R12 use R22 charge x 1.10  
For 90% full volume charge see P. 4

# INSTALLATION

## INSPECTION

A thorough inspection of the equipment, including all component parts and accessories, should be made immediately upon delivery. Any damage caused in transit, or missing parts, should be reported to the carrier at once. The consignee is responsible for making any claim for losses or damage. Electrical characteristics should also be checked at this time to ensure that they are correct.

## LOCATION

Before handling and placing the unit into position a review of the most suitable location must be made. This condenser is designed for outdoor installation.

A number of factors must be taken into consideration

when selecting a location. Most important is the provision for a supply of ambient air to the condenser, and removal of heated air from the condenser area.

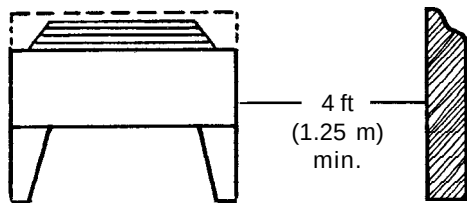
Higher condensing temperatures, decreased performance, and the possibility of equipment failure may result from inadequate air supply.

Other considerations include:

1. Customer requests
2. Loading capacity of the roof or floor.
3. Distance to suitable electrical supply.
4. Accessibility for maintenance.
5. Local building codes.
6. Adjacent buildings relative to noise levels.

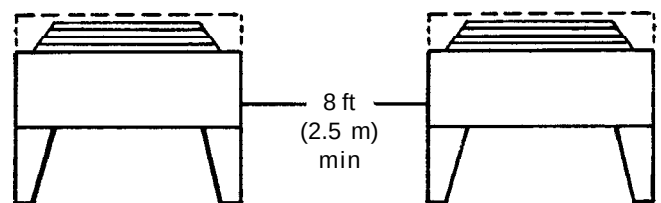
## WALLS OR OBSTRUCTIONS

All sides of the unit must be a minimum of 4 feet (1.25 m) away from any wall or obstruction. Overhead obstructions are not permitted. If enclosed by three walls, the condenser must be installed as indicated for units in a pit.



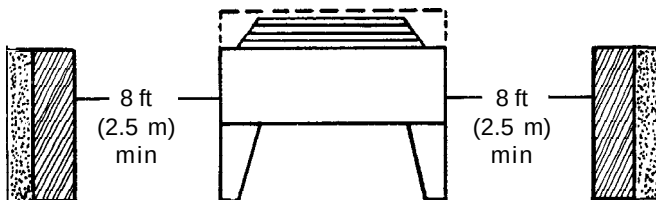
## MULTIPLE UNITS

A minimum of 8 feet (2.5 m) is required between multiple units placed side by side. If placed end to end, the minimum distance between units is 4 feet (1.25 m).



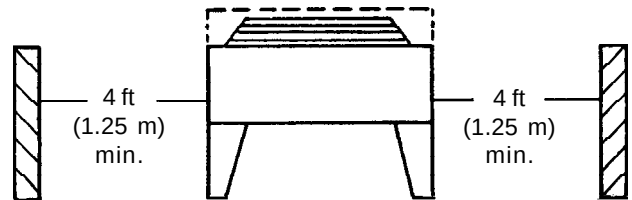
## UNITS IN PITS

The top of the condenser must be level with, or above the top of the pit. In addition, a minimum of 8 feet (2.5 m) is required between the unit and the pit walls.



## LOUVERS/FENCES

Louvers/fences must have a minimum of 80% free area and 4 feet (1.25 m) minimum clearance between the unit and louvers/fence. Height of louver/fence must not exceed top of unit.



## PLACEMENT

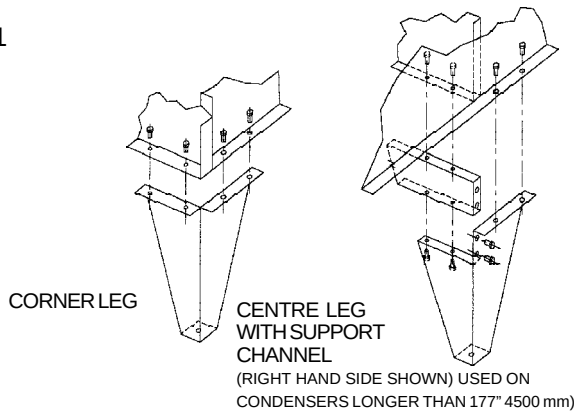
Once a suitable location is selected ensure all the remote mounting parts (legs and hardware) are available. Refer to Fig.1 (P. 36) and the dimensional data on pages 6 and 7

for the leg mounting locations. On 8, 10 and 12 fan models a 90" (2.3 m) channel is also included for maximum support. Single row 4, 5 and 6 fan models use a 45" (1.15m) channel.

# INSTALLATION

## LEG INSTALLATION INSTRUCTIONS

Fig. 1

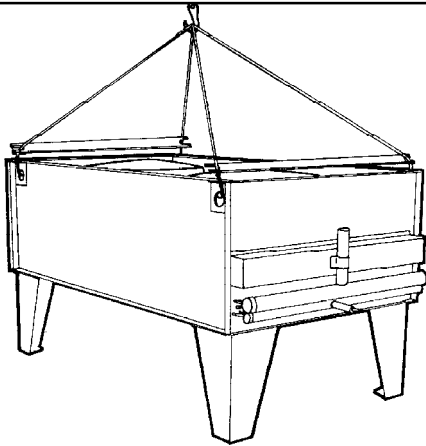


- 1) Assemble R.H. center leg L.H. center leg and 90" (or 45" on single row) channel as shown. Remove 2 bolts from bottom flange of unit side panels that match the hole pattern on the top flanges of both legs. Attach center leg and channel assembly using hardware provided at divider panel locations required for applicable model as shown in dimensional data. Replace bolts that were removed from side panels to secure leg assembly to bottom flanges of side panels.
- 2) Assemble four corner legs to bottom flanges on unit side panels and end panels using hardware provided, at matching mounting hole patterns. All corner legs are the same.

Air cooled condensers are large, heavy mechanical equipment and must be handled as such. A fully qualified and properly equipped crew with necessary rigging should be engaged to set the condenser into position.

Lifting brackets or holes have been provided at the corners for attaching lifting slings. Spreader bars must be used when lifting so that the lifting force must be applied vertically. See Fig. 2. **Under no circumstances should the coil headers or return bends be used in lifting or moving the condenser.**

Fig. 2



Ensure the unit is placed in a level position (to ensure proper drainage of liquid refrigerant and oil). The legs should be securely anchored to the building structure, sleeper or concrete pad. The weight of the condenser is not enough to hold in place during a strong wind, **the legs must be anchored.**

### REFRIGERANT PIPING

All refrigeration piping must be installed by a qualified refrigeration mechanic. The importance of correct refrigerant pipe sizing and layout cannot be over-emphasized. Failure to observe proper refrigerant piping practices can result in equipment failure which may not be covered under warranty.

All air cooled condensers are supplied complete with headers and refrigerant connections sized for connecting

to standard refrigeration tubing. These connections may not be the same as the actual line sizes required for the field installation. Refer to a recognized source (ASHRAE charts, manufacturer's engineering manuals etc.) for line sizing.

### DISCHARGE LINES

The proper design of discharge lines involves following objective:

- (1) to minimize refrigerant pressure drop, since high pressure losses increase the required compressor horsepower per ton of refrigeration.

Discharge lines must be pitched away from the compressor to ensure proper drainage of oil being carried in the line. A discharge check-valve at the bottom of a vertical riser will prevent oil (and liquid refrigerant) from draining back to the compressor during the off-cycle. When the vertical lift exceeds 30 feet (9 m), insert close-coupled traps in the riser at 30 feet (9 m) intervals.

An alternate method of handling the oil problem would be the addition of an oil separator see Figure 4 (b).

A reverse trap should be installed at the top of all vertical risers. The top of the reverse trap should be the highest point in the discharge line and should have an access valve installed to allow the reclamation of non-condensable gas from the system.

Pulsation of the hot gas in the discharge line is an inherent characteristic of systems utilizing reciprocating compressors. The discharge line must be rigidly supported along its entire length to prevent transmission of vibration and movement of the line.

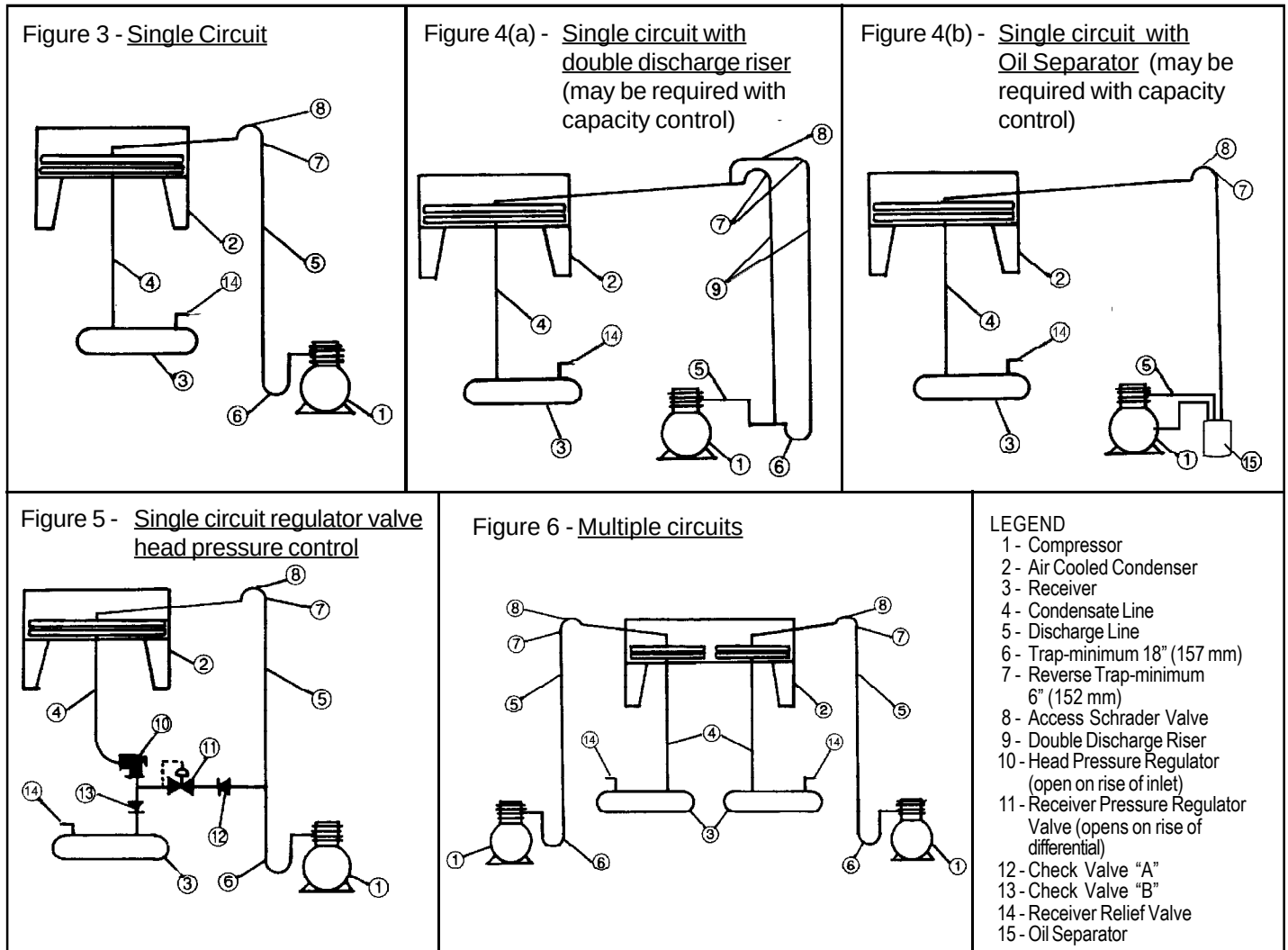
### CONDENSATE LINES

The condensate line must be designed to allow free drainage of refrigerant from the condenser coil to the receiver. Refer to Fig. 5 for typical condensate line piping when utilizing head pressure regulating valves.

# INSTALLATION

Fig. 3 - 6

## BVC TYPICAL SYSTEM PIPING



### ELECTRICAL WIRING

All wiring and connections to the air cooled condenser must be made in accordance with the National Electrical Code and all local codes and regulations. Any wiring diagrams shown are basic and do not necessarily include electrical components which must be field supplied. (see pages 8-11 for typical wiring diagrams). Refer to the Electrical Specifications table on pages 5, 15 and 19 for voltage availability and entering service requirements.

### SYSTEM START-UP CHECKS

1. Check the electrical characteristics of all components to be sure they agree with the power supply.
2. Check tightness of all fans and motor mounts.
3. Check tightness of all electrical connections.
4. Upon start-up, check fans for correct rotation. Air is drawn through the condenser coil. To change rotation on 3 phase units reverse any two (2) fan motor leads.
5. All system piping must be thoroughly leak checked before a refrigerant charge is introduced.

### MAINTENANCE

A semi annual inspection should be carried out by a qualified refrigeration service mechanic. The main power supply must be disconnected.

1. Check electrical components. Tighten any loose connections.
2. Check control capillary tubes and lines for signs of wear due to excessive vibration or rubbing on metal parts. Secure if necessary.
3. Check tightness of all fans and motor mounts. Remove any deposits which could effect fan balance. Note: Fan motors are permanently lubricated and require only visual inspection.
4. Clean the condenser coil using a soft brush or by flushing with cool water or coil cleansers available through NRP (National Refrigeration Products Inc.)
5. Update service log information (back page of service manual)

# SERVICE PARTS LIST

| PART DESCRIPTION                  | MODELS                                       | PART NUMBER        |
|-----------------------------------|----------------------------------------------|--------------------|
| <b>FAN MOTORS-60 Hz</b>           |                                              |                    |
| <b>850 RPM Models</b>             |                                              |                    |
| 208/230-1-60                      | 850 RPM ( 3/4 HP)                            | 1048725-001        |
| 208/230-3-60                      | 850 RPM ( 1 HP)                              | 1048726-001        |
| 460-3-60                          | 850 RPM ( 1 HP )                             | 1048727-001        |
| 575-3-60                          | 850 RPM (1 HP)                               | 1048728-001        |
| 208/230/460 -3-60                 | 850 RPM ( 1 HP )                             | 1062967-001        |
| <b>550 RPM Models</b>             |                                              |                    |
| 208/230/460 -3-60                 | 550 RPM ( 1/2 HP )                           | 1068176-001        |
| 575-3-60                          | 550 RPM ( 1/2 HP )                           | 1068177-001        |
| <b>1140 RPM Models</b>            |                                              |                    |
| 208/230/460 -3-60                 | 1140 RPM ( 2 HP )                            | 1067454-001        |
| 575-3-60                          | 1140 RPM ( 2 HP )                            | 1068175-001        |
| <b>FAN MOTORS-50 Hz</b>           |                                              |                    |
| <b>850 RPM Models</b>             |                                              |                    |
| 200/220-1-50                      | 700 RPM ( 3/4 HP)                            | 1048725-001        |
| 200/220-3-50                      | 700 RPM ( 1 HP)                              | 1048726-001        |
| 380-3-50                          | 700 RPM ( 1 HP)                              | 1048727-001        |
| 200/220/380 -3-50                 | 700 RPM ( 1 HP)                              | 1062967-001        |
| <b>550 RPM Models</b>             |                                              |                    |
| 200/220/380 -3-50                 | 450 RPM ( 1/2 HP )                           | 1068176-001        |
| <b>1140 RPM Models</b>            |                                              |                    |
| 200/220/380 -3-50                 | 950 RPM ( 2 HP )                             | 1067454-001        |
| <b>MOTOR MOUNT RAIL (2 REQ'D)</b> | 35" WIDE FAN SECTION<br>45" WIDE FAN SECTION | 1046500<br>1046502 |
| <b>MOTOR RAIN SHIELD*</b>         | ALL                                          | 1043295            |
| <b>MOTOR RAIN SLINGER*</b>        | ALL                                          | 106098             |
| <b>FAN BLADES</b>                 |                                              |                    |
| 30" 22° 4 BLADE                   | UP TO 144" LONG MODELS                       | 1048739            |
| 30" 28° 4 BLADE                   | 138" LONG AND OVER MODELS                    | 1048738            |
| <b>FAN GUARD - 35" DIA.</b>       | ALL                                          | 1048603            |
| <b>MOUNTING LEGS</b>              |                                              |                    |
| 20" CORNER LEG                    | ALL                                          | 106025             |
| 20" LEFT HAND CENTRE LEG          | 144" LONG AND OVER MODELS                    | 107024-001         |
| 20" RIGHT HAND CENTRE LEG         | 144" LONG AND OVER MODELS                    | 107024-002         |
| 90" SUPPORT RAIL - DOUBLE ROW     | 144" LONG AND OVER MODELS                    | 107025             |
| 45" SUPPORT RAIL - SINGLE ROW     | 144" LONG AND OVER MODELS                    | 1065906            |

\* Fan motor service kit part number with - 001 suffix includes a rain shield and slinger.

## NOTES

## SERVICE PARTS LIST

**Service Parts List  
Label  
To Be Attached  
HERE**

### PROJECT INFORMATION

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



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