

### COMPRESSOR DEFINITION

|                           |                           |
|---------------------------|---------------------------|
| Designation               | <b>F F110HAK</b>          |
| Nominal Voltage/Frequency | <b>220-230 V 50-60 Hz</b> |
| Engineering Number        | <b>513201012</b>          |

### A - APPLICATION / LIMIT WORKING CONDITIONS

|                                    |                                   |                                   |              |
|------------------------------------|-----------------------------------|-----------------------------------|--------------|
| 1 Type                             | Hermetic reciprocating compressor |                                   |              |
| 2 Refrigerant                      | R-134a                            |                                   |              |
| 3 Nominal voltage and frequency    | 220-230 / 50-60                   | [ V / Hz ]                        |              |
| 4 Application type                 | Low-Medium Back Pressure          |                                   |              |
| 4.1 Evaporating temperature range  | -35°C to -5°C                     | (-31°F to 23°F)                   |              |
| 5 Motor type                       | RSIR/CSIR                         |                                   |              |
| 6 Starting torque                  | LST - Low Starting Torque         |                                   |              |
| 7 Expansion device                 | Capillary tube                    |                                   |              |
| 8 Compressor cooling               |                                   | Operating voltage range           |              |
|                                    |                                   | 50 Hz                             | 60 Hz        |
| 8.1 LBP (32°C Ambient temperature) | Static/Fan                        | 187 to 244 V                      | 187 to 242 V |
| 8.2 LBP (43°C Ambient temperature) | Static/Fan                        | 187 to 244 V                      | 187 to 242 V |
| 8.3 HBP (32°C Ambient temperature) | -                                 | -                                 | -            |
| 8.4 HBP (43°C Ambient temperature) | -                                 | -                                 | -            |
| 9 Maximum condensing temperature   |                                   |                                   |              |
| 9.1 Operating                      | 14.2                              | [kgf/cm <sup>2</sup> ] (202 psig) | / °C - °F    |
| 9.2 Peak                           | 15.9                              | [kgf/cm <sup>2</sup> ] (226 psig) | / °C - °F    |
| 10 Maximum winding temperature     | 130                               | [ °C ]                            |              |

### B - MECHANICAL DATA

|                               |               |  |
|-------------------------------|---------------|--|
| 1 Commercial designation      | 1/3           | [hp]                                       |
| 2 Displacement                | 9.04          | [cm <sup>3</sup> ] (0.552 cu.in)           |
| 2.1 Bore [mm]                 | 24.000        |  |
| 2.2 Stroke [mm]               | 20.000        |  |
| 3 Lubricant charge            | 280           | [ml] (9.47 fl.oz.)                         |
| 3.1 Lubricants approved       |               |  |
| 3.2 Lubricants type/viscosity | ESTER / ISO22 |  |
| 4 Weight (with oil charge)    | 10.85         | [kg] (23.92 lb.)                           |
| 5 Nitrogen charge             | 0.2 to 0.3    | [kgf/cm <sup>2</sup> ] (2.84 to 4.27 psig) |

### C - ELETRICAL DATA

|  |                                       |                                    |
|--|---------------------------------------|------------------------------------|
| 1 Nominal Voltage/Frequency/Number of Phases | 220-230 V 50-60 Hz 1 ~ (Single phase) |                                    |
| 2 Starting device type                       | Current Relay                         |                                    |
| 2.1 Starting device                          | 213516035/213516043                   |                                    |
| 3 Start capacitor                            | 53-64(230)                            | [µF(VAC minimum)]                  |
| 4 Run capacitor                              | -                                     | [µF(VAC minimum)]                  |
| 5 Motor protection                           | CP4TMF210L61A2                        |                                    |
| 6 Start winding resistance                   | 28.15                                 | [Ω at 25°C (77°F)] +/- 8%          |
| 7 Run winding resistance                     | 7.15                                  | [Ω at 25°C (77°F)] +/- 8%          |
| 8 LRA - Locked rotor amperage (50/60 Hz)     | 18.00/17.50                           | [A] - Measured according to UL 984 |
| 9 FLA - Full load amperage L/MBP (50/60 Hz)  | 2.50/2.20                             | [A] - Measured according to UL 984 |
| 10 FLA - Full Load Amperage HBP (50/60 Hz)   | -                                     | [A] - Measured according to UL 984 |
| 11 Approval boards certification             |                                       |                                    |

### D - PERFORMANCE - CHECK POINT DATA

|                               |          |     |                                |                                  |  |                           |  |       |
|-------------------------------|----------|-----|--------------------------------|----------------------------------|--|---------------------------|--|-------|
| TEST CONDITIONS:<br>@220V50Hz |          |     | ASHRAELBP32<br>Static          |                                  | Evaporating temperature<br>(Condensing temperature |                           | -23.3°C (-9.94°F)<br>54.4°C (129.92°F) |       |
| Cooling capacity<br>+/- 5%    |          |     | Power<br>consumption<br>+/- 5% | Current<br>consumption<br>+/- 5% | Gas flow<br>rate<br>+/- 5%                         | EFFICIENCY RATE<br>+/- 7% |  |       |
| [Btu/h]                       | [kcal/h] | [W] | [W]                            | [A]                              | [kg/h]   | [Btu/Wh]                  | [kcal/Wh]                              | [W/W] |
| 850                           | 214      | 249 | 191                            | 1.73                             | 4.83   | 4.45                      | 1.12                                   | 1.30  |

|                               |          |     |                                |                                  |  |                           |  |       |
|-------------------------------|----------|-----|--------------------------------|----------------------------------|--|---------------------------|--|-------|
| TEST CONDITIONS:<br>@220V60Hz |          |     | ASHRAELBP32<br>Static          |                                  | Evaporating temperature<br>(Condensing temperature |                           | -23.3°C (-9.94°F)<br>54.4°C (129.92°F) |       |
| Cooling capacity<br>+/- 5%    |          |     | Power<br>consumption<br>+/- 5% | Current<br>consumption<br>+/- 5% | Gas flow<br>rate<br>+/- 5%                         | EFFICIENCY RATE<br>+/- 7% |  |       |
| [Btu/h]                       | [kcal/h] | [W] | [W]                            | [A]                              | [kg/h]   | [Btu/Wh]                  | [kcal/Wh]                              | [W/W] |
| 1030                          | 260      | 302 | 212                            | 1.54                             | 5.85   | 4.86                      | 1.22                                   | 1.42  |

### E - PERFORMANCE - CURVES

|                               |                            |          |                    |                                |  |                            |                           |           |       |
|-------------------------------|----------------------------|----------|--------------------|--------------------------------|--|----------------------------|---------------------------|-----------|-------|
| TEST CONDITIONS:<br>@220V50Hz |                            |          | ASHRAE32<br>Static |                                | (Condensing temperature 45°C (+113°F)) |                            |                           |           |       |
| Evaporating<br>temperature    | Cooling capacity<br>+/- 5% |          |                    | Power<br>consumption<br>+/- 5% | Current<br>consumption<br>+/- 5%       | Gas flow<br>rate<br>+/- 5% | EFFICIENCY RATE<br>+/- 7% |           |       |
| °C (°F)                       | [Btu/h]                    | [kcal/h] | [W]                | [W]                            | [A]                                    | [kg/h]                     | [Btu/Wh]                  | [kcal/Wh] | [W/W] |
| -35 (-31)                     | 431                        | 109      | 126                | 135                            | 1.67                                   | 2.44                       | 3.18                      | 0.80      | 0.93  |
| -30 (-22)                     | 601                        | 152      | 176                | 155                            | 1.70                                   | 3.41                       | 3.88                      | 0.98      | 1.14  |
| -25 (-13)                     | 834                        | 210      | 244                | 178                            | 1.73                                   | 4.73                       | 4.69                      | 1.18      | 1.37  |
| -20 (- 4)                     | 1123                       | 283      | 329                | 201                            | 1.77                                   | 6.39                       | 5.58                      | 1.41      | 1.64  |
| -15 (+ 5)                     | 1466                       | 370      | 430                | 225                            | 1.82                                   | 8.37                       | 6.53                      | 1.64      | 1.91  |
| -10 (+14)                     | 1858                       | 468      | 544                | 248                            | 1.88                                   | 10.64                      | 7.50                      | 1.89      | 2.20  |
| -5 (+23)                      | 2294                       | 578      | 672                | 271                            | 1.95                                   | 13.20                      | 8.47                      | 2.14      | 2.48  |

|                               |                            |          |                    |                                |  |                            |                           |           |       |
|-------------------------------|----------------------------|----------|--------------------|--------------------------------|--|----------------------------|---------------------------|-----------|-------|
| TEST CONDITIONS:<br>@220V50Hz |                            |          | ASHRAE32<br>Static |                                | (Condensing temperature 55°C (+131°F)) |                            |                           |           |       |
| Evaporating<br>temperature    | Cooling capacity<br>+/- 5% |          |                    | Power<br>consumption<br>+/- 5% | Current<br>consumption<br>+/- 5%       | Gas flow<br>rate<br>+/- 5% | EFFICIENCY RATE<br>+/- 7% |           |       |
| °C (°F)                       | [Btu/h]                    | [kcal/h] | [W]                | [W]                            | [A]                                    | [kg/h]                     | [Btu/Wh]                  | [kcal/Wh] | [W/W] |
| -35 (-31)                     | 358                        | 90       | 105                | 133                            | 1.67                                   | 2.03                       | 2.73                      | 0.69      | 0.80  |
| -30 (-22)                     | 521                        | 131      | 153                | 155                            | 1.70                                   | 2.95                       | 3.40                      | 0.86      | 1.00  |
| -25 (-13)                     | 744                        | 188      | 218                | 180                            | 1.74                                   | 4.23                       | 4.14                      | 1.04      | 1.21  |
| -20 (- 4)                     | 1025                       | 258      | 300                | 207                            | 1.78                                   | 5.83                       | 4.93                      | 1.24      | 1.44  |
| -15 (+ 5)                     | 1358                       | 342      | 398                | 236                            | 1.85                                   | 7.75                       | 5.74                      | 1.45      | 1.68  |
| -10 (+14)                     | 1738                       | 438      | 509                | 265                            | 1.93                                   | 9.96                       | 6.56                      | 1.65      | 1.92  |
| -5 (+23)                      | 2162                       | 545      | 634                | 294                            | 2.02                                   | 12.44                      | 7.34                      | 1.85      | 2.15  |

### E - PERFORMANCE - CURVES

| TEST CONDITIONS:<br>@220V50Hz |                            | ASHRAE32<br>Static |         |                             | (Condensing temperature 65°C (+149°F) ) |                         |                           |        |          |           |
|-------------------------------|----------------------------|--------------------|---------|-----------------------------|---|-------------------------|---------------------------|--------|----------|-----------|
| Evaporating temperature       | Cooling capacity<br>+/- 5% |                    |         | Power consumption<br>+/- 5% | Current consumption<br>+/- 5%           | Gas flow rate<br>+/- 5% | EFFICIENCY RATE<br>+/- 7% |        |          |           |
|                               | °C                         | (°F)               | [Btu/h] | [kcal/h]                    | [W]                                     | [W]                     | [A]                       | [kg/h] | [Btu/Wh] | [kcal/Wh] |
| -35                           | (-31)                      | 276                | 70      | 81                          | 123                                     | 1.65                    | 1.56                      | 2.23   | 0.56     | 0.65      |
| -30                           | (-22)                      | 425                | 107     | 125                         | 148                                     | 1.68                    | 2.41                      | 2.88   | 0.73     | 0.84      |
| -25                           | (-13)                      | 635                | 160     | 186                         | 177                                     | 1.73                    | 3.61                      | 3.58   | 0.90     | 1.05      |
| -20                           | (- 4)                      | 901                | 227     | 264                         | 210                                     | 1.79                    | 5.13                      | 4.29   | 1.08     | 1.26      |
| -15                           | (+ 5)                      | 1218               | 307     | 357                         | 244                                     | 1.87                    | 6.95                      | 5.00   | 1.26     | 1.47      |
| -10                           | (+14)                      | 1582               | 399     | 464                         | 280                                     | 1.96                    | 9.06                      | 5.67   | 1.43     | 1.66      |
| -5                            | (+23)                      | 1989               | 501     | 583                         | 317                                     | 2.08                    | 11.44                     | 6.28   | 1.58     | 1.84      |

| TEST CONDITIONS:<br>@220V60Hz |                            | ASHRAE32<br>Static |         |                             | (Condensing temperature 45°C (+113°F) ) |                         |                           |        |          |           |
|-------------------------------|----------------------------|--------------------|---------|-----------------------------|---|-------------------------|---------------------------|--------|----------|-----------|
| Evaporating temperature       | Cooling capacity<br>+/- 5% |                    |         | Power consumption<br>+/- 5% | Current consumption<br>+/- 5%           | Gas flow rate<br>+/- 5% | EFFICIENCY RATE<br>+/- 7% |        |          |           |
|                               | °C                         | (°F)               | [Btu/h] | [kcal/h]                    | [W]                                     | [W]                     | [A]                       | [kg/h] | [Btu/Wh] | [kcal/Wh] |
| -35                           | (-31)                      | 514                | 130     | 151                         | 140                                     | 1.36                    | 2.91                      | 3.66   | 0.92     | 1.07      |
| -30                           | (-22)                      | 766                | 193     | 224                         | 168                                     | 1.43                    | 4.34                      | 4.56   | 1.15     | 1.34      |
| -25                           | (-13)                      | 1044               | 263     | 306                         | 197                                     | 1.50                    | 5.93                      | 5.34   | 1.34     | 1.56      |
| -20                           | (- 4)                      | 1363               | 343     | 399                         | 226                                     | 1.59                    | 7.76                      | 6.05   | 1.52     | 1.77      |
| -15                           | (+ 5)                      | 1734               | 437     | 508                         | 257                                     | 1.69                    | 9.90                      | 6.76   | 1.70     | 1.98      |
| -10                           | (+14)                      | 2169               | 547     | 636                         | 288                                     | 1.80                    | 12.43                     | 7.52   | 1.89     | 2.20      |
| -5                            | (+23)                      | 2683               | 676     | 786                         | 319                                     | 1.92                    | 15.43                     | 8.39   | 2.11     | 2.46      |

| TEST CONDITIONS:<br>@220V60Hz |                            | ASHRAE32<br>Static |         |                             | (Condensing temperature 55°C (+131°F) ) |                         |                           |        |          |           |
|-------------------------------|----------------------------|--------------------|---------|-----------------------------|---|-------------------------|---------------------------|--------|----------|-----------|
| Evaporating temperature       | Cooling capacity<br>+/- 5% |                    |         | Power consumption<br>+/- 5% | Current consumption<br>+/- 5%           | Gas flow rate<br>+/- 5% | EFFICIENCY RATE<br>+/- 7% |        |          |           |
|                               | °C                         | (°F)               | [Btu/h] | [kcal/h]                    | [W]                                     | [W]                     | [A]                       | [kg/h] | [Btu/Wh] | [kcal/Wh] |
| -35                           | (-31)                      | 384                | 97      | 113                         | 129                                     | 1.33                    | 2.17                      | 3.00   | 0.76     | 0.88      |
| -30                           | (-22)                      | 636                | 160     | 186                         | 161                                     | 1.41                    | 3.61                      | 3.91   | 0.98     | 1.15      |
| -25                           | (-13)                      | 915                | 231     | 268                         | 195                                     | 1.49                    | 5.20                      | 4.67   | 1.18     | 1.37      |
| -20                           | (- 4)                      | 1234               | 311     | 362                         | 231                                     | 1.60                    | 7.02                      | 5.33   | 1.34     | 1.56      |
| -15                           | (+ 5)                      | 1605               | 405     | 470                         | 269                                     | 1.73                    | 9.16                      | 5.96   | 1.50     | 1.75      |
| -10                           | (+14)                      | 2042               | 515     | 598                         | 308                                     | 1.87                    | 11.70                     | 6.61   | 1.66     | 1.94      |
| -5                            | (+23)                      | 2555               | 644     | 749                         | 349                                     | 2.03                    | 14.70                     | 7.34   | 1.85     | 2.15      |

### E - PERFORMANCE - CURVES

| TEST CONDITIONS:<br>@220V60Hz |       | ASHRAE32<br>Static         |          |     | (Condensing temperature 65°C (+149°F) ) |                               |                         |                           |           |       |
|-------------------------------|-------|----------------------------|----------|-----|---|-------------------------------|-------------------------|---------------------------|-----------|-------|
| Evaporating temperature       |       | Cooling capacity<br>+/- 5% |          |     | Power consumption<br>+/- 5%             | Current consumption<br>+/- 5% | Gas flow rate<br>+/- 5% | EFFICIENCY RATE<br>+/- 7% |           |       |
| °C                            | (°F)  | [Btu/h]                    | [kcal/h] | [W] | [W]                                     | [A]                           | [kg/h]                  | [Btu/Wh]                  | [kcal/Wh] | [W/W] |
| -35                           | (-31) | 297                        | 75       | 87  | 119                                     | 1.31                          | 1.68                    | 2.52                      | 0.63      | 0.74  |
| -30                           | (-22) | 540                        | 136      | 158 | 155                                     | 1.38                          | 3.06                    | 3.44                      | 0.87      | 1.01  |
| -25                           | (-13) | 810                        | 204      | 237 | 193                                     | 1.48                          | 4.60                    | 4.18                      | 1.05      | 1.23  |
| -20                           | (- 4) | 1120                       | 282      | 328 | 234                                     | 1.60                          | 6.37                    | 4.80                      | 1.21      | 1.41  |
| -15                           | (+ 5) | 1482                       | 373      | 434 | 278                                     | 1.75                          | 8.46                    | 5.34                      | 1.35      | 1.57  |
| -10                           | (+14) | 1909                       | 481      | 559 | 324                                     | 1.93                          | 10.94                   | 5.88                      | 1.48      | 1.72  |
| -5                            | (+23) | 2414                       | 608      | 707 | 372                                     | 2.13                          | 13.88                   | 6.48                      | 1.63      | 1.90  |

### F - EXTERNAL CHARACTERISTICS

|                         |                               |      |                          |
|-------------------------|-------------------------------|------|--------------------------|
| 1 Base plate            | Universal EG/F/AMEM version 2 |      |                          |
| 2 Tray holder           | No                            |      |                          |
| 3 Connectors            |                               |      |                          |
| 3.1 SUCTION             | 6.5 +0.12/-0.08               | [mm] | (0.256" +0.005"/-0.003") |
| 3.1.1 Material          | Copper                        |      |                          |
| 3.1.2 Shape             | Slanted                       |      |                          |
| 3.2 DISCHARGE           | 4.94 +0.08/-0.08              | [mm] | (0.194" +0.003"/-0.003") |
| 3.2.1 Material          | Copper                        |      |                          |
| 3.2.2 Shape             | Straight                      |      |                          |
| 3.3 PROCESS             | 6.5 +0.12/-0.08               | [mm] | (0.256" +0.005"/-0.003") |
| 3.3.1 Material          | Copper                        |      |                          |
| 3.3.2 Shape             | Slanted                       |      |                          |
| 3.4 Oil cooler (Copper) | No                            | [mm] |                          |
| 3.5 Connector sealing   | Rubber Plugs                  |      |                          |